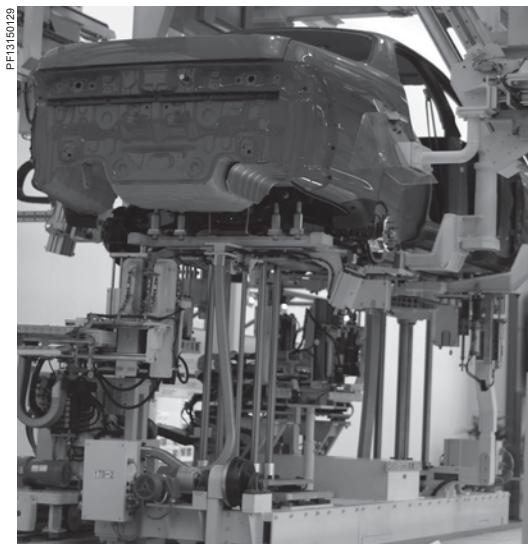




Application: packaging



Application: material handling

Presentation

The Altivar 312 drive is a frequency inverter for 200...600 V three-phase asynchronous motors from 0.18 to 15 kW.

The Altivar 312 drive is robust, compact and easy to install. Its integrated functions are particularly suitable for the requirements of applications involving simple industrial machines.

By taking account of constraints on product setup and use right from the design stage, we are able to offer a reliable, cost-effective solution to manufacturers of simple machines and installers.

With its various communication cards that are available as options, the Altivar 312 drive integrates perfectly in the main control system architectures.

Examples of solutions provided:

- Numerous options for loading, editing and saving drive configurations using various tools, such as the SoMove setup software, the SoMove Mobile software for mobile phones, remote display terminals and the Simple Loader and Multi-Loader configuration tools.
- Adaptation to industrial communication buses and networks by simply replacing the drive control I/O card with one of the communication cards
- User interface identical to the Altivar 12 range of variable speed drives, making setup easy and enabling those using it to adapt quickly.

Applications

The Altivar 312 drive incorporates functions that are suitable for the most common applications, including:

- Material handling (small conveyors, hoists, etc.)
- Packing and packaging machines (small bagging machines, labelling machines, etc.)
- Special machines (mixers, kneaders, textile machines, etc.)
- Pumps, compressors, fans

Functions

The Altivar 312 drive has six logic inputs, three analog inputs, one logic/analog output and two relay outputs.

The main functions available are as follows:

- Motor and drive protection
- Linear, S, U or customized acceleration and deceleration ramps
- Local control of the speed reference using the navigation button
- +/- speed
- 16 preset speeds
- PI regulator and references
- 2-wire/3-wire control
- Brake sequence
- Automatic catching a spinning load with speed detection and automatic restart
- Fault configuration and stop type configuration
- Saving the configuration in the drive

Several functions can be assigned to one logic input.

An optimized offer

The Altivar 312 range of variable speed drives covers motor power ratings from 0.18 kW to 15 kW with four types of power supply:

- 200 V...240 V single-phase, 0.18 kW to 2.2 kW (ATV 312H●●●M2)
- 200 V...240 V three-phase, 0.18 kW to 15 kW (ATV 312H●●●M3)
- 380 V...500 V three-phase, 0.37 kW to 15 kW (ATV 312H●●●N4)
- 525 V...600 V three-phase, 0.75 kW to 15 kW (ATV 312H●●●S6)

Several drives can be mounted side by side to save space.

The Altivar 312 drive integrates the Modbus and CANopen communication protocols as standard. The protocols can be accessed via the RJ45 connector on the underside of the drive.

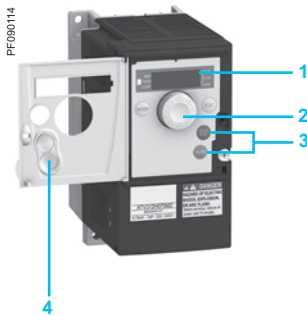
In addition to the Modbus and CANopen protocols that can be accessed as standard, the Altivar 312 drive can be connected to the main industrial communication buses and networks by replacing the drive's control I/O card with one of the communication cards that are available as options: CANopen Daisy chain, DeviceNet and PROFIBUS DP. The Modbus TCP network and the Fipio bus are also accessible via dedicated gateways.

See page 24.



ATV 312H037M3

ATV 312HD15N4



ATV 312H075M2
front panel door open



Remote display
terminal with cover closed



Remote display terminal with
cover open: RUN, FWD/REV
and STOP/RESET keys
accessible



Remote graphic display
terminal



Multi-Loader
configuration tool



Simple Loader
configuration tool

An optimized offer (continued)

The entire range complies with international standards IEC 61800-5-1, IEC 61800-2 and IEC 61800-3, and UL, CSA, C-Tick, NOM and GOST certifications. It has been developed to meet the requirements of environmental directives (RoHS) and those of the European Directives to obtain the CE mark.

EMC electromagnetic compatibility

The incorporation of EMC filters in **ATV 312H●●●M2** and **ATV 312H●●●N4** drives and compliance with EMC requirements simplify installation and provide a very economical means of ensuring devices meet the criteria to receive the CE mark. This filter can be disconnected via a jumper or a moveable wire with tag. The **ATV 312H●●●M3** and **ATV 312H●●●S6** drives are designed without an EMC filter.

Filters are available as an option and can be installed by the customer to reduce the emission levels of **ATV 312H●●●M2**, **ATV 312H●●●M3** and **ATV 312H●●●N4** drives. See page 38.

External accessories and options

External accessories and options can be used with Altivar 312 drives:

- UL Type 1 conformity kits, plates for direct mounting on 35 mm \square rails, etc.
- Braking resistors, line chokes, additional EMC input filters, output filters, etc.

Dialogue and configuration tools

Human-Machine interface

The 4-digit display **1** displays drive states, faults and parameter values.

The navigation button **2** is used to move around the menus, modify values and change the motor speed in local mode.

The RUN and STOP/RESET keys **3** are used to control motor starting and stopping in local mode. These two keys can be made accessible on the front panel by removing the cover **4** from the door.

HMI terminals

The Altivar 312 drive can be connected to a remote display terminal or a remote graphic display terminal, which are available as options.

The remote display terminal can be mounted on an enclosure door with IP 54 or IP 65 degree of protection. It provides access to the same functions as the Human-Machine interface.

The remote graphic display terminal, with its "full text" display in the user's language, provides a user-friendly interface for configuration, debugging or maintenance. See page 30.

SoMove setup software

The SoMove setup software is used to configure, adjust and debug the Altivar 312 drive with the Oscilloscope function, and also for maintenance of this drive, like all other Schneider Electric drives and starters.

It can be used with a direct connection or a Bluetooth® wireless connection. See page 31.

SoMove Mobile software for mobile phones

The SoMove Mobile software is used to edit the drive parameters from a mobile phone via a Bluetooth® wireless connection.

It can also be used to save configurations. These configurations can be imported or exported from a PC via a Bluetooth® wireless connection.


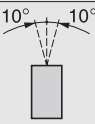
See page 31.

Simple Loader and Multi-Loader tools

The Simple Loader tool enables one powered-up drive's configuration to be duplicated on another powered-up drive.

The Multi-Loader tool enables configurations to be copied from a PC or a powered-up drive and duplicated on another powered-up drive.

See page 31.

Environmental characteristics			
Conformity to standards			Altivar 312 drives have been developed to conform to the strictest international standards and the recommendations relating to electrical industrial control devices (IEC), in particular: IEC 61800-5-1 (low voltage), IEC 61800-3 (EMC immunity and conducted and radiated EMC emissions).
EMC immunity			IEC 61800-3, Environments 1 and 2 (EMC requirement and specific test methods) IEC 61000-4-2 level 3 (electrostatic discharge immunity test) IEC 61000-4-3 level 3 (radio-frequency radiated electromagnetic field immunity test) IEC 61000-4-4 level 4 (electrical fast transient/burst immunity test) IEC 61000-4-5 level 3 (surge immunity test)
Conducted and radiated EMC emissions for drives	ATV 312H●●●●●		IEC 61800-3, Environments: 2 (industrial power supply) and 1 (public power supply), restricted distribution
	ATV 312H018M2...HU15M2 ATV 312H037N4...HU40N4		IEC 61800-3 category C2 With additional EMC filter (1): ■ IEC 61800-3 category C1
	ATV 312HU22M2, ATV 312HU55N4...HD15N4		IEC 61800-3 category C3 With additional EMC filter (1): ■ IEC 61800-3 category C2 ■ IEC 61800-3 category C1
	ATV 312H018M3...HD15M3		With additional EMC filter (1): ■ IEC 61800-3 category C2
CE marking			The drives are marked CE in accordance with the European low voltage (2006/95/EC) and EMC (2004/108/EC) directives
Product certification			UL, CSA, NOM, GOST and C-Tick
Degree of protection			IP 31 and IP 41 on upper part and IP 21 on connection terminals
Vibration resistance	Drive not mounted on  rail		Conforming to IEC 60068-2-6: 1.5 mm peak to peak from 3 to 13 Hz, 1 gn from 13 to 150 Hz
Shock resistance			15 gn for 11 ms conforming to IEC 60068-2-27
Maximum ambient pollution Definition of insulation			Degree 2 conforming to IEC 61800-5-1
Environmental conditions Use			IEC 60721-3-3 classes 3C2 and 3S2
Relative humidity		%	5...95 non condensing, no dripping water, conforming to IEC 60068-2-3
Ambient air temperature around the device	Operation	°C	- 10...+ 50 without derating - 10...+ 60 with derating removing the protective cover on top of the drive (see derating curves, page 50)
	Storage	°C	- 25...+ 70
Maximum operating altitude	ATV 312H●●●●●	m	1000 without derating
	ATV 312H●●●M2	m	Up to 2000 for single-phase supplies and corner grounded distribution networks, derating the current by 1% for each additional 100 m
	ATV 312H●●●M3 ATV 312H●●●N4 ATV 312H●●●S6	m	Up to 3000 metres for three-phase supplies, derating the current by 1% for each additional 100 m
Operating position Maximum permanent angle in relation to the normal vertical mounting position			

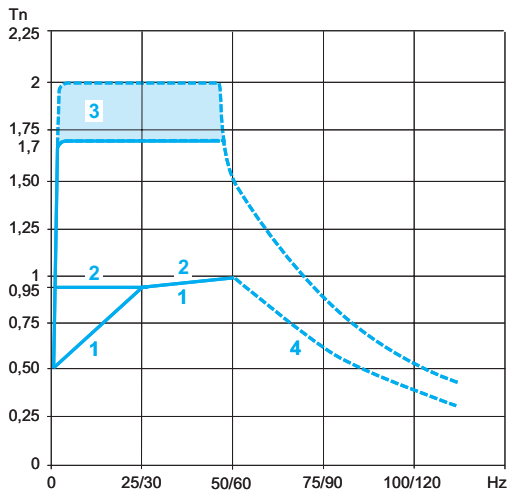
(1) See table on page 39 to check the permitted cable lengths.

Drive characteristics																		
Output frequency range		Hz	0...500															
Switching frequency		kHz	Nominal switching frequency: 4 kHz without derating in continuous operation. Adjustable during operation from 2...16 kHz. Above 4 kHz, derate the nominal drive current. The nominal motor current should not exceed this value. See derating curves on page 50															
Speed range			1...50															
Transient overtorque			170...200% of nominal motor torque (typical value)															
Braking torque	With braking resistor	ATV 312H●●●●●	100% of nominal motor torque continuously and up to 150% for 60 s															
	Without braking resistor	ATV 312H018M2	150% of nominal motor torque (typical value)															
		ATV 312H037M2...H075M2 ATV 312H018M3...H075M3 ATV 312H037N4...H075N4 ATV 312H075S6	100% of nominal motor torque (typical value)															
		ATV 312HU11M2, HU15M2 ATV 312HU11M3, HU15M3 ATV 312HU11N4, HU15N4 ATV 312HU15S6	50% of nominal motor torque (typical value)															
		ATV 312HU22M2 ATV 312HU22M3...HD15M3 ATV 312HU22N4...HD15N4 ATV 312HU22S6...HD15S6	30% of nominal motor torque (typical value)															
Maximum transient current			150% of the nominal drive current for 60 seconds (typical value)															
Motor control profiles			<ul style="list-style-type: none"> ■ Standard ratio (voltage/frequency) ■ Performance ratio (sensorless flux vector control) ■ Pump/fan ratio (Kn² quadratic ratio) ■ Energy saving ratio (specifically for ventilation) 															
Frequency loop gains			Factory-set with speed loop stability and gain. Possible options for machines with high resistive torque or high inertia, or for machines with fast cycles															
Slip compensation			Automatic whatever the load. Can be inhibited or adjusted															
Electrical power characteristics																		
Power supply	Voltage	V	200 - 15% ... 240 + 10% single-phase for ATV 312●●●●M2 200 - 15% ... 240 + 10% three-phase for ATV 312●●●●M3 380 - 15% ... 500 + 10% three-phase for ATV 312●●●●N4 525 - 15% ... 600 + 10% three-phase for ATV 312●●●●S6															
	Frequency	Hz	50...60 + 5%															
Prospective short-circuit current I _{sc}	ATV 312●●●●M2	A	≤ 1000 (I _{sc} at the connection point) for single-phase power supply															
	ATV 312H018M3...HU40M3 ATV 312H037N4...HU40N4 ATV 312H075S6...HU40S6	A	≤ 5000 (I _{sc} at the connection point) for three-phase power supply															
	ATV 312HU55M3...HD15M3 ATV 312HU55N4...HD15N4 ATV 312HU55S6...HD15S6	A	≤ 22000 (I _{sc} at the connection point) for three-phase power supply															
Drive supply voltage and output voltage			<table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th></th> <th>Drive supply voltage</th> <th>Drive output voltage for motor</th> </tr> </thead> <tbody> <tr> <td>ATV 312H●●●M2</td> <td>V 200...240 single-phase</td> <td>200...240 three-phase</td> </tr> <tr> <td>ATV 312H●●●M3</td> <td>V 200...240 three-phase</td> <td>200...240 three-phase</td> </tr> <tr> <td>ATV 312H●●●N4</td> <td>V 380...500 three-phase</td> <td>380...500 three-phase</td> </tr> <tr> <td>ATV 312H●●●S6</td> <td>V 525...600 three-phase</td> <td>525...600 three-phase</td> </tr> </tbody> </table>		Drive supply voltage	Drive output voltage for motor	ATV 312H●●●M2	V 200...240 single-phase	200...240 three-phase	ATV 312H●●●M3	V 200...240 three-phase	200...240 three-phase	ATV 312H●●●N4	V 380...500 three-phase	380...500 three-phase	ATV 312H●●●S6	V 525...600 three-phase	525...600 three-phase
	Drive supply voltage	Drive output voltage for motor																
ATV 312H●●●M2	V 200...240 single-phase	200...240 three-phase																
ATV 312H●●●M3	V 200...240 three-phase	200...240 three-phase																
ATV 312H●●●N4	V 380...500 three-phase	380...500 three-phase																
ATV 312H●●●S6	V 525...600 three-phase	525...600 three-phase																
Connection characteristics (drive terminals for line supply, motor output, DC bus and braking resistor)																		
Drive terminals			L1, L2, L3, U, V, W, PC/–, PA/+, PB															
Maximum wire size and tightening torque	ATV 312H018M2...H075M2 ATV 312H018M3...HU15M3		2.5 mm ² (AWG 14) 0.8 Nm															
	ATV 312HU11M2...HU22M2 ATV 312HU22M3...HU40M3 ATV 312H037N4...HU40N4 ATV 312H075S6...HU40S6		5 mm ² (AWG 10) 1.2 Nm															
	ATV 312HU55M3, HU75M3 ATV 312HU55N4, HU75N4 ATV 312HU55S6, HU75S6		16 mm ² (AWG 6) 2.5 Nm															
	ATV 312HD11M3, HD15M3 ATV 312HD11N4, HD15N4 ATV 312HD11S6, HD15S6		25 mm ² (AWG 3) 4.5 Nm															
Electrical isolation			Electrical isolation between power and control (inputs, outputs, power supplies)															

Electrical control characteristics		
Available internal supplies		Protected against short-circuits and overloads: <ul style="list-style-type: none"> ■ One 10 V $\overline{\text{---}}$ (0/+ 8%) supply for the reference potentiometer (2.2 to 10 kΩ), maximum current 10 mA ■ One 24 V $\overline{\text{---}}$ supply (min. 19 V, max. 30 V) for the control logic inputs, maximum current 100 mA
Analog inputs		Sampling time < 8 ms Resolution: 10 bits Accuracy: $\pm 4.3\%$ Linearity: $\pm 0.2\%$ of the maximum scale value Use: <ul style="list-style-type: none"> ■ 100 m maximum with shielded cable ■ 25 m maximum with unshielded cable
	AI1	One 0...10 V $\overline{\text{---}}$ analog voltage input, impedance 30 k Ω , maximum safe voltage 30 V
	AI2	One ± 10 V bipolar voltage analog input, impedance 30 k Ω , maximum safe voltage 30 V
	AI3	One X-Y mA analog current input, X and Y programmable from 0 to 20 mA, with impedance 250 Ω
Analog voltage outputs or analog current outputs configurable as logic outputs		2 analog outputs: <ul style="list-style-type: none"> ■ 1 analog voltage output (AOV) ■ 1 analog current output (AOC) configurable as a logic output. These 2 analog outputs cannot be used at the same time
	AOV	0...10 V $\overline{\text{---}}$ analog voltage output, min. load impedance 470 Ω 8-bit resolution, accuracy $\pm 1\%$, linearity $\pm 0.2\%$ of the maximum scale value
	AOC	0...20 mA analog current output, max. load impedance 800 Ω 8-bit resolution, accuracy $\pm 1\%$, linearity $\pm 0.2\%$ The AOC analog output can be configured as a 24 V logic output, max. 20 mA, min. load impedance 1.2 k Ω Refresh time < 8 ms
Relay outputs	R1A, R1B, R1C	1 relay logic output, one N/C contact and one N/O contact with common point Minimum switching capacity: 10 mA for 5 V $\overline{\text{---}}$ Maximum switching capacity: <ul style="list-style-type: none"> ■ On resistive load ($\cos \varphi = 1$ and L/R = 0 ms): 5 A for 250 V \sim or 30 V $\overline{\text{---}}$ ■ On inductive load ($\cos \varphi = 0.4$ and L/R = 7 ms): 2 A for 250 V \sim or 30 V $\overline{\text{---}}$ Sampling time < 8 ms Switching: 100,000 operations
	R2A, R2B	1 relay logic output, one N/C contact, contact open on fault. Minimum switching capacity: 10 mA for 5 V $\overline{\text{---}}$ Maximum switching capacity: <ul style="list-style-type: none"> ■ On resistive load ($\cos \varphi = 1$ and L/R = 0 ms): 5 A for 250 V \sim or 30 V $\overline{\text{---}}$ ■ On inductive load ($\cos \varphi = 0.4$ and L/R = 7 ms): 2 A for 250 V \sim or 30 V $\overline{\text{---}}$ Sampling time < 8 ms Switching: 100,000 operations
LI logic inputs	LI1...LI6	6 programmable logic inputs, compatible with PLC level 1, standard IEC/EN 61131-2 Impedance 3.5 k Ω 24 V $\overline{\text{---}}$ internal or 24 V $\overline{\text{---}}$ external power supply (min. 19 V, max. 30 V) Max. current: 100 mA Sampling time < 4 ms Multiple assignment makes it possible to configure several functions on one input (example: LI1 assigned to forward and preset speed 2, LI3 assigned to reverse and preset speed 3)
	Positive logic (Source)	State 0 if < 5 V or logic input not wired State 1 if > 11 V
	Negative logic (Sink)	State 0 if > 19 V or logic input not wired State 1 if < 13 V
	CLI position	Connection to PLC output (see diagram on page 48)
Maximum I/O wire size and tightening torque		2.5 mm ² (AWG 14) 0.6 Nm

Electrical control characteristics (continued)			
Acceleration and deceleration ramps			Ramp profiles: <ul style="list-style-type: none"> ■ Linear, can be adjusted separately from 0.1 to 999.9 s ■ S, U or customized Automatic adaptation of deceleration ramp time if braking capacities exceeded, possible inhibition of this adaptation (use of a braking resistor)
Braking to a standstill			By DC injection: <ul style="list-style-type: none"> ■ By a command on a logic input (LI1 to LI6) ■ Automatically as soon as the estimated output frequency drops to < 0.5 Hz, period adjustable from 0 to 30 s or continuous, current adjustable from 0 to 1.2 In
Main drive protection and safety features			Thermal protection against overheating Protection against short-circuits between motor phases Input phase loss protection, for three-phase supply Protection against motor phase breaks Overcurrent protection between motor output phases and earth Line supply overvoltage and undervoltage safety features
Motor protection (see page 67)			Thermal protection integrated in the drive by continuous calculation of the I ² t
Dielectric strength	Between earth and power terminals	ATV 312H●●●M2	2040 V ---
		ATV 312H●●●M3	
		ATV 312H●●●N4	2410 V ---
	ATV 312H●●●S6	2550 V ---	
	Between control and power terminals	ATV 312H●●●M2	2880 V ~
		ATV 312H●●●M3	
ATV 312H●●●N4		3400 V ~	
ATV 312H●●●S6		3600 V ~	
Signalling			Display coded by one 4-digit display (messages, values) and 5 status LEDs (current mode, CANopen bus)
Frequency resolution	Display units	Hz	0.1
	Analog inputs	Hz	Resolution = ((high speed - low speed)/1024) Min. value = 0.1
Time constant on a change of reference		ms	5

Communication port characteristics		
Available protocols		Modbus and CANopen protocols integrated in the drive. Both these protocols can be accessed via a single RJ45 connector on the underside of the drive.
Modbus protocol		
Structure	Connector	RJ45
	Physical interface	RS 485
	Transmission mode	RTU
	Transmission speed	Configurable via the Human-Machine interface, remote display terminals or SoMove setup software: 4800, 9600 or 19200 bps
	Number of subscribers	31
	Address	1 to 247, configurable via the Human-Machine interface, remote display terminals or SoMove setup software
Services	Functional profiles	CiA 402
	Messaging	Read Holding Registers (03) Write Single Register (06) Write Multiple Registers (16) Read Device Identification (43)
	Communication monitoring	Configurable
CANopen protocol		
Structure	Connector	RJ45
	Network management	Slave
	Transmission speed	Configurable via the Human-Machine interface, remote display terminals or SoMove setup software: 10, 20, 50, 125, 250, 500 kbps or 1 Mbps
	Number of subscribers	127
	Address (Node ID)	1 to 127, configurable via the Human-Machine interface, remote display terminals or SoMove setup software
Services	Number of PDOs (Process Data Objects)	2 PDOs: ■ PDO 1: cannot be configured ■ PDO 6: can be configured
	PDO modes	PDO 1: asynchronous PDO 6: asynchronous, Sync, cyclic asynchronous
	Number of SDOs (Service Data Objects)	1 receive SDO and 1 transmit SDO
	Functional profiles	CiA 402
	Communication monitoring	Node guarding and Heartbeat
Diagnostics	Using LEDs	On Human-Machine interface
Description file		An eds file is available on our website www.schneider-electric.com or the "Description of the Motion & Drives offer" DVD-ROM



Torque characteristics (typical curves)

The curves opposite define the available continuous torque and transient overtorque for both force-cooled and self-cooled motors. The only difference is in the ability of the motor to provide a high continuous torque at less than half the nominal speed.

- 1 Self-cooled motor: continuous useful torque (1)
- 2 Force-cooled motor: continuous useful torque
- 3 Transient overtorque 1.7 to 2 Tn
- 4 Torque in overspeed at constant power (2)

Special uses

Use with a motor with a different power rating to that of the drive

The device can power any motor which has a lower rating than that for which the drive was designed.

For motor ratings slightly higher than that of the drive, check that the current taken does not exceed the continuous output current of the drive.

Testing on a low power motor or without a motor

In a testing or maintenance environment the drive can be checked without having to switch to a motor with the same rating as the drive (particularly useful in the case of high power drives). This use requires deactivation of motor phase loss detection.

Use of motors in parallel

The drive rating must be greater than or equal to the sum of the currents and powers of the motors to be controlled.

In this case, it is necessary to provide external thermal protection for each motor using probes or thermal overload relays.

If three or more motors are connected in parallel, it is advisable to install a motor choke between the drive and the motors.

See page 40.

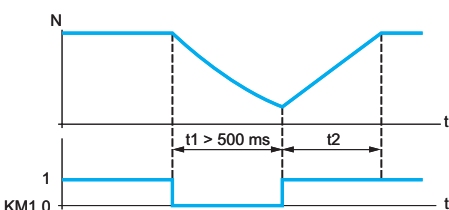
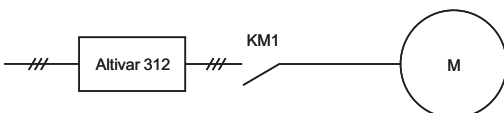
Motor switching at the drive output

Switching can be carried out with the drive locked or unlocked. In the case of switching on-the-fly (drive unlocked), the motor is controlled and accelerated until it reaches the reference speed smoothly following the acceleration ramp.

This use requires configuration of automatic catching a spinning load ("catch on the fly") and activation of the function which manages the presence of an output contactor.

Typical applications: loss of safety circuit at drive output, bypass function, switching of motors connected in parallel.

Recommendations for use: synchronize control of the output contactor with that of a freewheel stop request from the drive on a logic input.



KM1: contactor

t1: KM1 opening time (motor freewheeling)

t2: acceleration with ramp

N: speed

Example of loss of output contactor

(1) For power ratings ≤ 250 W, less derating is required (20% instead of 50% at very low frequencies).

(2) The nominal motor frequency and the maximum output frequency can be adjusted from 40 to 500 Hz. The mechanical overspeed characteristics of the selected motor must be checked with the manufacturer.



ATV 312H075M2



ATV 312HU15N4



ATV 312HU30N4



ATV 312HU75N4

Drives (frequency range from 0.5 to 500 Hz)											
Motor		Line supply				Altivar 312			Reference	Weight	
Power indicated on rating plate (1)	kW	HP	Max. line current (2), (3)		Apparent power	Max. prospective line Isc (4)	Max. continuous output current (In) (1)	Max. transient current for 60 s	Power dissipated at maximum output current (In) (1)	kg	
			at U1	at U2	at U2	kVA	kA	at U2			A
Single-phase supply voltage: 200...240 V 50/60 Hz, with integrated EMC filter (3) (5)											
0.18	0.25	3.0	2.5	0.6	1	1	1.5	2.3	24	ATV 312H018M2	1.500
0.37	0.5	5.3	4.4	1	1	1	3.3	5	41	ATV 312H037M2	1.500
0.55	0.75	6.8	5.8	1.4	1	1	3.7	5.6	46	ATV 312H055M2	1.500
0.75	1	8.9	7.5	1.8	1	1	4.8	7.2	60	ATV 312H075M2	1.500
1.1	1.5	12.1	10.2	2.4	1	1	6.9	10.4	74	ATV 312HU11M2	1.800
1.5	2	15.8	13.3	3.2	1	1	8	12	90	ATV 312HU15M2	1.800
2.2	3	21.9	18.4	4.4	1	1	11	16.5	123	ATV 312HU22M2	3.100
Three-phase supply voltage: 200...240 V 50/60 Hz, without EMC filter (3) (6)											
0.18	0.25	2.1	1.9	0.7	5	5	1.5	2.3	23	ATV 312H018M3	1.300
0.37	0.5	3.8	3.3	1.3	5	5	3.3	5	38	ATV 312H037M3	1.300
0.55	0.75	4.9	4.2	1.7	5	5	3.7	5.6	43	ATV 312H055M3	1.300
0.75	1	6.4	5.6	2.2	5	5	4.8	7.2	55	ATV 312H075M3	1.300
1.1	1.5	8.5	7.4	3	5	5	6.9	10.4	71	ATV 312HU11M3	1.700
1.5	2	11.1	9.6	3.8	5	5	8	12	86	ATV 312HU15M3	1.700
2.2	3	14.9	13	5.2	5	5	11	16.5	114	ATV 312HU22M3	1.700
3	–	19.1	16.6	6.6	5	5	13.7	20.6	146	ATV 312HU30M3	2.900
4	5	24.2	21.1	8.4	5	5	17.5	26.3	180	ATV 312HU40M3	2.900
5.5	7.5	36.8	32	12.8	22	22	27.5	41.3	292	ATV 312HU55M3	6.400
7.5	10	46.8	40.9	16.2	22	22	33	49.5	388	ATV 312HU75M3	6.400
11	15	63.5	55.6	22	22	22	54	81	477	ATV 312HD11M3	10.500
15	20	82.1	71.9	28.5	22	22	66	99	628	ATV 312HD15M3	10.500
Three-phase supply voltage: 380...500 V 50/60 Hz, with integrated EMC filter (3) (5)											
0.37	0.5	2.2	1.7	1.5	5	5	1.5	2.3	32	ATV 312H037N4	1.800
0.55	0.75	2.8	2.2	1.8	5	5	1.9	2.9	37	ATV 312H055N4	1.800
0.75	1	3.6	2.7	2.4	5	5	2.3	3.5	41	ATV 312H075N4	1.800
1.1	1.5	4.9	3.7	3.2	5	5	3	4.5	48	ATV 312HU11N4	1.800
1.5	2	6.4	4.8	4.2	5	5	4.1	6.2	61	ATV 312HU15N4	1.800
2.2	3	8.9	6.7	5.9	5	5	5.5	8.3	79	ATV 312HU22N4	3.100
3	–	10.9	8.3	7.1	5	5	7.1	10.7	125	ATV 312HU30N4	3.100
4	5	13.9	10.6	9.2	5	5	9.5	14.3	150	ATV 312HU40N4	3.100
5.5	7.5	21.9	16.5	15	22	22	14.3	21.5	232	ATV 312HU55N4	6.500
7.5	10	27.7	21	18	22	22	17	25.5	269	ATV 312HU75N4	6.500
11	15	37.2	28.4	25	22	22	27.7	41.6	397	ATV 312HD11N4	11.000
15	20	48.2	36.8	32	22	22	33	49.5	492	ATV 312HD15N4	11.000
Three-phase supply voltage: 525...600 V 50/60 Hz, without EMC filter (3)											
0.75	1	2.8	2.4	2.5	5	5	1.7	2.6	36	ATV 312H075S6 (7)	1.700
1.5	2	4.8	4.2	4.4	5	5	2.7	4.1	48	ATV 312HU15S6 (7)	1.700
2.2	3	6.4	5.6	5.8	5	5	3.9	5.9	62	ATV 312HU22S6 (7)	2.900
4	5	10.7	9.3	9.7	5	5	6.1	9.2	94	ATV 312HU40S6 (7)	2.900
5.5	7.5	16.2	14.1	15	22	22	9	13.5	133	ATV 312HU55S6 (7)	6.200
7.5	10	21.3	18.5	19	22	22	11	16.5	165	ATV 312HU75S6 (7)	6.200
11	15	27.8	24.4	25	22	22	17	25.5	257	ATV 312HD11S6 (7)	10.000
15	20	36.4	31.8	33	22	22	22	33	335	ATV 312HD15S6 (7)	10.000

(1) 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 derating curves on page 50.

(2) Typical value for a 4-pole motor and a maximum switching frequency of 4 kHz, with no line choke for max. prospective line Isc (4).

(3) Nominal supply voltage, min. U1, max. U2: 200 (U1)...240 V (U2), 380 (U1)...500 V (U2), 525 (U1)...600 V (U2).

(4) If line Isc is greater than the values in the table, add line chokes (see page 37).

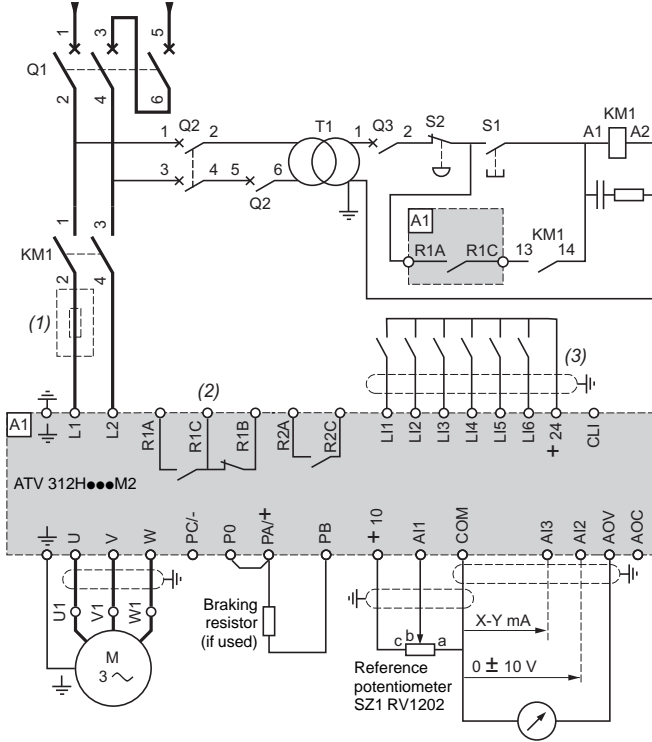
(5) Drives supplied with category C2 or C3 integrated EMC filter. This filter can be disconnected.

(6) EMC filter available as an option (see page 39).

(7) Mandatory line choke to be ordered separately (see page 37).

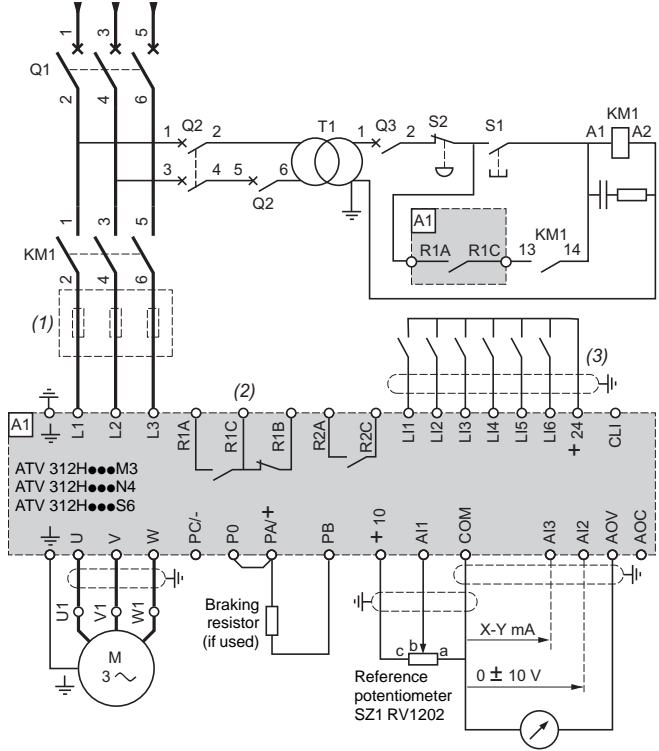
ATV 312H●●●M2

Single-phase power supply



ATV 312H●●●M3, ATV 312H●●●N4, ATV 312H●●●S6

Three-phase power supply



- (1) Line choke (single-phase or three-phase).
- (2) Fault relay contacts. Used for remote signalling of the drive status.
- (3) Connection of the common for the logic inputs depends on the position of the switch (see schemes below).

Note: All terminals are located at the bottom of the drive.

Install interference suppressors on all inductive circuits near the drive or connected to the same circuit, such as relays, contactors, solenoid valves, fluorescent lighting, etc.

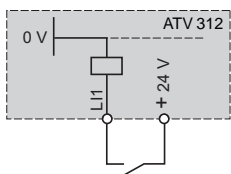
Compatible components (for a complete list of references, please refer to the "Motor starter solutions - Control and protection components" catalogue).

Item no.	Designation
KM1	Line contactor LC1 ●●● + suppressor module LA4 DA2U (see page 60431/2)
Q1	GV2 L magnetic circuit-breaker or Compact NS circuit-breaker (see page 60431/2)
Q2	GV2 L magnetic circuit-breaker rated at twice the nominal primary current of T1
Q3	GB2 CB05 thermal magnetic circuit breaker
S1, S2	XB4 B or XB5 A pushbuttons
T1	100 VA transformer 220 V secondary

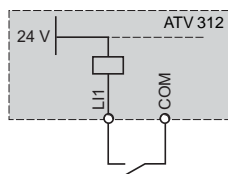
Examples of recommended schemes

Logic input switches

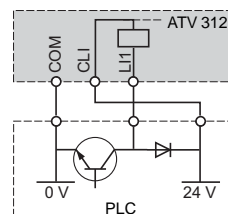
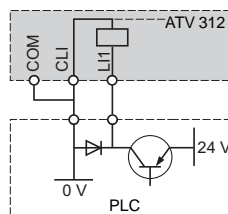
Source position



Sink position

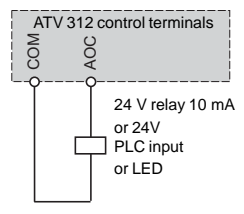


CLI position with PLC transistor outputs

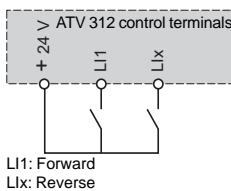


AOC output

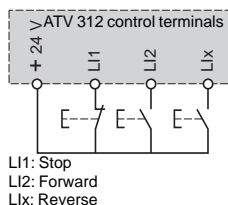
Wired as logic output



2-wire control

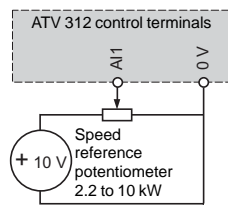


3-wire control

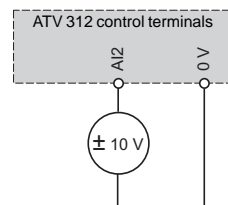


Voltage analog inputs

External + 10 V

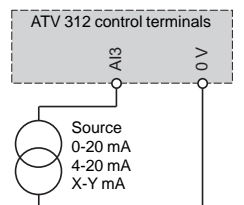


External ± 10 V



Current analog input

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



Presentation:
page 60420/2

Characteristics:
page 60421/2

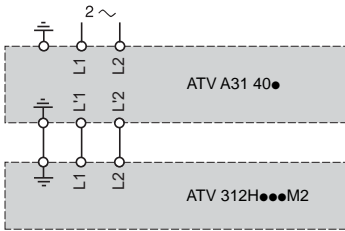
References:
page 60422/2

Dimensions:
page 60429/2

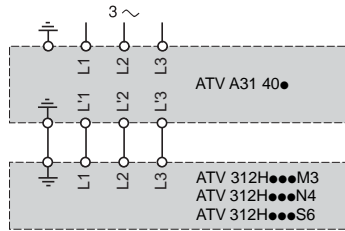
Functions:
page 60432/2

Additional EMC input filters VW3 A31 40●

Single-phase power supply



Three-phase power supply

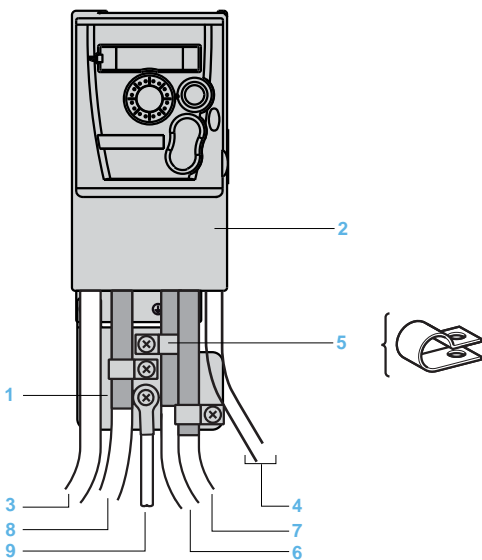


Connections ensuring conformity to EMC standards

Principle

- Earths between the drive, motor and cable shielding must have “high-frequency” equipotentiality.
- Use shielded cables with the shielding connected to earth throughout 360° at both ends for the motor cable, the braking resistor cable and the control-signal cables. Metal conduit or ducting can be used for part of the shielding length provided that there is no break in the continuity of the earth connection.
- Ensure maximum separation between the power supply cable and the motor cable.

Installation diagram



- 1 Steel plate to be mounted on the drive (earthed casing)
- 2 Altivar 312 drive
- 3 Unshielded power supply wires or cable
- 4 Unshielded wires or cable 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, attaching the clamp on the stripped part of the shielding.
 The shielding must be clamped tightly enough to the metal sheet to ensure good contact.
 For cables 6, 7 and 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.
- 6 Shielded cable for connecting the motor
- 7 Shielded cable for connecting the control-signal wiring. For applications requiring several conductors, use cables with a small cross-section (0.5 mm²).
- 8 Shielded cable for connecting the braking resistor
- 9 PE cable (green-yellow)

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

Operation on an IT system (isolated or impedance earthed neutral)

Use a permanent insulation monitor compatible with non-linear loads, such as the Schneider Electric XM200 (please consult our website www.schneider-electric.com or contact our customer service centre).

ATV 312H...M2 and ATV 312H...N4 drives have integrated EMC filters. For use on an IT system, these filters can be disconnected by removing their earth connection:

- For ATV 312H018M2...HU22M2 and H037N4...HU40N4 drives, remove a jumper to disconnect the filter.
- For ATV 312HU55N4...HD15N4 drives, move the wire with the cable tag to disconnect the filter.

Installation 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.

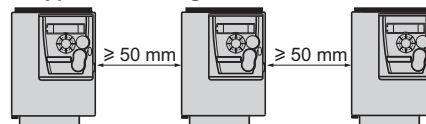
Install the unit vertically, at $\pm 10^\circ$:

- Do not place it close to heating elements
- Leave sufficient free space to ensure that the air required for cooling purposes can circulate from the bottom to the top of the unit

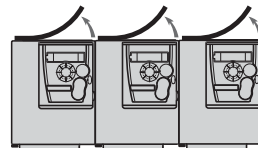


Mounting types

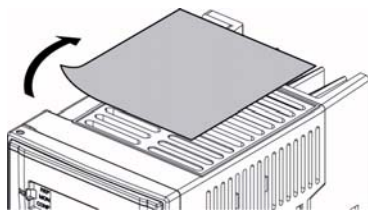
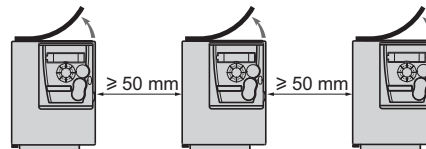
■ **Type A mounting**



■ **Type B mounting**



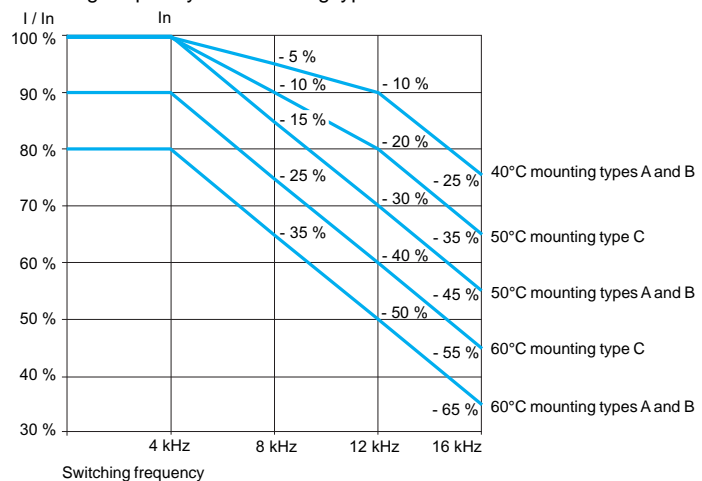
■ **Type C mounting**



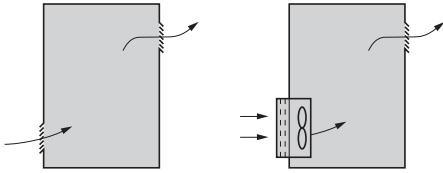
Removing the protective cover

Removing the protective cover from the top of the drive (as shown opposite) changes the degree of protection to IP 20.

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



For intermediate temperatures (for example, 55°C), interpolate between 2 curves.



Specific recommendations for mounting in an enclosure

Follow the mounting recommendations on the opposite page.

To ensure proper air circulation in the drive:

- Install 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 below).
- Use special filters with IP 54 protection
- Remove the protective cover from the top of the drive

Fan flow rate depending on the drive rating

ATV 312	Flow rate m ³ /min
H018M2...H055M2 H018M3...H055M3 H037N4...HU11N4 H075S6, HU15S6	0.3
H075M2...HU15M2 H075M3...HU15M3 HU15N4, HU22N4 HU22S6, HU40S6	0.55
HU22M2 HU22M3...HU40M3 HU30N4, HU40N4 HU55S6, HU75S6	1.55
HU55M3 HU55N4, HU75N4 HD11S6	1.7
HU75M3, HD11M3 HD11N4, HD15N4 HD15S6	2.8
HD15M3	3.6

Metal dust and damp proof wall-mounted or floor-standing enclosure (IP 54 degree of protection)

The drive must be mounted in a dust and damp proof enclosure in certain environmental conditions: dust, corrosive gases, high humidity with risk of condensation and dripping water, splashing liquid, etc. This enables the drive to be used in an enclosure where the maximum internal temperature can reach 50°C.

Calculating the dimensions of the enclosure

Maximum thermal resistance Rth (°C/W)

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

θ° = maximum temperature inside the 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 60422/2.

Add the power dissipated by the other components of the device.

Useful heat exchange area 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 metal enclosures:

- 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.