

Intelligent Load Bank User Manual

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Statements, Notices and Liability information

FCC Part 15 Class B

This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against interference in a residential installation.

This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation.

If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and receiver.
- Connect the affected equipment and the panel receiver to separate outlets, on different branch circuits.
- Consult the dealer or an experienced radio/TV technician for help.

STATEMENT OF FAULTLESSNESS:

The information in this manual has been reviewed for accuracy at the time of writing. No responsibility can be assumed by Rx Monitoring Services Inc. for inaccuracy or changes that have taken place since production. The “Cx Monitor User Manual” is for informational purposes only and is subject to change without notice.

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Definitions

- **WARNING**
This statement is to reinforce the practice of certain conditions may cause physical bodily harm or loss of life.
- **CAUTION**
This statement is to reinforce the practice of certain conditions may cause physical damage to the Load Bank, Cx Monitor, accessories, equipment or property.
- **NOTE**
General information for simplifying the user experience.

Abbreviations

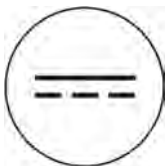
CT's :	Current Transducers	Wireless Probes:	Wireless add-on's for power monitor
Rope Probes :	Rogowski coil current transducers	EWE:	External Wireless Extensions
Cx :	Power Monitor	Site:	Cx Monitor data set.
Monitor :	Power Monitor (Cx)		

Symbols

The following are (IEC) symbols are used on this document or on the power monitor, and their definitions.



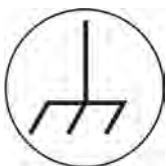
This symbol indicates AC or DC voltage or current



This symbol indicates DC only voltage or current



This symbol indicates AC only voltage or current



This symbol indicates earth ground conductor.



This symbol indicates that caution is necessary when operating the device or control close to where the symbol is placed, or to indicate that the current situation needs operator awareness or operator action in order to avoid undesirable consequences.



This symbol indicates high voltage. It calls your attention to items or operations that could be dangerous to you and other persons operation this equipment. Read the message and follow the instructions carefully.



This symbol indicates safety ground conductor.



To avoid electric shock or fire:

Review the entire manual before using the Power Monitor and its accessories and observe all warnings and cautions.

- Before using the power monitor inspect wireless probes, voltage probes, current probes, leads and accessories for mechanical damage or broken plastic and call Rx Monitoring Services Inc. for replacements.
- Wear proper Personal Protective Equipment, including safety glasses and insulated gloves when making connections to power circuits.
- Use only current probes, test leads, and adapters supplied with equipment.
- Remove unnecessary voltage leads or accessories that are not in use.
- Make sure the power monitor is properly connected through the power cord to protective earth ground.
- Do not insert foreign objects into connectors, only use approved accessories.
- Never open the equipment, there are no customer replaceable parts.
- Never use equipment outside or when condensing water is present.
- Use proper lockout procedures on circuits under test.
- Hands, boots and the working area must be dry when making connections to power system.
- Do not operate the equipment or probes around volatile gas or vapor.

******* WARNING DO NOT EXCEED CAT RATINGS *******

Voltage Ratings:



Power Monitor	: CAT III - 600V	Pollution Degree 2
Rope CT's	: CAT III - 1000V	Pollution Degree 2
Clamp CT's	: CAT III - 600V	Pollution Degree 2
Wireless DC	: CAT II - 600V	Pollution Degree 2
Wireless DCx	: CAT II - 150V	Pollution Degree 2

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The Intelligent Load Bank was designed with one function in mind, bringing usability and simplicity to the power testing market.

Throughout this documentation the Cx Monitor™ will be referred more simply as “Monitor”.

Throughout this documentation the Intelligent Load Bank will be referred more simply as “LoadBank”.

Some of the key features:

- **Software runs on any windows 7/10 PC as well as tablets (Windows 10 recommended)**
- **Up to 250 units in a Ethernet string**
- **Power Meter Integration**
- **Switch timings within 500mSec**
- **Voltage compensation based on power system levels**
- **Virtual groups within strings with different max power settings**
- **Automatic scripts with Run / Rewind / Restart**
- **Keeps running log of all LoadBank commands with time stamped that can be saved for later use**
- **Remote update of firmware**
- **Software:**

The packages used with the Cx Monitor - Live-View™ and U-View™ are free for life. On a release cycle of 2 months they are written and developed at Rx Monitoring Services, Inc. and are constantly being improved.

Minimum PC requirements:

Win 7/10
i3-8130 CPU
4Gbytes Ram
20Mbytes Hard Disk
WiFi or ethernet port
Display: 1920x1080

Intelligent Load Bank Components

Software running on tablet or Laptop



Minimum PC requirements:
Win 7/10
i3-8130 CPU
4Gbytes Ram
20Mbytes Hard Disk
WiFi or ethernet port

UPS: Use for best uninterrupted connection

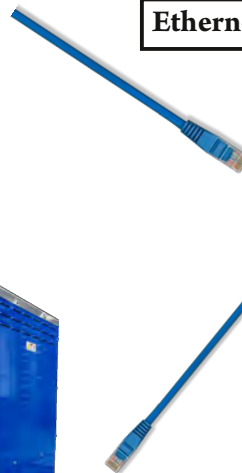


Power both router
and laptop / tablet

Ethernet Wi-Fi Router:
Provided in kit, uses DHCP



Ethernet Cables: Up to 200 Ft



LoadBanks:
Up to 250 load banks



Cx Monitor
Automatic Waveforms capture
and power readings



Load Bank Networking

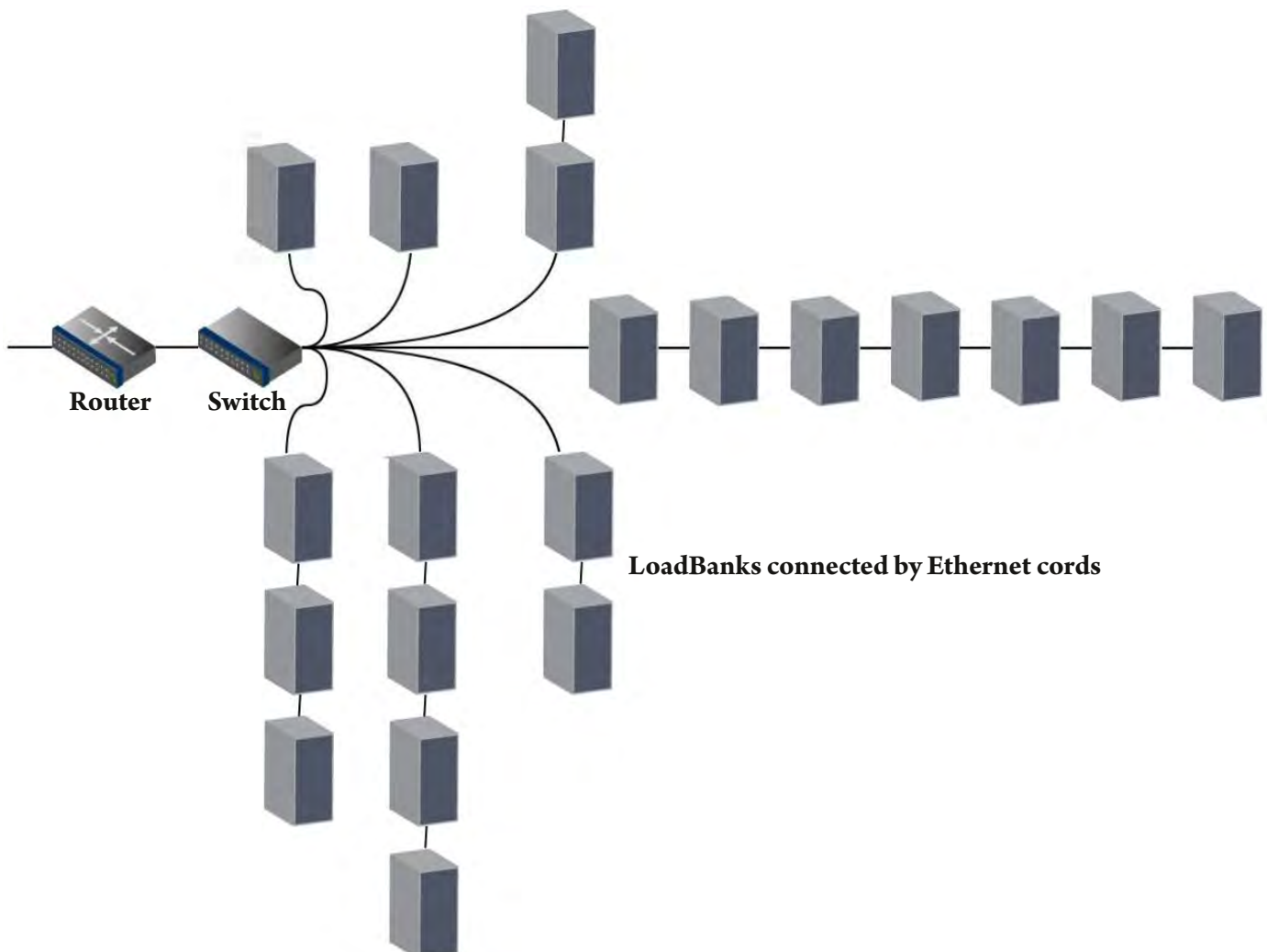
LoadBanks communicate with each other using standard Ethernet cords, which can be up to 200 feet.

- Each LoadBank will have a panel with two Ethernet ports - In and Out.
- Connect an Ethernet cord from the first LoadBank Out port to the next LoadBank In port.
- Continue this process until all LoadBanks are networked.
- Hook up the Router by Ethernet cord from the LAN port (see next page) to the In port on the first LoadBank of the chain.



Best practice to avoid latency is to not connect *more than 15* LoadBanks to one chain.

For more than 15 LoadBanks or LoadBanks need to be spaced out to other areas, use a Switch.



PC Connection Methods

To use the LoadBank, an Ethernet or Wi-Fi connection must be established to the device.

Power up the router adapters before the LoadBanks (30-40 Seconds)

There are 2 different connection types:

1. Ethernet through DHCP network.
2. Wi-Fi through DHCP network.

Note: Ethernet connection has lower latencies, surrounding noise and signal levels can affect Wi-Fi communication.

Ethernet router wired DHCP network (Tablet)

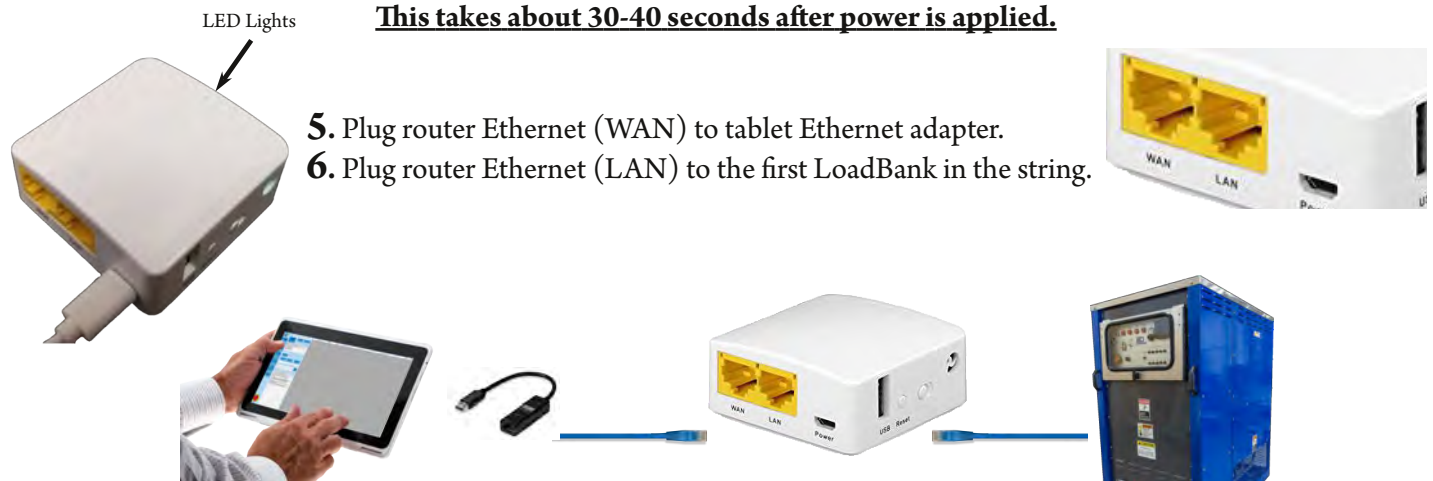
To ensure stability of the network we recommend using the USB power from the tablet (Battery backed) or use a UPS that can ride through instability on the 120V line.

1. Plug UPS into wall and power up with push button.
2. Plug USB to 120V converter into UPS.
3. Plug micro USB into router.
4. Plug USB into to Ethernet convert into Table.



The routers green LED means power is at the device, the red means that it is up and communicating.

This takes about 30-40 seconds after power is applied.



5. Plug router Ethernet (WAN) to tablet Ethernet adapter.
6. Plug router Ethernet (LAN) to the first LoadBank in the string.
7. Double check the daisy chain connections (see previous page)
8. Power Up LoadBanks, all LED lights on LoadBanks should blink
9. Start Intelligent Load Bank Software



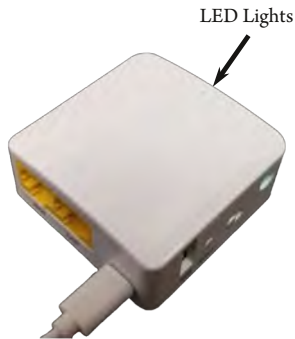
To ensure stability of the network we recommend using the USB power from the tablet (Battery backed) or use a UPS that can ride through instability on the 120V line.

1. Plug UPS into wall and power up with push button.
2. Plug USB to 120V converter into UPS.
3. Plug micro USB into router.
4. Connect tablet to wireless network (G1-AR150-xx)



The routers green LED means power is at the device, the red means that it is up and communicating.

This takes about 30-40 seconds after power is applied.



5. Plug router Ethernet (LAN) to the first LoadBank in the string.



6. Double check the daisy chain connections (see previous page)
7. Power Up LoadBanks, all LED lights on LoadBanks should blink
8. Start Intelligent Load Bank Software



Best practice is to limit Wi-Fi connections to 50 units.
Note: computer specification could affect latency of switch time.

Some load banks have green LED's that can tell the current state of the remote system.
The three states are as follows:

- | | |
|------------------|--|
| 1. LED off, | No Ethernet IP address available. (Router not powered or Ethernet wires not working) |
| 2. LED Blinking, | Load bank has IP address, router and cables are working. |
| 3. LED solid, | Software is talking to load bank and ready for commands. |

LP400



LP500



LP1000



Intelligent Load Bank Software

Description:

The Intelligent Load Bank Software is designed to integrate multiple LoadBank manufactures and sizes within one software platform. The system can control up to 50 different LoadBanks using simple Ethernet wires.

The LoadBanks can be put into virtual Groups with separate power limits and controlled remotely.

This software can also create Scripts for a LoadBank Group to run automatically.

Interface

The main interface to the Load Bank Software is the left menu.

There are 5 tabs:

Connect: LoadBanks are connected to the software.

LoadBank: Individual control to each LoadBank.

Group: Control multiple LoadBanks at once.

Script: Control group steps with a time setting.

Settings: Interface control settings for LoadBanks.

EMERGENCY STOP

Double tap to activate
Sheds all loads and stop blowers on all connected units.



Connect Tab

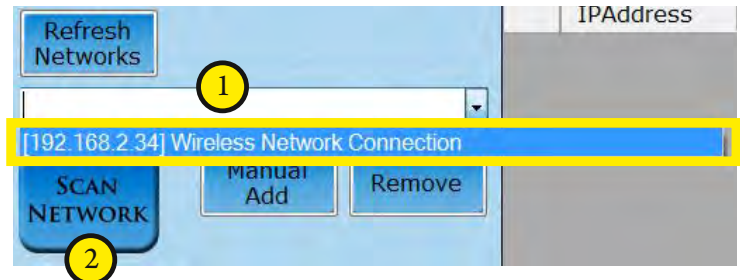
Description:

The connect tab controls which LoadBanks are communicating. It also shows which units are currently active. This discovery process will recommend firmware updates of the loadbanks, if needed.

How to Use Tab Summary:

Upon startup the software is not communicating with any IP addresses. There are two steps to start attaching units to software.

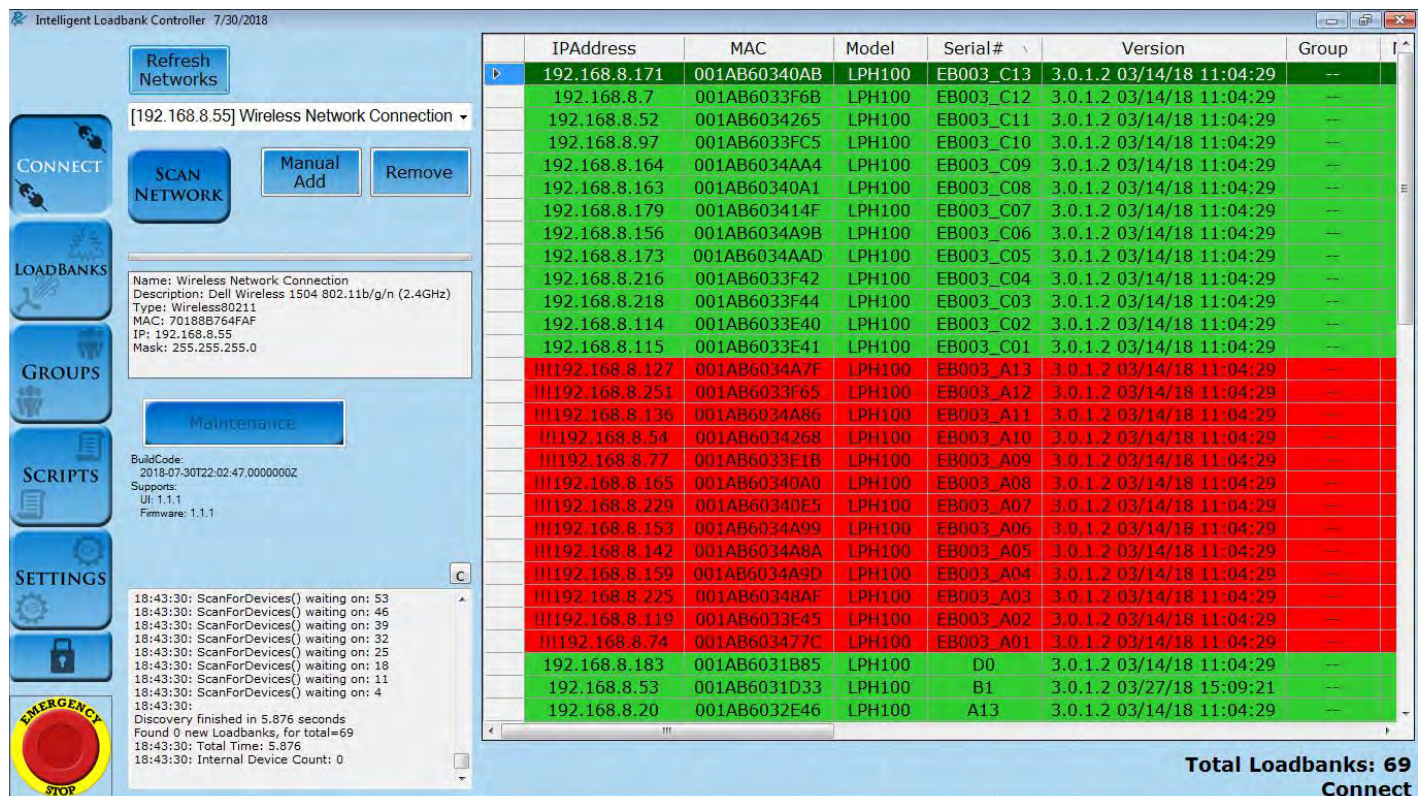
1. Ensure that you have the correct network interface on the loadbank software
2. Click **Scan Network**



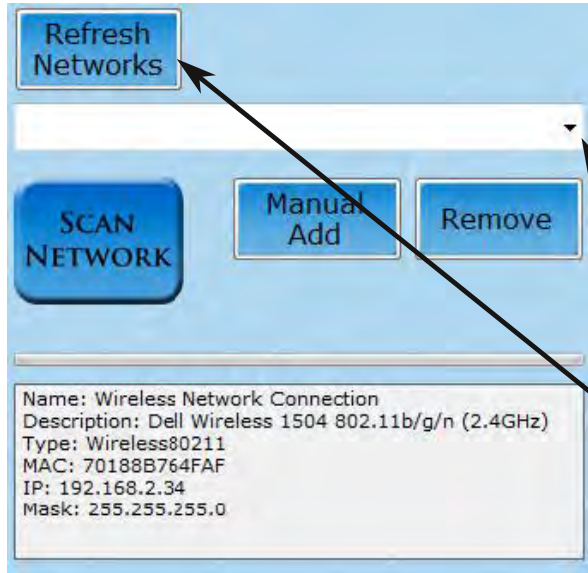
The units show up the right table section.

The color states of the units are below.

- Green:** Load Bank are working correctly.
- Red:** Load Bank are not communicating (!!!192.168.8.xxx) shows in the IP Address.
- Yellow:** Load Bank needs firmware update, pop-up will ask to update.



IPAddress	MAC	Model	Serial#	Version	Group
192.168.8.171	001AB60340AB	LPH100	EB003_C13	3.0.1.2 03/14/18 11:04:29	--
192.168.8.7	001AB6033F6B	LPH100	EB003_C12	3.0.1.2 03/14/18 11:04:29	--
192.168.8.52	001AB6034265	LPH100	EB003_C11	3.0.1.2 03/14/18 11:04:29	--
192.168.8.97	001AB6033FC5	LPH100	EB003_C10	3.0.1.2 03/14/18 11:04:29	--
192.168.8.164	001AB6034AA4	LPH100	EB003_C09	3.0.1.2 03/14/18 11:04:29	--
192.168.8.163	001AB60340A1	LPH100	EB003_C08	3.0.1.2 03/14/18 11:04:29	--
192.168.8.179	001AB603414F	LPH100	EB003_C07	3.0.1.2 03/14/18 11:04:29	--
192.168.8.156	001AB6034A9B	LPH100	EB003_C06	3.0.1.2 03/14/18 11:04:29	--
192.168.8.173	001AB6034AAD	LPH100	EB003_C05	3.0.1.2 03/14/18 11:04:29	--
192.168.8.216	001AB6033F42	LPH100	EB003_C04	3.0.1.2 03/14/18 11:04:29	--
192.168.8.218	001AB6033F44	LPH100	EB003_C03	3.0.1.2 03/14/18 11:04:29	--
192.168.8.114	001AB6033E40	LPH100	EB003_C02	3.0.1.2 03/14/18 11:04:29	--
192.168.8.115	001AB6033E41	LPH100	EB003_C01	3.0.1.2 03/14/18 11:04:29	--
!!!192.168.8.127	001AB6034A7F	LPH100	EB003_A13	3.0.1.2 03/14/18 11:04:29	--
!!!192.168.8.251	001AB6033F65	LPH100	EB003_A12	3.0.1.2 03/14/18 11:04:29	--
!!!192.168.8.136	001AB6034A86	LPH100	EB003_A11	3.0.1.2 03/14/18 11:04:29	--
!!!192.168.8.54	001AB6034268	LPH100	EB003_A10	3.0.1.2 03/14/18 11:04:29	--
!!!192.168.8.77	001AB6033E1B	LPH100	EB003_A09	3.0.1.2 03/14/18 11:04:29	--
!!!192.168.8.165	001AB60340A0	LPH100	EB003_A08	3.0.1.2 03/14/18 11:04:29	--
!!!192.168.8.229	001AB60340E5	LPH100	EB003_A07	3.0.1.2 03/14/18 11:04:29	--
!!!192.168.8.153	001AB6034A99	LPH100	EB003_A06	3.0.1.2 03/14/18 11:04:29	--
!!!192.168.8.142	001AB6034A8A	LPH100	EB003_A05	3.0.1.2 03/14/18 11:04:29	--
!!!192.168.8.159	001AB6034A9D	LPH100	EB003_A04	3.0.1.2 03/14/18 11:04:29	--
!!!192.168.8.225	001AB60348AF	LPH100	EB003_A03	3.0.1.2 03/14/18 11:04:29	--
!!!192.168.8.119	001AB6033E45	LPH100	EB003_A02	3.0.1.2 03/14/18 11:04:29	--
!!!192.168.8.74	001AB603477C	LPH100	EB003_A01	3.0.1.2 03/14/18 11:04:29	--
192.168.8.183	001AB6031B85	LPH100	D0	3.0.1.2 03/14/18 11:04:29	--
192.168.8.53	001AB6031D33	LPH100	B1	3.0.1.2 03/27/18 15:09:21	--
192.168.8.20	001AB6032E46	LPH100	A13	3.0.1.2 03/14/18 11:04:29	--



The software will try to acquire the network interface from the PC or Tablet on startup.

If the drop down menu is empty this means there were no valid networks on the PC on startup.

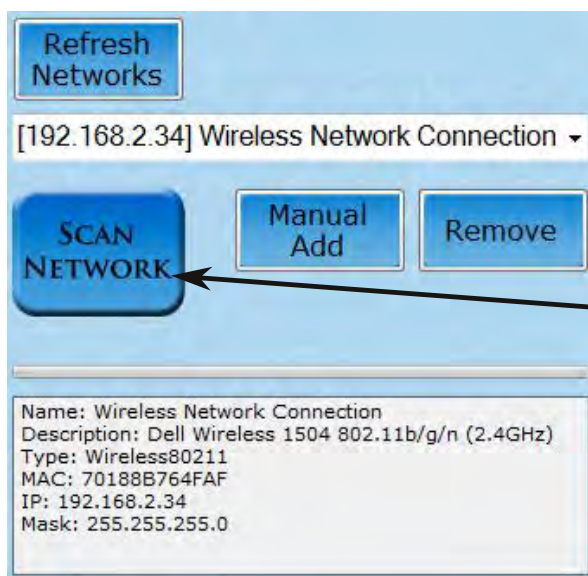
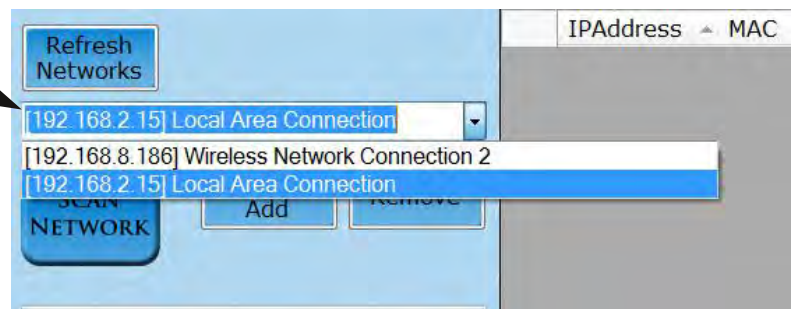
Click **Refresh Networks** to get a updated network list.

Once the list is updated select the one to use.

WiFi and Ethernet are supported.

WiFi could have high latency based on the surrounding noise and signal levels.

Ethernet has lower latencies.



Click **Scan Network** to start the connection process.

If not all LoadBanks are present, hit Scan Network again until all LoadBanks are shown

Note: Manual Add and Remove are for debugging purposes only

While scanning button is highlighted and lower bar will rotate.

This process takes 4-6 seconds.



After discovery the units will list here

IP Address	MAC	Model	Serial#	Version	Group	Nic
192.168.8.171	001AB60340AB	LPH100	EB003_C13	3.0.1.2 03/14/18 11:04:29	--	
192.168.8.7	001AB6033F6B	LPH100	EB003_C12	3.0.1.2 03/14/18 11:04:29	--	
192.168.8.52	001AB6034265	LPH100	EB003_C11	3.0.1.2 03/14/18 11:04:29	--	
192.168.8.97	001AB6033FC5	LPH100	EB003_C10	3.0.1.2 03/14/18 11:04:29	--	
192.168.8.164	001AB6034AA4	LPH100	EB003_C09	3.0.1.2 03/14/18 11:04:29	--	
192.168.8.163	001AB60340A1	LPH100	EB003_C08	3.0.1.2 03/14/18 11:04:29	--	
192.168.8.179	001AB603414F	LPH100	EB003_C07	3.0.1.2 03/14/18 11:04:29	--	
192.168.8.156	001AB6034A9B	LPH100	EB003_C06	3.0.1.2 03/14/18 11:04:29	--	
192.168.8.173	001AB6034AAD	LPH100	EB003_C05	3.0.1.2 03/14/18 11:04:29	--	
192.168.8.216	001AB6033F42	LPH100	EB003_C04	3.0.1.2 03/14/18 11:04:29	--	
192.168.8.218	001AB6033F44	LPH100	EB003_C03	3.0.1.2 03/14/18 11:04:29	--	
192.168.8.114	001AB6033E40	LPH100	EB003_C02	3.0.1.2 03/14/18 11:04:29	--	
192.168.8.115	001AB6033E41	LPH100	EB003_C01	3.0.1.2 03/14/18 11:04:29	--	
192.168.8.127	001AB6034A7F	LPH100	EB003_A13	3.0.1.2 03/14/18 11:04:29	--	
192.168.8.251	001AB6033F65	LPH100	EB003_A12	3.0.1.2 03/14/18 11:04:29	--	
192.168.8.136	001AB6034A86	LPH100	EB003_A11	3.0.1.2 03/14/18 11:04:29	--	
192.168.8.54	001AB6034268	LPH100	EB003_A10	3.0.1.2 03/14/18 11:04:29	--	
192.168.8.77	001AB6033E1B	LPH100	EB003_A09	3.0.1.2 03/14/18 11:04:29	--	
192.168.8.165	001AB60340A0	LPH100	EB003_A08	3.0.1.2 03/14/18 11:04:29	--	
192.168.8.229	001AB60340E5	LPH100	EB003_A07	3.0.1.2 03/14/18 11:04:29	--	
192.168.8.153	001AB6034A99	LPH100	EB003_A06	3.0.1.2 03/14/18 11:04:29	--	
192.168.8.142	001AB6034A8A	LPH100	EB003_A05	3.0.1.2 03/14/18 11:04:29	--	
192.168.8.159	001AB6034A9D	LPH100	EB003_A04	3.0.1.2 03/14/18 11:04:29	--	
192.168.8.225	001AB60348AF	LPH100	EB003_A03	3.0.1.2 03/14/18 11:04:29	--	
192.168.8.119	001AB6033E45	LPH100	EB003_A02	3.0.1.2 03/14/18 11:04:29	--	
192.168.8.74	001AB603477C	LPH100	EB003_A01	3.0.1.2 03/14/18 11:04:29	--	
192.168.8.183	001AB6031B85	LPH100	D0	3.0.1.2 03/14/18 11:04:29	--	
192.168.8.53	001AB6031D33	LPH100	B1	3.0.1.2 03/27/18 15:09:21	--	
192.168.8.20	001AB6032E46	LPH100	A13	3.0.1.2 03/14/18 11:04:29	--	

BuildCode: 2018-07-30T22:02:47.00000002
Supports: UI: 1.1.1
Firmware: 1.1.1

18:43:30: ScanForDevices() waiting on: 53
18:43:30: ScanForDevices() waiting on: 46
18:43:30: ScanForDevices() waiting on: 39
18:43:30: ScanForDevices() waiting on: 32
18:43:30: ScanForDevices() waiting on: 25
18:43:30: ScanForDevices() waiting on: 18
18:43:30: ScanForDevices() waiting on: 11
18:43:30: ScanForDevices() waiting on: 4
18:43:30: Discovery finished in 5.876 seconds
Found 0 new Loadbanks, for total=69
18:43:30: Total Time: 5.876
18:43:30: Internal Device Count: 0

Total Loadbanks: 69 Connect

A total count is given on the bottom right.

**A pop-up may occur asking to update the LoadBank to the newest firmware.
The update only takes 10 seconds and must be done to continue using software normally.**

Load Banks Tab

Description:

The Loadbanks tab shows the status of the individual LoadBanks connected and allow users to set nicknames, turn on/off, and apply different load amounts to individual LoadBanks.

How to Use Tab Summary:

- Highlighting a unit from the list shows the values for the unit below.
- To apply load to a unit first tap **Control (On)** and **Blowers (On)** switches.
- To use load switches click on value switches (this will queue them) then click **Apply Switches**.

Model	Serial#	Group	Nickname	Mode	Capacity KW/A	Applied(KW)	Applied(KVAR)	Avg Vrms	Avg I rms	Avg KW	Avg KVAR
LPH100	EB003_C12	--		480	100/120	0.00	0.00	480.675	0.00	0.00	0.00
LPH100	0000	--		480	100/120	0.00	0.00	479.325	0.00	0.00	0.00
LPH100	00008	--		480	100/120	0.00	0.00	480.675	0.00	0.00	0.00
LPH100	EB003_C11	--		480	100/120	0.00	0.00	480.675	0.00	0.00	0.00
LPH100	EB003_A10	--		480	100/120	0.00	0.00	479.325	0.00	0.00	0.00
LPH100	0000	--		480	100/120	0.00	0.00	480.675	0.00	0.00	0.00
LPH100	0000	--		480	100/120	0.00	0.00	479.325	0.00	0.00	0.00
LPH100	EB003_A01	--		480	100/120	0.00	0.00	479.325	0.00	0.00	0.00
LPH100	00007	--		480	100/120	0.00	0.00	479.325	0.00	0.00	0.00
LPH100	EB003_A09	--		480	100/120	0.00	0.00	479.325	0.00	0.00	0.00
LPH100	EB003_C10	--		480	100/120	0.00	0.00	480.675	0.00	0.00	0.00
LPH100	EB003_C02	--		480	100/120	0.00	0.00	480.675	0.00	0.00	0.00
LPH100	EB003_C01	--		480	100/120	0.00	0.00	480.675	0.00	0.00	0.00
LPH100	00010	--		480	100/120	0.00	0.00	479.325	0.00	0.00	0.00
LPH100	EB003_A13	--		480	100/120	0.00	0.00	479.325	0.00	0.00	0.00
LPH100	0000	--		480	100/120	0.00	0.00	480.675	0.00	0.00	0.00
LPH100	0000	--		480	100/120	0.00	0.00	480.675	0.00	0.00	0.00
LPH100	EB003_A11	--		480	100/120	0.00	0.00	479.325	0.00	0.00	0.00
LPH100	0000	--		480	100/120	0.00	0.00	480.675	0.00	0.00	0.00

Parameter	Nominal	Meter-Feedback
AB Voltage	480	479.33
BC Voltage	480	479.33
CA Voltage	480	479.33
A Current	0	0
B Current	0	0
C Current	0	0
Power(KW)	0	0
Power(KVAR)	0	0
Power(KVA)	0	0
Frequency	60	60
Power Factor	NaN	0

Control State: Off

Blowers State: Off

Volt Mode: 480 240

Alarms: OK OK OK

Nickname:

Group Settings: Input Voltage: 480 Volts, Applied KW: 0 / ---, Applied KVAR: 0 / ---

Apply Switches: 5.00 kW, 10.00 kW, 10.00 kW, 25.00 kW, 50.00 kW

[In Local Mode]

Active/Capacity: 0 / 120 Amps, 0 / 100 kW, 0 / 0 kVAR

Total Loadbanks: 69 Individual

1. Power Values from Onboard Meter

2. Nicknames

Signals:

3. Alarms

4. Notification Bar

Switches:

5. Control State

6. Blowers State

7. Volt Mode

8. LoadBank Switches

1. Power Values from Onboard Meter

The load bank tab shows the status of the individual load banks connected. This is also where nicknames are set.

Parameter	Nominal	Meter-Feedback
AB Voltage	480	479.33
BC Voltage	480	479.33
CA Voltage	480	479.33
A Current	0	0
B Current	0	0
C Current	0	0
Power(KW)	0	0
Power(KVAR)	0	0
Power(KVA)	0	0
Frequency	60	60
Power Factor	NaN	0

2. Nickname

Click in the Nickname text box and a keyboard will pop up. Use the keyboard to type out the name and press Enter. The Nickname will appear on the LoadBank list.

Note that once the keyboard is on the screen, user will be able to use computer or laptop keyboard.

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Model	Serial#	Group	Nickname	Mode	Capacity KW/A	Applied(KW)	Applied(KVAR)	Avg Vrms	Avg I rms	Avg KW
LPH100	EB003_C12	--	LoadBank1	480	100/120	0.00	0.00	480.675	0.00	0.00
LPH100	A12	--	LoadBank2	480	100/120	0.00	0.00	480.675	0.00	0.00
LPH100	A13	--		480	100/120	0.00	0.00	480.675	0.00	0.00
LPH100	00008	--		480	100/120	0.00	0.00	480.675	0.00	0.00
LPH100	A09	--		480	100/120	0.00	0.00	479.325	0.00	0.00
LPH100	EB003_C11	--		480	100/120	0.00	0.00	480.675	0.00	0.00
LPH100	A04	--		480	100/120	0.00	0.00	480.675	0.00	0.00
LPH100	00007	--		480	100/120	0.00	0.00	480.675	0.00	0.00
LPH100	EB003_C10	--		480	100/120	0.00	0.00	479.325	0.00	0.00
LPH100	EB003_C02	--		480	100/120	0.00	0.00	479.325	0.00	0.00
LPH100	E					0.00	0.00	480.675	0.00	0.00
LPH100	E					0.00	0.00	480.675	0.00	0.00
LPH100	E					0.00	0.00	479.325	0.00	0.00
LPH100	E					0.00	0.00	480.675	0.00	0.00
LPH100	E					0.00	0.00	479.325	0.00	0.00
LPH100	E					0.00	0.00	480.675	0.00	0.00

Parameter Nominal Meter-Feedback

AB Voltage 480 480.67

BC Voltage 480 480.67

CA Voltage 480 480.67

A Current 0 0

B Current 0 0

C Current 0 0

Power(KW) 0 0

Power(KVAR) 0 0

Power(KVA) 0 0

Frequency 60 60

Power Factor NaN 0

State: Off On

LoadBank2

Group Settings

Input Voltage: 480 Volts

Applied KW: 0 / ---

Applied KVAR: 0 / ---

Apply Switches

Cancel

[In Local Mode]

Alarms

OK OK OK OK OK OK

Active/Capacity: 0 / 120 Amps 0 / 100 kW 0 / 0 kVAR

Total Loadbanks: 69 Individual

3. Alarms

Click on the alarm to popup a description.

If there is a problem a red exclamation sign will appear.



Model	Serial#	Group	Nickname	Mode	Capacity KW/A	Applied(KW)	Applied(KVAR)	Avg Vrms	Avg Irms	Avg KW
LPH100	EB003_C12	---	LoadBank1	480	100/120	0.00	0.00	479.325	0.00	0.00
LPH100	A12	---	LoadBank2	480	100/120	0.00	0.00	480.675	0.00	0.00
LPH100	A13	---	---	480	100/120	0.00	0.00	480.675	0.00	0.00
LPH100	00008	---	---	480	100/120	0.00	0.00	479.325	0.00	0.00
LPH100	A09	---	---	480	100/120	0.00	0.00	480.675	0.00	0.00
LPH100	FB003_C11	---	---	480	100/120	0.00	0.00	479.325	0.00	0.00
LPH100	A04	---	---	480	100/120	0.00	0.00	480.675	0.00	0.00
LPH100	00007	---	---	480	100/120	0.00	0.00	480.675	0.00	0.00
LPH100	EB003_C10	---	---	---	---	---	---	---	---	---
LPH100	EB003_C02	---	---	---	---	---	---	---	---	---
LPH100	EB003_C01	---	---	---	---	---	---	---	---	---
LPH100	00010	---	---	---	---	---	---	---	---	---
LPH100	EB003_C09	---	---	---	---	---	---	---	---	---
LPH100	EB003_C08	---	---	---	---	---	---	---	---	---
LPH100	00009	---	---	---	---	---	---	---	---	---
LPH100	EB003_C06	---	---	---	---	---	---	---	---	---

Parameter	Nominal	Meter Feedback
AB Voltage	480	479.33
BC Voltage	480	479.33
CA Voltage	480	479.33
A Current	0	0
B Current	0	0
C Current	0	0
Power(KW)	0	0
Power(KVAK)	0	0
Power(KVA)	0	0
Frequency	60	60
Power Factor	N/A	0

Alarm Information

Over Temperature:

OK

Volt Mode: 480

Alarms: [OK] [OK] [OK] [OK] [OK] [OK]

Active/Capacity:
0 / 120 Amps
0 / 100 kW
0 / 0 kVAR

Total Loadbanks: 69
Individual

4. Notification Box

This area gives “hints” to what is going to happen or a status that is needed.

Control State: Off

Off On

Nickname

Group Settings

Input Voltage: 480 Volts

Applied KW: 0 / ---

Applied KVAR: 0 / ---

Apply Switches

Cancel

5.00 kW 10.00 kW 10.00 kW 25.00 kW 50.00 kW

[In Local Mode]

Active/Capacity:
0 / 120 Amps
0 / 100 kW
0 / 0 kVAR

Total Loadbanks: 69
Individual

Blowers State: -?-

Off On

Volt Mode

480 240

Alarms

[OK] [OK] [OK] [OK] [OK] [OK]

Control State: On

Off On

Nickname

Group Settings

Input Voltage: 480 Volts

Applied KW: 0 / ---

Applied KVAR: 0 / ---

Apply Switches

Cancel

5.00 kW 10.00 kW 10.00 kW 25.00 kW 50.00 kW

[Need Blowers]

Active/Capacity:
0 / 120 Amps
0 / 100 kW
0 / 0 kVAR

Total Loadbanks: 69
Individual

Blowers State: Off

Off On

Volt Mode

480 240

Alarms

[OK] [OK] [OK] [OK] [OK] [OK]

5. Control State

Enters Remote Mode which disables local control of LoadBank, thereby making the software/tablet combination the only control system

6. Blowers State

Turns fans on the LoadBank

7. Voltage Mode Controls (LoadBank dependant)

Be sure not to use 240V Volt Mode with an input voltage over 250Vrms.

Software will attempt to block this with warnings and Group settings will lock this as well.



Model	Serial#	Group	Nickname	Mode	Capacity KW/A	Applied(KW)	Applied(KVAR)	Avg Vrms	Avg Irms	Avg KW
LPH100	EB003_C12	--	LoadBank1	480	100/120	65.00	0.00	479.325	78.073	64.817
LPH100	A12	--	LoadBank2	480	100/120	0.00	0.00	479.325	0.00	0.00
LPH100	A13	--		480	100/120	0.00	0.00	479.325	0.00	0.00
LPH100	00008	--		480	100/120	0.00	0.00	480.675	0.00	0.00
LPH100	A09	--		480	100/120	0.00	0.00	479.325	0.00	0.00
LPH100	EB003_C11	--		480	100/120	0.00	0.00	479.325	0.00	0.00
LPH100	A04	--		480	100/120	0.00	0.00	479.325	0.00	0.00
LPH100	00007	--		480	100/120	0.00	0.00	480.675	0.00	0.00
LPH100	EB003_C10	--		480	100/120	0.00	0.00	479.325	0.00	0.00
LPH100	EB003_C02	--		480	100/120	0.00	0.00	479.325	0.00	0.00
LPH100	EB003_C01	--		480	100/120	0.00	0.00	480.675	0.00	0.00
LPH100	00010	--		480	100/120	0.00	0.00	480.675	0.00	0.00
LPH100	EB003_C09	--		480	100/120	0.00	0.00	479.325	0.00	0.00
LPH100	EB003_C08	--		480	100/120	0.00	0.00	479.325	0.00	0.00
LPH100	00009	--		480	100/120	0.00	0.00	480.675	0.00	0.00
LPH100	EB003_C06	--		480	100/120	0.00	0.00	479.325	0.00	0.00

Parameter	Nominal	Meter-Feedback
AB Voltage	480	479.33
BC Voltage	480	479.33
CA Voltage	480	479.33
A Current	0	0
B Current	0	0
C Current	0	0
Power(KW)	0	0
Power(KVAR)	0	0
Power(KVA)	0	0
Frequency	60	60
Power Factor	NaN	0

Control State: On

Blowers State: On

Volt Mode: 480 240

Nickname: LoadBank2
Group Settings:
Input Voltage: 480 Volts
Applied KW: 0 / ---
Applied KVAR: 0 / ---

5.00 kW 10.00 kW 10.00 kW 25.00 kW 50.00 kW

Hit "Apply Switches" to accept.
Will make: (42Amps) [35.00 kW]

Alarms: OK OK

Active/Capacity:
0 / 120 Amps
0 / 100 kW
0 / 0 kVAR
Total Loadbanks: 69
Individual

8. Load Switches

Apply a specific load amount to individual load bank.

- Steps to apply load:
1. Select to highlight a load bank from the list
 2. Switch **Control State** (on)
 3. Start **Blowers** (on)
 4. Click kW values to add to queue (indicated in pink)
 5. Check the total stated value that will be applied (indicated in blue)
 6. Click **Apply Switches**

Model	Serial#	Group	Nickname	Mode	Capacity KW/A	Applied(KW)	Ap
LPH100	EB003_C12	--	LoadBank1	480	100/120	65.00	
LPH100	A12	--	LoadBank2	480	100/120	0.00	

Once the load is applied it will show up on the list in this spot.

Groups Tab

Description:

The Groups tab is designed to link LoadBanks into groups and remotely control them as a single unit.

How to Use Tab Summary:

- Create Groups
- Add specific LoadBanks or add all LoadBanks to created group
- Change Group Setting to put kW or kVAR max in place
- Pick and Apply Load

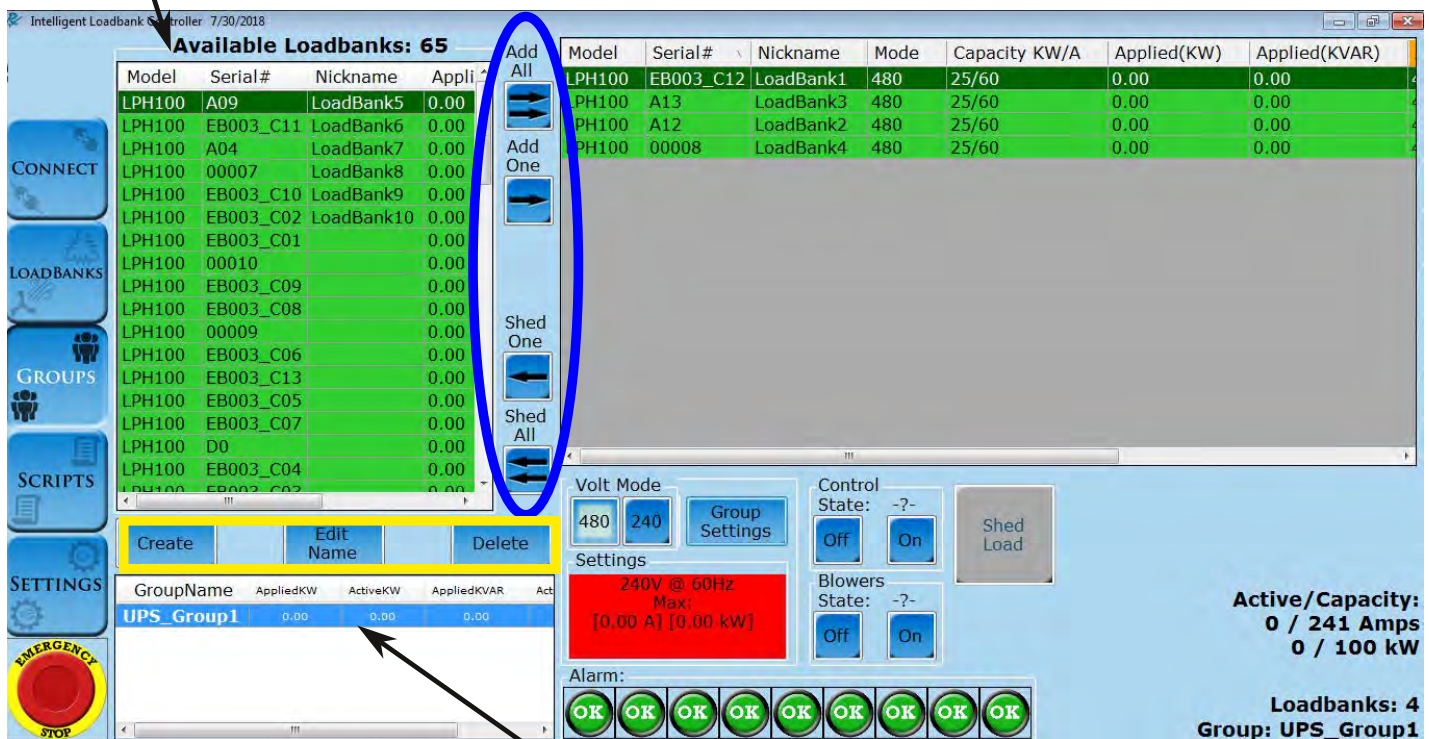
Note: Changing units in a group will cause all units to shed their load

Available LoadBanks:

These are all of the LoadBanks communicating. For available LoadBanks to appear here they need to:

- 1.) Not be indicated as red in Loadbanks tab or Connect tab
- 2.) Not currently be in another group

Add All: Takes all available load banks and adds to highlighted group.
Add One: Takes highlighted unit from Available and puts in highlighted group.
Shed One: Removes highlighted loadbank from group and puts in Available.
Shed All: Clears all loadbanks out of group and makes them Available for other groups.

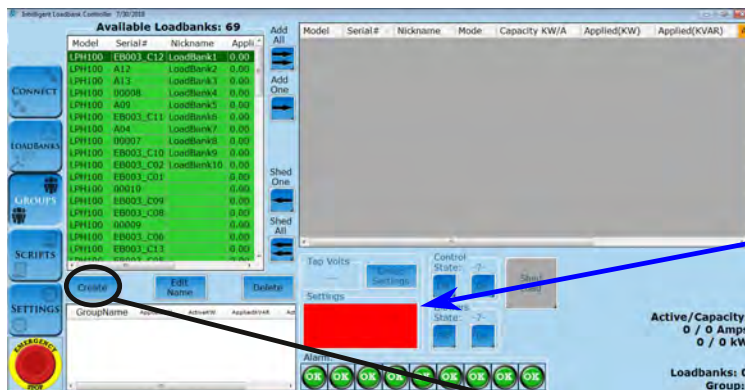


Highlight the group to add and subtract loadbanks.

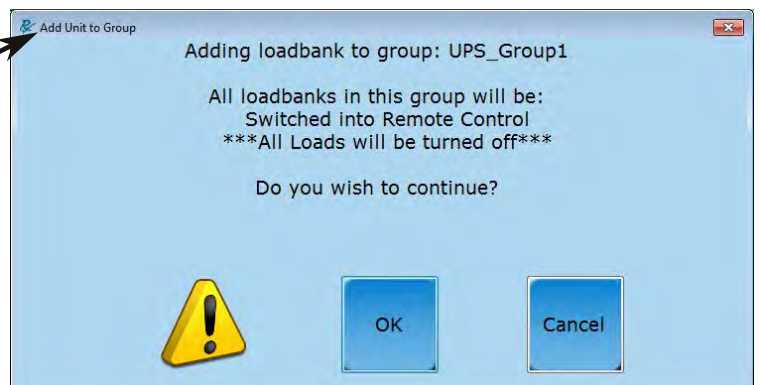
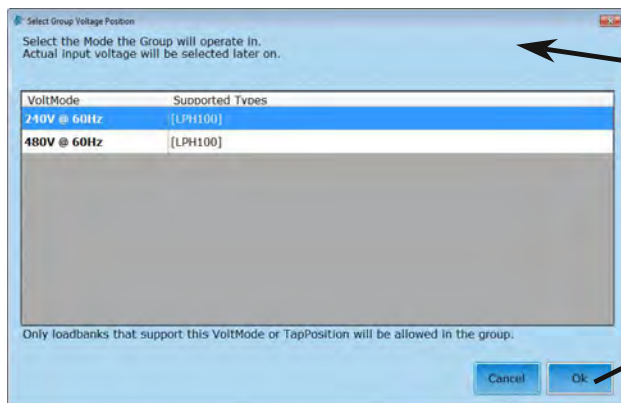
Create: Will start a new group.
Edit Name: Edit currently highlighted group name.
Delete: Removes highlighted group and make loadbank available for other groups.

1. Create a new group

- Default name will be Temp0
- Delete and type in the New Group Name using the keyboard on screen or the one with your computer/laptop/tablet
- Select the Mode the Group will operate in
 - Note: actual input voltage will be selected later
- Next a pop-up reminds the user all LoadBanks added to the Group will be switched into Remote Control mode and the loads will be shut off
- Click OK



This area is **red** to indicate either the Group Settings have not been set or there is an issue with the settings that needs to be addressed.



2. Highlight a Group from list of Groups in the lower left corner (indicated in pink)
 - The name of the Group selected will be displayed in the right bottom corner (pink star)
3. Press **Add All** to add all available LoadBanks on the network to the Group or select a single LoadBank from the list on the left and press **Add One** (indicated in yellow)
 - The number of LoadBanks in the Group will be displayed in the right bottom corner (yellow star)
4. Press **Shed All** to remove all LoadBanks from the Group or select a single LoadBank from the list on the right and press **Shed One** to remove (indicated in blue)

Note if the LoadBanks within a Group are changed then all applied loads in the Group will be **shed**

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Available Loadbanks: 5

Model	Serial#	Nickname	Applied(KW)
PH100	EB003_C01		0.00
LPH100	00010		0.00
LPH100	EB003_C09		0.00
LPH100	EB003_C08		0.00
LPH100	00009		0.00
LPH100	EB003_C06		0.00
LPH100	EB003_C13		0.00
LPH100	EB003_C05		0.00
LPH100	EB003_C07		0.00
LPH100	D0		0.00
LPH100	EB003_C04		0.00
LPH100	EB003_C03		0.00
LPH100	0000		0.00
LPH100	0000		0.00
LPH100	0000		0.00
LPH100	0000		0.00
LPH100	0000		0.00
LPH100	0000		0.00

Current Loadbanks:

Model	Serial#	Nickname	Mode	Capacity KW/A	Applied(KW)	Applied(KVAR)
PH100	EB003_C11	LoadBank6	480	100/120	0.00	0.00
PH100	EB003_C10	LoadBank9	480	100/120	0.00	0.00
PH100	EB003_C02	LoadBank10	480	100/120	0.00	0.00
LPH100	A09	LoadBank5	480	100/120	0.00	0.00
PH100	A04	LoadBank7	480	100/120	0.00	0.00
PH100	00007	LoadBank8	480	100/120	0.00	0.00

GROUPS

GroupName	AppliedKW	ActiveKW	AppliedKVAR
UPS_Group1	0.00	0.00	0.00
UPS_Group2	0.00	0.00	0.00

Settings

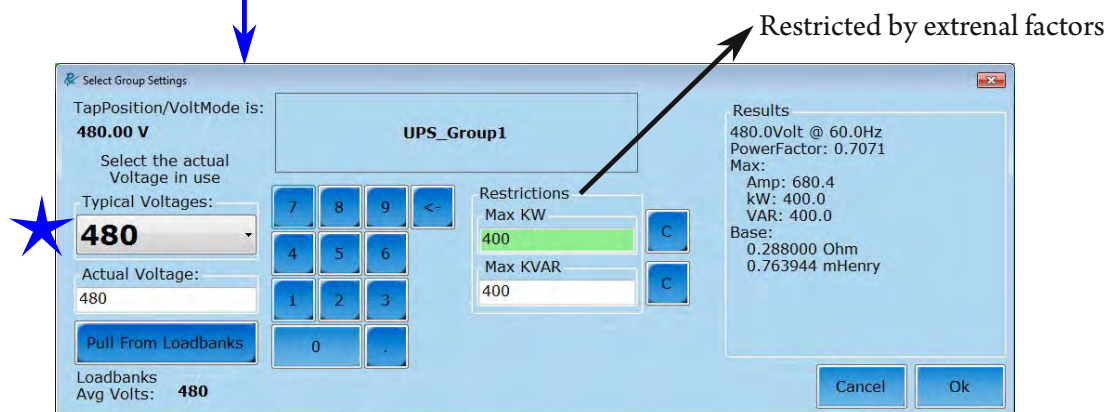
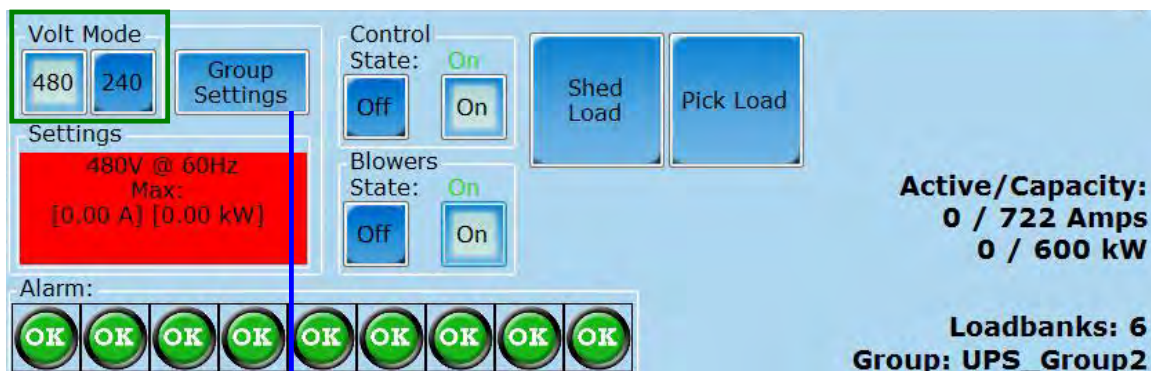
480V @ 60Hz
Max:
[0.00 A] [0.00 kW]

Active/Capacity:
0 / 722 Amps
0 / 600 kW

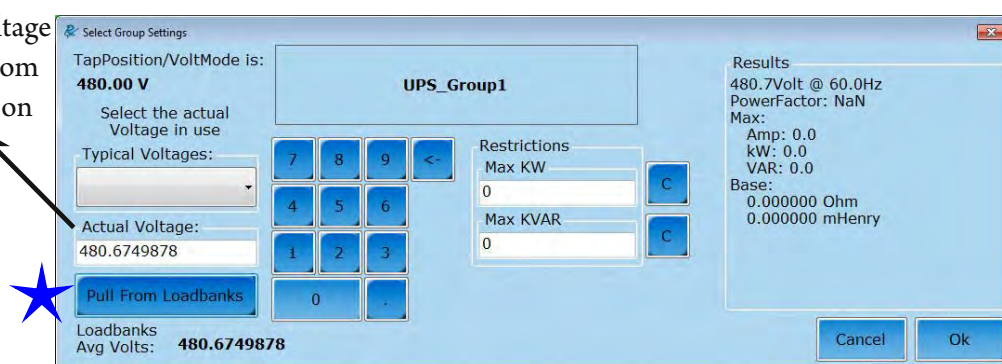
Loadbanks: 6
Group: UPS_Group2

This area is red to indicate either the Group Settings have not been set or there is an issue with the settings that needs to be addressed.

6. Highlight GroupName to apply load from list of groups
7. Select **Voltage Mode**, which is LoadBank specific (indicated in green)
 - Changing **Volt Mode** will shed all load in Group
8. Click **Group Settings** (indicated in blue)
 - Select the Typical Voltages from the drop down menu or Click Pull From Loadbanks to grab actual voltage
 - Fill out the Restrictions section for safety measures by entering **Max kW** and/or **Max kVAR**
 - Max kVAR is optional, but Max kW must be filled out



The Actual Voltage is an average from all LoadBanks on board meter



9. Enable **Control (On)**

10. Enable **Blowers (On)**

Notice this area is no longer red after inputting Group Settings

11. Click **Pick Load**

- Use **percentage buttons** on the left or the key pad on the right to enter % **Max kW** (this percentage entered will be the percentage of kW Max set in Group Settings)
--OR--
- Use key pad on the right to enter with **Target kW** or **Target Amps**
- If Max kVAR is entered in Group Settings then to load by Reactive kVAR or Power Factor will be available

Group Settings **without** kVAR Max input

Field	Target	Actual	GroupMax	Capacity
PF	1.0	1.0		
AMPS	120.3	120.3	481.1	481.1
kVA	100.0	100.0	400.0	400.0
kW	100.0	100.0	400.0	400.0
kVAR	0.0	0.0	0.0	0.0

UPS_Group1
Tap: 480.00 V@60.00 Hz
Input: 480.00 V@60.00 Hz

Group Settings **with** kVAR Max input

Field	Target	Actual	GroupMax	Capacity
PF	1.0	1.0		
AMPS	451.1	451.1	850.5	721.7
kVA	375.0	375.0	707.1	600.0
kW	375.0	375.0	500.0	600.0
kVAR	0.0	0.0	500.0	0.0

UPS_Group2
Tap: 480.00 V@60.00 Hz
Input: 480.00 V@60.00 Hz

12. Click **Apply Load**

After load is applied, total active kW is shown here.

Max kW is set at 400kW. Target set at 25% of Max kW. Group UPS_Group1 uses 4 loadbanks.
Reminder: the % of Max kW calculates the percentage of the max kW set in Group Settings

Model	Serial#	Nickname	Mode	Capacity KW/A	Applied(KW)	Applied(KVAR)
LPH100	EB003_C12	LoadBank1	480	100/120	25.00	0.00
LPH100	A13	LoadBank3	480	100/120	25.00	0.00
LPH100	A12	LoadBank2	480	100/120	25.00	0.00
LPH100	00008	LoadBank4	480	100/120	25.00	0.00

Active/Capacity:
120 / 481 Amps
100 / 400 kW

Loadbanks: 4
Group: UPS_Group1

UPS_Group1 Settings:
Tap: 480.00 V @ 60.00 Hz
Input: 480.00 V @ 60.00 Hz

Results:

Field	Target	Actual	GroupMax	Capacity
PH	1.0	1.0		
AMPS	120.3	120.3	481.1	481.1
kVA	100.0	100.0	400.0	400.0
kW	100.0	100.0	400.0	400.0
kVAR	0.0	0.0	0.0	0.0

Max kW is set at 500kW. Target set at 75% of Max kW. Group UPS_Group2 uses 6 loadbanks.

Model	Serial#	Nickname	Mode	Capacity KW/A	Applied(KW)	Applied(KVAR)
LPH100	EB003_C11	LoadBank6	480	100/120	75.00	0.00
LPH100	EB003_C10	LoadBank9	480	100/120	60.00	0.00
LPH100	EB003_C02	LoadBank10	480	100/120	60.00	0.00
LPH100	A09	LoadBank5	480	100/120	60.00	0.00
LPH100	A04	LoadBank7	480	100/120	60.00	0.00
LPH100	00007	LoadBank8	480	100/120	60.00	0.00

Active/Capacity:
451 / 722 Amps
375 / 600 kW

Loadbanks: 6
Group: UPS_Group2

UPS_Group2 Settings:
Tap: 480.00 V @ 60.00 Hz
Input: 480.00 V @ 60.00 Hz

Results:

Field	Target	Actual	GroupMax	Capacity
PH	1.0	1.0		
AMPS	451.1	451.1	850.5	721.7
kVA	375.0	375.0	707.1	600.0
kW	375.0	375.0	500.0	600.0
kVAR	0.0	0.0	500.0	0.0

Setting a target in the group mode uses four settings to calculate the total load applied to each of the Load Banks in the group:

- Max KW :** Uses this as the baseline for the total KW the group can use.
- Input Voltage :** Select the RMS voltage that the resisters will see (480V, 415, 240, 208)
- Voltage Mode :** Some units have 240/480 resistance, it applies this.
- Target % / Target KW / Target Amp :** The number the interface is aiming for taking in the above variables.

The algorithm for sharing is simple. It is a two step process ;

1. Take all available load banks and evenly distribute load across them.
2. Any left over load that needs to be added gets placed to the first available load bank till the KW is satisfied.
(If possible)

Example 1:

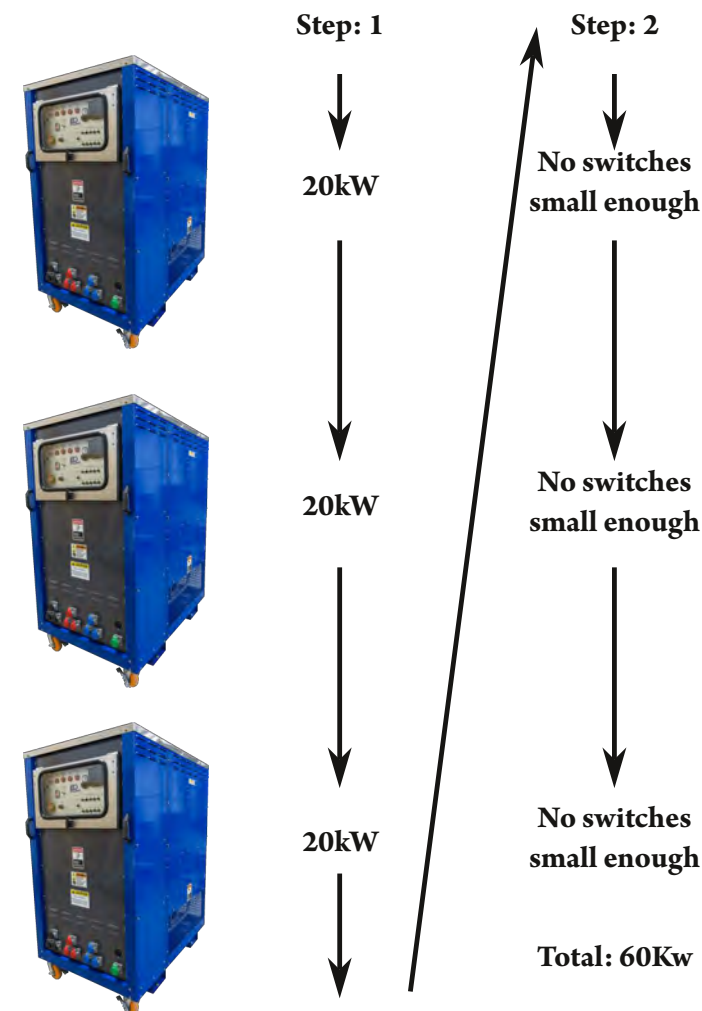
MaxKW setting = 250

Input Voltage = 480

Voltage Mode = 480

Target = 25%

Calculated target = 62.5kW (78.18A)



Example 2:

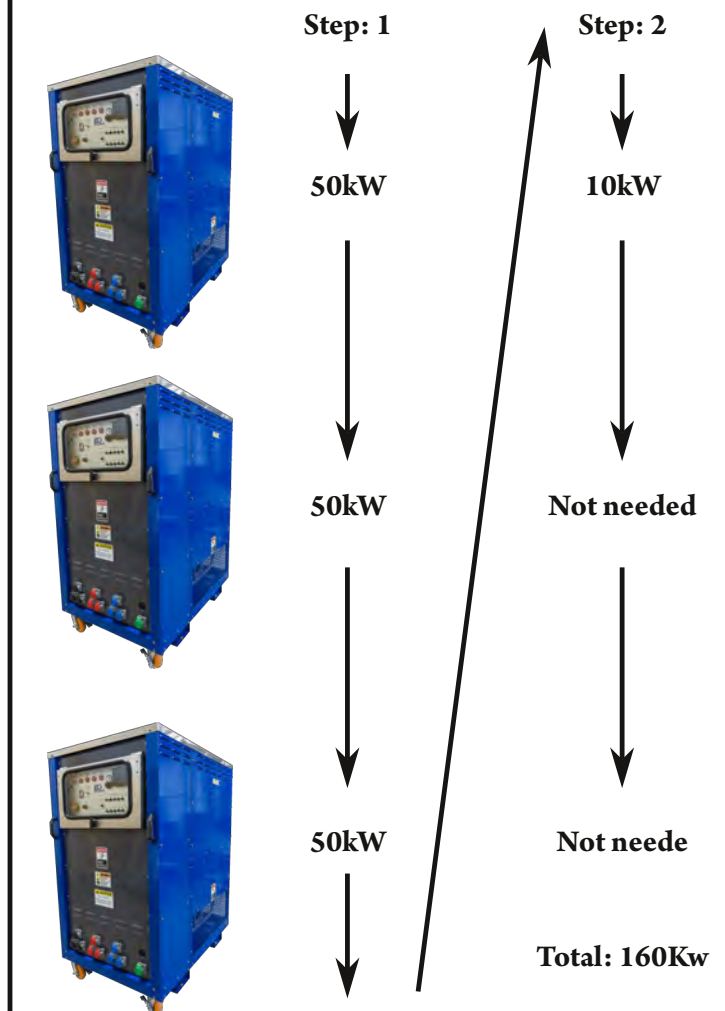
MaxKW setting = 300

Input Voltage = 480

Voltage Mode = 480

Target = 53%

Calculated target = 160kW (193A)



Example 3:

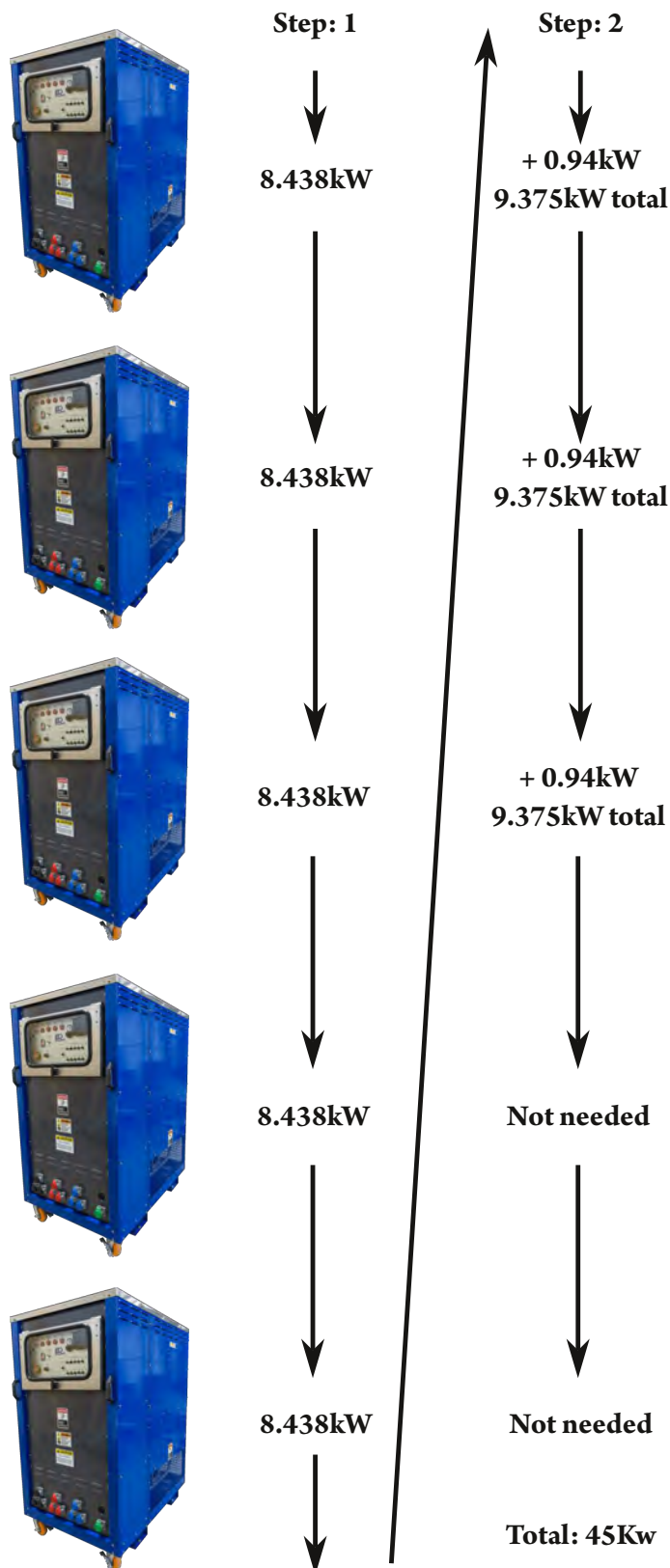
MaxKW setting = 98

Input Voltage = 208

Voltage Mode = 480

Target = 45kW

Calculated target = 45kW (125A)



Example 4:

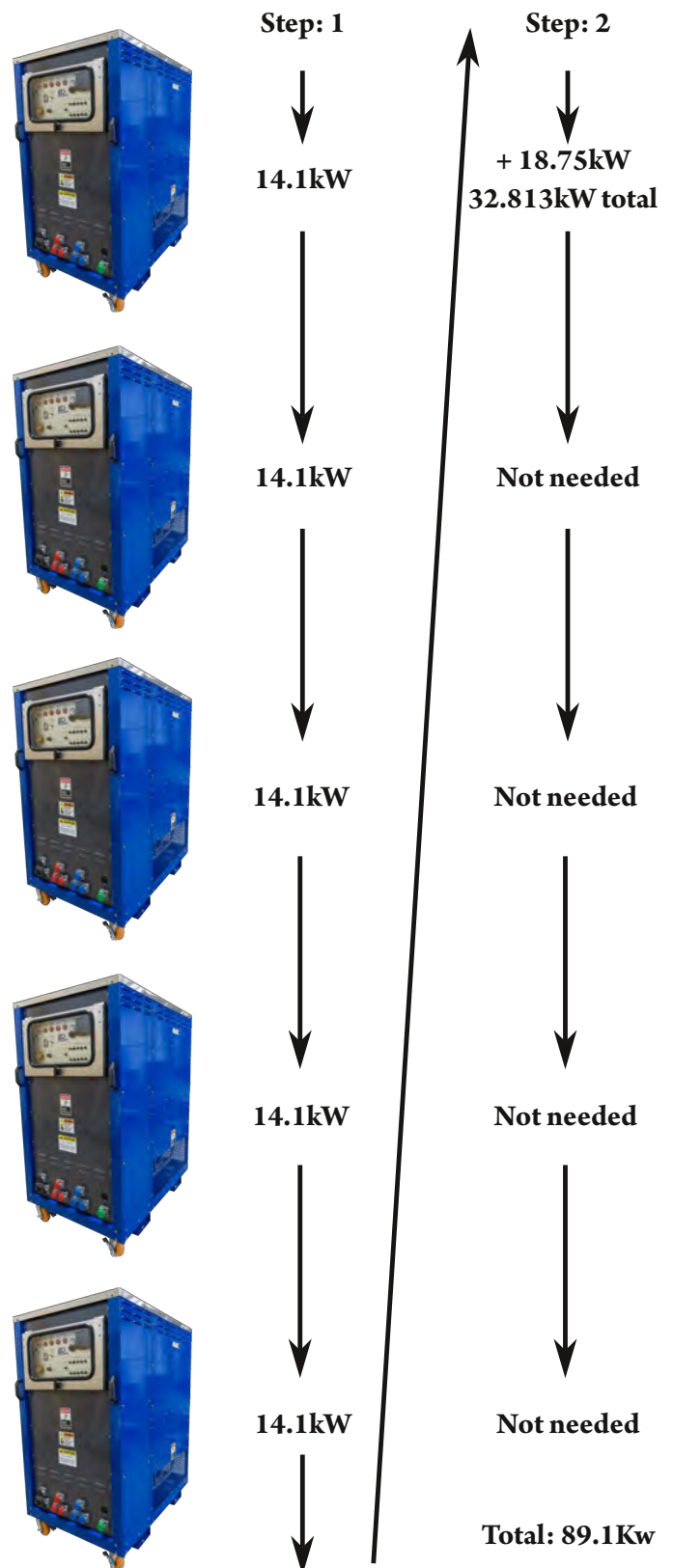
MaxKW setting = 144 (400A)

Input Voltage = 208

Voltage Mode = 240

Target = 250A

Calculated target = 90kW (250A)



Scripts Tab

Description:

To control multiple groups with a time slice for each step

How to Use Tab Summary:

- Create a New Step
- Set Duration in the top right of the screen for seconds step should occur
- Highlight Group under Step Settings
- Pick Load for Highlighted Group
- If multiple groups, Pick Load for each group separately or hit Copy Power to All Groups
- Add next step by hitting New Step or Copy Step buttons
- Continue process until entire Script is written
- Select starting Step and hit Start @ Highlighted Step
- Script will continue until completed or the Stop Script button is hit
- Save Script for future use

NOTE: Groups that are not ready for load (IE not in remote mode, Alarms or blower off) Will not be taken into account when setting loads in step.

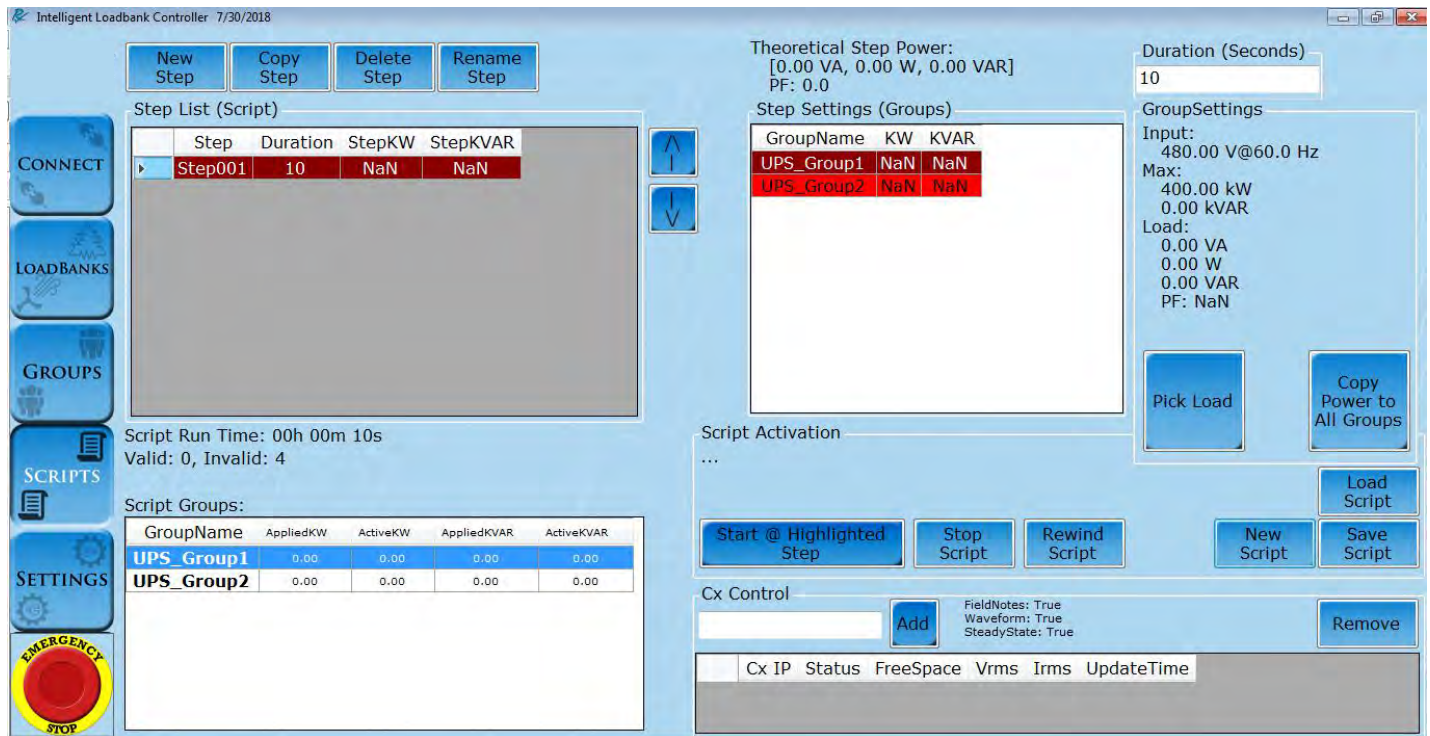
The screenshot shows the 'Scripts Tab' of the Intelligent Load Bank Controller. The interface includes a sidebar with buttons for CONNECT, LOADBANKS, GROUPS, SCRIPTS, SETTINGS, and an EMERGENCY STOP button. The main area is divided into several sections:

- Top Left:** Buttons for 'New Step', 'Copy Step', 'Delete Step', and 'Rename Step'.
- Top Center:** 'Step List (Script)' table with columns: Step, Duration, StepKW, StepKVAR.
- Top Right:** 'Step Settings (Groups)' table with columns: GroupName, KW, KVAR.
- Bottom Left:** 'Script Groups' table showing active loads for 'UPS_Group1' and 'UPS_Group2'.
- Bottom Center:** 'Script Activation' section with buttons: 'Start @ Highlighted Step', 'Stop Script', and 'Rewind Script'.
- Bottom Right:** 'GroupSettings' section with buttons: 'Pick Load', 'Copy Power to All Groups', 'Load Script', 'New Script', and 'Save Script'.

Annotations with arrows point to specific features:

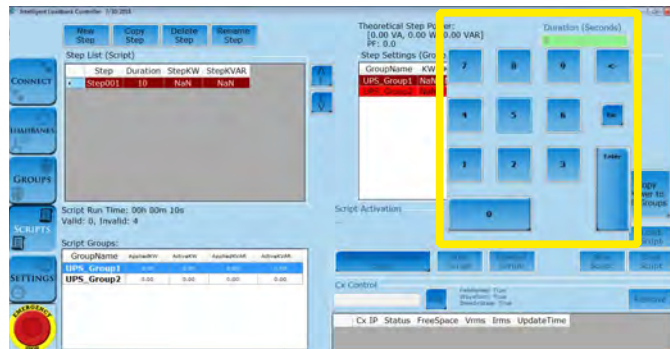
- Start script writingprocess here:** Points to the 'New Step' button.
- Groups to add Load will show here:** Points to the 'Step Settings (Groups)' table.
- Change Duration for each step here:** Points to the 'Duration (Seconds)' field.
- All groups active load show here:** Points to the 'Script Groups' table.
- New Script: Load Script: Save Script:** Points to the 'New Script', 'Load Script', and 'Save Script' buttons (circled in yellow).
- Restarts Step List. Load saved script. Save script for future use.** Points to the 'New Script' and 'Save Script' buttons.

Groups will show up in the Step Settings as red until the load for each group is picked.

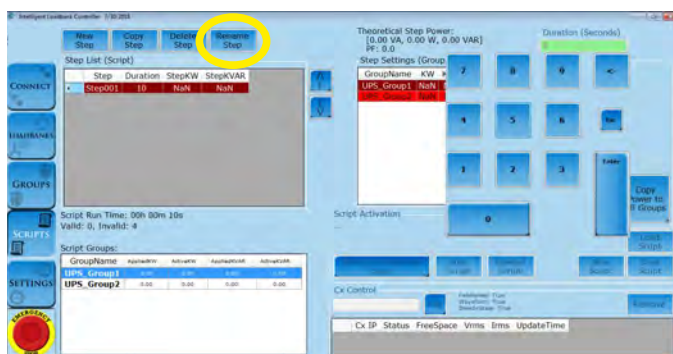


Set Duration

Press Duration text box use key pad to set duration between 1-600 seconds.



Rename Step



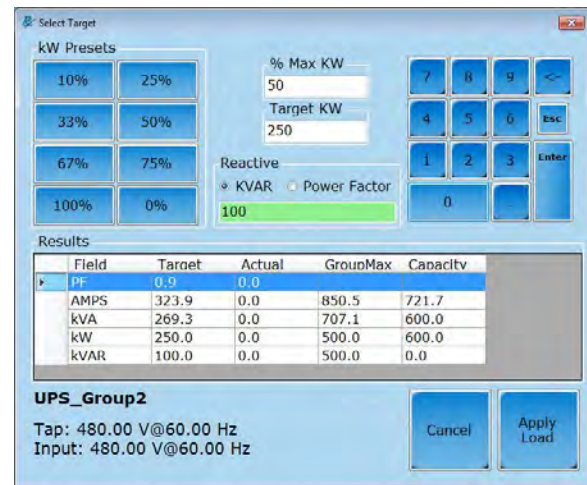
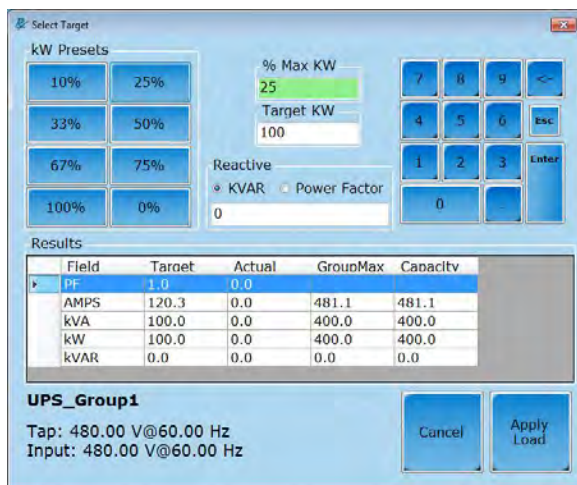
Click the Rename Step button, type new step name, and press enter.



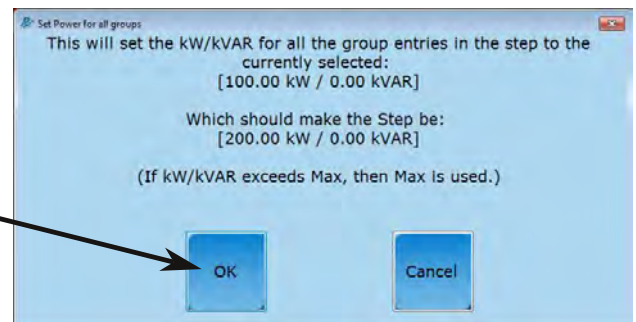
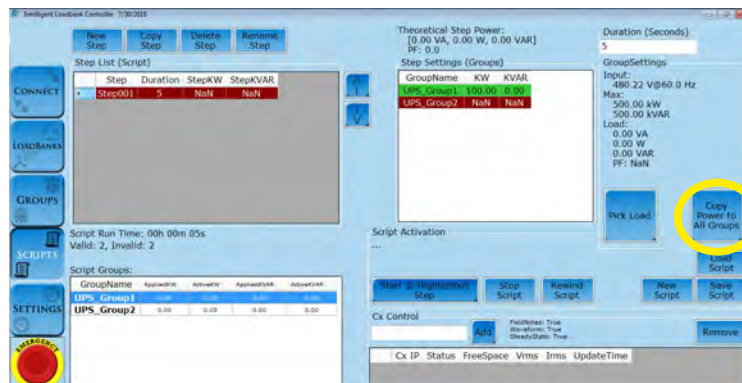
Highlight Group for the Step Settings and click Pick Load



Set % Max KW (based on Group Settings in Groups tab) or Target KW.
Or if Group Settings uses Max KVAR then user can enter a Reactive KVAR or Power Factor.



Instead of picking a load for Group 2, another option is to use the Copy Power to All Groups.



Groups that are not ready for load - not in remote mode, Alarms or blower off - will not be taken into account when setting load in a step.

If not getting expected load go to group mode and ensure units are all in working order.

Highlight:

This changes right area to selected step

Reorder:

Push highlighted step up or down

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New Step Copy Step Delete Step Rename Step

Step List (Script)

Step	Duration	StepKW	StepKVAR
Step001	5	400.00	0.00
Step002	2	100.00	0.00
Step003	1	132.00	0.00
Step004	2	0.00	0.00
Step005	2	300.00	0.00
Step006	5	350.00	500.00
Step007	2	268.00	0.00
Step008	3	400.00	0.00
Step009	2	125.00	0.00
Step010	2	250.00	100.00
Step011	5	0.00	0.00

Theoretical Step Power:
[610.33 kVA, 350.00 kW, 500.00 kVAR]
PF: 0.57

Step Settings (Groups)

GroupName	KW	KVAR
UPS_Group1	100.00	0.00
UPS_Group2	250.00	500.00

Duration (Seconds)
5

GroupSettings
Input:
480.00 V@60.0 Hz
Max:
400.00 kW
0.00 kVAR
Load:
100.00 kVA
100.00 kW
0.00 VAR
PF: 1.0

Script Run Time: 00h 00m 31s
Valid: 44, Invalid: 0

Script Groups:

GroupName	AppliedKW	ActiveKW	AppliedKVAR	ActiveKVAR
UPS_Group1	100.00	100.00	0.00	0.00
UPS_Group2	240.23	239.78	0.00	0.00

Script Activation
8/24/2018 3:08:34 PM :: [16]Step006 for [350.00] lasting 5s

Start on highlighted Step Stop Script Rewind Script

Pick Load Copy Power to All Groups Load Script New Script Save Script

CONNECT LOADBANKS GROUPS SCRIPTS SETTINGS EMERGENCY STOP

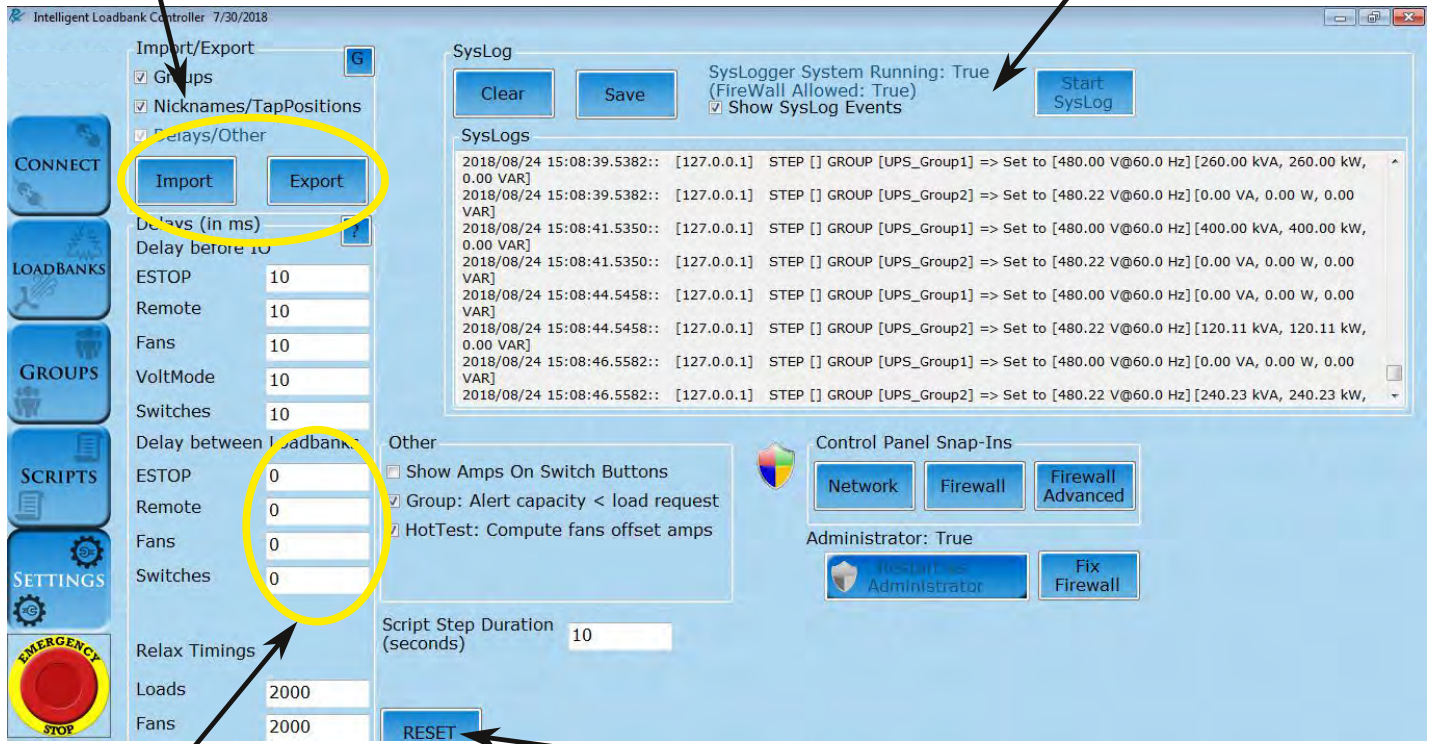
Play symbol appears
when script is running

Start: Start on highlighted Step
Stop: Stop current running script
Rewind: Bring highlight to top step

Settings Tab

Import/Export: Makes it easy to switch computers or tablets keeping groups/ nicknames and settings.

Syslog: Running log of all activities performed (more on next page)



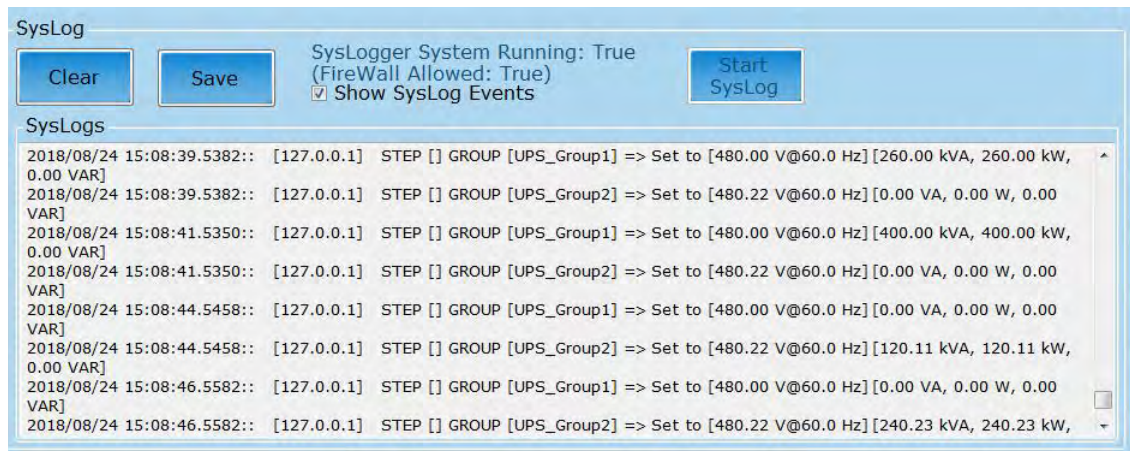
Reset: Sets all setting to default

Delay between load banks: Use this to soft load a system gives the ability to slowly start and remove loads. Adds delays between commands to load banks. In Milliseconds up to 6000 (6 seconds)

Other: Miscellaneous options that can be changed based on user preference.

Relax Timings: Set how long the loadbanks take to relax.

The Syslog keeps a running record of all communication from the Load Bank Software to the LoadBanks. The log timestamps the commands so the user can save their testing log and can be used in debugging issues with connectivity occur.



The Syslog can be saved as a text document to any device (pictured below).

Please note that if the log is not saved before logging out, it will be cleared and cannot be recovered.

The log shows events in two different ways.

Events about connectivity, firmware updates, and alarms:

Date / Time / Connection IP Address / Event that occurred

Events derived from user commands:

Date / Time / Software IP Address / Tab Event Derived / LB Name or Group Name / LoadBank Settings / Actual load applied

