

# ATV980C40Q4X1

Variable speed drive, Altivar Process ATV900,  
Regenerative System ATV980 -400/315 kW,  
400 V with CE, IP23



## Main

Device application	Industrial application
Device short name	ATV980
Provided equipment	Enclosure Spacial SF Graphical operating panel in the enclosure door Frequency inverter Main switch Line choke Terminal block main supply Terminal block motor Dv/dt filter choke
Colour of enclosure	Light grey (RAL 7035)
Noise level	75 dB conforming to 86/188/EEC - physical agents (noise) directive
Type of polarization	No impedance for Modbus serial
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 digital inputs and STO: 24 V DC (21...27 V), <200 mA, protection type: overload and short-circuit protection Internal supply for reference potentiometer (1 to 10 kOhm): 10.5 V DC +/- 0.5, <10 mA, protection type: overload and short-circuit protection
Range of product	Altivar Process ATV900
Product or component type	Variable speed drive
Communication port protocol	Modbus TCP EtherNet/IP Modbus serial
[Us] rated supply voltage	380...415 V - 10...6 %
Motor power kW	400 kW for normal duty 315 kW for heavy duty

## Complementary

Product destination	Asynchronous motors Synchronous motors
Type of cooling	Forced convection
Supply frequency	50...60 Hz +/- 5 %
Network number of phases	3 phases
Output voltage	<= power supply voltage
Permissible temporary current boost	1.2 x In during 60 s (normal duty) 1.5 x In during 60 s (heavy duty)
Speed drive output frequency	0.1...599 Hz
Continuous output current	730 A at 2.5 kHz for normal duty 590 A at 2.5 kHz for heavy duty
Energy efficiency ratio	0.965
Power dissipation in W	15850 W, total (normal duty) 12300 W, total (heavy duty) 1800 W, control part (normal duty) 1400 W, control part (heavy duty)
Volume of cooling air	3480 M3/H for power 420 m3/h for control
Prospective line Isc	50 kA for 100 ms

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Motor recommended cable cross section	3 x (3 x 120 mm <sup>2</sup> ) (heavy duty) 3 x (3 x 185 mm <sup>2</sup> ) (normal duty) 4 x (3 x 120 mm <sup>2</sup> ) (normal duty) 4 x (3 x 95 mm <sup>2</sup> ) (heavy duty)
Height	2150 mm
Depth	664 mm
Option module	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 A: communication module for CANopen daisy chain RJ45 Slot A: communication module for CANopen screw terminals Slot A: communication module for CANopen SUB-D 9 Slot A: communication module for DeviceNet Slot A: communication module for Profibus DP V1 Slot A: communication module for PROFINET Slot B: 512 V digital encoder interface module Slot B: digital encoder interface module Slot B: resolver encoder interface module Slot B: analog encoder interface module
Safety function	STO (safe torque off), level SIL 3 for <= 100 ms
Protection type	Motor: thermal protection Motor: safe torque off Motor: motor phase break Drive: thermal protection Drive: safe torque off Drive: overheating Drive: overcurrent (between output phases and earth) Drive: overload (output) Drive: short-circuit protection Drive: motor phase break Drive: overvoltage (DC bus) Drive: line supply overvoltage Drive: line supply undervoltage Drive: line supply phase loss Drive: overspeed Drive: break on the control circuit Drive: short-circuit protection with semi-conductor fuse (main supply) Drive: fan monitoring
Frequency resolution	Display unit: 0.1 Hz Analog input: 0.012/50 Hz
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
Number of addresses	1...247 for Modbus serial
Local signalling	LCD display unit front door operation function, status and configuration
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)
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
Refresh time	Relay output (R1, R2, R3): 5 ms (+/- 0.5 ms)
Isolation	Between power and control terminals
Insulation resistance	> 1 MOhm 500 V DC for 1 minute to earth
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 STOA, STOB safe torque off, 24 V DC, impedance: > 2.2 kOhm
Discrete input logic	16 preset speeds
Discrete output number	2
Discrete output type	Logic output DQ+ 0...1 kHz <= 30 V DC 100.0 mA Programmable as pulse output DQ+ 0...30 kHz <= 30 V DC 20.0 mA Logic output DQ- 0...1 kHz <= 30 V DC 100.0 mA
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, impedance: 250 Ohm, resolution 12 bits
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
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
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
Minimum switching current	Relay output R1, R2, R3: 5 mA at 24 V DC
Method of access	Slave Modbus TCP
Asynchronous motor control profile	Constant torque standard Optimized torque mode Variable torque standard
Synchronous motor control profile	Permanent magnet motor
Acceleration and deceleration ramps	S, U or customized Linear adjustable separately from 0.01 to 9000 s
Motor slip compensation	Adjustable Automatic whatever the load Can be suppressed Not available in permanent magnet motor law
Switching frequency	2...8 kHz adjustable with derating factor
Nominal switching frequency	2.5 kHz
Braking to standstill	By DC injection
Line current	620 A at 400 V (normal duty) 491 A at 400 V (heavy duty)
Apparent power	429 KVA at 400 V (normal duty) 340 kVA at 400 V (heavy duty)
Maximum transient current	876 A during 60 s per 10 min (normal duty) 885 A during 60 s per 10 min (heavy duty)
Short-circuit protection	Upstream: 800 A gG fuse (normal duty) Upstream: 630 A gG fuse (heavy duty) Internal: 315 A 3 aR fuse
Electrical connection	Removable screw terminals, clamping capacity: 0.5...1.5 mm <sup>2</sup> for control M12 bar for main supply M12 bar for motor
Cable entry	Bottom
Width	1600 mm
Net weight	1150 kg

## Environment

IP degree of protection	IP23 conforming to IEC 61800-5-1
EMC filter	Integrated conforming to EN/IEC 61800-3, category C4, unshielded cable with 250 m
Pollution degree	2 conforming to EN/IEC 61800-5-1
Vibration resistance	1.5 mm peak to peak (f= 3...20 Hz) conforming to IEC 60068-2-6 0.6 gn (f= 10...200 Hz) conforming to IEC 60068-2-6 3M3 conforming to IEC 60721-3-3 1.5 mm peak to peak (f= 3...10 Hz) conforming to IEC 60068-2-6
Shock resistance	4 gn for 11 ms conforming to IEC 60068-2-27 3M2 conforming to IEC 60721-3-3
Relative humidity	5...95 % without condensation conforming to IEC 60068-2-3
Operating altitude	<= 1000 m without derating 1000...2000 m with current derating 1 % per 100 m 2000...3800 m with current derating 1 % per 100 m for TT earthing system 2000...3800 m with current derating 1 % per 100 m for TN earthing system 2000...3800 m with current derating 1 % per 100 m for IT earthing system 3800...4800 m with current derating 1 % per 100 m for TT earthing system 3800...4800 m with current derating 1 % per 100 m for TN earthing system
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 Humidity resistant class 3K3 conforming to EN/IEC 60721-3-3
Product certifications	ATEX[RETURN]C-Tick[RETURN]EAC
Operating position	Vertical +/- 10 degree
Marking	CE
Standards	EN/IEC 60204-1 EN/IEC 61800-2 EN/IEC 61800-3 EN/IEC 61800-5-1
Maximum THDI	<5 % full load conforming to IEEE 519
Assembly style	In floor-standing enclosure compact version
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
Overvoltage category	III
Ambient air temperature for operation	-10...0 °C without derating (with option enclosure heating) 0...40 °C without derating 40...50 °C with derating factor
Ambient air temperature for storage	-25...70 °C

## Packing Units

Unit Type of Package 1	PCE
Number of Units in Package 1	1
Package 1 Height	215 cm
Package 1 Width	66.9 cm
Package 1 Length	160 cm
Package 1 Weight	1220 kg

## Offer Sustainability

REACH Regulation	 <a href="#">REACH Declaration</a>
EU RoHS Directive	Pro-active compliance (Product out of EU RoHS legal scope)
Mercury free	Yes
China RoHS Regulation	 <a href="#">China RoHS Declaration</a>
RoHS exemption information	 <a href="#">Yes</a>
WEEE	The product must be disposed on European Union markets following specific waste collection and never end up in rubbish bins
Take-back	Take-back program available

## Contractual warranty

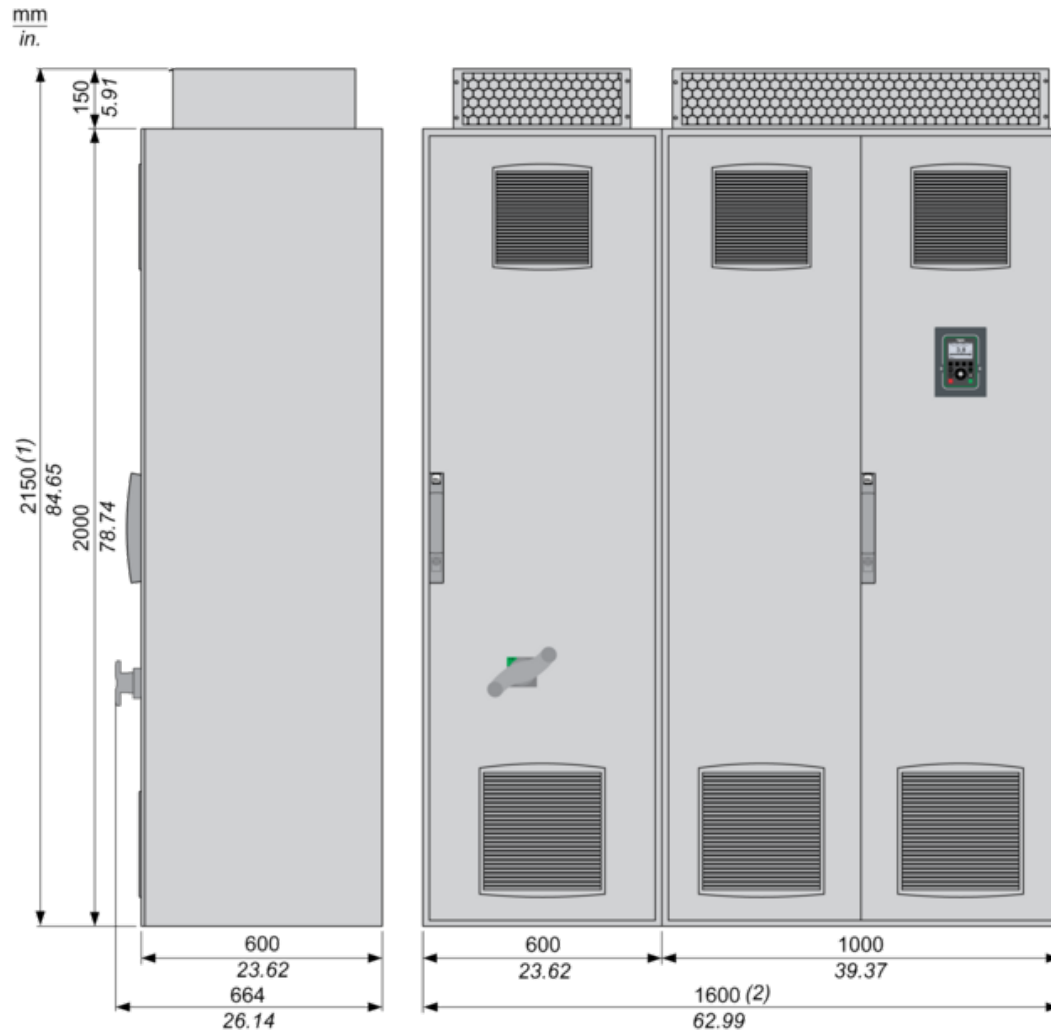
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Warranty	18 Monate
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Dimensions

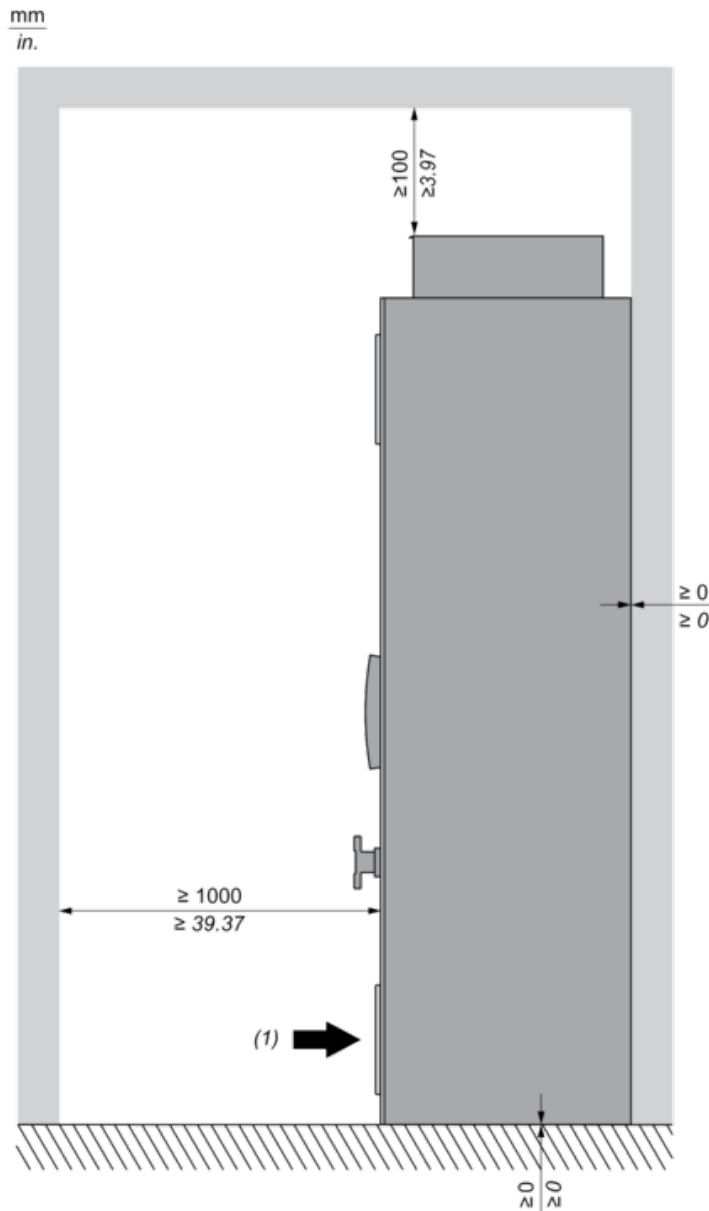
Right and Front Views



(1) + 200 mm/7.87 in. with option enclosure plinth or increased protection degree IP54.

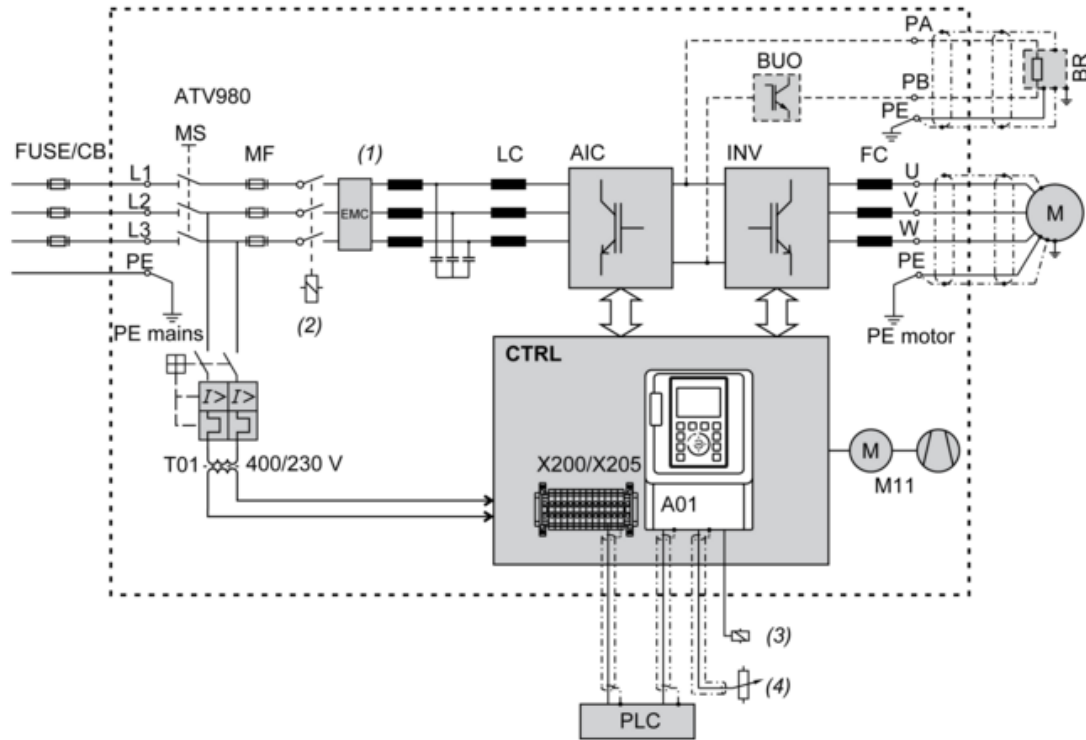
(2) + 600 mm/15.74 in. with option connection enclosure cable from top/bottom.

Mounting and Clearance



(1) Air inflow temperature: -10...+50 °C (below 0 °C with option enclosure heating, above +40 °C with derating).

Typical Wiring Diagram of the Frequency Inverter



(1) Clean Power Filter

(2) Line contactor

(3) Relay control

(4) Reference value

FUSE/CB External pre-fuse or circuit breaker to protect the main cable

MS Built-in main switch, lockable in open position

T01 Control transformer 400 / 230 V AC

MF aR fuse for short-circuit shut-down if the electronic protective devices do not work properly

Clean Power Filter Clean Power Filter with integrated EMC filter

LC Filter choke

AIC Active Infeed Converter module(s)

INV Inverter module(s)

FC dv/dt filter choke to reduce the voltage load of the motor (at some types a "dv/dt filter choke" is already integrated)

CTRL Control panel with control block and further control components

A01 Control terminals at the control block

X200 / X205 Control terminals at the control panel

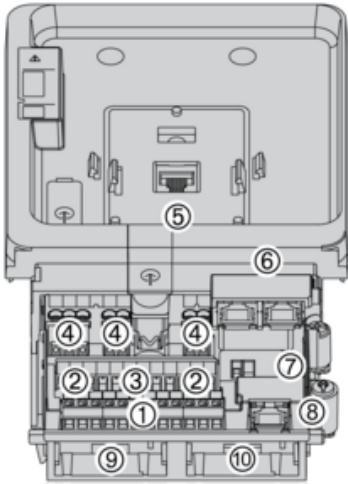
M11 Fan in enclosure door

BUO Braking unit option

BR Braking resistor (option)

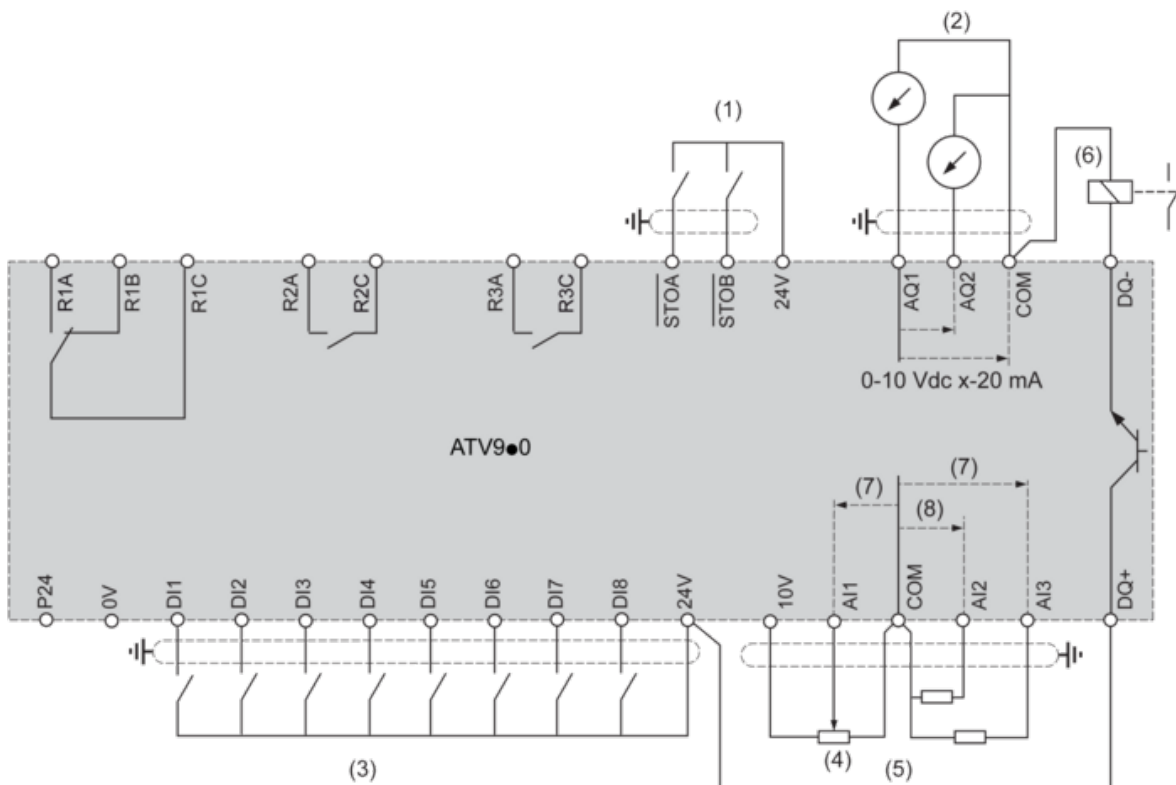
Structure of the Control Block





- (1) Control terminals of digital inputs
- (2) Control terminals STO (Safe Torque Off) and analog outputs
- (3) Control terminals of analog inputs
- (4) Control terminals of relay outputs
- (5) RJ45 port for the graphical keypad
- (6) Dual port RJ45 for Ethernet IP or Modbus TCP
- (7) Sink-Ext-Source selector switch and PTO/DQ selector switch
- (8) RJ45 port for serial Modbus
- (9) Slot B for I/O expansion card or encoder interface module
- (10) Slot A for communication card or I/O expansion card

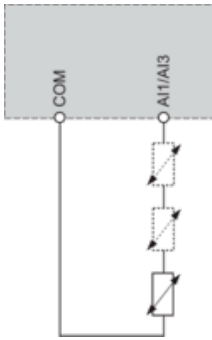
### Control Block Wiring Diagram



- (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



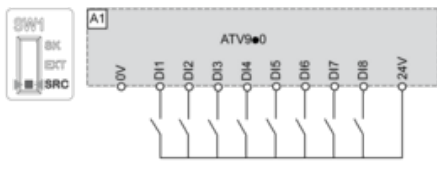
It is possible to connect either 1 or 3 sensors on terminals A11 or A13

### Sink / Source Switch Configuration

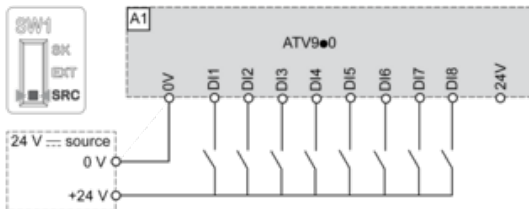
The switch is used to adapt the operation of the logic inputs to the technology of the programmable controller outputs.

- 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.

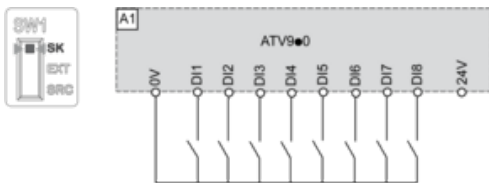
### Switch Set to SRC (Source) Position Using the Output Power Supply for the Digital Inputs



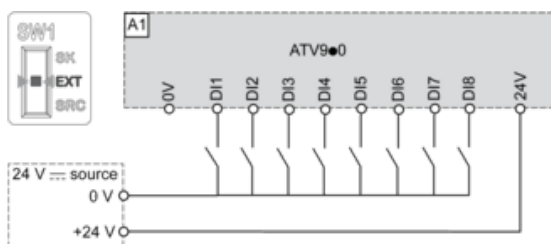
### Switch Set to SRC (Source) Position and Use of an External Power Supply for the DIs



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

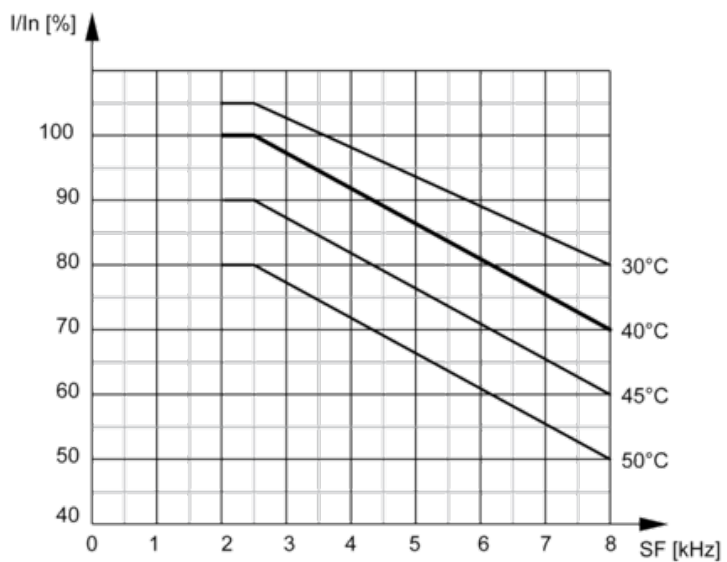


### Switch Set to EXT Position Using an External Power Supply for the DIs



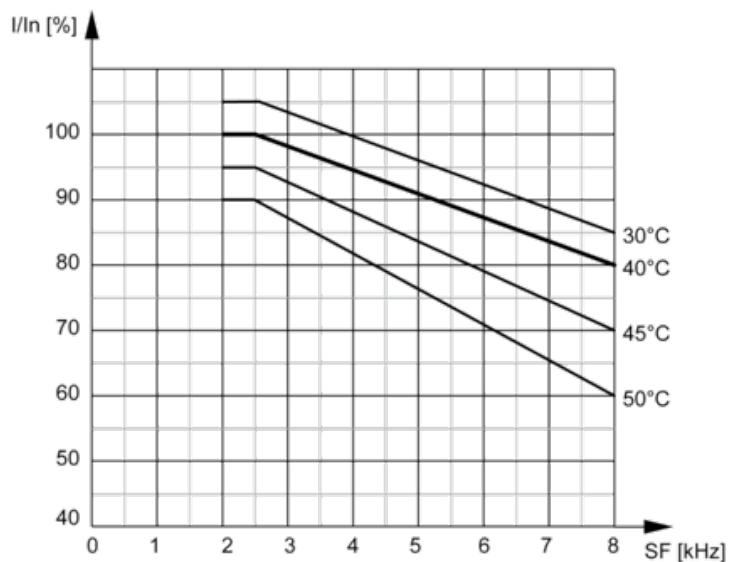
Derating Curves

Normal Duty



$I_n$  : Nominal Drive Current  
SF : Switching Frequency

Heavy Duty



$I_n$  : Nominal Drive Current  
SF : Switching Frequency