CLS-120

120W WIDE INPUT RANGE DC/DC CONVERTERS

GENERAL FEATURES:

Class S2 (hold-up time 10ms) according to EN50155
Fire and smoke: EN45545-2 approved
High input-output isolation
Optional ORing
Standard size Eurocard 3U available
Adjustable output voltage
Input voltage OK LED
Output voltage presence LED
Remote sensing
Remote inhibit
Power fail



	14,4V ... 154V Input
12V output	**CLS-120-6512**
24V output	**CLS-120-6513**
48V output	**CLS-120-6514**

Specifications are subject to change without notice. These products are not intended for use as critical components in life support or nuclear systems.

INPUT	
Input voltage range continuous	14.4 … 154V
Minimum start up input voltage	16.8V
Maximum allowed input ripple	10% pp of Vin nom (EN50155)
Efficiency	See table
OUTPUT	
Output voltage	See table
Output voltage adjustment	-10% … +10% Vo nom
Line regulation (Io = nom)	< 0,2 % (Io = nom)
Load regulation (Vin = nom)	< 0,2 % or < 2 % with ORing (Vin = nom; Io: 0…100%)
Ripple	< 50 mVpp
Noise (BW = 20MHz)	< 100 mVpp
ENVIRONMENTAL	
Storage temperature	-40ºC … 85ºC
Operating temperature range at Io = 100%	-40ºC … 55ºC (See note-1)
Operating temperature range at Io = 62.5%	-40ºC … 70ºC (See note-1)
Operating temperature range at Io = 25%	-40ºC … 85ºC (See note-1)
Maximum Relative humidity	95% with no condensation
Shock and vibration	EN61373 Category 1 class B body mounted
MTBF	300.000h @ 40°C according to IEC61709
EMC	
Emission	EN50121-4, EN50121-3-2
Immunity	EN50121-4, EN50121-3-2
SAFETY	
Safety	EN62368-1, EN50155
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	< 600g
Dimensions	100 x 160 x 40mm (3U, 8Te)
CONTROL	
Enable -Vin referenced	Enable when Ve<1.5V or Open Circuit, Disable when Ve >14.4V
Power fail -Vout referenced	Open collector when Vo < 0.85…0,90 x Vo nom
Remote sense (option Q)	< 0.3V per pole
PROTECTIONS	
Against overloads and short-circuits	Current limiting
Against reverse input voltage.	Input fuse
Against input voltage out of range.	Under/over voltage lock-out
Against Input over-currents	Input fuse

Note-1: Do not handle the connection terminals below -25°C.

ORDERING CODES

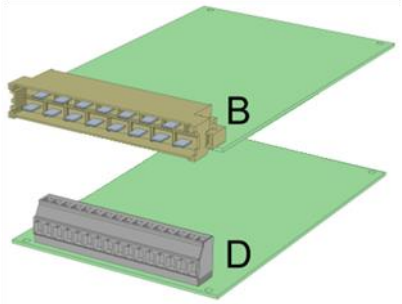
Part Number	Nominal output Power [W]	Input voltage range [V]	Maximum input current [A]	Nominal Output voltage [V]	Maximum output current [A]	Efficiency [%]
CLS-120-6512	120	14.4 – 154	9.45	12	10	88
CLS-120-6513	120	14.4 – 154	9.36	24	5	89
CLS-120-6514	120	14.4 – 154	9.26	48	2,5	90

CLS–120–65_ _–_ _

Q Remote sensing (Optional)
O ORing (Optional)

B DIN41612H15
D Spring clamp terminal

Model number

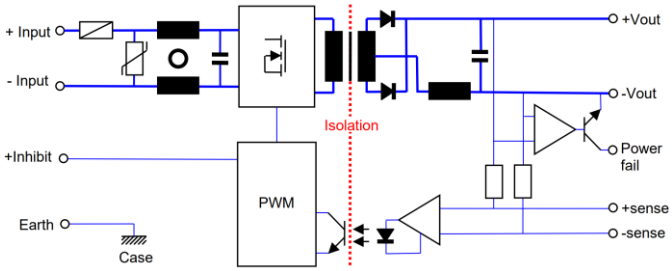


Option **ORing** only for models CLS-120-6513_O and CLS-120-6514_O (24 and 48V respectively)

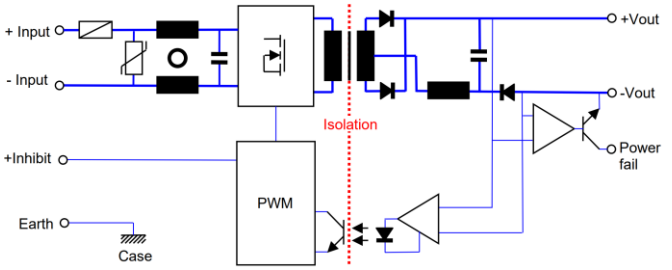
Accessories must be ordered in a separated order line

BLOCKS DIAGRAMS

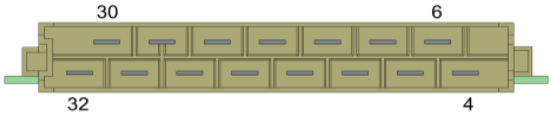
Option Q (Remote sensing)



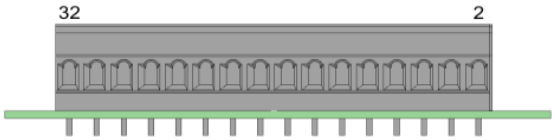
Option O (ORing)



Connector DIN41612H15 (Max. 12A / terminal)



Spring clamp terminals (Max. 12A / terminal)



Option: Q		
Terminal Function	PCB Marking	Terminal No.
+Output	+Out	4, 6
-Output	-Out	8,10
NC	-I	12, 14
+Sense	+S	16
-Sense	-S	18
P.Fail	PF	20
Enable	Inh	22
Earth	⏚	24
+ Input	+In	26, 28
- Input	-In	30, 32

Option: O		
Terminal Function	PCB Marking	Terminal No.
+Output	+Out	4, 6
-Output	-Out	8,10
NC	-I	12, 14
NC	+S	16
NC	-S	18
P.Fail	PF	20
Enable	Inh	22
Earth	⏚	24
+ Input	+In	26, 28
- Input	-In	30, 32

DESCRIPTION

The CLS-120 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 overload 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 a malfunction. Once the input reaches the lower voltage range the unit restarts automatically.

INSTALLATION

There are two connecting options:

- DIN-41612-H15 connector
- Spring clamp terminals

The product can be mounted:

- On a chassis by means of the 4 corner holes.
- In EUROCARD racks. For this application there is a standard 8Te front plate accessory reference **NP-9427**
- With the base reference **NP-9124.** This accessory can be mounted on a chassis or in DIN rail adding the clip accessory **NP-9135**.

START-UP

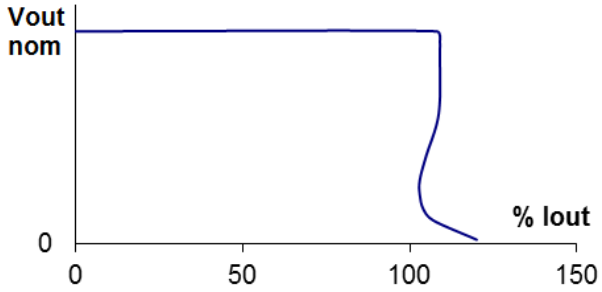
Perform connection as per the table. Use of remote sensing is not absolutely necessary, but if this is required, use of a co-axial or a twisted-pair cable is recommended.

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 card is placed in vertical position.

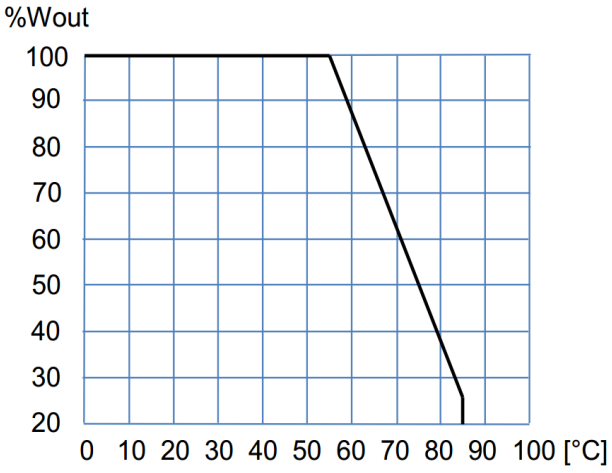
OUTPUT VOLTAGE ADJUSTMENT



TYPICAL OUTPUT CHARACTERISTIC



POWER DERATING vs AMBIENT TEMP.



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

Only use models with the "O" (ORing) option, otherwise a malfunction may occur. Set the output voltage for all converters featuring a mutual difference as small as possible. To adjust the output voltage use a small screwdriver to move a potentiometer (position indicated in the image). **Attention: use a plastic screwdriver to adjust the potentiometer to avoid accidental short circuits that could damage permanently the board.**

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

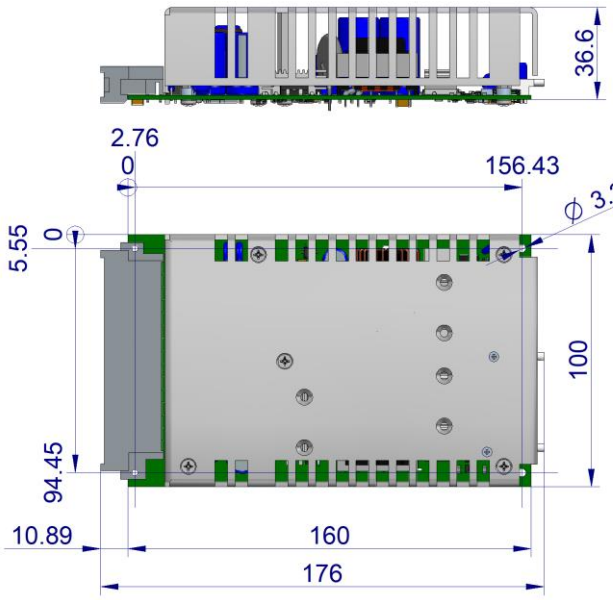
For safety reasons, the following requirements must be complied with:

Provide the equipment with some kind of protective enclosure that complies with the electrical safety directives in effect within the country where the equipment is installed.

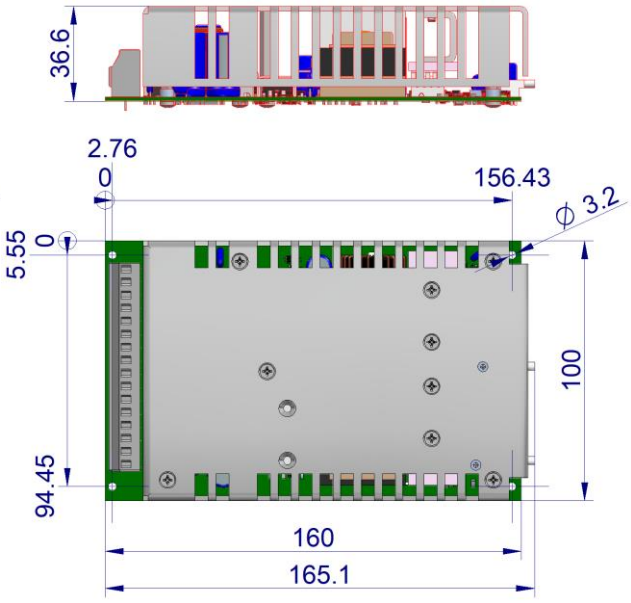
Only replace the fuse with another fuse of the same rating and type, and only after disconnecting the converter from DC power.

DIMENSIONS

B CONNECTOR

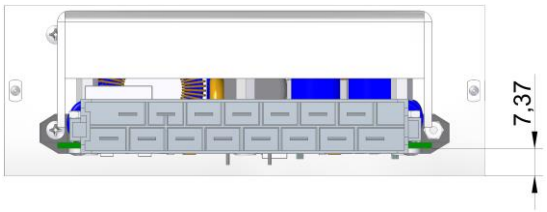


D CONNECTOR



FRONTAL DIMENSIONS

TYPE 1 (NP-9427)



TYPE 2 (NP-9464)



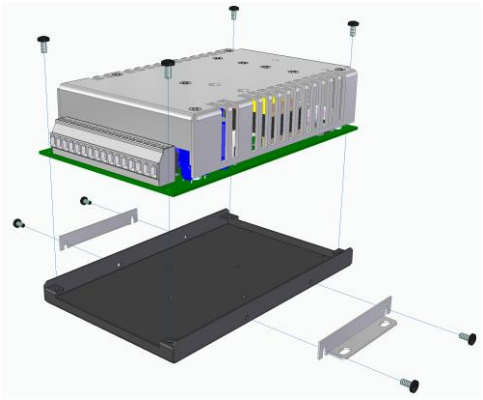
ACCESSORIES

ACCESSORIES	CODE
Mounting base	NP-9124
Rack 19” frontal panel type 1 (3U 8TE)	NP-9427
Rack 19” frontal panel type 2 (3U 8TE)	NP-9464
Solder side plastic cover with screws	NP-9465
Din rail clip for mounting base	NP-9135
Redundant connection for two units (ORing diodes + alarms contacts)	ACD-15, ACD-25

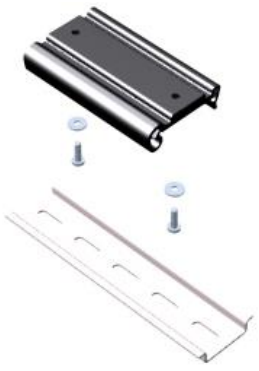
NP-9427



NP-9124



NP-9135



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: **CLS-120-6512 ... 6514**

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: **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**

ANNEX

<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 OT2 (-40 to 55°C): load < 100%
Class OT4 (-40 to 70°C): load <75%
Class OT6 (-40 to 85°C): load <25%</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 rowspan="2">Conducted emissions</td><td rowspan="2">IEC55016</td><td rowspan="2">Input</td><td>150kHz…500kHz</td><td>79dB(µV) Qpk, 66dB(µV) Av</td></tr>
<tr><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 S2 (Hold-up Time 10ms)</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: at 40°C and load 100%</td></tr>
<tr><td>14 Rapid Temperature variation test</td><td>Type</td></tr>
</table>
</td></tr>
</table>

RIA12 compatibility
Since the RIA12 standard requires 20ms transients of up to 3.5 times the nominal battery line voltage, the CLS-120 series is suitable for working with RIA12 battery lines up to 36V.