

# ATV950D37N4

variable speed drive - ATV950 - 37kW - 400/480V-  
with braking unit - IP55



## Main

|                                    |   |
|------------------------------------|---|
| Range of product                   | Altivar Process ATV900  |
| Product or component type          | Variable speed drive  |
| Device application                 | Industrial application  |
| Device short name                  | ATV950  |
| Variant                            | Standard version<br>With braking chopper  |
| Product destination                | Asynchronous motors<br>Synchronous motors   |
| Mounting mode                      | Wall mount  |
| EMC filter                         | Integrated conforming to EN/IEC 61800-3 category C2 with 50 m motor cable maxi<br>Integrated conforming to EN/IEC 61800-3 category C3 with 150 m motor cable maxi   |
| IP degree of protection            | IP55 conforming to IEC 60529<br>IP55 conforming to IEC 61800-5-1  |
| 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                     | 37 kW (normal duty)<br>30 kW (heavy duty)   |
| Motor power hp                     | 50 hp (normal duty)<br>40 hp (heavy duty)   |
| Line current                       | 66.2 A at 380 V (normal duty)<br>57.3 A at 480 V (normal duty)<br>54.8 A at 380 V (heavy duty)<br>48.3 A at 480 V (heavy duty)  |
| Prospective line I <sub>sc</sub>   | 50 kA   |
| Apparent power                     | 47.6 kVA at 480 V (normal duty)<br>40.2 kVA at 480 V (heavy duty)   |
| Continuous output current          | 74.5 A at 4 kHz (normal duty)<br>61.5 A at 4 kHz (heavy duty)   |
| Maximum transient current          | 92.3 A during 60 s (heavy duty)<br>89.4 A during 60 s (normal duty)   |
| Asynchronous motor control profile | Constant torque standard<br>Variable torque standard<br>Optimized torque mode   |
| Synchronous motor control profile  | Permanent magnet motor  |
| Speed drive output frequency       | 0.1...599 Hz  |
| Nominal switching frequency        | 4 kHz   |
| Switching frequency                | 2... 16 kHz adjustable<br>4... 16 kHz with derating factor  |
| Safety function                    | STO (safe torque off) SIL 3   |
| Discrete input logic               | 16 preset speeds  |
| Communication port protocol        | Ethernet/IP<br>Modbus serial<br>Modbus TCP  |
| Option card                        | Slot A : communication module for Profibus DP V1<br>Slot A : communication module for Profinet<br>Slot A : communication module for DeviceNet<br>Slot A : communication module for CANopen daisy chain RJ45<br>Slot A : communication module for CANopen SUB- |

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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

|                                     |  |
|-------------------------------------|--|
| Output voltage                      | <= power supply voltage  |
| Motor slip compensation             | Adjustable<br>Automatic whatever the load<br>Can be suppressed<br>Not available in permanent magnet motor law  |
| Acceleration and deceleration ramps | Linear adjustable separately from 0.01...9999 s  |
| Braking to standstill               | By DC injection  |
| Protection type                     | Motor : thermal protection<br>Motor : safe torque off<br>Motor : motor phase break<br>Drive : thermal protection<br>Drive : safe torque off<br>Drive : overheating<br>Drive : overcurrent between output phases and earth<br>Drive : overload of output voltage<br>Drive : short-circuit protection<br>Drive : motor phase break<br>Drive : overvoltages on the DC bus<br>Drive : line supply overvoltage<br>Drive : line supply undervoltage<br>Drive : line supply phase loss<br>Drive : overspeed<br>Drive : break on the control circuit |
| Frequency resolution                | Display unit : 0.1 Hz<br>Analog input : 0.012/50 Hz  |
| Electrical connection               | Line side, screw terminal : 25...50 mm <sup>2</sup> (AWG 4...AWG 1)<br>Motor, screw terminal : 35...50 mm <sup>2</sup> (AWG 3...AWG 1)<br>Control, screw terminal : 0.5...1.5 mm <sup>2</sup> (AWG 20...AWG 16)<br>DC bus, screw terminal : 25...50 mm <sup>2</sup> (AWG 4...AWG 1)  |
| Connector type                      | 2 RJ45 (on the control block) for Ethernet IP/Modbus TCP<br>1 RJ45 (on the control block) for Modbus serial  |
| 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<br>4.8, 9.6, 19.2, 38.4 kbit/s for Modbus serial  |
| Exchange mode                       | Half duplex, full duplex, autonegotiation for 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 for Modbus TCP   |
| Supply                              | External supply for digital inputs : 24 V DC (19...30 V) current <= 1.25 mA (overload and short-circuit protection)<br>Internal supply for reference potentiometer (1 to 10 kOhm) : 10.5 V DC +/- 5 % current <= 10 mA (overload and short-circuit protection)<br>Internal supply for digital inputs and STO : 24 V DC (21...27 V) current <= 200 mA (overload and short-circuit protection)   |
| Local signalling                    | 3 mono/dual colour LED for local diagnostic<br>5 dual colour LED for embedded communication status<br>2 dual colour LED for communication module status<br>1 red LED for presence of voltage   |
| Width                               | 290 mm   |
| Height                              | 910 mm   |
| Depth                               | 340 mm   |
| Product weight                      | 50 kg  |
| Analogue input number               | 3  |
| Analogue input type                 | Software-configurable voltage AI1, AI2, AI3 : 0...10 V DC impedance 30 kOhm,   |

|                           |  |
|---------------------------|--|
|                           | resolution 12 bits<br>Software-configurable current AI1, AI2, AI3 : 0...20 mA/4...20 mA impedance 250 Ohm,<br>resolution 12 bits   |
| Discrete input number     | 10   |
| Discrete input type       | Programmable DI1...DI8 : 24 V DC ( $\leq 30$ V) impedance 3.5 kOhm<br>Programmable as pulse input DI7, DI8 0...30 kHz : 24 V DC ( $\leq 30$ V)<br>Safe torque off STOA, STOB : 24 V DC ( $\leq 30$ V) impedance $> 2.2$ kOhm   |
| Input compatibility       | Discrete input STOA, STOB : level 1 PLC conforming to EN/IEC 61131-2<br>Discrete input DI1...DI8 : level 1 PLC conforming to EN/IEC 61131-2<br>Pulse input DI7, DI8 : level 1 PLC conforming to IEC 65A-68   |
| Discrete input logic      | DI1...DI8, DI1...DI8 positive logic (source) : $< 5$ V (state 0) $> 11$ V (state 1)<br>DI1...DI8, DI1...DI8 negative logic (sink) : $> 16$ V (state 0) $< 10$ V (state 1)<br>DI7, DI8, DI7, DI8 positive logic (source) : $< 0.6$ V (state 0) $> 2.5$ V (state 1)<br>STOA, STOB, STOA, STOB positive logic (source) : $< 5$ V (state 0) $> 11$ V (state 1)   |
| Analogue output number    | 2  |
| Analogue output type      | Software-configurable voltage AQ1, AQ2, AQ1, AQ2 : 0...10 V DC impedance 470 Ohm, resolution 10 bits<br>Software-configurable current AQ1, AQ2, AQ1, AQ2 : 0...20 mA impedance 500 Ohm, resolution 10 bits   |
| 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   |
| Sampling duration         | Discrete input DI1...DI8 : 2 ms (+/- 0.5 ms)<br>Pulse input DI7, DI8 : 5 ms (+/- 1 ms)<br>Analog input AI1, AI2, AI3 : 1 ms (+/- 1 ms)<br>Analog output AQ1, AQ2 : 5 ms (+/- 1 ms)   |
| Accuracy                  | Analog input AI1, AI2, AI3 : +/- 0.6 % for a temperature variation 60 °C<br>Analog output AQ1, AQ2 : +/- 1 % for a temperature variation 60 °C   |
| Linearity error           | Analog input AI1, AI2, AI3 : +/- 0.15 % of maximum value<br>Analog output AQ1, AQ2 : +/- 0.2 %   |
| Maximum switching current | Relay output R1 on inductive load ( $\cos \phi = 0.4$ and $L/R = 7$ ms) : 2 A at 250 V AC<br>Relay output R1 on inductive load ( $\cos \phi = 0.4$ and $L/R = 7$ ms) : 2 A at 30 V DC<br>Relay output R2, R3 on inductive load ( $\cos \phi = 0.4$ and $L/R = 7$ ms) : 2 A at 250 V AC<br>Relay output R2, R3 on inductive load ( $\cos \phi = 0.4$ and $L/R = 7$ ms) : 2 A at 30 V DC<br>Relay output R1 on resistive load ( $\cos \phi = 1$ ) : 3 A at 250 V AC<br>Relay output R1 on resistive load ( $\cos \phi = 1$ ) : 3 A at 30 V DC<br>Relay output R2, R3 on resistive load ( $\cos \phi = 1$ ) : 5 A at 250 V AC<br>Relay output R2, R3 on resistive load ( $\cos \phi = 1$ ) : 5 A at 30 V DC |
| Relay output number       | 3  |
| Relay output type         | Configurable relay logic R1 : fault relay NO/NC electrical durability 100000 cycles<br>Configurable relay logic R2 : sequence relay NO electrical durability 1000000 cycles<br>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  |
| Specific application      | Process  |
| IP degree of protection   | IP55   |

## Environment

|                               |  |
|-------------------------------|--|
| insulation resistance         | $> 1$ mOhm at 500 V DC for 1 minute to earth   |
| noise level                   | 69.7 dB conforming to 86/188/EEC   |
| vibration resistance          | 1 gn ( $f = 13...200$ Hz) conforming to IEC 60068-2-6<br>1.5 mm peak to peak ( $f = 2...13$ Hz) conforming to IEC 60068-2-6  |
| shock resistance              | 15 gn during 11 ms conforming to IEC 60068-2-27  |
| operating position            | Vertical +/- 10 degree   |
| THDI                          | $\leq 48$ % from 80...100 % of load conforming to IEC 61000-3-12   |
| electromagnetic compatibility | 1.2/50 $\mu$ s - 8/20 $\mu$ s surge immunity test level 3 conforming to IEC 61000-4-5<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>Conducted radio-frequency immunity test level 3 conforming to IEC 61000-4-6 |
| pollution degree              | 2 EN/IEC 61800-5-1   |

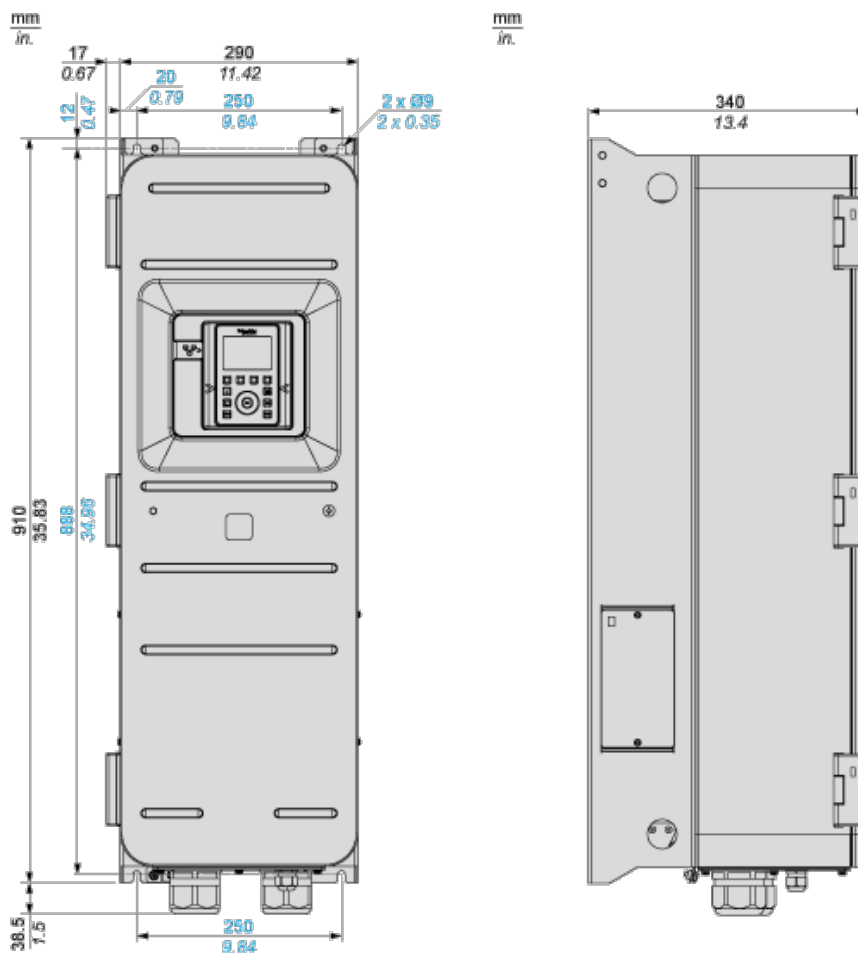
|                                       |  |
|---------------------------------------|--|
| environmental characteristic          | Chemical pollution resistance class 3C3 conforming to EN/IEC 60721-3-3<br>Dust pollution resistance class 3S3 conforming to EN/IEC 60721-3-3   |
| relative humidity                     | 5...95 % without condensation conforming to IEC 60068-2-3  |
| ambient air temperature for operation | -15...40 °C without derating<br>40...50 °C with derating factor  |
| ambient air temperature for storage   | -40...70 °C  |
| operating altitude                    | <= 1000 m without derating<br>1000...4800 m with current derating 1 % per 100 m  |
| standards                             | EN/IEC 61800-3<br>UL 508C<br>EN/IEC 61800-5-1<br>IEC 61000-3-12<br>IEC 60721-3<br>IEC 61508<br>IEC 13849-1<br>EN/IEC 61800-3 (environment 1 category C2)<br>EN/IEC 61800-3 (environment 2 category C3) |
| product certifications                | CSA<br>TÜV<br>UL<br>REACH  |
| marking                               | CE   |

## Offer Sustainability

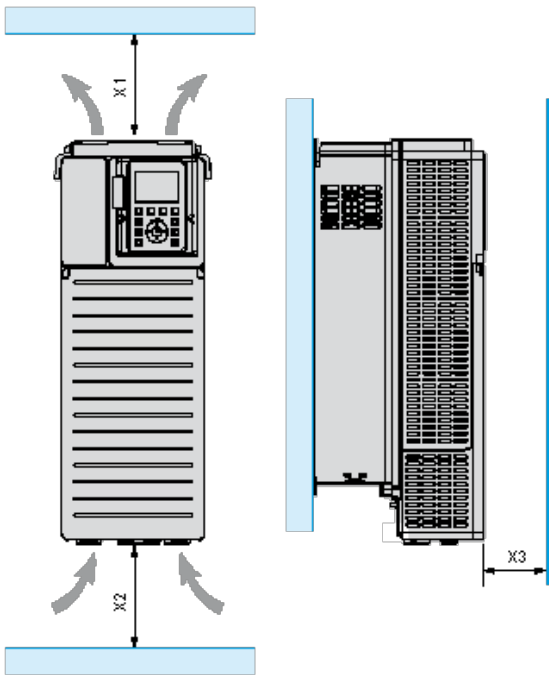
|                                  |   |
|----------------------------------|---|
| Sustainable offer status         | Green Premium product   |
| RoHS (date code: YYWW)           | Compliant - since 1526 - Schneider Electric declaration of conformity |
| REACH                            | Reference not containing SVHC above the threshold                     |
| Product environmental profile    | Available   |
| Product end of life instructions | Available   |

## Dimensions

Front and Left View



## Clearances

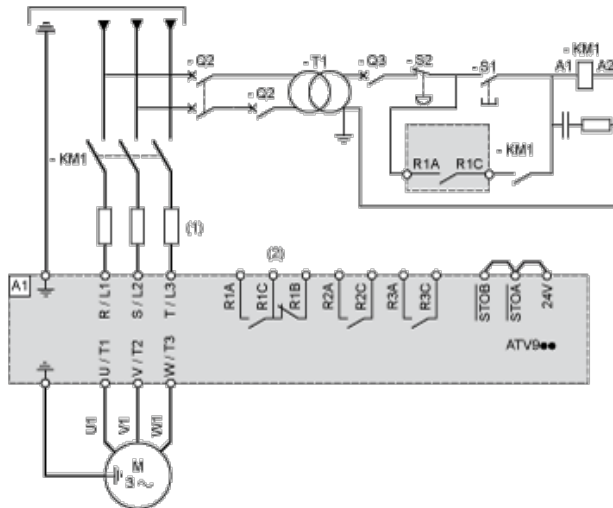


| X1                  | X2                  | X3                 |
|---------------------|---------------------|--------------------|
| ≥ 100 mm (3.94 in.) | ≥ 100 mm (3.94 in.) | ≥ 10 mm (0.39 in.) |

- 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.

## 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



- Line choke if used
- 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 :

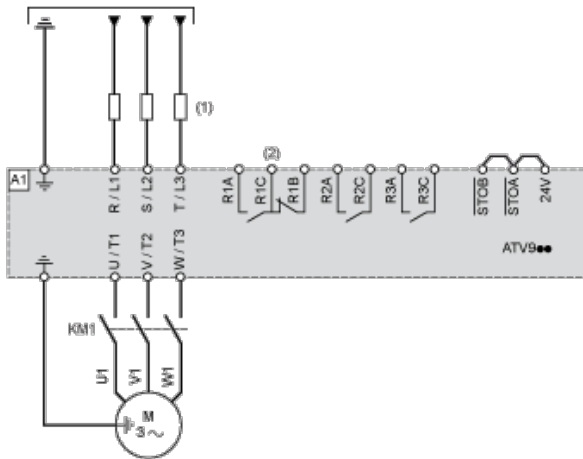
S1, Pushbuttons

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

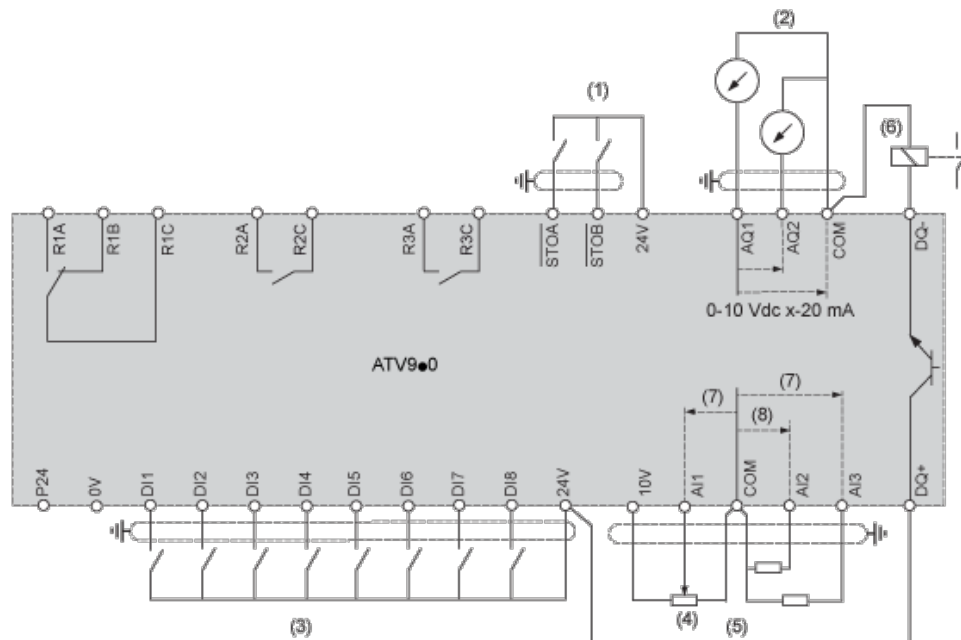


- (1) Line choke if used
- (2) Use relay R1 set to operating state Fault to switch Off the product once an error is detected.

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 :

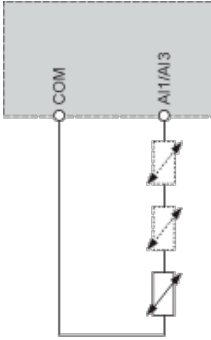
R2A, Sequence relay

R2C :

R3A, Sequence relay

R3C :

## Sensor Connection



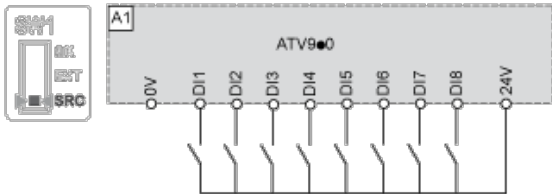
It is possible to connect either 1 or 3 sensors on terminals A1 or AI3

## Sink / Source Switch Configuration

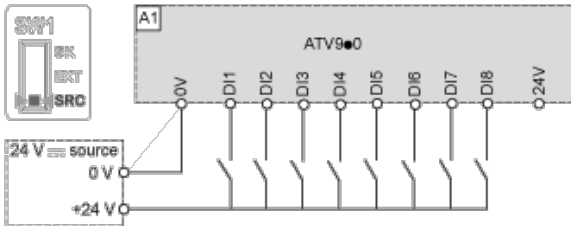
The switch is used to adapt the operation of the logic inputs to the technology of the programmable controller outputs.

- ▮ 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.

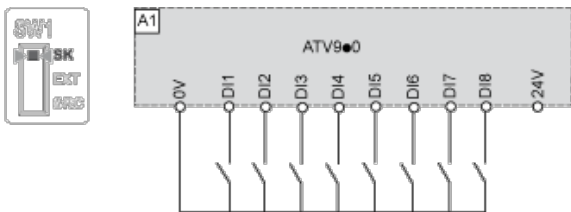
### Switch Set to SRC (Source) Position Using the Output Power Supply for the Digital Inputs



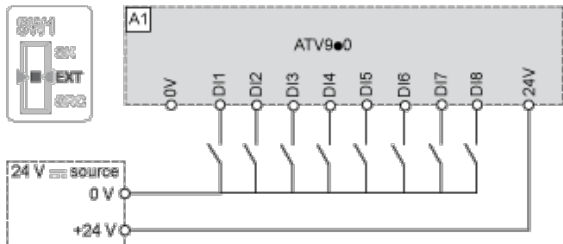
### Switch Set to SRC (Source) Position and Use of an External Power Supply for the DIs



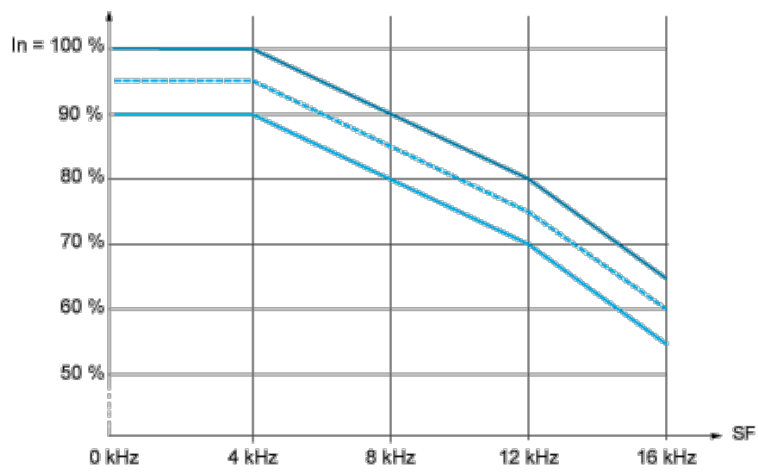
### Switch Set to SK (Sink) Position Using the Output Power Supply for the Digital Inputs



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



## Derating Curves



— 40 °C (104 °F)

- - - 45 °C (113 °F)

— 50 °C (122 °F)

In : Nominal Drive Current

SF : Switching Frequency