

# Product datasheet

Specifications



## Variable speed drive, Altivar Process ATV600, APM, single 400 V, 200 kW

ATV6A0C20Q4

### Main

|                                    |                                                                                                                                                |
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| Range of product                   | Altivar Process ATV600                                                                                                                         |
| Product or component type          | Variable speed drive                                                                                                                           |
| Product specific application       | Process and utilities                                                                                                                          |
| Device short name                  | ATV6A0                                                                                                                                         |
| Variant                            | Modular version                                                                                                                                |
| Product destination                | Synchronous motors<br>Asynchronous motors                                                                                                      |
| mounting mode                      | Cabinet mount                                                                                                                                  |
| Kit composition                    | 1 control unit<br>mechanical mounting kits<br>power connection<br>set of fuses<br>2 power module 160 kW<br>1 front cover                       |
| EMC filter                         | Integrated with 300 m conforming to IEC 61800-3 category C3                                                                                    |
| IP degree of protection            | IP00 (for IP21 or IP54 cabinet integration) conforming to IEC 61800-5-1<br>IP00 (for IP21 or IP54 cabinet integration) conforming to IEC 60529 |
| Type of cooling                    | Forced convection                                                                                                                              |
| Supply frequency                   | 50...60 Hz - 5...5 %                                                                                                                           |
| Network number of phases           | 3 phases                                                                                                                                       |
| [Us] rated supply voltage          | 400 V - 15...10 %                                                                                                                              |
| Prospective line Isc               | 50 kA                                                                                                                                          |
| Asynchronous motor control profile | Constant torque standard<br>Variable torque standard<br>Optimized torque mode                                                                  |
| Synchronous motor control profile  | Permanent magnet motor                                                                                                                         |
| Speed drive output frequency       | 0...500 Hz                                                                                                                                     |
| Nominal switching frequency        | 2.5 kHz                                                                                                                                        |
| Switching frequency                | 2.5...8 kHz with derating factor<br>2...8 kHz adjustable                                                                                       |
| Safety function                    | STO (safe torque off) SIL 3                                                                                                                    |
| number of preset speeds            | 16 preset speeds                                                                                                                               |
| Communication port protocol        | Ethernet<br>Modbus serial<br>Modbus TCP                                                                                                        |

Disclaimer: This documentation is not intended as a substitute for and is not to be used for determining suitability or reliability of these products for specific user applications

|               |                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |
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| option module | Slot A: communication module, Profibus DP V1<br>Slot A: communication module, PROFINET<br>Slot A: communication module, DeviceNet<br>Slot A: communication module, Modbus TCP/EtherNet/IP<br>Slot A: communication module, CANopen daisy chain RJ45<br>Slot A: communication module, CANopen SUB-D 9<br>Slot A: communication module, CANopen screw terminals<br>Slot A/slot B: digital and analog I/O extension module<br>Slot A/slot B: output relay extension module |
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## Complementary

|                                     |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |
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| Motor power kW                      | 200.0 kW at 400 V normal duty<br>160.0 kW at 400 V heavy duty                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
| Line current                        | 352.0 A at 400 V (normal duty)<br>290.0 A at 400 V (heavy duty)                                                                                                                                                                                                                                                                                                                                                                                                                                                              |
| Apparent power                      | 244 kVA at 400 V normal duty<br>201 kVA at 400 V heavy duty                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
| Continuous output current           | 370.0 A at 2.5 kHz normal duty<br>302.0 A at 2.5 kHz heavy duty                                                                                                                                                                                                                                                                                                                                                                                                                                                              |
| Maximum transient current           | 407 A during 60 s (normal duty)<br>453 A during 60 s (heavy duty)                                                                                                                                                                                                                                                                                                                                                                                                                                                            |
| Permissible temporary current boost | 1.1 x I <sub>n</sub> during 60 s (normal duty)<br>1.5 x I <sub>n</sub> during 60 s (heavy duty)                                                                                                                                                                                                                                                                                                                                                                                                                              |
| Output voltage                      | <= power supply voltage                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
| Motor slip compensation             | Can be suppressed<br>Adjustable<br>Automatic whatever the load<br>Not available in permanent magnet motor law                                                                                                                                                                                                                                                                                                                                                                                                                |
| Acceleration and deceleration ramps | S, U or customized<br>Linear adjustable separately from 0.01...9999 s                                                                                                                                                                                                                                                                                                                                                                                                                                                        |
| Braking to standstill               | By DC injection                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |
| Protection type                     | Thermal protection: motor<br>Safe torque off: motor<br>Motor phase break: motor<br>Thermal protection: drive<br>Safe torque off: drive<br>Overheating: drive<br>Overcurrent between output phases and earth: drive<br>Overload of output voltage: drive<br>Short-circuit protection: drive<br>Motor phase break: drive<br>Overvoltages on the DC bus: drive<br>Line supply overvoltage: drive<br>Line supply undervoltage: drive<br>Line supply phase loss: drive<br>Overspeed: drive<br>Break on the control circuit: drive |
| Frequency resolution                | Display unit: 0.1 Hz<br>Analog input: 0.012/50 Hz                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |
| Electrical connection               | Control: removable screw terminals 0.5...1.5 mm <sup>2</sup> /AWG 20...AWG 16<br>Line side: screw terminal<br>Motor: M10 x 2 bars                                                                                                                                                                                                                                                                                                                                                                                            |
| Physical interface                  | 2-wire RS 485 for Modbus serial                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |
| Transmission frame                  | RTU for Modbus serial                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |
| Transmission rate                   | 10/100 Mbit/s for Ethernet IP/Modbus TCP<br>4.8, 9.6, 19.2, 38.4 kbit/s for Modbus serial                                                                                                                                                                                                                                                                                                                                                                                                                                    |
| Exchange mode                       | Half duplex, full duplex, autonegotiation Ethernet/Modbus TCP                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
| Data format                         | 8 bits, configurable odd, even or no parity for Modbus serial                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
| Type of polarization                | No impedance for Modbus serial                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |

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| Number of addresses       | 1...247 for Modbus serial                                                                                                                                                                                                                                                                                                                                                                                      |
| Method of access          | Slave Modbus TCP                                                                                                                                                                                                                                                                                                                                                                                               |
| Supply                    | External supply for digital inputs: 24 V DC (19...30 V), <1.25 mA, protection type: overload and short-circuit protection<br>Internal supply for reference potentiometer (1 to 10 kOhm): 10.5 V DC +/- 5 %, <10 mA, protection type: overload and short-circuit protection<br>Internal supply for digital inputs and STO: 24 V DC (21...27 V), <200 mA, protection type: overload and short-circuit protection |
| Local signalling          | 3 LEDs for local diagnostic<br>3 LEDs (dual colour) for embedded communication status<br>4 LEDs (dual colour) for communication module status                                                                                                                                                                                                                                                                  |
| Analogue input type       | AI1, AI2, AI3 software-configurable voltage: 0...10 V DC, impedance: 30 kOhm, resolution 12 bits<br>AI1, AI2, AI3 software-configurable current: 0...20 mA/4...20 mA, impedance: 250 Ohm, resolution 12 bits                                                                                                                                                                                                   |
| Discrete input type       | DI1...DI6 programmable, 24 V DC (<= 30 V), impedance: 3.5 kOhm<br>DI5, DI6 programmable as pulse input: 0...30 kHz, 24 V DC (<= 30 V)<br>STOA, STOB safe torque off, 24 V DC (<= 30 V), impedance: > 2.2 kOhm                                                                                                                                                                                                  |
| Input compatibility       | DI1...DI6: discrete input level 1 PLC conforming to IEC 61131-2<br>DI5, DI6: discrete input level 1 PLC conforming to IEC 65A-68<br>STOA, STOB: discrete input level 1 PLC conforming to IEC 61131-2                                                                                                                                                                                                           |
| Discrete input logic      | Positive logic (source) (DI1...DI6), < 5 V (state 0), > 11 V (state 1)<br>Negative logic (sink) (DI1...DI6), > 16 V (state 0), < 10 V (state 1)<br>Positive logic (source) (DI5, DI6), < 0.6 V (state 0), > 2.5 V (state 1)<br>Positive logic (source) (STOA, STOB), < 5 V (state 0), > 11 V (state 1)                                                                                                         |
| Analogue output type      | Software-configurable voltage AO1, AO2: 0...10 V DC impedance 470 Ohm, resolution 10 bits<br>Software-configurable current AO1, AO2: 0...20 mA, resolution 10 bits                                                                                                                                                                                                                                             |
| Sampling duration         | 2 ms +/- 0.5 ms (DI1...DI4) - discrete input<br>5 ms +/- 1 ms (DI5, DI6) - discrete input<br>5 ms +/- 0.1 ms (AI1, AI2, AI3) - analog input<br>10 ms +/- 1 ms (AO1) - analog output                                                                                                                                                                                                                            |
| Accuracy                  | +/- 0.6 % AI1, AI2, AI3 for a temperature variation 60 °C analog input<br>+/- 1 % AO1, AO2 for a temperature variation 60 °C analog output                                                                                                                                                                                                                                                                     |
| Linearity error           | AI1, AI2, AI3: +/- 0.15 % of maximum value for analog input<br>AO1, AO2: +/- 0.2 % for analog output                                                                                                                                                                                                                                                                                                           |
| Relay output type         | Configurable relay logic R1: fault relay NO/NC electrical durability 100000 cycles<br>Configurable relay logic R2: sequence relay NO electrical durability 100000 cycles<br>Configurable relay logic R3: sequence relay NO electrical durability 100000 cycles                                                                                                                                                 |
| Refresh time              | Relay output (R1, R2, R3): 5 ms (+/- 0.5 ms)                                                                                                                                                                                                                                                                                                                                                                   |
| Minimum switching current | Relay output R1, R2, R3: 5 mA at 24 V DC                                                                                                                                                                                                                                                                                                                                                                       |
| Maximum switching current | Relay output R1, R2, R3 on resistive load, cos phi = 1: 3 A at 250 V AC<br>Relay output R1, R2, R3 on resistive load, cos phi = 1: 3 A at 30 V DC<br>Relay output R1, R2, R3 on inductive load, cos phi = 0.4 and L/R = 7 ms: 2 A at 250 V AC<br>Relay output R1, R2, R3 on inductive load, cos phi = 0.4 and L/R = 7 ms: 2 A at 30 V DC                                                                       |

## Environment

|                               |                                                                                                                                                                                                                                                                                                                                                                                                                                  |
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| Noise level                   | 70 dB conforming to 86/188/EEC                                                                                                                                                                                                                                                                                                                                                                                                   |
| Power dissipation in W        | Forced convection: 4840 W, switching frequency 2.5 kHz (normal duty)<br>Forced convection: 3780 W, switching frequency 2.5 kHz (heavy duty)                                                                                                                                                                                                                                                                                      |
| Maximum THDI                  | <48 % full load conforming to IEC 61000-3-12                                                                                                                                                                                                                                                                                                                                                                                     |
| 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 µs - 8/20 µs 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 |

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| <b>Pollution degree</b>                      | 2 conforming to IEC 61800-5-1                                                                                                                                                                      |
| <b>Vibration resistance</b>                  | 1.5 mm peak to peak (f= 2...13 Hz) conforming to IEC 60068-2-6<br>0.5 gn (f= 13...200 Hz) conforming to IEC 60068-2-6                                                                              |
| <b>Shock resistance</b>                      | 7 gn for 11 ms conforming to IEC 60068-2-27                                                                                                                                                        |
| <b>Relative humidity</b>                     | 5...95 % without condensation conforming to IEC 60068-2-3                                                                                                                                          |
| <b>Ambient air temperature for operation</b> | -10...40 °C without derating<br>40...50 °C with derating factor                                                                                                                                    |
| <b>Ambient air temperature for storage</b>   | -40...70 °C                                                                                                                                                                                        |
| <b>Operating altitude</b>                    | <= 1000 m without derating<br>1000...4800 m with current derating 1 % per 100 m                                                                                                                    |
| <b>Environmental characteristic</b>          | Chemical pollution resistance class 3C3 conforming to IEC 60721-3-3<br>Dust pollution resistance class 3S3 conforming to IEC 60721-3-3<br>Humidity resistant class 3K3 conforming to IEC 60721-3-3 |
| <b>Standards</b>                             | IEC 61800-3<br>IEC 61800-5-1<br>IEC 61000-3-12<br>IEC 60721-3<br>IEC 61508<br>IEC 13849-1                                                                                                          |
| <b>product certifications</b>                | cULus<br>TÜV                                                                                                                                                                                       |
| <b>marking</b>                               | CE                                                                                                                                                                                                 |