Variable speed drives

Altivar 61

Catalogue
September

05

For 3-phase asynchronous motors from 0.75 to 630 kW

a brand of Schneider Electric

Telemecanique

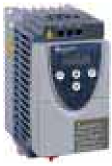
Contents

Variable speed drives for asynchronous motors Altivar 61

Selection guide . . . . page 2

- **Presentation** . . . . *page 4*
- **Variable speed drives Altivar 61**
  - ☐ Characteristics . . . . *page 8*
  - ☐ Operation . . . . *page 16*
  - ☐ References . . . . *page 18*
- **Options**
  - ☐ Accessories . . . . *page 22*
  - ☐ Dialogue . . . . *page 28*
  - ☐ I/O extension cards . . . . *page 31*
  - ☐ Multi-pump cards . . . . *page 35*
  - ☐ "Controller Inside" programmable card . . . . *page 43*
  - ☐ Communication buses and networks . . . . *page 52*
  - ☐ Resistance braking units . . . . *page 55*
  - ☐ Braking resistors . . . . *page 57*
  - ☐ Reduction of current harmonics
    - DC chokes . . . . *page 65*
    - line chokes . . . . *page 68*
    - passive filters . . . . *page 70*
  - ☐ Additional EMC input filters . . . . *page 76*
  - ☐ Output filters
    - motor chokes . . . . *page 80*
    - sinus filters . . . . *page 83*
- **Combinations of variable speed drives and options** . . . . *page 84*
- **Dimensions** . . . . *page 90*
- **Schemes** . . . . *page 112*
- **Motor starters** . . . . *page 128*
- **Mounting recommendations** . . . . *page 138*
- **Functions** . . . . *page 148*
- **Function compatibility table** . . . . *page 176*
- **PowerSuite software workshop** . . . . *page 180*
- **Ethernet TCP/IP network** . . . . *page 186*
- **Communication via Fipio bus** . . . . *page 190*
- **Communication via Modbus bus** . . . . *page 193*
- **Communication via Modbus Plus network** . . . . *page 198*
- **Communication via Uni-Telway bus** . . . . *page 201*
- **Communication gateways LUF P** . . . . *page 203*
- **Communication gateway LA9 P307** . . . . *page 205*
- **Product reference index** . . . . *page 206*

Variable speed drives for asynchronous motors

Applications			**Speed control for asynchronous motors**		
Application area			**Building (HVAC)** *(1)*	**Industry**	
Type of machine			**Fans**	**Simple machines** **Pumps**	**Simple machines**
					
Power range for 50…60 Hz supply (kW)			**0.75…30**	**0.18…2.2**	**0.18…15**
	Single phase 100…120 V (kW)		–	0.18…0.75	–
	Single phase 200…240 V (kW)		–	0.18…2.2	0.18…2.2
	Three phase 200…230 V (kW)		–	0.18…2.2	–
	Three phase 200…240 V (kW)		0.75…30	–	0.18…15
	Three phase 380…480 V (kW)		0.75…30	–	–
	Three phase 380…500 V (kW)		–	–	0.37…15
	Three phase 525…600 V (kW)		–	–	0.75…15
Drive	Output frequency		0.5…200 Hz	0.5…200 Hz	0.5…500 Hz
	Type of control	Asynchronous motor	Sensorless flux vector control, voltage/frequency ratio (2 or 5 points), energy saving ratio	Sensorless flux vector control	
		Synchronous motor	–	–	
	Transient overtorque		110% of the nominal motor torque	150…170% of the nominal motor torque	180% of the nominal motor torque for 2 seconds
Functions Number of functions			50	26	50
Number of preset speeds			8	4	16
Number of I/O	Analog inputs		1	1	3
	Logic inputs		3	4	6
	Analog outputs		1	–	1
	Logic outputs		–	1	–
	Relay outputs		2	1	2
Communication	Embedded		Modbus	–	Modbus and CANopen
	Available as an option		LonWorks, METASYS N2, APOGEE FLN, BACnet	–	Ethernet TCP/IP, DeviceNet, Fipio, Profibus DP
Cards (available as an option)			–	–	–
Standards and certification			EN 50178, IEC/EN61800-3 EN 55011, EN 55022: class A, class B with option card, CE, UL, C-Tick, N998	EN 50178, IEC/EN 61800-3 EN 55011, EN 55022: class B and class A gr.1 CE, UL, CSA, NOM 117, C-Tick	EN 50178, IEC/EN 61800-3 EN 55011, EN 55022: class A, class B with option card, CE, UL, C-Tick, N998
References			**ATV 21 ▲**	**ATV 11**	**ATV 31**
Pages			Please consult the “Altivar 21 variable speed drives” catalogue ▲	Please consult the “Soft starters and variable speed drives” catalogue	

▲ To be launched 1st quarter 2006

(1) Heating Ventilation Air Conditioning

Pumps and fans	**Complex, modular machines, high-power machines** **Machines requiring high-performance torque and accuracy at very low speed as well as high dynamics**

0.37…630	**0.37…500**
–	–
0.37…5.5	0.37…5.5
–	–
0.75…90	0.37…75
0.75…630	0.75…500
–	–
–	–

0.5…1000 Hz up to 37 kW, 0.5…500 Hz from 45 kW to 630 kW	0…1000 Hz up to 37 kW, 0…500 Hz from 45 kW to 500 kW
Sensorless flux vector control, voltage/frequency ratio (2 or 5 points), energy saving ratio	Flux vector control with or without sensor, voltage/frequency ratio (2 or 5 points), ENA System
–	Vector control without speed feedback
110…120% of the nominal motor torque for 60 seconds	220% of the nominal motor torque for 2 seconds 170% for 60 seconds

> 100	> 150
8	16
2…4	2…4
6…20	6…20
1…3	1…3
0…8	0…8
2…4	2…4

Modbus and CANopen	
Ethernet TCP/IP, Fipio, Modbus Plus, INTERBUS, Profibus DP, Modbus/Uni-Telway, DeviceNet, LONWORKS, METASYS N2, APOGEE FLN, BACnet	Ethernet TCP/IP, Fipio, Modbus Plus, INTERBUS, Profibus DP, Modbus/Uni-Telway, DeviceNet

I/O extension cards, “Controller Inside” programmable card, multi-pump cards	Encoder interface cards, I/O extension cards, “Controller Inside” programmable card

IEC/EN 61800-5-1, IEC/EN 61800-3 (environments 1 and 2, C1 to C3), EN 55011, EN 55022, IEC/EN 61000-4-2/4-3/4-4/4-5/4-6/4-11
CE, UL, CSA, DNV, C-Tick, NOM 117, GOST

ATV 61	**ATV 71**
18 to 21	Please consult the “Altivar 71 variable speed drives” catalogue

Variable speed drives for asynchronous motors

Altivar 61

522835

Ventilation application

522836

Air conditioning application

522834

Pumping application

Applications

The Altivar 61 drive is a frequency inverter for 3-phase asynchronous motors rated between 0.75 kW and 630 kW.
The drive has been designed for state-of-the-art applications in heating, ventilation and air conditioning (HVAC) in industrial and commercial buildings:

- Ventilation
- Air conditioning
- Pumping

The Altivar 61 can reduce operating costs in buildings by optimizing energy consumption whilst improving user comfort.
Its numerous integrated options enable it to be adapted to and incorporated into electrical installations, sophisticated control systems and building management systems.
The need for electromagnetic compatibility and a reduction in harmonics were taken into account at the outset of designing the drive.
Depending on its design characteristics, each type (UL Type 1/IP 20 and/or UL Type 12/IP 54) either has built-in class A or class B EMC filters and DC chokes, or these items are available as optional accessories.

Functions

With its macro-configurations and “Simply Start” menu, the Altivar 61 drive can be used to start up your applications without delay and to make adjustments in virtually no time using user-friendly dialogue tools.

Functions designed specifically for pumping and ventilation applications

- Energy saving ratio, 2-point or 5-point quadratic ratio
- Automatic catching of a spinning load with speed detection
- Adaptation of current limiting according to speed
- Noise and resonance suppression by means of the switching frequency which, depending on the power rating, can be set to up to 16 kHz during operation, and random modulation.
- Preset speeds
- Integrated PID regulator, with preset PID references and automatic/manual (“Auto/Man.”) mode
- Electricity and service hours meter
- Detection of absence of fluid, detection of zero flow rate, limiting of flow rate
- Sleep function, wake-up function
- Customer settings with display of physical values: bar, I/s, °C, etc.

Protection functions

- Motor and drive thermal protection, PTC thermal probe management
- Protection against overloads and overcurrents in continuous operation
- Machine mechanical protection via jump frequency function, phase rotation
- Protection of the installation by means of underload, overload and zero flow detection
- Protection via multiple fault management and configurable alarm groups

Safety functions

- Machine safety by means of the integrated “Power Removal” function

This function prevents the motor starting accidentally; it meets the requirements of machine safety standard EN 954-1, category 3 and those of operational safety standard IEC/EN 61508, SIL2 (safety control/signalling applied to processes and systems).

- Installation safety by means of the function for forced operation with inhibition of faults, direction of operation and configurable references.

Flexibility and user-friendliness

The Altivar 61 has numerous configurable logic and analog inputs and outputs in order that it can be optimised for your applications.
It supports the Modbus and CANopen protocols as standard in order to increase the performance of your control systems. It also supports the industry’s major communication buses and can be integrated easily into building management (HVAC) systems via option cards.
Furthermore, it features multi-pump cards, enabling it to provide flexible and user-friendly management of multiple pumps.

Characteristics:
pages 8 to 15

References:
pages 18 to 21

Dimensions:
pages 90 to 111

Schemes:
pages 112 to 127

Functions:
pages 148 to 175

Variable speed drives for asynchronous motors

Altivar 61

ATV 61HC31N4,
ATV 61HD37M3X, ATV 61HU22N4

A comprehensive offer

The Altivar 61 range of variable speed drives extends across a range of motor power ratings from 0.75 kW to 630 kW with three types of power supply:

- 200…240 V 3-phase, 0.75 kW to 90 kW, UL Type 1/IP 20, (**ATV 61H●●●M3**, **ATV 61H●●●M3X**)
- 380…480 V 3-phase, 0.75 kW to 630 kW, UL Type 1/IP 20,(**ATV 61H●●●N4**)
- 380…480 V 3-phase, 0.75 kW to 90 kW, UL Type 12/IP 54, (**ATV 61W●●●N4**, **ATV 61W●●●N4C**),

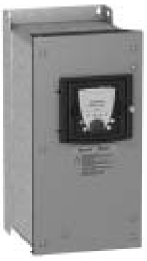
Altivar 61 UL Type 1/IP 20 drives can also be used in conjunction with motors rated between 0.37 kW and 5.5 kW on a single phase 200…240 V supply (derating is required).

The Altivar 61 drive integrates the Modbus and CANopen protocols as standard as well as numerous functions. These functions can be extended using communication, I/O extension and multi-pump option cards and a “Controller Inside” programmable card (see page 7).

Other external options, such as braking resistors, resistance braking units and filters, are available to complement this offer (see page 7).

The entire range conforms to international standards IEC/EN 61800-5-1, IEC/EN 61800-2, IEC/EN 61800-3, is UL, CSA, DNV, C-Tick, NOM 117 and GOST certified and has been developed to meet the requirements of the directives regarding protection of the environment (RoHS, WEEE, etc) as well of those of the European Directives governing the issuing of the CE marking.

The Altivar 61 drive can be inserted in an installation’s safety system. It integrates the “Power Removal” safety function which prevents the motor from restarting unintentionally.



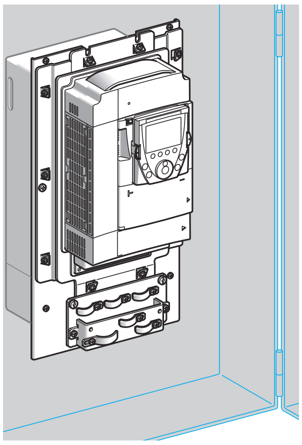
ATV 61W075N4,
ATV 61W075N4C

Electromagnetic compatibility EMC

The incorporation of EMC filters in **ATV 61H●●●M3** and **ATV 61●●●●N4** drives and the recognition of EMC requirements simplifies machine installation and provides a very economical means of meeting CE marking requirements.

ATV 61W●●●N4C drives feature integrated class B EMC filters, enabling them to meet the requirements of the EN 55011 (class B group 1) and IEC/EN 61800-3 (category C1) standards.

ATV 61H●●●M3X drives have been designed without an EMC filter. Filters are available as an option and can be installed by the user to reduce emission levels, see pages 74 to 77.



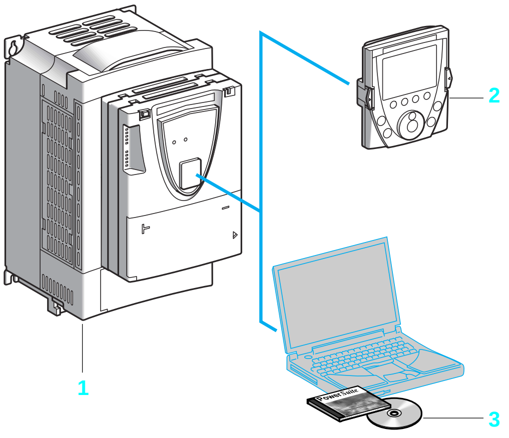
ATV 61HU75N4 flush-mounted

Installation

The Altivar 61 drive has been designed to optimize the size of enclosures (floor-standing, wall-mounted, etc):

- The power part, with IP 54 degree of protection, can be easily mounted outside the enclosure using the kit for flush-mounting in a dust and damp proof enclosure (**VW3 A9 5●●**, see page 23); this type of mounting can be used to limit the temperature rise inside the enclosure or to reduce the size of enclosure required.
- Ambient temperature inside the enclosure:
  - 50°C without derating corresponding to the drive rating
  - Up to 60°C using the control card fan kit **VW3 A9 4●●** corresponding to the drive rating and, if necessary, by derating the output current (see page 22)
- Mounting side-by-side (see pages 138, 140 and 144)

The Altivar 61 drive can also be wall-mounted in compliance with the requirements for UL Type 1 using kit **VW3 A9 2●●**, and in compliance with the requirements for IP 21 or IP 31 using kit **VW3 A9 1●●** (see pages 24 and 25).



Dialogue tools

The Altivar 61 drive 1 is supplied with a remote graphic display terminal 2:

- The navigation button provides a quick and easy means of accessing the drop-down menus.
- The graphic screen displays 8 lines of 24 characters of plain text.
- The advanced functions on the display unit provide access to the more complex drive functions.
- The display screens, menus and parameters can all be customized for the user or the machine.
- Online help screens are available.
- Configurations can be stored and downloaded: four configuration files can be stored.
- The drive can be connected to several other drives via a multidrop link.
- It can be located remotely on an enclosure door with IP 54 or IP 65 degree of protection, a standard feature of UL Type 12/IP54 drives.
- It is supplied with 6 languages installed as standard (English, French, German, Italian, Spanish and Chinese). Other languages can be loaded to the flash memory.

Up to 45 kW at 200…240 V and 75 kW at 380…480 V, the Altivar 61 drive can be controlled using an integrated 7-segment display terminal (see pages 18 and 19).

The PowerSuite software workshop 3 can be used to configure, adjust and debug the Altivar 61 in just the same way as all other Telemecanique speed drives and starters. It can be used via a direct, Ethernet, modem or wireless Bluetooth® connection.

Quick programming

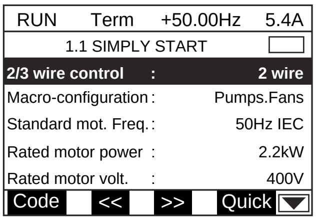
Macro-configuration

The Altivar 61 offers quick and easy programming using macro-configurations corresponding to different applications or uses: start-stop, pumping and ventilation, general use, connection to communication networks, PID regulator.
Each of these configurations is still fully modifiable.

“Simply Start” menu

In just a few steps, the “Simply Start” menu can be used to ensure the application operates correctly, obtain maximum motor performance and ensure motor protection.

The architecture, the hierarchical parameter structure and the direct access functions all serve to make programming quick and easy, even for more complex functions.



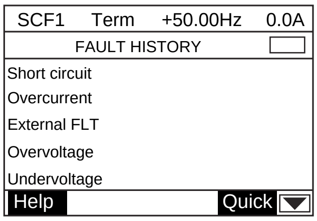
RUN Term +50.00Hz 5.4A
1.1 SIMPLY START
2/3 wire control : 2 wire
Macro-configuration : Pumps.Fans
Standard mot. Freq. : 50Hz IEC
Rated motor power : 2.2kW
Rated motor volt. : 400V

Simply Start menu

Services

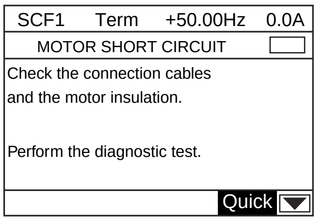
The Altivar 61 has numerous built-in maintenance, monitoring and diagnostic functions:

- Drive test functions with diagnostic screen on the remote graphic display terminal
- I/O maps
- Communication maps for the different ports
- Oscilloscope function that can be viewed using the PowerSuite software workshop
- Management of the drive installed base via processors with flash memory
- Remote use of these functions by connecting the drive to a modem via the Modbus port
- Identification of all the drive’s component parts as well as the software versions
- Fault logs with display of the value of up to 16 variables on occurrence of a fault
- Display terminal languages loaded in the flash memory
- A message of up to 5 lines of 24 characters can be stored in the drive.



SCF1 Term +50.00Hz 0.0A
FAULT HISTORY
Short circuit
Overcurrent
External FLT
Overvoltage
Undervoltage

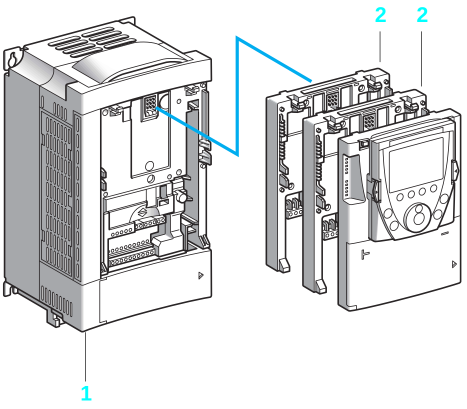
Fault log



SCF1 Term +50.00Hz 0.0A
MOTOR SHORT CIRCUIT
Check the connection cables
and the motor insulation.

Perform the diagnostic test.

Troubleshooting screen



Options

The Altivar 61 drive 1 can integrate up to two option cards simultaneously*(1)*:

- I/O extension cards 2 (see pages 30 and 31)
- Communication cards 2 for use in industrial applications or for HVAC (see pages 44 to 53)
- Multi-pump cards 2 for the management of multiple pumps (see pages 32 to 35)
- "Controller Inside" programmable card 2. This card is used to adapt the drive to specific applications quickly and progressively, by decentralizing the control system functions (programming in IEC 61131-3 compliant languages) (see pages 36 to 43).

External options can be associated with the Altivar 61:

- Braking units and resistors, see pages 54 to 61
- DC chokes, line chokes and passive filters, to reduce current harmonics (see pages 62 to 73)
- Additional EMC input filters (see pages 74 to 77)
- Motor chokes and sinus filters for long cable runs or to remove the need for shielding (see pages 78 to 83)

Note: *Please refer to the compatibility summary tables to determine which options are available for individual drives (see pages 84 to 89).*

Integration into control systems and building management systems

The Altivar 61 integrates a combined Modbus or CANopen port for adjustment, supervision and configuration. A second port is available for connecting a Magelis terminal for machine dialogue.

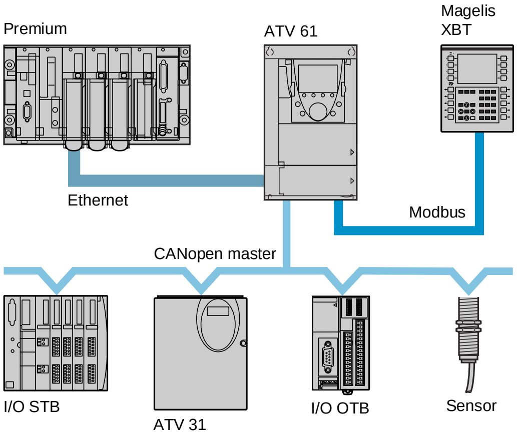
The Altivar 61 drive can also be connected to other communication networks using the communication cards (see pages 44 to 53). All communication protocols designed for use in industrial applications (Ethernet TCP/IP, Fipio, Modbus, Modbus Plus, Uni-Telway, Profibus DP, DeviceNet and INTERBUS) or in building management systems (LONWorks, METASYS N2, APOGEE FLN, BACnet) are available.

The option of powering the control part separately enables communication to be maintained (monitoring, diagnostics) even if there is no power supply to the power part.

The "Controller Inside" programmable card transforms the drive into an automation island:

- The card integrates its own I/O; it can also manage those of the drive and an I/O extension card.
- It contains onboard application programs developed in IEC 61131-3 compliant languages, which reduce the control system's response time.
- Its CANopen master port enables control of other drives and dialogue with I/O modules and sensors.

The two multi-pump cards enable the drive to be adapted for pump applications.
The **VW3 A3 502** multi-pump card ensures the compatibility of pump applications developed for an Altivar 38 drive with an Altivar 61 drive.
The **VW3 A3 503** multi-pump card enables all multi-pump applications to be supported.
Multi-pump cards feature their own I/O. They can manage I/O on the drive as well as those on I/O extension cards. They can also make use of drive parameters such as those for speed, current, torque, etc.



Example of a drive equipped with a communication card and a "Controller Inside" programmable card

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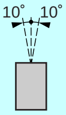
(1) The Altivar 61 cannot support more than one option card with the same reference. Please refer to the compatibility tables summarizing the possible combinations for drives, options and accessories on pages 84 to 89.

Environmental characteristics

Conformity to standards			Altivar 61 drives have been developed to conform to the strictest international standards and the recommendations relating to electrical industrial control devices (IEC, EN), in particular: low voltage, IEC/EN 61800-5-1, IEC/EN 61800-3 (conducted and radiated EMC immunity and emissions).
	EMC immunity		IEC/EN 61800-3, environments 1 and 2 IEC/EN 61000-4-2 level 3 IEC/EN 61000-4-3 level 3 IEC/EN 61000-4-4 level 4 IEC/EN 61000-4-5 level 3 IEC/EN 61000-4-6 level 3 IEC/EN 61000-4-11 *(1)*
	Conducted and radiated EMC emissions for drives		IEC/EN 61800-3, environments 1 and 2, categories C1, C2, C3
		ATV 61H075M3, HU15M3 ATV 61H075N4…HU40N4	EN 55011 class A group 1, IEC/EN 61800-3 category C2 With additional EMC filter *(2)*: ■ EN 55011 class B group 1, IEC/EN 61800-3 category C1
		ATV 61HU22M3…HU75M3 ATV 61HU55N4…HC63N4	EN 55011 class A group 2, IEC/EN 61800-3 category C3 With additional EMC filter *(2)*: ■ EN 55011 class A group 1, IEC/EN 61800-3 category C2 ■ EN 55011 class B group 1, IEC/EN 61800-3 category C1
		ATV 61H●●●M3X	With additional EMC filter *(2)*: ■ EN 55011 class A group 1, IEC/EN 61800-3 category C2 ■ EN 55011 class B group 1, IEC/EN 61800-3 category C1
		ATV 61W075N4…WD90N4	EN 55011 class A group 1, IEC/EN 61800-3 category C2
		ATV 61W075N4C…WD90N4C	EN 55011 class B group 1, IEC/EN 61800-3 category C1
CE marking			The drives have CE marking in accordance with the European directives on low voltage (73/23/EEC and 93/68/EEC) and EMC (89/336/EEC).
Product certifications			UL, CSA, DNV, C-Tick, NOM 117 and GOST
Degree of protection			IEC/EN 61800-5-1, IEC/EN 60529
		ATV 61H●●●M3 ATV 61HD11M3X…HD45M3X ATV 61H075N4…HD75N4	IP 21 and IP 41 on upper part IP 20 without blanking plate on upper part of cover IP 21 with accessory VW3 A9 1●●, UL Type 1 with accessory VW3 A9 2●●, see pages 24 and 25
		ATV 61HD55M3X…HD90M3X ATV 61HD90N4…HC31N4	IP 00, IP 41 on the upper part and IP 30 on the front panel and side parts IP 31 with accessory VW3 A9 1●●, UL Type 1 with accessory VW3 A9 2●●, see pages 24 and 25
		ATV 61HC40N4…HC63N4	IP 00, IP 41 on the upper part and IP 30 on the front panel and side parts IP 31 with accessory VW3 A9 1●●, see page 25
		ATV 61W075N4…WD90N4 ATV 61W075N4C…WD90N4C	UL Type 12/IP 54
Vibration resistance		ATV 61H●●●M3 ATV 61HD11M3X…HD45M3X ATV 61H075N4…HD75N4 ATV 61W075N4…WD75N4 ATV 61W075N4C…WD75N4C	1.5 mm peak to peak from 3…13 Hz, 1 gn from 13…200 Hz, conforming to IEC/EN 60068-2-6
		ATV 61HD55M3X…HD90M3X ATV 61HD90N4…HC63N4 ATV 61WD90N4 ATV 61WD90N4C	1.5 mm peak to peak from 3…10 Hz, 0.6 gn from 10…200 Hz, conforming to IEC/EN 60068-2-6
Shock resistance		ATV 61H●●●M3 ATV 61HD11M3X…HD45M3X ATV 61H075N4…HD75N4 ATV 61W075N4…WD75N4 ATV 61W075N4C…WD75N4C	15 gn for 11 ms conforming to IEC/EN 60068-2-27
		ATV 61HD55M3X…HD90M3X ATV 61HD90N4…HC16N4 ATV 61WD90N4 ATV 61WD90N4C	7 gn for 11 ms conforming to IEC/EN 60068-2-27
		ATV 61HC22N4…HC63N4	4 gn for 11 ms conforming to IEC/EN 60068-2-27

(1) Drive behaviour according to the drive configurations, see pages 166, 167, 173 and 174.
(2) See table on page 74 to check permitted cable lengths.

Environmental characteristics (continued)

Maximum ambient pollution	ATV 61H●●●M3 ATV 61HD11M3X, HD15M3X ATV 61H075N4…HD18N4 ATV 61W075N4…WD15N4 ATV 61W075N4C…WD15N4C		Degree 2 conforming to IEC/EN 61800-5-1
	ATV 61HD18M3X…HD90M3X ATV 61HD22N4…HC63N4 ATV 61WD18N4…WD90N4 ATV 61WD18N4C…WD90N4C		Degree 3 conforming to IEC/EN 61800-5-1
Environmental conditions	ATV 61H●●●M3, ATV 61H●●●M3X, ATV 61●●●●N4, ATV 61W●●●N4C		IEC 60721-3-3 classes 3C1 and 3S2
	ATV 61H●●●M3S337, ATV 61HD11M3X337…HD45M3X337, ATV 61HD55M3X…HD90M3X, ATV 61H075N4S337…HD75N4S337, ATV 61HD90N4…HC63N4, ATV 61W●●●N4337 ATV 61W●●●N4C337		IEC 60721-3-3 class 3C2
Relative humidity			5…95% without condensation or dripping water conforming to IEC 60068-2-3
Ambient temperature around the unit	Operation	**°C**	For ATV 61H●●●●● drives: - 10…+ 50 without derating, depending on the rating. Up to + 60°C with derating (and with the VW3 A9 4●● control card fan kit, depending on the ratings). For ATV 61W●●●●● drives: - 10…+ 40 without derating. See derating curves on pages 138 to 145.
	Storage	**°C**	- 25…+ 70
Maximum operating altitude		**m**	1000 without derating 1000…3000 derating the current by 1% per additional 100 m. Limited to 2000 m for the “Corner Grounded” distribution network
Operating position Maximum permanent angle in relation to the normal vertical mounting position			

Variable speed drives for asynchronous motors

Altivar 61

Drive characteristics

Output frequency range	ATV 61H●●●M3 ATV 61HD11M3X…HD37M3X ATV 61H075N4…HD37N4	**Hz**	0.5…1000
	ATV 61HD45M3X…HD90M3X ATV 61HD45N4…HC63N4 ATV 61W075N4…WD90N4 ATV 61W075N4C…WD90N4C	**Hz**	0.5…500
Configurable switching frequency	ATV 61H●●●M3, ATV 61HD11M3X…HD45M3X, ATV 61H075N4…HD75N4	**kHz**	Nominal switching frequency: 12 kHz without derating in continuous operation. Adjustable during operation from 1…16 kHz Above 12 kHz, see derating curves on pages 138 and 139.
	ATV 61HD55M3X	**kHz**	Nominal switching frequency: 2.5 kHz without derating in continuous operation. Adjustable during operation from 2.5…12 kHz Above 2.5 kHz, see derating curves on pages 140 and 141.
	ATV 61HD75M3X, HD90M3X	**kHz**	Nominal switching frequency: 2.5 kHz without derating in continuous operation. Adjustable during operation from 2.5…8 kHz Above 2.5 kHz, see derating curves on pages 140 and 141.
	ATV 61HD90N4	**kHz**	Nominal switching frequency: 4 kHz without derating in continuous operation. Adjustable during operation from 2…8 kHz Above 4 kHz, see derating curves on pages 140 and 141.
	ATV 61HC11N4…HC63N4	**kHz**	Nominal switching frequency: 2.5 kHz without derating in continuous operation. Adjustable during operation from 2…8 kHz Above 2.5 kHz, see derating curves on pages 140 to 143.
	ATV 61W075N4…WD15N4 ATV 61W075N4C…WD15N4C		Nominal switching frequency: 8 kHz without derating in continuous operation. Adjustable during operation from 2…16 kHz Above 8 kHz, see derating curves on pages 144 and 145.
	ATV 61WD18N4…WD90N4 ATV 61WD18N4C…WD90N4C		Nominal switching frequency: 4 kHz without derating in continuous operation. Adjustable during operation from 2…16 kHz Above 4 kHz, see derating curves on pages 144 and 145.
Speed range			1…100 in open loop mode
Speed accuracy	For a torque variation of 0.2 Tn to Tn		± 10% of nominal slip, without speed feedback
Torque accuracy			± 15% in open loop mode
Transient overtorque			130% of the nominal motor torque (typical value at ± 10%) for 60 s
Braking torque			30% of the nominal motor torque without braking resistor (typical value) Up to 130 % with braking resistor installed as an option, see page 57
Maximum transient current	ATV 61H●●●M3 ATV 61H●●●M3X ATV 61H●●●N4		120% of the nominal drive current for 60 s (typical value)
	ATV 61W●●●N4 ATV 61W●●●N4C		110% of the nominal drive current for 60 s (typical value)
Motor control profile	Asynchronous motor		Sensorless Flux Vector Control (FVC) (voltage or current vector) Voltage/frequency ratio (2 or 5 points) Energy saving ratio
	Synchronous motor		Vector control without speed feedback
Frequency loop			PI regulator with adjustable structure for a speed response adapted to the machine (accuracy, speed)
Slip compensation			Automatic whatever the load. Can be suppressed or adjusted Not available in voltage/frequency ratio

Electrical power characteristics

Power	Voltage	**V**	200 - 15%...240 + 10% single phase for ATV 61H075M3...HU75M3 200 - 15%...240 + 10% 3-phase for ATV 61H●●●M3 and ATV 61H●●●M3X 380 - 15%...480 + 10% 3-phase for ATV 61●●●●N4 and ATV 61W●●●N4C
	Frequency	**Hz**	50 - 5%...60 + 5%
Signalling			1 red LED: LED lit indicates the presence of drive voltage
Output voltage			Maximum 3-phase voltage equal to line supply voltage
Drive noise level			Conforming to directive 86-188/EEC
	ATV 61H075M3, HU15M3 ATV 61H075N4…HU22N4 ATV 61W075N4…WU30N4 ATV 61W075N4C…WU30N4C	**dBA**	43
	ATV 61HU22M3…HU40M3 ATV 61HU30N4, HU40N4 ATV 61WU40N4, WU55N4 ATV 61WU40N4C, WU55N4C	**dBA**	54.5
	ATV 61HU55M3 ATV 61HU55N4, HU75N4 ATV 61WU75N4, WD11N4 ATV 61WU75N4C, WD11N4C	**dBA**	55.6
	ATV 61HU75M3 ATV 61HD11N4 ATV 61WD15N4 ATV 61WD15N4C	**dBA**	57.4
	ATV 61HD11M3X, HD15M3X ATV 61HD15N4, HD18N4 ATV 61WD18N4, WD22N4 ATV 61WD18N4C, WD22N4C	**dBA**	60.2
	ATV 61HD18M3X, HD22M3X ATV 61HD22N4 ATV 61WD30N4 ATV 61WD30N4C	**dBA**	59.9
	ATV 61HD30M3X…HD45M3X, ATV 61HD30N4, HD37N4 ATV 61WD37N4, WD45N4 ATV 61WD37N4C, WD45N4C	**dBA**	64
	ATV 61HD45N4…HD75N4 ATV 61WD55N4…WD90N4 ATV 61WD55N4C…WD90N4C	**dBA**	63.7
	ATV 61HD55M3X, HD75M3X ATV 61HD90N4, HC11N4	**dBA**	60.5
	ATV 61HD90M3X ATV 61HC13N4	**dBA**	69.5
	ATV 61HC16N4, HC22N4	**dBA**	66
	ATV 61HC25N4, HC31N4	**dBA**	68
	ATV 61HC40N4, HC50N4	**dBA**	70
	ATV 61HC63N4	**dBA**	71
Electrical isolation			Between power and control (inputs, outputs, power supplies)

Connection cable characteristics

Cable type for	Mounting in an enclosure		Single-strand IEC cable, ambient temperature 45°C, copper 90°C XLPE/EPR or copper 70°C PVC
	Mounting in an enclosure with an IP 21 or IP 31 kit		3-strand IEC cable, ambient temperature 40°C, copper 70°C PVC
	Mounting in an enclosure with a UL Type 1 kit		3-strand UL 508 cable except for choke (2-strand UL 508 cable), ambient temperature 40°C, copper 75°C PVC

Connection characteristics (terminals for the power supply, the motor, the DC bus and the braking resistor)

Drive terminals		**L1/R, L2/S, L3/T, U/T1, V/T2, W/T3**	**PC/-, PO, PA/+**	**PA, PB**
Maximum wire size and tightening torque	ATV 61H075M3…HU40M3 ATV 61H075N4…HU40N4	4 mm^2, AWG 8 1.4 Nm, 12.3 lb.in		
	ATV 61HU55M3 ATV 61HU55N4, HU75N4	6 mm^2, AWG 6 3 Nm, 26.5 lb.in		
	ATV 61HU75M3 ATV 61HD11N4	16 mm^2, AWG 4 3 Nm, 26.5 lb.in		
	ATV 61HD11M3X, HD15M3X ATV 61HD15N4, HD18N4	35 mm^2, AWG 2 5.4 Nm, 47.7 lb.in		
	ATV 61HD18M3X, HD22M3X ATV 61HD22N4	50 mm^2, AWG 1/0 24 Nm, 212 lb.in		
	ATV 61HD30N4, HD37N4	50 mm^2, AWG 1/0 24 Nm, 212 lb.in		
	ATV 61HD30M3X, ATV 61HD45N4	150 mm^2, 300 kcmil 41 Nm, 360 lb.in		
	ATV 61HD37M3X, ATV 61HD55N4	150 mm^2, 300 kcmil 41 Nm, 360 lb.in		
	ATV 61HD45M3X, ATV 61HD75N4	150 mm^2, 300 kcmil 41 Nm, 360 lb.in		
	ATV 61HD55M3X, HD75M3X	2 x 100 mm^2, 2 x 250 MCM M10, 24 Nm, 212 lb.in	2 x 100 mm^2, 2 x 250 MCM M12, 41 Nm, 360 lb.in	60 mm^2, 250 MCM M8, 12 Nm, 106 lb.in
	ATV 61HD90M3X	2 x 100 mm^2, 2 x 250 MCM M10, 24 Nm, 212 lb.in	2 x 150 mm^2, 2 x 250 MCM M12, 41 Nm, 360 lb.in	60 mm^2, 250 MCM M8, 12 Nm, 106 lb.in
	ATV 61HD90N4, HC11N4	2 x 100 mm^2, 2 x 250 MCM M10, 24 Nm, 212 lb.in	2 x 100 mm^2, 2 x 250 MCM M12, 41 Nm, 360 lb.in	60 mm^2, 250 MCM M8, 12 Nm, 106 lb.in
	ATV 61HC13N4	2 x 100 mm^2, 2 x 250 MCM M10, 24 Nm, 212 lb.in	2 x 150 mm^2, 2 x 250 MCM M12, 41 Nm, 360 lb.in	60 mm^2, 250 MCM M8, 12 Nm, 106 lb.in
	ATV 61HC16N4	2 x 120 mm^2, 2 x 250 MCM M10, 24 Nm, 212 lb.in	2 x 120 mm^2, 2 x 250 MCM M12, 41 Nm, 360 lb.in	120 mm^2, 250 MCM M10, 24 Nm, 212 lb.in
	ATV 61HC22N4	2 x 150 mm^2, 2 x 350 MCM M12, 41 Nm, 360 lb.in	2 x 150 mm^2, 2 x 350 MCM M12, 41 Nm, 360 lb.in	120 mm^2, 250 MCM M10, 24 Nm, 212 lb.in
	ATV 61HC25N4	4 x 185 mm^2, 3 x 350 MCM M12, 41 Nm, 360 lb.in	4 x 185 mm^2, 3 x 350 MCM M12, 41 Nm, 360 lb.in	–
	ATV 61HC31N4	4 x 185 mm^2, 3 x 350 MCM M12, 41 Nm, 360 lb.in	4 x 185 mm^2, 3 x 350 MCM M12, 41 Nm, 360 lb.in	–
	ATV 61HC40N4	4 x 185 mm^2, 4 x 500 MCM M12, 41 Nm, 360 lb.in	8 x 185 mm^2, 4 x 500 MCM M12, 41 Nm, 360 lb.in	–
	ATV 61HC50N4	**L1/R, L2/S, L3/T** 2 x 2 x 185 mm^2, 4 x 500 MCM M12, 41 Nm, 360 lb.in **U/T1, V/T2, W/T3** 4 x 185 mm^2, 4 x 500 MCM M12, 41 Nm, 360 lb.in	8 x 185 mm^2, 4 x 500 MCM M12, 41 Nm, 360 lb.in	–
	ATV 61HC63N4	**L1/R, L2/S, L3/T** 2 x 4 x 185 mm^2, 5 x 500 MCM M12, 41 Nm, 360 lb.in **U/T1, V/T2, W/T3** 6 x 185 mm^2, 5 x 500 MCM M12, 41 Nm, 360 lb.in	8 x 185 mm^2, 5 x 500 MCM M12, 41 Nm, 360 lb.in	–
	ATV 61W075N4…WU55N4 ATV 61W075N4C…WU55N4C	4 mm^2, AWG 8 1.4 Nm, 12.3 lb.in		
	ATV 61WU75N4, WD11N4 ATV 61WU75N4C, WD11N4C	6 mm^2, AWG 6 3 Nm, 26.5 lb.in		
	ATV 61WD15N4 ATV 61WD15N4C	16 mm^2, AWG 4 3 Nm, 26.5 lb.in		
	ATV 61WD18N4, WD22N4 ATV 61WD18N4C, WD22N4C	35 mm^2, AWG 2 5.4 Nm, 47.7 lb.in		
	ATV 61WD30N4 ATV 61WD30N4C	50 mm^2, AWG 1/0 24 Nm, 212 lb.in		
	ATV 61WD37N4, WD45N4 ATV 61WD37N4C, WD45N4C	50 mm^2, AWG 1/0 24 Nm, 212 lb.in		
	ATV 61WD55N4 ATV 61WD55N4C	150 mm^2, 300 kcmil 41 Nm, 360 lb.in		
	ATV 61WD75N4 ATV 61WD75N4C	150 mm^2, 300 kcmil 41 Nm, 360 lb.in		
	ATV 61WD90N4 ATV 61WD90N4C	150 mm^2, 300 kcmil 41 Nm, 360 lb.in		

Electrical control characteristics

Internal supplies available		Short-circuit and overload protection: ■ 1 x 10.5 V ⎓ ± 5% supply for the reference potentiometer (1 to 10 kΩ), maximum current 10 mA ■ 1 x 24 V ⎓ supply (min. 21 V, max. 27 V), maximum current 200 mA.
External + 24 V power supply *(1)* (not supplied)		24 V ⎓ (min. 19 V, max. 30 V) Power 30 W
Analog inputs	AI1-/AI1+	1 bipolar differential analog input ± 10 V ⎓ (maximum safe voltage 24 V) Max. sampling time: 2 ms ± 0.5 ms Resolution: 11 bits +1 sign bit Accuracy: ± 0.6% for a temperature variation of 60°C Linearity: ± 0.15% of the maximum value
	AI2	1 software-configurable current or voltage analog input: ■ voltage analog input 0...10 V ⎓, impedance 30 kΩ (max. safe voltage 24 V) ■ current analog input X-Y mA by programming X and Y from 0 to 20 mA, with impedance 242 Ω Max. sampling time: 2 ms ± 0.5 ms Resolution: 11 bits Accuracy: ± 0.6% for a temperature variation of 60°C Linearity: ± 0.15% of the maximum value
	Other inputs	See option cards
Configurable voltage and current analog outputs	AO1	1 analog output configurable for voltage or current: ■ voltage analog output 0...10 V ⎓, minimum load impedance 470 Ω ■ current analog output X-Y mA by programming X and Y from 0 to 20 mA, maximum load impedance 500 Ω Max. sampling time: 2 ms ± 0.5 ms Resolution: 10 bits Accuracy: ± 1% for a temperature variation of 60°C Linearity: ± 0.2%
	Other outputs	See option cards
Configurable relay outputs	R1A, R1B, R1C	1 relay logic output, one “N/C” contact and one “N/O” contact with common point Minimum switching capacity: 3 mA for 24 V ⎓ Maximum switching capacity: ■ on resistive load (cos φ = 1): 5 A for 250 V ∿ or 30 V ⎓ ■ on inductive load (cos φ = 0.4 and L/R = 7 ms): 2 A for 250 V ∿ or 30 V ⎓ Max. response time: 7 ms ± 0.5 ms Electrical service life: 100,000 operations
	R2A, R2B	1 relay logic output, one “N/O” contact Minimum switching capacity: 3 mA for 24 V ⎓ Maximum switching capacity: ■ on resistive load (cos φ = 1): 5 A for 250 V ∿ or 30 V ⎓ ■ on inductive load (cos φ = 0.4 and L/R = 7 ms): 2 A for 250 V ∿ or 30 V ⎓ Max. response time: 7 ms ± 0.5 ms Electrical service life: 100,000 operations
	Other outputs	See option cards
Logic inputs LI	LI1...LI5	5 programmable logic inputs, 24 V ⎓ , compatible with level 1 PLC, IEC 65A-68 standard Impedance: 3.5 kΩ Maximum voltage: 30 V Max. sampling time: 2 ms ± 0.5 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)
	LI6	1 logic input, configurable by a switch as a logic input or as an input for PTC probes Logic input, characteristics identical to inputs LI1...LI5 Input for a maximum of 6 PTC probes mounted in series: ■ nominal value < 1.5 kΩ ■ trip resistance 3 kΩ, reset value 1.8 kΩ ■ short-circuit protection < 50 Ω
	Positive logic (Source)	State 0 if ⩽ 5 V or logic input not wired, state 1 if ⩾ 11 V
	Negative logic (Sink)	State 0 if ⩾ 16 V or logic input not wired, state 1 if ⩽ 10 V
	Other inputs	See option cards
Safety input	PWR	1 input for the Power Removal safety function: ■ Power supply: 24 V ⎓ (max. 30 V) ■ Impedance: 1.5 kΩ ■ State 0 if < 2 V, state 1 if > 17 V
Maximum I/O wire size and tightening torque		2.5 mm^2 (AWG 14) 0.6 Nm

(1) Please consult our specialist catalogue “Power supplies, splitter blocks and interfaces”.

Electrical control characteristics (continued)

Acceleration and deceleration ramps			Ramp profiles: ■ linear, can be adjusted separately from 0.01 to 9000 s ■ S, U or customized Automatic adaptation of deceleration ramp time if braking capacities exceeded, possible inhibition of this adaptation (use of braking resistor).
Braking to a standstill			By DC injection: ■ by a command on a programmable logic input ■ automatically as soon as the estimated output frequency drops to < 0.1 Hz, period adjustable from 0 to 60 s or continuous, current adjustable from 0 to 1.2 In (in open loop mode only).
Main drive protection and safety features			Thermal protection: ■ against overheating ■ of the power stage Protection against: ■ short-circuits between motor phases ■ input phase breaks ■ overcurrents between output phases and earth ■ overvoltages on the DC bus ■ a break on the control circuit ■ exceeding the limit speed Safety function for: ■ line supply overvoltage and undervoltage ■ input phase loss, in 3-phase
Motor protection (see page 172)			Thermal protection integrated in drive via continuous calculation of I^2t taking speed into account: ■ The motor thermal state is saved when the drive is powered down. ■ Function can be modified via operator dialogue terminals, depending on the type of motor (force-cooled or self-cooled). Protection against motor phase breaks Protection with PTC probes
Dielectric strength	ATV 61●●●M3 ATV 61●●●M3X		Between earth and power terminals: 2830 V ⎓ Between control and power terminals: 4230 V ⎓
	ATV 61●●●●N4 ATV 61W●●●N4C		Between earth and power terminals: 3535 V ⎓ Between control and power terminals: 5092 V ⎓
Insulation resistance to earth			> 1 MΩ (electrical isolation) 500 V ⎓ for 1 minute
Frequency resolution	Display units	**Hz**	0.1
	Analog inputs	**Hz**	0.024/50 Hz (11 bits)

Operational safety characteristics

Protection	Of the machine		Power Removal (PWR) safety function which forces stopping and/or prevents the motor from restarting unintentionally, conforming to EN 954-1 category 3 and draft standard IEC/EN 61800-5-2.
	Of the system process		Power Removal (PWR) safety function which forces stopping and/or prevents the motor from restarting unintentionally, conforming to IEC/EN 61508 level SIL2 and draft standard IEC/EN 61800-5-2.

Communication port characteristics

Modbus protocol

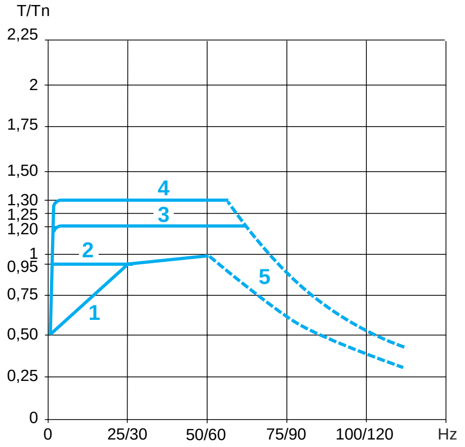
Type of connection		Modbus RJ45 terminal port	Modbus RJ45 network port
Structure	Physical interface	2-wire RS 485	
	Transmission mode	RTU	
	Transmission speed	Configurable via the display terminal or the PowerSuite software workshop: 9600 bps or 19200 bps	Configurable via the display terminal or the PowerSuite software workshop: 4800 bps, 9600 bps, 19200 bps or 38.4 Kbps
	Format	Fixed = 8 bits, even parity, 1 stop	Configurable via the display terminal or the PowerSuite software workshop: - 8 bits, odd parity, 1 stop - 8 bits, even parity, 1 stop - 8 bits, no parity, 1 stop - 8 bits, no parity, 2 stop
	Polarization	No polarization impedances These should be provided by the wiring system (for example, in the master)	
	Address	1 to 247, configurable via the terminal or the PowerSuite software workshop. 3 addresses can be configured in order to access the data of the drive, the “Controller Inside” programmable card, the multi-pump card and the communication card respectively. These 3 addresses are identical for the terminal and network ports.	
Services	Functional profiles	CiA DSP 402: “Device Profile Drives and Motion Control”. I/O profile	
	Messaging	Read Holding Registers (03) 63 words maximum Write Single Register (06) Write Multiple Registers (16) 61 words maximum Read/Write Multiple Registers (23) 63/59 words maximum Read Device Identification (43) Diagnostics (08)	
	Communication monitoring	Can be inhibited. “Time out”, which can be set between 0.1 s and 30 s	
Diagnostics	Via LED on ATV 61H●●●M3, ATV 61HD11M3X…HD45M3X, ATV 61H075N4…HD75N4	An activity LED on integrated 7-segment display terminal. One LED for each port.	
	With graphic display terminal	One activity LED Control word received Reference received For each port: ■ Number of frames received ■ Number of incorrect frames.	

CANopen protocol

Structure	Connector	9-way male SUB-D connector on CANopen adapter. This connects to the RJ45 Modbus network port.
	Network management	Slave
	Transmission speed	20 Kbps, 50 Kbps, 125 Kbps, 250 Kbps, 500 Kbps or 1 Mbps
	Address (Node ID)	1 to 127, configurable via the terminal or the PowerSuite software workshop.
Services	Number of PDOs	3 receive and 3 transmit (PDO1, PDO2 and PDO3)
	PDO modes	Event-triggered, Time-triggered, Remotely-requested, Sync (cyclic), Sync (acyclic)
	PDO linking	Yes
	PDO mapping	Configurable (PDO1 and PDO2)
	Number of SDOs	1 server
	Emergency	Yes
	CANopen application layer	CiA DS 301, V 4.02
	Functional profiles	CiA DSP 402: “Device Profile Drives and Motion Control”. I/O profile
	Communication monitoring	Node Guarding, Heartbeat
Diagnostics	Via LED on ATV 61H●●●M3, ATV 61HD11M3X…HD45M3X, ATV 61H075N4…HD75N4	2 LEDs: “RUN” and “ERROR” on integrated 7-segment display terminal
	With graphic display terminal and PowerSuite software workshop	2 LEDs: “RUN” and “ERROR” Control word received Reference received Display of received PDOs Display of transmitted PDOs State of NMT chart Received PDOs counter Transmitted PDOs counter Reception error counter Transmission error counter
Description file		A single eds file is supplied for the whole range on the CD-ROM containing the documentation or on the website: www.telemecanique.com. It contains the description of the drive parameters.

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.



Open loop applications

Open loop applications

1 Self-cooled motor: continuous useful torque *(1)*
2 Force-cooled motor: continuous useful torque
3 Overtorque for 60 seconds maximum for ATV 61W●●●●●
(UL Type 12/IP 54 drives)
4 Overtorque for 60 seconds maximum for ATV 61H●●●●●
(UL Type 1/IP 20 drives)
5 Torque in overspeed at constant power *(2)*

Motor thermal protection

Altivar 61 drives feature thermal protection designed specifically for self-cooled or force-cooled variable speed motors. The drive calculates the motor thermal state even when it is switched off.

This motor thermal protection is designed for a maximum ambient temperature of 40°C around the motor. If the temperature around the motor exceeds 40°C, thermal protection should be provided directly by thermistor probes (PTC) integrated in the motor. The probes are managed directly by the drive.

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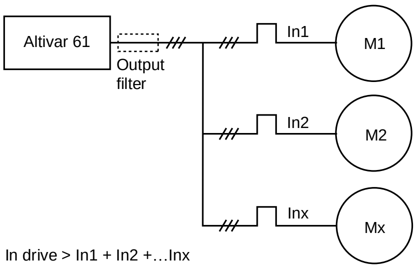
(1) For power ratings ⩽250 W, motor derating is 20% instead of 50% at very low frequencies.
(2) The motor nominal frequency and the maximum output frequency can be adjusted from 10 to 500 Hz or 1000 Hz, depending on the rating.
Check the mechanical overspeed characteristics of the selected motor with the manufacturer.

Special uses

Using Altivar 61 drives with synchronous motors

Altivar 61 drives are also suitable for powering synchronous motors (sinusoidal electromotive force) in open loop mode and are used to achieve performance levels comparable to those associated with an asynchronous motor in sensorless flux vector control.
This drive/motor combination makes it possible to obtain remarkable speed accuracy and maximum torque even at zero speed. The design and construction of synchronous motors are such that they offer enhanced power density and high-speed performance in a compact unit. Drive control for synchronous motors does not cause stalling.



In drive > In1 + In2 +…Inx

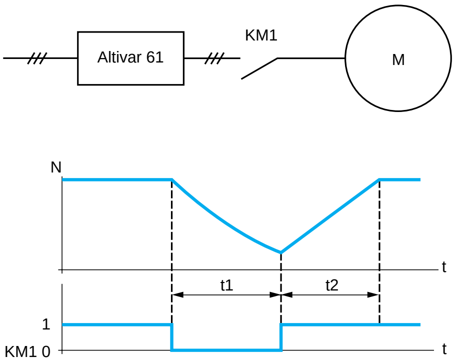
Connecting motors in parallel

Connecting motors in parallel

The nominal current of the drive must be greater than or equal to the sum of the currents of the motors to be controlled.
In this case, provide external thermal protection for each motor using probes or thermal overload relays. For cable runs over a certain length, taking account of all the tap links, it is advisable either to install an output filter between the drive and the motors or to use the overvoltage limitation function.

If several motors are used in parallel, there are 2 possible scenarios:

- The motors have equal power ratings, in which case the torque characteristics will remain optimized after the drive has been configured
- The motors have different power ratings, in which case the torque characteristics will not be optimized for all the motors.



KM1: Output contactor
t1: deceleration without ramp (freewheel)
t2: acceleration with ramp
N: Speed

Example of loss of output contactor

Switching the motor at the drive output

The drive can be switched when locked or unlocked. If the drive is switched on-the-fly (drive unlocked), the motor is controlled and accelerates until it reaches the reference speed smoothly following the acceleration ramp. This use requires configuration of the automatic catching a spinning load ("catch on the fly") and the motor phase loss on output cut functions.

Typical applications: loss of safety circuit at drive output, bypass function, switching of motors connected in parallel.
On new installations, it is recommended that the Power Removal safety function is used.

Test 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 function.

Variable speed drives for asynchronous motors

Altivar 61

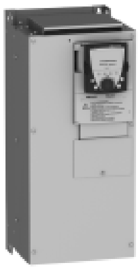
Supply voltage 200…240V 50/60 Hz

DF534520

ATV 61H075M3

DF534521

ATV 61HU22M3Z



DF534522

ATV 61HD37M3X

UL Type 1/IP 20 drives

Motor		Line supply				Altivar 61			
Power indicated on plate *(1)*		Line current *(2)*		Apparent power	Maximum prospective line Isc	Max. continuous current *(1)*	Max. transient current for 60 s	Reference *(3)*	Weight
		200 V	240 V	240 V		230 V			
kW	*HP*	A	A	kVA	kA	A	A		kg
Single phase supply voltage: 200…240 V 50/60 Hz									
0.37	*0.5*	6.9	5.8	1.4	5	3.6	5.7	**ATV 61H075M3** *(4)*	3.000
0.75	*1*	12	9.9	2.4	5	9.6	9.6	**ATV 61HU15M3** *(4)*	3.000
1.5	*2*	18.2	15.7	3.7	5	13.2	13.2	**ATV 61HU22M3** *(4)*	3.000
2.2	*3*	25.9	22.1	5.3	5	16.4	16.4	**ATV 61HU30M3** *(4)*	4.000
3	–	25.9	22	5.3	5	21	21	**ATV 61HU40M3** *(4) (5)*	4.000
4	*5*	34.9	29.9	7	5	33	33	**ATV 61HU55M3** *(4) (5)*	5.500
5.5	*7.5*	47.3	40.1	9.5	22	39.6	39.6	**ATV 61HU75M3** *(4) (5)*	5.500
Three phase supply voltage: 200…240 V 50/60 Hz									
0.75	*1*	6.1	5.3	2.2	5	4.8	5.7	**ATV 61H075M3** *(4)*	3.000
1.5	*2*	11.3	9.6	4	5	8	9.6	**ATV 61HU15M3** *(4)*	3.000
2.2	*3*	15	12.8	5.3	5	11	13.2	**ATV 61HU22M3** *(4)*	4.000
3	–	19.3	16.4	6.8	5	13.7	16.4	**ATV 61HU30M3** *(4)*	4.000
4	*5*	25.8	22.9	9.5	5	17.5	21	**ATV 61HU40M3** *(4)*	4.000
5.5	*7.5*	35	30.8	12.8	22	27.5	33	**ATV 61HU55M3** *(4)*	5.500
7.5	*10*	45	39.4	16.4	22	33	39.6	**ATV 61HU75M3** *(4)*	7.000
11	*15*	53.3	45.8	19	22	54	64.8	**ATV 61HD11M3X** *(4) (6)*	9.000
15	*20*	71.7	61.6	25.6	22	66	79.2	**ATV 61HD15M3X** *(4) (6)*	9.000
18.5	*25*	77	69	28.7	22	75	90	**ATV 61HD18M3X** *(4) (6)*	19.000
22	*30*	88	80	33.3	22	88	105.6	**ATV 61HD22M3X** *(4) (6)*	19.000
30	*40*	124	110	45.7	22	120	144	**ATV 61HD30M3X** *(4) (6)*	39.000
37	*50*	141	127	52.8	22	144	172.8	**ATV 61HD37M3X** *(4) (6)*	39.000
45	*60*	167	147	61.1	22	176	211.2	**ATV 61HD45M3X** *(4) (6)*	39.000
55	*75*	200	173	71.9	35	221	265.2	**ATV 61HD55M3X** *(6) (7) (8)*	59.000
75	*100*	271	232	96.4	35	285	313.5	**ATV 61HD75M3X** *(6) (7) (8)*	72.000
90	*125*	336	288	119.7	35	359	394.9	**ATV 61HD90M3X** *(6) (7) (8)*	72.000

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(1) These values are for a nominal switching frequency of 12 kHz up to ATV 61HD45M3X or of 2.5 kHz for ATV 61HD55M3X…HD90M3X drives for use in continuous operation.
The switching frequency is adjustable from 1…16 kHz up to ATV 61HD45M3X, from 2.5…12 kHz for ATV 61HD55M3X and from 2.5…8 kHz for ATV 61HD75M3X, HD90M3X drives.
Above 2.5 or 12 kHz, depending on the rating, the drive reduces the switching frequency itself in the event of an excessive temperature rise. For continuous operation above the nominal switching frequency, derate the nominal drive current, see derating curves on pages 138 to 141.

(2) Typical value for the indicated motor power and for the maximum prospective line Isc.

(3) The ATV 61HD55M3X…HD90M3X drives come in a reinforced version as standard, enabling them to operate in particular environmental conditions; see the enviromental conditions on page 9.
To order the reinforced version of the ATV 61H●●●M3 and ATV 61HD11M3X...HD45M3X drives, add at the end of the reference:
*- **S337** for ATV 61H●●●M3. Example: ATV 61H075M3 becomes **ATV 61H075M3S337**.*
*- **337** for ATV 61H●●●M3X. Example: ATV 61HD11M3X becomes **ATV 61HD11M3X337**.*
If a reinforced version of the drive is supplied for particular environmental conditions, it must come with a remote graphic display terminal.

*(4) All drives come with a remote graphic display terminal. The ATV 61H●●●M3 and ATV 61HD11M3X...ATV 61HD45M3X drives can be ordered without a graphic display terminal. In this case, add a **Z** at the end of the reference. They will then come equipped with an integrated 7-segment display terminal.*
*Example: ATV 61H075M3 without a graphic display terminal becomes **ATV 61H075M3Z**.*

(5) A line choke must be used, see page 68.

(6) Drive supplied without EMC filter. EMC filters are available as an option, see page 76.

(7) Drive supplied as standard with a DC choke, which must be used when connecting the drive to the 3-phase supply.
For connections to the DC bus, the drive can be ordered without a DC choke by adding D at the end of the reference.
*Example: ATV 61HD55M3X becomes **ATV 61HD55M3XD.***

(8) Drive supplied without plate for EMC mounting. It is included in the UL Type 1 or IP 31 conformity kits, to be ordered separately, see pages 24 and 25.

***Note:** Consult the tables summarizing the possible combinations: drives, options and accessories, see pages 84 to 87.*

ATV 61HU22N4

ATV 61HU40N4Z

ATV 61HC31N4

UL Type 1/IP 20 drives

Motor		Line supply				Altivar 61				
Power indicated on plate *(1)*		Line current *(2)*		Apparent power	Maximum prospective line Isc	Max. continuous current *(1)*		Max. transient current for 60 s	Reference *(3)*	Weight
		380 V	480 V	380 V		380 V	460 V			
kW	*HP*	A	A	kVA	kA	A	A	A		kg
Three phase supply voltage: 380...480 V 50/60 Hz										
0.75	*1*	3.7	3	2.4	5	2.3	2.1	2.7	**ATV 61H075N4** *(4)*	3.000
1.5	*2*	5.8	5.3	3.8	5	4.1	3.4	4.9	**ATV 61HU15N4** *(4)*	3.000
2.2	*3*	8.2	7.1	5.4	5	5.8	4.8	6.9	**ATV 61HU22N4** *(4)*	3.000
3	–	10.7	9	7	5	7.8	6.2	9.3	**ATV 61HU30N4** *(4)*	4.000
4	*5*	14.1	11.5	9.3	5	10.5	7.6	12.6	**ATV 61HU40N4** *(4)*	4.000
5.5	*7.5*	20.3	17	13.4	22	14.3	11	17.1	**ATV 61HU55N4** *(4)*	5.500
7.5	*10*	27	22.2	17.8	22	17.6	14	21.1	**ATV 61HU75N4** *(4)*	5.500
11	*15*	36.6	30	24.1	22	27.7	21	33.2	**ATV 61HD11N4** *(4)*	7.000
15	*20*	48	39	31.6	22	33	27	39.6	**ATV 61HD15N4** *(4)*	9.000
18.5	*25*	45.5	37.5	29.9	22	41	34	49.2	**ATV 61HD18N4** *(4)*	9.000
22	*30*	50	42	32.9	22	48	40	57.6	**ATV 61HD22N4** *(4)*	19.000
30	*40*	66	56	43.4	22	66	52	79.2	**ATV 61HD30N4** *(4)*	26.000
37	*50*	84	69	55.3	22	79	65	94.8	**ATV 61HD37N4** *(4)*	26.000
45	*60*	104	85	68.5	22	94	77	112.8	**ATV 61HD45N4** *(4)*	44.000
55	*75*	120	101	79	22	116	96	139.2	**ATV 61HD55N4** *(4)*	44.000
75	*100*	167	137	109.9	22	160	124	192	**ATV 61HD75N4** *(4)*	44.000
90	*125*	166	143	109.3	35	179	179	214.8	**ATV 61HD90N4** *(5) (6)*	60.000
110	*150*	202	168	133	35	215	215	236.5	**ATV 61HC11N4** *(5) (6)*	74.000
132	*200*	239	224	157.3	35	259	259	284.9	**ATV 61HC13N4** *(5) (6)*	80.000
160	*250*	289	275	190.2	50	314	314	345.4	**ATV 61HC16N4** *(5) (6)*	110.000
200	*300*	357	331	235	50	427	427	469.7	**ATV 61HC22N4** *(5) (6)*	140.000
220	*350*	396	383	260.6	50					
250	*400*	444	435	292.2	50	481	481	529.1	**ATV 61HC25N4** *(5) (6)*	140.000
280	*450*	494	494	325.1	50	616	616	677.6	**ATV 61HC31N4** *(5) (6)*	215.000
315	*500*	555	544	365.3	50					
355	–	637	597	419.3	50	759	759	834.9	**ATV 61HC40N4** *(5) (6)*	225.000
400	*600*	709	644	466.6	50					
500	*700*	876	760	576.6	50	941	941	1035.1	**ATV 61HC50N4** *(5) (6)*	300.000
560	*800*	978	858	643.6	50	1188	1188	1306.8	**ATV 61HC63N4** *(5) (6)*	300.000
630	*900*	1091	964	718	50					

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(1) These values are for a nominal switching frequency of 12 kHz up to ATV 61HD75N4, of 4 kHz for ATV 61HD90N4 or of 2.5 kHz for ATV 61HD11N4…HC63N4 drives for use in continuous operation.
The switching frequency is adjustable from 1…16 kHz up to ATV 61HD75N4 and from 2…8 kHz for ATV 61HD90N4…ATV 61HC63N4 drives.
Above 2.5, 4 or 12 kHz, depending on the rating, the drive reduces the switching frequency itself in the event of an excessive temperature rise. For continuous operation above the nominal switching frequency, derate the nominal drive current, see derating curves on pages 138 to 143.

(2) Typical value for the indicated motor power and for the maximum prospective line Isc.

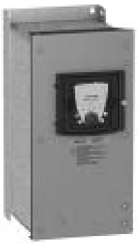
(3) The ATV 61HD90N4…HC63N4 drives come in a reinforced versions as standard, enabling them to operate in particular environmental conditions; see the environmental conditions on page 9.
*To order the reinforced version of the ATV 61H075N4...HD75N4 drives, add **S337** at the end of the reference. Example: ATV 61H075N4 becomes **ATV 61H075N4S337**.*
If a reinforced version of the drive is supplied for particular environmental conditions, it must come with a remote graphic display terminal.
The ATV 61HD90N4…HC63N4 drives come in the reinforced version as standard.

*(4) All drives come with a remote graphic display terminal. The ATV 61H075N4...ATV 61HD75N4 drives can be ordered without a graphic display terminal. In this case, add a **Z** at the end of the reference. They will then come equipped with an integrated 7-segment display terminal.*
*Example: ATV 61H075N4 without a graphic display terminal becomes **ATV 61H075N4Z**.*

(5) Drive supplied as standard with a DC choke, which must be used when connecting the drive to the 3-phase supply.
For connections to the DC bus, the drive can be ordered without a DC choke by adding D at the end of the reference.
*Example: ATV 61HD90N4 becomes **ATV 61HD90N4D.***

(6) Drive supplied without plate for EMC mounting. Depending on the rating, the plate is included in the UL Type 1 conformity kit and/or in the IP 31 conformity kit, to be ordered separately:
- for ATV 61HD90N4…ATV 61HC31N4 drives, order the UL Type 1 or IP 31 conformity kit, see pages 24 and 25,
- for ATV 61HC40N4…HC63N4 drives, order the IP 31 conformity kit, see page 25.

***Note:** Consult the tables summarizing the possible combinations: drives, options and accessories, see pages 84 to 87.*



ATV 61W075N4

UL Type 12/IP 54 drives with an integrated class A EMC filter

Motor		**Line supply**				**Altivar 61**				
Power indicated on plate *(1)*		**Line current** *(2)*		**Apparent power**	**Maximum prospective line Isc**	**Max. continuous current** *(1)*		**Max. transient current for 60 s**	**Reference** *(3) (4) (5)*	**Weight**
		380 V	**480 V**	**380 V**		**380 V**	**460 V**			
kW	***HP***	**A**	**A**	**kVA**	**kA**	**A**	**A**	**A**		**kg**
Three phase supply voltage: 380…480 V 50/60 Hz										
0.75	*1*	1.8	1.5	1.2	5	2.3	2.1	2.5	**ATV 61W075N4**	13.000
1.5	*2*	3.5	3	2.3	5	4.1	3.4	4.5	**ATV 61WU15N4**	13.000
2.2	*3*	5	4.1	3.3	5	5.1	4.8	5.6	**ATV 61WU22N4**	13.000
3	–	6.7	5.6	4.4	5	7.2	6.2	7.9	**ATV 61WU30N4**	14.000
4	*5*	8.8	7.4	5.8	5	9.1	7.6	10	**ATV 61WU40N4**	16.000
5.5	*7.5*	11.4	9.2	7.5	22	12	11	13.2	**ATV 61WU55N4**	16.000
7.5	*10*	15.8	13.3	10.4	22	16	14	17.6	**ATV 61WU75N4**	22.000
11	*15*	21.9	17.8	14.4	22	22.5	21	24.7	**ATV 61WD11N4**	22.000
15	*20*	30.5	25.8	20	22	30.5	27	33.5	**ATV 61WD15N4**	28.000
18.5	*25*	37.5	32.3	24.7	22	37	34	40.7	**ATV 61WD18N4**	36.000
22	*30*	43.6	36.6	28.7	22	43.5	40	47.8	**ATV 61WD22N4**	36.000
30	*40*	56.7	46.2	37.3	22	58.5	52	64.3	**ATV 61WD30N4**	51.000
37	*50*	69.5	56.8	45.7	22	71.5	65	78.6	**ATV 61WD37N4**	64.000
45	*60*	85.1	69.6	56	22	85	77	93.5	**ATV 61WD45N4**	65.000
55	*75*	104.8	87	69	35	103	96	113.3	**ATV 61WD55N4**	92.000
75	*100*	140.3	113.8	92.3	35	137	124	150.7	**ATV 61WD75N4**	92.000
90	*125*	171.8	140.9	113	35	163	156	179.3	**ATV 61WD90N4**	92.000

(1) These values are given for the nominal frequency switching of 8 kHz up to ATV 61WD15N4, or of 4 kHz for ATV 61WD18N4…WD90N4 drives for use in continuous operation.
The switching frequency is adjustable from 2…16 kHz for all ratings.
Above 4 or 8 kHz, depending on the rating, the drive will reduce the switching frequency itself in the event of an excessive temperature rise. For continuous operation above the nominal switching frequency, derate the nominal drive current, see derating curves on pages 144 and 145.

(2) Typical value for the indicated motor power and for the maximum prospective line Isc.

(3) These drives can be ordered in a reinforced version, enabling them to operate in particular environmental conditions; see environmental conditions on page 9. In this case, add ***337*** *at the end of the reference.*
Example: ATV 61W075N4 becomes ***ATV 61W075N4337****.*

(4) Drives supplied with 2 EMC plates:
- 1 for UL Type 12 conformity, to be installed by yourself,
- 1 for IP 54 conformity, already installed.

(5) These drives can be ordered with a 24 V ⎓ power supply, allowing an additional consumption of 250 mA. In this case, add A24 at the end of the reference.
Example: ATV 61W075N4 becomes ***ATV 61W075N4A24.***

Note: *Consult the tables summarizing the possible combinations: drives, options and accessories, see pages 88 and 89.*

UL Type 12/IP 54 drives with an integrated class B EMC filter

ATV 61WD30N4C

Motor		**Line supply**				**Altivar 61**				
Power indicated on plate *(1)*		**Line current** *(2)*		**Apparent power**	**Maximum prospective line Isc**	**Max. continuous current** *(1)*		**Max. transient current for 60 s**	**Reference** *(3) (4) (5)*	**Weight**
		380 V	**480 V**	**380 V**		**380 V**	**460 V**			
kW	***HP***	**A**	**A**	**kVA**	**kA**	**A**	**A**	**A**		**kg**
Three phase supply voltage: 380…480 V 50/60 Hz										
0.75	*1*	1.8	1.5	1.2	5	2.3	2.1	2.5	**ATV 61W075N4C**	19.000
1.5	*2*	3.5	3	2.3	5	4.1	3.4	4.5	**ATV 61WU15N4C**	19.000
2.2	*3*	5	4.1	3.3	5	5.1	4.8	5.6	**ATV 61WU22N4C**	20.000
3	–	6.7	5.6	4.4	5	7.2	6.2	7.9	**ATV 61WU30N4C**	20.000
4	*5*	8.8	7.4	5.8	5	9.1	7.6	10	**ATV 61WU40N4C**	23.000
5.5	*7.5*	11.4	9.2	7.5	22	12	11	13.2	**ATV 61WU55N4C**	23.000
7.5	*10*	15.8	13.3	10.4	22	16	14	17.6	**ATV 61WU75N4C**	32.000
11	*15*	21.9	17.8	14.4	22	22.5	21	24.7	**ATV 61WD11N4C**	32.000
15	*20*	30.5	25.8	20	22	30.5	27	33.5	**ATV 61WD15N4C**	40.000
18.5	*25*	37.5	32.3	24.7	22	37	34	40.7	**ATV 61WD18N4C**	51.000
22	*30*	43.6	36.6	28.7	22	43.5	40	47.8	**ATV 61WD22N4C**	50.000
30	*40*	56.7	46.2	37.3	22	58.5	52	64.3	**ATV 61WD30N4C**	68.000
37	*50*	69.5	56.8	45.7	22	71.5	65	78.6	**ATV 61WD37N4C**	85.000
45	*60*	85.1	69.6	56	22	85	77	93.5	**ATV 61WD45N4C**	85.000
55	*75*	104.8	87	69	35	103	96	113.3	**ATV 61WD55N4C**	119.000
75	*100*	140.3	113.8	92.3	35	137	124	150.7	**ATV 61WD75N4C**	119.000
90	*125*	171.8	140.9	113	35	163	156	179.3	**ATV 61WD90N4C**	119.000

(1) These values are given for the nominal frequency switching of 8 kHz up to ATV 61WD15N4C, or of 4 kHz for ATV 61WD18N4C…WD90N4C drives for use in continuous operation.
The switching frequency is adjustable from 2…16 kHz for all ratings.
Above 4 or 8 kHz, depending on the rating, the drive will reduce the switching frequency itself in the event of an excessive temperature rise. For continuous operation above the nominal switching frequency, derate the nominal drive current, see derating curves on pages 144 and 145.

(2) Typical value for the indicated motor power and for the maximum prospective line Isc.

(3) These drives can be ordered in a reinforced version, enabling them to operate in particular environmental conditions; see environmental conditions on page 9. In this case, add ***337*** *at the end of the reference.*
Example: ATV 61W075N4C becomes ***ATV 61W075N4C337****.*

(4) Drives supplied with 2 EMC plates:
- 1 for UL Type 12 conformity, to be installed by yourself,
- 1 for IP 54 conformity, already installed.

(5) These drives can be ordered with a 24 V ⎓ power supply, allowing an additional consumption of 250 mA. In this case, add 24 at the end of the reference.
Example: ATV 61W075N4C becomes ***ATV 61W075N4C24.***

Note: *Consult the tables summarizing the possible combinations: drives, options and accessories, see pages 88 and 89.*

Variable speed drives for asynchronous motors

Altivar 61

Option: accessories

Adapter for 115 V ∼ logic inputs

This adapter is used to connect 115 V ∼ logic signals to the logic inputs on the drive or an I/O extension card.

7 logic inputs with capacitive impedance at 60 Hz of 0.22 µF are available for connecting the logic signals:

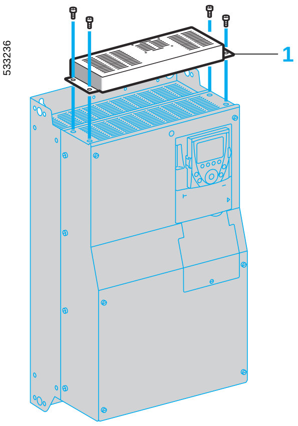
- Max. current: 200 mA
- Response time: 5 ms to change from state 0 to state 1, 20 ms to change from state 1 to state 0
- Logic state 0 for a voltage below 20 V, logic state 1 for a voltage between 70 V and 132 V

The power supply must be provided by a 115 V ∼ external power supply (min. 70 V, max. 132 V).

References

Description	Reference	Weight kg
Adapter for 115 V ∼ logic inputs	**VW3 A3 101**	–

Control card fan kit



Control card fan kit

This kit is required for ATV 61HD18M3X…HD45M3X and ATV 61HD22N4…HD75N4 drives.

It enables the drive to operate at an ambient temperature of 50°C to 60°C, for example, if it is mounted in an IP 54 enclosure. The circulation of air around the electronic cards prevents the formation of hot spots.

Check the derating to be applied to the drive nominal current, see derating curves on pages 138 to 143.

The kit 1 is mounted on the upper part of the drive. It is powered by the drive.

It consists of:

- A fan subassembly
- Fixing accessories
- A manual

References

For drives	Reference	Weight kg
ATV 61HD18M3X, HD22M3X ATV 61HD22N4	**VW3 A9 404**	–
ATV 61HD30N4, HD37N4	**VW3 A9 405**	–
ATV 61HD30M3X…HD45M3X	**VW3 A9 406**	–
ATV 61HD45N4…HD75N4	**VW3 A9 407**	–

Dimensions:
page 95

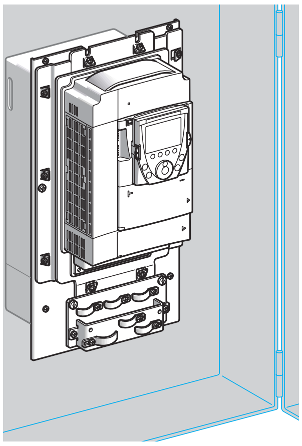
Kit for flush-mounting in a dust and damp-proof enclosure

This kit can be used to mount the power part of the drive outside the enclosure (IP 54 degree of protection), which reduces the power dissipated into the enclosure, see page 146.
It is available for ATV 61H●●●M3, ATV 61H●●●M3X, ATV 61HD55M3XD…ATV 61HD90M3XD, ATV 61HD90N4…HC31N4 and ATV 61HD90N4D…ATV 61HC31N4D drives.

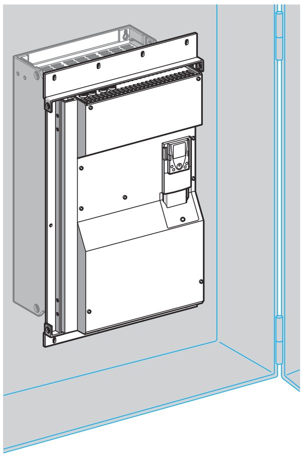
With this type of mounting, the maximum internal temperature in the enclosure can then reach 60°C without it being necessary to derate the drive current.
Between 50°C and 60°C, a control card fan kit must be used for the ATV 61HD18M3X…HD45M3X and ATV 61HD22N4…HD75N4 drives to prevent hot spots, see page 22.

The back of the enclosure must be drilled and cut out for this type of mounting.

The kit consists of:
- A metal frame of the right size for the drive rating
- Corner pieces
- Seals
- A fan support. This can be used to move the fans so that they can be accessed from the front of the enclosure
- Fixing accessories
- A cutting and drilling template
- A manual.



ATV 61HU75N4 flush-mounted



ATV 61HC31N4D flush-mounted

References

For drives		Reference	Weight kg
ATV 61H075M3…HU15M3 ATV 61H075N4…HU22N4		**VW3 A9 501**	2.700
ATV 61HU22M3…HU40M3 ATV 61HU30N4, HU40N4		**VW3 A9 502**	3.100
ATV 61HU55M3 ATV 61HU55N4, HU75N4		**VW3 A9 503**	3.700
ATV 61HU75M3 ATV 61HD11N4		**VW3 A9 504**	4.600
ATV 61HD11M3X, HD15M3X ATV 61HD15N4, HD18N4		**VW3 A9 505**	4.900
ATV 61HD18M3X, HD22M3X ATV 61HD22N4		**VW3 A9 506**	3.900
ATV 61HD30N4, HD37N4		**VW3 A9 507**	4.200
ATV 61HD30M3X…HD45M3X		**VW3 A9 508**	4.900
ATV 61HD45N4…HD75N4		**VW3 A9 509**	5.200
ATV 61HD55M3X, HD75M3X ATV 61HD55M3XD, HD75M3XD ATV 61HD90N4, HC11N4, ATV 61HD90N4D, HC11N4D		**VW3 A9 510** *(1)*	5.100
ATV 61HD90M3X ATV 61HD90M3XD ATV 61HC13N4 ATV 61HC13N4D		**VW3 A9 511** *(1)*	3.600
ATV 61HC16N4 ATV 61HC16N4D		**VW3 A9 512** *(1)*	4.300
ATV 61HC22N4 ATV 61HC22N4D		**VW3 A9 513** *(1)*	4.700
ATV 61HC25N4, HC31N4 ATV 61HC25N4D, HC31N4D	Without braking unit	**VW3 A9 514** *(1)*	4.700
	With braking unit	**VW3 A9 515** *(1)*	4.700

(1) The procedure for cutting out and drilling the enclosure varies depending on whether the DC choke is present or not:
- Drives supplied with DC choke: ATV 61HD55M3X…HD90M3X, ATV 61HD90N4…HC31N4,
- Drives supplied without DC choke: ATV 61HD55M3XD…HD90M3XD, ATV 61HD90N4D…HC31N4D.
See pages 97 and 98.

Dimensions:
pages 96 to 98

Kit for UL Type 1 conformity (mounting outside the enclosure)

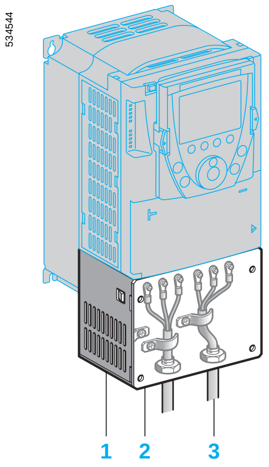
When the drive is mounted directly on a wall outside the enclosure, this kit can be used to ensure UL Type 1 conformity when connecting the cables with a tube.
The shielding is connected inside the kit.

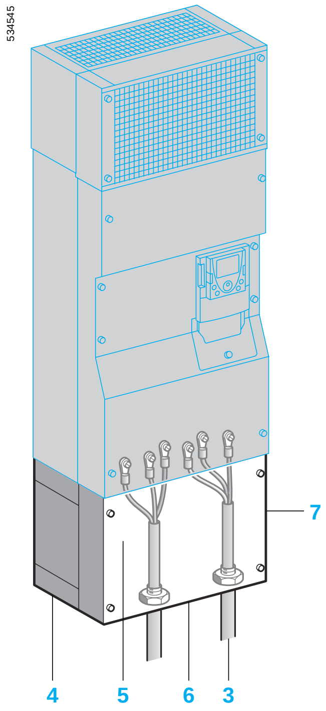
For ATV 61H●●●M3, ATV 61HD11M3X…HD45M3X and ATV 61H075N4…HD75N4 drives, the kit consists of:

- All the mechanical parts 1 including a pre-cut plate 2 for connecting the tubes 3
- Fixing accessories
- A manual.

For ATV 61HD55M3X…HD90M3X and ATV 61HD90N4…HC31N4 drives, the kit consists of:

- An IP 54 casing 4 used to maintain the IP 54 degree of protection for the power part
- An EMC plate 5
- A UL Type 1 cover 7
- A pre-drilled plate 6 for connecting the tubes 3
- Fixing accessories
- A manual.





UL Type 1 conformity kits

References

For drives		Reference	Weight kg
ATV 61H075M3…HU15M3 ATV 61H075N4…HU22N4		**VW3 A9 201**	1.300
ATV 61HU22M3…HU40M3 ATV 61HU30N4, HU40N4		**VW3 A9 202**	1.500
ATV 61HU55M3 ATV 61HU55N4, HU75N4		**VW3 A9 203**	1.800
ATV 61HU75M3 ATV 61HD11N4		**VW3 A9 204**	2.000
ATV 61HD11M3X, HD15M3X ATV 61HD15N4, HD18N4		**VW3 A9 205**	2.800
ATV 61HD18M3X, HD22M3X ATV 61HD22N4		**VW3 A9 206**	4.000
ATV 61HD30N4, HD37N4		**VW3 A9 207**	5.000
ATV 61HD30M3X…HD45M3X		**VW3 A9 217**	7.000
ATV 61HD45N4…HD75N4		**VW3 A9 208**	7.000
ATV 61HD55M3X, HD75M3X ATV 61HD90N4, HC11N4		**VW3 A9 209**	9.400
ATV 61HD90M3X ATV 61HC13N4		**VW3 A9 210**	11.800
ATV 61HC16N4		**VW3 A9 211**	11.600
ATV 61HC22N4		**VW3 A9 212**	14.600
ATV 61HC25N4, HC31N4	Without braking unit	**VW3 A9 213**	19.500
	With braking unit	**VW3 A9 214**	19.500

Dimensions:
pages 99 and 100

Variable speed drives for asynchronous motors

Altivar 61

Option: accessories

Kits for IP 21 or IP 31 conformity (mounting outside the enclosure)

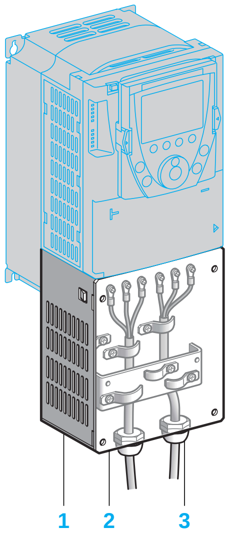
When the drive is mounted directly on a wall outside the enclosure, this kit can be used to ensure conformity with IP 21 or IP 31 degree of protection when connecting the cables with a cable gland.
The shielding is connected inside the kit.

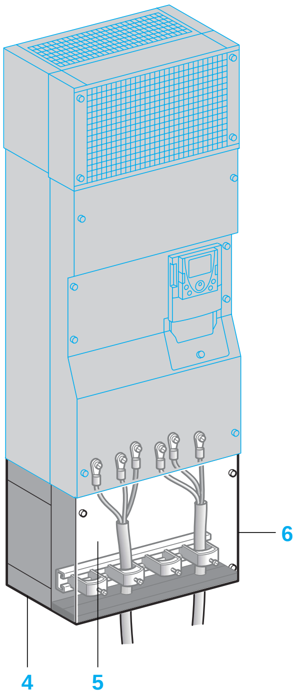
For ATV 61H●●●M3, ATV 61HD11M3X…HD45M3X and ATV 61H075N4...HD75N4 drives, the kit conforms to IP 21 degree of protection.
It consists of:

- All the mechanical parts 1 including a drilled plate 2 for attaching the cable glands 3
- Fixing accessories
- A manual.

For ATV 61HD55M3X…HD90M3X and ATV 61HD90N4...HC63N4 drives, the kit conforms to IP 31 degree of protection.
It consists of:

- An IP 54 casing 4 used to maintain the IP 54 degree of protection for the power part
- An EMC plate with cable clips 5
- An IP 31 cover 6
- Fixing accessories
- A manual.





IP 21 or IP 31 conformity kits

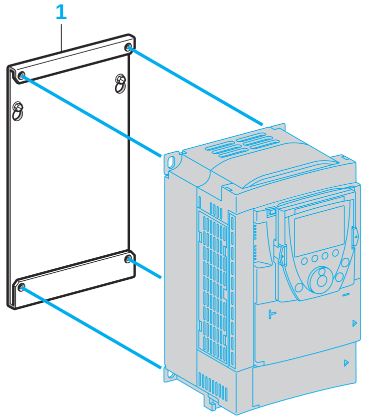
References

For drives		Degree of protection	Reference	Weight kg
ATV 61H075M3…HU15M3 ATV 61H075N4…HU22N4		IP 21	**VW3 A9 101**	1.300
ATV 61HU22M3…HU40M3 ATV 61HU30N4, HU40N4		IP 21	**VW3 A9 102**	1.500
ATV 61HU55M3 ATV 61HU55N4, HU75N4		IP 21	**VW3 A9 103**	1.800
ATV 61HU75M3 ATV 61HD11N4		IP 21	**VW3 A9 104**	2.000
ATV 61HD11M3X, HD15M3X ATV 61HD15N4, HD18N4		IP 21	**VW3 A9 105**	2.800
ATV 61HD18M3X, HD22M3X ATV 61HD22N4		IP 21	**VW3 A9 106**	4.000
ATV 61HD30N4, HD37N4		IP 21	**VW3 A9 107**	5.000
ATV 61HD30M3X…HD45M3X		IP 21	**VW3 A9 117**	7.000
ATV 61HD45N4…HD75N4		IP 21	**VW3 A9 108**	7.000
ATV 61HD55M3X, HD75M3X ATV 61HD90N4, HC11N4		IP 31	**VW3 A9 109**	9.400
ATV 61HD90M3X ATV 61HC13N4		IP 31	**VW3 A9 110**	11.800
ATV 61HC16N4		IP 31	**VW3 A9 111**	11.600
ATV 61HC22N4		IP 31	**VW3 A9 112**	14.600
ATV 61HC25N4, HC31N4	Without braking unit	IP 31	**VW3 A9 113**	19.500
	With braking unit	IP 31	**VW3 A9 114**	19.500
ATV 61HC40N4, HC50N4		IP 31	**VW3 A9 115**	25.000
ATV 61HC63N4		IP 31	**VW3 A9 116**	35.000

Dimensions:
pages 99 and 100

Substitution kit for Altivar 38 drives

This kit 1 is used to install an Altivar 61 drive in place of an Altivar 38 drive using the same fixing holes. It includes the mechanical adapters required for mounting.



VW3 A9 304

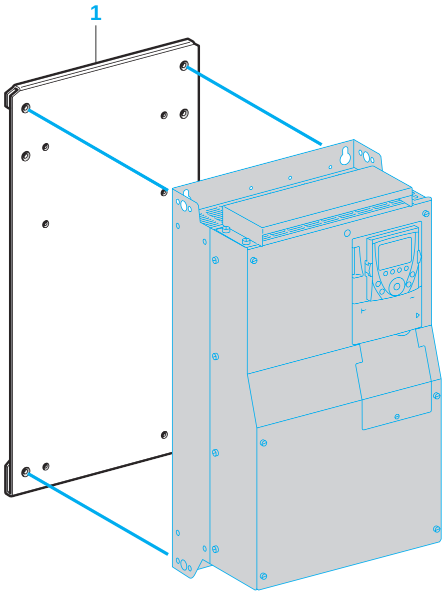
References

Old drive	Motor Power kW	Motor Power *HP*	Replaced by	Reference	Weight kg
Replacing an Altivar 38 drive with an integrated EMC filter Three phase supply voltage: 380…480 V 50/60 Hz					
ATV 38HU18N4	0.75	*1*	ATV 61H075N4	**VW3 A9 302**	–
ATV 38HU29N4	1.5	*2*	ATV 61HU15N4	**VW3 A9 302**	–
ATV 38HU41N4	2.2	*3*	ATV 61HU22N4	**VW3 A9 303**	–
ATV 38HU54N4	3	–	ATV 61HU30N4	**VW3 A9 304**	–
ATV 38HU72N4	4	*5*	ATV 61HU40N4	**VW3 A9 304**	–
ATV 38HU90N4	5.5	*7.5*	ATV 61HU55N4	**VW3 A9 305**	–
ATV 38HD12N4	7.5	*10*	ATV 61HU75N4	**VW3 A9 306**	–
ATV 38HD16N4	11	*15*	ATV 61HD11N4	**VW3 A9 307**	–
ATV 38HD23N4	15	*20*	ATV 61HD15N4	**VW3 A9 308**	–
ATV 38HD25N4	18.5	*25*	ATV 61HD18N4	**VW3 A9 309**	–
ATV 38HD28N4	22	*30*	ATV 61HD22N4	**VW3 A9 310**	–
ATV 38HD33N4	30	*40*	ATV 61HD30N4	**VW3 A9 311**	–
ATV 38HD46N4	37	*50*	ATV 61HD37N4	**VW3 A9 311**	–
ATV 38HD54N4	45	*60*	ATV 61HD45N4	**VW3 A9 315**	–
ATV 38HD64N4	55	*75*	ATV 61HD55N4	**VW3 A9 315**	–
ATV 38HD79N4	75	*100*	ATV 61HD75N4	**VW3 A9 315**	–

Variable speed drives for asynchronous motors

Altivar 61

Option: accessories



VW3 A9 315

References (continued)

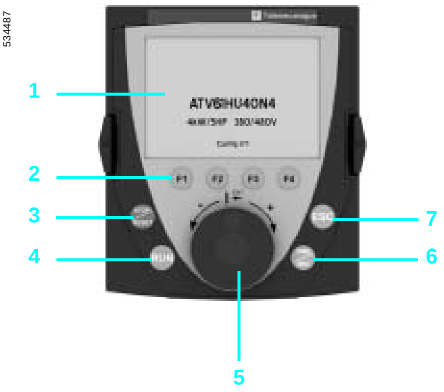
Old drive	Motor Power		Replaced by	Reference	Weight
	kW	*HP*			kg
Replacing an Altivar 38 drive without an integrated EMC filter **Three phase supply voltage: 380…480 V 50/60 Hz**					
ATV 38HD25N4X	18.5	*25*	ATV 61HD18N4	**VW3 A9 309**	–
ATV 38HD28N4X	22	*30*	ATV 61HD22N4	**VW3 A9 310**	–
ATV 38HD33N4X	30	*40*	ATV 61HD30N4	**VW3 A9 311**	–
ATV 38HD46N4X	37	*50*	ATV 61HD37N4	**VW3 A9 311**	–
ATV 38HD54N4X	45	*60*	ATV 61HD45N4	**VW3 A9 315**	–
ATV 38HD64N4X	55	*75*	ATV 61HD55N4	**VW3 A9 315**	–
ATV 38HD79N4X	75	*100*	ATV 61HD75N4	**VW3 A9 315**	–

Presentation, references

Variable speed drives for asynchronous motors

Altivar 61

Options: dialogue



Remote graphic display terminal

(this display terminal can be supplied with the drive or ordered separately)

This display terminal is attached to the front of the drive. In the case of drives supplied without a graphic display terminal, it covers the integrated 7-segment display terminal.

It can be:

- Used remotely in conjunction with the appropriate accessories (see below)
- Connected to several drives using multidrop link components (see page 29)

It is used:

- To control, adjust and configure the drive
- To display the current values (motor, input/output values, etc.)
- To save and download configurations; 4 configuration files can be saved.

The terminal's maximum operating temperature is 60°C and it features IP 54 protection.

Description

1 Graphic display:
  - 8 lines, 240 x 160 pixels
  - Large digits that can be read from 5 m away
  - Supports display of bar charts

2 Assignable function keys F1, F2, F3, F4:
  - Dialogue functions: direct access, help screens, navigation
  - Application functions: “Local Remote”, preset speed

3 “STOP/RESET”: local control of motor stop/fault reset

4 “RUN”: local control of motor operation

5 Navigation button:
  - Press: saves the current value (ENT)
  - Turn ±: increases or decreases the value, takes you to the next or previous line.

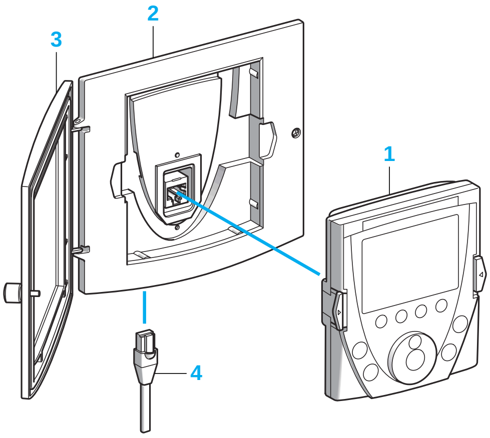
6 “FWD/REV”: reverses the direction of rotation of the motor

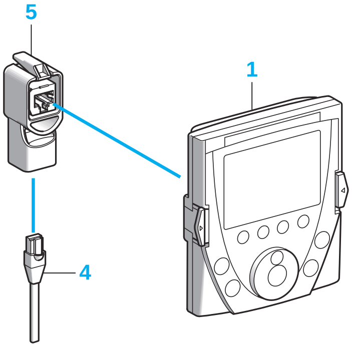
7 “ESC”: aborts a value, a parameter or a menu to return to the previous selection

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

References

Description	Code	Reference	Weight kg
Remote graphic display terminal	1	**VW3 A1 101**	0.145





Graphic display terminal accessories

The available accessories are:

- A remote mounting kit for mounting on an enclosure door with IP 54 degree of protection. It includes:
  - ☐ All the mechanical fittings
  - ☐ The screws and bolts
- A transparent door which attaches to the remote mechanics to achieve IP 65 degree of protection
- A cable equipped with two RJ45 connectors so that the graphic display terminal can be connected to the Altivar 61 drive (1, 3, 5 or 10 m lengths available)
- An RJ45 female/female adapter for connecting the VW3 A1 101 graphic display terminal to the VW3 A1 104 R●●● remote cable

References

Description	Code	Length m	Degree of protection	Reference	Weight kg
Remote mounting kit *(1)*	2	–	IP 54	**VW3 A1 102**	0.150
Door *(2)*	3	–	IP 65	**VW3 A1 103**	0.040
Remote cables Equipped with 2 RJ45 connectors	4	1	–	**VW3 A1 104 R10**	0.050
	4	3	–	**VW3 A1 104 R30**	0.150
	4	5	–	**VW3 A1 104 R50**	0.250
	4	10	–	**VW3 A1 104 R100**	0.500
RJ45 female/female adaptor	5	–	–	**VW3 A1 105**	0.010

(1) In this case, use a VW3 A1 104 R●● remote connecting cable, which must be ordered separately (see above).

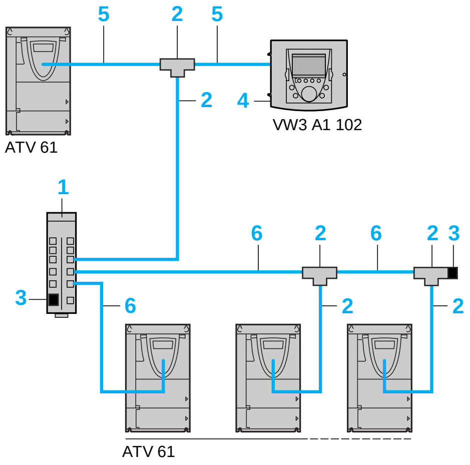
(2) To be mounted on remote mounting kit VW3 A1 102 (for mounting on an enclosure door), which must be ordered separately (see above).

Dimensions:
page 101

Variable speed drives for asynchronous motors

Altivar 61

Options: dialogue



Example of connection via multidrop link

Multidrop link components

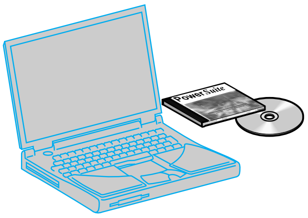
These components enable a graphic display terminal to be connected to several drives via a multidrop link. This multidrop link is connected to the Modbus terminal port on the front of the drive.

Connection accessories

Description		Code	Sold in lots of	Unit reference	Weight kg
Modbus splitter box 10 RJ45 connectors and 1 screw terminal		1	–	**LU9 GC3**	0.500
Modbus T-junction boxes	With integrated 0.3 m cable	2	–	**VW3 A8 306 TF03**	–
	With integrated 1 m cable	2	–	**VW3 A8 306 TF10**	–
Modbus line terminator	For RJ45 connector R = 120 Ω C = 1 nF	3	2	**VW3 A8 306 RC**	0.010
Remote mounting kit	For the VW3 A1 101 graphic display terminal	4	–	**VW3 A1 102**	0.150

Connecting cables
(equipped with 2 RJ45 connectors)

Used with	Code	Length m	Reference	Weight kg
For remote operation of the Altivar 61 and the VW3 A1 101 graphic display terminal	5	1	**VW3 A1 104 R10**	0.050
		3	**VW3 A1 104 R30**	0.150
		5	**VW3 A1 104 R50**	0.250
		10	**VW3 A1 104 R100**	0.500
Modbus bus	6	0.3	**VW3 A8 306 R03**	0.025
		1	**VW3 A8 306 R10**	0.060
		3	**VW3 A8 306 R30**	0.130



PowerSuite software workshop

PowerSuite software workshop

The PowerSuite software workshop offers the following benefits:

- Messages can be displayed in plain text in several languages (English, French, German, Italian and Spanish)
- Work can be prepared in the design office without having to connect the drive to the PC
- Configurations and settings can be saved to floppy disk or hard disk and downloaded to the drive
- Print facility
- Altivar 38 files can be converted for transfer to an Altivar 61 drive
- Oscillograms can be displayed

See pages 178 to 181.

Dimensions:
page 101

Presentation, characteristics

Variable speed drives for asynchronous motors

Altivar 61

Options: I/O extension cards

Presentation

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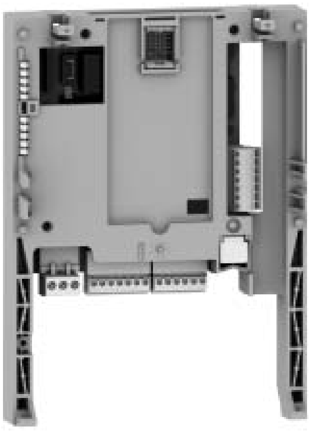


VW3 A3 202

Altivar 61 drives can be specially adapted to particular application areas by installing I/O extension cards.

Two models are available:

■ Card with logic I/O featuring:
☐ 1 relay logic output (“C/O” contact)
☐ 4 x 24 V ⎓ positive or negative logic inputs
☐ 2 x 24 V ⎓ open collector positive or negative logic outputs
☐ 1 input for PTC probes

■ Card with extended I/O featuring:
☐ 1 differential current analog input (0…20 mA)
☐ 1 software-configurable voltage (0…10 V ⎓) or current (0…20 mA) analog input
☐ 2 software-configurable voltage (± 10 V ⎓, 0…10 V) or current (0…20 mA) analog outputs
☐ 1 relay logic output
☐ 4 x 24 V ⎓ positive or negative logic inputs
☐ 2 x 24 V ⎓ open collector positive or negative logic outputs
☐ 1 input for PTC probes
☐ 1 frequency control input

Characteristics

Logic I/O card VW3 A3 201

Internal supplies available		Short-circuit and overload protection: ■ 1 x 24 V ⎓ supply (min. 21 V, max. 27 V), maximum current 200 mA for the complete drive and I/O extension card assembly ■ 1 x 10.5 V ⎓ supply (± 5%) for the reference potentiometer (1 to 10 kΩ), max. current 10 mA
Configurable relay output	R3A, R3B, R3C	1 relay logic output, one “N/C” contact and one “N/O” contact with common point. Minimum switching capacity: 3 mA for 24 V ⎓ Maximum switching capacity: ■ on resistive load (cos φ = 1): 5 A for 250 V ~ or 30 V ⎓ ■ on inductive load (cos φ = 0.4 and L/R = 7 ms): 2 A for 250 V ~ or 30 V ⎓ Electrical service life: 100,000 operations Maximum response time: 7 ms ± 0.5 ms
Logic inputs	LI7…LI10	4 programmable logic inputs, 24 V ⎓, compatible with level 1 PLC, IEC 65A-68 standard Impedance 3.5 kΩ Maximum voltage: 30 V Multiple assignment makes it possible to configure several functions on one input Maximum sampling time: 2 ms ± 0.5 ms
	Positive logic (Source)	State 0 if ⩽ 5 V or logic input not wired, state 1 if ⩾ 11 V
	Negative logic (Sink)	State 0 if ⩾ 16 V or logic input not wired, state 1 if ⩽ 10 V
Logic outputs	LO1, LO2	2 x 24 V ⎓ assignable open collector positive logic (Source) or negative logic (Sink) outputs, compatible with level 1 PLC, IEC 65A-68 standard 24 V ⎓ internal or 24 V ⎓ external power supply (min. 12 V, max. 30 V) Maximum current: 200 mA Logic output common (CLO) isolated from other signals Maximum sampling time: 2 ms ± 0.5 ms. The active state is software-configurable as is a delay for each switching operation
Input for PTC probes	TH1+/TH1-	1 input for a maximum of 6 PTC probes mounted in series: ■ nominal value < 1.5 kΩ ■ trip resistance 3 kΩ, reset value 1.8 kΩ ■ short-circuit protection < 50 Ω
Maximum I/O connection capacity and tightening torque		1.5 mm² (AWG 16) 0.25 Nm

Schemes:
page 120

Characteristics (continued), references

Variable speed drives for asynchronous motors

Altivar 61

Options: I/O extension cards

Characteristics (continued)

Extended I/O card VW3 A3 202

Internal supplies available		Short-circuit and overload protection: ■ 1 x 24 V ⎓ supply (min. 21 V, max. 27 V), max. current 200 mA for the complete drive and I/O extension card assembly ■ 1 x 10.5 V ⎓ supply (± 5%) for the reference potentiometer (1 to 10 kΩ), max. current 10 mA
Analog inputs AI	AI3+/AI3-	1 X-Y mA differential current analog input by programming X and Y from 0 to 20 mA, with impedance 250 Ω Maximum sampling time: 5 ms ± 1 ms Resolution: 11 bits + 1 sign bit Accuracy: ± 0.6% for a temperature variation of 60°C Linearity: ± 0.15% of the maximum value
	AI4	1 software-configurable current or voltage analog input: ■ voltage analog input 0…10 V ⎓, impedance 30 kΩ (maximum safe voltage 24 V) ■ X-Y mA current analog input by programming X and Y from 0 to 20 mA, with impedance 250 Ω Maximum sampling time: 5 ms ± 1 ms Resolution: 11 bits Accuracy: ± 0.6% for a temperature variation of 60°C Linearity: ± 0.15% of the maximum value
Analog outputs	AO2, AO3	2 software-configurable current or voltage analog outputs: ■ voltage analog output ± 10 V ⎓, 0…10 V, minimum load impedance 470 Ω ■ X-Y mA current analog output by programming X and Y from 0 to 20 mA, maximum load impedance 500 Ω Maximum sampling time: 5 ms ± 1 ms Resolution: 10 bits Accuracy: ± 1% for a temperature variation of 60°C Linearity: ± 0.2% of the maximum value
Configurable relay output	R4A, R4B, R4C	1 relay logic output, one “N/C” contact and one “N/O” contact with common point. Minimum switching capacity: 3 mA for 24 V ⎓ Maximum switching capacity: ■ on resistive load (cos φ = 1): 5 A for 250 V ∼ or 30 V ⎓ ■ on inductive load (cos φ = 0.4 and L/R = 7 ms): 1.5 A for 250 V ∼ or 30 V ⎓ Electrical service life: 100,000 operations Maximum response time: 10 ms ± 1 ms
Logic inputs	LI11…LI14	4 programmable logic inputs, 24 V ⎓, compatible with level 1 PLC, IEC 65A-68 standard Impedance 3.5 kΩ Maximum voltage: 30 V Multiple assignment makes it possible to configure several functions on one input Maximum sampling time: 5 ms ± 1 ms
	Positive logic (Source)	State 0 if ⩽ 5 V or logic input not wired, state 1 if ⩾ 11 V
	Negative logic (Sink)	State 0 if ⩾ 16 V or logic input not wired, state 1 if ⩽ 10 V
Logic outputs	LO3, LO4	2 x 24 V ⎓ assignable open collector positive logic (Source) or negative logic (Sink) outputs, compatible with level 1 PLC, IEC 65A-68 standard Maximum voltage: 30 V Maximum current: 200 mA Logic output common (CLO) isolated from other signals Maximum sampling time: 5 ms ± 1 ms. The active state is software-configurable as is a delay for each switching operation
Input for PTC probes	TH2+/TH2-	1 input for a maximum of 6 PTC probes mounted in series: ■ nominal value < 1.5 kΩ ■ trip resistance 3 kΩ, reset value 1.8 kΩ ■ short-circuit protection < 50 Ω
Frequency control input	RP	Frequency range: 0…30 kHz Cyclic ratio: 50 % ± 10 % Maximum sampling time: 5 ms ± 1 ms Maximum input voltage 30 V, 15 mA Add a resistor if the input voltage is greater than 5 V (510 Ω for 12 V, 910 Ω for 15 V, 1.3 kΩ for 24 V) State 0 if < 1.2 V, state 1 if > 3.5 V
Maximum I/O connection capacity and tightening torque		1.5 mm^2 (AWG 16) 0.25 Nm

References

I/O extension cards *(1)*

Description	Reference	Weight kg
Logic I/O card	**VW3 A3 201**	0.300
Extended I/O card	**VW3 A3 202**	0.300

(1) The Altivar 61 cannot support more than one I/O card with the same reference. Please refer to the compatibility tables summarizing the possible combinations for drives, options and accessories on pages 84 to 89.

Schemes:
page 120

Variable speed drives for asynchronous motors

Altivar 61

Option: Multi-pump cards

Presentation

Multi-pump cards are used to adapt the drive for pump applications.
Various predefined configurable applications are sold by Schneider Electric and its partners.
In order to protect our know-how, it is not possible to transfer the program from the card to the PC.
A single multi-pump card can be fitted in the Altivar 61 drive. It can be combined with another option card (I/O extension or communication). Consult the tables summarizing the possible combinations: drives, options and accessories, see pages 84 to 89.

Each multi-pump card consists of:

- 10 logic inputs, 2 of which can be used for 2 counters
- 2 analog inputs
- 6 logic outputs
- 2 analog outputs
- A master port for the CANopen bus.

If the power consumption table does not exceed 200 mA, this card can be powered by the ATV 61H●●●●● drives.
Otherwise, an external 24 V ⎓ power supply must be used.
The ATV 61W●●●N4A24 and ATV 61W●●●N4C24 variable speed drives incorporate a 24 V ⎓ power supply and allow an additional consumption of 250 mA.

Multi-pump cards can also use:

- The drive I/O
- The I/O extension card I/O
- The drive parameters (speed, current, torque, etc.).

The Altivar 61 drive:

- Incorporates all the application functions for managing your pumps:

sleep, wake-up, zero flow detection, fluid absence detection, underload detection, overload detection, PID regulator with preset PID references

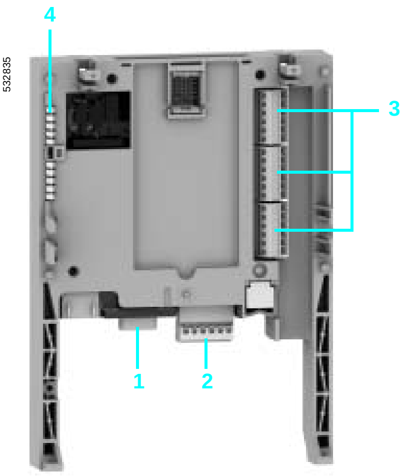
- Is used to adjust your pumps' operating points:

2/5-point quadratic ratio, energy saving ratio

- Protects your pumps:

motor thermal protection, PTC management, low speed detection and time delay.

Description



1 9-way male SUB-D connector for connection to the CANopen bus.

2 Connector with removable screw terminals, 6 contacts at intervals of 3.81 for the 24 V ⎓ power supply and 4 logic inputs.

3 3 connectors with removable screw terminals, 6 contacts at intervals of 3.81 for 6 logic inputs, 6 logic outputs, 2 analog inputs, 2 analog outputs and 2 commons.

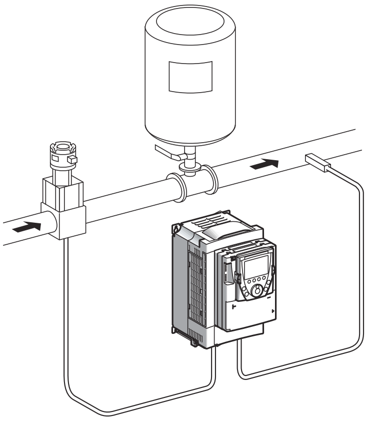
4 5 LEDs, comprising:

- 1 to indicate the presence of the 24 V ⎓ power supply
- 1 to indicate a program execution fault
- 2 to indicate the CANopen bus communication status
- 1 controlled by the application program.

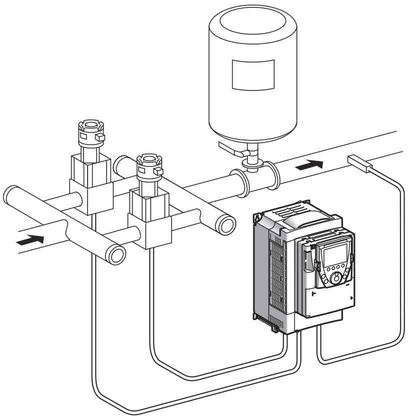
Variable speed drives for asynchronous motors

Altivar 61

Option: Multi-pump cards



Single variable mode



Single variable mode with auxiliary pump

Operation

Multi-pump cards have the following basic operating modes:

Single variable

The same variable pump is always used.
Fixed flow pumps are started in ascending order of the logic outputs.
Fixed flow pumps are stopped in descending order of the logic outputs.

Multiple variable

All the pumps can be variable. The variable pump is chosen according to its operating time. The pump with the shortest operating time is selected. Fixed pumps are started and stopped in ascending and descending order of the logic outputs respectively.

Switching the auxiliary pumps

You start by selecting the pump with the shortest operating time.
You stop a pump by selecting the pump with the longest operating time.

Limiting the operating time between pumps

A relative operating time differential between each pump can be programmed to ensure better distribution of operating times, thereby limiting pump wear.
If the total operating time differential between an operating auxiliary pump and one which is off exceeds the programmed differential, the first pump is stopped and replaced by the second one.

Continuity of service for your installation

If a pump is faulty (information on the Lix logic input) it is not taken into consideration and the start and stop conditions are determined by the other pumps.
It is possible for each pump to:

- Display the operating time
- Reset the counter
- Save the operating times.

Variable speed drives for asynchronous motors

Altivar 61

Option: Multi-pump cards

VW3 A3 502 multi-pump card

The **VW3 A3 502** multi-pump card ensures the compatibility of pump applications developed for an Altivar 38 drive with an Altivar 61 drive.

The card’s 9 operating modes are as follows:
- OFF: no function is activated; this mode is used in particular during the installation’s maintenance
- Single variable
- Multiple variable
- Single variable with changeover of auxiliary pumps
- Multiple variable with changeover of auxiliary pumps
- Single variable with limited operating time
- Multiple variable with limited operating time
- Single variable with changeover of auxiliary pumps and limited operating time
- Multiple variable with changeover of auxiliary pumps and limited operating time.

VW3 A3 503 multi-pump card

The **VW3 A3 503** multi-pump card is used to support all multi-pump applications.

In addition to the existing operating modes, it is possible to develop new applications: booster station, irrigation, etc.

Presentation:
page 32
Characteristics:
page 35
References:
page 35
Schemes:
page 121

Variable speed drives for asynchronous motors

Altivar 61

Option: Multi-pump cards

Electrical characteristics

Power supply	Voltage	**V**	24 ⎓ (min. 19, max. 30)
Power consumption Current	Maximum	**A**	2
	No-load	**mA**	80
	Per logic output	**mA**	200 maximum *(1)*
Analog inputs	AI51, AI52		2 current analog inputs 0…20 mA, impedance 250 Ω Resolution: 10 bits Accuracy: ± 1% for a temperature variation of 60°C Linearity: ± 0.2% of the maximum value Common point for all the card I/O *(2)*
Analog outputs	AO51, AO52		2 current analog outputs 0…20 mA, impedance 500 Ω Resolution: 10 bits Accuracy: ± 1% for a temperature variation of 60°C Linearity: ± 0.2% of the maximum value Common point for all the card I/O *(2)*
Logic inputs	LI51…LI60		Ten 24 V ⎓ logic inputs, compatible with leve1 1 PLC, IEC 65A-68 standard, 2 of which can be used for 2 counters or 4 of which can be used for 2 incremental encoders Impedance: 4.4 kΩ Maximum voltage: 30 V ⎓ Switching thresholds: State 0 if ⩽ 5 V or logic input not wired State 1 if ⩾ 11 V Common point for all the card I/O *(2)*
Logic outputs	LO51…LO56		Six 24 V ⎓ logic outputs, positive logic open collector type (source), compatible with level 1 PLC, standard IEC 65A-68 Maximum switching voltage: 30 V Maximum current: 200 mA Common point for all the card I/O *(2)*
Connection of I/O	Type of contact		Screw, at intervals of 3.81 mm^2
	Maximum wire	**mm^2**	1.5 (AWG 16)
	Tightening torque	**Nm**	0.25
Lithium battery	Life		8 years approx.

References

Description	Use	Reference	Weight kg
Multi-pump cards *(3)* equipped with one 9-way male SUB-D connector	This card ensures compatibility with an ATV 61 drive of applications developed for an ATV 38 drive	**VW3 A3 502**	0.320
	This card can be used to support all multi-pump applications	**VW3 A3 503**	0.320

---

(1) If the power consumption table does not exceed 200 mA, this card can be powered by the drive. Otherwise, an external 24 V ⎓ power supply must be used.

(2) This common point is also the drive 0 V.

(3) The Altivar 61 drive cannot support more than one multi-pump card. Consult the tables summarizing the possible combinations: drives, options and accessories, see pages 84 to 89.

Presentation:
page 32

Operation:
pages 33 and 34

Schemes:
page 121

Variable speed drives for asynchronous motors

Altivar 61

Option: “Controller Inside” programmable card

Presentation

The “Controller Inside” programmable card is used to adapt the variable speed drive to specific applications by integrating control system functions.

Various predefined configurable applications are sold by Schneider Electric and its partners.
The PS 1131 software workshop for PC is used for programming and debugging new applications, quickly and in an open-ended manner (see page 39).
It is not possible to transfer the program from the card to the PC, which enables us to protect our know-how.

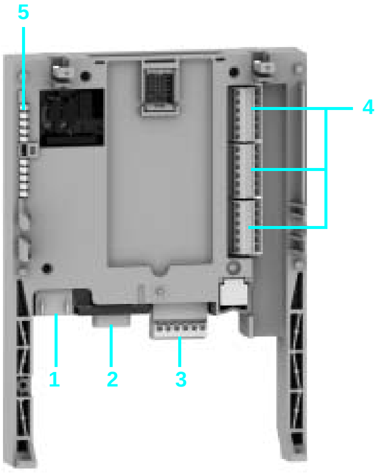
A single “Controller Inside” programmable card can be installed in the Altivar 61 drive. It can be combined with another option card (I/O extension or communication).
Consult the tables summarizing the possible combinations: drives, options and accessories, see pages 84 to 89.

The “Controller Inside” programmable card has:
- 10 logic inputs, 2 of which can be used for 2 counters or 4 of which can be used for 2 incremental encoders
- 2 analog inputs
- 6 logic outputs
- 2 analog outputs
- A master port for the CANopen bus
- A PC port for programming with the PS 1131 software workshop

If the power consumption table does not exceed 200 mA, this card can be powered by the drive. Otherwise, an external 24 V ⎓ power supply must be used.

The ATV 61W●●●N4A24 and ATV 61W●●●N4C24 variable speed drives incorporate a 24 V ⎓ power supply and allow an additional consumption of 250 mA.

The “Controller Inside” programmable card can also use:
- The drive I/O
- The I/O extension card I/O
- The encoder interface card points counter
- The drive parameters (speed, current, torque, etc.).



Description

1 RJ45 connector for connecting the PS 1131 software workshop via an RS 485 serial link.
Connection to the PC is via a cable and an RS 232/RS 485 connector included in the VW3 A8 106 PowerSuite for PC connection kit.

2 9-way male SUB-D connector for connection to the CANopen bus.

3 Connector with removable screw terminals, 6 contacts at intervals of 3.81 for the 24 V ⎓ power supply and 4 logic inputs.

4 3 connectors with removable screw terminals, 6 contacts at intervals of 3.81 for 6 logic inputs, 6 logic outputs, 2 analog inputs, 2 analog outputs and 2 commons.

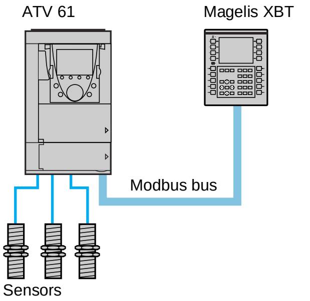
5 5 LEDs, comprising:
- 1 to indicate the presence of the 24 V ⎓ power supply
- 1 to indicate a program execution fault
- 2 to indicate the CANopen bus communication status
- 1 controlled by the application program

Characteristics:
page 38
Functions:
pages 39 to 42
Schemes:
page 121
References:
page 43

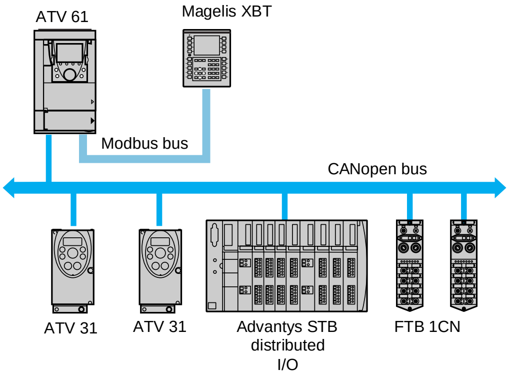
Variable speed drives for asynchronous motors

Altivar 61

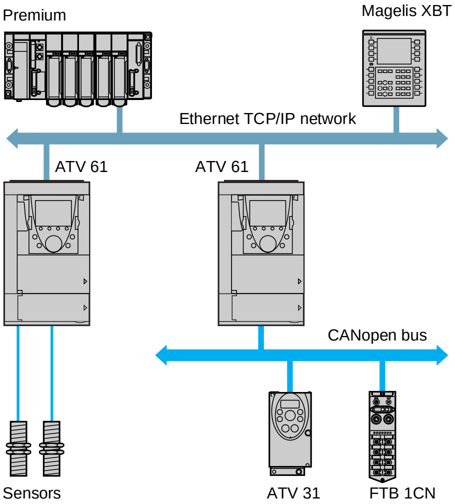
Option: “Controller Inside” programmable card



Independent machine with multiwire system



Independent machine with CANopen bus



Modular machine with Ethernet TCP/IP network

Dialogue

Human-machine dialogue with the application programmed in the “Controller Inside” programmable card is possible using:

- The Altivar 61 graphic display terminal
- A Magelis industrial HMI terminal connected to the drive Modbus port
- A Magelis industrial HMI terminal connected to the Ethernet TCP/IP network (if the drive is equipped with an Ethernet TCP/IP communication card)

A graphic terminal menu is dedicated to the “Controller Inside” programmable card. This menu can be customized by the card program according to the application.

Any industrial HMI terminal which supports the Modbus protocol can be used to display and modify the “Controller Inside” programmable card parameters. The Modbus server provides access to 2 Kwords (% MW, etc) in the card.

Master CANopen communication

The master CANopen port on the “Controller Inside” programmable card can be used to extend the I/O capacity and to control other CANopen slave devices.

Communication with a PLC

The Altivar 61 drive equipped with a “Controller Inside” programmable card fits easily into complex architectures.
Regardless of which bus or network is being used (Ethernet TCP/IP, Modbus/Uni-Telway, FIPIO, Modbus Plus, Profibus DP, INTERBUS, etc.), the PLC can communicate with the “Controller Inside” programmable card and the drive.
The periodic variables can still be configured as required.

Clock

A clock backed up by a lithium battery makes it possible to have a log of events that have occurred. When the “Controller Inside” programmable card is installed in the drive, the drive faults are automatically time and date-stamped without special programming.

Characteristics:
page 38

Functions:
pages 39 to 42

Schemes:
page 121

References:
page 43

Variable speed drives for asynchronous motors

Altivar 61

Option: “Controller Inside” programmable card

Electrical characteristics

Power supply	Voltage	**V**	24 ⎓ (min. 19, max. 30)
Power consumption Current	Maximum	**A**	2
	No-load	**mA**	80
	Per logic output	**mA**	200 maximum *(1)*
Analog inputs	AI51, AI52		2 current analog inputs 0…20 mA, impedance 250 Ω Resolution: 10 bits Accuracy: ± 1% for a temperature variation of 60°C Linearity: ± 0.2% of the maximum value Common point for all the card I/O *(2)*
Analog outputs	AO51, AO52		2 current analog outputs 0…20 mA, impedance 500 Ω Resolution: 10 bits Accuracy: ± 1% for a temperature variation of 60°C Linearity: ± 0.2% of the maximum value Common point for all the card I/O *(2)*
Logic inputs	LI51…LI60		Ten 24 V ⎓ logic inputs, compatible with level 1 PLC, IEC 65A-68 standard, 2 of which can be used for 2 counters or 4 of which can be used for 2 incremental encoders Impedance: 4.4 kΩ Maximum voltage: 30 V ⎓ Switching thresholds: State 0 if ⩽ 5 V or logic input not wired State 1 if ⩾ 11 V Common point for all the card I/O *(2)*
Logic outputs	LO51…LO56		Six 24 V ⎓ logic outputs, positive logic open collector type (source), compatible with level 1 PLC, standard IEC 65A-68 Maximum switching voltage: 30 V Maximum current: 200 mA Common point for all the card I/O *(2)*
Connection of I/O	Type of contact		Screw, at intervals of 3.81 mm^2
	Maximum wire	**mm^2**	1.5 (AWG 16)
	Tightening torque	**Nm**	0.25
Lithium battery	Life		8 years approx.

Characteristics of the application program

Compiled program (saved in “flash” memory)	Maximum size	**Kb**	320
Data	Maximum size	**Kwords**	64
	Saved size (NVRAM)	**Kwords**	4
	Size accessible by Modbus	**Kwords**	2

Characteristics of the CANopen communication port

Structure	Connector	One 9-way male SUB-D connector
	Network management	Master
	Transmission speed	Configurable via the program: 50 Kbps, 125 Kbps, 250 Kbps, 500 Kbps or 1 Mbps
	Address (Node ID)	32 slaves maximum
Services	CANopen application layer	DS 301 V4.02
	Functional profile	DSP 405
	PDO	10 receive and transmit PDOs in total for each slave
	SDO	2 client SDOs per slave (1 read and 1 write). Block transfer
	Error check	Node Guarding, producer and consumer Heartbeat
	Other services	Emergency, Boot-up, Sync
Diagnostics	Using LEDs	2 LEDs: *“*RUN*”* and *“* ERROR*”*, conforming to CIA DR303 version 1.0

(1) If the power consumption table does not exceed 200 mA, this card can be powered by the drive. Otherwise, an external 24 V ⎓ power supply must be used.

(2) This common point is also the drive 0 V.

Presentation:
page 36
Functions:
pages 39 to 42
Schemes:
page 121
References:
page 43

PS 1131 software workshop

The PS 1131 software workshop conforms to international standard IEC 61131-3, and includes all the functions for programming and setting up the “Controller Inside” programmable card.
It includes the configurator for CANopen.
It is designed for Microsoft Windows® 98, Microsoft Windows® NT 4.0, Microsoft Windows® Millennium, Microsoft Windows® 2000 Professional and Microsoft Windows® XP operating systems.

It benefits from the user-friendly interface associated with these operating systems:

- Pop-up menus
- Function blocks
- Online help.

The PS 1131 software workshop is available in both English and German.

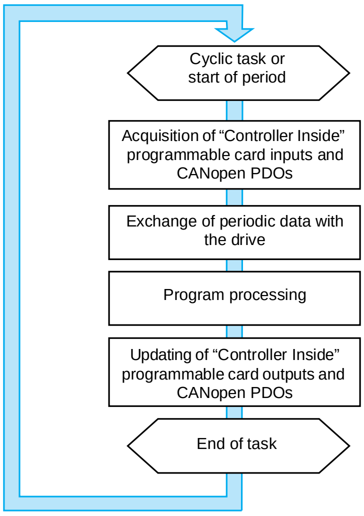
The programming and debugging tools are accessible via the application browser. This provides the user with an overview of the program and rapid access to all the application components:

- Program editor
- Function block editor
- Variables editor
- Animation tables editor
- Runtime screens editor.

Modular structured programming

The PS 1131 software workshop is used to structure an application into function modules consisting of sections (program code), animation tables and runtime screens. Each program section has a name and is programmed in one of the six available languages. To protect know-how or prevent any accidental modification, each section can be write-protected or read/write-protected.

Exporting/importing function modules
It is possible to export all or part of the tree structure in function modules.


Cyclic task or start of period
Acquisition of “Controller Inside” programmable card inputs and CANopen PDOs
Exchange of periodic data with the drive
Program processing
Updating of “Controller Inside” programmable card outputs and CANopen PDOs
End of task

Example of cycle execution for the “Controller Inside” programmable card connected on a CANopen bus

Program structure and execution of an application

The program structure is single-task. It consists of several subroutines.
Exchanges with the drive are performed by a function block available in the standard library.
Cycle execution can be either cyclic or periodic. A software watchdog, which can be configured between 100 and 800 ms by the user, monitors the cycle time.
A task can be synchronized with the drive’s main task to improve repeat accuracy in motion control applications.

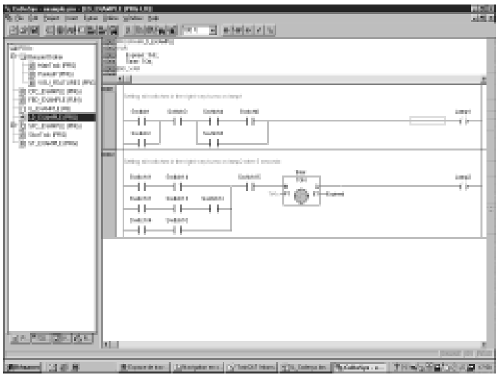
Cyclic execution
Once each cycle ends, execution of a new cycle begins. The cycle execution must last for at least 5 ms.

Periodic execution
The program is executed periodically, and the period can be set by the user between 5 and 100 ms. Cycle execution must last for less than the defined period. Drive response in the event of the cycle time being exceeded can be managed by the program.

Programming languages

6 programming languages are available:

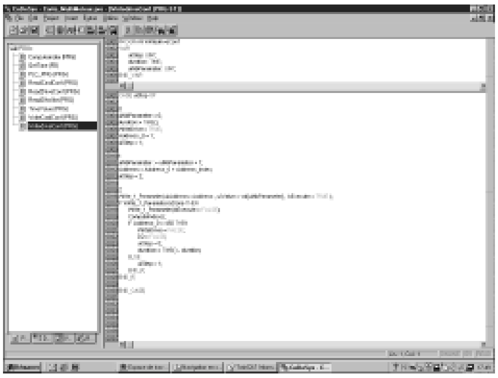
- Ladder language (LD)
- Structured Text language (ST)
- Grafcet language (SFC)
- Instruction List language (IL)
- Function block diagram (FBD)
- Continuous Flow Chart (CFC)



Example of Ladder language programming

Ladder Diagram (LD)

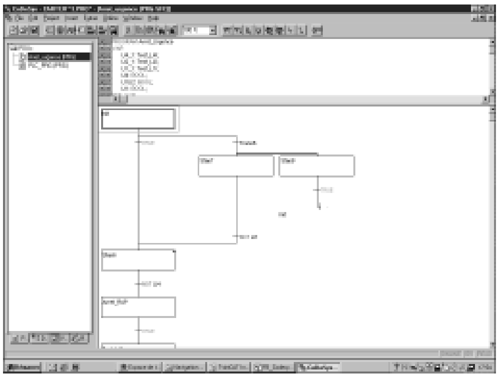
A Ladder language program consists of a set of rungs executed sequentially.
A rung consists of several lines.
A line consists of several contacts and a coil.
The language objects can be entered and displayed as symbols or tags as required.
The Ladder language editor enables the immediate call of entry help functions such as access to function libraries and access to the variables editor.



Example of Structured Text language programming

Structured Text (ST)

Structured Text language is a sophisticated algorithmic type language which is particularly well-suited to programming complex arithmetical functions, manipulating tables, message handling, etc.
Structured Text language enables direct transcription of an analysis based on a flow chart, and is organized in statements.

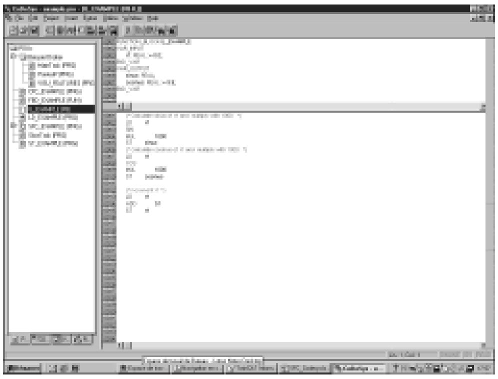


Example of Grafcet language programming

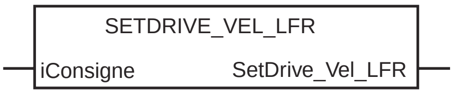
Grafcet language (SFC)

Grafcet language is used to describe the sequential part of the control system in a simple, graphic way. It corresponds to the “Sequential Function Chart” (SFC) language described in standard IEC 61131-3.
Programs written in Grafcet (SFC) language consist of:

- Macro-steps which are the grouping of a set of steps and transitions
- Steps with which the actions to be performed can be associated
- Transitions with which the conditions are associated (transition conditions)
- Directed links connecting the steps and transitions



Example of Instruction List language programming



Example of a function block:
sending the speed reference to the drive

Programming languages (continued)

Instruction List language (IL)

Instruction List language can be used to write Boolean equations and use all the functions available in the language. It can be used to represent the equivalent of a ladder diagram in text form.
Each instruction consists of an instruction code and a bit or word type operand.
As in Ladder language, instructions are organized in sequences of instructions called statements (equivalent to a rung).

Function block diagram (FBD)

FBD is a graphic language. It consists of function blocks connected by a rung.
The program is executed sequentially.
Each block can be a logical or arithmetical expression, a call to another function block, a jump or a return instruction.

Continuous Flow Chart (CFC)

Continuous Flow Chart programming is a graphic language. The rung connecting the various function blocks on the page is not necessarily sequential. The output of a function block may be looped back on its input or on the input of a block already inserted in the rung.

Function blocks

The PS 1131 software workshop has pre-programmed function blocks (standard library) and offers users the option of creating their own function blocks (user library).

Standard library

The standard library contains:
- Logic functions (AND, OR, etc.)
- Mathematical functions (Cos, Sin, Exp, etc.)
- Function blocks dedicated to drives which simplify data exchanges between the drive and the “Controller Inside” programmable card (e.g. sending the speed reference)
- Function blocks for managing the CANopen bus
- Graphic terminal display function blocks.

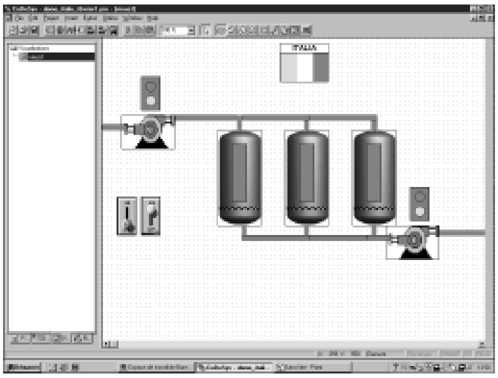
User library

Users have the option of creating their own function blocks in order to structure their applications. This is also a means of protecting the know-how contained in the algorithms, as it is possible to lock access to the user function blocks program.

Variable speed drives for asynchronous motors

Altivar 61

Option: “Controller Inside” programmable card



Example of runtime screen

Debugging

The PS 1131 software workshop offers a complete set of tools for debugging the application.

Program execution for debugging

The main debugging functions are:

- Use of breakpoints
- Step-by-step program execution
- Execution of a single cycle
- Direct access to the subroutines that have been called (call stack).

Realtime program animation

The main functions of realtime animation of the program are:

- Animation of part of the program in any language
- Automatic display of a variables window relating to this part of the program

Animation tables

Tables containing variables for the application to be monitored can be created and saved.

In both these tools, in addition to animating the data, it is possible to:

- Modify and force the value of data of any type
- Change the display format (binary, hexadecimal, etc.).

Oscilloscope

The PS 1131 software workshop Oscilloscope function can be used to monitor up to 20 variables in the form of curves.

Runtime screens

A tool integrated in the PS 1131 software workshop can be used to design and use runtime screens for the application:

- Creation of screen backgrounds
- Animation of graphic objects associated with variables
- Display of messages
- …

Simulation

The PS 1131 software workshop Simulation function can be used to test the program without having to set up the drive.

Variable speed drives for asynchronous motors

Altivar 61

Option: “Controller Inside” programmable card

References

Card

Description	Reference	Weight kg
“Controller Inside” programmable card *(1)* equipped with one 9-way male SUB-D connector	**VW3 A3 501**	0.320

Connection accessories

Description	Reference	Weight kg
CANopen connector 9-way female SUB-D with line terminator that can be disabled	**TSX CAN KCDF 180T**	–

Cables

Description	Length (m)	Reference	Weight kg
CANopen cables Standard cable. Low smoke emission, halogen-free. Flame retardant (IEC 60332-1).	50	**TSX CAN CA 50**	–
	100	**TSX CAN CA 100**	–
	300	**TSX CAN CA 300**	–
CANopen cables UL certification Flame retardant (IEC 60332-2).	50	**TSX CAN CB 50**	–
	100	**TSX CAN CB 100**	–
	300	**TSX CAN CB 300**	–
CANopen cables Cable for harsh environments *(2)* or mobile installation. Low smoke emission, halogen-free. Flame retardant (IEC 60332-1).	50	**TSX CAN CD 50**	–
	100	**TSX CAN CD 100**	–
	300	**TSX CAN CD 300**	–

PS 1131 software workshop

Description	Reference	Weight kg
PS 1131 software workshop supplied on CD-ROM	*(3)*	–
Connection kit for PC serial port including various accessories such as: ■ 1 x 3 m cable with 2 RJ45 connectors ■ 1 RS 232/RS 485 converter with one 9-way female SUB-D connector and 1 RJ45 connector	**VW3 A8 106**	0.350

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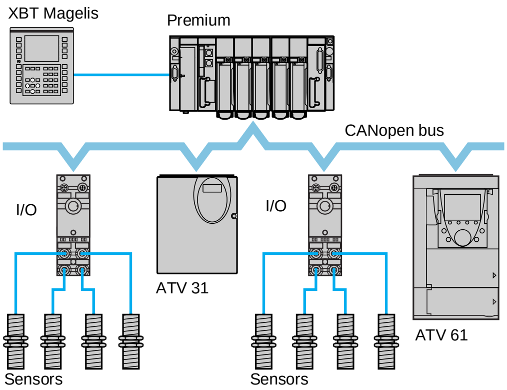
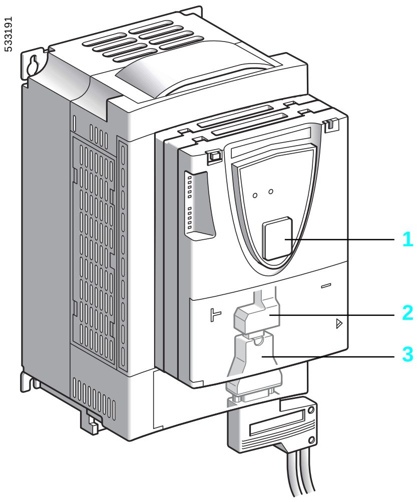
(1) The Altivar 61 drive can only take one “Controller Inside” programmable card. Consult the tables summarizing the possible combinations: drives, options and accessories, see pages 84 to 89.

(2) Harsh environments:
- *resistance to hydrocarbons, industrial oils, detergents, solder splashes*
- *relative humidity up to 100%*
- *saline atmosphere*
- *significant temperature variations*
- *operating temperature between - 10 °C and + 70 °C.*

(3) The product reference is provided during the “Controller Inside” programmable card training course. Please consult your Regional Sales Office.



Example of configuration on the CANopen bus



Presentation

The Altivar 61 drive is designed to suit all configurations found in communicating industrial installations.

It includes Modbus and CANopen communication protocols as standard.

The Modbus protocol can be accessed directly by means of 2 integrated communication ports (for characteristics, see page 15):

- One RJ45 Modbus terminal port 1, located on the drive front panel, for connecting:
  - The remote graphic display terminal
  - A Magelis industrial HMI terminal
  - The PowerSuite software workshop
- One RJ45 Modbus network port 2, located on the drive control terminals. It is dedicated to control and signalling by a PLC or other type of controller.
It can also be used to connect a terminal or the PowerSuite software workshop.

The CANopen protocol can be accessed from the Modbus network port via the CANopen adapter 3 (for characteristics, see page 15). In this case, terminal port 1 must be used to access the Modbus protocol.

By means of the addition of one of the 11 optional communication cards, the Altivar 61 drive can also be connected to other communication buses and networks used in different fields, for example in industrial applications or in building management systems (HVAC) *(1)*.

Communication cards for industrial applications:

- Ethernet TCP/IP
- Modbus/Uni-Telway: This card provides access to additional functions to complement those of the integrated, Modbus ASCII and 4-wire RS 485 ports
- Fipio
- Modbus Plus
- Profibus DP
- DeviceNet
- INTERBUS

Communication cards for building management systems (HVAC):

- LONWORKS,
- METASYS N2
- APOGEE FLN
- BACnet

The option of powering the control part separately enables communication to be maintained (monitoring, diagnostics) even if there is no power supply to the power part.

The main Altivar 38 drive communication functions are compatible with the Altivar 61 drive *(2)*:

- Connection
- Communication services
- Drive behaviour (profile)
- Control and monitoring parameters
- Standard adjustment parameters

The PowerSuite software workshop can be used to port configurations from the Altivar 38 drive to the Altivar 61 drive.

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(1) Heating Ventilation Air Conditioning

(2) Consult the ATV 38/ATV 61 substitution guide supplied on the documentation CD-ROM.

Functions:
page 45

Characteristics:
pages 46 to 51

References:
pages 52 and 53

Variable speed drives for asynchronous motors

Altivar 61

Communication buses and networks

Functions

All the drive functions can be accessed via the network:

- Control
- Monitoring
- Adjustment
- Configuration

If the drive is equipped with a “Controller Inside” programmable card or a multi-pump card, its variables (% MW, etc.) can be accessed using the Modbus message handling services via the integrated communication ports or the Ethernet TCP/IP communication card.

The speed command and reference may come from different control sources:

- I/O terminals
- Communication network
- “Controller Inside” programmable card
- Multi-pump cards
- Remote graphic display terminal

The advanced functions of the Altivar 61 drive can be used to manage switching of these drive control sources according to the application requirements.

It is possible to choose the assignment of the communication periodic variables using:

- The network configuration software (Sycon, etc.)
- The Altivar 61 drive communication scanner function

For the integrated Modbus and CANopen ports and for the communication cards for industrial applications, the Altivar 61 drive can be controlled:

- According to the CiA DSP 402 (Drivecom) profile
- According to the I/O profile where control is as simple and adaptable as control via the I/O terminals

The DeviceNet card also supports the ODVA AC Drive and Allen-Bradley drive profiles.

Communication is monitored according to criteria specific to each protocol. However, regardless of the protocol, it is possible to configure how the drive responds to a communication fault:

- Freewheel stop, stop on ramp, fast stop or braked stop
- Maintain the last command received
- Fallback position at a predefined speed
- Ignore the fault

A command from the CANopen bus is processed with the same priority as one of the drive terminal inputs. This results in excellent response times on the network port via the CANopen adaptor.

Presentation:
page 44

Characteristics:
pages 46 to 51

References:
pages 52 and 53

Characteristics of the VW3 A3 310 Ethernet TCP/IP card *(1)*

Structure	Connector	One RJ45 connector
	Transmission speed	10/100 Mbps, half duplex and full duplex
	IP addressing	■ Manual assignment via the display terminal or the PowerSuite software workshop ■ BOOTP (IP address dynamic server depending on the IEEE address) ■ DHCP (address dynamic server depending on the Device Name) with automatic reiteration
	Physical	Ethernet 2
	Link	LLC: IEEE 802.2 MAC: IEEE 802.3
	Network	IP (RFC791) ICMP client for supporting certain IP services such as the “ping” command
	Transport	TCP (RFC793), UDP The maximum number of connections is 8 (port 502)
Services	Transparent Ready *(2)* class	C20
	Web server	Simultaneous access via 3 Web browsers (more, according to the number of connections used) Server factory-configured and modifiable The memory available for the application is approximately 1 MB The factory-configured server contains the following pages: ■ Altivar viewer: displays the drive status and the state of its I/O, the main measurements (speed, current, etc) ■ Data editor: access to the drive parameters for configuration, adjustment and signalling ■ Altivar chart: simplified oscilloscope function ■ Security: configuration of passwords to access viewing and modification ■ FDR Agent: configuration of the “Faulty Device Replacement” parameters ■ IO Scanner: configuration of periodic variables for controlling and monitoring the drive via the PLC, etc. ■ Ethernet statistics: drive identification (IP addresses, version, etc.) from the Ethernet transmission statistics
	Messaging	Read Holding Registers (03), 63 words maximum Read Input Registers (04), 63 words maximum Write Single Register (06) Write Multiple Registers (16), 63 words maximum Read/Write Multiple Registers (23) Read Device Identification (43) Diagnostics (08)
	Periodic variables	I/O scanning service (can be inhibited): ■ 10 control variables which can be assigned by the PowerSuite software workshop or the standard Web server ■ 10 monitoring variables which can be assigned by the PowerSuite software workshop or the standard Web server The Global Data service is not supported
	Functional profiles	CiA DSP 402: “Device Profile Drives and Motion Control” I/O profile
	Network management	SNMP
	File transfer	FTP for Web server and TFTP for FDR
	FDR (Faulty Device Replacement)	Yes
	Communication monitoring	Can be inhibited Time out can be set between 0.5 and 60 s via the terminal, the PowerSuite software workshop or the standard Web server
Diagnostics	Using LEDs	5 LEDs on the card: “RX” (reception), “TX” (transmission), “FLT” (Ethernet fault), “STS” (IP address) and “10/100” Mbps (speed)
	Using the graphic display terminal	Control word received Reference received
	Via the Web server	Number of frames received Number of incorrect frames

(1) For Ethernet TCP/IP network, see pages 182 to 187.
(2) Please consult our “Ethernet TCP/IP Transparent Ready” catalogue.

Variable speed drives for asynchronous motors

Altivar 61

Communication buses and networks

Characteristics of the VW3 A3 303 Modbus/Uni-Telway card

Structure	Connector	One 9-way female SUB-D connector
	Transmission speed	Configurable via the display terminal or the PowerSuite software workshop: ■ 4800 bps ■ 9600 bps ■ 19200 bps
	Polarization	Type of polarization can be configured using switches on the card: ■ No polarization impedances (supplied by the wiring system, for example, in the master) ■ Two 4.7 kΩ polarization resistors
	Selection of the protocol	Via the display terminal or the PowerSuite software workshop: ■ Modbus RTU ■ Modbus ASCII ■ Uni-Telway
Services	Functional profiles	CiA DSP 402: “Device Profile Drives and Motion Control” I/O profile
	Communication monitoring	Can be inhibited Fixed time out: 10 s
Diagnostics	Using LEDs	2 LEDs on the card: “RUN” (status) and “ERR” (fault)
	Using the graphic display terminal	Control word received Reference received

Characteristics of the Modbus protocol *(1)*

Structure	Physical interface	2-wire RS 485, 4-wire RS 485
	Transmission mode	RTU, ASCII
	Format	Configurable via the display terminal or the PowerSuite software workshop: In RTU mode only: ■ 8 bits, odd parity, 1 stop ■ 8 bits, no parity, 1 stop ■ 8 bits, even parity, 1 stop ■ 8 bits, no parity, 2 stop In RTU and ASCII modes: ■ 7 bits, even parity, 1 stop ■ 7 bits, odd parity, 1 stop ■ 7 bits, even parity, 2 stop ■ 7 bits, odd parity, 2 stop
	Address	1 to 247, configurable using switches on the card.
Service	Messaging	Read Holding Registers (03), 63 words maximum Read Input Registers (04), 63 words maximum Write Single Register (06) Write Multiple Registers (16), 61 words maximum Read/Write Multiple Registers (23) Read Device Identification (43) Diagnostics (08)

Characteristics of the Uni-Telway protocol *(2)*

Structure	Physical interface	2-wire RS 485
	Format	8 bits, odd parity, 1 stop
	Address	1 to 147, configurable using switches on the card.
Service	Messaging	Read word (04h) Write word (14h) Read object (36h), 63 words maximum Write object (37h), 60 words maximum Identification (0Fh) Protocol version (30h) Mirror (FAh) Read error counters (A2h) Reset counters (A4h)

(1) For the Modbus bus, see pages 192 to 195.
(2) For the Uni-Telway bus, see pages 200 and 201.

Presentation:
page 44

Functions:
page 45

References:
pages 52 and 53

Variable speed drives for asynchronous motors

Altivar 61

Communication buses and networks

Characteristics of the VW3 A3 311 Fipio card *(1)*

Structure	Connector	One 9-way male SUB-D connector
	Transmission speed	1 Mbps
	Address	1 to 62, configurable using switches on the card
Services	Adjustment using PLC software (Unity, PL7)	No
	Periodic variables	8 control variables which can be assigned by communication scanner 8 monitoring variables which can be assigned by communication scanner PKW indexed periodic variable (settings)
	Communication profile	FED C 32
	Functional profiles	CiA DSP 402: “Device Profile Drives and Motion Control” I/O profile
	Communication monitoring	Can be inhibited Fixed time out: 256 ms
Diagnostics	Using LEDs	4 LEDs on the card: “RUN” (status), “ERROR” (fault), “COM” (data exchange) and “I/O” (initialization)
	Using the graphic display terminal	Control word received Reference received Periodic variables (communication scanner)

Characteristics of the VW3 A3 302 Modbus Plus card *(2)*

Structure	Connector	One 9-way female SUB-D connector
	Transmission speed	1 Mbps
	Address	1 to 64, configurable using switches on the card
Services	Messaging	Yes (Modbus)
	Periodic variables	“Peer Cop”: 8 control variables which can be assigned by communication scanner “Global data”: 8 monitoring variables which can be assigned by communication scanner
	Functional profiles	CiA DSP 402: “Device Profile Drives and Motion Control” I/O profile
	Communication monitoring	Can be inhibited Time out can be set between 0.1 and 60 s via the terminal or the PowerSuite software workshop.
Diagnostics	Using LEDs	1 LEDs on the card: “MB+” (status)
	Using the graphic display terminal	Control word received Reference received Periodic variables (communication scanner)

(1) For the Fipio bus, see pages 188 to 191.
(2) For the Modbus Plus network, see pages 196 to 199.

Variable speed drives for asynchronous motors

Altivar 61

Communication buses and networks

Characteristics of the VW3 A3 307 Profibus DP card

Structure	Connector	One 9-way female SUB-D connector
	Transmission speed	9600 bps, 19.2 Kbps, 93.75 Kbps, 187.5 Kbps, 500 Kbps, 1.5 Mbps, 3 Mbps, 6 Mbps or 12 Mbps
	Address	1 to 126, configurable using switches on the card
Services	Periodic variables	PPO type 5 8 control variables which can be assigned by communication scanner 8 monitoring variables which can be assigned by communication scanner PKW indexed periodic variable (settings)
	Functional profiles	CiA DSP 402: “Device Profile Drives and Motion Control” I/O profile
	Communication monitoring	Can be inhibited Time out can be set via the Profibus DP network configurator
Diagnostics	Using LEDs	2 LEDs on the card: “ST” (status) and “DX” (data exchange)
	Using the graphic display terminal	Control word received Reference received Periodic variables (communication scanner)
Description file		A single gsd file is supplied on the documentation CD-ROM for the whole range or can be downloaded from the Internet at “www.telemecanique.com”. This file does not contain the description of the drive parameters.

Characteristics of the VW3 A3 309 DeviceNet card

Structure	Connector	One removable screw connector, 5 contacts at intervals of 5.08
	Transmission speed	125 Kbps, 250 Kbps or 500 Kbps, configurable using switches on the card
	Address	1 to 63, configurable using switches on the card
Services	Periodic variables	ODVA assemblies type 20, 21, 70 and 71 Allen-Bradley® assemblies type 103, 104 and 105 Communication scanner assemblies 100 and 101
	Periodic exchange mode	Inputs: Polled, Change of state, Cyclic Outputs: Polled
	Functional profiles	ODVA AC Drive (02) profile Allen-Bradley drive profile CiA DSP 402: “Device Profile Drives and Motion Control” I/O profile
	Auto Device Replacement	No
	Communication monitoring	Can be inhibited Time out can be set via the DeviceNet network configurator
Diagnostics	Using LEDs	One two-tone LED on the card: “MNS” (status)
	Using the graphic display terminal	Control word received Reference received
Description file		A single eds file is supplied on the documentation CD-ROM for the whole range or can be downloaded from the Internet at “www.telemecanique.com”. This file contains the description of the drive parameters.

Presentation:
page 44

Functions:
page 45

References:
pages 52 and 53

Characteristics of the VW3 A3 304 INTERBUS card

Structure	Connector	2 connectors: One 9-way male SUB-D and one 9-way female SUB-D
	Power supply	The card is powered by the drive. To ensure that the INTERBUS subscriber continues to operate during line supply failures to the power part, fit a separate power supply for the drive control part.
Services	Messaging	PCP: ■ Read: read a parameter ■ Write: write a parameter ■ Initiate: initialize the communication relationship ■ Abort: abort the communication relationship ■ Status: Communication and drive status ■ Get-OV: read an object description ■ Identify: identification of the card
	Periodic variables	2 control variables which can be assigned by communication scanner 2 monitoring variables which can be assigned by communication scanner
	Functional profile	CiA DSP 402 (Drivecom profile 21)
	Communication monitoring	Can be inhibited Fixed time out: 640 ms
Diagnostics	Using LEDs	5 LEDs on the card: “U” (power supply), “RC” (bus input), “Rd” (bus output), “BA” (periodic data) and “TR” (messaging)
	Using the graphic display terminal	Control word received Reference received

Characteristics of the VW3 A3 312 LONWORKS card

Structure	Connector	1 removable 3-way screw connector
	Topology	TP/FT-10 (free topology)
	Transmission speed	78 Kbps
Services	Functional profiles	LONMARK 6010: Variable Speed Motor Drive LONMARK 0000: Node Object
Diagnostics	Using LEDs	3 LEDs on the card: “Service”, “Status”, “Fault”
	Using the graphic display terminal	Control word received Reference received
Description file		An xif file is supplied on the documentation CD-ROM or can be downloaded from the Internet at “www.telemecanique.com”.

Variable speed drives for asynchronous motors

Altivar 61

Communication buses and networks

Characteristics of the VW3 A3 313 METASYS N2 card

Structure	Connector	One 9-way female SUB-D connector
Diagnostics	Using LEDs	2 LEDs on the card: “COM” (network traffic) and “ERR” (fault)
	Using the graphic display terminal	Control word received Reference received

Characteristics of the VW3 A3 314 APOGEE FLN card

Structure	Connector	One 9-way female SUB-D connector
Diagnostics	Using LEDs	2 LEDs on the card: “COM” (network traffic) and “ERR” (fault)
	Using the graphic display terminal	Control word received Reference received

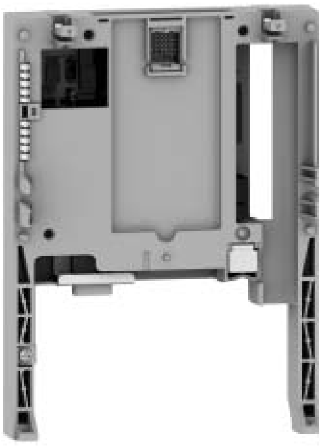
Characteristics of the VW3 A3 315 BACnet card

Structure	Connector	One 9-way female SUB-D connector
Diagnostics	Using LEDs	2 LEDs on the card: “COM” (network traffic) and “ERR” (fault)
	Using the graphic display terminal	Control word received Reference received

Variable speed drives for asynchronous motors

Altivar 61

Communication buses and networks



VW3 A3 311

TSX FP ACC12

490 NAD 911 03

Communication cards *(1) (2)*

Description	Use	Reference	Weight kg
Ethernet *(3)*	To be connected on a Hub or Switch using a 490 NTW 000 ●● cable. See pages 186 and 187	**VW3 A3 310**	0.300
Modbus/ Uni-Telway	To be connected on TSX SCA 62 subscriber socket using the VW3 A8 306 2 cable. See pages 194 and 201	**VW3 A3 303**	0.300
Fipio	To be connected using a TSX FP ACC 12 connector with a TSX FP CC●● extension cable or a TSX FP CA●● drop cable. See pages 190 and 191	**VW3 A3 311**	0.300
Modbus Plus	To be connected to the 990 NAD 230 00 IP 20 Modbus Plus tap using a 990 NAD 219●0 cable. See pages 198 and 199	**VW3 A3 302**	0.300
Profibus DP	To be connected using a 490 NAD 911●● connector to Profibus cable TSX PBS CA●00 *(4)*	**VW3 A3 307**	0.300
DeviceNet	The card is equipped with a removable 5-way screw terminal block.	**VW3 A3 309**	0.300
INTERBUS	To be connected using the 170 MCI ●●●00 *(4)*cable	**VW3 A3 304**	0.300
LONWORKS	The card is equipped with a removable 3-way screw terminal block.	**VW3 A3 312**	0.300
METASYS N2	The card is equipped with a 9-way male SUB-D connector	**VW3 A3 313**	0.300
APOGEE FLN	The card is equipped with a 9-way male SUB-D connector	**VW3 A3 314**	0.300
BACnet	The card is equipped with a 9-way male SUB-D connector	**VW3 A3 315**	0.300

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(1) The Altivar 61 drive can only take one communication card. Consult the tables summarizing the possible combinations: drives, options and accessories (see pages 84 to 89).

(2) The user manuals are supplied on CD-ROM or can be downloaded from the Internet at "www.telemecanique.com". For Profibus DP, DeviceNet and LONWORKS cards, the description files in gsd, eds or xif format are also supplied on CD-ROM or can be downloaded from the Internet at "www.telemecanique.com".

(3) Please consult our “Ethernet TCP/IP Transparent Ready” catalogue.

(4) Please consult our specialist “Automation platform Modicon Premium and Unity - PL7 software” catalogue.

Presentation:
page 44

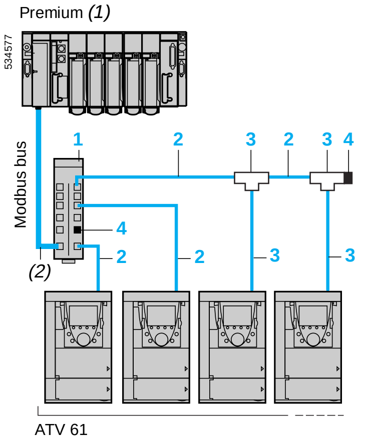
Functions:
page 45

Characteristics:
pages 46 to 51

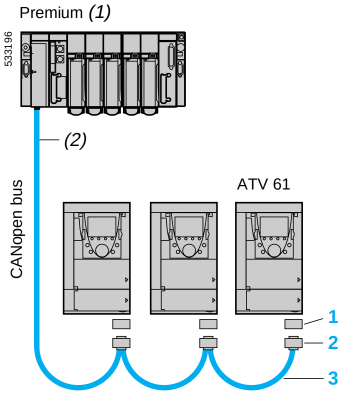
Variable speed drives for asynchronous motors

Altivar 61

Communication buses and networks



Example of Modbus diagram, connections via splitter blocks and RJ45 connectors



Example of CANopen diagram

VW3 CAN A71

VW3 CAN KCDF 180 T

Connection accessories

Description	No.	Length m	Unit reference	Weight kg
Modbus bus				
Modbus splitter block 10 RJ45 connectors and 1 screw terminal block	1	–	**LU9 GC3**	0.500
Cables for Modbus bus equipped with 2 RJ45 connectors	2	0.3	**VW3 A8 306 R03**	0.025
		1	**VW3 A8 306 R10**	0.060
		3	**VW3 A8 306 R30**	0.130
Modbus T-junction boxes (with integrated cable)	3	0.3	**VW3 A8 306 TF03**	–
		1	**VW3 A8 306 TF10**	–
Line terminator For RJ45 connector *(3)*	4	–	**VW3 A8 306 RC**	0.010

Description	No.	Length m	Reference	Weight kg
CANopen bus				
CANopen adapter for mounting on the RJ45 socket in the drive control terminals. The adapter provides a 9-way male SUB-D connector conforming to the CANopen standard (CIA DRP 303-1).	1	–	**VW3 CAN A71**	–
CANopen connector *(4)* 9-way female SUB-D connector with line terminator (can be disabled) Output at 180° for 2 CANopen cables. CAN-H, CAN-L, CAN-GND connection	2	–	**VW3 CAN KCDF 180T**	–
CANopen cables *(1)* Standard cable. Low smoke emission, halogen-free. Flame retardant (IEC 60332-1).	3	50	**TSX CAN CA 50**	–
		100	**TSX CAN CA 100**	–
		300	**TSX CAN CA 300**	–
CANopen cables *(1)* UL certification. Flame retardant (IEC 60332-2).	3	50	**TSX CAN CB 50**	–
		100	**TSX CAN CB 100**	–
		300	**TSX CAN CB 300**	–
CANopen cables *(1)* Cable for harsh environments *(5)* or mobile installation. Low smoke emission, halogen-free. Flame retardant (IEC 60332-1).	3	50	**TSX CAN CD 50**	–
		100	**TSX CAN CD 100**	–
		300	**TSX CAN CD 300**	–

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(1) Please consult our specialist “Automation platform Modicon Premium and Unity - PL7 software” and “Automation platform Modicon TSX Micro and PL7 software” catalogues.

(2) Cable depending on the type of controller or PLC.

(3) Sold in lots of 2.

(4) For ATV 61H●●●M3, ATV 61HD11M3X, HD15M3X, ATV 61H075N4 ... HD18N4 drives, this connector can be replaced by the TSX CAN KCDF 180T connector.

(5) Harsh environments:
- *Resistance to hydrocarbons, industrial oils, detergents and solder splashes*
- *Relative humidity up to 100%*
- *Saline atmosphere*
- *Significant temperature variations*
- *Operating temperature between -10°C and +70°C*

Presentation:
page 44

Functions:
pages 45

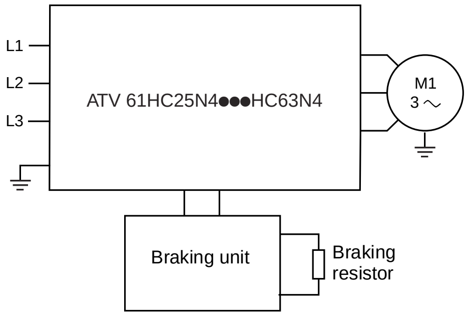
Characteristics:
pages 46 to 51

Variable speed drives for asynchronous motors

Altivar 61

Option: resistance braking units

Presentation



Resistance braking enables the Altivar 61 drive to operate while braking to a standstill or during "generator" operation, by dissipating the energy in the braking resistor.

The ATV 61H●●●M3, ATV 61H●●●M3X, ATV 61H075N4…HC22N4, ATV 61W●●●N4 and ATV 61W●●●N4C drives have a built-in dynamic brake transistor.

For ATV 61HC25N4…HC63N4 drives, a braking unit must be used. It is controlled by the drive:

- For ATV 61HC25N4 and ATV 61HC31N4 drives, the braking unit is mounted directly on the left-hand side of the drive, see dimensions on page 91
- For ATV 61HC40N4...HC63N4 drives, the braking unit is an external module, see dimensions on page 101.

Application

Machines with high inertia.

Characteristics

Type of braking unit			VW3 A7 101	VW3 A7 102
Ambient air temperature around the device	Operation	**°C**	- 10…+ 50	
	Storage	**°C**	- 25…+ 70	
Degree of protection of enclosure			IP 20	
Degree of pollution			2 according to standard EN 50178	
Relative humidity			Class 3K3 without condensation	
Maximum operating altitude		**m**	2000	
Vibration resistance			0.2 gn	
Nominal voltage of line supply and drive supply (rms value)		**V**	~ 380 - 15%…480 + 10%	
Engage threshold		**V**	⎓ 785 ± 1%	
Maximum DC bus voltage		**V**	850	
Maximum braking power on 400 V ≂ supply	785 V ⎓ *(1)*	**kW**	420	750
Percentage of conduction time at constant power at 785 V ⎓			5 % at 420 kW	5 % at 750 kW
			15% at 320 kW	15% at 550 kW
			50 % at 250 kW	50 % at 440 kW
Cycle time		**s**	≤ 240	
Maximum continuous power		**kW**	200	400
Thermal protection			Integrated, via thermal probe	
Forced ventilation		**m³/h**	100	600
Installation			Vertical	
Minimum resistor value to be associated with the braking unit		**Ω**	1.05	0.7

(1) Braking unit engage threshold

References:
page 55
Selection:
pages 58 to 61
Dimensions:
pages 91 and 101
Schemes:
page 118 and 123

Variable speed drives for asynchronous motors

Altivar 61

Option: resistance braking units

Braking units

Supply voltage: 380…480 V 50/60 Hz

For drives	Power		Loss	Cable (drive-braking unit)		Cable (braking unit-resistors)		Reference	Weight
	Continuous	Max.	Continuous power	Cross-section	Max. length	Cross-section	Max. length		
	kW	kW	W	mm²	m	mm²	m		kg
ATV 61HC25N4, ATV 61HC31N4	200	420	550	– Internal connections	–	2 x 95	50	**VW3 A7 101**	30.000
ATV 61HC40N4, ATV 61HC50N4, ATV 61HC63N4	400	750	750	2 x 150	1	2 x 150	50	**VW3 A7 102**	80.000

Note: *To increase the braking power, several resistors can be mounted in parallel on the same braking unit. In this case, do not forget to take the minimum resistance value on each unit into account, see Characteristics on page 54.*

Variable speed drives for asynchronous motors

Altivar 61

Option: braking resistors

Presentation

The braking resistor enables the Altivar 61 drive to operate while braking to a standstill, by dissipating the braking energy.
It enables maximum transient braking torque.
The resistors are designed to be mounted on the outside of the enclosure, but should not inhibit natural cooling. Air inlets and outlets must not be obstructed, even partially. The air must be free of dust, corrosive gas and condensation.

Application

Inertia machines.

General characteristics

Type of braking resistor			VW3 A7 701…709	VW3 A7 710…718
Ambient air temperature around the device	Operation	°C	0…+ 50	
	Storage	°C	- 25…+ 70	
Degree of protection of enclosure			IP 20	IP 23
Thermal protection			Via temperature controlled switch or via the drive	Via thermal overload relay
Temperature controlled switch *(1)*	Tripping temperature	°C	120	–
	Max. voltage - max. current		250 V ∼ -1 A	–
	Min. voltage - min. current		24 V ⎓ -0.1 A	–
	Maximum contact resistance	mΩ	60	–
Load factor for the dynamic brake transistors			The internal circuits of Altivar 61 drives rated 220 kW or less have a built-in dynamic brake transistor.	
	ATV 61H●●●M3, ATV 61H●●●M3X, ATV 61H075N4…HD75N4, ATV 61W075N4…WD90N4, ATV 61W075N4C…WD90N4C		The dynamic brake transistor is designed so that it can tolerate 120% of the nominal motor power for 60 s.	
	ATV 61HD90N4…HC22N4		The dynamic brake transistor is designed so that it can tolerate 110 % of the nominal motor power for 60 s.	

Connection characteristics

Type of terminal			Drive connection	Temperature-controlled switch
Maximum wire size	VW3 A7 701…703		4 mm^2 (AWG 28)	1.5 mm^2 (AWG 16)
	VW3 A7 704…709		Bar connection, M6	2.5 mm^2 (AWG 14)
	VW3 A7 710…718		Bar connection, M10	–

Minimum ohmic value of the resistors to be associated with the Altivar 61 drive, at 20°C *(2)*

Drive type	**ATV 61H**		**075M3**	**U15M3**	**U22M3, U30M3**	**U40M3**	**U55M3**	**U75M3**	**D11M3X, D15M3X**	**D18M3X**	**D22M3X, D30M3X**	**D37M3X…D75M3X**
Minimum value		Ω	44	33	22	16	11	8	3	4	3.3	1.7
Drive type	**ATV 61H**		**D90M3X**	**075N4…U22N4**	**U30N4, U40N4**	**U55N4**	**U75N4**	**D11N4**	**D15N4, D18N4**	**D22N4, D30N4**	**D37N4**	**D45N4, D55N4**
Minimum value		Ω	1.3	56	34	23	19	12	7	13.3	6.7	5
Drive type	**ATV 61H**		**D75N4**	**D90N4, C11N4**	**C13N4…C22N4**	**C25N4, C31N4**	**C40N4…C63N4**					
Minimum value		Ω	3.3	2.5	1.9	1.05	0.7					
Drive type	**ATV 61W**		**075N4…U30N4**	**U40N4, U55N4**	**U75N4**	**D11N4**	**D15N4**	**D18N4, D22N4**	**D30N4, D37N4**	**D45N4**	**D55N4, D75N4**	**D90N4**
Minimum value		Ω	56	34	23	19	12	7	13.3	6.7	5	3.3
Drive type	**ATV 61W**		**075N4C…U30N4C**	**U40N4C, U55N4C**	**U75N4C**	**D11N4C**	**D15N4C**	**D18N4C, D22N4C**	**D30N4C, D37N4C**	**D45N4C**	**D55N4C, D75N4C**	**D90N4C**
Minimum value		Ω	56	34	23	19	12	7	13.3	6.7	5	3.3

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(1) The contact should be connected in the sequence (use for signalling, or in the line contactor control).
(2) The minimum ohmic value is determined at a temperature of 20°C. In an environment where the temperature is below 20°C, make sure that the minimum ohmic value recommended in the table is followed.

References:
page 57

Selection:
pages 58 to 61

Dimensions:
pages 101 and 102

Schemes:
pages 118 and 123

Variable speed drives for asynchronous motors

Altivar 61

Option: braking resistors

Braking resistors

For drives	Ohmic value at 20 °C	Average power available at 50 °C *(1)*	Reference	Weight
	Ω	kW		kg
Supply voltage: 200…240 V 50/60 Hz				
ATV 61H075M3	100	0.05	**VW3 A7 701**	1.900
ATV 61HU15M3, HU22M3	60	0.1	**VW3 A7 702**	2.400
ATV 61HU30M3, HU40M3	28	0.2	**VW3 A7 703**	3.500
ATV 61HU55M3, HU75M3	15	1	**VW3 A7 704**	11.000
ATV 61HD11M3X	10	1	**VW3 A7 705**	11.000
ATV 61HD15M3X	8	1	**VW3 A7 706**	11.000
ATV 61HD18M3X, HD22M3X	5	1	**VW3 A7 707**	11.000
ATV 61HD30M3X	4	1	**VW3 A7 708**	11.000
ATV 61HD37M3X, HD45M3X	2.5	1	**VW3 A7 709**	11.000
ATV 61HD55M3X, HD75M3X	1.8	15.3	**VW3 A7 713**	50.000
ATV 61HD90M3X	1.4	20.9	**VW3 A7 714**	63.000
Supply voltage: 380…480 V 50/60 Hz				
ATV 61H075N4…HU40N4 ATV 61W075N4…WU55N4 *(2)* ATV 61W075N4C…WU55N4C *(2)*	100	0.05	**VW3 A7 701**	1.900
ATV 61HU55N4, HU75N4 ATV 61WU75N4, WD11N4 *(2)* ATV 61WU75N4C, WD11N4C *(2)*	60	0.1	**VW3 A7 702**	2.400
ATV 61HD11N4, HD15N4 ATV 61WD15N4, WD18N4 *(2)* ATV 61WD15N4C, WD18N4C *(2)*	28	0.2	**VW3 A7 703**	3.500
ATV 61HD18N4…HD30N4 ATV 61WD22N4…WD37N4 *(2)* ATV 61WD22N4C…WD37N4C *(2)*	15	1	**VW3 A7 704**	11.000
ATV 61HD37N4 ATV 61WD45N4 *(2)* ATV 61WD45N4C *(2)*	10	1	**VW3 A7 705**	11.000
ATV 61WD55N4…WD90N4 *(2)* ATV 61WD55N4C…WD90N4C *(2)*	8	1	**VW3 A7 706**	11.000
ATV 61HD45N4…HD75N4	5	1	**VW3 A7 707**	11.000
ATV 61HD90N4, HC11N4	2.75	25	**VW3 A7 710**	80.000
ATV 61HC13N4, HC16N4	2.1	37	**VW3 A7 711**	86.000
ATV 61HC22N4	2.1	44	**VW3 A7 712**	104.000
ATV 61HC25N4	1.05	56	**VW3 A7 715**	136.000
ATV 61HC31N4	1.05	75	**VW3 A7 716**	172.000
ATV 61HC40N4, HC50N4	0.7	112	**VW3 A7 717**	266.000
ATV 61HC63N4	0.7	150	**VW3 A7 718**	350.000

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(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) The braking resistors' degree of protection is IP 20 or IP 23.

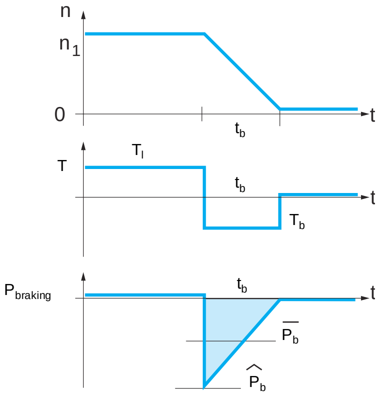
Determining the braking unit and resistor

Calculating the various braking powers makes it possible to determine the braking unit and the braking resistor.

Operation

The braking power during deceleration is characterized by a peak power $\hat{P}_b$ obtained at the start of deceleration, which decreases to 0 in proportion to the speed.
Example: Stopping centrifuges, translational movement, change of direction, etc.

n_1	Motor speed	[rpm]
T_l	Load torque	[Nm]
T_b	Braking torque	[Nm]
$\hat{P}_b$	Peak braking power	[W]
$\bar{P}_b$	Average braking power during t_b	[W]
t_b	Braking time	[s]



Calculating the braking time from the inertia

$$t_b = \frac{J \cdot \omega}{T_b + T_r}$$

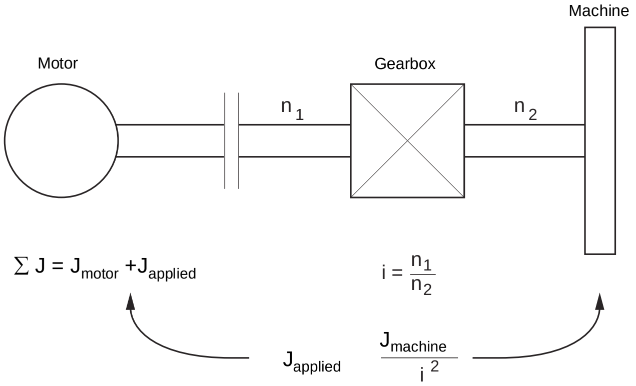
$$\omega = \frac{2\pi \cdot n}{60}$$

$$T_b = \frac{\Sigma J \cdot (n_1 - n_2)}{9,55 \cdot t_b}$$

$$\hat{P}_b = \frac{T_b \cdot n_1}{9,55}$$

$$\bar{P}_b = \frac{\hat{P}_b}{2}$$

T_b	Motor braking torque	[Nm]
ΣJ	Total inertia applied to the motor	[kgm²]
n_1	Motor speed ahead of gearbox	[rpm]
n_2	Motor speed after gearbox	[rpm]
t_b	Braking time	[s]
$\hat{P}_b$	Peak braking power	[W]
$\bar{P}_f$	Average braking power during time t_b	[W]
T_r	Resistive torque	[Nm]



Example of using characteristics curves

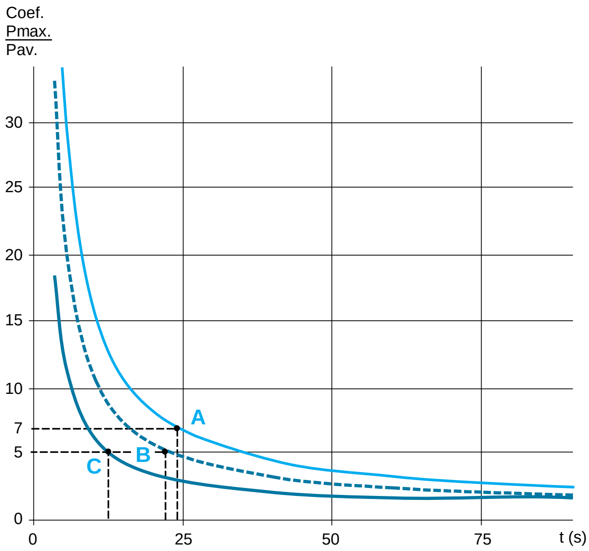
VW3 A7 710 (P continuous = 25 kW) for 2.75 Ω at 20°C

Example of using the curves:

Point **A** *For a 200 s cycle, the resistance of 2.75 Ω can take an overload of 7 x 25 kW (continuous power) for 24 s, or 175 kW of braking every 200 s.*

Point **B** *For a 120 s cycle, the resistance of 2.75 Ω can take an overload of 5 x 25 kW (continuous power) for 20 s, or 125 kW of braking every 120 s.*

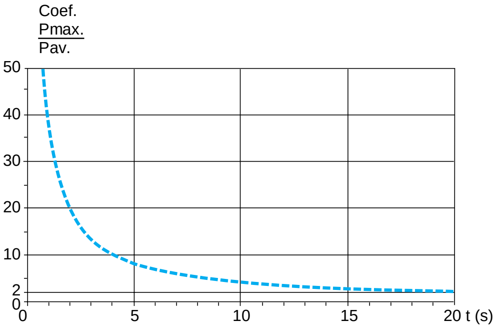
Point **C** *For a 60 s cycle, the resistance of 2.75 Ω can take an overload of 5 x 25 kW (continuous power) for 10 s, or 125 kW of braking every 60 s.*



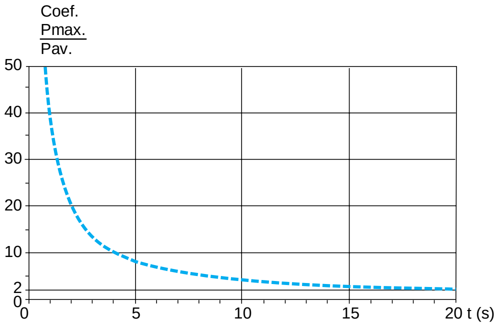
P max/P av (60 s cycle)
P max/P av (120 s cycle)
P max/P av (200 s cycle)

Braking resistors

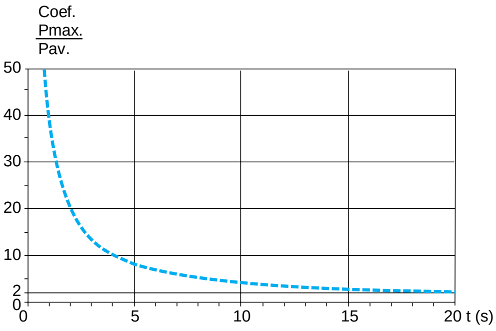
VW3 A7 701 (P continuous = 0.05 kW)



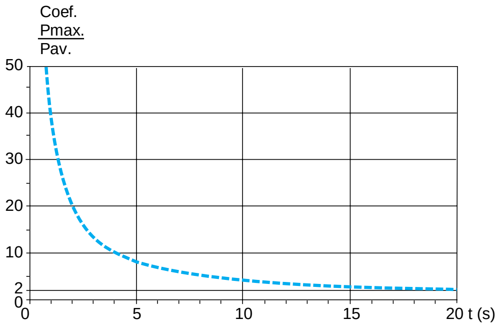
VW3 A7 702 (P continuous = 0.1 kW)



VW3 A7 703 (P continuous = 0.2 kW)



VW3 A7 704…709 (P continuous = 1 kW)



P max/P av (40 s cycle)

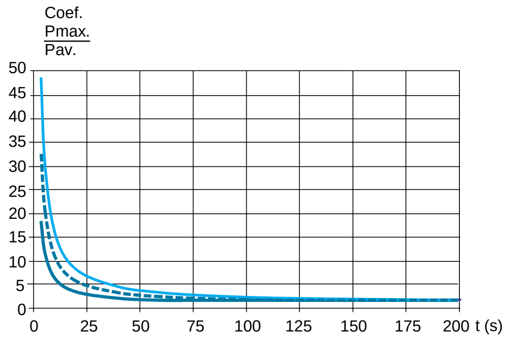
Variable speed drives for asynchronous motors

Altivar 61

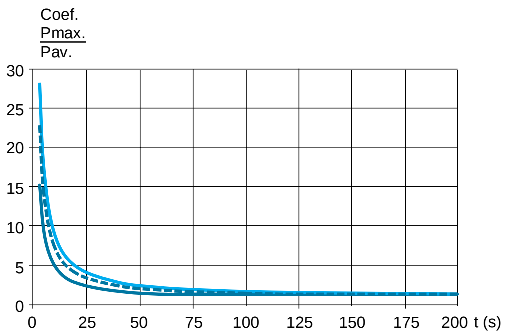
Characteristics curves for resistors

Braking resistors (continued)

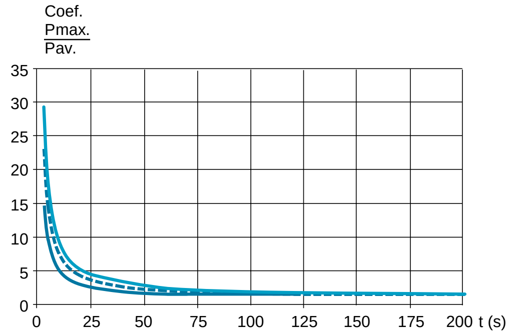
VW3 A7 710 (P continuous = 25 kW)



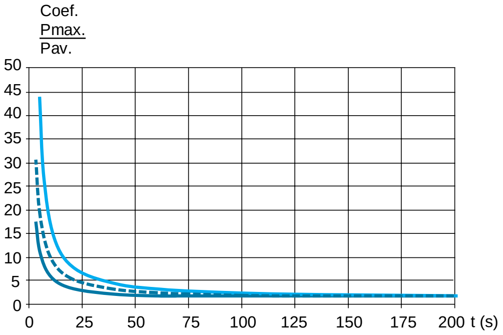
VW3 A7 711 (P continuous = 37 kW)



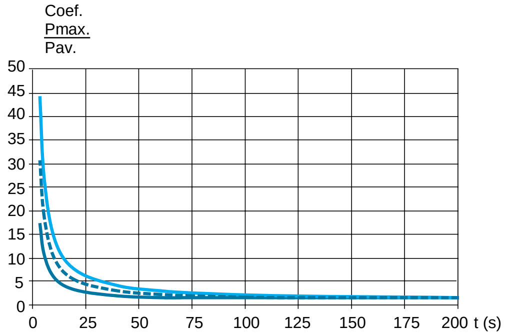
VW3 A7 712 (P continuous = 44 kW)



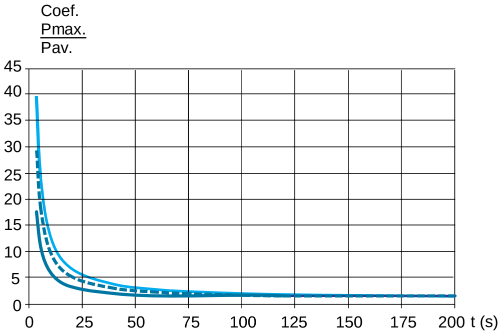
VW3 A7 713 (P continuous = 15.3 kW)



VW3 A7 714 (P continuous = 20.9 kW)



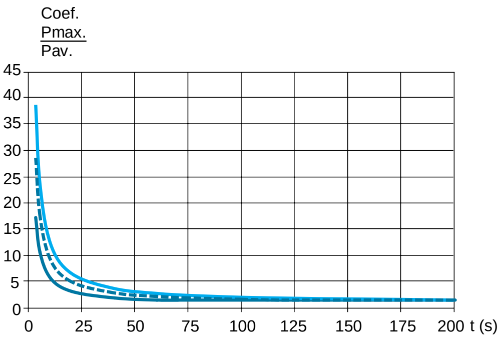
VW3 A7 715 (P continuous = 56 kW)



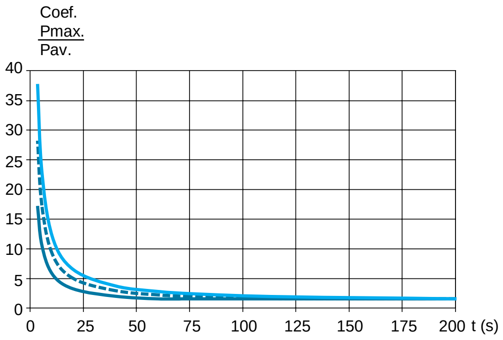
— *P max/P av (60 s cycle)*
- - - *P max/P av (120 s cycle)*
— *P max/P av (200 s cycle)*

Braking resistors (continued)

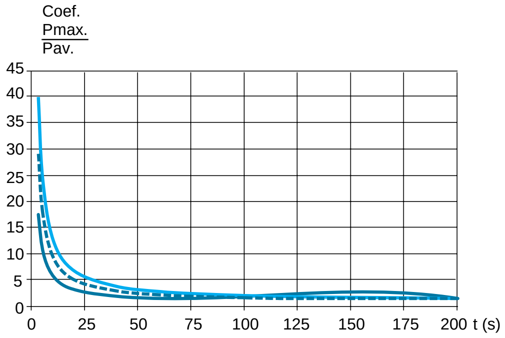
VW3 A7 716 (P continuous = 75 kW)



VW3 A7 717 (P continuous = 112 kW)



VW3 A7 718 (P continuous = 150 kW)



— *P max/P av (60 s cycle)*
- - - *P max/P av (120 s cycle)*
— *P max/P av (200 s cycle)*

Variable speed drives for asynchronous motors

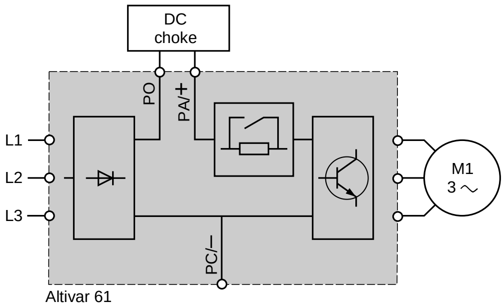
Altivar 61: Reduction of current harmonics

Option: DC chokes

The main solutions for reducing current harmonics are as follows:

- DC chokes, see below
- Line chokes, see page 66
- 16% and 10% passive filters, see page 69
- Use of passive filters with a DC choke, see pages 69 to 73

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/61000-3-2 for drives on which the line current is greater than 16 A and less than 75 A.
Using the DC choke with the drive complies with draft standard IEC/61000-3-12 provided that the RSCE ⩾ 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 draft 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 ⩾ 120.
The DC choke is connected to the drive power terminals.

It is supplied as standard with ATV 61HD55M3X, HD90M3X and ATV 61HD90N4…HC63N4 drives and is integrated into ATV 61W●●●N4 and ATV 61W●●●N4C drives.

Applications

Reduction of current harmonics.
Reduction of THD to 5% or to 10% in association with passive filters, see pages 69 to 73.
Maintaining the motor torque in relation to the DC choke.

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(1) Short-circuit ratio

Variable speed drives for asynchronous motors

Altivar 61: Reduction of current harmonics

Option: DC chokes

Example of current harmonic levels for ATV 61H075M3…ATV 61HD90M3X drives *(1)*

Motor power kW	Motor power *HP*	For ATV 61 drives	Line supply: Line current A	Line supply: Line Isc kA	Current harmonic levels: H1 A	H5 %	H7 %	H11 %	H13 %	H17 %	H19 %	H23 %	H25 %	H29 %	H31 %	H35 %	H37 %	H41 %	H43 %	H47 %	H49 %	THD *(2)*
3-phase supply voltage: 230 V 50 Hz, with optional DC choke																						
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	45.8	28.3	14.9	8.8	6.2	5.3	4.1	3.7	3	2.7	2.4	2.1	1.9	1.6	1.6	1.2	1.3	35
18.5	*25*	HD18M3X	60	22	56	31.5	17.1	8.7	6.1	5.2	3.9	3.7	2.9	2.7	2.3	2.1	1.9	1.7	1.6	1.3	1.3	38.5
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	120	14	109.29	39.77	18.67	7.98	4.67	4.16	2.59	2.61	1.81	1.76	1.35	1.23	1.02	0.87	0.78	0.63	0.59	45.36
75	*100*	HD75M3X	163.0	35	148.35	38.83	20.24	8.2	5.43	4.58	3.15	3.04	2.24	2.17	1.7	1.62	1.33	1.23	1.06	0.94	0.84	45.51
90	*125*	HD90M3X	196.06	35	177.16	40.75	21.04	8.1	5.26	4.42	2.93	2.88	2.06	2.04	1.55	1.49	1.21	1.12	0.95	0.85	0.75	47.41

Example of current harmonic levels for ATV 61H075N4…ATV 61HC63N4 drives *(1)*

Motor power kW	Motor power *HP*	For ATV 61 drives	Line supply: Line current A	Line supply: Line Isc kA	Current harmonic levels: H1 A	H5 %	H7 %	H11 %	H13 %	H17 %	H19 %	H23 %	H25 %	H29 %	H31 %	H35 %	H37 %	H41 %	H43 %	H47 %	H49 %	THD *(2)*
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	20.01	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*	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	188.59	35	175.53	33.15	16.56	8.29	5.6	4.81	3.57	3.26	2.58	2.36	1.97	1.77	1.53	1.36	1.2	1.04	0.95	39.26
132	*200*	HC13N4	226.53	35	209.69	34.91	17.14	8.21	5.36	4.66	3.33	3.11	2.4	2.22	1.82	1.64	1.41	1.24	1.1	0.94	0.86	40.86
160	*250*	HC16N4	271.34	50	251.7	34	17.22	8.28	5.59	4.8	3.51	3.23	2.56	2.35	1.94	1.76	1.51	1.34	1.2	1.04	0.95	40.24
200	*300*	HC22N4	337.95	50	313.51	34.38	16.75	8.23	5.33	4.65	3.32	3.09	2.39	2.2	1.81	1.63	1.38	1.22	1.07	0.91	0.84	40.24
220	*350*	HC22N4	369.49	50	344.77	32.98	15.54	8.23	5.26	4.66	3.33	3.07	2.39	2.17	1.79	1.57	1.35	1.16	1.03	0.86	0.79	38.53
250	*400*	HC25N4	418.15	50	390.95	32.69	14.89	8.15	5.14	4.56	3.26	2.98	2.32	2.07	1.71	1.48	1.29	1.07	0.97	0.78	0.72	37.95
280	*450*	HC31N4	471.17	50	437.41	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	526.6	50	492.29	33.1	14.44	8.08	4.85	4.41	3.05	2.81	2.15	1.9	1.57	1.32	1.15	0.92	0.84	0.65	0.61	37.99
355	–	HC40N4	591.92	50	554.81	32.59	13.7	8	4.73	4.32	2.99	2.71	2.09	1.8	1.5	1.22	1.08	0.84	0.78	0.57	0.55	37.2
400	*600*	HC40N4	660.94	50	622.77	31.23	12.61	7.95	4.71	4.26	2.99	2.63	2.06	1.71	1.45	1.12	1.01	0.75	0.7	0.51	0.49	35.57
500	*700*	HC50N4	834.65	50	781.47	33.52	13.05	7.75	4.28	3.97	2.65	2.37	1.82	1.49	1.26	0.96	0.88	0.63	0.61	0.43	0.42	37.54
560	*800*	HC63N4	930.84	50	874.82	32.5	12.37	7.76	4.28	3.96	2.67	2.34	1.78	1.46	1.21	0.86	0.79	0.56	0.54	0.39	0.38	36.39
630	*900*	HC63N4	1037.11	50	980.2	31.06	11.11	7.64	4.23	3.81	2.63	2.15	1.73	1.27	1.13	0.77	0.73	0.5	0.48	0.39	0.36	34.61

(1) Example of current harmonic levels up to harmonic order 49 for a 400 V/50 Hz supply with chokes connected between the PO and PA/+ terminals on the Altivar 61.

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

Characteristics:
page 65

References:
page 65

Dimensions:
page 103

Schemes:
pages 114 to 117, 123 and 124

Variable speed drives for asynchronous motors

Altivar 61: Reduction of current harmonics

Option: DC chokes

Example of current harmonic levels for ATV 61W●●●N4 and ATV 61W●●●N4C drives *(1)*

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

Motor power		For ATV 61 drives	Line supply		Current harmonic levels																	THD
			Line current	Line Isc	H1	H5	H7	H11	H13	H17	H19	H23	H25	H29	H31	H35	H37	H41	H43	H47	H49	*(2)*
kW	*HP*		A	kA	A	%	%	%	%	%	%	%	%	%	%	%	%	%	%	%	%	
0.75	*1*	W075N4 W075N4C	1.75	5	1.61	32.12	22.41	8.97	7.96	5.77	5	4.25	3.69	3.36	2.93	2.78	2.43	2.37	2.08	2.06	1.81	42.65
1.5	*2*	WU15N4 WU15N4C	3.38	5	3.08	34.84	23.58	8.77	7.71	5.60	4.77	4.11	3.51	3.24	2.78	2.67	2.30	2.26	1.96	1.96	1.71	45.12
2.2	*3*	WU22N4 WU22N4C	4.77	5	4.38	33.37	22.01	8.8	7.48	5.6	4.7	4.1	3.48	3.23	2.76	2.65	2.28	2.24	1.94	1.93	1.69	43.12
3	–	WU30N4 WU30N4C	6.39	5	5.84	35.07	22.41	8.51	7.38	5.36	4.63	3.89	3.43	3.04	2.73	2.48	2.26	2.08	1.93	1.79	1.67	44.48
4	*5*	WU40N4 WU40N4C	8.39	5	7.64	36.07	22.73	8.45	7.27	5.29	4.52	3.82	3.33	2.97	2.65	2.42	2.19	2.02	1.86	1.73	1.61	45.34
5.5	*7.5*	WU55N4 WU55N4C	10.71	22	9.9	30.94	21	9.56	8.22	6.09	5.31	4.47	3.94	3.52	3.14	2.9	2.6	2.45	2.21	2.11	1.92	41.41
7.5	*10*	WU75N4 WU75N4C	15.10	22	13.73	35.93	23.66	8.72	7.55	5.53	4.65	4.03	3.41	3.16	2.7	2.59	2.23	2.19	1.89	1.88	1.64	45.9
11	*15*	WD11N4 WD11N4C	20.75	22	19.35	29.81	18.76	9.1	7.38	5.76	4.79	4.2	3.56	3.29	2.83	2.69	2.34	2.26	1.99	1.93	1.72	38.88
15	*20*	WD15N4 WD15N4C	28.74	22	26.24	35.65	22.28	8.55	7.22	5.32	4.50	3.83	3.32	2.97	2.63	2.41	2.17	2.01	1.84	1.71	1.58	44.79
18.5	*25*	WD18N4 WD18N4C	35.41	22	32.11	37.49	23.29	8.44	7.13	5.22	4.36	3.74	3.19	2.88	2.52	2.32	2.08	1.93	1.75	1.63	1.51	46.65
22	*30*	WD22N4 WD22N4C	41.66	22	37.87	37.21	22.55	8.38	6.95	5.16	4.26	3.69	3.13	2.84	2.47	2.29	2.02	1.89	1.7	1.6	1.46	45.99
30	*40*	WD30N4 WD30N4C	54.02	22	50.77	29.05	16.24	8.66	6.55	5.39	4.32	3.86	3.22	2.96	2.55	2.36	2.09	1.92	1.76	1.59	1.5	36.54
37	*50*	WD37N4 WD37N4C	66.15	22	62.09	29.46	16.33	8.76	6.51	5.41	4.25	3.85	3.15	2.93	2.48	2.32	2.03	1.86	1.7	1.52	1.45	36.89
45	*60*	WD45N4 WD45N4C	80.82	22	75.33	31.82	17.26	8.57	6.24	5.22	4.02	3.69	2.97	2.78	2.34	2.18	1.91	1.73	1.59	1.39	1.35	38.98
55	*75*	WD55N4 WD55N4C	100.42	22	92.45	35.41	19.11	8.24	6.06	4.92	3.78	3.43	2.77	2.57	2.16	2	1.73	1.6	1.42	1.3	1.18	42.51
75	*100*	WD75N4 WD75N4C	133.88	22	125.86	30.11	14.93	8.5	5.85	5.07	3.82	3.49	2.81	2.56	2.19	1.92	1.76	1.46	1.43	1.12	1.18	36.35
90	*125*	WD90N4 WD90N4C	164.46	35	152.4	33.86	17.83	8.24	5.98	4.93	3.8	3.43	2.8	2.57	2.18	2	1.75	1.6	1.43	1.29	1.18	40.65

(1) Example of current harmonic levels up to harmonic order 49 for a 400 V/50 Hz supply with chokes connected between the PO and PA/+ terminals on the Altivar 61.

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

Characteristics, references

Variable speed drives for asynchronous motors

Altivar 61: Reduction of current harmonics

Option: DC chokes

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

(1) For ATV 61HD55M3X…HD90M3X, ATV 61HD90N4…HC63N4 drives, the choke is supplied as standard with the drive.
It is integrated into ATV 61W●●●N4 and ATV 61W●●●N4C drives.

Presentation:
pages 62 to 64

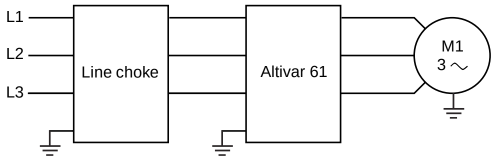
Dimensions:
page 103

Schemes:
pages 114 to 117, 123 and 124

Variable speed drives for asynchronous motors

Altivar 61: 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 the current harmonics produced by the drive.

Line chokes are compulsory on ATV 61HU40M3…HU75M3 drives supplied with a single phase 200…240 V 50/60 Hz supply voltage.

They can be used instead of a DC choke. In this case, to order an ATV 61HD55M3X…HD90M3X and ATV 61HD90N4…HC63N4 drive without DC choke, add the letter D to the end of the drive's reference, see pages 18 and 19.

The recommended chokes can be 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 inductance values are defined for a voltage drop between phases of between 3% and 5% of the nominal line 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
- Reduction of overload in cos φ correction capacitors, if the installation has a power factor correction unit

Variable speed drives for asynchronous motors

Altivar 61: Reduction of current harmonics

Option: Line chokes

General characteristics

Type of choke			**VW3 A58501. A58502**	**VW3 A4 551... A4 553**	**VW3 A4 554, A4 555**	**VW3 A4 556... A4 560**	**VW3 A4 561, A4 564, 565, A4 568, 569**
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 564, 565		Connected on a bar, Ø 13 mm –
	VW3 A4 568		Connected on a bar, Ø 11 mm –
	VW3 A4 569		Connected on a bar, Ø 13 mm –

Presentation:
page 66

References:
page 68

Dimensions:
page 103

Schemes:
pages 114 to 118

Variable speed drives for asynchronous motors

Altivar 61: Reduction of current harmonics

Option: Line chokes

Line chokes

For drives	Line supply Line Isc	Line choke Induct-ance value	Nominal current	Saturation current	Loss	Number required per drive	Reference	Weight
	kA	mH	A	A	W			kg
Single phase supply voltage: 200…240 V 50/60 Hz								
ATV 61HU40M3	5	2	25	–	45	1	**VW3 A58501**	3.500
ATV 61HU55M3	5	1	45	–	50	1	**VW3 A58502**	3.500
ATV 61HU75M3	22	1	45	–	50	1	**VW3 A58502**	3.500
3-phase supply voltage: 200…240 V 50/60 Hz								
ATV 61H075M3	5	10	4	–	45	1	**VW3 A4 551**	1.500
ATV 61HU15M3, HU22M3	5	4	10	–	65	1	**VW3 A4 552**	3.000
ATV 61HU30M3	5	2	16	–	75	1	**VW3 A4 553**	3.500
ATV 61HU40M3	5	1	30	–	90	1	**VW3 A4 554**	6.000
ATV 61HU55M3	22	1	30	–	90	1	**VW3 A4 554**	6.000
ATV 61HU75M3, HD11M3X	22	0.5	60	–	94	1	**VW3 A4 555**	11.000
ATV 61HD15M3X	22	0.3	100	–	260	1	**VW3 A4 556**	16.000
ATV 61HD18M3X…HD45M3X	22	0.15	230	–	400	1	**VW3 A4 557**	45.000
ATV 61HD55M3XD	35	0.066	344	685	258	1	**VW3 A4 561**	47.000
ATV 61HD75M3XD	35	0.066	344	685	258	1	**VW3 A4 561**	47.000
ATV 61HD90M3XD	35	0.038	613	1150	307	1	**VW3 A4 564**	73.000
3-phase supply voltage: 380…480 V 50/60 Hz								
ATV 61H075N4, HU15N4	5	10	4	–	45	1	**VW3 A4 551**	1.500
ATV 61HU22N4…HU40N4	5	4	10	–	65	1	**VW3 A4 552**	3.000
ATV 61HU55N4, HU75N4	22	2	16	–	75	1	**VW3 A4 553**	3.500
ATV 61HD11N4, HD15N4	22	1	30	–	90	1	**VW3 A4 554**	6.000
ATV 61HD18N4, HD22N4	22	0.5	60	–	94	1	**VW3 A4 555**	11.000
ATV 61HD30N4…HD55N4	22	0.3	100	–	260	1	**VW3 A4 556**	16.000
ATV 61HD75N4	22	0.15	230	–	400	1	**VW3 A4 557**	45.000
ATV 61HD90N4D	35	0.155	184	370	220	1	**VW3 A4 558**	31.000
ATV 61HC11N4D	35	0.12	222	445	230	1	**VW3 A4 559**	35.000
ATV 61HC13N4D	35	0.098	264	530	245	1	**VW3 A4 560**	43.000
ATV 61HC16N4D	50	0.085	300	570	268	1	**VW3 A4 568**	46.000
ATV 61HC22N4D Motor P 200 kW	50	0.066	344	685	258	1	**VW3 A4 561**	47.000
Motor P 220 kW	50	0.060	450	849	300	1	**VW3 A4 569**	70.000
ATV 61HC25N4D	50	0.060	450	849	300	1	**VW3 A4 569**	70.000
ATV 61HC31N4D	50	0.038	613	1150	307	1	**VW3 A4 564**	73.000
ATV 61HC40N4D	50	0.032	720	1352	428	1	**VW3 A4 565**	82.000
ATV 61HC50N4D	50	0.060	450	849	300	2	**VW3 A4 569**	70.000
ATV 61HC63N4D	50	0.038	613	1150	307	2	**VW3 A4 564**	73.000

Presentation:
page 66

Characteristics:
page 67

Dimensions:
page 103

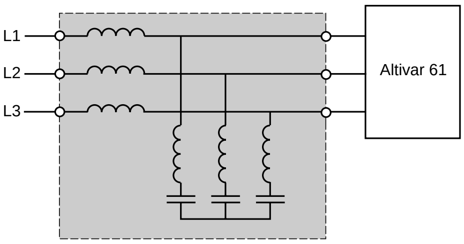
Schemes:
pages 114 to 118

Variable speed drives for asynchronous motors

Altivar 61: Reduction of current harmonics

Option: Passive filters

Passive filters



Passive filter

The passive filter is used to reduce current harmonics with total harmonic distortion factors of less than 16% or 10%. These ratios may be less than 10% or 5% if the filter is used with a DC choke, see pages 62 and 70 to 73.
For applications requiring stricter control of current harmonics, the filter can be controlled via the drive on the basis of the load, see page 122.

Applications

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 Up to 55°C with current derating of 3% per additional °C
	Storage	**°C**	- 25…+ 55
Maximum operating altitude		**m**	1000 without derating 1000…4000 with current derating of 5% per additional 1000 m

Electrical characteristics

Range		**400 V**	**460 V**
Nominal voltage ± 10%	**V**	380…415 ∿	440…480 ∿
Operating frequency		50 ± 5 %	60 ± 5 %
Overload capacity		1.5 x Irms (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, 614	Connected on a bar, Ø 12.5
	VW3 A4 612, 613, 615…617	Connected on a bar, Ø 16.5
	VW3 A4 618	Connected on a bar, Ø 16.5
	VW3 A4 621, 622	16 mm^2
	VW3 A4 623…627	50 mm^2
	VW3 A4 628, 629	Connected on a bar, Ø 12.5
	VW3 A4 630…637	Connected on a bar, Ø 16.5
	VW3 A4 638	Connected on a bar, Ø 16.5
	VW3 A4 641…644	16 mm^2
	VW3 A4 645…648	50 mm^2
	VW3 A4 649	Connected on a bar, Ø 12.5
	VW3 A4 650…655	Connected on a bar, Ø 16.5
	VW3 A4 656	Connected on a bar, Ø 16.5
	VW3 A4 661…663	16 mm^2
	VW3 A4 664…666	50 mm^2
	VW3 A4 667, 668	Connected on a bar, Ø 12.5
	VW3 A4 669…675	Connected on a bar, Ø 16.5
	VW3 A4 676	Connected on a bar, Ø 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.

References:
pages 70 to 73

Dimensions:
pages 104 and 105

Schemes:
page 122

Variable speed drives for asynchronous motors

Altivar 61: Reduction of current harmonics

Option: Passive filters

Passive filters: 3-phase power supply 400 V 50 Hz

Motor rating		For drives	Line supply Line current	Filter In *(2)*	Number required per drive	Reference	Weight
kW	***HP***		**A**	**A**			**kg**
THDI 16% *(1)*							
0.75	*1*	ATV 61H075N4	3.30	6	1	**VW3 A4 601**	15.000
1.5	*2*	ATV 61HU15N4	4.00	6	1	**VW3 A4 601**	15.000
2.2	*3*	ATV 61HU22N4	5.00	6	1	**VW3 A4 601**	15.000
3	–	ATV 61HU30N4	6.00	6	1	**VW3 A4 601**	15.000
4	*5*	ATV 61HU40N4	7.80	10	1	**VW3 A4 602**	19.000
5.5	*7.5*	ATV 61HU55N4	10.00	10	1	**VW3 A4 602**	19.000
7.5	*10*	ATV 61HU75N4	14.00	19	1	**VW3 A4 603**	21.000
11	*15*	ATV 61HD11N4	19.00	19	1	**VW3 A4 603**	21.000
15	*20*	ATV 61HD15N4	26.00	26	1	**VW3 A4 604**	22.000
18.5	*25*	ATV 61HD18N4	32.00	35	1	**VW3 A4 605**	34.000
22	*30*	ATV 61HD22N4	38.00	43	1	**VW3 A4 606**	38.000
30	*40*	ATV 61HD30N4	52.00	72	1	**VW3 A4 607**	56.000
37	*50*	ATV 61HD37N4	63.00	72	1	**VW3 A4 607**	56.000
45	*60*	ATV 61HD45N4	77.00	101	1	**VW3 A4 608**	69.000
55	*75*	ATV 61HD55N4	91.00	101	1	**VW3 A4 608**	69.000
75	*100*	ATV 61HD75N4	126.00	144	1	**VW3 A4 609**	97.000
90	*125*	ATV 61HD90N4	156.00	144	1	**VW3 A4 609**	97.000
110	*150*	ATV 61HC11N4	187.00	180	1	**VW3 A4 610**	103.000
132	*200*	ATV 61HC13N4	234.00	216	1	**VW3 A4 611**	112.000
160	*250*	ATV 61HC16N4	287.00	289	1	**VW3 A4 612**	135.000
200	*300*	ATV 61HC22N4	353.50	370	1	**VW3 A4 613**	155.000
220	*350*	ATV 61HC22N4	390.00	370	1	**VW3 A4 613**	155.000
250	*400*	ATV 61HC25N4	445.00	216	2	**VW3 A4 611**	112.000
280	*450*	ATV 61HC31N4	485.00	289	2	**VW3 A4 612**	135.000
315	*500*	ATV 61HC31N4	543.00	289	2	**VW3 A4 612**	135.000
355	–	ATV 61HC40N4	592.00	289	2	**VW3 A4 612**	135.000
400	*600*	ATV 61HC40N4	670.00	325	2	**VW3 A4 619**	155.000
500	*700*	ATV 61HC50N4	840.00	289	3	**VW3 A4 612**	135.000
560	*800*	ATV 61HC63N4	978.00	370	3	**VW3 A4 613**	155.000
630	*900*	ATV 61HC63N4	1091.00	370	3	**VW3 A4 613**	155.000

(1) If a DC choke (see page 62) is used with VW3 A4 601 to VW3 A4 613 and VW3 A4 619 passive filters, the THD will be ≤ 10%. These reduced current harmonics are obtained on condition that the THDU is < 2% and the RSCE is > 66% and only for the nominal current of the passive filter.

(2) In: Nominal filter current.

Variable speed drives for asynchronous motors

Altivar 61: Reduction of current harmonics

Option: Passive filters

Passive filters: 3-phase power supply 400 V 50 Hz (continued)

Motor rating		For drives	Line supply	Filter	Number required per drive	Reference	Weight
			Line current	In *(2)*			
kW	*HP*		A	A			kg
THDI 10% *(1)*							
0.75	*1*	ATV 61H075N4	3.30	6	1	**VW3 A4 621**	21.000
1.5	*2*	ATV 61HU15N4	4.00	6	1	**VW3 A4 621**	21.000
2.2	*3*	ATV 61HU22N4	5.00	6	1	**VW3 A4 621**	21.000
3	–	ATV 61HU30N4	6.00	6	1	**VW3 A4 621**	21.000
4	*5*	ATV 61HU40N4	7.80	10	1	**VW3 A4 622**	27.000
5.5	*7.5*	ATV 61HU55N4	10.00	10	1	**VW3 A4 622**	27.000
7.5	*10*	ATV 61HU75N4	14.00	19	1	**VW3 A4 623**	28.000
11	*15*	ATV 61HD11N4	19.00	19	1	**VW3 A4 623**	28.000
15	*20*	ATV 61HD15N4	26.00	26	1	**VW3 A4 624**	40.000
18.5	*25*	ATV 61HD18N4	32.00	35	1	**VW3 A4 625**	49.000
22	*30*	ATV 61HD22N4	38.00	43	1	**VW3 A4 626**	52.000
30	*40*	ATV 61HD30N4	52.00	72	1	**VW3 A4 627**	88.000
37	*50*	ATV 61HD37N4	63.00	72	1	**VW3 A4 627**	88.000
45	*60*	ATV 61HD45N4	77.00	101	1	**VW3 A4 628**	150.000
55	*75*	ATV 61HD55N4	91.00	101	1	**VW3 A4 628**	150.000
75	*100*	ATV 61HD75N4	126.00	144	1	**VW3 A4 629**	167.000
90	*125*	ATV 61HD90N4	156.00	144	1	**VW3 A4 629**	167.000
110	*150*	ATV 61HC11N4	187.00	180	1	**VW3 A4 630**	178.000
132	*200*	ATV 61HC13N4	234.00	216	1	**VW3 A4 631**	224.000
160	*250*	ATV 61HC16N4	287.00	289	1	**VW3 A4 632**	271.000
200	*300*	ATV 61HC22N4	353.50	370	1	**VW3 A4 633**	320.000
220	*350*	ATV 61HC22N4	390.00	370	1	**VW3 A4 633**	320.000
250	*400*	ATV 61HC25N4	445.00	216	2	**VW3 A4 631**	224.000
280	*450*	ATV 61HC31N4	485.00	289	2	**VW3 A4 632**	271.000
315	*500*	ATV 61HC31N4	543.00	289	2	**VW3 A4 632**	271.000
355	–	ATV 61HC40N4	592.00	289	2	**VW3 A4 632**	271.000
400	*600*	ATV 61HC40N4	670.00	325	2	**VW3 A4 639**	284.000
500	*700*	ATV 61HC50N4	840.00	289	3	**VW3 A4 632**	271.000
560	*800*	ATV 61HC63N4	918.00	370	3	**VW3 A4 633**	320.000
630	*900*	ATV 61HC63N4	1091.00	370	3	**VW3 A4 633**	320.000

(1) If a DC choke (see page 62) is used with VW3 A4 621 to VW3 A4 633 and VW3 A4 639 passive filters, the THD will be ≤ 5%. These reduced current harmonics are obtained on condition that the THDU is < 2% and the RSCE is > 66% and only for the nominal current of the passive filter.

(2) In: Nominal filter current.

Variable speed drives for asynchronous motors

Altivar 61: Reduction of current harmonics

Option: Passive filters

Passive filters: 3-phase power supply 460 V 60 Hz

Motor rating		For drives	Line supply Line current	Filter In *(2)*	Number required per drive	Reference	Weight
kW	*HP*		A	A			kg
THDI 16% *(1)*							
0.75	*1*	ATV 61H075N4	2.50	6	1	**VW3 A4 641**	15.000
1.5	*2*	ATV 61HU15N4	3.00	6	1	**VW3 A4 641**	15.000
2.2	*3*	ATV 61HU22N4	4.20	6	1	**VW3 A4 641**	15.000
3	–	ATV 61HU30N4	6.00	6	1	**VW3 A4 641**	15.000
4	*5*	ATV 61HU40N4	7.00	10	1	**VW3 A4 642**	19.000
5.5	*7.5*	ATV 61HU55N4	10.00	10	1	**VW3 A4 642**	19.000
7.5	*10*	ATV 61HU75N4	13.00	19	1	**VW3 A4 643**	23.000
11	*15*	ATV 61HD11N4	19.00	19	1	**VW3 A4 643**	23.000
15	*20*	ATV 61HD15N4	24.00	26	1	**VW3 A4 644**	34.000
18.5	*25*	ATV 61HD18N4	32.00	35	1	**VW3 A4 645**	42.000
22	*30*	ATV 61HD22N4	35.00	35	1	**VW3 A4 645**	42.000
30	*40*	ATV 61HD30N4	46.40	43	1	**VW3 A4 646**	45.000
37	*50*	ATV 61HD37N4	58.70	72	1	**VW3 A4 647**	61.000
45	*60*	ATV 61HD45N4	67.90	72	1	**VW3 A4 647**	61.000
55	*75*	ATV 61HD55N4	82.60	101	1	**VW3 A4 648**	75.000
75	*100*	ATV 61HD75N4	108.00	101	1	**VW3 A4 648**	75.000
90	*125*	ATV 61HD90N4	134.00	180	1	**VW3 A4 649**	107.000
110	*150*	ATV 61HC11N4	163.00	180	1	**VW3 A4 649**	107.000
132	*200*	ATV 61HC13N4	234.00	217	1	**VW3 A4 656**	119.000
160	*250*	ATV 61HC16N4	287.00	289	1	**VW3 A4 650**	145.000
200	*300*	ATV 61HC22N4	353.00	370	1	**VW3 A4 651**	185.000
220	*350*	ATV 61HC22N4	390.00	370	1	**VW3 A4 651**	185.000
250	*400*	ATV 61HC25N4	444.00	217	2	**VW3 A4 656**	119.000
280	*450*	ATV 61HC31N4	485.00	289	2	**VW3 A4 650**	145.000
315	*500*	ATV 61HC31N4	543.00	289	2	**VW3 A4 650**	145.000
355	–	ATV 61HC40N4	592.00	289	2	**VW3 A4 650**	145.000
400	*600*	ATV 61HC40N4	670.00	325	2	**VW3 A4 657**	165.000
500	*700*	ATV 61HC50N4	760.00	370	2	**VW3 A4 651**	185.000
560	*800*	ATV 61HC63N4	858.00	325	3	**VW3 A4 657**	165.000
630	*900*	ATV 61HC63N4	964.00	325	3	**VW3 A4 657**	165.000

(1) If a DC choke (see page 62) is used with VW3 A4 641 to VW3 A4 651, VW3 A4 656 and VW3 A4 657 passive filters, the THD will be ≤ 10%.
These reduced current harmonics are obtained on condition that the THDU is < 2% and the RSCE is > 66% and only for the nominal current of the passive filter.

(2) In: Nominal filter current.

Presentation:
page 69

Characteristics:
page 69

Dimensions:
pages 104 and 105

Schemes:
page 122

Variable speed drives for asynchronous motors

Altivar 61: Reduction of current harmonics

Option: Passive filters

Passive filters: 3-phase power supply 460 V 60 Hz

Motor rating		For drives	Line supply Line current	Filter In *(2)*	Number required per drive	Reference	Weight
kW	***HP***		**A**	**A**			**kg**
THDI 10% *(1)*							
0.75	*1*	ATV 61H075N4	2.50	6	1	**VW3 A4 661**	21.000
1.5	*2*	ATV 61HU15N4	3.00	6	1	**VW3 A4 661**	21.000
2.2	*3*	ATV 61HU22N4	4.20	6	1	**VW3 A4 661**	21.000
3	–	ATV 61HU30N4	6.00	6	1	**VW3 A4 661**	21.000
4	*5*	ATV 61HU40N4	7.00	10	1	**VW3 A4 662**	27.000
5.5	*7.5*	ATV 61HU55N4	10.00	10	1	**VW3 A4 662**	27.000
7.5	*10*	ATV 61HU75N4	13.00	19	1	**VW3 A4 663**	28.000
11	*15*	ATV 61HD11N4	19.00	19	1	**VW3 A4 663**	28.000
15	*20*	ATV 61HD15N4	24.00	26	1	**VW3 A4 664**	41.000
18.5	*25*	ATV 61HD18N4	32.00	35	1	**VW3 A4 665**	49.000
22	*30*	ATV 61HD22N4	35.00	35	1	**VW3 A4 665**	49.000
30	*40*	ATV 61HD30N4	46.40	43	1	**VW3 A4 666**	56.000
37	*50*	ATV 61HD37N4	58.70	72	1	**VW3 A4 667**	80.000
45	*60*	ATV 61HD45N4	68.00	72	1	**VW3 A4 667**	80.000
55	*75*	ATV 61HD55N4	82.60	101	1	**VW3 A4 668**	98.000
75	*100*	ATV 61HD75N4	108.00	101	1	**VW3 A4 668**	98.000
90	*125*	ATV 61HD90N4	134.00	180	1	**VW3 A4 669**	151.000
110	*150*	ATV 61HC11N4	163.00	180	1	**VW3 A4 669**	151.000
132	*200*	ATV 61HC13N4	234.00	217	1	**VW3 A4 676**	171.000
160	*250*	ATV 61HC16N4	287.00	289	1	**VW3 A4 670**	215.000
200	*300*	ATV 61HC22N4	353.50	370	1	**VW3 A4 671**	250.000
220	*350*	ATV 61HC22N4	390.00	370	1	**VW3 A4 671**	250.000
250	*400*	ATV 61HC25N4	444.00	217	2	**VW3 A4 676**	171.000
280	*450*	ATV 61HC31N4	485.00	289	2	**VW3 A4 670**	240.000
315	*500*	ATV 61HC31N4	543.00	289	2	**VW3 A4 670**	240.000
355	–	ATV 61HC40N4	592.00	289	2	**VW3 A4 670**	240.000
400	*600*	ATV 61HC40N4	670.00	325	2	**VW3 A4 677**	215.000
500	*700*	ATV 61HC50N4	760.00	370	2	**VW3 A4 671**	250.000
560	*800*	ATV 61HC63N4	858.00	325	3	**VW3 A4 677**	240.000
630	*900*	ATV 61HC63N4	964.00	325	3	**VW3 A4 677**	240.000

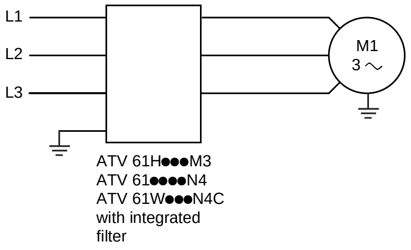
(1) If a DC choke (see page 62) is used with VW3 A4 661 to VW3 A4 671, VW3 A4 676 and VW3 A4 677 passive filters, the THD will be ≤ 5%.
These reduced current harmonics are obtained on condition that the THDU is < 2% and the RSCE is > 66% and only for the nominal current of the passive filter.

(2) In: Nominal filter current.

Variable speed drives for asynchronous motors

Altivar 61

Option: additional EMC input filters

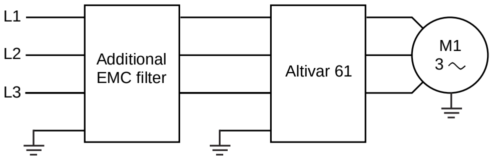


Integrated filters

The Altivar 61 drive, except for the ATV 61H●●●M3X, has built-in radio interference input filters to meet the EMC standard for variable speed electrical power drive "products" IEC/EN 61800-3, edition 2, category C2 or C3 in environment 1 or 2 and to comply with the European directive on EMC (electromagnetic compatibility).

Drives	Maximum length of shielded cable according to EN 55011, class A *(1)*			
	Group 1 *(2)*		**Group 2** *(2)*	
	LF *(3)*	**HF** *(3)*	**LF** *(3)*	**HF** *(3)*
	m	**m**	**m**	**m**
ATV 61H075M3…HU22M3	10	5	–	–
ATV 61HU30M3…HU75M3	–	–	10	5
ATV 61H075N4…HU40N4	10	5	–	–
ATV 61HU55N4…HD15N4	–	–	10	5
ATV 61HD18N4…HC63N4	–	–	50	25
ATV 61W●●●N4	80	50	–	–
ATV 61W●●●N4C	80	50	20	5

Additional EMC input filters



Applications

Additional EMC input filters can be used to meet more stringent requirements and are designed to cut down conducted emissions on the line supply below the limits of standard EN 55011 group 1, class A or B *(2)*.
For the ATV 61H●●●M3, ATV 61HD11M3X...HD45M3X and ATV 61H075N4...HD75N4 drives, the additional EMC filters can be mounted next to or under the device. They act as a support for the drives and are attached to them via tapped holes.
For the ATV61HD90N4…HC63N4 drives, the additional EMC filters are only mounted at the side of the drives.

Use according to the type of network

Use of these additional filters is only possible on TN (neutral connection) and TT (neutral to earth) type networks.

Standard IEC/EN 61800-3, appendix D2.1, states that on IT networks (impedance or isolated neutral), filters can cause permanent insulation monitors to operate in a random manner.
In addition, the effectiveness of additional filters on this type of network 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, one solution consists of inserting an isolation transformer and placing the machine locally on a TN or TT network.

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(1) Maximum lengths for shielded cables connecting motors to drives, for a factory-set switching frequency of 2.5 or 4 kHz, depending on the rating (see page 10). If motors are connected in parallel, it is the total length that should be taken into account.
(2) See page 8.
(3) LF: low switching frequency. HF: high switching frequency.
These frequencies depend on the drive rating.

Drives	Switching frequency	
	LF	**HF**
	kHz	**kHz**
ATV 61H●●●M3 ATV 61H075N4…HD30N4	4	4.1…16
ATV 61HD37N4…HD75N4	2…2.5	2.6…12
ATV 61HD90N4…HC63N4	2…4	4.1…8
ATV 61W075N4…WD45N4	8	8.1…16
ATV 61W075N4C…WD45N4C	8	8.1…16
ATV 61WD55N4…WD90N4	4	4.1…16
ATV 61WD55N4C…WD90N4C	4	4.1…16

Variable speed drives for asynchronous motors

Altivar 61

Option: additional EMC input filters

General characteristics

Type of EMC filter			VW3 A4 401…409	VW3 A4 410…413
Conformity to standards			EN 133200	
Degree of protection			IP 20 and IP 41 on upper part	IP 00 IP 30 with VW3 A9 601, 602 kits
Maximum relative humidity			93% without condensation or dripping water conforming to IEC 68-2-3	
Ambient temperature around the unit	Operation	°C	- 10…+ 50	- 25…+ 45
	Storage	°C	- 40…+ 65	- 25…+ 85
Maximum operating altitude		m	1000 without derating 1000…3000 derating the current by 1% per additional 100 m. Limited to 2000 m for the “Corner Grounded” distribution network	
Vibration resistance			1.5 mm peak to peak from 3…13 Hz, 1 gn peak from 13…150 Hz, in accordance with IEC 60068-2-6	
Shock resistance			15 gn for 11 ms in accordance with IEC/EN 60068-2-27	
Maximum nominal voltage	50/60 Hz three phase	V	240 + 10 % 480 + 10 %	

Connection characteristics

Maximum connection capacity and tightening torque	VW3 A4 401		4 mm² (AWG 10). 0.6 Nm
	VW3 A4 402		6 mm² (AWG 8). 1.5 Nm
	VW3 A4 403		10 mm² (AWG 6). 1.5 Nm
	VW3 A4 404		16 mm² (AWG 4). 2 Nm
	VW3 A4 405…407		50 mm² (AWG 0). 6 Nm
	VW3 A4 408		150 mm² (300 kcmil). 25 Nm
	VW3 A4 409		25 mm² (AWG 2). 4 Nm
	VW3 A4 410…412		Bar connection, M10 –
	VW3 A4 413		Bar connection, 2 x M12 –

Presentation:
Page 74

References:
Pages 76 and 77

Dimensions:
Pages 106 and 107

Schemes:
Page 122

Variable speed drives for asynchronous motors

Altivar 61

Option: additional EMC input filters

Additional EMC input filters

Drives	**Maximum length of shielded cable** *(1)*				**In** *(2)*	**Il** *(3)*	**Loss** *(4)*	**Reference**	**Weight**
	EN 55011 *(5)* **class A Gr1**		**EN 55011** *(5)* **class B Gr1**						
	LF *(6)*	**HF** *(6)*	**LF** *(6)*	**HF** *(6)*					
	m	**m**	**m**	**m**	**A**	**mA**	**W**		**kg**
Three phase supply voltage: 200…240 V 50/60 Hz									
ATV 61H075M3, HU15M3	100	50	50	20	12	4	10	**VW3 A4 401**	2.200
ATV 61HU22M3…HU40M3	100	50	50	20	26	4.4	18	**VW3 A4 402**	4.000
ATV 61HU55M3	100	50	50	20	35	3	24	**VW3 A4 403**	5.800
ATV 61HU75M3	100	50	50	20	46	10	19	**VW3 A4 404**	7.000
ATV 61HD11M3X, HD15M3X	200	100	50	25	72	33	34	**VW3 A4 405**	12.000
ATV 61HD18M3X, HD22M3X	200	100	50	25	90	33	34	**VW3 A4 406**	15.000
ATV 61HD30M3X...HD45M3X	200	100	50	25	180	80	58	**VW3 A4 408**	40.000
ATV 61HD55M3X, HD75M3X	100	50	50	25	273	285	60	**VW3 A4 410**	22.000
ATV 61HD90M3X	100	50	50	25	336	500	125	**VW3 A4 411**	22.000
Three phase supply voltage: 380…480 V 50/60 Hz									
ATV 61H075N4…HU22N4	100	50	50	20	12	7	5	**VW3 A4 401**	2.200
ATV 61HU30N4, HU40N4	100	50	50	20	26	8	6	**VW3 A4 402**	4.000
ATV 61HU55N4, HU75N4	100	50	50	20	35	7	14	**VW3 A4 403**	5.800
ATV 61HD11N4	100	50	50	20	46	14	13	**VW3 A4 404**	7.000
ATV 61HD15N4 *(7)*, HD18N4	300	200	100	100	72	60	14	**VW3 A4 405**	12.000
ATV 61HD22N4	300	200	100	100	90	60	11	**VW3 A4 406**	15.000
ATV 61HD30N4, HD37N4	300	200	100	100	92	60	30	**VW3 A4 407**	17.000
ATV 61HD45N4…HD75N4	300	200	100	100	180	140	58	**VW3 A4 408**	40.000
ATV 61HD90N4…HC16N4	300	150	50	25	273	500	60	**VW3 A4 410**	22.000
ATV 61HC22N4…HC31N4	300	150	50	25	546	500	125	**VW3 A4 411**	25.000
ATV 61HC40N4, HC50N4	300	150	50	25	728	500	210	**VW3 A4 412**	25.000
ATV 61HC63N4	300	150	50	25	1456	200	380	**VW3 A4 413**	34.000

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(1) The filter selection tables give the maximum lengths for shielded cables connecting motors to drives for a switching frequency of 1 to 16 kHz (see page 10). These limits 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 total length that should be taken into account.

(2) Filter nominal current.

(3) Maximum earth leakage current at 230 V and at 400 V 50 Hz on a TT network.

(4) Via thermal dissipation.

(5) See page 8.

(6) LF: low switching frequency. HF: high switching frequency. These frequencies depend on the drive rating:

For drives	**Switching frequency**	
	LF	**HF**
	kHz	**kHz**
ATV 61H●●●M3 ATV 61H075N4…HD11N4	4	4.1…16
ATV 61HD11M3X, HD15M3X ATV 61HD15N4…HD30N4	3.5...4	4.1…12
ATV 61HD18M3X...HD45M3X ATV 61HD37N4...HD75N4	2…2.5	2.6…12
ATV 61HD55M3X...HD90M3X	2.5…4	4.1…8
ATV 61HD90N4...HC63N4	2…4	4.1…8

(7) It is possible to use a special filter ***VW3 A4 409*** *with a leakage current Il (3) of 14 mA, which enables a maximum motor cable length of 100 m.*

Presentation:
Page 74

Characteristics:
Page 75

Dimensions:
Pages 106 and 107

Schemes:
Page 122

Variable speed drives for asynchronous motors

Altivar 61

Option: additional EMC input filters

IP 30 protection kits

Description	For filters	Reference	Weight kg
Mechanical device consisting of an IP 30 cover and cable clips	VW3 A4 410, 411	**VW3 A9 601**	–
	VW3 A4 412, 413	**VW3 A9 602**	–

Variable speed drives for asynchronous motors

Altivar 61: Output filters

The Altivar 61 drive includes as standard a software function used to limit overvoltages at the motor terminals.

Depending on the cable lengths or the type of application, it may be necessary to use output filters:

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

Cable length *(2)*	**10…50 m**	**50…100 m**	**100…150 m**	**150…300 m**	**300…600 m**	**600…1000 m**
Shielded cable						
ATV 61H●●●M3 ATV 61H075N4…HD15N4	Software function *(1)*	Motor choke		–		
ATV 61H●●●M3X ATV 61HD18N4…HC63N4	Software function *(1)*		Motor choke	–		
Unshielded cable						
ATV 61H075M3, HU15M3 ATV 61H075N4...HU22N4	Software function *(1)*		Motor choke or sinus filter		–	
ATV 61HU22M3...HU30M3 ATV 61HU30N4…HU55N4	Software function *(1)*		Motor choke		Sinus filter	–
ATV 61HU40M3…HU75M3 ATV 61HU75N4…HD15N4	Software function *(1)*		Motor choke		Sinus filter	
ATV 61HD11M3X…HU45M3X ATV 61HU18N4…HD75N4	Software function *(1)*			Motor choke	Sinus filter	
ATV 61HD55M3X…HD90M3X ATV 61HD90N4…HC63N4	Software function *(1)*			Motor choke	2 motor chokes connected in series	–

(1) The software function limits the overvoltage at the motor terminals to twice the DC bus voltage.
For any application with braking cycles, the DC bus voltage rises to more than the supply voltage multiplied by $\sqrt{2}$.
You must check the electrical characteristics of the motor before using this function.

(2) For an application with several motors connected in parallel, the cable length must include all tap-offs.
Recommended cable types:
- *Shielded cables: “GORSE” cable, type GUOSTV-LS/LH; “PROTOFLEX” cable, type EMV2YSL CY,*
- *Unshielded cables: “GORSE” cable, type H07 RN-F4GXX; “BELDEN” cable, type 2950X*

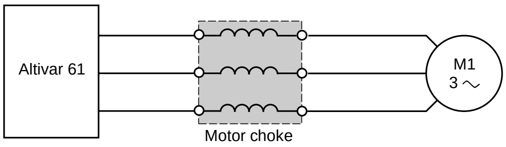
Schemes:
page 122

Variable speed drives for asynchronous motors

Altivar 61: Output filters

Option: Motor chokes

Motor chokes



Altivar 61 drives have been designed for operation with the following maximum motor cable lengths:

For drives	Maximum length of motor cable *(1)*	
	Shielded cable	Unshielded cable
	m	m
ATV 61H●●●M3 ATV 61HD11M3X, HD15M3X ATV 61H075N4…HD18N4	⩾ 50	⩾ 100
ATV 61HD18M3X…HD90M3X ATV 61HD22N4…HC63N4	⩾ 100	⩾ 200

The motor choke enables operation beyond these motor cable length limits and/or can limit the dv/dt to 500 V/µs at the motor terminals.

It also enables:

- ■ Overvoltages on the motor terminals to be limited as follows:
  - □ 1000 V to 400 V ~ (rms value)
  - □ 1150 V to 460 V ~ (rms value)
- ■ Interference caused by opening a contactor placed between the filter and the motor to be filtered
- ■ The motor earth leakage current to be reduced

General characteristics *(2)*

Type of choke			VW3 A5 101…103	VW3 A5 104…108
Maximum drive switching frequency	ATV 61H●●●M3 ATV 61HD11M3X, HD15M3X ATV 61H075N4…HD30N4	**kHz**	4	
	ATV 61HD18M3X…HD90M3X ATV 61HD37N4…HC63N4	**kHz**	2.5	
Maximum drive output frequency		**Hz**	100	
Degree of protection			IP 00	IP 00 IP 20 with kits VW3 A9 612 and VW3 A9 613
Thermal protection			By temperature controlled switch	–
Temperature controlled switch *(3)*	Tripping temperature	**°C**	125	–
	Maximum voltage	**V**	250 ~	–
	Maximum current	**A**	0.5	–
Ambient air temperature around the device	Operation	**°C**	- 10…+ 50	
	Storage	**°C**	- 25…+ 70	

Connection characteristics

Maximum connection capacity and tightening torque	VW3 A5 101, 102		10 mm² (AWG 6) 1.5 Nm
	VW3 A5 103		Connected on a bar, Ø 11 mm –
	VW3 A5 104		Connected on a tag connector, M10 –
	VW3 A5 105, 106		Connected on a tag connector, M12 –
	VW3 A5 107, 108		Connected on a tag connector, 2 x M12 –

(1) These values are given for a maximum switching frequency of 2.5 or 4 kHz depending on the rating.
(2) Choke performance is ensured by not exceeding the cable lengths between the motor and the drive given in the table above. For an application with several motors connected in parallel, the cable length must include all tap-offs. If a cable longer than that recommended is used, the motor chokes may overheat.
(3) The contact should be connected in sequence (used for signalling or controlling the line contactor).

References:
page 80

Dimensions:
pages 108 to 110

Schemes:
page 122

Variable speed drives for asynchronous motors

Altivar 61: Output filters

Option: Motor chokes

VW3 A5 101

Motor chokes

For drives		Maximum length of motor cable *(1)*		Loss	Nominal current	Sold in lots of	Unit reference	Weight
		Shielded	Un-shielded					
		m	m	W	A			kg
3-phase supply voltage: 200…240 V 50/60 Hz								
ATV 61H075M3…HU22M3		150	300	150	12	–	**VW3 A5 101**	5.500
ATV 61HU30M3…HU75M3		200	260	250	48	–	**VW3 A5 102**	8.000
		300	300	350	90	–	**VW3 A5 103**	10.000
ATV 61HD11M3X…HD22M3X		150	300	350	90	–	**VW3 A5 103**	10.000
ATV 61HD30M3X…HD45M3X		150	300	430	215	3	**VW3 A5 104**	17.300
ATV 61HD55M3X, HD75M3X		150	300	475	314	3	**VW3 A5 105**	29.600
ATV 61HD90M3X		250	300	530	481	3	**VW3 A5 106**	44.400
3-phase supply voltage: 380...480 V 50/60 Hz								
ATV 61H075N4…HU40N4		75	90	150	12	–	**VW3 A5 101**	5.500
		85	95	250	48	–	**VW3 A5 102**	8.000
		160	200	350	90	–	**VW3 A5 103**	10.000
ATV 61HU55N4…HD18N4		85	95	250	48	–	**VW3 A5 102**	8.000
		160	200	350	90	–	**VW3 A5 103**	10.000
		200	300	430	215	3	**VW3 A5 104**	17.300
ATV 61HD22N4…HD30N4		140	170	350	90	–	**VW3 A5 103**	10.000
		150	300	430	215	3	**VW3 A5 104**	17.300
ATV 61HD37N4		97	166	350	90	–	**VW3 A5 103**	10.000
		200	300	430	215	3	**VW3 A5 104**	17.300
ATV 61HD45N4…HD75N4		150	300	430	215	3	**VW3 A5 104**	17.300
ATV 61HD90N4		200	300	430	215	3	**VW3 A5 104**	17.300
ATV 61HC11N4, HC13N4		150	250	475	314	3	**VW3 A5 105**	29.600
ATV 61HC16N4		250	300	530	481	3	**VW3 A5 106**	44.400
ATV 61HC22N4		250	300	530	481	3	**VW3 A5 106**	44.400
ATV 61HC25N4		200	250	598	759	3	**VW3 A5 107**	64.500
ATV 61HC31N4		200	250	598	759	3	**VW3 A5 107**	64.500
ATV 61HC40N4	Motor P 355 kW	200	250	598	759	3	**VW3 A5 107**	64.500
	Motor P 400 kW	250	300	682	1188	3	**VW3 A5 108**	99.200
ATV 61HC50N4		250	300	682	1188	3	**VW3 A5 108**	99.200
ATV 61HC63N4		250	300	682	1188	3	**VW3 A5 108**	99.200

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(1) Maximum length given for a switching frequency of 2.5 or 4 kHz depending on the rating of the fan, see Characteristics on page 79.

Variable speed drives for asynchronous motors

Altivar 61: Output filters

Option: Motor chokes

IP 20 protection kits

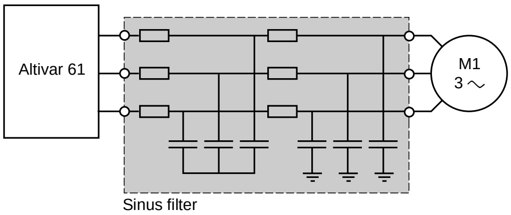
Description	For filters	Reference	Weight kg
Mechanical device consisting of an IP 20 cover and cable clips	VW3 A5 104, 105	**VW3 A9 612**	–
	VW3 A5 106…108	**VW3 A9 613**	–

Variable speed drives for asynchronous motors

Altivar 61: Output filters

Option: Sinus filters

Sinus filters



Sinus filters allow Altivar 61 drives to operate with longer motor cables (up to 1000 m).
For ATV 61H●●●M3, ATV 61HD11M3X...HD45M3X, ATV 61HU15N4... HD75N4 drives, they also enable the use of unshielded cables whilst maintaining compliance with the standards governing radiated EMC emissions (EN 55011 class A Gr 1).

Applications

For ATV 61H●●●M3, ATV 61HD11M3X...HD45M3X, ATV 61HU15N4... HD75N4 drives, applications requiring:

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

For ATV 61HD55M3X...HD75M3X and ATV 61HD90N4...HC63N4 drives, applications requiring:

- An intermediate transformer between the drive and the motor

General characteristics

Type of filter			VW3 A5 201…206	VW3 A5 207…211
Degree of protection			IP 20	IP 00
Atmospheric pollution			3C2, 3B1, 3S1 conforming to IEC 721.3.3	
Degree of pollution			2 conforming to standard EN 50178	
Vibration resistance			1.5 mm from 3...13 Hz, 1 gn from 13...200 Hz, conforming to IEC 60068-2	
Shock resistance			15 gn for 11 ms conforming to IEC 60068-2-27	
Maximum relative humidity			95%	
Ambient air temperature around the device	Operation	**°C**	-10...+40 without derating 40...50°C with current derating of 1.5% per additional °C	
	Storage	**°C**	- 40…+ 65	
Maximum operating altitude		**m**	1000 without derating 1000…3000 with current derating of 1% per additional 100 m	
Switching frequency		**kHz**	4...8	
Output frequency		**Hz**	0...100	
Voltage drop			< 10%	
Maximum voltage		**V**	500 ∼	
Maximum current			1.5 x nominal current for 60 s	
Maximum motor cable length	Unshielded cable	**m**	600 or 1000 depending on the drive rating, see page 78	

Connection characteristics

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

References:
page 83

Dimensions:
page 111

Schemes:
page 122

Variable speed drives for asynchronous motors

Altivar 61: Output filters

Option: Sinus filters

Sinus filters

For drives		Nominal current	Loss at 100 Hz	Reference	Weight
		A	W		kg
3-phase supply voltage: 200…240 V 50/60 Hz					
ATV 61H075M3, HU15M3 *(1)*		11	50	**VW3 A5 201**	8.000
ATV 61HU22M3, HU30M3		16	70	**VW3 A5 202**	11.000
ATV 61HU40M3... HU75M3		33	120	**VW3 A5 203**	22.000
ATV 61HD11M3X, HD15M3X		66	180	**VW3 A5 204**	45.000
ATV 61HD18M3X, HD22M3X		95	250	**VW3 A5 205**	60.000
ATV 61HD30M3X... HD45M3X		180	400	**VW3 A5 206**	120.000
ATV 61HD55M3X, HD75M3X		300	1360	**VW3 A5 208**	165.000
ATV 61HD90M3X		400	1900	**VW3 A5 209**	190.000
3-phase supply voltage: 380…480 V 50/60 Hz					
ATV 61HU15N4...HU40N4 *(1)*		11	50	**VW3 A5 201**	8.000
ATV 61HU55N4		16	70	**VW3 A5 202**	11.000
ATV 61HU75N4...HD15N4		33	120	**VW3 A5 203**	22.000
ATV 61HD18N4... HD30N4		66	180	**VW3 A5 204**	45.000
ATV 61HD37N4, HD45N4		95	250	**VW3 A5 205**	60.000
ATV 61HD55N4, HD75N4		180	400	**VW3 A5 206**	120.000
ATV 61HD90N4, HC11N4		200	945	**VW3 A5 207**	130.000
ATV 61HC13N4, HC16N4		300	1360	**VW3 A5 208**	165.000
ATV 61HC22N4		400	1900	**VW3 A5 209**	190.000
ATV 61HC25N4		600	2370	**VW3 A5 210**	260.000
ATV 61HC31N4		600	2370	**VW3 A5 210**	260.000
ATV 61HC40N4	Motor P 355 kW	600	2370	**VW3 A5 210**	260.000
	Motor P 400 kW	1200	5150	**VW3 A5 211**	600.000
ATV 61HC50N4		1200	5150	**VW3 A5 211**	600.000
ATV 61HC63N4		1200	5150	**VW3 A5 211**	600.000

(1) For ATV 61H075M3, HU15M3 and ATV 61HU15N4 drives, it is advisable to use a less powerful motor with a sinus filter.

Presentation:
pages 78 and 82

Characteristics:
page 82

Dimensions:
page 111

Schemes:
page 122

Variable speed drives for asynchronous motors

Altivar 61

Table showing possible combinations of Altivar 61 UL Type 1/IP 20 drive options

Motor		Drive	Options					
			DC choke	Line choke	Additional EMC input filter	IP 30 EMC filter kit	Motor choke	IP 20 motor choke kit
kW	*HP*							
Single phase supply voltage: 200…240 V 50/60 Hz								
0.37	*0.5*	**ATV 61H075M3**	VW3 A4 503	–	VW3 A4 401	–	VW3 A5 101	–
0.75	*1*	**ATV 61HU15M3**	VW3 A4 505	–	VW3 A4 401	–	VW3 A5 101	–
1.5	*2*	**ATV 61HU22M3**	VW3 A4 506	–	VW3 A4 402	–	VW3 A5 101	–
2.2	*3*	**ATV 61HU30M3**	VW3 A4 507	–	VW3 A4 402	–	VW3 A5 102, 103	–
3	*–*	**ATV 61HU40M3**	VW3 A4 508	VW3 A58501	VW3 A4 402	–	VW3 A5 102, 103	–
4	*5*	**ATV 61HU55M3**	VW3 A4 508	VW3 A58502	VW3 A4 403	–	VW3 A5 102, 103	–
5.5	*7.5*	**ATV 61HU75M3**	VW3 A4 509	VW3 A58502	VW3 A4 404	–	VW3 A5 102, 103	–
3-phase supply voltage: 200…240 V 50/60 Hz								
0.75	*1*	**ATV 61H075M3**	VW3 A4 503	VW3 A4 551	VW3 A4 401	–	VW3 A5 101	–
1.5	*2*	**ATV 61HU15M3**	VW3 A4 505	VW3 A4 552	VW3 A4 401	–	VW3 A5 101	–
2.2	*3*	**ATV 61HU22M3**	VW3 A4 506	VW3 A4 552	VW3 A4 402	–	VW3 A5 101	–
3	*–*	**ATV 61HU30M3**	VW3 A4 507	VW3 A4 553	VW3 A4 402	–	VW3 A5 102, 103	–
4	*5*	**ATV 61HU40M3**	VW3 A4 508	VW3 A4 554	VW3 A4 402	–	VW3 A5 102, 103	–
5.5	*7.5*	**ATV 61HU55M3**	VW3 A4 508	VW3 A4 554	VW3 A4 403	–	VW3 A5 102, 103	–
7.5	*10*	**ATV 61HU75M3**	VW3 A4 509	VW3 A4 555	VW3 A4 404	–	VW3 A5 102, 103	–
11	*15*	**ATV 61HD11M3X**	VW3 A4 510	VW3 A4 555	VW3 A4 405	–	VW3 A5 103	–
15	*20*	**ATV 61HD15M3X**	VW3 A4 510	VW3 A4 556	VW3 A4 405	–	VW3 A5 103	–
18.5	*25*	**ATV 61HD18M3X**	VW3 A4 511	VW3 A4 557	VW3 A4 406	–	VW3 A5 103	–
22	*30*	**ATV 61HD22M3X**	VW3 A4 511	VW3 A4 557	VW3 A4 406	–	VW3 A5 103	–
30	*40*	**ATV 61HD30M3X**	VW3 A4 512	VW3 A4 557	VW3 A4 408	–	VW3 A5 104	VW3 A9 612
37	*50*	**ATV 61HD37M3X**	VW3 A4 512	VW3 A4 557	VW3 A4 408	–	VW3 A5 104	VW3 A9 612
45	*60*	**ATV 61HD45M3X**	VW3 A4 512	VW3 A4 557	VW3 A4 408	–	VW3 A5 104	VW3 A9 612
55	*75*	**ATV 61HD55M3X**	Integrated	*(1)*	VW3 A4 410	VW3 A9 601	VW3 A5 105	VW3 A9 612
75	*100*	**ATV 61HD75M3X**	Integrated	*(1)*	VW3 A4 410	VW3 A9 601	VW3 A5 105	VW3 A9 612
90	*125*	**ATV 61HD90M3X**	Integrated	*(1)*	VW3 A4 411	VW3 A9 601	VW3 A5 106	VW3 A9 613
Pages		18	65	68	76	77	80	81

Table showing possible combinations of options common to all Altivar 61 UL Type 1/IP 20 drives

For drives	Logic input adaptor 115 V ∼	Remote graphic display terminal	I/O cards *(2)*		Multi-pump cards		"Controller Inside" programmable card	PowerSuite software workshop for PC
			Logic	Extended	Compatible with ATV 38 applications	For multi-pump applications		
ATV 61H●●●●●	VW3 A3 101	VW3 A1 101	VW3 A3 201	VW3 A3 202	VW3 A3 502	VW3 A3 503	VW3 A3 501	VW3 A8 104, 105
Pages	22	28	31	31	35	35	43	180

(1) See page 68.
(2) Maximum combination: 2 cards, in accordance with the compatibility table below:

Type of card	Logic I/O VW3 A3 201	Extended I/O VW3 A3 202	Multi-pump VW3 A3 502, 503	Programmable “Controller inside” VW3 A3 501	Communication VW3 A3 3●●
Logic I/O VW3 A3 201	□	■	■	■	■
Extended I/O VW3 A3 202	■	□	■	■	■
Multi-pump VW3 A3 502, 503	■	■	□	□	■
Programmable “Controller inside” VW3 A3 501	■	■	□	□	■
Communication VW3 A3 3●●	■	■	■	■	□

■ *Possible to combine*

□ *Not possible to combine*

Sinus filter	Braking resistor	Flush-mounting kit (inside dust and damp proof enclosure)	UL Type 1 conformity kit (outside enclosure)	IP 21 or IP 31 conformity kit (outside enclosure)	Control card fan kit
VW3 A5 201	VW3 A7 701	VW3 A9 501	VW3 A9 201	VW3 A9 101	–
VW3 A5 201	VW3 A7 702	VW3 A9 501	VW3 A9 201	VW3 A9 101	–
VW3 A5 202	VW3 A7 702	VW3 A9 502	VW3 A9 202	VW3 A9 102	–
VW3 A5 202	VW3 A7 703	VW3 A9 502	VW3 A9 202	VW3 A9 102	–
VW3 A5 203	VW3 A7 703	VW3 A9 502	VW3 A9 202	VW3 A9 102	–
VW3 A5 203	VW3 A7 704	VW3 A9 503	VW3 A9 203	VW3 A9 103	–
VW3 A5 203	VW3 A7 704	VW3 A9 504	VW3 A9 204	VW3 A9 104	–
VW3 A5 201	VW3 A7 701	VW3 A9 501	VW3 A9 201	VW3 A9 101	–
VW3 A5 201	VW3 A7 702	VW3 A9 501	VW3 A9 201	VW3 A9 101	–
VW3 A5 202	VW3 A7 702	VW3 A9 502	VW3 A9 202	VW3 A9 102	–
VW3 A5 202	VW3 A7 703	VW3 A9 502	VW3 A9 202	VW3 A9 102	–
VW3 A5 203	VW3 A7 703	VW3 A9 502	VW3 A9 202	VW3 A9 102	–
VW3 A5 203	VW3 A7 704	VW3 A9 503	VW3 A9 203	VW3 A9 103	–
VW3 A5 203	VW3 A7 704	VW3 A9 504	VW3 A9 204	VW3 A9 104	–
VW3 A5 204	VW3 A7 705	VW3 A9 505	VW3 A9 205	VW3 A9 105	–
VW3 A5 204	VW3 A7 706	VW3 A9 505	VW3 A9 205	VW3 A9 105	–
VW3 A5 205	VW3 A7 707	VW3 A9 506	VW3 A9 206	VW3 A9 106	VW3 A9 404
VW3 A5 205	VW3 A7 707	VW3 A9 506	VW3 A9 206	VW3 A9 106	VW3 A9 404
VW3 A5 206	VW3 A7 708	VW3 A9 508	VW3 A9 217	VW3 A9 117	VW3 A9 406
VW3 A5 206	VW3 A7 709	VW3 A9 508	VW3 A9 217	VW3 A9 117	VW3 A9 406
VW3 A5 206	VW3 A7 709	VW3 A9 508	VW3 A9 217	VW3 A9 117	VW3 A9 406
VW3 A5 208	VW3 A7 713	VW3 A9 510	VW3 A9 209	VW3 A9 109	–
VW3 A5 208	VW3 A7 713	VW3 A9 510	VW3 A9 209	VW3 A9 109	–
VW3 A5 209	VW3 A7 714	VW3 A9 511	VW3 A9 210	VW3 A9 110	–
83	57	23	24	25	22

Communication cards *(2)*										
Ethernet TCP/IP	**Modbus/ Uni-Telway**	**Fipio**	**Modbus Plus**	**Profibus DP**	**DeviceNet**	**INTERBUS**	**LONWORKS**	**METASYS N2**	**APOGEE FLN**	**BACnet**
VW3 A3 310	VW3 A3 303	VW3 A3 311	VW3 A3 302	VW3 A3 307	VW3 A3 309	VW3 A3 304	VW3 A3 312	VW3 A3 313	VW3 A3 314	VW3 A3 315
52 and 186	52, 193 and 201	52 and 190	52 and 198	52	52	52	52	52	52	52

Table showing possible combinations of Altivar 61 UL Type 1/IP 20 drive options

Motor		**Drive**	**Options**						
kW	***HP***		**DC choke**	**Line choke**	**Passive filter** *(1)*	**Additional EMC input filter**	**IP 30 EMC filter kit**	**Motor choke**	**IP 20 motor choke kit**
3-phase supply voltage: 380…480 V 50/60 Hz									
0.75	*1*	**ATV 61H075N4**	VW3 A4 501	VW3 A4 551	VW3 A4 6●1	VW3 A4 401	–	VW3 A5 10●	–
1.5	*2*	**ATV 61HU15N4**	VW3 A4 502	VW3 A4 551	VW3 A4 6●1	VW3 A4 401	–	VW3 A5 10●	–
2.2	*3*	**ATV 61HU22N4**	VW3 A4 503	VW3 A4 552	VW3 A4 6●1	VW3 A4 401	–	VW3 A5 10●	–
3	–	**ATV 61HU30N4**	VW3 A4 503	VW3 A4 552	VW3 A4 6●1	VW3 A4 402	–	VW3 A5 10●	–
4	*5*	**ATV 61HU40N4**	VW3 A4 504	VW3 A4 552	VW3 A4 6●2	VW3 A4 402	–	VW3 A5 10●	–
5.5	*7.5*	**ATV 61HU55N4**	VW3 A4 505	VW3 A4 553	VW3 A4 6●2	VW3 A4 403	–	VW3 A5 10●	VW3 A9 612
7.5	*10*	**ATV 61HU75N4**	VW3 A4 506	VW3 A4 553	VW3 A4 6●3	VW3 A4 403	–	VW3 A5 10●	VW3 A9 612
11	*15*	**ATV 61HD11N4**	VW3 A4 507	VW3 A4 554	VW3 A4 6●3	VW3 A4 404	–	VW3 A5 10●	VW3 A9 612
15	*20*	**ATV 61HD15N4**	VW3 A4 508	VW3 A4 554	VW3 A4 6●4	VW3 A4 405	–	VW3 A5 10●	VW3 A9 612
18.5	*25*	**ATV 61HD18N4**	VW3 A4 508	VW3 A4 555	VW3 A4 6●5	VW3 A4 405	–	VW3 A5 10●	VW3 A9 612
22	*30*	**ATV 61HD22N4**	VW3 A4 510	VW3 A4 555	VW3 A4 6●6	VW3 A4 406	–	VW3 A5 10●	VW3 A9 612
30	*40*	**ATV 61HD30N4**	VW3 A4 510	VW3 A4 556	VW3 A4 6●7	VW3 A4 407	–	VW3 A5 10●	VW3 A9 612
37	*50*	**ATV 61HD37N4**	VW3 A4 510	VW3 A4 556	VW3 A4 6●7	VW3 A4 407	–	VW3 A5 10●	VW3 A9 612
45	*60*	**ATV 61HD45N4**	VW3 A4 511	VW3 A4 556	VW3 A4 6●8	VW3 A4 408	–	VW3 A5 104	VW3 A9 612
55	*75*	**ATV 61HD55N4**	VW3 A4 511	VW3 A4 556	VW3 A4 6●8	VW3 A4 408	–	VW3 A5 104	VW3 A9 612
75	*100*	**ATV 61HD75N4**	VW3 A4 511	VW3 A4 557	VW3 A4 6●9	VW3 A4 408	–	VW3 A5 104	VW3 A9 612
90	*125*	**ATV 61HD90N4**	–	*(2)*	VW3 A4 6●9	VW3 A4 410	VW3 A9 601	VW3 A5 104	VW3 A9 612
110	*150*	**ATV 61HC11N4**	–	*(2)*	VW3 A4 6●0	VW3 A4 410	VW3 A9 601	VW3 A5 105	VW3 A9 612
132	*200*	**ATV 61HC13N4**	–	*(2)*	VW3 A4 6●1	VW3 A4 410	VW3 A9 601	VW3 A5 105	VW3 A9 612
160	*250*	**ATV 61HC16N4**	–	*(2)*	VW3 A4 6●2	VW3 A4 410	VW3 A9 601	VW3 A5 106	VW3 A9 613
200	*300*	**ATV 61HC22N4**	–	*(2)*	VW3 A4 6●3	VW3 A4 411	VW3 A9 601	VW3 A5 106	VW3 A9 613
220	*350*	**ATV 61HC22N4**	–	*(2)*	VW3 A4 6●3	VW3 A4 411	VW3 A9 601	VW3 A5 106	VW3 A9 613
250	*400*	**ATV 61HC25N4**	–	*(2)*	VW3 A4 6●1	VW3 A4 411	VW3 A9 601	VW3 A5 107	VW3 A9 613
280	*450*	**ATV 61HC31N4**	–	*(2)*	VW3 A4 6●2	VW3 A4 411	VW3 A9 601	VW3 A5 107	VW3 A9 613
315	*500*	**ATV 61HC31N4**	–	*(2)*	VW3 A4 6●2	VW3 A4 411	VW3 A9 601	VW3 A5 107	VW3 A9 613
355	–	**ATV 61HC40N4**	–	*(2)*	VW3 A4 6●2	VW3 A4 412	VW3 A9 602	VW3 A5 107	VW3 A9 613
400	*600*	**ATV 61HC40N4**	–	*(2)*	VW3 A4 6●9	VW3 A4 412	VW3 A9 602	VW3 A5 108	VW3 A9 613
500	*700*	**ATV 61HC50N4**	–	*(2)*	VW3 A4 6●2	VW3 A4 412	VW3 A9 602	VW3 A5 108	VW3 A9 613
560	*800*	**ATV 61HC63N4**	–	*(2)*	VW3 A4 6●3	VW3 A4 413	VW3 A9 602	VW3 A5 108	VW3 A9 613
630	*900*	**ATV 61HC63N4**	–	*(2)*	VW3 A4 6●3	VW3 A4 413	VW3 A9 602	VW3 A5 108	VW3 A9 613
Pages		19	65	68	70	76	77	80	81

Table showing possible combinations of options common to all Altivar 61 UL Type 1/IP 20 drives

For drives	**Logic input adaptor 115 V ∿**	**Remote graphic display terminal**	**I/O cards** *(3)*		**Multi-pump cards**		**Programmable "Controller Inside" card**	**PowerSuite software workshop for PC**
			Logic	**Extended**	**Compatible with ATV 38 applications**	**For multi-pump applications**		
ATV 61H●●●N4	VW3 A3 101	VW3 A1 101	VW3 A3 201	VW3 A3 202	VW3 A3 502	VW3 A3 503	VW3 A3 501	VW3 A8 104, 105
Pages	22	28	31	31	35	35	43	180

(1) There are special passive filters for a 460 V ∿ supply, see pages 72 and 73.
(2) See page 68.
(3) Maximum combination: 2 cards, in accordance with the compatibility table below:

Type of card	**Logic I/O** **VW3 A3 201**	**Extended I/O** **VW3 A3 202**	**Multi-pump** **VW3 A3 502, 503**	**Programmable "Controller inside"** **VW3 A3 501**	**Communication** **VW3 A3 3●●**
Logic I/O **VW3 A3 201**	□	■	■	■	■
Extended I/O **VW3 A3 202**	■	□	■	■	■
Multi-pump **VW3 A3 502, 503**	■	■	□	□	■
Programmable "Controller inside" VW3 A3 501	■	■	□	□	■
Communication **VW3 A3 3●●**	■	■	■	■	□

■ *Possible to combine* □ *Not possible to combine*

Sinus filter	**Braking unit on resistor**	**Braking resistor**	**Flush-mounting kit (inside dust and damp proof enclosure)**	**UL Type 1 conformity kit (outside enclosure)**	**IP 21 or IP 31 conformity kit (outside enclosure)**	**Control card fan kit**
–	–	VW3 A7 701	VW3 A9 501	VW3 A9 201	VW3 A9 101	–
VW3 A5 201	–	VW3 A7 701	VW3 A9 501	VW3 A9 201	VW3 A9 101	–
VW3 A5 201	–	VW3 A7 701	VW3 A9 501	VW3 A9 201	VW3 A9 101	–
VW3 A5 201	–	VW3 A7 701	VW3 A9 502	VW3 A9 202	VW3 A9 102	–
VW3 A5 201	–	VW3 A7 701	VW3 A9 502	VW3 A9 202	VW3 A9 102	–
VW3 A5 202	–	VW3 A7 702	VW3 A9 503	VW3 A9 203	VW3 A9 103	–
VW3 A5 203	–	VW3 A7 702	VW3 A9 503	VW3 A9 203	VW3 A9 103	–
VW3 A5 203	–	VW3 A7 703	VW3 A9 504	VW3 A9 204	VW3 A9 104	–
VW3 A5 203	–	VW3 A7 703	VW3 A9 505	VW3 A9 205	VW3 A9 105	–
VW3 A5 204	–	VW3 A7 704	VW3 A9 505	VW3 A9 205	VW3 A9 105	–
VW3 A5 204	–	VW3 A7 704	VW3 A9 506	VW3 A9 206	VW3 A9 106	VW3 A9 404
VW3 A5 204	–	VW3 A7 704	VW3 A9 507	VW3 A9 207	VW3 A9 107	VW3 A9 405
VW3 A5 205	–	VW3 A7 705	VW3 A9 507	VW3 A9 207	VW3 A9 107	VW3 A9 405
VW3 A5 205	–	VW3 A7 707	VW3 A9 509	VW3 A9 208	VW3 A9 108	VW3 A9 407
VW3 A5 206	–	VW3 A7 707	VW3 A9 509	VW3 A9 208	VW3 A9 108	VW3 A9 407
VW3 A5 206	–	VW3 A7 707	VW3 A9 509	VW3 A9 208	VW3 A9 108	VW3 A9 407
VW3 A5 207	–	VW3 A7 710	VW3 A9 510	VW3 A9 209	VW3 A9 109	–
VW3 A5 207	–	VW3 A7 710	VW3 A9 510	VW3 A9 209	VW3 A9 109	–
VW3 A5 208	–	VW3 A7 711	VW3 A9 511	VW3 A9 210	VW3 A9 110	–
VW3 A5 208	–	VW3 A7 711	VW3 A9 512	VW3 A9 211	VW3 A9 111	–
VW3 A5 209	–	VW3 A7 712	VW3 A9 513	VW3 A9 212	VW3 A9 112	–
VW3 A5 209	–	VW3 A7 712	VW3 A9 513	VW3 A9 212	VW3 A9 112	–
VW3 A5 210	VW3 A7 101	VW3 A7 715	VW3 A9 514, 515	VW3 A9 213, 214	VW3 A9 113, 114	–
VW3 A5 210	VW3 A7 101	VW3 A7 716	VW3 A9 514, 515	VW3 A9 213, 214	VW3 A9 113, 114	–
VW3 A5 210	VW3 A7 101	VW3 A7 716	VW3 A9 514, 515	VW3 A9 213, 214	VW3 A9 113, 114	–
VW3 A5 210	VW3 A7 102	VW3 A7 717	–	–	VW3 A9 115	–
VW3 A5 211	VW3 A7 102	VW3 A7 717	–	–	VW3 A9 115	–
VW3 A5 211	VW3 A7 102	VW3 A7 717	–	–	VW3 A9 115	–
VW3 A5 211	VW3 A7 102	VW3 A7 718	–	–	VW3 A9 116	–
VW3 A5 211	VW3 A7 102	VW3 A7 718	–	–	VW3 A9 116	–
83	55	57	23	24	25	22

Communication cards *(3)*										
Ethernet TCP/IP	**Modbus/ Uni-Telway**	**Fipio**	**Modbus Plus**	**Profibus DP**	**DeviceNet**	**InterBus**	**LonWorks**	**METASYS N2**	**APOGEE FLN**	**BACnet**
VW3 A3 310	VW3 A3 303	VW3 A3 311	VW3 A3 302	VW3 A3 307	VW3 A3 309	VW3 A3 304	VW3 A3 312	VW3 A3 313	VW3 A3 314	VW3 A3 315
52 and 186	52, 193 and 201	52 and 190	52 and 198	52	52	52	52	52	52	52

Variable speed drives for asynchronous motors

Altivar 61

Table showing possible combinations of Altivar 61 UL Type 12/IP 54 drive options

Motor		Drive	Option
			Braking resistor
kW	HP		
3-phase supply voltage: 380…480 V 50/60 Hz			
0.75	*1*	**ATV 61W075N4** **ATV 61W075N4C**	VW3 A7 701
1.5	*2*	**ATV 61WU15N4** **ATV 61WU15N4C**	VW3 A7 701
2.2	*3*	**ATV 61WU22N4** **ATV 61WU22N4C**	VW3 A7 701
3	–	**ATV 61WU30N4** **ATV 61WU30N4C**	VW3 A7 701
4	*5*	**ATV 61WU40N4** **ATV 61WU40N4C**	VW3 A7 701
5.5	*7.5*	**ATV 61WU55N4** **ATV 61WU55N4C**	VW3 A7 701
7.5	*10*	**ATV 61WU75N4** **ATV 61WU75N4C**	VW3 A7 702
11	*15*	**ATV 61WD11N4** **ATV 61WD11N4C**	VW3 A7 702
15	*20*	**ATV 61WD15N4** **ATV 61WD15N4C**	VW3 A7 703
18.5	*25*	**ATV 61WD18N4** **ATV 61WD18N4C**	VW3 A7 703
22	*30*	**ATV 61WD22N4** **ATV 61WD22N4C**	VW3 A7 704
30	*40*	**ATV 61WD30N4** **ATV 61WD30N4C**	VW3 A7 704
37	*50*	**ATV 61WD37N4** **ATV 61WD37N4C**	VW3 A7 704
45	*60*	**ATV 61WD45N4** **ATV 61WD45N4C**	VW3 A7 705
55	*75*	**ATV 61WD55N4** **ATV 61WD55N4C**	VW3 A7 706
75	*100*	**ATV 61WD75N4** **ATV 61WD75N4C**	VW3 A7 706
90	*125*	**ATV 61WD90N4** **ATV 61WD90N4C**	VW3 A7 706
Pages		20 and 21	57

Variable speed drives for asynchronous motors

Altivar 61

Table showing possible combinations of options common to all Altivar 61 UL Type 12/IP 54 drives

For	Logic input adaptor 115 V ∼	Remote graphic display terminal	I/O cards *(1)*		Multi-pump cards		"Controller Inside" programmable card	PowerSuite software workshop for PC
			Logic	Extended	Compatible with ATV 38 applications	For multi-pump applications		
ATV 61W●●●	VW3 A3 101	VW3 A1 101	VW3 A3 201	VW3 A3 202	VW3 A3 502	VW3 A3 503	VW3 A3 501	VW3 A8 104, 105
Pages	22	28	31	31	35	35	43	180

Table showing possible combinations of Altivar 61 UL Type 12/IP 54 communication options *(1)*

For	Ethernet TCP/IP	Modbus/ Uni-Telway	Fipio	Modbus Plus	Profibus DP	DeviceNet	INTERBUS	LONWORKS	METASYS N2	APOGEE FLN	BACnet
ATV 61W●●●	VW3 A3 310	VW3 A3 303	VW3 A3 311	VW3 A3 302	VW3 A3 307	VW3 A3 309	VW3 A3 304	VW3 A3 312	VW3 A3 313	VW3 A3 314	VW3 A3 315
Pages	52 and 186	52, 193 and 201	52 and 190	52 and 198	52	52	52	52	52	52	52

(1) Maximum combination: 2 cards, in accordance with the compatibility table below:

Type of card	**Logic I/O VW3 A3 201**	**Extended I/O VW3 A3 202**	**Multi-pump VW3 A3 502, 503**	**Programmable "Controller inside" VW3 A3 501**	**Communication VW3 A3 3●●**
Logic I/O VW3 A3 201	□	■	■	■	■
Extended I/O VW3 A3 202	■	□	■	■	■
Multi-pump VW3 A3 502, 503	■	■	□	□	■
Programmable "Controller inside" VW3 A3 501	■	■	□	□	■
Communication VW3 A3 3●●	■	■	■	■	□

■ *Possible to combine*

□ *Not possible to combine*

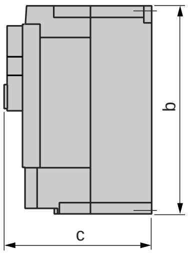
Variable speed drives for asynchronous motors

Altivar 61

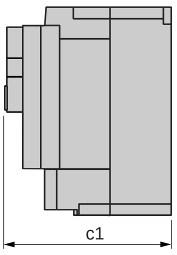
UL Type 1/IP 20 drives

ATV 61H●●●M3, ATV 61HD11M3X...HD15M3X, ATV 61H075N4...HD18N4

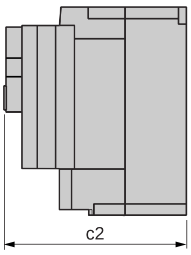
Without option card



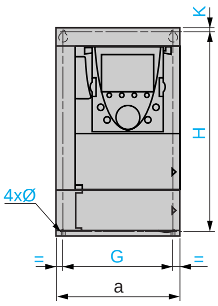
1 option card *(1)*



2 option cards *(1)*



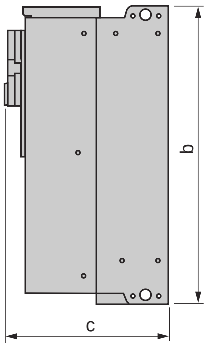
Common front view



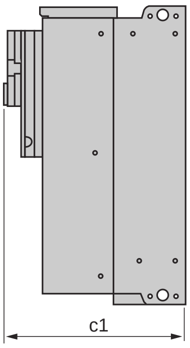
ATV 61H	a	b	c	c1	c2	G	H	K	Ø
075M3, U15M3, 075N4...U22N4	130	230	175	198	221	113.5	220	5	5
U22M3...U40M3, U30N4, U40N4	155	260	187	210	233	138	249	4	5
U55M3, U55N4, U75N4	175	295	187	210	233	158	283	6	6
U75M3, D11N4	210	295	213	236	259	190	283	6	6
D11M3X, D15M3X, D15N4, D18N4	230	400	213	236	259	210	386	8	6

ATV 61HD18M3X...45M3X, ATV 61HD22N4...HD37N4

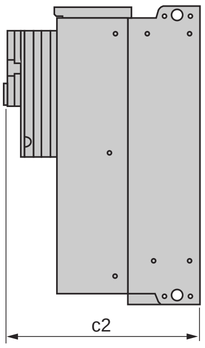
Without option card



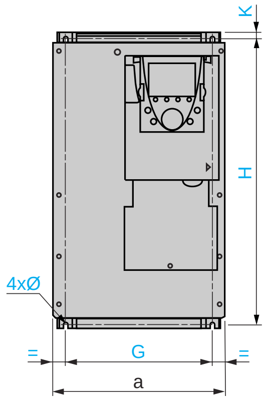
1 option card *(1)*



2 option cards *(1)*



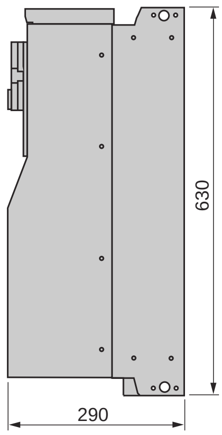
Common front view



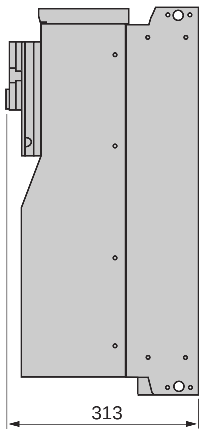
ATV 61H	a	b	c	c1	c2	G	H	K	Ø
D18M3X, D22M3X, D22N4	240	420	236	259	282	206	403	11.4	6
D30N4, D37N4	240	550	266	289	312	206	531.5	11.4	6
D30M3X...D45M3X	320	550	266	289	312	280	524	20	9

ATV 61HD45N4...HD75N4

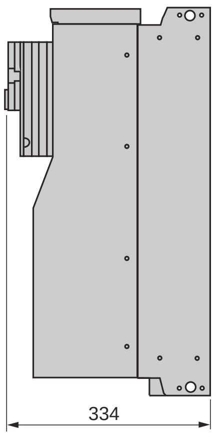
Without option card



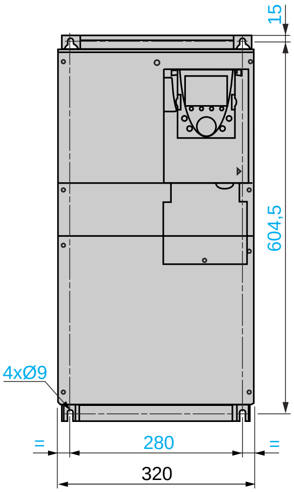
1 option card *(1)*



2 option cards *(1)*



Common front view



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

Presentation:
pages 4 to 7

Characteristics:
pages 8 to 15

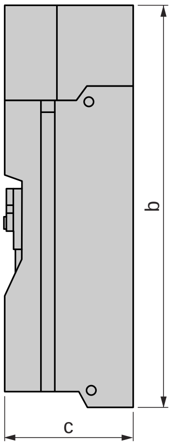
References:
pages 18 and 19

Schemes:
pages 112 to 127

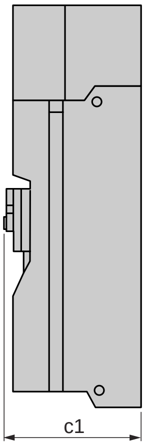
Functions:
pages 148 to 175

ATV 61HD55M3X…HD90M3X, ATV 61HD90N4...HC31N4

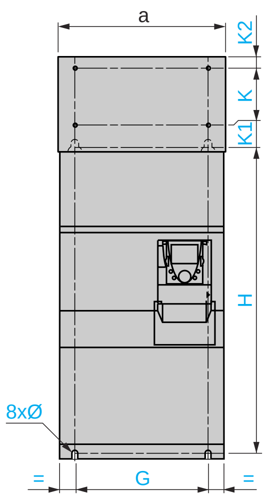
With or without 1 option card *(1)*



2 option cards *(1)*

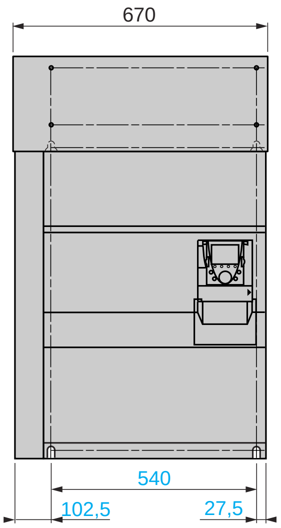


Common front view



ATV 61HC25N4, HC31N4 with braking unit VW3 A7 101

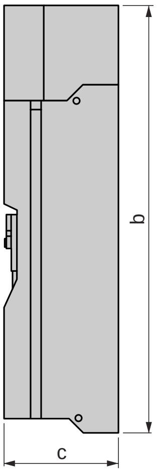
Front view



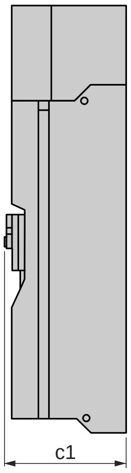
ATV 61H	a	b	c	c1	G	H	K	K1	K2	Ø
D55M3X, D75M3X D90N4, C11N4	320	920	377	392	250	650	150	75	30	11.5
D90M3X, C13N4	360	1022	377	392	298	758	150	72	30	11.5
C16N4	340	1190	377	392	285	920	150	75	30	11.5
C22N4	440	1190	377	392	350	920	150	75	30	11.5
C25N4, C31N4	595	1190	377	392	540	920	150	75	30	11.5

ATV 61HC40N4…HC63N4

With or without 1 option card *(1)*

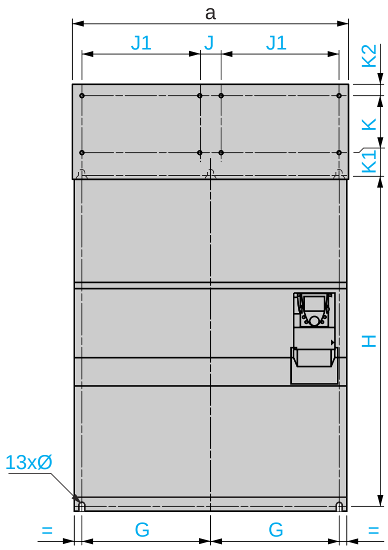


2 option cards *(1)*



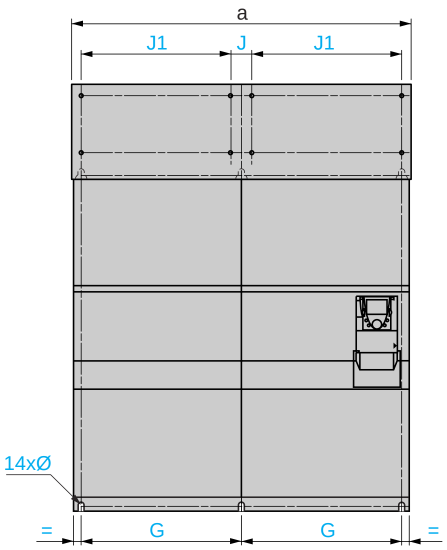
ATV 61HC40N4, HC50N4

Front view



ATV 61HC63N4

Front view



ATV 61H	a	b	c	c1	G	J	J1	H	K	K1	K2	Ø
C40N4, C50N4	890	1390	377	392	417.5	70	380	1120	150	75	30	11.5
C63N4	1120	1390	377	392	532.5	70	495	1120	150	75	30	11.5

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

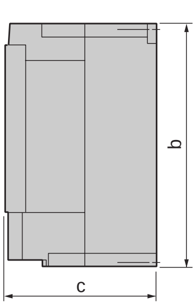
Variable speed drives for asynchronous motors

Altivar 61

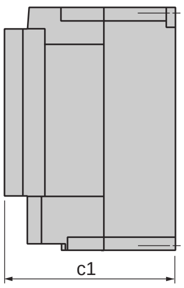
UL Type 1/IP 20 drives

ATV 61H●●●M3Z, ATV 61HD11M3XZ, HD15M3XZ, ATV 61H075N4Z…HD15N4Z

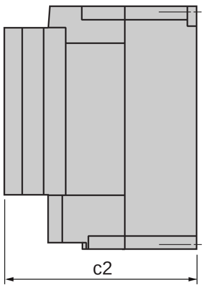
Without option card *(1)*



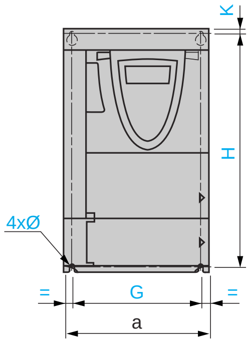
1 option card *(1)*



2 option cards *(1)*



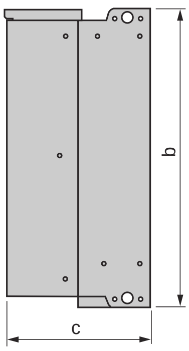
Common front view



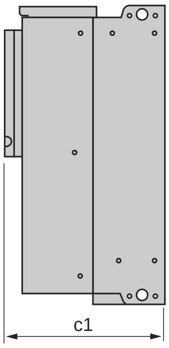
ATV 61H	a	b	c	c1	c2	G	H	K	Ø
075M3Z, U15M3Z, 075N4Z…U22N4Z	130	230	149	172	195	113.5	220	5	5
U22M3Z…U40M3Z, U30N4Z, U40N4Z	155	260	161	184	207	138	249	4	5
U55M3Z, U55N4Z, U75N4Z	175	295	161	184	207	158	283	6	6
U75M3Z, D11N4Z	210	295	187	210	233	190	283	6	6
D11M3XZ, D15M3XZ D15N4Z	230	400	187	210	233	210	386	8	6

ATV 61HD18M3XZ...45M3XZ, ATV 61HD22N4Z...HD37N4Z

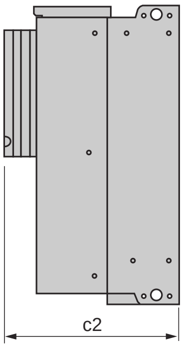
Without option card



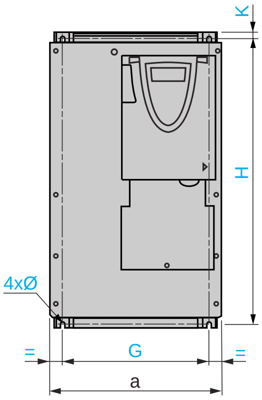
1 option card *(1)*



2 option cards *(1)*



Common front view



ATV 61H	a	b	c	c1	c2	G	H	K	Ø
D18M3XZ, D22M3XZ, D22N4Z	240	420	210	233	256	206	403	11.4	6
D30N4Z, D37N4Z	240	550	230	253	276	206	531.5	11.4	6
D30M3XZ...D45M3XZ	320	550	230	253	276	280	524	20	9

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

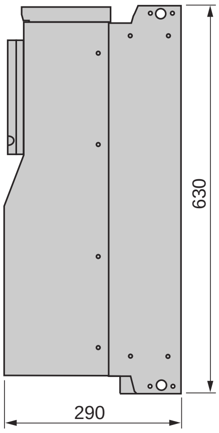
Variable speed drives for asynchronous motors

Altivar 61

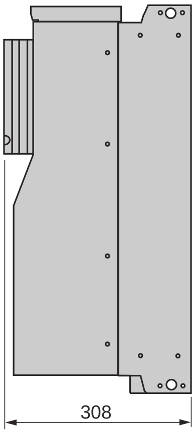
UL Type 1/IP 20 drives

ATV 61HD45N4Z...HD75N4Z

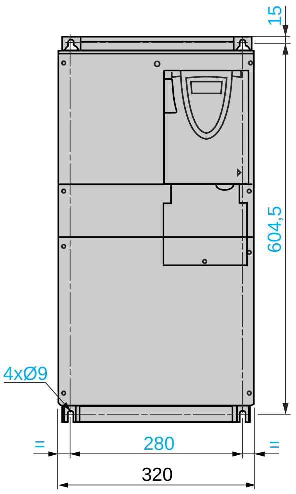
With or without 1 option card *(1)*



2 option cards *(1)*

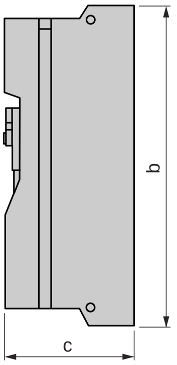


Common front view

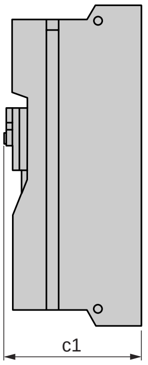


ATV 61HD55M3XD…HD90M3XD, ATV 61HD90N4D...HC31N4D

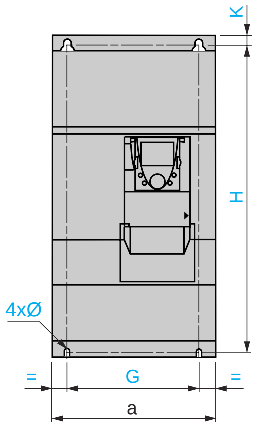
With or without 1 option card *(1)*



2 option cards *(1)*

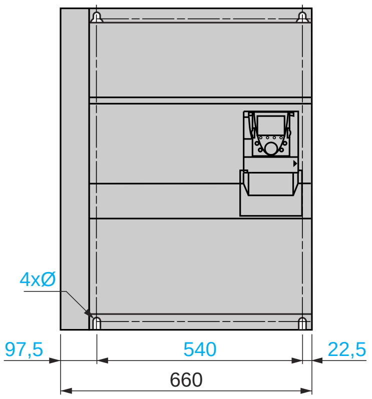


Common front view



ATV 61HC25N4D, HC31N4D with braking unit VW3 A7 101

Front view

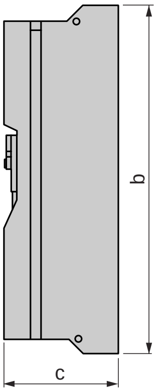


ATV 61H	a	b	c	c1	G	H	K	Ø
D55M3XD, D75M3XD D90N4D, C11N4D	310	680	377	392	250	650	15	11.5
D90M3XD, C13N4D	350	782	377	392	298	758	12	11.5
C16N4D	330	950	377	392	285	920	15	11.5
C22N4D	430	950	377	392	350	920	15	11.5
C25N4D, C31N4D	585	950	377	392	540	920	15	11.5

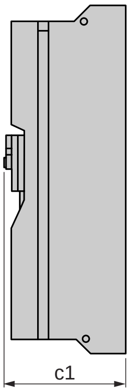
(1) Option cards: I/O extension cards, multi-pump cards, "Controller Inside" programmable card, communication cards.

ATV 61HC40N4D…HC63N4D

With or without 1 option card *(1)*

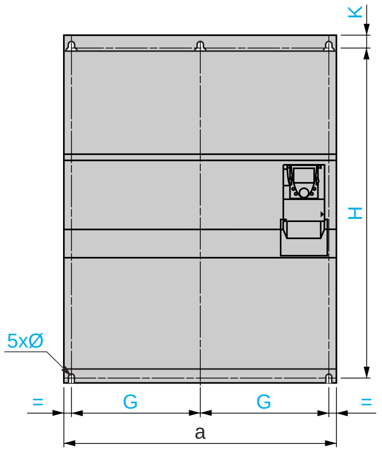


2 option cards *(1)*



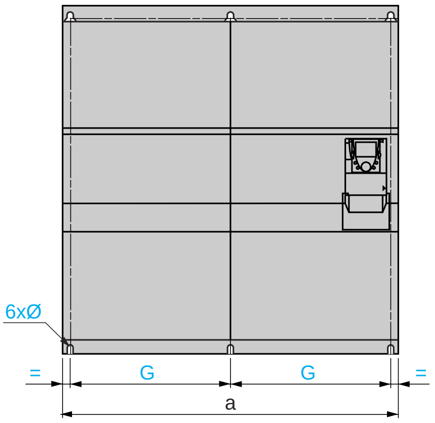
ATV 61HC40N4D, HC50N4D

Front view



ATV 61HC63N4D

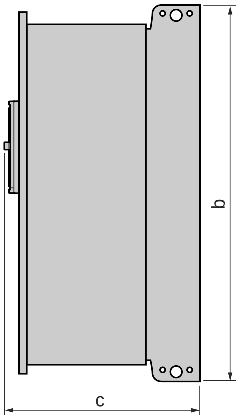
Front view

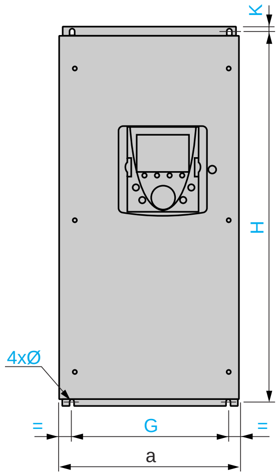


ATV 61H	a	b	c	c1	G	H	K	Ø
C40N4D, C50N4D	880	1150	377	392	417.5	1120	15	11.5
C63N4D	1110	1150	377	392	532.5	1120	15	11.5

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

ATV 61W075N4…WD90N4, ATV 61W075N4C…WD90N4C





ATV 61W	a	b	c	G	H	K	Ø
075N4…U30N4 **075N4C…U30N4C**	235	490	272	200	478	6	6
U40N4, U55N4 **U40N4C, U55N4C**	235	490	286	200	478	6	6
U75N4, D11N4 **U75N4C, D11N4C**	255	525	286	220	513	6	6
D15N4 **D15N4C**	290	560	315	250	544	8	6
D18N4, D22N4 **D18N4C, D22N4C**	310	665	315	270	650	10	6
D30N4 **D30N4C**	284	720	315	245	700	10	7
D37N4, D45N4 **D37N4C, D45N4C**	284	880	343	245	860	10	7
D55N4…D90N4 **D55N4C…D90N4C**	362	1000	364	300	975	10	9

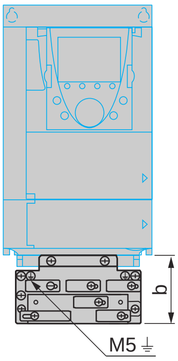
Variable speed drives for asynchronous motors

Altivar 61

Drives, accessories

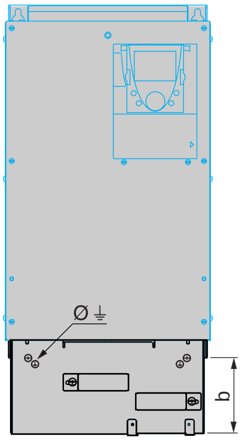
EMC mounting plates *(1)*

For ATV 61H●●●M3, ATV 61HD11M3X, HD15M3X, ATV 61H075N4…HD18N4



For ATV 61H	b
075M3…U40M3, 075N4…U40N4	83
U55M3…U75M3 D11M3X, D15M3X U55N4…D18N4	95

For ATV 61HD18M3X…HD45M3X, ATV 61HD22N4…HD75N4



For ATV 61H	b	Ø
D18M3X, D22M3X, D22N4	122	M5
D30N4, D37N4	113	M5
D30M3X…D45M3X D45N4…D75N4	118	M8

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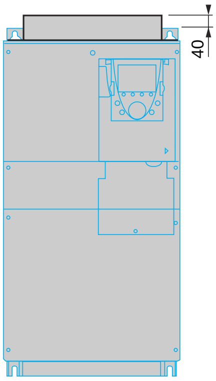
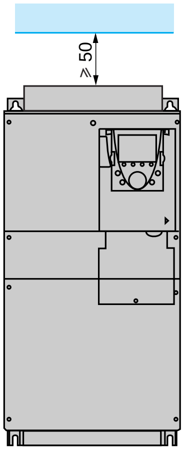
(1) Supplied with the drive apart from ATV 61HD55M3X… HD90M3X and ATV 61HD90N4…HC63N4. In the case of these drives the mounting plate is supplied with the UL Type 1, IP 21 or IP 31 conformity kits, which must be ordered separately, see pages 18, 19, 24 and 25. Dimensions, see page 99 and 100.

VW3 A9 404…407 control card fan kits



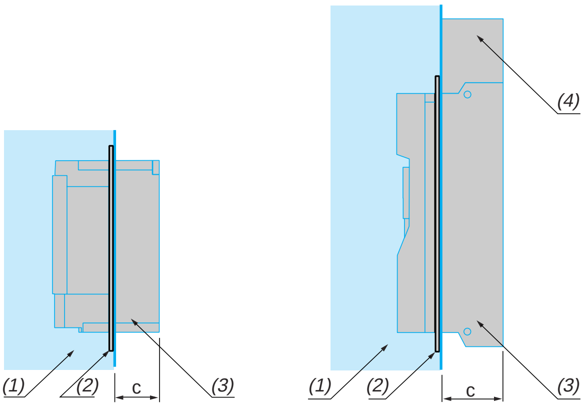
Mounting recommendations



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

Installation of the drive using the kit for flush-mounting

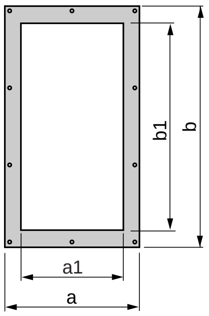
Side view



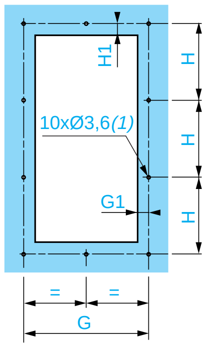
For ATV 61H drives	c	VW3 kit
075M3, U15M3, 075N4…U22N4	60	**A9 501**
U22M3…U55M3, U30N4…U75N4	70	**A9 502, 503**
U75M3, D11M3X, D15M3X, D11N4…D18N4	90	**A9 504, 505**
D18M3X…D45M3X D22N4…D75N4	105	**A9 506…509**
D55M3X…D90M3X, D55M3XD…D90M3XD, D90N4…C31N4, D90N4D…C31N4D	150	**A9 510…515**

(1) Dust and damp proof enclosure.
(2) Kit for flush-mounting in a dust and damp proof enclosure.
(3) Power part of the drive outside the enclosure.
(4) DC choke for ATV 61HD55M3X…HD90M3X and ATV 61HD90N4…HC31N4 drives.

VW3 A9 501…505



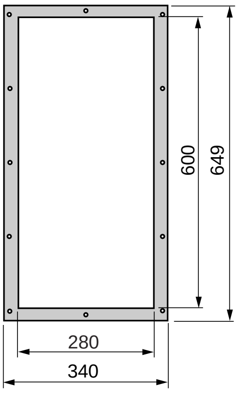
Cut-outs and drill holes


H1
H
10xØ3,6(1)
H
G1
H
=
=
G

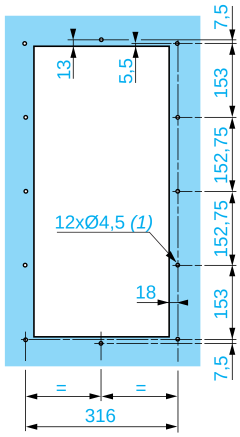
VW3	a	a1	b	b1	G	G1	H	H1
A9 501	222	170	397	351	205	17.5	127	15
A9 502	250	198	429.5	384.5	233	17.5	137.5	14
A9 503	267	215	465	419	250	17.5	149.5	14.5
A9 504	302	250	481.5	438	285	17.5	155	13
A9 505	324.5	270	584.5	537.5	305	17.5	189.5	15.5

(1) Ø 3.6 hole for M4 self-tapping screw.

VW3 A9 506

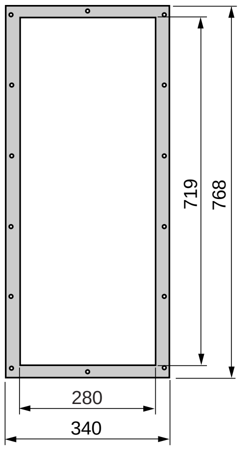

600
649
280
340

Cut-outs and drill holes

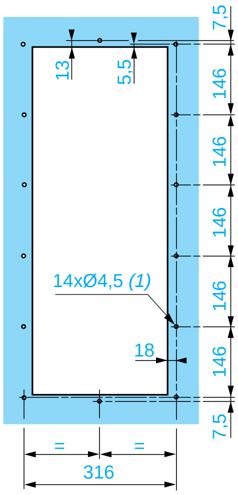

7,5
13
5,5
153
152,75
12xØ4,5 (1)
152,75
18
153
7,5
=
=
316

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

VW3 A9 507

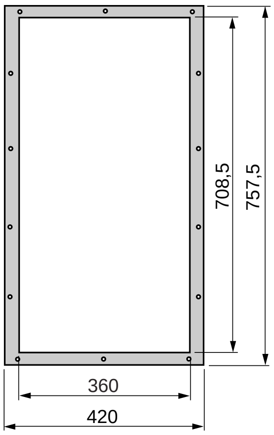

719
768
280
340

Cut-outs and drill holes

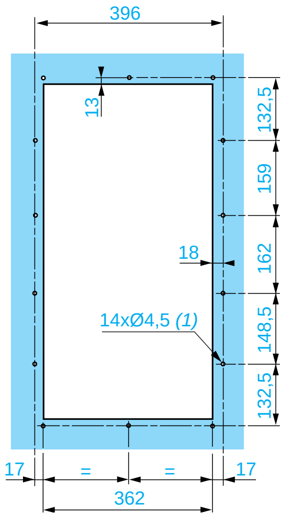

7,5
13
5,5
146
146
146
14xØ4,5 (1)
146
18
146
7,5
=
=
316

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

VW3 A9 508


708,5
757,5
360
420

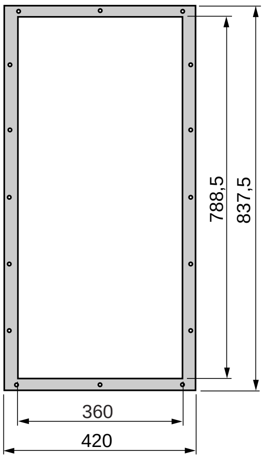
Cut-outs and drill holes


396
13
132,5
159
18
162
14xØ4,5 (1)
148,5
132,5
17
=
=
17
362

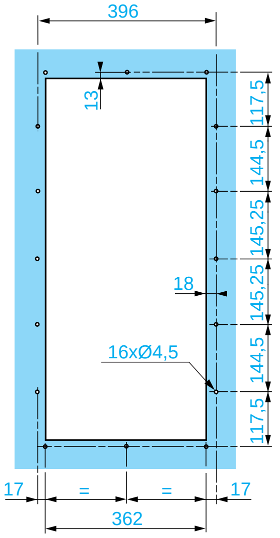
(1) Ø 4.5 hole for M5 self-tapping screw.

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

VW3 A9 509

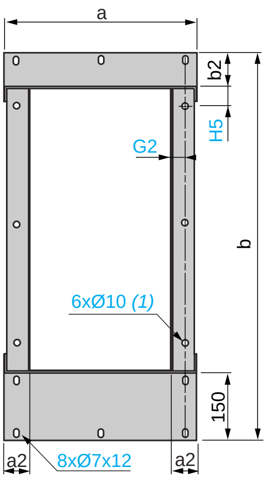

788,5
837,5
360
420

Cut-outs and drill holes

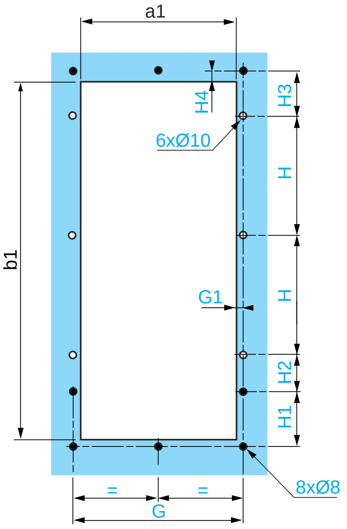

396
13
117,5
144,5
145,25
145,25
144,5
117,5
18
16xØ4,5
17
=
=
17
362

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

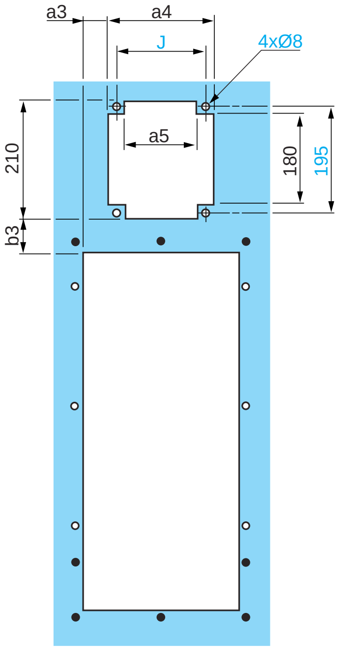
VW3 A9 510, 511


a
b2
H5
G2
b
6xØ10 (1)
150
a2
8xØ7x12
a2

Cut-outs and drill holes without DC choke


a1
H4
H3
6xØ10
H
b1
G1
H
H2
H1
8xØ8
=
=
G

Cut-outs and drill holes with DC choke


a3
a4
J
4xØ8
a5
210
180
195
b3

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

(1) For fixing using an M8 screw min.

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

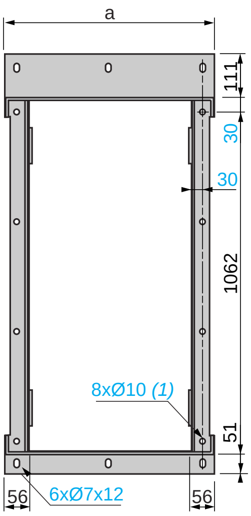
Variable speed drives for asynchronous motors

Altivar 61

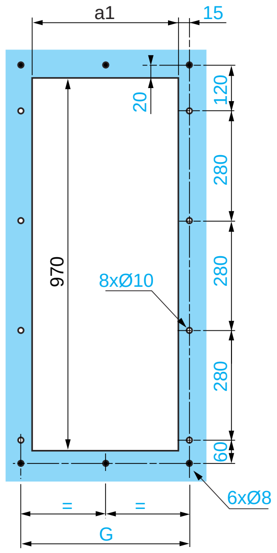
Accessories

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

VW3 A9 512, 513

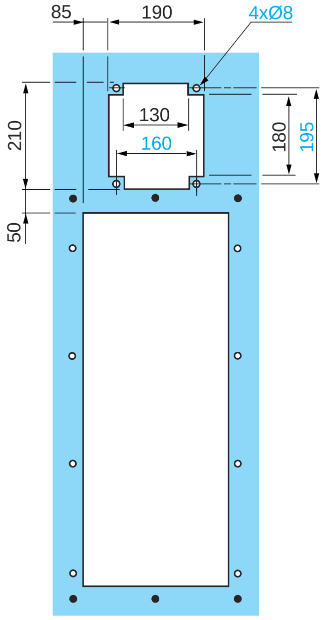

a
111
30
30
1062
8xØ10 (1)
51
56
6xØ7x12
56

Cut-outs and drill holes without DC choke

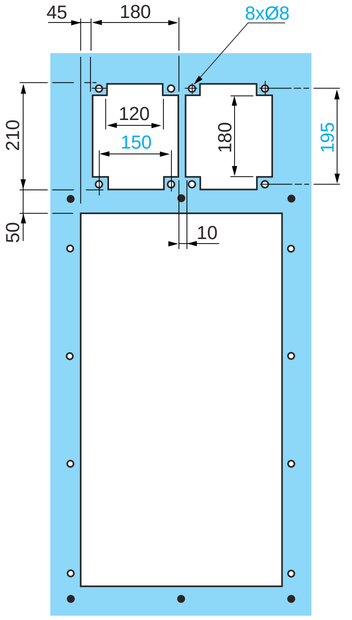

a1
15
20
120
280
970
8xØ10
280
280
60
=
=
G
6xØ8

VW3 A9 512

Cut-outs and drill holes with DC choke


85
190
4xØ8
210
130
160
180
195
50

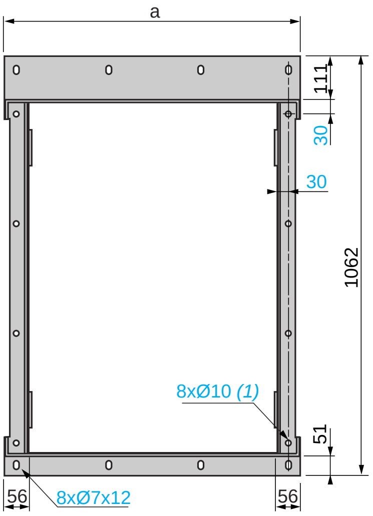
VW3 A9 513


45
180
8xØ8
210
120
150
180
195
50
10

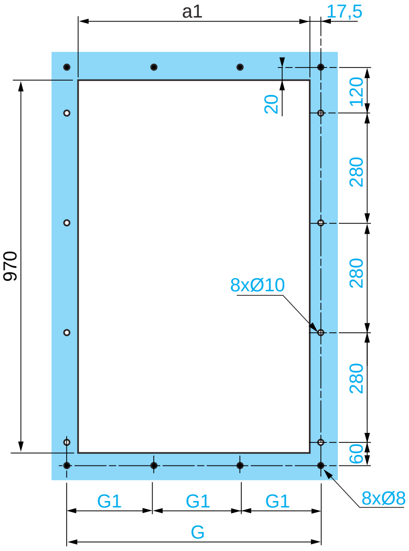
VW3	a	a1	G
A9 512	442	360	390
A9 513	542	460	490

(1) For fixing using an M8 screw min.

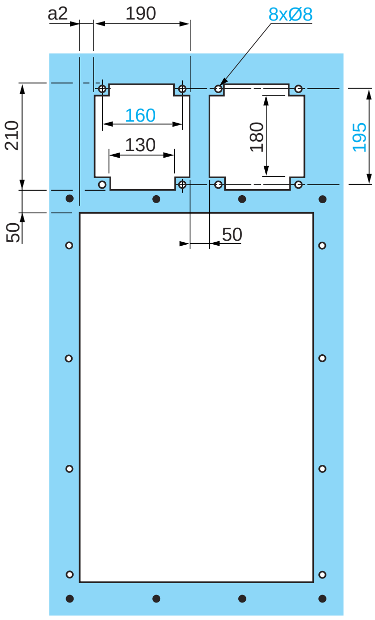
VW3 A9 514 (without braking unit), VW3 A9 515 (with braking unit)


a
111
30
30
1062
8xØ10 (1)
51
56
8xØ7x12
56

Cut-outs and drill holes without DC choke


a1
17,5
20
120
280
970
8xØ10
280
280
60
G1
G1
G1
G
8xØ8

Cut-outs and drill holes with DC choke


a2
190
8xØ8
210
160
130
180
195
50
50

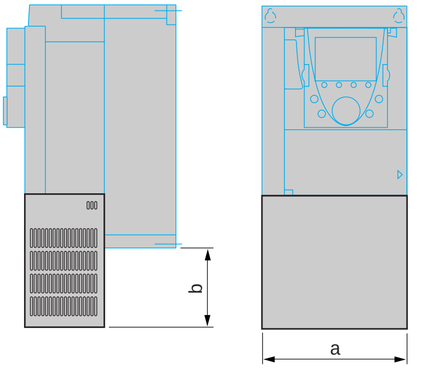
VW3	a	a1	G	G1
A9 514	697	610	645	215
A9 515	772	685	720	240

(1) For fixing using an M8 screw min.

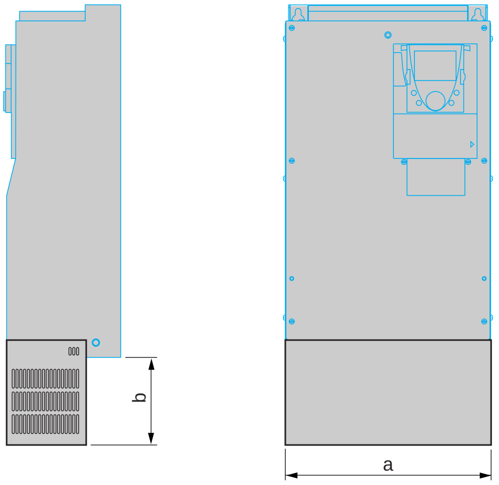
VW3	a2
A9 514	90
A9 515	165

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

VW3 A9 201…205, 101…105



VW3 A9 206…208, 217, 106…108, 117

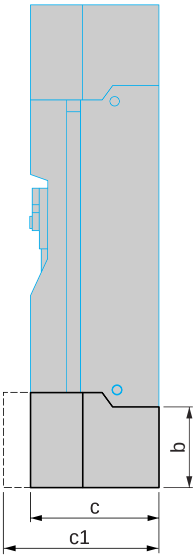


VW3	a	b
A9 201	132.6	31.4
A9 202	154.9	31.4
A9 203	177	31.4
A9 204	211.6	35.4
A9 205	231.6	38.9
A9 101	132.6	96.8
A9 102	154.9	104.1
A9 103	177	111.7
A9 104	211.6	128.9
A9 105	231.6	199.4

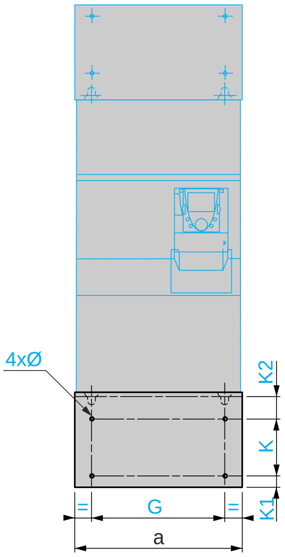
VW3	a	b
A9 206	240	59.9
A9 207	240	51.5
A9 217	320	48
A9 208	320	136
A9 106	240	75
A9 107	240	75
A9 117	320	75
A9 108	320	163

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

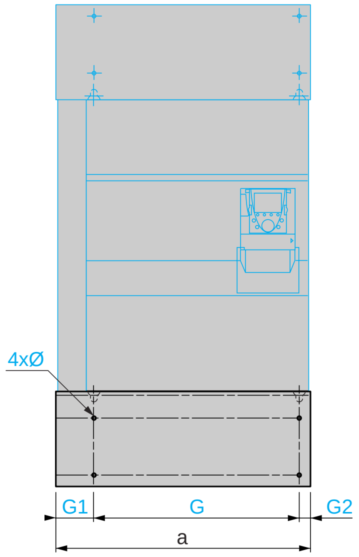
VW3 A9 209…214,
VW3 A9 109…116



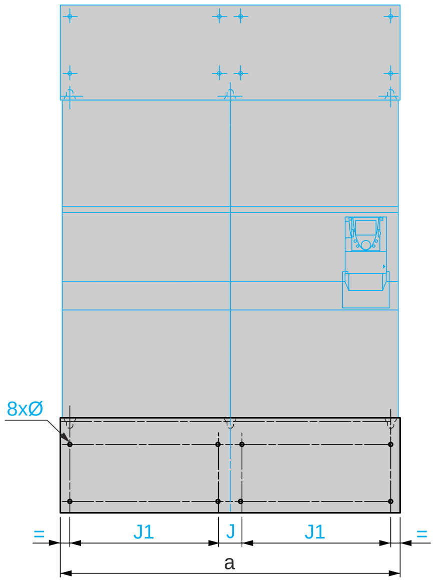
VW3 A9 209…213,
VW3 A9 109…113, 115



VW3 A9 214, 114
(with braking unit)



VW3 A9 116



VW3	a	b	c	c1	G	G1	G2	K	K1	K2	Ø	J	J1
A9 209	334	220	377	–	250	–	–	95	65	75	11.5	–	–
A9 210	374	300	377	–	298	–	–	172	65	75	11.5	–	–
A9 211	345	315	377	–	285	–	–	250	65	75	11.5	–	–
A9 212	445	375	377	–	350	–	–	250	65	75	11.5	–	–
A9 213	600	375	377	–	540	–	–	250	65	75	11.5	–	–
A9 214	670	375	377	–	540	102.5	27.5	250	65	75	11.5	–	–
A9 109	334	220	377	–	250	–	–	95	65	75	11.5	–	–
A9 110	374	300	377	–	298	–	–	172	65	75	11.5	–	–
A9 111	345	315	377	–	285	–	–	250	65	75	11.5	–	–
A9 112	445	375	377	–	350	–	–	250	65	75	11.5	–	–
A9 113	600	375	377	–	540	–	–	250	65	75	11.5	–	–
A9 114	670	375	377	–	540	102.5	27.5	250	65	75	11.5	–	–
A9 115	895	475	–	477	835	–	–	350	65	75	11.5	–	–
A9 116	1125	475	–	477	–	–	–	350	65	75	11.5	70	495

Presentation:
pages 24 and 25

References:
pages 24 and 25

Functions:
pages 148 to 175

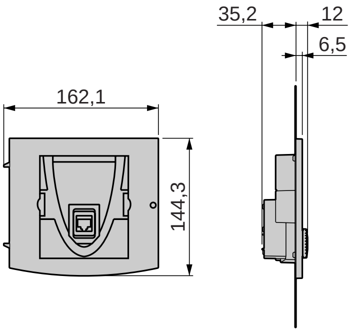
Variable speed drives for asynchronous motors

Altivar 61

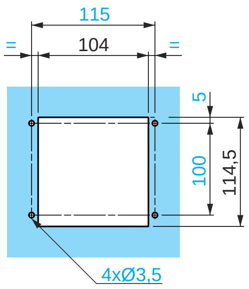
Dialogue, braking units, braking resistors

Remote graphic display terminal

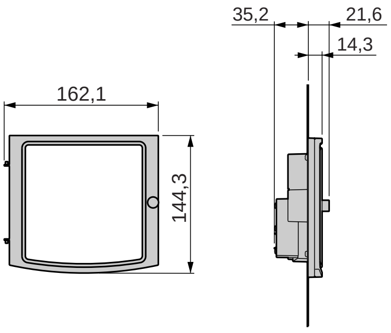
IP 54 kit VW3 A1 102


35,2
12
6,5
162,1
144,3

Cut-outs and drill holes

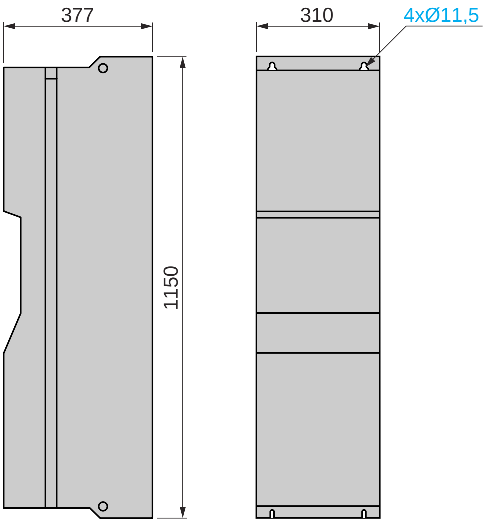

115
104
=
=
5
100
114,5
4xØ3,5

IP 65 door VW3 A1 103


35,2
21,6
14,3
162,1
144,3

Braking units VW3 A7 101 *(1)*, VW3 A7 102

VW3 A7 102


377
310
4xØ11,5
1150

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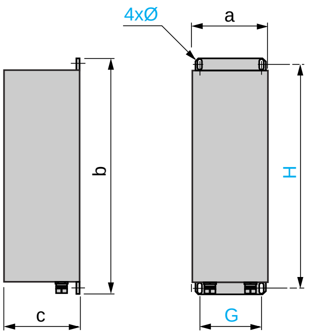
(1) The VW3 A7 101 braking unit is mounted on the left-hand side of the drive, see page 91

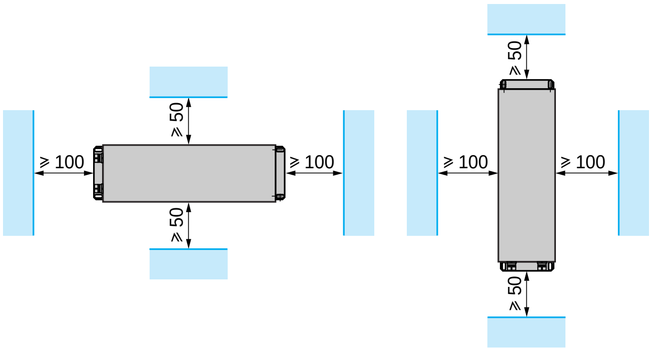
Braking resistors

VW3 A7 701…703



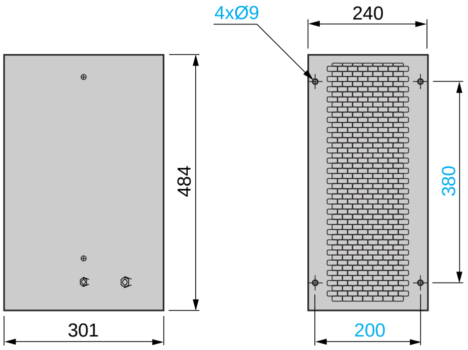
VW3	a	b	c	G	H	Ø
A7 701	95	293	95	70	275	6 x 12
A7 702	95	293	95	70	375	6 x 12
A7 703	140	393	120	120	375	6 x 12

Mounting recommendations

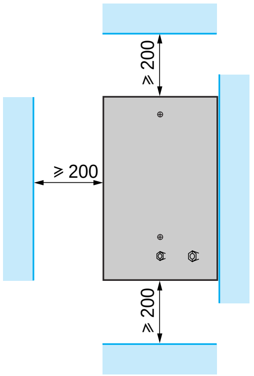

⩾ 50
⩾ 100
⩾ 100
⩾ 50
⩾ 50
⩾ 100
⩾ 100
⩾ 50

Braking resistors (continued)

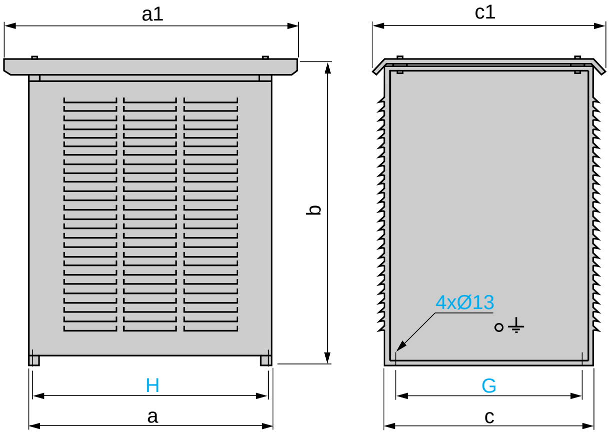
VW3 A7 704…709



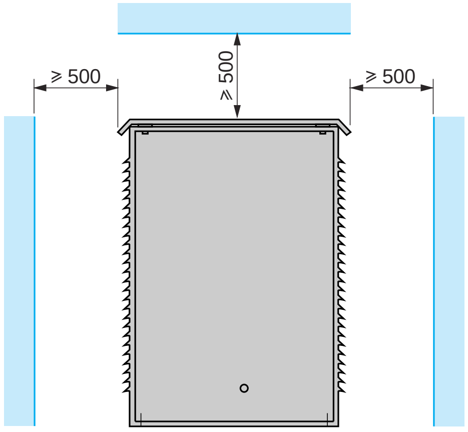
Mounting recommendations



VW3 A7 710…712, 715…718 *(1)*



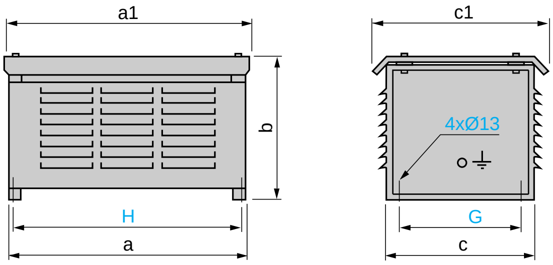
Mounting recommendations



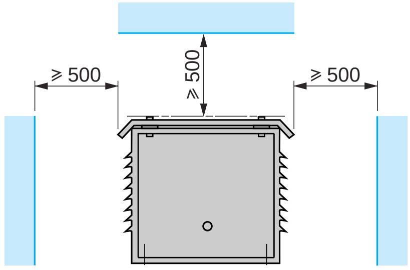
VW3	a	a1	b	c	c1	G	H
A7 710	860	1040	690	480	560	400	832
A7 711	960	1140	1150	380	460	300	932
A7 712	860	1040	1150	540	620	460	832
A7 715	960	1140	1150	540	620	460	932
A7 716	960	1140	1150	740	820	660	932
A7 717 *(1)*	960	1140	1150	540	620	460	932
A7 718 *(1)*	960	1140	1150	740	820	660	932

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

VW3 A7 713, 714



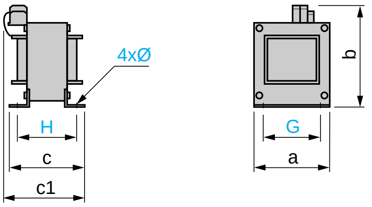
Mounting recommendations



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

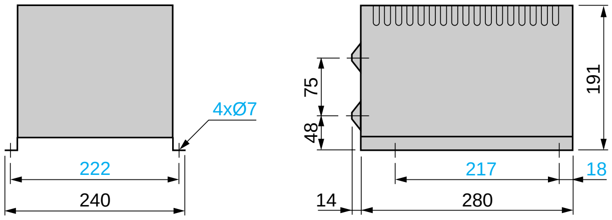
DC chokes

VW3 A4 501…510


4xØ
H
c
c1
G
a
b

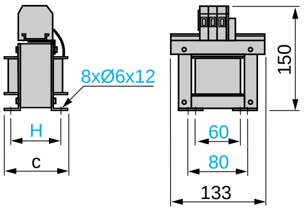
VW3	a	b	c	c1	G	H	Ø
A4 501	60	103	60	95	50	51	3.5
A4 502	60	103	77	118	50	68	3.5
A4 503	96	134	80	115	80	65	5.5
A4 504	96	134	79	115	80	64	5.5
A4 505	96	134	85	120	80	70	5.5
A4 506	96	134	89	120	80	74	5.5
A4 507	96	134	99	130	80	84	5.5
A4 508	108	142	112	145	90	97	5.5
A4 509	96	134	89	120	80	74	5.5
A4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

VW3 A4 511, 512


222
240
4xØ7
75
48
14
217
18
280
191

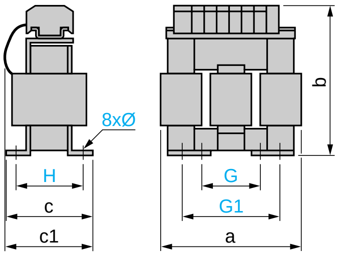
Line chokes

VW3 A58501, A58502


8xØ6x12
H
c
60
80
133
150

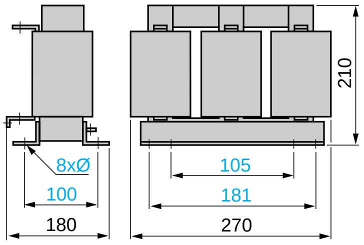
VW3	c	H
A58501	95	65
A58502	105	77

VW3 A4 551…555


8xØ
H
c
c1
G
G1
a
b

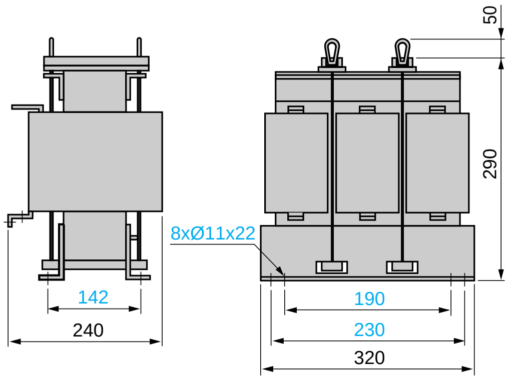
VW3	a	b	c	c1	G	G1	H	Ø
A4 551	100	135	55	60	40	60	42	6 x 9
A4 552, A4 553	130	155	85	90	60	80.5	62	6 x 12
A4 554	155	170	115	135	75	107	90	6 x 12
A4 555	180	210	125	165	85	122	105	6 x 12

VW3 A4 556

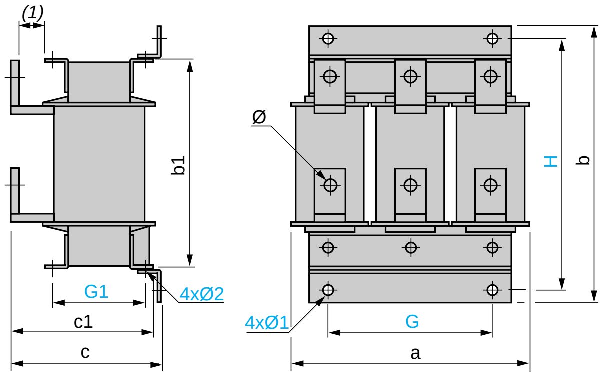

8xØ
100
180
105
181
270
210

VW3	Ø
A4 556	11 x 22

VW3 A4 557


142
240
8xØ11x22
190
230
320
290
50

VW3 A4 558…561, 564, 565, 568, 569


(1)
G1
c1
c
4xØ2
b1
Ø
4xØ1
G
a
H
b

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

(1) 25 mm minimum.

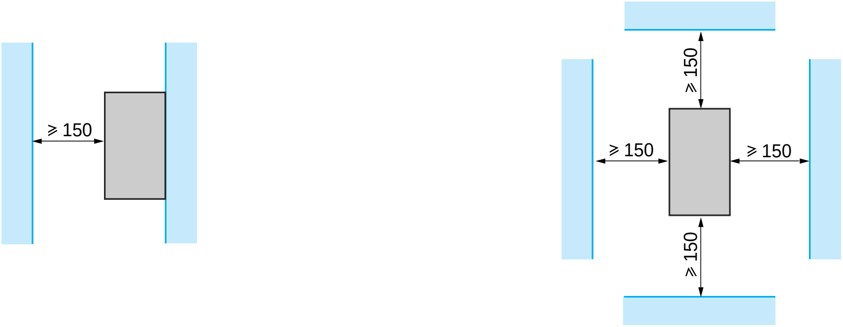
Variable speed drives for asynchronous motors

Altivar 61

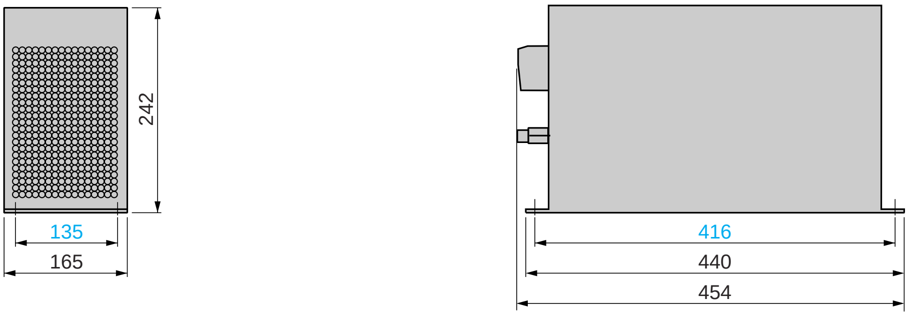
Passive filters

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

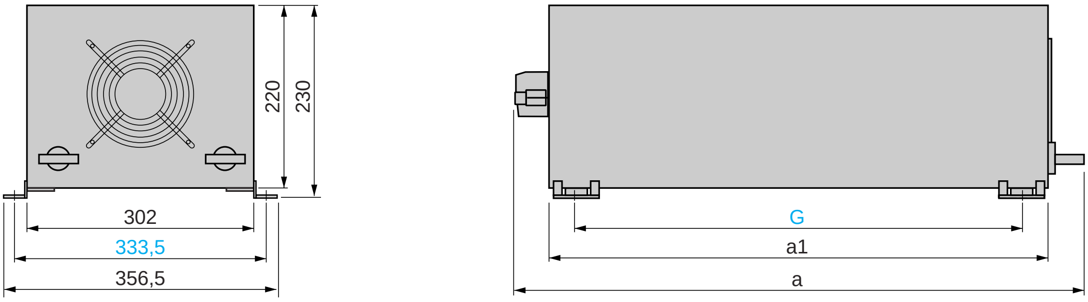
Mounting recommendations *(1)*


⩾ 150
⩾ 150
⩾ 150
⩾ 150
⩾ 150

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


242
135
165
416
440
454

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

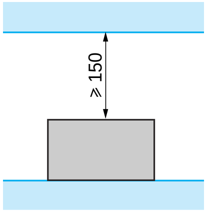

220
230
302
333,5
356,5
G
a1
a

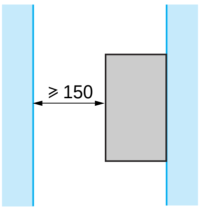
VW3	a	a1	G
A4 605, 606, 623…625, 645, 646, 664, 665	698	600	532,5
A4 607…609, 626, 627, 647, 648, 666	938	840	772,5

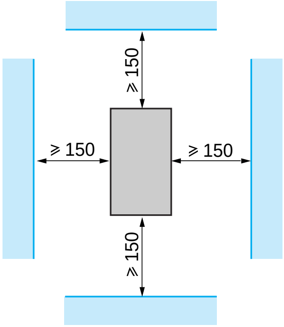
(1) Vertical mounting only

Passive filters VW3 A4 610…613, 619, 628…633, 639, 649…651, 656, 657, 667…671, 676, 677

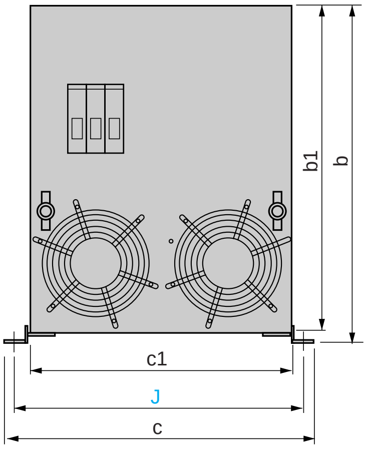
Mounting recommendations *(1)*

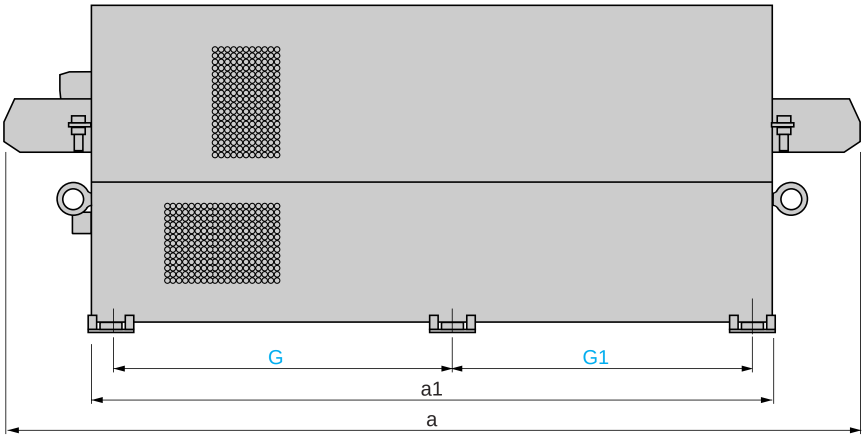





⩾ 150
⩾ 150
⩾ 150
⩾ 150

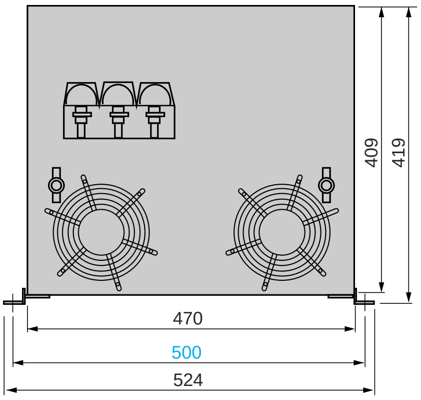
VW3 A4 610…613, 619, 628…632, 639, 649…651, 656, 657, 667…670, 676, 677

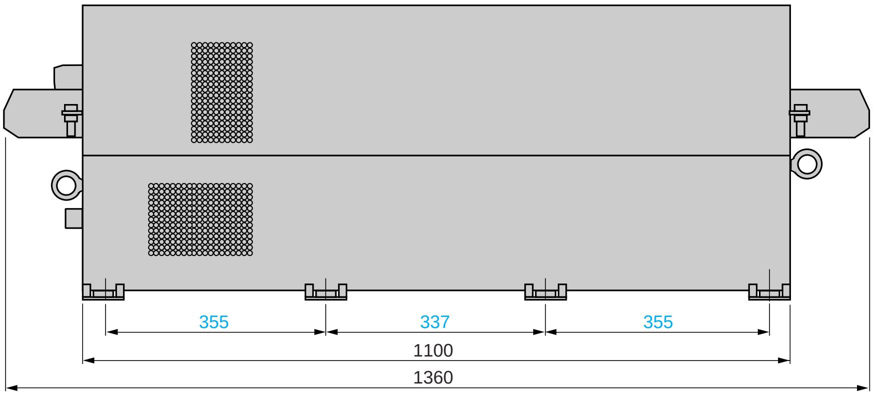




VW3	a	a1	b	b1	c	c1	G	G1	J
A4 610, 611, 628, 629, 649, 667, 668	1060	830	400	390	393	345	395	377	370
A4 612, 619, 630, 631, 650, 656, 657, 669	1160	900	419	409	454	406	430	412	430
A4 613, 632, 639, 651, 670, 676, 677	1330	1070	419	409	454	406	515	497	430

VW3 A4 633, 671


409
419
470
500
524


355
337
355
1100
1360

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(1) Vertical or horizontal mounting.

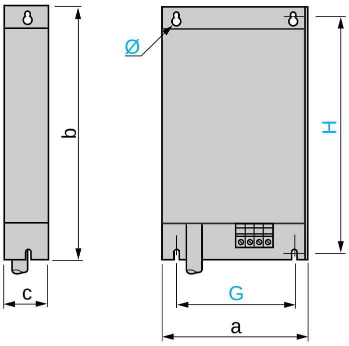
Variable speed drives for asynchronous motors

Altivar 61

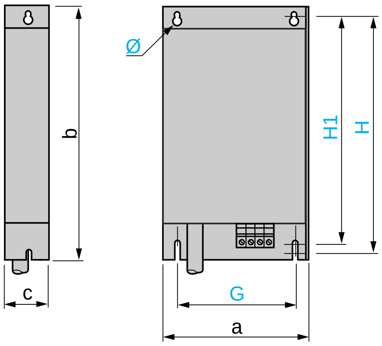
Additional EMC input filters

Additional EMC input filters

VW3 A4 401…404

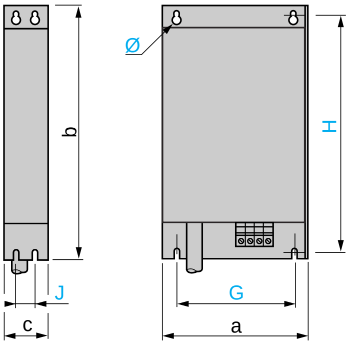


VW3 A4 405, 409



VW3	a	b	c	G	H	H1	Ø
A4 401	130	290	40	105	275	–	4.5
A4 402	155	324	50	130	309	–	4.5
A4 403	175	370	60	150	355	–	5.5
A4 404	210	380	60	190	365	–	5.5
A4 405	230	498.5	62	190	479.5	460	6.6
A4 409	230	498.5	62	190	479.5	460	6.6

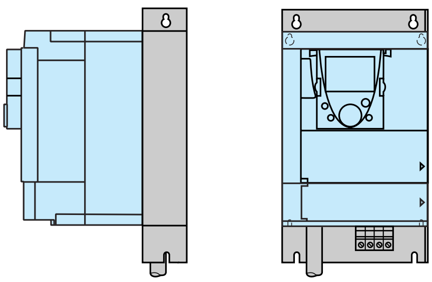
VW3 A4 406…408



VW3	a	b	c	G	H	J	Ø
A4 406	240	522	79	200	502.5	40	6.6
A4 407	240	650	79	200	631	40	6.6
A4 408	320	750	119	280	725	80	9

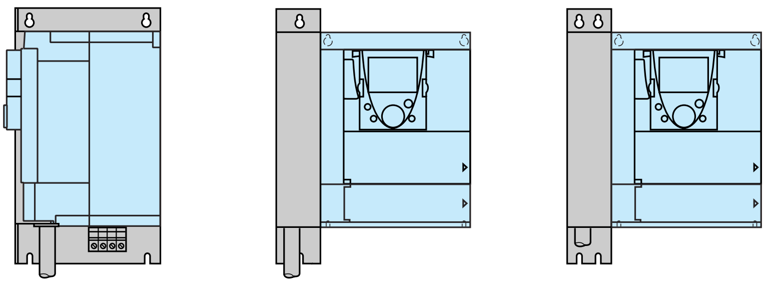
Mounting the filter under the drive

Front view



Mounting the filter next to the drive

Front view



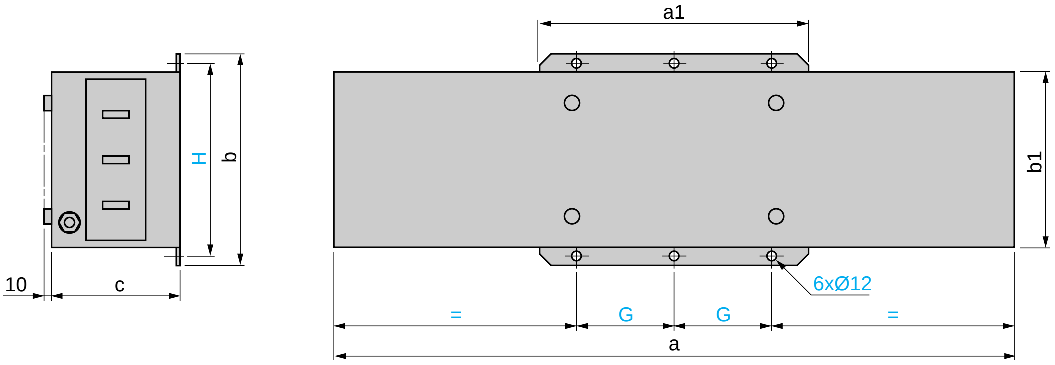
Variable speed drives for asynchronous motors

Altivar 61

Additional EMC input filters

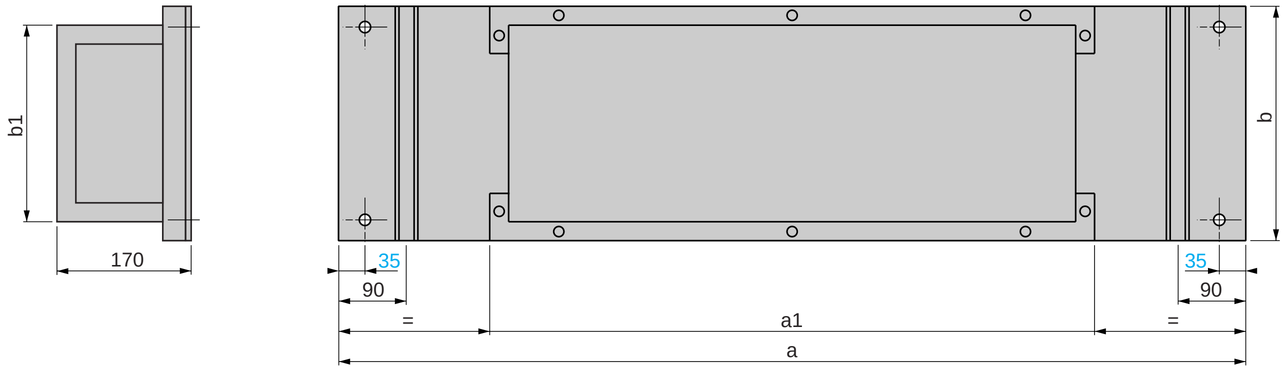
Additional EMC input filters (continued)

VW3 A4 410…413



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

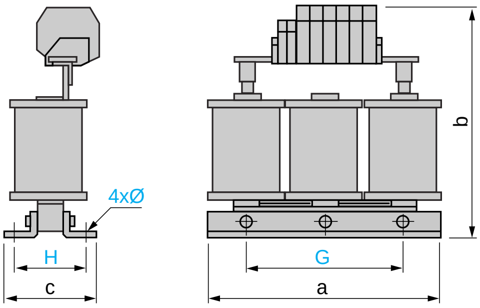
IP 30 protection kits for filters VW3 A4 410…413



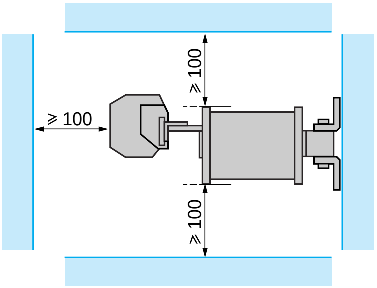
VW3	a	a1	b	b1
A9 601	1200	800	310	270
A9 602	1400	1000	350	310

Motor chokes *(1)*

VW3 A5 101, 102

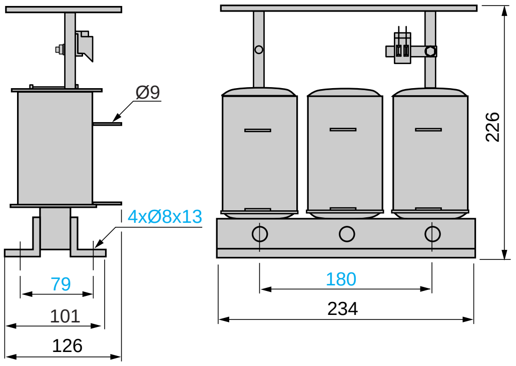


Mounting recommendations *(2)*

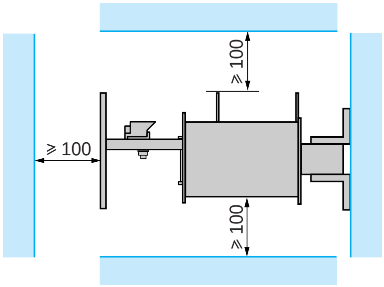


VW3	a	b	c	G	H	Ø
A5 101	190	210	90	170	45	8 x 12
A5 102	190	235	120	170	48	8 x 12

VW3 A5 103



Mounting recommendations *(2)*



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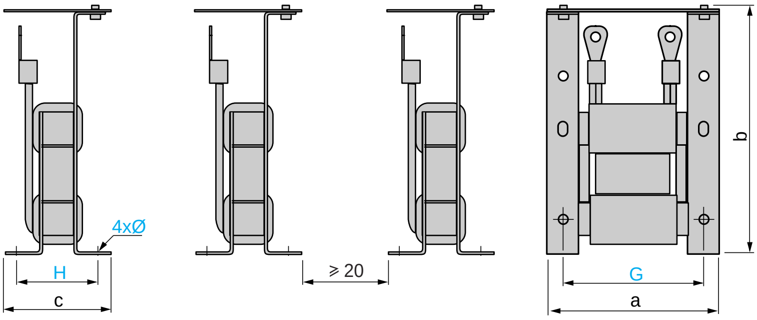
(1) It is absolutely essential that the motor chokes are mounted on a metal support (grille, frame, etc.)
(2) Because of the magnetic field and/or heat dissipation, it is very important to follow the mounting recommendations provided.

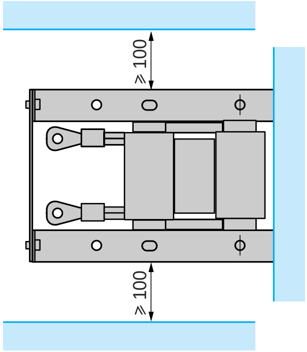
Motor chokes (continued) *(1)*

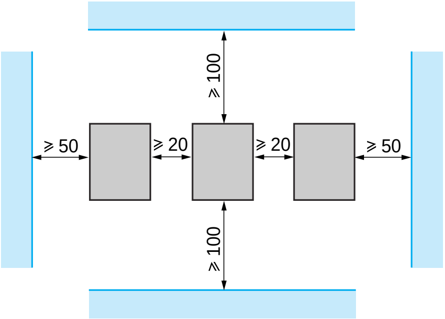
VW3 A5 104, 105 *(2)*

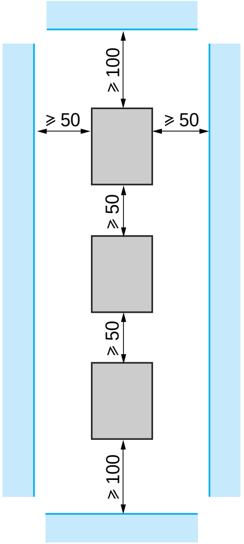


VW3	a	b	c	G	H	Ø
A5 104	170	250	100	150	75	9
A5 105	210	250	110	175	75	9 x 13

Mounting recommendations *(3)*





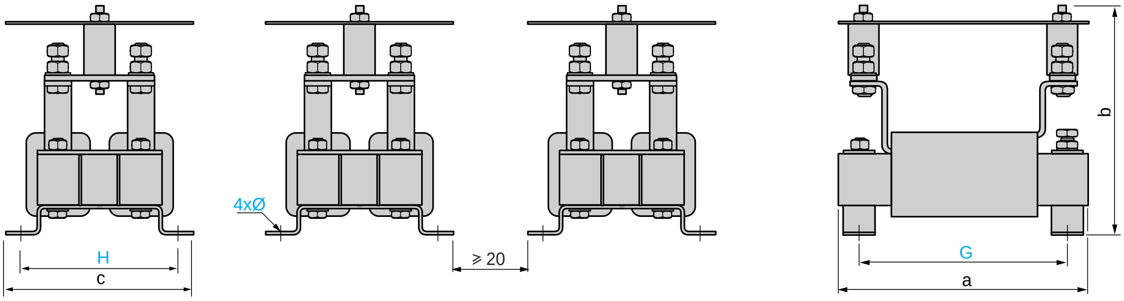


---

(1) It is absolutely essential that the motor chokes are mounted on a metal support (grille, frame, etc.)
(2) References VW3 A5 104 and 105 consist of 3 components.
(3) Because of the magnetic field and/or heat dissipation, it is very important to follow the mounting recommendations provided.

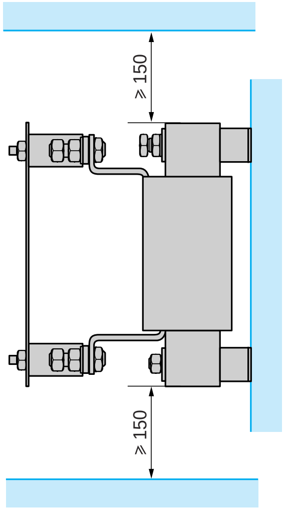
Motor chokes (continued) *(1)*

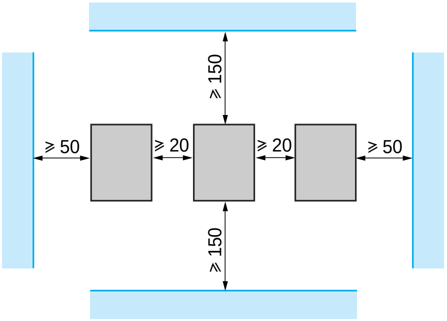
VW3 A5 106…108 *(2)*

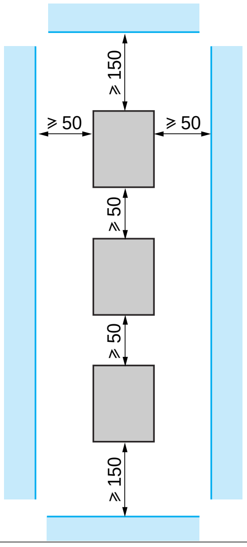


VW3	a	b	c	G	H	Ø
A5 106	245	250	200	225	175	9
A5 107	320	250	220	275	200	9
A5 108	370	250	230	325	200	9

Mounting recommendations *(3)*



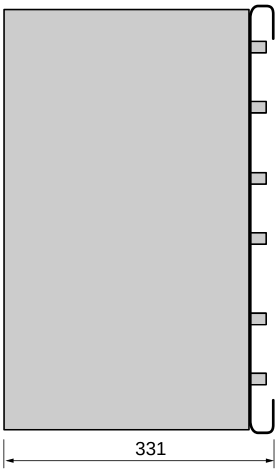


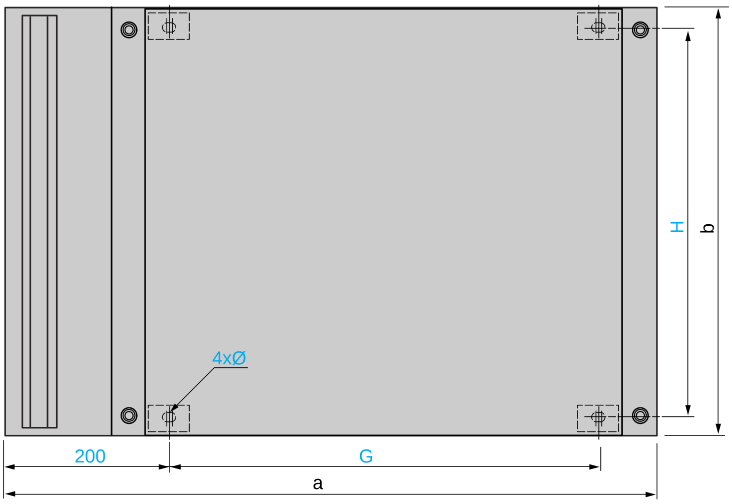


---

(1) It is absolutely essential that the motor chokes are mounted on a metal support (grille, frame, etc.)
(2) References VW3 A5 106…108 consist of 3 components.
(3) Because of the magnetic field and/or heat dissipation, it is very important to follow the mounting recommendations provided.

IP 20 protection kits for chokes VW3 A5 104…108

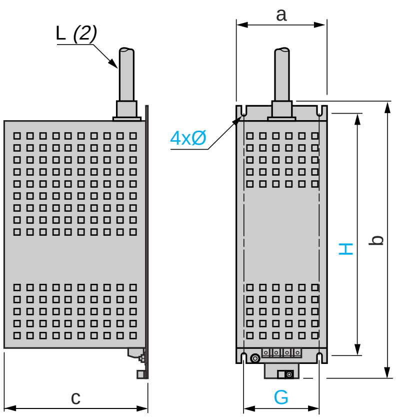




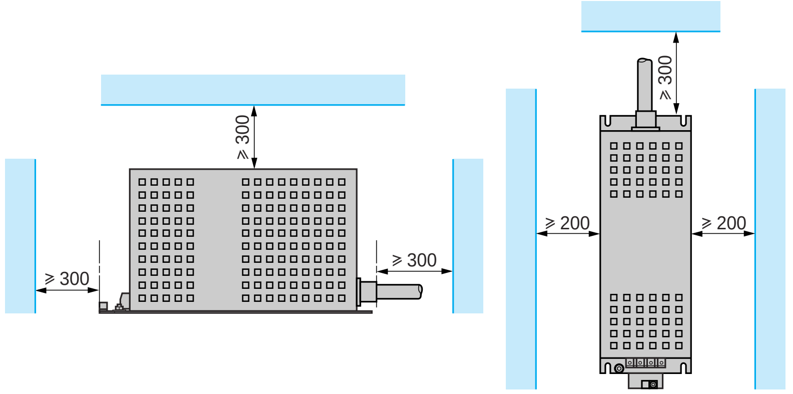
VW3	a	b	G	H	Ø
A9 612	800	600	530	554	10 x 15
A9 613	1200	800	800	757	10 x 15

Sinus filters *(1)*

VW3 A5 201…206

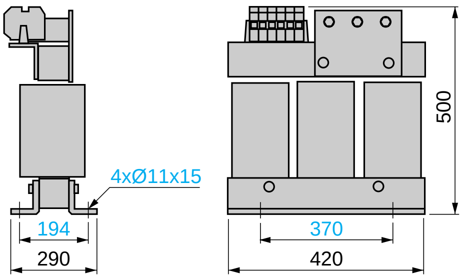

L (2)
a
4xØ
H
b
c
G

Mounting recommendations

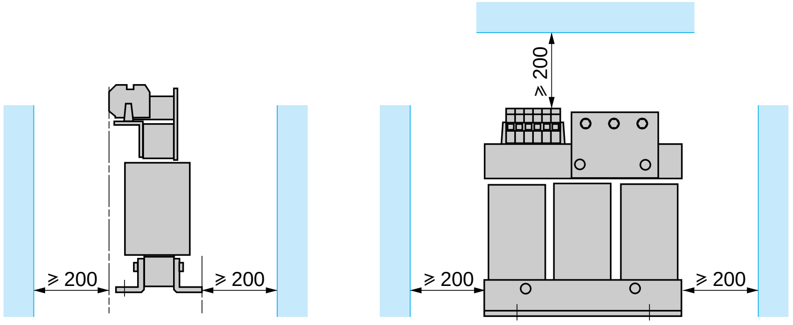

⩾ 300
⩾ 300
⩾ 300
⩾ 300
⩾ 200
⩾ 200

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

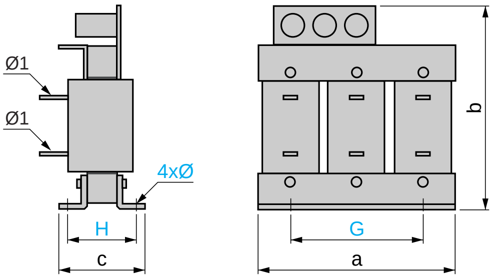
VW3 A5 207


4xØ11x15
194
290
500
370
420

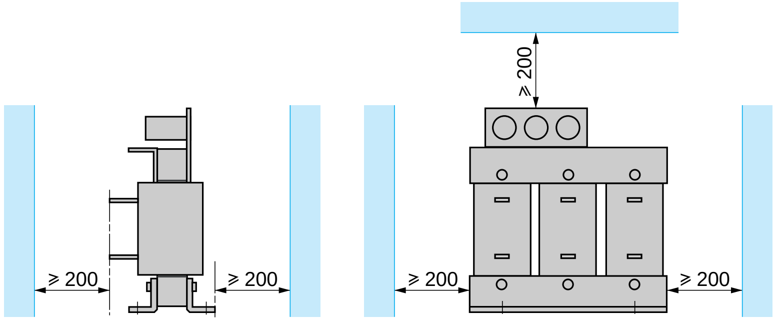
Mounting recommendations


⩾ 200
⩾ 200
⩾ 200
⩾ 200
⩾ 200

VW3 A5 208…211


Ø1
Ø1
4xØ
H
c
b
G
a

Mounting recommendations


⩾ 200
⩾ 200
⩾ 200
⩾ 200
⩾ 200

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

---

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

Variable speed drives for asynchronous motors

Altivar 61

Safety requirements

"Power Removal" safety function

The Altivar 61 drive integrates the "Power Removal" safety function which prohibits unintended equipment operation. The motor no longer produces torque.

This safety function:
- conforms to machine safety standard EN 954-1, category 3
- conforms to operational safety standard IEC/EN 61508, capacity SIL2 (safety control-signalling applied to processes and systems)

The SIL (Safety Integrity Level) capacity depends on the connection diagram for the drive and for the safety function. Failure to follow the setup recommendations could inhibit the SIL capacity of the "Power Removal" safety function.
- conforms to draft product standard IEC/EN 61800-5-2 for both stop functions:
  - ☐ Safe Torque Off ("STO")
  - ☐ Safe Stop 1 ("SS1")

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

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

Categories relating to safety according to EN 954-1

Categories	Main safety basis	Control system requirements	Behaviour in the event of a fault
B	Selecting components which conform to the relevant standards	Monitoring in accordance with established practice	Possible loss of safety function
1	Selecting components and safety principles	Use of tested components and tested safety principles	Possible loss of safety function with a lower probability than in **B**
2	Selecting components and safety principles	Test per cycle. The intervals between tests must be appropriate to both the machine and its application	Fault detected on each test
3	Structure of the safety circuits	A single fault should not result in loss of the safety function. The fault must be detected if this is reasonably possible	Safety function assured except in the event of an accumulation of faults
4	Structure of the safety circuits	A single fault should not result in loss of the safety function. The fault must be detected when or before the safety function is next invoked. An accumulation of faults should not result in loss of the safety function.	Safety function always assured

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

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

SIL1 according to standard IEC/EN 61508 is comparable with category 1 according to EN 954-1 (SIL1: mean probability of undetected dangerous failure per hour between 10^{-5} and 10^{-6}).
SIL2 according to standard IEC/EN 61508 is comparable with category 3 according to EN 954-1 (SIL 2: mean probability of undetected dangerous failure per hour between 10^{-6} and 10^{-7}).

---

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

“Power Removal” safety function considerations

The “Power Removal” safety function cannot be considered as a means of electrical disconnection of the motor (no electrical isolation); if necessary, a Vario switch disconnector must be used.
The “Power Removal” safety function is not designed to overcome any malfunction in the drive process control or application functions.
The output signals available on the drive must not be considered as safety signals (example: “Power Removal” active); these are Preventa-type safety module outputs which must be integrated into a safety control-signalling circuit.

The schemes on the following pages take into account conformity with standard IEC/EN 60204-1 that defines 3 stop categories:

- Category 0: stopping by immediate removal of the power from the actuators (example: uncontrolled stop)
- Category 1: controlled stop maintaining the power on the actuators until the machine stops, then cutting off the power when the actuators stop as a result of the machine stopping
- Category 2: controlled stop maintaining the power on the actuators

Connection schemes and applications

Conformity with category 1 of standard EN 954-1 and level SIL1 according to standard IEC/EN 61508

Use of the connection schemes on pages 114 and 115 which use a line contactor or a Vario switch disconnector between the drive and the motor. In this case, the “Power Removal” safety function is not used and the motor stops in accordance with category 0 of standard IEC/EN 60204-1.

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

The connection diagrams use the “Power Removal” safety function of the Altivar 61 drive combined with a Preventa safety module to monitor the Emergency stop circuits.

Machines with short freewheel stopping times (low inertia, see page 116).
When the activation command is given on the PWR input with the controlled motor, the motor power supply is immediately switched off and the motor stops according to category 0 of standard IEC/EN 60204-1.
Restarting is not permitted (“STO”) if the activation command is given after the motor has come to a complete stop.
This safe stop is maintained while the PWR input remains activated.

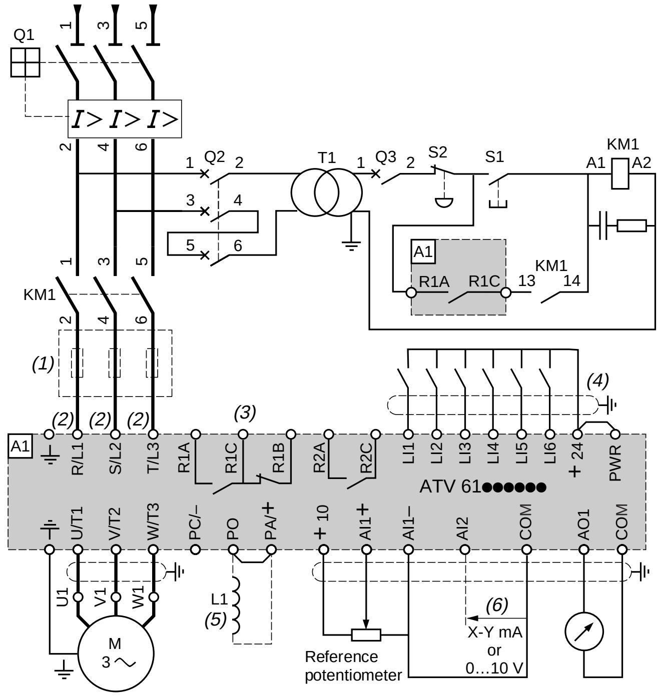
Machines with long freewheel stopping times (high inertia, see page 117).
When the activation command is given, deceleration of the motor controlled by the drive is first requested, then, following a time delay controlled by a Preventa-type fault relay which corresponds to the deceleration time, the “Power Removal” safety function is activated by the PWR input. The motor stops according to category 1 of standard IEC/EN 60204-1 (“SS1”).

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

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

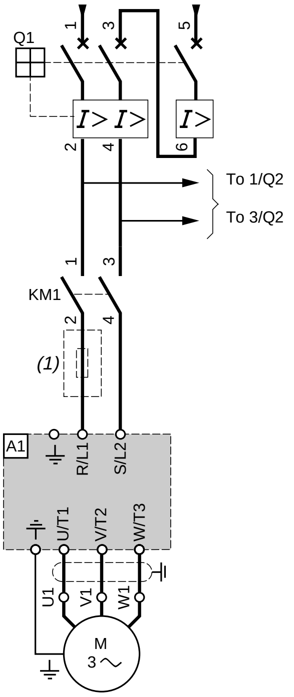
ATV 61●●●●M3, ATV 61●●●●M3X, ATV 61●●●●N4, ATV 61W●●●N4C

3-phase power supply with upstream breaking via contactor


Q1
1
3
5
I> I> I>
2
4
6
Q2
1
2
3
4
5
6
T1
1
Q3
2
S2
S1
KM1
A1
A2
A1
R1A
R1C
KM1
13
14
KM1
(1)
(2)
(2)
(2)
(3)
(4)
A1
R/L1
S/L2
T/L3
R1A
R1C
R1B
R2A
R2C
LI1
LI2
LI3
LI4
LI5
LI6
+ 24
PWR
ATV 61●●●●●●
U/T1
V/T2
W/T3
PC/–
PO
PA/+
+ 10
AI1+
AI1–
AI2
COM
AO1
COM
U1
V1
W1
L1
(5)
M
3
(6)
X-Y mA
or
0…10 V
Reference
potentiometer

ATV 61H075M3…HU75M3

Power section for single phase power supply


Q1
1
3
5
I> I>
I>
2
4
6
To 1/Q2
To 3/Q2
1
3
KM1
2
4
(1)
A1
R/L1
S/L2
U/T1
V/T2
W/T3
U1
V1
W1
M
3

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

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

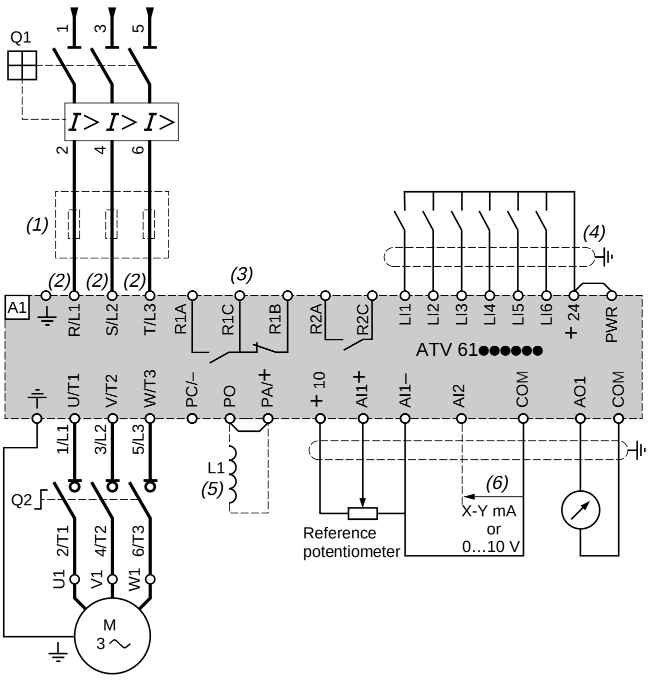
Reference	Description
A1	ATV 61 drive, see pages 18 to 21
KM1	Contactor, see motor starters pages 128 to 137
L1	DC choke, see page 65
Q1	Circuit-breaker, see motor starters pages 128 to 137
Q2	GV2 L rated at twice the nominal primary current of T1
Q3	GB2 CB05
S1, S2	XB4 B or XB5 A pushbuttons
T1	100 VA transformer 220 V secondary

(1) Line choke (single phase or 3-phase), see page 68.
(2) For ATV 61HC50N4 and ATV 61HC63N4 drives, see page 118.
(3) Fault relay contacts for remote signalling of the drive status
(4) Connection of the common for the logic inputs depends on the positioning of the SW1 switch: see schemes on page 118.
(5) DC choke as an option for ATV 61H●●●M3, ATV 61HD11M3X…HD45M3X, ATV 61H075N4…HD75N4. Connected in place of the strap between the PO and PA/+ terminals. For ATV 61HD55M3X, HD75M3X, ATV 61HD90N4…HC50N4 drives, the choke is supplied with the drive; the customer is responsible for connecting it. On drives ATV 61W●●●N4 and ATV 61W●●●N4C, the DC choke is integrated.
(6) Software-configurable current (0…20 mA) or voltage (0…10 V) analog input.

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

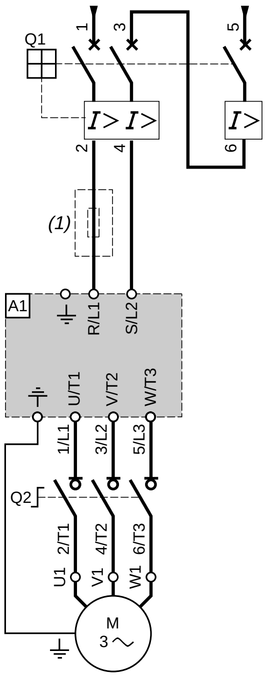
ATV 61●●●●M3, ATV 61●●●●M3X, ATV 61●●●●N4, ATV 61W●●●N4C

3-phase power supply with downstream breaking via switch disconnector


Q1
1
3
5
I> I> I>
2
4
6
(1)
(2)
(2)
(2)
(3)
(4)
A1
R/L1
S/L2
T/L3
R1A
R1C
R1B
R2A
R2C
LI1
LI2
LI3
LI4
LI5
LI6
+ 24
PWR
ATV 61●●●●●●
U/T1
V/T2
W/T3
PC/–
PO
PA/+
+ 10
AI1+
AI1–
AI2
COM
AO1
COM
1/L1
3/L2
5/L3
L1
(5)
Q2
2/T1
4/T2
6/T3
U1
V1
W1
M
3 ~
(6)
X-Y mA
or
0…10 V
Reference
potentiometer

ATV 61H075M3…HU75M3

Power section for single phase power supply


Q1
1
3
5
I> I>
I>
2
4
6
(1)
A1
R/L1
S/L2
U/T1
V/T2
W/T3
1/L1
3/L2
5/L3
Q2
2/T1
4/T2
6/T3
U1
V1
W1
M
3 ~

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

Components for use with the Altivar (for a complete list of references, see our “Motor starter solutions. Power control and protection components” specialist catalogue).

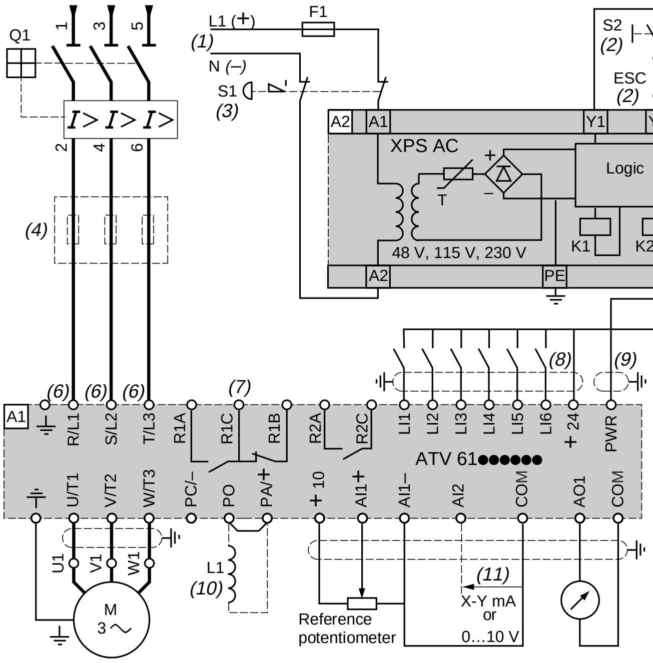
Reference	Description
A1	ATV 61 drive, see pages 18 to 21
L1	DC choke, see page 65
Q1	Circuit-breaker, see motor starters pages 128 to 137
Q2	Switch disconnector (Vario)

(1) Line choke (single phase or 3-phase), see page 68.
(2) For ATV 61HC50N4 and ATV 61HC63N4 drives, see page 118.
(3) Fault relay contacts for remote signalling of the drive status
(4) Connection of the common for the logic inputs depends on the positioning of the SW1 switch: see schemes on page 118.
(5) DC choke as an option for ATV 61H●●●M3, ATV 61HD11M3X…HD45M3X, ATV 61H075N4…HD75N4. Connected in place of the strap between the PO and PA/+ terminals. For ATV 61HD55M3X, HD75M3X, ATV 61HD90N4…HC50N4 drives, the choke is supplied with the drive; the customer is responsible for connecting it. On drives ATV 61W●●●N4 and ATV 61W●●●N4C, the DC choke is integrated.
(6) Software-configurable current (0…20 mA) or voltage (0…10 V) analog input.

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

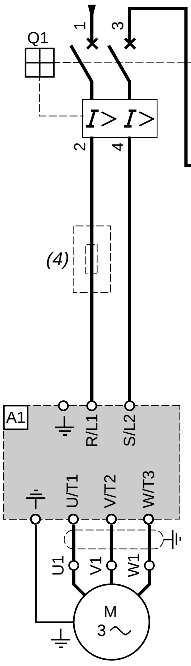
ATV 61H●●●M3, ATV 61H●●●M3X, ATV 61●●●●N4, ATV 61W●●●N4C

3-phase power supply, low inertia machine


Q1
1
3
5
2
4
6
I> I> I>
L1 (+)
F1
(1)
N (–)
S1
(3)
S2
(2)
ESC
(2)
A2
A1
Y1
Y2
13
23
33
Y43
XPS AC
T
Logic
K1
K2
48 V, 115 V, 230 V
PE
14
24
34
Y44
(5)
(4)
(8)
(9)
(6)
(7)
A1
R/L1
S/L2
T/L3
R1A
R1C
R1B
R2A
R2C
LI1
LI2
LI3
LI4
LI5
LI6
+ 24
PWR
ATV 61●●●●●●
U/T1
V/T2
W/T3
PC/–
PO
PA/+
+ 10
AI1+
AI1–
AI2
COM
AO1
COM
U1
V1
W1
M
3 ∼
L1
(10)
Reference potentiometer
(11)
X-Y mA
or
0…10 V

ATV 61H075M3…HU75M3

Power section for single phase power supply


Q1
1
3
5
2
4
6
I> I>
I>
(4)
A1
R/L1
S/L2
U/T1
V/T2
W/T3
U1
V1
W1
M
3 ∼

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

Components for use with the Altivar (for a complete list of references, see our “Motor starter solutions. Power control and protection components” and “Preventa safety solutions” specialist catalogues).

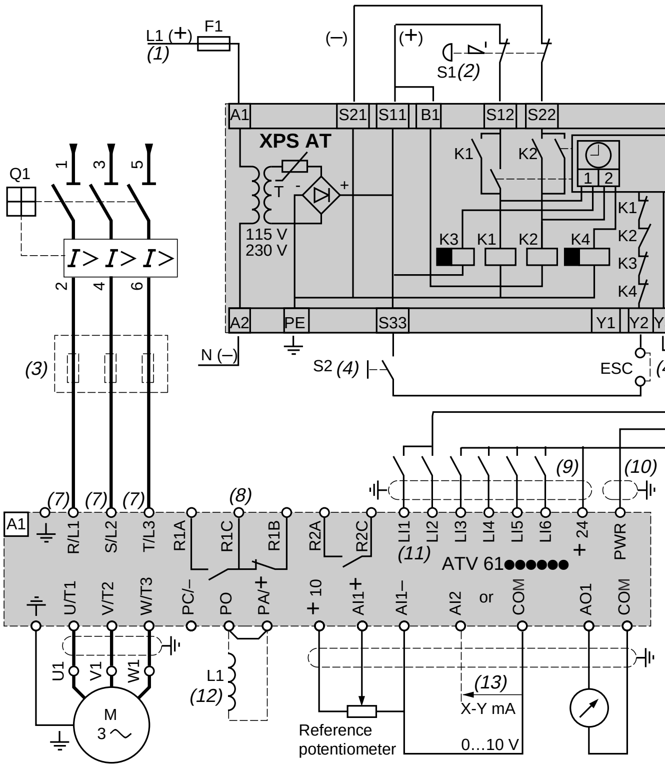
Reference	Description
A1	ATV 61 drive, see pages 18 to 21
A2	Preventa XPS AC safety module for monitoring Emergency stops and switches. One safety module can manage the “Power Removal” function for several drives on the same machine.
F1	Fuse
L1	DC choke, see page 65
Q1	Circuit-breaker, see motor starters pages 128 to 137
S1	Emergency stop button with 2 contacts
S2	XB4 B or XB5 A pushbutton

(1) *Power supply: ⎓ or 24 V ∼, 48 V ∼, 115 V ∼, 230 V ∼.*
(2) *S2: resets XPS AC module on power-up or after an Emergency stop. ESC can be used to set external starting conditions.*
(3) *Requests freewheel stopping of the movement and activates the “Power Removal” safety function.*
(4) *Line choke (single phase or 3-phase), see page 68.*
(5) *The logic output can be used to signal that the machine is in a safe stop state.*
(6) *For ATV 61HC50N4 and ATV 61HC63N4 drives, see page 118.*
(7) *Fault relay contacts for remote signalling of the drive status*
(8) *Connection of the common for the logic inputs depends on the positioning of the SW1 switch: see schemes on page 118.*
(9) *Standardized coaxial cable, type RG174/U according to MIL-C17 or KX3B according to NF C 93-550, external diameter 2.54 mm, maximum length 2m. The cable shielding must be earthed.*
(10) *DC choke as an option for ATV 61H●●●●M3, ATV 61HD11M3X…HD45M3X, ATV 61H075N4…HD75N4. Connected in place of the strap between the PO and PA/+ terminals. For ATV 61HD55M3X, HD75M3X, ATV 61HD90N4…HC50N4 drives, the choke is supplied with the drive; the customer is responsible for connecting it. On drives ATV 61W●●●N4 and ATV 61W●●●N4C, the DC choke is integrated.*
(11) *Software-configurable current (0…20 mA) or voltage (0…10 V) analog input.*

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

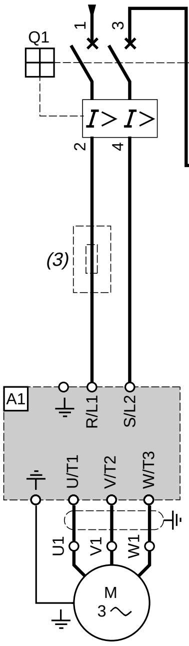
ATV 61H●●●M3, ATV 61H●●●M3X, ATV 61●●●●N4, ATV 61W●●●N4C

3-phase power supply, high inertia machine


L1 (+)
(1)
F1
(–)
(+)
S1(2)
A1
S21
S11
B1
S12
S22
13
23
33
41
57
67
XPS AT
T
115 V
230 V
K1
K2
K3
K4
1
2
A2
PE
S33
Y1
Y2
Y3
Y4
Y5
14
24
34
42
58
68
(5)
(6)
N (–)
S2 (4)
ESC
(4)
Q1
1
3
5
2
4
6
I> I> I>
(3)
(7)
(8)
(9)
(10)
A1
R/L1
S/L2
T/L3
R1A
R1C
R1B
R2A
R2C
LI1
LI2
LI3
LI4
LI5
LI6
+ 24
PWR
(11)
ATV 61●●●●●●
U/T1
V/T2
W/T3
PC/–
PO
PA/+
+ 10
AI1+
AI1–
AI2
or
COM
AO1
COM
U1
V1
W1
M
3 ∿
L1
(12)
(13)
X-Y mA
0…10 V
Reference potentiometer

ATV 61H075M3…HU75M3

Power section for single phase power supply


Q1
1
3
5
2
4
6
I> I>
I>
(3)
A1
R/L1
S/L2
U/T1
V/T2
W/T3
U1
V1
W1
M
3 ∿

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

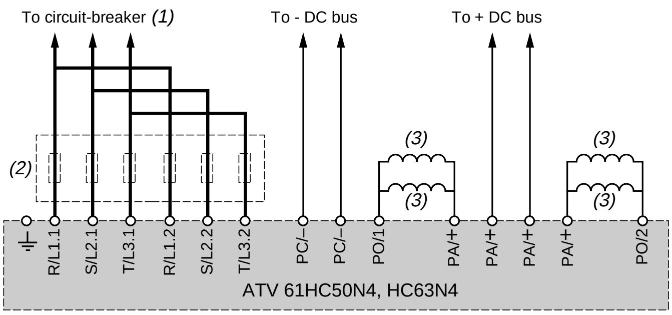
Components for use with the Altivar (for a complete list of references, see our “Motor starter solutions. Power control and protection components” and “Preventa safety solutions” specialist catalogues).

Reference	Description
A1	ATV 61 drive, see pages 18 to 21
A2 *(6)*	Preventa XPS AT safety module for monitoring Emergency stops and switches. One safety module can manage the “Power Removal” safety function for several drives on the same machine, but the time delay must be adjusted on the drive controlling the motor that requires the longest stopping time.
F1	Fuse
L1	DC choke, see page 65
Q1	Circuit-breaker, see motor starters pages 128 to 137
S1	Emergency stop button with 2 contacts
S2	XB4 B or XB5 A pushbutton

(1) Power supply: ⎓ or 24 V ∿, 115 V ∿, 230 V ∿.
(2) Requests controlled stopping of the movement and activates the “Power Removal” safety function.
(3) Line choke (single phase or 3-phase), see page 68.
(4) S2: resets XPS AT module on power-up or after an Emergency stop. ESC can be used to set external starting conditions.
(5) The “O” contact can be used to signal that the machine is in a safe stop state.
(6) For stopping times requiring more than 30 seconds in category 1, use a Preventa XPS AV safety module which can provide a maximum time delay of 300 seconds.
(7) For ATV 61HC50N4 and ATV 61HC63N4 drives, see page 118.
(8) Fault relay contacts for remote signalling of the drive status
(9) Connection of the common for the logic inputs depends on the positioning of the SW1 switch: see schemes on page 118.
(10) Standardized coaxial cable, type RG174/U according to MIL-C17 or KX3B according to NF C 93-550, external diameter 2.54 mm, maximum length 2m. The cable shielding must be earthed.
(11) Logic inputs LI1 and LI2 must be assigned to the direction of rotation: LI1 in the forward direction and LI2 in the reverse direction.
(12) DC choke as an option for ATV 61H●●●●M3, ATV 61HD11M3X…HD45M3X, ATV 61H075N4…HD75N4. Connected in place of the strap between the PO and PA/+ terminals. For ATV 61HD55M3X, HD75M3X, ATV 61HD90N4…HC50N4 drives, the choke is supplied with the drive; the customer is responsible for connecting it. On drives ATV 61W●●●N4 and ATV 61W●●●N4C, the DC choke is integrated.
(13) Software-configurable current (0…20 mA) or voltage (0…10 V) analog input.

Power terminal connections

For ATV 61HC50N4 and ATV 61HC63N4

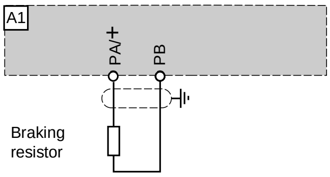

To circuit-breaker (1)
To - DC bus
To + DC bus
(2)
(3)
(3)
(3)
(3)
R/L1.1
S/L2.1
T/L3.1
R/L1.2
S/L2.2
T/L3.2
PC/–
PC/–
PO/1
PA/+
PA/+
PA/+
PA/+
PO/2
ATV 61HC50N4, HC63N4

---

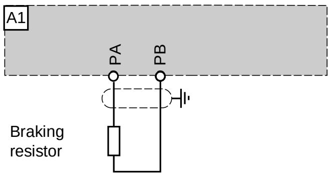
(1) For control section connections, see pages 114 to 117.
(2) Line choke, see page 68.
(3) DC chokes provided as standard with the drive

VW3 A7 7●● braking resistors or VW3 A7 1●● braking units

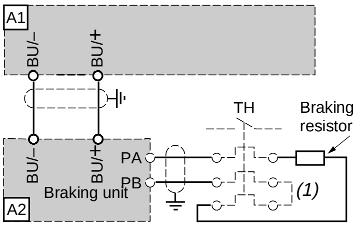
ATV 61H●●●M3, ATV 61HD11M3X...HD45M3X, ATV 61H075N4 ...HD75N4, ATV 61W●●●N4, ATV 61W●●●N4C


A1
PA/+
PB
Braking resistor

ATV 61HD55M3X...HD90M3X, ATV 61HD90N4...HC22N4


A1
PA
PB
Braking resistor

ATV 61HC25N4...HC63N4


A1
BU/–
BU/+
TH
Braking resistor
BU/–
BU/+
PA
PB
Braking unit
(1)
A2

Components for use with the Altivar

Reference	Description
A1	ATV 61 drive, see pages 18 to 21
A2	Braking unit, if using a braking resistor for ATV 61HC25N4...HC63N4, see page 55
Braking resistor	See page 57

---

(1) Option of using a thermal overload relay.

Examples of recommended schemes

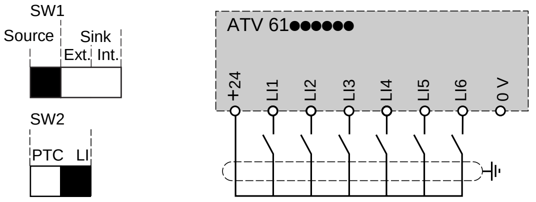
Logic inputs

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

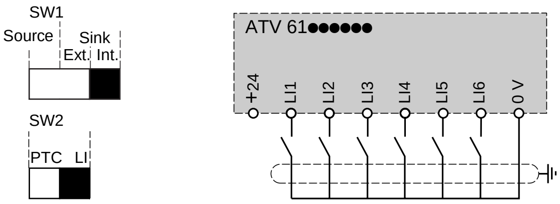
- Set the switch to Source (factory setting) if using PLC outputs with PNP transistors,
- Set the switch to Sink Int or Sink Ext if using PLC outputs with NPN transistors

Internal power supply

Switch in “Source” position

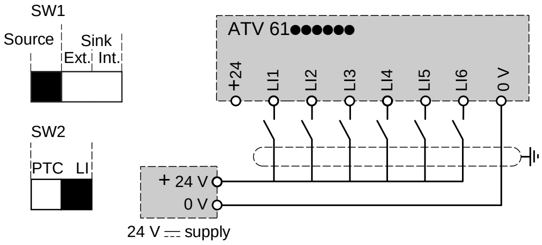

SW1
Source
Sink
Ext.
Int.
SW2
PTC
LI
ATV 61●●●●●●
+24
LI1
LI2
LI3
LI4
LI5
LI6
0 V

Switch in “Sink Int” position

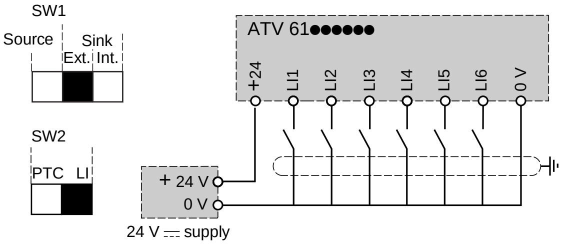

SW1
Source
Sink
Ext.
Int.
SW2
PTC
LI
ATV 61●●●●●●
+24
LI1
LI2
LI3
LI4
LI5
LI6
0 V

External power supply

Switch in “Source” position


SW1
Source
Sink
Ext.
Int.
SW2
PTC
LI
ATV 61●●●●●●
+24
LI1
LI2
LI3
LI4
LI5
LI6
0 V
+ 24 V
0 V
24 V ⎓ supply

Switch in “Sink Ext” position

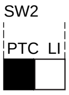

SW1
Source
Sink
Ext.
Int.
SW2
PTC
LI
ATV 61●●●●●●
+24
LI1
LI2
LI3
LI4
LI5
LI6
0 V
+ 24 V
0 V
24 V ⎓ supply

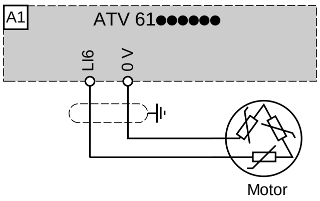
Examples of recommended schemes (continued)

Input for PTC probes

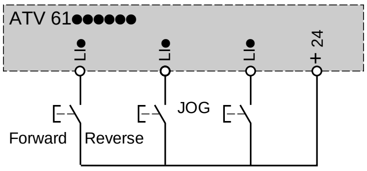
The SW2 switch is used to operate the LI6 input:

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

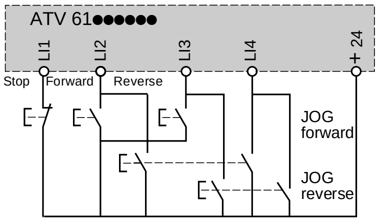



A1
ATV 61●●●●●●
LI6
0 V
Motor

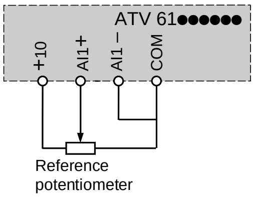
2-wire control and jog operation (JOG)


ATV 61●●●●●●
LI●
LI●
LI●
+ 24
Forward
Reverse
JOG

3-wire control and jog operation (JOG)

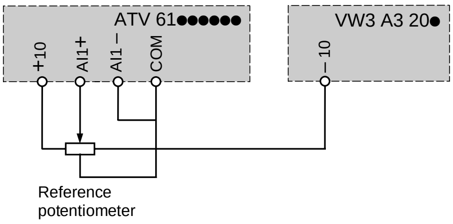

ATV 61●●●●●●
LI1
LI2
LI3
LI4
+ 24
Stop
Forward
Reverse
JOG forward
JOG reverse

Unipolar speed reference


ATV 61●●●●●●
+10
AI1+
AI1 –
COM
Reference potentiometer

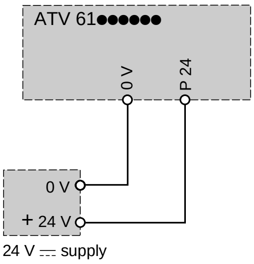
Bipolar speed reference

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


ATV 61●●●●●●
+10
AI1+
AI1 –
COM
VW3 A3 20●
– 10
Reference potentiometer

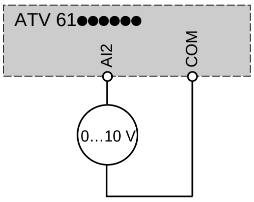
Separate control power supply

The separate control card can be powered by an external 24 V ⎓ supply

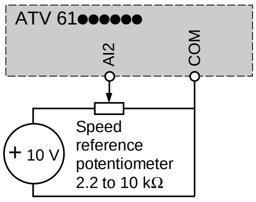

ATV 61●●●●●●
0 V
P 24
0 V
+ 24 V
24 V ⎓ supply

Analog input configured for voltage

External 0…10 V

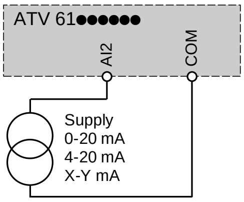

ATV 61●●●●●●
AI2
COM
0…10 V

External + 10 V


ATV 61●●●●●●
AI2
COM
+ 10 V
Speed reference potentiometer 2.2 to 10 kΩ

Analog input configured for current

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


ATV 61●●●●●●
AI2
COM
Supply
0-20 mA
4-20 mA
X-Y mA

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

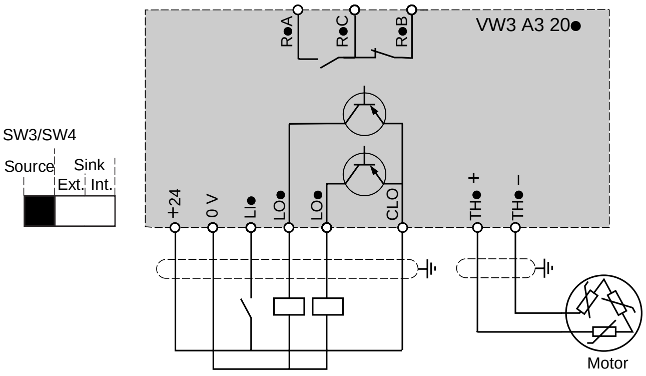
Logic I/O

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

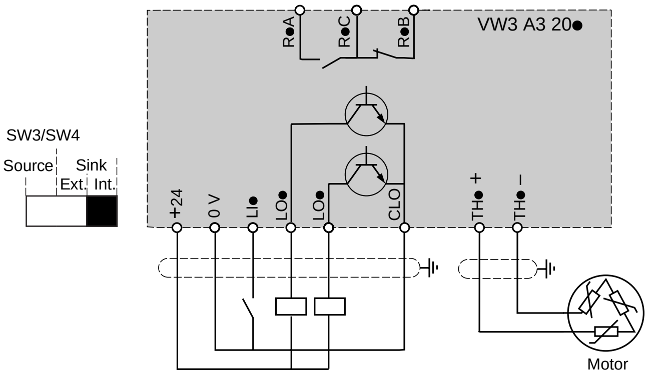
- Set the switch to Source (factory setting) if using PLC outputs with PNP transistors,
- Set the switch to Sink Int or Sink Ext if using PLC outputs with NPN transistors

Internal power supply

Switch in “Source” position

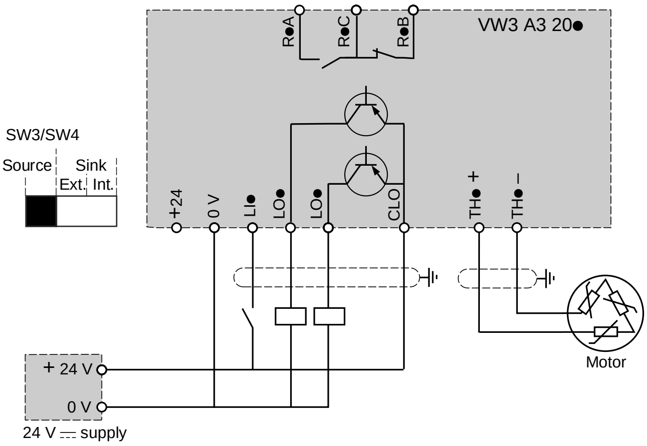

SW3/SW4
Source
Sink
Ext.
Int.
VW3 A3 20●
R●A
R●C
R●B
+24
0 V
LI●
LO●
LO●
CLO
TH● +
TH● –
Motor

Switch in “Sink Int” position

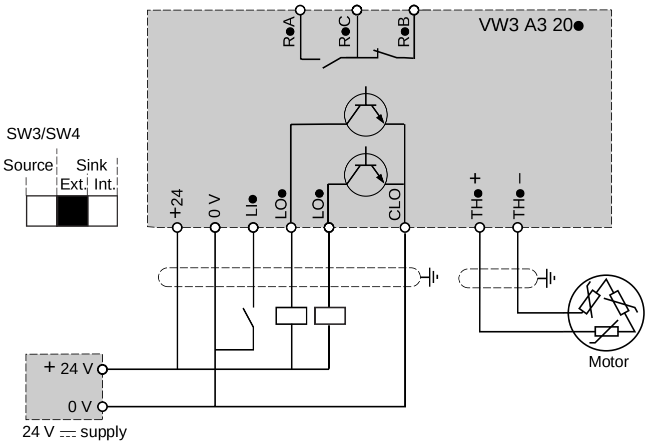

SW3/SW4
Source
Sink
Ext.
Int.
VW3 A3 20●
R●A
R●C
R●B
+24
0 V
LI●
LO●
LO●
CLO
TH● +
TH● –
Motor

External power supply

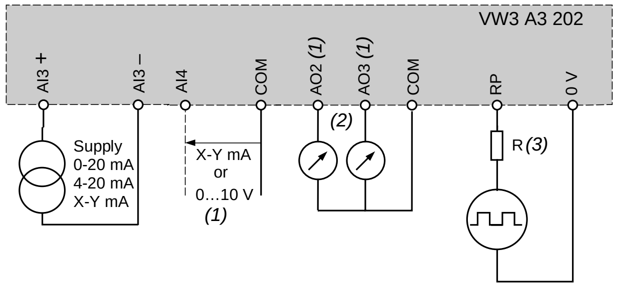
Switch in “Source” position


SW3/SW4
Source
Sink
Ext.
Int.
VW3 A3 20●
R●A
R●C
R●B
+24
0 V
LI●
LO●
LO●
CLO
TH● +
TH● –
Motor
+ 24 V
0 V
24 V ⎓ supply

Switch in “Sink Ext” position


SW3/SW4
Source
Sink
Ext.
Int.
VW3 A3 20●
R●A
R●C
R●B
+24
0 V
LI●
LO●
LO●
CLO
TH● +
TH● –
Motor
+ 24 V
0 V
24 V ⎓ supply

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


VW3 A3 202
AI3 +
AI3 –
AI4
COM
AO2 (1)
AO3 (1)
COM
RP
0 V
Supply
0-20 mA
4-20 mA
X-Y mA
X-Y mA
or
0...10 V
(1)
(2)
R (3)

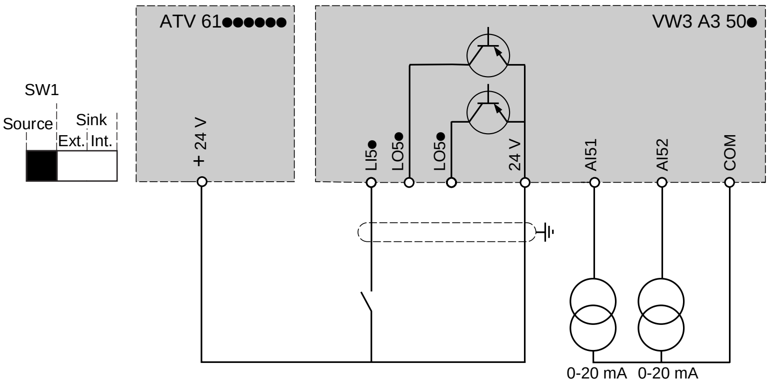
---

(1) Software-configurable current (0-20 mA) or voltage (0…10 V) analog input.
(2) Software-configurable current (0-20 mA) or voltage (± 10 V or 0…10 V) analog outputs, independent selection possible for each output via switch.
(3) R: add a resistor if the input voltage of the pulse train is greater than 5 V.
Recommended values:

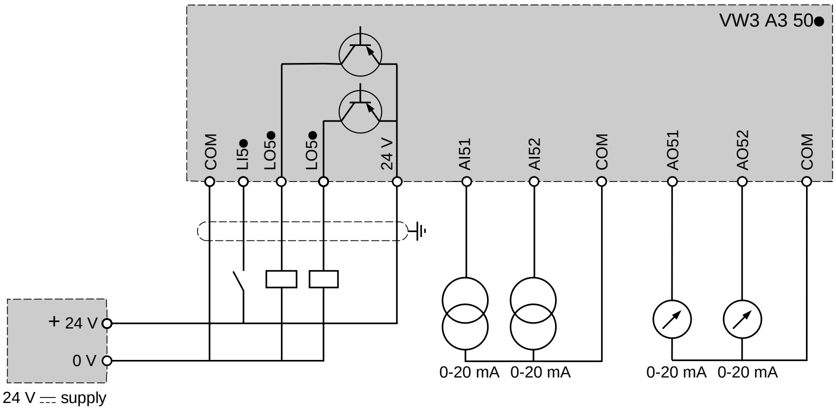
Input voltage V	Resistance Ω
12	510
15	910
24	1300

VW3 A3 502 and VW3 A3 503 multi-pump cards, VW3 A3 501 “Controller Inside” programmable card

Card powered by the drive (1)


SW1
Source
Sink
Ext.
Int.
ATV 61●●●●●●
+ 24 V
VW3 A3 50●
LI5●
LO5●
LO5●
24 V
AI51
AI52
COM
0-20 mA
0-20 mA

Card powered by external power supply

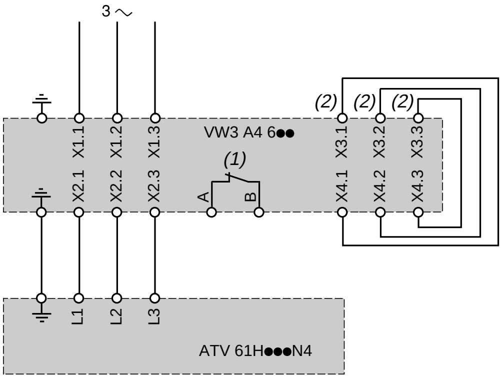

VW3 A3 50●
COM
LI5●
LO5●
LO5●
24 V
AI51
AI52
COM
AO51
AO52
COM
+ 24 V
0 V
24 V ⎓ supply
0-20 mA
0-20 mA
0-20 mA
0-20 mA

---

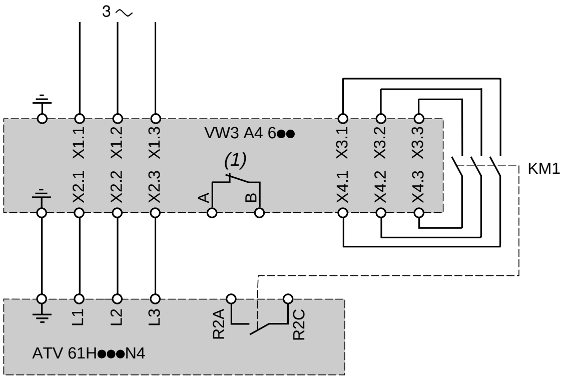
(1) Only if the power consumption is less than 200 mA; otherwise use an external power supply.

VW3 A4 6●● passive filters

Standard scheme


3 ~
(2)
(2)
(2)
X1.1
X1.2
X1.3
VW3 A4 6●●
(1)
A
B
X3.1
X3.2
X3.3
X2.1
X2.2
X2.3
X4.1
X4.2
X4.3
L1
L2
L3
ATV 61H●●●N4

Scheme for filter control by drive depending on load

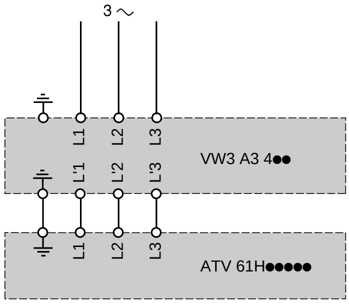

3 ~
X1.1
X1.2
X1.3
VW3 A4 6●●
(1)
A
B
X3.1
X3.2
X3.3
KM1
X2.1
X2.2
X2.3
X4.1
X4.2
X4.3
L1
L2
L3
R2A
R2C
ATV 61H●●●N4

---

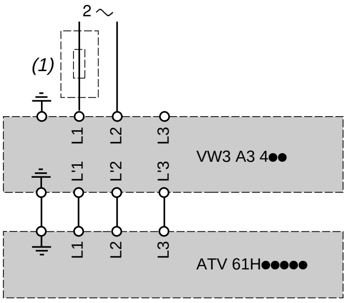
(1) Contact making it possible to show the thermal state of the passive filter
(2) Supplied wired.

VW3 A4 4●● additional EMC input filters

3-phase power supply, 3-phase filter


3 ~
L1
L2
L3
VW3 A3 4●●
L'1
L'2
L'3
L1
L2
L3
ATV 61H●●●●●

Single phase power supply, 3-phase filter

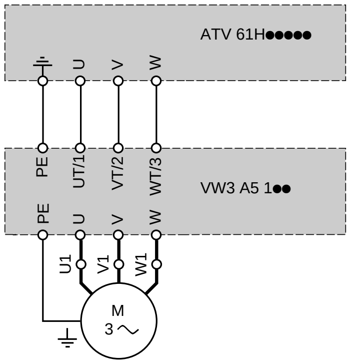

2 ~
(1)
L1
L2
L3
VW3 A3 4●●
L'1
L'2
L'3
L1
L2
L3
ATV 61H●●●●●

---

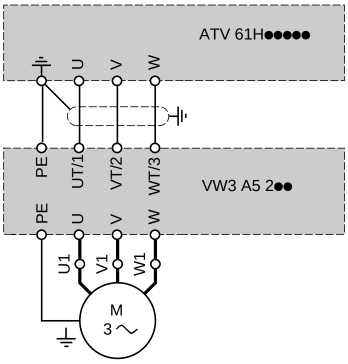
(1) Line choke compulsory for ATV 61HU40M3…HU75M3, see page 68.

Output filters

VW3 A5 1●● motor chokes

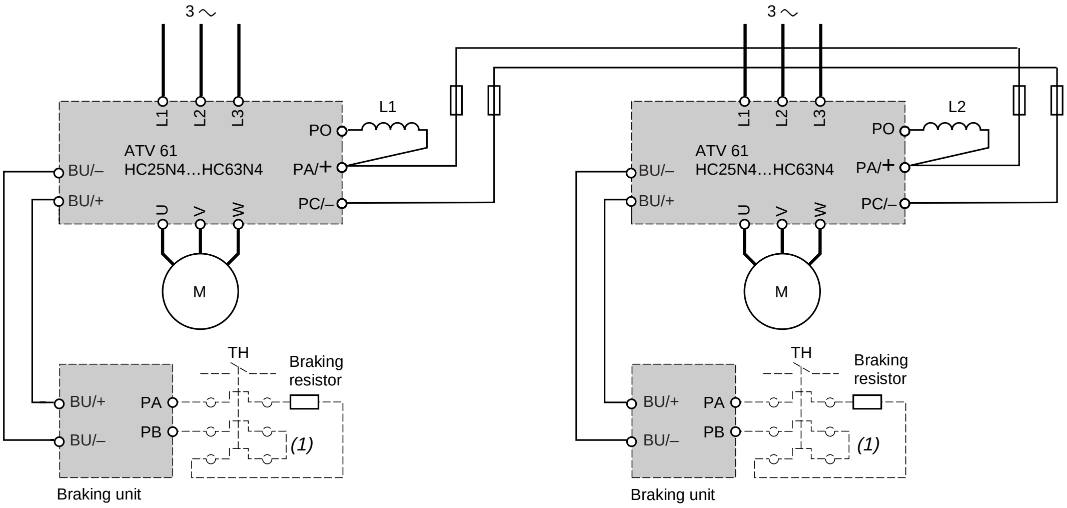

ATV 61H●●●●●
U
V
W
PE
UT/1
VT/2
WT/3
VW3 A5 1●●
PE
U
V
W
U1
V1
W1
M
3 ~

VW3 A5 2●● sinus filters


ATV 61H●●●●●
U
V
W
PE
UT/1
VT/2
WT/3
VW3 A5 2●●
PE
U
V
W
U1
V1
W1
M
3 ~

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

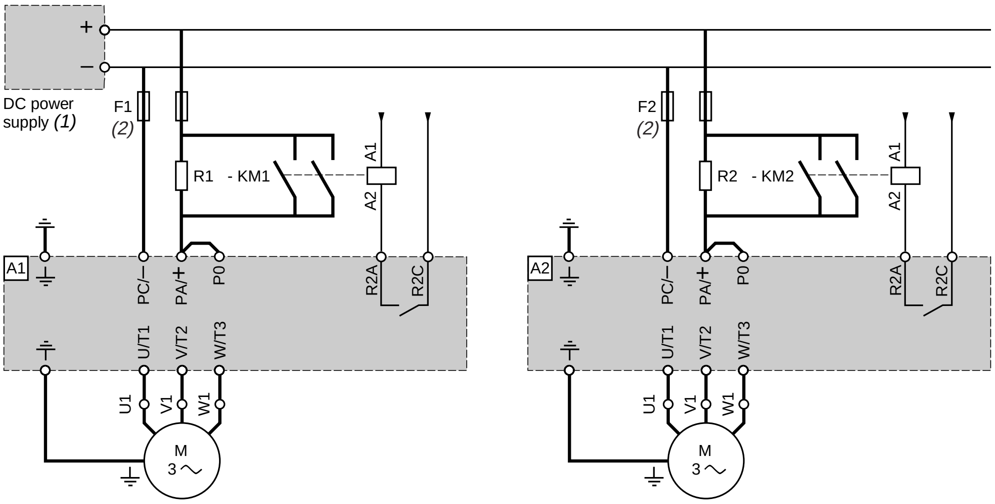
ATV 61HC25N4...HC63N4



(1) Option of using a thermal overload relay.

Drive powered by external DC power supply

ATV 61HD18M3X...HD45M3X, ATV 61HD22N4...HD75N4, ATV 61WD22N4...WD90N4, ATV 61WD22N4C...WD90N4C



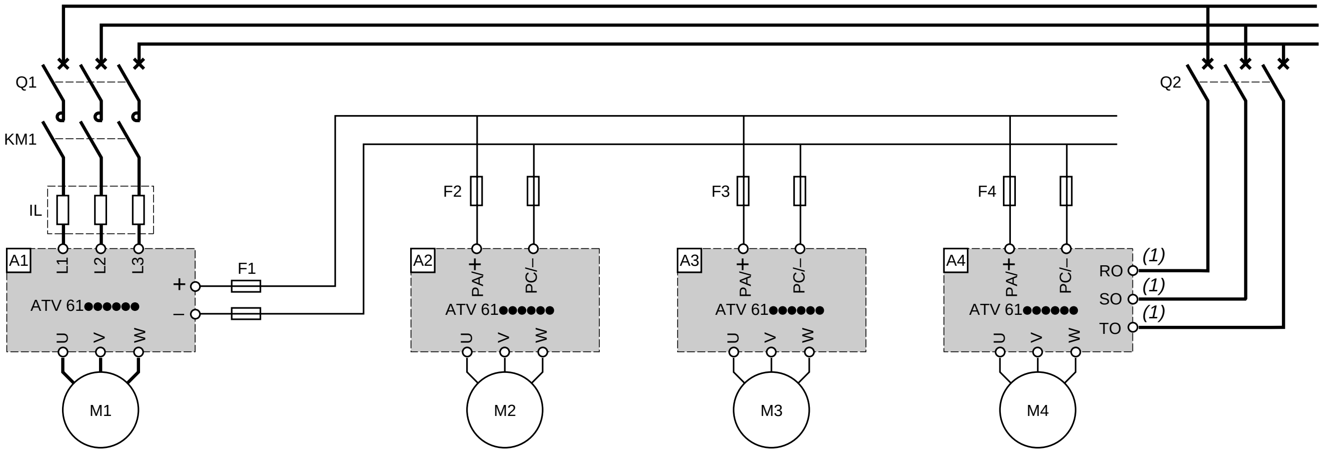
For drives A1, A2	Braking resistors R1, R2 Value	 Reference	Contactors *(3)* KM1, KM2
	Ω		
ATV 61HD18M3X	5	**VW3 A7 707**	**LC1 D32●●**
ATV 61HD22M3X	5	**VW3 A7 707**	**LC1 D40●●**
ATV 61HD30M3X	5	**VW3 A7 707**	**LC1 D65●●**
ATV 61HD37M3X	5	**VW3 A7 707**	**LC1 D80●●**
ATV 61HD45M3X	5	**VW3 A7 707**	**LC1 D80●●**
ATV 61HD22N4, ATV 61WD22N4, WD22N4C	5	**VW3 A7 707**	**LC1 D25●●**
ATV 61HD30N4, ATV 61WD30N4, WD30N4C	5	**VW3 A7 707**	**LC1 D32●●**
ATV 61HD37N4, ATV 61WD37N4, WD37N4C	5	**VW3 A7 707**	**LC1 D38●●**
ATV 61HD45N4, ATV 61WD45N4, WD45N4C	5	**VW3 A7 707**	**LC1 D40●●**
ATV 61HD55N4, ATV 61WD55N4, WD55N4C	5	**VW3 A7 707**	**LC1 D50●●**
ATV 61HD75N4, ATV 61WD75N4, WD75N4C	5	**VW3 A7 707**	**LC1 D80●●**
ATV 61HD90N4, ATV 61WD90N4, WD90N4C	5	**VW3 A7 707**	**LC1 D80●●**

(1) DC power supply not included.
(2) Fast-acting fuses, see page 125. The function of the fuses is to protect the DC bus wiring in the event of a drive short-circuit.
(3) See our "Motor starter solutions. Power control and protection components" specialist catalogue.

Note: *ATV 61H●●●M3, ATV 61HD11M3X, HD15M3X, ATV 61H075N4...HD18N4, ATV 61W075N4...WD18N4 and ATV 61W075N4C...WD18N4C have an integrated pre-charge circuit. This is used to connect the DC power supply directly to the drive without the need for an external pre-charge circuit.*

Connection diagrams for several drives in parallel on the DC bus

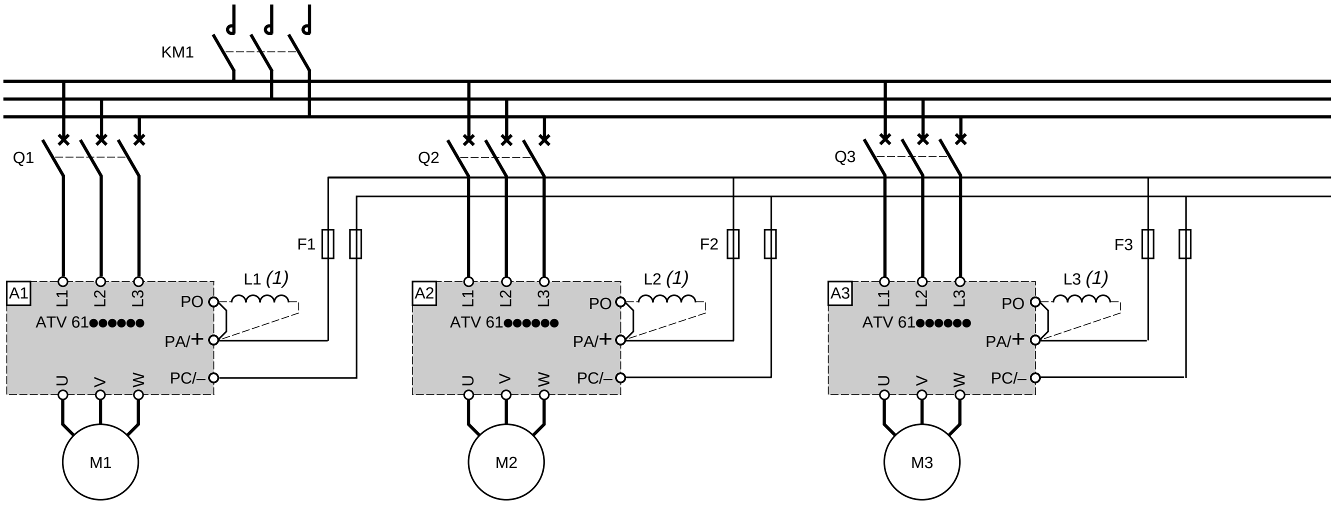
Drives with different ratings



Reference	Description
A1	ATV 61 drive, see pages 18 to 21. Drive power = ∑ motor power ratings M1 + M2 + M3 + M4 +…
A2, A3, A4	ATV 61 drives powered by the DC bus. They must be protected using fast-acting fuses. Contactors on the DC circuit are ineffective as the switching action may cause the fuses to blow owing to the high load current.
F1	Fast-acting fuses, see page 125. Drive A1 powered by the AC supply with an output bus. The function of the fuse is to protect the internal diode bridge in the event of a short-circuit on the external DC bus.
F2, F3, F4	Fast-acting fuses, see page 125. Drives A2 and A3 are powered by their DC bus and are not connected to the AC input. The function of the fuses is to protect the DC bus wiring in the event of a drive short-circuit.

(1) With ATV 61HD90M3X and ATV 61HC11N4…HC63N4 drives, make provision for connection of the fans' power supply.

Drives with equivalent ratings



Reference	Description
A1, A2, A3	ATV 61 drives, see pages 18 to 21. The power difference between the drives connected in parallel must not exceed any rating.
F1, F2, F3	Fast-acting fuses, see page 125. Drives A1, A2 and A3 powered by the AC supply with an output bus. The function of the fuse is to protect the internal diode bridge in the event of a short-circuit on the external DC bus.
KM1	When using a common line contactor, all the Altivar 61 drive load circuits operate in parallel and cannot therefore be overloaded.
L1, L2, L3	DC chokes, see page 65.
Q1, Q2, Q3	Circuit-breakers on the line supply side to protect drives against overloads. Use trip contacts on the "external fault" logic input or the line contactor. The line contactor must only be activated if all three circuit-breakers are closed, as otherwise there is a risk of damage to the drives.

(1) DC chokes compulsory except for ATV 61HD55M3X…HD90M3X and ATV 61HD90N4…HC63N4 (these drives include a DC choke as standard).

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

For drives	**Fast-acting fuses** *(1)*
	A
ATV 61H075M3	10
ATV 61HU15M3, HU22M3	16
ATV 61HU30M3	25
ATV 61HU40M3, HU55M3	40
ATV 61HU75M3	50
ATV 61HD11M3X	80
ATV 61HD15M3X	100
ATV 61HD18M3X	125
ATV 61HD22M3X	160
ATV 61HD30M3X	200
ATV 61HD37M3X	250
ATV 61HD45M3X	315
ATV 61HD55M3X	350
ATV 61HD75M3X	500
ATV 61HD90M3X	630
ATV 61H075N4…HU22N4, ATV 61W075N4…WU22N4, ATV 61W075N4C…WU22N4C	10
ATV 61HU30N4, HU40N4, ATV 61WU30N4, WU40N4, ATV 61WU30N4C, WU40N4C	16
ATV 61HU55N4, ATV 61WU55N4, ATV 61WU55N4C	25
ATV 61HU75N4, HD11N4, ATV 61WU75N4, WD11N4, ATV 61WU75N4C, WD11N4C	40
ATV 61HD15N4…HD22N4, ATV 61WD15N4…WD22N4, ATV 61WD15N4C…WD22N4C	80
ATV 61HD30N4, HD37N4, ATV 61WD30N4, WD37N4, ATV 61WD30N4C, WD37N4C	125
ATV 61HD45N4, ATV 61WD45N4, ATV 61WD45N4C	160
ATV 61HD55N4, ATV 61WD55N4, ATV 61WD55N4C	200
ATV 61HD75N4, HD90N4 ATV 61WD75N4, WD90N4, ATV 61WD75N4C, WD90N4C	315
ATV 61HC11N4	400
ATV 61HC13N4	500
ATV 61HC16N4	550
ATV 61HC22N4	800
ATV 61HC25N4	900
ATV 61HC31N4	1100
ATV 61HC40N4	1400
ATV 61HC50N4	1800
ATV 61HC63N4	2250

(1) Nominal voltage of fast-acting fuse:

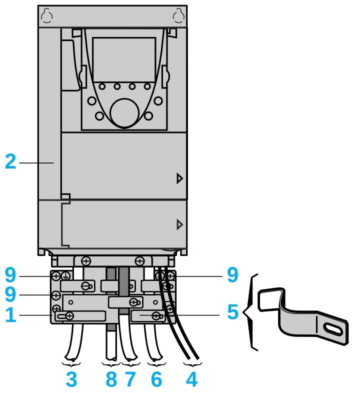
Line voltage	**Nominal voltage of fast-acting fuse**
∼ V	**V**
230	690
400	690
440	800
460	800
480	800

Connections to meet the requirements of EMC standards

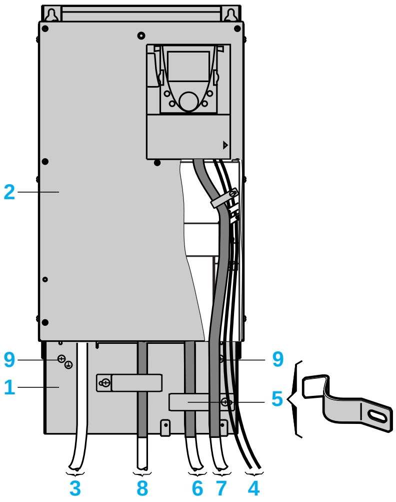
Principle

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

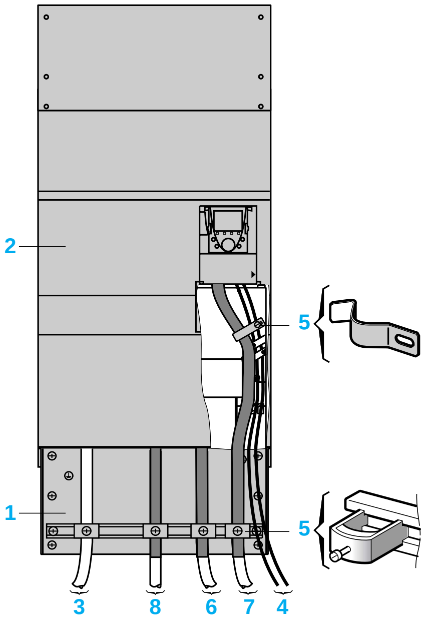
Installation plan for ATV 61H●●●M3, ATV 61H●●●M3X, ATV 61H●●●N4 drives



ATV 61H●●●M3, ATV 61HD11M3X, HD15M3X, ATV 61H075N4…HD18N4



ATV 61HD18M3X…HD45M3X, ATV 61HD22N4…HD75N4



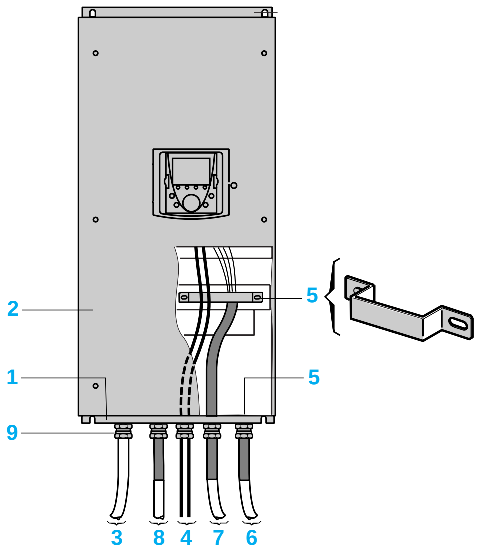
ATV 61HD55M3X…HD90M3X, ATV 61HD90N4…HC63N4

1 Steel plate *(1)*, to be mounted on the drive (machine earth).
2 Altivar 61 UL Type 1/IP 20 drive.
3 Unshielded power supply wires or cable.
4 Unshielded wires for the output of the fault relay contacts.
5 Attach and earth the shielding of cables 6, 7 and 8 as close as possible to the drive:
  - strip the shielding,
  - attach the cable to the plate 1 by attaching the clamp to the stripped part of the shielding.
  The shielding must be clamped tightly enough to the metal plate to ensure good contact.
6 Shielded cable for connecting the motor
7 Shielded cable for connecting the control/signalling wiring.
  For applications requiring several conductors, use cables with a small cross-section (0.5 mm^2).
8 Shielded cable for connecting the braking resistor
  6, 7, 8, the shielding must be earthed at both ends.
  The shielding must be continuous and intermediate terminals must be placed in EMC shielded metal boxes.
9 Earth screw.

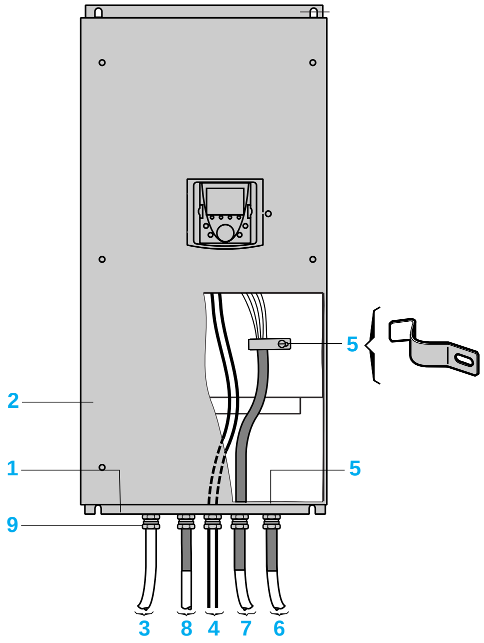
Note: *The HF equipotential ground connection between the drive, motor and cable shielding does not remove the need to connect the PE protective conductors (green-yellow) to the appropriate terminals on each unit.*
If using an additional EMC input filter, it should be mounted beneath the drive and connected directly to the line supply via an unshielded cable. Link 3 on the drive is then via the filter output cable.

---

(1) Plate supplied for ATV 61H●●●M3, ATV 61HD11M3X, HD45M3X and ATV 61H075N4…HD75N4 drives.
For ATV 61HD55M3X... HD90M3X and ATV 61HD90N4…HC31N4 drives, the plate is supplied with the UL Type 1 conformity kit or the IP 21 or IP 31 conformity kit, to be ordered separately, see pages 24 and 25.
For ATV 61HC40N4...HC63N4 drives the plate is supplied with the IP 31 conformity kit, to be ordered separately, see page 25.



ATV 61W075N4…WD30N4,
ATV 61W075N4C…WD30N4C



ATV 61WD37N4…WD90N4,
ATV 61WD37N4C…WD90N4C

Connections to meet the requirements of EMC standards (continued)

Installation plan for ATV 61W●●●N4, ATV 61W●●●N4C drives

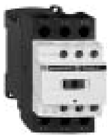
1 Steel plate (machine earth)
2 Altivar 61 UL Type 12/IP 54 drive.
3 Unshielded power supply wires or cable.
4 Unshielded wires for the output of the fault relay contacts.
5 Attach and earth the shielding of cables 6, 7 and 8 as close as possible to the drive:
- strip the shielding,
- Attach the shielded cable to the cable gland 9 ensuring it is fully in contact 360°,
- fold back the shielding and clamp it between the ring and the body of the cable gland.
According to the rating, the cable shielding 7 can be earthed by using a cable gland 5, a clamp 5 or a cable clip 5.
The shielding must be clamped tightly enough to the metal plate to ensure good contact.
6 Shielded cable for connecting the motor
7 Shielded cable for connecting the control/signalling wiring.
For applications requiring several conductors, use cables with a small cross-section (0.5 mm^2).
8 Shielded cable for connecting the braking resistor
6, 7, 8, the shielding must be earthed at both ends.
The shielding must be continuous and intermediate terminals must be placed in EMC shielded metal boxes.
9 Metal cable gland (not supplied) for cables 6, 7 and 8.
Standard cable gland (not supplied) for cables 3 and 4.

Note: *The HF equipotential ground connection between the drive, motor and cable shielding does not remove the need to connect the PE protective conductors (green-yellow) to the appropriate terminals on each unit.*
If using an additional EMC input filter, it should be mounted beneath 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.

Variable speed drives for asynchronous motors

Altivar 61

Motor starters: supply voltage 200…240 V



GV2 L20
+
LC1 D25●●
+
ATV 61HU22M3

Applications

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

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

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

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

Motor starters for UL Type 1/IP 20 drives

Motor		**Drive**	**Circuit-breaker**			**Line contactor**
Power *(1)*		**Reference**	**Reference** *(2)*	**Rating**	**Im**	**Reference** *(3) (4)*
kW	***HP***			**A**	**A**	
Single phase supply voltage: 200…240 V 50/60 Hz. Type 2 coordination						
0.37	*0.5*	**ATV 61H075M3**	**GV2 L14**	10	–	**LC1 D09●●**
0.75	*1*	**ATV 61HU15M3**	**GV2 L16**	14	–	**LC1 D18●●**
1.5	*2*	**ATV 61HU22M3**	**GV2 L20**	18	–	**LC1 D25●●**
2.2	*3*	**ATV 61HU30M3**	**GV2 L32** **NS80HMA50**	32 50	– 300	**LC1 D32●●** **LC1 D32●●**
3	–	**ATV 61HU40M3** *(5)*	**GV2 L32** **NS80HMA50**	32 50	– 300	**LC1 D32●●** **LC1 D32●●**
4	*5*	**ATV 61HU55M3** *(5)*	**NS80HMA50**	50	300	**LC1 D40●●**
5.5	*7.5*	**ATV 61HU75M3** *(5)*	**NS80HMA50**	50	300	**LC1 D50●●**
Single phase supply voltage: 200…240 V 50/60 Hz. Type 1 coordination						
0.37	*0.5*	**ATV 61H075M3**	**GV2 LE14**	10	–	**LC1 K06●●**
0.75	*1*	**ATV 61HU15M3**	**GV2 LE16**	14	–	**LC1 K06●●**
1.5	*2*	**ATV 61HU22M3**	**GV2 LE20**	18	–	**LC1 K06●●**
2.2	*3*	**ATV 61HU30M3**	**GV2 LE32**	32	–	**LC1 D18●●**
3	–	**ATV 61HU40M3** *(5)*	**GV2 LE32**	32	–	**LC1 D18●●**
4	*5*	**ATV 61HU55M3** *(5)*	**NS80HMA50**	50	300	**LC1 D40●●**
5.5	*7.5*	**ATV 61HU75M3** *(5)*	**NS80HMA50**	50	300	**LC1 D40●●**

(1) Standard power ratings for 4-pole motors 230 V 50/60 Hz.
The values expressed in HP comply with the NEC (National Electrical Code).
(2) NS80HMA: product sold under the Merlin Gerin brand.
Breaking capacity of circuit-breakers according to standard IEC 60947-2:

Circuit-breaker	**Icu (kA) for 240 V**
GV2 L14, GV2 L16, **GV2 LE14…GV2 LE20**	100
GV2 L20, GV2 L32, **GV2 LE32**	50
NS80HMA	100

(3) Composition of contactors:
LC1 K06: 3 poles + 1 “N/O” auxiliary contact and 1 “N/C” auxiliary contact.
LC1 D09 to LC1 D50: 3 poles + 1 “N/O” auxiliary contact and 1 “N/C” auxiliary contact.
(4) Replace ●● with the control circuit voltage reference indicated in the table below.

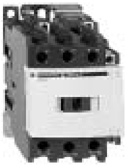
	Volts ∼	**24**	**48**	**110**	**220**	**230**	**240**
LC1 K06	50/60 Hz	**B7**	**E7**	**F7**	**M7**	**P7**	**U7**
LC1 D●●	50 Hz	**B5**	**E5**	**F5**	**M5**	**P5**	**U5**
	60 Hz	**B6**	**E6**	**F6**	**M6**	**–**	**U6**
	50/60 Hz	**B7**	**E7**	**F7**	**M7**	**P7**	**U7**

For other voltages available between 24 V and 660 V, or a DC control circuit, please consult your Regional Sales Office.
(5) A line choke must be added (see page 68).

Variable speed drives for asynchronous motors
Altivar 61
Motor starters: supply voltage 200…240 V

DF534570

DF534571



DF534629

NS80HMA50
+
LC1 D40●●
+
ATV 61HU55M3

Motor starters for UL Type 1/IP 20 drives

Motor Power *(1)*		Drive Reference	Circuit-breaker Reference *(2)*	Rating	Im	Line contactor Reference *(3) (4)*
kW	*HP*			A	A	
3-phase supply voltage: 200…240 V 50/60 Hz. Type 2 coordination						
0.75	*1*	**ATV 61H075M3**	**GV2 L10**	6.3	–	**LC1 D09●●**
1.5	*2*	**ATV 61HU15M3**	**GV2 L16**	14	–	**LC1 D18●●**
2.2	*3*	**ATV 61HU22M3**	**GV2 L20**	18	–	**LC1 D18●●**
3	–	**ATV 61HU30M3**	**GV2 L22**	25	–	**LC1 D25●●**
4	*5*	**ATV 61HU40M3**	**GV2 L32**	32	–	**LC1 D40●●**
5.5	*7.5*	**ATV 61HU55M3**	**NS80HMA50**	50	300	**LC1 D40●●**
7.5	*10*	**ATV 61HU75M3**	**NS80HMA50**	50	300	**LC1 D50●●**
11	*15*	**ATV 61HD11M3X**	**NS80HMA80**	80	480	**LC1 D65●●**
15	*20*	**ATV 61HD15M3X**	**NS80HMA80**	80	480	**LC1 D80●●**
18.5	*25*	**ATV 61HD18M3X**	**NS80HMA80**	80	480	**LC1 D80●●**
22	*30*	**ATV 61HD22M3X**	**NS100●MA100**	100	600	**LC1 D115●●**
30	*40*	**ATV 61HD30M3X**	**NS160●MA150**	150	1350	**LC1 D115●●**
37	*50*	**ATV 61HD37M3X**	**NS160●MA150**	150	1350	**LC1 D150●●**
45	*60*	**ATV 61HD45M3X**	**NS250●MA220**	220	1980	**LC1 F185●●**
55	*75*	**ATV 61HD55M3X**	**NS250●MA220**	220	1980	**LC1 F225●●**
75	*100*	**ATV 61HD75M3X**	**NS400●MA320**	320	1920	**LC1 F265●●**
90	*125*	**ATV 61HD90M3X**	**NS630●MA500**	500	3000	**LC1 F330●●**
3-phase supply voltage: 200…240 V 50/60 Hz. Type 1 coordination						
0.75	*1*	**ATV 61H075M3**	**GV2 LE10**	6.3	–	**LC1 K06●●**
1.5	*2*	**ATV 61HU15M3**	**GV2 LE16**	14	–	**LC1 K06●●**
2.2	*3*	**ATV 61HU22M3**	**GV2 LE20**	18	–	**LC1 K06●●**
3	–	**ATV 61HU30M3**	**GV2 LE22**	25	–	**LC1 K06●●**
4	*5*	**ATV 61HU40M3**	**GV2 LE32**	32	–	**LC1 D18●●**
5.5	*7.5*	**ATV 61HU55M3**	**NS80HMA50**	50	300	**LC1 D25●●**
7.5	*10*	**ATV 61HU75M3**	**NS80HMA50**	50	300	**LC1 D32●●**
11	*15*	**ATV 61HD11M3X**	**NS80HMA80**	80	480	**LC1 D40●●**
15	*20*	**ATV 61HD15M3X**	**NS80HMA80**	80	480	**LC1 D50●●**
18.5	*25*	**ATV 61HD18M3X**	**NS80HMA80**	80	480	**LC1 D50●●**
22	*30*	**ATV 61HD22M3X**	**NS100●MA100**	100	600	**LC1 D80●●**
30	*40*	**ATV 61HD30M3X**	**NS160●MA150**	150	1350	**LC1 D80●●**
37	*50*	**ATV 61HD37M3X**	**NS160●MA150**	150	1350	**LC1 D115●●**
45	*60*	**ATV 61HD45M3X**	**NS250●MA220**	220	1320	**LC1 D115●●**
55	*75*	**ATV 61HD55M3X**	**NS250●MA220**	220	1980	**LC1 D115●●**
75	*100*	**ATV 61HD75M3X**	**NS400●MA320**	320	1920	**LC1 F185●●**
90	*125*	**ATV 61HD90M3X**	**NS630●MA500**	500	3000	**LC1 F265●●**

(1) Standard power ratings for 4-pole motors 230 V 50/60 Hz.
The values expressed in HP comply with the NEC (National Electrical Code).
(2) NS80HMA●●, NS●●●●MA : products sold under the Merlin Gerin brand.
Breaking capacity of circuit-breakers according to standard IEC 60947-2:

Circuit-breaker	Icu (kA) for 240 V			
		N	H	L
GV2 L10, GV2 L16, GV2 L20, **GV2 LE10, GV2 LE16, GV2 LE20**	100	–	–	–
GV2 L22, GV2 L32, **GV2 LE22, GV2 LE32**	50	–	–	–
NS80HMA	100	–	–	–
NS●●●●MA	–	85	100	150

(3) Composition of contactors:
LC1 K06: 3 poles + 1 "N/O" auxiliary contact and 1 "N/C" auxiliary contact.
LC1 D09 to LC1 D150: 3 poles + 1 "N/O" auxiliary contact and 1 "N/C" auxiliary contact.
LC1 F●●●: 3 poles. To add auxiliary contacts or other accessories, please consult our specialist catalogue "Motor-starter solutions. Control and protection components".
(4) Replace ●● with the control circuit voltage reference indicated in the table below.

	Volts ∿	24	48	110	220	230	240
LC1 K06	50/60 Hz	**B7**	**E7**	**F7**	**M7**	**P7**	**U7**
LC1 D09…D150	50 Hz	**B5**	**E5**	**F5**	**M5**	**P5**	**U5**
	60 Hz	**B6**	**E6**	**F6**	**M6**	**–**	**U6**
	50/60 Hz	**B7**	**E7**	**F7**	**M7**	**P7**	**U7**
LC1 F185, F225	50 Hz (LX1 coil)	**B5**	**E5**	**F5**	**M5**	**P5**	**U5**
	60 Hz (LX1 coil)	**–**	**E6**	**F6**	**M6**	**–**	**U6**
	40…400 Hz (LX9 coil)	**–**	**E7**	**F7**	**M7**	**P7**	**U7**
LC1 F265, LC1 F330	40…400 Hz (LX1 coil)	**B7**	**E7**	**F7**	**M7**	**P7**	**U7**

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

Variable speed drives for asynchronous motors
Altivar 61
Motor starters: supply voltage 380…415 V

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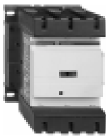
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NS160●MA150
+
LC1 D115●●
+
ATV 61HD55N4

Motor starters for UL Type 1/IP 20 drives

Motor		Drive	Circuit-breaker			Line contactor
Power *(1)*		Reference	Reference *(2)*	Rating	Im	Reference *(3) (4)*
kW	*HP*			A	A	
3-phase supply voltage: 380…415 V 50/60 Hz. Type 2 coordination						
0.75	*1*	**ATV 61H075N4**	**GV2 L08**	4	–	**LC1 D09●●**
1.5	*2*	**ATV 61HU15N4**	**GV2 L10**	6.3	–	**LC1 D09●●**
2.2	*3*	**ATV 61HU22N4**	**GV2 L14**	10	–	**LC1 D09●●**
3	*–*	**ATV 61HU30N4**	**GV2 L16**	14	–	**LC1 D18●●**
4	*5*	**ATV 61HU40N4**	**GV2 L16**	14	–	**LC1 D18●●**
5.5	*7.5*	**ATV 61HU55N4**	**GV2 L22**	25	–	**LC1 D25●●**
7.5	*10*	**ATV 61HU75N4**	**GV2 L32** **NS80HMA50**	32 50	– 300	**LC1 D32●●** **LC1 D32●●**
11	*15*	**ATV 61HD11N4**	**NS80HMA50**	50	300	**LC1 D40●●**
15	*20*	**ATV 61HD15N4**	**NS80HMA50**	50	300	**LC1 D50●●**
18.5	*25*	**ATV 61HD18N4**	**NS80HMA50**	50	300	**LC1 D50●●**
22	*30*	**ATV 61HD22N4**	**NS80HMA80**	80	480	**LC1 D50●●**
30	*40*	**ATV 61HD30N4**	**NS80HMA80**	80	480	**LC1 D65●●**
37	*50*	**ATV 61HD37N4**	**NS80HMA80**	80	480	**LC1 D80●●**
45	*60*	**ATV 61HD45N4**	**NS100●MA100**	100	600	**LC1 D115●●**
55	*75*	**ATV 61HD55N4**	**NS160●MA150**	150	1350	**LC1 D115●●**
75	*100*	**ATV 61HD75N4**	**NS250●MA220**	220	1980	**LC1 F185●●**
90	*125*	**ATV 61HD90N4**	**NS250●MA220**	220	1980	**LC1 F185●●**
110	*150*	**ATV 61HC11N4**	**NS250●MA220**	220	1980	**LC1 F225●●**
132	*200*	**ATV 61HC13N4**	**NS250●MA220**	220	1980	**LC1 F265●●**
160	*250*	**ATV 61HC16N4**	**NS400●MA320**	320	1920	**LC1 F330●●**
200	*300*	**ATV 61HC22N4**	**NS630●MA500**	500	3000	**LC1 F400●●**
220	*350*	**ATV 61HC22N4**	**NS630●MA500**	500	3000	**LC1 F400●●**
250	*400*	**ATV 61HC25N4**	**NS630●MA500**	500	3000	**LC1 F500●●**
280	*450*	**ATV 61HC31N4**	**NS630●MA500**	500	3000	**LC1 F500●●**
315	*500*	**ATV 61HC31N4**	**NS800L Micrologic 2 or 5 (LR OFF)**	800	1600	**LC1 F630●●**
355	*–*	**ATV 61HC40N4**	**NS800L Micrologic 2 or 5 (LR OFF)**	800	1600	**LC1 F630●●**
400	*600*	**ATV 61HC40N4**	**NS800L Micrologic 2 or 5 (LR OFF)**	800	1600	**LC1 F630●●**
500	*700*	**ATV 61HC50N4**	**NS1000L Micrologic 2 or 5 (LR OFF)**	1000	2000	**LC1 F630●●**
560	*800*	**ATV 61HC63N4**	**NS1000L Micrologic 2 or 5 (LR OFF)**	1000	2000	**LC1 F780●●**

(1) Standard power ratings for 4-pole motors 400 V 50/60 Hz.
The values expressed in HP comply with the NEC (National Electrical Code).

(2) NS80HMA●●, NS●●●●: products sold under the Merlin Gerin brand.
For references to be completed, replace the dot with the letter corresponding to the circuit-breaker breaking performance (N, H, L).
Breaking capacity of circuit-breakers according to standard IEC 60947-2:

Circuit-breaker	Icu (kA) for 400 V			
		N	H	L
GV2 L08…L14	100	–	–	–
GV2 L16…L32	50	–	–	–
NS80HMA	70	–	–	–
NS100●MA	–	25	70	150
NS160●MA, NS250●MA	–	36	70	150
NS400●MA, NS630●MA	–	45	70	150
NS800L Micrologic 2 or 5, **NS1000L Micrologic 2 or 5**	–	–	–	150

(3) Composition of contactors:
LC1 D09 to LC1 D115: 3 poles + 1 "N/O" auxiliary contact and 1 "N/C" auxiliary contact.
LC1 F●●●: 3 poles. To add auxiliary contacts or other accessories, please consult our specialist catalogue "Motor-starter solutions. Control and protection components".

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

	Volts ∿	24	48	110	220	230	240
LC1 D09…D115	50 Hz	**B5**	**E5**	**F5**	**M5**	**P5**	**U5**
	60 Hz	**B6**	**E6**	**F6**	**M6**	**–**	**U6**
	50/60 Hz	**B7**	**E7**	**F7**	**M7**	**P7**	**U7**
LC1 F185, F225	50 Hz (LX1 coil)	**B5**	**E5**	**F5**	**M5**	**P5**	**U5**
	60 Hz (LX1 coil)	**–**	**E6**	**F6**	**M6**	**–**	**U6**
	40…400 Hz (LX9 coil)	**–**	**E7**	**F7**	**M7**	**P7**	**U7**
LC1 F265, F330	40…400 Hz (LX1 coil)	**B7**	**E7**	**F7**	**M7**	**P7**	**U7**
LC1 F400…F630	40…400 Hz (LX1 coil)	**–**	**E7**	**F7**	**M7**	**P7**	**U7**
LC1 F780	40…400 Hz (LX1 coil)	**–**	**–**	**F7**	**P7**	**P7**	**P7**

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

Variable speed drives for asynchronous motors
Altivar 61
Motor starters: supply voltage 380…415 V

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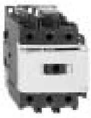

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NS160●MA150
+
LC1 D80●●
+
ATV 61HD55N4

Motor starters for UL Type 1/IP 20 drives

Motor Power *(1)* kW	*HP*	Drive Reference	Circuit-breaker Reference *(2)*	Rating A	Im A	Line contactor Reference *(3) (4)*
3-phase supply voltage: 380…415 V 50/60 Hz. Type 1 coordination						
0.75	*1*	**ATV 61H075N4**	**GV2 LE08**	4	–	**LC1 K06●●**
1.5	*2*	**ATV 61HU15N4**	**GV2 LE10**	6.3	–	**LC1 K06●●**
2.2	*3*	**ATV 61HU22N4**	**GV2 LE14**	10	–	**LC1 K06●●**
3	–	**ATV 61HU30N4**	**GV2 LE16**	14	–	**LC1 K06●●**
4	*5*	**ATV 61HU40N4**	**GV2 LE16**	14	–	**LC1 K06●●**
5.5	*7.5*	**ATV 61HU55N4**	**GV2 LE22**	25	–	**LC1 D09●●**
7.5	*10*	**ATV 61HU75N4**	**GV2 LE32**	32	–	**LC1 D18●●**
11	*15*	**ATV 61HD11N4**	**NS80HMA50**	50	300	**LC1 D25●●**
15	*20*	**ATV 61HD15N4**	**NS80HMA50**	50	300	**LC1 D32●●**
18.5	*25*	**ATV 61HD18N4**	**NS80HMA50**	50	300	**LC1 D32●●**
22	*30*	**ATV 61HD22N4**	**NS80HMA80**	50	300	**LC1 D32●●**
30	*40*	**ATV 61HD30N4**	**NS80HMA80**	80	480	**LC1 D50●●**
37	*50*	**ATV 61HD37N4**	**NS80HMA80**	80	480	**LC1 D80●●**
45	*60*	**ATV 61HD45N4**	**NS100●MA100**	100	600	**LC1 D80●●**
55	*75*	**ATV 61HD55N4**	**NS160●MA150**	150	1350	**LC1 D80●●**
75	*100*	**ATV 61HD75N4**	**NS250●MA220**	220	1980	**LC1 D115●●**
90	*125*	**ATV 61HD90N4**	**NS250●MA220**	220	1980	**LC1 D115●●**
110	*150*	**ATV 61HC11N4**	**NS250●MA220**	220	1980	**LC1 F150●●**
132	*200*	**ATV 61HC13N4**	**NS250●MA220**	220	1980	**LC1 F150●●**
160	*250*	**ATV 61HC16N4**	**NS400●MA320**	320	1920	**LC1 F225●●**
200	*300*	**ATV 61HC22N4**	**NS630●MA500**	500	3000	**LC1 F330●●**
220	*350*	**ATV 61HC22N4**	**NS630●MA500**	500	3000	**LC1 F330●●**
250	*400*	**ATV 61HC25N4**	**NS630●MA500**	500	3000	**LC1 F400●●**
280	*450*	**ATV 61HC31N4**	**NS630●MA500**	500	3000	**LC1 F400●●**
315	*500*	**ATV 61HC31N4**	**NS800 Micrologic 2 or 5 (LR OFF)**	800	1600	**LC1 F500●●**
355	–	**ATV 61HC40N4**	**NS800 Micrologic 2 or 5 (LR OFF)**	800	1600	**LC1 F500●●**
400	*600*	**ATV 61HC40N4**	**NS800 Micrologic 2 or 5 (LR OFF)**	800	1600	**LC1 F630●●**
500	*700*	**ATV 61HC50N4**	**NS1000 Micrologic 2 or 5 (LR OFF)**	1000	2000	**LC1 F630●●**
560	*800*	**ATV 61HC63N4**	**NS1000 Micrologic 2 or 5 (LR OFF)**	1000	2000	**LC1 F630●●**
630	*900*	**ATV 61HC63N4**	**NS1250 Micrologic 2 or 5 (LR OFF)**	1000	2000	**LC1 F630S011**

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(1) Standard power ratings for 4-pole motors 400 V 50/60 Hz.
The values expressed in HP comply with the NEC (National Electrical Code).

(2) NS80HMA●●, NS●●●●: products sold under the Merlin Gerin brand.
For references to be completed, replace the dot with the letter corresponding to the circuit-breaker breaking performance (N, H, L).
Breaking capacity of circuit-breakers according to standard IEC 60947-2:

Circuit-breaker	Icu (kA) for 400 V	N	H	L
GV2 LE08…LE22	15	–	–	–
GV2 LE32	10	–	–	–
NS80HMA	70	–	–	–
NS100●MA	–	25	70	150
NS160●MA, NS250●MA	–	36	70	150
NS400●MA, NS630●MA	–	45	70	150
NS800 Micrologic 2 or 5, **NS1000 Micrologic 2 or 5,** **NS1250 Micrologic 2 or 5**	–	50	70	–

(3) Composition of contactors:
LC1 K06, LC1 D09 to LC1 D115: 3 poles + 1 "N/O" auxiliary contact and 1 "N/C" auxiliary contact.
LC1 F●●●: 3 poles. To add auxiliary contacts or other accessories, please consult our specialist catalogue "Motor-starter solutions. Control and protection components".

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

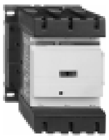
	Volts ∿	24	48	110	220	230	240
LC1 K06	50/60 Hz	**B7**	**E7**	**F7**	**M7**	**P7**	**U7**
LC1 D09…D115	50 Hz	**B5**	**E5**	**F5**	**M5**	**P5**	**U5**
	60 Hz	**B6**	**E6**	**F6**	**M6**	**–**	**U6**
	50/60 Hz	**B7**	**E7**	**F7**	**M7**	**P7**	**U7**
LC1 F150, F225	50 Hz (LX1 coil)	**B5**	**E5**	**F5**	**M5**	**P5**	**U5**
	60 Hz (LX1 coil)	**–**	**E6**	**F6**	**M6**	**–**	**U6**
	40…400 Hz (LX9 coil)	**–**	**E7**	**F7**	**M7**	**P7**	**U7**
LC1 F330	40…400 Hz (LX1 coil)	**B7**	**E7**	**F7**	**M7**	**P7**	**U7**
LC1 F400…F630	40…400 Hz (LX1 coil)	**–**	**E7**	**F7**	**M7**	**P7**	**U7**

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

Variable speed drives for asynchronous motors

Altivar 61

Motor starters: supply voltage 380…415 V



NS160●MA150
+
LC1 D115●●
+
ATV 61WD55N4

Motor starters for UL Type 12/IP 54 drives

Motor		Drive	Circuit-breaker			Line contactor
Power *(1)*		Reference	Reference *(2)*	Rating	Im	Reference *(3) (4)*
kW	*HP*			A	A	
3-phase supply voltage: 380…415 V 50/60 Hz Type 2 coordination						
0.75	*1*	**ATV 61W075N4** **ATV 61W075N4C**	**GV2 L07**	2.5	–	**LC1 D09●●**
1.5	*2*	**ATV 61WU15N4** **ATV 61WU15N4C**	**GV2 L08**	4	–	**LC1 D09●●**
2.2	*3*	**ATV 61WU22N4** **ATV 61WU22N4C**	**GV2 L10**	6.3	–	**LC1 D09●●**
3	–	**ATV 61WU30N4** **ATV 61WU30N4C**	**GV2 L14**	10	–	**LC1 D09●●**
4	*5*	**ATV 61WU40N4** **ATV 61WU40N4C**	**GV2 L14**	10	–	**LC1 D09●●**
5.5	*7.5*	**ATV 61WU55N4** **ATV 61WU55N4C**	**GV2 L16**	14	–	**LC1 D18●●**
7.5	*10*	**ATV 61WU75N4** **ATV 61WU75N4C**	**GV2 L20**	18	–	**LC1 D18●●**
11	*15*	**ATV 61WD11N4** **ATV 61WD11N4C**	**GV2 L22**	25	–	**LC1 D25●●**
15	*20*	**ATV 61WD15N4** **ATV 61WD15N4C**	**GV2 L32**	32	–	**LC1 D40●●**
18.5	*25*	**ATV 61WD18N4** **ATV 61WD18N4C**	**NS80HMA50**	50	300	**LC1 D40●●**
22	*30*	**ATV 61WD22N4** **ATV 61WD22N4C**	**NS80HMA50**	50	300	**LC1 D50●●**
30	*40*	**ATV 61WD30N4** **ATV 61WD30N4C**	**NS80HMA80**	80	480	**LC1 D65●●**
37	*50*	**ATV 61WD37N4** **ATV 61WD37N4C**	**NS80HMA80**	80	480	**LC1 D80●●**
45	*60*	**ATV 61WD45N4** **ATV 61WD45N4C**	**NS100●MA100**	100	600	**LC1 D80●●**
55	*75*	**ATV 61WD55N4** **ATV 61WD55N4C**	**NS160●MA150**	150	1350	**LC1 D115●●**
75	*100*	**ATV 61WD75N4** **ATV 61WD75N4C**	**NS160●MA150**	150	1350	**LC1 D115●●**
90	*125*	**ATV 61WD90N4** **ATV 61WD90N4C**	**NS250●MA220**	220	1980	**LC1 F185●●**

(1) Standard power ratings for 4-pole motors 400 V 50/60 Hz.
The values expressed in HP comply with the NEC (National Electrical Code).

(2) NS80HMA●●, NS●●●●: products sold under the Merlin Gerin brand.
For references to be completed, replace the dot with the letter corresponding to the circuit-breaker breaking performance (N, H, L).
Breaking capacity of circuit-breakers according to standard IEC 60947-2:

Circuit-breaker	Icu (kA) for 400 V			
		N	H	L
GV2 L07…L14	100	–	–	–
GV2 L16…L32	50	–	–	–
NS80HMA	70	–	–	–
NS100●MA	–	25	70	150
NS160●MA, NS250●MA	–	36	70	150

(3) Composition of contactors:
LC1 D09 to LC1 D115: 3 poles + 1 "N/O" auxiliary contact and 1 "N/C" auxiliary contact.
LC1 F185: 3 poles. To add auxiliary contacts or other accessories, please consult our specialist catalogue "Motor-starter solutions. Control and protection components".

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

	Volts ∿	24	48	110	220	230	240
LC1 D09…D115	50 Hz	**B5**	**E5**	**F5**	**M5**	**P5**	**U5**
	60 Hz	**B6**	**E6**	**F6**	**M6**	**–**	**U6**
	50/60 Hz	**B7**	**E7**	**F7**	**M7**	**P7**	**U7**
LC1 F185	50 Hz (LX1 coil)	**B5**	**E5**	**F5**	**M5**	**P5**	**U5**
	60 Hz (LX1 coil)	**–**	**E6**	**F6**	**M6**	**–**	**U6**
	40…400 Hz (LX9 coil)	**–**	**E7**	**F7**	**M7**	**P7**	**U7**

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

Combinations for customer assembly
(continued)

Variable speed drives for asynchronous motors

Altivar 61

Motor starters: supply voltage 380…415 V

NS160●MA150
+
LC1 D115●●
+
ATV 61WD75N4

Motor starters for UL Type 12/IP 54 drives

Motor Power *(1)* kW	 *HP*	Drive Reference	Circuit-breaker Reference *(2)*	 Rating A	 Im A	Line contactor Reference *(3) (4)*
3-phase supply voltage: 380…415 V 50/60 Hz Type 1 coordination						
0.75	*1*	**ATV 61W075N4** **ATV 61W075N4C**	**GV2 LE07**	2.5	–	**LC1 K06●●**
1.5	*2*	**ATV 61WU15N4** **ATV 61WU15N4C**	**GV2 LE08**	4	–	**LC1 K06●●**
2.2	*3*	**ATV 61WU22N4** **ATV 61WU22N4C**	**GV2 LE10**	6.3	–	**LC1 K06●●**
3	–	**ATV 61WU30N4** **ATV 61WU30N4C**	**GV2 LE14**	10	–	**LC1 K06●●**
4	*5*	**ATV 61WU40N4** **ATV 61WU40N4C**	**GV2 LE14**	10	–	**LC1 K06●●**
5.5	*7.5*	**ATV 61WU55N4** **ATV 61WU55N4C**	**GV2 LE16**	14	–	**LC1 K06●●**
7.5	*10*	**ATV 61WU75N4** **ATV 61WU75N4C**	**GV2 LE20**	18	–	**LC1 K06●●**
11	*15*	**ATV 61WD11N4** **ATV 61WD11N4C**	**GV2 LE22**	25	–	**LC1 D09●●**
15	*20*	**ATV 61WD15N4** **ATV 61WD15N4C**	**GV2 LE32**	32	–	**LC1 D18●●**
18.5	*25*	**ATV 61WD18N4** **ATV 61WD18N4C**	**NS80HMA50**	50	300	**LC1 D25●●**
22	*30*	**ATV 61WD22N4** **ATV 61WD22N4C**	**NS80HMA50**	50	300	**LC1 D32●●**
30	*40*	**ATV 61WD30N4** **ATV 61WD30N4C**	**NS80HMA80**	80	480	**LC1 D40●●**
37	*50*	**ATV 61WD37N4** **ATV 61WD37N4C**	**NS80HMA80**	80	480	**LC1 D50●●**
45	*60*	**ATV 61WD45N4** **ATV 61WD45N4C**	**NS100●MA100**	100	600	**LC1 D80●●**
55	*75*	**ATV 61WD55N4** **ATV 61WD55N4C**	**NS160●MA150**	150	1350	**LC1 D80●●**
75	*100*	**ATV 61WD75N4** **ATV 61WD75N4C**	**NS160●MA150**	150	1350	**LC1 D115●●**
90	*125*	**ATV 61WD90N4** **ATV 61WD90N4C**	**NS250●MA220**	220	1980	**LC1 D115●●**

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

Circuit-breaker	Icu (kA) for 400 V			
		N	H	L
GV2 LE07…LE14	100	–	–	–
GV2 LE16…LE22	15	–	–	–
GV2 LE32	10			
NS80HMA	70	–	–	–
NS100●MA	–	25	70	150
NS160●MA, NS250●MA	–	36	70	150

(3) Composition of contactors:
LC1 K06: 3 poles + 1 "N/O" auxiliary contact and 1 "N/C" auxiliary contact.
LC1 D09 to LC1 D115: 3 poles + 1 "N/O" auxiliary contact and 1 "N/C" auxiliary contact.
Replace ●● with the control circuit voltage reference indicated in the table below.

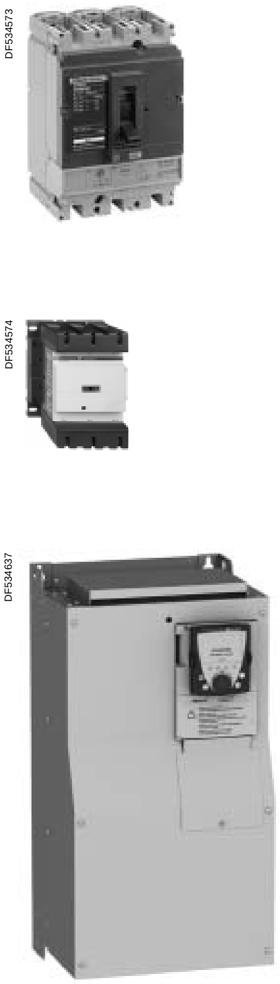
	Volts ∼	24	48	110	220	230	240
LC1 K06	50/60 Hz	**B7**	**E7**	**F7**	**M7**	**P7**	**U7**
LC1 D09…D115	50 Hz	**B5**	**E5**	**F5**	**M5**	**P5**	**U5**
	60 Hz	**B6**	**E6**	**F6**	**M6**	**–**	**U6**
	50/60 Hz	**B7**	**E7**	**F7**	**M7**	**P7**	**U7**

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

Variable speed drives for asynchronous motors

Altivar 61

Motor starters: supply voltage 440…480 V



NS160●MA150
+
LC1 D115●●
+
ATV 61HD75N4

Motor starters for UL Type 1/IP 20 drives

Motor		Drive	Circuit-breaker			Line contactor
Power *(1)*		Reference	Reference *(2)*	Rating	Im	Reference *(3) (4)*
kW	*HP*			A	A	
3-phase supply voltage: 440…480 V 50/60 Hz. Type 2 coordination						
0.75	*1*	**ATV 61H075N4**	**GV2 L08**	4	–	**LC1 D09●●**
1.5	*2*	**ATV 61HU15N4**	**GV2 L10**	6.3	–	**LC1 D09●●**
2.2	*3*	**ATV 61HU22N4**	**GV2 L14**	10	–	**LC1 D09●●**
3	–	**ATV 61HU30N4**	**GV2 L14**	10	–	**LC1 D09●●**
4	*5*	**ATV 61HU40N4**	**GV2 L16**	14	–	**LC1 D18●●**
5.5	*7.5*	**ATV 61HU55N4**	**GV2 L20**	18	–	**LC1 D18●●**
7.5	*10*	**ATV 61HU75N4**	**GV2 L22**	25	–	**LC1 D25●●**
11	*15*	**ATV 61HD11N4**	**GV2 L32** **NS80HMA50**	32 50	– 300	**LC1 D32●●** **LC1 D40●●**
15	*20*	**ATV 61HD15N4**	**NS80HMA50**	50	300	**LC1 D40●●**
18.5	*25*	**ATV 61HD18N4**	**NS80HMA50**	50	300	**LC1 D40●●**
22	*30*	**ATV 61HD22N4**	**NS80HMA50**	50	300	**LC1 D50●●**
30	*40*	**ATV 61HD30N4**	**NS80HMA80**	80	480	**LC1 D65●●**
37	*50*	**ATV 61HD37N4**	**NS80HMA80**	80	480	**LC1 D80●●**
45	*60*	**ATV 61HD45N4**	**NS100HMA100**	100	600	**LC1 D115●●**
55	*75*	**ATV 61HD55N4**	**NS100HMA100**	100	600	**LC1 D115●●**
75	*100*	**ATV 61HD75N4**	**NS160●MA150**	150	1350	**LC1 D115●●**
90	*125*	**ATV 61HD90N4**	**NS160●MA150**	150	1350	**LC1 D115●●**
110	*150*	**ATV 61HC11N4**	**NS250●MA220**	220	1980	**LC1 F185●●**
132	*200*	**ATV 61HC13N4**	**NS250●MA220**	220	1980	**LC1 F265●●**
160	*250*	**ATV 61HC16N4**	**NS400●MA320**	320	1920	**LC1 F330●●**
200	*300*	**ATV 61HC22N4**	**NS630●MA500**	500	3000	**LC1 F330●●**
220	*350*	**ATV 61HC22N4**	**NS630●MA500**	500	3000	**LC1 F400●●**
250	*400*	**ATV 61HC25N4**	**NS630●MA500**	500	3000	**LC1 F500●●**
280	*450*	**ATV 61HC31N4**	**NS630●MA500**	500	3000	**LC1 F500●●**
315	*500*	**ATV 61HC31N4**	**NS800L Micrologic 2 or 5 (LR OFF)**	800	1600	**LC1 F630●●**
355	–	**ATV 61HC40N4**	**NS800L Micrologic 2 or 5 (LR OFF)**	800	1600	**LC1 F630●●**
400	*600*	**ATV 61HC40N4**	**NS800L Micrologic 2 or 5 (LR OFF)**	800	1600	**LC1 F630●●**
500	*700*	**ATV 61HC50N4**	**NS1000L Micrologic 2 or 5 (LR OFF)**	1000	2000	**LC1 F630●●**
560	*800*	**ATV 61HC63N4**	**NS1000L Micrologic 2 or 5 (LR OFF)**	1000	2000	**LC1 F630●●**
630	*900*	**ATV 61HC63N4**	**NS1000L Micrologic 2 or 5 (LR OFF)**	1000	2000	**LC1 F630●●**

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

Circuit-breaker	Icu (kA) for 440 V			
		N	H	L
GV2 L08, GV2 L10	100	–	–	–
GV2 L14…L32	20	–	–	–
NS80HMA	65	–	–	–
NS100●MA	–	25	65	130
NS160●MA, NS250●MA	–	35	65	130
NS400●MA, NS600●MA	–	42	65	130
NS800L Micrologic 2 or 5, **NS1000L Micrologic 2 or 5**	–	–	–	130

(3) Composition of contactors:
LC1 D09 to LC1 D115: 3 poles + 1 "N/O" auxiliary contact and 1 "N/C" auxiliary contact.
LC1 F●●●: 3 poles. To add auxiliary contacts or other accessories, please consult our specialist catalogue "Motor-starter solutions. Control and protection components".
(4) Replace ●● with the control circuit voltage reference indicated in the table below.

	Volts ∿	24	48	110	220	230	240
LC1 D09…D115	50 Hz	**B5**	**E5**	**F5**	**M5**	**P5**	**U5**
	60 Hz	**B6**	**E6**	**F6**	**M6**	**–**	**U6**
	50/60 Hz	**B7**	**E7**	**F7**	**M7**	**P7**	**U7**
LC1 F185	50 Hz (LX1 coil)	**B5**	**E5**	**F5**	**M5**	**P5**	**U5**
	60 Hz (LX1 coil)	**–**	**E6**	**F6**	**M6**	**–**	**U6**
	40…400 Hz (LX9 coil)	**–**	**E7**	**F7**	**M7**	**P7**	**U7**
LC1 F265, LC1 F330	40…400 Hz (LX1 coil)	**B7**	**E7**	**F7**	**M7**	**P7**	**U7**
LC1 F400…F630	40…400 Hz (LX1 coil)	**–**	**E7**	**F7**	**M7**	**P7**	**U7**

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

Variable speed drives for asynchronous motors

Altivar 61

Motor starters: supply voltage 440…480 V

DF534573

DF534574

DF534637

NS160●MA150
+
LC1 D115●●
+
ATV 61HD75N4

Motor starters for UL Type 1/IP 20 drives

Motor Power *(1)*		Drive Reference	Circuit-breaker Reference *(2)*	Rating	Im	Line contactor Reference *(3) (4)*
kW	*HP*			A	A	
3-phase supply voltage: 440…480 V 50/60 Hz. Type 1 coordination						
0.75	*1*	**ATV 61H075N4**	**GV2 LE08**	4	–	**LC1 K06●●**
1.5	*2*	**ATV 61HU15N4**	**GV2 LE10**	6.3	–	**LC1 K06●●**
2.2	*3*	**ATV 61HU22N4**	**GV2 LE14**	10	–	**LC1 K06●●**
3	–	**ATV 61HU30N4**	**GV2 LE14**	10	–	**LC1 K06●●**
4	*5*	**ATV 61HU40N4**	**GV2 LE16**	14	–	**LC1 D09●●**
5.5	*7.5*	**ATV 61HU55N4**	**GV2 LE20**	18	–	**LC1 D09●●**
7.5	*10*	**ATV 61HU75N4**	**GV2 LE22**	25	–	**LC1 D18●●**
11	*15*	**ATV 61HD11N4**	**GV2 LE32**	32	–	**LC1 D25●●**
15	*20*	**ATV 61HD15N4**	**NS80HMA50**	50	300	**LC1 D40●●**
18.5	*25*	**ATV 61HD18N4**	**NS80HMA50**	50	300	**LC1 D40●●**
22	*30*	**ATV 61HD22N4**	**NS80HMA50**	50	300	**LC1 D40●●**
30	*40*	**ATV 61HD30N4**	**NS80HMA80**	80	300	**LC1 D50●●**
37	*50*	**ATV 61HD37N4**	**NS80HMA80**	80	300	**LC1 D65●●**
45	*60*	**ATV 61HD45N4**	**NS100HMA100**	100	600	**LC1 D80●●**
55	*75*	**ATV 61HD55N4**	**NS100HMA100**	100	600	**LC1 D80●●**
75	*100*	**ATV 61HD75N4**	**NS160●MA150**	150	1350	**LC1 D115●●**
90	*125*	**ATV 61HD90N4**	**NS160●MA150**	150	1350	**LC1 D115●●**
110	*150*	**ATV 61HC11N4**	**NS250●MA220**	220	1980	**LC1 D115●●**
132	*200*	**ATV 61HC13N4**	**NS250●MA220**	220	1980	**LC1 F265●●**
160	*250*	**ATV 61HC16N4**	**NS400●MA320**	320	1920	**LC1 F330●●**
200	*300*	**ATV 61HC22N4**	**NS630●MA500**	500	3000	**LC1 F330●●**
220	*350*	**ATV 61HC22N4**	**NS630●MA500**	500	3000	**LC1 F400●●**
250	*400*	**ATV 61HC25N4**	**NS630●MA500**	500	3000	**LC1 F500●●**
280	*450*	**ATV 61HC31N4**	**NS630●MA500**	500	3000	**LC1 F500●●**
315	*500*	**ATV 61HC31N4**	**NS800 Micrologic 2 or 5 (LR OFF)**	800	1600	**LC1 F630●●**
355	–	**ATV 61HC40N4**	**NS800 Micrologic 2 or 5 (LR OFF)**	800	1600	**LC1 F630●●**
400	*600*	**ATV 61HC40N4**	**NS800 Micrologic 2 or 5 (LR OFF)**	800	1600	**LC1 F630●●**
500	*700*	**ATV 61HC50N4**	**NS800 Micrologic 2 or 5 (LR OFF)**	800	1600	**LC1 F630●●**
560	*800*	**ATV 61HC63N4**	**NS1000 Micrologic 2 or 5 (LR OFF)**	1000	2000	**LC1 F630●●**
630	*900*	**ATV 61HC63N4**	**NS1000 Micrologic 2 or 5 (LR OFF)**	1000	2000	**LC1 F630●●**

(1) Standard power ratings for 4-pole motors 400 V 50/60 Hz.
The values expressed in HP comply with the NEC (National Electrical Code).

(2) NS80HMA●●, NS●●●●: products sold under the Merlin Gerin brand.
For references to be completed, replace the dot with the letter corresponding to the circuit-breaker breaking performance (N, H, L).
Breaking capacity of circuit-breakers according to standard IEC 60947-2:

Circuit-breaker	Icu (kA) for 440 V			
		N	H	L
GV2 LE08	100	–	–	–
GV2 LE10	50	–	–	–
GV2 LE14	15	–	–	–
GV2 LE16, GV2 LE20	8	–	–	–
GV2 LE22, GV2 LE32	6	–	–	–
NS80HMA	65	–	–	–
NS100●MA	–	25	65	130
NS160●MA, NS250●MA	–	35	65	130
NS400●MA, NS600●MA	–	42	65	130
NS800 Micrologic 2 or 5, **NS1000 Micrologic 2 or 5**	–	50	65	–

(3) Composition of contactors:
LC1 K06, LC1 D09 to LC1 D115: 3 poles + 1 "N/O" auxiliary contact and 1 "N/C" auxiliary contact.
LC1 F●●●: 3 poles. To add auxiliary contacts or other accessories, please consult our specialist catalogue "Motor-starter solutions. Control and protection components".

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

	Volts ∿	24	48	110	220	230	240
LC1 K06	50/60 Hz	**B7**	**E7**	**F7**	**M7**	**P7**	**U7**
LC1 D09…D115	50 Hz	**B5**	**E5**	**F5**	**M5**	**P5**	**U5**
	60 Hz	**B6**	**E6**	**F6**	**M6**	**–**	**U6**
	50/60 Hz	**B7**	**E7**	**F7**	**M7**	**P7**	**U7**
LC1 F265, LC1 F330	40…400 Hz (LX1 coil)	**B7**	**E7**	**F7**	**M7**	**P7**	**U7**
LC1 F400…F630	40…400 Hz (LX1 coil)	**–**	**E7**	**F7**	**M7**	**P7**	**U7**

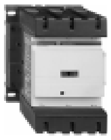
For other voltages available between 24 V and 660 V, or a DC control circuit, please consult your Regional Sales Office.

Combinations for customer assembly
(continued)

Variable speed drives for asynchronous motors
Altivar 61
Motor starters: supply voltage 440…480 V

DF534573

DF534574



DF534635

NS100●MA100
+
LC1 D115●●
+
ATV 61WD55N4

Motor starters for UL Type 12/IP 54 drives

Motor		Drive	Circuit-breaker			Line contactor
Power *(1)*		Reference	Reference *(2)*	Rating	Im	Reference *(3) (4)*
kW	*HP*			A	A	
3-phase supply voltage: 440…480 V 50/60 Hz. Type 2 coordination						
0.75	*1*	**ATV 61W075N4** **ATV 61W075N4C**	**GV2 L07**	2.5	–	**LC1 D09●●**
1.5	*2*	**ATV 61WU15N4** **ATV 61WU15N4C**	**GV2 L08**	4	–	**LC1 D09●●**
2.2	*3*	**ATV 61WU22N4** **ATV 61WU22N4C**	**GV2 L10**	6.3	–	**LC1 D09●●**
3	–	**ATV 61WU30N4** **ATV 61WU30N4C**	**GV2 L10**	6.3	–	**LC1 D09●●**
4	*5*	**ATV 61WU40N4** **ATV 61WU40N4C**	**GV2 L14**	10	–	**LC1 D09●●**
5.5	*7.5*	**ATV 61WU55N4** **ATV 61WU55N4C**	**GV2 L14**	10	–	**LC1 D18●●**
7.5	*10*	**ATV 61WU75N4** **ATV 61WU75N4C**	**GV2 L20**	18	–	**LC1 D18●●**
11	*15*	**ATV 61WD11N4** **ATV 61WD11N4C**	**GV2 L22**	25	–	**LC1 D25●●**
15	*20*	**ATV 61WD15N4** **ATV 61WD15N4C**	**GV2 L32**	32	–	**LC1 D40●●**
18.5	*25*	**ATV 61WD18N4** **ATV 61WD18N4C**	**NS80HMA50**	50	300	**LC1 D40●●**
22	*30*	**ATV 61WD22N4** **ATV 61WD22N4C**	**NS80HMA50**	50	300	**LC1 D40●●**
30	*40*	**ATV 61WD30N4** **ATV 61WD30N4C**	**NS80HMA50**	50	300	**LC1 D50●●**
37	*50*	**ATV 61WD37N4** **ATV 61WD37N4C**	**NS80HMA80**	80	480	**LC1 D80●●**
45	*60*	**ATV 61WD45N4** **ATV 61WD45N4C**	**NS80HMA80**	80	480	**LC1 D80●●**
55	*75*	**ATV 61WD55N4** **ATV 61WD55N4C**	**NS100●MA100**	100	600	**LC1 D115●●**
75	*100*	**ATV 61WD75N4** **ATV 61WD75N4C**	**NS160●MA150**	150	1350	**LC1 D115●●**
90	*125*	**ATV 61WD90N4** **ATV 61WD90N4C**	**NS250●MA220**	220	1980	**LC1 F185●●**

(1) Standard power ratings for 4-pole motors 400 V 50/60 Hz.
The values expressed in HP comply with the NEC (National Electrical Code).

(2) NS80HMA●●, NS●●●●: products sold under the Merlin Gerin brand.
For references to be completed, replace the dot with the letter corresponding to the circuit-breaker breaking performance (N, H, L).
Breaking capacity of circuit-breakers according to standard IEC 60947-2:

Circuit-breaker	Icu (kA) for 440 V			
		N	H	L
GV2 L07…GV2 L10	100	–	–	–
GV2 L14…L32	20	–	–	–
NS80HMA	65	–	–	–
NS100●MA	–	25	65	130
NS160●MA, NS250●MA	–	35	65	130

(3) Composition of contactors:
LC1 D09 to LC1 D115: 3 poles + 1 "N/O" auxiliary contact and 1 "N/C" auxiliary contact.
LC1 F185: 3 poles. To add auxiliary contacts or other accessories, please consult our specialist catalogue "Motor-starter solutions. Control and protection components".

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

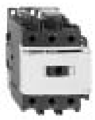
	Volts ∿	24	48	110	220	230	240
LC1 D09…D115	50 Hz	**B5**	**E5**	**F5**	**M5**	**P5**	**U5**
	60 Hz	**B6**	**E6**	**F6**	**M6**	**–**	**U6**
	50/60 Hz	**B7**	**E7**	**F7**	**M7**	**P7**	**U7**
LC1 F185	50 Hz (LX1 coil)	**B5**	**E5**	**F5**	**M5**	**P5**	**U5**
	60 Hz (LX1 coil)	**–**	**E6**	**F6**	**M6**	**–**	**U6**
	40…400 Hz (LX9 coil)	**–**	**E7**	**F7**	**M7**	**P7**	**U7**

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

Variable speed drives for asynchronous motors

Altivar 61

Motor starters: supply voltage 440…480 V



NS100●MA100
+
LC1 D80●●
+
ATV 61WD55N4

Motor starters for UL Type 12/IP 54 drives

Motor		**Drive**	**Circuit-breaker**			**Line contactor**
Power *(1)*		**Reference**	**Reference** *(2)*	**Rating**	**Im**	**Reference** *(3) (4)*
kW	***HP***			**A**	**A**	
3-phase supply voltage: 440…480 V 50/60 Hz. Type 1 coordination						
0.75	*1*	**ATV 61W075N4** **ATV 61W075N4C**	**GV2 LE07**	2.5	–	**LC1 K06●●**
1.5	*2*	**ATV 61WU15N4** **ATV 61WU15N4C**	**GV2 LE08**	4	–	**LC1 K06●●**
2.2	*3*	**ATV 61WU22N4** **ATV 61WU22N4C**	**GV2 LE10**	6.3	–	**LC1 K06●●**
3	–	**ATV 61WU30N4** **ATV 61WU30N4C**	**GV2 LE10**	6.3	–	**LC1 K06●●**
4	*5*	**ATV 61WU40N4** **ATV 61WU40N4C**	**GV2 LE14**	10	–	**LC1 K06●●**
5.5	*7.5*	**ATV 61WU55N4** **ATV 61WU55N4C**	**GV2 LE14**	10	–	**LC1 K06●●**
7.5	*10*	**ATV 61WU75N4** **ATV 61WU75N4C**	**GV2 LE20**	18	–	**LC1 D09●●**
11	*15*	**ATV 61WD11N4** **ATV 61WD11N4C**	**GV2 LE22**	25	–	**LC1 D09●●**
15	*20*	**ATV 61WD15N4** **ATV 61WD15N4C**	**GV2 LE32**	32	–	**LC1 D18●●**
18.5	*25*	**ATV 61WD18N4** **ATV 61WD18N4C**	**NS80HMA50**	50	300	**LC1 D32●●**
22	*30*	**ATV 61WD22N4** **ATV 61WD22N4C**	**NS80HMA50**	50	300	**LC1 D32●●**
30	*40*	**ATV 61WD30N4** **ATV 61WD30N4C**	**NS80HMA50**	50	300	**LC1 D40●●**
37	*50*	**ATV 61WD37N4** **ATV 61WD37N4C**	**NS80HMA80**	80	480	**LC1 D50●●**
45	*60*	**ATV 61WD45N4** **ATV 61WD45N4C**	**NS80HMA80**	80	480	**LC1 D65●●**
55	*75*	**ATV 61WD55N4** **ATV 61WD55N4C**	**NS100●MA100**	100	600	**LC1 D80●●**
75	*100*	**ATV 61WD75N4** **ATV 61WD75N4C**	**NS160●MA150**	150	1350	**LC1 D115●●**
90	*125*	**ATV 61WD90N4** **ATV 61WD90N4C**	**NS250●MA220**	220	1980	**LC1 D115●●**

(1) Standard power ratings for 4-pole motors 400 V 50/60 Hz.
The values expressed in HP comply with the NEC (National Electrical Code).

(2) NS80HMA●●, NS●●●●: products sold under the Merlin Gerin brand.
For references to be completed, replace the dot with the letter corresponding to the circuit-breaker breaking performance (N, H, L).
Breaking capacity of circuit-breakers according to standard IEC 60947-2:

Circuit-breaker	**Icu (kA) for 440 V**			
		N	**H**	**L**
GV2 LE07…LE10	100	–	–	–
GV2 LE14…LE32	20	–	–	–
NS80HMA	65	–	–	–
NS100●MA	–	25	65	130
NS160●MA, NS250●MA	–	35	65	130

(3) Composition of contactors:
LC1 K06, LC1 D09 to LC1 D115: 3 poles + 1 "N/O" auxiliary contact and 1 "N/C" auxiliary contact.

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

	Volts ∿	**24**	**48**	**110**	**220**	**230**	**240**
LC1 D09…D115	50 Hz	**B5**	**E5**	**F5**	**M5**	**P5**	**U5**
	60 Hz	**B6**	**E6**	**F6**	**M6**	**–**	**U6**
	50/60 Hz	**B7**	**E7**	**F7**	**M7**	**P7**	**U7**

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

Variable speed drives for asynchronous motors

Altivar 61

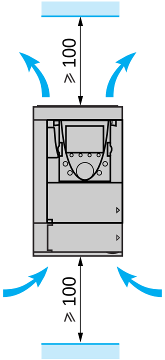
UL Type 1/IP 20 drives

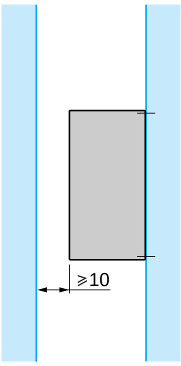
Mounting recommendations

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

- 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.

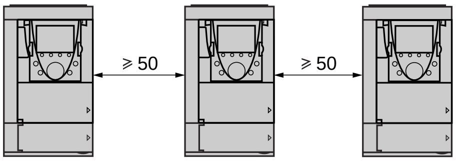
ATV 61H●●●M3, ATV 61HD11M3X...HD45M3X, ATV 61H075N4...HD75N4



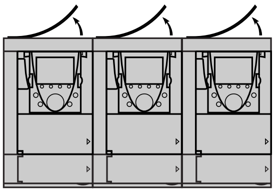


Mounting types

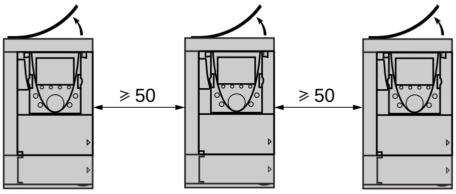
- **Type A mounting**



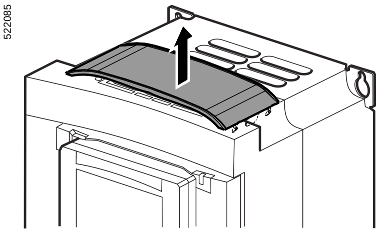
- **Type B mounting**



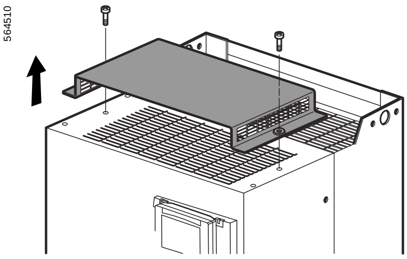
- **Type C mounting**



By removing the protective blanking cover from the top of the drive, the degree of protection for the drive becomes IP 20. The protective blanking cover may vary according to the drive model, see opposite.



Removing the protective blanking cover for:
ATV 61H●●●M3, ATV 61HD11M3X, HD15M3X,
ATV 61HD075N4...HD18N4



Removing the protective blanking cover for:
ATV 61HD18M3X...HD45M3X,
ATV 61HD22N4...HD75N4

Variable speed drives for asynchronous motors

Altivar 61

UL Type 1/IP 20 drives

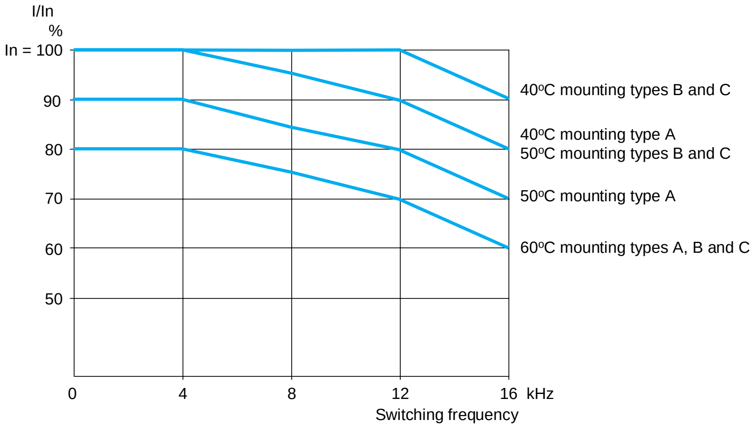
Mounting recommendations (continued)

Derating curves

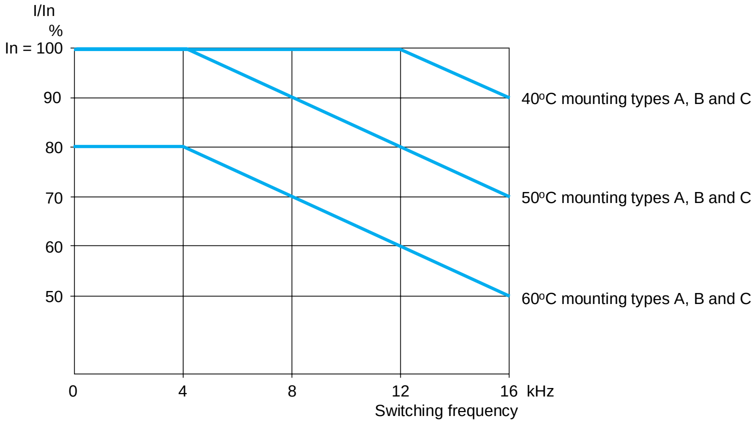
The derating curves for the drive nominal current (In) depend on the temperature, the switching frequency and the mounting type.

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

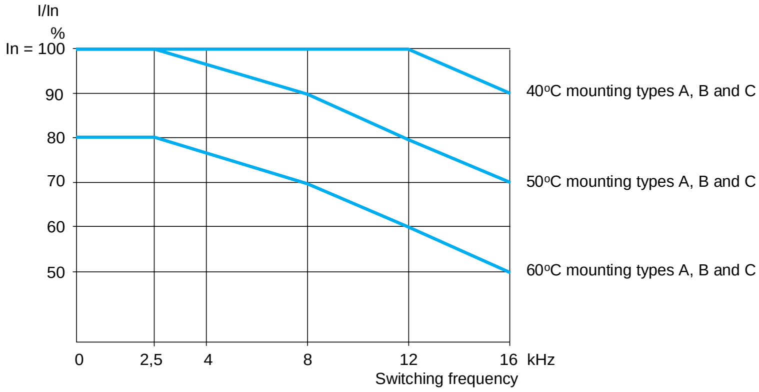
ATV 61H●●●M3, ATV 61HD11M3X, HD15M3X and ATV 61H075N4…HD18N4



ATV 61HD22N4 and ATV 61HD30N4 *(1)*



ATV 61HD18M3X…HD45M3X and ATV 61HD37N4…HD75N4 *(1)*



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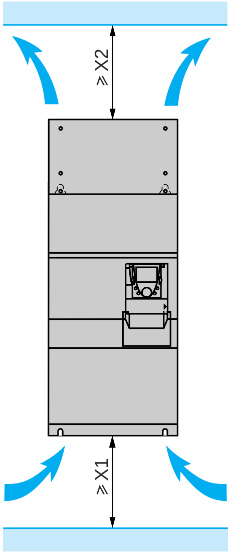
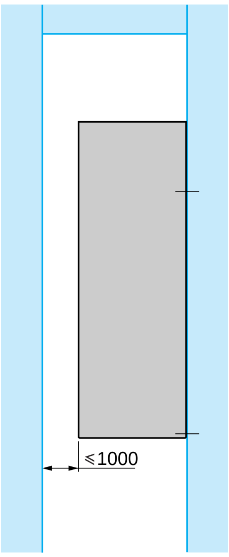
(1) Above 50°C, ATV 61HD18M3X…HD45M3X, ATV 61HD22N4…HD75N4 drives should be equipped with a control card fan kit. See page 22.

Mounting recommendations (continued)

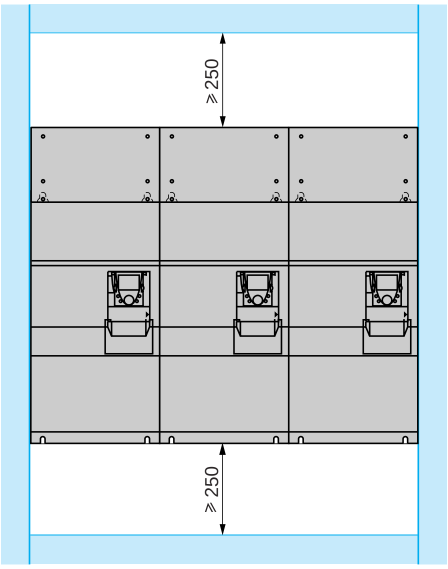
ATV 61HD55M3X…HD90M3X, ATV 61HD90N4…HC63N4

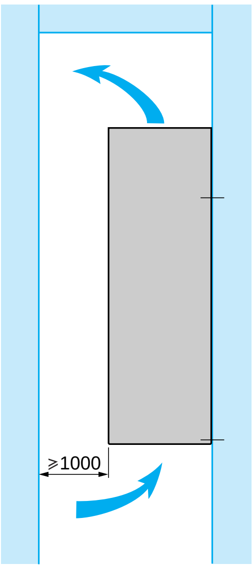




ATV 61H	X1	X2
D55M3X…D90M3X, D90N4, C11N4	100	100
C13N4…C22N4	150	150
C25N4, C31N4	150	200
C40N4, C50N4	250	300
C63N4	250	400

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





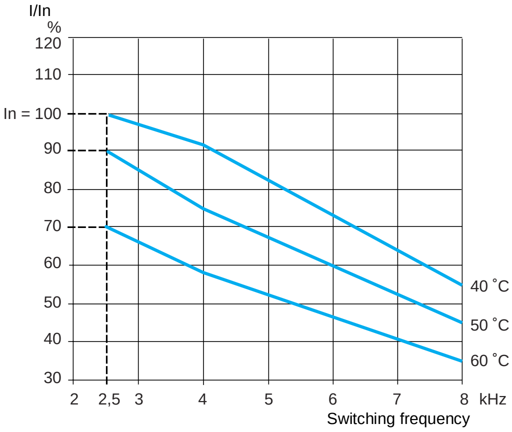
Mounting recommendations (continued)

Derating curves

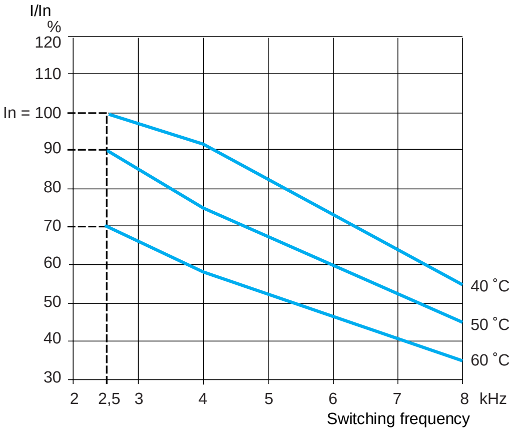
The derating curves for the drive nominal current (In) depend on the temperature, the switching frequency and the mounting type.

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

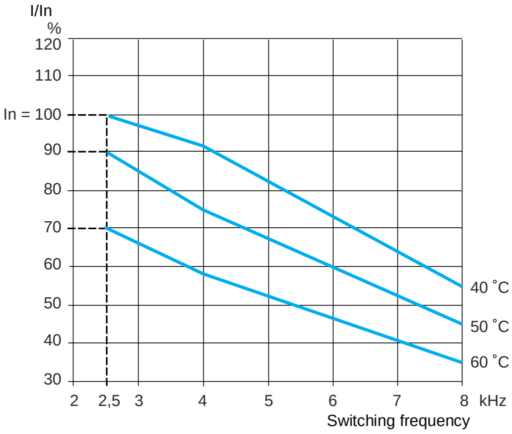
ATV 61HD55M3X



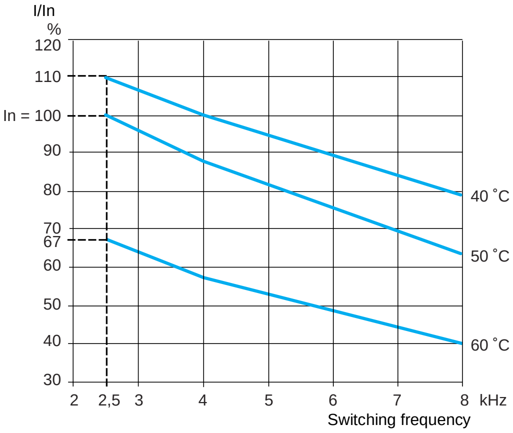
ATV 61HD75M3X



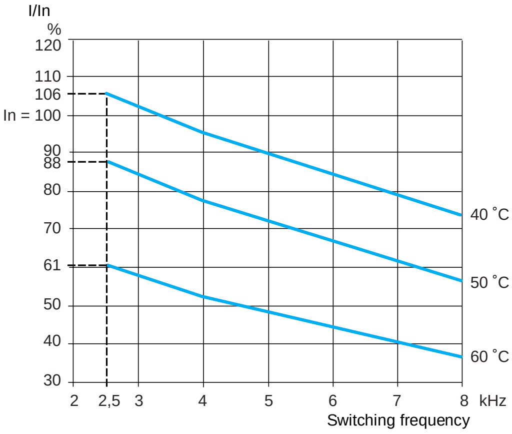
ATV 61HD90M3X



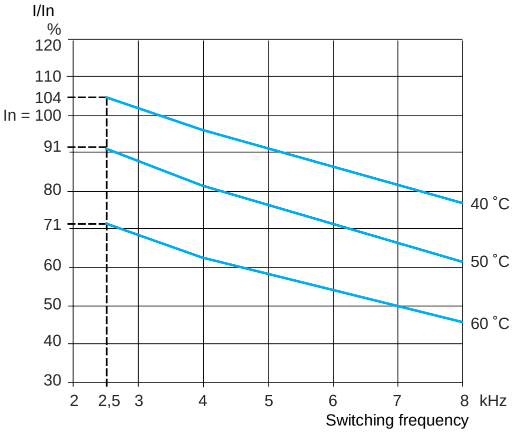
ATV 61HD90N4



ATV 61HC11N4

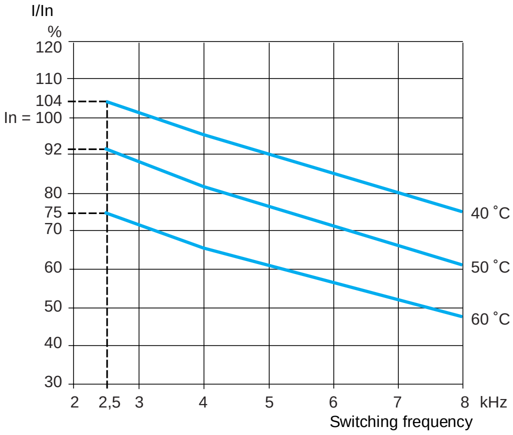


ATV 61HC13N4

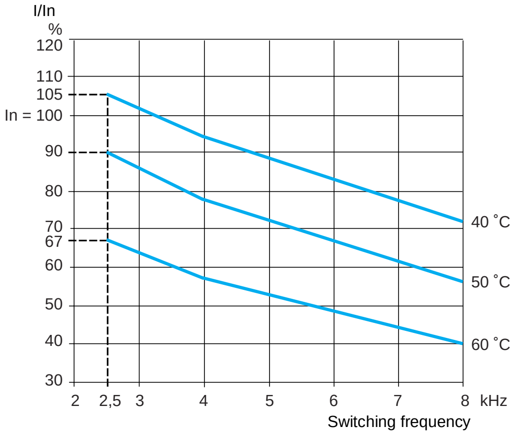


Derating curves (continued)

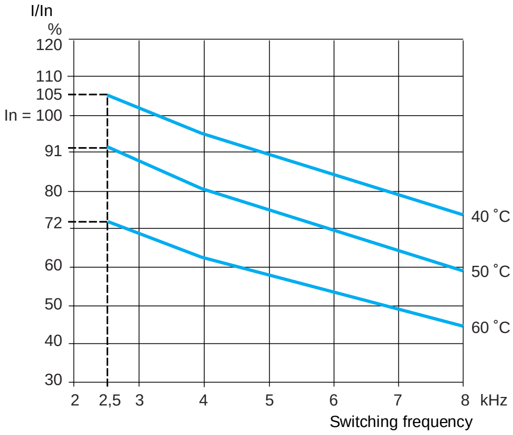
ATV 61HC16N4



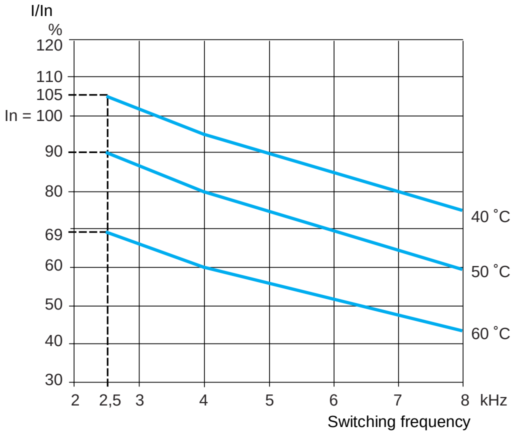
ATV 61HC22N4 combined with a 200 kW motor



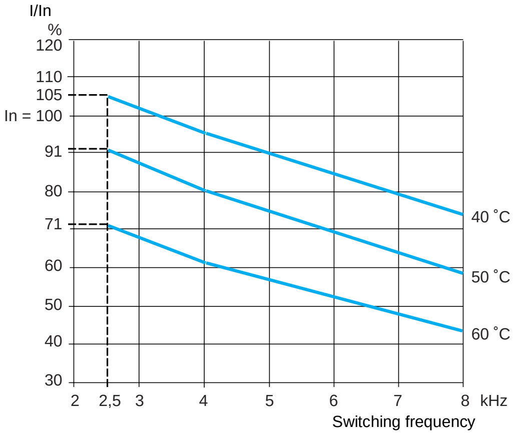
ATV 61HC22N4 combined with a 220 kW motor



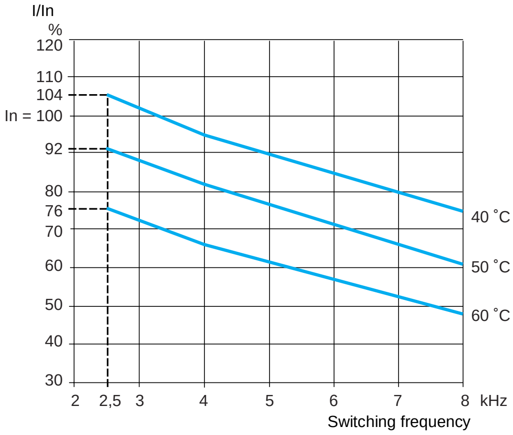
ATV 61HC25N4



ATV 61HC31N4 combined with a 280 kW motor

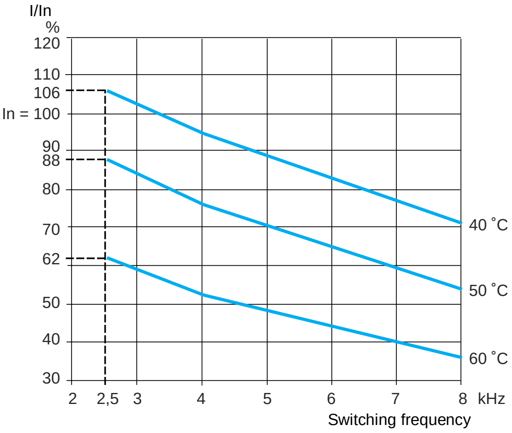


ATV 61HC31N4 combined with a 315 kW motor

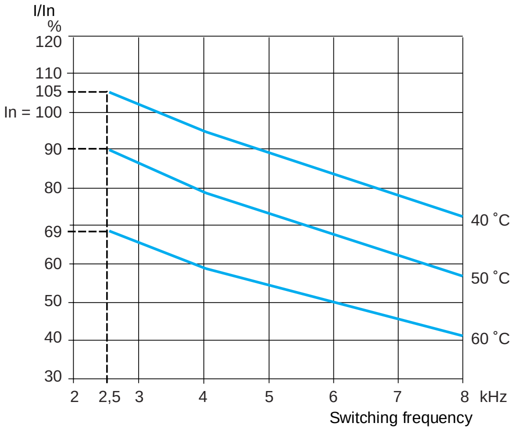


Derating curves (continued)

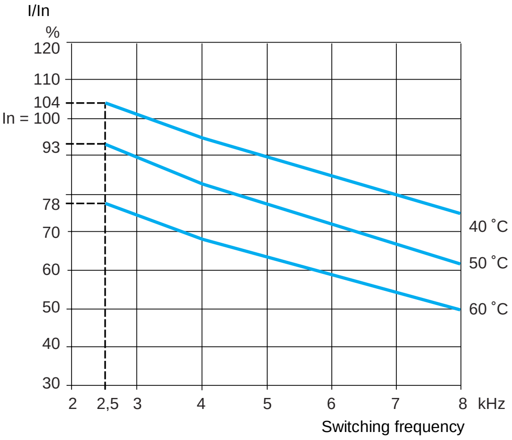
ATV 61HC40N4 combined with a 355 kW motor



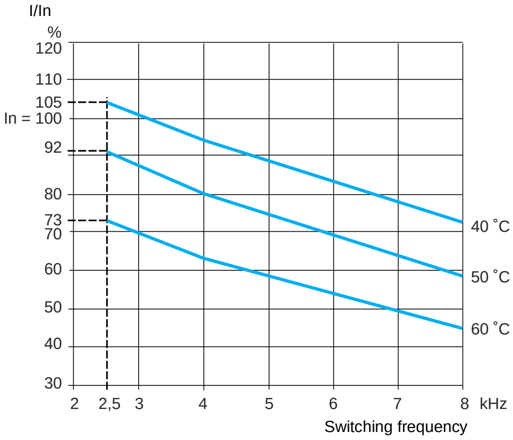
ATV 61HC40N4 combined with a 400 kW motor



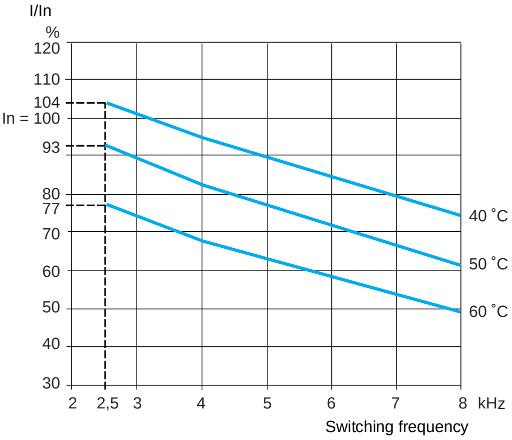
ATV 61HC50N4



ATV 61HC63N4 combined with a 560 kW motor



ATV 61HC63N4 combined with a 630 kW motor



Variable speed drives for asynchronous motors

Altivar 61

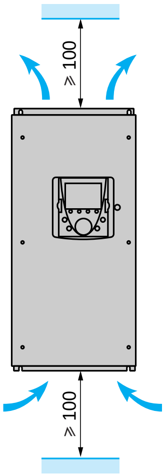
UL Type 12/IP 54 drives

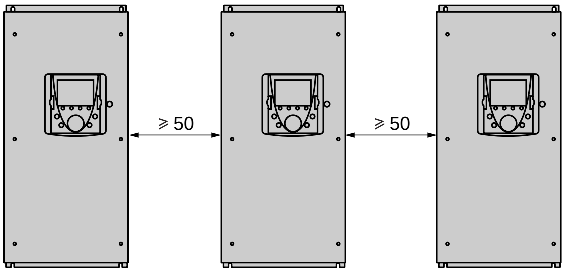
Mounting recommendations (continued)

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:

- 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.

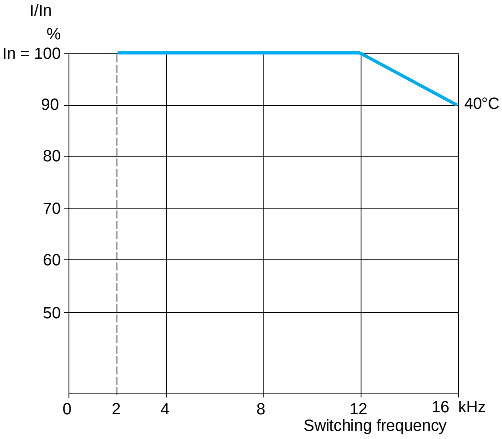
ATV 61W●●●N4, ATV 61W●●●N4C



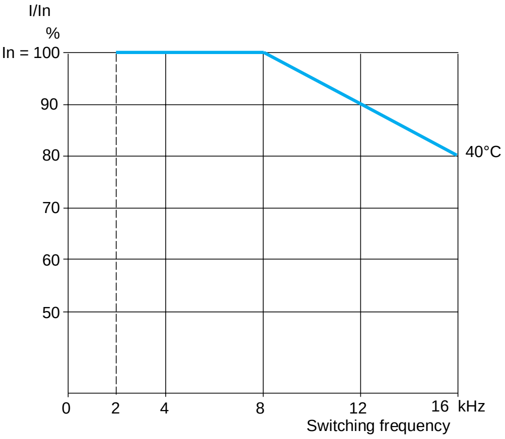


Derating curves

ATV 61W075N4...WU55N4, ATV 61W075N4C...WU55N4C

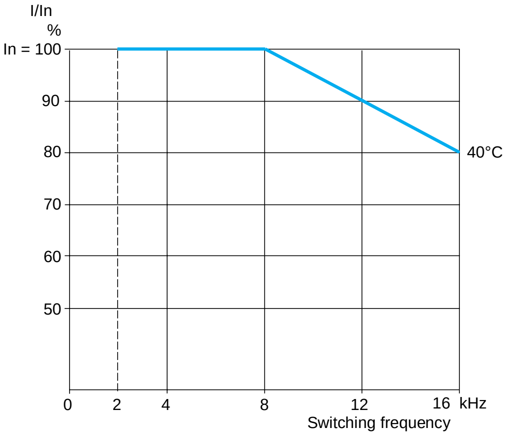


ATV 61WU75N4, WD11N4, ATV 61WU75N4C, WD11N4C

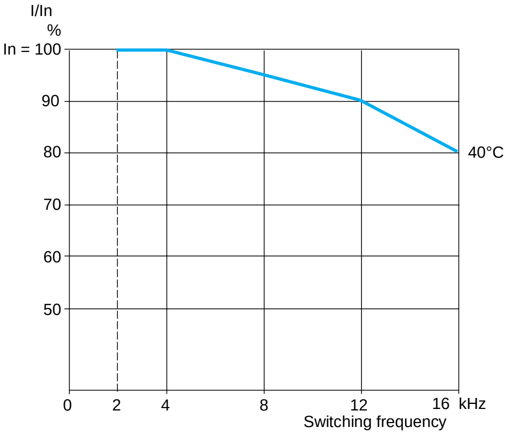


Derating curves (continued)

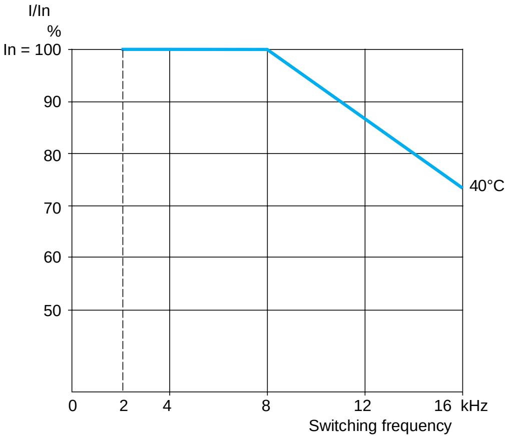
ATV 61WD15N4, ATV 61WD15N4C



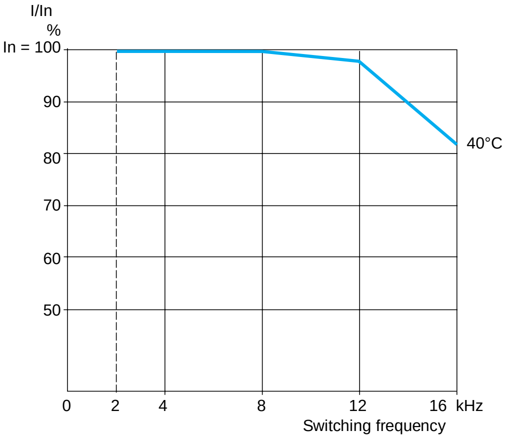
ATV 61WD18N4, WD22N4, ATV 61WD18N4C, WD22N4C



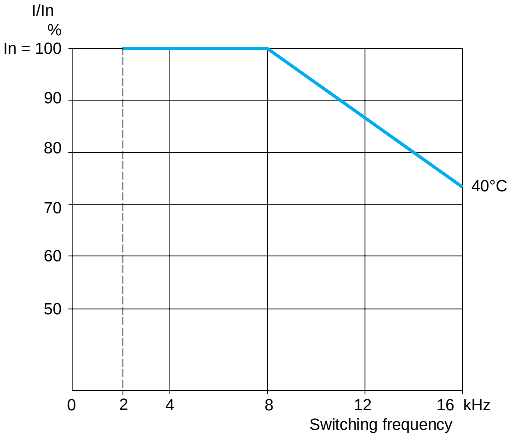
ATV 61WD30N4, ATV 61WD30N4C

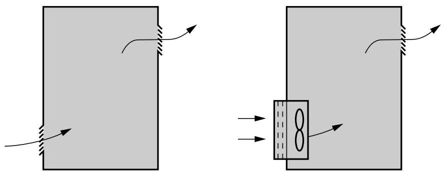


ATV 61WD37N4, WD45N4, ATV 61WD37N4C, WD45N4C



ATV 61WD55N4…WD90N4, ATV 61WD55NC4…WD90N4C





Specific recommendations for mounting in an enclosure *(1)*

Follow the mounting recommendations described on pages 138 to 143.
To ensure proper air circulation in the drive:

- Fit ventilation grilles.
- Ensure that there is sufficient ventilation. If there is not, install forced ventilation with a filter. The openings and/or fans must provide a flow rate at least equal to that of the drive fans (see page 147)
- Use special filters with IP 54 protection.
- Remove the blanking cover from the top of the drive, see page 138.

Power dissipated inside the enclosure *(1)*

For drives	Dissipated power *(2)*	
	Mounted in the enclosure (power section inside the enclosure)	**Dust and damp proof flush-mounting** (power section outside the enclosure)
	W	**W**
3-phase supply voltage: 200…240 V 50/60 Hz		
ATV 61H075M3	66	28
ATV 61HU15M3	101	30
ATV 61HU22M3	122	38
ATV 61HU30M3	154	38
ATV 61HU40M3	191	42
ATV 61HU55M3	293	52
ATV 61HU75M3	363	60
ATV 61HD11M3X	566	73
ATV 61HD15M3X	620	76
ATV 61HD18M3X	799	119
ATV 61HD22M3X	865	124
ATV 61HD30M3X	1134	151
ATV 61HD37M3X	1337	166
ATV 61HD45M3X	1567	184
ATV 61HD55M3X	1715	154
ATV 61HD75M3X	2233	154
ATV 61HD90M3X	2694	154
3-phase supply voltage: 380…480 V 50/60 Hz		
ATV 61H075N4	44	26
ATV 61HU15N4	64	28
ATV 61HU22N4	87	30
ATV 61HU30N4	114	35
ATV 61HU40N4	144	40
ATV 61HU55N4	178	50
ATV 61HU75N4	217	55
ATV 61HD11N4	320	65
ATV 61HD15N4	392	86
ATV 61HD18N4	486	86
ATV 61HD22N4	717	110
ATV 61HD30N4	976	135
ATV 61HD37N4	1174	137
ATV 61HD45N4	1360	165
ATV 61HD55N4	1559	178
ATV 61HD75N4	2326	225
ATV 61HD90N4	2403	237
ATV 61HC11N4	3056	269
ATV 61HC13N4	3583	304
ATV 61HC16N4	4036	362
ATV 61HC22N4	5482	452
ATV 61HC25N4	6379	606
ATV 61HC31N4	7867	769
ATV 61HC40N4	9598	–
ATV 61HC50N4	12055	–
ATV 61HC63N4	15007	–

(1) Only for ATV 61H●●●M3, ATV 61H●●●M3X and ATV 61H●●●N4 drives.
(2) This value is given for operation at nominal load and for a switching frequency of 2.5 or 4 kHz depending on the rating.
Add 7 W to this value for each additional option card.

Fan flow rate depending on the drive rating

For drive	Flow rate m^3/hour
ATV 61H075M3…HU15M3, **ATV 61H075N4…HU22N4**	17
ATV 61HU22M3…HU40M3, **ATV 61HU30N4, HU40N4**	56
ATV 61HU55M3, **ATV 61HU55N4, HU75N4**	112
ATV 61HU75M3, **ATV 61HD11N4**	163
ATV 61HD11M3X, HD15M3X **ATV 61HD15N4, HD18N4**	252
ATV 61HD18M3X, HD22M3X, **ATV 61HD22N4...HD37N4**	203
ATV 61HD30M3X…HD45M3X, **ATV 61HD45N4…HD75N4**	406
ATV 61HD55M3X, HD75M3X, **ATV 61HD90N4, HC11N4**	402
ATV 61HD90M3X, **ATV 61HC13N4**	774
ATV 61HC16N4	745
ATV 61HC22N4	860
ATV 61HC25N4, HC31N4	1260
ATV 61HC40N4, HC50N4	2100
ATV 61HC63N4	2400

Sealed metal enclosure (IP 54 degree of protection)

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

Calculating the enclosure dimensions *(1)*

Maximum thermal resistance Rth (°C/W)

$$Rth = \frac{\theta - \theta e}{P}$$

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

Power dissipated by drive: see page 146 (mounting in an enclosure or flush-mounting in an enclosure).
Add the power dissipated by the other equipment components.

Useful heat dissipation surface of enclosure S (m^2)

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

$$S = \frac{K}{Rth}$$

K = enclosure thermal resistance per m^2

For a metal enclosure:
- K = 0.12 with internal fan
- K = 0.15 without fan

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

---

(1) Only for ATV 61H●●●M3, ATV 61H●●●M3X and ATV 61H●●●N4 drives.

Summary of functions

Remote graphic display terminal functions

Description page 150
Navigation page 151
Password page 151

Integrated 7-segment display terminal

Presentation page 152

Start-up

Simply Start menu page 152
Programming using macro-configurations page 153
MONITORING menu page 154

Configuration and settings

Presentation page 154

Operation

Presentation page 154

Maintenance, diagnostics

Response to faults or alarms page 155
Fault history and help page 155
IDENTIFICATION menu page 155
Test functions page 155
Oscilloscope function page 155

Controlling the drive

Via the drive I/O page 156
Via the remote graphic display terminal page 156
Via a communication network
  - I/O profile page 157
  - CiA DSP 402 profile page 157
  - ODVA profile page 157

Functions suitable for pumping and ventilation applications

Motor control profiles
  - Energy saving ratio page 158
  - Quadratic ratio (Kn ^{2}) page 158
PID regulator
  - Internal references page 158
  - Preset PID references page 158
  - PID feedback page 159
  - PI feedback supervision page 159
  - Sleep/wake-up page 159
  - Activate sleep mode by flow detection page 159
  - Alarms page 159
  - Predictive speed reference page 159
  - Auto/Man. page 159
Forced operation page 159
Flow limit page 159

Other application functions

2-wire control
  - State detection page 160
  - Transition detection page 160
  - Forward operation as priority page 160
3-wire control page 160
Phase rotation page 160
Ramps
  - Time page 160
  - Profile (linear, S, U or customized) page 161
  - Switching page 161
  - Automatic adaptation page 161
Preset speeds page 162
JOG operation page 162
Limiting low speed operating time page 162

Summary of functions (continued)

Other application functions (continued)

Motor control types

- Flux Vector Control with sensor (FVC) page 163
- Sensorless Flux Vector Control page 163
- 2-point Vector Control page 163
- Voltage/frequency ratio page 163
- Synchronous motor page 163

Limiting motor overvoltage page 163
Auto-tuning page 163
Switching frequency, noise reduction page 163
Motor fluxing page 164
Output contactor command page 164
Stop on thermal alarm page 164
Uncontrolled output cut page 165

+/- speed

- Single action buttons page 165
- Double action buttons page 165
- Reference saving page 166
- Around a reference page 166

Automatic catching of a spinning load with speed detection page 166
Undervoltage management page 167
Braking balance page 167
Braking resistor thermal protection page 167
Parameter set switching page 168
Motor or configuration switching page 168
Reference switching page 168

Operations on the references

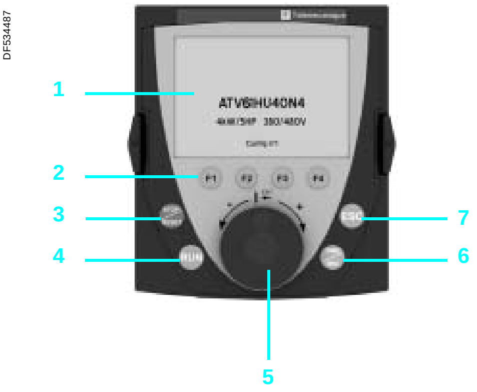
- Summing inputs page 169
- Subtraction inputs page 169
- Multiplication inputs page 169

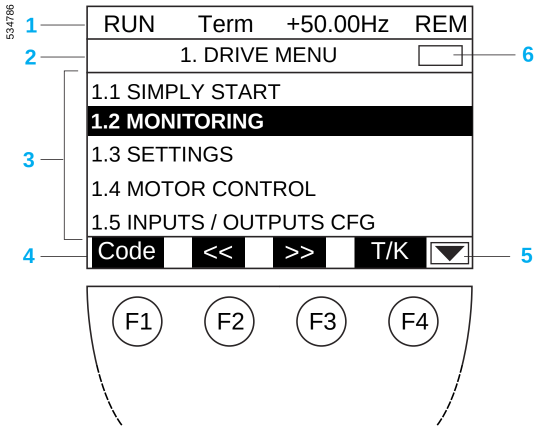
Torque limit page 170
Torque or current limit detection page 170
Current limit page 170
Reference saving page 171

Stop types

- Freewheel stop page 171
- Fast stop page 171
- Fastest possible stop page 171
- DC injection stop page 171

Motor thermal protection page 172
Drive thermal protection page 172
IGBT thermal protection page 172
Machine protection page 172
Configuring the drive’s fault response page 173
Resetting resettable faults page 173
General reset (disables all faults) page 173
Automatic restart page 174
PTC probe protection page 174
IGBT testing page 174
Resetting operating time to zero page 174
External fault page 174
Line contactor control page 175
Forced local mode page 175





Remote graphic display terminal functions

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

■ Description

□ Description of graphic display terminal

1 Graphic display unit:
- 8 lines, 240 x 160 pixels
- large digit display that can be read from 5 m away
- bar chart display

2 Assignable functions keys F1, F2, F3, F4:
- dialogue functions: direct access, help screens, navigation
- application functions: Local/Remote, preset speed.

3 STOP/RESET key: local control of motor stopping/fault clearing

4 RUN key: local control of motor operation

5 Navigation button:
- Press to save the current value (ENT)
- Turn ± to increase or decrease the value, or go to the next or previous line

6 FWD/REV key: reverses the direction of rotation of the motor

7 ESC key: aborts a value, parameter or menu to return to the previous option.

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

□ Description of graphic display unit

1 Display line. Its content can be configured; the factory settings show:
- the drive status (example: RUN)
- the active control channel (example: “Term”: Terminals),
- the frequency reference
- Type of control (example: “LOC/REM”).

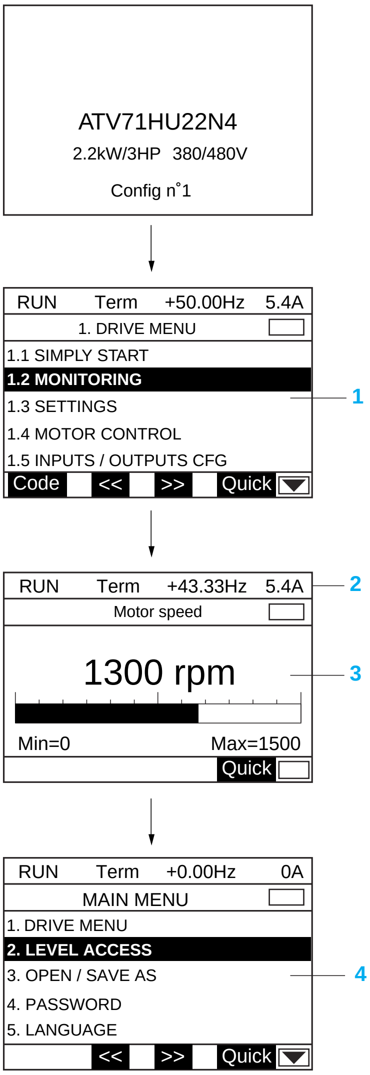
2 Menu line. Indicates the current menu or submenu.

3 Area displaying menus, submenus, parameters, values, bar charts, in the form of a scrolling window, with a maximum of 5 lines.
The line or value selected using the navigation button is displayed in reverse video (see opposite).

4 Section displaying the functions assigned to the keys F1 to F4 and aligned with them, for example:
- >> : Horizontal scrolling to the right, or proceeding to the next menu or submenu, or, in the case of a value, decreasing the value, displayed in reverse video (see example opposite)
- << : Horizontal scrolling to the left, or proceeding to the next menu or submenu, or, in the case of a value, increasing the value, displayed in reverse video
- “T/K” : Local Remote function assigned to key F4,
- HELP: Contextual help
- Code: Displays the selected parameter code
- Other functions (application functions) can be assigned to these keys via the 1.6 COMMAND menu.

5 ☐ : Means that this display window does not scroll further down.
▼ : Means that this display window can scroll further down.

6 ▲ : Means that this display window can scroll further up.
☐ : Means that this display window does not scroll further up.


ATV71HU22N4
2.2kW/3HP 380/480V
Config n°1
RUN Term +50.00Hz 5.4A
1. DRIVE MENU
1.1 SIMPLY START
1.2 MONITORING
1.3 SETTINGS
1.4 MOTOR CONTROL
1.5 INPUTS / OUTPUTS CFG
Code << >> Quick
1
RUN Term +43.33Hz 5.4A
2
Motor speed
1300 rpm
3
Min=0 Max=1500
Quick
RUN Term +0.00Hz 0A
MAIN MENU
1. DRIVE MENU
2. LEVEL ACCESS
3. OPEN / SAVE AS
4. PASSWORD
5. LANGUAGE
<< >> Quick
4

Remote graphic display terminal functions (continued)

■ Navigation: accessing menus and parameters

Structure of main menus:

1 Drive menu:

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

2 Display line

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

4 Main menu:

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

■ Password

Altivar 61 drives allow individual parameters to be selected for password protection. Rights can be set for save operations and for loading the configuration.

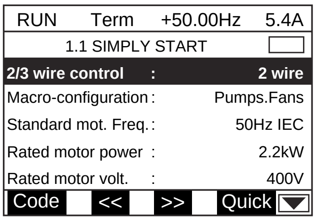
Integrated 7-segment display terminal

ATV 61●●●●●M3, ATV 61HD11M3X…HD45M3X and ATV 61H075N4…HD75N4 drives can be supplied without a graphic display terminal. In this case, they are equipped with an integrated 7-segment display terminal.
This can be used to:

- ☐ Display status and faults
- ☐ Access and modify parameters

Start-up

The Altivar 61 drive is supplied ready for use for most applications.
When the drive is switched on, the menus for setting the language and access level appear automatically.



RUN Term +50.00Hz 5.4A
1.1 SIMPLY START
2/3 wire control : 2 wire
Macro-configuration : Pumps.Fans
Standard mot. Freq. : 50Hz IEC
Rated motor power : 2.2kW
Rated motor volt. : 400V

Simply Start menu

■ **Simply Start menu**

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

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

Start-up (continued)

■ Programming using macro-configurations

Programming using macro-configurations offers the choice of five options corresponding to the various business areas and applications:
- ☐ Start/stop
- ☐ General use
- ☐ PID regulation
- ☐ Communication network connectivity
- ☐ Ventilation pump.

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

The Ventilation pump macro-configuration is set as the factory configuration.
The preset functions for each macro-configuration are given in the table below.

Type of macro-configuration		**Start/stop**	**General use**	**PID regulation**	**Communication network connectivity**	**Ventilation pump.**
Altivar 61 drive I/O						
AI1		Ref. 1 channel	Ref. 1 channel	PID reference	Ref. 2 channel Ref. 1 channel by bus	Ref. 1 channel
AI2		Not assigned	Sum ref. 2	PID feedback	Not assigned	Ref. 1B channel
AO1		Motor freq.	Motor freq.	Motor freq.	Motor freq.	Motor freq.
2-wire	**LI1**	Forward	Forward	Forward	Forward	Forward
	LI2	Fault reset	Reverse	Fault reset	Fault reset	Freewheel
	LI3	Not assigned	JOG	PID integral reset	Ref. 2 switching	Ref. 1B switching
	LI4	Not assigned	Fault reset	PID 2 preset ref.	Fault reset	Fault reset
	LI5	Not assigned	Torque limit	PID 4 preset ref.	Not assigned	Not assigned
	LI6	Not assigned	Not assigned	Not assigned	Not assigned	Not assigned
3-wire	**LI1**	Stop	Stop	Stop	Stop	Stop
	LI2	Forward	Forward	Forward	Forward	Forward
	LI3	Reverse	Reverse	Reverse	Reverse	Freewheel
	LI4	Not assigned	JOG	PID integral reset	Ref. 2 switching	Ref. 1B switching
	LI5	Not assigned	Fault reset	PID 2 preset ref.	Forced local	Fault reset
	LI6	Not assigned	Torque limit	PID 4 preset ref.	Not assigned	Not assigned
R1		Faulty	Faulty	Faulty	Faulty	Faulty
R2		Not assigned	Not assigned	Not assigned	Not assigned	Drive operation
I/O extension card I/O						
2-wire	**LI7**	Not assigned	Not assigned	Not assigned	Not assigned	Not assigned
3-wire	**LI7**	Not assigned	Not assigned	Not assigned	Not assigned	Not assigned
LI8 to LI14		Not assigned	Not assigned	Not assigned	Not assigned	Not assigned
LO1 to LO4		Not assigned	Not assigned	Not assigned	Not assigned	Not assigned
R3/R4		Not assigned	Not assigned	Not assigned	Not assigned	Not assigned
AI3, AI4		Not assigned	Not assigned	Not assigned	Not assigned	Not assigned
RP		Not assigned	Not assigned	Not assigned	Not assigned	Not assigned
AO2		Motor current	Motor current	Motor current	Motor current	Motor current
AO3		Not assigned	Not assigned	PID error	Not assigned	Not assigned
Graphic display terminal keys						
F1 key		Not assigned	Not assigned	Not assigned	Control via graphic display terminal	Not assigned
F2, F3, F4 keys		Not assigned	Not assigned	Not assigned	Not assigned	T/K (control via graphic display terminal)

Start-up (continued)

■ MONITORING menu

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

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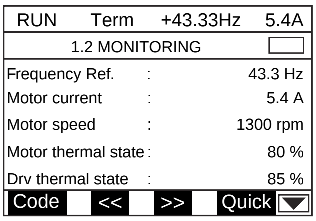
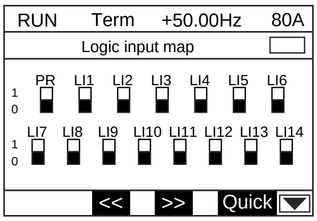
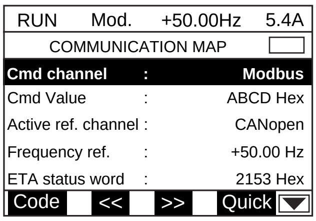

RUN Term +43.33Hz 5.4A
1.2 MONITORING
Frequency Ref. : 43.3 Hz
Motor current : 5.4 A
Motor speed : 1300 rpm
Motor thermal state : 80 %
Drv thermal state : 85 %

Displaying physical values


RUN Term +50.00Hz 80A
Logic input map

Logic input map


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

Communication map

One of the uses of this menu is to display the alarm groups, thermal states and electrical values such as:
- ☐ electrical power consumed by the drive
- ☐ the drive’s cumulative electrical power, etc.

Configuration and settings

The SETTINGS menu can be used to configure all the drive’s settings.
Activating a function automatically provides access to the related settings on the same screen (the application functions are described on pages 158 to 175).

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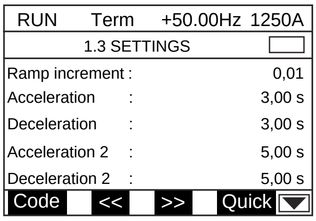
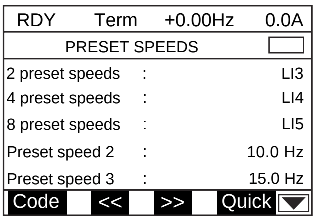
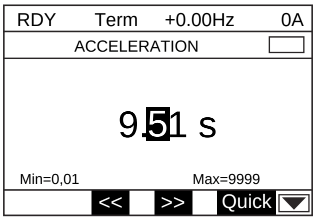

RUN Term +50.00Hz 1250A
1.3 SETTINGS
Ramp increment : 0,01
Acceleration : 3,00 s
Deceleration : 3,00 s
Acceleration 2 : 5,00 s
Deceleration 2 : 5,00 s

Settings screen


RDY Term +0.00Hz 0.0A
PRESET SPEEDS
2 preset speeds : LI3
4 preset speeds : LI4
8 preset speeds : LI5
Preset speed 2 : 10.0 Hz
Preset speed 3 : 15.0 Hz

Setting a function


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

Configuring a value

Operation

The display screen appears automatically every time the drive is turned on.
There are different possible scenarios:
- ■ One or two bar charts are displayed.
- ■ One, two or five digital values are displayed.

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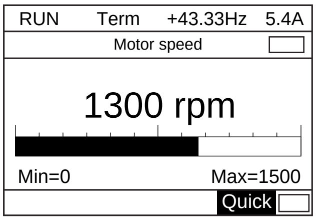
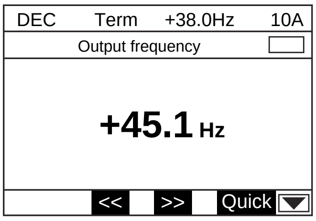
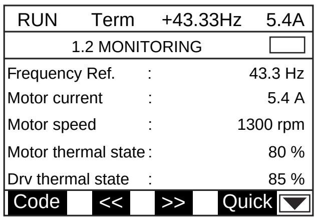

RUN Term +43.33Hz 5.4A
Motor speed
1300 rpm
Min=0 Max=1500

1 bar chart


DEC Term +38.0Hz 10A
Output frequency
+45.1 Hz

1 digital value


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

5 digital values

Variable speed drives for asynchronous motors
Altivar 61

Maintenance, diagnostics

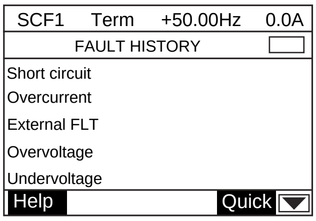
New functions have been added to the Altivar 61 drive to enable it to provide quick and simple maintenance, ultimately boosting productivity:

■ Response to faults or alarms

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

■ Fault history and help

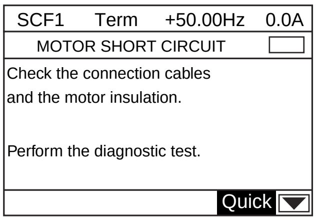
When a fault occurs, a help screen is available to quickly identify the cause of the fault.
As soon as the fault occurs, values such as speed, current, thermal state, timer are saved and restored in the fault history.
The last 8 faults are stored.



SCF1 Term +50.00Hz 0.0A
FAULT HISTORY

Short circuit
Overcurrent
External FLT
Overvoltage
Undervoltage

Fault history



SCF1 Term +50.00Hz 0.0A
MOTOR SHORT CIRCUIT

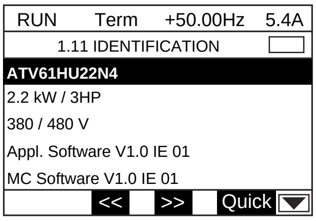
Check the connection cables
and the motor insulation.

Perform the diagnostic test.

Troubleshooting screen

■ IDENTIFICATION menu

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



RUN Term +50.00Hz 5.4A
1.11 IDENTIFICATION

ATV61HU22N4
2.2 kW / 3HP
380 / 480 V
Appl. Software V1.0 IE 01
MC Software V1.0 IE 01

Identification screen

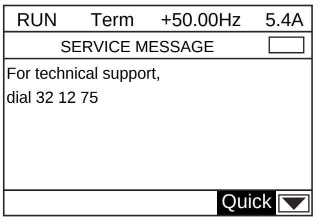
■ Test functions

The Altivar 61 drive includes the following test functions:

☐ Identifying any motor short-circuit before start-up

☐ Running, via the graphic display terminal or PowerSuite software workshop, automatic procedures during maintenance operations aimed at testing:
- the motor
- the drive power components

The test results are shown on the graphic display terminal or using the PowerSuite software workshop.
It is also possible to write and read messages in the drive using the graphic display terminal or the PowerSuite software workshop.



RUN Term +50.00Hz 5.4A
SERVICE MESSAGE

For technical support,
dial 32 12 75

Example of a customized message

■ Oscilloscope function

The Altivar 61 drive has an oscilloscope function, which produces traces that can be viewed using the PowerSuite software workshop.
The PowerSuite software workshop can also be used to carry out remote diagnostics via modem.

Controlling the drive

■ Via the drive I/O

Control signals are transmitted via cable to the I/O. Functions are assigned to logic inputs, analog inputs, etc.
A logic input can be assigned to more than one function. This means that two functions can be controlled using a single signal, thereby limiting the number of inputs required.

The Altivar 61 drive I/O can be configured independently from each other. For instance,

☐ A time delay can be applied when it comes to reading the logic inputs, so as to avoid any bounce-back from certain switches.

☐ Transforming incoming signals on the analog inputs can help the drive fully adapt to the control devices and applications:
  - Minimum and maximum values for the input signal
  - Input filtering in order to eliminate unwanted interference from the signals received
  - Magnifying glass effect through delinearizing the input signal in order to increase the precision with small amplitude signals
  - “Pedestal” and “Deadband” functions for signals in order to prevent low speed operations which can have an adverse effect on the application
  - “Mid-point” function, which can be used from a unipolar input signal to obtain a bipolar output signal to control the speed and direction of rotation

☐ Transforming analog outputs which transfer information sent by the drive to other devices (display units, drives, PLCs, etc.):
  - voltage or current output signal
  - minimum and maximum values for the output signal
  - output signal filtering

Logic outputs can be delayed on activation and deactivation. The output state can also be configured when the signal is active.
The frequency control signals are also transformed by the drive:

☐ signal frequency minimum and maximum values (30 kHz on the extended I/O card’s RP input).

■ Via the remote graphic display terminal

The rotation commands and references (speed or PID) can be controlled via the graphic display terminal. Some application functions can also be assigned to the function keys F1, F2, F3 and F4 on the graphic display terminal. It is possible to manage a change in command and/or reference source (bumpless function) in different ways.
Example: two options are offered when switching control from via the terminals to via the graphic display terminal:

☐ stop the Altivar 61 drive, or

☐ continue operation with a copy of the direction of rotation and reference

Controlling the drive (continued)

■ **Via a communication network**

☐ **I/O profile**

The I/O profile, which is easy and quick to use, can be used to control the Altivar 61 drive via the communication network, in the same way as via the I/O terminals.
When commands are sent via a network they are written in a command word. This word behaves like virtual terminals containing logic inputs.
Application functions can be assigned to the bits of this word. More than one function can be assigned to the same bit.

The commands and references can come from different sources, such as the terminals, graphic display terminal or communication networks.
Each source can be set or switched individually using logic inputs or command word bits.

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

☐ **CiA DSP 402 profile (“Device Profile Drives and Motion Control”)**

This profile from the organization CiA (CAN in Automation) describes standard functions, parameters and operation for variable speed drives.
This standard is an extension of the Drivecom profile. The Altivar 61 drive complies with the CiA DSP 402 standard and it supports the following 2 modes in this profile: separate and not separate.

Separate mode

The Start/Stop commands and references can come from different sources.
Example: the speed reference is transmitted by the Ethernet TCP/IP network and the Start/Stop commands by the logic signals wired on the terminals.

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

Not separate mode

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

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

The CiA DSP 402 profile is supported by all integrated communication ports (Modbus, CANopen), as well as by all the communication cards available (Ethernet TCP/IP, Fipio, Profibus DP, etc.).

☐ **ODVA profile**

The ODVA profile is supported by the DeviceNet communication card.

Functions suitable for pumping and ventilation applications

■ Motor control profiles

□ Energy saving ratio

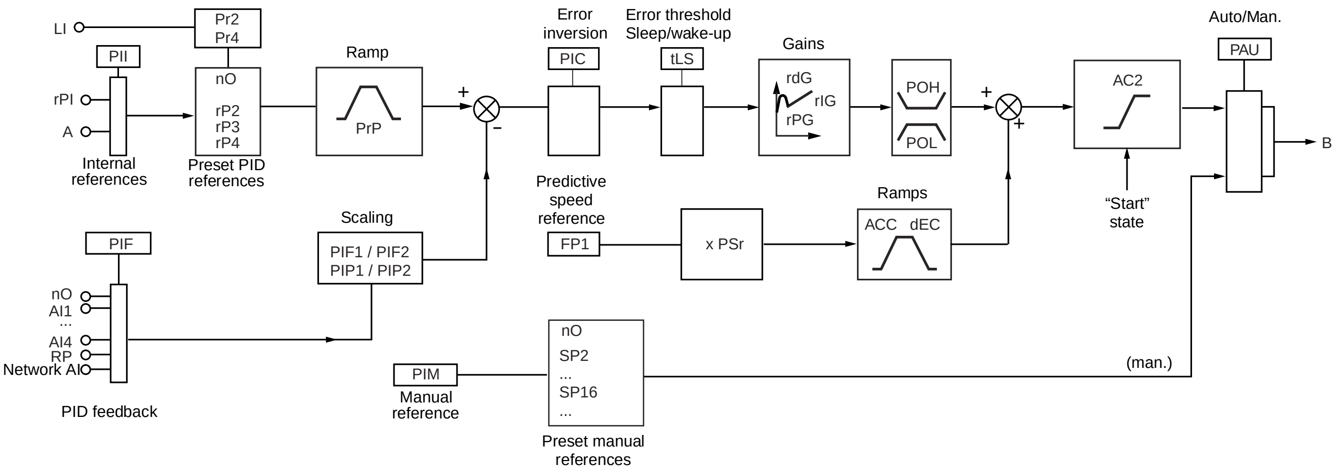
This type of command makes it possible to optimize the energy consumed based on the load applied to the machine.

□ Quadratic ratio (Kn²)

This type of command is optimized for centrifugal pumps and ventilators.

■ PID regulator

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


LI
Pr2
Pr4
PII
rPI
A
Internal references
nO
rP2
rP3
rP4
Preset PID references
Ramp
PrP
+
–
Error inversion
PIC
Error threshold Sleep/wake-up
tLS
Gains
rdG
rIG
rPG
POH
POL
+
+
AC2
"Start" state
Auto/Man.
PAU
B
Predictive speed reference
FP1
x PSr
Ramps
ACC dEC
Scaling
PIF1 / PIF2
PIP1 / PIP2
PIF
nO
AI1
...
AI4
RP
Network AI
PID feedback
PIM
Manual reference
nO
SP2
...
SP16
...
Preset manual references
(man.)

ACC: acceleration, dEC: deceleration, LI: logic inputs, B: Speed reference.

□ Internal references

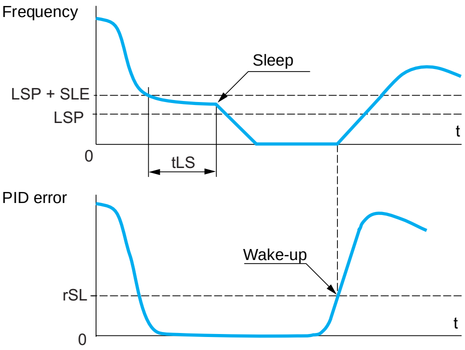
- rPI: reference transmitted by the graphic display terminal or a communication network.
- A: reference given by Fr1 or Fr1b with the summing, subtraction and multiplication functions, as appropriate.

The "PII" parameter is used to choose between these two references.

□ Preset PID references

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

LIx (Pr4)	LIy (Pr2)	Reference
0	0	rPI or A
0	1	rP2
1	0	rP3
1	1	rP4



LSP: Low speed
SLE: Adjustable restart threshold
tLS: Maximum low speed operating time
rSL: Restart error threshold

Example of operation of sleep/wake-up function

■ **PID regulator (continued)**

□ **PID feedback**

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

The following 4 functionalities can be used in combination with the PID regulator:

□ **PI feedback supervision**

□ **Sleep/wake-up**

This function is used in addition to the PID regulator to avoid extended operation at too low speeds that is unnecessary or undesirable.
It stops the motor following a period of reduced speed operation. This duration (tLS parameter) and this speed (LSP + SLE parameters) can be adjusted.
It restarts the motor if the error or the PID feedback exceeds an adjustable threshold (rSL or UPP parameters depending on the threshold).

□ **Activate sleep mode by flow detection**

This function is used in applications where zero flow cannot be detected by the sleep function alone.

□ **Alarms**

Minimum and maximum monitoring thresholds of the PID regulator feedback and monitoring threshold of the PID regulator error.

□ **Predictive speed reference**

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

□ **Auto/Man.**

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

Speed regulation mode (Man.)

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

PID regulation mode (Auto)

In automatic mode it is possible to:
- Adapt the references and feedback to the process (transformation)
- Correct a PID inversion
- Adjust the proportional, integral and derivative gains (Kp, Ki and Kd)
- Shunt the integral
- Use the “alarm” on the logic output or display it on the graphic display terminal, if the threshold is exceeded (Max. feedback, Min. feedback and PID error)
- Display the PID reference, PID feedback, PID error and PID output on the graphic display terminal and assign them to an analog output
- Apply a ramp (time = PrP) to the PID reference.

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

■ **Forced operation**

In combination with the function inhibiting all faults, this function allows the run command to be forced in a defined direction and the reference to be forced to a configured value.

■ **Flow limit**

Allows the flow of a fluid to be limited, for pumps.

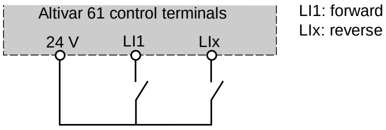
Other application functions

■ 2-wire control

This can be used to control the direction of operation by means of a stay-put contact.
It is enabled by means of 1 or 2 logic inputs (non-reversing or reversing).

This function is suitable for all non-reversing and reversing applications.
3 operating modes are possible:

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

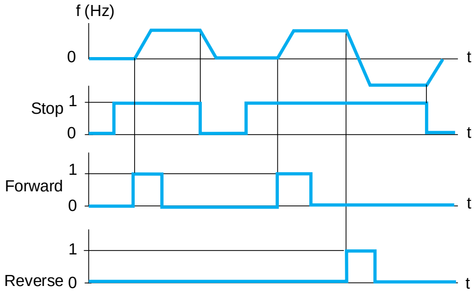


Wiring diagram for 2-wire control

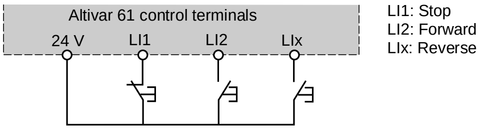
■ 3-wire control

This can be used to control the operating and stopping direction by means of pulsed contacts.
It is enabled by means of 2 or 3 logic inputs (non-reversing or reversing).

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



Example of 3-wire control operation



Wiring diagram for 3-wire control

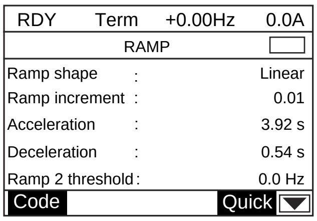
■ Phase rotation

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

■ Ramps

☐ Acceleration and deceleration ramp times

This can be used to define acceleration and deceleration ramp times according to the application and the machine dynamics.

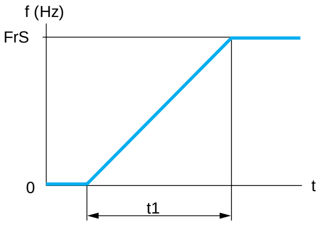


RDY Term +0.00Hz 0.0A

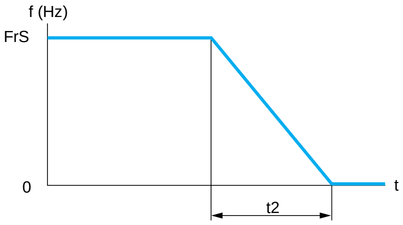
RAMP

Ramp shape :	Linear
Ramp increment :	0.01
Acceleration :	3.92 s
Deceleration :	0.54 s
Ramp 2 threshold :	0.0 Hz

Ramp settings



Linear acceleration ramp



Linear deceleration ramp

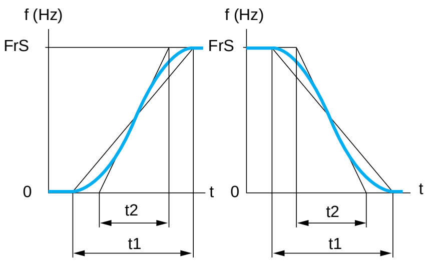
FrS: Nominal motor frequency
t1: Acceleration time
t2: Deceleration time
t1 and t2 can be set independently from 0.01 to 9000 s (according to one of the following ramp increments: 0.01 s, 0.1 s or 1 s);
Factory setting: 3 s.

□ Acceleration and deceleration ramp profile

This can be used to gradually increase the output frequency starting from a speed reference, following a linear profile or a preset profile.

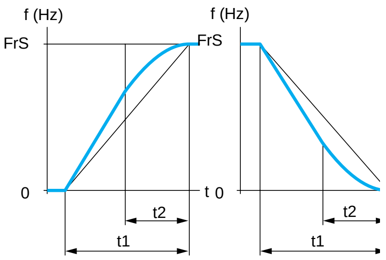
In the case of applications involving handling, packaging and passenger transport, the use of S ramps takes up mechanical play and eliminates jolts and also limits “non-following” of speed during rapid transient operation of high-inertia machines. Selecting “linear”, “S”, “U” or customized profiles assigns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

S ramps



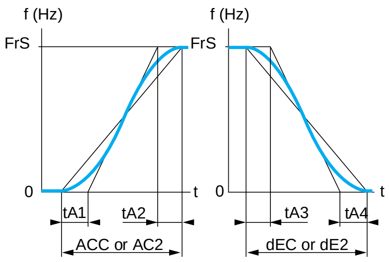
FrS: Nominal motor frequency
t1: Ramp time set
t2 = 0.6 x t1
The curve coefficient is fixed.

U ramps

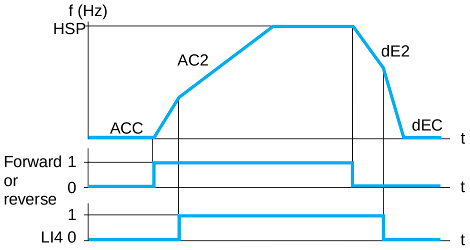


FrS: Nominal motor frequency
t1: Ramp time set
t2 = 0.5 x t1
The curve coefficient is fixed.

Customized ramps



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



Example of switching using logic input LI4

Acceleration 1 (ACC) and deceleration 1 (dEC):
- adjustment 0.01 to 9000 s
- factory setting 3 s

Acceleration 2 (AC2) and deceleration 2 (dE2):
- adjustment 0.01 to 9000 s
- factory setting 5 s

HSP: high speed.

□ Ramp switching

This can be used to switch 2 acceleration and deceleration ramp times, which can be adjusted separately.
Ramp switching can be enabled by:
- a logic input
- a frequency threshold
- a combination of the logic input (or a command word bit) and the frequency threshold
- a command word bit

Function suitable for:
- material handling with smooth starting and approach
- machines with fast steady state speed correction

□ Automatic adaptation of deceleration ramp

This can be used to automatically adapt the deceleration ramp if the initial setting is too low when the load inertia is taken into account. This function prevents the drive from locking in the event of an overbraking fault.
When this function is active and a short deceleration time has been set, the drive optimizes the motor power supply in order to achieve a high braking torque.

Function suitable for all applications which do not need to stop at a precise moment and do not use braking resistors.

Automatic adaption must be disabled for machines with a stop position on a ramp and using a braking resistor.

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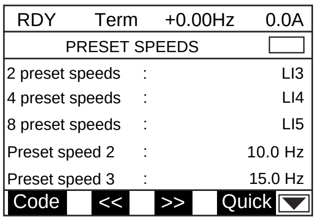


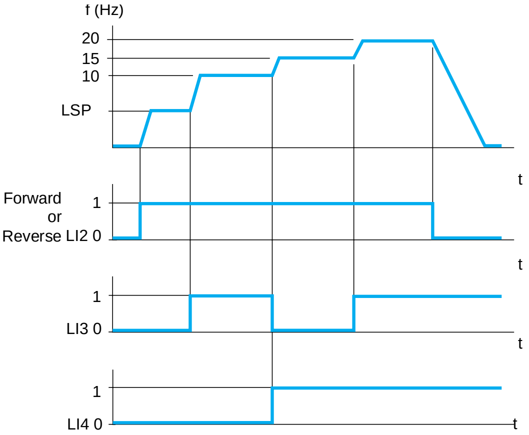
```
RDY      Term     +0.00Hz     0.0A
           PRESET SPEEDS
2 preset speeds   :            LI3
4 preset speeds   :            LI4
8 preset speeds   :            LI5
Preset speed 2    :        10.0 Hz
Preset speed 3    :        15.0 Hz
Code      <<      >>     Quick
```

Preset speed settings

■ Preset speeds

This can be used to switch preset speed references.
Choose between two, four or eight preset speeds.
Enabled by means of 1, 2 or 3 logic inputs.
Preset speeds can be set in increments of 0.1 Hz, from 0 Hz to 500 Hz or 1000 Hz, depending on the rating.

Function suitable for material handling and machines with several operating speeds.



The speed achieved with the LI3 and LI4 inputs at 0 is LSP or speed reference, resulting from the operations carried out on the references.

Factory settings:

1st speed: LSP (low speed or speed reference)

2th speed: 10 Hz

3th speed: 15 Hz

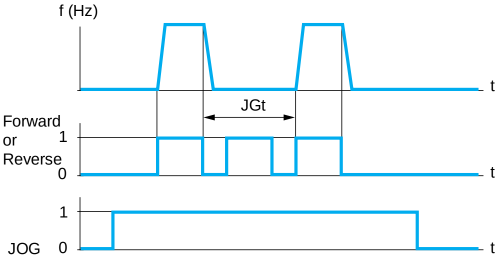
4th speed: 20 Hz

Example of operation with 4 preset speeds and 2 logic inputs

■ JOG operation

This can be used for pulse operation with minimum ramp times (0.1 s), limited speed reference and minimum time between 2 pulses.
It is enabled by 1 logic input and pulses given by the operating direction command.

Function suitable for machines with product insertion in manual mode
(example: gradual movement of the mechanism during maintenance operations).



Speed reference:
can be set from 0 to 10 Hz,
factory setting 10 Hz.

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

Example of JOG operation

■ Limiting low speed operating time

The motor is stopped automatically after a period of operation at low speed (LSP) with a zero reference and a run command present.
This time can be set between 0.1 and 999.9 seconds (0 corresponds to an unlimited time). Factory setting 0 s. The motor restarts automatically on the ramp when the reference reappears or if the run command is interrupted and then re-established.

Function suitable for automatic Stops/Starts.

Presentation:
pages 4 to 7

Characteristics:
pages 8 to 15

References:
pages 18 to 21

Dimensions:
pages 90 to 111

Schemes:
pages 112 to 127

■ Motor control types

□ Flux Vector Control with sensor (FVC)

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

□ Sensorless Flux Vector Control

In voltage mode, this control type can be used with a single motor or motors connected in parallel.
In current mode, this profile performs better than the previous type, but it cannot supply power to motors connected in parallel.

□ 2-point Vector Control

The zone for operating at constant power can be optimized by defining an additional point in the control profile.
This function should be used with motors offering a two-part defluxing zone.
It can be used to limit the voltage at the motor terminals when the motor is being powered by a high line supply.

□ Voltage/frequency ratio

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

□ Synchronous motor

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

■ Limiting motor overvoltage

The Altivar 61 drive inverter bridge control can be used to limit overvoltage in the motor terminals, which is double the voltage level in the DC bus (Stressless PWM).
This function is useful in cases where long lengths of cabling, rewound motors or motors in a low isolation class are involved.

■ Auto-tuning

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

Auto-tuning can be used to enhance application performance.
In Flux Vector Control mode (FVC open loop with voltage regulation), certain parameters are measured periodically.
Saving the motor thermal state can help to compensate exactly for the motor resistors, even after the drive has been switched off.

■ Switching frequency, noise reduction

The switching frequency setting permits a reduction in the noise generated by the motor for any application requiring a low level of noise.
The switching frequency is modulated randomly in order to avoid resonance. This function can be disabled if it causes instability.
Switching the intermediate DC voltage at high frequency is useful for supplying the motor with a current wave having little harmonic distortion.
The switching frequency is adjustable during operation to reduce the noise generated by the motor.
Value: 1 to 16 kHz depending on rating

Motor fluxing

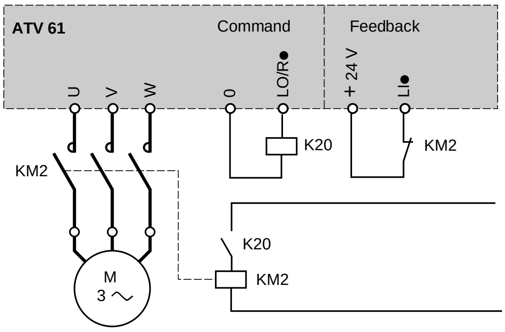
This can be used to obtain rapid high torque on start-up; magnetic flux needs to be already established in the motor.
There is a choice between open loop or closed loop operation.

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

In non-continuous mode:

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

Fluxing is accelerated if a higher current than the nominal motor current is applied, then it is set to the value of the motor no-load current.



Output contactor command

Output contactor command

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

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

Stop on thermal alarm

This can be used to:

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

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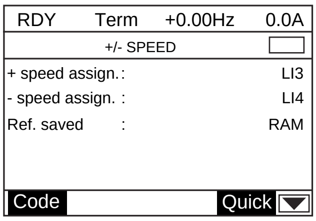


RDY	Term	+0.00Hz	0.0A

+/- SPEED

+ speed assign.: LI3
- speed assign. : LI4
Ref. saved : RAM

+/- speed function settings

■ Uncontrolled output cut

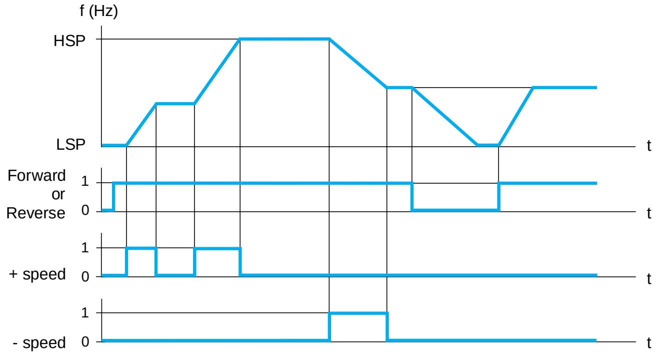
It is possible to configure output phase loss protection, which will allow the drive or motor circuit to be broken without the drive becoming locked in fault mode and facilitate a smooth restart after the motor has been reconnected. The output phase loss may also lock the drive, depending on the configuration.

■ +/- speed

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

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

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

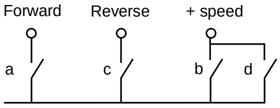


LSP: low speed, HSP: high speed

Example of "+/- speed" with 2 logic inputs, single action buttons and reference saving

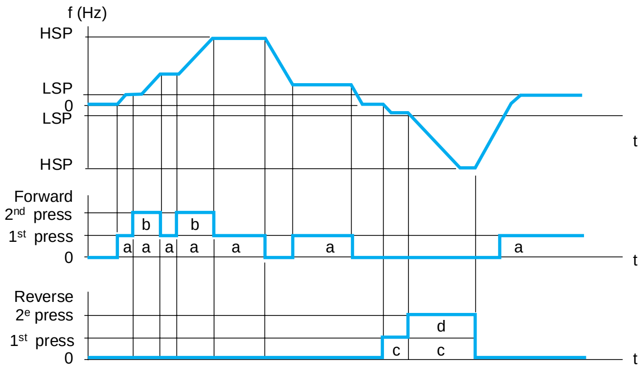
☐ **Use of double action buttons**: only 1 logic input assigned to + speed is required.

Logic inputs:



a and b: 1st press
c and d: 2st press

	Released (- speed)	**1st press** (speed maintained)	**2nd press** (+ speed)
Forward button	–	a	a and b
Reverse button	–	c	c and d



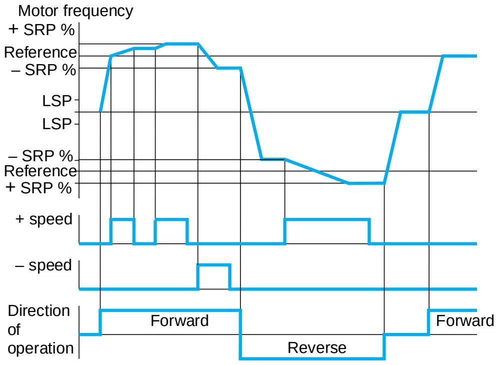
LSP: low speed, HSP: high speed

Example with double action buttons and 1 logic input

Note: *This type of +/- speed control is incompatible with 3-wire control.*

Variable speed drives for asynchronous motors

Altivar 61



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

☐ Reference saving

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

☐ +/- speed around a reference

The reference is given by Fr1 or Fr1b, including, if relevant, the summing, subtraction and multiplication functions, as well as the preset speeds.
During the run command the drive goes to the reference, following the acceleration and deceleration ramps (pressing +/- speed makes the speed vary around this reference according to acceleration ramp 2 and deceleration ramp 2).
+ or - speed variation around the reference is limited to a percentage of the reference (SRP parameter). When operation has stopped, the amended reference is not saved.
The maximum total reference is always limited by high speed (HSP parameter) and the minimum reference (LSP parameter).

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

This function can be used to restart the motor smoothly after one of the following events, provided the run command is still present:
- ☐ loss of line supply or power off
- ☐ fault reset or automatic restart
- ☐ freewheel stop.

Once the event is over, the effective speed of the motor is detected in order to restart on a ramp at this speed and return to the reference speed. The speed detection time can reach 0.5 s.

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

■ Undervoltage management

Depending on the application, it is possible to configure the Altivar 61's response to undervoltages or power failures.
If undervoltage occurs:
- ☐ The Altivar 61 drive can continue operating with undervoltage levels up to -50% (adjustable threshold)
- ☐ If the drive locks as a result, management of the fault relay can be configured (open or not). If the fault relay does not open an alarm is shown.

The Altivar 61 drive can also be configured to prevent the drive locking (using an alarm):
- ☐ Controlled stop according to the type of stop configured
- ☐ Deceleration based on a ramp which it automatically adapts to maintain the DC bus voltage, thereby preventing the drive from locking in fault mode
- ☐ Instant IGBT (inverter bridge) loss followed by power supplied to the motor as soon as the line voltage has reappeared. This function can be used to prevent the Altivar 61 drive being reinitialized.

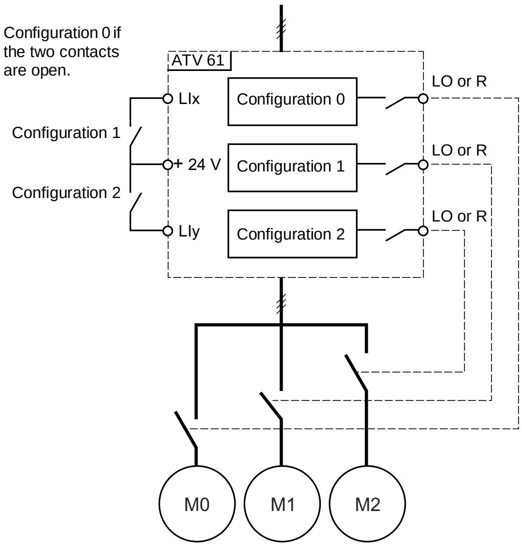
■ Braking balance

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

■ Braking resistor thermal protection

The Altivar 61 drive incorporates thermal protection for braking resistors if it is not equipped with a thermal switch. If the resistor thermal state is too high an alarm can be assigned to the logic output or the drive may lock in fault mode, depending on how the function is programmed.

Variable speed drives for asynchronous motors
Altivar 61



Schematic diagram for multi-motor mode

■ Parameter set switching (multi-parameter)

This can be used to switch 3 sets of 15 parameters maximum when the motor is running.
Each set can contain a different value for each of the parameters. The sets are switched using 1 or 2 logic inputs or command word bits.

Function suitable for machines involving 2 or 3 manufacturing processes.

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

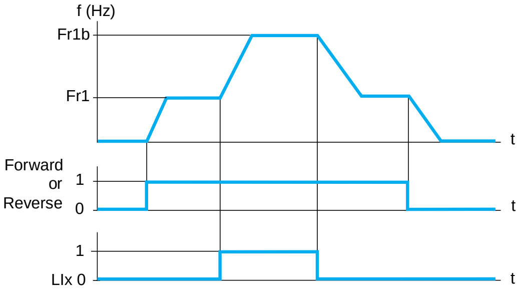
The Altivar 61 drive can have 3 configurations, which can be activated remotely, allowing it to adapt to:

☐ 2 or 3 different motors or mechanisms in multi-motor mode. In this instance, the thermal state for all the motors is calculated and saved. This means that each motor is protected thermally.

☐ 2 or 3 configurations for the same motor in multi-configuration mode. This function can also be used to save the current configuration in another memory zone, which it can be retrieved from.

Switching is carried out using 1 or 2 logic inputs, depending on the number of motors or configurations chosen (2 or 3).

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



Example of reference switching

■ Reference switching

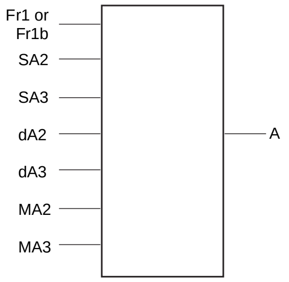
Switching between two references (speed, PID, etc.) can be enabled by:

☐ a logic input
☐ a command word bit

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

Reference Fr1b, like Fr1, can originate from:

☐ an analog input (AI)
☐ a frequency control input (RP)
☐ the graphic display terminal
☐ the Modbus or CANopen bus
☐ a communication card
☐ the “Controller Inside” programmable card



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

■ Operations on the references (summing, subtraction, multiplication)

Summing, subtraction and multiplication inputs can be activated simultaneously.

The drive reference is thus:
- ☐ reference of drive A = (Fr1 or Fr1b + SA2 + SA3 - dA2 - dA3) x MA2 x MA3

☐ Summing inputs

They can be used to add 2 to 3 references from different sources to Fr1 or Fr1b (see “Reference switching”).
The references to be added together are selected from all the possible types of reference.

Example:
Reference Fr1 or Fr1b from AI1
Reference SA2 from CANopen
Reference SA3 from a communication card
Reference of drive A = Fr1 or Fr1b + SA2 + SA3.

☐ Subtraction inputs

They can be used to subtract 2 to 3 references from different sources from Fr1 or Fr1b (see “Reference switching”).
The references to be subtracted are selected from all the possible types of reference.

Example:
Reference Fr1 or Fr1b from AI1
Reference dA2 from CANopen
Reference dA3 from a communication card
Reference of drive A = Fr1 or Fr1b - dA2 - dA3.

☐ Multiplication inputs

They can be used to multiply 2 to 3 references from different sources by Fr1 or Fr1b (see “Reference switching”).
The references to be multiplied are selected from all the possible types of reference.

Example:
Reference Fr1 or Fr1b from AI1
Reference MA2 from CANopen
Reference MA3 from a communication card
Reference of drive A = Fr1 or Fr1b x MA2 x MA3.

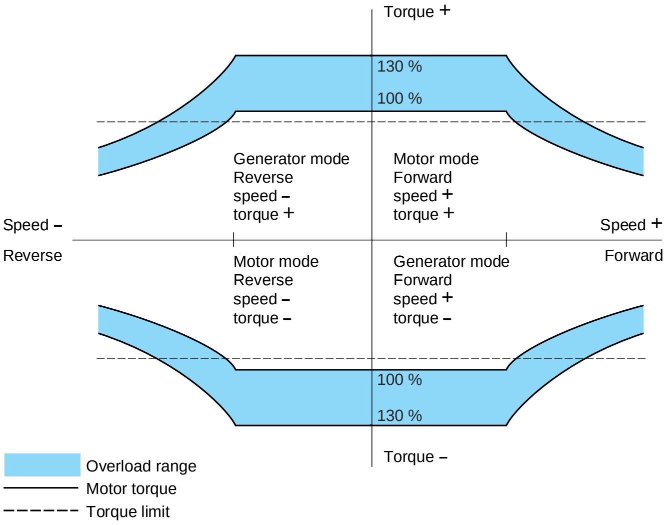
■ Torque limit

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

There are two types of torque limit:
- ☐ one with a value set by a parameter
- ☐ the other with a value given by an analog input or a frequency control input.

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

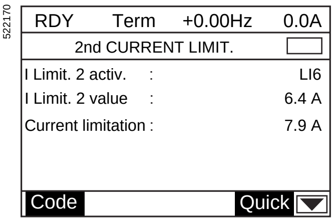
This function is not available for voltage/frequency ratio.


Torque +
130 %
100 %
Generator mode
Reverse
speed –
torque +
Motor mode
Forward
speed +
torque +
Speed –
Reverse
Speed +
Forward
Motor mode
Reverse
speed –
torque –
Generator mode
Forward
speed +
torque –
100 %
130 %
Torque –
Overload range
Motor torque
Torque limit

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

■ Torque or current limit detection

This function can be used to detect when the current or torque limit has been reached. Depending on the configuration, it is possible to:
- ☐ use an alarm to signal this
- ☐ lock the drive after an adjustable period of time.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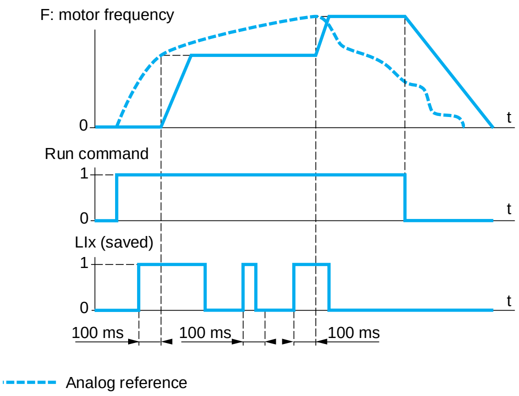
Code
Quick

RDY Term +0.00Hz 0.0A
2nd CURRENT LIMIT.
I Limit. 2 activ. : LI6
I Limit. 2 value : 6.4 A
Current limitation : 7.9 A

Configuring current switching

■ Current limit

A 2nd current limit can be configured between 1.1 and 1.2 times the nominal drive current and it can be used to limit the rise in motor temperature and the torque. Switching between 2 current limits can be enabled via:
- ☐ a logic input
- ☐ a command word bit



Example of how reference saving works

■ Reference saving

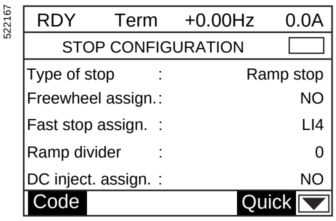
This can be used to:

☐ Read and save the speed reference value of the analog input using a logic input when the command lasts longer than 0.1 s

☐ Control the speed of several drives alternately via a single analog reference and a logic input for each drive

☐ Enable via a logic input a line reference (serial link) on several drives in order to synchronize movements by eliminating variations when the reference is sent

The reference is acquired 100 ms after the rising edge of the acquisition request.
A new reference is not then acquired until a new request is made.



RDY Term +0.00Hz 0.0A

STOP CONFIGURATION

Type of stop	:	Ramp stop
Freewheel assign.	:	NO
Fast stop assign.	:	LI4
Ramp divider	:	0
DC inject. assign.	:	NO

Configuring stop types

■ Stop types

☐ Freewheel stop

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

A freewheel stop is achieved:

- by configuring a normal stop command as a freewheel stop (when a run command is over or a stop command occurs)
- by enabling a logic input
- by activating a command word bit

☐ Fast stop

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

This is used for conveyors with emergency stop electrical braking.
A fast stop is achieved:

- by configuring a normal stop as a fast stop (when a run command is over or a stop command occurs)
- by enabling a logic input
- by activating a command word bit

☐ Fastest possible stop

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

☐ DC injection stop

This can be used to brake high-inertia machines at low speed or maintain torque on stopping.
A DC injection stop is achieved:

- by configuring a normal stop as a DC injection stop (when a run command is over or a stop command occurs)
- by enabling a logic input
- by activating a command word bit

The DC value and the standstill braking time are adjustable.

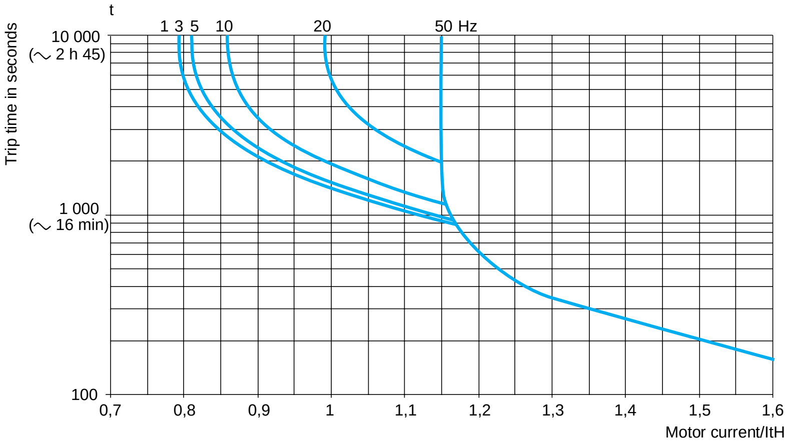
■ **Motor thermal protection**

Motor thermal protection is provided by the drive:
□ directly, through PTC probes located in the motor windings
□ indirectly, via the integrated thermal relay. Indirect thermal protection is implemented via continuous calculation of its theoretical temperature rise.

The microprocessor calculates the theoretical temperature rise of the motor based on various elements:
□ the operating frequency
□ the current taken by the motor
□ the operating time
□ the maximum ambient temperature around the motor (40°C)
□ the type of motor ventilation (self-cooled or force-cooled)

Thermal protection can be adjusted from 0.5 to 1.2 times the nominal current, depending on the drive type. It must be adjusted to the nominal current indicated on the motor rating plate.

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



Motor thermal protection curves

□ Self-cooled motors:
The tripping curves vary with the motor frequency.

□ Force-cooled motors:
Only the 50 Hz tripping curve should be considered, whatever the motor frequency.

■ **Drive thermal protection**

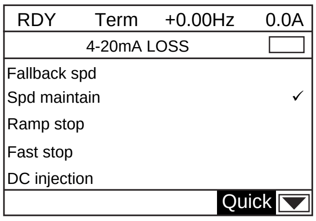
The drive thermal protection is provided by a PTC probe mounted on the heatsink or integrated with the power module.

■ **IGBT thermal protection**

The drive manages the switching frequency intelligently according to the IGBT temperature.
If the drive's current rating is exceeded (example: current higher than the nominal drive current for a zero stator frequency), an alarm is displayed and a timer increases for as long as the alarm is present.

■ **Machine protection**

Makes it possible to detect under and/or overload.



RDY Term +0.00Hz 0.0A
4-20mA LOSS
Fallback spd
Spd maintain ✓
Ramp stop
Fast stop
DC injection
Quick

Configuration of the drive's fault response

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

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

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

List of resettable faults:

- external fault
- speed feedback loss
- overspeed
- output phase loss
- auto-tuning fault
- loss of 4-20 mA
- PTC probe
- drive overheating
- motor overload if the thermal state is less than 100%
- line overvoltage
- overbraking
- current/torque limit
- IGBT overheating
- communication faults (Modbus, CANopen and other communication networks),
- process overload
- process underload
- PI supervision,
- No flow.

■ Resetting resettable faults

This can be used to remove the last fault using a logic input, command word bit or the STOP/RESET key on the graphic display terminal.
The restart conditions after a reset to zero are the same as those of a normal power-up.
List of resettable faults, see "Configuring the drive's fault response".
Line supply undervoltage and input phase loss faults are reset automatically when the line supply is restored.

Function suitable for applications where drives are difficult to access, for example, a drive placed on a moving part.

■ General reset (disables all faults)

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

Function suitable for applications where restarting may be crucial (conveyor in an oven, smoke extraction system, machines with solidifying products to be discarded).
The function is enabled by a logic input.
Fault monitoring is active if the logic input is at state 1.
All faults are reset on a change of state ↑ of the logic input.

Note: *Use of this function invalidates the guarantee.*

■ Automatic restart

This enables the drive to be restarted automatically after it has locked in fault mode if the relevant fault has disappeared and the other operating conditions permit a restart.
This restart is performed by a series of automatic attempts separated by increasingly longer waiting periods of 1 s, 5 s, 10 s then 1 minute for the rest.
The options for the restart process's duration are 5, 10 and 30 min., 1, 2, 3 hours and an unlimited time.
If the drive has not restarted after the configured time, it will lock and the procedure is abandoned until it has been powered off and on again.

The faults which allow the drive to be restarted in this way are:
- ☐ line overvoltage
- ☐ motor thermal overload
- ☐ drive thermal overload
- ☐ d.c. bus overvoltage
- ☐ line phase failure
- ☐ external fault
- ☐ loss of 4-20 mA
- ☐ PTC probe
- ☐ serial link
- ☐ current or torque limit
- ☐ output phase loss
- ☐ line voltage too low. For this fault, the function is always active, even if it is not configured.
- ☐ process overload
- ☐ process underload
- ☐ PI supervision
- ☐ no flow.
- ☐ fault caused by CANopen, Modbus or other commmunication networks. These faults are reset automatically as soon as the command word or frequency reference is sent to the drive.

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

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

■ PTC probe protection

The probes can be connected directly to the drive control card or to the I/O option cards.
The way in which a temperature fault is recorded by the drive can be configured:
- ☐ permanent record
- ☐ only recorded when the drive's power section is switched on
- ☐ only recorded when the motor is running

■ IGBT testing

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

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

■ Resetting operating time to zero

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

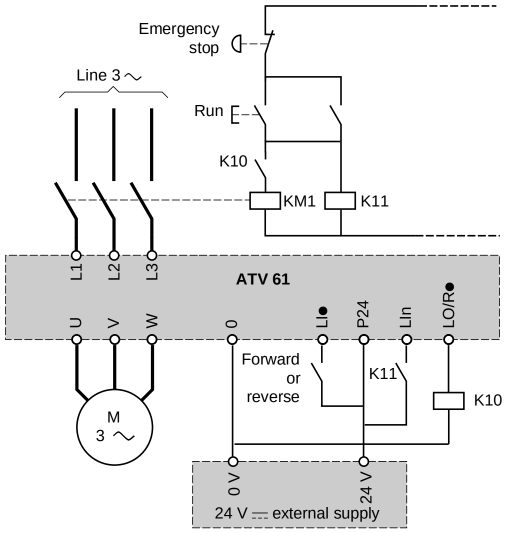
■ External fault

This function can lead to the drive locking if a fault occurs in the machine. This fault is flagged on the drive display unit. The fault is flagged if the signal is at 1 or 0, according to the function configuration.

■ Line contactor control

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

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



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

■ Forced local mode

Forced local mode imposes control via the terminals or graphic display terminal and disables all other control modes.
Switching to forced local mode may be activated via:

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

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

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

Function compatibility table

■ Configurable I/O

The table below lists the incompatibilities between the functions and indicates the priority functions:
Stop functions have priority over run commands.
The Power Removal safety function takes priority over all other functions.
The selection of functions is limited:

- ☐ By the number of drive I/O which can be reassigned: if necessary, add an I/O extension card.
- ☐ By the incompatibility of certain functions with one another

Functions	**PID regulator**	**Preset speeds**	**JOG operation**	**Synchronous motor**
PID regulator	▒	🟦	⊖	🟦
Preset speeds	🟦	▒	↑	🟦
JOG operation	⊖	←	▒	🟦
Synchronous motor	🟦	🟦	🟦	▒
+/- speed *(1)*	🟦	🟦	⊖	🟦
+/- speed around a reference	⊖	🟦	⊖	🟦
Operation on the references	⊖ *(2)*	↑	↑	🟦
Freewheel stop	🟦	🟦	🟦	🟦
Fast stop	🟦	🟦	🟦	🟦
DC injection stop	🟦	🟦	🟦	⊖

(1) Excluding special use with reference channel Fr2.
(2) Only the multiplier reference is incompatible with the PID regulator.
(3) Priority is given to the first of these two stop modes to be activated.

⊖ Incompatible functions

🟦 Compatible functions

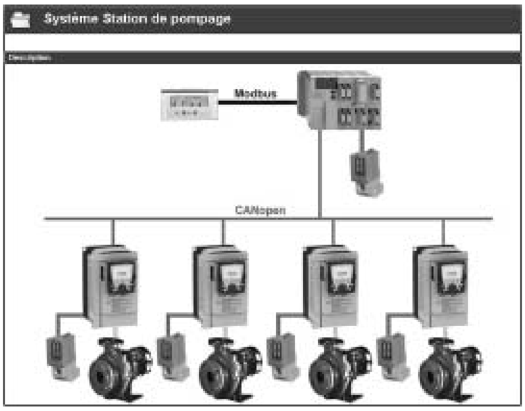
▒ N/A

Priority functions (functions which cannot be active at the same time)

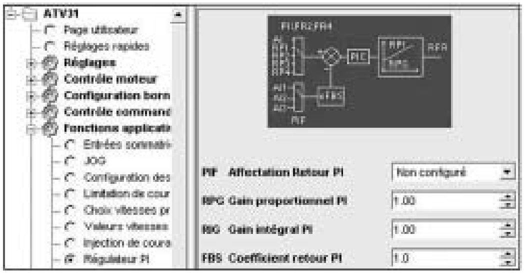
← The arrow indicates which function has priority.
Example: the "Freewheel stop" function has priority over the "Fast stop" function

+/- speed *(1)*	+/- speed around a reference	Operation on the references	Freewheel stop	Fast stop	DC injection stop
	⊖	⊖ *(2)*			
		←			
⊖	⊖	←			
					⊖
				←	←
			↑		⊖ *(3)*
			↑	⊖ *(3)*	

PowerSuite software workshop

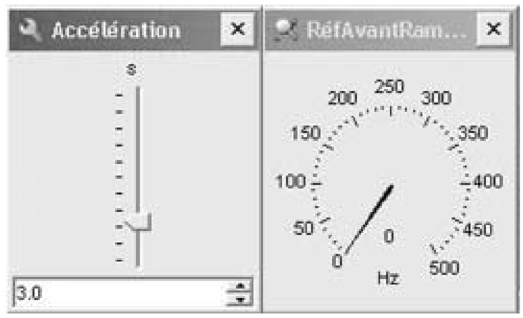

534513
Système Station de pompage
Description
Modbus
CANopen

PowerSuite screen on PC
Installed base management


533181
ATV31
Page utilisateur
Réglages rapides
Réglages
Contrôle moteur
Configuration born
Contrôle command
Fonctions applicati
Entrées sommatri
JOG
Configuration des
Limitation de cour
Choix vitesses pr
Valeurs vitesses
Injection de coura
Régulateur PI
FI/FR2/FR4
PIC
RPI
RPG
RFR
FBS
PIF

PIF Affectation Retour PI: Non configuré
RPG Gain proportionnel PI: 1.00
RIG Gain intégral PI: 1.00
FBS Coefficient retour PI: 1.0

PowerSuite screen on PC
View of PI regulator function parameters


533182
Accélération
s
RéfAvantRam...
0
50
100
150
200
250
300
350
400
450
500
0
Hz

Accélération: 3.0

PowerSuite screen on PC
Monitoring control panel (cursor, gauge)

Presentation

The PowerSuite software workshop for PC is a user-friendly tool designed for setting up control devices for the following Telemecanique brand motors:

- TeSys model U controller-starters
- Altistart soft start/soft stop units
- Altivar variable speed drives.

It includes various functions designed for setup phases such as:

- Preparing configurations
- Start-up
- Maintenance.

In order to simplify the start-up and maintenance phases, the PowerSuite software workshop can use the Bluetooth® wireless link.

Functions *(1)*

Preparing configurations

The PowerSuite software workshop can be used on its own to generate the device configuration. It can be saved, printed and exported to office automation software.

The PowerSuite software workshop can also be used to convert:

- An Altivar 28 drive configuration to an Altivar 31 drive configuration
- An Altivar 38 drive configuration to an Altivar 61 drive configuration
- An Altivar 58 or Altivar 58F drive configuration to an Altivar 71 drive configuration.

Start-up

When the PC is connected to the device, the PowerSuite software workshop can be used to:

- Transfer the generated configuration
- Adjust
- Monitor. This option has been enhanced with new functions such as:
  - The oscilloscope
  - The high speed oscilloscope (minimum time base: 2 ms)
  - Displaying communication parameters
- Control
- Save the final configuration.

Maintenance

In order to simplify maintenance operations, the PowerSuite software workshop can be used to:

- Compare the configuration of a device currently being used with a saved configuration
- Manage the user’s installed base of equipment, in particular:
  - Organize the installed base into folders (electrical equipment, machinery, workshops, etc.)
  - Store maintenance messages
  - Simplify Ethernet connection by storing the IP address.

User interface

The PowerSuite software workshop can be used to:

- Present the device parameters arranged by function in the form of illustrated views of diagrams or simple tables
- Customize the parameter names
- Create:
  - A user menu (choice of particular parameters)
  - Monitoring control panels with graphic elements (cursors, gauges)
- Perform sort operations on the parameters
- Display text in five languages (English, French, German, Italian and Spanish).

The language changes immediately and there is no need to restart the program.

It also has online contextual help:

- On the PowerSuite tool
- On the device functions by direct access to the user manuals.

---

(1) Some functions are not available for all devices. See the table of function availability, page 179.

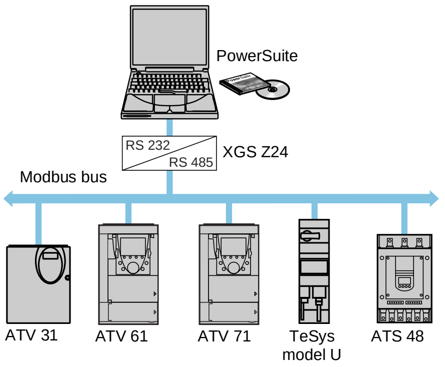
References:
page 180

Function availability for the PowerSuite software workshop

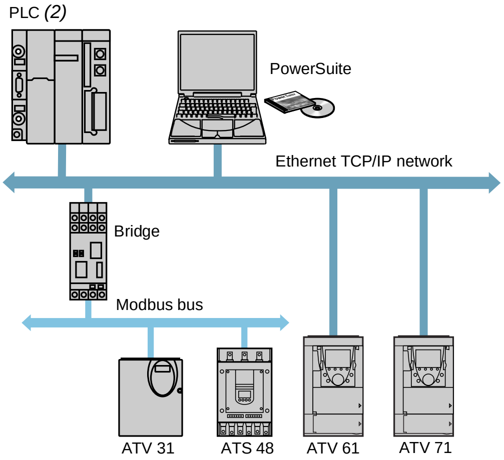
Functions not listed in the table are available for all devices.

Function available with devices	Controller-starter	Soft start/soft stop unit	Drives			
	TeSys model U	ATS 48	ATV 11	ATV 31	ATV 61	ATV 71
Monitoring	■	■	□	■	■	■
Oscilloscope	□	□	□	■	■	■
High speed oscilloscope	□	□	□	□	■	■
Display of communication parameters	□	□	□	□	■	■
Control	■	■	□	■	■	■
Customization of parameter names	□	□	■	■	■	■
Creation of a user menu	□	□	■	■	■	■
Creation of monitoring control panels	□	□	□	■	■	■
Sort operation on parameters	□	□	■	■	■	■

■ Functions available
□ Functions not available



Modbus multidrop connection



Ethernet connection

Connections *(1)*

Modbus communication bus

The PowerSuite software workshop can be connected directly to the device terminal port or Modbus network port via the serial port on the PC.

Two types of connection are possible:
- With a single device (point-to-point connection), using a VW3 A8 106 PC serial port connection kit
- With a number of devices (multidrop connection), using the XGS Z24 interface.

Ethernet TCP/IP communication network

The PowerSuite software workshop can be connected to an Ethernet TCP/IP network (see pages 182 to 187). In this case, the devices can be accessed:
- Using a VW3 A58 310 communication card for the Altivar 61and 71 drives
- Using a 174 CEV 300 20 Ethernet-Modbus bridge.

Bluetooth® wireless link

The PowerSuite software workshop can communicate via a Bluetooth® radio link with a device equipped with a Bluetooth® - Modbus VW3 A8 114 adapter. The adapter plugs into the device terminal port or Modbus network port and has a range of 10 m (class 2).

If the PC does not have Bluetooth® technology, use the VW3 A8 115 USB-Bluetooth® adapter.

Remote maintenance

Using a simple Ethernet connection, the PowerSuite software workshop can be used for remote monitoring and diagnostics.
When devices are not connected to the Ethernet network, or it is not directly accessible, various remote transmission solutions may be possible (modem, teleprocessing gateway, etc.). Please consult your Regional Sales Office.

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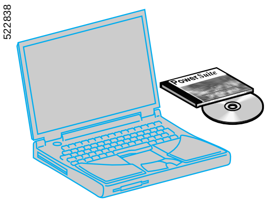
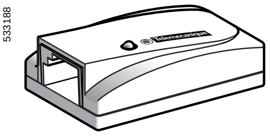
(1) Please refer to the compatibility table on page 181.
(2) Please refer to our specialist “Automation platform Modicon Premium and Unity - PL7 software” and “Automation platform Modicon TSX Micro - PL7 software” catalogues.

PowerSuite software workshop



VW3 A8 104



VW3 A8 114

Description	Composition	Reference	Weight kg
PowerSuite CD-ROM	■ 1 program for PC in English, French, German, Italian and Spanish ■ Variable speed drive and starter technical manuals.	**VW3 A8 104**	0.100
PowerSuite update CD-ROM *(1)*	■ 1 program for PC in English, French, German, Italian and Spanish ■ Variable speed drive and starter technical manuals.	**VW3 A8 105**	0.100
Connection kit for PC serial port for point-to-point Modbus connection	■ 1 x 3 m cable with 2 RJ45 connectors ■ 1 RS 232/RS 485 converter with one 9-way female SUB-D connector and 1 RJ45 connector ■ 1 converter for the ATV 11 drive, with one 4-way male connector and one RJ45 connector ■ 1 RJ45/9-way male SUB-D adapter for connecting ATV 38/58/58F drives ■ 1 RJ45/9-way female SUB-D adapter for connecting ATV 68 drives.	**VW3 A8 106**	0.350
RS 232-RS 485 interface for multidrop Modbus connection	1 multidrop Modbus converter for connection to screw terminals. Requires a 24 V ⎓ (20...30 V), 20 mA power supply *(3)*.	**XGS Z24**	0.105
Modbus-Bluetooth® adapter *(2)*	■ 1 Bluetooth® adapter (10 m range, class 2) with 1 RJ45 connector ■ 1 x 0.1 m cable with 2 RJ45 connectors for PowerSuite ■ 1 x 0.1 m cable with 1 RJ45 connector and 1 mini DIN connector for TwidoSoft ■ 1 RJ45/9-way male SUB-D adapter for connecting ATV 38/58/58F drives.	**VW3 A8 114**	0.155
USB-Bluetooth® adapter for PC	This adapter is required for a PC which is not equipped with Bluetooth® technology. It is connected to a USB port on the PC. Range of 10 m (class 2).	**VW3 A8 115**	0.290

(1) Updates a version $\geq$ V1.50 with the latest available version. For versions < V1.50, you should order the PowerSuite CD-ROM, VW3 A8 104.

(2) Can also be used to communicate between a Twido PLC and the TwidoSoft software workshop.

(3) Please consult our “Interfaces, I/O splitter boxes and power supplies” catalogue.

Compatibility of PowerSuite software workshop with the following devices *(1)*

Connection	Controller-starter	Soft start/ soft stop unit	Drives			
	TeSys model U	ATS 48	ATV 11	ATV 31	ATV 61	ATV 71
Modbus	V1.40	V1.30	V1.40	V2.0	V2.30	V2.2
Ethernet (device equipped with an Ethernet TCP/IP card)					V2.30	V2.2
Ethernet via Modbus Ethernet bridge		V1.50		V2.0	V2.30	V2.2
Bluetooth®		V2.2		V2.2	V2.30	V2.2

■ Compatible software versions
□ Incompatible software versions

Hardware and software environments

The PowerSuite software workshop can operate in the following PC environments and configurations:

- Microsoft Windows® 98 SE, Microsoft Windows® 2000, Microsoft Windows® XP
- Pentium III, 800 MHz, hard disk with 300 MB available, 128 MB RAM
- SVGA or higher definition monitor

---

(1) Software version supplied for the latest version of drive available.

Starters, drives and communication

Ethernet TCP/IP network

Transparent Ready concept

Presentation

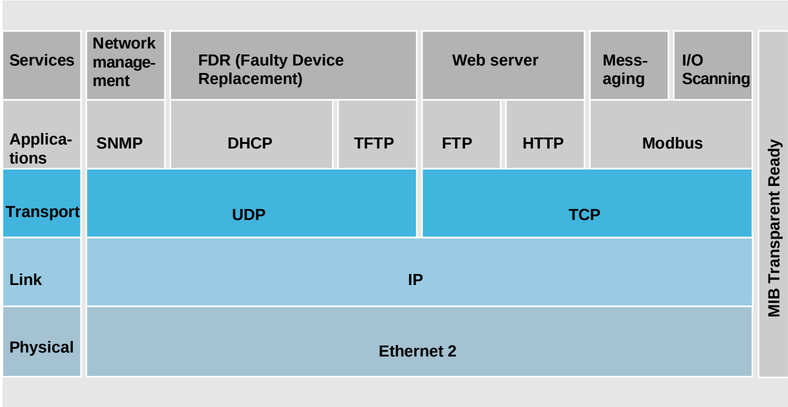
Introduced by Schneider Electric, the Transparent Ready concept enables transparent communication between control system devices, production and management. Network technologies and the associated new services are used to share and distribute data between sensors, PLCs, workstations and third-party devices in an increasingly efficient manner.
Web servers embedded in network components and control system devices can be used to:

- Access configuration data transparently
- Perform remote diagnostics
- Incorporate simple human/machine interface functions.

This concept is based on the Ethernet TCP/IP industrial standard which proposes a single network that meets most communication requirements from sensors/actuators through to production management systems.
Where a variety of communication systems are usually required, Transparent Ready standard technologies can result in significant cost savings in the areas of definition, installation, maintenance or training.

Transparent Ready is based on:

- Ethernet TCP/IP-based services meeting control system requirements in terms of functions, performance and quality of services
- Products including several ranges of PLC, distributed I/O, industrial terminals, variable speed drives, gateways and an increasing number of partner products
- The ConneXium range of cabling accessories: hubs, switches, cables adapted to the environment and to the requirements of industrial conditions.



Services supported by the Altivar 61 and Altivar 71 drives

The Altistart 48 soft start/soft stop unit and the Altivar 31 variable speed drive are connected to the Ethernet TCP/IP network via an Ethernet/Modbus 174 CEV 300 20 Ethernet/Modbus bridge.

The Altivar 61 and Altivar 71 variable speed drives are connected to the Ethernet TCP/IP network via a VW3 A3 310 communication card.
This card comes with a basic web server, which users can adapt completely according to the application (Java or FactoryCast development tool).

Characteristics:
page 183
Functions:
pages 183 to 185
Connections:
page 186
References:
pages 186 and 187

Starters, drives and communication

Ethernet TCP/IP network

Transparent Ready concept

Characteristics

Structure	Topology	Industrial local area network conforming to ANSI/IEEE 802.3 (4th edition 1993-07-08) Star network
	Transmission mode	Manchester baseband. Half-duplex or full-duplex
	Data rate	10/100 Mbps with automatic recognition
	Medium	STP double shielded twisted pair, impedance 100 Ω ± 15 Ω for 10 BASE-T or category 5 Ethernet cable, conforming to standard TIA/EIA-568A
	Length of network	100 m maximum between Hub or switch and a station

Type of device	**ATS 48, ATV 31**	**ATV 61, ATV 71**
Type of interface	**174 CEV 300 20**	**VW3 A3 310**
Universal services	SNMP	HTTP, BOOTP, DHCP, FTP, TFTP, SNMP
Transparent Ready services	Modbus messaging	Modbus messaging, IO Scanning, FDR

Universal services

HTTP

HTTP “Hypertext Transfer Protocol” (RFC 1945) is a protocol used to transmit web pages between a server and a browser. HTTP has been used on the Web since 1990.

Web servers embedded in control system devices are at the heart of the Transparent Ready concept and provide easy access to devices anywhere in the world using a standard web browser such as Internet Explorer or Netscape Navigator.

BOOTP/DHCP

BOOTP/DHCP (RFC 1531) is used to supply devices (client) automatically with IP addresses and parameters. This avoids having to manage the addresses of each device individually by transferring their management to a server.
BOOTP identifies the client device by its Ethernet MAC address. This address is unique to each device and should be entered in the server each time the device is changed.
DHCP “Dynamic Host Configuration Protocol” identifies the client device by a name in plain language (“Device Name”) which is maintained throughout the application: example: “Conveyor 23”.

Altivar 61 and Altivar 71 drives can be given a name (“Device Name”) by the terminal or the PowerSuite software workshop.
The FDR (“Faulty Device Replacement”) service uses the standard DHCP and TFTP protocols.

FTP/TFTP

FTP, “File Transfer Protocol” (RFCs 959, 2228 and 2640) and TFTP, “Trivial File Transfer Protocol” (RFC 1123), are used to exchange files with devices.

Transparent Ready devices implements FTP for downloading firmware or custom web pages.
The FDR (“Faulty Device Replacement”) service uses the standard DHCP and TFTP protocols.

SNMP

The Internet community has developed the SNMP standard , “Simple Network Management Protocol” (RFCs 1155, 1156 and 1157), to support the management of the various network components by means of a single system. The network management system can exchange data with SNMP agent devices. This function allows the manager to view the status of the network and devices, to modify their configuration and to return alarms in the event of a fault.

Transparent Ready devices are compatible with SNMP and can be integrated naturally into a network administered via SNMP.

Presentation:
page 182
Connections:
page 186
References:
pages 186 and 187

Transparent Ready services

Modbus communication standard

Modbus, the industry communication standard since 1979, has been ported to Ethernet TCP/IP, the backbone of the Internet revolution, to create Modbus TCP/IP, a totally open protocol on Ethernet. There is no need for any proprietary component, nor the purchase of a licence in order to develop a connection to Modbus TCP/IP.
This protocol can easily be ported to any device supporting a standard TCP/IP communication stack. The specifications can be obtained free of charge from the website: www.modbus.org.

Modbus TCP/IP, simple and open

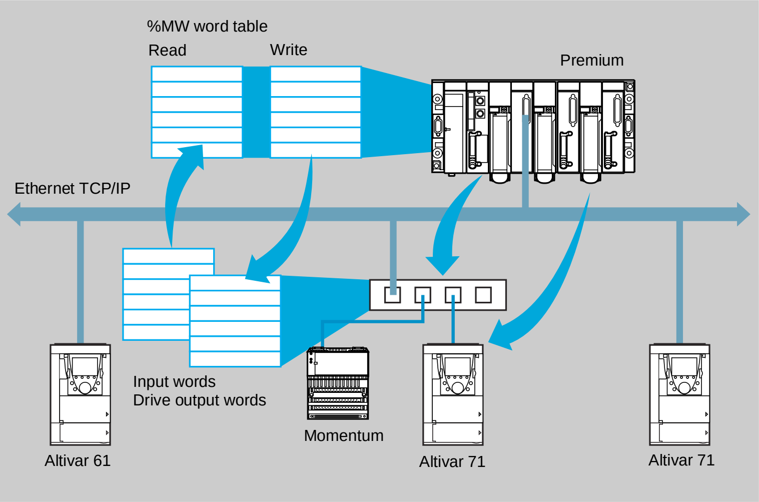
The Modbus application layer is very simple and universally familiar. Thousands of manufacturers are already implementing this protocol. Many have already developed a Modbus TCP/IP connection and numerous products are currently available.
The simplicity of Modbus TCP/IP enables any small field device, such as an I/O module, to communicate on Ethernet without the need for a powerful microprocessor or a large amount of internal memory.

Modbus TCP/IP, high performance

Thanks to the simplicity of its protocol and the fast Ethernet throughput data rate of 100 Mbps, the Modbus TCP/IP achieves excellent performance. This means that this type of network can be used in realtime applications such as I/O Scanning.

I/O Scanning service

Schematic diagram



The Altivar 61 and Altivar 71 drives accept the I/O scanning service generated by:
- The following automation platforms:
  - ☐ Premium equipped with a TSX ETY 410/5101 module
  - ☐ Quantum
  - ☐ Momentum M1E
- A PC equipped with Modbus communication software with the I/O scanner function.

This service is used to manage the exchange of remote I/O on the Ethernet network after simple configuration and without the need for special programming.

The drive I/O are scanned transparently by means of read/write requests according to the Modbus Master/Slave protocol on the TCP/IP profile.

The I/O Scanning service can be configured, activated or deactivated by:
- The PowerSuite software workshop
- The standard web server.

Starters, drives and communication

Ethernet TCP/IP network

Transparent Ready concept

Transparent Ready services (continued)

Faulty Device Replacement (FDR) service

The FDR service uses standard DHCP and TFTP technologies with the aim of simplifying the maintenance of Ethernet devices.
It is used to replace a faulty device with a new product, ensuring its detection, reconfiguration and automatic restarting by the system, without the need for any delicate manual intervention.

The main steps are:

- A device using the FDR service becomes faulty.
- A similar device is taken out of the maintenance reserve base, preconfigured with the “Device_name” of the faulty device, then reinstalled on the network.
- The FDR server (which can be a Quantum or Premium PLC Ethernet module) detects the new arrival, configures it with its IP address and transfers all its configuration parameters to it.
- The substituted device checks that the parameters are fully compatible with its own characteristics, then switches to operational mode.

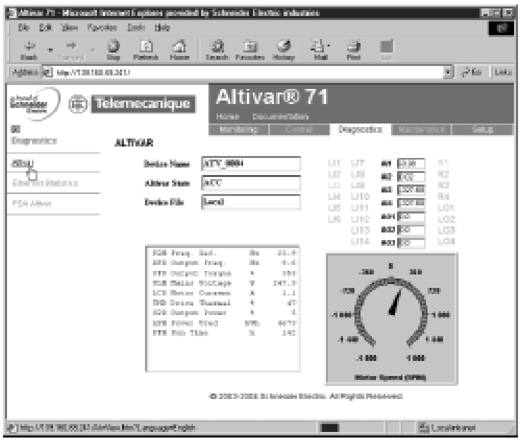
Web server

The Ethernet card in Altivar 61 and Altivar 71 drives incorporates a standard web server, in English.
The functions provided by this web server require no special configuration or programming of the PC supporting the web browser. Using a password, two levels of access can be defined to the web server: read-only or modification.

The standard web server provides access to the following functions:

- Altivar Viewer
- Data Editor
- Ethernet Statistics
- Security
- …

The standard web server can be adapted or replaced by a customized web server depending on the requirements of the application and downloaded via FTP.
Knowledge of the HTTP protocol and Java technology are required to be able to create or modify a web server.



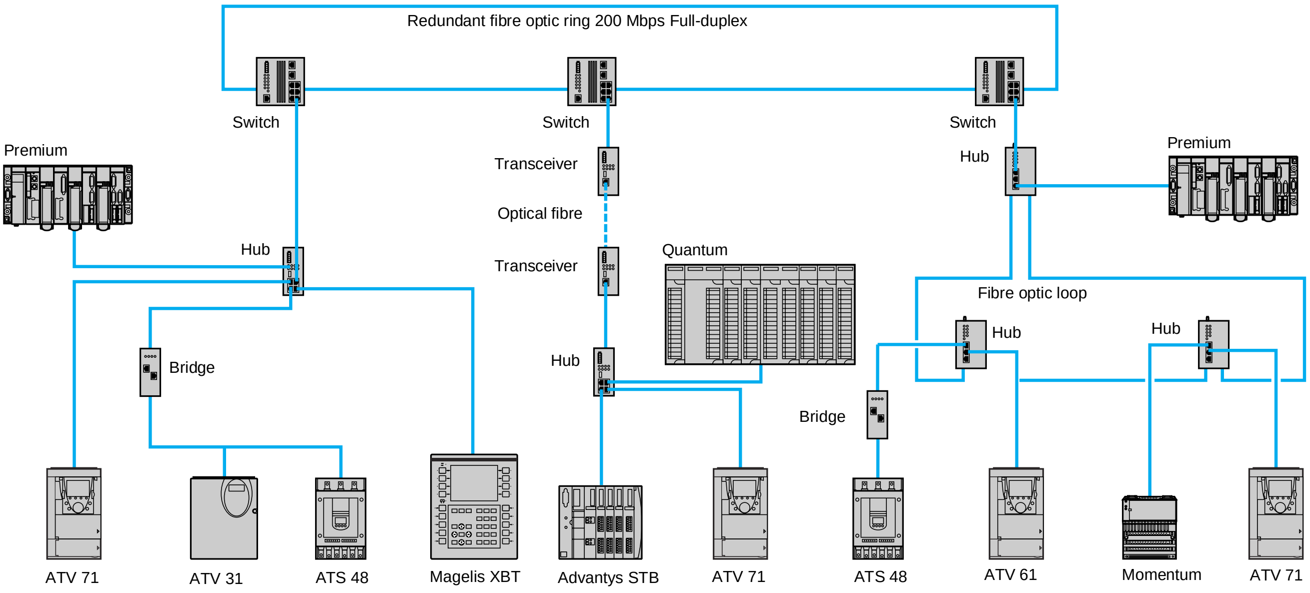
Altivar Viewer

Starters, drives and communication

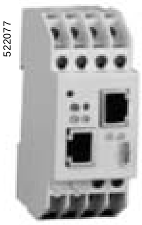
Ethernet TCP/IP network

Transparent Ready concept

Connections


Redundant fibre optic ring 200 Mbps Full-duplex
Switch
Switch
Switch
Premium
Transceiver
Hub
Premium
Optical fibre
Hub
Transceiver
Quantum
Fibre optic loop
Hub
Hub
Hub
Bridge
Bridge
ATV 71
ATV 31
ATS 48
Magelis XBT
Advantys STB
ATV 71
ATS 48
ATV 61
Momentum
ATV 71

Ethernet network connection elements



174 CEV 300 20

Communication interfaces

Description	For devices	Reference	Weight kg
Communication card equipped with an RJ45 connector Ethernet Modbus TCP/IP 10/100 Mbps Class C 20	ATV 61 ATV 71	**VW3 A3 310**	0.300
Ethernet /Modbus bridge with 1 x 10BASE-T/100BASE-TX Ethernet port (RJ45 type)	ATS 48 ATV 31	**174 CEV 300 20** *(1)*	0.500

Connecting cables

Description	Use		Length	Reference *(2)*	Weight
	From	To	m		kg
Straight shielded twisted pair cables 2 RJ45 connectors	ATV 61 or ATV 71 (+VW3 A3 310 communication card), Ethernet/ Modbus bridge 174 CEV 300 20	499 N●H 1●● 10 hubs, 499 N●S 171 00 switches	2	**490 NTW 000 02**	–
			5	**490 NTW 000 05**	–
			12	**490 NTW 000 12**	–
			40	**490 NTW 000 40**	–
			80	**490 NTW 000 80**	–
Cable for Modbus bus 1 RJ45 connector and one stripped end	ATS 48, ATV 31	Ethernet/ Modbus bridge 174 CEV 300 20	3	**VW3 A8 306 D30**	–

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(1) Please consult our specialist "Automation platform Modicon Premium and Unity - PL7 software" catalogue.

(2) Cable conforming to category 5 EIA/TIA-568 standard and IEC 1180/EN 50 173, class D. For UL and CSA 22.1 approved cables, add the letter **U** *at the end of the reference. Example: 490 NTW 000 02 becomes* ***490 NTW 000 02U****.*

Presentation:
page 182

Characteristics:
page 183

Functions:
pages 183 to 185

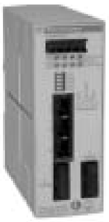
Ethernet network connection elements (continued)

499 NEH 141 00

Hubs

Description	Number of ports		Reference	Weight kg
	Copper cable	Optical fibre		
Hub - 10 Mbps twisted pair 10BASE-T ports for copper cable, shielded RJ45 connectors	4	–	**499 NEH 104 10**	0.530
Hub - 100 Mbps twisted pair 100BASE-T ports for copper cable, shielded RJ45 connectors	4	–	**499 NEH 141 00**	0.240
Hub - 10Mbps twisted pair and multimode fibre opticoptical fibre 10BASE-T ports for copper cable, shielded RJ45 connectors 10BASE-FL ports for optical fibre, ST connectors (BFOC)	3	2	**499 NOH 105 10**	0.900

499 NES 251 00



499 NMS 251 02

Switches

Description	Number of ports		Configurable	Reference	Weight kg
	Copper cable	Optical fibre			
Optimized switch, twisted pair 10BASE-T/100BASE-TX copper ports, for copper cable, shielded RJ45 connectors	5	–	no	**499 NES 251 00**	0.190
Switches, twisted pair 10BASE-T/100BASE-TX ports, for copper cable, shielded RJ45 connectors	8	–	no	**499 NES 181 00**	0.230
	7	–	yes	**499 NES 271 00**	0.460
Switches, twisted pair and multimode fibre opticoptical fibre 10BASE-T/100BASE-TX ports, for copper cable, shielded RJ45 connectors 100BASE-FX ports, for optical fibre, SC connectors	4	1	no	**499 NMS 251 01**	0.330
	3	2	no	**499 NMS 251 02**	0.335
	5	2	yes	**499 NOS 271 00**	0.460
Switches, twisted pair and single-mode fibre opticoptical fibre 10BASE-T/100BASE-TX ports, for copper cable, shielded RJ45 connectors 100BASE-FX ports, for optical fibre, SC connectors	4	1	no	**499 NSS 251 01**	0.330
	3	2	no	**499 NSS 251 02**	0.335
	5	2	yes	**499 NSS 271 00**	0.460

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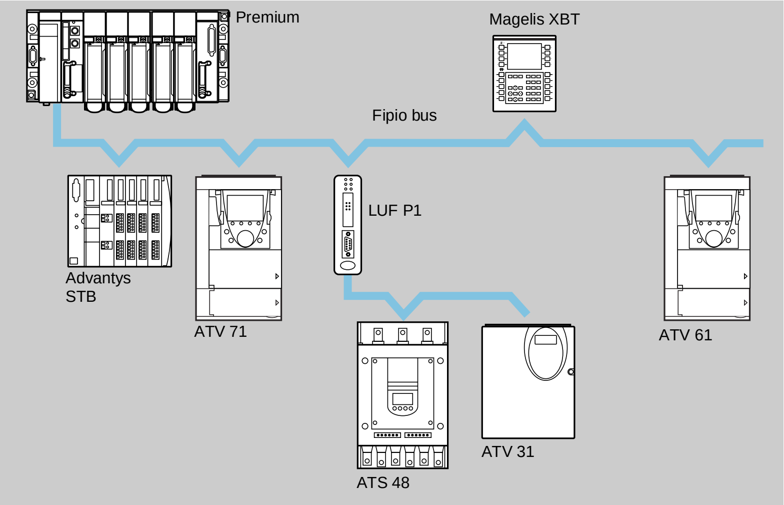
(1) For Transparent Ready accessories, please consult our "Ethernet TCP/IP, Transparent Ready" catalogue.

Starters, drives and communication

Communication via Fipio bus

Presentation



The Fipio fieldbus is a standard means of communication between control system components and conforms to the World FIP standard.
A Premium PLC (bus manager) can control 127 devices (agents) over a maximum distance of 15 km.
The Fipio bus manager is integrated in the PLC processor.

The Altistart 48 soft start/soft stop unit and the Altivar 31 variable speed drive can be connected to the Fipio bus via an LUF P1 Fipio/Modbus gateway.

The Altivar 61 and Altivar 71 variable speed drives can be connected to the Fipio network via a communication card VW3 A3 A311.

The following devices can also be connected to the Fipio bus:
- TSX Micro (2) or Premium Agent function *(1)* PLCs
- The CCX 17 operator panel *(2)*
- The Magelis XBT-F terminal with graphic screen *(3)*
- The Magelis *i*PC industrial PC *(3)*
- Advantys STB IP 20 distributed I/O *(4)*
- Discrete, analog or application-specific Momentum distributed I/O *(5)*
- Discrete or analog (IP 20) TBX distributed I/O *(1)*
- TBX discrete (IP 65) or TSX E●F (IP67) dust and damp proof distributed I/O *(1)*
- The TBX SAP 10 Fipio/AS-Interface gateway *(1)*
- The LUF P1 Fipio/Modbus gateway
- A PC terminal
- Partner products in the Collaborative Automation programme.

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(1) Please consult our specialist "Automation platform Modicon Premium and Unity - PL7 software" catalogue.
(2) Please consult our specialist "Automation platform Modicon TSX Micro and PL7 software" catalogue.
(3) Please consult our specialist "Human-Machine interfaces" catalogue.
(4) Please consult our specialist "Distributed I/O Advantys STB" catalogue.
(5) Please consult our specialist "Modicon Momentum Automation platform" catalogue.

Starters, drives and communication

Communication via Fipio bus

Characteristics

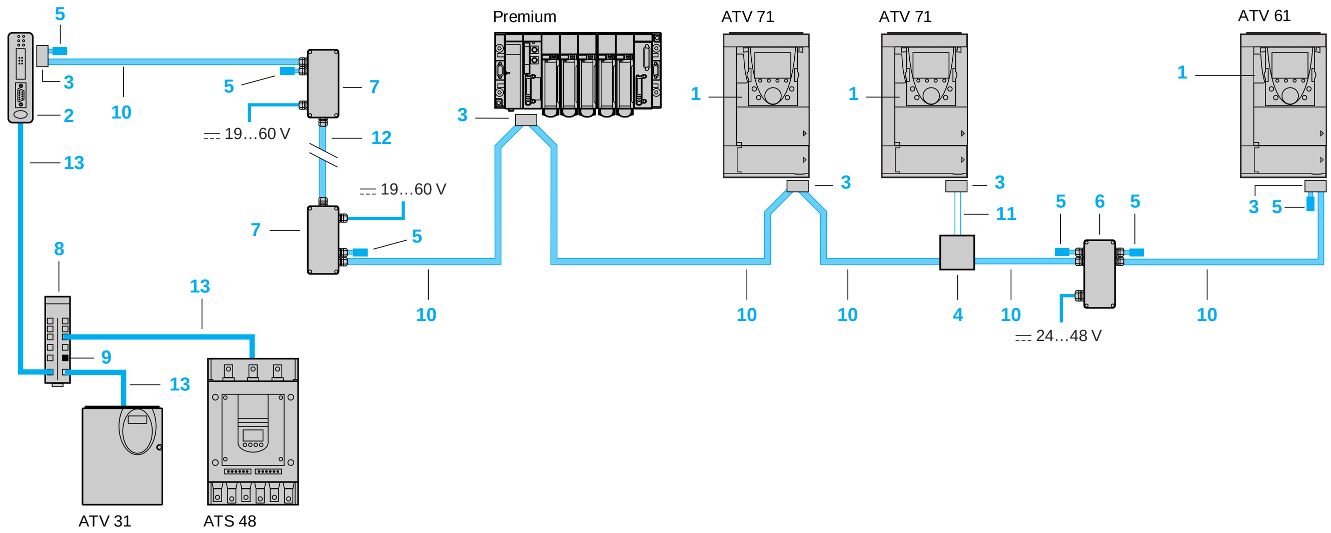
Structure	Topology	Industrial bus conforming to the World FIP standard Subscribers linked via daisy-chain or tap junctions	
	Access method	Producer/consumer principle Bus management by a fixed arbitrator (bus manager)	
	Transmission mode	Baseband physical layer on shielded twisted pair, according to standard NF C 46-604	
	Data rate	1 Mbps	
	Medium	Shielded twisted pair 150 Ω. Optical fibre 62.5/125 with the use of electrical/fibre optic repeaters	
	Number of subscribers	32 maximum per segment 1 manager + 127 agents maximum over all segments The number of Fipio agents is limited by the memory capacity of Premium processors (62 Altivar drives maximum) *(1)*	
	Number of segments	Unlimited in tree or star architectures Limited to 5 cascaded segments The link between 2 subscribers may cross 4 electrical or electrical/fibre optic repeaters maximum	
	Length of bus	15,000 m maximum 1,000 m maximum without repeater for an electrical segment 5,000 m maximum for 5 electrical segments 3,000 m maximum for 1 fibre optic segment	
Type of device		**ATS 48, ATV 31**	**ATV 61, ATV 71**
Type of interface		**LUF P1**	**VW3 A3 311**
Profile		FED C 32P	FED C 32
Control and adjustment		26 configurable words	8 configurable words (communication scanner)
Monitoring		26 configurable words	8 configurable words (communication scanner)
Configuration and adjustment		1 indexed word Read/write access to all functions by the PLC application program	

(1) Please consult our specialist "Automation platform Modicon Premium and Unity - PL7 software" catalogue.

Starters, drives and communication

Communication via Fipio bus

Fipio wiring system



Elements for connecting the Fipio bus and a Premium PLC *(1)*

LUF P1

Cards and gateway

Description	Used for	Code	Reference	Weight kg
Standard Fipio card The card is equipped with a 9-way male SUB-D connector, which can take a TSX FP ACC12 connector with a TSX FP CA●00 trunk cable or TSX FP CC●00 drop cable. This card should be used for new installations. It is also used to replace an ATV 58 or ATV 58F equipped with a VW3 A58311 card by an ATV 71.	ATV 61 ATV 71	1	**VW3 A3 311**	0.300
Substitution Fipio card The card is equipped with a 9-way male SUB-D connector, which can take a TSX FP ACC12 connector with a TSX FP CA●00 trunk cable or TSX FP CC●00 drop cable. This Fipio communication card is reserved for replacing an ATV 58 or ATV 58F equipped with a VW3 A58301 card by an ATV 71.	ATV 71	1	**VW3 A3 301**	0.300
Fipio/Modbus gateway The gateway is equipped with: ■ 1 Fipio 9-way male SUB-D connector which will take a TSX FP ACC12 connector for use with a TSX FP CA●00 trunk cable or TSX FPCC●00 drop cable ■ 1 RJ45 connector for Modbus for connection with the VW3 A8 306 R●● cable Fit an external 24 V ⎓ power supply, 100 mA minimum, to be ordered separately *(2)*.	ATS 48 ATV 31	2	**LUF P1**	0.240

(1) To order other elements for connection to the Fipio bus, please consult our specialist "Automation platform Modicon Premium and Unity - PL7 software" catalogue.

(2) Please consult our specialist "Interfaces, I/O splitter boxes and power supplies" catalogue.

Presentation:
page 188

Characteristics:
page 189

Elements for connecting the Fipio bus and a Premium PLC (continued) *(1)*

Accessories

Description	Use	Code	Unit reference	Weight kg
Female connector for device with 9-way female SUB-D connector (polycarbonate, IP 20)	Connection via daisy-chain or tap junctions. For ATV 61, ATV 71, LUF P1 gateway and Premium PLC	3	**TSX FP ACC12**	0.040
Tap junction (polycarbonate, IP 20)	Trunk cable tap link	4	**TSX FP ACC14**	0.120
Fipio line terminators (sold in lots of 2)	Connector, tap junction and repeater	5	**TSX FP ACC7**	0.020
Electrical repeater (IP 65) Power supply 24…48 V ⎓, 150 mA *(2)*	Increases the length of the bus while enabling connection of 2 segments of 1000 m maximum	6	**TSX FP ACC6**	0.520
Electrical/fibre optic repeater (IP 65) Power supply 19…60 V⎓, 210 mA *(2)*	Used for connection (via a patch panel) of an electrical segment (1000 m max.) and a fibre optic segment (3000 m max.)	7	**TSX FP ACC8M**	0.620
Modbus splitter block equipped with 10 RJ45 connectors and 1 screw terminal	Used to connect an ATV 31, ATS 48 on the LUP P1 gateway	8	**LU9 GC3**	0.500
Modbus line terminators *(3)*	LU9 GC3 Modbus splitter block	9	**VW3 A8 306 RC**	0.010
FIP wiring test tool	Used to test each section of a network segment	–	**TSX FP ACC9**	0.050

Connecting cables *(1)*

Description	Used		Code	Length	Reference	Weight
	From	To		m		kg
Trunk cables 8 mm, 1 shielded twisted pair 150 Ω. In standard atmosphere *(4)* and inside buildings	TSX FP ACC12 connector, TSX FP ACC14 junction box, TSX FP ACC6, ACC8M repeaters	TSX FP ACC12 connector, TSX FP ACC14 junction box, TSX FP ACC6 repeater	10	100	**TSX FP CA100**	5.680
				200	**TSX FP CA200**	10.920
				500	**TSX FP CA500**	30.000
Trunk cables 9.5 mm, 1 shielded twisted pair 150 Ω. In harsh environments *(5)*, outside buildings or in mobile installations *(6)*	TSX FP ACC12 connector, TSX FP ACC14 junction box, TSX FP ACC6, ACC8M repeaters	TSX FP ACC12 connector, TSX FP ACC14 junction box, TSX FP ACC6 repeater	10	100	**TSX FP CR100**	7.680
				200	**TSX FP CR200**	14.920
				500	**TSX FP CR500**	40.000
Drop cables 8 mm, 2 shielded twisted pairs 150 Ω. In standard atmosphere *(4)* and inside buildings	TSX FP ACC12 connector	TSX FP ACC14 junction box	11	100	**TSX FP CC100**	5.680
				200	**TSX FP CC200**	10.920
				500	**TSX FP CC500**	30.000
Fibre optic jumper Double optical fibre 62.5/125	TSX FP ACC8M repeater	Patch panel	12	2	**TSX FP JF020**	0.550
Cables for Modbus bus 2 RJ45 connectors	LUF P1 gateway, ATS 48, ATV 31	LU9 GC3 Modbus splitter block	13	0.3	**VW3 A8 306 R03**	0.025
				1	**VW3 A8 306 R10**	0.060
				3	**VW3 A8 306 R30**	0.130

Documentation

The manuals and quick reference guides for starters and variable speed drives, as well as the user manuals for communication gateways, are available on the web site: www.telemecanique.com.

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(1) To order other elements for connection to the Fipio bus, please consult our specialist “Automation platform Modicon Premium and Unity - PL7 software” catalogue.

(2) Please consult our specialist “Interfaces, I/O splitter boxes and power supplies” catalogue.

(3) Sold in lots of 2.

(4) Standard environment:
- no particular environmental constraints
- operating temperature between + 5 °C and + 60 °C
- fixed installation

(5) Harsh environment:
- withstand to hydrocarbons, industrial oils, detergents, solder splashes
- relative humidity up to 100%
- saline atmosphere
- significant temperature variations
- operating temperature between - 10 °C and + 70 °C

(6) Mobile installation: cables in accordance with VDE 472 part 603/H:
- use on a cable-carrier chain with bending radius 75 mm minimum
- use on a gantry, provided that operating conditions such as acceleration, speed, length, etc are adhered to: please consult your Regional Sales Office
- unauthorised use on robots, or multi-axis applications.

Presentation:
page 188

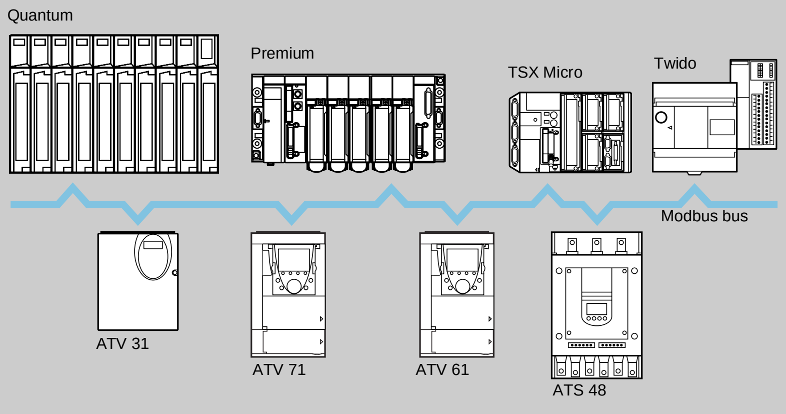
Characteristics:
page 189

Connections:
page 190

Starters, drives and communication

Communication via Modbus bus

Presentation



Modbus is a master/slave protocol.

Two exchange mechanisms are possible:

- Request/response: The request from the master is addressed to a given slave. The master then waits for the response from the slave which has been interrogated.
- Broadcasting: The master broadcasts a request to all the slave stations on the bus, which execute the command without transmitting a response.

The Altistart 48 soft start/soft stop unit and the Altivar 31, Altivar 61 and Altivar 71 variable speed drives have the Modbus protocol integrated as standard.

The Altistart 48 soft start/soft stop unit and the Altivar 31 drive are connected to the Modbus bus via their terminal port.

The Altivar 61 and Altivar 71 variable speed drives have 2 integrated communication ports:

- A terminal port for connecting the graphic display terminal or an industrial HMI terminal (Magelis type)
- A Modbus network port.

As an option, they can also be equipped with a VW3 A3 303 Modbus/Uni-Telway communication card which offers additional characteristics (4-wire RS 485, ASCII mode, etc.).

Characteristics

Type of device			**ATS 48**	**ATV 31**	**ATV 61, ATV 71**		
Type of connection			**Terminal port**			**Network port**	**Communication card**
Structure	Connector		RJ45	RJ45	RJ45	RJ45	9-way female SUB-D
	Topology		Bus				
	Physical interface		2-wire RS 485				2-wire or 4-wire RS 485
	Access method		Master/slave				
	Transmission mode		RTU				RTU or ASCII
	Data rate	38.4 Kbps	–	–	–	●	–
		19.2 or 9.6 Kbps	●	●	●	●	●
		4.8 Kbps	●	●	–	●	●
	Medium		Double shielded twisted pair				
	Number of subscribers		18, 27 or 31 slaves, depending on polarization *(1)*				
	Type of polarization		4.7 kΩ pulldown resistors	No pulldown	No pulldown	No pulldown	Configurable. No pulldown or 4.7 kΩ pulldown resistors
	Length of bus		1000 or 1300 m excluding tap links, depending on polarization *(1)*				
	Tap link		3 or 20 m maximum, depending on polarization *(1)*				

(1) See the configuration table on page 193.

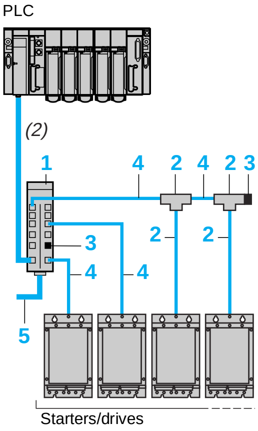
Connections:
pages 193 and 194

References:
pages 193 to 195

Configuration on the basis of polarization

The specification of the physical layer provided by standard RS 485 is incomplete.
Various polarization diagrams can therefore be applied depending on the environment in which the equipment is to be used.
The Modbus standard specifies the polarization exactly *(1)*.

		Master	
		With polarization 4.7 kΩ	**With polarization 470 Ω**
Slave	**Without polarization**	Configuration not recommended.	Modbus type configuration 31 slaves. Length of bus: 1,300 m Tap link: 3 m maximum. RC line terminators (R =120 Ω, C = 1 nF).
	With polarization 4.7 kΩ	Uni-Telway type configuration 27 slaves. Length of bus: 1,000 m Tap link: 20 m maximum. RC line terminators (R =120 Ω, C = 1 nF).	Mixed configuration 18 slaves. Length of bus: 1,000 m Tap link: 20 m maximum. RC line terminators (R =120 Ω, C = 1 nF).



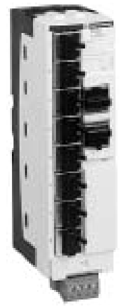
Connection elements for RJ45 wiring system

Card

Description	Used with	Reference	Weight kg
Communication card equipped with a 9-way female SUB-D connector	ATV 61, ATV 71	**VW3 A3 303**	0.300

Accessories

Description		Code	Unit reference	Weight kg
Modbus splitter block 10 RJ45 connectors and 1 screw terminal block		1	**LU9 GC3**	0.500
Modbus T-junction boxes	With integrated cable (0.3 m)	2	**VW3 A8 306 TF03**	–
	With integrated cable (1 m)	2	**VW3 A8 306 TF10**	–
Line terminators for RJ45 connector *(3)*	R = 120 Ω, C = 1 nF	3	**VW3 A8 306 RC**	0.200
	R = 150 Ω	3	**VW3 A8 306 R**	0.010



LU9 GC3

Cables

Description	Use From	To	Code	Length m	Reference	Weight kg
Cables for Modbus bus 2 RJ45 connectors	ATS 48, ATV 31, ATV 61, ATV 71 (terminal or Modbus network ports)	LU9 GC3 Modbus splitter block	4	0.3	**VW3 A8 306 R03**	0.025
				1	**VW3 A8 306 R10**	0.060
				3	**VW3 A8 306 R30**	0.130
	VW3 A8 306 TF●● Modbus T-junction box LU9 GC3 Modbus splitter block	VW3 A8 306 TF●● Modbus T-junction box LU9 GC3 Modbus splitter block				
Cables for Modbus bus One 9-way male SUB-D connector 1 RJ45 connector	ATV 61, ATV 71 (+ VW3 A3 303 communication card)	LU9 GC3 Modbus splitter block	4	1	**VW3 A58 306 R10**	0.080
				3	**VW3 A58 306 R30**	0.150
Double shielded twisted pair cables	LU9 GC3 Modbus splitter block (screw terminals)	LU9 GC3 Modbus splitter block (screw terminals)	5	100	**TSX CSA 100**	5.680
				200	**TSX CSA 200**	10.920
				500	**TSX CSA 500**	30.000

VW3 A8 306 TF●●

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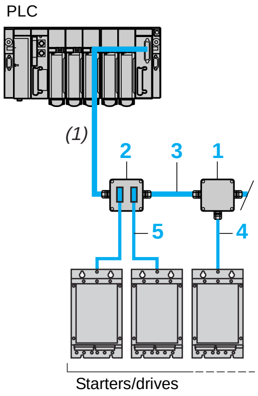
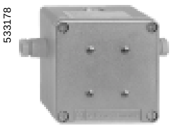
(1) Standard defined in 2002, available on the website: www.modbus.org.
(2) The cable for connecting the PLC and the splitter block depends on the type of PLC; please consult our “Automation platform Modicon Premium and Unity - PL7 software”, “Automation platform Modicon Quantum”, “Automation platform Modicon TSX Micro and PL7 software” and “Automation and relay functions” catalogues.
(3) Sold in lots of 2.

Presentation:
page 192

Characteristics:
page 192





TSX SCA 50

TSX SCA 62

Connection elements using tap junctions

Accessories

Description	Code	Reference	Weight kg
Tap junction 3 screw terminals, RC line terminator	1	**TSX SCA 50**	0.520
Subscriber socket Two 15-way female SUB-D connectors and 2 screw terminals, RC line terminator	2	**TSX SCA 62**	0.570

Cables

Description	Use		Code	Length	Reference	Weight
	From	To		m		kg
Double shielded twisted pair cables	TSX SCA 50 tap junction, TSX SCA 62 subscriber socket	TSX SCA 50 tap junction, TSX SCA 62 subscriber socket	3	100	**TSX CSA 100**	5.680
				200	**TSX CSA 200**	10.920
				500	**TSX CSA 500**	30.000
Cable for Modbus bus 1 RJ45 connector and one stripped end	ATS 48, ATV 31, ATV 61, ATV 71 (terminal or Modbus network ports)	TSX SCA 50 tap junction	4	3	**VW3 A8 306 D30**	0.150
Cable for Modbus bus 1 RJ45 connector and one 15-way male SUB-D connector	ATS 48, ATV 31, ATV 61, ATV 71 (terminal or Modbus network ports)	TSX SCA 62 subscriber socket	5	3	**VW3 A8 306**	0.150
Cable for Uni-Telway and Modbus bus 2 male SUB-D connectors, 9 and 15-way	ATV 61, ATV 71 (+ VW3 A3 303 communication card)	TSX SCA 62 subscriber socket	5	3	**VW3 A8 306 2**	0.150

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(1) The cable for connecting the PLC and the splitter block depends on the type of PLC; please consult our "Automation platform Modicon Premium and Unity - PL7 software", "Automation platform Modicon Quantum", "Automation platform Modicon TSX Micro and PL7 software" and "Automation and relay functions" catalogues.

Presentation:
page 192

Characteristics:
page 192

Starters, drives and communication

Communication via Modbus bus

Connection elements using screw terminals

Accessories

Description		Sold in lots of	Unit reference	Weight kg
Line terminators for screw terminals	R = 120 Ω, C = 1 nF	2	**VW3 A8 306 DRC**	0.200
	R = 150 Ω	2	**VW3 A8 306 DR**	0.200

Cable

Description	Use		Length	Reference	Weight
	From	To	m		kg
Cable for Modbus 1 RJ45 connector and one stripped end	ATS 48, ATV 31, ATV 61, ATV 71 (terminal or Modbus network ports)	Standard screw terminal, TSX SCA 50 tap junction	3	**VW3 A8 306 D30**	0.150

Documentation

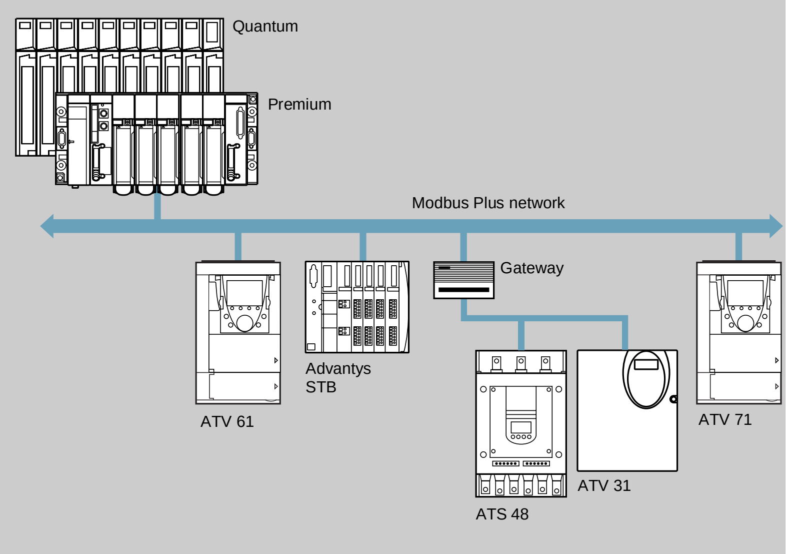
The manuals and quick reference guides for starters and variable speed drives, as well as the user manuals for communication gateways, are available on the website: www.telemecanique.com.

Presentation: page 192
Characteristics: page 192
Connections: pages 193 and 194

Starters, drives and communication

Communication via Modbus Plus network

Presentation



The Modbus Plus network is a high-performance industrial local area network which can be used to meet the needs of client/server type extended architectures, combining a high data rate (1 Mbps), simple low-cost transmission media and numerous messaging services.

The Altistart 48 soft start/soft stop unit and the Altivar 31 variable speed drive can be connected to the Modbus Plus network via an NW BM85000 gateway which has four RS 232 serial ports.

The Altivar 61 and Altivar 71 variable speed drives can be connected to the Modbus Plus network via a communication card VW3 A3 302

Communication services

The main data exchange services between subscribers connected to the network are:
- The “Modbus messaging” service according to Modbus protocol
- The “Global Data” service: each subscriber makes available 32 words for each of the 63 other network subscribers
- The “Peer Cop” dialogue service: point-to-point transaction of 32 receive or transmit words

The “Global Data” and “Peer Cop” services are restricted to a Modbus Plus network with a maximum of 64 subscribers.

Altivar 61 and Altivar 71 drives are accessed by simple configuration in the PLC using “Peer Cop” and “Global Data” services.
These services enable rapid exchange of the main drive parameters:
- The “Peer Cop” service for controlling and adjusting the drive
- The “Global data” service for monitoring the drive

Other parameters, which are used less frequently, can be accessed by the Modbus messaging service.

Characteristics:
page 197

Connections:
page 198

References:
pages 198 and 199

Starters, drives and communication

Communication via Modbus Plus network

Characteristics

Structure	Topology	Bus
	Physical interface	RS 485
	Access method	Token bus
	Transmission mode	HDLC synchronous
	Data rate	1 Mbps
	Medium	Shielded twisted pair 120 Ω Optical fibre
	Number of subscribers per network	32, without repeater 64, with one or more repeaters
	Number of networks	4, separated by a maximum of 3 bridges
	Length of network	450 m maximum without repeater 1800 m maximum with 3 electrical repeaters 3000 m between 2 fibre optic repeaters
Services	Modbus messaging	Point-to-point requests with confirmation report: 200 bytes maximum, compatible with all Modbus subscribers
	“Global Data”	4096-byte shared database Cyclic exchange of 32 broadcast words Limited to one network This service does not cross bridges
	“Peer Cop” dialogue	Point-to-point or broadcast message Limited to one network This service does not cross bridges

Type of device	**ATS 48, ATV 31**	**ATV 61, ATV 71**
Type of interface	**NW BM85000**	**VW3 A3 302**
Control	“Modbus messaging”	“Peer Cop” 8 configurable words maximum (communication scanner)
Monitoring	“Modbus messaging”	“Global Data” 8 configurable words maximum (communication scanner)
Configuration and adjustment	“Modbus messaging”	“Modbus messaging” Read/write access to all drive parameters

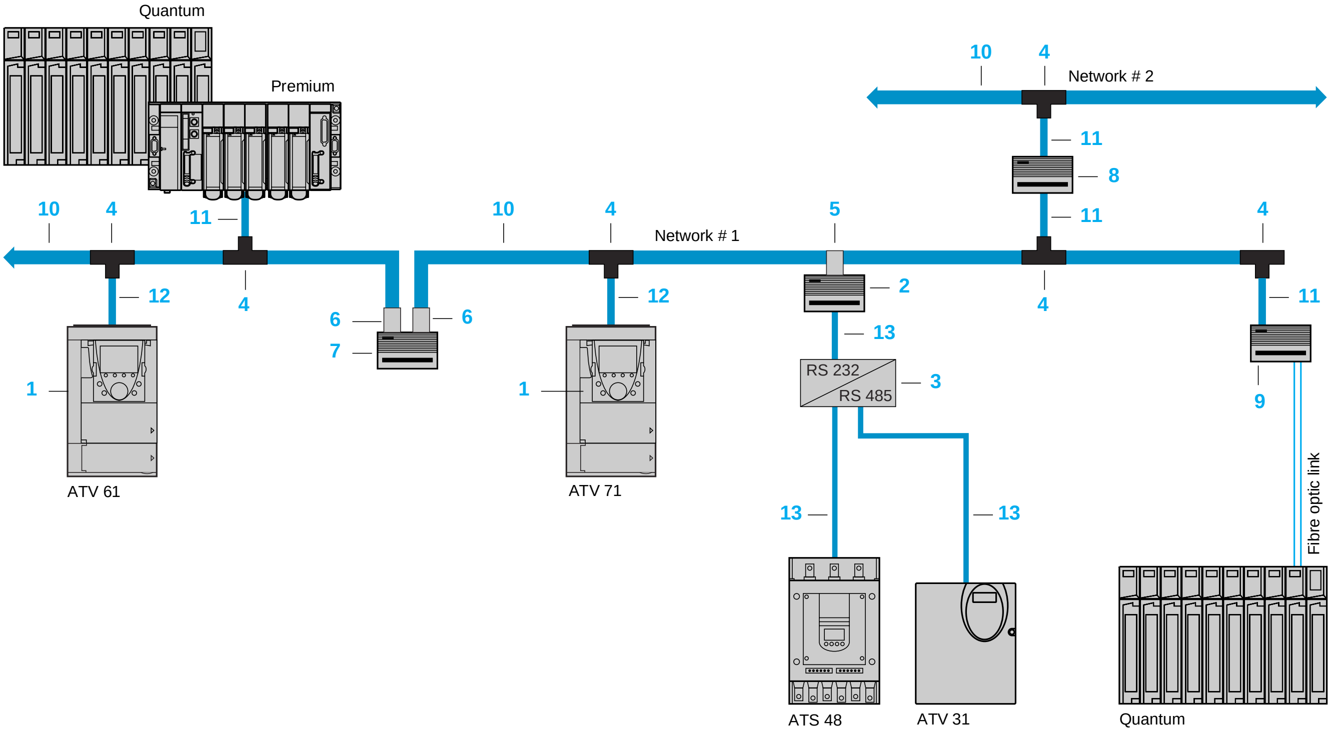
Presentation:
page 196

Connections:
page 198

References:
pages 198 and 199

Starters, drives and communication
Communication via Modbus Plus network

Modbus Plus wiring system



Modbus Plus bus connection elements *(1)*

Cards and gateways

Description	Used with	Code	Reference	Weight kg
Communication cards equipped with one 9-way female SUB-D connector	ATV 61, ATV 71	1	**VW3 A3 302**	0.300
Modbus Plus/Modbus gateway 4 RS 232 ports power supply 115…220 V ~	ATS 48, ATV 31	2	**NW BM85000**	3.158
RS 232/RS 485 interface power supply 24 V ⎓, 20 mA *(2)*	ATS 48, ATV 31	3	**XGS Z24**	0.105

Connection accessories

Description	Use	Code	Reference	Weight kg
Modbus Plus tap (IP 20)	For connecting via a tap junction	4	**990 NAD 230 00**	0.230
Modbus Plus in-line connector	Gateway, bridge and repeater	5	**AS MBKT 085**	0.035
Connector with Modbus Plus terminator (sold in lots of 2)	Bridge and repeater	6	**AS MBKT 185**	0.260
Modbus Plus electrical repeater	Extension beyond 450 m or up to 64 subscribers	7	**NW RR85 001**	2.677
Modbus Plus bridge with 4 ports	Connection of 4 networks maximum	8	**NW BP85 002**	2.813
Line/station fibre optic repeater	–	9	**490 NRP 254 00**	2.856
Point-to-point fibre optic repeater	Used to connect an electrical segment to the fibre optic segment (3000 m maximum)	–	**NW NRP 253 00**	2.863
Wiring tool	Inserting trunk and drop cables in a 990 NAD 230 00 tap	–	**043 509 383**	3.000

(1) To order other connection elements, please consult our specialist “Automation platform Modicon Premium and Unity - PL7 software” and “Automation platform Modicon Quantum” catalogues.

(2) Please consult our specialist “Interfaces, I/O splitter boxes and power supplies” catalogue.

Presentation:
page 196

Characteristics:
page 197

Modbus Plus bus connection elements **(continued)** *(1)*

Cables

Description	Used		Code	Length	Reference	Weight
	From	To		m		kg
Trunk cables for Modbus Plus	990 NAD 230 00 Modbus Plus tap	990 NAD 230 00 Modbus Plus tap, AS MBKT 085 Modbus Plus in-line connector, Modbus Plus connector with terminators AS MBKT 185	10	30.5	**490 NAA 271 01**	1.833
				152.5	**490 NAA 271 02**	10.135
				305	**490 NAA 271 03**	18.940
				457	**490 NAA 271 04**	30.000
				1525	**490 NAA 271 06**	112.950
Drop cables One 9-way male SUB-D connector and one stripped end	Premium, Quantum PLCs, NW BP85 002 Modbus Plus bridge with 4 ports, 490 NRP 253 00 line/station fibre optic repeater	990 NAD 230 00 Modbus Plus tap	11	2.4	**990 NAD 211 10**	0.169
				6	**990 NAD 211 30**	0.459
	ATV 61, ATV 71 (+ VW3 A3 302 communication card)	990 NAD 230 00 Modbus Plus tap	12	2.4	**990 NAD 219 10**	0.142
				6	**990 NAD 219 30**	0.465
Cable for Modbus 1 RJ45 connector and one stripped end	ATS 48, ATV 31, NW BM85000 Modbus Plus/ Modbus gateway	RS 232/RS 485 interface	13	3	**VW3 A8 306 D30**	0.115

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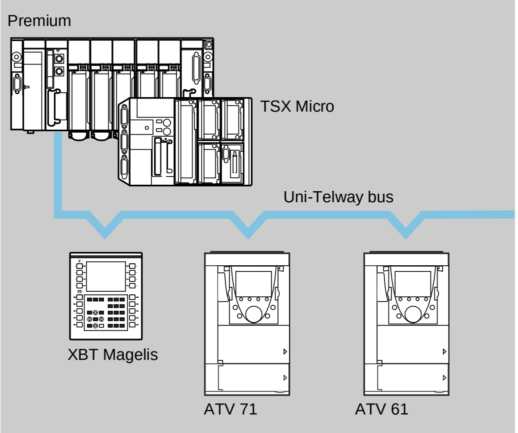
(1) To order other connection elements, please consult our specialist “Automation platform Modicon Premium and Unity - PL7 software” and “Automation platform Modicon Quantum” catalogues.

Starters, drives and communication

Communication via Uni-Telway bus

Presentation



The Uni-Telway bus is a standard means of communication between control system components (PLCs, HMI terminals, supervisors, variable speed drives, numerical controllers, etc).

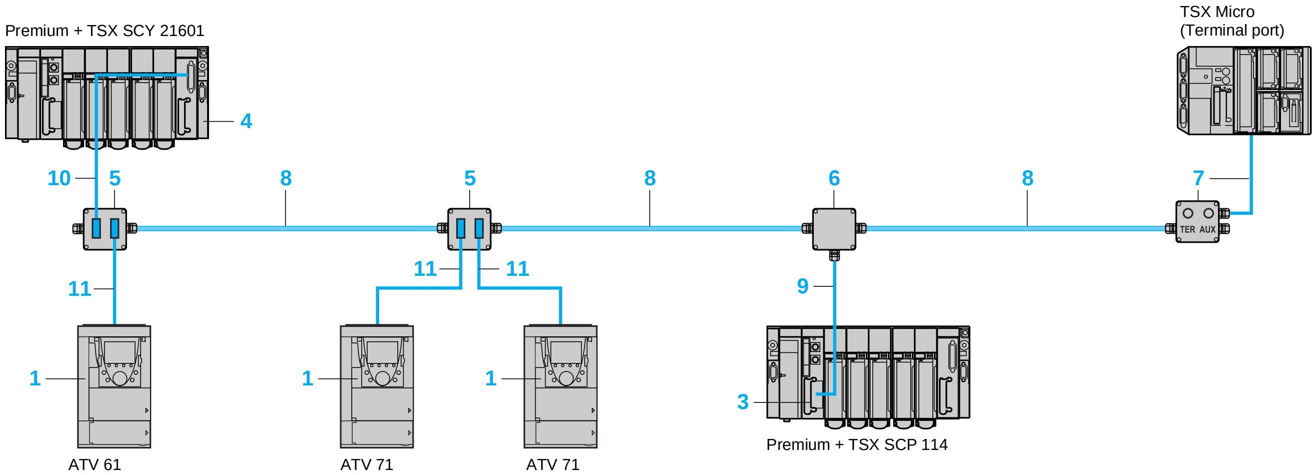
The Uni-Telway bus requires a master station (Premium, TSX Micro PLCs) which manages the allocation of bus access rights to the various connected slave stations (HMI terminals, variable speed drives, etc). The slave stations can communicate with one another without programming the master station.
An industrial HMI terminal (Magelis type) can be connected directly to the bus and can be used to adjust drives without developing applications specific to the PLC.

The Altivar 61 and Altivar 71 variable speed drives can be connected to the Uni-Telway bus via a communication card VW A3 303.

Characteristics

Structure	Topology	Bus
	Physical interface	RS 485 isolated
	Link	Multidrop
	Access method	Master/slave type
	Transmission mode	Asynchronous transmission in baseband
	Data rate	4.8…19.2 Kbps
	Medium	Double shielded twisted pair
	Number of stations	28 maximum
	Length of bus	1000 m maximum excluding tap links
	Tap links	20 m maximum
Services	UNI-TE	Request/response of up to 240 bytes *(1)* initiated by any connected station. Unsolicited point-to-point data of up to 240 bytes *(1)* without confirmation report, initiated by any connected station. Broadcast messages of up to 240 bytes *(1)* initiated by the master station.
	Other functions	Transparent communication, via the master station, with any X-WAY architecture. Diagnostics, debugging, adjustment, programming of PLCs.
	Security	Check character on each frame, acknowledgement and, if required, repetition of messages ensure security of transmission.
	Monitoring	The bus status table, transmission error counters and station status can be accessed on each station.

Uni-Telway bus wiring system



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(1) Limited to 128 bytes with the Premium and TSX Micro PLC terminal port.

Uni-Telway bus connection elements *(1)*

Cards, kit and module

Description	Used with	Code	Protocol	Reference	Weight kg
Communication card card equipped with a 9-way female SUB-D connector	ATV 61, ATV 71	1	Uni-Telway, Modbus	**VW3 A3 303**	0.300
RS 485 type III PCMCIA card (compatible with RS 422) 1.2...19.2 Kbps	Premium, Atrium, TSX Micro PLCs or TSX SCY 21601 module	3	Uni-Telway, Modbus, character mode	**TSX SCP 114**	0.105
Communication module	Premium or Atrium PLC	4	Uni-Telway, Modbus, character mode	**TSX SCY 21601**	0.360

533153

TSX SCA 62

533155

TSX SCA 50

533154

TSX P ACC 01

Connection accessories

Description	Use	Code	Reference	Weight kg
Subscriber socket Two 15-way female SUB-D connectors and 2 screw terminals	2-channel junction box, trunk cable extension and line terminator	5	**TSX SCA 62**	0.570
Tap junction 3 screw terminals	Junction box, trunk cable extension and line terminator	6	**TSX SCA 50**	0.520
Terminal port connection box with integrated cable of length 1 m	Connection of a TSX Micro or Premium PLC via the PLC terminal port and line terminator	7	**TSX P ACC 01**	0.690

Cables

Description	Used		Code	Length	Reference	Weight
	From	To		m		kg
Uni-Telway double shielded twisted pair cables	TSX SCA 50 junction box, TSX SCA 62 subscriber socket, TSX P ACC 01 terminal port connection box	TSX SCA 62 subscriber socket, TSX SCA 50 junction box, TSX P ACC 01 terminal port connection box	8	100	**TSX CSA 100**	5.680
				200	**TSX CSA 200**	10.920
				500	**TSX CSA 500**	30.000
Cables for isolated RS 485 tap link	TSX SCP 114 card	TSX SCA 50 junction box	9	3	**TSX SCP CU 4030**	0.160
		TSX SCA 62 subscriber socket	9	3	**TSX SCP CU 4530**	0.180
	Integrated channel (channel 0) of TSX SCY 21601 module	TSX SCA 50 junction box	10	3	**TSX SCP CU 6030**	0.180
		TSX SCA 62 subscriber socket	10	3	**TSX SCY CU 6530**	0.200
Cable for Uni-Telway and Modbus bus 2 male SUB-D connectors, 9 and 15-way	ATV 61, ATV 71 (+VW3 A3 303 communication card)	TSX SCA 62 subscriber socket	11	3	**VW3 A8 306 2**	0.150

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(1) To order other elements for connection to the Fipio bus, please consult our specialist "Automation platform Modicon Premium and Unity - PL7 software" and "Automation platform Modicon TSX Micro and PL7 software" catalogues.

Starters, drives and communication

Communication gateways LUF P

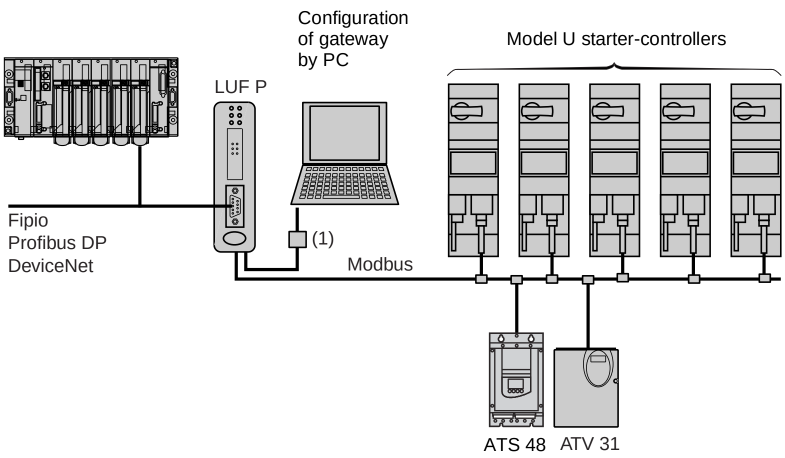
Presentation

Communication gateways LUF P allow connection between Modbus and field buses such as Fipio, Profibus DP or DeviceNet.

After configuration, these gateways manage information which can be accessed by the Modbus bus and make this information available for read/write functions (command, monitoring, configuration and adjustment) on the field buses.

An LUF P communication gateway consists of a box which can be clipped onto a 35 mm omega rail, allowing connection of up to 8 Slaves connected on the Modbus bus.

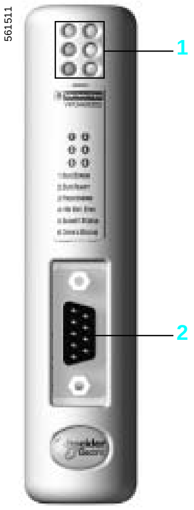
Example of architecture



(1) Connection kit for PowerSuite software workshop.

Description

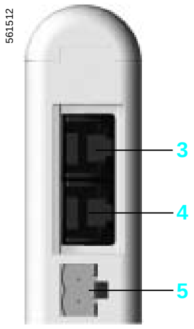
Front panel of the product



1 LED indicating :
- communication status of the Modbus buses,
- gateway status,
- communication status of the Fipio, Profibus DP or DeviceNet bus.

2 Connectors for connection to Fipio, Profibus DP or DeviceNet buses.

Underside of product



3 RJ45 connector for connection on the Modbus bus
4 RJ45 connector for link to a PC
5 ⎓ 24 V power supply

Software set-up

For the Fipio bus, software set-up of the gateway is performed using either PL7 Micro/Junior/Pro software or ABC Configurator software.
For the Profibus DP and DeviceNet buses, software set-up is performed using ABC Configurator.
This software is included:

- in the PowerSuite software workshop for PC (see page 180),
- in the TeSys model U user's manual.

Characteristics, references:
page 203

Dimensions:
page 203

Communication gateways LUF P

Characteristics

Bus type			Fipio	Profibus DP	DeviceNet
Environment	Conforming to IEC 60664		Degree of pollution: 2		
Ambient air temperature	Around the device	**°C**	+ 5…+ 50		
Degree of protection			IP 20		
Electromagnetic compatibility	Emission		Conforming to IEC 50081-2: 1993		
	Immunity		Conforming to IEC 61000-6-2: 1999		
Number of Modbus slaves which can be connected			⩽ 8		
Connection	Modbus		By RJ45 connector conforming to Schneider Electric RS485 standard		
	To a PC		By RJ45 connector, with PowerSuite connection kit		
	Field bus		By SUB D9 female connector	By SUB D9 female connector	By 5-way removable screw connector
Supply		**V**	External supply, ⎓ 24 ± 10 %		
Consumption	Max.	**mA**	280		
	Typical	**mA**	100		
Indication/diagnostics			By LED on front panel		
Services	Profile		FED C32 or FED C32P	–	–
	Command		26 configurable words *(1)*	122 configurable words	256 configurable words
	Monitoring		26 configurable words *(1)*	122 configurable words	256 configurable words
	Configuration and adjustment		By gateway mini messaging facility (PKW)		

(1) If the gateway is configured using PL7 and not ABC Configurator, the I/O capacity is limited to a total of 26 words.

References

Description	For use with	With bus type	Reference	Weight kg
Communication gateways	TeSys Model U starter-controllers, Altistart 48, Altivar 31	Fipio/Modbus	**LUF P1**	0.245
		Profibus DP/Modbus	**LUF P7**	0.245
		DeviceNet/Modbus	**LUF P9**	0.245

Connection accessories

TSX FP ACC 12

490 NAD 911 03

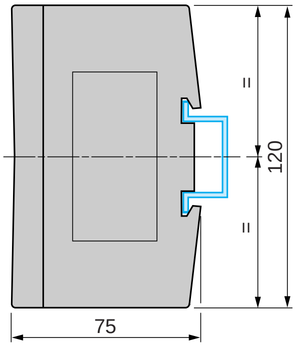
Description	For use with	Length m	Connectors	Reference	Weight kg
Connection cables	Modbus *(2)*	3	1 RJ45 type connector and one end with stripped wires	**VW3 A8 306 D30**	0.150
		0.3	2 RJ45 type connectors	**VW3 A8 306 R03**	0.050
		1	2 RJ45 type connectors	**VW3 A8 306 R10**	0.050
		3	2 RJ45 type connectors	**VW3 A8 306 R30**	0.150
Connectors	Fipio	–	1 SUB-D 9 male connector	**TSX FP ACC12**	0.040
	Profibus mid line	–	1 SUB-D 9 male connector	**490 NAD 911 04**	–
	Profibus line end	–	1 SUB-D 9 male connector	**490 NAD 911 03**	–

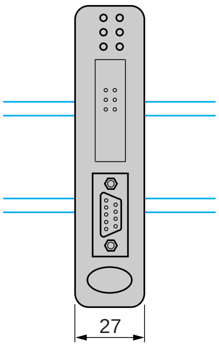
Documentation

Description	Medium	Language	Reference	Weight kg
User's manual for TeSys model U range *(3)*	CD-Rom	Multilingual: English, French, German, Italian, Spanish	**LU9 CD1**	0.022

(2) See pages 192 and 195.
(3) This CD-Rom contains user's manuals for AS-Interface and Modbus communication modules, multifunction control units and gateways, as well as for the gateway programming software, ABC Configurator.

Dimensions





Presentation, description:
page 202

Setting-up:
page 202

Starters, drives and communication

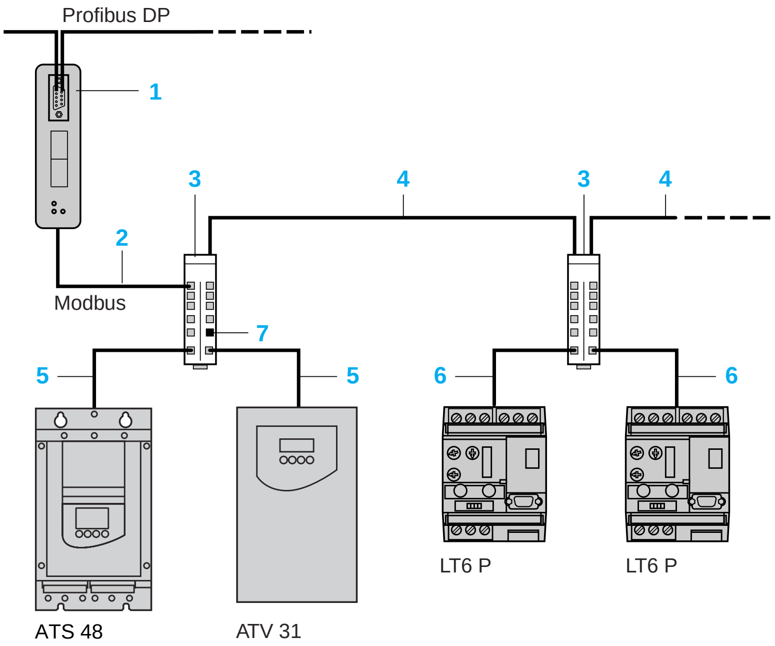
Communication gateway LA9 P307

Presentation

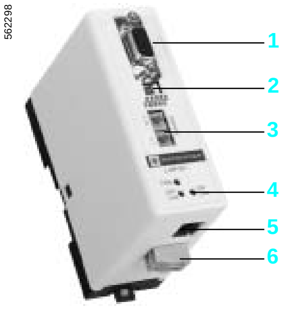
Communication gateway LA9 P307 provides connection between the Profibus DP and Modbus buses. It is a Slave on the Profibus DP bus and Master on the Modbus bus. It manages information present on the Modbus bus to make it available for read/write functions in the Master PLC on the Profibus DP bus.

Gateway LA9 P307 consists of a box which can be clipped onto a 35 mm omega rail. It manages up to15 Slaves on the Modus bus.

Example of architecture



1 Gateway LA9 P307,
2 Tap-off cable VW3 P07 306 R10,
3 Modbus splitter box LU9 GC3,
4 Cable TSX CSA ●00,
5 Tap-link cable VW3 A8 306 R●●,
6 Tap-link cable VW3 A8 306 D30,
7 Line end adapter VW3 A8 306 RC.



Description

Gateway LA9 P307 comprises:
1 A SUB-D 9-way female connector for connection to the Profibus DP bus,
2 A line end adapter on the Profibus DP bus,
3 Gateway address coding on the Profibus DP bus,
4 Status signalling LED,
5 RJ 45 female connector for connection on the Modbus bus,
6 ⎓ 24 V power supply.

Software set-up

The gateway is configured using the standard software tools for the Profibus bus. For the Premium automation platform, use SYCON configurator software.
The user's manual (.PDF) and the gateway description file (.GSD) are supplied on diskette with the gateway.

Characteristics, references:
page 205

Dimensions:
page 205

Starters, drives and communication
Communication gateway LA9 P307

Characteristics

Environment	Conforming to IEC 60664		Degree of pollution: 2
Ambient air temperature	Around the device	**°C**	0...+ 50
Degree of protection			IP 20
Number of Modbus slaves which can be connected			15
Connection on	Modbus		RJ 45 connector
	Profibus		SUB-D 9-way female connector
Supply			External supply, ⎓ 24 V ± 20 %
Consumption		**mA**	150 on ⎓ 24 V
Indication/diagnostics			By LED
Services	Command		16 words
	Monitoring		16 words
	Configuration and adjustment		By gateway mini messaging facility (PKW)

References

LA9 P307

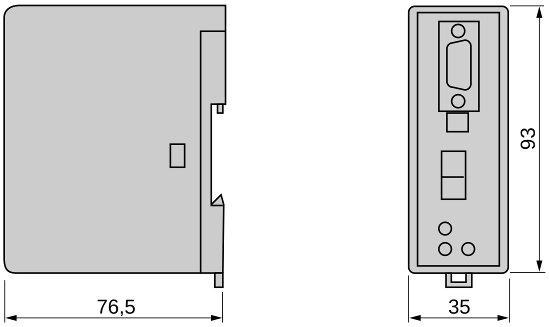
490 NAD 911 03

Description	For use with	Reference	Weight kg
Profibus DP/Modbus communication gateway	LT6 P ATS 48 ATV 31	**LA9 P307**	0.260

Description	For use with	Length m	Reference	Weight kg
RJ 45 cable with stripped wires	**Screw terminal block** - T-junction box TSX SCA 50 - Y-junction subscriber socket TSX SCA 62 **SUB-D connector** (to be ordered separately) - LT6 P (SUB-D 9 female)	3	**VW3 A8 306 D30**	0.150
RJ 45-RJ 45 cable	ATS 48 ATV 31 Modbus splitter box LU9 GC3	1	**VW3 P07 306 R10**	0.050
Connectors	Profibus mid line	–	**490 NAD 911 04**	–
	Profibus line end	–	**490 NAD 911 03**	–

Dimensions

LA9 P307



Presentation, description:
page 204

Setting-up:
page 204

Product reference index

043 509 383 *198*
174 CEV 300 20 *186*
490 NAA 271 01 *199*
490 NAA 271 02 *199*
490 NAA 271 03 *199*
490 NAA 271 04 *199*
490 NAA 271 06 *199*
490 NAD 911 03 *203 and 205*
490 NAD 911 04 *203 and 205*
490 NRP 254 00 *198*
490 NTW 000 02 *186*
490 NTW 000 05 *186*
490 NTW 000 12 *186*
490 NTW 000 40 *186*
490 NTW 000 80 *186*
499 NEH 104 10 *187*
499 NEH 141 00 *187*
499 NES 181 00 *187*
499 NES 251 00 *187*
499 NES 271 00 *187*
499 NMS 251 01 *187*
499 NMS 251 02 *187*
499 NOH 105 10 *187*
499 NOS 271 00 *187*
499 NSS 251 01 *187*
499 NSS 251 02 *187*
499 NSS 271 00 *187*
990 NAD 211 10 *199*
990 NAD 211 30 *199*
990 NAD 219 10 *199*
990 NAD 219 30 *199*
990 NAD 230 00 *198*

A

AS MBKT 085 *198*
AS MBKT 185 *198*
ATV 61H075M3 *18*
ATV 61H075M3 *18*
ATV 61H075N4 *19*
ATV 61HC11N4 *19*
ATV 61HC13N4 *19*
ATV 61HC16N4 *19*
ATV 61HC22N4 *19*
ATV 61HC25N4 *19*
ATV 61HC31N4 *19*
ATV 61HC40N4 *19*
ATV 61HC50N4 *19*
ATV 61HC63N4 *19*
ATV 61HD11M3X *18*
ATV 61HD11N4 *19*
ATV 61HD15M3X *18*
ATV 61HD15N4 *19*
ATV 61HD18M3X *18*
ATV 61HD18N4 *19*
ATV 61HD22M3X *18*
ATV 61HD22N4 *19*
ATV 61HD30M3X *18*
ATV 61HD30N4 *19*
ATV 61HD37M3X *18*
ATV 61HD37N4 *19*
ATV 61HD45M3X *18*
ATV 61HD45N4 *19*
ATV 61HD55M3X *18*
ATV 61HD55N4 *19*
ATV 61HD75M3X *18*
ATV 61HD75N4 *19*
ATV 61HD90M3X *18*
ATV 61HD90N4 *19*
ATV 61HU15M3 *18*
ATV 61HU15M3 *18*
ATV 61HU15N4 *19*
ATV 61HU22M3 *18*
ATV 61HU22N4 *19*
ATV 61HU30M3 *18*
ATV 61HU30N4 *19*
ATV 61HU40M3 *18*
ATV 61HU40N4 *19*
ATV 61HU55M3 *18*
ATV 61HU55N4 *19*
ATV 61HU75M3 *18*
ATV 61HU75N4 *19*
ATV 61W075N4 *20*
ATV 61W075N4C *21*
ATV 61WD11N4 *20*
ATV 61WD11N4C *21*
ATV 61WD15N4 *20*
ATV 61WD15N4C *21*
ATV 61WD18N4 *20*
ATV 61WD18N4C *21*
ATV 61WD22N4 *20*
ATV 61WD22N4C *21*
ATV 61WD30N4 *20*
ATV 61WD30N4C *21*
ATV 61WD37N4 *20*
ATV 61WD37N4C *21*
ATV 61WD45N4 *20*
ATV 61WD45N4C *21*
ATV 61WD55N4 *20*
ATV 61WD55N4C *21*
ATV 61WD75N4 *20*
ATV 61WD75N4C *21*
ATV 61WD90N4 *20*
ATV 61WD90N4C *21*
ATV 61WU15N4 *20*
ATV 61WU15N4C *21*
ATV 61WU22N4 *20*
ATV 61WU22N4C *21*
ATV 61WU30N4 *20*
ATV 61WU30N4C *21*
ATV 61WU40N4 *20*
ATV 61WU40N4C *21*
ATV 61WU55N4 *20*
ATV 61WU55N4C *21*
ATV 61WU75N4 *20*
ATV 61WU75N4C *21*

L

LA9 P307 *205*
LU9 CD1 *203*
LU9 GC3 *29, 53, 191 and 193*
LUF P1 *190 and 203*
LUF P7 *203*
LUF P9 *203*

N

NW BM85000 *198*
NW BP85 002 *198*
NW NRP 253 00 *198*
NW RR85 001 *198*

T

TSX CAN CA 100 *43 and 53*
TSX CAN CA 300 *43 and 53*
TSX CAN CA 50 *43 and 53*
TSX CAN CB 100 *43 53*
TSX CAN CB 300 *43 and 53*
TSX CAN CB 50 *43 and 53*
TSX CAN CD 100 *43 and 53*
TSX CAN CD 300 *43 and 53*
TSX CAN CD 50 *43 and 53*
TSX CAN KCDF *43*
TSX CSA 100 *193, 194 and 201*
TSX CSA 200 *193, 194 and 201*
TSX CSA 500 *193, 194 and 201*
TSX FP ACC12 *191 and 203*
TSX FP ACC14 *191*
TSX FP ACC6 *191*
TSX FP ACC7 *191*
TSX FP ACC8M *191*
TSX FP ACC9 *191*
TSX FP CA100 *191*
TSX FP CA200 *191*
TSX FP CC100 *191*
TSX FP CC200 *191*
TSX FP CC500 *191*
TSX FP CR100 *191*
TSX FP CR200 *191*
TSX FP CR500 *191*
TSX FP JF020 *191*
TSX P ACC 01 *201*
TSX SCA 50 *194 and 201*
TSX SCA 62 *194 and 201*
TSX SCP 114 *201*
TSX SCP CU 4030 *201*
TSX SCP CU 4530 *201*
TSX SCP CU 6030 *201*
TSX SCY 21601 *201*
TSX SCY CU 6530 *201*

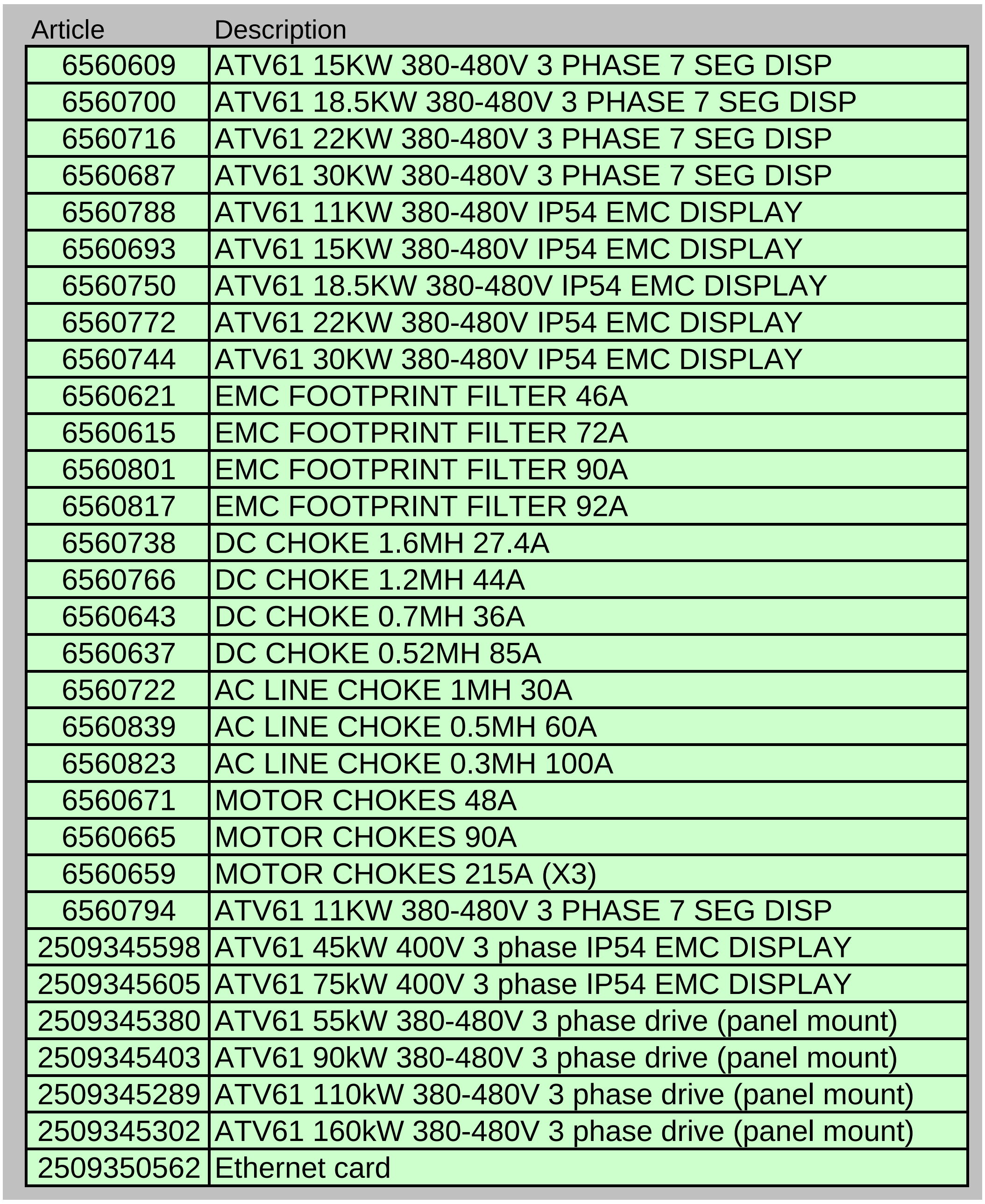
V

VW3 A1 101 *28*
VW3 A1 102 *28 and 29*
VW3 A1 103 *28*
VW3 A1 104 R10 *28 and 29*
VW3 A1 104 R100 *28 and 29*
VW3 A1 104 R30 *28 and 29*
VW3 A1 104 R50 *28 and 29*
VW3 A1 105 *28*
VW3 A3 101 *22*
VW3 A3 201 *31*
VW3 A3 202 *31*
VW3 A3 301 *190*
VW3 A3 302 *52 and 198*
VW3 A3 303 *52 and 201*
VW3 A3 304 *52*
VW3 A3 307 *52*
VW3 A3 309 *52*
VW3 A3 310 *52 and 186*
VW3 A3 311 *52 and 190*
VW3 A3 312 *52*
VW3 A3 313 *52*
VW3 A3 314 *52*
VW3 A3 315 *52*
VW3 A3 501 *43*
VW3 A3 502 *35*
VW3 A3 503 *35*
VW3 A4 401 *76*
VW3 A4 402 *76*
VW3 A4 403 *76*
VW3 A4 404 *76*
VW3 A4 405 *76*
VW3 A4 406 *76*
VW3 A4 407 *76*
VW3 A4 408 *76*
VW3 A4 410 *76*
VW3 A4 411 *76*
VW3 A4 412 *76*
VW3 A4 413 *76*
VW3 A4 501 *65*
VW3 A4 502 *65*
VW3 A4 503 *65*
VW3 A4 504 *65*
VW3 A4 505 *65*
VW3 A4 506 *65*
VW3 A4 507 *65*
VW3 A4 508 *65*
VW3 A4 509 *65*
VW3 A4 510 *65*
VW3 A4 511 *65*
VW3 A4 512 *65*
VW3 A4 551 *68*
VW3 A4 552 *68*
VW3 A4 553 *68*
VW3 A4 554 *68*
VW3 A4 555 *68*
VW3 A4 556 *68*
VW3 A4 557 *68*
VW3 A4 558 *68*
VW3 A4 559 *68*
VW3 A4 560 *68*
VW3 A4 561 *68*
VW3 A4 564 *68*
VW3 A4 565 *68*
VW3 A4 568 *68*
VW3 A4 569 *68*
VW3 A4 601 *70*
VW3 A4 602 *70*
VW3 A4 603 *70*
VW3 A4 604 *70*
VW3 A4 605 *70*
VW3 A4 606 *70*
VW3 A4 607 *70*
VW3 A4 608 *70*
VW3 A4 609 *70*
VW3 A4 610 *70*
VW3 A4 611 *70*
VW3 A4 612 *70*
VW3 A4 613 *70*
VW3 A4 619 *70*
VW3 A4 621 *71*
VW3 A4 622 *71*
VW3 A4 623 *71*
VW3 A4 624 *71*
VW3 A4 625 *71*
VW3 A4 626 *71*
VW3 A4 627 *71*
VW3 A4 628 *71*
VW3 A4 629 *71*
VW3 A4 630 *71*
VW3 A4 631 *71*
VW3 A4 632 *71*
VW3 A4 633 *71*
VW3 A4 639 *71*
VW3 A4 641 *72*
VW3 A4 642 *72*
VW3 A4 643 *72*
VW3 A4 644 *72*
VW3 A4 645 *72*
VW3 A4 646 *72*
VW3 A4 647 *72*
VW3 A4 648 *72*
VW3 A4 649 *72*
VW3 A4 650 *72*
VW3 A4 651 *72*
VW3 A4 656 *72*
VW3 A4 657 *72*
VW3 A4 661 *73*
VW3 A4 662 *73*
VW3 A4 663 *73*
VW3 A4 664 *73*
VW3 A4 665 *73*
VW3 A4 666 *73*
VW3 A4 667 *73*
VW3 A4 668 *73*
VW3 A4 669 *73*
VW3 A4 670 *73*
VW3 A4 671 *73*
VW3 A4 676 *73*
VW3 A4 677 *73*
VW3 A5 101 *80*
VW3 A5 102 *80*
VW3 A5 103 *80*
VW3 A5 104 *80*
VW3 A5 105 *80*
VW3 A5 106 *80*
VW3 A5 107 *80*
VW3 A5 108 *80*
VW3 A5 201 *83*
VW3 A5 202 *83*
VW3 A5 203 *83*
VW3 A5 204 *83*
VW3 A5 205 *83*
VW3 A5 206 *83*
VW3 A5 207 *83*
VW3 A5 208 *83*
VW3 A5 209 *83*
VW3 A5 210 *83*
VW3 A5 211 *83*
VW3 A58 306 R10 *193*
VW3 A58 306 R30 *193*
VW3 A58501 *68*
VW3 A58502 *68*
VW3 A7 101 *55*
VW3 A7 102 *55*
VW3 A7 701 *57*
VW3 A7 702 *57*
VW3 A7 703 *57*
VW3 A7 704 *57*
VW3 A7 705 *57*
VW3 A7 706 *57*
VW3 A7 707 *57*
VW3 A7 708 *57*
VW3 A7 709 *57*
VW3 A7 710 *57*
VW3 A7 711 *57*
VW3 A7 712 *57*
VW3 A7 713 *57*
VW3 A7 714 *57*
VW3 A7 715 *57*
VW3 A7 716 *57*
VW3 A7 717 *57*
VW3 A7 718 *57*
VW3 A8 104 *180*
VW3 A8 105 *180*
VW3 A8 106 *43 and 180*
VW3 A8 114 *180*
VW3 A8 115 *180*
VW3 A8 306 *194*
VW3 A8 306 2 *194 and 201*
VW3 A8 306 D30 *186, 194, 195, 199, 203 and 205*

Product reference index

VW3 A8 306 DR *195*
VW3 A8 306 DRC *195*
VW3 A8 306 R *193*
VW3 A8 306 R03 *29, 53, 191, 193 and 203*
VW3 A8 306 R10 *29, 53, 191, 193 and 203*
VW3 A8 306 R30 *29, 53, 191, 193 and 203*
VW3 A8 306 RC *29, 53, 191 and 193*
VW3 A8 306 TF03 *29, 53 and 193*
VW3 A8 306 TF10 *29, 53 and 193*
VW3 A9 101 *25*
VW3 A9 102 *25*
VW3 A9 103 *25*
VW3 A9 104 *25*
VW3 A9 105 *25*
VW3 A9 106 *25*
VW3 A9 107 *25*
VW3 A9 108 *25*
VW3 A9 109 *25*
VW3 A9 110 *25*
VW3 A9 111 *25*
VW3 A9 112 *25*
VW3 A9 113 *25*
VW3 A9 114 *25*
VW3 A9 115 *25*
VW3 A9 116 *25*
VW3 A9 117 *25*
VW3 A9 201 *24*
VW3 A9 202 *24*
VW3 A9 203 *24*
VW3 A9 204 *24*
VW3 A9 205 *24*
VW3 A9 206 *24*
VW3 A9 207 *24*
VW3 A9 208 *24*
VW3 A9 209 *24*
VW3 A9 210 *24*
VW3 A9 211 *24*
VW3 A9 212 *24*
VW3 A9 213 *24*
VW3 A9 214 *24*
VW3 A9 217 *24*
VW3 A9 302 *26*
VW3 A9 303 *26*
VW3 A9 304 *26*
VW3 A9 305 *26*
VW3 A9 306 *26*
VW3 A9 307 *26*
VW3 A9 308 *26*
VW3 A9 309 *26 and 27*
VW3 A9 310 *26 and 27*
VW3 A9 311 *26 and 27*
VW3 A9 315 *26 and 27*
VW3 A9 404 *22*
VW3 A9 405 *22*
VW3 A9 406 *22*
VW3 A9 407 *22*
VW3 A9 501 *23*
VW3 A9 502 *23*
VW3 A9 503 *23*
VW3 A9 504 *23*
VW3 A9 505 *23*
VW3 A9 506 *23*
VW3 A9 507 *23*
VW3 A9 508 *23*
VW3 A9 509 *23*
VW3 A9 510 *23*
VW3 A9 511 *23*
VW3 A9 512 *23*
VW3 A9 513 *23*
VW3 A9 514 *23*
VW3 A9 515 *23*
VW3 A9 601 *77*
VW3 A9 602 *77*
VW3 A9 612 *81*
VW3 A9 613 *81*
VW3 CAN A71 *53*
VW3 CAN KCDF *53*
VW3 P07 306 R10 *205*

X
XGS Z24 *180*
XGS Z24 *198*



Article	Description
6560609	ATV61 15KW 380-480V 3 PHASE 7 SEG DISP
6560700	ATV61 18.5KW 380-480V 3 PHASE 7 SEG DISP
6560716	ATV61 22KW 380-480V 3 PHASE 7 SEG DISP
6560687	ATV61 30KW 380-480V 3 PHASE 7 SEG DISP
6560788	ATV61 11KW 380-480V IP54 EMC DISPLAY
6560693	ATV61 15KW 380-480V IP54 EMC DISPLAY
6560750	ATV61 18.5KW 380-480V IP54 EMC DISPLAY
6560772	ATV61 22KW 380-480V IP54 EMC DISPLAY
6560744	ATV61 30KW 380-480V IP54 EMC DISPLAY
6560621	EMC FOOTPRINT FILTER 46A
6560615	EMC FOOTPRINT FILTER 72A
6560801	EMC FOOTPRINT FILTER 90A
6560817	EMC FOOTPRINT FILTER 92A
6560738	DC CHOKE 1.6MH 27.4A
6560766	DC CHOKE 1.2MH 44A
6560643	DC CHOKE 0.7MH 36A
6560637	DC CHOKE 0.52MH 85A
6560722	AC LINE CHOKE 1MH 30A
6560839	AC LINE CHOKE 0.5MH 60A
6560823	AC LINE CHOKE 0.3MH 100A
6560671	MOTOR CHOKES 48A
6560665	MOTOR CHOKES 90A
6560659	MOTOR CHOKES 215A (X3)
6560794	ATV61 11KW 380-480V 3 PHASE 7 SEG DISP
2509345598	ATV61 45kW 400V 3 phase IP54 EMC DISPLAY
2509345605	ATV61 75kW 400V 3 phase IP54 EMC DISPLAY
2509345380	ATV61 55kW 380-480V 3 phase drive (panel mount)
2509345403	ATV61 90kW 380-480V 3 phase drive (panel mount)
2509345289	ATV61 110kW 380-480V 3 phase drive (panel mount)
2509345302	ATV61 160kW 380-480V 3 phase drive (panel mount)
2509350562	Ethernet card

Simple machines
Altistart 01: 0.37 to 75 kW
Altivar 11: 0.18 to 2.2 kW
Altivar 31: 0.18 to 15 kW

Complex, high power machines
Altivar 71: 0.37 to 500 kW

Pumping and ventilation machines
Altistart 48: 4 to 1 200 kW
Altivar 11...347: 0.18 to 2.2 kW
Altivar 21: 0.75 to 30 kW
Altivar 61: 0.75 to 630 kW

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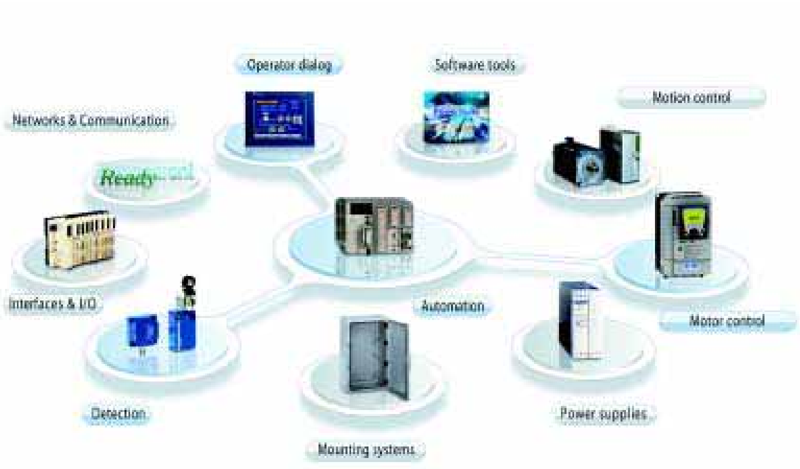
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