

# Product data sheet

Specifications



## variable speed drive ATV71 - 45kW-60HP - 480V- EMC filter- graphic terminal -IP54

ATV71WD45N4A24

⚠ Discontinued on: Mar 31, 2016

⚠ End-of-service on: Apr 1, 2024

⚠ Discontinued

### Main

Range Of Product	Altivar 71
Product Or Component Type	Variable speed drive
Product Specific Application	Complex, high-power machines
Component Name	ATV71
Motor Power Kw	45 kW, 3 phases at 380...480 V
Motor Power Hp	60 hp, 3 phases at 380...480 V
Maximum Motor Cable Length	100 m shielded cable 200 m unshielded cable
Power Supply Voltage	380...480 V - 15...10 %
Network Number Of Phases	3 phases
Line Current	104 A for 380 V 3 phases 45 kW / 60 hp 85 A for 480 V 3 phases 45 kW / 60 hp
Emc Filter	Class A EMC filter integrated
Assembly Style	Enclosed
Variant	Reinforced version With additional power supply 24 V DC With EMC plate
Apparent Power	68.5 kVA at 380 V 3 phases 45 kW / 60 hp
Prospective Line Isc	22 kA for 3 phases
Nominal Output Current	77 A at 2.5 kHz 460 V 3 phases 45 kW / 60 hp 94 A at 2.5 kHz 380 V 3 phases 45 kW / 60 hp
Maximum Transient Current	141 A for 60 s 3 phases 45 kW / 60 hp 155 A for 2 s 3 phases 45 kW / 60 hp
Output Frequency	0.1...500 Hz
Nominal Switching Frequency	2.5 kHz
Switching Frequency	1...16 kHz adjustable 2.5...16 kHz with derating factor
Asynchronous Motor Control Profile	Voltage/frequency ratio (2 or 5 points) Flux vector control (FVC) with sensor (current vector) ENA (Energy adaptation) system for unbalanced loads Sensorless flux vector control (SFVC) (voltage or current vector)
Type Of Polarization	No impedance for Modbus

### Complementary

Disclaimer: 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

<b>Product Destination</b>	Asynchronous motors Synchronous motors
<b>Power Supply Voltage Limits</b>	323...528 V
<b>Power Supply Frequency</b>	50...60 Hz - 5...5 %
<b>Power Supply Frequency Limits</b>	47.5...63 Hz
<b>Speed Range</b>	1...100 for asynchronous motor in open-loop mode, without speed feedback 1...1000 for asynchronous motor in closed-loop mode with encoder feedback 1...50 for synchronous motor in open-loop mode, without speed feedback
<b>Speed Accuracy</b>	+/- 0.01 % of nominal speed in closed-loop mode with encoder feedback 0.2 Tn to Tn +/- 10 % of nominal slip without speed feedback 0.2 Tn to Tn
<b>Torque Accuracy</b>	+/- 15 % in open-loop mode, without speed feedback +/- 5 % in closed-loop mode with encoder feedback
<b>Transient Overtorque</b>	170 % of nominal motor torque +/- 10 % for 60 s every 10 minutes 220 % of nominal motor torque +/- 10 % for 2 s
<b>Braking Torque</b>	<= 150 % with braking or hoist resistor 30 % without braking resistor
<b>Synchronous Motor Control Profile</b>	Vector control without speed feedback
<b>Regulation Loop</b>	Adjustable PI regulator
<b>Motor Slip Compensation</b>	Not available in voltage/frequency ratio (2 or 5 points) Adjustable Automatic whatever the load Suppressable
<b>Diagnostic</b>	1 LED (red) for drive voltage
<b>Output Voltage</b>	<= power supply voltage
<b>Insulation</b>	Electrical between power and control
<b>Type Of Cable For Mounting In An Enclosure</b>	With a NEMA Type1 kit: 3 wire(s)UL 508 cable at 40 °C, copper 75 °C / PVC With an IP21 or an IP31 kit: 3 wire(s)IEC cable at 40 °C, copper 70 °C / PVC Without mounting kit: 1 wire(s)IEC cable at 45 °C, copper 70 °C / PVC Without mounting kit: 1 wire(s)IEC cable at 45 °C, copper 90 °C / XLPE/EPR
<b>Electrical Connection</b>	Terminal, clamping capacity: 2.5 mm², AWG 14 (AI1-/AI1+, AI2, AO1, R1A, R1B, R1C, R2A, R2B, LI1...LI6, PWR) Terminal, clamping capacity: 150 mm² (L1/R, L2/S, L3/T, U/T1, V/T2, W/T3, PC/-, PO, PA/+, PA, PB)
<b>Tightening Torque</b>	0.6 N.m (AI1-/AI1+, AI2, AO1, R1A, R1B, R1C, R2A, R2B, LI1...LI6, PWR) 41 N.m, 360 lb.in (L1/R, L2/S, L3/T, U/T1, V/T2, W/T3, PC/-, PO, PA/+, PA, PB)
<b>Supply</b>	Internal supply for reference potentiometer (1 to 10 kOhm): 10.5 V DC +/- 5 %, <10 mA, protection type: overload and short-circuit protection Internal supply: 24 V DC (21...27 V), <200 mA, protection type: overload and short-circuit protection
<b>Analogue Input Number</b>	2
<b>Analogue Input Type</b>	AI1-/AI1+ bipolar differential voltage: +/- 10 V DC 24 V max, resolution 11 bits + sign AI2 software-configurable current: 0...20 mA, impedance: 242 Ohm, resolution 11 bits AI2 software-configurable voltage: 0...10 V DC 24 V max, impedance: 30000 Ohm, resolution 11 bits
<b>Input Sampling Time</b>	2 ms +/- 0.5 ms (AI1-/AI1+) - analog input(s) 2 ms +/- 0.5 ms (AI2) - analog input(s) 2 ms +/- 0.5 ms (LI1...LI5) - discrete input(s) 2 ms +/- 0.5 ms (LI6)if configured as logic input - discrete input(s)
<b>Response Time</b>	<= 100 ms in STO (Safe Torque Off) AO1 2 ms, tolerance +/- 0.5 ms for analog output(s) R1A, R1B, R1C 7 ms, tolerance +/- 0.5 ms for discrete output(s) R2A, R2B 7 ms, tolerance +/- 0.5 ms for discrete output(s)
<b>Absolute Accuracy Precision</b>	+/- 0.6 % (AI1-/AI1+) for a temperature variation 60 °C +/- 0.6 % (AI2) for a temperature variation 60 °C +/- 1 % (AO1) for a temperature variation 60 °C

Linearity Error	+/- 0.15 % of maximum value (AI1-/AI1+, AI2) +/- 0.2 % (AO1)
Analogue Output Number	1
Analogue Output Type	AO1 software-configurable logic output 10 V 20 mA AO1 software-configurable current 0...20 mA, impedance: 500 Ohm, resolution 10 bits AO1 software-configurable voltage 0...10 V DC, impedance: 470 Ohm, resolution 10 bits
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
Minimum Switching Current	3 mA at 24 V DC for configurable relay logic
Maximum Switching Current	R1, R2: 2 A at 250 V AC inductive load, cos phi = 0.4 R1, R2: 2 A at 30 V DC inductive load, cos phi = 0.4 R1, R2: 5 A at 250 V AC resistive load, cos phi = 1 R1, R2: 5 A at 30 V DC resistive load, cos phi = 1
Discrete Input Number	7
Discrete Input Type	LI1...LI5: programmable 24 V DC with level 1 PLC, impedance: 3500 Ohm LI6: switch-configurable 24 V DC with level 1 PLC, impedance: 3500 Ohm LI6: switch-configurable PTC probe 0...6, impedance: 1500 Ohm PWR: safety input 24 V DC, impedance: 1500 Ohm conforming to ISO 13849-1 level d
Discrete Input Logic	Negative logic (sink) (LI1...LI5), > 16 V (state 0), < 10 V (state 1) Positive logic (source) (LI1...LI5), < 5 V (state 0), > 11 V (state 1) Negative logic (sink) (LI6)if configured as logic input, > 16 V (state 0), < 10 V (state 1) Positive logic (source) (LI6)if configured as logic input, < 5 V (state 0), > 11 V (state 1)
Acceleration And Deceleration Ramps	Linear adjustable separately from 0.01 to 9000 s Automatic adaptation of ramp if braking capacity exceeded, by using resistor S, U or customized
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 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
Communication Port Protocol	Modbus CANopen
Connector Type	1 RJ45 (on front face) for Modbus 1 RJ45 (on terminal) for Modbus Male SUB-D 9 on RJ45 for CANopen
Physical Interface	2-wire RS 485 for Modbus
Transmission Frame	RTU for Modbus
Transmission Rate	4800 bps, 9600 bps, 19200 bps, 38.4 Kbps for Modbus on terminal 9600 bps, 19200 bps for Modbus on front face 20 kbps, 50 kbps, 125 kbps, 250 kbps, 500 kbps, 1 Mbps for CANopen
Data Format	8 bits, 1 stop, even parity for Modbus on front face 8 bits, odd even or no configurable parity for Modbus on terminal

Number Of Addresses	1...127 for CANopen 1...247 for Modbus
Method Of Access	Slave CANopen
Marking	CE
Operating Position	Vertical +/- 10 degree
Height	1000 mm
Depth	364 mm
Width	362 mm
Net Weight	61.5 kg
Option Card	Communication card for CC-Link Controller inside programmable card Communication card for DeviceNet Communication card for EtherNet/IP Communication card for Fipio I/O extension card Communication card for Interbus-S Interface card for encoder Communication card for Modbus Plus Communication card for Modbus TCP Communication card for Modbus/Uni-Telway Overhead crane card Communication card for Profibus DP Communication card for Profibus DP V1

## Environment

Noise Level	63.7 dB conforming to 86/188/EEC
Dielectric Strength	3535 V DC between earth and power terminals 5092 V DC between control and power terminals
Electromagnetic Compatibility	1.2/50 µs - 8/20 µs surge immunity test level 3 conforming to IEC 61000-4-5 Conducted radio-frequency immunity test level 3 conforming to IEC 61000-4-6 Electrical fast transient/burst immunity test level 4 conforming to IEC 61000-4-4 Electrostatic discharge immunity test level 3 conforming to IEC 61000-4-2 Radiated radio-frequency electromagnetic field immunity test level 3 conforming to IEC 61000-4-3 Voltage dips and interruptions immunity test conforming to IEC 61000-4-11
Standards	EN 61800-3 environments 1 category C3 EN/IEC 61800-5-1 IEC 60721-3-3 class 3C2 EN 61800-3 environments 2 category C3 EN 55011 class A group 2 EN/IEC 61800-3 UL Type 12
Product Certifications	GOST C-Tick NOM 117 UL CSA
Pollution Degree	2 conforming to EN/IEC 61800-5-1 3 conforming to UL 840
Ip Degree Of Protection	IP54
Vibration Resistance	1 gn (f= 13...200 Hz) conforming to EN/IEC 60068-2-6 1.5 mm peak to peak (f= 3...13 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 condensation conforming to IEC 60068-2-3 5...95 % without dripping water conforming to IEC 60068-2-3
Ambient Air Temperature For Operation	-10...50 °C (without derating)
Ambient Air Temperature For Storage	-25...70 °C

Operating Altitude	<= 1000 m without derating
	1000...3000 m with current derating 1 % per 100 m

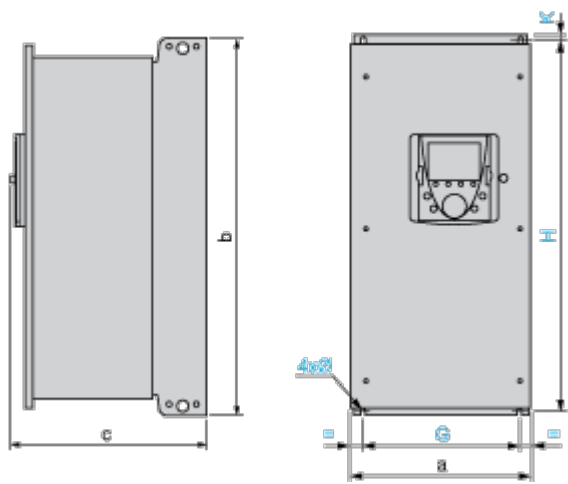
## Contractual warranty

Warranty	18 months
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Dimensions Drawings

UL Type 12/IP 54 Drives

Dimensions



Dimensions in mm

a	b	c	G	H	K	Ø
362	1000	364	300	975	10	9

Dimensions in in.

a	b	c	G	H	K	Ø
14.25	39.37	14.33	11.81	38.39	0.39	0.35

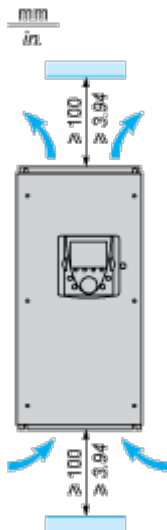
Mounting and Clearance

Mounting Recommendations

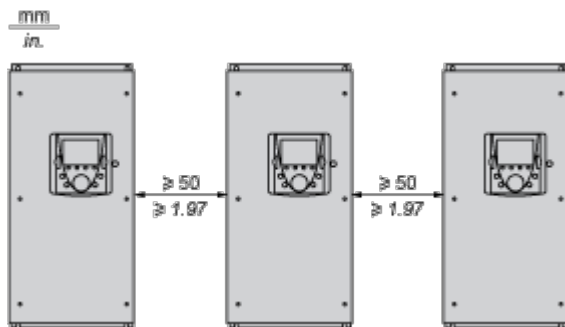
Depending on the conditions in which the drive is to be used, its installation will require certain precautions and the use of appropriate accessories. Install the unit vertically:

- 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



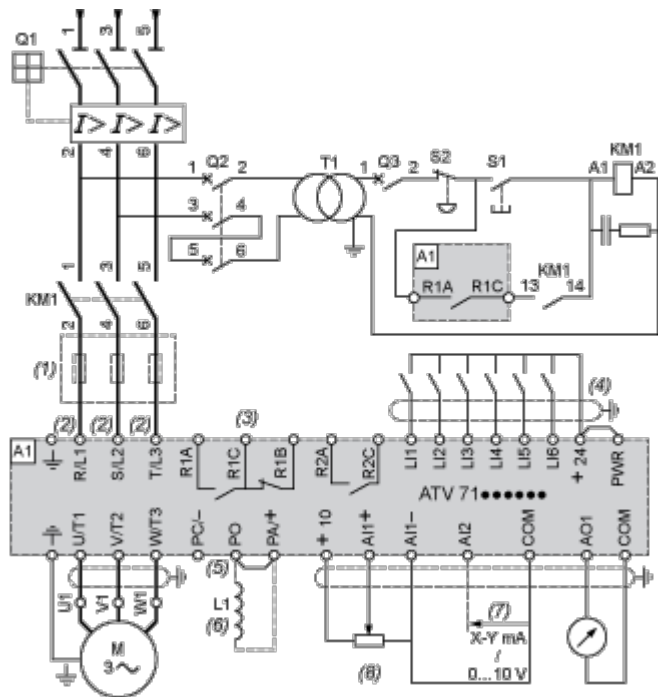
Mounting



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    ATV71 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 ATV71HC11Y...HC63Y drives (except when a special transformer is used (12-pulse)).
- (2)    For ATV71HC40N4 drives combined with a 400 kW motor, ATV71HC50N4 and ATV71HC40Y...HC63Y, 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 ATV71HC11Y...HC63Y drives.
- (6)    Optional DC choke for ATV71H...M3, ATV71HD11M3X...HD45M3X, ATV71•075N4...•D75N4 and ATV71P...N4Z drives. Connected in place of the strap between the PO and PA/+ terminals. For ATV71HD55M3X, HD75M3X, ATV71HD90N4...HC50N4 drives, the choke is supplied with the drive; the customer is responsible for connecting it.
- (7)    Software-configurable current (0...20 mA) or voltage (0...10 V) analog input.
- (8)    Reference potentiometer.

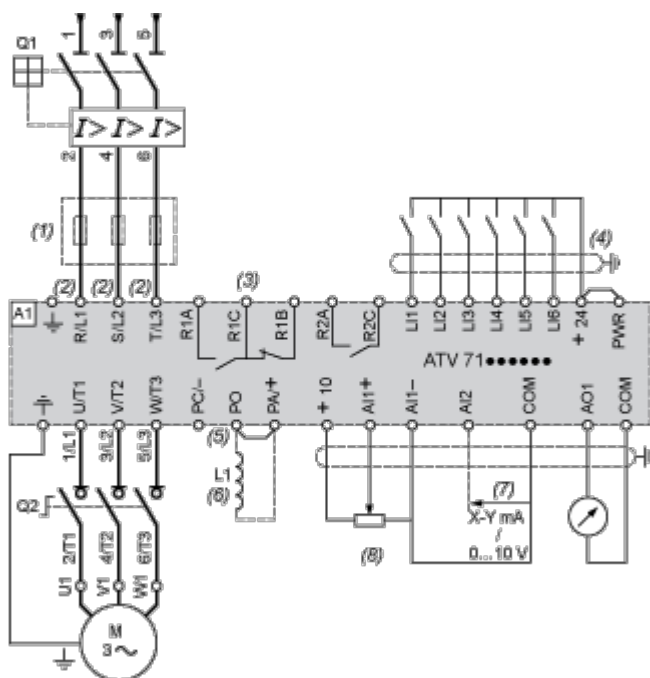


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All terminals are located at the bottom of the drive. Fit interference suppressors on all inductive circuits near the drive or connected on the same circuit, such as relays, contactors, solenoid valves, fluorescent lighting, etc.

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



L1    DC choke

Q1    Circuit-breaker

Q2 Switch disconnecter (Vario)

(1) Line choke (three-phase), mandatory for ATV71HC11Y...HC63Y drives (except when a special transformer is used (12-pulse)).

(2) For ATV71HC40N4 drives combined with a 400 kW motor, ATV71HC50N4 and ATV71HC40Y...HC63Y, 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 ATV71HC11Y...HC63Y drives.

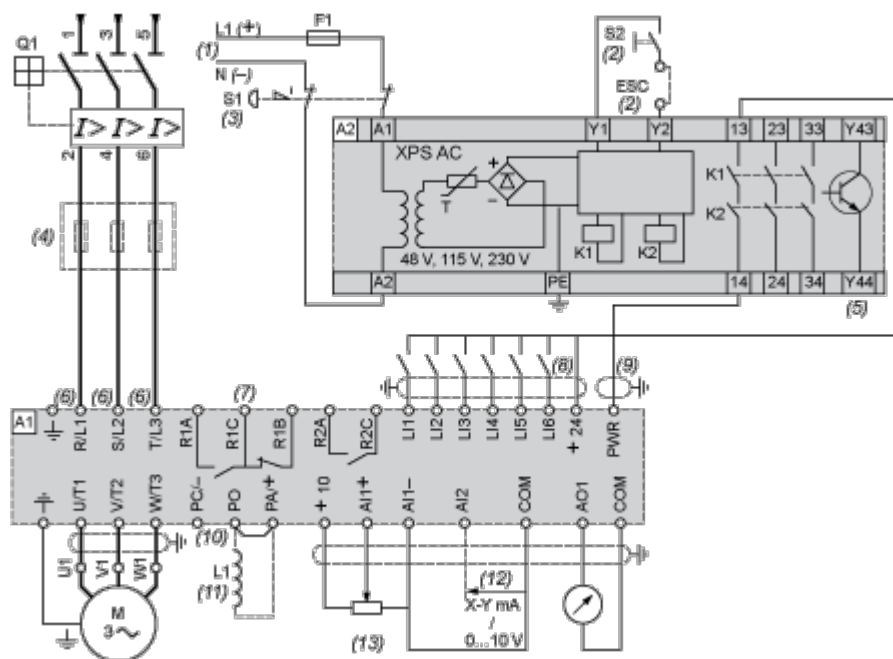
(6) Optional DC choke for ATV71H...M3, ATV71HD11M3X...HD45M3X, ATV71•075N4...•D75N4 and ATV71P...N4Z drives. Connected in place of the strap between the PO and PA/+ terminals. For ATV71HD55M3X, HD75M3X, ATV71HD90N4...HC50N4 drives, the choke is supplied with the drive; the customer is responsible for connecting it.

(7) Software-configurable current (0...20 mA) or voltage (0...10 V) analog input.

(8) Reference potentiometer.

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.

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



**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.

L1    DC choke

S1 Emergency stop button with 2 contacts

S2 XB4 B or XB5 A pushbutton

(1) Power supply: 24 Vdc or Vac, 48 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 ATV71HC11Y...HC63Y 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 ATV71HC40N4 drives combined with a 400 kW motor, ATV71HC50N4 and ATV71HC40Y...HC63Y, 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 ATV71HC11Y...HC63Y drives.

(11) Optional DC choke for ATV71H...M3, ATV71HD11M3X...HD45M3X, ATV71•075N4...•D75N4 and ATV71P...N4Z drives. Connected in place of the strap between the PO and PA/+ terminals. For ATV71HD55M3X...

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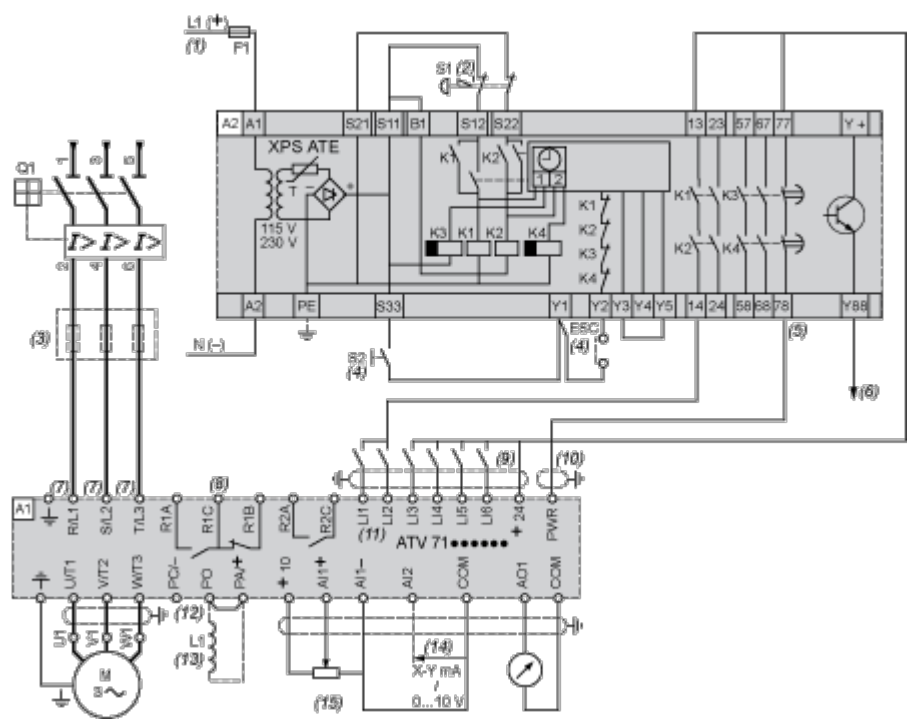
HD75M3X, ATV71HD90N4...HC50N4 drives, the choke is supplied with the drive; the customer is responsible for connecting it.

- (12)    Software-configurable current (0...20 mA) or voltage (0...10 V) analog input.
- (13)    Reference potentiometer.

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    ATV71 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 N/C contacts
- S2    Run button
- (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 ATV71HC11Y...HC63Y 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)    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.
- (6)    The logic output can be used to signal that the machine is in a safe state.
- (7)    For ATV71HC40N4 drives combined with a 400 kW motor, ATV71HC50N4 and ATV71HC40Y...HC63Y, 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 ATV71HC11Y...HC63Y drives.

(13) Optional DC choke for ATV71H...M3, ATV71HD11M3X...HD45M3X, ATV71•075N4...•D75N4 and ATV71P...N4Z drives. Connected in place of the strap between the PO and PA/+ terminals. For ATV71HD55M3X, HD75M3X, ATV71HD90N4...HC50N4 drives, the choke is supplied with the drive; the customer is responsible for connecting it.

(14) Software-configurable current (0...20 mA) or voltage (0...10 V) analog input.

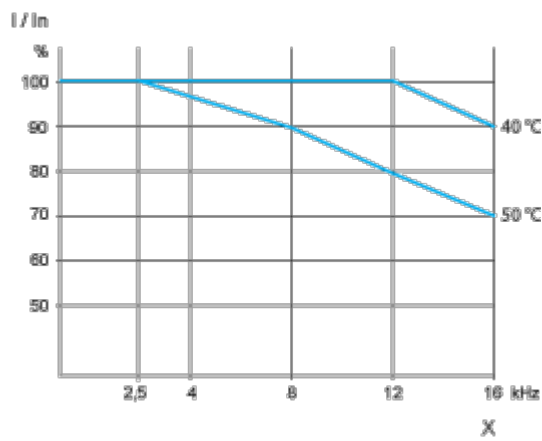
(15) Reference potentiometer.

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.

Performance Curves

Derating Curves

The derating curves for the drive nominal current ( $I_n$ ) depend on the temperature and the switching frequency. For intermediate temperatures (e.g. 45°C), interpolate between 2 curves.



X    Switching frequency