

CCS-60

50...70W SINGLE OUTPUT DC/DC CONVERTERS

GENERAL FEATURES:

- Railway features according to EN50155
- Hold up time 10ms
- Remote inhibit
- High input-output isolation
- Standard size Eurocard 3U
- Adjustable output voltage
- Remote sensing
- Input voltage OK LED
- Output voltage presence LED
- Efficiency up to 88%

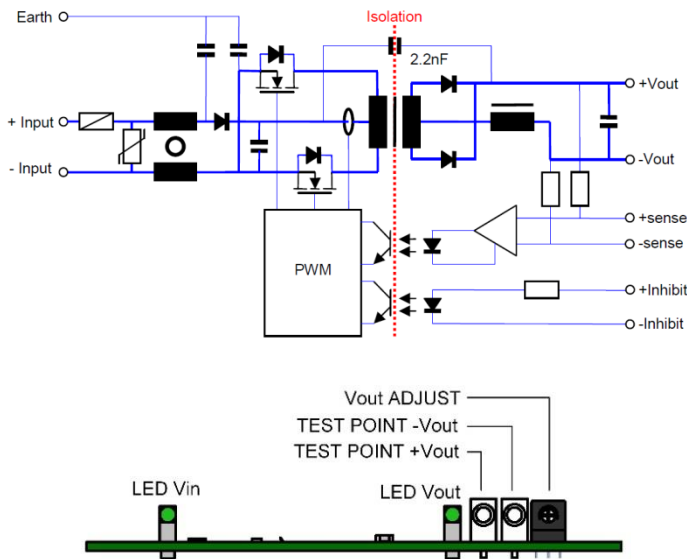


	12 Vin 9.5V ... 15V	24 Vin 14.4V ... 30V	36 Vin 21.6V ... 45V	48 Vin 28.8V ... 60V	72 Vin 43.2V ... 90V	110 Vin 66V ... 144V
5Vout	CCS-60-6551 50W	CCS-60-6555 50W	CCS-60-6571 50W	CCS-60-6559 50W	CCS-60-6563 50W	CCS-60-6567 50W
12Vout	CCS-60-6552 60W	CCS-60-6556 70W	CCS-60-6572 70W	CCS-60-6560 70W	CCS-60-6564 70W	CCS-60-6568 70W
24Vout	CCS-60-6553 60W	CCS-60-6557 70W	CCS-60-6573 70W	CCS-60-6561 70W	CCS-60-6565 70W	CCS-60-6569 70W
48Vout	CCS-60-6554 60W	CCS-60-6558 70W	CCS-60-6574 70W	CCS-60-6562 70W	CCS-60-6566 70W	CCS-60-6570 70W



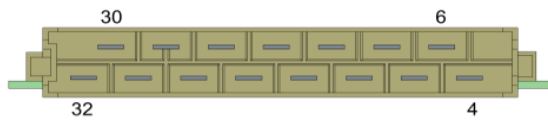
INPUT	
Input voltage range	See table
Maximum input ripple	15% V_{in} nom (EN50155)
OUTPUT	
Output voltage	See table
Output voltage adjustment range:	
$V_{imin} > 60\% V_i$ nom	-10 % ... +0 % V_o nom
$V_{imin} > 70\% V_i$ nom	-10 % ... +15 % V_o nom (Not applicable for 12V input models)
Line regulation ($I_o = \text{nom}$)	< 0,2 %
Load regulation ($V_{in} = \text{nom}$)	< 0,2 %
Ripple	< 50 mVpp
Noise (BW = 20MHz)	< 100 mVpp
Maximum remote sensing	0,3V / pole
Hold up time	10ms (Class S2 EN50155)
ENVIRONMENTAL	
Storage temperature	-40°C ... 80°C
Operating temperature at Full load	-25°C ... 60°C (-40°C ... 60°C with ripple <150mV)
Operating temperature at 75% load	-25°C ... 70°C (-40°C ... 70°C with ripple <150mV)
Operating temperature at 37.5% load	-25°C ... 85°C (-40°C ... 85°C with ripple <150mV)
Maximum Relative humidity	95% with no condensation
Shock and vibration	EN61373 Category 1 class B body mounted
MTBF	800.000h @ 40°C according to IEC61709
EMC	
Emission	EN61000-6-4, EN50121-4, EN50121-3-2
Immunity	EN61000-6-2, EN50121-4, EN50121-3-2
SAFETY	
Safety	EN-60950-1, EN68368-1, EN50155
Dielectric strength Input / Output	3000Vac, 4200Vdc 1min
Dielectric strength Input / Earth	1500Vac, 2100Vdc 1min
Dielectric strength Output / Earth	1500Vac, 2100Vdc 1min
MECHANICAL	
Approximate weight	200g
Dimensions	Eurocard 3U 5Te depth 160mm
CONTROL	
Remote inhibit range	5V... 24V
PROTECTIONS	
Against overloads and short-circuits	Current limiting
Against reverse input voltage.	Input diode
Against input under-voltage.	Under-voltage lock-out
Against Input over-currents	Input fuse

BLOCKS DIAGRAM



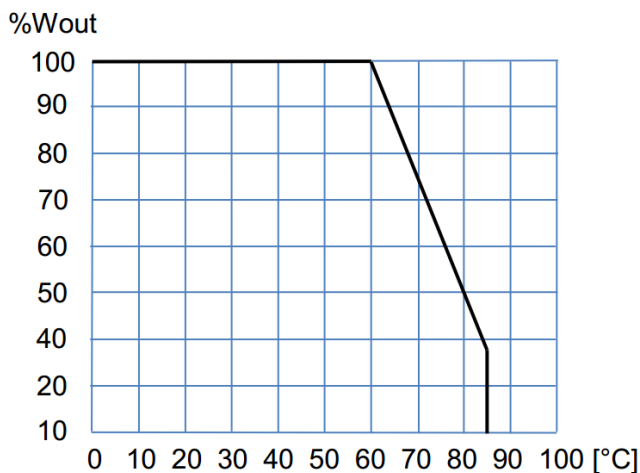
CONNECTIONS

Connector DIN41612H15 (Max. 12A / terminal)



CONNECTION	Terminal
+Vin	8,10
-Vin	(2),4,6
GND	16
+Vout	26,28,30
-Vout	20,22,24
+Sense	32
-Sense	18
+Inhibit	14
-Inhibit	12

POWER DERATING vs AMBIENT TEMP.



DESCRIPTION

The CCS-60 series consists of PWM DC-DC converters, with a galvanic isolation between input and output. The converters operate at a fixed switching frequency.

Voltage feedback is performed by transferring the error signal from the output to the primary side through an opto-coupler, where the PWM circuit changes the pulse width as required to keep the voltage output stable.

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 under-voltage condition occurs, the converter is disabled, thus preventing the battery from becoming totally discharged.

INSTALLATION

Connection: DIN-41612-H15 connector

The product can be mounted in several ways:

- On a chassis by means of the 4 holes.
- In EUROCARD racks. For this application there is a standard 5Te front plate accessory reference NP-9213.
- In the standard case IP30 code NP-9297

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.

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 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.

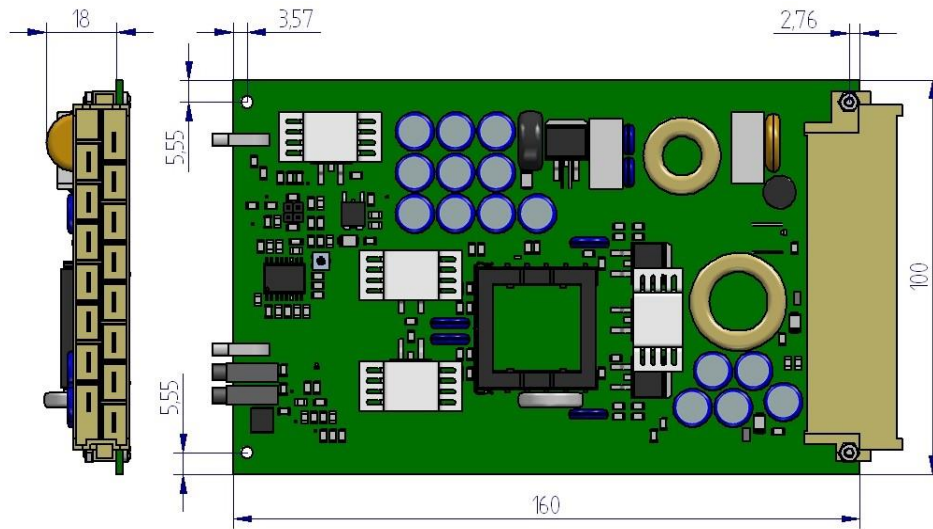
**ORDERING CODES**

Part Number	Power [W]	Input [V]	Input V range [V]	Output [V]	Output current [A]	Efficiency [%]
CCS-60-6551	50	12	9,5 - 15	5	10	81
CCS-60-6552	60	12	9,5 - 15	12	5	85
CCS-60-6553	60	12	9,5 - 15	24	2,5	86
CCS-60-6554	60	12	9,5 - 15	48	1,3	85
CCS-60-6555	50	24	14,4 - 30	5	10	82
CCS-60-6556	70	24	14,4 - 30	12	5,8	86
CCS-60-6557	70	24	14,4 - 30	24	2,9	87
CCS-60-6558	70	24	14,4 - 30	48	1,5	86
CCS-60-6571	50	36	21,6 - 45	5	10	83
CCS-60-6572	70	36	21,6 - 45	12	5,8	87
CCS-60-6573	70	36	21,6 - 45	24	2,9	87
CCS-60-6574	70	36	21,6 - 45	48	1,5	87
CCS-60-6559	50	48	28,8 - 60	5	10	83
CCS-60-6560	70	48	28,8 - 60	12	5,8	87
CCS-60-6561	70	48	28,8 - 60	24	2,9	88
CCS-60-6562	70	48	28,8 - 60	48	1,5	88
CCS-60-6563	50	72	43,2 - 90	5	10	83
CCS-60-6564	70	72	43,2 - 90	12	5,8	87
CCS-60-6565	70	72	43,2 - 90	24	2,9	88
CCS-60-6566	70	72	43,2 - 90	48	1,5	88
CCS-60-6567	50	110	66 - 144	5	10	83
CCS-60-6568	70	110	66 - 144	12	5,8	87
CCS-60-6569	70	110	66 - 144	24	2,9	88
CCS-60-6570	70	110	66 - 144	48	1,5	88

Accessories must be ordered in a separated order line



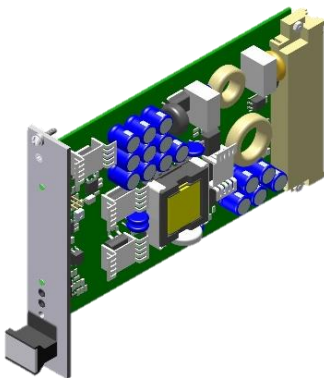
DIMENSIONS



ACCESSORIES

ACCESSORIES	CODE
Front plate 3U 5HP (25.4mm). It Includes Vout test points and LED light guides	NP-9213
Case IP30	NP-9297
Connector DIN 41612 H15 female for IP30 case	2601-379

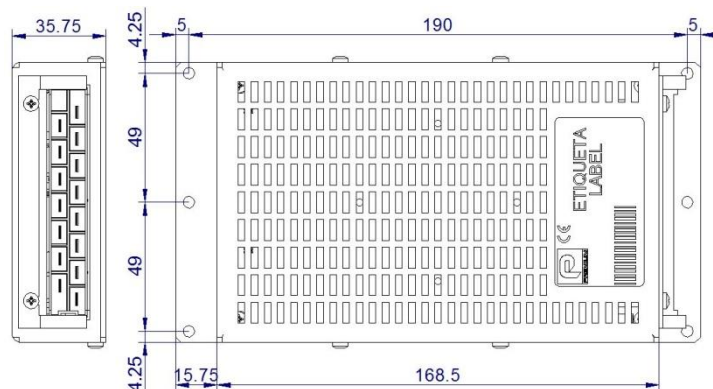
Front plate NP-9213



Case NP-9297



2601-379



Connector DIN 41612
H15 female
Cage Clamp terminal
for cables up to
1.5mm²
Model Harting09 06
015 2813





CE EU 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: **CCS-60-6555 ... 6574**

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

2014/35/EU	Low voltage
2014/30/EU	Electromagnetic compatibility
2011/65/EU	Restriction of the use of certain hazardous substances in electrical and electronic equipment (RoHS)

and that standards and/or technical specifications referenced overleaf 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: **2009**

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, 04-11-2019

Jordi Gazo
Chief Executive Officer

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 OT2 (-40 to 55°C): load < 100% (Output ripple <150mVpp) Class OT3 (-25 to 70°C): load <75% Class OT4 (-40 to 70°C): load <75% (Output ripple <150mVpp) Class OT5 (-25 to 85°C): load <37.5% Class OT6 (-40 to 85°C): load <37.5% (Output ripple <150mVpp)																																																																
4.3.3	Switch-on extended operating temp.	ST1																																																																
4.3.4	Rapid temperature variations	H1																																																																
4.3.5	Shocks and vibrations	According EN61373:2010 Category 1 class B																																																																
4.3.6	EMC Electromagnetic Compatibility EN50121-3-2:2016 EN50121-4:2016	<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="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</td> <td>Do not apply</td> </tr> <tr> <td rowspan="2">Conducted emissions</td> <td rowspan="2">IEC55016</td> <td rowspan="2">Input</td> <td>3...6GHz</td> <td>Internal freq. < 108MHz</td> </tr> <tr> <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> </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	Conducted emissions	IEC55016	Input	3...6GHz	Internal freq. < 108MHz	150kHz...500kHz	79dB(µV) Qpk, 66dB(µV) Av				500kHz...30MHz	79dB(µV) Qpk, 60dB(µV) Av																																						
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P = Performance criteria, L= Line, 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	Class S2 (up to 10ms)																																																																
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	1 Visual Inspection 2 Performance test 3 Power supply test 4 Insulation test 5 Low temperature storage test 6 Low temperature start-up test 7 Dry heat test 8 Cyclic damp heat test 9 Salt mist test 10 Enclosure protection test (IP code) 11 EMC test 12 Shocks and vibrations test 13 Equipment stress screening test 14 Rapid Temperature variation test	Routine Routine Routine Routine - Type Type Type - - Type Type Routine: 24h at 40°C and load 100% Type																																																															