

ATV930C11N4C

variable speed drive, ATV930, 110kW,
400/480V, w/o braking unit, IP00



Main

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| Range of product | Altivar Process ATV900 |
| Product or component type | Variable speed drive |
| Device application | Industrial application |
| Device short name | ATV930 |
| Variant | Standard version Without braking chopper |
| Product destination | Synchronous motors Asynchronous motors |
| EMC filter | Integrated with 150 m conforming to EN/IEC 61800-3 category C3 |
| IP degree of protection | IP00 conforming to IEC 61800-5-1 IP00 conforming to IEC 60529 IP21 conforming to IEC 61800-5-1 with kit VW3A9704 IP21 conforming to IEC 60529 with kit VW3A9704 |
| Type of cooling | Forced convection |
| Supply frequency | 50...60 Hz +/- 5 % |
| Network number of phases | 3 phases |
| [Us] rated supply voltage | 380...480 V - 15...10 % |
| Motor power kW | 110 kW (normal duty) 90 kW (heavy duty) |
| Motor power hp | 150 Hp normal duty 125 hp heavy duty |
| Line current | 201 A at 380 V (normal duty) 165 A at 480 V (normal duty) 170 A at 380 V (heavy duty) 143 A at 480 V (heavy duty) |
| Prospective line I _{sc} | 50 kA |
| Apparent power | 121.8 KVA at 480 V (normal duty) 102.6 kVA at 480 V (heavy duty) |
| Continuous output current | 211 A at 2.5 kHz for normal duty 173 A at 2.5 kHz for heavy duty |
| Maximum transient current | 253 A during 60 s (normal duty) 259.5 A during 60 s (heavy duty) |
| Asynchronous motor control profile | Constant torque standard Optimized torque mode Variable 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 | 1...8 kHz adjustable 2.5...8 kHz with derating factor |
| Safety function | STO (safe torque off) SIL 3 |
| Number of preset speeds | 16 preset speeds |

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| Communication port protocol | Ethernet/IP Modbus serial Modbus TCP |
| Option module | 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 EtherCAT 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/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 Communication module for Ethernet Powerlink |

Complementary

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| Output voltage | \leq power supply voltage |
| Motor slip compensation | Not available in permanent magnet motor law Automatic whatever the load Adjustable Can be suppressed |
| 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: screw terminal 0.5...1.5 mm ² /AWG 20...AWG 16 Line side: screw terminal 2 x 50...3 x 120 mm ² /AWG 1/0...300 kcmil Motor: screw terminal 2 x 50...3 x 120 mm ² /AWG 1/0...300 kcmil DC bus: screw terminal 2 x 50...3 x 120 mm ² /AWG 1/0...300 kcmil |
| Connector type | 2 RJ45 for Ethernet IP/Modbus TCP on the control block 1 RJ45 for Modbus serial on the control block |
| 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 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 |
| 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 |

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| Local signalling | Local diagnostic: 3 LED (mono/dual colour) Embedded communication status: 5 LED (dual colour) Communication module status: 2 LED (dual colour) Presence of voltage: 1 LED (red) |
| Width | 320 mm |
| Height | 852 mm |
| Depth | 393 mm |
| Net weight | 82 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 | 10 |
| 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 EN/IEC 61131-2 DI7, DI8: pulse 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...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 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 impedance 500 Ohm, resolution 10 bits |
| Discrete output number | 2 |
| 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 |
| 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 |
| 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 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 |
| Isolation | Between power and control terminals |

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| Variable speed drive application selection | Mixer Food and beverage processing Conveyor Food and beverage processing Shredder Food and beverage processing Process crane Hoisting Thruster Marine Winch Marine Press Material working (wood, ceramic, stone, pvc, metal) Extruder Material working (wood, ceramic, stone, pvc, metal) Other application Mining mineral and metal Drilling rig Oil and gas Progressive cavity pump Oil and gas Rod pump Oil and gas Swapping pump Oil and gas Compressor for regasification Oil and gas Separator Oil and gas Other application Oil and gas Separator Water and waste water |
| Power range | 110...220 kW at 380...440 V 3 phases 110...220 kW at 480...500 V 3 phases |
| Mounting mode | Wall mount |

Environment

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|---------------------------------------|--|
| Insulation resistance | > 1 MOhm 500 V DC for 1 minute to earth |
| Noise level | 69.9 dB conforming to 86/188/EEC |
| Power dissipation in W | Forced convection: 2511 W at 380 V, switching frequency 2.5 kHz Natural convection: 309 W at 380 V, switching frequency 2.5 kHz |
| 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 |
| Volume of cooling air | 600 m ³ /h |
| Operating position | Vertical +/- 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 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 |
| 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 |
| Pollution degree | 2 conforming to EN/IEC 61800-5-1 |
| Relative humidity | 5...95 % without condensation conforming to IEC 60068-2-3 |
| Ambient air temperature for operation | -15...50 °C (without derating) 50...60 °C (with derating factor) |
| Ambient air temperature for storage | -40...70 °C |
| Operating altitude | <= 1000 m without derating 1000...4800 m with current derating 1 % per 100 m |
| 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 | UL CSA TÜV REACH |
| Marking | CE |

Packing Units

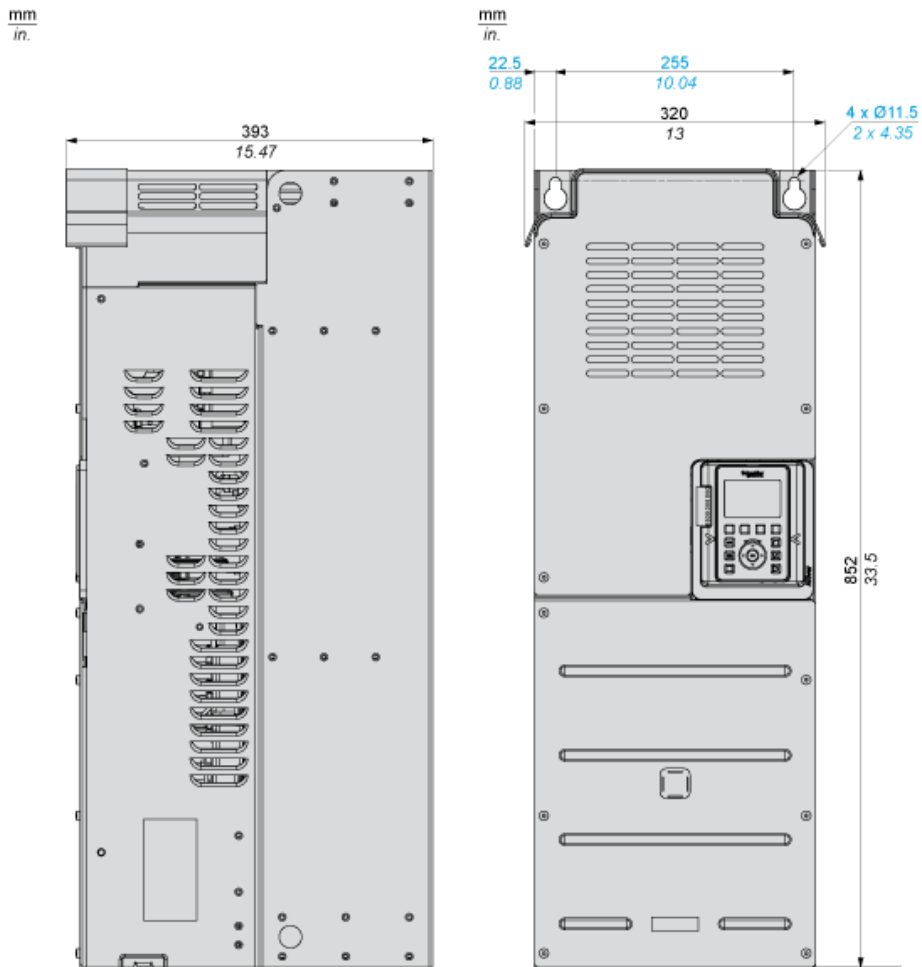
| | |
|------------------------------|---------|
| Unit Type of Package 1 | PCE |
| Number of Units in Package 1 | 1 |
| Package 1 Weight | 75.2 kg |
| Package 1 Height | 47.5 cm |
| Package 1 width | 65 cm |
| Package 1 Length | 103 cm |

Offer Sustainability

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|----------------------------|---|
| REACH Regulation | REACH Declaration |
| EU RoHS Directive | Pro-active compliance (Product out of EU RoHS legal scope) EU RoHS Declaration |
| Mercury free | Yes |
| RoHS exemption information | Yes |
| China RoHS Regulation | China RoHS Declaration |
| Environmental Disclosure | Product Environmental Profile |
| WEEE | The product must be disposed on European Union markets following specific waste collection and never end up in rubbish bins |
| Upgradeability | Upgraded Components Available |

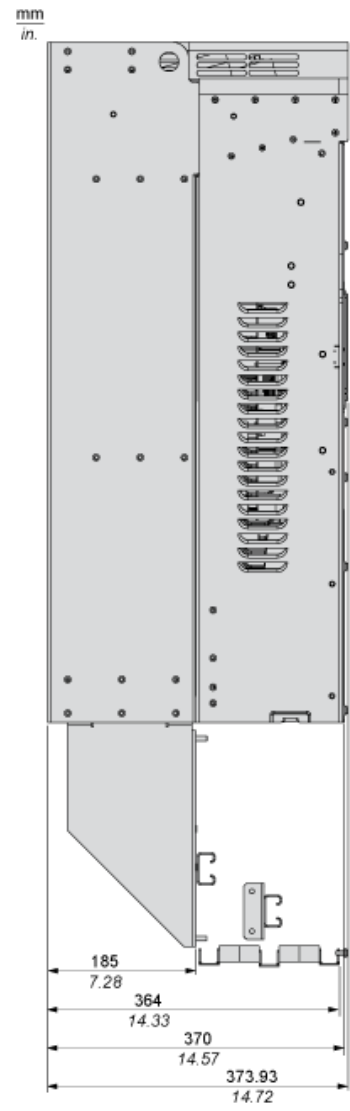
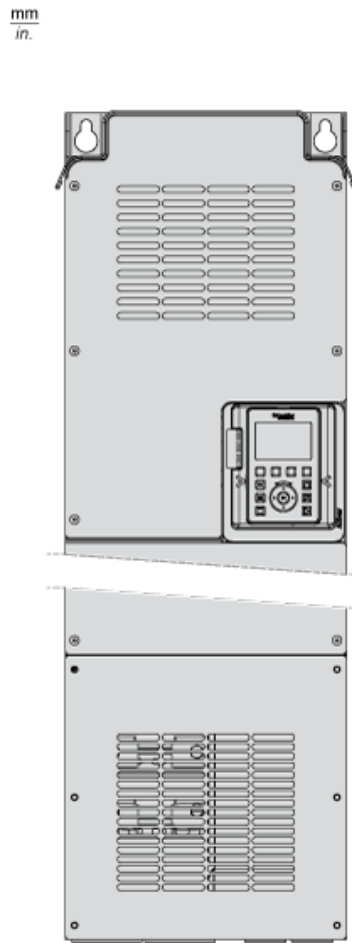
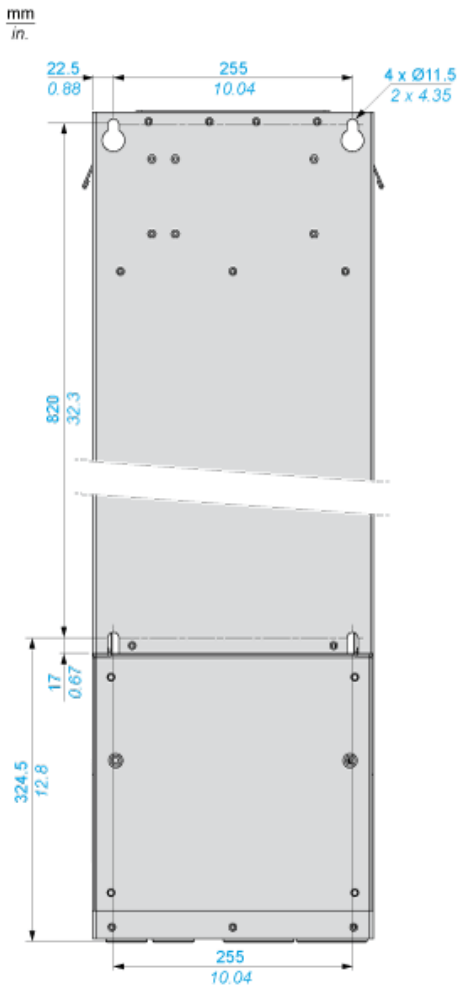
Dimensions

Right and Front View

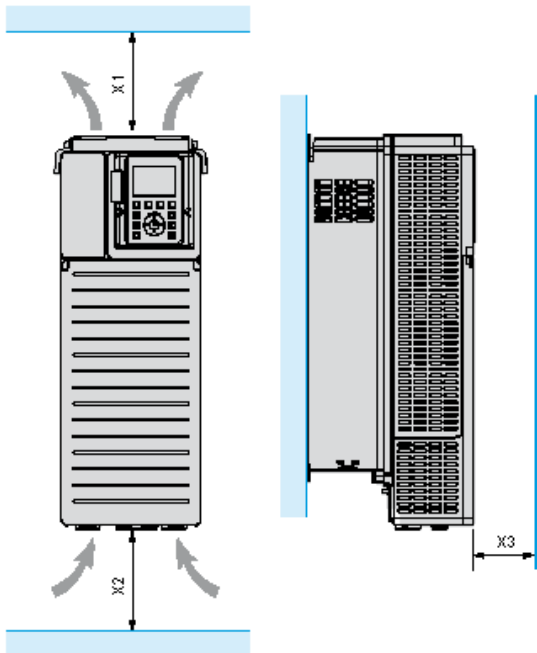


Drives with Lower Conduit Box Sold Separately

Rear, Front and Left View



Clearances

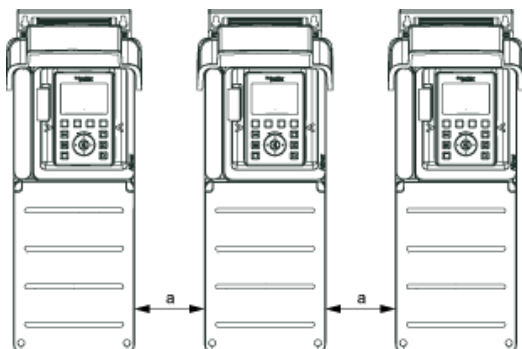


| X1 | X2 | X3 |
|-------------------|-------------------|---------------------|
| ≥ 250 mm (10 in.) | ≥ 250 mm (10 in.) | ≥ 100 mm (3.94 in.) |

- Mount the device in a vertical position ($\pm 10^\circ$). This is required for cooling the device.
- Do not mount the device close to heat sources.
- Leave sufficient free space so that the air required for cooling purposes can circulate from the bottom to the top of the drive.

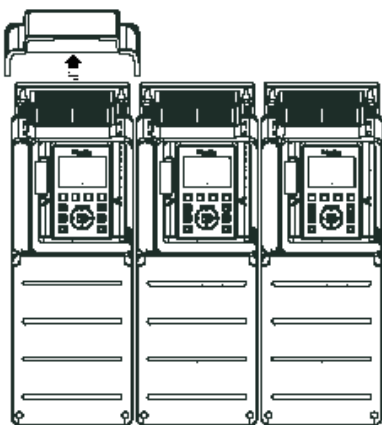
Mounting Types

Mounting Type A: Individual IP21

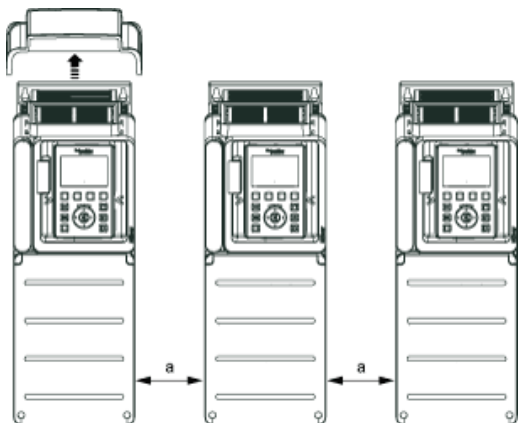


$a \geq 110 \text{ mm (4.33 in.)}$

Mounting Type B: Side by Side IP20 , Only possible at ambient temperature lower than 40 °C (104 °F)



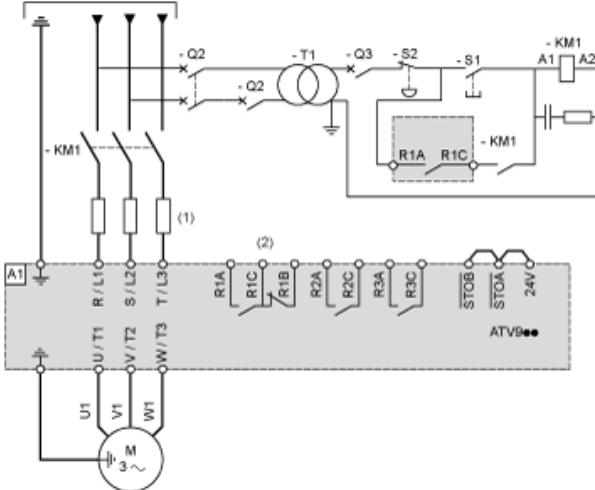
Mounting Type C: Individual IP20



$a \geq 110 \text{ mm (4.33 in.)}$

Three-Phase Power Supply with Upstream Breaking via Line Contactor

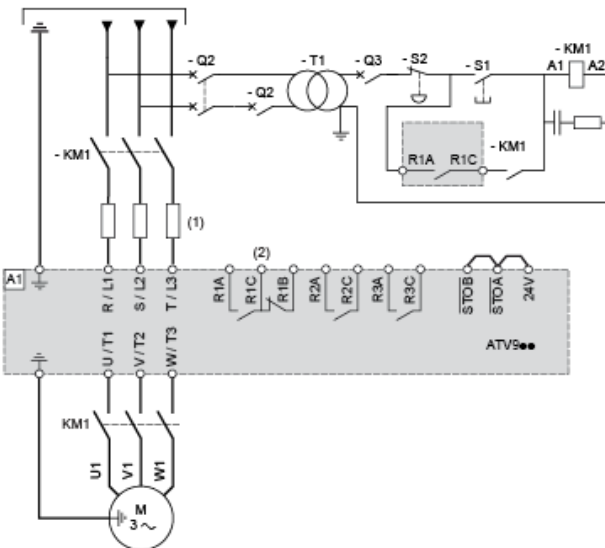
Connection diagrams conforming to standards EN 954-1 category 1 and IEC/EN 61508 capacity SIL1, stopping category 0 in accordance with standard IEC/EN 60204-1



- (1) Line choke if used
- (2) Use relay R1 set to operating state Fault to switch Off the product once an error is detected.
- A1 : Drive
- KM1 :Line Contactor
- Q2, Circuit breakers
- Q3 :
- S1, Pushbuttons
- S2 :
- T1 : Transformer for control part

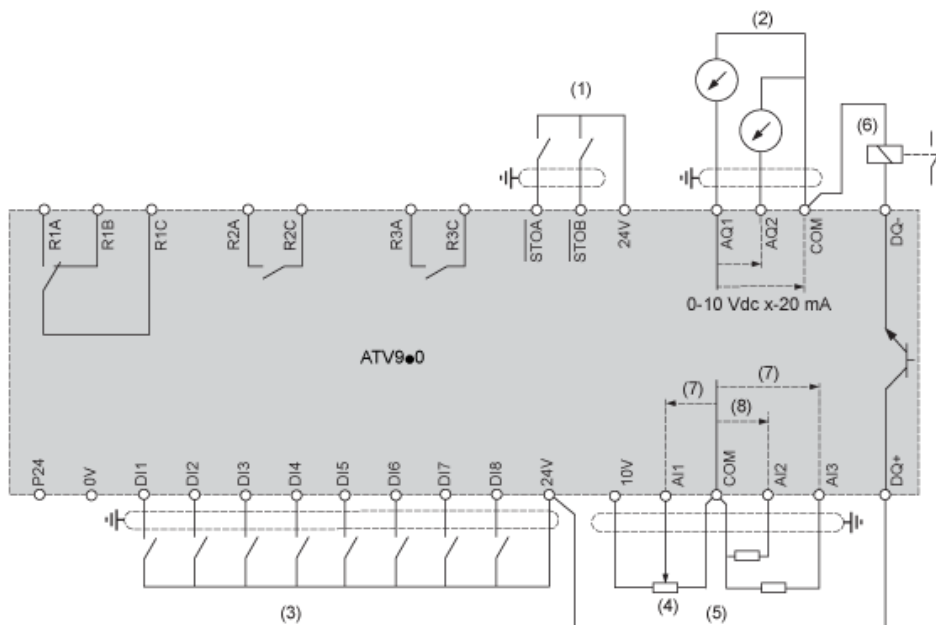
Three-Phase Power Supply with Downstream Breaking via Contactor

Connection diagrams conforming to standards EN 954-1 category 1 and IEC/EN 61508 capacity SIL1, stopping category 0 in accordance with standard IEC/EN 60204-1



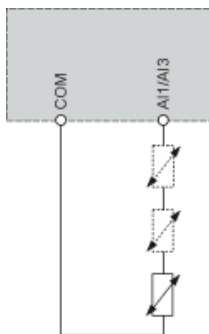
- (1) Line choke if used
- (2) Use relay R1 set to operating state Fault to switch Off the product once an error is detected.
- A1 : Drive
- KM1 :Contactor

Control Block Wiring Diagram



- (1) Safe Torque Off
 - (2) Analog Output
 - (3) Digital Input
 - (4) Reference potentiometer
 - (5) Analog Input
 - (6) Digital Output
 - (7) 0-10 Vdc, x-20 mA
 - (8) 0-10 Vdc, -10 Vdc...+10 Vdc
- R1A, Fault relay
R1B,
R1C :
R2A, Sequence relay
R2C :
R3A, Sequence relay
R3C :

Sensor Connection



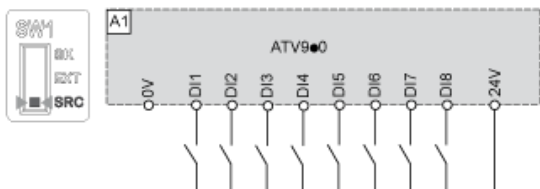
It is possible to connect either 1 or 3 sensors on terminals AI1 or AI3

Sink / Source Switch Configuration

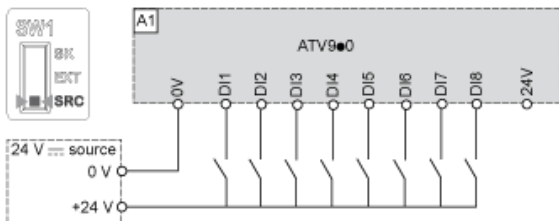
The switch is used to adapt the operation of the logic inputs to the technology of the programmable controller outputs.

- Set the switch to Source (factory setting) if using PLC outputs with PNP transistors.
- Set the switch to Ext if using PLC outputs with NPN transistors.

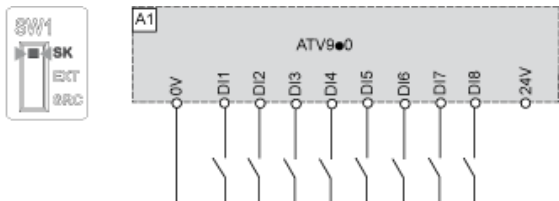
Switch Set to SRC (Source) Position Using the Output Power Supply for the Digital Inputs



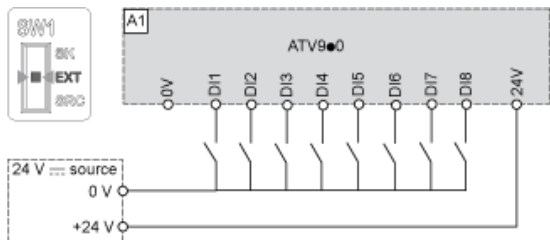
Switch Set to SRC (Source) Position and Use of an External Power Supply for the DIs



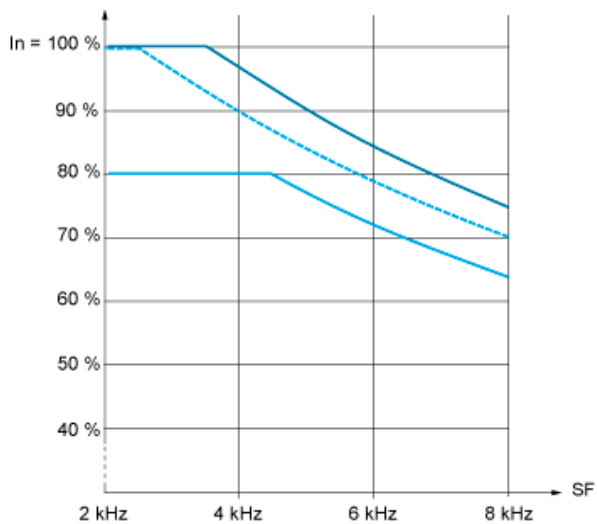
Switch Set to SK (Sink) Position Using the Output Power Supply for the Digital Inputs



Switch Set to EXT Position Using an External Power Supply for the DIs



Derating Curves



- 40 °C (104 °F) - Mounting type A, B and C
- - - 50 °C (122 °F) - Mounting type A and C
- 60 °C (140 °F) - Mounting type C

In : Nominal Drive Current

SF : Switching Frequency