ODX-4500

4500VA DC/AC INVERTER

GENERAL FEATURES:

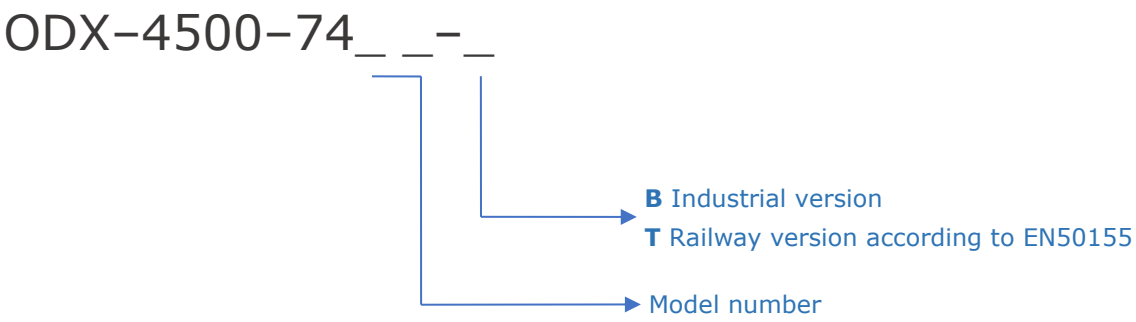
Sine wave output voltage
Suitable for motors control
Selectable output frequency: 50/60Hz
Adjustable output voltage
High input-output isolation 3000Vrms
Remote inhibit
Configurable input: Reverse or Mid power
Remote control via RS232
Alarms by isolated relay contacts
Remote off opto-coupled
Optional railway version EN50155
Fire and smoke: EN45545-2 approved

	72Vdc 50.4 ... 90V	100Vdc 70 ... 125V	110Vdc 77 ... 138V	571Vdc 400 ... 715V
400Vac	**ODX-4500-7425** 4000 W / 4500 VA	**ODX-4500-7426** 4000 W / 4500 VA	**ODX-4500-7427** 4000 W / 4500 VA	**ODX-4500-7428** 4000 W / 4500 VA

INPUT	
Input voltage range	See table
Maximum input ripple	5% Vin nom (Vrms, 100Hz)
Inrush current (cold unit)	See table
Reverse polarity protection	See table
OUTPUT	
Nominal output voltage (Von)	400 Vac
Output voltage range	50…440Vac via RS-232
Output frequency	50 / 60Hz via DIP-switch, 5…75Hz via RS-232
Load regulation	< 4%
Line regulation	< 2% Vin -25% … +25%, < 10% Vin -30% … +30%
Output wave distortion THD	< 2% (average of 16 samples)
Output HF ripple	< 2.5%
ENVIRONMENTAL	
Storage temperature	-25 … 80°C
Operating temperature:	
Full load	-25 … 55°C (EN50155 OT1)
62.5% load	-25 … 70°C (EN50155 OT3)
25% load	-25 … 85°C (EN50155 OT5)
Relative humidity without condensation	5 … 95%
Cooling	Controlled internal fan
MTBF (MIL-HDBK-217-E; G_b, 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	3000 Vrms / 50Hz / 1min
Dielectric strength: Output / ground	1500 Vrms / 50Hz / 1min
Dielectric strength: Input / ground	500 Vrms / 50Hz / 1min
Safety according to	EN62368-1
Fire and smoke	EN45545-2 (only for **T** railway versions)
MECHANICAL	
Weight	<7240 g
Shock and Vibrations according to	EN61373:2011 Category 1 Class B
PROTECTIONS	
Against overloads	Current and I^2T limited (see overload protection)
Against over-temperature	Shutdown with auto-recovery
CONTROL	
Output OK LED	Green
Input OK LED	Green
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…143Vdc, Impedance>35kΩ
Configurable input (reverse or mid-power)	ON: applying 15…143Vdc, Impedance>35kΩ

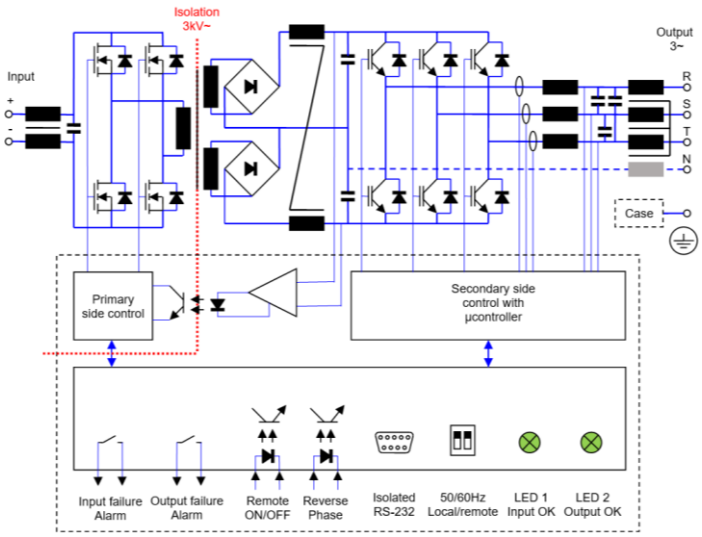
ORDERING CODES

Model	Input					Output							
	Voltage DC	Voltage range	No load current	Inrush Current	Reverse polarity protect.	Neutral Conn.	Voltage	Current	Power		Peak current		Effic
									Active	Appar.	5s rms	10ms Iopk	
	[V]	[V]	[A]	[A]			[V]	[A]	[W]	[VA]	[A]	[A]	[%]
ODX-4500-7425	72	50.4 - 90	< 0.67	-	No	Yes	400	6.50	4000	4500	9.5	15	92
ODX-4500-7426	100	70 - 125	< 0.49	-	No	Yes	400	6.50	4000	4500	9.5	15	93
ODX-4500-7427	110	77 - 138	< 0.44	-	No	Yes	400	6.50	4000	4500	9.5	15	93
ODX-4500-7428	571	400 - 715	TBD	<10	Yes	No	400	6.50	4000	4500	9.5	15	92

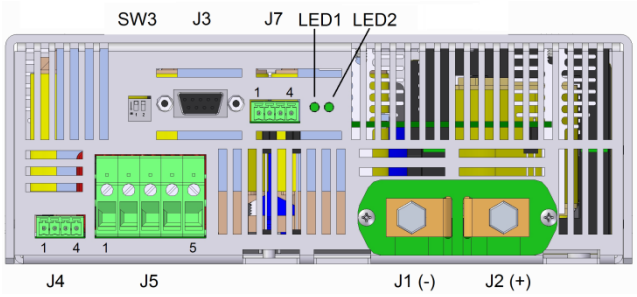


Accessories must be ordered in a separate order line

BLOCKS DIAGRAM



CONNECTIONS MODELS: 7425 7426 7427



J1	-Vin	Terminals M6
J2	+Vin	
J5 - 1	Protective Earth	Cables 1.5 … 2.5mm^2
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-G-3.81 Recommended female: Phoenix Contact MC1.5/4-ST-3.81
J4 - 2	- Configurable input	
J4 - 3	+ Remote ON/OFF	
J4 - 4	- Remote ON/OFF	
J7 - 1	Output alarm	Phoenix Contact MC1.5/4-G-3.81 Recommended female: Phoenix Contac MC1.5/4-ST-3.81
J7 - 2	Output alarm	
J7 - 3	Input alarm	
J7 - 4	Input alarm	
J3 - 2	RS-232 Rx	Sub-DB9 female
J3 - 3	RS-232 Tx	
J3 - 5	RS-232 GND	
J3 rest	Not connected	
LED1	Input OK	Green
LED2	Output OK	Green

DESCRIPTION

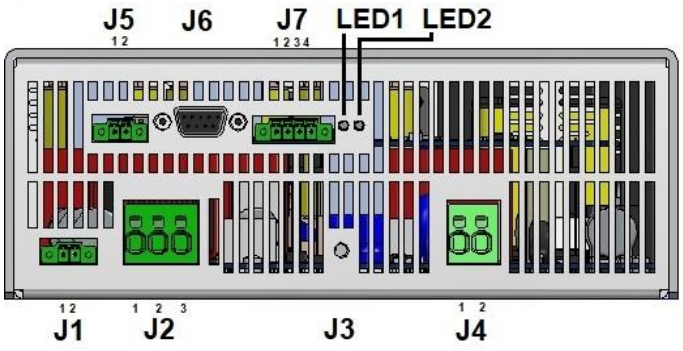
The ODX-4500 consists of three phase sine-wave DC-AC inverters with galvanic isolation between input and output.

The unit allows:

- Changing the output frequency by means of DIP-switch-1of SW3. OFF: 50Hz or default programmed, ON: 60Hz
- Change local/remote (waiting RS-232 commands) by means of DIP-switch-2 of SW3. 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.

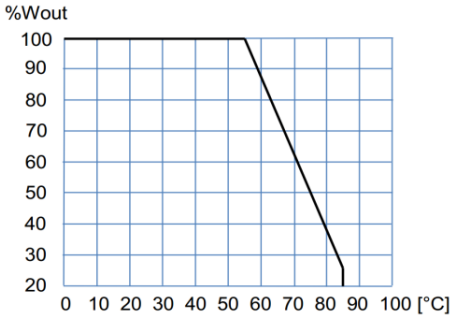
The ODX-4500 is equipped with a maximum average power protection as well as maximum output peak current protection. This protects the semiconductors even when an output short-circuit occurs. It also features a disable function for input under-voltage, which allows protecting the batteries from harmful discharges.

CONNECTIONS 7428



J4-1	+Vin	Spring clamp terminal. Maximum cross section 6mm²
J4-2	-Vin	
J3	Protective Earth	M5 stud. Recommended torque 6 Nm
J2 - 2	Output R	Spring clamp terminal. Maximum cross section 6mm²
J2 - 3	Output S	
J3 - 4	Output T	
J5 - 1	+ Configurable input	Phoenix Contact MC1.5/2-G-3.81 Recommended female: Phoenix Contact MC1.5/2-ST-3.81
J5 - 2	- Configurable input	
J1 - 3	+ Remote ON/OFF	
J1 - 4	- Remote ON/OFF	
J7 - 1	Output alarm	Phoenix Contact MC1.5/4-G-3.81 Recommended female: Phoenix Contac MC1.5/4-ST-3.81
J7 - 2	Output alarm	
J7 - 3	Input alarm	
J7 - 4	Input alarm	
J6 - 2	RS-232 Rx	Sub-DB9 female
J6 - 3	RS-232 Tx	
J6 - 5	RS-232 GND	
J6 rest	Not connected	
LED1	Input OK	Green
LED2	Output OK	Green

POWER DERATING vs AMBIENT TEMP.



INSTALLATION

- The unit has 4 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 50mm).
- 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 72V	Input 100V	Input 110V	Input 560V	Output 400V
Maximum current	87 A	62 A	57 A	11 A	6.5 A
Cable cross-section	**16 mm²**	**16 mm²**	**10 mm²**	**2.5 mm²**	**1.5 mm²**

RS232 communication port

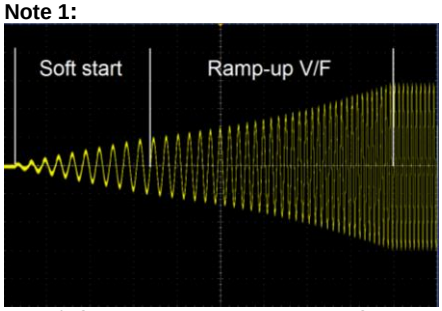
It is possible to control and monitor de unit via RS232 by means a terminal emulator like "Tera Term" or "Putty".
Also it is possible to control and monitor de unit directly using the protocol showed in table:

Protocol configuration: ASCII code, 9600 bauds, parity none, 8 bits, 1bit stop

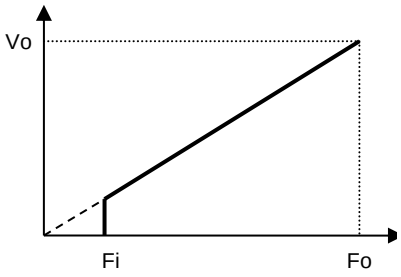
Header		Function	Parameter		Returns	Explanation
P	R	L	V		PTV■■■.■	Input voltage in Volts
			v		PTv■■■.■	Input voltage ripple in Volts
			U		PTURS=■■■■*[13]*UST=■■■■*[13]* UTR=■■■■	Output voltage in Volts RMS (*[13]* = char 13 of ASCII code)
			I		PTIR=■■.■■*[13]*IS=■■.■■*[13]* IT=■■.■■	Output current in Amps RMS (*[13]* = char 13 of ASCII code)
			T		PTT■■■.■	Internal temperature in K
			F		PTF■■■.■	Nominal output frequency in Hz
			f		PTf■■■.■	Actual output frequency in Hz
			u		PTu■■■.■	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 short-circuit
			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 in Vrms (Vo) (output must be stopped) 050.0 ≤ ■■■.■ ≤ 440.0
			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 start-up (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
			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) 050.0 ≤ ■■■.■ ≤ 440.0
			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 **111.1** → Phase RST (direct phase) **222.2** → Phase SRT (reverse phase)

*Parameters are only useful from version 6.0 of firmware

Note 1:

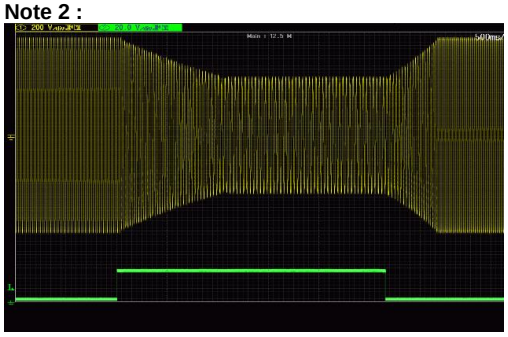


Example for N=1: start-up time = N x 1.7s for changes from 16Hz to 50Hz



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

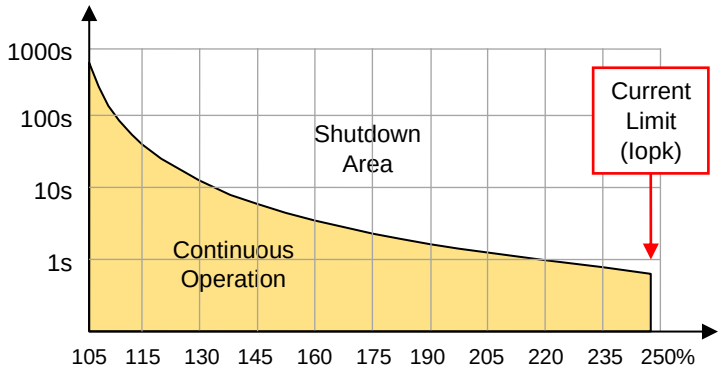
WORKING PARAMETERS

Thermal protection	**7425 … 7427**				
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	**7425**	**7426**	**7427**	**7428**	
High input voltage shutdown instantaneous	100.8	140	154.0	800	Vdc
High input voltage timed shutdown (t) (Input alarm)	93.6	125.5	143.0	714	Vdc
Low start-up voltage	57.6	74.5	88.0	457	Vdc
Low input voltage timed shutdown (t) (Input alarm)	50.4	70.0	77.0	400	Vdc
Low input voltage instantaneous shutdown	43.2	60.0	66.0	342	Vdc
Time to shutdown (t)	500				ms
Output voltage parameters	**7425 … 7427**				
Output voltage	400				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	5 cycles				
Ramp-up V/F	3 cycle / Hz				
Output current parameters	**7425 … 7427**				
Maximum continuous output current	6.50				A
Warning current (output alarm)	6.50				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	**7425 … 7427**				
Lock for continuous overload or internal failure	Unlimited time				
Reset time by input disconnection	>1				min

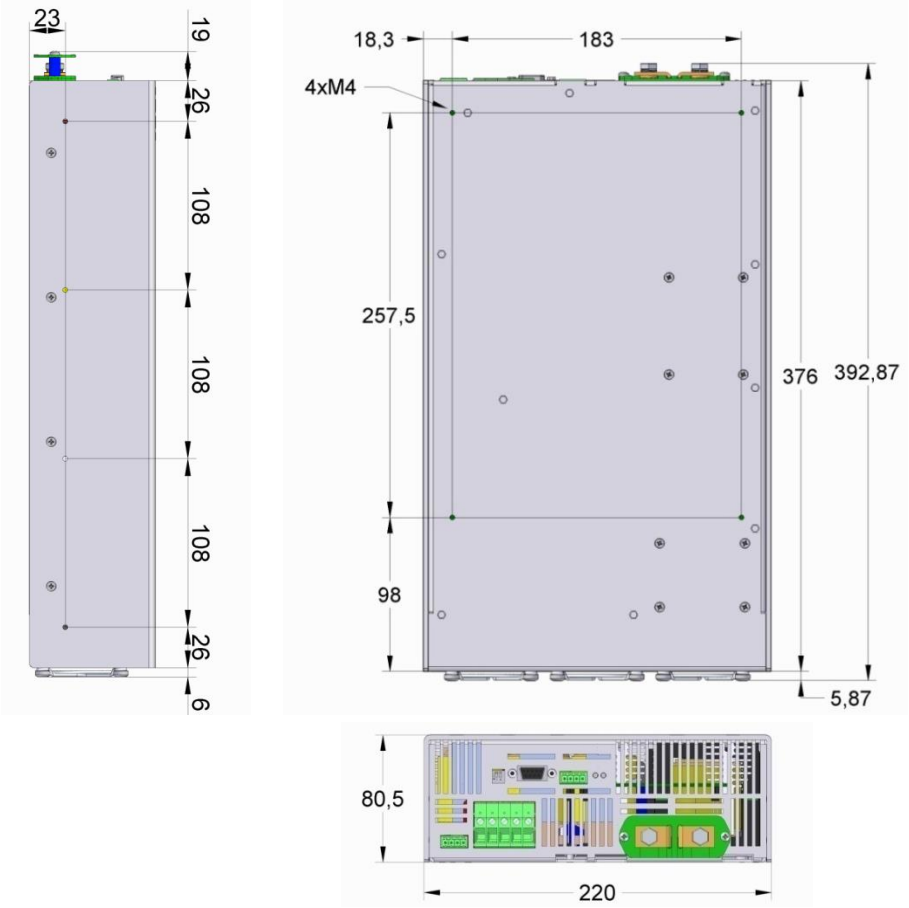
Configurable parameters underlined

WORKING PARAMETERSOVERLOAD 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 5 times. If the overload persists, the unit reminds shutdown until an **input reconnection**.



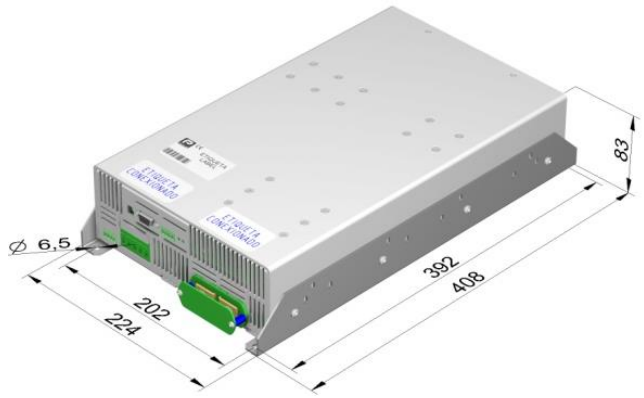
DIMENSIONS MODELS: 7425 7426 7427



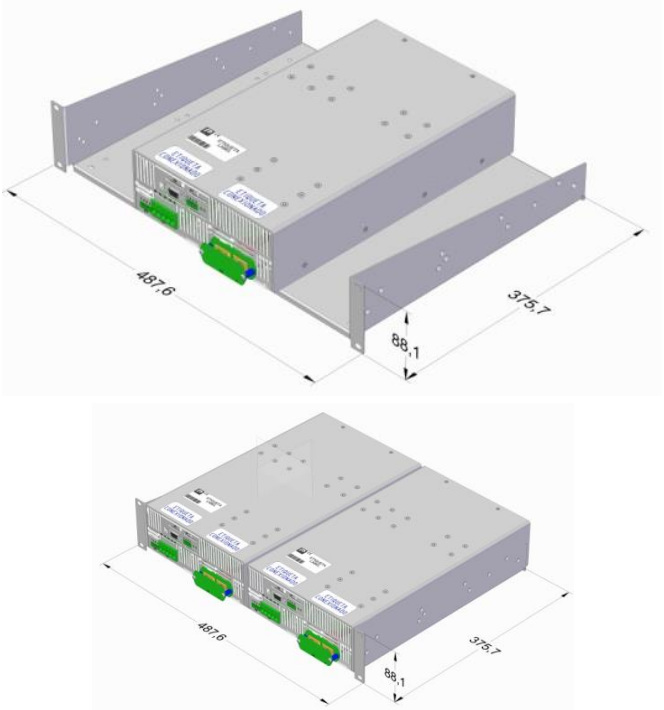
ACCESSORIES MODELS: 7425 7426 7427

Description	Notes	CODE
Mounting brackets kit	Contains two brackets and screws	NP-9282
2U 19" rackmount tray kit	It allows to install one or two ODX-4500	NP-9353

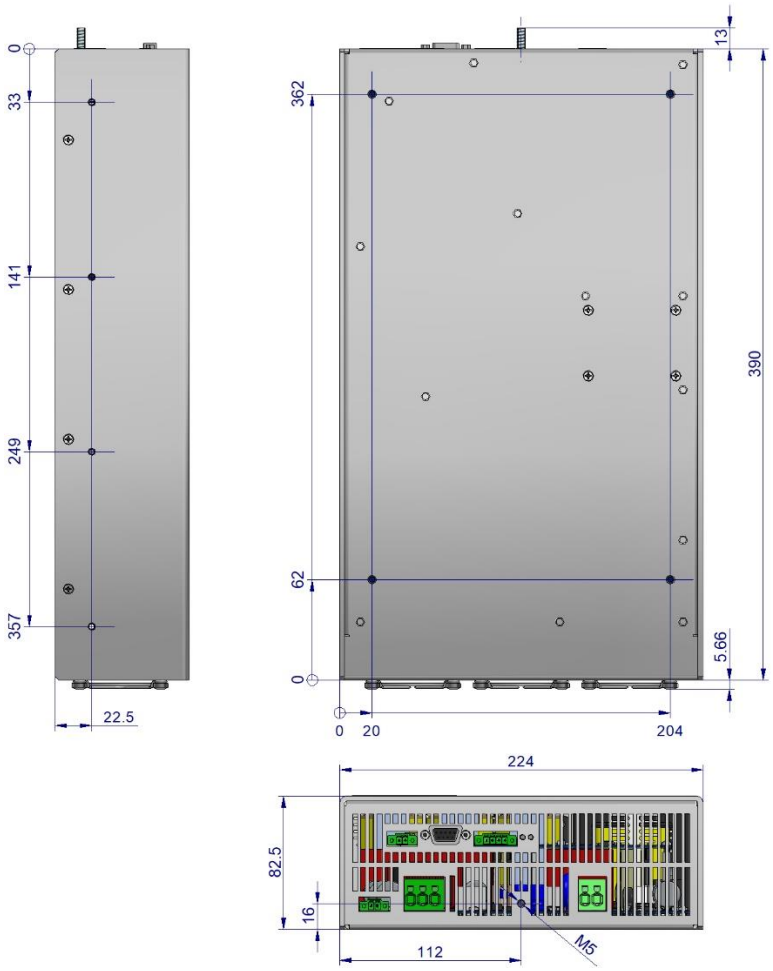
NP-9282



NP-9353



DIMENSIONS MODEL 7428



ACCESSORIES MODEL 7428

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-4500-7425 ... 7428**

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:

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: **2017**; 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, 31-05-2021

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 OT1 (-25 to 55°C): load < 100%
Class OT3 (-25 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>
</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>
</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>
<tr><td>5.1.1.6</td><td>Input ripple factor</td><td>10% peak to peak with a DC Ripple Factor of 5 %</td></tr>
<tr><td>5.1.3</td><td>Supply change-over</td><td>0.6 Un duration 100 ms (without interruptions). Performance criterion A</td></tr>
<tr><td>7.2.7</td><td>Input reverse polarity protection</td><td>By external fuse</td></tr>
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