

Variable speed drives

Altivar 32

Drives



ATV 32H018M2...H075M2
ATV 32H037N4...HU15N4



ATV 32HU11M2...HU22M2
ATV 32HU22N4...HU40N4



ATV 32HU55N4, HU75N4
EMC plate not mounted



ATV 32HD11N4, HD15N4
EMC plate not mounted

Drives (frequency range from 0.1 to 599 Hz)											
Motor		Line supply				Altivar 32			Reference	Weight	
Power indicated on rating plate	kW	HP	Max. line current (1), (2)		Apparent power	Max. prospective line Isc (3)	Max. continuous output current (In) (4)	Maximum transient current for 60 s	Power dissipated at maximum output current (In) (4)	kg	
			at U1	at U2	at U2	at U2	at U2	at U2			
			A	A	kVA	kA	A	A	W		
Single-phase supply voltage: 200...240 V 50/60 Hz, with integrated EMC filter (2) (5) (6)											
0.18	1/4		3.4	2.8	0.7	1	1.5	2.3	25	ATV 32H018M2	2.400
0.37	1/2		6	5	1.2	1	3.3	5	38	ATV 32H037M2	2.400
0.55	3/4		7.9	6.7	1.6	1	3.7	5.6	42	ATV 32H055M2	2.400
0.75	1		10.1	8.5	2	1	4.8	7.2	51	ATV 32H075M2	2.400
1.1	1 1/2		13.6	11.5	2.8	1	6.9	10.4	64	ATV 32HU11M2	2.900
1.5	2		17.6	14.8	3.6	1	8	12	81	ATV 32HU15M2	2.900
2.2	3		23.9	20.1	4.8	1	11	16.5	102	ATV 32HU22M2	2.900
Three-phase supply voltage: 380...500 V 50/60 Hz, with integrated EMC filter (2) (5) (6)											
0.37	1/2		2.1	1.6	1.4	5	1.5	2.3	27	ATV 32H037N4	2.500
0.55	3/4		2.8	2.2	1.9	5	1.9	2.9	31	ATV 32H055N4	2.500
0.75	1		3.6	2.7	2.3	5	2.3	3.5	37	ATV 32H075N4	2.500
1.1	1 1/2		5	3.8	3.3	5	3	4.5	50	ATV 32HU11N4	2.500
1.5	2		6.5	4.9	4.2	5	4.1	6.2	63	ATV 32HU15N4	2.500
2.2	3		8.7	6.6	5.7	5	5.5	8.3	78	ATV 32HU22N4	3.000
3	–		11.1	8.4	7.3	5	7.1	10.7	100	ATV 32HU30N4	3.000
4	5		13.7	10.5	9.1	5	9.5	14.3	125	ATV 32HU40N4	3.000
5.5	7 1/2		20.7	14.5	17.9	22	14.3	21.5	233	ATV 32HU55N4	7.500
7.5	10		26.5	18.7	22.9	22	17	25.5	263	ATV 32HU75N4	7.500
11	15		36.6	25.6	31.7	22	27.7	41.6	403	ATV 32HD11N4	8.700
15	20		47.3	33.3	41	22	33	49.5	480	ATV 32HD15N4	8.800

Dimensions (overall)		
Drives	L x H x D	
	EMC plate mounted	EMC plate not mounted
	mm	mm
ATV 32H018M2...H075M2, ATV 32H037N4...HU15N4	45 x 317 x 245	– (6)
ATV 32HU11M2...HU22M2, ATV 32HU22N4...HU40N4	60 x 317 x 245	– (6)
ATV 32HU55N4, HU75N4	150 x 308 x 232	150 x 232 x 232
ATV 32HD11N4, HD15N4	180 x 404 x 232	180 x 330 x 232

(1) Typical value for a 4-pole motor and a maximum switching frequency of 4 kHz, with no line choke for max. prospective line Isc (3).
 (2) Nominal supply voltage, min. U1, max. U2: 200 (U1)...240 V (U2), 380 (U1)...500 V (U2).
 (3) If line Isc is greater than the values in the table, add line chokes (see page 60471/8).
 (4) These values are given for a nominal switching frequency of 4 kHz, for use in continuous operation. The switching frequency is adjustable from 2 to 16 kHz. Above 4 kHz, derate the nominal drive current. The nominal motor current should not exceed this value. See the derating curves on our website www.schneider-electric.com.
 (5) Drives supplied with category C2 integrated EMC filter. This filter can be disconnected.
 (6) Connection in compliance with EMC standards:
 - ATV 32H●●M2, ATV 32H037N4...HU40N4 drives are supplied with an EMC plate. This is an integral part of the power terminals; these 2 components cannot be separated.
 - ATV 32HU55N4...HD15N4 drives are supplied with an EMC plate, for assembly by the customer.

PF095123



ATV 32HU15N4 with control module mounted at 90°

Accessories

Components for mounting GV2 circuit-breaker directly on ATV 32 drive

Description	For drives	Sold in lots of	Unit reference	Weight kg
Bracket for GV2/ATV 32 direct mounting Mechanical bracket for holding the GV2 circuit-breaker in place when directly mounted on ATV 32 drive. Requires a GV2 AF4 adaptor plate for electrical connection, to be ordered separately.	ATV 32H●●●M2 ATV 32H037N4...HU40N4	10	VW3 A9 921	0.075
Adaptor plate Provides the electrical link between the GV2 circuit-breaker and ATV 32 drive when GV2/ATV 32 directly mounted. Requires a VW3 A9 921 bracket for direct mounting, to be ordered separately.	ATV 32H●●●M2 ATV 32H037N4...HU40N4	10	GV2 AF4	0.016

Mounting the control module at 90°

Description	For drives	Reference	Weight kg
Adaptor for mounting the control module at 90° This is used to mount the power module on the side, keeping the control module visible and accessible	ATV 32H●●●M2 ATV 32H037N4...HU40N4	VW3 A9 920	0.125

Daisy Chain connection of the DC bus (1)

The DC bus is connected in a Daisy Chain in the following cases:

- Drives powered by the AC supply with parallel connection of the DC bus in order to balance the loads during braking phases between the drives; used in addition to braking resistors (see page 60471/7)
- Drives powered by the DC bus only

Requires the cordsets listed below:

Description	Use	From		To	Length m	Reference	Weight kg
		From	To				
Daisy chain DC bus cordsets (1)	Fitted with 2 connectors	ATV 32H●●●M2	ATV 32H●●●M2	ATV 32H037N4...HU40N4	0.18	VW3 M7 101 R01	–
	Fitted with one connector and flying leads at one end	ATV 32H037N4...HU40N4	ATV 32HU55N4...HD15N4		1.5	VW3 M7 102 R15	–
	Fitted with 2 connectors	ATV 32H●●●M2 ATV 32H●●●N4	LEX 32●●●M2 (2) LEX 32●●●N4 (2)		0.65	VW3 M7 101 R06	–

Documentation

Description	Reference	Weight kg
"Description of the Motion & Drives offer" DVD-ROM Comprises (3): ■ Technical documentation (programming manuals, installation manuals, quick reference guides) ■ Catalogues ■ Brochures	VW3 A8 200	0.100

(1) Setting up several devices on the DC bus requires special precautions, please refer to the installation manual which is available on our website at www.schneider-electric.com.

(2) Lexium 32 motion control offer. See page 0618Q/2 and please refer to our "Lexium 32 motion control" catalogue.

(3) The contents of this DVD-ROM are also available on our website www.schneider-electric.com.

PF095121



ATV 32H●●●M2 connected with a Daisy Chain DC bus cordset



Remote display terminal with cover open



Remote display terminal with cover closed



Remote graphic display terminal

Remote display terminal

This terminal is used to locate the Human-Machine Interface of the Altivar 32 drive remotely on the door of an enclosure with IP 54 or IP 65 protection.

It is used to:

- Control, adjust and configure the drive remotely
 - Display the drive status and faults remotely
- Its maximum operating temperature is 50°C.

Description

- 1 4-digit display
- 2 Navigation ▲, ▼ and selection ENT, ESC keys
- 3 Motor local control keys:
 - RUN: Starts the motor
 - FWD/REV: Reverses the direction of rotation of the motor
 - STOP/RESET : Stops the motor/resets drive faults
- 4 Operating mode selection key MODE
- 5 Cover controlling access to the motor local control keys

References

Designation	Degree of protection	Length	Reference	Weight
				kg
Remote display terminals	IP 54	–	VW3 A1 006	0.250
A remote-mounting cordset	IP 65	–	VW3 A1 007	0.275
Remote-mounting cordsets		1	VW3 A1 104 R10	0.050
fitted with 2 RJ45 connectors		3	VW3 A1 104 R30	0.150

Remote graphic display terminal

This graphic display terminal, common to all Schneider Electric's variable speed drive ranges, provides a user-friendly interface for configuration, debugging and maintenance. In particular, it is possible to transfer and store up to 4 configurations. For portable use or mounted on an enclosure door, it can also be connected to a number of drives (see page 60471/5).

Its main functions are as follows:

- The graphic screen displays 8 lines of 24 characters of plain text.
- The navigation button provides quick and easy access to the drop-down menus.
- It is supplied with six languages installed (Chinese, English, French, German, Italian and Spanish). The available languages can be modified using the Multi-Loader configuration tool (VW3 A8 121).

Its maximum operating temperature is 60°C, and it features IP 54 protection; this can be increased to IP 65 when mounted on an enclosure door.

Description

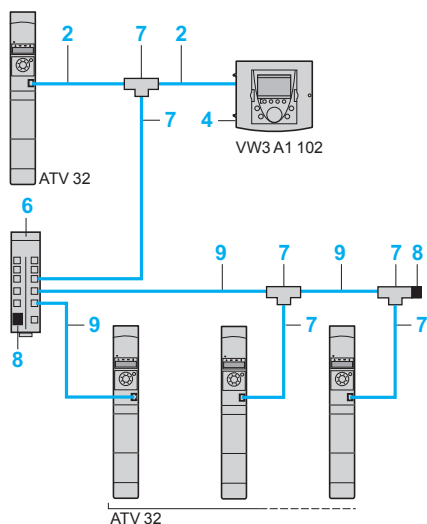
- 6 Graphic display:
 - 8 lines of 24 characters, 240 x 160 pixels, large digit display
- 7 Function keys (not operational on the Altivar 32)
- 8 Navigation button:
 - Rotate ±: Goes to the next/previous line, increases/decreases the value
 - Press: Saves the current value (ENT)
- ESC key: Aborts a value, a parameter or a menu to return to the previous selection
- 9 Motor local control keys:
 - RUN: Starts the motor
 - STOP/RESET : Stops the motor/resets drive faults
 - FWD/REV: Reverses the motor direction of rotation



Portable use of the portable graphic display terminal: 1 + 2 + 3



Using the graphic terminal on enclosure door: 1 + 2 + 4 (+ 5, if IP 65)



Example of connection via multidrop link

Remote graphic display terminal (continued)

Accessories for mounting the graphic display terminal remotely

Description	Item no.	Length m	Reference	Weight kg
Remote graphic display terminal A remote-mounting cordset VW3 A1 104 R●●● and an RJ45 adaptor VW3 A1 105 must be provided	1	–	VW3 A1 101	0.180
Remote-mounting cordsets fitted with 2 RJ45 connectors For remote mounting of the Altivar 71 drive and graphic display terminal VW3 A1 101	2	1	VW3 A1 104 R10	0.050
	3	3	VW3 A1 104 R30	0.150
	5	5	VW3 A1 104 R50	0.250
	10	10	VW3 A1 104 R100	0.500
Female/female RJ45 adaptor	3	–	VW3 A1 105	0.010
Remote mounting kit For mounting on enclosure door IP 54 degree of protection	4	–	VW3 A1 102	0.150
Door Used to increase the degree of protection for remote mounting kit VW3 A1 102 to IP 65 To be mounted on remote mounting kit VW3 A1 102	5	–	VW3 A1 103	0.040

Additional accessories for multidrop connection

Description	Item no.	Sold in lots of	Unit reference	Weight kg
Modbus splitter box 10 RJ45 connectors and 1 screw terminal block	6	–	LU9 GC3	0.500
Modbus T-junction boxes	7	–	VW3 A8 306 TF03	–
	7	–	VW3 A8 306 TF10	–
Modbus line terminator For RJ45 connector	8	2	VW3 A8 306 RC	0.010

Description	Item no.	Length m	Reference	Weight kg
Cordsets for Modbus serial link equipped with 2 RJ45 connectors	9	0.3	VW3 A8 306 R03	0.025
	1	1	VW3 A8 306 R10	0.060
	3	3	VW3 A8 306 R30	0.130

Example of connection via multidrop link

All the components described on this page enable a graphic display terminal to be connected to several drives via a multidrop link. This multidrop link is connected to the RJ45 port on the Modbus/CANopen communication port. See the example opposite.



Configuration with SoMove Mobile software for mobile phones via Bluetooth®



VW3 A8 121



VW3 A8 120



Configuring an Altivar 32 in its packaging:
VW3 A8 121 + VW3 A8 126 cordset

SoMove Mobile software for mobile phones (1)

The SoMove Mobile software "transforms" any compatible mobile phone (1) into a remote graphic display terminal by offering an identical Human-Machine Interface (see page 60471/4).

Particularly suitable for on-site or remote maintenance operations, the SoMove Mobile software can be used to print out and save configurations, import them from a PC and export them to a PC, or a drive, equipped with Bluetooth®.

The SoMove Mobile software and drive configuration files can be downloaded from our website www.schneider-electric.com.

References

Description	For drives	Reference	Weight kg
SoMove Mobile software for mobile phones (1) Can be downloaded from our website www.schneider-electric.com .	ATV 32H●●●●●	–	–

SoMove setup software

SoMove lite setup software for PC is used to prepare drive configuration files.

For presentation, description and references, see page 60205/2.

Simple Loader and Multi-Loader configuration tools

The Simple Loader tool enables one powered-up drive's configuration to be duplicated on another powered-up drive. It is connected to the drive's RJ45 communication port.

The Multi-Loader tool enables a number of configurations from a PC or drive to be copied and loaded onto another drive; the Altivar 32 drives do not need to be powered up.

References

Description	For drives	Reference	Weight kg
Simple Loader configuration tool Supplied with a cordset fitted with 2 RJ45 connectors.	ATV 32H●●●●●	VW3 A8 120	–
Multi-Loader configuration tool Supplied with: - 1 cordset fitted with 2 RJ45 connectors - 1 cordset fitted with one type A USB connector and one mini B USB connector - 1 x SD memory card - 1 x female/female RJ 45 adaptor - 4 AA/LR6 1.5 V batteries - 1 anti-shock protection - 1 carrying handle	ATV 32H●●●●●	VW3 A8 121	–
Cordset for Multi-Loader tool For connecting the Multi-Loader tool to the Altivar 32 drive in its packaging. Fitted with a non-locking RJ45 connector with special mechanical catch on the drive end and an RJ45 connector on the Multi-Loader end.	ATV 32H●●●●● in its packaging	VW3 A8 126	–

(1) SoMove Mobile software requires a mobile phone with minimum features; please consult our website www.schneider-electric.com.

Presentation

The braking resistor enables the Altivar 32 drive to operate while braking to a standstill or during slowdown braking, by dissipating the braking energy. It enables maximum transient braking torque.

Depending on the drive rating, two types of resistor are available:

- Enclosed model (IP 20 casing) designed to comply with the EMC standard and protected by a temperature-controlled switch or thermal overload relay.
- Enclosed model (IP 65 casing) with cordset, for ATV 32H●●●M2 and ATV 32H037N4...HU75N4 drives.

Note: To optimize the size of the braking resistor, the DC buses on Altivar 32 drives in the same application can be connected in parallel (see 60471/3).

Applications

Machines with high inertia, driving loads and machines with fast cycles.

References

For drives	Minimum value of the resistor to be connected	Ohmic value	Average power available at 50°C (1)	Length of connection cable	Reference	Weight
	Ω	Ω	W	m		kg
IP 65 braking resistors						
ATV 32H018M2...H075M2	40	100	25	0.75	VW3 A7 608 R07	0.410
ATV 32H037...H075N4	80			3	VW3 A7 608 R30	0.760
ATV 32HU11N4...HU22N4	54					
ATV 32HU11M2, HU15M2	27	72	25	0.75	VW3 A7 605 R07	0.620
				3	VW3 A7 605 R30	0.850
ATV 32HU22M2	25	27	50	0.75	VW3 A7 603 R07	0.930
				3	VW3 A7 603 R30	1.200
ATV 32HU30N4	54	72	50	0.75	VW3 A7 606 R07	0.930
ATV 32HU40N4	36			3	VW3 A7 606 R30	1.200
ATV 32HU55N4, HU75N4	27	27	100	0.75	VW3 A7 604 R07	1.420
				3	VW3 A7 604 R30	1.620
IP 20 braking resistors						
ATV 32H018M2...H075M2	40	100	50	–	VW3 A7 701	2.000
ATV 32HU11M2, HU15M2	27					
ATV 32H037N4...H075N4	80					
ATV 32HU11N4...HU30N4	54					
ATV 32HU40N4	36					
ATV 32HU22M2	25	60	100	–	VW3 A7 702	2.400
ATV 32HU55N4, HU75N4	27					
ATV 32HD11N4, HD15N4	16	28	200	–	VW3 A7 703	3.500

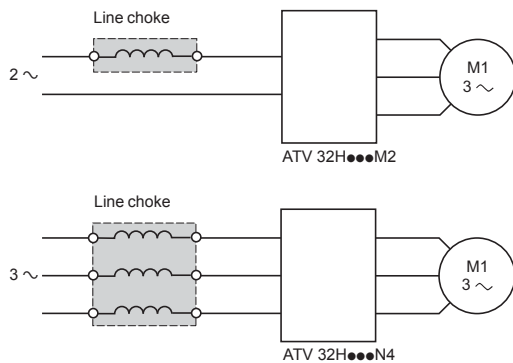
(1) Load factor for resistors: the value of the average power that can be dissipated at 50°C from the resistor into the casing is determined for a load factor during braking that corresponds to the majority of normal applications:
 - 2 s braking with a 0.6 Tn braking torque for a 40 s cycle
 - 0.8 s braking with a 1.5 Tn braking torque for a 40 s cycle



VW3 A7 608 R●●



VW3 A7 701



Presentation

Line chokes provide improved protection against overvoltages on the line supply and reduce harmonic distortion of the current produced by the drive.

The recommended chokes limit the line current. They have been developed in line with standard IEC 61800-5-1 (VDE 0160 level 1 high-energy overvoltages on the line supply).

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

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

- Line supply with significant disturbance from other equipment (interference, overvoltages)
- Line supply with voltage imbalance between phases > 1.8% of 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 inverters on the same line
- Reduction of overloads on the $\cos \phi$ correction capacitors, if the installation includes a power factor correction unit

The prospective short-circuit current at the point of connection of the drive must not exceed the maximum value indicated in the reference tables (see page 60471/2). The use of chokes allows connection to the following line supplies:

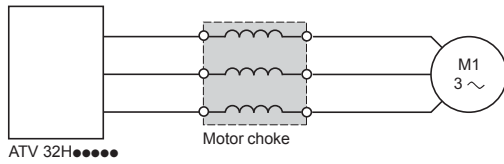
- Max. I_{sc} 22 kA for 200/240 V
- Max. I_{sc} 65 kA for 380/500 V

References

Drive Reference	Line current				Choke Reference	Weight kg
	without choke		with choke			
	U min. (1) A	U max. (1) A	U min. (1) A	U max. (1) A		
Single-phase supply voltage: 200...240 V 50/60 Hz						
ATV 32H018M2	3.0	2.5	2.1	1.8	VZ1 L004M010	0.630
ATV 32H037M2	5.3	4.4	3.9	3.3		
ATV 32H055M2	6.8	5.8	5.2	4.3	VZ1 L007UM50	0.880
ATV 32H075M2	8.9	7.5	7.0	5.9		
ATV 32HU11M2	12.1	10.2	10.2	8.6	VZ1 L018UM20	1.990
ATV 32HU15M2	15.8	13.3	13.4	11.4		
ATV 32HU22M2	21.9	18.4	19.2	16.1		
Three-phase supply voltage: 380...500 V 50/60 Hz						
ATV 32H037N4	2.2	1.7	1.1	0.9	VW3 A4 551	1.500
ATV 32H055N4	2.8	2.2	1.4	1.2		
ATV 32H075N4	3.6	2.7	1.8	1.5		
ATV 32HU11N4	4.9	3.7	2.6	2		
ATV 32HU15N4	6.4	4.8	3.4	2.6		
ATV 32HU22N4	8.9	6.7	5	4.1	VW3 A4 552	3.000
ATV 32HU30N4	10.9	8.3	6.5	5.2		
ATV 32HU40N4	13.9	10.6	8.5	6.6		
ATV 32HU55N4	21.9	16.5	11.7	9.3	VW3 A4 553	3.500
ATV 32HU75N4	27.7	21	15.4	12.1		
ATV 32HD11N4	37.2	28.4	22.5	18.1	VW3 A4 554	6.000
ATV 32HD15N4	48.2	36.8	29.6	23.3		

(1) Nominal supply voltage:

For drives	Nominal voltage	
	U min.	U max.
ATV 32H...M2	200	240
ATV 32H...N4	380	500



Presentation

Motor chokes can be inserted between the Altivar 32 drive and the motor to:

- Limit the dv/dt at the motor terminals (500 to 1500 V/μs), for cables longer than 50 m
- Filter interference caused by opening of a contactor placed between the filter and the motor
- Reduce the motor earth leakage current
- Minimizing the current wave, thus reducing motor noise

References (1)

For drives	Losses	Cable length (2)		Nominal current	Reference	Weight
		Shielded cable	Unshielded cable			
	W	m	m	A		kg
Single-phase supply voltage: 200...240 V 50/60 Hz						
ATV 32HU22M2	75	≤ 100	≤ 200	16	VW3 A4 553	3.500
Three-phase supply voltage: 380...500 V 50/60 Hz						
ATV 32HU22N4... HU40N4	65	≤ 100	≤ 200	10	VW3 A4 552	3.000
ATV 32HU55N4	75	≤ 100	≤ 200	16	VW3 A4 553	3.500
ATV 32HU75N4, HD11N4	90	≤ 100	≤ 200	30	VW3 A4 554	6.000
ATV 32HD15N4	80	≤ 100	≤ 200	60	VW3 A4 555	11.000

(1) For ATV 32H018M2...HU15M2 and ATV 32H037N4...HU15N4 drives, contact our Customer Care Centre.

(2) For an application with several motors connected in parallel, the cable length must take account of all the tap links. If a cable longer than that recommended is used, the filters may overheat.

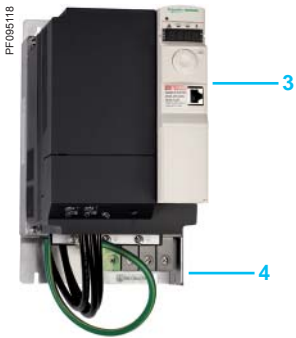
Variable speed drives

Altivar 32

Integrated EMC filters and additional EMC input filters



VW3 A4 422 + ATV 32HU11N4



VW3 A4 424 + ATV 32HU55N4

Presentation

Integrated filters

The Altivar 32 drive has integrated radio interference input filters to comply with the EMC (Electromagnetic Compatibility) standard for variable speed electrical power drive products IEC 61800-3 category C2 and the European EMC Directive.

Additional EMC input filters

The additional EMC input filters enable the drives to meet more stringent requirements; they are designed to reduce conducted emissions on the line supply below the limits of standard IEC 61800-3 category C1 or C2 (see page 60471/11).

Mounting

Depending on the model, the additional EMC filters can be mounted beside or underneath the drive.

They act as a support for the drives and are attached to them via tapped holes.

Mounting the filter on the side of the drive:

- 1 ATV 32H●●●M2, ATV 32H037N4...HU40N4 drives
- 2 Additional EMC input filters

Mounting the filter underneath the drive:

- 3 ATV 32HU55N4...HD15N4 drives
- 4 Additional EMC input filters

Use according to the type of line supply

Additional EMC filters can only be used on TN (neutral connection) and TT (neutral to earth) type systems.

Standard IEC 61800-3, appendix D2.1, states that on IT systems (isolated or impedance earthed neutral), filters can cause permanent insulation monitors to operate in a random manner.

The effectiveness of additional filters on this type of system depends on the type of impedance between neutral and earth, and therefore cannot be predicted.

In the case of a machine which needs to be installed on an IT network, the solution would be to insert an isolation transformer and place the machine locally on a TN or TT network.

The radio interference input filters integrated in Altivar 32 drives can easily be disconnected by means of a selector switch without removing the drive.

PF095115



VW3 A4 422

PF085117



VW3 A4 424

Additional EMC input filters

For drives	Additional EMC input filter						Weight
Reference	Maximum length of shielded cable (1)	In (2)	Losses (3)	Mounting the filter/ATV 32	Reference		kg
	IEC 61800-3 (4)						
	Category C2	Category C1	A	W			
	m	m					
Single-phase supply voltage: 200...240 V 50/60 Hz							
ATV 32H018M2 ATV 32H037M2 ATV 32H055M2 ATV 32H075M2	50	20	10.1	3.7	On the side	VW3 A4 420	0.600
ATV 32HU11M2 ATV 32HU15M2	50	20	17.6	6.9	On the side	VW3 A4 421	0.775
ATV 32HU22M2	50	20	23.9	7.5	On the side	VW3 A4 426	1.130
Three-phase supply voltage: 380...500 V 50/60 Hz							
ATV 32H037N4 ATV 32H055N4 ATV 32H075N4 ATV 32HU11N4 ATV 32HU15N4	50	20	15	9.9	On the side	VW3 A4 422	0.900
ATV 32HU22N4 ATV 32HU30N4 ATV 32HU40N4	50	20	25	15.8	On the side	VW3 A4 423	1.350
ATV 32HU55N4 ATV 32HU75N4	50	20	47	19.3	Underneath	VW3 A4 424	3.150
ATV 32HD11N4 ATV 32HD15N4	50	20	49	27.4	Underneath	VW3 A4 425	4.750

(1) The filter selection tables give the maximum lengths for shielded cables connecting motors to drives. These maximum lengths are given as examples only, as they vary depending on the stray capacitance of the motors and the cables used. If motors are connected in parallel, it is the sum of the cable lengths that should be taken into account.

(2) In: nominal filter current.

(3) Via heat dissipation, at the nominal filter current (In).

(4) Standard IEC 61800-3: EMC immunity and conducted and radiated EMC emissions:

- Category C1: public power supply (residential)

- Category C2: industrial power supply