



### Main

|                              |                                                             |
|------------------------------|-------------------------------------------------------------|
| Range of product             | Altivar Process ATV600                                      |
| Product or component type    | Variable speed drive                                        |
| Product specific application | Process and utilities                                       |
| Device short name            | ATV680                                                      |
| Product destination          | Asynchronous motors<br>Synchronous motors                   |
| Assembly style               | In floor-standing enclosure low harmonic version            |
| IP degree of protection      | IP23 conforming to IEC 61800-5-1                            |
| Supply frequency             | 50/60 Hz (+/- 5 %)                                          |
| Network number of phases     | 3 phases                                                    |
| Motor power kW               | 450 kW (normal duty)<br>355 kW (heavy duty)                 |
| Line current                 | 697 A at 400 V (normal duty)<br>553 A at 400 V (heavy duty) |

### Complementary

|                                     |                                                                                                                                                                                                                                                                                                 |
|-------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Provided equipment                  | Enclosure Spacial SF<br>Graphical operating panel in the enclosure door<br>Main switch<br>Semiconductor fuses<br>Clean power filter with EMC filter<br>Active infeed converter module<br>Frequency inverter<br>Terminal block for main supply<br>Terminal block for motor<br>Dv/Dt filter choke |
| Cable entry                         | Bottom                                                                                                                                                                                                                                                                                          |
| Colour of enclosure                 | Light grey RAL 7035                                                                                                                                                                                                                                                                             |
| Type of cooling                     | Forced convection                                                                                                                                                                                                                                                                               |
| [Us] rated supply voltage           | 380...415 V (- 10...6 %)                                                                                                                                                                                                                                                                        |
| Overvoltage category                | III                                                                                                                                                                                                                                                                                             |
| Asynchronous motor control profile  | Constant torque standard<br>Variable torque standard<br>Optimized torque mode                                                                                                                                                                                                                   |
| Synchronous motor control profile   | Permanent magnet motor                                                                                                                                                                                                                                                                          |
| Output voltage                      | <= power supply voltage                                                                                                                                                                                                                                                                         |
| Permissible temporary current boost | 1.1 x In for 60 s (normal duty)<br>1.5 x In for 60 s (heavy duty)                                                                                                                                                                                                                               |
| Nominal switching frequency         | 2.5 kHz                                                                                                                                                                                                                                                                                         |
| Switching frequency                 | 2...8 kHz adjustable with derating factor                                                                                                                                                                                                                                                       |
| Speed drive output frequency        | 0.1...500 Hz                                                                                                                                                                                                                                                                                    |
| Speed accuracy                      | V/F mode: slip frequency<br>VC without feedback: 0.3 x slip frequency                                                                                                                                                                                                                           |
| Continuous output current           | 830 A at 2.5 kHz (normal duty)<br>660 A at 2.5 kHz (heavy duty)                                                                                                                                                                                                                                 |
| Maximum transient current           | 913 A during 60 s per 10 min (normal duty)<br>990 A during 60 s per 10 min (heavy duty)                                                                                                                                                                                                         |
| Apparent power                      | 483 kVA at 400 V (normal duty)<br>383 kVA at 400 V (heavy duty)                                                                                                                                                                                                                                 |

|                                             |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
|---------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| THDI                                        | <= 5 % full load conforming to IEC 61000-3-12                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |
| Short circuit protection                    | 1000 A fuse type gG for upstream (normal duty)<br>800 A fuse type gG for upstream (heavy duty)<br>400 A, 3 fuse type aR for internal                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
| Energy efficiency ratio                     | >= 0.965                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |
| Power dissipation in W                      | 18210 W, total (normal duty)<br>13960 W, total (heavy duty)<br>2060 W, control part (normal duty)<br>1560 W, control part (heavy duty)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
| Volume of cooling air                       | 3480 m3/h (power)<br>420 m3/h (control)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |
| Prospective line I <sub>sc</sub>            | <= 50 kA for 100 ms                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
| Electrical connection                       | Control : removable screw terminals, 0.5...1.5 mm <sup>2</sup><br>Main supply : M12 bar<br>Motor : M12 bar                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
| Motor recommended cable cross section       | 4 x (3 x 95 mm <sup>2</sup> ) heavy duty<br>4 x (3 x 150 mm <sup>2</sup> ) normal duty<br>5 x (3 x 120 mm <sup>2</sup> ) normal duty<br>3 x (3 x 150 mm <sup>2</sup> ) heavy duty                                                                                                                                                                                                                                                                                                                                                                                                                                                    |
| Main supply recommended cable cross section | 4 x (3 x 185 mm <sup>2</sup> ) normal duty<br>4 x (3 x 150 mm <sup>2</sup> ) heavy duty                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |
| Width                                       | 1600 mm                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |
| Height                                      | 2150 mm                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |
| Depth                                       | 664 mm                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
| Product weight                              | 1150 kg                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |
| Number of preset speeds                     | 16 preset speeds                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
| Communication port protocol                 | Modbus serial<br>Modbus TCP<br>Ethernet IP                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
| Option card                                 | Slot A : communication module, Profibus DP V1<br>Slot A : communication module, Profinet<br>Slot A : communication module, DeviceNet<br>Slot A : communication module, Modbus TCP/EtherNet/IP<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 : digital and analog I/O extension module<br>Slot A/slot B : output relay extension module                                                                                                                                                     |
| Safety function                             | STO (safe torque off), level SIL 3                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
| 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 to 9000 s<br>S, U or customized                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
| 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 (output)<br>Drive : short-circuit protection<br>Drive : motor phase break<br>Drive : overvoltage (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<br>Drive : short-circuit protection with semi-conductor fuse (main supply)<br>Drive : fan monitoring |
| Frequency resolution                        | Display unit : 0.1 Hz<br>Analog input : 0.012/50 Hz                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
| Type of connector                           | For Modbus serial RJ45 (on the control block)<br>For Ethernet IP/Modbus TCP RJ45 (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<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[Sapce]: Modbus TCP                                                                                                                                                                                                                                                                                                                                                                                   |
| Supply                    | External supply for digital inputs : 24 V DC (19...30 V) current $\leq$ 1.25 mA (overload and short-circuit protection)<br>Internal supply for reference potentiometer (1 to 10 kOhm) : 10.5 V DC $\pm$ 5 % current $\leq$ 10 mA (overload and short-circuit protection)<br>Internal supply for digital inputs and STO : 24 V DC (21...27 V) current $\leq$ 200 mA (overload and short-circuit protection) |
| Local signalling          | LCD display unit operation function, status and configuration on front door                                                                                                                                                                                                                                                                                                                                |
| 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 impedance 250 Ohm, resolution 12 bits                                                                                                                                                                                                           |
| Discrete input number     | 8                                                                                                                                                                                                                                                                                                                                                                                                          |
| Discrete input type       | Programmable DI1...DI6 : 24 V DC ( $\leq$ 30 V) impedance 3.5 kOhm<br>Programmable as pulse input DI5, DI6 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 DI1...DI6 : level 1 PLC conforming to EN/IEC 61131-2<br>Discrete input DI5, DI6 : level 1 PLC conforming to IEC 65A-68<br>Discrete input STOA, STOB : level 1 PLC conforming to EN/IEC 61131-2                                                                                                                                                                                              |
| Discrete input logic      | DI1...DI6, positive logic (source) : $<$ 5 V (state 0) $>$ 11 V (state 1)<br>DI1...DI6, negative logic (sink) : $>$ 16 V (state 0) $<$ 10 V (state 1)<br>DI5, DI6, positive logic (source) : $<$ 0.6 V (state 0) $>$ 2.5 V (state 1)<br>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) 0...10 V DC - 470 Ohm, resolution 10 bits<br>Software-configurable current : (AQ1, AQ2) 0...20 mA, resolution 10 bits                                                                                                                                                                                                                                           |
| Sampling duration         | Discrete input DI1...DI4 : 2 ms ( $\pm$ 0.5 ms)<br>Discrete input DI5, DI6 : 5 ms ( $\pm$ 1 ms)<br>Analog input AI1, AI2, AI3 : 5 ms ( $\pm$ 1 ms)<br>Analog output AQ1, AQ2 : 10 ms ( $\pm$ 1 ms)                                                                                                                                                                                                         |
| Accuracy                  | Analog input AI1, AI2, AI3 : $\pm$ 0.6 % for a temperature variation 60 °C<br>Analog output AQ1, AQ2 : $\pm$ 1 % for a temperature variation 60 °C                                                                                                                                                                                                                                                         |
| Linearity error           | Analog input AI1, AI2, AI3 : $\pm$ 0.15 % of maximum value<br>Analog output AQ1, AQ2 : $\pm$ 0.2 %                                                                                                                                                                                                                                                                                                         |
| 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 100000 cycles<br>Configurable relay logic R3 : sequence relay NO electrical durability 100000 cycles                                                                                                                                          |
| Refresh time              | Relay output R1, R2, R3 : 5 ms ( $\pm$ 0.5 ms)                                                                                                                                                                                                                                                                                                                                                             |
| Minimum switching current | Relay output R1, R2, R3 : 5 mA at 24 V DC                                                                                                                                                                                                                                                                                                                                                                  |
| Maximum switching current | Relay output R1, R2, R3 on resistive load ( $\cos \phi = 1$ ) : 3 A at 250 V AC<br>Relay output R1, R2, R3 on resistive load ( $\cos \phi = 1$ ) : 3 A at 30 V DC<br>Relay output R1, R2, R3 on inductive load ( $\cos \phi = 0.4$ and L/R = 7 ms) : 2 A at 250 V AC<br>Relay output R1, R2, R3 on inductive load ( $\cos \phi = 0.4$ and L/R = 7 ms) : 2 A at 30 V DC                                     |
| Isolation                 | Between power and control terminals                                                                                                                                                                                                                                                                                                                                                                        |
| Insulation resistance     | $>$ 1 mOhm at 500 V DC for 1 minute to earth                                                                                                                                                                                                                                                                                                                                                               |
| Operating position        | Vertical $\pm$ 10 degree                                                                                                                                                                                                                                                                                                                                                                                   |
| Relative humidity         | 5...95 % without condensation conforming to IEC 60068-2-3                                                                                                                                                                                                                                                                                                                                                  |

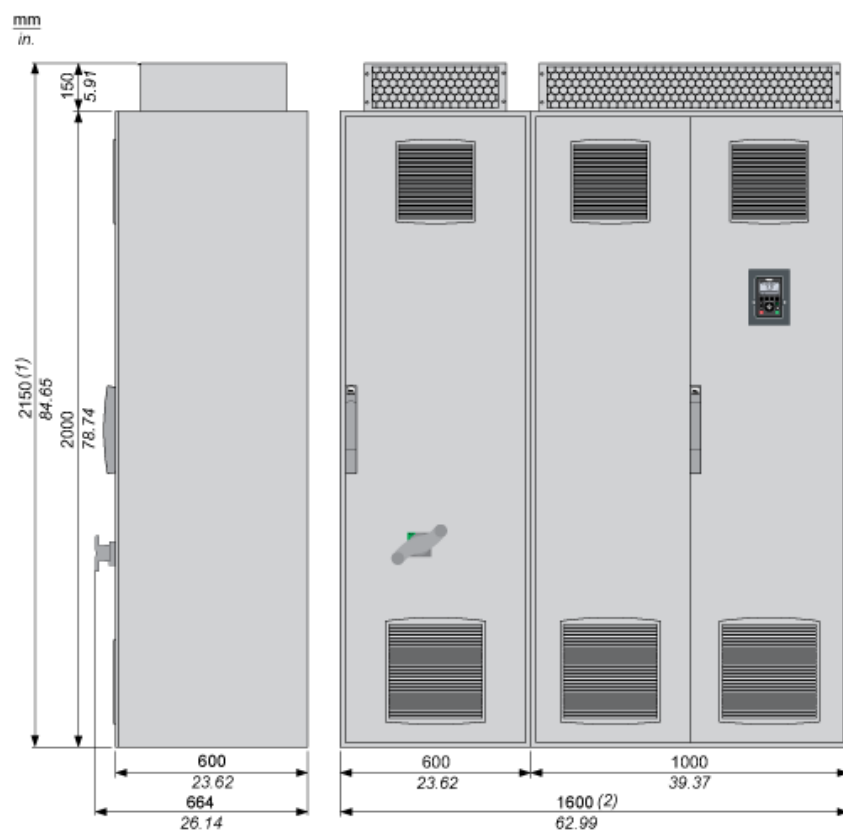
## Environment

|                                       |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
|---------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Noise level                           | 75 dB conforming to 86/188/EEC - physical agents (noise) directive                                                                                                                                                                                                                                                                                                                                                                                                              |
| EMC filter                            | Integrated conforming to EN/IEC 61800-3, category C3, shielded cable with 150 m motor cable maxi<br>Integrated conforming to EN/IEC 61800-3, category C4, unshielded cable with 250 m motor cable maxi                                                                                                                                                                                                                                                                          |
| Pollution degree                      | 2 EN/IEC 61800-5-1                                                                                                                                                                                                                                                                                                                                                                                                                                                              |
| Electromagnetic compatibility         | 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>Electrical fast transient/burst immunity test level 4 conforming to IEC 61000-4-4<br>1.2/50 $\mu$ s - 8/20 $\mu$ s 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                                      |
| Vibration resistance                  | 1.5 mm peak to peak (f = 3...10 Hz) conforming to IEC 60068-2-6<br>0.6 gn (f = 10...200 Hz) conforming to IEC 60068-2-6<br>3M3 conforming to IEC 60721-3-3                                                                                                                                                                                                                                                                                                                      |
| Shock resistance                      | 4 gn during 11 ms conforming to IEC 60068-2-27<br>3M2 conforming to IEC 60721-3-3                                                                                                                                                                                                                                                                                                                                                                                               |
| Ambient air temperature for operation | -10...0 °C without derating with option enclosure heating<br>0...40 °C without derating<br>40...50 °C with derating factor                                                                                                                                                                                                                                                                                                                                                      |
| Ambient air temperature for storage   | -25...70 °C                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
| Operating altitude                    | $\leq$ 1000 m without derating<br>1000...2000 m with current derating 1 % per 100 m<br>2000...3800 m with current derating 1 % per 100 m for TT earthing system<br>2000...3800 m with current derating 1 % per 100 m for TN earthing system<br>2000...3800 m with current derating 1 % per 100 m for IT earthing system<br>3800...4800 m with current derating 1 % per 100 m for TT earthing system<br>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<br>Dust pollution resistance class 3S3 conforming to EN/IEC 60721-3-3<br>Humidity resistant class 3K3 conforming to EN/IEC 60721-3-3                                                                                                                                                                                                                                                                     |
| Standards                             | EN/IEC 60204-1<br>EN/IEC 61800-3<br>EN/IEC 61800-5-1<br>EN/IEC 61800-2                                                                                                                                                                                                                                                                                                                                                                                                          |
| Product certifications                | ATEX<br>C-Tick<br>EAC                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
| Marking                               | CE                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |

## Offer Sustainability

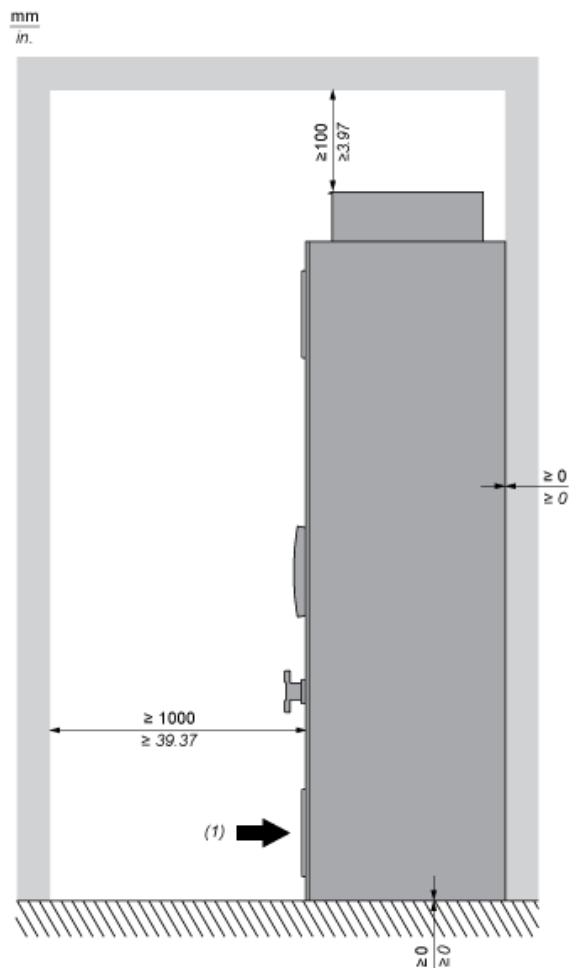
|                                  |                                                                                       |
|----------------------------------|---------------------------------------------------------------------------------------|
| Sustainable offer status         | Green Premium product                                                                 |
| RoHS (date code: YYWW)           | Compliant - since 1601 - <a href="#">Schneider Electric declaration of conformity</a> |
| REACH                            | Reference not containing SVHC above the threshold                                     |
| Product environmental profile    | Available <a href="#">Download Product Environmental</a>                              |
| Product end of life instructions | Available <a href="#">Download End Of Life Manual</a>                                 |

## Dimensions



- (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.

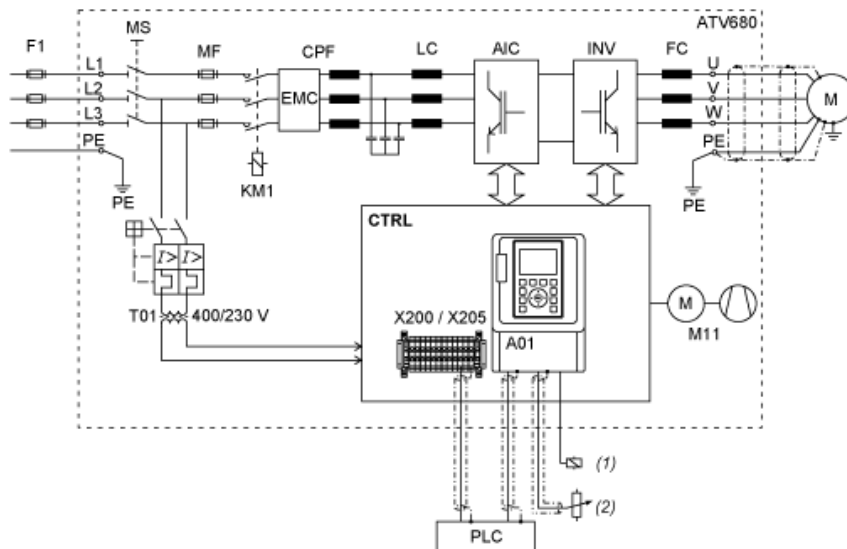
## Mounting and Clearance



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

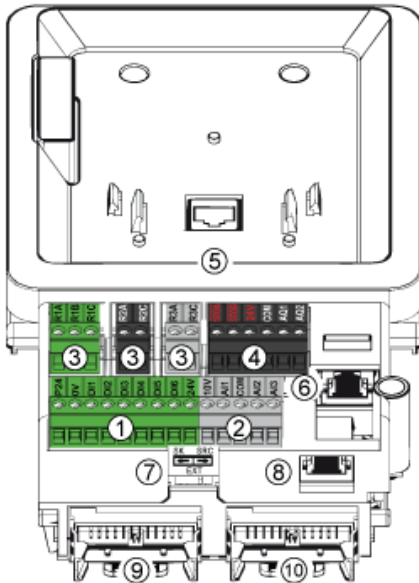
- Mount the device in a vertical position ( $\pm 10^\circ$ )
- Do not mount the device close to heat sources
- Leave sufficient free space so that the air required for cooling purposes can circulate from the bottom to the top of the drive

## Typical Wiring Diagram of the Frequency Inverter



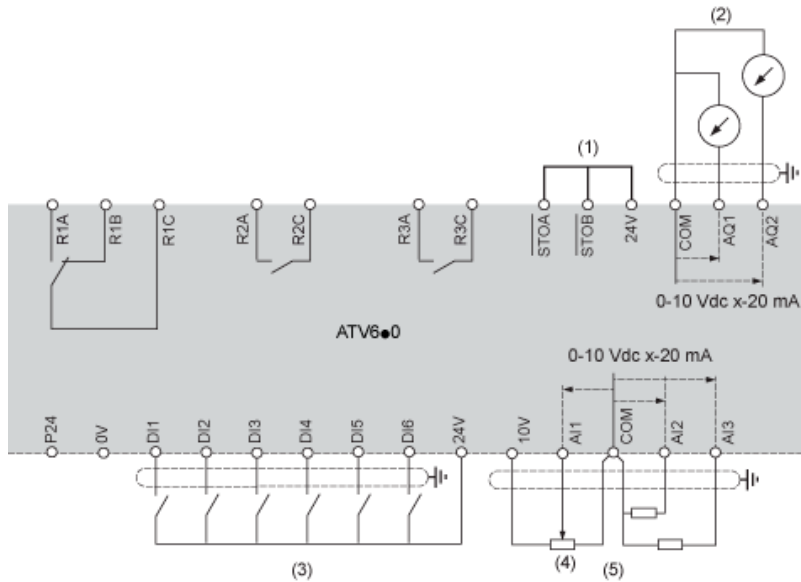
- F1 : External pre-fuse or circuit breaker
- MS : Built-in main switch
- T01 : Control transformer 400 / 230 V AC
- MF : aR fuses
- CPF : Clean Power Filter with integrated EMC filter
- LC : Line reactor Chokes
- AIC : Active Infeed Converter module
- INV : Inverter module
- FC : dv/dt filter (from 200 kW the dv/dt filter choke 150 m is built-in as standard)
- CTRL : Control panel
- A01 : Control terminals at the control block
- X200 : Control terminals at the control panel (depending on the chosen options)
- X205 :
- M11 : Fan in enclosure door
- KM1 : Line contactor
- (1) : Relay control
- (2) : Reference value

## Structure of the Control Block



- (1) Digital inputs
- (2) Analog inputs
- (3) Relay outputs
- (4) STO (Safe Torque Off) and analog outputs
- (5) RJ45 port for door mounting kit of the graphic keypad
- (6) RJ45 port for Ethernet IP or Modbus TCP
- (7) Sink-Ext-Source selector switch (see switch configuration below)
- (8) RJ45 port for serial Modbus
- (9) Slot for I/O expansion card
- (10) Slot for fieldbus or I/O expansion card

## Control Block Wiring Diagram

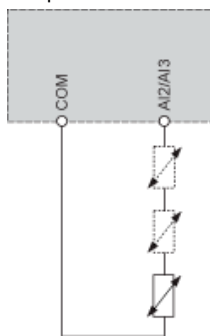


- (1) Safe Torque Off
- (2) Analog Output
- (3) Digital Input
- (4) Reference potentiometer
- (5) Analog Input
- A1 : ATV6.. Drive
- R1A, Fault relay
- R1B,
- R1C :
- R2A, Sequence relay
- R2C :
- R3A, Sequence relay
- R3C :



## Sensor Connection

It is possible to connect either 1 or 3 sensors on terminals AI2 or AI3.

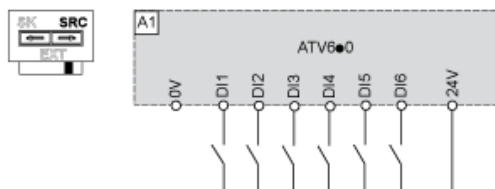


## Sink / Source Switch Configuration

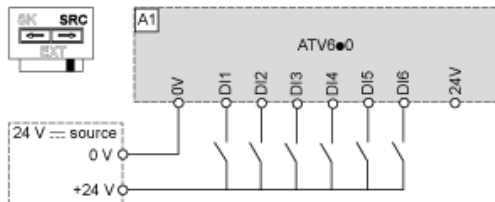
The switch is used to adapt the operation of the logic inputs to the technology of the programmable controller outputs.

- 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.

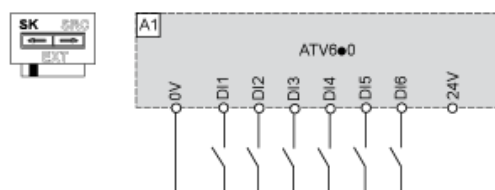
### Switch Set to SRC (Source) Position Using the Output Power Supply for the Digital Inputs



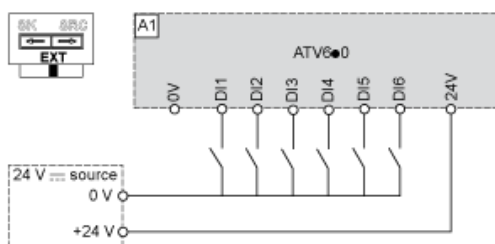
### Switch Set to SRC (Source) Position and Use of an External Power Supply for the DIs



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

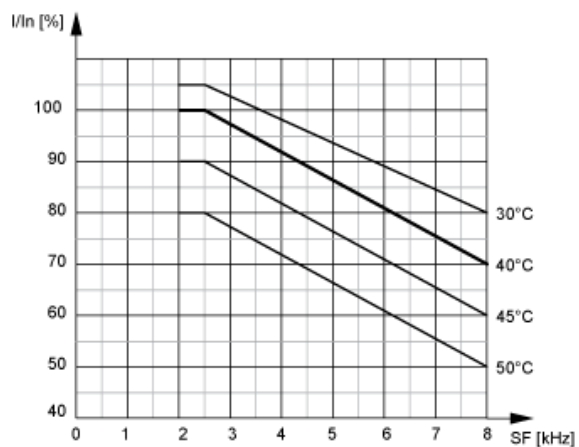


### Switch Set to EXT Position Using an External Power Supply for the DIs



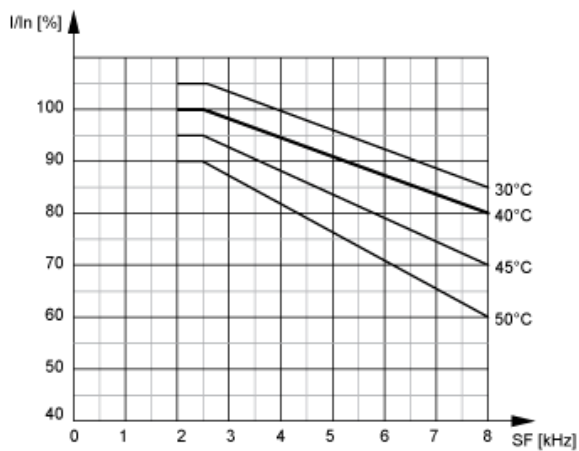
## Derating Curves

### Normal Duty



$I_n$  : Nominal Drive Current  
SF : Switching Frequency

### Heavy Duty



$I_n$  : Nominal Drive Current  
SF : Switching Frequency