# Product data sheet
## Characteristics

# ATV950U22N4E
variable speed drive, Altivar Process ATV900, ATV950, 2.2kW, 400 to 480V, with braking unit, switch, IP55



## Main

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|---|---|
| Range of product | Altivar Process ATV900 |
| Product specific application | Process for industrial |
| Product or component type | Variable speed drive |
| Variant | With braking chopper<br>With load break switch |
| Device application | Industrial application |
| Product destination | Synchronous motors<br>Asynchronous motors |
| Network number of phases | 3 phases |
| Mounting mode | Wall mount |
| Continuous output current | 5.6 A at 4 kHz for normal duty<br>4 A at 4 kHz for heavy duty |
| Communication port protocol | Modbus serial<br>Modbus TCP<br>EtherNet/IP |
| Option card | Slot A: communication module for Profibus DP V1<br>Slot A: communication module for PROFINET<br>Slot A: communication module for DeviceNet<br>Slot A: communication module for EtherCAT<br>Slot A: communication module for CANopen daisy chain RJ45<br>Slot A: communication module for CANopen SUB-D 9<br>Slot A: communication module for CANopen screw terminals<br>Slot A/slot B/slot C: digital and analog I/O extension module<br>Slot A/slot B/slot C: output relay extension module<br>Slot B: 5/12 V digital encoder interface module<br>Slot B: analog encoder interface module<br>Slot B: resolver encoder interface module<br>communication module for Ethernet Powerlink |
| [Us] rated supply voltage | 380...480 V - 15...10 % |
| [Us] rated supply voltage | 380...480 V |
| Relative symmetric mains voltage tolerance | 10 % |
| Relative symmetric network frequency tolerance | 5 % |
| Nominal output current | 5.6 A |
| Motor power kW | 2.2 KW for normal duty<br>1.5 KW for heavy duty |
| EMC filter | Integrated<br>With EMC plate option |
| IP degree of protection | IP55 |
| Degree of protection | UL type 1 |

## Complementary

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|---|---|
| Electrical connection | Control: screw terminal 0.5...1.5 mm²<br>Line side: screw terminal 4...6 mm²<br>Motor: screw terminal 4...6 mm²<br>DC bus: screw terminal 2.5...6 mm² |
| 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 IP/Modbus TCP |
| Data format | 8 bits, configurable odd, even or no parity for Modbus serial |
| Type of polarization | No impedance for Modbus serial |
| Number of addresses | 1…247 for Modbus serial |
| Supply | External supply for digital inputs: 24 V DC (19…30 V), <1.25 mA, protection type: overload and sho<br>Internal supply for reference potentiometer (1 to 10 kOhm): 10.5 V DC +/- 5 %, <10 mA, protection<br>Internal supply for digital inputs and STO: 24 V DC (21…27 V), <200 mA, protection type: overloa |
| Local signalling | Local diagnostic: 3 LED (mono/dual colour)<br>Embedded communication status: 5 LED (dual colour)<br>Communication module status: 2 LED (dual colour)<br>Presence of voltage: 1 LED (red) |
| Input compatibility | DI1...DI8: discrete input level 1 PLC conforming to IEC 61131-2<br>DI7, DI8: pulse 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...DI8), < 5 V (state 0), > 11 V (state 1)<br>Negative logic (sink) (DI1...DI8), > 16 V (state 0), < 10 V (state 1)<br>Positive logic (source) (DI7, DI8), < 0.6 V (state 0), > 2.5 V (state 1)<br>Positive logic (source) (STOA, STOB), < 5 V (state 0), > 11 V (state 1) |
| Sampling duration | 2 Ms +/- 0.5 ms (DI1...DI8) - discrete input<br>5 Ms +/- 1 ms (DI7, DI8) - pulse input<br>1 Ms +/- 1 ms (AI1, AI2, AI3) - analog input<br>5 Ms +/- 1 ms (AQ1, AQ2) - analog output |
| Accuracy | +/- 0.6 % AI1, AI2, AI3 for a temperature variation 60 °C analog input<br>+/- 1 % AQ1, AQ2 for a temperature variation 60 °C analog output |
| Linearity error | AI1, AI2, AI3: +/- 0.15 % of maximum value for analog input<br>AQ1, AQ2: +/- 0.2 % for analog output |
| Refresh time | Relay output (R1, R2, R3): 5 ms (+/- 0.5 ms) |
| Isolation | Between power and control terminals |
| Discrete input number | 10 |
| Discrete input type | DI1...DI8 programmable, 24 V DC (<= 30 V), impedance: 3.5 kOhm<br>DI7, DI8 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 |
| Discrete output number | 2 |
| Discrete output type | Logic output DQ+ 0…1 kHz <= 30 V DC 100 mA<br>Programmable as pulse output DQ+ 0…30 kHz <= 30 V DC 20 mA<br>Logic output DQ- 0…1 kHz <= 30 V DC 100 mA |
| Analogue input number | 3 |
| 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 |
| Analogue output number | 2 |
| Analogue output type | Software-configurable voltage AQ1, AQ2: 0...10 V DC impedance 470 Ohm, resolution 10 bits<br>Software-configurable current AQ1, AQ2: 0...20 mA impedance 500 Ohm, resolution 10 bits |
| Relay output number | 3 |
| 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 1000000 cycles<br>Configurable relay logic R3: sequence relay NO electrical durability 1000000 cycles |
| Maximum switching current | Relay output R1 on resistive load, cos phi = 1: 3 A at 250 V AC<br>Relay output R1 on resistive load, cos phi = 1: 3 A at 30 V DC<br>Relay output R1 on inductive load, cos phi = 0.4 and L/R = 7 ms: 2 A at 250 V AC<br>Relay output R1 on inductive load, cos phi = 0.4 and L/R = 7 ms: 2 A at 30 V DC<br>Relay output R2, R3 on resistive load, cos phi = 1: 5 A at 250 V AC<br>Relay output R2, R3 on resistive load, cos phi = 1: 5 A at 30 V DC<br>Relay output R2, R3 on inductive load, cos phi = 0.4 and L/R = 7 ms: 2 A at 250 V AC<br>Relay output R2, R3 on inductive load, cos phi = 0.4 and L/R = 7 ms: 2 A at 30 V DC |
| Minimum switching current | Relay output R1, R2, R3: 5 mA at 24 V DC |
| Discrete input logic | 16 preset speeds |
| Physical interface | Ethernet<br>2-wire RS 485 |

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|---|---|
| Connector type | 2 RJ45<br>1 RJ45 |
| Method of access | Slave Modbus TCP |
| Transmission rate | 10, 100 Mbits<br>4.8 kbps<br>9600 bit/s<br>19200 bit/s |
| Transmission frame | RTU |
| Number of addresses | 1…247 |
| Data format | 8 bits, configurable odd, even or no parity |
| Type of polarization | No impedance |
| 4 quadrant operation possible | True |
| Asynchronous motor control profile | Optimized torque mode<br>Constant torque standard<br>Variable torque standard |
| Synchronous motor control profile | Permanent magnet motor<br>Synchronous reluctance motor |
| Maximum output frequency | 599 Hz |
| Acceleration and deceleration ramps | Linear adjustable separately from 0.01...9999 s |
| Motor slip compensation | Automatic whatever the load<br>Not available in permanent magnet motor law<br>Adjustable<br>Can be suppressed |
| 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 | 4.3 A at 380 V (normal duty)<br>3.1 A at 380 V (heavy duty)<br>3.8 A at 480 V (normal duty)<br>2.9 A at 480 V (heavy duty) |
| Maximum input current | 4.3 A |
| Maximum output voltage | 480.0 V |
| Apparent power | 3.2 KVA at 480 V (normal duty)<br>2.4 KVA at 480 V (heavy duty) |
| Maximum transient current | 6.7 A during 60 s (normal duty)<br>6 A during 60 s (heavy duty) |
| Network frequency | 50...60 Hz |
| Prospective line Isc | 50 KA |
| Base load current at high overload | 4.0 A |
| Base load current at low overload | 5.6 A |
| With safety function Safely Limited Speed (SLS) | True |
| With safety function Safe brake management (SBC/SBT) | True |
| 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 |

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|---|---|
| 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 |
| Quantity per set | 1 |
| Width | 264 Mm |
| Height | 678 Mm |
| Depth | 300 Mm |
| Net weight | 10.5 Kg |

## Environment

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|---|---|
| Insulation resistance | > 1 MOhm 500 V DC for 1 minute to earth |
| Noise level | 52 DB conforming to 86/188/EEC |
| Vibration resistance | 1.5 mm peak to peak (f= 2…13 Hz) conforming to IEC 60068-2-6<br>1 gn (f= 13…200 Hz) conforming to IEC 60068-2-6 |
| Shock resistance | 15 gn for 11 ms conforming to IEC 60068-2-27 |
| Environmental characteristic | Chemical pollution resistance class 3C3 conforming to IEC 60721-3-3<br>Dust pollution resistance class 3S3 conforming to IEC 60721-3-3 |
| Relative humidity | 5…95 % without condensation conforming to IEC 60068-2-3 |
| Ambient air temperature for operation | -15…40 °C (without derating)<br>40…50 °C (with derating factor) |
| Operating altitude | <= 1000 m without derating<br>1000...4800 m with current derating 1 % per 100 m |
| Operating position | Vertical +/- 10 degree |
| Product certifications | TÜV |
| Marking | CE |
| Standards | UL 508C<br>IEC 61800-3<br>IEC 61800-5-1<br>IEC 61000-3-12<br>IEC 60721-3<br>IEC 61508<br>IEC 13849-1 |
| Maximum THDI | <48 % full load conforming to IEC 61000-3-12 |
| Assembly style | Enclosed |
| 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 |
| Environmental class (during operation) | Class 3C3 according to IEC 60721-3-3<br>Class 3S3 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 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 |
| Overvoltage category | III |
| Regulation loop | Adjustable PID regulator |
| Noise level | 52 DB |
| Pollution degree | 2 |
| Ambient air transport temperature | -40…70 °C |
| Ambient air temperature for storage | -40…70 °C |

## Packing Units

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|---|---|
| Unit Type of Package 1 | PCE |
| Number of Units in Package 1 | 1 |
| Package 1 Height | 54.0 Cm |
| Package 1 Width | 39.0 Cm |
| Package 1 Length | 80.0 Cm |
| Package 1 Weight | 21.4 Kg |

## Offer Sustainability

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|---|---|
| Recyclability potential, in % | 85 |
| Total lifecycle Carbon footprint | 1 658 kg CO2 eq. |
| Carbon footprint of the manufacturing phase [A1 to A3] | 155.89053066644084 |
| Carbon footprint of the manufacturing phase [A1 to A3] | 156 kg CO2 eq. |
| Carbon footprint of the distribution phase [A4] | 3.2921983436828333 |
| Carbon footprint of the distribution phase [A4] | 3 kg CO2 eq. |
| Carbon footprint of the installation phase [A5] | 17.319480966585182 |
| Carbon footprint of the installation phase [A5] | 17 kg CO2 eq. |
| Carbon footprint of the use phase [B2, B3, B4, B6] | 1462.4293920850955 |
| Carbon footprint of the use phase [B2, B3, B4, B6] | 1 462 kg CO2 eq. |
| Mercury free | Yes |
| Sustainable packaging | No |
| Carbon footprint of the end-of-life phase [C1 to C4] | 19.064438787679887 |
| Carbon footprint of the end-of-life phase [C1 to C4] | 19 kg CO2 eq. |
| Environmental Disclosure | Product Environmental Profile |
| Total lifecycle Carbon footprint | 1658 |
| Packaging made with recycled cardboard | Yes |
| Packaging without single use plastic | No |
| SCIP Number | 787b365c-1873-4754-9a59-b7356bc1cf3b |
| REACh Regulation | Reference contains Substances of Very High Concern above the threshold |
| EU RoHS Directive | Compliant By Exemption |
| California proposition 65 | WARNING: This product can expose you to chemicals including: Lead and lead compounds, w |
| Product contributes to saved and avoided emissions | Yes |
| End of life manual availability | End Of Life Information |
| Removable battery | Yes |
| Take-back | No |
| WEEE Label | The product must be disposed on European Union markets following specific waste collection a |

## Contractual warranty

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|---|---|
| Warranty (in months) | 18 |

Product Life Status : Commercialised