

# ATV950C20N4F

floor standing drive - ATV950 - 200kW - 400/440V-  
w/o braking unit - IP54



## Main

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	200 kW (normal duty) 160 kW (heavy duty)
Line current	349 A at 400 V (normal duty) 286 A at 400 V (heavy duty) 369 A at 380 V (normal duty) 302 A at 380 V (heavy duty)
Prospective line I <sub>sc</sub>	50 kA
Apparent power	242 kVA at 400 V (normal duty) 198 kVA at 400 V (heavy duty)
Continuous output current	370 A at 2.5 kHz (normal duty) 302 A at 2.5 kHz (heavy duty)
Maximum transient current	453 A during 60 s (heavy duty) 444 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

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 <sup>2</sup>
Motor recommended cable cross section	2 x (3 x 120 mm <sup>2</sup> ) (normal duty) 3 x (3 x 70 mm <sup>2</sup> ) (normal duty) 1 x (3 x 185 mm <sup>2</sup> ) (heavy duty) 2 x (3 x 95 mm <sup>2</sup> ) (heavy duty)
Cable composition	2 x (3 x 120 mm <sup>2</sup> ) (normal duty) 3 x (3 x 70 mm <sup>2</sup> ) (normal duty) 2 x (3 x 95 mm <sup>2</sup> ) (heavy 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	600 mm
Height	2350 mm
Depth	669 mm
Product weight	420 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 ( $\leq 30$ V) impedance 3.5 kOhm Programmable as pulse input DI7, DI8 0...30 kHz : 24 V DC ( $\leq 30$ V) Safe torque off STOA, STOB : 24 V DC ( $\leq 30$ V) impedance $> 2.2$ kOhm
Input compatibility	Discrete input STOA, STOB : level 1 PLC conforming to EN/IEC 61131-2 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 ( $\leq 30$ V) DC, $< 100$ mA Programmable as pulse output DQ+ : 0...30 kHz ( $\leq 30$ V) DC, $< 20$ mA Logic output DQ- : 0...1 kHz ( $\leq 30$ 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

insulation resistance	$> 1$ mOhm at 500 V DC for 1 minute to earth
noise level	70 dB conforming to 86/188/EEC
power dissipation in W	4380 W switching frequency 2.5 kHz (normal duty) 3380 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	1300 m <sup>3</sup> /h
operating position	Vertical +/- 10 degree
THDI	$\leq 48$ % full load conforming to IEC 61000-3-12
electromagnetic compatibility	1.2/50 $\mu$ s - 8/20 $\mu$ s surge immunity test level 3 conforming to IEC 61000-4-5 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

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

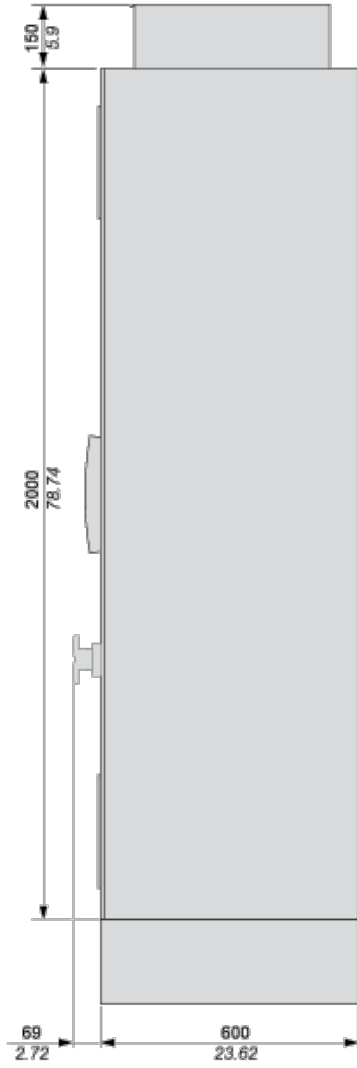
### Offer Sustainability

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

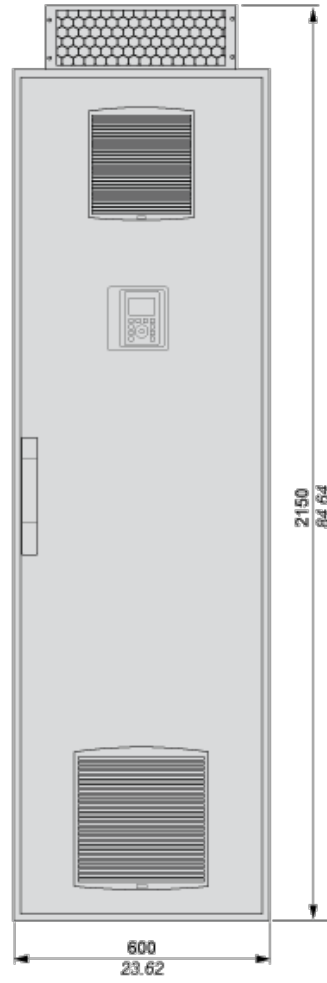
### Dimensions

Right and Front View

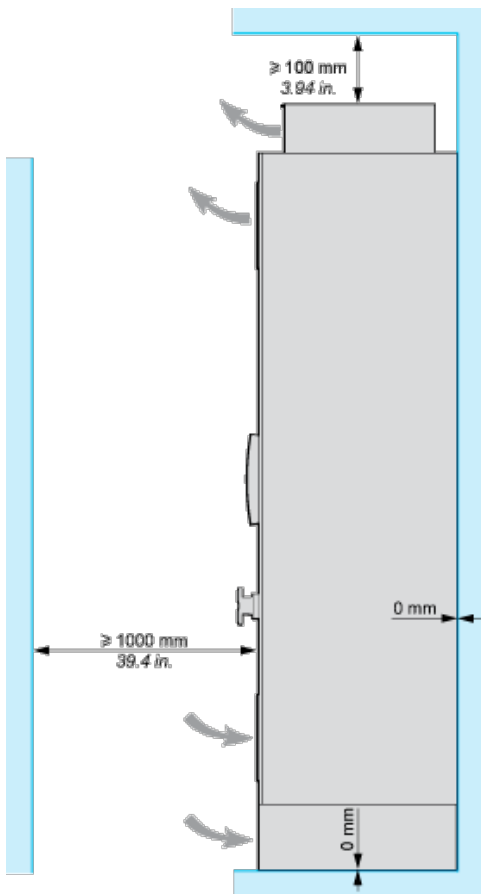
mm  
in.



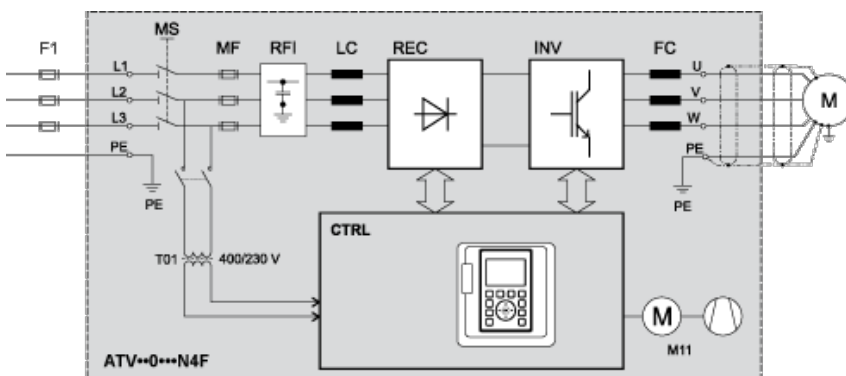
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## Clearances

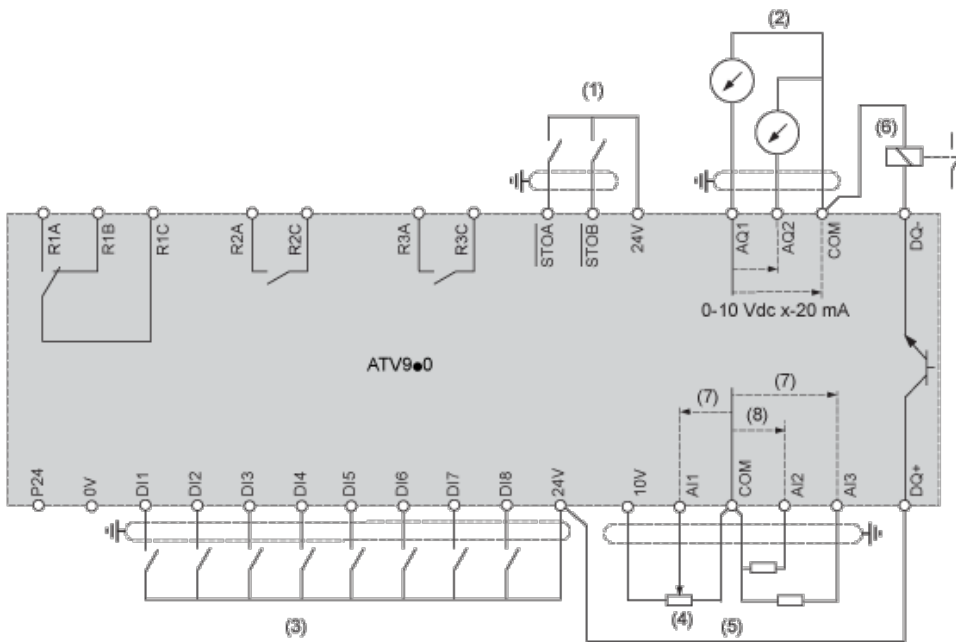


### Floor Standing Drive Circuit Diagram



- 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 :

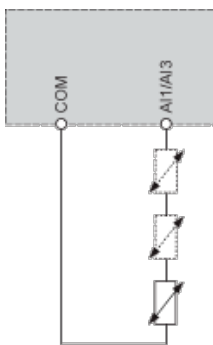
R2A, Sequence relay

R2C :

R3A, Sequence relay

R3C :

### Sensor Connection



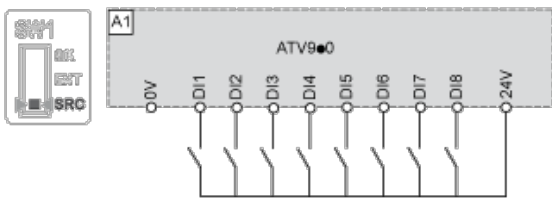
It is possible to connect either 1 or 3 sensors on terminals AI1 or AI3

### Sink / Source Switch Configuration

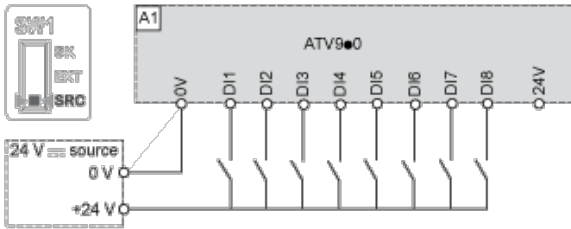
The switch is used to adapt the operation of the logic inputs to the technology of the programmable controller outputs.

- ▮ 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.

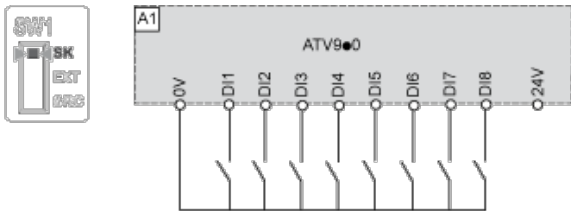
### Switch Set to SRC (Source) Position Using the Output Power Supply for the Digital Inputs



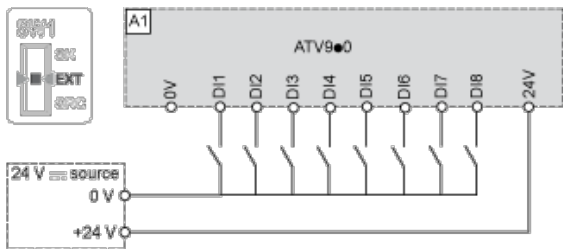
Switch Set to SRC (Source) Position and Use of an External Power Supply for the DIs



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

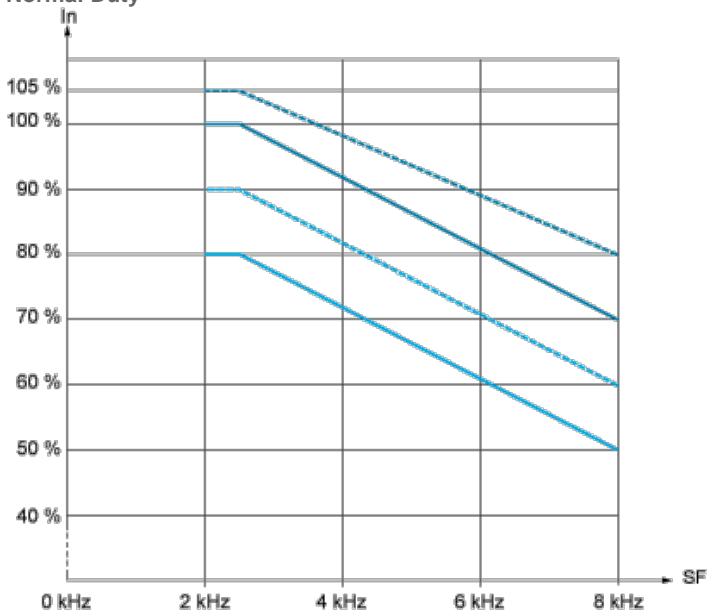


Switch Set to EXT Position Using an External Power Supply for the DIs



## Derating Curves

Normal Duty



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

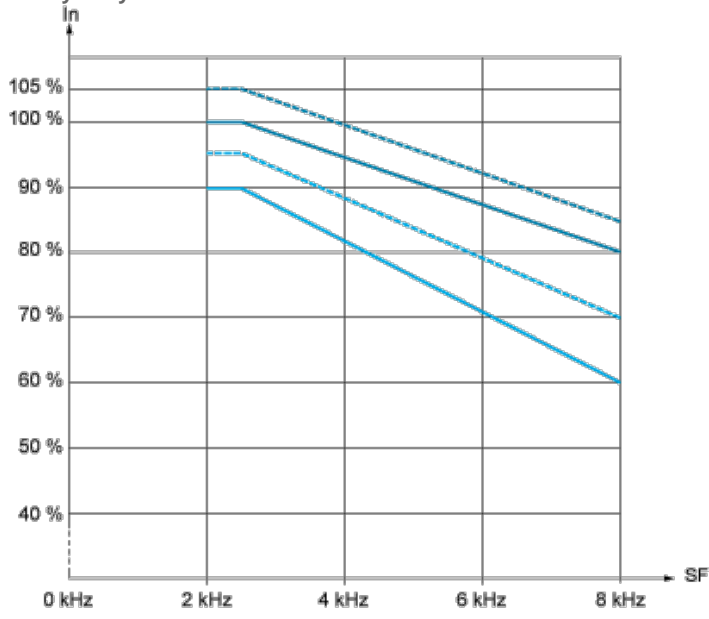


In : Nominal Drive Current

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