

Guide for Selecting Custom Setpoints for a PST-DC-UPS

The PST-DC-UPS DC UPS controllers have six custom setpoints. They are defined as follows.

Setpoint	Description
Main On	When the voltage at the main input is greater than this setpoint the controller will switch the load to the main input. 13.5V is typical for a vehicle.
Main Off	When the voltage at the Main input is less than this setpoint the controller will disconnect the Main Input and switch the load to the auxiliary battery. 13.1 is typical for a vehicle.
Charge On	The controller will begin to charge the auxiliary battery when the main voltage is above this setpoint. The charger operation is independent of the other functions. Charge On must be greater than Main On. Note that the charger can step the voltage up or down as is required to accurately charge the auxiliary battery. Typical is 13.5V for a vehicle
Charge Off	The controller will stop charging the auxiliary battery when the voltage at the Main Input falls below this value. Charge Off must be greater than Main Off or the charger will turn off when the Main Off is triggered. Typical is 13.1V for a vehicle
Aux On	This can also be called Aux Reset. If the Main Input is below Main Off, the unit will always switch to the auxiliary battery, independent of the value of Aux On. Once the auxiliary battery has dropped below Aux Off, it will stay off until the Main Input is above Main On. Aux On gives the feature of being able to power the load if the auxiliary battery is replaced or charged. It is important to set Aux On sufficiently above the Aux Off value so it will not restart due to the natural voltage bounce on the auxiliary battery when the load is removed. See Note 3 for more information. Typical is 12.5V
Aux Off	When the voltage at the Aux Input is less then the Aux Off setpoint, the Aux Input is disconnected. It will not be reconnected until the voltage at the Aux Input is greater than Aux On. If the Main Input voltages comes back it will switch the load to main and reset the Aux On/Off state. Typical is 10V.

Logically the unit is a single pole double throw switch (ON – OFF – ON) with an independent embedded lead acid battery charger. The switch and charger are independently enabled by the setpoints.

Online Ordering Instructions:

1. Select the custom version of the type of unit you are ordering.
2. Please add the following table to the *Ordering Instructions* box at the bottom of the ordering page.

Setpoint	Voltage	Typical
Main On		13.5V
Main Off		13.1V
Charger On		13.5V
Charger Off		13.1V
Aux On (Reset)		12.5 V
Aux Off		10V

3. If you are planning to order on a regular basis we can assign -Cz part number for use when reordering.

Notes:

1. Units have tolerances of $\pm 0.04V$.
2. Voltages are measured at the controller terminals. If high currents are flowing the voltages may be different at the unit than at the power source (i.e. battery). If you are unsure how this might apply to your installation, please don't hesitate to call PowerStream at 801.764.9060.
3. Lead-acid batteries, especially when they are under heavy load, will have the voltage jump back up when the load is disconnected. When the voltage drops below the Main Off (or Aux Off) the load is disconnected. However, if the voltage then jumps above the Main On (or Aux On) setpoint the unit will turn back on. This will lead to undesirable oscillation. To avoid this, the difference in the on and off setpoints must be sufficiently large.

Sample Setpoints

Main Input is Vehicle 12V Power		
Setpoint	Value	Unit With the Main Input Connected to the vehicle battery or alternator
Main On	13.5	Typically a vehicle bus voltage is above 13.8V. A fully charged 12V lead acid battery has an open circuit voltage of 12.9V. A <i>Main on</i> voltage of 13.5 ensures that the vehicle is running, even if under heavy load.
Main Off	13.1V	If the main voltage is less than 13.1V the engine is assumed to be off. If you want to run the load from the Main battery after the engine is off you can lower this value. Keep it above 11.8V to make sure the engine will start.
Charge On	13.5V	In this case the charger will start at the same time as <i>Main On</i> .
Charge Off	13.1V	The charger will turn off when the voltage falls to <i>Main Off</i> or <i>Charge Off</i> , whichever is higher. There usually isn't a reason to increase this value when the controller is used in a vehicle.
Aux On (Aux Reset)	12.6V	This is the voltage at which the load will be connected to the auxiliary battery after the controller has turned off due to <i>Main Off</i> and <i>Aux Off</i> being reached and a new auxiliary battery or separate battery charger (with enough current to supply the Load) has been connected to the auxiliary terminals. Open circuit voltage of a fully charged battery is 12.9V, but the <i>Aux On</i> value can be lower, as long as it is not so close to <i>Aux Off</i> to cause oscillation.
Aux Off	10.0V	At this voltage the battery is typically empty and allowing the battery to go much lower would damage the battery.

Main Input is an Unregulated Power Supply		
Setpoint	Value	Unit With the Main Input Connected by short leads to an Unregulated 12 Volt Power Supply and the Aux Input is connected by short leads to a Sealed Lead Acid Battery (Set points are dictated by the minimum voltage allowed on the output, which

		in this case is set to 10V which is also the turn off point for a standard SLA battery.)
Main On	11.0V	1.0 V higher than Main Off. Not really important with a power supply
Main Off	10.0V	Same as minimum allowed battery voltage
Charge On	11.2V	0.2V higher than Main On. Charger does not turn on at the same time as start up surge currents.
Charge Off	10.2V	Charger turns off 0.2 V before Main Off
Aux On	12.6V	This value is somewhat arbitrary. It should be sufficiently separated from the Aux Off voltage that oscillation does not occur when the maximum load is disconnected from the auxiliary battery. See Note 3. Currently it is set at the typical voltage at the output of a battery after it has sat unloaded for a few hours with a 50% or greater charge. Setting this to 12.0V might seem reasonable since it could mean it have 15%-35% of its capacity. However, in the case of a partially charge backup battery, it is likely that the charger was just turned off. In such cases the battery voltage reading may be artificially high.
Aux Off	10.0V	At this voltage the battery is typically empty and allowing the battery to go much lower would damage the battery.

Main Input is a Regulated Power Supply		
Setpoint	Value	Unit With the Main Input Connected by short leads to a $\pm 5\%$ Regulated 12 Volt Power Supply and the Aux Input is connected by short leads to a Sealed Lead Acid Battery (Set points are dictated by the minimum voltage of the power supply.)
Main On	11.0V	0.4 V lower than the minimum power supply voltage so allowing for tolerances the unit will turn on when the power supply has reached its minimum regulated voltage.
Main Off	10.0V	Same as minimum allowed battery voltage
Charge On	11.2V	0.2V higher than Main On. Charger does not turn on at the same time as start up surge currents.
Charge Off	10.2V	Charger turns off 0.2 V before Main Off
Aux On	12.6V	This value is somewhat arbitrary. It should be sufficiently separated from the Aux Off voltage that oscillation does not occur when the maximum load is disconnected from the auxiliary battery. See Note 3. Currently it is set at the typical voltage at the output of a battery after it has sat unloaded for a few hours with a 50% or greater charge. Setting this to 12.0V might seem reasonable since it could mean it have 15%-35% of its capacity. However, in the case of a partially charge backup battery, it is likely that the charger was just turned off. In such cases the battery voltage reading may be artificially high.
Aux Off	10.0V	At this voltage the battery is typically empty and allowing the battery to go much lower would damage the battery.

Main Input is an Lead Acid Battery		
Setpoint	Value	Unit With the Main Input Connected by short leads to a 12 Volt Battery that should be completely drained before switching and the Aux Input is connected by short leads to a Sealed Lead Acid Battery (Set points are dictated by the minimum voltage of the power supply.)
Main On	12.0V	Provides a 2V hysteresis to avoid oscillations in most cases. Does not restart operation of the main battery until it has recharged to at least 15%-35% of its capacity. Should reconnect to main if the charger (or alternator) has a high enough voltage to begin to recharge the main battery.
Main Off	10.0V	Except in the case of very large loads, this is the same as minimum allowed battery voltage
Charge On	12.2V	0.2V higher than Main On. Charger does not turn on at the same time as start up surge currents.
Charge Off	10.2V	Charger turns off 0.2 V before Main Off
Aux On	12.6V	This value is somewhat arbitrary. It should be sufficiently separated from the Aux Off voltage that oscillation does not occur when the maximum load is disconnected from the auxiliary battery. See Note 3. Currently it is set at the typical voltage at the output of a battery after it has sat unloaded for a few hours with a 50% or greater charge. Setting this to 12.0V might seem reasonable since it could mean it have 15%-35% of its capacity. However, in the case of a partially charge backup battery, it is likely that the charger was just turned off. In such cases the battery voltage reading may be artificially high.
Aux Off	10.0V	At this voltage the battery is typically empty and allowing the battery to go much lower would damage the battery.