Specifications



Variable speed drive, Altivar Machine ATV320, 0.37 kW, 200...240 V, 1 phase, compact

ATV320U04M2C

Main

wain	
Range of product	Altivar Machine ATV320
Product or component type	Variable speed drive
Product specific application	Complex machines
Variant	Standard version
Format of the drive	Compact
Mounting mode	Wall mount
Communication port protocol	Modbus serial CANopen
Option card	Communication module, CANopen Communication module, EtherCAT Communication module, Profibus DP V1 Communication module, PROFINET Communication module, Ethernet Powerlink Communication module, EtherNet/IP Communication module, DeviceNet
[Us] rated supply voltage	200240 V - 1510 %
Nominal output current	3.3 A
Motor power kW	0.37 kW for heavy duty
EMC filter	Class C2 EMC filter integrated
IP degree of protection	IP20

Complementary

Discrete input number	7
Discrete input type	STO safe torque off, 24 V DC, impedance: 1.5 kOhm DI1DI6 logic inputs, 24 V DC (30 V) DI5 programmable as pulse input: 0…30 kHz, 24 V DC (30 V)
Discrete input logic	Positive logic (source) Negative logic (sink)
Discrete output number	3
Discrete output type	Open collector DQ+ 01 kHz 30 V DC 100 mA Open collector DQ- 01 kHz 30 V DC 100 mA
Analogue input number	3
Analogue input type	Al1 voltage: 010 V DC, impedance: 30 kOhm, resolution 10 bits Al2 bipolar differential voltage: +/- 10 V DC, impedance: 30 kOhm, resolution 10 bits Al3 current: 020 mA (or 4-20 mA, x-20 mA, 20-x mA or other patterns by configuration), impedance: 250 Ohm, resolution 10 bits
Analogue output number	1



Analogue output type Sobheme configurable current A(1): 002 AV impedance 200 Cmr., resolution 10 bits Relay output type Configurable relay type (R1 A) type existed durability 100000 syckes Configurable relay type (R1 C) Maximum ewitching current Relay output A(1, R1); R1C or relative load, outp P = 1: 3 A # 200 VAC Relay output R(1, R1); R1C or relative load, outp P = 1: 3 A # 200 VAC Relay output R(1, R1); R1C or relative load, outp P = 1: 3 A # 200 VAC Relay output R(1, R1); R1C RC R2, R2C or inductive load, com P = 0 A and LR = 7 ms; 2 A # 200 VCC Relay output R(1, R1); R1C, R2A, R2C or inductive load, com P = 0 A and LR = 7 ms; 2 A # 200 VCC Relay output R(1, R1); R1C, R2A, R2C or inductive load, com P = 0 A and LR = 7 ms; 2 A # 200 VCC Relay output R(1, R1); R1C, R2A, R2C or inductive load, com P = 0 A and LR = 7 ms; 2 A # 200 VCC Relay output R(1, R1); R1C, R2A, R2C or inductive load, com P = 0 A and LR = 7 ms; 2 A # 200 VCC Relay output R(1, R1); R1C, R2A, R2C or inductive load, com P = 1: 3 A # 200 VAC Relay output R(1, R1); R1C, R2A, R2C or inductive load, com P = 0 A # # 20 VAC Relay output R(1, R1); R1C, R2A, R2C or inductive load, com P = 0 A # # 20 VAC Relay output R(1, R1); R1C, R2A, R2C or inductive load, R2A, R2C or i		
Configurable entry logic RT1 INC electrical durability 100000 cycles Configurable entry logic RT2 Maximum switching current Relay output RTA, RT8, RT0, RT0, RT2, RT2, RT2, RT2, RT2, RT2, RT2, RT2	Analogue output type	
Resign output RA, RHB, RHC, CAR ZRC on inductive load, cos phi = 0.4 and LR = 7 ms; 2.4 at 250 V/C Resign output RA, RHB, RHC, CAR ZC on inductive load, cos phi = 0.4 and LR = 7 ms; 2.4 at 250 V/C Resign output RA, RHB, RHC, CAR ZRC on inductive load, cos phi = 0.4 and LR = 7 ms; 2.4 at 30 V/C Minimum switching current Relay output RA, RHB, RHC, CAR, R2C on inductive load, cos phi = 1.5 at 250 V/AC Relay output RA, RHB, RHC, R2A, R2C on inductive load, cos phi = 0.4 and LR = 7 ms; 2.4 at 30 V/DC Method of access Slave CANopen 4 quadrant operation possible True Asynchronous motor control Voltop/fineumory ratio. 5 points France Vector control without sensor Environmental term or standard voltop/fineumory ratio. 5 points Synchronous motor control Voltop/fineumory ratio. 2 more yoang, quadrant out // Fixe vector control without sensor Profile Maximum output frequency Acceleration and deceleration Linear V Rate and the deceleration Automatic whatever the load Adjustable 0. 300 % Note and term or and adjustion Acceleration and deceleration Automatic whatever the load Adjustable 0. 300 % Rate adjustion Acceleration ramp adjustion Acceleration ramp adjustion Acceleration ramp adjustion Acceleration ramp adjustion <td>Relay output type</td> <td>Configurable relay logic R1B 1 NC electrical durability 100000 cycles Configurable relay logic R1C Configurable relay logic R2A 1 NO electrical durability 100000 cycles</td>	Relay output type	Configurable relay logic R1B 1 NC electrical durability 100000 cycles Configurable relay logic R1C Configurable relay logic R2A 1 NO electrical durability 100000 cycles
Method of access Slave CANopen 4 quadrant operation possible True Asynchronous motor control profile Wildspelfrequency ratio. 5 points Synchronous motor control profile Wildspelfrequency ratio. 2 points Synchronous motor control profile Vector control without sensor Voltage/frequency ratio. 2 points Synchronous motor control profile Vector control without sensor Voltage/frequency ratio. 2 points Acceleration and deceleration ranges Innear U S Signer sensor Voltage/frequency ratio. 2 points Acceleration and deceleration ranges Linear U S Signer Voltage/frequency ratio. 2 points Switching frequency 216 kHz adjustation Acceleration and deceleration range senticing Acceleration/deceleration range adaptation Acceleration/deceleration range adaptation Acceleration/deceleration range adaptation Acceleration/deceleration range adaptation Acceleration/deceleration range adaptation Acceleration senticing Acceleration and setter the load Adjustation & Ja00 Signer Range senticing Acceleration/deceleration range adaptation Acceleration and setter the load Adjustation & Ja00 Signer Range senticing Acceleration and setter the load Adjustation & Ja00 Signer Range senticing Acceleration and setter the load Adjustation & Ja00 V (heavy duty) Switching frequency 4	Maximum switching current	Relay output R1A, R1B, R1C on resistive load, cos phi = 1: 3 A at 30 V DC Relay output R1A, R1B, R1C, R2A, R2C on inductive load, cos phi = 0.4 and L/R = 7 ms: 2 A at 250 V AC Relay output R1A, R1B, R1C, R2A, R2C on inductive load, cos phi = 0.4 and L/R = 7 ms: 2 A at 30 V DC Relay output R2A, R2C on resistive load, cos phi = 1: 5 A at 250 V AC
4 quadrant operation possible True Asynchronous motor control profile Voltage/frequency ratio. 5 points Flux vector control without sensor - Energy Saving, Voltage/frequency ratio. 2 Energy Saving, Voltage/frequency ratio. 2 Energy Saving, Voltage/frequency ratio. 2 Energy Saving, Voltage/frequency Factor, 2 Energy Saving, Voltage/frequency ratio. 2 Energy Saving, Voltage/frequency Factor, 2 Energy Saving, Voltage/frequency ratio. 2 Energy Saving, Voltage/Factor, 2 Energy Saving, Voltage/frequency ratio. 2 Energy Saving, Voltage/Factor, 2 Energy Saving, Voltage/frequency ratio. 2 Energy Saving, Voltage/Factor, 2 Energy Saving, Voltage/frequency Acceleration and deceleration ramps Lineer U U Voltage/frequency Lineer U Voltage/frequency Switching frequency 2.16 KHz witching Acceleration automatic stop with DC injection Motor silp compensation Automatic whatever the lead Augustable an voltage/frequency ratio (2 or 5 points) Switching frequency 2.16 KHz with derating factor Nominal switching frequency 4 kHz Braking to standstill By DC injection Maximum input current 5.9 A Maximum output voltage 240 V Apparent power 12 kVA at 240 V (heavy duty) Network frequency 5% Prospective line lsc 1 kA Base load current at high overload 3.7 A Vith safety function Safe brake, Vith safety function Safe brake, Vith safety funct	Minimum switching current	Relay output R1A, R1B, R1C, R2A, R2C: 5 mA at 24 V DC
Asynchronous motor control profile Voltage/frequency ratio. 5 points Flux vector control without sensor, standard Voltage/frequency ratio. Energy Saving Voltage/frequency ratio. Energy Saving Voltage/frequency ratio. Energy Saving Voltage/frequency ratio. Energy Saving Voltage/frequency ratio. Provide Ratio vector control Synchronous motor control profile Vector control without sensor Maximum output frequency and control without sensor Vector control without sensor Acceleration and deceleration ramps Linear U U U U U U U U U U U U U U U U U U U	Method of access	Slave CANopen
profile Flux vector control without sensor, standard updatate Utf Flux vector control without sensor - Inergy Saving, quadrate Utf Flux vector control without sensor - Inergy Saving, quadrate Utf Flux vector control without sensor - Profile Synchronous motor control profile Vector control without sensor - Inergy Saving, quadrate Utf Flux vector control without sensor - Inergy Saving, quadrate Utf Flux vector control without sensor - Inergy Saving, quadrate Utf Flux vector control without sensor - Inergy Saving, quadrate Utf Flux vector control without sensor - Inergy Saving, quadrate Utf Flux vector control without sensor - Inergy Saving, quadrate Utf Flux vector control without sensor - Inergy Saving, quadrate Utf Flux vector control without sensor - Inergy Saving, quadrate Utf Flux vector control without sensor - Inergy Saving, quadrate Utf Flux vector control without sensor - Inergy Saving, quadrate Utf Flux vector control without sensor - Inergy Saving, quadrate - Intergy Saving Saving, quadrate - Intergy Saving Saving - Intergy Saving Saving Saving Saving - Intergy Saving Saving Saving - Intergy Saving Saving Saving Savi	4 quadrant operation possible	True
profile Maximum output frequency 0.599 kHz Transient overtorque 170200 % of nominal motor torque Acceleration and deceleration ramps Linear U S CUS Ramp switching Acceleration/deceleration automatic stop with DC injection Motor slip compensation Automatic whatever the load Adjustable 0300 % Not available in voltage/frequency ratio (2 or 5 points) Switching frequency 216 kHz adjustable 416 kHz with derating factor Nominal switching frequency 4 kHz Braking to standstill By DC injection Brake chopper integrated True Line current 5.9 A 1200 V (heavy duty) 4.9 A at 240 V (heavy duty) Maximum output voltage 240 V Apparent power 1.2 kVA at 240 V (heavy duty) Network frequency 5% Frequency tolerance 5 % Prospective line lsc 1 kA Base load current at high overload 3.7 A Power dissipation in W Self-cooled: 30 W at 200 V, switching frequency 4 kHz With safety function Safe brake management (SBC/SBT) False	-	Flux vector control without sensor, standard Voltage/frequency ratio - Energy Saving, quadratic U/f Flux vector control without sensor - Energy Saving
Transient overtorque 170200 % of nominal motor torque Acceleration and deceleration ramps Linear U S CUS Ramp svitching Acceleration/deceleration ramp adaptation Acceleration/deceleration automatic stop with DC injection Motor slip compensation Automatic whatever the load Adjustable 0300 % Not available in voltage/frequency ratio (2 or 5 points) Switching frequency 216 kHz adjustable 0300 % Not available in voltage/frequency ratio (2 or 5 points) Switching frequency 416 kHz Braking to standstill By DC injection Brake chopper integrated True Line current 5.9 A at 200 V (neavy duty) 49 A at 240 V (neavy duty) Maximum input current 5.9 A Maximum output voltage 240 V Apparent power 1.2 kVA at 240 V (heavy duty) Network frequency 5060 Hz Relative symmetric network frequency tolerance 5 % Prospective line Is c 1 kA Base load current at high overload 3.7 A Power dissipation in W Self-cooled: 30 W at 200 V, switching frequency 4 kHz With safety function Safe brake management (SBC/SBT) False With safety function Safe brake management (SBC/SBT) False		Vector control without sensor
Acceleration and deceleration ramps Linear U S CUS Ramp switching Acceleration/deceleration ramp adaptation Acceleration/deceleration automatic stop with DC injection Motor slip compensation Automatic whetever the load Adjustable 0300 % Not available in voltage/frequency ratio (2 or 5 points) Switching frequency 216 kHz adjustable 416 kHz with derating factor Nominal switching frequency 4 kHz Braking to standstill By DC injection Brake chopper integrated True Line current 5.9 A at 200 V (heavy duty) 4.9 A at 240 V (heavy duty) Maximum output voltage 240 V Apparent power 1.2 kVA at 240 V (heavy duty) Network frequency 5060 Hz Relative symmetric network frequency tolerance 5 % Prospective line Is to 1 kA Base load current at high overload 3.7 A Power dissipation in W Self-cooled: 30 W at 200 V, switching frequency 4 kHz With safety function Safeb y Links Safety function Safeb y Links Safety function Safe brake management (SBC/SBT) False	Maximum output frequency	0.599 kHz
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Adjustable 0300 % Not available in voltage/frequency ratio (2 or 5 points) Switching frequency 216 kHz adjustable 416 kHz with derating factor Nominal switching frequency 4 kHz Braking to standstill By DC injection Brake chopper integrated True Line current 5.9 A at 200 V (heavy duty) 4.9 A at 240 V (heavy duty) Maximum input current 5.9 A Maximum output voltage 240 V Apparent power 1.2 kVA at 240 V (heavy duty) Network frequency 5060 Hz Relative symmetric network frequency tolerance 5 % Prospective line lsc 1 kA Base load current at high overload 3.7 A Power dissipation in W Self-cooled: 30 W at 200 V, switching frequency 4 kHz With safety function Safe brake management (SBC/SBT) False		U S CUS Ramp switching Acceleration/deceleration ramp adaptation
416 kHz with derating factor Nominal switching frequency 4 kHz Braking to standstill By DC injection Brake chopper integrated True Line current 5.9 A at 200 V (heavy duty) 4.9 A at 240 V (heavy duty) Maximum input current 5.9 A A at 240 V A Apparent power 1.2 kVA at 240 V (heavy duty) Network frequency 5060 Hz Relative symmetric network frequency tolerance 5 % Prospective line Isc 1 kA Base load current at high overload 3.7 A Power dissipation in W Self-cooled: 30 W at 200 V, switching frequency 4 kHz With safety function Safe brake management (SBC/SBT) False With safety function Safe brake management (SBC/SBT) False	Motor slip compensation	Adjustable 0300 %
Braking to standstill By DC injection Brake chopper integrated True Line current 5.9 A at 200 V (heavy duty) 4.9 A at 240 V (heavy duty) Maximum input current 5.9 A Maximum output voltage 240 V Apparent power 1.2 kVA at 240 V (heavy duty) Network frequency 5060 Hz Relative symmetric network frequency tolerance 5 % Prospective line lsc 1 kA Base load current at high overload 3.7 A Power dissipation in W Self-cooled: 30 W at 200 V, switching frequency 4 kHz With safety function Safe brake management (SBC/SBT) False	Switching frequency	
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Line current5.9 A at 200 V (heavy duty) 4.9 A at 240 V (heavy duty)Maximum input current5.9 AMaximum output voltage240 VApparent power1.2 kVA at 240 V (heavy duty)Network frequency5060 HzRelative symmetric network frequency tolerance5 %Prospective line lsc1 kABase load current at high overload3.7 APower dissipation in WSelf-cooled: 30 W at 200 V, switching frequency 4 kHzWith safety function Safely Limited Speed (SLS)TrueWith safety function Safe management (SBC/SBT)False	Braking to standstill	By DC injection
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Maximum output voltage240 VApparent power1.2 kVA at 240 V (heavy duty)Network frequency5060 HzRelative symmetric network frequency tolerance5 %Prospective line Isc1 kABase load current at high overload3.7 APower dissipation in WSelf-cooled: 30 W at 200 V, switching frequency 4 kHzWith safety function Safe brake management (SBC/SBT)FalseWith safety function Safe brakeFalse	Line current	
Apparent power 1.2 kVA at 240 V (heavy duty) Network frequency 5060 Hz Relative symmetric network 5 % frequency tolerance 5 % Prospective line lsc 1 kA Base load current at high overload 3.7 A Power dissipation in W Self-cooled: 30 W at 200 V, switching frequency 4 kHz With safety function Safely Limited Speed (SLS) True With safety function Safe brake management (SBC/SBT) False With safety function Safe False	Maximum input current	5.9 A
Network frequency 5060 Hz Relative symmetric network frequency tolerance 5 % Prospective line lsc 1 kA Base load current at high overload 3.7 A Power dissipation in W Self-cooled: 30 W at 200 V, switching frequency 4 kHz With safety function Safely Limited Speed (SLS) True With safety function Safe brake management (SBC/SBT) False	Maximum output voltage	240 V
Relative symmetric network frequency tolerance 5 % Prospective line lsc 1 kA Base load current at high overload 3.7 A Power dissipation in W Self-cooled: 30 W at 200 V, switching frequency 4 kHz With safety function Safely Limited Speed (SLS) True With safety function Safe brake management (SBC/SBT) False With safety function Safe False	Apparent power	1.2 kVA at 240 V (heavy duty)
frequency tolerance Prospective line lsc 1 kA Base load current at high overload 3.7 A Power dissipation in W Self-cooled: 30 W at 200 V, switching frequency 4 kHz With safety function Safely Limited Speed (SLS) True With safety function Safe brake management (SBC/SBT) False With safety function Safe False	Network frequency	5060 Hz
Base load current at high overload3.7 APower dissipation in WSelf-cooled: 30 W at 200 V, switching frequency 4 kHzWith safety function Safely Limited Speed (SLS)TrueWith safety function Safe brake management (SBC/SBT)FalseWith safety function SafeFalse		5 %
overload Power dissipation in W Self-cooled: 30 W at 200 V, switching frequency 4 kHz With safety function Safely True With safety function Safe brake management (SBC/SBT) False With safety function Safe False	Prospective line Isc	1 kA
With safety function Safely True With safety function Safe brake False management (SBC/SBT) False With safety function Safe False	-	3.7 A
Limited Speed (SLS) With safety function Safe brake management (SBC/SBT) With safety function Safe False	Power dissipation in W	Self-cooled: 30 W at 200 V, switching frequency 4 kHz
management (SBC/SBT) With safety function Safe False		True
		False
		False

With safety function Safe Position (SP)	False
With safety function Safe programmable logic	False
With safety function Safe Speed Monitor (SSM)	False
With safety function Safe Stop 1 (SS1)	True
With sft fct Safe Stop 2 (SS2)	False
With safety function Safe torque off (STO)	True
With safety function Safely Limited Position (SLP)	False
With safety function Safe Direction (SDI)	False
Protection type	Input phase breaks: drive Overcurrent between output phases and earth: drive Overheating protection: drive Short-circuit between motor phases: drive Thermal protection: drive
Width	72.0 mm
Height	143.0 mm
Depth	128.0 mm
Net weight	1 kg
Environment	
Operating position	Vertical +/- 10 degree
Product certifications	CE
Froduct certifications	ATEX NOM GOST EAC RCM KC
Marking	CE ATEX UL CSA EAC RCM
Standards	EN/IEC 61800-5-1
Electromagnetic compatibility	Electrostatic discharge immunity test level 3 conforming to IEC 61000-4-2 Radiated radio-frequency electromagnetic field immunity test level 3 conforming to IEC 61000-4-3 Electrical fast transient/burst immunity test level 4 conforming to IEC 61000-4-4 1.2/50 µs - 8/20 µs surge immunity test level 3 conforming to IEC 61000-4-5 Conducted radio-frequency immunity test level 3 conforming to IEC 61000-4-6 Voltage dips and interruptions immunity test conforming to IEC 61000-4-11
Environmental class (during operation)	Class 3C3 according to IEC 60721-3-3 Class 3S2 according to IEC 60721-3-3
Maximum acceleration under shock impact (during operation)	150 m/s² at 11 ms
Maximum acceleration under vibrational stress (during operation)	10 m/s² at 13200 Hz
Maximum deflection under vibratory load (during operation)	1.5 mm at 213 Hz
Permitted relative humidity (during operation)	Class 3K5 according to EN 60721-3
Overvoltage category	III
Regulation loop	Adjustable PID regulator

Speed accuracy	+/- 10 % of nominal slip 0.2 Tn to Tn
Pollution degree	2
Ambient air transport temperature	-2570 °C
Ambient air temperature for operation	-1050 °C without derating 5060 °C with derating factor
Ambient air temperature for storage	-2570 °C

Packing Units

Unit Type of Package 1	PCE
Number of Units in Package 1	1
Package 1 Height	11.500 cm
Package 1 Width	18.700 cm
Package 1 Length	19.000 cm
Package 1 Weight	1.200 kg
Unit Type of Package 2	P06
Number of Units in Package 2	45
Package 2 Height	75.000 cm
Package 2 Width	60.000 cm
Package 2 Length	80.000 cm
Package 2 Weight	66.145 kg

Offer Sustainability

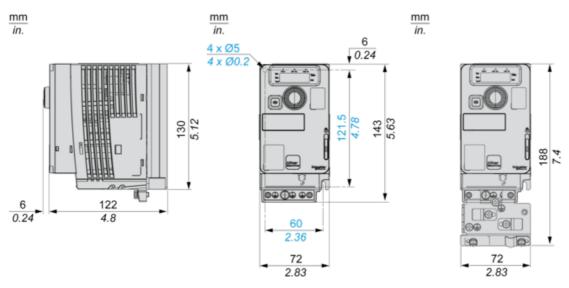
Sustainable offer status	Green Premium product
REACh Regulation	REACh Declaration
EU RoHS Directive	Pro-active compliance (Product out of EU RoHS legal scope) EU RoHS Declaration
Mercury free	Yes
China RoHS Regulation	China RoHS declaration
RoHS exemption information	Yes
Environmental Disclosure	Product Environmental Profile
Circularity Profile	End of Life Information
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
Upgradeability	Upgraded components available

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Dimensions Drawings

Dimensions

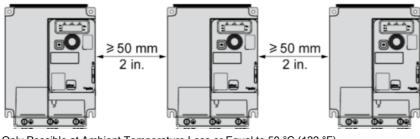
Right View, Front View and Front View with EMC Plate



Mounting and Clearance

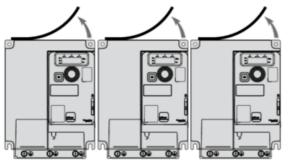
Mounting Types

Mounting Type A: Individual with Ventilation Cover

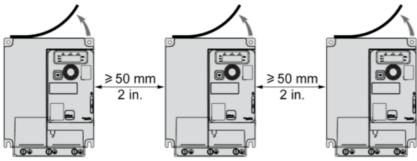


Only Possible at Ambient Temperature Less or Equal to 50 $^\circ\text{C}$ (122 $^\circ\text{F})$

Mounting Type B: Side by Side, Ventilation Cover Removed



Mounting Type C: Individual, Ventilation Cover Removed



For Operation at Ambient Temperature Above 50 $^\circ\text{C}$ (122 $^\circ\text{F})$

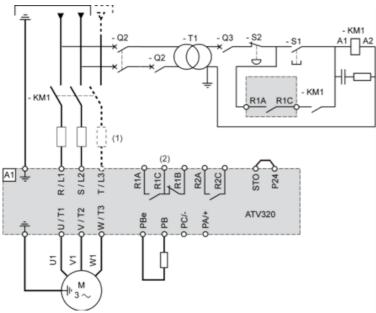
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Connections and Schema

Connection Diagrams

Diagram with Line Contactor

Connection diagrams conforming to standards ISO13849 category 1 and IEC/EN 61508 capacity SIL1, stopping category 0 in accordance with standard IEC/EN 60204-1.

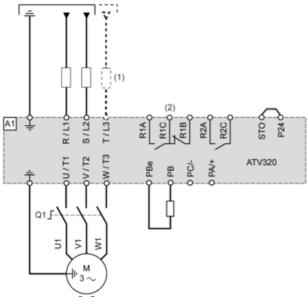


(1) Line choke (if used)

(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.

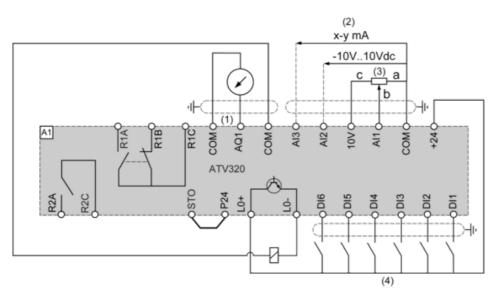


(1) Line choke (if used)

(2) Fault relay contacts, for remote signaling of drive status

Connections and Schema

Control Connection Diagram in Source Mode



(1) Analog output

(2) Analog inputs

(3) Reference potentiometer (10 kOhm maxi)

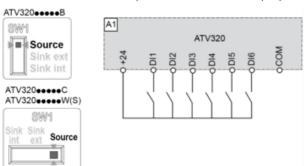
(4) Digital inputs

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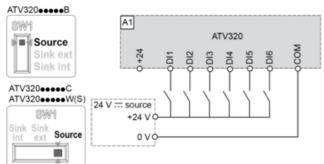
Connections and Schema

Digital Inputs Wiring

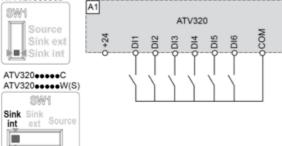
The logic input switch (SW1) is used to adapt the operation of the logic inputs to the technology of the programmable controller outputs. Switch SW1 set to "Source" position and use of the output power supply for the DIs.



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

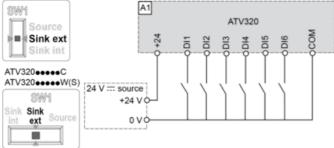


Switch SW1 set to "Sink Int" position and use of the output power supply for the DIs.



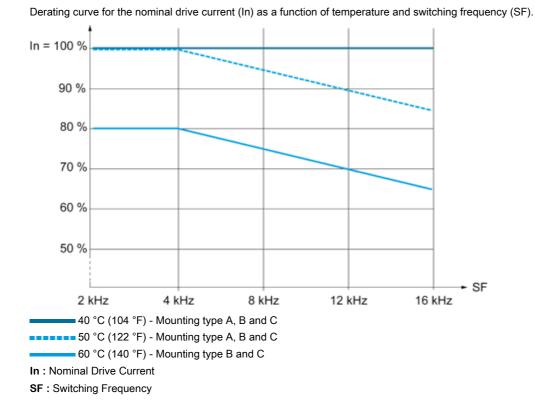
Switch SW1 set to "Sink Ext" position and use of an external power supply for the DIs.

ATV320



Derating Curves

Performance Curves



Recommended replacement(s)