# Product data sheet

Specifications

## enclosed variable speed drive ATV71 Plus - 160 kW - 690 V - IP23

ATV71EXC2C16Y

⚠ **Discontinued on:** Mar 12, 2021

⚠ **To be end-of-service on:** Dec 31, 2029

⚠ **Discontinued - Service only**

## Main

| | |
|---|---|
| **Range Of Product** | Altivar 71 Plus |
| **Product Or Component Type** | Variable speed drive |
| **Device Short Name** | ATV71 Plus |
| **Product Destination** | Asynchronous motors<br>Synchronous motors |
| **Product Specific Application** | Complex, high-power machines |
| **Assembly Style** | In floor-standing enclosure compact version |
| **Product Composition** | A wired ready-assembled Sarel Spacial 6000 enclosure<br>An IP65 remote mounting kit for graphic display terminal<br>Terminals/bars for motor connection<br>ATV71HC16Y drive on heatsink<br>A line choke<br>A switch and fast-acting semi-conductor fuses |
| **Emc Filter** | Integrated |
| **Network Number Of Phases** | 3 phases |
| **Rated Supply Voltage** | 690 V +/- 10 % |
| **Supply Voltage Limits** | 621…759 V |
| **Supply Frequency** | 50...60 Hz +/- 5 % |
| **Network Frequency** | 47.5...63 Hz |
| **Motor Power Kw** | 160 kW at 690 V |
| **Line Current** | 163 A for 690 V / 160 kW |

## Complementary

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|---|---|
| **Apparent Power** | 195 kVA for 690 V / 160 kW |
| **Prospective Line Isc** | 100 kA with external fuses |
| **Continuous Output Current** | 180 A at 2.5 kHz, 690 V / 160 kW |
| **Maximum Transient Current** | 270 A for 60 s / 160 kW |
| **Speed Drive Output Frequency** | 0…500 Hz |
| **Nominal Switching Frequency** | 2.5 kHz |
| **Switching Frequency** | 2.5...4.9 kHz with derating factor<br>2...4.9 kHz adjustable |
| **Speed Range** | 1…100 in open-loop mode, without speed feedback |
| **Speed Accuracy** | +/- 0.01 % of nominal speed in closed-loop mode with encoder feedback 0.2 Tn to Tn<br>+/- 10 % of nominal slip without speed feedback 0.2 Tn to Tn |

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|---|---|
| **Torque Accuracy** | +/- 15 % in open-loop mode, without speed feedback<br>+/- 5 % in closed-loop mode with encoder feedback |
| **Transient Overtorque** | 170 % of nominal motor torque +/- 10 % for 60 s<br>220 % of nominal motor torque +/- 10 % for 2 s |
| **Braking Torque** | <= 150 % with braking or hoist resistor<br>30 % without braking resistor |
| **Asynchronous Motor Control Profile** | Flux vector control with sensor, standard<br>Flux vector control without sensor, ENA (energy Adaptation) system<br>Voltage/frequency ratio - Energy Saving, quadratic U/f<br>Flux vector control without sensor, 2 points<br>Flux vector control without sensor, standard<br>Voltage/frequency ratio, 2 points<br>Voltage/frequency ratio, 5 points |
| **Synchronous Motor Control Profile** | Vector control with sensor, standard<br>Vector control without sensor, standard |
| **Regulation Loop** | Adjustable PI regulator |
| **Motor Slip Compensation** | Adjustable<br>Suppressable<br>Not available in voltage/frequency ratio (2 or 5 points)<br>Automatic whatever the load |
| **Overvoltage Category** | Class 3 conforming to EN 50178 |
| **Local Signalling** | LCD display unit for operation function, status and configuration |
| **Output Voltage** | <= power supply voltage |
| **Isolation** | Electrical between power and control |
| **Type Of Cable For External Connection** | IEC cable at 40 °C, copper 70 °C / PVC |
| **Electrical Connection** | Terminal M10 - 2 x 150 mm² (U/T1, V/T2, W/T3) entry from the bottom<br>Terminal - 2.5 mm² / AWG 14 (AI1-/AI1+, AI2, AO1, R1A, R1B, R1C, R2A, R2B, LI1...LI6, PWR) entry from the bottom<br>Terminal M12 - 2 x 185 mm² (L1/R, L2/S, L3/T) entry from the bottom |
| **Motor Recommanded Cable Cross Section** | 3 x 95 mm² |
| **Short-Circuit Protection** | 250 A fuse protection type gI - power supply upstream |
| **Supply** | External supply: 24 V DC (19…30 V), <1 A<br>Internal supply for reference potentiometer: 10 V DC (10…11 V), <10 mA<br>Internal supply: 24 V DC (21…27 V), <100 mA |
| **Analogue Input Number** | 2 |
| **Analogue Input Type** | AI2 software-configurable voltage: 0...10 V DC, 24 V max, impedance: 30000 Ohm, sampling time: 1.5…2.5 ms, resolution: 11 bits<br>AI1-/AI1+ bipolar differential voltage: +/- 10 V DC, 24 V max, sampling time: 1.5…2.5 ms, resolution: 11 bits + sign<br>AI2 software-configurable current: 0...20 mA/4...20 mA, impedance: 250 Ohm, sampling time: 1.5…2.5 ms, resolution: 11 bits |
| **Analogue Output Number** | 1 |
| **Analogue Output Type** | Software-configurable voltage: (AO1) 0...10 V DC - 470 Ohm - sampling time: 1.5…2.5 ms - resolution: 10 bits<br>Software-configurable current: (AO1) 0...20 mA/4...20 mA - 500 Ohm - sampling time: 1.5…2.5 ms - resolution: 10 bits |
| **Discrete Output Number** | 2 |
| **Discrete Output Type** | Configurable relay logic: (R1A, R1B, R1C)NO/NC - 6.5...7.5 ms - 100000 cycles<br>Configurable relay logic: (R2A, R2B)NO - 6.5...7.5 ms - 100000 cycles |
| **Minimum Switching Current** | 3 mA at 24 V DC (configurable relay logic) |
| **Maximum Switching Current** | 5 A at 250 V AC on resistive load - cos phi = 1 (R1, R2)<br>5 A at 30 V DC on resistive load - L/R = 0 ms (R1, R2)<br>2 A at 250 V AC on inductive load - cos phi = 0.4 (R1, R2)<br>2 A at 30 V DC on inductive load - L/R = 7 ms (R1, R2) |
| **Discrete Input Number** | 7 |

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| Discrete Input Type | Programmable (LI1...LI5) at 24 V DC <= 30 V level 1 PLC 3.5 kOhm (duration=1.5…2.5 ms)<br>Switch-configurable (LI6) at 24 V DC <= 30 V level 1 PLC 1.5 kOhm (duration=1.5…2.5 ms)<br>Safety input (PWR) at 24 V DC <= 30 V 1.5 kOhm |
|---|---|
| Discrete Input Logic | Positive logic (source) (LI1...LI6), 0...5 V (state 0), 11...30 V (state 1)<br>Negative logic (sink) (LI1...LI6), 16...30 V (state 0), 0...10 V (state 1)<br>Positive logic (source) (PWR), 0...2 V (state 0), 17...30 V (state 1) |
| Acceleration And Deceleration Ramps | S, U or customized<br>Automatic adaptation of ramp if braking capacity exceeded, by using resistor<br>Linear adjustable separately from 0.01 to 9000 s |
| Braking To Standstill | By DC injection |
| Protection Type | Against exceeding limit speed: drive<br>Against input phase loss: drive<br>Break on the control circuit: drive<br>Input phase breaks: drive<br>Line supply overvoltage: drive<br>Line supply undervoltage: drive<br>Overcurrent between output phases and earth: drive<br>Overheating protection: drive<br>Overvoltages on the DC bus: drive<br>Short-circuit between motor phases: drive<br>Thermal protection: drive<br>Input phase breaks: motor<br>Power removal: motor<br>Thermal protection: motor |
| Dielectric Strength | 3110 V DC between earth and power terminals<br>5345 V DC between control and power terminals |
| Insulation Resistance | > 1 mOhm 500 V DC for 1 minute to earth |
| Frequency Resolution | Analog input: 0.024/50 Hz<br>Display unit: 0.1 Hz |
| Communication Port Protocol | CANopen<br>Modbus |
| Connector Type | 1 RJ45 (on front face) for Modbus<br>1 RJ45 (on terminal) for Modbus<br>Male SUB-D 9 on RJ45 for CANopen |
| Physical Interface | 2-wire RS 485 for Modbus |
| Transmission Frame | RTU for Modbus |
| Transmission Rate | 4800 bps, 9600 bps, 19200 bps, 38.4 Kbps for Modbus on terminal<br>9600 bps, 19200 bps for Modbus on front face<br>20 kbps, 50 kbps, 125 kbps, 250 kbps, 500 kbps, 1 Mbps for CANopen |
| Data Format | 8 bits, 1 stop, even parity for Modbus on front face<br>8 bits, odd even or no configurable parity for Modbus on terminal |
| Type Of Polarization | No impedance for Modbus |
| Number Of Addresses | 1…247 for CANopen<br>1…247 for Modbus |
| Method Of Access | Slave CANopen |
| Option Card | Communication card for CC-Link<br>Communication card for DeviceNet<br>Communication card for EtherNet/IP<br>Communication card for Fipio<br>Communication card for Interbus-S<br>Communication card for Modbus Plus<br>Communication card for Modbus/Uni-Telway<br>Communication card for Profibus DP<br>Communication card for Profibus DP V1<br>Communication card for Modbus TCP/IP<br>Controller inside programmable card<br>Basic I/O extension card<br>Extended I/O extension card<br>Encoder interface cards |

| | |
|---|---|
| **Options For Enclosure Configuration** | Safe standstill for power circuit<br>PTC relay for power circuit<br>Pt100 relay for power circuit<br>Insulation monitoring for power circuit<br>Design for IT networks for power circuit<br>External 230 V supply terminals for power circuit<br>Buffer voltage 24 V DC power supply for power circuit<br>External 24 V DC supply terminals for power circuit<br>Enclosure lighting for power circuit<br>Key switch (local/remote) for power circuit<br>Motor heating for power circuit<br>External motor fan for power circuit<br>Voltmeter for power circuit<br>Door handle for main switch for power circuit<br>Circuit breaker for power circuit<br>Line contactor for power circuit<br>Ammeter for power circuit<br>Enclosure heating for power circuit<br>Motor choke for power circuit<br>Cable entry via the top for power circuit<br>Enclosure plinth for power circuit<br>Braking unit for power circuit<br>Door handle for circuit breaker for power circuit<br>Control terminals for control circuit<br>Adaptor for 115 V logic inputs for control circuit<br>Relay output C/O for control circuit<br>Isolated amplifier for control circuit |
| **Operating Position** | Vertical +/- 10 degree |
| **Colour Of Enclosure** | Light grey (RAL 7035) |
| **Height** | 2162 mm |
| **Width** | 600 mm |
| **Depth** | 642 mm |
| **Net Weight** | 415 kg |

# Environment

| | |
|---|---|
| **Electromagnetic Compatibility** | 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<br>Electrical fast transient/burst immunity test level 4 conforming to IEC 61000-4-4<br>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>Voltage dips and interruptions immunity test conforming to IEC 61000-4-11 |
| **Pollution Degree** | 2 conforming to EN/IEC 61800-5-1 |
| **Ip Degree Of Protection** | IP23 |
| **Vibration Resistance** | 0.6 gn (f= 10…200 Hz) conforming to EN/IEC 60068-2-6<br>1.5 mm (f= 3…10 Hz) conforming to EN/IEC 60068-2-6<br>3M3 conforming to EN/IEC 60721-3-3 |
| **Shock Resistance** | 4 gn for 11 ms conforming to EN/IEC 60068-2-27<br>3M2 conforming to EN/IEC 60721-3-3 |
| **Noise Level** | 64 dB conforming to 86/188/EEC |
| **Environmental Characteristic** | Without condensation: 3C2 conforming to IEC 60721-3-3<br>Without condensation: 3K3 conforming to IEC 60721-3-3<br>Without condensation: 3S2 conforming to IEC 60721-3-3 |
| **Relative Humidity** | 0…95 % |
| **Ambient Air Temperature For Operation** | 0…40 °C (without derating)<br>40…50 °C (with current derating of 0.6 % per °C) |
| **Ambient Air Temperature For Storage** | -25…70 °C |
| **Volume Of Cooling Air** | 600 m3/h |
| **Operating Altitude** | <= 1000 m without derating<br>1000...3000 m with current derating 1 % per 100 m |

| Standards | EN/IEC 61800-3 |
|---|---|
| | EN/IEC 61800-5-1 |
| | EN 55011 class A group 2 |
| | EN 61800-3 environments 2 category C3 |
| | EN 61800-3 environments 1 category C3 |
| Product Certifications | GOST |
| | ATEX |
| Marking | CE |

# Packing Units

| Unit Type Of Package 1 | PCE |
|---|---|
| Number Of Units In Package 1 | 1 |
| Package 1 Height | 216.0 cm |
| Package 1 Width | 66.0 cm |
| Package 1 Length | 61.6 cm |
| Package 1 Weight | 415.0 kg |

# Contractual warranty

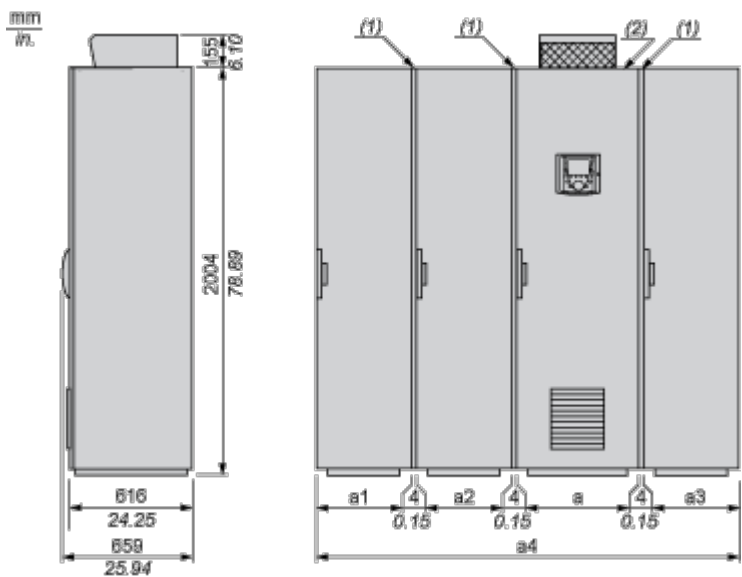| Warranty | 18 months |
|---|---|

Dimensions Drawings

**IP 23 Floor-Standing Enclosure Compact Version**

**Standard Compact Floor-Standing Enclosure**
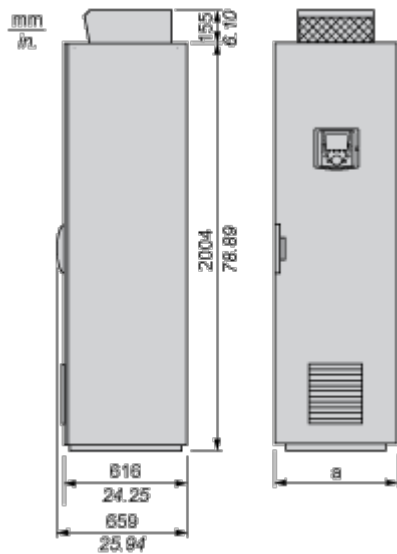


**Standard Compact Floor-Standing Enclosure + Additional Floor-Standing Enclosures, According to the Configuration**



(1)   Seal. For each floor-standing enclosure added, allow a 4 mm/0.15 in. space for the seal.

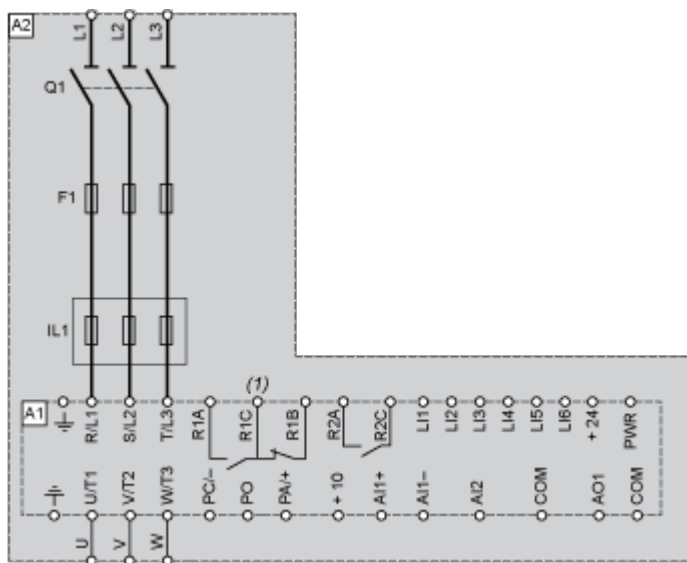(2)   Standard IP 23 compact version floor-standing enclosure.

NOTE: The position of the enclosures must be complied with during installation. The number of additional enclosures can vary according to the chosen configuration.

| Options | a | a1 | a2 | a3 | a4 |
|---|---|---|---|---|---|
| With or without common options or options dependent on the drive rating | 616 mm/ 24.2 in. | – | – | – | 616 mm/ 24.2 in. |
| Cable entry via the top option | 608 mm/ 23.9 in. | – | 408 mm/ 16 in. | – | 1020 mm/ 40.1 in. |

(3)     Except sinus filter option, which requires an additional enclosure. The sinus filter option is not compatible with the cable entry via the top option.

(4)     The cable entry via the top option is not compatible with the sinus filter option.

Connections and Schema

**Floor-Standing Enclosure Compact Version**

**Wiring Diagram**



A1    Drive

A2    Enclosure

F1    Fast-acting semi-conductor fuse

IL1    Line choke

Q1    Switch

(1)    Fault relay contacts. For remote signalling of drive status.

Performance Curves

**Floor-Standing Enclosure Compact Version**

**Derating Curves**

The derating curves for the drive nominal current (In) are dependent on the temperature and switching frequency. For intermediate temperatures, interpolate between 2 curves.

NOTE: The drive will reduce the switching frequency automatically in the event of excessive temperature rise.
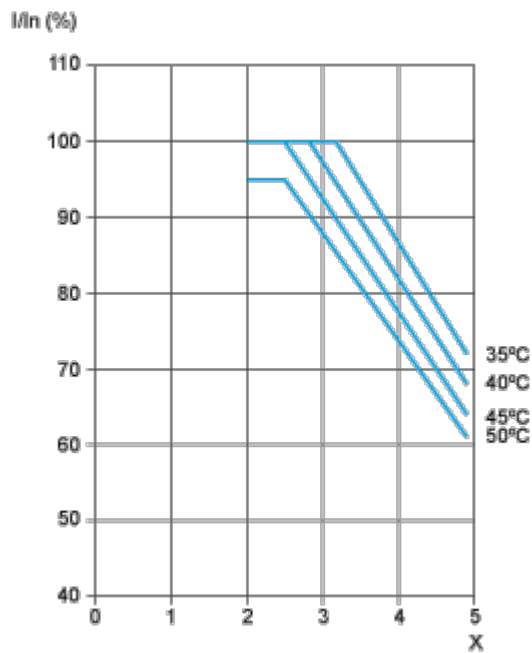


X    Switching frequency (kHz)

NOTE: The temperatures shown correspond to the temperature of the air entering the enclosure.