

Altivar[®] 61

Variable Speed Drive Controllers

Simplified Manual

75–125 hp (55–90 kW) / 200–240 V
125–900 hp (90–630 kW) / 380–480 V
125–800 hp (110–800 kW) / 500–690 V

Instruction Bulletin

30072-452-65

Retain for future use.

For Use in the United States of America



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Hazard Categories and Special Symbols

The following symbols and special messages may appear in this manual or on the equipment to warn of potential hazards or to call attention to information that clarifies or simplifies a procedure.

A lightning bolt or ANSI man symbol in a “Danger” or “Warning” safety label on the equipment indicates an electrical hazard which, as indicated below, can or will result in personal injury if the instructions are not followed.

The exclamation point symbol in a safety message in a manual indicates potential personal injury hazards. Obey all safety messages introduced by 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

<p>CAUTION, used without the safety alert symbol, indicates a potentially hazardous situation which, if not avoided, can result in property damage.</p>

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.

Before you begin

Read and understand these instructions before performing any procedure on this drive¹.

DANGER

HAZARD OF ELECTRIC SHOCK, EXPLOSION, OR ARC FLASH

- Read and understand this manual before installing or operating the Altivar 61 drives. Installation, adjustment, repair, and maintenance must be performed by qualified personnel.
- The user is responsible for conforming to all applicable code requirements with respect to grounding the equipment.
- Many parts in this drive, including printed circuit boards, operate at the line voltage. **DO NOT TOUCH.** Use only electrically insulated tools.
- **DO NOT** short across DC bus capacitors or touch unshielded components or terminal strip screw connections with voltage present.
- 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 the drive disconnect.
 - Lock disconnect in the open position.
 - **WAIT 15 MINUTES** for the DC bus capacitors to discharge. Then follow the DC bus voltage measurement procedure on page 28 to verify that the DC voltage is less than 42 V. The drive LEDs are not indicators 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.

¹ The word drive as it is used in this manual refers to the controller portion of the adjustable speed drive as per the NEC.

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 61 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."

CAUTION

RISK OF PERMANENT DAMAGE TO DRIVE

- If no power is applied to the drive for a long period, the performance of its electrolytic capacitors will be reduced.
- Apply power to the drive every two years using the following procedure. Without a motor connected to the drive, gradually increase the voltage using an adjustable AC source connected between drive terminals L1 and L2:
 - 25% of rated voltage for 30 minutes
 - 50% of rated voltage for 30 minutes
 - 75% of rated voltage for 30 minutes
 - 100% of rated voltage for at least 5 hours
- Check the drive operation before placing into service.

Failure to follow these instructions can result in equipment damage.

Product Support

For more information, call, fax, or write:

Schneider Electric AC Drives Product Support Group
8001 Knightdale Blvd
Knightdale, NC 27545

For support and assistance, contact the Product Support Group. The Product Support Group is staffed Monday through Friday 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: 1-888-SquareD (1-888-778-2733)
E-mail: drive.products.support@us.schneider-electric.com
Fax Line: 919-217-6508

Setting Up the Drive

■ 1 Take delivery of the drive.

- Ensure that the catalog number printed on the label is the same as that on the purchase order.
- Remove the drive from its packaging and ensure that it has not been damaged in transit.

■ 2 Check the line voltage.

- Ensure that the line voltage is compatible with the voltage range of the drive.

■ 3 Mount the drive (page 21).

- Mount the drive according to the instructions in this document.
- Install any internal and external options.
- Install and connect the line reactor (page 29) or the transformers (page 30)

■ 4 Wire the drive (page 37).

- Connect the motor, ensuring that its connections correspond to the voltage.
- With power off, connect the line supply.
- Connect the control wiring.
- Connect the speed reference.

■ 5 Energize drive with no inputs active.

- Removing the control terminal card ensures no active inputs.
- See page 43 for control terminal card removal procedure.
- If you are using a separate power supply for the control section follow the instructions on page 44.

■ 6 Select the language (page 58),

if the drive is equipped with a graphic display terminal.

■ 7 Configure the menu [SIMPLY START] (SIM-) (page 61).

- 2-wire or 3-wire control
- Macro configuration
- Motor parameters



Optimize performance.

- To optimize performance:
- Refer to the auto-tuning section on 66.
 - Motor thermal current
 - Acceleration and deceleration ramps
 - Speed variation range

■ 8 Start.

**Steps 1–4
must be
performed
with the
power off.**



NOTE: Ensure that the wiring of the drive is compatible with its configuration.

Short-Circuit Marking System Applied to Schneider Electric AC Drives

Altivar drives have a prospective short-circuit rating that is based on three performance attributes that affect all drives. The performance attributes are characterized by three rating parameters described below and listed in Tables 1–3 on pages 14–16. The overall maximum rating of the drive is the lowest of the three ratings. Higher ratings can be attained for Altivar drives. Contact Schneider Electric for tested combinations of overcurrent protective devices (OCPD), line reactors, and enclosures or refer to the *Altivar 61 and 71 Supplementary Short Circuit Protection Information* bulletin shipped with the drive.

Output Interrupting Rating

The maximum prospective input short-circuit current at which the drive is capable of interrupting a short-circuit at its motor output terminals. The output interrupting rating conforms to the existing short-circuit requirements of UL508C 3rd edition with revisions effective February 15, 2008.

Input Withstand Current Rating (without line reactor or choke)

The maximum prospective input short-circuit current at the drive input terminals with which the drive was designed to operate. The input withstand current rating is an important parameter in determining the maximum thermal and electrical operating limits for the drive. Exceeding the maximum prospective input short-circuit current rating may cause overheating with reduction of drive life expectancy or damage to the drive.

CAUTION

DRIVE OVERHEATING

Ensure the prospective input short-circuit current does not exceed the input withstand current rating.

Failure to follow these instructions can result in equipment damage.

Drive Containment Rating with OCPD

The maximum prospective input short-circuit current at the drive input terminals with the marked OCPD present at which an internal component breakdown in the drive will not create a shock, flame, fire or expulsion hazard outside the marked enclosure structure. This rating applies to drives with a listed enclosure rating or to drives that have a listed enclosure rating with the addition of conduit box.

DANGER

HAZARD OF ELECTRIC SHOCK, EXPLOSION, OR ARC FLASH

- Only use the overcurrent protective device marked on the drive or in the manual.
- Do not operate the drive on an input mains line with a prospective input short circuit current greater than the Drive Containment Rating.
- Ensure that the drive has a listed enclosure rating or uses the conduit kit to achieve an enclosure rating.

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

Use of the drive with different prospective short-circuit currents may be possible. Contact Schneider Electric for tested combinations of OCPD, line reactors, drives and enclosures or refer to the *Altivar 61 and 71 Supplementary Short Circuit Protection Information* bulletin shipped with the drive.

Three phase motor 200 V to 240 V

For drives with an input line voltage of 200 V to 240 V, a Class J time delay or non-time delay fuse is required.

Table 1 on page 14 shows the maximum available short-circuit current value for each of the rating parameters.

Table 1: 200 V to 240 V 50/60 Hz Three Phase Supply Voltage

Motor Power Indicated on Plate ¹		Altivar 61 Drive			Max. Fuse Size	
		Part Number ²	Output Interrupting Rating	Input Withstand Current		Drive Containment Rating
kW	hp		kA	kA	kA	A
55	75	ATV61HD55M3X	100	35	10	350
75	100	ATV61HD75M3X	100	35	10	350
90	125	ATV61HD90M3X	100	35	18	450

¹ These power ratings are given for an ambient temperature of 45 °C (113 °F) and at the factory-set switching frequency of 2.5 kHz, used in continuous operation.

² The drives are provided with a DC choke as standard. The DC choke can be omitted by adding the letter D to the catalog number. For example, ATV 61HD90N4 becomes ATV 61HD90N4D. A customer supplied input line reactor must be used in place of the DC choke. See the installation manual for more information.

Three-phase motor 380 V to 480 V

For drives with an input line voltage of 380 V to 480 V, a Class J time delay or non-time delay fuse is required. Table 2 on page 15 shows the fuse size required and available short circuit current rating associated with each drive.

NOTE: The ATV61HC31N4 and ATV61HC63N4 uses a Class T rather than a Class J. The ATV61HC40N4 uses a semiconductor fuse rather than a Class J time delay or non-time delay fuse.

Table 2: 380 V to 480 V, 50/60 Hz Three Phase Supply Voltage

Motor Power Indicated on Plate ¹		Altivar 61 Drive				Max. Fuse Size A
		Part Number ²	Output Interrupting Rating kA	Input Withstand Current kA	Drive Containment Rating kA	
kW	hp					
90	125	ATV61HD90N4	100	35	10	250
110	150	ATV61HC11N4	100	35	10	300/315
132	200	ATV61HC13N4	100	35	10	350
160	250	ATV61HC16N4	100	50	18	400
220	350	ATV61HC22N4	100	50	18	500
250	400	ATV61HC25N4	100	50	18	550/600
280	450	ATV61HC28N4	100	50	30	700
315	500	ATV61HC31N4	100	50	30	800
400	600	ATV61HC40N4	100	50	30	900
500	700	ATV61HC50N4	100	50	30	2x600/2 x630
630	900	ATV61HC63N4	100	50	30	2x800

¹ These power ratings are given for an ambient temperature of 45 °C (113 °F) and at the factory-set switching frequency of 2.5 kHz, used in continuous operation.

² The drives are provided with a DC choke as standard. The DC choke can be omitted by adding the letter D to the catalog number. For example, ATV 61HD90N4 becomes ATV 61HD90N4D. A customer supplied input line reactor must be used in place of the DC choke. See the installation manual for more information.

Three-phase motor 500 V to 690 V

For drives with an input line voltage of 500 V to 690 V, a Class J time delay or non-time delay fuse is required. Table 3 shows the fuse size required and available short circuit current rating associated with each drive.

Table 3: 500 V to 690 V, 50/60 Hz Three Phase Supply Voltage

Motor Power Indicated on Plate ¹			Altivar 61 Drive			Max. Fuse Size A	
			Part Number ²	Output Interrupting Rating kA	Input Withstand Current kA		Drive Containment Rating kA
kW (500 V)	hp (575 V)	kW (690 V)					
90	125	110	ATV61HC11Y	100	22	28	160
110	150	132	ATV61HC13Y	100	28	28	200
132	—	160	ATV61HC16Y	100	28	35	250
160	200	200	ATV61HC20Y	100	35	35	300/315
200	250	250	ATV61HC25Y	100	35	35	400
250	350	315	ATV61HC31Y	100	35	35	500
315	450	400	ATV61HC40Y	100	35	42	630
400	550	500	ATV61HC50Y	100	35	42	2x400
500	700	630	ATV61HC63Y	100	42	42	2x500
630	800	800	ATV61HC80Y	100	42	42	2x630

¹ These power ratings are given for an ambient temperature of 45 °C (113 °F) and at the factory-set switching frequency of 2.5 kHz, used in continuous operation.

² The 500 V to 690 V drives must use a customer supplied input line reactor or special transformer for all installations. See the installation manual for more information.

Receiving, Handling, and Storage

Handling and storage

To help protect the drive prior to installation, handle and store the device in its packaging. Ensure that the ambient conditions are acceptable. Refer to “Dimensions and Weights” on pages 22–27.

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 or serious injury.

WARNING

DAMAGED DRIVE EQUIPMENT

Do not operate or install any drive or drive accessory that appears damaged.

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

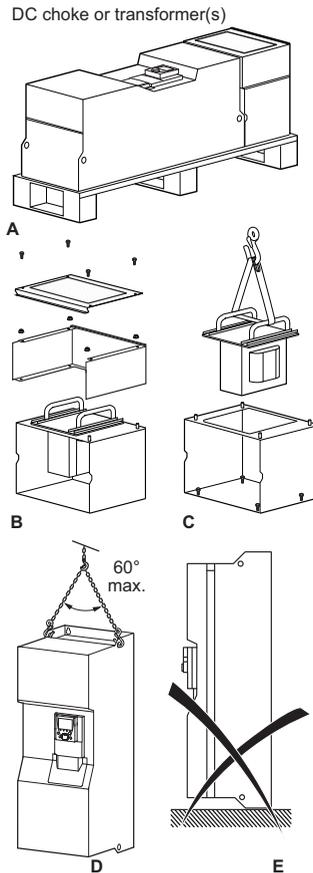
Unpacking and Handling

The packaging contains one or more items depending on the model:

- ATV61H•••M3X and ATV61H•••N4 comprises the drive and a DC choke.
- ATV61H•••M3XD and ATV61H•••N4D comprises the drive only.
- ATV61H•••Y comprises the drive and one or two transformers.

In Figure 1, the drive and the DC choke or transformer(s) are mounted on a pallet with screws (A). The DC choke or transformer(s) are supplied pre-assembled for easy transport.

Figure 1: Unpacking and handling the drive



The unit should be unpacked in the following order (see Figure 1 on page 18):

1. Disassemble the components of the DC choke or transformer(s) **(B)** for installation later, and use a hoist to remove the choke or transformers **(C)**.
2. Remove the screws **(C)** from the choke or transformer support on the pallet.

 **WARNING**

RISK OF CUTS

- Take every precaution and use protective gloves to avoid this risk of cutting your hands.
- The screws that hold the choke or transformer support on the pallet are difficult to access.

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

3. Remove the screws holding the drive on the pallet and use a hoist to lift it off. It has lifting lugs for this purpose **(D)**.

 **WARNING**

RISK OF TOPPLING

Do not stand the drive upright. Keep the drive on the pallet until it is installed.

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

Before You Begin

You must observe the following precautions.

DANGER

UNINTENDED EQUIPMENT OPERATION

- Before turning on and configuring the Altivar 61 drive, ensure that the PWR (POWER REMOVAL) input is deactivated (at state 0) in order to help prevent unintended operation.
- Before turning the controller on or upon exiting the configuration menus, ensure that the inputs assigned to the run command are deactivated (at state 0) since they can cause the motor to start immediately.
- Refer to the characteristics and functions table in the Control Terminals section on page 44 for more information about the Power Removal Input.

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

CAUTION

INCOMPATIBLE LINE VOLTAGE

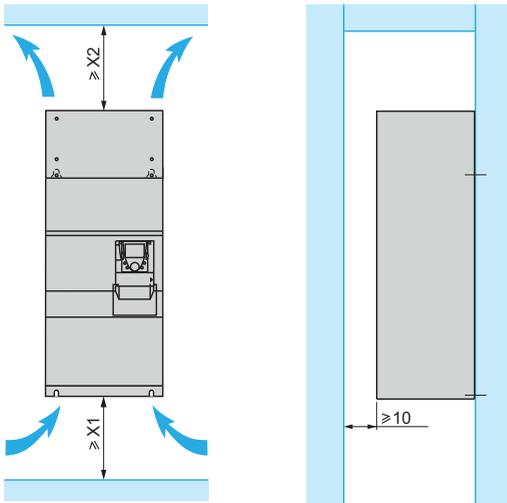
Before turning on and configuring the drive, ensure that the line voltage is compatible with the supply voltage range shown on the drive nameplate. The drive may be damaged if the line voltage is not compatible.

Failure to follow these instructions can result in equipment damage.

NOTE: The Power Removal function takes priority over any run command. For use as an emergency stop, this function requires the use of connection diagrams conforming to category 3 of standard EN 954-1 and safety integrity level 2 according to IEC/EN 61508. Consult the *ATV61 Installation Manual* on the CD-ROM supplied with the drive.

Mounting recommendations

Figure 2: ATV61HD55M3X to ATV61HD90M3X, ATV61HD90N4 to ATV61HC63N4, ATV61HC611Y to ATV61HC80Y

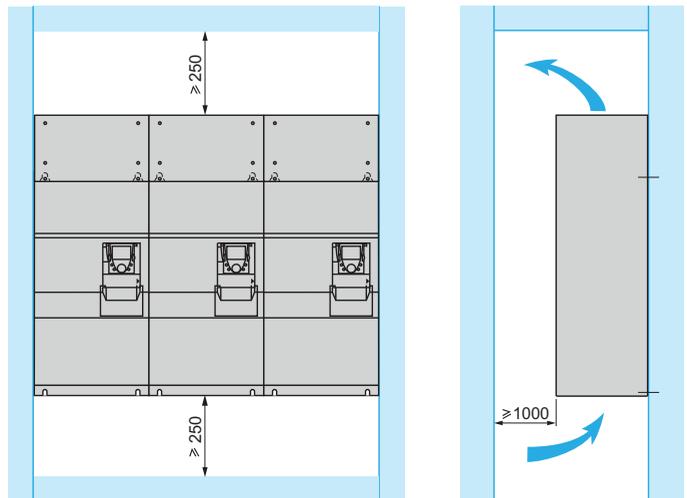


ATV61H	X1 ¹	X2 ¹
D55M3X...D90M3X, D90N4, C11N4	100	100
C13N4...C22N4, C11Y...C20Y	150	150
C25N4, C31N4, C25Y...C40Y	150	200
C40N4, C50N4	250	300
C63N4, C50Y...C80Y	250	400

¹ All dimensions are in mm.

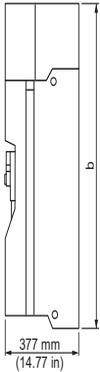
When forced cooling is provided. These drives can be mounted side by side, observing the following mounting recommendations:

NOTE: The enclosure size and ventilation must be considered since drives dissipate a lot of heat. The dimensions on this page indicate the minimum free space required around the drives when adequate forced cooling is provided. For more information about enclosure mounting, refer to the installation manual on the CD-ROM provided with the drive.

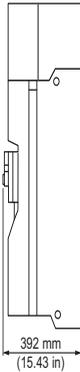


Dimensions and Weights

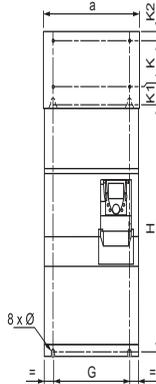
With or without 1 option card (1)



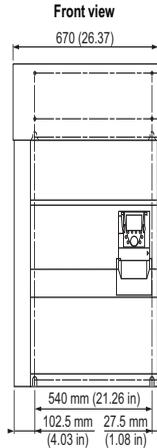
2 option cards (1)



Common front view

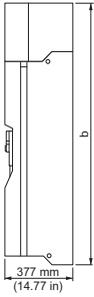


ATV 61HC25N4, HC31N4
 with braking unit VW3 A7 101

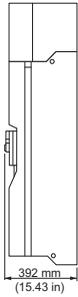


ATV61H	a mm (in.)	b mm (in.)	G mm (in.)	H mm (in.)	K mm (in.)	K1 mm (in.)	K2 mm (in.)	Ø mm (in.)	For screws	Weight kg (lb.)
D55M3X, D90N4	320 (12.60)	920 (36.22)	250 (9.84)	650 (25.59)	150 (5.91)	75 (2.95)	30 (1.18)	11.5 (0.45)	M10	60 (132)
D75M3X, C11N4										74 (163)
C13N4, D90M3X,	360 (14.17)	1022 (40.23)	298 (11.73)	758 (29.84)	150 (5.91)	72 (2.83)	30 (1.18)	11.5 (0.45)		80 (176)
C16N4, C11Y...C20Y	340 (13.39)	1190 (46.62)	285 (11.22)	920 (36.22)	150 (5.91)	75 (2.95)	30 (1.18)	11.5 (0.45)		116 (255)
C22N4	440 (17.32)	1190 (46.62)	350 (13.78)	920 (36.22)	150 (5.91)	75 (2.95)	30 (1.18)	11.5 (0.45)		163 (358)
C25N4, C31N4, C25Y...C40Y	595 (23.43)	1190 (46.62)	540 (21.26)	920 (36.22)	150 (5.91)	75 (2.95)	30 (1.18)	11.5 (0.45)		207 (455)

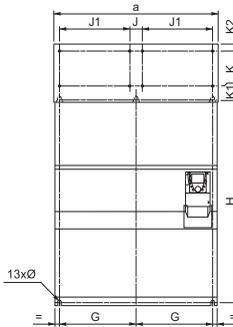
With 0 or 1 option card (1)



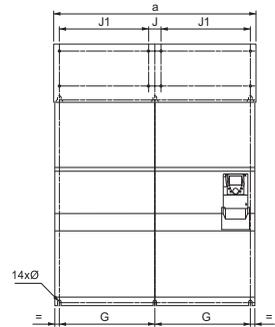
With 2 option cards (1)



ATV61H C40N4 to C50N4



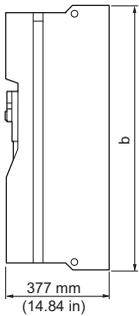
ATV61HC63N4



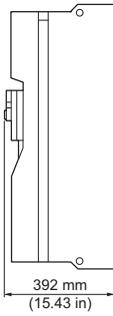
ATV61H	a mm (in.)	b mm (in.)	G mm (in.)	J mm (in.)	J1 mm (in.)	H mm (in.)	K mm (in.)	K1 mm (in.)	K2 mm (in.)	Ø mm (in.)	For screws	Weight kg (lb.)
C40N4	890 (35.04)	1390 (54.72)	417 (16.44)	75 (2.76)	380 (14.96)	1120 (44.09)	150 (5.91)	75 (2.95)	30 (1.18)	11.5 (0.45)	M10	320 (704)
C50N4												330 (726)
C63N4	1120 (44.09)	1390 (54.72)	532.5 (20.96)	70 (2.76)	495 (19.49)	1120 (44.09)	150 (5.91)	75 (2.95)	30 (1.18)	11.5 (0.45)	M10	435 (957)

¹ For the addition of I/O extension cards, communication cards, the multi-pump card or the "Controller Inside" programmable card.

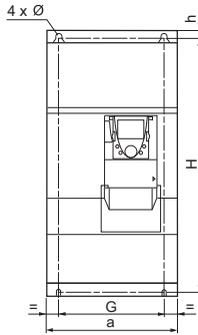
With 0 or 1 option card (1)



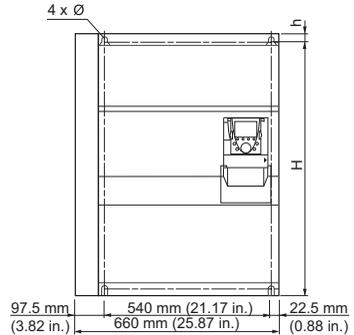
With 2 option cards (1)



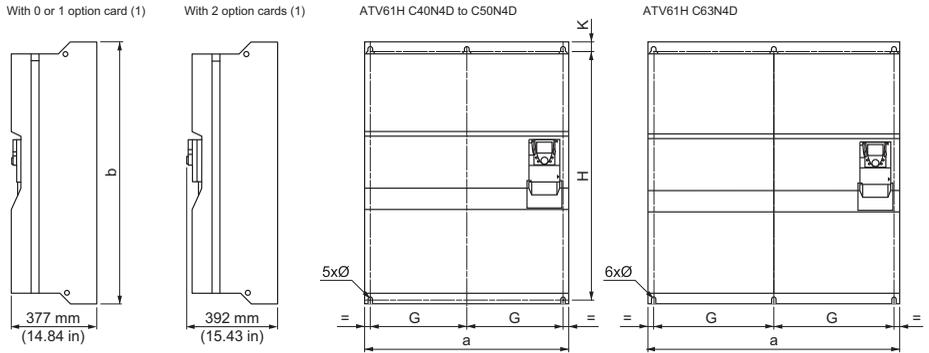
ATV61H D55M3XD to D90M3XD
 ATV61H D90N4D to C22N4D



ATV61H C25N4D to C31N4D
 with braking unit (VW3A7 101)



ATV61H	a mm (in.)	b mm (in.)	G mm (in.)	H mm (in.)	h mm (in.)	Ø mm (in.)	For screws	Weight kg (lb.)
D55M3XD, D90N4D	310 (12.20)	680 (26.77)	250 (9.84)	650 (25.59)	15 (0.59)	11.5 (0.45)	M10	60 (132)
D75M3XD, C11N4D								74 (163)
C13N4D, D90M3XD	350 (13.78)	782 (30.79)	298 (11.73)	758 (29.84)	12 (0.47)	11.5 (0.45)	M10	80 (176)
C16N4D	330 (12.99)	950 (37.4)	285 (11.22)	920 (36.22)	15 (0.59)	11.5 (0.45)	M10	80 (176)
C22N4D	430 (16.33)	950 (37.4)	350 (13.78)	920 (36.22)	5 (0.59)	11.5 (0.45)	M10	110 (242)
C25N4D, C31N4D	585 (23.03)	950 (37.4)	540 (21.26)	920 (36.22)	15 (0.59)	11.5 (0.45)	M10	140 (309)



ATV61H	a mm (in.)	b mm (in.)	G mm (in.)	H mm (in.)	F mm (in.)	Ø mm (in.)	For screws	Weight kg (lb.)
C40N4D	880 (35.65)	1,150 (54.72)	417.5 (16.44)	1,120 (44.09)	415 (16.34)	11.5 (0.45)	M10	215 (474)
C50N4D								225 (496)
C63N4D	1,110 (43.49)	1,150 (54.72)	532.5 (20.96)	1,120 (44.09)	532.5 (20)	11.5 (0.45)	M10	300 (661)

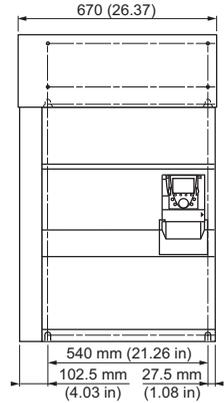
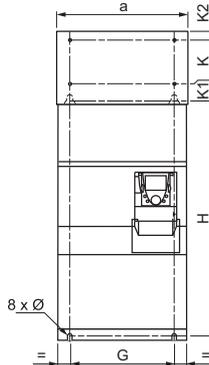
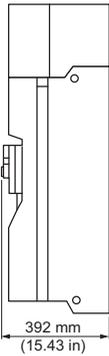
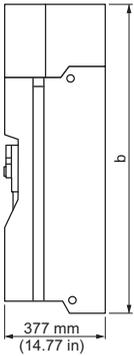
¹ For the addition of I/O extension cards, communication cards, the multi-pump card or the "Controller Inside" programmable card.

With 0 or 1 option card (1)

With 2 option cards (1)

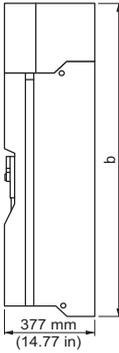
ATV61H C11Y to C20Y

ATV61H C25Y to C40Y with braking

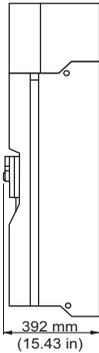


ATV61H	a mm (in.)	b mm (in.)	G mm (in.)	H mm (in.)	K mm (in.)	K1 mm (in.)	K2 mm (in.)	Ø mm (in.)	For screws	Weight kg (lb.)
C11Y...C20Y	340 (13.39)	1,190 (46.62)	285 (11.22)	920 (36.22)	150 (5.91)	75 (2.95)	30 (1.18)	11.5 (0.45)	M10	110 (242)
C25Y...C40Y	595 (23.43)	1,190 (46.62)	540 (21.26)	920 (36.22)	150 (5.91)	75 (2.95)	30 (1.18)	11.5 (0.45)	M10	190 (418)

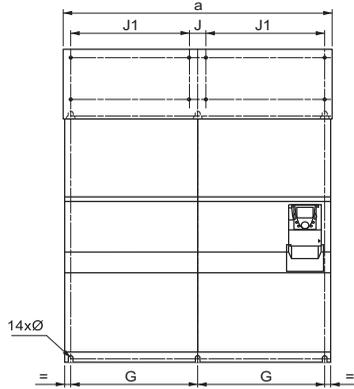
With 0 or 1 option card (1)



With 2 option cards (1)



ATV61H C50Y to C80Y



ATV61H	a mm (in.)	b mm (in.)	G mm (in.)	J mm (in.)	J1 mm (in.)	H mm (in.)	K mm (in.)	K1 mm (in.)	K2 mm (in.)	Ø mm (in.)	For screws	Weight kg (lb.)
C50Y... C80Y	1120 (44.09)	1390 (54.72)	532.5 (20.96)	70 (2.76)	495 (19.49)	1,120 (44.09)	150 (5.91)	75 (2.95)	30 (1.18)	11.5 (0.45)	M10	400 (880)

¹ For the addition of I/O extension cards, communication cards, the multi-pump card or the "Controller Inside" programmable card.

DC Bus Voltage Measurement Procedure

Measuring the DC bus voltage

DANGER

HAZARD OF ELECTRIC SHOCK, EXPLOSION, OR ARC FLASH

Read and understand the instructions on page 7 before performing this procedure.

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

The DC bus voltage can exceed 1,000 V $\overline{\text{---}}$. Use a properly rated voltage-sensing device when performing this procedure. To measure the DC bus voltage:

1. Disconnect the drive power supply.
2. Wait 15 minutes to allow the DC bus to discharge.
3. Measure the voltage of the DC bus between the PO and PC/– terminals to ensure that the voltage is less than 42 V $\overline{\text{---}}$.
4. If the DC bus capacitors do not discharge completely, contact your local Schneider Electric representative. Do not repair or operate the drive.

Installing the drive

- Mount the drive on a wall or the back of the enclosure in accordance with the recommendations described in this document, before installing the DC choke or transformer(s).
- Mount the DC choke or the transformer(s) on the back of the enclosure or on the wall above the drive and connect it/them up. Installation and connection instructions are given on page 31 for the choke and page 34 for the transformer(s).
- Make sure that the seal between the drive and the choke or transformer is properly seated.

Installing the line reactor on ATV61H***Y drives

The use of an AC line reactor (which must be ordered separately) is mandatory on these drives if a special transformer is not used (for example, 12-pulse).

CAUTION

CONTROLLER DAMAGE

A 3–5% impedance input line reactor is required on all ATV61HC**Y drive installations.

Failure to follow these instructions can result in equipment damage.

Installing the line reactor on ATV61H***M3XD and ATV61***N4D drives

ATV61H D55M3XD to D90M3XD and ATV61H D90N4D to C63N4D drives are supplied without a DC choke. A minimum 3% impedance input line reactor (ordered separately) must be used for connecting these drives to a three phase line supply.

Installing the transformer(s) on ATV61H***Y drives

ATV61H C**Y to C80Y drives are supplied with one or two transformers to power the fan. The transformer(s) must be installed on top of the drive and wired in accordance with the recommendations set out in this document.

Recommendations

If the safety of personnel requires the prohibition of unwanted or unintended operation, electronic locking is performed by the Altivar 61's Power Removal function.

This function requires the use of connection diagrams conforming to category 3 of standard EN 954-1 and safety integrity level 2 according to IEC/EN 61508 (refer to the catalog or the CD-ROM supplied with the drive). The Power Removal function takes priority over any run command.

CAUTION

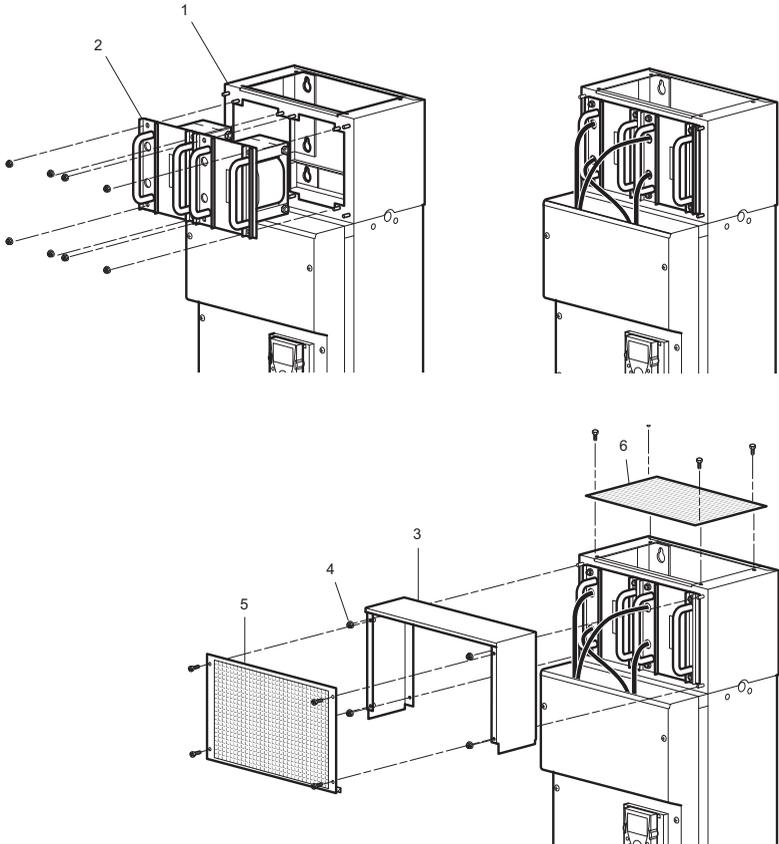
INCOMPATIBLE LINE VOLTAGE

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

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

Installing the DC choke or the transformer(s)

Figure 3: Installing DC chokes on an ATV61HC22N4 drive



- Mount the DC choke chassis **(1)** on the wall, on top of the drive. Ensure that the chassis is tightly secured to the drive to maintain the IP54 seal of the ventilation duct.
- Install the DC choke **(2)** on the chassis **(1)** using the nuts provided.
- Connect the choke between the PO and PA/+ terminals on the drive (see Figure 4 on page 33).
- Connect the grounding strip between the DC choke chassis **(1)** and the drive.

- Mount the cover **(3)** on the chassis and secure it with the nuts provided.
- Mount panels **(5)** and **(6)** using the screws provided.

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

NOTE: The number of DC chokes supplied with the drive varies according to the drive rating.

Between 1 and 4 chokes can be connected in parallel as illustrated in the following examples.

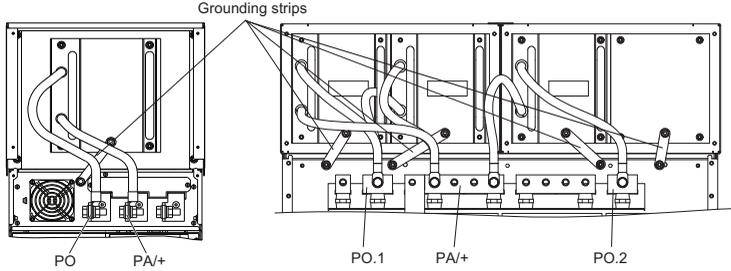
Table 4: Drive and choke combinations

Drive	Number of chokes in parallel	Choke model
ATV61HD55M3X, D75M3X	1	DC-CHOKE 5
ATV61HD90M3X	1	DC-CHOKE 6
ATV61HD90N4, C11N4	1	DC-CHOKE 1
ATV61HC13N4	1	DC-CHOKE 2
ATV61HC16N4	1	DC-CHOKE 4
ATV61HC22N4	2	DC-CHOKE 1
ATV61HC25N4	2	DC-CHOKE 3
ATV61HC31N4	2	DC-CHOKE 4
ATV61HC40N4	3	DC-CHOKE 3
ATV61HC50N4	4	DC-CHOKE 2
ATV61HC63N4	4	DC-CHOKE 7

Figure 4: DC chokes connected in parallel

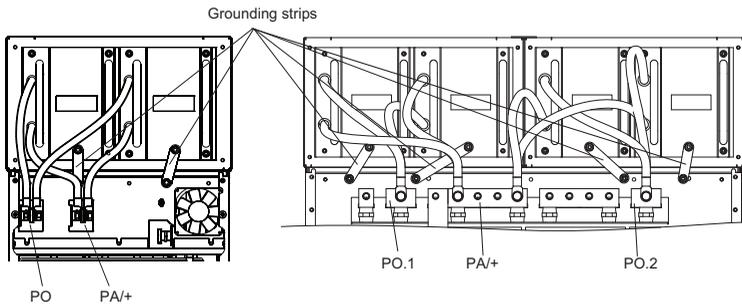
Example 1:
ATV61H D-M3X to D90M3X,
ATV61H D90N4 to C16N4

Example 3:
ATV61HC40N4



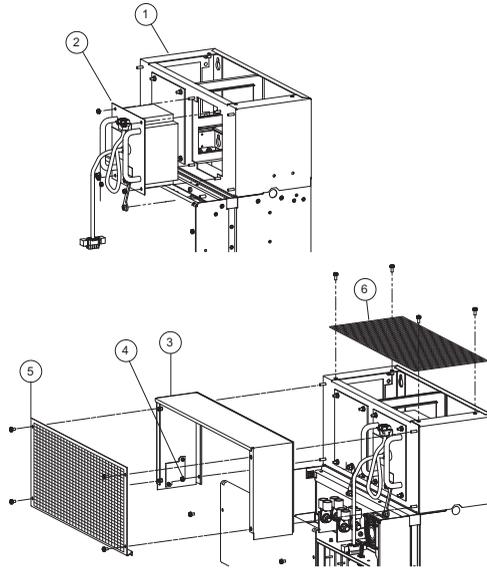
Example 2:
ATV61H C22N4 to C31N4

Example 4:
ATV61H C50N4 to C63N4



Example of installing a transformer on an ATV61HC25Y drive

Figure 5: Installing a transformer on an ATV61HC25Y drive



- Mount the transformer chassis **(1)** on the wall, on top of the drive. Ensure that the chassis is tightly secured to the drive to maintain the IP54 seal of the ventilation duct.
- Mount the transformer **(2)** on the chassis **(1)** using the nuts provided.
- Connect the transformer connector to the drive (see Figure 7 and Figure 8 on page 36).
- Connect the grounding strips between the transformer chassis **1** and the drive.
- Mount the cover **(3)** on the chassis and secure it with the nuts **(4)** provided.
- Mount panels **(5)** and **(6)** using the screws provided.

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

Location of transformers:

ATV61HC11Y to C20Y



ATV61HC25Y to C40Y



ATV61HC50Y to C80Y



1 to 2 transformers can be connected as illustrated in the following examples.

Table 5: Drive and transformer combinations

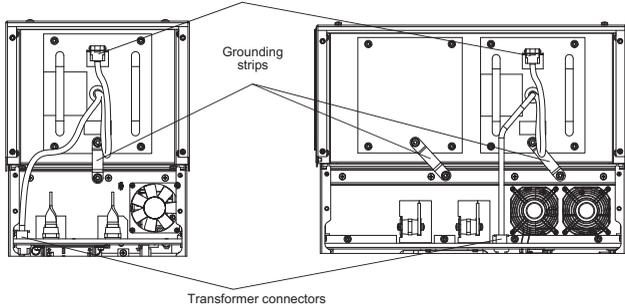
Drive	Number of transformers
ATV61HC11Y to C20Y	1
ATV61HC25Y to C40Y	1
ATV61HC50Y to C80Y	2

Figure 6: Examples of drive and transformer combinations

Example 1:
ATV61H C11Y to C20Y

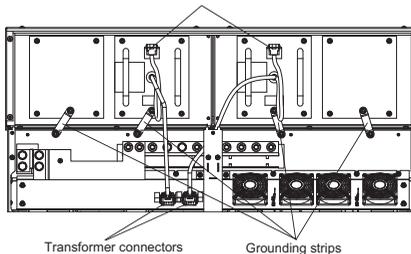
Example 2:
ATV61H C25Y to C40Y

Unused X0 connectors are put into the parking position



Example 3:
ATV61H C50Y to C80Y

Unused X0 connectors are put into the parking position



Each transformer is equipped with a 500 V/600 V connector and a 690 V connector. See Figure 7 and Figure 8. The unused connector is put into the parking position.

Figure 7: Connecting a 500 V/50 Hz or 600 V/60 Hz supply transformer (use X2A)

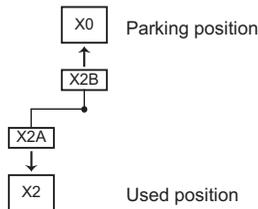
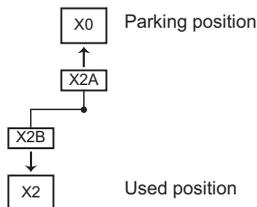


Figure 8: Connecting a 690 V/50 Hz supply transformer (use X2B)



The ATV61HC50Y to ATV61HC80Y models include 2 transformers. Set up this connection for each transformer.

⚠ CAUTION

DRIVE TRANSFORMER DAMAGE

Ensure the transformer connection corresponds to the line voltage.

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

Wiring

Power

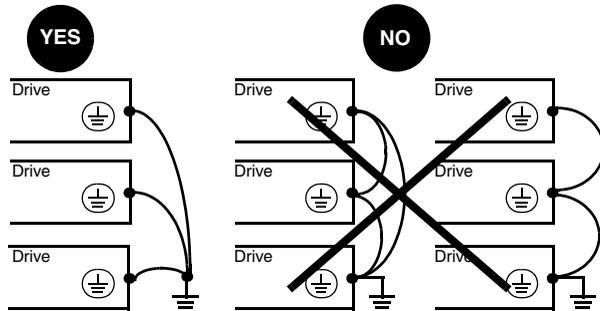
Ground the drive to local and national code requirements. A minimum wire size of 13.29 mm² (6 AWG) may be required to meet standards limiting leakage current.

⚠ DANGER

HAZARD OF ELECTRIC SHOCK, EXPLOSION, OR ARC FLASH

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

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



- Ensure that the resistance of the ground is 1 Ω or less.
- If grounding several drives you must connect each one directly, as shown in the figure above.
- Do not loop the ground cables or connect them in series

WARNING

IMPROPER WIRING PRACTICES

- The ATV61 controller will be damaged if input line voltage is applied to the output terminals (U/T1, V/T2, W/T3).
- Check the power connections before energizing the ATV61 drive.
- If replacing another drive, verify that all wiring connections to the ATV61 controller comply with all wiring instructions in this manual.

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

Where local and national codes require upstream protection by means of a residual current device, use a Type A device for single-phase drives and a Type B device for three-phase drives as defined in the IEC 60755. Choose a suitable model integrating:

- Harmonic Frequency (HF) current filtering
- A time delay that helps prevent tripping caused by the load from stray capacitance on power-up. The time delay is not possible for 30 mA devices; in this case, choose devices with immunity against nuisance tripping.

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

WARNING

INADEQUATE OVERCURRENT PROTECTION

- Overcurrent protective devices must be properly coordinated.
- The Canadian Electrical Code and the National Electrical Code require branch circuit protection. Use the over current protective device recommended on the drive nameplate or in document 30072-451-38 to achieve published short-circuit current ratings.
- Do not connect the drive to a power feeder whose short-circuit capacity exceeds the controller short-circuit current rating listed on the controller nameplate or in document 30072-451-38.

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

CAUTION

IMPROPER USE OF A BRAKING RESISTOR

Wire the thermal protection contact on the resistor so that the drive power supply is disconnected immediately in the event of a detected fault (refer to the manual supplied with the resistor).

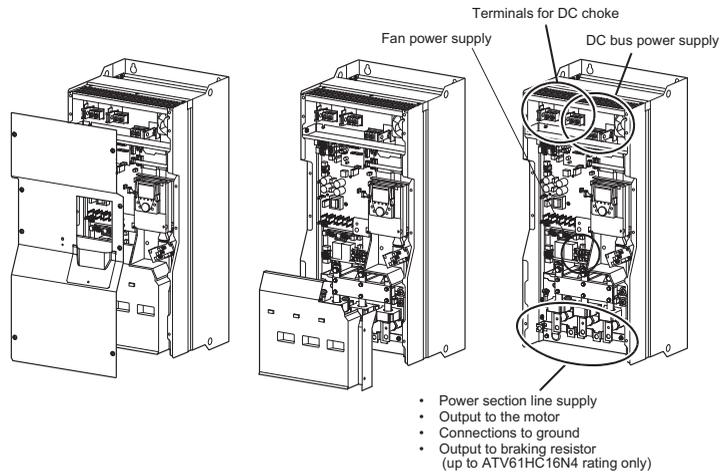
Failure to follow these instructions can result in equipment damage.

Power Terminals

Access to the power terminals

To access the power terminals, unscrew the front panel and remove the cover.

Figure 9: Accessing power terminals



Functions of power terminals

Terminals	Function	Drive
3x \perp	Ground connection terminals	All ratings
R/L1 – S/L2 – T/L3 ¹	Power section line supply	All ratings
PO	DC choke connection	ATV61H D55M3X, D90M3X, ATV61H D90N4 to C31N4
PO.1, PO.2	DC choke connection	ATV61H C40N4, C63N4
PA/+	DC bus + polarity and DC choke connection	All ratings
PC/-	DC bus – polarity	All ratings
PA	Output to braking resistor	ATV61H D55M3X, D90M3X, ATV61H D90N4 to C22N4 ²
PB	Output to braking resistor	ATV61H D90N4 to C22N4 ²
U/T1 – V/T2 – W/T3	Outputs to the motor	All ratings
RO, SO, TO	Separate fan supply when the drive is only powered by the DC bus (refer to the CD-ROM supplied with the drive)	ATV61H D75M3X, D90M3X, ATV61H C13N4 to C63N4
BU+, BU-	+ and - polarities to be connected to the braking unit	ATV61H C25N4 to C63N4 (refer to the User's Manual for the braking unit)
X20, X92, X3	Braking unit control cable connection	

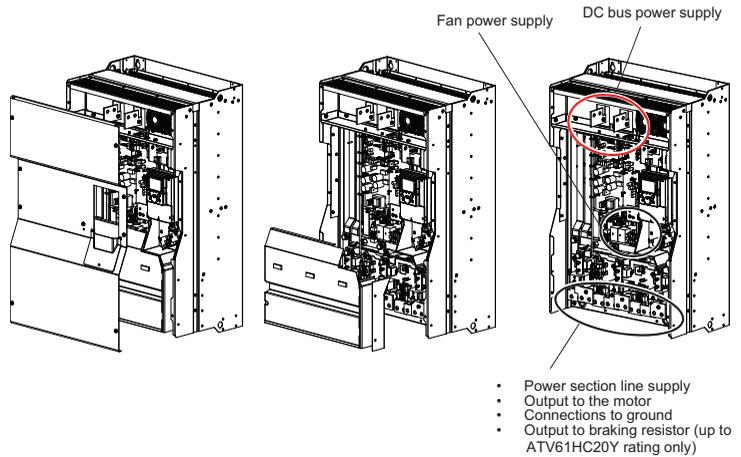
¹ ATV61H C40N4 to C63N4 drives have two input bridges. The power section AC supply is connected on terminals R/L1.1 – R/L1.2, S/L2.1 – S/L2.2 and T/L3.1 – T/L3.2.

² From the ATV61HC25N4 upwards, there are no braking resistor connection terminals on the drive as the braking unit is optional (please refer to the catalog). The braking resistor is connected on the braking unit.

Accessing the power terminals on ATV61H***Y drives

To access the power terminals, unscrew the front panel and remove the cover.

Figure 10: Accessing power terminals



Characteristics and functions of power terminals

Terminals	Function	Drive
3x \perp	Ground connection terminals	All ratings
R/L1 – S/L2 – T/L3 ¹	Power section line supply	All ratings
PA/+	DC bus + polarity and DC choke connection	All ratings
PC/-	DC bus – polarity	All ratings
PA	Output to braking resistor	ATV61H C11Y to C20Y ²
PB	Output to braking resistor	
U/T1 – V/T2 – W/T3	Outputs to the motor	All ratings
RO, SO, TO	Separate fan supply when the drive is only powered by the DC bus	ATV61H C11Y to C80Y
BU+, BU-	+ and - polarities to be connected to the braking unit	ATV61H C25Y to C80Y (refer to the User's Manual for the braking unit)
X20, X92, X3	Braking unit control cable connection	

¹ ATV61H C50Y to C80Y drives have two input bridges. The power section AC supply is connected on terminals R/L1.1 – R/L1.2, S/L2.1 – S/L2.2 and T/L3.1 – T/L3.2.

² From the ATV61HC25Y upwards, there are no braking resistor connection terminals on the drive as the braking unit is optional (please refer to the catalog). The braking resistor is connected on the braking unit.

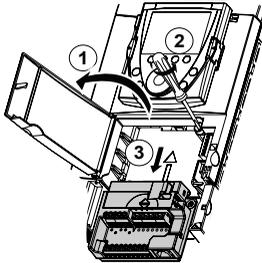
Maximum wire size and tightening torque

Table 6: Wire size and tightening torque

Drive terminals	L1/R, L2/S, L3/T	R/L1.1, R/L1.2, S/L2.1, S/L2.2, T/L3.1, T/L3.2	U/T1, V/T2, W/T3	PC/-, PA/+	PA, PB	RO, SO, TO
ATV 61HD55M3X ATV 61HD75M3X ATV 61HD90N4 ATV 61HC11N4	2 x 100 mm ² /24 N•m	—	2 x 100 mm ² / 24 N•m	2 x 100 mm ² / 41 N•m	60 mm ² / 12 N•m	5.5 mm ² / 1.4 N•m
	2 x 250 MCM / 212 lb.in	—	2 x 250 MCM / 212 lb.in	2 x 250 MCM / 360 lb.in	250 MCM / 106 lb.in	10 AWG 12 lb.in
ATV 61HD90M3X ATV 61HC13N4	2 x 100 mm ² /24 N•m	—	2 x 100 mm ² / 24 N•m	2 x 150 mm ² / 41 N•m	60 mm ² / 12 N•m	5.5 mm ² / 1.4 N•m
	2 x 250 MCM / 212 lb.in	—	2 x 250 MCM / 212 lb.in	2 x 250 MCM / 360 lb.in	250 MCM / 106 lb.in	10 AWG 12 lb.in
ATV61HC16N4 ATV 61HC11Y ATV 61HC13Y ATV 61HC16Y ATV 61HC20Y	2 x 120 mm ² /24 N•m	—	2 x 120 mm ² / 24 N•m	2 x 120 mm ² / 41 N•m	120 mm ² / 24 N•m	5.5 mm ² / 1.4 N•m
	2 x 250 MCM / 212 lb.in	—	2 x 250 MCM / 212 lb.in	2 x 250 MCM / 360 lb.in	250 MCM / 212 lb.in	10 AWG 12 b.in
ATV 61HC22N4	2 x 150 mm ² /41 N•m	—	2 x 150 mm ² / 41 N•m	2 x 150 mm ² / 41 N•m	120 mm ² / 24 N•m	5.5 mm ² / 1.4 N•m
	2 x 350 MCM / 360 lb.in	—	2 x 350 MCM / 360 lb.in	2 x 350 MCM / 360 lb.in	250 MCM / 212 lb.in	10 AWG 12 lb.in
ATV 61HC25N4 ATV 61HC31N4 ATV 61HC25Y ATV 61HC31Y ATV 61HC40Y	4 x 185 mm ² /41 N•m	—	4 x 185 mm ² / 41 N•m	4 x 185 mm ² / 41 N•m	—	5.5 mm ² / 1.4 N•m
	3 x 350 MCM / 360 lb.in	—	3 x 350 MCM / 360 lb.in	3 x 350 MCM / 360 lb.in	—	10 AWG 12 lb.in
ATV 61HC40N4	4 x 185 mm ² /41 N•m	—	4 x 185 mm ² / 41 N•m	8 x 185 mm ² / 41 N•m	—	5.5 mm ² / 1.4 N•m
	4 x 500 MCM / 360 lb.in	—	4 x 500 MCM / 360 lb.in	4 x 500 MCM / 360 lb.in	—	10 AWG 12 lb.in
ATV 61HC50N4	—	2 x 2 x 185 mm ² /41 N•m	4 x 185 mm ² / 41 N•m	8 x 185 mm ² / 41 N•m	—	5.5 mm ² / 1.4 N•m
	—	4 x 500 MCM /360 lb.in	4 x 500 MCM / 360 lb.in	4 x 500 MCM / 360 lb.in	—	10 AWG 12 lb.in
ATV 61HC63N4	—	2 x 4 x 185 mm ² /41 N•m	6 x 185 mm ² /41 N•m	8 x 185 mm ² /41 N•m	—	5.5 mm ² / 1.4 N•m
	—	3 x 500 MCM /360 lb.in	5 x 500 MCM / 360 lb.in	5 x 500 MCM / 360 lb.in	—	10 AWG 12 lb.in
ATV 61HC50Y ATV 61HC63Y ATV 61HC80Y	—	4 x 185 mm ² /41 N•m	6 x 185 mm ² /41 N•m	8 x 185 mm ² /41 N•m	—	5.5 mm ² /1.4 N•m
	—	3 x 500 MCM /360 lb.in	5 x 500 MCM / 360 lb.in	5 x 500 MCM / 360 lb.in	—	10 AWG 12 lb.in

Control Terminals

Access to the control terminals



1. To access the control terminals, open the cover on the front panel of the control section.
2. To make it easier to wire the drive control section, remove the control terminal card by loosening the screw until the spring is fully extended.
3. Remove the card by sliding it downwards.

NOTE: For control wiring the maximum wire size is 2.5 mm² (14 AWG). The maximum tightening torque is 0.6 N•m (5.3 lb-in).

⚠ DANGER

UNINTENDED EQUIPMENT OPERATION

- The accidental grounding of logic inputs configured for Sink Logic 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.

CAUTION

IMPROPERLY SECURED TERMINAL CARD

When replacing the control terminal card, it is essential to fully tighten the captive screw. Torque the captive screw to 1.1 to 1.7 N•m (9.7 to 15 lb-in).

Failure to follow these instructions can result in equipment damage.

Table 7: Characteristics and functions of the control terminals

Terminals	Function	Electrical characteristics									
R1A R1B R1C	1 relay logic output, one N.C. contact and one N.O. contact with common point (R1A to R1C is N.O.; R1B to R1C is N.C.)	Minimum switching capacity: 3 mA for 24 V $\overline{\text{---}}$ Maximum switching capacity: <ul style="list-style-type: none"> on resistive load ($\cos \varphi = 1$): 5 A for 250 V a or 30 V V $\overline{\text{---}}$ on inductive load ($\cos \varphi = 0.4$ and L/R = 7 ms): 2 A for 250 V a or 30 V $\overline{\text{---}}$ 									
R2A R2C	1 relay logic output one N.O. contact	Max. response time: 7 ms ± 0.5 ms Electrical service life: 100,000 operations									
+10	+10 V $\overline{\text{---}}$ power supply for reference potentiometer 1 to 10 k Ω	<ul style="list-style-type: none"> +10 V $\overline{\text{---}}$ (10.5 V ± 0.5 V) 10 mA max. 									
AI1+ AI1-	Differential analog input AI1	<ul style="list-style-type: none"> -10 to +10 V $\overline{\text{---}}$ (max. safe voltage 24 V) Reaction time: 2 ms ± 0.5 ms, 11-bit resolution + 1 sign bit Accuracy $\pm 0.6\%$ for $\Delta\theta = 60$ °C (140 °F), linearity $\pm 0.15\%$ of max. value 									
COM	Analog I/O common	0 V									
AI2	Depending on the software configuration: Analog voltage or current input	<ul style="list-style-type: none"> Analog input 0 to +10 V $\overline{\text{---}}$ (max. safe voltage 24 V), impedance 30 kΩ Analog input X-Y mA, X and Y programmable from 0 to 20 mA, impedance 250 Ω Reaction time: 2 ms ± 0.5 ms 11-bit resolution, accuracy $\pm 0.6\%$ for $\Delta\theta = 60$ °C (140 °F), linearity $\pm 0.15\%$ of max. value 									
COM	Analog I/O common	0 V									
AO1	Depending on the software configuration: Analog voltage or current output or logic output	<ul style="list-style-type: none"> Analog output 0 to +10 V c, min. load impedance 50 kΩ Analog output X-Y mA, X and Y can be programmed from 0 to 20 mA, max. load impedance 500 Ω 10-bit resolution, reaction time: 2 ms ± 0.5 ms Accuracy $\pm 1\%$ for $\Delta\theta = 60$ °C (140 °F), linearity $\pm 0.2\%$ of max. value Logic output: 0 or 10 V, 0 to 20 mA 									
P24	Input for external +24 V c control power supply	<ul style="list-style-type: none"> +24 V $\overline{\text{---}}$ (min. 19 V, max. 30 V) Power 30 W 									
0V	Logic input common and 0 V of external P24 power supply	0 V									
LI1 LI2 LI3 LI4 LI5	Programmable logic inputs	<ul style="list-style-type: none"> +24 V $\overline{\text{---}}$ (max. 30 V) Impedance 3.5 kΩ Reaction time: 2 ms ± 0.5 ms <table border="1" style="margin-left: 20px;"> <thead> <tr> <th>SW1 Switch</th> <th>State 0</th> <th>State 1</th> </tr> </thead> <tbody> <tr> <td>Source (factory setting)</td> <td>< 5 V $\overline{\text{---}}$</td> <td>> 11 V $\overline{\text{---}}$</td> </tr> <tr> <td>Sink Int or Sink Ext</td> <td>> 16 V $\overline{\text{---}}$</td> <td>< 10 V $\overline{\text{---}}$</td> </tr> </tbody> </table>	SW1 Switch	State 0	State 1	Source (factory setting)	< 5 V $\overline{\text{---}}$	> 11 V $\overline{\text{---}}$	Sink Int or Sink Ext	> 16 V $\overline{\text{---}}$	< 10 V $\overline{\text{---}}$
SW1 Switch	State 0	State 1									
Source (factory setting)	< 5 V $\overline{\text{---}}$	> 11 V $\overline{\text{---}}$									
Sink Int or Sink Ext	> 16 V $\overline{\text{---}}$	< 10 V $\overline{\text{---}}$									
LI6	Depending on the position of the SW2 switch: LI (Programmable logic input) or PTC (Input for PTC probes)	SW2 = LI (factory setting): <ul style="list-style-type: none"> Same characteristics as logic inputs LI1 to LI5 SW2 = PTC: <ul style="list-style-type: none"> Trip threshold 3 kΩ, reset threshold 1.8 kΩ Short-circuit detection threshold < 50 Ω 									

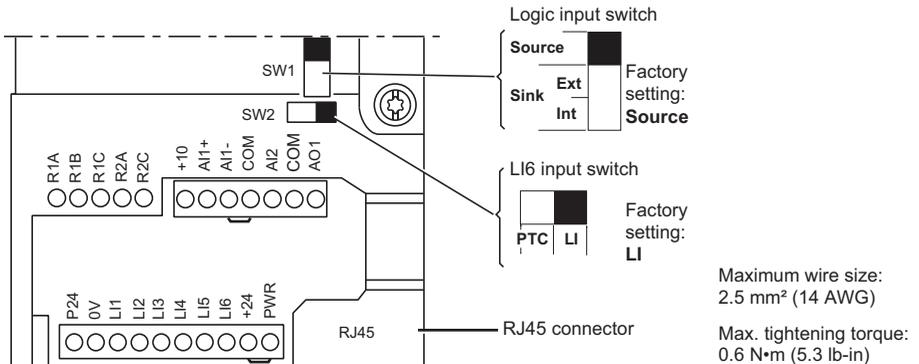
NOTE: $\Delta\theta$ = temperature change

Table 7: Characteristics and functions of the control terminals (continued)

Terminals	Function	Electrical characteristics
+24	Logic input power supply	SW1 switch in Source or Sink Int position: <ul style="list-style-type: none"> • Internal +24 V $\bar{\text{---}}$ power supply (min. 21 V, max. 27 V), protected against short-circuits and overloads • 200 mA max. SW1 switch in Sink Ext position: <ul style="list-style-type: none"> • Input for external +24 V $\bar{\text{---}}$ power supply for the logic inputs
PWR	Power Removal input.	<ul style="list-style-type: none"> • 24 V $\bar{\text{---}}$ (max. 30 V) • Impedance 1.5 kΩ • State 0 if < 2 V, state 1 if > 17 V • Reaction time: 10 ms
When PWR is not connected to 24 V, the motor cannot be started (compliance with functional safety standard EN 954-1 and IEC/EN 61508).		

NOTE: $\Delta\theta$ = temperature change

Arrangement of the control terminals



Note: The ATV61 controller is supplied with links between the PWR and +24 terminals and the AI1- and COM terminals.

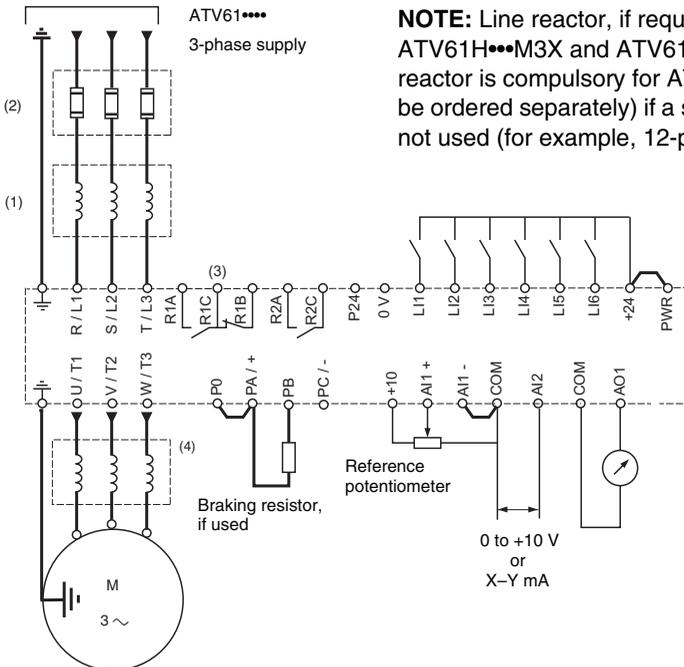
Connection diagrams

CAUTION

CONTROLLER DAMAGE

A 3–5% impedance input line reactor is required on all ATV71HC••Y drive controller installations.

Failure to follow these instructions can result in equipment damage.



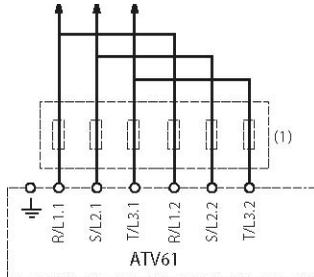
NOTE: Line reactor, if required, for ATV61H•••M3X and ATV61H•••N4. This line reactor is compulsory for ATV61H•••Y drives (to be ordered separately) if a special transformer is not used (for example, 12-pulse).

- 1 Line reactor is required for 575 V installations.
- 2 Refer to the drive nameplate or document 30072-451-38 or to Tables 1, 2, 3 of this document for recommended fuses.
- 3 R1 relay contacts for remote signaling of drive status.
- 4 Installation of a load reactor or motor filter is recommended for all 575 V installations.

Install interference suppressors on all inductive circuits near the drive or coupled to the same circuit (such as relays, contactors, and solenoid valves).

- Use shielded cable for PWR input connections.
- See page 52 for factory configurations for logic inputs, analog inputs, relays and analog inputs

Power terminal connection diagram ATV61H C50N4, C63N4, C50Y, C63Y and C80Y



¹ Line reactor, if used, for ATV61H...M3X and ATV61H...N4. This line reactor is compulsory for ATV61H...Y drives (to be ordered separately) if a special transformer is not used (for example, 12-pulse).

ATV61H C25N4 to C63N4 and ATV61H C25Y to C80Y

For these drive ratings, braking resistors are connected to the external braking unit. Please refer to the braking unit User's Manual.

Drive supplied by the DC bus

Consult the CD-ROM supplied with the drive.

Operation on an IT system and corner grounded system

⚠ CAUTION

RISK OF DAMAGE TO THE DRIVE

Certain precautions have to be taken when using the drive on an IT system; please refer to the Installation Manual on the CD-ROM supplied with the drive for more information.

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

WARNING

RISK OF ELECTRIC SHOCK

ATV61HC•••Y drives must not be connected on a corner grounded system.

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

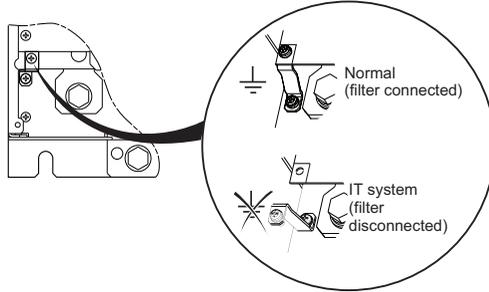
IT system: Isolated or impedance grounded neutral. Use a permanent insulation monitor compatible with non-linear loads, such as a Merlin Gerin type XM200.

Altivar 61 drive controllers feature built-in common mode RFI (EMC) filters. When an ATV61HC••Y drive controller is operating on an isolated or resistance grounded electrical distribution system, the filters must be isolated (disconnected). For any other drive controller referenced in this manual the filter should be isolated (disconnected).

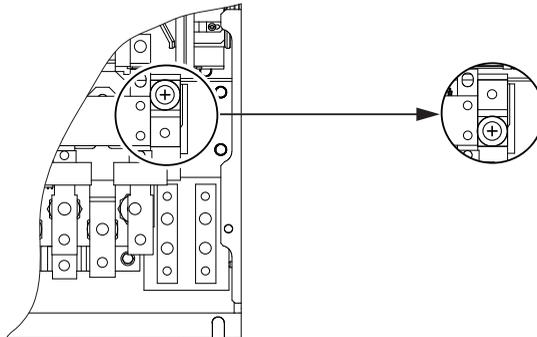
Corner Grounded System: The ATV61HC••Y drive controllers must never be connected on a corner grounded electrical distribution system. When any other drive controller referenced in this manual is connected to a corner grounded electrical distribution system the filters must be isolated (disconnected).

Disconnecting filters

ATV61H D90N4 to C13N4 and ATV61H C11Y to C20Y:



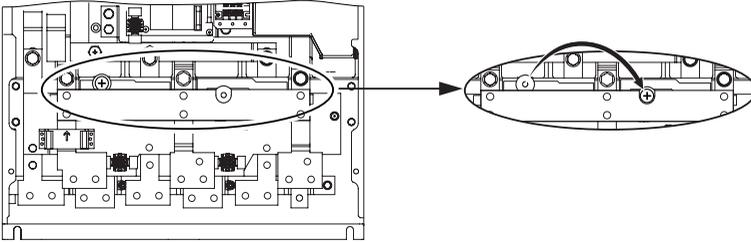
ATV61H C16N4 to C22N4:



ATV61H C25N4 to C31N4 and ATV61H C25Y to C40Y:

Normal
 (filter connected)

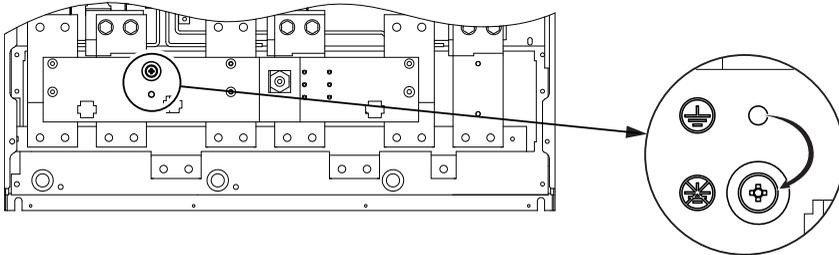
IT system
 (filter disconnected)



ATV61HC40N4:

Normal
 (filter connected)

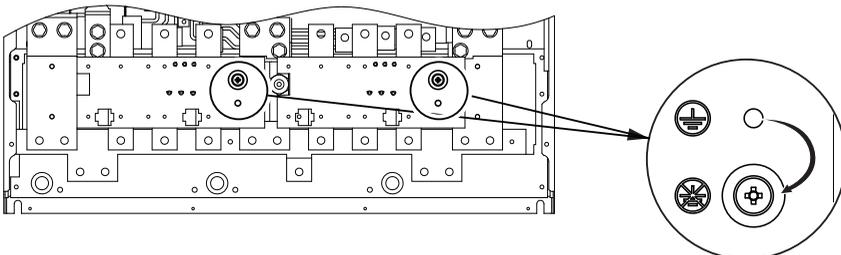
IT system
 (filter disconnected)



ATV61HC50N4:

Normal
 (filter connected)

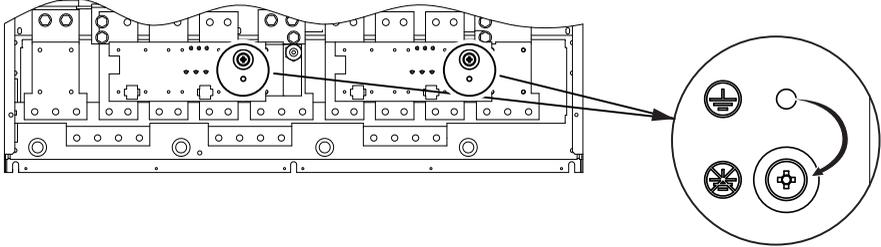
IT system
 (filter disconnected)



ATV61HC63N4 and ATV61H C50Y to C80Y:

 Normal
(filter connected)

 IT system
(filter disconnected)



Electromagnetic Compatibility, Wiring

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, 100 V 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 Installation Guide.

Setup—Preliminary Recommendations

Drive settings (factory configuration)

The Altivar 61 drive is factory-set for the following operating conditions:

Table 8: Factory configurations

Macro-configuration	Pumps/fans
Motor frequency	50 Hz
Motor control type	Energy-saving variable torque applications
Stop mode	Normal stop mode on deceleration ramp
	Freewheel, in the event of a detected fault
Linear, acceleration, and deceleration ramps	3 s
Low speed	0 Hz
High speed	50 Hz
Motor thermal current	Rated drive current
Standstill injection braking current	0.7 x rated drive current, for 0.5 s
Automatic starts	No automatic starts after a detected fault is cleared
Switching frequency	2.5 kHz to 12 kHz depending on drive rating
Logic inputs	<ul style="list-style-type: none"> • LI1: forward (1 operating direction), 2-wire control type is transition. See "Starting" on page 54. • LI2: inactive (not assigned) • LI3: switching of 2nd speed reference. If LI3 = 0 the speed reference AI1 is active. If LI3 = 1 the speed reference AI2 is active. • LI4: fault reset • LI5, LI6: inactive (not assigned)

Table 8: Factory configurations (continued)

Analog inputs	<ul style="list-style-type: none"> AI1: 1st speed reference 0 to 10 V AI2: 2nd speed reference 0 to 20 mA <p>NOTE: For 4–20 mA, go to Menu [1.5 Input/Output CFG], then to [AI2 configuration] and change [AI2 min. value] from 0 to 4.</p>
Relay R1	R1C to R1A contact opens and R1C to R1B contact closes in the event of a detected fault or when the drive is powered off.
Relay R2	R2A to R2C contact closes when the drive is running.
Analog output AO1	0 to 20 mA, motor frequency

For programming instructions, refer to the ATV61 programming manual on the CD-ROM included with the drive.

Power switching via line contactor

CAUTION

EXCESSIVE LINE CONTACTOR SWITCHING

- Avoid operating the contactor frequently to avoid premature aging of the filter capacitors.
- Do not have cycle times less than 60 seconds.

Failure to follow these instructions can result in equipment damage.

Starting

NOTE: The factory setting for the programming parameter [2-wire type] is set to [Transition], when input line power is applied $r 5 t$ may display as the drive state and the controller will not start. This could indicate that a run command was present before the input line power was applied and a transition or change of state must be made to this command before the drive will start.

If it is desired that the drive starts when the input line power is applied without a transition of the run command, make the following change to the program configuration. Go to the menu [1.5 Inputs/Outputs CFG] and change parameter [2-wire type] from [Transition] to [Level]. When the change is made, the drive can begin

running immediately on application of the input line power if a run command is present. For more information, see page 58.

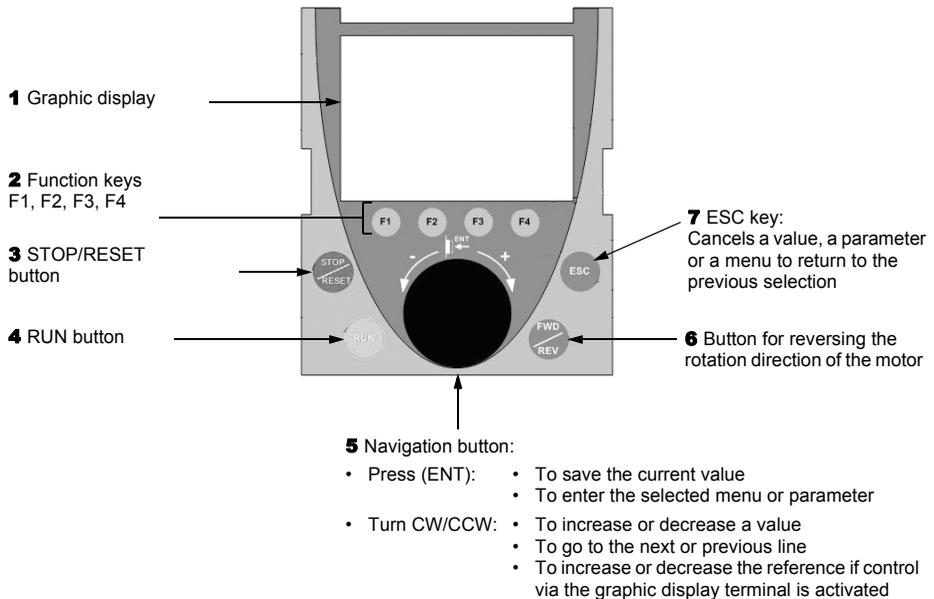
Test on a low-power motor or without a motor, using motors in parallel

Consult the Programming Manual on the CD-ROM supplied with the drive.

Display Terminals

Graphic Display Terminal

The graphic display terminal can be disconnected and connected remotely (for example, on the door of an enclosure) using the cables and accessories available as options.



NOTE: Buttons 3, 4, 5, and 6 can be used to control the drive directly, if control via the graphic display terminal is activated.

Drive state codes

Table 9: Drive state codes

ACC	Acceleration
CLI	Current limiting
CTL	Controlled stop on input phase loss
DCB	DC injection braking in progress
DEC	Deceleration
FLU	Motor fluxing in progress
FRF	Drive at fallback speed
FST	Fast stop
NLP	No line power (no line supply on L1, L2, L3)
NST	Freewheel stop
OBR	Auto-adapted deceleration
PRA	Power Removal function active (drive locked)
RDY	Drive ready
RUN	Drive running
SOC	Controlled output cut in progress
TUN	Auto-tuning in progress
USA	Undervoltage alarm

The first time the drive is powered on, the user is automatically guided through the menus as far as [1. DRIVE MENU].

The parameters in the [1.1 SIMPLY START] submenu must be configured before the motor is started up. To optimize performance, perform an auto-tune (see Table 10 on page 66).

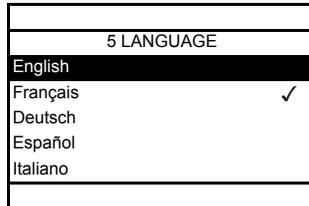
Only the [1.1 SIMPLY START] menu is described in this document. For more information about the content of the other menus, consult the Programming Manual and the CD-ROM supplied with the drive.

Figure 11: First time drive power on menu



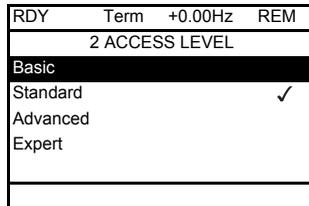
Displayed for 3 seconds following power-up

3 seconds



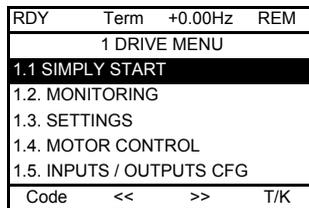
Switches to [5 LANGUAGE] menu automatically.

Select the language and press ENT.



Switches to [2 ACCESS LEVEL] menu (consult the Programming Manual on the CD-ROM supplied with the drive)

Select the access level and press ENT.



Switches to [1 DRIVE MENU] (consult the Programming Manual on the CD-ROM supplied with the drive)

ESC



Figure 11: First time drive power on menu (continued)

RDY	Term	+0.00Hz	REM
MAIN MENU			
1 DRIVE MENU			
2 ACCESS LEVEL			
3 OPEN / SAVE AS			
4 PASSWORD			
5 LANGUAGE			
Code		T/K	

Press ESC to return to [MAIN MENU]

Integrated Display Terminal

The graphic display terminal described on page 56 is supplied as standard. In addition to the removable graphic display an integrated display terminal with a 7-segment 4-digit display will be provided.



- Pressing or does not store the choices.
- Press and hold down (>2 s) or to scroll through the data quickly.
- Press ENT to save and store the selection.

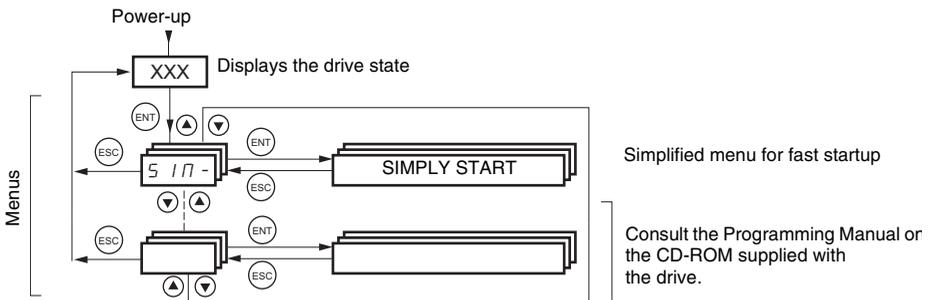
The display flashes once a value is stored.

A normal display has no detected fault present and no startup:

- *43.0*: Display of the parameter selected in the SUP menu (default selection: motor frequency)
- *CLL*: Current limit
- *CLL*: Controlled stop on input phase loss
- *dcB*: DC injection braking in progress
- *FLU*: Motor fluxing in progress
- *FRF*: Drive at fallback speed
- *FSt*: Fast stop
- *nLP*: No line power (no line supply on L1, L2, L3)
- *nSt*: Freewheel stop.
- *DBr*: Auto-adapted deceleration
- *PRB*: Power Removal function active (drive locked)
- *rdY*: Drive ready
- *rUn*: Drive running
- *SOC*: Controlled output cut in progress
- *tUn*: Auto-tuning in progress
- *USP*: Undervoltage alarm

The display flashes continuously to indicate the presence of a detected fault.

Access to Menu



A dash appears after menu and submenu codes to differentiate them from parameter codes.

Example: SIM- menu, ACC parameter

[1.1 SIMPLY START] (SIM-) Menu

DANGER

UNINTENDED EQUIPMENT OPERATION

- Changes to parameters in other menus may change the [1.1 SIMPLY START] (SIM-) parameter settings.
- Read and understand the ATV61 Programming Manual before configuring parameter values.

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

The [1.1 SIMPLY START] (SIM-) menu can be used to quickly configure key parameters to get the drive and motor running.

Modifying parameters in other menus may modify the parameter settings in the [1.1 SIMPLY START] (SIM-) menu. As an example, configuration of motor parameters in [1.4 MOTOR CONTROL] (drC-) will be reflected in the [1.1 SIMPLY START] (SIM-) parameters.

The [1.1-SIMPLY START] (SIM-) menu can be used for quick startup, which is sufficient for many of applications.

NOTE: The parameters of the [1.1 SIMPLY START] (SIM-) menu must be entered in the order in which they appear, as the later ones are dependent on the first ones.

For example [2/3 wire control] (tCC) must be configured before any other parameters.

Macro configuration

Selecting a macro configuration allows you to quickly configure the drive with settings that are suitable for a specific application.

Input/output	[Start/Stop]	[Gen. Use]	[PID regul.]	[Network C.]	[Pumps.Fans]
AI1	[Ref.1 channel]	[Ref.1 channel]	[Ref.1 channel] (PID reference)	[Ref.2 channel] ([Ref.1 channel] = integrated Modbus)	[Ref.1 channel]
AI2	[No]	[Summing ref. 2]	[PID feedback]	[No]	[Ref.1B channel]
AO1	[Motor freq.]	[Motor freq.]	[Motor freq.]	[Motor freq.]	[Motor freq.]
R1	[No drive fit]	[No drive fit]	[No drive fit]	[No drive fit]	[No drive fit]
R2	[No]	[No]	[No]	[No]	[Drv running]
LI1 (2-wire)	[Forward]	[Forward]	[Forward]	[Forward]	[Forward]
LI2 (2-wire)	[Fault reset]	[Reverse]	[Fault reset]	[Fault reset]	[No]
LI3 (2-wire)	[No]	[Jog]	[PID integral reset]	[Ref. 2 switching]	[Ref 1B switching]
LI4 (2-wire)	[No]	[Fault reset]	[2 preset PID ref.]	[Forced local]	[Fault reset]
LI5 (2-wire)	[No]	[Torque limitation]	[4 preset PID ref.]	[No]	[No]
LI6 (2-wire)	[No]	[No]	[No]	[No]	[No]
LI1 (3-wire)	Stop	Stop	Stop	Stop	Stop
LI2 (3-wire)	[Forward]	[Forward]	[Forward]	[Forward]	[Forward]
LI3 (3-wire)	[Fault reset]	[Reverse]	[Fault reset]	[Fault reset]	[No]
LI4 (3-wire)	[No]	[Jog]	[PID integral reset]	[Ref. 2 switching]	[Ref 1B switching]
LI5 (3-wire)	[No]	[Fault reset]	[2 preset PID ref.]	[Forced local]	[Fault reset]
LI6 (3-wire)	[No]	[Torque limitation]	[4 preset PID ref.]	[No]	[No]

The assignment of inputs LI1 to LI6 differs in 3-wire control.

Factory settings

NOTE: All settings listed in the preceding table can be modified, adjusted and reassigned. Consult the ATV61 Programming Manual on the CD-ROM supplied with the drive.

The following table describes the codes, adjustment range, and factory settings.

Table 10: Codes, adjustment range, and factory settings

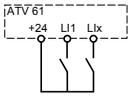
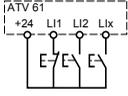
Code	Name/Description	Adjustment range	Factory setting
<p>t C C</p> <p>2 C</p> <p>3 C</p>	<p>[2/3 wire control]</p> <ul style="list-style-type: none"> [2 wire] (2C) [3 wire] (3C) <p>2-wire control Maintained control: Maintained closed to run and maintained opened to stop.</p> <p>3-wire control (Pulse control): A forward or reverse pulse is sufficient to command starting, a stop pulse is sufficient to command stopping.</p>	 <p>Example of source wiring: L1: forward Llx: reverse</p>  <p>Example of source wiring: L1: stop L2: forward Llx: reverse</p>	<p>[2 wire] (2C)</p>
<p>To change the assignment of [2/3 wire control] (tCC) press and hold the ENT key for 2 s. The [2 wire type] (tCt) function and the functions assigning the logic inputs and analog inputs will return to the factory settings. The selected macro configuration will reset, losing its custom settings.</p>			
<p>⚠ DANGER</p> <p>UNINTENDED EQUIPMENT OPERATION</p> <ul style="list-style-type: none"> Ensure that this parameter is configured before configuring the [1.6 COMMAND] (CtI-) and [1.7 APPLICATION FUNCT.] (FU-). Ensure that this assignment change is compatible with the wiring scheme used. For more information, consult the CD-ROM with the drive. <p>Failure to follow these instructions will result in death or serious injury.</p>			

Table 10: Codes, adjustment range, and factory settings (*continued*)

Code	Name/Description	Adjustment range	Factory setting
<p>CFG</p> <p>StS</p> <p>Gen</p> <p>PId</p> <p>nEt</p> <p>PnF</p>	<p>[Macro configuration]</p> <ul style="list-style-type: none"> • [Start/Stop] (StS): Start/stop • [Gen. Use] (Gen): General use • [PID regul.] (PId): PID regulation • [Network C.] (nEt): Communication bus • [Pumps.Fans] (PnF): Pumps/fans <p>To change the assignment of [Macro configuration] (CFG) press the ENT key for 2 s.</p>		[Pumps.Fans] (PnF)
<p>⚠ DANGER</p> <p>UNINTENDED EQUIPMENT OPERATION</p> <p>Ensure that the selected macro configuration is compatible with the wiring scheme used.</p> <p>Failure to follow these instructions will result in death or serious injury.</p>			
<p>CCFG</p> <p>YES</p>	<p>[Customized macro]</p> <p>Read-only parameter, visible only if at least one macro configuration parameter has been modified.</p> <ul style="list-style-type: none"> • [Yes] (YES) 		
<p>bFr</p> <p>50</p> <p>60</p>	<p>[Standard mot. freq]</p> <ul style="list-style-type: none"> • [50 Hz IEC] (50): IEC • [60 Hz NEMA] (60): NEMA <p>This parameter modifies the presets of the following parameters: [Rated motor power] (nPr), [Rated motor volt.] (UnS), [Rated mot. current] (nCr), [Rated motor freq.] (FrS), [Rated motor speed] (nSP) and [Max frequency] (tFr), see below; and [Mot. therm. current] (lth) and [High speed] (HSP), see page 67.</p>		[50 Hz IEC] (50)
<p>IPL</p> <p>nO</p> <p>YES</p>	<p>[Input phase loss]</p> <ul style="list-style-type: none"> • [Ignore] (nO): A detected phase loss is ignored. To be used when the drive is supplied via a single phase supply or by the DC bus. • [Freewheel] (YES): A detected phase loss with freewheel stop. If one phase is lost, the drive indicates mode [Input phase loss] (IPL); but if 2 or 3 phases are lost, the drive continues to operate until it trips due to undervoltage. This parameter is only accessible in this menu on ATV61H037M3 to HU75M3 drives (used with a single phase supply). 		Varies with the drive rating.
nPr	<p>[Rated motor power]</p> <p>Rated motor power given on the nameplate, in kW if [Standard mot. freq] (bFr) = [50 Hz IEC] (50), in HP if [Standard mot. freq] (bFr) = [60 Hz NEMA] (60).</p>	According to drive rating	Varies with the drive rating.

Table 10: Codes, adjustment range, and factory settings (continued)

Code	Name/Description	Adjustment range	Factory setting
<i>U n S</i>	[Rated motor volt.] Rated motor voltage given on the nameplate. ATV61***M3: 100 to 240 V ATV61***N4: 200 to 480 V ATV61***Y: 400 to 690 V	According to drive rating	Varies with the drive rating and [Standard mot. freq] (bFr)
<i>n C r</i>	[Rated mot. current] Rated motor current given on the nameplate.	0.25 to 1.1 or 1.2 Hz depending on rating	Varies with the drive rating and [Standard mot. freq] (bFr)
<i>F r S</i>	[Rated motor freq.] Rated motor frequency given on the nameplate. The factory setting is 50 Hz, or preset to 60 Hz if [Standard mot. freq] (bFr) is set to 60 Hz.	10 to 500 or 1000 Hz depending on rating	50 Hz
<i>n S P</i>	[Nom motor speed] Rated motor speed given on the nameplate. 0 to 9999 rpm and 10.00 to 60.00 krpm on the integrated display terminal. If, rather than the rated speed, the nameplate indicates the synchronous speed and the slip in Hz or as a %, calculate the rated speed as follows: <ul style="list-style-type: none"> • Nominal speed = Synchronous speed x $\frac{100 - \text{slip as a \%}}{100}$ or • Nominal speed = Synchronous speed x $\frac{50 - \text{slip in Hz}}{50}$ (50 Hz motors) or • Nominal speed = Synchronous speed x $\frac{60 - \text{slip in Hz}}{60}$ (60 Hz motors) 	0 to 60000 rpm	Varies with the drive rating.
<i>t F r</i>	[Max frequency] The factory setting is 60 Hz, or preset to 72 Hz if [Standard mot. freq] (bFr) is set to 60 Hz. The maximum value is limited by the following conditions: <ul style="list-style-type: none"> • It must not exceed 10 times the value of [Rated motor freq.] (FrS) • Values between 500 Hz and 1000 Hz are possible only in V/F control and for powers limited to 37 kW (50 HP) for ATV61H*** and 45 kW (60 HP) for ATV61W***. In this case configure [Motor control type] (Ctt) before [Max frequency] (tFr). 	10 to 1000 Hz	60 Hz

Table 10: Codes, adjustment range, and factory settings (*continued*)

Code	Name/Description	Adjustment range	Factory setting
tUn	<p>[Auto tuning]</p> <div style="background-color: black; color: white; text-align: center; padding: 5px;">⚠ DANGER</div> <p>HAZARD OF ELECTRIC SHOCK, EXPLOSION, OR ARC FLASH</p> <ul style="list-style-type: none"> • During auto tuning, the motor operates at rated current. • Do not service the motor during auto tuning. <p>Failure to follow these instructions will result in death or serious injury.</p> <div style="background-color: black; color: white; text-align: center; padding: 5px;">⚠ DANGER</div> <p>UNINTENDED EQUIPMENT OPERATION</p> <ul style="list-style-type: none"> • The following motor parameters must be correctly configured before starting auto tuning: [Rated motor volt.] (UnS), [Rated motor freq.] (FrS), [Rated mot. current] (nCr), [Rated motor speed] (nSP), and [Rated motor power] (nPr). • If one or more of these parameters is modified after auto tuning has been performed, Auto tuning (tUn) will be set to [No] and the procedure must be repeated. <p>Failure to follow these instructions will result in death or serious injury.</p>		[No] (nO)
nO YES dOnE	<ul style="list-style-type: none"> • [No] (nO): Auto-tuning not performed. • [Yes] (YES): Auto-tuning is performed as soon as possible, then the parameter automatically changes to [Done] (dOnE). • [Done] (dOnE): Use of the values given the last time auto-tuning was performed. Important: <ul style="list-style-type: none"> • It is essential that all motor parameters—[Rated motor volt.] (UnS), [Rated motor freq.] (FrS), [Rated mot. current.] (nCr), [Rated motor speed] (nSP), [Rated motor power] (nPr)—are configured correctly before starting auto-tuning. If one or more of these parameters is modified after auto-tuning has been performed, [Auto tuning] (tUn) will return to [No] (nO) and the procedure must be repeated. • Auto-tuning is performed only if no stop command has been activated. If a freewheel stop or fast stop function has been assigned to a logic input, this input must be set to 1 (active at 0). • Auto-tuning takes priority over any run or prefluxing commands, which will take effect after the auto-tuning sequence. • If auto-tuning is unsuccessful, the drive displays [No] (nO) and, depending on the configuration of [Autotune fault mgt] (tnL) (consult the CD-ROM supplied with the drive), may switch to [Auto-tuning] (tnF) detected fault. • Auto-tuning may last for 1 to 2 seconds. Do not interrupt; wait for the display to change to [Done] (dOnE) or [No] (nO). <p>NOTE: During auto-tuning the motor operates at rated current.</p>		

Table 10: Codes, adjustment range, and factory settings (*continued*)

Code	Name/Description	Adjustment range	Factory setting
<i>t U S</i>	[Auto tuning status] (for information only, cannot be modified)		[Not done] (tAb)
<i>t R b</i> <i>P E n d</i> <i>P r O G</i> <i>F A I L</i> <i>d O n E</i>	<ul style="list-style-type: none"> • [Not done] (tAb): The default stator resistance value is used to control the motor. • [Pending] (PEnd): Auto-tuning has been requested but not yet performed. • [In Progress] (PrOG): Auto-tuning in progress. • [Failed] (FAIL): Auto-tuning unsuccessful. • [Done] (dOnE): The stator resistance measured by the auto-tuning function is used to control the motor. 		
<i>P H r</i>	[Output Ph rotation]		[ABC] (AbC)
<i>A b C</i> <i>A C b</i>	<ul style="list-style-type: none"> • [ABC] (AbC): Forward • [ACB] (ACb): Reverse This parameter can be used to reverse the rotation direction of the motor without reversing the wiring.		

Parameters that can be changed while the drive is running or stopped

Table 11: Parameters that can be changed while the drive is running or stopped

Code	Name/Description	Adjustment range	Factory setting
<i>I t H</i>	[Mot. therm. current] Motor thermal overload current, to be set to the rated current indicated on the nameplate.	0 to 1.1 or 1.2 In (1) according to rating	Varies with the drive rating.
<i>A C C</i>	[Acceleration] Time to accelerate from 0 to the [Rated motor freq.] (FrS) (page 65). Ensure that this value is compatible with the inertia being driven.	0.1 to 999.9 s	3.0 s
<i>d E C</i>	[Deceleration] Time to decelerate from the [Rated motor freq.] (FrS) (page 65) to 0. Ensure that this value is compatible with the inertia being driven.	0.1 to 999.9 s	3.0 s
<i>L S P</i>	[Low speed] Motor frequency at minimum reference, can be set between 0 and [High speed] (HSP).		0
<i>H S P</i>	[High speed] Motor frequency at maximum reference, can be set between [Low speed] (LSP) and [Max frequency] (tFr). The factory setting changes to 60 Hz if [Standard mot. freq] (bFr) = [60 Hz] (60).		50 Hz

(1) "In" corresponds to the rated controller current indicated in the installation manual and on the controller nameplate.

Detected Faults and Troubleshooting

Drive does not start, no detected fault code displayed

- If the display does not light up, check the power supply to the drive.
- If the drive displays [Freewheel] (nSt) or [Fast stop] (FSt):
The Fast Stop and Freewheel functions help prevent the drive from starting if the corresponding logic inputs are not powered up. This is normal—these functions are active at zero so that the drive will stop if there is a wire break.
- Make sure that the run command input or inputs are activated according to the selected control mode:
 - [2/3 wire control] (tCC) parameter, described on page 63
 - [2 wire type] (tCt) parameter, described on page 54 and in the ATV61 programming manual on the CD-ROM supplied with the drive.

Conditions requiring a power reset

 DANGER
LOSS OF PERSONNEL AND EQUIPMENT PROTECTION FEATURES
<ul style="list-style-type: none">• Enabling fault inhibition (InH) will disable the drive protection features.• InH should not be enabled for typical applications of this equipment.• InH should be enabled only in extraordinary situations where a thorough risk analysis demonstrates that the presence of adjustable speed drive protection features poses a greater risk than personnel injury or equipment damage.
Failure to follow these instructions will result in death or serious injury.

Table 12 on page 69 lists the conditions requiring a power reset. A power reset is accomplished by cycling power to the drive after the cause of the condition has been removed.

AI2F, EnF, SOF, SPF, and tnF conditions can also be reset remotely by means of a logic input or control bit (consult the Programming Manual on the CD-ROM supplied with the drive).

EnF, InFA, InFb, SOF, SPF, and tnF conditions can be inhibited and cleared remotely by means of a logic input or control bit (consult the Programming Manual on the CD-ROM supplied with the drive).

Table 12: Conditions requiring a power reset

Code	Name	Probable cause	Remedy
<i>A I 2 F</i>	[AI2 input]	<ul style="list-style-type: none"> AI2 signal out of range 	<ul style="list-style-type: none"> Check the wiring of analog input AI2 and the value of the signal.
<i>b D F</i>	[DBR overload]	<ul style="list-style-type: none"> Incorrect DB resistor settings 	<ul style="list-style-type: none"> Check the size of the resistor and wait for it to cool down. Check parameters [DB Resistor Power] (brP) and [DB Resistor value] (brU) (consult the CD-ROM supplied with the drive).
<i>b U F</i>	[DB unit sh. Circuit]	<ul style="list-style-type: none"> Short-circuit output from braking unit 	<ul style="list-style-type: none"> Check the wiring of the braking unit and the resistor. Check the braking resistor.
<i>C r F 1</i>	[Precharge]	<ul style="list-style-type: none"> Charging relay control condition or charging resistor damaged 	<ul style="list-style-type: none"> Turn the drive off and then back on again. Check the internal connections. Contact Schneider Electric Product Support.
<i>C r F 2</i>	[Thyr. soft charge]	<ul style="list-style-type: none"> Improper DC bus charging condition (thyristors) 	
<i>E E F 1</i>	[Control Eeprom]	<ul style="list-style-type: none"> Control card Internal memory 	<ul style="list-style-type: none"> Check the environment (electromagnetic compatibility). Turn off, reset, return to factory settings. Contact Schneider Electric Product Support.
<i>E E F 2</i>	[Power Eeprom]	<ul style="list-style-type: none"> Power card internal memory 	
<i>F C F 1</i>	[Out. contact. stuck]	<ul style="list-style-type: none"> The output contactor remains closed although the opening conditions have been met 	<ul style="list-style-type: none"> Check the contactor and its wiring. Check the feedback circuit.
<i>H d F</i>	[IGBT desaturation]	<ul style="list-style-type: none"> Short-circuit or grounding at the drive output 	<ul style="list-style-type: none"> Check the cables connecting the drive to the motor, and the motor insulation. Perform the diagnostic tests via the [1.10 DIAGNOSTICS] menu.
<i>I L F</i>	[Internal com. link]	<ul style="list-style-type: none"> Communication condition between option card and drive 	<ul style="list-style-type: none"> Check the environment (electromagnetic compatibility). Check the connections. Ensure that no more than 2 option cards (max. permitted) have been installed on the drive. Replace the option card. Contact Schneider Electric Product Support.
<i>I n F 1</i>	[Rating error]	<ul style="list-style-type: none"> The power card is different from the card stored 	<ul style="list-style-type: none"> Check the catalog number of the power card and ensure that it is compatible with the drive.
<i>I n F 2</i>	[Incompatible PB]	<ul style="list-style-type: none"> The power card is incompatible with the control card 	<ul style="list-style-type: none"> Check the catalog number of the power card and ensure that it is compatible with the drive.
<i>I n F 3</i>	[Internal serial link]	<ul style="list-style-type: none"> Communication condition between the internal cards 	<ul style="list-style-type: none"> Check the internal connections. Contact Schneider Electric Product Support.

Table 12: Conditions requiring a power reset (continued)

Code	Name	Probable cause	Remedy
<i>I n F 4</i>	[Internal MFG area]	<ul style="list-style-type: none"> Internal data inconsistent 	<ul style="list-style-type: none"> Contact Schneider Electric Product Support to have the drive recalibrated.
<i>I n F 5</i>	[Internal-option]	<ul style="list-style-type: none"> The option installed in the controller is not recognized 	<ul style="list-style-type: none"> Check the catalog reference and compatibility of the option.
<i>I n F 7</i>	[Internal-hard init.]	<ul style="list-style-type: none"> Initialization of the drive is incomplete 	<ul style="list-style-type: none"> Turn off the drive to reset.
<i>I n F 8</i>	[Internal-ctrl supply]	<ul style="list-style-type: none"> The control section power supply is incorrect 	<ul style="list-style-type: none"> Check the control section power supply.
<i>I n F 9</i>	[Internal-I measure]	<ul style="list-style-type: none"> The current measurements are incorrect 	<ul style="list-style-type: none"> Replace the current sensors or the power card. Contact Schneider Electric Product Support.
<i>I n F B</i>	[Internal-mains circuit]	<ul style="list-style-type: none"> The input stage is not operating correctly 	<ul style="list-style-type: none"> Perform the diagnostic tests via the [1.10 DIAGNOSTICS] menu. Contact Schneider Electric Product Support.
<i>I n F b</i>	[Internal-th. sensor]	<ul style="list-style-type: none"> The drive temperature sensor is not operating correctly 	<ul style="list-style-type: none"> Replace the temperature sensor. Contact Schneider Electric Product Support.
<i>I n F C</i>	[Internal-time meas.]	<ul style="list-style-type: none"> Detected fault on the electronic time measurement component 	<ul style="list-style-type: none"> Contact Schneider Electric Product Support.
<i>I n F E</i>	[Internal- CPU]	<ul style="list-style-type: none"> Internal microprocessor event 	<ul style="list-style-type: none"> Turn off the drive to reset. Contact Schneider Electric Product Support.
<i>□ C F</i>	[Overcurrent]	<ul style="list-style-type: none"> Motor parameters are not set correctly Excessive inertia or load Mechanical locking 	<ul style="list-style-type: none"> Check the motor parameters. Check the size of the motor, controller, and load. Check the state of the mechanism.
<i>P r F</i>	[Power removal]	<ul style="list-style-type: none"> Detected fault with the drive's Power Removal safety function¹ 	<ul style="list-style-type: none"> Contact Schneider Electric Product Support.
<i>5 C F 1</i>	[Motor short circuit]	<ul style="list-style-type: none"> Short-circuit or grounding at the drive output 	<ul style="list-style-type: none"> Check the cables connecting the drive to the motor, and the insulation of the motor Perform the diagnostic tests via the [1.10 DIAGNOSTICS] menu. Reduce the switching frequency. Connect chokes in series with the motor.
<i>5 C F 2</i>	[Impedant sh. circuit]	<ul style="list-style-type: none"> Significant ground leakage current at the controller output if several motors are connected in parallel 	
<i>5 C F 3</i>	[Ground short circuit]		
<i>5 D F</i>	[Overspeed]	<ul style="list-style-type: none"> Instability Overhauling load 	<ul style="list-style-type: none"> Check the motor, gain and stability parameters. Add a braking resistor. Check the size of the motor, controller, and load.
<i>5 P F</i>	[Speed Feedback Loss]	<ul style="list-style-type: none"> Encoder feedback signal missing. 	<ul style="list-style-type: none"> Check the wiring between the encoder and the drive. Check the encoder.
<i>t n F</i>	[Auto-tuning]	<ul style="list-style-type: none"> Special motor, or motor power not suitable for the drive Motor not connected to the drive 	<ul style="list-style-type: none"> Ensure that the motor and drive are compatible. Ensure that the motor is present during auto-tuning. If an output contactor is being used, close it during auto-tuning.

¹ Safety function as defined by IEC61508.

Auto-Reset Conditions (customer configured)

 DANGER

LOSS OF PERSONNEL AND EQUIPMENT PROTECTION FEATURES

- Enabling the fault inhibition (InH) will disable the drive protection features.
- InH should not be enabled for typical applications of this equipment.
- InH should be enabled only in extraordinary situations where a thorough risk analysis demonstrates that the presence of adjustable speed drive protection features poses a greater risk than personnel injury or equipment damage.

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

Table 13 lists the conditions that can be reset with the automatic restart function after the cause has been removed. These conditions can also be reset by turning the drive off then on again, or by means of a logic input or control bit (consult the Programming Manual on the CD-ROM supplied with the drive).

The following conditions can be inhibited and cleared remotely by means of a logic input or control bit: APF, CnF, COF, EPF1, EPF2, FCF2, LFF2, LFF3, LFF4, nFF, ObF, OHF, OLC, OLF, OPF1, OPF2, OSF, OtF1, OtF2, OtFL, PHF, PtF1, PtF2, PtFL, SLF1, SLF2, SLF3, SPIF, SSF, tJF, and ULF (consult the Programming Manual on the CD-ROM supplied with the drive).

Table 13: Auto-Reset Conditions (customer configured)

Code	Name	Probable cause	Remedy
<i>APPF</i>	[Application fault]	<ul style="list-style-type: none"> • Controller Inside card 	<ul style="list-style-type: none"> • Check the card programming. Refer to the card documentation.
<i>LCnF</i>	[Com. network]	<ul style="list-style-type: none"> • Communication interruption 	<ul style="list-style-type: none"> • Check the environment (electromagnetic compatibility). • Check the wiring. • Check the time-out. • Replace the option card. • Contact Schneider Electric Product Support.

Table 13: Auto-Reset Conditions (customer configured) (continued)

Code	Name	Probable cause	Remedy
C D F	[CAN com.]	<ul style="list-style-type: none"> • Interruption in communication on the CANopen bus 	<ul style="list-style-type: none"> • Check the communication bus. • Check the time-out. • Refer to the CANopen user's manual.
E P F 1	[External fit-LI/Bit]	<ul style="list-style-type: none"> • An external device, depending on user 	<ul style="list-style-type: none"> • Correct the device and reset the drive.
E P F 2	[External fault com.]	<ul style="list-style-type: none"> • A communication network 	<ul style="list-style-type: none"> • Correct the communication network and reset the drive.
F C F 2	[Out. contact. open.]	<ul style="list-style-type: none"> • The output contactor remains open although the closing conditions have been met 	<ul style="list-style-type: none"> • Check the contactor and its wiring. • Check the feedback circuit.
L C F	[input contactor]	<ul style="list-style-type: none"> • The drive is not turned on even though [Mains V. time out] (LCt) has elapsed. 	<ul style="list-style-type: none"> • Check the contactor and its wiring. • Check the time-out. • Check the line/contactor/controller connection.
L F F 2 L F F 3 L F F 4	[AI2 4-20mA loss] [AI3 4-20mA loss] [AI4 4-20mA loss]	<ul style="list-style-type: none"> • Loss of the 4 to 20 mA reference on analog input AI2, AI3 or AI4 	<ul style="list-style-type: none"> • Check the connection on the analog inputs.
n F F	[No Flow Fault]	<ul style="list-style-type: none"> • Zero fluid 	<ul style="list-style-type: none"> • Check and correct the cause of the low flow. • Check the zero fluid detection parameters (consult the Programming Manual on the CD-ROM supplied with the drive).
D b F	[Overbraking]	<ul style="list-style-type: none"> • Braking ramp too short • Overhauling load 	<ul style="list-style-type: none"> • Increase the deceleration time. • Install a braking resistor if necessary. • Activate the [Dec ramp adapt.] (brA) function (consult the Programming Manual on the CD-ROM supplied with the drive), if it is compatible with the application.
D H F	[Drive overheat]	<ul style="list-style-type: none"> • Ambient temperature too high • Drive ventilation blocked • Drive cooling fan 	<ul style="list-style-type: none"> • Check the motor load, the drive ventilation, and the ambient temperature. Wait for the controller to cool down before restarting.
D L C	[Proc.Overload Fit]	<ul style="list-style-type: none"> • Process overload (consult the programming manual on the CD-ROM) 	<ul style="list-style-type: none"> • Check and remove the cause of the overload. • Check the parameters of the [PROCESS UNDERLOAD] (OLd-) function (consult the CD-ROM supplied with the controller).
D L F	[Motor overload]	<ul style="list-style-type: none"> • Motor power rating too small for the application • Overload setting incorrect for the motor full-load rating • Output phase loss (see D P F 1) 	<ul style="list-style-type: none"> • Check the setting of the motor thermal current parameter. Check the motor load. Wait for the motor to cool down before restarting.

Table 13: Auto-Reset Conditions (customer configured) (continued)

Code	Name	Probable cause	Remedy
OPF1	[1 motor phase loss]	<ul style="list-style-type: none"> Loose connection causing loss of one phase at controller output 	<ul style="list-style-type: none"> Check the connections from the drive to the motor.
OPF2	[3 motor phase loss]	<ul style="list-style-type: none"> Motor not connected or motor power too low Output contactor open Instantaneous instability in the motor current 	<ul style="list-style-type: none"> Check the connections from the drive to the motor. If an output contactor is being used, consult the Programming Manual on the CD-ROM supplied with the drive. Test on a low-power motor or without a motor: In factory settings mode, motor phase loss detection is active [Output Phase Loss] (OPL) = [Yes] (YES). To check the drive in a test or maintenance environment without having to switch to a motor with the same rating as the drive (particularly useful in the case of high-power drives), deactivate motor phase loss detection [Output phase loss] (OPL) = [No] (nO). Check and optimize the parameters [Rated motor volt.] (UnS) and [Rated mot. current.] (nCr) and perform an [Auto tuning] (tUn).
OSF	[Mains overvoltage]	<ul style="list-style-type: none"> Line voltage too high Disturbances in the line supply 	<ul style="list-style-type: none"> Check the line voltage.
OTF1	[PTC1 overheat]	<ul style="list-style-type: none"> Overheating of the PTC1 probes detected 	<ul style="list-style-type: none"> Check the motor load and motor size. Check the motor ventilation. Wait for the motor to cool before restarting. Check the type and state of the PTC probes.
OTF2	[PTC2 overheat]	<ul style="list-style-type: none"> Overheating of the PTC2 probes detected 	
OTFL	[PTC=LI6 overheat]	<ul style="list-style-type: none"> Overheating of PTC probes detected on input LI6. 	
PTF1	[PTC1 probe]	<ul style="list-style-type: none"> PTC1 probes open or short-circuited 	
PTF2	[PTC2 probe]	<ul style="list-style-type: none"> PTC2 probes open or short-circuited 	
PTFL	[LI6=PTC probe]	<ul style="list-style-type: none"> PTC probes on input LI6 open or short-circuited 	
SCF4	[IGBT short circuit]	<ul style="list-style-type: none"> Power component 	<ul style="list-style-type: none"> Perform a test via the [1.10 DIAGNOSTICS] menu. Contact Schneider Electric Product Support.

Table 13: Auto-Reset Conditions (customer configured) (continued)

Code	Name	Probable cause	Remedy
S C F 5	[Motor short circuit]	<ul style="list-style-type: none"> Short-circuit at drive output 	<ul style="list-style-type: none"> Check the cables connecting the controller to the motor, and the motor insulation. Perform a test via the [1.10 DIAGNOSTICS] menu. Contact Schneider Electric Product Support.
S L F 1	[Modbus com.]	<ul style="list-style-type: none"> Interruption in communication on the Modbus bus 	<ul style="list-style-type: none"> Check the communication bus. Check the time-out. Refer to the Modbus User's Manual
S L F 2	[PowerSuite com.]	<ul style="list-style-type: none"> Communication with PowerSuite™ software 	<ul style="list-style-type: none"> Check the PowerSuite connecting cable. Check the time-out.
S L F 3	[HMI com.]	<ul style="list-style-type: none"> Communication with the graphic display terminal 	<ul style="list-style-type: none"> Check the terminal connection. Check the time-out.
S P I F	[PI Feedback]	<ul style="list-style-type: none"> PID feedback below the lower limit 	<ul style="list-style-type: none"> Check the PID function feedback. Check the PID feedback supervision threshold and time delay (consult the Programming Manual on the CD-ROM supplied with the drive).
S S F	[Torque/current lim]	<ul style="list-style-type: none"> Switch to torque limitation 	<ul style="list-style-type: none"> Check if there are any mechanical problems. Consult the Programming Manual on the CD-ROM supplied with the drive.
E J F	[IGBT overheat]	<ul style="list-style-type: none"> Drive overheated 	<ul style="list-style-type: none"> Check the size of the load, motor, and controller. Reduce the switching frequency. Wait for the drive to cool before restarting.
U L F	[Proc. Underload Fit]	<ul style="list-style-type: none"> Process underload 	<ul style="list-style-type: none"> Check and remove the cause of the underload. Consult the Programming Manual on the CD-ROM supplied with the drive.

Auto-Reset Conditions

DANGER

LOSS OF PERSONNEL AND EQUIPMENT PROTECTION

- Enabling the fault inhibition parameter (InH) will disable the drive protection features.
- InH should not be enabled for typical applications of this equipment.
- InH should be enabled only in extraordinary situations where a thorough risk analysis demonstrates that the presence of adjustable speed drive protection features poses a greater risk than personnel injury or equipment damage.

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

Table 14 on page 76 lists the conditions that can be reset as soon as the cause of the condition has been removed. The USF condition can be inhibited and cleared remotely by means of a logic input or control bit ([Fault inhibit assign.] (InH), consult the CD-ROM supplied with the drive).

Table 14: Auto Reset Conditions

Code	Name	Probable cause	Remedy
<i>C F F</i>	[Incorrect config.]	<ul style="list-style-type: none"> Option card changed or removed The current configuration is inconsistent 	<ul style="list-style-type: none"> Check that there are no card errors. If the option card was changed or removed deliberately, consult the Programming Manual on the CD-ROM supplied with the drive. Return to factory settings or retrieve the backup configuration, if it is valid (consult the Programming Manual on the CD-ROM supplied with the drive).
<i>C F I</i>	[Invalid config.]	<ul style="list-style-type: none"> Invalid configuration. The configuration loaded in the controller via the bus or network is inconsistent. 	<ul style="list-style-type: none"> Check the configuration loaded previously. Load a compatible configuration.
<i>H C F</i>	[Cards pairing]	<ul style="list-style-type: none"> The [CARDS PAIRING] (PPI-) function has been configured and a drive card has been changed 	<ul style="list-style-type: none"> Consult the Programming Manual on the CD-ROM supplied with the drive.
<i>P H F</i>	[Input phase loss]	<ul style="list-style-type: none"> Controller incorrectly supplied or a fuse blown Loss of one phase 3-phase ATV61 used on a single phase line supply Unbalanced load <p>Monitors only with the drive on load.</p>	<ul style="list-style-type: none"> Check the power connection and the fuses. Use a 3-phase mains supply Disable [Input phase loss] (IPL) = [No] (nO).
<i>P r t F</i>	[Power Ident]	<ul style="list-style-type: none"> The [Power Identification] (Prt) parameter is incorrect. Control card replaced by a control card configured on a drive with a different rating 	<ul style="list-style-type: none"> Enter the correct parameter (reserved for Schneider Electric product support). Check that there are no card errors. If the control card was changed deliberately, consult the Programming Manual on the CD-ROM supplied with the drive.
<i>U S F</i>	[Undervoltage]	<ul style="list-style-type: none"> Line supply too low Transient voltage dip Damaged pre-charge resistor 	<ul style="list-style-type: none"> Check the voltage and the voltage parameter (consult the Programming Manual on the CD-ROM supplied with the drive). Replace the pre-charge resistor. Contact Schneider Electric Product Support.

**Altivar® 61 Variable Speed Drive Controllers Simplified Manual
Instruction Bulletin**

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