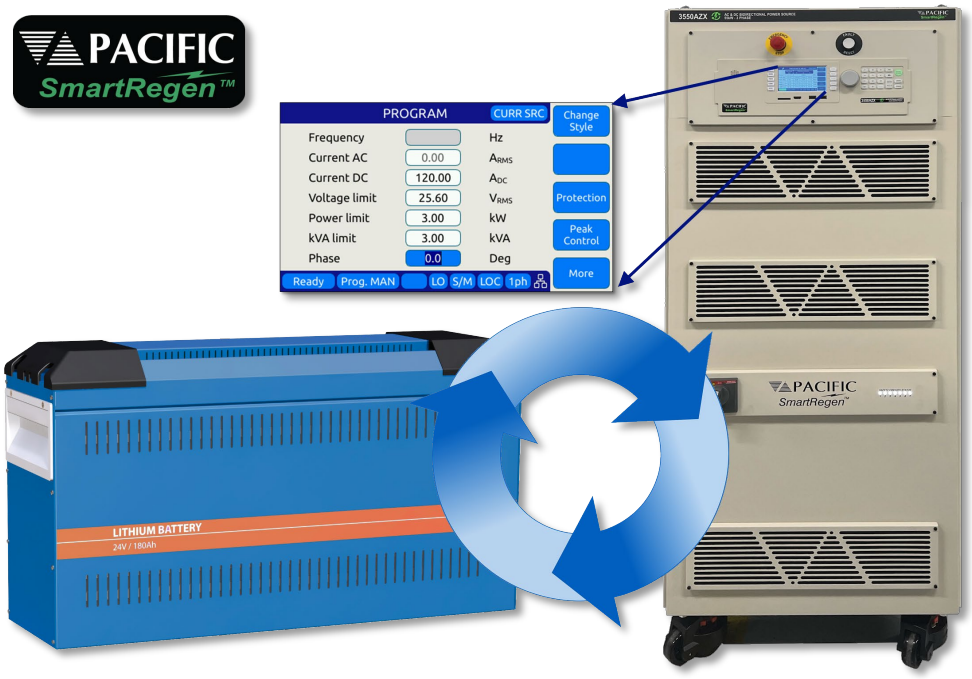
PACIFIC POWER SOURCE
2802 Kelvin Ave, Suite 100, Irvine, CA, 92614 USA

Battery Charging & Discharging Applications

AZX SERIES



1 Abstract

This application note provides recommended settings on the AZX regenerative AC & DC power source for battery charging and discharge application requirements. Both sourcing and sinking of current is available in the Current Source mode of operation. When sinking current for battery discharge testing, the AZX will return energy to the AC power grid by virtue of its standard regenerative capability.

2 Battery Applications Operating Mode

For battery charge/discharge applications, the AZX must be set to current source mode. This will allow control of the charge or discharge current by the AZX regardless of the battery voltage or charge state as the DC setpoints will control the current. The AZX current can be either positive (charging) or negative (discharging). Also, any inrush will be controlled in current mode by the current setpoint as well.

Note: **There will still be some inrush current when first connecting the AZX output to the battery. The internal capacitors that are part of the AZX output stage filters will charge to the battery voltage present when first connected. Even if the battery voltage is relatively low – say 24Vdc - this initial current surge can still be significant.**

Note that the voltage limit setting on the AZX may be used to limit the RMS current when reaching the set voltage limit. This is useful for the constant voltage mode when ending the charge cycle.

It is also recommended to use the over and under voltage protection settings (OVP/UVP) and over-voltage RMS protections to trip the AZX off in case the battery voltage goes outside of specified battery voltage range.

3 Battery Charging Example:

The following AZX settings are applied for battery charging applications. This example assumes the battery rating is 24 Vdc max.

- AZX in the Current source mode, low voltage range (0 to 335 Vdc), single phase or output mode (FORM1).
- Set the DC current setpoint to 120 Adc.
- Set power and kVA limits to 3kW and 3kVA limits (This will limit the current indirectly as well.)
- Set the DC voltage limit to 25.6V (This limits the current and causes the AZX to enter constant voltage mode at the end of the battery charging cycle)
- Set the OVP and over-voltage RMS protections to 30 to protect the battery form over voltage. The AZX will turn off if the battery voltage passes this value.
- Set under voltage protection so the AZX will turn off if the voltage goes low of this value. This is useful when discharging a battery.

These program settings are reflected in the web browser CONTROL menu, PROGRAM screen below.

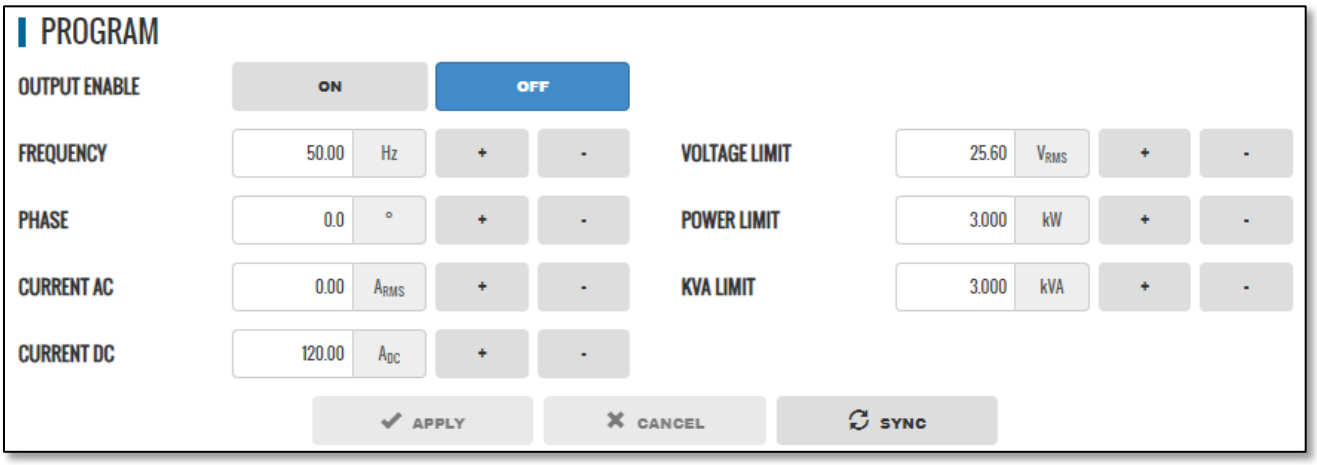


Figure 3-1: Battery Charging Setting in Control -> Program screen

They can also be made from the front panel using the CONF and PROG menus and softkeys to configure the AZX for DC current mode and set the values indicated.

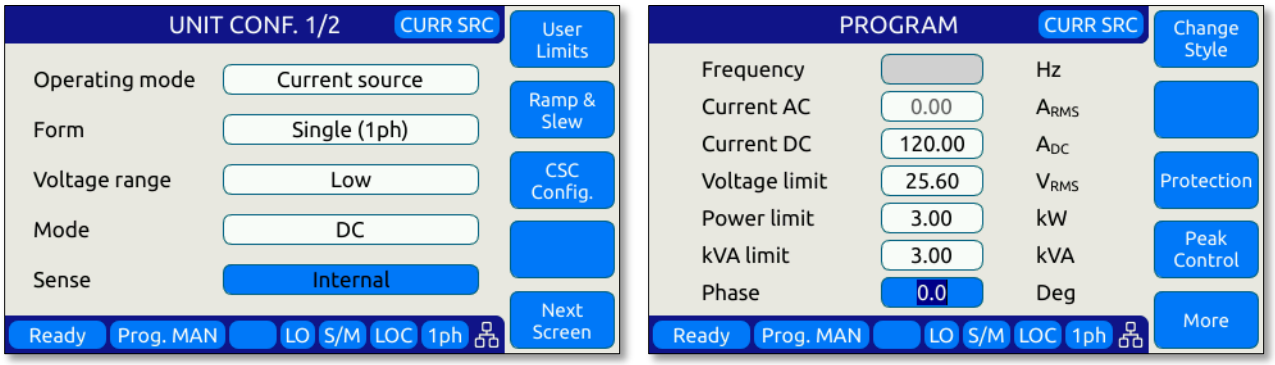


Figure 3-2: Front Panel Setting Screens

The protection settings are entered in the CONTROL menu, PROTECTIONS screen below.

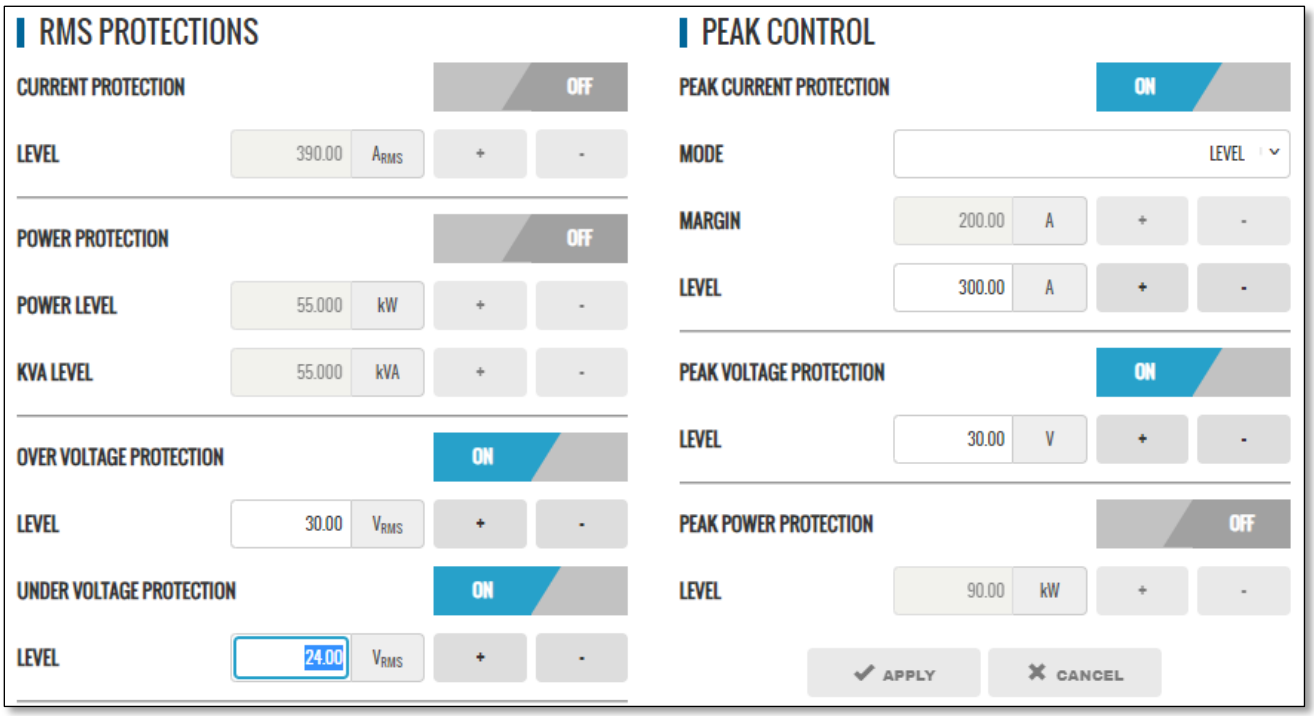
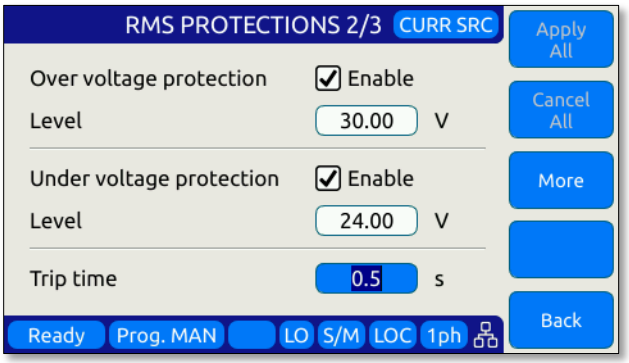


Figure 3-3: Protection Settings in Control -> Protections screen

The protection settings can also be entered from the front panel using the PROG menu, Protections softkey.



4 Battery Discharge Example:

The following AZX settings are applied for battery charging applications. This example assumes the battery rating is 24 Vdc max.

All settings are the same as in the previous example except for the current setting which is now a negative current value. Thus, instead of +120 Adc, the current set value is now a negative 120 Adc.

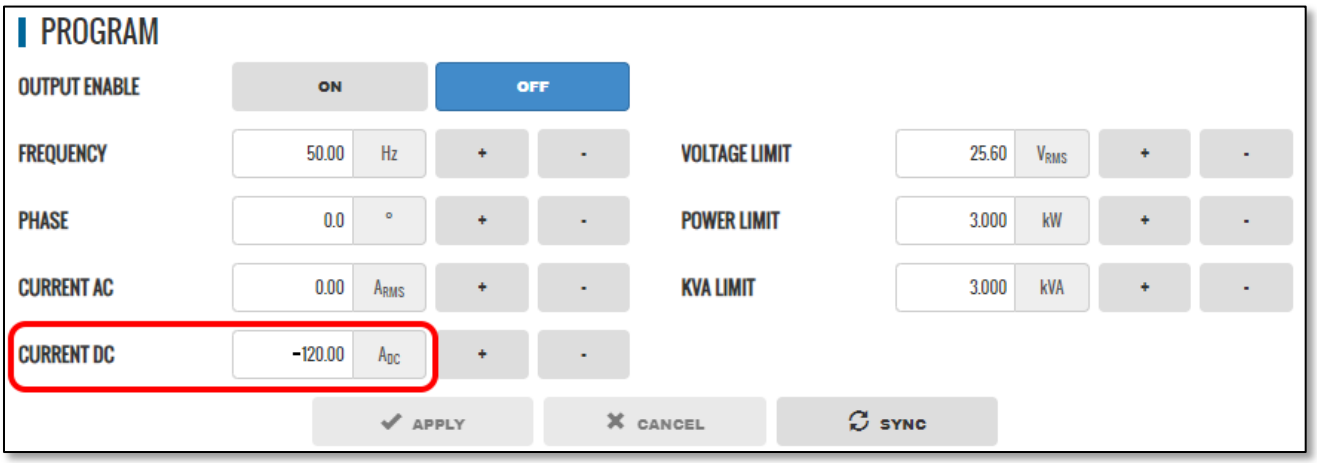
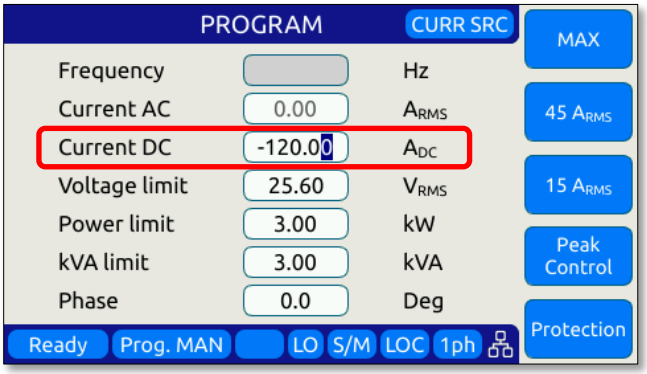


Figure 4-1: Battery Charging Setting in Control -> Program screen



5 Additional Notes on Battery Charging / Discharging

The following considerations must be made when battery testing:

- Values may have to be adjusted based on battery VI curves if available.
- If the AZX will be used in SINGLE phase mode, the output phases A, B and C should be shorted externally. On AZX models with the "W" option, the output neutrals – N_A, N_B, N_C - must also be shorted together for SINGLE phase mode operation.
- The AZX can also be used in three-phase mode if sufficient current and power is available in three phase mode and connect the battery to phase A and N_A.
    - Note that the DC current limit on a 3550AZX in three phase mode is +/-100A for the DC setpoint. All the settings should be programmed to phase A only.
- **Do NOT energize the AZX with the battery connected. Connect the battery once the AZX is fully energized, otherwise the AZX may be damaged.**

6 Customer Support

For application support, contact Pacific Power Source's Customers Service - Toll Free US: +1 (800) 854-2433 / support@pacificpower.com or your local authorized Pacific Power Source distributor.

PACIFIC® POWER SOURCE
2802 Kelvin Ave, Suite 100
Irvine, CA 92614 USA
Phone: +1 949.251.1800
Fax: +1 949.756.0756
Toll Free: 800.854.2433
E-mail: sales@pacificpower.com
www.pacificpower.com