Altivar® 61

Variable Speed Drives Simplified Manual

0.5–60 hp (0.37–45 kW) / 200–240 V
1–100 hp (0.75–75 kW) / 380–480 V
3–100 hp (2.2–90 kW) / 500–690 V

Instruction Bulletin

30072-451-60C

Retain for future use.

For Use in the United States of America

Schneider Electric

TABLE OF CONTENTS

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

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 drive[1].

⚠ 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 wiring 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 24 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 FROM A COMMUNICATION INTERRUPTION

- 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

IMPROPER DRIVE OPERATION

- If, for a prolonged period of time, voltage is not applied to the drive, the performance of its electrolytic capacitors will be reduced.
- If it is stopped for a prolonged period, turn the drive on every two years for at least 5 hours to restore the performance of the capacitors, then check its operation. It is recommended that the drive not be connected directly to the line voltage. The voltage should be increased gradually using an adjustable AC source.

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
P.O. Box 27446
Raleigh, NC 27611-7446

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 **20**)

- Mount the drive according to the instructions in this document.
- Install any internal and external options.

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

■ 4 Wire the drive (page **25**).

- 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 30 for control terminal card removal procedure.

■ 6 Select the language (page **42**),

if the drive is equipped with a graphic display terminal.

■ 7 Configure the menu [SIMPLY START] (SIM-) (page **44**)

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

☞ Optimize performance

To optimize performance:

- Refer to the auto-tuning section on page 53.
- Motor thermal current
- Acceleration and deceleration ramps
- Speed variation range

■ 8 Start.

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 1–4 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 61and 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 Single Phase Supply Voltage

Power Indicated on Plate[1]		Altivar 61 Drive				
		Part Number[2]	Output Interrupting Rating	Input Withstand Current	Drive Containment Rating	Max. Fuse Size
kW	hp		kA	kA	kA	A
0.37	0.5	ATV61H075M3	100	5	5	15
0.75	1	ATV61HU15M3	100	5	5	25
1.5	2	ATV61HU22M3	100	5	5	25
2.2	3	ATV61HU30M3	100	5	5	40
3	–	ATV61HU40M3[3]	100	5	5	45
4	5	ATV61HU55M3[3]	100	22	5	60
5.5	7.5	ATV61HU75M3[3]	100	22	5	70

1 These power ratings and currents are given for an ambient temperature of 50 °C (122 °F) at the factory-set switching frequency, used in continuous operation.

2 These part numbers are also available without a graphic terminal display by adding a Z to the end of the part number, for example, ATV61H075M3Z.

3 A line choke must be used. Refer to the drives catalog for more information.

Table 2: 200 V to 240 V 50/60 Hz Three Phase Supply Voltage

Power Indicated on Plate[1]		Altivar 61 Drive				
		Part Number[2]	Output Interrupting Rating	Input Withstand Current	Drive Containment Rating	Max. Fuse Size
kW	hp		kA	kA	kA	A
0.75	1	ATV61H075M3	100	5	5	15
1.5	2	ATV61HU15M3	100	5	5	25
2.2	3	ATV61HU22M3	100	5	5	25
3	–	ATV61HU30M3	100	5	5	40
4	5	ATV61HU40M3	100	5	5	45
5.5	7.5	ATV61HU55M3	100	22	5	60
7.5	10	ATV61HU75M3	100	22	5	70

Table 2: 200 V to 240 V 50/60 Hz Three Phase Supply Voltage *(continued)*

Power Indicated on Plate[1]		Altivar 61 Drive				
		Part Number[2]	Output Interrupting Rating	Input Withstand Current	Drive Containment Rating	Max. Fuse Size
kW	hp		kA	kA	kA	A
11	15	ATV61HD11M3X	100	22	5	90
15	20	ATV61HD15M3X	100	22	5	110
18.5	25	ATV61HD18M3X	100	22	5	125
22	30	ATV61HD22M3X	100	22	5	150
30	40	ATV61HD30M3X	100	22	5	200
37	50	ATV61HD37M3X	100	22	5	225
45	60	ATV61HD45M3X	100	22	10	300

1 These power ratings and currents are given for an ambient temperature of 50 °C (122 °F) at the factory-set switching frequency, used in continuous operation.

2 These part numbers are also available without a graphic terminal display by adding a Z to the end of the part number, for example, ATV61H075M3Z.

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 3 shows the fuse size required and available short circuit current rating associated with each drive.

Table 3: 380 V to 480 V, 50/60 Hz Three Phase Supply Voltage

Power Indicated on Plate[1]		Altivar 61 Drive				
		Part Number[2]	Output Interrupting Rating	Input Withstand Current	Drive Containment Rating	Max. Fuse Size
kW	hp		kA	kA	kA	A
0.75	1	ATV61H075N4	100	5	5	6
1.5	2	ATV61HU15N4	100	5	5	12
2.2	3	ATV61HU22N4	100	5	5	15
3	–	ATV61HU30N4	100	5	5	17.5
4	5	ATV61HU40N4	100	5	5	25
5.5	7.5	ATV61HU55N4	100	22	5	40
7.5	10	ATV61HU75N4	100	22	5	40
11	15	ATV61HD11N4	100	22	5	60

Table 3: 380 V to 480 V, 50/60 Hz Three Phase Supply Voltage *(continued)*

Power Indicated on Plate[1]		Altivar 61 Drive				
		Part Number[2]	Output Interrupting Rating	Input Withstand Current	Drive Containment Rating	Max. Fuse Size
kW	hp		kA	kA	kA	A
15	20	ATV61HD15N4	100	22	5	70
18.5	25	ATV61HD18N4	100	22	5	70
22	30	ATV61HD22N4	100	22	5	80
30	40	ATV61HD30N4	100	22	5	90
37	50	ATV61HD37N4	100	22	5	110
45	60	ATV61HD45N4	100	22	10	150
55	75	ATV61HD55N4	100	22	10	175
75	100	ATV61HD75N4	100	22	10	225

1 These power ratings and currents are given for an ambient temperature of 50 °C (122 °F) at the factory-set switching frequency, used in continuous operation.

2 These part numbers are also available without a graphic terminal display by adding a Z to the end of the part number, for example, ATV61H075M3Z.

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 4 shows the fuse size required and available short circuit current rating associated with each drive.

Table 4: 500 V to 690 V, 50/60 Hz Three Phase Supply Voltage

Power Indicated on Plate[1]			Altivar 61 Drive				
			Part Number	Output Interrupting Rating	Input Withstand Current	Drive Containment Rating	Max. Fuse Size
kW (500 V)	hp (600 V)	kW (690 V)		kA	kA	kA	A
2.2	3	3	ATV61HU30Y	100	22	22	10
3	–	4	ATV61HU40Y	100	22	22	15
4	5	5.5	ATV61HU55Y	100	22	22	15
5.5	7.5	7.5	ATV61HU75Y	100	22	22	20
7.5	10	11	ATV61HD11Y	100	22	22	25

Table 4: 500 V to 690 V, 50/60 Hz Three Phase Supply Voltage *(continued)*

Power Indicated on Plate[1]			Altivar 61 Drive				Max. Fuse Size
			Part Number	Output Interrupting Rating	Input Withstand Current	Drive Containment Rating	
kW (500 V)	hp (600 V)	kW (690 V)		kA	kA	kA	A
11	15	15	ATV61HD15Y	100	22	22	35
15	20	18.5	ATV61HD18Y	100	22	22	45
18.5	25	22	ATV61HD22Y	100	22	22	60
22	30	30	ATV61HD30Y	100	22	22	60
30	40	37	ATV61HD37Y	100	22	22	90
37	45	45	ATV61HD45Y	100	22	22	110
12	55	55	ATV61HD55Y	100	22	22	125
22	75	75	ATV61HD75Y	100	22	22	150
75	100	90	ATV61HD90Y	100	22	22	175

[1] These power ratings and currents are given for an ambient temperature of 50 °C (122 °F) at the factory-set switching frequency, used in continuous operation.

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 page 22.

⚠ 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.

Handling during installation

Altivar 61 drives up to 20 hp (see Table 1and Table 2 on page) and 25 hp (table & page) can be removed from their packaging and installed without a handling device.

A hoist must be used for higher ratings and for ATV61H•••Y drives; for this reason the controllers are fitted with handling holes. Attach a spreader bar to the top handling holes on the drive.

⚠ 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 30 for more information about the Power Removal Input.

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

CAUTION

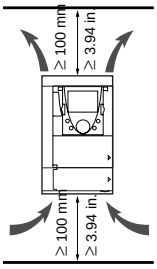
INCOMPATIBLE LINE VOLTAGE

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 and Temperature Conditions

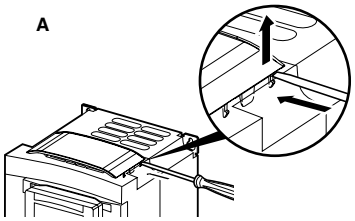


- Install the drive vertically, ±10°.
- Do not place it close to heating elements.
- Leave a minimum of 10 mm (0.39 in.) free space in front of the drive to ensure that the air required for cooling purposes can circulate from the bottom to the top of the unit.
- Where IP20 protection is adequate, we recommend that you remove the cover on top of the drive, as shown below in diagrams A and B.

Removing the top cover

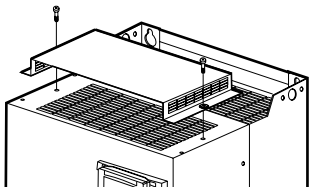
ATV61H 075M3 to D15M3X[1] and ATV61H 075N4 to D18N4[2]

A



ATV61H D18M3X to D45M3X[1], ATV61H D22N4 to D75N4[2], and ATV61H U30Y to D90Y[3]

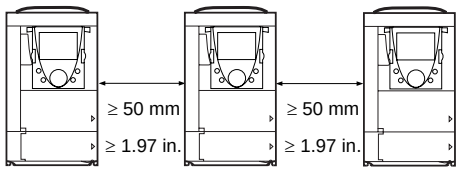
B



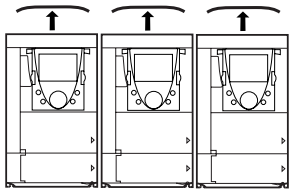
[1] For drive part numbers, see Table 2 on page 14.
[2] For drive part numbers, see Table 3 on page 15.
[3] For drive part numbers, seeTable 4 on page 16.

3 types of mounting are possible:

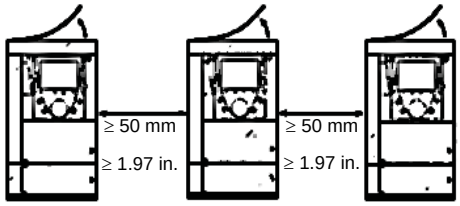
Type A mounting:
Free space ≥ 50 mm (≥ 1.97 in.) on each side, with cover in place.



Type B mounting:
Drives mounted side by side, with the cover removed (the degree of protection becomes IP20).



Type C mounting:
Free space ≥ 50 mm (≥ 1.97 in.) on each side, with cover removed (the degree of protection becomes IP20).

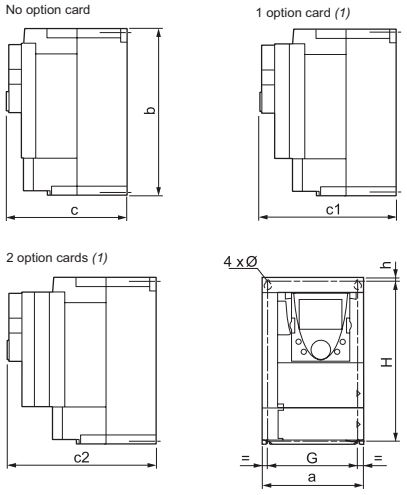


With these types of mounting, the drive can be used without derating up to an ambient temperature of 50°C (122°F), with the factory-set switching frequency. For other temperatures and other switching frequencies, consult the Installation Manual on the CD-ROM supplied with the drive.

Dimensions and Weights

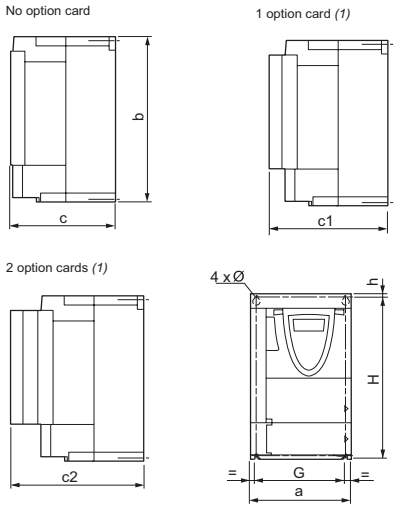
Refer to the Dimensions table on page 23.

With graphic display terminal



(1) For the addition of I/O extension cards, communication cards, or the Controller Inside programmable card.

Without graphic display terminal



For a drive without a graphic display terminal, dimensions c, c1 and c2 are reduced by 26 mm (1.01 in.). The other dimensions are unchanged.

(1) For the addition of I/O extension cards, communication cards, or the Controller Inside programmable card.

Table 5: Dimensions

ATV61H...	Dimensions, mm (in.)									Screws	Weight
	a	b	c	c1	c2	G	H	h	Ø		kg (lb)
075M3, U15M3, 075N4, U15N4, U22N4	130 (5.12)	230 (9.05)	175 (6.89)	198 (7.80)	221 (8.70)	113.5 (4.47)	220 (8.66)	5 (0.20)	5 (0.20)	M4	3 (6.61)
U22M3, U30M3, U40M3, U30N4, U40N4	155 (6.10)	260 (10.23)	187 (7.36)	210 (8.27)	233 (9.17)	138 (5.43)	249 (9.80)	4 (0.16)	5 (0.20)	M4	4 (8.82)
U55M3, U55N4, U75N4	175 (6.89)	295 (11.61)	187 (7.36)	210 (8.27)	233 (9.17)	158 (6.22)	283 (11.14)	6 (0.24)	5 (0.20)	M4	5.5 (12.13)
U75M3, D11N4	210 (8.27)	295 (11.61)	213 (8.39)	236 (9.29)	259 (10.20)	190 (7.48)	283 (11.14)	6 (0.24)	6 (0.24)	M5	7 (15.43)
D11M3X, D15M3X, D15N4, D18N4	230 (9.05)	400 (15.75)	213 (8.39)	236 (9.29)	259 (10.20)	210 (8.26)	386 (15.20)	8 (0.31)	6 (0.24)	M5	9 (19.84)
D18M3X, D22M3X, D22N4, U30Y to D30Y	240 (9.45)	420 (16.54)	236 (9.29)	259 (10.20)	282 (11.10)	206 (8.11)	403 (15.87)	11 (0.45)	6 (0.24)	M5	30 (66.14)
D30N4, D37N4,	240 (9.45)	550 (21.65)	266 (10.47)	289 (11.38)	312 (12.28)	206 (8.11)	531.5 (20.93)	11 (0.45)	6 (0.24)	M5	37 (81.57)
D30M3X, D37M3X, D45M3X	320 (12.60)	550 (21.65)	266 (10.47)	289 (11.38)	312 (12.28)	280 (11.02)	524 (20.93)	20 (0.79)	9 (0.35)	M8	37 (81.57)
D45N4, D55N4, D75N4 D37Y to D90Y	320 (12.60)	630 (24.80)	290 (11.42)	313 (12.32)	334 (13.15)	280 (11.02)	604.5 (23.80)	15 (0.59)	9 (0.35)	M8	45 (99.21)

DC Bus Voltage Measurement Procedure

Before working on the drive, turn it off and wait 15 minutes to allow the DC bus to discharge. Then measure the DC bus voltage.

Measuring the DC bus voltage

⚠ DANGER

HAZARD OF ELECTRIC SHOCK, EXPLOSION, OR ARC FLASH

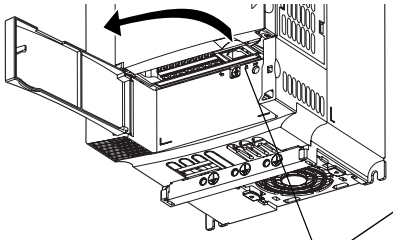
Read and understand the instructions on page 7 before performing this procedure.

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

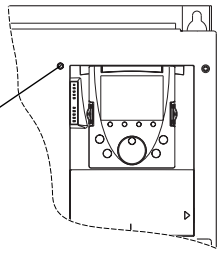
The DC bus voltage can exceed 1,000 V ⎓. Use a properly rated voltage-sensing device when performing this procedure. To measure the DC bus voltage:

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 ⎓.
4. If the DC bus capacitors do not discharge completely, contact your local Schneider Electric representative. Do not repair or operate the drive.

ATV61H 075M3 to D15M3X[1] and ATV61H 075N4 to D18N4[2]



ATV61H D18M3X to D45M3X[1] ATV61H D22N4 to D75N4[2], and ATV61H U30Y to D90Y[3]



Red LED indicating that the DC bus is turned on. The drive LEDs are not indicators of the absence of DC bus voltage.

[1] For drive part numbers, see Table 2 on page 14.
[2] For drive part numbers, see Table 3 on page 15.
[3] For drive part numbers, see Table 4 on page 16.

Wiring

Power

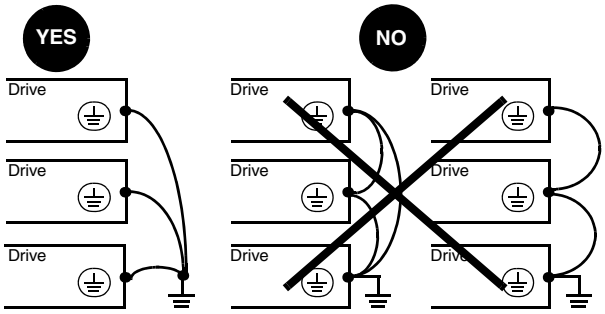
Ground the drive to local and national code requirements. A minimum wire size of 13.29 mm² (6 AWG) may be required to meet standards limiting leakage current.

⚠ 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).

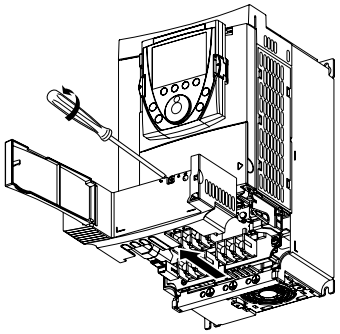
Failure to follow these instructions can result in equipment damage.

Power Terminals

Access to the power terminals

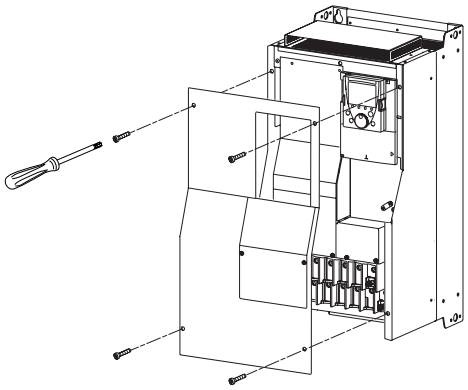
ATV61 H075M3 to HD15M3X[1] and ATV61 H075N4 to HD18N4[2]

Unlock the power-section access flap, and remove it as shown below.



ATV61 HD18M3X to HD45M3X[1], ATV61 HD22N4 to HD75N4[2], and ATV61H U30Y to HD90Y[3]

To access the power terminals, remove the front panel as shown below.



[1] For drive part numbers, see Table 2 on page 14.
[2] For drive part numbers, see Table 3 on page 15.
[3] For drive part numbers, see Table 4 on page 16.

Functions of power terminals

Terminals	Function
⏚	Protective ground connection terminal
R/L1 – S/L2 – T/L3	Power section line supply
PO	DC bus +polarity
PA/+	Output to braking resistor (+polarity)
PB	Output to braking resistor
PC/–	DC bus –polarity
U/T1 – V/T2 – W/T3	Outputs to the motor

NOTE: Remove the link between PO and PA/+ only if a DC choke has been added. The PO and PA/+ terminal screws must always be fully tightened, since a high current flows through the common link. Refer to the table on page 29 for tightening torque.

Characteristics of power terminals

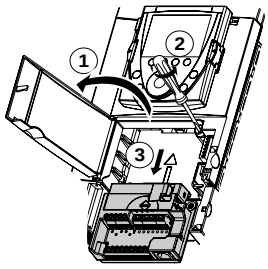
Table 6: Characteristics of power terminals

ATV61H...	Maximum wire size			Tightening torque
	mm²	AWG	kcmils	N•m (lb-in)
075M3, U15M3, U22M3, U30M3, U40M3,075N4, U15N4, U22N4, U30N4, U40N4,	4	10		1.4 (12.3)
U55M3, U55N4, U75N4	6	8		3 (26.5)
U73M3, D11N4	16	4		3 (26.5)
D11M3X, D15M3X, D15N4, D18N4	35	2		5.4 (47.7)
D18M3X, D22M3X, D22N4, D30N4, D37N4, U30Y to D30Y[1]	50	1/0		12 (106.2)
D30M3X, D37M3X, D45M3X, D45N4, D55N4, D75N4, D37Y to D90Y[1]	150		300	41 (360)

[1] For drive part numbers, see Table 4 on pages16 and 17.

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 ⎓ Maximum switching capacity: • on resistive load (cos φ = 1): 5 A for 250 V a or 30 V V ⎓ • on inductive load (cos φ = 0.4 and L/R = 7 ms): 2 A for 250 V a or 30 V ⎓ Max. response time: 7 ms ±0.5 ms Electrical service life: 100,000 operations
R2A R2C	1 relay logic output one N.O. contact	
+10	+10 V ⎓ power supply for reference potentiometer 1 to 10 kΩ	• +10 V ⎓ (10.5 V ±0.5 V) • 10 mA max.
AI1+ AI1–	Differential analog input AI1	• –10 to +10 V ⎓ (max. safe voltage 24 V) • Reaction time: 2 ms ±0.5 ms, 11-bit resolution + 1 sign bit • Accuracy ±0.6% for Δθ = 60 °C (140 °F), linearity ±0.15% of max. value
COM	Analog I/O common	0 V
AI2	Depending on the software configuration: Analog voltage or current input	• Analog input 0 to +10 V ⎓ (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 ±0.6% for Δθ = 60 °C (140 °F), linearity ±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	• 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 ±1% for Δθ = 60 °C (140 °F), linearity ±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	• +24 V ⎓ (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	• +24 V ⎓ (max. 30 V) • Impedance 3.5 kΩ • Reaction time: 2 ms ± 0.5 ms **SW1 Switch** / **State 0** / **State 1** Source (factory setting) / < 5 V ⎓ / > 11 V ⎓ Sink Int or Sink Ext / > 16 V ⎓ / < 10 V ⎓
LI6	Depending on the position of the SW2 switch: LI (Programmable logic input) or PTC (Input for PTC probes)	SW2 = LI (factory setting): • Same characteristics as logic inputs LI1 to LI5 SW2 = PTC: • Trip threshold 3 kΩ, reset threshold 1.8 kΩ • Short-circuit detection threshold < 50 Ω

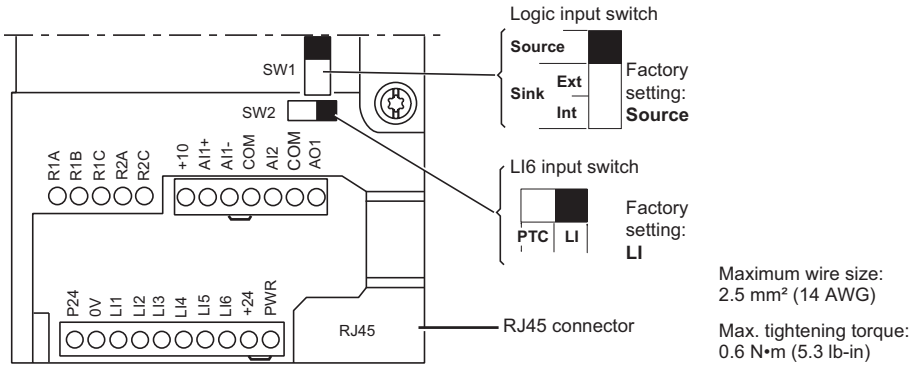
NOTE: Δθ = temperature change

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: • Internal +24 V ⎓ power supply (min. 21 V, max. 27 V), protected against short-circuits and overloads • 200 mA max. SW1 switch in Sink Ext position: • Input for external +24 V ⎓ power supply for the logic inputs
PWR	Power Removal input.	• 24 V ⎓ (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).	

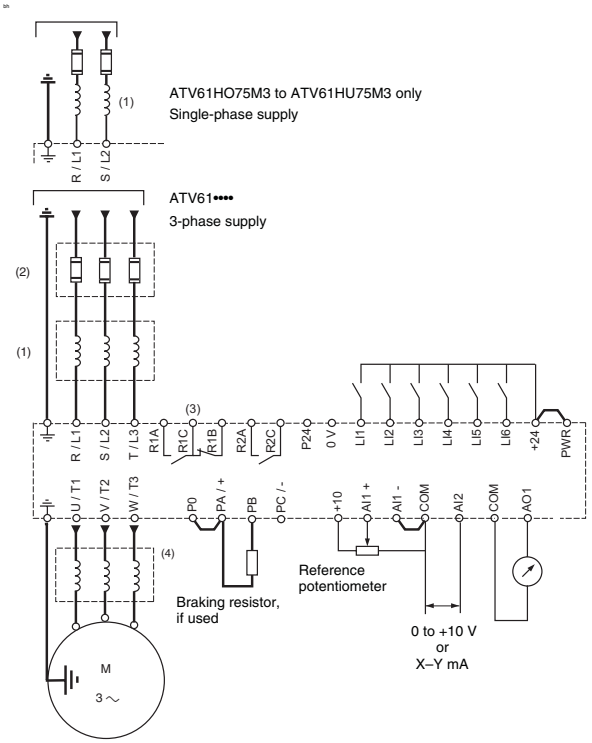
NOTE: Δθ = temperature change

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



1 Line reactor, if used (required in single phase operation for ATV61H U40M3 to U75M3 drives). Recommended for 575 V installations.

2 For recommended fuses, refer to Tables 1–4 on pages14–16, the drive nameplate, or the *Altivar 61 and 71 Supplementary Short Circuit Protection Information* bulletin shipped with the drive.

3 R1 relay contacts, for remote signaling of drive status.

4 Installation of a load reactor or motor protecting filter is recommended for all 575 V installations.

NOTE:

- To operate the drive on a single phase supply, you must inhibit the input phase loss detection. If the input phase loss detection is set to its factory configuration, the drive will display a PHF code until the input phase loss is inhibited. For possible drives, see Table 1 on page 14.
- 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 38 for factory configurations for logic inputs, analog inputs, relays and analog inputs.

Operation on an Isolated, Impedance Grounded (IT), or Corner Grounded Delta System

Isolated or impedance grounded (IT) neutral system:
Use a permanent insulation monitor compatible with non-linear loads, such as a Merlin Gerin Type XM200 or equivalent. Altivar 61 drives feature built-in common mode RFI (EMC) filters. When any ATV61 drive is operating on an isolated or impedance grounded electrical distribution system, the filters must be isolated (disconnected).

NOTE: The ATV61D22N4 has two jumpers for filter disconnection.

CAUTION

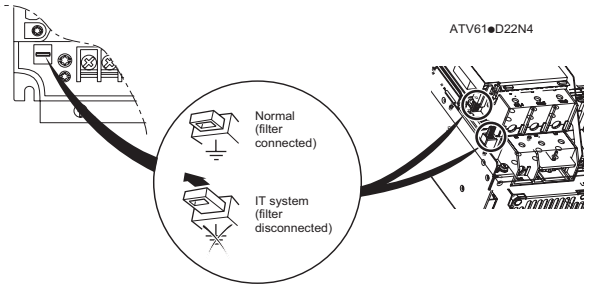
DRIVE DAMAGE

- Do not exceed 4 kHz switching frequency on ATV61H 075N4(Z), U15N4(Z), U22N4(Z), U30N4(Z), U40N4(Z drives if the filters are disconnected.
- Refer to the programming manual on the CD-ROM supplied with the drive to adjust parameter SFr.

Failure to follow these instructions can result in equipment damage.

Disconnecting the filter

For ATV61HO75M3–ATV61HD45M3X[1], ATV61HO75N4–ATV61HD75N4[2], and ATV61HU3OY–ATV61HD30Y[3]

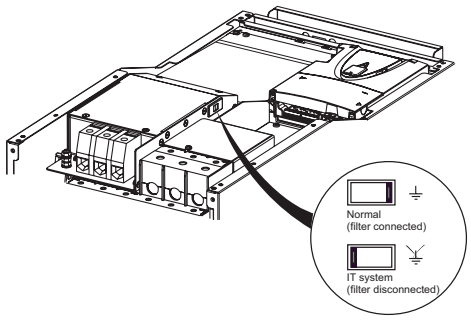


1 For ATV61 part numbers, see Tables 1 and 2 on pages 14 and 15.

2 For ATV61 part numbers, see Table 3 on pages15 and 16.

3 For ATV61 part numbers, see Table4 on pages 16 and 17.

For ATV61HD37Y, ATV61HD45Y, ATV61HD55Y, ATV61HD75Y, and ATV61HD90Y



⚠ WARNING

RISK OF ELECTRIC SHOCK

ATV61•••Y drives must not be connected to a corner grounded system.

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

Corner grounded delta systems:
The ATV61HU30Y–ATV61HD90Y drives[1] must **never** be connected on a corner grounded delta electrical distribution system. When any other drive referenced in this manual is connected to a corner grounded delta electrical distribution system the filters must be isolated (disconnected) as shown in the diagram above.

[1] For ATV61 part numbers, see Table 4 on pages16 and 17.

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, 100V or higher) in order to provide a path for the higher frequency noise.
- Keep the control circuits away from the power circuits. For control and speed reference circuits, use of shielded twisted cables with a pitch of between 25 and 50 mm (0.98 and 1.97 in.) is recommended.
- Ensure maximum separation between the power supply cable (line supply) and the motor cable and also ensure maximum separation between the control cables and any power cables.

- The motor cables must be at least 0.5 m (20 in.) long.
- Do not use surge arresters or power factor correction capacitors on the variable speed drive output.
- If using an additional input filter, refer to the Installation Guide for more information.
- For installation of the EMC plate provided with the drive and instructions for meeting EN55011 Class A directive, refer to the 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	• LI1: forward (1 operating direction), 2-wire control type is transition. See “Starting” on page 39. • 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)
Analog inputs	• AI1: 1st speed reference 0 to 10 V • AI2: 2nd speed reference 0 to 20 mA **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.
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 s.

Failure to follow these instructions can result in equipment damage.

Starting

Important: The factory setting for the programming parameter [2-wire type] is set to [Transition], when input line power is applied nSt 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 42.

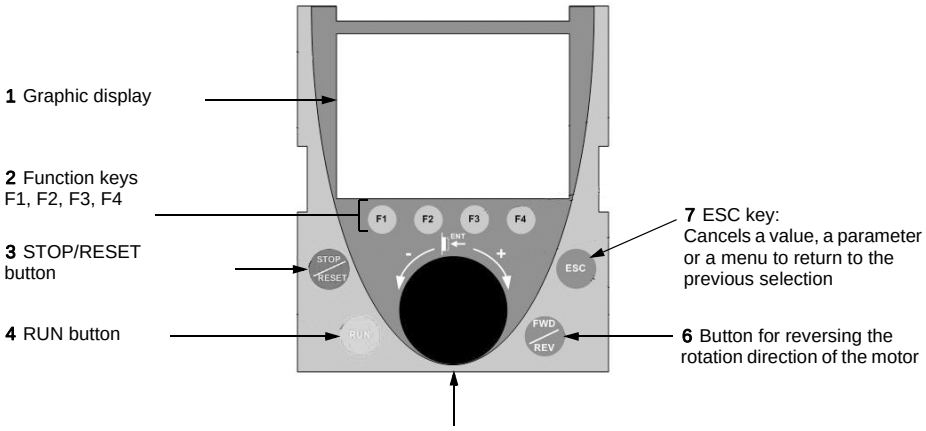
Test on a low-power motor or without a motor, using motors in parallel

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 (on the door of an enclosure, for example) using the cables and accessories available as options.



5 Navigation button:

- Press (ENT):
  - To save the current value
  - To enter the selected menu or parameter
- Turn CW/CCW:
  - To increase or decrease a value
  - To go to the next or previous line
  - To increase or decrease the reference if control via the graphic display terminal is activated

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

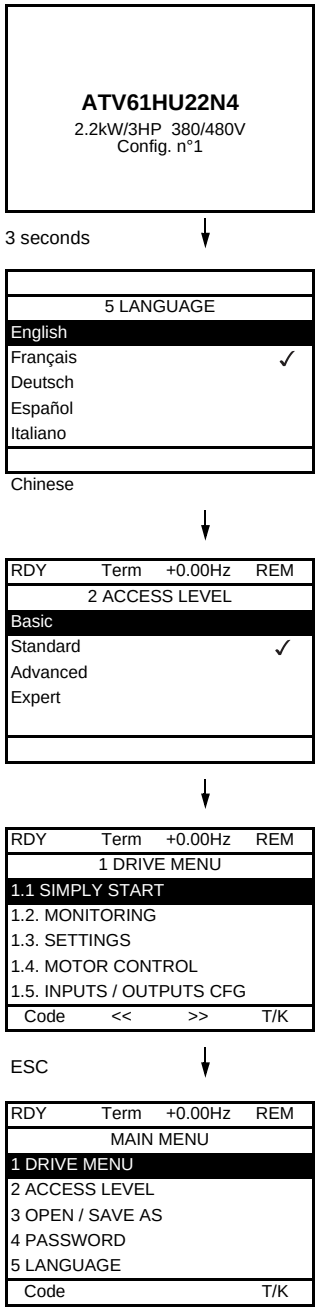
Table 9: Drive state codes

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 page page 50).

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.



Displayed for 3 seconds following power-up

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)

Press ESC to return to [MAIN MENU]

Integrated Display Terminal

The integrated display terminal with a 7-segment 4-digit display is an optional feature for the low-power ATV61 drives. The graphic display terminal described on page 40 is supplied as standard.

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.

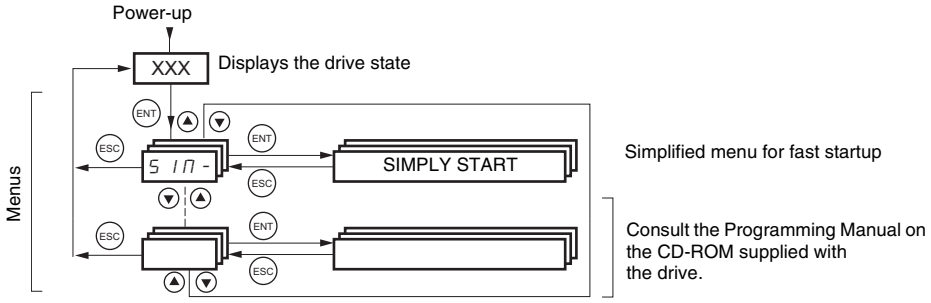
The display flashes once a value is stored.

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)
- CLI: Current limit
- CtL: 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.
- 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 display flashes continuously to indicate the presence of a detected fault.

Access to Menus



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 flt]	[No drive flt]	[No drive flt]	[No drive flt]	[No drive flt]
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]

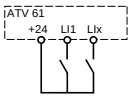
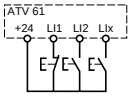
The assignment of inputs LI1 to LI6 differs in 3-wire control.

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
tCC	**[2/3 wire control]**		[2 wire] (2C)
2C 3C	• **[2 wire]** (2C) • **[3 wire]** (3C) **2-wire control** **Maintained control:** Maintained closed to run and maintained opened to stop.  Example of source wiring: LI1: forward LIx: reverse **3-wire control** (Pulse control): A forward or reverse pulse is sufficient to command starting, a stop pulse is sufficient to command stopping.  Example of source wiring: LI1: stop LI2: forward LIx: reverse 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.		

⚠ DANGER

UNINTENDED EQUIPMENT OPERATION

- Ensure that this parameter is configured before configuring the [1.6 COMMAND] (Ctl-) and [1.7 APPLICATION FUNCT.] (FUn-).
- Ensure that this assignment change is compatible with the wiring scheme used. For more information, consult the CD-ROM with the drive.

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

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

Code	Name/Description	Adjustment range	Factory setting
CFG	**[Macro configuration]** • **[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 To change the assignment of [Macro configuration] (CFG) press the ENT key for 2 s. **⚠ DANGER** **UNINTENDED EQUIPMENT OPERATION** Ensure that the selected macro configuration is compatible with the wiring scheme used. **Failure to follow these instructions will result in death or serious injury.**		[Pumps.Fans] (PnF)
CCFG YES	**[Customized macro]** Read-only parameter, visible only if at least one macro configuration parameter has been modified. • **[Yes]** (YES)		
bFr 50 60	**[Standard mot. freq]** • [50 Hz IEC] (50): IEC • [60 Hz NEMA] (60): NEMA 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] (ItH) and [High speed] (HSP), see page 51.		[50 Hz IEC] (50)
IPL nO YES	**[Input phase loss]** • **[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 on an undervoltage fault. 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	**[Rated motor power]** 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).	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
UnS	**[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)
nCr	**[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)
FrS	**[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
nSP	**[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: • 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.
tFr	**[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: • 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	**[Auto tuning]** **⚠ DANGER** **HAZARD OF ELECTRIC SHOCK, EXPLOSION, OR ARC FLASH** • During auto tuning, the motor operates at rated current. • Do not service the motor during auto tuning. **Failure to follow these instructions will result in death or serious injury.** **⚠ DANGER** **UNINTENDED EQUIPMENT OPERATION** • 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. **Failure to follow these instructions will result in death or serious injury.**		[No] (nO)
nO YES dOnE	• **[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:** • 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). **NOTE:** During auto-tuning the motor operates at rated current.		

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

Code	Name/Description	Adjustment range	Factory setting
tUS	**[Auto tuning status]**		[Not done] (tAb)
	(for information only, cannot be modified)		
tAb PEnd PrOG FAIL dOnE	• **[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.		
PHr	**[Output Ph rotation]**		[ABC] (AbC)
AbC ACb	• **[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		Factory setting
ItH	**[Mot. therm. current]**	0 to 1.1 or 1.2 In (1) according to rating	Varies with the drive rating.
	Motor thermal overload current, to be set to the rated current indicated on the nameplate.		
ACC	**[Acceleration]**	0.1 to 999.9 s	3.0 s
	Time to accelerate from 0 to the [Rated motor freq.] (FrS) (page 49). Ensure that this value is compatible with the inertia being driven.		
dEC	**[Deceleration]**	0.1 to 999.9 s	3.0 s
	Time to decelerate from the [Rated motor freq.] (FrS) (page 49) to 0. Ensure that this value is compatible with the inertia being driven.		
LSP	**[Low speed]**		0
	Motor frequency at minimum reference, can be set between 0 and [High speed] (HSP).		
HSP	**[High speed]**		50 Hz
	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).		

(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 47
  - — [2 wire type] (tCt) parameter, described on page 39 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

- 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 53 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
AI2F	[AI2 input]	• AI2 signal out of range	• Check the wiring of analog input AI2 and the value of the signal.
bOF	[DBR overload]	• Incorrect DB resistor settings	• 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).
bUF	[DB unit sh. Circuit]	• Short-circuit output from braking unit	• Check the wiring of the braking unit and the resistor. • Check the braking resistor.
CrF1	[Precharge]	• Charging relay control condition or charging resistor damaged	• Turn the drive off and then back on again. • Check the internal connections. • Contact Schneider Electric Product Support.
CrF2	[Thyr. soft charge]	• Improper DC bus charging condition (thyristors)	
EEF1	[Control Eeprom]	• Control card Internal memory	• Check the environment (electromagnetic compatibility). • Turn off, reset, return to factory settings. • Contact Schneider Electric Product Support.
EEF2	[Power Eeprom]	• Power card internal memory	
FCF1	[Out. contact. stuck]	• The output contactor remains closed although the opening conditions have been met	• Check the contactor and its wiring. • Check the feedback circuit.
HdF	[IGBT desaturation]	• Short-circuit or grounding at the drive output	• Check the cables connecting the drive to the motor, and the motor insulation. • Perform the diagnostic tests via the [1.10 DIAGNOSTICS] menu.
ILF	[internal com. link]	• Communication condition between option card and drive	• 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.
InF1	[Rating error]	• The power card is different from the card stored	• Check the catalog number of the power card and ensure that it is compatible with the drive.
InF2	[Incompatible PB]	• The power card is incompatible with the control card	• Check the catalog number of the power card and ensure that it is compatible with the drive.
InF3	[Internal serial link]	• Communication condition between the internal cards	• Check the internal connections. • Contact Schneider Electric Product Support.

Table 12: Conditions requiring a power reset *(continued)*

Code	Name	Probable cause	Remedy
InF4	[Internal MFG area]	• Internal data inconsistent	• Contact Schneider Electric Product Support to have the drive recalibrated.
InF6	[Internal-option]	• The option installed in the controller is not recognized	• Check the catalog reference and compatibility of the option.
InF7	[Internal-hard init.]	• Initialization of the drive is incomplete	• Turn off the drive and reset.
InF8	[Internal-ctrl supply]	• The control section power supply is incorrect	• Check the control section power supply.
InF9	[Internal-I measure]	• The current measurements are incorrect	• Replace the current sensors or the power card. • Contact Schneider Electric Product Support.
InFA	[Internal-mains circuit]	• The input stage is not operating correctly	• Perform the diagnostic tests via the [1.10 DIAGNOSTICS] menu. • Contact Schneider Electric Product Support.
InFb	[Internal-th. sensor]	• The drive temperature sensor is not operating correctly	• Replace the temperature sensor. • Contact Schneider Electric Product Support.
InFC	[Internal-time meas.]	• Detected fault on the electronic time measurement component	• Contact Schneider Electric Product Support.
InFE	[internal- CPU]	• Internal microprocessor event	• Turn off the drive and reset. Contact Schneider Electric Product Support.
OCF	[Overcurrent]	• Motor parameters are not set correctly • Excessive inertia or load • Mechanical locking	• Check the motor parameters. • Check the size of the motor, controller, and load. • Check the state of the mechanism.
PrF	[Power removal]	• Detected fault with the drive's Power Removal safety function[1]	• Contact Schneider Electric Product Support.
SCF1	[Motor short circuit]	• Short-circuit or grounding at the drive output • Significant earth leakage current at the controller output if several motors are connected in parallel	• 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.
SCF2	[Impedant sh. circuit]		
SCF3	[Ground short circuit]		
SOF	[Overspeed]	• Instability • Overhauling load	• Check the motor, gain and stability parameters. • Add a braking resistor. • Check the size of the motor, controller, and load.
SPF	[Speed Feedback Loss]	• Encoder feedback signal missing.	• Check the wiring between the encoder and the drive. • Check the encoder.
tnF	[Auto-tuning]	• Special motor, or motor power not suitable for the drive • Motor not connected to the drive	• 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
APF	[Application fault]	• Controller Inside card	• Check the card programming. Refer to the card documentation.
CnF	[Com. network]	• Communication interruption	• 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
CAN	[CAN com.]	• Interruption in communication on the CANopen bus	• Check the communication bus. • Check the time-out. • Refer to the CANopen user's manual.
EPF1	[External flt-LI/Bit]	• An external device, depending on user	• Correct the device and reset the drive.
EPF2	[External fault com.]	• A communication network	• Correct the communication network and reset the drive.
FCF2	[Out. contact. open.]	• The output contactor remains open although the closing conditions have been met	• Check the contactor and its wiring. • Check the feedback circuit.
LCF	[input contactor]	• The drive is not turned on even though [Mains V. time out] (LCt) has elapsed.	• Check the contactor and its wiring. • Check the time-out. • Check the line/contactor/controller connection.
LFF2 LFF3 LFF4	[AI2 4-20mA loss] [AI3 4-20mA loss] [AI4 4-20mA loss]	• Loss of the 4 to 20 mA reference on analog input AI2, AI3 or AI4	• Check the connection on the analog inputs.
nFF	[No Flow Fault]	• Zero fluid	• 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).
ObF	[Overbraking]	• Braking ramp too short • Overhauling load	• 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.
OHF	[Drive overheat]	• Ambient temperature too high • Drive ventilation blocked • Drive cooling fan failure	• Check the motor load, the drive ventilation, and the ambient temperature. Wait for the controller to cool down before restarting.
OLC	[Proc.Overload Flt]	• Process overload (consult the programming manual on the CD-ROM)	• 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).
OLF	[Motor overload]	• Motor power rating too small for the application • Overload setting incorrect for the motor full-load rating • Output phase loss (see OPF1)	• 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]	• Loose connection causing loss of one phase at controller output	• Check the connections from the drive to the motor.
OPF2	[3 motor phase loss]	• Motor not connected or motor power too low • Output contactor open • Instantaneous instability in the motor current	• 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]	• Line voltage too high • Disturbances in the line supply	• Check the line voltage.
OTF1	[PTC1 overheat]	• Overheating of the PTC1 probes detected	• 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]	• Overheating of the PTC2 probes detected	
OTFL	[PTC=LI6 overheat]	• Overheating of PTC probes detected on input LI6.	
PTF1	[PTC1 probe]	• PTC1 probes open or short-circuited	• Check the PTC probes and the wiring between them and the motor/controller.
PTF2	[PTC2 probe]	• PTC2 probes open or short-circuited	
PTFL	[LI6=PTC probe]	• PTC probes on input LI6 open or short-circuited	
SCF4	[IGBT short circuit]	• Power component	• 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
SCFS	[Motor short circuit]	• Short-circuit at drive output	• 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.
SLF1	[Modbus com.]	• Interruption in communication on the Modbus bus	• Check the communication bus. • Check the time-out. • Refer to the Modbus User's Manual
SLF2	[PowerSuite com.]	• Communication with PowerSuite™ software	• Check the PowerSuite -connecting cable. • Check the time-out.
SLF3	[HMI com.]	• Communication with the graphic display terminal	• Check the terminal connection. • Check the time-out.
SPIF	[PI Feedback]	• PID feedback below the lower limit	• 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).
SSF	[Torque/current lim]	• Switch to torque limitation	• Check if there are any mechanical problems. • Consult the Programming Manual on the CD-ROM supplied with the drive.
tJF	[IGBT overheat]	• Drive overheated	• Check the size of the load, motor, and controller. • Reduce the switching frequency. • Wait for the drive to cool before restarting.
ULF	[Proc. Underload Flt]	• Process underload	• 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 60 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
CFF	[Incorrect config.]	• Option card changed or removed • The current configuration is inconsistent	• 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).
CFI	[Invalid config.]	• Invalid configuration. The configuration loaded in the controller via the bus or network is inconsistent.	• Check the configuration loaded previously. • Load a compatible configuration.
HCF	[Cards pairing]	• The [CARDS PAIRING] (PPI-) function has been configured and a drive card has been changed	• Consult the Programming Manual on the CD-ROM supplied with the drive.
PHF	[Input phase loss]	• Controller incorrectly supplied or a fuse blown • Loss of one phase • 3-phase ATV61 used on a single phase line supply • Unbalanced load Monitors only with the drive on load.	• Check the power connection and the fuses. • Use a 3-phase mains supply • Disable [Input phase loss] (IPL) = [No] (nO).
PrtF	[Power Ident]	• The [Power Identification] (Prt) parameter is incorrect. • Control card replaced by a control card configured on a drive with a different rating	• 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.
USF	[Undervoltage]	• Line supply too low • Transient voltage dip • Damaged pre-charge resistor	• 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 and Supplementary Instructions
Instruction Bulletin

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