LB-View User Manual

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WARNING

The TCP protocol is inherently unsecure and therefore should be used with care to avoid sensitive information disclosure and unauthorized access. To mitigate the risks associated with weaknesses in the Modbus/TCP protocol, users should set up network segmentation and implement a firewall to block all unauthorized access.

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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 volrage or current

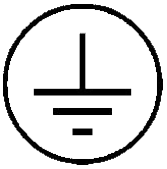
This symbol indicates DC only voltage or current

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.

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WARNING

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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Introduction

LBView and the Rx controller 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 Rx controller or Wireless Gateway will be referred more simply as “LoadBank”.

Some of the key features:

- **Software runs on any Windows 11 PC as well as tablets**
- **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**
- **Supports Avtron Wireless Gateway**

Minimum PC requirements:
Win 11/10
i3-8130 CPU
4Gbytes Ram
20Mbytes Hard Disk
100Mbyte for supporting Logging
WiFi or ethernet port
Display: 1920x1080

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LB-View / Rx Contoller Components

Software running on tablet or Laptop

Win 11/10
N5100 or i3-8130 CPU
4Gbytes Ram
20Mbytes Hard Disk
100Mbyte for supporting Logging
WiFi or ethernet port
Display: 1920x1080

UPS: Use for best uninterrupted connection

Power both router
and laptop / tablet

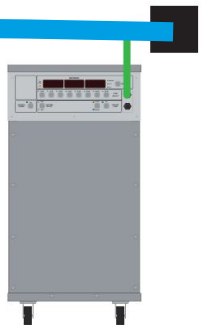
LoadBanks:
Up to 250 load banks though the wired switch network
See Next page for structure

Ethernet Wi-Fi Router:
Using DHCP

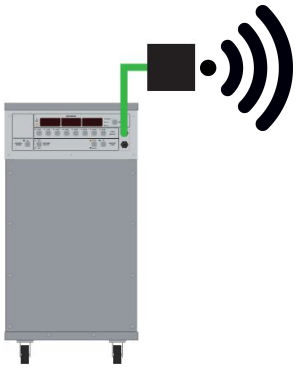
Avtron Sigma wireless gateway
Connected by ethernet cord

Standard Ethernet Switch

Ethernet Cables: Up to 200 Ft



Avtron Sigma wireless gateway
Connected by wireless to router
Limit to 15 wireless devices.



Legend

Avtron SIGMA
CANbus Cable

Avtron SIGMA
WIreless Gateway

CAT5 Ethernet

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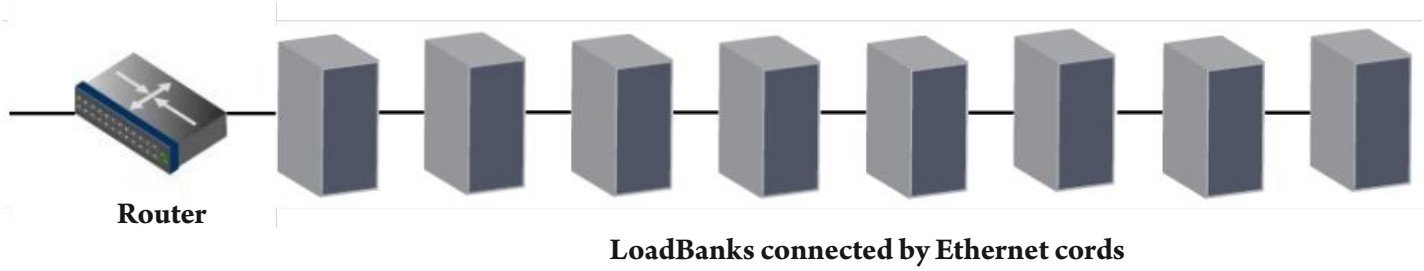
Load Bank Networking

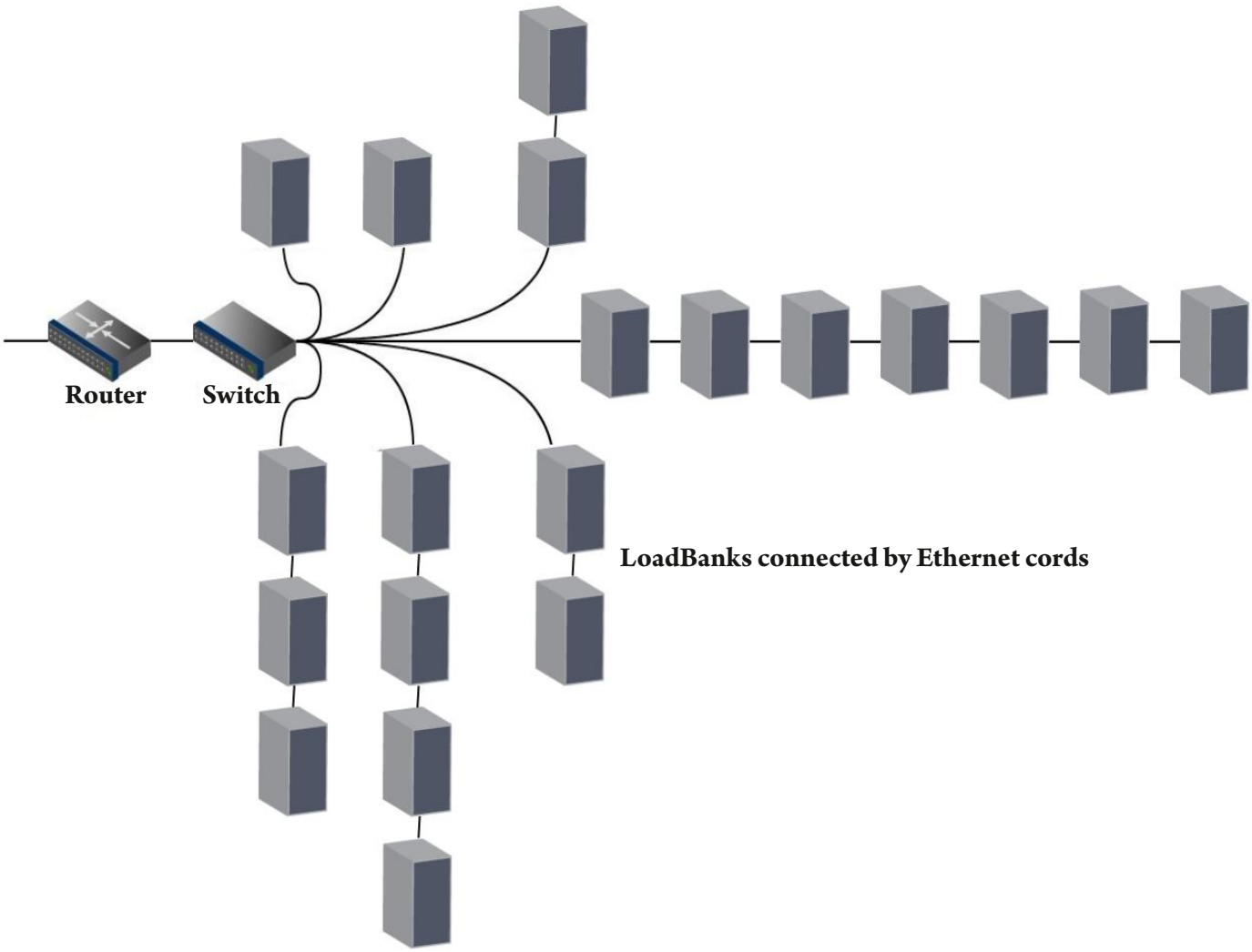
LoadBanks communicate with each other using standard Ethernet cords, which can be up to 200 feet.

- Each LoadBank with iLB will have a panel with two Ethernet ports - In and Out.
- Loadbanks using Sigma Wireless gateway will need to connect to ethernet switch or wireless
- Hook up the Router by Ethernet cord from the LAN port (see next page) to the In port on the first LoadBank or ethernet switch.



Best practice to avoid latency is to not connect *more than 1*0 LoadBanks to one chain.

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



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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.

2. Plug USB into 120V converter then into UPS.

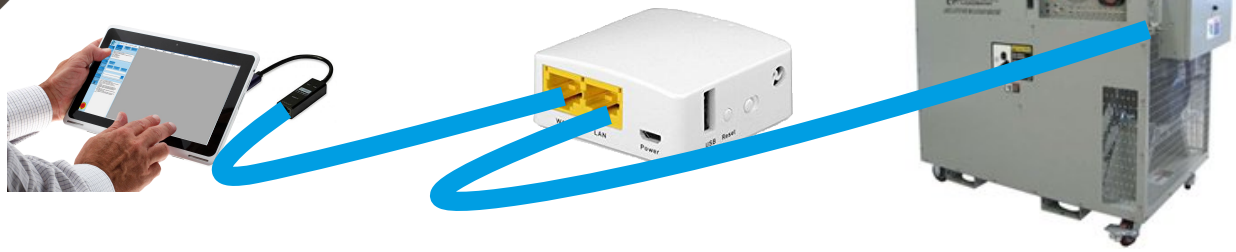
3. Plug micro USB into router.

4. Plug Ethernet into USB converter then into Tablet.

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

<u>This takes about 30-40 seconds after power is applied.</u>

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 loadbank connections (see previous page)

8. Power Up LoadBanks, all LED lights on LoadBanks should blink

9. Start Intelligent Load Bank Software

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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.

2. Plug USB into 120V converter then into UPS.

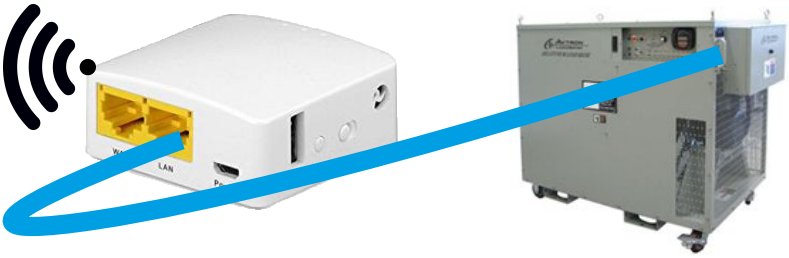
3. Plug micro USB into router.

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.

<u>This takes about 30-40 seconds after power is applied.</u>

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.

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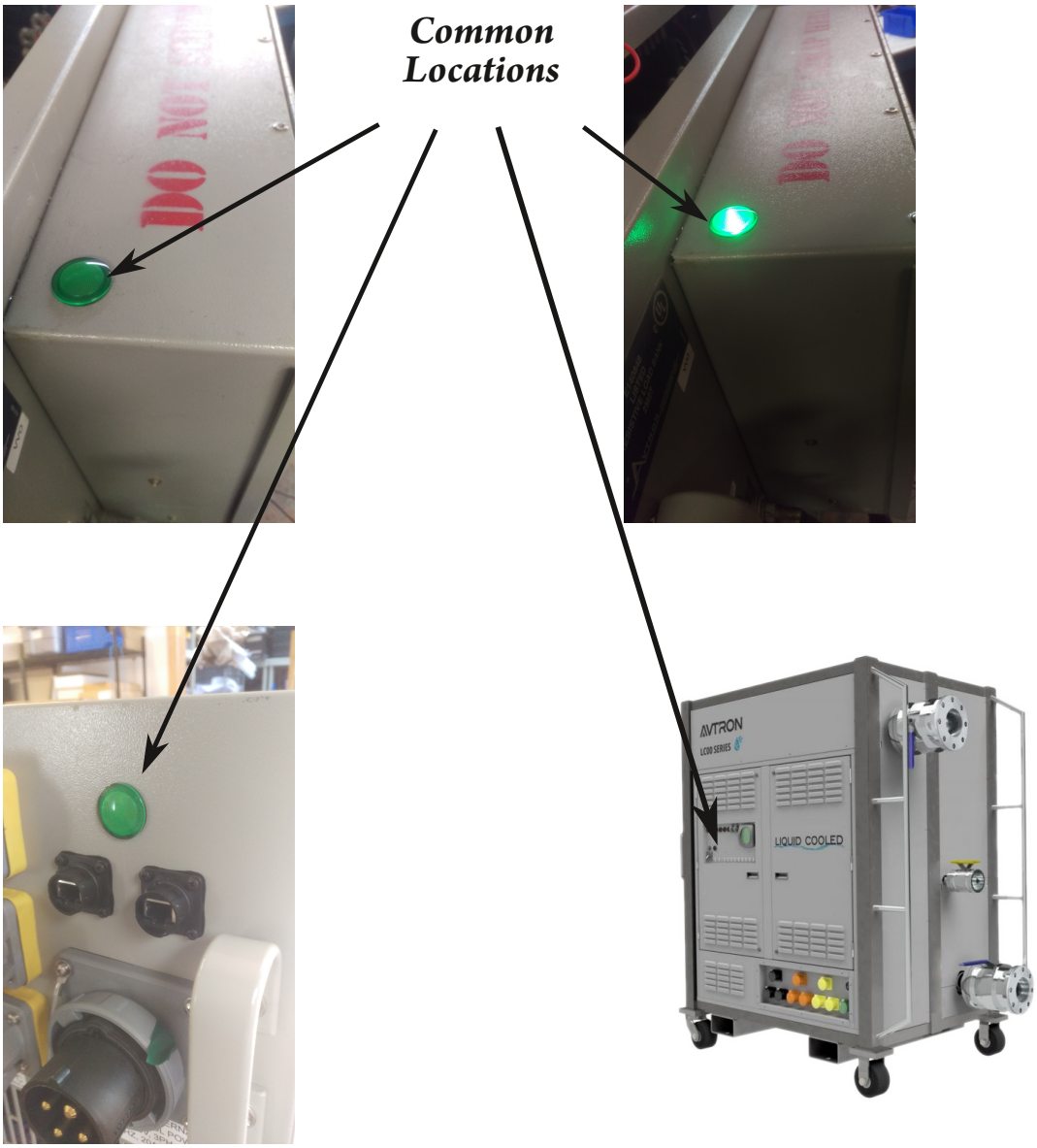
LoadBank "Remote" LED

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.



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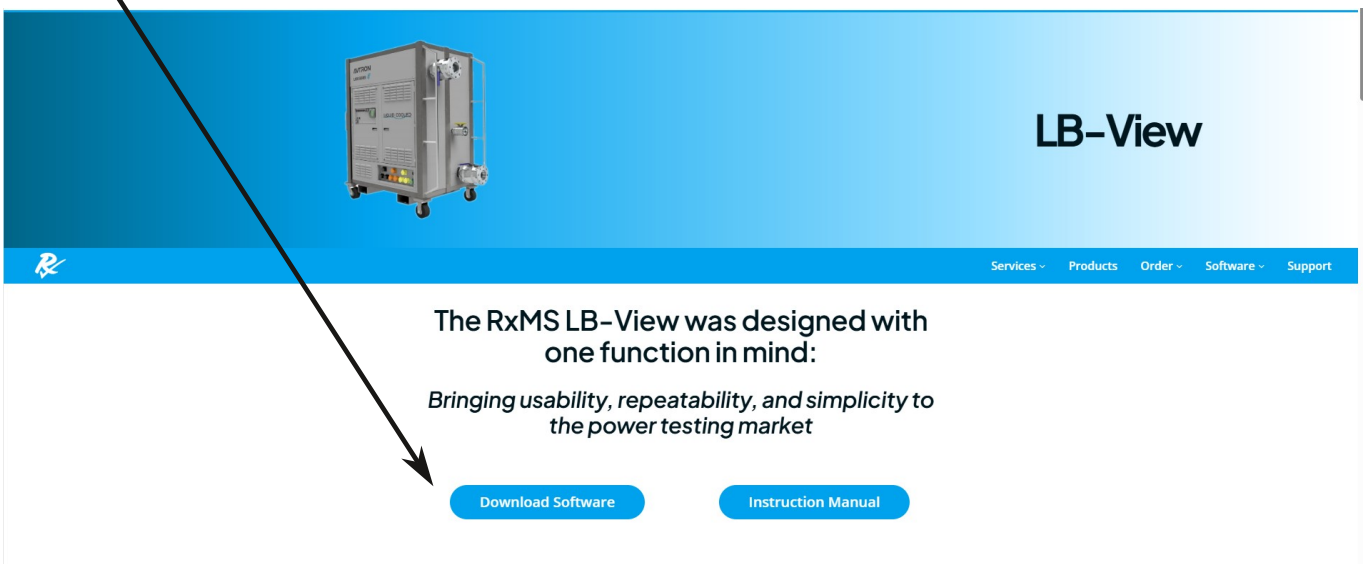
1. Go to www.rxms.com
2. Go to Software/LB-View

3. Scroll down and, click the link for Download Software.
4. The program might load and appear as a tab in the bottom left corner. Click on that tab to launch the installation wizard.



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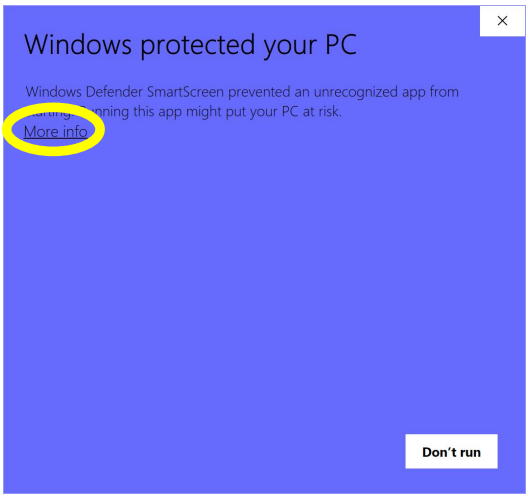
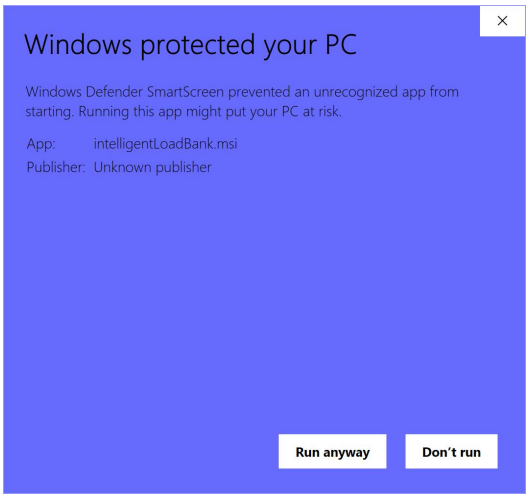
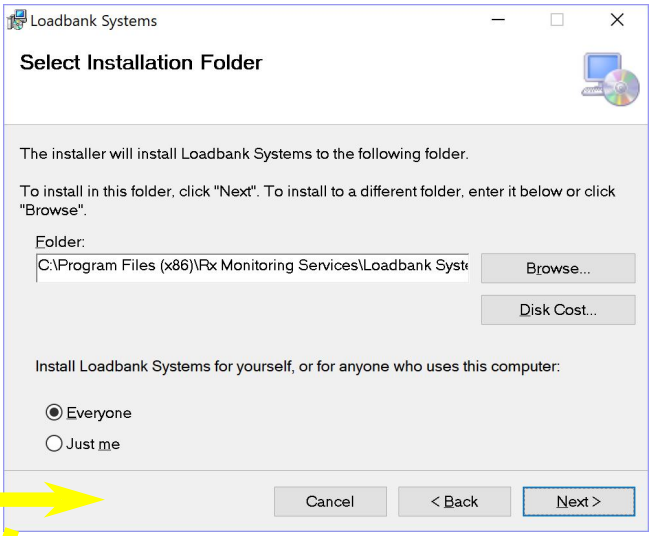
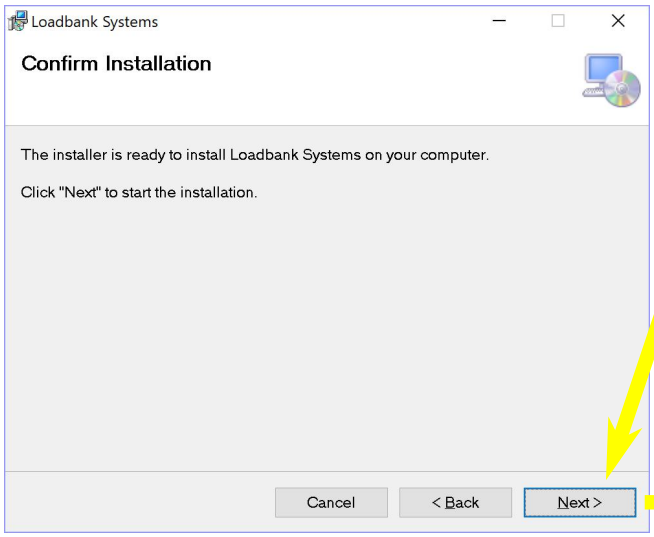
5. A warning from Windows might appear, click on More Info and the "Run anyway" button will appear. Click "Run anyway" to start installation wizard.

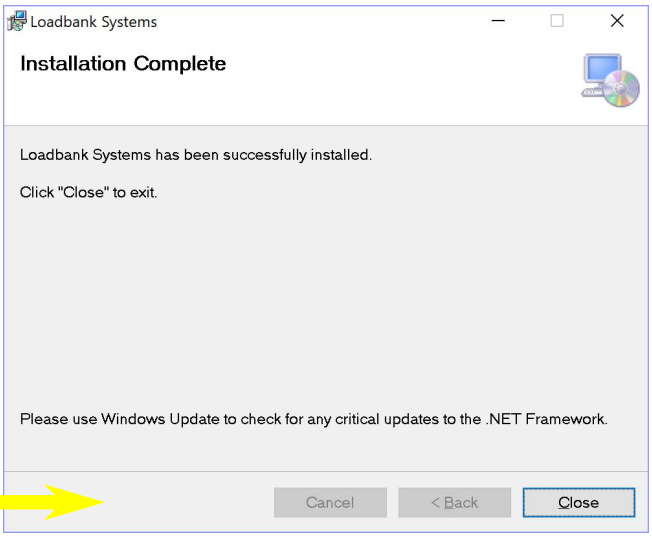




6. Once wizard starts, click "Next" for each prompt.







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Description:

The LB-View Software is designed to integrate multiple LoadBank manufactures and sizes within one software platform. The system can control up to 250 different LoadBanks using simple Ethernet wires.

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

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

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.

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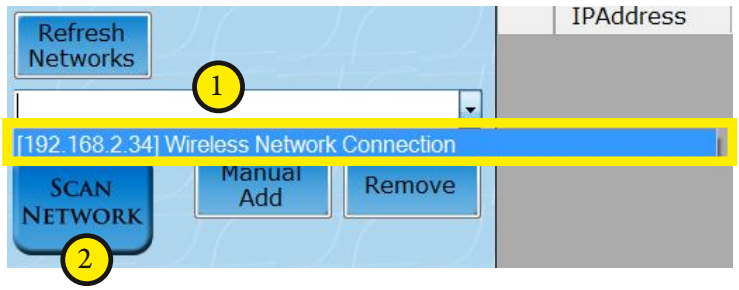
Description:

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 Loadbanks. 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**



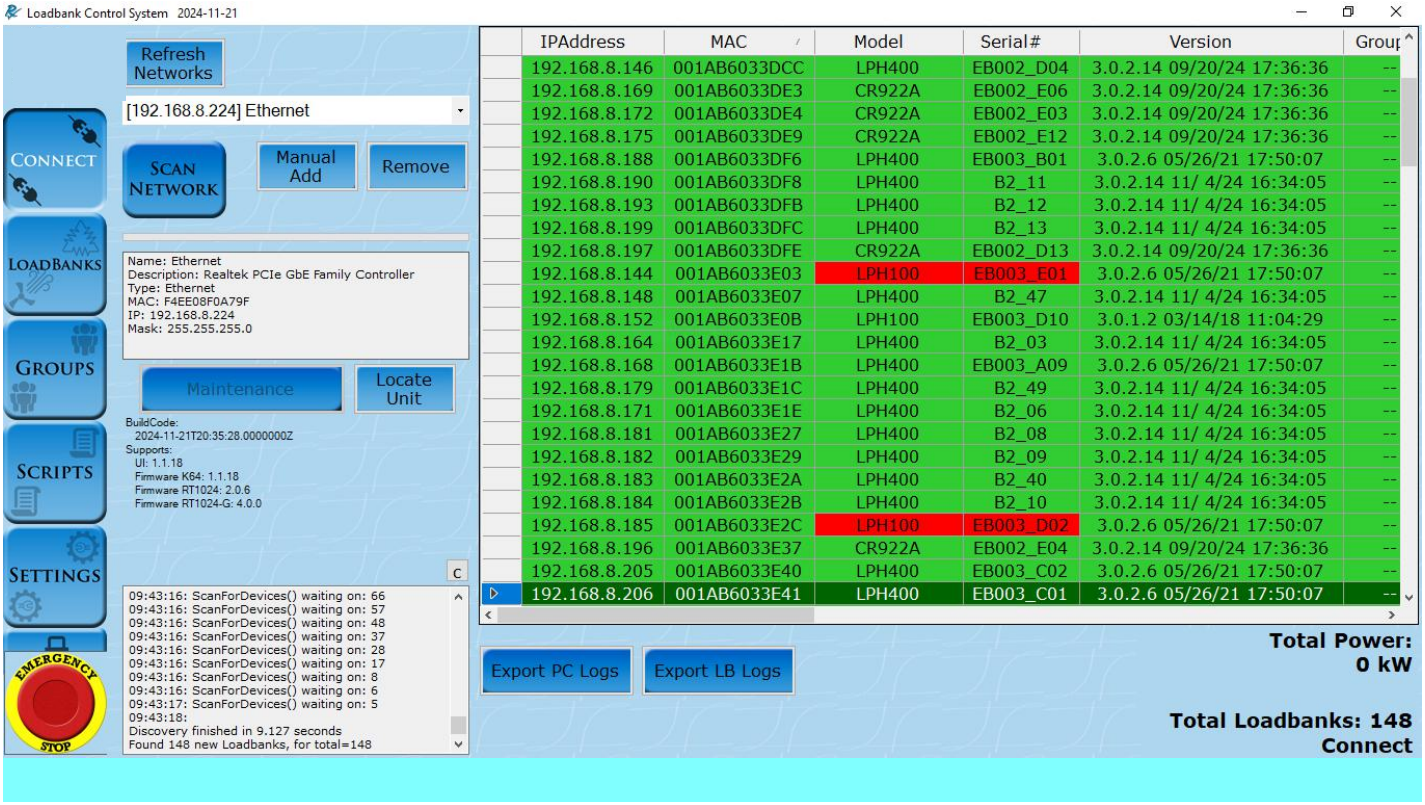
The units show up the right table section.

The color states of the units are below.

Green: Load Bank are working correctly.

Red: Row Red: Not communicating (!!!192.168.8.xxx) shows in the IP Address.
Model & Serial # Red : That loadbank has a alarm.

Yellow: Load Bank needs firmware update, pop-up will ask to update.



IPAddress	MAC	Model	Serial#	Version	Group
192.168.8.146	001AB6033DCC	LPH400	EB002_D04	3.0.2.14 09/20/24 17:36:36	--
192.168.8.169	001AB6033DE3	CR922A	EB002_E06	3.0.2.14 09/20/24 17:36:36	--
192.168.8.172	001AB6033DE4	CR922A	EB002_E03	3.0.2.14 09/20/24 17:36:36	--
192.168.8.175	001AB6033DE9	CR922A	EB002_E12	3.0.2.14 09/20/24 17:36:36	--
192.168.8.188	001AB6033DF6	LPH400	EB003_B01	3.0.2.6 05/26/21 17:50:07	--
192.168.8.190	001AB6033DF8	LPH400	B2_11	3.0.2.14 11/ 4/24 16:34:05	--
192.168.8.193	001AB6033DFB	LPH400	B2_12	3.0.2.14 11/ 4/24 16:34:05	--
192.168.8.199	001AB6033DFC	LPH400	B2_13	3.0.2.14 11/ 4/24 16:34:05	--
192.168.8.197	001AB6033DFE	CR922A	EB002_D13	3.0.2.14 09/20/24 17:36:36	--
192.168.8.144	001AB6033E03	LPH100	EB003_E01	3.0.2.6 05/26/21 17:50:07	--
192.168.8.148	001AB6033E07	LPH400	B2_47	3.0.2.14 11/ 4/24 16:34:05	--
192.168.8.152	001AB6033E0B	LPH100	EB003_D10	3.0.1.2 03/14/18 11:04:29	--
192.168.8.164	001AB6033E17	LPH400	B2_03	3.0.2.14 11/ 4/24 16:34:05	--
192.168.8.168	001AB6033E1B	LPH400	EB003_A09	3.0.2.6 05/26/21 17:50:07	--
192.168.8.179	001AB6033E1C	LPH400	B2_49	3.0.2.14 11/ 4/24 16:34:05	--
192.168.8.171	001AB6033E1E	LPH400	B2_06	3.0.2.14 11/ 4/24 16:34:05	--
192.168.8.181	001AB6033E27	LPH400	B2_08	3.0.2.14 11/ 4/24 16:34:05	--
192.168.8.182	001AB6033E29	LPH400	B2_09	3.0.2.14 11/ 4/24 16:34:05	--
192.168.8.183	001AB6033E2A	LPH400	B2_40	3.0.2.14 11/ 4/24 16:34:05	--
192.168.8.184	001AB6033E2B	LPH400	B2_10	3.0.2.14 11/ 4/24 16:34:05	--
192.168.8.185	001AB6033E2C	LPH100	EB003_D02	3.0.2.6 05/26/21 17:50:07	--
192.168.8.196	001AB6033E37	CR922A	EB002_E04	3.0.2.14 09/20/24 17:36:36	--
192.168.8.205	001AB6033E40	LPH400	EB003_C02	3.0.2.6 05/26/21 17:50:07	--
192.168.8.206	001AB6033E41	LPH400	EB003_C01	3.0.2.6 05/26/21 17:50:07	--

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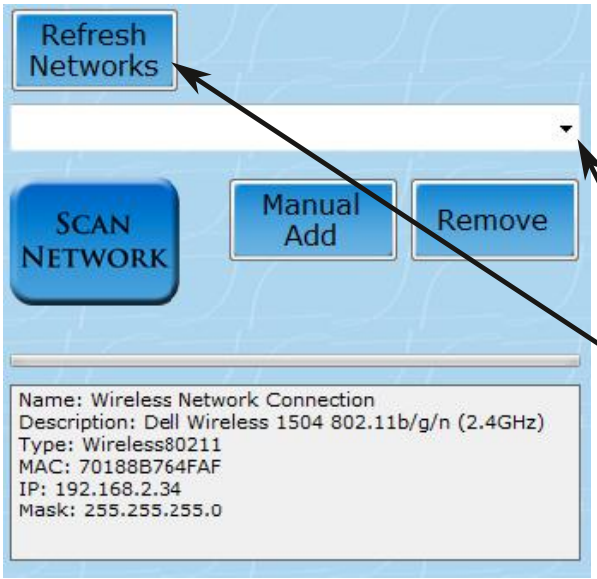


The software will try to acquire the network interface from the PC or Tablet on startup.

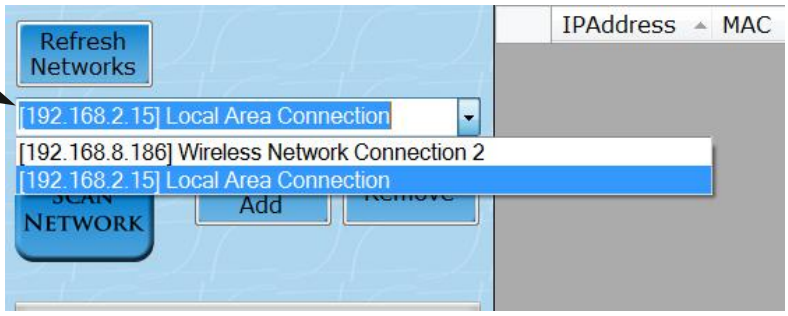
If the drop down menu is empty this means there were no valid networks on the PC on startup.

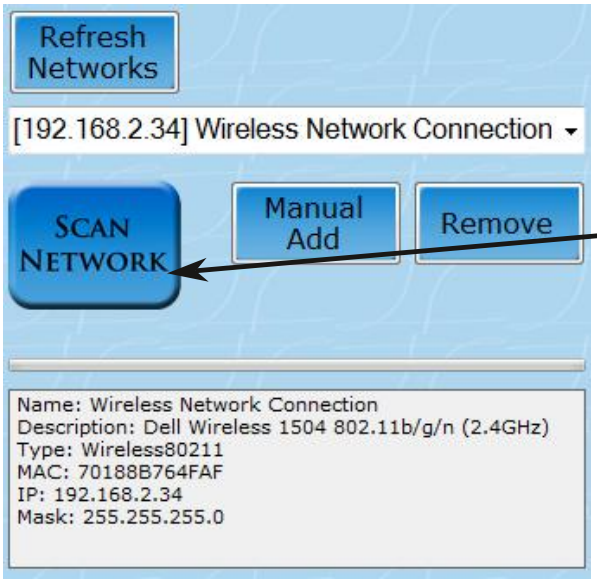
Click **Refresh Networks** to get a updated network list.

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.

Wired 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

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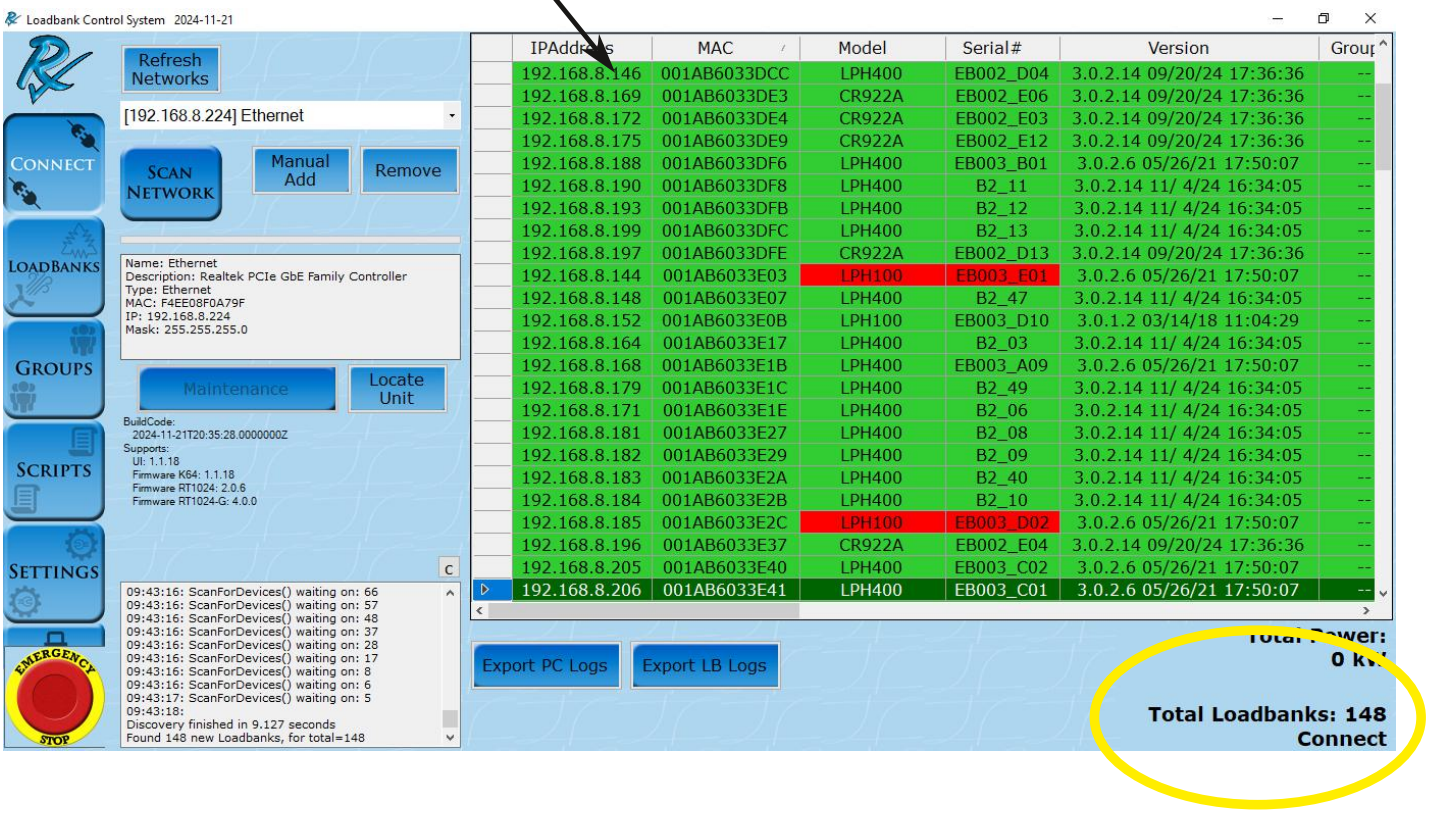
While scanning button is highlighted and lower bar will rotate.

This process takes 4-12 seconds.

After discovery the units will list here



A total loadbank count and total power is given on the bottom right.

A pop-up may occur asking to update the LoadBank to the newest firmware. The update only takes 30 seconds and must be done to continue using software normally.

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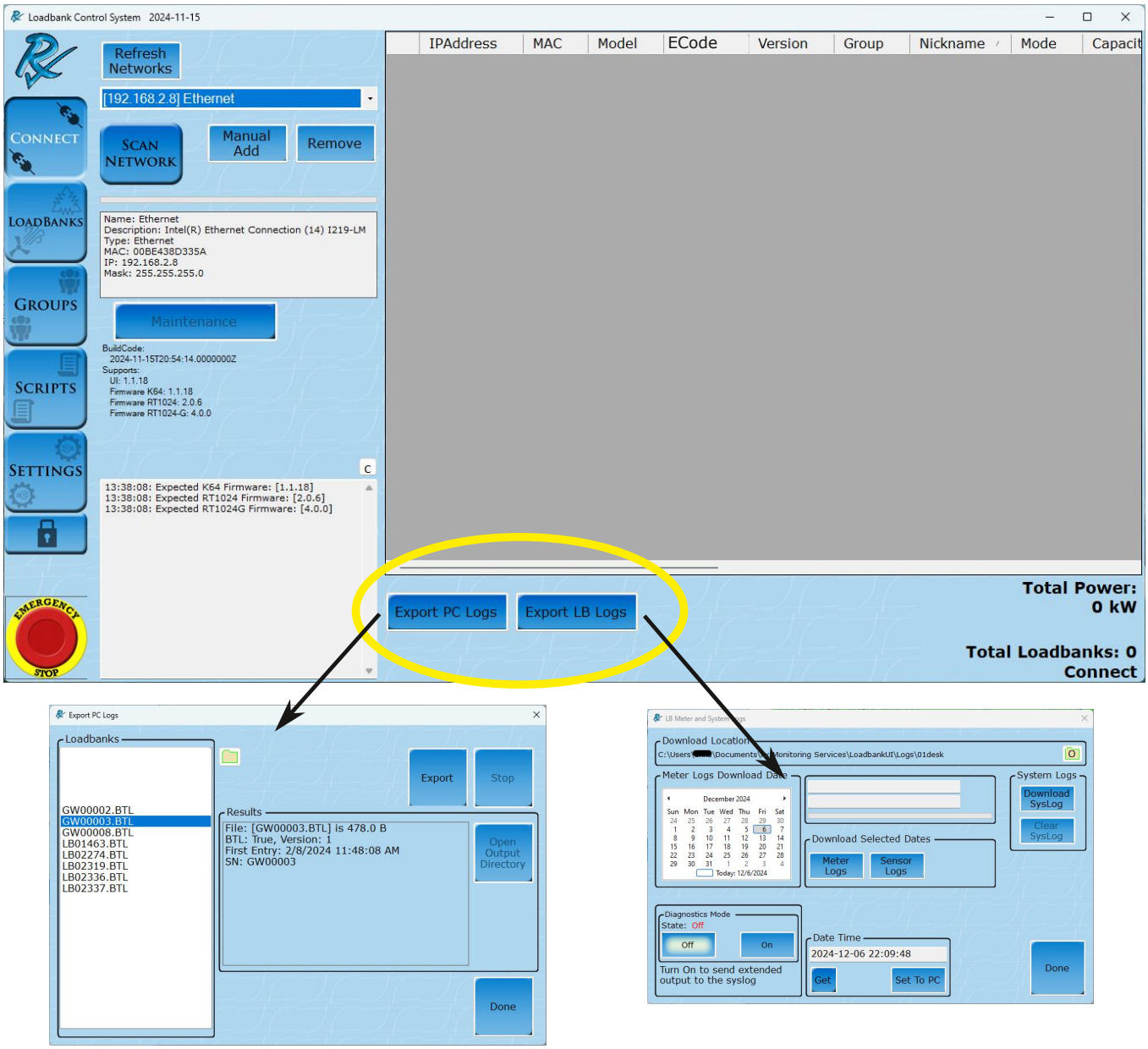
Two types of logs exist in the iLB platform:

1. On the PC tablet/laptop (logged on the PC with the feature enables in settings)

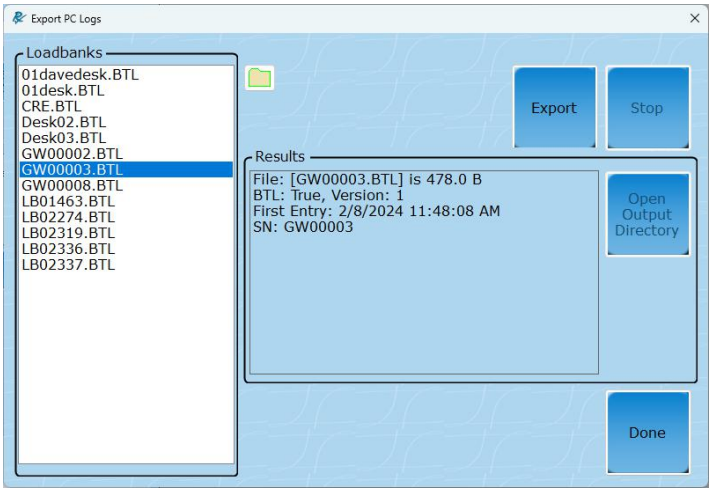
2. On the loadbank controller board. (If supported)



Logs are located in:
~\user\Documents\Rx Monitoring Services\LoadbankUI\Trending\Loadbanks

Export PC loadbank Logs

1. Highlight the unit
2. Click "Export"
3. Click Open Output Directory to see CSV files



To get PC logs the feature must be enabled:

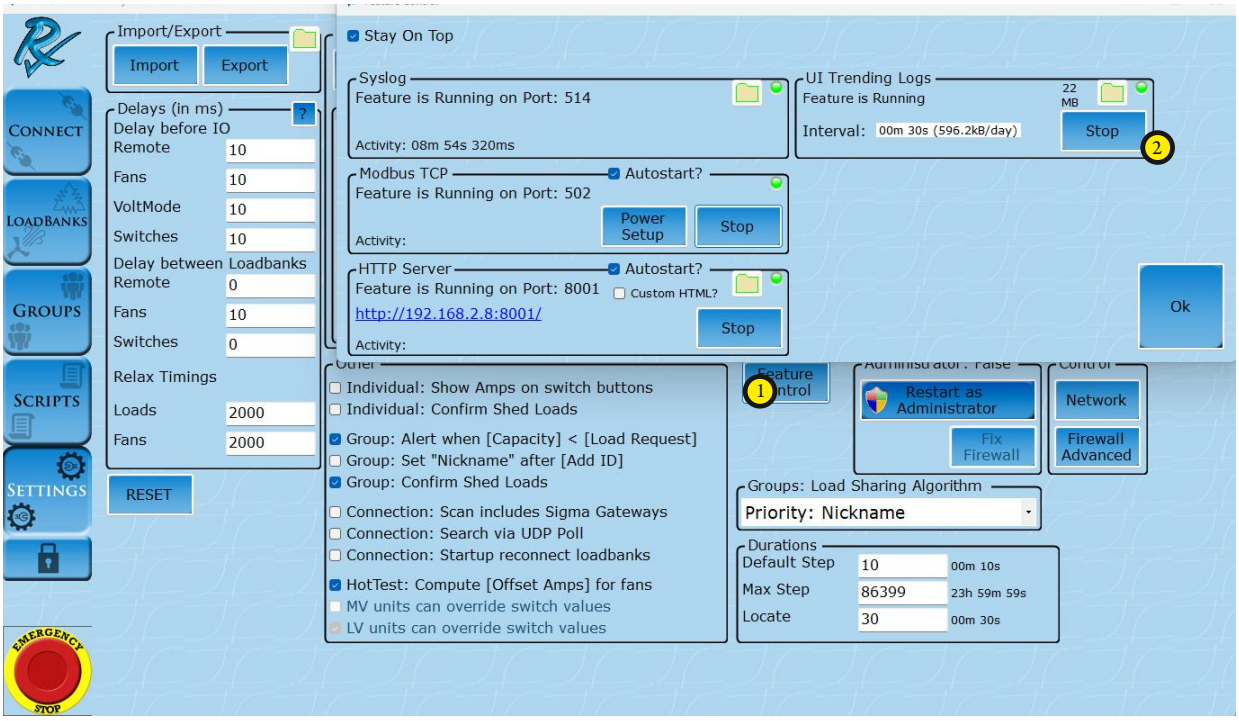
The logs need to be enabled in the settings tab to enable function.
Each time a loadbank is connected to the controller it will log its values.

Go to

1. Settings (Tab) -> Feature Control -> UI Trending Logs
2. Click Start (If not started)

Interval : Time between data points for each loadbank. (Default 30 seconds)

Click on the folder icon to open the writing location
User\documents\Rx Monitoring Services\LoadbankUI\Trending
Files are stored as "Serial#".BTL



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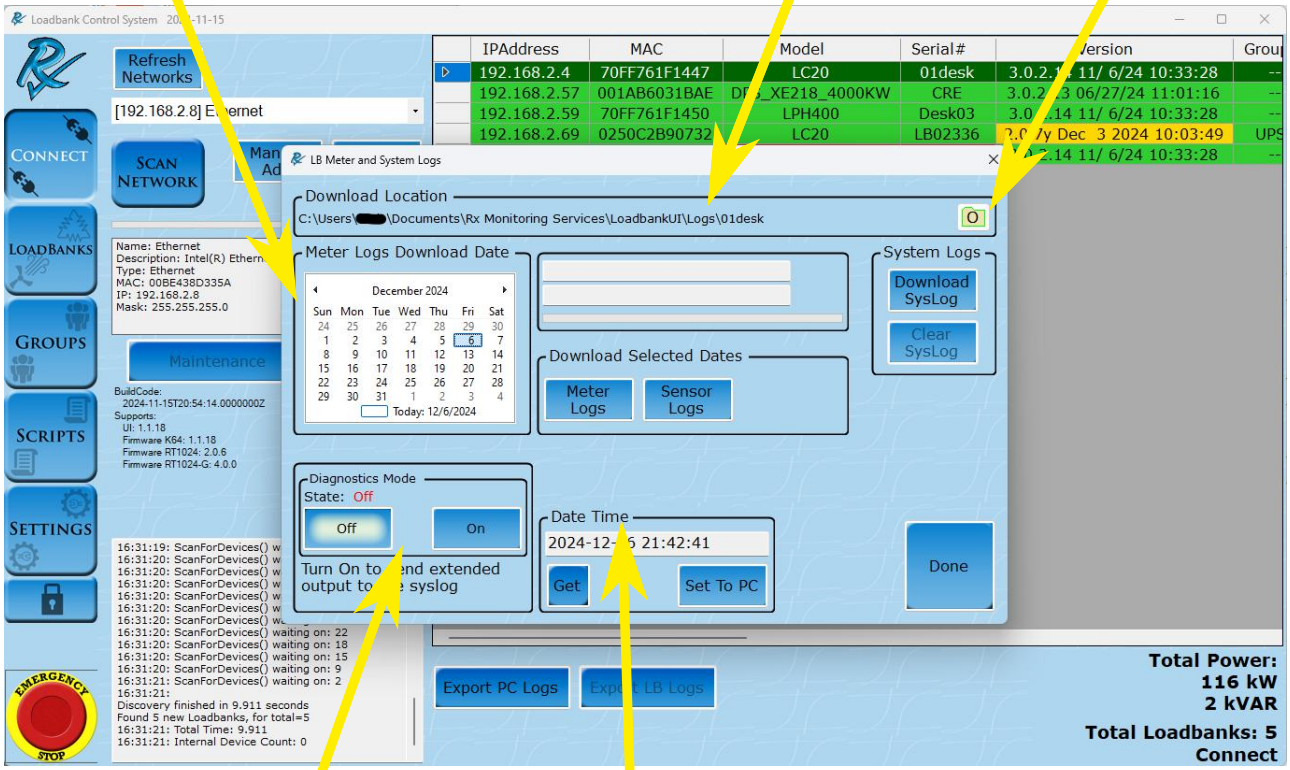
Export LB Logs

Meter logs are only avalible on the Gen3 Boards (1100-10166-xx)

Location is added to folder by the E-Code / Serial number

Downloads are selectable by data range. Select range before downloading.

Open folder location in file explorer



Diagnostics increases the debug output to the Syslog locally and to the network based syslog (Settings ->Syslog)

Set and get the real time clock for the logging.

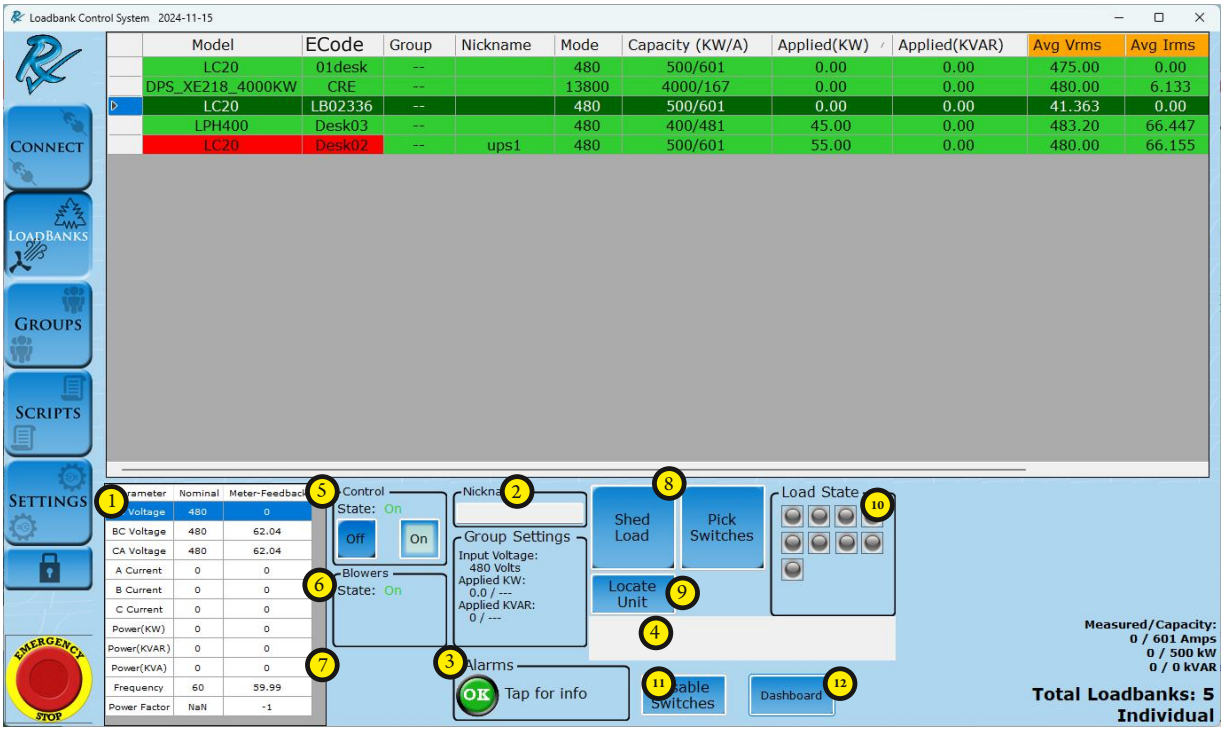
Each Syslog download makes a new file based on the time it was downloaded.
IE:
SysLog_20230824_100637.txt
SysLog_year Month Date_Time.txt

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:

- Click on a unit from the list to highlight it and show the values from the onboard meter below.
- To apply load to a unit, first tap **Control (On)** and **Blowers (On)** switches.
- To use load switches click on **Pick Switches** then select switch values in the popup



1. Power Values from Onboard Meter

2. Nicknames

3. Alarms

4. Notification Bar

5. Control State

6. Blowers State

7. Volt Mode

8. LoadBank Switches

9. Locate Unit (LED on the LoadBank will blink for a specified time)

10. Switch state indicators

11. Switch disabling

12. Dashboard / Advanced Commands

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1. Power Values from Onboard Meter

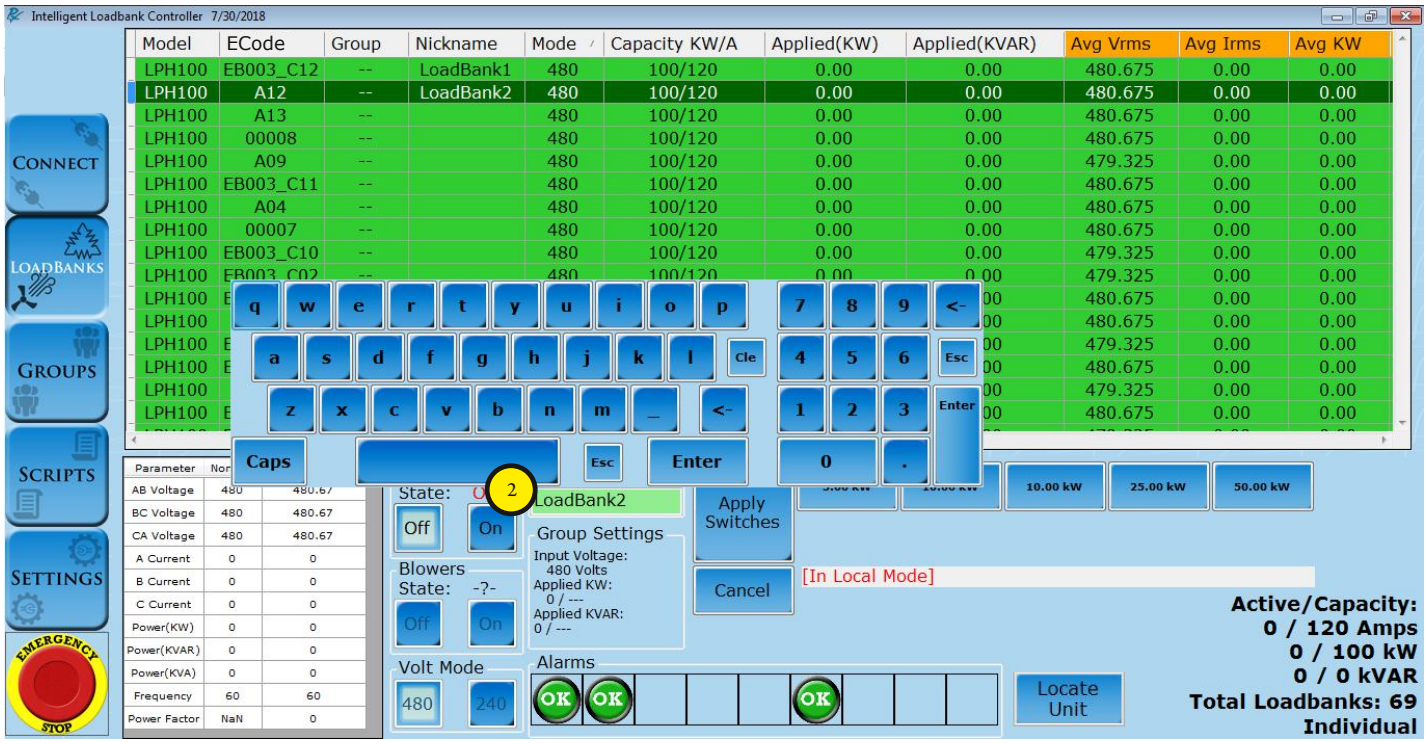
The load bank tab shows the status and the power values of the individual load banks connected.

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.

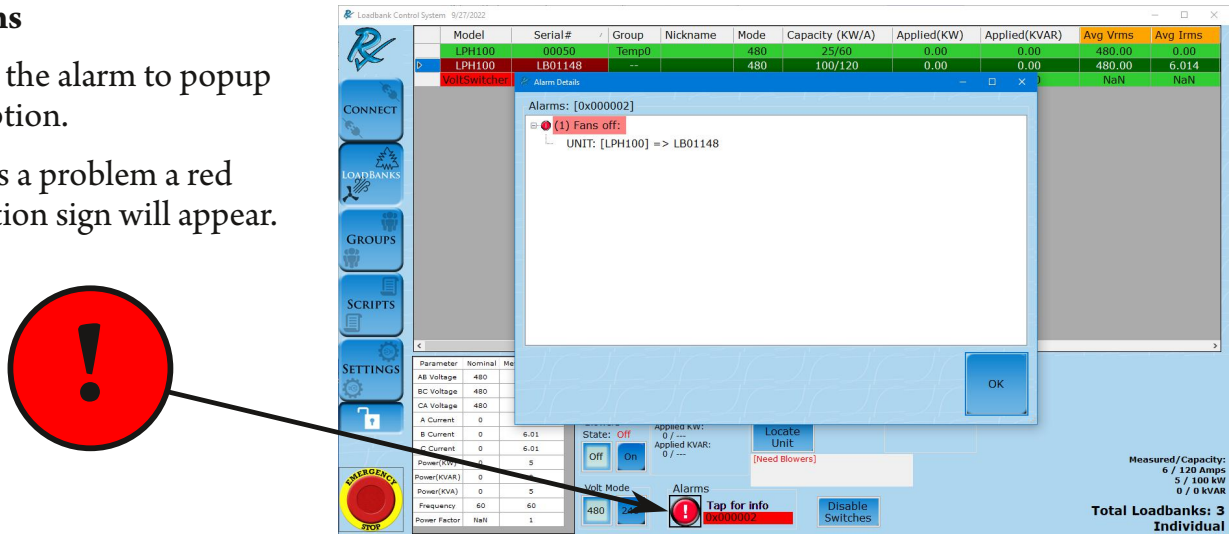
Note that once the keyboard is on the screen, user will be able to use computer or laptop keyboard.



3. Alarms

Click on the alarm to popup a description.

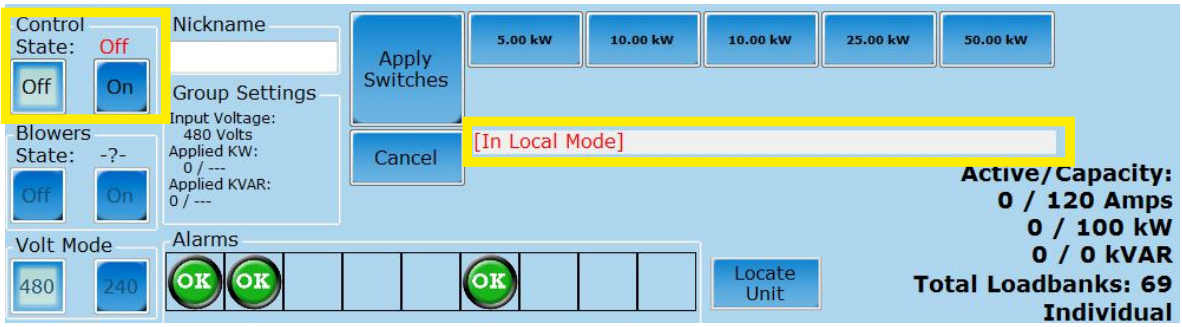
If there is a problem a red exclamation sign will appear.

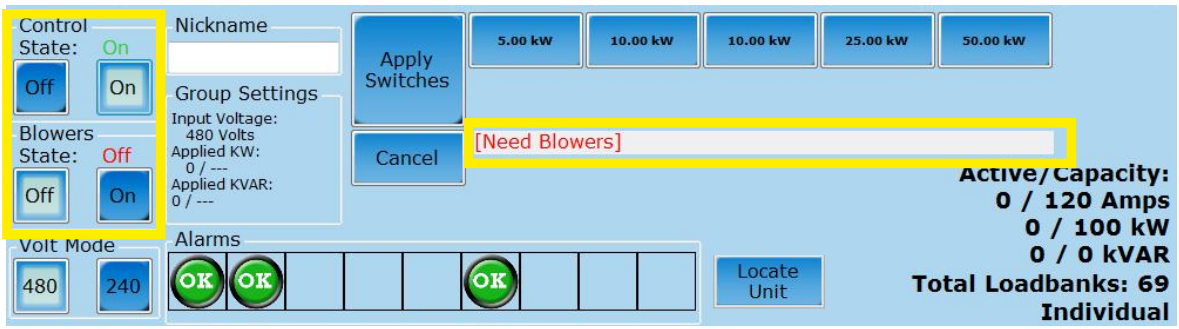


The Model and Serial # columns will turn RED when the loadbank is in an Alarm state.

4. Notification Box

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





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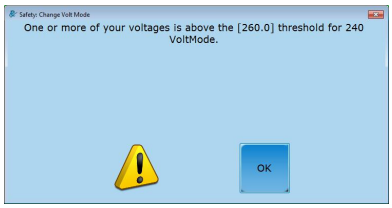
5. Control State

By turning the Control State [On], the LoadBank enters Remote Mode which disables local control of LoadBank, thereby making the software/tablet combination the only control system

6. Blowers State

Turns on fans on the LoadBank

7. Voltage Mode Controls (LoadBank dependant)



Be sure not to use 240V Volt Mode with an input voltage over 260Vrms.

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

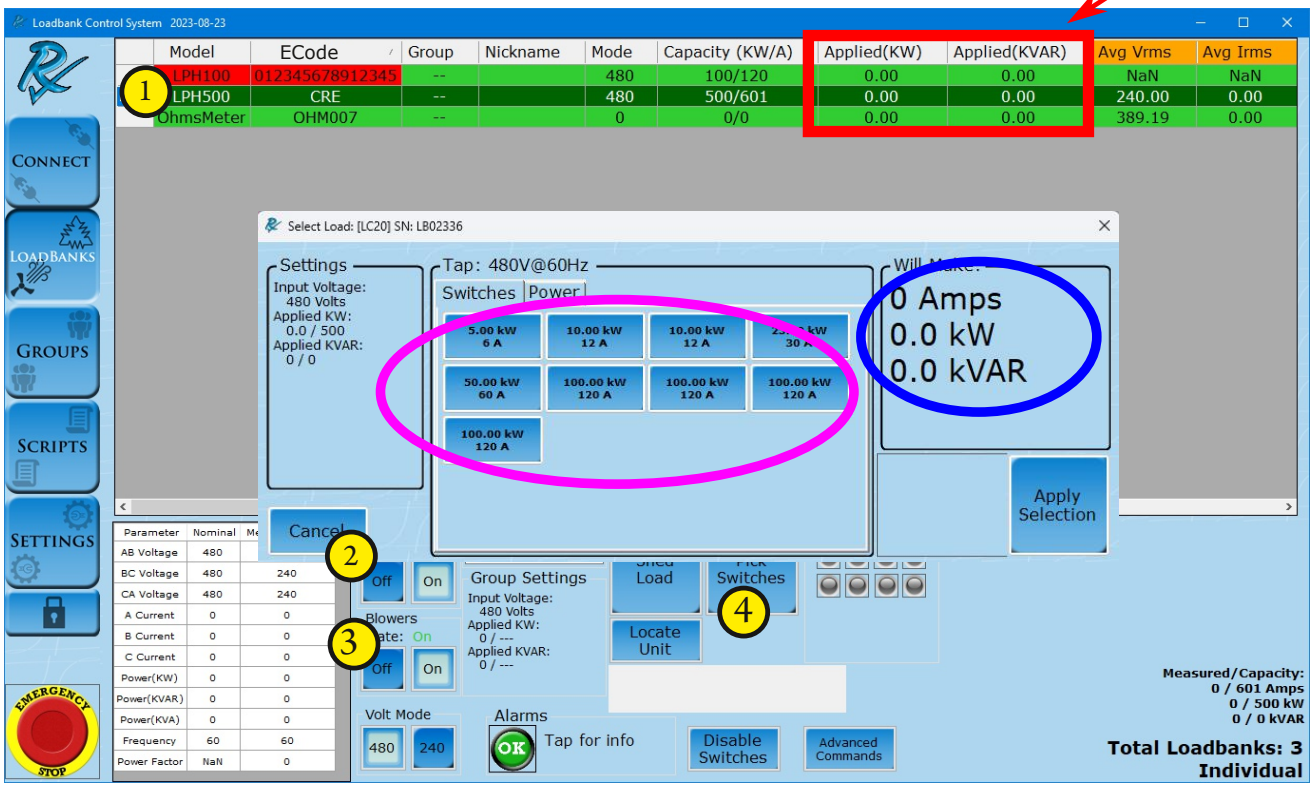
8. Load Switches / KW Select

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 **Pick Switches**
5. Click kW values to add to queue (indicated in **pink**) Or Click Power Tab and enter KW and KVar
6. Check the total stated value that will be applied (indicated in **blue**)
7. Click **Apply Selection**

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



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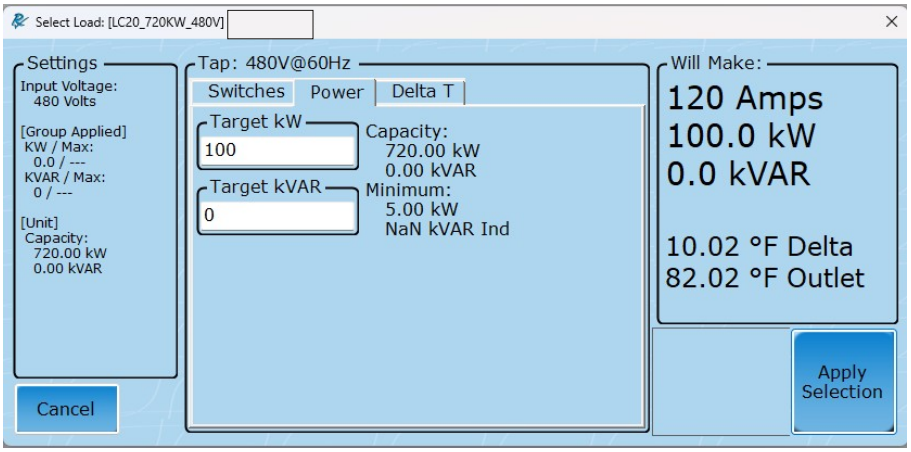
Power Selection Tab:

Enter the requested power from the individual loadbank.

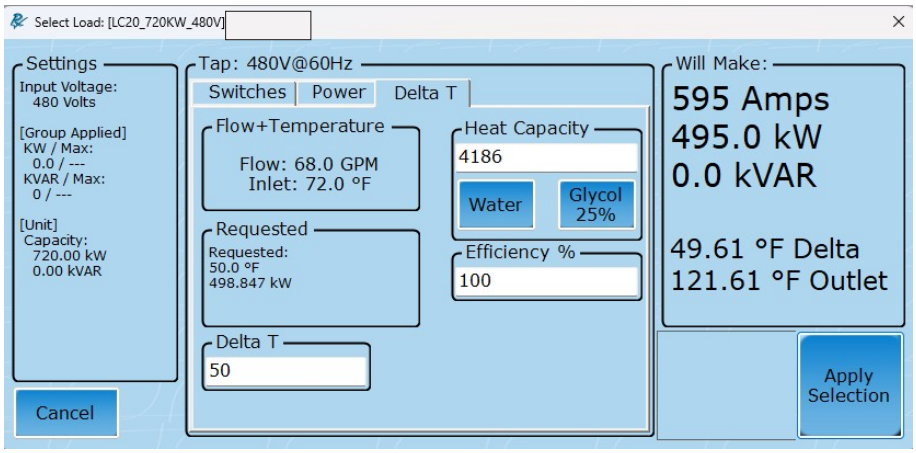
The amount sent to the loadbank will be displayed in the right box.



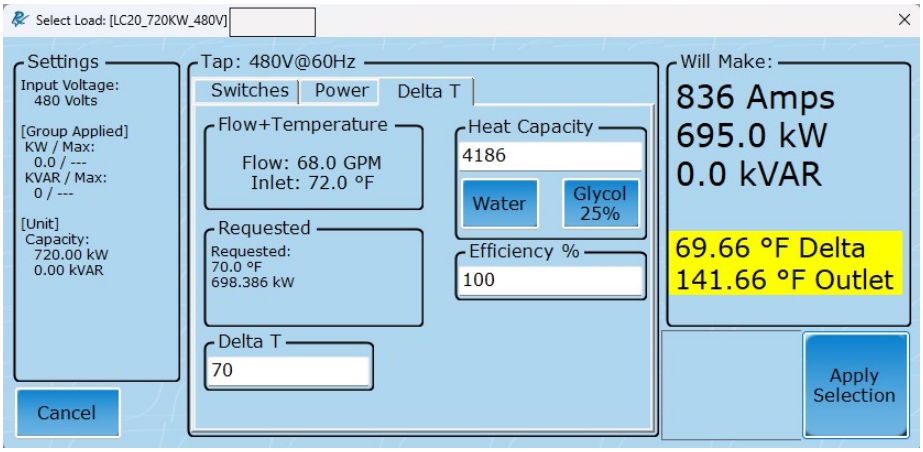
Delta T Selection Tab:

You can enter the requested Delta T from the load bank.

LB-View will calculate the estimated power based on the flow rate, heat capacity and effeciency entered. (These are only estimates and the Heat Capacity and Effciency will need to be changed based on customer site.)



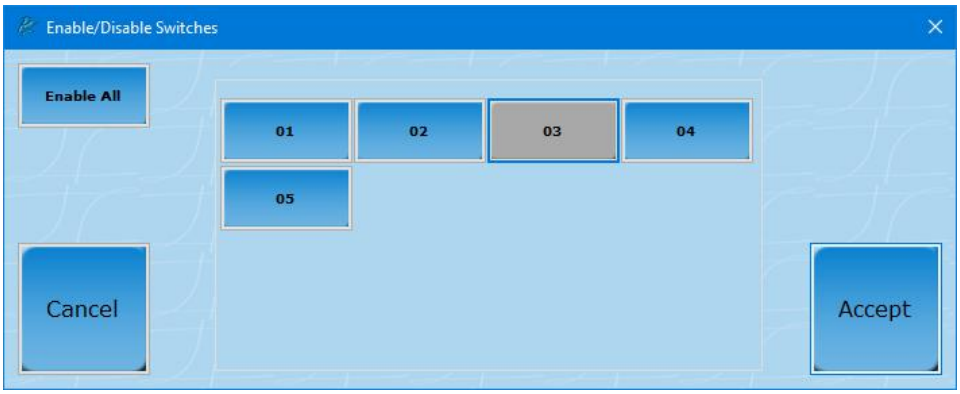
Note:
On LT units these values are the lowest flow and highest inlet temp from the string.

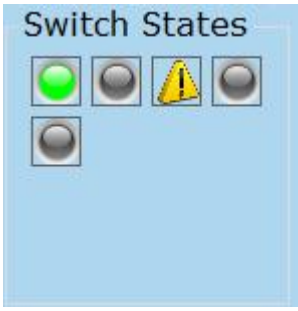


Note:
A Warning is produced if the return temp will exceed 140F. Load can still be applied

Disable Switches

Disable Switches
Requires a password ("power") each time unless in maintenance mode.
Switch is disabled for all Volt Modes/Tap Positions.
Only disabled for the current use of the loadbank software.
Does not stay with loadbank and if the UI closes for any reason you need to disable it again.





Indicator lights (Switch States)
Green - Load Step is Active
Gray - Load Step is Inactive
Warning - Load Step/Switch is disabled in software

Locate Unit

Locate Unit
Causes the LED on the selected loadbank to blink rapidly for a period of time.
Allows for quick acquisition of desired unit in the field.

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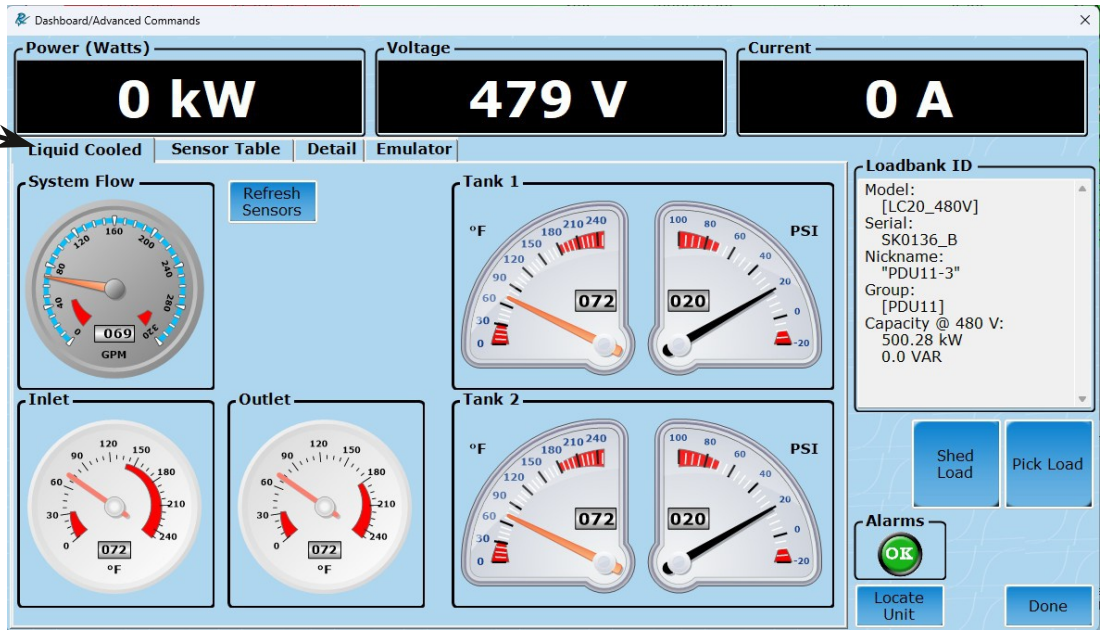
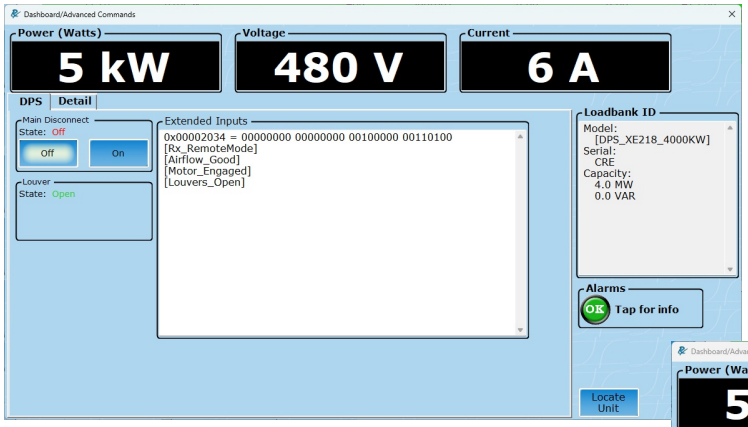
The Dashboard and Advanced Commands are dependent on loadbank features.

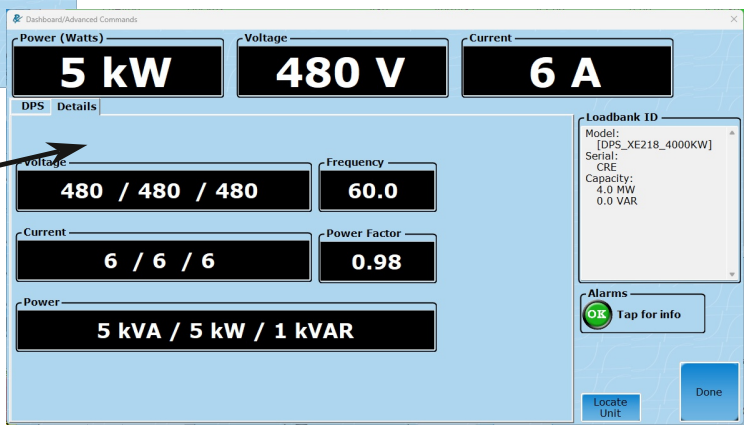
Specific commands when available will be displayed on this screen based on model type.

Multiple Tabs are available on some models of loadbanks

For Liquid Cooled and sensored models gauges are available.







Detail tab shows the voltage and power readings

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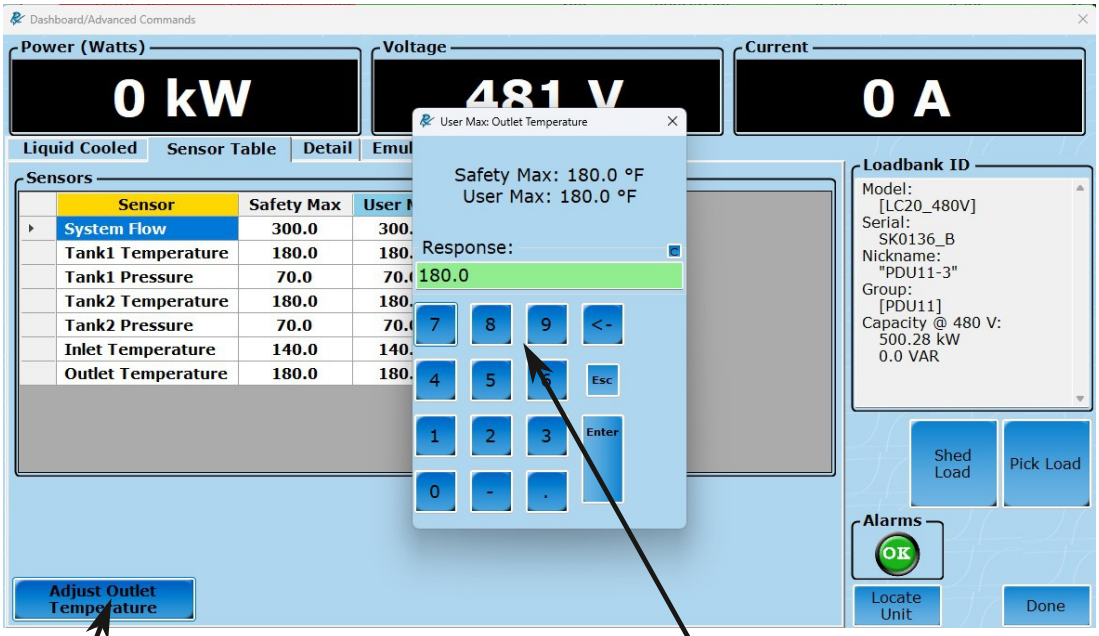
Outlet temp adjustment can be found in the dashboard.
This will be under the tab "Sensor Table"

This feature will cutt off the load at a lower temperature then the standard 180F rate.



Click to popup input box

Adjust outlet temp and click Enter

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

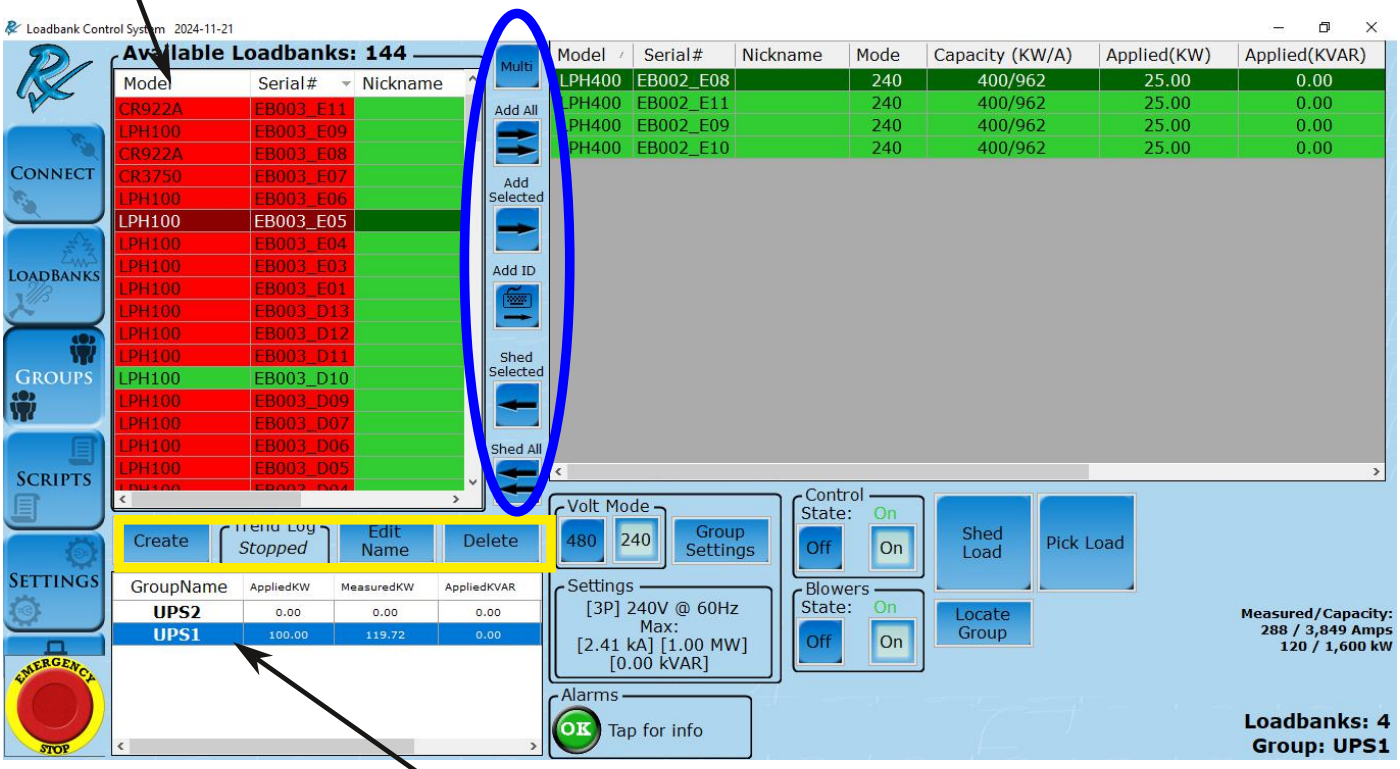
Note: Moving loadbanks to a group will cause units to shed their load

Available LoadBanks:

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

1.) Not currently be in another group

Multi:	Allows selection of multiple units from the Available section.
Add All:	Takes all available load banks and adds to highlighted group.
Add One:	Takes highlighted unit from Available and puts in highlighted group.
Add ID:	Add by number will pop up a keyboard input (or scanner)
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 remove loadbanks from that group.

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

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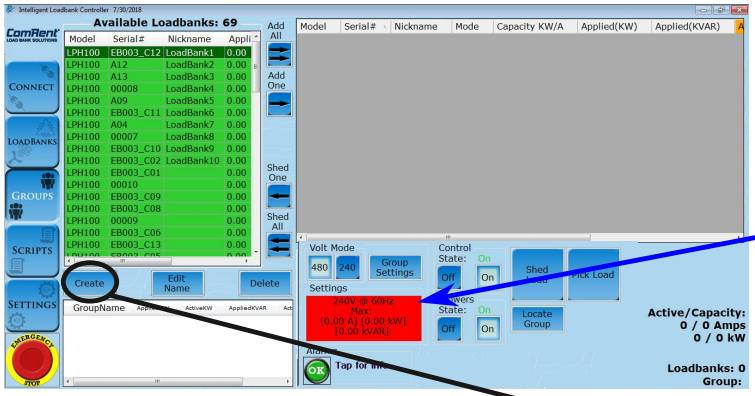
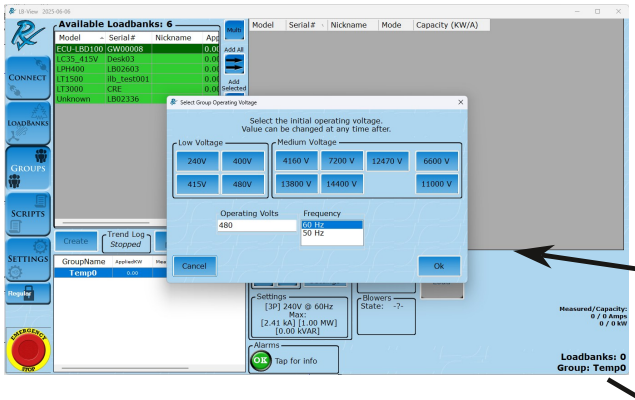
1. **Create** a new group
   - Default name will be Temp0
   - Delete and type in the New Group Name using the keyboard on screen or the one with your computer/laptop/tablet
   - Select the Mode the Group will operate in
     - Note: actual input voltage will be selected later

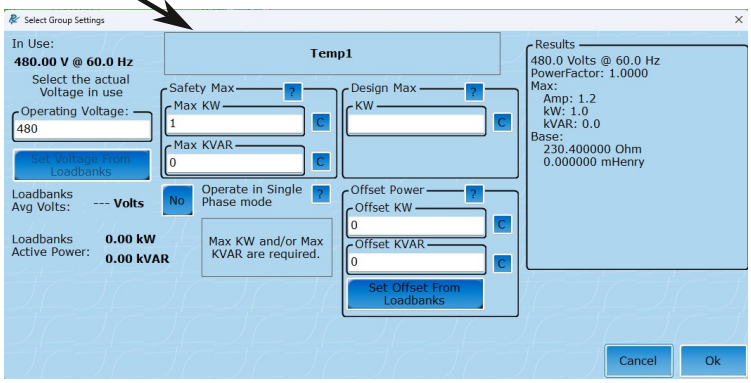


This area is red to indicate either the Group Settings have not been set or there is an issue with the settings that needs to be addressed.



When creating a new group, a Operating Mode must be selected. This selection is how the group will operate, not the actual input voltage.

The actual voltage can be pulled from the loadbanis in the groups settings.



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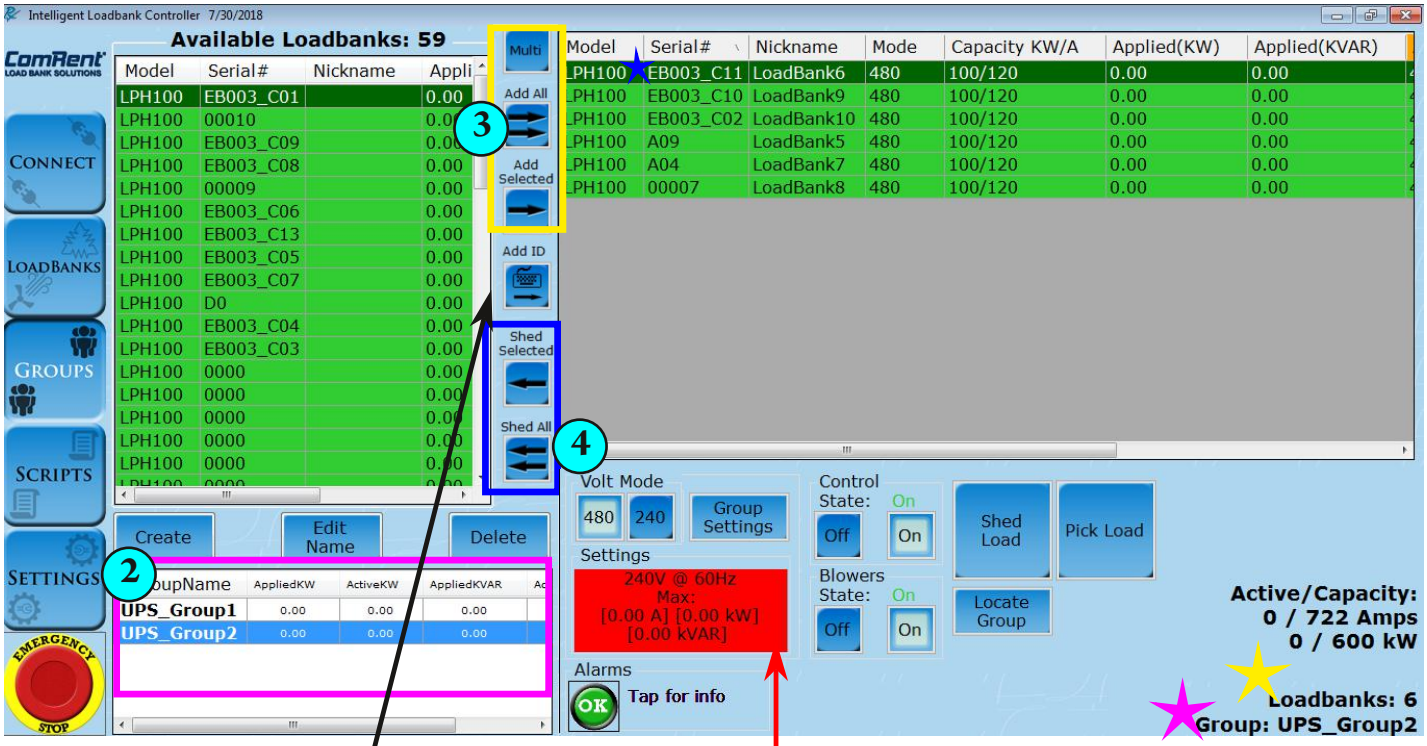
2. Highlight a Group from list of Groups in the lower left corner (indicated in pink)
   - The name of the Group selected will be displayed in the right bottom corner (pink star)

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**



Click the **ADD ID** to pop up a text input sceen (Scanner ready) that can add an available load bank to the group selected.

NickName can be added to the Load bank directly after a succesful move to a group. Go to and check **Settings->Group: Add nickname after Add By ID.**

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.

Issues that can affect group settings are:
- MAX KW is exceeded
- Voltage level is 110% of nominal

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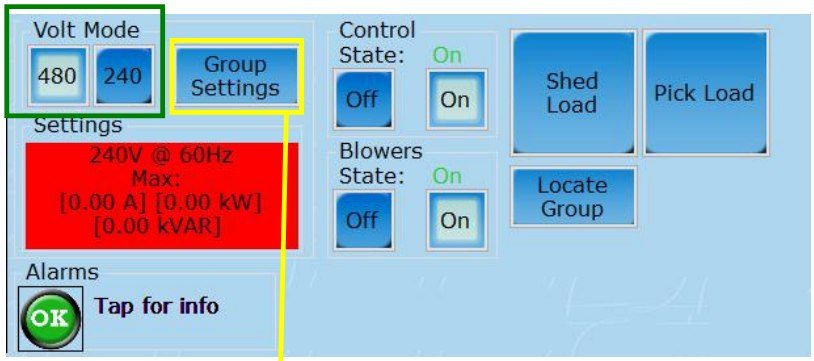
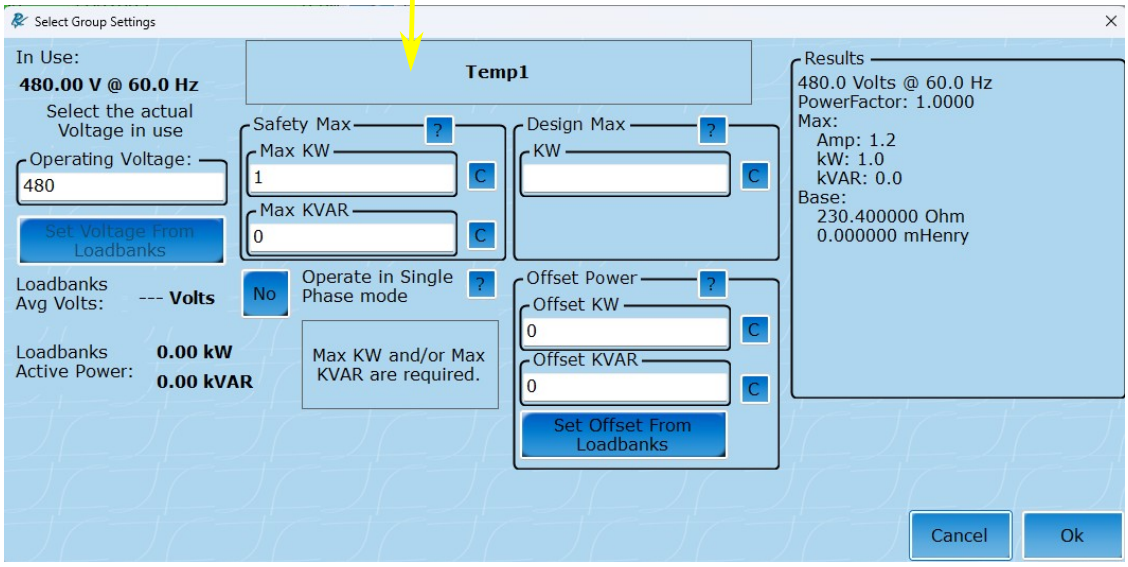
6. Highlight the Group Name to apply load to a group

7. Check **Voltage Mode**, which was established when the Group was created and is LoadBank specific (indicated in green)
   - Changing **Volt Mode** will shed all load in Group

8. Click **Group Settings** (indicated in yellow)
   - Set Input Voltage and Offset, more information below.
     - Incoming voltage cannot exceed VoltMode
   - Fill out the Restrictions section for safety measures by entering **Max kW** and/or **Max kVAR**
     - Max kVAR is optional but we recommend a minumum of the fan power (if running on internal), but Max kW must be filled out





Safety Max:
Max switch value that controller will allow.

Design Max:
Gives ability to set the % math different then the safety max. If empty, safety max is used for % load calculations.

Operating Voltages:

Can be set two ways:

1. Typed into the Actual Voltage text box.
2. Click Set Voltage From Loadbanks to use the averaged voltage from the load banks.

Offset Power:

Offset power is for subtracting from your safety max during load step calculations.

This can be manually added or pulled from LoadBank current load by using Set Offset From Loadbanks.(Such as fans running on internal power)

Target = 80% * (1200kw) - 50Kw Offset

Target = 910kW

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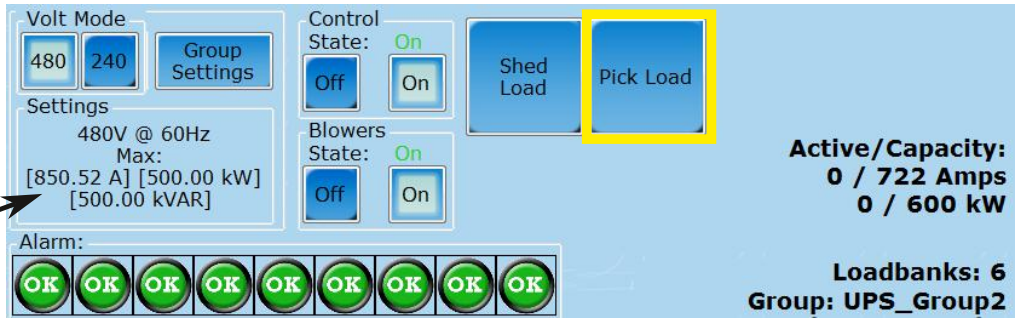
9. Enable **Control (On)**

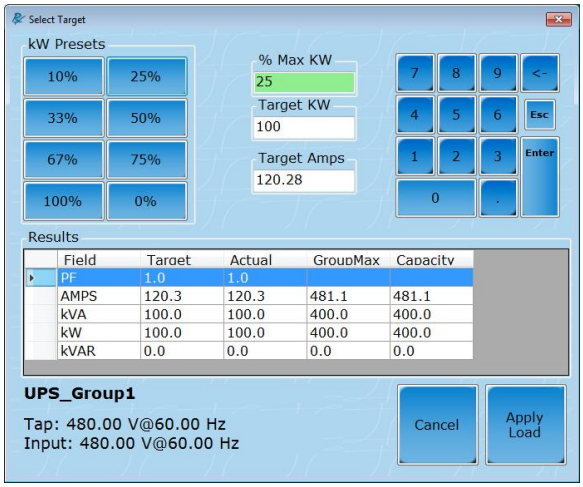
10. Enable **Blowers (On)**

Note: This area is no longer red after inputting Group Settings

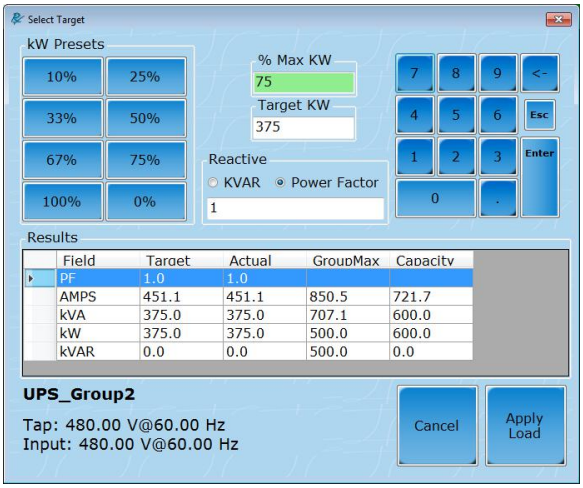


11. Click **Pick Load**
    - Use **percentage buttons** on the left or the key pad on the right to enter **% Max kW** (this percentage entered will be the percentage of kW Max set in Group Settings)
      --OR--
    - Use key pad on the right to enter with **Target kW** or **Target Amps**
    - If <u>Max kVAR is entered in Group Settings</u> then loading by Reactive kVAR or Power Factor will be available

Group Settings **without** kVAR Max input



Group Settings **with** kVAR Max input



12. Click **Apply Load**

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

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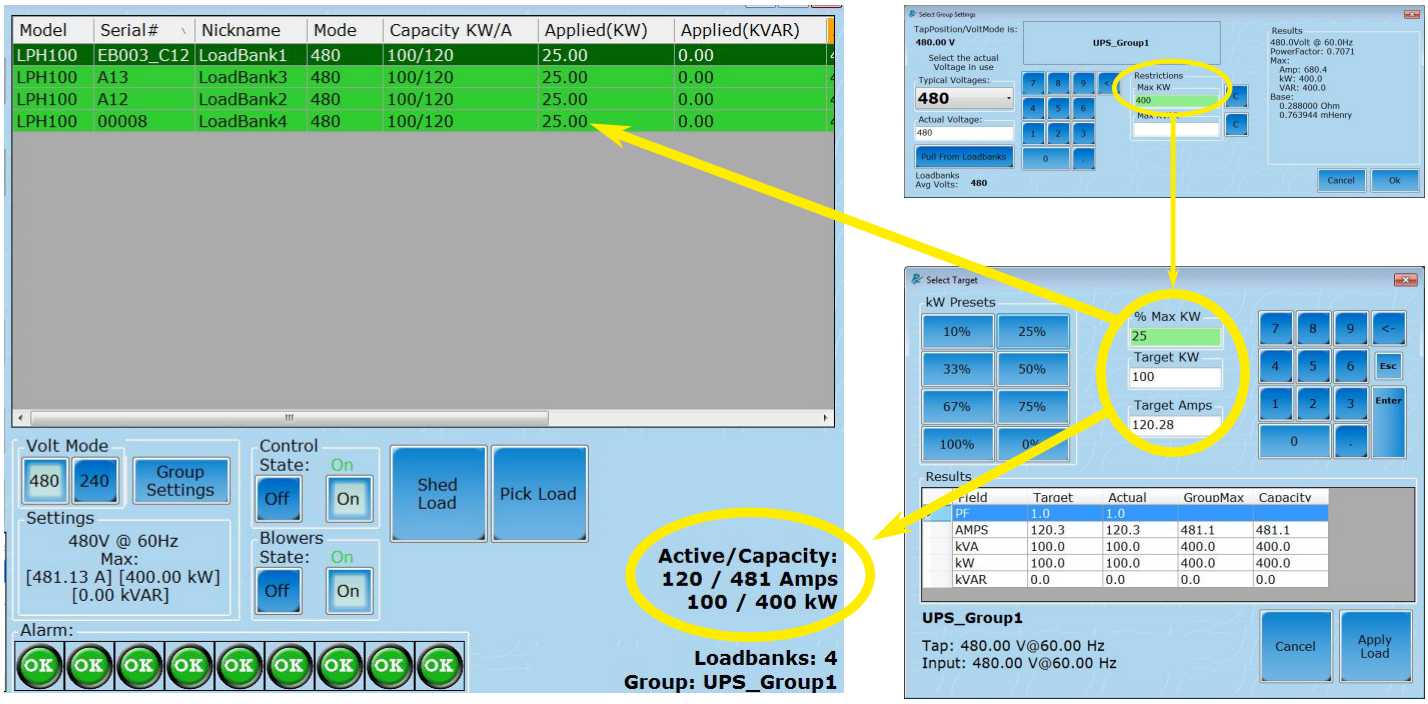
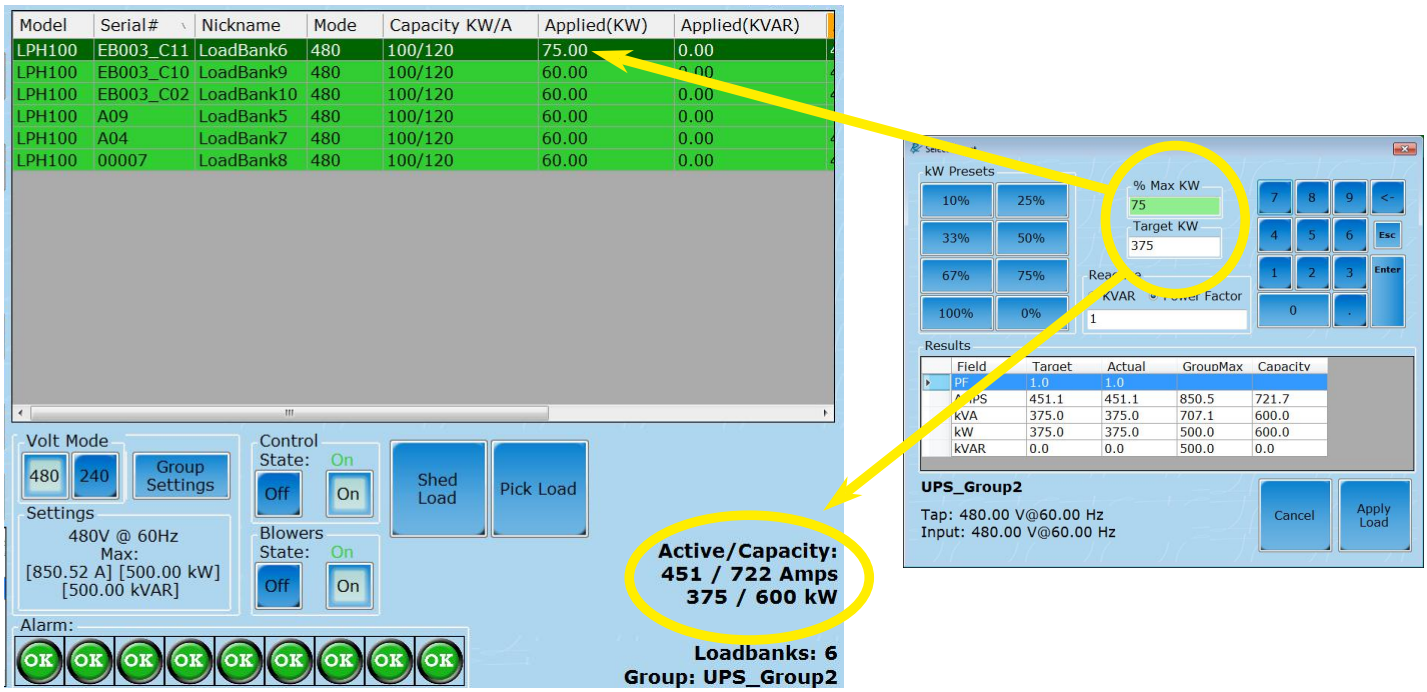
Max kW is set at 400kW. Target set at 25% of Max kW. Group UPS_Group1 uses 4 loadbanks.

Reminder: the % of Max kW calculates the percentage of the max kW set in Group Settings



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



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How group sharing works (Balanced Mode)

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:

Safety KW : Uses this as the baseline for the total KW the group can use.

Design Max KW : Number used to calculate the load switches in %.

Input Voltage : Select the RMS voltage that the resisters will see (480V, 415, 240, 208)

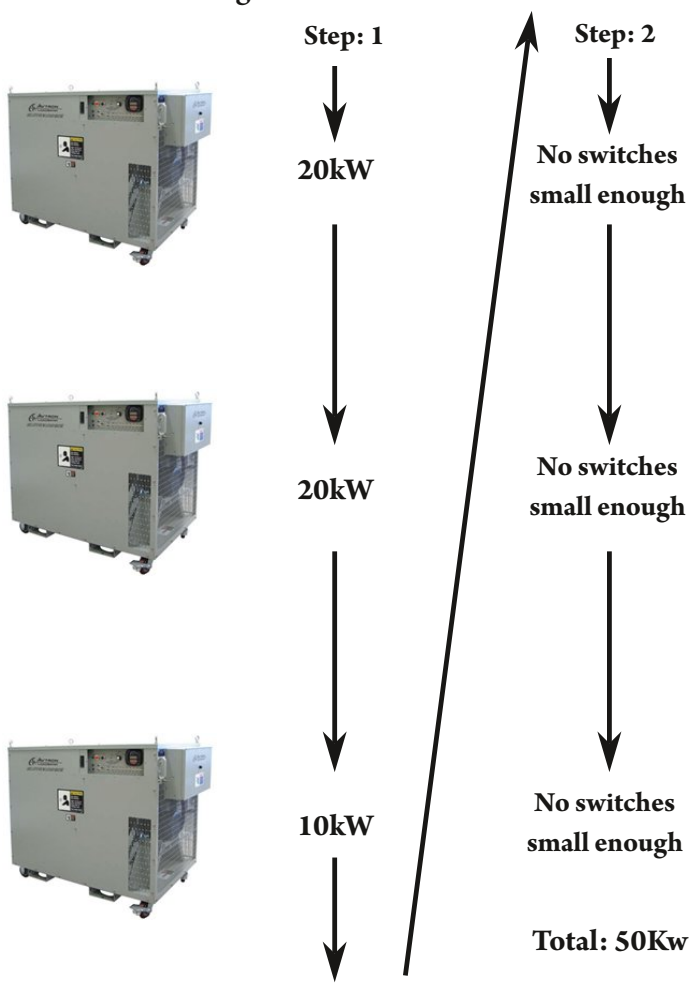
Voltage Mode : Some units have 240/480 resistance that applies.

Target % / Target KW / Target Amp : The number the interface is aiming for taking in the above variables.

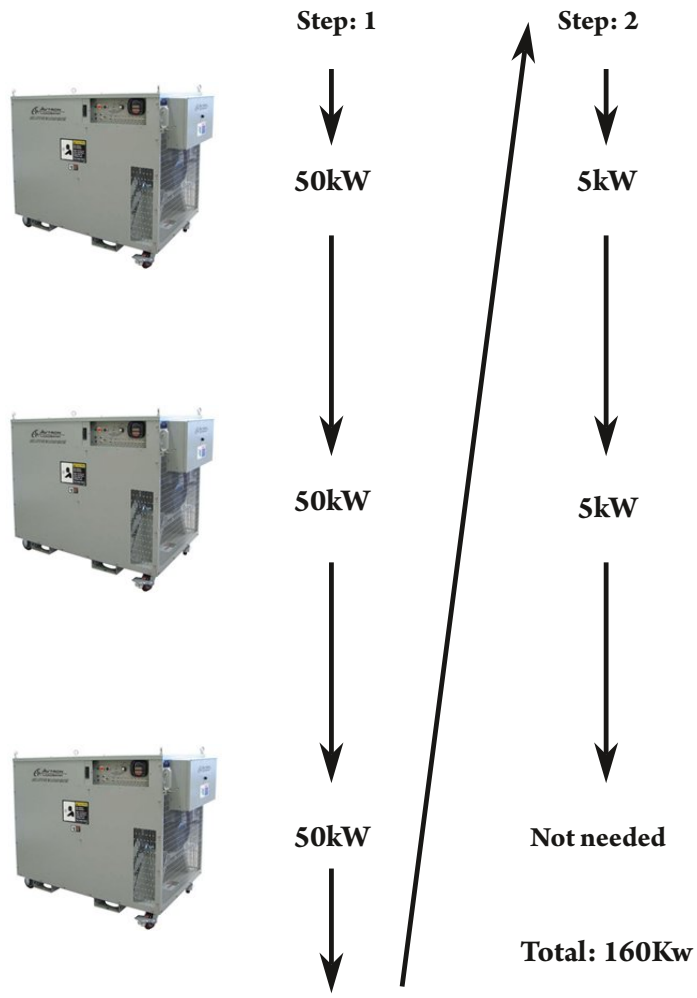
The algorithm for sharing is simple. It is a two step process ;

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:
Safety Max = 250
Design Max = 200
Input Voltage = 480
Voltage Mode = 480
Target = 25%
Calculated target = 50kW



Example 2:
Safety Max = 300
Input Voltage = 480
Voltage Mode = 480
Target = 53%
Calculated target = 160kW



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Example 3:
Safety Max = 98
Input Voltage = 208
Voltage Mode = 480
Target = 45kW
Calculated target = 45kW

Step: 1	Step: 2
8.438kW	+ 0.94kW 9.375kW total
8.438kW	+ 0.94kW 9.375kW total
8.438kW	+ 0.94kW 9.375kW total
8.438kW	Not needed
8.438kW	Not needed
	Total: 45Kw

Example 4:
Safety Max = 200
Input Voltage = 240
Voltage Mode = 240
Target = 500kW
Calculated target = 200kW

Step: 1	Step: 2
40kW	Not needed
40kW	Not needed
40kW	Not needed
40kW	Not needed
40kW	Not needed
	Total:200kW

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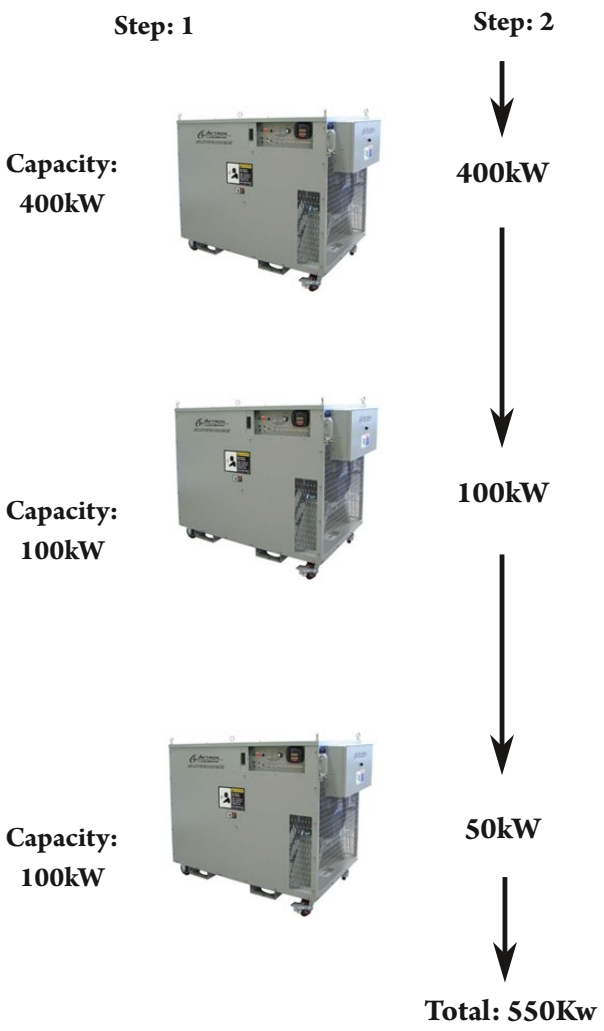
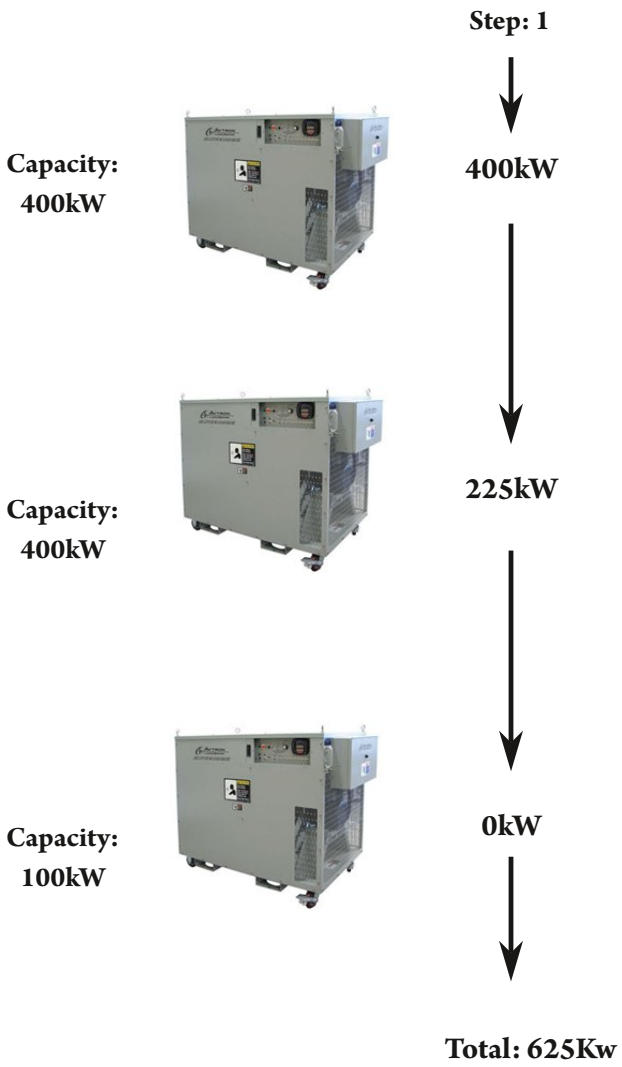
The algorithm for Capacity Mode:

1. Inventory all available load banks and sort by size. (Largest to Smallest)
2. Add all available load steps starting in order, if no more are available or the target is not met move to the next LoadBank in the list.

Example 1:
Safety Max = 550
Input Voltage = 480
Voltage Mode = 480
Target = 100%
Calculated target = 550kW



Example 2:
Safety Max = 1000
Design Max = 500
Input Voltage = 480
Voltage Mode = 480
Target = 125%
Calculated target = 625kW



Note: LoadBanks do not physically need to be connected in any particular order, changing the software settings will change the sorted order the load is applied.

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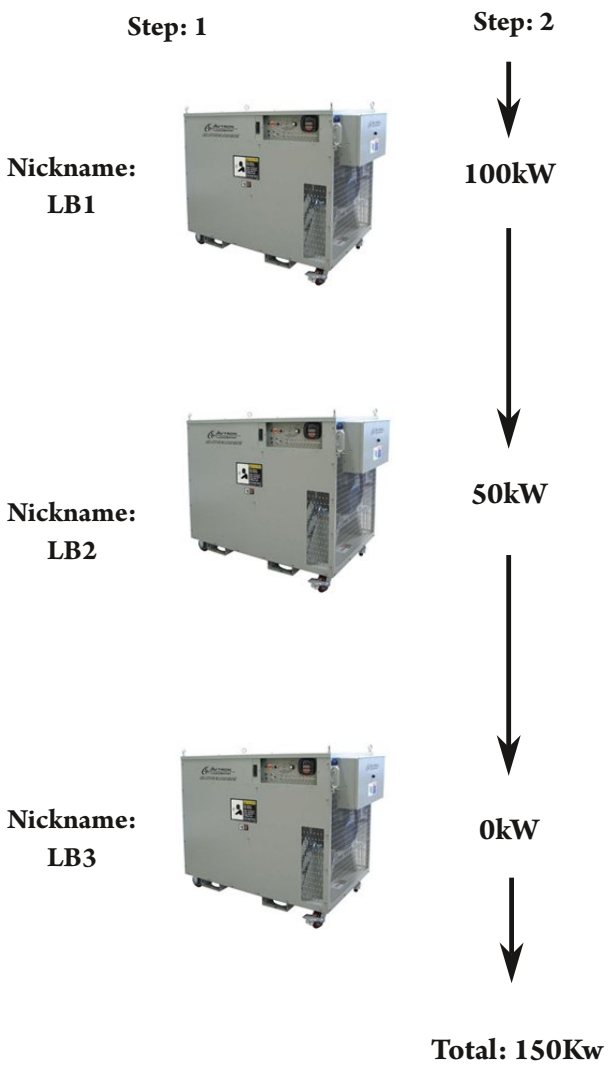
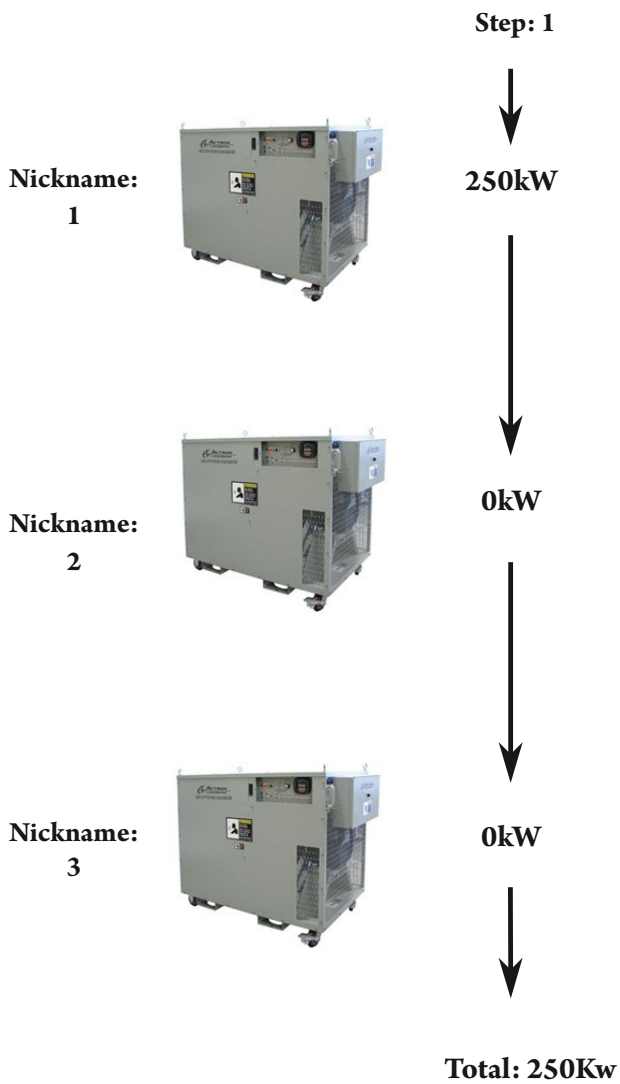
The algorithm for Nickname Mode:

1. Inventory all available LoadBanks and sort by nickname. (asciibetical)
2. Add all available load steps starting in order, if no more are available or the target is not met move to the next load bank in the list.

Example 1:
Safety Max = 150
Input Voltage = 480
Voltage Mode = 480
Target = 100%
Calculated target = 150kW



Example 2:
Safety Max = 900
Design Max = 500
Input Voltage = 480
Voltage Mode = 480
Target = 50%
Calculated target = 250kw



Note: LoadBanks do not physically need to be connected in any particular order, changing the software settings will change the sorted order the load is applied.

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Description:
To control multiple groups with a time slice for each step

How to Use Tab Summary:

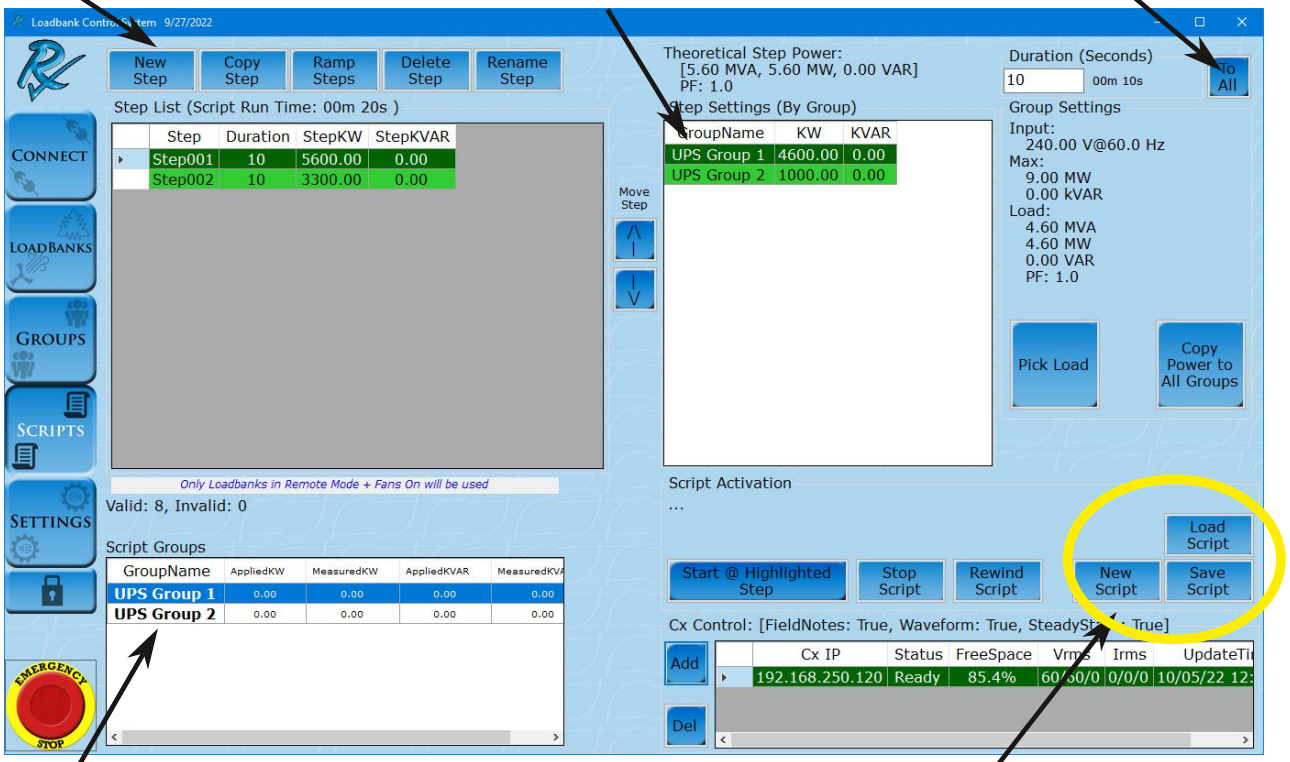
- Create a New Step
- Set Duration in the top right of the screen for seconds step should occur
- Highlight Group under Step Settings
- Pick Load for Highlighted Group
- If multiple groups, Pick Load for each group separately or hit Copy Power to All Groups
- Add next step by hitting New Step or Copy 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, Blower [Off], or Alarms) will not be taken into account when setting loads in step.

Start script writing process here

Groups to add Load will show here

Change Duration for each step
– Use the To All button to changes all step durations



All groups current load show here.

New Script: Restarts Step List.
Load Script: Load saved script.
Save Script: Save script for future use.

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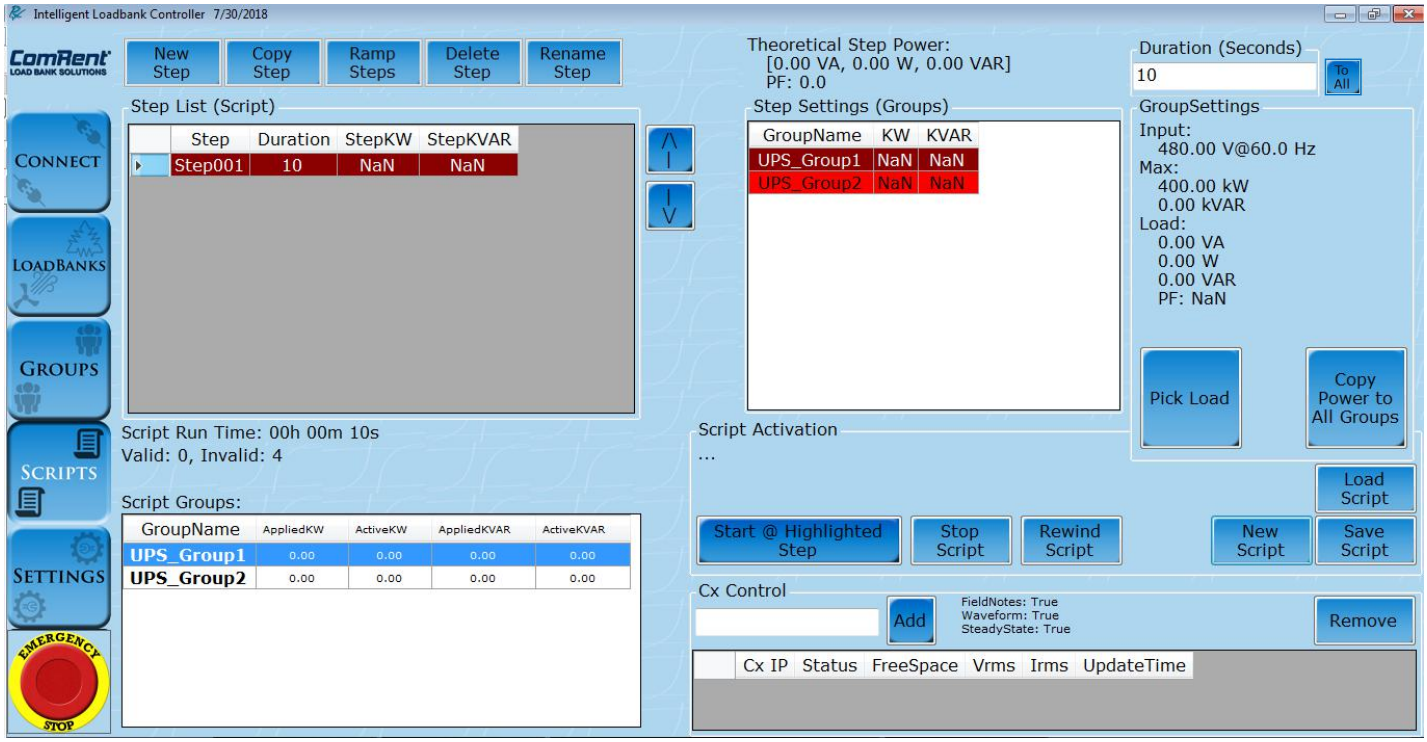
Start New Step

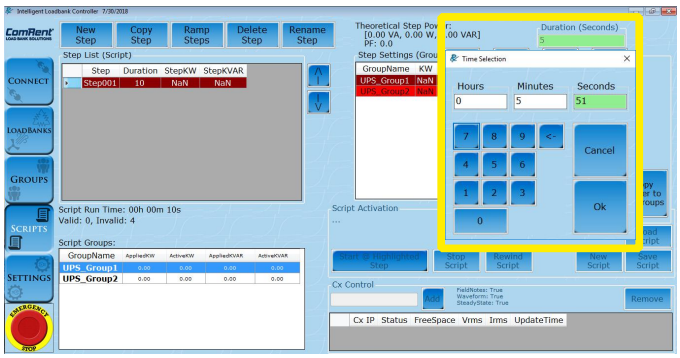
Groups will show up in the Step Settings as red until the load for each group is picked.



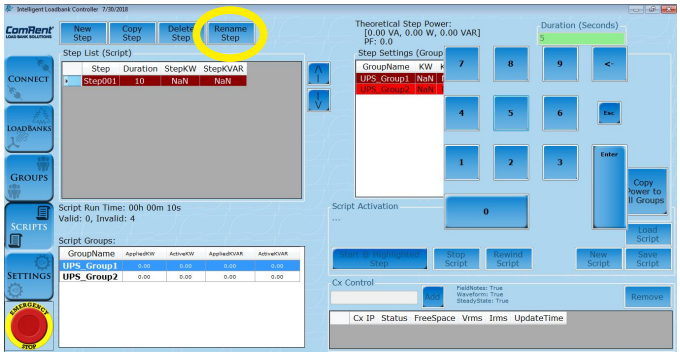
Set Duration

Press Duration and use key pad to set duration between 1 second and 1 day (duration must be entered in seconds).

If duration is being reduced, check the Max Script Duration on settings page.



Rename Step



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

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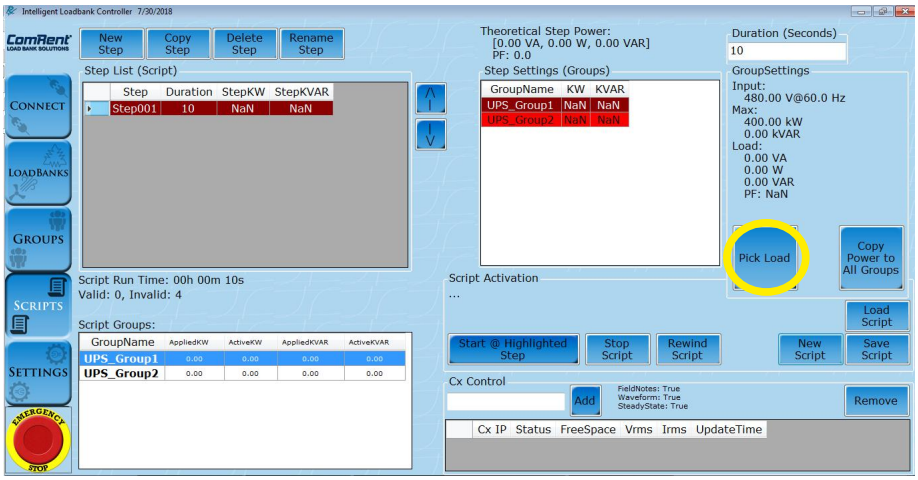
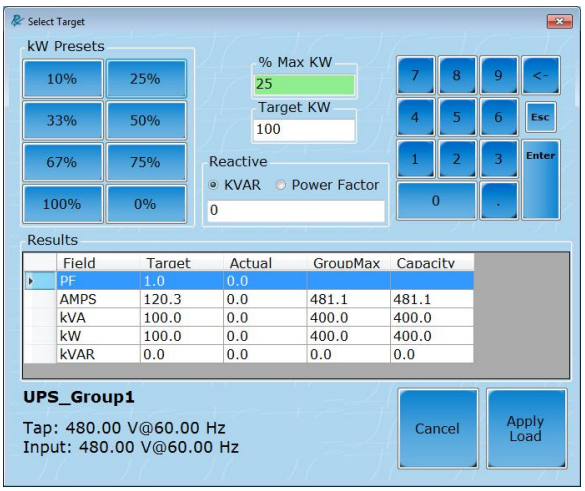
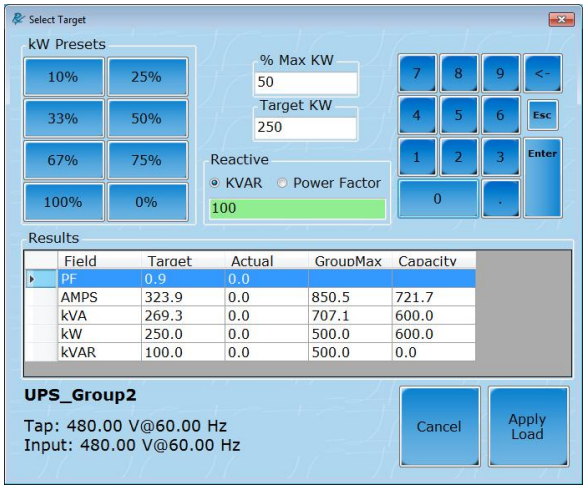
Highlight Group for the Step Settings and click Pick Load

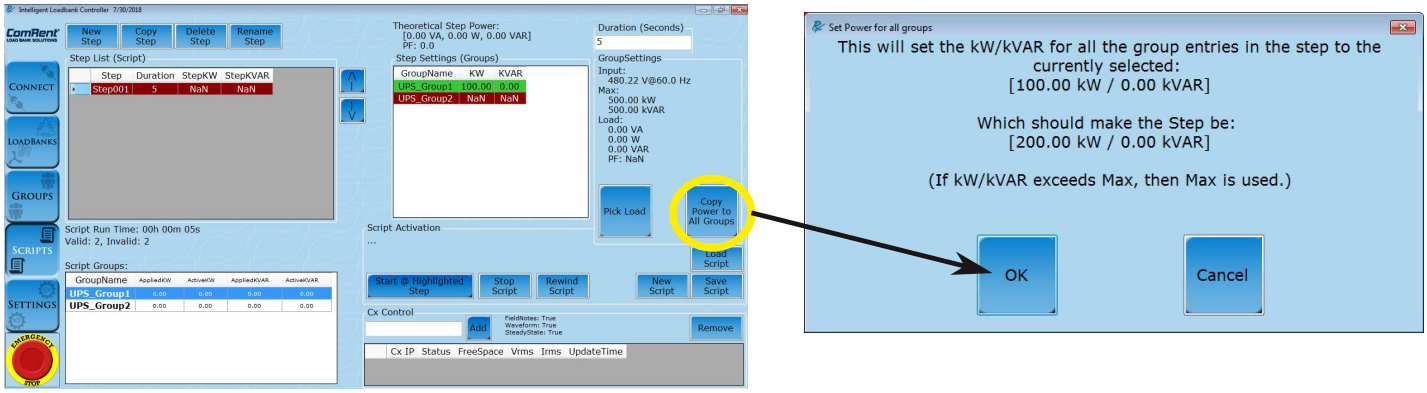


Set % Max KW (based on Group Settings in Groups tab) or Target KW.
Or if Group Settings uses Max KVAR then user can enter a KVAR or Power Factor.





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



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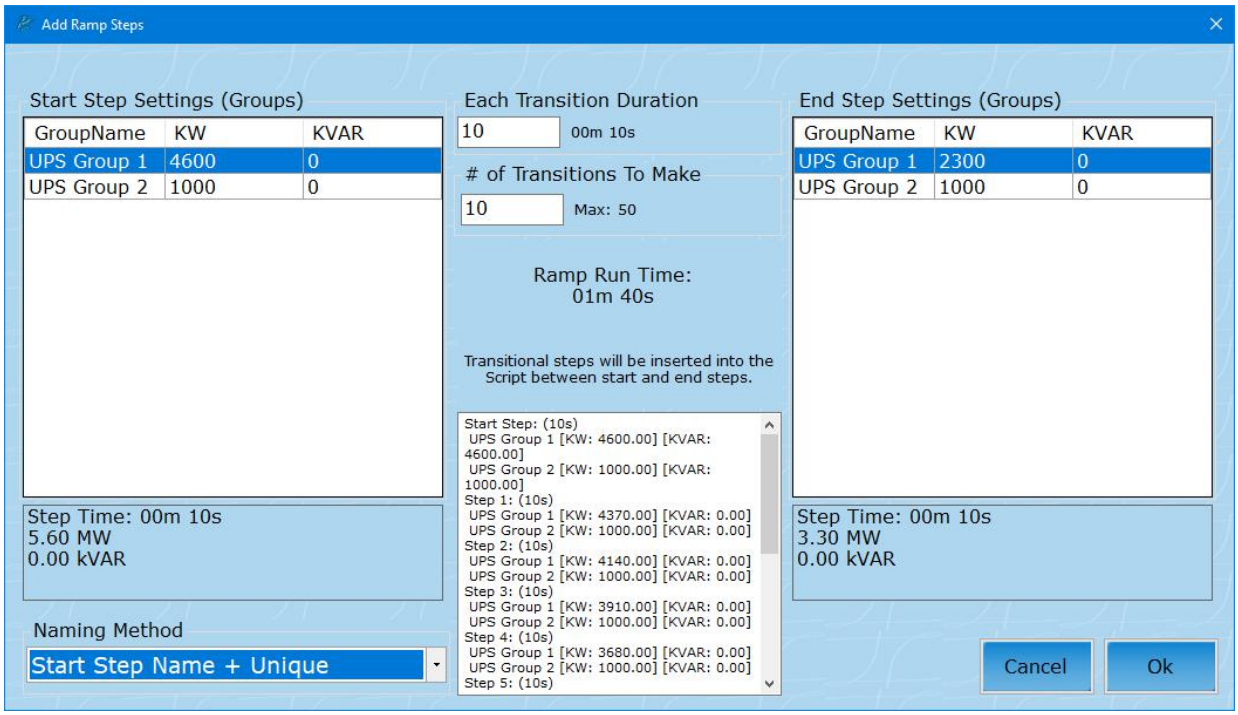
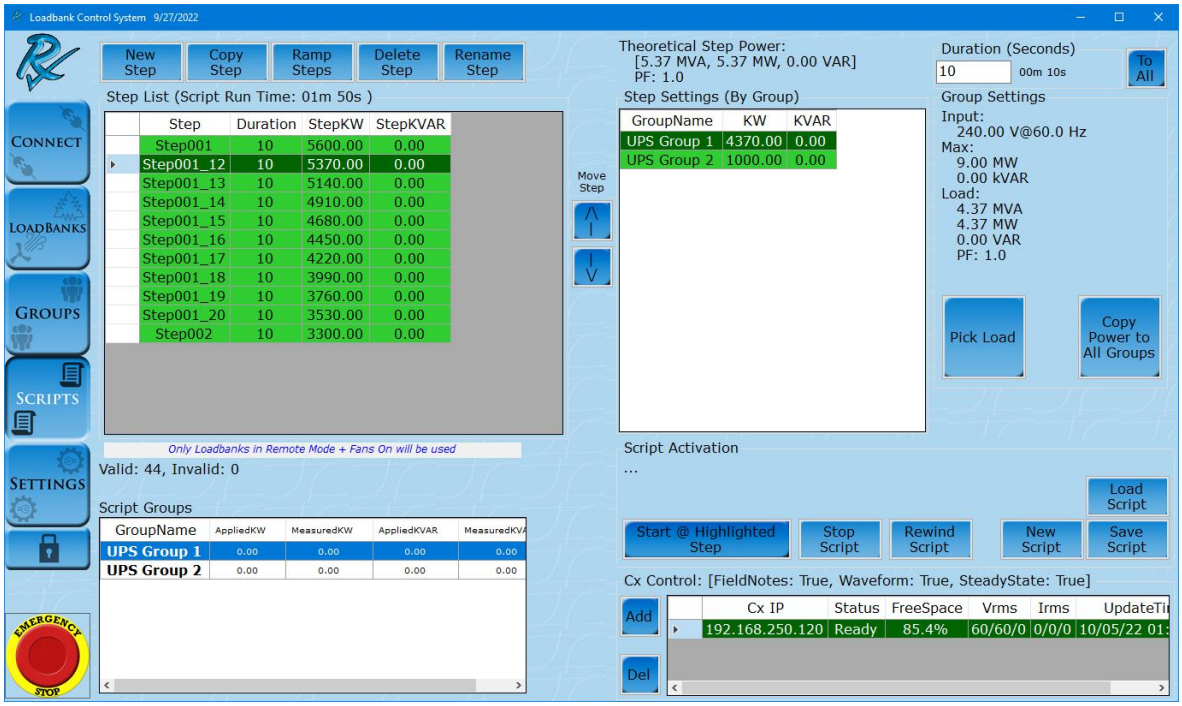
Ramp Steps require a starting step and an ending step to already be defined.



New steps will be created to fill in the transition from start to end.
Each group will be ramped against itself. *UPS Group 2* will maintain 1000 kW for all steps, while *UPS Group 1* will move by 230 kW each time.



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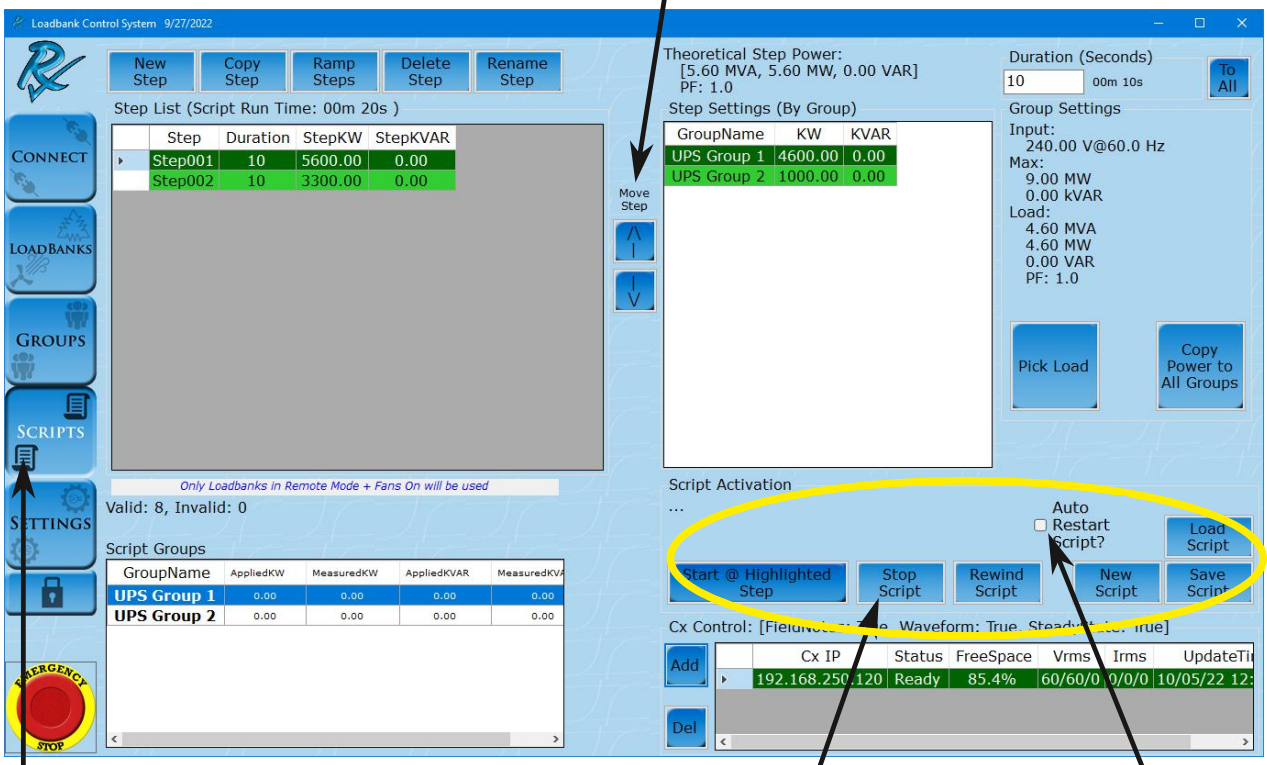
Groups that are not ready for load - not in Remote Mode, Blower [Off] or Alarms - will not be taken into account when setting load in a step.

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

Highlight:
Click on step to select it to change.

Reorder:
Push highlighted step up or down



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

"Play" symbol appears when script is running

Auto Restart Script: Restarts at beginning once the last step is complete. Will continue till stop is pressed.

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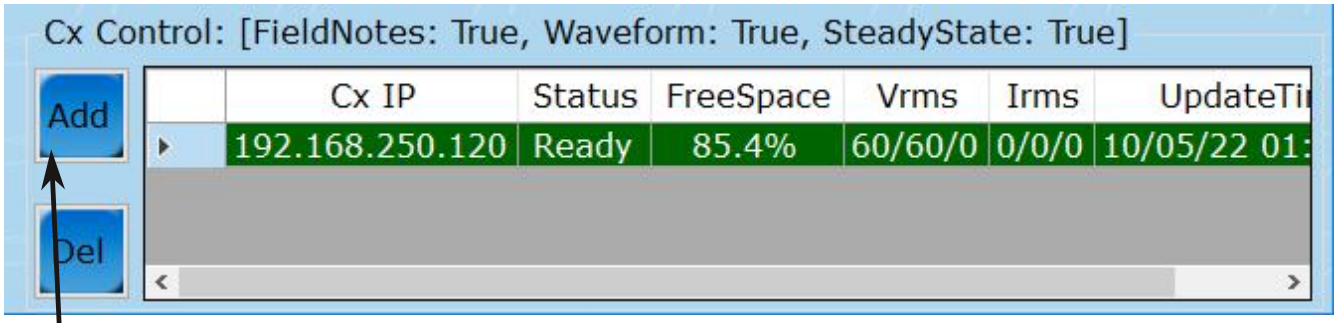

Cx Monitors are added by their IP Address, which can be found on their front screens.

Adding a Cx Monitor to scripting can help with automated data capture.

Each Cx will capture and store a waveform and field note during the steady state AND load step change through out the script.

Note: Cxs will need to be properly installed to corresponding locations before capturing data

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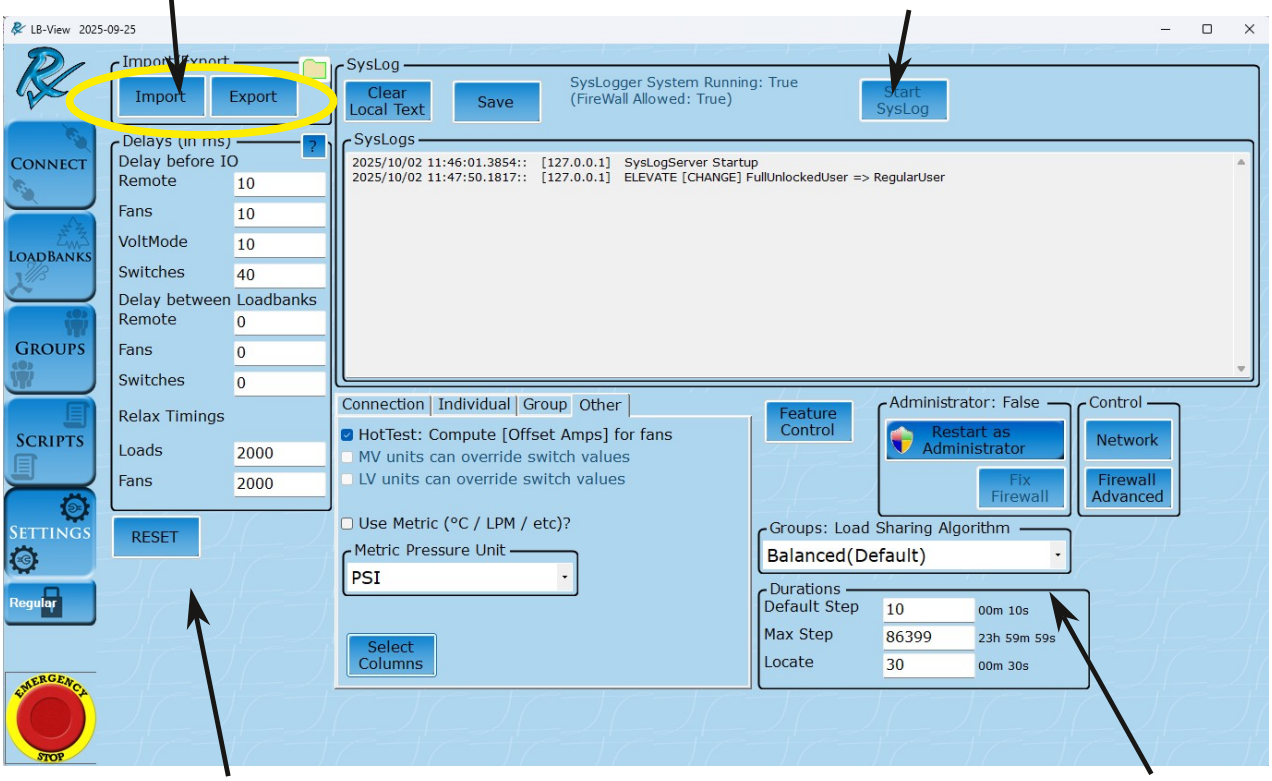
Import/Export: Makes it easy to switch computers or tablets keeping groups/ nicknames and settings.

Syslog: Running log of all activities performed (more on next page)
To operate make sure that the firewall on the PC is open for Syslog events.
FireWall Allowed must = True



Reset: Sets all setting to default

Group Sharing Algorithm: Changes the way the controller spreads the load to the loadbanks in a group. See ***how group sharing works*** section.

Delay before IO:
This section gives the ability to delay timings on each loadbank. In Milliseconds up to 6000 (6 seconds)

Default Step Duration: Length in seconds that a step is defaulted to in script page.
Max Step Duration: Limit script step to this length in seconds
Locate: Set the time period the LED of a LoadBank will flash once the "Locate Unit" or "Locate Group" button is hit.

Delay between Loadbanks:
This section gives the ability to slowly start and remove loads in group mode. Adds delays between commands to load banks. In Milliseconds up to 6000 (6 seconds)

Relax Timings: Set how long the controller locks out the commands after an action is deployed.

Override Switch Values: Low Voltage and Medium Voltage loadbanks honor switch values set in maintenance mode

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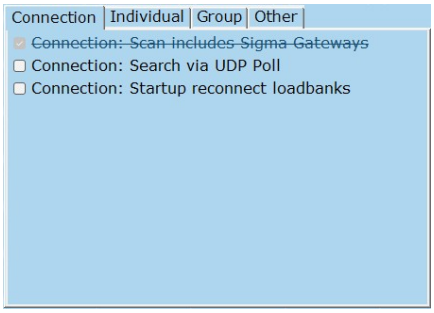
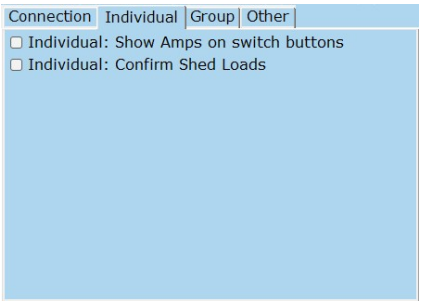
Connection Tab:



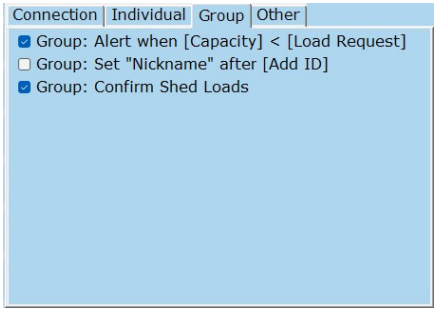
Search Via UDP Poll:
Alternate loadbank search method. Allows for use of larger networks.
This is unavailable with Sigma Gateway Scans
Startup reconnect loadbanks:
When software starts it reconnects to last loadbanks without a scan.

Individual Tab:



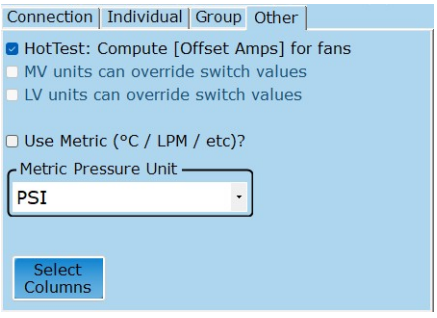
Show Amps on switch buttons:
On the pick load switches (Non gateway loadbanks) you can see the amperage that each step produces.
Confirm Shed Loads:
Confirm shed load button. (Adds extra popup)

Group Tab:



Alert when Capacity < request:
This gives a warning if you are not going to apply the load requested. (Not enough capacity in group)
Set "Nickname" After [Add group ID]:
If using the "Add ID" (See groups section) This is for scanning in codes.
A second box will open so a nickname can be entered.
Confirm Shed Loads:
Confirm shed load button in groups (Adds extra popup)

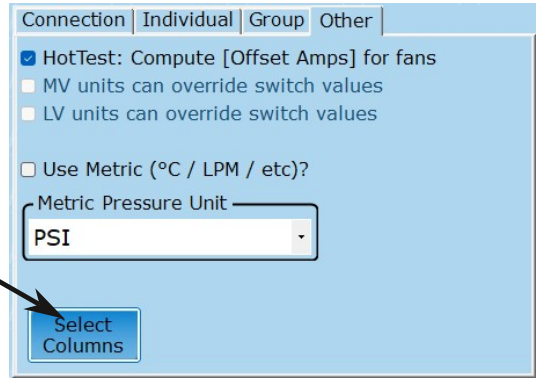
Other Tab:



HotTest: Compute [Offset Amps] for fans:
Maintenance mode item. This allows the fans to be turned on and load offset to be calculated before steps are added.

Use Metric : Selects C as Temp LPM as flow
Use dropdown box to select pressure.
PSI / kPA / Bar

Select Columns:

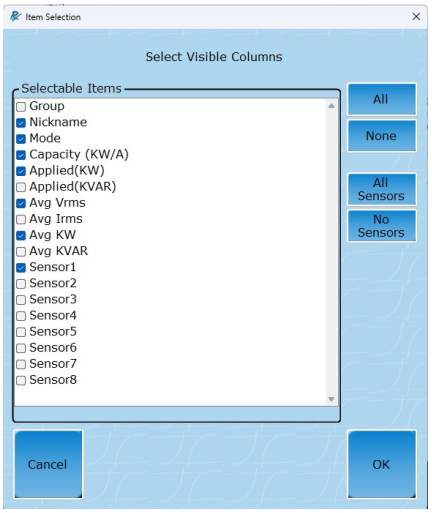


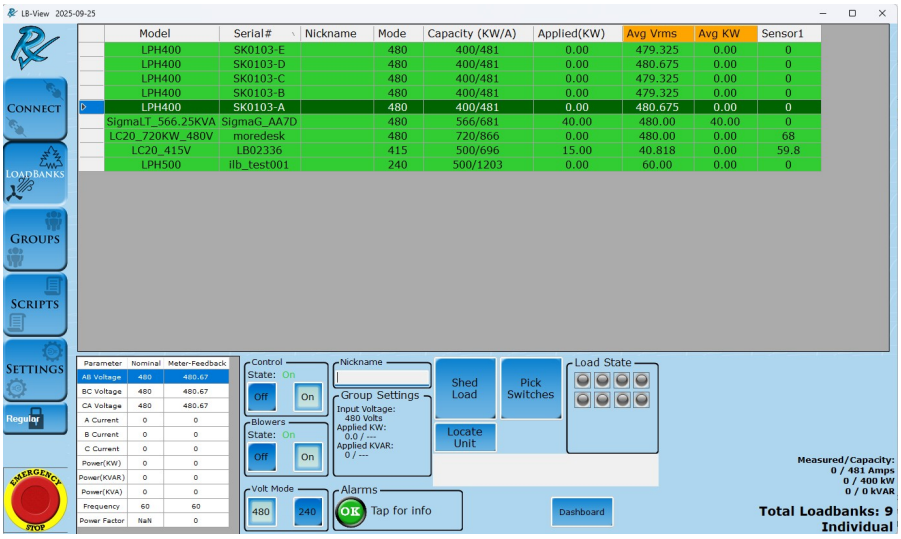
Select columns gives the user the abilty to Add / Remove columns in the Loadbank information table.
Sensors are modules specific. See below.

LC20
Sensor 1 = Flow
Sensor 2 = Tank 1 Temp
Sensor 3 = Tank 1 Pressure
Sensor 4 = Tank 2 Temp
Sensor 5 = Tank 2 Pressure
Sensor 6 = Inlet Temp
Sensor 7 = Outlet Temp

LC35
Sensor 1 = Flow
Sensor 2 = Tank 1 Temp
Sensor 3 = Tank 1 Pressure
Sensor 4 = Inlet Temp
Sensor 5 = Outlet Temp

Example:





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.

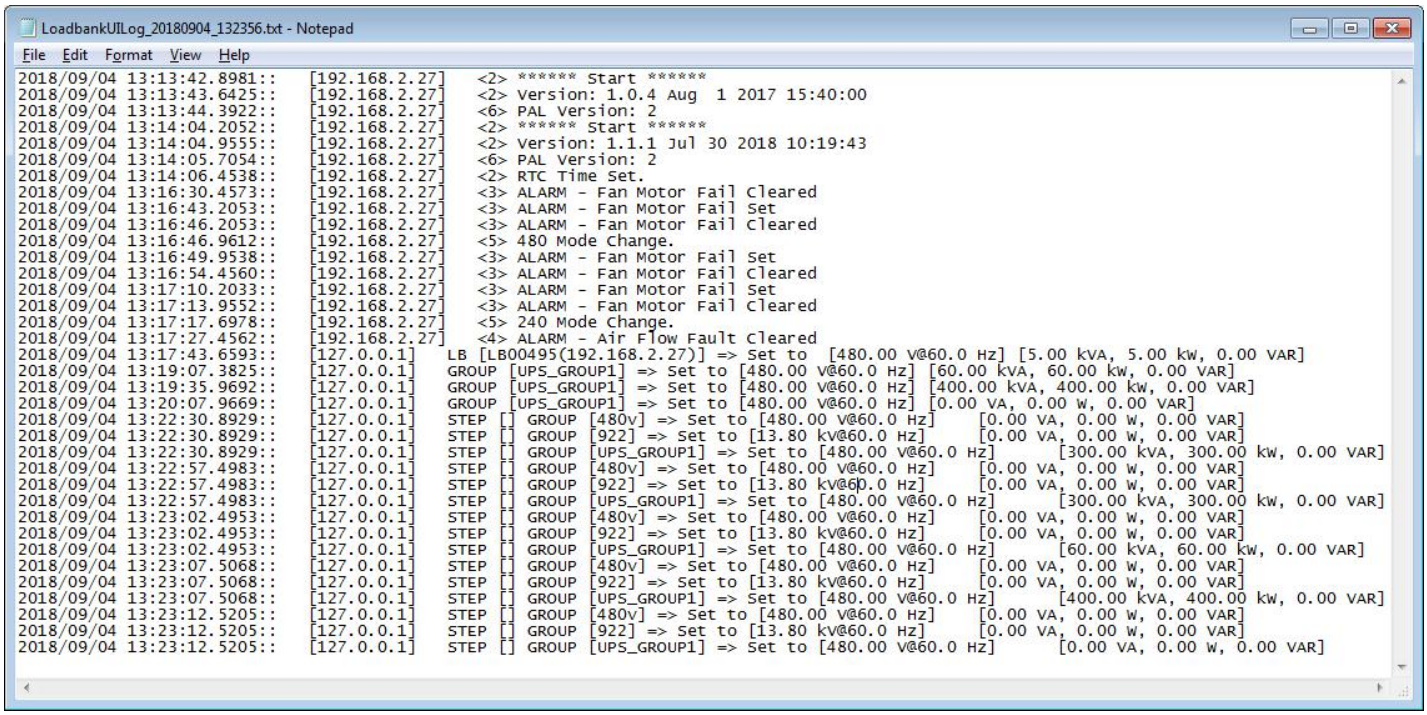
The Syslog can be saved as a text document to any device (pictured below).

Please note that the log is saved each day. See tab in feature control for info.

The log shows events in two different ways.

<u>Events about connectivity, firmware updates, and alarms:</u>
Date / Time / Connection IP Address / Event that occured

<u>Events derivived from user commands:</u>
Date / Time / Software IP Address / Tab Event Derived / LB Name or Group Name / LoadBank Settings / Actual load applied



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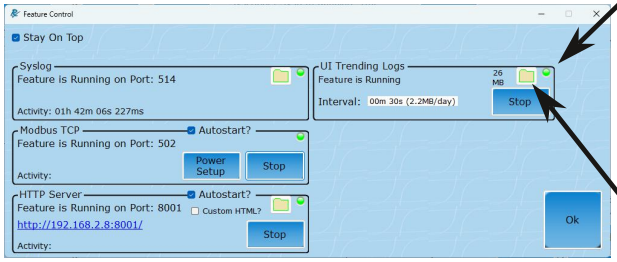
Enable PC Trending Logs:

Click "Feature Control" to enable feature

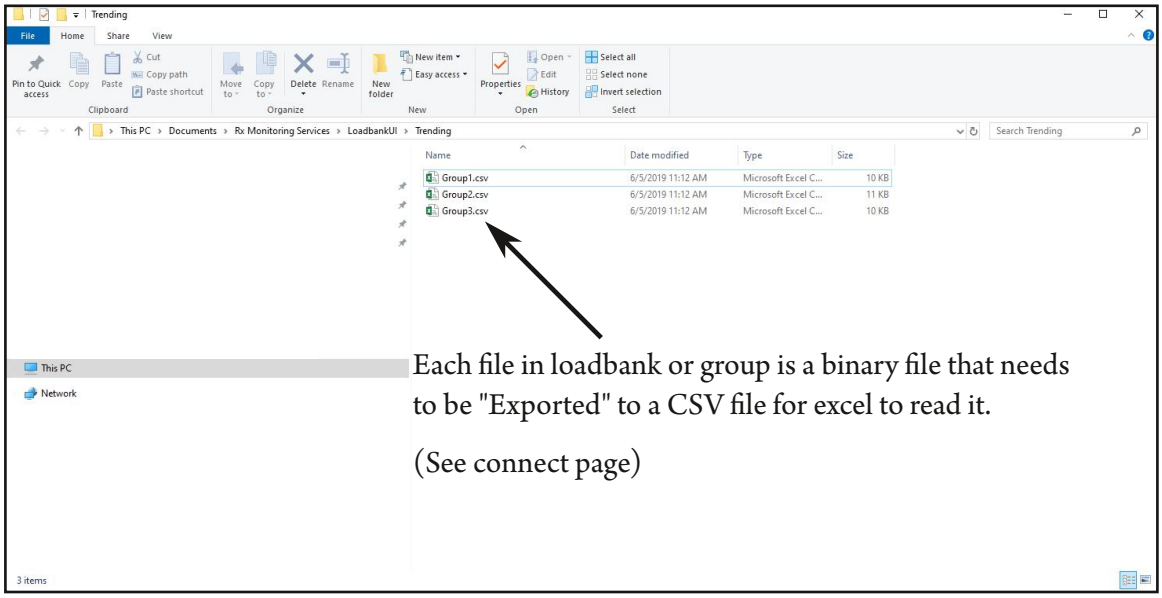
Click "Start" is not already started under section.

Green light means trending is logging to PC.



Click here to open windown explorer to logs directory or :

c:\Users\{currentUser}\Documents\Rx Monitoring Services\LoadbankUI\Trending\

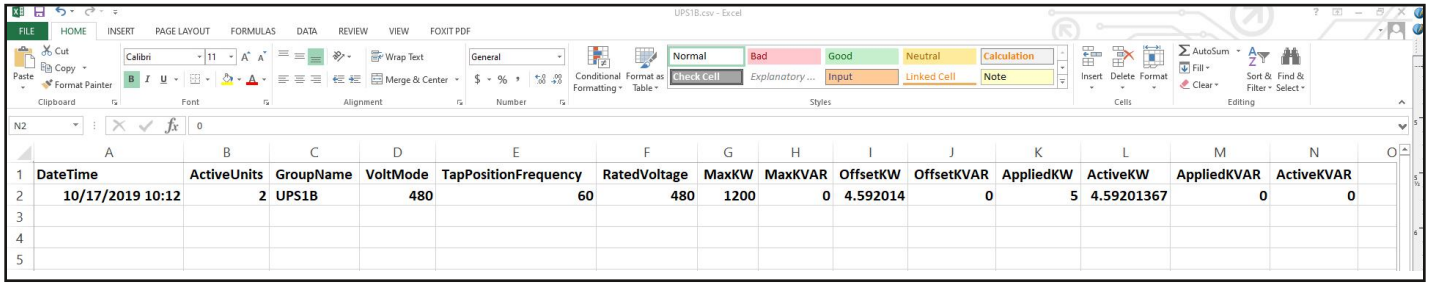


Each file in loadbank or group is a binary file that needs to be "Exported" to a CSV file for excel to read it.

(See connect page)

Output File Format (CSV) after export using "Export PC Logs" on connect screen.

Imports directly to Microsoft Excel



	A	B	C	D	E	F	G	H	I	J	K	L	M	N
1	DateTime	ActiveUnits	GroupName	VoltMode	TapPositionFrequency	RatedVoltage	MaxKW	MaxKVAR	OffsetKW	OffsetKVAR	AppliedKW	ActiveKW	AppliedKVAR	ActiveKVAR
2	10/17/2019 10:12	2	UPS1B	480	60	480	1200	0	4.592014	0	5	4.59201367	0	0
3														
4														
5														

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Modbus TCP Server:

The modbus server give the user the ability to set KW through a modbus interface.

This interface presents the attached loadbanks on the modbus interface as one group.

These settings for that group are under the "Power Setup" section.

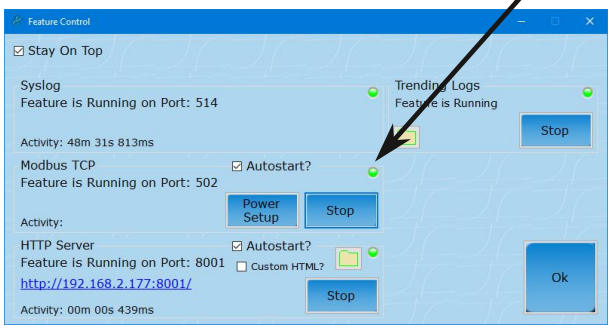
It also has the ability to read the values from each individual load bank.
See "TCP_MODBUS_MAP" For register definitions.

Enable Modbus TCP Server:

Click "Feature Control" to enable feature

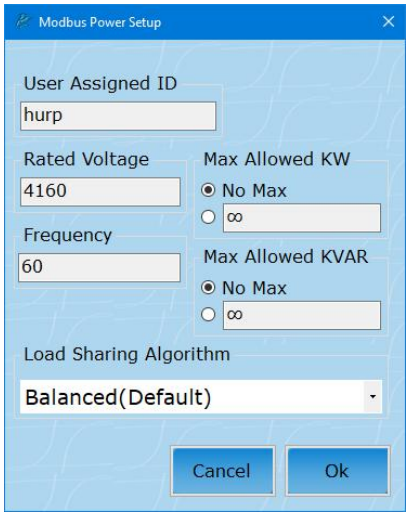
Click "Start" is not already started under section.

Green light means Modbus TCP server is running on PC.



Settings are similar to ones needed to define a group.

See group section in manual for explanation of functionality.



NOTE:

The green light needs to be illuminated to ensure that the server is running. If it will not start go back to settings page and click "**Restart as Administrator**" to restart the Intelligent Loadbank Controller with elevated permissions to open ports.

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HTTP Server (Read Only):

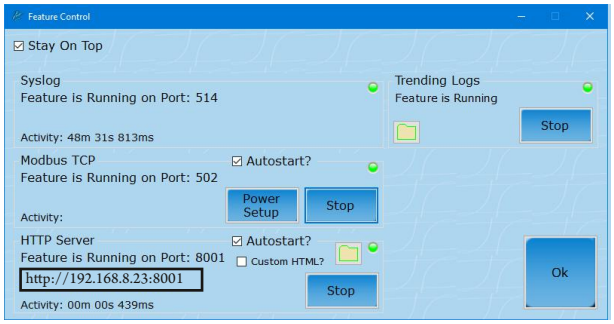
The HTTP server give the user the ability to see the connected loadbanks through a web address from the Intelligent Loadbank Controller.

The web address is the computers IP address on port 8001:

http://{PC IP ADDRESS}:8001

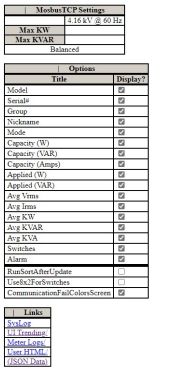
You can locate the PC IP address by going to the connect screen above "Scan Network"

Custom HTML:
The controller can have the default index.html overridden with a custom HTML web page if desired.

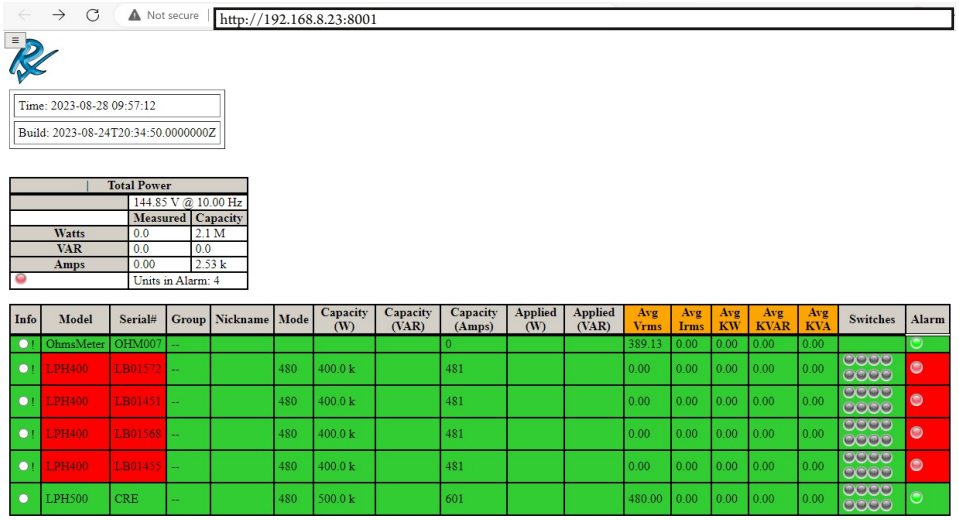


Default Website Option: Scoll to bottom of page.

Modbus TCP settings: Shows settings for the Modbus TCP group settings
Options: Add or remove columns from the website
Links: Click on to download or view available files from the controller.



Default website:



Total Power		
	144.85 V @ 10.00 Hz	
	Measured	Capacity
Watts	0.0	2.1 M
VAR	0.0	0.0
Amps	0.00	2.53 k
	Units in Alarm: 4	

Info	Model	Serial#	Group	Nickname	Mode	Capacity (W)	Capacity (VAR)	Capacity (Amps)	Applied (W)	Applied (VAR)	Avg Vrms	Avg Irms	Avg KW	Avg KVAR	Avg KVA	Switches	Alarm
I	OhmsMeter	OHM007	--					0			389.13	0.00	0.00	0.00	0.00		
I	LPH400	LB01572	--		480	400.0 k		481			0.00	0.00	0.00	0.00	0.00		
I	LPH400	LB01451	--		480	400.0 k		481			0.00	0.00	0.00	0.00	0.00		
I	LPH400	LB01568	--		480	400.0 k		481			0.00	0.00	0.00	0.00	0.00		
I	LPH400	LB01455	--		480	400.0 k		481			0.00	0.00	0.00	0.00	0.00		
	LPH500	CRE	--		480	500.0 k		601			480.00	0.00	0.00	0.00	0.00		

NOTE:

The green light needs to be illuminated to ensure that the server is running. If it will not start go back to settings page and click "**Restart as Administrator**" to restart the Intelligent Loadbank Controller with elevated permissions to open ports.

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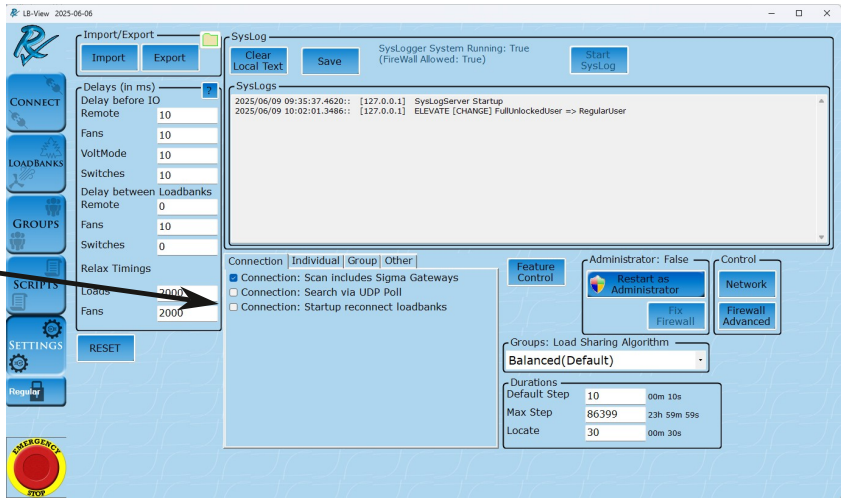
NOTE:
The loadbank controller supports Avtron's Wireless Sigma Gateway. To use the gateway with a LT or Sigma2 loadbank the controller must be on the same IP network as the gateway interface.

Strings of LT controllers are supported, but the software will only show the model "SigmaLT_{Capacity}"
The capacity will be of the entire string.
The software will also not be able to control a single loadbank in a string. It will be treated as a block.

To enable search for Sigma gateways Check "**Connection: Scan includes Sigma Gateways**" Under settings



For usage of the Sigma Wireless Platform see:

https://avtronpower.com/load-banks/load-bank-control/sigma-wireless-gateway/

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Low Flow is a de-rating for the liquid cooled loadbank when operating flow below the min required flow to support full power.

In "remote control" operation a new minimum flow requirement can be set. Reducing the overall capacity of the loadbank to give the option to run equipment at lower pumping rates.

NOTE:

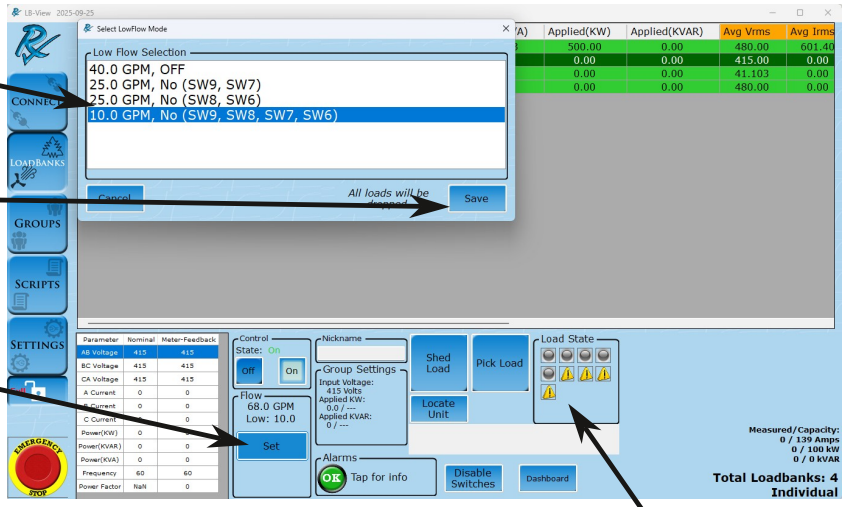
*** This feature is not available while using the manual switches ***

Select New Minimum flow rate

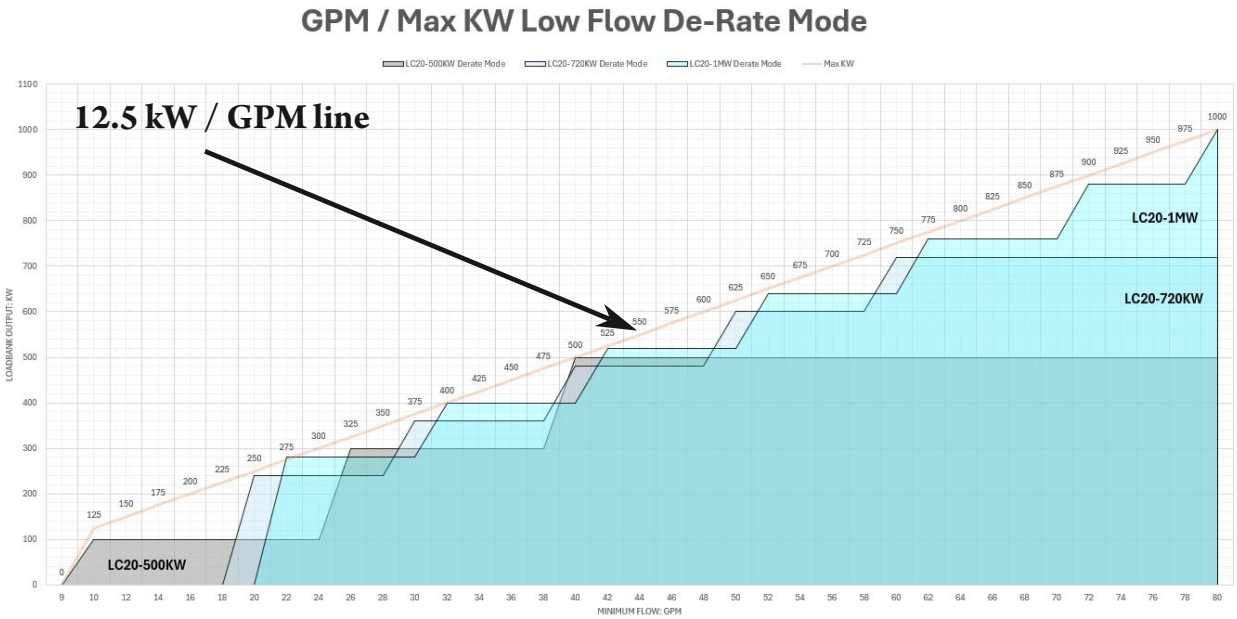
Click "Save"

Trigger Popup by clicking "Set"

Under Flow section



An ! replace switches that are disabled



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