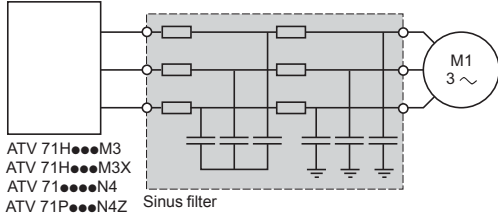

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Sinus filters



Sinus filters allow Altivar 71 drives to operate with longer motor cables (up to 1000 m).

For ATV 71H075M3...HD45M3X, ATV 71●U15N4...●D75N4 and ATV 71P●●●N4Z drives, they also allow the use of unshielded cables while still complying with the standards on radiated EMC emissions (EN55011 class A Gr1 and IEC/EN 61800-3 category C2).

For ATV 71HD55M3X, HD75M3X and ATV 71HD90N4...HC50N4 drives, the sinus filter only operates with a voltage/frequency drive ratio.

The sinus filter is never compatible with the current Flux Vector Control with sensor ratio.

Note: The Programming Manual must be referred to when setting up the sinus filter.

Applications

For ATV 71H075M3...HD45M3X, ATV 71●U15N4... ●D75N4 and ATV 71P●●●N4Z drives, applications requiring:

- Long cable runs
- Mechanical restrictions preventing the use of shielded cables
- An intermediate transformer between the drive and the motor
- Motors connected in parallel.

For ATV 71HD55M3X, HD75M3X and ATV 71HD90N4...HC50N4 drives, applications requiring:

- An intermediate transformer between the drive and the motor.

General characteristics

Type of choke		VW3 A5 201...206	VW3 A5 207...211
Degree of protection		IP 20	IP 00
Atmospheric pollution		3C2, 3B1, 3S1 conforming to IEC 721.3.3	
Degree of pollution		2 conforming to standard EN 50178	
Vibration resistance		1.5 mm from 3...13 Hz, 1 gn from 13...200 Hz, conforming to IEC 60068-2	
Shock resistance		15 gn for 11 ms conforming to IEC 60068-2-27	
Maximum relative humidity		95 %	
Ambient air temperature around the device	Operation	°C - 10...+ 40 without derating From 40...50°C with current derating of 1.5% per additional °C	
	Storage	°C - 40...+ 65	
Maximum operating altitude		m 1000 without derating From 1000...3000 with current derating of 1% per additional 100 m	
Switching frequency		kHz 4...8	
Output frequency		Hz 0...100	
Voltage drop		< 10 %	
Maximum voltage		V 500~	
Maximum current		1.5 x nominal current for 60 s	
Maximum length of motor cable	Unshielded cable	m	600 or 1000 depending on the drive rating, see page 170

Connection characteristics

Maximum wire size and tightening torque	Model	Wire size (mm²)	Tightening torque (Nm)
	VW3 A5 201	4 mm² (AWG 10)	0.6 Nm
	VW3 A5 202	6 mm² (AWG 8)	1.5 Nm
	VW3 A5 203	10 mm² (AWG 6)	1.5 Nm
	VW3 A5 204	25 mm² (AWG 2)	4 Nm
	VW3 A5 205	50 mm² (AWG 0)	6 Nm
	VW3 A5 206, 207	95 mm² (AWG 4/0)	20 Nm
	VW3 A5 208, 209	Connected on a bar, Ø 11 mm	
	VW3 A5 210	Connected on a bar, Ø 14 mm	
	VW3 A5 211	Connected on a bar, 4 x Ø 11 mm	

Variable speed drives

Altivar 71: output filters

Option: sinus filters

Sinus filters						
For drives		Nominal current	Loss at 100 Hz	Reference	Weight	
		A	W		kg	
Three-phase supply voltage: 200...240 V 50/60 Hz						
ATV 71H075M3, HU15M3 (1)		11	50	VW3 A5 201	8.000	
ATV 71HU22M3, HU30M3		16	70	VW3 A5 202	11.000	
ATV 71HU40M3... HU75M3		33	120	VW3 A5 203	22.000	
ATV 71HD11M3X, HD15M3X		66	180	VW3 A5 204	45.000	
ATV 71HD18M3X, HD22M3X		95	250	VW3 A5 205	60.000	
ATV 71HD30M3X... HD45M3X		180	400	VW3 A5 206	120.000	
ATV 71HD55M3X, HD75M3X		300	1360	VW3 A5 208	165.000	
Three-phase supply voltage: 380...480 V 50/60 Hz						
ATV 71HU15N4...HU40N4 (1) ATV 71WU15N4...WU40N4 ATV 71PU15N4Z...PU40N4Z		11	50	VW3 A5 201	8.000	
ATV 71HU55N4 ATV 71WU55N4 ATV 71PU55N4Z		16	70	VW3 A5 202	11.000	
ATV 71HU75N4...HD15N4 ATV 71WU75N4...WD15N4 ATV 71PU75N4Z, PD11N4Z		33	120	VW3 A5 203	22.000	
ATV 71HD18N4... HD30N4 ATV 71WD18N4...WD30N4		66	180	VW3 A5 204	45.000	
ATV 71HD37N4, HD45N4 ATV 71WD37N4, WD45N4		95	250	VW3 A5 205	60.000	
ATV 71HD55N4, HD75N4 ATV 71WD55N4, WD75N4		180	400	VW3 A5 206	120.000	
ATV 71HD90N4, HC11N4		200	945	VW3 A5 207	130.000	
ATV 71HC13N4, HC16N4		300	1360	VW3 A5 208	165.000	
ATV 71HC20N4		400	1900	VW3 A5 209	190.000	
ATV 71HC25N4		Motor P 220 kW	400	1900	VW3 A5 209	190.000
		Motor P 250 kW	600	2370	VW3 A5 210	260.000
ATV 71HC28N4, HC31N4		600	2370	VW3 A5 210	260.000	
ATV 71HC40N4		Motor P 355 kW	600	2370	VW3 A5 210	260.000
		Motor P 400 kW	1200	5150	VW3 A5 211	600.000
ATV 71HC50N4		1200	5150	VW3 A5 211	600.000	

(1) For ATV 71H075M3, ATV 71HU15M3 and ATV 71HU15N4 drives, it is advisable to use a lower category of motor with a sinus filter.

Table showing possible combinations of ATV 71H●●●M3 and ATV 71H●●●M3X drive options (1)

Motor		Drive	Options				
kW	HP		DC choke	Line choke	Additional EMC input filter	Motor choke	IP 20 motor choke kit
Single-phase supply voltage: 200...240 V 50/60 Hz							
0.37	0.5	ATV 71H075M3	–	–	VW3 A4 401	VW3 A5 101	–
0.75	1	ATV 71HU15M3	–	–	VW3 A4 401	VW3 A5 101	–
1.5	2	ATV 71HU22M3	–	–	VW3 A4 402	VW3 A5 101	–
2.2	3	ATV 71HU30M3	–	–	VW3 A4 402	VW3 A5 102, 103	–
3	–	ATV 71HU40M3	–	VW3 A58 501	VW3 A4 402	VW3 A5 102, 103	–
4	5	ATV 71HU55M3	–	VW3 A58 502	VW3 A4 403	VW3 A5 102, 103	–
5.5	7.5	ATV 71HU75M3	–	VW3 A58 502	VW3 A4 404	VW3 A5 102, 103	–
Three-phase supply voltage: 200...240 V 50/60 Hz							
0.37	0.5	ATV 71H037M3	VW3 A4 501	VW3 A4 551	VW3 A4 401	VW3 A5 101	–
0.75	1	ATV 71H075M3	VW3 A4 503	VW3 A4 551	VW3 A4 401	VW3 A5 101	–
1.5	2	ATV 71HU15M3	VW3 A4 505	VW3 A4 552	VW3 A4 401	VW3 A5 101	–
2.2	3	ATV 71HU22M3	VW3 A4 506	VW3 A4 552	VW3 A4 402	VW3 A5 101	–
3	–	ATV 71HU30M3	VW3 A4 507	VW3 A4 553	VW3 A4 402	VW3 A5 102, 103	–
4	5	ATV 71HU40M3	VW3 A4 508	VW3 A4 554	VW3 A4 402	VW3 A5 102, 103	–
5.5	7.5	ATV 71HU55M3	VW3 A4 508	VW3 A4 554	VW3 A4 403	VW3 A5 102, 103	–
7.5	10	ATV 71HU75M3	VW3 A4 509	VW3 A4 555	VW3 A4 404	VW3 A5 102, 103	–
11	15	ATV 71HD11M3X	VW3 A4 510	VW3 A4 555	VW3 A4 405	VW3 A5 103	–
15	20	ATV 71HD15M3X	VW3 A4 510	VW3 A4 556	VW3 A4 405	VW3 A5 103	–
18.5	25	ATV 71HD18M3X	VW3 A4 511	VW3 A4 557	VW3 A4 406	VW3 A5 103	–
22	30	ATV 71HD22M3X	VW3 A4 511	VW3 A4 557	VW3 A4 406	VW3 A5 103	–
30	40	ATV 71HD30M3X	VW3 A4 512	VW3 A4 557	VW3 A4 408	VW3 A5 104	VW3 A9 612
37	50	ATV 71HD37M3X	VW3 A4 512	VW3 A4 557	VW3 A4 408	VW3 A5 104	VW3 A9 612
45	60	ATV 71HD45M3X	VW3 A4 512	VW3 A4 557	VW3 A4 408	VW3 A5 104	VW3 A9 612
55	75	ATV 71HD55M3X	–	VW3 A4 562	VW3 A4 410	VW3 A5 105	VW3 A9 612
75	100	ATV 71HD75M3X	–	VW3 A4 563	VW3 A4 410	VW3 A5 105	VW3 A9 612
Pages		22	155	160	168	172	173

(1) The options available for ATV 71H●●●M3 and H●●●M3X drives are also valid, at the same rating, for ATV 71H●●●M3383 and ATV 71H●●●M3X383 drives.

Sinus filter	Braking resistor	Hoist resistor	Flush-mounting kit (in a dust and damp proof enclosure)	UL Type 1 conformity kit (outside enclosure)	IP 21 or IP 31 conformity kit (outside enclosure)	Control card fan kit	DNV kit
VW3 A5 201	VW3 A7 701	VW3 A7 801	VW3 A9 501	VW3 A9 201	VW3 A9 101	–	–
VW3 A5 201	VW3 A7 702	VW3 A7 802	VW3 A9 501	VW3 A9 201	VW3 A9 101	–	–
VW3 A5 202	VW3 A7 702	VW3 A7 803	VW3 A9 502	VW3 A9 202	VW3 A9 102	–	–
VW3 A5 202	VW3 A7 703	VW3 A7 803	VW3 A9 502	VW3 A9 202	VW3 A9 102	–	–
VW3 A5 203	VW3 A7 703	VW3 A7 803	VW3 A9 502	VW3 A9 202	VW3 A9 102	–	–
VW3 A5 203	VW3 A7 704	VW3 A7 804	VW3 A9 503	VW3 A9 203	VW3 A9 103	–	–
VW3 A5 203	VW3 A7 704	VW3 A7 804	VW3 A9 504	VW3 A9 204	VW3 A9 104	–	–
VW3 A5 201	VW3 A7 701	VW3 A7 801	VW3 A9 501	VW3 A9 201	VW3 A9 101	–	VW3 A9 621
VW3 A5 201	VW3 A7 701	VW3 A7 801	VW3 A9 501	VW3 A9 201	VW3 A9 101	–	VW3 A9 621
VW3 A5 201	VW3 A7 702	VW3 A7 802	VW3 A9 501	VW3 A9 201	VW3 A9 101	–	VW3 A9 621
VW3 A5 202	VW3 A7 702	VW3 A7 803	VW3 A9 502	VW3 A9 202	VW3 A9 102	–	VW3 A9 622
VW3 A5 202	VW3 A7 703	VW3 A7 803	VW3 A9 502	VW3 A9 202	VW3 A9 102	–	VW3 A9 622
VW3 A5 203	VW3 A7 703	VW3 A7 803	VW3 A9 502	VW3 A9 202	VW3 A9 102	–	VW3 A9 622
VW3 A5 203	VW3 A7 704	VW3 A7 804	VW3 A9 503	VW3 A9 203	VW3 A9 103	–	VW3 A9 623
VW3 A5 203	VW3 A7 704	VW3 A7 804	VW3 A9 504	VW3 A9 204	VW3 A9 104	–	VW3 A9 624
VW3 A5 204	VW3 A7 705	VW3 A7 805	VW3 A9 505	VW3 A9 205	VW3 A9 105	–	VW3 A9 625
VW3 A5 204	VW3 A7 706	VW3 A7 805	VW3 A9 505	VW3 A9 205	VW3 A9 105	–	VW3 A9 625
VW3 A5 205	VW3 A7 707	VW3 A7 806	VW3 A9 506	VW3 A9 206	VW3 A9 106	VW3 A9 404	VW3 A9 626
VW3 A5 205	VW3 A7 707	VW3 A7 807	VW3 A9 506	VW3 A9 206	VW3 A9 106	VW3 A9 404	VW3 A9 626
VW3 A5 206	VW3 A7 708	VW3 A7 807	VW3 A9 508	VW3 A9 217	VW3 A9 117	VW3 A9 406	VW3 A9 628
VW3 A5 206	VW3 A7 709	VW3 A7 808	VW3 A9 508	VW3 A9 217	VW3 A9 117	VW3 A9 406	VW3 A9 628
VW3 A5 206	VW3 A7 709	VW3 A7 808	VW3 A9 508	VW3 A9 217	VW3 A9 117	VW3 A9 406	VW3 A9 628
VW3 A5 208	VW3 A7 713	VW3 A7 809	VW3 A9 510	VW3 A9 209	VW3 A9 109	–	VW3 A9 629 (1)
VW3 A5 208	VW3 A7 714	VW3 A7 810	VW3 A9 511	VW3 A9 210	VW3 A9 110	–	VW3 A9 631 (1)
175	137	139	30	32	33	27	28

(1) For the DNV VW3 A9 629 and 631 kits, it is necessary to order a variable speed drive without DC choke, by adding D at the end of the reference.
Example : ATV 71HD55M3X becomes ATV 71HD55M3XD, see page 22.

Table showing possible combinations of ATV 71H●●●N4 drive options

Motor		Drive	Options						
kW	HP		DC choke	Line choke	Passive filter (1)	Additional EMC input filter	IP 30 EMC filter kit	Motor choke	IP 20 motor choke kit
Three-phase supply voltage: 380...480 V 50/60 Hz									
0.75	1	ATV 71H075N4	VW3A4 501	VW3A4 551	VW3A4 6●1	VW3A4 401	–	VW3A5 101, 102, 103	–
1.5	2	ATV 71HU15N4	VW3A4 502	VW3A4 551	VW3A4 6●1	VW3A4 401	–	VW3A5 101, 102, 103	–
2.2	3	ATV 71HU22N4	VW3A4 503	VW3A4 552	VW3A4 6●1	VW3A4 401	–	VW3A5 101, 102, 103	–
3	–	ATV 71HU30N4	VW3A4 503	VW3A4 552	VW3A4 6●1	VW3A4 402	–	VW3A5 101, 102, 103	–
4	5	ATV 71HU40N4	VW3A4 504	VW3A4 552	VW3A4 6●2	VW3A4 402	–	VW3A5 101, 102, 103	–
5.5	7.5	ATV 71HU55N4	VW3A4 505	VW3A4 553	VW3A4 6●2	VW3A4 403	–	VW3A5 102, 103, 104	VW3A9 612
7.5	10	ATV 71HU75N4	VW3A4 506	VW3A4 553	VW3A4 6●3	VW3A4 403	–	VW3A5 102, 103, 104	VW3A9 612
11	15	ATV 71HD11N4	VW3A4 507	VW3A4 554	VW3A4 6●3	VW3A4 404	–	VW3A5 102, 103, 104	VW3A9 612
15	20	ATV 71HD15N4	VW3A4 508	VW3A4 554	VW3A4 6●4	VW3A4 405	–	VW3A5 102, 103, 104	VW3A9 612
18.5	25	ATV 71HD18N4	VW3A4 508	VW3A4 555	VW3A4 6●5	VW3A4 405	–	VW3A5 102, 103, 104	VW3A9 612
22	30	ATV 71HD22N4	VW3A4 510	VW3A4 555	VW3A4 6●6	VW3A4 406	–	VW3A5 103, 104	VW3A9 612
30	40	ATV 71HD30N4	VW3A4 510	VW3A4 556	VW3A4 6●7	VW3A4 407	–	VW3A5 103, 104	VW3A9 612
37	50	ATV 71HD37N4	VW3A4 510	VW3A4 556	VW3A4 6●7	VW3A4 407	–	VW3A5 103, 104	VW3A9 612
45	60	ATV 71HD45N4	VW3A4 511	VW3A4 556	VW3A4 6●8	VW3A4 408	–	VW3A5 104	VW3A9 612
55	75	ATV 71HD55N4	VW3A4 511	VW3A4 556	VW3A4 6●8	VW3A4 408	–	VW3A5 104	VW3A9 612
75	100	ATV 71HD75N4	VW3A4 511	VW3A4 558	VW3A4 6●9	VW3A4 408	–	VW3A5 104	VW3A9 612
90	125	ATV 71HD90N4	–	VW3A4 558	VW3A4 6●9	VW3A4 410	VW3A9 601	VW3A5 104	VW3A9 612
110	150	ATV 71HC11N4	–	VW3A4 559	VW3A4 6●0	VW3A4 410	VW3A9 601	VW3A5 105	VW3A9 612
132	200	ATV 71HC13N4	–	VW3A4 560	VW3A4 6●1	VW3A4 410	VW3A9 601	VW3A5 105	VW3A9 612
160	250	ATV 71HC16N4	–	VW3A4 561	VW3A4 6●2	VW3A4 411	VW3A9 601	VW3A5 106	VW3A9 613
200	300	ATV 71HC20N4	–	VW3A4 569	VW3A4 6●3	VW3A4 411	VW3A9 601	VW3A5 106	VW3A9 613
220	350	ATV 71HC25N4	–	VW3A4 562	VW3A4 6●3	VW3A4 411	VW3A9 601	VW3A5 106	VW3A9 613
250	400	ATV 71HC25N4	–	VW3A4 564	VW3A4 6●1	VW3A4 411	VW3A9 601	VW3A5 107	VW3A9 613
280	450	ATV 71HC28N4	–	VW3A4 564	VW3A4 6●2	VW3A4 411	VW3A9 601	VW3A5 107	VW3A9 613
315	500	ATV 71HC31N4	–	VW3A4 565	VW3A4 6●2	VW3A4 412	VW3A9 602	VW3A5 107	VW3A9 613
355	–	ATV 71HC40N4	–	VW3A4 569	VW3A4 6●2	VW3A4 412	VW3A9 602	VW3A5 107	VW3A9 613
400	600	ATV 71HC40N4	–	VW3A4 569	VW3A4 6●9	VW3A4 412	VW3A9 602	VW3A5 108	VW3A9 613
500	700	ATV 71HC50N4	–	VW3A4 564	VW3A4 6●2	VW3A4 413	VW3A9 602	VW3A5 108	VW3A9 613
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(1) There are passive filters for a 460 V ~ supply, see pages 164 and 165.

Sinus filter	Resistance braking unit	Braking resistor	Hoist resistor	Flush-mounting kit (in a dust and damp proof enclosure)	UL Type 1 conformity kit (outside enclosure)	IP 21 or IP 31 conformity kit (outside enclosure)	Control card fan kit	DNV kit (1)
–	–	VW3 A7 701	VW3 A7 801	VW3 A9 501	VW3 A9 201	VW3 A9 101	–	VW3 A9 621
VW3 A5 201	–	VW3 A7 701	VW3 A7 801	VW3 A9 501	VW3 A9 201	VW3 A9 101	–	VW3 A9 621
VW3 A5 201	–	VW3 A7 701	VW3 A7 801	VW3 A9 501	VW3 A9 201	VW3 A9 101	–	VW3 A9 621
VW3 A5 201	–	VW3 A7 701	VW3 A7 802	VW3 A9 502	VW3 A9 202	VW3 A9 102	–	VW3 A9 622
VW3 A5 201	–	VW3 A7 701	VW3 A7 802	VW3 A9 502	VW3 A9 202	VW3 A9 102	–	VW3 A9 622
VW3 A5 202	–	VW3 A7 702	VW3 A7 802	VW3 A9 503	VW3 A9 203	VW3 A9 103	–	VW3 A9 623
VW3 A5 203	–	VW3 A7 702	VW3 A7 803	VW3 A9 503	VW3 A9 203	VW3 A9 103	–	VW3 A9 623
VW3 A5 203	–	VW3 A7 703	VW3 A7 803	VW3 A9 504	VW3 A9 204	VW3 A9 104	–	VW3 A9 624
VW3 A5 203	–	VW3 A7 703	VW3 A7 804	VW3 A9 505	VW3 A9 205	VW3 A9 105	–	VW3 A9 625
VW3 A5 204	–	VW3 A7 704	VW3 A7 804	VW3 A9 505	VW3 A9 205	VW3 A9 105	–	VW3 A9 625
VW3 A5 204	–	VW3 A7 704	VW3 A7 804	VW3 A9 506	VW3 A9 206	VW3 A9 106	VW3 A9 404	VW3 A9 626
VW3 A5 204	–	VW3 A7 704	VW3 A7 804	VW3 A9 507	VW3 A9 207	VW3 A9 107	VW3 A9 405	VW3 A9 627
VW3 A5 205	–	VW3 A7 705	VW3 A7 805	VW3 A9 507	VW3 A9 207	VW3 A9 107	VW3 A9 405	VW3 A9 627
VW3 A5 205	–	VW3 A7 707	VW3 A7 805	VW3 A9 509	VW3 A9 208	VW3 A9 108	VW3 A9 407	VW3 A9 628
VW3 A5 206	–	VW3 A7 707	VW3 A7 805	VW3 A9 509	VW3 A9 208	VW3 A9 108	VW3 A9 407	VW3 A9 628
VW3 A5 206	–	VW3 A7 707	VW3 A7 806	VW3 A9 509	VW3 A9 208	VW3 A9 108	VW3 A9 407	VW3 A9 628
VW3 A5 207	–	VW3 A7 710	VW3 A7 811	VW3 A9 510	VW3 A9 209	VW3 A9 109	–	VW3 A9 629
VW3 A5 207	–	VW3 A7 711	VW3 A7 812	VW3 A9 511	VW3 A9 210	VW3 A9 110	–	VW3 A9 631
VW3 A5 208	–	VW3 A7 711	VW3 A7 812	VW3 A9 512	VW3 A9 211	VW3 A9 111	–	VW3 A9 633
VW3 A5 208	–	VW3 A7 712	VW3 A7 813	VW3 A9 513	VW3 A9 212	VW3 A9 112	–	VW3 A9 635
VW3 A5 209	VW3 A7 101	VW3 A7 715	VW3 A7 814	VW3 A9 514, 515	VW3 A9 213, 214	VW3 A9 113, 114	–	VW3 A9 637
VW3 A5 209	VW3 A7 101	VW3 A7 716	VW3 A7 815	VW3 A9 514, 515	VW3 A9 213, 214	VW3 A9 113, 114	–	VW3 A9 638
VW3 A5 210	VW3 A7 101	VW3 A7 716	VW3 A7 815	VW3 A9 514, 515	VW3 A9 213, 214	VW3 A9 113, 114	–	VW3 A9 638
VW3 A5 210	VW3 A7 101	VW3 A7 716	VW3 A7 815	VW3 A9 514, 515	VW3 A9 213, 214	VW3 A9 113, 114	–	VW3 A9 638
VW3 A5 210	VW3 A7 102	VW3 A7 717	VW3 A7 816	–	–	VW3 A9 115	–	VW3 A9 639
VW3 A5 210	VW3 A7 102	VW3 A7 717	VW3 A7 816	–	–	VW3 A9 115	–	VW3 A9 640
VW3 A5 211	VW3 A7 102	VW3 A7 717	VW3 A7 816	–	–	VW3 A9 115	–	VW3 A9 640
VW3 A5 211	VW3 A7 102	VW3 A7 718	VW3 A7 817	–	–	VW3 A9 116	–	VW3 A9 641
175	135	137	139	30	32	33	27	28

(1) For the DNV VW3 A9 629...641 kits, it is necessary to order a variable speed drive without DC choke, by adding D at the end of the reference.
Example : ATV 71HD90N4 becomes ATV 71HD90N4D, see page 23.

Table showing possible combinations of ATV 71W●●●N4 drive options

Motor		Drive	Options			
kW	HP		DC choke	Line choke	Passive filter (1)	Additional EMC filter
Three-phase supply voltage: 380...480 V 50/60 Hz						
0.75	1	ATV 71W075N4	VW3 A4 501	VW3 A4 551	VW3 A4 6●1	VW3 A4 401
1.5	2	ATV 71WU15N4	VW3 A4 502	VW3 A4 551	VW3 A4 6●1	VW3 A4 401
2.2	3	ATV 71WU22N4	VW3 A4 503	VW3 A4 552	VW3 A4 6●1	VW3 A4 401
3	–	ATV 71WU30N4	VW3 A4 503	VW3 A4 552	VW3 A4 6●1	VW3 A4 402
4	5	ATV 71WU40N4	VW3 A4 504	VW3 A4 552	VW3 A4 6●2	VW3 A4 402
5.5	7.5	ATV 71WU55N4	VW3 A4 505	VW3 A4 553	VW3 A4 6●2	VW3 A4 403
7.5	10	ATV 71WU75N4	VW3 A4 506	VW3 A4 553	VW3 A4 6●3	VW3 A4 403
11	15	ATV 71WD11N4	VW3 A4 507	VW3 A4 554	VW3 A4 6●3	VW3 A4 404
15	20	ATV 71WD15N4	VW3 A4 508	VW3 A4 554	VW3 A4 6●4	VW3 A4 405
18.5	25	ATV 71WD18N4	VW3 A4 508	VW3 A4 555	VW3 A4 6●5	VW3 A4 405
22	30	ATV 71WD22N4	VW3 A4 510	VW3 A4 555	VW3 A4 6●6	VW3 A4 406
30	40	ATV 71WD30N4	VW3 A4 510	VW3 A4 556	VW3 A4 6●7	VW3 A4 407
37	50	ATV 71WD37N4	VW3 A4 510	VW3 A4 556	VW3 A4 6●7	VW3 A4 407
45	60	ATV 71WD45N4	VW3 A4 511	VW3 A4 556	VW3 A4 6●8	VW3 A4 408
55	75	ATV 71WD55N4	VW3 A4 511	VW3 A4 556	VW3 A4 6●8	VW3 A4 408
75	100	ATV 71WD75N4	VW3 A4 511	VW3 A4 558	VW3 A4 6●9	VW3 A4 408
Pages		24	155	160	162	168

(1) There are passive filters for a 460 V ~ supply, see pages 164 and 165.

Motor choke	IP 20 motor choke kit	Sinus filter	Braking resistor	Hoist resistor	Ready-assembled IP 54 base plate
VW3 A5 101, 102, 103	–	–	VW3 A7 701	VW3 A7 801	VW3 A9 901
VW3 A5 101, 102, 103	–	VW3 A5 201	VW3 A7 701	VW3 A7 801	VW3 A9 901
VW3 A5 101, 102, 103	–	VW3 A5 201	VW3 A7 701	VW3 A7 801	VW3 A9 901
VW3 A5 101, 102, 103	–	VW3 A5 201	VW3 A7 701	VW3 A7 802	VW3 A9 901
VW3 A5 101, 102, 103	–	VW3 A5 201	VW3 A7 701	VW3 A7 802	VW3 A9 901
VW3 A5 102, 103, 104	VW3 A9 612	VW3 A5 202	VW3 A7 702	VW3 A7 802	VW3 A9 902
VW3 A5 102, 103, 104	VW3 A9 612	VW3 A5 203	VW3 A7 702	VW3 A7 803	VW3 A9 902
VW3 A5 102, 103, 104	VW3 A9 612	VW3 A5 203	VW3 A7 703	VW3 A7 803	VW3 A9 903
VW3 A5 102, 103, 104	VW3 A9 612	VW3 A5 203	VW3 A7 703	VW3 A7 804	VW3 A9 904
VW3 A5 102, 103, 104	VW3 A9 612	VW3 A5 204	VW3 A7 704	VW3 A7 804	VW3 A9 904
VW3 A5 103, 104	VW3 A9 612	VW3 A5 204	VW3 A7 704	VW3 A7 804	VW3 A9 905
VW3 A5 103, 104	VW3 A9 612	VW3 A5 204	VW3 A7 704	VW3 A7 804	VW3 A9 906
VW3 A5 103, 104	VW3 A9 612	VW3 A5 205	VW3 A7 705	VW3 A7 805	VW3 A9 906
VW3 A5 104	VW3 A9 612	VW3 A5 205	VW3 A7 707	VW3 A7 805	VW3 A9 907
VW3 A5 104	VW3 A9 612	VW3 A5 206	VW3 A7 707	VW3 A7 805	VW3 A9 907
VW3 A5 104	VW3 A9 612	VW3 A5 206	VW3 A7 707	VW3 A7 806	VW3 A9 907
172	173	175	137	139	26

Table showing possible combinations of ATV 71P●●●N4Z drive options

Motor		Drive	Options					IP 20 motor choke kit
kW	HP		DC choke	Line choke	Passive filter (1)	Additional EMC filter	Motor choke	
Three-phase supply voltage: 380...480 V 50/60 Hz								
0.75	1	ATV 71P075N4Z	VW3 A4 501	VW3 A4 551	VW3 A4 6●1	VW3 A4 401	VW3 A5 101	–
1.5	2	ATV 71PU15N4Z	VW3 A4 502	VW3 A4 551	VW3 A4 6●1	VW3 A4 401	VW3 A5 101, 102, 103	–
2.2	3	ATV 71PU22N4Z	VW3 A4 503	VW3 A4 552	VW3 A4 6●1	VW3 A4 401	VW3 A5 101, 102, 103	–
3	–	ATV 71PU30N4Z	VW3 A4 503	VW3 A4 552	VW3 A4 6●1	VW3 A4 402	VW3 A5 101, 102, 103	–
4	5	ATV 71PU40N4Z	VW3 A4 504	VW3 A4 552	VW3 A4 6●2	VW3 A4 402	VW3 A5 101, 102, 103	–
5.5	7.5	ATV 71PU55N4Z	VW3 A4 505	VW3 A4 553	VW3 A4 6●2	VW3 A4 403	VW3 A5 102, 103, 104	VW3 A9 612
7.5	10	ATV 71PU75N4Z	VW3 A4 506	VW3 A4 553	VW3 A4 6●3	VW3 A4 403	VW3 A5 102, 103, 104	VW3 A9 612
11	15	ATV 71PD11N4Z	VW3 A4 507	VW3 A4 554	VW3 A4 6●3	VW3 A4 404	VW3 A5 102, 103, 104	VW3 A9 612
Pages		24	155	160	162	168	172	173

(1) There are passive filters for a 460 V ~ supply, see pages 164 and 165.

Sinus filter	Braking resistor	Hoist resistor	Kit for mounting in a dust and damp proof enclosure	Fan	UL Type 1 conformity kit (outside enclosure)	IP 21 or IP 31 conformity kit (outside enclosure)
VW3 A5 201	VW3 A7 701	VW3 A7 801	VW3 A9 801	VZ3 V1 203	VW3 A9 201	VW3 A9 101
VW3 A5 201	VW3 A7 701	VW3 A7 801	VW3 A9 801	VZ3 V1 203	VW3 A9 201	VW3 A9 101
VW3 A5 201	VW3 A7 701	VW3 A7 801	VW3 A9 801	VZ3 V1 203	VW3 A9 201	VW3 A9 101
VW3 A5 201	VW3 A7 701	VW3 A7 802	VW3 A9 802	VZ3 V1 209	VW3 A9 202	VW3 A9 102
VW3 A5 201	VW3 A7 701	VW3 A7 802	VW3 A9 802	VZ3 V1 209	VW3 A9 202	VW3 A9 102
VW3 A5 202	VW3 A7 702	VW3 A7 802	VW3 A9 803	VZ3 V1 204	VW3 A9 203	VW3 A9 103
VW3 A5 203	VW3 A7 702	VW3 A7 803	VW3 A9 803	VZ3 V1 204	VW3 A9 203	VW3 A9 103
VW3 A5 203	VW3 A7 703	VW3 A7 803	–	VZ3 V1 210	VW3 A9 204	VW3 A9 104
175	137	139	31	31	32	33

Table showing possible combinations of ATV 71H●●●Y drive options

Motor			Drive	Options					
				Line choke	Motor choke	IP 20 motor choke kit	Resistance braking unit	Braking resistor	Hoist resistor
500 V	575 V	690 V							
kW	HP	kW							
Three-phase supply voltage: 500...690 V 50/60 Hz									
1.5	2	2.2	ATV 71HU22Y	VW3A4 551	VW3A5 101, 102, 103	–	–	VW3A7 701	VW3A7 801
2.2	3	3	ATV 71HU30Y	VW3A4 551	VW3A5 101, 102, 103	–	–	VW3A7 701	VW3A7 802
3	–	4	ATV 71HU40Y	VW3A4 551	VW3A5 101, 102, 103	–	–	VW3A7 701	VW3A7 802
4	5	5.5	ATV 71HU55Y	VW3A4 552	VW3A5 101, 102, 103	–	–	VW3A7 701	VW3A7 802
5.5	7.5	7.5	ATV 71HU75Y	VW3A4 552	VW3A5 101, 102, 103	–	–	VW3A7 702	VW3A7 803
7.5	10	11	ATV 71HD11Y	VW3A4 553	VW3A5 102, 103, 104	VW3A9 612	–	VW3A7 702	VW3A7 803
11	15	15	ATV 71HD15Y	VW3A4 553	VW3A5 102, 103, 104	VW3A9 612	–	VW3A7 703	VW3A7 804
15	20	18.5	ATV 71HD18Y	VW3A4 554	VW3A5 102, 103, 104	VW3A9 612	–	VW3A7 703	VW3A7 804
18.5	25	22	ATV 71HD22Y	VW3A4 554	VW3A5 102, 103, 104	VW3A9 612	–	VW3A7 704	VW3A7 804
22	30	30	ATV 71HD30Y	VW3A4 555	VW3A5 102, 103, 104	VW3A9 612	–	VW3A7 704	VW3A7 804
30	40	37	ATV 71HD37Y	VW3A4 555	VW3A5 103, 104	VW3A9 612	–	VW3A7 704	VW3A7 805
37	50	45	ATV 71HD45Y	VW3A4 555	VW3A5 103, 104	VW3A9 612	–	VW3A7 705	VW3A7 805
45	60	55	ATV 71HD55Y	VW3A4 556	VW3A5 103, 104	VW3A9 612	–	VW3A7 705	VW3A7 805
55	75	75	ATV 71HD75Y	VW3A4 556	VW3A5 104	VW3A9 612	–	VW3A7 707	VW3A7 818
75	100	90	ATV 71HD90Y	VW3A4 556	VW3A5 104	VW3A9 612	–	VW3A7 707	VW3A7 818
90	125	110	ATV 71HC11Y	VW3A4 570	VW3A5 104	VW3A9 612	–	–	VW3A7 806
110	150	132	ATV 71HC13Y	VW3A4 571	VW3A5 104	VW3A9 612	–	–	VW3A7 805
132	–	160	ATV 71HC16Y	VW3A4 571	VW3A5 105	VW3A9 612	–	–	VW3A7 805
160	200	200	ATV 71HC20Y	VW3A4 560	VW3A5 105	VW3A9 612	VW3A7 103	–	VW3A7 806
200	250	250	ATV 71HC25Y	VW3A4 572	VW3A5 106	VW3A9 613	VW3A7 103	–	VW3A7 716
250	350	315	ATV 71HC31Y	VW3A4 572	VW3A5 106	VW3A9 613	VW3A7 103	–	VW3A7 814
315	450	400	ATV 71HC40Y	VW3A4 568	VW3A5 107	VW3A9 613	VW3A7 104	–	VW3A7 717
400	550	500	ATV 71HC50Y	VW3A4 572	VW3A5 107	VW3A9 613	VW3A7 104	–	VW3A7 718
500	700	630	ATV 71HC63Y	VW3A4 572	VW3A5 108	VW3A9 613	VW3A7 104	–	VW3A7 816
Pages			25	160	173	173	135	137	139

Flushing-mounting kit (in a dust and damp proof enclosure)	UL Type 1 conformity kit (outside enclosure)	IP 21 or IP 31 conformity kit (outside enclosure)	Control card fan kit	DNV kit
VW3 A9 506	VW3 A9 206	VW3 A9 106	VW3 A9 404	VW3 A9 642
VW3 A9 506	VW3 A9 206	VW3 A9 106	VW3 A9 404	VW3 A9 642
VW3 A9 506	VW3 A9 206	VW3 A9 106	VW3 A9 404	VW3 A9 642
VW3 A9 506	VW3 A9 206	VW3 A9 106	VW3 A9 404	VW3 A9 642
VW3 A9 506	VW3 A9 206	VW3 A9 106	VW3 A9 404	VW3 A9 642
VW3 A9 506	VW3 A9 206	VW3 A9 106	VW3 A9 404	VW3 A9 642
VW3 A9 506	VW3 A9 206	VW3 A9 106	VW3 A9 404	VW3 A9 642
VW3 A9 506	VW3 A9 206	VW3 A9 106	VW3 A9 404	VW3 A9 642
VW3 A9 506	VW3 A9 206	VW3 A9 106	VW3 A9 404	VW3 A9 642
VW3 A9 506	VW3 A9 206	VW3 A9 106	VW3 A9 404	VW3 A9 642
VW3 A9 509	VW3 A9 208	VW3 A9 108	VW3 A9 407	VW3 A9 643
VW3 A9 509	VW3 A9 208	VW3 A9 108	VW3 A9 407	VW3 A9 643
VW3 A9 509	VW3 A9 208	VW3 A9 108	VW3 A9 407	VW3 A9 643
VW3 A9 509	VW3 A9 208	VW3 A9 108	VW3 A9 407	VW3 A9 643
VW3 A9 509	VW3 A9 208	VW3 A9 108	VW3 A9 407	VW3 A9 643
VW3 A9 512	VW3 A9 211	VW3 A9 111	–	VW3 A9 644
VW3 A9 512	VW3 A9 211	VW3 A9 111	–	VW3 A9 645
VW3 A9 512	VW3 A9 211	VW3 A9 111	–	VW3 A9 645
VW3 A9 514, 515	VW3 A9 213, 214	VW3 A9 113, 114	–	VW3 A9 646
VW3 A9 514, 515	VW3 A9 213, 214	VW3 A9 113, 114	–	VW3 A9 647
VW3 A9 514, 515	VW3 A9 213, 214	VW3 A9 113, 114	–	VW3 A9 647
–	–	VW3 A9 116	–	VW3 A9 648
–	–	VW3 A9 116	–	VW3 A9 649
–	–	VW3 A9 116	–	VW3 A9 649
30	32	33	27	28

List of options common to Altivar 71 drives

Description	Reference	Page
Logic input adapter		
115 V ~ logic input adapter	VW3 A3 101	26
HMI terminal		
Remote graphic display terminal	VW3 A1 101	108
Encoder interface cards		
With RS 422 compatible differential outputs	VW3 A3 401, 402	113
With open collector outputs	VW3 A3 403, 404	113
With push-pull outputs	VW3 A3 405...407	113
I/O extension cards (1)		
Logic	VW3 A3 201	115
Extended	VW3 A3 202	115
Programmable card (1)		
"Controller Inside" programmable card	VW3 A3 501	123
PowerSuite software workshop		
PowerSuite software workshop for PC	VW3 A8 104, 105	304

List of options specific to Altivar 71H●●●M3383, M3X383 and N4383 drives

Description	Reference	Page
Encoder interface cards		
Resolver	VW3 A3 408	113
Universal with SinCos, SinCos Hiperface®, EnDat® or SSI output	VW3 A3 409	113
With RS 422 compatible differential outputs with encoder emulation	VW3 A3 411	113

List of communication cards (1)

Description	Reference	Page
Modbus TCP	VW3 A3 310	126 and 310
EtherNet/IP	VW3 A3 316	127
Standard Fipio	VW3 A3 311	128 and 314
Substitution Fipio	VW3 A3 301	128 and 314
Modbus Plus	VW3 A3 302	128 and 322
DeviceNet	VW3 A3 309	129
INTERBUS	VW3 A3 304	129
CC-Link	VW3 A3 317	129
Modbus/Uni-Telway	VW3 A3 303	131, 317 and 325
PROFIBUS DP	VW3 A3 307	130

(1) For card compatibility table, see page opposite.

Card compatibility table (1)				
Type of card	Logic I/O VW3 A3 201	Extended I/O VW3 A3 202	Programmable "Controller inside" VW3 A3 501	Communication VW3 A3 3●●
Logic I/O VW3 A3 201				
Extended I/O VW3 A3 202				
Programmable "Controller inside" VW3 A3 501				
Communication VW3 A3 3●●				

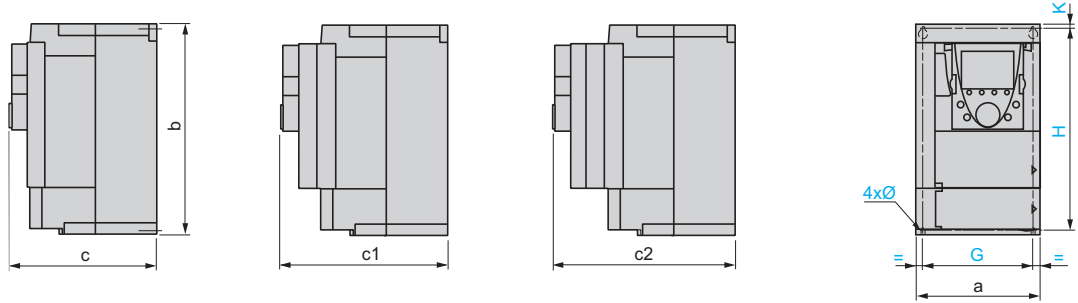
Possible to combine

Not possible to combine

(1) Maximum combination involving two types of card is 2.

ATV 71H●●●M3, ATV 71HD11M3X, HD15M3X, ATV 71H075N4...HD18N4

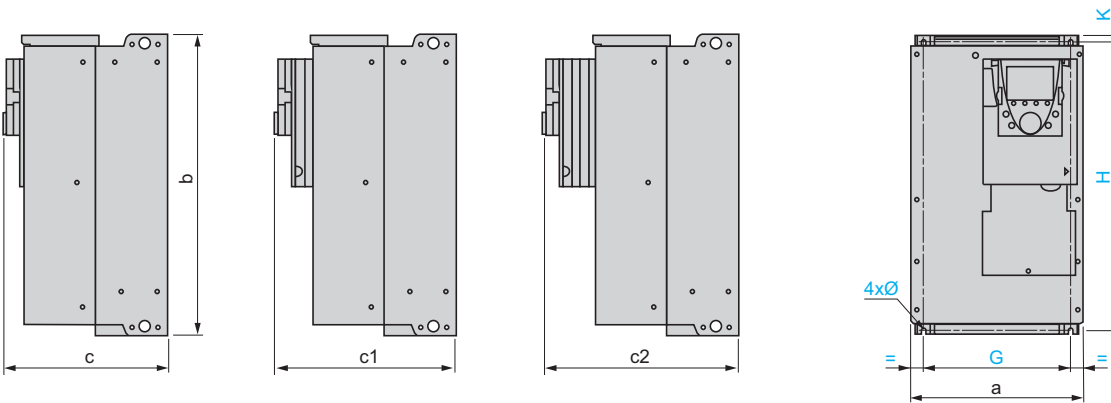
Without option card 1 option card (1) 2 option cards (1) Common front view



ATV 71H	a	b	c	c1	c2	G	H	K	Ø
037M3...U15M3, 075N4...U22N4	130	230	175	198	221	113.5	220	5	5
U22M3...U40M3, U30N4, U40N4	155	260	187	210	233	138	249	4	5
U55M3, U55N4, U75N4	175	295	187	210	233	158	283	6	5
U75M3, D11N4	210	295	213	236	259	190	283	6	6
D11M3X, D15M3X, D15N4, D18N4	230	400	213	236	259	210	386	8	6

ATV 71HD18M3X...45M3X, ATV 71HD22N4...HD37N4, ATV 71HU22Y...HD30Y

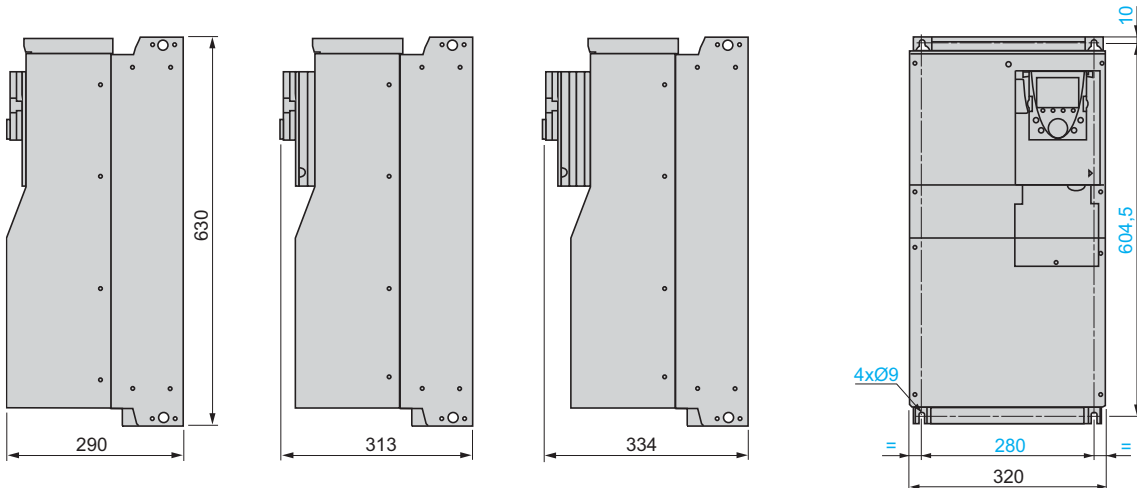
Without option card 1 option card (1) 2 option cards (1) Common front view



ATV 71H	a	b	c	c1	c2	G	H	K	Ø
D18M3X, D22M3X, D22N4, U22Y...D30Y	240	420	236	259	282	206	403	10	6
D30N4, D37N4	240	550	266	289	312	206	529	10	6
D30M3X...D45M3X	320	550	266	289	312	280	524	10	9

ATV 71HD45N4...HD75N4, ATV 71HD37Y...HD90Y

Without option card 1 option card (1) 2 option cards (1) Common front view



(1) Option cards: I/O extension cards, communication cards or "Controller Inside" programmable card.

Variable speed drives

Altivar 71

UL Type 1/IP 20 drives

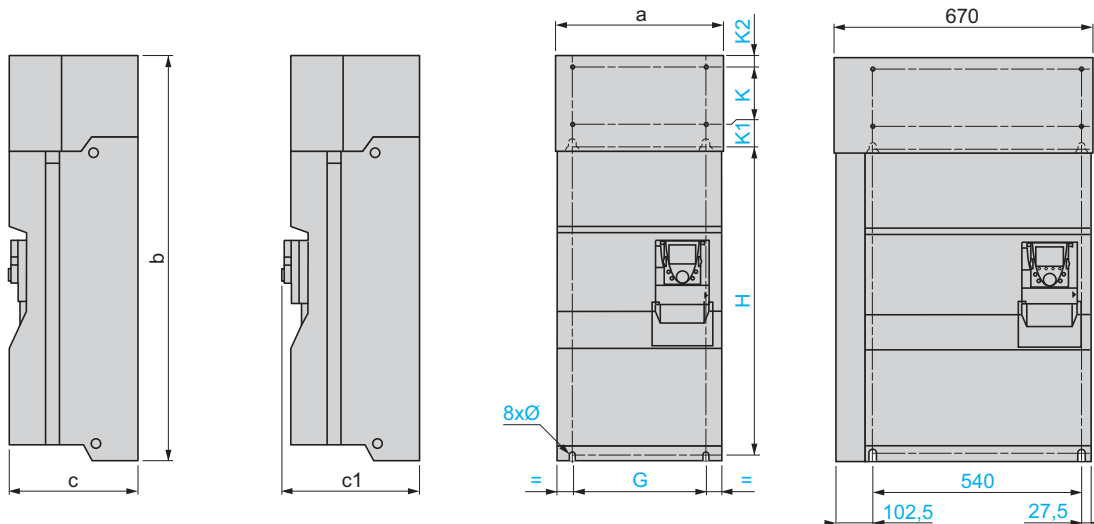
ATV 71HD55M3X, HD75M3X, ATV 71HD90N4...HC28N4, ATV 71HC11Y...HC31Y

With or without 1 option card (1)

2 option cards (1)

Common front view

ATV 71HC20N4...HC28N4 with braking unit VW3 A7 101



ATV 71H	a	b	c	c1	G	H	K	K1	K2	Ø
D55M3X, D90N4	320	920	377	392	250	650	150	75	30	11.5
D75M3X, C11N4	360	1022	377	392	298	758	150	75	30	11.5
C13N4, C11Y...C16Y	340	1190	377	392	285	920	150	75	30	11.5
C16N4	440	1190	377	392	350	920	150	75	30	11.5
C20N4...C28N4, C20Y...C31Y	595	1190	377	392	540	920	150	75	30	11.5

ATV 71HC31N4...HC50N4, ATV 71HC40Y...HC63Y

With or without 1 option card (1)

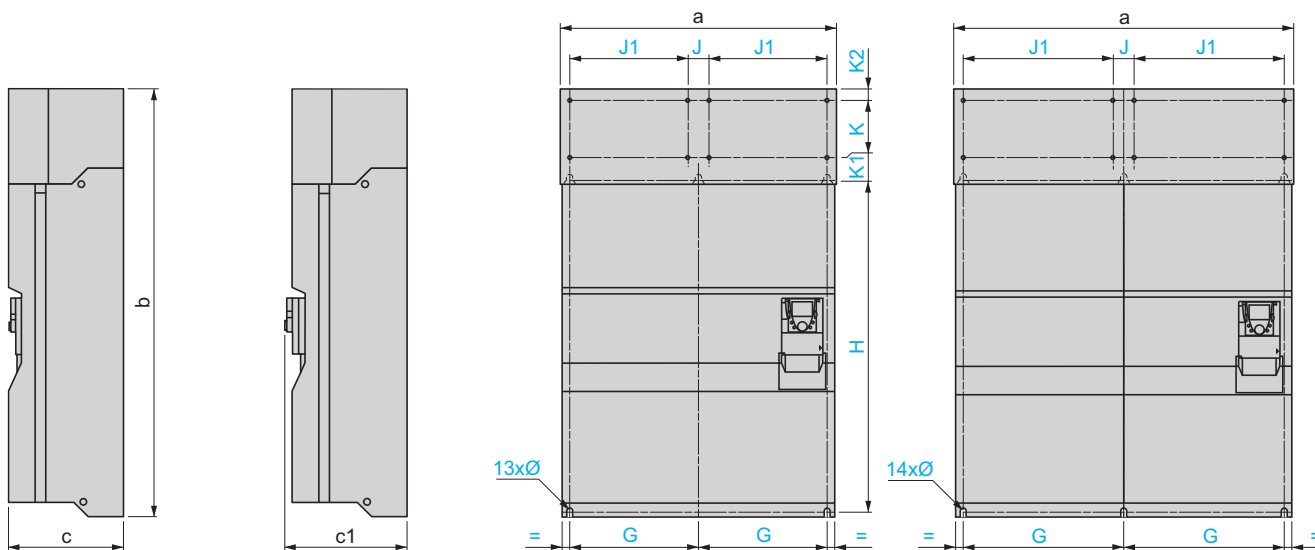
2 option cards (1)

ATV 71HC31N4, HC40N4

ATV 71HC50N4, HC40Y...HC63Y

Front view

Front view



ATV 71H	a	b	c	c1	G	J	J1	H	K	K1	K2	Ø
C31N4, C40N4	890	1390	377	392	417.5	75	380	1120	150	75	30	11.5
C50N4, HC40Y...HC63Y	1120	1390	377	392	532.5	75	495	1120	150	75	30	11.5

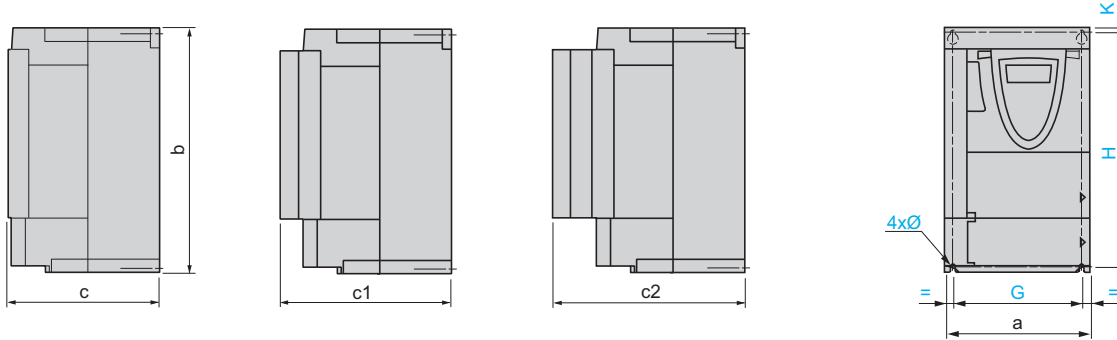
(1) Option cards: I/O extension cards, communication cards or "Controller Inside" programmable card.

Variable speed drives

Altivar 71
UL Type 1/IP 20 drives

Variable speed drives without graphic display terminal
ATV 71H●●●M3Z, ATV 71HD11M3XZ, HD15M3XZ, ATV 71H075N4Z...HD18N4Z, ATV 71P●●●N4Z

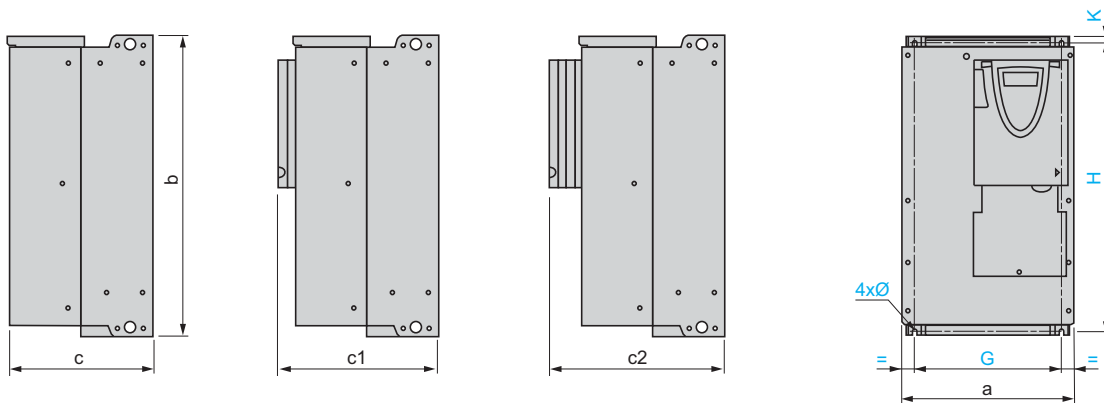
Without option card (1) 1 option card (1) 2 option cards (1) Common front view



ATV 71	a	b	c	c1	c2	G	H	K	Ø
H037M3Z...HU15M3Z, H075N4Z...HU22N4Z P075N4Z, PU22N4Z	130	230	149	172	195	113.5	220	5	5
HU22M3Z...HU40M3Z, HU30N4Z, HU40N4Z PU30N4Z, PU40N4Z	155	260	161	184	207	138	249	4	5
HU55M3Z, HU55N4Z, HU75N4Z PU55N4Z, PU75N4Z	175	295	161	184	207	158	283	6	6
HU75M3Z, HD11N4Z, PD11N4Z	210	295	187	210	233	190	283	6	6
HD11M3XZ, HD15M3XZ HD15N4Z, HD18N4Z	230	400	187	210	233	210	386	8	6

Variable speed drives without graphic display terminal
ATV 71HD22N4Z...HD37N4Z

Without option card 1 option card (1) 2 option cards (1) Common front view



ATV 71H	a	b	c	c1	c2	G	H	K	Ø
D22N4Z	240	420	210	233	256	206	403	10	6
D30N4Z, D37N4Z	240	550	230	253	276	206	531.5	10	6

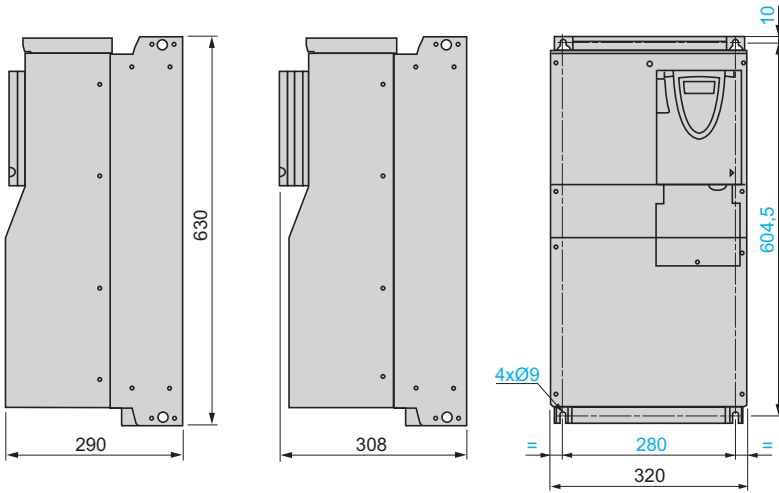
(1) Option cards: I/O extension cards, communication cards or "Controller Inside" programmable card.

Variable speed drives without graphic display terminal
ATV 71HD45N4Z...HD75N4Z

With or without 1 option card (1)

2 option cards (1)

Common front view



(1) Option cards: I/O extension cards, communication cards or "Controller Inside" programmable card.

Variable speed drives

Altivar 71

UL Type 1/IP 20 drives

Variable speed drives without DC choke

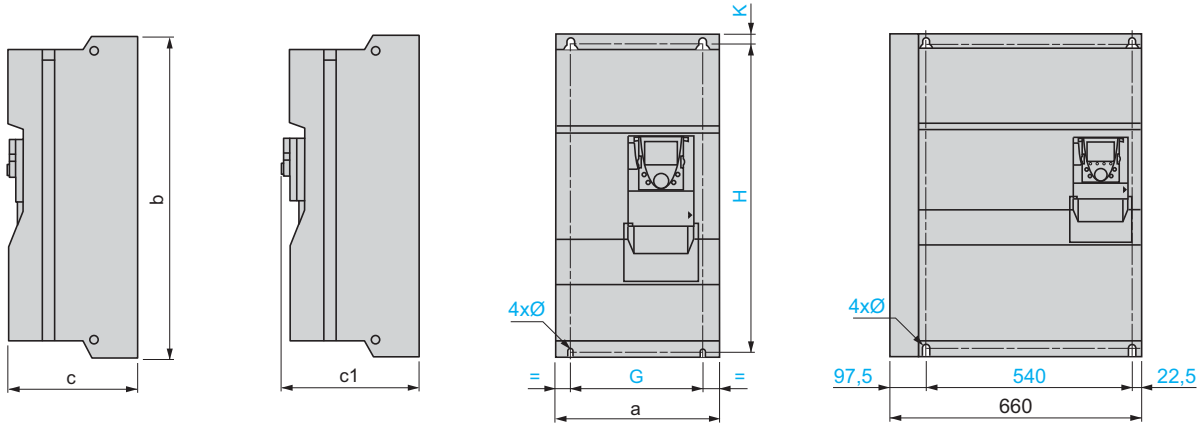
ATV 71HD55M3XD, HD75M3XD, ATV 71HD90N4D...HC28N4D

With or without 1 option card (1)

2 option cards (1)

Common front view

ATV 71HC20N4D...HC28N4D with braking unit VW3 A7 101



ATV 71H	a	b	c	c1	G	H	K	Ø
D55M3XD, D90N4D	310	680	377	392	250	650	15	11.5
D75M3XD, C11N4D	350	782	377	392	298	758	12	11.5
C13N4D	330	950	377	392	285	920	15	11.5
C16N4D	430	950	377	392	350	920	15	11.5
C20N4D...C28N4D	585	950	377	392	540	920	15	11.5

Variable speed drives without DC choke

ATV 71HC31N4D...HC50N4D

With or without 1 option card (1)

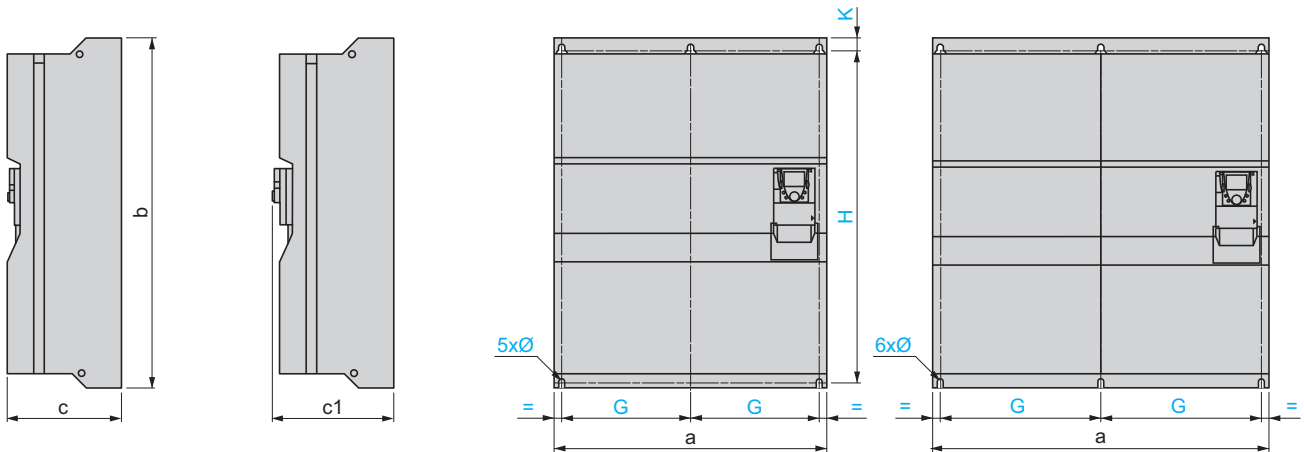
2 option cards (1)

ATV 71HC31N4D, HC40N4D

ATV 71HC50N4D

Front view

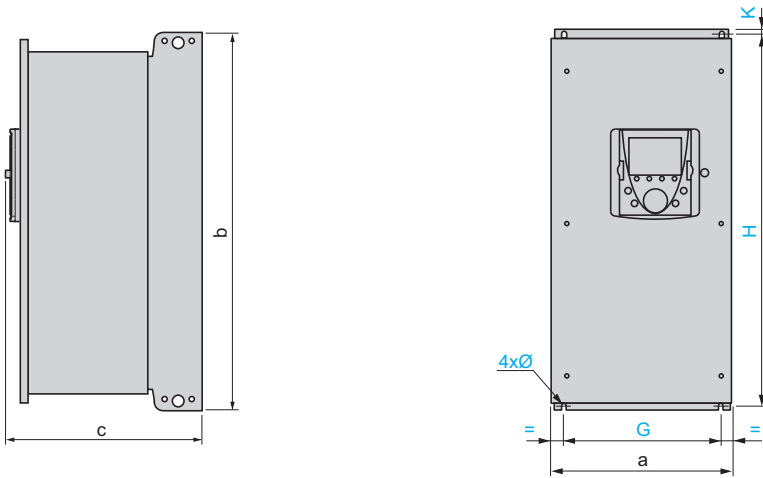
Front view



ATV 71H	a	b	c	c1	G	H	K	Ø
C31N4D, C40N4D	880	1150	377	392	417.5	1120	15	11.5
C50N4D	1110	1150	377	392	532.5	1120	15	11.5

(1) Option cards: I/O extension cards, communication cards or "Controller Inside" programmable card.

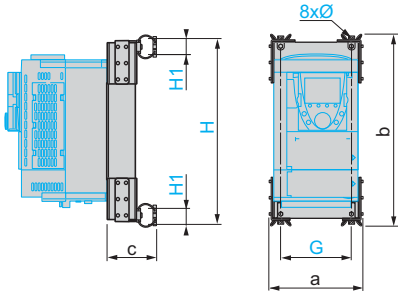
ATV 71W075N4...WD75N4 variable speed drives



ATV 71W	a	b	c	G	H	K	Ø
075N4...U22N4	240	490	272	200	476	6	6
U30N4, U40N4	240	490	286	200	476	6	6
U55N4, U75N4	260	525	286	220	511	6	6
D11N4	295	560	315	250	544	8	6
D15N4, D18N4	315	665	315	270	647	10	6
D22N4	285	720	315	245	700	10	7
D30N4, D37N4	285	880	343	245	860	10	7
D45N4...D75N4	362	1000	364	300	975	10	9

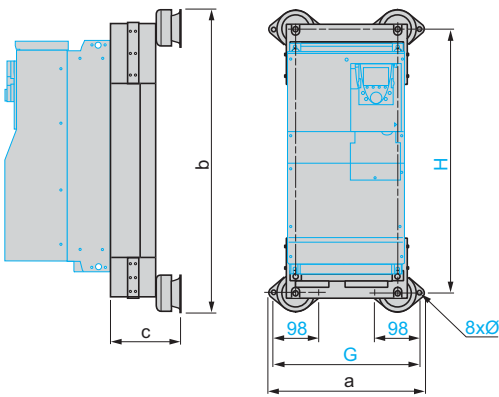
DNV kits

VW3 A9 621...625



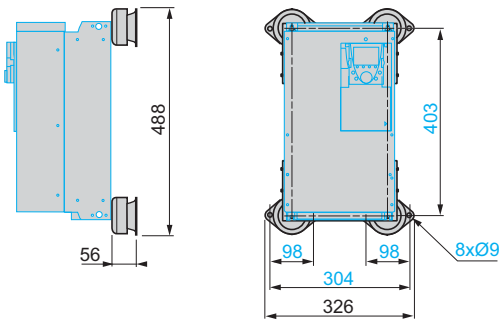
VW3	a	b	c	Ø	G	H	H1
A9 621	148	336	84	5.8	105	324.4	49.4
A9 622	173	370	105	5.8	130	358.4	49.4
A9 623	193	445	121	7	150	424.4	69.4
A9 624	228	455	120	7	190	434.4	69.4
A9 625	248	550	129	7	190	529.4	69.4

VW3 A9 626...628

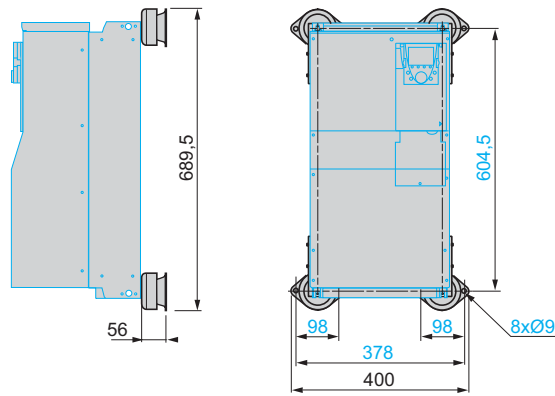


VW3	a	b	c	Ø	G	H
A9 626	320	588	140	9	298	502.5
A9 627	320	716	140	9	298	631
A9 628	400	810	180	9	388	725

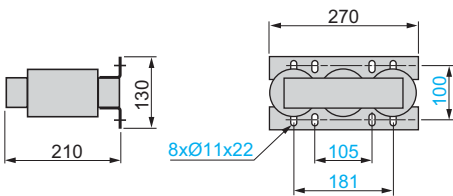
VW3 A9 642



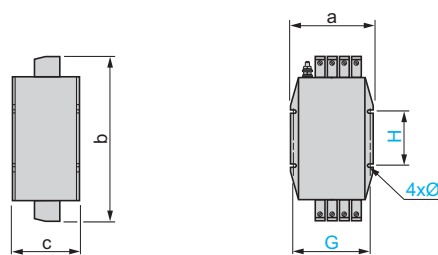
VW3 A9 643



Line choke for DNV kit VW3 A9 643 (1)



EMC input filter for DNV kits VW3 A9 642 and 643 (1)



For kit	a	b	c	Ø	G	H
VW3 A9 642	156	237	91	6.6	140	80
VW3 A9 643	171	348	141	6.6	155	115

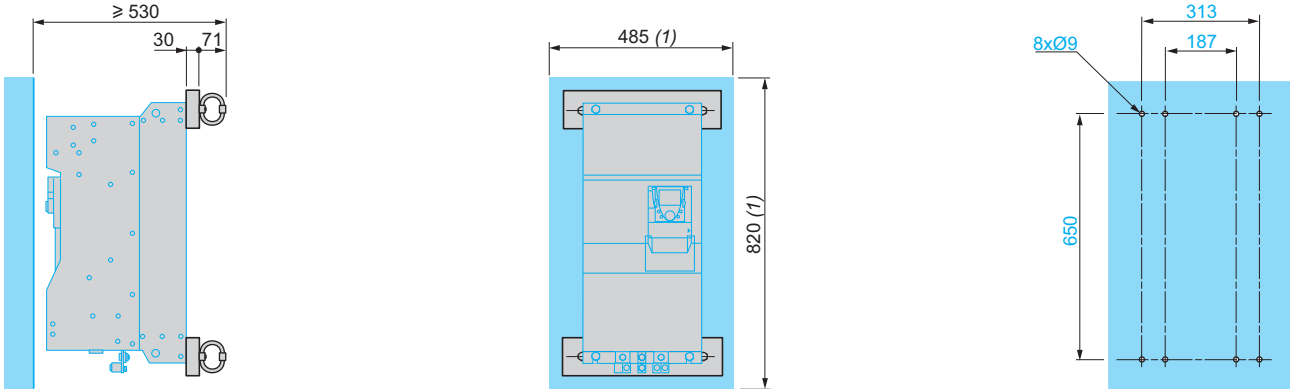
(1) For mounting the line choke upstream of the variable speed drive, see page 28.

(1) For mounting the EMC filter next to the variable speed drive, see page 28.

DNV kits (continued)

VW3 A9 629

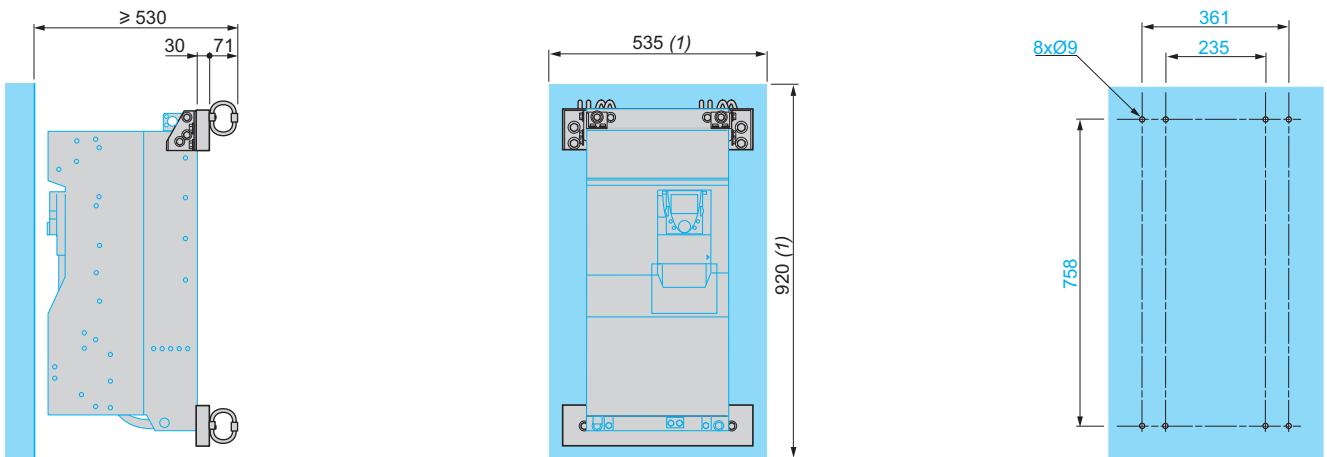
Drill holes and mounting recommendations



(1) Minimum free area to be left around the drive.

VW3 A9 631

Drill holes and mounting recommendations

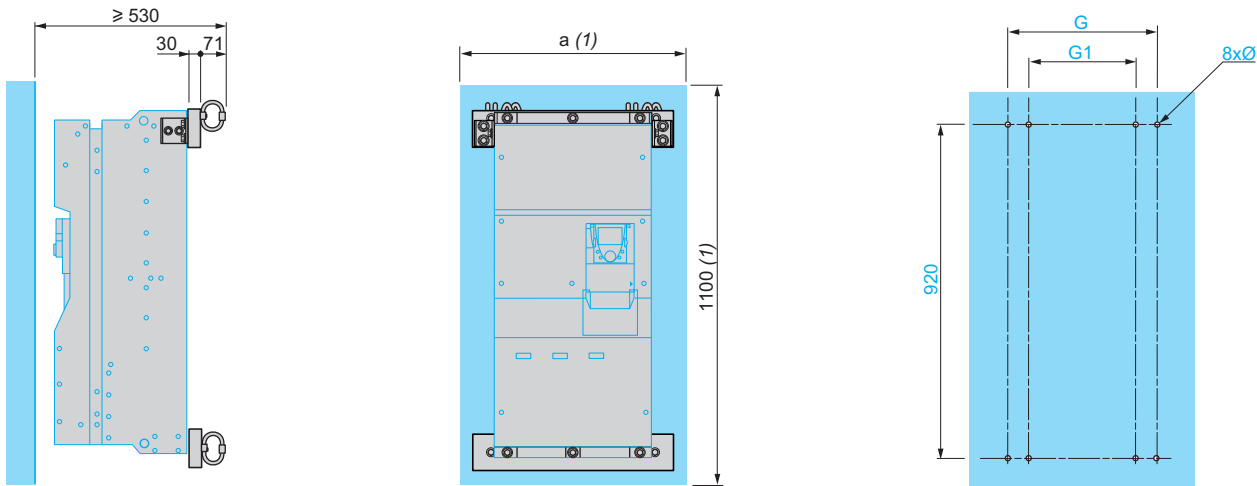


(1) Minimum free area to be left around the drive.

DNV kits (continued)

VW3 A9 633, 635, 637, 638, 644...647

Drill holes and mounting recommendations

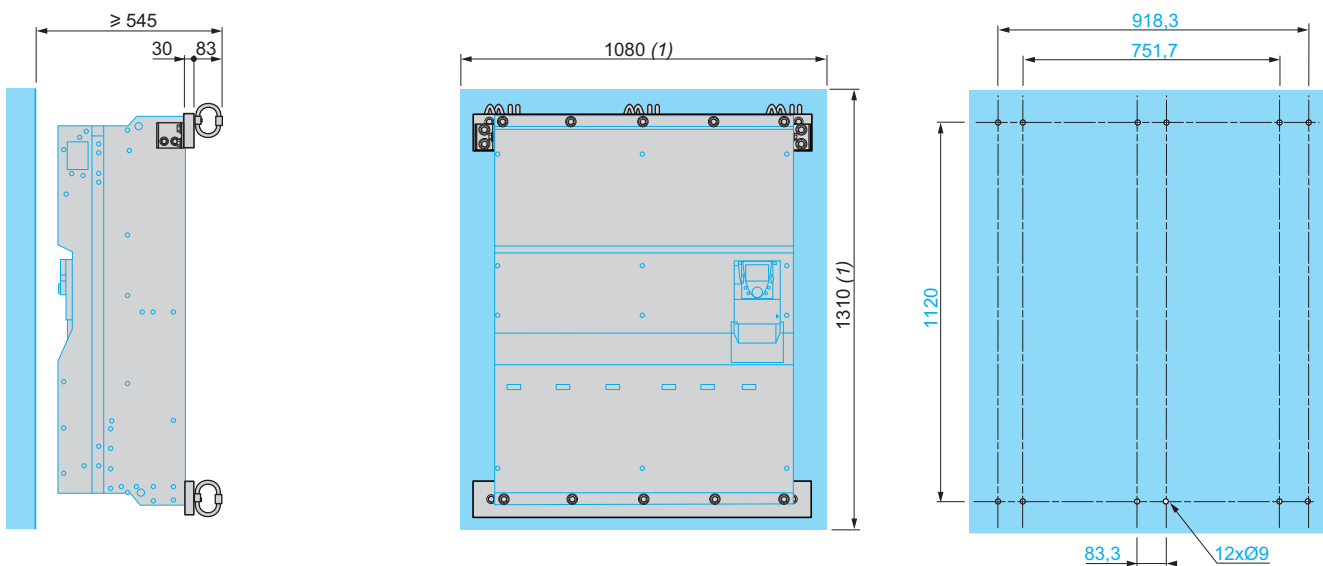


VW3	a	Ø	G	G1
A9 633, 644, 645	520	9	348	222
A9 635	620	9	413	287
A9 637, 638, 646, 647	770	9	603	477

(1) Minimum free area to be left around the drive.

VW3 A9 639, 640

Drill holes and mounting recommendations

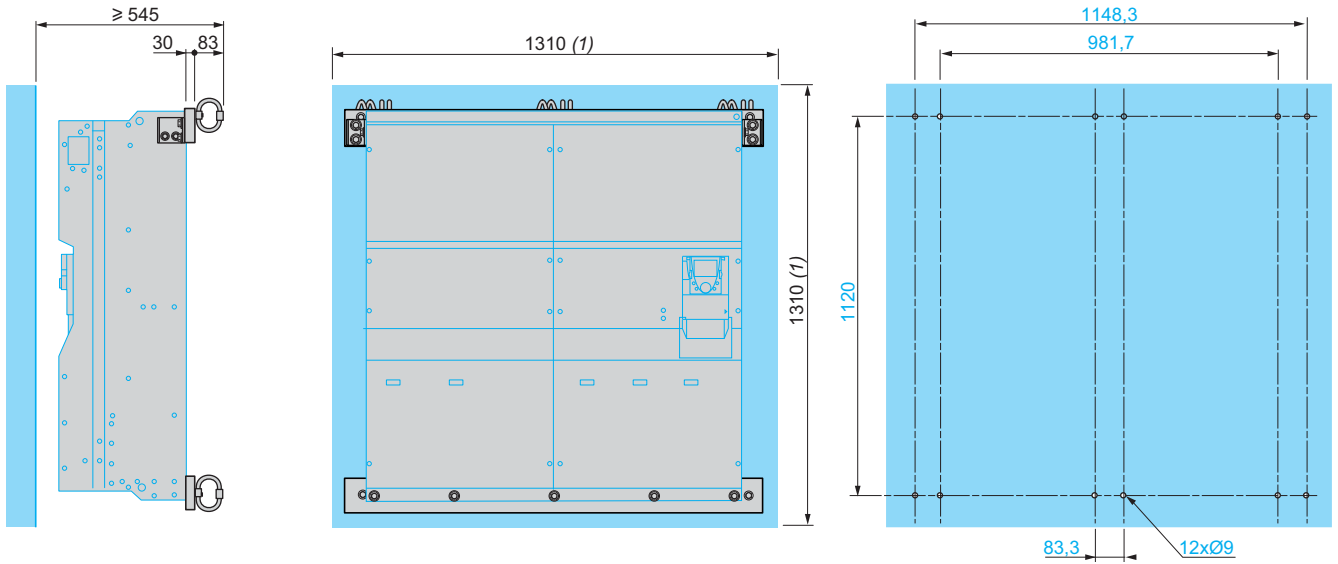


(1) Minimum free area to be left around the drive.

DNV kits (continued)

VW3 A9 641, 648, 649

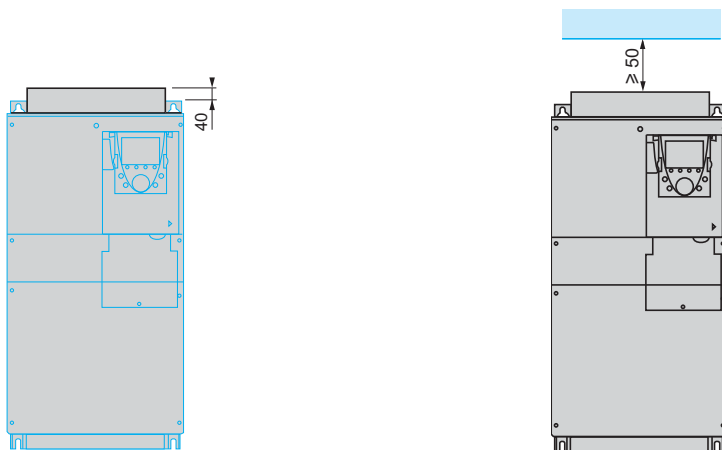
Drill holes and mounting recommendations



(1) Minimum free area to be left around the drive.

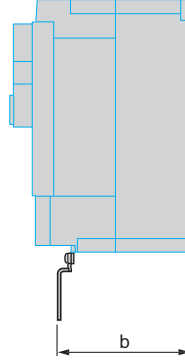
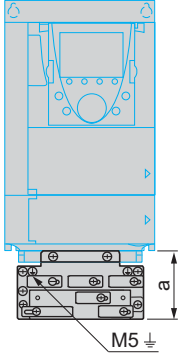
Control card fan kits VW3 A9 404...407

Mounting recommendations



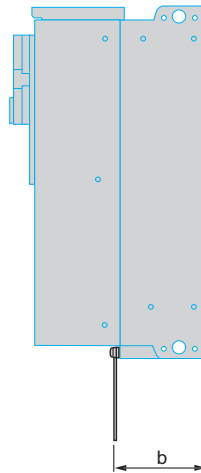
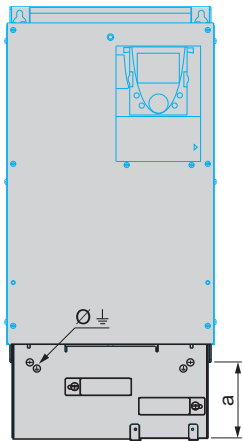
EMC mounting plates (1)

For ATV 71H●●●M3, ATV 71HD11M3X, HD15M3X, ATV 71H075N4...HD18N4, ATV 71P●●●N4Z



For ATV 71	a	b
H037M3...HU15M3 H075N4...HU22N4 P075N4Z...PU22N4Z	83	70
HU22M3...HU40M3 HU30N4, HU40N4 PU30N4Z, PU40N4Z	83	85
HU55M3 HU55N4, HU75N4 PU55N4Z, PU75N4Z	95	85
HU75M3...HD15M3X HD11N4...HD18N4 PD11N4Z	95	118

For ATV 71HD18M3X...HD45M3X, ATV 71HD22N4...HD75N4, ATV 71HU22Y...HD90Y



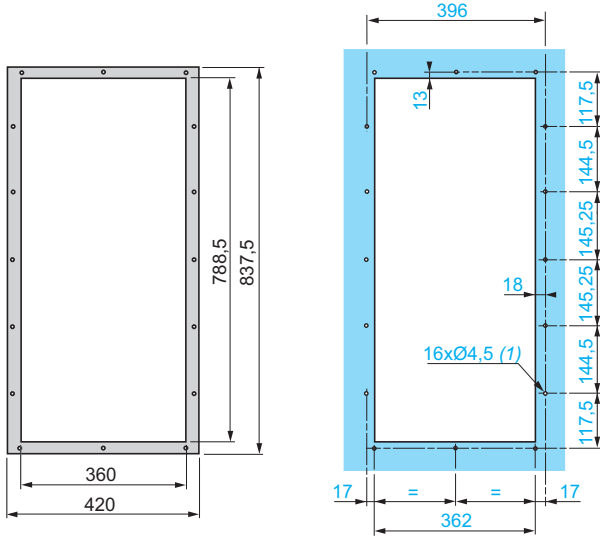
For ATV 71	a	b	Ø
HD18M3X, HD22M3X HD22N4 HU22Y...HD30Y	122	120	M5
HD30N4, HD37N4	113	127	M5
HD30M3X...HD45M3X	118	128	M8
HD45N4...HD75N4 HD37Y...HD90Y	118	173	M8

(1) Supplied with the drive except for ATV 71HD55M3X, HD75M3X, ATV 71HD90N4...HC50N4 or ATV 71HC11Y...HC63Y. In the case of these drives, the mounting plate is supplied with the UL Type 1 or IP 31 conformity kit, which must be ordered separately, see pages 32 and 33. For dimensions, see pages 202 and 203.

Kits for flush-mounting in a dust and damp proof enclosure (continued)

VW3 A9 509

Cut-outs and drill holes

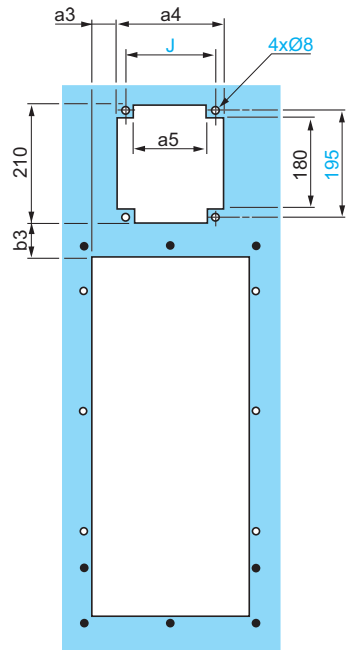
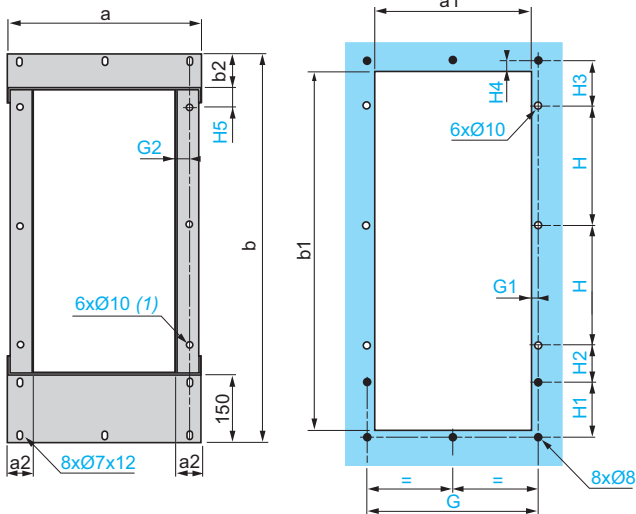


(1) Ø 4.5 hole for M5 self-tapping screw.

VW3 A9 510, 511

Cut-outs and drill holes
without DC choke

Cut-outs and drill holes with DC choke



VW3	a	a1	a2	b	b1	b2	G	G1
A9 510	420	340	55	850	790	80	370	15
A9 511	440	360	45	885	845	66	396	18
VW3	G2	H	H1	H2	H3	H4	H5	
A9 510	30	260	120	80	100	15	35	
A9 511	23	310	70	91.5	83.5	10	27.5	

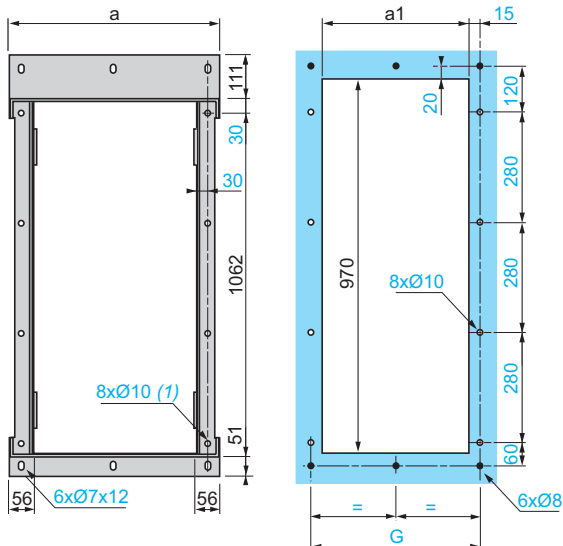
VW3	a3	a4	a5	b3	J
A9 510	82.5	180	120	45	150
A9 511	87.5	190	130	35	160

(1) For fixing using an M8 minimum screw.

Kits for flush-mounting in a dust and damp proof enclosure (continued)

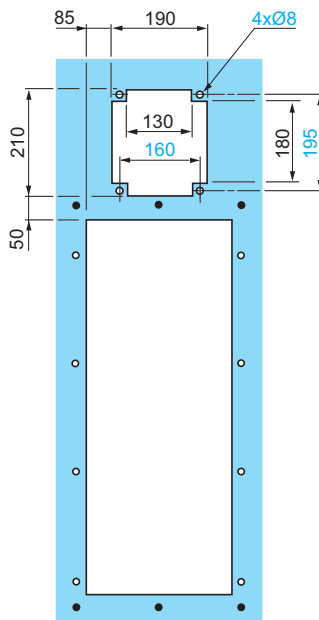
VW3 A9 512, 513

Cut-outs and drill holes without DC choke

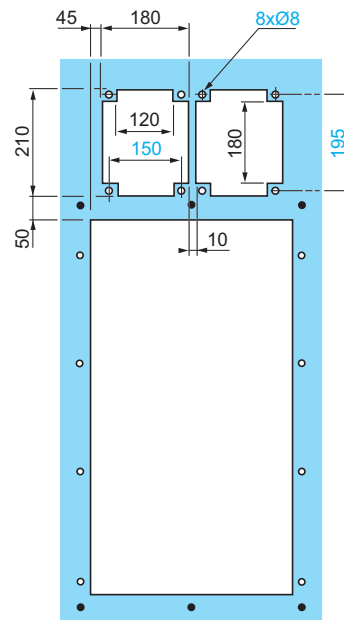


VW3 A9 512

Cut-outs and drill holes with DC choke or transformer for fan



VW3 A9 513

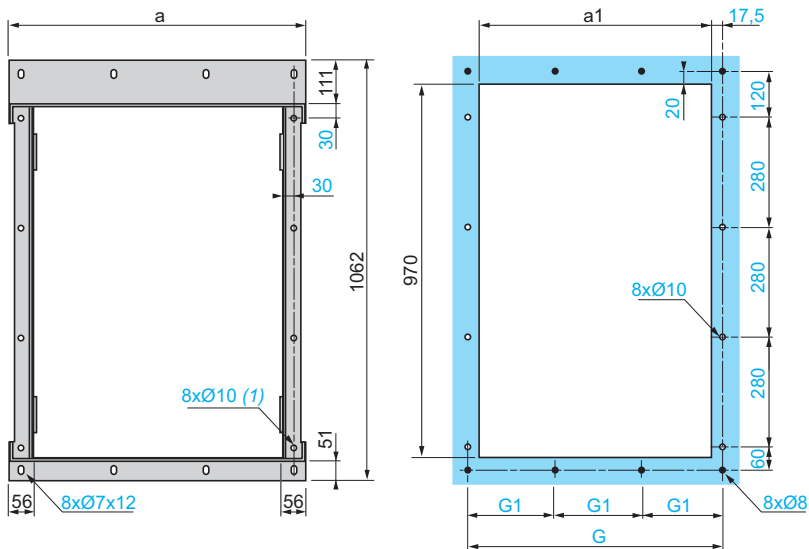


VW3	a	a1	G
A9 512	442	360	390
A9 513	542	460	490

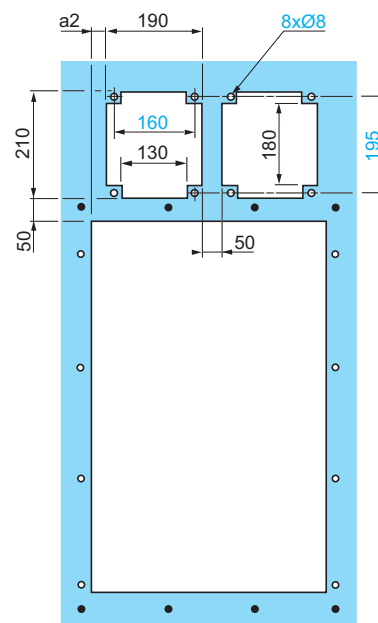
(1) For fixing using an M8 minimum screw.

VW3 A9 514 (without braking unit), VW3 A9 515 (with braking unit)

Cut-outs and drill holes without DC choke



Cut-outs and drill holes with DC choke or transformer for fan



VW3	a	a1	G	G1
A9 514	697	610	645	215
A9 515	772	685	720	240

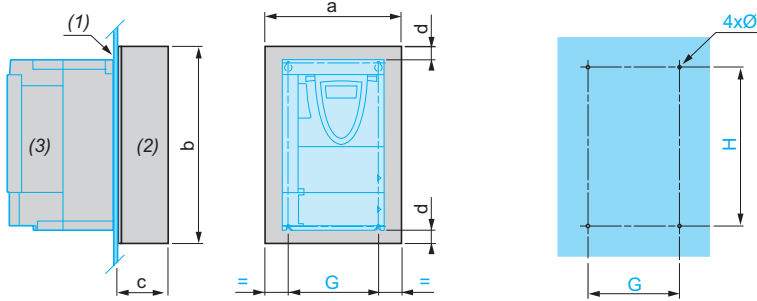
VW3	a2
A9 514	90
A9 515	165

(1) For fixing using an M8 minimum screw.

Kits for mounting in a dust and damp proof enclosure

VW3 A9 801...803

Drill holes in the enclosure



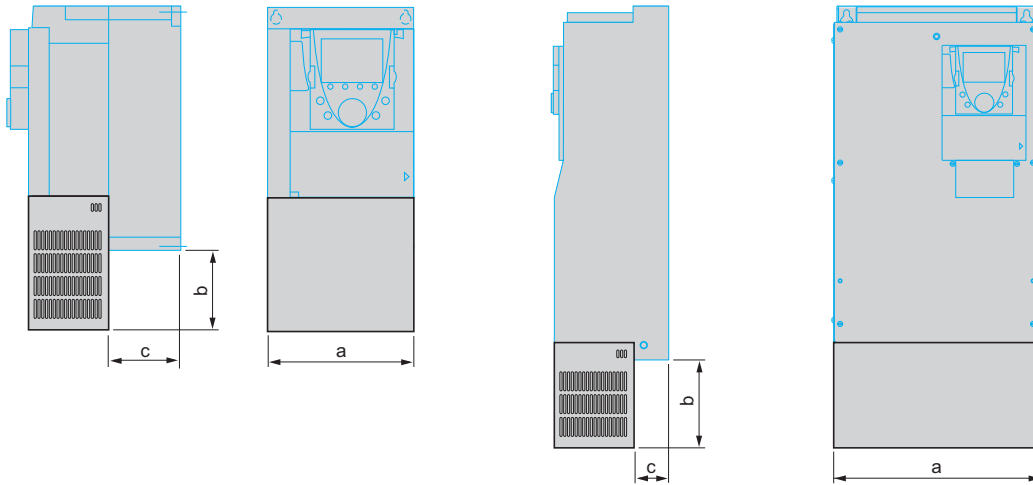
VW3	a	b	c	d	G	H	Ø
A9 801	150	226	80	2	113.5	220	M4
A9 802	175	450	80	95	138	249	M4
A9 803	300	700	83	203	158	283	M5

- (1) Enclosure plate
- (2) Kit VW3 A9 801, VW3 A9 802 or VW3 A9 803
- (3) ATV 71P●●●N4Z drive

UL Type 1 conformity kits VW3 A9 2●●, IP 21 or IP 31 conformity kits VW3 A9 1●●

VW3 A9 201...205, 101...105

VW3 A9 206...208, 217, 106...108, 117



VW3	a	b	c
A9 201	132.6	32	60
A9 202	155	35	70
A9 203	176	32	70
A9 204	211.6	36	90
A9 205	231.6	40	90
A9 101	132.6	115	60
A9 102	155	105	70
A9 103	176	115	70
A9 104	211.6	115	90
A9 105	231.6	130	90

VW3	a	b	c
A9 206	240	60	102
A9 207	240	52	102
A9 217	320	48	102
A9 208	320	136	116
A9 106	240	186	102
A9 107	240	178	102
A9 117	320	180	102
A9 108	320	180	116

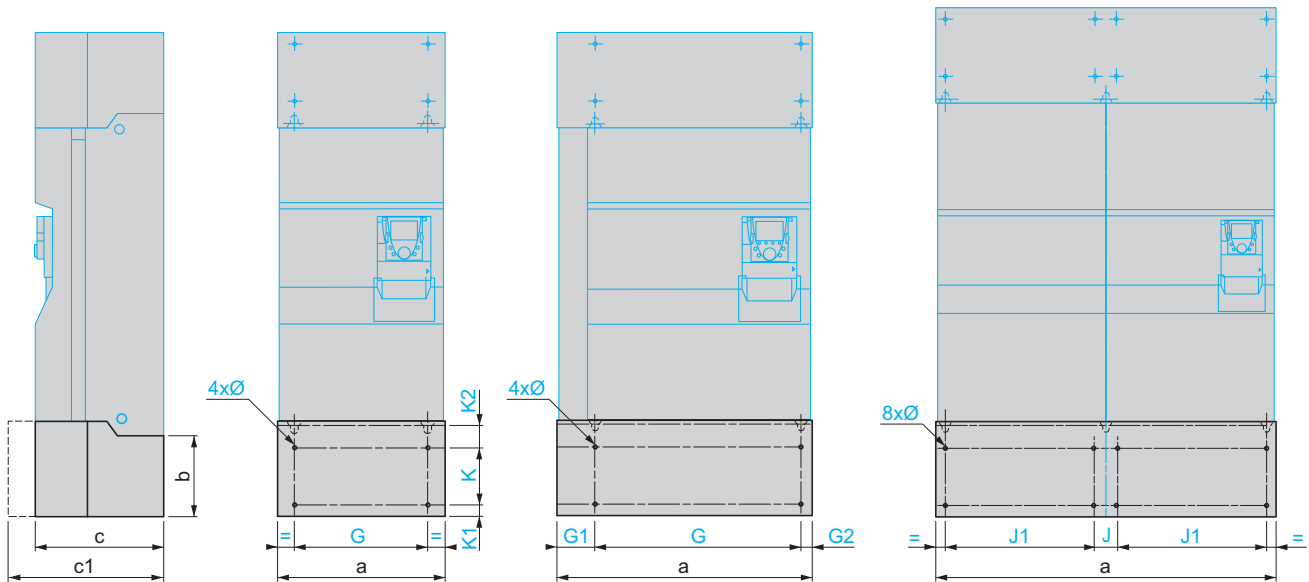
UL Type 1 conformity kits VW3 A9 2●●, IP 21 or IP 31 conformity kits VW3 A9 1●● (continued)

VW3 A9 209...214,
VW3 A9 109...116

VW3 A9 209...213,
VW3 A9 109...113, 115

VW3 A9 214, 114
(with braking unit)

VW3 A9 116



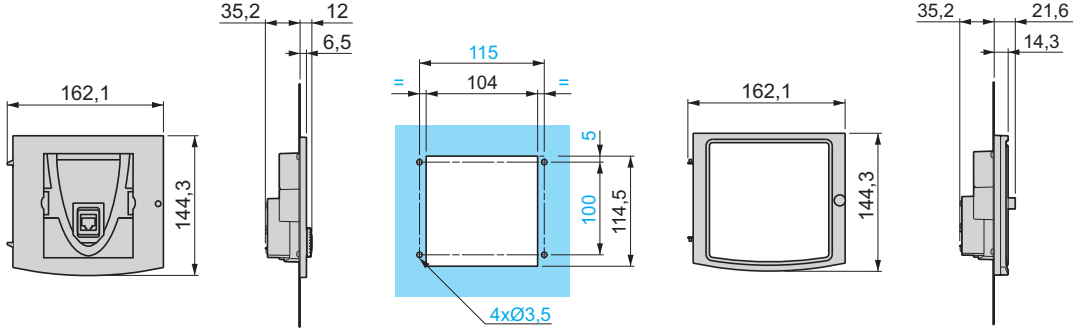
VW3	a	b	c	c1	G	G1	G2	K	K1	K2	Ø	J	J1
A9 209	334	220	377	-	250	-	-	95	65	75	11.5	-	-
A9 210	374	300	377	-	298	-	-	172	65	75	11.5	-	-
A9 211	345	315	377	-	285	-	-	250	65	75	11.5	-	-
A9 212	445	375	377	-	350	-	-	250	65	75	11.5	-	-
A9 213	600	375	377	-	540	-	-	250	65	75	11.5	-	-
A9 214	670	375	377	-	540	102	27	250	65	75	11.5	-	-
A9 109	334	220	377	-	250	-	-	95	65	75	11.5	-	-
A9 110	374	300	377	-	298	-	-	172	65	75	11.5	-	-
A9 111	345	315	377	-	285	-	-	250	65	75	11.5	-	-
A9 112	445	375	377	-	350	-	-	250	65	75	11.5	-	-
A9 113	600	375	377	-	540	-	-	250	65	75	11.5	-	-
A9 114	670	375	377	-	540	102	27	250	65	75	11.5	-	-
A9 115	895	475	-	477	835	-	-	350	65	75	11.5	-	-
A9 116	1125	475	-	477	-	-	-	350	65	75	11.5	70	495

Remote graphic display terminal

IP 54 kit VW3 A1 102

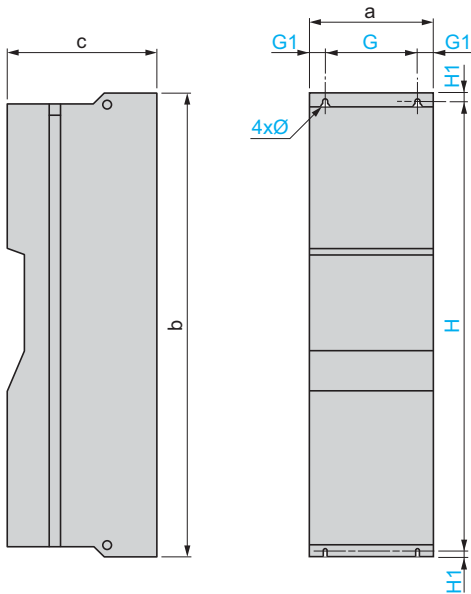
IP65 door VW3 A1 103

Cut-outs and drill holes



Braking units VW3 A7 101 (1), VW3 A7 102...104

VW3 A7 102...104



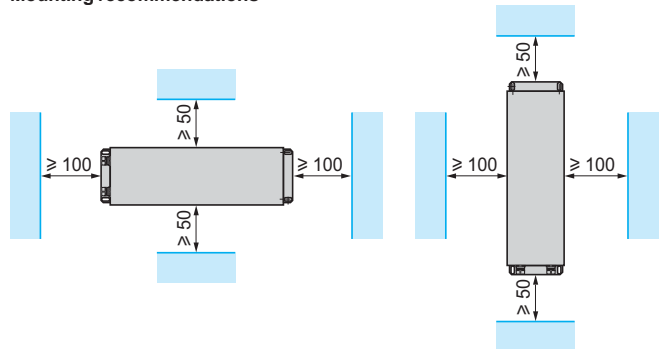
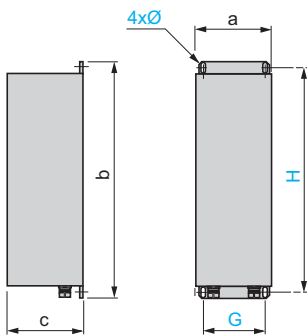
VW3	a	b	c	G	G1	H	H1	Ø
A7 101 (1)	75	950	377	-	-	-	-	-
A7 102...104	310	1150	377	265	22.5	1120	15	11.5

(1) Braking unit VW3 A7 101 can only be mounted on the left side of the drive, see page 189.

Braking resistors

VW3 A7 701...703

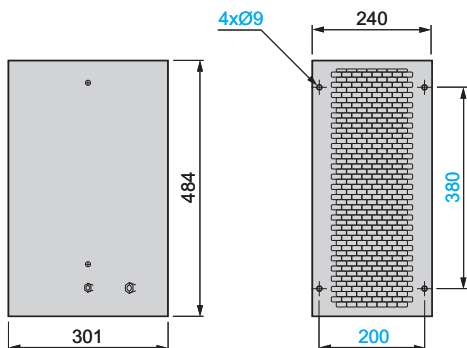
Mounting recommendations



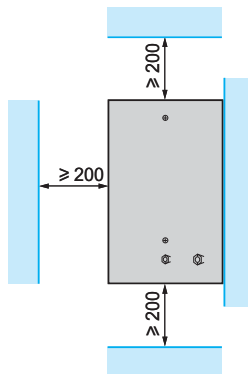
VW3	a	b	c	G	H	Ø
A7 701	95	293	95	70	275	6 x 12
A7 702	95	293	95	70	375	6 x 12
A7 703	140	393	120	120	375	6 x 12

Braking resistors (continued)

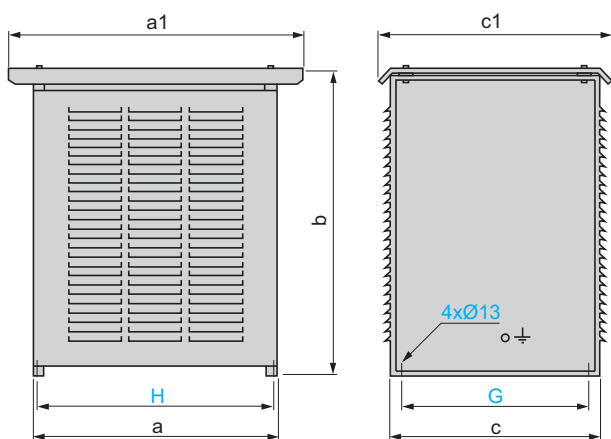
VW3 A7 704...709



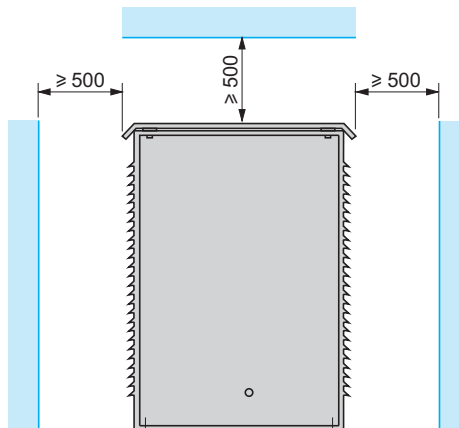
Mounting recommendations



VW3 A7 710...712, 715...718 (1)



Mounting recommendations

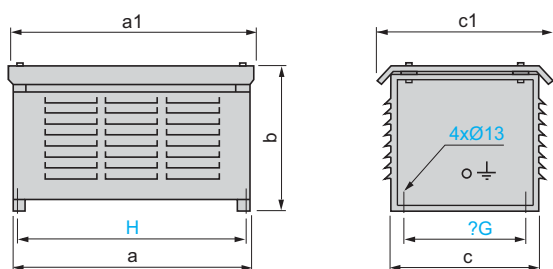


VW3	a	a1	b	c	c1	G	H
A7 710	860	1040	690	480	560	400	832
A7 711	960	1140	1150	380	460	300	932
A7 712	860	1040	1150	540	620	460	832
A7 715	960	1140	1150	540	620	460	932
A7 716 (1)	960	1140	1150	740	820	660	932
A7 717 (1) (2)	960	1140	1150	540	620	460	932
A7 718 (1) (2)	960	1140	1150	740	820	660	932

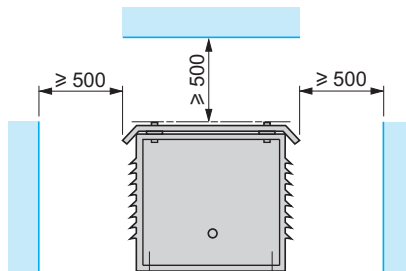
(1) For mounting in series or parallel, a space of 300 mm must be left between each resistor.

(2) The dimension is given for 1 component. References VW3 A7 717, 718 comprise two components; all components must be taken into account to determine the overall dimensions. A space of 300 mm must be left between each component.

VW3 A7 713, 714



Mounting recommendations

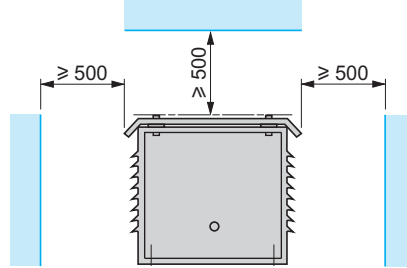
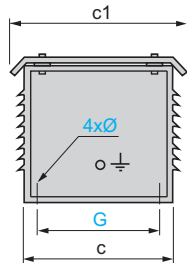
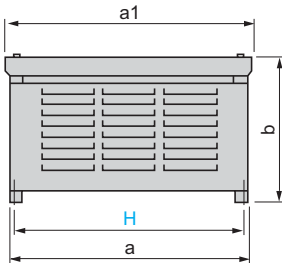


VW3	a	a1	b	c	c1	G	H
A7 713	760	790	440	480	540	400	732
A7 714	960	990	440	480	540	400	932

Hoist resistors

VW3 A7 801...804, 807...809

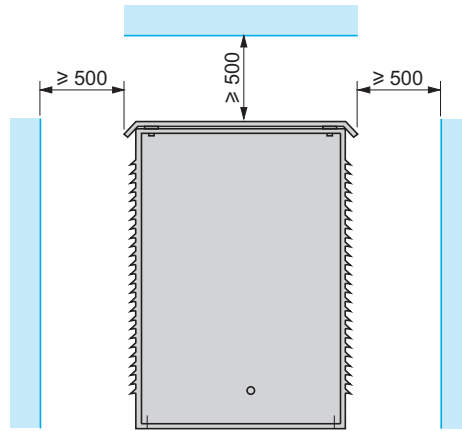
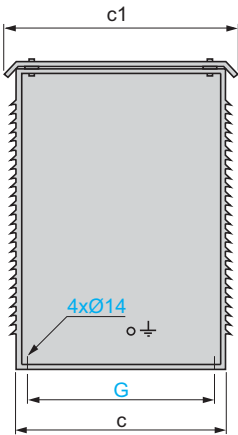
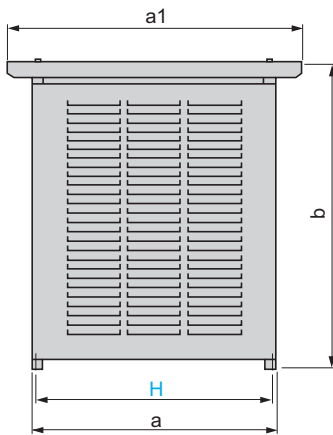
Mounting recommendations



VW3	a	a1	b	c	c1	G	H	Ø
A7 801	490	452	203.5	153	202	95	470	10
A7 802	420	450	452	480	540	400	392	13
A7 803	580	610	452	480	540	400	552	13
A7 804	960	990	452	480	540	400	932	13
A7 807	860	890	452	480	540	400	832	13
A7 808	860	890	743	480	540	400	832	13
A7 809	860	890	743	480	450	400	832	13

VW3 A7 805, 806, 810...818 (1)

Mounting recommendations



VW3	a	a1	b	c	c1	G	H
A7 805 (1)	860	1040	1150	540	620	460	832
A7 806 (1)	860	1040	1150	740	820	660	832
A7 810	860	1040	1150	540	620	460	832
A7 811	960	1140	1150	540	620	460	932
A7 812	960	1140	1150	740	820	660	932
A7 813 (2)	960	1140	1150	540	620	460	932
A7 814 (1) (2)	960	1140	1150	540	620	460	932
A7 815 (2)	960	1140	1150	740	820	660	932
A7 816 (1) (2)	960	1140	1150	740	820	660	932
A7 817 (2)	960	1140	1700	740	820	660	932
A7 818	960	1140	1150	740	820	660	932

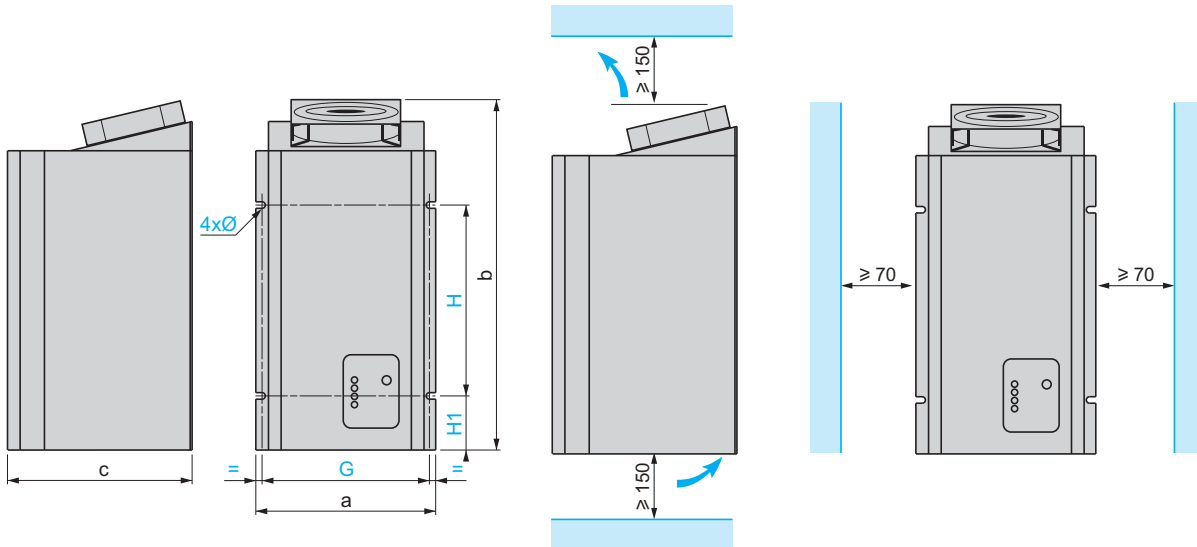
(1) For mounting in series or parallel, a space of 300 mm must be left between each resistor.

(2) The dimension is given for 1 component. References VW3 A7 813...815 comprise 2 components and references VW3 A7 816 and 817 comprise 3 components; all components must be taken into account to determine the overall dimensions. A space of 300 mm must be left between each component.

Network braking units

VW3 A7 201...205, 231, 232

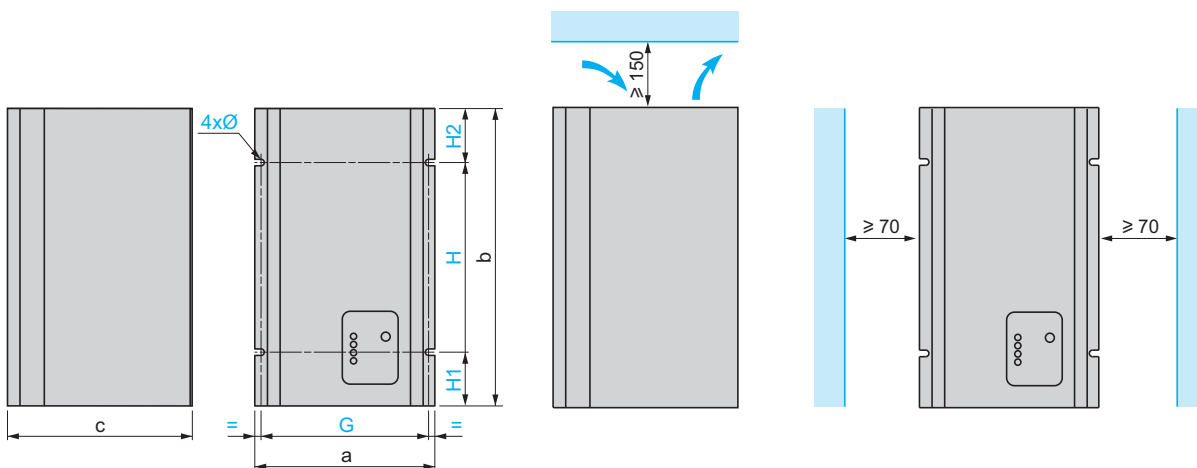
Mounting recommendations



VW3	a	b	c	G	H	H1	Ø
A7 201, 202	270	500	295	260	260	80	7
A7 203...205, A7 231...232	270	580	295	260	340	80	7

VW3 A7 206...208, 233...237

Mounting recommendations

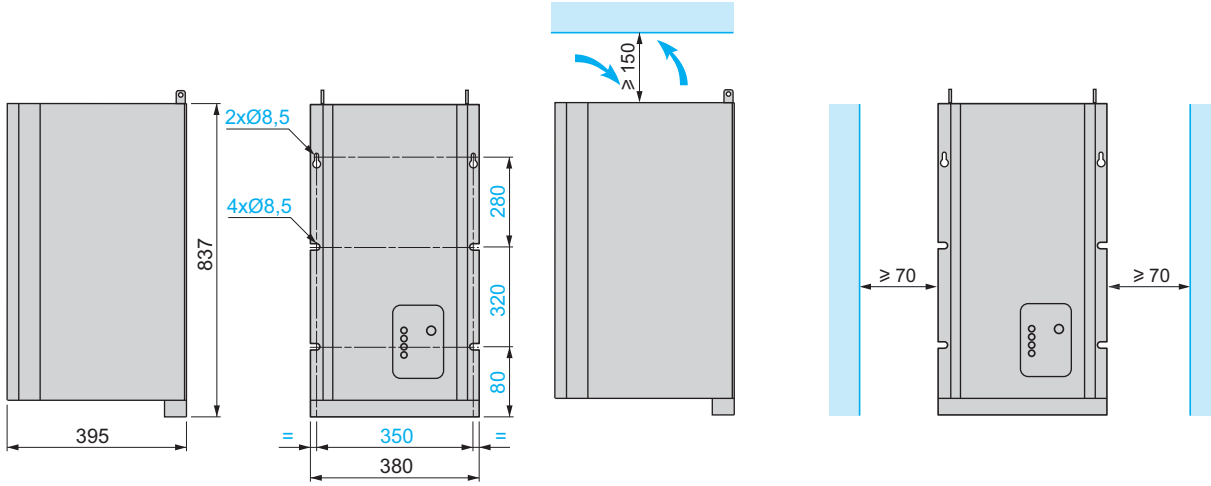


VW3	a	b	c	G	H	H1	H2	Ø
A7 206...208	245	700	272	260	440	80	180	7
A7 233...237	272	700	295	260	440	80	180	7

Network braking units (continued)

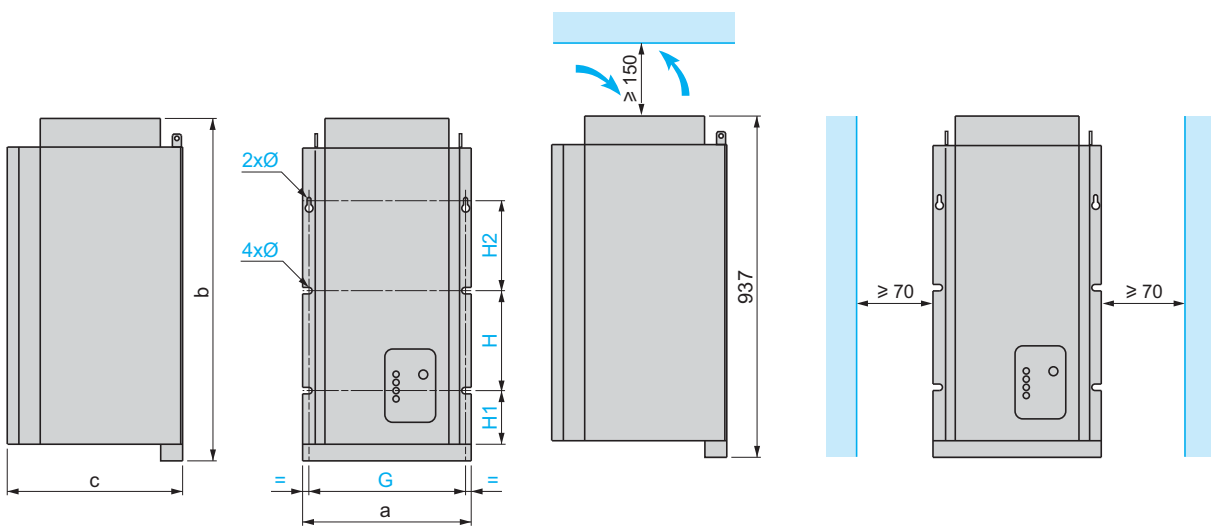
VW3 A7 209, 210, 238, 239

Mounting recommendations



VW3 A7 211, 212, 240, 241

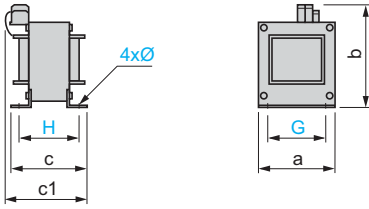
Mounting recommendations



VW3	a	b	c	G	H	H1	H2	Ø
A7 211, 240	380	937	395	350	320	80	280	8.5
A7 212, 241	380	1037	395	350	320	80	280	8.5

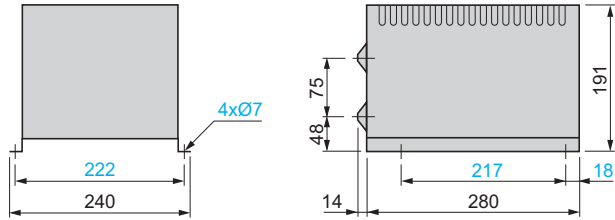
DC chokes

VW3 A4 501...510



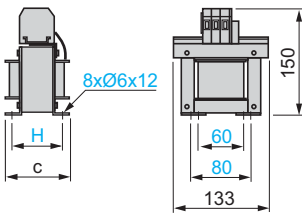
VW3	a	b	c	c1	G	H	Ø
A4 501	60	103	60	95	50	51	3.5
A4 502	60	103	77	118	50	68	3.5
A4 503	96	134	80	115	80	65	5.5
A4 504	96	134	79	115	80	64	5.5
A4 505	96	134	85	120	80	70	5.5
A4 506	96	134	89	120	80	74	5.5
A4 507	96	134	99	130	80	84	5.5
A4 508	108	142	112	145	90	97	5.5
A4 509	96	134	89	120	80	74	5.5
A4 510	126	171	120	170	105	103	7

VW3 A4 511, 512



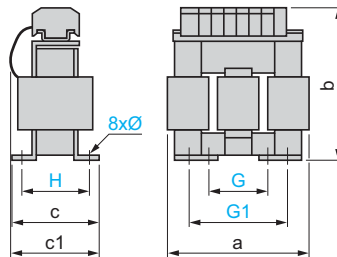
Line chokes

VW3 A58501, A58502



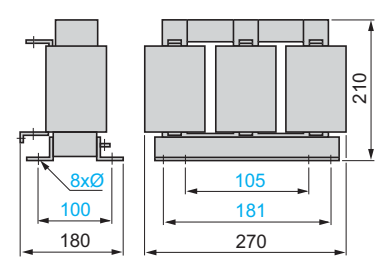
VW3	c	H
A58501	95	65
A58502	105	77

VW3 A4 551...555



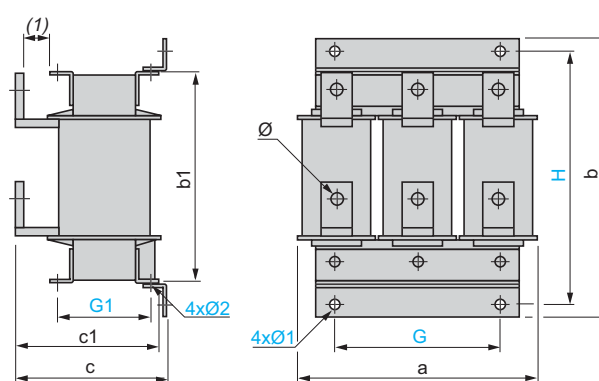
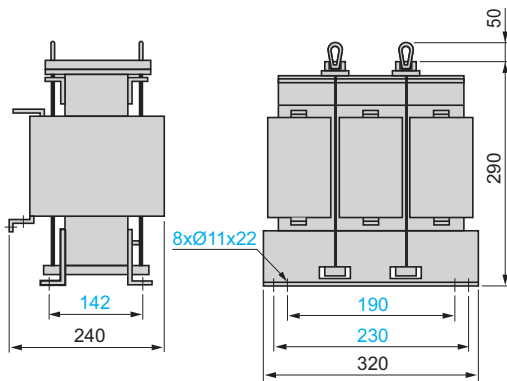
VW3	a	b	c	c1	G	G1	H	Ø
A4 551	100	135	55	60	40	60	42	6 x 9
A4 552, A4 553	130	155	85	90	60	80.5	62	6 x 12
A4 554	155	170	115	135	75	107	90	6 x 12
A4 555	180	210	125	165	85	122	105	6 x 12

VW3 A4 556



VW3	Ø
A4 556	11 x 22

VW3 A4 557



VW3	a	b	b1	c	c1	G	G1	H	Ø	Ø1	Ø2
A4 558, 570	280	305	240	210	200	200	125	275	9	9	9
A4 559	280	330	260	210	200	200	125	300	11	9	9
A4 560, 561, 568	320	380	300	210	200	225	150	350	11	9	9
A4 562...564	320	380	300	250	230	225	150	350	13	11	11
A4 565	385	440	340	275	250	300	125	400	2 x Ø13	13.5	13.5
A4 569	320	380	300	250	230	225	150	350	13	11	11
A4 571	385	440	340	265	245	300	150	400	13	13	13
A4 572	385	440	340	305	245	300	150	400	13	13	13

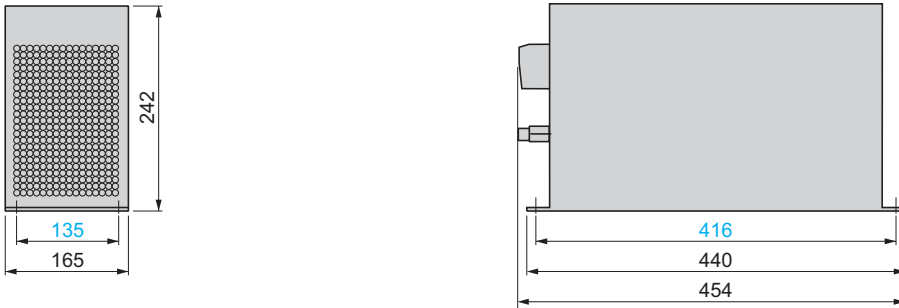
(1) 25 mm minimum.

Passive filters VW3 A4 601...609, 621...627, 641...648, 661...666

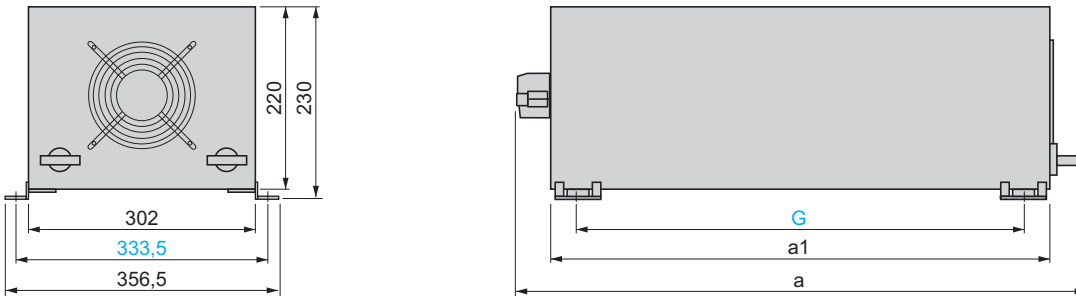
Mounting recommendations (1)



VW3 A4 601...604, 621, 622, 641...644, 661...663



VW3 A4 605...609, 623...627, 645...648, 664...666

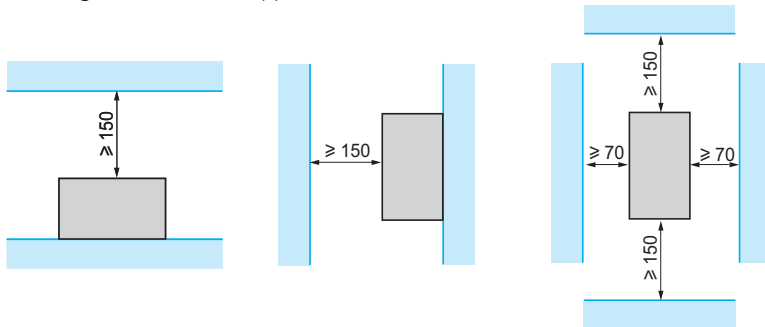


VW3	a	a1	G
A4 605, 606, 623...625, 645, 646, 664, 665	698	600	532.5
A4 607...609, 626, 627, 647, 648, 666	938	840	772.5

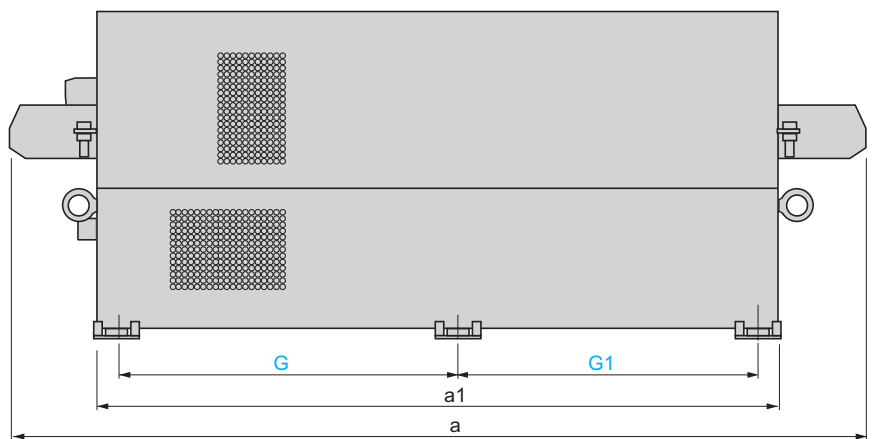
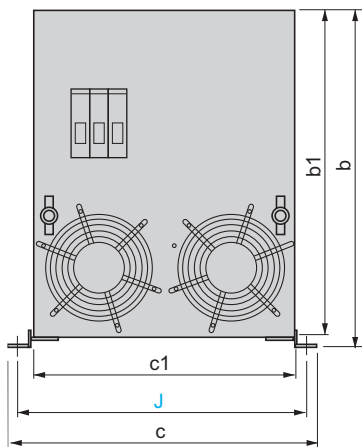
(1) Vertical mounting only

Passive filters VW3 A4 610...613, 619, 628...633, 639, 649...651, 656, 657, 667...671, 676, 677 (continued)

Mounting recommendations (1)

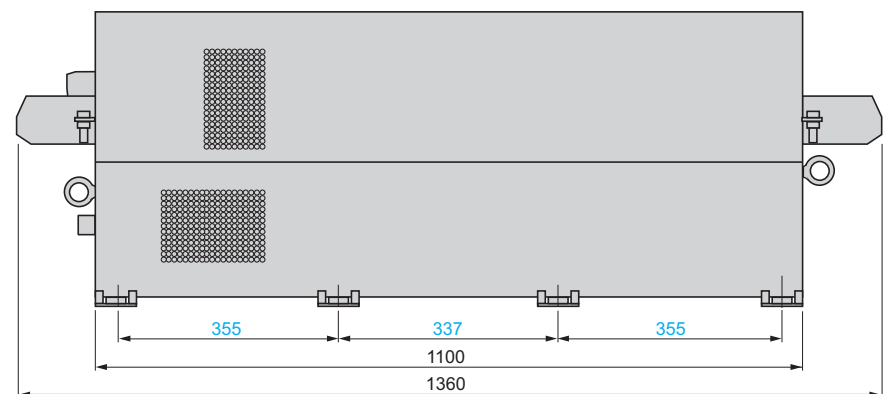
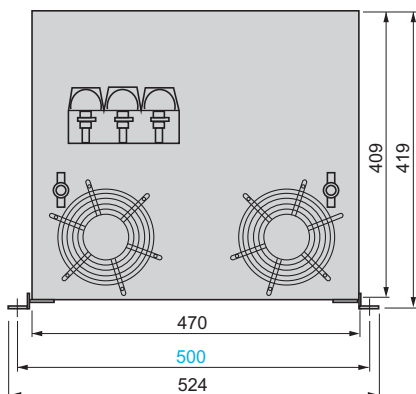


VW3 A4 610...613, 619, 628...632, 639, 649...651, 656, 657, 667...670, 676, 677



VW3	a	a1	b	b1	c	c1	G	G1	J
A4 610, 611, 628, 629, 649, 667, 668	1060	830	400	390	393	345	395	377	370
A4 612, 619, 630, 631, 650, 656, 657, 669	1160	900	419	409	454	406	430	412	430
A4 613, 632, 639, 651, 670, 676, 677	1330	1070	419	409	454	406	515	497	430

VW3 A4 633, 671

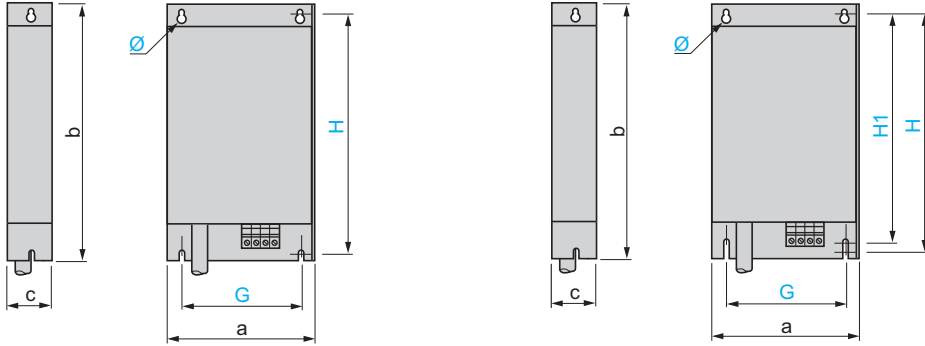


(1) Horizontal or vertical mounting

Additional EMC input filters

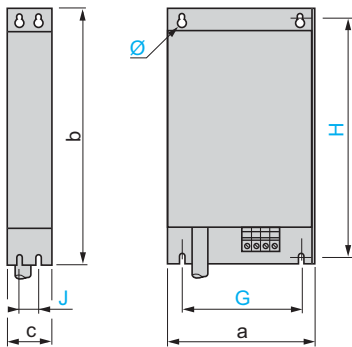
VW3 A4 401...404

VW3 A4 405, 409



VW3	a	b	c	G	H	H1	Ø
A4 401	130	290	40	105	275	–	4.5
A4 402	155	324	50	130	309	–	4.5
A4 403	175	370	60	150	355	–	6.5
A4 404	210	380	60	190	365	–	6.5
A4 405	230	498.5	62	190	479.5	460	6.5
A4 409	230	498.5	62	190	479.5	460	6.5

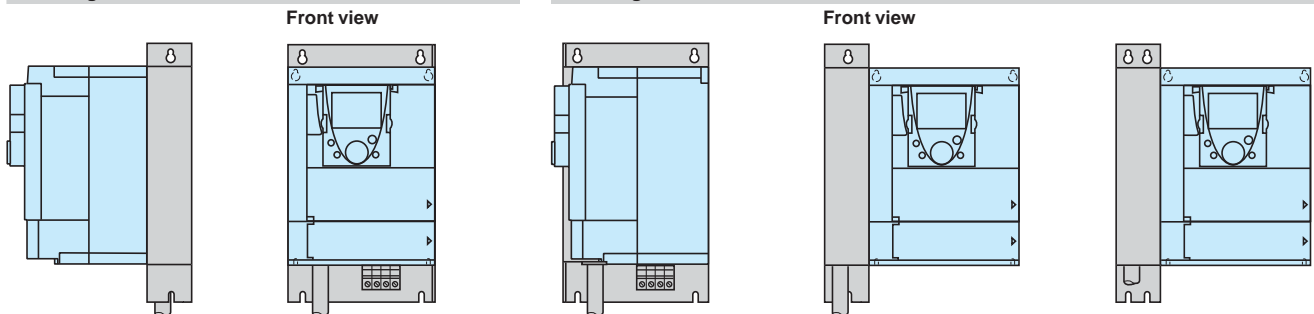
VW3 A4 406...408



VW3	a	b	c	G	H	J	Ø
A4 406	240	522	79	200	502.5	40	9
A4 407	240	650	79	200	631	40	9
A4 408	320	750	119	280	725	80	9

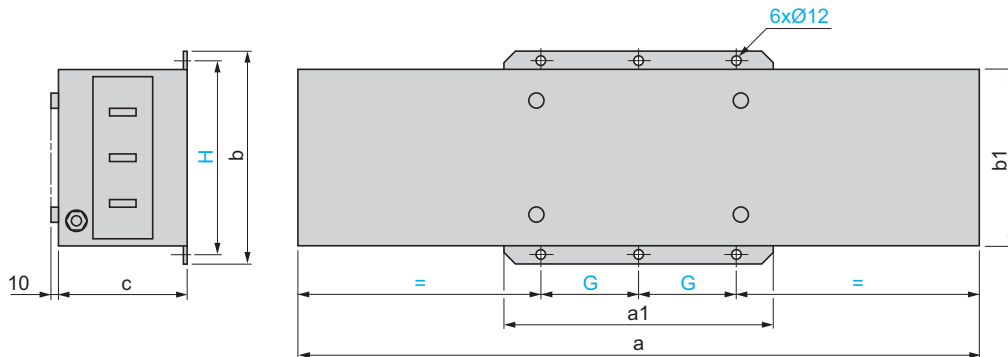
Mounting the filter under the drive

Mounting the filter next to the drive



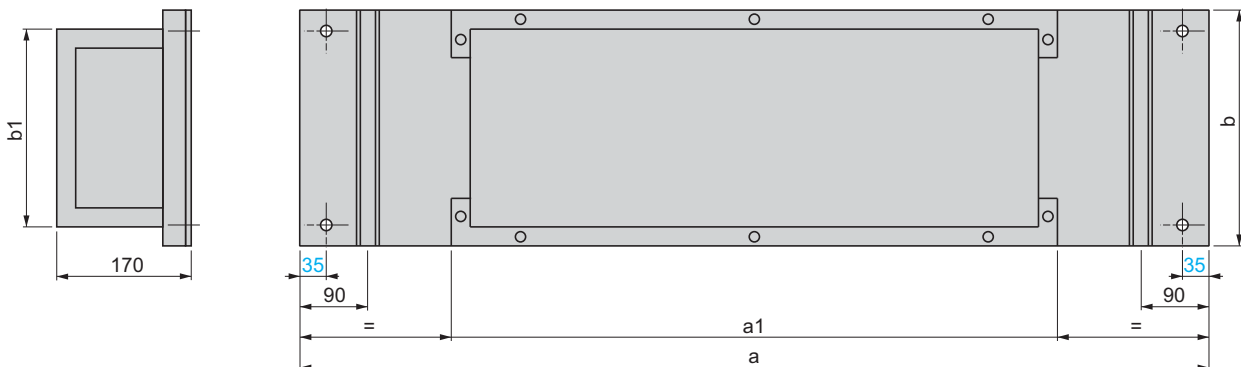
Additional EMC input filters (continued)

VW3 A4 410...413



VW3	a	a1	b	b1	c	G	H
A4 410	800	302	261	219	139	120	235
A4 411	800	302	261	219	139	120	235
A4 412	900	352	281	239	174	145	255
A4 413	1000	401	301	259	164	170	275

IP 30 protection kits for filters VW3 A4 410...413

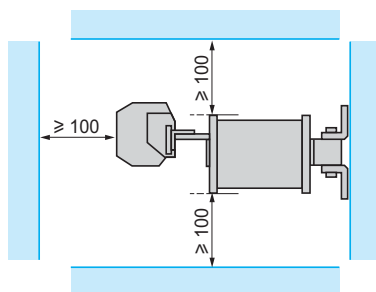
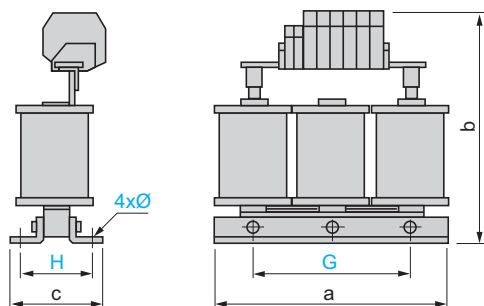


VW3	a	a1	b	b1
A9 601	1200	800	310	270
A9 602	1400	1000	350	310

Motor chokes (1)

VW3 A5 101, 102

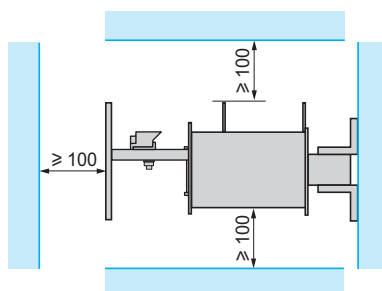
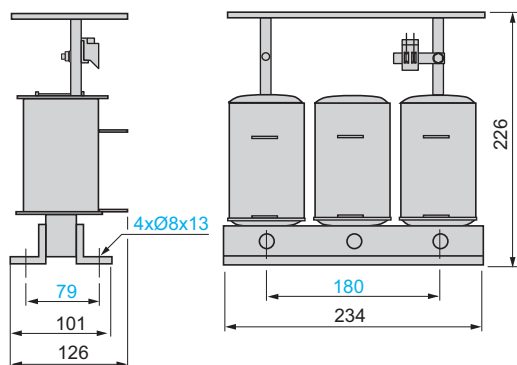
Mounting recommendations (2)



VW3	a	b	c	G	H	Ø
A5 101	190	210	90	170	45	8 x 12
A5 102	190	235	120	170	48	8 x 12

VW3 A5 103

Mounting recommendations (2)

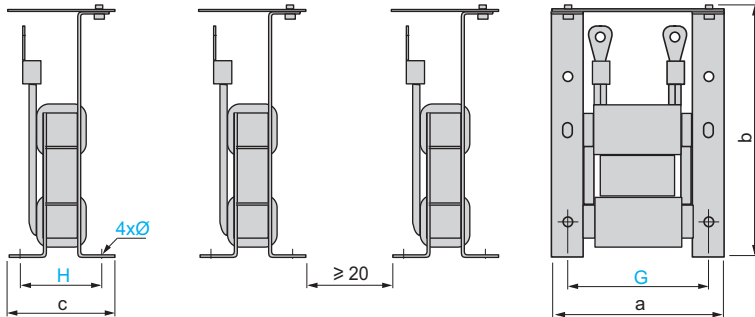


(1) It is absolutely essential that the motor chokes are mounted on a metal support (grille, frame, etc.)

(2) Because of the magnetic field and/or the heat dissipation, it is essential to follow the mounting recommendations provided.

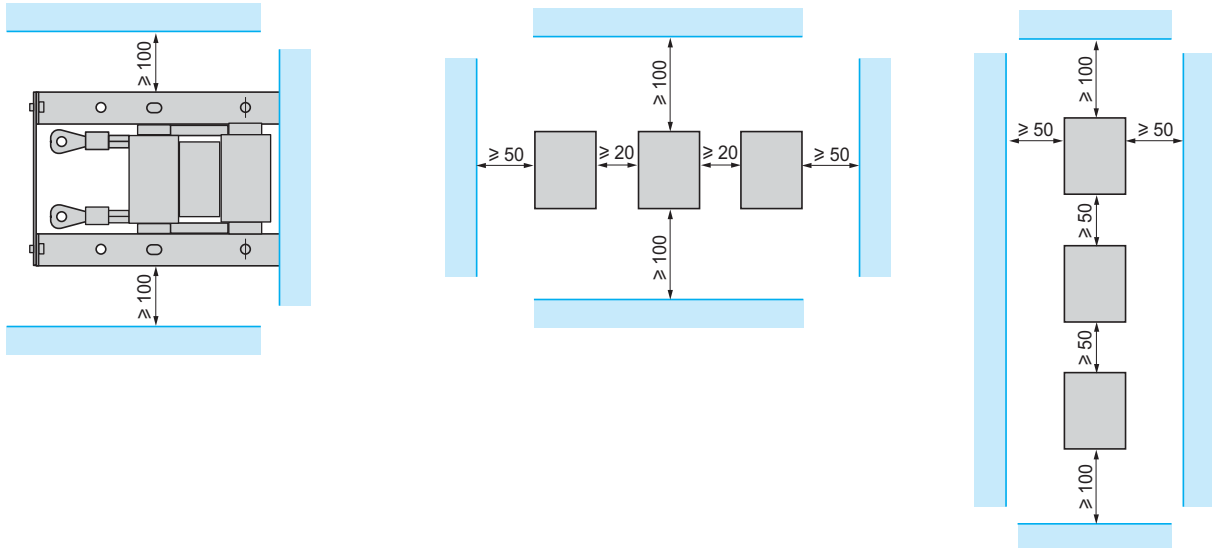
Motor chokes (continued) (1)

VW3 A5 104, 105 (2)



VW3	a	b	c	G	H	Ø
A5 104	170	250	100	150	75	9 x 13
A5 105	210	250	110	175	75	9 x 13

Mounting recommendations (3)



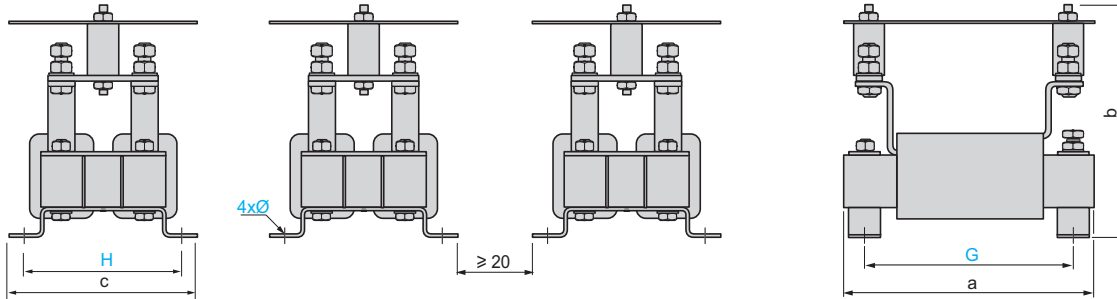
(1) It is absolutely essential that the motor chokes are mounted on a metal support (grille, frame, etc.)

(2) References VW3 A5 104 and 105 comprise 3 components.

(3) Because of the magnetic field and/or the heat dissipation, it is essential to follow the mounting recommendations provided.

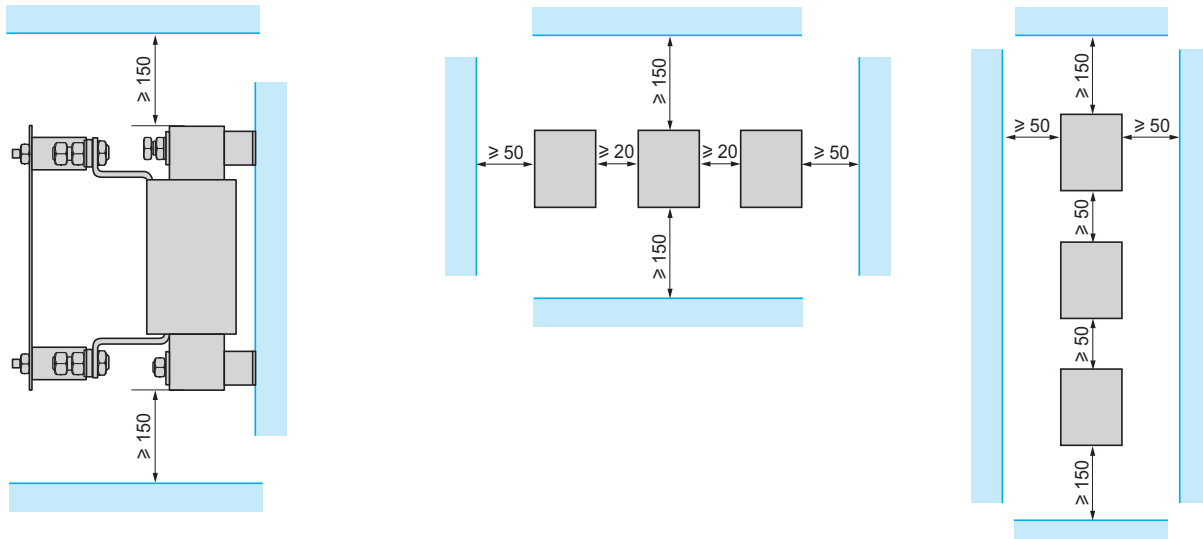
Motor chokes (continued) (1)

VW3 A5 106...108 (2)



VW3	a	b	c	G	H	Ø
A5 106	245	250	200	225	175	9 x 13
A5 107	315	250	210	275	200	9 x 13
A5 108	370	250	230	325	200	9 x 13

Mounting recommendations (3)

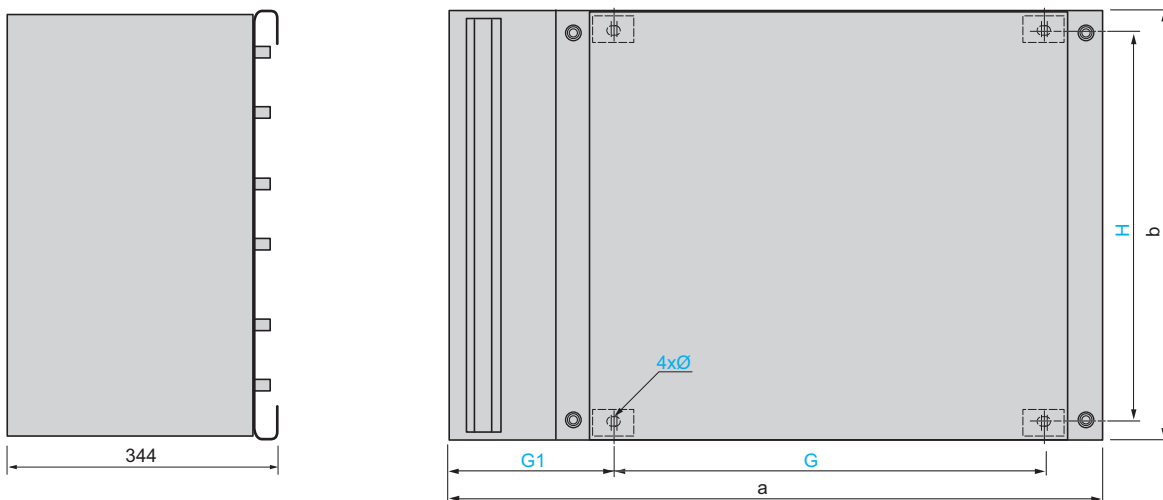


(1) It is absolutely essential that the motor chokes are mounted on a metal support (grille, frame, etc.)

(2) References VW3 A5 106...108 comprise 3 components.

(3) Because of the magnetic field and/or the heat dissipation, it is essential to follow the mounting recommendations provided.

IP 20 protection kits for chokes VW3 A5 104...108

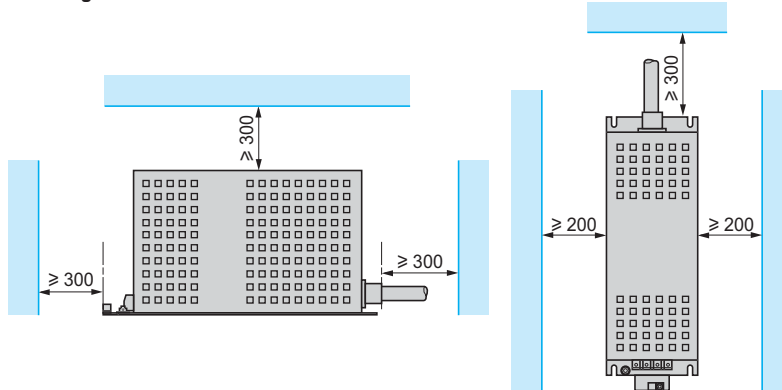
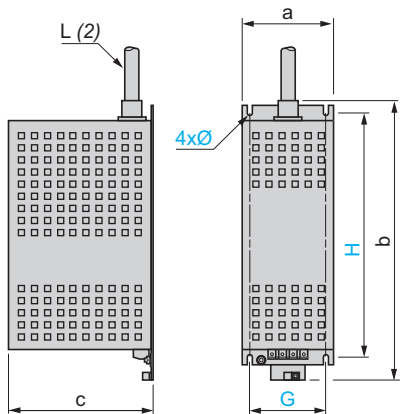


VW3	a	b	G	G1	H	Ø
A9 612	780	580	530	190	526	10 x 15
A9 613	1180	780	800	200	726	10 x 15

Sinus filters (1)

VW3 A5 201...206

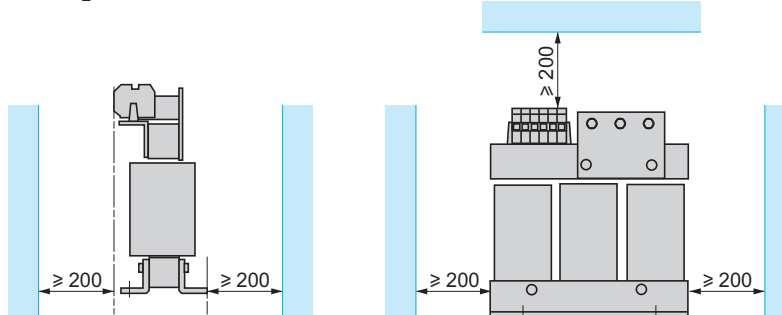
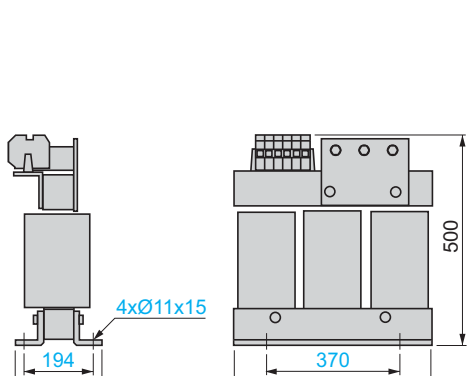
Mounting recommendations



VW3	a	b	c	G	H	Ø	L (2)
A5 201	120	335	160	100	280	6.6	700
A5 202	120	405	190	100	350	6.6	900
A5 203	150	470	240	120	380	6.6	900
A5 204	210	650	280	160	530	8.6	1500
A5 205	250	780	360	200	650	11	1600
A5 206	310	1060	375	220	880	11	2700

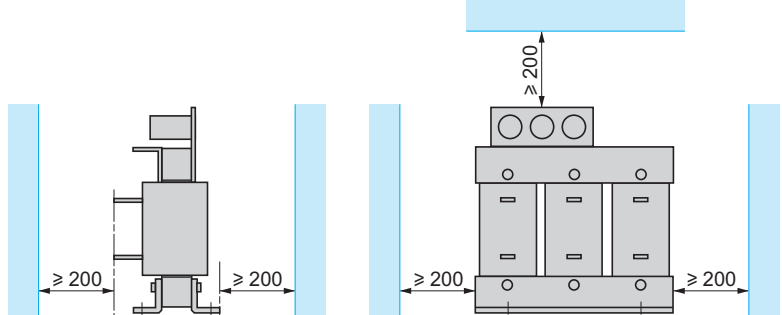
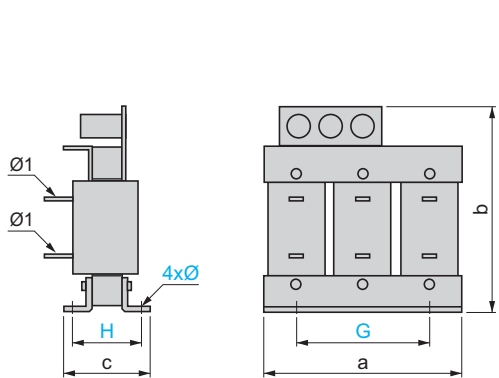
VW3 A5 207

Mounting recommendations



VW3 A5 208...211

Mounting recommendations



VW3	a	b	c	G	H	Ø	Ø1
A5 208	420	500	345	370	231	11 x 15	11
A5 209	480	600	340	430	238	13 x 18	11
A5 210	480	710	370	430	258	13 x 18	14
A5 211	620	930	500	525	352	13 x 22	4 x Ø11

(1) Sinus filters emit considerable heat and must not be placed underneath the drive.
 (2) Length of the cable integrated in the sinus filter.

“Power Removal” safety function

The Altivar 71 drive integrates the “Power Removal” safety function which prohibits unintended equipment operation. The motor no longer produces torque.

This safety function:

- Complies with the standard for safety of machinery EN 954-1, category 3
- Complies with operational safety standard IEC/EN 61508, SIL2 capability (safety control-signalling applied to processes and systems)

The SIL (Safety Integrity Level) capability depends on the connection scheme for the drive and for the safety function. Failure to observe the setup recommendations could inhibit the SIL capability of the “Power Removal” safety function.

- Complies with draft product standard IEC/EN 61800-5-2 for the two stop functions:
 - Safe Torque Off (“STO”): response time ≤ 100 ms
 - Safe Stop 1 (“SS1”)

The “Power Removal” safety function has a redundant electronic architecture ⁽¹⁾ which is monitored continuously by a diagnostics function.

This level SIL2 and category 3 safety function is certified as conforming to these standards by the INERIS certification body under a program of voluntary certification.

Categories relating to safety according to EN 954-1

Category	Basic safety principle	Control system requirements	Behaviour in the event of a fault
B	Selection of components that comply with the relevant standards	Control in accordance with good engineering practice	Possible loss of the safety function
1	Selection of components and safety principles	Use of tried and tested components and proven safety principles	Possible loss of the safety function with a lower probability than in B
2	Selection of components and safety principles	Cyclic testing. The test intervals must be appropriate to both the machine and its application	Fault detected at each test
3	Structure of the safety circuits	A single fault must not result in loss of the safety function. This single fault must be detected, if reasonably practicable	Safety function ensured, except in the event of an accumulation of faults
4	Structure of the safety circuits	A single fault must not result in loss of the safety function. This fault must be detected when or before the safety function is next invoked. An accumulation of faults must not result in loss of the safety function.	Safety function always ensured

The machinery manufacturer is responsible for selecting the safety category. The category depends of the level of risk factors given in standard EN 954-1.

Note: The Altivar 71 drive can be used up to category 3

Safety Integrity Levels (SIL) according to standard IEC/EN 61508

SIL1 according to standard IEC/EN 61508 is comparable with category 1 according to EN 954-1 (SIL1: mean probability of undetected hazardous failure per hour between 10^{-5} and 10^{-6}).

SIL2 according to standard IEC/EN 61508 is comparable with category 3 according to EN 954-1 (SIL2: mean probability of undetected hazardous failure per hour between 10^{-6} and 10^{-7}).

⁽¹⁾ Redundant: consists of mitigating the effects of failure of one component by means of the correct operation of another, assuming that faults do not occur simultaneously on both.

“Power Removal” safety function considerations

The “Power Removal” safety function cannot be considered as a means of electrical disconnection of the motor (no electrical isolation); if necessary, a Vario switch disconnecter must be used.

The “Power Removal” safety function is not designed to overcome any malfunction in the drive process control or application functions.

The output signals available on the drive must not be considered as safety signals (e.g. “Power Removal” active); these are Preventa-type safety module outputs which must be integrated into a safety control-signalling circuit.

The schemes on the following pages take into account conformity to standard IEC/EN 60204-1 which defines three stopping categories:

- Category 0: Stopping by immediate removal of the power from the actuators (e.g. uncontrolled stop)
- Category 1: Controlled stop maintaining the power on the actuators until the machine stops, then removal of the power when the actuators stop when stop is achieved
- Category 2: Controlled stop maintaining the power on the actuators

Connection schemes and applications**Conforming to category 1 of standard EN 954-1 and level SIL1 according to standard IEC/EN 61508**

Use of the connection schemes on pages 222 and 223 which use a line contactor or a Vario switch disconnecter between the drive and the motor.

In this case, the “Power Removal” safety function is not used and the motor stops in accordance with category 0 of standard IEC/EN 60204-1.

Conforming to category 3 of standard EN 954-1 and level SIL2 according to standard IEC/EN 61508

The connection schemes use the “Power Removal” safety function of the Altivar 71 drive combined with a Preventa safety module to monitor the emergency stop circuits.

Machines with short freewheel stopping times (low inertia or high resistive torque, see page 224).

When the activation command is given on the PWR input with the controlled motor, the motor power supply is immediately switched off and the motor stops according to category 0 of standard IEC/EN 60204-1.

Restarting is not permitted even when the activation command is given after the motor has come to a complete stop (“STO”).

This safe stop is maintained while the PWR input remains activated.

This scheme must also be used for hoisting applications.

On a “Power Removal” command, the drive requires the brake to be engaged, but a Preventa safety module contact must be inserted in series in the brake control circuit to engage it safely when a request is made to activate the “Power Removal” safety function.

Machines with long freewheel stopping times (high inertia or low resistive torque, see page 225).

When the activation command is given, deceleration of the motor controlled by the drive is first requested, then, following a time delay controlled by a Preventa-type fault relay (1) which corresponds to the deceleration time, the “Power Removal” safety function is activated by the PWR input. The motor stops according to category 1 of standard IEC/EN 60204-1 (“SS1”).

Periodic test

The “Power Removal” safety input must be activated at least once a year for preventive maintenance purposes. The drive must be switched off before preventive maintenance takes place, and then powered up again. If the power supply to the motor is not switched off during testing, safety integrity is no longer assured for the “Power Removal” safety function. The drive must therefore be replaced to ensure the operational safety of the machine or of the system process.

(1) Please refer to the “Safety solutions using Preventa” catalogue.

Applications in a potentially explosive atmosphere (ATEX)**Classification of zones**

European directive 1999/92/EC (referred to as the ATEX 137 directive, or worker protection directive) classifies the ATEX zones and compatible product types. It is the user's responsibility to define the ATEX zone where the ATEX motor controlled by the Altivar 71 variable speed drive will be installed.

The Altivar 71 variable speed drive must always be installed outside the hazardous ATEX zone. The various installation schemes proposed in the ATEX guide (1) are compatible with operation of the ATEX motor in zone 1, 21, 2 or 22. The table below summarizes the characteristics relating to each ATEX zone.

Atmosphere	Zone	Definition	Time and presence of explosive atmosphere Hours/year
Gas	0	The potentially explosive atmosphere is present permanently, or over long periods, or frequently owing to malfunctions	> 1000 hr
Dust	20		
Gas	1	The potentially explosive atmosphere can be present owing to probable malfunctions	10...1000 hr
Dust	21		
Gas	2	The presence of a potentially explosive atmosphere is unlikely, and if it occurs it is for a short duration and not during normal operation	< 10 hr
Dust	22		

Note: Installation of electrical equipment and motors is prohibited in ATEX zone 0 or 20.

General considerations

European directive 94/9/EC (also referred to as directive ATEX 95, or product directive) defines the constraints applicable to ATEX products and the associated certification requirements.

The OEM, the installer and the user are responsible for the selection and operation of the components they use to provide ATEX protection of the systems they design or operate:

- The motor must be ATEX certified and compatible with use in zone 1, 21, 2 or 22
 - The motor must be equipped with ATEX certified thermal sensor switch(es), or ATEX certified thermal sensor(s), associated with a control unit, itself ATEX certified.
- Caution:** In general the control units are designed to operate outside the hazardous ATEX zone. It is then possible to place these control units close to the variable speed drive, in the protected zone.

Thermal protection of the ATEX motor

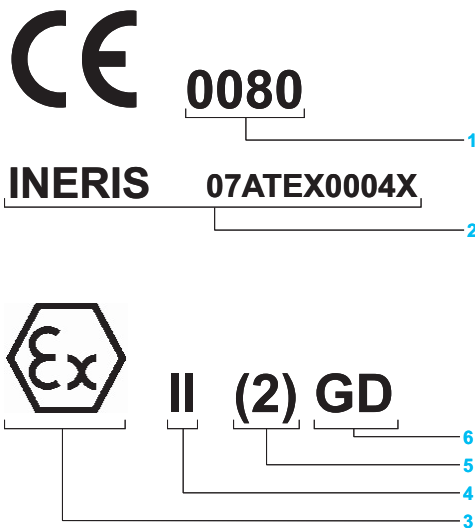
Use of the "Power Removal" safety function enables the variable speed drive to provide thermal protection in the event of excessive temperature rise of the ATEX motor, but it does not enable it to safely control and regulate the temperature of the ATEX motor.

All motor types ATEX certified for use in zone 1, 21, 2 or 22, which are equipped with ATEX thermal sensors, can be protected by the Altivar 71 variable speed drive.

The switching device, integrated with the thermal sensor or integrated with the thermal protection control unit of the ATEX motor, must be connected to the PWR safety input of the Altivar 71 variable speed drive. When the excessive temperature of the ATEX motor is reached, the control device automatically triggers the "Power Removal" safety function. The electrical power supply of the motor is then switched off in order to ensure a temperature of the motor casing lower than the temperature that is dangerous for the gas or dust mixture in which the ATEX motor is installed. When the ATEX application requires the use of the "Power Removal" safety function, the safety module (of Preventa type) (2) must be used. The schemes proposed in the ATEX guide (1) show how the switching devices, integrated with the thermal sensor or with the thermal protection control unit, are connected to the safety module. The output of the safety module must be connected to the PWR safety input of the Altivar 71 variable speed drive.

(1) Please consult the ATEX guide, available on our website "www.telemecanique.com"

(2) Please refer to the "Safety solutions using Preventa" catalogue.

**ATEX marking identification**

ATEX certified Altivar 71 variable speed drives can be identified by the marking corresponding to all the applications covered by the drive's ATEX certification.

- 1 0080** corresponds to the identification number of the INERIS notified body that issued the notifications for the quality assurance systems for the drive production units in compliance with EN 50980.
- 2 INERIS 07ATEX0004X** corresponds to the identification of the certification report issued by the INERIS notified body for conformity of the variable speed drive with the requirements of ATEX directive 94/9/EC.
- 3 Ex** The logo corresponds to the identification of an ATEX product
- 4 II** allows the equipment to be used in ATEX surface applications (use prohibited for mining applications).
- 5 (2)** The brackets “()” identify the Altivar 71 variable speed drive as being equipment associated with the control and signalling of an ATEX motor installed in a hazardous zone. The figure 2 corresponds to identification of the ATEX motor as category 2 equipment, for use in ATEX zone 1 or 21.
Note: Category 3 motors for use in ATEX zone 2 or 22 are also covered by this marking.
- 6 G** for Gas, corresponds to ATEX applications for explosive gas atmospheres.
D for Dust, corresponds to ATEX applications for atmospheres containing an explosive dust mixture.

General

Operation of the equipment and the cable connection method must comply with the local regulations in the installation location. The rules given by ATEX installation standards, when applicable, should also be observed:

- IEC 60079-14 for applications in an explosive gas atmosphere
 - IEC 61241-14 for applications in a combustible dust atmosphere
- In zone 1 or 2, for applications in an explosive gas atmosphere, the requirements of IEC 60079-14 apply to the installation:

- **IEC 60079-14:** Electrical apparatus for explosive gas atmospheres
- **Part 14:** Electrical installations in hazardous areas (other than mines).

In zone 21 or 22, for applications in a combustible dust atmosphere, the requirements of IEC 61241-14 apply to the installation:

- **IEC 61241-14:** Electrical apparatus for use in the presence of combustible dust
- **Part 14:** Selection and installation.

The schemes proposed in the ATEX guide (1) for the use of Altivar 71 variable speed drives in ATEX applications take account of the nature of the thermal sensors mounted in the ATEX motor.

Note: Motor stopping categories according to standard IEC/EN 60204-1

The installation schemes proposed in the ATEX guide (1) show the use of the Preventa XPS-AC safety module (2) in combination with an ATEX application for implementing the safety function in stopping category 0 according to standard IEC/EN 60204-1.

The user should make sure that use of the delayed activation fault relay (Preventa XPS-ATE module) (2) is compatible in combination with its ATEX application, for stopping category 1 according to standard IEC/EN 60204-1.

Periodic ATEX test

For preventive maintenance, the complete safety loop (starting from the thermal sensors of the ATEX motor up to the “Power Removal” safety function incorporated in the drive) must be tested at least once a year, in order to verify that, in the event of excessive temperature rise, the electrical power supply of the ATEX motor is always cut off automatically.

(1) Please consult the ATEX guide, available on our website “www.telemecanique.com”

(2) Please refer to the “Safety solutions using Preventa” catalogue.

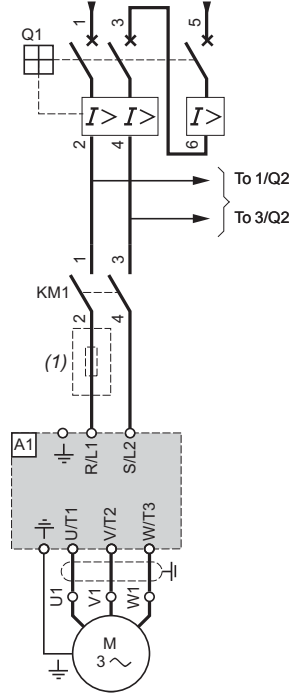
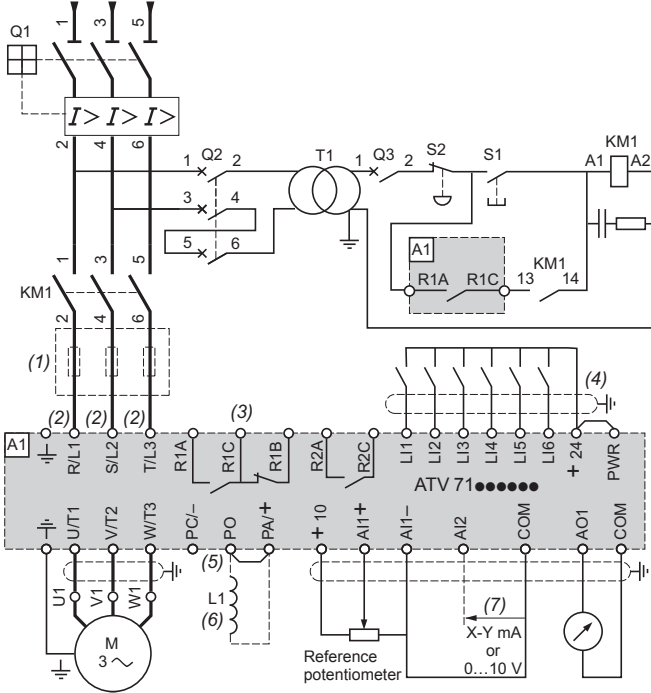
Schemes conforming to standards EN 954-1 category 1, IEC/EN 61508 capacity SIL1, in stopping category 0 according to IEC/EN 60204-1

ATV 71H●●●M3, ATV 71H●●●M3X, ATV 71●●●N4, ATV 71H●●●Y, ATV 71P●●●N4Z

Three-phase power supply with upstream breaking via contactor

ATV 71H075M3...HU75M3

Power section for single-phase power supply



Note: All terminals are located at the bottom of the drive. Fit interference suppressors on all inductive circuits near the drive or connected on the same circuit, such as relays, contactors, solenoid valves, fluorescent lighting, etc.

Components for use with the Altivar (for a complete list of references, see our catalogue "Motor starter solutions. Control and protection components").

Item	Description
A1	ATV 71 drive, see pages 22 to 25
KM1	Contactors, see motor starters pages 242 to 249
L1	DC choke, see page 155
Q1	Circuit-breaker, see motor starters pages 242 to 249
Q2	GV2 L rated at twice the nominal primary current of T1
Q3	GB2 CB05
S1, S2	XB4 B or XB5A pushbuttons
T1	100 VA transformer 220 V secondary

(1) Line choke (single phase or three-phase); mandatory for ATV 71HU40M3...HU75M3 drives with a 200...240 V 50/60 Hz single-phase power supply and ATV 71HC11Y...HC63Y (except when a special transformer is used (12-pulse)). See page 160.

(2) For ATV 71HC40N4 drives combined with a 400 kW motor, ATV 71HC50N4 and ATV 71HC40Y...HC63Y, see page 226.

(3) Fault relay contacts. Used for remote signalling of the drive status.

(4) Connection of the common for the logic inputs depends on the positioning of the SW1 switch: see schemes on page 227.

(5) There is no PO terminal on ATV 71HC11Y...HC63Y drives.

(6) Optional DC choke for ATV 71H●●●M3, ATV 71HD11M3X...HD45M3X, ATV 71●075N4...D75N4 and ATV 71P●●●N4Z. Connected in place of the strap between the PO and PA/+ terminals. For ATV 71HD55M3X, HD75M3X, ATV 71HD90N4...HC50N4 drives, the choke is supplied with the drive; the customer is responsible for connecting it.

(7) Software-configurable current (0...20 mA) or voltage (0...10 V) analog input.

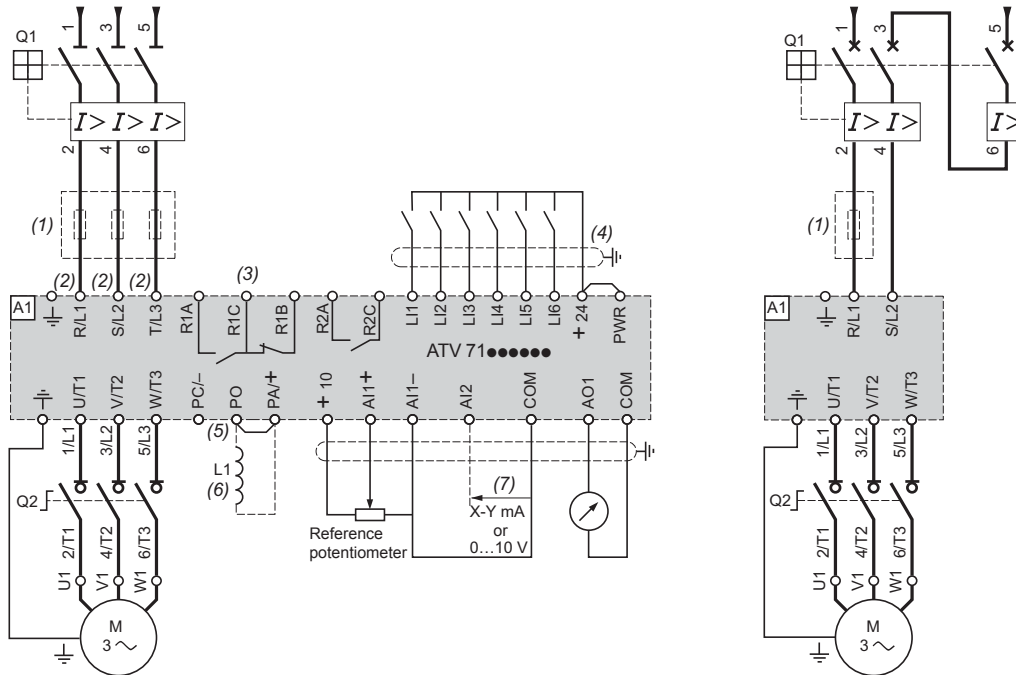
Schemes conforming to standards EN 954-1 category 1, IEC/EN 61508 capacity SIL1, in stopping category 0 according to IEC/EN 60204-1 (continued)

ATV 71H●●●M3, ATV 71H●●●M3X, ATV 71●●●●N4, ATV 71H●●●Y,
ATV 71P●●●N4Z

ATV 71H075M3...HU75M3

Three-phase power supply with downstream breaking via switch disconnector

Power section for single-phase power supply



Note: All terminals are located at the bottom of the drive. Fit interference suppressors on all inductive circuits near the drive or connected on the same circuit, such as relays, contactors, solenoid valves, fluorescent lighting, etc.

Components for use with the Altivar (for a complete list of references, see our catalogue "Motor starter solutions. Control and protection components").

Item	Description
A1	ATV 71 drive, see pages 22 to 25
L1	DC choke, see page 155
Q1	Circuit-breaker, see motor starters pages 242 to 249
Q2	Switch disconnector (Vario)

(1) Line choke (single phase or three-phase), mandatory for ATV 71HU40M3...HU75M3 drives with a 200...240 V 50/60 Hz single-phase power supply and ATV 71HC11Y...HC63Y (except when a special transformer is used (12-pulse)). See page 160.

(2) For ATV 71HC40N4 drives combined with a 400 kW motor, ATV 71HC50N4 and ATV 71HC40Y...HC63Y, see page 226.

(3) Fault relay contacts. Used for remote signalling of the drive status.

(4) Connection of the common for the logic inputs depends on the positioning of the SW1 switch: see schemes on page 227.

(5) There is no PO terminal on ATV 71HC11Y...HC63Y drives.

(6) Optional DC choke for ATV 71H●●●M3, ATV 71HD11M3X...HD45M3X, ATV 71●075N4...●D75N4 and ATV 71P●●●N4Z. Connected in place of the strap between the PO and PA/+ terminals. For ATV 71HD55M3X, HD75M3X, ATV 71HD90N4...HC50N4 drives, the choke is supplied with the drive; the customer is responsible for connecting it.

(7) Software-configurable current (0...20 mA) or voltage (0...10 V) analog input.

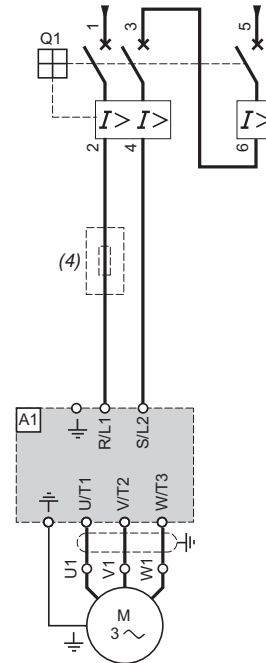
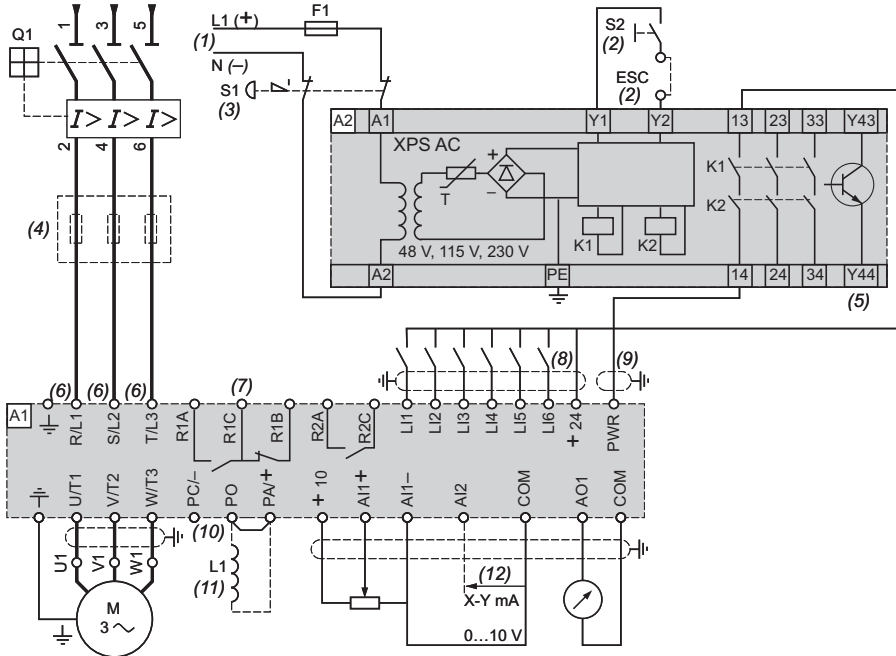
Schemes conforming to standards EN 954-1 category 3, IEC/EN 61508 capacity SIL2, in stopping category 0 according to IEC/EN 60204-1

ATV 71H●●●M3, ATV 71H●●●M3X, ATV 71●●●N4, ATV 71H●●●Y, ATV 71P●●●N4Z

Three-phase power supply, low inertia machine, vertical movement

ATV 71H075M3...HU75M3

Power section for single-phase power supply



Note: All terminals are located at the bottom of the drive. Fit interference suppressors on all inductive circuits near the drive or connected on the same circuit, such as relays, contactors, solenoid valves, fluorescent lighting, etc.

Components for use with the Altivar (for a complete list of references, see our catalogues "Motor starter solutions. Control and protection components" and "Safety solutions using Preventa").

Item	Description
A1	ATV 71 drive, see pages 22 to 25
A2	Preventa XPS AC safety module for monitoring emergency stops and switches. One safety module can manage the "Power Removal" function for several drives on the same machine. In this case, each drive must connect its PWR terminal to its + 24 V via the safety contacts on the XPS AC module. These contacts are independent for each drive.
F1	Fuse W
L1	DC choke, see page 155
Q1	Circuit-breaker, see motor starters pages 242 to 249
S1	Emergency stop button with 2 contacts
S2	XB4 B or XB5 A pushbutton

- (1) Power supply: 24 V $\overline{\text{---}}$ or \sim , 48 V \sim , 115 V \sim , 230 V \sim .
- (2) S2: resets XPS AC module on power-up or after an emergency stop. ESC can be used to set external starting conditions.
- (3) Requests freewheel stopping of the movement and activates the "Power Removal" safety function.
- (4) Line choke (single phase or three-phase), mandatory for ATV 71HU40M3...HU75M3 drives with a 200...240 V 50/60 Hz single-phase power supply and ATV 71HC11Y...HC63Y (except when a special transformer is used (12-pulse)). See page 160.
- (5) The logic output can be used to signal that the machine is in a safe stop state.
- (6) For ATV 71HC40N4 drives combined with a 400 kW motor, ATV 71HC50N4 and ATV 71HC40Y...HC63Y, see page 226.
- (7) Fault relay contacts. Used for remote signalling of the drive status.
- (8) Connection of the common for the logic inputs depends on the positioning of the SW1 switch: see schemes on page 227.
- (9) Standardized coaxial cable, type RG174/U according to MIL-C17 or KX3B according to NF C 93-550, external diameter 2.54 mm, maximum length 15 m. The cable shielding must be earthed.
- (10) There is no PO terminal on ATV 71HC11Y...HC63Y drives.
- (11) Optional DC choke for ATV 71H●●●M3, ATV 71HD11M3X...HD45M3X, ATV 71●075N4...●D75N4 and ATV 71P●●●N4Z. Connected in place of the strap between the PO and PA+ terminals. For ATV 71HD55M3X, HD75M3X, ATV 71HD90N4...HC50N4 drives, the choke is supplied with the drive; the customer is responsible for connecting it.
- (12) Software-configurable current (0...20 mA) or voltage (0...10 V) analog input.

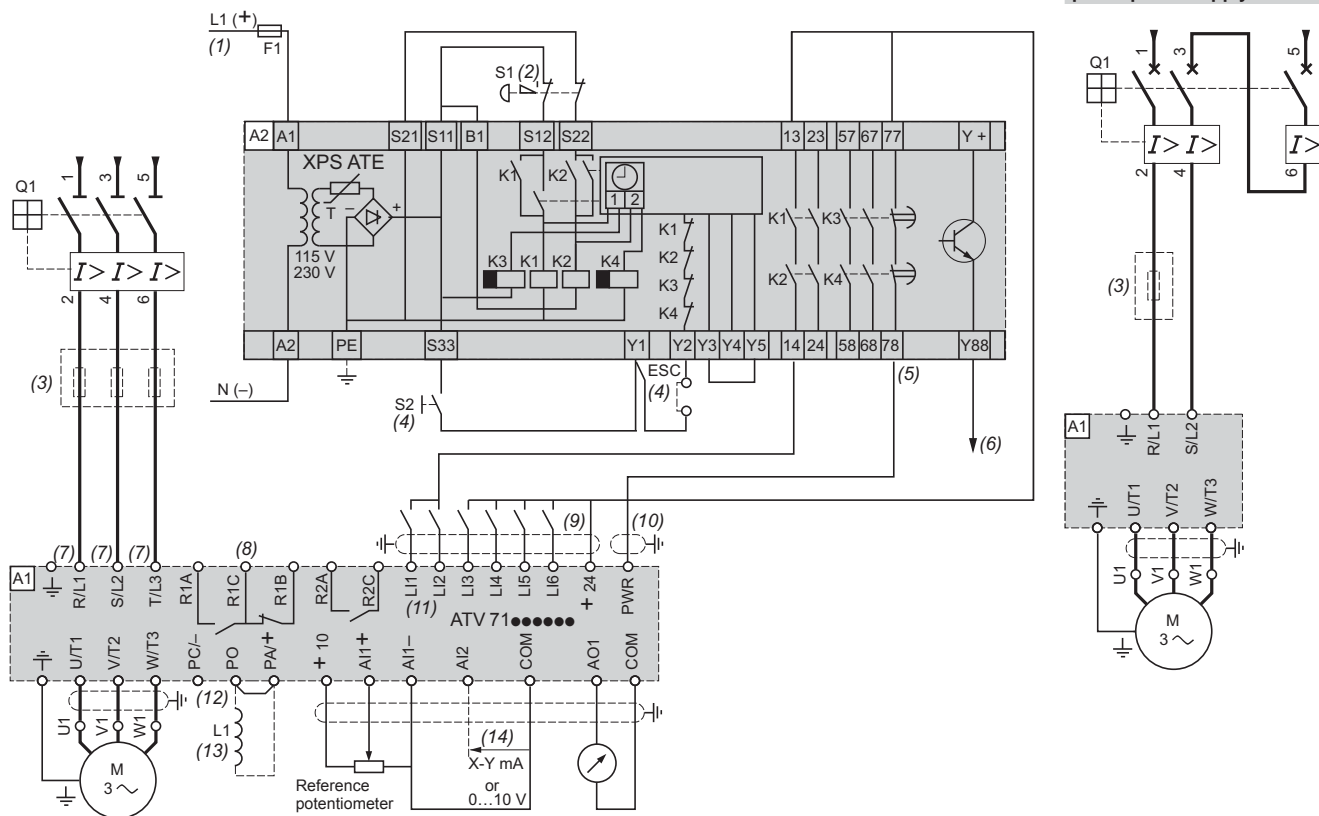
Schemes conforming to standards EN 954-1 category 3, IEC/EN 61508 capacity SIL2, in stopping category 1 according to IEC/EN 60204-1

ATV 71H●●●M3, ATV 71H●●●M3X, ATV 71H●●●N4, ATV 71H●●●Y, ATV 71P●●●N4Z

Three-phase power supply, high inertia machine

ATV 71H075M3...HU75M3

Power section for single-phase power supply



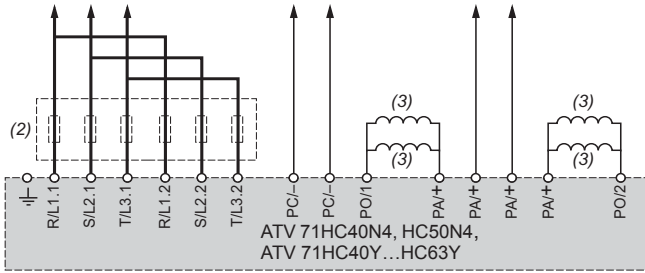
Note: All terminals are located at the bottom of the drive. Fit interference suppressors on all inductive circuits near the drive or connected on the same circuit, such as relays, contactors, solenoid valves, fluorescent lighting, etc.

Components for use with the Altivar (for a complete list of references, see our catalogues "Motor starter solutions. Control and protection components" and "Safety solutions using Preventa").

Item	Description
A1	ATV 71 drive, see pages 22 to 25
A2 (5)	Preventa XPS ATE safety module for monitoring emergency stops and switches. One safety module can manage the "Power Removal" safety function for several drives on the same machine. In this case the time delay must be adjusted on the drive controlling the motor that requires the longest stopping time. In addition, each drive must connect its PWR terminal to its + 24 V via the safety contacts on the XPS ATE module. These contacts are independent for each drive.
F1	Fuse
L1	DC choke, see page 155
Q1	Circuit-breaker, see motor starters pages 242 to 249
S1	Emergency stop button with 2 N/C contacts
S2	Run button

- (1) Power supply: 24 V $\overline{\text{---}}$ or \sim , 115 V \sim , 230 V \sim .
- (2) Requests controlled stopping of the movement and activates the "Power Removal" safety function.
- (3) Line choke (single phase or three-phase), mandatory for ATV 71HU40M3...HU75M3 drives with a 200...240 V 50/60 Hz single-phase power supply and ATV 71HC11Y...HC63Y (except when a special transformer is used (12-pulse)). See page 160.
- (4) S2: resets XPS ATE module on power-up or after an emergency stop. ESC can be used to set external starting conditions.
- (5) For stopping times requiring more than 30 seconds in category 1, use a Preventa XPS AV safety module which can provide a maximum time delay of 300 seconds.
- (6) The logic output can be used to signal that the machine is in a safe state.
- (7) For ATV 71HC40N4 drives combined with a 400 kW motor, ATV 71HC50N4 and ATV 71HC40Y...HC63Y, see page 226.
- (8) Fault relay contacts. Used for remote signalling of the drive status.
- (9) Connection of the common for the logic inputs depends on the positioning of the SW1 switch: see schemes on page 227.
- (10) Standardized coaxial cable, type RG174/U according to MIL-C17 or KX3B according to NF C 93-550, external diameter 2.54 mm, maximum length 15 m. The cable shielding must be earthed.
- (11) Logic inputs LI1 and LI2 must be assigned to the direction of rotation: LI1 in the forward direction and LI2 in the reverse direction.
- (12) There is no PO terminal on ATV 71HC11Y...HC63Y drives.
- (13) Optional DC choke for ATV 71H●●●M3, ATV 71HD11M3X...HD45M3X, ATV 71●075N4...●D75N4 and ATV 71P●●●N4Z. Connected in place of the strap between the PO and PA/+ terminals. For ATV 71HD55M3X, HD75M3X, ATV 71HD90N4...HC50N4 drives, the choke is supplied with the drive; the customer is responsible for connecting it.
- (14) Software-configurable current (0...20 mA) or voltage (0...10 V) analog input.

Power terminal connections for ATV 71HC40N4 combined with a 400 kW motor, ATV 71HC50N4, ATV 71HC40Y... HC63Y



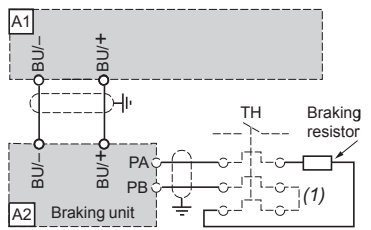
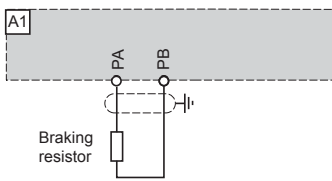
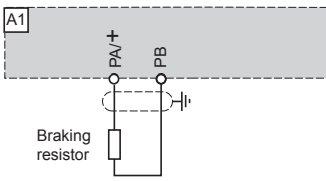
(1) For control section connections, see pages 222 to 225
 (2) Line chokes, see page 160 ; these are mandatory for ATV 71HC40Y...HC63Y, to be ordered separately.
 (3) DC chokes supplied as standard with ATV 71HC40N4, HC50N4 drives. Not available for ATV 71HC40Y...HC63Y.

VW3 A7 7●● braking resistors or VW3 A7 8●● hoist resistors, VW3 A7 1●● braking units

ATV 71H●●M3, ATV 71HD11M3X...HD45M3X, ATV 71H075N4...HD75N4, ATV 71HU22Y...HD90Y, ATV 71W●●N4, ATV 71P●●N4Z

ATV 71HD55M3X, HD75M3X, ATV 71HD90N4...HC16N4, ATV 71HC11Y...HC16Y

ATV 71HC20N4...HC50N4, ATV 71HC20Y...HC63Y



Components for use with the Altivar

Item	Description
A1	ATV 71 drive, see pages 22 to 25
A2	Braking unit, if using a braking resistor or a hoist resistor, for ATV 71HC20N4...HC50N4, and ATV 71HC20Y...HC63Y. See pages 134 and 135
Braking resistor	See pages 136 and 138

(1) A thermal overload relay can be added; its contact must then be integrated into the control circuit.

Examples of recommended schemes

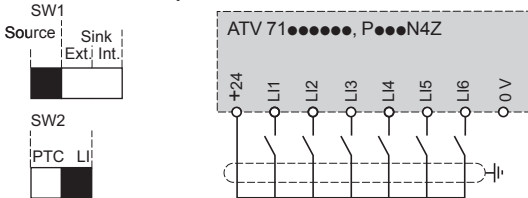
Logic inputs

The SW1 switch is used to adapt operation of the logic inputs (LI) to the PLC output technology:

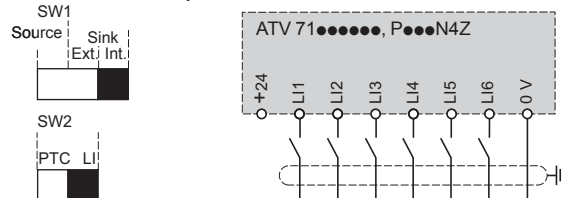
- Set the switch to Source (factory setting) if using PLC outputs with PNP transistors
- Set the switch to Sink Int. or Sink Ext. if using PLC outputs with NPN transistors

Internal power supply

Switch in "Source" position

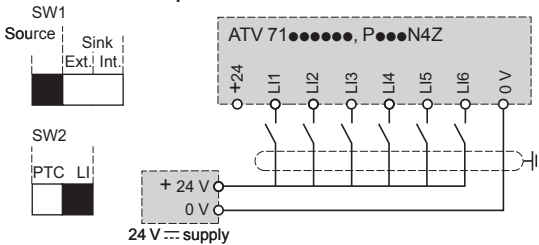


Switch in "Sink Int" position

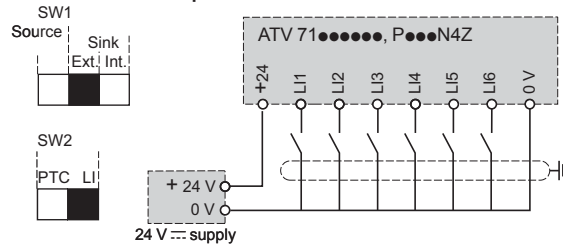


External power supply

Switch in "Source" position



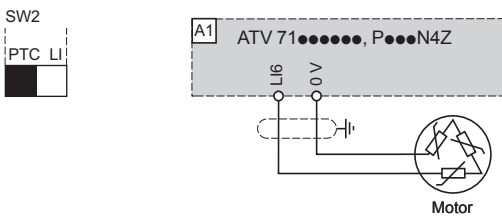
Switch in "Sink Ext" position



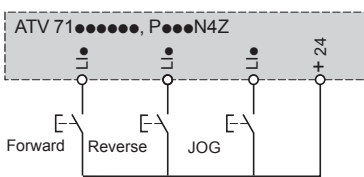
Input for PTC probes

The SW2 switch is used to operate the LI6 input:

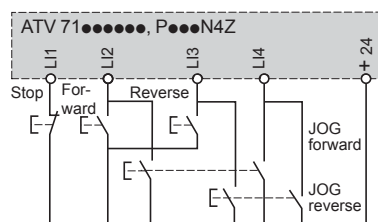
- As a logic input by setting the SW2 switch to LI (factory setting)
- Or for protecting the motor via PTC probes by setting the SW2 switch to PTC



2-wire control and jog operation (JOG)

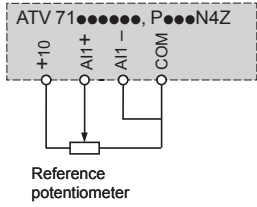


3-wire control and jog operation (JOG)



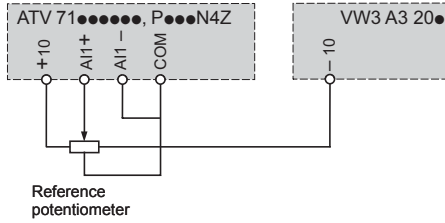
Examples of recommended schemes (continued)

Unipolar speed reference

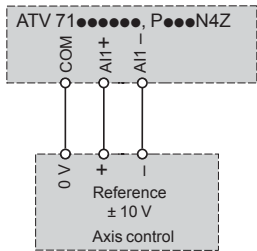


Bipolar speed reference

Requires a VW3 A3 201 or VW3 A3 202 I/O extension card

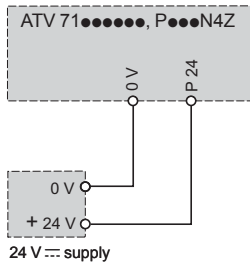


Speed reference using axis control



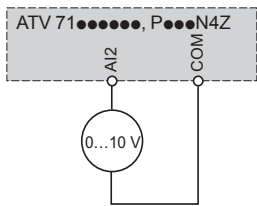
Separate control power supply

The separate control card can be powered by an external 24 V $\overline{\text{---}}$ supply

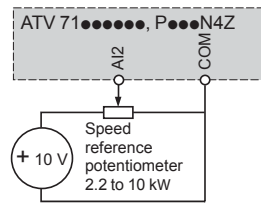


Analog input configured for voltage

External 0...10 V

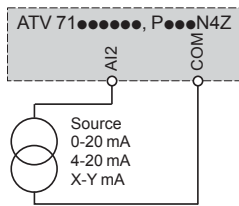


External + 10 V



Analog input configured for current

0-20 mA, 4-20 mA, X-Y mA



VW3 A3 201 and VW3 A3 202 I/O extension cards

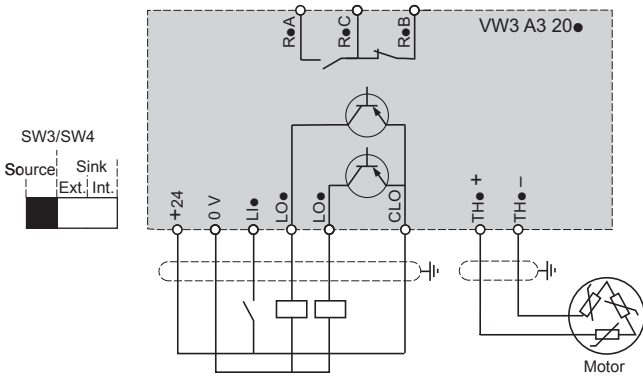
Logic I/O

The SW3 or SW4 switch is used to adapt operation of the logic inputs (LI) to the PLC output technology:

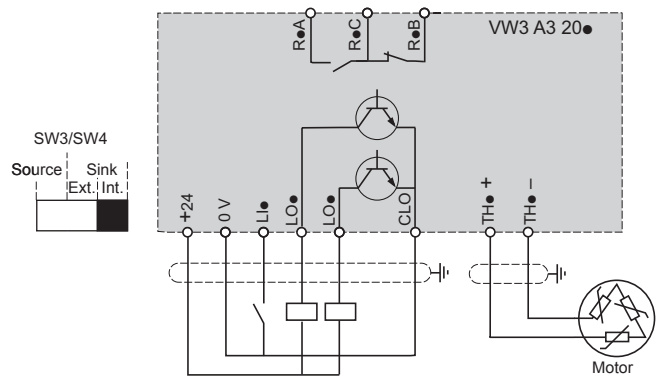
- Set the switch to Source (factory setting) if using PLC outputs with PNP transistors
- Set the switch to Sink Int. or Sink Ext. if using PLC outputs with NPN transistors

Internal power supply

Switch in "Source" position

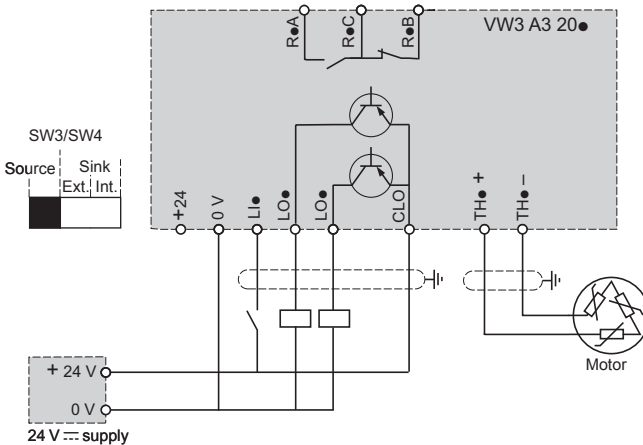


Switch in "Sink Int" position

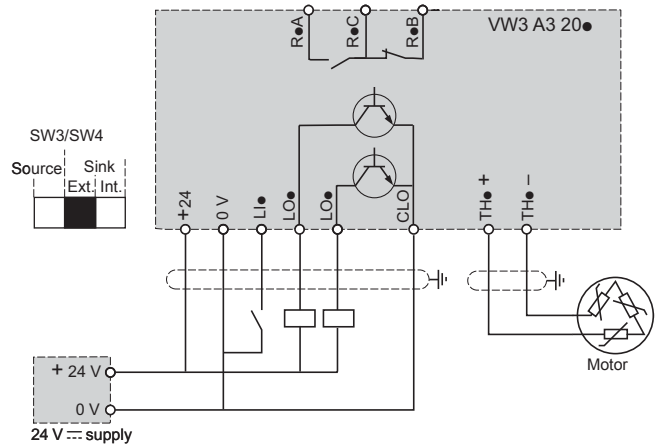


External power supply

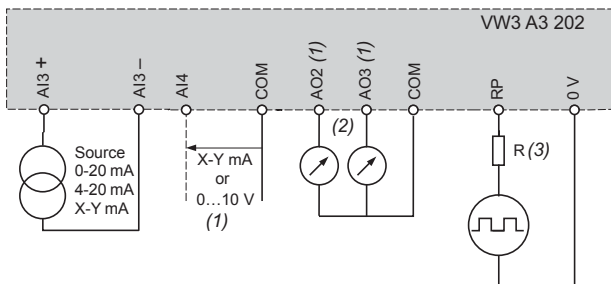
Switch in "Source" position



Switch in "Sink Ext" position



Analog I/O (only on VW3 A3 202 extended I/O card)



(1) Software-configurable current (0-20 mA) or voltage (0...10 V) analog input.

(2) Software-configurable current (0-20 mA) or voltage (± 10 V or 0...10 V) analog outputs, independent selection possible for each output via switch.

(3) R: add a resistor if the input voltage of the pulse train is greater than 5 V.

Recommended values:

Input voltage V	Resistance Ω
12	510
15	910
24	1300

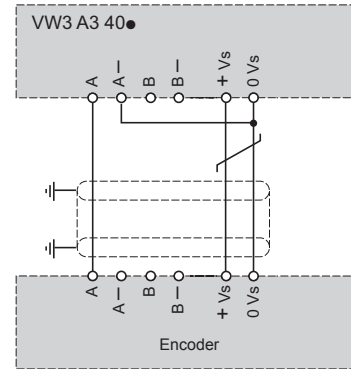
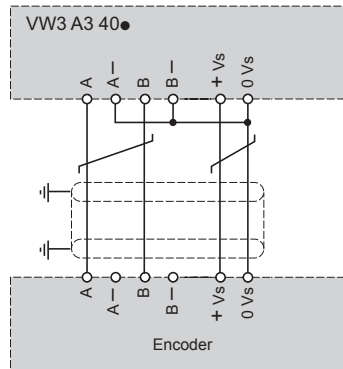
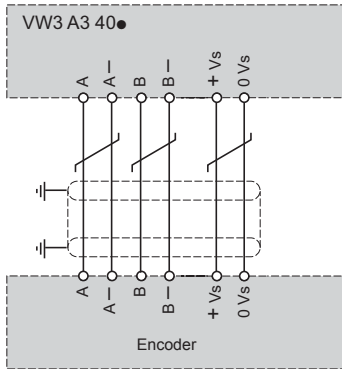
VW3 A3 401 to VW3 A3 411 encoder interface cards

Closed loop control

Wiring of encoders VW3 A3 401...407 A, A, B, B signals

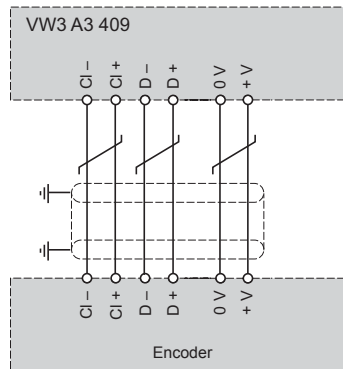
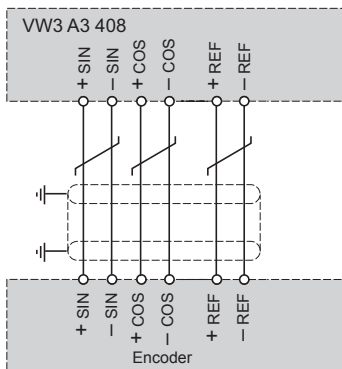
Wiring of encoders VW3 A3 403...407 AB signals

Wiring of encoders VW3 A3 403...407 A signal

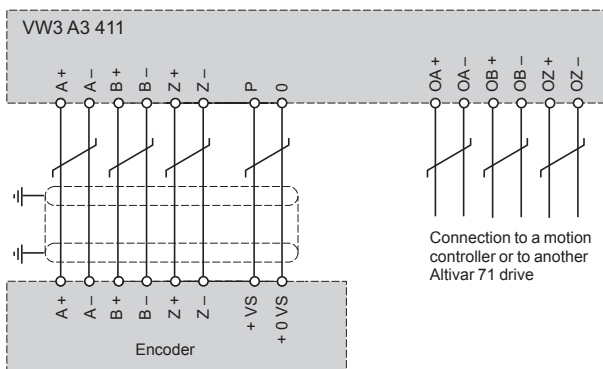


Wiring of encoder VW3 A3 408 Resolver signals

Wiring of encoder VW3 A3 409 EnDat or SSI signals

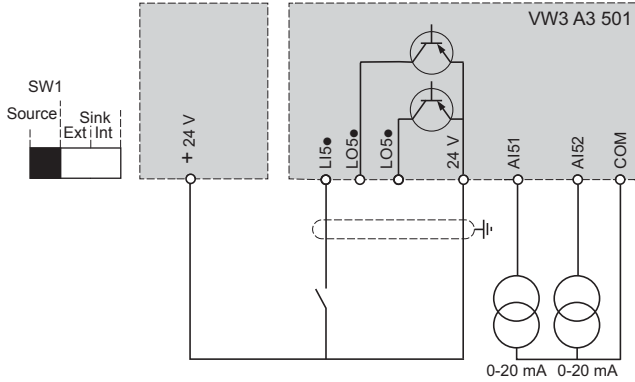


Wiring of encoder VW3 A3 411 AA/AAB/AABBZ signals A

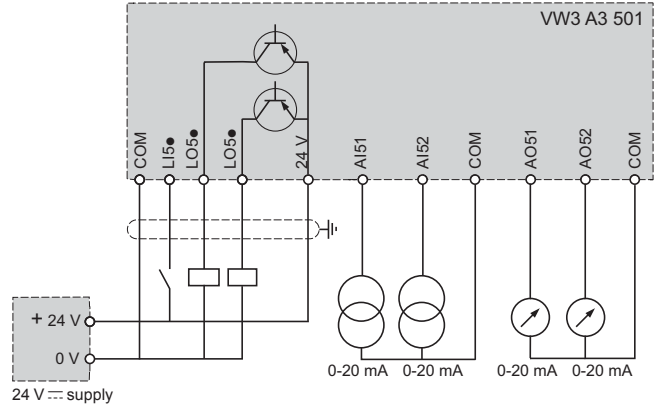


VW3 A3 501 "Controller Inside" programmable card

Card powered by the drive (1)



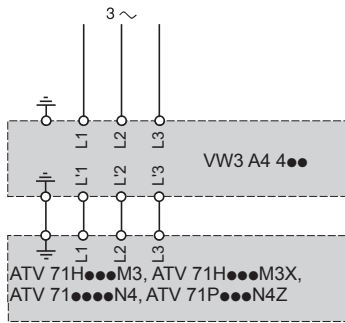
Card powered by external power supply



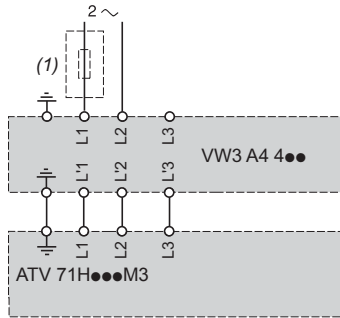
(1) Only if the power consumption is less than 200 mA; otherwise use an external power supply.

VW3 A4 4... additional EMC input filters

Three-phase power supply, three-phase filter



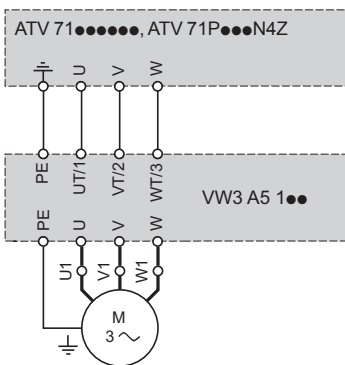
Single-phase power supply, three-phase filter



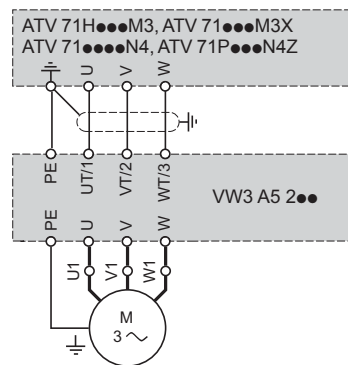
(1) Line choke mandatory for ATV 71HU40M3...HU75M3, see page 160

Output filters

VW3 A5 1... motor chokes

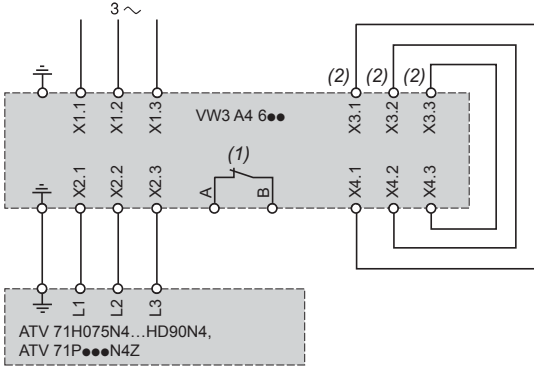


VW3 A5 2... sinus filters



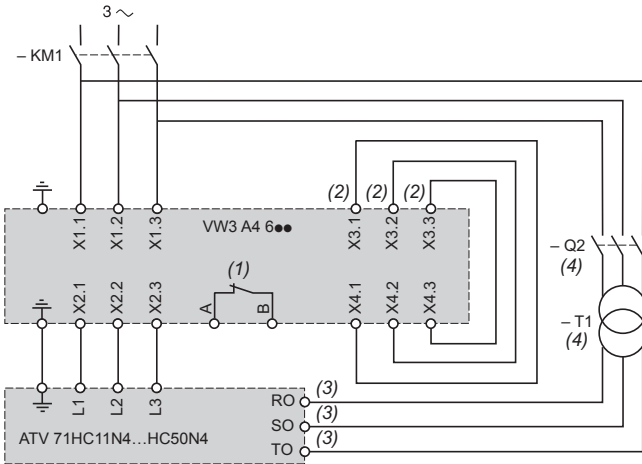
VW3 A4 6●● passive filters

Scheme with 1 passive filter for ATV 71H075N4...HD90N4 and ATV 71P●●●N4Z drives

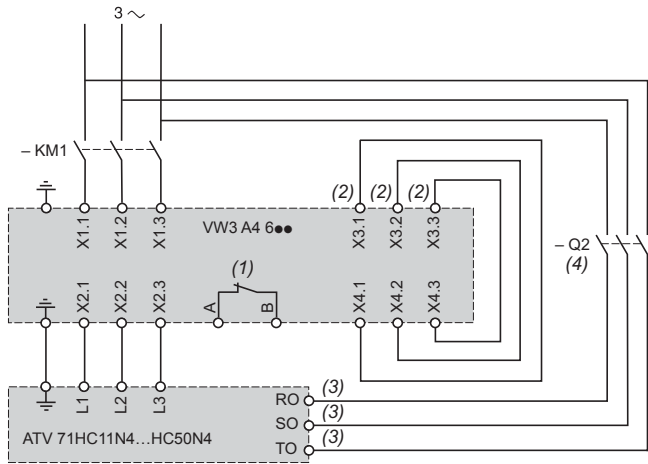


Scheme with 1 passive filter for ATV 71HC11N4...HC50N4 drives

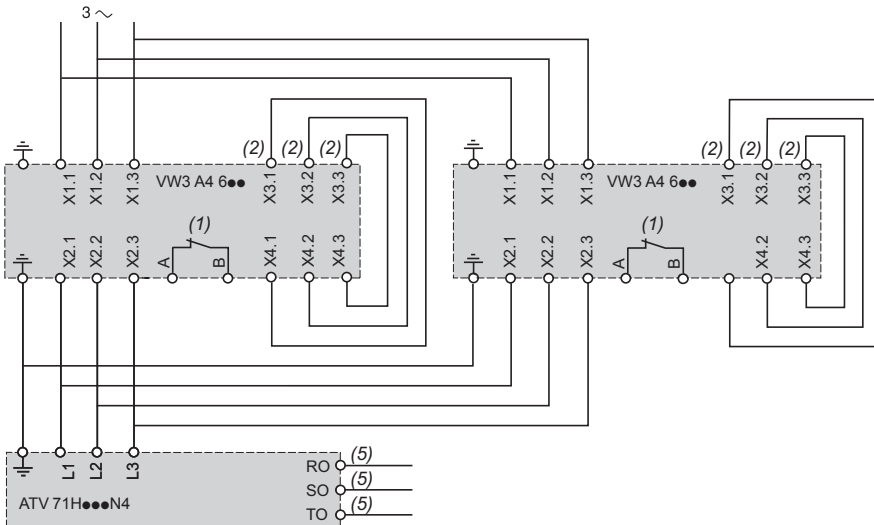
Connection downstream of the line contactor



Connection upstream of the line contactor



Scheme with 2 passive filters for ATV 71H075N4...HD90N4 drives



(1) Contact for indicating the thermal state of the passive filter, to be connected in the safety circuit of the installation.

(2) Delivered wired.

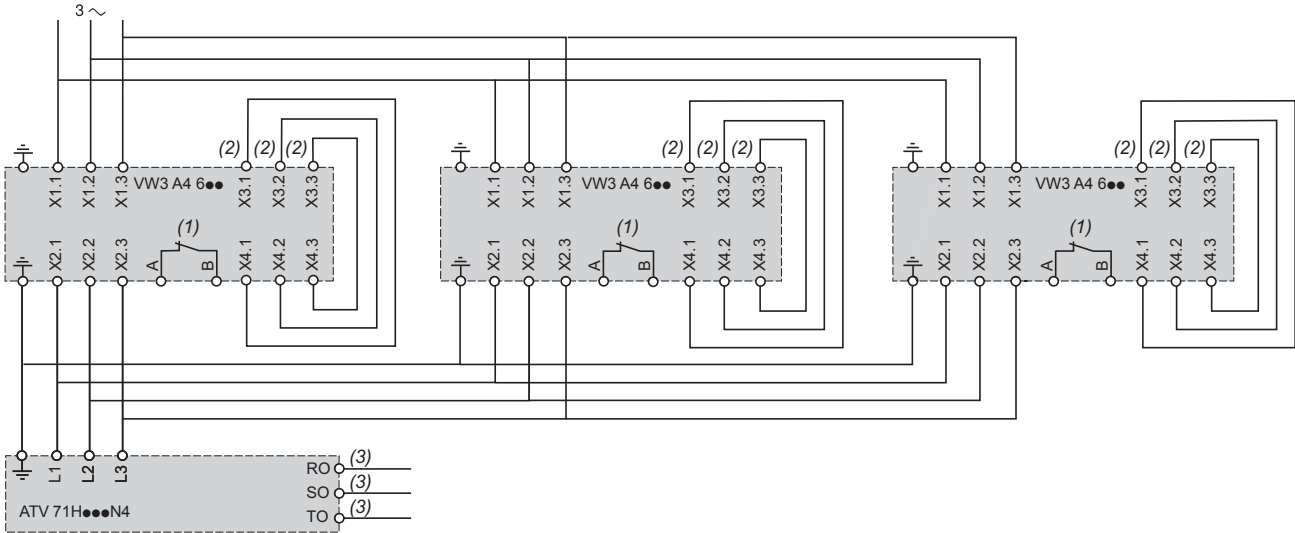
(3) Fan external power supply.

(4) Q2: GV2 RT10 thermal magnetic motor circuit-breaker. T1: 400/400 V or 460/460 V transformer.

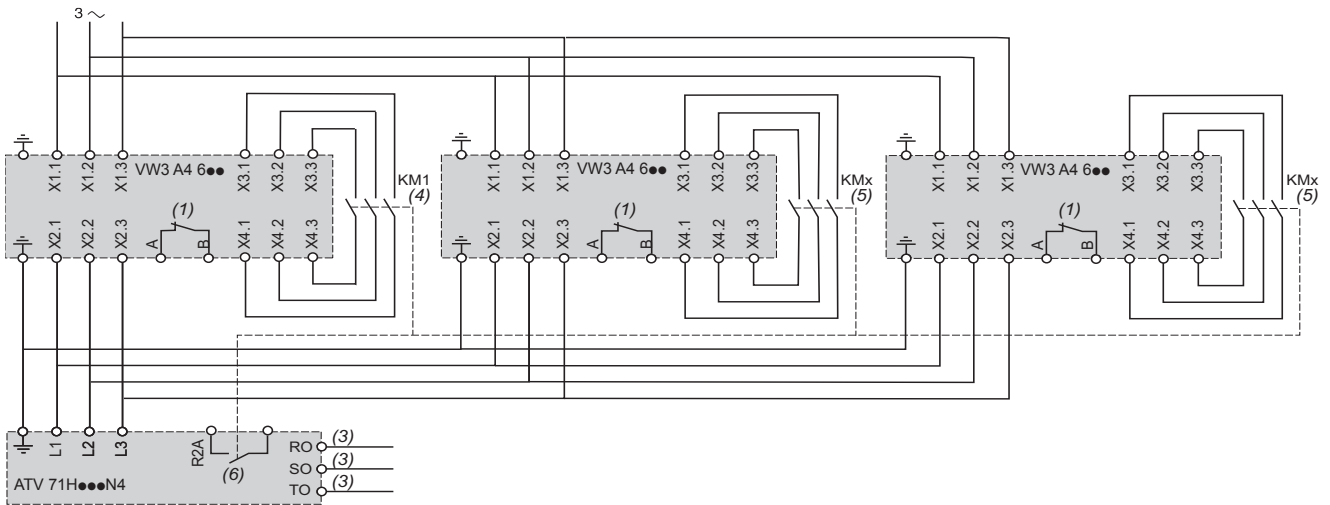
(5) For ATV 71HC11N4...HC50N4 drives, the external power supply for the fan is mandatory, see scheme above with one passive filter.

VW3 A4 6●● passive filters (continued)

Scheme with 3 passive filters for ATV 71H075N4...HD90N4 drives



Scheme for controlling the filter via the drive according to the load



(1) Contact for indicating the thermal state of the passive filter, to be connected in the safety circuit of the installation.

(2) Delivered wired.

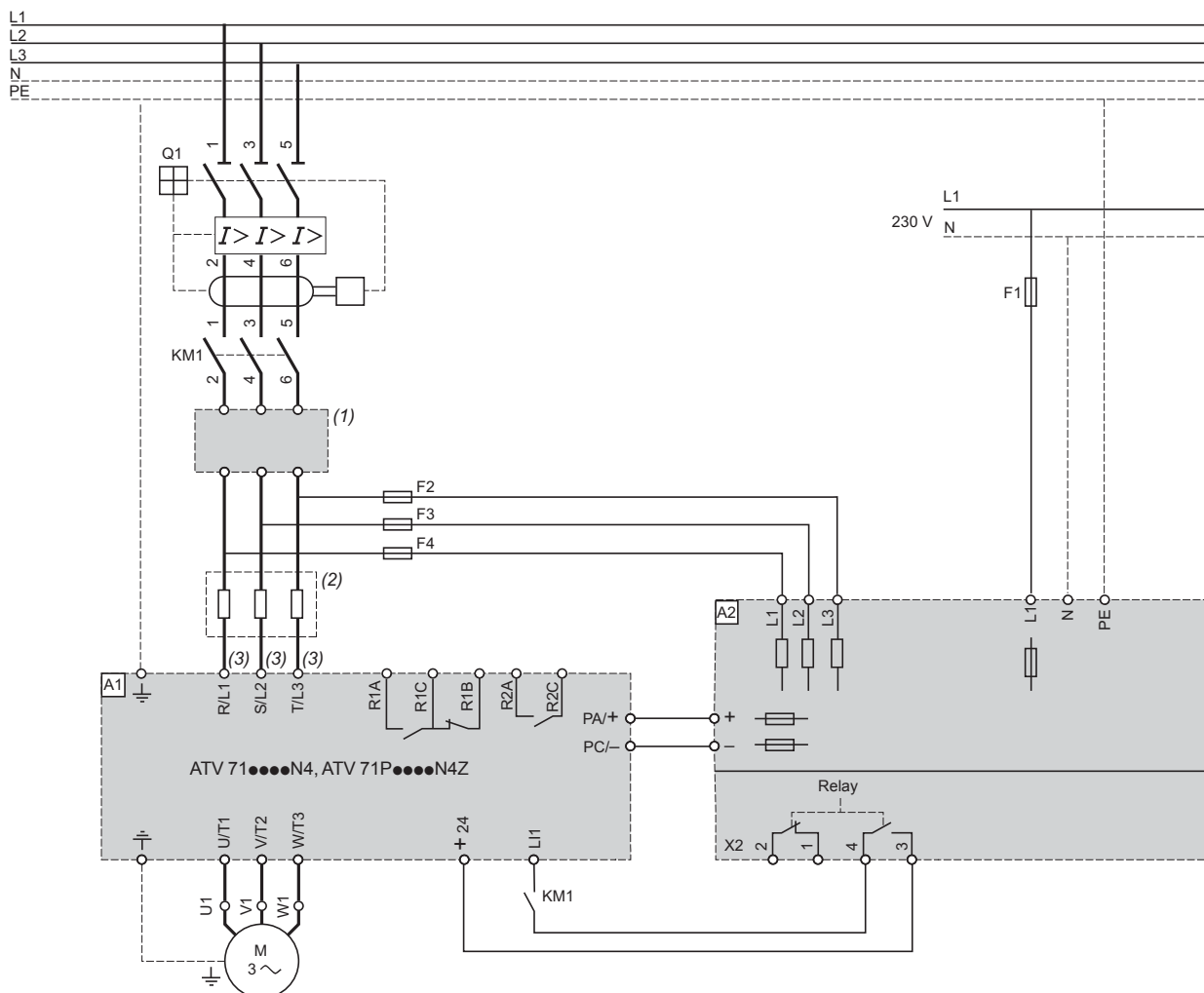
(3) For ATV 71HC11N4...HC50N4 drives, the external power supply for the fan is mandatory, see scheme on opposite page with one passive filter.

(4) KM1: category AC1 contactor sized at 50% of the drive nominal current (I_n).

(5) KMx: contactor type and sizing identical to KM1. It may be necessary to provide an intermediate relay to control the KMx contactors.

(6) The logic output at relay R2A must be assigned to the "Current threshold reached" (CtA) parameter.

Network braking unit



Components for use with the Altivar (for a complete list of references, see our catalogue "Motor starter solutions. Control and protection components").

Item	Description
A1	ATV 71 drive, see pages 23 and 24
A2	Network braking unit, see page 149
F1	2 A fuse, 230 V ~
F2...F4	For fuses, see reference tables on page 149.
Q1	300 mA earth fault circuit-breaker. Provides protection against earth leakage faults. Rating: see motor starters on pages 244 to 247

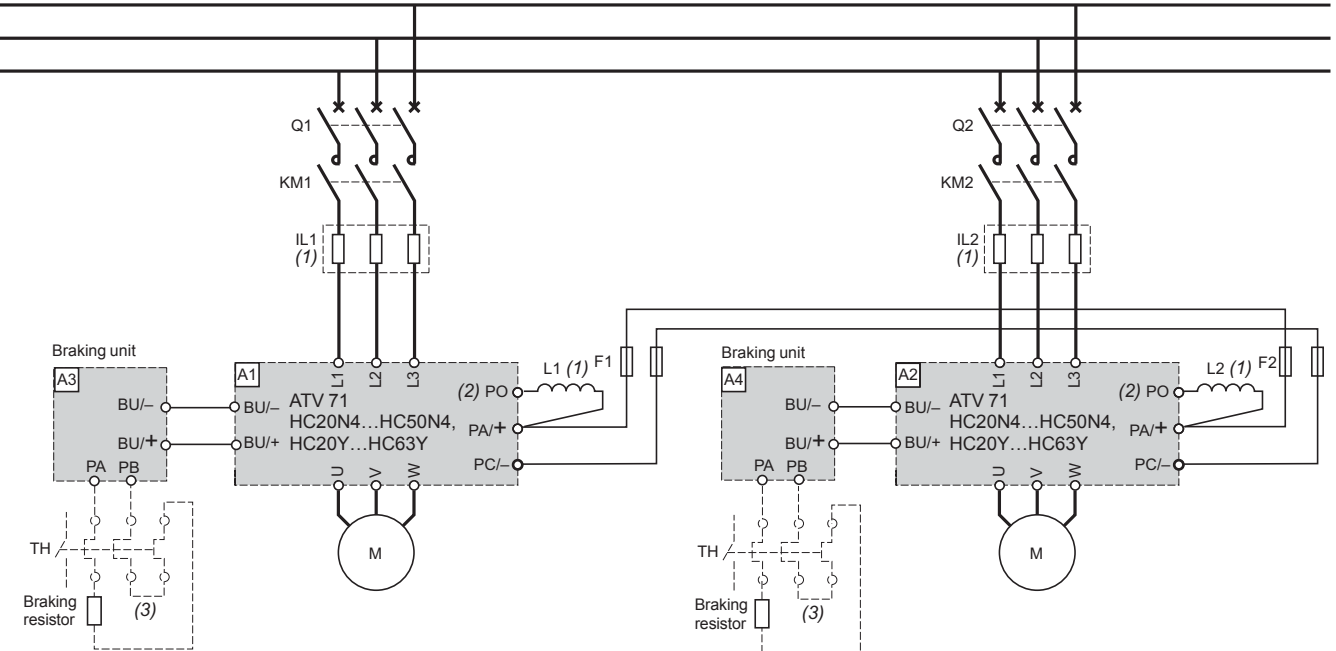
(1) Additional EMC input filter if necessary, see page 168.

(2) Line choke recommended, see page 160.

(3) For ATV 71HC40N4 drives combined with a 400 kW motor and ATV 71HC50N4, see page 226.

Drives combined with a braking unit and wired onto the same DC bus

ATV 71HC20N4...HC50N4, ATV 71 HC20Y...HC63Y



Item	Description
A1, A2	ATV 71 drives, see pages 23 and 25.
A3, A4	Braking units, see pages 134 and 135.
F1, F2, F3	Fast-acting semi-conductor fuses, see page 239. The function of the fuses is to protect the DC bus wiring in the event of a drive short-circuit.
IL1, IL2 (1)	Mandatory line chokes for ATV 71HC20Y...HC63Y drives; to be ordered separately, see page 160.
KM1, KM2	Line contactors. Rating: see motor starters on pages 244 to 249.
L1, L2 (1)	Mandatory DC chokes for ATV 71HC20N4...HC63N4 drives; supplied as standard with these drives. Not used for ATV 71HC20Y...HC63Y drives. These drives require the presence of line chokes (IL●)
Q1, Q2	Circuit-breakers. Rating: see motor starters on pages 244 to 249.

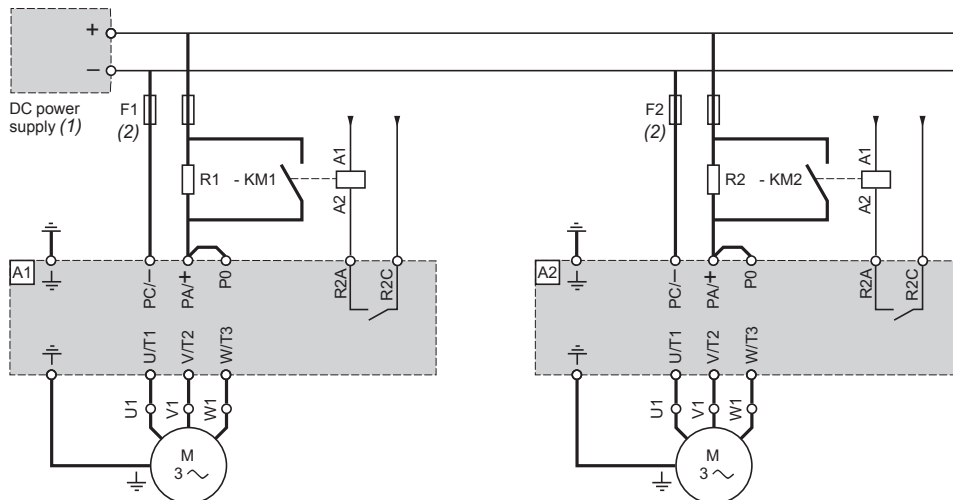
(1) The use of line chokes or DC chokes depends on the drive type, see table above.

(2) There is no PO terminal on ATV 71HC20Y...HC63Y drives.

(3) A thermal overload relay can be added; its contact must then be integrated into the control circuit.

Drives powered by external DC power supply

ATV 71HD18M3X...HD45M3X, ATV 71●D22N4...●D75N4, ATV 71●U22Y...HD90Y



For drives A1, A2	Precharge resistors R1, R2		Contactors (3) KM1, KM2
	Value	Reference	
	Ω		
ATV 71HD18M3X	5	VW3 A7 707	LC1 D32●●
ATV 71HD22M3X	5	VW3 A7 707	LC1 D40●●
ATV 71HD30M3X	5	VW3 A7 707	LC1 D65●●
ATV 71HD37M3X	5	VW3 A7 707	LC1 D80●●
ATV 71HD45M3X	5	VW3 A7 707	LC1 D80●●
ATV 71HD22N4, WD22N4	5	VW3 A7 707	LC1 D25●●
ATV 71HD30N4, WD30N4	5	VW3 A7 707	LC1 D32●●
ATV 71HD37N4, WD37N4	5	VW3 A7 707	LC1 D38●●
ATV 71HD45N4, WD45N4	5	VW3 A7 707	LC1 D40●●
ATV 71HD55N4, WD55N4	5	VW3 A7 707	LC1 D50●●
ATV 71HD75N4, WD75N4	5	VW3 A7 707	LC1 D80●●
ATV 71HU22Y	8	VW3 A7 706	LC1 D09●●
ATV 71HU30Y	8	VW3 A7 706	LC1 D09●●
ATV 71HU40Y	8	VW3 A7 706	LC1 D12●●
ATV 71HU55Y	8	VW3 A7 706	LC1 D12●●
ATV 71HU75Y	8	VW3 A7 706	LC1 D18●●
ATV 71HD11Y	8	VW3 A7 706	LC1 D18●●
ATV 71HD15Y	8	VW3 A7 706	LC1 D25●●
ATV 71HD18Y	8	VW3 A7 706	LC1 D32●●
ATV 71HD22Y	8	VW3 A7 706	LC1 D32●●
ATV 71HD30Y	8	VW3 A7 706	LC1 D40●●
ATV 71HD37Y	8	VW3 A7 706	LC1 D40●●
ATV 71HD45Y	8	VW3 A7 706	LC1 D65●●
ATV 71HD55Y	8	VW3 A7 706	LC1 D65●●
ATV 71HD75Y	8	VW3 A7 706	LC1 D80●●
ATV 71HD90Y	8	VW3 A7 706	LC1 D80●●

(1) DC power supply not included.

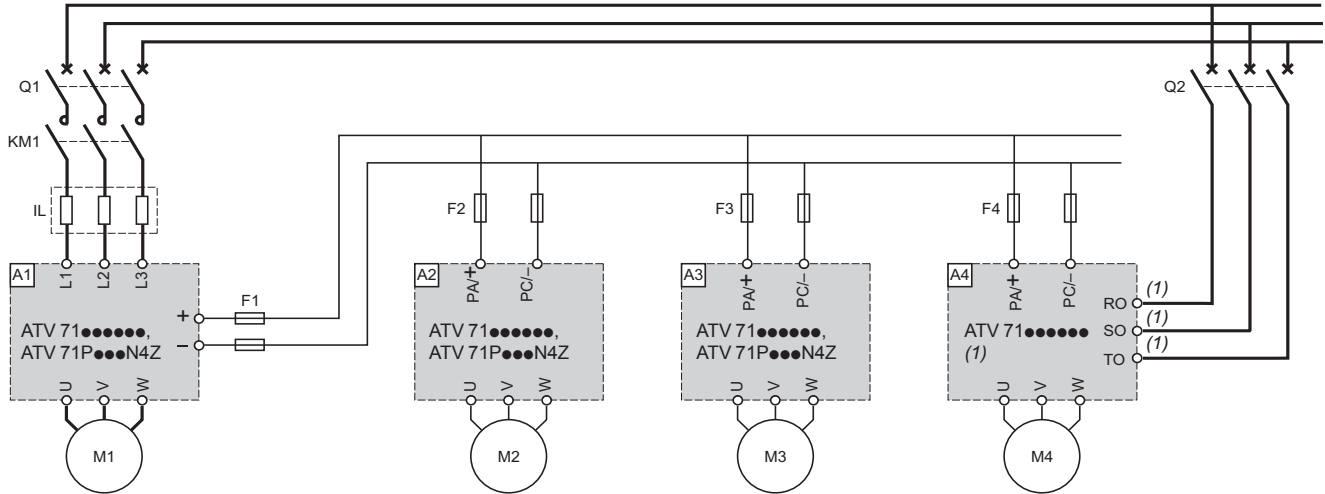
(2) Fast-acting semi-conductor fuses, see page 239. The function of the fuses is to protect the DC bus wiring in the event of a drive short-circuit.

(3) See our catalogue "Motor starter solutions. Control and protection components".

Note: ATV 71H●●●M3, ATV 71HD11M3X, HD15M3X, ATV 71●075N4...●D18N4 and ATV 71P●●●N4Z drives have an integrated pre-charge circuit. This is used to connect the DC power supply directly to the drive without the need for an external pre-charge circuit.

Connection schemes for several drives in parallel on the DC bus

Drives with different ratings

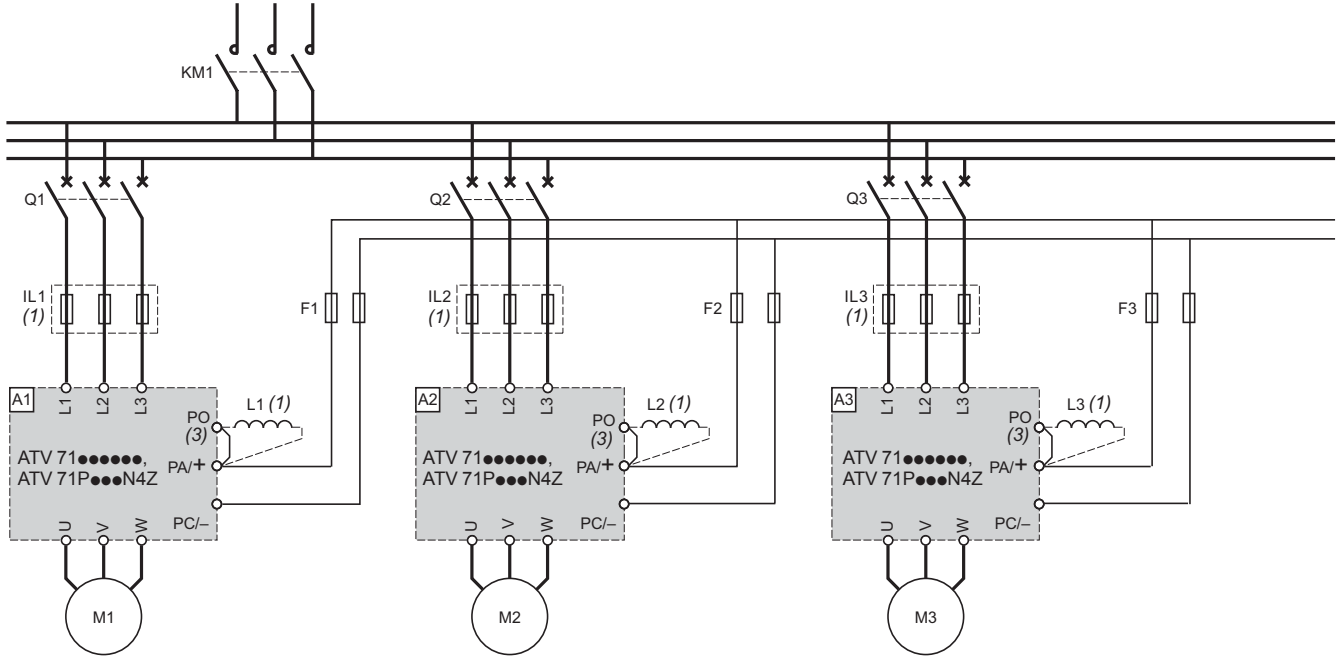


Item	Description
A1	ATV 71 drive, see pages 22 to 25. Drive power = \sum motor power ratings M1 + M2 + M3 + M4 + ...
A2, A3, A4	ATV 71 drives powered by the DC bus. They must be protected using fast-acting semi-conductor fuses. Contactors on the DC circuit are ineffective as the switching action may cause the fuses to blow owing to the high load current.
F1	Fast-acting semi-conductor fuses, see page 239. Drive A1 powered by the AC supply with an output bus. The function of the fuses is to protect the internal diode bridge in the event of a short-circuit on the external DC bus.
F2, F3, F4	Fast-acting semi-conductor fuses, see page 239. Drives A2, A3 and A4 are powered by their DC bus and are not connected to the AC input. The function of the fuses is to protect the DC bus wiring in the event of a drive short-circuit.
IL	Mandatory line chokes for ATV 71HC20Y...HC63Y drives; to be ordered separately, see page 160.
KM1	Line contactors. Rating: see motor starters on pages 243 to 249.
Q1	Circuit-breakers. Rating: see motor starters on pages 243 to 249.

(1) For ATV 71HD55M3X, HD75M3X and ATV 71HD90N4...HC50N4 drives, provide the fan power supply connection.

Connection schemes for several drives in parallel on the DC bus (continued)

Drives with equivalent ratings



Item	Description
A1, A2, A3	ATV 71 drives, see pages 22 to 25. The power difference between the drives connected in parallel must not exceed one rating.
F1, F2, F3	Fast-acting semi-conductor fuses, see page 239. Drives A1, A2 and A3 powered by the AC supply with an output bus. The function of the fuses is to protect the internal diode bridge in the event of a short-circuit on the external DC bus.
IL1, IL2, IL3 (1)	Mandatory line chokes for ATV 71H●●●Y drives; to be ordered separately, see page 160.
KM1	When using a common line contactor, all the Altivar 71 drive load circuits operate in parallel and cannot therefore be overloaded.
L1, L2, L3 (1)	Mandatory DC chokes for ATV 71H●●●M3, ATV 71H●●●M3X, ATV 71●●●N4 and ATV 71P●●●N4Z drives; to be ordered separately (see page 155) except for drives ATV 71HD55M3X, HD75M3X and ATV 71HD90N4...HC50N4 which are supplied as standard with a DC choke. Not used for ATV 71H●●●Y drives. These drives require the presence of line chokes (IL●).
Q1, Q2, Q3	Circuit-breakers on the line supply side to protect drives against overloads. Use trip contacts on the "external fault" logic input or the line contactor. The line contactor must only be activated if all three circuit-breakers are closed, as otherwise there is a risk of damage to the drives.

(1) The use of line chokes or DC chokes depends on the drive type, see table above.

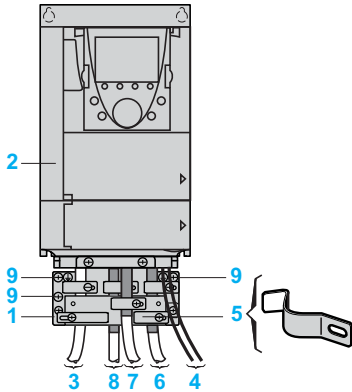
(2) There is no PO terminal on ATV 71HC11Y...HC63Y drives.

Size of DC bus fuses (F1, F2, F3 and F4) depending on the drive rating

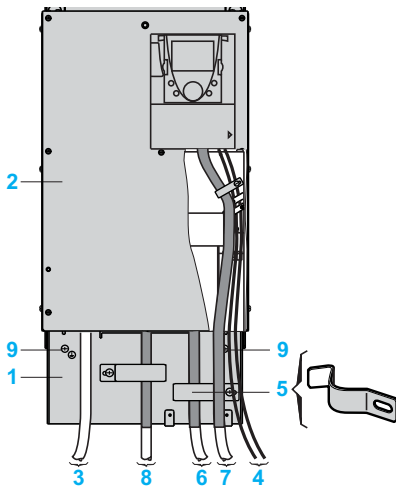
For drives	Fast-acting semi-conductor fuses (1)
	A
ATV 71H037M3...HU15M3	25
ATV 71HU22M3...HU40M3	50
ATV 71HU55M3, HU75M3	100
ATV 71HD11M3X...HD18M3X	160
ATV 71HD22M3X, HD30M3X	250
ATV 71HD37M3X, HD45M3X	350
ATV 71HD55M3X	500
ATV 71HD75M3X	630
ATV 71H075N4...HU22N4	25
ATV 71W075N4...WU22N4	
ATV 71P075N4Z...PU22N4Z	
ATV 71HU30N4, HU40N4	50
ATV 71WU30N4, WU40N4	
ATV 71PU30N4Z, PU40N4Z	
ATV 71HU55N4...HD11N4	80
ATV 71WU55N4...WD11N4	
ATV 71PU55N4Z, PU75N4Z	
ATV 71HD15N4...HD22N4	100
ATV 71WD15N4...WD22N4	
ATV 71HD30N4, HD37N4	160
ATV 71WD30N4, WD37N4	
ATV 71HD45N4	200
ATV 71WD45N4	
ATV 71HD55N4	250
ATV 71WD55N4	
ATV 71HD75N4	350
ATV 71WD75N4	
ATV 71HD90N4	315
ATV 71HC11N4, HC13N4	400
ATV 71HC16N4	500
ATV 71HC20N4	630
ATV 71HC25N4, HC28N4	800
ATV 71HC31N4	1000
ATV 71HC40N4, HC50N4	1250
ATV 71HU22Y...HU55Y	25
ATV 71HU75Y...HD15Y	40
ATV 71HD18Y...HD30Y	63
ATV 71HD37Y...HD55Y	125
ATV 71HD75Y, HD90Y	200
ATV 71HC11Y	250
ATV 71HC13Y	315
ATV 71HC16Y	350
ATV 71HC20Y	450
ATV 71HC25Y	630
ATV 71HC31Y	800
ATV 71HC40Y	900
ATV 71HC50Y	1250
ATV 71HC63Y	1500

(1) Nominal voltage of fast-acting semi-conductor fuse:

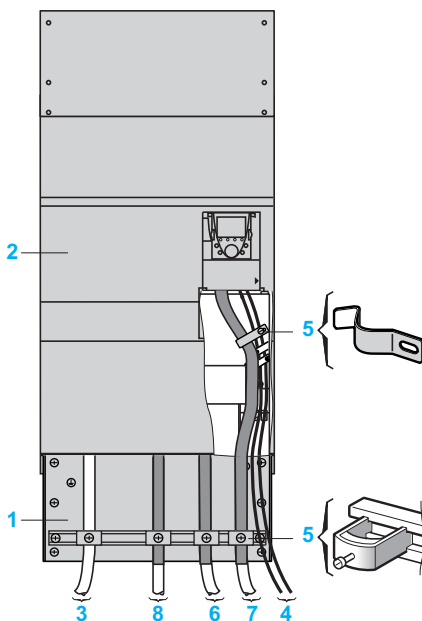
Line supply voltage	Nominal voltage of fast-acting semi-conductor fuse
V ~	V
230, 400	690
440, 460, 480	800
500, 600, 690	1000



ATV 71H...M3, ATV 71HD11M3X, HD15M3X,
ATV 71H075N4...HD18N4,
ATV 71P075N4Z...PD11N4Z



ATV 71HD18M3X...HD45M3X,
ATV 71HD22N4...HD75N4
ATV 71HU22Y...HD90Y



ATV 71HD55M3X, HD75M3X,
ATV 71HD90N4...HC50N4
ATV 71HC11Y...HC63Y

Connections for ensuring conformity to EMC standards

Principle

- Earths between drive, motor and cable shielding must have "high frequency" equipotentiality.
- Use shielded cables with shielding connected to earth over 360° at both ends for the motor cable, the braking resistor cable and the control-signalling cables. Conduit or metal ducting can be used for part of the shielding length provided that there is no break in the continuity of the earth connections.
- Ensure maximum separation between the power supply cable (line supply) and the motor cable.

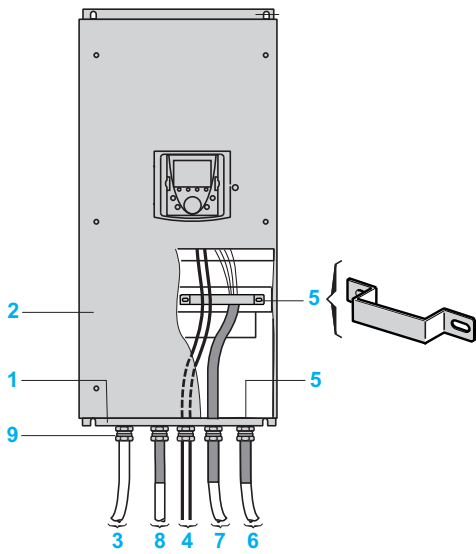
Installation diagram for ATV 71H...M3, ATV 71H...M3X, ATV 71H...N4, ATV 71H...Y and ATV 71P...N4Z drives

- 1 Steel plate (1), to be mounted on the drive (earthed casing).
- 2 Altivar 71 UL Type 1/IP 20 drive.
- 3 Unshielded power supply wires or cable.
- 4 Unshielded wires for the output of the fault relay contacts.
- 5 Attach and earth the shielding of cables 6, 7 and 8 as close as possible to the drive:
 - Strip the cable to expose the shielding
 - Attach the cable to the plate 1 by tightening the clamp on the stripped part of the shielding
 The shielding must be clamped tightly enough to the metal sheet to ensure good contact.
- 6 Shielded cable for connecting the motor
- 7 Shielded cable for connecting the control-signal section.
For applications requiring several conductors, use cables with a small cross-section (0.5 mm²).
- 8 Shielded cable for connecting the braking resistor.
6, 7, 8, the shielding must be connected to earth at both ends.
The shielding must be continuous, and if intermediate terminals are used, they must be placed in EMC shielded metal boxes.
- 9 Earth screw.

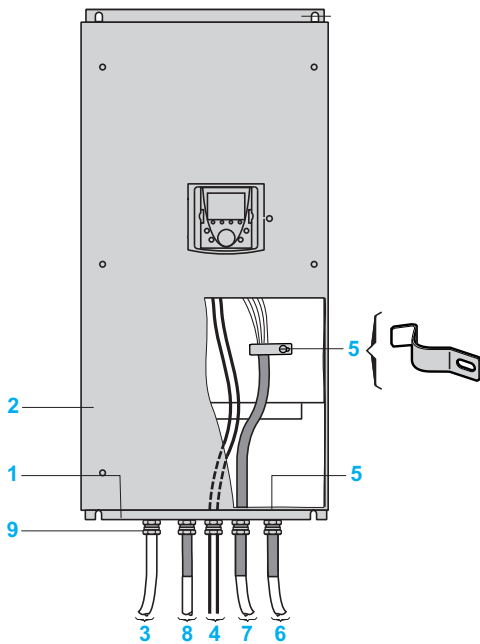
Note: The HF equipotential earth connection between the drive, motor and cable shielding does not remove the need to connect the PE conductors (green-yellow) to the appropriate terminals on each unit.

If using an additional EMC input filter, it should be mounted beside or beneath the drive, depending on the rating, and connected directly to the line supply via an unshielded cable. Link 3 on the drive is then made by the filter output cable.

(1) Plate supplied for ATV 71H...M3, ATV 71HD11M3X...HD45M3X, ATV 71H075N4...HD75N4, ATV 71HU22Y...HD90Y and ATV 71P075N4Z...PD11N4Z drives.
For ATV 71HD55M3X, HD75M3X, ATV 71HD90N4...HC28N4 and ATV 71HC11Y...HC31Y drives, the plate is supplied with the UL Type 1 conformity kit or the IP 31 conformity kit.
For ATV 71HC31N4...HC50N4 and ATV 71HC40Y...HC63Y drives, the plate is supplied with the IP 31 conformity kit.
These kits must be ordered separately, see pages 32 and 33.



ATV 71W075N4...WD22N4



ATV 71WD30N4...WD75N4

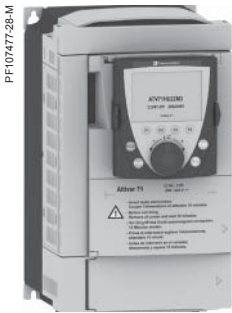
Connections for ensuring conformity to EMC standards (continued)

Installation diagram for ATV 71W●●●N4 drives

- 1 Steel plate mounted on the drive (earthed casing).
- 2 Altivar 71 UL Type 12/IP 54 drive.
- 3 Unshielded power supply wires or cable.
- 4 Unshielded wires for the output of the fault relay contacts.
- 5 Attach and earth the shielding of cables 6, 7 and 8 as close as possible to the drive:
 - Strip the cable to expose the shielding
 - Fit the shielded cable in the cable gland 9 ensuring it is fully in contact through 360°
 - Fold back the shielding and clamp it between the ring and body of the cable gland.
 Depending on the rating, the shielding of the cable 7 can be earthed using a cable gland 9, a clamp 5 or a cable clip 5. The shielding must be clamped tightly enough to the metal sheet to ensure good contact.
- 6 Shielded cable for connecting the motor
- 7 Shielded cable for connecting the control-signal section.
 - For applications requiring several conductors, use cables with a small cross-section (0.5 mm²).
- 8 Shielded cable for connecting the braking resistor.
 - 6, 7, 8, the shielding must be connected to earth at both ends. The shielding must be continuous, and if intermediate terminals are used, they must be placed in EMC shielded metal boxes.
- 9 Metal cable gland (not supplied) for cables 6, 7 and 8.
 - Standard cable gland (not supplied) for cables 3 and 4.

Note: The HF equipotential earth connection between the drive, motor and cable shielding does not remove the need to connect the PE conductors (green-yellow) to the appropriate terminals on each unit.

If using an additional EMC input filter, it should be mounted beside the drive and connected directly to the line supply via an unshielded cable. Link 3 on the drive is then made by the filter output cable.



GV2 L20
+
LC1 D25●●
+
ATV 71HU22M3

Applications

Circuit-breaker/contactor/drive combinations can be used to ensure continuous service of the installation with optimum safety.

The type of circuit-breaker/contactor coordination selected can reduce maintenance costs in the event of a motor short-circuit by minimizing the time required to make the necessary repairs and the cost of replacement equipment. The suggested combinations provide type 1 or type 2 coordination depending on the drive rating.

Type 2 coordination: A motor short-circuit will not damage the device or affect its settings. The motor starter should be able to operate once the electrical fault has been removed. The electrical isolation provided by the circuit-breaker will not be affected by the short-circuit. Welding of the contactor contacts is permissible if they can be separated easily.

Type 1 coordination: The electrical isolation provided by the circuit-breaker will not be affected by the incident and no other elements apart from the contactor are damaged as a result of the motor short-circuit.

The drive controls the motor, provides protection against short-circuits between the drive and the motor and protects the motor cable against overloads. The overload protection is provided by the drive's motor thermal protection. If this protection is removed, external thermal protection should be provided. Before restarting the installation, the cause of the trip must be removed.

Motor starters for UL Type 1/IP 20 drives

Motor Power (1)	Drive Reference	Circuit-breaker			Line contactor	
		Reference (2)	Rating	Im	Reference (3) (4)	
kW	HP		A	A		
Single-phase supply voltage 200...240 V 50/60 Hz. Type 2 coordination						
0.37	0.5	ATV 71H075M3	GV2 L10	6.3	–	LC1 D18●●
0.75	1	ATV 71HU15M3	GV2 L14	10	–	LC1 D18●●
1.5	2	ATV 71HU22M3	GV2 L20	18	–	LC1 D25●●
2.2	3	ATV 71HU30M3	GV2 L22	25	–	LC1 D25●●
3	–	ATV 71HU40M3 (5)	GV2 L22	25	–	LC1 D25●●
4	5	ATV 71HU55M3 (5)	GV3 L40	40	–	LC1 D40●●
5.5	7.5	ATV 71HU75M3 (5)	GV3 L50	50	–	LC1 D50●●

(1) Standard power ratings for 230 V 50/60 Hz 4-pole motors.
The values expressed in HP conform to the NEC (National Electrical Code).

(2) Breaking capacity of circuit-breakers according to standard IEC 60947-2:

Circuit-breaker	Icu (kA) for 240 V
GV2 L	50
GV3 L	100

(3) Composition of contactors:
LC1 D18 to LC1 D50: 3 poles + 1 "N/O" auxiliary contact and 1 "N/C" auxiliary contact.

(4) Replace ●● with the control circuit voltage reference indicated in the table below:

LC1 D	Volts ~	24	48	110	220	230	240
		50 Hz	B5	E5	F5	M5	P5
	60 Hz	B6	E6	F6	M6	–	U6
	50/60 Hz	B7	E7	F7	M7	P7	U7

For other voltages available between 24 V and 660 V, or a DC control circuit, please consult your Regional Sales Office.

(5) A line choke must be added, see page 160.



GV2 L20
+
LC1 D25●●
+
ATV 71HU30M3

Motor starters for UL Type 1/IP 20 drives

Motor Power (1)		Drive Reference	Circuit-breaker Reference (2)		Line contactor Reference (3) (4)	
kW	HP		Rating	Im		
			A	A		
Three-phase supply voltage 200...240 V 50/60 Hz. Type 2 coordination						
0.37	0.5	ATV 71H037M3	GV2 L08	4	–	LC1 D09●●
0.75	1	ATV 71H075M3	GV2 L14	10	–	LC1 D09●●
1.5	2	ATV 71HU15M3	GV2 L14	10	–	LC1 D18●●
2.2	3	ATV 71HU22M3	GV2 L16	14	–	LC1 D18●●
3	–	ATV 71HU30M3	GV2 L20	18	–	LC1 D25●●
4	5	ATV 71HU40M3	GV2 L22	25	–	LC1 D25●●
5.5	7.5	ATV 71HU55M3	GV3 L40	40	–	LC1 D40●●
7.5	10	ATV 71HU75M3	GV3 L50	50	–	LC1 D50●●
11	15	ATV 71HD11M3X	GV3 L65	65	–	LC1 D65●●
15	20	ATV 71HD15M3X	NS100NMA80	80	480	LC1 D65●●
18.5	25	ATV 71HD18M3X	NS100NMA100	100	600	LC1 D80●●
22	30	ATV 71HD22M3X	NS100NMA100	100	600	LC1 D80●●
30	40	ATV 71HD30M3X	NS160NMA150	150	1350	LC1 D115●●
37	50	ATV 71HD37M3X	NS160NMA150	150	1350	LC1 D150●●
45	60	ATV 71HD45M3X	NS250NMA220	220	1980	LC1 D150●●
55	75	ATV 71HD55M3X	NS250NMA220	220	1980	LC1 F225●●
75	100	ATV 71HD75M3X	NS400NMA320	320	1920	LC1 F265●●

(1) Standard power ratings for 230 V 50/60 Hz 4-pole motors.

The values expressed in HP conform to the NEC (National Electrical Code).

(2) NS●●●NMA: products sold under the Merlin Gerin brand.

Breaking capacity of circuit-breakers according to standard IEC 60947-2:

Circuit-breaker	Icu (kA) for 240 V
GV2 L08...L20, GV3 L40...L65	100
GV2 L22	50
NS●●●NMA	85

(3) Composition of contactors:

LC1 D09 to LC1 D150: 3 poles + 1 "N/O" auxiliary contact and 1 "N/C" auxiliary contact.

LC1 F●●●: 3 poles. To add auxiliary contacts or other accessories, please consult our specialist catalogue "Motor starter solutions. Control and protection components".

(4) Replace ●● with the control circuit voltage reference indicated in the table below:

	Volts ~	24	48	110	220	230	240
LC1 D	50 Hz	B5	E5	F5	M5	P5	U5
	60 Hz	B6	E6	F6	M6	–	U6
	50/60 Hz	B7	E7	F7	M7	P7	U7
LC1 F225	50 Hz (LX1 coil)	B5	E5	F5	M5	P5	U5
	60 Hz (LX1 coil)	–	E6	F6	M6	–	U6
	40...400 Hz (LX9 coil)	–	E7	F7	M7	P7	U7
LC1 F265	40...400 Hz (LX1 coil)	B7	E7	F7	M7	P7	U7

For other voltages available between 24 V and 660 V, or a DC control circuit, please consult your Regional Sales Office.

DFE53345-20-M



108517-13-M



PF 07476-32-M



NS160●MA150
+
LC1 D115●●
+
ATV 71HD45N4

Motor starters for UL Type 1/IP 20 drives

Motor Power (1)		Drive Reference	Circuit-breaker Reference (2)	Rating	Im	Line contactor Reference (3) (4)
kW	HP			A	A	
Three-phase supply voltage 380...415 V 50/60 Hz. Type 2 coordination						
0.75	1	ATV 71H075N4	GV2 L08	4	–	LC1 D18●●
1.5	2	ATV 71HU15N4	GV2 L10	6.3	–	LC1 D18●●
2.2	3	ATV 71HU22N4	GV2 L14	10	–	LC1 D18●●
3	–	ATV 71HU30N4	GV2 L16	14	–	LC1 D18●●
4	5	ATV 71HU40N4	GV2 L16	14	–	LC1 D18●●
5.5	7.5	ATV 71HU55N4	GV2 L22	25	–	LC1 D25●●
7.5	10	ATV 71HU75N4	GV3 L32	32	–	LC1 D40●●
11	15	ATV 71HD11N4	GV3 L40	40	–	LC1 D40●●
15	20	ATV 71HD15N4	GV3 L50	50	–	LC1 D50●●
18.5	25	ATV 71HD18N4	GV3 L50	50	–	LC1 D50●●
22	30	ATV 71HD22N4	GV3 L65	65	–	LC1 D65●●
30	40	ATV 71HD30N4	NS80HMA80	80	480	LC1 D65●●
37	50	ATV 71HD37N4	NS100●MA100	100	800	LC1 D80●●
45	60	ATV 71HD45N4	NS160●MA150	150	1350	LC1 D115●●
55	75	ATV 71HD55N4	NS160●MA150	150	1350	LC1 D115●●
75	100	ATV 71HD75N4	NS250●MA220	220	1980	LC1 F185●●
90	125	ATV 71HD90N4	NS250●MA220	220	1980	LC1 F185●●
110	150	ATV 71HC11N4	NS250●MA220	220	1980	LC1 F185●●
132	200	ATV 71HC13N4	NS400●MA320	320	1920	LC1 F265●●
160	250	ATV 71HC16N4	NS400●MA320	320	1920	LC1 F265●●
200	300	ATV 71HC20N4	NS400●MA320	320	1920	LC1 F400●●
220	350	ATV 71HC25N4	NS630●MAE500	500	3000	LC1 F400●●
250	400	ATV 71HC25N4	NS630●MAE500	500	3000	LC1 F500●●
280	450	ATV 71HC28N4	NS630●MAE500	500	3000	LC1 F500●●
315	500	ATV 71HC31N4	NS630●MAE500	500	3000	LC1 F500●●
Three-phase supply voltage 380...415 V 50/60 Hz. Type 1 coordination						
355	–	ATV 71HC40N4	NS800 MicroLogic 2 or 5 (LR OFF)	800	1600	LC1 F630●●
400	600	ATV 71HC40N4	NS800 MicroLogic 2 or 5 (LR OFF)	800	1600	LC1 F630●●
500	700	ATV 71HC50N4	NS1000 MicroLogic 2 or 5 (LR OFF)	1000	2000	LC1 F800●●

- (1) Standard power ratings for 400 V 50/60 Hz 4-pole motors.
The values expressed in HP conform to the NEC (National Electrical Code).
(2) NS80HMA, NS●●●●, NS800, NS1000: products sold under the Merlin Gerin brand.
For references to be completed, replace the dot with the letter corresponding to the circuit-breaker breaking performance (N, H, L).
Breaking capacity of circuit-breakers according to standard IEC 60947-2:

Circuit-breaker	Icu (kA) for 400 V		
	N	H	L
GV2 L08...L14, GV3 L32	100	–	–
GV2 L16, L22, GV3 L40...L65	50	–	–
NS80HMA	70	–	–
NS100●MA	–	25	150
NS160●MA, NS250●MA	–	36	150
NS400●, NS630●, NS800, NS1000	–	45	150

- (3) Composition of contactors:
LC1 D18 to LC1 D150: 3 poles + 1 "N/O" auxiliary contact and 1 "N/C" auxiliary contact.
LC1 F●●●: 3 poles. To add auxiliary contacts or other accessories, please consult our specialist catalogue "Motor starter solutions. Control and protection components".
(4) Replace ●● with the control circuit voltage reference indicated in the table below:

	Volts ~	24	48	110	220	230	240
LC1 D	50 Hz	B5	E5	F5	M5	P5	U5
	60 Hz	B6	E6	F6	M6	–	U6
	50/60 Hz	B7	E7	F7	M7	P7	U7
LC1 F185	50 Hz (LX1 coil)	B5	E5	F5	M5	P5	U5
	60 Hz (LX1 coil)	–	E6	F6	M6	–	U6
	40...400 Hz (LX9 coil)	–	E7	F7	M7	P7	U7
LC1 F265	40...400 Hz (LX1 coil)	B7	E7	F7	M7	P7	U7
LC1 F400...F630	40...400 Hz (LX1 coil)	–	E7	F7	M7	P7	U7
LC1 F800	40...400 Hz (LX1 coil)	–	–	FE7	P7	P7	P7

For other voltages available between 24 V and 660 V, or a DC control circuit, please consult your Regional Sales Office.

DF504573



105617-15-M



107460-33-M



NS160●MA150
+
LC1 D115●●
+
ATV 71HD75N4

Motor starters for UL Type 1/IP 20 drives

Motor Power (1)		Drive Reference	Circuit-breaker Reference (2)	Rating A	Im A	Line contactor Reference (3) (4)
kW	HP					
Three-phase supply voltage 440...480 V 50/60 Hz. Type 2 coordination						
0.75	1	ATV 71H075N4	GV2 L08	4	–	LC1 D18●●
1.5	2	ATV 71HU15N4	GV2 L10	6.3	–	LC1 D18●●
2.2	3	ATV 71HU22N4	GV2 L14	10	–	LC1 D18●●
3	–	ATV 71HU30N4	GV2 L14	10	–	LC1 D18●●
4	5	ATV 71HU40N4	GV2 L16	14	–	LC1 D18●●
5.5	7.5	ATV 71HU55N4	GV2 L22	25	–	LC1 D25●●
7.5	10	ATV 71HU75N4	GV3 L32	32	–	LC1 D40●●
11	15	ATV 71HD11N4	GV3 L40	40	–	LC1 D40●●
15	20	ATV 71HD15N4	GV3 L50	50	–	LC1 D50●●
18.5	25	ATV 71HD18N4	GV3 L50	50	–	LC1 D50●●
22	30	ATV 71HD22N4	GV3 L50	50	–	LC1 D65●●
30	40	ATV 71HD30N4	GV3 L65	65	–	LC1 D65●●
37	50	ATV 71HD37N4	NS100●MA100	100	600	LC1 D80●●
45	60	ATV 71HD45N4	NS160●MA100	100	600	LC1 D115●●
55	75	ATV 71HD55N4	NS160●MA150	150	1350	LC1 D115●●
75	100	ATV 71HD75N4	NS160●MA150	150	1350	LC1 D115●●
90	125	ATV 71HD90N4	NS160●MA150	150	1350	LC1 D115●●
110	150	ATV 71HC11N4	NS250●MA220	220	1980	LC1 F185●●
132	200	ATV 71HC13N4	NS250●MA220	220	1980	LC1 F225●●
160	250	ATV 71HC16N4	NS400●MA320	320	1920	LC1 F265●●
200	300	ATV 71HC20N4	NS400●MA320	320	1920	LC1 F330●●
220	350	ATV 71HC25N4	NS400●MA320	320	1920	LC1 F400●●
250	400	ATV 71HC25N4	NS630●MAE500	500	3000	LC1 F400●●
280	450	ATV 71HC28N4	NS630●MAE500	500	3000	LC1 F500●●
315	500	ATV 71HC31N4	NS630●MAE500	500	3000	LC1 F500●●
355	–	ATV 71HC40N4	NS630●MAE500	500	3000	LC1 F630●●
Three-phase supply voltage 440...480 V 50/60 Hz. Type 1 coordination						
400	600	ATV 71HC40N4	NS800 MicroLogic 2 or 5 (LR OFF)	800	1600	LC1 F630●●
500	700	ATV 71HC50N4	NS1000 MicroLogic 2 or 5 (LR OFF)	1000	2000	LC1 F800●●

(1) Standard power ratings for 400 V 50/60 Hz 4-pole motors.

The values expressed in HP conform to the NEC (National Electrical Code).

(2) NS●●●●, NS800, NS1000: products sold under the Merlin Gerin brand.

For references to be completed, replace the dot with the letter corresponding to the circuit-breaker breaking performance (N, H, L).

Breaking capacity of circuit-breakers according to standard IEC 60947-2:

Circuit-breaker	Icu (kA) for 440 V			
	N	H	L	
GV2 L08, GV2 L10, GV3 L32	100	–	–	–
GV2 L14...GV2 L22	20	–	–	–
GV3 L40...L65	50	–	–	–
NS100●MA	–	25	65	130
NS160●MA, NS250●MA	–	35	65	130
NS400●, NS630●	–	42	65	130
NS800, NS1000	–	50	65	130

(3) Composition of contactors:

LC1 D18 to LC1 D115: 3 poles + 1 "N/O" auxiliary contact and 1 "N/C" auxiliary contact.

LC1 F●●●: 3 poles. To add auxiliary contacts or other accessories, please consult our specialist catalogue "Motor starter solutions. Control and protection components".

(4) Replace ●● with the control circuit voltage reference indicated in the table below:

	Volts ~	24	48	110	220	230	240
LC1 D	50 Hz	B5	E5	F5	M5	P5	U5
	60 Hz	B6	E6	F6	M6	–	U6
	50/60 Hz	B7	E7	F7	M7	P7	U7
LC1 F185	50 Hz (LX1 coil)	B5	E5	F5	M5	P5	U5
	60 Hz (LX1 coil)	–	E6	F6	M6	–	U6
	40...400 Hz (LX9 coil)	–	E7	F7	M7	P7	U7
LC1 F265, F330	40...400 Hz (LX1 coil)	B7	E7	F7	M7	P7	U7
LC1 F400...F630	40...400 Hz (LX1 coil)	–	E7	F7	M7	P7	U7
LC1 F800	40...400 Hz (LX1 coil)	–	–	FE7	P7	P7	P7

For other voltages available between 24 V and 660 V, or a DC control circuit, please consult your Regional Sales Office.

DF53345-20-M



105517-15-M



PF107482-32-M



NS160●MA150
+
LC1 D115●●
+
ATV 71WD55N4

Motor starters for UL Type 12/IP 54 drives

Motor Power (1) kW	Drive HP	Drive Reference	Circuit-breaker			Line contactor Reference (3) (4)
			Reference (2)	Rating A	Im A	
Three-phase supply voltage 380...415 V 50/60 Hz. Type 2 coordination						
0.75	1	ATV 71W075N4	GV2 L08	4	–	LC1 D18●●
1.5	2	ATV 71WU15N4	GV2 L10	6.3	–	LC1 D18●●
2.2	3	ATV 71WU22N4	GV2 L14	10	–	LC1 D18●●
3	–	ATV 71WU30N4	GV2 L16	14	–	LC1 D18●●
4	5	ATV 71WU40N4	GV2 L16	14	–	LC1 D18●●
5.5	7.5	ATV 71WU55N4	GV2 L22	25	–	LC1 D25●●
7.5	10	ATV 71WU75N4	GV3 L32	32	–	LC1 D40●●
11	15	ATV 71WD11N4	GV3 L40	40	–	LC1 D40●●
15	20	ATV 71WD15N4	GV3 L50	50	–	LC1 D50●●
18.5	25	ATV 71WD18N4	GV3 L50	50	–	LC1 D50●●
22	30	ATV 71WD22N4	GV3 L65	65	–	LC1 D65●●
30	40	ATV 71WD30N4	NS80HMA80	80	480	LC1 D65●●
37	50	ATV 71WD37N4	NS100●MA100	100	800	LC1 D80●●
45	60	ATV 71WD45N4	NS160●MA150	150	1350	LC1 D115●●
55	75	ATV 71WD55N4	NS160●MA150	150	1350	LC1 D115●●
75	100	ATV 71WD75N4	NS250●MA150	150	1350	LC1 D150●●
Three-phase supply voltage 440...480 V 50/60 Hz. Type 2 coordination						
0.75	1	ATV 71W075N4	GV2 L08	4	–	LC1 D18●●
1.5	2	ATV 71WU15N4	GV2 L10	6.3	–	LC1 D18●●
2.2	3	ATV 71WU22N4	GV2 L14	10	–	LC1 D18●●
3	–	ATV 71WU30N4	GV2 L14	10	–	LC1 D18●●
4	5	ATV 71WU40N4	GV2 L16	14	–	LC1 D18●●
5.5	7.5	ATV 71WU55N4	GV2 L22	25	–	LC1 D25●●
7.5	10	ATV 71WU75N4	GV3 L32	32	–	LC1 D40●●
11	15	ATV 71WD11N4	GV3 L40	40	–	LC1 D40●●
15	20	ATV 71WD15N4	GV3 L50	50	–	LC1 D50●●
18.5	25	ATV 71WD18N4	GV3 L50	50	–	LC1 D50●●
22	30	ATV 71WD22N4	GV3 L65	65	–	LC1 D65●●
30	40	ATV 71WD30N4	NS100●MA100	100	600	LC1 D65●●
37	50	ATV 71WD37N4	NS100●MA100	100	600	LC1 D80●●
45	60	ATV 71WD45N4	NS160●MA100	100	600	LC1 D115●●
55	75	ATV 71WD55N4	NS160●MA150	150	1350	LC1 D115●●
75	100	ATV 71WD75N4	NS160●MA150	150	1350	LC1 D115●●

(1) Standard power ratings for 400 V 50/60 Hz 4-pole motors.
The values expressed in HP conform to the NEC (National Electrical Code).
(2) NS80HMA●●, NS●●●●MA: products sold under the Merlin Gerin brand.
For references to be completed, replace the dot with the letter corresponding to the circuit-breaker breaking performance (N, H, L).
Breaking capacity of circuit-breakers according to standard IEC 60947-2:

Circuit-breaker	Icu (kA) for 400 V		
	N	H	L
GV2 L08...L14, GV3 L32	100	–	–
GV2 L16, L22, GV3 L40...L65	50	–	–
NS80HMA	70	–	–
NS100●MA	–	25	70
NS160●MA, NS250●MA	–	36	70
Circuit-breaker	Icu (kA) for 440 V		
	N	H	L
GV2 L08, GV2 L10, GV3 L32	100	–	–
GV2 L14...L22	20	–	–
GV3 L40...L65	50	–	–
NS100●MA	–	25	65
NS160●MA	–	35	65

(3) Composition of contactors:
LC1 D18 to LC1 D150: 3 poles + 1 "N/O" auxiliary contact and 1 "N/C" auxiliary contact.
(4) Replace ●● with the control circuit voltage reference indicated in the table below:

LC1 D	Volts ~						
	24	48	110	220	230	240	
50 Hz	B5	E5	F5	M5	P5	U5	
60 Hz	B6	E6	F6	M6	–	U6	
50/60 Hz	B7	E7	F7	M7	P7	U7	

For other voltages available between 24 V and 660 V, or a DC control circuit, please consult your Regional Sales Office.



GV2 L16
+
LC1 D18●●
+
ATV 71PU40N4Z

Motor starters for UL Type 1/IP 20 drives on base plates

Motor Power (1)		Drive Reference	Circuit-breaker Reference (2)	Rating	Im	Line contactor Reference (3) (4)
kW	HP			A	A	
Three-phase supply voltage 380...415 V 50/60 Hz. Type 2 coordination						
0.75	1	ATV 71P075N4Z	GV2 L08	4	–	LC1 D18●●
1.5	2	ATV 71PU15N4Z	GV2 L10	6.3	–	LC1 D18●●
2.2	3	ATV 71PU22N4Z	GV2 L14	10	–	LC1 D18●●
3	–	ATV 71PU30N4Z	GV2 L16	14	–	LC1 D18●●
4	5	ATV 71PU40N4Z	GV2 L16	14	–	LC1 D18●●
5.5	7.5	ATV 71PU55N4Z	GV2 L22	25	–	LC1 D25●●
7.5	10	ATV 71PU75N4Z	GV3 L32	32	–	LC1 D40●●

Three-phase supply voltage 440...480 V 50/60 Hz. Type 2 coordination

0.75	1	ATV 71P075N4Z	GV2 L08	4	–	LC1 D18●●
1.5	2	ATV 71PU15N4Z	GV2 L10	6.3	–	LC1 D18●●
2.2	3	ATV 71PU22N4Z	GV2 L14	10	–	LC1 D18●●
3	–	ATV 71PU30N4Z	GV2 L14	10	–	LC1 D18●●
4	5	ATV 71PU40N4Z	GV2 L16	14	–	LC1 D18●●
5.5	7.5	ATV 71PU55N4Z	GV2 L22	25	–	LC1 D25●●
7.5	10	ATV 71PU75N4Z	GV3 L32	32	–	LC1 D40●●

(1) Standard power ratings for 400 V 50/60 Hz 4-pole motors.

The values expressed in HP conform to the NEC (National Electrical Code).

(2) Breaking capacity of circuit-breakers according to standard IEC 60947-2:

Circuit-breaker	Icu (kA) for 400 V		
	N	H	L
GV2 L08...L14, GV3 L32	100	–	–
GV2 L16, L22	50	–	–

(3) Composition of contactors:

LC1 D18 to LC1 D40: 3 poles + 1 "N/O" auxiliary contact and 1 "N/C" auxiliary contact.

(4) Replace ●● with the control circuit voltage reference indicated in the table below:

LC1 D	Volts ~	24	48	110	220	230	240
	50 Hz		B5	E5	F5	M5	P5
60 Hz		B6	E6	F6	M6	–	U6
50/60 Hz		B7	E7	F7	M7	P7	U7

For other voltages available between 24 V and 660 V, or a DC control circuit, please consult your Regional Sales Office.

DF53086-16-M



103282-14-M



107537-26-M



GV2 L16
+
LC1 D25●●
+
ATV 71HU75Y

Motor starters for UL Type 1/IP 20 drives

Motor Power (1) kW	Drive Reference	Circuit-breaker		Line contactor	
		Reference (2)	Rating A	Im A	Reference (3) (4)
Three-phase supply voltage 690 V 50 Hz. Type 2 coordination					
2.2	ATV 71HU22Y	GV2 L10	6.3	–	LC1 D25●●
3	ATV 71HU30Y	GV2 L10	6.3	–	LC1 D25●●
4	ATV 71HU40Y	GV2 L14	10	–	LC1 D25●●
5.5	ATV 71HU55Y	GV2 L14	10	–	LC1 D25●●
7.5	ATV 71HU75Y	GV2 L16	14	–	LC1 D25●●
11	ATV 71HD11Y	GV2 L20	18	–	LC1 D40●●
15	ATV 71HD15Y	GV2 L22	25	–	LC1 D40●●
18.5	ATV 71HD18Y	GV3 L25	25	–	LC1 D40●●
22	ATV 71HD22Y	GV3 L32	32	–	LC1 D65●●
30	ATV 71HD30Y	GV3 L40	40	–	LC1 D80●●
37	ATV 71HD37Y	GV3 L50	50	–	LC1 D80●●
45	ATV 71HD45Y	GV3 L65	65	–	LC1 D80●●
55	ATV 71HD55Y	NS100LMA100	100	1100	LC1 D80●●
75	ATV 71HD75Y	NS100LMA100	100	1100	LC1 D95●●
90	ATV 71HD90Y	NS400LMA320	320	2880	LC1 F265●●
110	ATV 71HC11Y	NS400LMA320	320	2880	LC1 F265●●
132	ATV 71HC13Y	NS400LMA320	320	2880	LC1 F265●●
160	ATV 71HC16Y	NS400LMA320	320	2880	LC1 F265●●
200	ATV 71HC20Y	NS400LMA320	320	2880	LC1 F330●●

(1) Standard power ratings for 690 V 50 Hz 4-pole motors.
 (2) NS●●●LMA: products sold under the Merlin Gerin brand.
 Breaking capacity of circuit-breakers according to standard IEC 60947-2:

Circuit-breaker	Icu (kA) for 690 V
GV2 L10...L22, GV3 L25, L32	4
GV3 L40...L65	5
NS●●●LMA	75

(3) Composition of contactors:
 LC1 D●●: 3 poles + 1 "N/O" auxiliary contact and 1 "N/C" auxiliary contact.
 LC1 F●●●: 3 poles. To add auxiliary contacts or other accessories, please consult our specialist catalogue "Motor starter solutions. Control and protection components".

(4) Replace ●● with the control circuit voltage reference indicated in the table below:

	Volts ~	24	48	110	220	230	240
LC1 D	50 Hz	B5	E5	F5	M5	P5	U5
	60 Hz	B6	E6	F6	M6	–	U6
	50/60 Hz	B7	E7	F7	M7	P7	U7
LC1 F	40...400 Hz (LX1 coil)	B7	E7	F7	M7	P7	U7

For other voltages available between 24 V and 660 V, or a DC control circuit, please consult your Regional Sales Office.

PF0482288



PF105715



PF107540



NS630LMA500
+
LC1 F400
+
ATV 71HC25Y

Motor starters for UL Type 1/IP 20 drives

Motor Power (1)	Drive Reference	Circuit-breaker Reference (2)	Rating	Im	Line contactor Reference (3) (4)
kW			A	A	
Three-phase supply voltage 690 V 50 Hz. Type 1 coordination					
250	ATV 71HC25Y	NS630LMA500	500	–	LC1 F400●●
315	ATV 71HC31Y	NS630LMA500	500	–	LC1 F500●●
400	ATV 71HC40Y	NS630LMA500	500	–	LC1 F630●●
500	ATV 71HC50Y	NS630L MicroLogic 5	630	–	LC1 BL33●●
630	ATV 71HC63Y	NS630L MicroLogic 5	630	–	LC1 BL33●●

(1) Standard power ratings for 690 V 50 Hz 4-pole motors.

(2) NS630L: products sold under the Merlin Gerin brand.

Breaking capacity of circuit-breakers according to standard IEC 60947-2:

Circuit-breaker	Icu (kA) for 690 V
NS630L	75

(3) Composition of contactors:

LC1 F●●●: 3 poles. To add auxiliary contacts or other accessories, please consult our specialist catalogue "Motor starter solutions. Control and protection components".

LC1 BL●●: 3 poles. To add auxiliary contacts or other accessories, please consult our specialist catalogue "Motor starter solutions. Control and protection components".

(4) Replace ●● with the control circuit voltage reference indicated in the table below:

	Volts ~	24	48	110	220	230	240
LC1 F	40...400 Hz (LX1 coil)	–	E7	F7	M7	P7	U7
LC1 BL	50...400 Hz (WB1 coil)	–	–	F	M	P	U

For other voltages available between 24 V and 660 V, or a DC control circuit, please consult your Regional Sales Office.

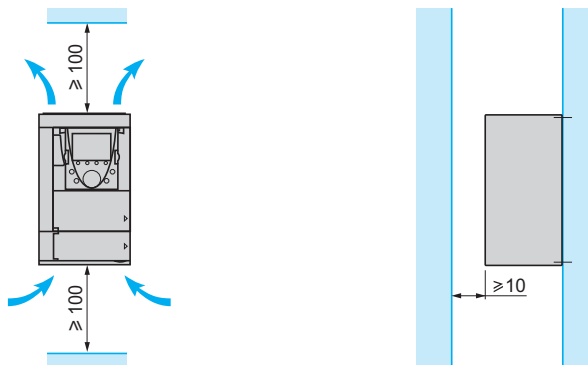
Mounting recommendations

Depending on the conditions in which the drive is to be used, its installation will require certain precautions and the use of appropriate accessories.

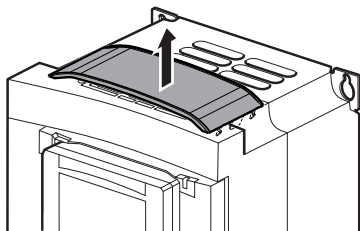
Install the unit vertically:

- Avoid placing 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.

ATV 71H●●●M3, ATV 71HD11M3X...HD45M3X, ATV 71H075N4...HD75N4,
ATV 71HU22Y...HD90Y, ATV 71P075N4Z...PD11N4Z

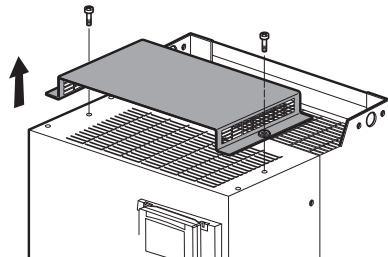


522085



Removing the protective blanking cover for:
ATV 71H●●●M3, ATV 71HD11M3X, HD15M3X,
ATV 71H075N4...HD18N4,
ATV 71P075N4Z...PD11N4Z

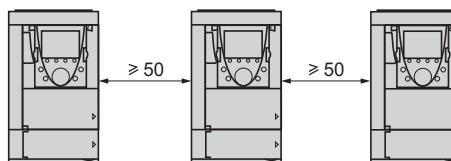
564510



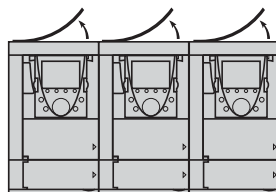
Removing the protective blanking cover for:
ATV 71HD18M3X...HD45M3X,
ATV 71HD22N4...HD75N4,
ATV 71HU22Y...HD90Y

Mounting types

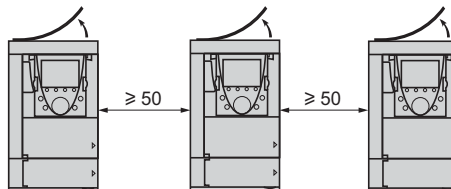
■ Type A mounting



■ Type B mounting



■ Type C mounting



By removing the protective blanking cover from the top of the drive, the degree of protection for the drive becomes IP 20.

The protective blanking cover may vary according to the drive model, see drawings opposite.

Note: The protective blanking cover must be removed from ATV 71P●●●N4Z drives when they are mounted in a dust and damp proof enclosure.

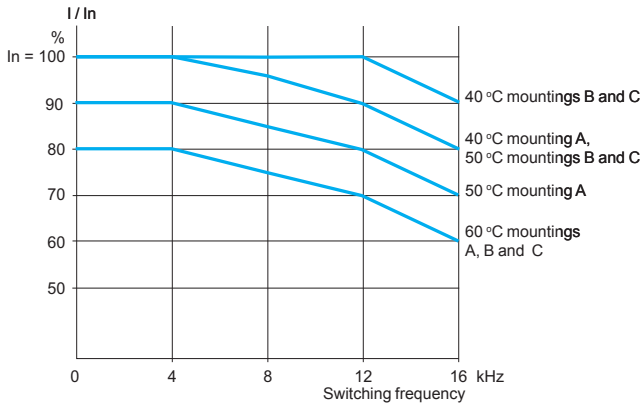
Mounting recommendations (continued)

Derating curves for ATV 71H●●●M3, ATV 71HD11M3X...HD45M3X, ATV 71H075N4...HD75N4, ATV 71P075N4Z...PD11N4Z

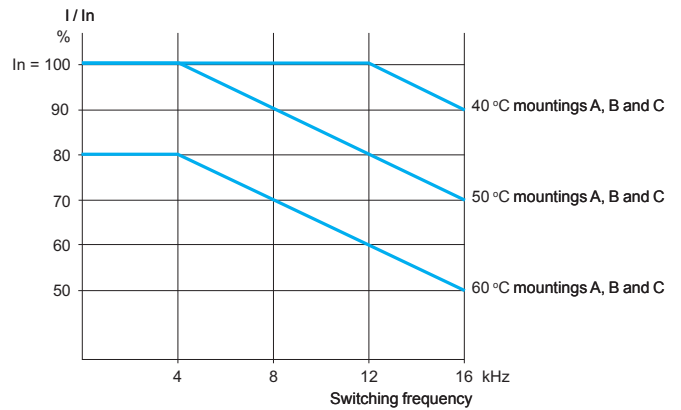
The derating curves for the drive nominal current (In) depend on the temperature, the switching frequency and the mounting type.

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

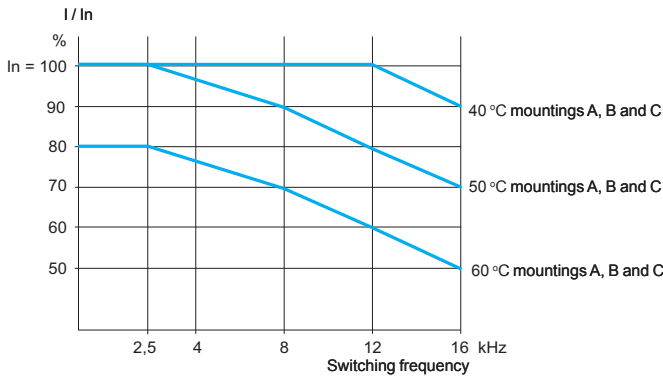
ATV 71H037M3...HD15M3X, ATV 71H075N4...HD18N4, ATV 71P075N4Z...PD11N4Z



ATV 71HD22N4, HD30N4 (1)



ATV 71HD18M3X...HD45M3X, ATV 71HD37N4...HD75N4 (1)

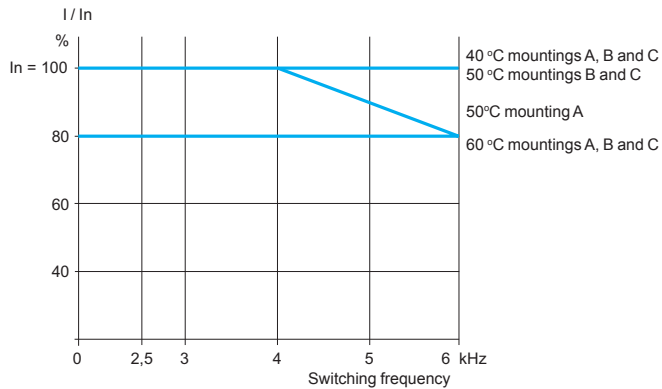


(1) Above 50°C, ATV 71HD18M3X...HD45M3X and ATV 71HD22N4...HD75N4 drives should be fitted with a control card fan kit. See page 27.

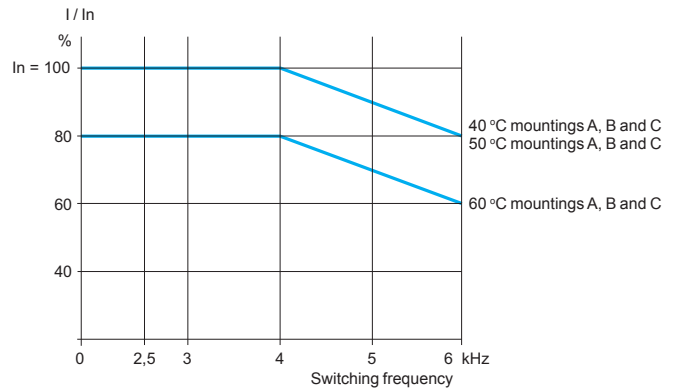
Mounting recommendations (continued)

Derating curves for ATV 71HU22Y...HD90Y

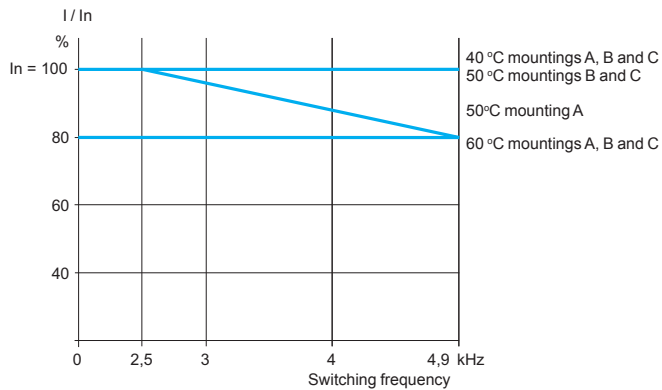
ATV 71HU22Y...HD15Y (1)



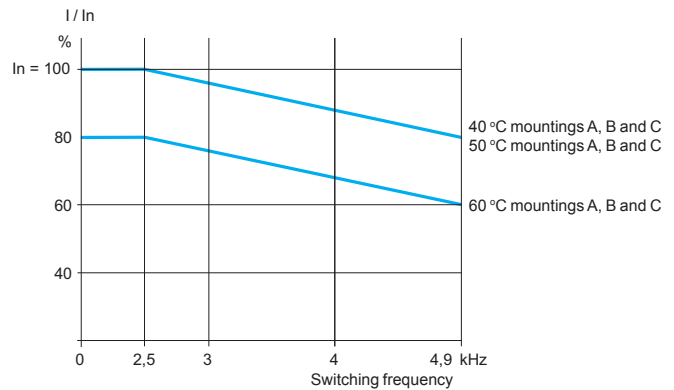
ATV 71HD18Y...HD30Y (1)



ATV 71HD37Y...HD55Y (1)



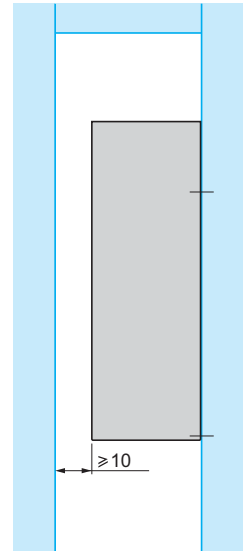
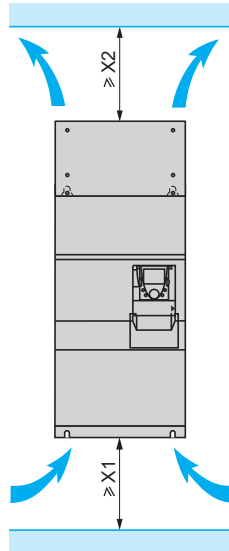
ATV 71HD75Y, ATV 71HD90Y (1)



(1) Above 50 °C, ATV 71HU22Y...HD90Y drives should be fitted with a control card fan kit. See page 27.

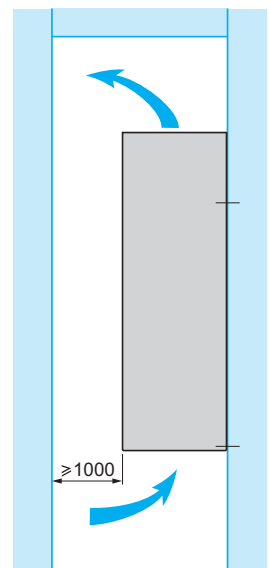
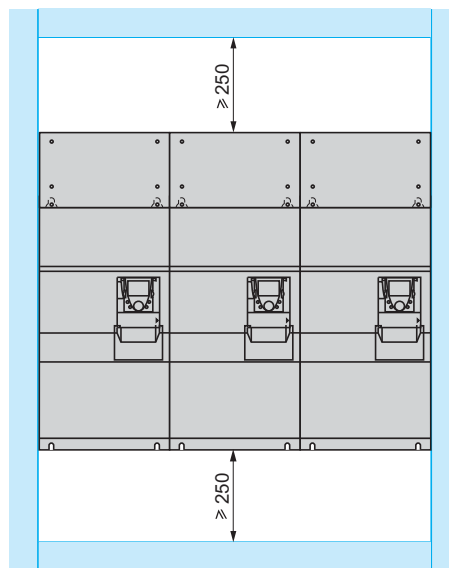
Mounting recommendations (continued)

ATV 71HD55M3X, HD75M3X, ATV 71HD90N4...HC50N4, ATV 71HC11Y...HC63Y



ATV 71H	X1	X2
D55M3X, D75M3X D90N4	100	100
C11N4...C16N4, C11Y...C16Y	150	150
C20N4...C28N4, C20Y...C31Y	150	200
C31N4, C40N4	250	300
C50N4, C40Y...C63Y	250	400

These drives can be mounted side by side, observing the following mounting recommendations:



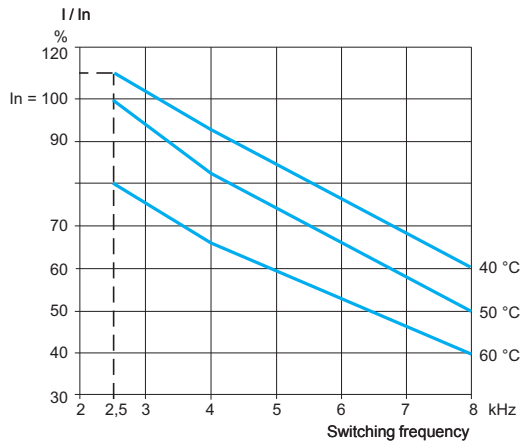
Mounting recommendations (continued)

Derating curves for ATV 71HD55MX, HD75MX, ATV 71HD90N4...HC13N4

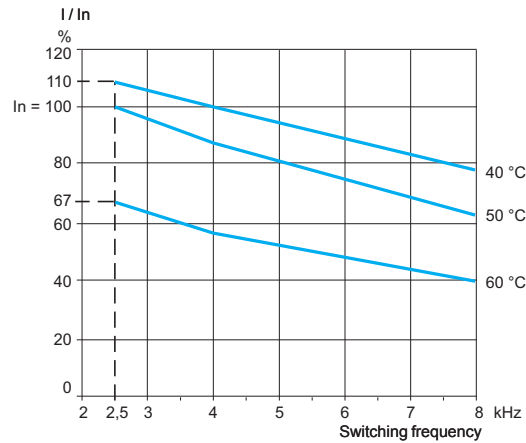
The derating curves for the drive nominal current (I_n) depend on the temperature, the switching frequency and the mounting type.

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

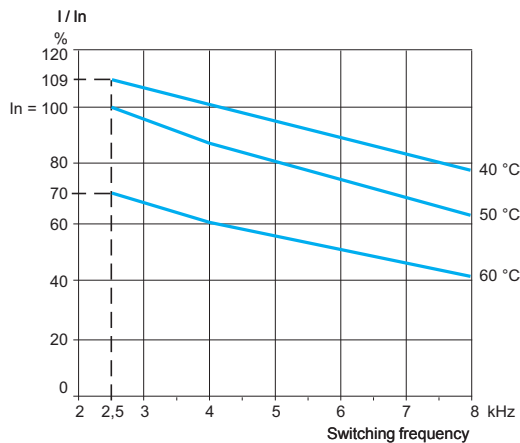
ATV 71HD55M3X, HD75M3X



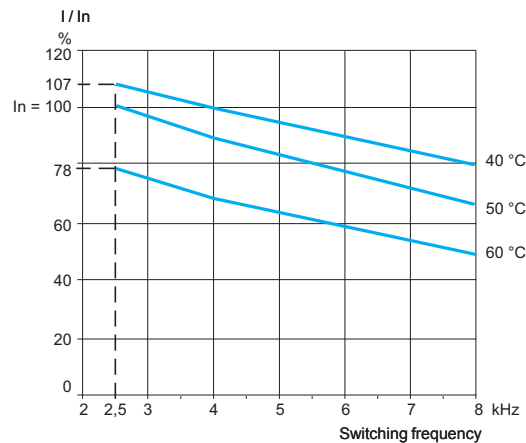
ATV 71HD90N4



ATV 71HC11N4



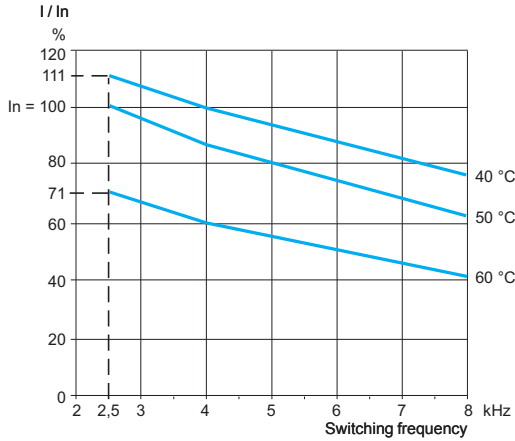
ATV 71HC13N4



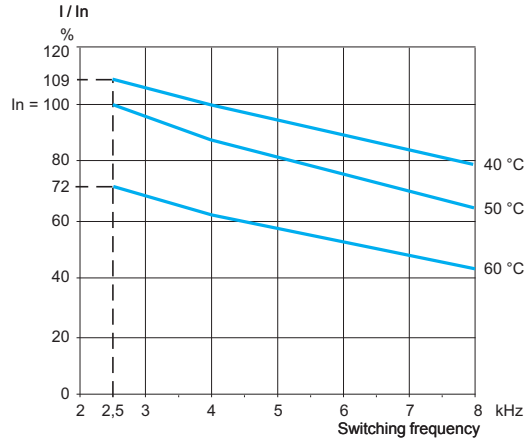
Mounting recommendations (continued)

Derating curves for ATV 71HC16N4...HC31N4

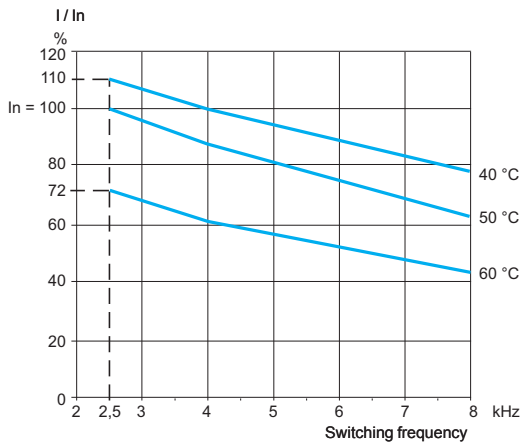
ATV 71HC16N4



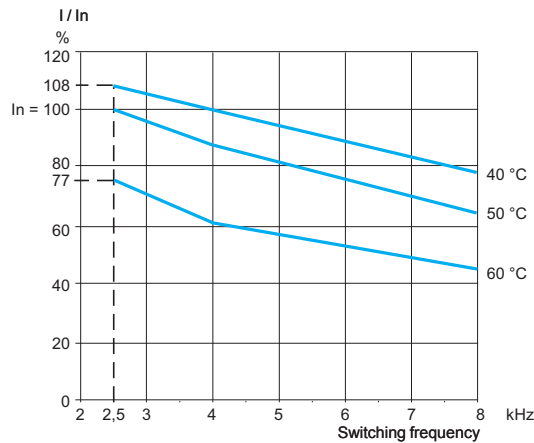
ATV 71HC20N4



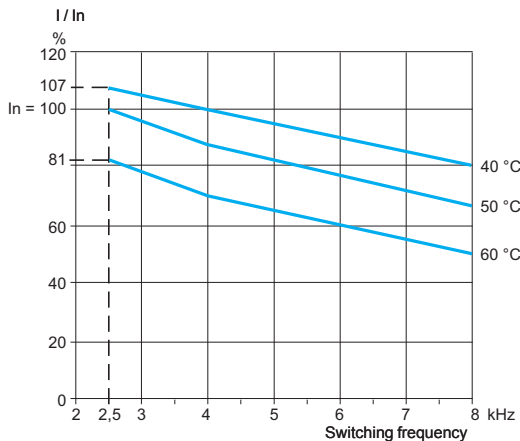
ATV 71HC25N4 combined with a 220 kW motor



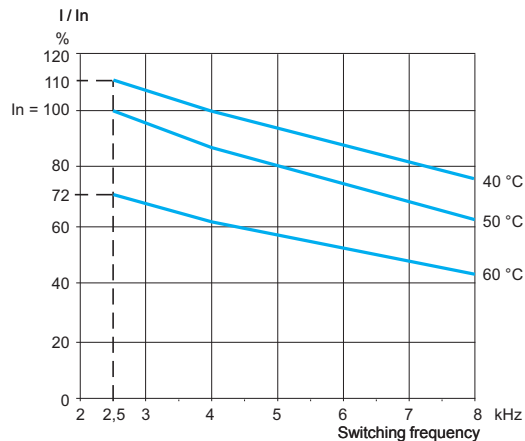
ATV 71HC25N4 combined with a 250 kW motor



ATV 71HC28N4



ATV 71HC31N4

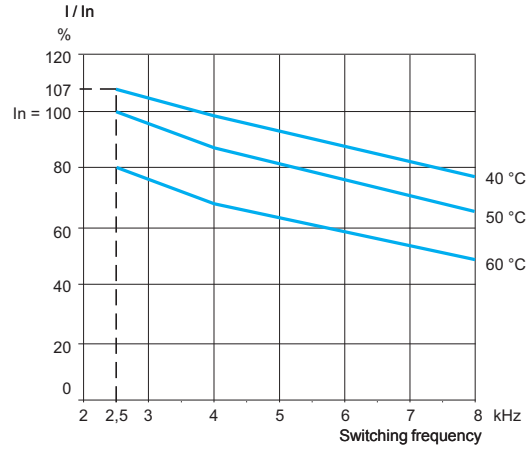
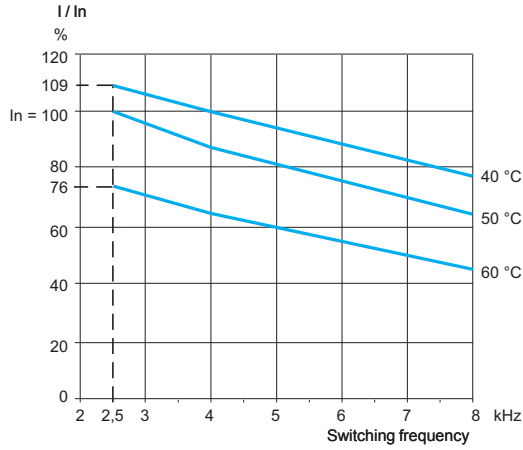


Mounting recommendations (continued)

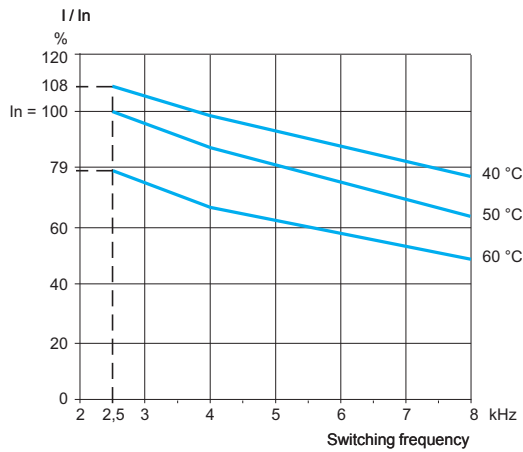
Derating curves for ATV 71HC40N4, HC50N4

ATV 71HC40N4 combined with a 355 kW motor

ATV 71HC40N4 combined with a 400 kW motor



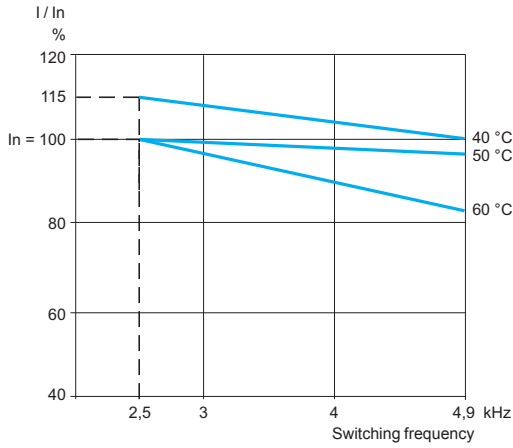
ATV 71HC50N4



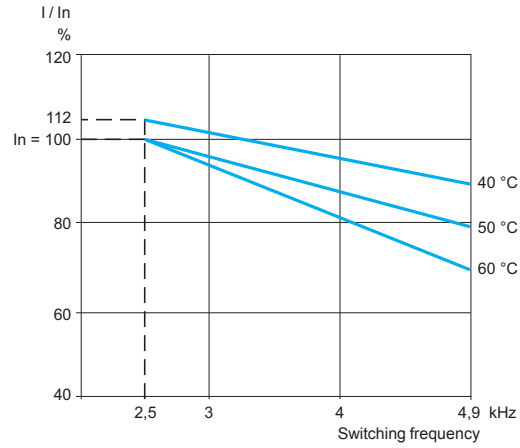
Mounting recommendations (continued)

Derating curves for ATV 71HC11Y...HC31Y

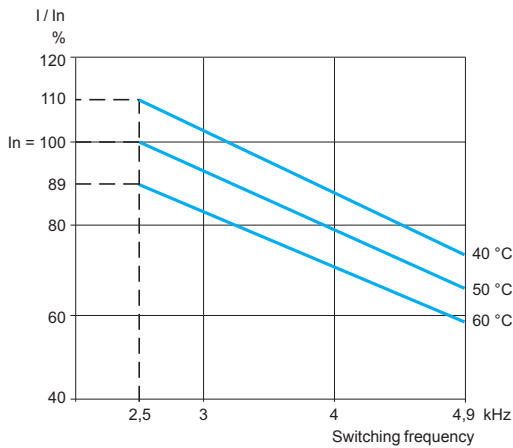
ATV 71HC11Y



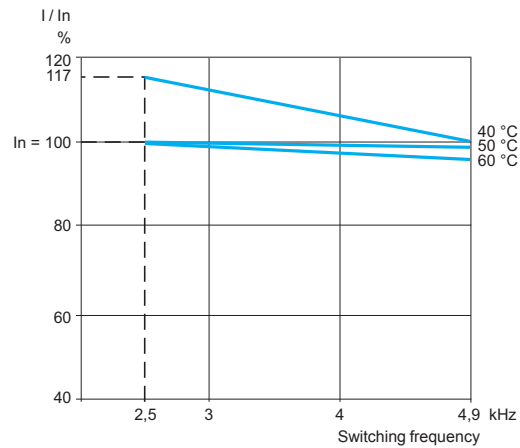
ATV 71HC13Y



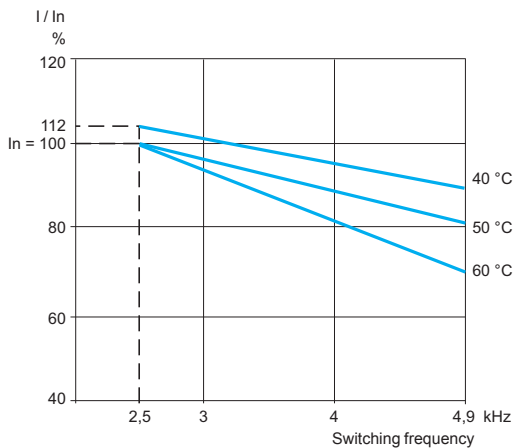
ATV 71HC16Y



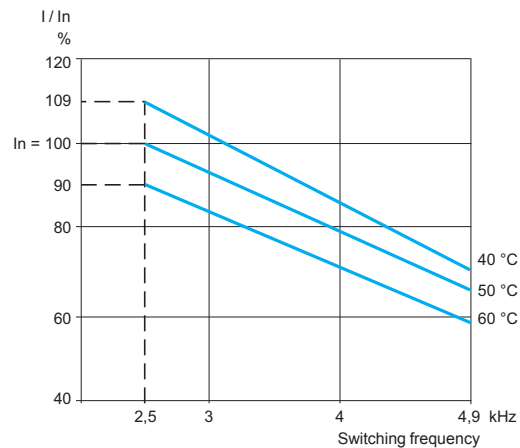
ATV 71HC20Y



ATV 71HC25Y



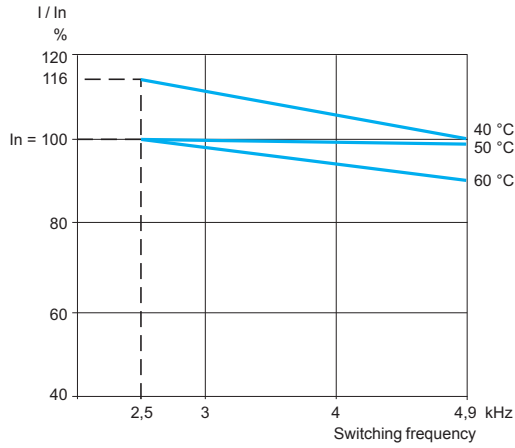
ATV 71HC31Y



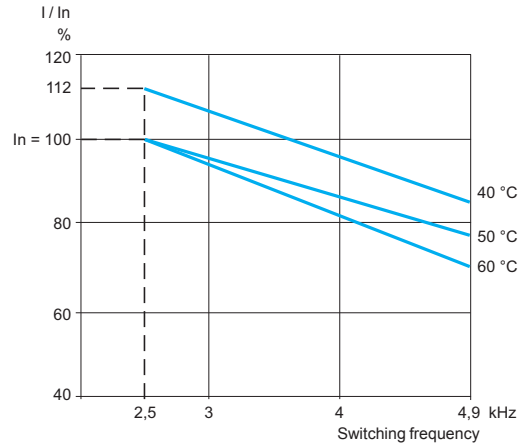
Mounting recommendations (continued)

Derating curves for ATV 71HC40Y...HC63Y

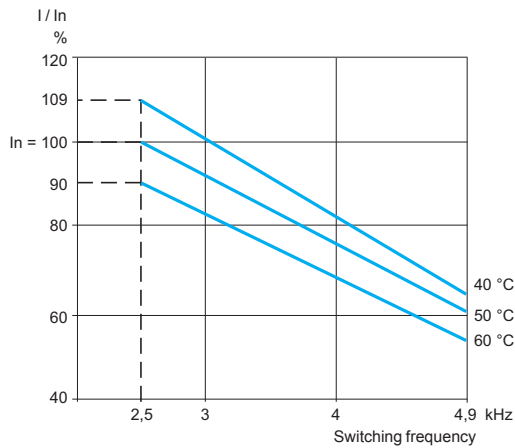
ATV 71HC40Y

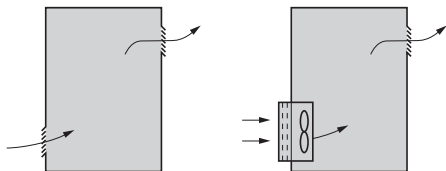


ATV 71HC50Y



ATV 71HC63Y





Specific recommendations for mounting ATV 71H●●●M3, ATV 71H●●●M3X, ATV 71H●●●N4 and ATV 71H●●●Y drives in enclosures

Follow the mounting recommendations described on pages 250 to 258.

To ensure proper air circulation in the drive:

- Fit ventilation grilles
- Ensure that there is sufficient ventilation. If there is not, install a forced ventilation unit with a filter. The openings and/or fans must provide a flow rate at least equal to that of the drive fans, see page 261)
- Use special filters with IP 54 protection
- Remove the blanking cover from the top of the drive, see page 250

Power dissipated inside the enclosure

For drives	Dissipated power (1)	
	Mounted in the enclosure (power section inside the enclosure) W	Dust and damp proof flush-mounted (power section outside the enclosure) W
Three-phase supply voltage: 200...240 V 50/60 Hz		
ATV 71H037M3	46	25
ATV 71H075M3	66	27
ATV 71HU15M3	101	30
ATV 71HU22M3	122	38
ATV 71HU30M3	154	38
ATV 71HU40M3	191	41
ATV 71HU55M3	293	59
ATV 71HU75M3	363	67
ATV 71HD11M3X	566	80
ATV 71HD15M3X	620	84
ATV 71HD18M3X	657	114
ATV 71HD22M3X	766	124
ATV 71HD30M3X	980	144
ATV 71HD37M3X	1154	161
ATV 71HD45M3X	1366	180
ATV 71HD55M3X	1715	154
ATV 71HD75M3X	2204	154

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

ATV 71H075N4	44	26
ATV 71HU15N4	64	28
ATV 71HU22N4	87	30
ATV 71HU30N4	114	35
ATV 71HU40N4	144	40
ATV 71HU55N4	185	50
ATV 71HU75N4	217	55
ATV 71HD11N4	320	65
ATV 71HD15N4	392	85
ATV 71HD18N4	486	86
ATV 71HD22N4	574	110
ATV 71HD30N4	799	133
ATV 71HD37N4	861	137
ATV 71HD45N4	1060	165
ATV 71HD55N4	1210	178
ATV 71HD75N4	1720	225
ATV 71HD90N4	2403	237
ATV 71HC11N4	2726	261
ATV 71HC13N4	3191	296
ATV 71HC16N4	3812	350
ATV 71HC20N4	4930	493
ATV 71HC25N4	5873	586
ATV 71HC28N4	6829	658
ATV 71HC31N4	7454	772
ATV 71HC40N4	9291	935
ATV 71HC50N4	11345	1116

(1) This value is given for operation at nominal load and for a switching frequency of 2.5 or 4 kHz depending on the rating.

Add 7 W to this value for each additional option card.

Power dissipated inside the enclosure (continued)		
For drives	Dissipated power (1)	
	Mounted in the enclosure (power section inside the enclosure)	Dust and damp proof flush-mounted (power section outside the enclosure)
	W	W
Three-phase supply voltage: 500...690 V 50/60 Hz		
ATV 71HU22Y	111	71
ATV 71HU30Y	119	71
ATV 71HU40Y	136	73
ATV 71HU55Y	158	75
ATV 71HU75Y	182	77
ATV 71HD11Y	227	81
ATV 71HD15Y	300	87
ATV 71HD18Y	386	94
ATV 71HD22Y	463	100
ATV 71HD30Y	556	108
ATV 71HD37Y	716	120
ATV 71HD45Y	911	133
ATV 71HD55Y	1087	144
ATV 71HD75Y	1545	158
ATV 71HD90Y	1947	179
ATV 71HC11Y	2320	169
ATV 71HC13Y	2739	179
ATV 71HC16Y	3271	196
ATV 71HC20Y	4005	267
ATV 71HC25Y	5142	311
ATV 71HC31Y	6293	363
ATV 71HC40Y	7596	471
ATV 71HC50Y	9614	554
ATV 71HC63Y	11921	658

(1) This value is given for operation at nominal load and for a switching frequency of 2.5 or 4 kHz depending on the rating.

Add 7 W to this value for each additional option card.

Fan flow rate depending on the drive rating

For drives	Flow rate m ³ /hour
ATV 71H037M3...HU15M3	17
ATV 71HU22M3...HU40M3	56
ATV 71HU55M3	112
ATV 71HU75M3	163
ATV 71HD11M3X, HD15M3X	252
ATV 71HD18M3X, HD22M3X	203
ATV 71HD30M3X...HD45M3X	406
ATV 71HD55M3X	402
ATV 71HD75M3X	774
ATV 71H075N4...HU22N4	17
ATV 71HU30N4, HU40N4	56
ATV 71HU55N4, HU75N4	112
ATV 71HD11N4	163
ATV 71HD15N4, HD18N4	252
ATV 71HD22N4 ... HD37N4	203
ATV 71HD45N4...HD75N4	406
ATV 71HD90N4	402
ATV 71HC11N4	774
ATV 71HC13N4	745
ATV 71HC16N4	860
ATV 71HC20N4...HC28N4	1260
ATV 71HC31N4, HC40N4	2100
ATV 71HC50N4	2400
ATV 71HU22Y...HD30Y	330
ATV 71HD37Y...HD90Y	406
ATV 71HC11Y...HC16Y	600
ATV 71HC20Y...HC31Y	1200
ATV 71HC40Y...HC63Y	2400

Dust and damp proof metal 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.

This enables the drive to be used in an enclosure where the maximum internal temperature reaches 50°C.

Calculating the dimensions of the enclosure

Maximum thermal resistance R_{th} (°C/W)

$$R_{th} = \frac{\theta - \theta_e}{P}$$

θ = maximum temperature inside enclosure in °C
 θ_e = maximum external temperature in °C
 P = total power dissipated in the enclosure in W

Power dissipated by drive: see page 259 (mounting in an enclosure or flush-mounting in an enclosure).

Add the power dissipated by the other equipment components.

Useful heat dissipation surface of enclosure S (m²)

(sides + top + front panel if wall-mounted)

$$S = \frac{K}{R_{th}}$$

K = thermal resistance per m² of the enclosure

For a metal enclosure:

- K = 0.12 with internal fan
- K = 0.15 without fan

Note: Do not use insulated enclosures, as they have a poor level of conductivity.

Specific recommendations for mounting drives on base plates in a dust and damp proof enclosure or on a machine frame

Follow the mounting recommendations described on pages 250 and 251.

Power dissipated inside the enclosure

For drives	Dissipated power (1)	
	Mounted in the enclosure with no fan (2)	Mounted in the enclosure with a fan
	W	W
Three-phase supply voltage: 380...480 V 50/60 Hz		
ATV 71P075N4Z	26	39
ATV 71PU15N4Z	28	41
ATV 71PU22N4Z	30	43
ATV 71PU30N4Z	35	65
ATV 71PU40N4Z	37	67
ATV 71PU55N4Z	40	95
ATV 71PU75N4Z	40	95
ATV 71PD11N4Z	50	115

Specific recommendations for mounting in a dust and damp proof enclosure (3)

Drives on base plates can be mounted in a dust and damp proof enclosure in accordance with the following specific recommendations:

- External ambient temperature (heatsink side, see page 31): - 10...+ 40°C
- Temperature inside the enclosure: + 50°C for a switching frequency of 4 kHz, or + 40°C for a switching frequency of 12 kHz
- Remove the blanking cover from the top of the drive, see page 250.

Specific recommendations for mounting on a machine frame (3)

Drives on base plates can also be mounted on a machine frame in accordance with the following specific recommendations:

- Ambient temperature: - 10...+ 40°C
- Thermal resistance (Rth) of the frame less than or equal to the thermal resistance of the kit for mounting in a dust and damp proof enclosure VW3 A9 80●, see page 31
- Aluminium machine frame; mounting on iron frame not recommended
- Support area machined on the frame, to give a surface smoothness of 100 µm and unevenness of 3.2 µm maximum
- Drive mounted in the centre of the support with a minimum thickness and a minimum cooling area, exposed to the open air (see table below)

For drives	Switching frequency	Minimum area		Minimum thickness
		With DC choke	With fan	
		m ²	m ²	mm
ATV 71P075N4Z	4 kHz	–	–	20
...PU22N4Z	12 kHz	0.60	0.70	20
ATV 71PU30N4Z,	4 kHz	1.50	–	20
PU40N4Z	12 kHz	2.00	1.50	20
ATV 71PU55N4Z,	4 kHz	3.50	3.00	20
PU75N4Z	12 kHz	5.40	5.00	20

(1) This value is given for operation at nominal load and for a switching frequency of 4 Hz.

Add 7 W to this value for each additional option card.

(2) Add the dissipation of the DC choke, see page 155.

(3) For ATV 71PD11N4Z drive, please contact your Regional Sales Office.

Definition of thermal resistance

Thermal resistance Rth of the frame or the cold plate (°C/W)

For drives	Maximum Rth (°C/W)
ATV 71P075N4Z	0.65
ATV 71PU15N4Z	0.36
ATV 71PU22N4Z	0.24
ATV 71PU30N4Z	0.21
ATV 71PU40N4Z	0.15
ATV 71PU55N4Z	0.03
ATV 71PU75N4Z	0.02
ATV 71PD11N4Z	0.015

Mounting several drives on the same frame or the same cold plate

Determine the equivalent thermal resistance (Rthe) for all the drives:

$$\frac{1}{R_{the}} = \frac{1}{R_{th1}} + \frac{1}{R_{th2}} + \frac{1}{R_{th3}} + \dots + \frac{1}{R_{thn}}$$

Calculation example with three drives of 0.75 kW, 1.5 kW and 2.2 kW

$$\frac{1}{R_{th}} = \frac{1}{0.65} + \frac{1}{0.36} + \frac{1}{0.24} \quad \text{i.e. } R_{th} = 0.12^{\circ}\text{C/W}$$

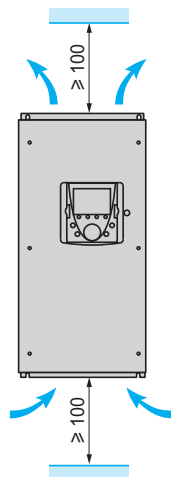
Mounting recommendations

Depending on the conditions in which the drive is to be used, its installation will require certain precautions and the use of appropriate accessories.

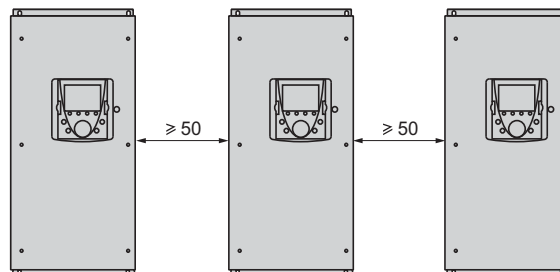
Install the unit vertically:

- Avoid placing 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.

ATV 71W●●●N4



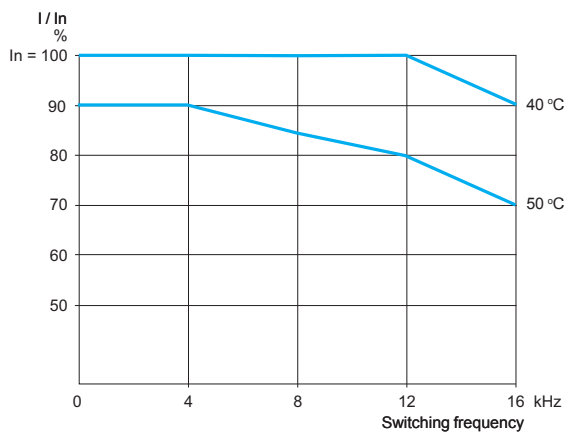
Mounting



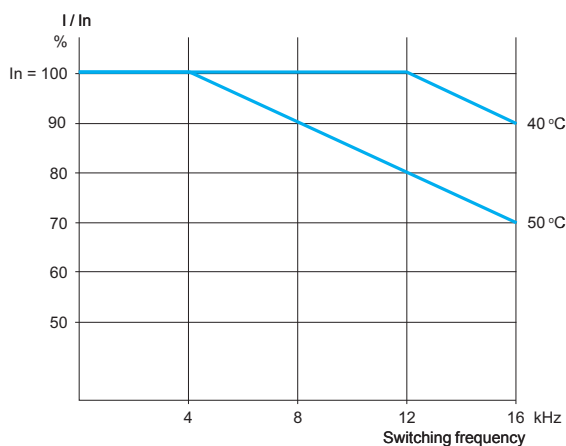
Mounting recommendations (continued)

Derating curves for ATV 71W075N4...WD75N4

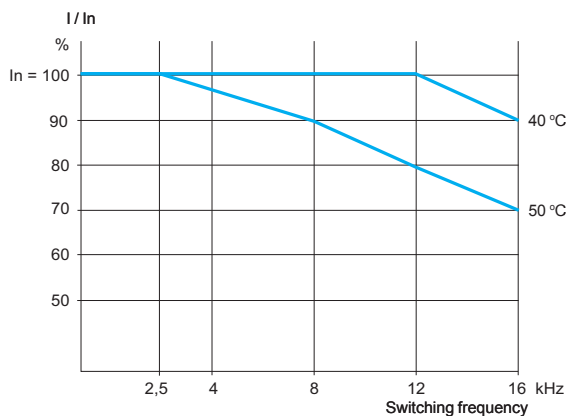
ATV 71W075N4...WD18N4






ATV 71WD22N4, WD30N4



ATV 71WD37N4...WD75N4



Compatible combinations of functions and applications

Applications	Hoisting	Lift	Material handling
Machines	Cranes, overhead cranes, gantries (vertical hoisting, translation, slewing), lifting platforms	Retrofit lifts up to 1.2 ms	Palletizers/depalletizers, carton packers, labelling machines, conveyors, roller tables
			

Motor control functions


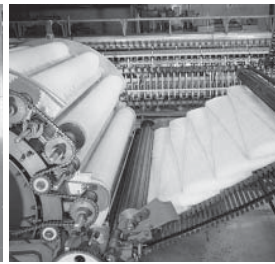
Flux vector control with and without sensor	■	■	■
2-point vector control	■		
Synchronous motor without speed feedback			
Synchronous motor with speed feedback		■	■
ENA system			
Voltage/frequency ratio			■
Output frequency 1600 Hz			
Motor overvoltage limiting	■	■	■

Application functions

Differential bipolar reference	■		■
Reference delinearization (magnifying glass effect)	■		■
Frequency control input			
Operations on references (summing, subtraction, multiplication)			■
Brake control	■	■	■
Brake feedback via contact	■		
High-speed hoisting	■		
Load measurement	■	■	
Load sharing	■		■
Slack sling	■		
Limit switch management	■	■	■
S ramp	■	■	■
Current limiting			
Output contactor command		■	
Integrity check of output contactor		■	
Rescue following power failure		■	
Stop on thermal alarm		■	
Torque control			■
Torque limit			■
Motor fluxing	■		■
Parameter set switching	■	■	■
Motor switching	■		■
Position control via limit switches			■
Uncontrolled output cut			■
Torque or current limit detection			■
PID regulator			
Auto/man.			
Reference saving			
+/- speed, single-action button			
+/- speed, double-action button	■		
+/- speed around a reference			
Traverse control			
Automatic catching of a spinning load with speed detection (catch on the fly)			
Undervoltage management			
Fastest possible stop			

■ Frequent or necessary use

(For other functions that can be used for all applications, see pages 278 to 299)

Packing	Textiles	Wood	High inertia	Process
Palletizers/depalletizers, carton packers, labelling machines	Weaving looms, carding frames, washing machines, spinners, drawing frames	Automatic lathes, saws, milling	Centrifuges, mixers, unbalanced machines (beam pumps, presses)	Sectional production lines (speed < 500 m/min) Example: building materials
				
■	■	■	■	■
■	■	■	■	■
■	■	■	■	■
■	■	■	■	■
■	■	■	■	■
■	■	■	■	■

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Remote graphic display terminal functions

This display terminal is attached to the front of the drive. It includes the integrated 7-segment display terminal for drives supplied without a graphic display terminal or for ATV 71HU22Y...HC63Y drives.

■ **Description**

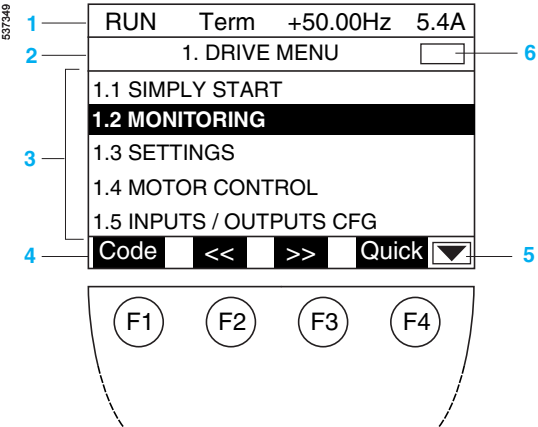
□ **Description of graphic display terminal**

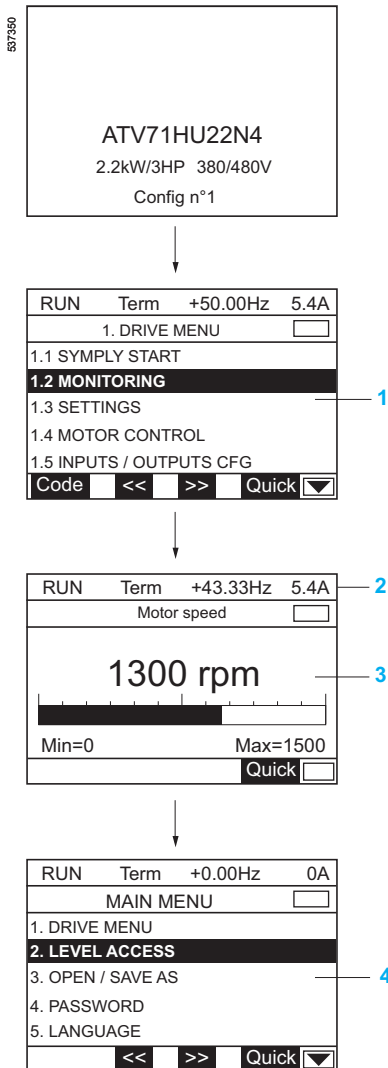
- 1 Graphic display unit:
 - 8 lines, 240 x 160 pixels
 - large digit display that can be read from 5 m away
 - bar chart display
- 2 Assignable function keys F1, F2, F3, F4:
 - dialogue functions: direct access, help screens, navigation
 - application functions: Local/Remote, preset speed
- 3 STOP/RESET key: local control of motor stopping/fault clearing
- 4 RUN key: local control of motor operation
- 5 Navigation button:
 - Press to save the current value (ENT)
 - Turn ± to increase or decrease the value, go to the next or previous line
- 6 FWD/REV key: reverses the direction of rotation of the motor
- 7 ESC key: aborts a value, parameter or menu to return to the previous option

Note: keys 3, 4 and 6 can be used to control the drive directly.

□ **Description of graphic display unit**

- 1 Display line. Its content can be configured; the factory settings show:
 - the drive status (e.g. RUN)
 - the active control channel (e.g. "Term": terminals)
 - the frequency reference
 - the current in the motor
- 2 Menu line. Indicates the current menu or submenu.
- 3 Area displaying menus, submenus, parameters, values, bar charts, in the form of a scrolling window, with a maximum of 5 lines.
 - The line or value selected using the navigation button is displayed in reverse video (see example opposite).
- 4 Section displaying the functions assigned to the F1 to F4 keys and aligned with them, for example:
 - >>: Horizontal scrolling to the right, or proceeding to the next menu or submenu, or, in the case of a value, decreasing the value, displayed in reverse video (see example opposite).
 - <<: Horizontal scrolling to the left, or proceeding to the next menu or submenu, or, in the case of a value, increasing the value, displayed in reverse video
 - Quick: Rapid access to a parameter from any screen when the Quick function is displayed above the F4 key
 - HELP: Contextual help
 - Code: Displays the selected parameter code
 - Other functions (application functions) can be assigned to these keys via the
- 1.6 COMMAND menu.
 - 5 : Means that this display window does not scroll further down.
 - : Means that this display window can scroll further down.
 - 6 : Means that this display window can scroll further up.
 - : Means that this display window does not scroll further up.





Remote graphic display terminal functions (continued)

Navigation: accessing menus and parameters

Structure of main menus:

1 Drive menu:

Menu type	Function
1.1 SIMPLY START	Simplified menu for a quick start
1.2 MONITORING	Displays current values for motor, inputs/outputs and communication (command words, status words, etc.)
1.3 SETTINGS	Accesses the adjustment parameters, which can be modified during operation
1.4 MOTOR CONTROL	Accesses the motor parameters, including adjustment of motor control profiles
1.5 INPUTS/OUTPUTS CFG	Configures the I/O and transforms signals
1.6 COMMAND	Configures the command and reference channels
1.7 APPLICATION FUNCT.	Configures the application functions (preset speeds, PID regulator, etc.)
1.8 FAULT MANAGEMENT	Configures the fault management process
1.9 COMMUNICATION	Configures the communication networks
1.10 DIAGNOSTICS	Provides diagnostics for motor and drive, integrated test procedures, fault log
1.11 IDENTIFICATION	Identifies the drive and the internal options
1.12 FACTORY SETTINGS	Restores factory settings (completely or by parameter group)
1.13 USER MENU	Accesses the parameters selected by the user
1.14 PROGRAMMABLE CARD	Accesses the parameters for the Controller Inside programmable card

2 Display line

3 Display screen: Displays values in the form of bar charts or digital values, depending on the extent of customization.

4 Main menu:

Menu type	Function
1. DRIVE MENU	See above (1 Drive menu)
2. ACCESS LEVEL	4 access levels: basic, limited, advanced, expert
3. OPEN/SAVE AS	Transfers files between the graphic display terminal and the drive
4. PASSWORD	Provides password protection for the configuration
5. LANGUAGE	Choice of 6 languages available (English, German, Spanish, French, Italian and Chinese)
6. MONITORING CONFIG.	Customizes the display line 2 and the display screen 3 (bar charts, digital values)
7. DISPLAY CONFIG.	Configures how parameters are displayed: customization, selection for User menu, visibility, accessibility

Password

Altivar 71 drives allow individual parameters to be selected for password protection. Rights can be set for save operations and for loading the configuration.

Integrated 7-segment display terminal

ATV 71●●●●M3, ATV 71HD11M3X, HD15M3X, ATV 71H075N4...HD75N4 drives can be supplied without a graphic display terminal. In this case, they are equipped with an integrated 7-segment display terminal.

ATV 71P●●●N4Z drives are equipped as standard with an integrated 7-segment display terminal.

ATV 71HU22Y...HC63Y drives are equipped as standard with an integrated 7-segment display terminal as well as the remote graphic display terminal.

The integrated 7-segment display terminal can be used to:

- Display status and faults
- Access and modify parameters

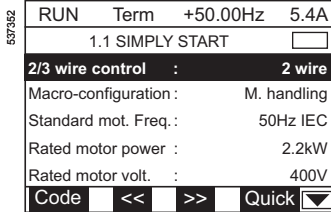
Start-up

The Altivar 71 drive is supplied ready for use for most applications. When the drive is switched on, the menus for setting the language and access level appear automatically.

■ Simply Start menu

By accessing the Simply Start menu directly it is possible to:

- Pre-program the drive for an application:
 - Select the relevant macro-configuration
 - 2-wire/3-wire control
- Benefit from optimum motor performance:
 - Enter data from the motor rating plate
 - Auto-tuning
- Protect the motor by setting the drive's integrated electronic thermal overload relay



Simply Start menu

Start-up (continued)

■ Programming using macro-configurations

Programming using macro-configurations offers the choice of seven options corresponding to the various business areas and applications:

- Start/stop
- Material handling
- General use
- Hoisting
- Lift
- PID regulation
- Communication network connectivity
- Master/slave applications

Choosing one of these macro-configurations automatically assigns the functions, parameters and I/O, even in the case of option cards. Although the configuration is preset, it can still be modified, if necessary.

The Start/stop macro-configuration is set as the factory configuration.

The preset functions for each macro-configuration are given in the table below.

Type of macro-configuration	Start/stop	Material handling	General use	Hoisting	Lift (1)	PID regulation	Communication network connectivity	Master/slave application	
Altivar 71 drive I/O									
A11	Ref. channel 1	Ref. channel 1	Ref. channel 1	Ref. channel 1	Ref. channel 1	PID reference	Ref. channel 2 Ref. channel 1 by bus	Ref. channel 1	
A12	Not assigned	Ref. sum 2	Ref. sum 2	Not assigned	Not assigned	PID feedback	Not assigned	Ref. channel torque	
AO1	Motor freq.	Motor freq.	Motor freq.	Motor freq.	Not assigned	Motor freq.	Motor freq.	Signed torque	
2-wire	LI1	Forward	Forward	Forward	Forward	Forward	Forward	Forward	
	LI2	Reverse	Reverse	Reverse	Reverse	Reverse	Reverse	Reverse	
	LI3	Not assigned	2 speeds preset	JOG	Fault reset	2 speeds preset	Integral reset PID	Switching ref.2	Switching torque/speed
	LI4	Not assigned	4 speeds preset	Fault reset	Fault assign. ext.	4 speeds preset	Ref. 2 PID preset	Fault reset	Fault reset
	LI5	Not assigned	8 speeds preset	Limit torque	Not assigned	Fault reset	Ref. 4 PID preset	Not assigned	Not assigned
	LI6	Not assigned	Fault reset	Not assigned	Not assigned	Not assigned	Not assigned	Not assigned	Not assigned
3-wire	LI1	Stop	Stop	Stop	Stop	Stop	Stop	Stop	
	LI2	Not assigned	Not assigned	Not assigned	Not assigned	Forward	Not assigned	Not assigned	
	LI3	Reverse	Reverse	Reverse	Reverse	Reverse	Reverse	Reverse	
	LI4	Not assigned	2 speeds preset	JOG	Fault reset	2 speeds preset	Integral reset PID	Switching ref.2	Switching torque/speed
	LI5	Not assigned	4 speeds preset	Fault reset	Fault assign. ext.	4 speeds preset	Ref. 2 PID preset	Fault reset	Fault reset
	LI6	Not assigned	8 speeds preset	Limit torque	Not assigned	Fault reset	Ref. 4 PID preset	Not assigned	Not assigned
R1	Faulty	Faulty	Faulty	Faulty	Faulty	Faulty	Faulty	Faulty	
R2	Not assigned	Not assigned	Not assigned	Brake control	Brake control	Not assigned	Not assigned	Not assigned	
I/O extension card I/O									
2-wire LI7	Not assigned	Not assigned	Not assigned	Not assigned	Not assigned	Not assigned	Not assigned	Not assigned	
3-wire LI7	Not assigned	Not assigned	Not assigned	Not assigned	Not assigned	Not assigned	Not assigned	Not assigned	
LI8 to LI14	Not assigned	Not assigned	Not assigned	Not assigned	Not assigned	Not assigned	Not assigned	Not assigned	
LO1 to LO4	Not assigned	Not assigned	Not assigned	Not assigned	Not assigned	Not assigned	Not assigned	Not assigned	
R3/R4	Not assigned	Not assigned	Not assigned	Not assigned	Not assigned	Not assigned	Not assigned	Not assigned	
AI3, AI4	Not assigned	Not assigned	Not assigned	Not assigned	Not assigned	Not assigned	Not assigned	Not assigned	
RP	Not assigned	Not assigned	Not assigned	Not assigned	Not assigned	Not assigned	Not assigned	Not assigned	
AO2	Motor current	Motor current	Motor current	Motor current	Motor current	Motor current	Motor current	Motor current	
AO3	Not assigned	Signed torque	Not assigned	Signed torque	Signed torque	PID output	Not assigned	Motor freq.	

Graphic display terminal keys

F1 key	Not assigned	Not assigned	Not assigned	Not assigned	Not assigned	Not assigned	Control via graphic display terminal	Not assigned
F2, F3, F4 keys	Not assigned	Not assigned	Not assigned	Not assigned	Not assigned	Not assigned	Not assigned	Not assigned

(1) The "Lift" macro-configuration is programmable only on ATV 71H●●●●383 variable speed drives (see pages 22 and 23).

Start-up (continued)

■ **MONITORING menu**

The MONITORING menu can be used to display commands, the operation of the motor and the application via the drive, its I/O or the communication network connections.

557351

RUN	Term	+43.33Hz	5.4A
1.2 MONITORING			
Frequency Ref. :		43.3 Hz	
Motor current :		5.4 A	
Motor speed :		1300 rpm	
Motor thermal state :		80 %	
Drv thermal state :		85 %	
Code	<<	>>	Quick

Displaying physical values

RUN	Term	+50.00Hz	80A
Logic input map			
1	PR	L11	L12
0		L13	L14
1	L17	L18	L19
0		L110	L111
		L112	L113
		L114	
Code	<<	>>	Quick

Logic input map

RUN	Mod.	+50.00Hz	5.4A
COMMUNICATION MAP			
Cmd channel :		Modbus	
Cmd Value :		ABCD Hex	
Active ref. channel :		CANopen	
Frequency ref. :		+50.00 Hz	
ETA status word :		2153 Hex	
Code	<<	>>	Quick

Communication map

Configuration and settings

The SETTINGS menu can be used to configure all the drive's settings. Activating a function automatically provides access to the related settings on the same screen (the application functions are described on pages 278 to 299).

557353

RUN	Term	+50.00Hz	1250A
1.3 SETTINGS			
Ramp increment :		0,01	
Acceleration :		3,00 s	
Deceleration :		3,00 s	
Acceleration 2 :		5,00 s	
Deceleration 2 :		5,00 s	
Code	<<	>>	Quick

Settings screen

RDY	Term	+0.00Hz	0.0A
PRESET SPEEDS			
2 preset speeds :		L13	
4 preset speeds :		L14	
8 preset speeds :		L15	
16 preset speeds :		NO	
Preset speed 2 :		10.0 Hz	
Code	<<	>>	Quick

Setting a function

RDY	Term	+0.00Hz	0A
ACCELERATION			
9.51 s			
Min=0,01		Max=9999	
Code	<<	>>	Quick

Configuring a value

Operation

The display screen appears automatically every time the drive is turned on. There are various possibilities:

- One or two bar charts are displayed.
- One, two or five digital values are displayed.

557354

RUN	Term	+43.33Hz	5.4A
Motor speed			
1300 rpm			
Min=0		Max=1500	
Code	<<	>>	Quick

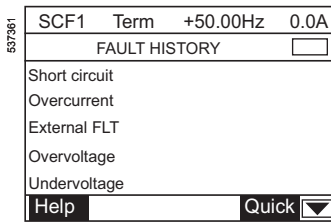
1 bar chart

DEC	Term	+38.0Hz	10A
Output frequency			
+45.1 Hz			
Code	<<	>>	Quick

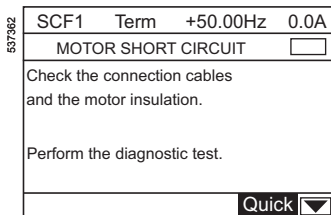
1 digital value

RUN	Term	+43.33Hz	5.4A
1.2 MONITORING			
Frequency Ref. :		43.3 Hz	
Motor current :		5.4 A	
Motor speed :		1300 rpm	
Motor thermal state :		80 %	
Drv thermal state :		85 %	
Code	<<	>>	Quick

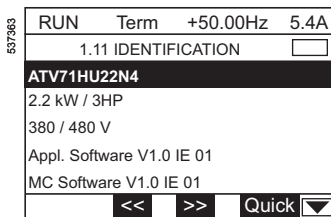
5 digital values



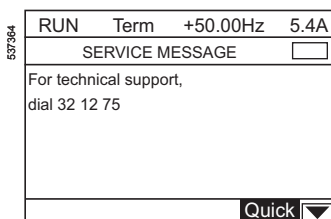
Fault log



Troubleshooting screen



Identification screen



Example of a customized message

Maintenance, diagnostics

New functions have been added to the Altivar 71 drive to enable it to provide quick and simple maintenance, ultimately boosting productivity:

■ Response to faults or alarms

It is possible to use the alarm management or drive operation configuration functions to take corrective actions before stopping the machine.

■ Fault log and help

When a fault occurs, a help screen is available to quickly identify the cause of the fault.

When a fault occurs, values such as speed, current, thermal state and timer are saved and restored in the fault log.

The last 8 faults are stored.

■ IDENTIFICATION menu

The IDENTIFICATION menu can be used to display the relevant serial numbers and software versions, thereby helping to manage the equipment base. This information, also available with the PowerSuite software workshop, can be exported to other database-type software applications.

■ Test functions

The Altivar 71 drive includes the following test functions:

- Identifying any motor short-circuit before start-up
- Running, via the graphic display terminal or PowerSuite software workshop, automatic procedures during maintenance operations to test:
 - the motor
 - the drive power components

The test results are shown on the graphic display terminal or using the PowerSuite software workshop.

It is also possible to write and read messages in the drive using the graphic display terminal or the PowerSuite software workshop.

■ Oscilloscope function

The Altivar 71 drive has an oscilloscope function, which produces traces that can be viewed using the PowerSuite software workshop.

The PowerSuite software workshop can also be used to carry out remote diagnostics via modem.

Controlling the drive

■ Via the drive I/O

Control signals are transmitted via cable to the I/O. Functions are assigned to logic inputs, analog inputs, etc.

A logic input can be assigned to more than one function. This means that two functions can be controlled using a single signal, thereby limiting the number of inputs required.

The Altivar 71 drive I/O can be configured independently from each other. For instance,

- A time delay can be applied when it comes to reading the logic inputs, so as to avoid any bounce-back from certain switches.
- Transforming incoming signals on the analog inputs can help the drive fully adapt to the control devices and applications:
 - Minimum and maximum values for the input signal
 - Input filtering in order to eliminate unwanted interference from the signals received
 - Magnifying glass effect through delinearizing the input signal in order to increase the precision with small amplitude signals
 - "Pedestal" and "Deadband" functions for signals in order to prevent low speed operations which can have an adverse effect on the application
 - "Mid-point" function, which can be used from a unipolar input signal to obtain a bipolar output signal to control the speed and direction of rotation
- Transforming analog outputs which transfer information sent by the drive to other devices (display units, drives, PLCs, etc.):
 - voltage or current output signal
 - minimum and maximum values for the output signal
 - output signal filtering

Logic outputs can be delayed on activation and deactivation.

The output state can also be configured when the signal is active.

The frequency control signals are also transformed by the drive:

- signal frequency minimum and maximum values (30 kHz on the extended I/O card's RP input, 300 kHz maximum on the encoder interface card input).

■ Via the remote graphic display terminal

The rotation commands and references (torque, speed or PID) can be controlled via the graphic display terminal. Some application functions can also be assigned to the function keys F1, F2, F3 and F4 on the graphic display terminal. It is possible to manage a change in command and/or reference source (bumpless function) in different ways.

For example: two options are offered when switching from control via the terminals to control via the graphic display terminal:

- stop the Altivar 71 drive, or
- continue operation with a copy of the direction of rotation and reference

Controlling the drive (continued)

■ Via a communication network

□ I/O profile

The I/O profile, which is quick and easy to use, can be used to control the Altivar 71 drive via the communication network, in the same way as via the I/O terminals.

When commands are sent via a network they are written in a command word.

This word behaves like virtual terminals containing logic inputs.

Application functions can be assigned to the bits of this word. More than one function can be assigned to the same bit.

The commands and references can come from different sources, such as the terminals, graphic display terminal or communication networks.

Each source can be set or switched individually using logic inputs or command word bits.

The I/O profile is supported by all integrated communication ports (Modbus, CANopen machine bus), as well as by all the communication cards available (Modbus TCP, Fipio, PROFIBUS DP, etc.).

□ CiA 402 profile (“Device Profile Drives and Motion Control”)

This profile, from the CiA (CAN in Automation) organization, describes standard functions, parameters and operation for variable speed drives.

This standard is an extension of the Drivecom profile. The Altivar 71 drive complies with the CiA 402 profile which supports the following 2 modes: separate and not separate.

Separate mode

The Start/Stop commands and references can come from different sources.

E.g. the speed reference is transmitted by the Modbus TCP network and the Start/Stop commands by the logic signals wired on the terminals.

Each source can be set or switched individually using logic inputs or command word bits.

Not separate mode

The Start/Stop commands and references (speed, torque, PID, etc.) come from the same source (e.g. CANopen machine bus).

It is possible to replace this source by another one, using a logic input or command word bit.

The CiA 402 profile is supported by all integrated communication ports (Modbus, CANopen machine bus), as well as by all the communication cards available (Modbus TCP, Fipio, PROFIBUS DP, etc.).

□ CIP profile

The CIP profile is supported by the DeviceNet communication card.

Application functions

■ 2-wire control

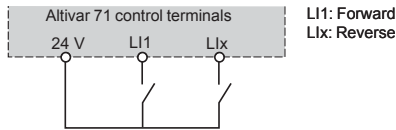
This function is used to control the direction of operation by means of a stay-put contact.

It is enabled by means of 1 or 2 logic inputs (non-reversing or reversing).

This function is suitable for all non-reversing and reversing applications.

3 operating modes are possible:

- Detection of the state of the logic inputs
- Detection of a change in state of the logic inputs
- Detection of the state of the logic inputs with forward operation always having priority over reverse



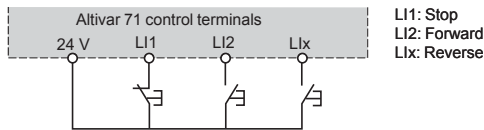
Wiring diagram for 2-wire control

■ 3-wire control

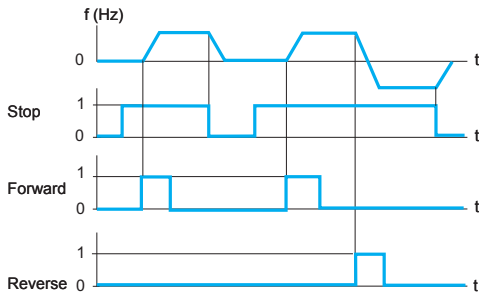
This function is used to control the operating and stopping direction by means of pulsed contacts.

It is enabled by means of 2 or 3 logic inputs (non-reversing or reversing).

This function is suitable for all non-reversing and reversing applications.



Wiring diagram for 3-wire control



Example of 3-wire control operation

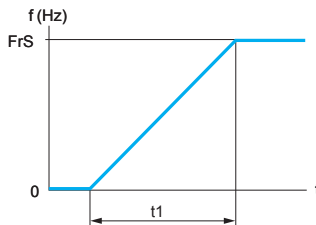
■ Phase rotation

This function can be used to reverse the direction of rotation without modifying the drive wiring.

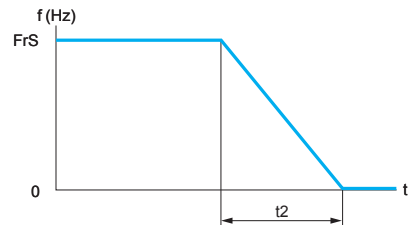
■ Ramps

□ Acceleration and deceleration ramp times

This function is used to define acceleration and deceleration ramp times according to the application and the machine dynamics.



Linear acceleration ramp



Linear deceleration ramp

FrS: Nominal motor frequency

t1: Acceleration time

t2: Deceleration time

t1 and t2 can be set independently from 0.01 to 9999 s

(according to one of the following ramp increments: 0.01 s, 0.1 s or 1 s)

Factory setting: 3 s.

RDY	Term	+0.00Hz	0.0A
RAMP <input type="checkbox"/>			
Ramp shape :		Linear	
Ramp increment :		0.01	
Acceleration :		3.92 s	
Deceleration :		0.54 s	
Ramp 2 threshold :		0.0 Hz	
Code		Quick	<input type="button" value="v"/>

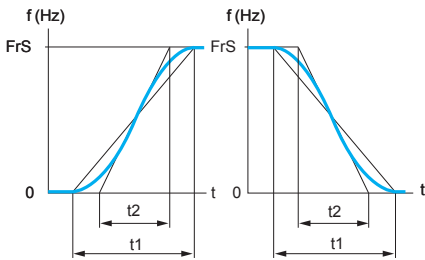
Ramp settings

Acceleration and deceleration ramp profile

Used to gradually increase the output frequency starting from a speed reference, following a linear profile or a preset profile.

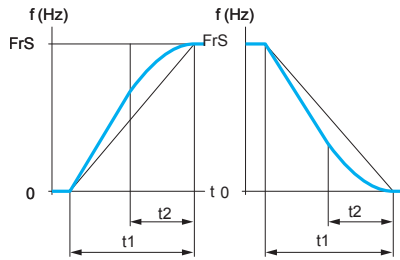
In the case of applications involving handling, packaging and passenger transport, the use of S ramps takes up mechanical play and eliminates jolts, and also limits “non-following” of speed during rapid transient operation of high-inertia machines. Selecting “linear”, “S”, “U” or customized profiles assigns both the acceleration and deceleration ramps.

S ramps



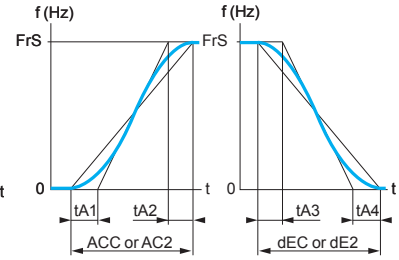
FrS: Nominal motor frequency
t1: Ramp time set
t2 = 0.6 x t1
The curve coefficient is fixed.

U ramps

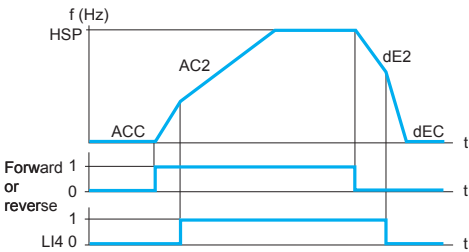


FrS: Nominal motor frequency
t1: Ramp time set
t2 = 0.5 x t1
The curve coefficient is fixed.

Customized ramps



FrS: Nominal motor frequency
tA1: Adjustable between 0 and 100% (of ACC or AC2)
tA2: Adjustable between 0 and (100% - tA1) (of ACC or AC2)
tA3: Adjustable between 0 and 100% (of dEC or dE2)
tA4: Adjustable between 0 and (100% - tA3) (of dEC or dE2)
ACC: Acceleration ramp 1 time
AC2: Acceleration ramp 2 time
dEC: Deceleration ramp 1 time
dE2: Deceleration ramp 2 time



Example of switching using logic input LI4

Acceleration 1 (ACC) and deceleration 1 (dEC):
- Adjustment 0.01 to 9999 s
- Factory setting 3 s
Acceleration 2 (AC2) and deceleration 2 (dE2):
- Adjustment 0.01 to 9999 s
- Factory setting 5 s
HSP: High speed.

Ramp switching

This function is used to switch two acceleration and deceleration ramp times, which can be adjusted separately.

Ramp switching can be enabled by:

- a logic input
- a frequency threshold
- a combination of the logic input (or a command word bit) and the frequency threshold
- a command word bit

This function is suitable for:

- material handling with smooth starting and approach
- machines with fast steady state speed correction

Automatic adaptation of deceleration ramp

Used to automatically adapt the deceleration ramp if the initial setting is too low when the load inertia is taken into account. This function prevents the drive from locking in the event of an overbraking fault.

When this function is active and a short deceleration time has been set, the drive optimizes the motor power supply in order to achieve a high braking torque.

This function is suitable for all applications not requiring precise stopping and not using braking resistors.

Automatic adaption must be disabled for machines with a stop position on a ramp and using a braking resistor. This function is automatically disabled if the brake sequence is configured.

RDY	Term	+0.00Hz	0.0A
PRESET SPEEDS			<input type="checkbox"/>
2 preset speeds	:	LI3	
4 preset speeds	:	LI4	
8 preset speeds	:	LI5	
16 preset speeds	:	NO	
Preset speed 2	:	10.0 Hz	
Code	<<	>>	Quick <input type="checkbox"/>

Preset speed settings

■ Preset speeds

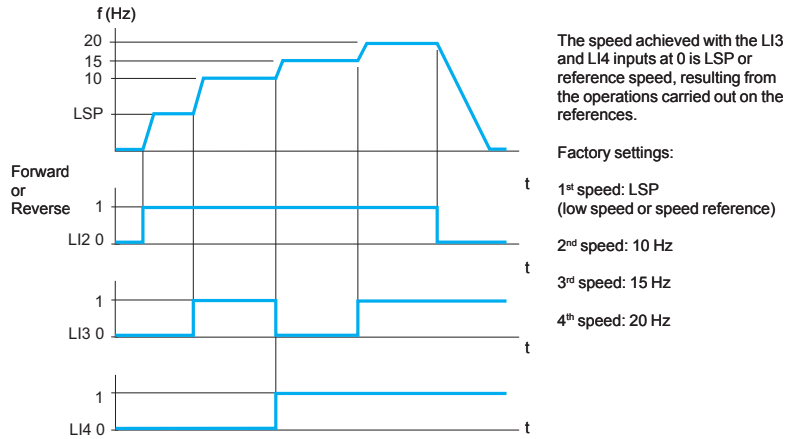
This can be used to switch preset speed references.

Choose between 2, 4, 8 or 16 preset speeds.

It is enabled by means of 1, 2, 3 or 4 logic inputs.

Preset speeds can be set in increments of 0.1 Hz, from 0 Hz to 500 Hz or 1000 Hz, depending on the rating.

This function is suitable for material handling and machines with several operating speeds.



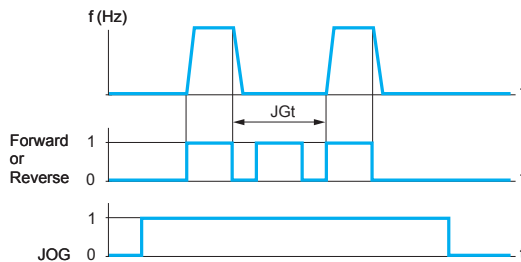
Example of operation with 4 preset speeds and 2 logic inputs

■ Jog operation

This can be used for pulse operation with minimum ramp times (0.1 s), limited speed reference and minimum time between 2 pulses.

It is enabled by 1 logic input and pulses given by the operating direction command.

This function is suitable for machines with product insertion in manual mode (e.g. gradual movement of the mechanism during maintenance operations).



Speed reference: Adjustable from 0 to 10 Hz, factory setting 10 Hz.

JGt: minimum time between 2 pulses, which can be set between 0.5 and 2 s, factory setting 10 Hz.

Example of jog operation

■ Limiting low speed operating time

The motor is stopped automatically after a period of operation at low speed (LSP) with a zero reference and a run command present.

This time can be set between 0.1 and 999.9 seconds (0 corresponds to an unlimited time). Factory setting 0 s. The motor restarts automatically on the ramp when the reference reappears or if the run command is interrupted and then re-established.

Function suitable for automatic Stops/Starts.

■ Motor control types

□ Flux vector control with sensor (FVC)

In current mode, this control type can be used to obtain the best static and dynamic torque performance.

□ Sensorless flux vector control

In voltage mode, this control type can be used with a single motor or motors connected in parallel.

In current mode, this profile performs better than the previous type, but it cannot supply power to motors connected in parallel.

□ 2-point vector control

The zone for operating at constant power can be optimized by defining an additional point in the control profile.

This function should be used with motors offering a two-part defluxing zone.

It can be used to limit the voltage at the motor terminals when the motor is being powered by a high line supply.

□ Voltage/frequency ratio

This control type is particularly suitable for special motors (high-speed motors, synchronized asynchronous motors, etc.). The ratio can be adjusted by 2 or 5 points and used to achieve output frequencies of up to 1000 Hz.

□ ENA system

This profile is reserved for unbalanced machines (presses, etc.). It can be used to reduce mechanical stress, power consumption and avoid the use of braking resistors.

□ Synchronous motor

This control type is exclusively reserved for controlling open loop synchronous permanent magnet motors with sinusoidal electromotive force (EMF).

■ Using an incremental encoder

The Altivar 71 drive uses encoder feedback to:

- Operate in FVC closed loop control mode. In addition to the torque performance and speed accuracy it provides, the speed feedback can also be used to manage overspeed and slipping protection.
- Improve the steady state speed accuracy and/or manage overspeed and slipping protection in the other control types (FVC open loop control mode and U/f ratio)
- Manage only overspeed and slipping protection

■ Encoder tests

The Altivar 71 drive can detect encoder signal loss, as well as a mechanical break in the coupling between encoder and motor.

■ Limiting motor overvoltage

The Altivar 71 drive inverter bridge control can be used to limit overvoltage in the motor terminals, which is double the voltage level in the DC bus (Stressless PWM). This function is useful in cases where long lengths of cabling, rewound motors or motors in a low isolation class are involved.

■ Auto tune

Auto-tuning can be performed:

- using a dialogue tool (graphical display terminal, PowerSuite software workshop, integrated 7-segment display terminal)
- via a communication network
- automatically every time the drive is switched on
- by enabling a logic input

Auto-tuning is used to optimize application performance.

In Flux Vector Control mode (FVC closed loop and FVC open loop with current control), certain parameters are measured periodically.

Saving the motor thermal state can help to compensate exactly for the motor resistors, even after the drive has been switched off.

■ Switching frequency, noise reduction

The switching frequency setting permits a reduction in the noise generated by the motor for any application requiring a low level of noise.

The switching frequency is modulated randomly in order to avoid resonance.

This function can be disabled if it causes instability.

High frequency switching of the intermediate DC voltage can be used to supply the motor with a current wave that has little harmonic distortion.

The switching frequency can be adjusted during operation to reduce the noise generated by the motor.

Value: 1 to 16 kHz; factory setting 2.5 or 4 kHz, depending on the rating.

■ Motor fluxing

This can be used to obtain rapid high torque on start-up; magnetic flux needs to be already established in the motor.

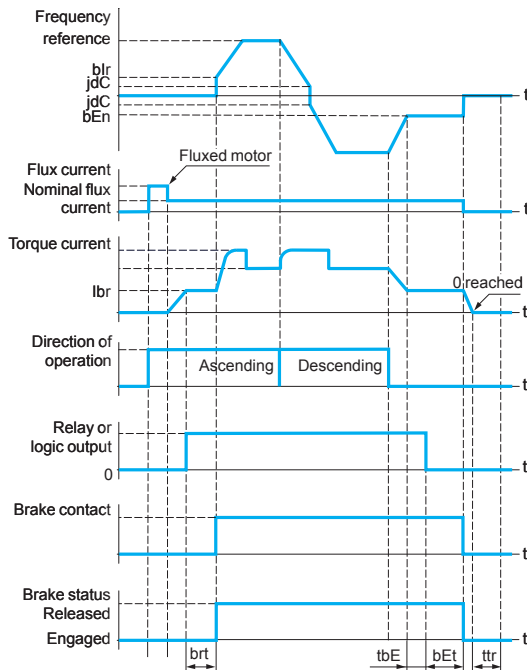
There is a choice between open loop or closed loop operation.

In continuous mode, the drive automatically establishes the flux when it is powered up.

In non-continuous mode:

- If a logic input or command word bit is assigned to the motor fluxing command, flux is established when the command is confirmed.
- If neither a logic input nor a command word bit has been assigned, or if the latter are not active when a run command is given, fluxing occurs when the motor starts.

Fluxing is accelerated if a current higher than the nominal motor current is applied, then it is set to the value of the motor magnetizing current.



Open loop vertical movement

bE_n : Brake engage frequency
 bEt : Brake engage time
 bI_r : Initialization of ramp once the "brake release" time (brt) has expired
 brt : Brake release time
 Ibr : Brake release current
 JdC : Reverse jump
 tbE : Brake engage time
 ttr : Restart time

Note: In open loop mode, feedback from an incremental encoder can be connected to the drive in order to directly detect overspeed and slipping.

■ Brake control

This can be used to manage control of an electromagnetic brake in synchronization with starting and stopping the motor to avoid jolts and load slipping. The brake control sequence is managed by the drive.

□ Movement type

The Altivar 71 drive adapts the brake control operation to the type of movement, whether vertical or horizontal, in order to achieve maximum torque performance and eliminate jolts.

□ Brake feedback via contact

By connecting a brake contact to the drive, it is possible to detect brake faults. If the brake status does not match the relevant control (the contact must be open for a released brake), the drive locks when a fault occurs.

□ Brake release pulse

This can be used to set the torque for brake release when ascending (forward) or two release thresholds (one for ascending and the other for descending).

This function is only available for vertical movements.

□ Brake engage on reversal of operating direction

To prevent the speed from passing through zero when reversing the direction of rotation, the drive firstly requires the brake to be engaged at the end of deceleration and then for it to be released before accelerating in the other direction of rotation.

□ Brake engage request time delay

In the case of slewing movements, this function can be used, at the end of deceleration, to control how the brake is engaged when the torsional stress being exerted on the machine structure is zero.

□ Automatic DC injection

In the case of a horizontal movement, the DC injection at the end of deceleration can be used to prevent jolting when the brake is being engaged.

This function is only available for horizontal movements.

■ Limit switch management

This can be used to manage the operation of one or two limit switches (with 1 or 2 operating directions).

Each limit (forward, reverse) is associated with a logic input. The type of stop that occurs on detection of a limit can be configured as a stop on ramp, freewheel or fast stop.

Following a stop, the motor can restart in the opposite direction only.

■ Slack sling

This is used to adapt the motor speed to the load depending on the minimum configured torque, either in speed reference mode or in current limiting mode.

A logic output can be assigned to this function to indicate the load value in relation to the configured torque value.

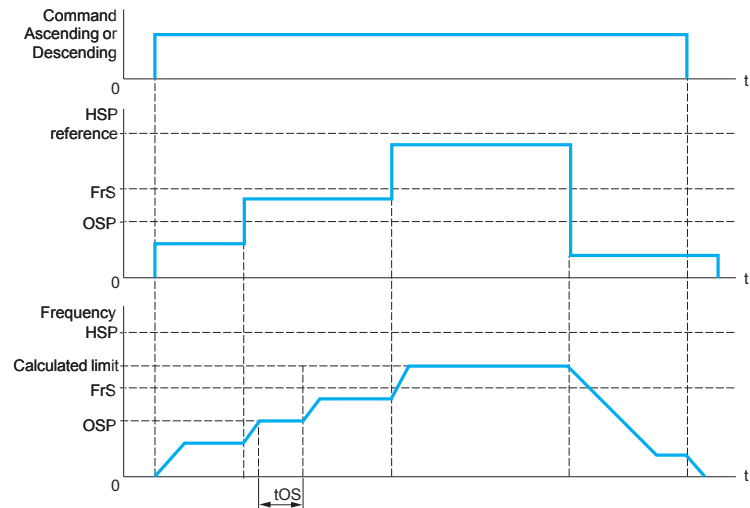
■ High-speed hoisting

This can be used to optimize cycle times for hoisting movements when the load is zero or small.

It allows operation at constant power (motor defluxing beyond the nominal motor frequency) in order to achieve a higher speed than the nominal speed, without exceeding the nominal motor current and thereby preventing the motor from overheating.

There are 2 possible operating modes:

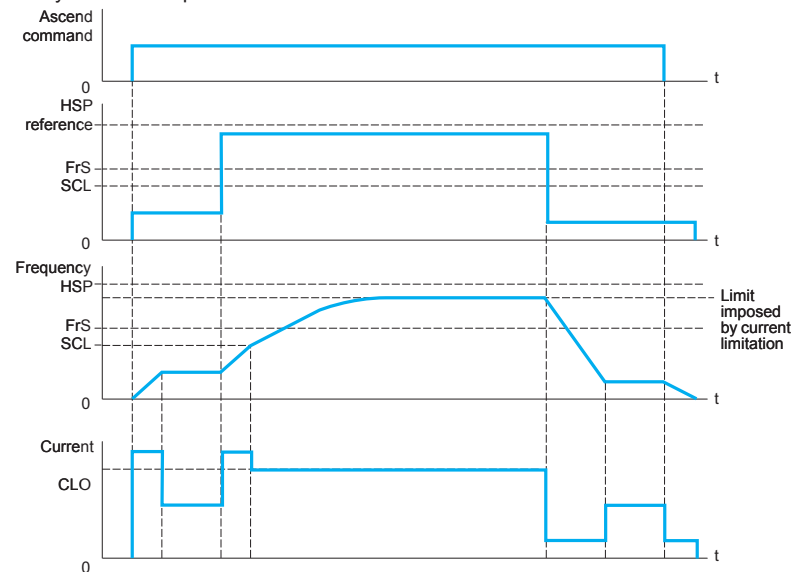
- Speed reference mode: The maximum permitted speed is calculated by the drive at an imposed speed step so that the drive can measure the load.



Speed reference mode

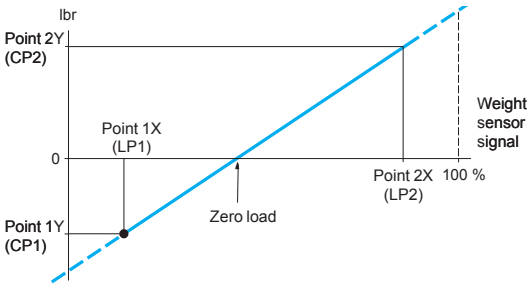
FrS: Nominal motor frequency
 HSP: High speed parameter
 OSP: Adjustable speed step for load measurement
 tOS: Load measuring time
 Two parameters can be used to reduce the speed calculated by the drive, for ascending and descending.

- Current limiting mode: The maximum permitted speed is the speed at which the current is limited in the motor quadrant, ascending only. For descending, operation is always based on speed reference mode.



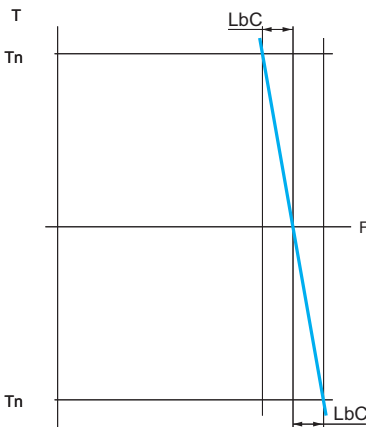
Current limiting mode

CLO: Current limitation for high speed-function
 FrS: Nominal motor frequency
 HSP: High speed parameter
 SCL: Adjustable speed threshold above which current limitation is active



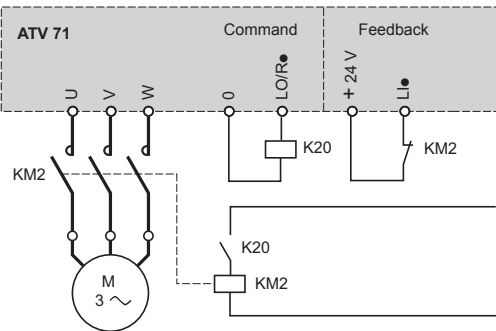
CP1, CP2, LP1, LP2: weight sensor calibration points

This curve can represent a weight sensor on a lift winch, where a zero load is exerted on the motor when the load in the cabin is not zero.



LbC: Load correction (Hz)

Load sharing



Output contactor control and integrity check

■ **External weight measurement**

This function uses the information supplied by a weight sensor via an analog input (usually a 4-20 mA signal) to adapt the current (I_{br}) of the Brake logic control function.

Function suitable for applications involved in:

- measuring the total weight of a hoisting winch and its load
- measuring the total weight of a lift winch, the cabin and counterweight.

The current (I_{br}) is adapted according to the curve opposite.

■ **Load sharing**

This function can be used for applications where several motors are mechanically linked in order to balance the loads of the different motors by adjusting the speed according to the torque on each motor.

■ **Output contactor control and integrity check**

□ **Control**

This allows the drive to control a contactor located between the drive and the motor. The request to close the contactor is made when a run command appears. The request to open the contactor is made when there is no current in the motor.

Note: If a DC injection braking function has been configured it should not be left operating too long in stop mode, as the contactor only opens at the end of braking.

□ **Integrity check**

This check is carried out by connecting a volt-free contact on each contactor to one of the drive's logic inputs.

The corresponding logic input should be at 1 when there is no run command and at 0 during operation.

When there is any inconsistency, the drive locks in fault mode if the output contactor does not close ($Lx = 1$) or gets stuck ($Lx = 0$). The time delay for when the drive locks in fault mode can be adjusted.

These sequences are commonly used in lift applications.

In order to increase the safety level and reduce the amount of maintenance work, it is recommended that the Altivar 71 drive's integrated "Power Removal" safety function is used.

■ **Stop on thermal alarm**

This can be used to:

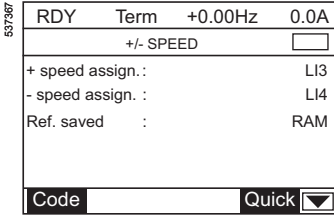
- Allow a movement to end before examining a thermal fault. There are two adjustable thresholds used to define the thermal state level which, when exceeded, makes a machine stop.
- Prevent a new run command from being accepted as long as the drive and motor temperatures are not less than 100%.

Function suitable for lift applications: it can prevent people getting trapped if a lift gets stuck between two floors.

■ **Evacuation following power failure**

This can be used to control the reduced speed engine with a reduced voltage supply (220 V \sim , for example: uninterruptible power supply (UPS)), by preserving torque performance.

Function suitable for lift applications: When there is a power failure, it facilitates the evacuation of people trapped in a lift stuck between two floors.



+/- speed function settings

■ Uncontrolled output cut

It is possible to configure output phase loss protection, which will allow the drive or motor circuit to be broken without the drive becoming locked in fault mode and facilitate a smooth restart after the motor has been reconnected. The output phase loss may also lock the drive, depending on the configuration.

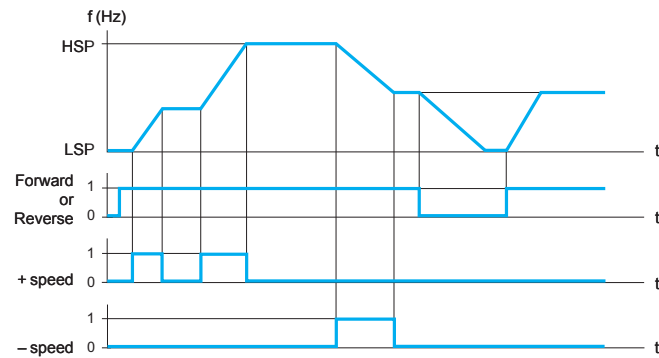
■ +/- speed

Used to increase or decrease a speed reference by means of 1 or 2 logic inputs, with or without the last reference being saved (motorized potentiometer function). This function is suitable for centralized control of a machine with several sections operating in one direction or for control by a handling crane pendant control station with two operating directions.

Two types of operation are available:

- Use of single action buttons: 2 logic inputs are required in addition to the operating direction(s).
- Use of double action buttons: only 1 logic input assigned to + speed is required.

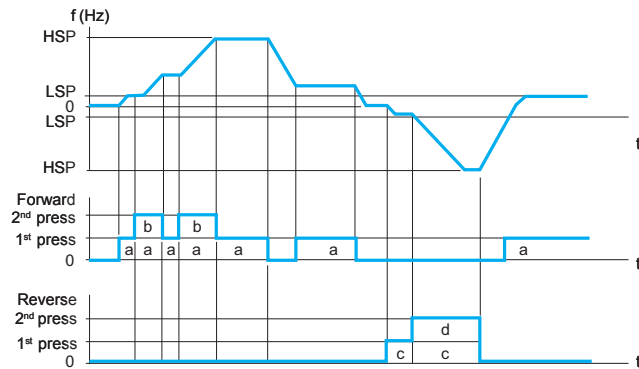
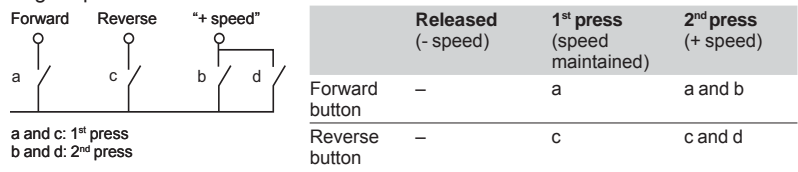
Use of single action buttons: 2 logic inputs are required in addition to the operating direction(s).



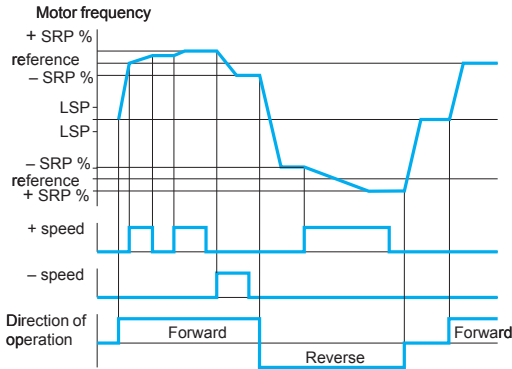
PV : low speed, HSP: high speed
Example of "+/- speed" with 2 logic inputs, single action buttons and reference saving

Use of double action buttons: only 1 logic input assigned to + speed is required.

Logic inputs:



PV : low speed, HSP: high speed
Example with double action buttons and 1 logic input
Note: This type of +/- speed control is incompatible with 3-wire control.



Example of +/- speed around a 2-wire control reference

Reference saving

This function is associated with “+/- speed” control.

This can be used for reading and saving the last speed reference prior to the loss of the run command or line supply. The saved reference is applied the next time a run command is received.

+/- speed around a reference

The reference is given by Fr1 or Fr1b, including, if relevant, the summing, subtraction and multiplication functions, as well as the preset speeds.

During the run command the drive goes to the reference, following the acceleration and deceleration ramps (pressing +/- speed makes the speed vary around this reference according to acceleration ramp 2 and deceleration ramp 2).

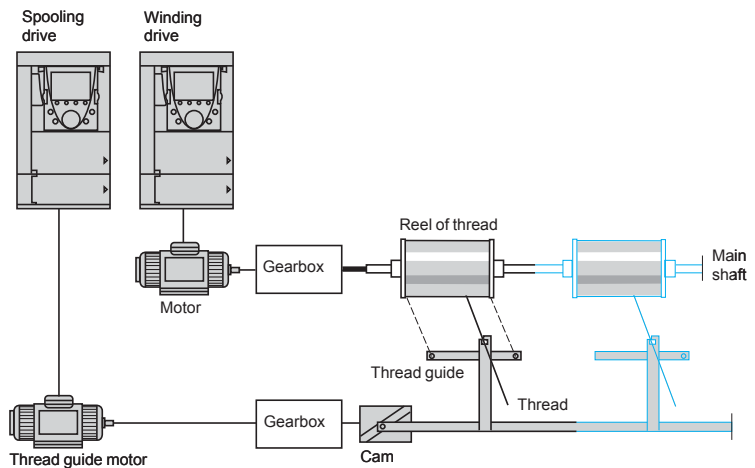
+ or – speed variation around the reference is limited to a percentage of the reference (SRP parameter). When operation has stopped, the amended reference is not saved.

The maximum total reference is always limited by high speed (HSP parameter) and the minimum reference (LSP parameter).

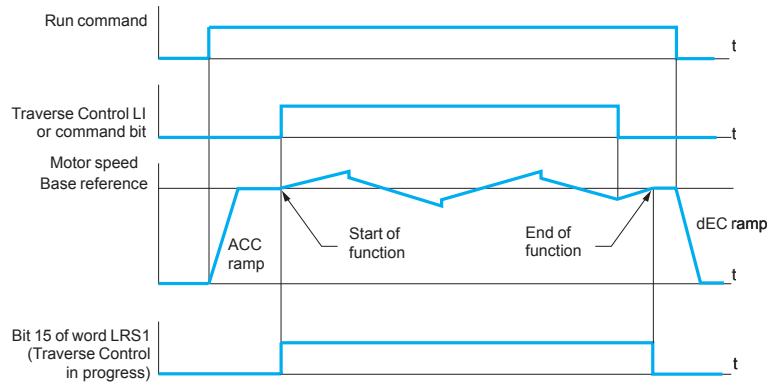
Spooling

Traverse control

Function for winding reels of thread (in textile applications)

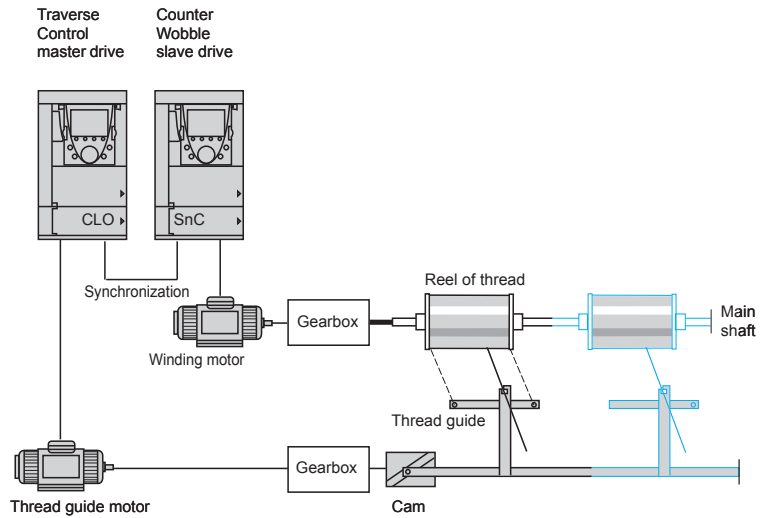


The cam rotation speed must follow a precise profile to ensure a steady, compact, linear reel is obtained.



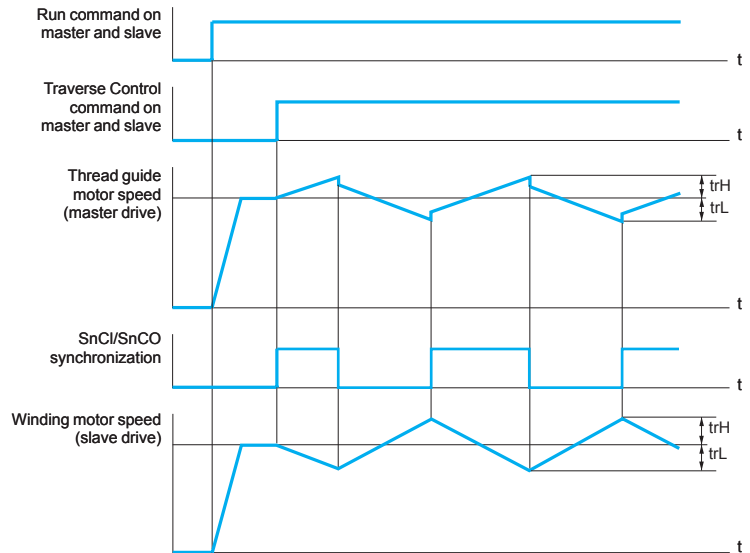
A function can also be used to reduce the base reference as the reel gets larger.

□ Counter Wobble



The Counter Wobble function is used in certain applications to obtain a constant thread tension when the Traverse Control function is producing considerable variations in speed on the thread guide motor.

The master drive controls the speed of the thread guide, while the slave drive controls the winding speed. The function assigns the slave a speed profile, which is in antiphase to that of the master. This means that synchronization is required, using one of the master's logic outputs and one of the slave's logic inputs.



■ Automatic catching of a spinning load with speed detection (“catch on the fly”)

This function is used to restart the motor smoothly after one of the following events, provided the run command is still present:

- loss of line supply or power off
- fault reset or automatic restart
- freewheel stop

On disappearance of the event, the effective speed of the motor is detected in order to restart on a ramp at this speed and return to the reference speed.

The speed detection time can reach 0.5 s.

This function is automatically disabled if the brake sequence is configured.

This function is suitable for machines for which the motor speed loss is negligible during a power failure (high-inertia machines such as centrifuges, etc.).

■ Undervoltage management

Depending on the application, it is possible to configure the Altivar 71's response to undervoltages or power failures.

If undervoltage occurs:

- The Altivar 71 drive can continue operating with undervoltage levels up to -50% (adjustable threshold)
- If the drive locks as a result, management of the fault relay can be configured (open or not). If the fault relay does not open an alarm is shown.

The Altivar 71 drive can also be configured to prevent the drive locking (using an alarm):

- Controlled stop according to the type of stop configured
- Deceleration based on a ramp which it automatically adapts to maintain the DC bus voltage, thereby preventing the drive from locking in fault mode
- Instant IGBT (inverter bridge) loss followed by power supplied to the motor as soon as the line voltage has reappeared. This function can be used to prevent the Altivar 71 drive being reinitialized.

■ Braking balance

When several drives are connected on a common DC bus, this function can be used to adjust the braking thresholds in order to balance the braking powers between the various drives or braking units.

■ Braking resistor thermal protection

The Altivar 71 drive incorporates thermal protection for the braking resistor if it is not equipped with a thermal switch. If the resistor thermal state is too high an alarm can be assigned to the logic output or the drive may lock in fault mode, depending on how the function is programmed.

■ Parameter set switching (multi-parameter)

This can be used to switch 3 sets of 15 parameters maximum when the motor is running.

Each set can contain a different value for each of the parameters.

The sets are switched using 1 or 2 logic inputs or command word bits.

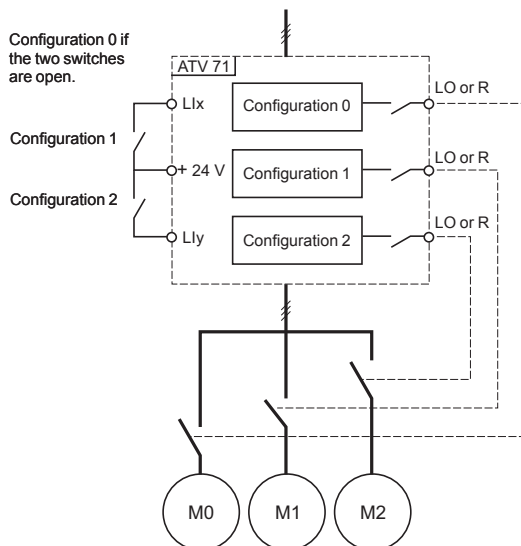
Function suitable for machines involving 2 or 3 manufacturing processes.

■ Motor or configuration switching (multi-motor or multi-configuration)

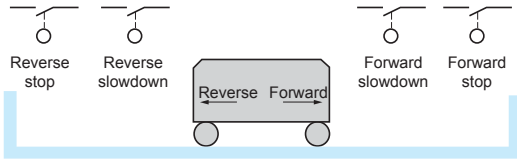
The Altivar 71 drive can have 3 configurations, which can be activated remotely, allowing it to adapt to:

- 2 or 3 different motors or mechanisms in multi-motor mode. In this instance, the thermal state for all the motors is calculated and saved. This means that each motor is protected thermally.
 - 2 or 3 configurations for the same motor in multi-configuration mode. This function can also be used to save the current configuration in another memory zone, from which it can be retrieved.
- Switching is carried out using 1 or 2 logic inputs, depending on the number of motors or configurations chosen (2 or 3).

Multi-motor and multi-configuration modes cannot be used together.

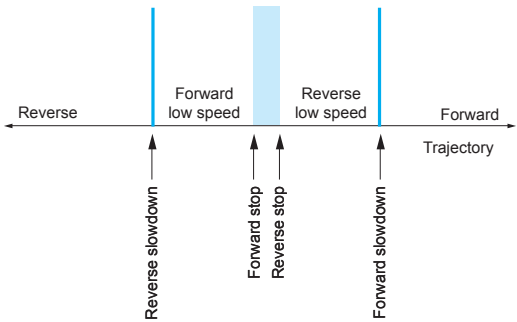


Schematic diagram for multi-motor mode



Example 1: limit switch positioning

Slowdown and stopping occur when the sensor changes state (open contact). It is possible to assign a command word bit or a logic input to disable the function in order to be able restart or not stop on the position.

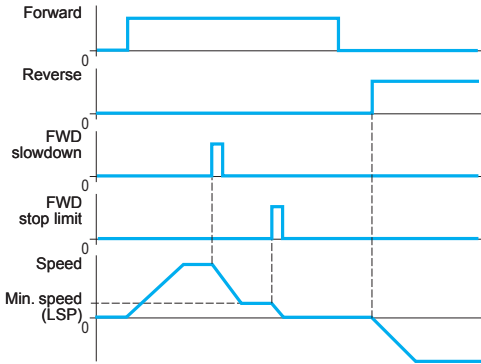


Example 2: positioning on a target zone

The disable contact can be used to restart in order to get past the target.

Positioning on limit switches or position sensors

This can be used to manage positioning based on limit switches or position sensors.



Activating the slowdown contact or stop contact allows the device to start in the other direction, even at high speed.

Slowdown mode can be configured:

- The drive uses the validated ramp time
- The drive calculates a ramp time according to the actual speed when the request to slow down is made. This calculation can be used to optimize the cycle time by limiting the time spent operating at low speed.

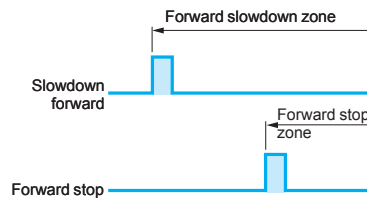
The stop type can also be configured:

- stop on ramp
- freewheel stop
- fast stop

Short and long cam operation

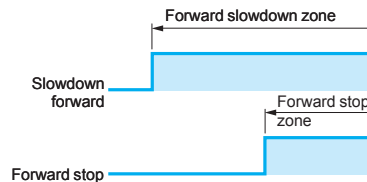
Short cams

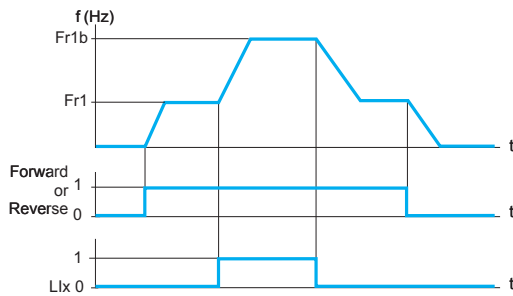
In this instance, when operating for the first time or after restoring the factory settings, the drive must initially be started outside the slowdown and stop zones in order to initialize the function.



Long cams

In this instance, there is no restriction, which means that the function is initialized across the whole trajectory.





Example of reference switching

Reference switching

Switching between two references (speed, torque, PID, etc.) can be enabled by:

- a logic input
- a command word bit

Reference 1 (Fr1) is active if the logic input (or command word bit) is at 0; reference 2 (Fr1b) is active if the logic input (or command word bit) is at 1. References can be switched with the motor running.

Reference Fr1b, like Fr1, can originate from:

- an analog input (AI)
- a frequency control input (RP)
- the graphic display terminal
- the Modbus serial link or the CANopen machine bus
- a communication card
- the Controller Inside programmable card

Operations on references (summing, subtraction, multiplication)

Summing, subtraction and multiplication inputs can be activated simultaneously.

The drive reference is thus:

- reference of drive A = $(Fr1 \text{ or } Fr1b + SA2 + SA3 - dA2 - dA3) \times MA2 \times MA3$

Summing inputs

These can be used to add 2 to 3 references from different sources to Fr1 or Fr1b (see "Reference switching").

The references to be added together are selected from all the possible types of reference.

For example:

- Reference Fr1 or Fr1b from AI1
- Reference SA2 from CANopen
- Reference SA3 from a communication card
- Reference of drive A = $Fr1 \text{ or } Fr1b + SA2 + SA3$.

Subtraction inputs

These can be used to subtract 2 to 3 references from different sources from Fr1 or Fr1b (see "Reference switching").

The references to be subtracted are selected from all the possible types of reference.

For example:

- Reference Fr1 or Fr1b from AI1
- Reference dA2 from CANopen
- Reference dA3 from a communication card
- Reference of drive A = $Fr1 \text{ or } Fr1b - dA2 - dA3$.

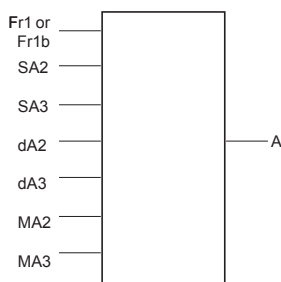
Multiplication inputs

These can be used to multiply 2 to 3 references from different sources by Fr1 or Fr1b (see "Reference switching").

The references to be multiplied are selected from all the possible types of reference.

For example:

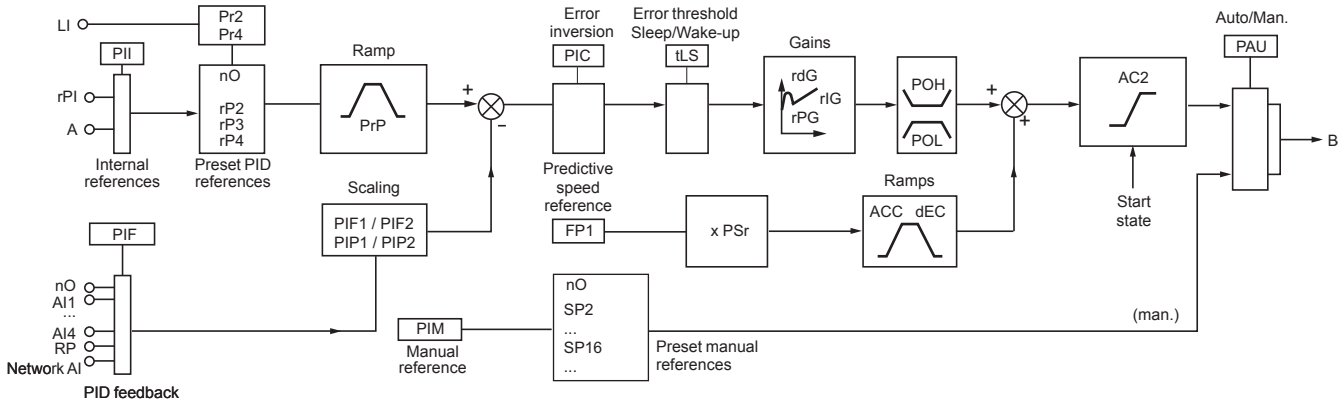
- Reference Fr1 or Fr1b from AI1
- Reference MA2 from CANopen
- Reference MA3 from a communication card
- Reference of drive A = $Fr1 \text{ or } Fr1b \times MA2 \times MA3$.



A: drive reference
SA2, SA3: summed inputs
dA2, dA3: subtraction inputs
MA2, MA3: multiplication inputs.

■ PID regulator

This can be used to regulate a process with a reference and feedback given by a sensor.
Function suitable for controlling traction on a winder.



ACC: Acceleration, DEC: Deceleration, LI: Logic inputs, B: Speed reference

□ Internal references

- rPI: reference transmitted by the graphic display terminal or a communication network.
 - A: reference given by Fr1 or Fr1b with the summing, subtraction and multiplication functions, as appropriate.
- The "PII" parameter is used to choose between these two references.

□ Preset PID references

2 or 4 PID references are available. Table showing combinations of selected PID references:

Llx (Pr4)	Lly (Pr2)	Reference
0	0	rPI or A
0	1	rP2
1	0	rP3
1	1	rP4

□ PID feedback

PID feedback can be assigned to one of the analog inputs (AI1 to AI4), the frequency control input (RP) or the encoder, depending on the option cards present. It can also be transmitted by a communication network (AI network).

□ Predictive speed reference

This reference can come from the terminals (analog inputs, encoders, etc.), the graphic display terminal or a communication network.
This speed input gives an initial reference for starting.

□ Auto/Man.

This can be used to switch from speed regulation mode (Man.) to PID regulation mode (Auto). A logic input or command word bit is used for switching.

Speed regulation mode (Man.)

The manual reference is transmitted via the terminals (analog inputs, encoder, preset speeds, etc.).
With manual switching, the speed reference changes according to the ACC and dEC ramp times.

PID regulation mode (Auto)

In automatic mode it is possible to:

- adapt the references and feedback to the process (transformation)
- correct a PID inversion
- adjust the proportional, integral and derivative gains (Kp, Ki and Kd)
- shunt the integral
- use the "alarm" on the logic output or display it on the graphic display terminal, if the threshold is exceeded (Max. feedback, Min. feedback and PID error)
- display the PID reference, PID feedback, PID error and PID output on the graphic display terminal and assign them to an analog output
- apply a ramp (time = PrP) to the PID reference

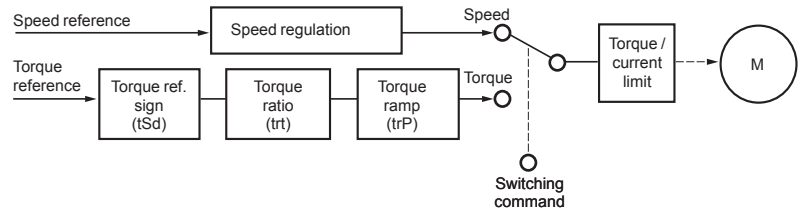
The motor speed is limited to between LSP and HSP. It is displayed as process values.

■ Torque control

This supports torque control or speed regulation mode.

These two types of mode can be switched using a logic input or command word bit.

Function suitable for applications requiring traction control.



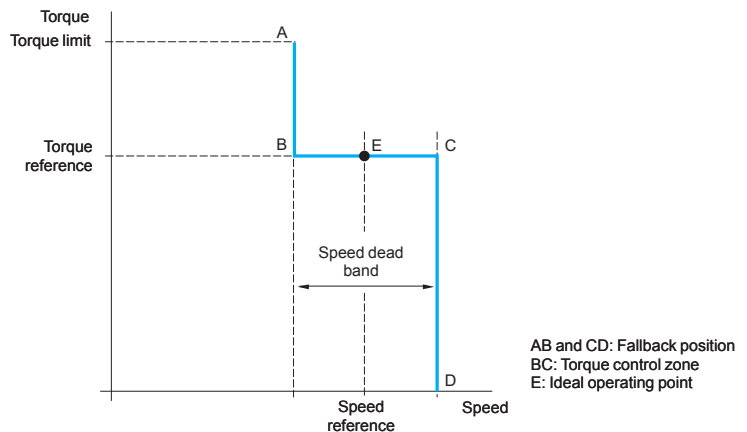
The torque reference is signed and has its own ramp. A torque ratio can be used to scale the reference. It can be transmitted via an analog input, frequency control input (RP input or encoder) or communication network.

The torque sign and value can be output to a logic output and an analog output.

In torque control mode the speed may vary within an adjustable dead band. When it has reached the lower or upper limit, the drive automatically switches to speed regulation mode (fallback position).

The regulated torque is no longer maintained, in which case two scenarios can occur:

- The speed falls within the dead band; the torque takes the required value.
- The torque does not return to the required value at the end of an adjustable time; the drive switches to fault or alarm mode, depending on the configuration.



The stop in torque control mode can be configured:

- automatic switch to speed regulation mode
- freewheel stop
- stop at zero torque but still maintaining the flux in the motor for an adjustable period of time.

■ Torque limit

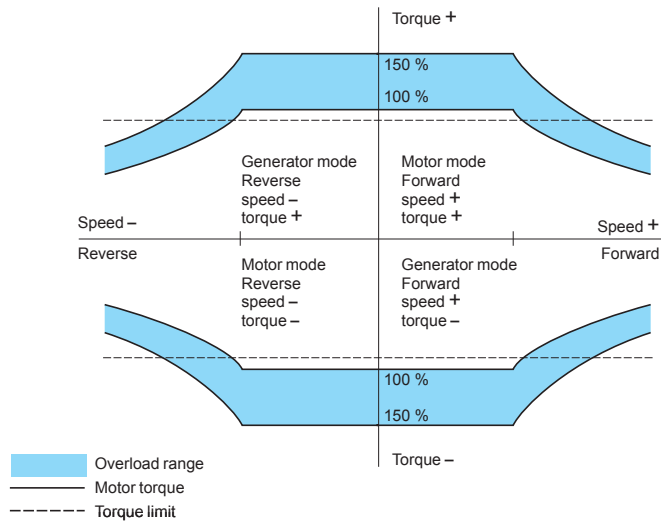
This can be used to limit the torque in the motor and generator quadrants using separate settings.

There are two types of torque limit:

- one with a value set by a parameter
- the other with a value given by an analog input, frequency control input or encoder.

When both torque limit types are enabled it is the lowest value which is read. They can be switched using a logic input or command word bit.

This function is not available for voltage/frequency ratio.



The torque limit operates in both directions of rotation in motor or generator mode.

■ Torque or current limit detection

This function can be used to detect when the current or torque limit has been reached. Depending on the configuration, it is possible to:

- use an alarm to signal this
- lock the drive after an adjustable period of time.

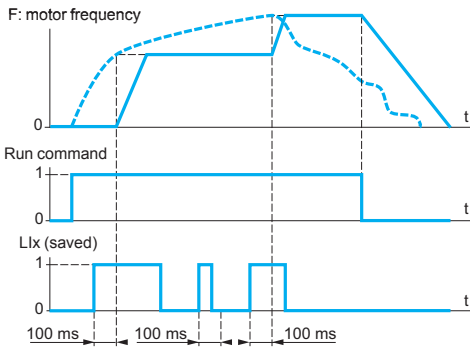
■ Current limit

A 2nd current limit can be configured between 0 and 1.65 times the drive nominal current and it can be used to limit the rise in motor temperature and the torque. Switching between the two current limits can be enabled via:

- a logic input
- a command word bit

RDY	Term	+0.00Hz	0.0A
2nd CURRENT LIMIT.		<input type="text"/>	
I Limit. 2 activ.	:	LI6	
I Limit. 2 value	:	6.4 A	
Current limitation	:	7.9 A	
Code	<input type="text"/>		Quick <input type="button" value="▼"/>

Configuring current switching



----- Analog reference
Example of how reference saving works

537269

RDY	Term	+0.00Hz	0.0A
STOP CONFIGURATION <input type="checkbox"/>			
Type of stop :		Ramp stop	
Freewheel assign. :		NO	
Fast stop assign. :		LI4	
Ramp divider :		0	
DC inject. assign. :		NO	
Code		Quick	<input type="button" value="v"/>

Configuring stop types

■ Reference saving

This can be used to:

- Read and save a speed reference level on the reference input using a command lasting longer than 0.1 s on a logic input
- Control the speed of several drives alternately via a single analog reference and a logic input for each drive
- Enable a line reference (serial link) on several drives via a logic input in order to synchronize movements by eliminating variations when the reference is sent. The reference is acquired 100 ms after the rising edge of the request. A new reference is not then acquired until a new request is made.

■ Stop types

Freewheel stop

This stops the motor by resistive torque if the motor power supply is cut.

A freewheel stop is achieved:

- by configuring a normal stop command as a freewheel stop (on disappearance of a run command or appearance of a stop command)
- by enabling a logic input
- by activating a command word bit

Fast stop

This can be used to achieve a braked stop with an acceptable deceleration ramp time (divided by an adjustable coefficient from 0 to 10) for the drive/motor unit to avoid locking in the event of an overbraking fault. If the coefficient is equal to 0 the motor decelerates as fast as possible.

Used for conveyors with emergency stop electrical braking.

A fast stop is achieved:

- by configuring a normal stop as a fast stop (on disappearance of a run command or appearance of a stop command)
- by enabling a logic input
- by activating a command word bit

Fastest possible stop

If the ramp divider coefficient is equal to 0 the motor decelerates as fast as possible.

DC injection stop

This can be used to brake high-inertia machines at low speed or maintain torque on stopping.

A DC injection stop is achieved:

- by configuring a normal stop as a DC injection stop (on disappearance of a run command or appearance of a stop command)
- by enabling a logic input
- by activating a command word bit

The DC value and the standstill braking time are adjustable.

■ **Motor thermal protection**

Motor thermal protection is provided by the drive:

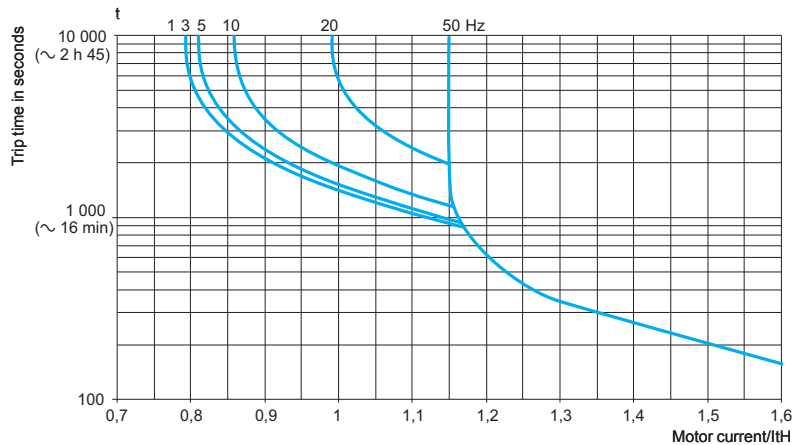
- directly, through PTC probes located in the motor windings
- indirectly, via the integrated thermal relay. Indirect thermal protection is implemented via continuous calculation of its theoretical temperature rise.

The microprocessor calculates the theoretical temperature rise of the motor based on various elements:

- the operating frequency
- the current taken by the motor
- the operating time
- the maximum ambient temperature around the motor (40°C)
- the type of motor ventilation (self-cooled or force-cooled)

Thermal protection can be adjusted from 0.2 to 1.5 times the nominal drive current. It must be adjusted to the nominal current indicated on the motor rating plate.

Note: The motor thermal state memory returns to zero when the drive control section is switched off.



Motor thermal protection curves

- Self-cooled motors:
The tripping curves vary with the motor frequency.
- Force-cooled motors:
Only the 50 Hz tripping curve should be considered, whatever the motor frequency.

■ **Drive thermal protection**

The drive thermal protection is provided by a PTC probe mounted on the heatsink or integrated in the power module.

■ **IGBT thermal protection**

The drive manages the switching frequency intelligently according to the IGBT temperature.

If the drive's current rating is exceeded (e.g.: current higher than the nominal drive current for a zero stator frequency), an alarm is displayed and a timer increases for as long the alarm is present.

537370	RDY	Term	+0.00Hz	0.0A
	4-20mA LOSS <input type="checkbox"/>			
	Fallback spd			
	Spd maintain			<input checked="" type="checkbox"/>
	Ramp stop			
	Fast stop			
DC injection				
				Quick <input type="button" value="v"/>

Configuration of the drive's fault response

■ Configuring the drive's fault response (fault management)

Different responses can be configured for the drive in the event of a resettable fault occurring:

- freewheel stop
- drive switches to the fallback speed
- drive maintains the speed at which it was operating when the fault occurred until the fault disappears
- stop on ramp
- fast stop
- DC injection stop
- no stop (alarm activated)

List of resettable faults:

- external fault
- speed feedback loss
- overspeed
- slipping
- output phase loss
- auto-tuning fault
- brake contactor feedback fault
- encoder coupling
- loss of 4-20mA
- PTC probe
- drive overheating
- motor overload if the thermal state is less than 100%
- line overvoltage
- overbraking
- current/torque limit
- IGBT overheating
- communication faults (Modbus, CANopen machine bus and other communication networks).

■ Resetting resettable faults

This can be used to remove the last fault using a logic input, command word bit or the STOP/RESET key on the graphic display terminal.

The restart conditions after a reset to zero are the same as those of a normal power-up.

List of resettable faults, see "Configuring the drive's fault response".

Line supply undervoltage and input phase loss faults are reset automatically when the line supply is restored.

Function suitable for applications where drives are difficult to access, such as when a drive is placed on a moving part.

■ General reset (disables all faults)

This function inhibits all faults, including thermal protection (forced operation), which can destroy the drive.

This function is suitable for applications where restarting may be crucial (conveyor in an oven, smoke extraction system, machines with solidifying products that need to be removed).

The function is enabled by a logic input.

Fault monitoring is active if the logic input is at state 1.

All faults are reset on a change of state \uparrow the logic input.

Note: Use of this function invalidates the guarantee.

■ Automatic restart

This function enables the drive to be restarted automatically after it has locked in fault mode, provided the relevant fault has disappeared and the other operating conditions permit a restart.

This restart is performed by a series of automatic attempts separated by increasingly longer waiting periods of 1 s, 5 s, 10 s then 1 minute for the rest.

The options for the restart process's duration are 5, 10 and 30 min., 1, 2, 3 hours and an unlimited time.

If the drive has not restarted after the configured time, it will lock and the procedure is abandoned until it has been powered off and on again.

The faults which permit this type of restart are:

- line overvoltage
- motor thermal overload
- drive thermal overload
- DC bus overvoltage
- line phase failure
- external fault
- loss of 4-20mA
- PTC probe
- serial link
- current or torque limit
- output phase loss
- line voltage too low. For this fault, the function is always active, even if it is not configured.
- fault caused by CANopen machine bus, Modbus serial link or other communication networks. These faults are reset automatically as soon as the command word or frequency reference is sent to the drive.

For these types of fault, the relay configured as a fault relay remains activated if the function is configured. The speed reference and direction of operation must be maintained for this function.

This function is suitable for machines or installations which are in continuous operation or are not monitored, and where a restart will not endanger equipment or personnel in any way.

■ PTC probe protection

The probes can be connected directly to the drive control card or to the I/O option cards.

The way in which a temperature fault is recorded by the drive can be configured:

- permanent record
- only recorded when the drive's power section is switched on
- only recorded when the motor is running

■ IGBT testing

When enabled, this function tests every IGBT and the motor connections in order to detect a short-circuit or an open circuit. This test is run every time the drive is powered on and before each motor start.

This function must not be enabled with machines with fast cycles in order to preserve the time for recording run commands.

■ Resetting operating time to zero

The drive operating and power-up time can be reset.

■ External fault

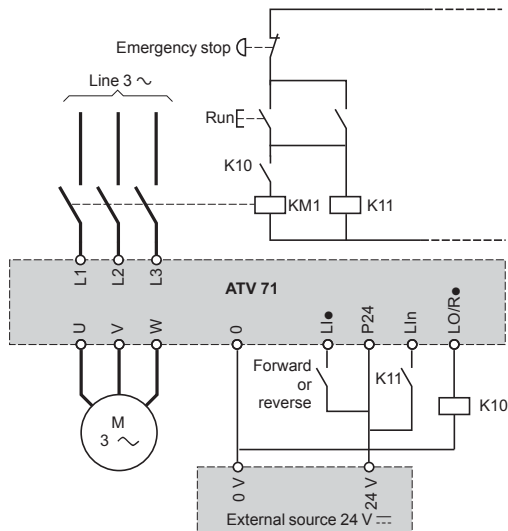
This function can lead to the drive locking if a fault occurs in the machine.

This fault is flagged on the drive display unit. The fault is flagged if the signal is at 1 or 0, according to the function configuration.

■ Line contactor control

This can be used on each run command to close the line contactor and open it when the motor is no longer on. The drive control section must be powered without fail by an external 24 V $\overline{\text{DC}}$ source.

This function must be used for simple sequences with a low number of Start/Stop operations (Start/Stop cycle longer than 60 seconds).



After a run command, if the line contactor is not closed the drive will lock after an adjustable period of time.

■ Forced local mode

Forced local mode imposes control via the terminals or graphic display terminal and disables all other control modes.

Switching to forced local mode may be activated via:

- a logic input
- a function key on the graphic display terminal

The following references and commands are available for forced local mode:

- references AI1, AI2, etc. and command via logic inputs
- reference and command via the graphic display terminal