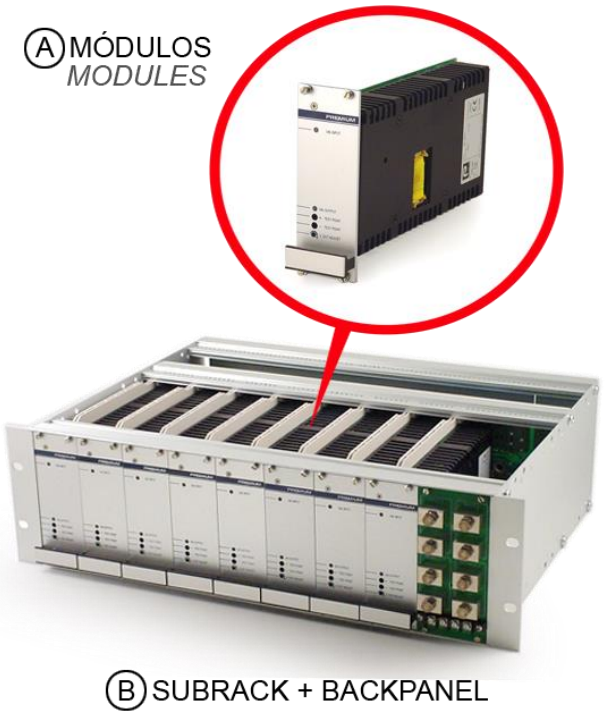
CKR-2000

Up to 1960W redundant DC/DC CONVERTER

GENERAL FEATURES:

Modules series CRS-240 / CTS-240
Module hot swap
Input and/or output redundancy
ORing by diodes
High input-output isolation
Module Input voltage OK LED
Module output voltage presence LED
Module output voltage test point
Output failure alarm by relay contacts
Railway version EN50155



5 YEAR WARRANTY · EN45545 fire & smoke · EN50155 · ROHS REACH

	B - Sub-rack			A - Módulos / Modules	
		Total power	Redun. N+1	48Vin	110Vin
12Vout	**NP-9176**	1920W	1680W	**NP-9179** 240W	**NP-9182** 280W
24Vout	**NP-9177**	2240W	1960W	**NP-9180** 280W	**NP-9183** 280W
48Vout	**NP-9178**	2240W	1960W	**NP-9181** 280W	**NP-9184** 280W

INPUT	
Input voltage range	See table
Maximum allowed input ripple	15% Vin nom (EN-50155)
OUTPUT	
Line regulation	< 0,2 %
Load regulation	< 2 %
Ripple:	< 100 mVpp
Noise	< 250 mVpp
Output voltage adjustment	±15% Vo nom
ENVIRONMENTAL	
Operating temperature	
Full load	-25…55ºC (EN-50155 Class T1)
half load	-25…70ºC (EN-50155 Class T3)
Storage temperature	-25…80ºC
EMC	
Emission	EN61000-6-4, EN50121-3-2
Immunity	EN61000-6-2, EN50121-3-2
SAFETY	
Safety	EN62368
Dielectric strength Input-Output	3000Vac, 4200Vdc 1min.
Dielectric strength Input-Earth	1500Vac, 2100Vdc 1min.
Dielectric strength Output-Earth	1500Vac, 2100Vdc 1min.
MECHANICAL	
Mechanical shape	Mechanical shape
Weight with 8 modules	Weight with 8 modules
CONTROL	
Alarm contacts	1A @ 24Vdc, 1A @ 120Vac
Local: Input OK, Output OK	Green LEDs in each module
PROTECTIONS	
Against output overloads and short-circuits	Current limiting
Against input over-currents	Input fuse in each module

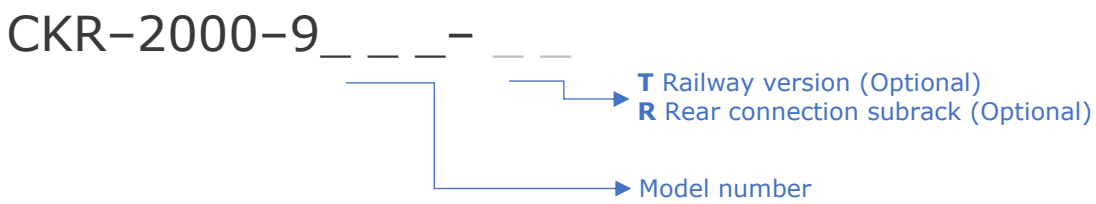
Note-1: The unit can start up and work at an ambient temperature of -40°C with the following restrictions:
1) The output ripple can rise up to 150mVpp at -40°C

SUBRACK ORDERING CODES

Part Number	Maximum Input current (48Vin modules) [A]	Maximum Input current (110Vin modules) [A]	Nominal Output voltage [V]	Maximum Output current [A]
CKR-2000-9176	88	40	12	160
CKR-2000-9177	88	40	24	93.3
CKR-2000-9176	88	40	48	47.7

MODULES ORDERING CODES

Part Number	Maximum Output Power [W]	Nominal Input voltage [V]	Input Voltage range [V]	Nominal Output voltage [V]	Maximum Output current [A]	Efficiency [%]
NP-9179	240	48	28.8 - 60	12	20	84
NP-9180	280	48	28.8 - 60	24	11.7	88
NP-9181	280	48	28.8 - 60	48	5.8	89
NP-9182	240	110	66 - 144	12	20	88
NP-9183	280	110	66 - 144	24	11.7	91
NP-9184	280	110	66 - 144	48	5.8	92

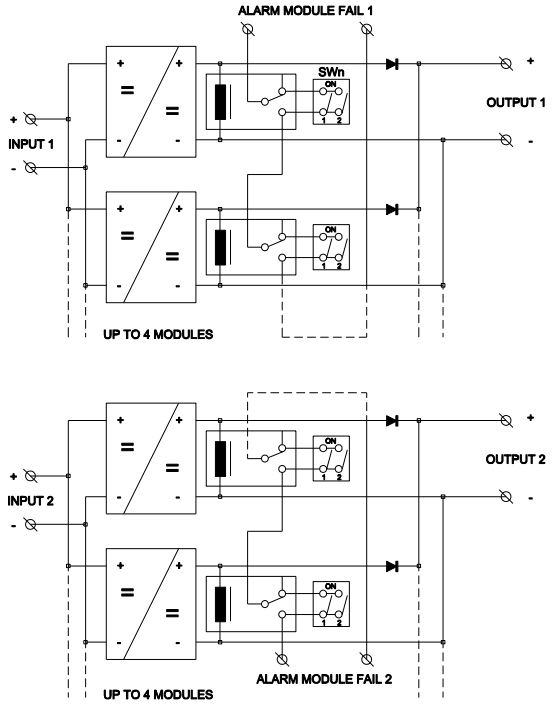


ACCESSORIES

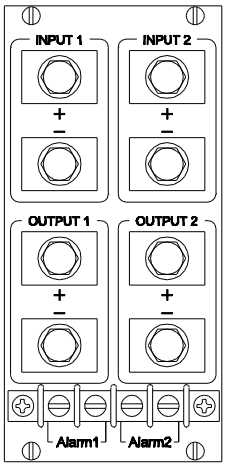
Description	Notes	CODE
Blind front plate for unused slots	Could be necessary for IP20 Fixing screws included	**NP-9283**
Top and bottom covers IP20		**7000176**
Terminals cover IP20		**0903770**

Accessories must be ordered in a separate order line

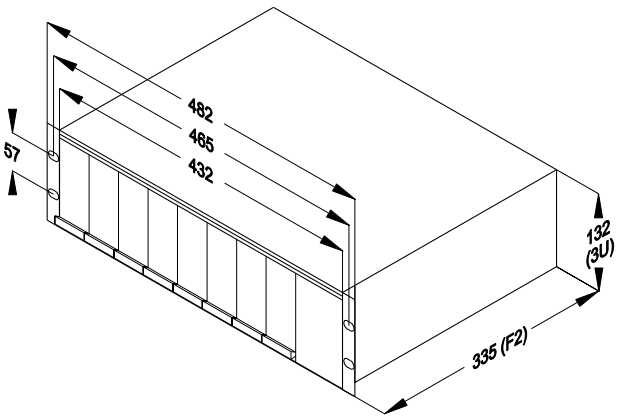
Blocks diagram



Connections



Dimensions



DESCRIPTION

The CKR-2000 is a modular DC/DC converter series consisting of a set of up to 8 modules of 240W or 280W, according to the model, installed in a 19" subrack internally connected in redundant mode.

The unit allows 1920W or 2240W to be supplied without redundancy, 1680W or 1960W with N+1 redundancy, 1440W or 1680W with N+2 redundancy, etc.

The equipment comes with two input lines, each of which powers a set of four modules, providing line redundancy of up to 960W or 1120W.

Each converter has one relay to signal output failure and all relays are connected in series to ensure detection at the alarm terminals of any failure in the modules within each group

INSTALLATION

This equipment has been designed for installation in a standard 19” 3U rack.

There are two connection choices: front or rear. By default, this series is manufactured with front connection.

START-UP

The equipment must be connected as indicated in the diagram.

It is important that the mounting enhances cooling by natural convention. Forced ventilation must be provided if two CKR-2000 units are installed in the same rack.

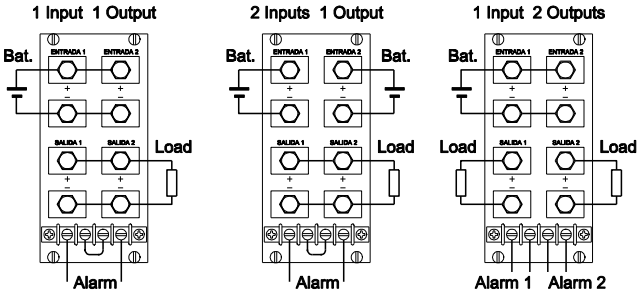
Each module has a dip switch in the back plane, with the contacts parallel to those of the alarm relays. In normal operation, the two channels of each module must be in the OFF position (see figure).

If it is necessary to operate the assembly with a missing module, the alarm for the module must be disabled by placing the respective dip switch in the ON position. This makes it possible to monitor any failure in the remaining modules.

For safety reasons, you must:

- Provide the equipment with a protective housing that meets electrical safety directives of the country where it is installed.
- Replace fuses only with other fuses of the same rating and type and only with the module disconnected from the subrack.

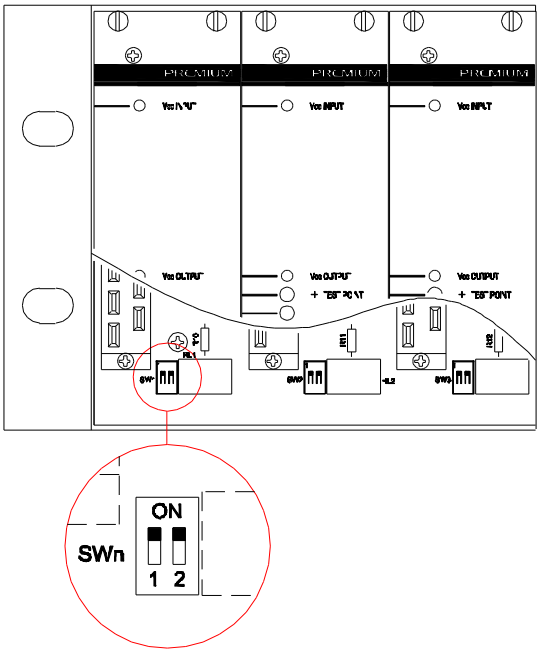
Configurations

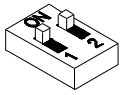
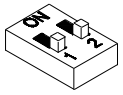


- Use cables of adequate cross-section to connect inputs and outputs. The following table lists the maximum currents and the minimum cross-sections for the cables used for each connection in a complete equipment

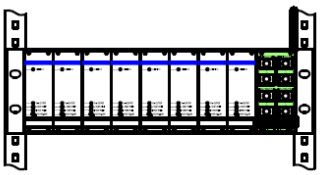
	48V input	110V input	12V output	24V output	48V output
1 cable	88A **16mm²**	40A **6mm²**	160A **50mm²**	94A **25mm²**	47A **10mm²**
2 cables	44A **6mm²**	20A **2.5mm²**	80A **16mm²**	47A **10mm²**	24A **2.5mm²**

Module alarm disabling

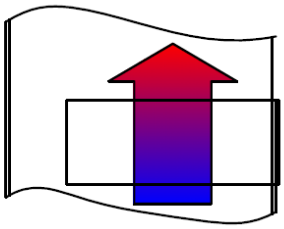


Dip-switch alarma para cada módulo *Dip-switch alarm for each module*	
	
Alarma desactivada *Alarm disabled*	Alarma Activada *Alarm enabled*

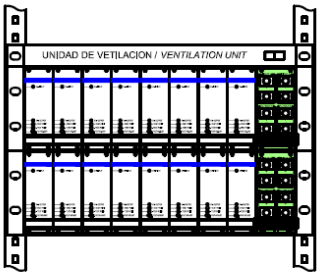
COOLING



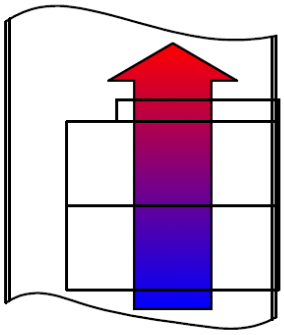
1



1 The CKR-2000 is designed to operate with natural convection. It must be installed in a rack or in a place that allows the natural convection.



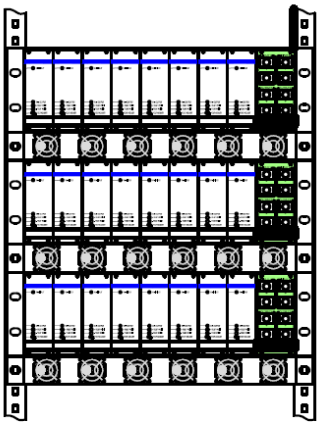
2



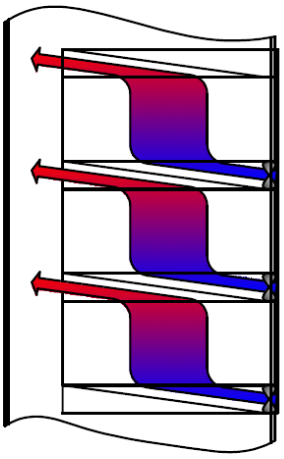
2 Two CKR-2000 can be stacked in a rack if a forced air cooling is provided.

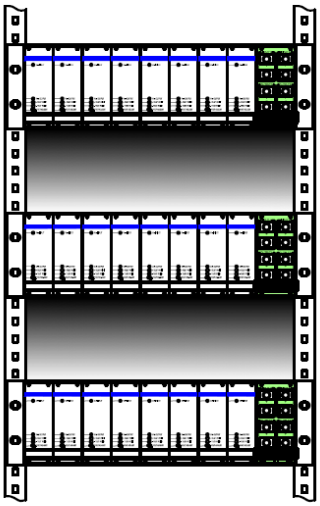
3 It is possible to stack more than two CKR-2000 in a rack including forced air units with front air inlet and top outlet.

4 When the natural convection cooling is required, several CKR-2000 can also be stacked. To this it is necessary to leave a gap of 3U between them and include plates that conduct the hot air from the intermediate units to the rear side.

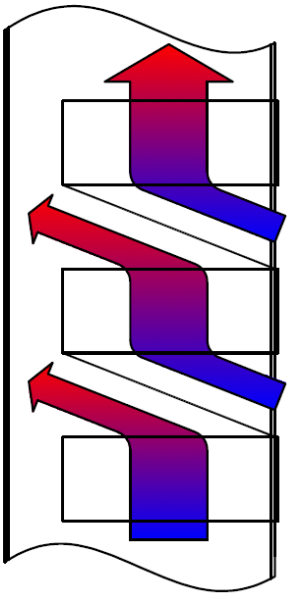


3





4



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: DC/DC converter
Models: **CKR-2000-9176 ... 9178**
NP-9179 ... 9184

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
EN 50121-4: 2016*	Railway applications. EMC of the signalling and telecommunications apparatus

* See annexe

CE marking year: **2005**; 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

Albert Sole
Technical Director

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 OT2 (-40 to 55°C): load < 100% (Without connectors handling and output ripple <150mVpp)
Class OT3 (-25 to 70°C): load <75%
Class OT4 (-40 to 70°C): load <75% (Without Connectors handling and output ripple <150mVpp)
Class OT5 (-25 to 85°C): load <37.5%
Class OT6 (-40 to 85°C): load <37.5% (Without Connectors handling and output ripple <150mVpp)</td></tr>
<tr><td>4.3.3</td><td>Switch-on extended operating temp.</td><td>ST1</td></tr>
<tr><td>4.3.4</td><td>Rapid temperature variations</td><td>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

EN50121-3-2:2016
EN50121-4:2016</td><td>
<table>
<tr><th>Test</th><th>Norm</th><th>Port</th><th>Frequency</th><th>Limits</th></tr>
<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 rowspan="2">Do not apply
Internal freq. < 108MHz</td></tr>
<tr><td>3…6GHz</td></tr>
<tr><td>Conducted emissions</td><td>IEC55016</td><td>Input</td><td>150kHz…500kHz</td><td>79dB(µV) Qpk, 66dB(µV) Av</td></tr>
<tr><td></td><td></td><td></td><td>500kHz…30MHz</td><td>79dB(µV) Qpk, 60dB(µV) Av</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 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>PE</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 PE</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>PE</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>
</table>
P= Performance criteria, L= Line, 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>Class S1 (without interruptions)</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 fuse</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>
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</table>