



## Main

Range of product	Altivar Process ATV600
Product or component type	Variable speed drive
Product specific application	Process and utilities
Device short name	ATV650
Variant	Standard version
Product destination	Asynchronous motors Synchronous motors
EMC filter	Integrated with 50 m conforming to EN/IEC 61800-3 category C2 Integrated with 150 m conforming to EN/IEC 61800-3 category C3
IP degree of protection	IP55 conforming to IEC 61800-5-1 IP55 conforming to IEC 60529
Degree of protection	UL type 12 conforming to UL 508C
Type of cooling	Forced convection
Supply frequency	50...60 Hz - 5...5 %
Network number of phases	3 phases
[Us] rated supply voltage	380...480 V - 15...10 %
Motor power kW	2.2 KW (normal duty) 1.5 KW (heavy duty)
Motor power hp	3 Hp normal duty 2 Hp heavy duty
Line current	4.3 A at 380 V (normal duty) 3.8 A at 480 V (normal duty) 3.1 A at 380 V (heavy duty) 2.9 A at 480 V (heavy duty)
Prospective line I <sub>sc</sub>	50 KA
Apparent power	3.2 KVA at 480 V (normal duty) 2.4 KVA at 480 V (heavy duty)
Continuous output current	5.6 A at 4 kHz for normal duty 4 A at 4 kHz for heavy duty
Maximum transient current	6 A during 60 s (heavy duty) 6.2 A during 60 s (normal duty)
Asynchronous motor control profile	Constant torque standard Variable torque standard Optimized torque mode
Synchronous motor control profile	Permanent magnet motor Synchronous reluctance motor
Output frequency	0.0001...0.5 KHz
Speed drive output frequency	0.1...599 Hz
Nominal switching frequency	4 kHz
Switching frequency	2...12 kHz adjustable 4...12 kHz with derating factor
Safety function	STO (safe torque off) SIL 3
Discrete input logic	16 preset speeds

Communication port protocol	Modbus TCP Modbus serial Ethernet
Option card	Slot A: communication module, Profibus DP V1 Slot A: communication module, Profinet Slot A: communication module, DeviceNet Slot A: communication module, Modbus TCP/EtherNet/IP Slot A: communication module, CANopen daisy chain RJ45 Slot A: communication module, CANopen SUB-D 9 Slot A: communication module, CANopen screw terminals Slot A/slot B: digital and analog I/O extension module Slot A/slot B: output relay extension module Slot A: communication module, Ethernet IP/Modbus TCP/MD-Link Communication module, BACnet MS/TP Communication module, Ethernet Powerlink

## Complementary

Output voltage	$\leq$ power supply voltage
Permissible temporary current boost	1.1 x $I_n$ during 60 s (normal duty) 1.5 x $I_n$ during 60 s (heavy duty)
Motor slip compensation	Can be suppressed Adjustable Not available in permanent magnet motor law Automatic whatever the load
Acceleration and deceleration ramps	Linear adjustable separately from 0.01...9999 s
Braking to standstill	By DC injection
Protection type	Thermal protection: motor Safe torque off: motor Motor phase break: motor Thermal protection: drive Safe torque off: drive Overheating: drive Overcurrent between output phases and earth: drive Overload of output voltage: drive Short-circuit protection: drive Motor phase break: drive Overvoltages on the DC bus: drive Line supply overvoltage: drive Line supply undervoltage: drive Line supply phase loss: drive Overspeed: drive Break on the control circuit: drive
Frequency resolution	Display unit: 0.1 Hz Analog input: 0.012/50 Hz
Electrical connection	Control: removable screw terminals 0.5...1.5 mm <sup>2</sup> /AWG 20...AWG 16 Line side: screw terminal 4...6 mm <sup>2</sup> /AWG 12...AWG 10 Motor: screw terminal 4...6 mm <sup>2</sup> /AWG 12...AWG 10
Connector type	RJ45 (on the remote graphic terminal) for Ethernet/Modbus TCP RJ45 (on the remote graphic terminal) for Modbus serial
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 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
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 Internal supply for reference potentiometer (1 to 10 kOhm): 10.5 V D-C +/- 5 %, <10 mA, protection type: overload and short-circuit protection 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 local diagnostic: 3 LEDs (dual colour) embedded communication status: 4 LEDs (dual colour) communication module status: 1 LED (red) presence of voltage:
Width	264 Mm
Height	678 Mm

Depth	272 Mm
Net weight	10.5 Kg
Analogue input number	3
Analogue input type	AI1, AI2, AI3 software-configurable voltage: 0...10 V DC, impedance: 30 kOhm, resolution 12 bits AI1, AI2, AI3 software-configurable current: 0...20 mA/4...20 mA, impedance: 250 Ohm, resolution 12 bits
Discrete input number	8
Discrete input type	DI1...DI6 programmable, 24 V DC ( $\leq 30$ V), impedance: 3.5 kOhm DI5, DI6 programmable as pulse input: 0...30 kHz, 24 V DC ( $\leq 30$ V) STOA, STOB safe torque off, 24 V DC ( $\leq 30$ V), impedance: $> 2.2$ kOhm
Input compatibility	DI1...DI6: discrete input level 1 PLC conforming to EN/IEC 61131-2 DI5, DI6: discrete input level 1 PLC conforming to IEC 65A-68 STOA, STOB: discrete input level 1 PLC conforming to EN/IEC 61131-2
Discrete input logic	Positive logic (source) (DI1...DI6), $< 5$ V (state 0), $> 11$ V (state 1) Negative logic (sink) (DI1...DI6), $> 16$ V (state 0), $< 10$ V (state 1) Positive logic (source) (DI5, DI6), $< 0.6$ V (state 0), $> 2.5$ V (state 1) Positive logic (source) (STOA, STOB), $< 5$ V (state 0), $> 11$ V (state 1)
Analogue output number	2
Analogue output type	Software-configurable voltage AO1, AO2: 0...10 V DC impedance 470 Ohm, resolution 10 bits Software-configurable current AO1, AO2: 0...20 mA, resolution 10 bits
Sampling duration	2 Ms $\pm$ 0.5 ms (DI1...DI4) - discrete input 5 Ms $\pm$ 1 ms (DI5, DI6) - discrete input 5 Ms $\pm$ 0.1 ms (AI1, AI2, AI3) - analog input 10 Ms $\pm$ 1 ms (AO1) - analog output
Accuracy	$\pm$ 0.6 % AI1, AI2, AI3 for a temperature variation 60 °C analog input $\pm$ 1 % AO1, AO2 for a temperature variation 60 °C analog output
Linearity error	AI1, AI2, AI3: $\pm$ 0.15 % of maximum value for analog input AO1, AO2: $\pm$ 0.2 % for analog output
Relay output number	3
Relay output type	Configurable relay logic R1: fault relay NO/NC electrical durability 100000 cycles Configurable relay logic R2: sequence relay NO electrical durability 100000 cycles Configurable relay logic R3: sequence relay NO electrical durability 100000 cycles
Refresh time	Relay output (R1, R2, R3): 5 ms ( $\pm$ 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 Relay output R1, R2, R3 on resistive load, $\cos \phi = 1$ : 3 A at 30 V DC Relay output R1, R2, R3 on inductive load, $\cos \phi = 0.4$ and L/R = 7 m-s: 2 A at 250 V AC Relay output R1, R2, R3 on inductive load, $\cos \phi = 0.4$ and L/R = 7 m-s: 2 A at 30 V DC
Isolation	Between power and control terminals
Mounting mode	Wall mount

## Environment

Insulation resistance	$> 1$ MOhm 500 V DC for 1 minute to earth
Noise level	52 DB conforming to 86/188/EEC
Operating position	Vertical $\pm$ 10 degree
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 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 $\mu$ s - 8/20 $\mu$ s surge immunity test level 3 conforming to IEC 61000-4-5 Conducted radio-frequency immunity test level 3 conforming to IEC 61000-4-6
Pollution degree	2 conforming to EN/IEC 61800-5-1
Vibration resistance	1.5 mm peak to peak ( $f = 2...13$ Hz) conforming to IEC 60068-2-6 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
Relative humidity	5...95 % without condensation conforming to IEC 60068-2-3
Ambient air temperature for operation	-15...40 °C (without) 40...50 °C (with derating factor)
Ambient air temperature for storage	-40...70 °C

Operating altitude	<= 1000 m without 1000...4800 m with current derating 1 % per 100 m
Environmental characteristic	Chemical pollution resistance class 3C3 conforming to EN/IEC 60721-3-3 Dust pollution resistance class 3S3 conforming to EN/IEC 60721-3-3
Standards	UL 508C EN/IEC 61800-3 Environment 1 category C2 EN/IEC 61800-3 Environment 2 category C3 EN/IEC 61800-3 EN/IEC 61800-5-1 IEC 61000-3-12 IEC 60721-3 IEC 61508 IEC 13849-1
Product certifications	ATEX INERIS ABS REACH UL DNV-GL Bureau Veritas TÜV CSA
Marking	CE

### 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

Product Life Status : **Commercialised**