

PowerCycle Battery Conditioner Operation Manual



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SPECIFICATIONS

SPECIFICATIONS	PCYFC-10kW-250A	PCYFC-20kW-250A
INPUT SPECIFICATIONS		
Voltage	480VAC, 3-Phase $\pm 10\%$ Delta with Earth Ground	480VAC, 3-Phase $\pm 10\%$ Delta with Earth Ground
Current	13.8 A rms nominal	27.6 A rms nominal
Input Protection	Disconnect Rated On/Off Switch	
OUTPUT SPECIFICATIONS		
Battery Voltage	24 - 48 V nominal	24 - 48 V nominal
Discharge Current	250 A max	250 A max
Charge Current	400 A max @ 25 V 200 A max @ 50 V	800 A max @ 25 V 400 A max @ 50 V
Max Power	10 kW	20 kW
OPERATING CONDITIONS		
Temperature	0 - 40°C	
Humidity	10-90% RH non-condensing	
INTERFACE		
Communication User Interface	Keypad Display, InfraRed (IR), RS-232, Optional Ethernet	
MECHANICAL		
Cooling	Forced air (fans)	

SAVE THESE INSTRUCTIONS

BEFORE ATTEMPTING TO OPERATE THE CYCLER, PLEASE READ THIS GUIDE CAREFULLY.

This guide contains important instructions for PowerCycler series product line that shall be followed during installation and maintenance of the Cyclor. Only qualified personnel should install, operate, or service this equipment.



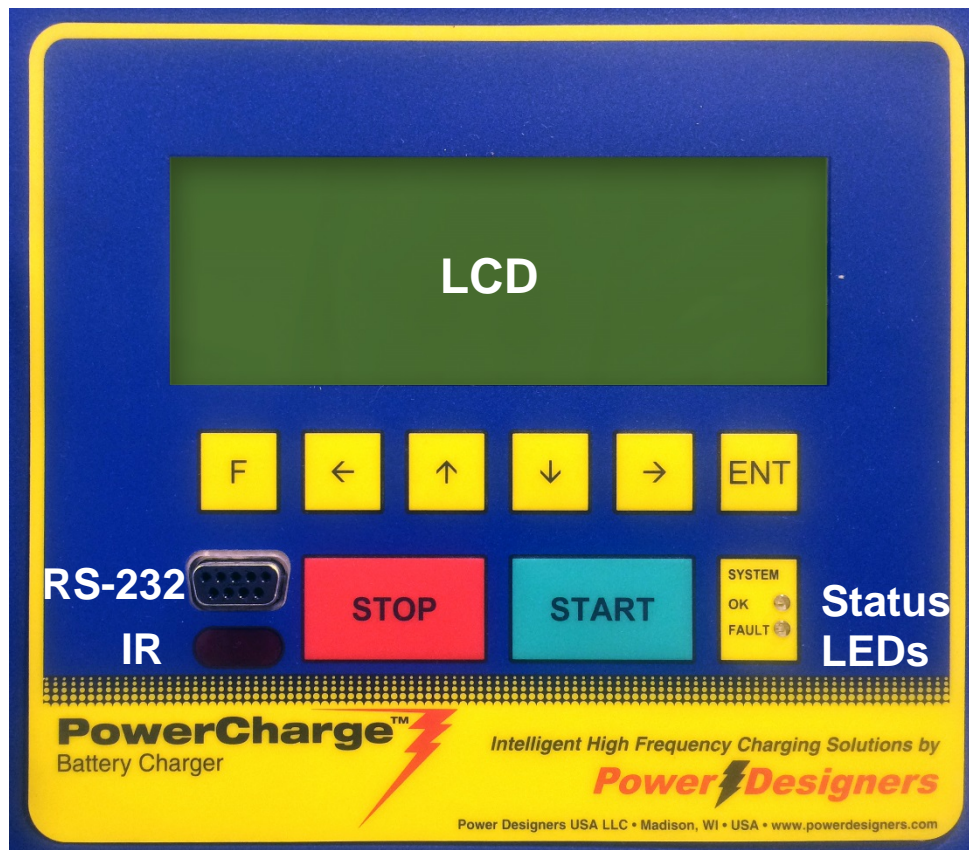
Cycler Controls and User Interface

The Cycler controls are found in the top section of the cabinet.



Disconnect Rated On/Off Switch: Used to turn the Cycler on and off

Keypad Display Assembly: User interface for programming, and operating the cycler, along with viewing the current status of the cycler.



OPERATING PROCEDURE

Turn on the Unit

Energize the AC Mains.

Turn the On/Off switch to the On Position

4	8	V														2	0	0	A
0	1	/	0	1	/	0	5					1	2	:	0	0	:	0	0
			C	O	N	N	E	C	T			B	A	T	T	E	R	Y	
D	I	S	P	L	A	Y													

If the LCD is not lit or if the above message is not displayed contact Power Designers for assistance.

Connect the battery to the Cyclor

Programing and Operating the Cyclor Using the Key Pad and Display

Select Operating Mode

Press the function (F) key to access the Main Menu . The following screen Set Cyclor Operation Mode appears.

Note: if any other screen appears use the arrows (↑/↓) and scroll to the Set Cyclor Operation Mode screen

M	A	I	N		M	E	N	U	:												
					S	E	T		C	Y	C	L	E	R							
					O	P	E	R	A	T	I	O	N		M	O	D	E			
E	X	I	T														E	N	T	E	R

Press Enter accesses the Set Cyclor Operation Mode menu. Using the arrow (↑/↓) keys select from cycling, charging, or discharging modes, the Enter key will save the desired value.

					O	P	E	R	A	T	I	N	G		M	O	D	E	:				
E	X	I	T																E	N	T	E	R

Setting Discharge Cycle Parameters

The Discharge Cycle Parameters menu is accessed from the main menu.

Press the F key to access the Main Menu. Scroll down (↓) to the Discharge Cycle Settings:

M	A	I	N		M	E	N	U	:												
					D	I	S	C	H	A	R	G	E		C	Y	C	L	E		
										S	E	T	T	I	N	G	S				
E	X	I	T														E	N	T	E	R

Pressing the Enter key will access the discharge menu. The various parameters required to set a discharge cycle are then displayed on successive screens.

Enter the nominal battery voltage.

					N	O	M	I	N	A	L		B	A	T	T	E	R	Y			
										V	O	L	T	A	G	E						
										4	8	V										
E	X	I	T															E	N	T	E	R

Using the arrow (↑/↓) keys change the battery voltage, selecting from 24V, 36V, or 48V. Once the correct voltage is selected, pressing the Enter key will save the desired value.

Enter the nominal battery capacity (Ahrs).

					N	O	M	I	N	A	L		B	A	T	T	E	R	Y			
										C	A	P	A	C	I	T	Y					
										1	0	5	0		A	H	R	S				
E	X	I	T															E	N	T	E	R

Using the arrow (↑/↓) keys select the battery capacity pressing the Enter key will save the desired value. Note the capacity is selectable in 10 Ahr increments

Next, set discharge current through the discharge current setting screen.

			S	E	T		D	I	S	C	H	A	R	G	E					
							C	U	R	R	E	N	T							
							2	1	0	A										
E	X	I	T													E	N	T	E	R

Using the arrow (↑/↓) keys set the desired discharge current, pressing Enter to save the desired value. Note the setting increments or decrements by 5

Set the maximum Depth of Discharge (DoD) percentage.

				S	E	T		M	A	X	I	M	U	M						
			D	E	P	T	H		O	F		D	I	S	C	H	A	R	G	E
									X	X	X	%								
E	X	I	T													E	N	T	E	R

Using the arrow (↑/↓) keys set the discharge current pressing the Enter key saves the desired value. Note, DoD setting uses 1% increments. Note, when the desired % DoD is reached, the discharge cycle stops.

Set the low cutoff voltage

	L	O	W		C	U	T	O	F	F		V	O	L	T	A	G	E			
					V	O	L	T	S	/	C	E	L	L							
							1	.	8	0											
E	X	I	T													E	N	T	E	R	

Using the arrow (↑/↓) keys set the low cutoff voltage setting, pressing the Enter key will save the desired value Note: the value uses 0.01V increment. When, if the battery voltage falls below the programmed low cut off voltage, the discharge cycle stops

Set the maximum discharge time limit.

		M	A	X	I	M	U	M		D	I	S	C	H	A	R	G	E				
					T	I	M	E		L	I	M	I	T								
							8	:	0	0												
E	X	I	T															E	N	T	E	R

Using the arrow (↑/↓) keys set the maximum discharge time, the Enter key saves the desired value. When the maximum discharge time limit is exceeded, the discharge cycle stops

Once programming is complete, the discharge cycle programming complete message appears.

		D	I	S	C	H	A	G	R	E		C	Y	C	L	E						
					P	R	O	G	R	A	M	M	I	N	G							
					C	O	M	P	L	E	T	E										
E	X	I	T																			

Pressing the EXIT key will return to the Main Menu.

Setting the Charge Cycle Parameters

When setting the Charge Cycle parameters, the previously entered values from the Discharge cycle are retained. The charge parameters menu is accessed from the main menu.

Press the F key to access the Main Menu. Then scroll down (↓) to the Charge Cycle Settings

M	A	I	N		M	E	N	U	:												
					C	H	A	R	G	E		C	Y	C	L	E					
							S	E	T	T	I	N	G	S							
E	X	I	T														E	N	T	E	R

Pressing the Enter key will access the charge menu parameter settings. The various parameters required to set a charge cycle are then displayed on successive screens.

Enter the nominal battery voltage, using the arrow keys to select and Enter to save.

			N	O	M	I	N	A	L		B	A	T	T	E	R	Y					
							V	O	L	T	A	G	E									
							4	8	V													
E	X	I	T															E	N	T	E	R

Enter the nominal battery capacity (Ahrs), using the arrow keys to select and Enter to save.

			N	O	M	I	N	A	L		B	A	T	T	E	R	Y					
							C	A	P	A	C	I	T	Y								
							1	0	5	0		A	H	R	S							
E	X	I	T															E	N	T	E	R

Set the charge current, using the arrow keys to select and Enter to save.

						C	H	A	R	G	E		R	A	T	E						
						(	C	C		C	U	R	R	E	N	T)				
										2	0	0				A						
E	X	I	T															E	N	T	E	R

Set the gassing volts per cell, using the arrow keys to select and Enter to save.

						G	A	S	S	I	N	G		(	C	V	)		V	O	L	T	A	G	E	
										V	O	L	T	S	/	C	E	L	L									
													2	.	3	7												
E	X	I	T																					E	N	T	E	R

Set the finish volts per cell to the desired value for 100% State of Charge (SoC) using the arrow keys to select and Enter to save.

						F	I	N	I	S	H		V	O	L	T	A	G	E										
										V	O	L	T	S	/	C	E	L	L										
													2	.	5	5													
E	X	I	T																						E	N	T	E	R

Set the equalize volts per cell, typically high enough to cause an excess return, bringing gravity up to approximately 105 - 110% SoC, using the arrow keys to select and Enter to save.

						E	Q	U	A	L	I	Z	E		V	O	L	T	A	G	E									
										V	O	L	T	S	/	C	E	L	L											
													2	:	5	8														
E	X	I	T																							E	N	T	E	R

Enable Finish if desired, for the desired profiles, using the arrow keys to select and Enter to save. It is suggested that Finish be enabled every charge cycle when cycling a battery.

			E	N	A	B	L	E		F	I	N	I	S	H					
								N	O											
E	X	I	T													E	N	T	E	R

Enable Equalize if desired, for the desired profiles, using the arrow keys to select and Enter to save. It is suggested that the final charge cycle for a battery include Equalize.

			E	N	A	B	L	E		E	Q	U	A	L	I	Z	E				
								N	O												
E	X	I	T														E	N	T	E	R

After entering the desired Equalize function the charge cycle complete message is displayed. Pressing Exit will return to the main menu.

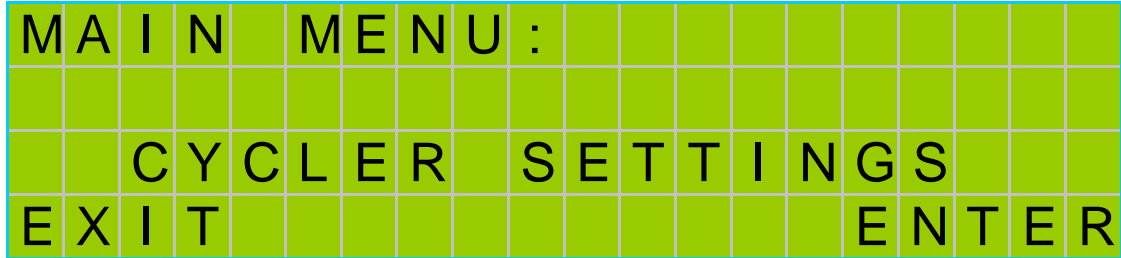
				C	H	A	R	G	E		C	Y	C	L	E						
				P	R	O	G	R	A	M	M	I	N	G							
				C	O	M	P	L	E	T	E										
E	X	I	T																		

For more information on charge parameters, discharge parameters and graphic representation of typical cycles; refer to the section on typical settings following the programming section

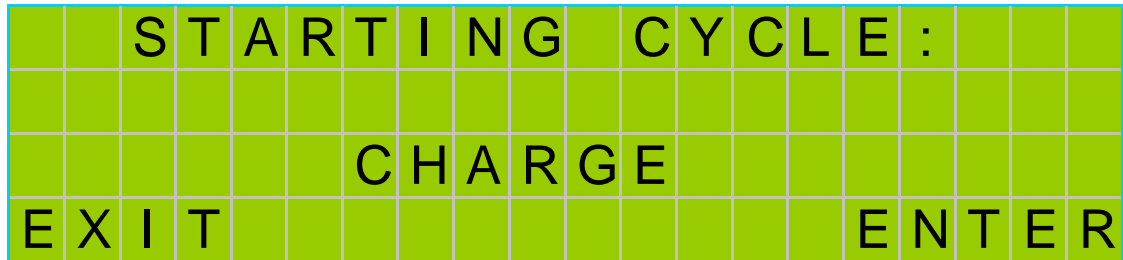
Cycler Settings

Cycler Settings are accessed from the Main Menu.

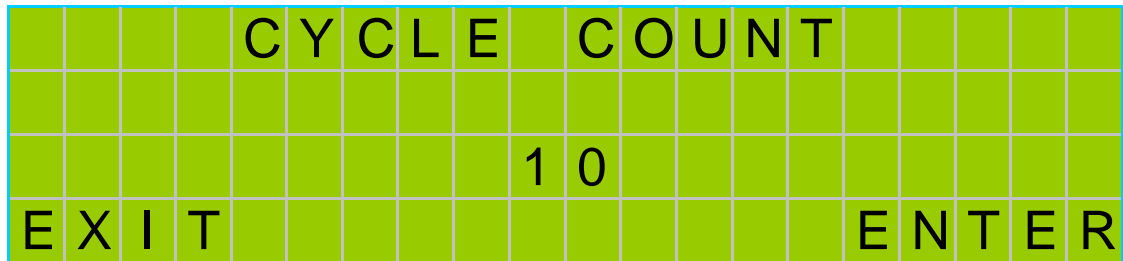
Press the F key to access the Main Menu. Use the arrow keys, scroll (↓) down to the Cycler Settings



Pressing the Enter key will access the cycler settings. The various parameters required to set the order of discharge and/or charge cycles and the number of cycles are then displayed on successive screens.



Use the arrow (↑/↓) keys to select the starting cycle charge or discharge, and Enter to save.



Use the arrow (↑/↓) keys set the number of cycles to complete, press enter to save.

Note: In the Cycle Count, a Cycle is defined as a charge or a discharge.

If a discharged battery is connected, and a charged battery is desired at the end of the test, the Cycle Start will be set to Charge and the Cycle Count will be set to an odd number.

If a charged battery is connected, and a test is desired consisting of discharging the battery and then recharging, Cycle Start will be set to Discharge, and Cycle Count will be set to an even number

There are two rest timers to allow the battery to cool following a charge or a discharge. The first timer is the rest following a charge cycle; while the second is the rest following a discharge cycle.

				R	E	S	T		C	H	A	R	G	E							
								T	I	M	E	R									
								0	1	:	3	0									
E	X	I	T														E	N	T	E	R

Use the arrow keys to set the desired time then, enter to save

				R	E	S	T		D	I	S	C	H	A	R	G	E					
								T	I	M	E	R										
								0	1	:	3	0										
E	X	I	T															E	N	T	E	R

Use the arrow keys to set the desired time then, enter to save

Once programming is complete, the charge cycle programming complete message will appear.

				C	Y	C	L	E	R		S	E	T	T	I	N	G	S					
								P	R	O	G	R	A	M	M	I	N	G					
								C	O	M	P	L	E	T	E								
E	X	I	T																				

Use the Exit key to return to the main menu

Starting a Cycle

Connect the battery to the Cycler.

The screen will now show either Push Start to Begin Charge or Push Start to Begin Discharge. Pressing Start initiates the indicated cycle.

4	8	V																2	0	0	A
0	1	/	0	1	/	0	5					1	2	:	0	0	:	0	0		
			P	U	S	H		S	T	A	R	T		T	O						
			B	E	G	I	N		C	H	A	R	G	E							

Briefly a starting screen will appear, followed by a status screen indicating: cycle type, cycle number out of total programmed cycles, running time for the present cycle, voltage, amperes, temperature if being sensed, ampere hours, charging mode when charging, SoC or DoD

If the cycle is a charge cycle, the following screen showing the charge cycle details will appear.

C	H	A	R	G	E	Y	/	X			H	H	:	M	M	:	S	S
			V	:	X	X	X	.	X		A	:	X	X	X	X		
			T	:	X	X	X	F		A	H	:	X	X	X	X		
M	M		%	S	O	C	:	X	X	%								

D	I	S	C	H	Y	/	X				H	H	:	M	M	:	S	S
			V	:	X	X	X	.	X		A	:	X	X	X	X		
			T	:	X	X	X	F		A	H	:	X	X	X	X		
			%	D	O	D	:	X	X	%								

To pause or stop the cycler press the stop button, at first a paused screen will appear. Pressing stop a second time will stop the cycles and return to the press start screen.

C	H	A	R	G	E		P	A	U	S	E	D	:						
P	U	S	H		S	T	A	R	T		T	O		R	E	S	U	M	^E
S	T	O	P		T	O		T	E	R	M	I	N	A	T	E			
A	L	L		P	E	N	D	I	N	G		C	Y	C	L	E	S		

At the end of each cycle the number of completed cycles is displayed along with the rest timer, along with total A-hrs

C	H	A	R	G	E		Y		O	F		X								
C	O	M	P	L	E	T	E					H	H	:	M	M	:	S	S	
T	E	M	P	:	X	X	X	F				A	H	R	S	:	X	X	X	X
E	X	I	T				R	E	S	T		H	H	:	M	M	:	S	S	

After the last cycle completes a summary screen displaying the last cycle type is present.

C	H	A	R	G	E		X		O	F		X								
C	O	M	P	L	E	T	E					H	H	:	M	M	:	S	S	
T	E	M	P	:	X	X	X	F				A	H	R	S	:	X	X	X	X
E	X	I	T																	

Status Screens Available From Main Menu

The following are available by selecting the main menu, when the connect battery or push to start messages are displayed.

Cycle History

Using the arrow keys scroll to the cycle history display, press enter to view the history of up to the last 200 cycles, when finished press exit to return to the main menu.

M	A	I	N		M	E	N	U	:											
			C	Y	C	L	E		H	I	S	T	O	R	Y					
E	X	I	T													E	N	T	E	R

A typical cycle screen will show the cycle number, date, time, last voltage, and A-hrs

C	H	#	9	9		0	1	/	0	1	/	0	6		0	4	:	2	0				
															D	R	A	W	E	R	S	:	1
V	O	L	T	:	5	8	.	6						H	R	S	:	0	3	:	2	1	
T	E	M	P	:	9	8	F							A	H	R	S	:	5	6	2		

The left and right arrows toggle between the two screens showing the details of the cycle.

The up down arrows sequentially scroll through the cycles by number

C	H	#	9	9		0	1	/	0	1	/	0	5		0	4	:	2	0				
A	C	T	I	V	A	T	E	D		P	R	O	F	I	L	E	S	:					
T	R		C	C		C	V		F	I		E	Q										
S	T	A	T	E	:	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X

Finish / Equalize Next Cycle

This screen is used to force the next cycle to finish and equalize independent of other settings

Cycler Model

Displays the cycler model number

Lifetime Summary

Displays the total use of the cycle

Charge Profiles

Displays the settings for the charge segments selected for profile 0 and profile 1

Recovery Cycle for Sulfated Battery

This bring up a series of entries to set battery capacity, current, and timers to force a one-time very low current cycle to recover a severely sulfated or over discharged battery.

Programming and Operating the Cyclor From a PC

General Information

Programming and operating the cyclor may be performed from a laptop connected to the cyclor in addition to using the keypad.

These ports may be used to down load the operating history of the cyclor as well.

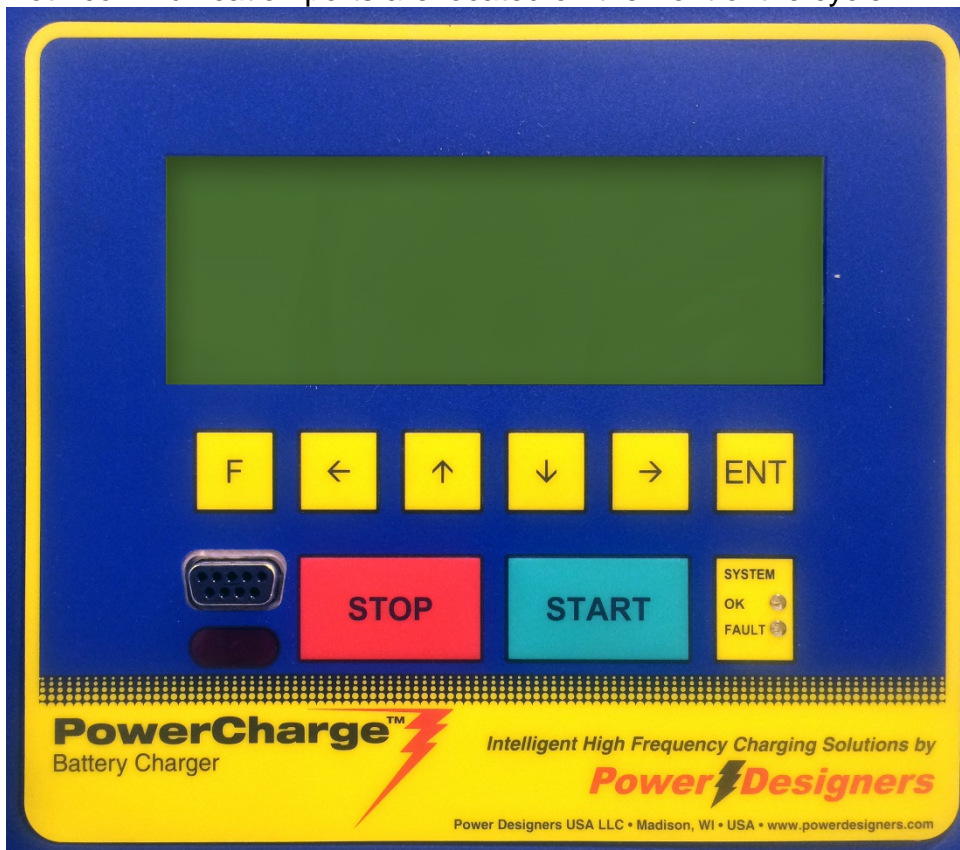
PowerCharge DataLink User is required on the laptop, and is available at the following web location:

<http://powerdesigners.com/downloads/>

You will also need either a USB to InfraRed (IR) adapter, if you choose to use the IR communications window on the cyclor; or you will need a USB to RS-232 Male adapter.

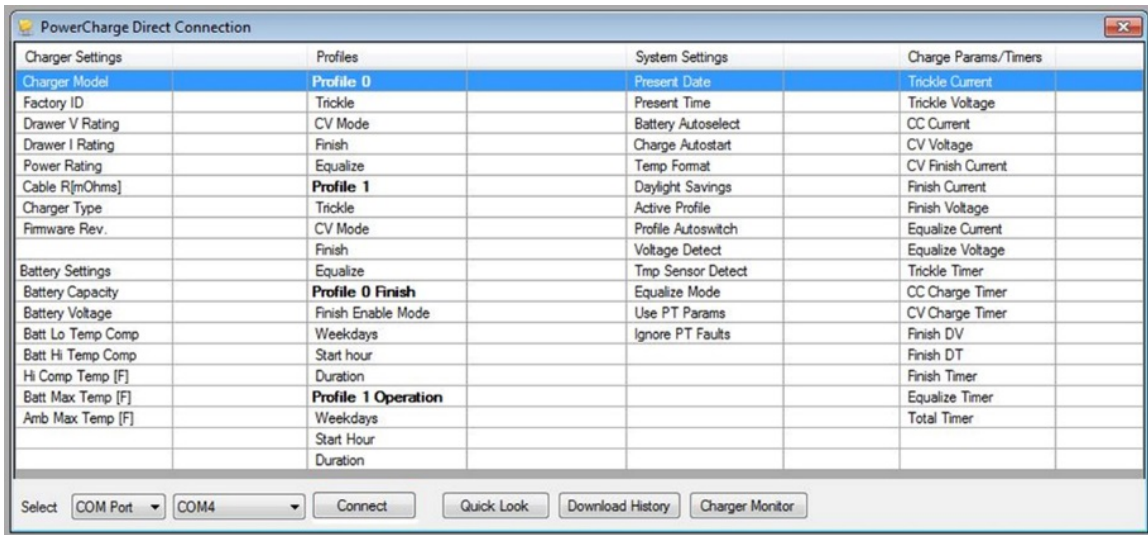
Port Location

Both communication ports are located on the front of the cyclor

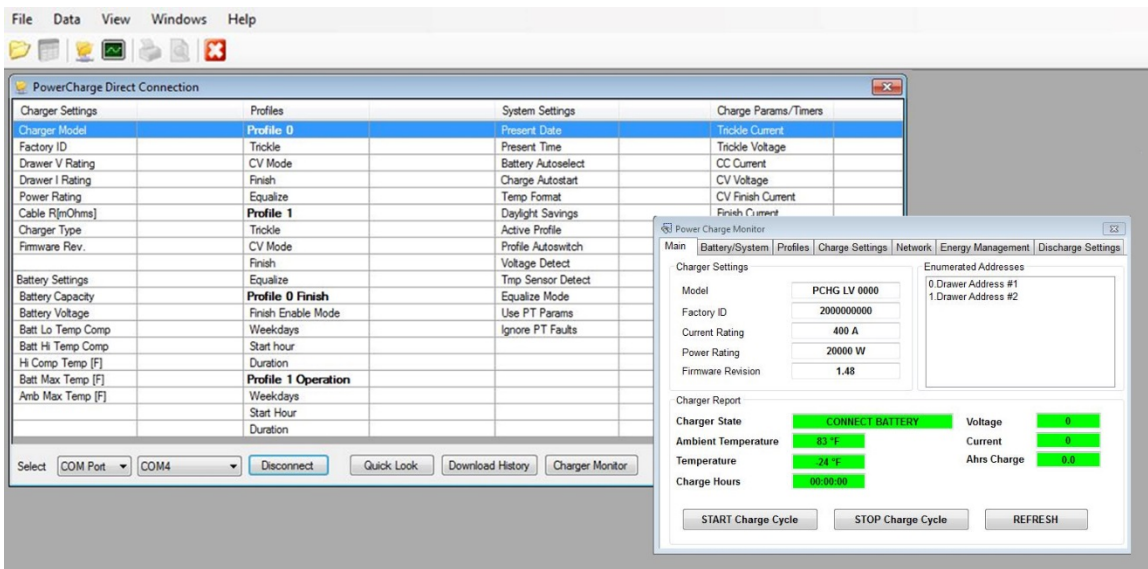


Connecting to the Cyclor Using the Actisys IR Adapter or the USB to RS-232 Adapter

1. With the IR adapter connected to the PC, First select the COM Port option and second select the COM channel desired. Or with the USB to RS-232 adapter connected to the Cyclor and PC, First select the COM Port option and second select the COM channel desired
2. From This Point Forward When Using the IR Adapter it is Necessary to Hold the Adapter in Front of the Cycle IR Window When Depressing Any Menu Button.
3. All Screens and Buttons Are the Same Using Either of the Ports
4. Pressing Connect followed by Quick Look Will Display the Present Settings



5. Pressing the Cyclor Monitor Button Top Left Will Launch the Monitor Window



Main Tab

The Main tab has the following features and functions:

1. The top half of the screen shows the model serial number, current and power rating along with firmware revision, the available charger drawers also appear.
2. The bottom half shows the current operating state of the cycler, along with buttons that allow start, stop and a display refresh.

The screenshot shows the 'Power Charge Monitor' application window with the 'Main' tab selected. The interface is divided into several sections:

- Charger Settings:** A table of configuration parameters.

Model	PCHG LV 0000
Factory ID	2000000000
Current Rating	400 A
Power Rating	20000 W
Firmware Revision	1.48
- Enumerated Addresses:** A list of drawer addresses.

0.Drawer Address #1
1.Drawer Address #2
- Charger Report:** Real-time operational data.

Charger State	CONNECT BATTERY	Voltage	0
Ambient Temperature	100 °F	Current	0
Temperature	-24 °F	Ahrs Charge	0.0
Charge Hours	00:00:00		
- Control Buttons:** Three buttons at the bottom: 'START Charge Cycle', 'STOP Charge Cycle', and 'REFRESH'.

Battery/Systems Tab

The Battery/System tab provides the capability to change settings specific to all Power Designers products, therefore some settings are not used with the cyclers. Those settings that are **not** used include:

Battery LowTemp Comp; Battery High Temp Comp; Battery High Comp Temp; Battery Max Temperature; Precharge Idle; Temp Sensor Detect; Use PT Params; and Ignore PT Faults

For settings that are used Power Designers recommends the user change only the following:

Battery Capacity, set to the desired Ahr rating; and Battery Voltage set to the desired battery voltage.

Setting is accomplished by typing the value into the numeric field and then pressing the disk icon to save.

The remainder of the settings Power Designers recommends be left at the default values:

Battery Auto Select **Disabled**
Charge Auto Start **Enabled**
Temperature Format **Fahrenheit**
Daylight Saving **Enabled**
Charge Profile **Profile0**
Profile Autoswitch **Enabled**

Section	Setting	Value	Action
Battery Parameters	Battery Capacity [Ahr]	850	Save
	Battery Voltage [V]	36	Save
	Battery Low Temp Comp [mV/°C]	2	Save
	Battery High Temp Comp [mV/°C]	4	Save
	Battery High Comp Temp [°F]	126	Save
	Battery Max Temperature [°F]	131	Save
	Ambient Max Temperature [°F]	140	Save
Date & Time	Set Date	10/Mar/2016	Save
	Set Time	13:28	Save
	System Date & Time	<input type="checkbox"/>	
System Settings	Battery Autoselect	Disabled	Save
	Charge Auto Start	Enabled	Save
	Temperature Format	Fahrenheit	Save
	Daylight Savings	Enabled	Save
	Charge Profile	Profile0	Save
	Profile Autoswitch	Enabled	Save
	Temp Sensor Detect	Disabled	Save
	Precharge Idle	Disabled	Save
	Equalize Mode	Timer Limit	Save
Use PT Params	Enabled	Save	
Ignore PT Faults	Yes	Save	

Buttons: Load Config, Default, Save Config

Note Default Values Are Restored by pressing the Default button followed by the Save Config button

Profiles Tab

The Profiles tab shows and adjusts the portions of the charge cycle that are applied to the battery for charging purposes.

Power Designers recommends:

The following modes be checked for both profiles:, Trickle Mode, CV Mode, and Finish Mode.

Finish Pulse should never be checked for either profile

Equalize should be checked for profile 1 only.

Profile 0 finish, should be Default, 23:00 and 08:00 for start and duration respectively and all days except Sunday checked.

Profile 1 operation should start at 01:00 and have a 22:00 hour duration on Sunday only.

The screenshot shows the 'Profiles' tab in the 'Power Charge Monitor' application. The interface is divided into several sections:

- Charger Profile 0:** Includes checkboxes for Trickle Mode (checked), CV Mode (checked), Finish Mode (unchecked), Equalize (unchecked), Zero Pulse (unchecked), and Finish Pulse (unchecked).
- Charger Profile 1:** Includes checkboxes for Trickle Mode (checked), CV Mode (checked), Finish Mode (checked), Equalize (unchecked), Zero Pulse (unchecked), and Finish Pulse (unchecked).
- Profile 0 Finish:** Includes dropdowns for Finish Mode (Default), Start Hour (23:00), and Duration (08:00). It also has checkboxes for days of the week: Sunday (unchecked), Monday (checked), Tuesday (checked), Wednesday (checked), Thursday (checked), Friday (checked), and Saturday (checked).
- Profile 1 Operation:** Includes dropdowns for Start Hour (01:00) and Duration (22:00). It has checkboxes for days of the week: Sunday (checked), Monday (unchecked), Tuesday (unchecked), Wednesday (unchecked), Thursday (unchecked), Friday (unchecked), and Saturday (unchecked).

At the bottom of the window, there are buttons for 'Save Profiles', 'Load Config', 'Default', and 'Save Config'.

Note Default Values Are Restored by pressing the Default button followed by the Save Config button

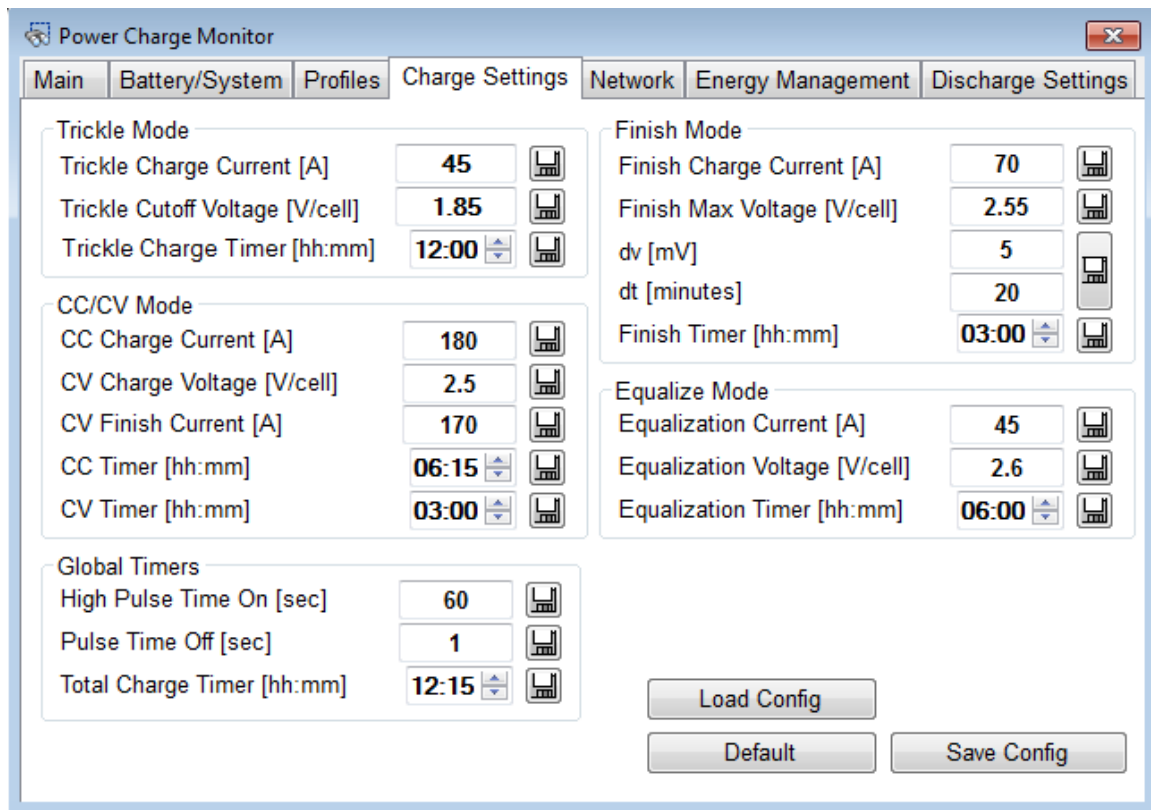
Charge Settings Tab

The charge settings tab allows the current, voltage and timer; for each portion of the charge to be adjusted independently. For the cycler the High Pulse Time On and Pulse Time Off do not affect the operation. When working with this screen it is suggested that these steps be performed in this order:

1. Press the Default Button
2. Press Save Config button
3. Set Currents
 - a. Trickle 3% of battery capacity
 - b. CC Charge Current 17% of battery capacity
 - c. CV Finish Current 12 to 15% of battery capacity
 - d. Finish Charge Current 5% of battery capacity
 - e. Equalize Current 3% of battery capacity
4. Save currents by either pressing each disk icon, or by pressing the save config button

Recommended timers are: Trickle Charge Timer 12:00, CC Timer 06:15, CV Timer 03:00, Finish Timer 03:00, Equalize Timer 06:00 and Total Charge Timer 12:15.

Recommended voltages are Trickle Cutoff Voltage 1.85, CV Charge Voltage 2.37, Finish Max Voltage 2.55 to 2.60, and Equalize to 2.60

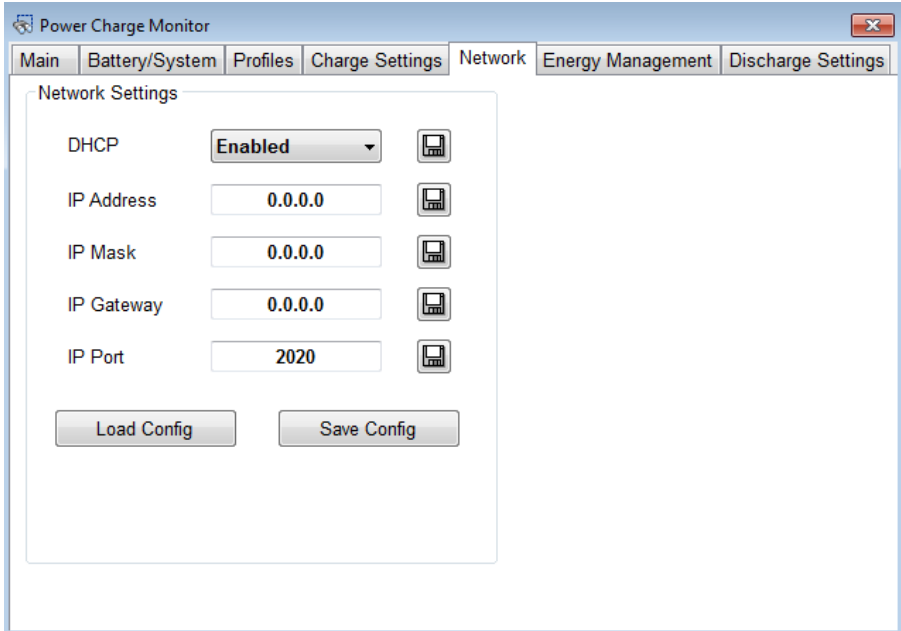


Note Default Values Are Restored by pressing the Default button followed by the Save Config button

Network Tab

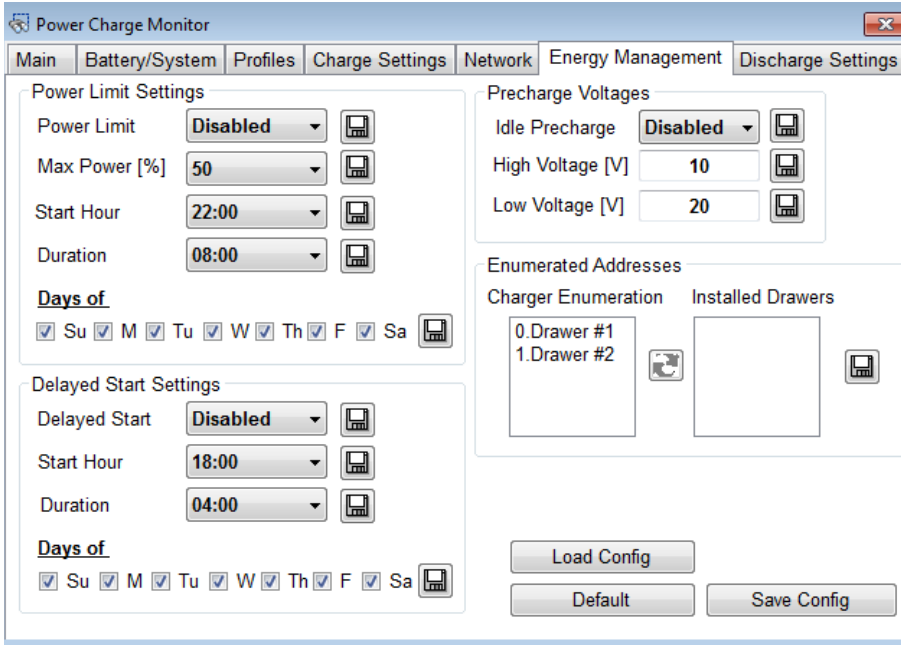
The network tab is **only used** with the **Ethernet option**. These settings are typically adjusted your IT department, based on the local server needs.

These should only be changed by IT personnel.



Energy Management

Power Designers recommends that the Energy Management features **are left in the default disabled state** when operating the cycler. Reducing the power will limit the effectiveness of the charging portion of the cycle.



Discharge Setting Tab

Discharge settings allow selection of the mode of operation; cycling, charging, or discharging; the starting cycle charge or discharge; as well as the discharge current recommended to be 20% of battery capacity; the depth of discharge recommended at 80; the discharge cutoff voltage recommendation of 1.7 VPC; the Discharge timer; and the rest timers following both discharge, and charge.

The screenshot shows the 'Discharge Settings' tab in the 'Power Charge Monitor' application. The window has a title bar with a close button and a menu bar with tabs: 'Main', 'Battery/System', 'Profiles', 'Charge Settings', 'Network', 'Energy Management', and 'Discharge Settings'. The 'Discharge Settings' tab is active and contains the following controls:

Parameter	Value	Icon
Cycler Operation Mode	Charger	Save icon
Starting Cycle	Charge	Save icon
Cycle Count	1	Save icon
Discharge Current	8	Save icon
Depth of Disch.	50	Save icon
Disch Cutoff Volt	1.7	Save icon
Discharge Timer	08:00	Save icon
Reset Charge Timer	01:00	Save icon
Reset Disch. Timer	01:30	Save icon

At the bottom right of the settings area, there are three buttons: 'Load Config', 'Default', and 'Save Config'.

Timers should be used to allow the battery to cool between charge and discharge cycles.

Note: In the Cycle Count, a Cycle is defined as a charge or a discharge.

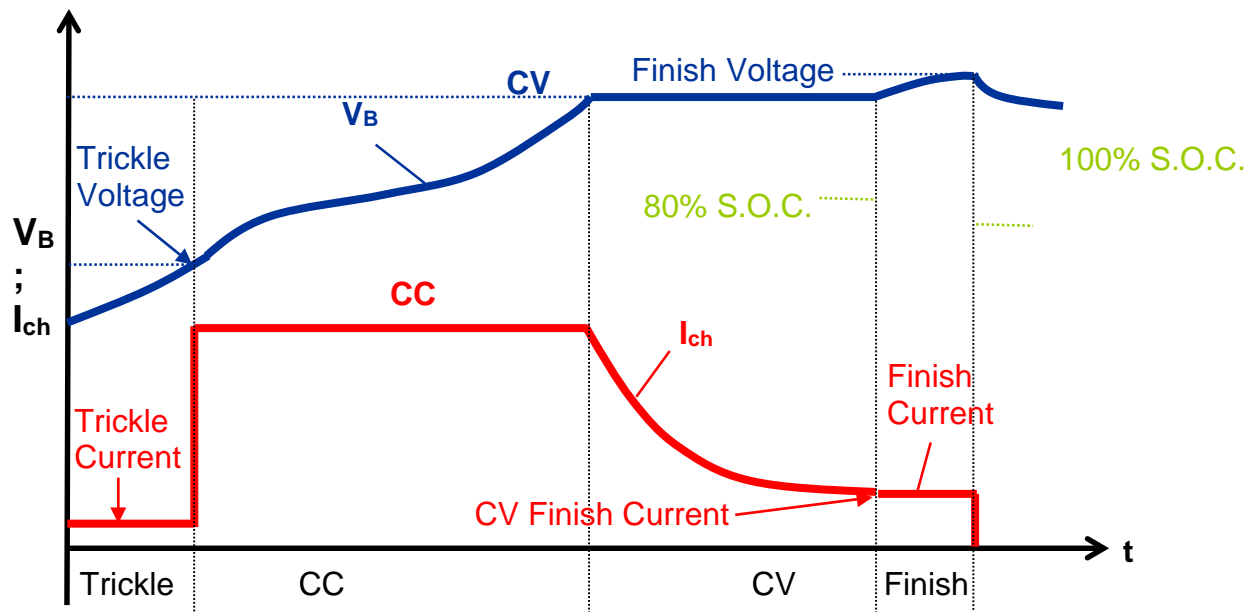
a discharged battery is connected, and a charged battery is desired at the end of the test, the Cycle Start will be set to Charge and the Cycle Count will be set to an odd number.

If a charged battery is connected, and a test is desired consisting of discharging the battery and then recharging, Cycle Start will be set to Discharge, and Cycle Count will be set to an even number

Recommended Settings and Typical Cycle Representations

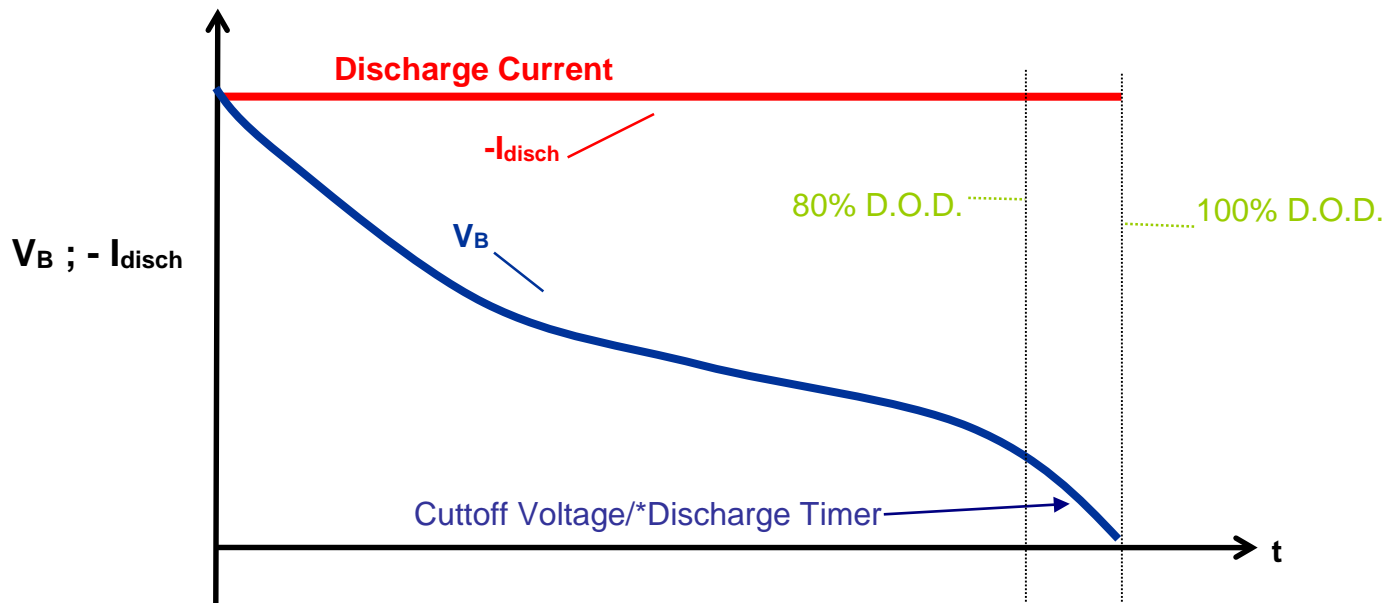
Charge Parameters:

	Parameter	Recommended Value
1	Trickle Current	3 A / 100 Ahrs
2	Trickle Voltage	1.75-1.95 VPC
3	CC Current	17 – 20A / 100 Ahrs
4	CV Voltage	2.37 VPC
5	CV Finish Current	12 - 15 A / 100 Ahrs
6	Finish Current	5 A / 100 Ahrs
7	Finish Voltage	2.55-2.60 VPC
8	Equalize Current	3 A / 100 Ahrs
9	Equalize Voltage	2.60 VPC



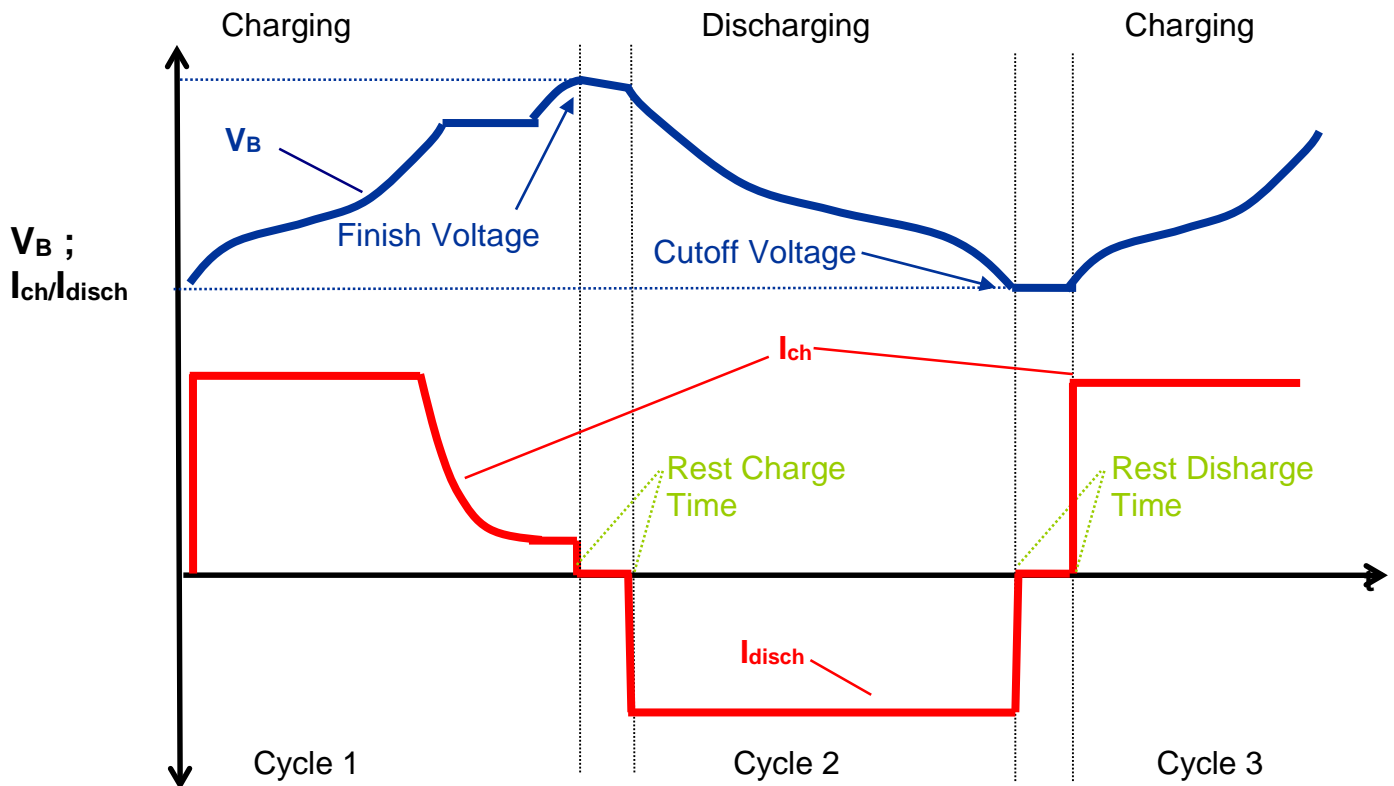
Discharge Parameters

	Parameter	Recommended Value
1	Discharge Current	20A/100 Ahrs
2	Depth of Disch.	80%
3	Disch. Cutoff Volt	1.80



Cycle Parameters Screen Variables:

	Parameter	Recommended Value
1	Cycle Count	As desired
2	Rest Charge Time	1:00 to 8:00 to allow battery to cool
3	Rest Discharge Time	1:00 to 8:00 to allow battery to cool



TROUBLESHOOTING

There are a number of instances where the cyclor will fault to protect itself from damage or to protect the battery. In these instances the fault is reset by pushing the stop button. Pressing the start button restarts the cyclor. If the fault returns immediately or persists; contact Power Designers.

Power Designers will guide you through identifying the cause and corrective action.

**DO NOT ATTEMPT TO SERVICE THE UNIT UNLESS
INSTRUCTED TO BY POWER DESIGNERS.**

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Phones are answered between 8 a.m. and 4 p.m., Monday through Friday Central Time. After-hours calls are answered by voice mail and returned on the next business day. Questions and comments can also be submitted via fax or email.

SAFETY PRECAUTIONS

WARNING: Only qualified personnel should install and connect the cyclor to the electrical supply

WARNING: Working with Batteries has inherent risks, Personnel Protective Equipment is requires, and must be defined by the end user company.

EMC Compliance:

This device complies with Part 15 section 103 of FCC Rules as a digital device used exclusively as a power system in public utilities or industrial plants.

Operation is subject to the following two conditions:

1. This device may not cause harmful interference, and
2. This device must accept any interference received, including interference that may cause undesired operation