

Variable speed drives for asynchronous motors

Altivar 71: reduction of current harmonics Option: DC chokes

The main solutions for reducing current harmonics are as follows:

- DC chokes, see below
- Line chokes, see page 60289/6
- 16% and 10% passive filters, see page 60289/9,
- Use of passive filters with a DC choke, see page 60289/9

These 4 solutions can be used on the same installation.

It is always easier and less expensive to handle current harmonics at installation level as a whole rather than at the level of each individual unit, particularly when using passive filters and active compensators.

DC chokes

DC chokes are used to reduce current harmonics in order to comply with standard IEC 61000-3-12 for drives in which the line current is more than 16 A and less than 75 A.

Using the DC choke with the drive complies with standard IEC 61000-3-12 provided that the $RSCE \geq 120$ (1) at the point of connection to the public network.

120 represents the minimum value of RSCE (1) for which the values in table 4 of standard IEC 61000-3-12 are not exceeded.

It is the responsibility of the installer or the user to ensure that the device is connected correctly to a connection point with an $RSCE \geq 120$.

The choke is connected to the drive power terminals.

The DC choke is supplied as standard with ATV 71HD55M3X, HD75M3X and ATV 71HD90N4...HC50N4 drives.

It is compulsory for ATV 71P●●●N4Z drives if they do not have a fan (see page 60283/4).

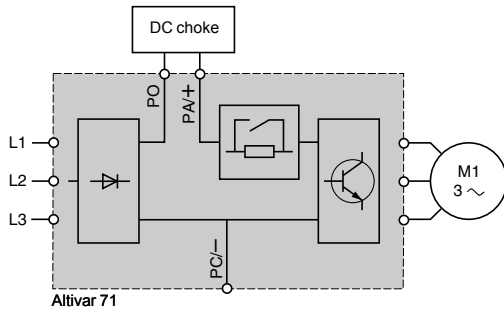
Applications

Reduction of current harmonics.

Reduction of the THD to 5% or 10% when used with passive filters, see pages 60289/10 to 60289/13.

Maintaining the motor torque in relation to the line choke.

(1) Short-circuit ratio.



Variable speed drives for asynchronous motors

Altivar 71: reduction of current harmonics

Option: DC chokes

Example of current harmonic levels for ATV 71H●●●M3 and ATV 71H●●●M3X drives (1)

Motor power	For ATV 71 drives	Line supply		Current harmonic levels																THD (3)		
		Line current	Line Isc (2)	H1	H5	H7	H11	H13	H17	H19	H23	H25	H29	H31	H35	H37	H41	H43	H47		H49	
kW	HP	A	kA	A	%	%	%	%	%	%	%	%	%	%	%	%	%	%	%	%		
3-phase supply voltage: 230 V 50 Hz, with optional DC choke																						
0.37	0.5	H037M3	1.5	5	1.4	26.7	18.4	9.1	7.7	5.8	5.1	4.3	3.8	3.4	3	2.8	2.5	2.4	2.2	2.1	1.9	36.3
0.75	1	H075M3	3.05	5	2.81	31.99	20.91	8.88	7.36	5.6	4.63	4.07	3.42	3.18	2.71	2.59	2.24	2.17	1.91	1.86	1.66	41.27
1.5	2	HU15M3	6.04	5	5.55	33.65	21.59	8.14	6.84	4.97	4.19	3.54	3.08	2.71	2.43	2.17	2.01	1.78	1.7	1.5	1.47	42.4
2.2	3	HU22M3	8.33	5	7.64	34.89	21.11	8.78	6.72	5.36	4.1	3.8	3	2.9	2.37	2.29	1.95	1.85	1.66	1.52	1.44	43.33
3	-	HU30M3	11.12	5	10.19	35.17	20.68	8.71	6.48	5.24	3.94	3.67	2.88	2.76	2.27	2.15	1.87	1.71	1.58	1.37	1.37	43.22
4	5	HU40M3	14.53	5	13.29	36.23	20.51	8.73	6.2	5.2	3.73	3.61	2.71	2.68	2.14	2.06	1.76	1.61	1.49	1.27	1.28	43.91
5.5	7.5	HU55M3	19.2	8	17.9	30.68	17.26	8.75	6.31	5.3	4.03	3.72	2.98	2.79	2.36	2.17	1.94	1.71	1.63	1.36	1.4	38
7.5	10	HU75M3	26.1	15	23.9	35.23	21.09	8.82	6.71	5.38	4.09	3.82	2.98	2.91	2.35	2.31	1.92	1.87	1.63	1.54	1.4	43.96
11	15	HD11M3X	36.6	15	34.2	30.91	17.12	8.86	6.36	5.37	4.08	3.77	3.01	2.82	2.37	2.19	1.94	1.73	1.62	1.37	1.38	38.14
15	20	HD15M3X	48.6	15	55.8	25.51	13.46	8.73	6.32	5.25	4.21	3.6	3.11	2.62	2.42	1.95	1.93	1.47	1.56	1.12	1.26	35.34
18.5	25	HD18M3X	58.7	22	55.8	25.51	13.46	8.73	6.32	5.25	4.21	3.6	3.11	2.62	2.42	1.95	1.93	1.47	1.56	1.12	1.26	32.31
22	30	HD22M3X	70.28	22	65.92	29.81	15.91	8.7	6.15	5.23	3.99	3.63	2.95	2.68	2.32	2.04	1.89	1.57	1.57	1.22	1.32	36.62
30	40	HD30M3X	96.9	22	88.78	36.68	19.42	8.38	5.67	4.86	3.44	3.29	2.52	2.38	1.98	1.77	1.62	1.34	1.34	1.02	1.12	43.51
37	50	HD37M3X	116.1	22	107.9	33.09	16.4	8.59	5.59	4.97	3.54	3.33	2.6	2.36	2.03	1.72	1.63	1.26	1.32	0.94	1.06	39.24
45	60	HD45M3X	138.7	22	130.5	30.15	13.86	8.65	5.38	5.01	3.49	3.33	2.55	2.33	1.96	1.66	1.53	1.2	1.19	0.9	0.9	35.7
3-phase supply voltage: 230 V 50 Hz, with DC choke supplied as standard with the drive																						
55	75	HD55M3X	163.5	35	175.8	46.43	27.19	8.18	6.32	4.57	3.27	3.06	2.23	2.23	1.69	1.70	1.35	1.33	1.10	1.07	0.90	55.32
75	100	HD75M3X	215.7	35	236.8	45.17	25.21	8.08	5.85	4.40	3.02	2.89	2.06	2.06	1.55	1.54	1.23	1.18	0.99	0.92	0.80	53.17

Example of current harmonic levels for ATV 71H●●●N4 drives (1)

Motor power	For ATV 71 drives	Line supply		Current harmonic levels																THD (3)		
		Line current	Line Isc (2)	H1	H5	H7	H11	H13	H17	H19	H23	H25	H29	H31	H35	H37	H41	H43	H47		H49	
kW	HP	A	kA	A	%	%	%	%	%	%	%	%	%	%	%	%	%	%	%	%	%	
3-phase supply voltage: 400 V 50 Hz, with optional DC choke																						
0.75	1	H075N4	1.77	5	1.61	34.6	23.7	8.9	7.8	5.6	4.8	4.1	3.5	3.2	2.8	2.6	2.3	2.2	1.9	1.9	1.7	44.95
1.5	2	HU15N4	3.34	5	3.03	35.55	23.53	8.95	7.65	5.61	4.74	4.06	3.49	3.16	2.76	2.57	2.28	2.15	1.94	1.83	1.68	45.48
2.2	3	HU22N4	4.83	5	4.4	35.79	22.77	8.7	7.11	5.41	4.36	3.89	3.2	3.01	2.53	2.43	2.09	2.01	1.77	1.7	1.53	45
3	-	HU30N4	6.13	5	5.67	31.61	18.82	9.41	6.82	5.88	4.57	4.24	3.38	3.28	2.67	2.63	2.19	2.16	1.86	1.8	1.6	40.08
4	5	HU40N4	8.24	5	7.51	36.16	21.63	9	8.17	5.52	4.17	3.93	3.05	3	2.4	2.38	1.98	1.93	1.68	1.58	1.45	44.72
5.5	7.5	HU55N4	10.81	22	9.83	34.85	23.08	9.68	4.05	6.12	5.18	4.45	3.83	3.48	3.04	2.85	2.52	2.4	2.14	2.06	1.85	45.19
7.5	10	HU75N4	15.01	10	13.8	34.09	20.49	8.57	6.43	5.28	3.95	3.78	2.89	2.9	2.28	2.32	1.88	1.9	1.59	1.58	1.37	42.25
11	15	HD11N4	21.1	9	19.3	35.22	20.11	8.95	6.5	5.41	4.02	3.8	2.95	2.86	2.32	2.23	1.9	1.77	1.6	1.42	1.37	43.1
15	20	HD15N4	28.2	12	25.8	35.22	20.11	8.98	6.49	5.43	4.02	3.82	2.94	2.88	2.32	2.24	1.9	1.78	1.6	1.43	1.37	43.06
18.5	25	HD18N4	33.9	12	31.9	28.36	15.16	8.85	6.18	5.39	4.04	3.78	2.98	2.83	2.34	2.18	1.9	1.7	1.58	1.33	1.33	35.23
22	30	HD22N4	40.87	22	37.85	32.79	18.73	8.6	6.42	5.28	4.09	3.75	3.03	2.85	2.4	2.25	1.97	1.81	1.67	1.48	1.44	40.4
30	40	HD30N4	54.1	20	50.6	29.97	16.26	8.75	6.27	5.32	4.07	3.73	3.01	2.79	2.37	2.15	1.94	1.69	1.62	1.33	1.38	36.99
37	50	HD37N4	66.43	22	62.6	28.49	15.01	8.63	6.08	5.23	4	3.65	2.97	2.71	2.34	2.07	1.9	1.61	1.58	1.26	1.32	35.13
45	60	HD45N4	83.11	22	75.56	38.31	20.96	8.24	5.81	4.85	3.48	3.33	2.54	2.44	2	1.85	1.64	1.42	1.38	1.1	1.17	45.59
55	75	HD55N4	98.6	22	91.69	32.94	16.76	8.5	5.68	4.98	3.62	3.38	2.67	2.44	2.09	1.81	1.69	1.37	1.39	1.04	1.14	39.29
75	100	HD75N4	134	22	125.9	30.65	14.43	8.4	5.4	4.84	3.52	3.21	2.59	2.25	2	1.61	1.58	1.17	1.25	0.88	0.96	36.2
3-phase supply voltage: 400 V 50 Hz, with DC choke supplied as standard with the drive																						
90	125	HD90N4	158.81	35	145.1	36.72	20.66	8.33	6.19	4.93	3.78	3.43	2.75	2.56	2.13	1.99	1.72	1.59	1.4	1.29	1.16	44.26
110	150	HC11N4	193.81	35	175.7	38.91	21.7	8.24	6.03	4.78	3.56	3.28	2.56	2.42	1.98	1.87	1.58	1.47	1.28	1.19	1.06	46.45
132	200	HC13N4	228.92	35	209.3	37.23	20.02	8.26	5.8	4.76	3.51	3.26	2.52	2.38	1.94	1.82	1.55	1.42	1.24	1.12	1	44.23
160	250	HC16N4	276.22	50	251.7	38.29	20.22	8.19	5.59	4.66	3.32	3.13	2.37	2.26	1.82	1.7	1.43	1.31	1.14	1.02	0.91	45.11
200	300	HC20N4	340.29	50	313.6	36.03	17.85	8.16	5.3	4.59	3.25	3.05	2.32	2.17	1.76	1.6	1.37	1.2	1.05	0.91	0.82	42.07
220	350	HC25N4	378.67	50	344.9	38.91	19.7	8.11	5.22	4.47	3.04	2.93	2.15	2.07	1.63	1.52	1.27	1.14	0.99	0.85	0.78	45.26
250	400	HC25N4	423.72	50	390.1	36.61	17.59	8.11	5.04	4.46	3.04	2.9	2.16	2.02	1.62	1.46	1.24	1.07	0.95	0.78	0.73	42.35
280	450	HC28N4	471.17	50	437.3	34.78	15.9	8.1	4.92	4.44	3.04	2.86	2.16	1.97	1.6	1.4	1.21	1	0.9	0.72	0.67	40.05
315	500	HC31N4	528.66	50	492.2	34.19	15.08	8.03	4.79	4.36	2.98	2.78	2.1	1.88	1.54	1.31	1.14	0.92	0.84	0.65	0.61	39.15
355	-	HC40N4	607.3	50	555.5	38.78	17.83	7.88	4.59	4.14	2.64	2.58	1.84	1.74	1.37	1.21	1.04	0.85	0.78	0.6	0.58	44.12
400	600	HC40N4	675.3	50	623.4	36.78	15.99	7.86	4.43	4.1	2.64	2.53	1.85	1.67	1.35	1.13	0.99	0.78	0.73	0.54	0.53	41.6
500	700	HC50N4	833.84	50	779.9	33.73	13.22	7.82	4.26	3.99	2.63	2.38	1.81	1.5	1.26	0.95	0.88	0.63	0.61	0.44	0.43	37.8

(1) Example of current harmonic levels up to harmonic order 49 for a 230 V/50 Hz line supply for ATV 71H●●●M3 and ATV 71H●●●M3X drives or 400 V/50 Hz for ATV 71H●●●N4 drives, with the chokes connected between the PO and PA/+ terminals on the Altivar 71.

(2) The line Isc values are given for the current harmonic levels in the table.

(3) Total harmonic distortion conforming to standard IEC 61000-3-12.

Variable speed drives for asynchronous motors

Altivar 71: reduction of current harmonics

Option: DC chokes

Example of current harmonic levels for ATV 71W●●●N4 drives (1)

3-phase supply voltage: 400 V 50 Hz, with optional DC choke

Motor power	For ATV 71 drives	Line supply		Current harmonic levels																THD (3)		
		Line current	Line Isc (2)	H1	H5	H7	H11	H13	H17	H19	H23	H25	H29	H31	H35	H37	H41	H43	H47		H49	
kW	HP	A	kA	A	%	%	%	%	%	%	%	%	%	%	%	%	%	%	%	%		
0.75	1	W075N4	1.77	5	1.61	34.6	23.7	8.9	7.8	5.6	4.8	4.1	3.5	3.2	2.8	2.6	2.3	2.2	1.9	1.9	1.7	44.95
1.5	2	WU15N4	3.34	5	3.03	35.55	23.53	8.95	7.65	5.61	4.74	4.06	3.49	3.16	2.76	2.57	2.28	2.15	1.94	1.83	1.68	45.48
2.2	3	WU22N4	4.83	5	4.4	35.79	22.77	8.7	7.11	5.41	4.36	3.89	3.2	3.01	2.53	2.43	2.09	2.01	1.77	1.7	1.53	45
3	-	WU30N4	6.13	5	5.67	31.61	18.82	9.41	6.82	5.88	4.57	4.24	3.38	3.28	2.67	2.63	2.19	2.16	1.86	1.8	1.6	40.08
4	5	WU40N4	8.24	5	7.51	36.16	21.63	9	8.17	5.52	4.17	3.93	3.05	3	2.4	2.38	1.98	1.93	1.68	1.58	1.45	44.72
5.5	7.5	WU55N4	10.81	22	9.83	34.85	23.08	9.68	4.05	6.12	5.18	4.45	3.83	3.48	3.04	2.85	2.52	2.4	2.14	2.06	1.85	45.19
7.5	10	WU75N4	15.01	10	13.8	34.09	20.49	8.57	6.43	5.28	3.95	3.78	2.89	2.9	2.28	2.32	1.88	1.9	1.59	1.58	1.37	42.25
11	15	WD11N4	21.1	9	19.3	35.22	20.11	8.95	6.5	5.41	4.02	3.8	2.95	2.86	2.32	2.23	1.9	1.77	1.6	1.42	1.37	43.1
15	20	WD15N4	28.2	12	25.8	35.22	20.01	8.98	6.49	5.43	4.02	3.82	2.94	2.88	2.32	2.24	1.9	1.78	1.6	1.43	1.37	43.06
18.5	25	WD18N4	33.9	12	31.9	28.36	15.16	8.85	6.18	5.39	4.04	3.78	2.98	2.83	2.34	2.18	1.9	1.7	1.58	1.33	1.33	35.23
22	30	WD22N4	40.87	22	37.85	32.79	18.73	8.6	6.42	5.28	4.09	3.75	3.03	2.85	2.4	2.25	1.97	1.81	1.67	1.48	1.44	40.4
30	40	WD30N4	54.1	20	50.6	29.97	16.26	8.75	6.27	5.32	4.07	3.73	3.01	2.79	2.37	2.15	1.94	1.69	1.62	1.33	1.38	36.99
37	50	WD37N4	66.43	22	62.6	28.49	15.01	8.63	6.08	5.23	4	3.65	2.97	2.71	2.34	2.07	1.9	1.61	1.58	1.26	1.32	35.13
45	60	WD45N4	83.11	22	75.56	38.31	20.96	8.24	5.81	4.85	3.48	3.33	2.54	2.44	2	1.85	1.64	1.42	1.38	1.1	1.17	45.59
55	75	WD55N4	98.6	22	91.69	32.94	16.76	8.5	5.68	4.98	3.62	3.38	2.67	2.44	2.09	1.81	1.69	1.37	1.39	1.04	1.14	39.29
75	100	WD75N4	134	22	125.9	30.65	14.43	8.4	5.4	4.84	3.52	3.21	2.59	2.25	2	1.61	1.58	1.17	1.25	0.88	0.96	36.2

Example of current harmonic levels for ATV 71P●●●N4Z drives (1)

3-phase supply voltage: 400 V 50 Hz, with optional DC choke

Motor power	For ATV 71 drives	Line supply		Current harmonic levels																THD (3)		
		Line current	Line Isc (2)	H1	H5	H7	H11	H13	H17	H19	H23	H25	H29	H31	H35	H37	H41	H43	H47		H49	
kW	HP	A	kA	A	%	%	%	%	%	%	%	%	%	%	%	%	%	%	%	%	%	
0.75	1	P075N4Z	1.77	5	1.61	34.6	23.7	8.9	7.8	5.6	4.8	4.1	3.5	3.2	2.8	2.6	2.3	2.2	1.9	1.9	1.7	44.95
1.5	2	PU15N4Z	3.34	5	3.03	35.55	23.53	8.95	7.65	5.61	4.74	4.06	3.49	3.16	2.76	2.57	2.28	2.15	1.94	1.83	1.68	45.48
2.2	3	PU22N4Z	4.83	5	4.4	35.79	22.77	8.7	7.11	5.41	4.36	3.89	3.2	3.01	2.53	2.43	2.09	2.01	1.77	1.7	1.53	45
3	-	PU30N4Z	6.13	5	5.67	31.61	18.82	9.41	6.82	5.88	4.57	4.24	3.38	3.28	2.67	2.63	2.19	2.16	1.86	1.8	1.6	40.08
4	5	PU40N4Z	8.24	5	7.51	36.16	21.63	9	8.17	5.52	4.17	3.93	3.05	3	2.4	2.38	1.98	1.93	1.68	1.58	1.45	44.72
5.5	7.5	PU55N4Z	10.81	22	9.83	34.85	23.08	9.68	4.05	6.12	5.18	4.45	3.83	3.48	3.04	2.85	2.52	2.4	2.14	2.06	1.85	45.19
7.5	10	PU75N4Z	15.01	10	13.8	34.09	20.49	8.57	6.43	5.28	3.95	3.78	2.89	2.9	2.28	2.32	1.88	1.9	1.59	1.58	1.37	42.25

(1) Example of current harmonic levels up to harmonic order 49 for a 400 V/50 Hz line supply with chokes connected between the PO and PA+ terminals on the Altivar 71.

(2) The line Isc values are given for the current harmonic levels in the table.

(3) Total harmonic distortion conforming to standard IEC 61000-3-12.

General characteristics			
Degree of protection			IP 20
Maximum relative humidity			95%
Ambient air temperature around the device	Operation	°C	-10...+50 without derating Up to 60°C with current derating of 2.2% per °C above 50°C
	Storage	°C	-40...+65
Maximum operating altitude		m	1000 without derating 1000...3000 with current derating of 1% per additional 100 m
Voltage drop			4 to 6%
Maximum current			1.65 x nominal current for 60 seconds

Connection characteristics			
Type of terminal		Earth	Power supply
Maximum connection capacity and tightening torque	VW3 A4 501...505	10 mm ² (AWG 6) 1.2...1.4 Nm	2.5 mm ² (AWG 12) 0.4...0.6 Nm
	VW3 A4 506	10 mm ² (AWG 6) 1.2...1.4 Nm	4 mm ² (AWG 10) 0.5...0.8 Nm
	VW3 A4 507	10 mm ² (AWG 6) 1.2...1.4 Nm	6 mm ² (AWG 8) 0.8...1 Nm
	VW3 A4 508, 509	10 mm ² (AWG 6) 1.2...1.4 Nm	10 mm ² (AWG 6) 1.2...1.4 Nm
	VW3 A4 510	10 mm ² (AWG 6) 1.2...1.4 Nm	35 mm ² (AWG 0) 2.5...3 Nm
	VW3 A4 511	–	Connected on a bar, Ø 9 –
	VW3 A4 512	–	Connected on a bar, Ø 9 –

DC chokes (1)

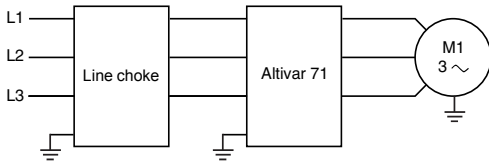
For drives	Inductance value mH	Nominal current A	Loss W	Reference	Weight kg
3-phase supply voltage: 200...240 V 50/60 Hz					
ATV 71H037M3	18	2.25	7.7	VW3 A4 501	0.650
ATV 71H075M3	6.8	8	22.5	VW3 A4 503	1.700
ATV 71HU15M3	3.2	14.3	32	VW3 A4 505	2.200
ATV 71HU22M3	2.2	19.2	33	VW3 A4 506	2.500
ATV 71HU30M3	1.6	27.4	43	VW3 A4 507	3.000
ATV 71HU40M3, HU55M3	1.2	44	61	VW3 A4 508	4.500
ATV 71HU75M3	0.7	36	30.5	VW3 A4 509	2.500
ATV 71HD11M3X, HD15M3X	0.52	84.5	77	VW3 A4 510	6.200
ATV 71HD18M3X, HD22M3X	0.22	171.2	86	VW3 A4 511	15.500
ATV 71HD30M3X...HD45M3X	0.09	195	73	VW3 A4 512	10.000
3-phase supply voltage: 380...480 V 50/60 Hz					
ATV 71H075N4 ATV 71W075N4 ATV 71P075N4Z	18	2.25	7.7	VW3 A4 501	0.650
ATV 71HU15N4 ATV 71WU15N4 ATV 71PU15N4Z	10	4.3	11	VW3 A4 502	1.000
ATV 71HU22N4, HU30N4 ATV 71WU22N4, WU30N4 ATV 71PU22N4Z, PU30N4Z	6.8	8	22.5	VW3 A4 503	1.700
ATV 71HU40N4 ATV 71WU40N4 ATV 71PU40N4Z	3.9	10.7	27	VW3 A4 504	1.650
ATV 71HU55N4 ATV 71WU55N4 ATV 71PU55N4Z	3.2	14.3	32	VW3 A4 505	2.200
ATV 71HU75N4 ATV 71WU75N4 ATV 71PU75N4Z	2.2	19.2	33	VW3 A4 506	2.500
ATV 71HD11N4 ATV 71WD11N4	1.6	27.4	43	VW3 A4 507	3.000
ATV 71HD15N4, HD18N4 ATV 71WD15N4, WD18N4	1.2	44	57.5	VW3 A4 508	4.300
ATV 71HD22N4...HD37N4 ATV 71WD22N4...WD37N4	0.52	84.5	98.3	VW3 A4 510	5.600
ATV 71HD45N4...HD75N4 ATV 71WD45N4...WD75N4	0.22	171.2	128	VW3 A4 511	9.100

(1) With ATV 71HD55M3X, HD75M3X and ATV 71HD90N4...HC50N4 drives, the DC choke is supplied as standard with the drive.

Variable speed drives for asynchronous motors

Altivar 71: reduction of current harmonics

Option: line chokes



Line chokes

A line choke can be used to provide improved protection against overvoltages on the line supply and to reduce harmonic distortion of the current produced by the drive.

Line chokes are compulsory on ATV 71HU40M3...HU75M3 drives supplied with a single phase 200...240 V 50/60 Hz supply voltage.

Line chokes can be used instead of a DC choke. In this case, to obtain an ATV 71HD55M3X, HD75M3X or ATV 71HD90N4...HC50N4 drive without a DC choke, add the letter D at the end of the drive reference, see pages 60282/2 and 60282/3.

The recommended chokes are used to limit the line current. They have been developed in line with standard EN 50178 (VDE 0160 level 1 high energy overvoltages on the line supply).

The choke values are defined for a voltage drop between 3% and 5% of the nominal supply voltage. Values higher than this will cause loss of torque.

These chokes should be installed upstream of the drive.

Applications

The use of line chokes is recommended in particular under the following circumstances:

- Close connection of several drives in parallel
- Line supply with significant disturbance from other equipment (interference, overvoltages)
- Line supply with voltage imbalance between phases above 1.8% of the nominal voltage
- Drive supplied by a line with very low impedance (in the vicinity of a power transformer 10 times more powerful than the drive rating)
- Installation of a large number of frequency converters on the same line
- Reducing overloads on the $\cos \varphi$ correction capacitors, if the installation includes a power factor correction unit.

Variable speed drives for asynchronous motors

Altivar 71: reduction of current harmonics
Option: line chokes

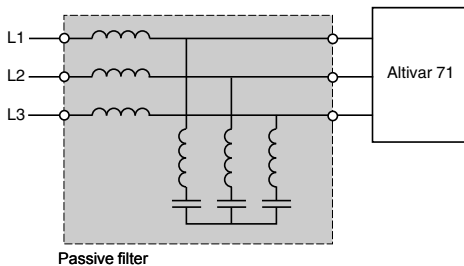
General characteristics		VW3 A58501, A58502	VW3 A4 551... A4 553	VW3 A4 554, A4 555	VW3 A4 556... A4 560	VW3 A4 561... A4 565, A4 569
Type of choke						
Conformity to standards		EN 50178 (VDE 0160 level 1 high energy overvoltages on the line supply), IEC 60076 (with HD 398)				
Degree of protection	Choke	IP 00				
	Terminals	IP 20		IP 10	IP 00	
Atmospheric pollution		3 C2, 3B1, 3S1 conforming to IEC 721.3.3				
Degree of pollution		2 conforming to 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/EN 60068-2-27				
Maximum relative humidity		95%				
Ambient air temperature around the device	Operation	°C 0...+45 without derating Up to +55°C with current derating of 2% per °C above 45°C				
	Storage	°C -25...+70				
Isolation class		F				
Clearance distance in air		mm 5.5 conforming to IEC 60664				
Leakage distance in air		mm 11.5 conforming to IEC 60664				
Maximum operating altitude		m 1000 without derating 1000...3000 with current derating of 1% per additional 100 m				
Voltage drop		Between 3% and 5% of the nominal supply voltage. Values higher than this will cause loss of torque				
Maximum current		1.65 x nominal current for 60 seconds				
Connection characteristics						
Maximum connection capacity and tightening torque	VW3 A58501	16 mm ² , (AWG 4) 1.2...1.4 Nm				
	VW3 A58502	6 mm ² , (AWG 8) 0.8...1 Nm				
	VW3 A4 551, 552	2.5 mm ² , (AWG 12) 0.4...0.6 Nm				
	VW3 A4 553	6 mm ² , (AWG 8) 0.8...1 Nm				
	VW3 A4 554	16 mm ² , (AWG 4) 1.2...1.4 Nm				
	VW3 A4 555	35 mm ² , (AWG 0) 2.5...3 Nm				
	VW3 A4 556	Connected on a bar, Ø 6.5 mm -				
	VW3 A4 557, 558	Connected on a bar, Ø 9 mm -				
	VW3 A4 559...561	Connected on a bar, Ø 11 mm -				
	VW3 A4 562...565, 569	Connected on a bar, Ø 13 mm -				

Variable speed drives for asynchronous motors

Altivar 71: reduction of current harmonics
Option: line chokes

Line chokes								
For drives	Line supply	Line choke				Quantity per drive	Reference	Weight
	Line Isc	Inductance value	Nominal current	Saturation current	Loss			
	kA	mH	A	A	W			kg
Single phase supply voltage: 200...240 V 50/60 Hz								
ATV 71HU40M3	5	2	25	–	45	1	VW3 A58501	3.500
ATV 71HU55M3	5	1	45	–	50	1	VW3 A58502	3.500
ATV 71HU75M3	22	1	45	–	50	1	VW3 A58502	3.500
3-phase supply voltage: 200...240 V 50/60 Hz								
ATV 71H037M3, H075M3	5	10	4	–	45	1	VW3 A4 551	1.500
ATV 71HU15M3, HU22M3	5	4	10	–	65	1	VW3 A4 552	3.000
ATV 71HU30M3	5	2	16	–	75	1	VW3 A4 553	3.500
ATV 71HU40M3	5	1	30	–	90	1	VW3 A4 554	6.000
ATV 71HU55M3	22	1	30	–	90	1	VW3 A4 554	6.000
ATV 71HU75M3, HD11M3X	22	0.5	60	–	94	1	VW3 A4 555	11.000
ATV 71HD15M3X	22	0.3	100	–	260	1	VW3 A4 556	16.000
ATV 71HD18M3X...HD45M3X	22	0.15	230	–	400	1	VW3 A4 557	45.000
ATV 71HD55M3X	35	0.049	429	855	278	1	VW3 A4 562	50.000
ATV 71HD75M3X	35	0.038	509	1025	280	1	VW3 A4 563	59.000
3-phase supply voltage: 380...480 V 50/60 Hz								
ATV 71H075N4, HU15N4 ATV 71W075N4, WU15N4 ATV 71P075N4Z, PU15N4Z	5	10	4	–	45	1	VW3 A4 551	1.500
ATV 71HU22N4...HU40N4 ATV 71WU22N4...WU40N4 ATV 71PU22N4Z...PU40N4Z	5	4	10	–	65	1	VW3 A4 552	3.000
ATV 71HU55N4, HU75N4 ATV 71WU55N4, WU75N4 ATV 71PU55N4Z, PU75N4Z	22	2	16	–	75	1	VW3 A4 553	3.500
ATV 71HD11N4, HD15N4 ATV 71WD11N4, WD15N4	22	1	30	–	90	1	VW3 A4 554	6.000
ATV 71HD18N4, HD22N4 ATV 71WD18N4, WD22N4	22	0,5	60	–	94	1	VW3 A4 555	11.000
ATV 71HD30N4...HD55N4 ATV 71WD30N4...WD55N4	22	0.3	100	–	260	1	VW3 A4 556	16.000
ATV 71HD75N4 ATV 71WD75N4	22	0.155	184	370	220	1	VW3 A4 558	31.000
ATV 71HD90N4, HC11NA	35	0.12	222	346	278	1	VW3 A4 559	35.000
ATV 71HC13N4	35	0.098	264	530	245	1	VW3 A4 560	43.000
ATV 71HC16N4	50	0.066	344	685	258	1	VW3 A4 561	47.000
ATV 71HC20N4	50	0.060	450	574	335	1	VW3 A4 569	70.000
ATV 71HC25N4, HC28N4	50	0.038	613	1150	307	1	VW3 A4 564	73.000
ATV 71HC31N4	50	0.032	720	1352	428	1	VW3 A4 565	82.000
ATV 71HC40N4	50	0.060	450	849	335	2	VW3 A4 569	70.000
ATV 71HC50N4	50	0.038	613	1150	307	2	VW3 A4 564	73.000

Passive filters



The passive filter is used to reduce current harmonics with total harmonic distortion factors of less than 16% or 10%. These ratios may be reduced to 10% or 5% if the filter is used with a DC choke, see pages 60289/2 to 60289/5.

The reactive power increases at no load or low load. To eliminate this reactive power, the filter capacitors can be disconnected via the drive, see page 60295/15. To do this, the contactor must be controlled by one of the relay outputs on the drive, at a value lower than 10% of the nominal drive current (I_n) (please refer to the Programming Manual).

Application

Reduction of current harmonics in order to use drives in the first environment.

General characteristics

Degree of protection		IP 20
Maximum relative humidity		Class F humidity without condensation 5%...85%
Ambient air temperature around the device	Operation	°C 5...+40 without derating
	Storage	°C -25...+55
Maximum operating altitude	m	1000 without derating

Electrical characteristics

Range		400 V	460 V
Nominal voltage $\pm 10\%$	V	380...415 ~	440...480 ~
Operating frequency		50 $\pm 5\%$	60 $\pm 5\%$
Overload capacity		1.5 x I_n (A)	
Efficiency		98% (2% of thermal losses)	
THDI (1)	%	≤ 16	
Cos φ		At 75% of the line current: 0.85 At 100% of the line current: 0.99 At 150% of the line current: 1	

Connection characteristics

Maximum connection capacity		
VW3 A4 601...604		16 mm ²
VW3 A4 605...609		50 mm ²
VW3 A4 610, 611		Connected on a bar, \varnothing 12.5
VW3 A4 612, 613, 619		Connected on a bar, \varnothing 16.5
VW3 A4 621, 622		16 mm ²
VW3 A4 623...627		50 mm ²
VW3 A4 628, 629		Connected on a bar, \varnothing 12.5
VW3 A4 630...633, 639		Connected on a bar, \varnothing 16.5
VW3 A4 641...644		16 mm ²
VW3 A4 645...648		50 mm ²
VW3 A4 649		Connected on a bar, \varnothing 12.5
VW3 A4 650, 651, 656, 657		Connected on a bar, \varnothing 16.5
VW3 A4 661...663		16 mm ²
VW3 A4 664...666		50 mm ²
VW3 A4 667, 668		Connected on a bar, \varnothing 12.5
VW3 A4 669...671, 676, 677		Connected on a bar, \varnothing 16.5

(1) The total current harmonic distortion (THDI) is indicated for a total voltage harmonic distortion (THDU) < 2% and a short-circuit ratio (RSCE) > 66%, and only for the nominal current of the passive filter. If these conditions are not adhered to, the total current harmonics will be reduced without any guarantee of level.

Variable speed drives for asynchronous motors

Altivar 71: reduction of current harmonics

Option: passive filters

Passive filters: 3-phase power supply 400 V 50 Hz							
Motor rating		For drives	Line supply	Filter	Quantity per drive	Reference	Weight
kW	HP		Line current	In (2)			
			A	A			
THDI 16% (1)							
0.75	1	ATV 71H075N4 ATV 71W075N4 ATV 71P075N4Z	2.5	6	1	VW3 A4 601	15.000
1.5	2	ATV 71HU15N4 ATV 71WU15N4 ATV 71PU15N4Z	3.6	6	1	VW3 A4 601	15.000
2.2	3	ATV 71HU22N4 ATV 71WU22N4 ATV 71PU22N4Z	5	6	1	VW3 A4 601	15.000
3	–	ATV 71HU30N4 ATV 71WU30N4 ATV 71PU30N4Z	6	6	1	VW3 A4 601	15.000
4	5	ATV 71HU40N4 ATV 71WU40N4 ATV 71PU40N4Z	7.8	10	1	VW3 A4 602	19.000
5.5	7.5	ATV 71HU55N4 ATV 71WU55N4 ATV 71PU55N4Z	10	10	1	VW3 A4 602	19.000
7.5	10	ATV 71HU75N4 ATV 71WU75N4 ATV 71PU75N4Z	14	19	1	VW3 A4 603	21.000
11	15	ATV 71HD11N4 ATV 71WD11N4	19	19	1	VW3 A4 603	21.000
15	20	ATV 71HD15N4 ATV 71WD15N4	26	26	1	VW3 A4 604	22.000
18.5	25	ATV 71HD18N4 ATV 71WD18N4	32	35	1	VW3 A4 605	34.000
22	30	ATV 71HD22N4 ATV 71WD22N4	38	43	1	VW3 A4 606	38.000
30	40	ATV 71HD30N4 ATV 71WD30N4	52	72	1	VW3 A4 607	56.000
37	50	ATV 71HD37N4 ATV 71WD37N4	63	72	1	VW3 A4 607	56.000
45	60	ATV 71HD45N4 ATV 71WD45N4	77	101	1	VW3 A4 608	69.000
55	75	ATV 71HD55N4 ATV 71WD55N4	91	101	1	VW3 A4 608	69.000
75	100	ATV 71HD75N4 ATV 71WD75N4	126	144	1	VW3 A4 609	97.000
THDI 10%							
90	125	ATV 71HD90N4	149	144	1	VW3 A4 609	97.000
110	150	ATV 71HC11N4	182	180	1	VW3 A4 610	103.000
132	200	ATV 71HC13N4	218	216	1	VW3 A4 611	112.000
160	250	ATV 71HC16N4	287	289	1	VW3 A4 612	135.000
200	300	ATV 71HC20N4	353.5	370	1	VW3 A4 613	155.000
220	350	ATV 71HC25N4	364	370	1	VW3 A4 613	155.000
250	400	ATV 71HC25N4	415	216	2	VW3 A4 611	112.000
280	450	ATV 71HC28N4	485	289	2	VW3 A4 612	135.000
315	500	ATV 71HC31N4	543	289	2	VW3 A4 612	135.000
355	–	ATV 71HC40N4	588	289	2	VW3 A4 612	135.000
400	600	ATV 71HC40N4	664	325	2	VW3 A4 619	155.000
500	700	ATV 71HC50N4	840	289	3	VW3 A4 612	135.000

(1) By adding a DC choke (see page 60289/2) to ATV 71●075N4...●D75N4 and ATV 71P●●●N4Z drives, we get a THD ≤10%.

This DC choke is supplied as standard with ATV 71HD90N4...HC50N4 drives.

These reduced current harmonics are obtained, only for the nominal filter current, on condition that the THDU is <2% and the RSCE >66%.

(2) In: nominal filter current.

Variable speed drives for asynchronous motors

Altivar 71: reduction of current harmonics
Option: passive filters

Passive filters: 3-phase power supply 400 V 50 Hz							
Motor rating		For drives	Line supply	Filter	Quantity per drive	Reference	Weight
kW	HP		Line current	In (2)			
			A	A			
THDI 10% (1)							
0.75	1	ATV 71H075N4 ATV 71W075N4 ATV 71P075N4Z	2.5	6	1	VW3 A4 621	21.000
1.5	2	ATV 71HU15N4 ATV 71WU15N4 ATV 71PU15N4Z	3.6	6	1	VW3 A4 621	21.000
2.2	3	ATV 71HU22N4 ATV 71WU22N4 ATV 71PU22N4Z	5	6	1	VW3 A4 621	21.000
3	–	ATV 71HU30N4 ATV 71WU30N4 ATV 71PU30N4Z	6	6	1	VW3 A4 621	21.000
4	5	ATV 71HU40N4 ATV 71WU40N4 ATV 71PU40N4Z	7.8	10	1	VW3 A4 622	27.000
5.5	7.5	ATV 71HU55N4 ATV 71WU55N4 ATV 71PU55N4Z	10	10	1	VW3 A4 622	27.000
7.5	10	ATV 71HU75N4 ATV 71WU75N4 ATV 71PU75N4Z	14	19	1	VW3 A4 623	28.000
11	15	ATV 71HD11N4 ATV 71WD11N4	19	19	1	VW3 A4 623	28.000
15	20	ATV 71HD15N4 ATV 71WD15N4	26	26	1	VW3 A4 624	40.000
18.5	25	ATV 71HD18N4 ATV 71WD18N4	32	35	1	VW3 A4 625	49.000
22	30	ATV 71HD22N4 ATV 71WD22N4	38	43	1	VW3 A4 626	52.000
30	40	ATV 71HD30N4 ATV 71WD30N4	52	72	1	VW3 A4 627	88.000
37	50	ATV 71HD37N4 ATV 71WD37N4	63	72	1	VW3 A4 627	88.000
45	60	ATV 71HD45N4 ATV 71WD45N4	77	101	1	VW3 A4 628	150.000
55	75	ATV 71HD55N4 ATV 71WD55N4	91	101	1	VW3 A4 628	150.000
75	100	ATV 71HD75N4 ATV 71WD75N4	126	144	1	VW3 A4 629	167.000
THDI 5%							
90	125	ATV 71HD90N4	149	144	1	VW3 A4 629	167.000
110	150	ATV 71HC11N4	182	180	1	VW3 A4 630	178.000
132	200	ATV 71HC13N4	218	216	1	VW3 A4 631	224.000
160	250	ATV 71HC16N4	287	289	1	VW3 A4 632	271.000
200	300	ATV 71HC20N4	353.5	370	1	VW3 A4 633	320.000
220	350	ATV 71HC25N4	364	370	1	VW3 A4 633	320.000
250	400	ATV 71HC25N4	415	216	2	VW3 A4 631	224.000
280	450	ATV 71HC28N4	485	289	2	VW3 A4 632	271.000
315	500	ATV 71HC31N4	543	289	2	VW3 A4 632	271.000
355	–	ATV 71HC40N4	588	289	2	VW3 A4 632	271.000
400	600	ATV 71HC40N4	664	325	2	VW3 A4 639	284.000
500	700	ATV 71HC50N4	840	289	3	VW3 A4 632	271.000

(1) By adding a DC choke (see page 60289/2) to ATV 71●075N4...●D75N4 and ATV 71P●●●N4Z drives, we get a THD ≤5%.

This DC choke is supplied as standard with ATV 71HD90N4...HC50N4 drives.

These reduced current harmonics are obtained, only for the nominal filter current, on condition that the THDU is <2% and the RSCE >66%.

(2) In: nominal filter current.

Variable speed drives for asynchronous motors

Altivar 71: reduction of current harmonics

Option: passive filters

Passive filters: 3-phase power supply 460 V 60 Hz							
Motor rating		For drives	Line supply	Filter	Quantity per drive	Reference	Weight
kW	HP		Line current	In (2)			
			A	A			
THDI 16% (1)							
0.75	1	ATV 71H075N4 ATV 71W075N4 ATV 71P075N4Z	2.5	6	1	VW3 A4 641	15.000
1.5	2	ATV 71HU15N4 ATV 71WU15N4 ATV 71PU15N4Z	3	6	1	VW3 A4 641	15.000
2.2	3	ATV 71HU22N4 ATV 71WU22N4 ATV 71PU22N4Z	5	6	1	VW3 A4 641	15.000
3	–	ATV 71HU30N4 ATV 71WU30N4 ATV 71PU30N4Z	6	6	1	VW3 A4 641	15.000
4	5	ATV 71HU40N4 ATV 71WU40N4 ATV 71PU40N4Z	7	10	1	VW3 A4 642	19.000
5.5	7.5	ATV 71HU55N4 ATV 71WU55N4 ATV 71PU55N4Z	10	10	1	VW3 A4 642	19.000
7.5	10	ATV 71HU75N4 ATV 71WU75N4 ATV 71PU75N4Z	13	19	1	VW3 A4 643	23.000
11	15	ATV 71HD11N4 ATV 71WD11N4	19	19	1	VW3 A4 643	23.000
15	20	ATV 71HD15N4 ATV 71WD15N4	24	26	1	VW3 A4 644	34.000
18.5	25	ATV 71HD18N4 ATV 71WD18N4	32	35	1	VW3 A4 645	42.000
22	30	ATV 71HD22N4 ATV 71WD22N4	35	35	1	VW3 A4 645	42.000
30	40	ATV 71HD30N4 ATV 71WD30N4	44	43	1	VW3 A4 646	45.000
37	50	ATV 71HD37N4 ATV 71WD37N4	58.7	72	1	VW3 A4 647	61.000
45	60	ATV 71HD45N4 ATV 71WD45N4	68	72	1	VW3 A4 647	61.000
55	75	ATV 71HD55N4 ATV 71WD55N4	82.6	101	1	VW3 A4 648	75.000
75	100	ATV 71 HD75N4 ATV 71 WD75N4	108	101	1	VW3 A4 648	75.000
THDI 10%							
90	125	ATV 71HD90N4	134	180	1	VW3 A4 649	107.000
110	150	ATV 71HC11N4	163	180	1	VW3 A4 649	107.000
132	200	ATV 71HC13N4	192	217	1	VW3 A4 656	119.000
160	250	ATV 71HC16N4	235	289	1	VW3 A4 650	145.000
200	300	ATV 71HC20N4	300	370	1	VW3 A4 651	185.000
220	350	ATV 71HC25N4	330	370	1	VW3 A4 651	185.000
250	400	ATV 71HC25N4	400	217	2	VW3 A4 656	119.000
280	450	ATV 71HC28N4	440	289	2	VW3 A4 650	145.000
315	500	ATV 71HC31N4	470	289	2	VW3 A4 650	145.000
355	–	ATV 71HC40N4	530	289	2	VW3 A4 650	145.000
400	600	ATV 71HC40N4	590	325	2	VW3 A4 657	165.000
500	700	ATV 71HC50N4	730	370	2	VW3 A4 651	185.000

(1) By adding a DC choke (see page 60289/2) to **ATV 71●075N4...●D75N4** and **ATV 71P●●●N4Z** drives, we get a THD ≤ 10%.
This DC choke is supplied as standard with **ATV 71HD90N4...HC50N4** drives.

These reduced current harmonics are obtained, only for the nominal filter current, on condition that the THDU is <2% and the RSCE >66%.

(2) In: nominal filter current.

Variable speed drives for asynchronous motors

Altivar 71: reduction of current harmonics
Option: passive filters

Passive filters: 3-phase power supply 460 V 60 Hz							
Motor rating		For drives	Line supply	Filter	Quantity per drive	Reference	Weight
kW	HP		Line current	In (2)			
			A	A			
			THDI 10% (1)				
0.75	1	ATV 71H075N4 ATV 71W075N4 ATV 71P075N4Z	2.5	6	1	VW3 A4 661	21.000
1.5	2	ATV 71HU15N4 ATV 71WU15N4 ATV 71PU15N4Z	3	6	1	VW3 A4 661	21.000
2.2	3	ATV 71HU22N4 ATV 71WU22N4 ATV 71PU22N4Z	4.2	6	1	VW3 A4 661	21.000
3	–	ATV 71HU30N4 ATV 71WU30N4 ATV 71PU30N4Z	6	6	1	VW3 A4 661	21.000
4	5	ATV 71HU40N4 ATV 71WU40N4 ATV 71PU40N4Z	7	10	1	VW3 A4 662	27.000
5.5	7.5	ATV 71HU55N4 ATV 71WU55N4 ATV 71PU55N4Z	10	10	1	VW3 A4 662	27.000
7.5	10	ATV 71HU75N4 ATV 71WU75N4 ATV 71PU75N4Z	13	19	1	VW3 A4 663	28.000
11	15	ATV 71HD11N4 ATV 71WD11N4	19	19	1	VW3 A4 663	28.000
15	20	ATV 71HD15N4 ATV 71WD15N4	24	26	1	VW3 A4 664	41.000
18.5	25	ATV 71HD18N4 ATV 71WD18N4	32	35	1	VW3 A4 665	49.000
22	30	ATV 71HD22N4 ATV 71WD22N4	35	35	1	VW3 A4 665	49.000
30	40	ATV 71HD30N4 ATV 71WD30N4	44	43	1	VW3 A4 666	56.000
37	50	ATV 71HD37N4 ATV 71WD37N4	58.7	72	1	VW3 A4 667	80.000
45	60	ATV 71HD45N4 ATV 71WD45N4	68	72	1	VW3 A4 668	98.000
55	75	ATV 71HD55N4 ATV 71WD55N4	82.6	101	1	VW3 A4 668	98.000
75	100	ATV 71HD75N4 ATV 71WD75N4	108	101	1	VW3 A4 668	98.000
			THDI 5%				
90	125	ATV 71HD90N4	134	180	1	VW3 A4 669	151.000
110	150	ATV 71HC11N4	163	180	1	VW3 A4 669	151.000
132	200	ATV 71HC13N4	192	217	1	VW3 A4 676	171.000
160	250	ATV 71HC16N4	235	289	1	VW3 A4 670	215.000
200	300	ATV 71HC20N4	300	370	1	VW3 A4 671	250.000
220	350	ATV 71HC25N4	330	370	1	VW3 A4 671	250.000
250	400	ATV 71HC25N4	400	217	2	VW3 A4 676	171.000
280	450	ATV 71HC28N4	440	289	2	VW3 A4 670	215.000
315	500	ATV 71HC31N4	470	289	2	VW3 A4 670	215.000
355	–	ATV 71HC40N4	530	289	2	VW3 A4 670	215.000
400	600	ATV 71HC40N4	590	325	2	VW3 A4 677	240.000
500	700	ATV 71HC50N4	730	370	2	VW3 A4 671	250.000

(1) By adding a DC choke (see page 60289/2) to ATV 71●075N4...●D75N4 and ATV 71P●●●N4Z drives, we get a THD ≤5%.

This DC choke is supplied as standard with ATV 71HD90N4...HC50N4 drives.

These reduced current harmonics are obtained, only for the nominal filter current, on condition that the THDU is <2% and the RSCE >66%.

(2) In: nominal filter current.