OVX-6400

6400VA DC/AC INVERTER

GENERAL FEATURES:

Sine wave output voltage
Suitable for motors control
Adjustable output frequency
Adjustable output voltage
High input-output isolation 5200V_{RMS}
Remote off opto-coupled
Alarm by isolated relay contacts
Configurable input: Reverse or Mid power
Remote control via RS232
CAN BUS
Designed according to EN61287-1
Input voltage according to:
- EN50163:2006
- EN50124-2:2017

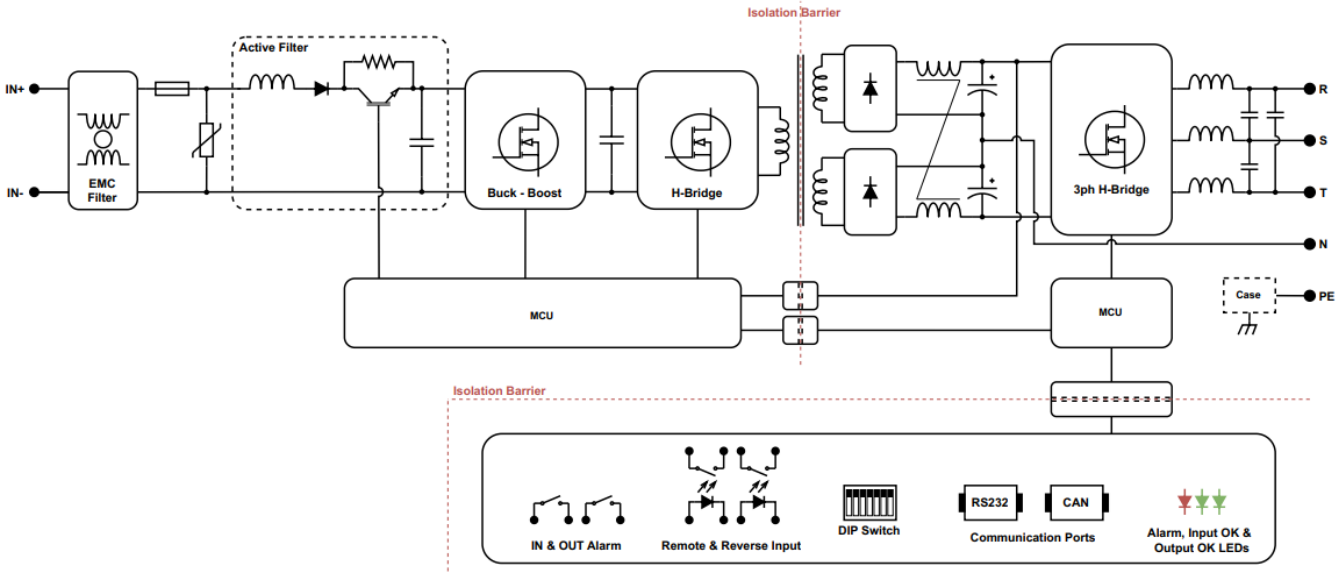
Fire and smoke: EN45545-2 pending

	Input voltage	Transient input overvoltage	Output voltage	Output power
OVX-6400-7701	400 … 900 V_{DC}	None	400V three phase	6kW 6.4kVA 8kW_{PK}
OVX-6400-7701Z	400 … 900 V_{DC}	2800V acc. EN50163	400V three phase	6kW 6.4kVA 8kW_{PK}

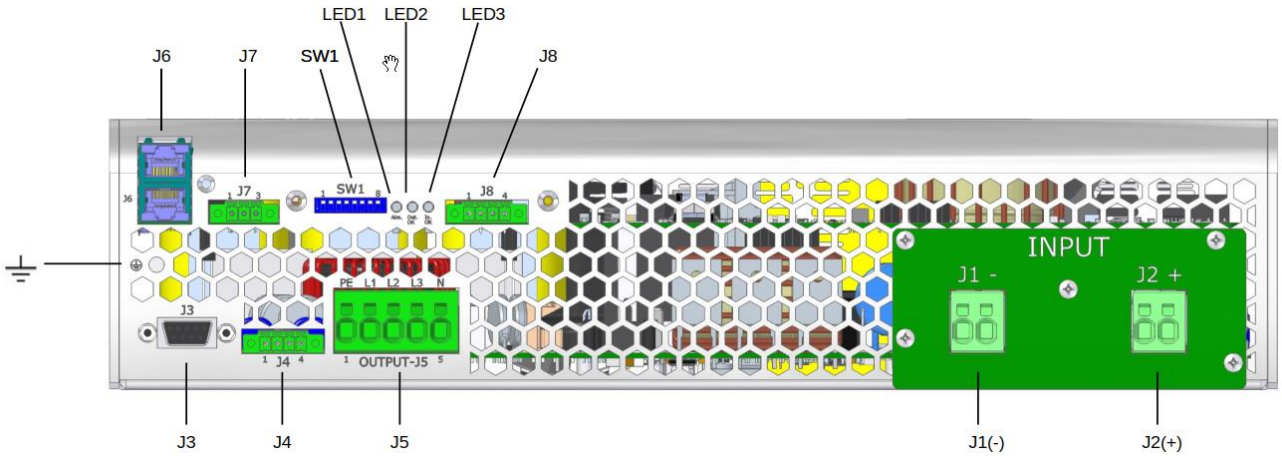
INPUT	
Nominal DC input voltage	600 / 750V
Minimum DC input voltage	400V continuous
Maximum DC input voltage	900V continuous
Maximum Input overvoltage	Only for the model OVX-6400-7701Z: • EN50163:2006 (Supply voltage of traction systems) • 2800V according to EN50124-2=2017 4.2.2 and Annex A
Maximum input ripple	±5% V_{PP} from 300 to 360Hz
Inrush current	15A
OUTPUT	
Output type	AC 3ph with neutral
Output Voltage	400V line to line
Output Waveform	Sinusoidal
Voltage tolerance	±5%
Output voltage range	20…100% of V_{OUT} (adjust via remote control)
Output frequency	50 / 60Hz via DIP-switch, 5…75Hz via RS-232
Maximum continuous current (I_{RMS})	9.24A
Maximum peak current 5s (I_{RMS})	11.5A
Continuous active / apparent power	6000W / 6400VA
Peak active / apparent power 5s	8000W / 8000VA
Load regulation	< 4.5%
Line regulation	< 2%
Output wave distortion THD	< 2% (average of 16 samples)
Output HF ripple	< 2.5%
ENVIRONMENTAL	
Storage temperature	-25 … 80°C
Operating ambient temperature: Full load 62.5% load	 -25 … 55°C, 70ºC 10 min (SU3 class, according to EN61287-1) -25 … 70°C
Relative humidity without condensation	5 … 95%
Maximum Altitude	2000m at full load
Cooling	Internal forced air controlled
Shock and Vibrations according to	EN61373:2011 Category 1 class B body mounted
Environmental regulations	RoHS & Reach according to directive 2011/65/EU
EMC	
Immunity according	EN61000-6-2, EN50121-3-2
Emissions according	EN61000-6-4, EN50121-3-2
SAFETY	
Safety according to	EN50124-1 Railway app. (Insulation coordination)
Dielectric strength: Input-Output	5200V_{RMS} 50Hz 1min.
Dielectric strength: Input-Earth	3400V_{RMS} 50Hz 1min.
Dielectric strength: Output-Earth	2300V_{RMS} 50Hz 1min.
Pollution degree	PD2
Overvoltage category	OV3
Fire and smoke	EN45545-2
RELIABILITY	
MTBF	100.000h @40ºC according to SN29500
Life cycle	20 years (fan maintenance after 10 years is required)

MECHANICAL	
Dimensions (H x W x D mm)	87 x 430 x 450
Weight	< 12 kg
Protection degree	IP20
PROTECTIONS	
Against reverse input voltage	Series diode at the input
Against input under-voltage	Under-voltage lock-out
Against input over-voltage	Over-voltage lock-out
Against input over-current	Input fuse
Against output overloads and short-circuits	Current and I^2T limited (see overload protection curve)
Against over-temperature	Shutdown with auto-recovery
CONTROL	
Output OK LED	Green
Input OK LED	Green
Alarm LED	Red
Input alarm	Open when alarm. Maximum rating: 0.16A at $160V_{DC}$
Output alarm	Open when alarm. Maximum rating: 0.16A at $160V_{DC}$
Remote OFF input	Off applying 15…143 V_{DC}, Impedance >35kΩ
Configurable input (reverse or mid-power)	ON: applying 15…143 V_{DC}, Impedance >35kΩ

BLOCKS DIAGRAM



CONNECTIONS



J1	-Vin	Spring clamp terminals cables 2.5 … 4mm²
J2	+Vin	
J5 - 1	Protective Earth	
J5 - 2	Output R	
J5 - 3	Output S	
J5 - 4	Output T	
J5 - 5	Output Neutral	
J4 - 1	+ Configurable input	Phoenix Contact MC1.5/4-GF-3.81 Recommended female: Phoenix Contact MC1.5/4-STF-3.81
J4 - 2	- Configurable input	
J4 - 3	+ Remote	
J4 - 4	- Remote	
J8 - 1	Status output	Phoenix Contact MC1.5/4-GF-3.81 Recommended female: Phoenix Contac MC1.5/4-STF-3.81
J8 - 2	Status output	
J8 - 3	Status input	
J8 - 4	Status input	
J7 - 1	CAN L (optional Can bus)	Phoenix Contact MC1.5/3-GF-3.81 Recommended female: Phoenix Contac MC1.5/3-STF-3.81
J7 - 2	CAN H (optional Can bus)	
J7 - 3	GND CAN	
J3	RS-232	Female D-Sub DB9
J6A -J6B	Optional Parallel operation	RJ45

DESCRIPTION

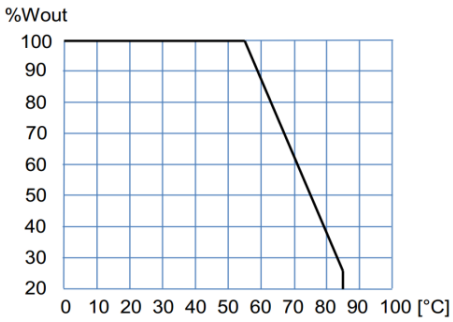
The OVX-6400 is a three-phase sine-wave DC-AC inverter designed not only to work within 400 to 900V input voltage range but also to withstand surges and over-voltages as described in EN50124-2.

The unit allows:

- Changing the output frequency by means of DIP-switch-7 of SW1. OFF: 50Hz or default programmed, ON: 60Hz.
- Change local/remote (waiting RS-232 commands) by means of DIP-switch-6 of SW1. OFF: local, ON: remote.
- Shutdown applying voltage output 15 to 143V on pins 3 and 4 of J4.
- Start-up motors by means of a soft start. In the start-up, the output voltage rises linearly from 0V to set voltage and the frequency from the initial to the set one. The start-up ramp slope may be changed via RS-232.
- Set the rotation speed of a motor according to the appropriate Voltage/Frequency ratio.
- Configurable input (pin 1 and 2 of J4):
  - Reverse mode: Changing the rotation direction for the next start-up of a motor by applying voltage between 15 and 143V.
  - Mid power mode: Changing the output frequency in V/F mode from nominal to a mid-power frequency by applying voltage between 15 and 143V.
- Monitoring the status of the input and output voltage through the contacts of two separate solid-state relays.
- Set and monitor parameters via RS232, CAN BUS.

The OVX-6400 is equipped with maximum average power protection as well as maximum output peak current protection. This protects the semiconductors even when an output short-circuit occurs. It also features a disable function for input under-voltage, which allows protecting the batteries from harmful discharges.

POWER DERATING vs AMBIENT TEMP.



START-UP

- 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 and an air flow reduction (minimum recommended distance to other objects 90mm).
- Make connections as shown in the figure.
- The default output frequency is 50Hz. For 60Hz simply actuate the dip-switch as indicated in the figure.

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.
- Include an input fuse with a rating immediately higher than the maximum input current.

RS232 communication port

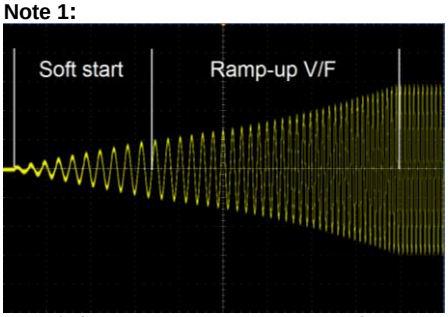
It is possible to control and monitor de unit via RS232 by means a terminal emulator like "Tera Term" or "Putty".
Also, it is possible to control and monitor de unit directly using the protocol showed in table:

Protocol configuration: ASCII code, 57600 bauds, parity none, 8 bits, 1bit stop.

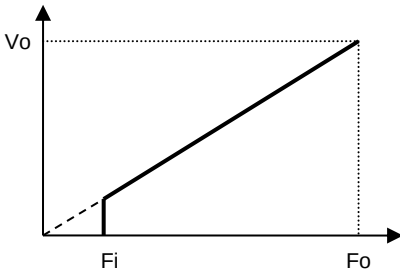
Header		Function	Parameter		Returns	Explanation
P	R	L	V		PTV■■■.■	Input voltage in Volts
			v		PTv■■■.■	Input voltage ripple in Volts
			Y		PTYRN=■■■■ *[13]*YSN=■■■■ *[13]*YTN=■■■■	Output voltage in Volts RMS Phase-Neutral (*[13]* = char 13 of ASCII code)
			I		PTIR=■■.■■*[13]*IS=■■.■■ *[13]*IT=■■.■■	Output current in Amps RMS (*[13]* = char 13 of ASCII code)
			T		PTT■■■.■	Internal temperature1 in K
			t		PTt■■■.■	Internal temperature 2 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■■■.■	Inverter 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** → Inverter enabled **000.0** → Inverter 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 inverter
			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)

OTHER PORTS PENDING

Note 1:

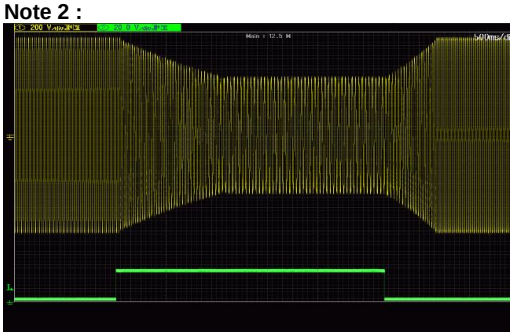


Example for N=1: start-up time = N x 1.7s for changes from 16Hz to 50Hz



Mode V/F curve

Note 2 :



Example for change from 50Hz / 400V to 30HZ and 240V with ramp-down of 2 cycles /Hz and ramp-up de 1 Cycle/Hz. Yellow: output voltage and Green: Mid-Power input signal

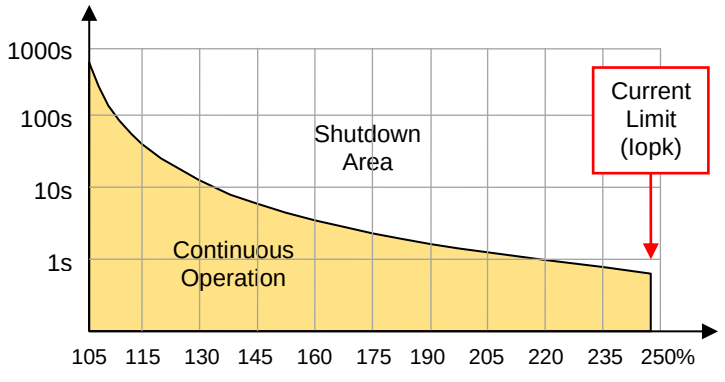
WORKING PARAMETERS

Thermal protection		
Internal warning temperature (output alarm)	88	ºC
Internal shutdown temperature	92	ºC
Internal restart temperature	75	ºC
Internal temperature of fan start-up	45	ºC
Input voltage parameters	**750V_{DC}**	
High input voltage instantaneous shutdown	1300>	V_{DC}
High input voltage timed shutdown (t)	1270 - 1080	V_{DC}
Time to shutdown (t)	Controlled via temperature measurement	s
Start-up voltage	390	V_{DC}
Low input voltage instantaneous shutdown	370	V_{DC}
Time to shutdown (t)	500m	s
Output voltage parameters		
Output voltage	400 (line to line)	V_{RMS}
Output under-voltage shutdown	< 85% of setting 1000ms	
Warning voltage (output alarm)	< 90% of setting 200ms	
Initial start-up frequency	5	Hz
Soft start duration	1 cycle	
Ramp-up V/F	1 Hz/cycle	
Output current parameters		
Maximum continuous output current	9.24	A
Warning current (output alarm)	8.8	A
Maximum overload I^2t	See figure below	
Time between restart attempts	4000	ms
Number of attempts of consecutive overload	5	
Working failures and reset		
Lock for continuous overload or internal failure	Unlimited time	
Reset time by input disconnection	> 2	min.

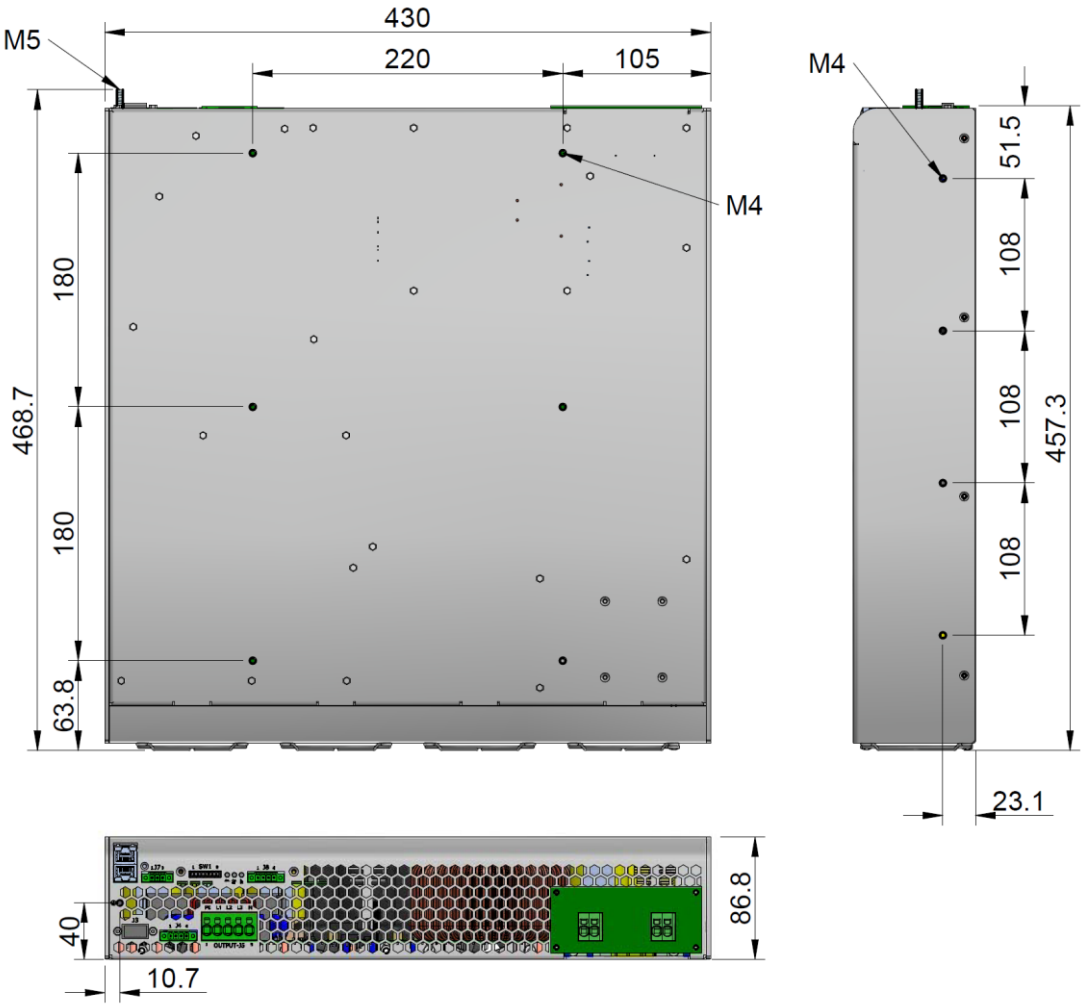
Configurable parameters underlined

OVERLOAD PROTECTION

Protection against overloads and short-circuits	By **current** limiting at $I_{O,PK}$ By **I^2t**. 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 5 times. If the overload persists, the unit reminds shutdown until an **input reconnection**.

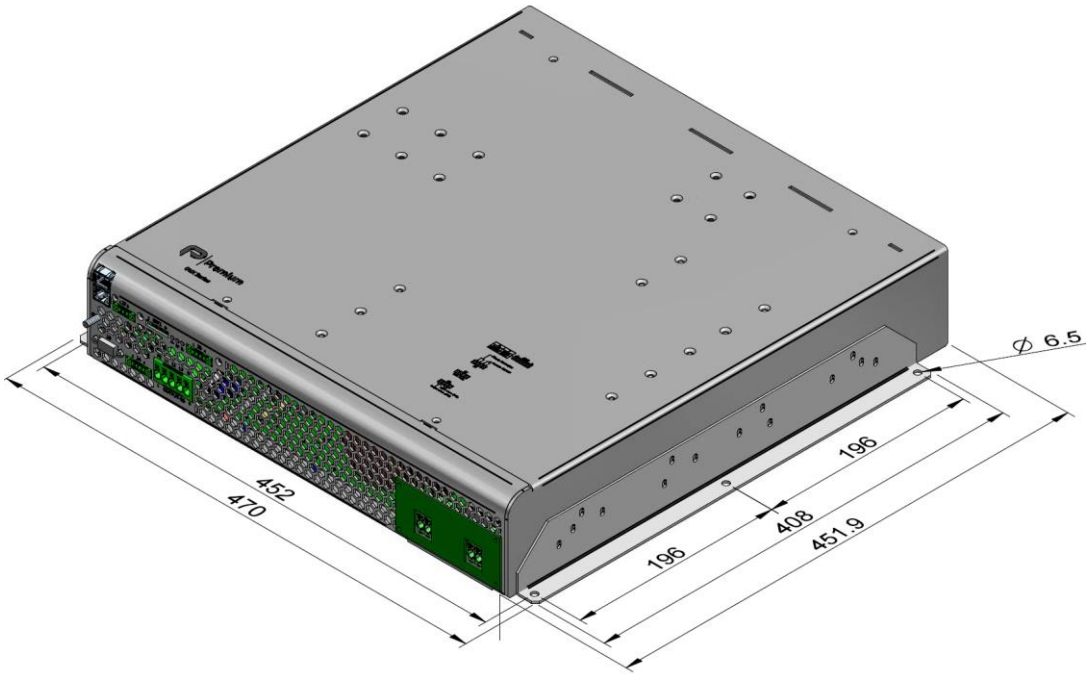


DIMENSIONS


430
220
105
M5
M4
180
180
468.7
63.8
M4
51.5
108
108
108
457.3
23.1
86.8
40
10.7

ACCESSORIES

Description	Notes	CODE
Mounting brackets kit	Contains two brackets and screws	9282



NP-9282

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/AC converter
Model: **OVX-6400**

is in conformity with the provisions of the following directives or 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:

EN50124-1:2017	Railway app. (Insulation coordination)
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
IEC 61287-1: 2015	Railway applications. Power converters installed on board rolling stock
EN 50121-3-2: 2016	Railway applications. EMC Rolling stock equipment

* Optional, See annexe

CE marking year: **2024**; UKCA marking year: **2024**

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, 10-02-2024

Albert Sole
Technical Director

PREMIUM S.A. is an ISO9001and ISO14001certified company by **Bureau Veritas**

ANNEXE

<table>
<tr><th colspan="3">Applicable values for the different sections of the norm 61287-1: 2015</th></tr>
<tr><td>4.2.2</td><td>Working altitude</td><td>Up to 2000m</td></tr>
<tr><td>4.2.3</td><td>Ambient temperature</td><td>Class T3 inside vehicle compartment (-25 to 55°C full load)
Class T3 Inside cubicle (55 to 70°C load <62.5%)</td></tr>
<tr><td>4.2.5</td><td>Shocks and vibrations</td><td>According EN61373:2010 Category 1 class B</td></tr>
<tr><td>4.5.3.19</td><td>EMC Electromagnetic Compatibility

EN50121-3-2:2016
IEC62236-3-2:2018</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">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>99dB(µV) Qpk</td></tr>
<tr><td>500kHz…30MHz</td><td>93dB(µV) Qpk</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>4.5.2.3</td><td>Tests list</td><td>
<table>
<tr><td>1 Visual Inspection</td><td>Routine</td></tr>
<tr><td>2 Verification of size and tolerance</td><td>Type</td></tr>
<tr><td>3 Weight</td><td>Type</td></tr>
<tr><td>4 Marking inspection</td><td>Routine</td></tr>
<tr><td>5 Functional test on refrigeration system</td><td>Type</td></tr>
<tr><td>6 Sealing test</td><td>N/A</td></tr>
<tr><td>7 Grade protection test</td><td>N/A</td></tr>
<tr><td>8 Dielectric strength test</td><td>Routine</td></tr>
<tr><td>9 Resistance to isolation test</td><td>Type</td></tr>
<tr><td>10 Test for mechanical and electrical protection and for the measurement equipment</td><td>N/A</td></tr>
<tr><td>11 Low load test</td><td>Type</td></tr>
<tr><td>12 Switching test</td><td>Routine</td></tr>
<tr><td>13 Measurement of acoustic noise</td><td>Routine</td></tr>
<tr><td>14 Heating test</td><td>Type</td></tr>
<tr><td>15 Power loss test</td><td>Type</td></tr>
<tr><td>16 Power overvoltage test and energy transients</td><td>Type</td></tr>
<tr><td>17 Fast changes in load test</td><td>Type</td></tr>
<tr><td>18 Inspection of safety requirements</td><td>Type</td></tr>
<tr><td>19 Shock and vibration test</td><td>Type</td></tr>
<tr><td>20 EMC test</td><td>Type</td></tr>
<tr><td>21 Step in power line test</td><td>Type</td></tr>
<tr><td>22 Interruption of voltage supply test</td><td>Type</td></tr>
<tr><td>23 Current Sharing</td><td>Type</td></tr>
</table>
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</table>