

# ATV71EXS5C11N4

enclosed variable speed drive ATV71 Plus -  
110 kW - 400V - IP54 SA



## Main

Range of product	Altivar 71 Plus
Product or component type	Variable speed drive
Device short name	ATV71 Plus
Product destination	Asynchronous motors Synchronous motors
Product specific application	Complex, high-power machines
Assembly style	In floor-standing enclosure with separate air flows
Product composition	A DC choke A plinth An IP65 remote mounting kit for graphic display terminal A switch and fast-acting semi-conductor fuses A wired ready-assembled Sarel Spacial 6000 enclosure Terminals/Bars for motor connection ATV71HC11N4 drive on heatsink
EMC filter	Integrated
Network number of phases	3 phases
Rated supply voltage	(+/- 10 %)
Supply voltage limits	342...457 V
Supply frequency	50...60 Hz (+/- 5 %)
Network frequency	47.5...63 Hz
Motor power kW	110 kW for 380...415 V
Line current	194 A for 400 V / 110 kW

## Complementary

Apparent power	133 kVA for 400 V / 110 kW
Prospective line I <sub>sc</sub>	50 kA with external fuses
Continuous output current	215 A at 2.5 kHz, 400 V / 110 kW
Maximum transient current	323 A for 60 s / 110 kW
Speed drive output frequency	0.1...500 Hz
Nominal switching frequency	2.5 kHz
Switching frequency	2...8 kHz adjustable 2.5...8 kHz with derating factor
Speed range	1...50 synchronous motor in open-loop mode, without speed feedback 1...1000 asynchronous motor in closed-loop mode with encoder feedback 1...100 asynchronous motor in open-loop mode, without speed feedback
Speed accuracy	+/- 10 % of nominal slip for 0.2 T <sub>n</sub> to T <sub>n</sub> torque variation, without speed feedback +/- 0.01 % of nominal speed for 0.2 T <sub>n</sub> to T <sub>n</sub> torque variation, in closed-loop mode with encoder feedback
Torque accuracy	+/- 5 % in closed-loop mode with encoder feedback +/- 15 % in open-loop mode, without speed feedback
Transient overtorque	220 % of nominal motor torque for 2 s 170 % of nominal motor torque for 60 s
Braking torque	30 % without braking resistor <= 150 % with braking or hoist resistor

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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
Overvoltage category	Class 3 conforming to EN 50178
Local signalling	LCD display unit - operation function, status and configuration - mounted in the front door
Output voltage	<= rated supply voltage
Isolation	Electrical between power and control
Type of cable for external connection	IEC cable - 40 °C, copper 70 °C / PVC
Electrical connection	Terminal M12 - 2 x 185 mm <sup>2</sup> (L1/R, L2/S, L3/T) bottom entry Terminal - 2.5 mm <sup>2</sup> / AWG 14 (AI1-/AI1+, AI2, AO1, R1A, R1B, R1C, R2A, R2B, LI1...LI6, PWR) bottom entry Terminal M10 - 2 x 150 mm <sup>2</sup> (U/T1, V/T2, W/T3) bottom entry
Motor recommended cable cross section	3 x 120 mm <sup>2</sup>
Short circuit protection	315 A fuse protection type gI - power supply upstream
Supply	Internal supply : 24 V DC (21...27 V) - 0...100 mA Internal supply for reference potentiometer : 10 V DC (10...11 V) - 0...10 mA External supply : 24 V DC (19...30 V) - 1 A
Analogue input number	2
Analogue input type	Software-configurable current : (AI2) 0...20 mA - 24 V max - 250 Ohm - sampling time: 1.5...2.5 ms - resolution: 11 bits Software-configurable voltage : (AI2) 0...10 V DC - 30000 Ohm - sampling time: 1.5...2.5 ms - resolution: 11 bits Bipolar differential voltage : (AI1-/AI1+) +/- 10 V DC - 24 V max - sampling time: 1.5...2.5 ms - resolution: 11 bits + sign
Analogue output number	1
Analogue output type	Software-configurable current : (AO1) 0...20 mA/4...20 mA - 470 Ohm - sampling time: 1.5...2.5 ms - resolution: 10 bits Software-configurable voltage : (AO1) 0...10 V DC - 500 Ohm - sampling time: 1.5...2.5 ms - resolution: 10 bits
Discrete output number	2
Discrete output type	Configurable relay logic : (R2A, R2B) NO - 6.5...7.5 ms - 100000 cycles Configurable relay logic : (R1A, R1B, R1C) NO/NC - 6.5...7.5 ms - 100000 cycles
Minimum switching current	3 mA at 24 V DC (configurable relay logic)
Maximum switching current	2 A at 30 V DC on inductive load - L/R = 7 ms (R1, R2) 2 A at 250 V AC on inductive load - cos phi = 0.4 (R1, R2) 5 A at 30 V DC on resistive load - L/R = 0 ms (R1, R2) 5 A at 250 V AC on resistive load - cos phi = 1 (R1, R2)
Discrete input number	7
Discrete input type	Safety input (PWR) 24 V DC (<= 30 V) - 1.5 kOhm Switch-configurable (LI6) 24 V DC (<= 30 V) , with level 1 PLC - 1.5 kOhm - sampling time: 1.5...2.5 ms Programmable (LI1...LI5) 24 V DC (<= 30 V) , with level 1 PLC - 3.5 kOhm - sampling time: 1.5...2.5 ms
Discrete input logic	Positive logic (source) (PWR) , 0...2 V (state 0), 17...30 V (state 1) Negative logic (sink) (LI1...LI6) , 16...30 V (state 0), 0...10 V (state 1) Positive logic (source) (LI1...LI6) , 0...5 V (state 0), 11...30 V (state 1)
Acceleration and deceleration ramps	Linear adjustable separately from 0.01 to 9000 s S, U or customized
Braking to standstill	By DC injection

Protection type	<ul style="list-style-type: none"> <li>Thermal protection for motor</li> <li>Power removal for motor</li> <li>Motor phase break for motor</li> <li>Thermal protection for drive</li> <li>Short-circuit between motor phases for drive</li> <li>Overvoltages on the DC bus for drive</li> <li>Overheating protection for drive</li> <li>Overcurrent between output phases and earth for drive</li> <li>Line supply undervoltage for drive</li> <li>Line supply overvoltage for drive</li> <li>Input phase breaks for drive</li> <li>Break on the control circuit for drive</li> <li>Against input phase loss for drive</li> <li>Against exceeding limit speed for drive</li> </ul>
Dielectric strength	<ul style="list-style-type: none"> <li>5092 V DC between control and power terminals</li> <li>3535 V DC between earth and power terminals</li> </ul>
Insulation resistance	> 1 mOhm at 500 V DC for 1 minute to earth
Frequency resolution	<ul style="list-style-type: none"> <li>0.1 Hz for display unit</li> <li>0.024/50 Hz for analog input</li> </ul>
Communication port protocol	<ul style="list-style-type: none"> <li>CANopen</li> <li>Modbus</li> </ul>
Type of connector	<ul style="list-style-type: none"> <li>Male SUB-D 9 on RJ45 for CANopen</li> <li>1 RJ45 for Modbus on terminal</li> <li>1 RJ45 for Modbus on front face</li> </ul>
Physical interface	2-wire RS 485 for Modbus
Transmission frame	RTU for Modbus
Transmission rate	<ul style="list-style-type: none"> <li>20 kbps, 50 kbps, 125 kbps, 250 kbps, 500 kbps, 1 Mbps for CANopen</li> <li>9600 bps, 19200 bps for Modbus on front face</li> <li>4800 bps, 9600 bps, 19200 bps, 38.4 Kbps for Modbus on terminal</li> </ul>
Data format	<ul style="list-style-type: none"> <li>8 bits, odd even or no configurable parity for Modbus on terminal</li> <li>8 bits, 1 stop, even parity for Modbus on front face</li> </ul>
Type of polarization	No impedance for Modbus
Number of addresses	<ul style="list-style-type: none"> <li>1...247 addresses for Modbus</li> <li>1...127 addresses for CANopen</li> </ul>
Method of access	Slave for CANopen
Option card	<ul style="list-style-type: none"> <li>Encoder interface cards</li> <li>Extended I/O extension card</li> <li>Basic I/O extension card</li> <li>Controller inside programmable card</li> <li>Communication card for Modbus TCP/IP</li> <li>Communication card for Profibus DP V1</li> <li>Communication card for Profibus DP</li> <li>Communication card for Modbus/Uni-Telway</li> <li>Communication card for Modbus Plus</li> <li>Communication card for Interbus-S</li> <li>Communication card for Fipio</li> <li>Communication card for Ethernet/IP</li> <li>Communication card for DeviceNet</li> <li>Communication card for CC-Link</li> </ul>

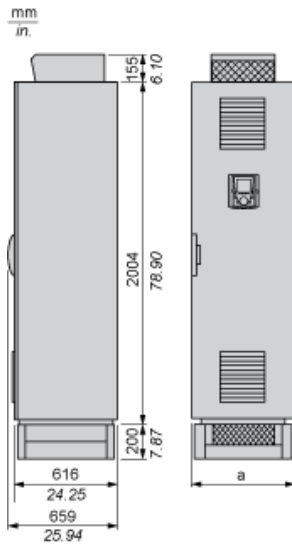
Options for enclosure configuration	<p>Isolated amplifier for control circuit  Relay output C/O for control circuit  Adaptor for 115 V logic inputs for control circuit  Control terminals for control circuit  Door handle for circuit breaker for power circuit  Braking unit for power circuit  Enclosure plinth for power circuit  Cable entry via the top for power circuit  Motor choke for power circuit  Enclosure heating for power circuit  Ammeter for power circuit  Line reactor for power circuit  12-pulse supply for power circuit  Line contactor for power circuit  Circuit breaker for power circuit  Door handle for main switch for power circuit  Voltmeter for power circuit  External motor fan for power circuit  Motor heating for power circuit  Key switch (local/remote) for power circuit  Enclosure lighting for power circuit  External 24 V DC supply terminals for power circuit  Buffer voltage 24 V DC power supply for power circuit  External 230 V supply terminals for power circuit  Design for IT networks for power circuit  Insulation monitoring for power circuit  Pt100 relay for power circuit  PTC relay for power circuit  Safe standstill for power circuit</p>
Operating position	Vertical +/- 10 degree
Colour of enclosure	Light grey RAL 7035
Colour of base of enclosure	Dark grey RAL 7022
Height	2362 mm
Width	600 mm
Depth	642 mm
Product weight	310 kg

## Environment

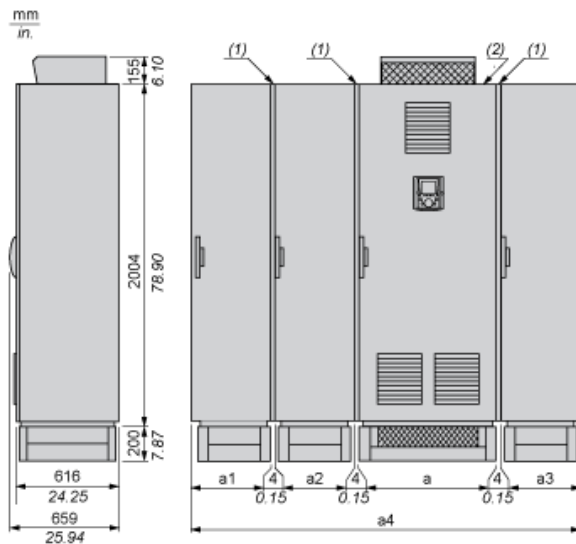
Electromagnetic compatibility	<p>Voltage dips and interruptions immunity test conforming to IEC 61000-4-11  Radiated radio-frequency electromagnetic field immunity test level 3 conforming to IEC 61000-4-3  Electrostatic discharge immunity test level 3 conforming to IEC 61000-4-2  Electrical fast transient/burst immunity test level 4 conforming to IEC 61000-4-4  Conducted radio-frequency immunity test level 3 conforming to IEC 61000-4-6  1.2/50 <math>\mu</math>s - 8/20 <math>\mu</math>s surge immunity test level 3 conforming to IEC 61000-4-5</p>
Pollution degree	2 conforming to EN/IEC 61800-5-1
Vibration resistance	<p>3M3 conforming to EN/IEC 60721-3-3  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</p>
Shock resistance	<p>3M2 conforming to EN/IEC 60721-3-3  4 gn for 11 ms conforming to EN/IEC 60068-2-27</p>
Noise level	64 dB conforming to 86/188/EEC
Environmental characteristic	<p>3S2 without condensation conforming to IEC 60721-3-3  3K3 without condensation conforming to IEC 60721-3-3  3C2 without condensation conforming to IEC 60721-3-3</p>
Relative humidity	<= 95 %
Ambient air temperature for operation	<p>40...50 °C with current derating of 1.2 % per °C  0...40 °C without derating</p>
Ambient air temperature for storage	-25...70 °C
Volume of cooling air	700 m <sup>3</sup> /h
Operating altitude	<p>1000...3000 m with current derating 1 % per 100 m  &lt;= 1000 m without derating</p>
Standards	<p>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</p>
Product certifications	<p>ATEX  GOST</p>
Marking	CE

IP 54 Floor-Standing Enclosure with Separate Air Flows

Standard Floor-Standing Enclosure



Standard Compact Floor-Standing Enclosure + Additional Floor-Standing Enclosures, According to the Configuration



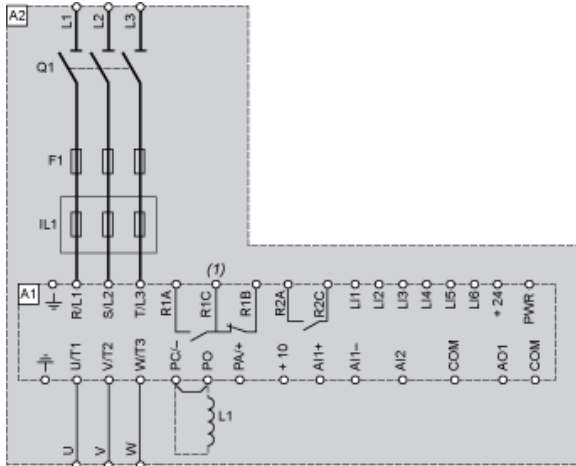
- (1) Seal. For each floor-standing enclosure added, allow a 4 mm/0.15 in. space for the seal.
- (2) Standard version floor-standing enclosure.

NOTE: The position of the enclosures must be complied with during installation. The number of additional enclosures can vary according to the chosen configuration.

Options	a	a1	a2	a3	a4
With or without common options or options (3) dependent on the drive rating	616 mm/24.2 in.	–	–	–	616 mm/24.2 in.
Cable entry via the top option (4)	608 mm/23.9 in.	–	408 mm/16 in.	–	1020 mm/40.1 in.
Sinus filter option	608 mm/23.9 in.	–	–	608 mm/23.9 in.	1220 mm/48 in.
(3) Except sinus filter option, which requires an additional enclosure. The sinus filter option is not compatible with the cable entry via the top option.					
(4) The cable entry via the top option is not compatible with the sinus filter option.					

IP 54 Floor-Standing Enclosure with Separate Air Flows

Wiring Diagram



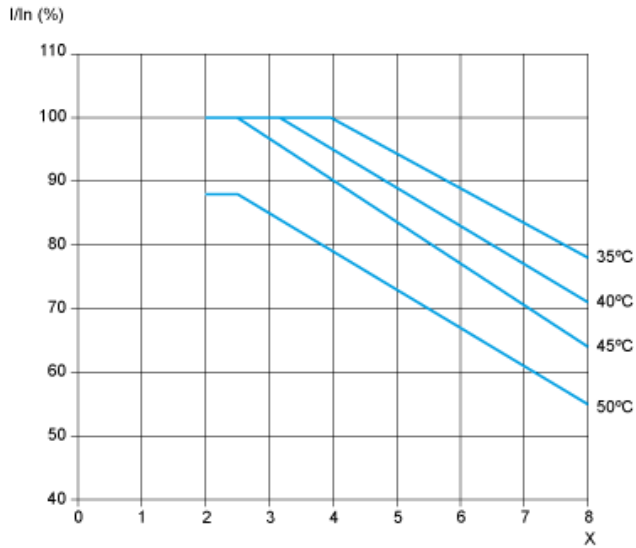
- A1 Drive
- A2 Enclosure
- F1 Fast-acting semi-conductor fuse
- IL1 Line choke
- L1 DC choke
- Q1 Switch
- (1) Fault relay contacts. For remote signalling of drive status.

Ready to Use IP 54 Enclosure

Derating Curves

The derating curves for the drive nominal current ( $I_n$ ) are dependent on the temperature and switching frequency. For intermediate temperatures, interpolate between 2 curves.

NOTE: The drive will reduce the switching frequency automatically in the event of excessive temperature rise.



X Switching frequency (kHz)

NOTE: The temperatures shown correspond to the temperature of the air entering the enclosure.