

Variable speed drives

Altivar 61

Catalogue
September

05






For 3-phase asynchronous motors from 0.75 to 630 kW



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 | | 0.5...200 Hz | 0.5...200 Hz | 0.5...500 Hz |
| Output frequency | | 0.5...200 Hz | 0.5...200 Hz | 0.5...500 Hz |
| Type of control | | Asynchronous motor | 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 | | 50 | 26 | 50 |
| 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 | | Modbus | – | Modbus and CANopen |
| Embedded | | Modbus | – | Ethernet TCP/IP, DeviceNet, Fipio, Profibus DP |
| Available as an option | | LONWORKS, METASYS N2, APOGEE FLN, BACnet | – | |
| Cards (available as an option) | | – | – | – |
| | | – | – | – |
| Standards and certification | | EN 50178, IEC/EN61800-3 EN 55011, EN 55022: class A, class B with option card, C€, UL, C-Tick, N998 | EN 50178, IEC/EN 61800-3 EN 55011, EN 55022: class B and class A gr.1 C€, UL, CSA, NOM 117, C-Tick | EN 50178, IEC/EN 61800-3 EN 55011, EN 55022: class A, class B with option card, C€, 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...5.5 |
| – |
| 0.75...90 |
| 0.75...630 |
| – |
| – |

| |
|------------|
| 0.37...500 |
| – |
| 0.37...5.5 |
| – |
| 0.37...75 |
| 0.75...500 |
| – |
| – |

| |
|--|
| 0.5...1000 Hz up to 37 kW, 0.5...500 Hz from 45 kW to 630 kW |
| Sensorless flux vector control, voltage/frequency ratio (2 or 5 points), energy saving ratio |
| – |
| 110...120% of the nominal motor torque for 60 seconds |

| |
|---|
| 0...1000 Hz up to 37 kW, 0...500 Hz from 45 kW to 500 kW |
| Flux vector control with or without sensor, voltage/frequency ratio (2 or 5 points), ENA System |
| – |
| Vector control without speed feedback |
| 220% of the nominal motor torque for 2 seconds |
| 170% for 60 seconds |

| |
|--------|
| > 100 |
| 8 |
| 2...4 |
| 6...20 |
| 1...3 |
| 0...8 |
| 2...4 |

| |
|--------|
| > 150 |
| 16 |
| 2...4 |
| 6...20 |
| 1...3 |
| 0...8 |
| 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

| |
|----------|
| 18 to 21 |
|----------|

ATV 71

| |
|---|
| Please consult the "Altivar 71 variable speed drives" catalogue |
|---|

Variable speed drives for asynchronous motors

Altivar 61



Ventilation application



Air conditioning application



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, l/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.

Variable speed drives for asynchronous motors

Altivar 61

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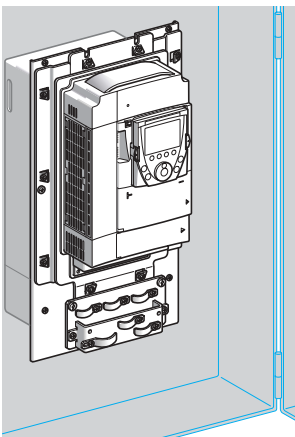
ATV 61HC31N4,
ATV 61HD37M3X, ATV 61HU22N4

534628



ATV 61W075N4,
ATV 61W075N4C

533295



ATV 61HU75N4 flush-mounted

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.

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.

Installation

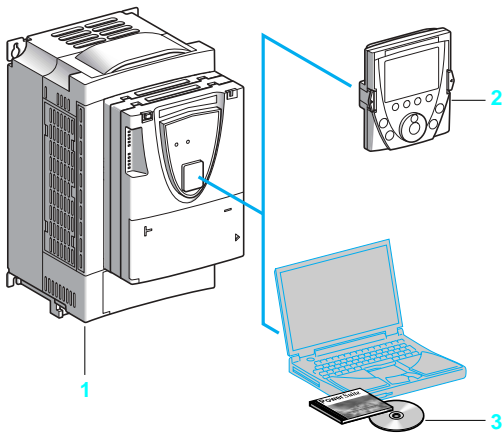
The Altivar 61 drive has been designed to optimize the size of enclosures (floor-standing, wall-mounted, etc):

- 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).

Variable speed drives for asynchronous motors

Altivar 61



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.

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.

534783

| | | | |
|---|------|------------|--|
| RUN | Term | +50.00Hz | 5.4A |
| 1.1 SIMPLY START <input type="checkbox"/> | | | |
| 2/3 wire control : | | 2 wire | |
| Macro-configuration : | | Pumps.Fans | |
| Standard mot. Freq. : | | 50Hz IEC | |
| Rated motor power : | | 2.2kW | |
| Rated motor volt. : | | 400V | |
| Code | << | >> | Quick <input type="button" value="v"/> |

Simply Start menu

533363

| | | | |
|--|------|----------|--|
| SCF1 | Term | +50.00Hz | 0.0A |
| FAULT HISTORY <input type="checkbox"/> | | | |
| Short circuit | | | |
| Overcurrent | | | |
| External FLT | | | |
| Overvoltage | | | |
| Undervoltage | | | |
| Help | | | Quick <input type="button" value="v"/> |

Fault log

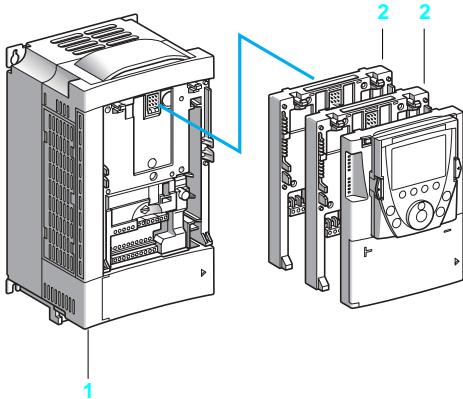
52162

| | | | |
|---|------|----------|--|
| SCF1 | Term | +50.00Hz | 0.0A |
| MOTOR SHORT CIRCUIT <input type="checkbox"/> | | | |
| Check the connection cables and the motor insulation. | | | |
| Perform the diagnostic test. | | | |
| | | | Quick <input type="button" value="v"/> |

Troubleshooting screen

Variable speed drives for asynchronous motors

Altivar 61



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:

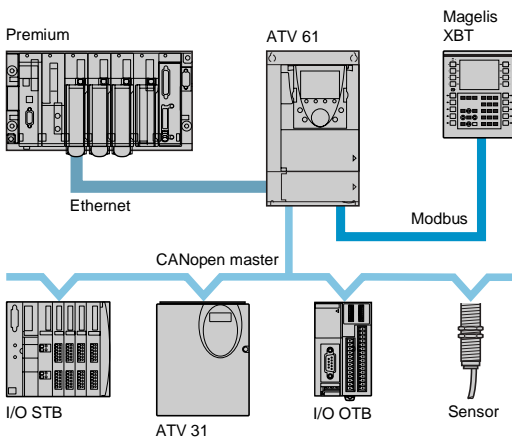
- The card integrates its own I/O; it can also manage those of the drive and an I/O extension card.
- It contains onboard application programs developed in IEC 61131-3 compliant languages, which reduce the control system’s response time.
- Its CANopen master port enables control of other drives and dialogue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

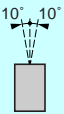
⁽¹⁾ The Altivar 61 cannot support more than one option card with the same reference. Please refer to the compatibility tables summarizing the possible combinations for drives, options and accessories on pages 84 to 89.

Variable speed drives for asynchronous motors

Altivar 61

| 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 | |  |

| 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 |

Variable speed drives for asynchronous motors

Altivar 61

| 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) |

Variable speed drives for asynchronous motors

Altivar 61

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 | 8 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 | | |
| | 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 | 8 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 | | |
| | 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 | | | |

Variable speed drives for asynchronous motors

Altivar 61

Electrical control characteristics

| | | |
|---|-------------------------|---|
| Internal supplies available | | Short-circuit and overload protection: <ul style="list-style-type: none"> ■ 1 x 10.5 V \pm 5% supply for the reference potentiometer (1 to 10 kΩ), maximum current 10 mA ■ 1 x 24 V \pm supply (min. 21 V, max. 27 V), maximum current 200 mA. |
| External + 24 V power supply (1) (not supplied) | | 24 V \pm (min. 19 V, max. 30 V) Power 30 W |
| Analog inputs | A11-/A11+ | 1 bipolar differential analog input \pm 10 V \pm (maximum safe voltage 24 V) Max. sampling time: 2 ms \pm 0.5 ms Resolution: 11 bits +1 sign bit Accuracy: \pm 0.6% for a temperature variation of 60°C Linearity: \pm 0.15% of the maximum value |
| | A12 | 1 software-configurable current or voltage analog input: <ul style="list-style-type: none"> ■ voltage analog input 0...10 V \pm, 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 \pm 0.5 ms Resolution: 11 bits Accuracy: \pm 0.6% for a temperature variation of 60°C Linearity: \pm 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: <ul style="list-style-type: none"> ■ voltage analog output 0...10 V \pm, 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 \pm 0.5 ms Resolution: 10 bits Accuracy: \pm 1% for a temperature variation of 60°C Linearity: \pm 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 \pm Maximum switching capacity: <ul style="list-style-type: none"> ■ on resistive load ($\cos \phi = 1$): 5 A for 250 V \sim or 30 V \pm ■ on inductive load ($\cos \phi = 0.4$ and L/R = 7 ms): 2 A for 250 V \sim or 30 V \pm Max. response time: 7 ms \pm 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 \pm Maximum switching capacity: <ul style="list-style-type: none"> ■ on resistive load ($\cos \phi = 1$): 5 A for 250 V \sim or 30 V \pm ■ on inductive load ($\cos \phi = 0.4$ and L/R = 7 ms): 2 A for 250 V \sim or 30 V \pm Max. response time: 7 ms \pm 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 \pm , compatible with level 1 PLC, IEC 65A-68 standard Impedance: 3.5 k Ω Maximum voltage: 30 V Max. sampling time: 2 ms \pm 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: <ul style="list-style-type: none"> ■ 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 \leq 5 V or logic input not wired, state 1 if \geq 11 V |
| | Negative logic (Sink) | State 0 if \geq 16 V or logic input not wired, state 1 if \leq 10 V |
| | Other inputs | See option cards |
| Safety input | PWR | 1 input for the Power Removal safety function: <ul style="list-style-type: none"> ■ Power supply: 24 V \pm (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".

Variable speed drives for asynchronous motors

Altivar 61

| Electrical control characteristics (continued) | | | |
|--|-----------------------|----|--|
| Acceleration and deceleration ramps | | | Ramp profiles: <ul style="list-style-type: none"> ■ 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: <ul style="list-style-type: none"> ■ 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: <ul style="list-style-type: none"> ■ against overheating ■ of the power stage Protection against: <ul style="list-style-type: none"> ■ 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: <ul style="list-style-type: none"> ■ 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 ² t taking speed into account: <ul style="list-style-type: none"> ■ 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 | | Between earth and power terminals: 2830 V ~ |
| | ATV 61●●●M3X | | Between control and power terminals: 4230 V ~ |
| | ATV 61●●●N4 | | Between earth and power terminals: 3535 V ~ |
| | ATV 61W●●●N4C | | 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. |

Variable speed drives for asynchronous motors

Altivar 61

| 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. | | |

Variable speed drives for asynchronous motors

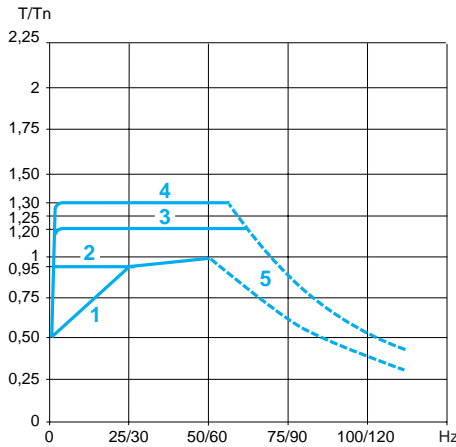
Altivar 61

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

- 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)



Open loop applications

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.

(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.

Variable speed drives for asynchronous motors

Altivar 61

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.

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.

Switching the motor at the drive output

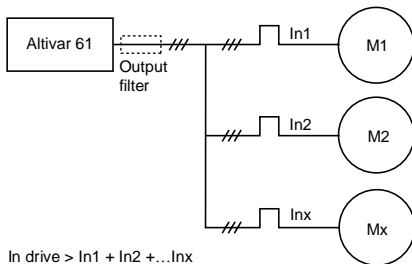
The drive can be switched when locked or unlocked. If the drive is switched on-the-fly (drive unlocked), the motor is controlled and accelerates until it reaches the reference speed smoothly following the acceleration ramp. This use requires configuration of the automatic catching a spinning load ("catch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

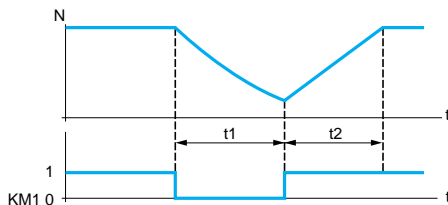
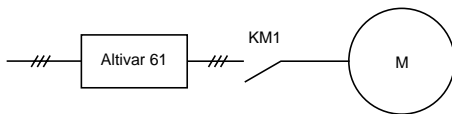
On new installations, it is recommended that the Power Removal safety function is used.

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.



$I_n \text{ drive} > I_{n1} + I_{n2} + \dots + I_{nx}$
Connecting motors in parallel



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

Example of loss of output contactor

Variable speed drives for asynchronous motors

Altivar 61

Supply voltage 200...240V 50/60 Hz

UL Type 1/IP 20 drives

| Motor Power indicated on plate (1) | | Line supply (2) | | | | Altivar 61 | | Reference (3) | Weight |
|--|-----|------------------|-------|----------------|------------------------------|-----------------------------|---------------------------------|---------------------------|--------|
| | | Line current (2) | | Apparent power | Maximum prospective line Isc | Max. continuous current (1) | Max. transient current for 60 s | | |
| | | 200 V | 240 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 |

DF534520



ATV 61H075M3

DF534621



ATV 61HU22M3Z

DF534522



ATV 61HD37M3X

- (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 environmental 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.

Variable speed drives for asynchronous motors

Altivar 61

Supply voltage 380...480V 50/60 Hz

UL Type 1/IP 20 drives

| Motor Power indicated on plate (1) | | Line supply | | | | Altivar 61 | | | Reference (3) | Weight |
|---|-----|------------------|-------|----------------|------------------------------|-----------------------------|-------|---------------------------------|----------------------|---------|
| | | Line current (2) | | Apparent power | Maximum prospective line Isc | Max. continuous current (1) | | Max. transient current for 60 s | | |
| | | 380 V | 480 V | | | 380 V | 380 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 | | | | | |

(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.

DF594523



ATV 61HU22N4

DF594624



ATV 61HU40N4Z

DF594564



ATV 61HC31N4

Variable speed drives for asynchronous motors

Altivar 61

Supply voltage 380...480V 50/60 Hz



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

| Motor | | Line supply | | | | Altivar 61 | | | Reference (3) (4) (5) | Weight |
|---|-----|------------------|-------|----------------|------------------------------|-----------------------------|-------|---------------------------------|-----------------------|--------|
| Power indicated on plate (1) | | Line current (2) | | Apparent power | Maximum prospective line Isc | Max. continuous current (1) | | Max. transient current for 60 s | | |
| | | 380 V | 480 V | | | 380 V | 380 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.

Variable speed drives for asynchronous motors

Altivar 61

Supply voltage 380...480V 50/60 Hz

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

| Motor Power indicated on plate (1) | | Line supply | | | | Altivar 61 | | | Reference (3) (4) (5) | Weight |
|---|-----|---------------------|-------|----------------------------|------------------------------------|-----------------------------------|--|-------|-----------------------|---------|
| | | Line current (2) | | Apparent power 380 V | Maximum prospective line Isc | Max. continuous current (1) | Max. transient current for 60 s | | | |
| | | 380 V | 480 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 \pm 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.



ATV 61WD30N4C

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

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.

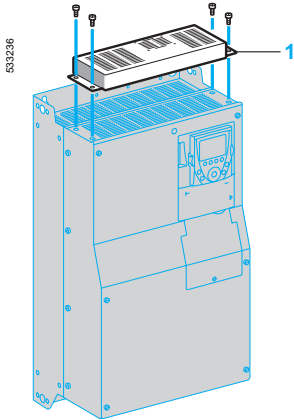
The kit 1 is mounted on the upper part of the drive. It is powered by the drive.

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 | – |



Control card fan kit

Variable speed drives for asynchronous motors

Altivar 61

Option: accessories

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.

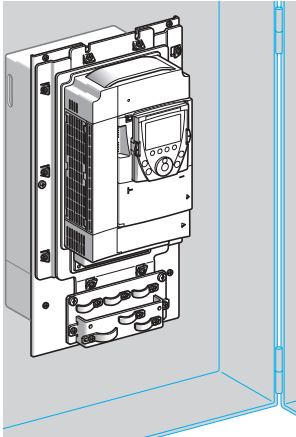
With this type of mounting, the maximum internal temperature in the enclosure can then reach 60°C without it being necessary to derate the drive current.

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.

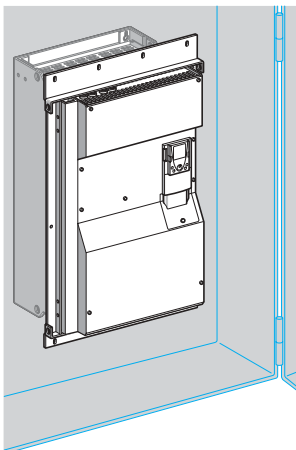
The back of the enclosure must be drilled and cut out for this type of mounting.

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 | Without braking unit VW3 A9 514 (1) | 4.700 |
| ATV 61HC25N4D, HC31N4D | 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,

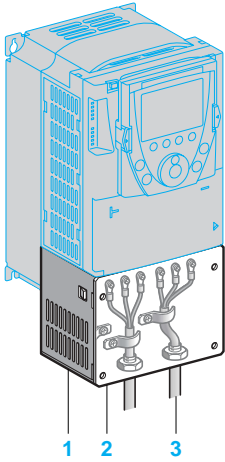
- Drives supplied without DC choke: ATV 61HD55M3XD...HD90M3XD,
ATV 61HD90N4D...HC31N4D.

See pages 97 and 98.

Variable speed drives for asynchronous motors

Altivar 61
Option: accessories

534644



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.

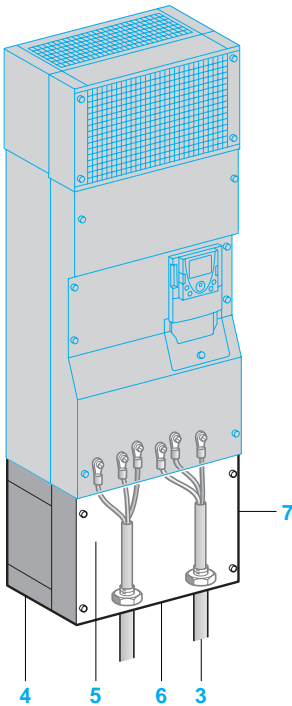
For ATV 61H●●●M3, ATV 61HD11M3X...HD45M3X and ATV 61H075N4...HD75N4 drives, the kit consists of:

- 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.

534545



UL Type 1 conformity kits

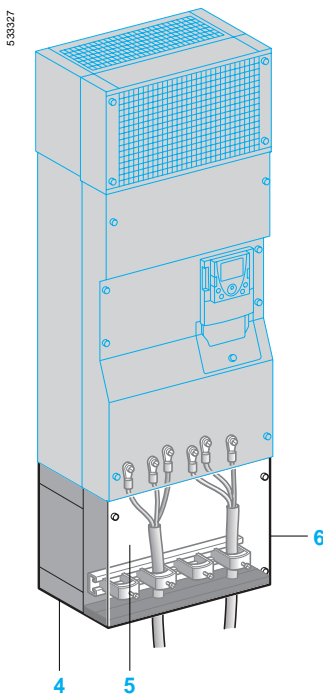
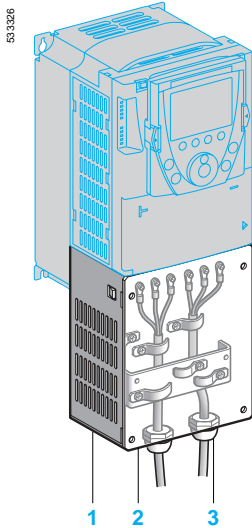
References

| 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 |

Variable speed drives for asynchronous motors

Altivar 61

Option: accessories



IP 21 or IP 31 conformity kits

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.

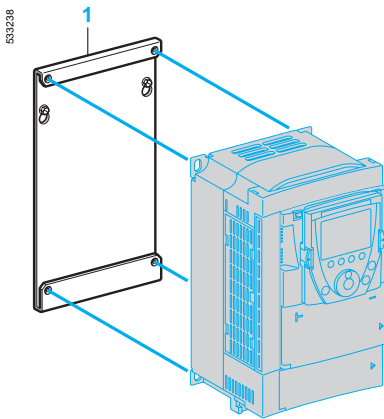
References

| 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 | VW3 A9 114 | 19.500 |
| ATV 61HC40N4, HC50N4 | IP 31 | VW3 A9 115 | 25.000 |
| ATV 61HC63N4 | IP 31 | VW3 A9 116 | 35.000 |

Variable speed drives for asynchronous motors

Altivar 61

Option: accessories



VW3 A9 304

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.

References

| Old drive | Motor Power | | Replaced by | Reference | Weight kg |
|-----------|-------------|----|-------------|-----------|--------------|
| | kW | HP | | | |

Replacing an Altivar 38 drive with an integrated EMC filter

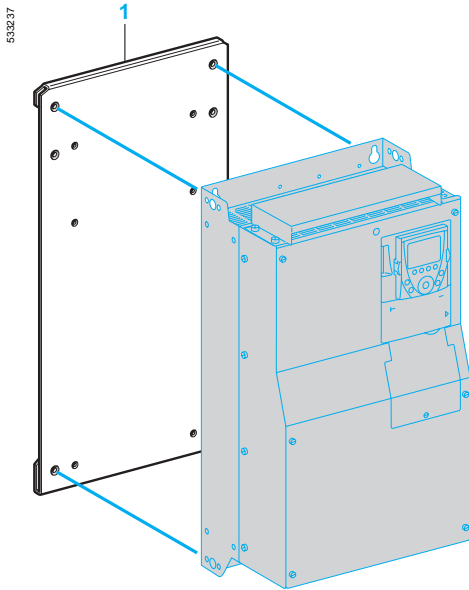
Three phase supply voltage: 380...480 V 50/60 Hz

| | | | | | |
|--------------|------|-----|--------------|------------|---|
| 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 | | | |
| 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 | — |

Variable speed drives for asynchronous motors

Altivar 61
Options: dialogue

534487



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:

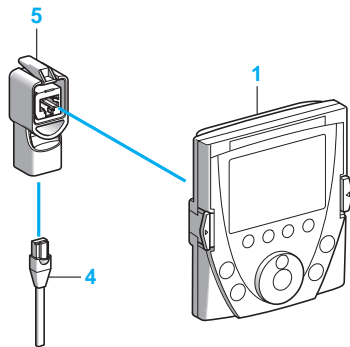
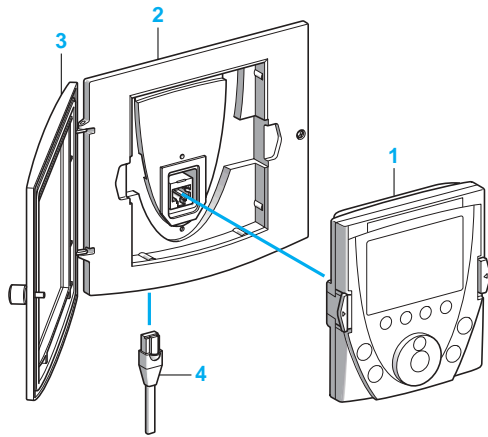
- A remote mounting kit for mounting on an enclosure door with IP 54 degree of protection. It includes:
 - All the mechanical fittings
 - The screws and bolts
- A transparent door which attaches to the remote mechanics to achieve IP 65 degree of protection
- A cable equipped with two RJ45 connectors 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 adaptor 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).

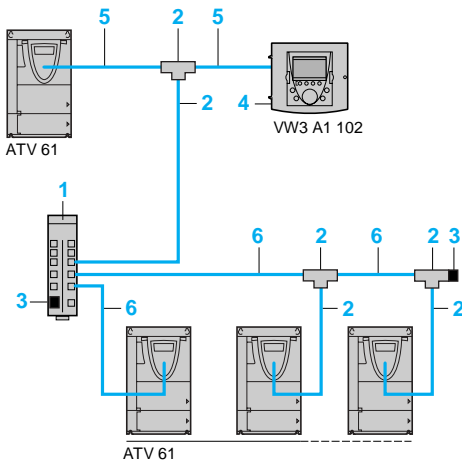
(2) To be mounted on remote mounting kit VW3 A1 102 (for mounting on an enclosure door), which must be ordered separately (see above).



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 | 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 |

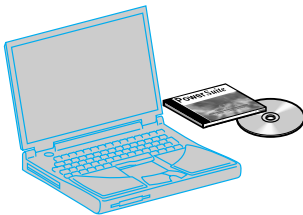
PowerSuite software workshop

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.

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PowerSuite software workshop

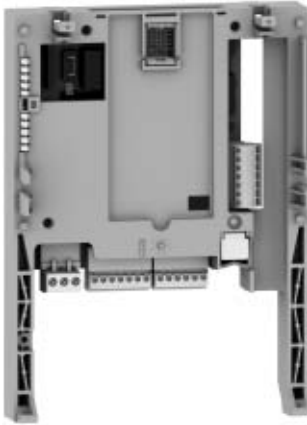
Variable speed drives for asynchronous motors

Altivar 61

Options: I/O extension cards

Presentation

632728



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: <ul style="list-style-type: none"> ■ 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 ($\pm 5\%$) 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: <ul style="list-style-type: none"> ■ on resistive load ($\cos \phi = 1$): 5 A for 250 V \sim or 30 V --- ■ on inductive load ($\cos \phi = 0.4$ and L/R = 7 ms): 2 A for 250 V \sim or 30 V --- Electrical service life: 100,000 operations Maximum response time: 7 ms \pm 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 k Ω Maximum voltage: 30 V Multiple assignment makes it possible to configure several functions on one input Maximum sampling time: 2 ms \pm 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 \pm 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: <ul style="list-style-type: none"> ■ 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 mm ² (AWG 16) 0.25 Nm |

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 | | <p>Short-circuit and overload protection:</p> <ul style="list-style-type: none"> 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 ($\pm 5\%$) for the reference potentiometer (1 to 10 kΩ), max. current 10 mA |
| Analog inputs AI | AI3+/AI3- | <p>1 X-Y mA differential current analog input by programming X and Y from 0 to 20 mA, with impedance 250 Ω</p> <p>Maximum sampling time: 5 ms \pm 1 ms</p> <p>Resolution: 11 bits + 1 sign bit</p> <p>Accuracy: $\pm 0.6\%$ for a temperature variation of 60°C</p> <p>Linearity: $\pm 0.15\%$ of the maximum value</p> |
| | AI4 | <p>1 software-configurable current or voltage analog input:</p> <ul style="list-style-type: none"> 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 <p>Maximum sampling time: 5 ms \pm 1 ms</p> <p>Resolution: 11 bits</p> <p>Accuracy: $\pm 0.6\%$ for a temperature variation of 60°C</p> <p>Linearity: $\pm 0.15\%$ of the maximum value</p> |
| Analog outputs | AO2, AO3 | <p>2 software-configurable current or voltage analog outputs:</p> <ul style="list-style-type: none"> 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 <p>Maximum sampling time: 5 ms \pm 1 ms</p> <p>Resolution: 10 bits</p> <p>Accuracy: $\pm 1\%$ for a temperature variation of 60°C</p> <p>Linearity: $\pm 0.2\%$ of the maximum value</p> |
| Configurable relay output | R4A, R4B, R4C | <p>1 relay logic output, one "N/C" contact and one "N/O" contact with common point.</p> <p>Minimum switching capacity: 3 mA for 24 V ---</p> <p>Maximum switching capacity:</p> <ul style="list-style-type: none"> on resistive load ($\cos \phi = 1$): 5 A for 250 V \sim or 30 V --- on inductive load ($\cos \phi = 0.4$ and L/R = 7 ms): 1.5 A for 250 V \sim or 30 V --- <p>Electrical service life: 100,000 operations</p> <p>Maximum response time: 10 ms \pm 1 ms</p> |
| Logic inputs | LI11...LI14 | <p>4 programmable logic inputs, 24 V ---, compatible with level 1 PLC, IEC 65A-68 standard</p> <p>Impedance 3.5 kΩ</p> <p>Maximum voltage: 30 V</p> <p>Multiple assignment makes it possible to configure several functions on one input</p> <p>Maximum sampling time: 5 ms \pm 1 ms</p> |
| | 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 | <p>2 x 24 V --- assignable open collector positive logic (Source) or negative logic (Sink) outputs, compatible with level 1 PLC, IEC 65A-68 standard</p> <p>Maximum voltage: 30 V</p> <p>Maximum current: 200 mA</p> <p>Logic output common (CLO) isolated from other signals</p> <p>Maximum sampling time: 5 ms \pm 1 ms. The active state is software-configurable as is a delay for each switching operation</p> |
| Input for PTC probes | TH2+/TH2- | <p>1 input for a maximum of 6 PTC probes mounted in series:</p> <ul style="list-style-type: none"> nominal value < 1.5 kΩ trip resistance 3 kΩ, reset value 1.8 kΩ short-circuit protection < 50 Ω |
| Frequency control input | RP | <p>Frequency range: 0...30 kHz</p> <p>Cyclic ratio: 50 % \pm 10 %</p> <p>Maximum sampling time: 5 ms \pm 1 ms</p> <p>Maximum input voltage 30 V, 15 mA</p> <p>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)</p> <p>State 0 if < 1.2 V, state 1 if > 3.5 V</p> |
| Maximum I/O connection capacity and tightening torque | | <p>1.5 mm² (AWG 16)</p> <p>0.25 Nm</p> |

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.

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:

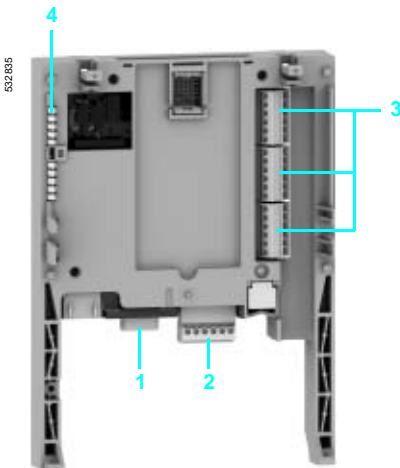
- The drive I/O
- The I/O extension card I/O
- The drive parameters (speed, current, torque, etc.).

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

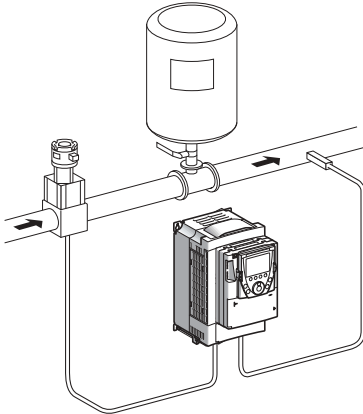
- 1 9-way male SUB-D connector for connection to the CANopen bus.
- 2 Connector with removable screw terminals, 6 contacts at intervals of 3.81 for the 24 V --- power supply and 4 logic inputs.
- 3 3 connectors with removable screw terminals, 6 contacts at intervals of 3.81 for 6 logic inputs, 6 logic 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.



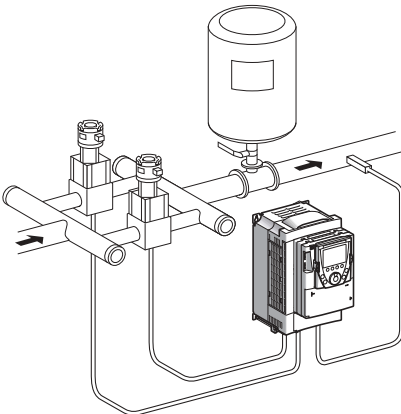
Variable speed drives for asynchronous motors

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.

Variable speed drives for asynchronous motors

Altivar 61

Option: Multi-pump cards

Electrical characteristics

| | | | |
|--------------------------|-------------------|-----------------------|---|
| Power supply | Voltage | V | 24 \pm (min. 19, max. 30) |
| Power consumption | Maximum | A | 2 |
| | Current | | |
| | 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: \pm 1% for a temperature variation of 60°C Linearity: \pm 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: \pm 1% for a temperature variation of 60°C Linearity: \pm 0.2% of the maximum value Common point for all the card I/O (2) |
| Logic inputs | LI51...LI60 | | Ten 24 V \pm 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 k Ω Maximum voltage: 30 V \pm Switching thresholds: State 0 if \leq 5 V or logic input not wired State 1 if \geq 11 V Common point for all the card I/O (2) |
| Logic outputs | LO51...LO56 | | Six 24 V \pm 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 | mm² | 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 \pm 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.

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 DC power supply must be used.

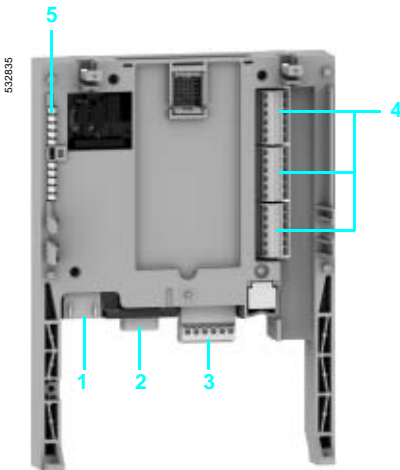
The ATV 61W●●●N4A24 and ATV 61W●●●N4C24 variable speed drives incorporate a 24 V DC power supply and allow an additional consumption of 250 mA.

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

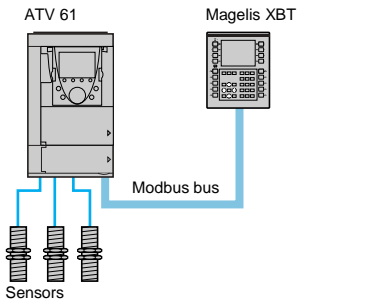
- 1 RJ45 connector for connecting the PS 1131 software workshop via an RS 485 serial link.
Connection to the PC is via a cable and an RS 232/RS 485 connector included in the VW3 A8 106 PowerSuite for PC connection kit.
- 2 9-way male SUB-D connector for connection to the CANopen bus.
- 3 Connector with removable screw terminals, 6 contacts at intervals of 3.81 for the 24 V DC 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 DC power supply
 - 1 to indicate a program execution fault
 - 2 to indicate the CANopen bus communication status
 - 1 controlled by the application program



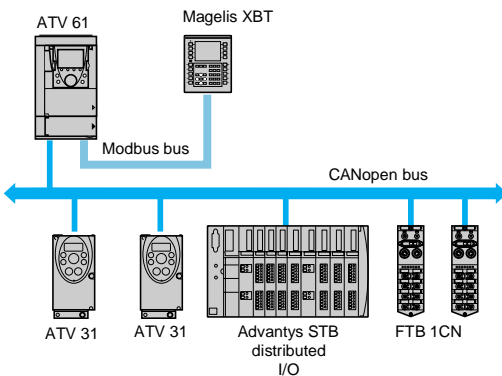
Variable speed drives for asynchronous motors

Altivar 61

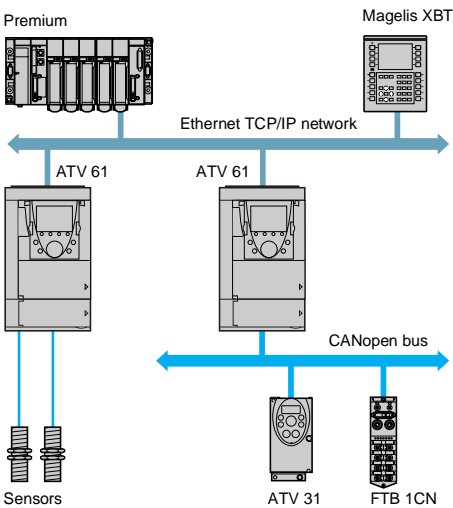
Option: "Controller Inside" programmable card



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.

Variable speed drives for asynchronous motors

Altivar 61

Option: "Controller Inside" programmable card

| Electrical characteristics | | | |
|------------------------------|-------------------|-----------------------|---|
| Power supply | Voltage | V | 24 --- (min. 19, max. 30) |
| | Maximum | A | 2 |
| Power consumption Current | 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 | mm² | 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.

Variable speed drives for asynchronous motors

Altivar 61

Option: "Controller Inside" programmable card

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.

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.

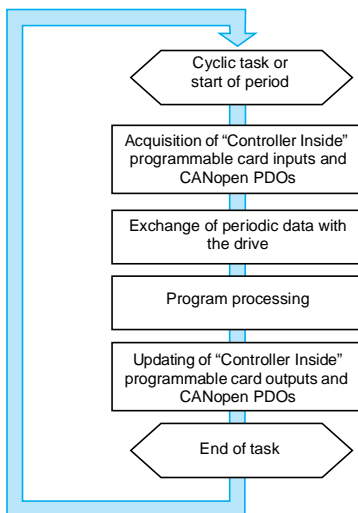
A task can be synchronized with the drive's main task to improve repeat accuracy in motion control applications.

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.



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

Variable speed drives for asynchronous motors

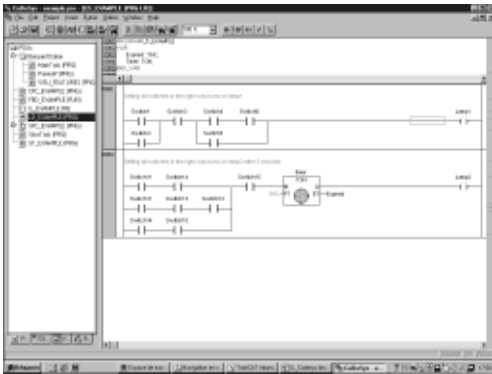
Altivar 61

Option: "Controller Inside" programmable card

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)

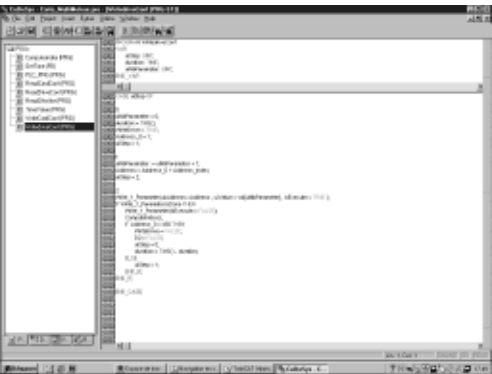
A Ladder language program consists of a set of rungs executed sequentially.

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.

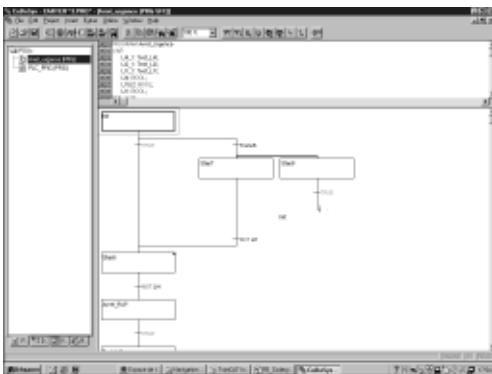


Example of Structured Text language programming

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.

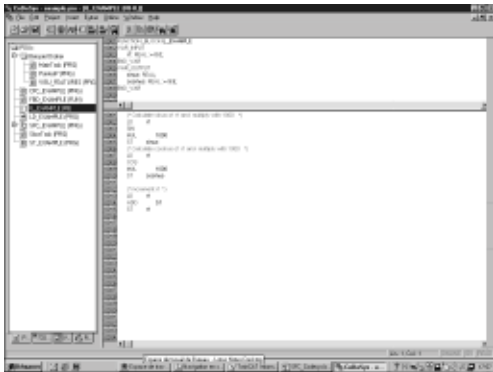
Programs written in Grafcet (SFC) language consist of:

- 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

Variable speed drives for asynchronous motors

Altivar 61

Option: "Controller Inside" programmable card



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.

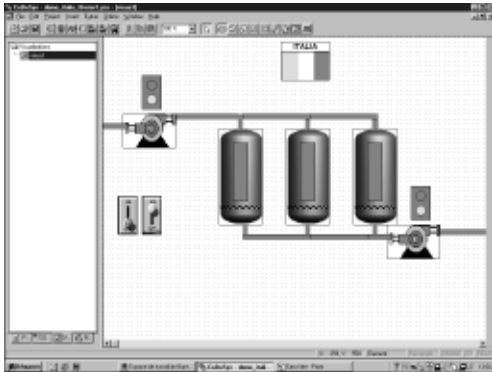
User library

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) | – |

| Description | Reference | Weight kg |
|---|------------|--------------|
| 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 |

(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:

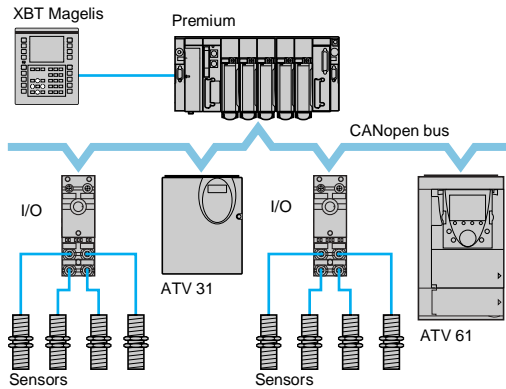
- resistance to hydrocarbons, industrial oils, detergents, solder splashes
- relative humidity up to 100%
- saline atmosphere
- significant temperature variations
- operating temperature between - 10 °C and + 70 °C.

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

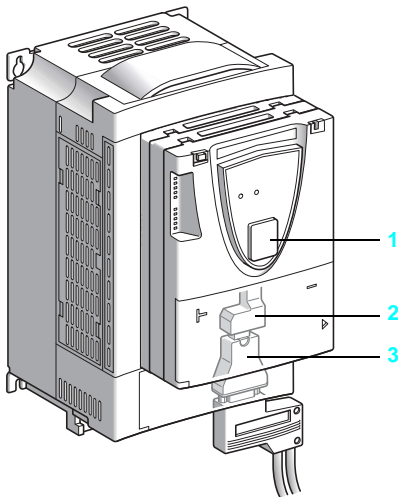
Variable speed drives for asynchronous motors

Altivar 61

Communication buses and networks



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.

(1) Heating Ventilation Air Conditioning

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

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.

Variable speed drives for asynchronous motors

Altivar 61

Communication buses and networks

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 | <ul style="list-style-type: none"> ■ 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 | <p>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</p> <p>The factory-configured server contains the following pages:</p> <ul style="list-style-type: none"> ■ 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 | <p>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)</p> |
| Periodic variables | | <p>I/O scanning service (can be inhibited):</p> <ul style="list-style-type: none"> ■ 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 <p>The Global Data service is not supported</p> | |
| 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 | | <p>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</p> | |
| 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: <ul style="list-style-type: none"> ■ 4800 bps ■ 9600 bps ■ 19200 bps |
| | Polarization | Type of polarization can be configured using switches on the card: <ul style="list-style-type: none"> ■ 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: <ul style="list-style-type: none"> ■ 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: <ul style="list-style-type: none"> ■ 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: <ul style="list-style-type: none"> ■ 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.

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. | |

Variable speed drives for asynchronous motors

Altivar 61

Communication buses and networks

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: <ul style="list-style-type: none"> ■ 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 |
| | Functional profile | 2 monitoring variables which can be assigned by communication scanner |
| | Communication monitoring | 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 |

(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".

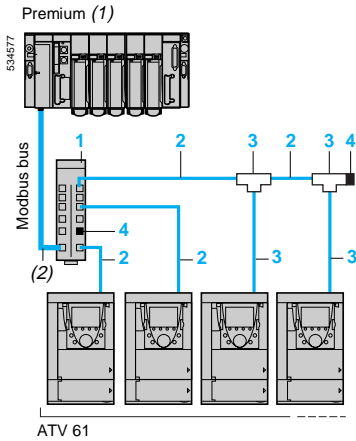
(3) Please consult our "Ethernet TCP/IP Transparent Ready" catalogue.

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

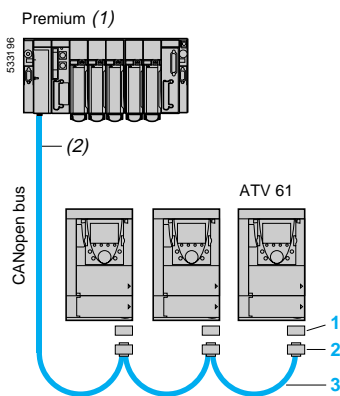
Variable speed drives for asynchronous motors

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 | – |

(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:

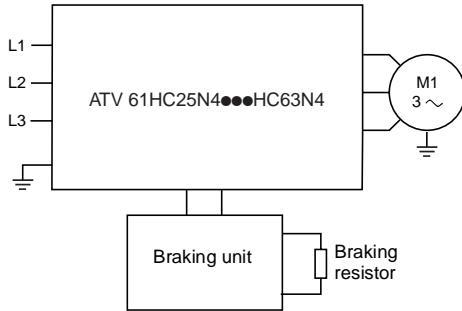
- Resistance to hydrocarbons, industrial oils, detergents and solder splashes
- Relative humidity up to 100%
- Saline atmosphere
- Significant temperature variations
- Operating temperature between -10°C and +70°C

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

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 | mm ² | m | mm ² | m | | |
| ATV 61HC25N4, ATV 61HC31N4 | 200 | 420 | 550 | – | – | 2 x 95 | 50 | VW3 A7 101 | 30.000 |
| | | | | Internal connections | | | | | |
| 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 ATV 61HD90N4...HC22N4 | | The dynamic brake transistor is designed so that it can tolerate 120% of the nominal motor power for 60 s. | |
| | | | 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 |

(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.

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 | 100 | 0.05 | VW3 A7 701 | 1.900 |
| ATV 61W075N4...WU55N4 (2) | | | | |
| ATV 61W075N4C...WU55N4C (2) | | | | |
| ATV 61HU55N4, HU75N4 | 60 | 0.1 | VW3 A7 702 | 2.400 |
| ATV 61WU75N4, WD11N4 (2) | | | | |
| ATV 61WU75N4C, WD11N4C (2) | | | | |
| ATV 61HD11N4, HD15N4 | 28 | 0.2 | VW3 A7 703 | 3.500 |
| ATV 61WD15N4, WD18N4 (2) | | | | |
| ATV 61WD15N4C, WD18N4C (2) | | | | |
| ATV 61HD18N4...HD30N4 | 15 | 1 | VW3 A7 704 | 11.000 |
| ATV 61WD22N4...WD37N4 (2) | | | | |
| ATV 61WD22N4C...WD37N4C (2) | | | | |
| ATV 61HD37N4 | 10 | 1 | VW3 A7 705 | 11.000 |
| ATV 61WD45N4 (2) | | | | |
| ATV 61WD45N4C (2) | | | | |
| ATV 61WD55N4...WD90N4 (2) | 8 | 1 | VW3 A7 706 | 11.000 |
| ATV 61WD55N4C...WD90N4C (2) | | | | |
| 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 |

(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.

Variable speed drives for asynchronous motors

Altivar 61

Option: braking units and resistors

Determining the braking unit and resistor

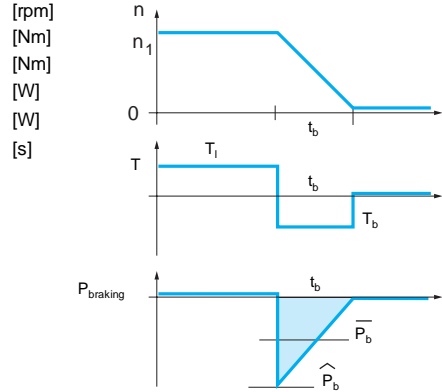
Calculating the various braking powers makes it possible to determine the braking unit and the braking resistor.

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
- T_l Load torque
- T_b Braking torque
- P_b Peak braking power
- \bar{P}_b Average braking power during t_b
- t_b Braking time



Calculating the braking time from the inertia

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

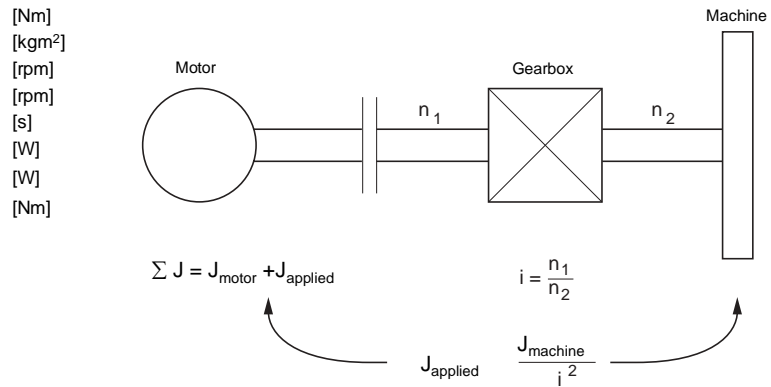
$$\omega = \frac{2\pi \cdot n}{60}$$

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

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

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

- T_b Motor braking torque
- ΣJ Total inertia applied to the motor
- n_1 Motor speed ahead of gearbox
- n_2 Motor speed after gearbox
- t_b Braking time
- P_b Peak braking power
- \bar{P}_f Average braking power during time t_b
- T_r Resistive torque



Variable speed drives for asynchronous motors

Altivar 61

Characteristics curves for resistors

Example of using characteristics curves

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

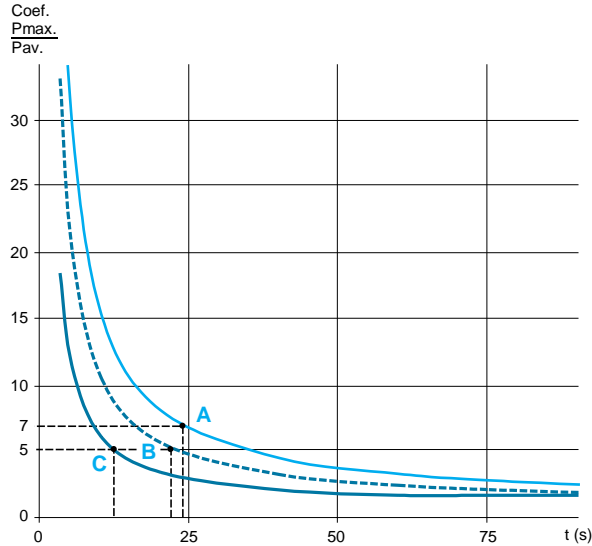
Example of using the curves:

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.

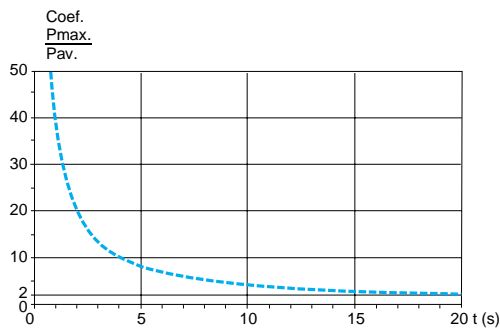
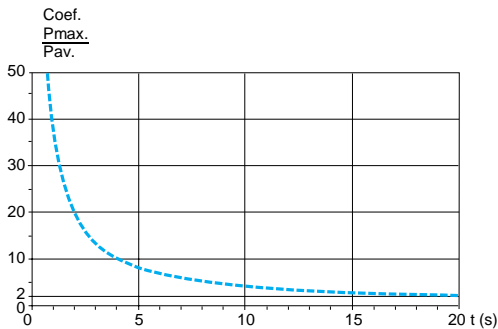
- P max/P av (60 s cycle)
- - - P max/P av (120 s cycle)
- P max/P av (200 s cycle)



Braking resistors

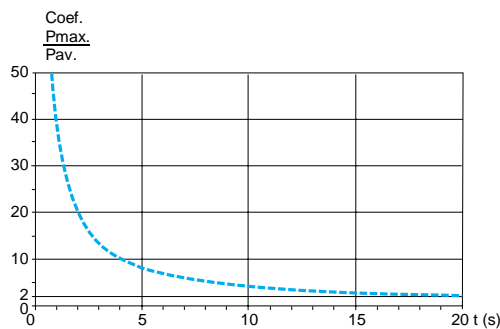
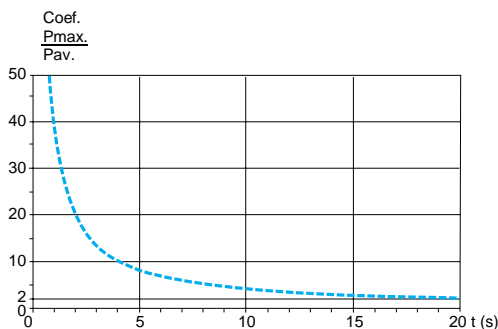
VW3 A7 701 (P continuous = 0.05 kW)

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)

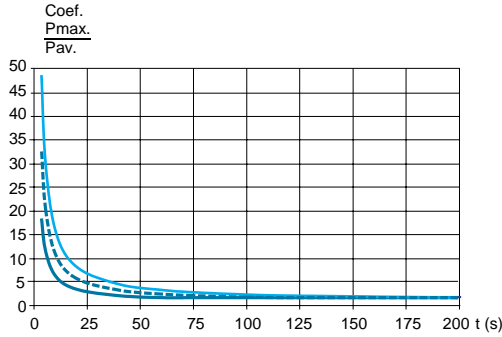
Variable speed drives for asynchronous motors

Altivar 61

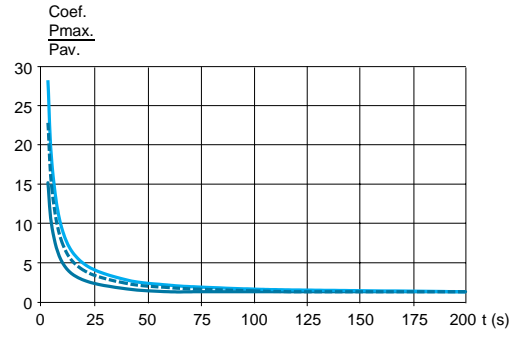
Characteristics curves for resistors

Braking resistors (continued)

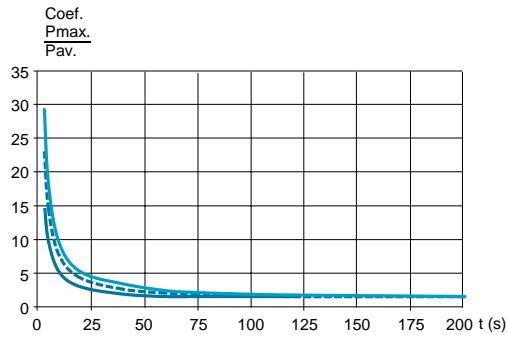
VW3 A7 710 (P continuous = 25 kW)



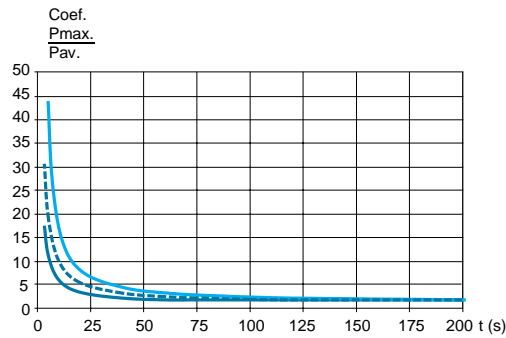
VW3 A7 711 (P continuous = 37 kW)



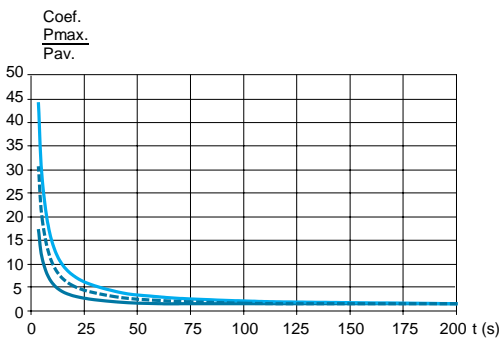
VW3 A7 712 (P continuous = 44 kW)



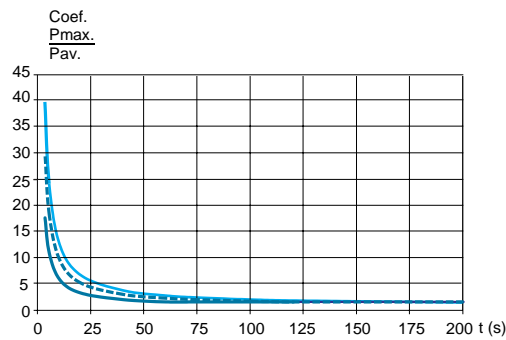
VW3 A7 713 (P continuous = 15.3 kW)



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)

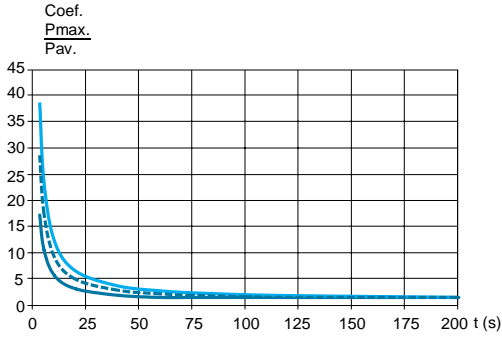
Variable speed drives for asynchronous motors

Altivar 61

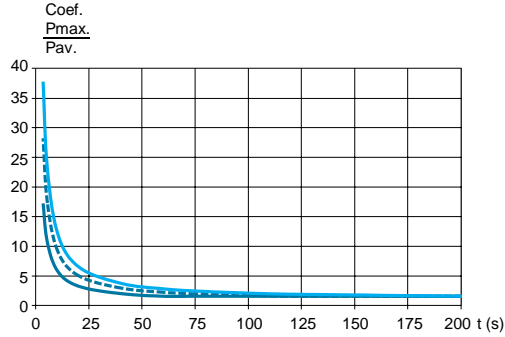
Characteristics curves for resistors

Braking resistors (continued)

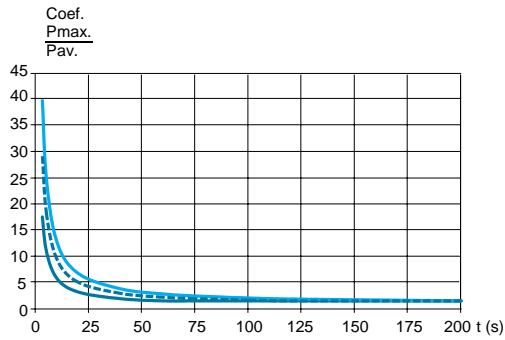
VW3 A7 716 (P continuous = 75 kW)



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

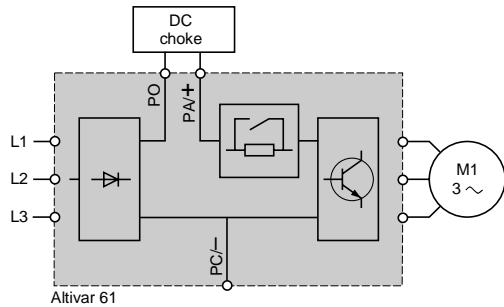
Altivar 61: Reduction of current harmonics
Option: DC chokes

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 $RSCE \geq 120$ (1) at the point of connection to the public network. 120 represents the minimum value of RSCE (1) for which the values in table 4 of 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 $RSCE \geq 120$.

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.

(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 | For ATV 61 drives | Line supply | | Current harmonic levels | | | | | | | | | | | | | | | | THD (2) | | |
|---|-------------------|--------------|----------|-------------------------|--------|-------|-------|------|------|------|------|------|------|------|------|------|------|------|------|---------|------|-------|
| | | Line current | Line Isc | H1 | H5 | H7 | H11 | H13 | H17 | H19 | H23 | H25 | H29 | H31 | H35 | H37 | H41 | H43 | H47 | | H49 | |
| kW | HP | A | kA | A | % | % | % | % | % | % | % | % | % | % | % | % | % | % | % | % | % | |
| 3-phase supply voltage: 230 V 50 Hz, with optional DC choke | | | | | | | | | | | | | | | | | | | | | | |
| 0.75 | 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 | For ATV 61 drives | Line supply | | Current harmonic levels | | | | | | | | | | | | | | | | THD (2) | | |
|---|-------------------|--------------|----------|-------------------------|--------|-------|-------|------|------|------|------|------|------|------|------|------|------|------|------|---------|------|-------|
| | | Line current | Line Isc | H1 | H5 | H7 | H11 | H13 | H17 | H19 | H23 | H25 | H29 | H31 | H35 | H37 | H41 | H43 | H47 | | H49 | |
| kW | HP | A | kA | A | % | % | % | % | % | % | % | % | % | % | % | % | % | % | % | % | % | |
| 3-phase supply voltage: 400 V 50 Hz, with optional DC choke | | | | | | | | | | | | | | | | | | | | | | |
| 0.75 | 1 | H075N4 | 1.77 | 5 | 1.61 | 34.6 | 23.7 | 8.9 | 7.8 | 5.6 | 4.8 | 4.1 | 3.5 | 3.2 | 2.8 | 2.6 | 2.3 | 2.2 | 1.9 | 1.9 | 1.7 | 44.95 |
| 1.5 | 2 | HU15N4 | 3.34 | 5 | 3.03 | 35.55 | 23.53 | 8.95 | 7.65 | 5.61 | 4.74 | 4.06 | 3.49 | 3.16 | 2.76 | 2.57 | 2.28 | 2.15 | 1.94 | 1.83 | 1.68 | 45.48 |
| 2.2 | 3 | HU22N4 | 4.83 | 5 | 4.4 | 35.79 | 22.77 | 8.7 | 7.11 | 5.41 | 4.36 | 3.89 | 3.2 | 3.01 | 2.53 | 2.43 | 2.09 | 2.01 | 1.77 | 1.7 | 1.53 | 45 |
| 3 | - | HU30N4 | 6.13 | 5 | 5.67 | 31.61 | 18.82 | 9.41 | 6.82 | 5.88 | 4.57 | 4.24 | 3.38 | 3.28 | 2.67 | 2.63 | 2.19 | 2.16 | 1.86 | 1.8 | 1.6 | 40.08 |
| 4 | 5 | HU40N4 | 8.24 | 5 | 7.51 | 36.16 | 21.63 | 9 | 8.17 | 5.52 | 4.17 | 3.93 | 3.05 | 3 | 2.4 | 2.38 | 1.98 | 1.93 | 1.68 | 1.58 | 1.45 | 44.72 |
| 5.5 | 7.5 | HU55N4 | 10.81 | 22 | 9.83 | 34.85 | 23.08 | 9.68 | 4.05 | 6.12 | 5.18 | 4.45 | 3.83 | 3.48 | 3.04 | 2.85 | 2.52 | 2.4 | 2.14 | 2.06 | 1.85 | 45.19 |
| 7.5 | 10 | HU75N4 | 15.01 | 10 | 13.8 | 34.09 | 20.49 | 8.57 | 6.43 | 5.28 | 3.95 | 3.78 | 2.89 | 2.9 | 2.28 | 2.32 | 1.88 | 1.9 | 1.59 | 1.58 | 1.37 | 42.25 |
| 11 | 15 | HD11N4 | 21.1 | 9 | 19.3 | 35.22 | 20.11 | 8.95 | 6.5 | 5.41 | 4.02 | 3.8 | 2.95 | 2.86 | 2.32 | 2.23 | 1.9 | 1.77 | 1.6 | 1.42 | 1.37 | 43.1 |
| 15 | 20 | HD15N4 | 28.2 | 12 | 25.8 | 35.22 | 20.01 | 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.

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 (2) | | |
|-------------|-------------------|-------------------|----------|-------------------------|--------|-------|-------|------|------|------|------|------|------|------|------|------|------|------|------|---------|------|-------|
| | | Line current | Line Isc | H1 | H5 | H7 | H11 | H13 | H17 | H19 | H23 | H25 | H29 | H31 | H35 | H37 | H41 | H43 | H47 | | H49 | |
| kW | HP | A | kA | A | % | % | % | % | % | % | % | % | % | % | % | % | % | % | % | % | | |
| 0.75 | 1 | W075N4 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.

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 – |

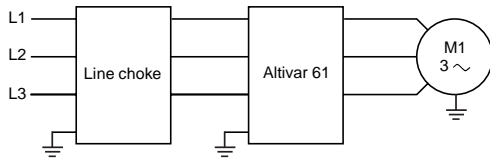
DC chokes (1)

| For drives | Inductance value | Nominal current | Loss | Reference | Weight |
|---|---------------------|--------------------|------|------------|--------|
| | | | | | |
| 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.

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 $\cos \phi$ 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 | | 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 |
|---|-----------|---|----------------------|--------------------|----------------------|--------------------------------------|
| Type of choke | | | | | | |
| Conformity to standards | | EN 50178 (VDE 0160 level 1 high energy overvoltages on the line supply), IEC 60076 (with HD 398) | | | | |
| Degree of protection | Choke | IP 00 | | | | |
| | Terminals | IP 20 | | IP 10 | IP 00 | |
| Atmospheric pollution | | 3 C2, 3B1, 3S1 conforming to IEC 721.3.3 | | | | |
| Degree of pollution | | 2 conforming to EN 50178 | | | | |
| Vibration resistance | | 1.5 mm from 3...13 Hz, 1 gn from 13...200 Hz, conforming to IEC 60068-2 | | | | |
| Shock resistance | | 15 gn for 11 ms conforming to IEC/EN 60068-2-27 | | | | |
| Maximum relative humidity | | 95% | | | | |
| Ambient air temperature around the device | Operation | °C 0...+ 45 without derating Up to + 55°C with current derating of 2% per °C above 45°C | | | | |
| | Storage | °C - 25...+ 70 | | | | |
| Isolation class | | F | | | | |
| Clearance distance in air | | mm 5.5 conforming to IEC 60664 | | | | |
| Leakage distance in air | | mm 11.5 conforming to IEC 60664 | | | | |
| Maximum operating altitude | | m 1000 without derating 1000...3000 with current derating of 1% per additional 100 m | | | | |
| Voltage drop | | Between 3% and 5% of the nominal supply voltage. Values higher than this will cause loss of torque. | | | | |
| Maximum current | | 1.65 x nominal current for 60 seconds | | | | |

| Connection characteristics | | | |
|---|------------------|--|--|
| Maximum connection capacity and tightening torque | VW3 A58501 | | 16 mm ² , (AWG 4) 1.2...1.4 Nm |
| | VW3 A58502 | | 6 mm ² , (AWG 8) 0.8...1 Nm |
| | VW3 A4 551, 552 | | 2.5 mm ² , (AWG 12) 0.4...0.6 Nm |
| | VW3 A4 553 | | 6 mm ² , (AWG 8) 0.8...1 Nm |
| | VW3 A4 554 | | 16 mm ² , (AWG 4) 1.2...1.4 Nm |
| | VW3 A4 555 | | 35 mm ² , (AWG 0) 2.5...3 Nm |
| | VW3 A4 556 | | Connected on a bar, Ø 6.5 mm - |
| | VW3 A4 557, 558 | | Connected on a bar, Ø 9 mm - |
| | VW3 A4 559...561 | | Connected on a bar, Ø 11 mm - |
| | VW3 A4 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 - |

Variable speed drives for asynchronous motors

Altivar 61: Reduction of current harmonics
Option: Line chokes

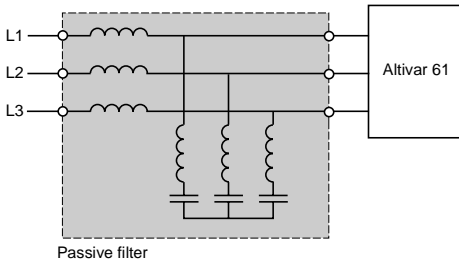
| Line chokes | | | | | | | | | |
|--|-------------------------|---------------------|--------------------|-----------------------|------|---------------------------------|------------|------------|--------|
| For drives | Line supply Line Isc | Line choke | | | | Number required per drive | Reference | Weight | |
| | | Inductance value | Nominal current | Saturation current | Loss | | | | |
| | 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 |

Variable speed drives for asynchronous motors

Altivar 61: Reduction of current harmonics

Option: Passive filters

Passive filters



The passive filter is used to reduce current harmonics with total harmonic distortion factors of less than 16% or 10%. These ratios may be 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 I _{rms} (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.

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 | Filter | Number required per drive | Reference | Weight |
| kW | HP | | Line current | In (2) | | | |
| | | | A | A | | | kg |
| THDI 16% (1) | | | | | | | |
| 0.75 | 1 | ATV 61HU075N4 | 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 $\leq 10\%$.
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 Line current | Filter In (2) | Number required per drive | Reference | Weight |
| 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 $\leq 5\%$.
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 | Filter | Number required per drive | Reference | Weight |
|---------------------|-----|--------------|--------------|--------|---------------------------------|------------|---------|
| kW | HP | | Line current | In (2) | | | |
| | | | A | A | | | |
| 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 $\leq 10\%$.

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 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 $\leq 5\%$.

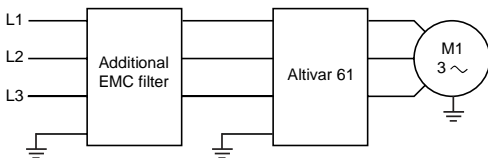
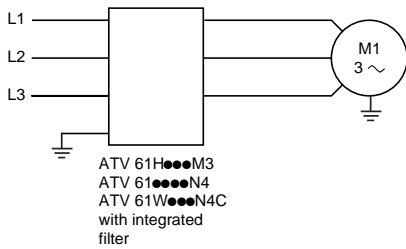
These reduced current harmonics are obtained on condition that the THDU is $< 2\%$ and the RSCE is $> 66\%$ and only for the nominal current of the passive filter.

(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.

(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 | 4 | 4.1...16 |
| ATV 61H075N4...HD30N4 | | |
| 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 |
| | Storage | °C | - 40...+ 65 |
| 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 mm ² (AWG 10). 0.6 Nm | |
| | VW3 A4 402 | 6 mm ² (AWG 8). 1.5 Nm | |
| | VW3 A4 403 | 10 mm ² (AWG 6). 1.5 Nm | |
| | VW3 A4 404 | 16 mm ² (AWG 4). 2 Nm | |
| | VW3 A4 405...407 | 50 mm ² (AWG 0). 6 Nm | |
| | VW3 A4 408 | 150 mm ² (300 kcmil). 25 Nm | |
| | VW3 A4 409 | 25 mm ² (AWG 2). 4 Nm | |
| | VW3 A4 410...412 | Bar connection, M10 - | |
| | VW3 A4 413 | Bar connection, 2 x M12 - | |

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) | II (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) | A | mA | W | | |
| | m | m | m | m | | | | | kg |
| Three phase supply voltage: 200...240 V 50/60 Hz | | | | | | | | | |
| ATV 61HU075M3, 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 |

(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 ATV 61HD90N4...HC63N4 | 2.5...4 | 4.1...8 |
| | 2...4 | 4.1...8 |

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

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 | – |

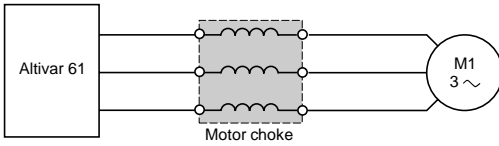
(1) The software function limits the overvoltage at the motor terminals to twice the DC bus voltage.
For any application with braking cycles, the DC bus voltage rises to more than the supply voltage multiplied by $\sqrt{2}$.
You must check the electrical characteristics of the motor before using this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

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 | ≥ 50 | ≥ 100 |
| ATV 61HD11M3X, HD15M3X | | |
| ATV 61H075N4...HD18N4 | | |
| ATV 61HD18M3X...HD90M3X | ≥ 100 | ≥ 200 |
| ATV 61HD22N4...HC63N4 | | |

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

Connection characteristics

| | | |
|--|-----------------|--|
| Maximum connection capacity and tightening torque | VW3 A5 101, 102 | 10 mm ² (AWG 6) 1.5 Nm |
| | VW3 A5 103 | Connected on a bar, Ø 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).

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 W | Nominal current A | Sold in lots of | Unit reference | Weight kg | |
|---|-----------------------------------|-----------------|-----------|-------------------------|-----------------------|-------------------|--------------|--------|
| | Shielded | Un- shielded | | | | | | |
| | m | m | | | | | | |
| 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 |
| | | 250 | 300 | 682 | 1188 | 3 | VW3 A5 108 | 99.200 |
| ATV 61HC50N4 | Motor P 400 kW | 250 | 300 | 682 | 1188 | 3 | VW3 A5 108 | 99.200 |
| ATV 61HC63N4 | | 250 | 300 | 682 | 1188 | 3 | VW3 A5 108 | 99.200 |

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

Variable speed drives for asynchronous motors

Altivar 61: Output filters

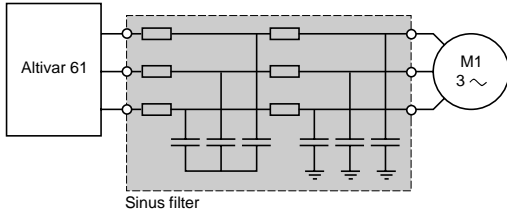
Option: Motor chokes

| 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 mm ² (AWG 10) 0.6 Nm |
| | VW3 A5 202 | 6 mm ² (AWG 8) 1.5 Nm |
| | VW3 A5 203 | 10 mm ² (AWG 6) 1.5 Nm |
| | VW3 A5 204 | 25 mm ² (AWG 2) 4 Nm |
| | VW3 A5 205 | 50 mm ² (AWG 0) 6 Nm |
| | VW3 A5 206, 207 | 95 mm ² (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 - |

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 |
| 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.

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 | | | | | |
|--|-----|---------------|------------|------------|-----------------------------|----------------------|-----------------|-----------------------|
| kW | HP | | DC choke | Line choke | Additional EMC input filter | IP 30 EMC filter kit | Motor choke | IP 20 motor choke kit |
| 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 |

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 | | | | | | |
|---|-----|--------------|------------|------------|--------------------|-----------------------------|----------------------|-------------|-----------------------|
| 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 | Possible to combine | Not possible to combine | Not possible to combine | Not possible to combine | Not possible to combine |
| Extended I/O VW3 A3 202 | Not possible to combine | Not possible to combine | Not possible to combine | Not possible to combine | Not possible to combine |
| Multi-pump VW3 A3 502, 503 | Not possible to combine | Not possible to combine | Not possible to combine | Not possible to combine | Not possible to combine |
| Programmable "Controller inside" VW3 A3 501 | Not possible to combine | Not possible to combine | Not possible to combine | Not possible to combine | Not possible to combine |
| Communication VW3 A3 3●● | Not possible to combine | Not possible to combine | Not possible to combine | Not possible to combine | Not possible to combine |

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 |
|---|-----------|-------------------------------|------------------|
| kW | HP | | Braking resistor |
| 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

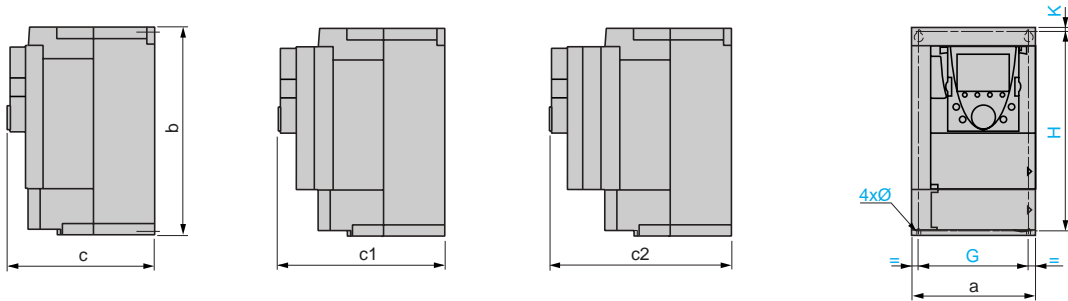
Not possible to combine

Variable speed drives for asynchronous motors

Altivar 61
UL Type 1/IP 20 drives

ATV 61H075M3, ATV 61HD11M3X...HD15M3X, ATV 61H075N4...HD18N4

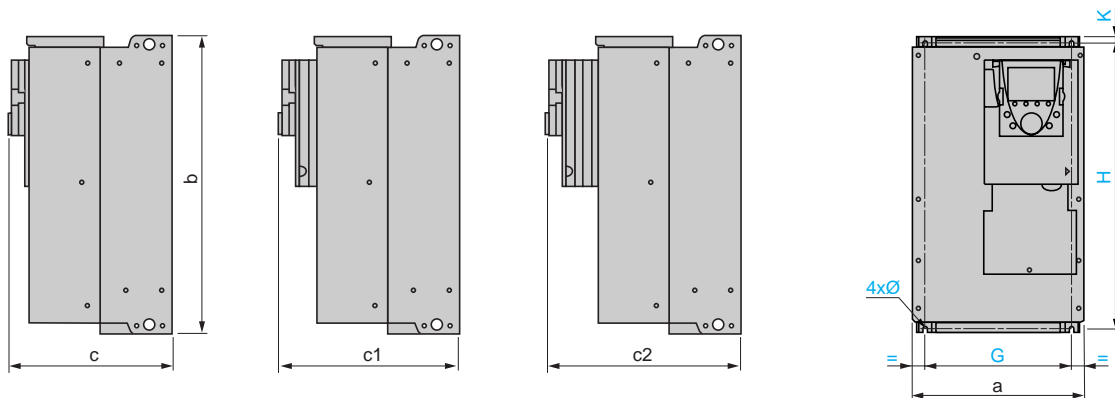
Without option card 1 option card (1) 2 option cards (1) Common front view



| 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

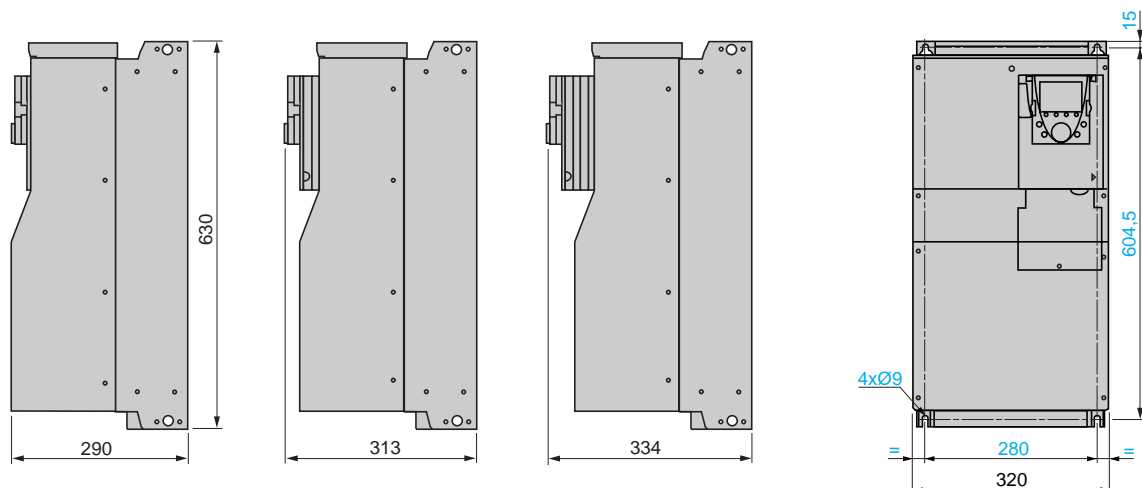
Without option card 1 option card (1) 2 option cards (1) Common front view



| 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



(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

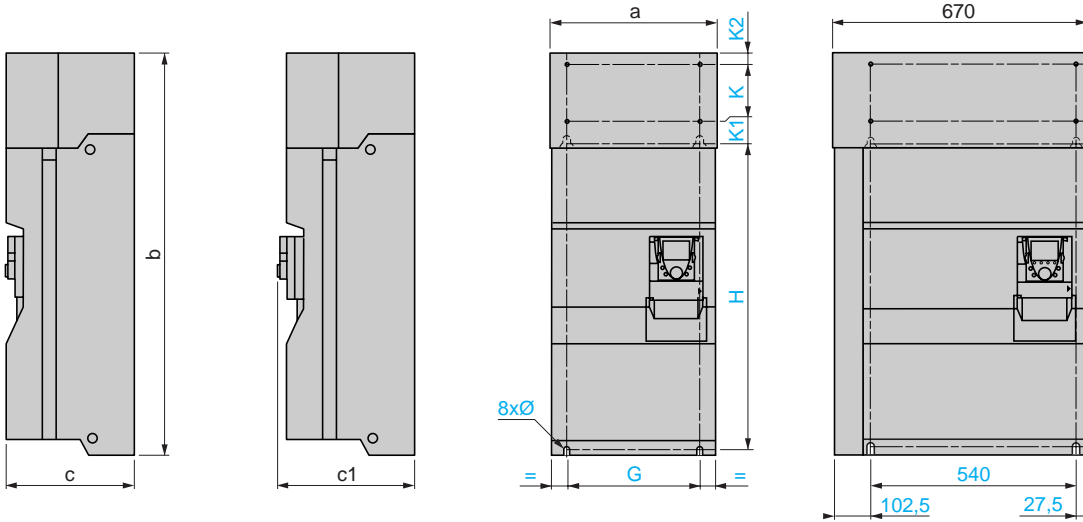
ATV 61HD55M3X...HD90M3X, ATV 61HD90N4...HC31N4

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)

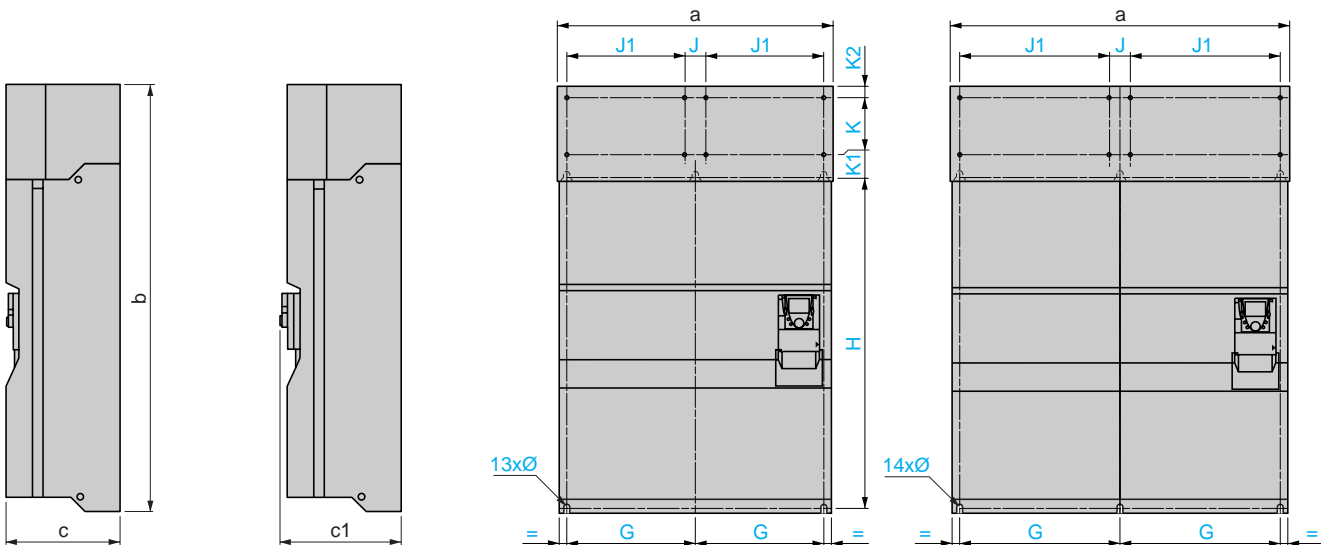
2 option cards (1)

ATV 61HC40N4, HC50N4

ATV 61HC63N4

Front view

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 |

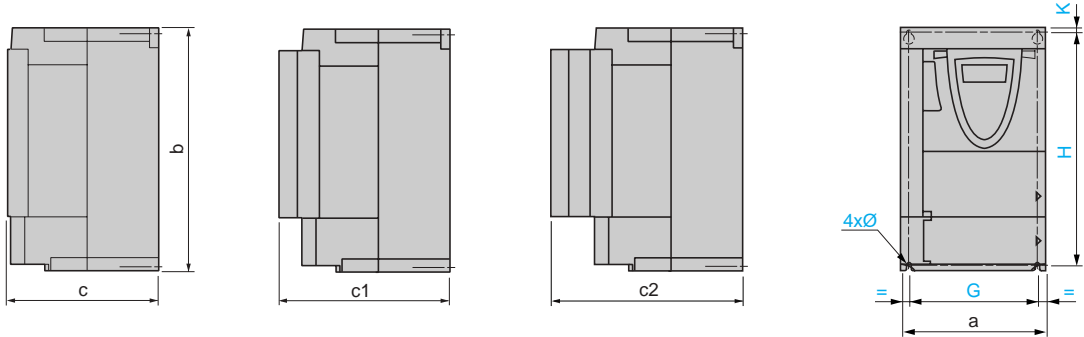
(1) Option cards: I/O extension cards, multi-pump cards, "Controller Inside" programmable card, communication cards.

Variable speed drives for asynchronous motors

Altivar 61
UL Type 1/IP 20 drives

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

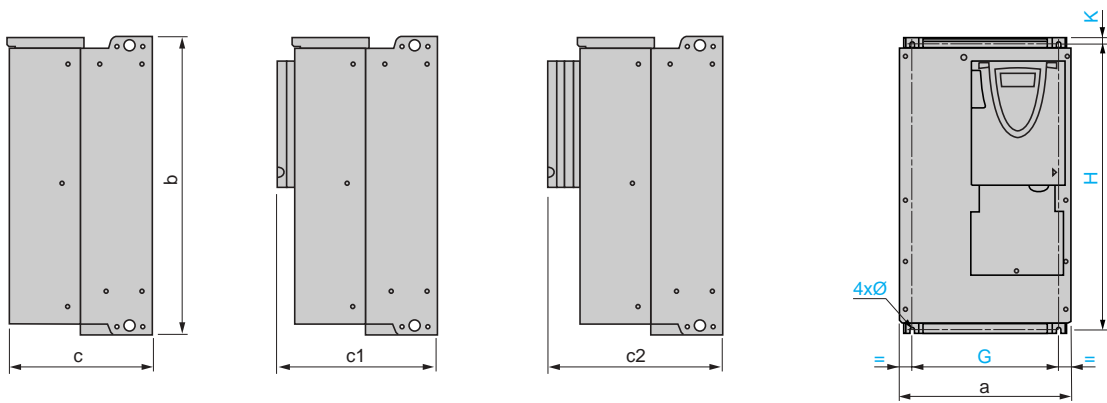
Without option card (1) 1 option card (1) 2 option cards (1) Common front view



| 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

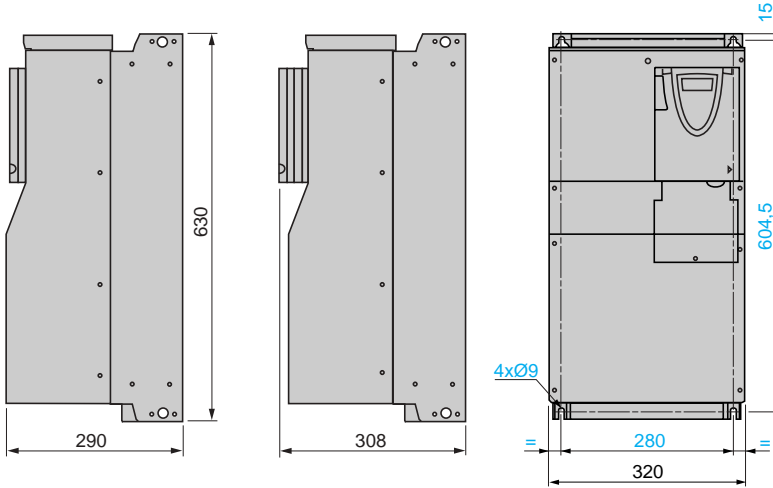
Altivar 61
UL Type 1/IP 20 drives

ATV 61HD45N4Z...HD75N4Z

With or without 1 option card (1)

2 option cards (1)

Common front view



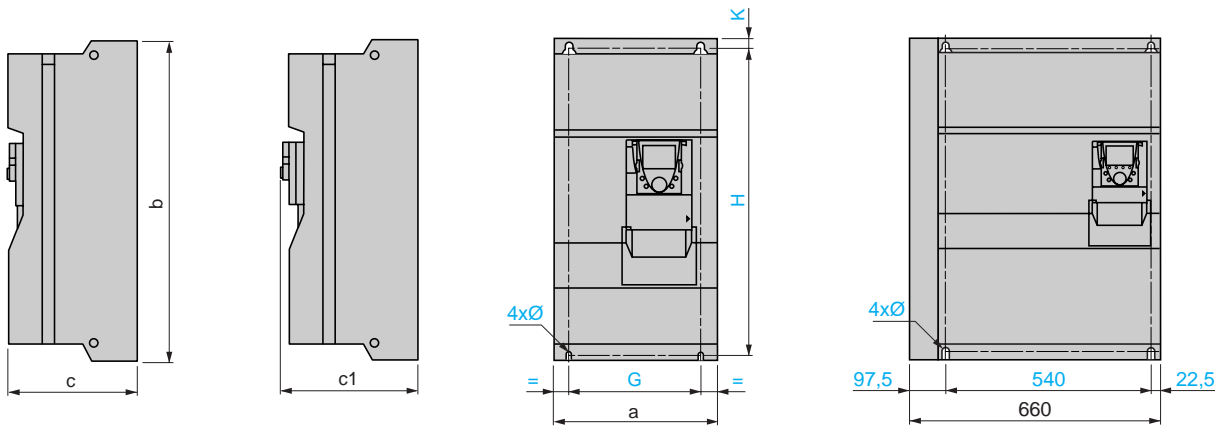
ATV 61HD55M3XD...HD90M3XD, ATV 61HD90N4D...HC31N4D

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.

Variable speed drives for asynchronous motors

Altivar 61

UL Type 1/IP 20, UL Type 12/IP 54 drives

ATV 61HC40N4D...HC63N4D

With or without 1 option card (1)

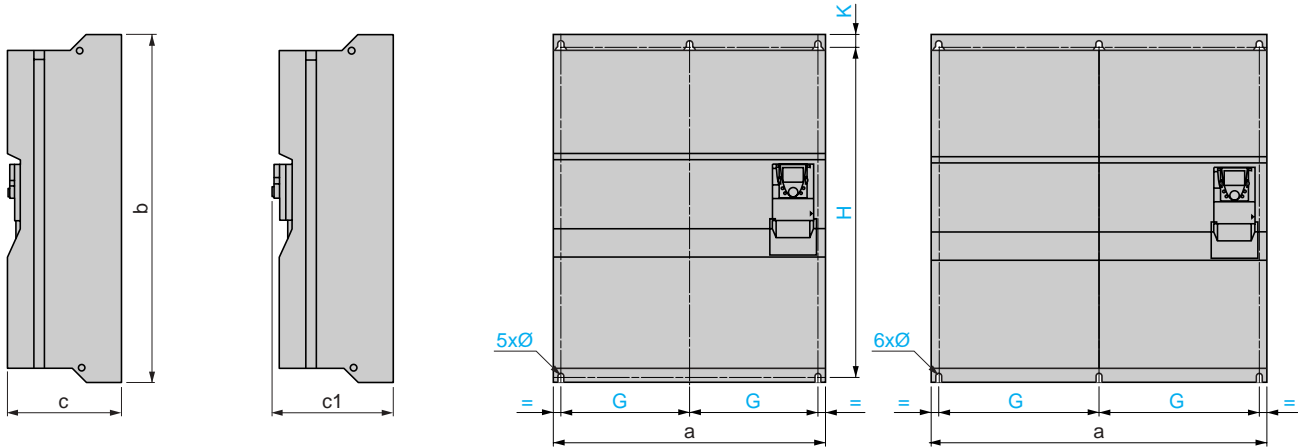
2 option cards (1)

ATV 61HC40N4D, HC50N4D

ATV 61HC63N4D

Front view

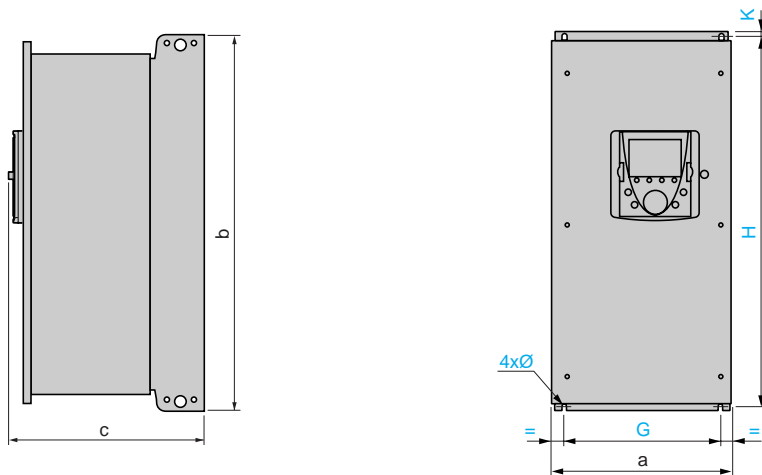
Front view



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

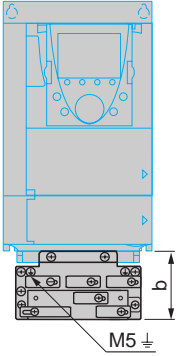
Variable speed drives for asynchronous motors

Altivar 61
Drives, accessories

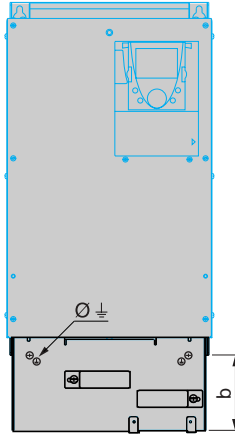
EMC mounting plates (1)

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

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



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

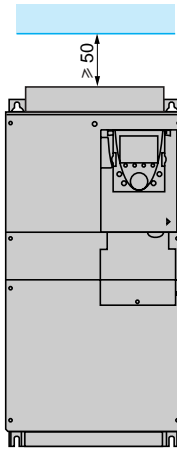
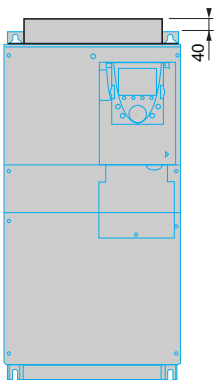


| For ATV 61H | b | Ø |
|----------------------------------|-----|----|
| D18M3X, D22M3X, D22N4 | 122 | M5 |
| D30N4, D37N4 | 113 | M5 |
| D30M3X...D45M3X D45N4...D75N4 | 118 | M8 |

(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



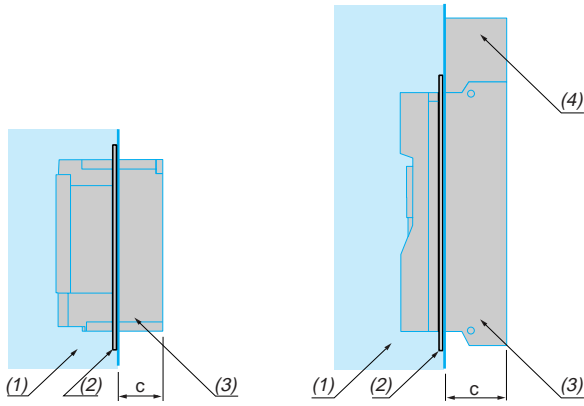
Variable speed drives for asynchronous motors

Altivar 61
Accessories

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

Installation of the drive using the kit for flush-mounting

Side view

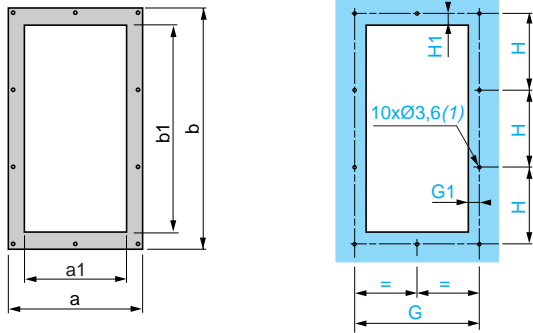


| For ATV 61H drives | c | VW3 kit |
|---|-----|--------------|
| 075M3, U15M3, 075N4...U22N4 | 60 | A9 501 |
| U22M3...U55M3, U30N4...U75N4 | 70 | A9 502, 503 |
| U75M3, D11M3X, D15M3X, D11N4...D18N4 | 90 | A9 504, 505 |
| D18M3X...D45M3X D22N4...D75N4 | 105 | A9 506...509 |
| D55M3X...D90M3X, D55M3XD...D90M3XD, 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

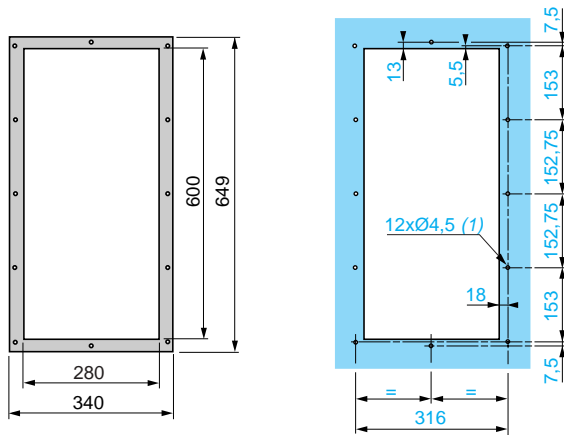


| VW3 | a | a1 | b | b1 | G | G1 | H | H1 |
|--------|-------|-----|-------|-------|-----|------|-------|------|
| A9 501 | 222 | 170 | 397 | 351 | 205 | 17.5 | 127 | 15 |
| A9 502 | 250 | 198 | 429.5 | 384.5 | 233 | 17.5 | 137.5 | 14 |
| A9 503 | 267 | 215 | 465 | 419 | 250 | 17.5 | 149.5 | 14.5 |
| 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

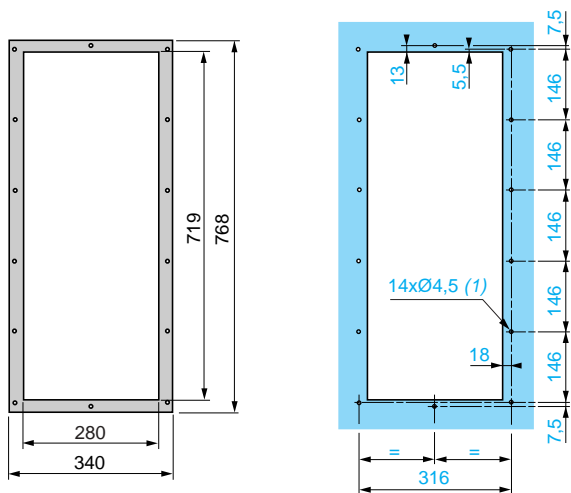
Cut-outs and drill holes



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

VW3 A9 507

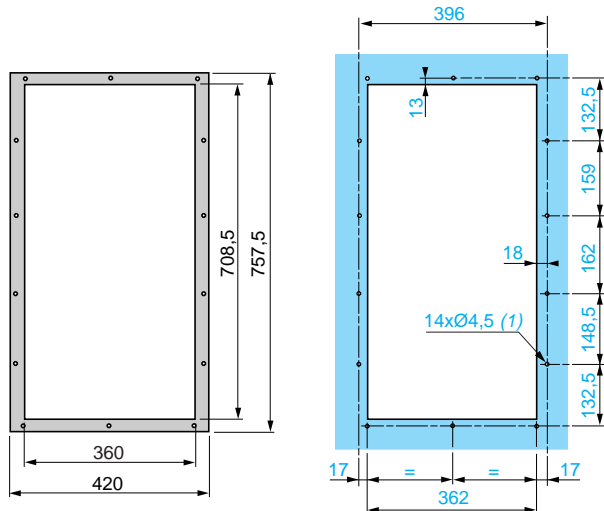
Cut-outs and drill holes



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

VW3 A9 508

Cut-outs and drill holes

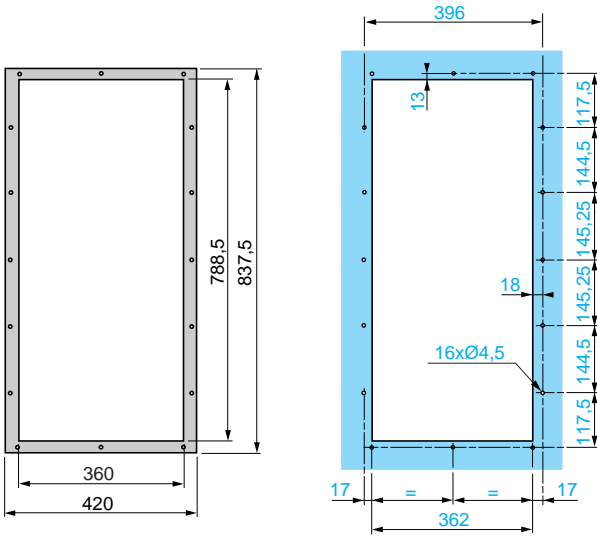


(1) Ø 4.5 hole for M5 self-tapping screw.

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

VW3 A9 509

Cut-outs and drill holes

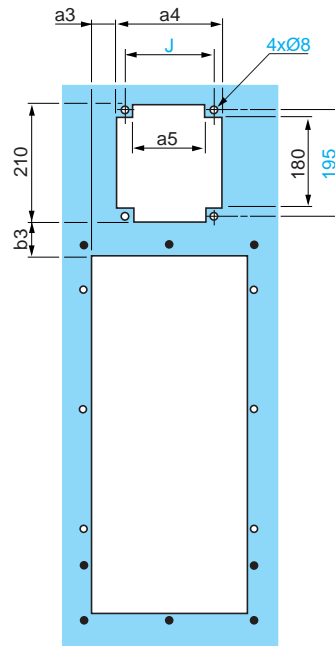
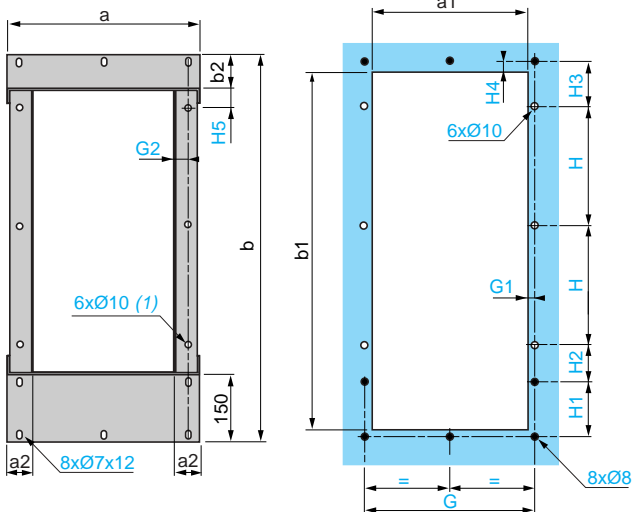


(1) Ø 4.5 hole for M5 self-tapping screw.

VW3 A9 510, 511

Cut-outs and drill holes
without DC choke

Cut-outs and drill holes with DC choke



| 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 | |

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

(1) For fixing using an M8 screw min.

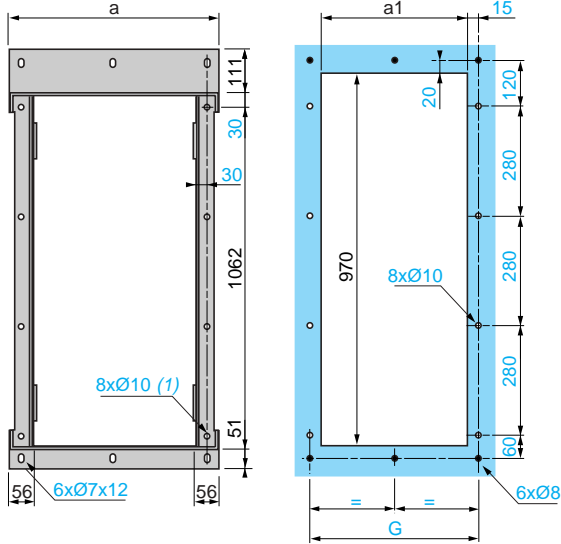
Variable speed drives for asynchronous motors

Altivar 61
Accessories

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

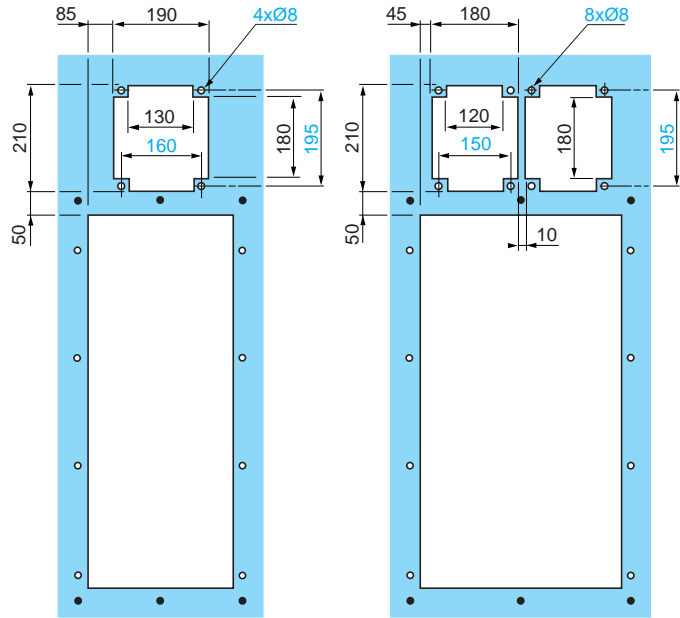
VW3 A9 512, 513

Cut-outs and drill holes
without DC choke



VW3 A9 512

Cut-outs and drill holes with DC choke



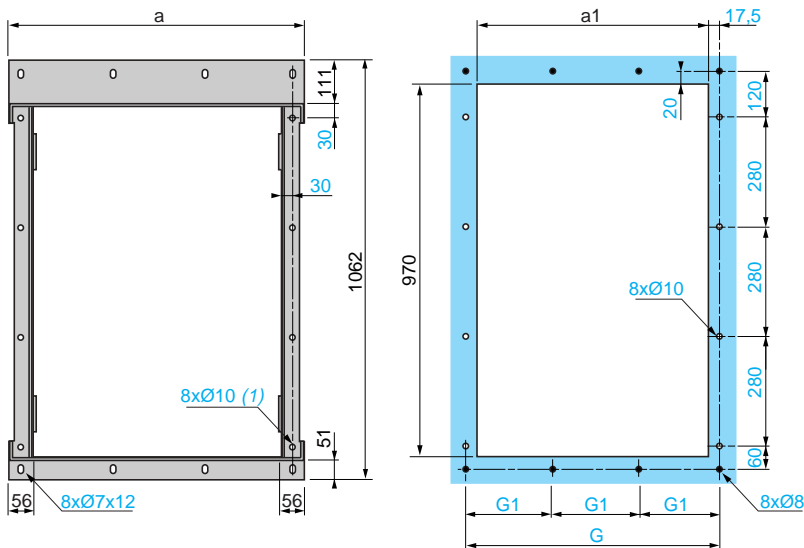
VW3 A9 513

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

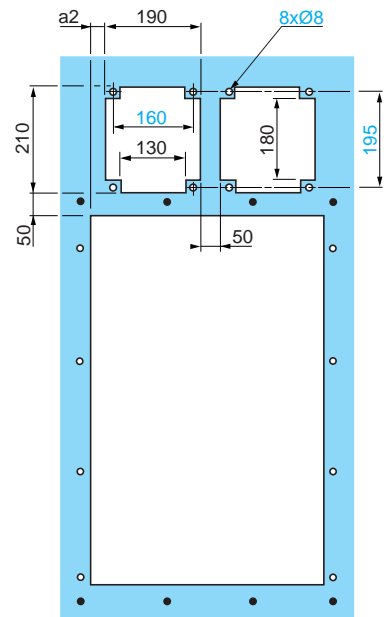
(1) For fixing using an M8 screw min.

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

Cut-outs and drill holes without DC choke



Cut-outs and drill holes with DC choke



| 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 |

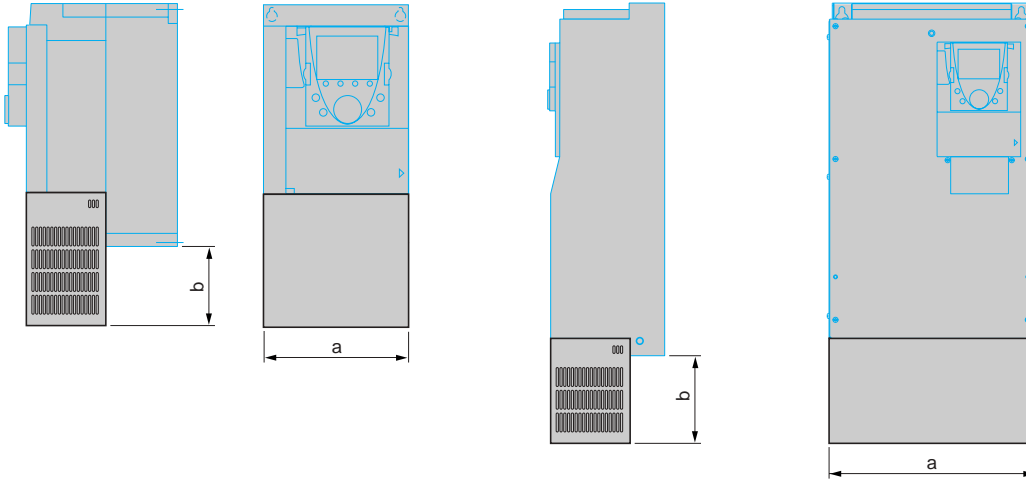
Variable speed drives for asynchronous motors

Altivar 61
Accessories

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 |

Variable speed drives for asynchronous motors

Altivar 61
Accessories

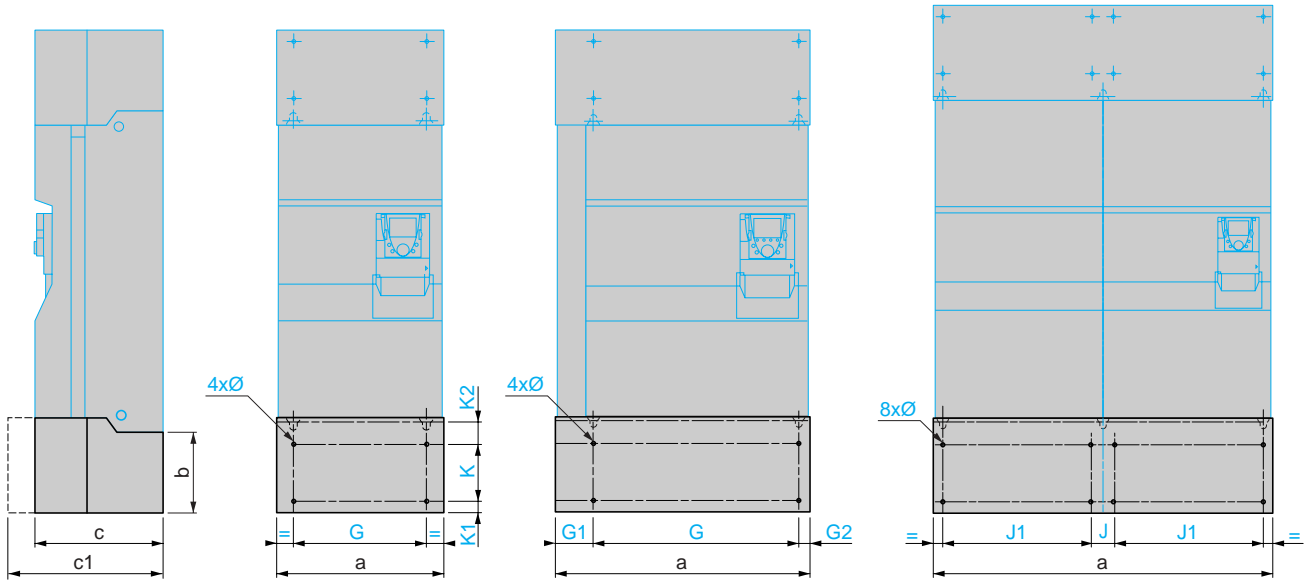
UL Type 1 VW3 A9 2●●, IP 21 or IP 31 VW3 A9 1●● conformity kits (continued)

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 |

Variable speed drives for asynchronous motors

Altivar 61

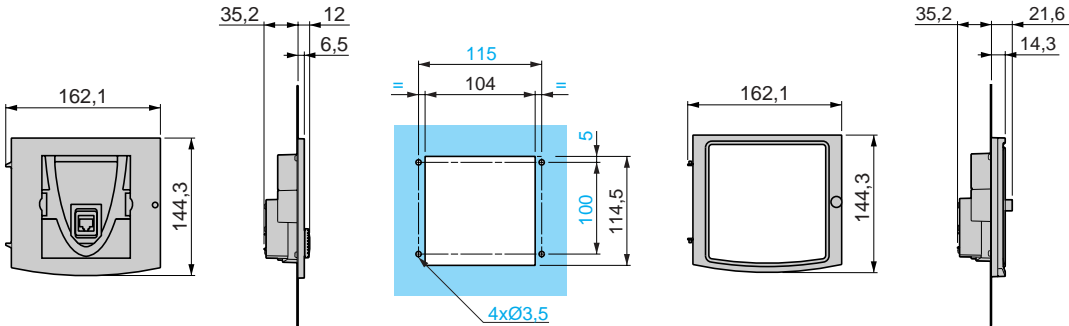
Dialogue, braking units, braking resistors

Remote graphic display terminal

IP 54 kit VW3 A1 102

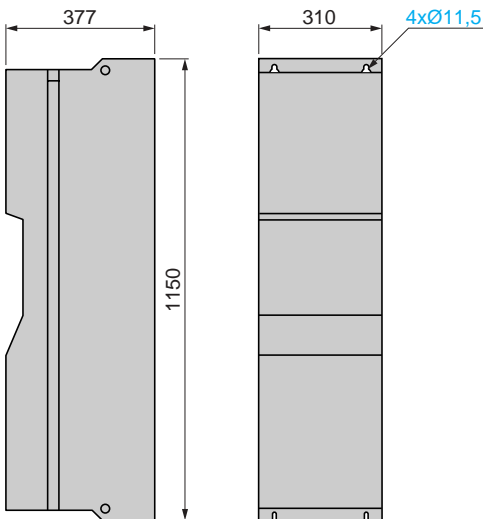
IP 65 door VW3 A1 103

Cut-outs and drill holes



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

VW3 A7 102

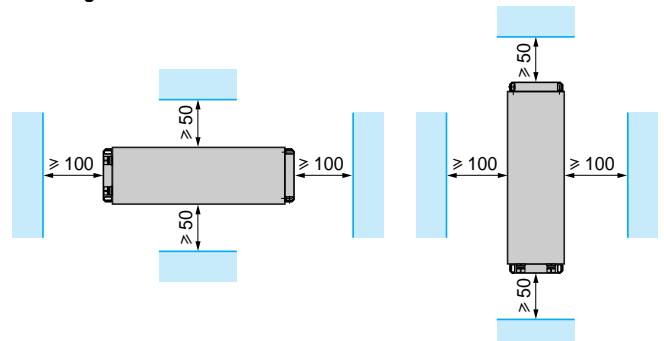
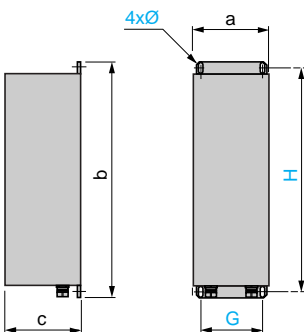


(1) The VW3 A7 101 braking unit is mounted on the left-hand side of the drive, see page 91

Braking resistors

VW3 A7 701...703

Mounting recommendations



| 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 |

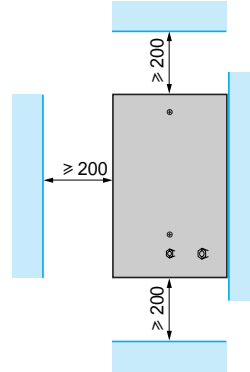
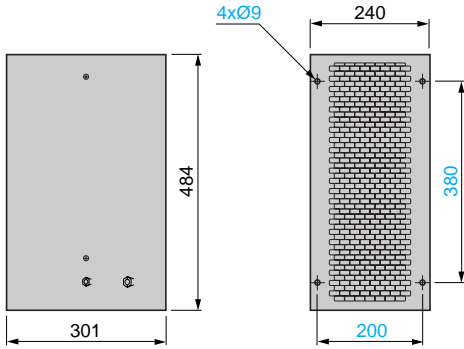
Variable speed drives for asynchronous motors

Altivar 61
Braking resistors

Braking resistors (continued)

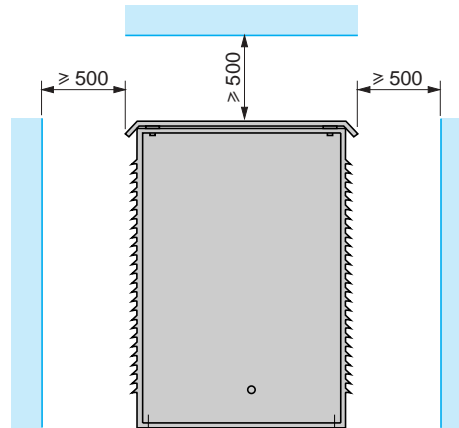
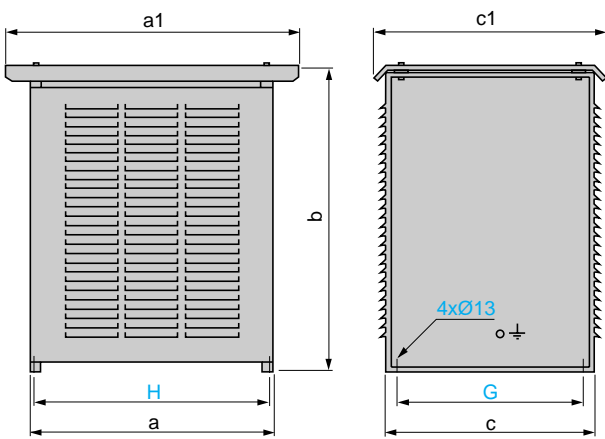
VW3 A7 704...709

Mounting recommendations



VW3 A7 710...712, 715...718 (1)

Mounting recommendations

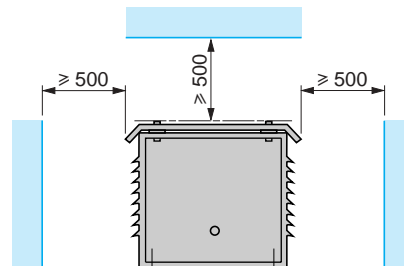
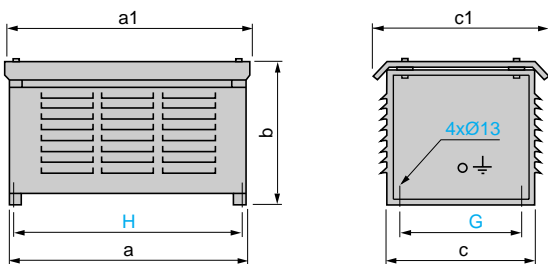


| VW3 | a | a1 | b | c | c1 | G | H |
|------------|-----|------|------|-----|-----|-----|-----|
| A7 710 | 860 | 1040 | 690 | 480 | 560 | 400 | 832 |
| A7 711 | 960 | 1140 | 1150 | 380 | 460 | 300 | 932 |
| A7 712 | 860 | 1040 | 1150 | 540 | 620 | 460 | 832 |
| A7 715 | 960 | 1140 | 1150 | 540 | 620 | 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



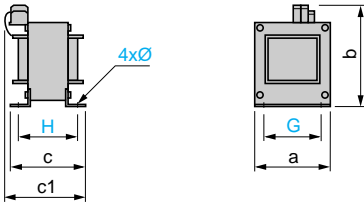
| VW3 | a | a1 | b | c | c1 | G | H |
|--------|-----|-----|-----|-----|-----|-----|-----|
| A7 713 | 760 | 790 | 440 | 480 | 540 | 400 | 732 |
| A7 714 | 960 | 990 | 440 | 480 | 540 | 400 | 932 |

Variable speed drives for asynchronous motors

Altivar 61
DC chokes, line chokes

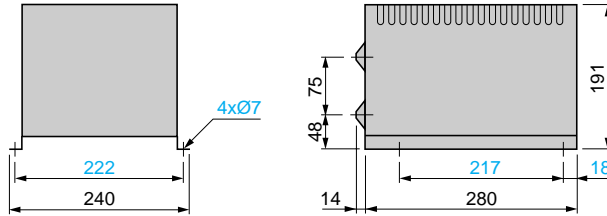
DC chokes

VW3 A4 501...510



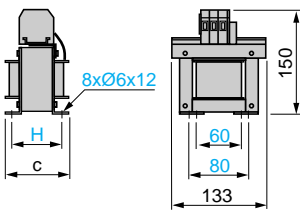
| VW3 | a | b | c | c1 | G | H | Ø |
|--------|-----|-----|-----|-----|-----|-----|-----|
| A4 501 | 60 | 103 | 60 | 95 | 50 | 51 | 3.5 |
| A4 502 | 60 | 103 | 77 | 118 | 50 | 68 | 3.5 |
| A4 503 | 96 | 134 | 80 | 115 | 80 | 65 | 5.5 |
| A4 504 | 96 | 134 | 79 | 115 | 80 | 64 | 5.5 |
| A4 505 | 96 | 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



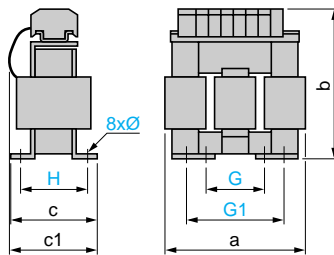
Line chokes

VW3 A58501, A58502



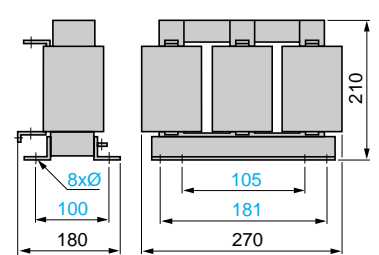
| VW3 | c | H |
|--------|-----|----|
| A58501 | 95 | 65 |
| A58502 | 105 | 77 |

VW3 A4 551...555



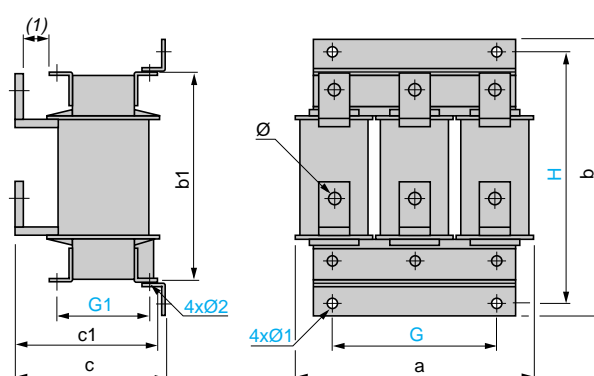
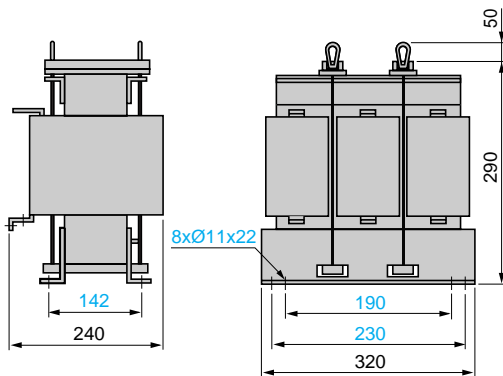
| VW3 | a | b | c | c1 | G | G1 | H | Ø |
|----------------|-----|-----|-----|-----|----|------|-----|--------|
| A4 551 | 100 | 135 | 55 | 60 | 40 | 60 | 42 | 6 x 9 |
| A4 552, A4 553 | 130 | 155 | 85 | 90 | 60 | 80.5 | 62 | 6 x 12 |
| A4 554 | 155 | 170 | 115 | 135 | 75 | 107 | 90 | 6 x 12 |
| A4 555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

VW3 A4 556



| VW3 | Ø |
|--------|---------|
| A4 556 | 11 x 22 |

VW3 A4 557



| 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

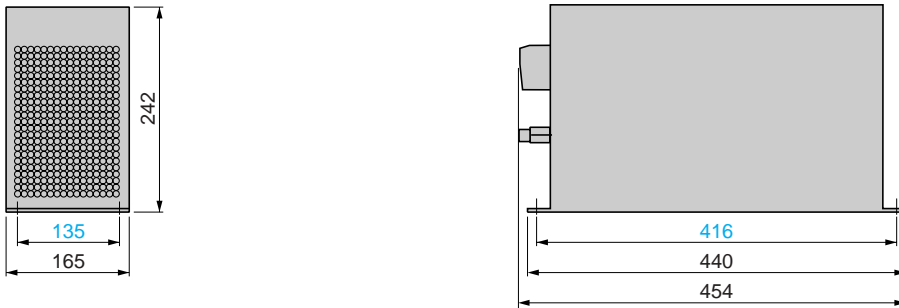
Altivar 61
Passive filters

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

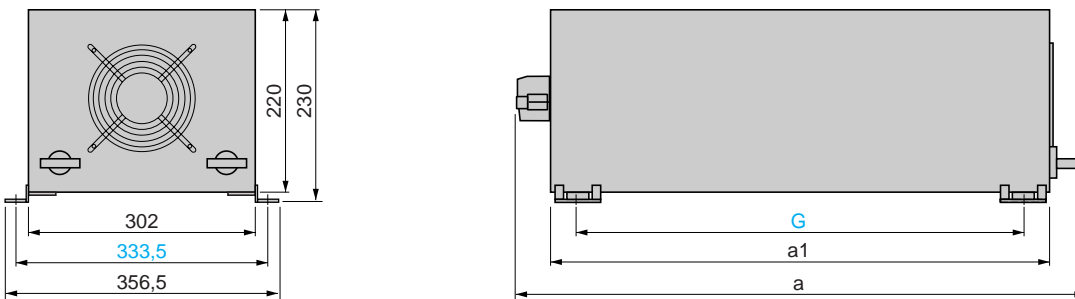
Mounting recommendations (1)



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



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



| 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 |

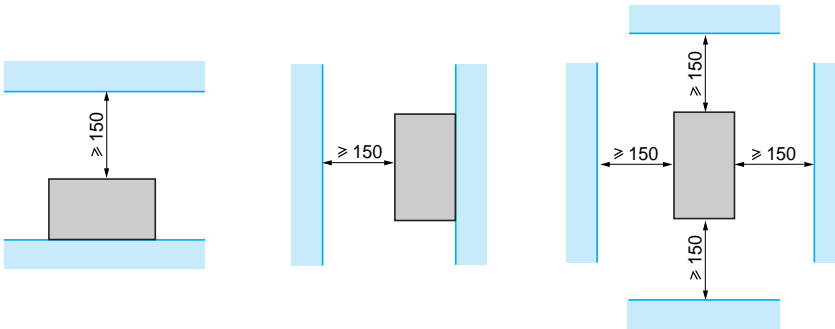
(1) Vertical mounting only

Variable speed drives for asynchronous motors

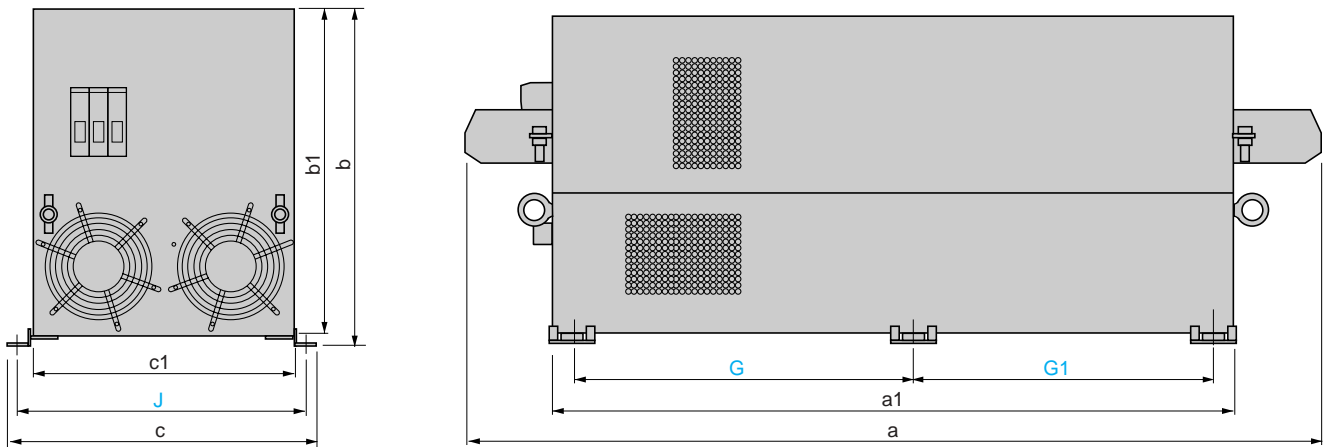
Altivar 61
Passive filters

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

Mounting recommendations (1)

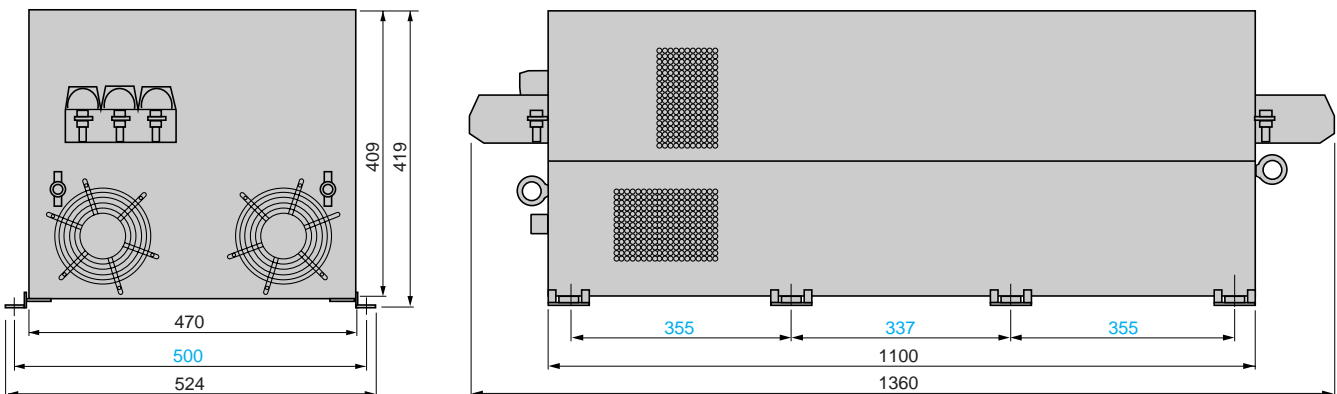


VW3 A4 610...613, 619, 628...632, 639, 649...651, 656, 657, 667...670, 676, 677



| 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



(1) Vertical or horizontal mounting.

Variable speed drives for asynchronous motors

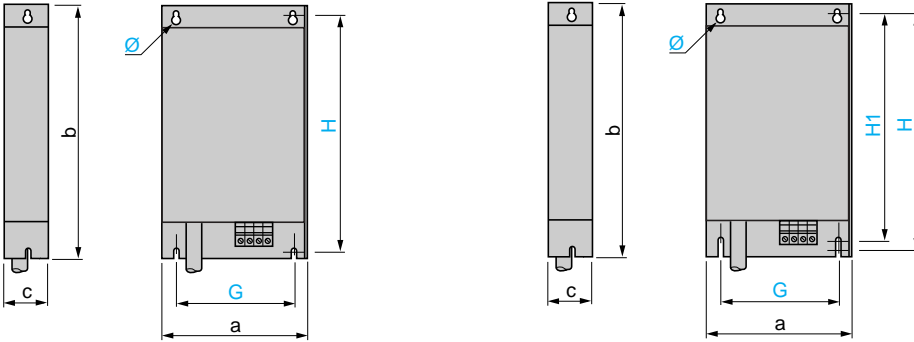
Altivar 61

Additional EMC input filters

Additional EMC input filters

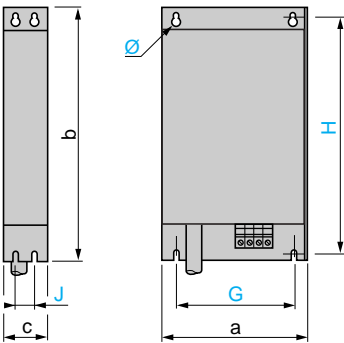
VW3 A4 401...404

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 |

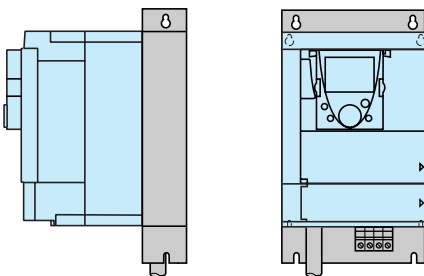
VW3 A4 406...408



| 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 |

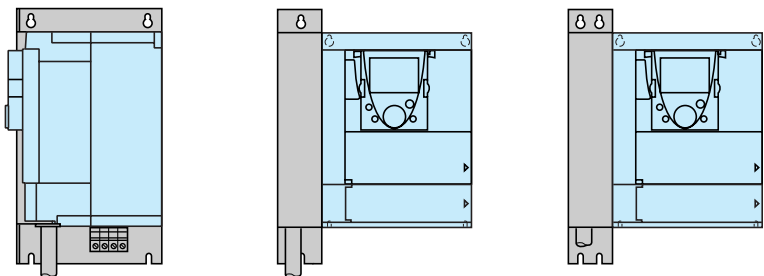
Mounting the filter under the drive

Front view



Mounting the filter next to the drive

Front view



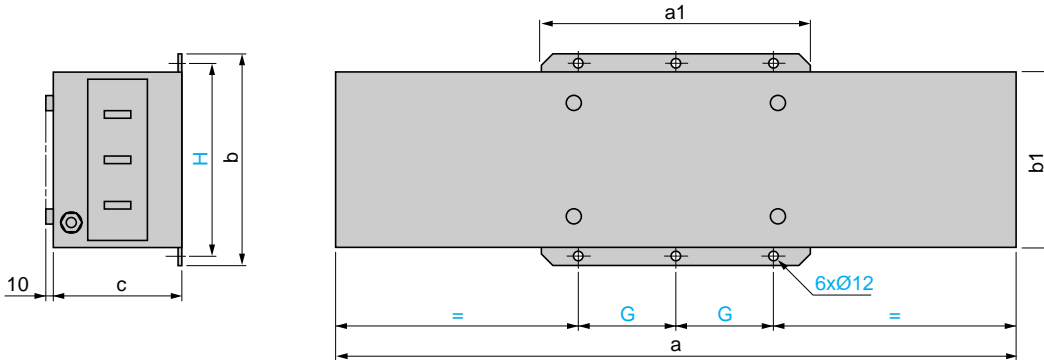
Variable speed drives for asynchronous motors

Altivar 61

Additional EMC input filters

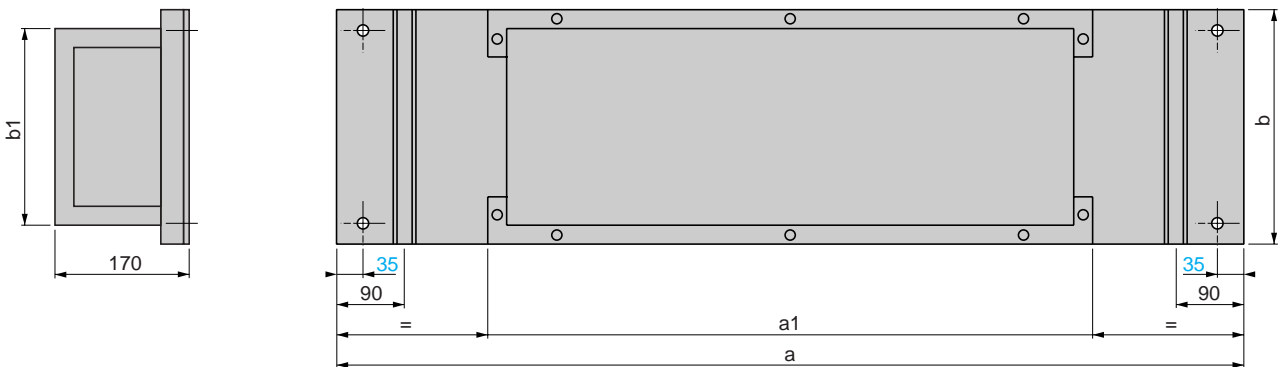
Additional EMC input filters (continued)

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 |

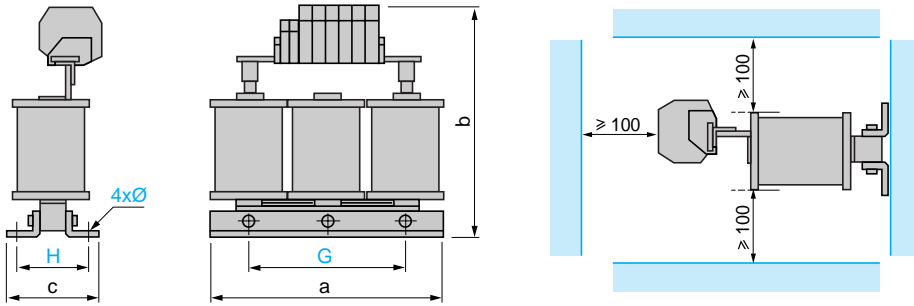
Variable speed drives for asynchronous motors

Altivar 61
Motor chokes

Motor chokes (1)

VW3 A5 101, 102

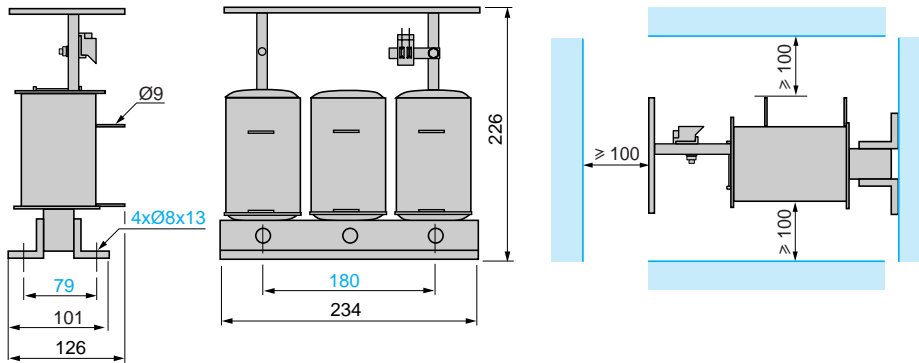
Mounting recommendations (2)



| 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)



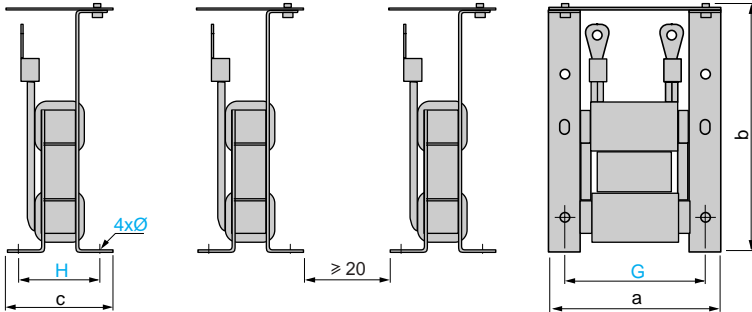
(1) It is absolutely essential that the motor chokes are mounted on a metal support (grille, frame, etc.)
 (2) Because of the magnetic field and/or heat dissipation, it is very important to follow the mounting recommendations provided.

Variable speed drives for asynchronous motors

Altivar 61
Motor chokes

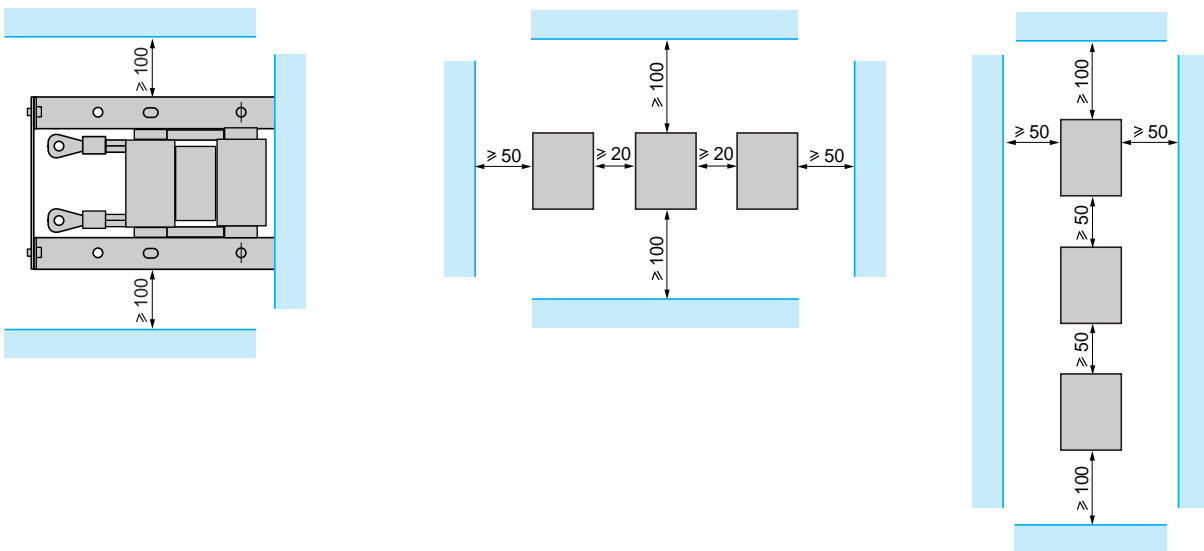
Motor chokes (continued) (1)

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.

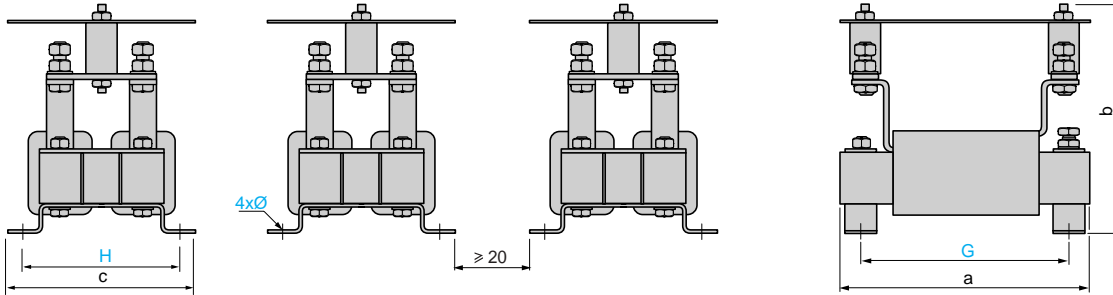
(3) Because of the magnetic field and/or heat dissipation, it is very important to follow the mounting recommendations provided.

Variable speed drives for asynchronous motors

Altivar 61
Motor chokes

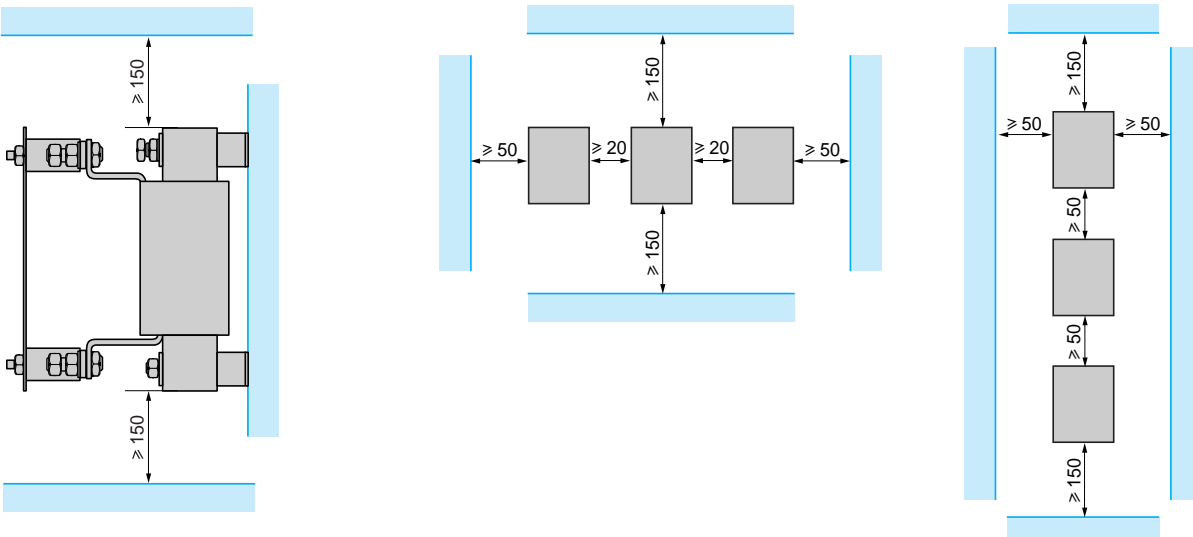
Motor chokes (continued) (1)

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)

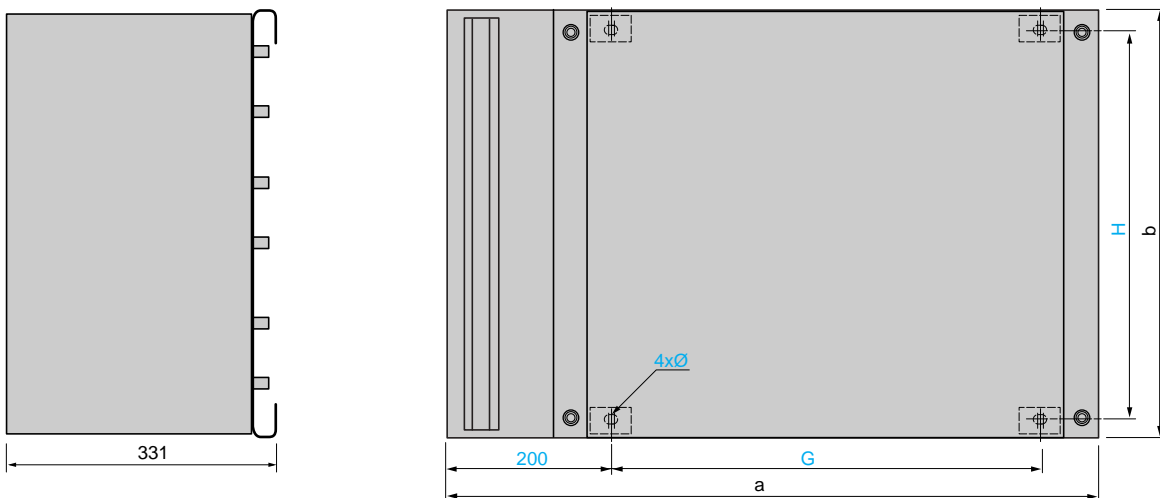


(1) It is absolutely essential that the motor chokes are mounted on a metal support (grille, frame, etc.)

(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 |

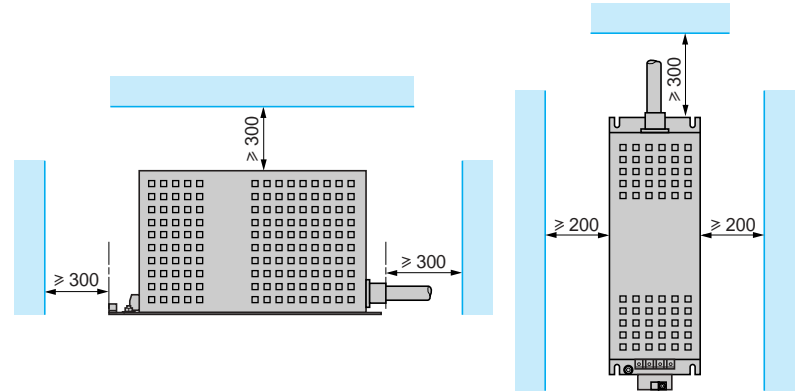
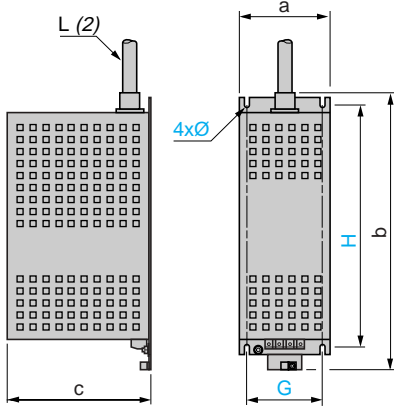
Variable speed drives for asynchronous motors

Altivar 61
Sinus filters

Sinus filters (1)

VW3 A5 201...206

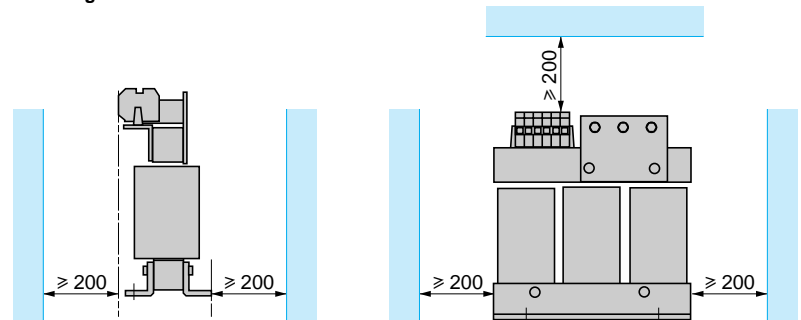
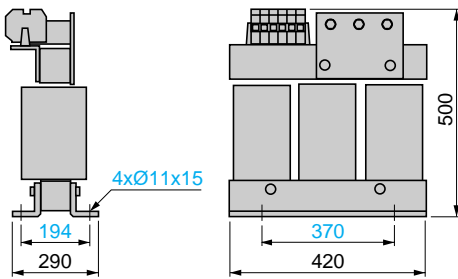
Mounting recommendations



| 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 |

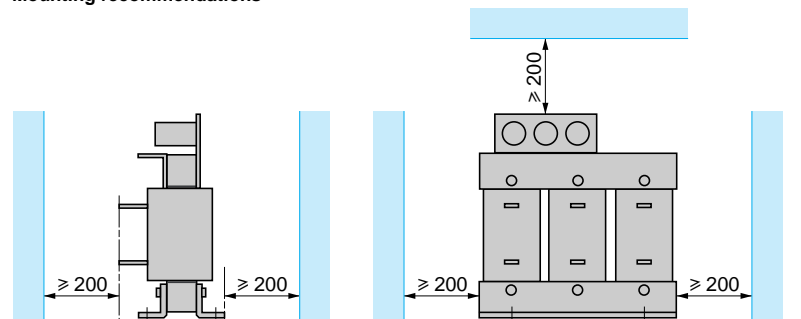
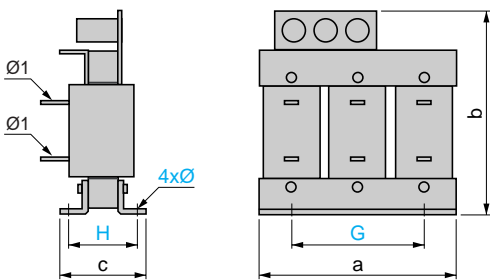
VW3 A5 207

Mounting recommendations



VW3 A5 208...211

Mounting recommendations



| 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.

Variable speed drives for asynchronous motors

Altivar 61

Safety requirements

“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 disconnecter 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 disconnecter 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.

Variable speed drives for asynchronous motors

Altivar 61

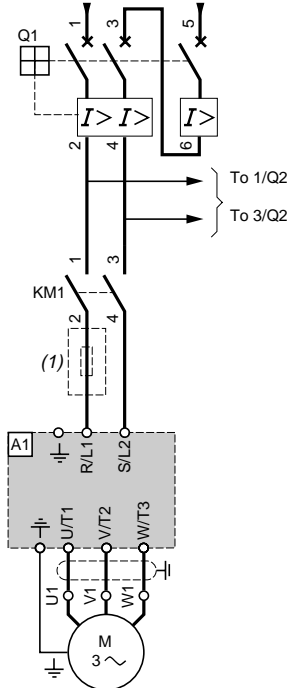
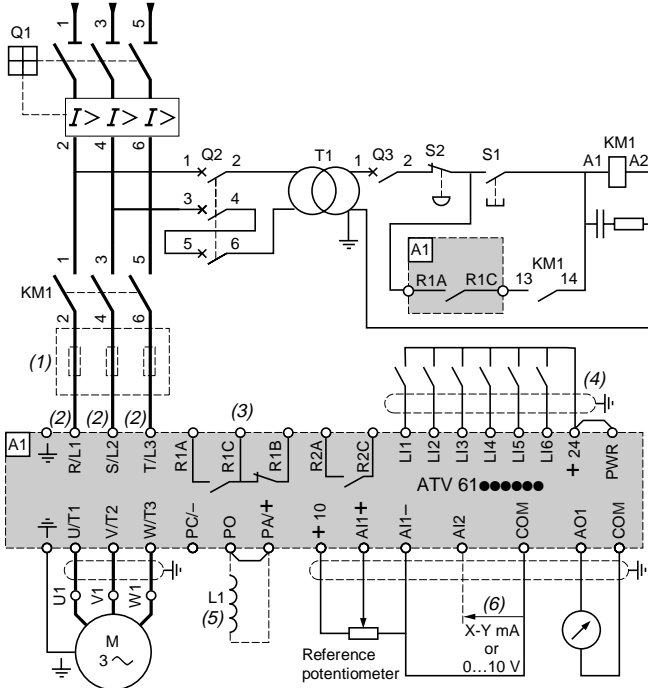
Schemes conforming to standards EN 954-1 category 1, IEC/EN 61508 capacity SIL1, in stopping category 0 according to IEC/EN 60204-1

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

3-phase power supply with upstream breaking via contactor

ATV 61H075M3...HU75M3

Power section for single phase power supply



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 | Contactors, 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.

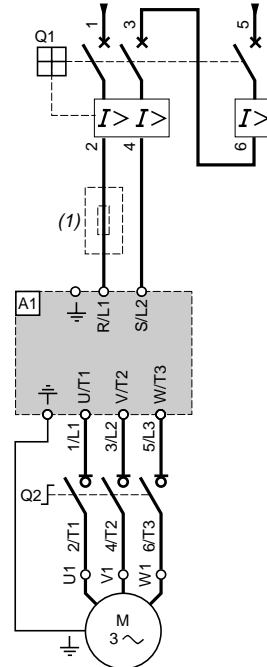
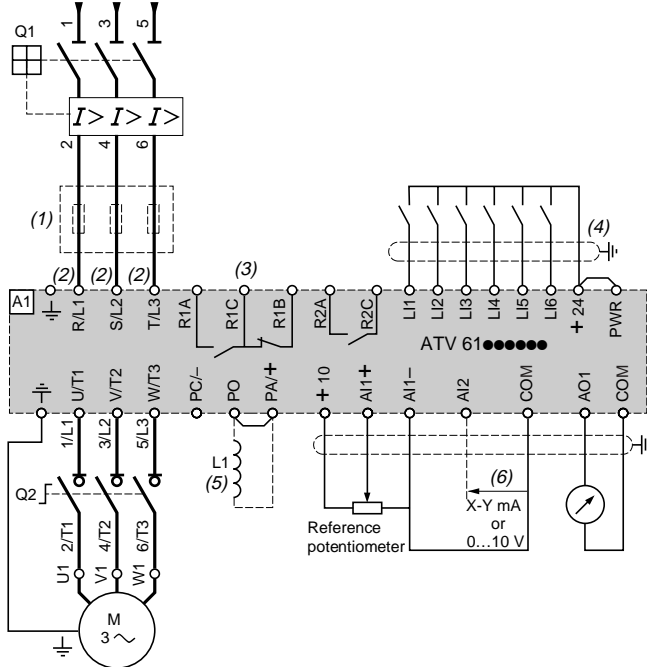
Schemes conforming to standards EN 954-1 category 1, IEC/EN 61508 capacity SIL1, in stopping category 0 according to IEC/EN 60204-1 (continued)

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

3-phase power supply with downstream breaking via switch disconnector

ATV 61H075M3...HU75M3

Power section for single phase power supply



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.

Variable speed drives for asynchronous motors

Altivar 61

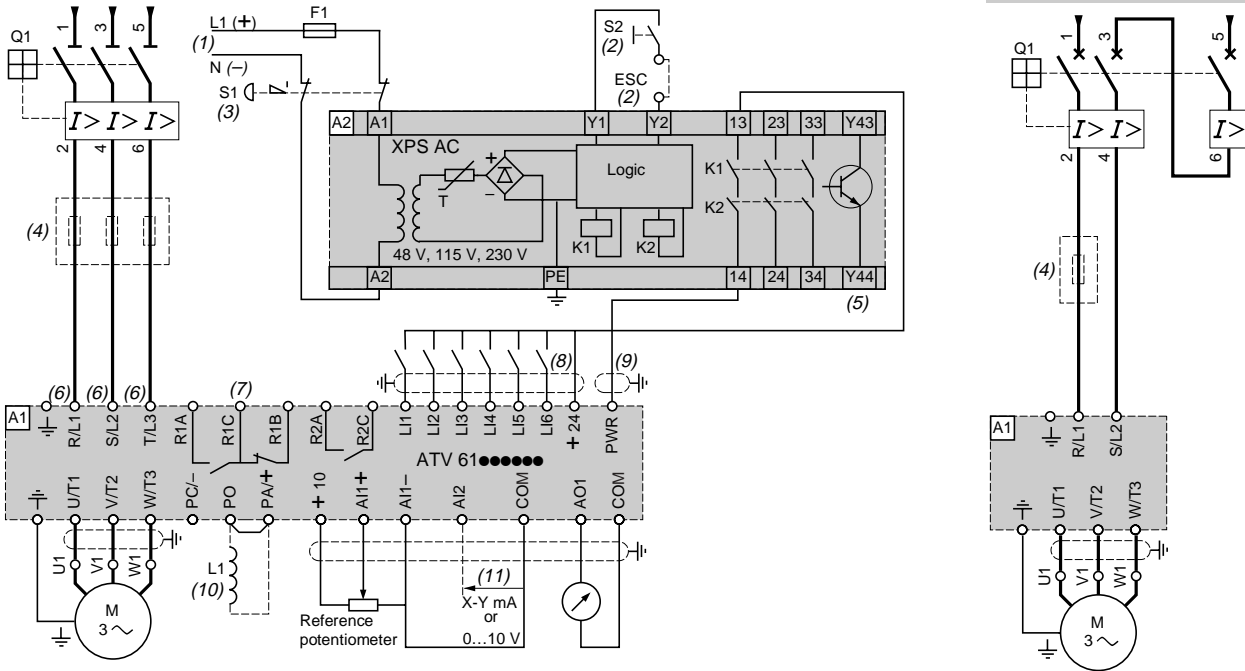
Schemes conforming to standards EN 954-1 category 3, IEC/EN 61508 capacity SIL2, in stopping category 0 according to IEC/EN 60204-1

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

3-phase power supply, low inertia machine

ATV 61H075M3...HU75M3

Power section for single phase power supply



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.

Variable speed drives for asynchronous motors Altivar 61

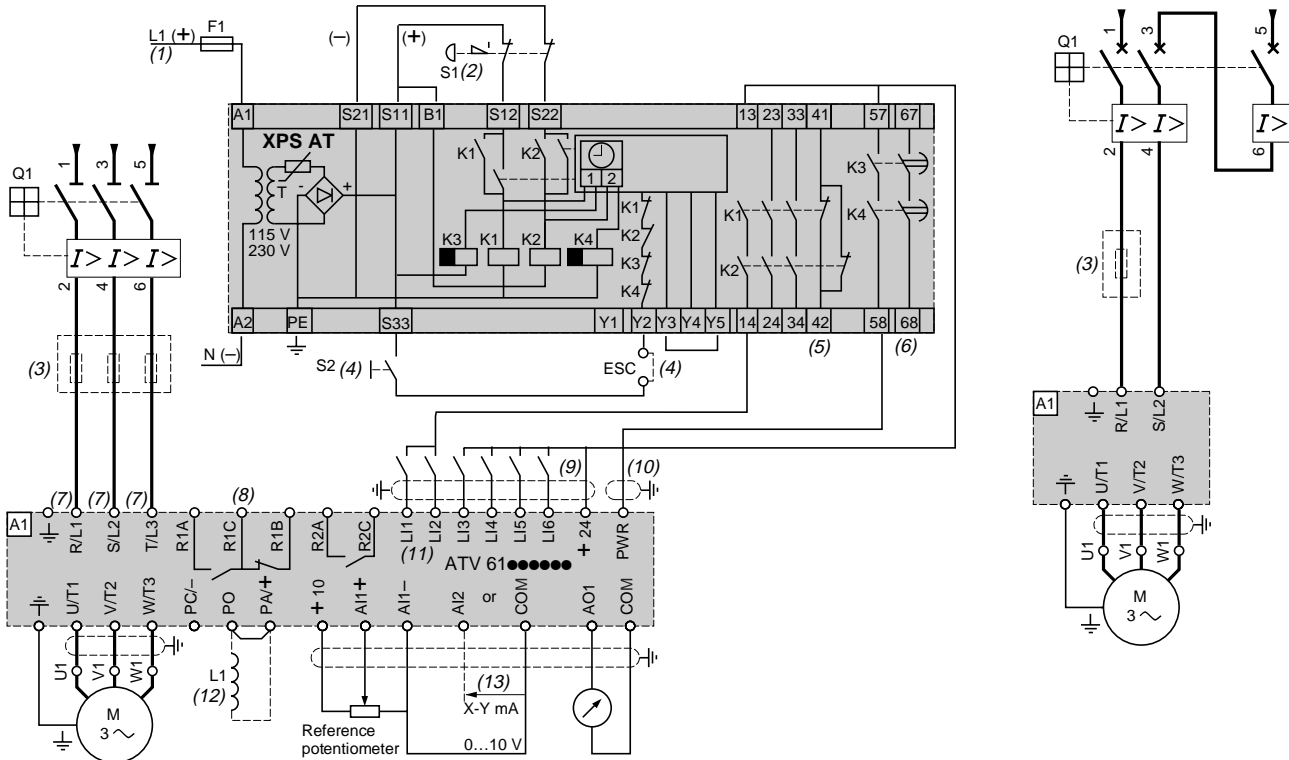
Schemes conforming to standards EN 954-1 category 3, IEC/EN 61508 capacity SIL2, in stopping category 1 according to IEC/EN 60204-1

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

3-phase power supply, high inertia machine

ATV 61H075M3...HU75M3

Power section for single phase power supply



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.

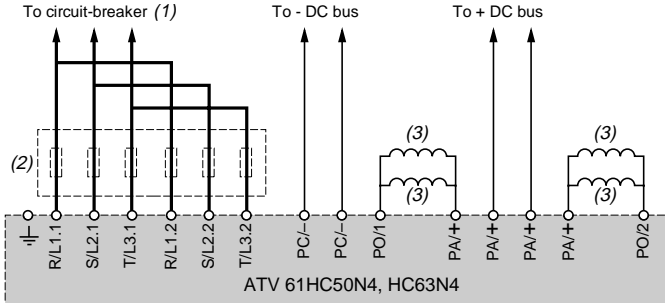
Components for use with the Altivar (for a complete list of references, see our "Motor starter solutions. Power control and protection components" and "Preventa safety solutions" specialist catalogues).

| 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



(1) For control section connections, see pages 114 to 117.

(2) Line choke, see page 68.

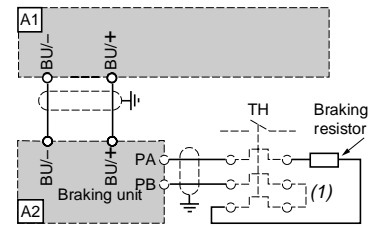
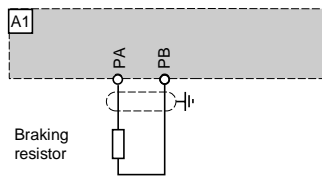
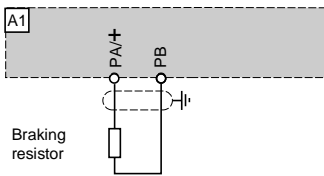
(3) DC chokes provided as standard with the drive

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

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

ATV 61HC25N4...HC63N4



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

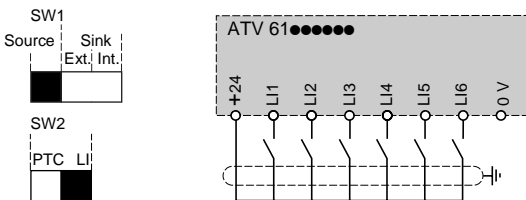
Logic inputs

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

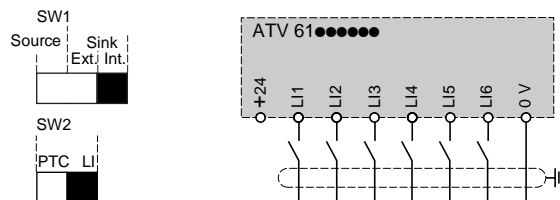
- Set the switch to Source (factory setting) if using PLC outputs with PNP transistors,
- Set the switch to Sink Int or Sink Ext if using PLC outputs with NPN transistors

Internal power supply

Switch in "Source" position

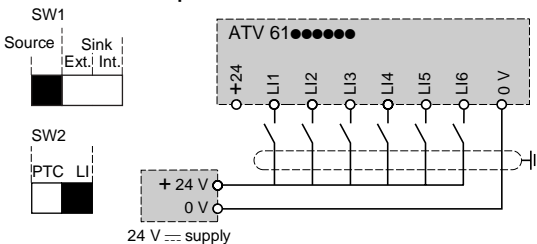


Switch in "Sink Int" position

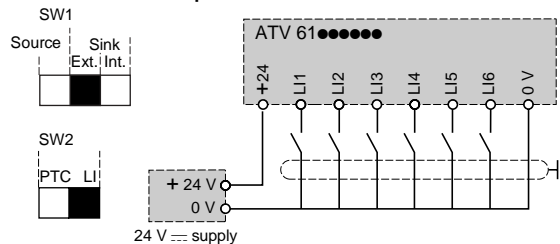


External power supply

Switch in "Source" position



Switch in "Sink Ext" position

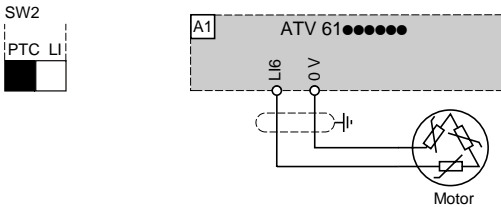


Examples of recommended schemes (continued)

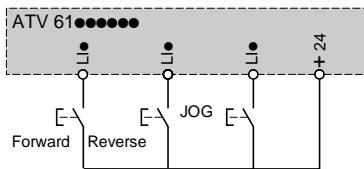
Input for PTC probes

The SW2 switch is used to operate the LI6 input:

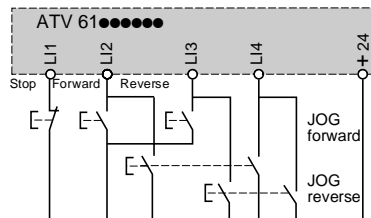
- As a logic input by setting the SW2 switch to LI (factory setting)
- Or for protecting the motor via PTC probes by setting the SW2 switch to PTC



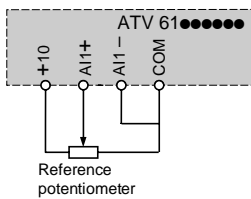
2-wire control and jog operation (JOG)



3-wire control and jog operation (JOG)

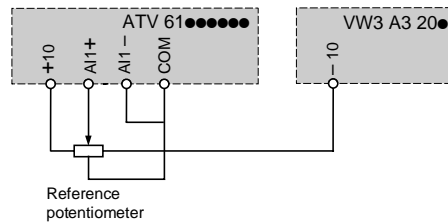


Unipolar speed reference



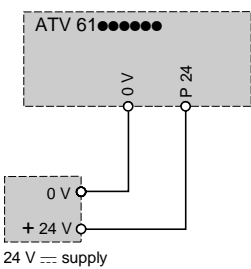
Bipolar speed reference

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



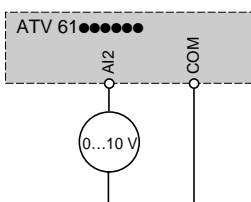
Separate control power supply

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

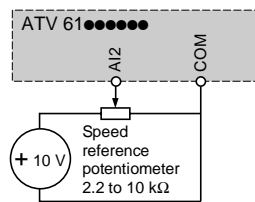


Analog input configured for voltage

External 0...10 V

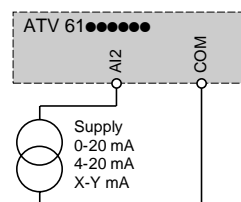


External +10 V



Analog input configured for current

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



Variable speed drives for asynchronous motors Altivar 61

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

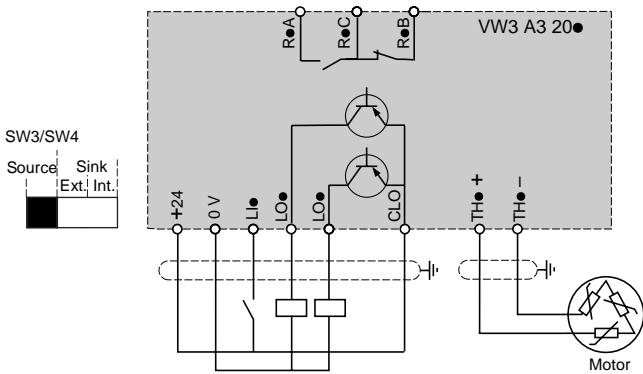
Logic I/O

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

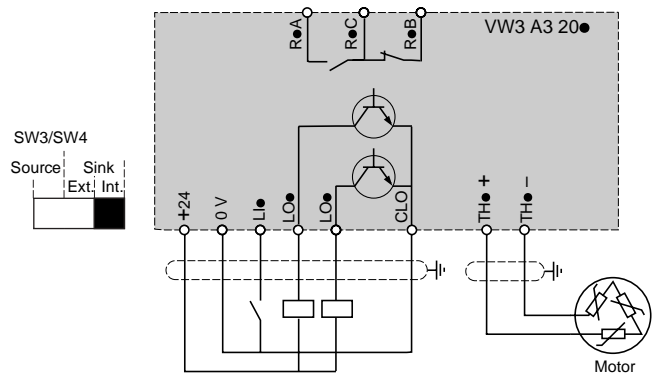
- Set the switch to Source (factory setting) if using PLC outputs with PNP transistors,
- Set the switch to Sink Int or Sink Ext if using PLC outputs with NPN transistors

Internal power supply

Switch in "Source" position

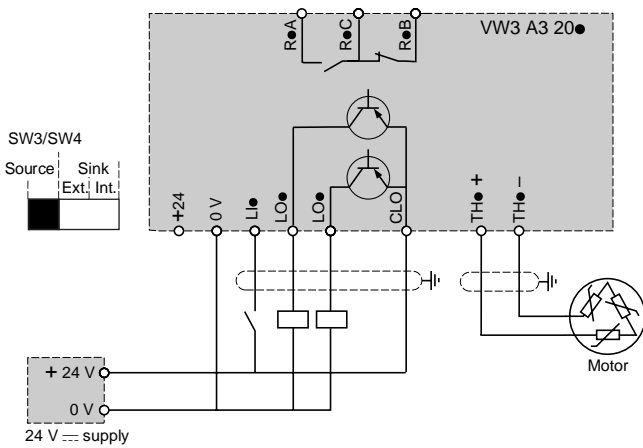


Switch in "Sink Int" position

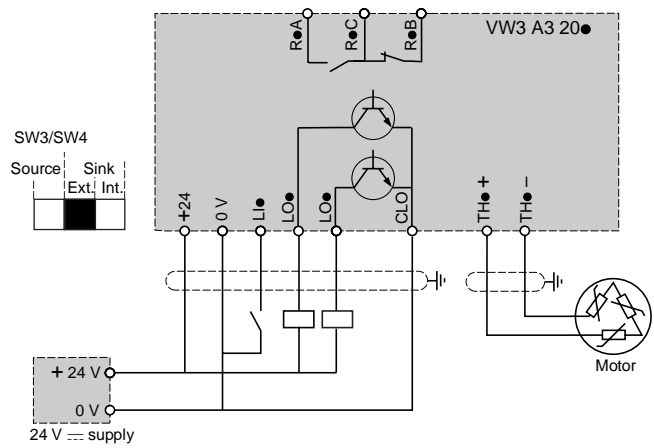


External power supply

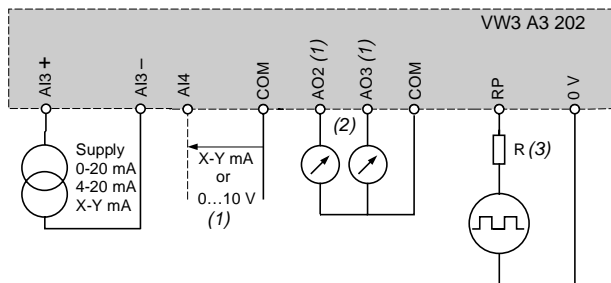
Switch in "Source" position



Switch in "Sink Ext" position



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



(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.

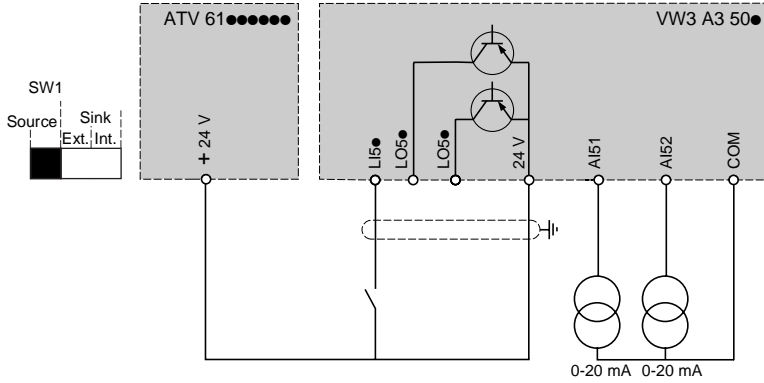
(3) R: add a resistor if the input voltage of the pulse train is greater than 5 V.

Recommended values:

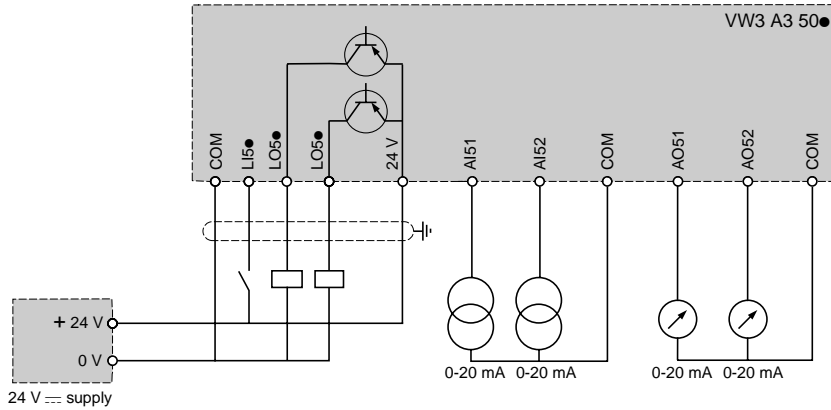
| Input voltage V | Resistance Ω |
|--------------------|------------------------|
| 12 | 510 |
| 15 | 910 |
| 24 | 1300 |

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

Card powered by the drive (1)



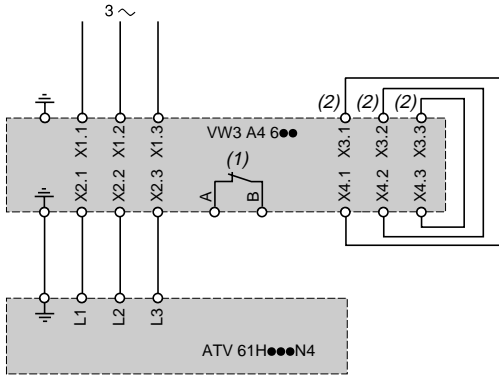
Card powered by external power supply



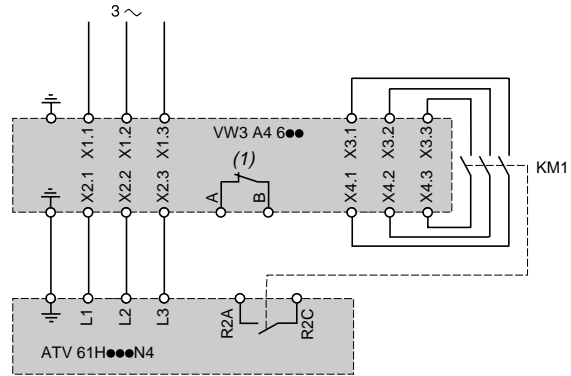
(1) Only if the power consumption is less than 200 mA; otherwise use an external power supply.

VW3 A4 6●● passive filters

Standard scheme



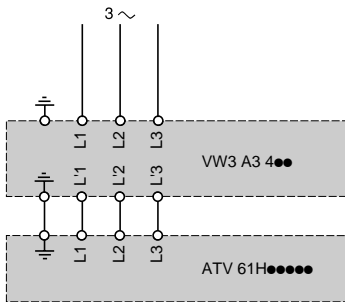
Scheme for filter control by drive depending on load



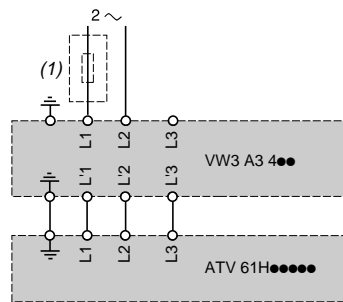
(1) Contact making it possible to show the thermal state of the passive filter
(2) Supplied wired.

VW3 A4 4●● additional EMC input filters

3-phase power supply, 3-phase filter



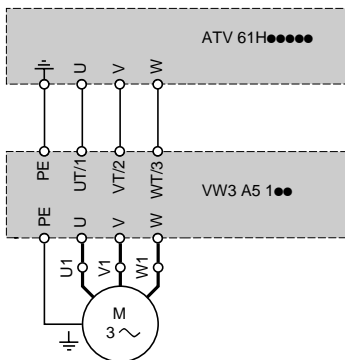
Single phase power supply, 3-phase filter



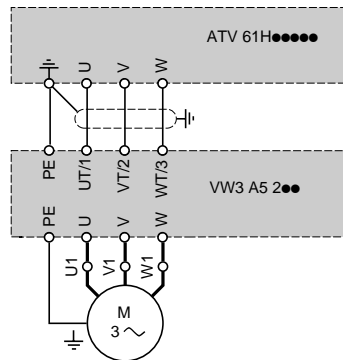
(1) Line choke compulsory for ATV 61HU40M3...HU75M3, see page 68.

Output filters

VW3 A5 1●● motor chokes

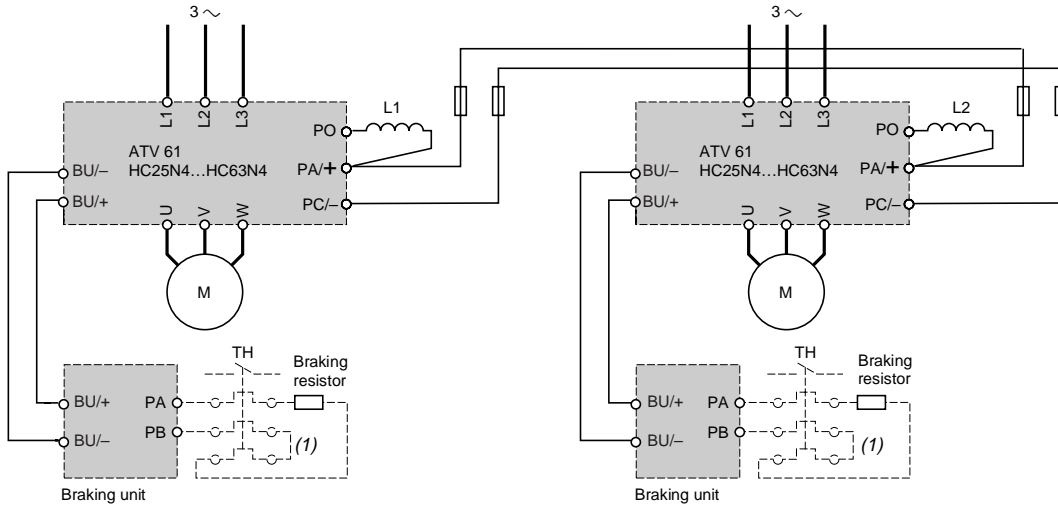


VW3 A5 2●● sinus filters



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

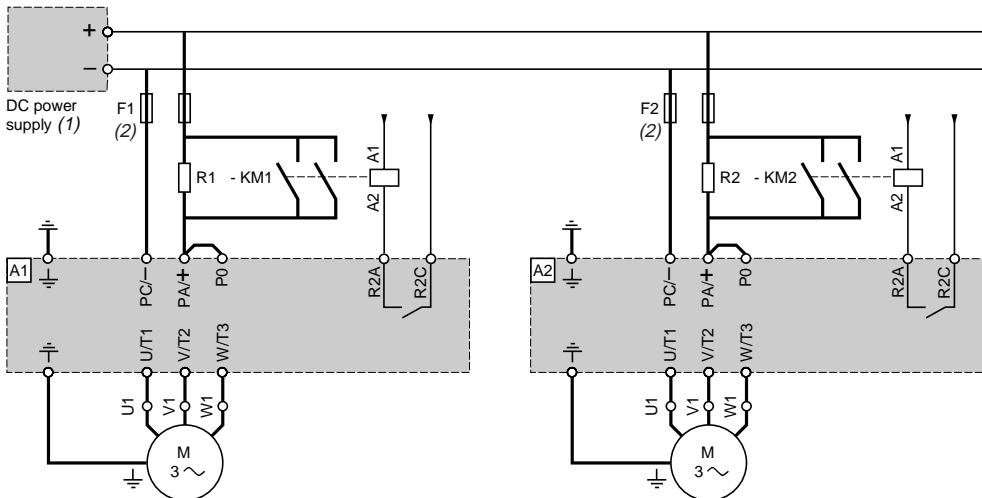
ATV 61HC25N4...HC63N4



(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 | | Contactors (3) KM1, KM2 |
|-------------------------------------|--------------------------|------------|----------------------------|
| | Value | Reference | |
| | 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.

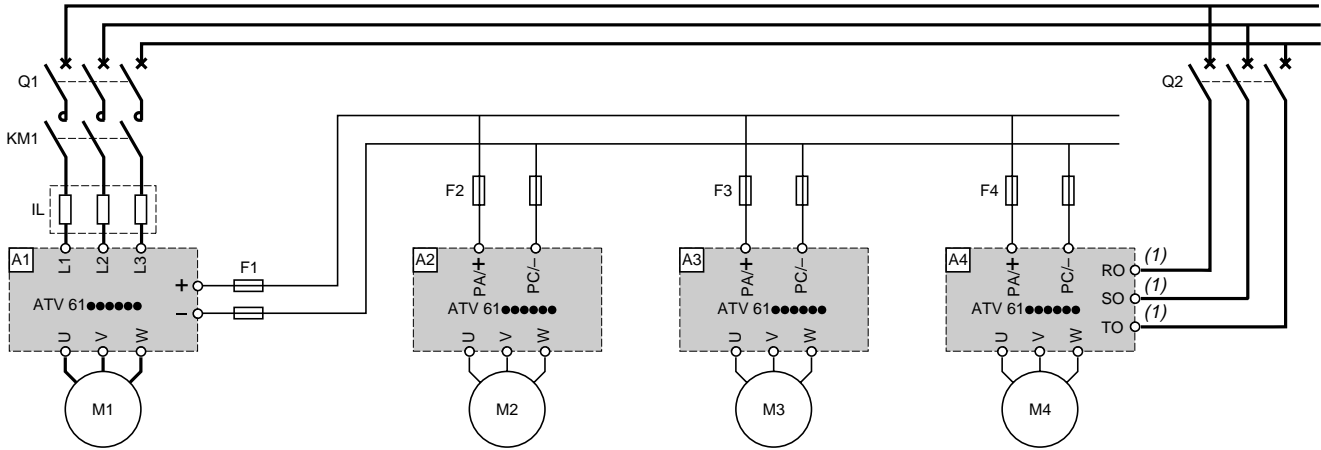
Note: ATV 61H●●●M3, ATV 61HD11M3X, HD15M3X, ATV 61H075N4...HD18N4, ATV 61W075N4...WD18N4 and ATV 61W075N4C...WD18N4C have an integrated pre-charge circuit. This is used to connect the DC power supply directly to the drive without the need for an external pre-charge circuit.

Variable speed drives for asynchronous motors

Altivar 61

Connection diagrams for several drives in parallel on the DC bus

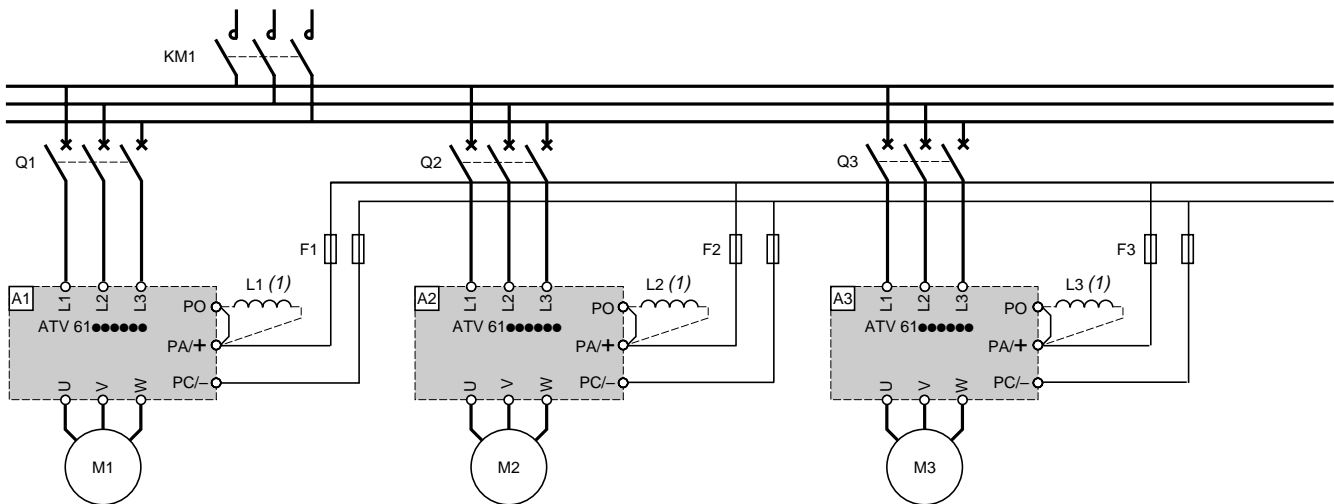
Drives with different ratings



| Reference | Description |
|------------|---|
| A1 | ATV 61 drive, see pages 18 to 21. Drive power = \sum 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).

Variable speed drives for asynchronous motors

Altivar 61

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 |

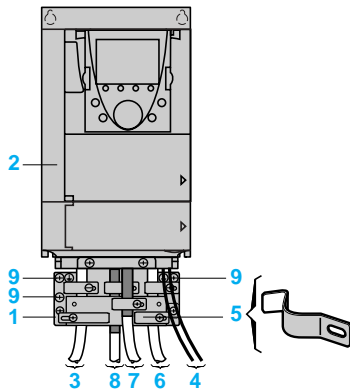
(1) Nominal voltage of fast-acting fuse:

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

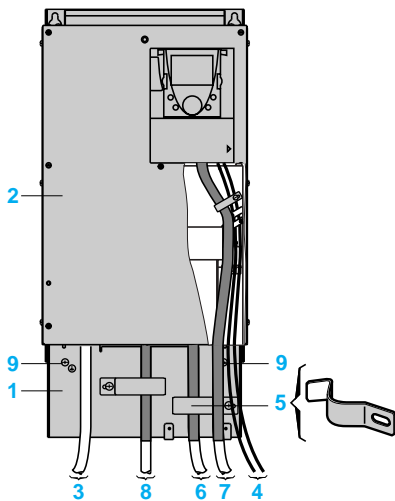
Variable speed drives for asynchronous motors

Altivar 61

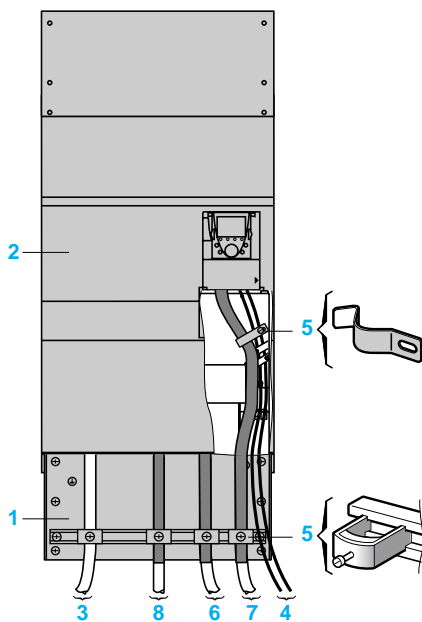
Electromagnetic compatibility



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



ATV 61HD18M3X...HD45M3X,
ATV 61HD22N4...HD75N4



ATV 61HD55M3X...HD90M3X,
ATV 61HD90N4...HC63N4

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

- 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 mm²).
- 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.

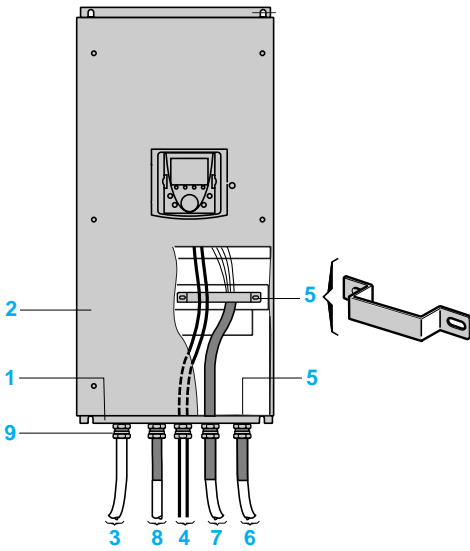
Variable speed drives for asynchronous motors

Altivar 61

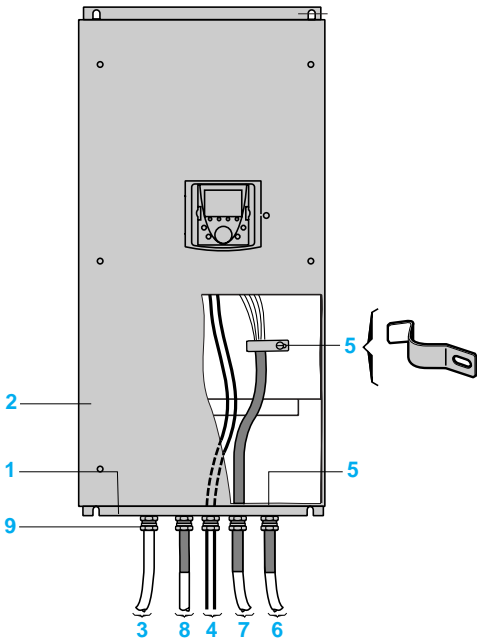
Electromagnetic compatibility

Connections to meet the requirements of EMC standards (continued)

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



ATV 61W075N4...WD30N4,
ATV 61W075N4C...WD30N4C



ATV 61WD37N4...WD90N4,
ATV 61WD37N4C...WD90N4C

- 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 mm²).
- 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

DF534567



DF534568



DF534636



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 Power (1) | Drive Reference | Circuit-breaker Reference (2) | | Rating Im | | Line contactor Reference (3) (4) |
|---|-----------------|-------------------------------|-----------|-----------|-----|----------------------------------|
| | | | | A | A | |
| kW | HP | | | | | |
| 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 | 32 | – | LC1 D32●● |
| | | | NS80HMA50 | 50 | 300 | LC1 D32●● |
| 3 | – | ATV 61HU40M3 (5) | GV2 L32 | 32 | – | LC1 D32●● |
| | | | NS80HMA50 | 50 | 300 | 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

DF534670



DF534671



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) | |
|--|-----------------|-------------------------------|--------------|-----|----------------------------------|------------|
| | | | 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 |
| LC1 F185, F225 | 50/60 Hz | B7 | E7 | F7 | M7 | P7 | U7 |
| | 50 Hz (LX1 coil) | B5 | E5 | F5 | M5 | P5 | U5 |
| | 60 Hz (LX1 coil) | – | E6 | F6 | M6 | – | U6 |
| LC1 F265, LC1 F330 | 40...400 Hz (LX9 coil) | – | E7 | F7 | M7 | P7 | U7 |
| | 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

DF534673



DF534674



DF534631



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

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: 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 | 32 | – | LC1 D32●● |
| | | | NS80HMA50 | 50 | 300 | 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 voltage reference indicated in the table below.

| | Volts ~ | Reference | | | | | |
|-----------------|------------------------|-----------|----|-----|-----|-----|-----|
| | | 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

DF534673



DF534832



DF5341831



NS160●MA150
+
LC1 D80●●
+
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 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 |

(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 |
| LC1 F150, F225 | 50/60 Hz | B7 | E7 | F7 | M7 | P7 | U7 |
| | 50 Hz (LX1 coil) | B5 | E5 | F5 | M5 | P5 | U5 |
| | 60 Hz (LX1 coil) | – | E6 | F6 | M6 | – | U6 |
| LC1 F330 | 40...400 Hz (LX9 coil) | – | E7 | F7 | M7 | P7 | U7 |
| | 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

DF534673



DF534674



DF534634



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 | 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.

Variable speed drives for asynchronous motors

Altivar 61

Motor starters: supply voltage 380...415 V

DF534673



DF534674



DF534635



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

Motor starters for UL Type 12/IP 54 drives

| Motor | | Drive | Circuit-breaker | | Line contactor | |
|---|-----|-------------------------------|-----------------|--------|-------------------|------------|
| Power (1) | | Reference | Reference (2) | Rating | Im | |
| kW | HP | | | A | A | |
| 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

DF534673



DF534674



DF534637



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 |
| kW | HP | | | | A | A |
| 3-phase supply voltage: 440...480 V 50/60 Hz. Type 2 coordination | | | | | | |
| 0.75 | 1 | ATV 61HU75N4 | 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 | 32 | – | LC1 D32●● |
| | | | NS80HMA50 | 50 | 300 | 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 | 130 |
| NS160●MA, NS250●MA | – | 35 | 130 |
| NS400●MA, NS600●MA | – | 42 | 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 ~ | Reference | | | | | |
|--------------------|------------------------|-----------|----|-----|-----|-----|-----|
| | | 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



DF534837



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 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 |
| NS160●MA, NS250●MA | – | 35 | 65 |
| NS400●MA, NS600●MA | – | 42 | 65 |
| 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.

Variable speed drives for asynchronous motors

Altivar 61

Motor starters: supply voltage 440...480 V

DF534673



DF534674



DF534685



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 | 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.

| LC1 D09...D115 | Volts ~ | 24 | 48 | 110 | 220 | 230 | 240 |
|----------------|------------------------|----|----|-----|-----|-----|-----|
| | 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

DF534673



DF534632



DF534635



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.

| LC1 D09...D115 | Volts ~ | 24 | 48 | 110 | 220 | 230 | 240 |
|----------------|---------|----|----|-----|-----|-----|-----|
| | 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.

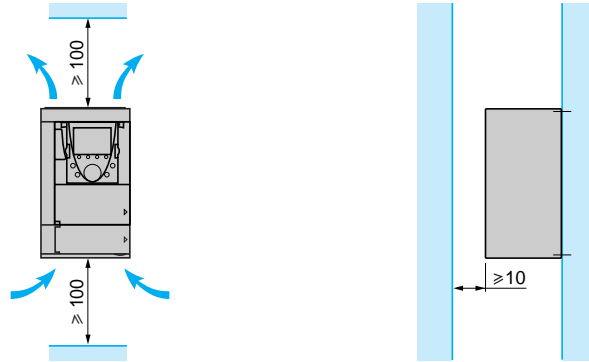
Mounting recommendations

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:

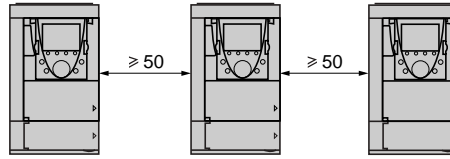
- Do not place it close to heating elements.
- Leave sufficient free space to ensure that the air required for cooling purposes can circulate from the bottom to the top of the unit.

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

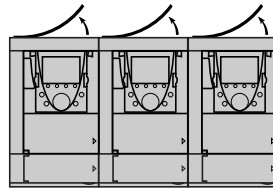


Mounting types

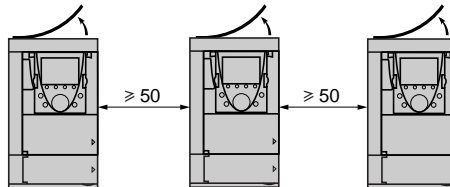
■ Type A mounting



■ Type B mounting

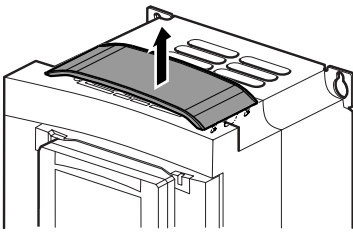


■ Type C mounting



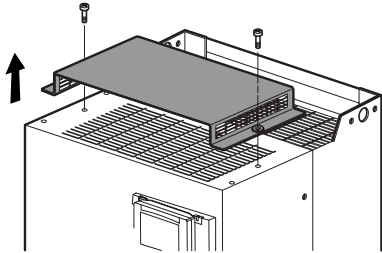
By removing the protective blanking cover from the top of the drive, the degree of protection for the drive becomes IP 20. The protective blanking cover may vary according to the drive model, see opposite.

522085



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

5564510



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

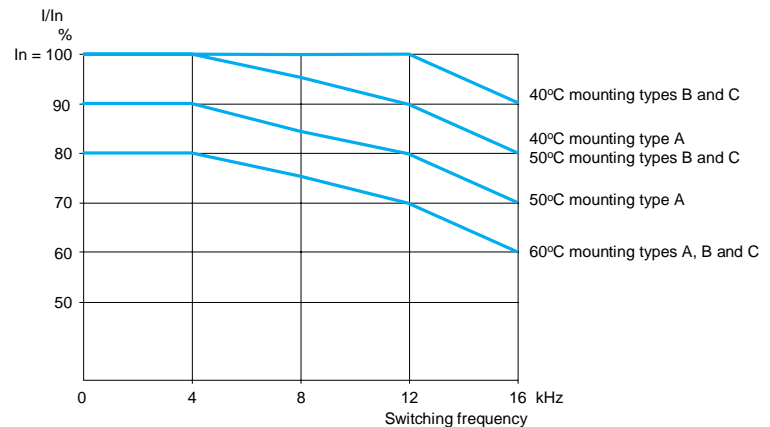
Mounting recommendations (continued)

Derating curves

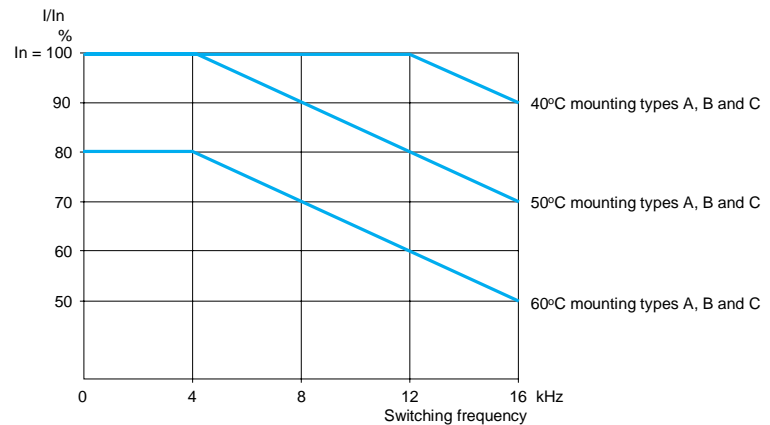
The derating curves for the drive nominal current (I_n) depend on the temperature, the switching frequency and the mounting type.

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

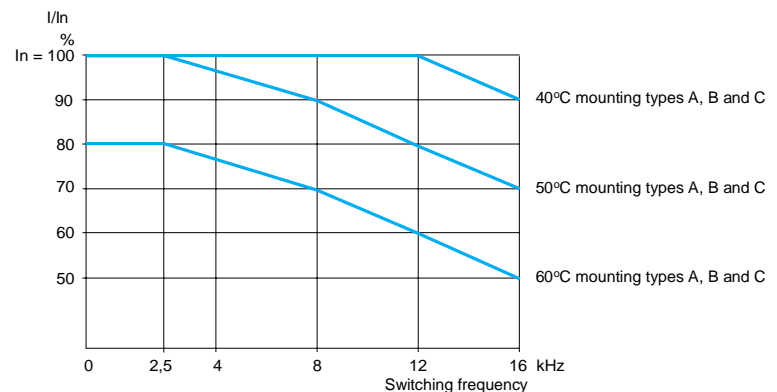
ATV 61H...M3, ATV 61HD11M3X, HD15M3X and ATV 61H075N4...HD18N4



ATV 61HD22N4 and ATV 61HD30N4 (1)



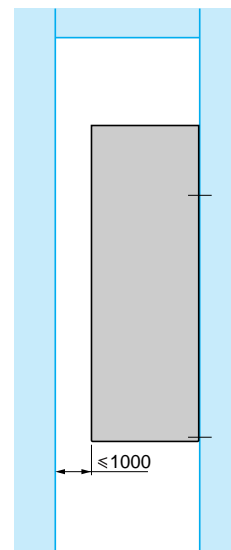
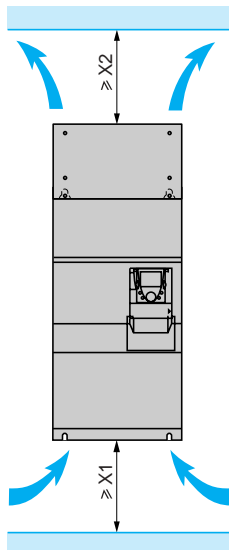
ATV 61HD18M3X...HD45M3X and ATV 61HD37N4...HD75N4 (1)



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

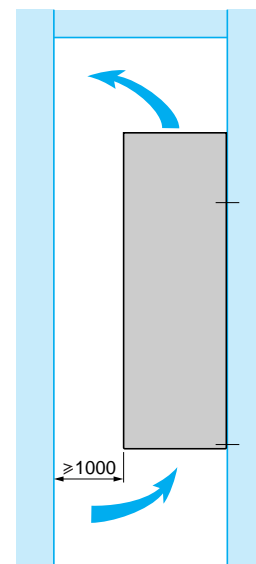
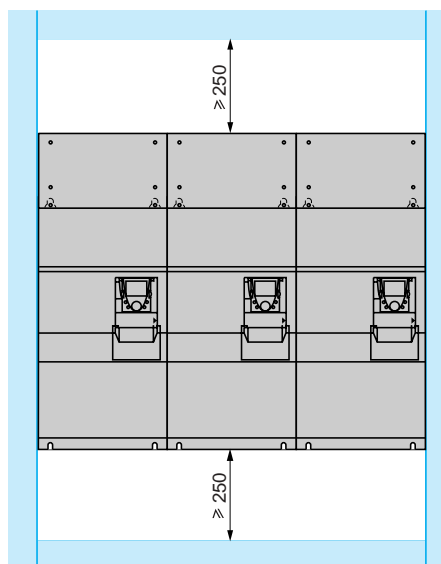
Mounting recommendations (continued)

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:



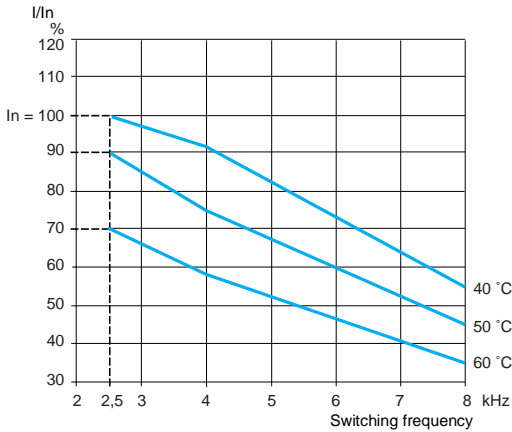
Mounting recommendations (continued)

Derating curves

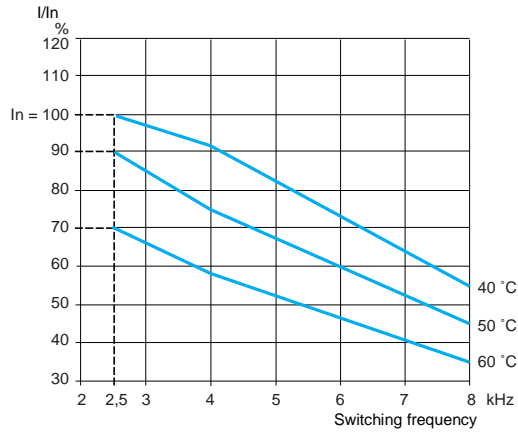
The derating curves for the drive nominal current (I_n) depend on the temperature, the switching frequency and the mounting type.

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

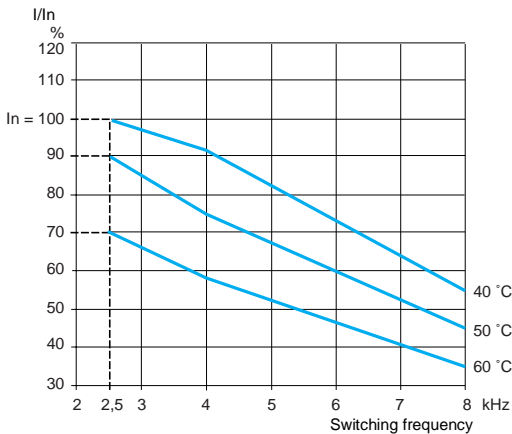
ATV 61HD55M3X



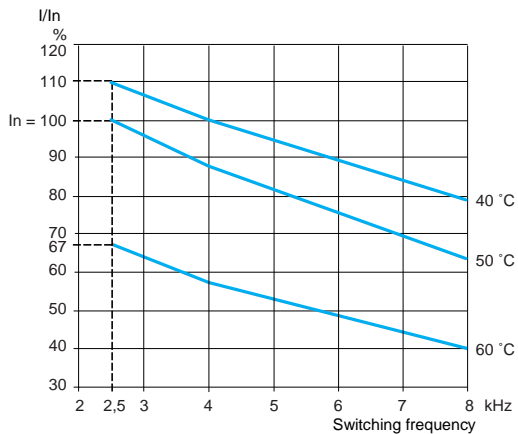
ATV 61HD75M3X



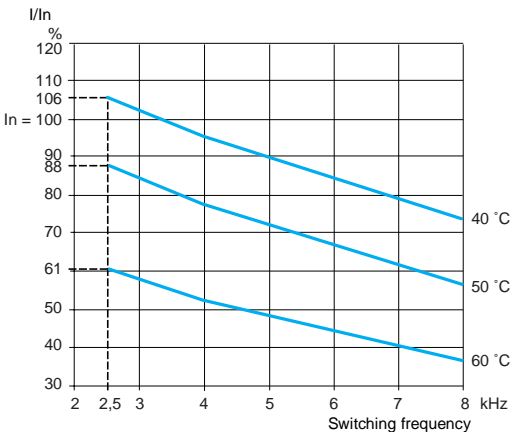
ATV 61HD90M3X



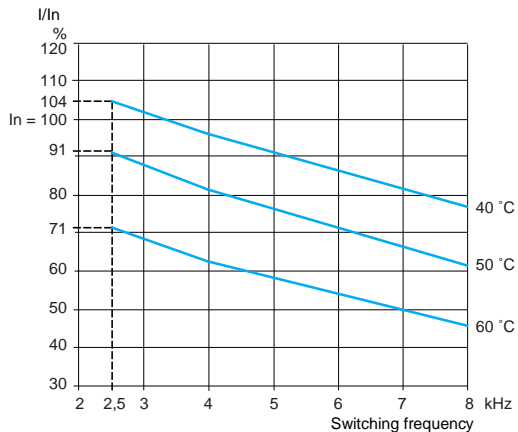
ATV 61HD90N4



ATV 61HC11N4

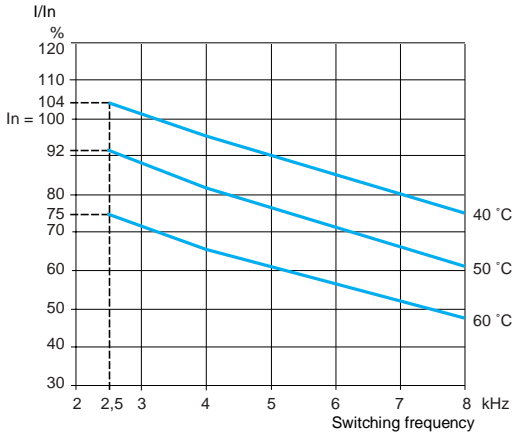


ATV 61HC13N4

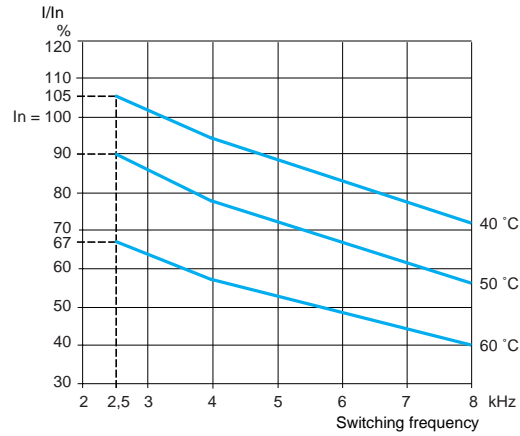


Derating curves (continued)

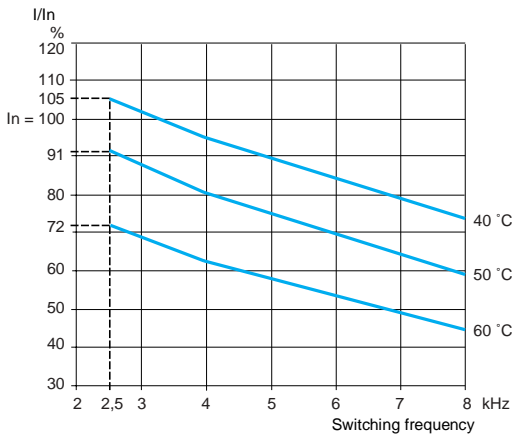
ATV 61HC16N4



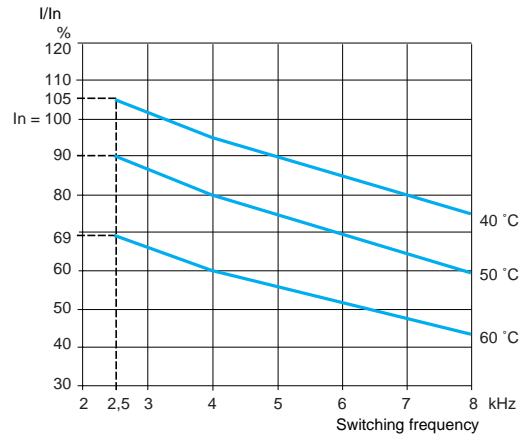
ATV 61HC22N4 combined with a 200 kW motor



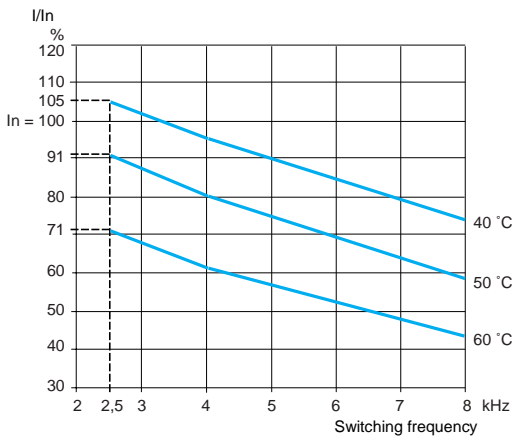
ATV 61HC22N4 combined with a 220 kW motor



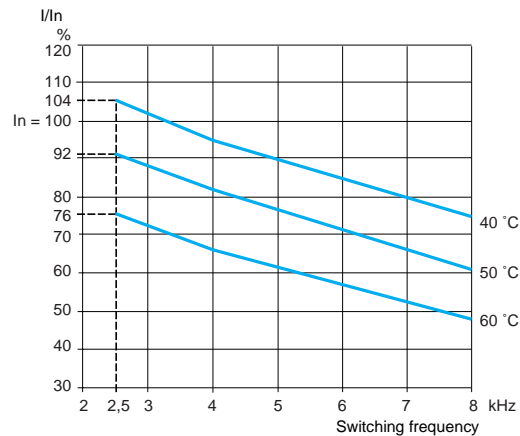
ATV 61HC25N4



ATV 61HC31N4 combined with a 280 kW motor

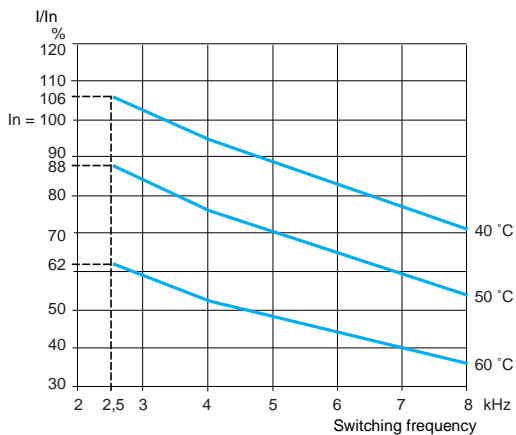


ATV 61HC31N4 combined with a 315 kW motor

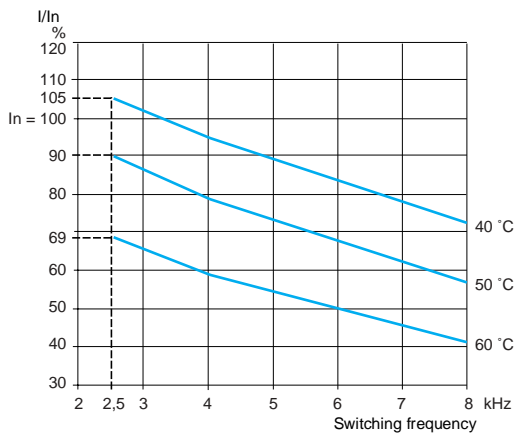


Derating curves (continued)

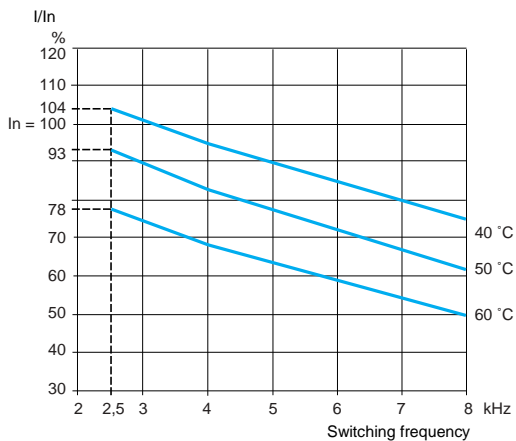
ATV 61HC40N4 combined with a 355 kW motor



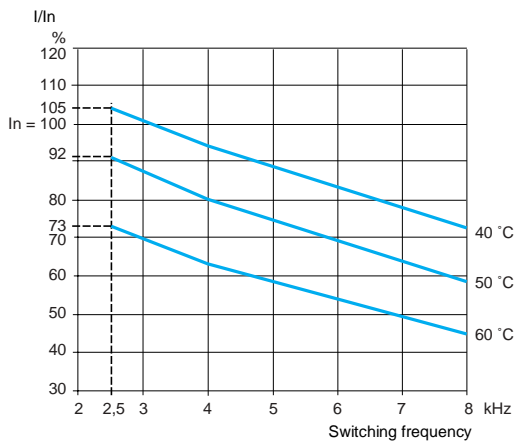
ATV 61HC40N4 combined with a 400 kW motor



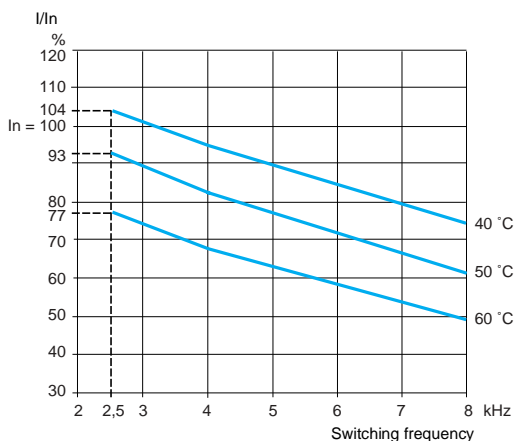
ATV 61HC50N4



ATV 61HC63N4 combined with a 560 kW motor



ATV 61HC63N4 combined with a 630 kW motor



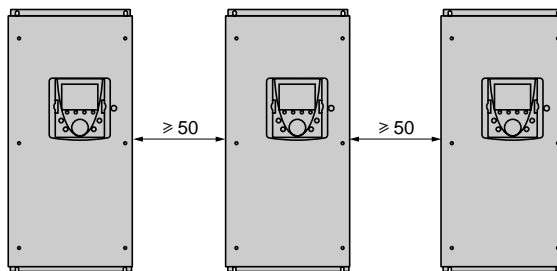
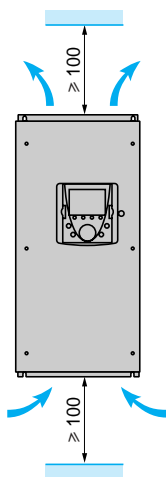
Mounting recommendations (continued)

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.

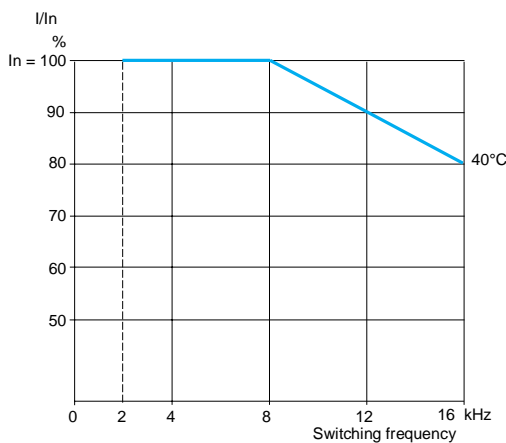
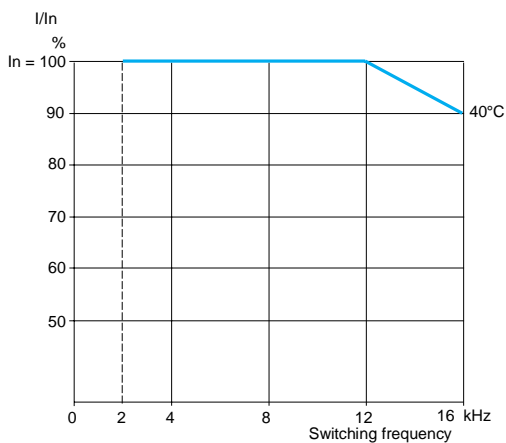
ATV 61W●●●N4, ATV 61W●●●N4C



Derating curves

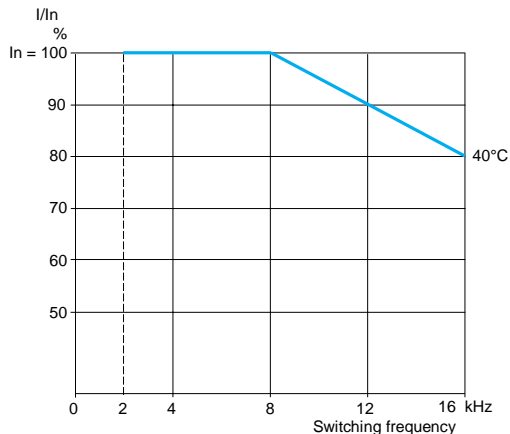
ATV 61W075N4...WU55N4, ATV 61W075N4C...WU55N4C

ATV 61WU75N4, WD11N4, ATV 61WU75N4C, WD11N4C

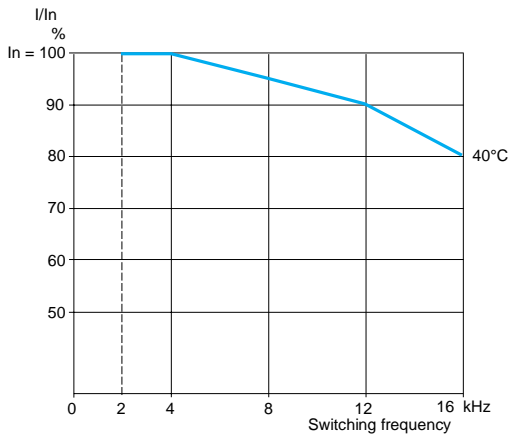


Derating curves (continued)

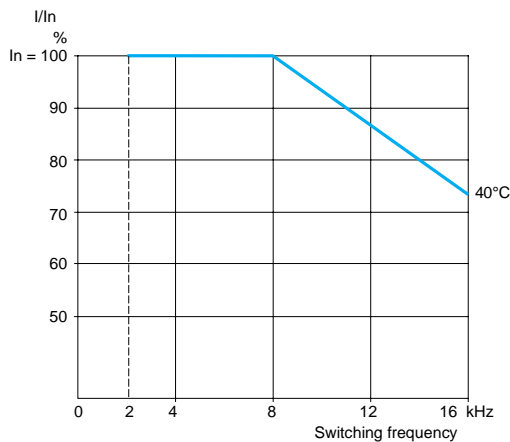
ATV 61WD15N4, ATV 61WD15N4C



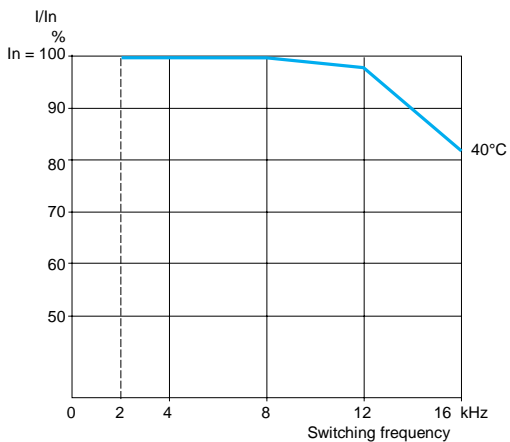
ATV 61WD18N4, WD22N4, ATV 61WD18N4C, WD22N4C



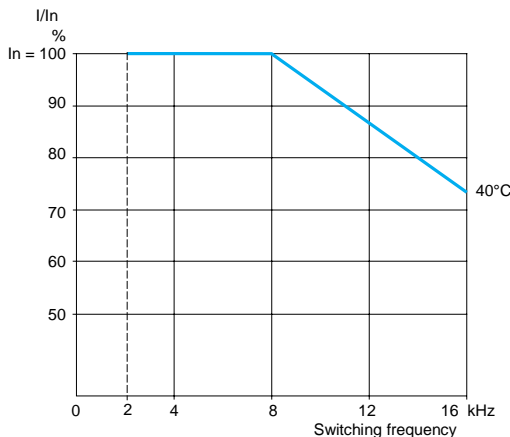
ATV 61WD30N4, ATV 61WD30N4C

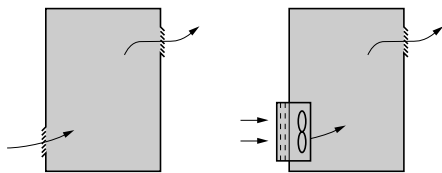


ATV 61WD37N4, WD45N4, ATV 61WD37N4C, WD45N4C



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 R_{th} (°C/W)

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

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

Power dissipated by drive: see page 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 (m²)

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

$$S = \frac{K}{R_{th}}$$

K = enclosure thermal resistance per m²

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.

Variable speed drives for asynchronous motors

Altivar 61

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 |

Variable speed drives for asynchronous motors

Altivar 61

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 |

Variable speed drives for asynchronous motors

Altivar 61

DF634487



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**

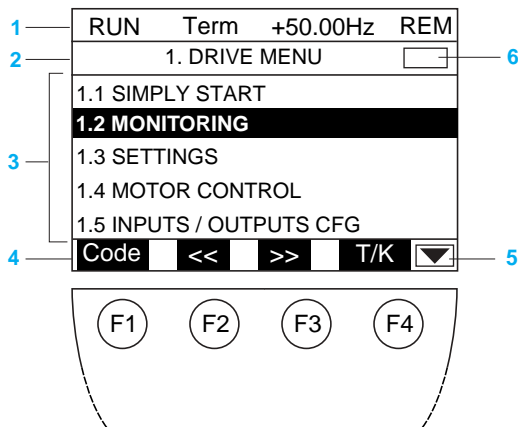
- 1 Graphic display unit:
 - 8 lines, 240 x 160 pixels
 - large digit display that can be read from 5 m away
 - bar chart display
- 2 Assignable functions keys F1, F2, F3, F4:
 - dialogue functions: direct access, help screens, navigation
 - application functions: Local/Remote, preset speed.
- 3 STOP/RESET 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**

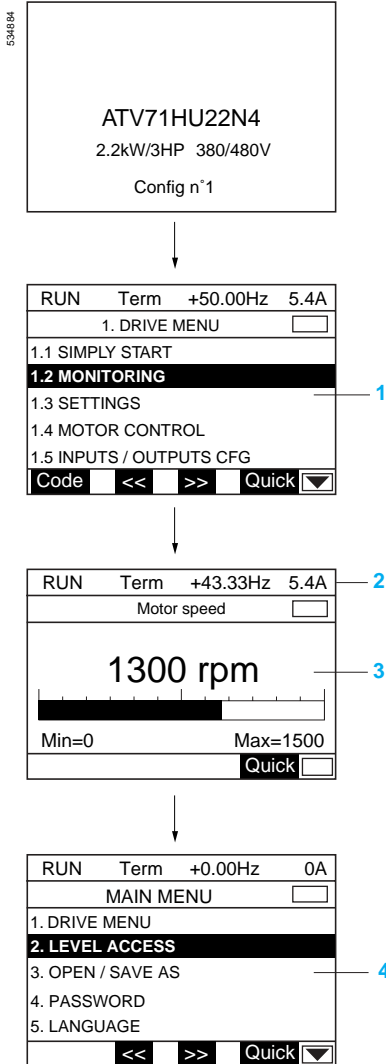
- 1 Display line. Its content can be configured; the factory settings show:
 - the drive status (example: RUN)
 - the active control channel (example: "Term": Terminals),
 - the frequency reference
 - Type of control (example: "LOC/REM").
- 2 Menu line. Indicates the current menu or submenu.
- 3 Area 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.

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Variable speed drives for asynchronous motors

Altivar 61



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.

Variable speed drives for asynchronous motors

Altivar 61

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.

■ 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

DF504783

| | | | |
|---|------|------------|--------------------------------|
| RUN | Term | +50.00Hz | 5.4A |
| 1.1 SIMPLY START <input type="checkbox"/> | | | |
| 2/3 wire control : | | 2 wire | |
| Macro-configuration : | | Pumps.Fans | |
| Standard mot. Freq. : | | 50Hz IEC | |
| Rated motor power : | | 2.2kW | |
| Rated motor volt. : | | 400V | |
| Code | << | >> | Quick <input type="checkbox"/> |

Simply Start menu

Variable speed drives for asynchronous motors

Altivar 61

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 |
| | LI2 | Fault reset | Reverse | Fault reset | Fault reset |
| | LI3 | Not assigned | JOG | PID integral reset | Ref. 2 switching |
| | LI4 | Not assigned | Fault reset | PID 2 preset ref. | Fault reset |
| | LI5 | Not assigned | Torque limit | PID 4 preset ref. | Not assigned |
| | LI6 | Not assigned | Not assigned | Not assigned | Not assigned |
| 3-wire | LI1 | Stop | Stop | Stop | Stop |
| | LI2 | Forward | Forward | Forward | Forward |
| | LI3 | Reverse | Reverse | Reverse | Reverse |
| | LI4 | Not assigned | JOG | PID integral reset | Ref. 2 switching |
| | LI5 | Not assigned | Fault reset | PID 2 preset ref. | Forced local |
| | LI6 | Not assigned | Torque limit | PID 4 preset ref. | 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 |
| 3-wire | LI7 | Not assigned | Not assigned | Not assigned | Not assigned |
| LI8 to LI14 | | Not assigned | Not assigned | Not assigned | Not assigned |
| LO1 to LO4 | | Not assigned | Not assigned | Not assigned | Not assigned |
| R3/R4 | | Not assigned | Not assigned | Not assigned | Not assigned |
| AI3, AI4 | | Not assigned | Not assigned | Not assigned | Not assigned |
| RP | | Not assigned | Not assigned | Not assigned | Not assigned |
| AO2 | | Motor current | Motor current | Motor current | Motor current |
| AO3 | | Not assigned | Not assigned | PID error | Not assigned |
| Graphic display terminal keys | | | | | |
| F1 key | | Not assigned | Not assigned | Not assigned | Control via graphic display terminal |
| F2, F3, F4 keys | | Not assigned | Not assigned | Not assigned | T/K (control via graphic display terminal) |

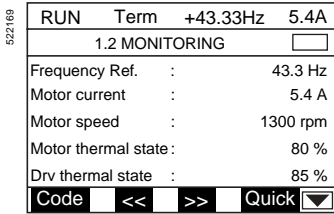
Variable speed drives for asynchronous motors

Altivar 61

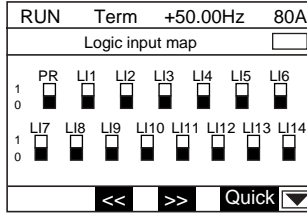
Start-up (continued)

■ MONITORING menu

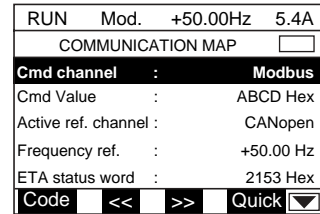
The MONITORING menu can be used to display commands, the operation of the motor and application through the drive of its I/O or of the communication network connections.



Displaying physical values



Logic input map



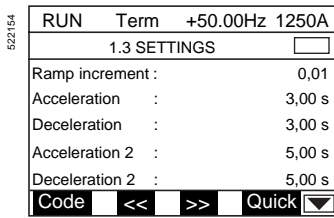
Communication map

One of the uses of this menu is to display the alarm groups, thermal states and electrical values such as:

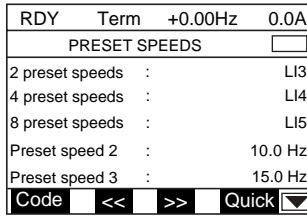
- electrical power consumed by the drive
- the drive's cumulative electrical power, etc.

Configuration and settings

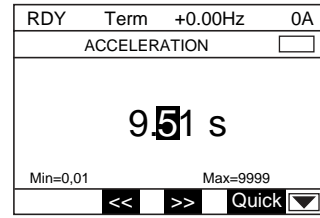
The SETTINGS menu can be used to configure all the drive's settings. Activating a function automatically provides access to the related settings on the same screen (the application functions are described on pages 158 to 175).



Settings screen



Setting a function

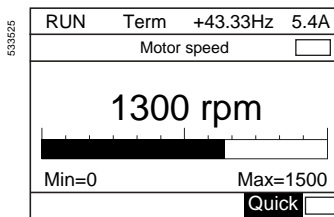


Configuring a value

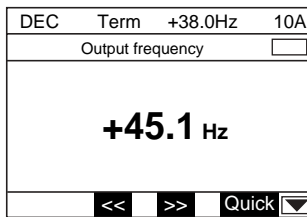
Operation

The display screen appears automatically every time the drive is turned on. There are different possible scenarios:

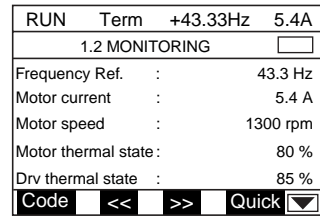
- One or two bar charts are displayed.
- One, two or five digital values are displayed.



1 bar chart



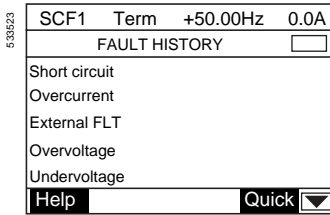
1 digital value



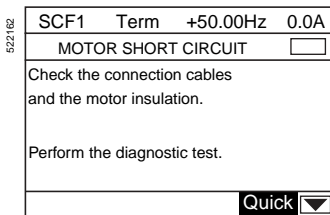
5 digital values

Variable speed drives for asynchronous motors

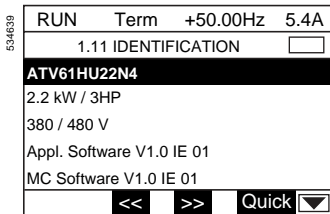
Altivar 61



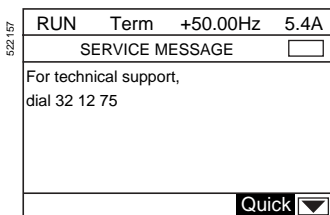
Fault history



Troubleshooting screen



Identification screen



Example of a customized message

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.

■ 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.

■ 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.

■ 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.

Variable speed drives for asynchronous motors

Altivar 61

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

Variable speed drives for asynchronous motors

Altivar 61

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.

Variable speed drives for asynchronous motors

Altivar 61

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.

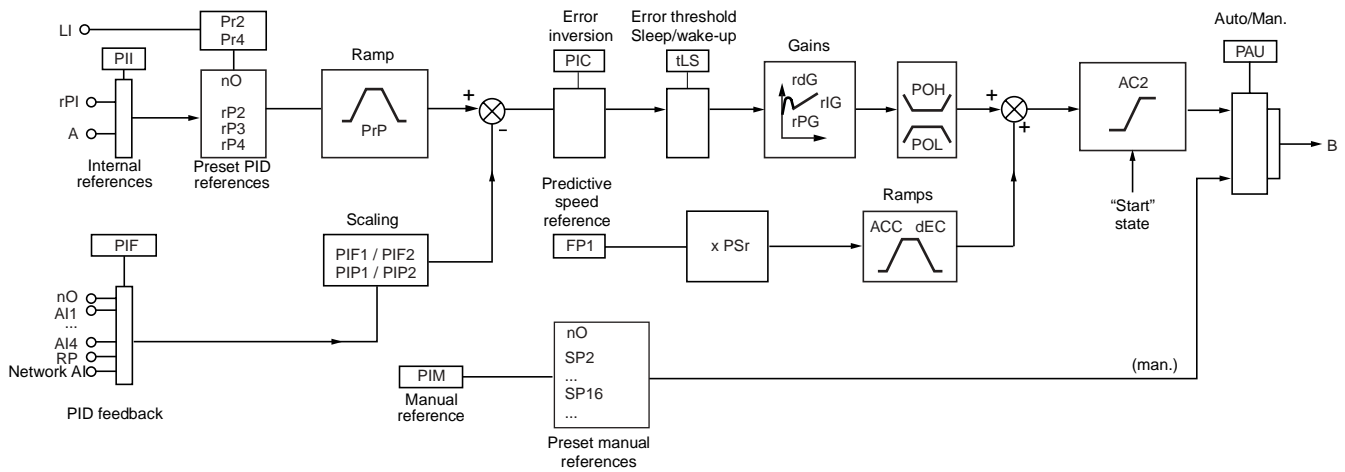
□ **Quadratic ratio (Kn²)**

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.



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.

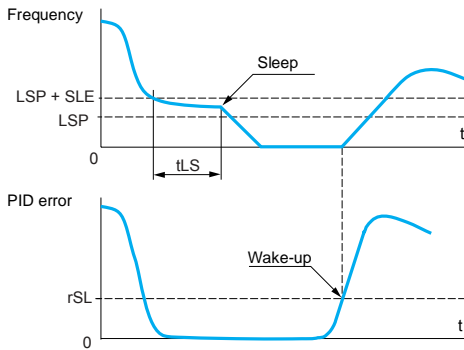
The "PII" parameter is used to choose between these two references.

□ **Preset PID references**

2 or 4 PID references are available. Table showing combinations of selected PID references:

| Llx (Pr4) | Lly (Pr2) | Reference |
|-----------|-----------|-----------|
| 0 | 0 | rPI or A |
| 0 | 1 | rP2 |
| 1 | 0 | rP3 |
| 1 | 1 | rP4 |

Variable speed drives for asynchronous motors Altivar 61



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.

Variable speed drives for asynchronous motors

Altivar 61

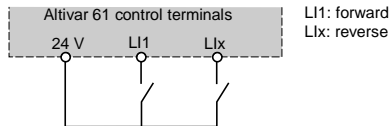
Other application functions

■ 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



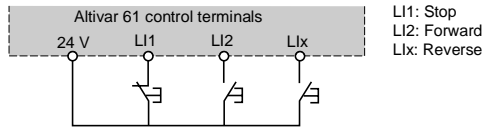
Wiring diagram for 2-wire control

■ 3-wire control

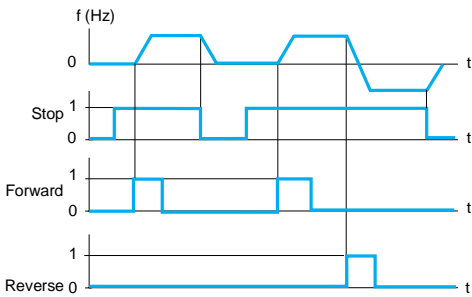
This can be used to control the operating and stopping direction by means of pulsed contacts.

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.



Wiring diagram for 3-wire control



Example of 3-wire control operation

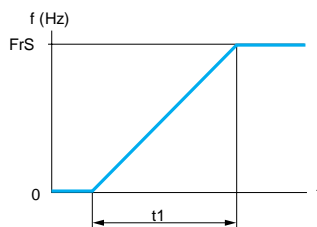
■ Phase rotation

This function can be used to reverse the direction of rotation without modifying the drive wiring.

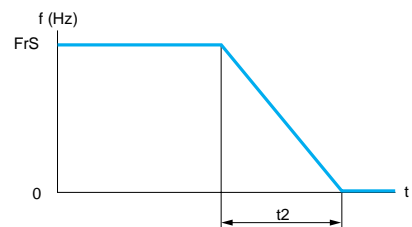
■ Ramps

□ Acceleration and deceleration ramp times

This can be used to define acceleration and deceleration ramp times according to the application and the machine dynamics.



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.

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| | | | |
|--------------------|------|---------|------|
| 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 | |
| Code | | Quick | |

Ramp settings

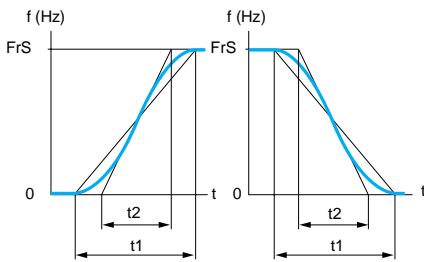
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Acceleration and deceleration ramp profile

This can be used to gradually increase the output frequency starting from a speed reference, following a linear profile or a preset profile.

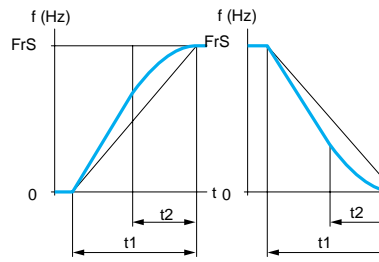
In the case of applications involving handling, packaging and passenger transport, the use of S ramps takes up mechanical play and eliminates jolts and also limits “non-following” of speed during rapid transient operation of high-inertia machines. Selecting “linear”, “S”, “U” or customized profiles assigns both the acceleration and deceleration ramps.

S ramps



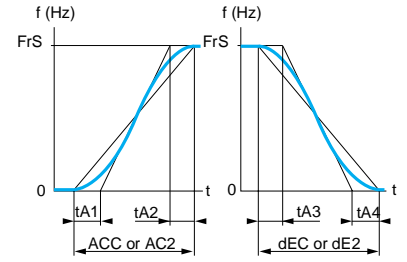
FrS: Nominal motor frequency
t1: Ramp time set
t2 = 0.6 x t1
The curve coefficient is fixed.

U ramps

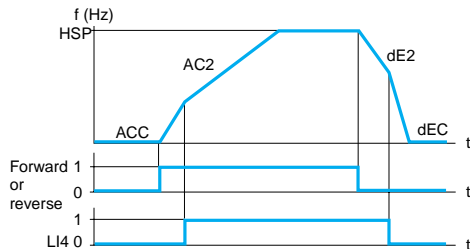


FrS: Nominal motor frequency
t1: Ramp time set
t2 = 0.5 x t1
The curve coefficient is fixed.

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.

Variable speed drives for asynchronous motors Altivar 61

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| | | | |
|-------------------|------|---------|----------------------------|
| RDY | Term | +0.00Hz | 0.0A |
| PRESET SPEEDS | | | <input type="text"/> |
| 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 <input type="text"/> |

Preset speed settings

■ Preset speeds

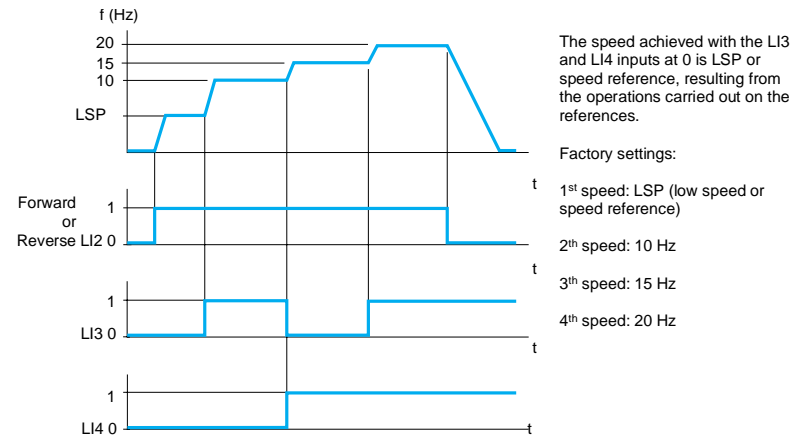
This can be used to switch preset speed references.

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.



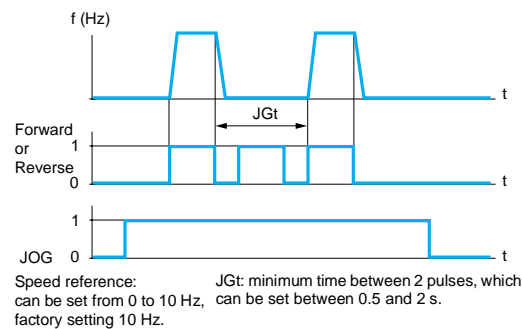
Example of operation with 4 preset speeds and 2 logic inputs

■ 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).



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.

Variable speed drives for asynchronous motors

Altivar 61

■ 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, rewind 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

Variable speed drives for asynchronous motors

Altivar 61

■ 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

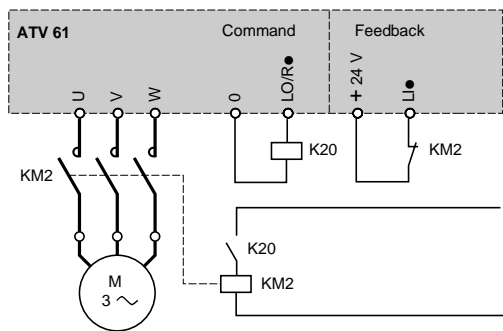
This allows the drive to control a contactor located between the drive and the motor. The request to close the contactor is made when a run command appears. The request to open the contactor is made when there is no current in the motor.

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%.



Output contactor command

Variable speed drives for asynchronous motors

Altivar 61

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| | | | |
|------------------|------|--|----------------------|
| RDY | Term | +0.00Hz | 0.0A |
| +/- SPEED | | | <input type="text"/> |
| + speed assign.: | | LI3 | |
| - speed assign.: | | LI4 | |
| Ref. saved : | | RAM | |
| Code | | Quick <input type="button" value="v"/> | |

+/- 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

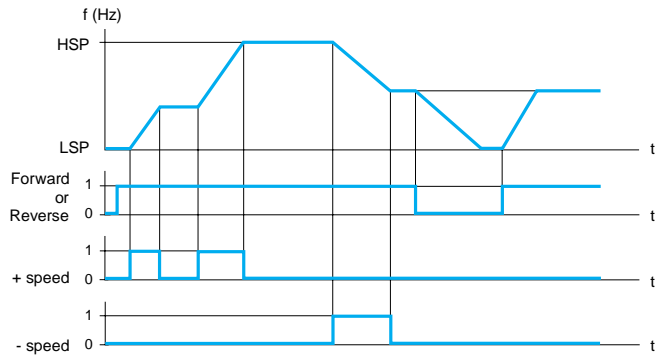
This can be used to increase or decrease a speed reference by means of 1 or 2 logic inputs, with or without the last reference being saved (motorized potentiometer function).

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).

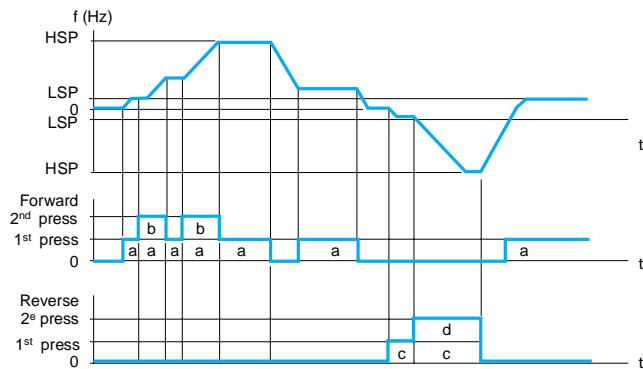
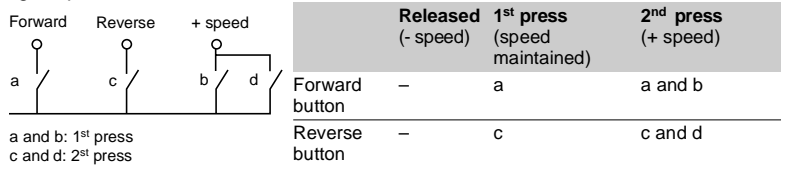


LSP: low speed, HSP: high speed

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:



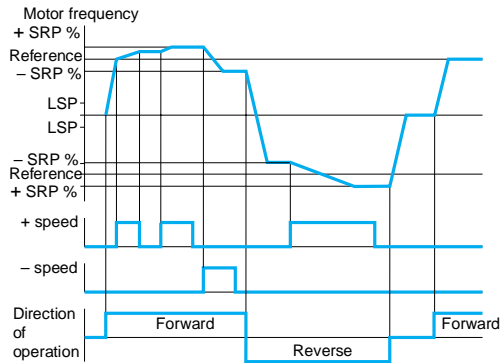
LSP: low speed, HSP: high speed

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.).

Variable speed drives for asynchronous motors

Altivar 61

■ 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

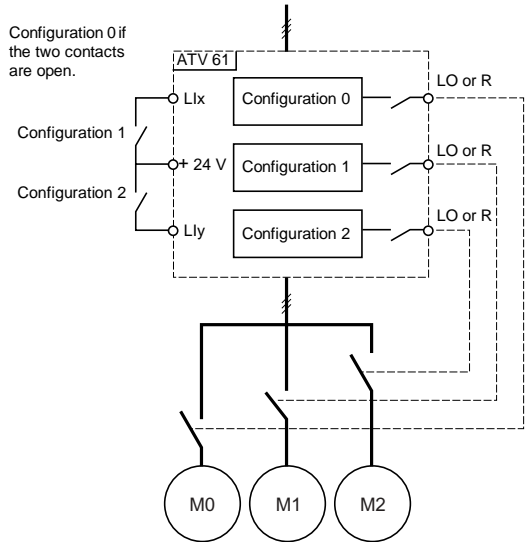
When several drives are connected on a common DC bus, this function can be used to adjust the braking thresholds in order to balance the braking powers among the various drives or braking units.

■ Braking resistor thermal protection

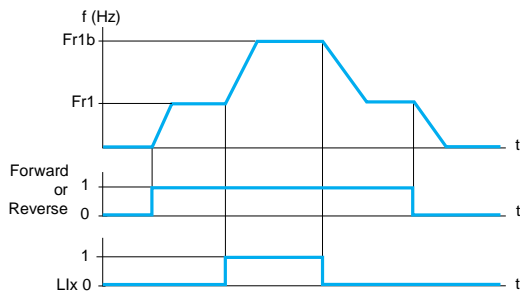
The Altivar 61 drive incorporates thermal protection for braking resistors if it is not equipped with a thermal switch. If the resistor thermal state is too high an alarm can be assigned to the logic output or the drive may lock in fault mode, depending on how the function is programmed.

Variable speed drives for asynchronous motors

Altivar 61



Schematic diagram for multi-motor mode



Example of reference switching

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.

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.

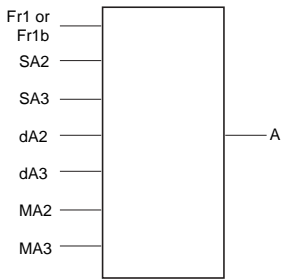
References can be switched with the motor running.

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

Variable speed drives for asynchronous motors

Altivar 61



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:

$$\square \text{ reference of drive A} = (\text{Fr1 or Fr1b} + \text{SA2} + \text{SA3} - \text{dA2} - \text{dA3}) \times \text{MA2} \times \text{MA3}$$

□ 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.

Variable speed drives for asynchronous motors

Altivar 61

■ Torque limit

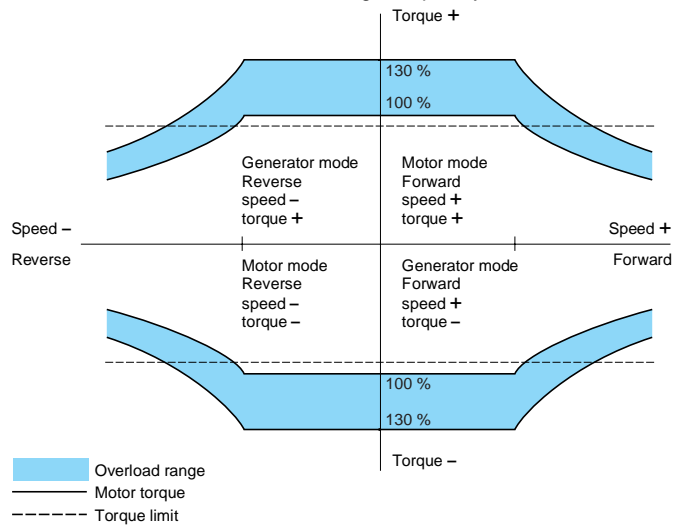
This can be used to limit the torque in the motor and generator quadrants using separate settings.

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.



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.

■ 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:

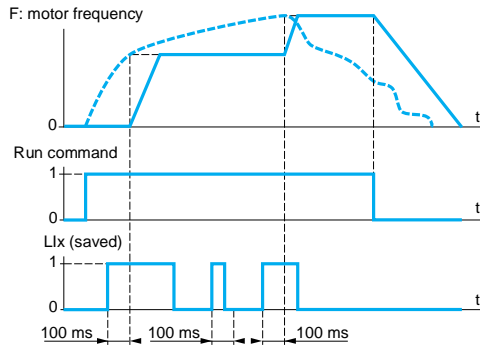
- a logic input
- a command word bit

| | | | |
|--------------------|----------------------|---------|----------------------------------|
| RDY | Term | +0.00Hz | 0.0A |
| 2nd CURRENT LIMIT. | | | <input type="text"/> |
| I Limit. 2 activ. | : | | LI6 |
| I Limit. 2 value | : | | 6.4 A |
| Current limitation | : | | 7.9 A |
| Code | <input type="text"/> | Quick | <input type="button" value="v"/> |

Configuring current switching

Variable speed drives for asynchronous motors

Altivar 61



----- Analog reference
 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.

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| | | | |
|---|--|---------|------|
| RDY | Term | +0.00Hz | 0.0A |
| STOP CONFIGURATION <input type="checkbox"/> | | | |
| Type of stop : | Ramp stop | | |
| Freewheel assign. : | NO | | |
| Fast stop assign. : | LI4 | | |
| Ramp divider : | 0 | | |
| DC inject. assign. : | NO | | |
| Code | Quick <input type="button" value="v"/> | | |

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.

Variable speed drives for asynchronous motors

Altivar 61

■ Motor thermal protection

Motor thermal protection is provided by the drive:

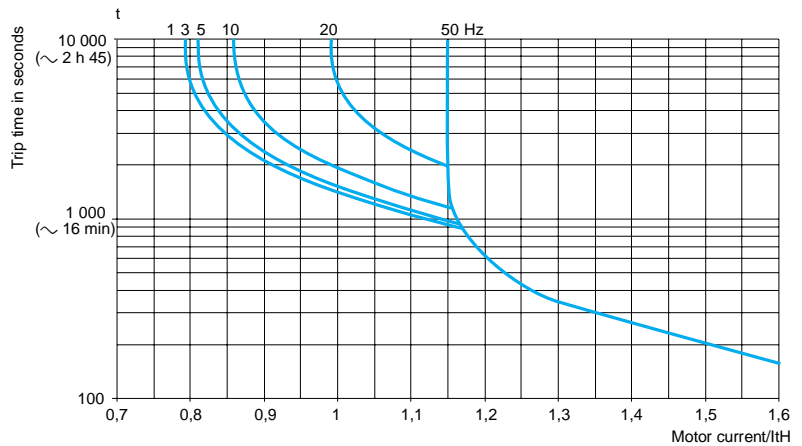
- directly, through PTC probes located in the motor windings
- indirectly, via the integrated thermal relay. Indirect thermal protection is implemented via continuous calculation of its theoretical temperature rise.

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 the alarm is present.

■ Machine protection

Makes it possible to detect under and/or overload.

Variable speed drives for asynchronous motors Altivar 61

5/21/08

| | | | |
|--------------|------|---------|---------|
| 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 \uparrow of the logic input.

Note: Use of this function invalidates the guarantee.

Variable speed drives for asynchronous motors

Altivar 61

■ 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 communication 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.

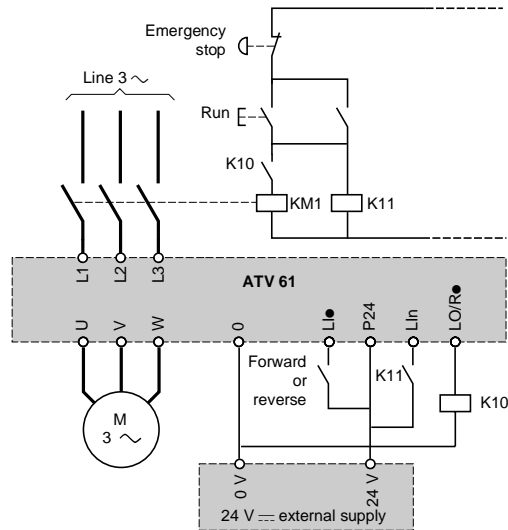
Variable speed drives for asynchronous motors

Altivar 61

■ 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 DC 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

Variable speed drives for asynchronous motors

Altivar 61

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

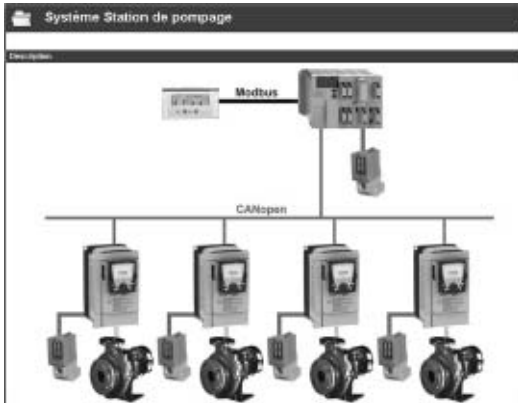
N/A

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) | |

534513



PowerSuite screen on PC
Installed base management

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:

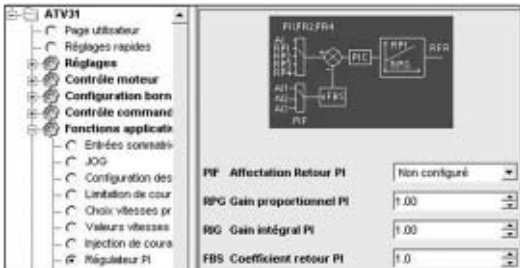
- An Altivar 28 drive configuration to an Altivar 31 drive configuration
- An Altivar 38 drive configuration to an Altivar 61 drive configuration
- An Altivar 58 or Altivar 58F drive configuration to an Altivar 71 drive configuration.

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.

533181



PowerSuite screen on PC
View of PI regulator function parameters

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:

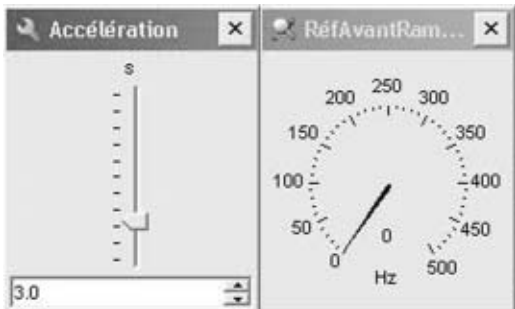
- Present the device parameters arranged by function in the form of illustrated views of diagrams or simple tables
- Customize the parameter names
- Create:
 - A user menu (choice of particular parameters)
 - Monitoring control panels with graphic elements (cursors, gauges)
- Perform sort operations 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.

533182



PowerSuite screen on PC
Monitoring control panel (cursor, gauge)

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

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 61 and 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).

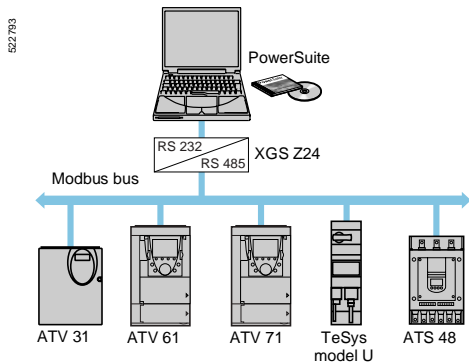
If the PC does not have Bluetooth® technology, use the VW3 A8 115 USB-Bluetooth® adapter.

Remote maintenance

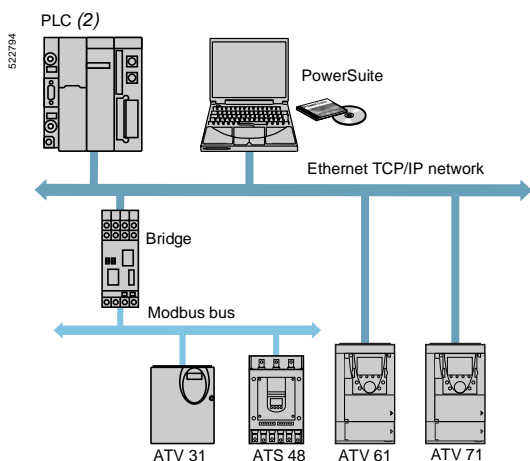
Using a simple Ethernet connection, the PowerSuite software workshop can be used for remote monitoring and diagnostics. When devices are not connected to the Ethernet network, or it is not directly accessible, various remote transmission solutions may be possible (modem, teleprocessing gateway, etc.). Please consult your Regional Sales Office.

(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.

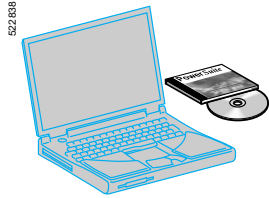


Modbus multidrop connection

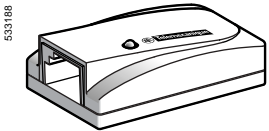


Ethernet connection

PowerSuite software workshop



VW3 A8 104



VW3 A8 114

| Description | Composition | Reference | Weight kg |
|--|--|-------------------|-----------|
| PowerSuite CD-ROM | <ul style="list-style-type: none"> ■ 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) | <ul style="list-style-type: none"> ■ 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 | <ul style="list-style-type: none"> ■ 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) | <ul style="list-style-type: none"> ■ 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 | Network management | FDR (Faulty Device Replacement) | | Web server | | Mess-aging | I/O Scanning | MIB Transparent Ready |
| Applica-tions | SNMP | DHCP | TFTP | FTP | HTTP | Modbus | | |
| Transport | UDP | | | TCP | | | | |
| Link | IP | | | | | | | |
| Physical | Ethernet 2 | | | | | | | |

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).

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.

Starters, drives and communication

Ethernet TCP/IP network

Transparent Ready concept

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

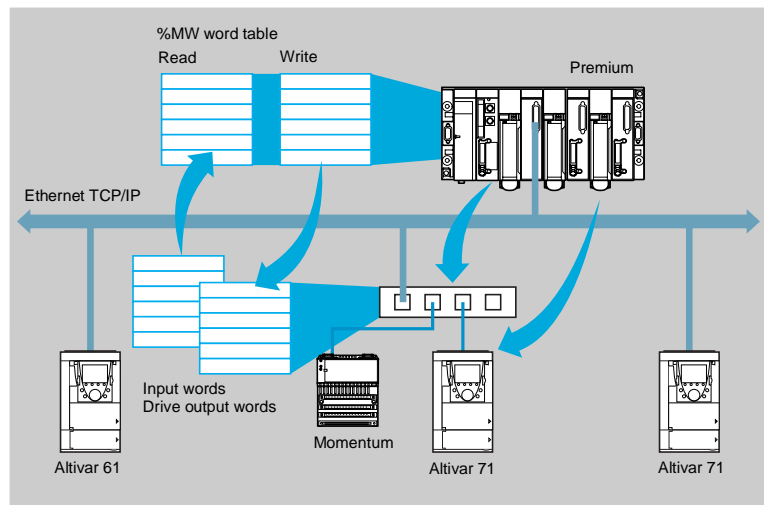
The Modbus application layer is very simple and universally familiar. Thousands of manufacturers are already implementing this protocol. Many have already developed a Modbus TCP/IP connection and numerous products are currently available. The simplicity of Modbus TCP/IP enables any small field device, 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.

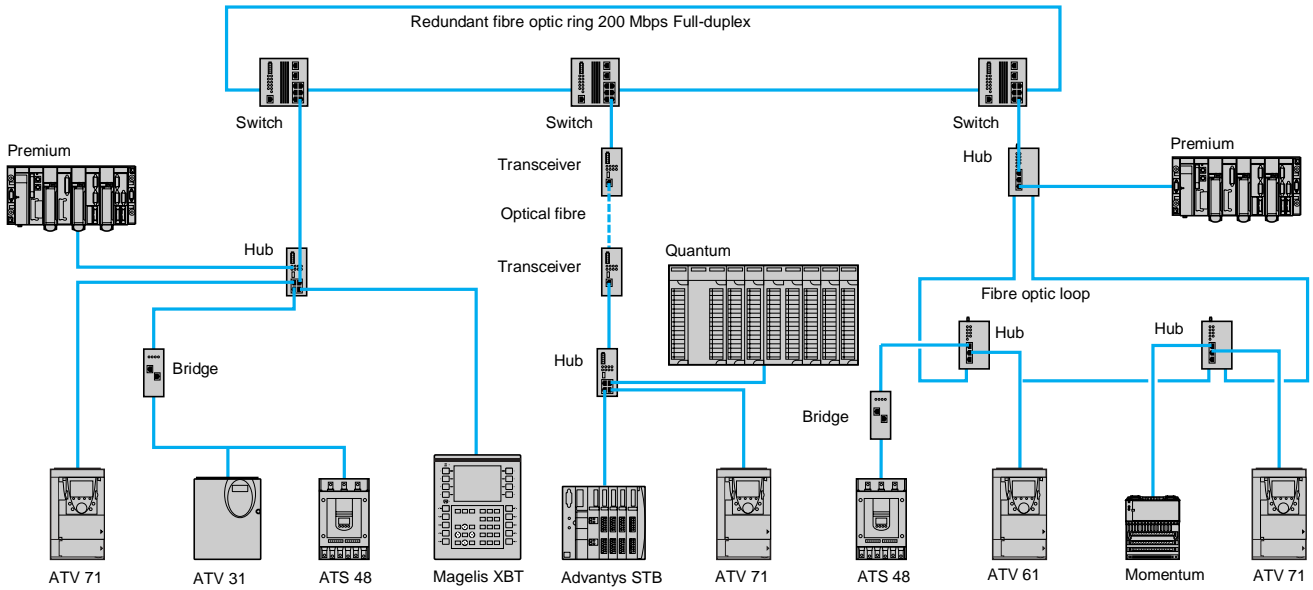


Altivar Viewer

Starters, drives and communication

Ethernet TCP/IP network
Transparent Ready concept

Connections



Ethernet network connection elements

5.22077



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 m | Reference (2) | Weight kg |
|---|---|--|----------|-----------------------|-----------|
| | From | To | | | |
| Straight shielded twisted pair cables 2 RJ45 connectors | ATV 61 or ATV 71 | 499 N●H 1●● 10 hubs, | 2 | 490 NTW 000 02 | - |
| | (+VW3 A3 310 communication card), | 499 N●S 171 00 switches | 5 | 490 NTW 000 05 | - |
| | Ethernet/ Modbus bridge | | 12 | 490 NTW 000 12 | - |
| | 174 CEV 300 20 | | 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 | - |

(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**.

Starters, drives and communication

Ethernet TCP/IP network
Transparent Ready concept

571200-1



499 NEH 141 00

571385-1



499 NES 251 00

571829-1



499 NMS 251 02

Ethernet network connection elements (continued)

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 |

Switches

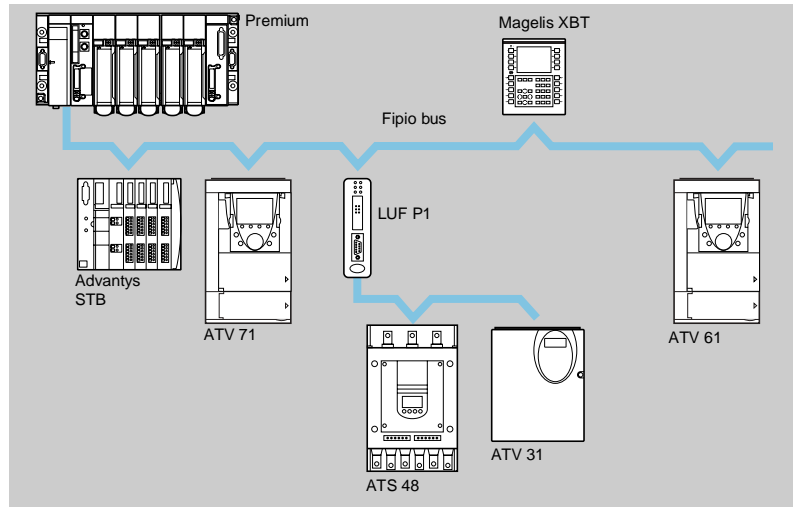
| Description | Number of ports | | Configurable | Reference | Weight kg |
|---|-----------------|------------------|--------------|----------------|--------------|
| | Copper cable | Optical fibre | | | |
| Optimized switch, twisted pair 10BASE-T/100BASE-TX copper ports, for copper cable, shielded RJ45 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 |

(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 iPC 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.

(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.

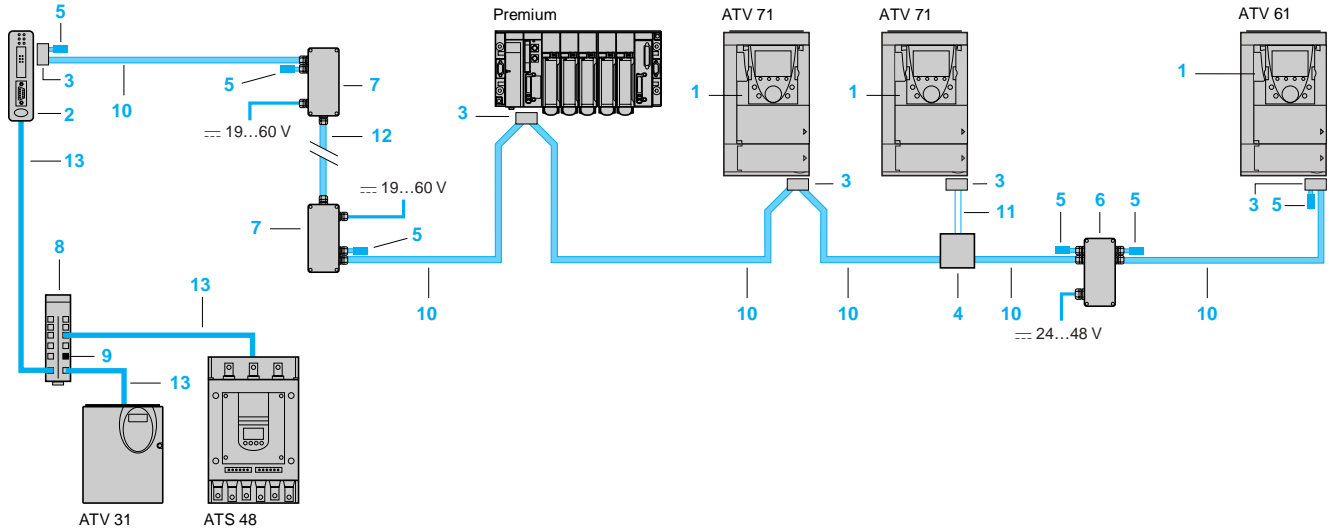
Starters, drives and communication

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.

Fipio wiring system



Elements for connecting the Fipio bus and a Premium PLC (1)

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: <ul style="list-style-type: none"> 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 \approx power supply, 100 mA minimum, to be ordered separately (2). | ATS 48 ATV 31 | 2 | LUF P1 | 0.240 |



LUF P1

(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.

Starters, drives and communication

Communication via Fipio bus

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 $\bar{=}$, 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 $\bar{=}$, 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 m | Reference | Weight kg |
|--|---------------------------------|-------------------------------|-----------|-------------|-----------------------|--------------|
| | From | To | | | | |
| Trunk cables 8 mm, 1 shielded twisted pair 150 Ω . In standard atmosphere (4) and inside buildings | TSX FP ACC12 connector, | TSX FP ACC12 connector, | 10 | 100 | TSX FP CA100 | 5.680 |
| | TSX FP ACC14 junction box, | TSX FP ACC14 junction box, | | 200 | TSX FP CA200 | 10.920 |
| | TSX FP ACC6, ACC8M repeaters | TSX FP ACC6 repeater | | 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 ACC12 connector, | 10 | 100 | TSX FP CR100 | 7.680 |
| | TSX FP ACC14 junction box, | TSX FP ACC14 junction box, | | 200 | TSX FP CR200 | 14.920 |
| | TSX FP ACC6, ACC8M repeaters | TSX FP ACC6 repeater | | 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, | LU9 GC3 | 13 | 0.3 | VW3 A8 306 R03 | 0.025 |
| | ATS 48, | Modbus splitter | | 1 | VW3 A8 306 R10 | 0.060 |
| | ATV 31 | block | | 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.

(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

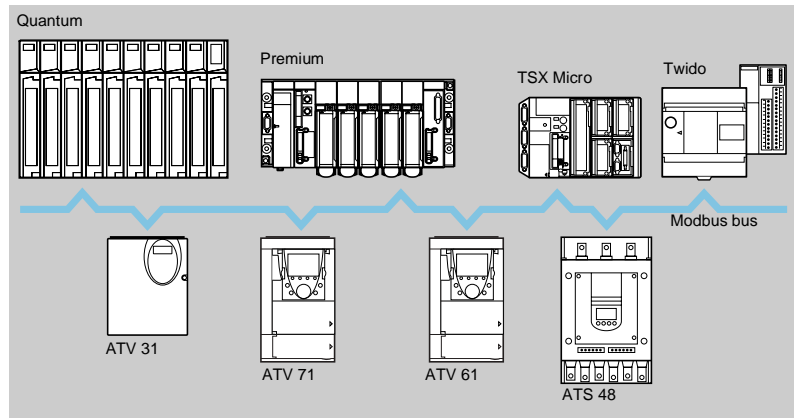
(5) Harsh environment:

- 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



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 | | RJ45 | RJ45 | RJ45 | RJ45 | 9-way female SUB-D |
| Connector | | | | | | |
| 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 pull-down resistors | No pull-down | No pull-down | No pull-down | Configurable. No pull-down or 4.7 kΩ pull-down 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.

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 | |

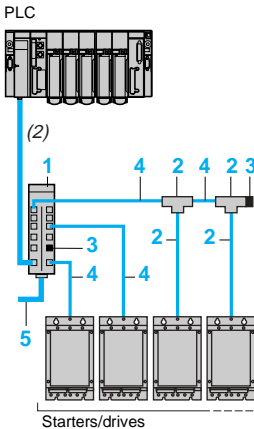
| | | | | |
|--|-------------------------------|---|-----------------|-------|
| Modbus T-junction boxes | With integrated cable (0.3 m) | 2 | VW3 A8 306 TF03 | – |
| | With integrated cable (1 m) | 2 | VW3 A8 306 TF10 | – |
| Line terminators for RJ45 connector (3) | R = 120 Ω, C = 1 nF | 3 | VW3 A8 306 RC | 0.200 |
| | R = 150 Ω | 3 | VW3 A8 306 R | 0.010 |

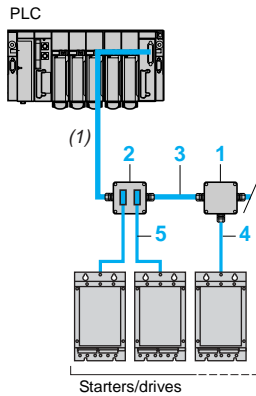
| Cables | | | | | | | |
|--|--|---|------|-------------|-----------------|--------------|--|
| Description | Use | | Code | Length m | Reference | Weight kg | |
| | From | To | | | | | |
| Cables for Modbus bus 2 RJ45 connectors | ATS 48, ATV 31, ATV 61, ATV 71 (terminal or Modbus network ports) | LU9 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 | |

(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.





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 m | Reference | Weight kg | | |
|---|---|------------------------------|------|----------|----------------|-----------|-------------|--------|
| | From | To | | | | | | |
| Double shielded twisted pair cables | TSX SCA 50 tap junction, | TSX SCA 50 tap junction, | 3 | 100 | TSX CSA 100 | 5.680 | | |
| | TSX SCA 62 subscriber socket | TSX SCA 62 subscriber socket | | 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 | | |

(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.

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 m | Reference | Weight kg |
|---|--|---|----------|----------------|-----------|
| | From | To | | | |
| 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 |

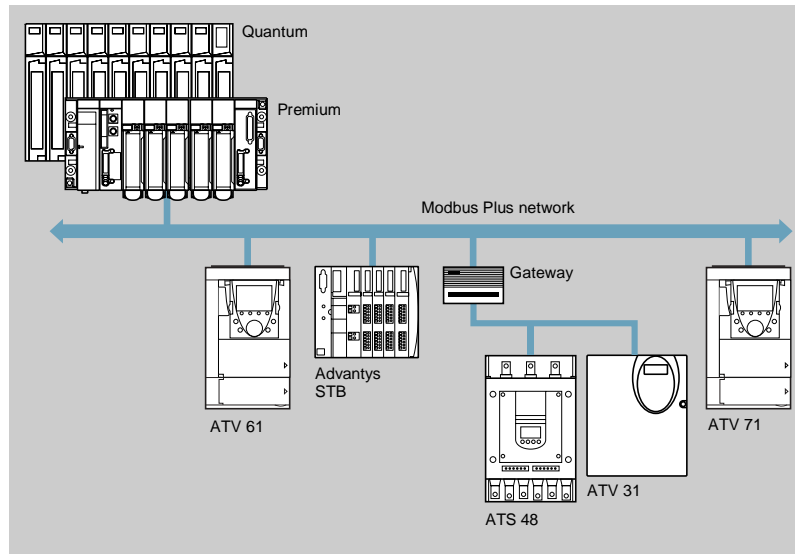
Documentation

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.

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

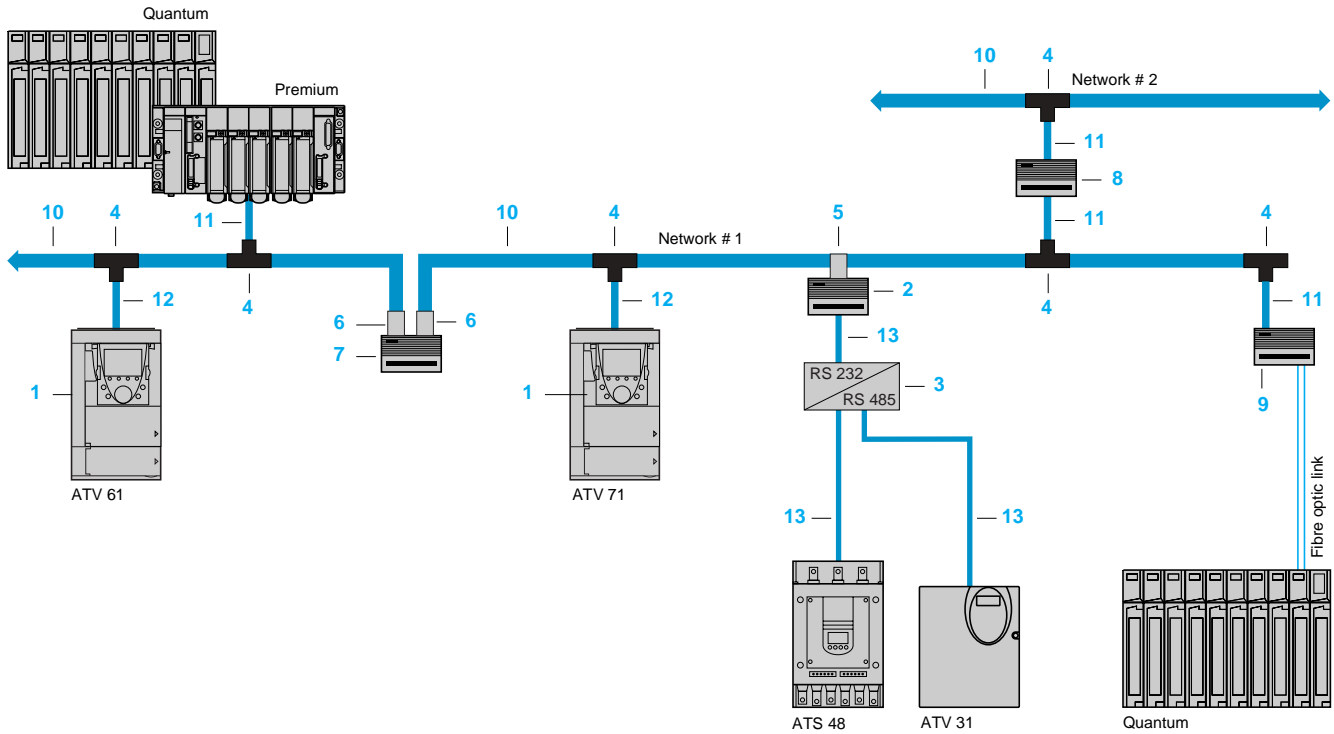
Other parameters, which are used less frequently, can be accessed by the Modbus messaging service.

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 |

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.

Starters, drives and communication

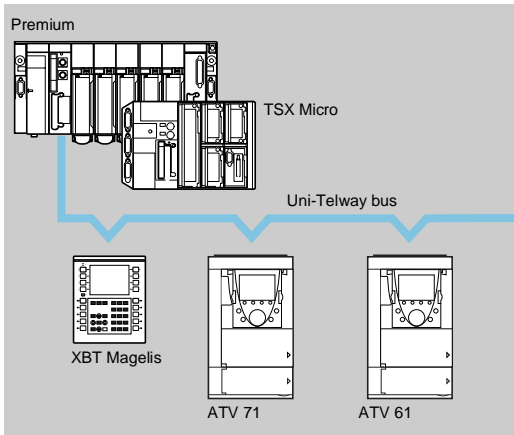
Communication via Modbus Plus network

Modbus Plus bus connection elements (continued) (1)

| Cables | | | | | | | | |
|---|---|--|------|-------------|----------------|--------------|----------------|---------|
| Description | Used | | Code | Length m | Reference | Weight kg | | |
| | From | To | | | | | | |
| Trunk cables for Modbus Plus | 990 NAD 230 00 | 990 NAD 230 00 | 10 | 30.5 | 490 NAA 271 01 | 1.833 | | |
| | Modbus Plus tap | Modbus Plus tap, | | 152.5 | | | 490 NAA 271 02 | 10.135 |
| | | AS MBKT 085 | | 305 | | | 490 NAA 271 03 | 18.940 |
| | | Modbus Plus in-line connector, | | 457 | | | 490 NAA 271 04 | 30.000 |
| | | Modbus Plus connector with terminators AS MBKT 185 | | 1525 | | | 490 NAA 271 06 | 112.950 |
| Drop cables One 9-way male SUB-D connector and one stripped end | Premium, Quantum PLCs, | 990 NAD 230 00 | 11 | 2.4 | 990 NAD 211 10 | 0.169 | | |
| | NW BP85 002 | Modbus Plus tap | | 6 | | | 990 NAD 211 30 | 0.459 |
| | Modbus Plus bridge with 4 ports, 490 NRP 253 00 line/station fibre optic repeater | | | | | | | |
| | ATV 61, ATV 71 | 990 NAD 230 00 | 12 | 2.4 | 990 NAD 219 10 | 0.142 | | |
| | (+ VW3 A3 302 communication card) | Modbus Plus tap | | 6 | | | 990 NAD 219 30 | 0.465 |
| Cable for Modbus 1 RJ45 connector and one stripped end | ATS 48, ATV 31, NW BM85000 | RS 232/RS 485 interface | 13 | 3 | VW3 A8 306 D30 | 0.115 | | |

(1) To order other connection elements, please consult our specialist "Automation platform Modicon Premium and Unity - PL7 software" and "Automation platform Modicon Quantum" catalogues.

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.

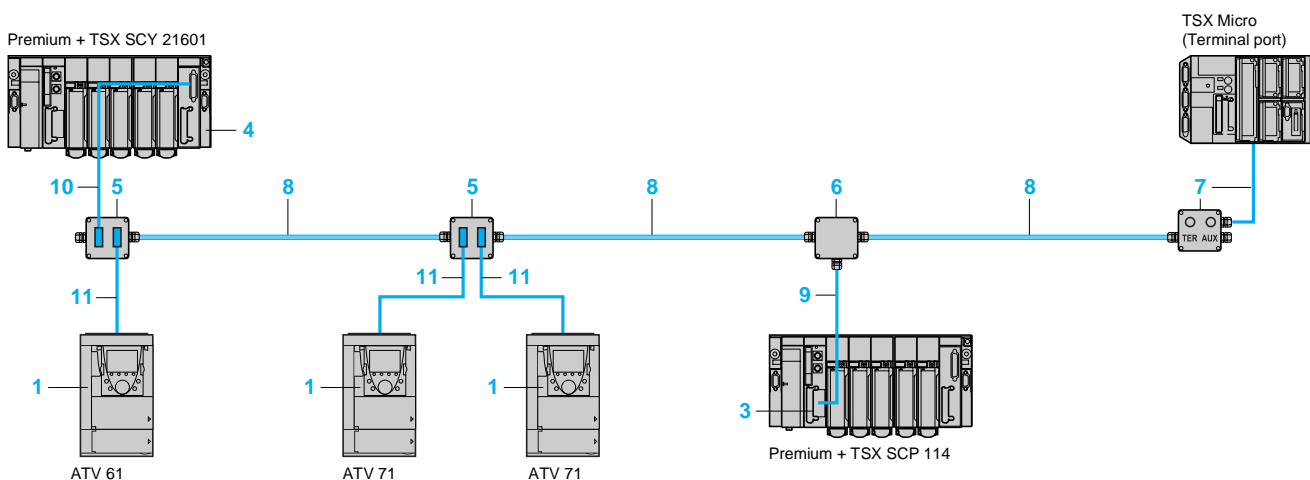
An industrial HMI terminal (Magelis type) can be connected directly to the bus and can be used to adjust drives without developing applications specific to the PLC.

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



(1) Limited to 128 bytes with the Premium and TSX Micro PLC terminal port.

Starters, drives and communication

Communication via Uni-Telway bus

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 |

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 | 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 m | Reference | Weight kg |
|---|--|--|------|----------|-----------------|-----------|
| | From | To | | | | |
| 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, | 8 | 100 | TSX CSA 100 | 5.680 |
| | | TSX SCA 50 junction box, | | 200 | TSX CSA 200 | 10.920 |
| | | TSX P ACC 01 terminal port connection box | | 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 | 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 |

(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.



TSX SCA 62



TSX SCA 50



TSX P ACC 01

Starters, drives and communication

Communication gateways LUF P

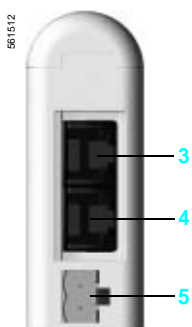
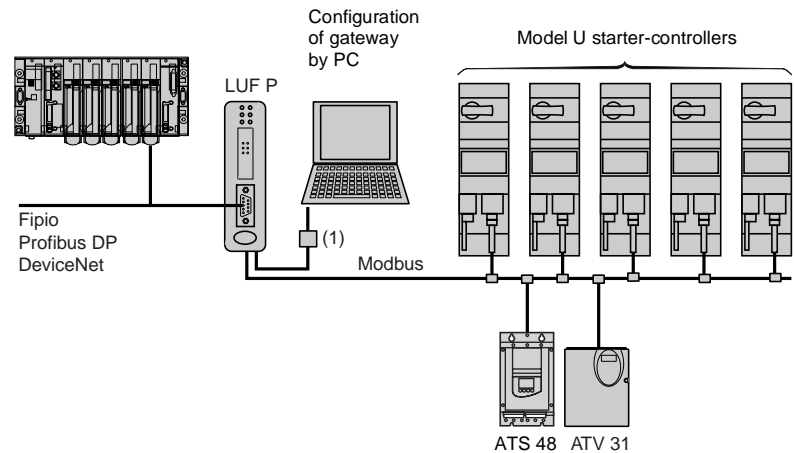
Presentation

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

| 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

| 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 | – |

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TSX FP ACC 12

82713



490 NAD 911 03

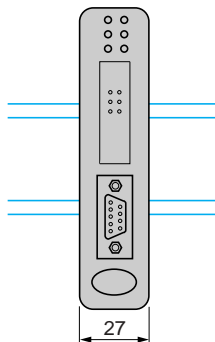
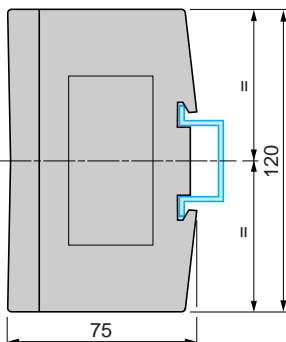
Documentation

| 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



Starters, drives and communication

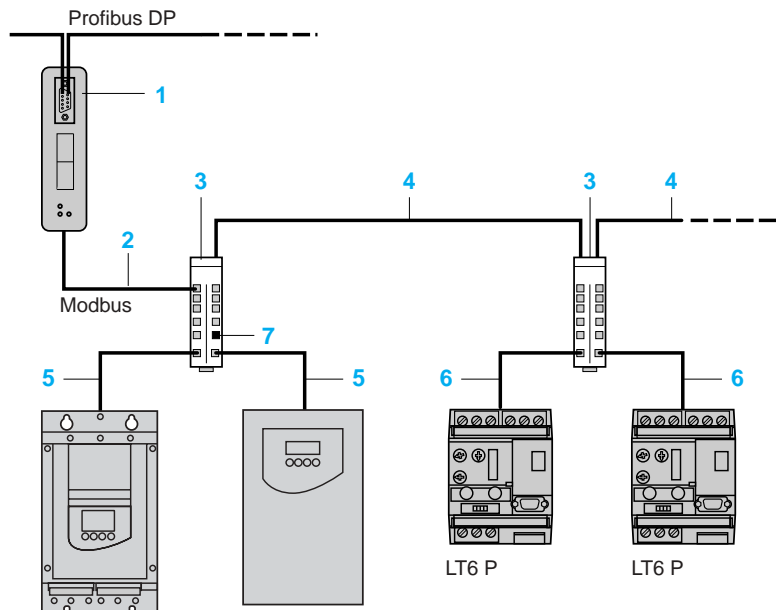
Communication gateway LA9 P307

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 to 15 Slaves on the Modbus 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

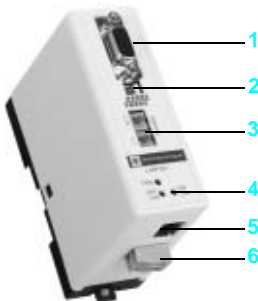
Gateway LA9 P307 comprises:

- 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 \pm 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.

562208



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, $\pm 24\text{ V} \pm 20\%$ |
| Consumption | | mA | 150 on $\pm 24\text{ V}$ |
| Indication/diagnostics | | | By LED |
| Services | Command | | 16 words |
| | Monitoring | | 16 words |
| | Configuration and adjustment | | By gateway mini messaging facility (PKW) |

References



LA9 P307

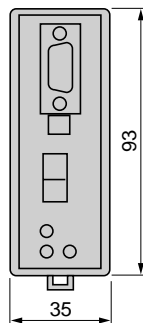
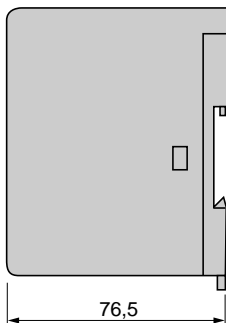


490 NAD 911 03

| 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 | 3 | VW3 A8 306 D30 | 0.150 |
| | SUB-D connector (to be ordered separately) - LT6 P (SUB-D 9 female) | | | |
| 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



Product reference index

| | | | | | | | | | |
|----------------|---------|----------------|---------|-----------------|---------|------------|----|-----------------|---------|
| 043 509 383 | 198 | ATV 61HU30N4 | 19 | TSX CAN CD 50 | 43 | VW3 A3 503 | 35 | VW3 A4 649 | 72 |
| 174 CEV 300 20 | 186 | ATV 61HU40M3 | 18 | | and 53 | VW3 A4 401 | 76 | VW3 A4 650 | 72 |
| 490 NAA 271 01 | 199 | ATV 61HU40N4 | 19 | TSX CAN KCDF | 43 | VW3 A4 402 | 76 | VW3 A4 651 | 72 |
| 490 NAA 271 02 | 199 | ATV 61HU55M3 | 18 | TSX CSA 100 | 193, | VW3 A4 403 | 76 | VW3 A4 656 | 72 |
| 490 NAA 271 03 | 199 | ATV 61HU55N4 | 19 | | 194 | VW3 A4 404 | 76 | VW3 A4 657 | 72 |
| 490 NAA 271 04 | 199 | ATV 61HU75M3 | 18 | | and 201 | VW3 A4 405 | 76 | VW3 A4 661 | 73 |
| 490 NAA 271 06 | 199 | ATV 61HU75N4 | 19 | TSX CSA 200 | 193, | VW3 A4 406 | 76 | VW3 A4 662 | 73 |
| 490 NAD 911 03 | 203 | ATV 61W075N4 | 20 | | 194 | VW3 A4 407 | 76 | VW3 A4 663 | 73 |
| | and 205 | ATV 61W075N4C | 21 | | and 201 | VW3 A4 408 | 76 | VW3 A4 664 | 73 |
| 490 NAD 911 04 | 203 | ATV 61WD11N4 | 20 | TSX CSA 500 | 193, | VW3 A4 410 | 76 | VW3 A4 665 | 73 |
| | and 205 | ATV 61WD11N4C | 21 | | 194 | VW3 A4 411 | 76 | VW3 A4 666 | 73 |
| 490 NRP 254 00 | 198 | ATV 61WD15N4 | 20 | | and 201 | VW3 A4 412 | 76 | VW3 A4 667 | 73 |
| 490 NTW 000 02 | 186 | ATV 61WD15N4C | 21 | TSX FP ACC12 | 191 | VW3 A4 413 | 76 | VW3 A4 668 | 73 |
| 490 NTW 000 05 | 186 | ATV 61WD18N4 | 20 | | and 203 | VW3 A4 501 | 65 | VW3 A4 669 | 73 |
| 490 NTW 000 12 | 186 | ATV 61WD18N4C | 21 | TSX FP ACC14 | 191 | VW3 A4 502 | 65 | VW3 A4 670 | 73 |
| 490 NTW 000 40 | 186 | ATV 61WD22N4 | 20 | TSX FP ACC6 | 191 | VW3 A4 503 | 65 | VW3 A4 671 | 73 |
| 490 NTW 000 80 | 186 | ATV 61WD22N4C | 21 | TSX FP ACC7 | 191 | VW3 A4 504 | 65 | VW3 A4 676 | 73 |
| 499 NEH 104 10 | 187 | ATV 61NEH30N4 | 20 | TSX FP ACC8M | 191 | VW3 A4 505 | 65 | VW3 A4 677 | 73 |
| 499 NEH 141 00 | 187 | ATV 61WD30N4C | 21 | TSX FP ACC9 | 191 | VW3 A4 506 | 65 | VW3 A5 101 | 80 |
| 499 NES 181 00 | 187 | ATV 61WD37N4 | 20 | TSX FP CA100 | 191 | VW3 A4 507 | 65 | VW3 A5 102 | 80 |
| 499 NES 251 00 | 187 | ATV 61WD37N4C | 21 | TSX FP CA200 | 191 | VW3 A4 508 | 65 | VW3 A5 103 | 80 |
| 499 NES 271 00 | 187 | ATV 61WD45N4 | 20 | TSX FP CA500 | 191 | VW3 A4 509 | 65 | VW3 A5 104 | 80 |
| 499 NMS 251 01 | 187 | ATV 61WD45N4C | 21 | TSX FP CC100 | 191 | VW3 A4 510 | 65 | VW3 A5 105 | 80 |
| 499 NMS 251 02 | 187 | ATV 61WD55N4 | 20 | TSX FP CC200 | 191 | VW3 A4 511 | 65 | VW3 A5 106 | 80 |
| 499 NOH 105 10 | 187 | ATV 61WD55N4C | 21 | TSX FP CC500 | 191 | VW3 A4 512 | 65 | VW3 A5 107 | 80 |
| 499 NOS 271 00 | 187 | ATV 61WD75N4 | 20 | TSX FP CR100 | 191 | VW3 A4 551 | 68 | VW3 A5 108 | 80 |
| 499 NSS 251 01 | 187 | ATV 61WD75N4C | 21 | TSX FP CR200 | 191 | VW3 A4 552 | 68 | VW3 A5 201 | 83 |
| 499 NSS 251 02 | 187 | ATV 61WDR90N4 | 20 | TSX FP CR500 | 191 | VW3 A4 553 | 68 | VW3 A5 202 | 83 |
| 499 NSS 271 00 | 187 | ATV 61WDR90N4C | 21 | TSX FP JF020 | 191 | VW3 A4 554 | 68 | VW3 A5 203 | 83 |
| 990 NAD 211 10 | 199 | ATV 61WU15N4 | 20 | TSX P ACC 01 | 201 | VW3 A4 555 | 68 | VW3 A5 204 | 83 |
| 990 NAD 211 30 | 199 | ATV 61WU15N4C | 21 | TSX SCA 50 | 194 | VW3 A4 556 | 68 | VW3 A5 205 | 83 |
| 990 NAD 219 10 | 199 | ATV 61WU22N4 | 20 | | and 201 | VW3 A4 557 | 68 | VW3 A5 206 | 83 |
| 990 NAD 219 30 | 199 | ATV 61WU22N4C | 21 | TSX SCA 62 | 194 | VW3 A4 558 | 68 | VW3 A5 207 | 83 |
| 990 NAD 230 00 | 198 | ATV 61WU30N4 | 20 | | and 201 | VW3 A4 559 | 68 | VW3 A5 208 | 83 |
| | | ATV 61WU30N4C | 21 | TSX SCP 114 | 201 | VW3 A4 560 | 68 | VW3 A5 209 | 83 |
| A | | ATV 61WU40N4 | 20 | TSX SCP CU 4030 | 201 | VW3 A4 561 | 68 | VW3 A5 210 | 83 |
| AS MBKT 085 | 198 | ATV 61WU40N4C | 21 | TSX SCP CU 4530 | 201 | VW3 A4 564 | 68 | VW3 A5 211 | 83 |
| AS MBKT 185 | 198 | ATV 61WU55N4 | 20 | TSX SCP CU 6030 | 201 | VW3 A4 565 | 68 | VW3 A58 306 R10 | 193 |
| ATV 61H075M3 | 18 | ATV 61WU55N4C | 21 | TSX SCY 21601 | 201 | VW3 A4 568 | 68 | VW3 A58 306 R30 | 193 |
| ATV 61H075M3 | 18 | ATV 61WU75N4 | 20 | TSX SCY CU 6530 | 201 | VW3 A4 569 | 68 | VW3 A58501 | 68 |
| ATV 61H075N4 | 19 | ATV 61WU75N4C | 21 | | | VW3 A4 601 | 70 | VW3 A58502 | 68 |
| ATV 61HC11N4 | 19 | | | V | | VW3 A4 602 | 70 | VW3 A7 101 | 55 |
| ATV 61HC13N4 | 19 | L | | VW3 A1 101 | 28 | VW3 A4 603 | 70 | VW3 A7 102 | 55 |
| ATV 61HC16N4 | 19 | LA9 P307 | 205 | VW3 A1 102 | 28 | VW3 A4 604 | 70 | VW3 A7 701 | 57 |
| ATV 61HC22N4 | 19 | LU9 CD1 | 203 | | and 29 | VW3 A4 605 | 70 | VW3 A7 702 | 57 |
| ATV 61HC25N4 | 19 | LU9 GC3 | 29, 53, | VW3 A1 103 | 28 | VW3 A4 606 | 70 | VW3 A7 703 | 57 |
| ATV 61HC31N4 | 19 | | 191 | VW3 A1 104 R10 | 28 | VW3 A4 607 | 70 | VW3 A7 704 | 57 |
| ATV 61HC40N4 | 19 | | and 193 | | and 29 | VW3 A4 608 | 70 | VW3 A7 705 | 57 |
| ATV 61HC50N4 | 19 | LUF P1 | 190 | VW3 A1 104 R100 | 28 | VW3 A4 609 | 70 | VW3 A7 706 | 57 |
| ATV 61HC63N4 | 19 | | and 203 | | and 29 | VW3 A4 610 | 70 | VW3 A7 707 | 57 |
| ATV 61HD11M3X | 18 | LUF P7 | 203 | VW3 A1 104 R30 | 28 | VW3 A4 611 | 70 | VW3 A7 708 | 57 |
| ATV 61HD11N4 | 19 | LUF P9 | 203 | | and 29 | VW3 A4 612 | 70 | VW3 A7 709 | 57 |
| ATV 61HD15M3X | 18 | N | | VW3 A1 104 R50 | 28 | VW3 A4 613 | 70 | VW3 A7 710 | 57 |
| ATV 61HD15N4 | 19 | NW BM85000 | 198 | | and 29 | VW3 A4 619 | 70 | VW3 A7 711 | 57 |
| ATV 61HD18M3X | 18 | NW BP85 002 | 198 | VW3 A1 105 | 28 | VW3 A4 621 | 71 | VW3 A7 712 | 57 |
| ATV 61HD18N4 | 19 | NW NRP 253 00 | 198 | VW3 A3 101 | 22 | VW3 A4 622 | 71 | VW3 A7 713 | 57 |
| ATV 61HD22M3X | 18 | NW RR85 001 | 198 | VW3 A3 201 | 31 | VW3 A4 623 | 71 | VW3 A7 714 | 57 |
| ATV 61HD22N4 | 19 | | | VW3 A3 202 | 31 | VW3 A4 624 | 71 | VW3 A7 715 | 57 |
| ATV 61HD30M3X | 18 | T | | VW3 A3 301 | 190 | VW3 A4 625 | 71 | VW3 A7 716 | 57 |
| ATV 61HD30N4 | 19 | TSX CAN CA 100 | 43 | VW3 A3 302 | 52 | VW3 A4 626 | 71 | VW3 A7 717 | 57 |
| ATV 61HD37M3X | 18 | | and 53 | | and 198 | VW3 A4 627 | 71 | VW3 A7 718 | 57 |
| ATV 61HD37N4 | 19 | TSX CAN CA 300 | 43 | VW3 A3 303 | 52 | VW3 A4 628 | 71 | VW3 A8 104 | 180 |
| ATV 61HD45M3X | 18 | | and 53 | | and 201 | VW3 A4 629 | 71 | VW3 A8 105 | 180 |
| ATV 61HD45N4 | 19 | TSX CAN CA 50 | 43 | VW3 A3 304 | 52 | VW3 A4 630 | 71 | VW3 A8 106 | 43 |
| ATV 61HD55M3X | 18 | | and 53 | VW3 A3 307 | 52 | VW3 A4 631 | 71 | | and 180 |
| ATV 61HD55N4 | 19 | TSX CAN CB 100 | 43 | VW3 A3 309 | 52 | VW3 A4 632 | 71 | VW3 A8 114 | 180 |
| ATV 61HD75M3X | 18 | | 53 | VW3 A3 310 | 52 | VW3 A4 633 | 71 | VW3 A8 115 | 180 |
| ATV 61HD75N4 | 19 | TSX CAN CB 300 | 43 | | and 186 | VW3 A4 639 | 71 | VW3 A8 306 | 194 |
| ATV 61HD90M3X | 18 | | and 53 | VW3 A3 311 | 52 | VW3 A4 641 | 72 | VW3 A8 306 2 | 194 |
| ATV 61HD90N4 | 19 | TSX CAN CB 50 | 43 | | and 190 | VW3 A4 642 | 72 | | and 201 |
| ATV 61HU15M3 | 18 | | and 53 | VW3 A3 312 | 52 | VW3 A4 643 | 72 | VW3 A8 306 D30 | 186, |
| ATV 61HU15M3 | 18 | TSX CAN CD 100 | 43 | VW3 A3 313 | 52 | VW3 A4 644 | 72 | | 194, |
| ATV 61HU15N4 | 19 | | and 53 | VW3 A3 314 | 52 | VW3 A4 645 | 72 | | 195, |
| ATV 61HU22M3 | 18 | TSX CAN CD 300 | 43 | VW3 A3 315 | 52 | VW3 A4 646 | 72 | | 199, |
| ATV 61HU22N4 | 19 | | and 53 | VW3 A3 501 | 43 | VW3 A4 647 | 72 | | 203 |
| ATV 61HU30M3 | 18 | | and 53 | VW3 A3 502 | 35 | VW3 A4 648 | 72 | | and 205 |

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