

# ATV930U40N4Z

Variable speed drive, Altivar Process  
ATV900, ATV930, 4 kW, 380...480 V, cabinet  
Integration, IP20





## Main

|                                    |  |
|------------------------------------|--|
| Range of Product                   | Altivar Process ATV900   |
| Device Application                 | Industrial Application   |
| Product or Component Type          | Variable speed drive   |
| Product destination                | Synchronous motors<br>Asynchronous motors  |
| Product Specific Application       | Process for industrial   |
| Variant                            | Standard version<br>With braking chopper   |
| Phase                              | 3 phase  |
| Mounting Mode                      | Cabinet mount  |
| Communication Port Protocol        | Modbus serial<br>Modbus TCP<br>EtherNet/IP   |
| [Us] rated supply voltage          | 380...480 V - 15...10 %  |
| Motor power kW                     | 4.0 KW normal duty<br>3.0 kW heavy duty  |
| Maximum Horse Power Rating         | 5.0 hp normal duty   |
| Continuous output current          | 9.3 A 4 kHz normal duty<br>7.2 A 4 kHz heavy duty  |
| EMC filter                         | Integrated<br>With EMC plate option  |
| IP degree of protection            | IP21   |
| Option module                      | Slot A communication module Profibus DP V1<br>Slot A communication module PROFINET<br>Slot A communication module DeviceNet<br>Slot A communication module EtherCAT<br>Slot A communication module CANopen daisy chain RJ45<br>Slot A communication module CANopen SUB-D 9<br>Slot A communication module CANopen screw terminals<br>Slot A/slot B/slot C digital and analog I/O extension module<br>Slot A/slot B/slot C output relay extension module<br>Slot B 5/12 V digital encoder interface module<br>Slot B analog encoder interface module<br>Slot B resolver encoder interface module<br>Communication module Ethernet Powerlink |
| Discrete input logic               | 16 preset speeds   |
| Asynchronous motor control profile | Optimized torque mode<br>Constant torque standard<br>Variable torque standard  |
| Synchronous motor control profile  | Permanent magnet motor<br>Synchronous reluctance motor   |
| Maximum output frequency           | 599 Hz   |
| Switching frequency                | 2...16 kHz adjustable<br>4...16 kHz with derating factor   |
| Nominal switching frequency        | 4 kHz  |
| Line current                       | 7.6 A 380 V normal duty)<br>6.0 A 380 V heavy duty)<br>6.7 A 480 V normal duty)<br>5.4 A 480 V heavy duty)   |
| Apparent power                     | 5.6 KVA 480 V normal duty)<br>4.5 kVA 480 V heavy duty)  |
| Maximum transient current          | 11.2 A 60 s normal duty)<br>10.8 A 60 s heavy duty)  |
| Network Frequency                  | 50-60 Hz   |
| Prospective line Isc               | 50 kA  |

## Complementary

|  |  |
|--|--|
| Discrete input number                                    | 10   |
| Discrete input type                                      | DI1...DI8 programmable, 24 V DC $\leq$ 30 V)3.5 kOhm<br>DI7, DI8 programmable as pulse input 0...30 kHz, 24 V DC $\leq$ 30 V)<br>STOA, STOB safe torque off, 24 V DC $\leq$ 30 V) $>$ 2.2 kOhm   |
| Discrete output number                                   | 2  |
| Discrete output type                                     | Logic output DQ+ 0...1 kHz $\leq$ 30 V DC 100 mA<br>Programmable as pulse output DQ+ 0...30 kHz $\leq$ 30 V DC 20 mA<br>Logic output DQ- 0...1 kHz $\leq$ 30 V DC 100 mA   |
| Analogue input number                                    | 3  |
| Analogue input type                                      | AI1, AI2, AI3 software-configurable voltage 0...10 V DC 30 kOhm 12 bits<br>AI1, AI2, AI3 software-configurable current 0...20 mA/4...20 mA 250 Ohm 12 bits   |
| Analogue output number                                   | 2  |
| Analogue output type                                     | Software-configurable voltage AQ1, AQ2 0...10 V DC 470 Ohm 10 bits<br>Software-configurable current AQ1, AQ2 0...20 mA 500 Ohm 10 bits   |
| Relay output number                                      | 3  |
| Relay output type  | Configurable relay logic R1 fault relay NO/NC 100000 cycles<br>Configurable relay logic R2 sequence relay NO 1000000 cycles<br>Configurable relay logic R3 sequence relay NO 1000000 cycles  |
| Maximum switching current                                | Relay output R1 resistive, $\cos \phi = 1$ 3 A 250 V AC<br>Relay output R1 resistive, $\cos \phi = 1$ 3 A 30 V DC<br>Relay output R1 inductive, $\cos \phi = 0.4$ 7 ms 2 A 250 V AC<br>Relay output R1 inductive, $\cos \phi = 0.4$ 7 ms 2 A 30 V DC<br>Relay output R2, R3 resistive, $\cos \phi = 1$ 5 A 250 V AC<br>Relay output R2, R3 resistive, $\cos \phi = 1$ 5 A 30 V DC<br>Relay output R2, R3 inductive, $\cos \phi = 0.4$ 7 ms 2 A 250 V AC<br>Relay output R2, R3 inductive, $\cos \phi = 0.4$ 7 ms 2 A 30 V DC |
| Minimum switching current                                | Relay output R1, R2, R3 5 mA 24 V DC   |
| Physical interface                                       | Ethernet<br>2-wire RS 485  |
| Connector Type   | 2 RJ45<br>1 RJ45   |
| Method of access   | Slave Modbus TCP   |
| Transmission Rate  | 10, 100 Mbits<br>4.8 kbps<br>9600 bit/s<br>19200 bit/s   |
| Transmission frame                                       | RTU  |
| Number of addresses                                      | 1...247  |
| Data format  | 8 bits, configurable odd, even or no parity  |
| Type of polarization                                     | No impedance   |
| 4 quadrant operation possible                            | True   |
| Acceleration and deceleration ramps                      | Linear adjustable separately from 0.01...9999 s  |
| Motor slip compensation                                  | Not available in permanent magnet motor law<br>Can be suppressed<br>Adjustable<br>Automatic whatever the load  |
| Braking to standstill                                    | By DC injection  |
| Brake chopper integrated                                 | True   |
| Maximum Input Current per Phase                          | 7.6 A  |
| Maximum output voltage                                   | 480.0 V  |
| Relative symmetric network frequency tolerance           | 5 %  |
| Base load current at high overload                       | 7.2 A  |
| Base load current at low overload                        | 9.3 A  |
| Power dissipation in W                                   | Natural convection 33 W 380 V 4 kHz<br>Forced convection 97 W 380 V 4 kHz  |
| With safety function Safely Limited Speed (SLS)          | True   |
| With safety function Safe brake management (SBC/<br>SBT) | True   |
| 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)             | True   |
| 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                                    | Thermal protection motor<br>Safe torque off motor<br>Motor phase break motor<br>Thermal protection drive<br>Safe torque off drive<br>Overheating drive<br>Overcurrent between output phases and earth drive<br>Overload of output voltage drive<br>Short-circuit protection drive<br>Motor phase break drive<br>Overvoltages on the DC bus drive<br>Line supply overvoltage drive<br>Line supply undervoltage drive<br>Line supply phase loss drive<br>Overspeed drive<br>Break on the control circuit drive |
| Quantity per Set                                   | 1  |
| Width  | 5.12 in (130 mm)   |
| Height   | 11.22 in (285 mm)  |
| Depth  | 7.72 in (196 mm)   |
| Electrical connection                              | Control screw terminal 0.5...1.5 mm <sup>2</sup> AWG 20...AWG 16<br>Line side screw terminal 2.5...6 mm <sup>2</sup> AWG 14...AWG 10<br>Motor screw terminal 2.5...6 mm <sup>2</sup> AWG 14...AWG 10<br>DC bus screw terminal 2.5...6 mm <sup>2</sup> AWG 14...AWG 10  |
| Transmission Rate                                  | 10/100 Mbit/s Ethernet IP/Modbus TCP<br>4.8, 9.6, 19.2, 38.4 kbit/s Modbus serial  |
| Exchange mode                                      | Half duplex, full duplex, autonegotiation Ethernet IP/Modbus TCP   |
| Data format  | 8 bits, configurable odd, even or no parity Modbus serial  |
| Type of polarization                               | No impedance Modbus serial   |
| Number of addresses                                | 1...247 Modbus serial  |
| Supply   | External supply for digital inputs 24 V DC 19...30 V), <1.25 mA overload and short-circuit protection<br>Internal supply for reference potentiometer (1 to 10 kOhm) 10.5 V DC +/- 5 %, <10 mA overload and short-circuit protection<br>Internal supply for digital inputs and STO 24 V DC 21...27 V), <200 mA overload and short-circuit protection  |
| Local signalling                                   | Local diagnostic 3 LED mono/dual colour)<br>Embedded communication status 5 LED dual colour)<br>Communication module status 2 LED dual colour)<br>Presence of voltage 1 LED red)   |
| Input compatibility                                | DI1...DI8 discrete input level 1 PLC EN/IEC 61131-2<br>DI7, DI8 pulse input level 1 PLC IEC 65A-68<br>STOA, STOB discrete input level 1 PLC EN/IEC 61131-2   |
| Discrete input logic                               | Positive logic (source) DI1...DI8), < 5 V, > 11 V<br>Negative logic (sink) DI1...DI8), > 16 V, < 10 V<br>Positive logic (source) DI7, DI8), < 0.6 V, > 2.5 V<br>Positive logic (source) STOA, STOB), < 5 V, > 11 V   |
| Sampling duration                                  | 2 Ms +/- 0.5 ms DI1...DI8) - discrete input<br>5 Ms +/- 1 ms DI7, DI8) - pulse input<br>1 Ms +/- 1 ms AI1, AI2, AI3) - analog input<br>5 ms +/- 1 ms AQ1, AQ2) - analog output   |
| Accuracy   | +/- 0.6 % AI1, AI2, AI3 for a temperature variation 60 °C analog input<br>+/- 1 % AQ1, AQ2 for a temperature variation 60 °C analog output   |
| Linearity error                                    | AI1, AI2, AI3 +/- 0.15 % of maximum value analog input<br>AQ1, AQ2 +/- 0.2 % analog output   |
| Refresh time                                       | Relay output R1, R2, R3)5 ms +/- 0.5 ms)   |
| Isolation  | Between power and control terminals  |

## Environment

|  |  |
|--|--|
| Operating altitude   | <= 3280.84 ft (1000 m) without derating<br>1000...4800 m with current derating 1 % per 100 m   |
| Operating position   | Vertical +/- 10 degree   |
| Product Certifications   | CSA<br>UL<br>TÜV   |
| Marking  | CE   |
| Standards  | UL 508C<br>EN/IEC 61800-3<br>EN/IEC 61800-5-1<br>IEC 61000-3-12<br>IEC 60721-3<br>IEC 61508<br>IEC 13849-1   |
| Maximum THDI   | <48 % full load IEC 61000-3-12   |
| Assembly style   | With heat sink   |
| Electromagnetic compatibility                                    | Electrostatic discharge immunity test level 3 IEC 61000-4-2<br>Radiated radio-frequency electromagnetic field immunity test level 3 IEC 61000-4-3<br>Electrical fast transient/burst immunity test level 4 IEC 61000-4-4<br>1.2/50 µs - 8/20 µs surge immunity test level 3 IEC 61000-4-5<br>Conducted radio-frequency immunity test level 3 IEC 61000-4-6 |
| Environmental class (during operation)                           | Class 3C3 according to IEC 60721-3-3<br>Class 3S3 according to IEC 60721-3-3   |
| Maximum acceleration under shock impact (during operation)       | 150 m/s <sup>2</sup> at 11 ms  |
| Maximum acceleration under vibrational stress (during operation) | 10 m/s <sup>2</sup> 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  |
| Volume of cooling air  | 10038.72 Gal/hr(US) (38 m <sup>3</sup> /h)   |
| Overvoltage category   | III  |
| Regulation loop  | Adjustable PID regulator   |
| Insulation resistance  | > 1 MOhm 500 V DC for 1 minute to earth  |
| Noise level  | 54.5 dB 86/188/EEC   |
| Vibration resistance   | 1.5 mm peak to peak 2...13 Hz)IEC 60068-2-6<br>1 gn 13...200 Hz)IEC 60068-2-6  |
| Shock resistance   | 15 gn 11 ms IEC 60068-2-27   |
| Environmental characteristic                                     | Chemical pollution resistance class 3C3 EN/IEC 60721-3-3<br>Dust pollution resistance class 3S3 EN/IEC 60721-3-3   |
| Relative humidity  | 5...95 % without condensation IEC 60068-2-3  |
| Ambient air temperature for operation                            | 5...122 °F (-15...50 °C) without derating)<br>122...140 °F (50...60 °C) with derating factor)  |
| Noise level  | 54.5 dB  |
| Pollution degree   | 2  |
| Ambient air transport temperature                                | -40...158 °F (-40...70 °C)   |
| Ambient Air Temperature for Storage                              | -40...158 °F (-40...70 °C)   |

## Ordering and shipping details

|      |               |
|------|---------------|
| GTIN | 3606489740054 |
|------|---------------|

## Packing Units

|                              |                         |
|------------------------------|-------------------------|
| Unit Type of Package 1       | PCE                     |
| Number of Units in Package 1 | 1                       |
| Package 1 Height             | 9.84 in (25.0 cm)       |
| Package 1 Width              | 6.30 in (16.0 cm)       |
| Package 1 Length             | 13.39 in (34.0 cm)      |
| Package 1 Weight             | 11.17 lb(US) (5.066 kg) |

|                              |                        |
|------------------------------|------------------------|
| Unit Type of Package 2       | P06                    |
| Number of Units in Package 2 | 6                      |
| Package 2 Height             | 29.53 in (75.0 cm)     |
| Package 2 Width              | 31.50 in (80.0 cm)     |
| Package 2 Length             | 23.62 in (60.0 cm)     |
| Package 2 Weight             | 94.80 lb(US) (43.0 kg) |

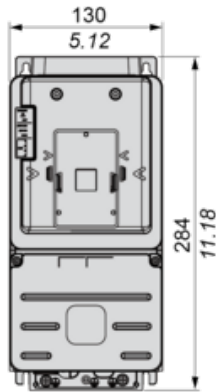
### Offer Sustainability

|                            |   |
|----------------------------|---|
| Sustainable offer status   | Green Premium product   |
| California proposition 65  | WARNING: This product can expose you to chemicals including: Lead and lead compounds, which is known to the State of California to cause cancer and birth defects or other reproductive harm. For more information go to <a href="http://www.P65Warnings.ca.gov">www.P65Warnings.ca.gov</a> |
| 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   |
| China RoHS Regulation      | <a href="#">China RoHS Declaration</a>  |
| RoHS exemption information | <a href="#">Yes</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.  |
| Upgradeability             | Upgraded components available   |

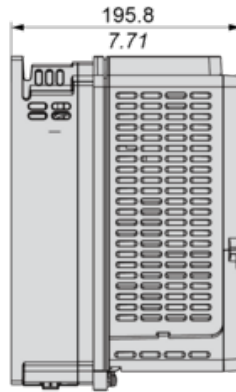
## Dimensions

### Front, Left and Rear Views

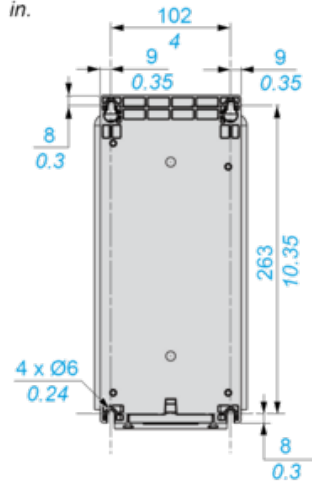
$\frac{\text{mm}}{\text{in.}}$



$\frac{\text{mm}}{\text{in.}}$

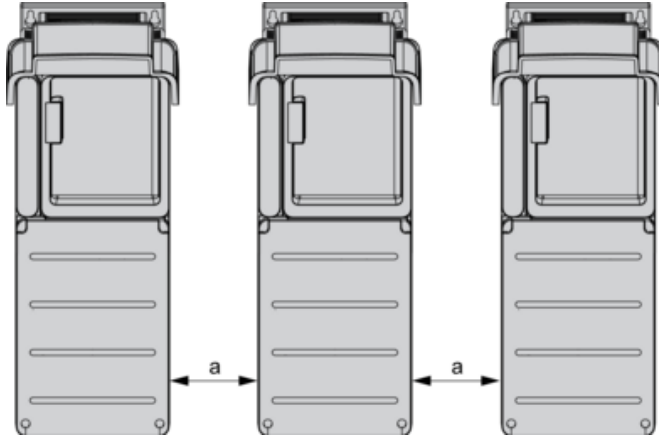


$\frac{\text{mm}}{\text{in.}}$



Mounting Types

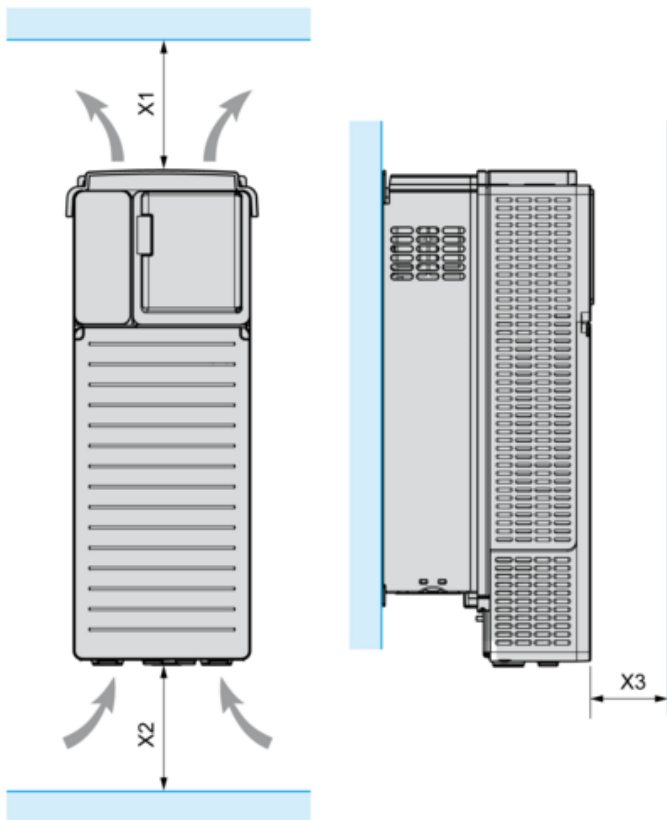
Mounting Type A : Individual IP21 and IP55



Frame sizes 1, 2, 3, 3S and 5S:  $a \geq 100$  mm (3.9 in.)

Frame sizes 4, 5 and 6:  $a \geq 110$  mm (4.33 in.)

Clearance

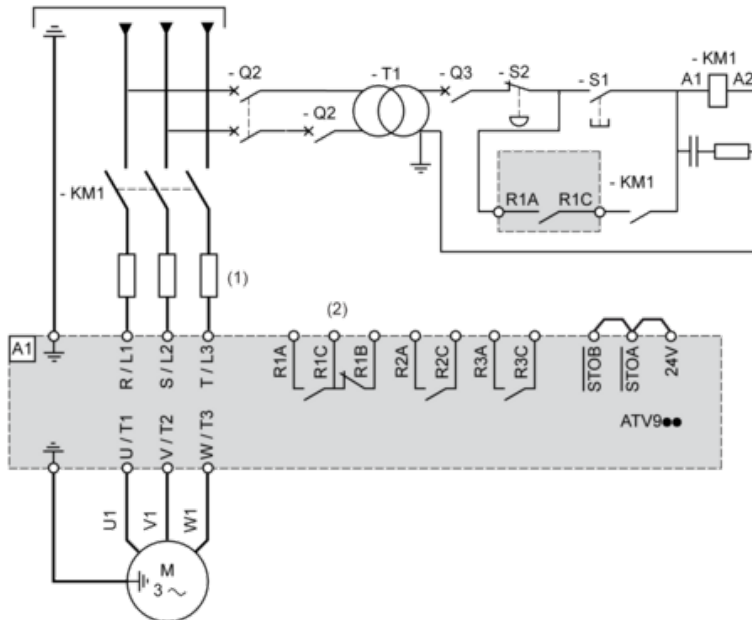


| Frame Size | X1         |             | X2         |             | X3         |             |
|------------|------------|-------------|------------|-------------|------------|-------------|
|            | mm         | in.         | mm         | in.         | mm         | in.         |
| 1...5      | $\geq 100$ | $\geq 3.94$ | $\geq 100$ | $\geq 3.94$ | $\geq 10$  | $\geq 0.39$ |
| 6          | $\geq 250$ | $\geq 10$   | $\geq 250$ | $\geq 10$   | $\geq 100$ | $\geq 3.94$ |



Three-Phase Power Supply with Upstream Breaking via Line Contactor

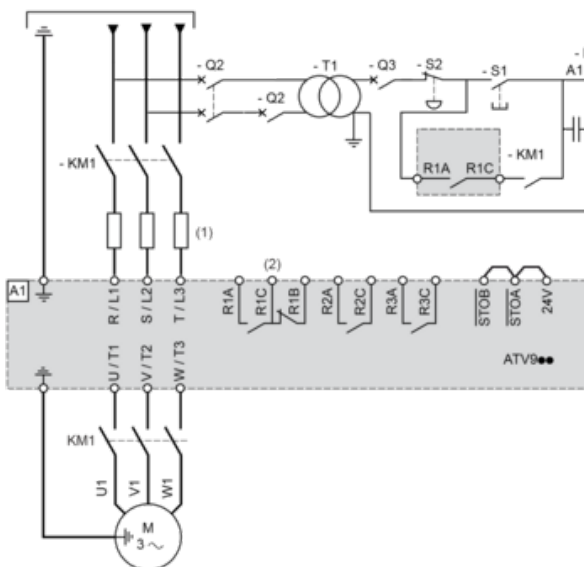
Connection diagrams conforming to standards EN 954-1 category 1 and IEC/EN 61508 capacity SIL1, stopping category 0 in accordance with standard IEC/EN 60204-1



- (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, Q3 : Circuit breakers  
 S1, S2 : Pushbuttons  
 T1 : Transformer for control part

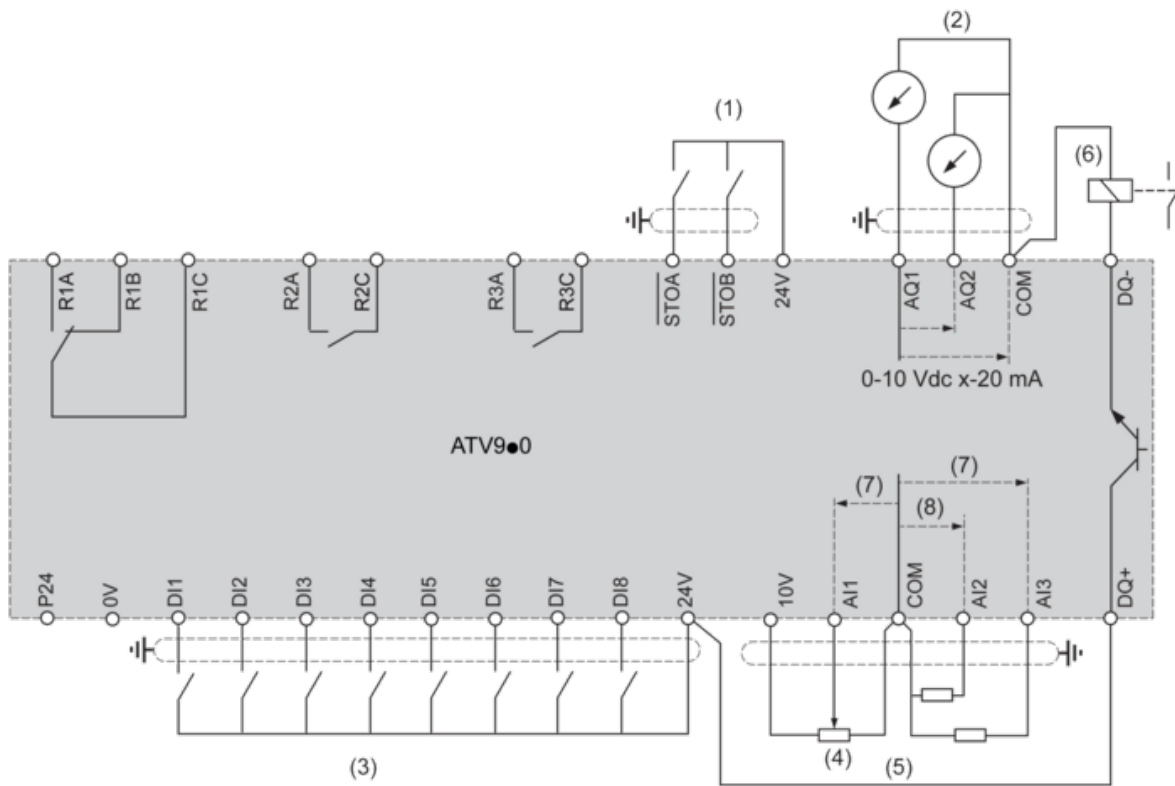
Three-Phase Power Supply with Downstream Breaking via Contactor

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



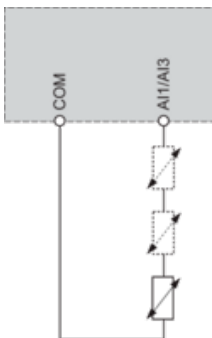
- (1) Line choke if used
- (2) Use relay R1 set to operating state Fault to switch Off the product once an error is detected.
- A1 : Drive
- KM1 : Contactor

### 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, R1B, R1C : Fault relay
- R2A, R2C : Sequence relay
- R3A, R3C : Sequence relay

### Sensor Connection



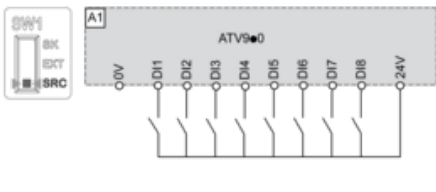
It is possible to connect either 1 or 3 sensors on terminals AI1 or AI3

### Sink / Source Switch Configuration

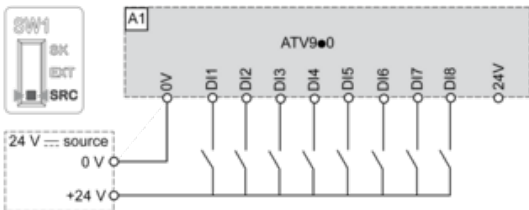
The switch is used to adapt the operation of the logic inputs to the technology of the programmable controller outputs.

- 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.

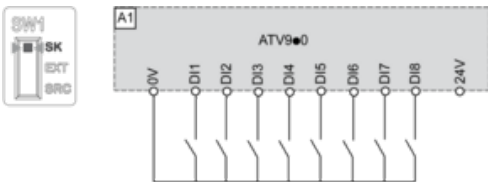
### Switch Set to SRC (Source) Position Using the Output Power Supply for the Digital Inputs



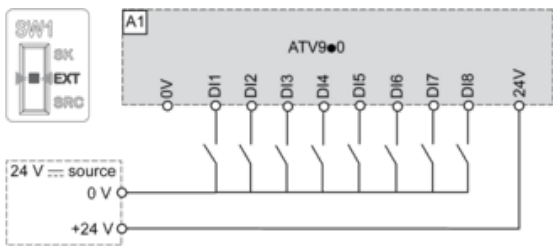
### Switch Set to SRC (Source) Position and Use of an External Power Supply for the DIs



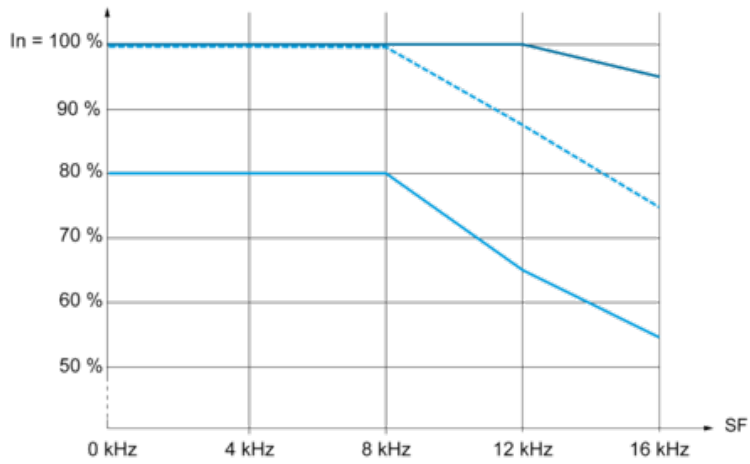
### Switch Set to SK (Sink) Position Using the Output Power Supply for the Digital Inputs



### 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, B and C
- 60 °C (140 °F) - Mounting type B and C

In : Nominal Drive Current

SF : Switching Frequency