Premium
Powering Your Challenge

AC Master series (TDS/TDX)

3.3kW AC/AC Voltage & Frequency Changer

GENERAL FEATURES:

Designed according to EN50155
Fire and smoke: EN45545-2
High input-output isolation
Remote start signal
Output failure alarm
Output short circuit protection
Over temperature shutdown
Low inrush current
94% efficiency
HV DC input allowed



Models	Input	Output
TDS-3300-7801	400V three phase	230V single phase
TDX-3300-7802	400V three phase	400V three phase

INPUT		
Nominal voltages	400 - 480 Vac three phase or 600 Vdc	
AC voltage range	360 … 528 Vac	
DC voltage range	400 … 740 Vac	
Frequency range	47 … 63 Hz	
Maximum input current	6.8 Aac 3ph or 8.8 Adc	
Inrush current	< 12 Apk	
Efficiency	> 93.5% at nominal conditions	
OUTPUT	**TDS-3300**	**TDX-3300**
Type	AC single phase	AC three phase
Nominal AC voltage	230 V	400V
Maximum continuous current	14.4 A	4.77A
Waveform	Sinusoidal	
Voltage adjust range	20 … 100 %	
Frequency	5 … 75 Hz	
Load regulation	< 4.5 %	
Line regulation	< 1 %	
Maximum active power	3.3 kW	
Maximum apparent power	3.3 kVA	
RELIABILITY		
MTBF (SN29500)	150 kh	
Service life	20 years	
ENVIRONMENTAL		
Derating output power / temperature	-2.5 %/ºC	
Operating temperature:		
Full load	-40 – 55 ºC (OT2 & OT1 acc. to EN50155:2021)	
62.5 % load	-40 – 70 ºC (OT4 & OT3 acc. to EN50155:2021)	
Cooling	Internal forced air with fan speed control	
Relative humidity	5-95 % with no condensation	
Shock and vibration	EN61373:2010 Category 1 class B body mounted	
Environmental regulations	RoHS according to directive 2015/863/EU and REACH	
Altitude	2000 m	
MECHANICAL		
Mechanical shape	Slotted case	
Height	84.8 mm	
Width	245.4 mm	
Depth	421.7 mm	
Weight	5.80 kg	
SAFETY		
Safety according to	EN50124-1:2017 Railway app. (Insulation coordination)	
Pollution degree	PD2	
Overvoltage category	OV2	
Dielectric strength Input-Output	3000 Vac / 50 Hz / 1 min	
Dielectric strength Input-Earth	1500 Vac / 50 Hz / 1 min	
Dielectric strength Output-Earth	1500 Vac / 50 Hz / 1 min	
Dielectric strength Signals-Output	1500 Vac / 50 Hz / 1 min	
Dielectric strength Signals-Earth	500 Vac / 50 Hz / 1 min	
Fire and smoke	EN45545-2:2020	
Protection degree	IP20	
Isolation resistance Input /Output	>20 MΩ at 500 V_{dc}	
Isolation resistance Input/Earth	>20 MΩ at 500 V_{dc}	
Isolation resistance Output/Earth	>20 MΩ at 500 V_{dc}	

Isolation resistance Signals/Output	>20 MΩ at 500 V_{dc}
Isolation resistance Signals/Earth	>20 MΩ at 500 V_{dc}
Time for discharging all voltages under 60V	< 1 minute

ADDITIONAL FEATURES

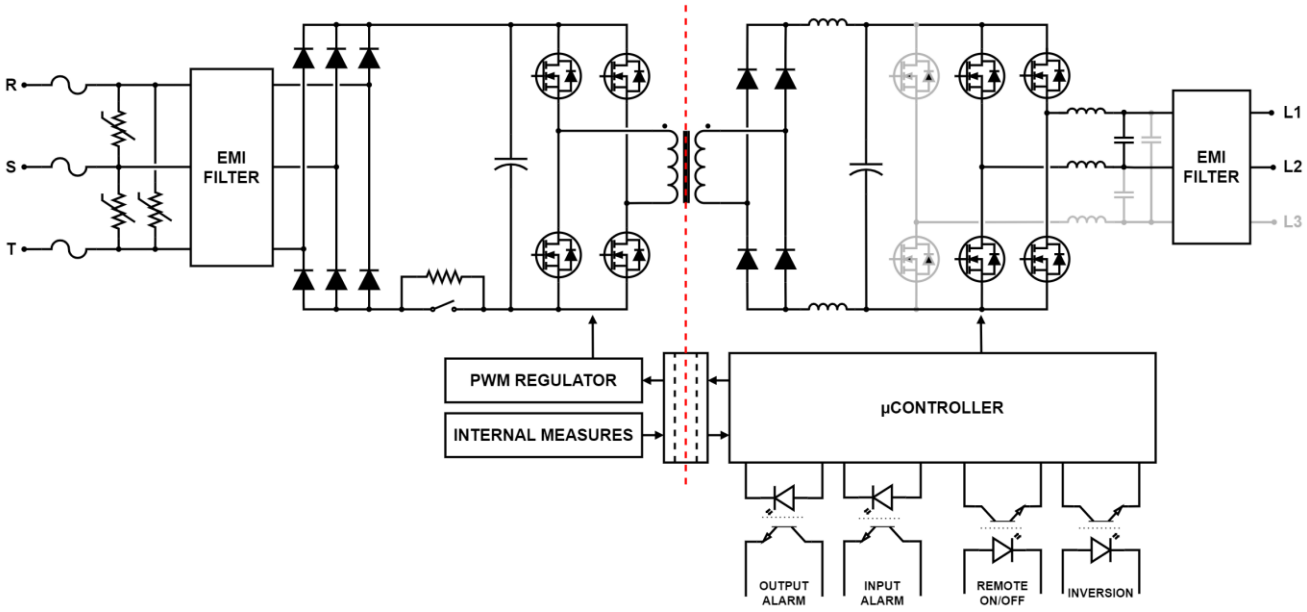
Output protected against overloads and short circuits	By shutdown when I^2t is exceeded
Over-temperature shutdown	Self-recoverable
Input over-voltage lockout	
Input under-voltage lockout	

ORDERING CODES

TD_–3300–780_–_

- **D** For DC voltage input (optional)
- Model number
- **S** Single phase output
  X Three phase output

BLOCKS DIAGRAM



DESCRIPTION

The TDS and TDX series are AC/AC or DC/AC isolated voltage and frequency changers.

The unit maintains the output voltage stable within the whole input voltage range.

In addition, they can withstand load peaks according to a I^2T characteristic curve and limiting short circuits at the output, disabling it and restarting itself after a certain time. If short circuit is persistent after a determined number of restarts, the output switches off and an input voltage reset is needed. The output can be activated or deactivated with an opto-isolated remote ON/OFF signal and has an output and input failure opto-isolated alarm, which is activated if an error is detected (output short circuit, output overload, internal DC bus out of margins or input voltage out of specs).

INSTALLATION

- The unit has 6 threaded holes for the fixation on a mounting surface.
- The unit has internal fans. For an appropriate cooling, the air input and output should be free of elements that cause an air flow reduction (minimum recommended distance to other objects 50 mm).
- Make connections according to the connections picture and table.
- The ground connection can be done through the stud on the front side.

For safety reasons, the following requirements must be met:

- 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.
- Protect the input line using time lag fuses or circuit breaker curve D with a rating higher than the maximum input current.
- Use cables of adequate cross-section to connect inputs and outputs. The following table lists the maximum currents and the minimum cross-sections for the cables used for each power connection.

	Input 400 V 3ph	Input 600 V DC (D option)	Output TDS-3300 230 V 1ph	Output TDX-3300 400 V 3ph
Maximum current	6.8 A	8.8 A	14.4 A	4.77 A
Internal fuse	T 10A 600Vac	none	none	none
Cable cross-section	**2.5 mm^2**	**2.5 mm^2**	**2.5 mm^2**	**2.5 mm^2**

CONNECTIONS



AC INPUT or DC INPUT	J5-1	Phase R	AC 3 phase voltage or DC voltage using two phases in any polarity	Cables 2.5 … 4mm²
	J5-2	Phase S		
	J5-3	Phase T		
AC OUTPUT	J4-1	L1		
	J4-2	L2		
	J4-3	L3	Only for TDX-3300	
Earth	-	PE	Protective Earth	Stud M5
Reverse rotation	J2A-1	+	Only for TDX-3300	Recommended aerial female: Phoenix Contact FK-MCP 1.5/4-STF-3.81
	J2B-1	-		
Remote ON-OFF	J2A-2	+	Remote ON	
	J2B-2	-		
Input status	J2A-3	no polarity	Input status signal, free potential solid-state relay	
	J2B-3			
Output status	J2A-4	no polarity	Output status signal, free potential solid-state relay	
	J2B-4			
RS-232	J1-2	RX	RS-232 communications	DB9
	J1-3	TX		
	J1-5	GND		
CAN BUS	J3-1	L	CAN BUS communications	Recommended aerial female: Phoenix Contac MC1.5/3-STF-3.81
	J3-2	H		
	J3-3	GND		

SIGNAL	TYPE	SPECIFICATIONS	DESCRIPTION
Input Status	Output	Potential-free solid-state relay without polarity. Maximum current 160mA, maximum blocking voltage 140V	CLOSED if input voltage is within range, OPEN if input voltage is out of specs
Output status			CLOSED if the AC output is running, OPEN when it's idle.
Remote ON/OFF	Input	Potential free with polarity optocoupled. Maximum applying voltage 140V.	17V > applied voltage < 140V, output disabled. 0V > applied voltage < 12V (or open circuit), output enabled.
Reverse rotation			

OVERLOAD PROTECTION

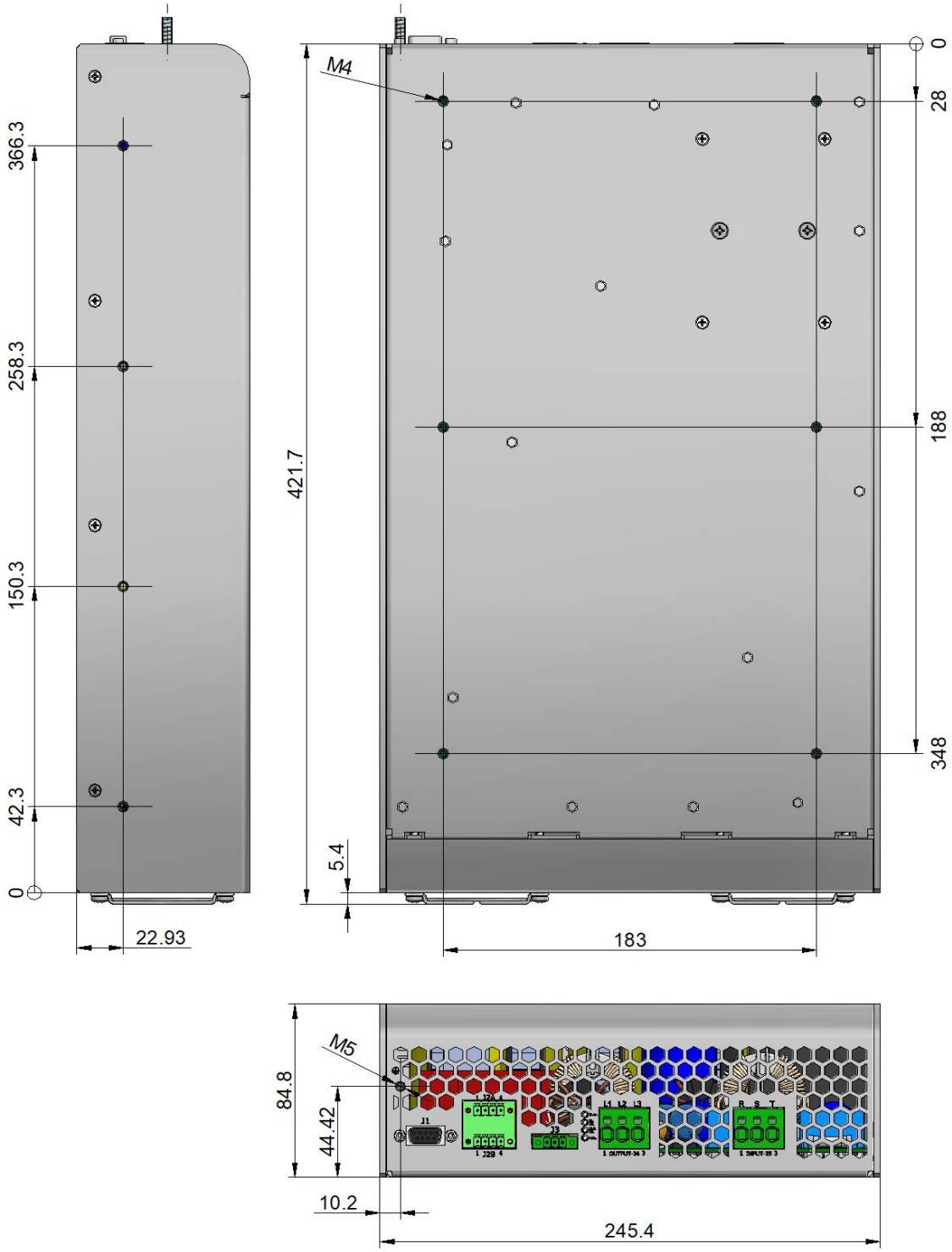
Protection against overloads and short-circuits	By **current** limiting at Iopk By **I²t**. The unit shutdowns when the current-time is over the continuous operation curve	
Overload protection recovery	Every 4 seconds after shutdown, the unit tries to restart up to 3 times. If the overload persists, the unit reminds shutdown until an **input reconnection**.	

RS232 COMMUNICATION PORT

It is possible to control and monitor de unit via RS232 by means a terminal emulator like "Tera Term" or "Putty".
Also it is possible to control and monitor de unit directly using the protocol showed in table:
Protocol configuration: ASCII code, 57600 bauds, parity none, 8 bits, 1bit stop

Header		Function	Parameter		Returns	Command description
P	R	L	V		PTV■■■.■	Input voltage in Volts
			U		PTURS=■■■■ *[13]*UST=■■■■ *[13]*UTR=■■■■	Output voltage in Volts RMS Phase-Neutral (*[13]* = char 13 of ASCII code)
			I		PTIR=■■.■■*[13]*IS=■■.■■ *[13]*IT=■■.■■	Output current in Amps RMS (*[13]* = char 13 of ASCII code)
			T		PTT■■■.■	Internal temperature1 in K
			F		PTF■■■.■	Nominal output frequency in Hz
			f		PTf■■■.■	Actual output frequency in Hz
			y		PTy■■■.■	Actual output voltage set-point in V
			S		PTS■■■.■	AC output state **999.9** → Enabled **000.0** → Disabled **222.2** → Blocked by overload **111.1** → Blocked by overload or shortcircuit
			M		PTM■■■■	Model number
			R		PTR■■■■	Firmware version
			Other		PTE	Command not supported
		G	1	■■■.■	OK / ERR	Set the low input voltage timed shutdown in V
			2	■■■.■	OK / ERR	Set the minimum alarm input voltage in V
			3	■■■.■	OK / ERR	Change the status bit (after start up enabled with SW3 =LOCAL and disabled with SW3 =REMOTE) **999.9** → AC output enabled **000.0** → AC output disabled
			4	■■■.■	OK / ERR	Set the output voltage Phase-neutral in Vrms (Vo)(output must be stopped) 040.0≤ ■■■.■ ≤ 230.0
			5	■■■.■	OK / ERR	Set the maximum output current in Arms 20% I_{nom} ≤ ■■■.■ ≤ 100% I_{nom}
			6	■■■.■	OK / ERR	Set the nominal output frequency in Hz (Fo) (output must be stopped) 005.0 ≤ ■■■.■ ≤ 075.0
			7	■■■.■	OK / ERR	Set the alarm maximum output current 0 < ■■■.■ ≤ 100% $I_{max_warning}$
			8	■■■.■	OK / ERR	**111.1** → Reset the AC output
			L	■■■.■	OK / ERR	Set the minimum input starting voltage in Volts
			O	■■■.■	OK / ERR	Set the initial frequency in the startup (Fi) 005.0 ≤ ■■■.■ ≤ 075.0
			P	■■■.■	OK / ERR	Set the ramp-up in increment of "N" cycles per Hz in mode V/F, frequency changes or start-up (Note-1) 001.0 ≤ ■■■.■ ≤ 100.0
			Q	■■■.■	OK / ERR	Set the ramp-down in decrement of "N" cycles per Hz in mode V/F (Note-1) 002.0 ≤ ■■■.■ ≤ 100.0
			Y	■■■.■	OK / ERR	Change the working mode of the input J4-1,J4-2 **111.1** → Input as reverse phase control (default) **222.2** → Input as mid-power control (Note-2)
			X	■■■.■	OK / ERR	Set the mid-power frequency for V/F mode by the use of input J4-1,J4-2 005.0 ≤ ■■■.■ ≤ 75.0
		M	1	■■■.■	OK / ERR	Set a new output frequency in Hz (output must be run and not stored in memory) 005.0 ≤ ■■■.■ ≤ 075.0
			2	■■■.■	OK / ERR	Set a new output voltage in Volts (output must be run and not stored in memory) 040.0 ≤ ■■■.■ ≤ 230.0
			3	■■■.■	OK / ERR	Set a new output frequency in Hz in mode V/F (output must be run and not stored in memory) 005.0 ≤ ■■■.■ ≤ 075.0
			4	■■■.■	OK / ERR	Changes the output phase order (output must be run and not stored in memory) **111.1** → Phase RST (direct phase) **222.2** → Phase SRT (reverse phase)

MECHANICAL DIMENSIONS

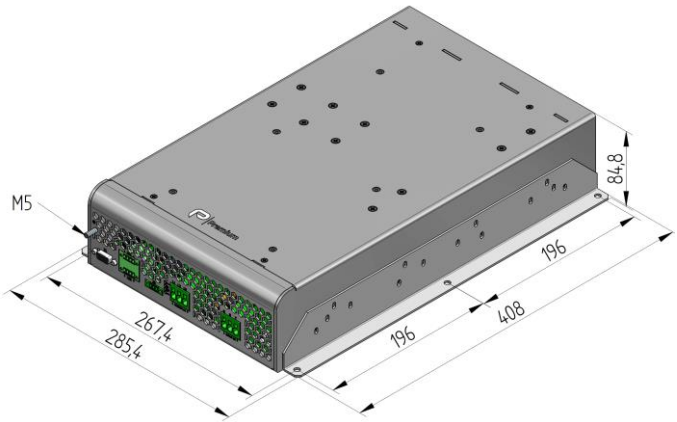


Remark: The maximum allowable depth penetration for the fixation threaded holes M4 is 4.5mm

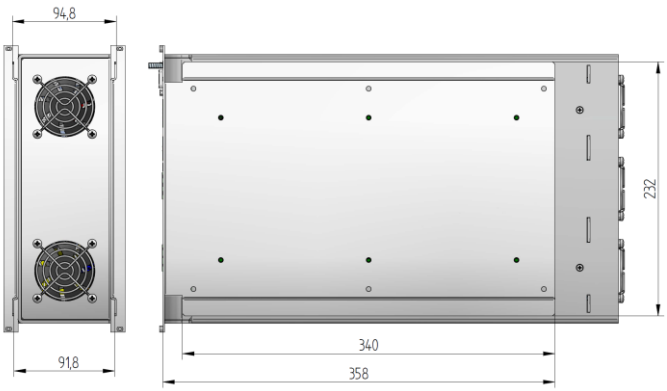
ACCESSORIES

Description	Notes	CODE
Standard Mounting brackets kit	Contains two brackets and screws	NP-9282
Special mounting brackets kit	Contains two brackets and screws	NP-9643
Guiding and fixing kit for 19” 6U subrack	Contains two pieces and all necessary screws	NP-9644

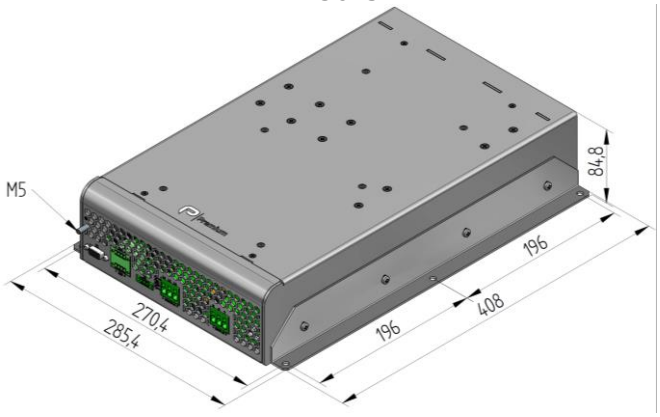
NP-9282

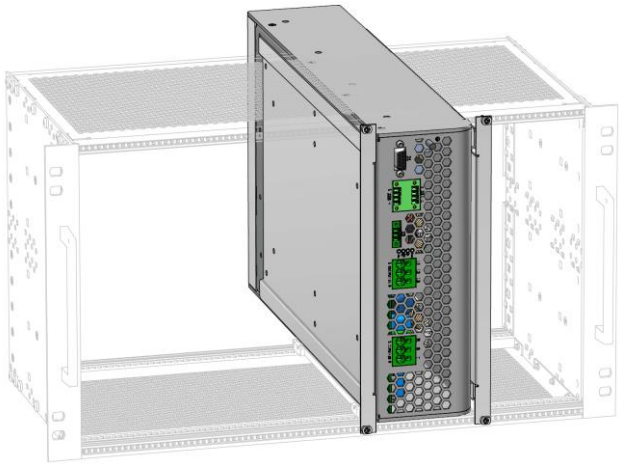


NP-9644



NP-9643





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: AC/AC converter
Models: **TDS-3300-7801**

is in conformity with the provisions of the following EU directives or UK regulations:

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 signalling and telecommunications apparatus

* See annexe

CE marking year: 2023; UKCA marking year: 2023

Notes:

For the fulfilment 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, 14-06-2023

Albert Sole
Technical Director

PREMIUM S.A. is an ISO9001and ISO14001 certified company by **Bureau Veritas**

ANNEX A

<table>
<tr><th colspan="3">Applicable values for the different sections of the norm EN50155:2021</th></tr>
<tr><td>4.4.1</td><td>Working altitude</td><td>AX, up to 2000m</td></tr>
<tr><td>4.4.2</td><td>Operating temperature</td><td>Class OT1 (-25 to 55°C): load < 100%
Class OT2 (-40 to 55°C): load < 100%
Class OT3 (-25 to 70°C): load < 62.5%
Class OT4 (-40 to 70°C): load < 62.5%</td></tr>
<tr><td>4.4.3</td><td>Switch-on extended operating temp.</td><td>ST1: OTx + 15 ºC, test cycle B</td></tr>
<tr><td>4.4.4</td><td>Rapid temperature variations</td><td>H1</td></tr>
<tr><td>4.4.5</td><td>Shocks and vibrations</td><td>According EN61373:2011 Category 1 class B</td></tr>
<tr><td>4.4.6</td><td>EMC Electromagnetic Compatibility

EN50121-3-2:2016
IEC 62236-3-2: 2018</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">EN61000-6-4</td><td rowspan="4">Case</td><td>30-230 MHz</td><td>40 dB(µV/m) Qpk at 10 m</td></tr>
<tr><td>230-1 GHz</td><td>47 dB(µV/m) Qpk at 10 m</td></tr>
<tr><td>1-3 GHz</td><td rowspan="2">Do not apply
Internal freq. < 108 MHz</td></tr>
<tr><td>3-6 GHz</td></tr>
<tr><td>Conducted emissions</td><td>EN55016-2-1</td><td>Input & Output</td><td>150-500 kHz</td><td>99 dB(µV) Qpk</td></tr>
<tr><td></td><td></td><td></td><td>0.5-30 MHz</td><td>93 dB(µV) Qpk</td></tr>
<tr><td>THD (Total Harmonic Distortion)</td><td>EN61000-4-30</td><td>Output</td><td>50 Hz-2 KHz</td><td>< 8%</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">EN61000-4-2</td><td rowspan="2">Case</td><td>±8 kV</td><td>Air (isolated parts)</td><td rowspan="2">B</td></tr>
<tr><td>±6 kV</td><td>Contact (conductive parts)</td></tr>
<tr><td rowspan="4">Radiated high-frequency</td><td rowspan="4">EN61000-4-3</td><td rowspan="4">Case
X/Y/Z Axis</td><td>20 V/m</td><td>0.08-1.0 GHz M. 80% 1 kHz</td><td rowspan="4">A</td></tr>
<tr><td>10 V/m</td><td>1.4-2 GHz M. 80% 1 kHz</td></tr>
<tr><td>5 V/m</td><td>2-2.7 GHz M. 80% 1 kHz</td></tr>
<tr><td>3 V/m</td><td>5.1-6 Ghz M. 80% 1 kHz</td></tr>
<tr><td rowspan="3">Fast transients</td><td rowspan="3">EN61000-4-4</td><td>Input</td><td rowspan="3">±2 kV</td><td rowspan="3">Tr/Th: 5/50 ns, 5 kHz</td><td rowspan="3">A</td></tr>
<tr><td>Output</td></tr>
<tr><td>Signals</td></tr>
<tr><td rowspan="2">Surge</td><td rowspan="2">EN61000-4-5</td><td>Input L to L</td><td>±1 kV</td><td rowspan="2">Tr/Th: 1.2/50 µs</td><td rowspan="2">B</td></tr>
<tr><td>Input L to PE</td><td>±2 kV</td></tr>
<tr><td rowspan="3">Conducted RF</td><td rowspan="3">EN61000-4-6</td><td>Input</td><td>10 V</td><td rowspan="3">0.15-80 MHz M. 80% 1 kHz</td><td rowspan="3">A</td></tr>
<tr><td>Output</td><td>10 V</td></tr>
<tr><td>Signal</td><td>10 V</td></tr>
</table>
P= Performance criteria, L= Line, PE= Protective Earth
</td></tr>
<tr><td>4.4.7</td><td>Relative humidity</td><td>Up to 95%</td></tr>
<tr><td>5.3.2</td><td>Supply by AC auxiliary power converter</td><td>It shall operate satisfactorily for the voltage characteristics given in EN50533.</td></tr>
<tr><td>6.1.1</td><td>Predicted reliability SN29500</td><td>150kh</td></tr>
<tr><td>6.2</td><td>Useful life</td><td>L4, 20 years</td></tr>
<tr><td>7.2.1</td><td>Insulation coordination EN50124-1:2016</td><td>PD2, OV2</td></tr>
<tr><td>7.2.8</td><td>Inrush current</td><td>< 12A</td></tr>
<tr><td>10.7</td><td>Protective coating for PCB assemblies</td><td>PC2</td></tr>
<tr><td>11.4</td><td>Fire behaviour</td><td>EN45545-2:2020</td></tr>
<tr><td>13.3</td><td>Tests list</td><td>
<table>
<tr><th>TEST</th><th>TYPE</th><th>ROUTINE</th></tr>
<tr><td>1. Visual inspection</td><td>✓</td><td>✓</td></tr>
<tr><td>2. Performance test</td><td>✓</td><td>✓</td></tr>
<tr><td>3. DC power supply test</td><td>✗ (1)</td><td>✗ (1)</td></tr>
<tr><td>4. Low temperature test (start-up)</td><td>✓</td><td>✗</td></tr>
<tr><td>5. Dry heat test</td><td>✓</td><td>✗</td></tr>
<tr><td>6. Low temperature storage test</td><td>✓</td><td>✗</td></tr>
<tr><td>7. Insulation test</td><td>✓</td><td>✓</td></tr>
<tr><td>8. Cyclic damp heat test</td><td>✓</td><td>✗</td></tr>
<tr><td>9. Electromagnetic compatibility test</td><td>✓</td><td>✗</td></tr>
<tr><td>10. Shock and vibration test</td><td>✓</td><td>✗</td></tr>
<tr><td>11. Enclosure protection test (IP code)</td><td>✗</td><td>✗</td></tr>
<tr><td>12. Stress screening test</td><td>✗</td><td>40°C and load 100%</td></tr>
<tr><td>13. Rapid temperature variation test</td><td>✗</td><td>✗</td></tr>
<tr><td>14. Salt mist test</td><td>✗</td><td>✗</td></tr>
</table>
</td></tr>
</table>

Note (1) Not applicable because the unit does not have DC power supply ports