

# Altivar 71

Installation manual

Variable speed drives  
for asynchronous motors

**0.37 ... 45 KW / 200 - 240V**

**0.75 ... 75 KW / 380 - 480V**





# Table of Contents

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Before you begin	4
Steps for setting up the drive	5
Preliminary recommendations	6
Drive references	7
Mounting and temperature conditions	10
Mounting in a wall-fixing or floor-standing enclosure	12
Fitting the graphic display terminal	14
Position of the charging LED	15
Fitting the option cards	16
Fitting the EMC plates	18
Wiring recommendations	19
Power terminals	21
Control terminals	23
Option terminals	25
Connection diagrams	30
Operation on an IT system	39
Electromagnetic compatibility, wiring	40

# Before you begin

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Read and take note of these instructions before you begin any procedure with this drive.

## DANGER

### DANGEROUS VOLTAGE

- Read and make sure you understand the whole of this installation manual before installing and operating the ATV71 variable speed drive. Installation, settings, and repairs must be undertaken 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 THEM.** Only use tools equipped with electrical insulation.
- Do not touch unshielded components or screws on the terminals if the device is switched on.
- Do not short-circuit the PA/+ and PC/- terminals or the DC bus capacitors.
- Fit and close all the covers before switching on the drive.
- Before any servicing or repair work on the variable speed drive
  - Disconnect the power supply
  - Place a label stating "DO NOT SWITCH ON" on the variable speed drive circuit-breaker or isolator
  - Lock the circuit-breaker or isolator in the open position
- Before working on the speed drive, disconnect the power supply, including the external control circuit supply if it is used. **WAIT FOR 15 MINUTES** to allow the DC bus capacitors to discharge. Then follow the procedure for measuring the DC bus voltage on page 15 to check whether the DC voltage is below 45 V. The LED on the variable speed drive is not an accurate indicator of lack of voltage on the DC bus.

**Electric shock will cause death or serious injury.**

## CAUTION

- 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, switch 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 alternostat.

**Failure to observe this precaution may result in material damage.**

## INSTALLATION

### ■ 1 Take delivery of the drive

- Check that the reference 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 [7](#) and [8](#))

### ■ 3 Mount the drive

- Fix the drive in accordance with the instructions in this document
- Fit any internal and external options

### ■ 4 Wire the drive

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

*Steps 1 to 4 must be performed with the power off*



## PROGRAMMING

- 1 Please refer to the programming manual

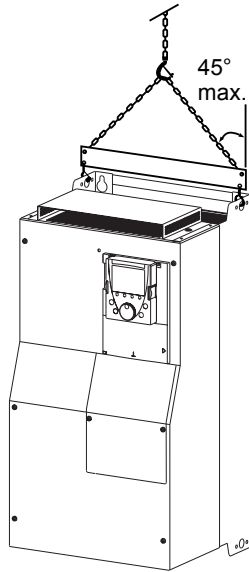
# Preliminary recommendations

## Handling and storage

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

<b>CAUTION</b>
<b>DAMAGED UNIT</b> Do not either install or operate the drive if it appears to be damaged. <b>Failure to observe this precaution may result in material damage.</b>

## Handling on installation



ALTIVAR 71 drives up to ratings ATV71HD15M3X and ATV71HD18N4 can be removed from their packaging and installed without a handling device.


A hoist must be used with higher ratings; for this reason they are fitted with handling "lugs". The precautions described below must be observed.

## Precautions

Read and take note of the instructions in the "programming manual".

<b>CAUTION</b>
<b>INCOMPATIBLE LINE VOLTAGE</b> Before switching on and configuring the drive, check that the line voltage is compatible with the drive supply voltage. The drive may be damaged if the line voltage is not compatible. <b>Failure to observe this precaution may result in material damage.</b>

<b>⚠ DANGER</b>
<b>UNEXPECTED OPERATION OF THE DEVICE</b> <ul style="list-style-type: none"><li>• Before switching on and configuring the Altivar 71, check that the PWR (POWER REMOVAL) input is deactivated (at state 0) in order to prevent unexpected restarting.</li><li>• Before switching on or on 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.</li></ul> <b>Failure to observe these precautions will result in death or serious injury.</b>

 If the safety of personnel requires the prohibition of unwanted or unexpected restarting, electronic locking is performed by the Altivar 71's Power Removal function. This function requires the use of connection diagrams conforming to category 3 of standard EN 954-1 and safety integrity level 2 according to IEC/EN 61508. The Power Removal function takes priority over any run command.

# Drive references

## Single phase supply voltage: 200...240 V 50/60 Hz

3-phase motor 200...240 V

Motor		Line supply (input)					Drive (output)			Altivar 71
Power indicated on plate (1)		Max. line current (2)		Max. prospective line Isc	Apparent power	Max. inrush current (3)	Nominal current In (1)	Max. transient current for (1)		Reference (5)
		at 200 V	at 240 V					60 s	2 s	
kW	HP	A	A	kA	kVA	A	A	A	A	
0.37	0.5	6.9	5.8	5	1.4	9.6	3	4.5	4.9	ATV71H075M3(4)
0.75	1	12	9.9	5	2.4	9.6	4.8	7.2	7.9	ATV71HU15M3(4)
1.5	2	18.2	15.7	5	3.7	9.6	8	12	13.2	ATV71HU22M3(4)
2.2	3	25.9	22.1	5	5.3	9.6	11.0	16.5	18.1	ATV71HU30M3(4)
3	-	25.9	22	5	5.3	9.6	13.7	20.6	22.6	ATV71HU40M3(4)(6)
4	5	34.9	29.9	22	7	9.6	17.5	26.3	28.8	ATV71HU55M3(4)(6)
5.5	7.5	47.3	40.1	22	9.5	23.4	27.5	41.3	45.3	ATV71HU75M3(4)(6)

## 3-phase supply voltage: 200...240 V 50/60 Hz

3-phase motor 200...240 V

Motor		Line supply (input)					Drive (output)			Altivar 71
Power indicated on plate (1)		Max. line current (2)		Max. prospective line Isc	Apparent power	Max. inrush current (3)	Nominal current In (1)	Max. transient current for (1)		Reference (5)
		at 200 V	at 240 V					60 s	2 s	
kW	HP	A	A	kA	kVA	A	A	A	A	
0.37	0.5	3.5	3.1	5	1.3	9.6	3	4.5	4.9	ATV71H037M3(4)
0.75	1	6.1	5.3	5	2.2	9.6	4.8	7.2	7.9	ATV71H075M3(4)
1.5	2	11.3	9.6	5	4	9.6	8	12	13.2	ATV71HU15M3(4)
2.2	3	15	12.8	5	5.3	9.6	11	16.5	18.1	ATV71HU22M3(4)
3	-	19.3	16.4	5	6.8	9.6	13.7	20.6	22.6	ATV71HU30M3(4)
4	5	25.8	22.9	5	9.2	9.6	17.5	26.3	28.8	ATV71HU40M3(4)
5.5	7.5	35	30.8	22	12.4	23.4	27.5	41.3	45.3	ATV71HU55M3(4)
7.5	10	45	39.4	22	15.9	23.4	33	49.5	54.5	ATV71HU75M3(4)
11	15	53.3	45.8	22	18.8	93.6	54	81	89.1	ATV71HD11M3X(4)
15	20	71.7	61.6	22	25.1	93.6	66	99	109	ATV71HD15M3X(4)
18.5	25	77	69	22	27.7	100	75	112	124	ATV71HD18M3X
22	30	88	80	22	32	100	88	132	145	ATV71HD22M3X
30	40	124	110	22	42.4	250	120	180	198	ATV71HD30M3X
37	50	141	127	22	51	250	144	216	238	ATV71HD37M3X
45	60	167	147	22	65	250	176	264	290	ATV71HD45M3X

(1) These power ratings and currents are given for an ambient temperature of 50°C at the factory-set switching frequency, used in continuous operation (switching frequency factory setting 4 kHz for ATV71H 037M3 to D15M3X drives, and 2.5 kHz for ATV71H D18M3X to D45M3X drives).

Above this factory setting, the drive will reduce the switching frequency of its own accord in the event of excessive temperature rise.

For continuous operation above the factory setting, derating must be applied to the drive nominal current in accordance with the curves on page 11.

(2) Current on a line supply with the "Max. prospective line Isc" indicated and for a drive without any external options.

(3) Peak current on power-up for the max. voltage (240 V +10%).

(4) ATV71H 037M3 to D15M3X drives are available with or without a graphic display terminal. References of drives without a graphic display terminal have the letter Z added at the end, e.g.: ATV71H075M3Z. This option is not available for drives which operate in difficult environmental conditions (5).

(5) Drives with the S337 or 337 extension are designed for use in difficult environmental conditions (class 3C2 in accordance with IEC 721-3-3). They are supplied with a graphic display terminal.

(6) A line choke must be used (please refer to the catalog).



Inhibit the fault indicating the loss of a line phase (IPL) so that ATV71H 075M3 to U75M3 drives can operate on a single phase supply (see programming manual). If this fault is set to its factory configuration, the drive will stay locked in fault mode.

## Drive references

### 3-phase supply voltage: 380...480 V 50/60 Hz

3-phase motor 380...480 V

Motor		Line supply (input)					Drive (output)				Altivar 71 Reference (5)
		Max. line current (2)		Max. prospective line Isc	Apparent power	Max. inrush current (3)	Max. available nominal current In (1)		Max. transient current for (1)		
kW	HP	at 380 V	at 480 V				kA	kVA	A	at 380 V	at 460 V
		0.75	1	3.7	3	5				2.4	19.2
1.5	2	5.8	5.3	5	4.1	19.2	4.1	3.4	6.2	6.8	<b>ATV71HU15N4(4)</b>
2.2	3	8.2	7.1	5	5.6	19.2	5.8	4.8	8.7	9.6	<b>ATV71HU22N4(4)</b>
3	-	10.7	9	5	7.2	19.2	7.8		11.7	12.9	<b>ATV71HU30N4(4)</b>
4	5	14.1	11.5	5	9.4	19.2	10.5	7.6	15.8	17.3	<b>ATV71HU40N4(4)</b>
5.5	7.5	20.3	17	22	13.7	46.7	14.3	11	21.5	23.6	<b>ATV71HU55N4(4)</b>
7.5	10	27	22.2	22	18.1	46.7	17.6	14	26.4	29	<b>ATV71HU75N4(4)</b>
11	15	36.6	30	22	24.5	93.4	27.7	21	41.6	45.7	<b>ATV71HD11N4(4)</b>
15	20	48	39	22	32	93.4	33	27	49.5	54.5	<b>ATV71HD15N4(4)</b>
18.5	25	45.5	37.5	22	30.5	93.4	41	34	61.5	67.7	<b>ATV71HD18N4</b>
22	30	50	42	22	33	75	48	40	72	79.2	<b>ATV71HD22N4</b>
30	40	66	56	22	44.7	90	66	52	99	109	<b>ATV71HD30N4</b>
37	50	84	69	22	55.7	90	79	65	118.5	130	<b>ATV71HD37N4</b>
45	60	104	85	22	62.7	200	94	77	141	155	<b>ATV71HD45N4</b>
55	75	120	101	22	81.8	200	116	96	174	191	<b>ATV71HD55N4</b>
75	100	167	137	22	110	200	160	124	240	264	<b>ATV71HD75N4</b>

(1) These power ratings and currents are given for an ambient temperature of 50°C at the factory-set switching frequency, used in continuous operation (switching frequency factory setting 4 kHz for ATV71H 075N4 to D30N4 drives, and 2.5 kHz for ATV71H D37N4 to D75N4 drives).

Above this factory setting, the drive will reduce the switching frequency of its own accord in the event of excessive temperature rise. For continuous operation above the factory setting, derating must be applied to the drive nominal current in accordance with the curves on page 11.

(2) Current on a line supply with the "Max. prospective line Isc" indicated and for a drive without any external options.

(3) Peak current on power-up for the max. voltage (480 V +10%).

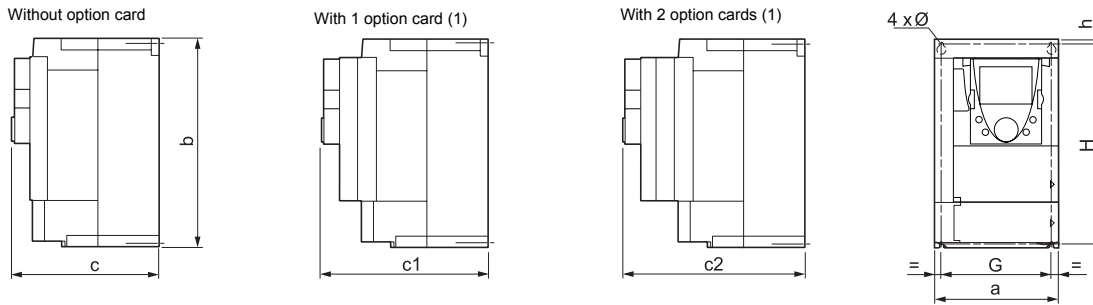
(4) ATV71H 037M3 to D15M3X drives are available with or without a graphic display terminal. References of drives without a graphic display terminal have the letter Z added at the end, e.g.: ATV71H075M3Z. This option is not available for drives which operate in difficult environmental conditions (5).

(5) Drives with the S337 or 337 extension are designed for use in difficult environmental conditions (class 3C2 in accordance with IEC 721-3-3). They are supplied with a graphic display terminal.



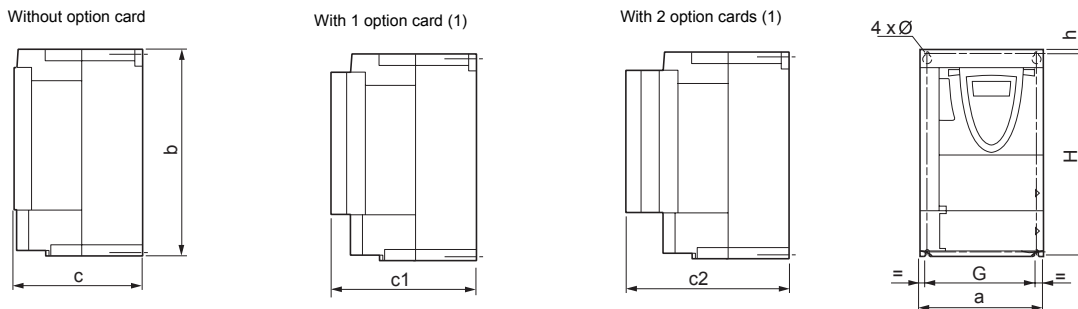
# Dimensions and weights

## With graphic display terminal



ATV71H	a	b	c	c1	c2	G	H	h	Ø	For screw	Weight
	mm (in.)	mm (in.)	mm (in.)	mm (in.)	mm (in.)	mm (in.)	mm (in.)	mm (in.)	mm (in.)		kg (lb.)
<b>037M3, 075M3, U15M3, 075N4, U15N4, U22N4</b>	130 (5.12)	230 (9.05)	172 (6.77)	195 (7.68)	218 (8.58)	113.5 (4.47)	220 (8.66)	5 (0.20)	5 (0.20)	M4	3 (6.61)
<b>U22M3, U30M3, U40M3, U30N4, U40N4</b>	155 (6.10)	260 (10.23)	184 (7.25)	207 (8.15)	230 (9.06)	138 (5.43)	249 (9.80)	4 (0.16)	5 (0.20)	M4	4 (8.82)
<b>U55M3, U55N4, U75N4</b>	175 (6.89)	295 (11.61)	184 (7.25)	207 (8.15)	230 (9.06)	158 (6.22)	283 (11.14)	6 (0.24)	6 (0.24)	M5	5.5 (12.13)
<b>U75M3, D11N4</b>	210 (8.27)	295 (11.61)	210 (8.27)	233 (9.17)	256 (10.08)	190 (7.48)	283 (11.14)	6 (0.24)	6 (0.24)	M5	7 (15.43)
<b>D11M3X, D15M3X, D15N4, D18N4</b>	230 (9.05)	400 (15.75)	210 (8.27)	233 (9.17)	256 (10.08)	210 (8.26)	386 (15.20)	8 (0.31)	6 (0.24)	M6	9 (19.84)
<b>D18M3X, D22M3X, D22N4</b>	240 (9.45)	420 (16.54)	210 (8.27)	243 (9.57)	266 (10.47)	206 (8.11)	403 (15.87)	11 (0.45)	5.5 (0.22)	M6	30 (66.14)
<b>D30N4, D37N4</b>	240 (9.45)	550 (21.65)	240 (9.45)	263 (10.35)	286 (11.25)	206 (8.11)	531.5 (20.93)	11 (0.45)	5.5 (0.22)	M6	37 (81.57)
<b>D30M3X, D37M3X, D45M3X</b>	320 (12.60)	550 (21.65)	240 (9.45)	263 (10.35)	286 (11.25)	280 (11.02)	524 (20.93)	20 (0.79)	8.6 (0.22)	M8	37 (81.57)
<b>D45N4, D55N4, D75N4</b>	320 (12.60)	630 (24.80)	290 (11.42)	315 (12.40)	335 (13.19)	280 (11.02)	604.5 (23.80)	15 (0.59)	9 (0.22)	M8	45 (99.21)

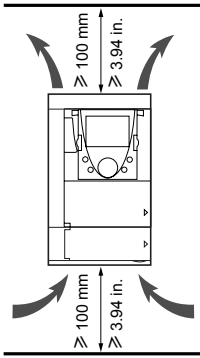
## Without graphic display terminal



ATV71H	a	b	c	c1	c2	G	H	h	Ø	For screw	Weight
	mm (in.)	mm (in.)	mm (in.)	mm (in.)	mm (in.)	mm (in.)	mm (in.)	mm (in.)	mm (in.)		kg (lb.)
<b>037M3Z, 075M3Z, U15M3Z, 075N4Z, U15N4Z, U22N4Z</b>	130 (5.12)	230 (9.05)	149 (5.87)	172 (6.77)	195 (7.68)	113.5 (4.47)	220 (8.66)	5 (0.20)	5 (0.20)	M4	3 (6.61)
<b>U22M3Z, U30M3Z, U40M3Z, U30N4Z, U40N4Z</b>	155 (6.10)	260 (10.23)	161 (6.34)	184 (7.25)	207 (8.15)	138 (5.43)	249 (9.80)	4 (0.16)	5 (0.20)	M4	4 (8.82)
<b>U55M3Z, U55N4Z, U75N4Z</b>	175 (6.89)	295 (11.61)	161 (6.34)	184 (7.25)	207 (8.15)	158 (6.22)	283 (11.14)	6 (0.24)	6 (0.24)	M5	5.5 (12.13)
<b>U75M3Z, D11N4Z</b>	210 (8.27)	295 (11.61)	187 (7.36)	210 (8.27)	233 (9.17)	190 (7.48)	283 (11.14)	6 (0.24)	6 (0.24)	M5	7 (15.43)
<b>D11M3XZ, D15M3XZ, D15N4Z</b>	230 (9.05)	400 (15.75)	187 (7.36)	210 (8.27)	233 (9.17)	210 (8.26)	386 (15.20)	8 (0.31)	6 (0.24)	M6	9 (19.84)

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

# Mounting and temperature conditions



Install the drive vertically at  $\pm 10^\circ$ .  
 Do not place it close to heating elements.  
 Leave sufficient free space to ensure that the air required for cooling purposes can circulate from the bottom to the top of the unit.

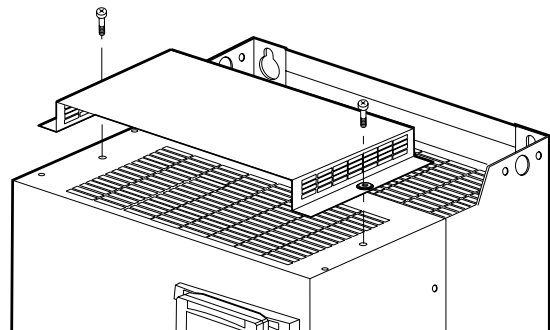
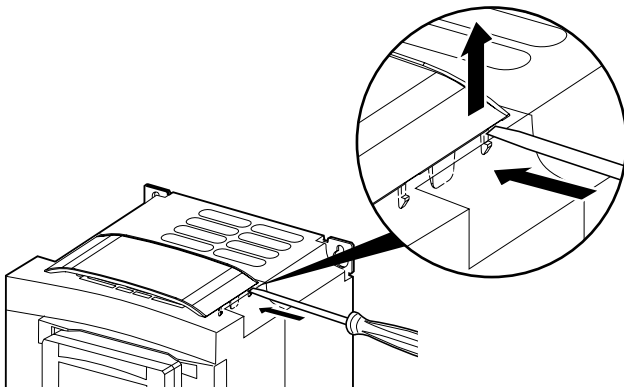
Free space in front of the drive: 10 mm (0.39 in.) minimum

When IP20 is adequate, it is recommended that the protective cover on the top of the drive is removed as shown below.

## Removing the protective cover

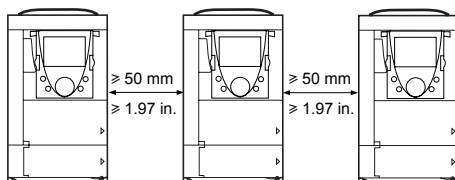
ATV71H 037M3 to D15M3X and ATV71H 075N4 to D18N4

ATV71H D18M3X to D45M3X and ATV71H D22N4 to D75N4

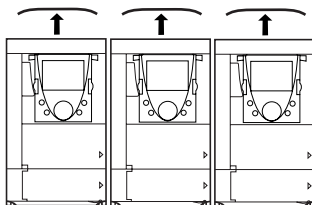


## 2 types of mounting are possible:

**Type A mounting** Free space  $\geq 50$  mm ( $\geq 1.97$  in.) on each side, with protective cover fitted



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

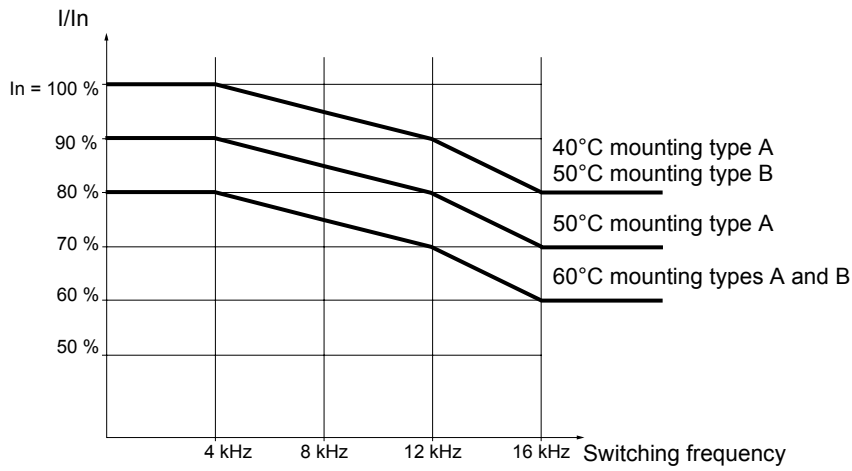


# Mounting and temperature conditions

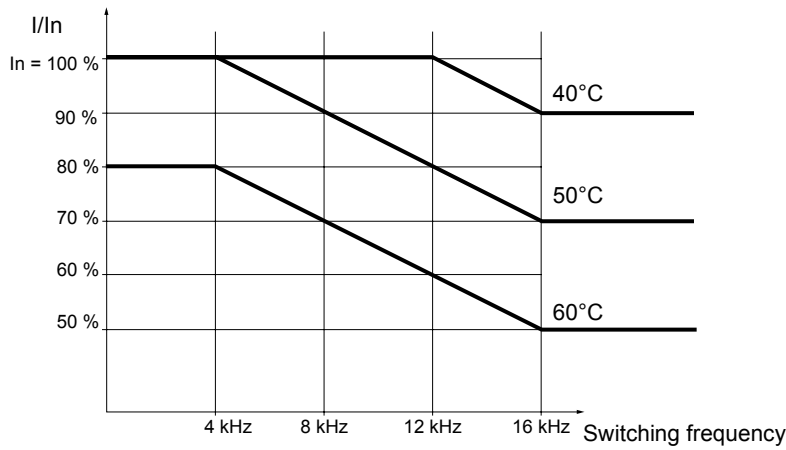
## Derating curves

Derating curves for the drive current  $I_n$  as a function of the temperature, switching frequency and type of mounting.

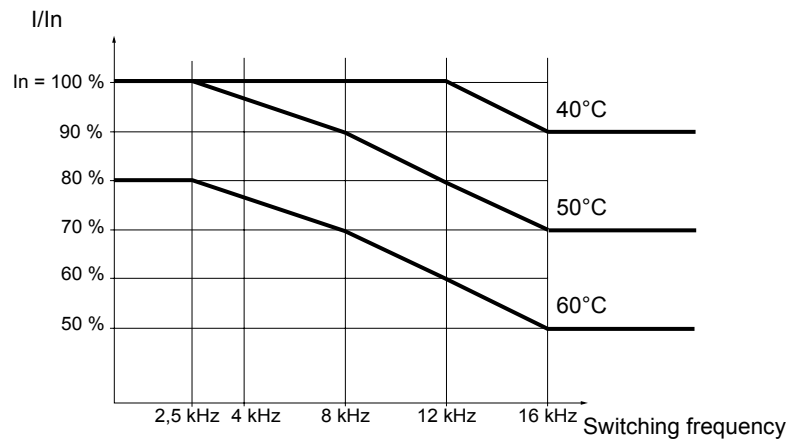
### ATV71H 037M3 to D15M3X and ATV71H 075N4 to D18N4



### ATV71H D22N4 and ATV71H D30N4



### ATV71H D18M3X to D45M3X and ATV71H D37N4 to D75N4



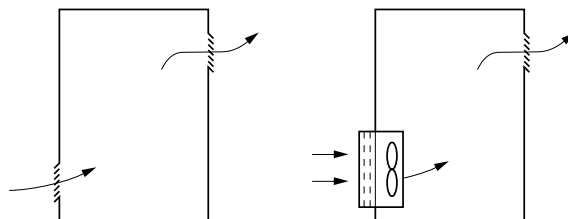
For intermediate temperatures (e.g. 55°C), interpolate between 2 curves.

# Mounting in a wall-fixing or floor-standing enclosure

Observe the mounting recommendations on the previous pages.

To ensure proper air circulation in the drive:

- Fit ventilation grilles
- Ensure that the ventilation is adequate: if not, install forced ventilation with a filter
- Use special IP54 filters



## Dust and damp proof metal wall-fixing or floor-standing enclosure (IP 54 degree of protection)

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

To avoid hot spots in the drive, add a fan to circulate the air inside the enclosure, reference VW3A94●● (please refer to the catalog).

## Mounting the drive in the enclosure

### Power dissipated

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

ATV71H	Power dissipated (1) W	ATV71H	Power dissipated (1) W
037M3	46	075N4	44
075M3	66	U15N4	64
U15M3	101	U22N4	87
U22M3	122	U30N4	114
U30M3	154	U40N4	144
U40M3	191	U55N4	178
U55M3	293	U75N4	217
U75M3	363	D11N4	320
D11M3X	566	D15N4	392
D15M3X	620	D18N4	486
D18M3X	799	D22N4	717
D22M3X	865	D30N4	976
D30M3X	1134	D37N4	1174
D37M3X	1337	D45N4	1360
D45M3X	1567	D55N4	1559
		D75N4	2326

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

Ensure that the flow of air in the enclosure is at least equal to the value given in the table below for each drive.

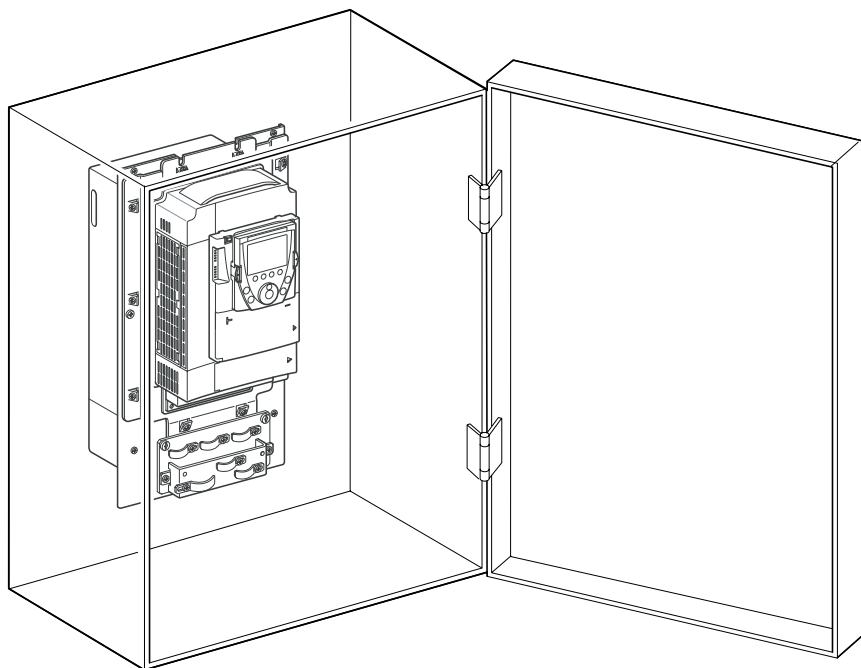
ATV71H	Flow rate	
	m <sup>3</sup> /hour	ft <sup>3</sup> /min
037M3, 075M3, U15M3, 075N4, U15N4, U22N4	17	10
U22M3, U30M3, U40M3, U30N4, U40N4	56	33
U55M3, U55N4, U75N4	112	66
U75M3, D11N4	163	96
D11M3X, D15M3X, D15N4, D18N4	252	148
D18M3X, D22M3X, D22N4	203	119
D30N4, D37N4	203	119
D30M3X, D37M3X, D45M3X	406	239
D45N4, D55N4, D75N4	406	239

# Mounting in a wall-fixing or floor-standing enclosure

## Dust and damp proof flush mounting

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 the dust and damp proof flush mounting kit VW3A9501...516 (please refer to the catalog). The degree of protection for the drive mounted in this way becomes IP54.

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



Example: ATV71HU55N4

## Power dissipated inside the enclosure for dust and damp proof flush mounting

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

ATV71H	Power dissipated (1) W	ATV71H	Power dissipated (1) W
037M3	25	075N4	28
075M3	28	U15N4	31
U15M3	35	U22N4	35
U22M3	39	U30N4	43
U30M3	41	U40N4	48
U40M3	48	U55N4	54
U55M3	71	U75N4	64
U75M3	81	D11N4	76
D11M3X	120	D15N4	100
D15M3X	137	D18N4	134
D18M3X	291	D22N4	298
D22M3X	294	D30N4	354
D30M3X	368	D37N4	441
D37M3X	447	D45N4	538
D45M3X	452	D55N4	592
		D75N4	958

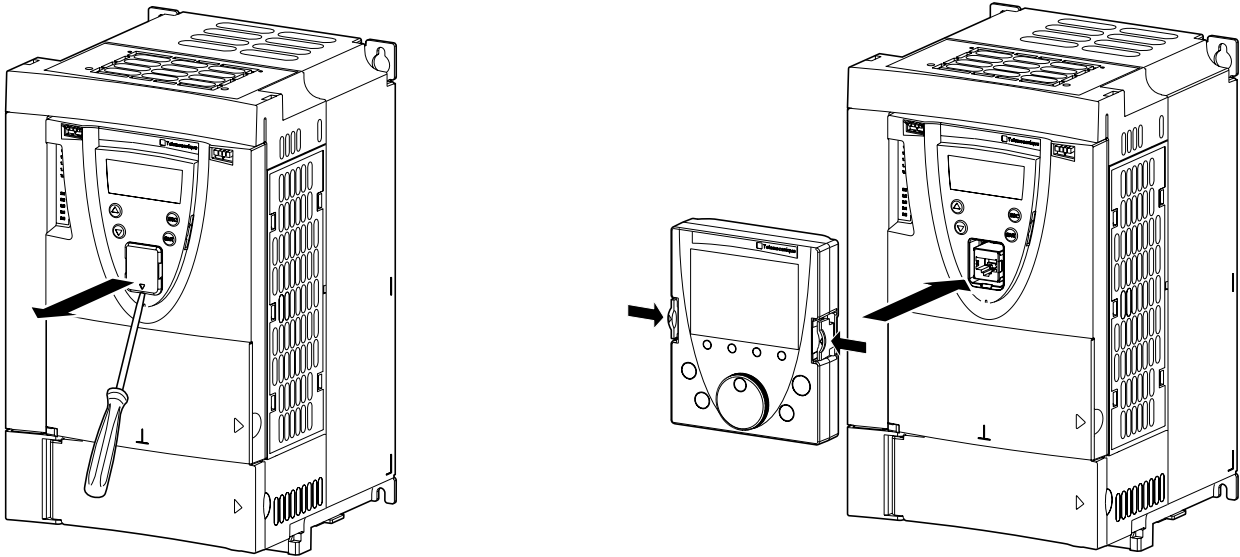
(1) Add 7W to this value for each option card added

# Fitting the graphic display terminal

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## Fitting the graphic display terminal on the drive

Drives, whose references end in the letter Z, are supplied without a graphic display terminal (VW3A1101). This can be ordered separately. It is fitted to the drive as shown below.



The graphic display terminal can be connected or disconnected with the power on. Before disconnecting it, drive control via the display terminal must be disabled (refer to the programming manual).

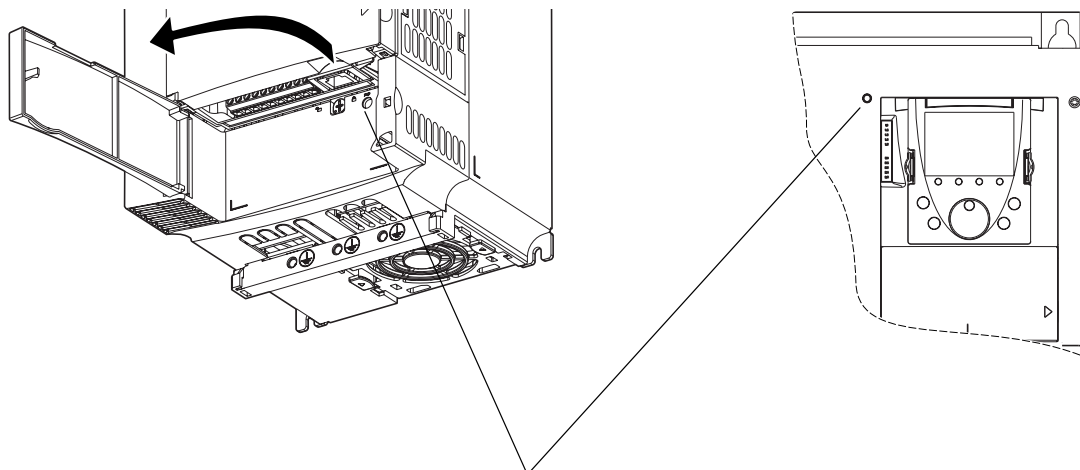
## Position of the charging LED

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

ATV71H 037M3 to D15M3X  
and ATV 71 075N4 to D18N4

ATV71H D18M3 to D45M3X  
and ATV 71H D22N4 to D75N4



Red LED indicating that the DC bus is switched on

### Procedure for measuring the DC voltage

#### DANGER

##### DANGEROUS VOLTAGE

Read and make sure you understand the precautions on page 4 before you begin this procedure.  
**Failure to observe this precaution will result in death or serious injury.**

The DC bus voltage can exceed 1000 V  $\text{---}$ . Use a suitable measuring instrument when undertaking this procedure. To measure the DC bus voltage:

- 1 Disconnect the drive power supply.
- 2 Wait 15 minutes to allow the DC bus capacitors to discharge.
- 3 Measure the voltage of the DC bus between the PA/+ and PC/- terminals to check whether the voltage is less than 45 V  $\text{---}$ . Refer to page 22 for the layout of the power terminals.
- 4 If the DC bus capacitors have not discharged completely, contact your local Schneider Electric agent (do not repair or operate the drive).

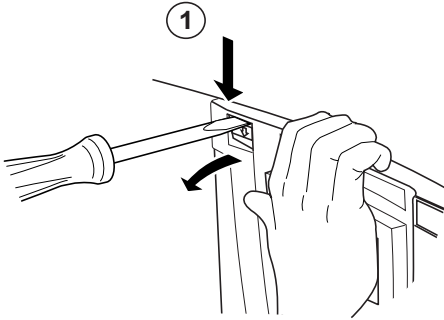
## Fitting the option cards

These should ideally be fitted once the drive is fixed in place and before wiring it.

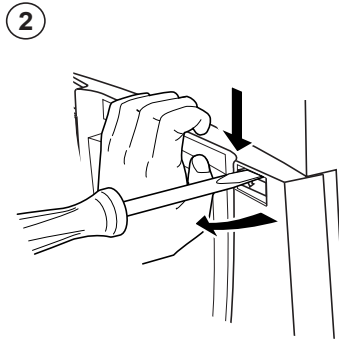
Check that the red capacitor charging LED has gone out. Measure the DC bus voltage in accordance with the procedure indicated on page 15.

The option cards are fitted under the drive control front panel. If the drive has a graphic display terminal, remove it, then remove the control front panel as indicated below.

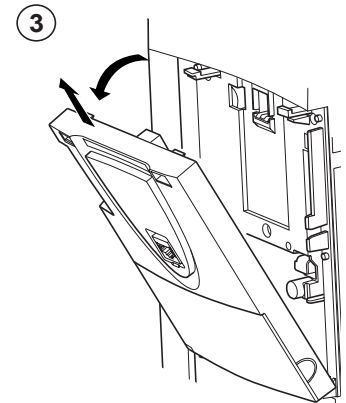
### Removing the control front panel



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



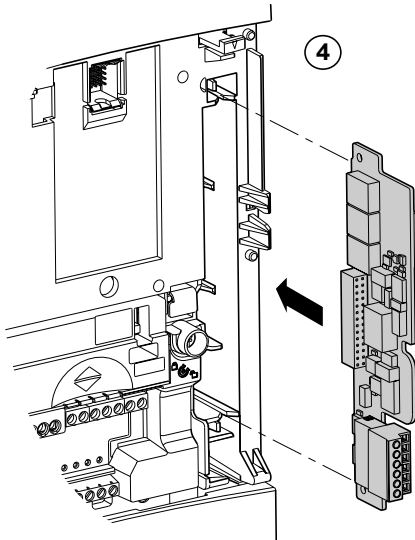
- Do the same on the right-hand side



- Pivot the control front panel and remove it

### Fitting an encoder interface card

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



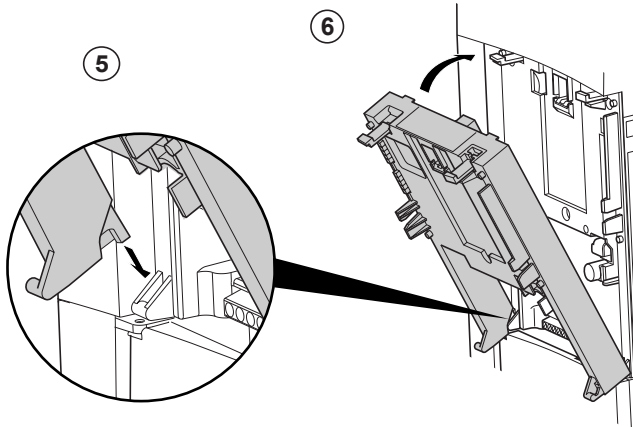
- If an I/O or communication option card or a "Controller Inside" programmable card has already been fitted, remove it so you can access the slot for the encoder interface card.



# Fitting the option cards

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## Fitting an I/O extension card, a communication card or a "Controller Inside" programmable card

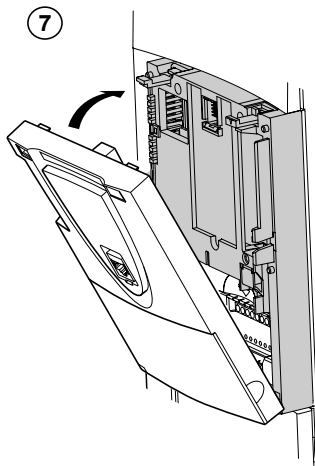


①, ② and ③ Remove the control front panel (see previous page)

④ Fit an encoder interface card (if used) (see previous page)

⑤ Position the option card on the clasps

⑥ Then pivot it until it clicks into place

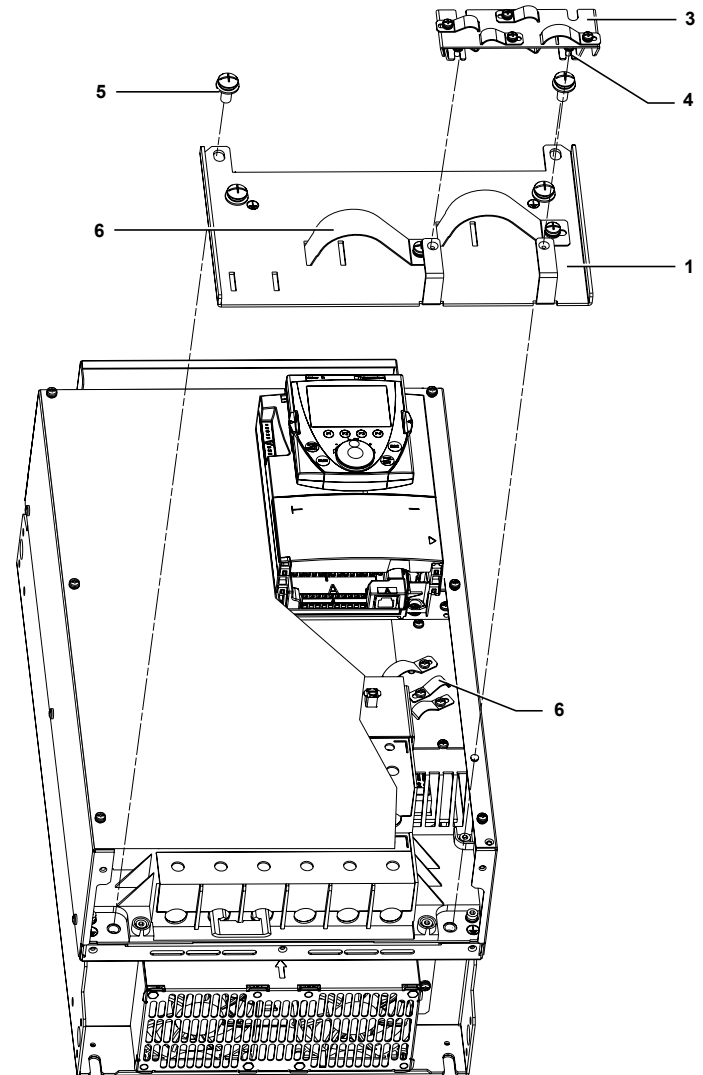
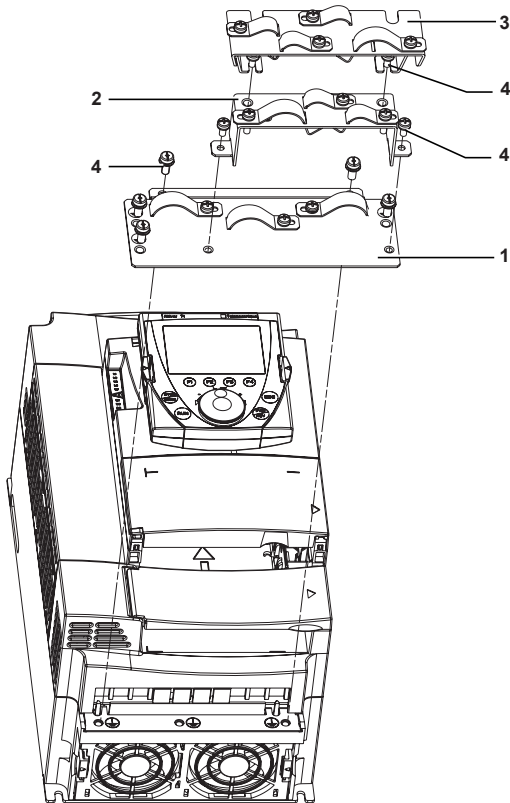


⑦ Replace the control front panel over the option card (same procedure as for fitting the option card, see ⑤ and ⑥)

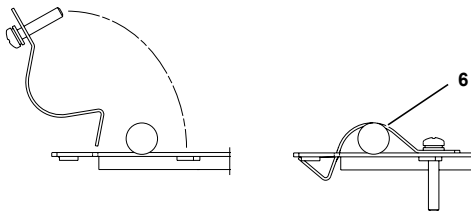
# Fitting the EMC plates

ATV71H 037M3 to D15M3X and ATV71H 075N4 to D18N4

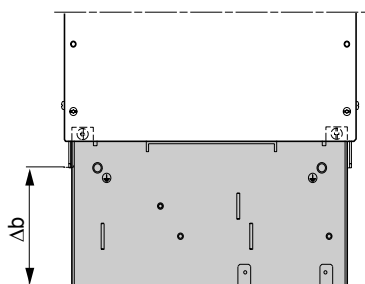
ATV71H D18M3X to D45M3X and ATV71H D22N4 to D75N4



## Fixing the EMC clamps



- 1 - EMC plate for connecting the power cables
- 2 - EMC plate for connecting the control cables (only for ATV71H 037M3 to D15M3X and ATV71H 075N4 to D18N4)
- 3 - EMC plate for connecting the I/O option card cables (supplied with the option cards)
- 4 - M4 screws (supplied)
- 5 - M8 screws (supplied)
- 6 - EMC clamps with captive screws (supplied)




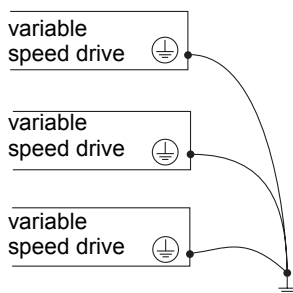
ATV71H	Δb	
	mm	in.
037M3, 075M3, U15M3, U22M3, U30N4, U40M3, 075N4, U15N4, U22N4, U30N4, U40N4	50	1.97
U55M3, U75M3, D11M3X, D15M3X, U55N4, U75N4, D11N4, D15N4, D18N4	49	1.93
D18M3X, D22M3X, D22N4, D30N4, D37N4, D30M3X, D37M3X, D45M3X, D45N4, D55N4, D75N4	120	4.72

# Wiring recommendations


## Power

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

 <b>DANGER</b>
<b>DANGEROUS VOLTAGE</b> Connect the drive to the protective ground using the grounding connection point provided, as shown in the diagram. The drive fixing points must be connected to the protective ground before switching on. <b>Failure to observe these precautions will result in death or serious injury.</b>




- Check whether the resistance to the protective ground is one ohm or less. Connect a number of variable speed drives to the protective ground, as shown in the diagram (see left). Do not lay protective grounding cables in a loop or in series.

 <b>WARNING</b>
<b>UNSUITABLE WIRING CONNECTIONS</b> <ul style="list-style-type: none"><li>• The ATV71 will be damaged if the line voltage is applied to the output terminals (U/T1,V/T2,W/T3).</li><li>• Check the electrical connections before switching on the ATV71.</li><li>• If you are replacing another variable speed drive, check that all the electrical connections to the ATV71 conform to all the wiring instructions in this manual.</li></ul> <b>Failure to observe this precaution will result in death or serious injury.</b>

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 3-phase drives. Choose a suitable model incorporating:

- 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 accidental 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.

 <b>WARNING</b>
<b>INADEQUATE PROTECTION AGAINST OVERCURRENTS</b> <ul style="list-style-type: none"><li>• Devices for protecting against overcurrents must be matched to the drive correctly.</li><li>• The Canadian electricity code or National Electrical code (US) insist on protection of branch circuits. Use the fuses recommended on the drive rating plate in order to obtain the nominal short-circuit current.</li><li>• Do not connect the drive to a line supply whose short-circuit capacity exceeds the maximum prospective short-circuit current indicated on the drive rating plate.</li></ul> <b>Failure to observe this precaution may result in death or serious injury.</b>

# Wiring recommendations

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

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

Do not immerse the motor cables in water.

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

## CAUTION

### USING A BRAKING RESISTOR

- Only use the braking resistors recommended in our catalogs.
- Wire the thermal protection contact on the resistor so that the drive power supply is disconnected immediately in the event of a fault (refer to the manual supplied with the resistor).

**Failure to observe this precaution may result in material 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. The power supply and control cables must always cross over at right-angles.

## Length of motor cables

ATV71H		0 m (0 ft)	50 m (164 ft)	100 m (328 ft)	150 m (492 ft)	300 m (984 ft)	1000 m (3280 ft)
037M3 to U75M3 075N4 to D15N4	Shielded cable						
	Unshielded cable						
D11M3X to D45M3X D18N4 to D75N4	Shielded cable						
	Unshielded cable						

 with dv/dt filters

 with output filters

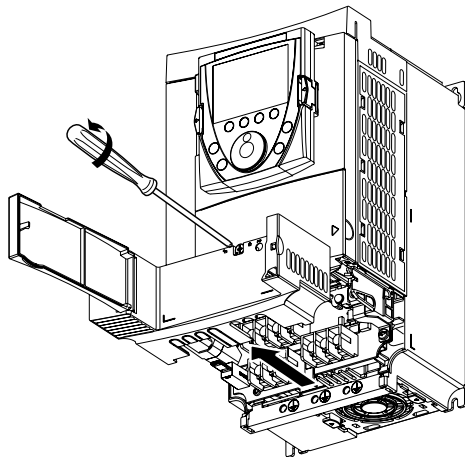
### Choice of associated components:

Please refer to the catalog.

# Power terminals

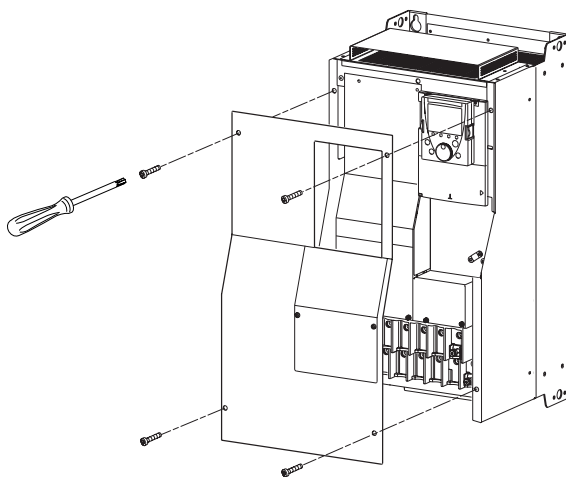
## Access to the power terminals

**ATV71 H037M3 to HD15M3X and ATV71 H075N4 to HD18N4**  
Unlock the power part access flap and remove it as shown below.




Example of ATV71HU22M3


**ATV71 HD18M3X to HD45M3X and ATV71 HD22N4 to HD75N4**  
To access the power terminals, remove the front panel as shown below.



Example of ATV71HD75N4

## Characteristics and functions of the power terminals

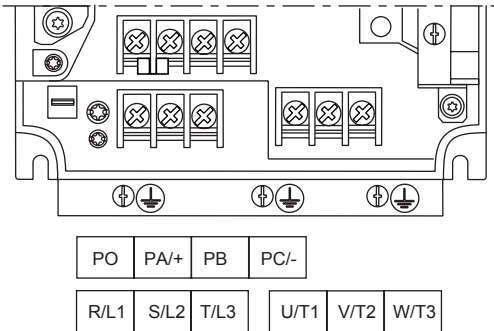
Terminal	Function
	Protective ground connection terminal
R/L1 S/L2 T/L3	Power supply
PO	DC bus + polarity
PA/+	Output to braking resistor (+ polarity)
PB	Output to braking resistor
PC/-	DC bus - polarity
U/T1 V/T2 W/T3	Outputs to the motor

 Only remove the PO and PA/+ commoning link if a DC choke has been added. The screws on the PO and PA/+ terminals must always be fully tightened as there is a high current circulating in the commoning link.

# Power terminals

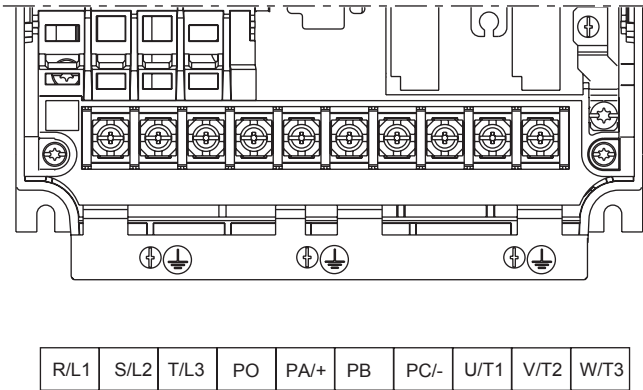
## Layout of the power terminals

**ATV71H 037M3, 075M3, U15M3, U22M3, U30M3, U40M3, 075N4, U15N4, U22N4, U30N4, U40N4**



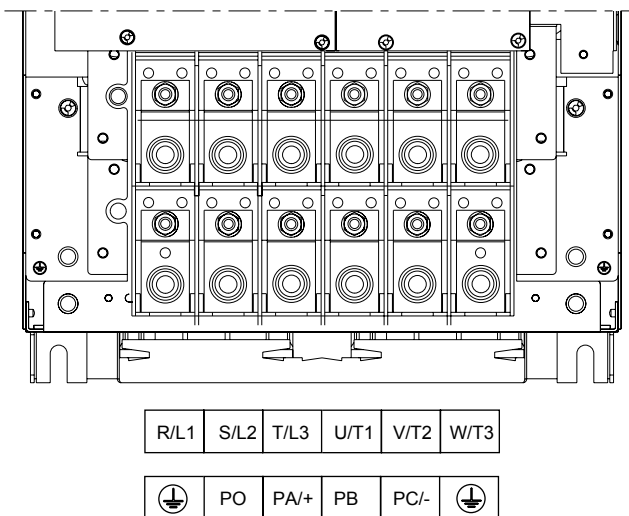
ATV71H	Maximum connection capacity		Tightening torque
	mm <sup>2</sup>	AWG	Nm (lb.in)
<b>037M3, 075M3, U15M3, 075N4, U15N4, U22N4</b>	2,5	14	1,2 (10.6)
<b>U22M3, U30M3, U40M3, U30N4, U40N4</b>	6	8	1,2 (10.6)

**ATV71H U55M3, U75M3, D11M3X, D15M3X, U55N4, U75N4, D11N4, D15N4, D18N4**



ATV71H	Maximum connection capacity		Tightening torque
	mm <sup>2</sup>	AWG	Nm (lb.in)
<b>U55M3, U55N4, U75N4</b>	10	6	2 (17.7)
<b>U75M3, D11N4</b>	16	4	2,4 (21)
<b>D11M3X, D15M3X, D15N4, D18N4</b>	35	1	2,4 (21)

**ATV71H D18M3X, D22M3X, D30M3X, D37M3X, D45M3X, D22N4, D30N4, D37N4, D45N4, D55N4, D75N4**

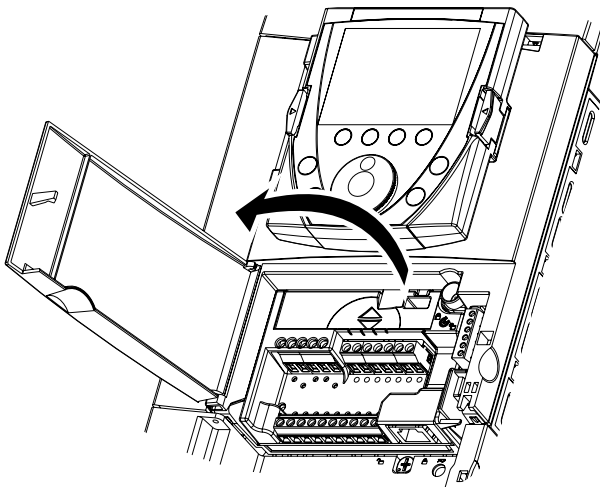


ATV71H	Maximum connection capacity		Tightening torque
	mm <sup>2</sup>	AWG	Nm (lb.in)
<b>D18M3X, D22M3X, D22N4, D30N4, D37N4</b>	50	1/0	6 (53)

ATV71H	Maximum connection capacity		Tightening torque
	mm <sup>2</sup>	kcmils	Nm (lb.in)
<b>D30M3X, D37M3X, D45M3X, D45N4, D55N4, D75N4</b>	120	350	19 (168)

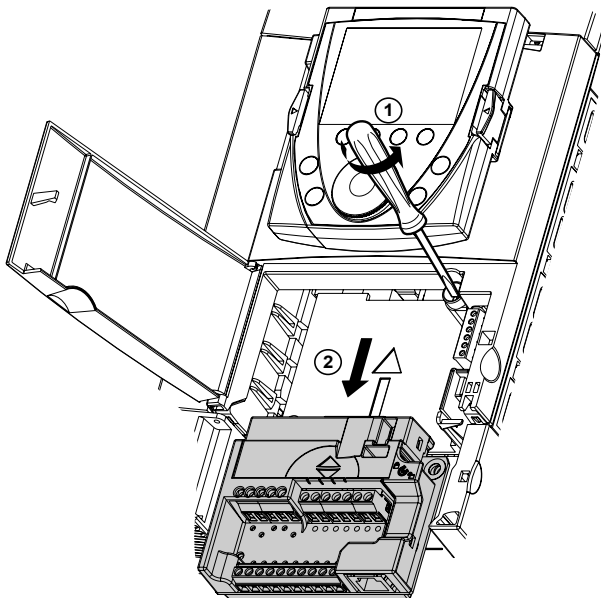
# Control terminals

## Access to 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.

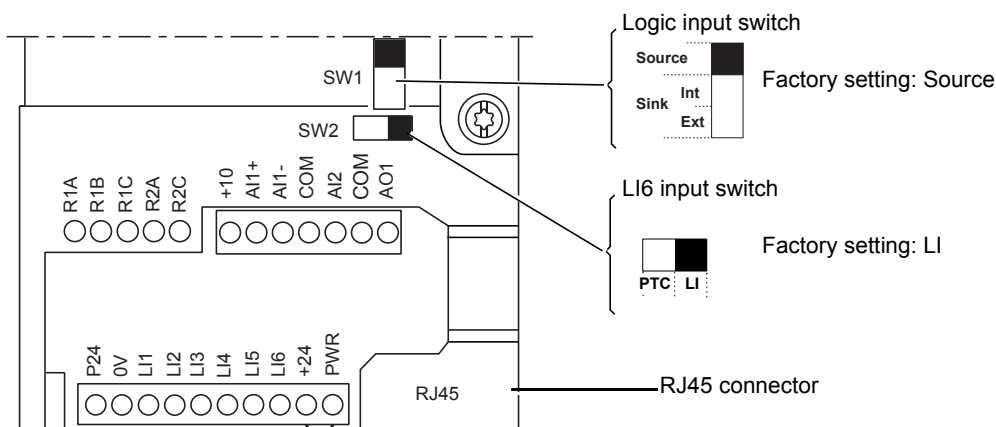
- Undo the screw until the spring is fully extended
- Remove the card by sliding it downwards

### CAUTION

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

**Failure to observe this precaution may result in material damage.**

## Layout of the control terminals



Maximum connection capacity:  
2.5 mm<sup>2</sup> - AWG 14

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

**Note:** The ATV71 is supplied with a link between the PWR and +24 terminals.

# Control terminals

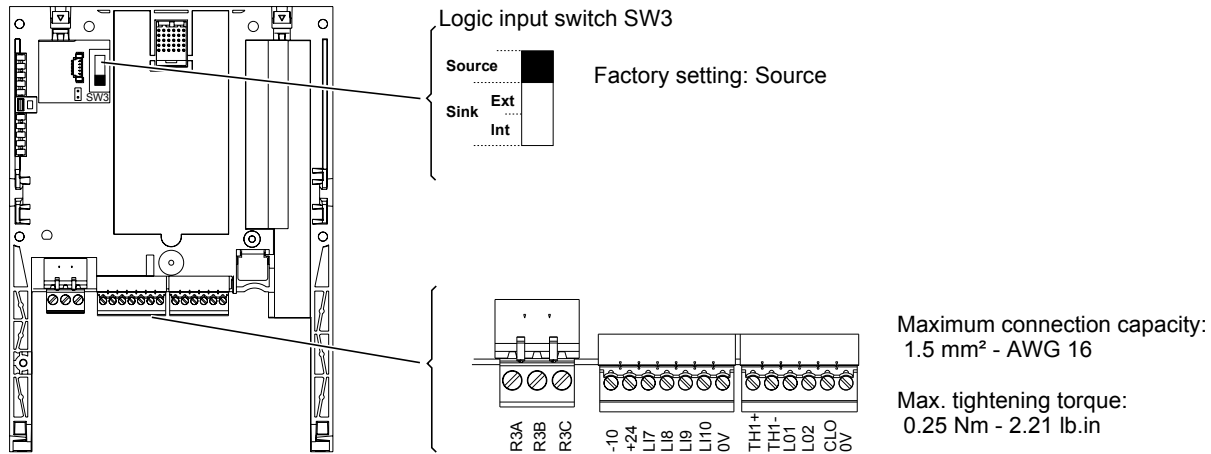
## Characteristics and functions of the control terminals

Terminal	Function	Electrical characteristics									
R1A R1B R1C	Common point C/O contact (R1C) of programmable relay R1	<ul style="list-style-type: none"> <li>Minimum switching capacity: 3 mA for 24 V <math>\overline{\text{---}}</math></li> <li>Maximum switching capacity on resistive load: 5 A for 250 V <math>\sim</math> or 30 V <math>\overline{\text{---}}</math></li> </ul>									
R2A R2C	N/O contact of programmable relay R2	<ul style="list-style-type: none"> <li>Maximum switching current on inductive load (<math>\cos \varphi = 0.4</math> L/R = 7 ms): 2 A for 250 V <math>\sim</math> or 30 V <math>\overline{\text{---}}</math></li> <li>Reaction time: 7 ms <math>\pm</math> 0.5 ms</li> <li>Service life: 100,000 operations at max. switching power</li> </ul>									
+10	+10 V $\overline{\text{---}}$ power supply for reference potentiometer 1 to 10 k $\Omega$	<ul style="list-style-type: none"> <li>+10 V <math>\overline{\text{---}}</math> (10.5 V <math>\pm</math> 5V)</li> <li>10 mA max.</li> </ul>									
A11+ A11 -	Differential analog input A11	<ul style="list-style-type: none"> <li>-10 to +10 V <math>\overline{\text{---}}</math> (max. safe voltage 24 V)</li> <li>Reaction time: 2 ms <math>\pm</math> 0.5 ms, 11-bit resolution + 1 sign bit</li> <li>Accuracy <math>\pm</math> 0.6% for <math>\Delta\theta = 60^\circ\text{C}</math>, linearity <math>\pm</math> 0.15% of max. value</li> </ul>									
COM	Analog I/O common	0V									
A12	Depending on software configuration: Analog voltage input  or Analog current input	<ul style="list-style-type: none"> <li>Analog input 0 to +10 V <math>\overline{\text{---}}</math> (max. safe voltage 24 V), impedance 30 k<math>\Omega</math></li> <li>or</li> <li>analog input X - Y mA, X and Y can be programmed from 0 to 20 mA,</li> <li>Impedance 250 <math>\Omega</math></li> <li>Reaction time: 2 ms <math>\pm</math> 0.5 ms</li> <li>Resolution 11 bits, accuracy <math>\pm</math> 0.6% pour <math>\Delta\theta = 60^\circ\text{C}</math>, linearity <math>\pm</math> 0.15% of max. value</li> </ul>									
COM	Analog I/O common	0V									
AO1	Depending on software configuration: Analog voltage output or Analog current output	<ul style="list-style-type: none"> <li>analog output 0 to +10 V <math>\overline{\text{---}}</math>, min. load impedance 470 <math>\Omega</math></li> <li>or</li> <li>analog output X - Y mA, X and Y can be programmed from 0 to 20 mA</li> <li>max. load impedance 500 <math>\Omega</math></li> <li>10-bit resolution, reaction time: 2 ms <math>\pm</math> 0.5 ms</li> <li>Accuracy <math>\pm</math> 1% for <math>\Delta\theta = 60^\circ\text{C}</math>, linearity <math>\pm</math> 0.2% of max. value</li> </ul>									
P24	Input for external +24 V $\overline{\text{---}}$ control power supply	<ul style="list-style-type: none"> <li>+24 V <math>\overline{\text{---}}</math> (min. 19 V, max. 30 V)</li> <li>Power 30 Watts</li> </ul>									
0V	Logic input common and 0V of P24 external power supply	0V									
L11 L12 L13 L14 L15	Programmable logic inputs	<ul style="list-style-type: none"> <li>+24 V <math>\overline{\text{---}}</math> (max. 30 V)</li> <li>impedance 3.5 k<math>\Omega</math></li> <li>Reaction time: 2 ms <math>\pm</math> 0.5 ms</li> </ul> <table border="1" style="margin-left: auto; margin-right: auto;"> <thead> <tr> <th>SW1 switch</th> <th>State 0</th> <th>State 1</th> </tr> </thead> <tbody> <tr> <td>Source (factory setting)</td> <td>&lt; 5 V <math>\overline{\text{---}}</math></td> <td>&gt; 11 V <math>\overline{\text{---}}</math></td> </tr> <tr> <td>Int Sink or Ext Sink</td> <td>&gt; 16 V <math>\overline{\text{---}}</math></td> <td>&lt; 10 V <math>\overline{\text{---}}</math></td> </tr> </tbody> </table>	SW1 switch	State 0	State 1	Source (factory setting)	< 5 V $\overline{\text{---}}$	> 11 V $\overline{\text{---}}$	Int Sink or Ext Sink	> 16 V $\overline{\text{---}}$	< 10 V $\overline{\text{---}}$
SW1 switch	State 0	State 1									
Source (factory setting)	< 5 V $\overline{\text{---}}$	> 11 V $\overline{\text{---}}$									
Int Sink or Ext Sink	> 16 V $\overline{\text{---}}$	< 10 V $\overline{\text{---}}$									
L16	Depending on the position of the SW2 switch. - Programmable logic input  or - Input for PTC probes	SW2 switch on LI (factory setting) <ul style="list-style-type: none"> <li>Same characteristics as logic inputs L11 to L15</li> </ul> or SW2 switch on PTC <ul style="list-style-type: none"> <li>Trip threshold 3 k<math>\Omega</math>, reset threshold 1.8 k<math>\Omega</math></li> <li>Short-circuit detection threshold &lt; 50 <math>\Omega</math></li> </ul>									
+24	Logic input power supply	SW1 switch in Source or Int Sink position <ul style="list-style-type: none"> <li>+24 V <math>\overline{\text{---}}</math> power supply (min. 21 V, max. 27 V), protected against short-circuits and overloads</li> <li>Max. current available for customers 200 mA</li> </ul> SW1 switch in Ext Sink position <ul style="list-style-type: none"> <li>Input for external +24 V <math>\overline{\text{---}}</math> power supply for the logic inputs</li> </ul>									
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 and IEC/EN 61508)	<ul style="list-style-type: none"> <li>24 V <math>\overline{\text{---}}</math> power supply (max. 30 V)</li> <li>Impedance 1.5 k<math>\Omega</math></li> <li>State 0 if &lt; 2V, state 1 if &gt; 17V</li> <li>Reaction time: 10ms</li> </ul>									



# Option terminals

## Logic I/O option card terminals (VW3A3201)

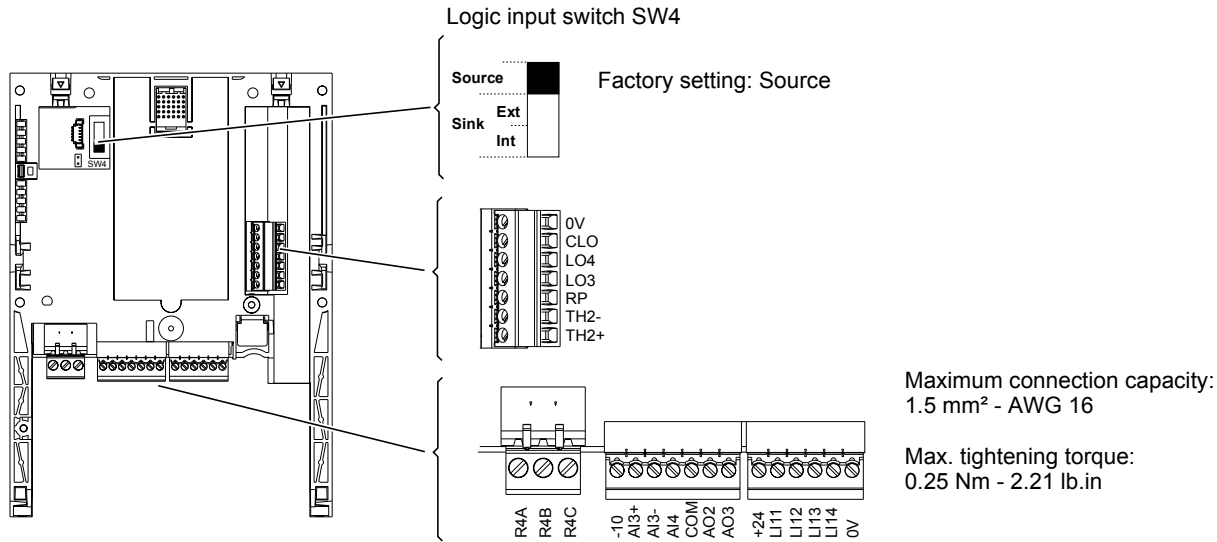


### Characteristics and functions of the terminals

Terminal	Function	Electrical characteristics									
R3A R3B R3C	Common point C/O contact R3C of programmable relay R3	<ul style="list-style-type: none"> <li>Minimum switching capacity: 3mA for 24 V <math>\overline{\text{DC}}</math></li> <li>Maximum switching capacity on resistive load: 5 A for 250 V <math>\sim</math> or 30 V <math>\overline{\text{DC}}</math></li> <li>Maximum switching capacity on inductive load (<math>\cos \varphi = 0.4</math> L/R = 7 ms): 2 A for 250 V <math>\sim</math> or 30 V <math>\overline{\text{DC}}</math></li> <li>Reaction time: 7 ms <math>\pm</math> 0.5 ms</li> <li>Service life: 100,000 operations</li> </ul>									
-10	-10 V $\overline{\text{DC}}$ power supply for reference potentiometer 1 to 10 k $\Omega$	<ul style="list-style-type: none"> <li>-10 V <math>\overline{\text{DC}}</math> (-10.5 V <math>\pm</math> 5V)</li> <li>10 mA max.</li> </ul>									
+24	Logic input power supply	<p>SW3 switch in Source or Int Sink position</p> <ul style="list-style-type: none"> <li>+24 V <math>\overline{\text{DC}}</math> power supply (min. 21 V, max. 27 V), protected against short-circuits and overloads</li> <li>Max. current available for customers 200 mA (This current corresponds to the total consumption on the control card +24 and the option cards +24)</li> </ul> <p>SW3 switch in Ext Sink position</p> <ul style="list-style-type: none"> <li>Input for external +24 V <math>\overline{\text{DC}}</math> power supply for the logic inputs</li> </ul>									
LI7 LI8 LI9 LI10	Programmable logic inputs	<ul style="list-style-type: none"> <li>+24 V <math>\overline{\text{DC}}</math> power supply (max. 30 V)</li> <li>Impedance 3.5 k<math>\Omega</math></li> <li>Reaction time 2 ms <math>\pm</math> 0.5 ms</li> </ul> <table border="1"> <thead> <tr> <th>Switch SW3</th> <th>State 0</th> <th>State 1</th> </tr> </thead> <tbody> <tr> <td>Source (factory setting)</td> <td>&lt; 5 V <math>\overline{\text{DC}}</math></td> <td>&gt; 11 V <math>\overline{\text{DC}}</math></td> </tr> <tr> <td>Int Sink or Ext Sink</td> <td>&gt; 16 V <math>\overline{\text{DC}}</math></td> <td>&lt; 10 V <math>\overline{\text{DC}}</math></td> </tr> </tbody> </table>	Switch SW3	State 0	State 1	Source (factory setting)	< 5 V $\overline{\text{DC}}$	> 11 V $\overline{\text{DC}}$	Int Sink or Ext Sink	> 16 V $\overline{\text{DC}}$	< 10 V $\overline{\text{DC}}$
Switch SW3	State 0	State 1									
Source (factory setting)	< 5 V $\overline{\text{DC}}$	> 11 V $\overline{\text{DC}}$									
Int Sink or Ext Sink	> 16 V $\overline{\text{DC}}$	< 10 V $\overline{\text{DC}}$									
0 V	0 V	0 V									
TH1+ TH1-	PTC probe input	<ul style="list-style-type: none"> <li>Trip threshold 3 k<math>\Omega</math>, reset threshold 1.8 k<math>\Omega</math></li> <li>Short-circuit or open-circuit detection threshold &lt; 50 <math>\Omega</math></li> </ul>									
LO1 LO2	Open collector programmable logic outputs	<ul style="list-style-type: none"> <li>+24 V <math>\overline{\text{DC}}</math> (max. 30 V)</li> <li>Max. current 200 mA for internal power supply and 200 mA for external power supply</li> <li>Reaction time: 2 ms <math>\pm</math> 0.5 ms</li> </ul>									
CLO	Logic output common										
0V	0 V	0 V									

# Option terminals

## Extended I/O option card terminals (VW3A3202)



### Characteristics and functions of the terminals

Terminal	Function	Electrical characteristics
R4A R4B R4C	Common point C/O contact R4C of programmable relay R4	<ul style="list-style-type: none"> <li>Minimum switching capacity: 3mA for 24 V <math>\overline{\text{DC}}</math></li> <li>Maximum switching capacity on resistive load: 5 A for 250 V <math>\sim</math> or 30 V <math>\overline{\text{DC}}</math></li> <li>Maximum switching capacity on inductive load (<math>\cos \varphi = 0.4</math> L/R = 7 ms): 1.5 A for 250 V <math>\sim</math> or 30 V <math>\overline{\text{DC}}</math></li> <li>Reaction time 10 ms <math>\pm</math> 1ms</li> <li>Service life: 100,000 operations</li> </ul>
-10	-10 V $\overline{\text{DC}}$ power supply for reference potentiometer 1 to 10 k $\Omega$	<ul style="list-style-type: none"> <li>-10 V <math>\overline{\text{DC}}</math> (-10.5 V <math>\pm</math> 5V)</li> <li>10 mA max.</li> </ul>
AI3 +	+ polarity of the current differential analog input AI3	<ul style="list-style-type: none"> <li>Analog input X - Y mA, X and Y can be programmed from 0 to 20 mA, impedance 250 <math>\Omega</math></li> <li>Reaction time: 5 ms <math>\pm</math> 1 ms</li> <li>11-bit resolution + 1 sign bit, accuracy <math>\pm</math> 0.6% for <math>\Delta\theta = 60^\circ\text{C}</math></li> <li>Linearity <math>\pm</math> 0.15% of max. value</li> </ul>
AI3 -	- polarity of the current differential analog input AI3	
AI4	Depending on software configuration: Analog current input  or Analog voltage input	<ul style="list-style-type: none"> <li>Analog input 0 to +10 V <math>\overline{\text{DC}}</math> (max. safe voltage 24 V), impedance 30 k<math>\Omega</math></li> <li>or</li> <li>Analog input X - Y mA, X and Y can be programmed from 0 to 20 mA, impedance 250 <math>\Omega</math></li> <li>Reaction time: 5 ms <math>\pm</math> 1 ms</li> <li>Resolution 11 bits, accuracy <math>\pm</math> 0.6% pour <math>\Delta\theta = 60^\circ\text{C}</math>, linearity <math>\pm</math> 0.15% of max. value</li> </ul>
COM	Analog I/O common	0 V
AO2 AO3	Depending on software configuration: Analog voltage outputs  or Analog current outputs	<ul style="list-style-type: none"> <li>0 - 10 V <math>\overline{\text{DC}}</math> or -10/+10 V <math>\overline{\text{DC}}</math> bipolar analog output depending on software configuration, min. load impedance 470 <math>\Omega</math></li> <li>or</li> <li>Analog current output X-Y mA, X and Y can be programmed from 0 to 20 mA, max. load impedance 500 <math>\Omega</math></li> <li>10-bit resolution</li> <li>Reaction time 5 ms <math>\pm</math> 1ms, accuracy <math>\pm</math> 1% for <math>\Delta\theta = 60^\circ\text{C}</math>, linearity <math>\pm</math> 0.2%</li> </ul>

## Option terminals

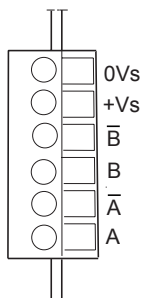
+24	Logic input power supply	<p>SW4 switch in Source or Int Sink position</p> <ul style="list-style-type: none"> <li>+24 V <math>\overline{\text{---}}</math> output (min. 21 V, max. 27 V), protected against short-circuits and overloads</li> <li>Max. current available for customers 200 mA (This current corresponds to the total consumption on the control card +24 and the option cards +24)</li> </ul> <p>SW4 switch in Ext Sink position</p> <ul style="list-style-type: none"> <li>Input for external +24 V <math>\overline{\text{---}}</math> power supply for the logic inputs</li> </ul>									
LI11 LI12 LI13 LI14	Programmable logic inputs	<ul style="list-style-type: none"> <li>+24 V <math>\overline{\text{---}}</math> (max. 30 V)</li> <li>Impedance 3.5 k<math>\Omega</math></li> <li>Reaction time: 5 ms <math>\pm</math> 1 ms</li> </ul> <table border="1"> <tr> <td>SW4 switch</td> <td>State 0</td> <td>State 1</td> </tr> <tr> <td>Source (factory setting)</td> <td>&lt; 5 V <math>\overline{\text{---}}</math></td> <td>&gt; 11 V <math>\overline{\text{---}}</math></td> </tr> <tr> <td>Int Sink or Ext Sink</td> <td>&gt; 16 V <math>\overline{\text{---}}</math></td> <td>&lt; 10 V <math>\overline{\text{---}}</math></td> </tr> </table>	SW4 switch	State 0	State 1	Source (factory setting)	< 5 V $\overline{\text{---}}$	> 11 V $\overline{\text{---}}$	Int Sink or Ext Sink	> 16 V $\overline{\text{---}}$	< 10 V $\overline{\text{---}}$
SW4 switch	State 0	State 1									
Source (factory setting)	< 5 V $\overline{\text{---}}$	> 11 V $\overline{\text{---}}$									
Int Sink or Ext Sink	> 16 V $\overline{\text{---}}$	< 10 V $\overline{\text{---}}$									
0V	Logic input common	0 V									

TH2 + TH2 -	PTC probe input	<ul style="list-style-type: none"> <li>Trip threshold 3 k<math>\Omega</math>, reset threshold 1.8 k<math>\Omega</math></li> <li>Short-circuit or open-circuit detection threshold &lt; 50 <math>\Omega</math></li> </ul>
RP	Frequency input	<ul style="list-style-type: none"> <li>Frequency range 0 to 30 kHz</li> <li>Reaction time 5 ms <math>\pm</math> 1 ms</li> </ul>
LO3 LO4	Open collector programmable logic outputs	<ul style="list-style-type: none"> <li>+24 V <math>\overline{\text{---}}</math> (max. 30 V)</li> <li>Max. current 20 mA for internal power supply and 200 mA for external power supply</li> <li>Reaction time 5 ms <math>\pm</math> 1 ms</li> </ul>
CLO	Logic output common	
0V	0 V	0 V

# Option terminals

## Encoder interface card terminals

VW3A3401...407



Maximum connection capacity:  
1.5 mm<sup>2</sup> - 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	Encoder power supply	<ul style="list-style-type: none"> <li>5V <math>\overline{\text{---}}</math> (max. 5.5V) protected against short-circuits and overloads</li> <li>Max. current 150 mA</li> </ul>	<ul style="list-style-type: none"> <li>15V <math>\overline{\text{---}}</math> (max. 16V) protected against short-circuits and overloads</li> <li>Max. current 175 mA</li> </ul>
A, /A B, /B	Incremental logic inputs	<ul style="list-style-type: none"> <li>Max. resolution: 10000 points/rev</li> <li>Max. frequency: 300kHz</li> </ul>	

### Encoder interface cards with open collector outputs

Terminal	Function	Electrical characteristics	
		VW3 A3 403	VW3 A3 404
+Vs 0Vs	Encoder power supply	<ul style="list-style-type: none"> <li>12V <math>\overline{\text{---}}</math> (max. 13V) protected against short-circuits and overloads</li> <li>Max. current 175 mA</li> </ul>	<ul style="list-style-type: none"> <li>15V <math>\overline{\text{---}}</math> (max. 16V) protected against short-circuits and overloads</li> <li>Max. current 175 mA</li> </ul>
A, /A B, /B	Incremental logic inputs	<ul style="list-style-type: none"> <li>Max. resolution: 10000 points/rev</li> <li>Max. frequency: 300 kHz</li> </ul>	

### Encoder interface cards with push-pull outputs

Terminal	Function	Electrical characteristics		
		VW3 A3 405	VW3 A3 406	VW3 A3 407
+Vs 0Vs	Encoder power supply	<ul style="list-style-type: none"> <li>12V <math>\overline{\text{---}}</math> (max. 13V) protected against short-circuits and overloads</li> <li>Max. current 175 mA</li> </ul>	<ul style="list-style-type: none"> <li>15V <math>\overline{\text{---}}</math> (max. 16V) protected against short-circuits and overloads</li> <li>Max. current 175 mA</li> </ul>	<ul style="list-style-type: none"> <li>24V <math>\overline{\text{---}}</math> (min. 20V, max. 30V) protected against short-circuits and overloads</li> <li>Max. current 100 mA</li> </ul>
A, /A B, /B	Incremental logic inputs	<ul style="list-style-type: none"> <li>Max. resolution: 10000 points/rev</li> <li>Max. frequency: 300 kHz</li> </ul>		

# Option terminals

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## Selecting the encoder

The 7 encoder interface cards available as an option with the ATV71 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

The encoder must comply with the following two limits:

- Maximum encoder frequency 300 kHz
- Maximum resolution 10000 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, in order to limit line voltage drop:

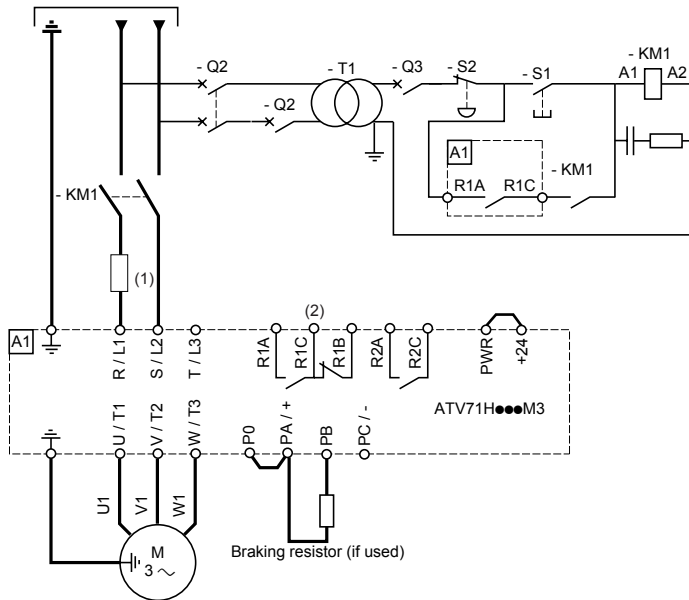
Max. length of encoder cable	VW3 A3 401...402			VW3 A3 403...407		
	Max. consumption current of encoder	Minimum cross-section of conductors		Max. consumption current of encoder	Minimum cross-section of conductors	
10 m 32.8 ft	100 mA	0.2 mm <sup>2</sup>	AWG 24	100 mA	0.2 mm <sup>2</sup>	AWG 24
	200 mA	0.2 mm <sup>2</sup>	AWG 24	200 mA	0.2 mm <sup>2</sup>	AWG 24
50 m 164 ft	100 mA	0.5 mm <sup>2</sup>	AWG 20	100 mA	0.5 mm <sup>2</sup>	AWG 20
	200 mA	0.75 mm <sup>2</sup>	AWG 18	200 mA	0.75 mm <sup>2</sup>	AWG 18
100 m 328 ft	100 mA	0.75 mm <sup>2</sup>	AWG 18	100 mA	0.75 mm <sup>2</sup>	AWG 18
	200 mA	1.5 mm <sup>2</sup>	AWG 15	200 mA	1.5 mm <sup>2</sup>	AWG 16
200 m 656 ft	-	-	-	100 mA	0.5 mm <sup>2</sup>	AWG 20
	-	-	-	200 mA	1.5 mm <sup>2</sup>	AWG 15
300 m 984 ft	-	-	-	100 mA	0.75 mm <sup>2</sup>	AWG 18
	-	-	-	200 mA	1.5 mm <sup>2</sup>	AWG 15

# Connection diagrams

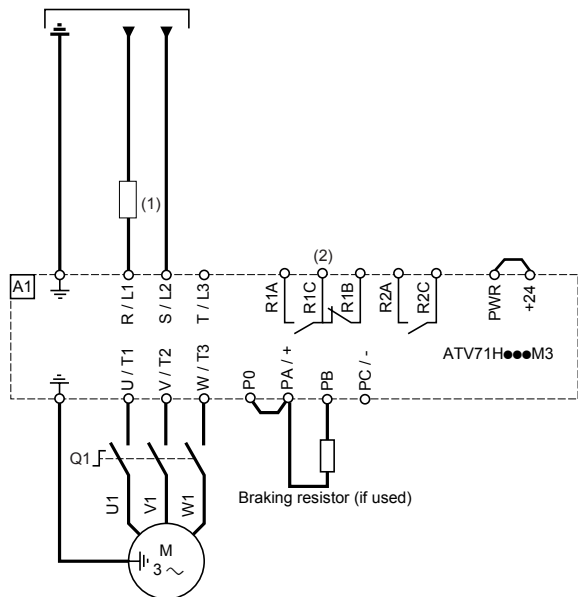
## Connection diagrams conforming to standards EN 954-1 category 1 and IEC/EN 61508 capacity SIL1, stopping category 0 in accordance with standard IEC/EN 60204 1

### Single phase power supply (ATV71H 075M3 to U75M3)

#### Diagram with line contactor



#### Diagram with switch disconnecter



- (1) Line choke, if used (compulsory for ATV71H U40M3 to U75M3 drives)
- (2) Fault relay contacts, for remote signaling of drive status

Inhibit the fault indicating the loss of a line phase (IPL) so that ATV71H 075M3 to U75M3 drives can operate on a single phase supply (see programming manual). If this fault is set to its factory configuration, the drive will stay locked in fault mode.

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

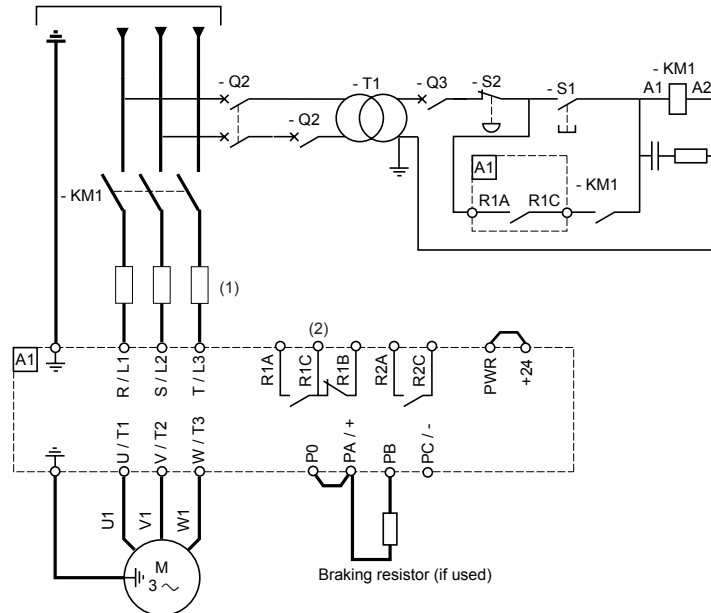
**Choice of associated components:**  
Please refer to the catalog.

# Connection diagrams

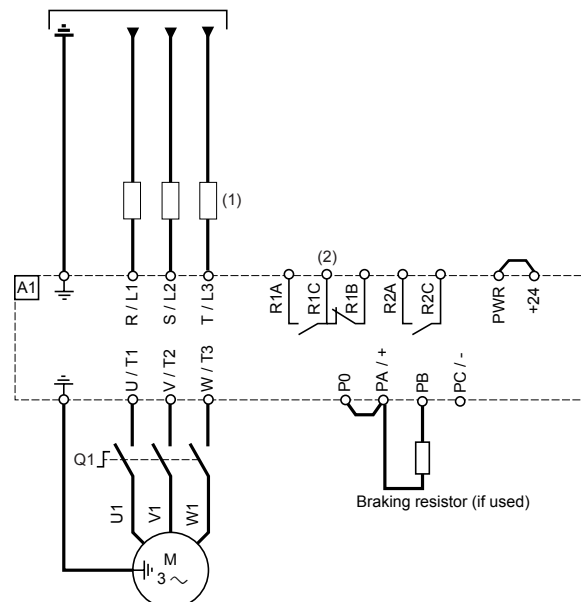
## Connection diagrams conforming to standards EN 954-1 category 1 and IEC/EN 61508 capacity SIL1, stopping category 0 in accordance with standard IEC/EN 60204-1

### 3-phase power supply

#### Diagram with line contactor



#### Diagram with switch disconnector



(1) Line choke (if used)

(2) Fault relay contacts, for remote signaling of drive status

**Note:** 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.

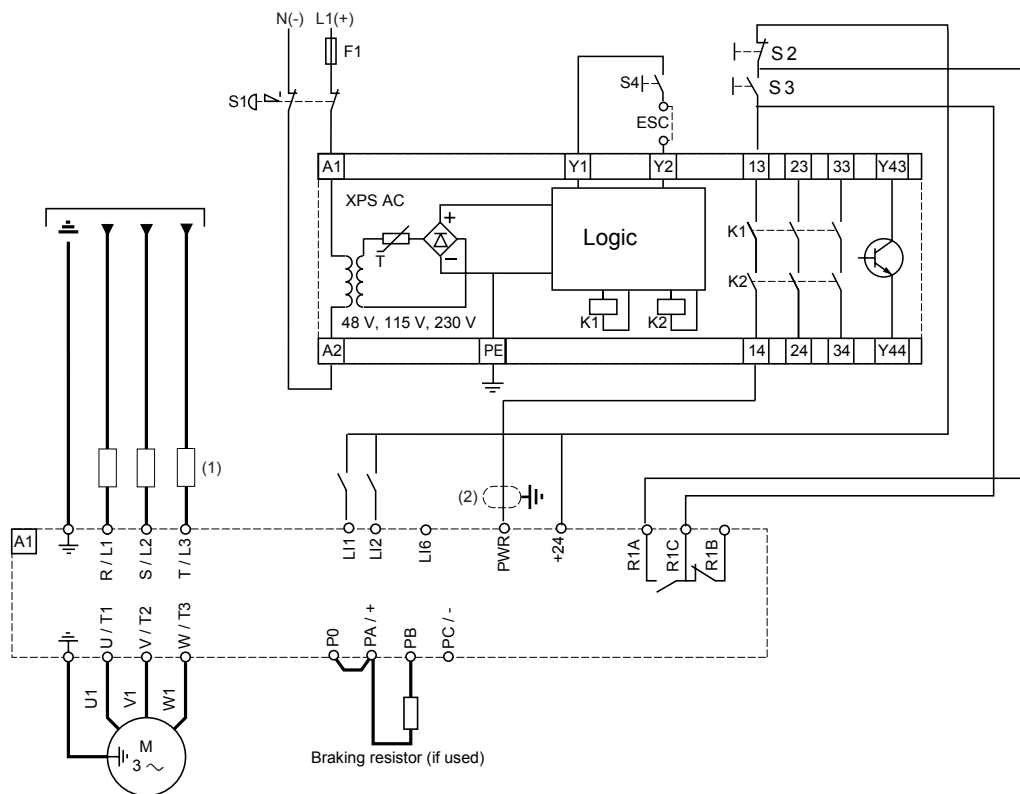
# Connection diagrams

## Connection diagrams conforming to standards EN 954-1 category 3 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 stop request is activated, the motor power supply is switched off immediately and it stops in accordance with category 0 of standard IEC/EN 60204-1.

 **This diagram must be used for hoisting applications if a mechanical brake is controlled by the ATV71.**

A contact on the Preventa XPS AC module must be inserted in the brake control circuit to engage it safely when the Power Removal safety function is activated.



(1) Line choke (if used)

(2) It is essential to connect the shielding on the cable connected to the Power Removal input to ground.

- Standard EN 954-1 category 3 requires the use of a stop button with double contact (S1).
- S1 is used to activate the Power Removal safety function.
- S2 and S3 are the optional start and stop controls.
- S4 is used to initialize the Preventa module when switching on 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 ATV71 drives.
- A logic input 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 power supply must be switched off and then on again before carrying out this preventive maintenance.

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

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

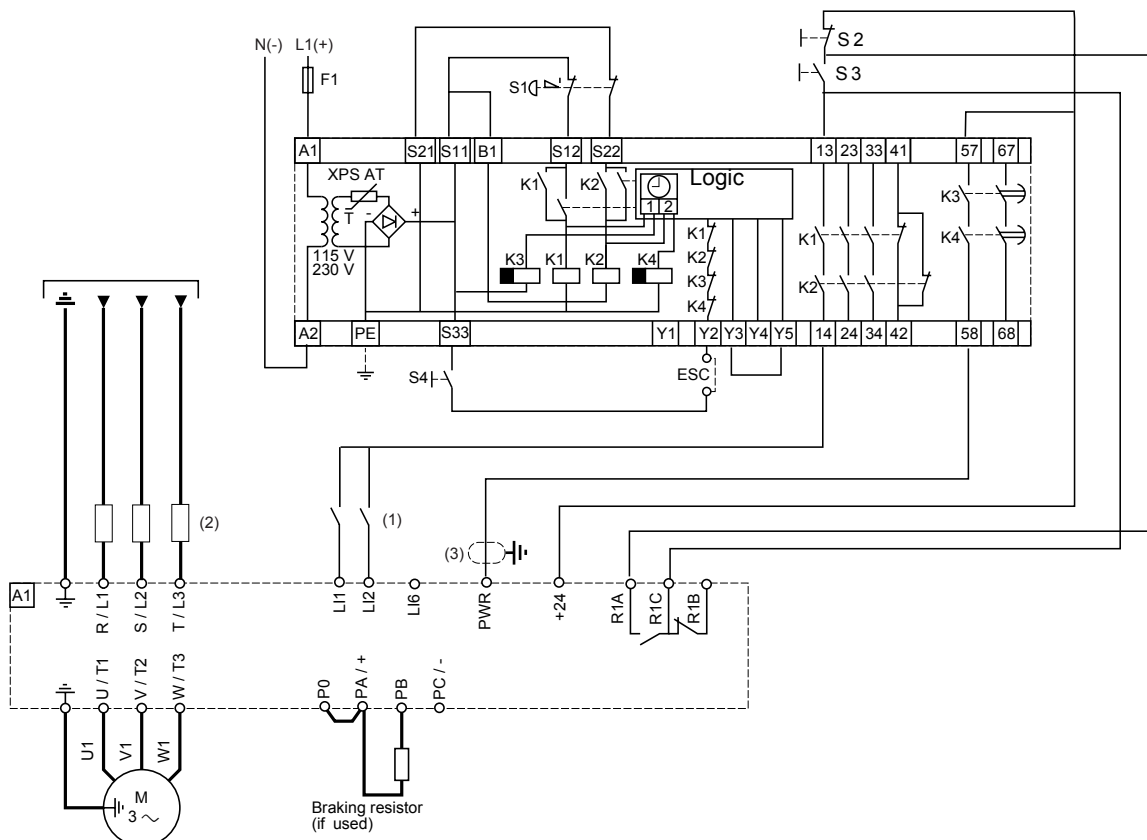
This connection diagram is suitable for use with machines with a long freewheel stop time (machines with high inertia or low resistive torque).

 **This diagram must not be used for lifting applications.**

When the stop request 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) In this example, the logic inputs LI● are wired as "Source" but can be wired as "Int Sink" or "Ext Sink".
- (2) Line choke (if used)
- (3) It is essential to connect the shielding on the cable connected to the Power Removal input to ground.

- Standard EN 954-1 category 3 requires the use of a stop button with double contact (S1).
- S1 is used to activate the Power Removal safety function.
- S2 and S3 are the optional start and stop controls.
- S4 is used to initialize the Preventa module when switching on 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 ATV71 drives. In this case the time delay must be set to the longest stopping time.
- A logic input 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 power supply must be switched off and then on again before carrying out this preventive maintenance. 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).

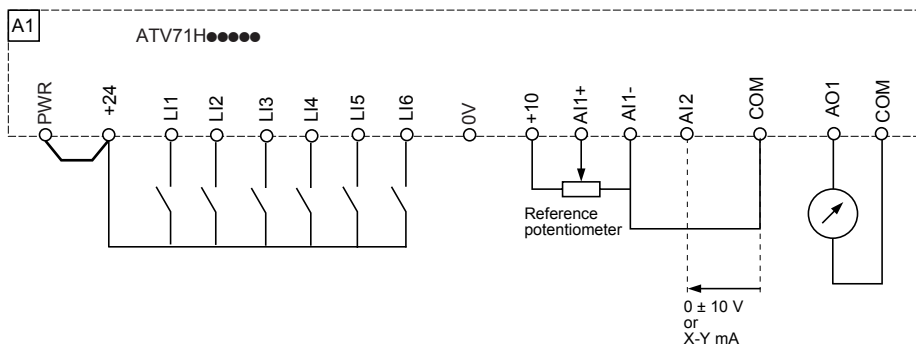
### Choice of associated components:

Please refer to the catalog.

# Connection diagrams

## Control connection diagrams

### Control card connection diagram

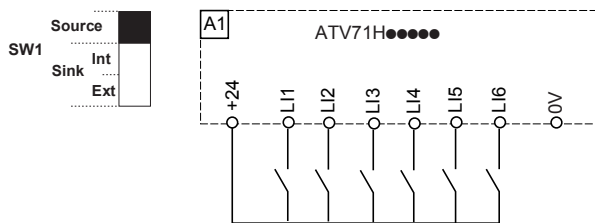


### Logic input switch (SW1)

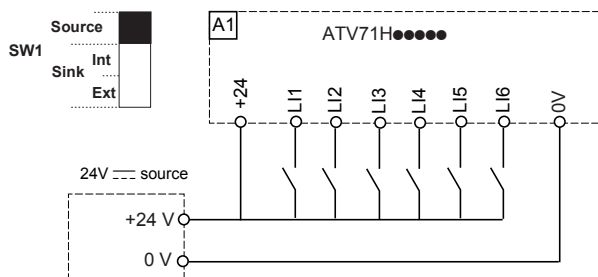
The logic input switch (SW1) is used to adapt the operation of the logic inputs to the technology of the programmable controller outputs.

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

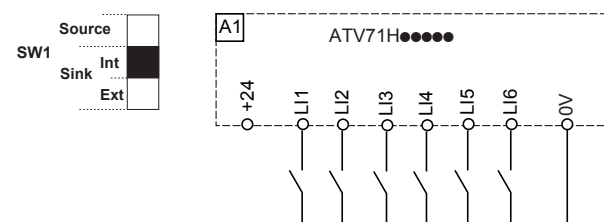
- SW1 switch set to "Source" position



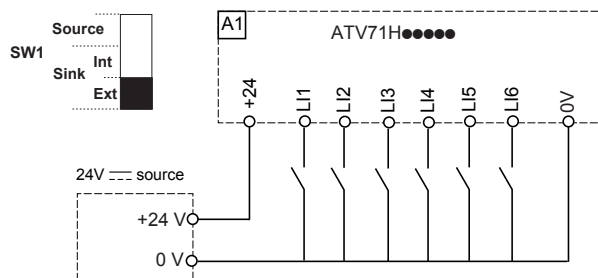
- SW1 switch set to "Source" position and use of an external power supply for the LIs



- SW1 switch set to "Int Sink" position



- SW1 switch set to "Ext Sink" position



## WARNING

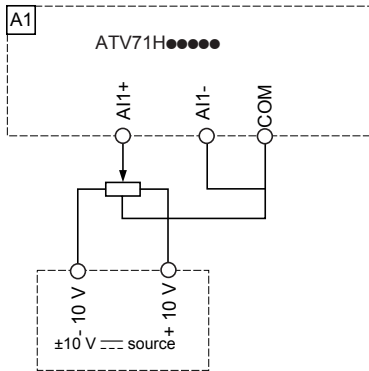
### Accidental starting of the drive

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

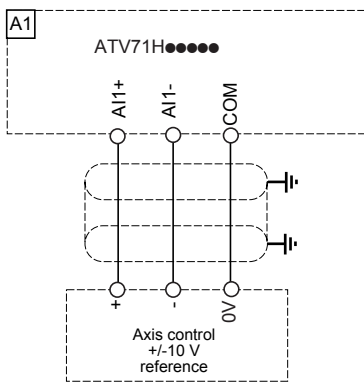
**Failure to observe this precaution may result in death or serious injury.**

# Connection diagrams

## Bipolar speed reference



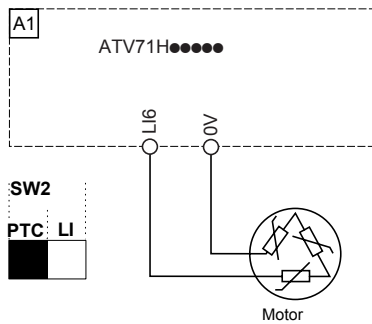
## Speed reference using axis control



## SW2 switch

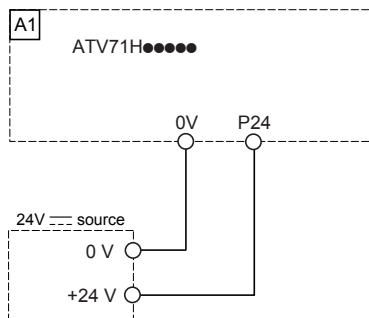
The LI6 logic input switch (SW2) makes it possible to use the LI6 input:

- 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

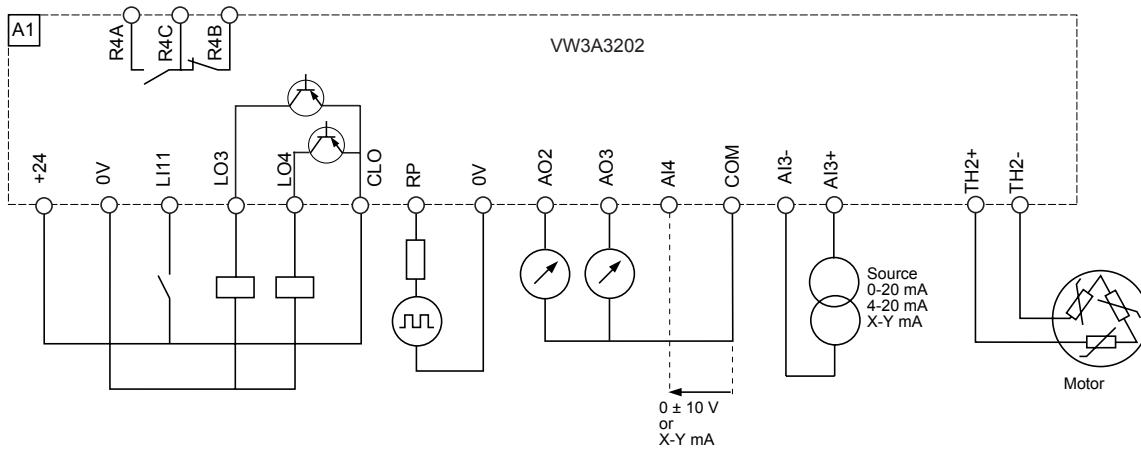
The control card can be supplied via an external +24V source



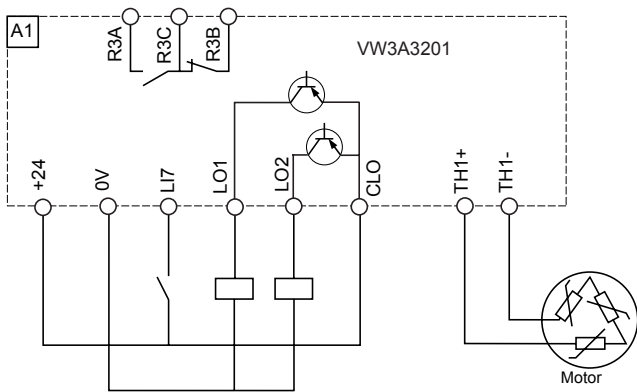
# Connection diagrams

## I/O extension card connection diagrams

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



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

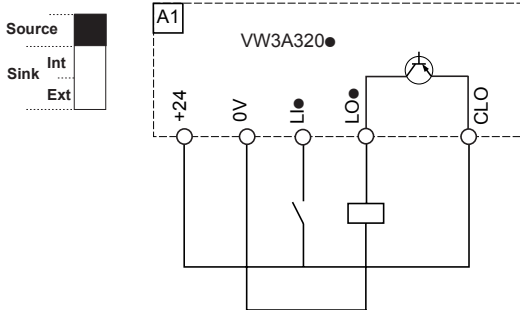


# Connection diagrams

## SW3/SW4 logic I/O switch

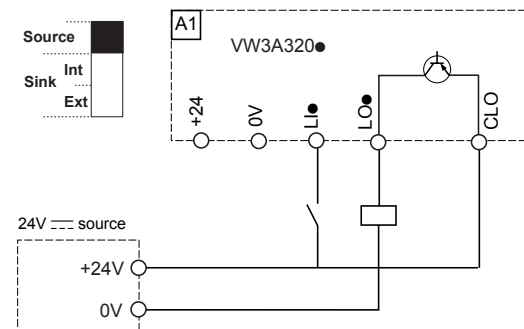
- Switch in "Source" position

SW3 or SW4



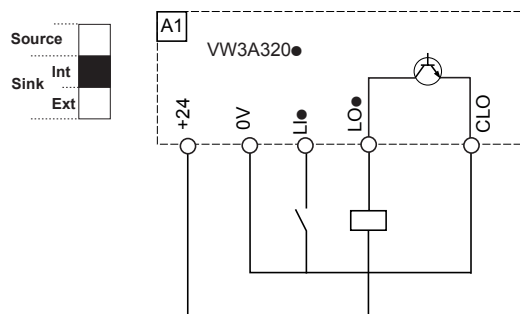
- Switch in "Source" position and use of an external +24 V source

SW3 or SW4



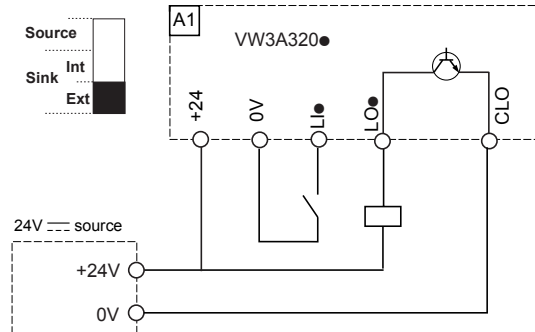
- Switch in "Int Sink" position

SW3 or SW4



- Switch in "Ext Sink" position

SW3 or SW4



## WARNING

### Accidental starting of the drive

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

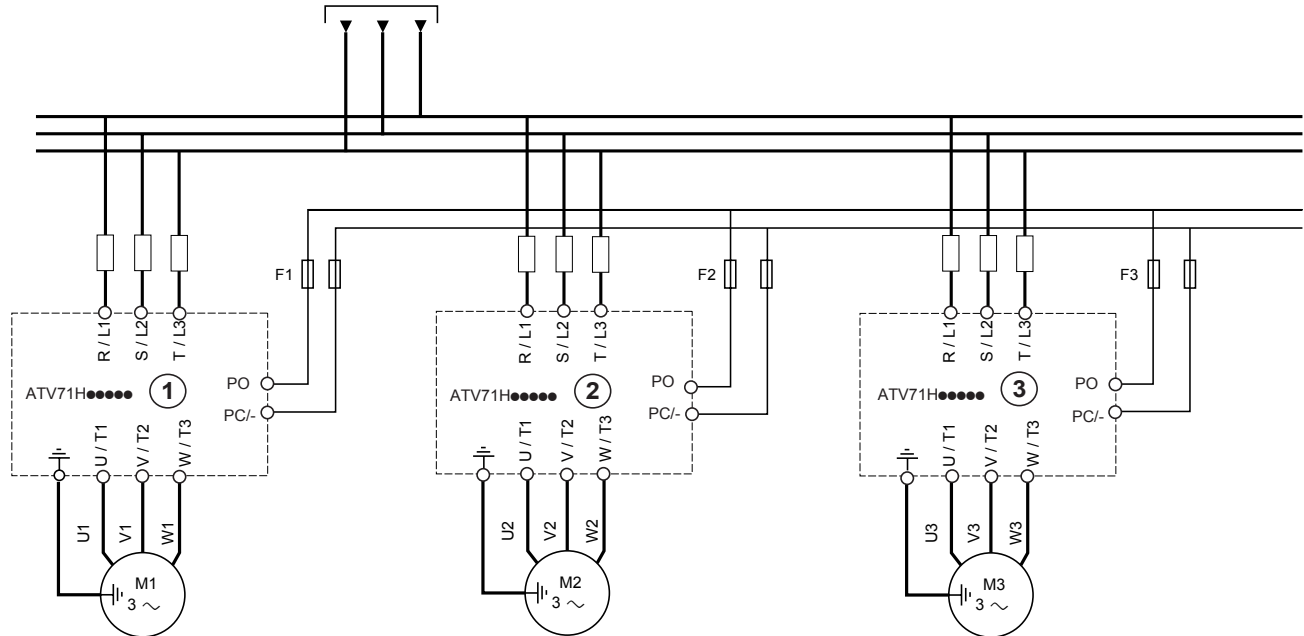
**Failure to observe this precaution may result in death or serious injury.**

# Connection diagrams

## Connection of several drives in parallel on the DC bus

Connection in parallel on the DC bus is recommended in applications for which full motor power must be guaranteed.

### 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 fuses for protection on the DC bus side.

## Operation on an IT system

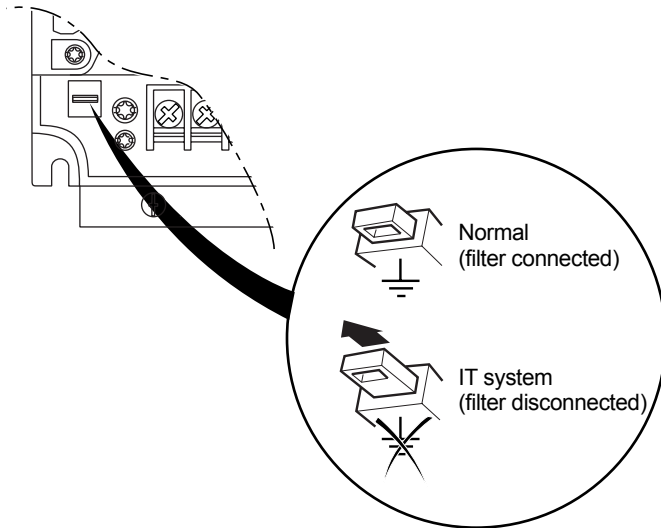
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IT system: Isolated or impedance grounded neutral.

Use a permanent insulation monitor compatible with non-linear loads: a Merlin Gerin type XM200, for example.

Altivar 71 drives feature built-in RFI filters. These filters can be isolated from ground for operation on an IT system as follows:

Remove the jumper located to the left of the power terminals



### CAUTION

When the filters are disconnected, the drive switching frequency must not exceed 4 kHz. Refer to the programming manual for the corresponding parameter setting.

**Failure to observe this precaution may result in material damage.**

# Electromagnetic compatibility, wiring

## Electromagnetic compatibility

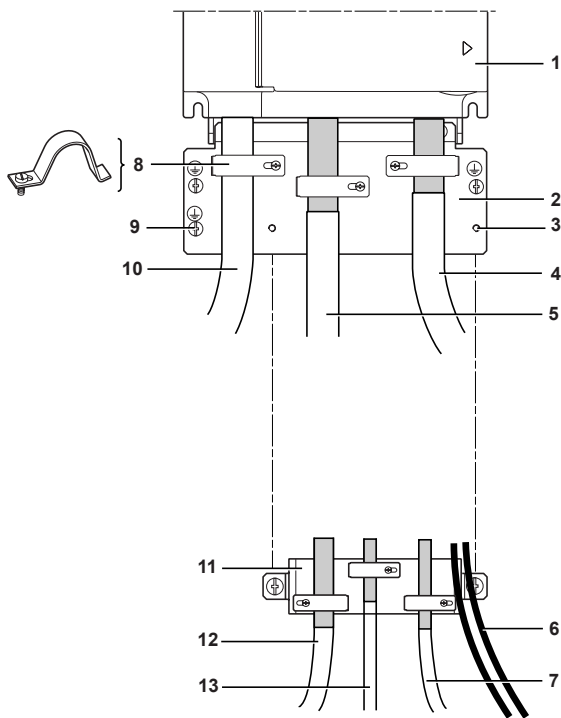
### Principle

- 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-signaling wiring. Conduits or metal ducting 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

#### ATV71H 037M3 to D15M3X and ATV71H 075N4 to D18N4

- Fix and ground the shielding of cables **4** and **5** as close as possible to the drive:
  - Strip the shielding.
  - Use stainless metal cable clamps on the parts from which the shielding has been stripped, to attach them to the plate **2**. The shielding must be clamped tightly enough to the metal plate to ensure correct contact.
- Fit the control EMC plate **11** on the sheet steel grounded plate **2**, as shown in the drawing.
- Fix and ground the shielding of cables **7**, **12** and **13** as close as possible to the drive:
  - Strip the shielding.
  - Use stainless metal cable clamps on the parts from which the shielding has been stripped, to attach them to the control EMC flange **9**. The shielding must be clamped tightly enough to the metal plate to ensure correct contact.



1 Altivar 71

2 Sheet steel grounded plate supplied with the drive.

3 Tapped holes for fixing the control EMC plate.

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 fitted). The shielding must be continuous and intermediate terminals must be in EMC shielded metal boxes.

6 Non-shielded wires for relay contact output.

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 Metal clamps.

9 Connection to the protective ground.

10 Non-shielded power supply wires or cable.

11 Control EMC plate.

12 Shielded cables for connecting the control-signaling wiring. For applications requiring several conductors, use cables with a small cross-section (0.5 mm<sup>2</sup>).

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

### Note:

- If using an additional input filter, it should be fitted under the drive and 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 PG protective conductors (green-yellow) to the appropriate terminals on each unit.



# Electromagnetic compatibility, wiring

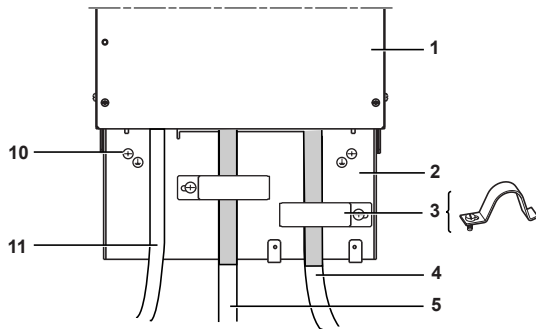
## Installation diagram

### ATV71H D18M3X to D45M3X and ATV71H D22N4 to D75N4

Fix and ground the shielding of cables **4** and **5** as close as possible to the drive:

- Strip the shielding.
- Use stainless metal cable clamps on the parts from which the shielding has been stripped, to attach them to the plate **2**. The shielding must be clamped tightly enough to the metal plate to ensure correct contact.

- Fix and ground the shielding of cables **6**, **7** and **8** as close as possible to the drive:
  - Strip the shielding.
  - Use stainless metal cable clamps on the parts from which the shielding has been stripped, to attach them to the drive. The shielding must be clamped tightly enough to the metal plate to ensure correct contact.



**1** Altivar 71

**2** Sheet steel grounded plate supplied with the drive.

**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 fitted). The shielding must be continuous and intermediate terminals must be in EMC shielded metal boxes.

**6** Shielded cables for connecting the control-signaling cables. For applications requiring several conductors, use cables with a small cross-section ( $0.5 \text{ mm}^2$ ).

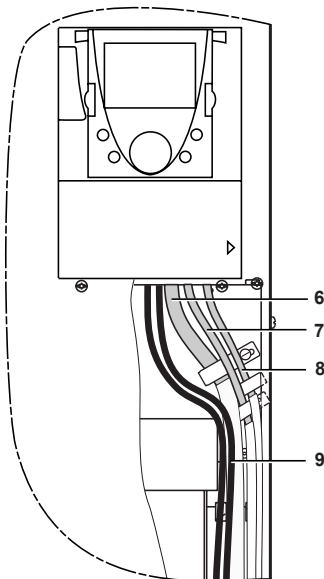
**7** Shielded cables for connecting the Power Removal safety function input. The shielding must be continuous and intermediate terminals must be in EMC shielded metal boxes.

**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** Connection to the protective ground.

**11** Non-shielded power supply wires or cable.



### Note:

- If using an additional input filter, it should be fitted under the drive and connected directly to the line supply via an unshielded cable. Link **4** 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 PG protective conductors (green-yellow) to the appropriate terminals on each unit.

