# Product data sheet
## Characteristics

# ATV61WD22N4A24
## variable speed drive ATV61 - 22kW 30HP - 380...480V - EMC filter - IP54

### Main

| | |
|---|---|
| Range of product | Altivar 61 |
| Product or component type | Variable speed drive |
| Product specific application | Pumping and ventilation machine |
| Component name | ATV61 |
| Motor power kW | 22 kW 3 phases at 380...480 V |
| Motor power hp | 30 hp 3 phases at 380...480 V |
| Power supply voltage | 380...480 V (- 15...10 %) |
| Supply number of phases | 3 phases |
| Line current | 43.6 A for 380 V 3 phases 22 kW / 30 hp<br>36.6 A for 480 V 3 phases 22 kW / 30 hp |
| EMC filter | Class C2 EMC filter integrated |
| Variant | With additional power supply 24 V DC |
| Assembly style | Enclosed |
| Apparent power | 28.7 kVA for 380 V 3 phases 22 kW / 30 hp |
| Maximum prospective line Isc | 22 kA 3 phases |
| Maximum transient current | 47.8 A for 60 s 3 phases |
| Nominal switching frequency | 4 kHz |
| Switching frequency | 8...16 kHz with derating factor<br>2...16 kHz adjustable |
| Asynchronous motor control | Voltage/Frequency ratio, 2 points<br>Voltage/Frequency ratio, 5 points<br>Flux vector control without sensor, standard<br>Voltage/Frequency ratio - Energy Saving, quadratic U/f |
| Synchronous motor control profile | Vector control without sensor, standard |
| Communication port protocol | CANopen<br>Modbus |
| Type of polarization | No impedance for Modbus |
| Option card | Profibus DP V1 communication card<br>Profibus DP communication card<br>Multi-pump card<br>Modbus/Uni-Telway communication card<br>Modbus TCP communication card<br>Modbus Plus communication card<br>METASYS N2 communication card<br>LonWorks communication card<br>Interbus-S communication card<br>I/O extension card<br>Fipio communication card<br>Ethernet/IP communication card<br>DeviceNet communication card<br>Controller inside programmable card<br>CC-Link communication card<br>BACnet communication card<br>APOGEE FLN communication card |

The information provided in this documentation contains general descriptions and/or technical characteristics of the performance of the products contained herein.
This documentation is not intended as a substitute for and is not to be used for determining suitability or reliability of these products for specific user applications.
It is the duty of any such user or integrator to perform the appropriate and complete risk analysis, evaluation and testing of the products with respect to the relevant specific application or use thereof.
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## Complementary

| | |
|---|---|
| Product destination | Asynchronous motors<br>Synchronous motors |
| Power supply voltage limits | 323...528 V |
| Power supply frequency | 50...60 Hz (- 5...5 %) |
| Power supply frequency limits | 47.5...63 Hz |
| Continuous output current | 43.5 A at 4 kHz, 380 V 3 phases<br>40 A at 4 kHz, 460 V 3 phases |
| Speed drive output frequency | 0.1...599 Hz |
| Speed range | 1...100 in open-loop mode, without speed feedback |
| Speed accuracy | +/- 10 % of nominal slip for 0.2 Tn to Tn torque variation without speed feedback |
| Torque accuracy | +/- 15 % in open-loop mode, without speed feedback |
| Transient overtorque | 130 % of nominal motor torque, +/- 10 % for 60 s |
| Braking torque | 30 % without braking resistor<br><= 125 % with braking resistor |
| Regulation loop | Frequency PI regulator |
| Motor slip compensation | Adjustable<br>Automatic whatever the load<br>Can be suppressed<br>Not available in voltage/frequency ratio (2 or 5 points) |
| Diagnostic | 1 LED red presence of drive voltage |
| Output voltage | <= power supply voltage |
| Electrical isolation | Between power and control terminals |
| Type of cable for mounting in an enclosure | Without mounting kit : 1-strand IEC cable at 45 °C, copper 90 °C XLPE/EPR<br>Without mounting kit : 1-strand IEC cable at 45 °C, copper 70 °C PVC<br>With UL Type 1 kit : 3-strand UL 508 cable at 40 °C, copper 75 °C PVC<br>With an IP21 or an IP31 kit : 3-strand IEC cable at 40 °C, copper 70 °C PVC |
| Electrical connection | L1/R, L2/S, L3/T, U/T1, V/T2, W/T3, PC/-, PO, PA/+, PA, PB terminal 25 mm² / AWG 3<br>AI1-/AI1+, AI2, AO1, R1A, R1B, R1C, R2A, R2B, LI1...LI6, PWR terminal 2.5 mm² / AWG 14 |
| Tightening torque | L1/R, L2/S, L3/T, U/T1, V/T2, W/T3, PC/-, PO, PA/+, PA, PB 5.4 N.m / 47.7 lb.in<br>AI1-/AI1+, AI2, AO1, R1A, R1B, R1C, R2A, R2B, LI1...LI6, PWR 0.6 N.m |
| Supply | Internal supply 24 V DC (21...27 V), <= 200 mA for overload and short-circuit protection<br>Internal supply for reference potentiometer (1 to 10 kOhm) 10.5 V DC +/- 5 %, <= 10 mA for overload and short-circuit protection<br>External supply 24 V DC (19...30 V), 30 W |
| Analogue input number | 2 |
| Analogue input type | AI2 software-configurable voltage 0...10 V DC, input voltage 24 V max, impedance 30000 Ohm, resolution 11 bits<br>AI2 software-configurable current 0...20 mA, impedance 242 Ohm, resolution 11 bits<br>AI1-/AI1+ bipolar differential voltage +/- 10 V DC, input voltage 24 V max, resolution 11 bits + sign |
| Sampling time | Discrete input LI6 (if configured as logic input) 2 ms, +/- 0.5 ms<br>Discrete input LI1...LI5 2 ms, +/- 0.5 ms<br>Analog output AO1 2 ms, +/- 0.5 ms<br>Analog input AI2 2 ms, +/- 0.5 ms<br>Analog input AI1-/AI1+ 2 ms, +/- 0.5 ms |
| Absolute accuracy precision | AO1 +/- 1 % for a temperature variation 60 °C<br>AI2 +/- 0.6 % for a temperature variation 60 °C<br>AI1-/AI1+ +/- 0.6 % for a temperature variation 60 °C |
| Linearity error | AO1 +/- 0.2 %<br>AI2 +/- 0.15 % of maximum value<br>AI1-/AI1+ +/- 0.15 % of maximum value |
| Analogue output number | 1 |
| Analogue output type | AO1 software-configurable logic output 10 V, <= 20 mA<br>AO1 software-configurable voltage, analogue output range 0...10 V DC, impedance 470 Ohm, resolution 10 bits<br>AO1 software-configurable current, analogue output range 0...20 mA, impedance 500 Ohm, resolution 10 bits |
| Discrete output number | 2 |
| Discrete output type | (R2A, R2B) configurable relay logic NO, electrical durability 100000 cycles<br>(R1A, R1B, R1C) configurable relay logic NO/NC, electrical durability 100000 cycles |

| | |
|---|---|
| Maximum response time | R2A, R2B <= 7 ms, tolerance +/- 0.5 ms<br>R1A, R1B, R1C <= 7 ms, tolerance +/- 0.5 ms<br><= 100 ms in STO (Safe Torque Off) |
| Minimum switching current | Configurable relay logic 3 mA at 24 V DC |
| Maximum switching current | R1, R2 on resistive load, 5 A at 30 V DC, cos phi = 1, L/R = 0 ms<br>R1, R2 on resistive load, 5 A at 250 V AC, cos phi = 1, L/R = 0 ms<br>R1, R2 on inductive load, 2 A at 30 V DC, cos phi = 0.4, L/R = 7 ms<br>R1, R2 on inductive load, 2 A at 250 V AC, cos phi = 0.4, L/R = 7 ms |
| Discrete input number | 7 |
| Discrete input type | (PWR) safety input, 24 V DC, voltage limits <= 30 V, impedance 1500 Ohm<br>(LI6) switch-configurable PTC probe, 0...6, impedance 1500 Ohm<br>(LI6) switch-configurable, 24 V DC, voltage limits <= 30 V, with level 1 PLC, impedance 3500 Ohm<br>(LI1...LI5) programmable, 24 V DC, voltage limits <= 30 V, with level 1 PLC, impedance 3500 Ohm |
| Discrete input logic | LI6 (if configured as logic input) positive logic (source), < 5 V (state 0), > 11 V (state 1)<br>LI6 (if configured as logic input) negative logic (sink), > 16 V (state 0), < 10 V (state 1)<br>LI1...LI5 positive logic (source), < 5 V (state 0), > 11 V (state 1)<br>LI1...LI5 negative logic (sink), > 16 V (state 0), < 10 V (state 1) |
| Acceleration and deceleration ramps | Automatic adaptation of ramp if braking capacity exceeded, by using resistor<br>Linear adjustable separately from 0.01 to 9000 s<br>S, U or customized |
| Braking to standstill | By DC injection |
| Protection type | Motor thermal protection<br>Motor power removal<br>Motor motor phase break<br>Drive thermal protection<br>Drive short-circuit between motor phases<br>Drive power removal<br>Drive overvoltages on the DC bus<br>Drive overheating protection<br>Drive overcurrent between output phases and earth<br>Drive line supply undervoltage<br>Drive line supply overvoltage<br>Drive input phase breaks<br>Drive break on the control circuit<br>Drive against input phase loss<br>Drive against exceeding limit speed |
| Insulation resistance | > 1 mOhm at 500 V DC for 1 minute to earth |
| Frequency resolution | Display unit 0.1 Hz<br>Analog input 0.024/50 Hz |
| Type of connector | Male SUB-D 9 on RJ45 for CANopen<br>1 RJ45 for Modbus on terminal<br>1 RJ45 for Modbus on front face |
| Physical interface | 2-wire RS 485 for Modbus |
| Transmission frame | RTU for Modbus |
| Transmission rate | 20 kbps, 50 kbps, 125 kbps, 250 kbps, 500 kbps, 1 Mbps for CANopen<br>9600 bps, 19200 bps for Modbus on front face<br>4800 bps, 9600 bps, 19200 bps, 38.4 Kbps for Modbus on terminal |
| Data format | 8 bits, odd even or no configurable parity for Modbus on terminal<br>8 bits, 1 stop, even parity for Modbus on front face |
| Number of addresses | 1...247 for Modbus<br>1...127 for CANopen |
| Method of access | Slave for CANopen |
| Marking | CE |
| Operating position | Vertical +/- 10 degree |
| Product weight | 36 kg |
| Width | 315 mm |
| Height | 665 mm |
| Depth | 315 mm |

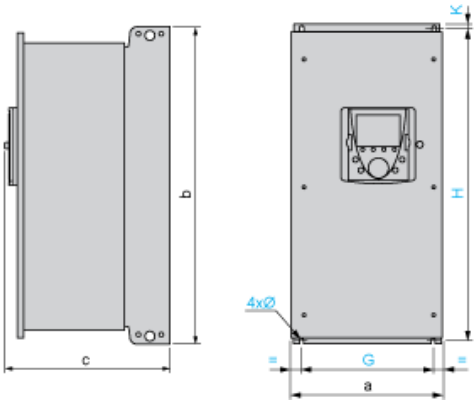
## Environment

| | |
|---|---|
| Noise level | 60.2 dB conforming to 86/188/EEC |
| Dielectric strength | 5092 V DC between control and power terminals<br>3535 V DC between earth and power terminals |
| Electromagnetic compatibility | Voltage dips and interruptions immunity test conforming to IEC 61000-4-11<br>Radiated radio-frequency electromagnetic field immunity test conforming to IEC 61000-4-3 level 3<br>Electrostatic discharge immunity test conforming to IEC 61000-4-2 level 3<br>Electrical fast transient/burst immunity test conforming to IEC 61000-4-4 level 4<br>Conducted radio-frequency immunity test conforming to IEC 61000-4-6 level 3 |
| Standards | EN 55011 class A group 1<br>EN 61800-3 environments 1 category C2<br>EN 61800-3 environments 2 category C2<br>EN/IEC 61800-3<br>EN/IEC 61800-5-1<br>IEC 60721-3-3 class 3C2<br>UL Type 12 |
| Product certifications | CSA<br>C-Tick<br>DNV<br>GOST<br>NOM 117<br>UL |
| Pollution degree | 3 conforming to UL 840<br>3 conforming to EN/IEC 61800-5-1 |
| Degree of proctection | IP54 conforming to UL Type 12<br>IP54 conforming to EN/IEC 61800-5-1<br>IP54 conforming to EN/IEC 60529 |
| Vibration resistance | 1.5 mm peak to peak (f = 3...13 Hz) conforming to EN/IEC 60068-2-6<br>1 gn (f = 13...200 Hz) conforming to EN/IEC 60068-2-6 |
| Shock resistance | 15 gn for 11 ms conforming to EN/IEC 60068-2-27 |
| Relative humidity | 5...95 % without dripping water conforming to IEC 60068-2-3<br>5...95 % without condensation conforming to IEC 60068-2-3 |
| Ambient air temperature for operation | -10...50 °C with derating factor<br>-10...40 °C without derating |
| Ambient air temperature for storage | -25...70 °C |
| Operating altitude | 1000...3000 m with current derating 1 % per 100 m<br><= 1000 m without derating |

# ATV61WD22N4A24

## UL Type 12/IP 54 Drives

### Dimensions




Dimensions in mm

| a | b | c | G | H | K | Ø |
|---|---|---|---|---|---|---|
| 315 | 665 | 315 | 270 | 647 | 10 | 6 |

Dimensions in in.

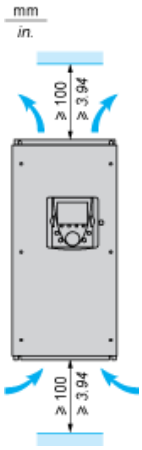
| a | b | c | G | H | K | Ø |
|---|---|---|---|---|---|---|
| 12.40 | 26.18 | 12.40 | 10.63 | 25.47 | 0.39 | 0.23 |

## Mounting Recommendations

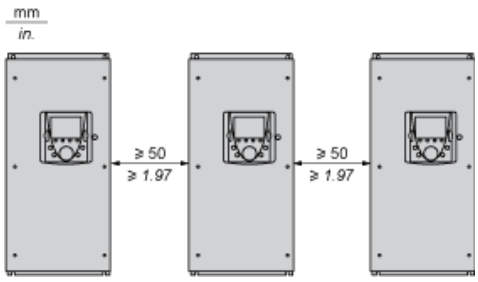
Depending on the conditions in which the drive is to be used, its installation will require certain precautions and the use of appropriate accessories.Install the unit vertically:

- Avoid placing 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.

## Clearance

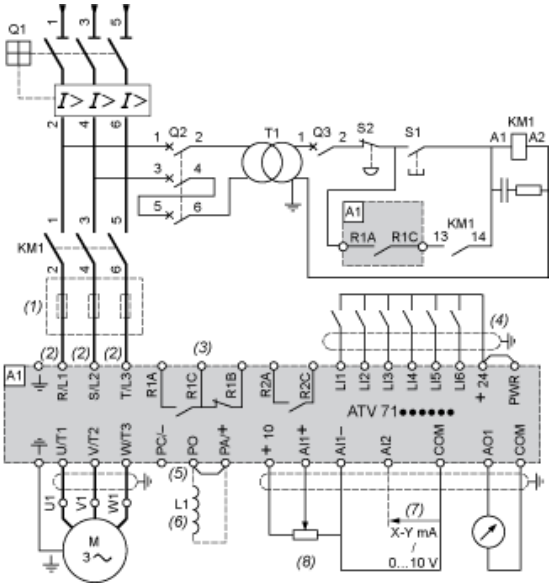



## Mounting



## Wiring Diagram Conforming to Standards EN 954-1 Category 1, IEC/EN 61508 Capacity SIL1, in Stopping Category 0 According to IEC/EN 60204-1

### Three-Phase Power Supply with Upstream Breaking via Contactor

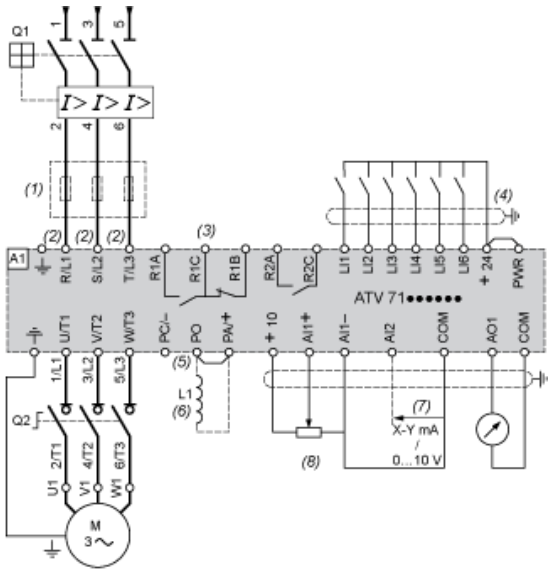



A1 ATV61 drive
KM1 Contactor
L1 DC choke
Q1 Circuit-breaker
Q2 GV2 L rated at twice the nominal primary current of T1
Q3 GB2CB05
S1, S2 XB4 B or XB5 A pushbuttons
T1 100 VA transformer 220 V secondary
(1) Line choke (three-phase); mandatory for ATV61HC11Y…HC80Y drives (except when a special transformer is used (12-pulse)).
(2) For ATV61HC50N4, ATV61HC63N4 and ATV61HC50Y…HC80Y drives, refer to the power terminal connections diagram.
(3) Fault relay contacts. Used for remote signalling of the drive status.
(4) Connection of the common for the logic inputs depends on the positioning of the SW1 switch. The above diagram shows the internal power supply switched to the “source” position (for other connection types, refer to the user guide).
(5) There is no PO terminal on ATV61HC11Y…HC80Y drives.
(6) Optional DC choke for ATV61H•••M3, ATV61HD11M3X…HD45M3X and ATV61H075N4…HD75N4 drives. Connected in place of the strap between the PO and PA/+ terminals. For ATV61HD55M3X…HD90M3X, ATV61HD90N4…HC63N4 drives, the choke is supplied with the drive; the customer is responsible for connecting it. For ATV61W•••N4 and ATV61W•••N4C drives, the DC choke is integrated.
(7) Software-configurable current (0…20 mA) or voltage (0…10 V) analog input.
(8) Reference potentiometer.

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

## Wiring Diagram Conforming to Standards EN 954-1 Category 1, IEC/EN 61508 Capacity SIL1, in Stopping Category 0 According to IEC/EN 60204-1

## Three-Phase Power Supply with Downstream Breaking via Switch Disconnector

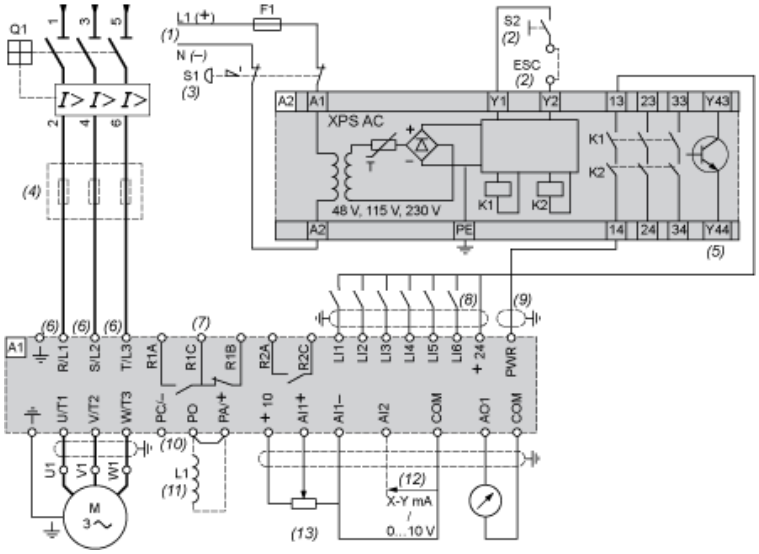



A1 ATV61 drive
L1 DC choke
Q1 Circuit-breaker
Q2 Switch disconnector (Vario)
(1) Line choke (three-phase), mandatory for ATV61HC11Y…HC80Y drives (except when a special transformer is used (12-pulse)).
(2) For ATV61HC50N4, ATV61HC63N4 and ATV61HC50Y…HC80Y drives, refer to the power terminal connections diagram.
(3) Fault relay contacts. Used for remote signalling of the drive status.
(4) Connection of the common for the logic inputs depends on the positioning of the SW1 switch. The above diagram shows the internal power supply switched to the “source” position (for other connection types, refer to the user guide).
(5) There is no PO terminal on ATV61HC11Y…HC80Y drives.
(6) Optional DC choke for ATV61H•••M3, ATV61HD11M3X…HD45M3X and ATV61H075N4…HD75N4 drives. Connected in place of the strap between the PO and PA/+ terminals. For ATV61HD55M3X…HD90M3X, ATV61HD90N4…HC63N4 drives, the choke is supplied with the drive; the customer is responsible for connecting it. For ATV61W•••N4 and ATV61W•••N4C drives, the DC choke is integrated.
(7) Software-configurable current (0…20 mA) or voltage (0…10 V) analog input.
(8) Reference potentiometer.

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

## Wiring Diagram Conforming to Standards EN 954-1 Category 3, IEC/EN 61508 Capacity SIL2, in Stopping Category 0 According to IEC/EN 60204-1

## Three-Phase Power Supply, Low Inertia Machine, Vertical Movement

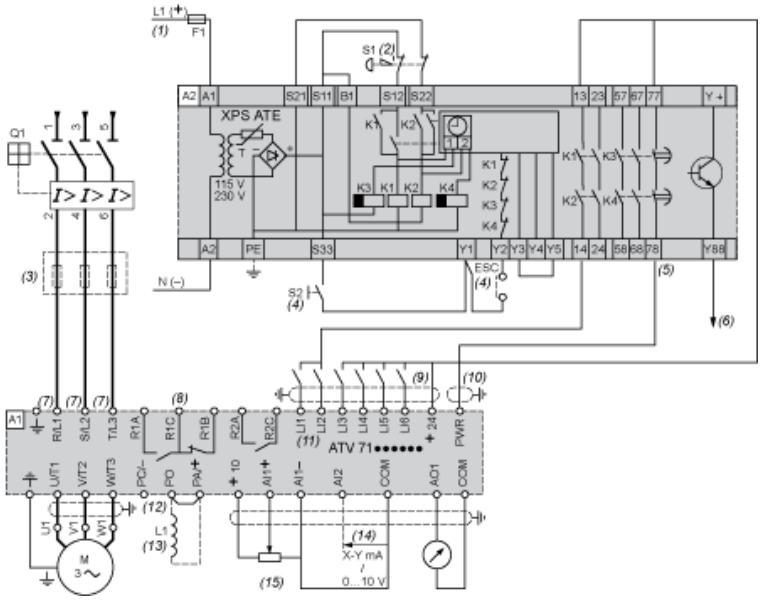



A1 ATV61 drive
A2 Preventa XPS AC safety module for monitoring emergency stops and switches. One safety module can manage the “Power Removal” function for several drives on the same machine. In this case, each drive must connect its PWR terminal to its + 24 V via the safety contacts on the XPS AC module. These contacts are independent for each drive.
F1 Fuse
L1 DC choke
Q1 Circuit-breaker
S1 Emergency stop button with 2 contacts
S2 XB4 B or XB5 A pushbutton
(1) Power supply: 24 Vdc or Vac, 115 Vac, 230 Vac.
(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 (three-phase), mandatory for and ATV61HC11Y…HC80Y drives (except when a special transformer is used (12-pulse)).
(5) The logic output can be used to signal that the machine is in a safe stop state.
(6) For ATV61HC50N4, ATV61HC63N4 and ATV61HC50Y…HC80Y drives, refer to the power terminal connections diagram.
(7) Fault relay contacts. Used for remote signalling of the drive status.
(8) Connection of the common for the logic inputs depends on the positioning of the SW1 switch. The above diagram shows the internal power supply switched to the “source” position (for other connection types, refer to the user guide).
(9) Standardized coaxial cable, type RG174/U according to MIL-C17 or KX3B according to NF C 93-550, external diameter 2.54 mm /0.09 in., maximum length 15 m / 49.21 ft. The cable shielding must be earthed.
(10) There is no PO terminal on ATV61HC11Y…HC80Y drives.
(11) Optional DC choke for ATV61H•••M3, ATV61HD11M3X…HD45M3X and ATV61H075N4…HD75N4 drives. Connected in place of the strap between the PO and PA/+ terminals. For ATV61HD55M3X…HD90M3X, ATV61HD90N4…HC63N4 drives, the choke is supplied with the drive; the customer is responsible for connecting it. For ATV61W•••N4 and ATV61W•••N4C drives, the DC choke is integrated.
(12) Software-configurable current (0…20 mA) or voltage (0…10 V) analog input.
(13) Reference potentiometer.

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

## Wiring Diagram Conforming to Standards EN 954-1 Category 3, IEC/EN 61508 Capacity SIL2, in Stopping Category 1 According to IEC/EN 60204-1

## Three-Phase Power Supply, High Inertia Machine

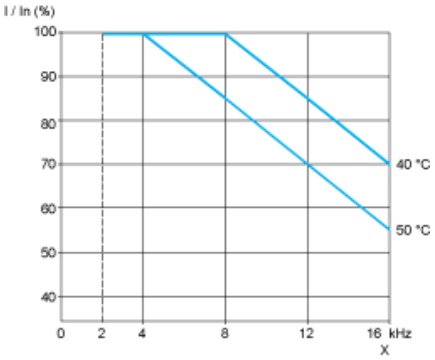



A1 ATV61 drive
A2 Preventa XPS ATE safety module for monitoring emergency stops and switches. One safety module can manage the "Power Removal"
(5) safety function for several drives on the same machine. In this case the time delay must be adjusted on the drive controlling the motor that requires the longest stopping time. In addition, each drive must connect its PWR terminal to its + 24 V via the safety contacts on the XPS ATE module. These contacts are independent for each drive.
F1 Fuse
L1 DC choke
Q1 Circuit-breaker
S1 Emergency stop button with 2 contacts
S2 XB4 B or XB5 A pushbutton
(1) Power supply: 24 Vdc or Vac, 115 Vac, 230 Vac.
(2) Requests controlled stopping of the movement and activates the “Power Removal” safety function.
(3) Line choke (three-phase), mandatory for ATV61HC11Y…HC80Y drives (except when a special transformer is used (12-pulse)).
(4) S2: resets XPS ATE module on power-up or after an emergency stop. ESC can be used to set external starting conditions.
(5) The logic output can be used to signal that the machine is in a safe 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 ATV61HC50N4, ATV61HC63N4 and ATV61HC50Y…HC80Y drives, refer to the power terminal connections diagram.
(8) Fault relay contacts. Used for remote signalling of the drive status.
(9) Connection of the common for the logic inputs depends on the positioning of the SW1 switch. The above diagram shows the internal power supply switched to the “source” position (for other connection types, refer to the user guide).
(10) Standardized coaxial cable, type RG174/U according to MIL-C17 or KX3B according to NF C 93-550, external diameter 2.54 mm/0.09 in., maximum length 15 m/49.21 ft. 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) There is no PO terminal on ATV61HC11Y…HC80Y drives.
(13) Optional DC choke for ATV61H•••M3, ATV61HD11M3X…HD45M3X and ATV61H075N4…HD75N4 drives. Connected in place of the strap between the PO and PA/+ terminals. For ATV61HD55M3X…HD90M3X, ATV61HD90N4…HC63N4 drives, the choke is supplied with the drive; the customer is responsible for connecting it. For ATV61W•••N4 and ATV61W•••N4C drives, the DC choke is integrated.
(14) Software-configurable current (0…20 mA) or voltage (0…10 V) analog input.
(15) Reference potentiometer.

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

## Derating Curves

The derating curves for the drive nominal current (In) depend on the temperature and the switching frequency. For intermediate temperatures (e.g. 55°C), interpolate between 2 curves.




X Switching frequency