Specification





variable speed drive ATV61 - 500kW / 690V - 550HP / 575V - IP20

ATV61HC50Y

- ! Discontinued on: Feb 17, 2021
- ! To be end-of-service on: Dec 31, 2028

Main

mam	
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	400 kW, 3 phase 500 V 500 kW, 3 phase 690 V
Maximum Horse Power Rating	550 hp, 3 phase 575 V
Power Supply Voltage	500690 V - 1510 %
Supply Number Of Phases	3 phase
Line Current	494 A 600 V 3 phase 400 kW / 550 hp 505 A 690 V 3 phase 400 kW / 550 hp 547 A 500 V 3 phase 400 kW / 550 hp
Emc Filter	Level 3 EMC filter
Assembly Style	With heat sink
Maximum Prospective Line Isc	35 kA 3 phase
Maximum Transient Current	708 A 60 s, 3 phase
Nominal Switching Frequency	2.5 kHz
Switching Frequency	2.54.9 kHz adjustable 2.54.9 kHz with derating factor
Asynchronous Motor Control	Voltage/frequency ratio, 5 points Flux vector control without sensor, standard Voltage/frequency ratio, 2 points Voltage/frequency ratio - Energy Saving, quadratic U/f
Synchronous Motor Control Profile	Vector control without sensor, standard
Communication Port Protocol	CANopen Modbus
Type Of Polarization	No impedance Modbus

Price is "List Price" and may be subject to a trade discount – check with your local distributor or retailer for actual price.

Option Card	Communication card APOGEE FLN
	Communication card BACnet
	Communication card CC-Link
	Controller inside programmable card
	Communication card DeviceNet
	Communication card EtherNet/IP
	Communication card Fipio
	I/O extension card
	Communication card Interbus-S
	Communication card LonWorks
	Communication card METASYS N2
	Communication card Modbus Plus
	Communication card Modbus TCP
	Communication card Modbus/Uni-Telway
	Multi-pump card
	Communication card Profibus DP
	Communication card Profibus DP V1

Complementary

Complementary Description						
Product Destination	Synchronous motors Asynchronous motors					
Power Supply Voltage Limits	425759 V					
Power Supply Frequency	5060 Hz - 55 %					
Power Supply Frequency Limits	47.563 Hz					
Continuous Output Current	528 A 2.5 kHz, 575 V - 3 phase 543 A 2.5 kHz, 690 V - 3 phase 590 A 2.5 kHz, 500 V - 3 phase					
Output Frequency	0.1500 Hz					
Speed Range	1100 in open-loop mode, without speed feedback					
Speed Accuracy	+/- 10 % of nominal slip 0.2 Tn to Tn without speed feedback					
Torque Accuracy	+/- 15 % in open-loop mode, without speed feedback					
Transient Overtorque	130 % of nominal motor torque +/- 10 % 60 s					
Braking Torque	<= 125 % with braking resistor 30 % without braking resistor					
Regulation Loop	Frequency PI regulator					
Motor Slip Compensation	Adjustable Can be suppressed Not available in voltage/frequency ratio (2 or 5 points) Automatic whatever the load					
Diagnostic	for drive voltage 1 LED (red)					
Output Voltage	<= power supply voltage					
Electrical Isolation	Between power and control terminals					
Type Of Cable For Mounting In An Enclosure	With an IP21 or an IP31 kit 3 IEC cable 104 °F (40 °C), copper 70 °C / PVC With UL Type 1 kit 3 UL 508 cable 104 °F (40 °C), copper 75 °C / PVC Without mounting kit 1 IEC cable 113 °F (45 °C), copper 70 °C / PVC Without mounting kit 1 IEC cable 113 °F (45 °C), copper 90 °C / XLPE/EPR					
Electrical Connection	Terminal 2.5 mm² / AWG 14 Al1-/Al1+, Al2, AO1, R1A, R1B, R1C, R2A, R2B, L11L16, PWR) Terminal 8 x 185 mm² / 5 x 500 kcmil PC/-, PO, PA/+) Terminal 2 x 4 x 185 mm² / 2 x 3 x 500 kcmil R/L1.1, S/L2.1, T/L3.1, R/L1.2, S/L2.2, T/L3.2) Terminal 6 x 185 mm² / 5 x 500 kcmil U/T1, V/T2, W/T3)					
Tightening Torque	5.31 lbf.in (0.6 N.m) Al1-/Al1+, Al2, AO1, R1A, R1B, R1C, R2A, R2B, Ll1Ll6, PWR) 362.88 lbf.in (41 N.m), 360 lb.in PC/-, PO, PA/+) 362.88 lbf.in (41 N.m), 360 lb.in R/L1.1, S/L2.1, T/L3.1, R/L1.2, S/L2.2, T/L3.2) 362.88 lbf.in (41 N.m), 360 lb.in U/T1, V/T2, W/T3)					

Supply	Internal supply for reference potentiometer (1 to 10 kOhm) 10.5 V DC, +/- 5 %, <10 mA overload and short-circuit protection Internal supply 24 V DC 2127 V), <200 mA overload and short-circuit protection External supply 24 V DC 1930 V)					
Analogue Input Number	2					
Analogue Input Type	Al1-/Al1+ bipolar differential voltage +/- 10 V DC 24 V max 11 bits + sign Al2 software-configurable current 020 mA 242 Ohm 11 bits Al2 software-configurable voltage 010 V DC 24 V max 30000 Ohm 11 bits					
Sampling Time	2 ms +/- 0.5 ms Al1-/Al1+) - analog input 2 ms +/- 0.5 ms Al2) - analog input 2 ms +/- 0.5 ms AO1) - analog output 2 ms +/- 0.5 ms Ll1Ll5) - discrete input 2 ms +/- 0.5 ms Ll6)if configured as logic input - discrete input					
Absolute Accuracy Precision	+/- 0.6 % Al1-/Al1+) for a temperature variation 60 °C +/- 0.6 % Al2) for a temperature variation 60 °C +/- 1 % AO1) for a temperature variation 60 °C					
Linearity Error	+/- 0.15 % of maximum value Al1-/Al1+) +/- 0.15 % of maximum value Al2) +/- 0.2 % AO1)					
Analogue Output Number	1					
Analogue Output Type	AO1 software-configurable current 020 mA 500 Ohm 10 bits AO1 software-configurable voltage 010 V DC 470 Ohm 10 bits AO1 software-configurable logic output 10 V, 20 mA					
Discrete Output Number	2					
Discrete Output Type	Configurable relay logic R1A, R1B, R1C) NO/NC - 100000 cycles Configurable relay logic R2A, R2B) NO - 100000 cycles					
Maximum Response Time	<= 100 ms in STO (Safe Torque Off) R1A, R1B, R1C <= 7 ms +/- 0.5 ms R2A, R2B <= 7 ms +/- 0.5 ms					
Minimum Switching Current	3 mA 24 V DC configurable relay logic					
Maximum Switching Current	R1, R2 2 A 250 V AC inductive, cos phi = 0.4 7 ms R1, R2 2 A 30 V DC inductive, cos phi = 0.4 7 ms R1, R2 5 A 250 V AC resistive, cos phi = 1 0 ms R1, R2 5 A 30 V DC resistive, cos phi = 1 0 ms					
Discrete Input Number	7					
Discrete Input Type	Programmable LI1LI5) 24 V DC <= 30 V)level 1 PLC - 3500 Ohm Switch-configurable LI6) 24 V DC <= 30 V)level 1 PLC - 3500 Ohm Switch-configurable PTC probe LI6)06 - 1500 Ohm Safety input PWR) 24 V DC <= 30 V) - 1500 Ohm					
Discrete Input Logic	Negative logic (sink) LI1LI5), > 16 V, < 10 V Positive logic (source) LI1LI5), < 5 V, > 11 V Negative logic (sink) LI6)if configured as logic input, > 16 V, < 10 V Positive logic (source) LI6)if configured as logic input, < 5 V, > 11 V					
Acceleration And Deceleration Ramps	S, U or customized Automatic adaptation of ramp if braking capacity exceeded, by using resistor Linear adjustable separately from 0.01 to 9000 s					
Braking To Standstill	By DC injection					
Protection Type	Against exceeding limit speed drive Against input phase loss drive Break on the control circuit drive Input phase breaks drive Line supply overvoltage drive Line supply undervoltage drive Overcurrent between output phases and earth drive Overheating protection drive Overvoltages on the DC bus drive Power removal drive Short-circuit between motor phases drive Thermal protection drive Motor phase break motor Power removal motor Thermal protection motor					

Insulation Resistance	> 1 mOhm 500 V DC for 1 minute to earth
Frequency Resolution	Analog input 0.024/50 Hz
	Display unit 0.1 Hz
Connector Type	1 RJ45 on front face)Modbus
	1 RJ45 on terminal)Modbus
	Male SUB-D 9 on RJ45CANopen
Physical Interface	2-wire RS 485 Modbus
Transmission Frame	RTU Modbus
Transmission Rate	4800 bps, 9600 bps, 19200 bps, 38.4 Kbps Modbus on terminal
	9600 bps, 19200 bps Modbus on front face
	20 kbps, 50 kbps, 125 kbps, 250 kbps, 500 kbps, 1 Mbps CANopen
Data Format	8 bits, 1 stop, even parity Modbus on front face
	8 bits, odd even or no configurable parity Modbus on terminal
Number Of Addresses	1127 CANopen
	1247 Modbus
Method Of Access	Slave CANopen
Marking	CE
Operating Position	Vertical +/- 10 degree
Net Weight	844.37 lb(US) (383 kg)
Width	44.09 in (1120 mm)
Height	54.72 in (1390 mm)
Depth	14.84 in (377 mm)

Environment

Noise Level	77 dB 86/188/EEC 3110 V DC between earth and power terminals 5345 V DC between control and power terminals Conducted radio-frequency immunity test level 3 IEC 61000-4-6 Electrical fast transient/burst immunity test level 4 IEC 61000-4-4 Electrostatic discharge immunity test level 3 IEC 61000-4-2 Radiated radio-frequency electromagnetic field immunity test level 3 IEC 61000-4-3 Voltage dips and interruptions immunity test IEC 61000-4-11					
Dielectric Strength						
Electromagnetic Compatibility						
Standards	EN 61800-3 environments 2 category C3 EN/IEC 61800-5-1 EN/IEC 61800-3 UL Type 1 EN 55011 class A group 2 IEC 60721-3-3 class 3C2 EN 61800-3 environments 1 category C3					
Product Certifications	C-tick DNV GOST UL NOM 117 CSA					
Pollution Degree	3 EN/IEC 61800-5-1 3 UL 840					
Degree Of Proctection	IP41 on upper part EN/IEC 60529 IP41 on upper part EN/IEC 61800-5-1 IP00 EN/IEC 60529 IP00 EN/IEC 61800-5-1 IP30 on side parts EN/IEC 60529 IP30 on side parts EN/IEC 61800-5-1 IP30 on the front panel EN/IEC 60529 IP30 on the front panel EN/IEC 60529 IP30 on the front panel EN/IEC 61800-5-1					
Vibration Resistance	0.6 gn 10200 Hz)EN/IEC 60068-2-6 1.5 mm peak to peak 310 Hz)EN/IEC 60068-2-6					

Shock Resistance	4 gn 11 ms EN/IEC 60068-2-27					
Relative Humidity	595 % without condensation IEC 60068-2-3 595 % without dripping water IEC 60068-2-3					
Ambient Air Temperature For Operation	14113 °F (-1045 °C) without derating) 113140 °F (4560 °C) with derating factor)					
Ambient Air Temperature For Storage	-13158 °F (-2570 °C)					
Operating Altitude	<= 3280.84 ft (1000 m) without derating 3280 84 7414 7 ft (1000 2260 m) with current derating 1 % per 100 m					

Ordering and shipping details

Category	22140-ATV61 500 THRU 900 HP DRIVES
	ZZTIO ATVOTOGO TITAC GGOTII BIAVEG
Discount Schedule	CP4C
Gtin	3389119215107
Returnability	No
Country Of Origin	CN

Packing Units

Unit Type Of Package 1	PCE
Number Of Units In Package 1	1
Package 1 Height	20.87 in (53.0 cm)
Package 1 Width	46.06 in (117.0 cm)
Package 1 Length	57.09 in (145.0 cm)
Package 1 Weight	1047.20 lb(US) (475.0 kg)

Contractual warranty

Warranty 18 months



Green PremiumTM **label** is Schneider Electric's commitment to delivering products with best-inclass environmental performance. Green Premium promises compliance with the latest regulations, transparency on environmental impacts, as well as circular and low-CO₂ products.

Guide to assessing product sustainability is a white paper that clarifies global eco-label standards and how to interpret environmental declarations.

Learn more about Green Premium >

Guide to assess a product's sustainability >



RoHS/REACh

Well-being performance



Mercury Free



Rohs Exemption Information

Yes

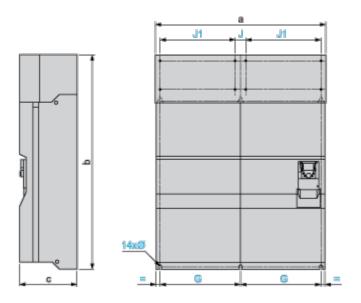
Certifications & Standards

Eu Rohs Directive	Pro-active compliance (Product out of EU RoHS legal scope)				
	EU RoHS Declaration				
China Rohs Regulation	China RoHS declaration				
Weee	The product must be disposed on European Union markets following specific waste collection and never end up in rubbish bins.				
California Proposition 65	WARNING: This product can expose you to chemicals including: Lead and lead compounds, which is known to the State of California to cause cancer and birth defects or other reproductive harm. For more information go to www.P65Warnings.ca.gov				

Dimensions Drawings

UL Type 1/IP 20 Drives

Dimensions with or without 1 Option Card (1)



Dimensions in mm

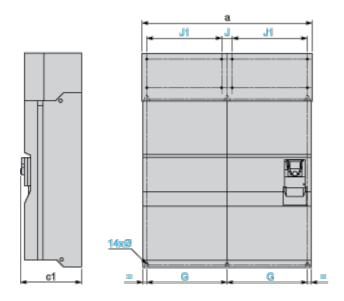
а	b	С	G	J	J1	Н	K	K1	K2	Ø	
1120	1390	377	532.5	75	495	1120	150	75	30	11.5	

Dimensions in in.

а	b	С	G	J	J1	Н	K	K1	K2	Ø
44.09	54.72	14.84	20.96	2.95	19.49	44.09	5.90	2.95	1.18	0.45

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

Dimensions with 2 Option Cards (1)



Dimensions in mm

ATV61HC50Y

а	с1	G	J	J1	Н	K	K1	K2	Ø
1120	392	532.5	75	495	1120	150	75	30	11.5

Dimensions in in.

а	c1	G	J	J1	Н	K	K1	K2	Ø
44.09	15.43	20.96	2.95	19.49	44.09	5.90	2.95	1.18	0.45

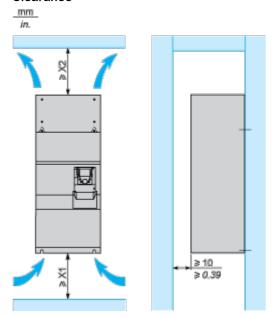
(1) Option cards: I/O extension cards, communication cards or "Controller Inside" programmable card.

ATV61HC50Y

Mounting and Clearance

Mounting Recommendations

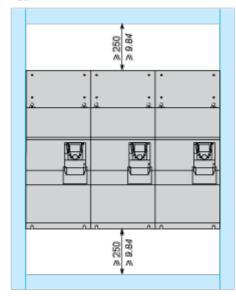
Clearance

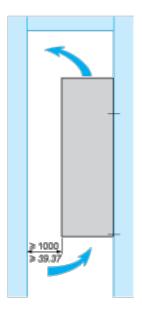


X1 in mm	X2 in mm	X1 in in.	X2 in in.	
250	400	9.84	15.75	

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







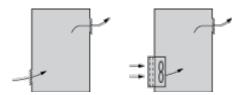
ATV61HC50Y

Specific Recommendations for Mounting the Drive in an Enclosure

Ventilation

To ensure proper air circulation in the drive:

- . Fit ventilation grilles.
- Ensure that there is sufficient ventilation. If there is not, install a forced ventilation unit with a filter. The openings and/or fans must provide a flow rate at least equal to that of the drive fans (refer to the product characteristics).



- Use special filters with IP 54 protection.
- Remove the blanking cover from the top of the drive.

Dust and Damp Proof Metal Enclosure (IP 54)

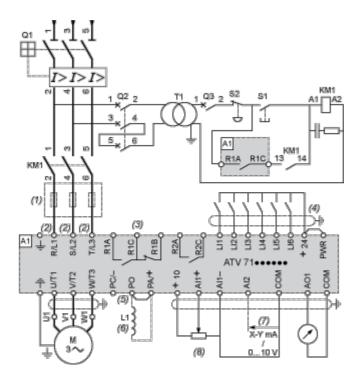
The drive must be mounted in a dust and damp proof enclosure in certain environmental conditions: dust, corrosive gases, high humidity with risk of condensation and dripping water, splashing liquid, etc.

This enables the drive to be used in an enclosure where the maximum internal temperature reaches 50°C.

Connections and Schema

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

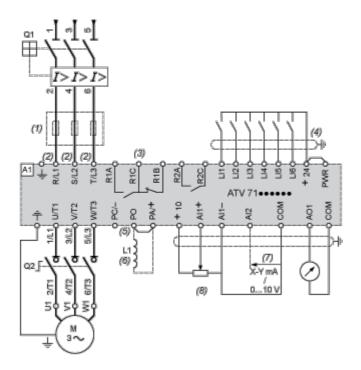
T1 100 VA transformer 220 V secondary

- (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.

Product data sheet ATV61HC50Y

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

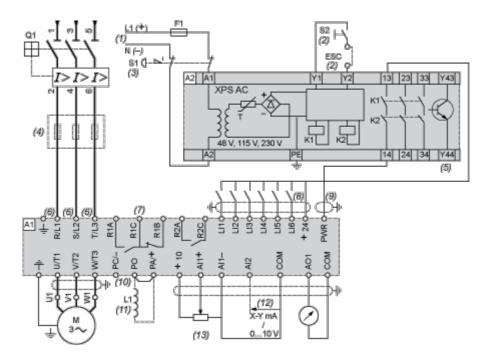
Three-Phase Power Supply with Downstream Breaking via Switch Disconnector



- 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 quide).
- (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.

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,

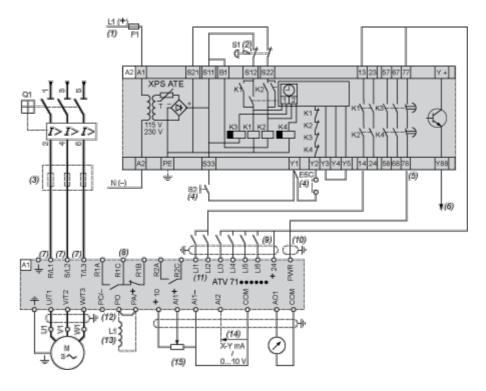
ATV61HC50Y

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.

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 (5) Preventa XPS ATE 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. 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.

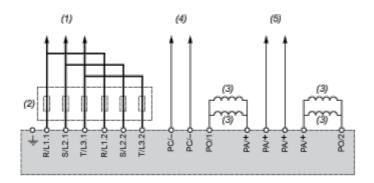
- F1 Fuse
- L1 DC choke
- Q1 Circuit-breaker
- S1 Emergency stop button with 2 contacts
- S2 XB4 B or XB5 A pushbutton
- (1) Power supply: 24 Vdc or Vac, 115 Vac, 230 Vac.
- (2) Requests controlled stopping of the movement and activates the "Power Removal" safety function.
- (3) Line choke (three-phase), 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.

ATV61HC50Y

- (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.

ATV61HC50Y

Power Terminal Connections



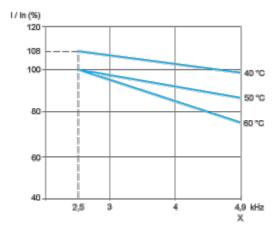
- (1) To circuit-breaker.
- (2) Line chokes, these are mandatory for ATV61HC50Y...HC80Y drives, to be ordered separately.
- (3) DC chokes supplied as standard with ATV61HC50N4, HC63N4 drives. Not available for ATV61HC50Y...HC80Y.
- (4) To DC bus -
- (5) To DC bus +

ATV61HC50Y

Performance Curves

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