Specifications





# variable speed drive ATV71 - 160kW - 690V - EMC filter-graphic terminal

ATV71HC16Y

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

## Main

Mani	
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	132 kW, 3 phase 500 V 160 kW, 3 phase 690 V
Maximum Motor Cable Length	49.21 ft (15 m) shielded cable 98.43 ft (30 m) unshielded cable
Power Supply Voltage	500690 V - 1510 %
Phase	3 phase
Line Current	163 A 690 V 3 phase 160 kW 182 A 500 V 3 phase 132 kW
Emc Filter	Integrated
Assembly Style	With heat sink
Variant	Reinforced version
Prospective Line Isc	35 kA 3 phase
Nominal Output Current	180 A 2.5 kHz 690 V 3 phase 160 kW 200 A 2.5 kHz 500 V 3 phase 132 kW
Maximum Transient Current	300 A 60 s 3 phase 132 kW 330 A 2 s 3 phase 330 A 2 s 3 phase 160 kW
Output Frequency	0.1500 Hz
Nominal Switching Frequency	2.5 kHz
Switching Frequency	2.54.9 kHz adjustable 2.54.9 kHz with derating factor
Asynchronous Motor Control Profile	Flux vector control (FVC) with sensor (current vector) ENA (Energy adaptation) system for unbalanced loads Sensorless flux vector control (SFVC) (voltage or current vector) Voltage/frequency ratio (2 or 5 points)
Type Of Polarization	No impedance Modbus

# Complementary

Product Destination	Asynchronous motors Synchronous motors
Power Supply Voltage Limits	425759 V

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

Power Supply Frequency	5060 Hz - 55 %					
Power Supply Frequency Limits	47.563 Hz					
Speed Range	1100 asynchronous motor in open-loop mode, without speed feedback     11000 asynchronous motor in closed-loop mode with encoder feedback     150 synchronous motor in open-loop mode, without speed feedback					
Speed Accuracy	+/- 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					
Torque Accuracy	+/- 15 % in open-loop mode, without speed feedback +/- 5 % in closed-loop mode with encoder feedback					
Transient Overtorque	170 % +/- 10 % 60 s every 10 minutes 220 % +/- 10 % 2 s					
Braking Torque	<= 150 % with braking or hoist resistor 30 % without braking resistor					
Synchronous Motor Control Profile	Vector control without speed feedback					
Regulation Loop	Adjustable PI regulator					
Motor Slip Compensation	Automatic whatever the load Suppressable Adjustable Not available in voltage/frequency ratio (2 or 5 points)					
Diagnostic	for drive voltage 1 LED (red)					
Output Voltage	<= power supply voltage					
Insulation	Electrical between power and control					
Type Of Cable For Mounting In An Enclosure	With a NEMA Type1 kit 3 UL 508 cable 104 °F (40 °C), copper 75 °C / PVC With an IP21 or an IP31 kit 3 IEC cable 104 °F (40 °C), copper 70 °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, Ll1Ll6, PWR) Terminal 2 x 120 mm² L1/R, L2/S, L3/T, U/T1, V/T2, W/T3) Terminal 120 mm² PA, PB) Terminal 2 x 120 mm² PC/-, PO, PA/+)					
Tightening Torque	5.31 lbf.in (0.6 N.m) Al1-/Al1+, Al2, AO1, R1A, R1B, R1C, R2A, R2B, Ll1Ll6, PWR) 212.42 lbf.in (24 N.m), 212 lb.in L1/R, L2/S, L3/T, U/T1, V/T2, W/T3) 212.42 lbf.in (24 N.m), 212 lb.in PA, PB) 212.42 lbf.in (24 N.m), 212 lb.in PC/-, PO, PA/+)					
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					
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					
Input Sampling Time	2 ms +/- 0.5 ms Al1-/Al1+) - analog 2 ms +/- 0.5 ms Al2) - analog 2 ms +/- 0.5 ms Ll1Ll5) - discrete 2 ms +/- 0.5 ms Ll6)if configured as logic input - discrete					
Response Time	<= 100 ms in STO (Safe Torque Off) AO1 2 ms +/- 0.5 ms analog R1A, R1B, R1C 7 ms +/- 0.5 ms discrete R2A, R2B 7 ms +/- 0.5 ms discrete					
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 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 020 mA 500 Ohm 10 bits AO1 software-configurable voltage 010 V DC 470 Ohm 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 24 V DC configurable relay logic					
Maximum Switching Current	R1, R2 2 A 250 V AC inductive, cos phi = 0.4 R1, R2 2 A 30 V DC inductive, cos phi = 0.4 R1, R2 5 A 250 V AC resistive, cos phi = 1 R1, R2 5 A 30 V DC resistive, cos phi = 1					
Discrete Input Number	7					
Discrete Input Type	LI1LI5 programmable 24 V DC level 1 PLC 3500 Ohm LI6 switch-configurable 24 V DC level 1 PLC 3500 Ohm LI6 switch-configurable PTC probe 06 1500 Ohm PWR safety input 24 V DC 1500 Ohm ISO 13849-1 level d					
Discrete Input Logic	Negative logic (sink) Ll1Ll5), > 16 V, < 10 V Positive logic (source) Ll1Ll5), < 5 V, > 11 V Negative logic (sink) Ll6)if configured as logic input, > 16 V, < 10 V Positive logic (source) Ll6)if configured as logic input, < 5 V, > 11 V					
Acceleration And Deceleration Ramps	Automatic adaptation of ramp if braking capacity exceeded, by using resistor Linear adjustable separately from 0.01 to 9000 s 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	CANopen Modbus					
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					

Height	46.85 in (1190 mm)
Depth	14.84 in (377 mm)
Width	13.39 in (340 mm)
Net Weight	255.74 lb(US) (116 kg)
Option Card	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
	Interface card for encoder
	Communication card Modbus Plus
	Communication card Modbus TCP
	Communication card Modbus/Uni-Telway
	Overhead crane card
	Communication card Profibus DP
	Communication card Profibus DP V1

## **Environment**

Noise Level	77 dB 86/188/EEC
Dielectric Strength	3110 V DC between earth and power terminals
	5345 V DC between control and power terminals
Electromagnetic Compatibility	1.2/50 μs - 8/20 μs surge immunity test level 3 IEC 61000-4-5
	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
Standards	EN 61800-3 environments 2 category C3
	EN/IEC 61800-5-1
	UL Type 1
	IEC 60721-3-3 class 3C2
	EN/IEC 61800-3
	EN 61800-3 environments 1 category C3
	EN 55011 class A group 2
Product Certifications	NOM 117
	C-tick
	GOST
	UL
	CSA
Pollution Degree	2 EN/IEC 61800-5-1
	3 UL 840
Ip Degree Of Protection	IP41 on upper part EN/IEC 60529
	IP41 on upper part EN/IEC 61800-5-1
	IP54 on lower part EN/IEC 60529
	IP54 on lower 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 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	7 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	14122 °F (-1050 °C) without derating)
Ambient Air Temperature For	-13158 °F (-2570 °C)

# Ordering and shipping details

Category	22133-ATV71 200 THRU 450HP DRIVES
Discount Schedule	CP4C
Gtin	3389119214964
Returnability	No
Country Of Origin	CN

# **Packing Units**

Unit Type Of Package 1	PCE
Number Of Units In Package 1	1
Package 1 Height	21.26 in (54.0 cm)
Package 1 Width	16.93 in (43.0 cm)
Package 1 Length	48.43 in (123.0 cm)
Package 1 Weight	253.53 lb(US) (115.0 kg)

# **Contractual warranty**

Warranty 18 months



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RoHS/REACh

# Well-being performance



Mercury Free



Rohs Exemption Information

Yes

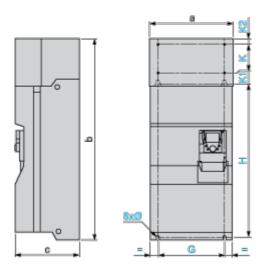
## **Certifications & Standards**

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

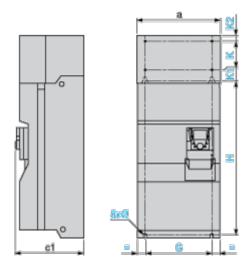
а	b	С	G	Н	K	K1	K2	Ø
340	1190	377	285	920	150	75	30	11.5

#### Dimensions in in.

а	b	С	G	Н	K	K1	K2	Ø
13.39	46.85	14.84	11.22	36.22	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

а	c1	G	Н	K	K1	K2	Ø
340	392	285	920	150	75	30	11.5

Dimensions in in.

# ATV71HC16Y

а	c1	G	Н	K	K1	K2	Ø
13.39	15.43	11.22	36.22	5.90	2.95	1.18	0.45

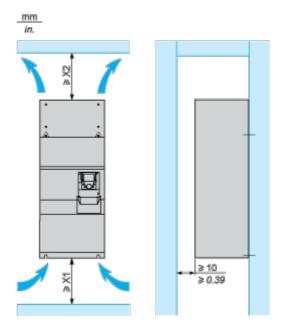
(1) Option cards: I/O extension cards, communication cards or "Controller Inside" programmable card.

# ATV71HC16Y

## Mounting and Clearance

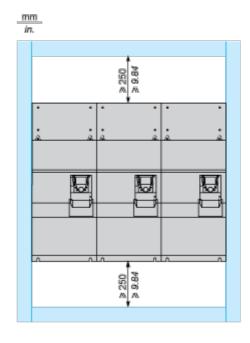
## **Mounting Recommendations**

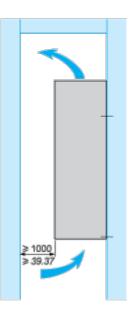
#### Clearance



X1 in mm	X2 in mm	X1 in in.	X2 in in.
150	150	5.91	5.91

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





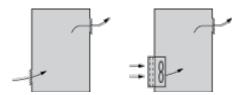
## ATV71HC16Y

#### 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)**

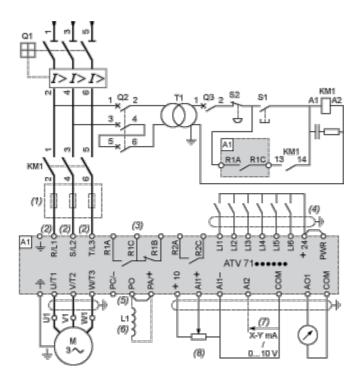
The drive must be mounted in a dust and damp proof enclosure in certain environmental conditions: dust, corrosive gases, high humidity with risk of condensation and dripping water, splashing liquid, etc.

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 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

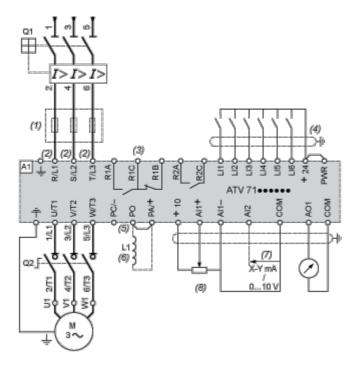
T1 100 VA transformer 220 V secondary

- (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.
- $\hbox{(3)} \quad \hbox{Fault relay contacts. Used for remote signalling of the drive status.}$
- (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.

## ATV71HC16Y

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

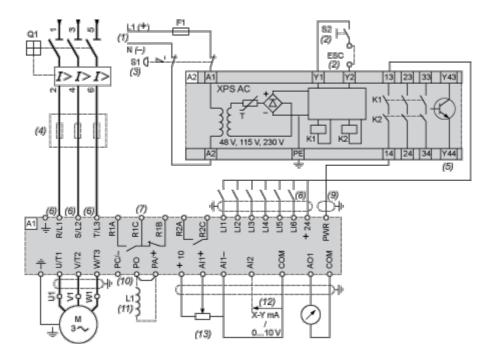
Three-Phase Power Supply with Downstream Breaking via Switch Disconnector



- A1 ATV71 drive
- L1 DC choke
- Q1 Circuit-breaker
- Q2 Switch disconnector (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.

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 ATV71 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, 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,

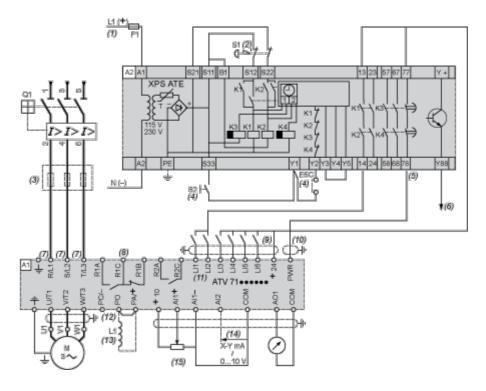
## ATV71HC16Y

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.

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.

## ATV71HC16Y

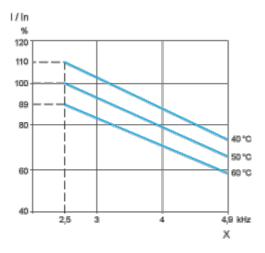
- (9) Connection of the common for the logic inputs depends on the positioning of the SW1 switch. The above diagram shows the internal power supply switched to the "source" position (for other connection types, refer to the user guide).
- (10) Standardized coaxial cable, type RG174/U according to MIL-C17 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.

## ATV71HC16Y

## 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.  $55^{\circ}$ C), interpolate between 2 curves.



#### X Switching frequency