

ACB-3000

Redundancy Static Transfer Switch

GENERAL FEATURES:

Two models: 120V_{ac} and 230V_{ac}, 50Hz

Switching time < 2 ms

Designed for industrial and railway applications according to EN50155:2017 and EN45545-2

Safety according to norm IEC 62368-1

Local signaling by LED

Remote signaling by solid state relays

CANopen BUS port



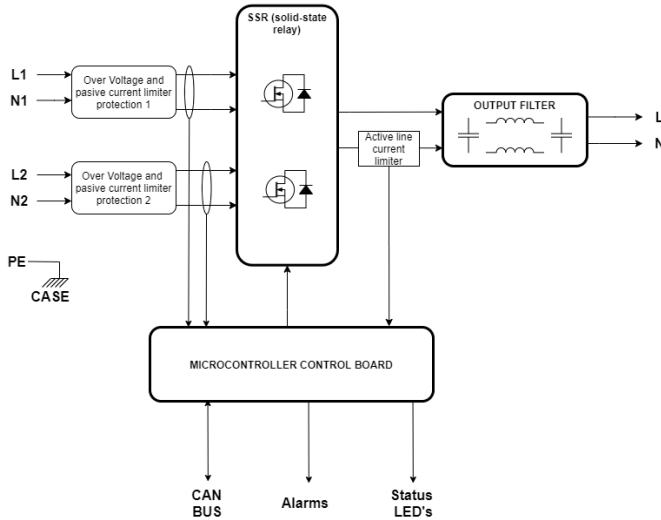
| MODEL | ACB-3000-9431 | | | ACB-3000-9576* | | |
|------------------------|----------------------|----------|----------|-----------------------|----------|----------|
| Voltage lines | 230 V _{ac} | | | 120 V _{ac} | | |
| Suitable for inverters | ODS-750 | ODS-1500 | ODS-3000 | ODS-750 | ODS-1500 | ODS-3000 |

*Product available on request and subject to MOQ

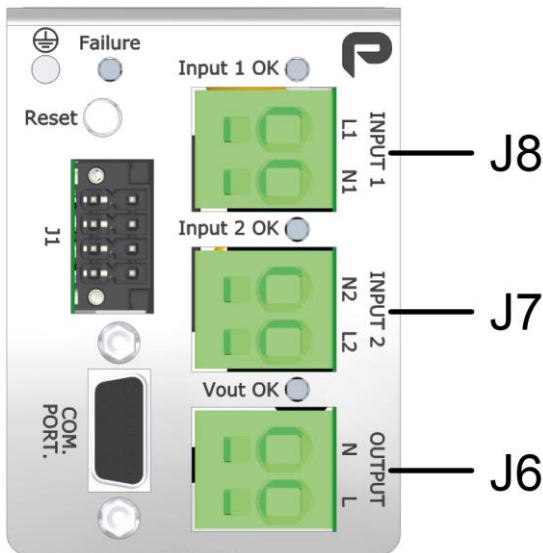


| MODEL | 9431 | 9576 |
|---|--|-----------------------|
| INPUTS | | |
| Nominal AC input voltage | 230 V | 120 V |
| Minimum/Maximum AC input voltage | ±10% of nominal | |
| Efficiency at nominal conditions | >99% | |
| OUTPUT | | |
| Output voltage | 230 V (same as input) | 120 V (same as input) |
| Voltage tolerance | ≤ ±10 % of nominal | |
| Load regulation | -2 V | |
| Line regulation | $V_{input} - 2 V$ | |
| Nominal AC output current | 13 A _{rms} | 21 A _{rms} |
| Maximum peak input current | 22 A _{pk} | 32 A _{pk} |
| DC AUXILIAR (not necessary) | | |
| Nominal DC input voltage | 15 – 139 V _{dc} | |
| ENVIRONMENTAL | | |
| Storage temperature | -40 ... 85 °C | |
| Operating temperature: Full load | -40 ... 55 °C (EN50155 OT2) | |
| Operating temperature: 70 % load | -40 ... 70 °C (EN50155 OT4) | |
| Operating temperature: 50 % load | -40 ... 85 °C (EN50155 OT6) | |
| Cooling | Natural convection | |
| Operating altitude | 2000m at full load, 2500m at 90% of load | |
| Maximum Relative humidity | 95 % with no condensation | |
| Shock and vibration | EN61373:2011 Category 1 class B body mounted | |
| Service life | > 20 years | |
| MTBF | > 1000000 h @ 40 °C according to IEC61709 | |
| EMC | | |
| Emission | EN50121-4 | |
| Immunity | EN50121-4 | |
| SAFETY | | |
| Safety according to norm | IEC 62368-1 | |
| Dielectric strength Input-Output / Earth | 1500 V _{ac} 50 Hz | |
| Dielectric strength DC input / Earth | 1500 V _{ac} 50 Hz | |
| Protection Degree | IP40 | |
| Pollution degree | PD2 | |
| Overvoltage category | OV2 | |
| Fire and smoke | EN45545-2:2013 +A1:2015 | |
| MECHANICAL | | |
| Dimensions | 78,34 x 60 x 200 mm | |
| Weight | 1,2 kg | |
| CONTROL | | |
| Switching response in case of failure | < 2 ms | |
| Input Line 1 OK | Green | |
| Input line 2 OK | Green | |
| Output OK | Green | |
| Failure of the system | Red | |
| Status | Can Bus | |
| PROTECTIONS | | |
| Against output overloads and short-circuits | Current limiting by fuse and active protection of overcurrent with push-in button for system restart after 3 overcurrent situations. | |
| Failure in line 1 | Solid state relay 1 closed if line 1 is OK and opened if it isn't | |
| Failure in line 2 | Solid state relay 2 closed if line 2 is OK and opened if it isn't | |
| Failure in system | Solid state relay 3 closed if all the system is OK and opened if it isn't | |

BLOCKS DIAGRAM



CONNECTIONS



| | | |
|-----------|--|--|
| J8 - 1 | Neutral Input 1 | Spring clamp terminals Maximum cross section cable: 6mm ² |
| J8 - 2 | Line input 1 | |
| J7 - 1 | Line input 2 (priority) | |
| J7 - 2 | Neutral input 2 (priority) | |
| J6 - 1 | Line output | |
| J6 - 2 | Neutral output | |
| J1 - 1 | - Vbat auxiliar | Recommended male connector: Phoenix Contact 1790124 |
| J1 - 2 | + Vbat auxiliar | |
| J1 - 3, 4 | Relay of failure in line 1 | |
| J1 - 5, 6 | Relay of failure in line 2 | |
| J1 - 7, 8 | Relay of failure in system | |
| J4 | CAN-BUS communications | SubD9 |
| Earth | Earth connection | Stud M4 Max. torque 2.5 Nm |
| Reset | Restart of the system in case of 3 overcurrent situation. | Button |

DESCRIPTION

The ACB-3000 is an ultrafast two lines static transfer switch. It selects the appropriate line in case one of them fails.

The unit constantly monitors the evolution of the wave form of both lines. If the selected line goes out the spec, the system is able to change the line in less than 2 ms. It possible thanks to a fully digital control and the power switches used: SiC MOS.

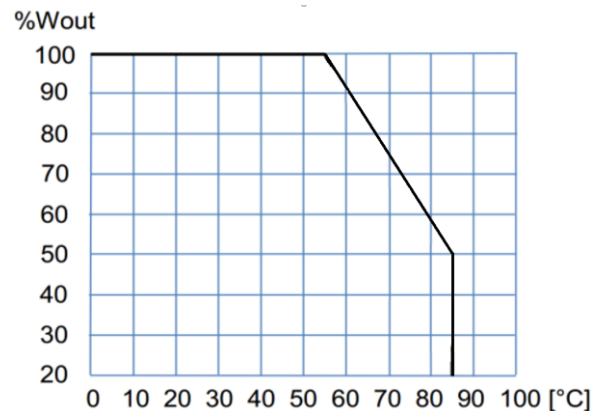
The ACB-3000 is suitable for the Premium ODS-750, ODS-1500 and ODS-3000 inverter families, operating in both industrial and railway environment.

In case of any failure, the unit can signalize it locally, by means of LED, and also remotely by means of a signal solid-state relays and CANopen bus port.

The device is protected against overload and short-circuits by means of a current limiting circuit. When an overcurrent is detected, the failure LED changes to ON and the power switches will be OFF. The unit will attempt to restart every 2 seconds up to 3 times after the overload detection. If the overload persists, the output will remain switched OFF until reset, by pressing the RESET button.

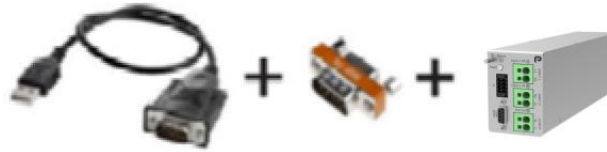
In normal operation, the input line that feeds the output will have its LED blinking. As long as the other input line is properly powered, its LED will be ON. If the output is active, the LED will blink indicating correct function.

POWER DERATING vs AMBIENT TEMP.



CAN Communication port

It is possible to monitor the unit via DSUB9 connector with CAN protocol.



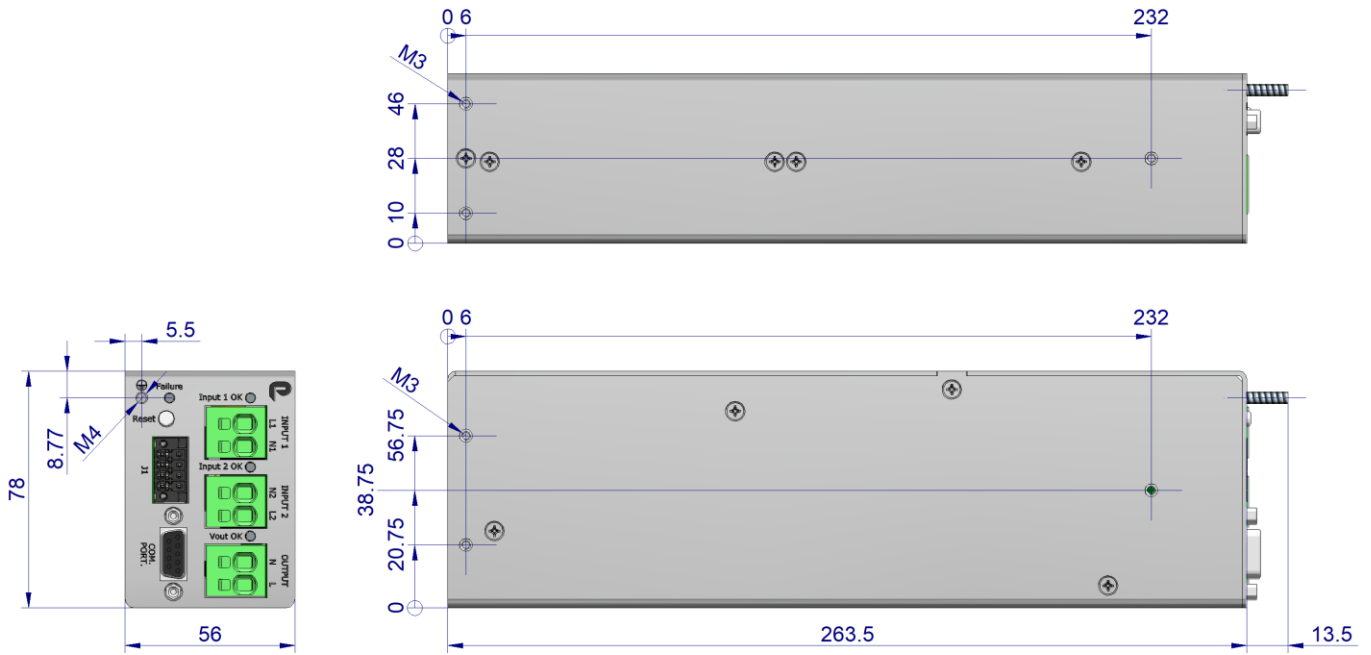
Protocol configuration: By default, CANopen devices start without CANopen Node-ID (0xFF) and baudrate of 250 kbit. Node ID must be set to communicate with the device.

| Standardized Device Profile Area | | | | | |
|----------------------------------|----------|---------------------|--------|-----------|-------|
| Index | SubIndex | Name | Type | Attribute | Notes |
| 6001 | 00 | Active line | UINT8 | ro | |
| 6002 | 00 | State | UINT8 | ro | |
| 6003 | 00 | Number of failures | UINT8 | ro | |
| 6100 | 01 | Input voltage RMS 1 | UINT32 | ro | |
| 6100 | 02 | Input voltage RMS | UINT32 | ro | |
| 6101 | 01 | Input current RMS 1 | UINT32 | ro | |
| 6101 | 02 | Input current RMS | UINT32 | ro | |
| 6102 | 01 | Input frequency 1 | UINT32 | ro | |
| 6102 | 02 | Input frequency 2 | UINT32 | ro | |
| 6103 | 01 | Input state 1 | UINT8 | ro | |
| 6103 | 02 | Input state 2 | UINT8 | ro | |
| 6200 | 00 | Output voltage RMS | UINT32 | ro | |
| 6201 | 00 | Output current RMS | UINT32 | ro | |
| 6202 | 00 | Output freq | UINT32 | ro | |
| 6300 | 00 | Number of startups | UINT32 | ro | |
| 6301 | 00 | Number of hours ON | UINT32 | ro | |

| Communication Profile Area | | | | | |
|----------------------------|----------|-------------------------------|---------------|-----------|-------|
| Index | SubIndex | Name | Type | Attribute | Notes |
| 1001 | 00 | Error register | UINT8 | ro | |
| 1003 | 00 | Number of errors | DYNAMIC_TABLE | rw | |
| 1003 | 01 | Error messages | DYNAMIC_TABLE | ro | |
| 1008 | 00 | Manufacturer device name | ARRAY | ro | |
| 100A | 00 | Manufacturer software version | ARRAY | ro | |
| 1017 | 00 | Producer Heartbeat time | UINT16 | rw | |
| 1029 | 00 | Error behavior object | UINT8 | - | |
| 1018 | 01 | vendor_ID | UINT32 | ro | |
| 1018 | 02 | Product Code | UINT32 | ro | |
| 1018 | 03 | Revision Number | UINT32 | ro | |
| 1018 | 04 | Serial Number | UINT32 | ro | |



DIMENSIONS



Fixing holes 6 x M3 (screw torque < 1.6 Nm). Maximum screw penetration depth 5 mm.
Earth screw M4 (nut torque < 2.5 Nm)

ACCESSORIES

| Description | Notes | CODE |
|--------------------------------|---|---------|
| 2U 19" rack mounting tray kit. | Allows to install an ACB-3000 and up to two inverters | NP-9353 |



ODS-1500



ODS-3000



CE|UK CA EU, UKCA DECLARATION OF CONFORMITY

The undersigned, representing the following:

Manufacturer: PREMIUM, S. A.,
Address: C/ Dolors Aleu 19-21, 08908 L'Hospitalet de Llobregat, SPAIN

herewith declares that the product:

Type: AC/AC bypass
Model: **ACB-3000- 9431 - 9576**

is in conformity with the provisions of the following EU directive(s):

| | |
|---------------------------------|--|
| 2014/35/EU SI 2016 No 1101 | Low voltage / The electrical equipment (safety) regulations |
| 2014/30/EU SI 2016 No 1091 | EMC / Electromagnetic compatibility regulations |
| 2015/863/EU SI 2012 No. 3032 | RoHS / Restriction of the use of certain hazardous substances in electrical and electronic equipment |

and that standards and/or technical specifications referenced below have been applied:

| | |
|---------------------|---|
| EN 60950-1: 2005 | Safety. Information technology equipment |
| EN 62368-1: 2014 | Safety. Audio/video, information and communication technology equipment |
| EN 61000-6-3: 2007 | Generic emission standard |
| EN 61000-6-2: 2005 | Generic immunity standard |
| EN 50155: 2017* | Railway applications. Electronic equipment used on rolling stock material |
| EN 50121-3-2: 2016* | Railway applications. EMC Rolling stock equipment |

* See annexe

CE marking year: **2020**; UKCA marking year: **2021**

Notes:

For the fulfillment of this declaration the product must be used only for the aim that has been conceived, considering the limitations established in the instructions manual or datasheet.

L'Hospitalet de Llobregat, 31-05-2021

Miguel Angel Fernandez
Chief Research & Development Officer

PREMIUM S.A. is an ISO9001 and ISO14001
certified company by **Bureau Veritas**

ANNEXE

| Applicable values for the different sections of the norm EN50155: 2017 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
|--|---|---|---------------------|--------------------------|--------------------|----------------------------|---------------------|--------------------|-------------------------|--------------|--------------------------------|-----------------------|---------------------------------|-----------------------|-----------------|----------------------------|-------------------------|-------------------------|---------------------|----------|--|-----------------|--------------|--------------------------|-------------------------------|--------------------------|------------------------------------|------------------------------------|-------------------------------------|--------------|-------|------|----------------|---|--------|------|--------|------|---|------|-------|--------------|--------------|------|-----------------|---|--------------|------|--------------|--------------|-------|-----|--------------------------|---|--------|-----|--------|-----|---|-----|----------------|--------------|------------|--------|----------------------|---|----------------------|--------------|------------|--------|-----------------|---|
| 4.3.1 | Working altitude | Up to 2000m | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 4.3.2 | Ambient temperature | Class OT1 (-25 to 55°C): load < 100% Class OT3 (-25 to 70°C): load <62.5% Class OT5 (-25 to 85°C): load <25% | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 4.3.3 | Switch-on extended operating temp. | Class ST1 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 4.3.4 | Rapid temperature variations | Class H1 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 4.3.5 | Shocks and vibrations | According EN61373:2010 Category 1 class B | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 4.3.6 | EMC Electromagnetic Compatibility EN50121-3-2:2015 | <table border="1"> <thead> <tr> <th>Test</th> <th>Norm</th> <th>Port</th> <th>Frequency</th> <th>Limits</th> </tr> </thead> <tbody> <tr> <td rowspan="4">Radiated emissions</td> <td rowspan="4">IEC55016</td> <td rowspan="4">Case</td> <td>30MHz...230MHz</td> <td>40dB(μV/m) Qpk at 10m</td> </tr> <tr> <td>230MHz...1GHz</td> <td>47dB(μV/m) Qpk at 10m</td> </tr> <tr> <td>1...3GHz</td> <td>Do not apply</td> </tr> <tr> <td>3...6GHz</td> <td>Internal freq. < 108MHz</td> </tr> <tr> <td rowspan="2">Conducted emissions</td> <td rowspan="2">IEC55016</td> <td rowspan="2">Output</td> <td>150kHz...500kHz</td> <td>99dB(μV) Qpk</td> </tr> <tr> <td>500kHz...30MHz</td> <td>93dB(μV) Qpk</td> </tr> </tbody> </table> | Test | Norm | Port | Frequency | Limits | Radiated emissions | IEC55016 | Case | 30MHz...230MHz | 40dB(μV/m) Qpk at 10m | 230MHz...1GHz | 47dB(μV/m) Qpk at 10m | 1...3GHz | Do not apply | 3...6GHz | Internal freq. < 108MHz | Conducted emissions | IEC55016 | Output | 150kHz...500kHz | 99dB(μV) Qpk | 500kHz...30MHz | 93dB(μV) Qpk | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | Test | Norm | Port | Frequency | Limits | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | Radiated emissions | IEC55016 | Case | 30MHz...230MHz | 40dB(μV/m) Qpk at 10m | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | | | | 230MHz...1GHz | 47dB(μV/m) Qpk at 10m | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | | | | 1...3GHz | Do not apply | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | | | | 3...6GHz | Internal freq. < 108MHz | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | Conducted emissions | IEC55016 | Output | 150kHz...500kHz | 99dB(μV) Qpk | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | | | | 500kHz...30MHz | 93dB(μV) Qpk | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | <table border="1"> <thead> <tr> <th>Test</th> <th>Norm</th> <th>Port</th> <th>Severity</th> <th>Conditions</th> <th>P</th> </tr> </thead> <tbody> <tr> <td rowspan="2">Electrostatic discharge</td> <td rowspan="2">IEC61000-4-2</td> <td rowspan="2">Case</td> <td>±8kV</td> <td>Air (isolated parts)</td> <td rowspan="2">B</td> </tr> <tr> <td>±8kV</td> <td>Contact (conductive parts)</td> </tr> <tr> <td rowspan="4">Radiated high-frequency</td> <td rowspan="4">IEC61000-4-3</td> <td rowspan="4">X/Y/Z Axis</td> <td>20V/m</td> <td>0.08...1.0GHz M. 80% 1kHz</td> <td rowspan="4">A</td> </tr> <tr> <td>10V/m</td> <td>1.4...2.1GHz M. 80% 1kHz</td> </tr> <tr> <td>5V/m</td> <td>2.1...2.5GHz M. 80% 1kHz</td> </tr> <tr> <td>3V/m</td> <td>5.1...6Ghz M. 80% 1kHz</td> </tr> <tr> <td rowspan="4">Fast transients</td> <td rowspan="4">IEC61000-4-4</td> <td>Input</td> <td>±2kV</td> <td rowspan="4">Tr/Th: 5/50 ns</td> <td rowspan="4">A</td> </tr> <tr> <td>Output</td> <td>±2kV</td> </tr> <tr> <td>Signal</td> <td>±2kV</td> </tr> <tr> <td>P</td> <td>±1kV</td> </tr> <tr> <td rowspan="2">Surge</td> <td rowspan="2">IEC61000-4-5</td> <td>Input L to L</td> <td>±1kV</td> <td rowspan="2">Tr/Th: 1.2/50μs</td> <td rowspan="2">B</td> </tr> <tr> <td>Input L to P</td> <td>±2kV</td> </tr> <tr> <td rowspan="4">Conducted RF</td> <td rowspan="4">IEC61000-4-6</td> <td>Input</td> <td>10V</td> <td rowspan="4">0.15...80MHz M. 80% 1kHz</td> <td rowspan="4">A</td> </tr> <tr> <td>Output</td> <td>10V</td> </tr> <tr> <td>Signal</td> <td>10V</td> </tr> <tr> <td>P</td> <td>10V</td> </tr> <tr> <td>Magnetic field</td> <td>IEC61000-4-8</td> <td>X/Y/Z Axis</td> <td>300A/m</td> <td>0Hz, 16.7Hz, 50/60Hz</td> <td>A</td> </tr> <tr> <td>Pulse magnetic field</td> <td>IEC61000-4-9</td> <td>X/Y/Z Axis</td> <td>300A/m</td> <td>Tr/Th: 6.4/16μs</td> <td>B</td> </tr> </tbody> </table> | Test | Norm | Port | Severity | Conditions | P | Electrostatic discharge | IEC61000-4-2 | Case | ±8kV | Air (isolated parts) | B | ±8kV | Contact (conductive parts) | Radiated high-frequency | IEC61000-4-3 | X/Y/Z Axis | 20V/m | 0.08...1.0GHz M. 80% 1kHz | A | 10V/m | 1.4...2.1GHz M. 80% 1kHz | 5V/m | 2.1...2.5GHz M. 80% 1kHz | 3V/m | 5.1...6Ghz M. 80% 1kHz | Fast transients | IEC61000-4-4 | Input | ±2kV | Tr/Th: 5/50 ns | A | Output | ±2kV | Signal | ±2kV | P | ±1kV | Surge | IEC61000-4-5 | Input L to L | ±1kV | Tr/Th: 1.2/50μs | B | Input L to P | ±2kV | Conducted RF | IEC61000-4-6 | Input | 10V | 0.15...80MHz M. 80% 1kHz | A | Output | 10V | Signal | 10V | P | 10V | Magnetic field | IEC61000-4-8 | X/Y/Z Axis | 300A/m | 0Hz, 16.7Hz, 50/60Hz | A | Pulse magnetic field | IEC61000-4-9 | X/Y/Z Axis | 300A/m | Tr/Th: 6.4/16μs | B |
| | | Test | Norm | Port | Severity | Conditions | P | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | Electrostatic discharge | IEC61000-4-2 | Case | ±8kV | Air (isolated parts) | B | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | | | | ±8kV | Contact (conductive parts) | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | Radiated high-frequency | IEC61000-4-3 | X/Y/Z Axis | 20V/m | 0.08...1.0GHz M. 80% 1kHz | A | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | | | | 10V/m | 1.4...2.1GHz M. 80% 1kHz | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | | | | 5V/m | 2.1...2.5GHz M. 80% 1kHz | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 3V/m | 5.1...6Ghz M. 80% 1kHz | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Fast transients | IEC61000-4-4 | Input | ±2kV | Tr/Th: 5/50 ns | A | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | Output | ±2kV | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | Signal | ±2kV | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | P | ±1kV | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Surge | IEC61000-4-5 | Input L to L | ±1kV | Tr/Th: 1.2/50μs | B | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | Input L to P | ±2kV | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Conducted RF | IEC61000-4-6 | Input | 10V | 0.15...80MHz M. 80% 1kHz | A | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | Output | 10V | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | Signal | 10V | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | P | 10V | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Magnetic field | IEC61000-4-8 | X/Y/Z Axis | 300A/m | 0Hz, 16.7Hz, 50/60Hz | A | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Pulse magnetic field | IEC61000-4-9 | X/Y/Z Axis | 300A/m | Tr/Th: 6.4/16μs | B | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| P= Performance criteria, L= Line, P= PE (Protective Earth) | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 4.3.7 | Relative humidity | Up to 95% | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 5.1.1.2 | DC power supply range | From 0.70 to 1.25 Un continuous | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 5.1.1.3 | Temporary DC power supply fluctuation | From 0.60 to 1.40 Un 0.1s From 1.25 to 1.40 Un 1s without damage | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 5.1.1.4 | Interruptions of voltage supply | S1 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 5.1.1.6 | Input ripple factor | 10% peak to peak with a DC Ripple Factor of 5 % | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 5.1.3 | Supply change-over | 0,6 Un duration 100 ms (without interruptions). Performance criterion A | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 7.2.7 | Input reverse polarity protection | By serial diode in the input | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 10.7 | Protective coating for PCB assemblies | Class PC2 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 13.3 | Tests list | <table border="0"> <tbody> <tr><td>1 Visual Inspection</td><td>Routine</td></tr> <tr><td>2 Performance test</td><td>Routine</td></tr> <tr><td>3 Power supply test</td><td>Routine</td></tr> <tr><td>4 Insulation test</td><td>Routine</td></tr> <tr><td>5 Low temperature storage test</td><td>-</td></tr> <tr><td>6 Low temperature start-up test</td><td>Type</td></tr> <tr><td>7 Dry heat test</td><td>Type</td></tr> <tr><td>8 Cyclic damp heat test</td><td>Type</td></tr> <tr><td>9 Salt mist test</td><td>-</td></tr> <tr><td>10 Enclosure protection test (IP code)</td><td>-</td></tr> <tr><td>11 EMC test</td><td>Type</td></tr> <tr><td>12 Shocks and vibrations test</td><td>Type</td></tr> <tr><td>13 Equipment stress screening test</td><td>Routine: 24h at 40°C and load 100%</td></tr> <tr><td>14 Rapid Temperature variation test</td><td>Type</td></tr> </tbody> </table> | 1 Visual Inspection | Routine | 2 Performance test | Routine | 3 Power supply test | Routine | 4 Insulation test | Routine | 5 Low temperature storage test | - | 6 Low temperature start-up test | Type | 7 Dry heat test | Type | 8 Cyclic damp heat test | Type | 9 Salt mist test | - | 10 Enclosure protection test (IP code) | - | 11 EMC test | Type | 12 Shocks and vibrations test | Type | 13 Equipment stress screening test | Routine: 24h at 40°C and load 100% | 14 Rapid Temperature variation test | Type | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 1 Visual Inspection | Routine | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 2 Performance test | Routine | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
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| 6 Low temperature start-up test | Type | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
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| 11 EMC test | Type | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 12 Shocks and vibrations test | Type | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 13 Equipment stress screening test | Routine: 24h at 40°C and load 100% | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 14 Rapid Temperature variation test | Type | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |