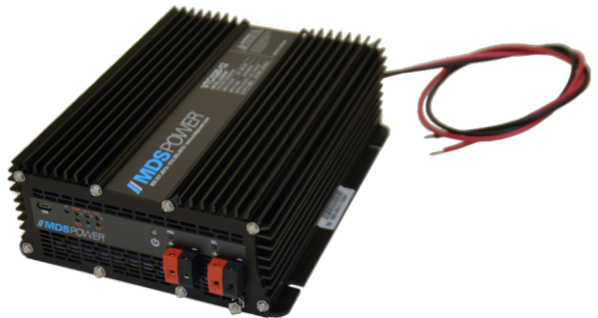




## **INSTALLATION & OPERATION MANUAL**

**VTCi320  
INTELLIGENT  
VOLTAGE  
CONVERTER**



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[www.mdspower.com](http://www.mdspower.com)

# VOLTAGE CONVERTERS

## IMPORTANT SAFETY INSTRUCTIONS

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**SAVE THESE INSTRUCTIONS** — This manual contains important safety and operating instructions for the voltage converter

### VOLTAGE CONVERTER PRECAUTIONS

1. Do not expose the voltage converter to rain or snow unless it is a sealed model.
2. Use of an attachment not recommended or sold by the manufacturer may result in a risk of fire, electric shock, or injury to persons.
3. Do not disassemble the voltage converter. If service or repair is required, return it to the manufacturer or an authorized service center. Incorrect reassembly may result in a risk of fire or electric shock. Voltages up to 350 volts are present inside the voltage converter any time it is connected to input power, even if it is switched OFF.
4. To reduce risk of electric shock, disconnect the voltage converter from the input power before attempting any maintenance or cleaning. Switching the voltage converter to OFF will not reduce this risk.
5. Never place the voltage converter directly above a battery; gases from the battery will corrode and damage the voltage converter.
6. Never allow battery acid to drip onto the voltage converter.

**WARNING:** Do not connect this unit to a battery. It does not have the circuitry or programming to properly charge a battery. Both the voltage converter and the battery could be damaged or destroyed!

### MEDICAL EQUIPMENT NOTICE

This unit is not recommended for use in life support applications where failure or malfunction can be reasonably expected to cause failure of the life support device or to significantly affect its safety or effectiveness. This unit is not recommend the use of any of its products in direct patient care. Examples of devices considered to be life support devices are neonatal oxygen analyzers, nerve stimulators (whether used for anesthesia, pain relief, or other purposes), auto-transfusion devices, blood pumps, defibrillators, arrhythmia detectors and alarms, pacemakers, hemodialysis systems, peritoneal dialysis systems, neonatal ventilator incubators, ventilators for both adults and infants, anesthesia ventilators, and infusion pumps as well as any other devices designated as “critical” by the U.S. FDA.

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# Introduction

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The VTCi320 series Intelligent DC-source Voltage Converter operates from 100 to 350 VDC to deliver up to 300 watts of precision power to supply your 12, 24, or 48 volt electrical systems.

Internally, LLC Resonant Converter technology allows Zero Voltage/Zero Current switching on the primary or high voltage side of the main power transformer. Multiple stages of filtering ensures ultra quiet operation for minimum electromagnetic interference (EMI) near sensitive radio frequency communication equipment.

The unit's front panel features eight-dual color LEDs to clearly indicate operating condition and alarm states. Other safety features include over temperature derating with shutdown, current limiting, output short circuit protection, input under voltage shutdown and output over voltage protection all with automatic recovery.

# Box Contents

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The box you have received should contain the following:

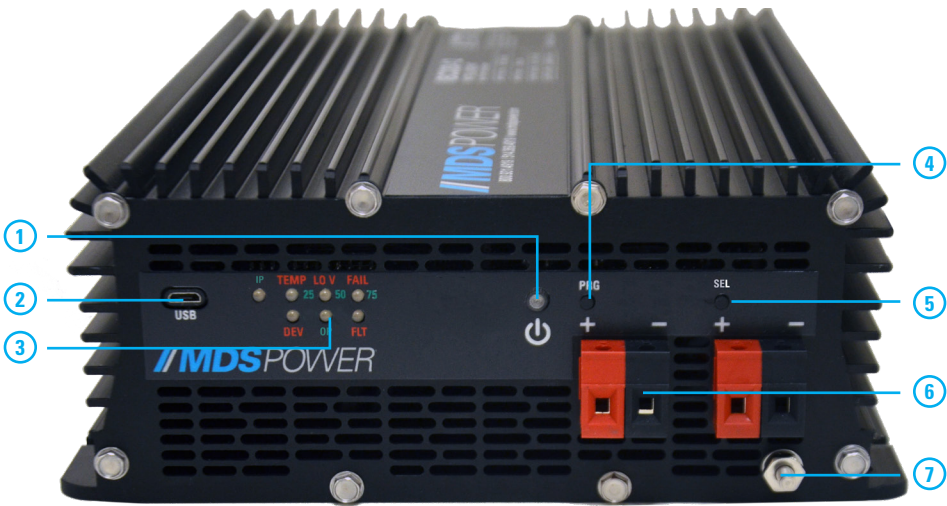
- One VTCi320 *Intelligent* Voltage Converter
- One USB cable
- This user guide
- One Warranty Registration Card

*If anything is missing or damaged please contact your dealer for a replacement*

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# Main Parts

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## Front Panel

1. Power Button
2. MicroUSB Port
3. Indicator LEDs
4. Program Button
5. Select Button
6. **DC Output Connection:** 2x Phoenix VDFK Terminal Block Connections (Red: Positive, Black Negative)
7. Chassis Ground Stud

## Rear Panel (Not shown)

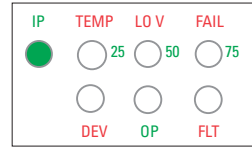
1. **AC Power Input Connection:** 1ft/30cm Type-D #14AWG Stranded Input Leads (Red: Positive, Black Negative)
2. **Input Fuse:** 6.3 Amp-400 VDC fuse

# Operation

The VTCi320 Voltage Converter is designed for simple operation. It is intended to operate fully unattended and will attempt to recover from any fault, including Over-Temperature, Low Input Voltage, Input Power Failure and Overload.

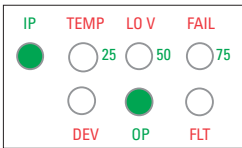
## TO INSTALL

1. Connect the Voltage Converter to the load before connecting the input power.
2. Connect the Power Supply to the input power. The IP LED should illuminate indicating it is receiving power.

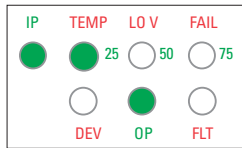


## TO OPERATE

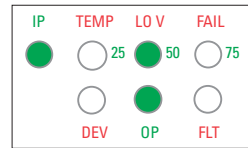
1. Press the Power Button on the unit's front panel. It will start glowing.
2. The voltage converter will go through its startup sequence. All 6 microprocessor-controlled LEDs flash red and then green. When the Power Button starts glowing, the sequence is complete.
3. The VTCi320 will automatically supply the load with the voltage indicated on its label for as long as the load is connected.
4. The Indicator LEDs can be used to determine the amount of current being drawn by the load. See the diagram below.



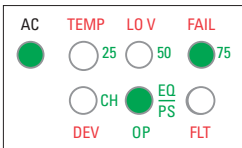
CURRENT < 10%



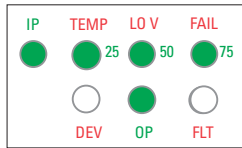
CURRENT > 11-39%



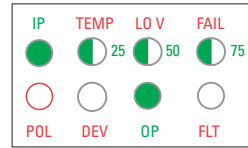
CURRENT > 40-59%



CURRENT > 60-84%



CURRENT > 85%



CURRENT = 100%



## TO END OPERATION

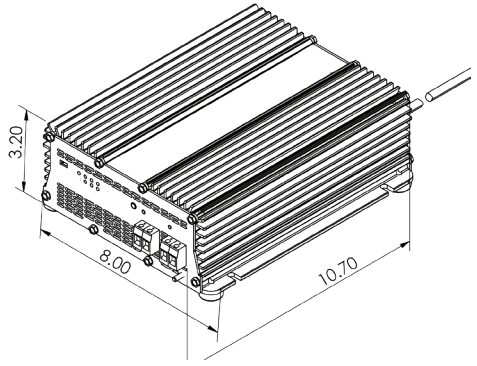
1. Press the Power Button on the unit's front panel.
2. The voltage converter will beep and the LED indicators will stop glowing.
3. When all the LEDs are dim, the unit is safe to disconnect from the load and power source.
4. The unit can now be safely serviced or put into storage.

# Installation

## MOUNTING

When mounting your unit, take the following into consideration:

- The indicator LEDs and front panel controls should be easy to see and access.
- There are at least 2 inches of clearance all around the converter for air circulation and heat dissipation.
- The load should be close enough for to easy connection and to prevent trampling of the wiring.
- If there is possibility of water drippage, such as if the units in a marine environment, install the optional drip shield above the unit.



***CAUTION: THE VOLTAGE CONVERTER MUST BE TURNED OFF BEFORE CONNECTING OR DISCONNECTING ANYTHING TO IT.***

To prevent the risk of high voltage electric shock, the voltage converter must be OFF before connecting or disconnecting anything to the unit.

## INPUT POWER CONNECTION

The unit is equipped with two 3-foot/1 meter Type-D Stranded AWG14 wire leads to serve as a DC Input Connection. Connect these leads to the DC power source in the polarity indicated.

Red Input Lead - Positive DC Terminal

Black Input Lead - Negative DC Terminal

Normally these leads should be adequate to connect to the DC power source, however, if you must extend the leads, be sure to:

- Use the smallest extension length possible.
- Use a good quality (typeTEW) wire
- Use no less than 14 gauge conductors.
- Splice and solder the joints and protect the joints with heat shrink tubing.

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## DC OUTPUT CONNECTION

This unit is equipped with a pair of Phoenix VDFK Terminal block connectors to serve as a DC Output connection for connection to DC loads. The connection can support up to two connected loads. The polarity for these connections can be found on the unit's front panel label.

Connector Color	Polarity
Red	Output Positive
Black	Output Negative

### **CAUTION: DO NOT CONNECT THE LOAD IN THE REVERSE POLARITY!!**

This will activate the reverse connection protection which will blow the output fuse(s) inside the unit in order to protect the device. The unit will be inoperable until these fuses have been replaced.

### **IMPORTANT: OUTPUT CONNECTION WIRING USED MUST BE APPROPRIATELY RATED FOR THE EXPECTED OUTPUT CURRENT.**

See specifications or your unit's label for the maximum output current and the table below for usable wire gauges.

Max. Output Current	24.00 A	15.00 A	9.30 A	5.90 A	3.70 A
American Wire Gauge	#8AWG	#10AWG	#12AWG	#14AWG	#16AWG

Max. Output Current	2.30 A	1.50 A	0.92 A	0.58 A	0.23 A
American Wire Gauge	#18AWG	#20AWG	#22AWG	#24AWG	#28AWG

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## Front Panel Adjustments

The PRG and SEL buttons on the front panel currently have no function. However, in a future firmware update they will add the capability to adjust the output voltage over a range from nominal to +17% (-0V to +2V for a 12V model for example). Subscribe to our newsletter to be notified when this update becomes available.





# Maintenance

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This voltage converter requires no maintenance other than the occasional wipe down to remove dust that could reduce its ability to dissipate heat. Carefully blow air through the cooling vent to remove any dust buildup inside the unit.

## Dry Contact Relay

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The voltage converter can be fitted with a 1-amp dry contact relay to indicate its status to a monitoring system. It has both a normally-open and normally-closed contact which changes state depending on the presence or absence of charging voltage on the output and is independent of the microprocessor.

If the unit is producing voltage on the output, the normally closed contact will be closed and there will be an electrical connection between NC and COM. If the voltage on the output goes to zero, the contact will change state. The Normally Open contact operates exactly in the reverse of the Normally Closed contact.

## Abbreviations and Definitions

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We use a number of abbreviations on the labels to save space. Here are the full words corresponding to each abbreviation along with common terms and their definitions:

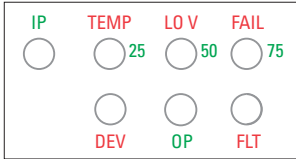
Abbreviation	Full Name	Meaning
DEV	Device	Refers to the Device. Used together with the Fault (FLT) LED to indicate a fault with the device.
FLT	Fault	Used to indicate a problem with the device (DEV)
IP	Input Power	Refers to the presence of DC power on the input connection.
OP	Output Power	Refers to the presence of DC power on the output connection.
TEMP	Temperature	Used to indicate that the Device is too hot.
LO V	Low Voltage	Used to indicate that the Input Voltage is too low.
FAIL	Failure	Used to indicate that the device needs repair or replacement.
PRG	Program	Button used to initiate the Programming Mode (not used)
SEL	Select	Button used to make choices during Programming Mode (not used)

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# Troubleshooting

The VTCi320 is designed to provide years of reliable service and to auto-recover in the event of an operational failure. In the event of malfunction, the unit is fitted with eight LED indicators and an audible alarm to help diagnose the cause of the issue. Below is a list of potential issues, and how to repair them.

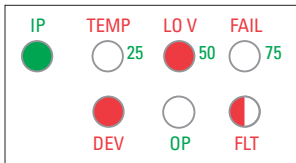
## FAULT INDICATORS



NO DC POWER DETECTED

### No DC Power Detected

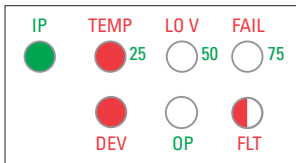
The converter is not detecting any power on the input. Using a multimeter, check that the power source is working. Check that the input fuse hasn't blown. If the fuse is blown, replace it with the recommended fuse listed on the label. If the LEDs still do not glow, then there is likely an internal failure and the unit will have to be returned for service.



LOW VOLTAGE

### Low Input Voltage Indication

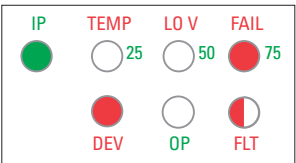
The voltage converter has detected that the input voltage has dropped below the minimum level needed for normal operation. The unit will shut off and wait for the voltage to recover.



OVERTEMP

### Over Temperature Indication

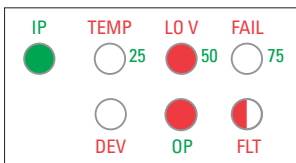
The voltage converter has detected that its internal temperature is above safe operating limits. It will shut off until the temperature has returned to normal limits. If this happens frequently, the unit may need to be remounted for better air circulation.



CONVERTER FAILED

### Converter Failure Indication

The microprocessor has detected a condition that prevents the converter from operating. Try disconnecting the input power and re-connecting it. If this does not clear the fault, the cause is likely an internal component failure and the unit will have to be returned for service.



OVERLOAD/SHORT CIRCUIT

### Output Overload/ Short Circuit

If the voltage converter is overloaded and the output voltage has dropped below nominal voltage range for the unit, the output will cycle on/off until the overload condition is removed.

# Specifications

Input	
Nominal Voltage	100 - 350 VDC
Maximum Input Amps	4 Amps w. Inrush Protection
Input Fuse	6.3 Amp 400 VDC fuse

Output			
Nominal Voltage	12 VDC	24 VDC	48 VDC
Voltage Range (VDC)**	12.0-15.5 VDC	24.0-31.0 VDC	48.0-62.0VDC
Output Current	20 A	10 A	8 A
Peak Amps	25 A	12.5 A	6.25 A
Efficiency	90% @ Full Load		


Mechanical	
Length	10.7 in. / 27.2 cm
Width	8.0 in. / 20.3 cm
Height	3.25 in. / 8.3 cm
Clearance	2.0 in. / 5.0 cm all around
Weight	6.2 lb / 2.8 kg
Material and Finish	Marine-grade black anodized aluminum
Fasteners	18-8 Stainless steel
Mounting	Vertical or horizontal mounting
Output Connection	<b>DC Output:</b> 2x sets of Phoenix VDFK Terminal Block (Red and Black)
Input Connection	<b>AC Input:</b> Type-D #14AWG Stranded Input Leads (Red: Positive, Black Negative)
Other Connections	<b>Data/Communications:</b> MicroUSB port

Environmental and Safety	
Operating Temperature Range	-25°C+ to +40°C (-40°C to +55°C Optional)
Storage Temperature Range	-55°C to +85°C
Humidity	0 - 95% Relative Humidity (non-condensing)
Emissions	Complies with FCC Class B, Part 15
Isolation	Input-Output, Input-Case, Output-Case: > 1500 VDC
Audible Noise	None (Ø db)
Duty Cycle	Continuous
Warranty	Five Years Parts and Labor
Safety	Built to meet ABS, CE, UL458 and CSA 22.2.107.1

\* Specifications subjects to change without notice.

DESIGNED AND BUILT IN CANADA

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