WRHD-DC-AC-4500W-3PH

4500VA THREE-PHASE DC/AC SINE INVERTER

72Vdc, 100Vdc, 110Vdc, 127Vdc to 400Vac three phase output

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 Alarms by isolated relay

contacts Remote off opto-coupled

Available models

Input voltage DC [V]	Input voltage range [V]	Output voltage AC [V]	Output current [A]	Active output power [W]	Appar. output power [VA]	Output peakcurrent 5s (rms) [A]	Output peakcurrent (Iopk) 10ms [A]	Efficien. [%]	No load input current [A]
72	50.4 - 90	400	6.50	4000	4500	9.5	15	92	< 0.67
100	70 - 125	400	6.50	4000	4500	9.5	15	93	< 0.49
110	77 - 138	400	6.50	4000	4500	9.5	15	93	< 0.44

Version and order code:

Request a quote

WRHD-DC/AC in - 400 - 4500 - 3PH : DC-AC Three-phase sine converter

in **:** Input DC voltage (12Vdc, 24Vdc, 48Vdc, 110Vdc, 127Vdc) +/-20%

Output AC voltage : 400Vac

Output power : 4500W

Mounting : **-WM** Wall mounting (standard)

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INPUT	
Input voltage range	-30, +25% Vin nom
Maximum input ripple	5% Vin nom (Vrms, 100Hz)
OUTPUT	
Nominal output voltage (Von)	400 Vac
Output voltage range	50…440Vac via RS-232
Output frequency	50 / 60Hz via DIP-switch
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
62.5% load	-25 … 70°C
25% load	-25 … 85°C
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	EN60950-1, EN62368-1
Fire and smoke	EN45545-2 (only for **T** railway versions)
MECHANICAL	
Weight	<7240 g
Shock and Vibrations according to	EN61393:2011 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

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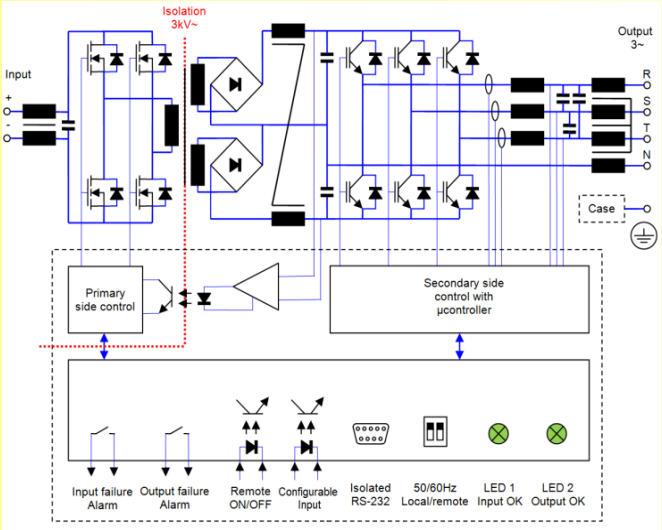
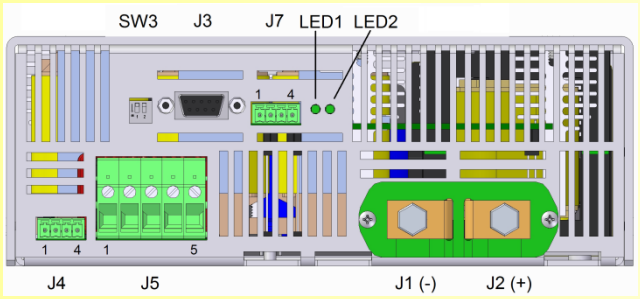
WRHD-DC-AC-4500W-3PH

BLOCKS DIAGRAM

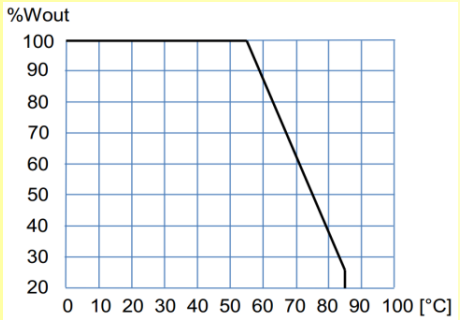


CONNECTIONS



J1	-Vin	Terminals M6
J2	+Vin	
J5 - 1	Protective Earth	Cables 1.5 … 2.5mm²
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	

POWER DERATING vs AMBIENT TEMP.



DESCRIPTION

The WRHD-DC-DC 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.
- 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.

The WRHD-DC-AC 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

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	Output 400V
Maximum current	87 A	62 A	57 A	6.5 A
Cable cross-section	**16 mm²**	**16 mm²**	**10 mm²**	**1.5 mm²**

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WRHD-DC-AC-4500W-3PH

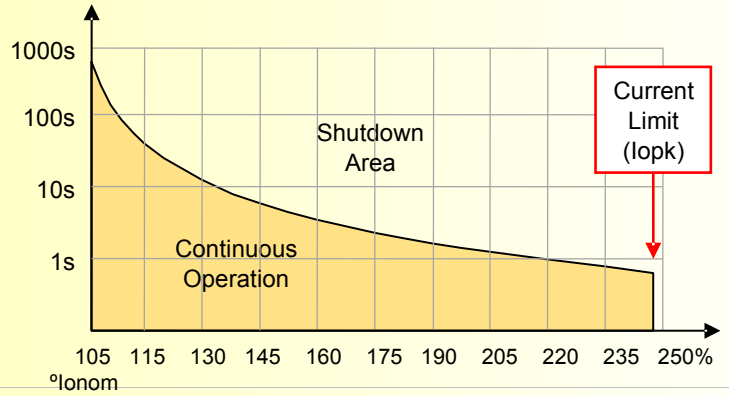
WORKING PARAMETERS

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				
High input voltage shutdown instantaneous	100.8	140	154.0	Vdc
High input voltage timed shutdown (t) (Input alarm)	93.6	125.5	143.0	Vdc
Low start-up voltage	57.6	74.5	88.0	Vdc
Low input voltage timed shutdown (t) (Input alarm)	50.4	70.0	77.0	Vdc
Low input voltage instantaneous shutdown	43.2	60.0	66.0	Vdc
Time to shutdown (t)		500		ms
Output voltage parameters				
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				
Maximum continuous output current		6.50		A
Warning current (output alarm)		6.50		A
Maximum overload ∱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		>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**.



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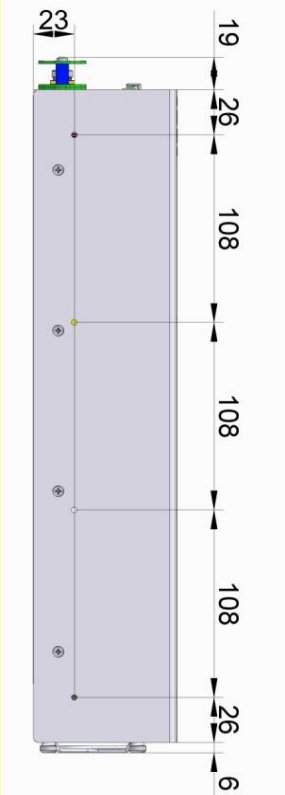
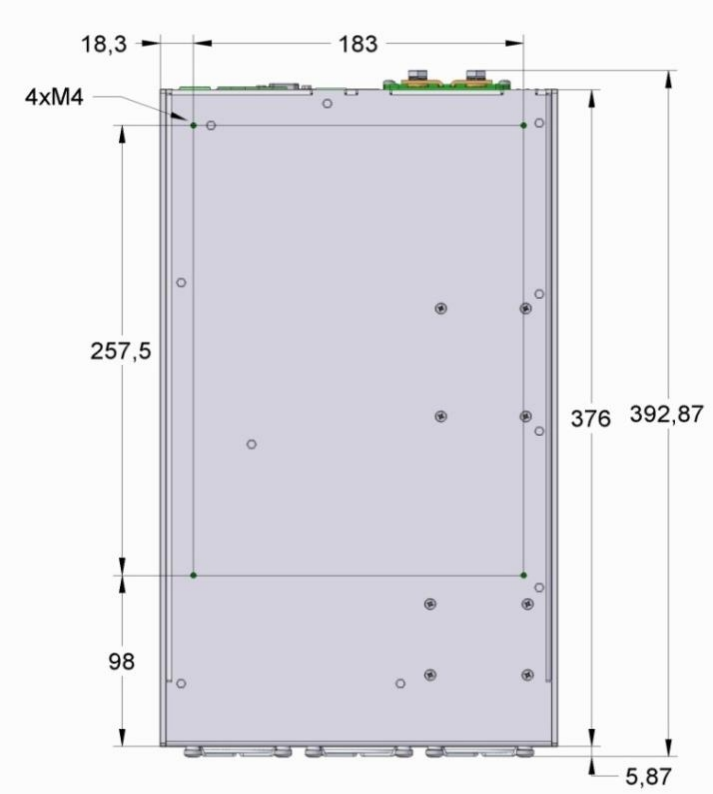
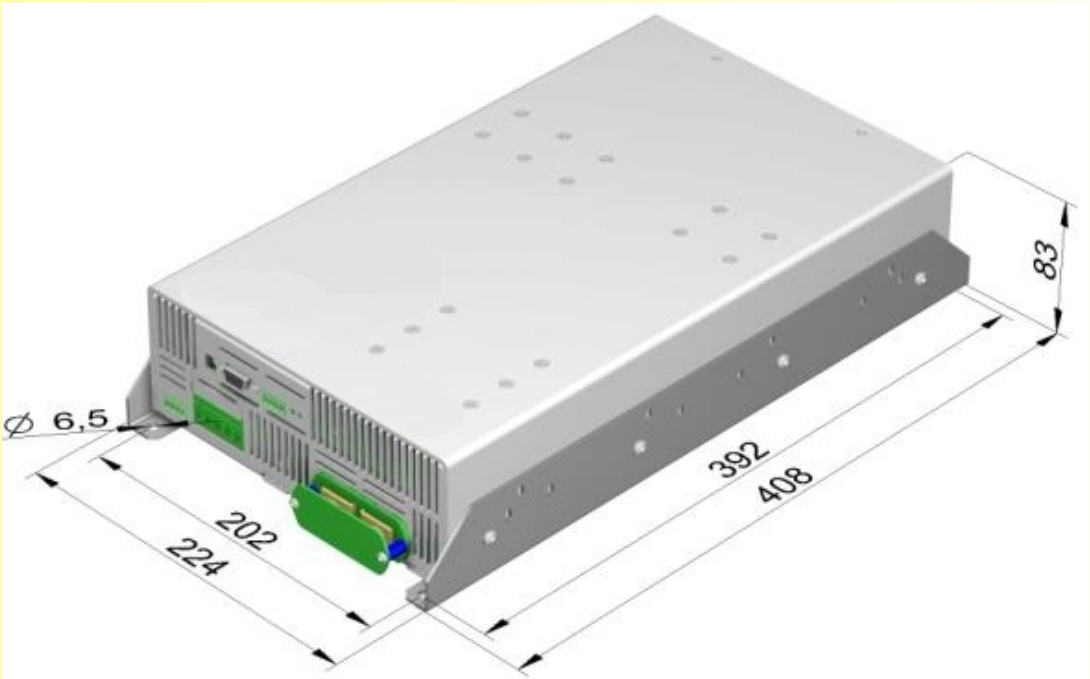




ACCESSORIES

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



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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%
Class OT5 (-25 to 85°C): load <25%</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>Conducted emissions</td><td>IEC55016</td><td>Input</td><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>
</table>
<table>
<tr><th>Test</th><th>Norm</th><th>Port</th><th>Severity</th><th>Conditions</th><th>P</th></tr>
<tr><td>Electrostatic discharge</td><td>IEC61000-4-2</td><td>Case</td><td>±8kV</td><td>Air (isolated parts)</td><td rowspan="2">B</td></tr>
<tr><td></td><td></td><td></td><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>
<tr><td>10.7</td><td>Protective coating for PCB assemblies</td><td>Class PC2</td></tr>
</table>

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