

ATV61QC40Y

variable speed drive ATV61Q - 400kW / 450HP
- 500...690V - IP20



Main

Range of product	Altivar 61Q
Product or component type	Variable speed drive
Device short name	ATV61Q
Product destination	Asynchronous motors Synchronous motors
Product specific application	Pumping and ventilation machine
Assembly style	With heat sink
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	400 kW 3 phases for 690 V 315 kW 3 phases for 500 V
Motor power hp	450 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	426 A for 500 V 3 phases / 315 kW / 450 hp 394 A for 690 V 3 phases / 315 kW / 450 hp 390 A for 600 V 3 phases / 315 kW / 450 hp

Complementary

Prospective line I _{sc}	35 kA for 3 phases
Continuous output current	462 A at 2.5 kHz, 500 V - 3 phases 420 A at 2.5 kHz, 690 V - 3 phases 420 A at 2.5 kHz, 575 V - 3 phases
Maximum transient current	554.4 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...100 in open-loop mode, without speed feedback
Speed accuracy	+/- 10 % of nominal slip for 0.2 T _n to T _n 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 <= 125 % with 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
Synchronous motor control profile	Vector control without sensor, standard
Regulation loop	Frequency PI regulator

Motor slip compensation	Adjustable Automatic whatever the load Can be suppressed Not available in voltage/frequency ratio (2 or 5 points)
Local signalling	1 LED - red - drive voltage
Output voltage	<= power supply voltage
Isolation	Between power and control terminals
Type of cable	IEC cable without mounting kit : 1 wire(s) - 45 °C, copper 90 °C / XLPE/EPR IEC cable without mounting kit : 1 wire(s) - 45 °C, copper 70 °C / PVC UL 508 cable with UL Type 1 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
Electrical connection	Terminal 4 x 185 mm ² / 3 x 350 kcmil (PC/-, PA/+) Terminal 4 x 185 mm ² / 3 x 350 kcmil (L1/R, L2/S, L3/T, U/T1, V/T2, W/T3) Terminal 2.5 mm ² / 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 External supply : 24 V DC (19...30 V) - 30 W
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 (LI1...LI5) for discrete input 2 ms +/- 0.5 ms (AO1) for analog output 2 ms +/- 0.5 ms (AI2) for analog input 2 ms +/- 0.5 ms (AI1-/AI1+) for analog 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 (AI2) +/- 0.15 % of maximum value (AI1-/AI1+)
Analogue output number	1
Analogue output type	Software-configurable logic output : (AO1) 10 V - <= 20 mA Software-configurable voltage : (AO1) 0...10 V DC - 470 Ohm - resolution: 10 bits Software-configurable current : (AO1) 0...20 mA - 500 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) <= 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	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) 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)
Discrete input number	7
Discrete input type	Safety input (PWR) 24 V DC - 1500 Ohm 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) (LI1...LI5) , < 5 V (state 0), > 11 V (state 1) Negative logic (sink) (LI1...LI5) , > 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) Negative logic (sink) (LI6) if configured as logic input, > 16 V (state 0), < 10 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

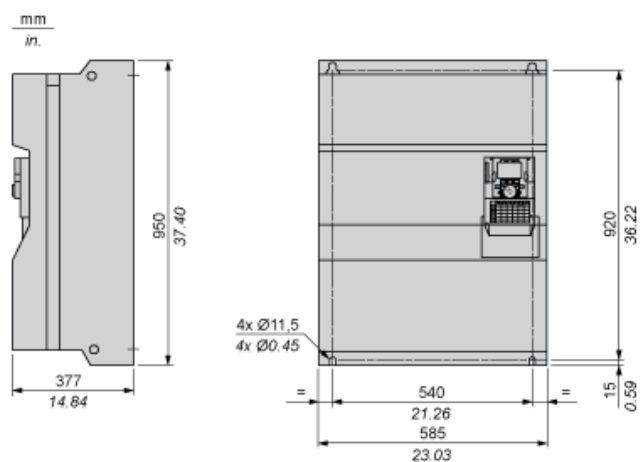
Protection type	Thermal protection for motor Power removal for motor Motor phase break for motor Thermal protection for drive Short-circuit between motor phases for drive Power removal for drive Overvoltages on the DC bus for drive Overheating protection for drive Overcurrent between output phases and earth for drive Line supply undervoltage for drive Line supply overvoltage for drive Input phase breaks for drive Break on the control circuit for drive Against input phase loss for drive Against exceeding limit speed 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	0.1 Hz for display unit 0.024/50 Hz for analog input
Communication port protocol	CANopen Modbus
Type of connector	Male SUB-D 9 on 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 9600 bps, 19200 bps for Modbus on front face 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 8 bits, 1 stop, even parity for Modbus on front face
Type of polarization	No impedance for Modbus
Number of addresses	1...247 addresses for Modbus 1...127 addresses for CANopen
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	1020 W 100 % of line current for area of air cooling (control part) 6000 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	Multi-pump card I/O extension card Controller inside programmable card Communication card for Profibus DP V1 Communication card for Profibus DP Communication card for Modbus/Uni-Telway Communication card for Modbus TCP Communication card for Modbus Plus Communication card for METASYS N2 Communication card for LonWorks Communication card for Interbus-S Communication card for Fipio Communication card for Ethernet/IP Communication card for DeviceNet Communication card for CC-Link Communication card for BACnet Communication card for APOGEE FLN
Width	585 mm
Height	950 mm
Depth	377 mm

Environment

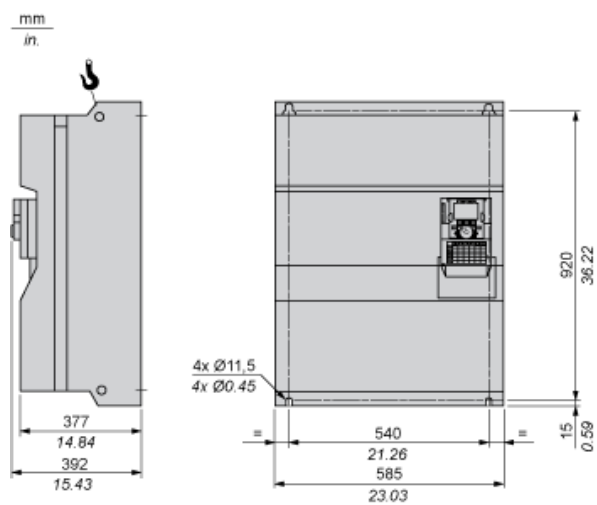
Ambient air temperature for operation	50...60 °C with derating factor -10...50 °C without derating
Ambient air temperature for storage	-25...70 °C
Operating altitude	1000...2260 m with current derating 1 % per 100 m ≤ 1000 m without derating
Electromagnetic compatibility	Voltage dips and interruptions immunity test conforming to IEC 61000-4-11 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 Electrical fast transient/burst immunity test level 4 conforming to IEC 61000-4-4 Conducted radio-frequency immunity test level 3 conforming to IEC 61000-4-6
Pollution degree	3 conforming to UL 840 3 conforming to EN/IEC 61800-5-1
IP degree of protection	IP54 on lower part conforming to EN/IEC 61800-5-1 IP54 on lower part conforming to EN/IEC 60529 IP41 on upper part conforming to EN/IEC 61800-5-1 IP41 on upper part conforming to EN/IEC 60529 IP30 on the front panel conforming to EN/IEC 61800-5-1 IP30 on the front panel conforming to EN/IEC 60529 IP30 on side parts conforming to EN/IEC 61800-5-1 IP30 on side parts conforming to EN/IEC 60529 IP00 conforming to EN/IEC 61800-5-1 IP00 conforming to EN/IEC 60529
Vibration resistance	1.5 mm peak to peak (f = 3...10 Hz) conforming to EN/IEC 60068-2-6 0.6 gn (f = 10...200 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 UL Type 1
Product certifications	CSA C-Tick DNV GOST NOM 117 UL
Marking	CE

Dimensions

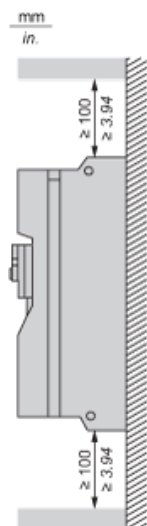
Without or with 1 option card



With 2 option cards

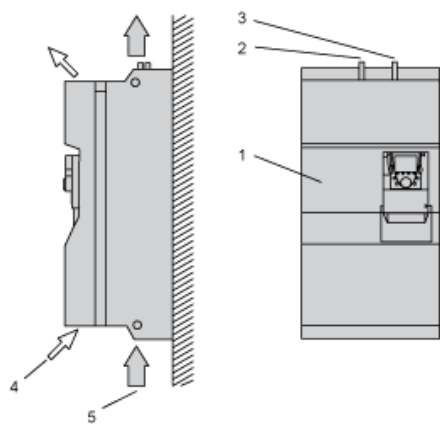


Clearance



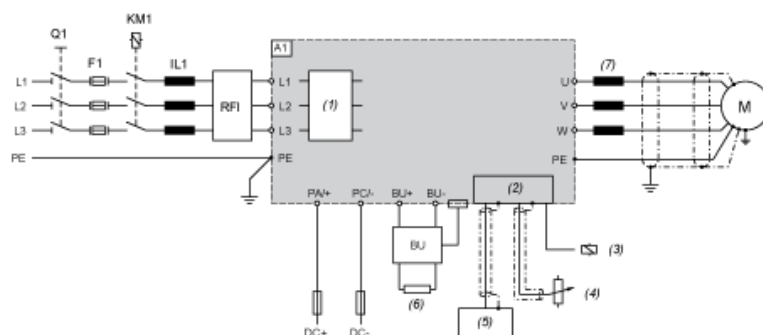
Wall-Mounting

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)

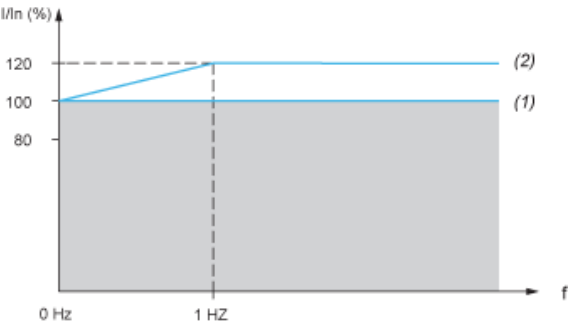
Wiring Diagram



- 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 a high overload capability is also available in the speed range of < 1 Hz.



- (1) Continuous operation: 120% overload capability
- (2) Overload 120% for 60 s

Power Derating

4 kHz pulse frequency	+5°K air temperature
22%	7%