Product data sheet
Characteristics

ATV650U15N4E
variable speed drive, Altivar Process ATV600, ATV650, 1.5kW, 400 to 480V, IP55, disconnect switch



Main

Range of product	Altivar Process ATV600
Product specific application	Process and utilities
Product or component type	Variable speed drive
Variant	With disconnect switch
Device short name	ATV650
Mounting mode	Wall mount
Communication port protocol	Modbus serial Ethernet
[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	4.0 A
IP degree of protection	IP55
Product destination	Asynchronous motors Synchronous motors
EMC filter	Integrated with 50 m conforming to IEC 61800-3 category C2 Integrated with 150 m conforming to IEC 61800-3 category C3
IP degree of protection	IP55 conforming to IEC 60529 IP55 conforming to IEC 61800-5-1
Type of cooling	Forced convection
Supply frequency	50...60 Hz - 5...5 %
Motor power kW	0.75 KW (heavy duty) 1.5 KW (normal duty)
Motor power hp	1 Hp heavy duty 2 Hp normal duty
Line current	2.6 A at 480 V (normal duty) 1.7 A at 380 V (heavy duty) 1.5 A at 480 V (heavy duty) 3 A at 380 V (normal duty)
Continuous output current	2.2 A at 4 kHz for heavy duty 4 A at 4 kHz for normal duty
Speed drive output frequency	0.1…500 Hz

Safety function	STO (safe torque off) SIL 3
Option card	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 Slot A: communication module, Profibus DP V1

Complementary

Discrete input number	8
Discrete input type	DI7, DI8 programmable as pulse input: 0…30 kHz, 24 V DC (<= 30 V)
Discrete input logic	16 preset speeds
Discrete output number	0
Discrete output type	Relay outputs R1A, R1B, R1C 250 V AC 3000 mA Relay outputs R1A, R1B, R1C 30 V DC 3000 mA Relay outputs R2A, R2C 250 V AC 5000 mA Relay outputs R2A, R2C 30 V DC 5000 mA Relay outputs R3A, R3C 250 V AC 5000 mA Relay outputs R3A, R3C 30 V DC 5000 mA
Analogue input number	3
Analogue input type	AI1, AI2, AI3 software-configurable voltage: 0...10 V DC, impedance: 31.5 kOhm, resolution 12 bits AI1, AI2, AI3 software-configurable current: 0...20 mA, impedance: 250 Ohm, resolution 12 bits AI2 voltage analog input: - 10...10 V DC, impedance: 31.5 kOhm, resolution 12 bits
Analogue output number	2
Analogue output type	Software-configurable voltage AQ1, AQ2: 0...10 V DC impedance 470 Ohm, resolution 10 bits Software-configurable current AQ1, AQ2: 0...20 mA, resolution 10 bits Software-configurable current DQ-, DQ+: 30 V DC Software-configurable current DQ-, DQ+: 100 mA
Relay output number	3
Relay output type	Configurable relay logic R2: sequence relay NO electrical durability 100000 cycles Configurable relay logic R3: sequence relay NO electrical durability 100000 cycles Configurable relay logic R1: fault relay NO/NC electrical durability 100000 cycles
Maximum switching current	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 ms: 2 A at 250 V AC Relay output R1, R2, R3 on inductive load, cos phi = 0.4 and L/R = 7 ms: 2 A at 30 V DC Relay output R1, R2, R3 on resistive load, cos phi = 1: 3 A at 250 V AC
Minimum switching current	Relay output R1, R2, R3: 5 mA at 24 V DC
Network number of phases	3 phases
Physical interface	Ethernet 2-wire RS 485
Method of access	Slave Modbus TCP
Transmission rate	10, 100 Mbits 4800 bps, 9600 bps, 19200 bps, 38.4 Kbps
Transmission frame	RTU
Output voltage	<= power supply voltage
Permissible temporary current boost	1.5 x In during 60 s (heavy duty) 1.1 x In during 60 s (normal duty)
Data format	8 bits, configurable odd, even or no parity
Type of polarization	No impedance
Frequency resolution	Analog input: 0.012/50 Hz Display unit: 0.1 Hz
Electrical connection	Line side: screw terminal 4...6 mm²/12 AWG...10 AWG Motor: screw terminal 4...6 mm²/12 AWG...10 AWG Control: removable screw terminals 0.5...1.5 mm²
Connector type	RJ45 (on the remote graphic terminal) for Modbus serial RJ45 (on the remote graphic terminal) for Ethernet/Modbus TCP
Exchange mode	Half duplex, full duplex, autonegotiation Ethernet/Modbus TCP
Number of addresses	1…247 for Modbus serial
Supply	Internal supply for reference potentiometer (1 to 10 kOhm): 10.5 V DC +/- 5 %, <10 mA, protection Internal supply for digital inputs and STO: 24 V DC (21…27 V), <200 mA, protection type: overloa External supply for digital inputs: 24 V DC (19…30 V), <1.25 mA, protection type: overload and sh

Local signalling	3 LEDs (dual colour) for embedded communication status 4 LEDs (dual colour) for communication module status 1 LED (red) for presence of voltage 3 LEDs for local diagnostic
Input compatibility	DI5, DI6: discrete input level 1 PLC conforming to IEC 65A-68 STOA, STOB: discrete input level 1 PLC conforming to IEC 61131-2 DI1...DI6: 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) Negative logic (sink) (DI1...DI8), > 16 V (state 0), < 10 V (state 1)
Sampling duration	5 Ms +/- 1 ms (DI5, DI6) - discrete input 5 Ms +/- 0.1 ms (AI1, AI2, AI3) - analog input 10 Ms +/- 1 ms (AO1) - analog output 2 Ms +/- 0.5 ms (DI1...DI4) - discrete input
Accuracy	+/- 1 % AO1, AO2 for a temperature variation 60 °C analog output +/- 0.6 % AI1, AI2, AI3 for a temperature variation 60 °C analog input
Linearity error	AO1, AO2: +/- 0.2 % for analog output AI1, AI2, AI3: +/- 0.15 % of maximum value for analog input
Refresh time	Relay output (R1, R2, R3): 5 ms (+/- 0.5 ms)
Isolation	Between power and control terminals
Discrete and process manufacturing	Food and beverage processing other application Mining mineral and metal fan Mining mineral and metal pump Oil and gas fan Water and waste water other application Building - HVAC screw compressor Food and beverage processing pump Food and beverage processing fan Food and beverage processing atomization Oil and gas electro submersible pump (ESP) Oil and gas water injection pump Oil and gas jet fuel pump Oil and gas compressor for refinery Water and waste water centrifuge pump Water and waste water positive displacement pump Water and waste water electro submersible pump (ESP) Water and waste water screw pump Water and waste water lobe compressor Water and waste water screw compressor Water and waste water compressor centrifugal Water and waste water fan Water and waste water conveyor Water and waste water mixer
Power range	1.1…2 KW at 480…500 V 3 phases
Enclosure mounting	Wall mounted
4 quadrant operation possible	False
Asynchronous motor control profile	Constant torque standard Optimized torque mode Variable torque standard
Synchronous motor control profile	Synchronous reluctance motor Permanent magnet motor
Maximum output frequency	500 KHz
Acceleration and deceleration ramps	Linear adjustable separately from 0.01...9999 s
Motor slip compensation	Adjustable Can be suppressed Not available in permanent magnet motor law Automatic whatever the load
Switching frequency	4...12 kHz with derating factor 2...12 kHz adjustable
Nominal switching frequency	4 kHz
Braking to standstill	By DC injection
Brake chopper integrated	False
Maximum input current	3.0 A
Maximum output voltage	480.0 V
Apparent power	1.2 KVA at 480 V (heavy duty) 2.2 KVA at 480 V (normal duty)
Maximum transient current	3.3 A during 60 s (heavy duty) 4.4 A during 60 s (normal duty)
Network frequency	50...60 Hz
Prospective line Isc	50 KA

Base load current at high overload	2.2 A
Base load current at low overload	4.0 A
With safety function Safely Limited Speed (SLS)	False
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)	False
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	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 Thermal protection: motor
Quantity per set	1
Width	264 Mm
Height	678 Mm
Depth	300 Mm
Net weight	10.5 Kg

Environment

Insulation resistance	> 1 MOhm 500 V DC for 1 minute to earth
Noise level	52 DB conforming to 86/188/EEC
Pollution degree	2 conforming to IEC 61800-5-1
Vibration resistance	1 gn (f= 13…200 Hz) conforming to IEC 60068-2-6 1.5 mm peak to peak (f= 2…13 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	40…50 °C (with derating factor) -15…40 °C (without derating)
Operating altitude	1000...4800 m with current derating 1 % per 100 m <= 1000 m without derating
Operating position	Vertical +/- 10 degree
Product certifications	ATEX INERIS[RETURN]ATEX zone 2/22[RETURN]UL[RETURN]CSA[RETURN]DNV-GL
Marking	CE
Standards	IEC 61800-3 IEC 61800-3 environment 1 category C2 EN/IEC 61800-3 environment 2 category C3 IEC 61800-5-1 IEC 61000-3-12 IEC 60721-3 IEC 61508 IEC 13849-1
Maximum THDI	<48 % full load conforming to IEC 61000-3-12
Electromagnetic compatibility	Radiated radio-frequency electromagnetic field immunity test level 3 conforming to IEC 61000-4-3 Electrical fast transient/burst immunity test level 4 conforming to IEC 61000-4-4 1.2/50 µs - 8/20 µs surge immunity test level 3 conforming to IEC 61000-4-5 Conducted radio-frequency immunity test level 3 conforming to IEC 61000-4-6 Electrostatic discharge immunity test level 3 conforming to IEC 61000-4-2

Environmental class (during operation)	Class 3C3 according to IEC 60721-3-3 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	3
Ambient air transport temperature	-40…70 °C
Ambient air temperature for storage	-40…70 °C

Packing Units

Unit Type of Package 1	PCE
Number of Units in Package 1	1
Package 1 Height	54 Cm
Package 1 Width	39.2 Cm
Package 1 Length	80 Cm
Package 1 Weight	12.5 Kg

Offer Sustainability

Recyclability potential, in %	85
Total lifecycle Carbon footprint	1 185 kg CO2 eq.
Carbon footprint of the manufacturing phase [A1 to A3]	90.87275619249831
Carbon footprint of the manufacturing phase [A1 to A3]	91 kg CO2 eq.
Carbon footprint of the distribution phase [A4]	1.9230130512166081
Carbon footprint of the distribution phase [A4]	2 kg CO2 eq.
Carbon footprint of the installation phase [A5]	10.116519256182931
Carbon footprint of the installation phase [A5]	10 kg CO2 eq.
Carbon footprint of the use phase [B2, B3, B4, B6]	1071.4020212705793
Carbon footprint of the use phase [B2, B3, B4, B6]	1 071 kg CO2 eq.
Mercury free	Yes
Sustainable packaging	No
Carbon footprint of the end-of-life phase [C1 to C4]	11.135577022290645
Carbon footprint of the end-of-life phase [C1 to C4]	11 kg CO2 eq.
Environmental Disclosure	Product Environmental Profile
Total lifecycle Carbon footprint	1185
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

Warranty (in months)	18

Product Life Status : Commercialised