

CRS-2000

2000W SINGLE OUTPUT DC/DC CONVERTERS

GENERAL FEATURES:

Designed according to EN50155
 Fire and smoke: EN45545-2
 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 93%



	24Vin 16.8V ... 30V 14.4V ... 33.6V ⁽¹⁾	36Vin 25.2V ... 45V 21.6V ... 50.4V ⁽¹⁾	48Vin 33.6V ... 60V 28.8V ... 67.2V ⁽¹⁾	72Vin 50.4V ... 90V 43.2V ... 100.8V ⁽¹⁾	110Vin 77V ... 137.5V 66V ... 154V ⁽¹⁾
24Vout	CRS-2000-6951	CRS-2000-6955	CRS-2000-6959	CRS-2000-6963	CRS-2000-6967
48Vout	CRS-2000-6952	CRS-2000-6956	CRS-2000-6960	CRS-2000-6964	CRS-2000-6968
72Vout	CRS-2000-6953	CRS-2000-6957	CRS-2000-6961	CRS-2000-6965	CRS-2000-6969
110Vout	CRS-2000-6954	CRS-2000-6958	CRS-2000-6962	CRS-2000-6966	CRS-2000-6970

Note: ⁽¹⁾ Input voltage range for 100ms.

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



INPUT	
Input voltage range	See table
Input undervoltage shutdown	55% to 60% $V_{i\text{ nom}}$
Maximum allowed input ripple	5% $V_{i\text{ nom}}$ (EN50155:2021)
Maximum inrush current	< $I_{i\text{ max}}$ (Only for H option)
OUTPUT	
Output voltage	See table
Output voltage adjustment:	
$V_{i\text{ min}} = 60\% V_{i\text{ nom}}$	-10% ... +0% $V_{o\text{ nom}}$
$V_{i\text{ min}} = 70\% V_{i\text{ nom}}$	-10% ... +15% $V_{o\text{ nom}}$
Line regulation ($I_o = \text{nom}$)	< 0.2 %
Load regulation ($V_{i\text{ in}} = \text{nom}$, $I_o: 0...100\%$)	< 0.2 %
Ripple and noise (BW: 20MHz)	< 100 mVpp ($T^a: -25^\circ\text{C} \dots 70^\circ\text{C}$) < 150 mVpp ($T^a: -40^\circ\text{C} \dots -25^\circ\text{C}$)
Max. overvoltage protection	< 140% $V_{o\text{ out nom}}$
Max. overcurrent protection	105 ... 110% $I_{o\text{ out nom}}$
Maximum remote sense	0.3V / pole
Hold up time	10ms (only for option H)
ENVIRONMENTAL	
Storage temperature	-40°C ... 85°C
Operating temperature range $I_o: 100\%$	-40°C ... 55°C (OT1-2) ⁽²⁾
Operating temperature range $I_o: 62.5\%$	-40°C ... 70°C (OT3-4) ⁽²⁾
Cooling	Internal forced air controlled
Maximum Relative humidity	95% with no condensation
Shock and vibration	EN61373:2010 Category 1 class B body mounted with accessory NP-9282
MTBF	250.000h @ 40°C according to IEC61709:2017
Service life (at 40°C and 75% load)	20 years (fan maintenance after 10 years is required)
EMC	
Emission according to	EN50121-3-2:2016, EN50121-4:2016, EN61000-6-4:2019 ⁽³⁾
Immunity according to	EN50121-3-2:2016, EN50121-4:2016, EN61000-6-2:2019 ⁽³⁾
SAFETY	
Safety according to	EN62368-1:2020
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
MECHANICAL	
Approximate weight	<6kg
CONTROL	
Remote inhibit range	Logic: 1=OFF, Range: $V_{i\text{ in}}$
Alarm contacts	1A @ 24Vdc, 0.3A @ 150Vdc, 0.5A @ 125Vac
Local: Input OK, Output OK	Green LEDs
PROTECTIONS	
Against overloads and short-circuits	Current limiting
Against output over-voltages	Self-recovery
Against over-temperature	Shutdown with self-recovery
Against reverse input polarity	Input fuse (Active protection for option H)
Against input under-voltage	Under-voltage lock-out
Against input over-voltage	Over-voltage lock-out
Against input over-currents	Input fuse

Notes:⁽²⁾ Below -25°C, handling the signals connector is not recommended.⁽³⁾ The emissions and immunity standard that the product meets depend on its part number (CRS-2000-69XX**S-or-ZXX**).

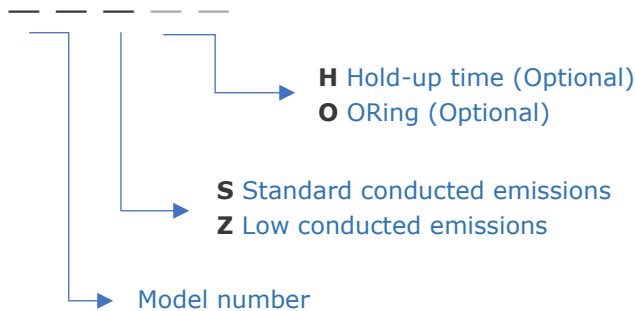


ORDERING CODES

Part Number	Input				Output			Efficiency Full load [%]
	Voltage			Current	Voltage	Current	Power	
	Nominal [V]	Range 100ms [V]	Range cont. [V]	Max. [A]	Nom. [V]	Max. [A]	Max. [W]	
CRS-2000-6951	24	14.4 - 33.6	16.8 - 30	135	24	83.3	2000	88
CRS-2000-6952	24	14.4 - 33.6	16.8 - 30	134	48	41.7	2000	89
CRS-2000-6953	24	14.4 - 33.6	16.8 - 30	132	72	27.8	2000	90
CRS-2000-6954	24	14.4 - 33.6	16.8 - 30	131	110	18.2	2000	91
CRS-2000-6955	36	21.6 - 50.4	25.2 - 45	88,2	24	83.3	2000	90
CRS-2000-6956	36	21.6 - 50.4	25.2 - 45	88,2	48	41.7	2000	90
CRS-2000-6957	36	21.6 - 50.4	25.2 - 45	87,2	72	27.8	2000	91
CRS-2000-6958	36	21.6 - 50.4	25.2 - 45	87,2	110	18.2	2000	91
CRS-2000-6959	48	28.8 - 67.2	33.6 - 60	65,4	24	83.3	2000	91
CRS-2000-6960	48	28.8 - 67.2	33.6 - 60	64,7	48	41.7	2000	92
CRS-2000-6961	48	28.8 - 67.2	33.6 - 60	64,7	72	27.8	2000	92
CRS-2000-6962	48	28.8 - 67.2	33.6 - 60	64,7	110	18.2	2000	92
CRS-2000-6963	72	43.2 - 100.8	50.4 - 90	43,6	24	83.3	2000	91
CRS-2000-6964	72	43.2 - 100.8	50.4 - 90	43,1	48	41.7	2000	92
CRS-2000-6965	72	43.2 - 100.8	50.4 - 90	42,7	72	27.8	2000	93
CRS-2000-6966	72	43.2 - 100.8	50.4 - 90	42,7	110	18.2	2000	93
CRS-2000-6967	110	66 - 154	77 - 137.5	28,2	24	83.3	2000	92
CRS-2000-6968	110	66 - 154	77 - 137.5	27,9	48	41.7	2000	93
CRS-2000-6969	110	66 - 154	77 - 137.5	27,9	72	27.8	2000	93
CRS-2000-6970	110	66 - 154	77 - 137.5	27,9	110	18.2	2000	93

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

CRS - 2000 - 69

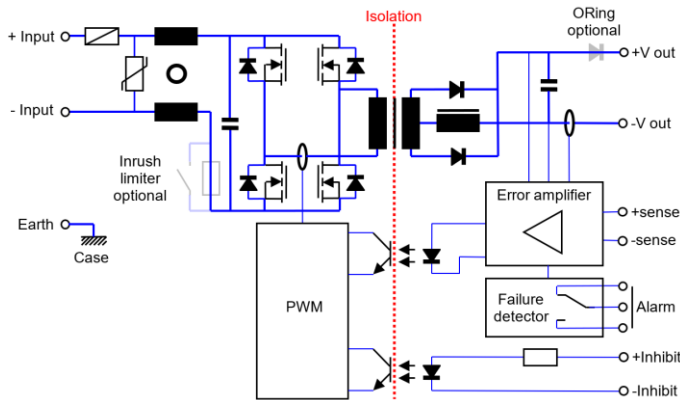


OPTIONS INFORMATION	Letter code
EMC according to EN50121-3-2:2016, EN61000-6-4:2019	S
EMC according to EN50121-4:2016, EN50121-3-2:2016, EN61000-6-4:2019	Z
Hold up time of 10ms at 2000W. Includes: <ul style="list-style-type: none"> Active protection against input reverse polarity Active inrush current limiter at < In max (Maximum Input current) 	H
ORing FET for redundancy. Includes a passive current sharing by voltage drop < 2.5%	O

Accessories must be ordered in a separate order line.



BLOCKS DIAGRAM



DESCRIPTION

The CRS-2000 series consists of DC-DC converters with galvanic isolation between input and output. The converters operate at a fixed switching frequency and use full-bridge converter topology.

For optimum regulation, remote sensing terminals must be connected on the load allowing to compensate for a voltage drop up to 0.3V on each cable.

A current limiting circuit protects the PSU against overloads and short-circuits.

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

Under input undervoltage condition the PSU is disabled to prevent excessive discharge on the battery. Once the input is within the range the unit restarts automatically.

START-UP

Cable connection should follow power and signal connection figures. Remote sensing is not mandatory, but if it 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 be made unusable due to the acting of the internal fuse protection.

If power levels close to the maximum 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 paralleled, do as follows:

- Adjust output voltage of paralleled PSUs till they values match.
- Join the load outputs by using cables with a cross-section no greater than the one required and of equal length.
- Connect both output loads using cable with proper cross-section area and equal length.
- Do not use remote sensing.

For safety reasons, provide the equipment with a protective enclosure that complies with the electrical safety directives in effect within the country where the equipment is installed.

INSTALLATION

It is possible to install the unit by means of the threaded holes on the bottom or using mounting brackets, see accessories section.

The inlet and outlet air must be free of elements that cause an airflow reduction (the minimum recommended distance to other objects is 50mm).

It is necessary to consider the environmental conditions of maximum temperature and altitude since they can limit the maximum output power.

See cabling recommendation below.

LEDs

The CRS-2000 is equipped with 4 LEDs that light up when:

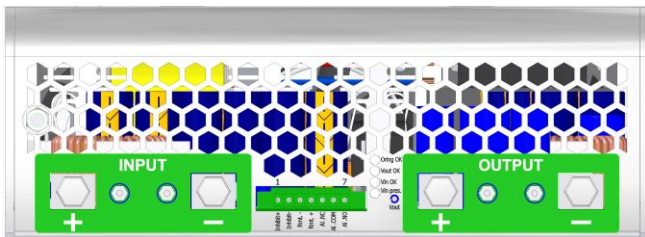
- **Vin pres.** → Control supply voltage OK
- **Vin OK** → 70% < Input voltage < 125% of nominal
- **Vout OK** → 90% < Output voltage < 115% of nominal
- **ORing OK** → ORing circuitry is active

ALARMS

The alarm is activated when one of the following occurs:

- 70% > Input voltage > 125% of nominal voltage
- 90% > Output voltage > 115% of nominal voltage
- There is a defective fan → LED *Vin OK* blinks at 2Hz
- Internal temperature > 98°C → LED *Vin OK* blinks at ½Hz
- ORing circuitry fails → LED *ORing OK* blinks at 2Hz and output turns off

CONNECTIONS



Power connections

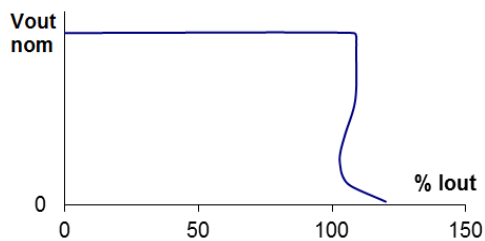
Input and Output: M6x10mm, maximum torque 1.5Nm

Earth: M5 Threaded stud

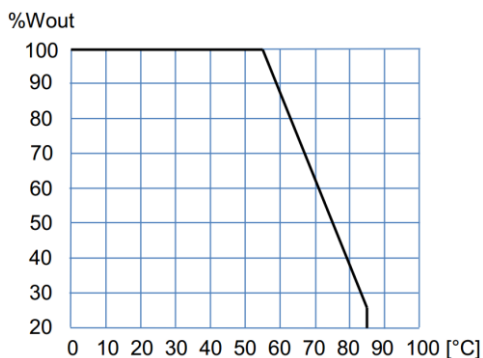
Signals connector

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.



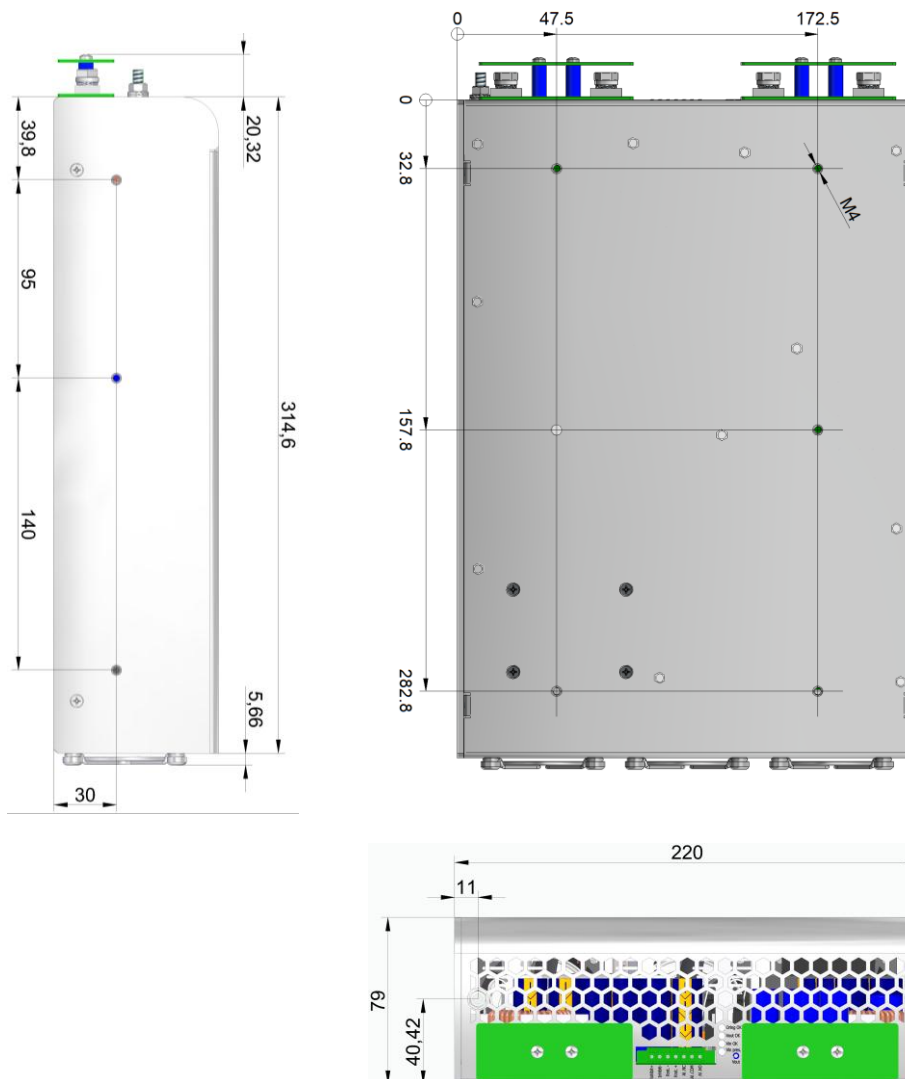
CABLING RECOMMENDATIONS

	Input					Output			
	24 V	36 V	48 V	72 V	110 V	24 V	48 V	72 V	110 V
Maximum current	135 A	88.2 A	65.4 A	43.6 A	28.2 A	83.3 A	41.7 A	27.8 A	18.2 A
Cable cross-section	50 mm²	25 mm²	16 mm²	10 mm²	6 mm²	25 mm²	10 mm²	6 mm²	4 mm²

WORKING PARAMETERS

Input voltage parameters	24V	36V	48V	72V	110V
High input voltage instantaneous shutdown	34.1V	51.1V	68.2V	102.2V	156.2V
High input voltage timed shutdown (t >100ms) (Full load)	31.2V	46.8V	62.4V	93.6V	143V
Start-up voltage	18-30.5V	27-45.7V	36-61V	54-91.4V	82.5-139.7V
Low input voltage timed shutdown (t >100ms) (Full load)	15.6V	23.4V	31.2V	46.8V	71.5V
Low input voltage instantaneous shutdown	13.9V	20.9V	27.8V	41.8V	63.8V

DIMENSIONS

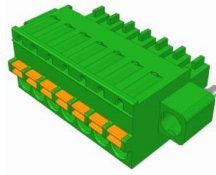


Note: All fixing holes are M4, maximum screw length inside the converter 4.5mm, maximum torque 0.6Nm.

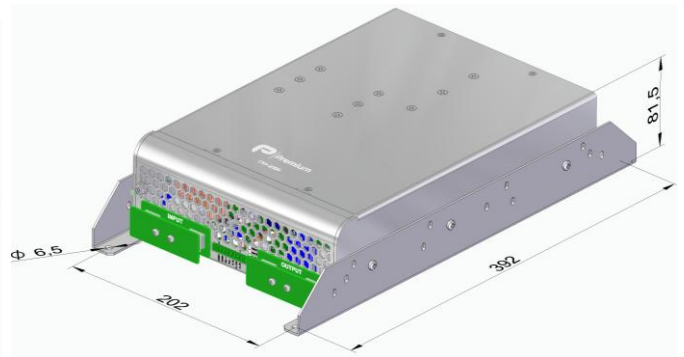
ACCESSORIES

Description	Notes	CODE
Signals mating connector	Phoenix Contact FK-MCP 1,5/ 7-STF-3,81	2601-395
Mounting brackets kit	Contains two brackets and screws	NP-9282
6U Subrack mounting kit	Contains two brackets and screws	NP-9634

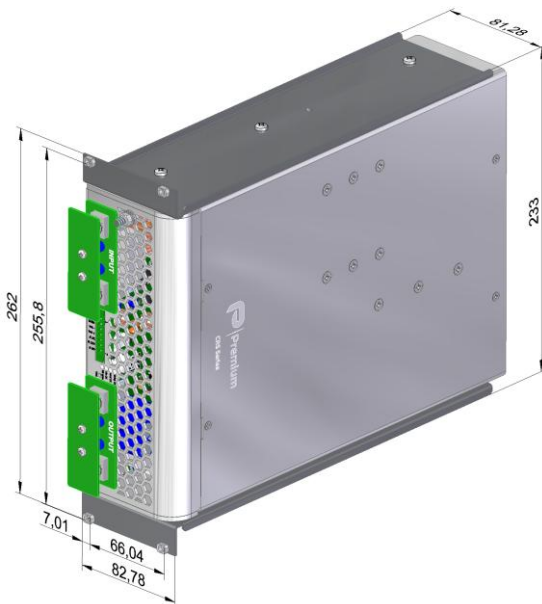
2601-395



NP-9282



NP-9634





CE|UK CA 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-2000-6951 ... 6970**

is in conformity with the provisions of the following EU directives and UK legislation:

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 62368-1: 2020	Safety. Audio/video information and communication technology equipment
EN 61000-6-4: 2019	Generic emission standard
EN 61000-6-2: 2019	Generic immunity standard
EN 50155: 2021*	Railway applications. Electronic equipment used on rolling stock material
EN 50121-3-2: 2016* IEC 62236-3-2: 2018*	Railway applications. EMC Rolling stock equipment
EN 50121-4: 2016* IEC 62236-4: 2018*	Railway applications. EMC of the signaling and telecommunications apparatus

* See annexe

CE marking year: **2021**; 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, 21-10-2021

Albert Sole
Technical Director

PREMIUM S.A. is an ISO9001 and ISO14001
certified company by **Bureau Veritas**

ANNEXE

Applicable values for the different sections of the norm EN50155:2021																																																																		
4.4.1	Working altitude	Up to 2000m																																																																
4.4.2	Working temperature	Class OT2 (-40 to 55 °C): load <100 % Class OT4 (-40 to 70 °C): load <62.5 %																																																																
4.4.3	Switch-on extended operating temp.	ST1																																																																
4.4.4	Rapid temperature variations	H1																																																																
4.4.5	Shocks and vibrations	According EN61373:2010 Category 1 class B																																																																
4.4.6	EMC Electromagnetic Compatibility EN50121-3-2:2016 IEC62236-3-2:2018 EN50121-4:2016 IEC62236-4:2018	<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="4">Radiated emissions</td> <td rowspan="4">IEC55016 :2019</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>Do not apply</td> </tr> <tr> <td>3...6GHz</td> <td>Internal freq. < 108MHz</td> </tr> <tr> <td rowspan="2">Conducted emissions</td> <td rowspan="2">IEC55016 :2019</td> <td rowspan="2">Input</td> <td>150kHz...500kHz</td> <td>EN50121-3-2: 99dB(μV) Qpk EN50121-4: 79dB(μV) Qpk, 66dB(μV) Av</td> </tr> <tr> <td>500kHz...30MHz</td> <td>EN50121-3-2: 93dB(μV) Qpk EN50121-4: 73dB(μV) Qpk, 60dB(μV) Av</td> </tr> </tbody> </table>	Test	Norm	Port	Frequency	Limits	Radiated emissions	IEC55016 :2019	Case	30MHz...230MHz	40dB(μV/m) Qpk at 10m	230MHz...1GHz	47dB(μV/m) Qpk at 10m	1...3GHz	Do not apply	3...6GHz	Internal freq. < 108MHz	Conducted emissions	IEC55016 :2019	Input	150kHz...500kHz	EN50121-3-2: 99dB(μV) Qpk EN50121-4: 79dB(μV) Qpk, 66dB(μV) Av	500kHz...30MHz	EN50121-3-2: 93dB(μV) Qpk EN50121-4: 73dB(μV) Qpk, 60dB(μV) Av																																									
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4.4.7	Relative humidity	Up to 95%																																																																
5.2.2	DC power supply range	From 0.60 to 0.70 Un 0.1s	Performance criteria A																																																															
		From 0.70 to 1.25 Un continuous	Performance criteria A																																																															
		From 1.25 to 1.40 Un 0.1s	Performance criteria A																																																															
		From 1.25 to 1.40 Un 1s	Performance criteria C																																																															
5.2.4	Interruptions of voltage supply	Class S2																																																																
5.2.5	Supply change-over	Class C1 (0.6 Un duration 100ms without interruptions. Performance criterion A)																																																																
5.2.7	Input ripple factor	10% peak to peak with a DC Ripple Factor of 5 %																																																																
7.2.7	Input reverse polarity protection	By fuse																																																																
10.7	Protective coating for PCB assemblies	Class PC2																																																																
13.3	Tests list	<table border="1"> <tbody> <tr><td>1</td><td>Visual Inspection</td><td>Routine</td></tr> <tr><td>2</td><td>Performance test</td><td>Routine</td></tr> <tr><td>3</td><td>Power supply test</td><td>Type</td></tr> <tr><td>4</td><td>Low temperature start-up test</td><td>Type</td></tr> <tr><td>5</td><td>Dry heat test</td><td>Type</td></tr> <tr><td>6</td><td>Low temperature storage test</td><td>-</td></tr> <tr><td>7</td><td>Insulation test</td><td>Routine</td></tr> <tr><td>8</td><td>Cyclic damp heat test</td><td>Type</td></tr> <tr><td>9</td><td>EMC test</td><td>Type</td></tr> <tr><td>10</td><td>Shocks and vibrations test</td><td>Type</td></tr> <tr><td>11</td><td>Enclosure protection test (IP code)</td><td>-</td></tr> <tr><td>12</td><td>Equipment stress screening test</td><td>Routine: 40°C and load 100%</td></tr> <tr><td>13</td><td>Rapid Temperature variation test</td><td>-</td></tr> <tr><td>14</td><td>Salt mist test</td><td>Type</td></tr> </tbody> </table>	1	Visual Inspection	Routine	2	Performance test	Routine	3	Power supply test	Type	4	Low temperature start-up test	Type	5	Dry heat test	Type	6	Low temperature storage test	-	7	Insulation test	Routine	8	Cyclic damp heat test	Type	9	EMC test	Type	10	Shocks and vibrations test	Type	11	Enclosure protection test (IP code)	-	12	Equipment stress screening test	Routine: 40°C and load 100%	13	Rapid Temperature variation test	-	14	Salt mist test	Type																						
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