

# Product data sheet

Specifications



## enclosed variable speed drive ATV71 Plus - 800 kW - 500V - IP54

ATV71EXA5C80N

⚠ To be discontinued on: 31 December 2023

⚠ To be end-of-service on: 31 December 2031

⚠ To be discontinued

### Main

|                              |                                                                                                                                                                                                                                                                    |
|------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Range of product             | Altivar 71 Plus                                                                                                                                                                                                                                                    |
| Product or component type    | Variable speed drive                                                                                                                                                                                                                                               |
| Device short name            | ATV71 Plus                                                                                                                                                                                                                                                         |
| Product destination          | Synchronous motors<br>Asynchronous motors                                                                                                                                                                                                                          |
| Product specific application | Complex, high-power machines                                                                                                                                                                                                                                       |
| Assembly style               | With integrated cooling circuit<br>In floor-standing enclosure with separate air flows                                                                                                                                                                             |
| Product composition          | A switch and fast-acting fuses<br>A wired ready-assembled Sarel Spacial 6000 enclosure<br>An IP65 remote mounting kit for graphic display terminal<br>Integrated drive system ATV71EM10YE1<br>Control transformer for 230 V<br>Terminals/bars for motor connection |
| EMC filter                   | Integrated                                                                                                                                                                                                                                                         |
| Network number of phases     | 3 phases                                                                                                                                                                                                                                                           |
| Rated supply voltage         | 500...525 V +/- 10 %                                                                                                                                                                                                                                               |
| Supply voltage limits        | 450...578 V                                                                                                                                                                                                                                                        |
| Supply frequency             | 50...60 Hz +/- 5 %                                                                                                                                                                                                                                                 |
| Network frequency            | 47.5...63 Hz                                                                                                                                                                                                                                                       |
| Motor power kW               | 800 kW, 3 phases at 500 V                                                                                                                                                                                                                                          |
| Line current                 | 1083 A for 500 V / 800 kW                                                                                                                                                                                                                                          |

### Complementary

|                                  |                                                                          |
|----------------------------------|--------------------------------------------------------------------------|
| Apparent power                   | 938 kVA for 500 V / 800 kW                                               |
| Prospective line I <sub>sc</sub> | 100 kA with external fuses                                               |
| Continuous output current        | 1100 A at 2.5 kHz, 500 V / 800 kW                                        |
| Maximum transient current        | 1650 A for 60 s / 800 kW                                                 |
| Speed drive output frequency     | 0.1...500 Hz                                                             |
| Nominal switching frequency      | 2.5 kHz                                                                  |
| Switching frequency              | 2...4.9 kHz adjustable<br>2.5...4.9 kHz with derating factor             |
| Speed range                      | 1...100 for asynchronous motor in open-loop mode, without speed feedback |

|                                       |                                                                                                                                                                                                                                                                                                                                                                                                                                              |
|---------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                                       | 1...50 for synchronous motor in open-loop mode, without speed feedback<br>1...1000 for asynchronous motor in closed-loop mode with encoder feedback                                                                                                                                                                                                                                                                                          |
| Speed accuracy                        | +/- 0.01 % of nominal speed in closed-loop mode with encoder feedback 0.2 T <sub>n</sub> to T <sub>n</sub><br>+/- 10 % of nominal slip without speed feedback 0.2 T <sub>n</sub> to T <sub>n</sub>                                                                                                                                                                                                                                           |
| Torque accuracy                       | +/- 5 % in closed-loop mode with encoder feedback<br>+/- 15 % in open-loop mode, without speed feedback                                                                                                                                                                                                                                                                                                                                      |
| Transient overtorque                  | 170 % of nominal motor torque for 60 s<br>220 % of nominal motor torque for 2 s                                                                                                                                                                                                                                                                                                                                                              |
| Braking torque                        | 30 % without braking resistor<br><= 150 % with braking or hoist resistor                                                                                                                                                                                                                                                                                                                                                                     |
| Asynchronous motor control profile    | Voltage/frequency ratio, 2 points<br>Flux vector control without sensor, 2 points<br>Flux vector control without sensor, standard<br>Voltage/frequency ratio - Energy Saving, quadratic U/f<br>Voltage/frequency ratio, 5 points<br>Flux vector control without sensor, ENA (energy Adaptation) system<br>Flux vector control with sensor, standard                                                                                          |
| Synchronous motor control profile     | Vector control without sensor, standard<br>Vector control with sensor, standard                                                                                                                                                                                                                                                                                                                                                              |
| Regulation loop                       | Adjustable PI regulator                                                                                                                                                                                                                                                                                                                                                                                                                      |
| Motor slip compensation               | Adjustable<br>Automatic whatever the load<br>Not available in voltage/frequency ratio (2 or 5 points)<br>Suppressable                                                                                                                                                                                                                                                                                                                        |
| Overvoltage category                  | Class 3 conforming to EN 50178                                                                                                                                                                                                                                                                                                                                                                                                               |
| Local signalling                      | LCD display unit for operation function, status and configuration - mounted in the front door                                                                                                                                                                                                                                                                                                                                                |
| Output voltage                        | <= supply voltage                                                                                                                                                                                                                                                                                                                                                                                                                            |
| Isolation                             | Electrical between power and control                                                                                                                                                                                                                                                                                                                                                                                                         |
| Type of cable for external connection | IEC cable at 40 °C, copper 70 °C / PVC<br>UL 508 cable at 40 °C, copper 75 °C / PVC                                                                                                                                                                                                                                                                                                                                                          |
| Electrical connection                 | Bar M12 - 10 x 240 mm <sup>2</sup> (L1/R, L2/S, L3/T) bottom entry at 6-pulse operation<br>Bar M12 - 4 x 240 mm <sup>2</sup> (L1/R, L2/S, L3/T) bottom entry at 12-pulse operation<br>Bar M12 - 16 x 240 mm <sup>2</sup> (U/T1, V/T2, W/T3) bottom entry<br>Terminal - 2.5 mm <sup>2</sup> / AWG 14 (R1A, R1B, R1C, R2A, R2B) bottom entry<br>Screw clamp terminals - 1.5 mm <sup>2</sup> (AI1-/AI1+, AI2, AO1, LI1...LI6, PWR) bottom entry |
| Motor recommended cable cross section | 4 (3 x 240) mm <sup>2</sup><br>5 (3 x 185) mm <sup>2</sup>                                                                                                                                                                                                                                                                                                                                                                                   |
| Short-circuit protection              | 1600 A fuse protection type gI - power supply upstream - at 6-pulse operation<br>800 A fuse protection type gI - power supply upstream - at 12-pulse operation                                                                                                                                                                                                                                                                               |
| Supply                                | External supply: 24 V DC (19...30 V), <1 A<br>Internal supply for reference potentiometer: 10 V DC (10...11 V), <10 mA<br>Internal supply: 24 V DC (21...27 V), <100 mA                                                                                                                                                                                                                                                                      |
| Analogue input number                 | 2                                                                                                                                                                                                                                                                                                                                                                                                                                            |
| Analogue input type                   | AI2 software-configurable voltage: 0...10 V DC, 24 V max, impedance: 30000 Ohm, sampling time: 1.5...2.5 ms, resolution: 11 bits<br>AI1-/AI1+ bipolar differential voltage: +/- 10 V DC, 24 V max, sampling time: 1.5...2.5 ms, resolution: 11 bits + sign<br>AI2 software-configurable current: 0...20 mA/4...20 mA, impedance: 250 Ohm, sampling time: 1.5...2.5 ms, resolution: 11 bits                                                   |
| Analogue output number                | 1                                                                                                                                                                                                                                                                                                                                                                                                                                            |
| Analogue output type                  | Software-configurable voltage: (AO1) 0...10 V DC - 470 Ohm - sampling time: 1.5...2.5 ms - resolution: 10 bits<br>Software-configurable current: (AO1) 0...20 mA/4...20 mA - 500 Ohm - sampling time: 1.5...2.5 ms - resolution: 10 bits                                                                                                                                                                                                     |
| Discrete output number                | 2                                                                                                                                                                                                                                                                                                                                                                                                                                            |
| Discrete output type                  | Configurable relay logic: (R1A, R1B, R1C)NO/NC - 6.5...7.5 ms - 100000 cycles<br>Configurable relay logic: (R2A, R2B)NO - 6.5...7.5 ms - 100000 cycles                                                                                                                                                                                                                                                                                       |
| Minimum switching current             | 3 mA at 24 V DC (configurable relay logic)                                                                                                                                                                                                                                                                                                                                                                                                   |
| Maximum switching current             | 5 A at 250 V AC on resistive load - cos phi = 1 (R1, R2)<br>5 A at 30 V DC on resistive load - L/R = 0 ms (R1, R2)<br>2 A at 250 V AC on inductive load - cos phi = 0.4 (R1, R2)<br>2 A at 30 V DC on inductive load - L/R = 7 ms                                                                                                                                                                                                            |
| Discrete input number                 | 7                                                                                                                                                                                                                                                                                                                                                                                                                                            |

|                                     |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
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| Discrete input type                 | Programmable (LI1...LI5) at 24 V DC <= 30 V level 1 PLC 3.5 kOhm (duration=1.5...2.5 ms)<br>Switch-configurable (LI6) at 24 V DC <= 30 V level 1 PLC 1.5 kOhm (duration=1.5...2.5 ms)<br>Safety input (PWR) at 24 V DC <= 30 V 1.5 kOhm                                                                                                                                                                                                                                                                                                                                                                         |
| Discrete input logic                | Positive logic (source) (LI1...LI5), 0...5 V (state 0), 11...30 V (state 1)<br>Negative logic (sink) (LI1...LI5), 16...30 V (state 0), 0...10 V (state 1)<br>Positive logic (source) (PWR), 0...2 V (state 0), 17...30 V (state 1)                                                                                                                                                                                                                                                                                                                                                                              |
| 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                     | Overheating protection: drive<br>Thermal protection: drive<br>Short-circuit between motor phases: drive<br>Input phase breaks: drive<br>Overcurrent between output phases and earth: drive<br>Overvoltages on the DC bus: drive<br>Break on the control circuit: drive<br>Against exceeding limit speed: drive<br>Line supply undervoltage: drive<br>Line supply overvoltage: drive<br>Against input phase loss: drive<br>Thermal protection: motor<br>Motor phase break: motor<br>Power removal: motor                                                                                                         |
| Dielectric strength                 | 3535 V DC between earth and power terminals<br>5092 V DC between control and power terminals                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |
| Insulation resistance               | > 1 mOhm 500 V DC for 1 minute to earth                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |
| Frequency resolution                | Display unit: 0.1 Hz<br>Analog input: 0.024/50 Hz                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
| Communication port protocol         | CANopen<br>Modbus                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
| Connector type                      | 1 RJ45 (on front face) for Modbus<br>1 RJ45 (on terminal) for Modbus<br>Male SUB-D 9 on RJ45 for CANopen                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |
| Physical interface                  | 2-wire RS 485 for Modbus                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |
| Transmission frame                  | RTU for Modbus                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
| Transmission rate                   | 9600 bps, 19200 bps for Modbus on front face<br>4800 bps, 9600 bps, 19200 bps, 38.4 Kbps for Modbus on terminal<br>20 kbps, 50 kbps, 125 kbps, 250 kbps, 500 kbps, 1 Mbps for CANopen                                                                                                                                                                                                                                                                                                                                                                                                                           |
| Data format                         | 8 bits, 1 stop, even parity for Modbus on front face<br>8 bits, odd even or no configurable parity for Modbus on terminal                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
| Type of polarization                | No impedance for Modbus                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |
| Number of addresses                 | 1...247 for Modbus<br>1...127 for CANopen                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
| Method of access                    | Slave CANopen                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
| Option card                         | Communication card for Modbus TCP/IP<br>Communication card for Fipio<br>Communication card for Modbus/Uni-Telway<br>Communication card for Modbus Plus<br>Communication card for EtherNet/IP<br>Communication card for DeviceNet<br>Communication card for Profibus DP<br>Communication card for Profibus DP V1<br>Communication card for Interbus-S<br>Communication card for CC-Link<br>Basic I/O extension card<br>Extended I/O extension card<br>Controller inside programmable card<br>Encoder interface cards                                                                                             |
| Options for enclosure configuration | Safe standstill for power circuit<br>PTC relay for power circuit<br>Pt100 relay for power circuit<br>Insulation monitoring for power circuit<br>Design for IT networks for power circuit<br>External 230 V supply terminals for power circuit<br>Buffer voltage 24 V DC power supply for power circuit<br>External 24 V DC supply terminals for power circuit<br>Enclosure lighting for power circuit<br>Key switch (local/remote) for power circuit<br>Motor heating for power circuit<br>External motor fan for power circuit<br>Voltmeter for power circuit<br>Door handle for main switch for power circuit |

|  |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |
|--|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|  | Circuit breaker for power circuit<br>Line contactor for power circuit<br>12-pulse supply for power circuit<br>Line reactor for power circuit<br>Ammeter for power circuit<br>Enclosure heating for power circuit<br>Motor choke for power circuit<br>Cable entry via the top for power circuit<br>Enclosure plinth for power circuit<br>Door handle for circuit breaker for power circuit<br>Control terminals for control circuit<br>Adaptor for 115 V logic inputs for control circuit<br>Relay output C/O for control circuit<br>Isolated amplifier for control circuit |
|--|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|

|                             |                        |
|-----------------------------|------------------------|
| Operating position          | Vertical +/- 10 degree |
| Colour of enclosure         | Light grey (RAL 7035)  |
| Colour of base of enclosure | Dark grey (RAL 7022)   |
| Height                      | 2009 mm                |
| Width                       | 1800 mm                |
| Depth                       | 642 mm                 |
| Net weight                  | 950 kg                 |

## Environment

|                                       |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
|---------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 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 µs - 8/20 µs 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<br>Voltage dips and interruptions immunity test conforming to IEC 61000-4-11 |
| Pollution degree                      | 3 conforming to EN/IEC 61800-5-1                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |
| IP degree of protection               | IP54                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
| Vibration resistance                  | 1.5 mm peak to peak (f= 3...10 Hz) conforming to EN/IEC 60068-2-6<br>0.6 gn (f= 10...200 Hz) conforming to EN/IEC 60068-2-6<br>3M3 conforming to EN/IEC 60721-3-3                                                                                                                                                                                                                                                                                                                                             |
| Shock resistance                      | 4 gn for 11 ms conforming to EN/IEC 60068-2-27<br>3M2 conforming to EN/IEC 60721-3-3                                                                                                                                                                                                                                                                                                                                                                                                                          |
| Noise level                           | 77 dB conforming to 86/188/EEC                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
| Environmental characteristic          | Without condensation: 3C2 conforming to IEC 60721-3-3<br>Without condensation: 3S2 conforming to IEC 60721-3-3<br>Without condensation: 3K3 conforming to IEC 60721-3-3                                                                                                                                                                                                                                                                                                                                       |
| Relative humidity                     | 0...95 %                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
| Ambient air temperature for operation | 0...40 °C (without derating)<br>40...50 °C (with current derating of 1.2 % per °C)                                                                                                                                                                                                                                                                                                                                                                                                                            |
| Ambient air temperature for storage   | -25...70 °C                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
| Volume of cooling air                 | 5500 m3/h                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
| Operating altitude                    | <= 1000 m without derating<br>1000...3000 m with current derating 1 % per 100 m                                                                                                                                                                                                                                                                                                                                                                                                                               |
| Standards                             | EN 61800-3 environments 1 category C3<br>EN/IEC 61800-5-1<br>EN/IEC 61800-3<br>EN 61800-3 environments 2 category C3<br>EN 55011 class A group 2                                                                                                                                                                                                                                                                                                                                                              |
| Product certifications                | GOST<br>ATEX                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
| Marking                               | CE                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |

## Packing Units

|                              |     |
|------------------------------|-----|
| Unit Type of Package 1       | PCE |
| Number of Units in Package 1 | 1   |

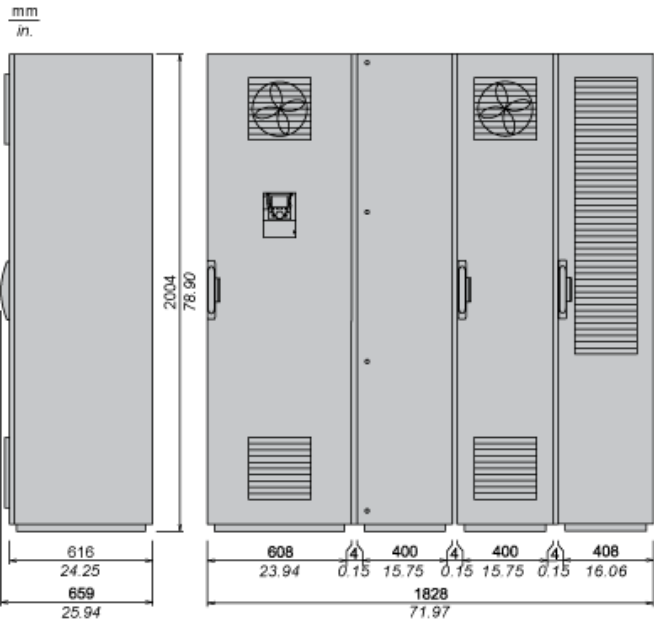
|                              |          |
|------------------------------|----------|
| Package 1 Height             | 200.0 cm |
| Package 1 Width              | 66.0 cm  |
| Package 1 Length             | 183.0 cm |
| Package 1 Weight             | 940.0 kg |
| Unit Type of Package 2       | CAR      |
| Number of Units in Package 2 | 1        |
| Package 2 Height             | 215.0 cm |
| Package 2 Width              | 68.0 cm  |
| Package 2 Length             | 185.0 cm |
| Package 2 Weight             | 940.0 kg |

Contractual warranty

|          |           |
|----------|-----------|
| Warranty | 18 months |
|----------|-----------|

IP 23 Floor-Standing Enclosure with Separate Air Flows

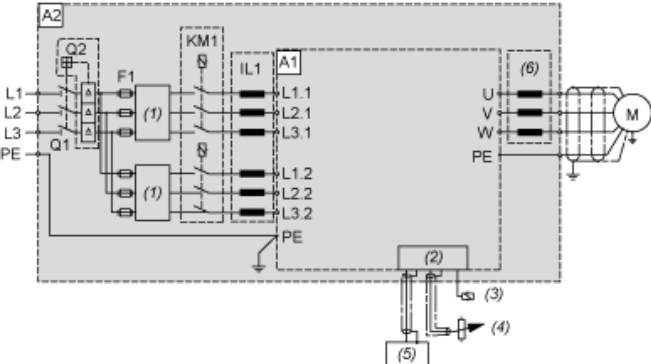
Dimensions



NOTE: For each floor-standing enclosure added, allow a 4 mm/0.15 in. space for the seal.

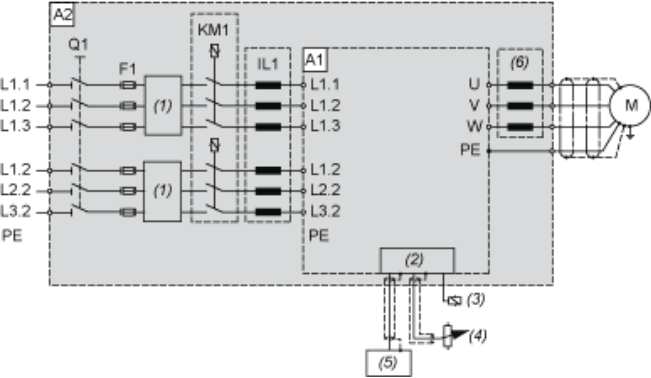
Floor-Standing Enclosure with Separate Air Flows

Standard 6-pulse Design



- A1 Drive
- A2 Enclosure
- F1 Fuses
- IL1 Optional line choke
- KM1 Optional line contactor
- M Motor
- Q1 Switch
- Q2 Optional circuit breaker
- (1) Filter
- (2) Control
- (3) Relay control
- (4) Reference potentiometer
- (5) PLC
- (6) Optional motor choke

Optional 12-pulse Design



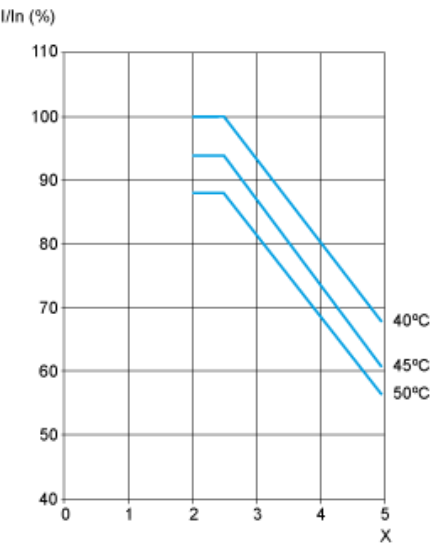
- A1 Drive
- A2 Enclosure
- F1 Fuses
- IL1 Optional line choke
- KM1 Optional line contactor
- M Motor
- Q1 Switch
- (1) Filter
- (2) Control
- (3) Relay control
- (4) Reference potentiometer
- (5) PLC
- (6) Optional motor choke

IP 23 Floor-Standing Enclosure with Separate Air Flows

Derating Curves

The derating curves for the drive nominal current (In) are dependent on the temperature and switching frequency. For intermediate temperatures, interpolate between 2 curves.

NOTE: The drive will reduce the switching frequency automatically in the event of excessive temperature rise.



X Switching frequency (kHz)

NOTE: The temperatures shown correspond to the temperature of the air entering the enclosure.

Recommended replacement(s)