



## Main

|                              |                                                                                                                                                                                                                                                               |
|------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 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<br>CANopen                                                                                                                                                                                                                                      |
| Option card                  | Communication module, CANopen<br>Communication module, EtherCAT<br>Communication module, Profibus DP V1<br>Communication module, Profinet<br>Communication module, Ethernet Powerlink<br>Communication module, EtherNet/IP<br>Communication module, DeviceNet |
| [Us] rated supply voltage    | 380...500 V - 15...10 %                                                                                                                                                                                                                                       |
| Nominal output current       | 1.5 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<br>DI1...DI6 logic inputs, 24 V DC (30 V)<br>DI5 programmable as pulse input: 0...30 kHz, 24 V DC (30 V)                                                                                                                                    |
| Discrete input logic   | Positive logic (source)<br>Negative logic (sink)                                                                                                                                                                                                                                              |
| Discrete output number | 3                                                                                                                                                                                                                                                                                             |
| Discrete output type   | Open collector DQ+ 0...1 kHz 30 V DC 100 mA<br>Open collector DQ- 0...1 kHz 30 V DC 100 mA                                                                                                                                                                                                    |
| Analogue input number  | 3                                                                                                                                                                                                                                                                                             |
| Analogue input type    | AI1 voltage: 0...10 V DC, impedance: 30 kOhm, resolution 10 bits<br>AI2 bipolar differential voltage: +/- 10 V DC, impedance: 30 kOhm, resolution 10 bits<br>AI3 current: 0...20 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   | Software-configurable current AQ1: 0...20 mA impedance 800 Ohm, resolution 10 bits<br>Software-configurable voltage AQ1: 0...10 V DC impedance 470 Ohm, resolution 10 bits                                                                                                                    |
| Relay output type      | Configurable relay logic R1A 1 NO electrical durability 100000 cycles<br>Configurable relay logic R1B 1 NC electrical durability 100000 cycles<br>Configurable relay logic R1C<br>Configurable relay logic R2A 1 NO electrical durability 100000 cycles<br>Configurable relay logic R2C       |

|                                                      |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
|------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Maximum switching current                            | Relay output R1A, R1B, R1C on resistive load, $\cos \phi = 1$ : 3 A at 250 V AC<br>Relay output R1A, R1B, R1C on resistive load, $\cos \phi = 1$ : 3 A at 30 V DC<br>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<br>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<br>Relay output R2A, R2C on resistive load, $\cos \phi = 1$ : 5 A at 250 V AC<br>Relay output R2A, R2C on resistive load, $\cos \phi = 1$ : 5 A at 30 V DC |
| Minimum switching current                            | Relay output R1A, R1B, R1C, R2A, R2C: 5 mA at 24 V DC                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
| Method of access                                     | Slave CANopen                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |
| 4 quadrant operation possible                        | True                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
| Asynchronous motor control profile                   | Voltage/Frequency ratio, 5 points<br>Flux vector control without sensor, standard<br>Voltage/Frequency ratio - Energy Saving, quadratic U/f<br>Flux vector control without sensor - Energy Saving<br>Voltage/frequency ratio, 2 points                                                                                                                                                                                                                                                                                                                |
| Synchronous motor control profile                    | Vector control without sensor                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |
| Maximum output frequency                             | 0.599 kHz                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |
| Transient overtorque                                 | 170...200 % of nominal motor torque                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
| Acceleration and deceleration ramps                  | Linear<br>U<br>S<br>CUS<br>Ramp switching<br>Acceleration/Deceleration ramp adaptation<br>Acceleration/deceleration automatic stop with DC injection                                                                                                                                                                                                                                                                                                                                                                                                  |
| Motor slip compensation                              | Automatic whatever the load<br>Adjustable 0...300 %<br>Not available in voltage/frequency ratio (2 or 5 points)                                                                                                                                                                                                                                                                                                                                                                                                                                       |
| Switching frequency                                  | 2...16 kHz adjustable<br>4...16 kHz with derating factor                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |
| Nominal switching frequency                          | 4 kHz                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
| Braking to standstill                                | By DC injection                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
| Brake chopper integrated                             | True                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
| Line current                                         | 2.1 A at 380 V (heavy duty)<br>1.6 A at 500 V (heavy duty)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |
| Maximum input current                                | 2.1 A                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
| Maximum output voltage                               | 500 V                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
| Apparent power                                       | 1.4 kVA at 500 V (heavy duty)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |
| Network frequency                                    | 50...60 Hz                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |
| Relative symmetric network frequency tolerance       | 5 %                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
| Prospective line I <sub>sc</sub>                     | 5 kA                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
| Base load current at high overload                   | 27.5 A                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
| Power dissipation in W                               | Fan: 23.0 W at 380 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 Operating Stop (SOS)       | 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<br>Overcurrent between output phases and earth: drive<br>Overheating protection: drive<br>Short-circuit between motor phases: drive<br>Thermal protection: drive                                                                                                                                                                                                                                                                                                                                                            |
| Width                                                | 105.0 mm                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |
| Height                                               | 142.0 mm                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |

|            |          |
|------------|----------|
| Depth      | 158.0 mm |
| Net weight | 1.2 kg   |

## Environment

|                                                                  |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |
|------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Operating position                                               | Vertical +/- 10 degree                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
| Product certifications                                           | CE<br>ATEX<br>NOM<br>GOST<br>EAC<br>RCM<br>KC                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
| Marking                                                          | CE<br>ATEX<br>UL<br>CSA<br>EAC<br>RCM                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
| Electromagnetic compatibility                                    | Electrostatic discharge immunity test level 3 conforming to IEC 61000-4-2<br>Radiated radio-frequency electromagnetic field immunity test level 3 conforming to IEC 61000-4-3<br>Electrical fast transient/burst immunity test level 4 conforming to IEC 61000-4-4<br>1.2/50 $\mu$ s - 8/20 $\mu$ s surge immunity test level 3 conforming to IEC 61000-4-5<br>Conducted radio-frequency immunity test level 3 conforming to IEC 61000-4-6<br>Voltage dips and interruptions immunity test conforming to IEC 61000-4-11 |
| Environmental class (during operation)                           | Class 3C3 according to IEC 60721-3-3<br>Class 3S2 according to IEC 60721-3-3                                                                                                                                                                                                                                                                                                                                                                                                                                            |
| Maximum acceleration under shock impact (during operation)       | 150 m/s <sup>2</sup> at 11 ms                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
| Maximum acceleration under vibrational stress (during operation) | 10 m/s <sup>2</sup> at 13...200 Hz                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
| Maximum deflection under vibratory load (during operation)       | 1.5 mm at 2...13 Hz                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
| Permitted relative humidity (during operation)                   | Class 3K5 according to EN 60721-3                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
| Volume of cooling air                                            | 18.0 m <sup>3</sup> /h                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
| 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                                | -25...70 °C                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |
| Ambient air temperature for operation                            | -10...50 °C without derating<br>50...60 °C with derating factor                                                                                                                                                                                                                                                                                                                                                                                                                                                         |
| Ambient air temperature for storage                              | -25...70 °C                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |

## Packing Units

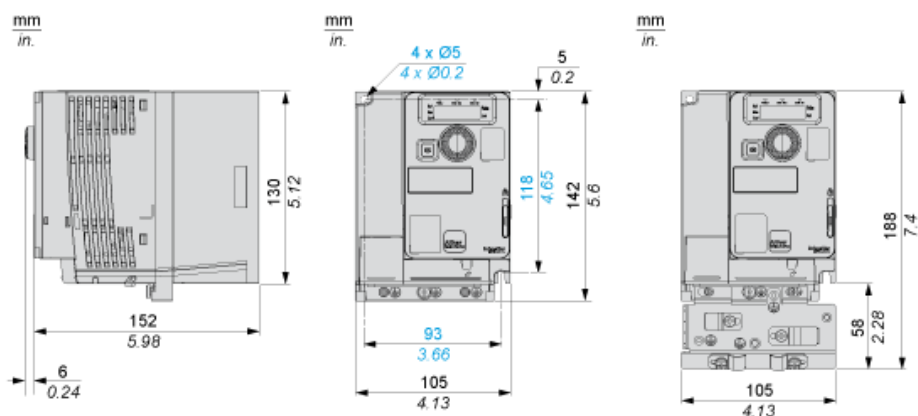
|                              |          |
|------------------------------|----------|
| Unit Type of Package 1       | PCE      |
| Number of Units in Package 1 | 1        |
| Package 1 Weight             | 1.639 kg |
| Package 1 Height             | 18 cm    |
| Package 1 width              | 18.6 cm  |
| Package 1 Length             | 19 cm    |
| Unit Type of Package 2       | P06      |
| Number of Units in Package 2 | 30       |
| Package 2 Weight             | 62.17 kg |
| Package 2 Height             | 80 cm    |
| Package 2 width              | 80 cm    |
| Package 2 Length             | 60 cm    |

## Offer Sustainability

|                            |                                                                                                                             |
|----------------------------|-----------------------------------------------------------------------------------------------------------------------------|
| Sustainable offer status   | Green Premium product                                                                                                       |
| REACH Regulation           | <a href="#">REACH Declaration</a>                                                                                           |
| EU RoHS Directive          | Pro-active compliance (Product out of EU RoHS legal scope) <a href="#">EU RoHS Declaration</a>                              |
| Mercury free               | Yes                                                                                                                         |
| RoHS exemption information | <a href="#">Yes</a>                                                                                                         |
| China RoHS Regulation      | <a href="#">China RoHS Declaration</a>                                                                                      |
| Environmental Disclosure   | <a href="#">Product Environmental Profile</a>                                                                               |
| Circularity Profile        | <a href="#">End Of Life Information</a>                                                                                     |
| WEEE                       | The product must be disposed on European Union markets following specific waste collection and never end up in rubbish bins |
| Upgradeability             | <a href="#">Upgraded Components Available</a>                                                                               |

## Dimensions

### Right View, Front View and Front View with EMC Plate



## Mounting Types

### Mounting Type A: Individual with Ventilation Cover



Only Possible at Ambient Temperature Less or Equal to 50 °C (122 °F)

### Mounting Type B: Side by Side, Ventilation Cover Removed



### Mounting Type C: Individual, Ventilation Cover Removed



For Operation at Ambient Temperature Above 50 °C (122 °F)

## 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

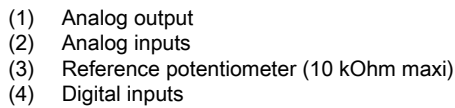
### Diagram with Switch Disconnect

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.

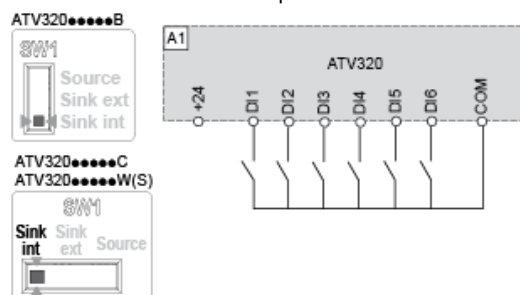


- (1) Line choke (if used)
- (2) Fault relay contacts, for remote signaling of drive status

## Control Connection Diagram in Source Mode



## ATV320●●●●●B



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



## Derating Curves

