

ATV950C13N4F

Variable speed drive, Altivar Process ATV900, floor standing ATV950, 132 kW, 400/440 V, w/o braking unit, IP54



Main

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| Device application | Industrial application |
| Device short name | ATV950 |
| Product destination | Asynchronous motors Synchronous motors |
| 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 |
| Motor power kW | 132 kW (normal duty) 110 kW (heavy duty) |
| Line current | 232 A at 400 V (normal duty) 197 A at 400 V (heavy duty) 250 A at 380 V (normal duty) 207 A at 380 V (heavy duty) |
| Continuous output current | 250 A at 2.5 kHz for normal duty 211 A at 2.5 kHz for heavy duty |
| Maximum transient current | 300 A during 60 s (normal duty) 317 A during 60 s (heavy duty) |
| Speed drive output frequency | 0.1...599 Hz |
| Safety function | STO (safe torque off) SIL 3 |
| Option module | 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 EtherCAT 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/slot B/slot C: digital and analog I/O extension module |

Disclaimer: This documentation is not intended as a substitute for and is not to be used for determining suitability or reliability of these products for specific user applications

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
 communication module for Ethernet Powerlink

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| Range of product | Altivar Process ATV900 |
| Product or component type | Variable speed drive |
| Variant | With load break switch Without braking chopper |
| Mounting mode | Floor-standing |
| Communication port protocol | Modbus TCP EtherNet/IP Modbus serial |
| [Us] rated supply voltage | 380...440 V - 15...10 % |
| IP degree of protection | IP54 |

Complementary

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| Output voltage | <= power supply voltage |
| Frequency resolution | Display unit: 0.1 Hz Analog input: 0.012/50 Hz |
| Electrical connection | Control: removable screw terminals 0.5...1.5 mm ² Line side: M12 bar Motor: M12 bar |
| Motor recommended cable cross section | 1 x (3 x 150 mm ²) (normal duty) 2 x (3 x 70 mm ²) (normal duty) 1 x (3 x 120 mm ²) (heavy duty) 2 x (3 x 50 mm ²) (heavy duty) |
| Main supply recommended cable cross section | 2 x (3 x 70 mm ²) (normal duty) 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) |
| 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 |
| Type of polarization | No impedance for Modbus serial |
| Number of addresses | 1...247 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 reference potentiometer (1 to 10 kOhm): 10.5 V DC +/- 5 %, <10 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 |
| Local signalling | Local diagnostic: 3 LED (mono/dual colour) Embedded communication status: 5 LED (dual colour) Communication module status: 2 LED (dual colour) Presence of voltage: 1 LED (red) |
| 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 |

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| | +/- 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 |
| Variable speed drive application selection | Mixer Food and beverage processing Conveyor Food and beverage processing Shredder Food and beverage processing Process crane Hoisting Thruster Marine Winch Marine Press Material working (wood, ceramic, stone, pvc, metal) Extruder Material working (wood, ceramic, stone, pvc, metal) Other application Mining mineral and metal Drilling rig Oil and gas Progressive cavity pump Oil and gas Rod pump Oil and gas Swapping pump Oil and gas Compressor for regasification Oil and gas Separator Oil and gas Other application Oil and gas Separator Water and waste water |
| Power range | 110...220 kW at 380...440 V 3 phases |
| 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 (<= 30 V) STOA, STOB safe torque off, 24 V DC (<= 30 V), impedance: > 2.2 kOhm |
| Number of preset speeds | 16 preset speeds |
| 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 |
| 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/4...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 | Optimized torque mode Constant torque standard Variable torque standard |
| Synchronous motor control profile | Permanent magnet motor Synchronous reluctance motor |
| Acceleration and deceleration ramps | Linear adjustable separately from 0.01...9999 s |
| Motor slip compensation | Not available in permanent magnet motor law Automatic whatever the load Can be suppressed Adjustable |
| Switching frequency | 2.5...8 kHz with derating factor 2...8 kHz adjustable |

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| Nominal switching frequency | 2.5 kHz |
| Braking to standstill | By DC injection |
| Apparent power | 161 kVA at 400 V (normal duty) 136 kVA at 400 V (heavy duty) |
| Prospective line I _{sc} | 50 kA |
| Power dissipation in W | 3150 W, switching frequency 2.5 kHz (normal duty) 2520 W, switching frequency 2.5 kHz (heavy duty) |
| Protection type | Thermal protection: motor Safe torque off: motor Motor phase break: motor 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: drive |
| Width | 400 mm |
| Height | 2350 mm |
| Depth | 669 mm |
| Product weight | 310 kg |

Environment

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| Insulation resistance | > 1 MOhm 500 V DC for 1 minute to earth |
| Noise level | 69 dB conforming to 86/188/EEC |
| Vibration resistance | 1.5 mm peak to peak (f= 2...13 Hz) conforming to IEC 60068-2-6 1 gn (f= 13...200 Hz) conforming to IEC 60068-2-6 |
| Shock resistance | 15 gn for 11 ms conforming to IEC 60068-2-27 |
| 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 |
| Pollution degree | 2 conforming to EN/IEC 61800-5-1 |
| 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) |
| Standards | UL 508C EN/IEC 61800-3 Environment 2 category C3 EN/IEC 61800-3 EN/IEC 61800-5-1 IEC 61000-3-12 IEC 60721-3 IEC 61508 IEC 13849-1 |
| Operating altitude | <= 1000 m without derating 1000...4800 m with current derating 1 % per 100 m |
| Operating position | Vertical +/- 10 degree |
| Product certifications | TÜV CSA |
| Marking | CE |
| Maximum THDI | <48 % full load conforming to IEC 61000-3-12 |
| 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 |
| Volume of cooling air | 720 m ³ /h |
| Ambient air temperature for storage | -40...70 °C |

Packing Units

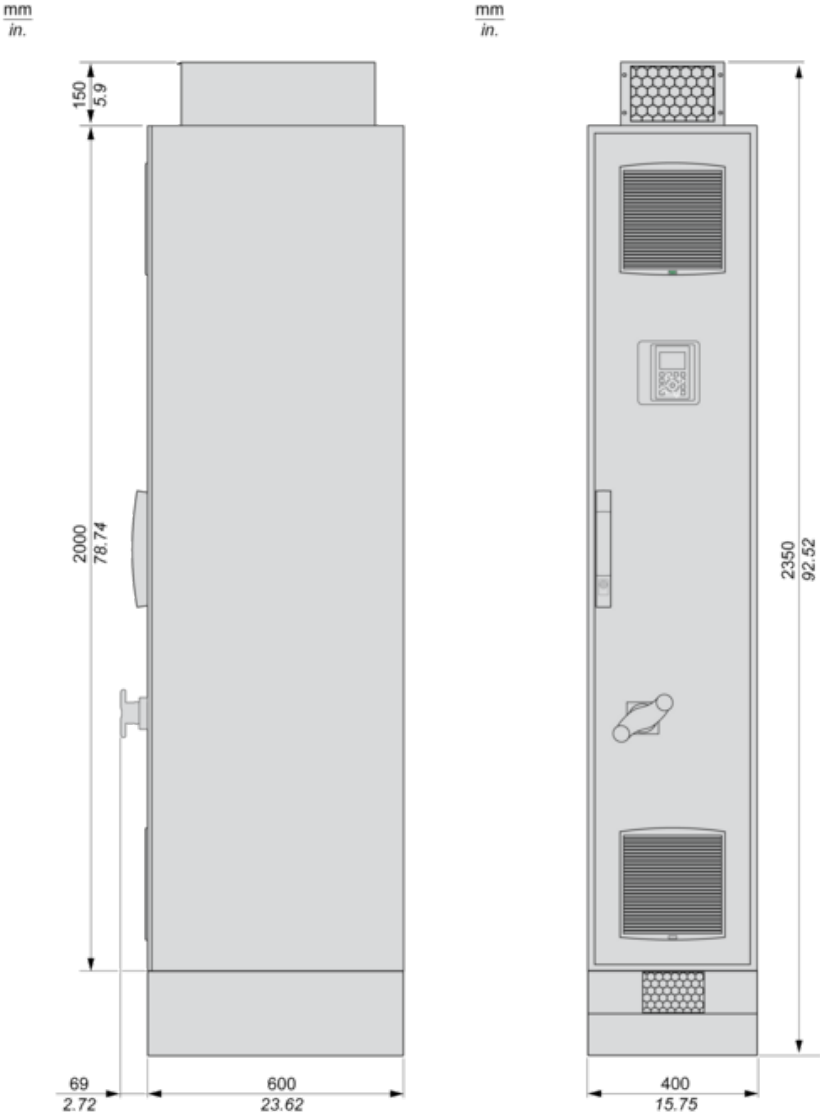
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|------------------------------|----------|
| Unit Type of Package 1 | PCE |
| Number of Units in Package 1 | 1 |
| Package 1 Weight | 400 kg |
| Package 1 Height | 238.5 cm |
| Package 1 width | 120 cm |
| Package 1 Length | 110 cm |

Offer Sustainability

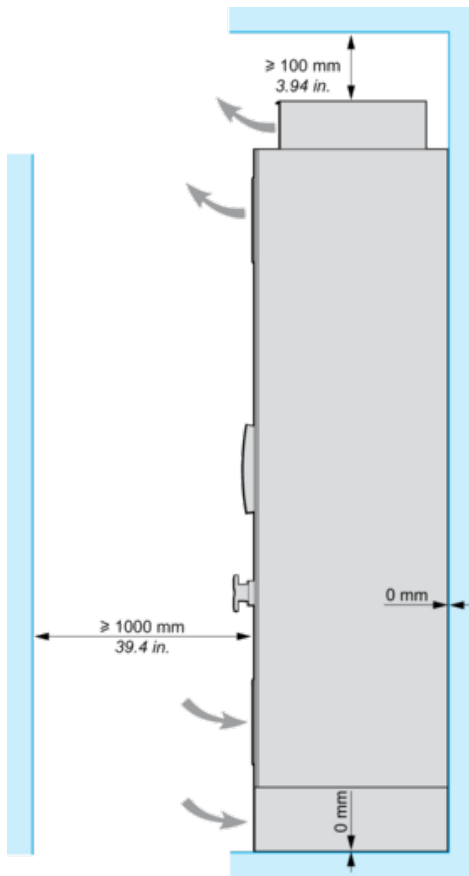
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| Sustainable offer status | Green Premium product |
| REACH Regulation | REACH Declaration |
| EU RoHS Directive | Pro-active compliance (Product out of EU RoHS legal scope) EU RoHS Declaration |
| Mercury free | Yes |
| RoHS exemption information | Yes |
| China RoHS Regulation | China RoHS declaration |
| Environmental Disclosure | Product Environmental Profile |
| Circularity Profile | End of Life Information |
| 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 |

Dimensions

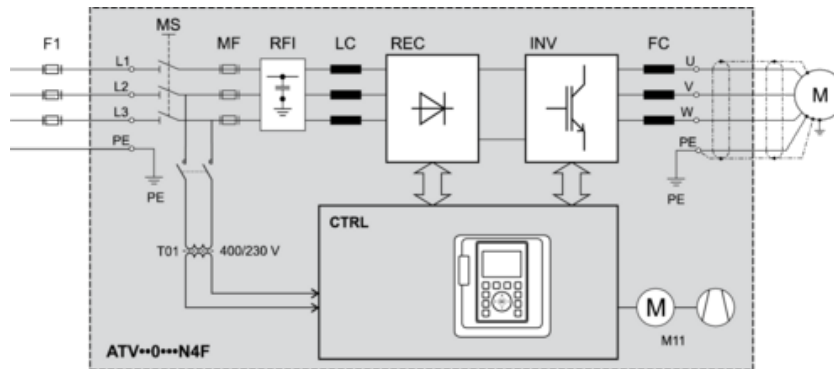
Right and Front View



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

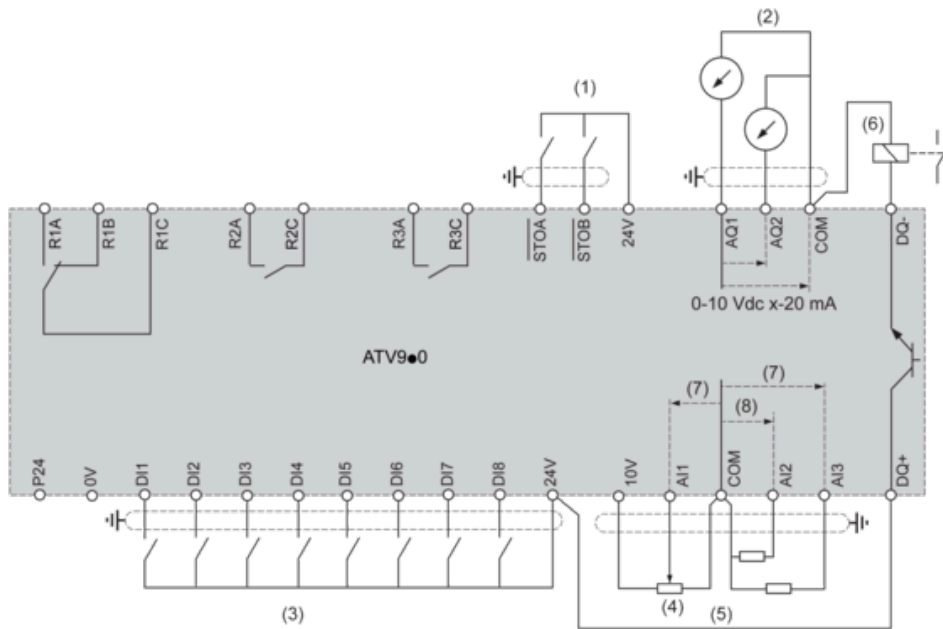
INV Inverter module

FC dv/dt filter (from 355 kW the dv/dt filter choke 150 m is built-in as standard)

CTRL Control panel

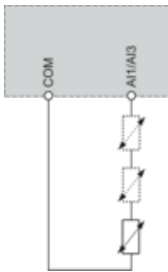
M11 Fan in enclosure door

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

Sensor Connection



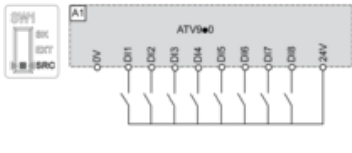
It is possible to connect either 1 or 3 sensors on terminals AI1 or AI3

Sink / Source Switch Configuration

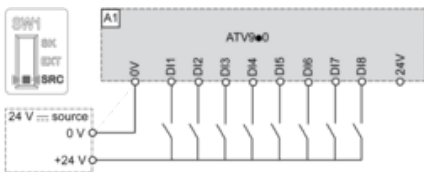
The switch is used to adapt the operation of the logic inputs to the technology of the programmable controller outputs.

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

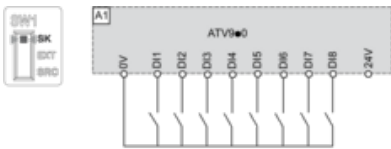
Switch Set to SRC (Source) Position Using the Output Power Supply for the Digital Inputs



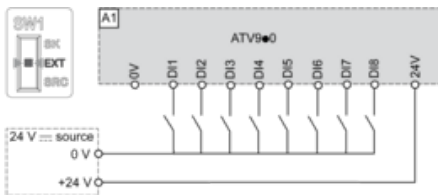
Switch Set to SRC (Source) Position and Use of an External Power Supply for the DIs



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

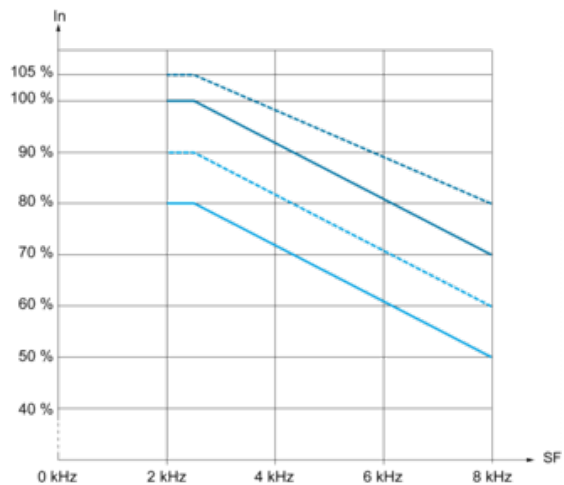


Switch Set to EXT Position Using an External Power Supply for the DIs



Derating Curves

Normal Duty

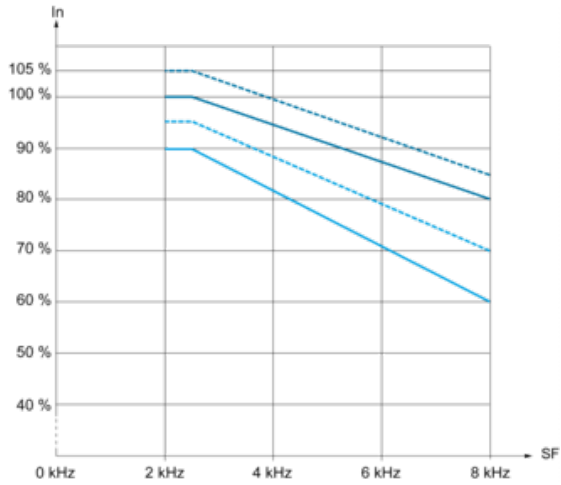


- 30 °C (86 °F)
- 40 °C (104 °F)
- 45 °C (122 °F)
- 50 °C (140 °F)

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