

Variable speed drives for asynchronous motors

Altivar 71: output filters

The Altivar 71 drive includes as standard a software function used to limit overvoltages at the motor terminals.
Depending on the cable lengths or the type of application, it may be necessary to use output filters:

- Motor chokes used to limit the dv/dt
- Sinus filters that are particularly effective for long cable runs

Cable length (2)	10...50 m	50...100 m	100...150 m	150...300 m	300...600 m	600...1000 m
Shielded cable						
ATV 71H●●●M3 ATV 71H075N4...HD15N4 ATV 71W075N4...WD15N4 ATV 71P075N4Z...PU75N4Z	Software function (1)	Motor choke			–	
ATV 71H●●●M3X ATV 71HD18N4...HC50N4 ATV 71WD18N4...WD75N4	Software function (1)	Motor choke			–	
Unshielded cable						
ATV 71H037M3...HU15M3 ATV 71H075N4...HU22N4 ATV 71W075N4...WU22N4 ATV 71P075N4Z...PU22N4Z	Software function (1)	Motor choke or sinus filter			–	
ATV 71HU22M3, HU30M3 ATV 71HU30N4...HU55N4 ATV 71PU30N4Z...PU55N4Z ATV 71WU30N4...WU55N4	Software function (1)	Motor choke			Sinus filter	–
ATV 71HU40M3...HU75M3 ATV 71HU75N4...HD15N4 ATV 71WU75N4...WD15N4 ATV 71PU75N4Z	Software function (1)	Motor choke			Sinus filter	
ATV 71HD11M3X...HD45M3X ATV 71HD18N4...HD75N4 ATV 71WD18N4...WD75N4	Software function (1)			Motor choke	Sinus filter	
ATV 71HD55M3X...HD75M3X ATV 71HD90N4...HC50N4	Software function (1)			Motor choke	2 motor chokes in series	–

(1) The software function limits the overvoltage at the motor terminals to twice the DC bus voltage.

For any application with braking cycles, the DC bus voltage rises to more than the supply voltage multiplied by $\sqrt{2}$.

You must check the electrical characteristics of the motor before using this function.

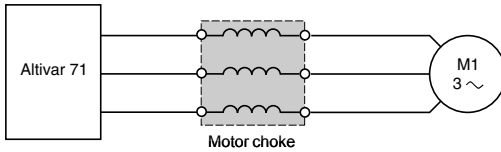
(2) The cable length varies depending on the combination variable speed drive/motor choke or sinus filter, see pages 60291/4 and 60291/7.

For an application with several motors connected in parallel, the cable length must include all cabling.

Recommended types of cable:

- Shielded cables: "GORSE" cable, type GUOSTV-LS/LH; "PROTOFLEX" cable, type EMV2YSL CY,
- Unshielded cables: "GORSE" cable, type H07 RN-F4GXX; "BELDEN" cable, type 2950X

Motor chokes



Altivar 71 drives have been developed to operate with the following maximum motor cable lengths:

For drives	Maximum length of motor cable (1)	
	Shielded cable	Unshielded cable
	m	m
ATV 71H●●●M3	50	100
ATV 71HD11M3X, HD15M3X		
ATV 71H075N4...HD18N4		
ATV 71W075N4...WD18N4		
ATV 71P075N4Z...PU75N4Z		
ATV 71HD18M3X...HD75M3X	100	200
ATV 71HD22N4...HC50N4		
ATV 71WD22N4...WD75N4		

The motor choke enables operation with motor cables above these maximum lengths and/or limits the dv/dt to 500 V/μs at the motor terminals.

It is also used to:

■ Limit overvoltages on the motor terminals to:

□ 1000 V to 400 V ~ (rms value)

□ 1150 V to 460 V ~ (rms value)

■ Filter interference caused by opening a contactor placed between the filter and the motor

■ Reduce the motor earth leakage current.

General characteristics (2)

Type of choke		VW3 A5 101...103	VW3 A5 104...108
Drive switching frequency	ATV 71H●●●M3 ATV 71HD11M3X, HD15M3X ATV 71H075N4...HD30N4 ATV 71W075N4...WD30N4 ATV 71P075N4Z...PU75N4Z	kHz	4
	ATV 71HD18M3X...HD75M3X ATV 71HD37N4...HC50N4 ATV 71WD37N4...WD75N4	kHz	2.5
Maximum drive output frequency		Hz	100
Degree of protection		IP 00	IP 00 IP 20 with kits VW3 A9 612 and VW3 A9 613
Thermal protection			By temperature controlled switch
Temperature controlled switch (3)	Tripping temperature	°C	125
	Maximum voltage	V	250 ~
	Maximum current	A	0.5
Ambient air temperature around the device	Operation	°C	-10...+50
	Storage	°C	-25...+70

Connection characteristics

Maximum connection capacity and tightening torque	VW3 A5 101, 102	10 mm ² (AWG 6) 1.5 Nm
	VW3 A5 103	Connected on a bar, Ø 9 mm
	VW3 A5 104	Connected on a tag connector, M10
	VW3 A5 105, 106	Connected on a tag connector, M12
	VW3 A5 107, 108	Connected on a tag connector, 2 x M12

(1) These values are given for a switching frequency of 2.5 or 4 kHz depending on the rating.

(2) Choke performance is ensured by not exceeding the above cable lengths. For an application with several motors connected in parallel, the cable length must include all cabling. If a cable longer than that recommended is used, the motor chokes may overheat.

(3) The contact should be connected in the sequence (use for signalling or controlling the line contactor).

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Option: motor chokes



VW3A5 101

Motor chokes								
For drives	Maximum length of motor cable (1)		Loss W	Nominal current A	Sold in lots of	Reference	Weight kg	
	Shielded	Un-shielded						
	m	m						
3-phase supply voltage: 200...240 V 50/60 Hz								
ATV 71H037M3...HU22M3	150	300	150	12	–	VW3 A5 101	5.500	
ATV 71HU30M3...HU75M3	200	260	250	48	–	VW3 A5 102	8.000	
	300	300	350	90	–	VW3 A5 103	10.000	
ATV 71HD11M3X...HD22M3X	150	300	350	90	–	VW3 A5 103	10.000	
ATV 71HD30M3X...HD45M3X	150	300	430	215	3	VW3 A5 104	17.300	
ATV 71HD55M3X, HD75M3X	150	300	475	314	3	VW3 A5 105	29.600	
3-phase supply voltage: 380...480 V 50/60 Hz								
ATV 71H075N4...HU40N4	75	90	150	12	–	VW3 A5 101	5.500	
ATV 71W075N4...WU40N4	85	95	250	48	–	VW3 A5 102	8.000	
ATV 71P075N4Z...PU40N4Z								
	160	200	350	90	–	VW3 A5 103	10.000	
ATV 71HU55N4...HD18N4	85	95	250	48	–	VW3 A5 102	8.000	
ATV 71WU55N4...WD18N4	160	200	350	90	–	VW3 A5 103	10.000	
ATV 71PU55N4Z...PU75N4Z								
	200	300	430	215	3	VW3 A5 104	17.300	
ATV 71HD22N4, HD30N4	140	170	350	90	–	VW3 A5 103	10.000	
ATV 71WD22N4, WD30N4	150	300	430	215	3	VW3 A5 104	17.300	
ATV 71HD37N4	97	166	350	90	–	VW3 A5 103	10.000	
ATV 71WD37N4	200	300	430	215	3	VW3 A5 104	17.300	
ATV 71HD45N4...HD75N4	150	300	430	215	3	VW3 A5 104	17.300	
ATV 71WD45N4...WD75N4	200	300	430	215	3	VW3 A5 104	17.300	
ATV 71HD90N4,								
ATV 71HC11N4, HC13N4	150	250	475	314	3	VW3 A5 105	29.600	
ATV 71HC16N4, HC20N4	250	300	530	481	3	VW3 A5 106	44.400	
ATV 71HC25N4	Motor P 220 kW	250	300	530	481	3	VW3 A5 106	44.400
	Motor P 250 kW	200	250	598	759	3	VW3 A5 107	64.500
ATV 71HC28N4, HC31N4	200	250	598	759	3	VW3 A5 107	64.500	
ATV 71HC40N4	Motor P 355 kW	200	250	598	759	3	VW3 A5 107	64.500
	Motor P 400 kW	250	300	682	1188	3	VW3 A5 108	99.200
ATV 71HC50N4	250	300	682	1188	3	VW3 A5 108	99.200	

(1) Maximum length given for a switching frequency of 2.5 or 4 kHz depending on the rating of the fan, see characteristics page 60291/3.

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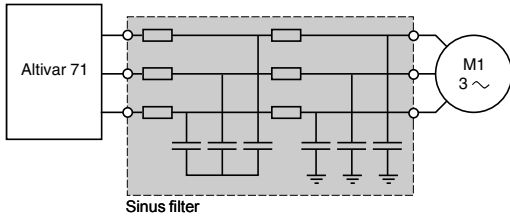
Option: motor chokes

IP 20 protection kits			
Description	For filters	Reference	Weight kg
Mechanical kit including an IP 20 cover and cable clamps	VW3 A5 104, 105	VW3 A9 612	–
	VW3 A5 106...108	VW3 A9 613	–

Variable speed drives for asynchronous motors

Altivar 71: output filters
Option: sinus filters

Sinus filters



Sinus filter allows 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, it also enables 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 drive voltage/frequency ratio.

The sinus filter is never compatible with the voltage ratio in flux vector control with sensor.

Nota : 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 sinus filter		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 60291/2

Connection characteristics

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

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Altivar 71: output filters

Option: sinus filters

Sinus filters						
For drives		Nominal current	Loss at 100 Hz	Reference	Weight	
		A	W		kg	
3-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	
3-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 ATV 71PU75N4Z		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.