Product data sheet
Characteristics

ATV71QC20Y
variable speed drive ATV71Q - 200kW / 200HP - 500…690V - IP20

Main

Range of product	Altivar 71Q
Product or component type	Variable speed drive
Device short name	ATV71Q
Product destination	Asynchronous motors Synchronous motors
Product specific application	Complex, high-power machines
Assembly style	With heat sink
Variant	Reinforced version
EMC filter	Integrated
Network number of phases	3 phases
[Us] rated supply voltage	500...690 V (- 15...10 %)
Supply voltage limits	425...759 V
Supply frequency	50...60 Hz (- 5...5 %)
Network frequency limits	47.5...63 Hz
Motor power kW	200 kW 3 phases for 690 V 160 kW 3 phases for 500 V
Motor power hp	200 hp 3 phases for 575 V
Motor cable length	<= 400 m unshielded cable with motor choke <= 250 m shielded cable with motor choke <= 30 m unshielded cable without motor choke <= 15 m shielded cable without motor choke
Line current	212 A for 690 V 3 phases / 200 kW 204 A for 600 V 3 phases / 250 hp 227 A for 500 V 3 phases / 160 kW

Complementary

Prospective line Isc	<= 35 kA for 3 phases
Continuous output current	220 A at 2.5 kHz, 690 V - 3 phases 220 A at 2.5 kHz, 575 V - 3 phases 240 A at 2.5 kHz, 500 V - 3 phases
Maximum transient current	396 A for 2 s - 3 phases 360 A for 60 s - 3 phases
Speed drive output frequency	0.1...500 Hz
Nominal switching frequency	2.5 kHz
Switching frequency	2.5...4.9 kHz with derating factor 2...4.9 kHz adjustable
Speed range	1...1000 asynchronous motor in closed-loop mode with encoder feedback 1...50 synchronous motor in open-loop mode, without speed feedback 1...100 asynchronous motor in open-loop mode, without speed feedback
Speed accuracy	+/- 10 % of nominal slip for 0.2 Tn to Tn torque variation, without speed feedback +/- 0.01 % of nominal speed for 0.2 Tn to Tn torque variation, in closed-loop mode with encoder feedback
Torque accuracy	+/- 15 % in open-loop mode, without speed feedback +/- 5 % in closed-loop mode with encoder feedback
Transient overtorque	220 % of nominal motor torque, +/- 10 % for 2 s 170 % of nominal motor torque, +/- 10 % for 60 s
Braking torque	< 150 % with braking or hoist resistor 30 % without braking resistor

Asynchronous motor control profile	Voltage/Frequency ratio, 2 points Voltage/Frequency ratio, 5 points Flux vector control without sensor, standard Voltage/Frequency ratio - Energy Saving, quadratic U/f Flux vector control without sensor, ENA (energy Adaptation) system Flux vector control without sensor, 2 points Flux vector control with sensor, standard
Synchronous motor control profile	Vector control without sensor, standard Vector control with sensor, standard
Regulation loop	Adjustable PI regulator
Motor slip compensation	Adjustable Automatic whatever the load Not available in voltage/frequency ratio (2 or 5 points) Suppressable
Local signalling	1 LED - red - drive voltage
Output voltage	<= power supply voltage
Isolation	Electrical between power and control
Type of cable	UL 508 cable with a NEMA Type1 kit : 3 wire(s) - 40 °C, copper 75 °C / PVC IEC cable with an IP21 or an IP31 kit : 3 wire(s) - 40 °C, copper 70 °C / PVC IEC cable without mounting kit : 1 wire(s) - 45 °C, copper 70 °C / PVC IEC cable without mounting kit : 1 wire(s) - 45 °C, copper 90 °C / XLPE/EPR
Electrical connection	Terminal 4 x 185 mm² (PC/-, PA/+) Terminal 4 x 185 mm² (L1/R, L2/S, L3/T, U/T1, V/T2, W/T3) Terminal 2.5 mm² / AWG 14 (AI1-/AI1+, AI2, AO1, R1A, R1B, R1C, R2A, R2B, LI1...LI6, PWR)
Tightening torque	0.6 N.m (AI1-/AI1+, AI2, AO1, R1A, R1B, R1C, R2A, R2B, LI1...LI6, PWR) 41 N.m, 360 lb.in (PC/-, PA/+) 41 N.m, 360 lb.in (L1/R, L2/S, L3/T, U/T1, V/T2, W/T3)
Supply	Internal supply : 24 V DC (21...27 V) - <= 200 mA with overload and short-circuit protection Internal supply for reference potentiometer (1 to 10 kOhm) : 10.5 V DC, +/- 5 % - <= 10 mA with overload and short-circuit protection
Analogue input number	2
Analogue input type	Software-configurable current : (AI2) 0...20 mA - 242 Ohm - resolution: 11 bits Bipolar differential voltage : (AI1-/AI1+) +/- 10 V DC - 24 V max - resolution: 11 bits + sign Software-configurable voltage : (AI2) 0...10 V DC - 24 V max - 30000 Ohm - resolution: 11 bits
Sampling duration	2 ms +/- 0.5 ms (AI2) for analog output 2 ms +/- 0.5 ms (AI1-/AI1+) for analog output 2 ms +/- 0.5 ms (LI1...LI5) for discrete input 2 ms +/- 0.5 ms (LI6) if configured as logic input for discrete input
Accuracy	+/- 1 % (AO1) for a temperature variation 60 °C +/- 0.6 % (AI2) for a temperature variation 60 °C +/- 0.6 % (AI1-/AI1+) for a temperature variation 60 °C
Linearity error	+/- 0.2 % (AO1) +/- 0.15 % of maximum value (AI1-/AI1+, AI2)
Analogue output number	1
Analogue output type	Software-configurable logic output : (AO1) 10 V - <= 20 mA Software-configurable current : (AO1) 0...20 mA - 500 Ohm - resolution: 10 bits Software-configurable voltage : (AO1) 0...10 V DC - 470 Ohm - resolution: 10 bits
Discrete output number	2
Discrete output type	Configurable relay logic : (R2A, R2B) NO - 100000 cycles Configurable relay logic : (R1A, R1B, R1C) NO/NC - 100000 cycles
Response time	<= 100 ms in STO (Safe Torque Off) 2 ms +/- 0.5 ms (AO1) 7 ms +/- 0.5 ms (R2A, R2B) 7 ms +/- 0.5 ms (R1A, R1B, R1C)
Minimum switching current	3 mA at 24 V DC (configurable relay logic)
Maximum switching current	2 A at 30 V DC on inductive load - cos phi = 0.4 - L/R = 7 ms (R1, R2) 2 A at 250 V AC on inductive load - cos phi = 0.4 - L/R = 7 ms (R1, R2) 5 A at 30 V DC on resistive load - cos phi = 1 - L/R = 0 ms (R1, R2) 5 A at 250 V AC on resistive load - cos phi = 1 - L/R = 0 ms (R1, R2)
Discrete input number	7
Discrete input type	Safety input (PWR) 24 V DC - 1500 Ohm conforming to ISO 13849-1 level d Switch-configurable PTC probe (LI6) - 0...6 probes - 1500 Ohm Switch-configurable (LI6) 24 V DC, with level 1 PLC - 3500 Ohm Programmable (LI1...LI5) 24 V DC, with level 1 PLC - 3500 Ohm

Discrete input logic	Positive logic (source) (PWR) , < 2 V (state 0), > 17 V (state 1) 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	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	Power removal for motor Motor phase break for motor Thermal protection for motor Against input phase loss for drive Line supply overvoltage for drive Line supply undervoltage for drive Against exceeding limit speed for drive Break on the control circuit for drive Overvoltages on the DC bus for drive Overcurrent between output phases and earth for drive Input phase breaks for drive Short-circuit between motor phases for drive Thermal protection for drive Overheating protection for drive
Dielectric strength	5345 V DC between control and power terminals 3110 V DC between earth and power terminals
Insulation resistance	> 1 mOhm at 500 V DC for 1 minute to earth
Frequency resolution	0.024/50 Hz for analog input 0.1 Hz for display unit
Communication port protocol	CANopen Modbus
Type of connector	1 RJ45 for CANopen 1 RJ45 for Modbus on terminal 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 4800 bps, 9600 bps, 19200 bps, 38.4 Kbps for Modbus on terminal 9600 bps, 19200 bps for Modbus on front face
Data format	8 bits, odd even or no configurable parity for Modbus on terminal 8 bits, 1 stop, even parity for Modbus on front face
Type of polarization	No impedance for Modbus
Number of addresses	1...127 addresses for CANopen 1...247 addresses for Modbus
Method of access	Slave for CANopen
Type of cooling	Water cooled
Cooling fluid type	Water-glycol mixture Clean water Industrial water
Operating temperature water	5...55 °C
Thermal losses	730 W 100 % of line current for area of air cooling (control part) 3000 W 100 % of line current for area of liquid cooling (power part)
Flow velocity	24
Pressure drop	<= 1 bar
Volume of cooling water	0.4 l
Operating position	Vertical +/- 10 degree
Product weight	140 kg

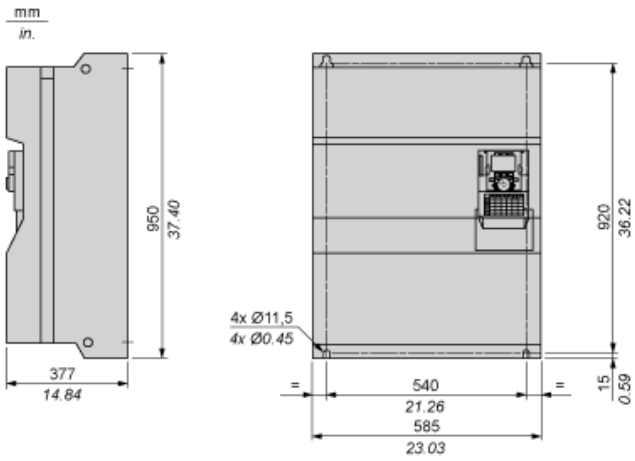
Option card	Overhead crane card Controller inside programmable card I/O extension card Interface card for encoder Communication card for CC-Link Communication card for Interbus-S Communication card for Profibus DP V1 Communication card for Profibus DP Communication card for DeviceNet Communication card for Ethernet/IP Communication card for Modbus Plus Communication card for Modbus/Uni-Telway Communication card for Fipio Communication card for Modbus TCP
Width	585 mm
Height	950 mm
Depth	377 mm

Environment

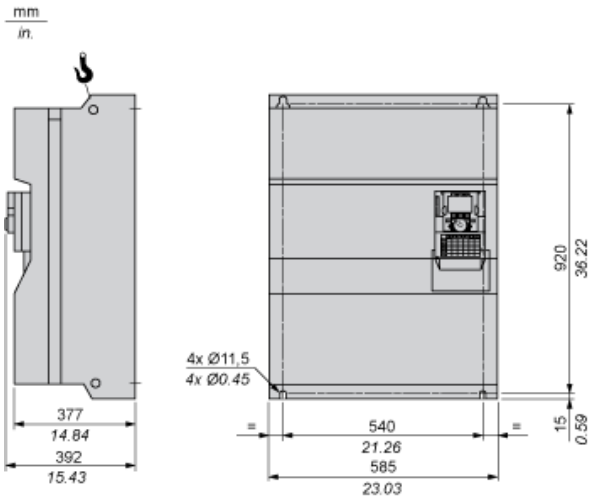
Ambient air temperature for operation	-10...50 °C without derating
Ambient air temperature for storage	-25...70 °C
Operating altitude	1000...2260 m with current derating 1 % per 100 m <= 1000 m without derating
Electromagnetic compatibility	Voltage dips and interruptions immunity test conforming to IEC 61000-4-11 Conducted radio-frequency immunity test level 3 conforming to IEC 61000-4-6 1.2/50 µs - 8/20 µs surge immunity test level 3 conforming to IEC 61000-4-5 Electrical fast transient/burst immunity test level 4 conforming to IEC 61000-4-4 Radiated radio-frequency electromagnetic field immunity test level 3 conforming to IEC 61000-4-3 Electrostatic discharge immunity test level 3 conforming to IEC 61000-4-2
Pollution degree	3 conforming to UL 840 2 conforming to EN/IEC 61800-5-1
IP degree of protection	IP54 on lower part conforming to EN/IEC 60529 IP54 on lower part conforming to EN/IEC 61800-5-1 IP30 on side parts conforming to EN/IEC 60529 IP30 on side parts conforming to EN/IEC 61800-5-1 IP30 on the front panel conforming to EN/IEC 60529 IP30 on the front panel conforming to EN/IEC 61800-5-1 IP41 on upper part conforming to EN/IEC 60529 IP41 on upper part conforming to EN/IEC 61800-5-1 IP00 conforming to EN/IEC 60529 IP00 conforming to EN/IEC 61800-5-1
Vibration resistance	0.6 gn (f = 10...200 Hz) conforming to EN/IEC 60068-2-6 1.5 mm peak to peak (f = 3...10 Hz) conforming to EN/IEC 60068-2-6
Shock resistance	4 gn for 11 ms conforming to EN/IEC 60068-2-27
Relative humidity	5...95 % without dripping water conforming to IEC 60068-2-3 5...95 % without condensation conforming to IEC 60068-2-3
Noise level	77 dB conforming to 86/188/EEC
Standards	EN 55011 class A group 2 EN 61800-3 environments 1 category C3 EN 61800-3 environments 2 category C3 EN/IEC 61800-3 EN/IEC 61800-5-1 IEC 60721-3-3 class 3C2 ISO 13849-1 level d UL Type 1 IEC 61508 SIL2
Product certifications	CSA C-Tick GOST NOM 117 UL
Marking	CE

Dimensions

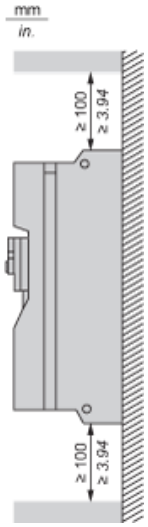
Without or with 1 option card



With 2 option cards

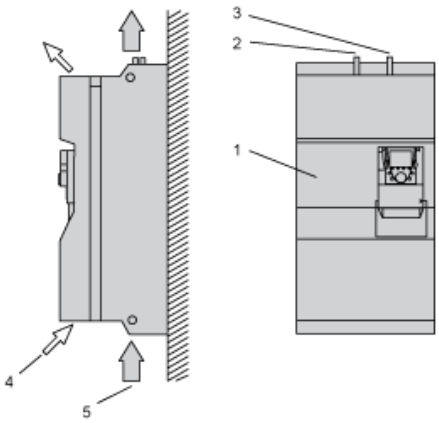


Clearance



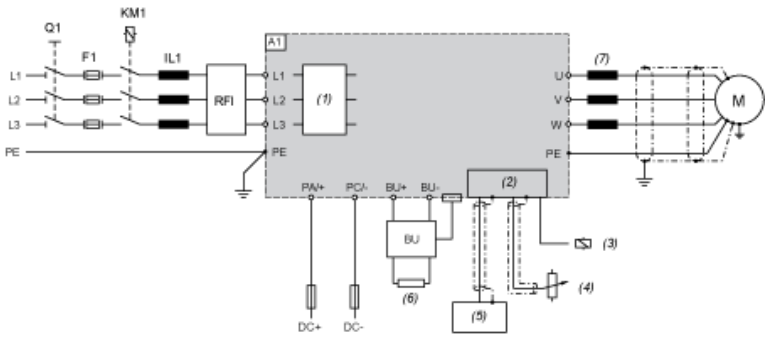
Wall-Mounting

The drive is designed for installation on the wall, in an electrical room or into an enclosure. The device is built according to pollution degree 2. If the environment does not correspond to these conditions then the necessary transition of the pollution degree must be provided e.g. by means of an enclosure.



(1) Drive
(2) Cooling water inlet
(3) Cooling water return
(4) Cooling air for control part
(5) Cooling air for power part (only capacitors)

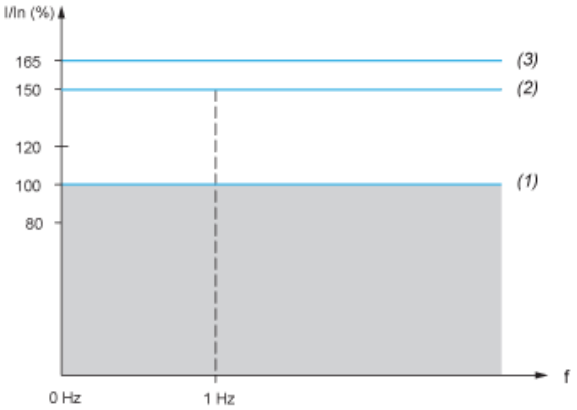
Wiring Diagram



A1 Drive
BU Braking Unit
F1 Fast-acting semi-conductor fuse
IL1 Line choke
KM1 Optional line contactor
M Motor
Q1 Switch
RFI Optional radio frequency interference filter
(1) Filter
(2) Control
(3) Relay control
(4) Control potentiometer
(5) PLC
(6) External optional braking resistor
(7) Optional motor choke

Continuous Current at Output Frequencies < 1 Hz

Due to the especially efficient liquid cooling of the drive the full overload capability is also available in the speed range of 0 Hz.



(1) Continuous operation: 150% (165%) overload capability
(2) Overload 150% for 60 s
(3) Overload 165% for 2 s

Power Derating

4 kHz pulse frequency	+5°K air temperature
18%	5%