

# ODX-6000

## 6000VA DC/AC INVERTER

### GENERAL FEATURES:

- Sine wave output voltage
- Suitable for motors control
- Adjustable output frequency
- Adjustable output voltage
- High input-output isolation 3000Vrms
- Remote off opto-coupled
- Alarm by isolated relay contacts
- Configurable input: Reverse or Mid power
- Remote control via RS232
- CAN BUS (optional)
- Parallelable output (optional)
- Railway version EN50155 (optional)
- Fire and smoke: EN45545-2 approved



	24Vdc 16.8 ... 30V	48Vdc 33.6 ... 60V	72Vdc 50.4 ... 90V	110Vdc 77 ... 138V
400Vac	ODX-6000-7502 3500 W	ODX-6000-7505 6000 W	ODX-6000-7506 6000 W	ODX-6000-7507 6000 W



## INPUT

Input voltage range	-30, +25% Vin nom
Maximum input ripple	5% Vin nom (Vrms, 100Hz)

## OUTPUT

Nominal output voltage (Von)	See table
Output voltage range	20...100% of Von (adjust via remote control)
Output frequency	50 / 60Hz via DIP-switch, 5...75Hz via RS-232
Load regulation	< 4.5%
Line regulation	< 2% Vin -25% ... +25% < 10% Vin -30% ... +30% < 20 % Vin -40 % ... +40 % (100ms)

Output wave distortion THD	< 2% (average of 16 samples)
Output HF ripple	< 2.5%

## ENVIRONMENTAL

	Options B and T	Option L (Note-1)
Storage temperature	-25 ... 80 °C	-40 ... 80 °C
Operating temperature: Full load	-25 ... 55 °C (EN50155 OT1)	-40 ... 55 °C (EN50155 OT2)
Operating temperature: 62.5 % load	-25 ... 70 °C (EN50155 OT3)	-40 ... 70 °C (EN50155 OT4)
Operating temperature: 25 % load	-25 ... 85 °C (EN50155 OT5)	-40 ... 85 °C (EN50155 OT6)
Relative humidity without condensation	5 ... 95%	
Maximum altitude	2000m at full load, 2500m at 95% of load	
Cooling	Internal controlled internal fan	
Shock and Vibrations according to	EN61373:2011 Category 1 Class B body mounted	
MTBF (MIL-HDBK-217-E; Gb, 25°C)	100.000 h	

## EMC

Immunity according	EN61000-6-2, EN50121-3-2
Emissions according	EN61000-6-4, EN50121-3-2

## SAFETY

Dielectric strength: Input /output	3000Vrms / 50Hz / 1min
Dielectric strength: Output / Earth	1500Vrms / 50Hz / 1min
Dielectric strength: Input / Earth	500Vrms / 50Hz / 1min
Safety according to	EN60950-1, EN62368-1
Fire and smoke	EN45545-2 approved (only for options T and L, railway versions)

## MECHANICAL

Weight	< 8950 g
Protection degree	IP20

## PROTECTIONS

Against overloads	Current and I <sup>2</sup> T 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 160Vdc
Output alarm	Open when alarm. Maximum rating: 0.16A at 160Vdc
Remote OFF input	Off applying 15...143 Vdc (acc. to EN50155), Impedance >35kΩ
Configurable input (reverse or mid-power)	ON: applying 15...143 Vdc (acc. to EN50155), Impedance >35kΩ

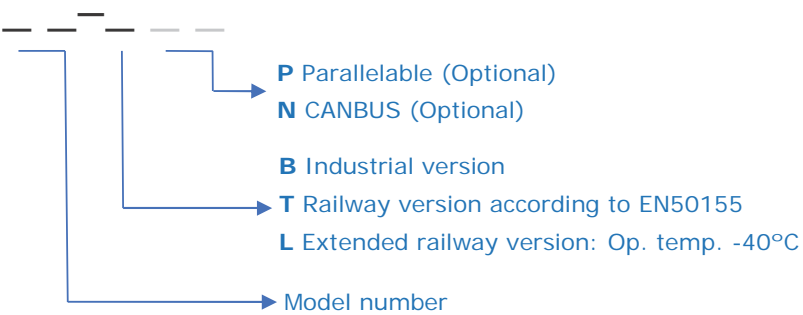
Note-1: Is not recommended to handle connectors below -25°C



## ORDERING CODES

Model	Input voltage DC [V]	Input voltage range [V]	Max. Input current [A]	Output voltage AC [V]	Output current [A]	Active output power [W]	Appar. output power [VA]	Output peak current		Efficien. [%]	No load input current [A]
								5s (rms) [A]	(lopk) 10ms [A]		
ODX-6000-7502	24	16.8 - 30	232	400	6.50	3500	4500	7.8A	20	91.0	1.70
ODX-6000-7505	48	33.6 - 60	191	400	8.66	6000	6000	11.5	20	93.6	0.85
ODX-6000-7506	72	50.4 - 90	127	400	8.66	6000	6000	11.5	20	94.3	0.58
ODX-6000-7507	110	77 - 138	83	400	8.66	6000	6000	11.5	20	94.2	0.38

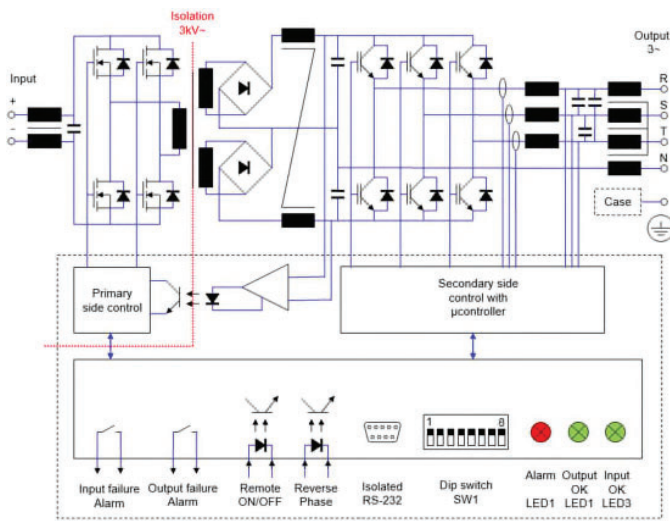
## ODX-6000-75



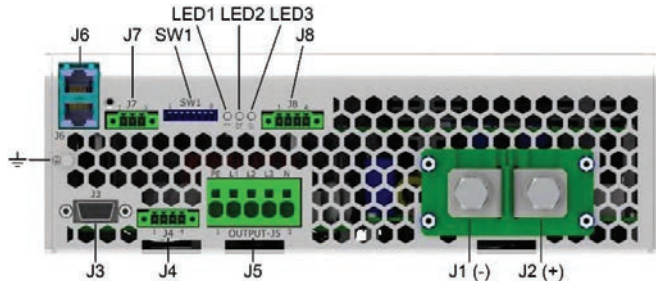
Accessories must be ordered in a separate order line  
 The option P (parallelable) always has N (CANBUS)  
 Please check availability for P or N options



## BLOCKS DIAGRAM

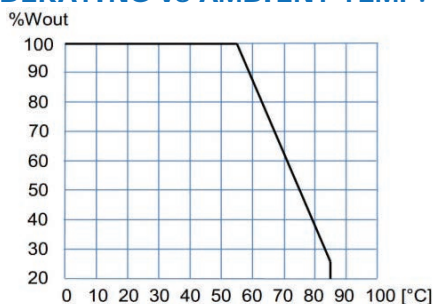


## CONNECTIONS



J1	-Vin	Terminal M8
J2	+Vin	
J5 - 1	Protective Earth	Cables 2.5 ... 4mm <sup>2</sup>
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, 2	Output alarm	Phoenix Contact MC1.5/3-GF-3.81 Recommended female: Phoenix Contact MC1.5/3-STF-3.81
J8 - 3, 4	Input alarm	
J7 - 1	CAN L (optional Can bus)	Phoenix Contact MC1.5/3-GF-3.81 Recommended female: Phoenix Contact MC1.5/3-STF-3.81
J7 - 2	CAN H (optional Can bus)	
J7 - 3	GND CAN	
J3 - 2	RS-232 Rx	Female D-Sub DB9
J3 - 3	RS-232 Tx	
J3 - 5	RS-232 GND	
J3 rest	Not connected	
J6A - J6B	Optional Parallel operation	
SW1 - 1	Master / Slave	ON (down): Slave
SW1 - 2	Parallel / Stand alone	ON (down): Stand alone
SW1 - 6	Local / Remote	ON (down): Remote
SW1 - 7	50Hz / 60Hz	ON (down): 60Hz
SW1 rest	Not used	

## POWER DERATING vs AMBIENT TEMP.



## DESCRIPTION

The ODX-6000 consists of three phase sine-wave DC-AC inverters with galvanic isolation between input and output.

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 RS-232.

The ODX-6000 is equipped with a 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.

## 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.
- 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 24V	Input 48V	Input 72V	Input 110V	Output 400V
Maximum current	232 A	191 A	127A	83A	8.7A
Cable cross-section	150 mm <sup>2</sup>	95 mm <sup>2</sup>	50 mm <sup>2</sup>	25 mm <sup>2</sup>	2.5 mm <sup>2</sup>

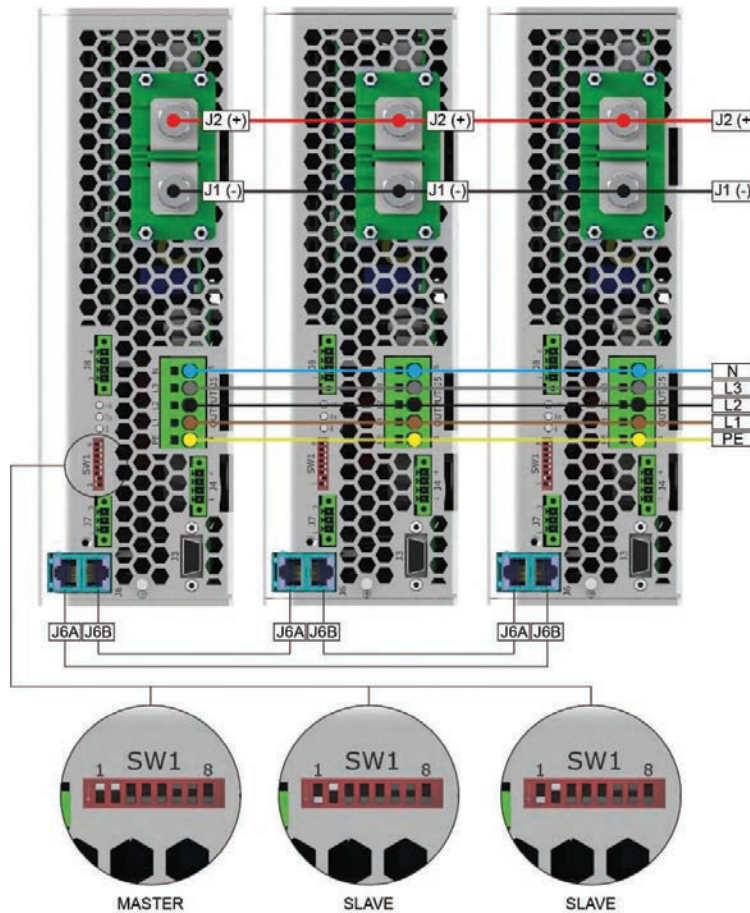


## PARALLEL OPERATION

The models 75xxTPN are designed to work in parallel with one unit set as a MASTER and the rest as SLAVES.

For this mode of operation, it is necessary to connect the MASTER/SLAVE port with a cable RJ45 FTP cat 6 (or higher) from J6B of the first unit to J6A of the following, and the last unit J6B to J6A of the first unit in a ring connection.

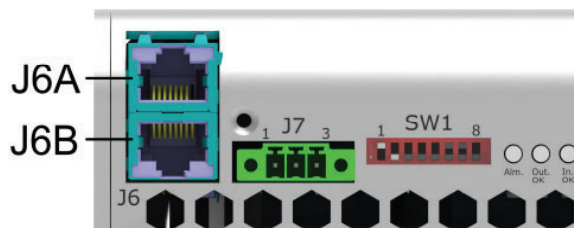
In addition, it is necessary to interconnect the output port respecting the phase order, as shown in the diagram:



Example for 3 units working in parallel mode

## STAND ALONE OPERATION

The models 75xxTPN, can operate stand alone with no connections, setting the dip-switch SW1-1 OFF (MASTER), and SW1-2 ON (Alone) as the diagram show:







## RS232 communication port

It is possible to control and monitor de unit via RS232 by means of an application tool named PAM. This application is free and can be downloaded from the Premium website

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	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	
		R	G	1	####
	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% Inom ≤ #### ≤ 100% Inom
	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 <sub>max_warning</sub>
	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	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)

## CAN communication port (optional)

It is possible to control and monitor the unit using the CAN connection with the CANOpen protocol. It is provided an .eds file with all the objects available.

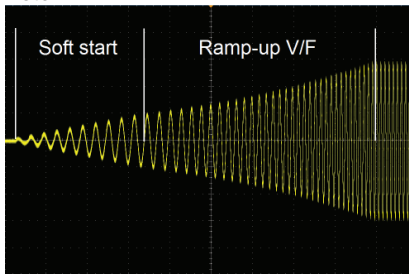
**Protocol configuration:** 250kbit/s, NODE ID: 1. The most relevant objects can be found in the following table:



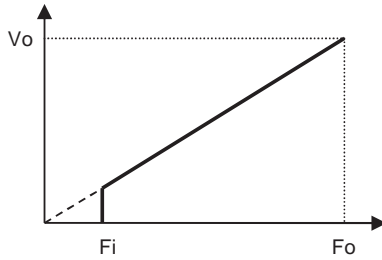
Index	Subindex	Name	Type	Attribute	Explanation
0x6001	0x00	Input voltage	UINT32	ro	Input voltage in tenths of Volt
0x6002	0x00	Input Ripple Voltage	UINT32	ro	Input voltage ripple in tenths of Volt
0x6003	0x01	Vrn	UINT32	ro	Output voltage in Volts Phase R-Neutral
0x6003	0x02	Vsn	UINT32	ro	Output voltage in Volts Phase S-Neutral
0x6003	0x03	Vtn	UINT32	ro	Output voltage in Volts Phase T-Neutral
0x6004	0x01	IR	UINT32	ro	Output current in hundredths of Amp Phase R
0x6004	0x02	IS	UINT32	ro	Output current in hundredths of Amp Phase S
0x6004	0x03	IT	UINT32	ro	Output current in hundredths of Amp Phase T
0x6005	0x00	Internal temperature Secondary	UINT32	ro	Internal temperature1 in tenths of K
0x6006	0x00	Internal temperature Primary	UINT32	ro	Internal temperature 2 in tenths of K
0x6007	0x00	Nominal output frequency	UINT32	ro	Nominal output frequency in Hz
0x6008	0x00	Actual output frequency	UINT32	ro	Actual output frequency in Hz
0x6009	0x00	Actual output voltage set-point	UINT32	ro	Actual output voltage set-point in V
0x600A	0x00	Inverter state	UINT16	ro	Inverter state 3 → Enabled 0 → Disabled 2 → Blocked by overload 1 → Blocked by overload or shortcircuit
0x600B	0x00	Product ID	UINT16	ro	Model number
0x600C	0x00	Firmware version	UINT16	ro	Firmware version
0x6100	0x00	Low input voltage timed shutdown	UINT32	rw	Set the low input voltage timed shutdown in tenths of V
0x610B	0x00	Input voltage minimum warning	UINT32	rw	Set the minimum alarm input voltage in tenths of V
0x6101	0x00	AC status bit	UINT8	rw	Change the status bit (after start up enabled with SW3 =LOCAL and disabled with SW3 =REMOTE) 1 → Inverter enabled 0 → Inverter disabled
0x6102	0x00	Nominal output voltage	UINT32	rw	Set the output voltage Phase-neutral in Vrms (Vo) (output must be stopped) 40 ≤ X ≤ 230
0x6103	0x00	Maximum output current	UINT32	rw	Set the maximum output current in Arms (per mille) 200‰ I <sub>nom</sub> ≤ ■■■■ ≤ 1000‰ I <sub>nom</sub>
0x6104	0x00	Nominal frequency	UINT32	rw	Set the nominal output frequency in Hz (Fo) (output must be stopped) 5 ≤ x ≤ 75
0x6105	0x00	Alarm maximum output current	UINT32	rw	Set the alarm maximum output current in Arms (per mille) 0‰ ≤ x ≤ 1000‰ I <sub>max_warning</sub>
0x6106	0x00	Inverter reset	UINT8	wo	1 → Reset the inverter
0x6107	0x00	Minimum starting input voltage	UINT32	rw	Set the minimum input starting voltage in tenths of Volts
0x6108	0x00	Start frequency	UINT32	rw	Set the initial frequency in the startup (Fi) 5 ≤ x ≤ 75
0x6109	0x00	Ramp up value	UINT32	rw	Set the ramp-up in increment of "N" cycles per Hz in mode V/F, frequency changes or start-up (Note-1) 1 ≤ x ≤ 100
0x610A	0x00	Ramp down value	UINT32	rw	Set the ramp-down in decrement of "N" cycles per Hz in mode V/F (Note-1) 2 ≤ x ≤ 100
0x6120	0x00	confi_inversion	UINT8	rw	Change the working mode of the input J4-1,J4-2 0 → Input as reverse phase control (default) 1 → Input as mid-power control (Note-2)
0x6121	0x00	Mid_power_frequency	UINT32	rw	Set the mid-power frequency for V/F mode by the use of input J4-1,J4-2 5 ≤ x ≤ 75
0x6200	0x00	Runtime target frequency	UINT32	wo	Set a new output frequency in Hz (output must be run and not stored in memory) 5 ≤ x ≤ 75
0x6201	0x00	Runtime output voltage	UINT32	wo	Set a new output voltage in Volts (output must be run and not stored in memory) 40 ≤ x ≤ 230
0x6202	0x00	Runtime frequency V/F	UINT32	wo	Set a new output frequency in Hz in mode V/F (output must be run and not stored in memory) 5 ≤ ■■■■ ≤ 75
0x6203	0x00	Change phase order	UINT32	wo	Changes the output phase order (output must be run and not stored in memory) 1 → Phase RST (direct phase) 2 → Phase SRT (reverse phase)



**Note 1:**

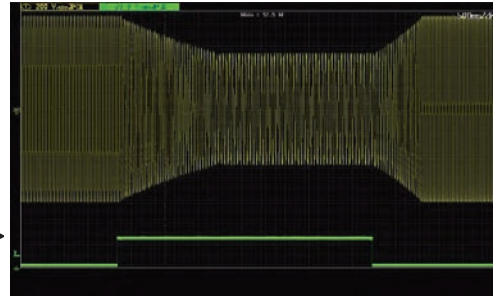


Example for N=1: start-up time = N x 1.7s for changes from 16Hz to 50Hz



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

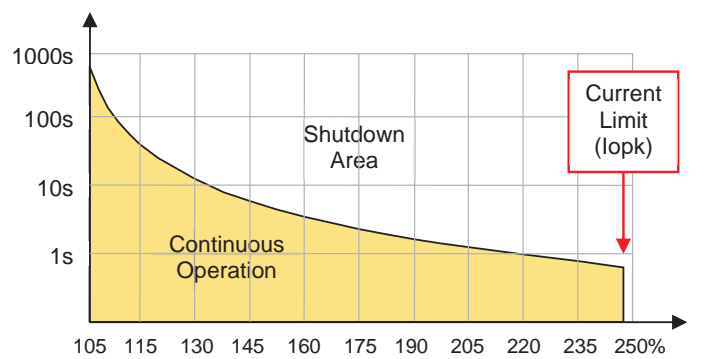
**WORKING PARAMETERS**

Thermal protection					
Internal warning temperature (output alarm)					88 °C
Internal shutdown temperature					92 °C
Internal restart temperature					75 °C
Internal temperature of fan start-up					45 °C
Input voltage parameters					
	24V	48V	72V	110V	
High input voltage shutdown instantaneous	33.6	62.4	93.6	143.0	Vdc
High input voltage timed shutdown (t) (Input alarm)	31.2	60.0	90.0	137.5	Vdc
<u>Start-up voltage</u>	19.2	38.4	57.6	88.0	Vdc
<u>Low input voltage timed shutdown (t) (Input alarm)</u>	16.8	33.6	50.4	77.0	Vdc
Low input voltage instantaneous shutdown	14.4	28.8	43.2	66.0	Vdc
Time to shutdown (t)			500		ms
Output voltage parameters					
<u>Output voltage phase-neutral</u>			230		Vac
Output under-voltage shutdown			< 85% of setting	1000ms	
Warning voltage (output alarm)			< 90% of setting	200ms	
<u>Initial start-up frequency</u>			5		Hz
Soft start duration			1 cycles		
<u>Ramp-up V/F</u>			1 Hz/cycle		
Output current parameters					
<u>Maximum continuous output current</u>	6.52	8.66	8.66	8.66	A
<u>Warning current (output alarm)</u>	6.20	8.22	8.22	8.22	A
Maximum overload I <sup>2</sup> t			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**

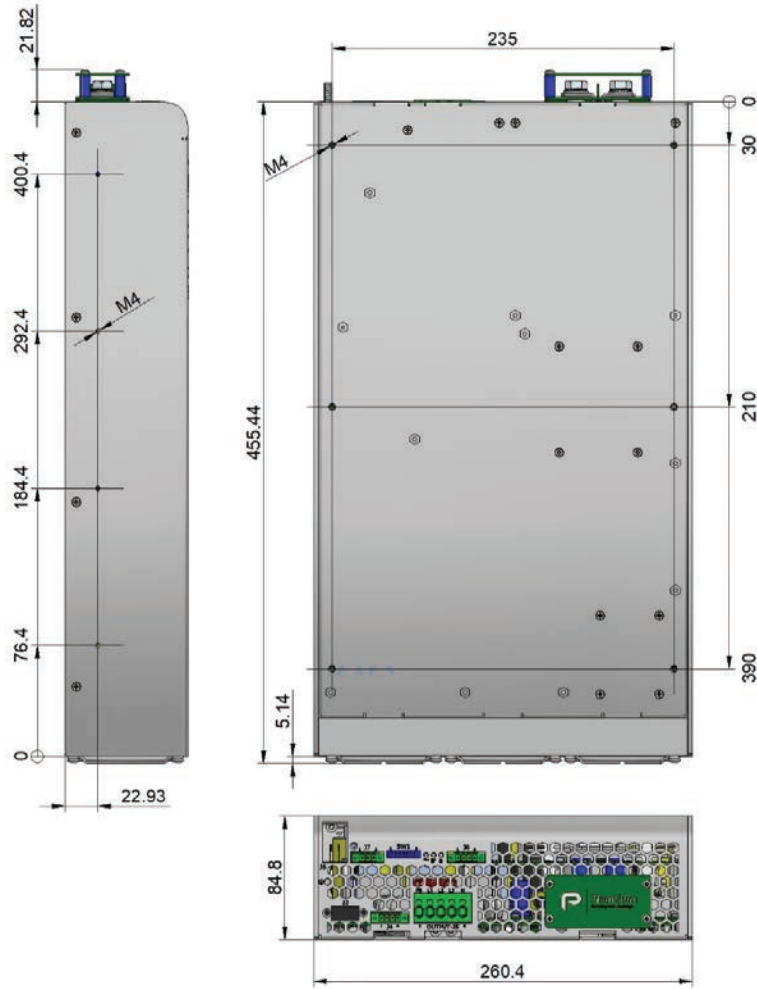
Protection against overloads and short-circuits	By <b>current</b> limiting at I <sub>opk</sub> By <b>I<sup>2</sup>t</b> . The unit shutdowns when the current-time is over the continuous operation curve
Overload protection recovery	Every 4 seconds after shutdown, the unit tries to restart up to 5 times. If the overload persists, the unit reminds shutdown until an <b>input reconnection</b> .







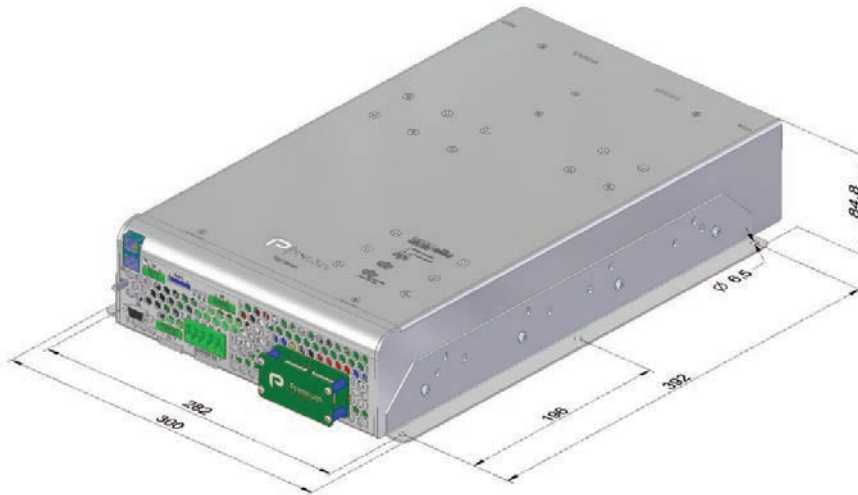
## DIMENSIONS



**NOTE:** All the fixing holes are M4. Maximum screw length inside de inverter 5mm.

## ACCESSORIES

Description	Notes	CODE
Mounting brackets kit	Contains two brackets and screws	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/DC converter  
Models: **ODX-6000-7502 ... 7507**

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

\* Optional, See annexe

CE marking year: **2019**; UKCA marking year: **2021**

### 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, 13-09-2021

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: 2017**

4.3.1	Working altitude	Up to 2000m																																																																			
4.3.2	Ambient temperature	For options B and T: Class OT1 (-25 to 55 °C): load < 100 % For options B and T: Class OT3 (-25 to 70 °C): load < 62.5 % For options B and T: Class OT5 (-25 to 85 °C): load < 25 % For option L: Class OT2 (-40 to 55 °C): load < 100 % For option L: Class OT4 (-40 to 70 °C): load < 62.5 % For option L: 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	<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. &lt; 108MHz</td> </tr> <tr> <td>150kHz...500kHz</td> <td>99dB(µV) Qpk</td> </tr> <tr> <td></td> <td></td> <td></td> <td>500kHz...30MHz</td> <td>93dB(µV) Qpk</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	99dB(µV) Qpk				500kHz...30MHz	93dB(µV) Qpk																																						
		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	99dB(µV) Qpk																																																															
					500kHz...30MHz	93dB(µV) Qpk																																																															
		<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 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> </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 S1 (without interruptions)																																																																			
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 external 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																																																																		