Altivar 61

Variable speed drives for synchronous and asynchronous motors

Installation Manual

03/2011



55 kW (75 HP) ... 90 kW (125 HP)/200 - 240V

90 kW (125 HP) ... 630 kW (900 HP)/380 - 480V

90 kW (125 HP) ... 800 kW (800 HP)/500 - 690V

1760655

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Table of Contents

Important information 4
Before you begin 5
Steps for setting up the drive 6
Preliminary recommendations 7
Drive ratings 11
Dimensions and weights 14
Installing the DC choke on ATV61H●●●M3X and ATV61H●●●N4 drives 17
Installing the DC choke on ATV61H●●●M3X and ATV61H●●●N4 drives 18
Installing the transformer(s) on ATV61H●●●Y drives 19
Connecting the transformer(s) on ATV61H●●●Y drives 20
Derating as a function of the temperature and switching frequency 22
Mounting in a wall-mounted or floor-standing enclosure 25
Installing the kit for IP31/UL Type 1 conformity 28
Position of the charging LED 30
Installing option cards 31
Wiring recommendations 33
Power terminals 35
Control terminals 52
Option terminals 54
Connection diagrams 59
Connection diagrams 60
Operation on an IT system and a "corner grounded" system 73
Electromagnetic compatibility, wiring 76

Important information

PLEASE NOTE

Please read these instructions carefully and examine the equipment in order to familiarize yourself with the device before installing, operating or carrying out any maintenance work on it.

The following special messages that you will come across in this document or on the device are designed to warn you about potential risks or draw your attention to information that will clarify or simplify a procedure.



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



This is a safety warning symbol. It warns you of potential risks of injury. You must comply with all safety messages that follow this symbol in order to avoid the risk of injury or death.

⚠ DANGER

DANGER indicates an imminently hazardous situation which, if not avoided, **will result in** death, serious injury or equipment damage.

⚠ WARNING

WARNING indicates a potentially hazardous situation which, if not avoided, **can result in** death, serious injury or equipment damage.

⚠ CAUTION

CAUTION indicates a potentially hazardous situation which, if not avoided, **can result in** injury or equipment damage.

PLEASE NOTE:

Only qualified staff are authorized to carry out maintenance work on electrical equipment. Schneider Electric accepts no responsibility for the consequences of using this device. This document does not constitute an instruction manual for inexperienced personnel.
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Read and understand these instructions before performing any procedure on this drive.

⚠ DANGER

HAZARDOUS VOLTAGE

- Read and understand this manual before installing or operating the ATV61 drive. Installation, adjustment, repair, and maintenance must be performed by qualified personnel.
- The user is responsible for compliance with all international and national electrical standards in force concerning protective grounding of all equipment.
- Many parts of this variable speed drive, including the printed circuit boards, operate at the line voltage. DO NOT TOUCH.
  Use only electrically insulated tools.
- DO NOT touch unshielded components or terminal strip screw connections with voltage present.
- DO NOT short across terminals PA and PB or across the DC bus capacitors.
- Install and close all covers before applying power or starting and stopping the drive.
- Before servicing the variable speed drive
  - Disconnect all power.
  - Place a “DO NOT TURN ON” label on the variable speed drive disconnect.
  - Lock the disconnect in the open position.
- Disconnect all power including external control power that may be present before servicing the drive. Wait for the charging LED to go off. Then follow the DC bus voltage measurement procedure on page 30 to verify that the DC voltage is less than 45 V. The drive LEDs are not accurate indicators of the absence of DC bus voltage.

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

⚠ CAUTION

IMPROPER DRIVE OPERATION

- If the drive is not switched on for a long period, 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 is not 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.

INSTALLATION

■ 1 Receive and inspect the drive controller

- ☐ Check that the catalog number printed on the label is the same as that on the purchase order
- ☐ Remove the Altivar from its packaging and check that it has not been damaged in transit

■ 2 Check the line voltage

- ☐ Check that the line voltage is compatible with the voltage range of the drive (see pages 11 to 13)

Steps 1 to 4 must be performed with the power off



■ 3 Mount the drive

- ☐ Install the drive in accordance with the instructions in this document
- ☐ Install and connect the DC choke (see page 16) or the transformer(s) (see page 19) and the AC choke
- ☐ Install any internal and external options

■ 4 Wire the drive

- ☐ Connect the motor, ensuring that its connections correspond to the voltage
- ☐ Connect the line supply, after making sure that it is turned off
- ☐ Connect the control
- ☐ Connect the speed reference

PROGRAMMING

☐ 5 Please refer to the Programming Manual

Preliminary recommendations

Acceptance

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

- ATV61H●●●M3X and ATV61H●●●N4 contain:
  - The drive and a DC choke, both mounted on the same pallet. The DC choke consists of 1 to 3 components depending on the drive rating.
- ATV61H●●●M3XD and ATV61H●●●N4D contain:
  - The drive only.
- ATV61H●●●Y contains:
  - The drive and one or two transformers mounted on the same pallet.

Handling/storage

To protect the drive prior to installation, handle and store the device in its packaging. Ensure that the ambient conditions are acceptable.

WARNING

DAMAGED PACKAGING

If the packaging appears damaged, it can be dangerous to open and handle it.
Take precautions against all risks when performing this operation.
Failure to follow this instruction can result in death, serious injury or equipment damage.

WARNING

DAMAGED EQUIPMENT

Do not install or operate any drive that appears damaged.
Failure to follow this instruction can result in death, serious injury or equipment damage.

Unpacking/handling ATV61H●●●M3X and ATV61H●●●N4 drives

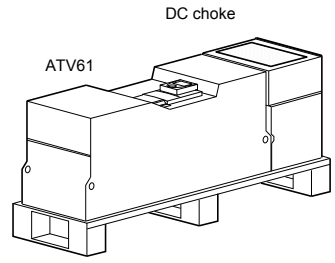


Figure 1

The drive and the DC choke are mounted on a pallet with screws (figure 1). When the DC choke is present, it is supplied already assembled to make it easier to transport. It consists of 1 to 3 components depending on the drive rating. The unit should be unpacked in the following order:

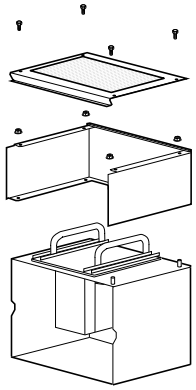


Figure 2

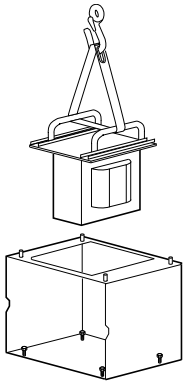


Figure 3

1 Disassemble the components of the DC choke (figure 2) for installation later, and remove the choke by means of a hoist (figure 3).

2 Remove the fixing screws (figure 3) from the choke support on the pallet.

⚠ WARNING

RISK OF CUTS

The fixing screws that hold the choke support on the pallet are difficult to access, leading to a risk of cutting oneself. Take all possible measures to avoid this risk, and use protective gloves.

Failure to follow this instruction can result in death, serious injury or equipment damage.

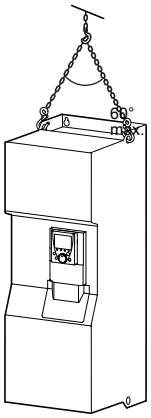


Figure 4

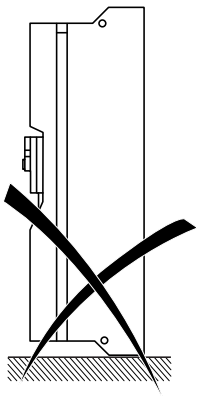


Figure 5

3 Remove the screws holding the drive on the pallet and lift off the drive by means of a hoist. It is fitted with handling lugs for this purpose (figure 4).

⚠ WARNING

RISK OF TOPPLING

Never stand the drive upright (figure 5) without keeping hold of it, or it will topple over.

Failure to follow this instruction can result in death, serious injury or equipment damage.

Unpacking/handling ATV61H●●●M3XD and ATV61H●●●N4D drives

These models do not include a DC choke; just follow the procedure in step **3** above.

Unpacking/handling ATV61H●●●Y drives

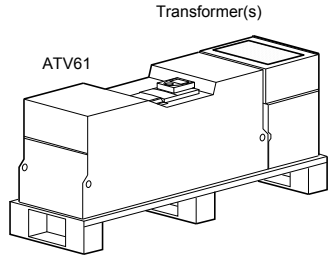


Figure 1

The drive and one or two transformers are mounted on a pallet with screws (figure 1). The transformer(s) are supplied already assembled to make them easier to transport. The unit should be unpacked in the following order:

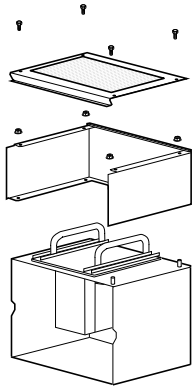


Figure 2

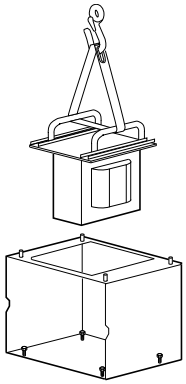


Figure 3

1 Disassemble the components of the transformer(s) (figure 2) for installation later, and remove the transformer(s) by means of a hoist (figure 3).

2 Remove the fixing screws (figure 3) from the transformer support.

⚠ WARNING

RISK OF CUTS

The fixing screws that hold the transformer support on the pallet are difficult to access, leading to a risk of cutting oneself. Take all possible measures to avoid this risk, and use protective gloves.

Failure to follow this instruction can result in death, serious injury or equipment damage.

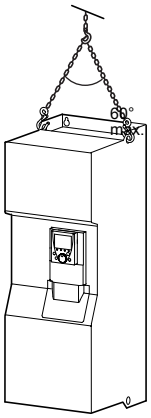


Figure 4

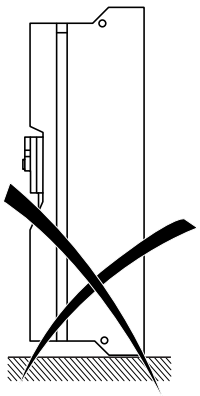


Figure 5

3 Remove the screws holding the drive on the pallet and lift off the drive by means of a hoist. It is fitted with handling lugs for this purpose (figure 4).

⚠ WARNING

RISK OF TOPPLING

Never stand the drive upright (figure 5) without keeping hold of it, or it will topple over.

Failure to follow this instruction can result in death, serious injury or equipment damage.

Preliminary recommendations

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.

Installing the DC choke on ATV61H●●●M3X and ATV61H●●●N4 drives

ATV61H D55M3XD to D90M3XD and ATV61H D90N4D to C63N4D drives are supplied without a DC choke.
ATV61H D55M3X to D90M3X and ATV61H D90N4 to C63N4 drives are supplied with a DC choke that must be installed on top of the drive and wired in accordance with the recommendations described in this document. This choke must be used for connecting drives to the three-phase line supply.

- Mount the DC choke on the back of the enclosure or on the wall above the drive and connect it up. The instructions for installing and connecting the choke are given on page 16.
- Make sure that the seal between the drive and the choke chassis is doing its job properly.

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

ATV61H C11Y 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.

Installing the AC choke on ATV61H●●●Y drives

The use of an AC choke (to be ordered separately) is compulsory with these drives if no special transformers (e.g. 12-pulse transformer) are being used.

Precautions

Read and understand the instructions in the Programming Manual.

⚠ CAUTION

INCOMPATIBLE LINE VOLTAGE

Before powering up 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 this instruction can result in equipment damage.

⚠ DANGER

UNINTENDED EQUIPMENT OPERATION

- Before turning on and configuring the Altivar 61, check that the PWR (POWER REMOVAL) input is deactivated (at state 0) in order to prevent unintended operation. Do not forget to reactivate the Power Removal input to start the motor.
- Before turning on the drive, or when exiting the configuration menus, check that the inputs assigned to the run command are deactivated (at state 0) since they can cause the motor to start immediately.

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

☞ 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, ISO 13849-1 and safety integrity level 2 according to IEC/EN 61508.
The Power Removal function takes priority over any run command.

Drive ratings

Powers in kW

Three-phase supply voltage: 200…240 V 50/60 Hz

Three-phase motor 200...240 V

Motor	Line supply (input)				Drive (output)		Altivar 61
Power indicated on plate (1)	Line current (2)		Max. prospective line Isc (4)	Apparent power	Max. available nominal current In (1)	Max. transient current (1) for 60 s	Catalog number (3)
	at 200 V	at 240 V					
kW	A	A	kA	kVA	A	A	
55	202	176	35	72	221	265	**ATV61HD55M3X**
75	269	230	35	96	285	313	**ATV61HD75M3X**
90	323	277	35	120	359	395	**ATV61HD90M3X**

Three-phase supply voltage: 380…480 V 50/60 Hz

Three-phase motor 380...480 V

Motor	Line supply (input)				Drive (output)		Altivar 61
Power indicated on plate (1)	Line current (2)		Max. prospective line Isc (4)	Apparent power	Max. available nominal current In (1)	Max. transient current (1) for 60 s	Catalog number (3)
	at 380 V	at 480 V					
kW	A	A	kA	kVA	A	A	
90	166	143	35	109	179	215	**ATV61HD90N4**
110	202	168	35	133	215	236	**ATV61HC11N4**
132	239	224	35	157	259	285	**ATV61HC13N4**
160	289	275	50	190	314	345	**ATV61HC16N4**
200	357	331	50	235	427	470	**ATV61HC22N4**
220	396	383	50	261			
250	444	435	50	292	481	529	**ATV61HC25N4**
280	494	494	50	365	616	678	**ATV61HC31N4**
315	555	544	50	365			
355	637	597	50	419	759	835	**ATV61HC40N4**
400	709	644	50	467			
500	876	760	50	577	941	1,035	**ATV61HC50N4**
560	978	858	50	644	1,188	1,307	**ATV61HC63N4**
630	1,091	964	50	718			

(1) These power ratings and currents 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.
Above 2.5 kHz, the drive will reduce the switching frequency automatically in the event of excessive temperature rise. For continuous operation above 2.5 kHz, derating must be applied to the drive nominal current in accordance with the curves on pages 21 and 23.

(2) Typical value for the indicated motor power, with a standard 4-pole motor on a line supply with the indicated "max. prospective line Isc".

(3) The drives are supplied as standard with a DC choke which must be used for connecting the drive on a three-phase line supply.
For connections on the DC bus, the drive can be controlled without a choke. Just add the letter D to the end of the catalog number.
For example, ATV 61HD90N4 becomes ATV 61HD90N4D.

(4) If the drive is installed on a line supply with a prospective short circuit current that is higher than the value given in this column, use line chokes (please refer to the catalog).

Drive ratings

Powers in HP

Three-phase supply voltage: 200…240 V 50/60 Hz

Three-phase motor 200...240 V

Motor	Line supply (input)				Drive (output)		Altivar 61
Power indicated on plate (1)	Line current (2)		Max. prospective line Isc (4)	Apparent power	Max. available nominal current In (1)	Max. transient current (1) for 60 s	Catalog number (3)
	at 200 V	at 240 V					
HP	A	A	kA	kVA	A	A	
75	202	176	35	72	221	265	**ATV61HD55M3X**
100	269	230	35	96	285	313	**ATV61HD75M3X**
125	323	277	35	120	359	395	**ATV61HD90M3X**

Three-phase supply voltage: 460...480 V 50/60 Hz

Three-phase motor 480 V

Motor	Line supply (input)			Drive (output)		Altivar 61
Power indicated on plate (1)	Line current (2)	Max. prospective line Isc (4)	Apparent power	Max. available nominal current In (1)	Max. transient current (1) for 60 s	Catalog number (3)
	at 480 V					
HP	A	kA	kVA	A	A	
125	143	35	109	179	215	**ATV61HD90N4**
150	168	35	133	215	236	**ATV61HC11N4**
200	224	35	157	259	285	**ATV61HC13N4**
250	275	50	190	314	345	**ATV61HC16N4**
300	331	50	235	427	470	**ATV61HC22N4**
350	383	50	261			
400	435	50	292	481	529	**ATV61HC25N4**
450	494	50	365	616	678	**ATV61HC31N4**
500	544	50	365			
-	597	50	419	759	835	**ATV61HC40N4**
600	644	50	467			
700	760	50	577	941	1,035	**ATV61HC50N4**
800	858	50	644	1,188	1,307	**ATV61HC63N4**
900	964	50	718			

(1) These power ratings and currents 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.
Above 2.5 kHz, the drive will reduce the switching frequency automatically in the event of excessive temperature rise. For continuous operation above 2.5 kHz, derating must be applied to the drive nominal current in accordance with the curves on pages 21 and 23.

(2) Typical value for the indicated motor power, with a standard 4-pole motor on a line supply with the indicated "max. prospective line Isc".

(3) The drives are supplied as standard with a DC choke which must be used for connecting the drive on a three-phase line supply.
For connections on the DC bus, the drive can be controlled without a choke. Just add the letter D to the end of the catalog number.
For example, ATV 61HD90N4 becomes ATV 61HD90N4D.

(4) If the drive is installed on a line supply with a prospective short circuit current that is higher than the value given in this column, use line chokes (please refer to the catalog).

Powers in kW and HP

Three-phase supply voltage: 500...690 V 50/60 Hz

Three-phase motor 500...690 V

Motor			Line supply (input)				Drive (output)			Altivar 61
Power indicated on plate (1)			Max. line current (2)			Max. prospective line Isc	Max. available nominal current In (1)			Catalog number (3)(4)
500 V	575 V	690 V	at 500 V	at 600 V	at 690 V		500 V	575 V	690 V	
kW	HP	kW	A	A	A	kA	A	A	A	
90	125	110	128	113	117	22	136	125	125	**ATV61HC11Y**
110	150	132	153	133	137	28	165	150	150	**ATV61HC13Y**
132	-	160	182	-	163	28	200	-	180	**ATV61HC16Y**
160	200	200	218	197	199	35	240	220	220	**ATV61HC20Y**
200	250	250	277	250	257	35	312	290	290	**ATV61HC25Y**
250	350	315	342	311	317	35	390	355	355	**ATV61HC31Y**
315	450	400	426	390	394	35	462	420	420	**ATV61HC40Y**
400	550	500	547	494	505	35	590	543	543	**ATV61HC50Y**
500	700	630	673	613	616	42	740	675	675	**ATV61HC63Y**
630	800	800	847	771	775	42	900	840	840	**ATV61HC80Y**

(1) These power ratings and currents 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.
Above 2.5 kHz, the drive will reduce the switching frequency automatically in the event of excessive temperature rise. For continuous operation above 2.5 kHz, derating must be applied to the drive nominal current in accordance with the curves on pages 24 to 25.

(2) Typical value for the indicated motor power, with a standard 4-pole motor on a line supply with the indicated "max. prospective line Isc".

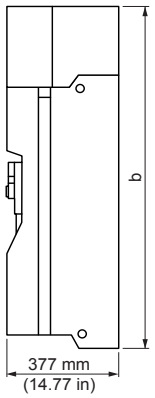
(3) The drives are supplied as standard with one or two transformers which must be used for powering the fan.

(4) The use of an AC choke (to be ordered separately) is compulsory with these drives if no special transformers (e.g. 12-pulse transformer) are being used.

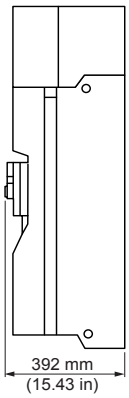
Note:
The maximum transient current for 60 s corresponds to 120% of the maximum nominal current In.

Dimensions and weights

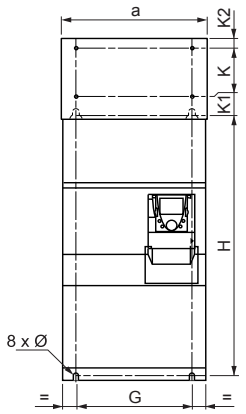
With 0 or 1 option card (1)



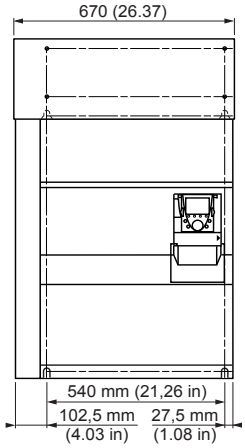
With 2 option cards (1)



ATV61H D55M3X to D90M3X
ATV61H D90N4 to C31N4

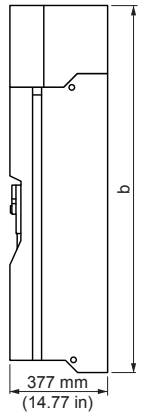


ATV61H C25N4 to C31N4 with braking unit

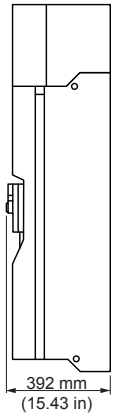


ATV61H	a mm (in.)	b mm (in.)	G mm (in.)	H mm (in.)	K mm (in.)	K1 mm (in.)	K2 mm (in.)	Ø mm (in.)	For screws	Weight kg (lb.)
D55M3X, D90N4, D75M3X, C11N4	320 (12.60)	920 (36.22)	250 (9.84)	650 (25.59)	150 (5.91)	75 (2.95)	30 (1.18)	11.5 (0.45)	M10	84 (185)
C13N4, D90M3X	360 (14.17)	1,022 (40.23)	298 (11.73)	758 (29.84)	150 (5.91)	72 (2.83)	30 (1.18)	11.5 (0.45)	M10	106 (234)
C16N4	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	116 (255)
C22N4	440 (17.32)	1,190 (46.62)	350 (13.78)	920 (36.22)	150 (5.91)	75 (2.95)	30 (1.18)	11.5 (0.45)	M10	163 (358)
C25N4, C31N4	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	207 (455)

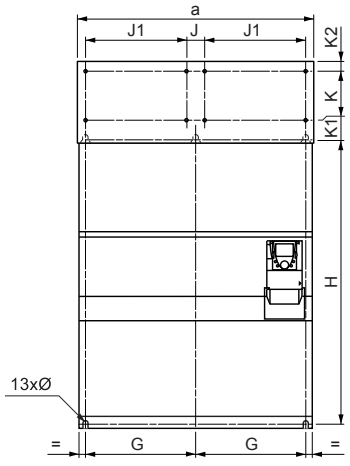
With 0 or 1 option card (1)



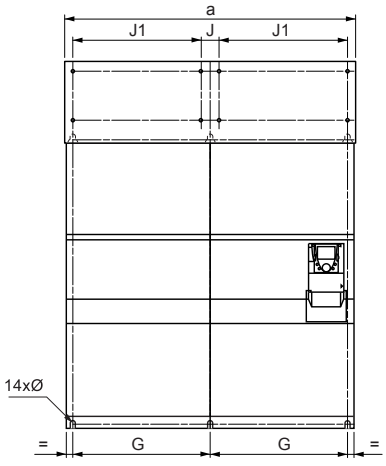
With 2 option cards (1)



ATV61H C40N4 to C50N4



ATV61HC63N4

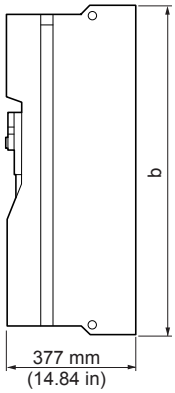


ATV61H	a mm (in.)	b mm (in.)	G mm (in.)	J mm (in.)	J1 mm (in.)	H mm (in.)	K mm (in.)	K1 mm (in.)	K2 mm (in.)	Ø mm (in.)	For screws	Weight kg (lb.)
C40N4	890 (35.04)	1390 (54.72)	417.5 (16.44)	70 (2.76)	380 (14.96)	1,120 (44.09)	150 (5.91)	75 (2.95)	30 (1.18)	11.5 (0.45)	M10	320 (704)
C50N4												330 (726)
C63N4	1120 (44.09)	1390 (54.72)	532.5 (20.96)	70 (2.76)	495 (1949)	1,120 (44.09)	150 (5.91)	75 (2.95)	30 (1.18)	11.5 (0.45)	M10	435 (957)

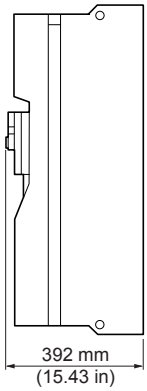
(1) For the addition of I/O extension cards, communication cards, the multi-pump card or the "Controller Inside" programmable card.

Dimensions and weights

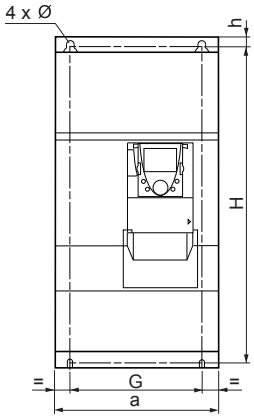
With 0 or 1 option card (1)



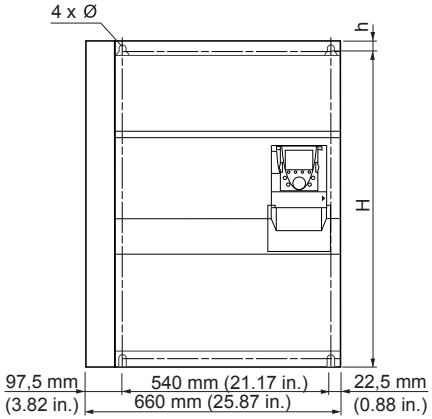
With 2 option cards (1)



ATV61H D55M3XD to D90M3XD
ATV61H D90N4D to C22N4D

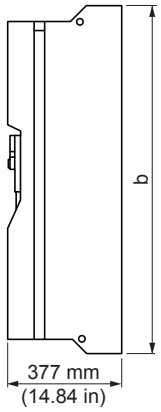


ATV61H C25N4D to C31N4D
with braking unit (VW3A7 101)

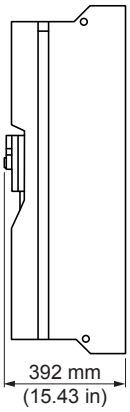


ATV61H	a mm (in.)	b mm (in.)	G mm (in.)	H mm (in.)	h mm (in.)	Ø mm (in.)	For screws	Weight kg (lb.)
D55M3XD, D90N4D, D75M3XD, C11N4D	310 (12.20)	680 (26.77)	250 (9.84)	650 (25.59)	15 (0.59)	11.5 (0.45)	M10	60 (132)
C13N4D, D90M3XD	350 (13.78)	782 (30.79)	298 (11.73)	758 (29.84)	12 (0.47)	11.5 (0.45)	M10	74 (163)
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)	15 (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)

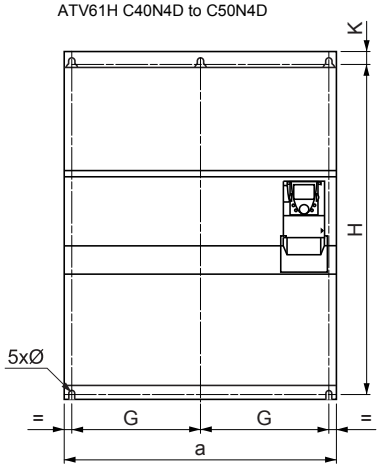
With 0 or 1 option card (1)



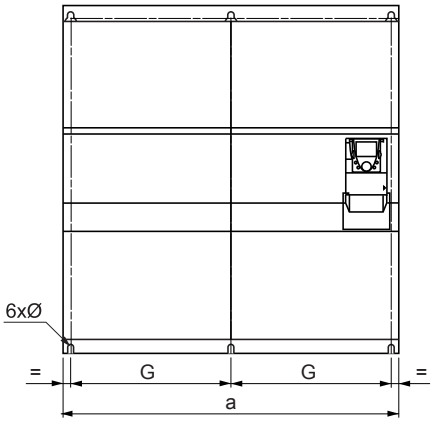
With 2 option cards (1)



ATV61H C40N4D to C50N4D



ATV61H C63N4D

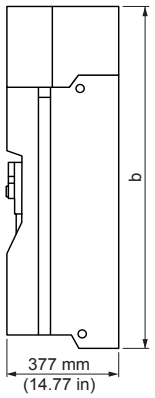


ATV61H	a mm (in.)	b mm (in.)	G mm (in.)	H mm (in.)	F mm (in.)	Ø mm (in.)	For screws	Weight kg (lb.)
C40N4D	880 (35.65)	1,150 (54.72)	417.5 (16.44)	1,120 (44.09)	415 (16.34)	11.5 (0.45)	M10	215 (474)
C50N4D								225 (496)
C63N4D	1,110 (43.49)	1,150 (54.72)	532.5 (20.96)	1,120 (44.09)	532.5 (20)	11.5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

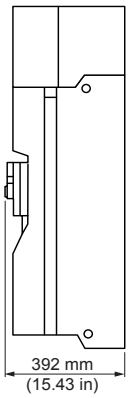
(1) For the addition of I/O extension cards, communication cards, the multi-pump card or the "Controller Inside" programmable card.

Dimensions and weights

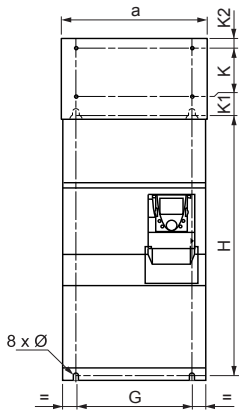
With 0 or 1 option card (1)



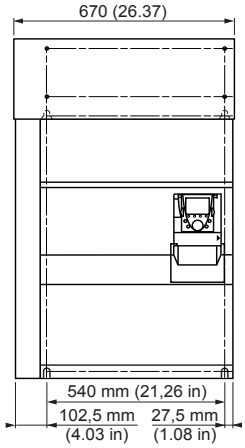
With 2 option cards (1)



ATV61H C11Y to C20Y

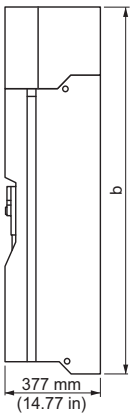


ATV61H C25Y to C40Y with braking unit

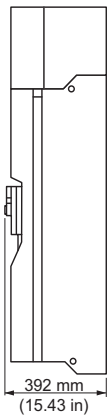


ATV61H	a mm (in.)	b mm (in.)	G mm (in.)	H mm (in.)	K mm (in.)	K1 mm (in.)	K2 mm (in.)	Ø mm (in.)	For screws	Weight kg (lb.)
C11Y ... C20Y	340 (13.39)	1,190 (46.62)	285 (11.22)	920 (36.22)	150 (5.91)	75 (2.95)	30 (1.18)	11.5 (0.45)	M10	102 (225)
C25Y ... C40Y	595 (23.43)	1,190 (46.62)	540 (21.26)	920 (36.22)	150 (5.91)	75 (2.95)	30 (1.18)	11.5 (0.45)	M10	181 (399)

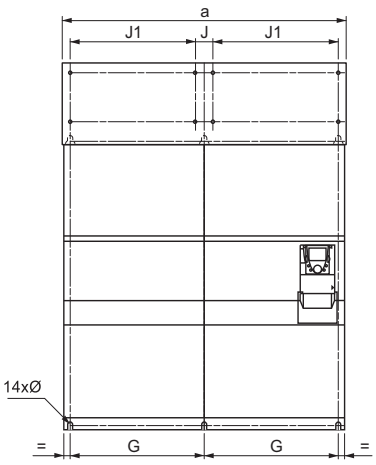
With 0 or 1 option card (1)



With 2 option cards (1)



ATV61H C50Y to C80Y



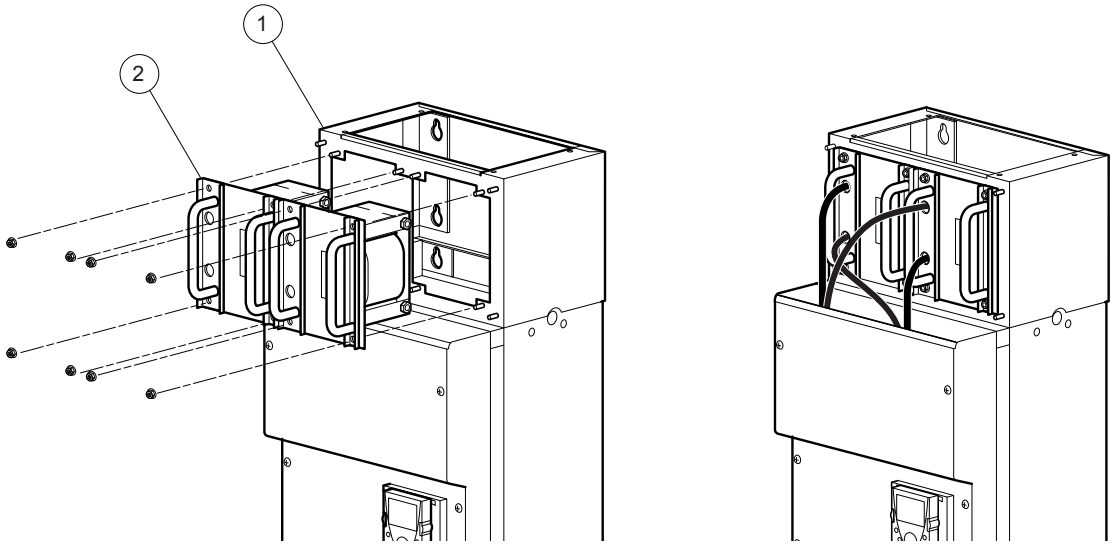
ATV61H	a mm (in.)	b mm (in.)	G mm (in.)	J mm (in.)	J1 mm (in.)	H mm (in.)	K mm (in.)	K1 mm (in.)	K2 mm (in.)	Ø mm (in.)	For screws	Weight kg (lb.)
C50Y ... C80Y	1120 (44.09)	1390 (54.72)	532.5 (20.96)	70 (2.76)	495 (1949)	1,120 (44.09)	150 (5.91)	75 (2.95)	30 (1.18)	11.5 (0.45)	M10	383 (844)

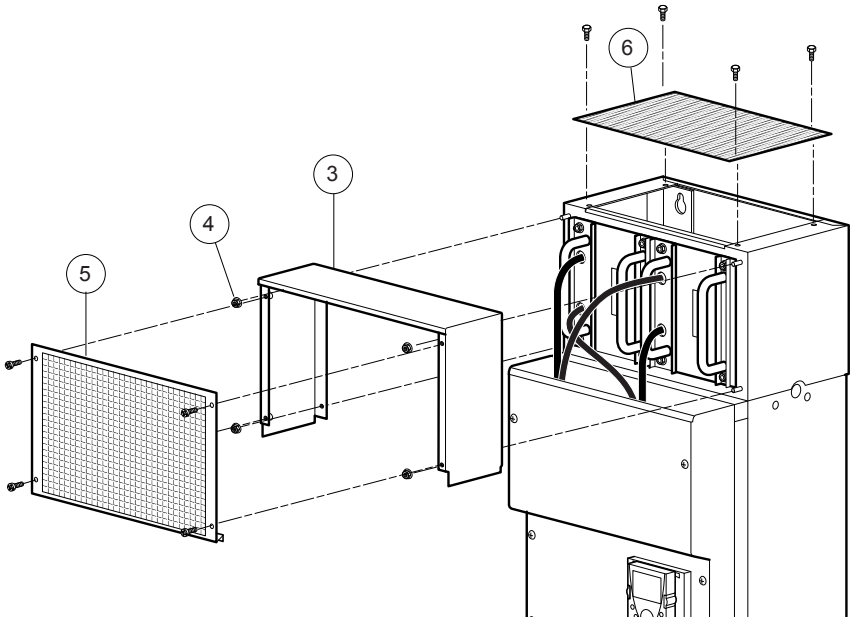
(1) For the addition of I/O extension cards, communication cards, the multi-pump card or the "Controller Inside" programmable card.

Installing the DC choke on ATV61H●●●M3X and ATV61H●●●N4 drives

This should be performed after mounting the drive and before wiring it. If a VW3 A7 101 braking module is being used, install the module on the drive before mounting the DC choke.
During installation, ensure that no liquid, dust or conductive objects fall into the drive.

Example of 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.
- Then 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 note and next page).
- Connect the grounding strip between the DC choke chassis (1) and the drive.
- Then mount the cover (3) on the chassis and secure it with the nuts (4) provided.
- Then mount panels (5) and (6) using the screws provided.

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

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

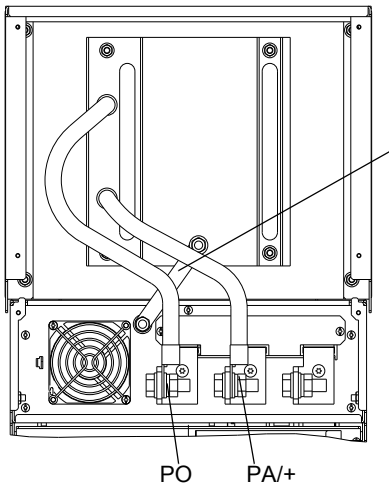
Installing the DC choke on ATV61H●●●M3X and ATV61H●●●N4 drives

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

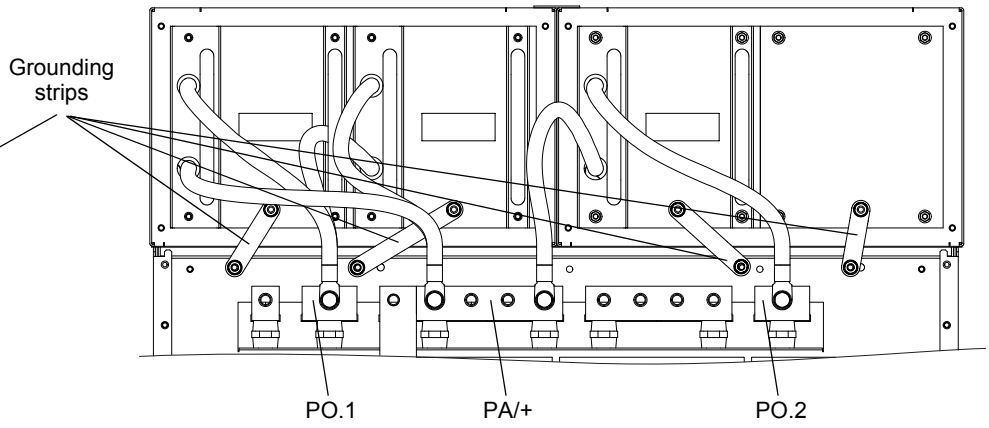
Table of drive/choke combinations

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

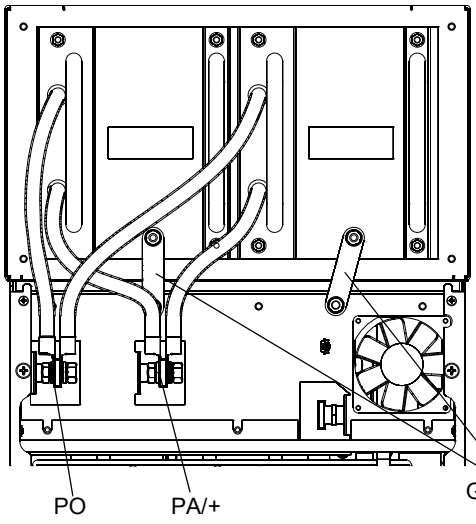
Example 1:
ATV61H D55M3X ... D90M3X,
ATV61H D90N4 ... C16N4



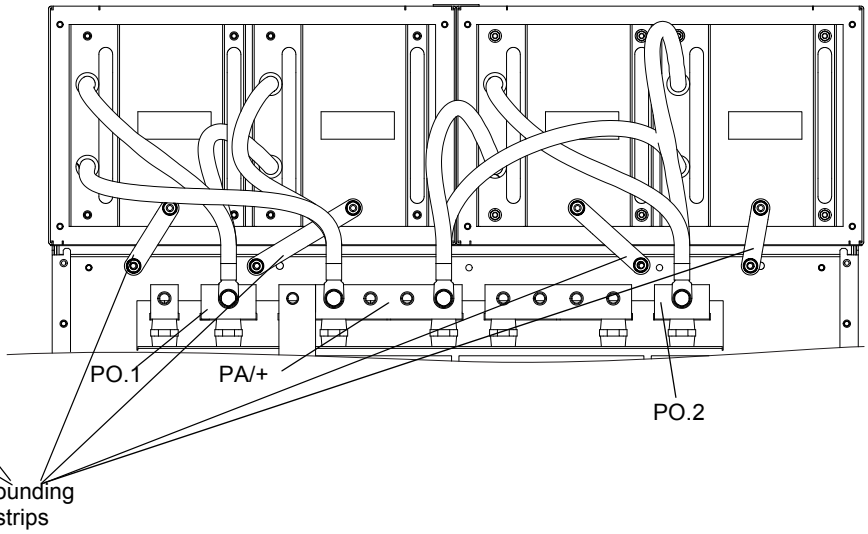
Example 3:
ATV61HC40N4



Example 2: ATV61H C22N4 ... C31N4



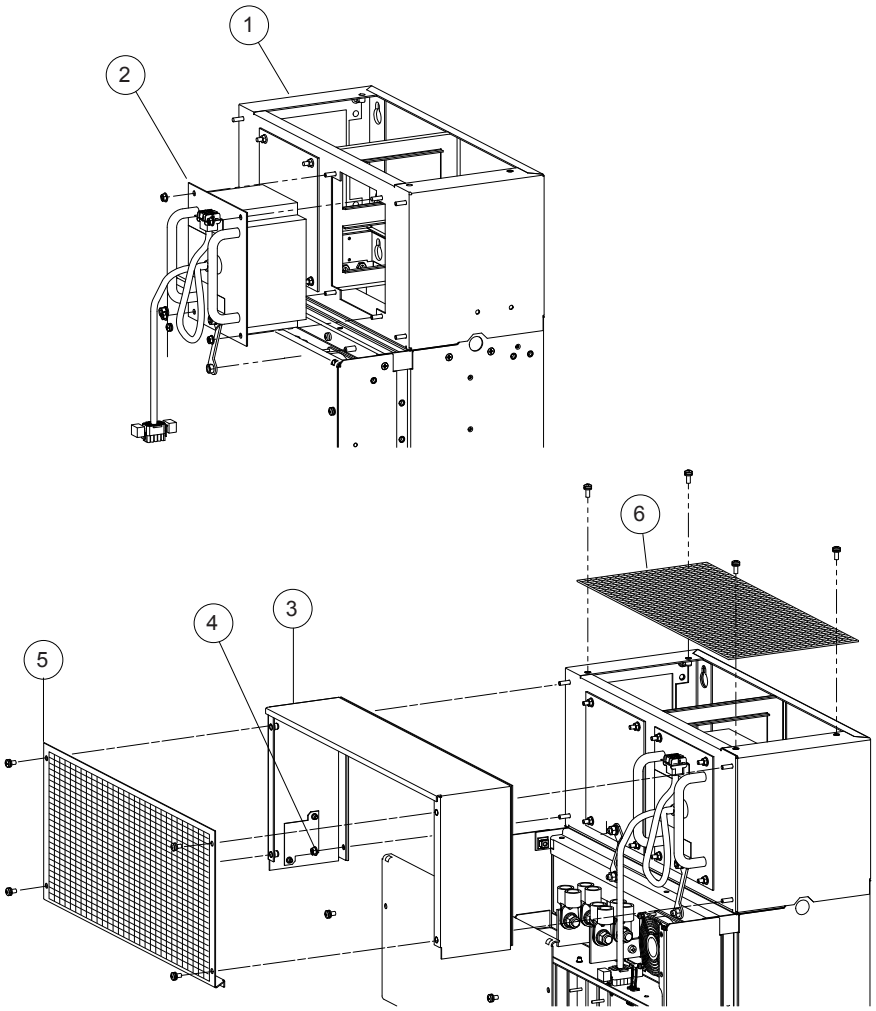
Example 4: ATV61H C50N4 ... C63N4



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

This should be performed after mounting the drive and before wiring it.
During installation, ensure that no liquid, dust or conductive objects fall into the drive.

Example of 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.
- Then mount the transformer (2) on the chassis (1) using the nuts provided.
- Connect the transformer connector to the drive (see next page).
- Connect the grounding strips between the transformer chassis (1) and the drive.
- Then mount the cover (3) on the chassis and secure it with the nuts (4) provided.
- Then 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:

ATV61 HC11Y to HC20Y: one transformer 

ATV61 HC25Y to HC40Y: one transformer 

ATV61 HC50Y to HC80Y: two transformers 

Connecting the transformer(s) on ATV61H●●●Y drives

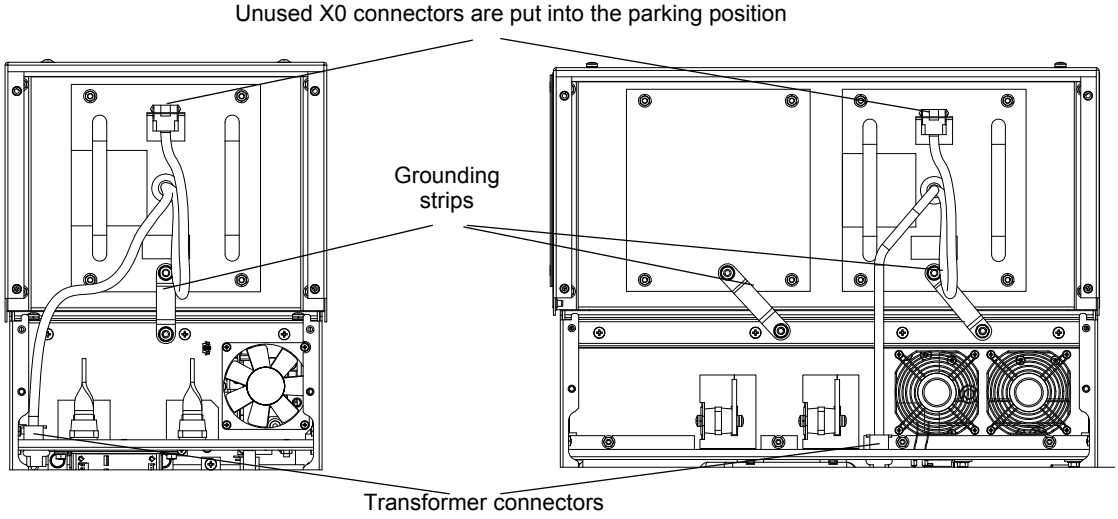
1 to 2 transformers can be connected in parallel as described in the following examples.

Table of drive/transformer combinations

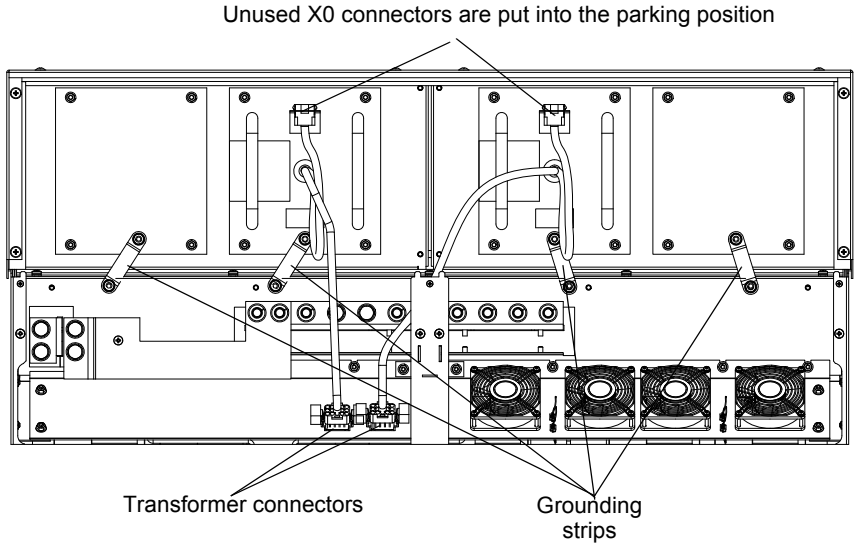
Drive	Number of transformers
ATV61H C11Y to C20Y	1
ATV61H C25Y to C40Y	1
ATV61H C50Y to C80Y	2

Example 1:
ATV61H C11Y ... C20Y

Example 2:
ATV61H C25Y ... C40Y



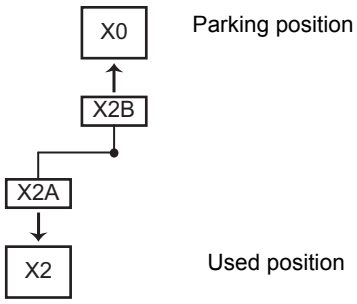
Example 3: ATV61H C50Y ... C80Y



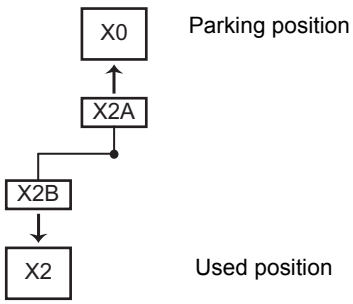
Connecting the transformer(s) on ATV61H●●●Y drives

Each transformer is equipped with a 500 V/600 V connector and a 690 V connector. Connect the connector corresponding to the line supply (see below). The unused connector is put into the parking position.

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



Connecting a transformer (690 V/50 Hz supply): Use X2B



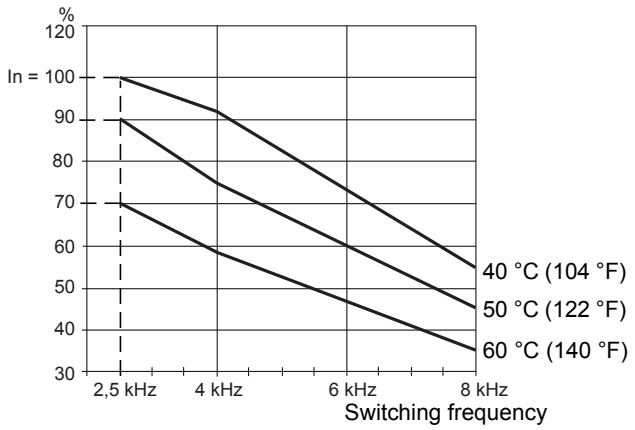
The ATV61HC50Y to ATV61HC80Y models include 2 transformers. Set up this connection for each transformer.

⚠ CAUTION
IMPROPER WIRING PRACTICES The transformer(s) and the ATV61 drive will be damaged if the connection made does not correspond to the line voltage. **Failure to follow this instruction can result in injury and/or equipment damage.**

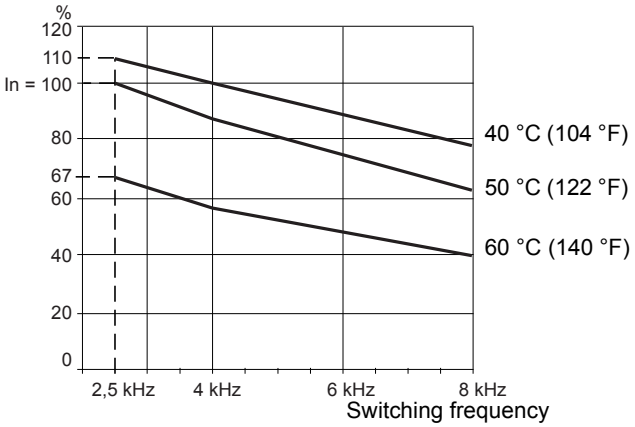
Derating as a function of the temperature and switching frequency

Derating curves for the drive current In as a function of the temperature and switching frequency.

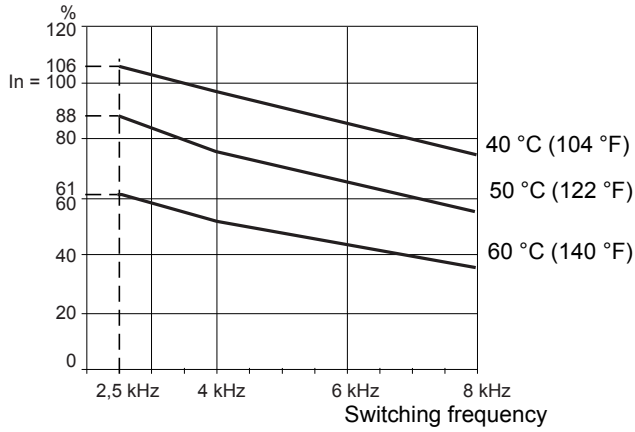
ATV61HD55M3X, HD75M3X, HD90M3X



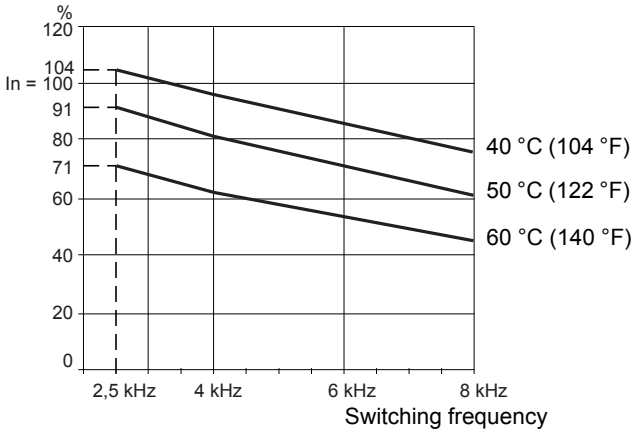
ATV61HD90N4



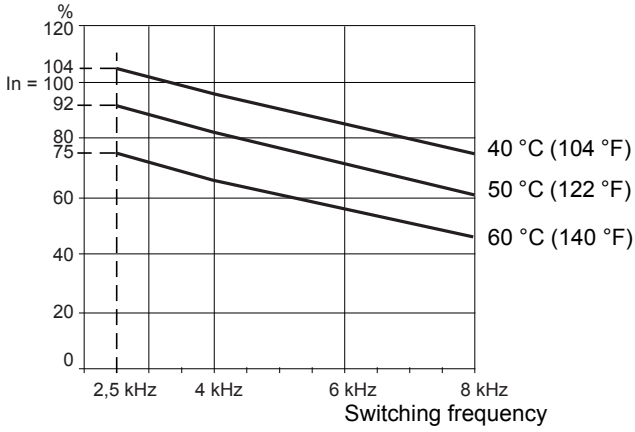
ATV61HC11N4



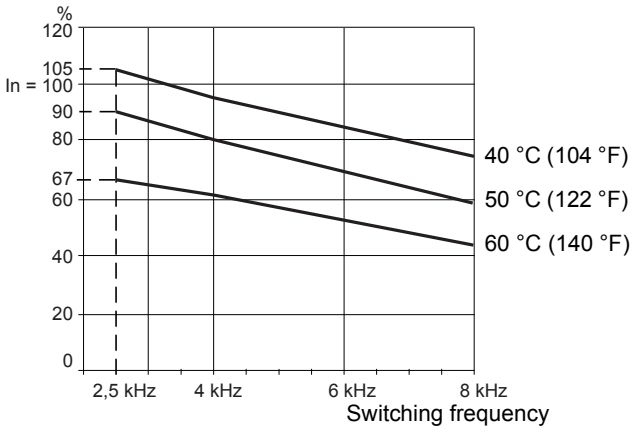
ATV61HC13N4



ATV61HC16N4



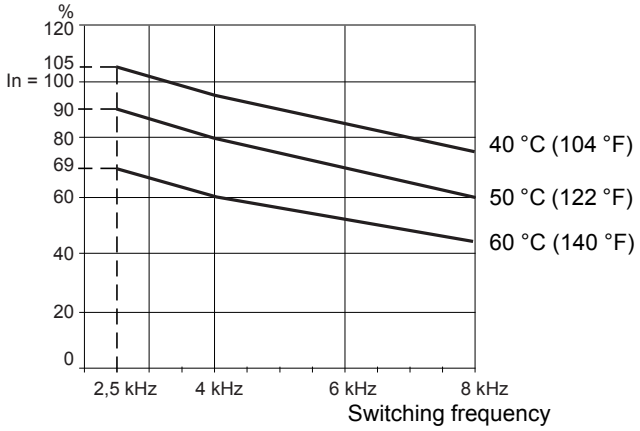
ATV61HC22N4



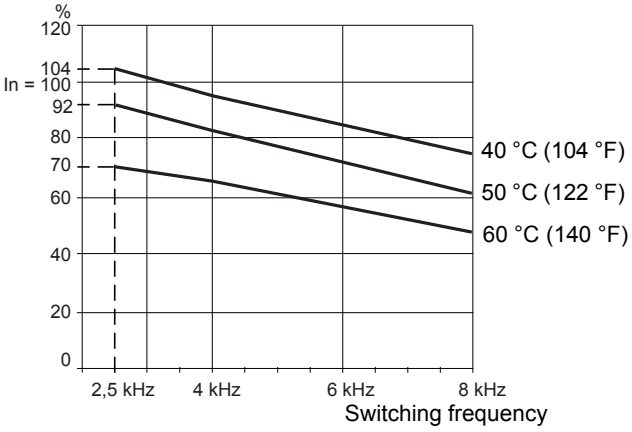
For intermediate temperatures (e.g. 55 °C (131 °F)), interpolate between 2 curves.

Derating as a function of the temperature and switching frequency

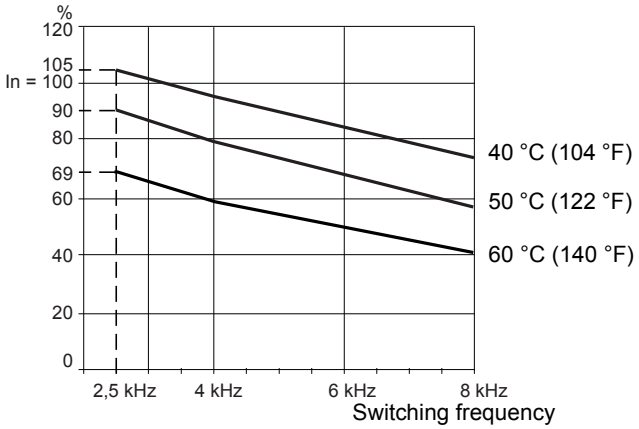
ATV61HC25N4



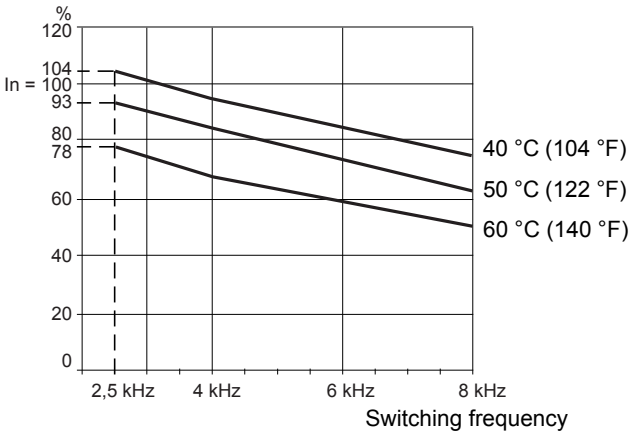
ATV61HC31N4



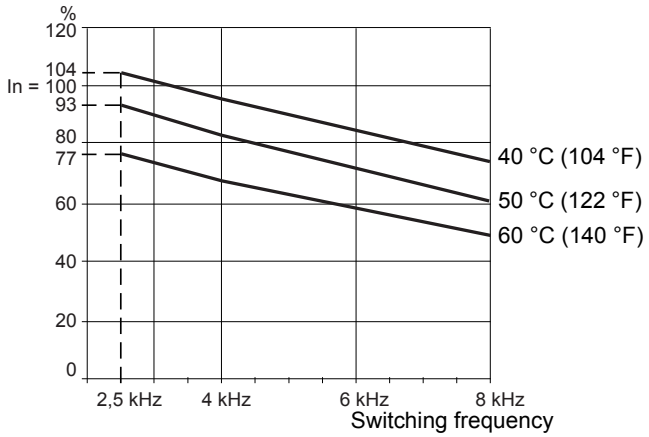
ATV61HC40N4



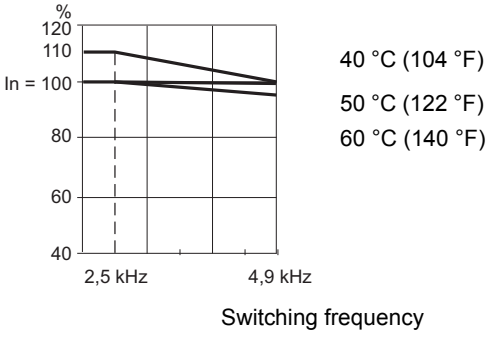
ATV61HC50N4



ATV61HC63N4



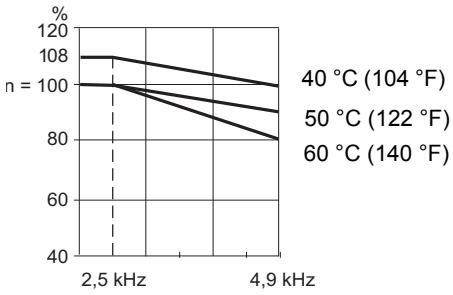
ATV61HC11Y



For intermediate temperatures (e.g. 55 °C (131 °F)), interpolate between 2 curves.

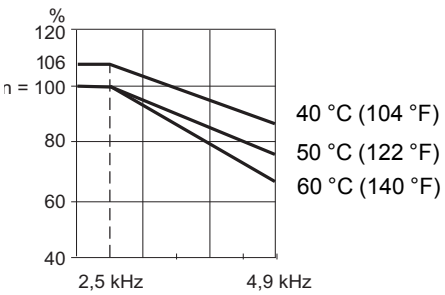
Derating as a function of the temperature and switching frequency

ATV61HC13Y



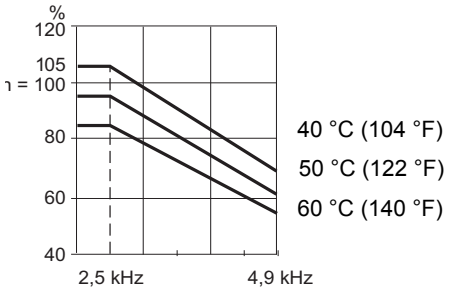
Switching frequency

ATV61HC16Y



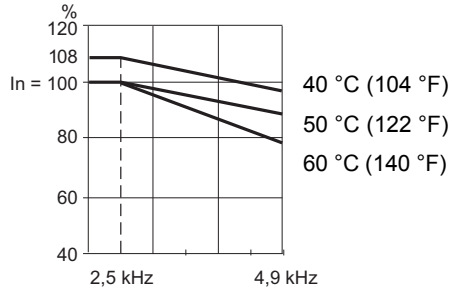
Switching frequency

ATV61HC20Y



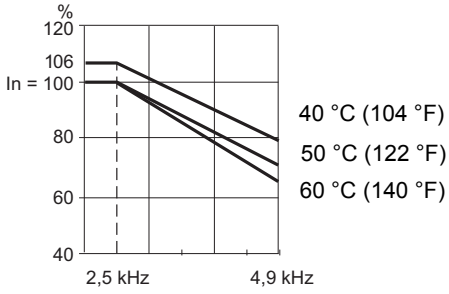
Switching frequency

ATV61HC25Y



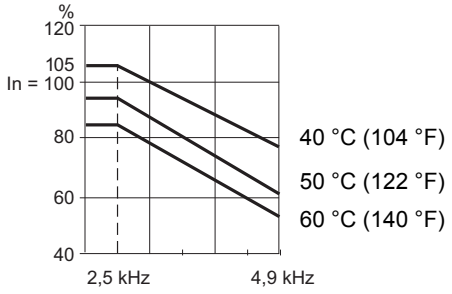
Switching frequency

ATV61HC31Y



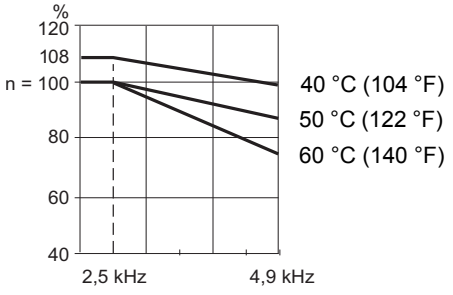
Switching frequency

ATV61HC40Y



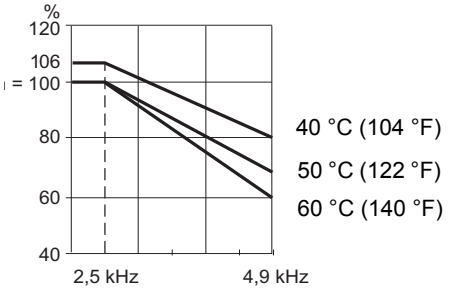
Switching frequency

ATV61HC50Y



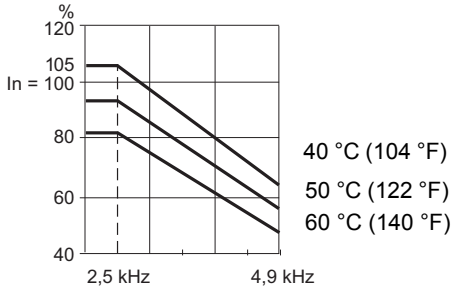
Switching frequency

ATV61HC63Y



Switching frequency

ATV61HC80Y



Switching frequency

For intermediate temperatures (e.g. 55 °C (131 °F)), interpolate between 2 curves.

Mounting in a wall-mounted or floor-standing enclosure

Install the drive vertically at ± 10°. Do not place it close to heating elements.

Mounting with the heatsink inside the enclosure

The power dissipated by the drive power components is given in the table below.

Dissipated power

These levels of power dissipation are given for operation at nominal load and for a switching frequency of 2.5 kHz.

ATV61H	Dissipated power W
D55M3X	1,715
D75M3X	1,715
D90M3X	2,204
D90N4	2,065
C11N4	2,514
C13N4	3,179
C16N4	4,036

ATV61H	Dissipated power W
C22N4	5,482
C25N4	6,379
C31N4	7,867
C40N4	9,598
C50N4	12,055
C63N4	15,007

ATV61H	Dissipated power W
C11Y	2,325
C13Y	2,751
C16Y	3,287
C20Y	4,031
C25Y	5,159
C31Y	6,308
C40Y	7,551

ATV61H	Dissipated power W
C50Y	9,659
C63Y	11,954
C80Y	14,983

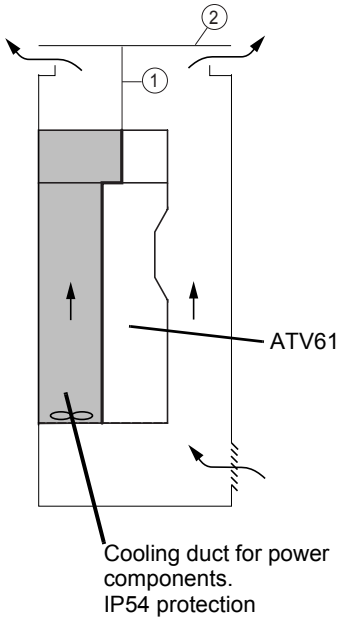
The drive has a fan for cooling the power components. The air is circulated from the bottom to the top of the unit via a duct (the duct is shown shaded gray on the diagram below). This duct is isolated from the control section by IP54 protection. The DC choke (ATV61H●●●M3X, ATV61H●●●N4) extends this duct while maintaining IP54 protection.
The drive dissipates a great deal of power which must be evacuated to the outside of the enclosure.
Air inlets and outlets must be provided to ensure that the flow of air in the enclosure is at least equal to the value given in the table below for each drive.

ATV61H	Flow rate	
	m^3/hour	ft^3/min
D55M3X, D75M3X, D90N4, C11N4	402	236
D90M3X, C13N4	774	455
C16N4	745	438
C22N4	860	506
C25N4, C31N4	1,260	742
C40N4, C50N4	2,100	1,236
C63N4	2,400	1,412

ATV61H	Flow rate	
	m^3/hour	ft^3/min
C11Y, C13Y, C16Y, C20Y	600	353
C25Y, C31Y, C40Y	1,200	706
C50Y, C63Y, C80Y	2,400	1,412

Several methods of evacuation are possible, as described below for IP23 and IP54 mounting.

Figure 1



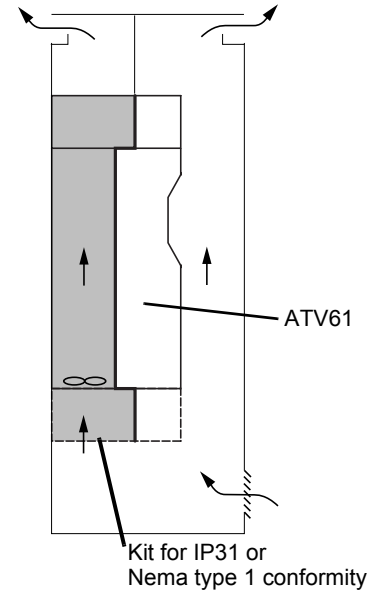
IP23 mounting (standard operating conditions):

Figure 1
Install the drive on an enclosure baseplate.
Install the DC choke (ATV61H●●●M3X, ATV61H●●●N4) or the transformer (ATV61H●●●Y) in accordance with the mounting recommendations.
The simplest mounting is to extend the IP54 duct between the upper outlet of the DC choke and the top of the enclosure (1). Fixing points are provided for this purpose on the top of the DC choke.
The hot air is thus evacuated to the outside and does not contribute towards increasing the internal temperature of the enclosure.
It is advisable to add a plate (2) approximately 150 mm from the top of the enclosure over the air outlet opening to prevent foreign bodies falling into the drive cooling duct.
The air inlet can be via a grille on the bottom front panel of the enclosure door, in accordance with the required flow rates given in the above table.

Note:
- If the air in the power circuit is totally evacuated to the outside, very little power is dissipated inside the enclosure. In this case, use the dissipated power table for dust and damp proof flange-mounting (see the next page).
- Connect all the additional metal parts to ground using the strips.

Mounting with the heatsink inside the enclosure (continued)

Figure 2

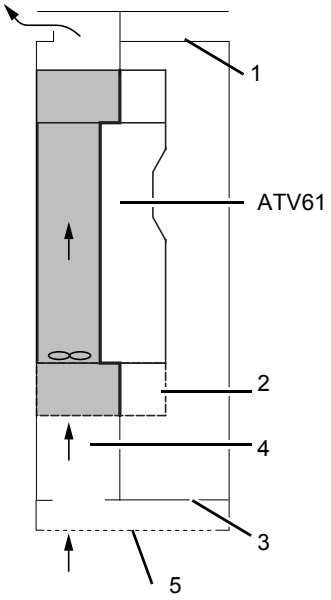


IP23 mounting (standard operating conditions, continued):

Figure 2
It is advisable to use a kit for IP31/NEMA type 1 conformity (to be ordered as an option) for attaching the power cables. The design of the IP31 kit is based on the same principle as the DC choke, and has an IP54 duct to help guide the incoming air.

Note:
- If the air in the power circuit is totally evacuated to the outside, very little power is dissipated inside the enclosure. In this case, use the dissipated power table for dust and damp proof flange-mounting (see below).
- Connect all the additional metal parts to ground using the strips.

Figure 3



IP54 mounting (standard operating conditions):

The drive must be mounted in an IP54 enclosure in certain environmental conditions: dust, corrosive gases, high humidity with risk of condensation and dripping water, splashing liquid, etc.

The simplest way of obtaining an enclosure with IP54 protection is to follow the mounting recommendations for IP23 protection with the following additional points (figure 3):

1 Do not make an air outlet hole for the control section. Do not make an air inlet hole in the enclosure door. In the power section, the air will enter through the bottom of the enclosure via a plinth added for this purpose.
2 Add the IP31 or NEMA type 1 conformity kit in accordance with the mounting instructions.
3 Add an enclosure baseplate designed to provide IP54 protection around the power cables.
4 Add an air evacuation duct between the baseplate and the duct of the IP31 or NEMA type 1 conformity kit. The IP31 or NEMA type 1 conformity kit enables an extension duct to be mounted. Drill a hole in the base of the enclosure to allow air to enter. Place seals around the duct that has been added to maintain IP54 protection.
5 Add a 200 mm plinth at the bottom of the enclosure with grilles to allow air to enter.
6 Use the dissipated power table below to calculate the enclosure dimensions.

Note: Connect all the additional metal parts to ground using the strips.

Power dissipated by the control section inside the enclosure (for calculating the enclosure dimensions)

These levels of power dissipation are given for operation at nominal load and for the factory-set switching frequency.

ATV61H	Dissipated power (1) W
D55M3X, D75M3X, D90M3X	154
D90N4	237
C11N4	237
C13N4	261
C16N4	296
C22N4	350

ATV61H	Dissipated power (1) W
C25N4	493
C31N4	658
C40N4	772
C50N4	935
C63N4	1,116

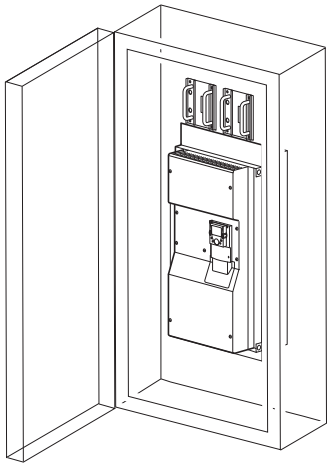
ATV61H	Dissipated power (1) W
C11Y	174
C13Y	189
C16Y	213
C20Y	244
C25Y	326

ATV61H	Dissipated power (1) W
C31Y	377
C40Y	439
C50Y	580
C63Y	692
C80Y	857

(1) Add 7W to this value for each option card added

Mounting in a wall-mounted or floor-standing enclosure

Dust and damp proof flange-mounting (heatsink outside the enclosure)



This mounting is used to reduce the power dissipated in the enclosure by locating the power section outside the enclosure.
This requires the use of a dust and damp proof flange mounting kit VW3A9509...517 (please refer to the catalog).
The degree of protection for drives mounted in this way becomes IP54.

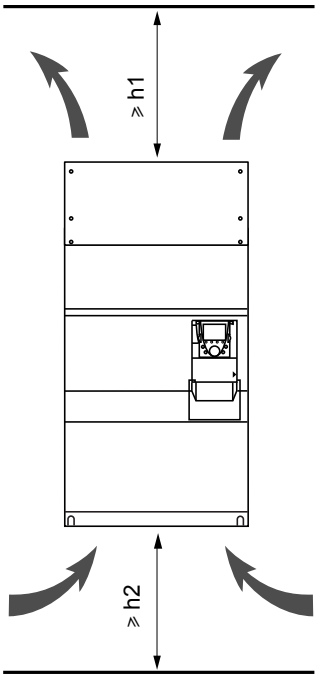
To fit the kit to the drive, please refer to the manual supplied with the kit.

Check that the back of the enclosure is strong enough to support the weight of the drive.

Use the dissipated power table in the previous page to calculate the enclosure dimensions.

In this case, the DC choke (ATV61H●●●M3X, ATV61H●●●N4) or the transformer(s) (ATV61H●●●Y) can be mounted directly on the back of the enclosure.

If the hot air exiting the drive is not ducted and evacuated to the outside, it risks being sucked back in, making the ventilation totally ineffective. In order to avoid this, it is important to leave enough free space around the drive, as indicated below.
The enclosure must be cooled in order to get rid of the dissipated heat.



ATV61H	h1		h2	
	mm	in.	mm	in.
D55M3X, D75M3X, D90M3X, D90N4, C11N4	100	3.94	100	3.94
C13N4, C16N4, C22N4, C11Y, C13Y, C16Y, C20Y	150	5.90	150	5.90
C25N4, C31N4, C25Y, C31Y, C40Y	200	7.87	150	5.90
C40N4, C50N4	300	11.81	250	9.84
C63N4, C50Y, C63Y, C80Y	400	15.75	250	9.84

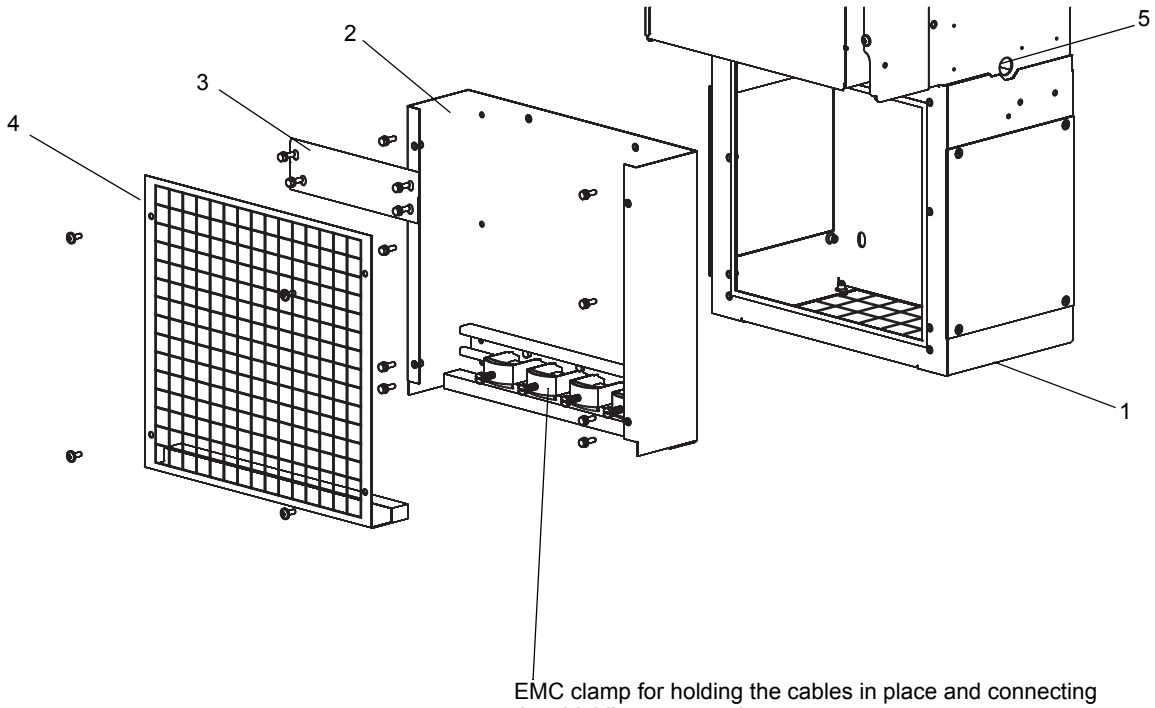
Free space in front of the drive: 10 mm (0.39 in.) minimum

Installing the kit for IP31/UL Type 1 conformity

On ATV61H D55M3X to D90M3X, D90N4 to C31N4 and C11Y to C40Y drives, the cable shielding can be attached and connected to ground using one of the following two kits:
- Kit for IP31 conformity (VW3 A9 109 ... 114)
- Kit for UL Type 1 conformity (VW3 A9 209 ... 214)

On ATV61H C40N4 to C63N4 and C50Y to C80Y drives, the cable shielding can be attached and connected to ground using the kit for IP31 conformity (VW3 A9 115, 116).

This kit is not supplied with the drive. It must be ordered separately (please refer to the catalog). It is mounted under the drive as shown below.



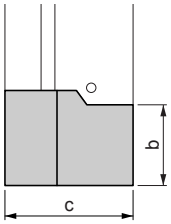
- Mount the chassis (1) on the wall or in the bottom of the enclosure under the drive. Ensure that the chassis is tightly secured to the drive to maintain the IP54 seal of the ventilation duct. To do this, use the 2 locking flanges that are attached in the drive transport holes (5).
- Mount the EMC plate (2) on the kit chassis using the screws provided.
- Mount the bridge (3) to ensure equipotentiality of the grounds between the drive and the EMC plate.
- Then mount the IP31 or UL Type 1 cover (4) on the EMC plate using the screws provided.

Note:

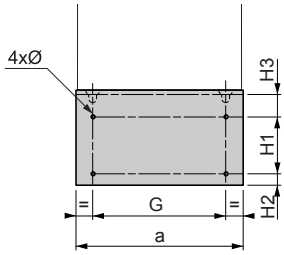
This kit makes it easier to guide the inlet air. It is supplied with a seal to provide IP54 sealing for the duct to the drive. Close the drive transport holes (5) with the plastic plugs provided.

Installing the kit for IP31/UL Type 1 conformity

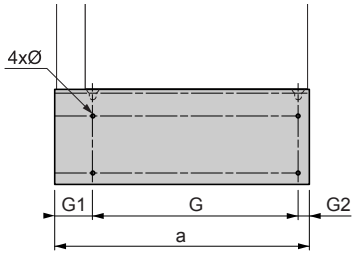
VW3 A9 109 ... 116



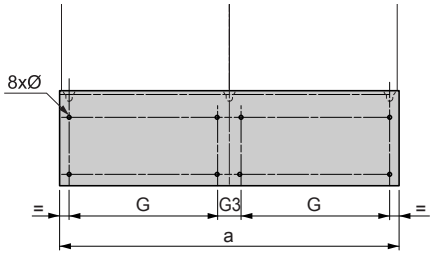
VW3 A9 109 ... 113, 115



VW3 A9 114

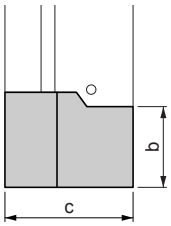


VW3 A9 116

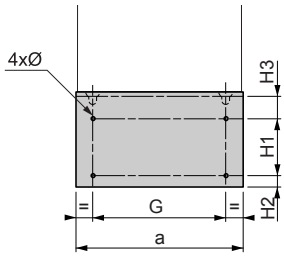


VW3	a mm (in.)	b mm (in.)	c mm (in.)	G mm (in.)	G1 mm (in.)	G2 mm (in.)	G3 mm (in.)	H1 mm (in.)	H2 mm (in.)	H3 mm (in.)	Ø mm (in.)	For screws
A9 109	325 (12.80)	228 (8.98)	375 (14.76)	250 (9.84)	- -	- -	- -	95 (3.74)	73 (2.87)	75 (2.95)	11.5 (0.45)	M10
A9 110	365 (14.37)	308 (12.13)	375 (14.76)	298 (11.73)	- -	- -	- -	250 (9.84)	35 (1.38)	35 (1.38)	11.5 (0.45)	M10
A9 111	345 (13.58)	323 (12.72)	362 (14.25)	285 (11.22)	- -	- -	- -	240 (9.40)	35 (1.38)	55 (2.15)	11.5 (0.45)	M10
A9 112	445 (17.52)	383 (15.08)	362 (14.25)	350 (13.78)	- -	- -	- -	250 (9.84)	65 (2.56)	75 (2.95)	11.5 (0.45)	M10
A9 113	600 (23.62)	383 (15.08)	362 (14.25)	540 (21.26)	- -	- -	- -	250 (9.84)	65 (2.56)	75 (2.95)	11.5 (0.45)	M10
A9 114	670 (23.43)	383 (15.08)	362 (14.25)	540 (21.26)	102.5 (4.03)	27.5 (1.08)	- -	250 (9.84)	65 (2.56)	75 (2.95)	11.5 (0.45)	M10
A9 115	(895) (35.04)	483 (19.02)	462 (18.19)	835 (32.87)	- -	- -	- -	350 (13.78)	65 (2.56)	75 (2.95)	11.5 (0.45)	M10
A9 116	1,125 (44.29)	483 (19.02)	462 (18.19)	495 (19.49)	- -	- -	75 (2.95)	350 (13.78)	65 (2.56)	75 (2.95)	11.5 (0.45)	M10

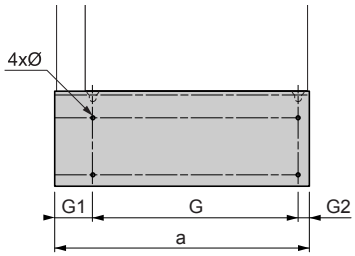
VW3 A9 209 ... 214



VW3 A9 209 ... 213



VW3 A9 214

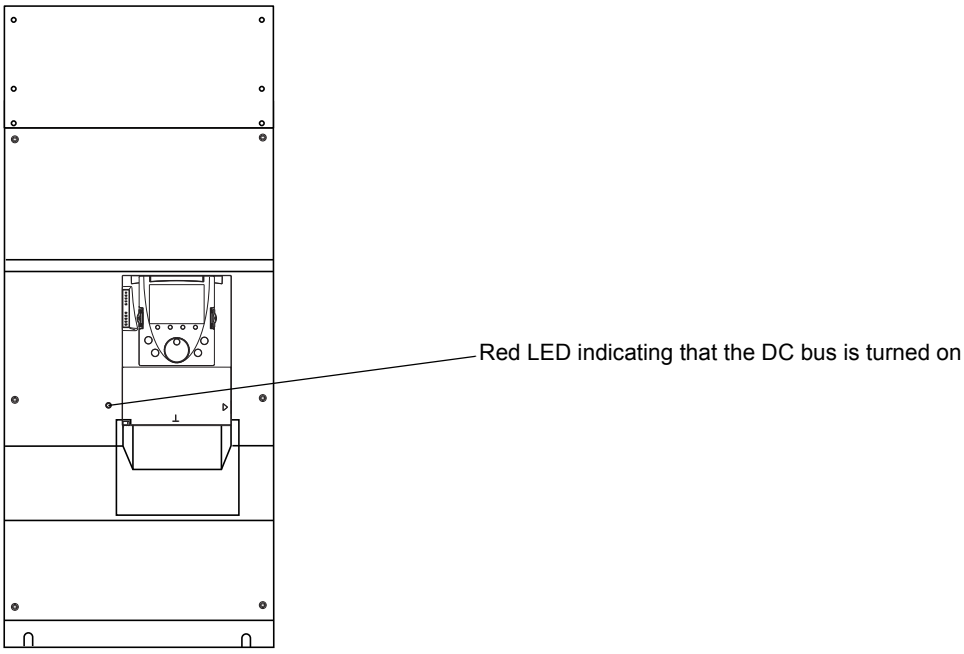


VW3	a mm (in.)	b mm (in.)	c mm (in.)	G mm (in.)	G1 mm (in.)	G2 mm (in.)	G3 mm (in.)	H1 mm (in.)	H2 mm (in.)	H3 mm (in.)	Ø mm (in.)	For screws
A9 209	325 (12.80)	228 (8.98)	375 (14.76)	250 (9.84)	- -	- -	- -	95 (3.74)	73 (2.87)	75 (2.95)	11.5 (0.45)	M10
A9 210	365 (14.37)	308 (12.13)	375 (14.76)	298 (11.73)	- -	- -	- -	250 (9.84)	35 (1.38)	35 (1.38)	11.5 (0.45)	M10
A9 211	345 (13.58)	323 (12.72)	375 (14.76)	285 (11.22)	- -	- -	- -	240 (9.40)	35 (1.37)	55 (2.15)	11.5 (0.45)	M10
A9 212	445 (17.52)	383 (15.08)	429 (16.89)	350 (13.78)	- -	- -	- -	250 (9.84)	65 (2.56)	75 (2.95)	11.5 (0.45)	M10
A9 213	600 (23.62)	383 (15.08)	475 (18.70)	540 (21.26)	- -	- -	- -	250 (9.84)	65 (2.56)	75 (2.95)	11.5 (0.45)	M10
A9 214	670 (23.43)	383 (15.08)	475 (18.70)	540 (21.26)	102.5 (4.03)	27.5 (1.08)	- -	250 (9.84)	65 (2.56)	75 (2.95)	11.5 (0.45)	M10

Position of the charging LED

Before working on the drive, switch it off, wait until the red capacitor charging LED has gone out, then measure the DC bus voltage.

Position of the capacitor charging LED



Procedure for measuring the DC bus voltage

⚠ DANGER

HAZARDOUS VOLTAGE

Read and understand the instructions on page 5 before performing this procedure.
Failure to follow this instruction will result in death or serious injury.

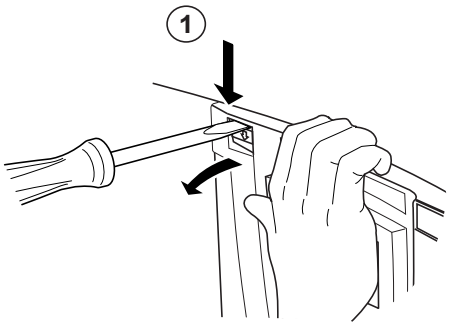
The DC bus voltage can exceed 1,000 V ⎓. Use a properly rated voltage sensing device when performing this procedure. To measure the DC bus voltage:

1. Disconnect the drive power supply.
2. Wait for the capacitor charging LED to go out.
3. Measure the voltage of the DC bus between the PA/+ and PC/- terminals to check whether the voltage is less than 45 V ⎓. See page 35 for the arrangement of the power terminals.
4. If the DC bus capacitors have not discharged completely, contact your local Schneider Electric representative (do not repair or operate the drive).

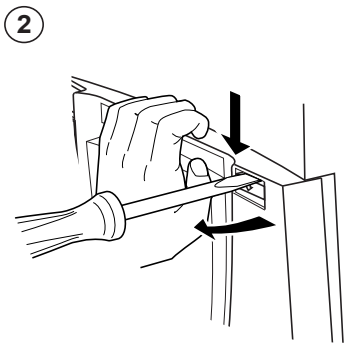
Installing option cards

These should ideally be installed once the drive is mounted and before wiring it.
Check that the red capacitor charging LED has gone out. Measure the DC bus voltage in accordance with the procedure on page 30.
The option cards are installed under the drive control front panel. Remove the graphic display terminal then take off the control front panel as indicated below.

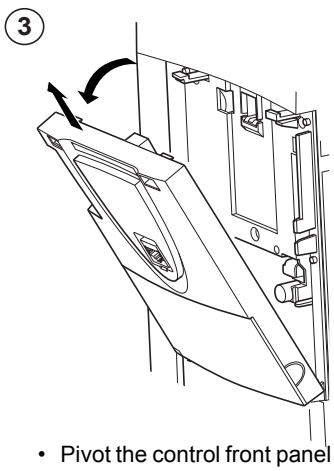
Removing the control front panel



- Using a screwdriver, press down on the catch and pull to release the left-hand part of the control front panel



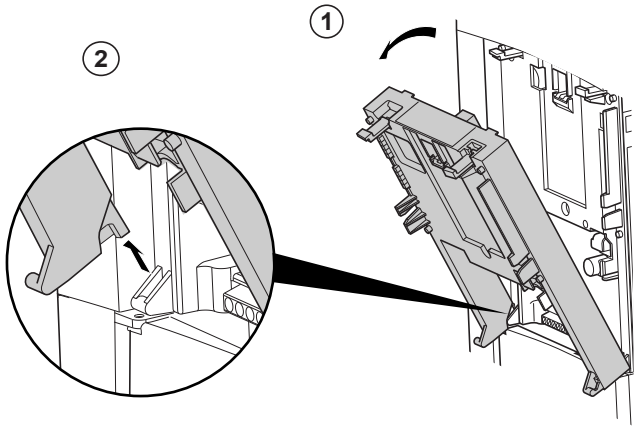
- Do the same on the right-hand side



- Pivot the control front panel and remove it

Removing the empty option card support

ATV61H D55M3X to D90M3X, ATV61H D90N4 to C63N4 and ATV61H C11Y to C80Y drives are supplied with an empty option card support. If adding an I/O or communication option card, the multi-pump card or a "Controller Inside" programmable card, remove the support using the procedure outlined below. This card support serves no purpose when at least one option card is used.



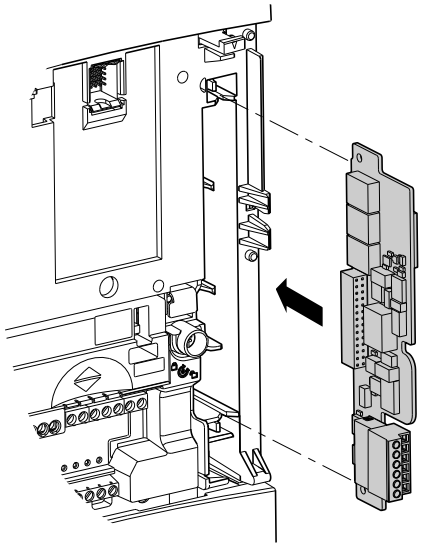
(1) Open the empty option card support

(2) Unhook the support from its clasps and remove it

Installing option cards

Installing an encoder interface card

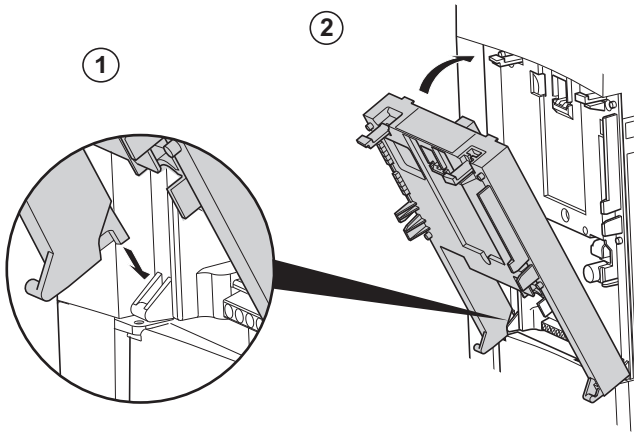
There is a special slot on the drive for adding an encoder interface card.



• First remove the empty option card support (if present), as indicated on the previous page, so you can access the slot for the encoder feedback card.
• If an I/O or communication option card or a "Controller Inside" programmable card has already been installed, remove it so you can access the slot for the encoder feedback card.
• After installing the encoder interface card, replace the empty card support or any option cards.

Installing an I/O extension card, a communication card, a "Controller Inside" programmable card or a multi-pump card

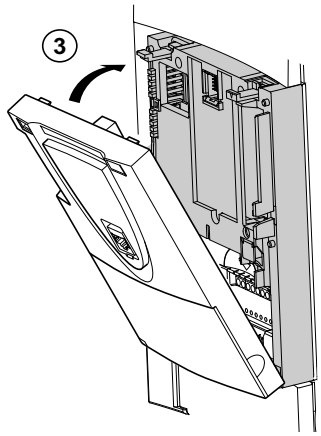
CAUTION
RISK OF DAMAGE TO THE CONNECTOR
Ensure good positioning of the option card on the clasps to avoid damage to the connector.
Failure to follow these instructions can result in equipment damage.



(1) Position the option card on the clasps

(2) Pivot the card until it clicks into place

Replacing the control front panel



(3) Replace the control front panel on the option card (same procedure as for installing the option card, see (1) and (2))

Power

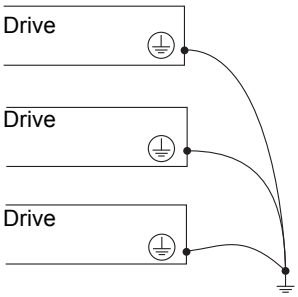
The drive must be connected to the protective ground. To comply with current regulations concerning high leakage currents (above 3.5 mA), use at least a 10 mm² (AWG 6) protective conductor or 2 protective conductors with the same cross-section as the power supply conductors.

⚠ DANGER

HAZARDOUS VOLTAGE

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.



- Check whether the resistance to the protective ground is one ohm or less.
- If several drives need to be connected to protective ground, each one must be connected directly to this ground as indicated opposite.

⚠ WARNING

IMPROPER WIRING PRACTICES

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

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

When upstream protection by means of a "residual current device" is required by the installation standards, a type A device should be used for single-phase drives and type B for three-phase drives. Choose a suitable model integrating:
- HF current filtering
- A time delay which prevents 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, for example "residual current devices" with reinforced immunity from the **s.i** range (Merlin Gerin brand).

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 Electricity Code and the National Electrical Code require branch circuit protection. Use the fuses recommended on the drive nameplate to achieve published short-circuit current ratings.
- Do not connect the drive to a power feeder whose short-circuit capacity exceeds the drive short-circuit current rating listed in the tables on pages 11, 12 and 13.

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

Wiring recommendations

Keep the power cables separate from circuits in the installation with low-level signals (sensors, PLCs, measuring apparatus, video, telephone).

The motor cables must be at least 0.5 m (20 in.) long.

In certain cases where motor cables need to be immersed in water, ground leakage currents can cause tripping. The addition of output filters is therefore required.

Do not use surge arresters or power factor correction capacitors on the variable speed drive output.

⚠ CAUTION

IMPROPER USE OF A BRAKING RESISTOR

- Only use the braking resistance values recommended in our catalogs.
- Wire a thermal overload relay in the sequence or configure the braking resistor protection (please refer to the Programming Manual) so that the drive power section AC supply is disconnected in the event of a fault.

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

Control

Keep the control circuits away from the power circuits. For control and speed reference circuits, we recommend using shielded twisted cables with a pitch of between 25 and 50 mm (0.98 and 1.97 in.) and connecting the shielding to ground at each end.

If using conduit, do not lay the motor, power supply and control cables in the same conduit. Keep the metal conduit containing the power supply cables at least 8 cm (3 in.) away from the metal conduit containing the control cables. Keep the non-metal conduits or cable ducts containing the power supply cables at least 31 cm (12 in.) away from the metal conduits containing the control cables. If it is necessary for control and power cables to cross each other, be sure they cross at right angles.

Length of motor cables

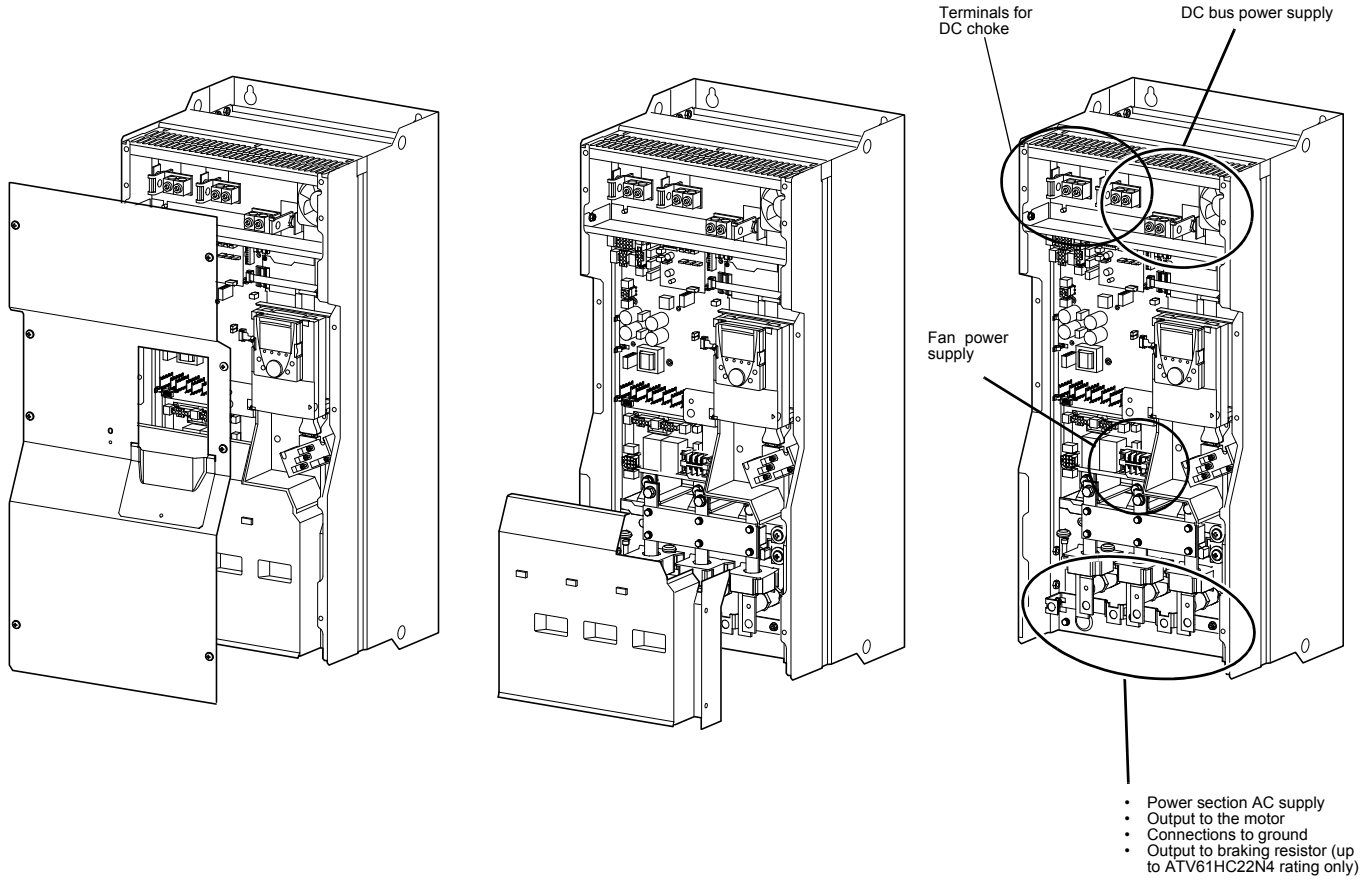
<table>
<tr><th colspan="2"></th><th>0
(0 ft)</th><th>15 m
(49.2 ft)</th><th>30 m
(98.4 ft)</th><th>100 m
(328 ft)</th><th>200 m
(656 ft)</th><th>300 m
(984 ft)</th><th>400 m
(1312 ft)</th><th>600 m
(1,968 ft)</th></tr>
<tr><td rowspan="2">ATV61H●●●M3X
ATV61H D90N4 to C63N4</td><td>Shielded cable</td><td colspan="2"></td><td></td><td>Motor choke</td><td colspan="4">2 motor chokes in series</td></tr>
<tr><td>Unshielded cable</td><td colspan="2"></td><td></td><td colspan="2">Motor choke</td><td colspan="3">2 motor chokes in series</td></tr>
<tr><td rowspan="2">ATV61H C11Y to C80Y</td><td>Shielded cable</td><td></td><td colspan="8">Please refer to the catalog</td></tr>
<tr><td>Unshielded cable</td><td colspan="2"></td><td colspan="7">Please refer to the catalog</td></tr>
</table>

Note: On old-generation motors or those with poor insulation we recommend using a motor choke where the cable is more than 5 m (16.4 ft) long.

Choice of associated components:
Please refer to the catalog.

Accessing the power terminals on ATV61H●●●M3X and ATV61H●●●N4 drives

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



Characteristics and functions of the power terminals

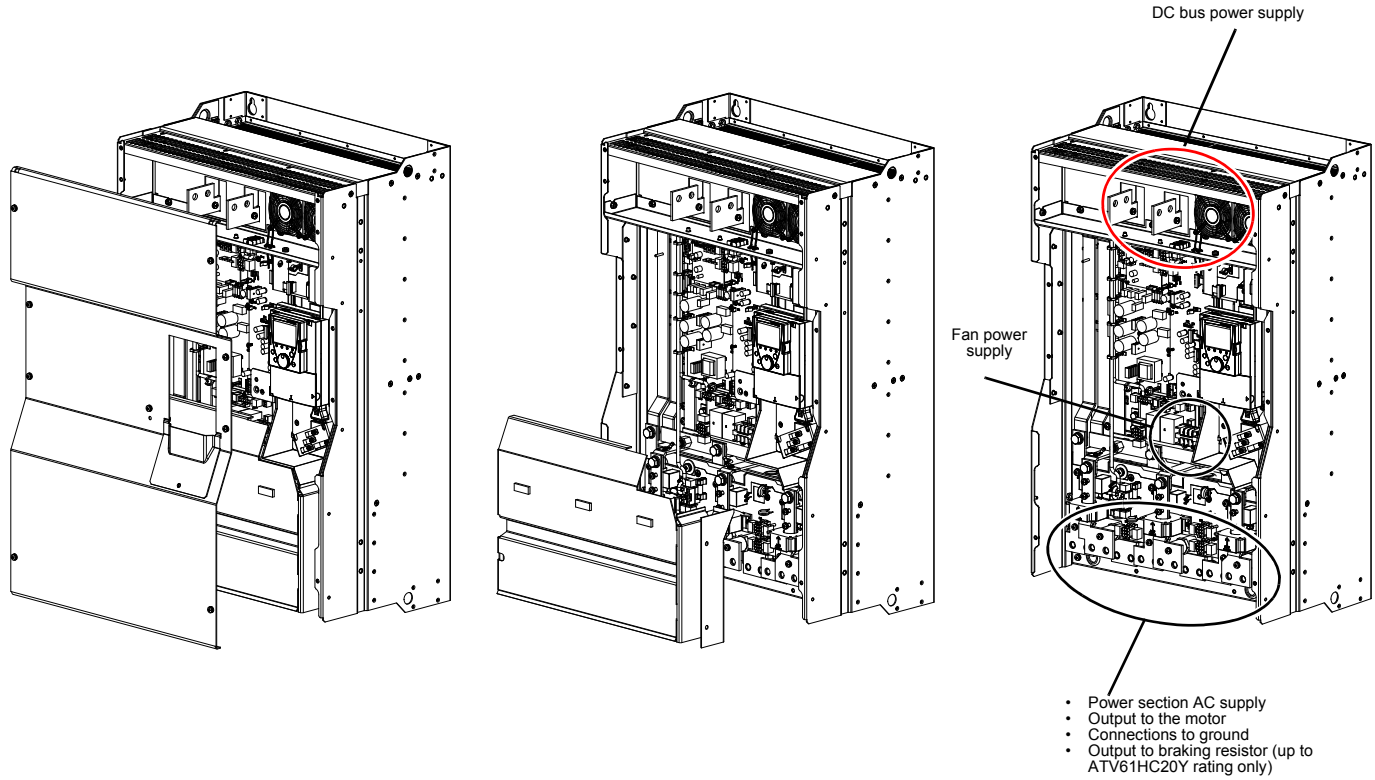
Terminal	Function	Altivar
3 x ⏚	Protective ground connection terminals	All ratings
R/L1, S/L2, T/L3 (1)	Power section AC supply	All ratings
PO	Connection of the DC choke	ATV61H D55M3X to D90M3X ATV61H D90N4 to C31N4
PO.1, PO.2	Connection of the DC chokes	ATV61H C40N4 to C63N4
PA/+	DC bus + polarity and connection of the DC choke	All ratings
PC/-	DC bus - polarity	All ratings
PA	Output to braking resistor	ATV61H D55M3X to D90M3X ATV61H D90N4 to C22N4 (2)
PB	Output to braking resistor	
U/T1, V/T2, W/T3	Output to the motor	All ratings
RO, SO, TO	Separate fan supply when the drive is only powered by the DC bus	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	Connection of the braking unit control cable	

(1) ATV61H C50N4 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 then 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 protective cover



Characteristics and functions of the power terminals

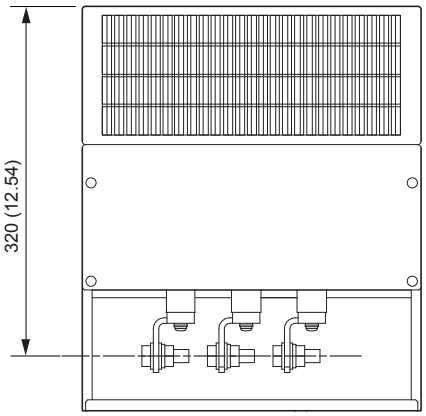
Terminal	Function	Altivar
3 x ⏚	Protective ground connection terminals	All ratings
R/L1, S/L2, T/L3 (1)	Power section AC supply	All ratings
PA/+	DC bus + polarity	All ratings
PC/-	DC bus - polarity	All ratings
PA	Output to braking resistor	ATV61H C11Y to C20Y (2)
PB	Output to braking resistor	
U/T1, V/T2, W/T3	Output 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	Connection of the braking unit control cable	

(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 then connected on the braking unit.

Power terminals

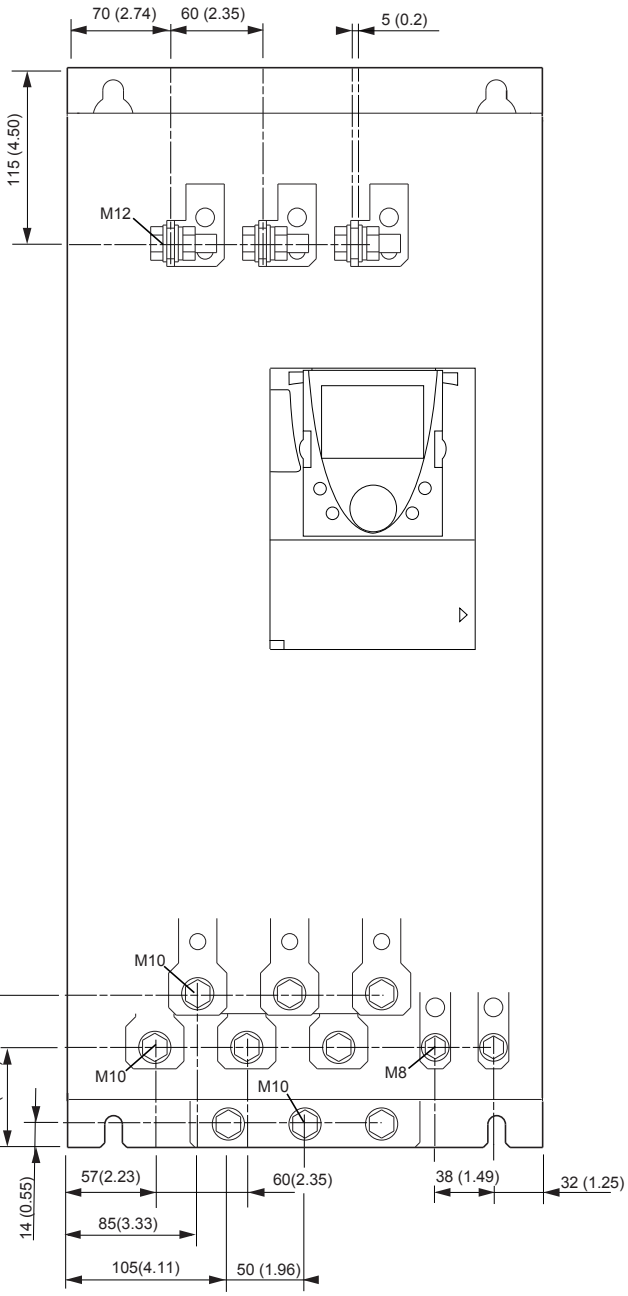
ATV61H D55M3X, D75M3X, D90N4, C11N4

View from above



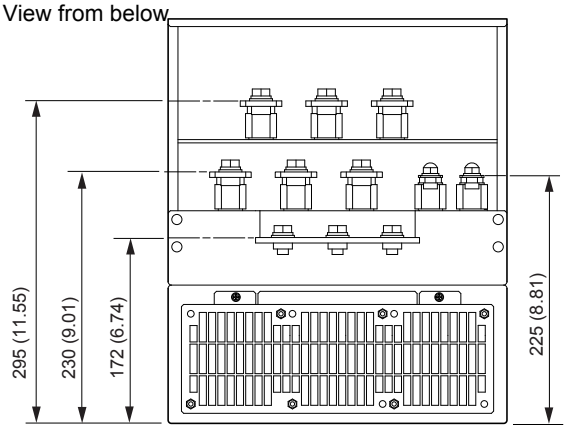
PO	PA/+	PC/-

Front view



View from below

View from below



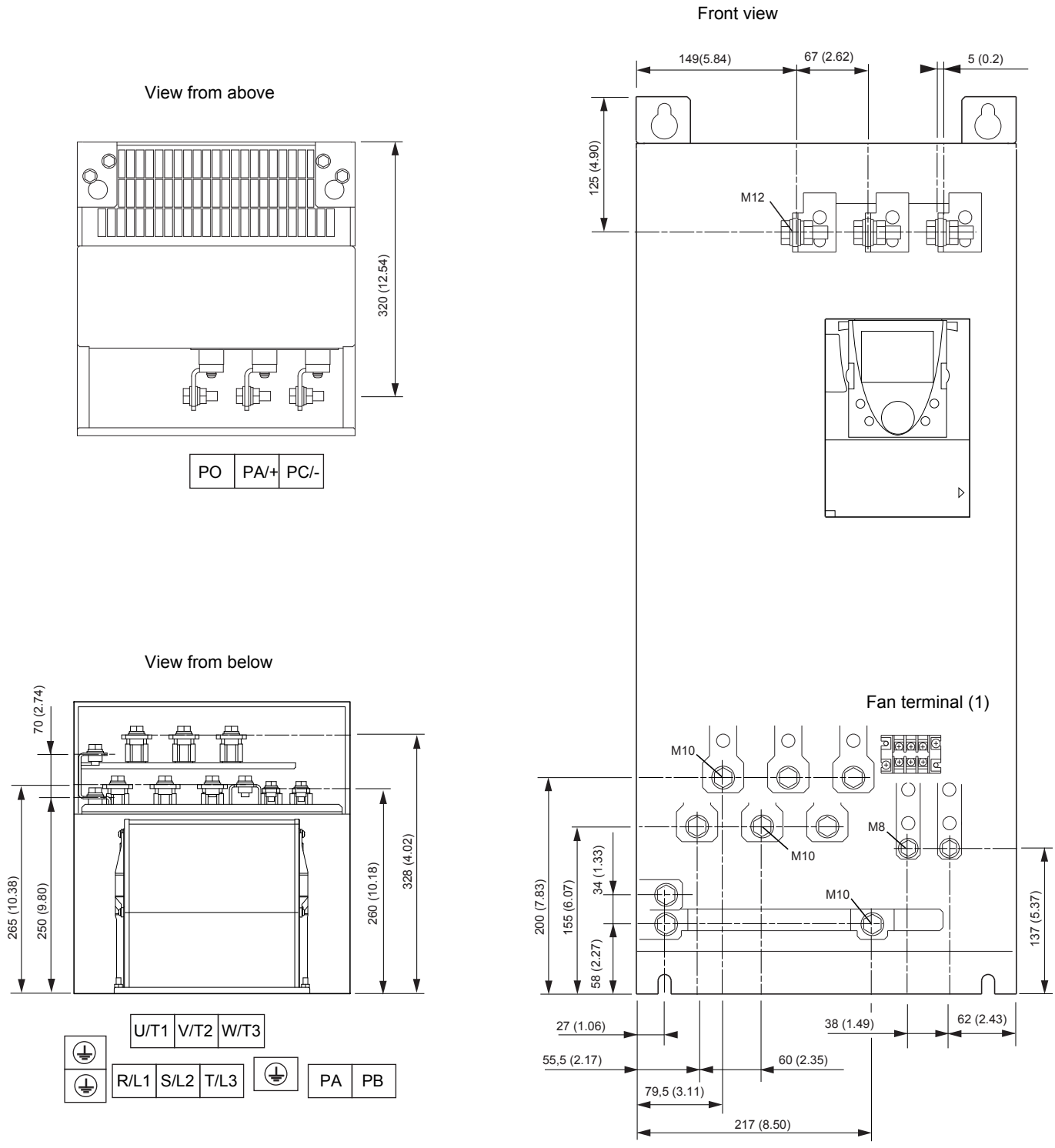
U/T1	V/T2	W/T3		
R/L1	S/L2	T/L3	PA	PB

Maximum terminal wire size/tightening torque

Drive terminals	L1/R, L2/S, L3/T, U/T1, V/T2, W/T3	PC/-, PO, PA/+	PA, PB
	2 x 100 mm^2/24 Nm	2 x 100 mm^2/41 Nm	60 mm^2/12 Nm
	2 x 250 MCM/212 lb.in	2 x 250 MCM/360 lb.in	250 MCM/106 lb.in

Power terminals

ATV61H D90M3X, C13N4



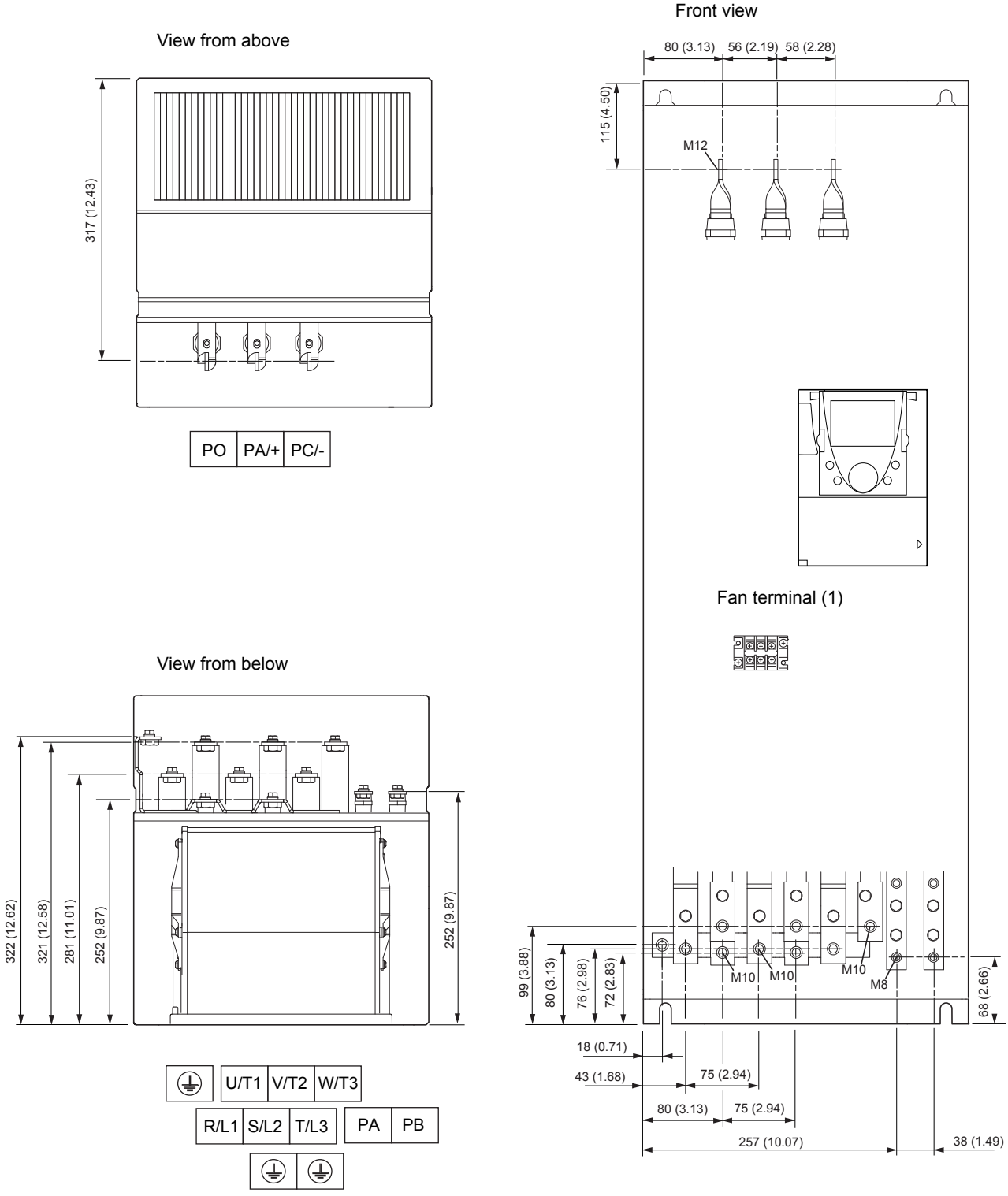
Maximum terminal wire size/tightening torque

Drive terminals	L1/R, L2/S, L3/T, U/T1, V/T2, W/T3	PC/-, PO, PA/+	PA, PB	RO, SO, TO (1)
	2 x 100 mm^2/24Nm	2 x 150 mm^2/41 Nm	60 mm^2/12 Nm	5.5 mm^2/1.4 Nm
	2 x 250 MCM/212 lb.in	2 x 250 MCM/360 lb.in	250 MCM/106 lb.in	AWG 10/12 lb.in

(1) Power supply for the fans, compulsory if the drive is only powered by the DC bus. Do not use if the drive is powered with a three-phase supply by L1/R, L2/S, L3/T.

Power terminals

ATV61HC16N4

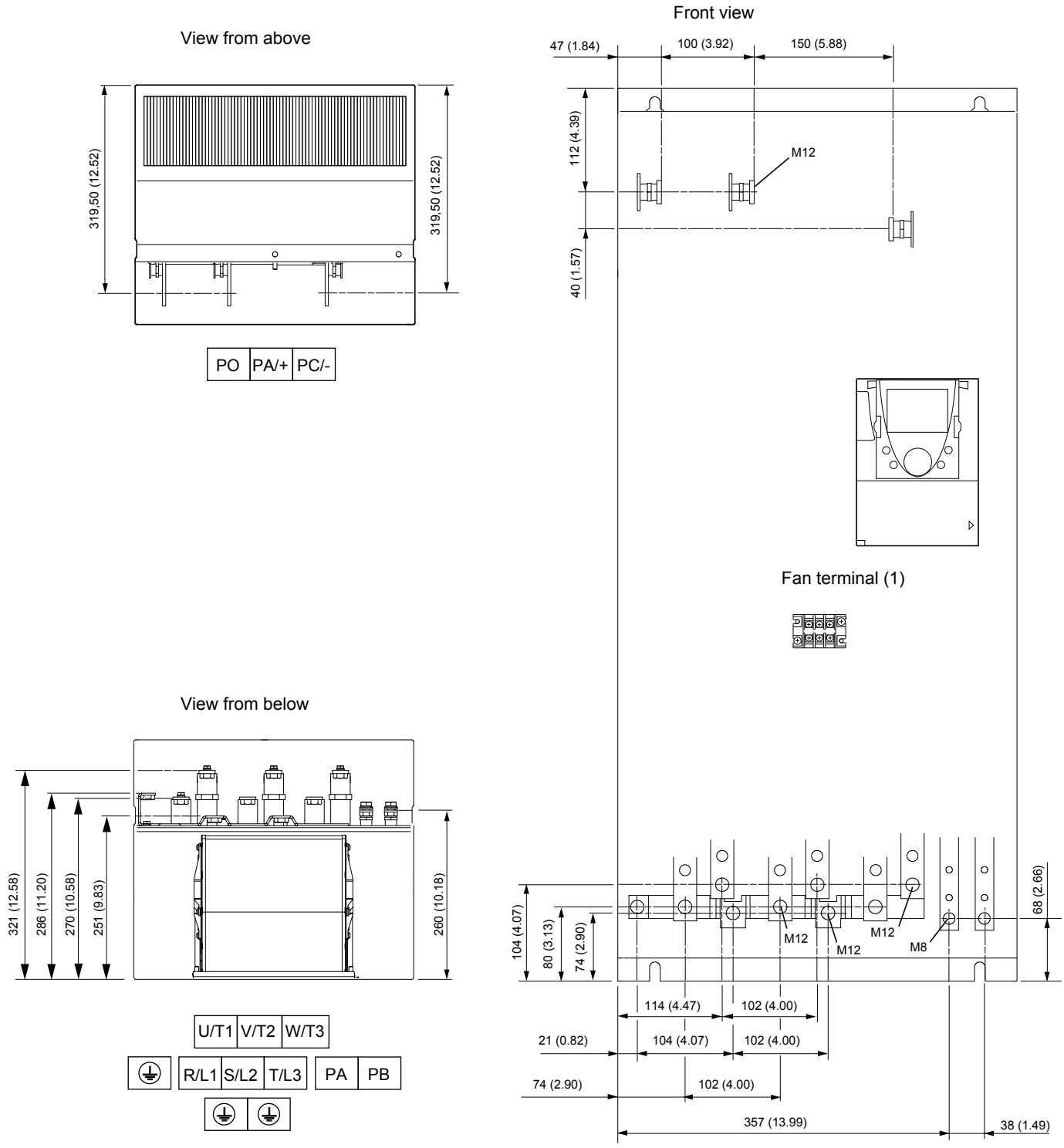


Maximum terminal wire size/tightening torque

Drive terminals	L1/R, L2/S, L3/T, U/T1, V/T2, W/T3	PC/-, PO, PA/+	PA, PB	RO, SO, TO (1)
	2 x 120 mm^2/24 Nm	2 x 120 mm^2/24 Nm	120 mm^2/24 Nm	5.5 mm^2/1.4 Nm
	2 x 250 MCM/212 lb.in	2 x 250 MCM/212 lb.in	250 MCM/212 lb.in	AWG 10/12 lb.in

(1) Power supply for the fans, compulsory if the drive is only powered by the DC bus. Do not use if the drive is powered with a three-phase supply by L1/R, L2/S, L3/T.

ATV61HC22N4



Maximum terminal wire size/tightening torque

Drive terminals	L1/R, L2/S, L3/T, U/T1, V/T2, W/T3	PC/-, PO, PA/+	PA, PB	RO, SO, TO (1)
	2 x 150 mm^2/41 Nm	2 x 150 mm^2/41 Nm	120 mm^2/24 Nm	5.5 mm^2/1.4 Nm
	2 x 350 MCM/360 lb.in	2 x 350 MCM/360 lb.in	250 MCM/212 lb.in	AWG 10/12 lb.in

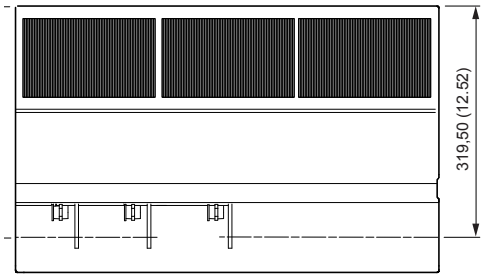
(1) Power supply for the fans, compulsory if the drive is only powered by the DC bus. Do not use if the drive is powered with a three-phase supply by L1/R, L2/S, L3/T.

Power terminals

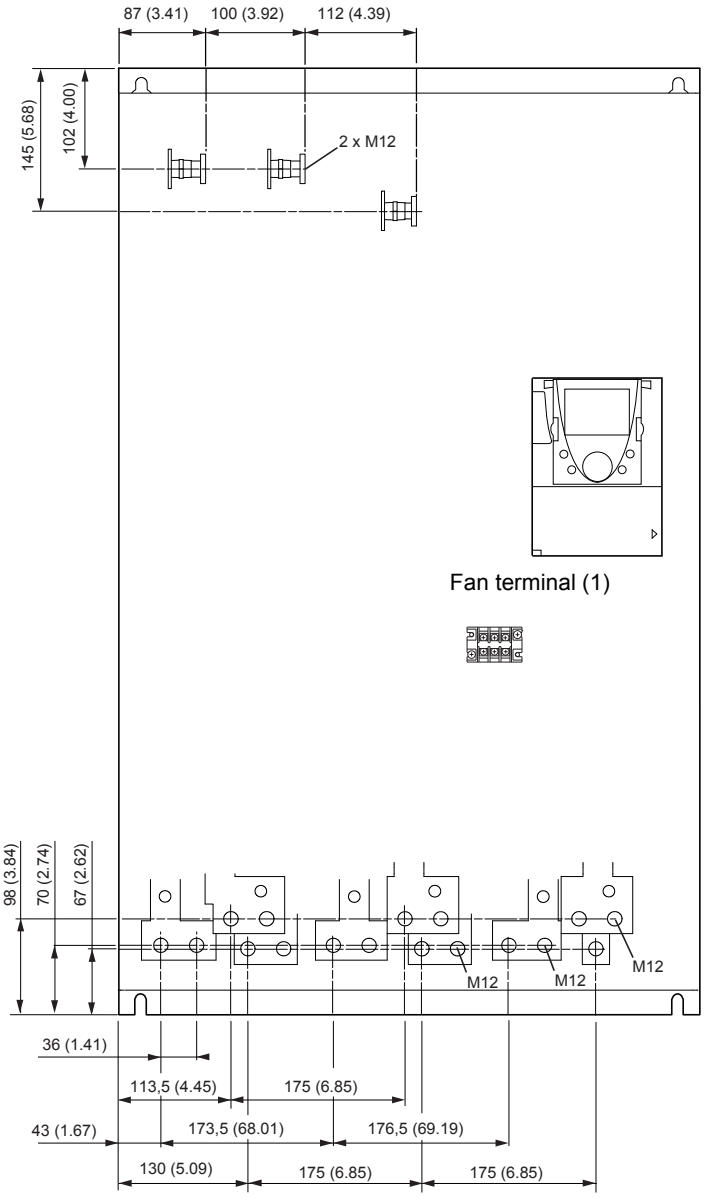
ATV61H C25N4, C31N4

Front view

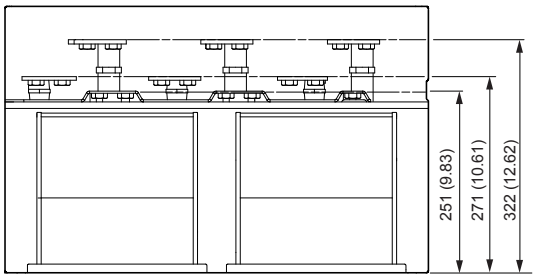
View from above



PO	PA/+	PC/-



View from below



U/T1	V/T2	W/T3

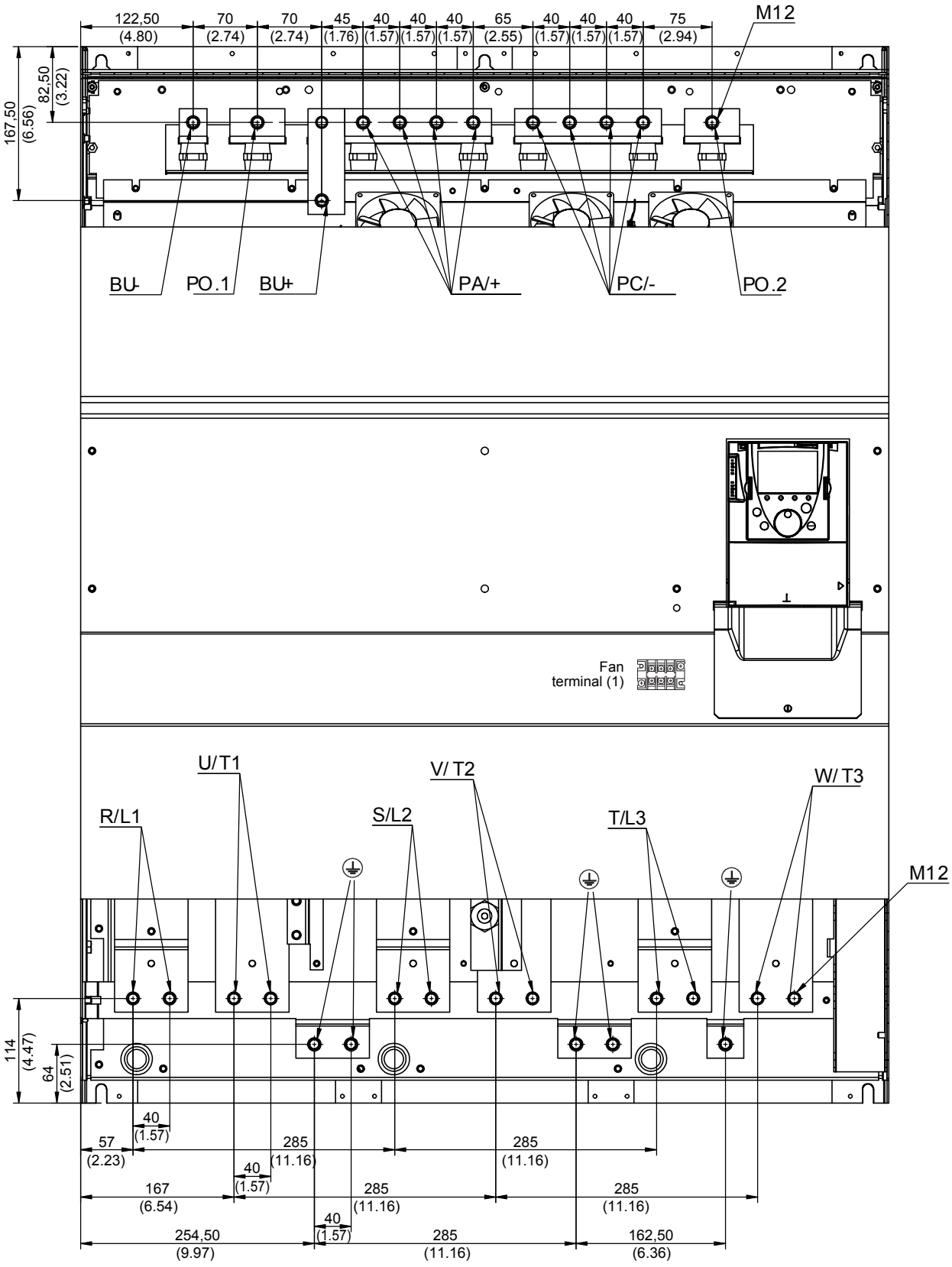
R/L1	S/L2	T/L3

Maximum terminal wire size/tightening torque

Drive terminals	L1/R, L2/S, L3/T, U/T1, V/T2, W/T3	PC/-, PO, PA/+	RO, SO, TO (1)
	4 x 185 mm^2/41 Nm	4 x 185 mm^2/41 Nm	5.5 mm^2/1.4 Nm
	3 x 350 MCM/360 lb.in	3 x 350 MCM/360 lb.in	AWG 10/12 lb.in

(1) Power supply for the fans, compulsory if the drive is only powered by the DC bus. Do not use if the drive is powered with a three-phase supply by L1/R, L2/S, L3/T.

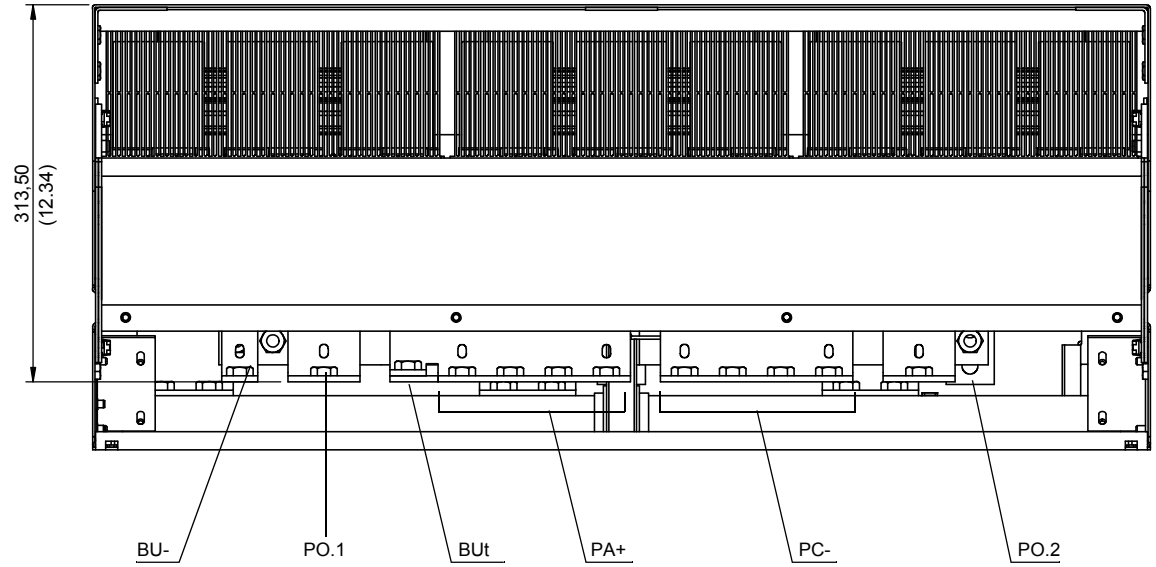
ATV61H C40N4



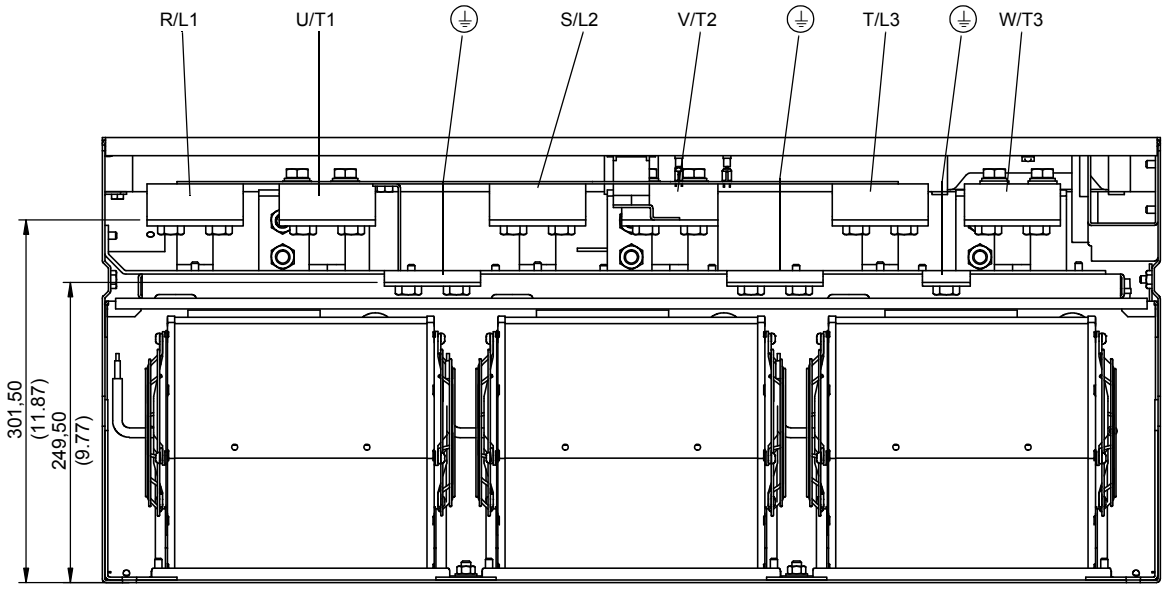
Power terminals

ATV61HC40N4

View from above



View from below



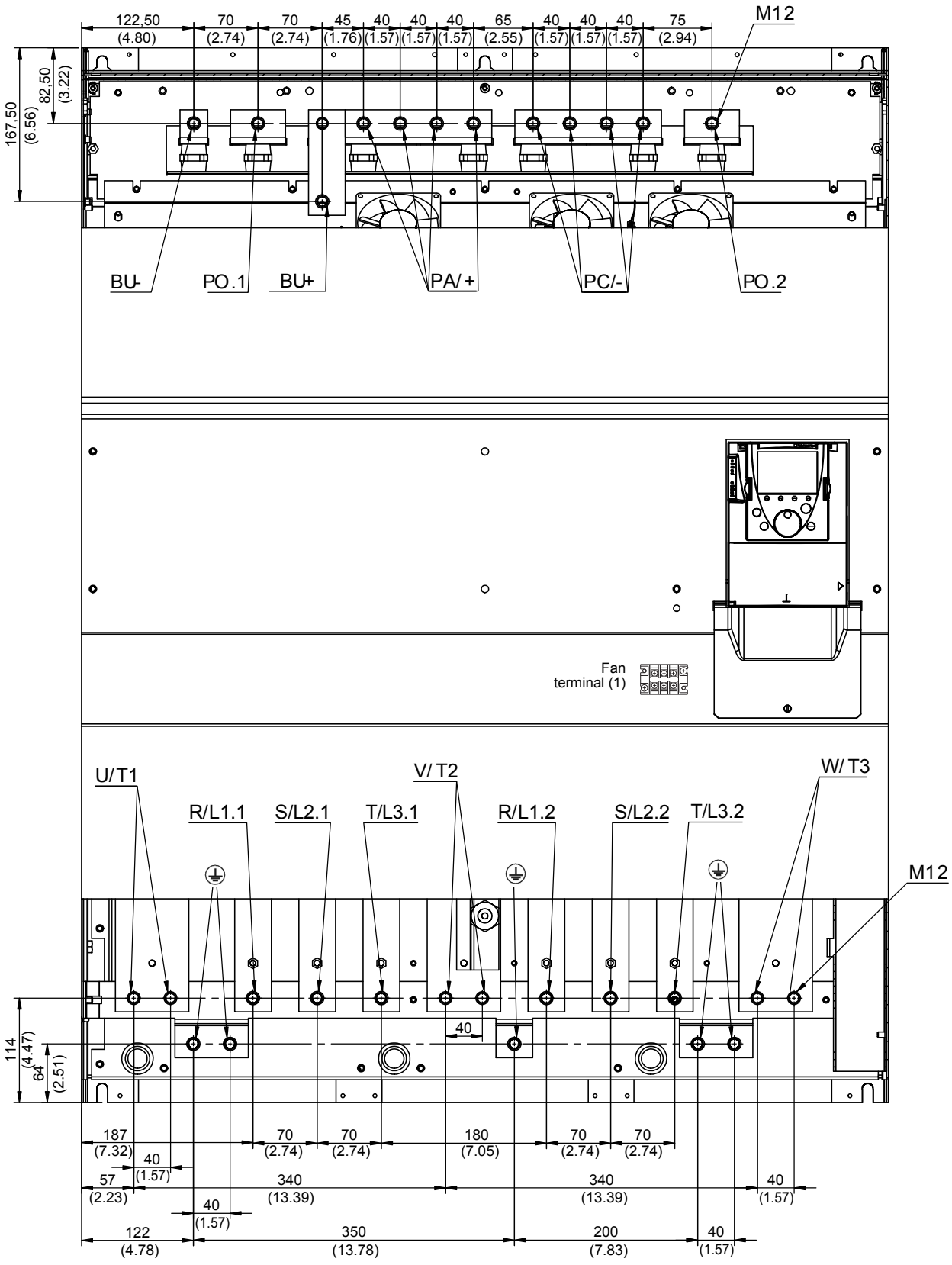
Maximum terminal wire size/tightening torque

Drive terminals	**L1/R, L2/S, L3/T, U/T1, V/T2, W/T3**	**PC/-, PA/+**	**RO, SO, TO** (1)
	4 x 185 mm^2/41 Nm	8 x 185 mm^2 /41 Nm	5.5 mm^2 /1.4 Nm
	4 x 500 MCM/360 lb.in	4 x 500 MCM/360 lb.in	AWG 10/12 lb.in

(1) Power supply for the fans, compulsory if the drive is only powered by the DC bus. Do not use if the drive is powered with a three-phase supply by L1/R, L2/S, L3/T.

Power terminals

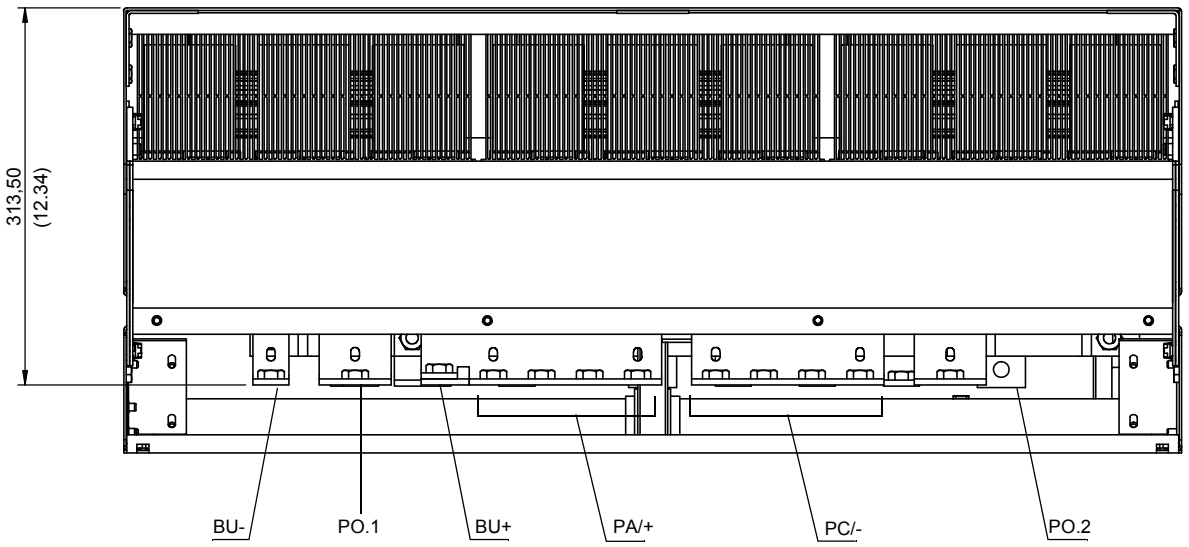
ATV61HC50N4

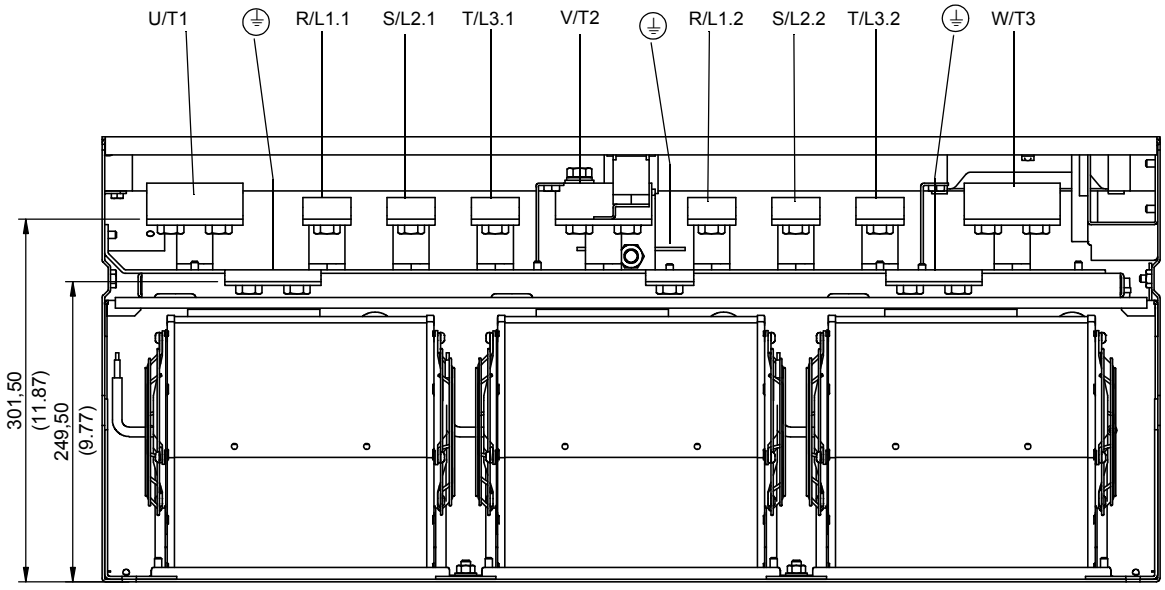


Power terminals

ATV61HC50N4

View from above





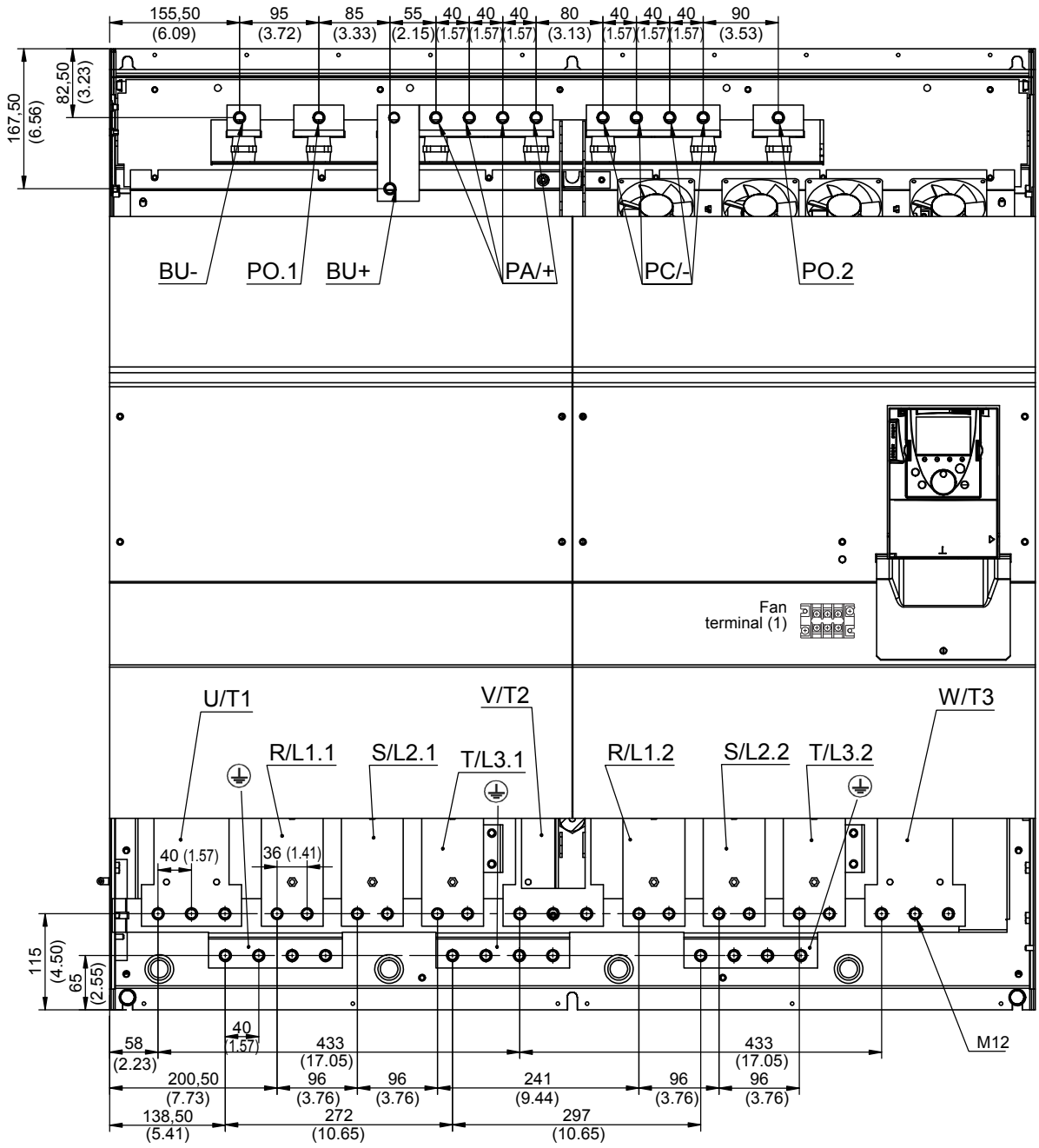
Maximum terminal wire size/tightening torque

Drive terminals	**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/+**	**RO, SO, TO** (1)
	2 x 185 mm²/41 Nm	4 x 185 mm²/41 Nm	8 x 185 mm²/41 Nm	5.5 mm²/1.4 Nm
	2 x 500 MCM/360 lb.in	4 x 500 MCM/360 lb.in	4 x 500 MCM/360 lb.in	AWG10/12 lb.in

(1) Power supply for the fans, compulsory if the drive is only powered by the DC bus. Do not use if the drive is powered with a three-phase supply by L1/R, L2/S, L3/T.

Power terminals

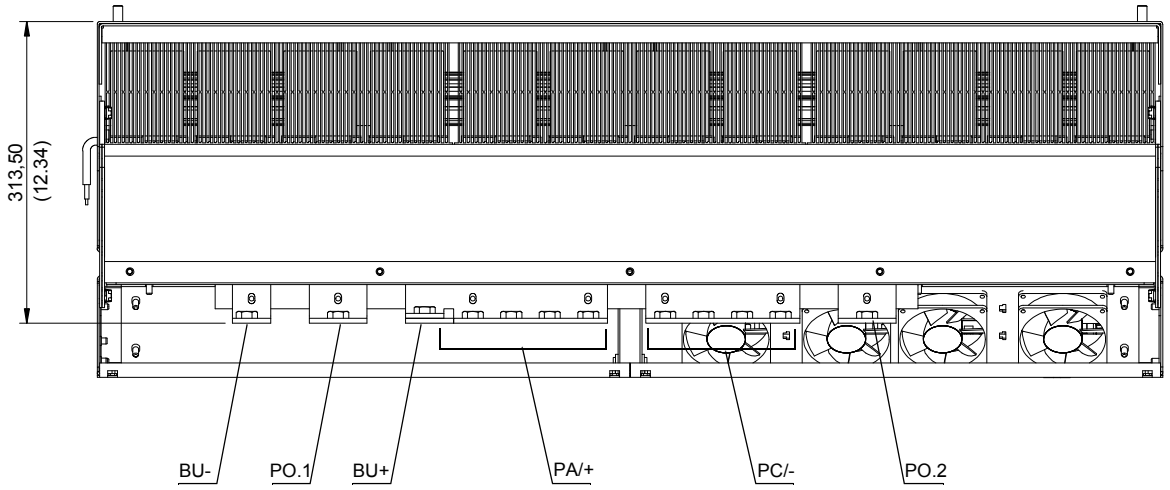
ATV61HC63N4

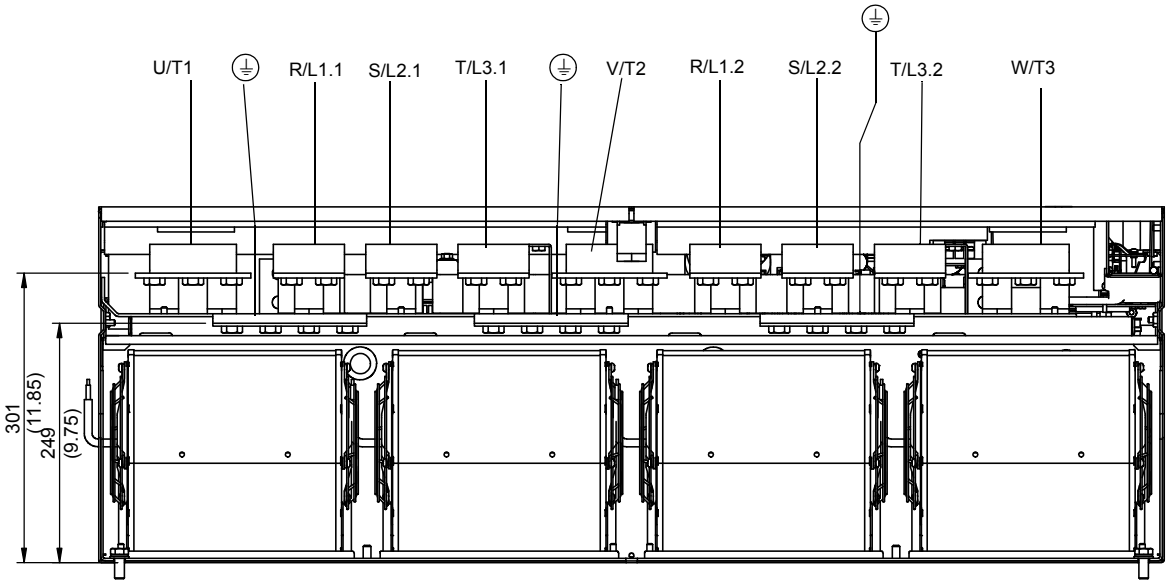


Power terminals

ATV61HC63N4

View from above





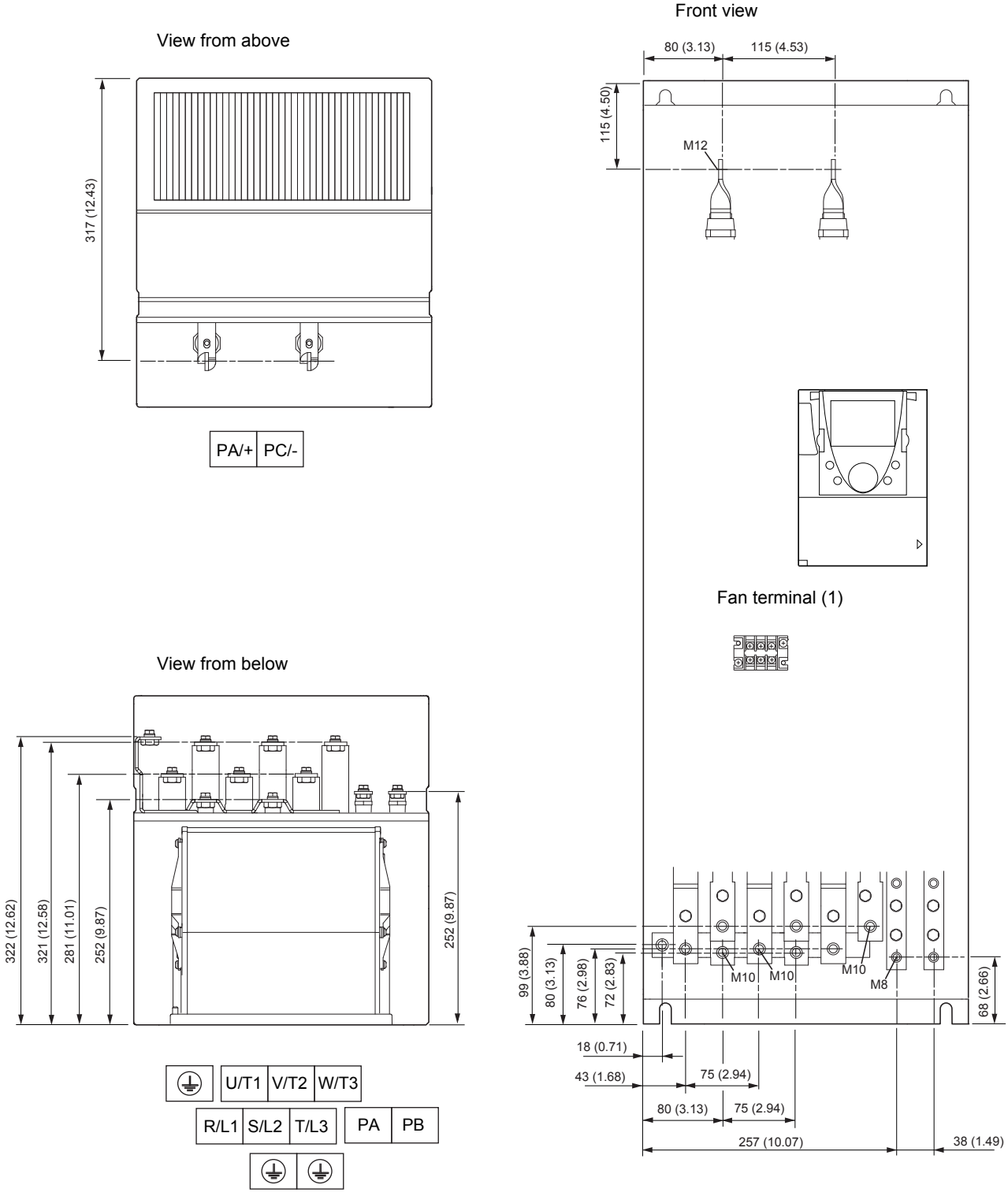
Maximum terminal wire size/tightening torque

Drive terminals	**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/+**	**RO, SO, TO** (1)
	4 x 185 mm²/41 Nm	6 x 185 mm²/41 Nm	8 x 185 mm²/41 Nm	5.5 mm²/1.4 Nm
	3 x 500 MCM/360 lb.in	5 x 500 MCM/360 lb.in	5 x 500 MCM/360 lb.in	AWG 10/12 lb.in

(1) Power supply for the fans, compulsory if the drive is only powered by the DC bus. Do not use if the drive is powered with a three-phase supply by L1/R, L2/S, L3/T.

Power terminals

ATV61H C11Y, C13Y, C16Y, C20Y



Maximum terminal wire size/tightening torque

Drive terminals	L1/R, L2/S, L3/T, U/T1, V/T2, W/T3	PC/-, PA/+	PA, PB	RO, SO, TO (1)
	2 x 120 mm^2/24 Nm	2 x 120 mm^2/24 Nm	120 mm^2/24 Nm	5.5 mm^2/1.4 Nm
	2 x 250 MCM/212 lb.in	2 x 250 MCM/212 lb.in	250 MCM/212 lb.in	AWG 10/12 lb.in

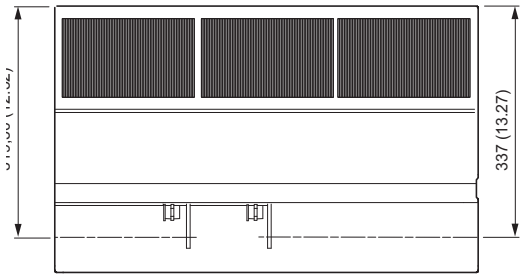
(1) Power supply for the fans, compulsory if the drive is only powered by the DC bus. Do not use if the drive is powered with a three-phase supply by L1/R, L2/S, L3/T.

Power terminals

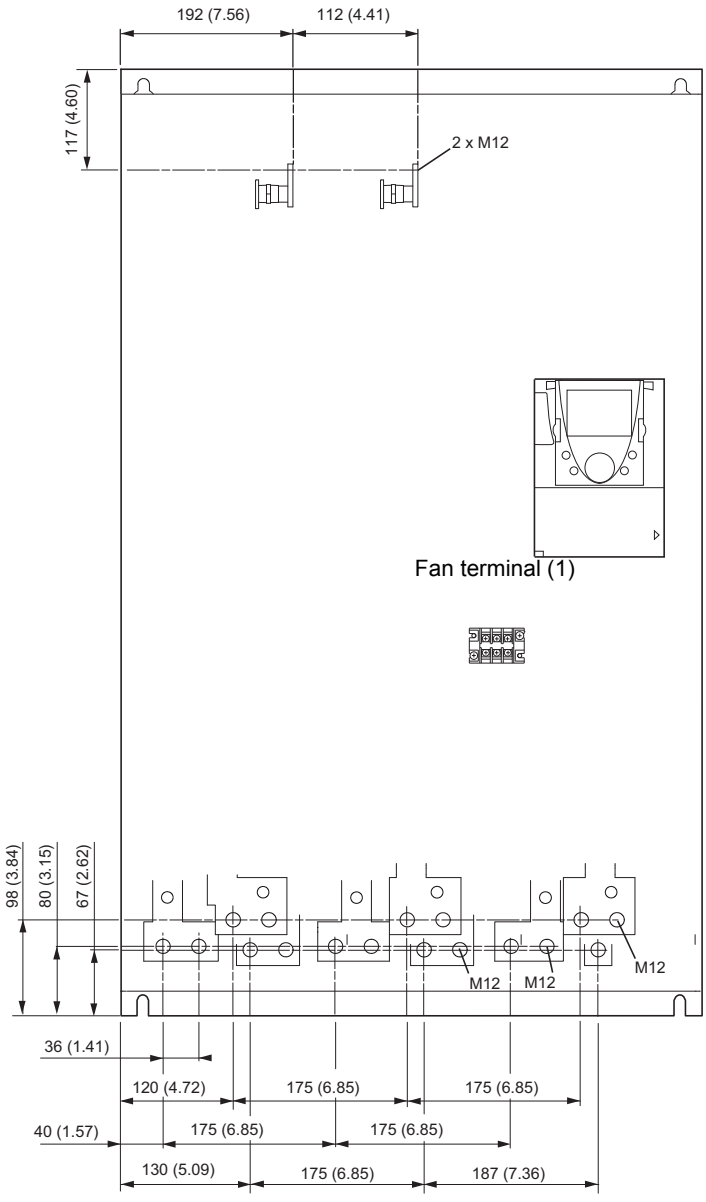
ATV61H C25Y, C31Y, C40Y

Front view

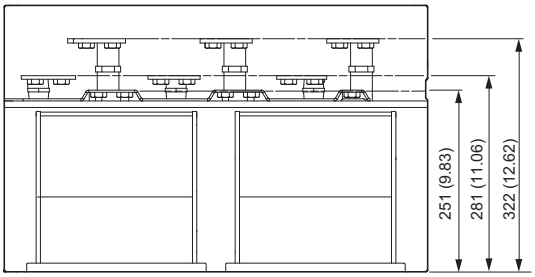
View from above



PA/+	PC/-



View from below



U/T1	V/T2	W/T3

R/L1	S/L2	T/L3

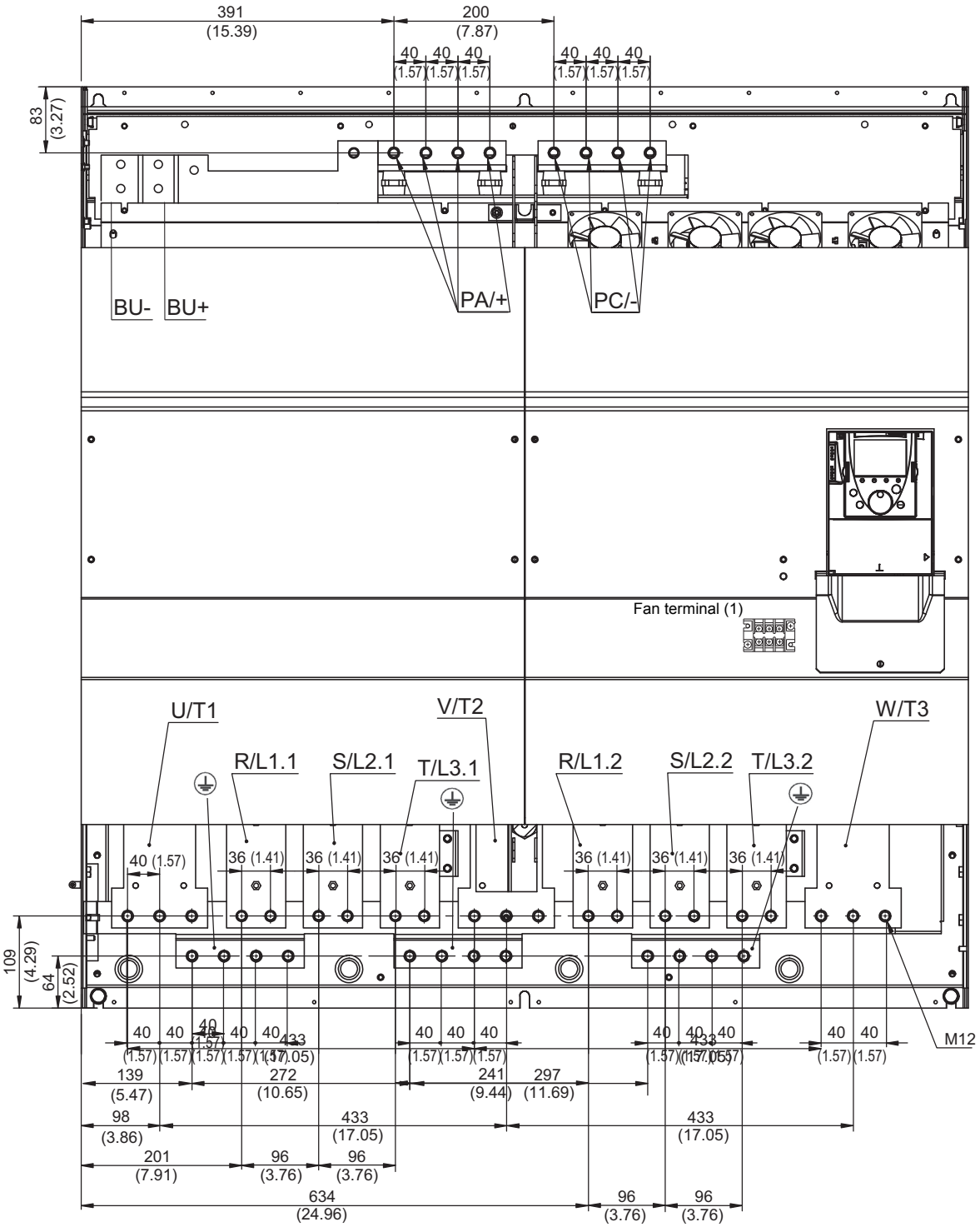
Maximum terminal wire size/tightening torque

Drive terminals	L1/R, L2/S, L3/T, U/T1, V/T2, W/T3	PC/-, PA/+	RO, SO, TO (1)
	4 x 185 mm^2/41 Nm	4 x 185 mm^2/41 Nm	5.5 mm^2/1.4 Nm
	3 x 350 MCM/360 lb.in	3 x 350 MCM/360 lb.in	AWG 10/12 lb.in

(1) Power supply for the fans, compulsory if the drive is only powered by the DC bus. Do not use if the drive is powered with a three-phase supply by L1/R, L2/S, L3/T.

Power terminals

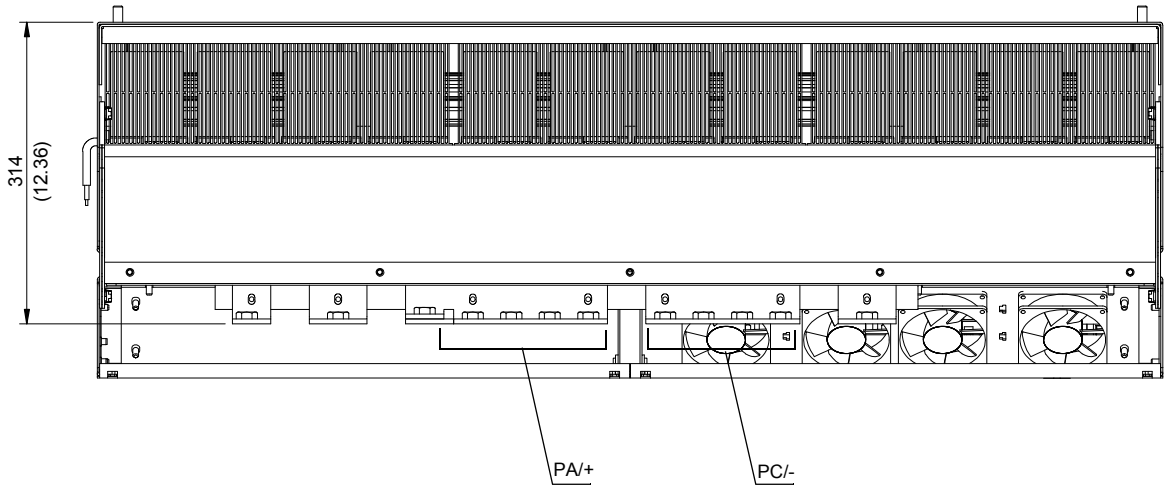
ATV61H C50Y, C63Y, C80Y



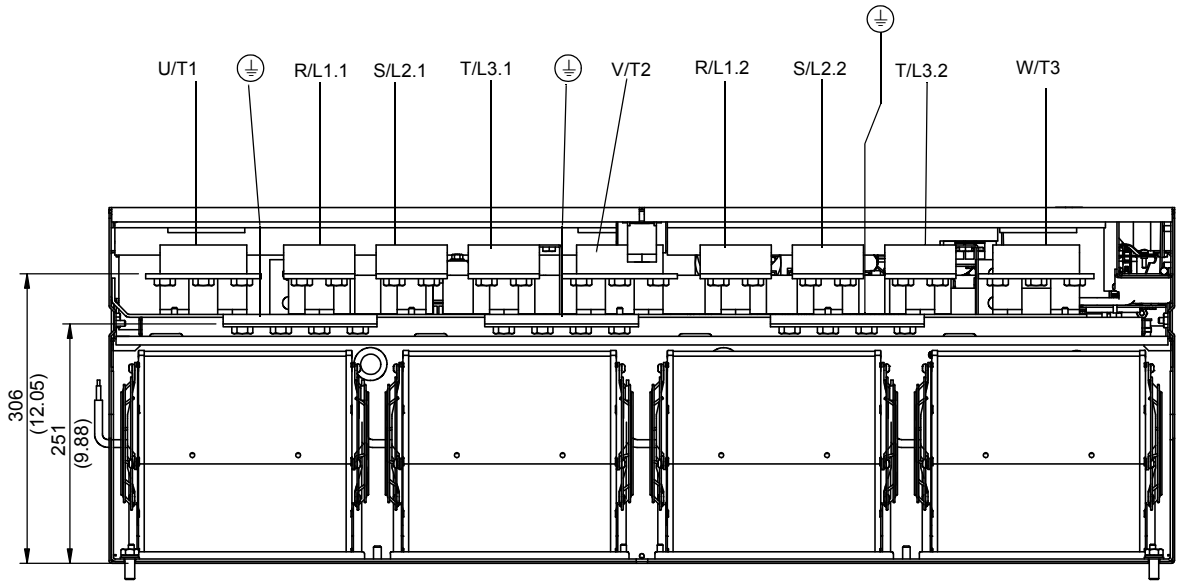
Power terminals

ATV61H C50Y, C63Y, C80Y

View from above



View from below



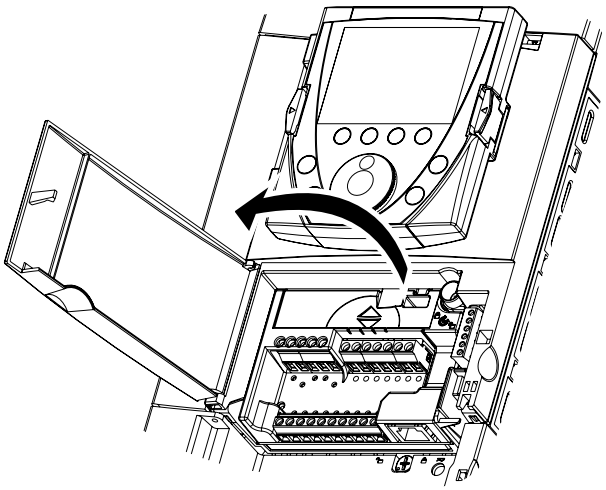
Maximum terminal wire size/tightening torque

Drive terminals	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/+	RO, SO, TO (1)
	4 x 185 mm²/41 Nm	6 x 185 mm²/41 Nm	8 x 185 mm²/41 Nm	5.5 mm²/1.4 Nm
	3 x 500 MCM/360 lb.in	5 x 500 MCM/360 lb.in	5 x 500 MCM/360 lb.in	AWG 10/12 lb.in

(1) Power supply for the fans, compulsory if the drive is only powered by the DC bus. Do not use if the drive is powered with a three-phase supply by L1/R, L2/S, L3/T.

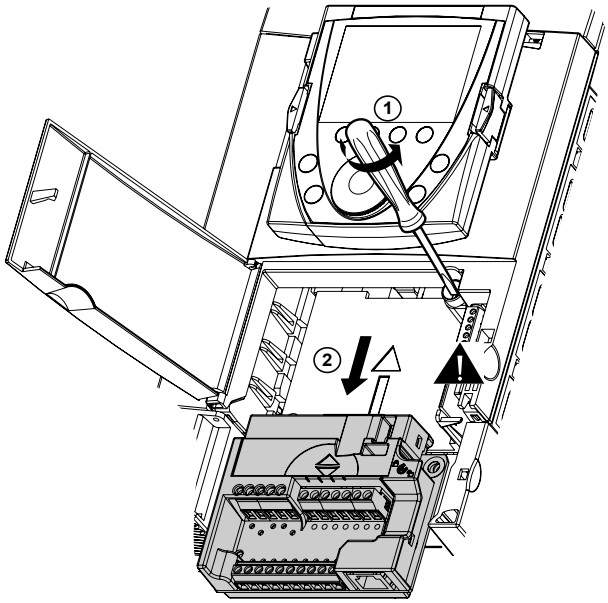
Control terminals

Accessing the control terminals



To access the control terminals,
open the cover on the control front panel.

Removing the terminal card



To make it easier to wire the drive control section,
the control terminal card can be removed.

- Undo the screw until the spring is fully extended.
- Remove the card by sliding it downwards.

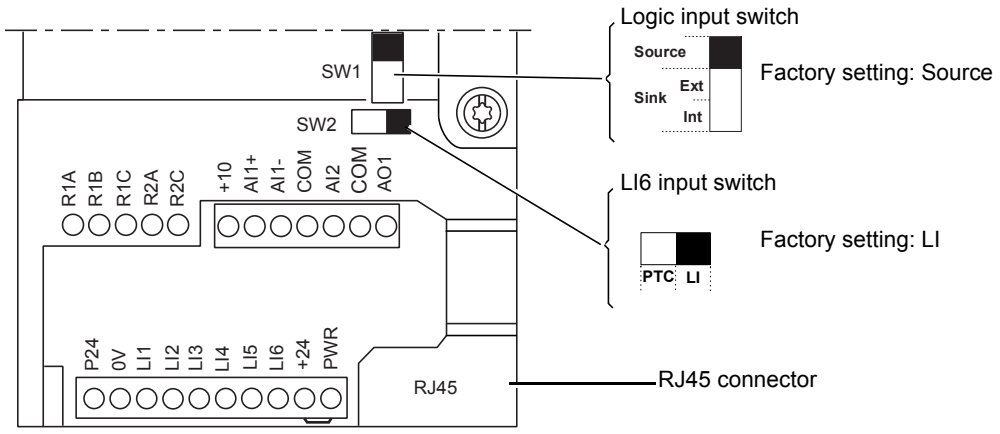
⚠ CAUTION

IMPROPERLY SECURED TERMINAL CARD

When replacing the control terminal card, it is essential to fully tighten the captive screw.

Failure to follow this instruction can result in injury and/or equipment damage.

Arrangement of the control terminals



Maximum wire size:
2.5 mm² - AWG 14

Max. tightening torque:
0.6 Nm - 5.3 lb.in

Note: The ATV61 is supplied with a link between the PWR and +24 terminals.

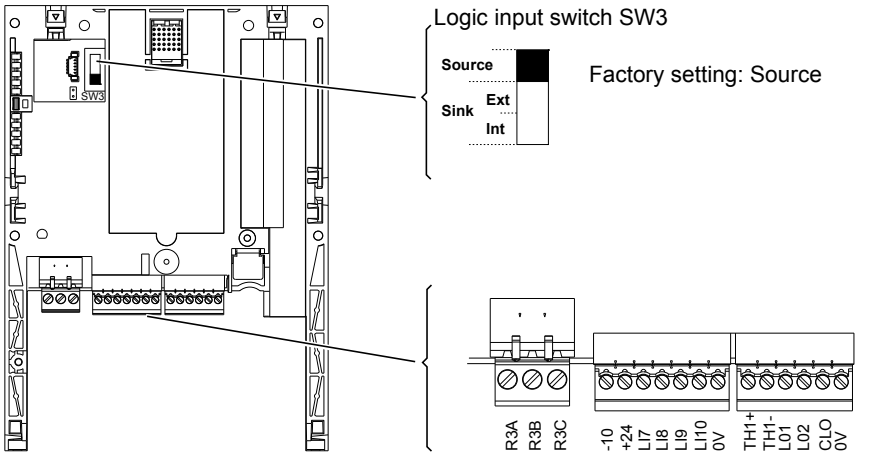
Characteristics and functions of the control terminals

Terminal	Function	Electrical characteristics
R1A R1B R1C	Common point C/O contact (R1C) of programmable relay R1	• Minimum switching capacity: 3 mA for 24 V ⎓ • Maximum switching capacity on resistive load: 5 A for 250 V ∿ or 30 V ⎓ • Maximum switching current on inductive load (cos φ = 0.4 L/R = 7 ms): 2 A for 250 V ∿ or 30 V ⎓ • Reaction time: 7 ms ± 0.5 ms • Service life: 100,000 operations at max. switching power
R2A R2C	N/O contact of R2 programmable relay	
+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	0V
AI2	Depending on software configuration: Analog voltage input or Analog current input	• Analog input 0 to +10 V ⎓ (max. safe voltage 24 V), impedance 30 kΩ or • Analog input X - Y mA, X and Y can be programmed 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	0V
AO1	Depending on software configuration: Analog voltage output or Analog current output or Logic output	• Analog output 0 to +10 V ⎓, load impedance greater than 50 kΩ or • 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 or • Logic output : 0 to + 10 V or 0 to 20 mA.
P24	Input for external +24 V ⎓ control power supply	• +24 V ⎓ (min. 19 V, max. 30 V) • Power 30 Watts
0V	Logic input common and 0V of P24 external 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
LI6	Depending on the position of the SW2 switch: - Programmable logic input or - Input for PTC probes	SW2 switch on LI (factory setting) • Same characteristics as logic inputs LI1 to LI5 or SW2 switch on PTC • Trip threshold 3 kΩ, reset threshold 1.8 kΩ • Short-circuit detection threshold < 50 Ω
+24	Logic input power supply	SW1 switch in Source or Sink Int position • +24 V ⎓ power supply (min. 21 V, max. 27 V), protected against short-circuits and overloads • Max. current available for customers 200 mA SW1 switch in Sink Ext position • Input for external +24 V ⎓ power supply for the logic inputs
PWR	Power Removal safety function input When PWR is not connected to the 24V, the motor cannot be started (compliance with functional safety standard EN 954-1, ISO 13849-1 and IEC/EN 61508)	• 24 V ⎓ power supply (max. 30 V) • Impedance 1.5 kΩ • State 0 if < 2 V, state 1 if > 17 V • Reaction time: 10 ms

SW1 switch	State 0	State 1
Source (factory setting)	< 5 V ⎓	> 11 V ⎓
Sink Int or Sink Ext	> 16 V ⎓	< 10 V ⎓

Option terminals

Logic I/O option card terminals (VW3 A3 201)



Maximum wire size:
1.5 mm² - AWG 16

Max. tightening torque:
0.25 Nm - 2.21 lb.in

Characteristics and functions of the terminals

Terminal	Function	Electrical characteristics
R3A R3B R3C	Common point C/O contact R3C of programmable relay R3	• Minimum switching capacity: 3 mA for 24 V ⎓ • Maximum switching capacity on resistive load: 5 A for 250 V ∿ or 30 V ⎓ • Maximum switching capacity on inductive load (cos φ = 0.4 L/R = 7 ms): 2 A for 250 V ∿ or 30 V ⎓ • Reaction time: 7 ms ± 0.5 ms • Service life: 100,000 operations

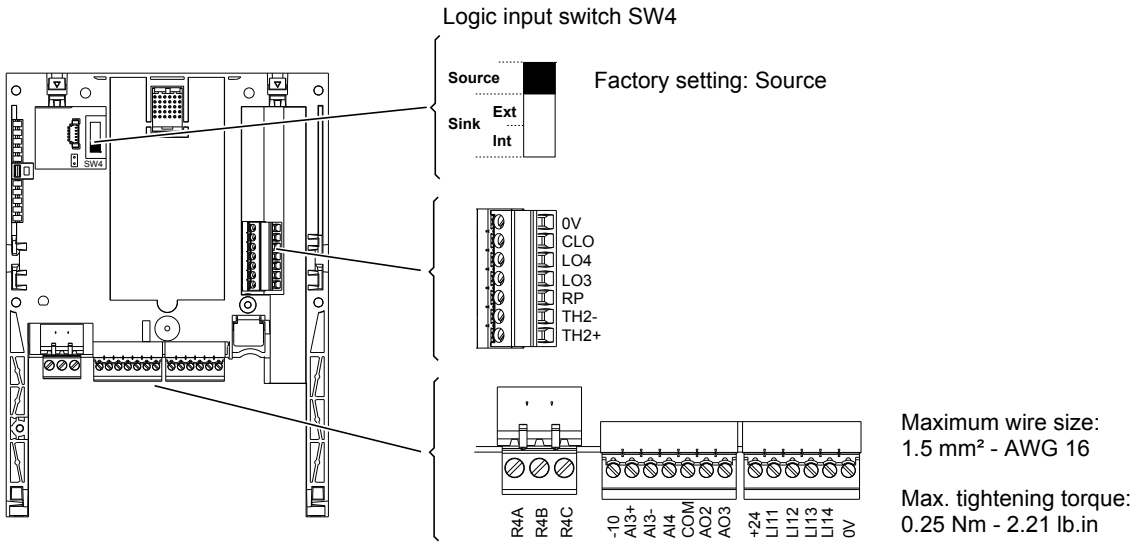
-10	-10 V ⎓ power supply for reference potentiometer 1 to 10 kΩ	• -10 V ⎓ (-10.5 V ± 0.5 V) • 10 mA max.
+24	Logic input power supply	SW3 switch in Source or Sink Int position • +24 V ⎓ power supply (min. 21 V, max. 27 V), protected against short-circuits and overloads • Max. current available for customers 200 mA. (This current corresponds to the total consumption on the control card +24 and the option cards +24) SW3 switch in Sink Ext position • Input for external +24 V ⎓ power supply for the logic inputs
LI7 LI8 LI9 LI10	Programmable logic inputs	• +24 V ⎓ power supply (max. 30 V) • Impedance 3.5 kΩ • Reaction time: 2 ms ± 0.5 ms
0V	0 V	0 V

Switch SW3	State 0	State 1
Source (factory setting)	< 5 V ⎓	> 11 V ⎓
Sink Int or Sink Ext	> 16 V ⎓	< 10 V ⎓

TH1+ TH1-	PTC probe input	• Trip threshold 3 kΩ, reset threshold 1.8 kΩ • Short-circuit detection threshold < 50 Ω
LO1 LO2	Open collector programmable logic outputs	• +24 V ⎓ (max. 30 V) • Max. current 200 mA for internal power supply and 200 mA for external power supply • Reaction time: 2 ms ± 0.5 ms
CLO	Logic output common	
0V	0 V	0 V

Option terminals

Extended I/O option card terminals (VW3 A3 202)



Characteristics and functions of the terminals

Terminal	Function	Electrical characteristics
R4A R4B R4C	Common point C/O contact R4C of programmable relay R4	• Minimum switching capacity: 3 mA for 24 V ⎓ • Maximum switching capacity on resistive load: 5 A for 250 V ∿ or 30 V ⎓ • Maximum switching capacity on inductive load (cos φ = 0.4 L/R = 7 ms): 1.5 A for 250 V ∿ or 30 V ⎓ • Reaction time: 10 ms ± 1 ms • Service life: 100,000 operations
-10	-10 V ⎓ power supply for reference potentiometer 1 to 10 kΩ	• -10 V ⎓ (-10.5 V ± 0.5 V) • 10 mA max.
AI3+	+ polarity of the current differential analog input AI3	• Analog input X - Y mA, X and Y can be programmed from 0 to 20 mA, impedance 250 Ω • Reaction time: 5 ms ± 1 ms • 11-bit resolution + 1 sign bit, accuracy ± 0.6% for Δθ = 60 °C (140 °F) • Linearity ± 0.15% of max. value
AI3-	- polarity of the current differential analog input AI3	
AI4	Depending on software configuration: Analog current input or Analog voltage input	• Analog input 0 to +10 V ⎓ (max. safe voltage 24 V), impedance 30 kΩ or • Analog input X - Y mA, X and Y can be programmed from 0 to 20 mA, impedance 250 Ω • Reaction time: 5 ms ± 1 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
AO2 AO3	Depending on software configuration: Analog voltage outputs or Analog current outputs	• 0 - 10 V ⎓ or -10/+10 V ⎓ bipolar analog output depending on software configuration, load impedance greater than 50 kΩ or • Analog current 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 5 ms ± 1 ms, accuracy ± 1% for Δθ = 60 °C (140 °F), linearity ± 0.2%

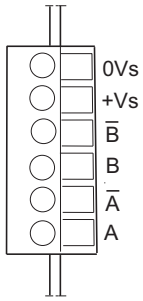
Option terminals

<table>
<tr><th>Terminal</th><th>Function</th><th>Electrical characteristics</th></tr>
<tr><td>+24</td><td>Logic input power supply</td><td>SW4 switch in Source or Int Sink position
• +24 V ⎓ output (min. 21 V, max. 27 V), protected against short-circuits and overloads
• Max. current available for customers 200 mA. (This current corresponds to the total consumption on the control card +24 and the option cards +24)

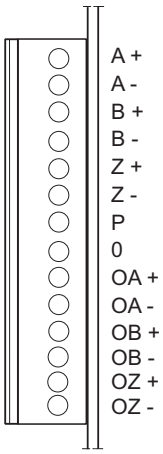
SW4 switch in Sink Ext position
• Input for external +24 V ⎓ power supply for the logic inputs</td></tr>
<tr><td>LI11
LI12
LI13
LI14</td><td>Programmable logic inputs</td><td>• +24 V ⎓ (max. 30 V)
• Impedance 3.5 kΩ
• Reaction time: 5 ms ± 1 ms
<table><tr><td>SW4 switch</td><td>State 0</td><td>State 1</td></tr><tr><td>Source (factory setting)</td><td>< 5 V ⎓</td><td>> 11 V ⎓</td></tr><tr><td>Sink Int or Sink Ext</td><td>> 16 V ⎓</td><td>< 10 V ⎓</td></tr></table></td></tr>
<tr><td>0V</td><td>Logic input common</td><td>0 V</td></tr>
<tr><td>TH2 +
TH2 -</td><td>PTC probe input</td><td>• Trip threshold 3 kΩ, reset threshold 1.8 kΩ
• Short-circuit detection threshold < 50 Ω</td></tr>
<tr><td>RP</td><td>Frequency input</td><td>• Frequency range: 0…30 kHz
• Cyclic ratio: 50% ± 10%
• Maximum sampling time: 5 ms ± 1 ms
• Maximum input voltage 30 V, 15 mA
• Add a resistor if the input voltage is greater than 5 V (510 Ω for 12 V, 910 Ω for 15 V, 1.3 kΩ for 24 V)
• State 0 if < 1.2 V, state 1 if > 3.5 V</td></tr>
<tr><td>LO3
LO4</td><td>Open collector programmable logic outputs</td><td>• +24 V ⎓ (max. 30 V)
• Max. current 20 mA for internal power supply and 200 mA for external power supply
• Reaction time: 5 ms ± 1 ms</td></tr>
<tr><td>CLO</td><td>Logic output common</td><td></td></tr>
<tr><td>0V</td><td>0 V</td><td>0 V</td></tr>
</table>

Encoder interface card terminals

VW3 A3 401...407



VW3 A3 411



Maximum wire size:
1.5 mm² - AWG 16

Max. tightening torque:
0.25 Nm - 2.21 lb.in

Characteristics and functions of the terminals

Encoder interface cards with RS422-compatible differential outputs

Terminal	Function	Electrical characteristics	
		VW3 A3 401	VW3 A3 402
+Vs 0Vs	Power supply for encoder	• 5 V ⎓ (max. 5.5 V) protected against short-circuits and overloads • Max. current 200 mA	• 15 V ⎓ (max. 16 V) protected against short-circuits and overloads • Max. current 175 mA
A, /A B, /B	Incremental logic inputs	• Max. resolution: 5,000 points/rev • Max. frequency: 300 kHz • Nominal input voltage: 5 V	

Encoder interface cards with open collector outputs

Terminal	Function	Electrical characteristics	
		VW3 A3 403	VW3 A3 404
+Vs 0Vs	Power supply for encoder	• 12 V ⎓ (max. 13 V) protected against short-circuits and overloads • Max. current 175 mA	• 15 V ⎓ (max. 16 V) protected against short-circuits and overloads • Max. current 175 mA
A, /A B, /B	Incremental logic inputs	• Max. resolution: 5,000 points/rev • Max. frequency: 300 kHz	

Encoder interface cards with push-pull outputs

Terminal	Function		Electrical characteristics		
			VW3 A3 405	VW3 A3 406	VW3 A3 407
+Vs 0Vs	Power supply for encoder		• 12 V ⎓ (max. 13 V) protected against short-circuits and overloads • Max. current 175 mA	• 15 V ⎓ (max. 16 V) protected against short-circuits and overloads • Max. current 175 mA	• 24 V ⎓ (min. 20 V, max. 30 V) protected against short-circuits and overloads • Max. current 100 mA
		State 0	If < 1.5 V		
		State 1	If > 7.7 V and < 13 V	If > 7.7 V and < 16 V	If > 11.5 V and < 25 V
A, /A B, /B	Incremental logic inputs		• Max. resolution: 5,000 points/rev • Max. frequency: 300 kHz		

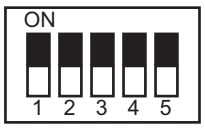
Encoder interface cards with RS422 compatible differential outputs with encoder emulation

Terminal	Function	Electrical characteristics	
		VW3 A3 411	
P 0	Encoder power supply	• 5 V ⎓ (max. 5.5 V) protected against short-circuits and overloads • Max. current 200 mA	• 15 V ⎓ (max. 16 V) protected against short-circuits and overloads • Max. current 200 mA
A+, A- B+, B- Z+, Z-	Logic inputs	• Max. resolution: 10,000 points/rev • Max. frequency: 300 kHz	
OA+, OA- OB+, OB- OZ+, OZ-	Logic outputs	• Selectable ratio: 1, 1/2, 1/4, 1/8, 1/16, 1/32, 1/64 • Max. frequency: 300 kHz	

This encoder card has two groups of parameter switches:
- The first is for selecting the supply voltage supplied by the interface card to the encoder: 5 V or 15 V.
- The second is a set of five switches numbered 1 to 5 (see diagram below). The division ratio for the ESIM outputs is selected using switches 1, 2 and 3. Switches 4 and 5 are used to select the input signals for the encoder card. Fault detection will be inhibited for the inputs selected using these switches.

1	2	3	ESIM outputs
ON	ON	ON	A and B divided by 1
ON	ON	OFF	A and B divided by 2
ON	OFF	ON	A and B divided by 4
ON	OFF	OFF	A and B divided by 8
OFF	ON	ON	A and B divided by 16
OFF	ON	OFF	A and B divided by 32
OFF	OFF	ON	A and B divided by 64
OFF	OFF	OFF	ESIM disabled

4	5	Encoder inputs
ON	ON	Encoder A, B and Z
ON	OFF	Encoder A and B
OFF	ON	Encoder A and B
OFF	OFF	Encoder A



Selecting the encoder

The 8 encoder interface cards available as an option with the ATV61 enable three different encoder technologies to be used.

- Optical incremental encoder with differential outputs compatible with the RS422 standard
- Optical incremental encoder with open collector outputs
- Optical incremental encoder with push-pull outputs
- Incremental encoder with RS422-compatible differential outputs with encoder emulation

The encoder must comply with the following two limits:
- Maximum encoder frequency 300 kHz
- Maximum resolution 5,000 points/revolution

Choose the max. standard resolution within these two limits to obtain optimum accuracy.

Wiring the encoder

Use a shielded cable containing 3 twisted pairs with a pitch of between 25 and 50 mm (0.98 in. and 1.97 in.). Connect the shielding to ground at both ends.
The minimum cross-section of the conductors must comply with the table below to limit line voltage drop.

Max. encoder cable length	VW3 A3 401...402			VW3 A3 403...407		
	Max. consumption current of encoder	Minimum cross-section of conductors		Max. consumption current of encoder	Minimum cross-section of conductors	
10 m 32.8 ft	100 mA	0.2 mm²	AWG 24	100 mA	0.2 mm²	AWG 24
	200 mA	0.2 mm²	AWG 24	200 mA	0.2 mm²	AWG 24
50 m 164 ft	100 mA	0.5 mm²	AWG 20	100 mA	0.5 mm²	AWG 20
	200 mA	0.75 mm²	AWG 18	200 mA	0.75 mm²	AWG 18
100 m 328 ft	100 mA	0.75 mm²	AWG 18	100 mA	0.75 mm²	AWG 18
	200 mA	1.5 mm²	AWG 15	200 mA	1.5 mm²	AWG 16
200 m 656 ft	-	-	-	100 mA	0.5 mm²	AWG 20
	-	-	-	200 mA	1.5 mm²	AWG 15
300 m 984 ft	-	-	-	100 mA	0.75 mm²	AWG 18
	-	-	-	200 mA	1.5 mm²	AWG 15

Max. encoder cable length	VW3 A3 411				
	Max. consumption current of encoder	Minimum cross-section of conductors			
		15 V power supply		5 V power supply	
25 m 82 ft	100 mA	0.2 mm²	AWG 24	0.5 mm²	AWG 20
	200 mA	0.5 mm²	AWG 20	1 mm²	AWG 17
50 m 164 ft	100 mA	0.5 mm²	AWG 20	0.75 mm²	AWG 18
	200 mA	0.75 mm²	AWG 18	1.5 mm²	AWG 15
100 m 328 ft	100 mA	0.75 mm²	AWG 18	-	-
	200 mA	1.5 mm²	AWG 15	-	-

Connection diagrams conforming to standards EN 954-1 category 1, ISO 13849-1 and IEC/EN 61508 capacity SIL1, stopping category 0 in accordance with standard IEC/EN 60204-1

Diagram with line contactor

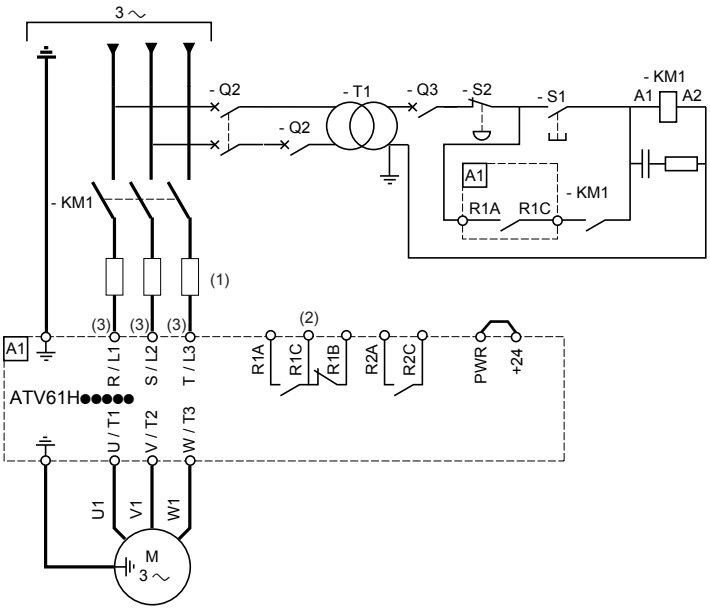
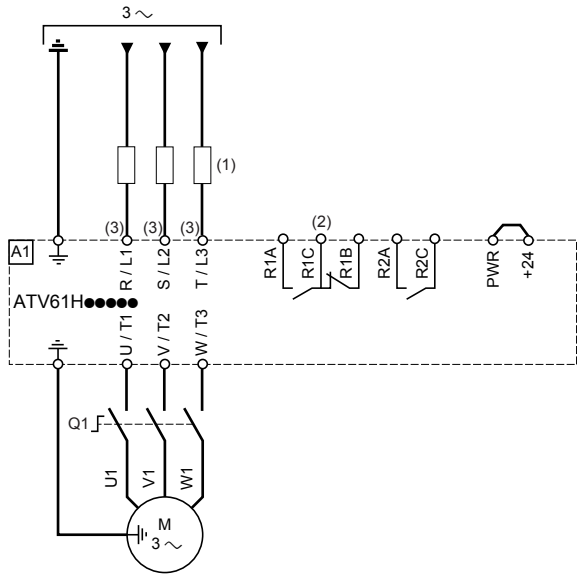


Diagram with switch disconnect



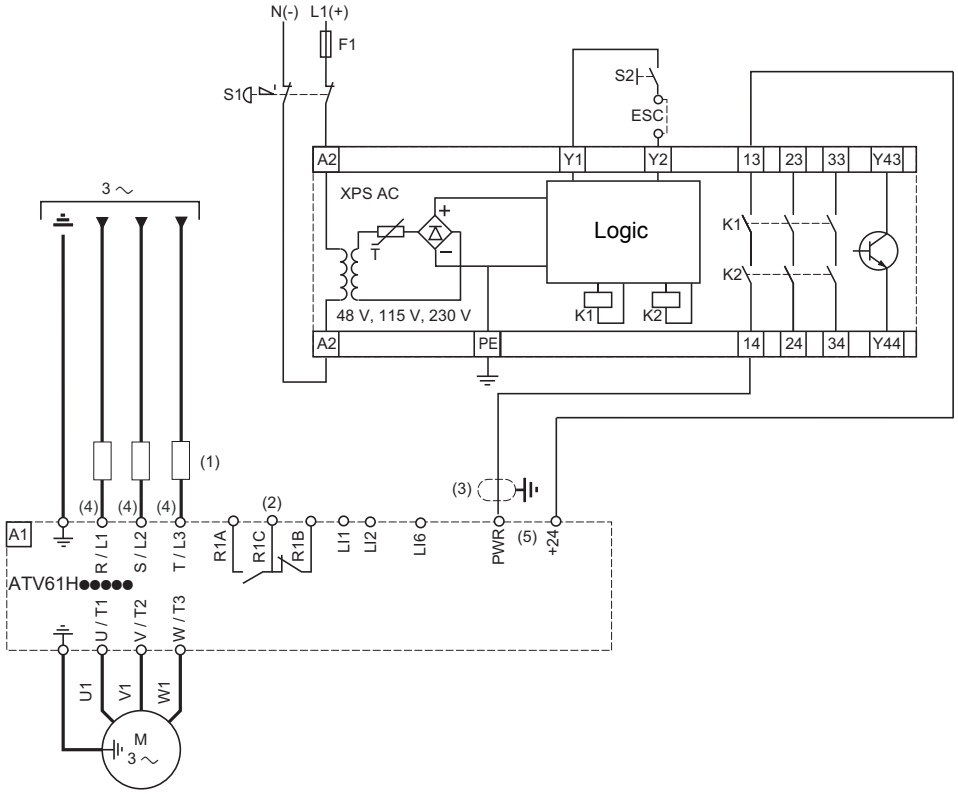
(1) Line choke, if required, for ATV61H●●●M3X and ATV61H●●●N4, compulsory for ATV61H●●●Y (to be ordered separately) if no special transformers (e.g. 12-pulse transformer) are being used.
(2) Fault relay contacts, for remote signaling of drive status.
(3) For the wiring of the power section AC supply of ATV61HC50N4, C63N4, C50Y, C63Y and C80Y drives, refer to page 63.

Note: Install interference suppressors on all inductive circuits near the drive or coupled to the same circuit (relays, contactors, solenoid valves, etc).

Choice of associated components:
Please refer to the catalog.

Connection diagrams conforming to standards EN 954-1 category 3, ISO 13849-1 and IEC/EN 61508 capacity SIL2, stopping category 0 in accordance with standard IEC/EN 60204-1

This connection diagram is suitable for use with machines with a short freewheel stop time (with low inertia or high resistive torque). When the emergency stop is activated, the drive power supply is turned off immediately and the motor stops in accordance with category 0 of standard IEC/EN 60204-1.



(1) Line choke, if required, for ATV61H●●●M3X and ATV61H●●●N4, compulsory for ATV61H●●●Y (to be ordered separately) if no special transformers (e.g. 12-pulse transformer) are being used.
(2) Fault relay contacts, for remote signaling of drive status.
(3) It is essential to connect the shielding on the cable connected to the Power Removal input to ground.
(4) For the wiring of the power section AC supply of ATV61HC50N4, C63N4, C50Y, C63Y and C80Y drives, refer to page 63.
(5) Use cable ends DZ5CE020 (yellow) on wires connected to PWR and +24 inputs.

- Standard EN 954-1 category 3 and ISO 13849-1 require the use of a stop button with double contact (S1).
- S1 is used to activate the Power Removal safety function.
- S2 is used to initialize the Preventa module when powering up or after an emergency stop. ESC enables the use of other initialization conditions for the module.
- One Preventa module can be used for the Power Removal safety function on several ATV61 drives.
- A logic output on the Preventa module can be used to indicate safely that the drive is operating in safe conditions.

Note:
For preventive maintenance, the Power Removal function must be activated at least once a year.
The drive must be switched off before preventive maintenance takes place, and then switched back on again.
The drive logic output signals cannot be considered as safety-type signals.
Fit interference suppressors to all inductive circuits near the drive or coupled to the same circuit (relays, contactors, solenoid valves, etc).

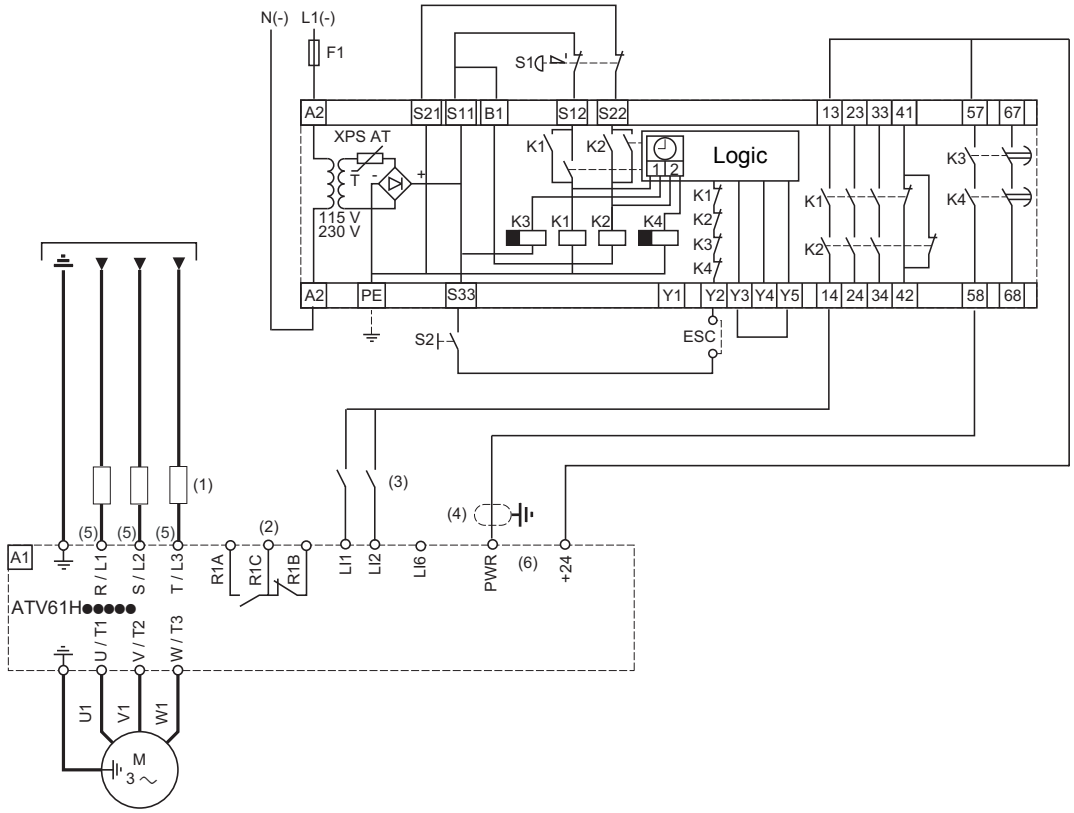
Choice of associated components:
Please refer to the catalog.

Connection diagrams conforming to standards EN 954-1 category 3, ISO 13849-1 and IEC/EN 61508 capacity SIL2, stopping category 1 in accordance with standard IEC/EN 60204-1

This connection diagram is suitable for use with machines with a long freewheel stop time (machines with high inertia or low resistive torque).

When the emergency stop is activated, deceleration of the motor controlled by the drive is requested first. Then, after a time delay corresponding to the deceleration time, the Power Removal safety function is activated.

Example:
- 2-wire control
- LI1 assigned to forward
- LI2 assigned to reverse



(1) Line choke, if required, for ATV61H●●●M3X and ATV61H●●●N4, compulsory for ATV61H●●●Y (to be ordered separately) if no special transformers (e.g. 12-pulse transformer) are being used.
(2) Fault relay contacts, for remote signaling of drive status.
(3) In this example, the logic inputs Lix are wired as "Source" but can be wired as "Sink Int" or "Sink Ext" (please refer to page 64).
(4) It is essential to connect the shielding on the cable connected to the Power Removal input to ground.
(5) For the wiring of the power section AC supply of ATV61HC50N4, C63N4, C50Y, C63Y and C80Y drives, refer to page 63.
(6) Use cable ends DZ5CE020 (yellow) on wires connected to PWR and +24 inputs.

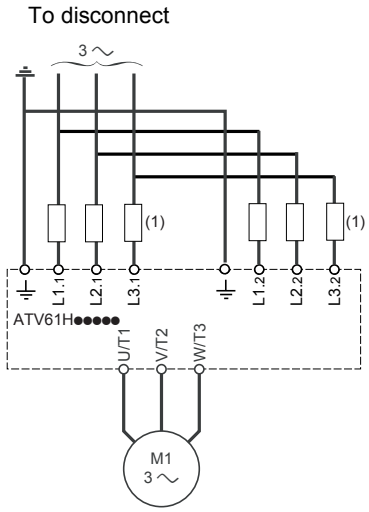
- Standard EN 954-1 category 3 and ISO 13849-1 require the use of an emergency stop with double contact (S1).
- S1 is used to activate the Power Removal safety function.
- S2 is used to initialize the Preventa module when powering up or after an emergency stop. ESC enables the use of other initialization conditions for the module.
- One Preventa module can be used for the Power Removal safety function on several ATV61 drives. In this case the time delay must be set to the longest stopping time.
- A logic output on the Preventa module can be used to indicate safely that the drive is operating in safe conditions.

Note: For preventive maintenance, the Power Removal function must be activated at least once a year.
The drive must be switched off before preventive maintenance takes place, and then switched back on again.
The drive logic output signals cannot be considered as safety-type signals.
Install interference suppressors on all inductive circuits near the drive or coupled to the same circuit (relays, contactors, solenoid valves, etc).

Choice of associated components:
Please refer to the catalog.

Connection diagrams

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

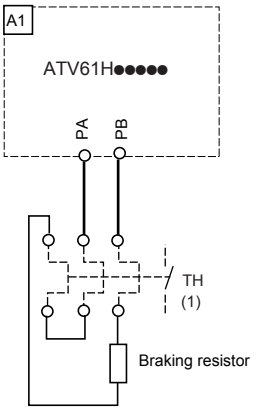


(1) Line chokes, if required, for ATV61H●●●N4, compulsory for ATV61H●●●Y (to be ordered separately) if no special transformers (e.g. 12-pulse transformer) are being used.

Braking resistor connection diagram

ATV61H D55M3X, D75M3X, D90M3X
ATV61H D90N4 to C22N4
ATV61H C11Y to C20Y

For these drive ratings, braking resistors are connected directly to the terminals at the base of the drive (terminals PA/+ and PB).



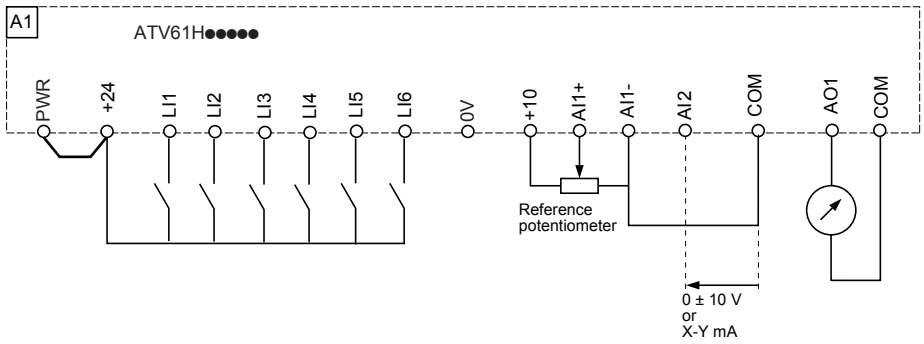
(1) Thermal overload relay

ATV61H C25N4 to C63N4
ATV61H C25Y to C80Y

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

Control connection diagrams

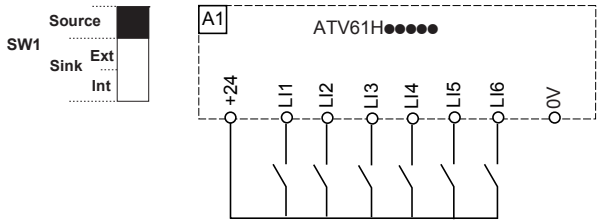
Control card connection diagram



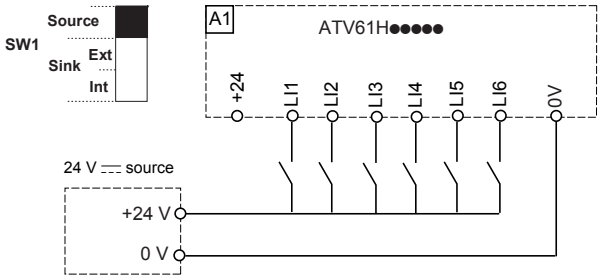
Logic input switch (SW1)

The logic input switch (SW1) is used to adapt the operation of the logic inputs to the technology of the programmable controller outputs.
- Set the switch to Source (factory setting) if using PLC outputs with PNP transistors.
- Set the switch to Sink Int or Sink Ext if using PLC outputs with NPN transistors.

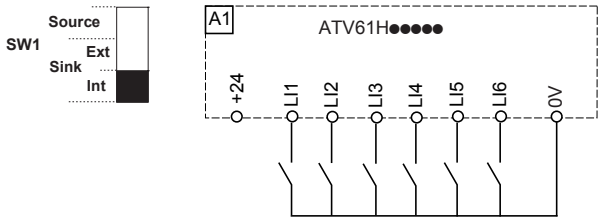
- SW1 switch set to "Source" position



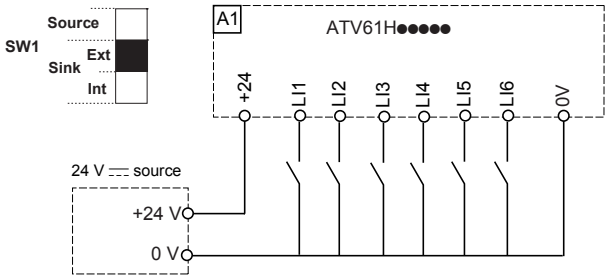
- SW1 switch set to "Source" position and use of an external power supply for the LIs



- SW1 switch set to "Sink Int" position



- SW1 switch set to "Sink Ext" position



WARNING

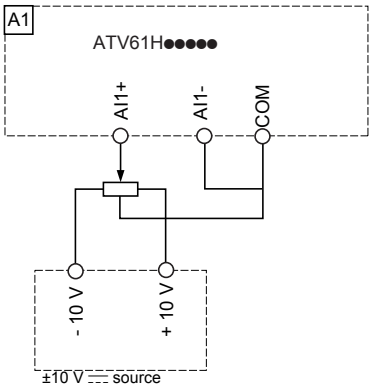
UNINTENDED EQUIPMENT OPERATION

When the SW1 switch is set to "Sink Int" or "Sink Ext", the common must never be connected to ground or the protective ground, as there is then a risk of unintended equipment operation on the first insulation fault.

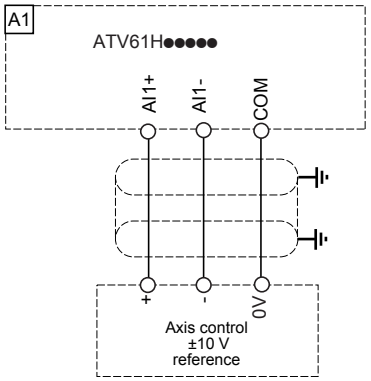
Failure to follow this instruction can result in death, serious injury or equipment damage.

Connection diagrams

Bipolar speed reference

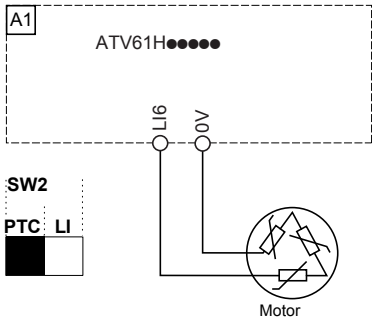


Speed reference using axis control



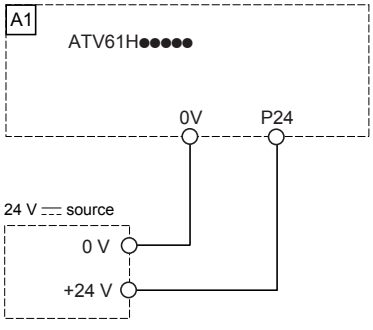
SW2 switch

The LI6 logic input switch (SW2) makes it possible to use the LI6 input:
- either as a logic input by setting the switch to LI (factory setting)
- or for motor protection via PTC probes by setting the switch to PTC



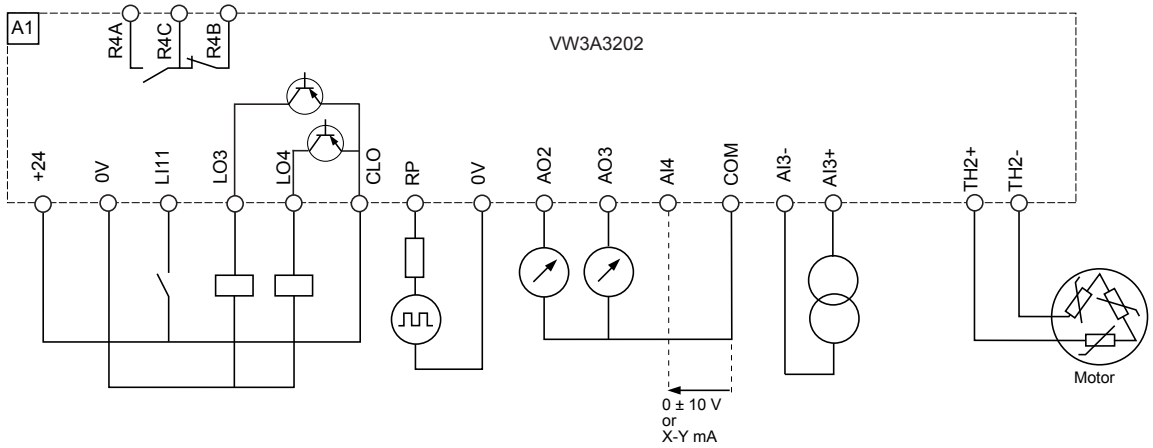
Control power supply via an external source

The control card can be supplied via an external +24 V ⎓ source

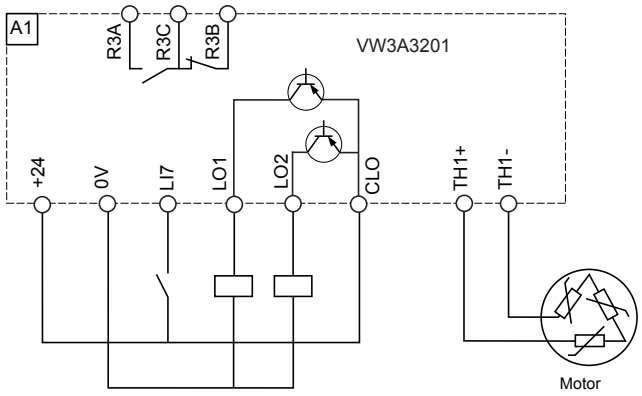


I/O extension card connection diagrams

Connection diagram for extended I/O option card (VW3A3202)



Connection diagram for logic I/O option card (VW3A3201)

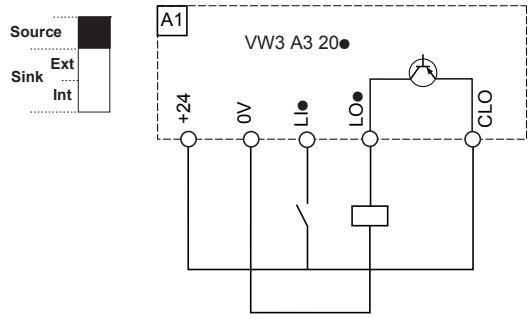


Connection diagrams

SW3/SW4 logic I/O switch

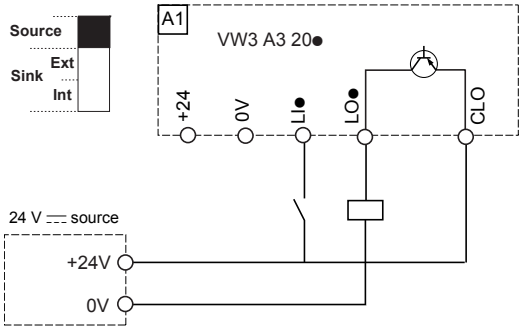
- Switch in "Source" position

SW3 or SW4



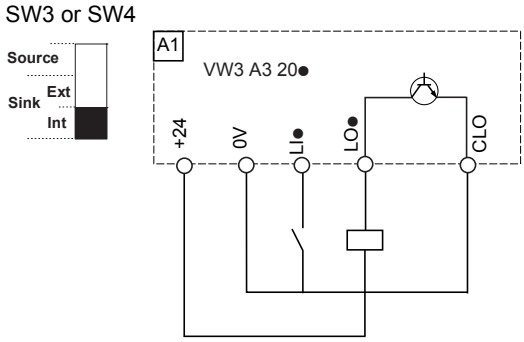
- Switch in "Source" position and use of an external +24 V ⎓ source

SW3 or SW4



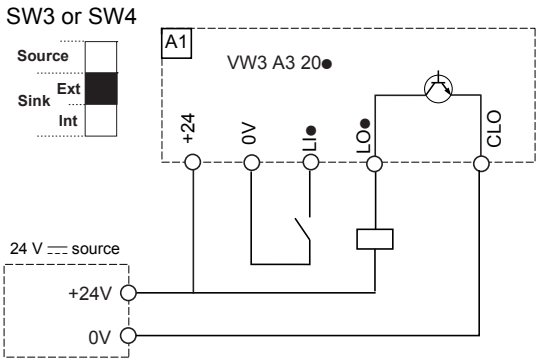
- Switch in "Sink Int" position

SW3 or SW4



- Switch in "Sink Ext" position

SW3 or SW4



⚠ WARNING

UNINTENDED EQUIPMENT OPERATION

When the SW3 or SW4 switches are set to "Sink Int" or "Sink Ext", the common must never be connected to ground or the protective ground, as there is then a risk of unintended equipment operation on the first insulation fault.

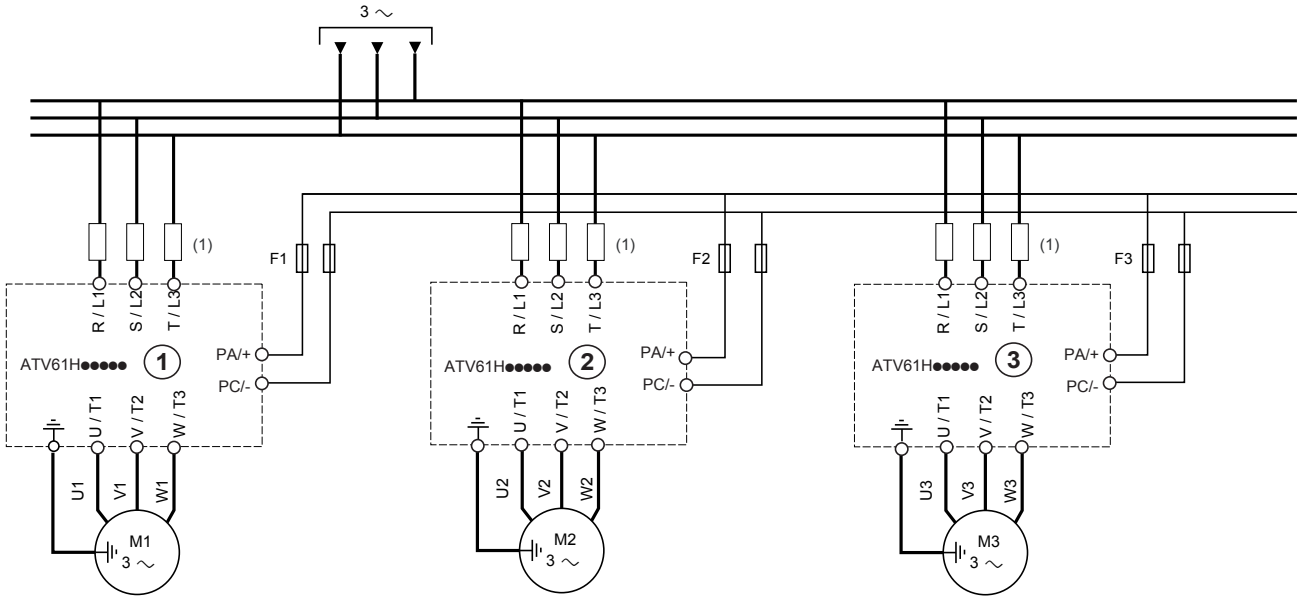
Failure to follow this instruction can result in death, serious injury or equipment damage.

Connection of several drives in parallel on the DC bus

These drives must all have the same voltage rating.

Connection on DC bus between drives with equivalent ratings

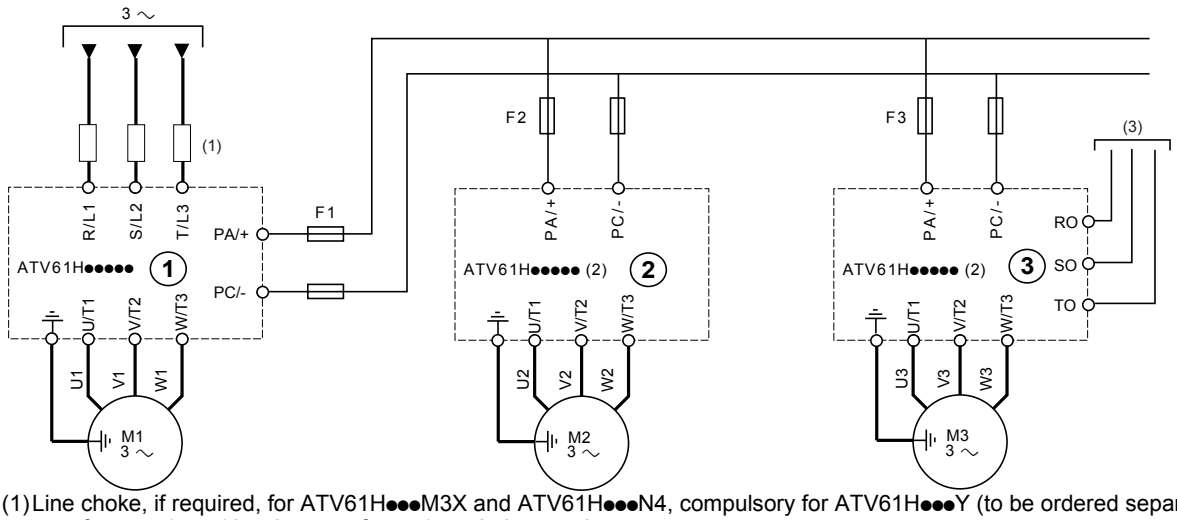
Each drive uses its own charging circuit



Drives (1), (2) and (3) must not be more than one size apart when they are connected in this way.

F1, F2, F3: Fast-acting semiconductor fuses for protection on the DC bus side.

Connection on DC bus between drives with different ratings



(1) Line choke, if required, for ATV61H●●●M3X and ATV61H●●●N4, compulsory for ATV61H●●●Y (to be ordered separately) if no special transformers (e.g. 12-pulse transformer) are being used.
(2) Drives (2) and (3) powered only by their DC bus do not necessarily have a DC choke (catalog number ATV61H●●●M3XD or ATV61H●●●N4D).
(3) Separate fan power supply for certain ratings, see warning below.

F1, F2, F3: Fast-acting semiconductor fuses for protection on the DC bus side.

⚠ CAUTION

RISK OF DAMAGE TO DRIVES

- Drive 1 must be large enough to supply all the motors capable of operating simultaneously.
- When models D90M3X, C13N4 to C63N4 and C11Y to C80Y (drive 3 in diagram above) are powered only by their DC bus and not by their R/L1, S/L2, T/L3 terminals, it is essential to power the fans separately with a three-phase supply 380…480 V, 50/60 Hz (RO, SO, TO terminals), protected with fuses or motor disconnect. Power and connection are detailed on the following page.

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

Connection diagrams

Power consumed by the fans

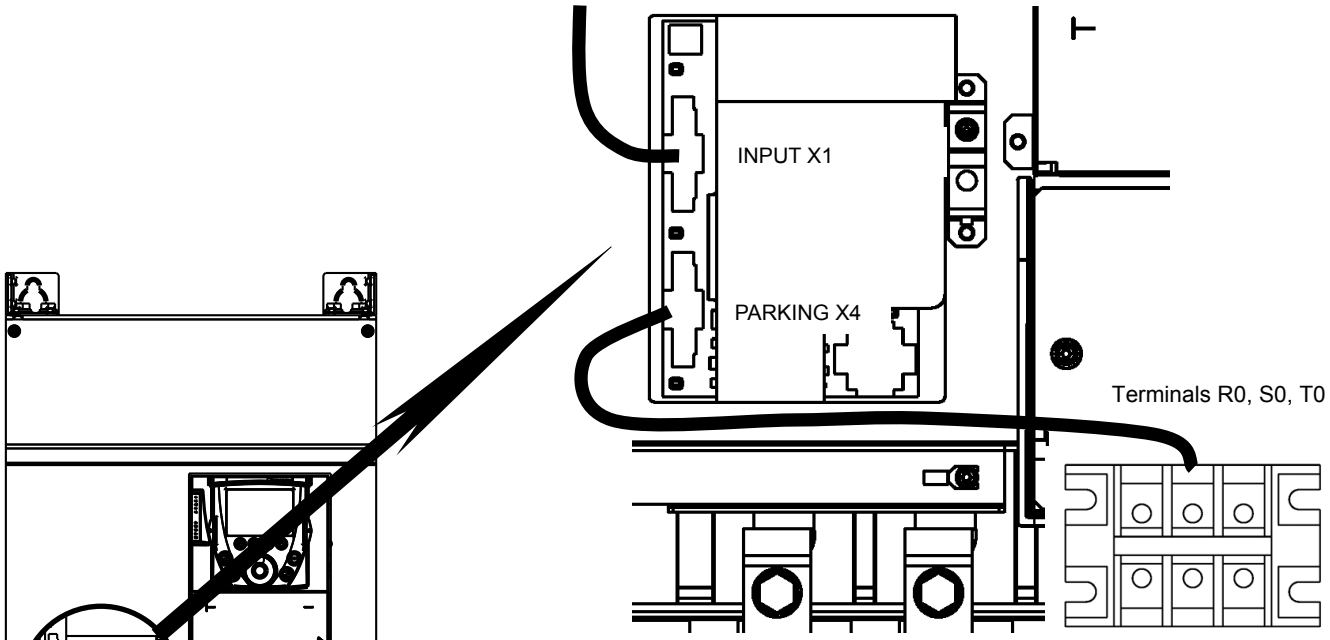
ATV61H drive	Power consumed by the fans
D90M3X, C13N4, C16N4, C22N4, C11Y, C13Y, C16Y, C20Y	550 VA
C25N4, C31N4, C25Y, C31Y, C40Y	1,100 VA
C40N4, C50N4, C63N4, C50Y, C63Y, C80Y	2,200 VA

Connecting fans for a separate power supply

In order to remove the link between the fans and power supply terminals R/L1, S/L2, T/L3 and take it to terminals RO, SO, TO, connectors X1 and X4 must be crossed as indicated on the diagrams below.

ATV61H D90M3X, C13N4 to C22N4, C11Y to C20Y

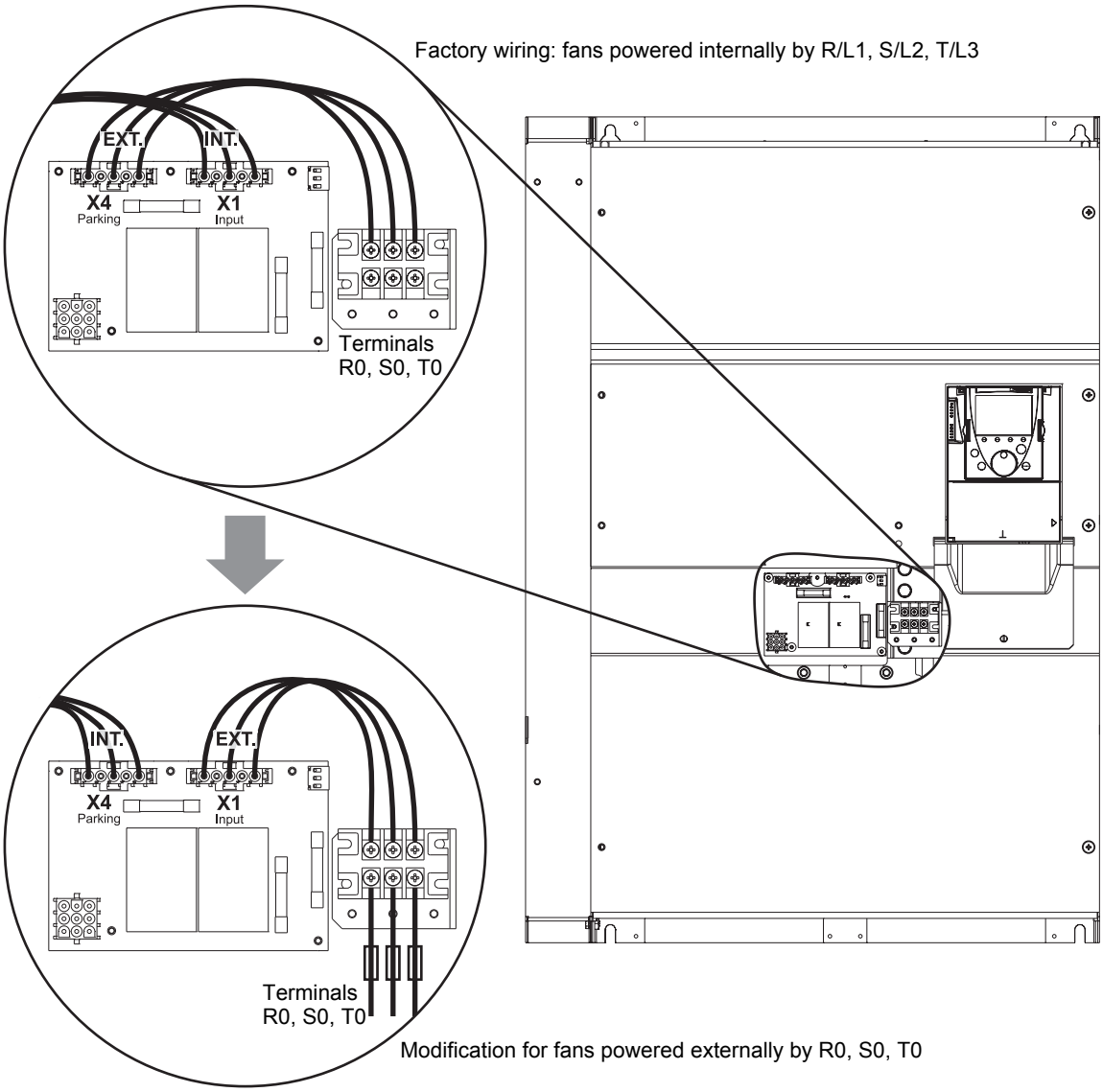
Factory wiring: fans powered internally by R/L1, S/L2, T/L3



Modification for fans powered externally by R0, S0, T0

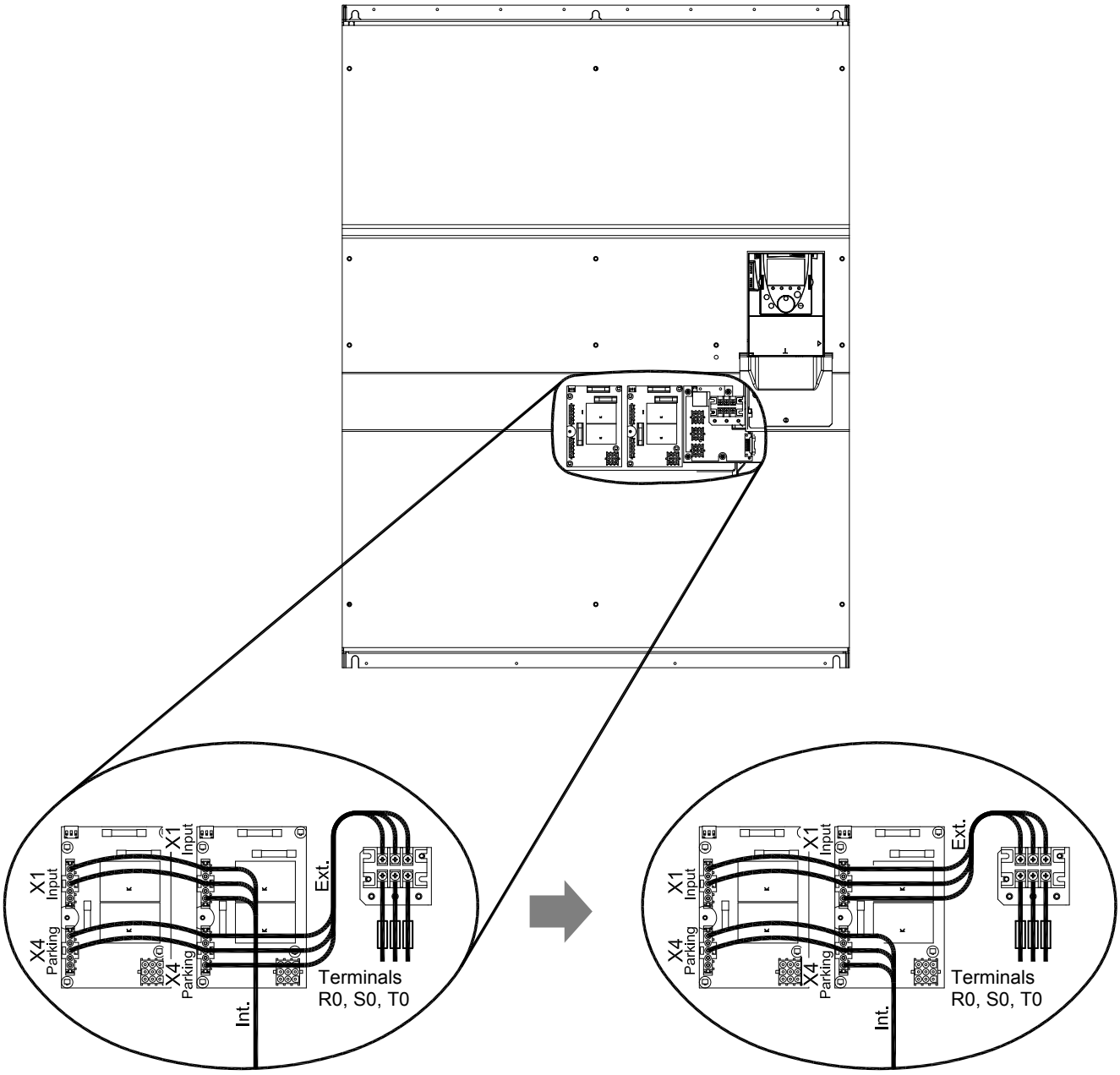
Connection diagrams

ATV61H C25N4, C31N4, C25Y to C40Y



Connection diagrams

ATV61H C40N4, C50N4

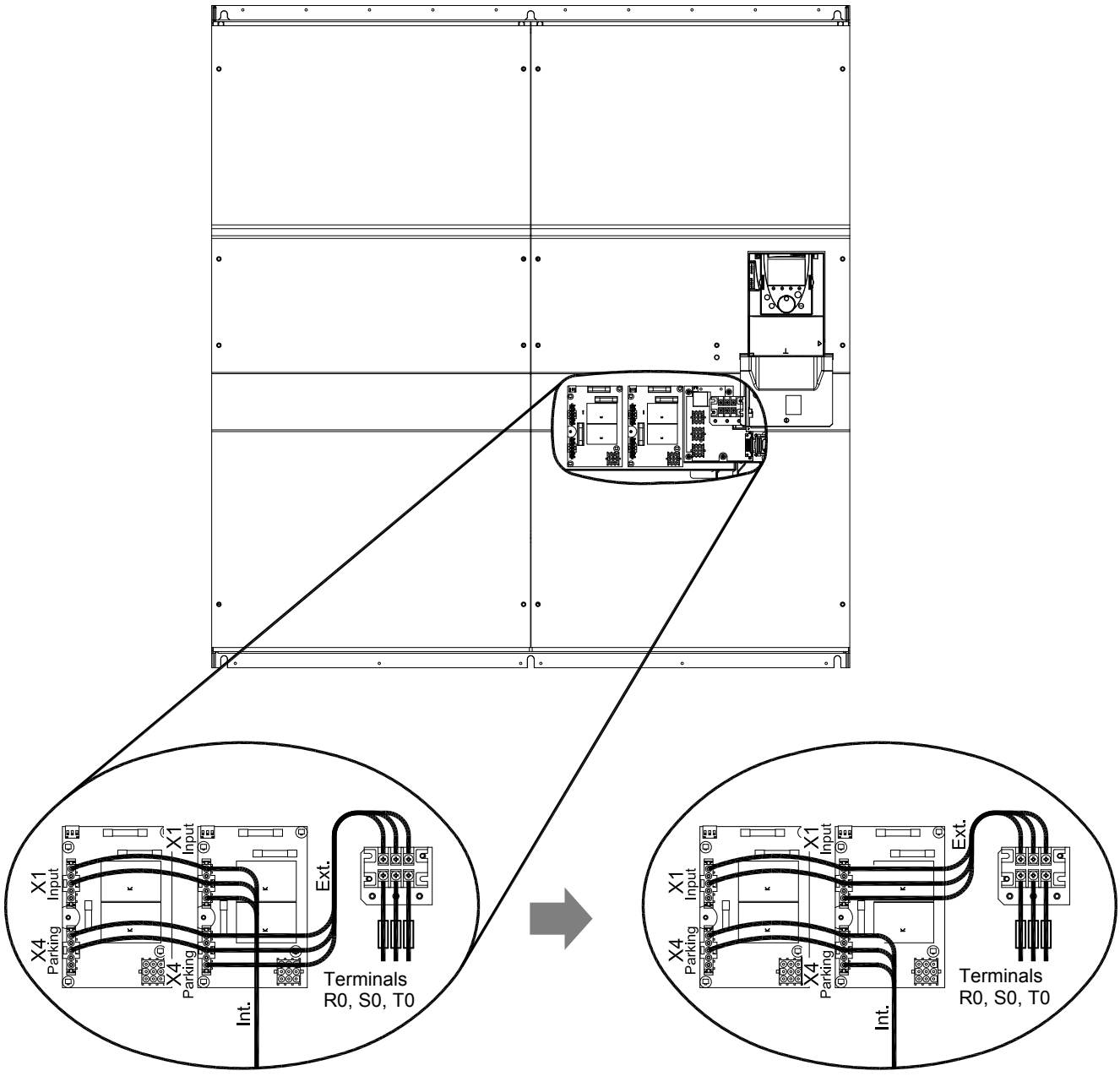


Factory wiring:
fans powered internally
by R/L1, S/L2, T/L3

Modification for fans
powered externally by R0, S0, T0

Connection diagrams

ATV61H C63N4, C50Y to C80Y



Factory wiring:
fans powered internally
by R/L1, S/L2, T/L3

Modification for fans
powered externally by R0, S0, T0

Operation on an IT system and a "corner grounded" system

IT system: Isolated or impedance grounded 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 RFI filters. In the case of ATV61H C11Y to C80Y drives, the filters must be isolated from ground for operation on an IT system, as illustrated in the diagrams below. For other models, the filters can be isolated from ground, but this is not compulsory.

"Corner grounded" system: System with one phase connected to ground.

⚠ WARNING

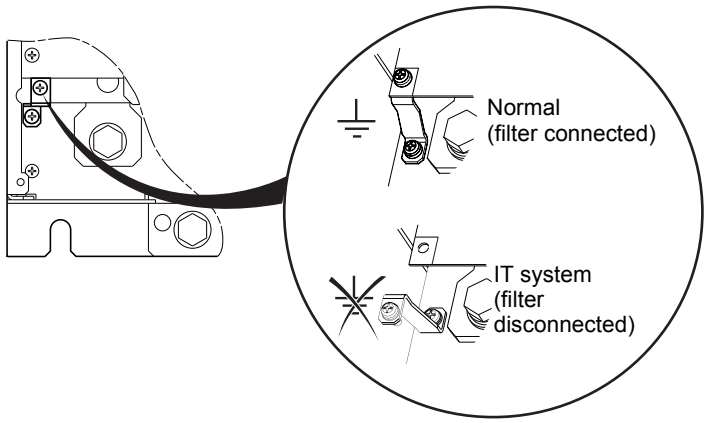
RISK OF ELECTRIC SHOCK

ATV61H C11Y to C80Y drives must not be connected on a "corner grounded" system.

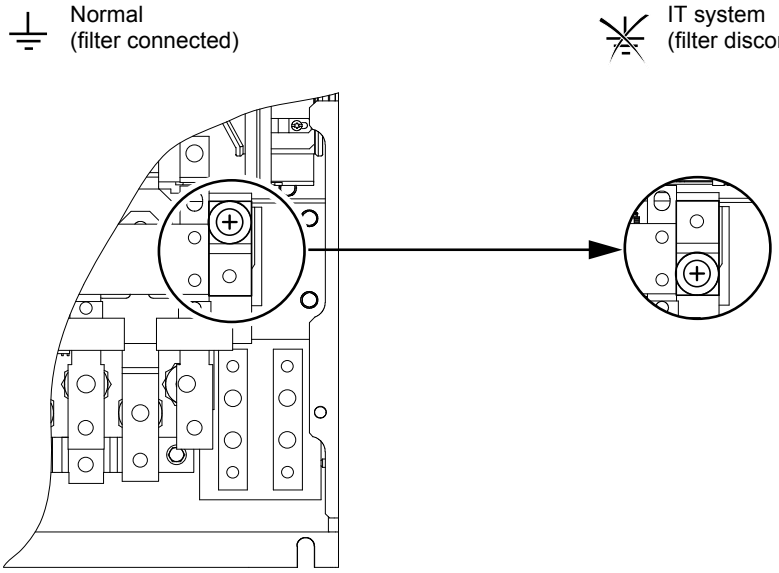
Failure to follow this instruction can result in death, serious injury or equipment damage.

Disconnecting RFI filters

ATV61H D90N4 to C13N4 and ATV61H C11Y to C20Y:



ATV61H C16N4 to C22N4:



⚠ CAUTION

RISK OF DAMAGE TO DRIVE

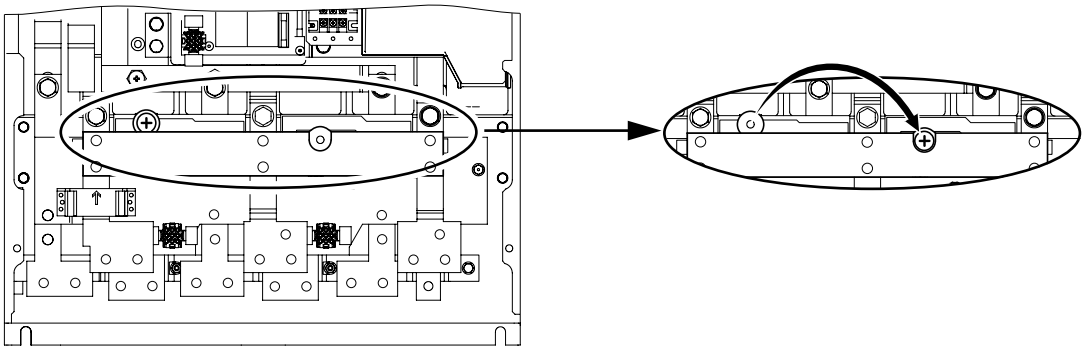
For operation on IT or "corner grounded" systems, the filter must be disconnected.
Failure to follow this instruction can result in injury and/or equipment damage.

Operation on an IT system and a "corner grounded" system

ATV61H C25N4 to C31N4 and ATV61H C25Y to C40Y:

Normal
(filter connected)

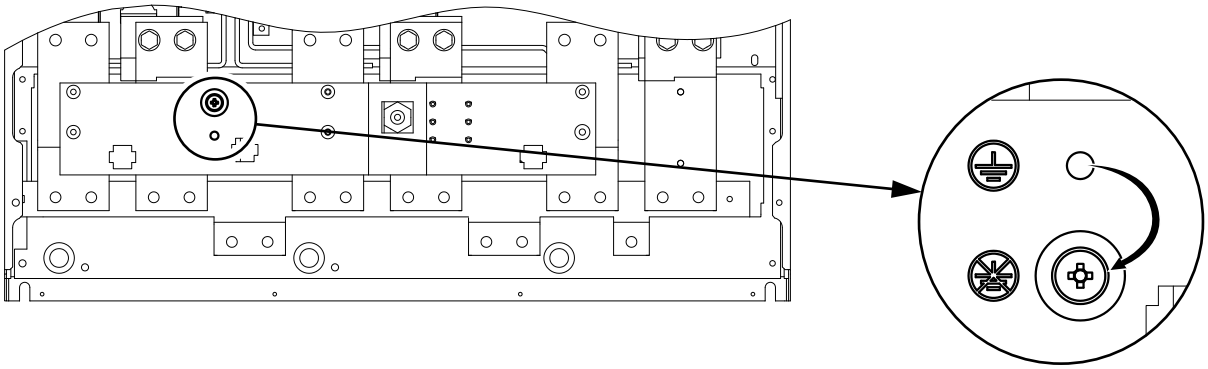
IT system
(filter disconnected)



ATV61HC40N4:

Normal
(filter connected)

IT system
(filter disconnected)



⚠ CAUTION

RISK OF DAMAGE TO DRIVE

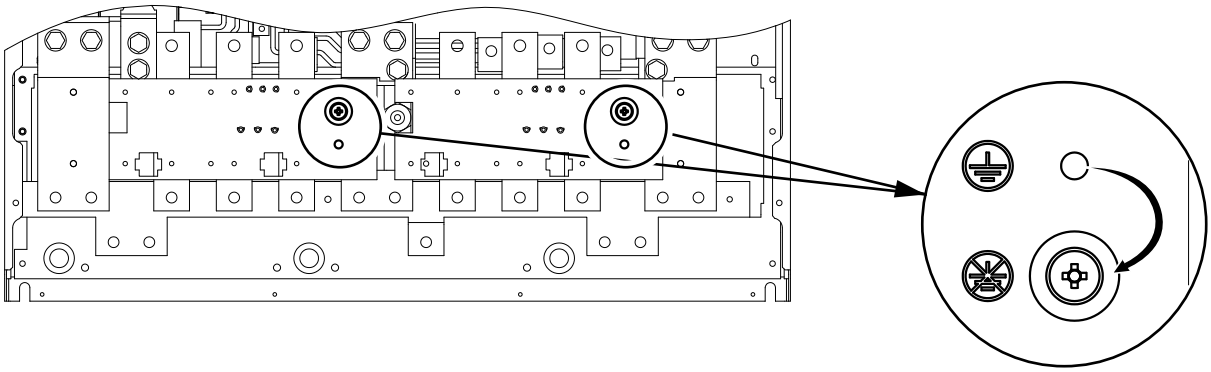
For operation on IT or "corner grounded" systems, the filter must be disconnected.
Failure to follow this instruction can result in injury and/or equipment damage.

Operation on an IT system and a "corner grounded" system

ATV61HC50N4:

Normal
(filter connected)

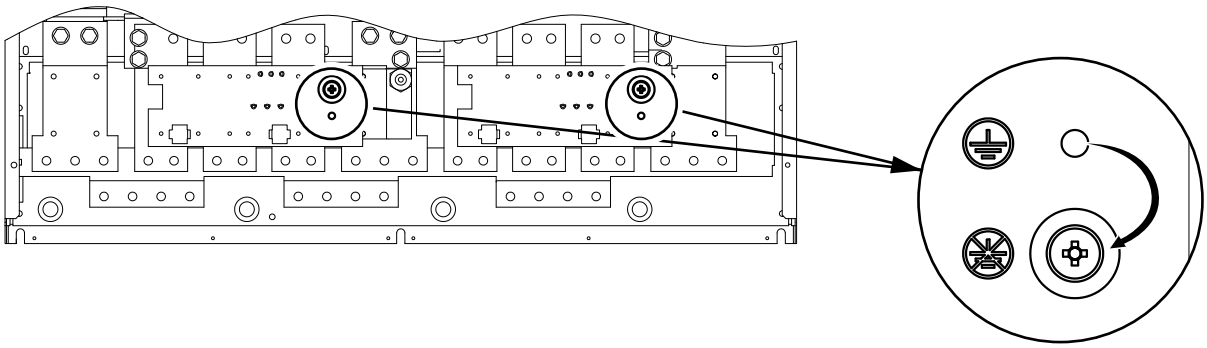
IT system
(filter disconnected)



ATV61HC63N4 and ATV61H C50Y to C80Y:

Normal
(filter connected)

IT system
(filter disconnected)



⚠ CAUTION
RISK OF DAMAGE TO DRIVE For operation on IT or "corner grounded" systems, the filter must be disconnected. **Failure to follow this instruction can result in injury and/or equipment damage.**

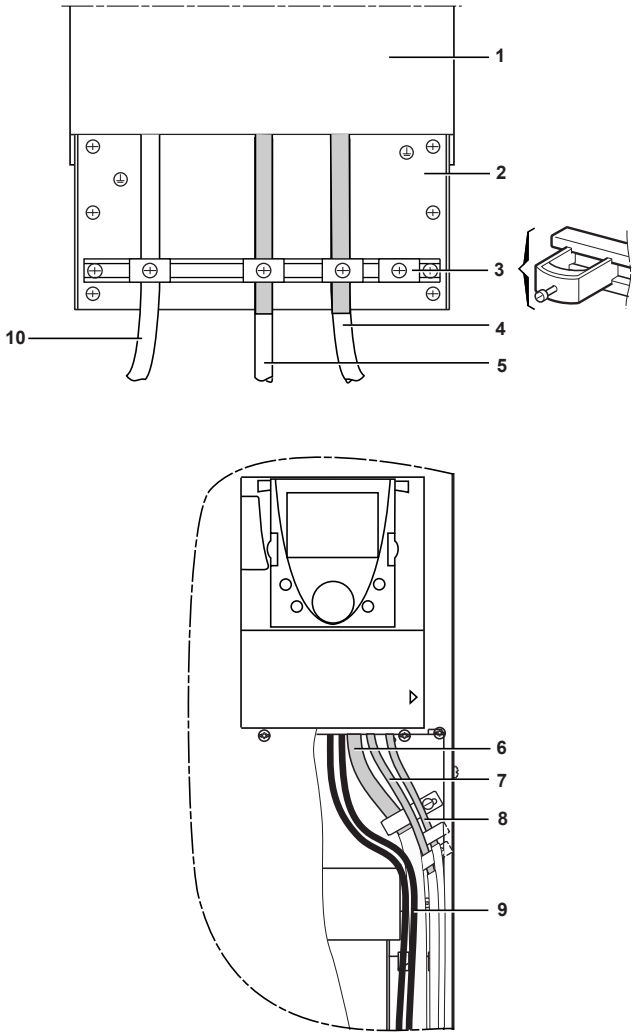
Electromagnetic compatibility

Principle

- Grounds between drive, motor and cable shielding must have "high frequency" equipotentiality.
- Use of shielded cables with shielding connected to ground at both ends for the motor cables, braking resistor (if used) and control-signal cables. Metal ducting or conduit can be used for part of the shielding length provided that there is no break in continuity.
- Ensure maximum separation between the power supply cable (line supply) and the motor cable.

Installation diagram

ATV61H D55M3X to D90M3X, ATV61H D90N4 to C63N4 and ATV61H C11Y to C80Y



1 Altivar 61

2 Sheet steel grounded plate

3 Metal clamps

4 Shielded cable for motor connection with shielding connected to ground at both ends. The shielding must be continuous and intermediate terminals must be in EMC shielded metal boxes.

5 Shielded cable for connecting the braking resistor (if used). The shielding must be continuous and intermediate terminals must be in EMC shielded metal boxes.

6 Shielded cables for connecting the control-signal wiring. For applications requiring several conductors, use cables with a small cross-section (0.5 mm²).

7 Shielded cables for connecting the Power Removal safety function input. The shielding must be continuous and intermediate terminals must be in EMC shielded metal boxes.

8 Shielded cables for connecting the encoder. The shielding must be continuous and intermediate terminals must be in EMC shielded metal boxes.

9 Non-shielded wires for relay contact output.

10 Unshielded drive power supply cables.

Note:

- If using an additional input filter, it should be connected directly to the line supply via an unshielded cable. Link **10** on the drive is then via the filter output cable.
- The HF equipotential ground connection between the drive, motor and cable shielding does not remove the need to connect the PE protective conductors (green-yellow) to the appropriate terminals on each unit.

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1760655 03/2011