ACB-3000

Redundancy Static Transfer Switch

GENERAL FEATURES:

Available in two variants (13 A_{rms} and 21 A_{rms}) with configurable nominal input voltage

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}			230 V_{AC}		
Maximum current	13 A_{RMS}			21 A_{RMS}		
Suitable for inverters	ODS-750	ODS-1500	ODS-3000	ODS-750	ODS-1500	ODS-3000

Several references are subjected to special MOQs and lead times. Please consult Premium's Sales Dept. and website.

MODEL	9431	9576
INPUTS		
Default nominal AC input voltage	230 V	
Minimum/Maximum AC input voltage[1]	±20% of nominal	
Input Frequency	50/60 Hz ± 10 %	
Efficiency at nominal conditions	>99%	
OUTPUT		
Output voltage	230 V (same as input)	
Maximum continuous current	13 A_{RMS}	21 A_{RMS}
Maximum instantaneous current (100ms)[2]	26 A_{rms}	42 A_{rms}
EXTERNAL CONTROL SUPPLY (optional)[3]		
Nominal DC input voltage (Vbat)	15 – 139 V_{dc}	
ENVIRONMENTAL		
Storage temperature	-40 … 85 °C	
Operating temperature: Full load Operating temperature: 70 % load Operating temperature: 50 % load	-40 … 55 °C (EN50155 OT2) -40 … 70 °C (EN50155 OT4) -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	> 1Mh @ 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 time in case of failure[4]	< 2 ms	
Input 1 OK	Green	
Input 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 a recurrent overcurrent situation.	
Failure in line 1	Solid state relay 1 closed if line 1 is OK.	
Failure in line 2	Solid state relay 2 closed if line 2 is OK.	
Failure in system	Solid state relay 3 closed if all the system is OK.	

Note-1: ACB3000 input voltage protection will trigger when the difference between the input sine wave and an ideal one is ±0.2 p.u.

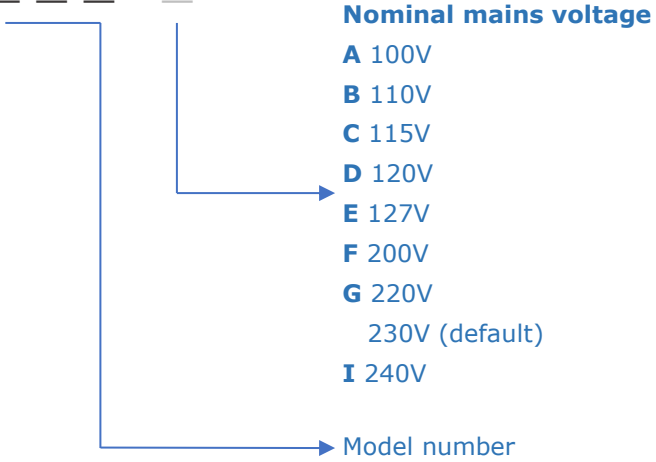
Note-2: The ACB-3000 is designed to handle maximum instantaneous currents as specified by the Instantaneous Current Error Detection graph.

Note-3: This option allows the user to maintain communication with the internal MCU in the event of an L1 + L2 failure.

Note-4: Under no-load conditions (below 20W), the switching time is not guaranteed.

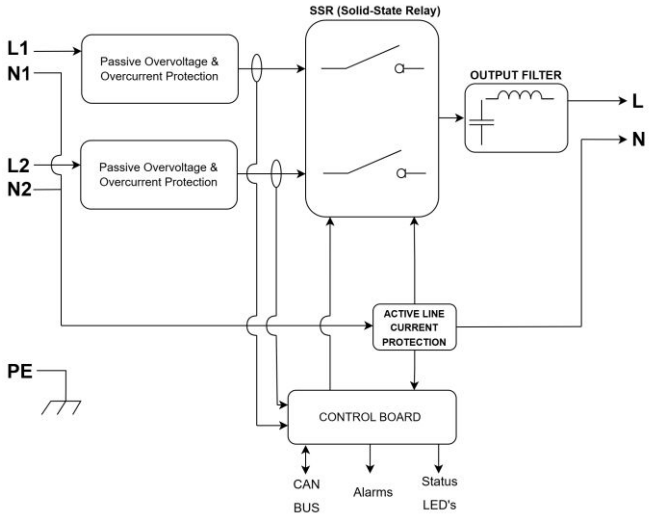
ORDERING CODES

ACB–9_ _ _– _

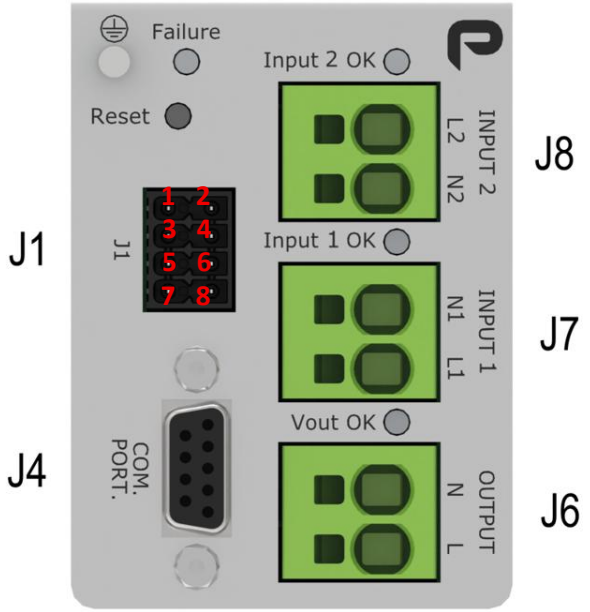


Several references are subjected to special MOQs and lead times. Please consult Premium's Sales Dept. and website.

BLOCKS DIAGRAM



CONNECTIONS



Element	Description	Notes
J7 - 1	Line input 1 (priority)	Spring clamp terminals Maximum cross section cable: 6mm²
J7 - 2	Neutral input 1 (priority)	
J8 - 1	Neutral input 2	
J8 - 2	Line input 2	
J6 - 1	Line output	
J6 - 2	Neutral output	
J1 - 1	- Vbat auxiliar (optional)[3]	Recommended male connector: Phoenix Contact 1790124
J1 - 2	+ Vbat auxiliar (optional)[3]	
J1 - 3, 4	Relay of failure in line 2	
J1 - 5, 6	Relay of failure in line 1	
J1 - 7, 8	Relay of failure in system	
J4 - 2	CAN bus: CAN_L	Sub-D9
J4 - 3	CAN bus: CAN_GND	
J4 - 7	CAN bus: CAN_H	
Earth	Earth connection	Stud M4 Torque <2.5 Nm
Reset	Restarts the system from a permanent overcurrent situation.	Button

DESCRIPTION

The ACB-3000 is an ultrafast dual-line static transfer switch that selects the appropriate line when a failure occurs.

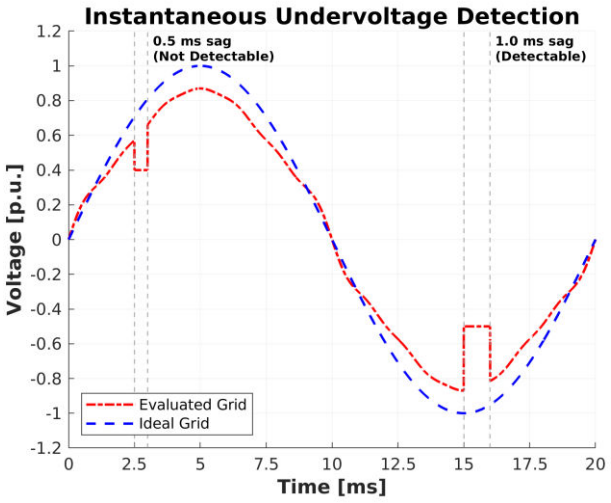
It continuously monitors the waveform of both input lines and, if the active line deviates from specifications, switches to the other line within 2 ms. This rapid response is achieved through a fully digital control combined with advanced SiC MOS power switches.

Designed for both industrial and railway environments, the ACB-3000 is compatible with the Premium ODS-750, ODS-1500, and ODS-3000 inverter families.

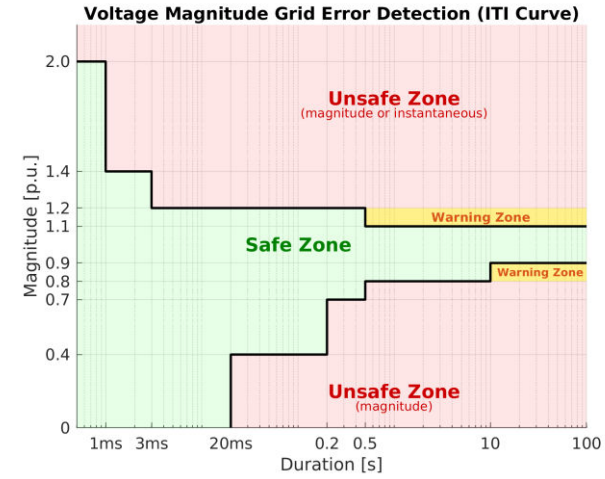
In case of any failure, the unit indicates it locally via an LED and remotely via a solid-state relay and a CANopen bus port. During normal operation, the active input line is indicated by a blinking LED. When the other input line is properly powered, its LED remains illuminated. Similarly, an illuminated output LED confirms proper operation.

The switching occurs when the active input line has any of the following events:

1. Frequency out of range (10%).
2. Instantaneous undervoltage detection (20% of voltage). The response time is 1ms.



3. Voltage out of the safe zone: As indicated by the ITI curve in the figure, if the active line voltage moves beyond the defined "Safe Zone" for longer than the permissible duration, the system triggers a switching to the other line.
   The yellow zone represents a warning area, where a rapidly blinking LED alerts that the voltage has deviated more than 10% from its nominal value.



When both input lines are within their specified ranges, input 1 is automatically selected as the active input by default (this setting can be configured via CAN).

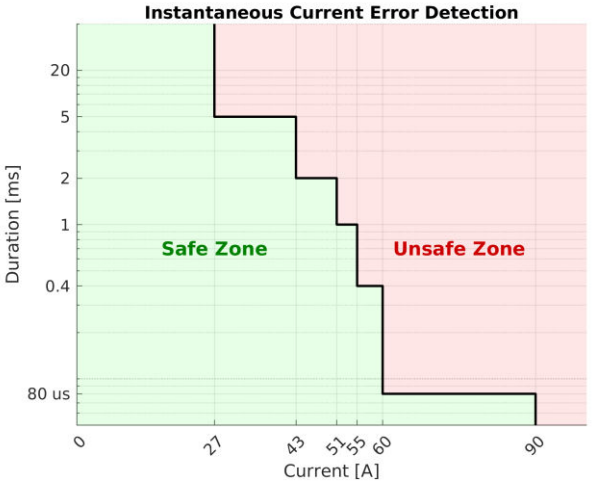
Conversely, if both input lines fall outside the acceptable ranges, the output is disconnected from both inputs.

OVERLOAD PROTECTION

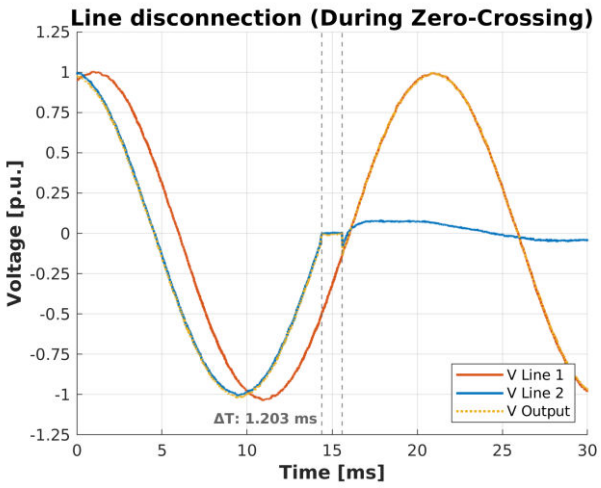
The device is protected against overloads and short-circuits through a current-limiting circuit. When an overcurrent is detected, the failure LED is on, and the power switches turn off.

The unit will attempt to restart every second, up to 3 times after the overload detection (configurable by CAN). If the overload persists, the output remains disabled until a manual reset is performed by pressing the RESET button.

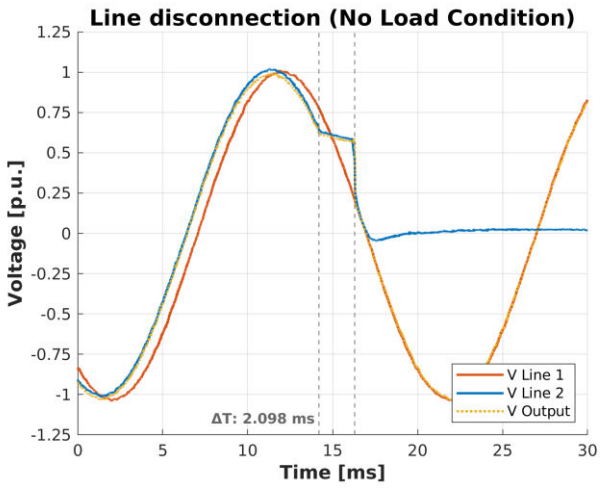
The device can handle demanding conditions, sustaining twice the RMS current for 100 ms. Furthermore, as shown in the lower graph, it can withstand higher transient surges for shorter durations, ensuring robust and reliable performance during transient load conditions.



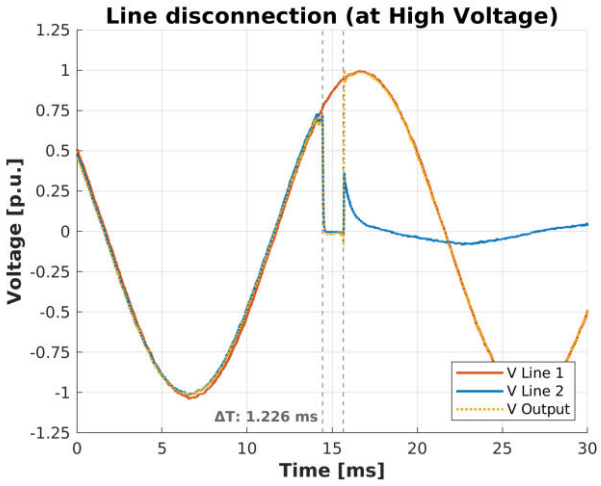
OUTPUT WAVEFORMS



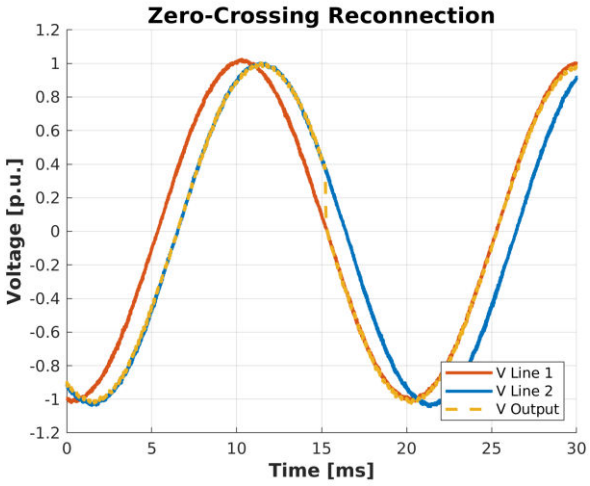
Example of line disconnection. Line fault at 0V.



Example of line disconnection at no load condition (<20W).



Example of line disconnection. Line fault at high voltage.



Example of reconnection to the priority line.

CAN COMMUNICATION PORT

It is possible to control and monitor the unit via SUB-D9 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.

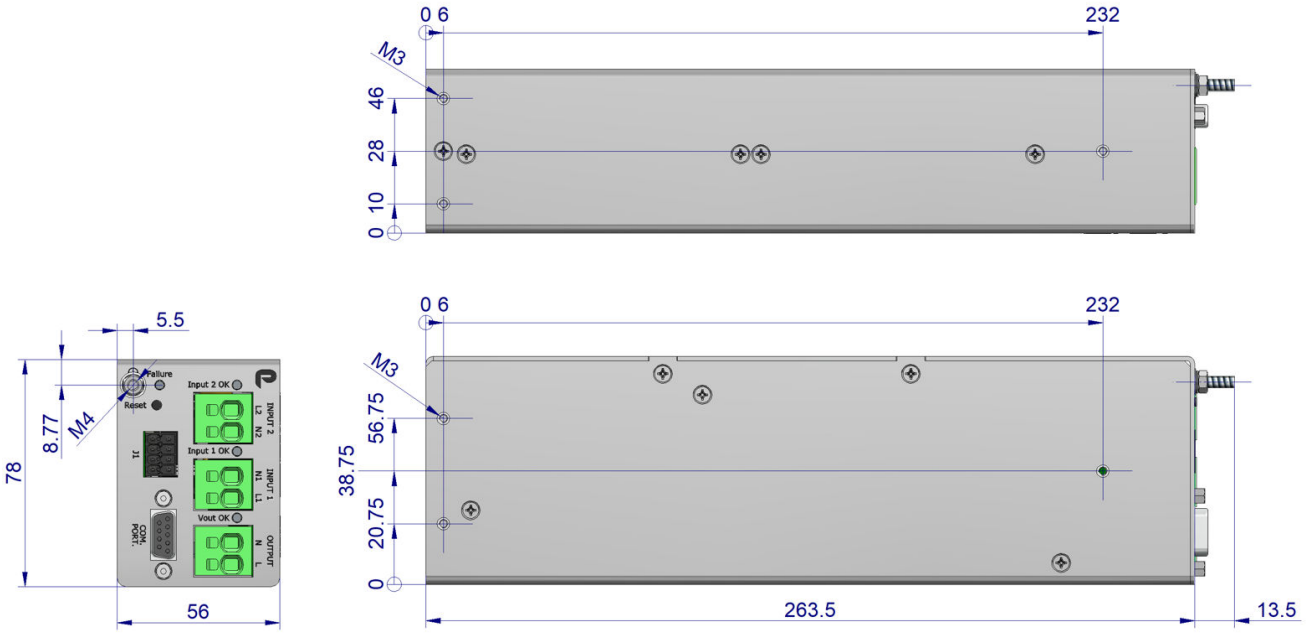
STANDARIZED DEVICE PROFILE AREA

Index	SubIndex	Name	Type	Attribute	Notes
0x6001	0x00	Active Line	UINT8	ro	
0x6002	0x00	State	UINT8	ro	
0x6003	0x00	Number of Failures	UINT8	ro	
0x6100	0x01	Input Voltage RMS 1	UINT32	ro	
0x6100	0x02	Input Voltage RMS 2	UINT32	ro	
0x6101	0x01	Input Current RMS 1	UINT32	ro	
0x6101	0x02	Input Current RMS 2	UINT32	ro	
0x6102	0x01	Input Frequency 1	UINT32	ro	
0x6102	0x02	Input Frequency 2	UINT32	ro	
0x6103	0x01	Input State 1	UINT8	ro	
0x6103	0x02	Input State 2	UINT8	ro	
0x6105	0x01	Input Frequency 1 (float)	FLOAT	ro	
0x6105	0x02	Input Frequency 2 (float)	FLOAT	ro	
0x6200	0x00	Output Voltage RMS	UINT32	ro	
0x6201	0x00	Output Current RMS	UINT32	ro	Measure in deciAmperes (dA)
0x6202	0x00	Output Frequency	UINT32	ro	
0x6203	0x00	Output Current (float)	FLOAT	ro	
0x6300	0x00	Number of Startups	UINT32	ro	
0x6301	0x00	Number of Hours ON	UINT32	ro	
0x6302	0x00	Zero-Crossing Grid Transition Switch	UINT32	rw	Ensures grid transition at zero crossing (default: disabled)
0x6303	0x00	Nominal Voltage	UINT32	rw	Limited between 100 and 240 Vrms
0x6304	0x00	Frequency Mode Selection	UINT32	rw	0 = 50 Hz, 1 = 60 Hz (default: 50 Hz)
0x6305	0x00	Allowed Number of Consecutive Overcurrents	UINT32	rw	Default: 3
0x6306	0x00	Overcurrent Clear Time (ms)	UINT32	rw	Time to reset the consecutive overcurrent counter (default: 10000 ms, min: 1000 ms)
0x6307	0x00	Overcurrent State Duration (ms)	UINT32	rw	Time before restarting the system after an overcurrent (default: 1000 ms, min: 16 ms)
0x6308	0x00	Recovery Time to Priority Grid (ms)	UINT32	rw	Time to switch back to the priority grid (default: 5000 ms, min: 200 ms)
0x6309	0x00	Configured Priority Mode	UINT32	rw	1 = Grid 1, 2 = Grid 2 (default: grid 1)
0x630A	0x00	ITI Mode	UINT32	rw	Uses ITI curve as stability evaluation criterion (default: enabled)

COMMUNICATION PROFILE AREA

Index	SubIndex	Name	Type	Attribute	Notes
0x1001	0x00	Error register	UINT8	ro	
0x1003	0x00	Number of errors	DYNAMIC_TABLE	rw	
0x1003	0x01	Error messages	DYNAMIC_TABLE	ro	
0x1008	0x00	Manufacturer device name	ARRAY	ro	
0x100A	0x00	Manufacturer software version	ARRAY	ro	
0x1017	0x00	Producer Heartbeat time	UINT16	rw	
0x1029	0x00	Error behavior object	UINT8	-	
0x1018	0x01	Vendor_ID	UINT32	ro	
0x1018	0x02	Product Code	UINT32	ro	
0x1018	0x03	Revision Number	UINT32	ro	
0x1018	0x04	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)

ACESSORIES

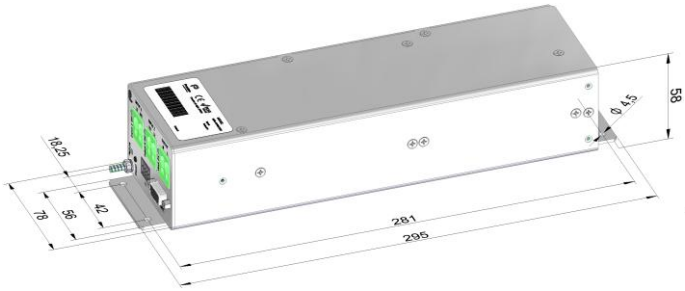
Description	Notes	CODE
2U 19" rack mounting tray kit.	Allows to install an ACB-3000 and up to two inverters	NP-9353
Base mounting plate	Includes 3 screws	NP-9636
DIN rail mounting	Includes DIN rail adaptor, interface plate and screws	NP-9637

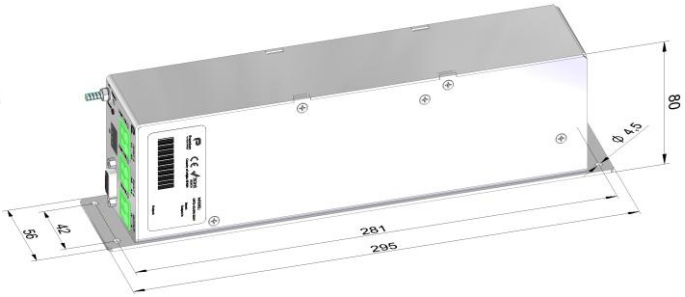
NP-9353

Example for ODS-1500

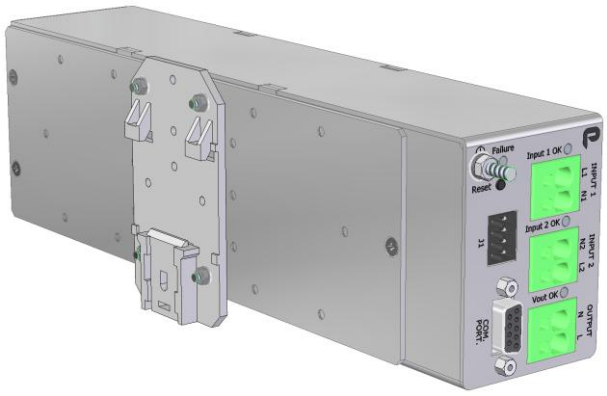
Example for ODS-3000

NP-9636





NP-9637



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
2011/65/EU Annex II and its amendment 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 50121-4: 2017*	Railway applications. EMC Rolling stock equipment

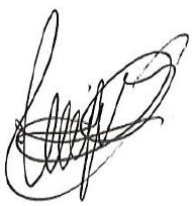
* See annexe

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 ISO9001and ISO14001 certified company by **Bureau Veritas**

ANNEXE

<table>
<tr><th colspan="3">Applicable values for the different sections of the norm EN50155: 2017</th></tr>
<tr><td>4.3.1</td><td>Working altitude</td><td>Up to 2000m</td></tr>
<tr><td>4.3.2</td><td>Ambient temperature</td><td>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%</td></tr>
<tr><td>4.3.3</td><td>Switch-on extended operating temp.</td><td>Class ST1</td></tr>
<tr><td>4.3.4</td><td>Rapid temperature variations</td><td>Class H1</td></tr>
<tr><td>4.3.5</td><td>Shocks and vibrations</td><td>According EN61373:2010 Category 1 class B</td></tr>
<tr><td>4.3.6</td><td>EMC Electromagnetic Compatibility

EN50121-4:2017</td><td>
<table>
<tr><th>Test</th><th>Norm</th><th>Port</th><th>Frequency</th><th>Limits</th></tr>
<tr><td rowspan="3">Radiated emissions</td><td rowspan="3">IEC55016</td><td rowspan="3">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
3...6GHz</td><td>Do not apply
Internal freq. < 108MHz</td></tr>
<tr><td>Conducted emissions</td><td>IEC55016</td><td>Output</td><td>150kHz...500kHz
500kHz...30MHz</td><td>79dB(µV) Qpk
66dB(µV) Qpk</td></tr>
</table>
<table>
<tr><th>Test</th><th>Norm</th><th>Port</th><th>Severity</th><th>Conditions</th><th>P</th></tr>
<tr><td>Electrostatic discharge</td><td>IEC61000-4-2</td><td>Case</td><td>±8kV
±6kV</td><td>Air (isolated parts)
Contact (conductive parts)</td><td>B</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>
</table>
P= Performance criteria, L= Line, P= PE (Protective Earth)
</td></tr>
<tr><td>4.3.7</td><td>Relative humidity</td><td>Up to 95%</td></tr>
<tr><td>5.1.1.2</td><td>DC power supply range</td><td>From 0.70 to 1.25 Un continuous</td></tr>
<tr><td>5.1.1.3</td><td>Temporary DC power supply fluctuation</td><td>From 0.60 to 1.40 Un 0.1s
From 1.25 to 1.40 Un 1s without damage</td></tr>
<tr><td>5.1.1.4</td><td>Interruptions of voltage supply</td><td>S1</td></tr>
<tr><td>5.1.1.6</td><td>Input ripple factor</td><td>10% peak to peak with a DC Ripple Factor of 5 %</td></tr>
<tr><td>5.1.3</td><td>Supply change-over</td><td>0,6 Un duration 100 ms (without interruptions). Performance criterion A</td></tr>
<tr><td>7.2.7</td><td>Input reverse polarity protection</td><td>By serial diode in the input</td></tr>
<tr><td>10.7</td><td>Protective coating for PCB assemblies</td><td>Class PC2</td></tr>
<tr><td>13.3</td><td>Tests list</td><td>
<table>
<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>
</table>
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</table>