TORUS POWER

Engineered to perform & protect like no other

Toroidal Isolation Power Transformers

TOT AVR Series Manual

Audio / Video Power Isolation Units with Automatic Voltage Regulation

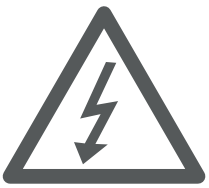
TOT AVR shown with CB black faceplate. Other configurations are available.

Receptacle panel of TOT AVR, North American model shown.

	SMSS	Maximum Available Output Current	Input Voltage	Output Voltage	Output Connector
TOT AVR **TOT AVR SMSS**	√	10A	120VAC Operating Range (85-135VAC)	120VAC ±5V	6 outlets 15A NEMA 5-15R
TOT AVR CE **TOT AVR CE SMSS**	√	4A	220-240VAC Operating Range (170-270VAC)	220-240VAC ±10V	3 outlets 16A/250V CEE7 Continental European Schuko
TOT AVR UK **TOT AVR UK SMSS**	√	4A	220-240VAC Operating Range (170-270VAC)	220-240VAC ±10V	3 outlets, 13A/250V UK Socket
TOT AVR AUS **TOT AVR AUS SMSS**	√	4A	220-240VAC Operating Range (170-270VAC)	220-240VAC ±10V	3 outlets, 15A/250V AS/NZ 3112
TOT AVR MX **TOT AVR MX SMSS**	√	10A	127VAC Operating Range (100-150VAC)	120VAC ±5V	6 outlets 15A NEMA 5-15R

Table of Contents

Important Safety Instructions



CAUTION! To reduce the risk of electric shock and fire, do not remove the cover of this device. There are no user serviceable parts inside. Please refer all servicing to licensed service technicians.

CAUTION! The international symbol of a lightning bolt inside a triangle is intended to alert the user to uninsulated "dangerous voltage" within the device's enclosure. The international symbol of an exclamation point inside a triangle is intended to alert the user to the presence of important operating, maintenance and servicing information in the manual accompanying the device.

CAUTION! To prevent electrical shock, match wide blade of plug to wide slot, fully insert.

CAUTION! To reduce the risk of electrical shock, do not expose this equipment to rain or moisture.

1. Read Instructions—All safety and operating instructions should be read before operating the device.

2. Retain Instructions—The safety and operating instructions should be retained for future reference.

3. Heed Warnings—All warnings on the device and in the operating instructions should be adhered to.

4. Follow Instructions—All operating and safety instructions should be followed.

5. Water & Moisture—The device should never be used in, on or near water for risk of fatal shock.

6. Ventilation—The device should always be located in such a way that it maintains proper ventilation. It should never be placed in a built-in installation or anywhere that may impede the flow of air through its ventilation slots.

7. Heat—Never locate the device near heat sources such as radiators, floor registers, stoves or other heat-generating devices.

8. Power Cord Protection—Power cables should be routed so they are not likely to be stepped on or crushed by items placed on them or against them. Special attention should be paid to areas where the plug enters a socket or fused strip and where the cord exits the device.

9. Periods Of Non-Use—The device should be unplugged when not being used for extended periods.

10. Dangerous Entry—Care should be taken that no foreign objects or liquids fall or are spilled inside the device.

11. Damage Requiring Service—The device should be serviced by licensed technicians when:

- The plug or power supply cord has been damaged.
- Objects have fallen or liquid has spilled inside the device.
- The device has been exposed to moisture.
- The device does not appear to be operating properly or exhibits a marked change in performance.
- The device has been dropped or the enclosure becomes damaged.

12. Service—The device should always be serviced by licensed technicians. Only replacement parts specified by the manufacturer should be used. The use of unauthorized substitutions may result in fire, shock, or other hazards.

13. Do not position the equipment so that it is difficult to operate the disconnecting device (power cord).

14. If the equipment is used in a manner not specified by the manufacturer, the protection provided by the equipment may be impaired.

15. The power switch should be in the "off" position when connecting or disconnecting equipment from a Torus Power unit.

16. **CAUTION** Some units can be very heavy, please use safe practices when lifting.

≥18 kg (39.7 lb)

≥32 kg (70.5 lb)

≥55 kg (121.2 lb)

Shipping Carton & Packing Material

Please keep the original shipping box and all packing material. This will ensure the AVR is protected in future transport.

In the unlikely event you have a problem and must return it for service you must use the original packing material.

Ship the AVR only in the original packing material, as the unit is not insurable by carriers otherwise.

Placement and ventilation
Allow 1" distance on all sides when positioning the AVR for proper ventilation, and allow 6" behind the AVR for adequate wiring space. Do not place heat-generating devices directly below the AVR.

Connecting components and using the AVR
Using the AVR is as simple as plugging in audio and video components to the outlets on the rear panel. The order and position in which you connect your components will not affect the performance of the AVR or your components. Connect the AVR to the wall outlet, and switch it on. Turn on the components individually.

While the AVR has built-in software that can be accessed via the Ethernet connection, there is no need for you to use this software. The AVR system provides all the standard features, performance, and benefits out of the box by simply plugging it in as described in this section. You can use the AVR software to monitor the voltage conditions via your computer, and for such additional features as being able to turn your system on/off remotely and change the duration of displays backlight.

Torus AVR – Description

Torus Power AVR (Automatic Voltage Regulation) is a full-feature state-of-the-art power conditioner, isolating and protecting your system. Like all Torus Power products, the AVR series provides true isolation (using massive toroidal transformers) and protects all connected equipment from the risk of severe power line surges using series-mode surge suppression. In addition, Torus AVR provides stable voltage to keep equipment running in the optimal range of 115VAC to 125VAC for any input voltage from 90V to 130VAC. (International units operate within nominal input voltage such as 220V, 230V, 240V; Torus AVR keeps them operating within a range of +/- 10V.). See table on page 7 for more details.

Torus Power AVR series uses a micro-processor to monitor and control the power provided to connected components. The front panel display on the Torus Power AVR indicates input and output voltages, and displays output current, as well as displaying fault conditions.

The Torus Power AVR is pre-programmed to power down the system when a high or low fault conditions occurs (user can over-ride).

There are multiple interfaces built into the Torus Power AVR:
1) Ethernet interface with built-in web browser allows any computer to view voltage and current readings and turn the AVR unit on or off.
2) RS-232 is provided for connection to media control systems.
3) Two 12V triggers are provided.

Does your system need automatic voltage regulation?
Under ideal conditions, when the supplied power line is stable and dependable, you may not need voltage regulation. In such an ideal situation, your equipment can operate within the normal tolerance of the line voltage.

In reality, the power supplied to most areas is less than ideal due to outdated power grids. In most areas, the power regularly drops or rises above the acceptable range (in North America +/– 5V, Europe/Asia/Australia +/- 10V) . These voltage sags, brownouts, and surges can stress components and shorten equipment life. In the worst case, catastrophic events can destroy valuable equipment. In such real-world conditions, Torus Power AVR can protect your equipment, and improve the quality and enjoyment of your audio and video experience.

Front Panel

The Front Panel display consists of a 2 line LCD and 1 push button.

Typical display.

```
In: 115V
Out: 120V      5.2A
```

Press button to show IP Address.

```
IP Address
10.1.1.112
```

See section on AVR software for further information on the IP Address.

Voltage Faults

If a high or low voltage condition exists for 30 seconds or more, a voltage fault is displayed and the fault output is turned on and the system shuts down (unless over-ridden by the user).

Display will show

```
System OFF
LOW AC VOLTAGE
```

Or

```
System OFF
HIGH AC VOLTAGE
```

As the output power from the Torus Power AVR is shut down, all the connected equipment is turned off. The AVR power switch remains in the ON position, although there is no power to the load.

The connected equipment should be switched off.

When the voltage has been restored to the normal operating range, the following procedure can be followed:

- The Torus Power AVR can be switched OFF and then ON.
- Wait thirty seconds to verify the fault condition no longer exists.
- The connected equipment should be switched on individually.

If the fault condition still exists, the AVR will require approximately 15 seconds to monitor the incoming voltage, and the system will shut down again.

The user can program the AVR software to allow the system to remain on in case of fault (see AVR software section for details).

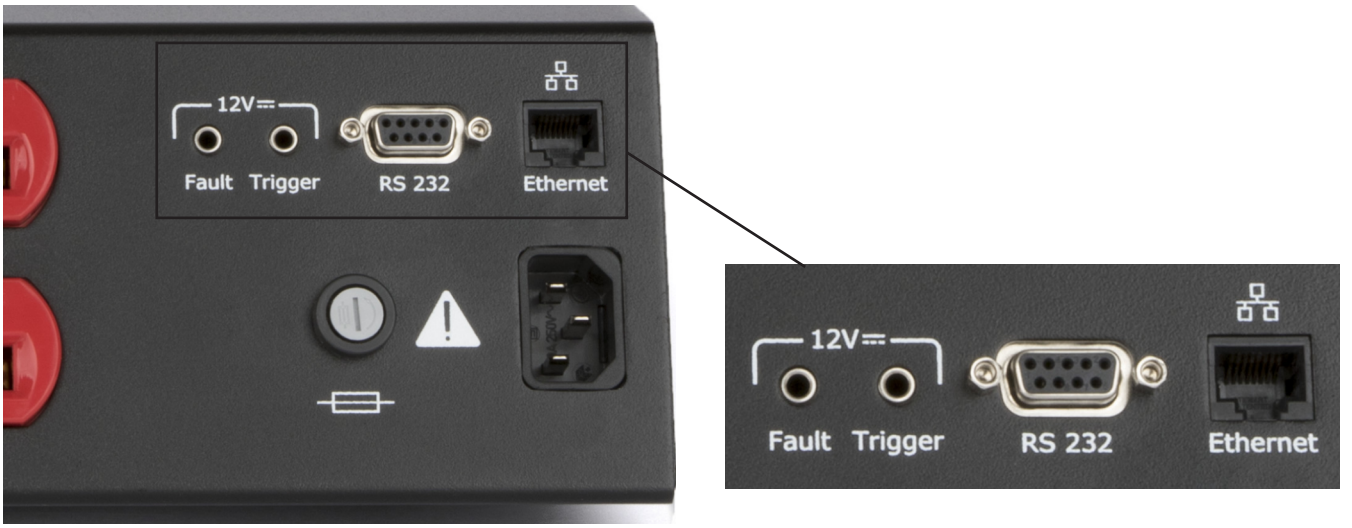


Figure 1: AVR Rear Panel connections.

Ethernet
Allows access to the AVR and internal software. See AVR Software section for more details.

RS232
Allows access to automation and external control. See Home Automation Interface commands at end of manual.

12V Trigger On/Off
The AVR can be turned on and off by a 12 volt trigger input. Applying 12 volts turns on the AVR and removing the 12 volts turns it off.

12V Fault Output
The AVR provides a 12 volt fault output through a jack on the back panel. The output goes to 12 volts when a relay or voltage fault is detected. The maximum current that can be drawn from this output is 75mA.

AVR Software

AVR software is resident in the microprocessor on the internal control board. There are two methods to access the software.

1) Connect the AVR to the Ethernet port. Open a browser window on a PC that is connected to the same network through another Ethernet port. Enter AVR (or the I.P address displayed on the LCD) into the browser window. Press ENTER and the software will open.

2) Use a three way Hub, which is connected to an existing network. You then connect both PC and AVR to the same Hub. Open a browser window from the PC. Type AVR, (or the I.P address displayed on the LCD) into the browser window. Press ENTER and the software will open.

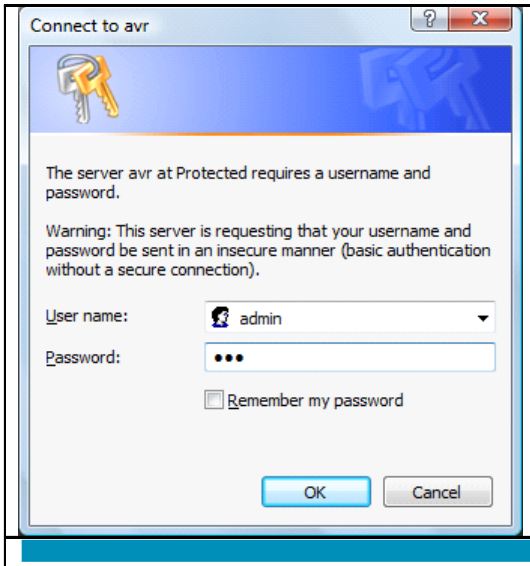
Username and Password
The password is required to change the setup of the Torus unit.
Username is **admin** This is factory set and cannot be changed
Password is **avr** This is the default password, and can be changed.

In case you forget your password, the AVR can be restored to the factory default password **avr** by pressing and holding the button on the front panel for at least 10 seconds.

AVR Menu Selections

AVR Status
Switch Power
Setup
Email Configuration
Set Password
Torus Power Home (website)
Network configuration

Below is a screen by screen description of software options.

<table>
<tr>
<td> 
</td>
<td>To access AVR software, enter user name and password.

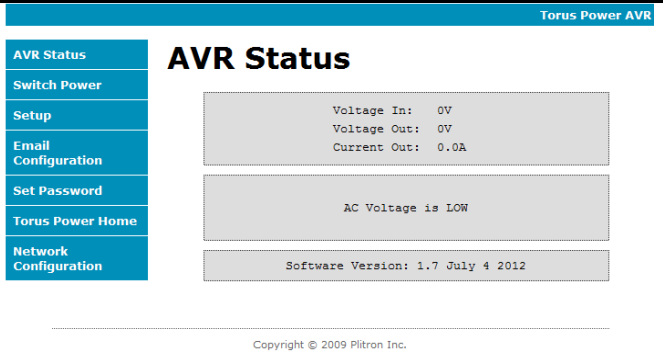
User name :

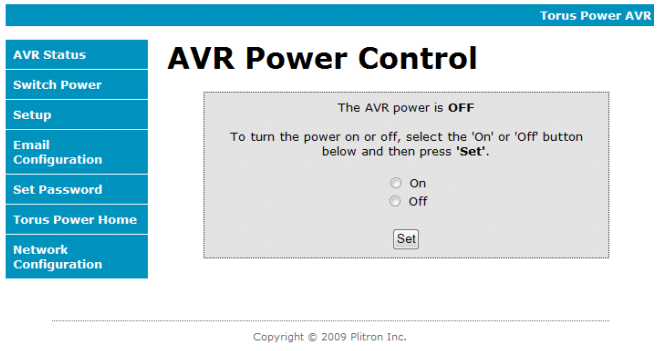
admin

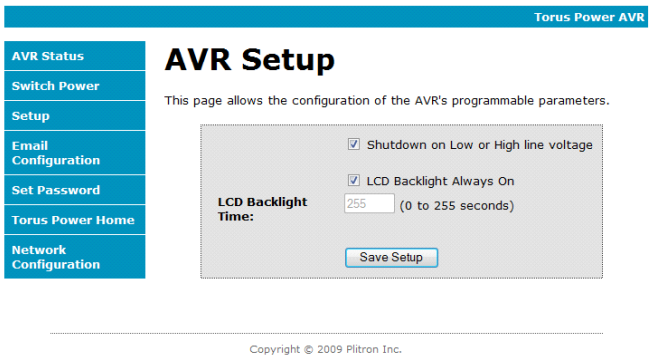
is factory set and cannot be changed

Default Password :

avr

You can change your password.
Select Set Password</td>
</tr>
<tr>
<td> 
</td>
<td>AVR Status
This screen indicates the overall status of the system, showing Voltage In, Voltage Out, and Current output.

It also reports if the system is functioning normally or whether there is a fault condition.</td>
</tr>
<tr>
<td> 
</td>
<td>AVR Power Control
This screen allows ON or OFF control of the AVR unit.
Press SET button to implement your selection.</td>
</tr>
</table>

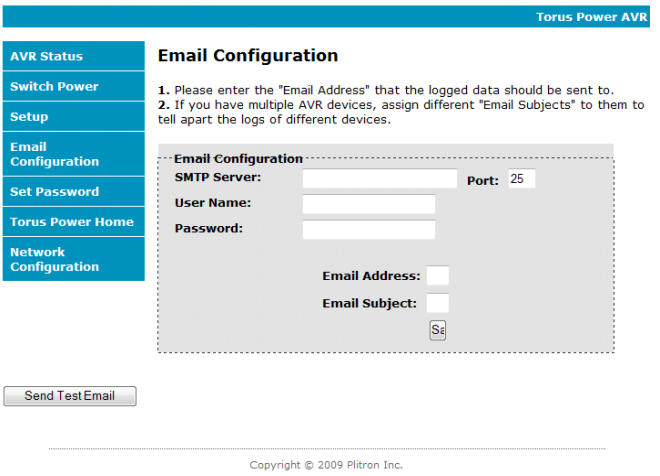


AVR Setup

This screen allows the user to configure two AVR parameters.

1. Shutdown on Low or High line voltage. (The factory default is YES – to shut down in case of fault conditions.) Unselecting this button will override, and the AVR will remain on even if voltage drops or rises beyond the acceptable range.

2. LCD Display. Always ON is the default setting. If you don't want the display on all the time, you can select a time from 0 to 255 seconds. When you have made your selections, press SAVE SETUP.



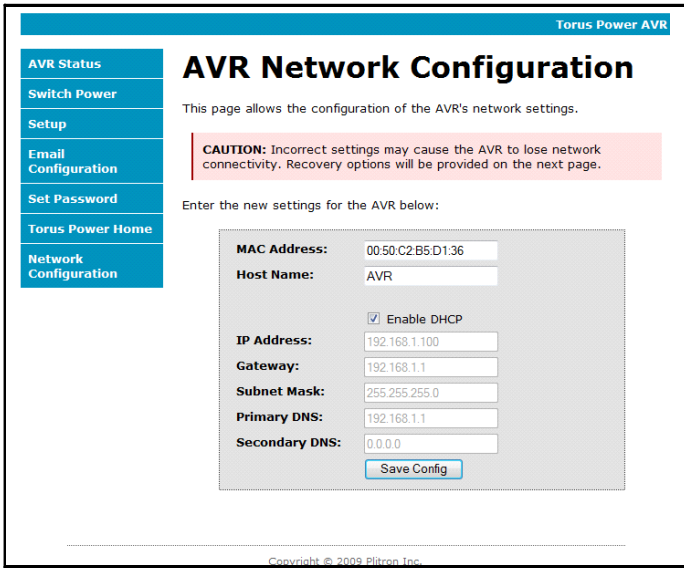
Email Fault Alert Notification

In the unlikely event your AVR experiences an issue the AVR will shut down and send an email notification if this section is configured. After entering the configuration parameters use the 'Send Test Email' button to confirm your settings are correct.

Set Password

If you wish to change the password, use this screen.

In case your forget your new password, you can restore the AVR to factory default password by pressing the button on the front of the AVR unit and HOLDING it down for at least 10 seconds. The default password is **avr**



Each AVR unit has a unique MAC Address which is factory assigned.

The IP address assigned to the AVR is dynamically assigned and is displayed on this screen as well as on the front panel LCD of the AVR.

The AVR can be programmed through the web browser to automatically get an IP address from the network switch or router and this is the default setting and should work on most networks. Some networks require each PC or device to use a fixed IP address and the AVR also supports this option.

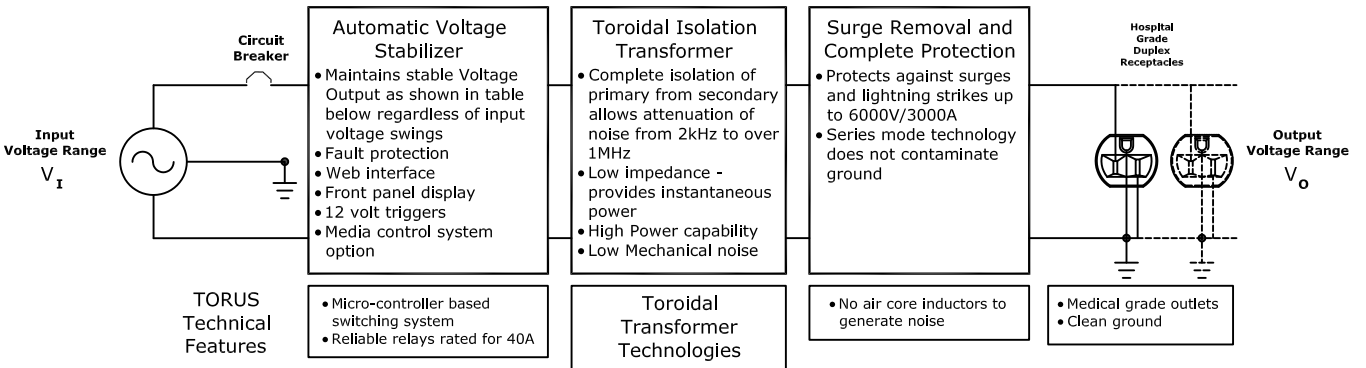
Notes:

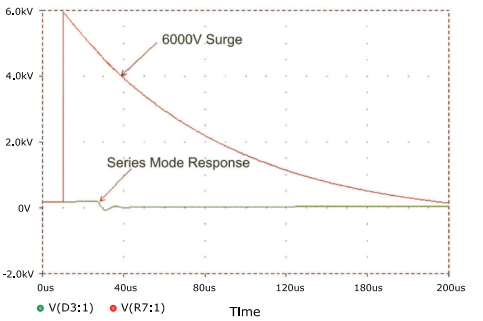
1. The output current (Amps) displayed on the LCD is the RMS reading of the load. It does not indicate the peak current loads.
2. There is a 20-second delay built into the AVR system, to prevent nuisance switching. The AVR will take approximately 20-seconds to change relay taps to switch to the proper output voltage setting.
3. Torus AVR will keep the output constant within the range of 220-240V ± 10V, with an input voltage of 170V to 270V.
4. A drop in the Input voltage is normal when increasing the load on the Torus AVR. This is a result of the impedance of the power line, and is a function of the distance from the electrical panel.

Switch On Delay Feature

The Automatic Voltage Regulation (AVR) feature is designed to handle normal utility fluctuations to provide the connected equipment with an optimal voltage supply. It is common when utility power is restored after a blackout that the voltage supply is unstable for a few seconds. To further protect connected equipment your AVR is equipped with a start up delay feature. When the power switch is turned on or when the power switch is on and utility power is restored, power will not be connected to the output receptacles until the delay time has passed.

Block Diagram - AVR System

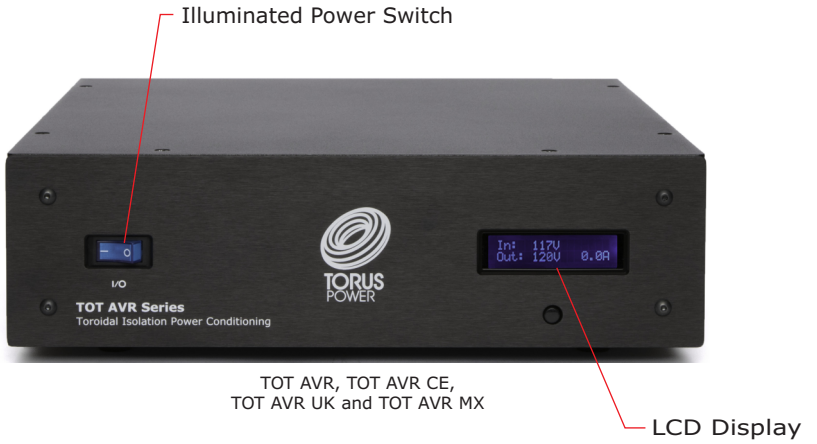




Available Models:

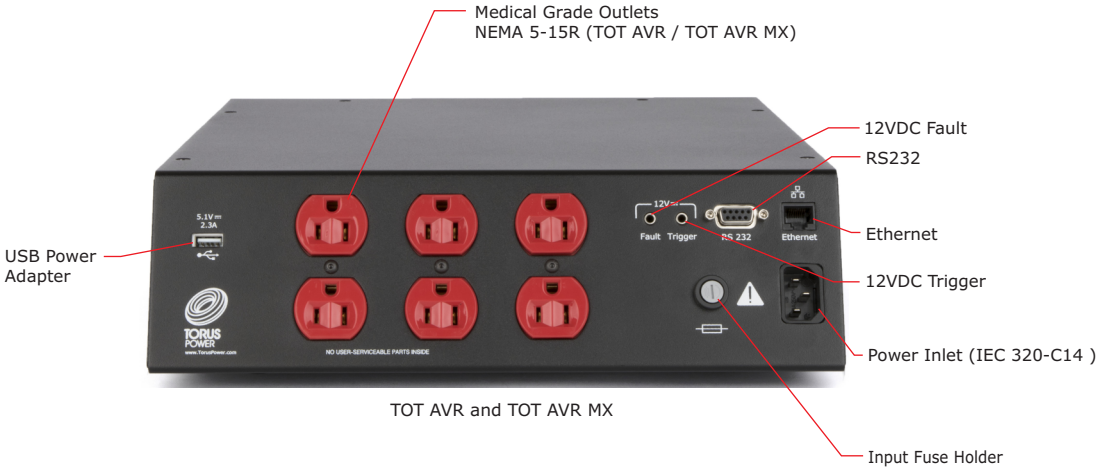
North American	120V	85V-135V	120V±5V
International CE	220-240V	150V-250V	220-240V±10V
International UK	220-240V	150V-250V	220-240V±10V
Mexico	127V	92-142V	127V±5V

Front Panel Layout

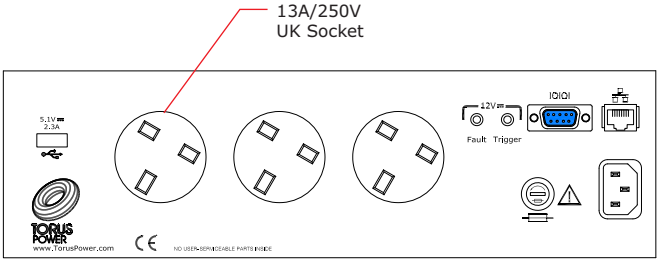


TOT AVR, TOT AVR CE,
TOT AVR UK and TOT AVR MX

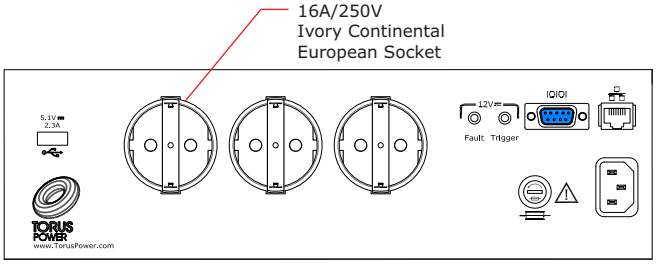
Rear Panel Layout



TOT AVR and TOT AVR MX



TOT AVR and TOT AVR UK



TOT AVR and TOT AVR CE

Circuit Protection

The Input Power Switch on the front panel turns the main power to the AVR unit on and off.

Thermal Protection

Torus AVRs will shutdown if internal unit temperature reaches excessive levels.

Electrical Specifications

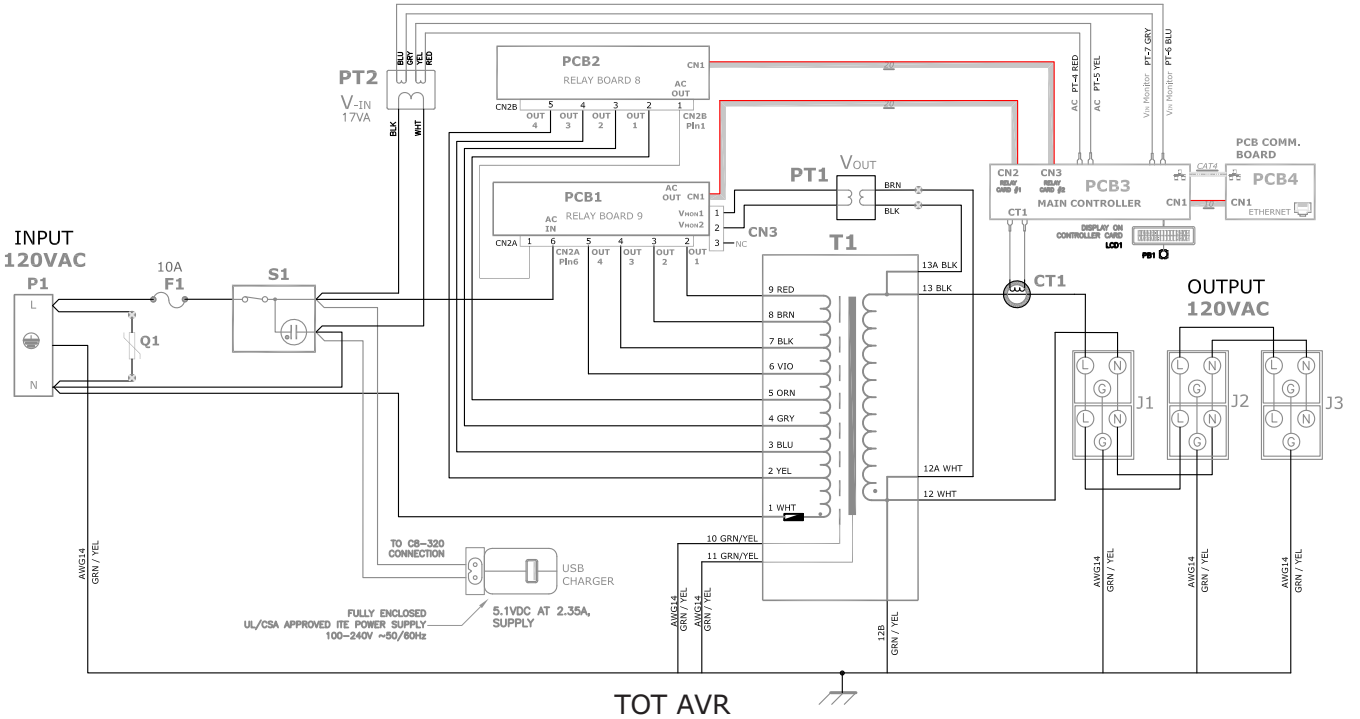
Model Number	SMSS	Input Voltage Nominal	Input Current	Output Voltage Nominal	Maximum Available Output Current	Over-current Protection
TOT AVR		120VAC, 60Hz Range from	10A	120VAC ±5V	10A	Input: 10A Fuse (1) (Rear Panel Mounted)
TOT AVR SMSS	√	85-135VAC 57-63Hz				
TOT AVR CE		220-240VAC Range from	4A	220-240VAC ±10V	4A	Input: 4A Fuse (1) (Rear Panel Mounted)
TOT AVR CE SMSS	√	170-270VAC 47-63Hz				
TOT AVR UK		220-240VAC Range from	4A	220-240VAC ±10V	4A	Input: 4A Fuse (1) (Rear Panel Mounted)
TOT AVR UK SMSS	√	170-270VAC 47-63Hz				
TOT AVR MX		127VAC, 60Hz Range from	10A	120VAC ±5V	10A	Input: 10A Fuse (1) (Rear Panel Mounted)
TOT AVR MX SMSS	√	100-150VAC 57-63Hz				

Mechanical Specifications

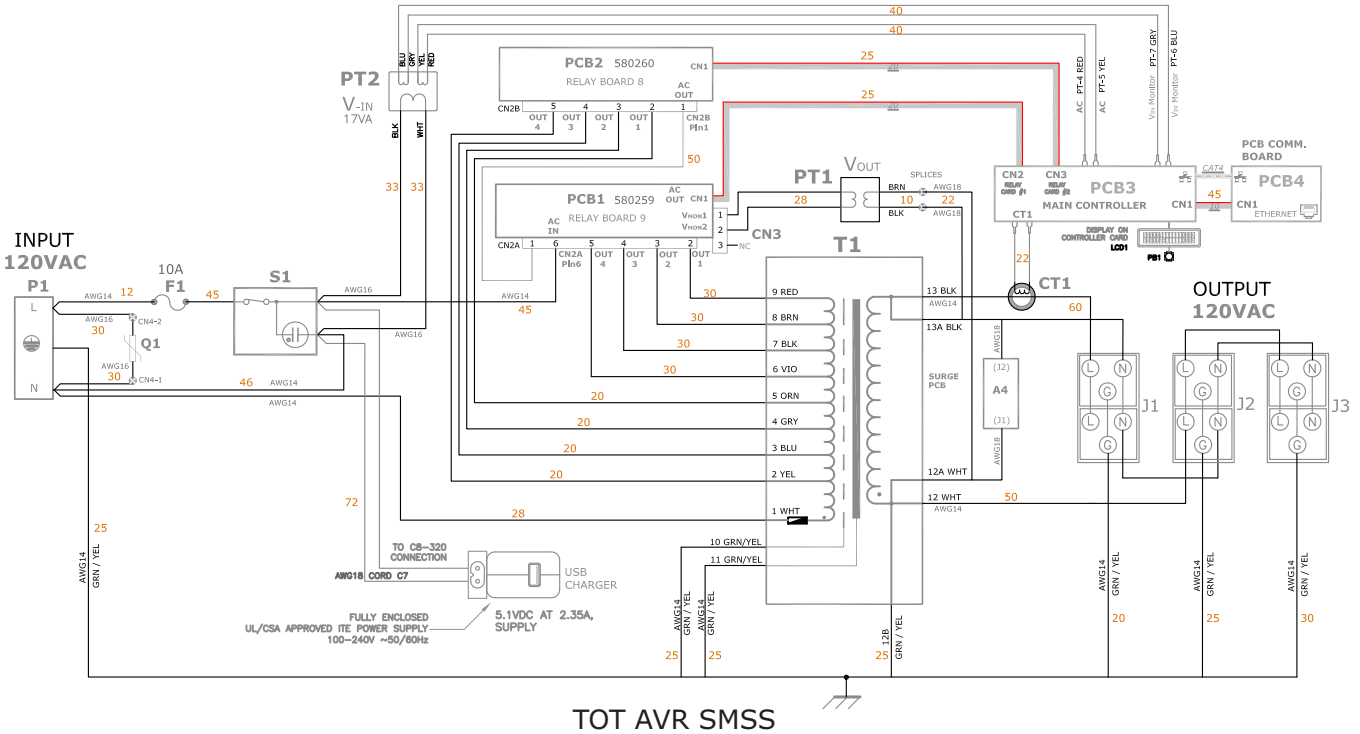
Model Number	SMSS	Input (Inlet) Connector (Rear Panel)	Line Cord	Output Connector (Rear Panel)	Weight	Size, mm (w x d x h) Size inch (w x d x h)
TOT AVR		IEC 320-C14	Included	6 outlets 15A	16 kg 35.2lbs	318 x 356 x 89 12.5 x 14 x 3.5
TOT AVR SMSS	√			NEMA 5-15R		
TOT AVR CE		IEC 320-C14	Included	3 outlets 16A/250V	15.6 kg 34.3lbs	318 x 356 x 89 12.5 x 14 x 3.5
TOT AVR CE SMSS	√			Ivory Continental European Socket		
TOT AVR UK		IEC 320-C14	Included	3 outlets, 13A/250V	15.6 kg 34.3lbs	318 x 356 x 89 12.5 x 14 x 3.5
TOT AVR UK SMSS	√			UK Socket		
TOT AVR MX		IEC 320-C14	Included	6 outlets 15A	16.3 kg 35.9lbs	318 x 356 x 89 12.5 x 14 x 3.5
TOT AVR MX SMSS	√			NEMA 5-15R		

Height includes removable rubber mounting feet.

Schematic TOT AVR, TOT AVR SMSS



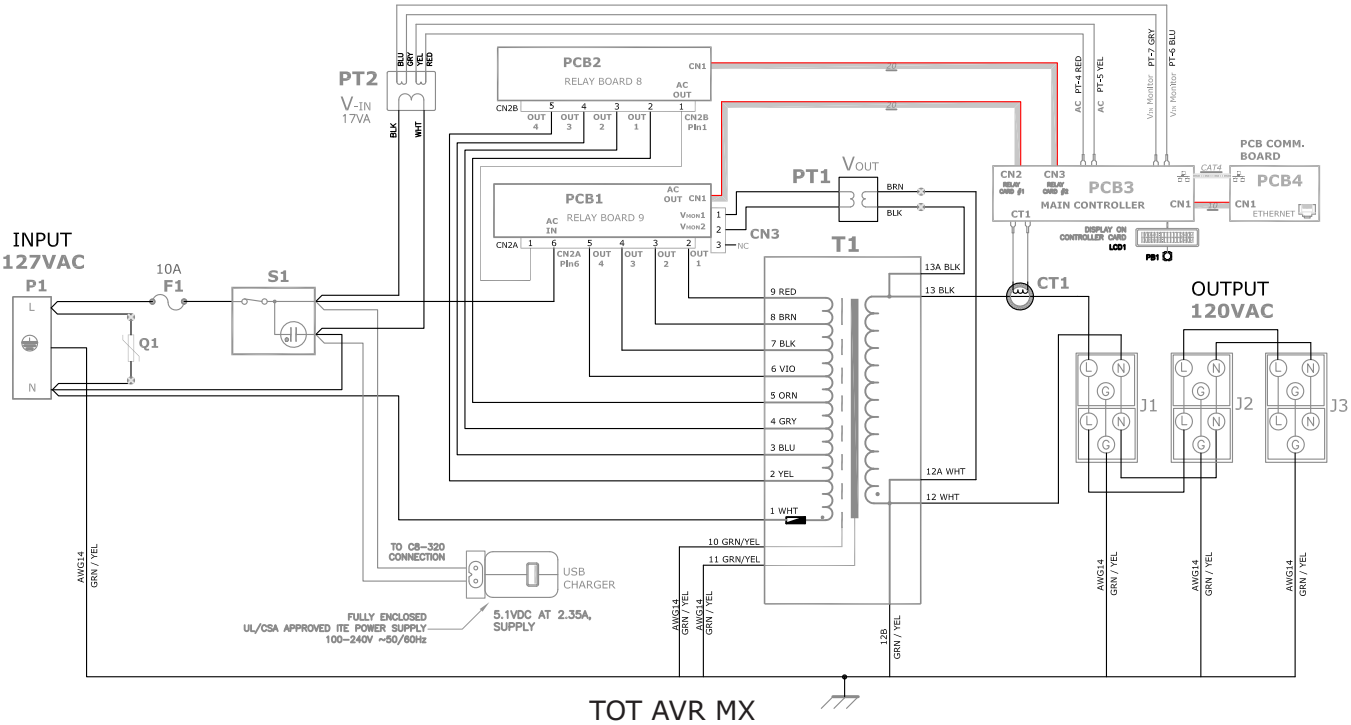
TOT AVR



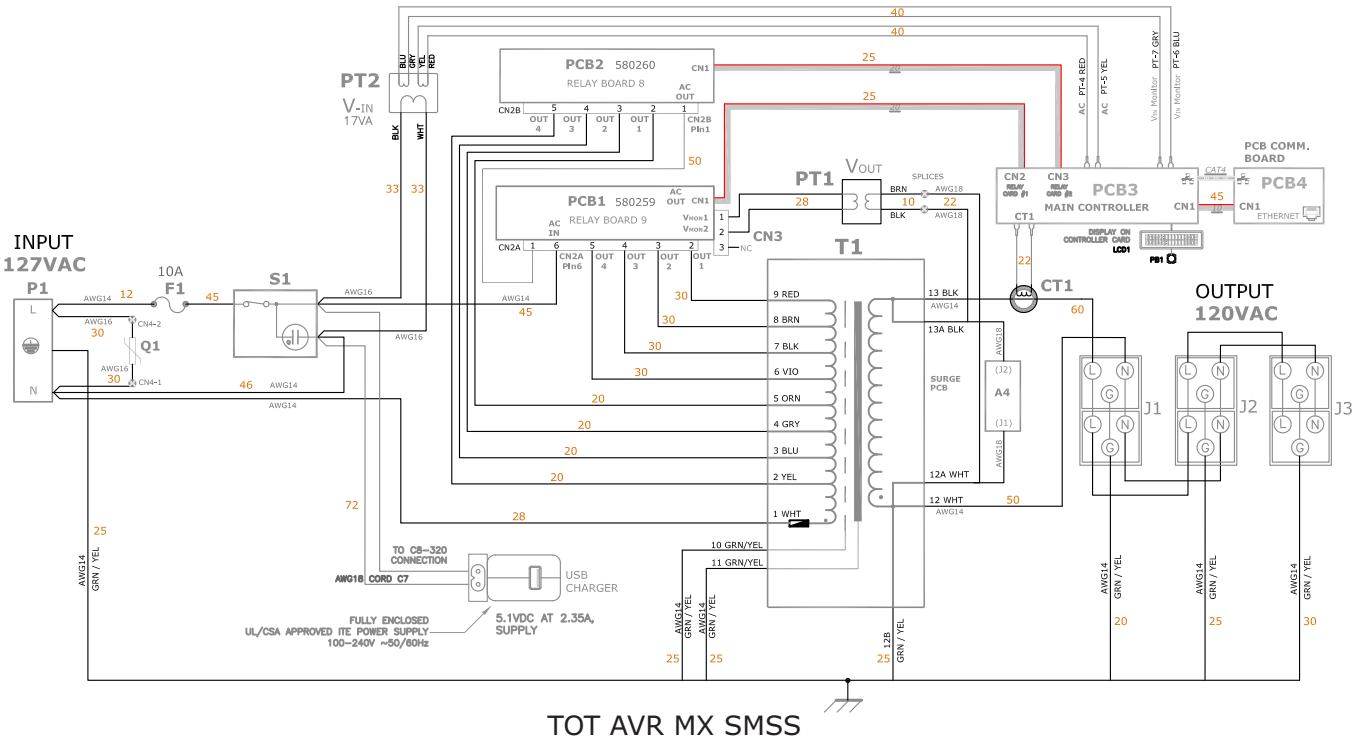
TOT AVR SMSS

Note:
Schematic drawings are provided for reference only, Torus Power AVR units have no serviceable parts inside. Please return unit to manufacturer for repair and service when required.

Schematic TOT AVR MX, TOT AVR MX SMSS



TOT AVR MX



TOT AVR MX SMSS

Note:
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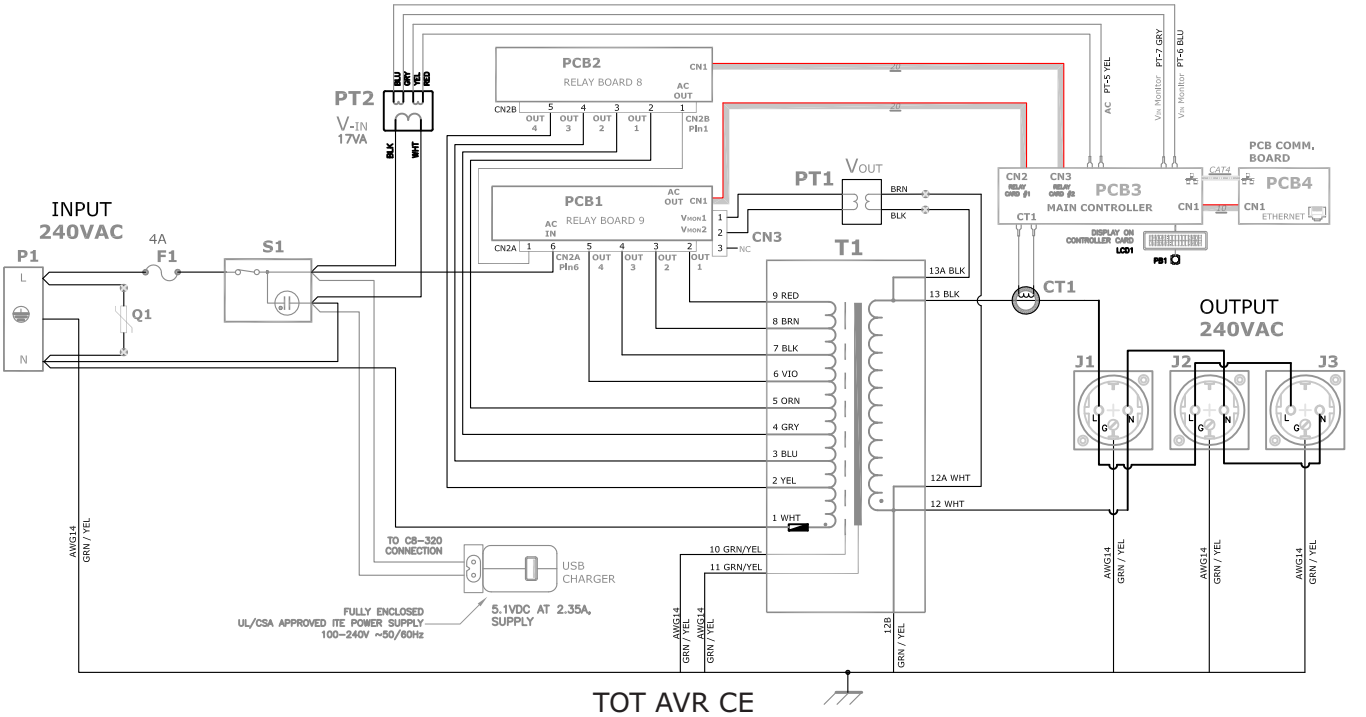
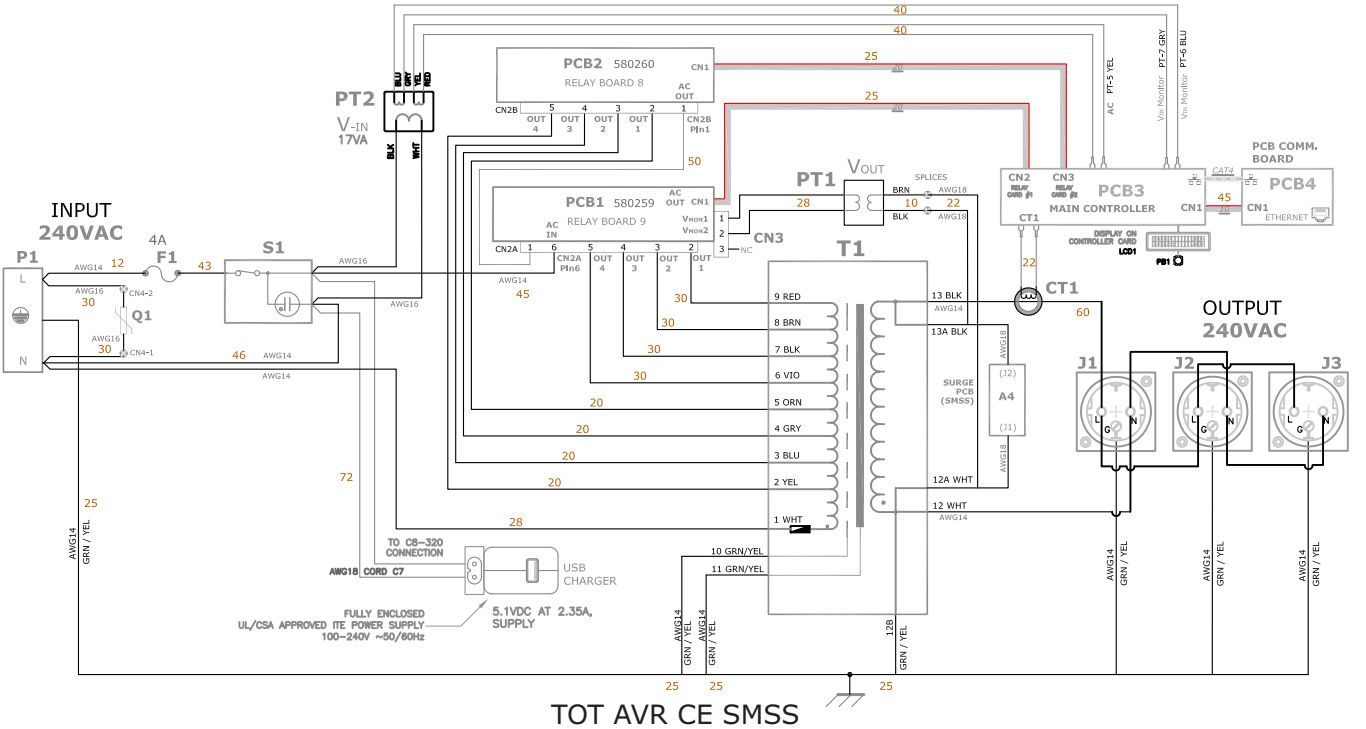
Schematic TOT AVR CE, TOT AVR CE SMSS



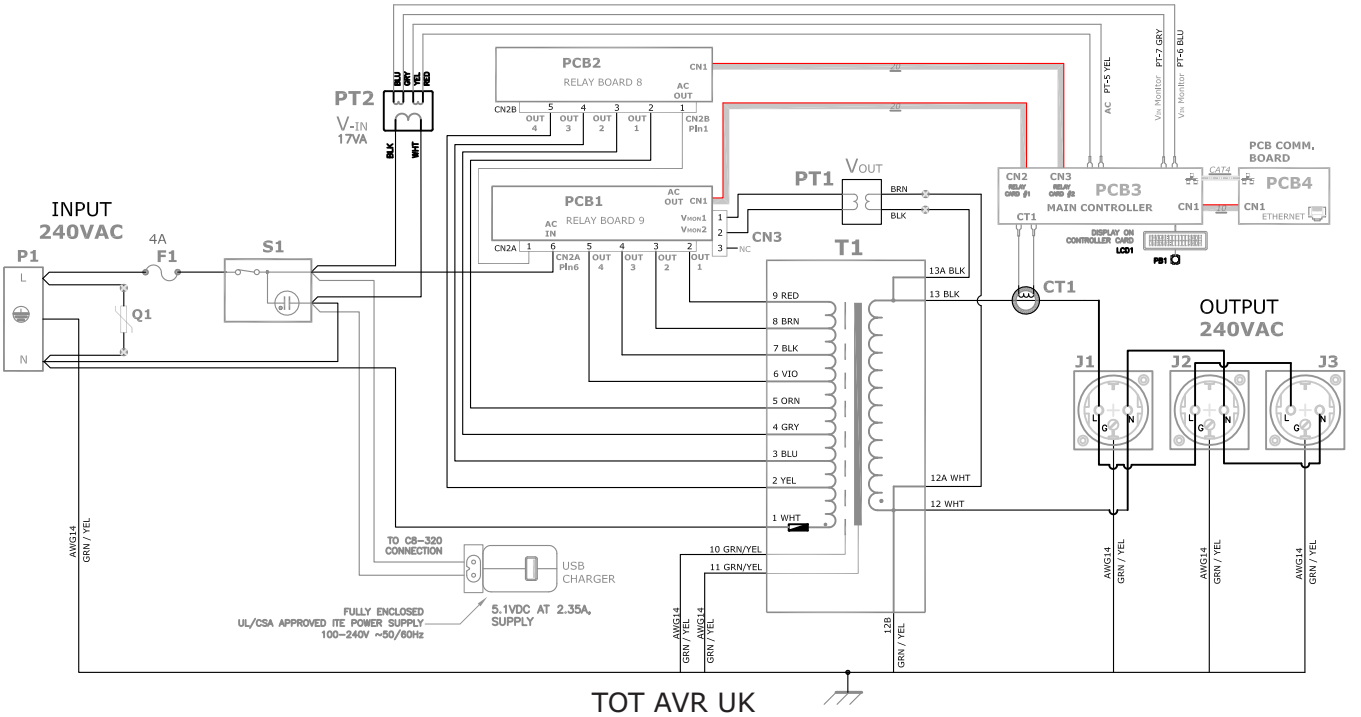
TOT AVR CE



TOT AVR CE SMSS

Note:
Schematic drawings are provided for reference only, Torus Power AVR units have no serviceable parts inside. Please return unit to manufacturer for repair and service when required.

Schematic TOT AVR UK



Note:
Schematic drawings are provided for reference only, Torus Power AVR units have no serviceable parts inside. Please return unit to manufacturer for repair and service when required.

Serial Port Settings

9600 baud
8 data bits
No parity

Commands are terminated with the carriage return character (13 decimal).

Command	Description	Response
"C0<CR>"	Turn off power	"OK<CR>"
"C1<CR>"	Turn on power	"OK<CR>"
Other commands	Not supported	"ERROR<CR>

Warranty

Torus Power Inc. products are warranted to be free from manufacturing defects as follows:

- Five years from the original date of sale for toroidal transformers.
- Two years from the original date of sale for all other components.

The product warranty includes parts, labour and return shipping to the customer. Shipping to Torus Power Inc. for warranty repair is the responsibility of the customer.
Warranty coverage is not transferrable and original proof of purchase is required for warranty claims.
In the event of a warranty claim, Torus Power Inc. will remedy the issue by repair or replacement, as we deem necessary, to restore the product to full performance.
This warranty is considered void if the failure of the product or any component part is caused by damage or misuse. Failure to fully comply with Torus Power operating instructions voids the warranty.

Torus Power products are marketed worldwide by Torus Power Inc.

For sales contact:
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Phone: (+1) 416-477-4799
Toll free: 1-877-337-9480

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Phone: (+1) 416-477-4799
Toll free: 1-877-337-9480

TORUS POWER

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REV.01/23/2017