

ATV950C16N4F

floor standing drive - ATV950 - 160kW - 400/440V-
w/o braking unit - IP54



Main

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|------------------------------------|--|
| Range of product | Altivar Process ATV900 |
| Product or component type | Variable speed drive |
| Device application | Industrial application |
| Device short name | ATV950 |
| Variant | With load break switch Without braking chopper |
| Product destination | Asynchronous motors Synchronous motors |
| Mounting mode | Floor-standing |
| EMC filter | Integrated conforming to EN/IEC 61800-3 category C3 |
| IP degree of protection | IP54 conforming to IEC 61800-5-1 IP54 conforming to IEC 60529 |
| Type of cooling | Forced convection |
| Supply frequency | 50...60 Hz (+/- 5 %) |
| Network number of phases | 3 phases |
| [Us] rated supply voltage | 380...440 V (- 15...10 %) |
| Motor power kW | 160 kW (normal duty) 132 kW (heavy duty) |
| Line current | 277 A at 400 V (normal duty) 232 A at 400 V (heavy duty) 291 A at 380 V (normal duty) 244 A at 380 V (heavy duty) |
| Prospective line I _{sc} | 50 kA |
| Apparent power | 192 kVA at 400 V (normal duty) 161 kVA at 400 V (heavy duty) |
| Continuous output current | 302 A at 2.5 kHz (normal duty) 250 A at 2.5 kHz (heavy duty) |
| Maximum transient current | 375 A during 60 s (heavy duty) 362 A during 60 s (normal duty) |
| Asynchronous motor control profile | Constant torque standard Variable torque standard Optimized torque mode |
| Synchronous motor control profile | Permanent magnet motor |
| Speed drive output frequency | 0.1...599 Hz |
| Nominal switching frequency | 2.5 kHz |
| Switching frequency | 2...8 kHz adjustable 2.5...8 kHz with derating factor |
| Safety function | STO (safe torque off) SIL 3 |
| Discrete input logic | 16 preset speeds |
| Communication port protocol | Ethernet/IP Modbus serial Modbus TCP |
| Option card | Slot A : communication module for Profibus DP V1 Slot A : communication module for Profinet Slot A : communication module for DeviceNet Slot A : communication module for CANopen daisy chain RJ45 Slot A : communication module for CANopen SUB-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 |

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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

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| Output voltage | <= power supply voltage |
| Motor slip compensation | Adjustable Automatic whatever the load Can be suppressed 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 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 of output voltage Drive : short-circuit protection Drive : motor phase break Drive : overvoltages on the DC bus Drive : line supply overvoltage Drive : line supply undervoltage Drive : line supply phase loss Drive : overspeed Drive : break on the control circuit |
| Frequency resolution | Display unit : 0.1 Hz Analog input : 0.012/50 Hz |
| Electrical connection | Line side, M12 bar Motor, M12 bar Control, removable screw terminals : 0.5...1.5 mm ² |
| Motor recommended cable cross section | 1 x (3 x 185 mm ²) (normal duty) 2 x (3 x 95 mm ²) (normal duty) 1 x (3 x 150 mm ²) (heavy duty) 2 x (3 x 70 mm ²) (heavy duty) |
| Cable composition | 2 x (3 x 70 mm ²) (heavy duty) 1 x (3 x 185 mm ²) (normal duty) 1 x (3 x 185 mm ²) (heavy duty) 2 x (3 x 95 mm ²) (normal duty) |
| Connector type | 2 RJ45 (on the control block) for Ethernet IP/Modbus TCP 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 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) Internal supply for reference potentiometer (1 to 10 kOhm) : 10.5 V DC +/- 5 % current <= 10 mA (overload and short-circuit protection) 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 5 dual colour LED for embedded communication status 2 dual colour LED for communication module status 1 red LED for presence of voltage |
| Width | 400 mm |
| Height | 2350 mm |
| Depth | 669 mm |

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| Product weight | 310 kg |
| Analogue input number | 3 |
| Analogue input type | Software-configurable voltage AI1, AI2, AI3 : 0...10 V DC impedance 30 kOhm, resolution 12 bits Software-configurable current AI1, AI2, AI3 : 0...20 mA/4...20 mA impedance 250 Ohm, resolution 12 bits |
| Discrete input number | 10 |
| Discrete input type | Programmable DI1...DI8 : 24 V DC (≤ 30 V) impedance 3.5 kOhm Programmable as pulse input DI7, DI8 0...30 kHz : 24 V DC (≤ 30 V) Safe torque off STOA, STOB : 24 V DC (≤ 30 V) impedance > 2.2 kOhm |
| Input compatibility | Discrete input STOA, STOB : level 1 PLC conforming to EN/IEC 61131-2 Discrete input DI1...DI8 : level 1 PLC conforming to EN/IEC 61131-2 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) DI1...DI8, DI1...DI8 negative logic (sink) : > 16 V (state 0) < 10 V (state 1) DI7, DI8, DI7, DI8 positive logic (source) : < 0.6 V (state 0) > 2.5 V (state 1) 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 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 (≤ 30 V) DC, < 100 mA Programmable as pulse output DQ+ : 0...30 kHz (≤ 30 V) DC, < 20 mA Logic output DQ- : 0...1 kHz (≤ 30 V) DC, < 100 mA |
| Sampling duration | Discrete input DI1...DI8 : 2 ms (+/- 0.5 ms) Pulse input DI7, DI8 : 5 ms (+/- 1 ms) Analog input AI1, AI2, AI3 : 1 ms (+/- 1 ms) Analog output AQ1, AQ2 : 5 ms (+/- 1 ms) |
| Accuracy | Analog input AI1, AI2, AI3 : +/- 0.6 % for a temperature variation 60 °C Analog output AQ1, AQ2 : +/- 1 % for a temperature variation 60 °C |
| Linearity error | Analog input AI1, AI2, AI3 : +/- 0.15 % of maximum value 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 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 inductive load ($\cos \phi = 0.4$ and $L/R = 7$ ms) : 2 A at 250 V AC Relay output R2, R3 on inductive load ($\cos \phi = 0.4$ and $L/R = 7$ ms) : 2 A at 30 V DC Relay output 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 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 number | 3 |
| Relay output type | Configurable relay logic R1 : fault relay NO/NC electrical durability 100000 cycles Configurable relay logic R2 : sequence relay NO electrical durability 1000000 cycles Configurable relay logic R3 : sequence relay NO electrical durability 1000000 cycles |
| Refresh time | Relay output R1, R2, R3 : 5 ms (+/- 0.5 ms) |
| Minimum switching current | Relay output R1, R2, R3 : 5 mA at 24 V DC |
| Isolation | Between power and control terminals |
| Specific application | Process |
| IP degree of protection | IP54 |

Environment

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|-------------------------------|---|
| insulation resistance | > 1 mOhm at 500 V DC for 1 minute to earth |
| noise level | 69 dB conforming to 86/188/EEC |
| power dissipation in W | 3120 W switching frequency 2.5 kHz (normal duty) 4030 W switching frequency 2.5 kHz (heavy duty) |
| vibration resistance | 1 gn ($f = 13...200$ Hz) conforming to IEC 60068-2-6 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 |
| volume of cooling air | 720 m ³ /h |
| operating position | Vertical +/- 10 degree |
| THDI | ≤ 48 % full load conforming to IEC 61000-3-12 |
| electromagnetic compatibility | 1.2/50 μ s - 8/20 μ s surge immunity test level 3 conforming to IEC 61000-4-5 |

Electrical fast transient/burst immunity test level 4 conforming to IEC 61000-4-4
 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
 Conducted radio-frequency immunity test level 3 conforming to IEC 61000-4-6

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

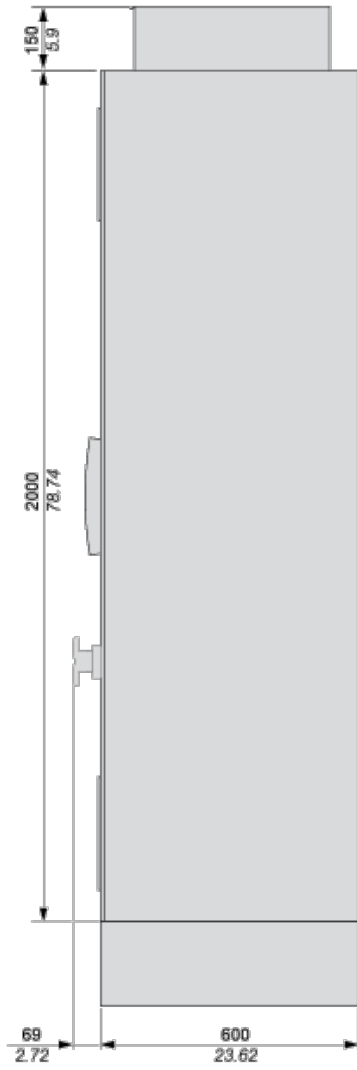
Offer Sustainability

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|----------------------------------|---|
| Sustainable offer status | Green Premium product |
| RoHS (date code: YYWW) | Compliant - since 1601 - Schneider Electric declaration of conformity |
| REACH | Reference not containing SVHC above the threshold |
| Product environmental profile | Available |
| Product end of life instructions | Available |

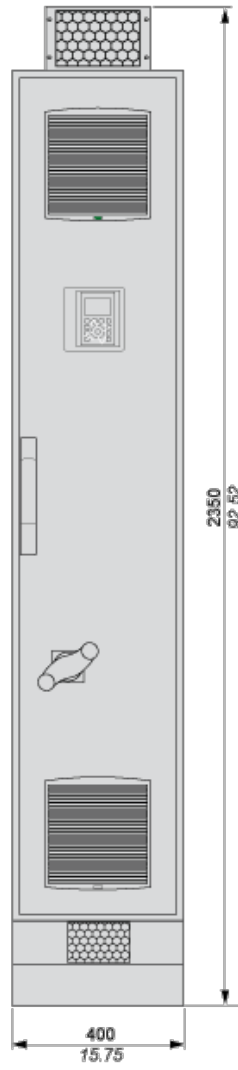
Dimensions

Right and Front View

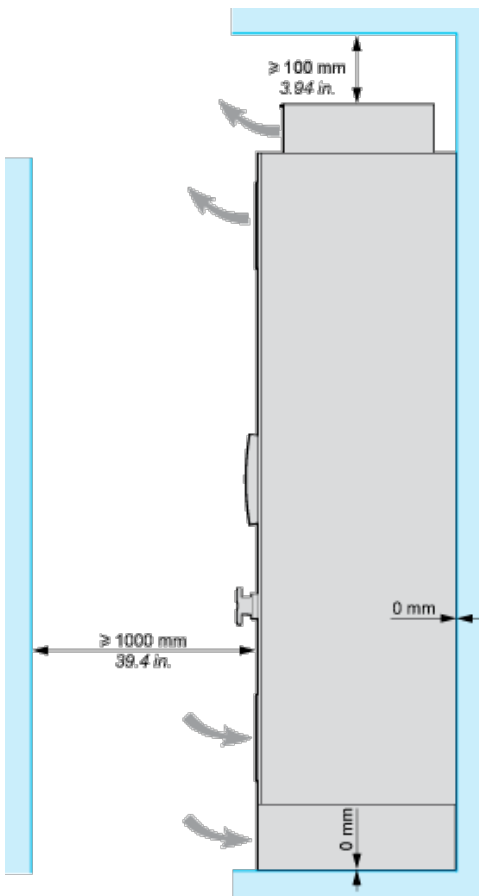
mm
in.



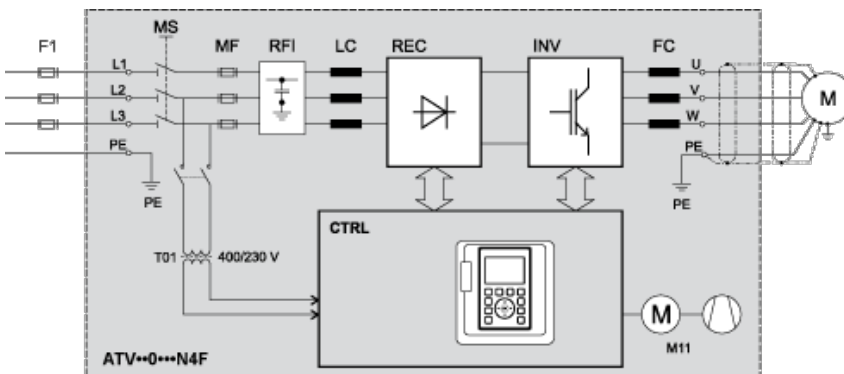
mm
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Clearances

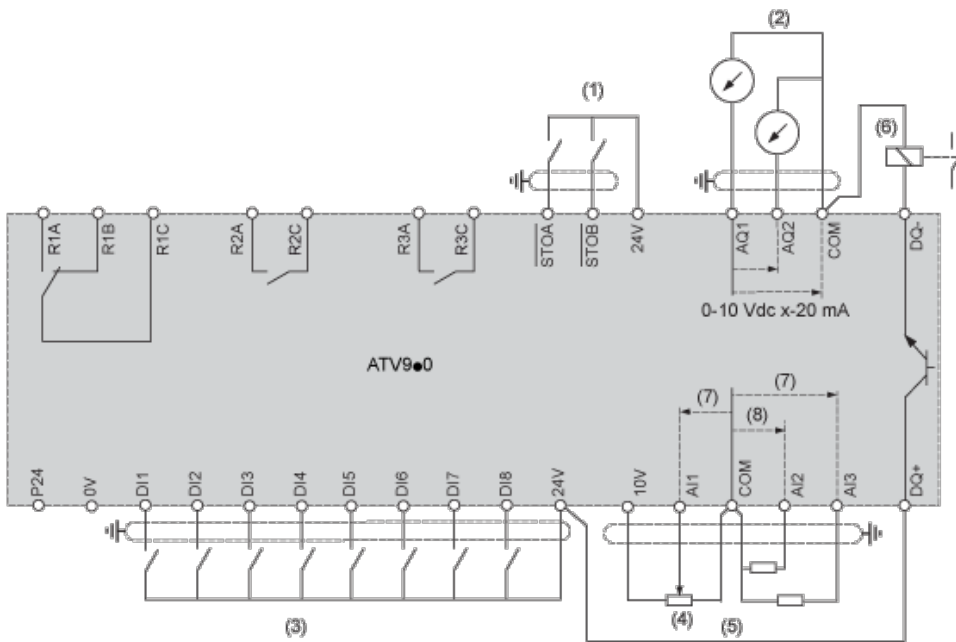


Floor Standing Drive Circuit Diagram



- F1 External pre-fuse or circuit breaker
- MS Built-in main switch (only available on IP54 drives)
- T01 Control transformer 400 / 230 V AC
- MF aR fuses
- RFI Built-in RFI filter
- LC Line reactor choke
- REC Rectifier module
- INV Inverter module
- FC dv/dt filter (from 355 kW the dv/dt filter choke 150 m is built-in as standard)
- CTRL Control panel
- M11 Fan in enclosure door

Control Block Wiring Diagram



- (1) Safe Torque Off
- (2) Analog Output
- (3) Digital Input
- (4) Reference potentiometer
- (5) Analog Input
- (6) Digital Output
- (7) 0-10 Vdc, x-20 mA
- (8) 0-10 Vdc, -10 Vdc...+10 Vdc

R1A, Fault relay

R1B,

R1C :

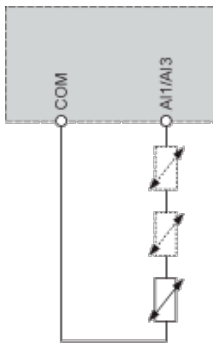
R2A, Sequence relay

R2C :

R3A, Sequence relay

R3C :

Sensor Connection



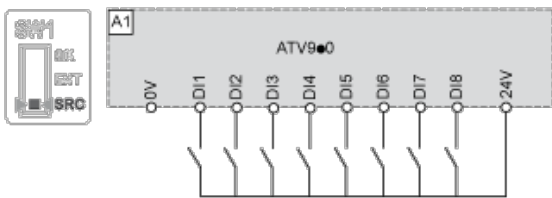
It is possible to connect either 1 or 3 sensors on terminals AI1 or AI3

Sink / Source Switch Configuration

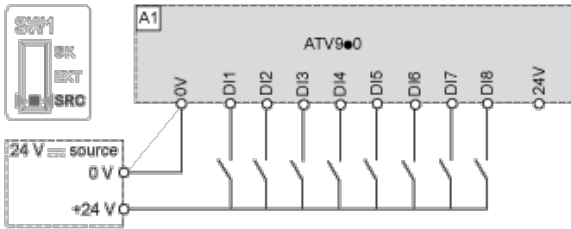
The switch is used to adapt the operation of the logic inputs to the technology of the programmable controller outputs.

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

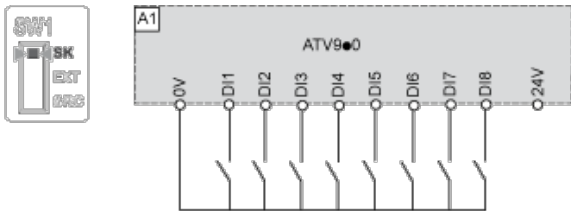
Switch Set to SRC (Source) Position Using the Output Power Supply for the Digital Inputs



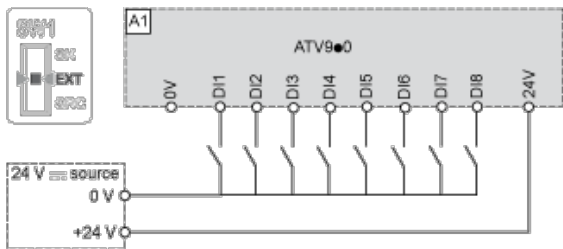
Switch Set to SRC (Source) Position and Use of an External Power Supply for the DIs



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

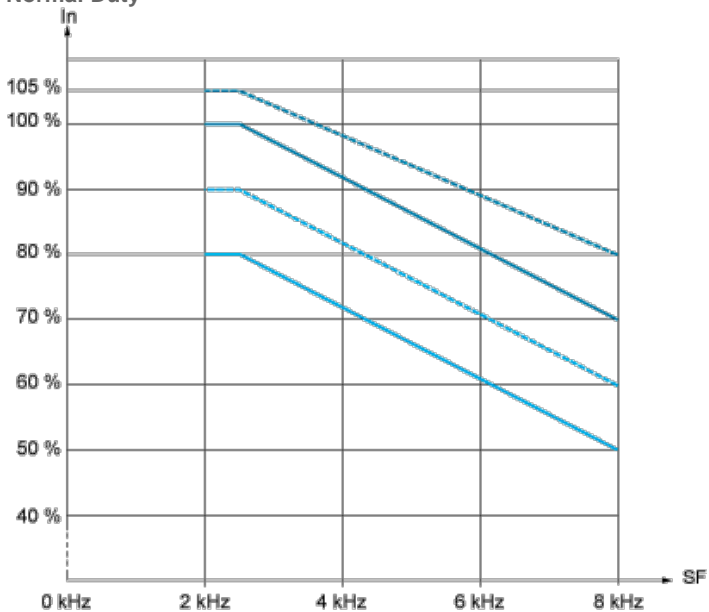


Switch Set to EXT Position Using an External Power Supply for the DIs



Derating Curves

Normal Duty



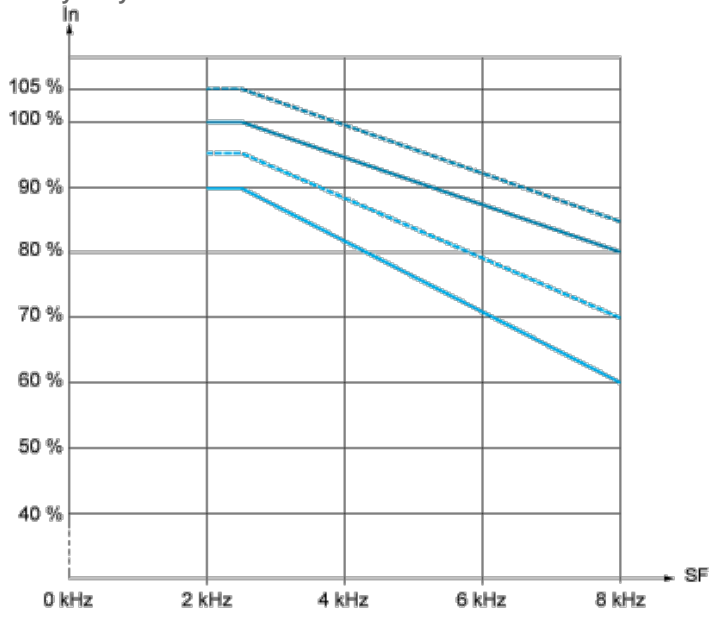
- 30 °C (86 °F)
- 40 °C (104 °F)
- 45 °C (122 °F)
- 50 °C (140 °F)

In : Nominal Drive Current

SF : Switching Frequency

Derating Curves

Heavy Duty



----- 30 °C (86 °F)

———— 40 °C (104 °F)

----- 45 °C (122 °F)

———— 50 °C (140 °F)

In : Nominal Drive Current

SF : Switching Frequency