CRS-500

500W SINGLE OUTPUT DC/DC CONVERTERS

GENERAL FEATURES:

Designed according to EN50155
Fire and smoke: EN45545-2 approved
High input-output isolation
Adjustable output voltage
Remote inhibit
Remote sensing
Input &Output OK LEDs
Output failure alarm
Input reverse polarity protection
ORing FET option
Efficiency up to 92%

	24Vin 14,4V ... 30V	36Vin 21,6V ... 47V	48Vin 28,8V ... 60V	72Vin 43,2V ... 90V	110Vin 66V ... 144V
24Vout	**CRS-500-6455**	**CRS-500-6467**	**CRS-500-6458**	**CRS-500-6461**	**CRS-500-6464**
48Vout	**CRS-500-6456**	**CRS-500-6468***	**CRS-500-6459**	**CRS-500-6462**	**CRS-500-6465**
110Vout	**CRS-500-6457**	Available under request*	Available under request*	Available under request*	**CRS-500-6466***

*References subject to special MOQs and lead times

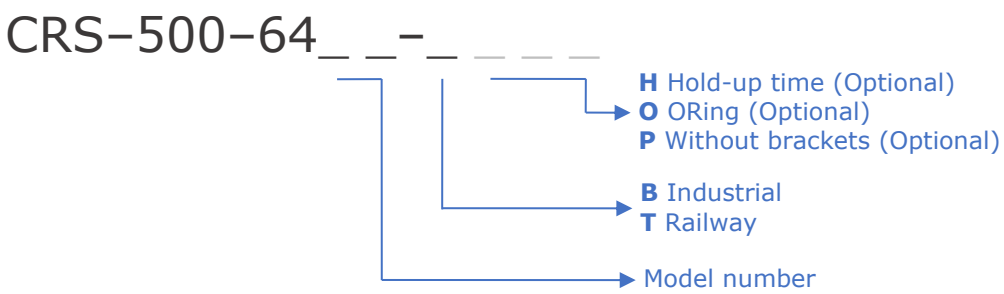
INPUT	
Input voltage range	See table
Input undervoltage shutdown	55% to 60% Vi nom
Maximum allowed input ripple	15% Vin nom (EN50155)
OUTPUT	
Output voltage	See table
Output voltage adjustment	
Vi min = 60% Vi nom	-10% ... +0% Vo nom
Vi min = 70% Vi nom	-10% ... +15% Vo nom
Line regulation (Io = nom)	< 0,2 %
Load regulation (Vin = nom Io: 0…100%))	< 0,2 %, 2.5 % for ORing FET option
Ripple	< 50 mVpp
Noise (BW = 20MHz)	< 100 mVpp
Max. overvoltage protection	< 140% Vout nom
Maximum remote sense	0.3V / pole
Hold up time	10ms (Class S2 EN50155) only with option H
ENVIRONMENTAL	
Storage temperature	-40ºC … 85ºC
Operating temperature range Io: 100%	-25ºC ... 55ºC(-40°C … 55ºC, see note-1)
Operating temperature range Io :75%	-25ºC ... 70ºC(-40°C … 70ºC, see note-1)
Cooling	Natural convection
Maximum Relative humidity	95% with no condensation
Shock and vibration	EN61373 Category 1 class B body mounted
MTBF	400.000h @ 40°C according to IEC61709
EMC	
Emission	EN61000-6-4, EN50121-3-2
Immunity	EN61000-6-2, EN50121-3-2
SAFETY	
Safety	EN60950-1, EN62368-1
Dielectric strength Input-Output	3000Vac, 4200Vdc 1min.
Dielectric strength Input-Earth	1500Vac, 2100Vdc 1min.
Dielectric strength Output-Earth	1500Vac, 2100Vdc 1min.
Fire and smoke	EN45545-2:2013 +A1:2015
MECHANICAL	
Approximate weight	1800g
CONTROL	
Remote inhibit range	16.8 … 143 Vdc
Alarm contacts	1A @ 24Vdc, 0.3A @ 150Vdc, 1A @ 125Vac
Local: Input OK, Output OK	Green LEDs
PROTECTIONS	
Against overloads and short-circuits	Current limiting
Against output over-voltages	Shutdown (reset by input switch off)
Against reverse input voltage.	Input fuse (Active protection with option H)
Against input under-voltage.	Under-voltage lock-out
Against Input over-currents	Input fuse

Note-1: The unit can start up and work at an ambient temperature of -40°C with the following restrictions:
1) Do not handle the connection terminals below -25°C. 2) The output ripple can rise up to 150mVpp at -40°C

ORDERING CODES

Part Number	Power [W]	Input [V]	Continuous Input range [V]	Output [V]	Output current [A]	Efficiency [%]
CRS-500-6455	500	24	14,4-30	24	20,8	88
CRS-500-6456	500	24	14,4-30	48	10,4	89
CRS-500-6457	500	24	14,4-30	110	4,54	90
CRS-500-6467	500	36	21,6-47	24	20,8	90
CRS-500-6468	500	36	21,6-47	48	10,4	90
CRS-500-6458*	500	48	28,8-60	24	20,8	91
CRS-500-6459	500	48	28,8-60	48	10,4	91
CRS-500-6461	500	72	43,2-90	24	20,8	91
CRS-500-6462	500	72	43,2-90	48	10,4	91
CRS-500-6464	500	110	66-144	24	20,8	91
CRS-500-6465	500	110	66-144	48	10,4	92
CRS-500-6466	500	110	66-144	110	4,54	92

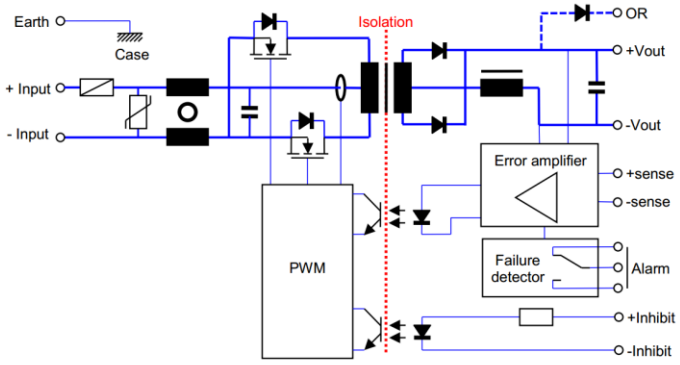
*References subject to special MOQs and lead times



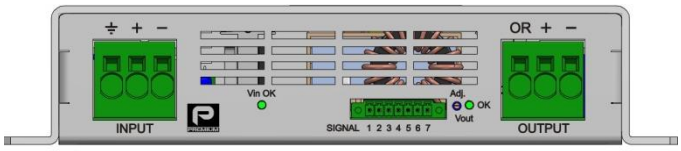
OPTIONS INFORMATION	Letter code
Industrial version	**B**
Railway version	**T**
Hold up time of 10ms at 500W and Vin nom for all models except the 24Vin, which power is 440W. Includes: • Active protection against input reverse polarity • Active inrush current limiter at< 3·I(input nominal)	**H**
Oring FET for redundancy. Includes a passive current sharing by voltage drop < 2.5%	**O**
Case **without mounting brackets** for 6U subrack fitting or DIN rail	**P**

Accessories must be ordered in a separated order line

BLOCKS DIAGRAM



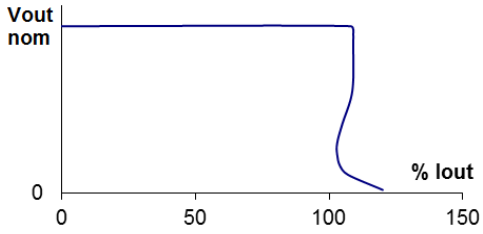
CONNECTIONS



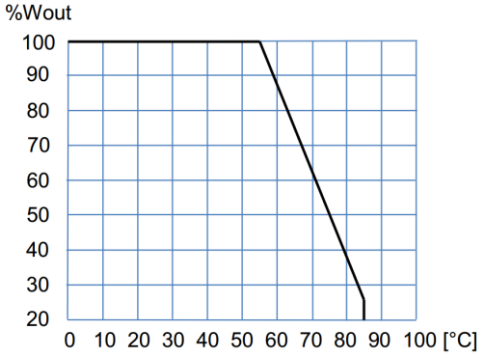
Power connections (input and output)
Spring clamp terminals up to 16mm^2

Signals connector	
1	+ Inhibit
2	- Inhibit
3	- Remote sense
4	+ Remote sense
5	Alarm relay NC (closed when alarm)
6	Alarm relay Common
7	Alarm relay NO (open when alarm)

TYPICAL OUTPUT CHARACTERISTIC



POWER DERATING vs AMBIENT TEMP.



DESCRIPTION

The CRS-500 series consists of DC-DC converters with a galvanic isolation between input and output. The converters operate at a fixed switching frequency and use push-pull converter topology.

For maximum regulation, the remote sensing terminals can be connected to the load. This will allow a power cable voltage drop of up to 0.3 V on each cable to be offset.

The device is protected against overloads and short-circuits by means of a current limiting circuit.

The device is also protected against reverse polarity input voltage, and the input fuse blows if an improper connection is made.

When a converter input undervoltage condition occurs, the converter is disabled, thus preventing the battery from becoming totally discharged. Once the input is within the range the unit restarts automatically.

INSTALLATION

The product can be mounted in several ways:

- On a chassis by means of the mounting brackets holes.
- On a DIN rail adding two clip accessories NP-9135.

Into a 6U subrack adding the accessory NP-9222

START-UP

Perform connection according to the figure. Use of remote sensing is not mandatory, but if this is required, use of a co-axial or a twisted-pair cable is recommended.

WARNING: If the load is connected to the tabs of remote sensing (+/-S) and the connection from the output to this load is missing the remote sensing function could make unusable due to the acting of the internal fuse of protection.

If power levels close to the maximum output are required, make sure the assembly enhances cooling by natural convection and the unit is placed in vertical position.

If several converters need to be connected in parallel, do the following:

•Set the output voltage for all converters featuring a mutual difference as small as possible.

•Join the load outputs by using cables with a cross-section no greater than the one required and of equal length.

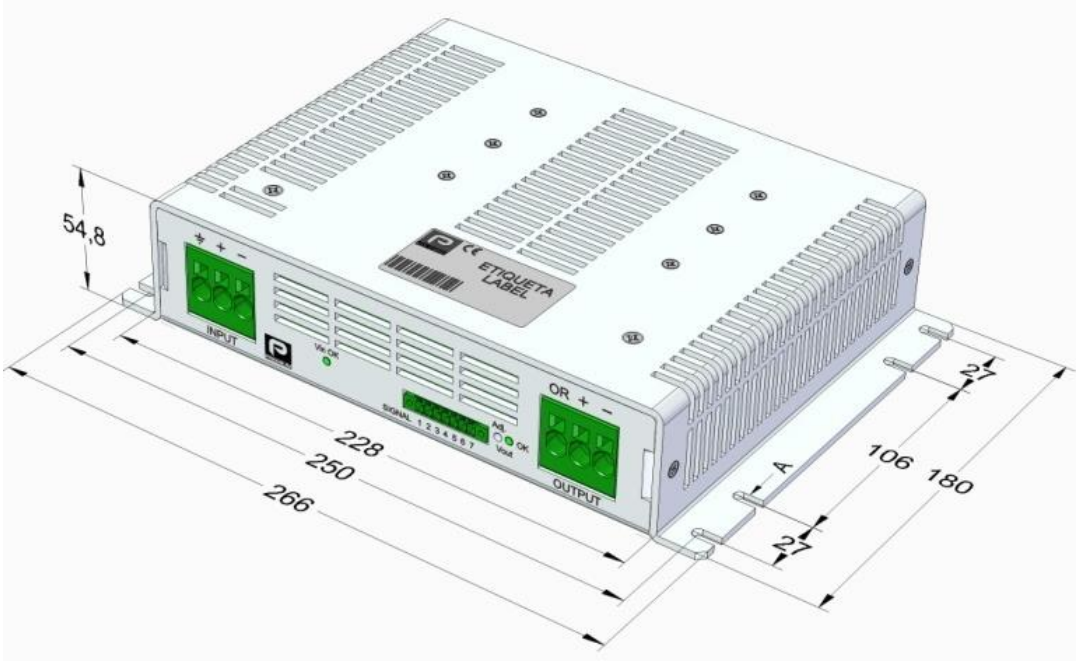
•Do not use remote sensing.

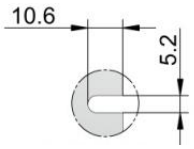
For safety reasons, the following requirements must be complied with:

•Provide the equipment with a protective enclosure that complies with the electrical safety directives in effect within the country where the equipment is installed.

•Only replace the fuse with another fuse of the same rating and type, and only after disconnecting the converter from DC power.

DIMENSIONS





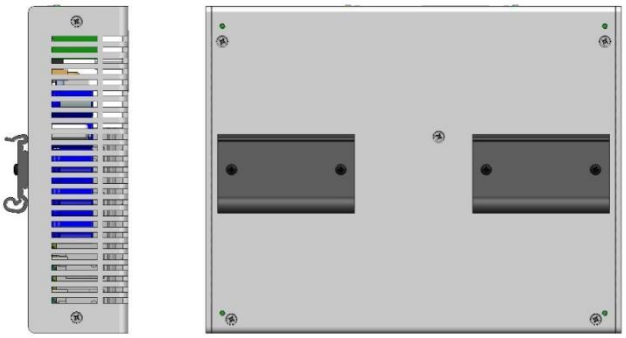
ACCESSORIES

ACCESSORIES	Notes	Order qty. / device	CODE
Signals mating connector	Phoenix Contact FK-MCP 1,5/ 7-STF-3,81	1	2601-395
DIN RAIL CLIP	Screws included	2	NP-9135
Subrack guiding plates	Screws included	1	NP-9222
2U 19" rackmount tray kit	Screws included	1	NP-9354

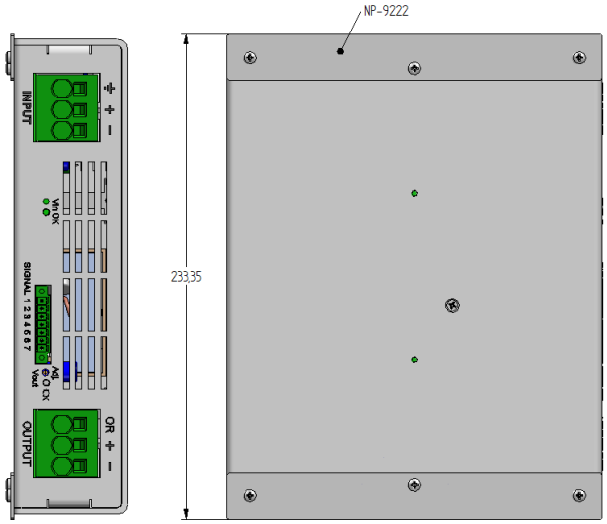
2601-395

NP-9135

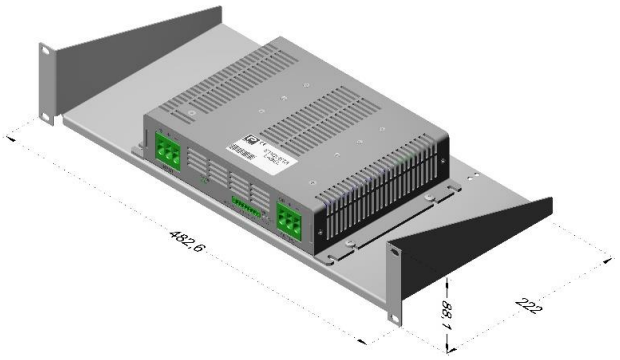
Option P + 2xNP-9135



Option P + 1xNP-9222



NP-9354



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: **CRS-500-6455... 6475**

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 61000-6-4: 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

* Optional, See annexe

CE marking year: **2009**; 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, 11-07-2022

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)</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>Electrostatic discharge</td><td>IEC61000-4-2</td><td>Case</td><td>±8kV</td><td>Air (isolated parts)</td><td rowspan="2">B</td></tr>
<tr><td></td><td></td><td></td><td>±6kV</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
Note: If this range differs from the indicated in the ordering code table, the wider one prevails.</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
Note: If these ranges differ from the indicated in the ordering code table, the wider ones prevail.</td></tr>
<tr><td>5.1.1.4</td><td>Interruptions of voltage supply</td><td>Class S1 (without interruptions)
Class S2 (10ms) option H</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: 40°C and load 100%</td></tr>
<tr><td>14 Rapid Temperature variation test</td><td>Type</td></tr>
</table>
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