Product data sheet

Specifications



variable speed drive APM, ATV900, Low Harmonic/Regen drive, 440 V, 160 kW

ATV9B0C16R4

Main

Range of product	Altivar Process ATV900
Product specific application	Process and utilities
Product or component type	Variable speed drive
Device short name	ATV9B0
Variant	Modular version
Product destination	Synchronous motors Asynchronous motors
Mounting mode	Cabinet mount
Kit composition	1 control unit mechanical mounting kits power connection set of fuses 1.0 power module 160 kW 1.0 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 IP00 (for IP21 or IP54 cabinet integration) conforming to IEC 60529
Type of cooling	Forced convection
Supply frequency	50...60 Hz +/- 5 %
Network number of phases	3 phases
[Us] rated supply voltage	440 V - 15...10 %
Permissible temporary current boost	1.2 x In during 60 s (normal duty) 1.5 x In during 60 s (heavy duty)
Asynchronous motor control profile	Optimized torque mode Variable torque standard Constant torque standard
Synchronous motor control profile	Permanent magnet motor Synchronous reluctance motor
Speed drive output frequency	0.1…599 Hz
Nominal switching frequency	2.5 kHz
Switching frequency	2.5...8 kHz with derating factor 2...8 kHz adjustable
Safety function	STO (safe torque off) SIL 3
Communication port protocol	EtherNet/IP Modbus serial 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

Option card	Slot A: communication module for Profibus DP V1 Slot A: communication module for PROFINET Slot A: communication module for DeviceNet Slot A: communication module for CANopen daisy chain RJ45 Slot A: communication module for CANopen SUB-D 9 Slot A: communication module for CANopen screw terminals Slot A: communication module for EtherCAT Slot A/slot B/slot C: digital and analog I/O extension module Slot A/slot B/slot C: output relay extension module Slot B: 5/12 V digital encoder interface module Slot B: analog encoder interface module Slot B: resolver encoder interface module

Complementary

Motor power kW	160.0 kW at 440 V normal duty 132.0 kW at 440 V heavy duty 160.0 kW at 440 V normal duty regenerative mode 132.0 kW at 440 V heavy duty regenerative mode
Line current	229.0 A at 440 V (normal duty) 190.0 A at 440 V (heavy duty) 192.5 A at 440 V regenerative mode (normal duty) 158.0 A at 440 V regenerative mode (heavy duty)
Apparent power	174.0 kVA at 440 V normal duty 145.0 kVA at 440 V heavy duty 146.7 kVA at 440 V normal duty regenerative mode 120.4 kVA at 440 V heavy duty regenerative mode
Continuous output current	302.0 A at 2.5 kHz normal duty 250.0 A at 2.5 kHz heavy duty 302.0 A at 2.5 kHz normal duty regenerative mode 250.0 A at 2.5 kHz heavy duty regenerative mode
Maximum transient current	362.4 A during 60 s (normal duty) 375.0 A during 60 s (heavy duty) 362.4 A during 60 s regenerative mode (normal duty) 375.0 A during 60 s regenerative mode (heavy duty)
Motor slip compensation	Adjustable Automatic whatever the load Not available in permanent magnet motor law Can be suppressed
Acceleration and deceleration ramps	Linear adjustable separately from 0.01...9999 s S, U or customized
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 mm²/20 AWG...16 AWG Line side: screw terminal Motor: M10 x 2 bars
Connector type	2 RJ45 for Ethernet IP/Modbus TCP on terminal 1 RJ45 for Modbus serial on terminal
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
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 DC +/- 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	Local diagnostic: 3 LED (mono/dual colour) Embedded communication status: 5 LED (dual colour) Communication module status: 2 LED (dual colour)
Analogue input type	AI1, AI3 software-configurable voltage: 0...10 V DC, impedance: 30 kOhm, resolution 12 bits AI1, AI3 software-configurable current: 0...20 mA/4...20 mA, impedance: 250 Ohm, resolution 12 bits AI2 software-configurable voltage: +/- 10 V DC, impedance: 30 kOhm, resolution 12 bits AI2 software-configurable voltage: 0...10 V DC, impedance: 30 kOhm, resolution 12 bits
Discrete input type	DI1...DI8 programmable, 24 V DC (<= 30 V), impedance: 3.5 kOhm DI7, DI8 programmable as pulse input: 0…30 kHz, 24 V DC (<= 30 V) STOA, STOB safe torque off, 24 V DC (<= 30 V), impedance: > 2.2 kOhm
Input compatibility	DI1...DI8: discrete input level 1 PLC conforming to IEC 61131-2 DI7, DI8: pulse input level 1 PLC conforming to IEC 65A-68 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) Negative logic (sink) (DI1...DI8), > 16 V (state 0), < 10 V (state 1) Positive logic (source) (DI7, DI8), < 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 type	Software-configurable voltage AQ1, AQ2: 0...10 V DC impedance 470 Ohm, resolution 10 bits Software-configurable current AQ1, AQ2: 0...20 mA impedance 500 Ohm, resolution 10 bits
Discrete output type	Logic output DQ+ 0…1 kHz <= 30 V DC 100 mA Programmable as pulse output DQ+ 0…30 kHz <= 30 V DC 20 mA Logic output DQ- 0…1 kHz <= 30 V DC 100 mA
Sampling duration	2 ms +/- 0.5 ms (DI1...DI8) - discrete input 5 ms +/- 1 ms (DI7, DI8) - pulse input 1 ms +/- 1 ms (AI1, AI2, AI3) - analog input 5 ms +/- 1 ms (AQ1, AQ2) - analog output
Accuracy	+/- 0.6 % AI1, AI2, AI3 for a temperature variation 60 °C analog input +/- 1 % AQ1, AQ2 for a temperature variation 60 °C analog output
Linearity error	AI1, AI2, AI3: +/- 0.15 % of maximum value for analog input AQ1, AQ2: +/- 0.2 % for analog output
Relay output type	Configurable relay logic R1: fault relay NO/NC electrical durability 100000 cycles Configurable relay logic R2: sequence relay NO electrical durability 1000000 cycles Configurable relay logic R3: sequence relay NO electrical durability 1000000 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 on resistive load, cos phi = 1: 3 A at 250 V AC Relay output R1 on resistive load, cos phi = 1: 3 A at 30 V DC Relay output R1 on inductive load, cos phi = 0.4 and L/R = 7 ms: 2 A at 250 V AC Relay output R1 on inductive load, cos phi = 0.4 and L/R = 7 ms: 2 A at 30 V DC Relay output R2, R3 on resistive load, cos phi = 1: 5 A at 250 V AC Relay output R2, R3 on resistive load, cos phi = 1: 5 A at 30 V DC Relay output R2, R3 on inductive load, cos phi = 0.4 and L/R = 7 ms: 2 A at 250 V AC Relay output R2, R3 on inductive load, cos phi = 0.4 and L/R = 7 ms: 2 A at 30 V DC
Insulation resistance	> 1 MOhm at 500 V DC, 1 min, earth

Environment

Noise level	70 dB conforming to 86/188/EEC
Maximum THDI	<5 % full load conforming to IEEE 519
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 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
Pollution degree	2 conforming to IEC 61800-5-1
Vibration resistance	1.5 mm peak to peak (f= 2…13 Hz) conforming to IEC 60068-2-6 0.5 gn (f= 13…200 Hz) conforming to IEC 60068-2-6
Shock resistance	4 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	-5…40 °C without derating 40…50 °C with derating factor
Ambient air temperature for storage	-40…70 °C
Operating altitude	0...4800 m with current derating above 1000m
Environmental characteristic	Chemical pollution resistance class 3C3 conforming to IEC 60721-3-3 Dust pollution resistance class 3S3 conforming to IEC 60721-3-3
Standards	IEC 61800-3 IEC 61800-5-1 IEC 61000-3-12 IEC 60721-3 IEC 61508 IEC 13849-1
Product certifications	TÜV
Marking	CE

Contractual warranty

Warranty (in months)	18