

ATV320D15N4B

variable speed drive ATV320 - 15kW -
380...500V - 3 phase - book



Main

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| Range of product | Altivar Machine ATV320 |
| Product or component type | Variable speed drive |
| Product specific application | Complex machines |
| Device short name | ATV320 |
| Format of the control block | Book |
| Product destination | Asynchronous motors Synchronous motors |
| EMC filter | Class C2 EMC filter integrated |
| IP degree of protection | IP20 conforming to EN/IEC 61800-5-1 |
| Degree of protection | UL type 1 with UL type 1 conformity kit |
| Type of cooling | Fan |
| Network number of phases | 3 phases |
| [Us] rated supply voltage | 380...500 V (- 15...10 %) |
| Supply frequency | 50...60 Hz (- 5...5 %) |
| Motor power kW | 15 kW for heavy duty |
| Motor power hp | 20 hp for heavy duty |
| Line current | 33.3 A at 500 V for heavy duty 47.3 A at 380 V for heavy duty |
| Prospective line I _{sc} | <= 22 kA |
| Apparent power | 28.8 kVA at 500 V for heavy duty |
| Continuous output current | 33 A at 4 kHz for heavy duty |
| Maximum transient current | 49.5 A during 60 s for heavy duty |
| 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 - Energy Saving |
| Synchronous motor control profile | Vector control without sensor |
| Speed drive output frequency | 0.1...599 Hz |
| Nominal switching frequency | 4 kHz |
| Switching frequency | 2...16 kHz adjustable |
| Safety function | GDL (guard door locking) SMS (safe maximum speed) SS1 (safe stop 1) SLS (safe limited speed) STO (safe torque off) SIL 3 |

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| Communication port protocol | CANopen Modbus |
| Optional communication modules | Communication module: Ethernet Powerlink Communication module: Profinet Communication module: Profibus DP V1 Communication module: Ethernet/IP Communication module: DeviceNet Communication module: EtherCAT RJ45 Communication module: CANopen open style terminal block Communication module: CANopen SUB-D 9 Communication module: CANopen daisy chain RJ45 |

Complementary

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| Output voltage | \leq power supply voltage |
| Permissible temporary current boost | 1.5 x In during 60 s for heavy duty |
| Speed range | 1...100 with asynchronous motor in open-loop mode |
| Speed accuracy | +/- 10 % of nominal slip 0.2 Tn to Tn |
| Torque accuracy | +/- 15 % |
| Transient overtorque | 170...200 % of nominal motor torque |
| Braking torque | < 170 % with braking resistor during 60 s |
| Regulation loop | Adjustable PID regulator |
| Motor slip compensation | Automatic whatever the load Not available in voltage/frequency ratio (2 or 5 points) Adjustable 0...300 % |
| Acceleration and deceleration ramps | S U CUS Deceleration ramp automatic stop DC injection Deceleration ramp adaptation Linear Ramp switching |
| Braking to standstill | By DC injection |
| Protection type | Drive: thermal protection Drive: short-circuit between motor phases Drive: overheating protection Drive: overcurrent between output phases and earth Drive: input phase breaks |
| Frequency resolution | Analog input: 0.012/50 Hz Display unit: 0.1 Hz |
| Electrical connection | Power supply, screw terminal: 16 mm ² AWG 6 Motor/Braking resistor, screw terminal: 6...16 mm ² AWG 8...AWG 6 Control, screw terminal: 0.5...1.5 mm ² AWG 18...AWG 14 |
| Type of connector | 1 RJ45 for Modbus/CANopen on front face |
| Physical interface | 2-wire RS 485 for Modbus |
| Transmission frame | RTU for Modbus |
| Transmission rate | 50 kbps, 125 kbps, 250 kbps, 500 kbps, 1 Mbps for CANopen 4.8, 9.6, 19.2, 38.4 kbit/s for Modbus |
| Data format | 8 bits, configurable odd, even or no parity for Modbus |
| Type of polarization | No impedance for Modbus |
| Number of addresses | 1...247 for Modbus 1...127 for CANopen |
| Method of access | Slave for CANopen |
| Supply | Internal supply for reference potentiometer (1 to 10 kOhm): 10.5 V DC (+/- 5 %) current \leq 10 mA (overload and short-circuit protection) |
| Local signalling | 1 LED red for drive voltage 1 LED red for drive fault 1 LED red for CANopen error 1 LED green for CANopen run |
| Width | 180 mm |
| Height | 404 mm with EMC plate 330 mm |
| Depth | 232 mm |
| Product weight | 8.8 kg |
| Analogue input number | 3 |

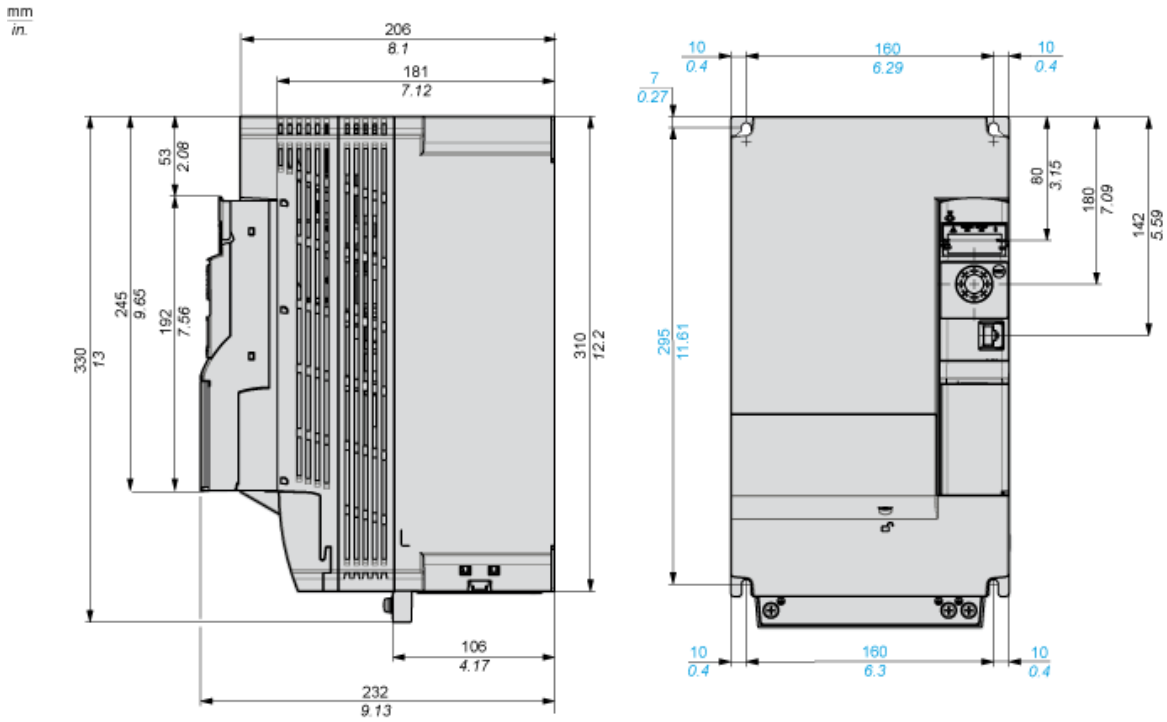
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| Analogue input type | Current (AI3): 0...20 mA (or 4-20 mA, x-20 mA, 20-x mA or other patterns by configuration), impedance 250 Ohm, resolution 10 bits Bipolar differential voltage (AI2): +/- 10 V DC, impedance 30000 Ohm, resolution 10 bits Voltage (AI1): 0...10 V DC, impedance 30000 Ohm, resolution 10 bits |
| Discrete input number | 7 |
| Discrete input type | Safe torque off (STO): 24...30 V DC, impedance 1500 Ohm Switch-configurable PTC probe (DI6): 24...30 V DC Programmable as pulse input 20 kpps (DI5): 24...30 V DC: level 1 PLC Programmable (sink/source) (DI1...DI4): 24...30 V DC: level 1 PLC |
| Discrete input logic | Positive logic (source): : DI1...DI6, < 5 V (state 0) > 11 V (state 1) Negative logic (sink): : DI1...DI6, > 19 V (state 0) < 13 V (state 1) |
| Analogue output number | 1 |
| Analogue output type | Software-configurable voltage (AQ1): 0...10 V, impedance 470 Ohm, resolution 10 bits Software-configurable current (AQ1): 0...20 mA, impedance 800 Ohm, resolution 10 bits |
| Sampling duration | Analog output (AQ1): 2 ms Analog input (AI1, AI2, AI3): 2 ms |
| Accuracy | Analog output AQ1: +/- 2 % for a temperature of -10...60 °C Analog output AQ1: +/- 1 % for a temperature of 25 °C Analog input AI1, AI2, AI3: +/- 0.5 % for a temperature of 25 °C Analog input AI1, AI2, AI3: +/- 0.2 % for a temperature of -10...60 °C |
| Linearity error | Analog output (AQ1): +/- 0.3 % Analog input (AI1, AI2, AI3): +/- 0.2...0.5 % of maximum value |
| Discrete output number | 3 |
| Discrete output type | Logic (LO) Configurable relay logic NO (R2A, R2B): electrical durability 100000 cycles Configurable relay logic NO/NC (R1A, R1B, R1C): electrical durability 100000 cycles |
| Refresh time | Relay output (R2A, R2C): 2 ms Relay output (R1A, R1B, R1C): 2 ms Logic input (DI1...DI6): 8 ms (+/- 0.7 ms) |
| Minimum switching current | Relay output (R1, R2): 5 mA at 24 V DC |
| Maximum switching current | Relay output (R2) on resistive load (cos phi = 1): 5 A at 30 V DC Relay output (R2) on resistive load (cos phi = 1): 5 A at 250 V AC Relay output (R1, R2) on inductive load (cos phi = 0.4): 2 A at 30 V DC Relay output (R1, R2) on inductive load (cos phi = 0.4): 2 A at 250 V AC Relay output (R1) on resistive load (cos phi = 1): 4 A at 30 V DC Relay output (R1) on resistive load (cos phi = 1): 3 A at 250 V AC |

Environment

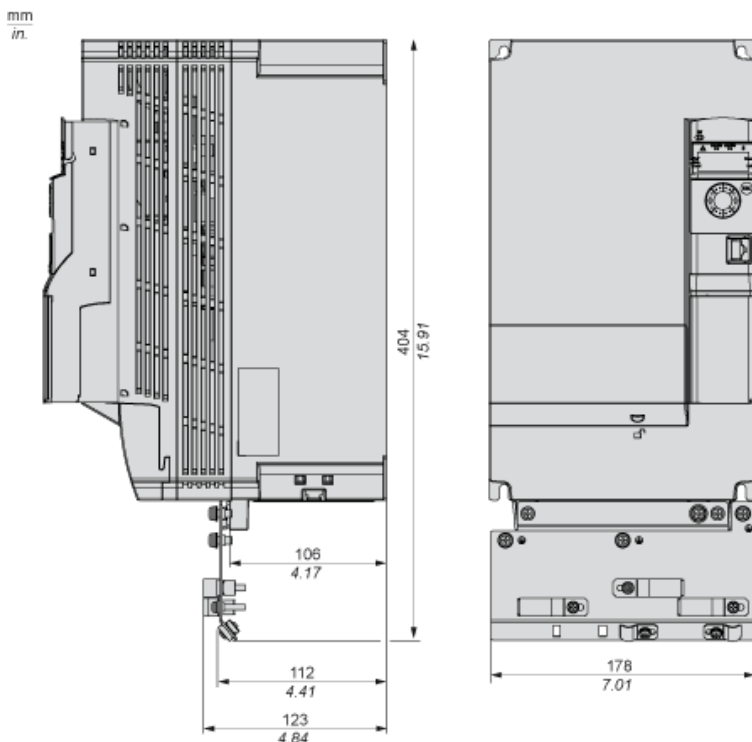
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| Isolation | Between power and control terminals |
| Insulation resistance | > 1 mOhm at 500 V DC for 1 minute to earth |
| Noise level | 58 dB conforming to 86/188/EEC |
| Power dissipation in W | 480 W (fan) at 380 V, 4 kHz for heavy duty |
| Operating position | Vertical +/- 10 degree |
| Electromagnetic compatibility | Voltage dips and interruptions immunity test conforming to IEC 61000-4-11 Radiated radio-frequency electromagnetic field immunity test conforming to IEC 61000-4-3 level 3 Electrostatic discharge immunity test conforming to IEC 61000-4-2 level 3 Electrical fast transient/burst immunity test conforming to IEC 61000-4-4 level 4 Conducted radio-frequency immunity test conforming to IEC 61000-4-6 level 3 1.2/50 µs - 8/20 µs surge immunity test conforming to IEC 61000-4-5 level 3 |
| Pollution degree | 2 conforming to EN/IEC 61800-5-1 |
| Vibration resistance | 1.5 mm peak to peak (f = 3...13 Hz) conforming to EN/IEC 60068-2-6 1 gn (f = 13...200 Hz) conforming to EN/IEC 60068-2-6 |
| Shock resistance | 15 gn during 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 |
| 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...2000 m with current derating 1 % per 100 m <= 1000 m without derating |

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| Standards | EN 61800-3 environment 2 category C2 EN 61800-3 environment 1 category C2 EN 55011 class A group 1 EN/IEC 61800-5-1 EN/IEC 61800-3 |
| Product certifications | CSA NOM 117 UL RCM EAC |
| Marking | CE |

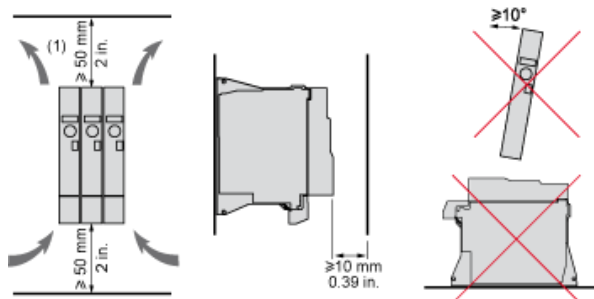
Dimensions



With EMC Plate



Mounting and Clearance



(1) Minimum value corresponding to thermal constraints.

Connection Diagrams

Diagram with Line Contactor

Connection diagrams conforming to standards EN 954-1 category 1 and IEC/EN 61508 capacity SIL1, stopping category 0 in accordance with standard IEC/EN 60204-1.



- (1) Line choke (if used)
- (2) Fault relay contacts, for remote signaling of drive status

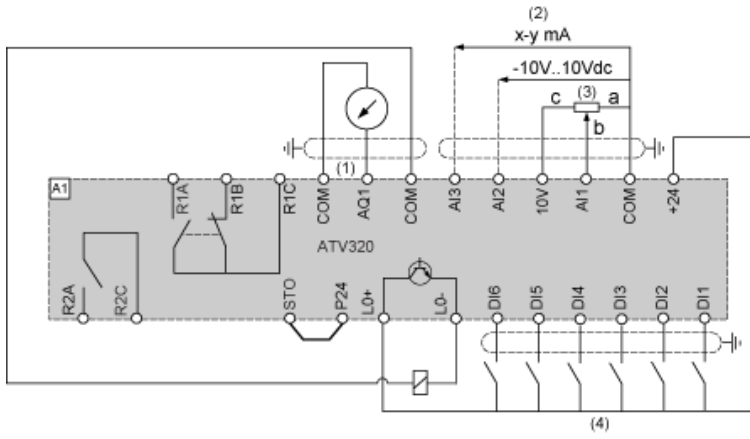
Diagram with Switch Disconnect

Connection diagrams conforming to standards EN 954-1 category 1 and IEC/EN 61508 capacity SIL1, stopping category 0 in accordance with standard IEC/EN 60204-1.



- (1) Line choke (if used)
- (2) Fault relay contacts, for remote signaling of drive status

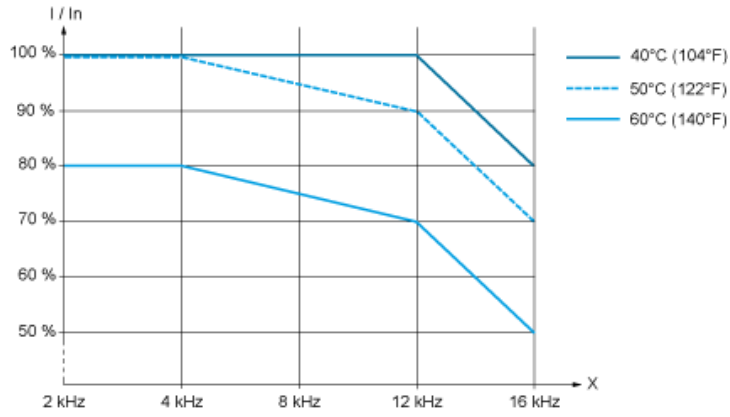
Control Connection Diagram in Source Mode



- (1) Analog output
- (2) Analog inputs
- (3) Reference potentiometer (10 kOhm maxi)
- (4) Digital inputs

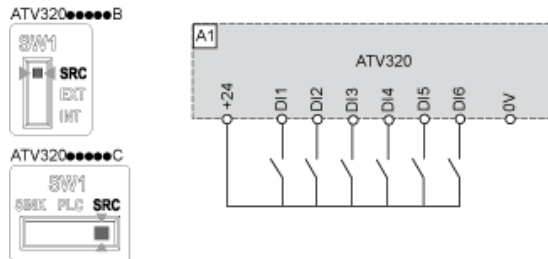
Derating Curves

Derating curve for the nominal drive current (I_n) as a function of temperature and switching frequency (X).

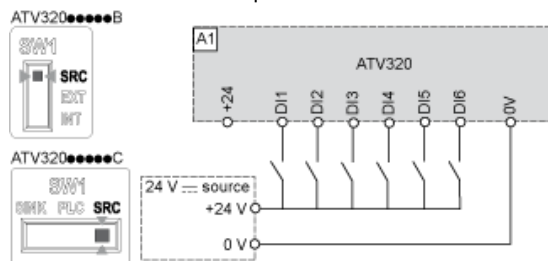


Sink / Source Switch Configuration (SW1)

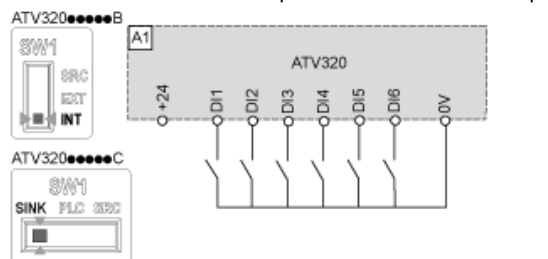
The logic input switch (SW1) is used to adapt the operation of the logic inputs to the technology of the programmable controller outputs. Switch SW1 set to "SRC" position and use of the output power supply for the DIs.



Switch SW1 set to "SRC" position and use of an external power supply for the DIs.



Switch SW1 set to "Sink Int" position and use of the output power supply for the DIs.



Switch SW1 set to "Sink Ext" position and use of an external power supply for the DIs.

