

# 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



PRELIMINARY



	14,4V ... 154V Input
12V output	<b>CLS-120-6512</b>
24V output	<b>CLS-120-6513</b>
48V output	<b>CLS-120-6514</b>

**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% ... +15% 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	-40°C ... 85°C
Operating temperature range at Io = 100%	-40°C ... 55°C (See note-1)
Operating temperature range at Io = 62.5%	-40°C ... 70°C (See note-1)
Operating temperature range at Io = 25%	-40°C ... 85°C (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 (option Q)	Enable when Ve < 1.5V or Open Circuit, Disable when Ve > 14.4V
Power fail -Vout referenced (option Q)	Open collector when Vo < 0.85...0,90 x Vo nom
Remote sense (option Q)	< 0.3V per pole
Isolated remote inhibit (option R)	OFF: 14.4V ... 154V, ON: < 1.5V or Open Circuit
Isolated low output voltage alarm (option R)	Isolated solid state relay: Open when Vo < 0.85...0.90 Vo nom max. 100mA, 160V

**PROTECTIONS**

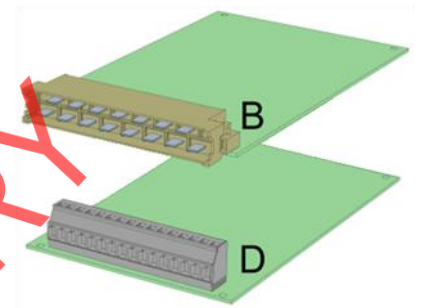
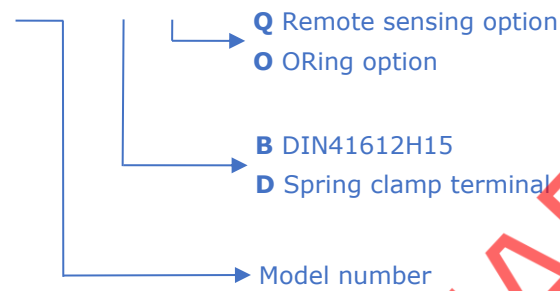
Against overloads and short-circuits	Current limiting
Against reverse input voltage.	Input fuse
Against input voltage out of range.	Under/over voltage lock-out
Against Input over-currents	Input fuse

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 [%]
<b>CLS-120-6512</b>	120	14.4 – 154	9.45	12	10	88
<b>CLS-120-6513</b>	120	14.4 – 154	9.36	24	5	89
<b>CLS-120-6514</b>	120	14.4 – 154	9.26	48	2,5	90

CLS-120-65 \_ \_ \_ \_

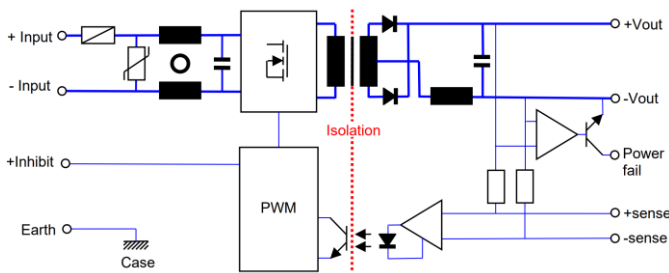


Option ORing only for models CLS-120-6513\_O and CLS-120-6513\_O (24 and 48V respectively)  
Accessories must be ordered in a separated order line

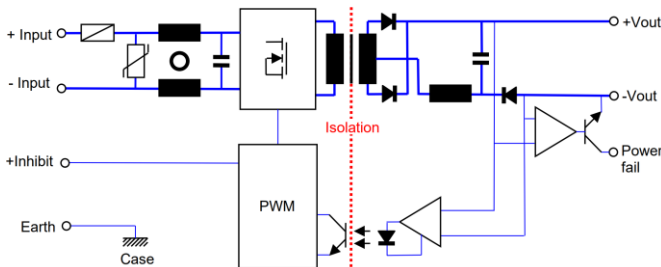
PRELIMINARY

## BLOCKS DIAGRAMS

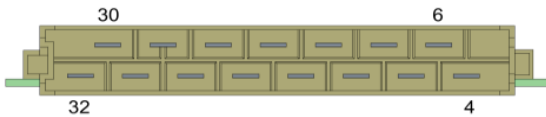
### Option Q (Remote sensing)



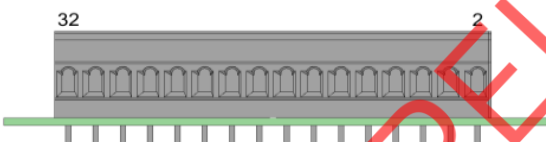
### Option O (ORing)



### 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	Ihn	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	Ihn	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 the battery from becoming totally discharged.

## 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 coaxial or a twisted-pair cable is recommended.

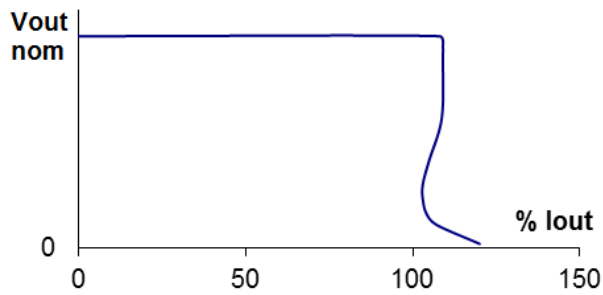
**WARNING:** If the load is connected to the tabs of remote sensing (+/-S) and the connection from the output to this load is missing the remote sensing function could make unusable due to the acting of the internal fuse of protection. If power levels close to the maximum output are required, make sure 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.



### TYPICAL OUTPUT CHARACTERISTIC



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

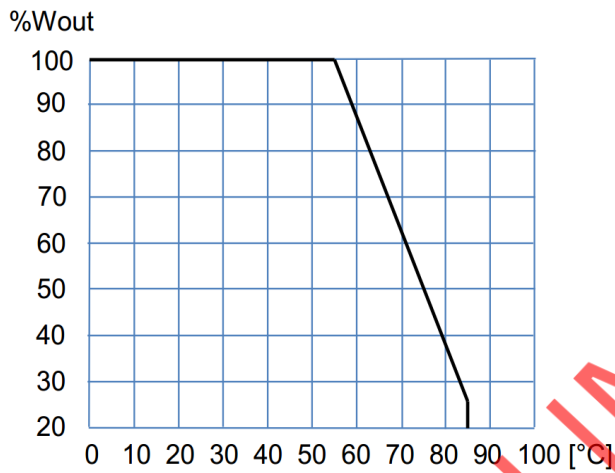
Do not use remote sensing.

**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.

### POWER DERATING vs AMBIENT TEMP.

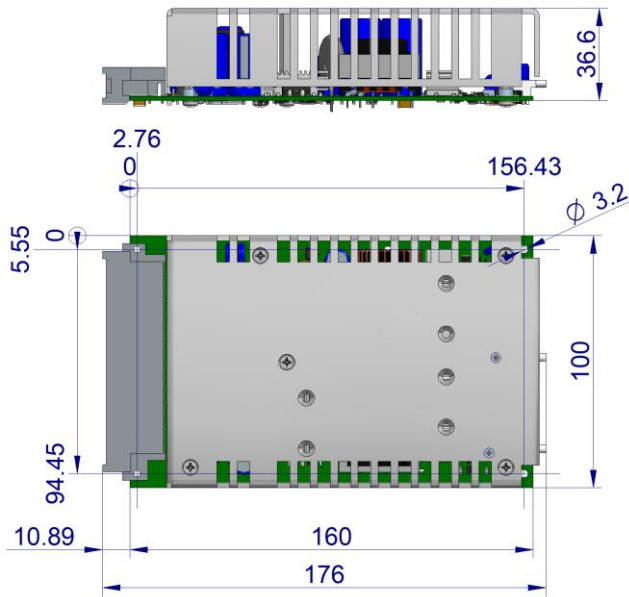


PRELIMINARY

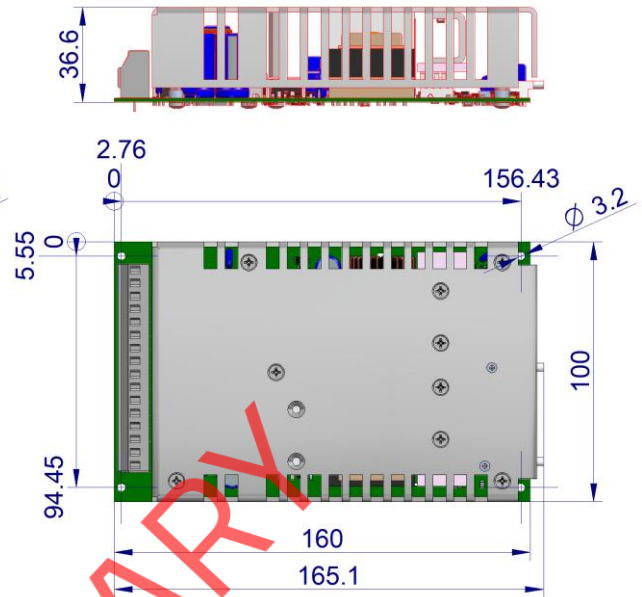


## DIMENSIONS

### B CONNECTOR

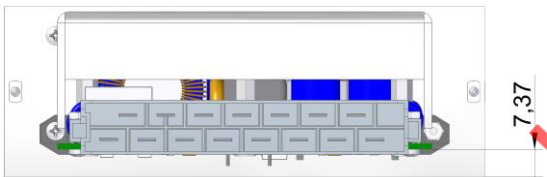


### D CONNECTOR

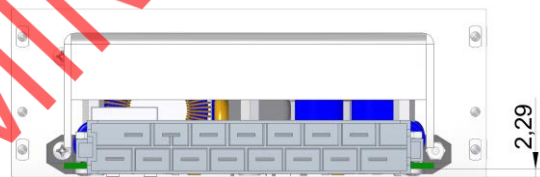


## FRONTAL DIMENSIONS

### TYPE 1 (NP-9427)



### TYPE 2 (NP-9464)



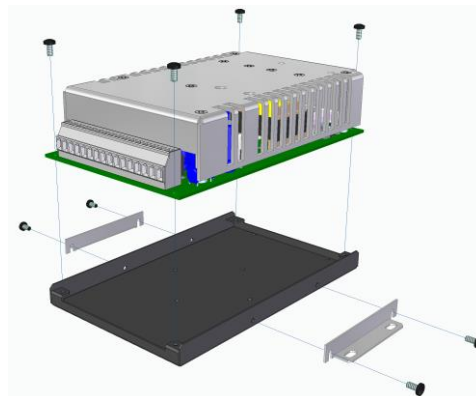
## ACCESSORIES

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

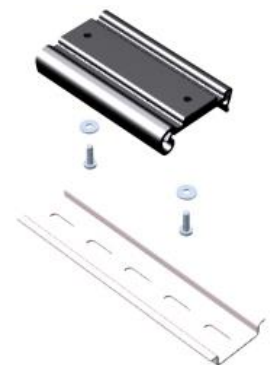
NP-9427



NP-9124



NP-9135





# 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: **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 ISO9001 and ISO14001  
certified company by **Bureau Veritas**

## ANNEX

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 OT2 (-40 to 55°C): load < 100% Class OT4 (-40 to 70°C): load <75% Class OT6 (-40 to 85°C): load <25%																																																																	
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="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>Do not apply</td> </tr> <tr> <td>3...6GHz</td> <td>Internal freq. &lt; 108MHz</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> </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	3...6GHz	Internal freq. < 108MHz	Conducted emissions	IEC55016	Input	150kHz...500kHz	79dB(µV) Qpk, 66dB(µV) Av				500kHz...30MHz	79dB(µV) Qpk, 60dB(µV) Av																																							
		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																																																													
					3...6GHz	Internal freq. < 108MHz																																																													
		Conducted emissions	IEC55016	Input	150kHz...500kHz	79dB(µV) Qpk, 66dB(µV) Av																																																													
					500kHz...30MHz	79dB(µV) Qpk, 60dB(µV) Av																																																													
		<table border="1"> <thead> <tr> <th>Test</th> <th>Norm</th> <th>Port</th> <th>Severity</th> <th>Conditions</th> <th>P</th> </tr> </thead> <tbody> <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>B</td> </tr> <tr> <td>±8kV</td> <td>Contact (conductive parts)</td> <td></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> </tbody> </table>	Test	Norm	Port	Severity	Conditions	P	Electrostatic discharge	IEC61000-4-2	Case	±8kV	Air (isolated parts)	B	±8kV	Contact (conductive parts)		Radiated high-frequency	IEC61000-4-3	X/Y/Z Axis	20V/m	0.08...1.0GHz M. 80% 1kHz	A	10V/m	1.4...2.1GHz M. 80% 1kHz	5V/m	2.1...2.5GHz M. 80% 1kHz	3V/m	5.1...6GHz M. 80% 1kHz	Fast transients	IEC61000-4-4	Input	±2kV	Tr/Th: 5/50 ns	A	Output	±2kV	Signal	±2kV	PE	±1kV	Surge	IEC61000-4-5	Input L to L	±1kV	Tr/Th: 1.2/50µs	B	Input L to PE	±2kV	Conducted RF	IEC61000-4-6	Input	10V	0.15...80MHz M. 80% 1kHz	A	Output	10V	Signal	10V	PE	10V	Magnetic field	IEC61000-4-8	X/Y/Z Axis	300A/m	0Hz, 16.7Hz, 50/60Hz	A
		Test	Norm	Port	Severity	Conditions	P																																																												
		Electrostatic discharge	IEC61000-4-2	Case	±8kV	Air (isolated parts)	B																																																												
					±8kV	Contact (conductive parts)																																																													
Radiated high-frequency	IEC61000-4-3	X/Y/Z Axis	20V/m	0.08...1.0GHz M. 80% 1kHz	A																																																														
			10V/m	1.4...2.1GHz M. 80% 1kHz																																																															
			5V/m	2.1...2.5GHz M. 80% 1kHz																																																															
			3V/m	5.1...6GHz M. 80% 1kHz																																																															
Fast transients	IEC61000-4-4	Input	±2kV	Tr/Th: 5/50 ns	A																																																														
		Output	±2kV																																																																
		Signal	±2kV																																																																
		PE	±1kV																																																																
Surge	IEC61000-4-5	Input L to L	±1kV	Tr/Th: 1.2/50µs	B																																																														
		Input L to PE	±2kV																																																																
Conducted RF	IEC61000-4-6	Input	10V	0.15...80MHz M. 80% 1kHz	A																																																														
		Output	10V																																																																
		Signal	10V																																																																
		PE	10V																																																																
Magnetic field	IEC61000-4-8	X/Y/Z Axis	300A/m	0Hz, 16.7Hz, 50/60Hz	A																																																														
		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 (Hold-up Time 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 fuse																																																																	
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																																																																