WAKESPEED®

WS48-12x MANUAL

CHARGE SMARTER

www.wakespeed.com 775.221.8898 support@wakespeed.com

OVERVIEW

Unlock next-level power capabilities with high energy systems. Experience lower costs, faster charging, and more real-world power availability. The Wakespeed 48v/12v Bi-Directional DC-DC Converter (WS48-12X) simplifies and streamlines installation with its efficient bi-directional buck/boost DC-DC converter. From installation using the existing chassis alternator, to supplementing or even replace the chassis alternator with a high energy charging component, the WS48-12x seamlessly manages power distribution, putting it exactly where you need it.

- Seamless transfer of up to 3,000 watts of power from one voltage bus to the other.
- Support for 12v/48v power buses.
- Charge higher voltage batteries utilizing existing chassis electrical system.
- Works with existing chassis alternators - no 'add on' required.
- Dynamic power transfer regulation to match the capability of the chassis alternator – without over-loading it.
- Optionally suppliant system power generation using 2nd 48v alternator fully controlled by the same WS500.
- On demand supplemental chassis electrical system power to support surge loads without cost of additional batteries.
- J1939/RV-C based CAN support for system and BMS integration.
- Wide BMS integration support, both CAN and non-CAN based batteries.

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SAFETY CONSIDERATION

The WS48-12X bidirectional converter is a part of a complex electrical system. A trained and licensed automotive or marine electrician is strongly recommended for its installation. Please note that an improperly installed electrical system component can result in severe damage to property and serious personal injury. Failure to properly install the WS48-12X bidirectional converter, the components wiring, or improper configuration may void the regulator's warranty in addition to damaging other system components. Wakespeed® is not liable for damage or injury resulting from improperly installed, configured, or modified applications of its products. The following safety precautions are recommended:

- Electrical and mechanical system installation or repair should NEVER be attempted when fatigued or while using alcohol or medication that can impair judgment or motor skills.
- Ensure that all jewelry and loose clothing is removed prior to work around engine or mechanical equipment.
- Use the proper tools per the installation requirements.
- Turn off switches and disconnect your batteries prior to installing your WS48-12X bidirectional converter or other electrical system components. Failure to do so may cause system damage or bodily injury.
- Ensure your alternator can provide the required current to charge your auxiliary battery bank.
- Read the manual!
- If you are not comfortable with the installation or operation of the charging system, please consider consulting a licensed and experienced technician to complete the installation.

FEATURES

The following list shows the main features of the WS48-12x.

SYSTEM VOLTAGE	
12v - 48v	Bidirectional power transfer from two power busses
48v - 12v	
12v INPUT RANGE	8v to 16v (reduced capacity below 12v and above 15v)
48V INPUT RANGE	24v to 60v (reduced capacity below 48v and above 60v)

ALTERNATOR SUPPORT	
CHASSIS ALTERNATOR	12v
HIGH ENERGY ALTERNATOR	48v
DEPLOYMENT OPTIONS	12v Chassis Alternator
	48v High Energy Alternator
	Both 12v Chassis and 48v High Energy Alternators

ALTERNATOR MANAGEMENT	
CHASSIS ALTERNATOR	No change needed. Alternator monitored for overloading and overheating
HIGH ENERGY ALTERNATOR	Full Management

TERMINAL MANAGEMENT	
ALTERNATOR MONITORING	Both Chassis and High Energy Alternators are monitored and managed for overheating
DC-DC CONVERTS	DC-DC converter scales back to prevent overheating.

BATTERY CHARGE PROFILES	
CHARGE PROFILE	Preset and configurable profiles to match battery manufactures guidance
CHARGE PHASE CRITERIA	Flexible charging protocol integrating: System voltage, Battery Acceptance Current, Battery Temperature, Alternator Temperature, and/or Time duration
EXTENDED BATTERY TEMPERATURE RANGE SUPPORT	Converter can be configured to provide safe charging of batteries outside of normal temperature ranges by dynamically limiting chare current.

CONFIGURATIONS	
VIA APP	Full feature Application allows for simple configuration of alternator, battery, BMS and communication options.

COMMUNICATIONS	
CAN	J1939 based CAN for systemconfiguration, integration and monitoring.
PROTOCOLS	J1939, RV-C, Marine
BMS PROTOCOLS	RV-C, SMA, Victron, LUX, Others
USB	Diagnostics/configuration. Firmware upgrade.

FIRMWARE UPDATES	
YES	Controller firmware updatable via built-in USB connector

COMPATIBILITY	
SYSTEM	Fully compatible with Wakespeed WS500 Advanced Alternator Controller
BMS	Wide range of BMS integration supporting both CAN and non-CAN integration

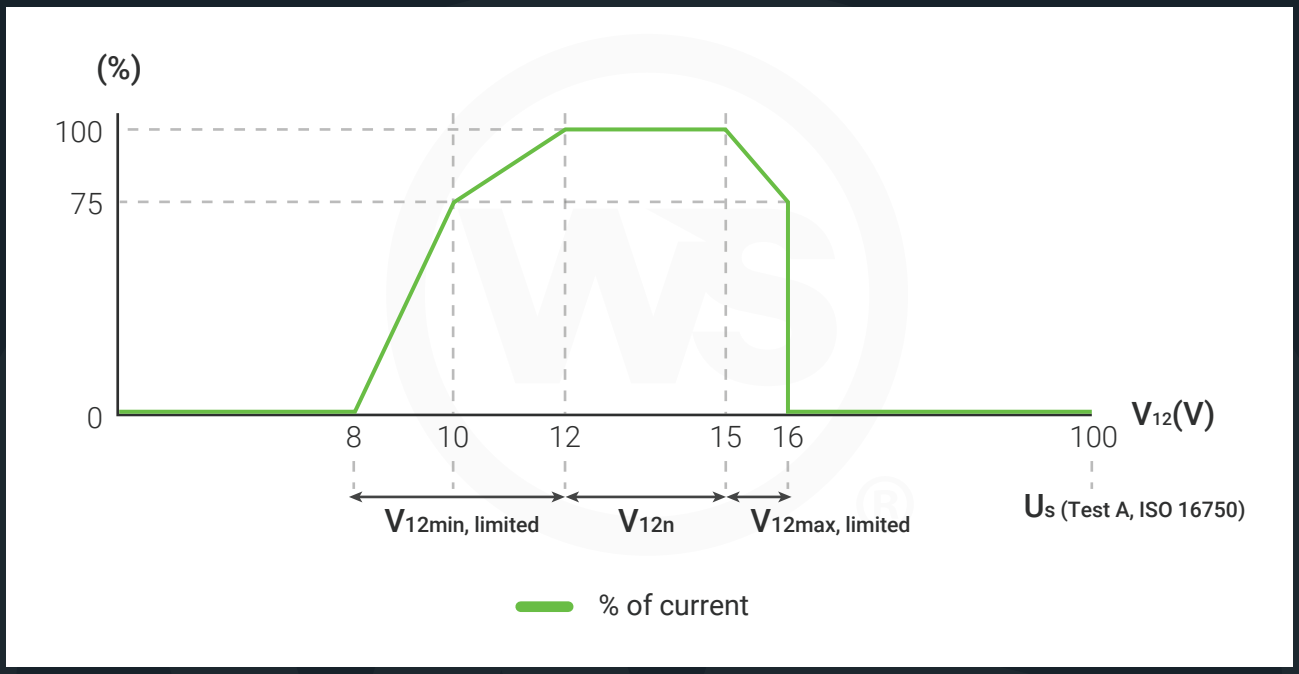
CONNECTIONS	
SYSTEM	Multi-pin harness provides for system, optional alternator, CAN and BMS connection
POWER	12v: M10 48v: M8 Ground: M6

PROTECTIONS	
12V	Reverse polarity, over current, short-circuit, under voltage and overvoltage protections
48V	Reverse polarity, short-circuit, overcurrent, under voltage and overvoltage protections

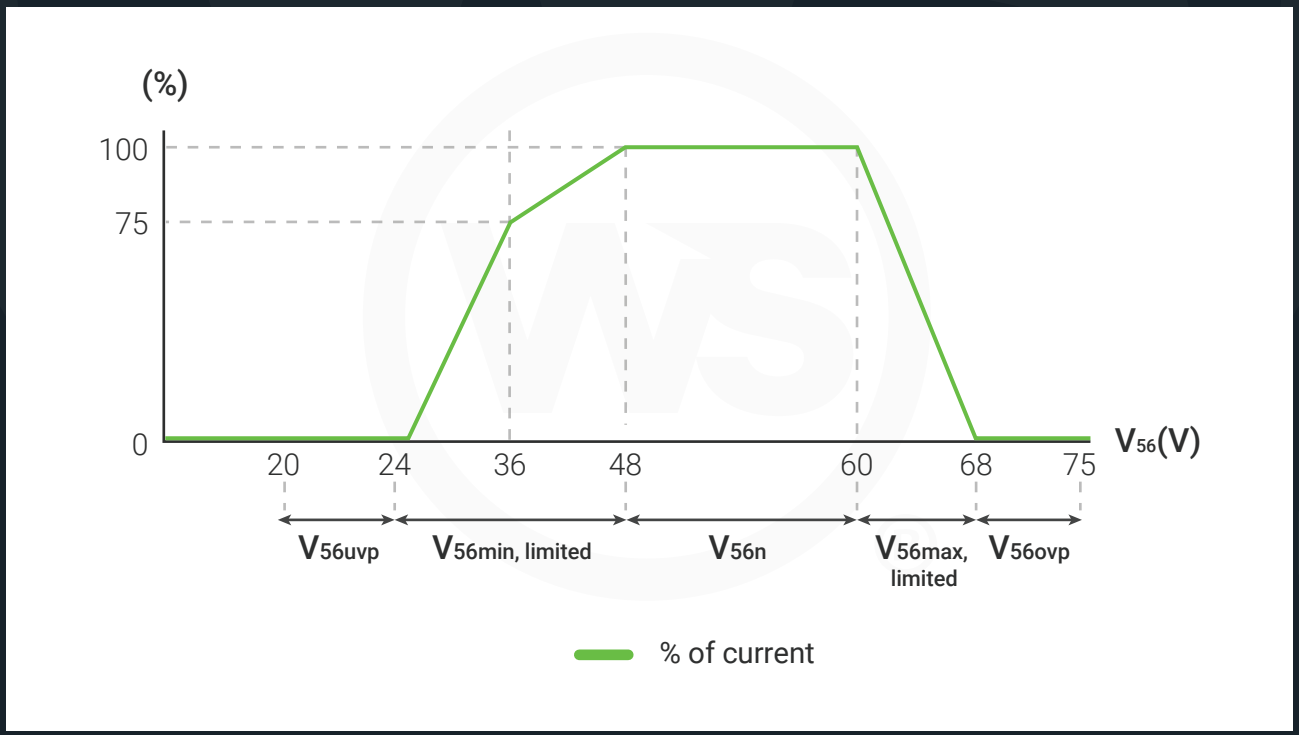
PHYSICAL AND ENVIRONMENTAL	
DIMENSIONS	8.93" x 9.17" x 2.44" / 226.8mm x 233mm x 62mm
IP RATING	IP69K, IP67
OPERATING AMBIENT TEMPERATURE	-40°C to 75°C

CONVERTER PERFORMANCE

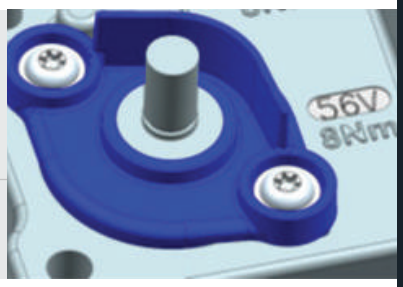
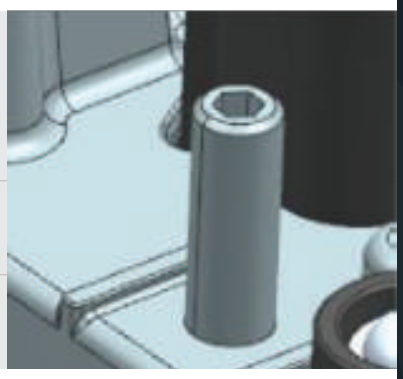
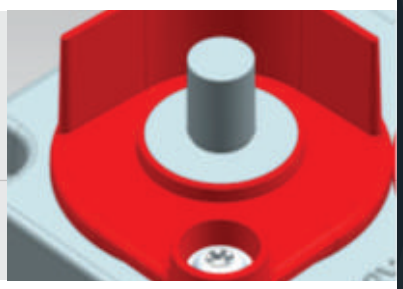
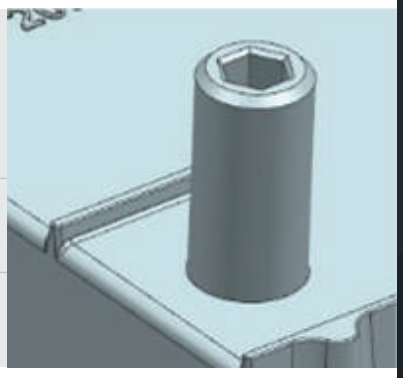
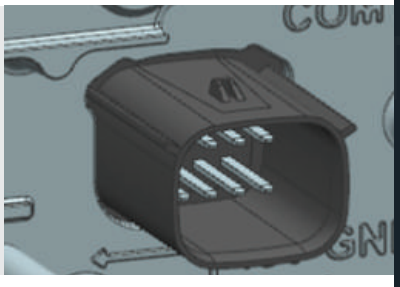
Performance derating applied on the 12v input voltage, as shown below:



Performance derating applied on the 48v input side, as shown below:

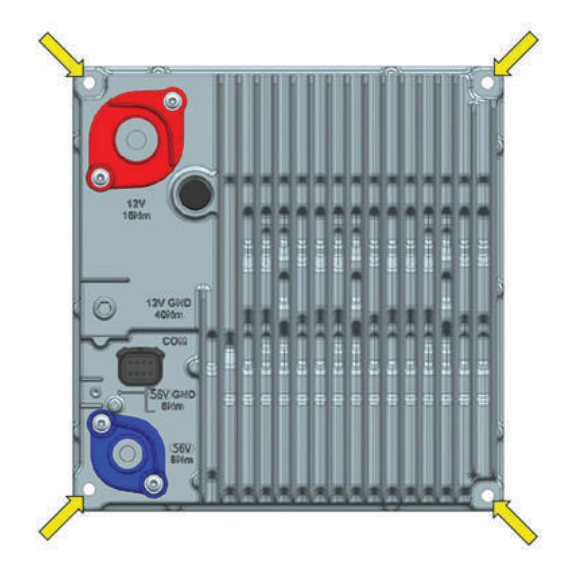


CONNECTIONS

56V (48V) POS TYPE:	M8 Thread pitch: 1.25mm Torque: 8 [Nm] ±10%	
CONTACT AREA:	Brass, Tin plating, plating thickness 8µm	
56V (48V) GND TYPE:	M6 Thread pitch: 1.0mm Torque: 8 [Nm] ±10%	
CONTACT AREA:	Al (aluminum)	
STUD MATERIAL:	Steel, Zinc Flake, plating thickness 5µm	
12V POS TYPE:	M10 Thread pitch: 1.5mm Torque: 16 [Nm] ±10%	
CONTACT AREA:	Brass, Tin plating, plating thickness 8µm	
12V GND TYPE:	M12 Thread pitch: 1.75mm Torque: 40 [Nm] ±10%	
CONTACT AREA:	Al (aluminum)	
STUD MATERIAL:	Steel, Zinc Flake, plating thickness 8µm	
COM TYPE:	Molex MX150 (custom PN), 8 pins male (PN 75757-5341), Au plated, Polarization A (mating connector type 33472-4806, 33472-4801, 33472-4901, or 33472-4906	

MOUNTING ORIENTATION

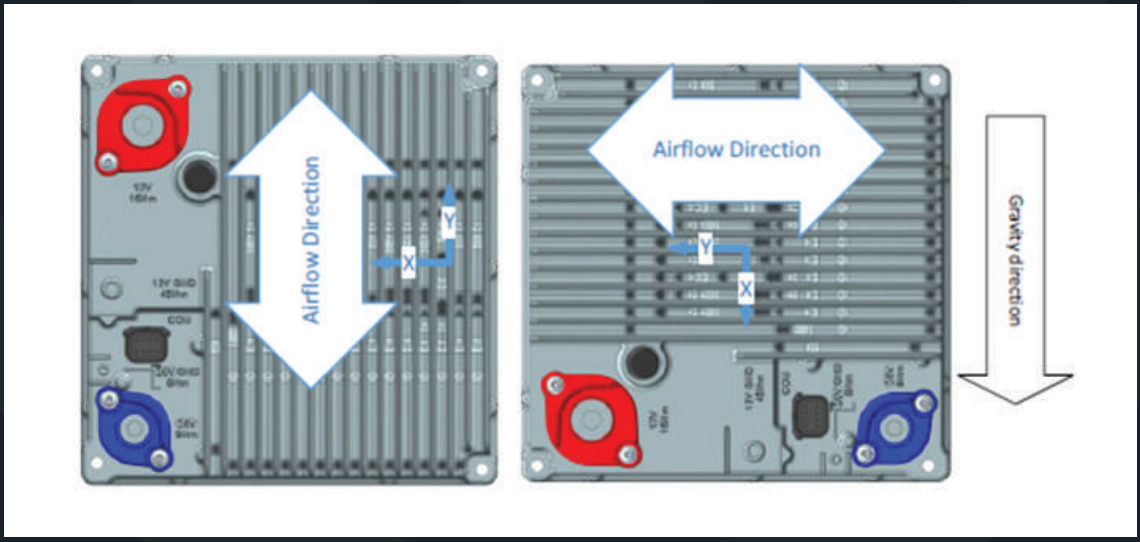
The mounting orientation and the airflow direction should be applied according to mounting orientation 1, 2 or 3 as shown below.



Hardware:

- Mount using M6 Flange head bolt according to DIN EN 1665 or similar
- Torque: 8 [Nm] ±10%

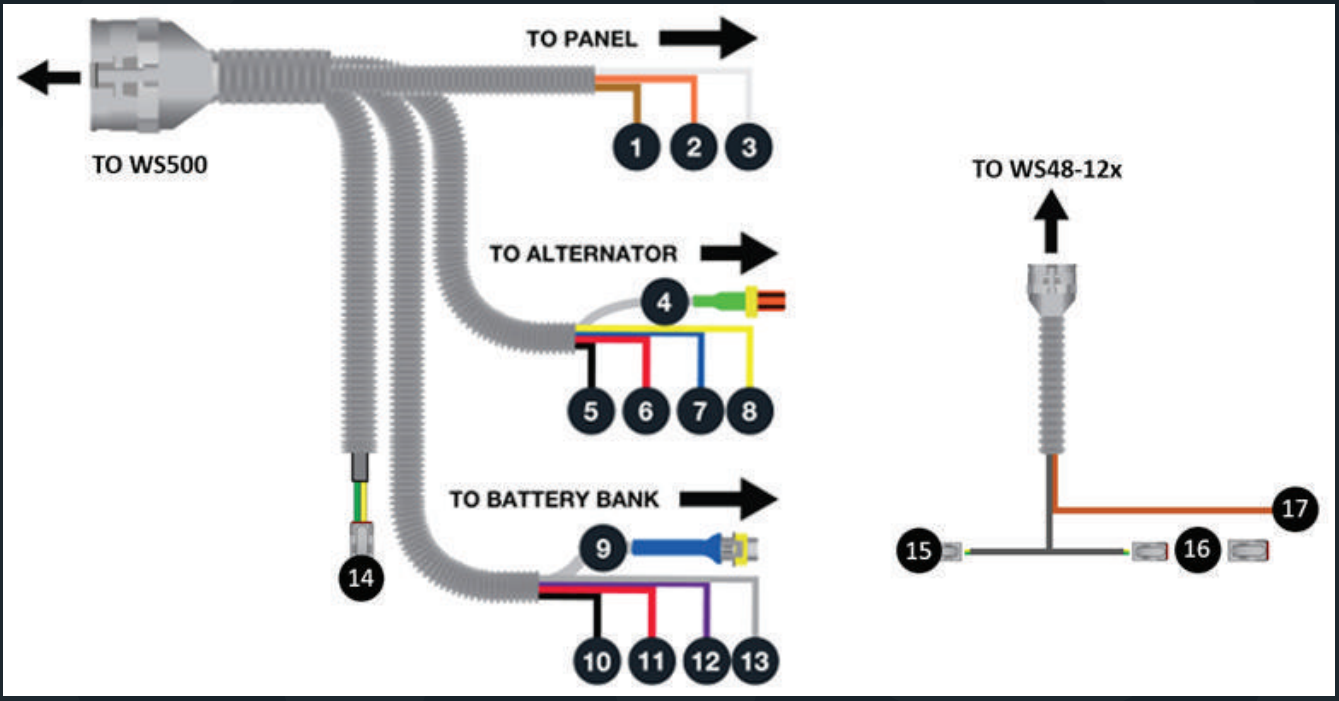
Active airflow will help promote optimal operation but is not required. If active air flow is opted for, direct the airflow across the cooling fins as shown below.



WIRING HARNESS INSTALLATION

The WS48-12X includes a high quality, industrial grade Ampseal connector system to provide a waterproof pairing between the WS500 regulator, harness, and WS48-12X bidirectional converter, along with sealed RJ45 connectors (via the WS500) for additional CAN bus system connection. The WS48-12X bidirectional converter is compatible with harness WSPHCAN and WSPH-VAN, which are CAN compatible WS500 harnesses.

This document will highlight the Harness installation specific for use with the WS48-12X bidirectional converter. For standard installation of the Wakespeed Regulator harness, please see the WS500 Alternator Regulator Product Manual.



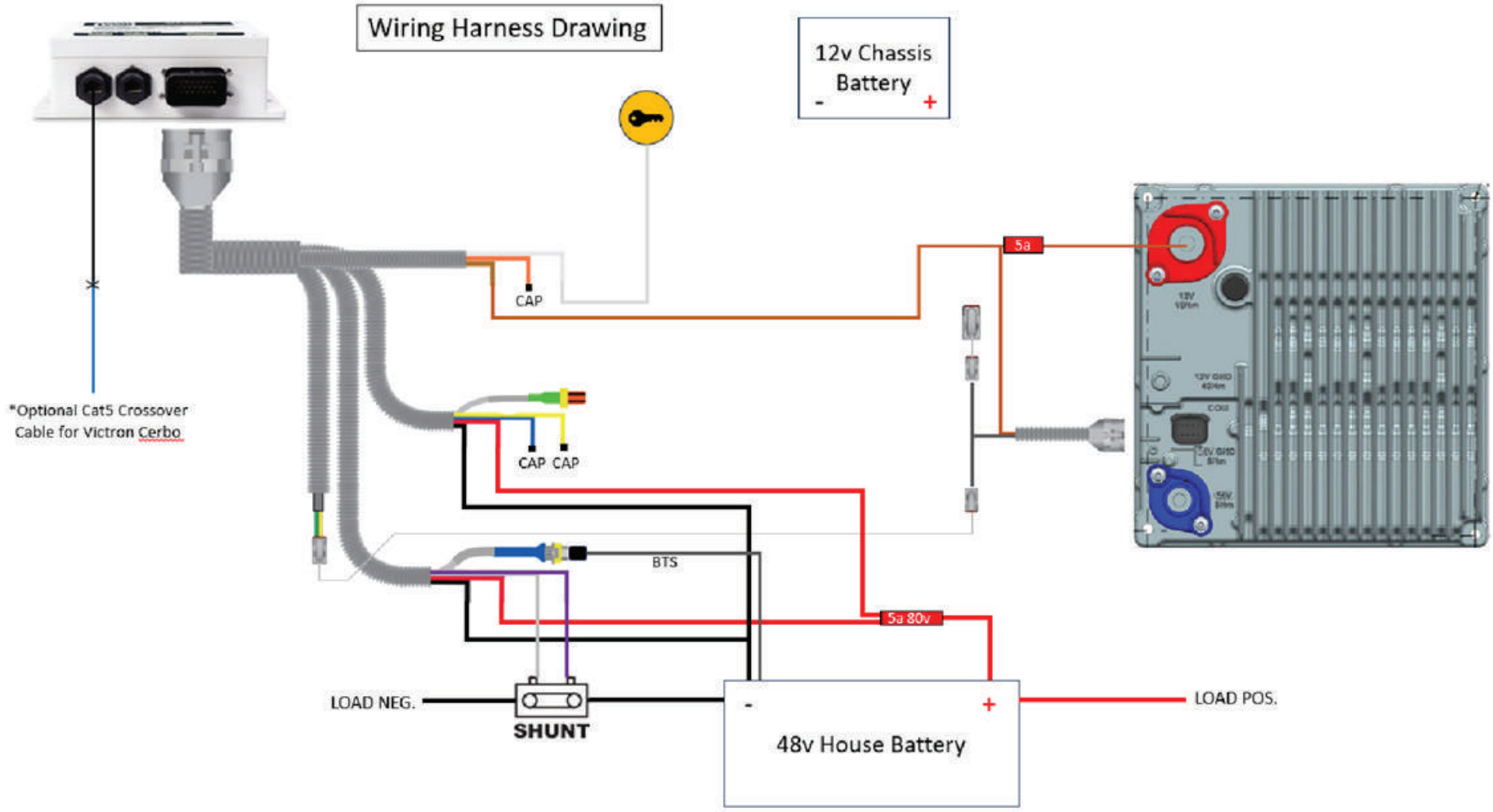
WS500 Harness Connections: WSPHCAN or WSPHVAN

1. Ignition – The brown 16-gauge wire must see 8.5 volts or greater to turn on the WS500. Most often connect to a continuous DC power source to allow 24/7 control of the WS48-12X DCDC Converter.
2. Lamp – If not used. Cap off.
3. Function In – The white Function-In is often used connected to the Ignition to allow the WS500/WS48-12X combo to know if the chassis engine is running or not. A voltage > 8.5VDC signals the engine is running and excess power may be drawn from the chassis 12VDC system.
4. Alternator Temperature Sensor – Attach to the dedicated 48v alternator (If used). Optionally may be attached to the chassis 12v alternator or capped off and not used.
5. Alternator Negative – The black alternator negative must be connected to the negative post of the battery being charged. In multiple battery banks this wire should be instead connected to the Negative Bus-bar used to combine the multiple battery banks. If an optional dedicated 48v alternator is installed, the Alternator Negative may be connected either to the Battery negative, or the negative power post of the alternator.

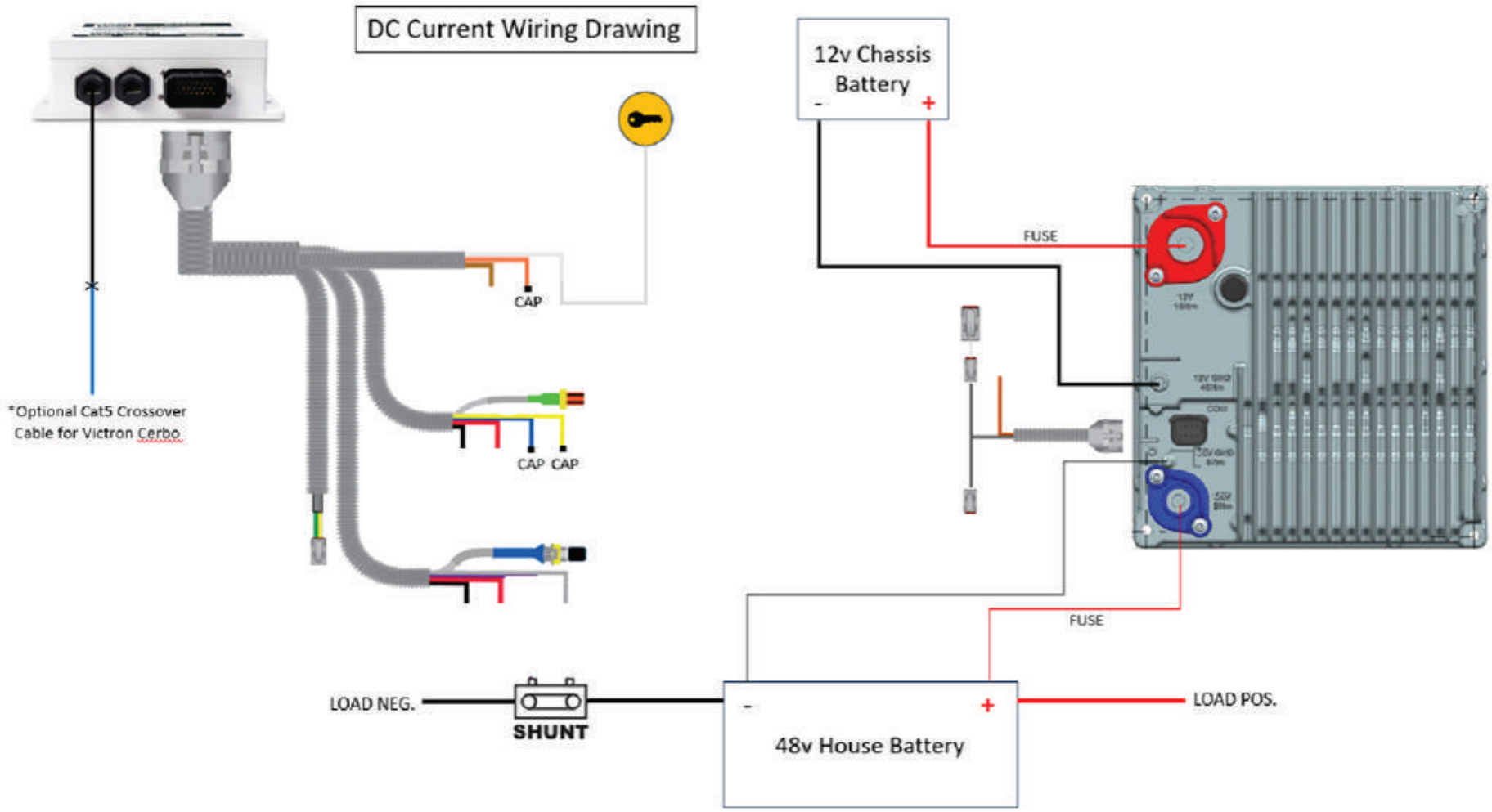
6. Alternator Positive – The red positive wire must be connected to the positive post of the battery being charged. In multiple battery banks this wire should be instead connected to the Positive Bus-bar used to combine the multiple battery banks. If an optional, dedicated 48v alternator is installed, the Alternator Positive may be connected either to the Battery negative, or the negative power post of the alternator. In all cases, properly fuse the alternator Positive with a 10-15A/80v fuse. When fitting with an optional 48v alternator it is important to attach the Alternator Positive wire to the 'alternator' side of any potential charge bus disconnect: Fuse, Service Switch, etc. At all times the Alternator Positive need to be able to sense the actual Alternator voltage under all conditions.
7. Field – If installing the optional 48v alternator, connect this to the positive Field Post on that alternator. Else this is not used and should be properly sealed to prevent accidental shorting.
8. Stator (AC Tap) – May optionally be connected to either the 48v or 12v alternator 'Stator' output. If not used property seal to prevent accidental shorting.
9. Battery Temperature Sensor Terminal – The grey two-conductor cable is terminated with a Superseal-type connector which mates with the optional Battery Temperature Sensor. The battery temperature sensor enables the regulator to determine the temperature of the batteries, allowing for reduced charging rates as temperature extremes are approached, and charging cutoff as the battery reaches its defined charging temperature range: Too hot, or too cold.
10. Negative Battery Sense – The black with yellow tracer, 16-gauge negative wire must be connected to the negative post of the battery being charged. In multiple battery banks, should be connected to the battery Negative Bus-bar.
11. Positive Battery Sense – The red with yellow tracer positive wire must be connected to the battery being charged, or the positive Battery Bus bar in the case of a multi-battery installation. Properly fuse with a 3A/80V fuse. It is acceptable to use a common 10-15A fuse with the Alternator Positive wire if distances from the battery themselves are short.
12. Current Sense High – The purple wire connects to the "high" side of a current shunt. The default current shunt rating is 500A/50mV. See reference image on page 9 for details on which side of the shunt to connect depending on if the shunt is mounted in the batteries Ground or Power cable. In some installs where Battery Current is sensed remotely via CAN from the BMS and the Current Sense wires are not used, cap off the ends to prevent accidental shorting.
13. Current Sense Low –The grey wire connects to the "low" side of a current shunt. The default current shunt rating is 500A/50mV. See reference image on page 9.
14. CAN – The green and yellow twisted pair of wire provides communication between WS48-12X and WS500. Connect CAN (14) to CAN (15) via the WS48-12H adapter cable provided with the WS48-12x.

WS48-12H Connections

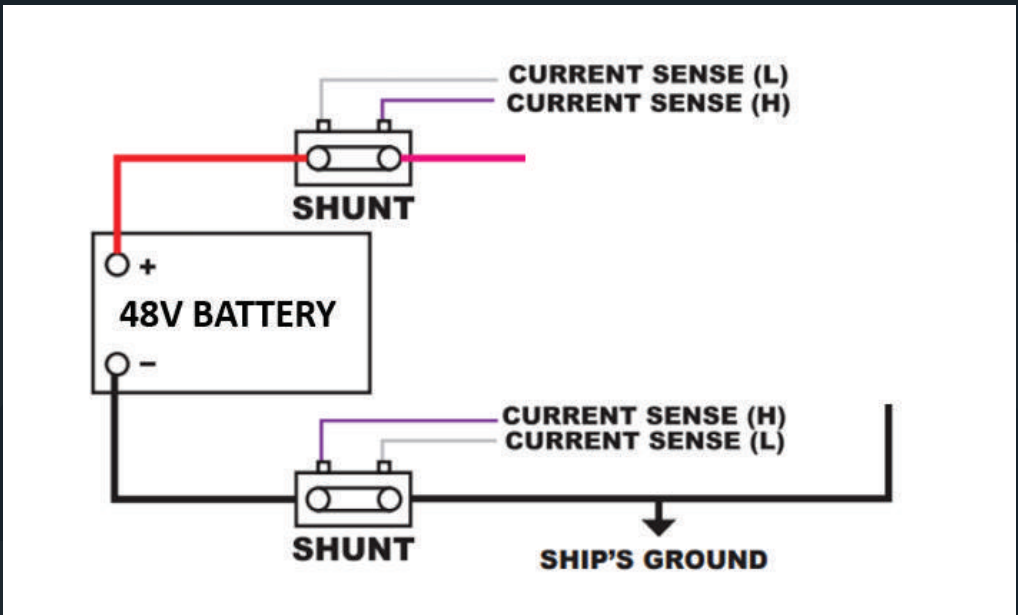
15. CAN - The green and yellow twisted pair of wire provides communication between WS48-12X and WS500. Connect CAN (15) to CAN (14) of WS CAN Harness.
16. CAN Terminator – Connect to the included DTM CAN Terminator
17. Power – The brown wire connects to the positive 12v post of converter, providing power to the converter itself. Use 3A/40V or better fuse. Often connected to the same 'power source' as the Brown Ignition wire (1) of the WS500 harness. **DO NOT CONNECT TO 48V.**


Wiring Harness Drawing
12v Chassis Battery
-
+
CAP
5a
*Optional Cat5 Crossover Cable for Victron Cerbo
CAP CAP
BTS
5a 80v
LOAD NEG.
SHUNT
-
+
48v House Battery
LOAD POS.

DC CURRENT WIRING



*Shunt may be mounted on positive or negative side of the 48v house battery bank.



> ***Note:*** *Diagram is intended to indicate placement of current sense wires base on shunt location. Only one shunt is required for regulator operation.*

CONFIGURATION

*Need Screenshots

WARRANTY

*2 Years