Premium
Powering Your Challenge

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

3 YEAR WARRANTY INDUSTRY
ROHS REACH
5 YEAR WARRANTY RAILWAY
EN50155
EN45545 fire & smoke

	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	
Storage temperature	-40 … 80 °C
Operating temperature: Full load Operating temperature: 62.5 % load	-40 … 55 °C (EN50155 OT2) -40 … 70 °C (EN50155 OT4)
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^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 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]	(Iopk) 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_ _–_ _ _

P Parallelable + CANBUS (Optional)
K Motor breaking + CANBUS (Optional)
N CANBUS (Optional)

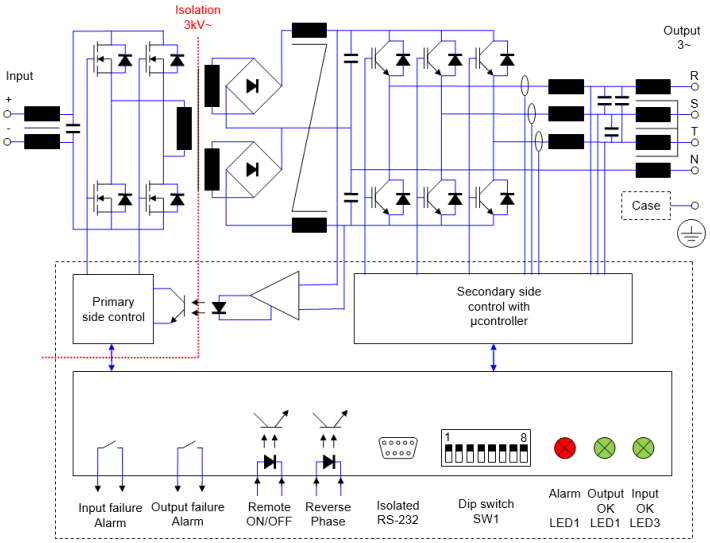
B Industrial version
T Railway version according to EN50155

Model number

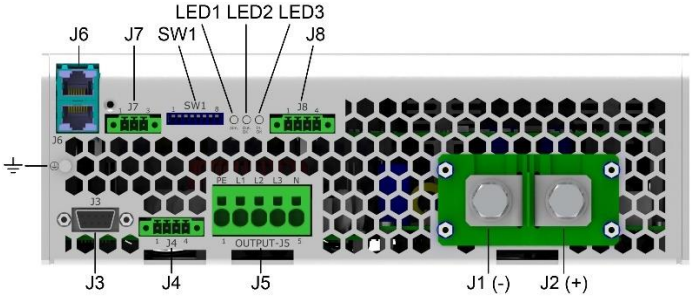
Option P (Parallelable) includes CANBUS port.
Option K (Motor breaking) allows a motor to slow down faster. It includes internal resistors to dissipate energy from the motor; up to 1200Wkp and 800W for 5s. This option includes CANBUS port.

Please check availability for P, K or N options
Accessories must be ordered in a separate order line.

BLOCKS DIAGRAM

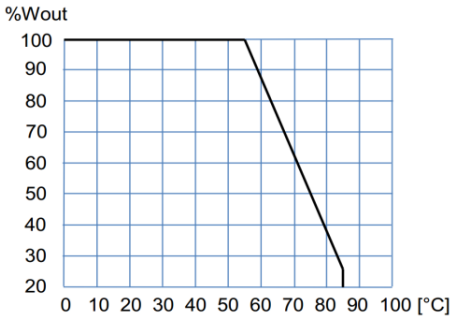


CONNECTIONS



J1	-Vin	Terminal M8
J2	+Vin	
J5 - 1	Protective Earth	Cables 2.5 … 4mm²
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	
J8 - 3, 4	Input alarm	
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 - 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	RJ45
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.

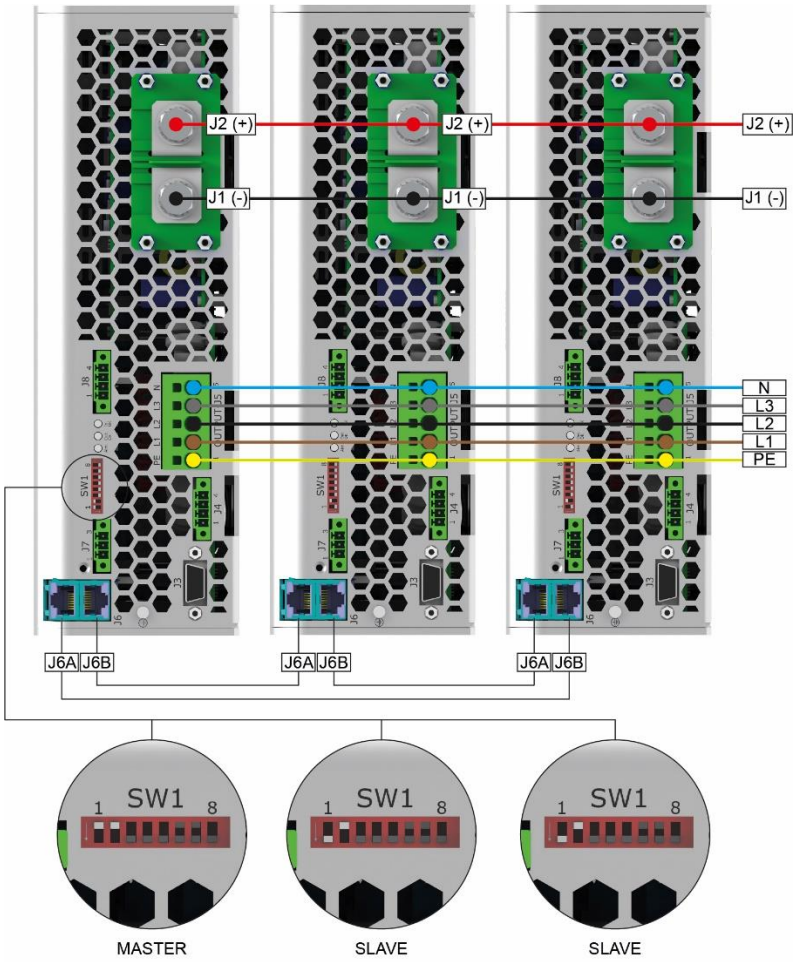
	Input 24V	Input 48V	Input 72V	Input 110V	Output 400V
Maximum current	232 A	191 A	127A	83A	8.7A
Cable cross-section	**150 mm²**	**95 mm²**	**50 mm²**	**25 mm²**	**2.5 mm²**

PARALLEL OPERATION

The models 75*xx*T**P**N 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.

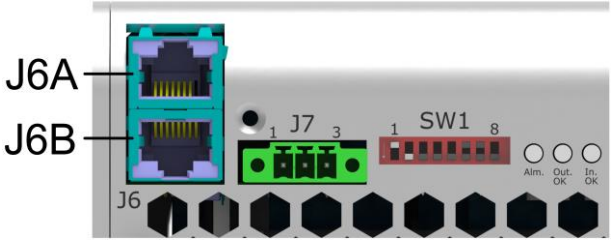
In addition, it is necessary to interconnect the output port respecting the phase order, as shown in the diagram:



Example for 3 units working in parallel mode

STAND ALONE OPERATION

The models 75*xx*T**P**N, 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 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 SW1:6 =LOCAL and disabled with SW1:6 =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)

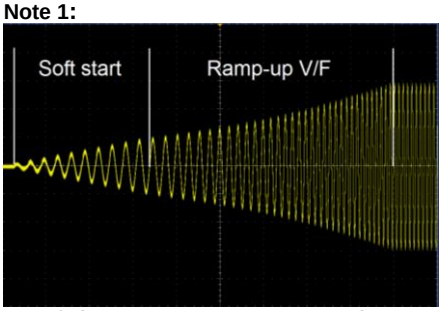
CAN communication port (optional)

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.

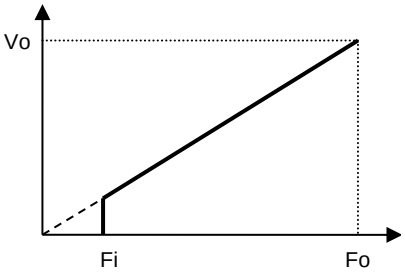
Protocol configuration: 500kbit/s, NODE ID: 1. The most relevant objects can be found in the following table:

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_{nom} ≤ ■■■■ ≤ 1000‰ I_{nom}
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**	**UIN32**	rw	Set the alarm maximum output current in Arms (per mille) 0‰ ≤ x ≤ 1000‰ $I_{max\_warning}$
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:

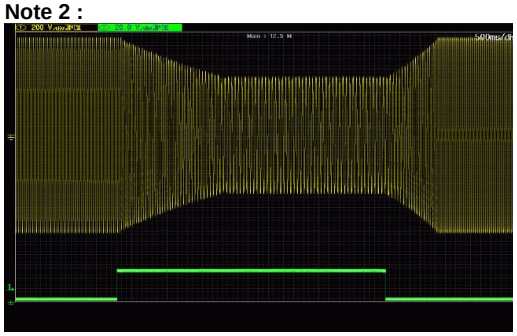


Example for N=1: start-up time = N x 1.7s for changes from 16Hz to 50Hz



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

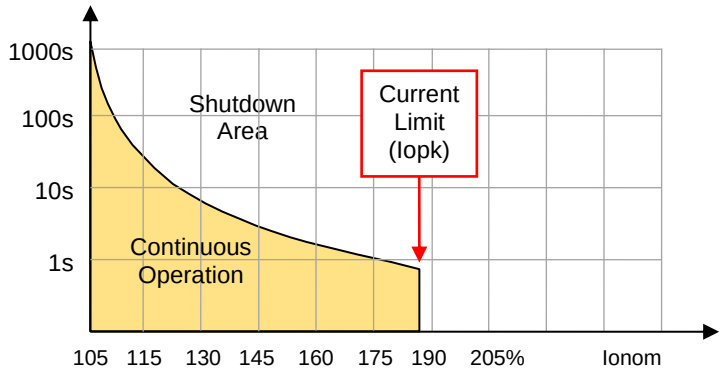
WORKING PARAMETERS

Thermal protection					
Internal warning temperature (output alarm)	88				ºC
Internal shutdown temperature	92				ºC
Internal restart temperature	75				ºC
Internal temperature of fan start-up	45				ºC
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
Start-up voltage	19.2	38.4	57.6	88.0	Vdc
Low input voltage timed shutdown (t) (Input alarm)	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					
Output voltage phase-neutral	230				Vac
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 cycles				
Ramp-up V/F	1 Hz/cycle				
Output current parameters					
Maximum continuous output current	6.52	8.66	8.66	8.66	A
Warning current (output alarm)	6.20	8.22	8.22	8.22	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

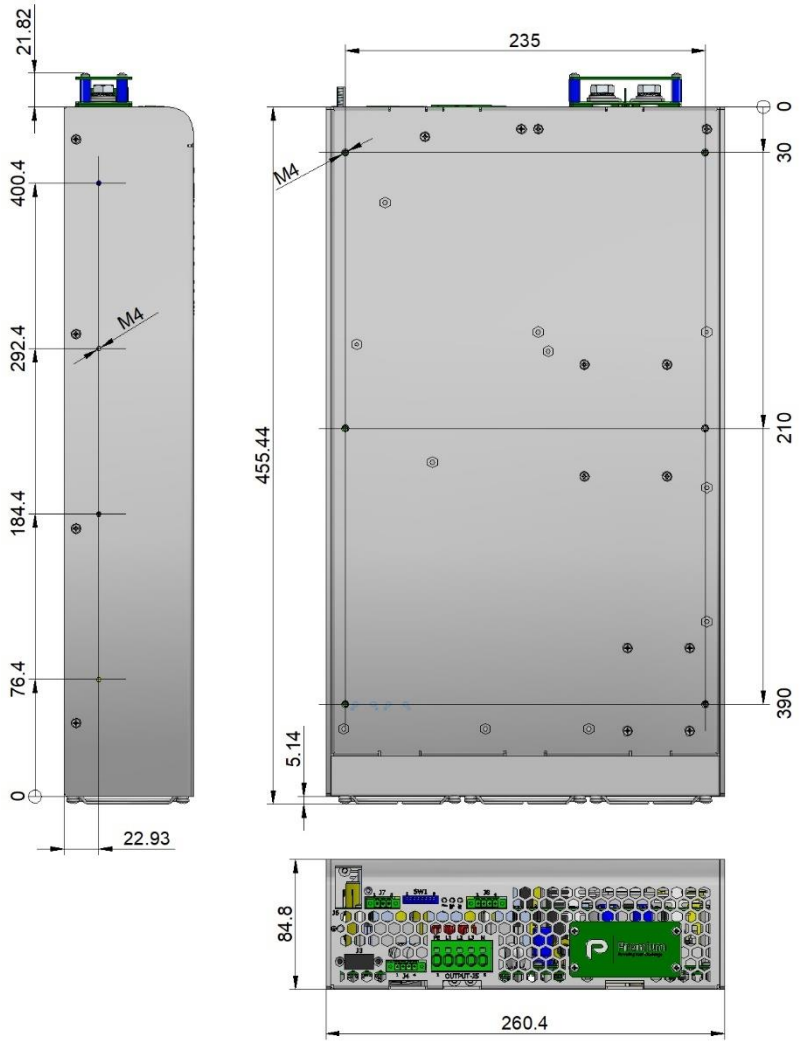
Configurable parameters underlined

OVERLOAD PROTECTION

Protection against overloads and short-circuits	By **current** limiting at Iopk 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**.



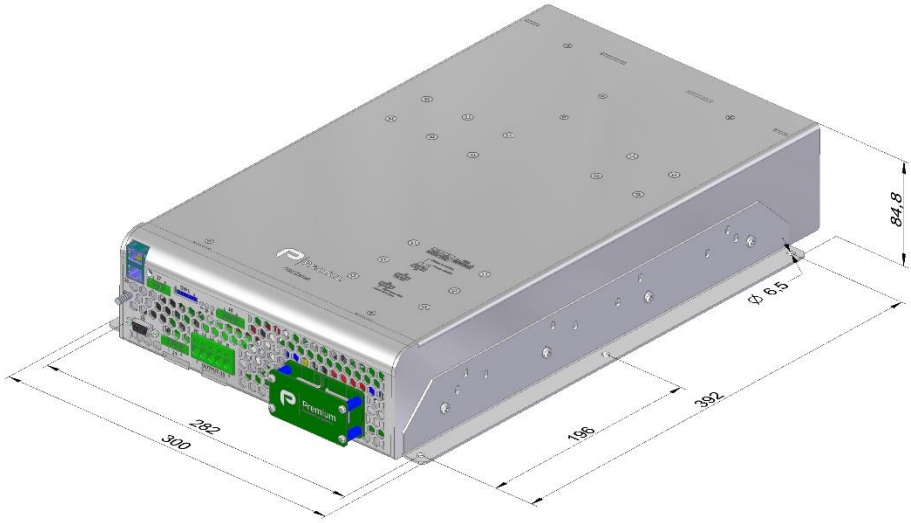
DIMENSIONS



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 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
Models: **ODX-6000-7502 … 7507**

Complies with the essential protection requirements of the following EU directives:

2014/35/EU	Low voltage / The electrical equipment (safety) regulations
2014/30/EU	EMC / Electromagnetic compatibility regulations
2015/863/EU	RoHS / Restriction of the use of certain hazardous substances in electrical and electronic equipment

This declaration applies to all specimens manufactured identical to the samples submitted for testing/evaluation.

Assessment of compliance of the product with the requirements relating to aforementioned directives, was performed by Premium S.A. and is based on the following standards:

EN IEC 62368-1:2020	Safety. Audio/video, information and communication technology equipment
EN IEC 61000-6-4:2019	Generic emission standard
EN IEC 61000-6-2:2019	Generic immunity standard
EN 50155:2021*	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**

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, 24-04-2023

Albert Sole
Technical Director

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

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
Models: **ODX-6000-7502 … 7507**

Complies with the essential protection requirements of the following regulations:

SI 2016 No 1101	Low voltage / The electrical equipment (safety) regulations
SI 2016 No 1091	EMC / Electromagnetic compatibility regulations
SI 2012 No. 3032	RoHS / Restriction of the use of certain hazardous substances in electrical and electronic equipment

This declaration applies to all specimens manufactured identical to the samples submitted for testing/evaluation.

Assessment of compliance of the product with the requirements relating to aforementioned regulations, was performed by Premium S.A. and is based on the following standards:

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

* Optional, See annexe

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, 24-04-2023

Albert Sole
Technical Director

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

ANNEXE

<table>
<tr><th colspan="3">Applicable values for the different sections of the norm EN50155: 2017</th></tr>
<tr><td>4.3.1</td><td>Working altitude</td><td>Up to 2000m</td></tr>
<tr><td>4.3.2</td><td>Ambient temperature</td><td>Class OT2 (-40 to 55 °C): load < 100 %
Class OT4 (-40 to 70 °C): load <62.5 %</td></tr>
<tr><td>4.3.3</td><td>Switch-on extended operating temp.</td><td>ST1</td></tr>
<tr><td>4.3.4</td><td>Rapid temperature variations</td><td>H1</td></tr>
<tr><td>4.3.5</td><td>Shocks and vibrations</td><td>According EN61373:2010 Category 1 class B</td></tr>
<tr><td>4.3.6</td><td>EMC Electromagnetic Compatibility

EN50121-3-2:2016</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>
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<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>
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</table>
P= Performance criteria, L= Line, PE= Protective Earth
</td></tr>
<tr><td>4.3.7</td><td>Relative humidity</td><td>Up to 95%</td></tr>
<tr><td>5.1.1.2</td><td>DC power supply range</td><td>From 0.70 to 1.25 Un continuous</td></tr>
<tr><td>5.1.1.3</td><td>Temporary DC power supply fluctuation</td><td>From 0.60 to 1.40 Un 0.1s
From 1.25 to 1.40 Un 1s without damage</td></tr>
<tr><td>5.1.1.4</td><td>Interruptions of voltage supply</td><td>Class S1 (without interruptions)</td></tr>
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<tr><td>5.1.3</td><td>Supply change-over</td><td>0.6 Un duration 100ms (without interruptions). Performance criterion A</td></tr>
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<tr><td>4 Insulation test</td><td>Routine</td></tr>
<tr><td>5 Low temperature storage test</td><td>-</td></tr>
<tr><td>6 Low temperature start-up test</td><td>Type</td></tr>
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<tr><td>12 Shocks and vibrations test</td><td>Type</td></tr>
<tr><td>13 Equipment stress screening test</td><td>Routine: at 40°C and load 100%</td></tr>
<tr><td>14 Rapid Temperature variation test</td><td>Type</td></tr>
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