# Intelligent Load Bank User Manual

Revised: Aug 2023

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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:*

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# Safety Information

## 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) | | |

## Symols

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 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.
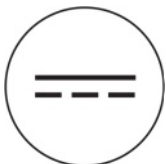
This symbol indicates DC only voltage or current

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 AC only voltage or current

This symbol indicates safety ground conductor.

This symbol indicates earth 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** |

# Table of Contents

# Introduction

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 10 /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**

- **Software:**
  The packages used with the 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 11/10
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:
Win10
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
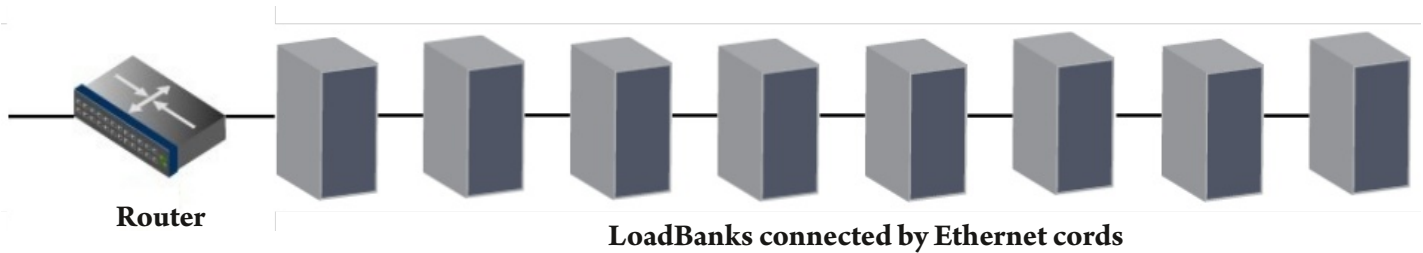
**LoadBanks:**
Up to 250 load banks

**Cx Monitor™**
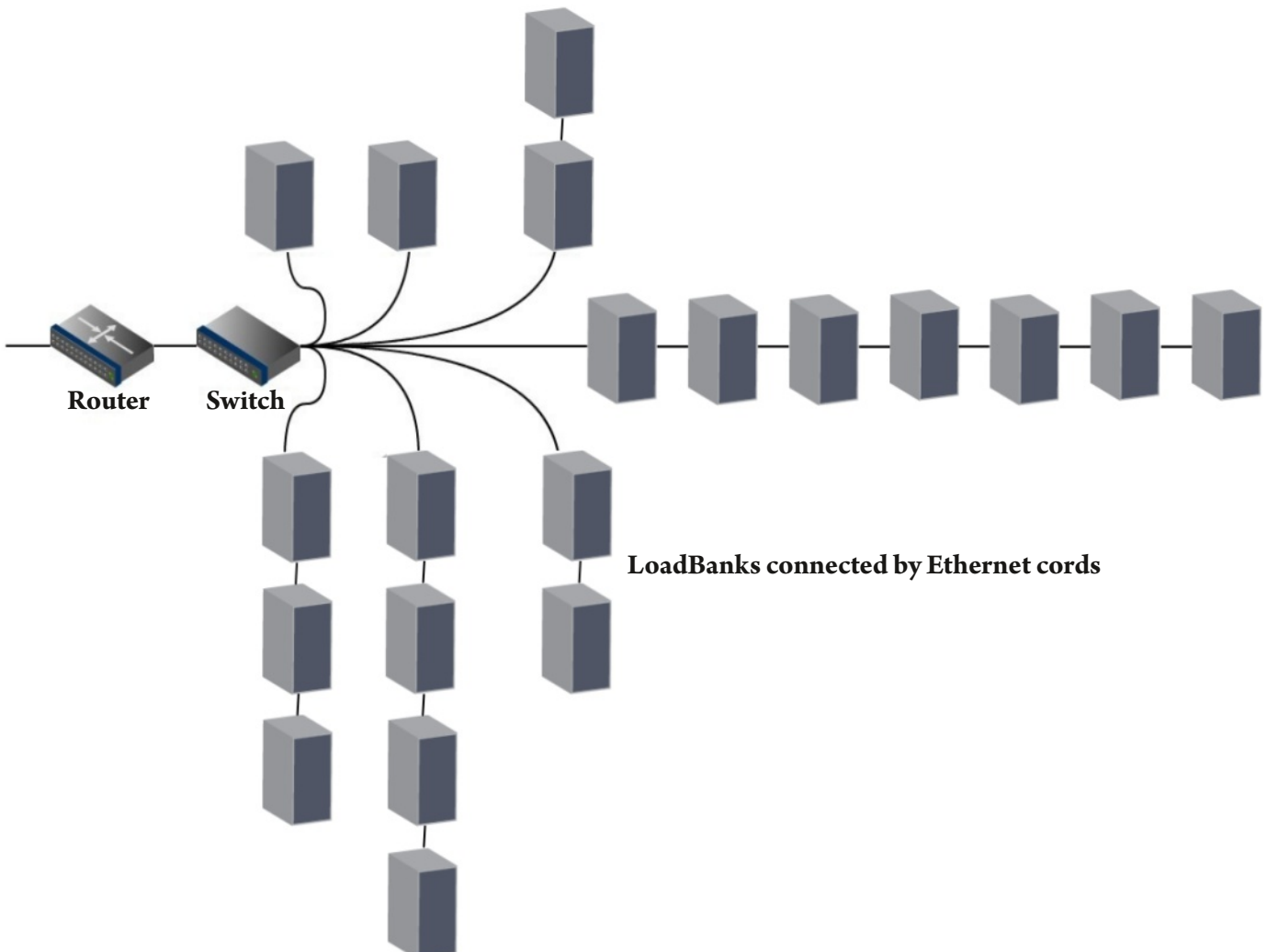Automatic Waveforms capture and
power readings

# 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.

**Router**

**LoadBanks connected by Ethernet cords**

**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.

**Router      Switch**

**LoadBanks connected by Ethernet cords**

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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.**

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

LED Lights

**5.** Plug router Ethernet (WAN) to tablet Ethernet adapter.
**6.** Plug router Ethernet (LAN) to the first LoadBank in the string.
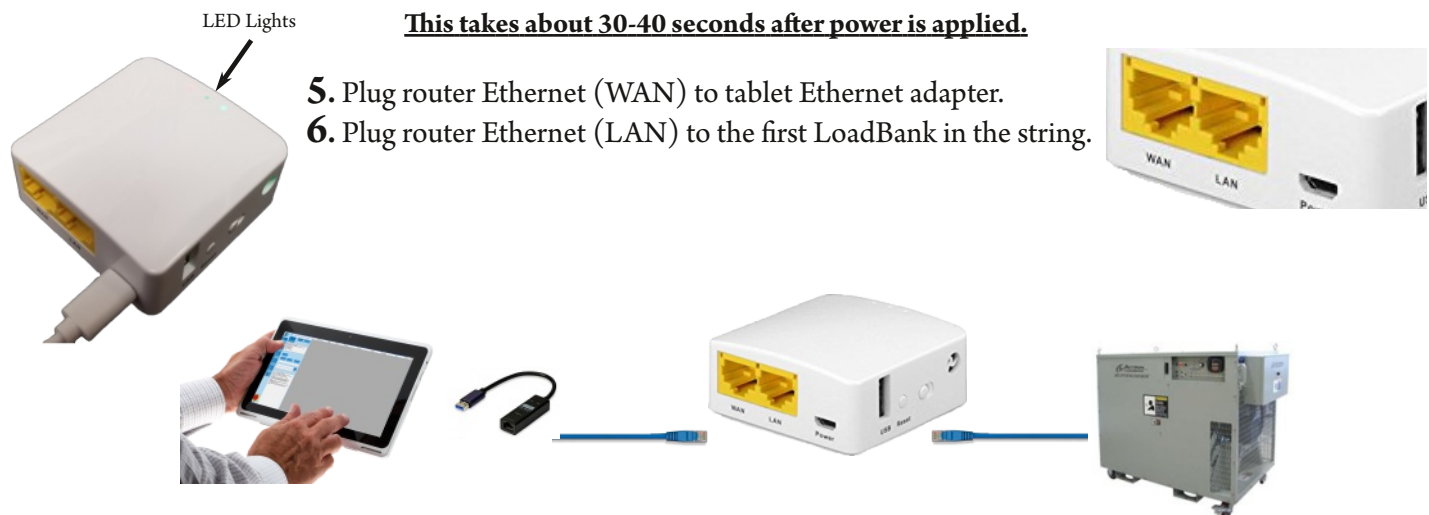


**7.** Double check the daisy chain connections (see previous page)

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

**9.** Start Intelligent Load Bank Software

Loadbank UI

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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.**

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

LED Lights

**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

Loadbank UI

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

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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*



*LPH400*



*LPH100 (TOP)*
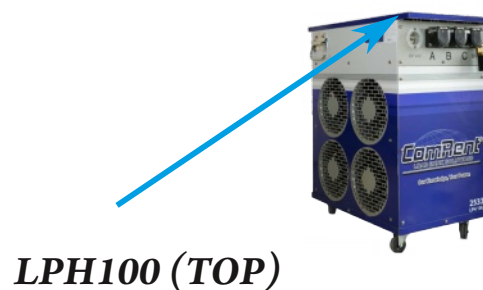
## *Intelligent Load Bank Software Installation*

1. Go to www.rxms.com
2. Go to Products/Software/Intelligent Load Bank
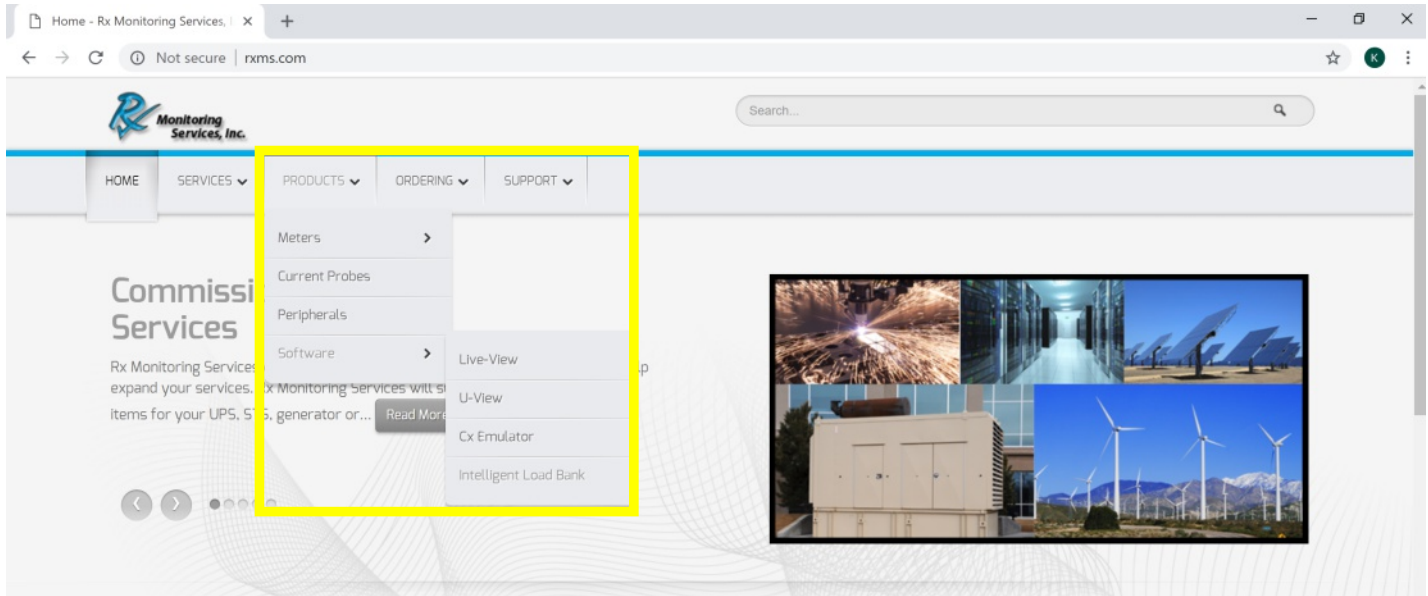


3. Under the Links box in the right-hand screen, click the link for Download.
4. The program might load and appear as a tab in the bottom left corner. Click on that tab to launch the installation wizard.

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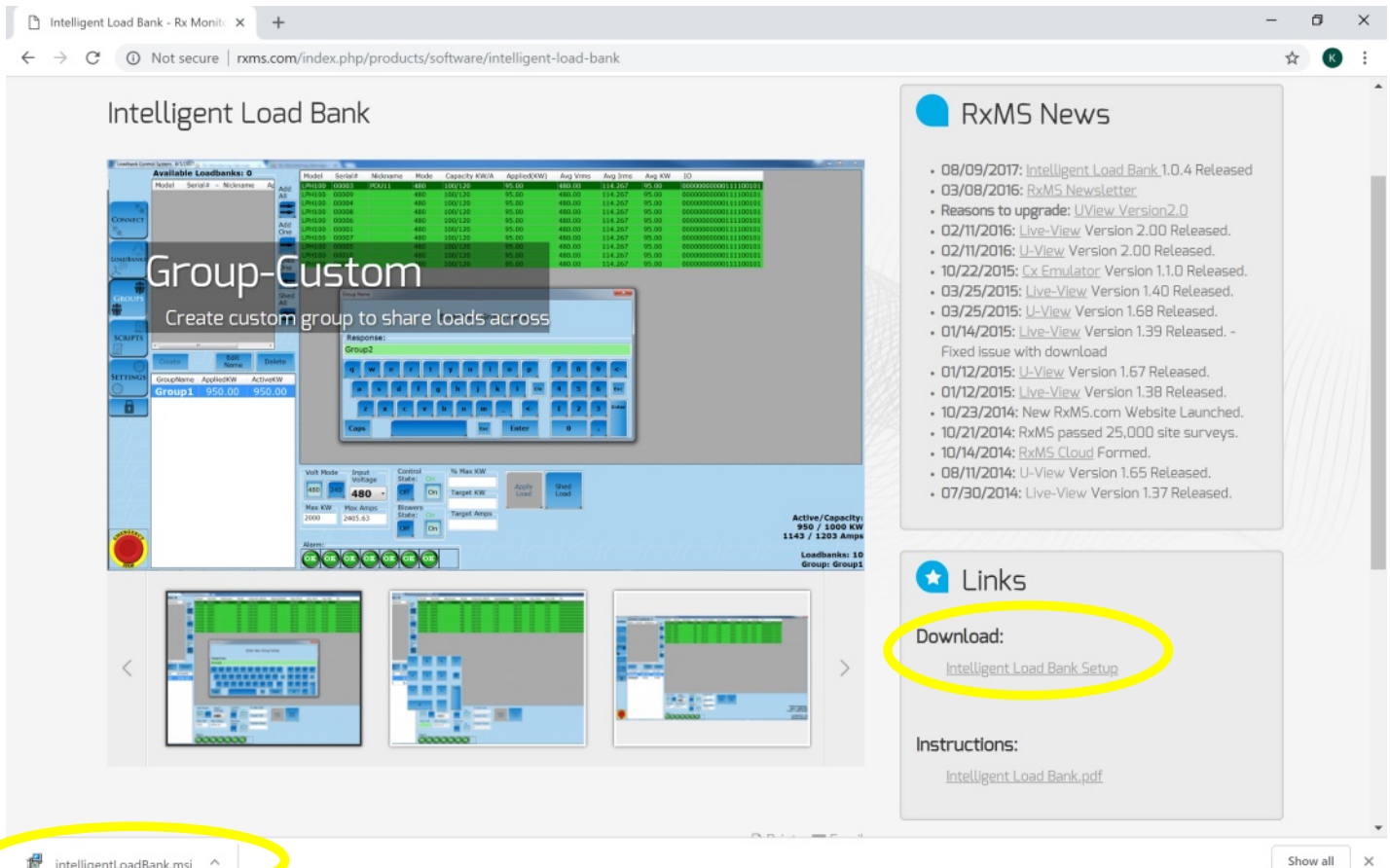
5. A warning from Windows might appear, click on More Info and the "Run anyway" button will appear. Click "Run anyway" to start installation wizard.
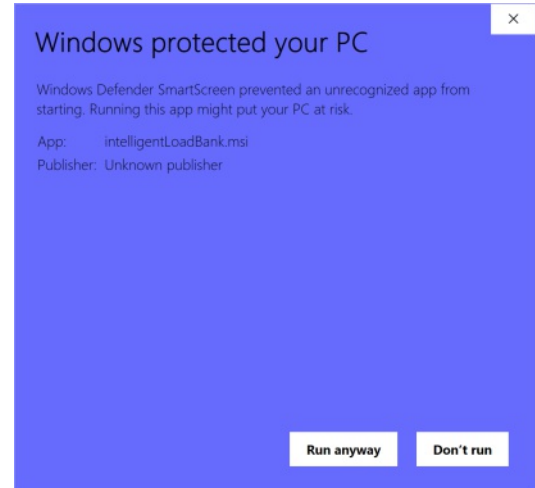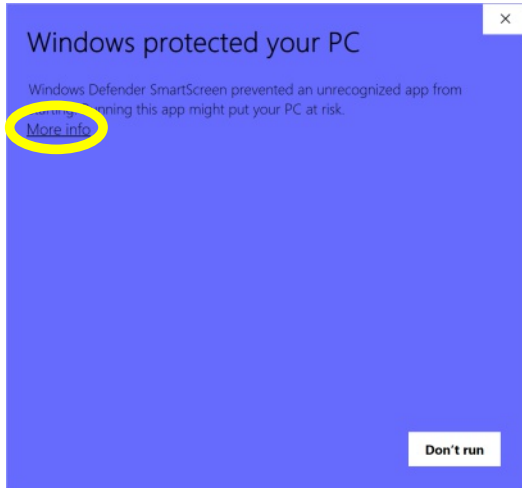


6. Once wizard starts, click "Next" for each prompt.

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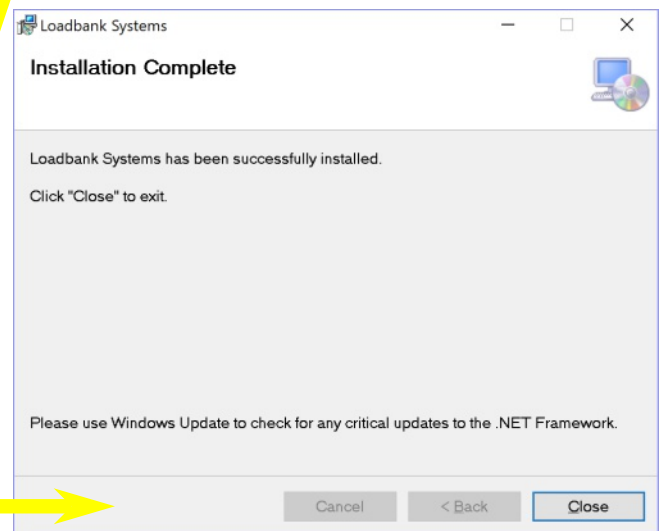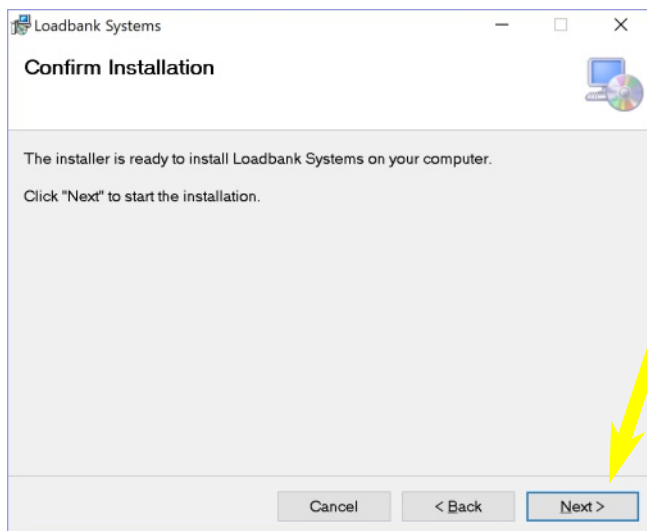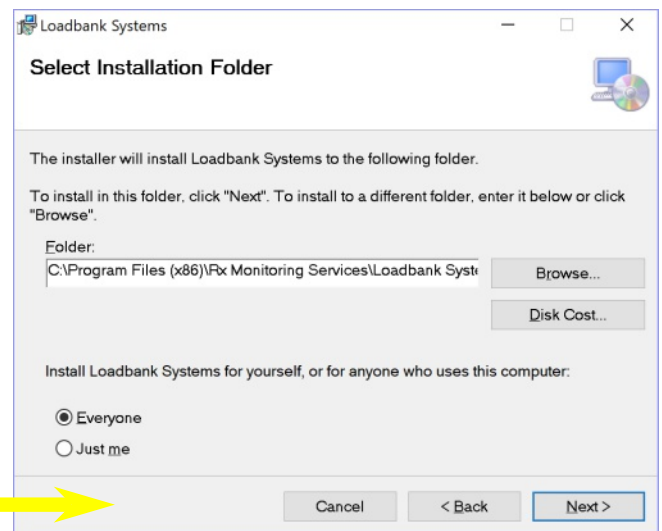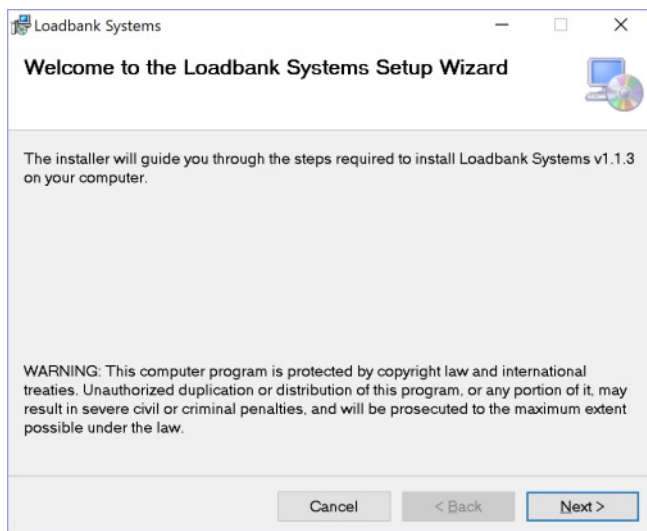
# Intelligent Load Bank Software

## 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 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.

## *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**
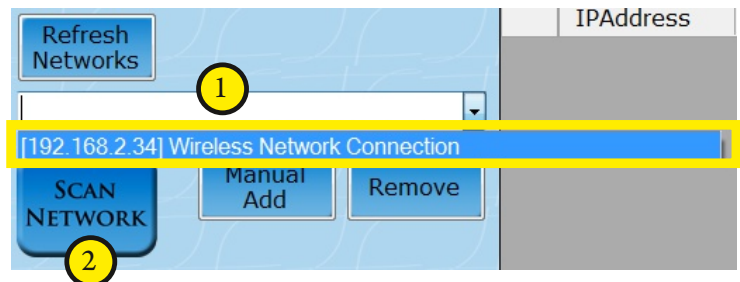
**The units show up the right table section.**

The color states of the units are below.

| | |
|---|---|
| **Green**: | Load Bank are working correctly. |
| **Red**: | 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. |

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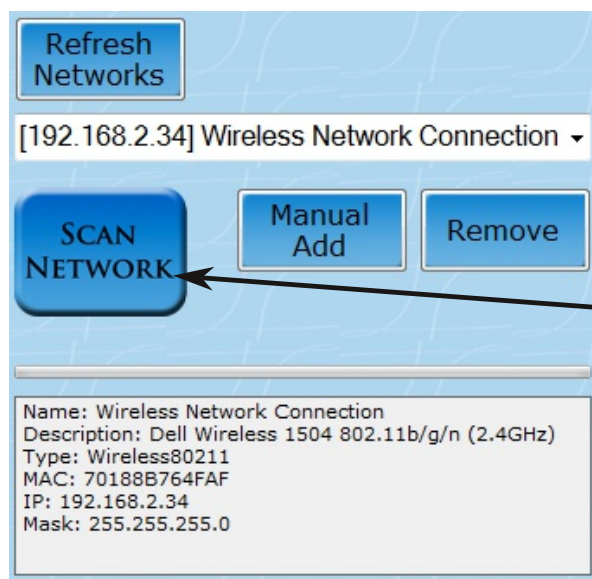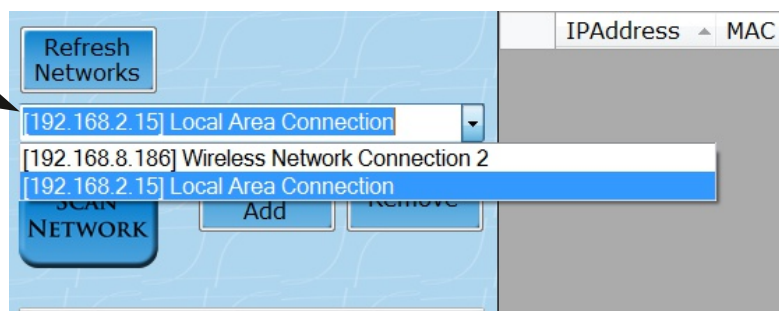
Click **Refresh Networks** to get a updated network list.

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.

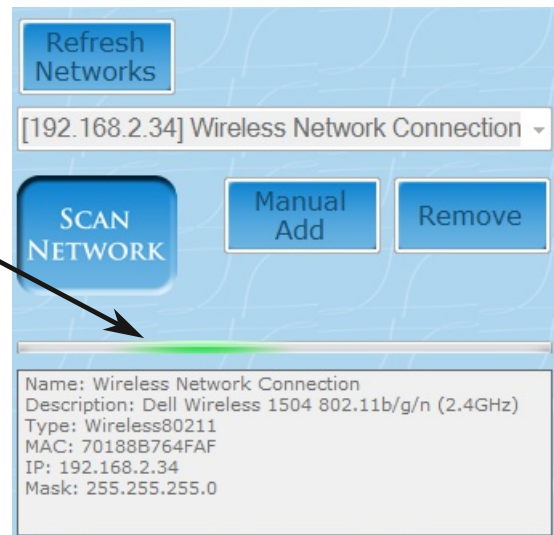Ethernet has lower latencies.





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

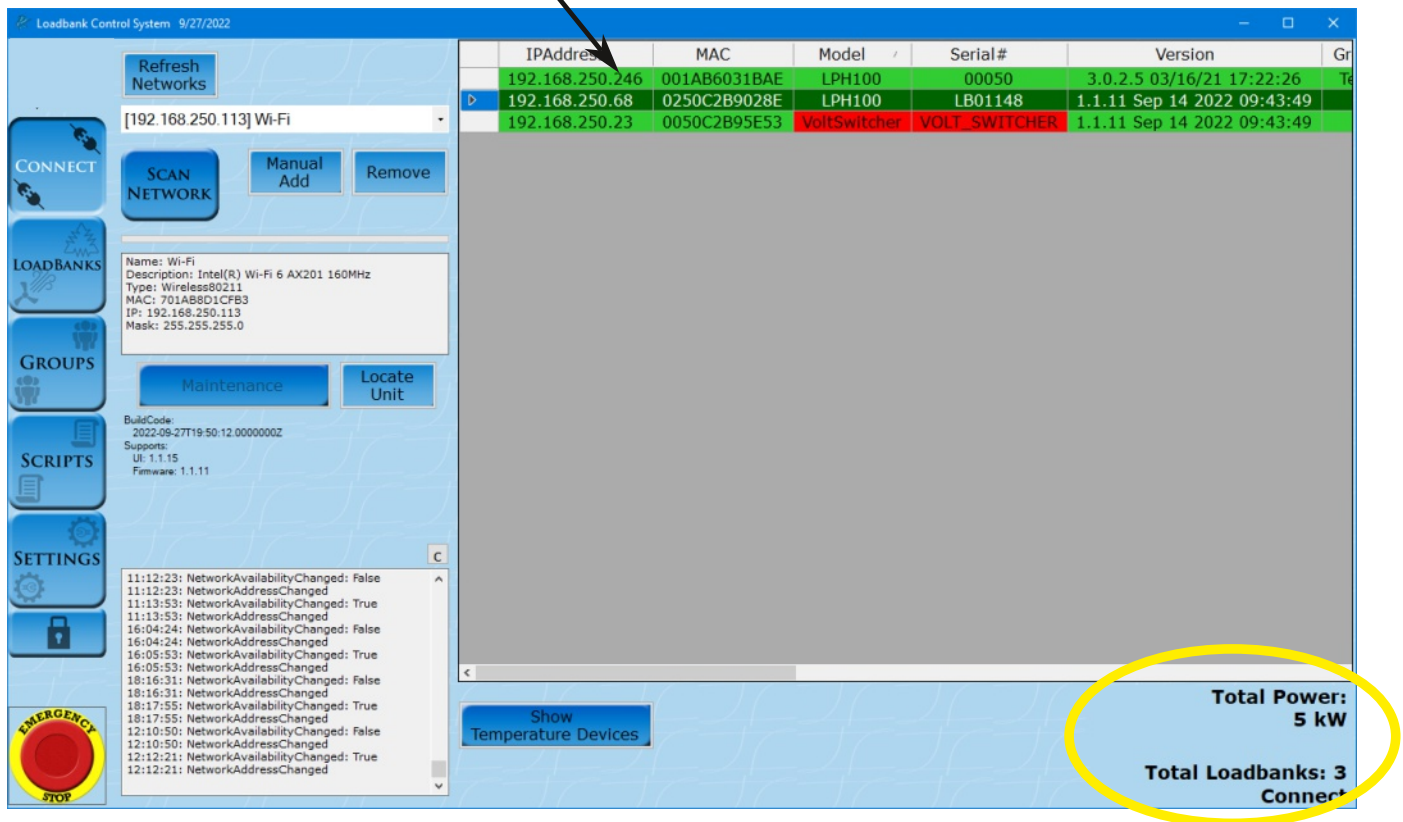If not all LoadBanks are present, hit Scan Network again until all LoadBanks are shown

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

A total 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 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:**

- 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
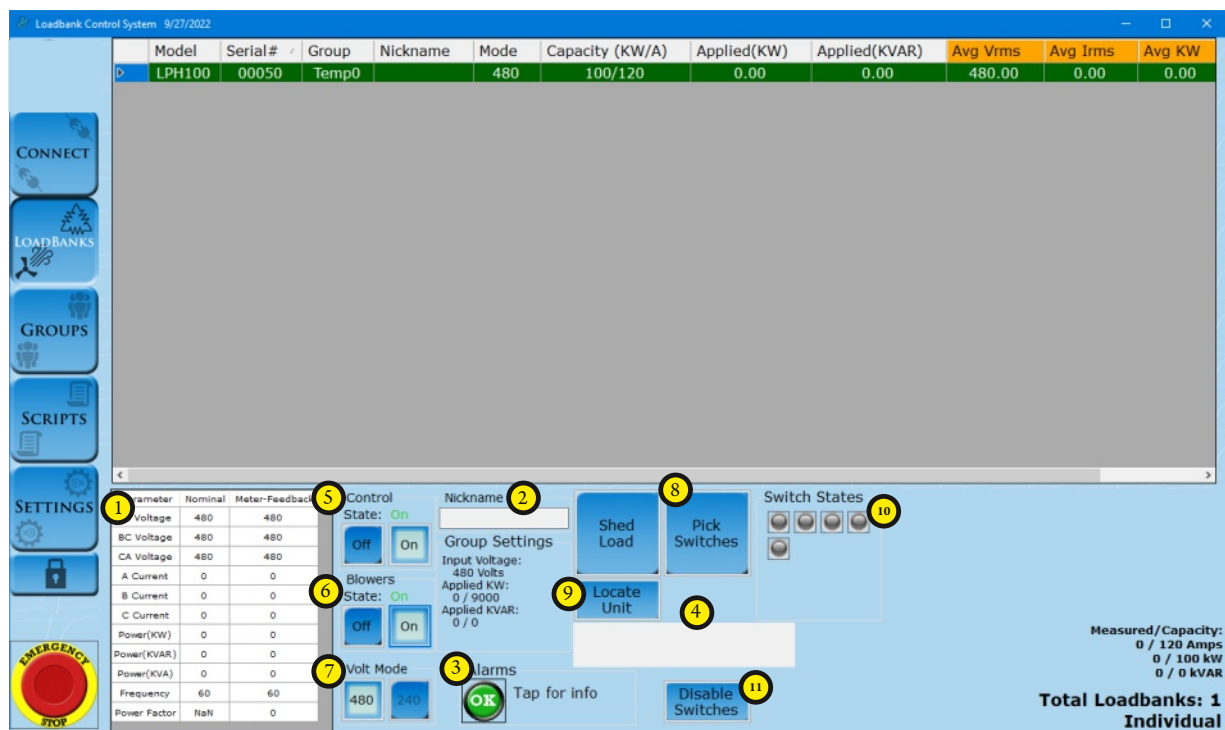


| 1. Power Values from Onboard Meter | 8. LoadBank Switches |
| 2. Nicknames | 9. Locate Unit (LED on the LoadBank will blink for a specified time) |
| 3. Alarms | 10. Switch state indicators |
| 4. Notification Bar | 11. Switch disabling |
| 5. Control State | |
| 6. Blowers State | |
| 7. Volt Mode | |

## 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

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 **Blower**s [On]
4. Click **Pick Switches**
5. Click kW values to add to queue (indicated in **pink**)
6. Check the total stated value that will be applied (indicated in **blue**)
7. Click **Apply Switches**



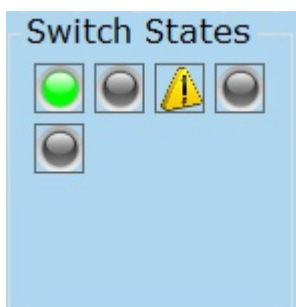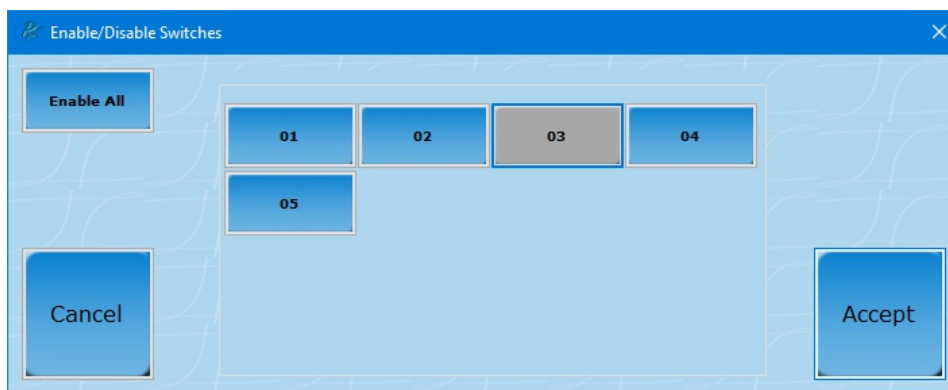Once the load is applied it will show up on the list in this spot.

**Disable Switches**

Requires a password ("power") each time unless in maintenance mode.

Switch is disabled for all Volt Modes/Tap Positions.

Only disabled for THAT instance of the UI software.

Does not stay with loadbank and if the UI closes for any reason you need to disable it again.
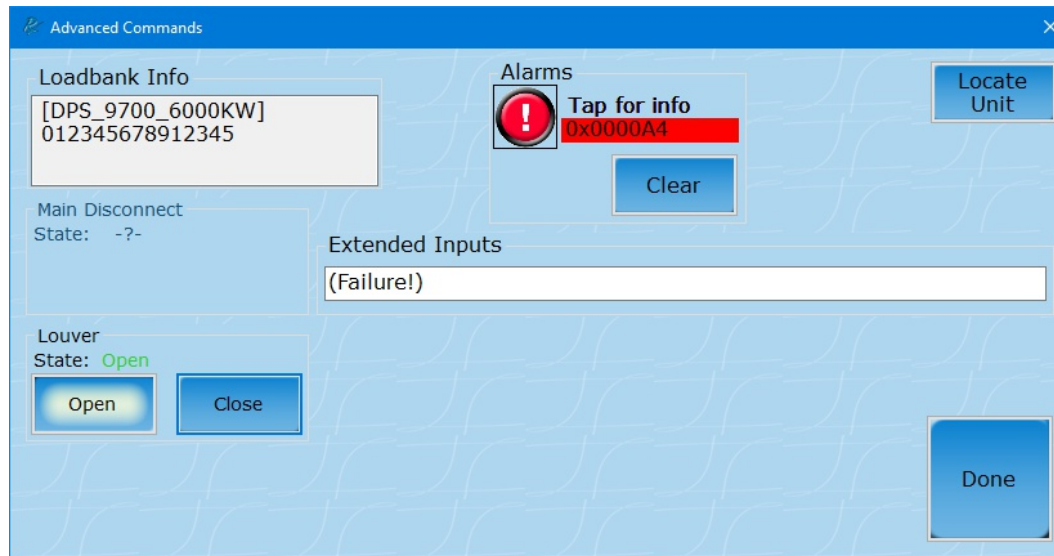




**Indicator lights (Switch States)**

Green - Load Step is Active

Gray - Load Step is Inactive

Warning - Load Step/Switch is disabled in software

Advanced Commands are dependent on loadbank features.

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

**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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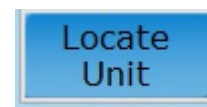
# Groups Tab

**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 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: 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**
>
> **Multi**: Allows selection of multiple units from the Available section.
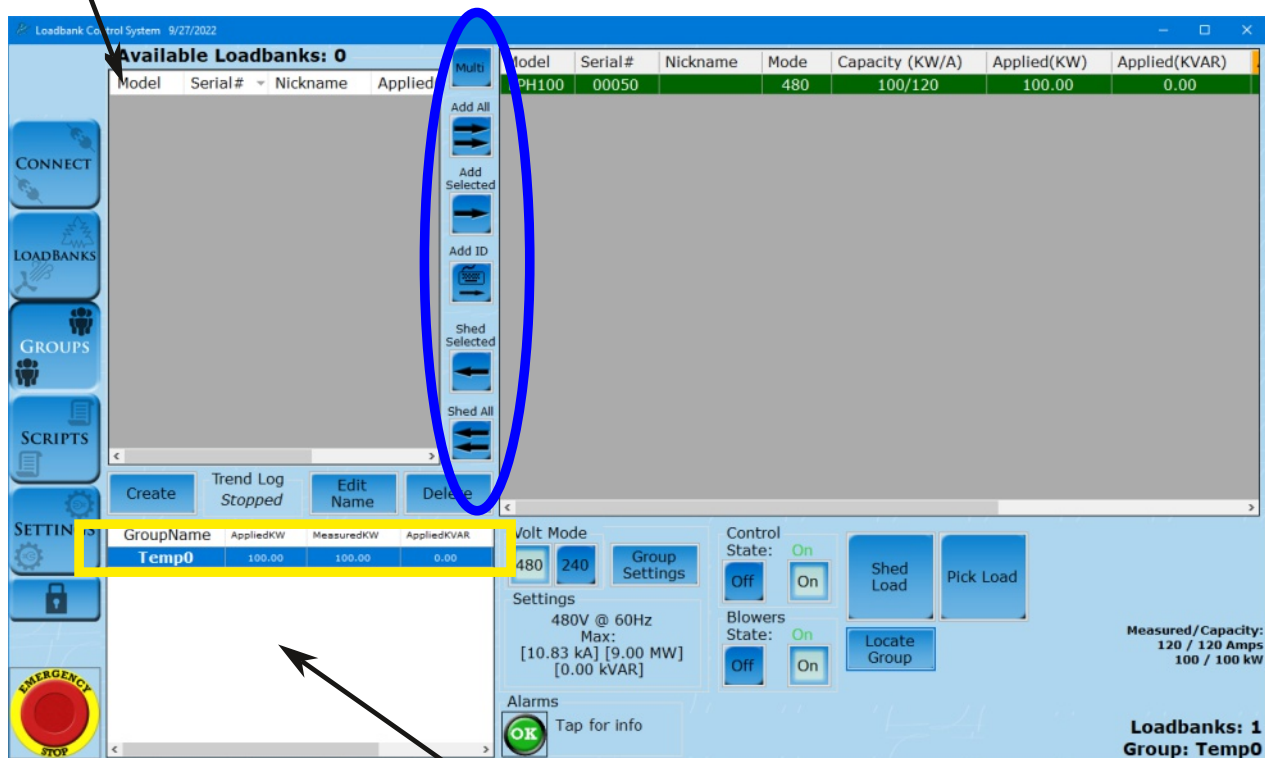>
> **Add All**: Takes all available load banks and adds to highlighted group.
>
> **Add One**: Takes highlighted unit from Available and puts in highlighted group.
>
> **Add ID**: Add by number will pop up a keyboard input (or scanner)
>
> **Shed One**: Removes highlighted loadbank from group and puts in Available.
>
> **Shed All**: Clears all loadbanks out of group and makes them Available for other groups.



**Highlight the group to add and subtract loadbanks.**

**Create:** Will start a new group.

**Edit Name:** Edit currently highlighted group name.

**Delete:** Removes highlighted group and makes loadbanks 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
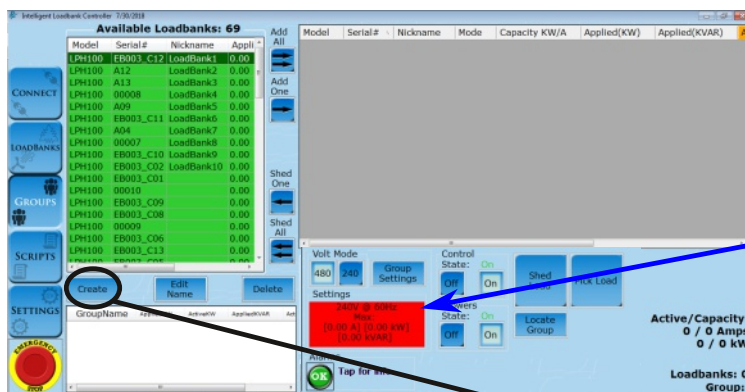


This area is red to indicate either the Group Settings have not been set or there is an issue with the settings that needs to be addressed.
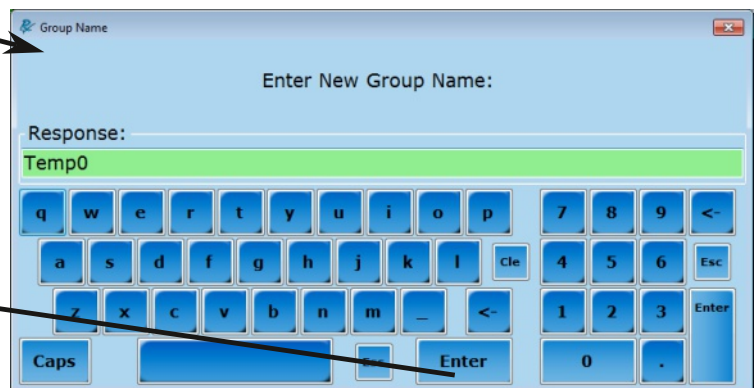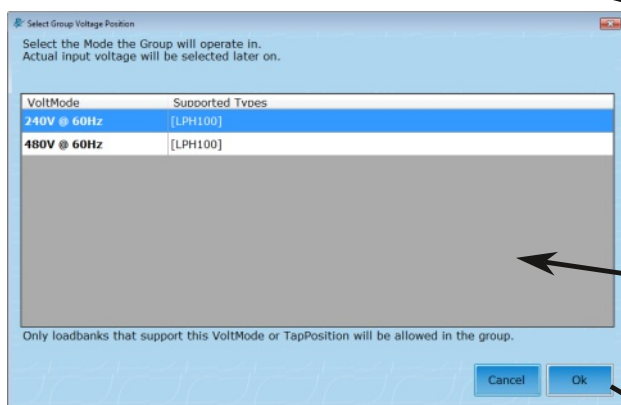




When creating a new group, a Voltage Mode must be selected. This selection is how the group will operate, not the actual input voltage. Only LoadBanks that support the selected mode will be allowed in the group.

For example, if 100kW LoadBank is in a 480V mode group and then the actual input voltage is 240V, the LoadBank can only produce 50kW. If the same LoadBank is in a 240V group, 480V will not be able to be selected as actual input voltage.

Note: Groups with Medium Voltage selected cannot be changed after the group is created, a new group would need to be created. Low modes can be changed with toggle switches after the group is set..

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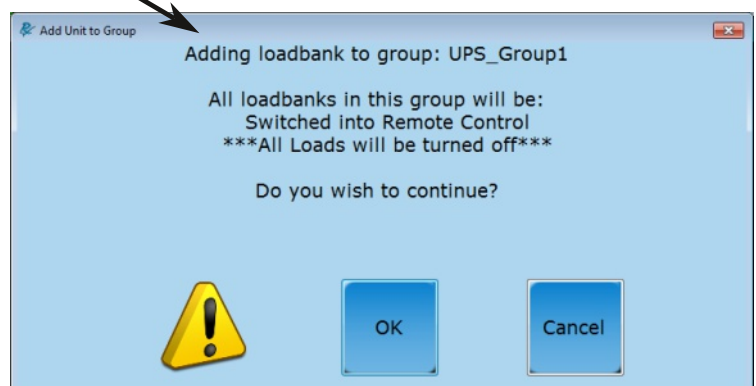
2. Highlight a Group from list of Groups in the lower left corner (indicated in pink)
   - The name of the Group selected will be displayed in the right bottom corner (pink star)

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**
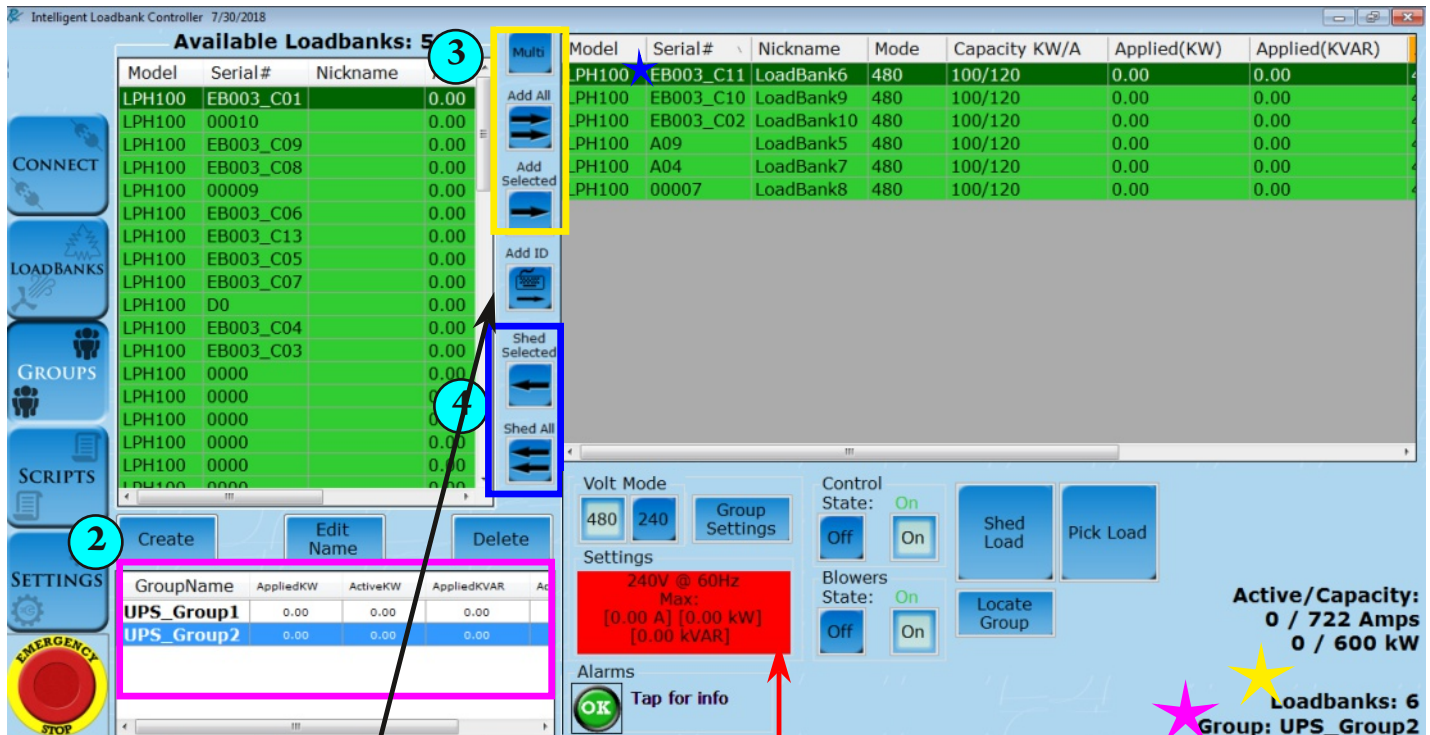


Click the **ADD ID** to pop up a text input sceen (Scanner ready) that can add an available load bank to the group selected.

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 excedded
- Voltage level is 110% of nominal

6.     Highlight GroupName to apply load from list of groups

7.     Check **Voltage Mode**, which was established when the Group was created and is LoadBank specific (indicated in <span style="color:green">green</span>)
   - Changing **Volt Mode** will shed all load in Group

8.     Click **Group Settings** (indicated in <mark>yellow</mark>)
   - 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 Max kW must be filled out
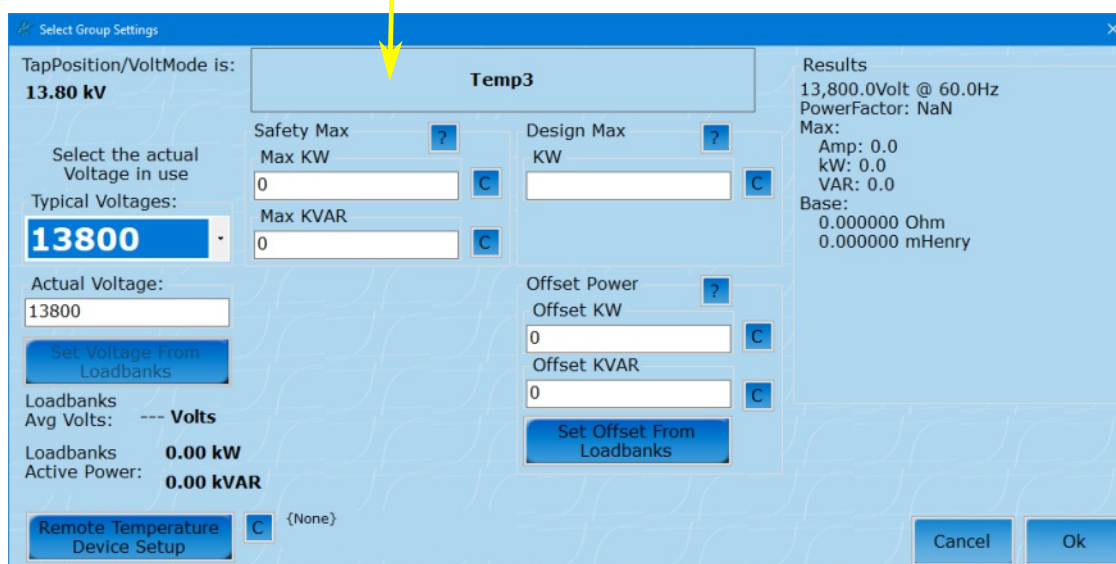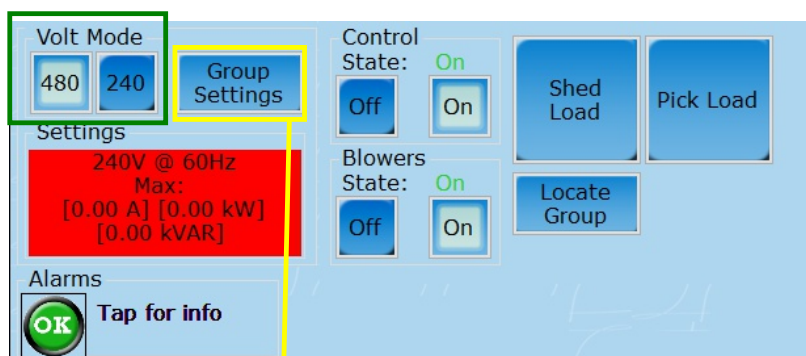


**Safety Max:**

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.

## Input Voltages:

Can be set three ways
1. Selected from the Typical Voltages drop down menu.
2. Typed into the Actual Voltage text box.
3. Hit Set Voltage From Loadbanks to use the averaged from the load banks meters.

## 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 = 920kW

Configuration applies to whole Group.
Configured temperature devices will be used by loadbanks to trip their Over Temperature alarm remotely.

Rx Temperature Devices must be on the same network as the loadbanks to communicate.



Note: This area turns RED on invalid configuration

**Status Column (Yellow Circle):**
OK/NoCOM - Communicating / Lost Communication

**Temperature Column:**
Last value reported by device, turns RED if it would alarm with current Conditions

**Included Devices (Blue Square):**
Only devices in this list will be used for alarm states.
Non communicating devices will be considered in an alarm state.

**Alarm Conditions:**
Alarm is triggered when values reaches the "Alarm at" value.
Alarm will only clear when value drops below "Recover at" value.

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 Max kVAR is entered in Group Settings 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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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:

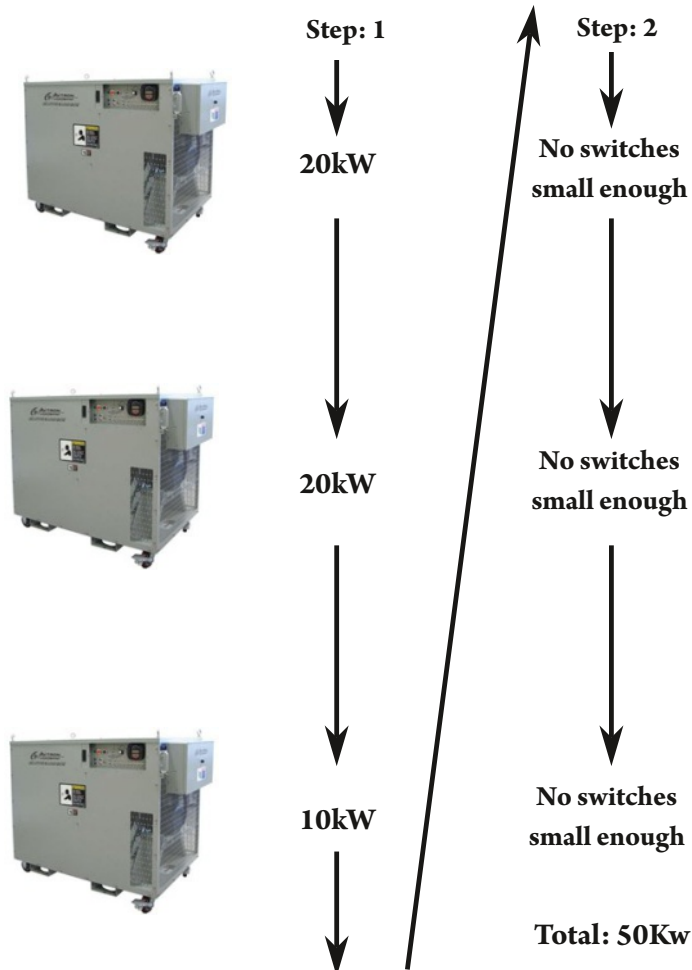    **Safety KW** :                        Uses this as the baseline for the total KW the group can use.

    **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**

**Step: 1**

20kW

20kW

10kW

**Step: 2**

No switches
small enough

No switches
small enough

No switches
small enough

**Total: 50Kw**

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

**Step: 1**

50kW

50kW

50kW

**Step: 2**

5kW

5kW

Not needed

**Total: 160Kw**
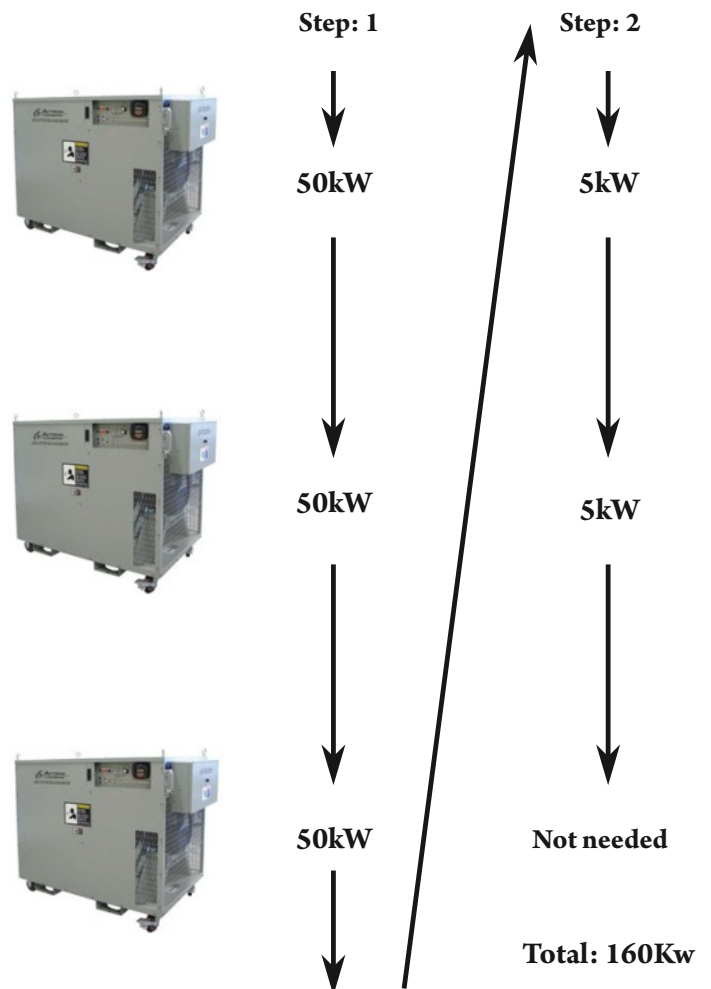
**Example 3:**
**Safety Max = 98**
**Input Voltage = 208**
**Voltage Mode = 480**
**Target = 45kW**
**Calculated target = 45kW**
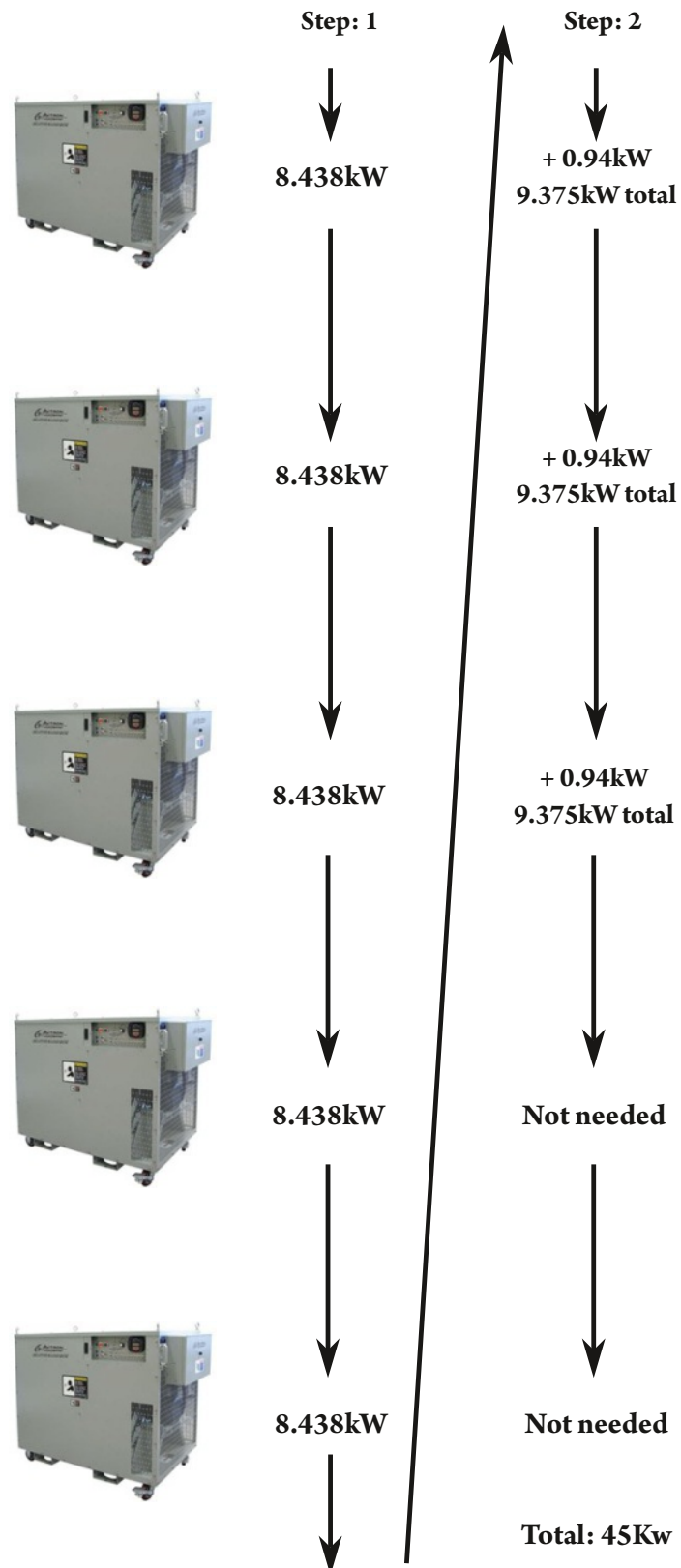
**Example 4:**
**Safety Max = 200**
**Input Voltage = 240**
**Voltage Mode = 240**
**Target = 500kW**
**Calculated target = 200kW**

| Step: 1 | Step: 2 | | Step: 1 | Step: 2 |
|---|---|---|---|---|
| 8.438kW | + 0.94kW 9.375kW total | | 40kW | Not needed |
| 8.438kW | + 0.94kW 9.375kW total | | 40kW | Not needed |
| 8.438kW | + 0.94kW 9.375kW total | | 40kW | Not needed |
| 8.438kW | Not needed | | 40kW | Not needed |
| 8.438kW | Not needed | | 40kW | Not needed |
| | Total: 45Kw | | | Total:200kW |
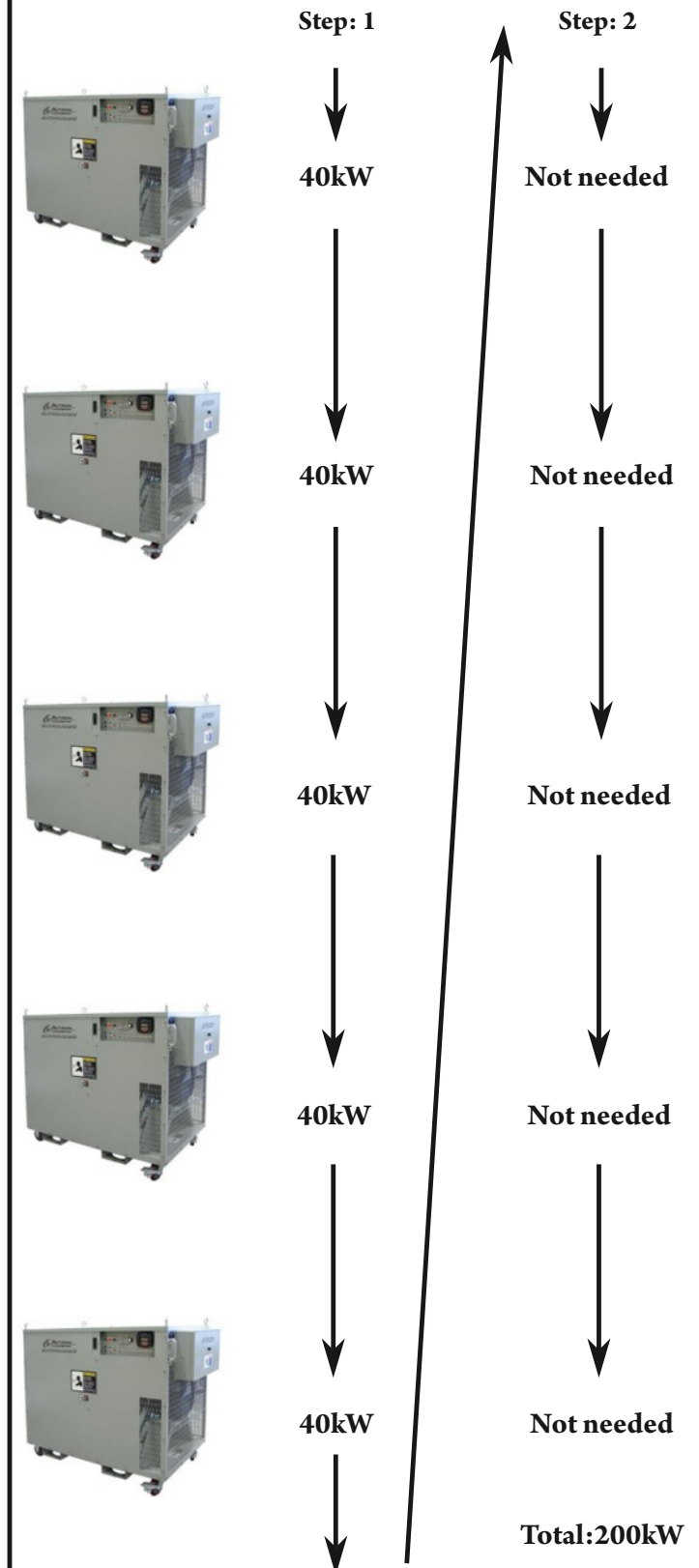
**The algorithm for Capacity Mode**:
1.    Inventory all available load banks and sort by size. (Largest to Smallest)
2.    Add all available load steps starting in order, if no more are available or the target is not met move to the next LoadBank in the list.

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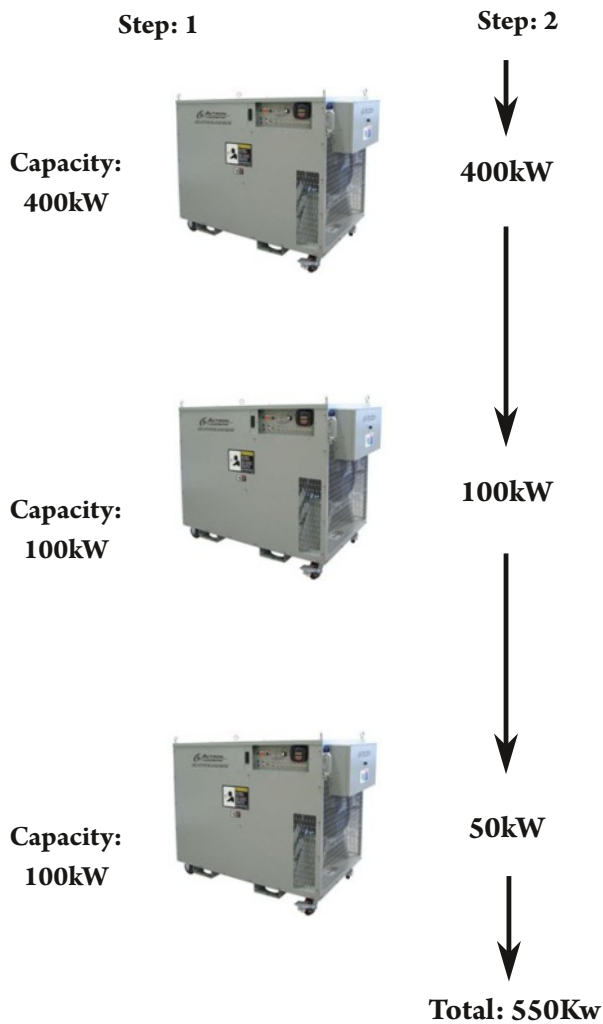**Calculated target = 550kW**

**Example 2:**
**Safety Max = 1000**
**Design Max = 500**
**Input Voltage = 480**
**Voltage Mode = 480**
**Target = 125%**
**Calculated target = 625kW**
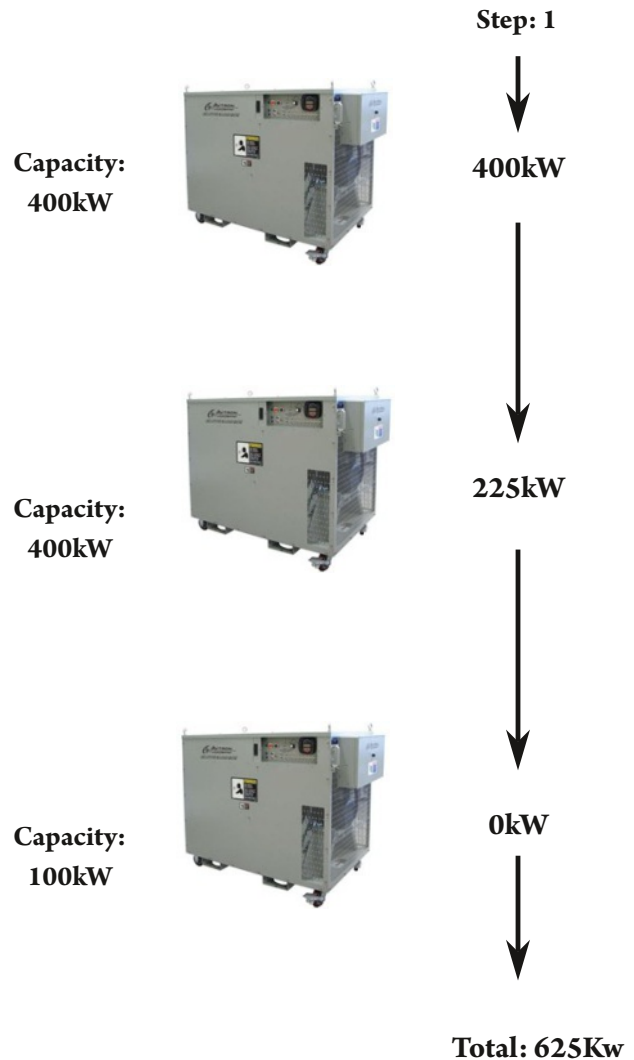
| Step: 1 | | Step: 2 |
|---|---|---|
| Capacity: 400kW | | 400kW |
| Capacity: 100kW | | 100kW |
| Capacity: 100kW | | 50kW |
| | | **Total: 550Kw** |

| Step: 1 |
|---|
| 400kW |
| 225kW |
| 0kW |
| **Total: 625Kw** |

Capacity: 400kW
Capacity: 400kW
Capacity: 100kW

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. (Alphanumeric)
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.
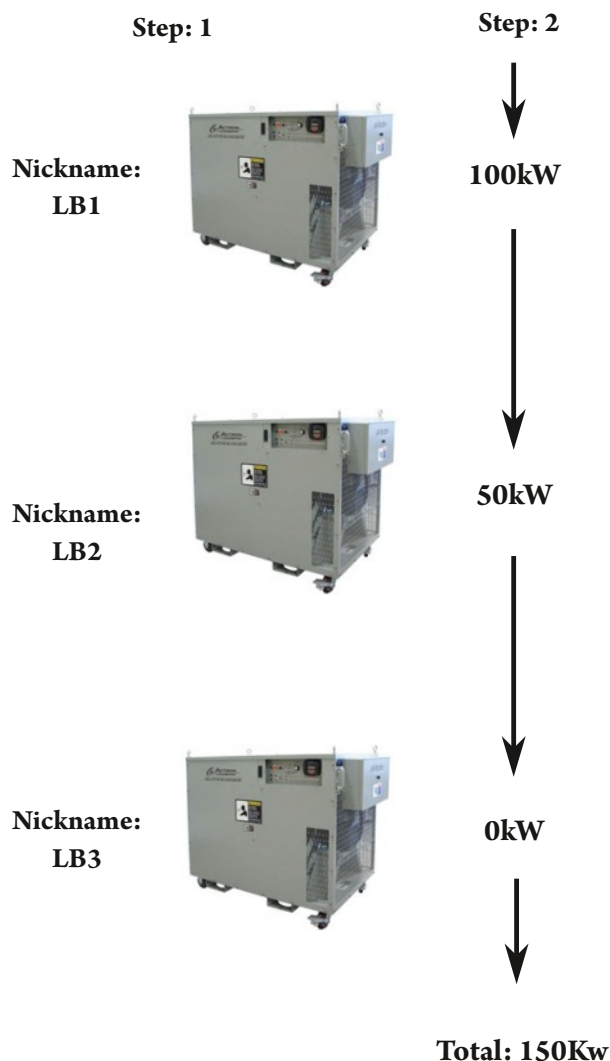
**Example 1:**
**Safety Max = 150**
**Input Voltage = 480**
**Voltage Mode = 480**
**Target = 100%**
**Calculated target = 150kW**

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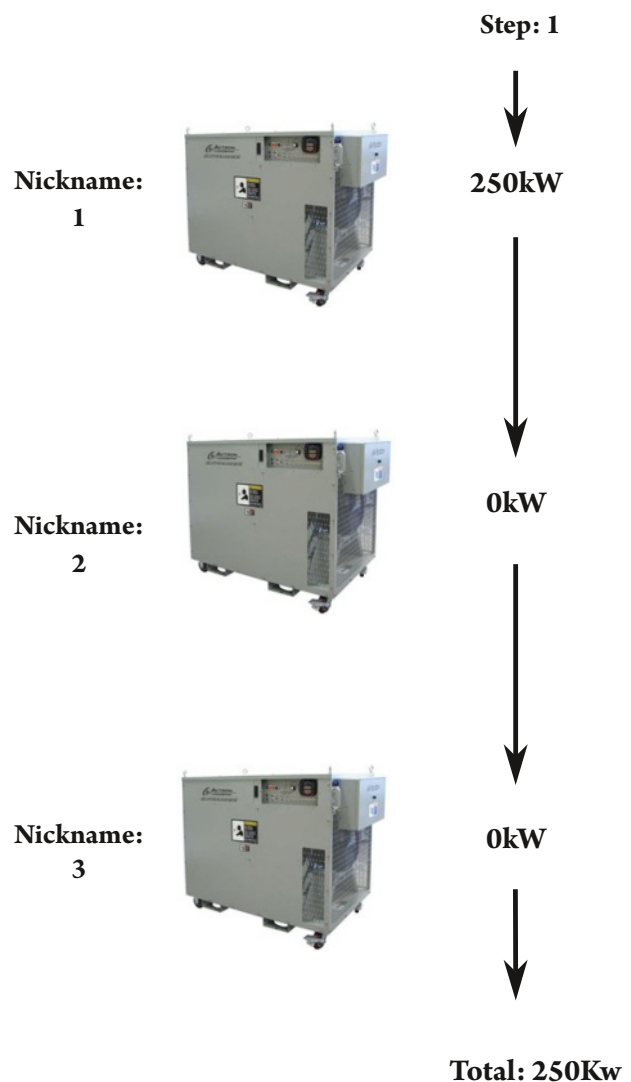


**Example 1:**

| Step: 1 | | Step: 2 |
|---|---|---|
| **Nickname: LB1** | | **100kW** |
| **Nickname: LB2** | | **50kW** |
| **Nickname: LB3** | | **0kW** |
| | | **Total: 150Kw** |

**Example 2:**

| | | Step: 1 |
|---|---|---|
| **Nickname: 1** | | **250kW** |
| **Nickname: 2** | | **0kW** |
| **Nickname: 3** | | **0kW** |
| | | **Total: 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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# 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, 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
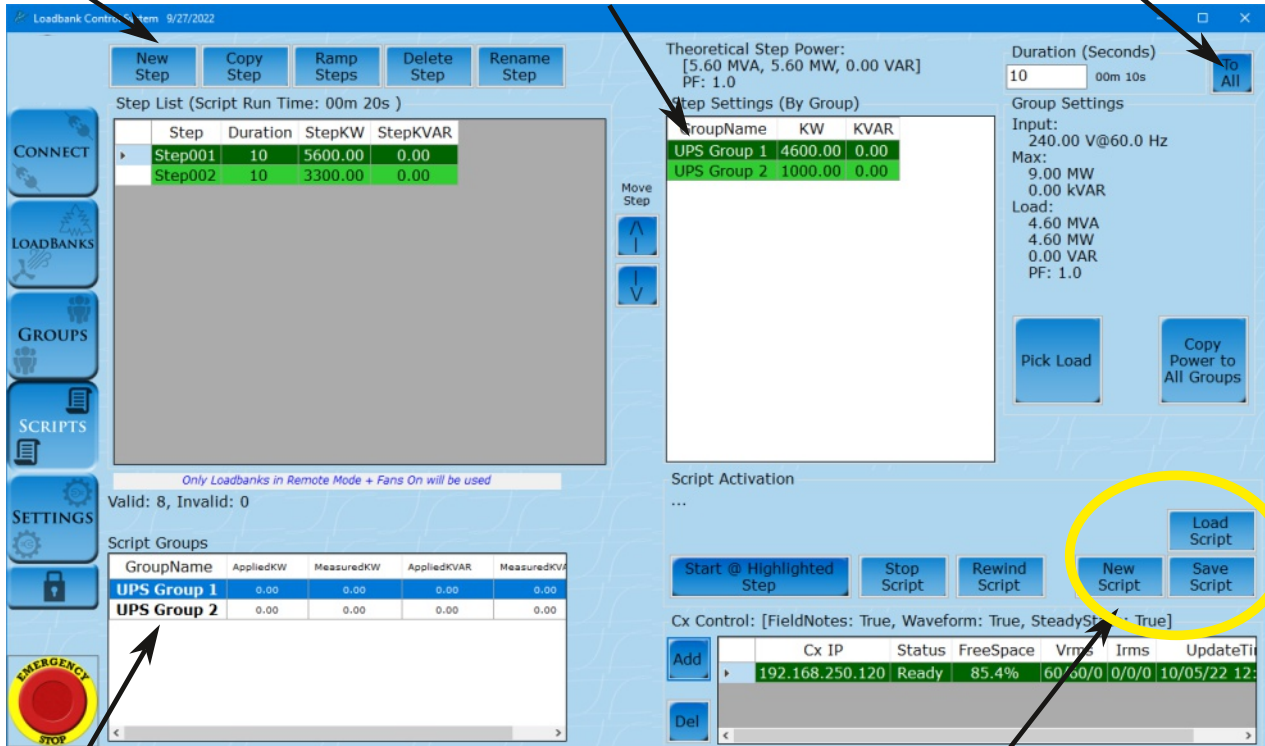


All groups current load show here.

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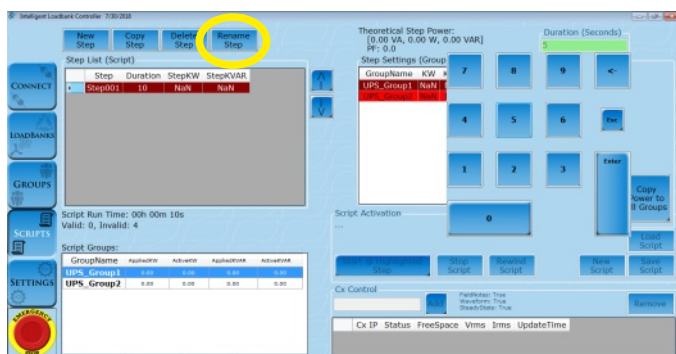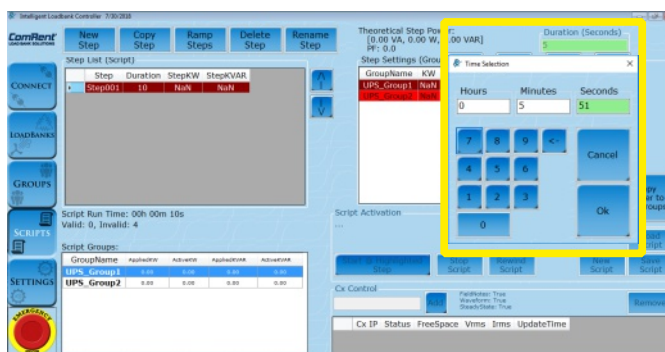**Load Script:** Load saved script.
**Save Script:** Save script for future use.

Groups will show up in the Step Settings as red until the load for each group is picked.
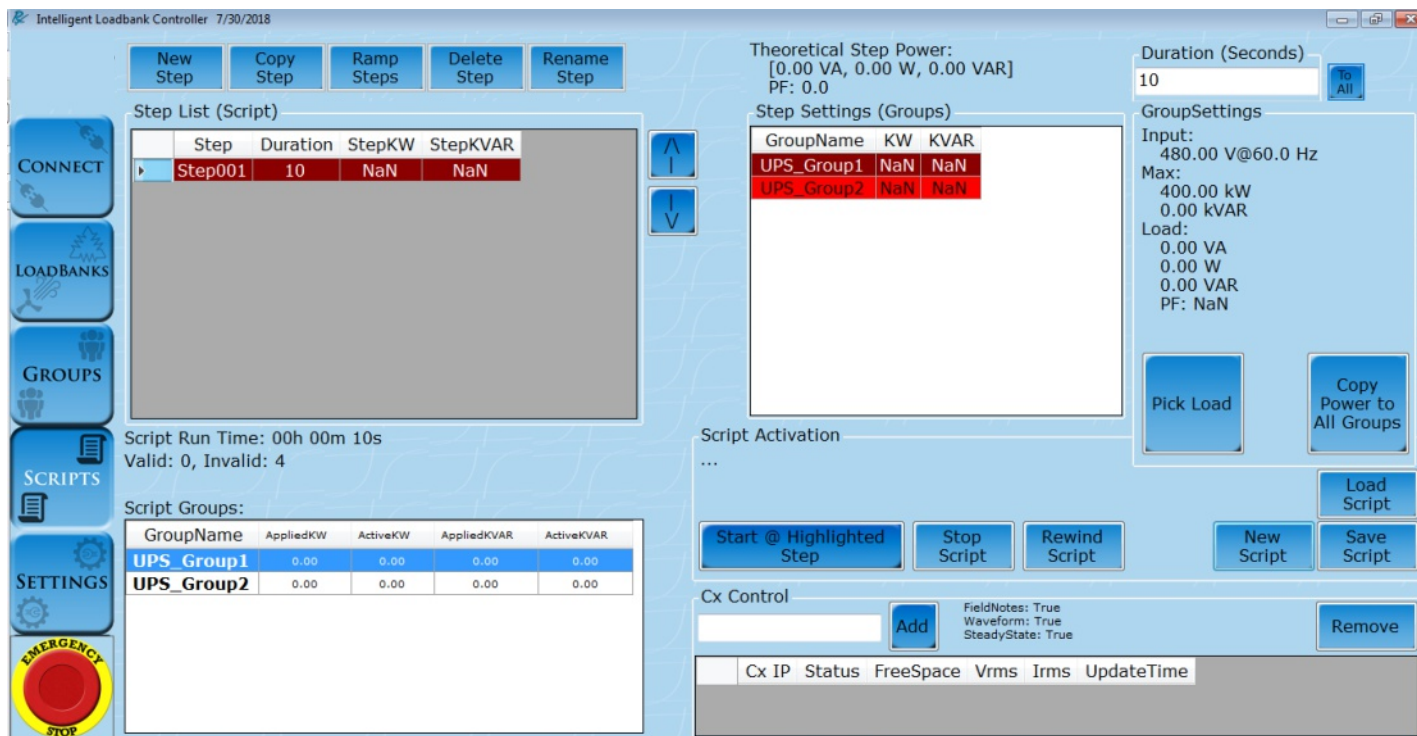
Press Duration and use key pad to set duration between 1 second and 1 day (duration must be entered in seconds).
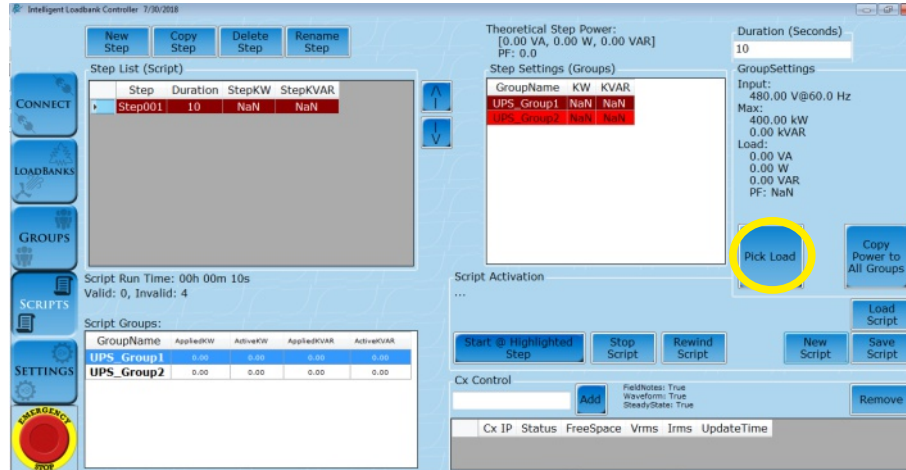
**If duration is being reduced, check the Max Script Duration on settings page.**

Click the Rename Step button, type new step name, and press enter.
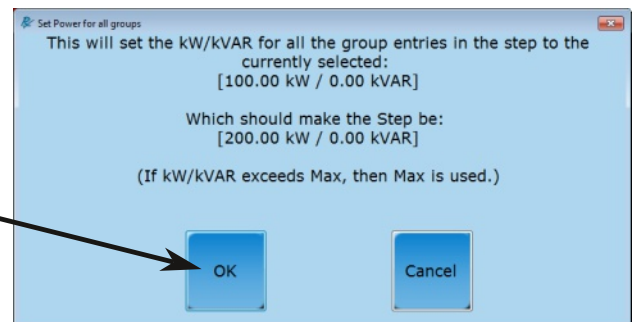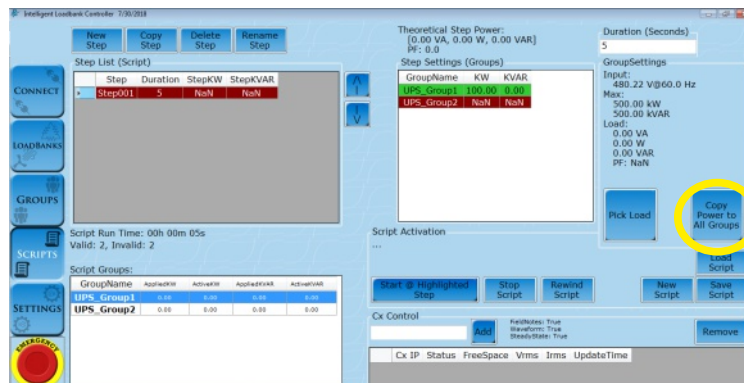
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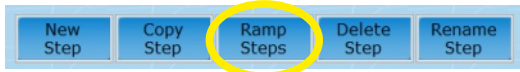Highlight Group for the Step Settings and click Pick Load



**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 Reactive KVAR or Power Factor.**
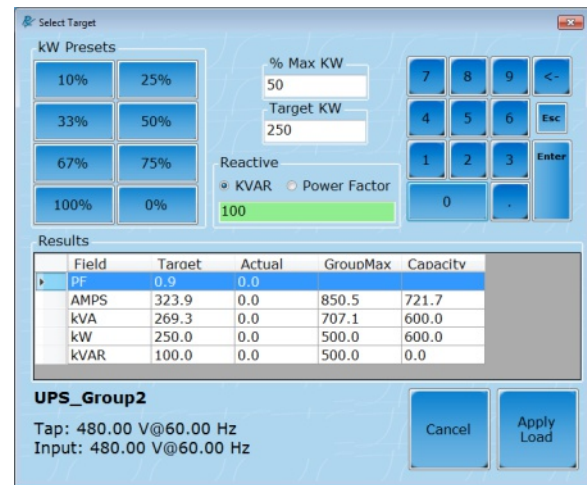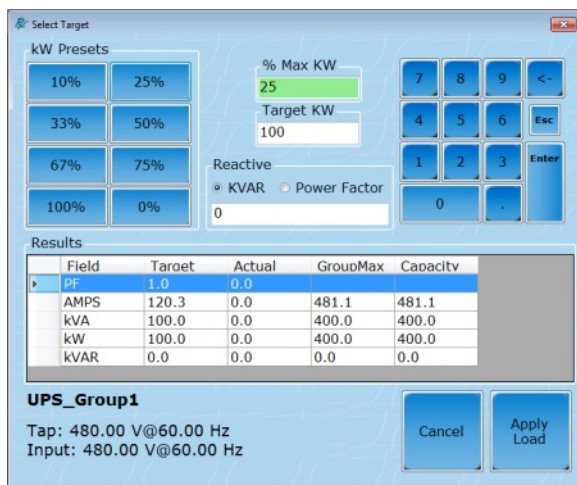


Instead of picking a load for Group 2, another option is to use the Copy Power to All Groups.

**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.

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**

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| Cx Control: [FieldNotes: True, Waveform: True, SteadyState: True] | | | | | | |
|---|---|---|---|---|---|---|
| | Cx IP | Status | FreeSpace | Vrms | Irms | UpdateTi |
| Add ▶ | 192.168.250.120 | Ready | 85.4% | 60/60/0 | 0/0/0 | 10/05/22 01: |
| Del | | | | | | |

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
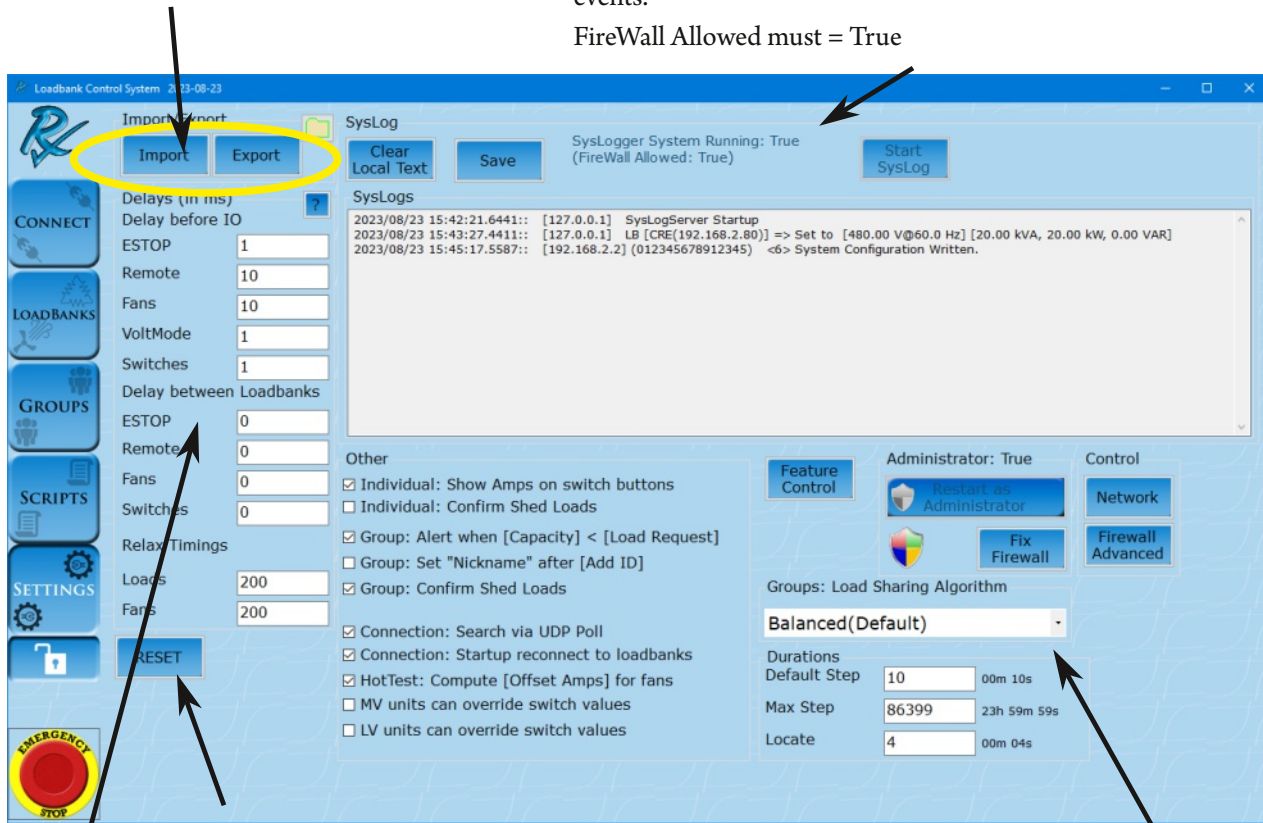
# *Settings Tab*

**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)
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

**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.

**Group: Set nickname after Add by ID:**

This pops up a second text input after a successful add of a loadbank into a group to modify its nickname. (Scanner ready)

**Enable Group Trending Logs:**

Enables trending on each group in a CSV file. Fixed at 30 Seconds. From LoadBank power meters.

Explained in *Group Trending Logs* section*.*

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

**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.

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

**Search Via UDP:** Alternate loadbank search method. Allows for use of larger networks.

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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.
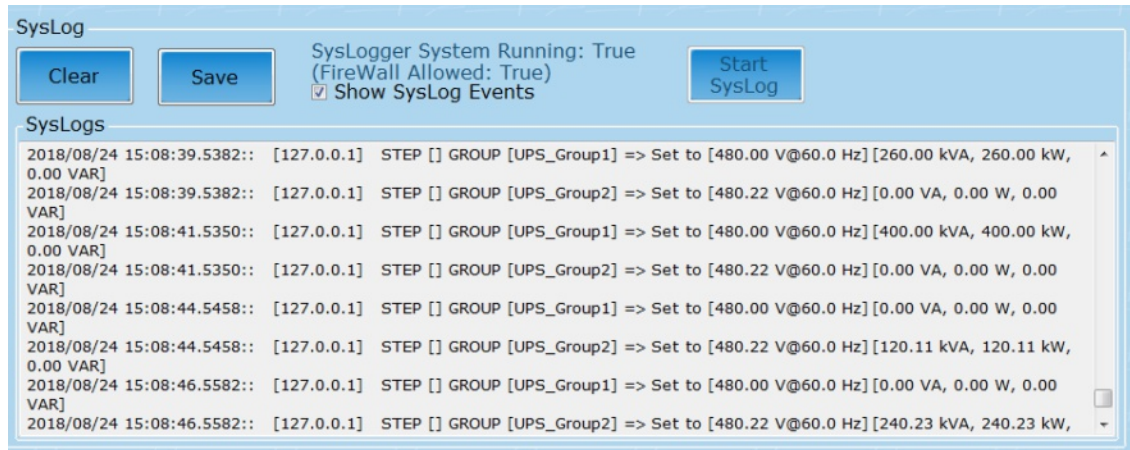


The Syslog can be saved as a text document to any device (pictured below).

**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 occured

Events derivived from user commands:

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



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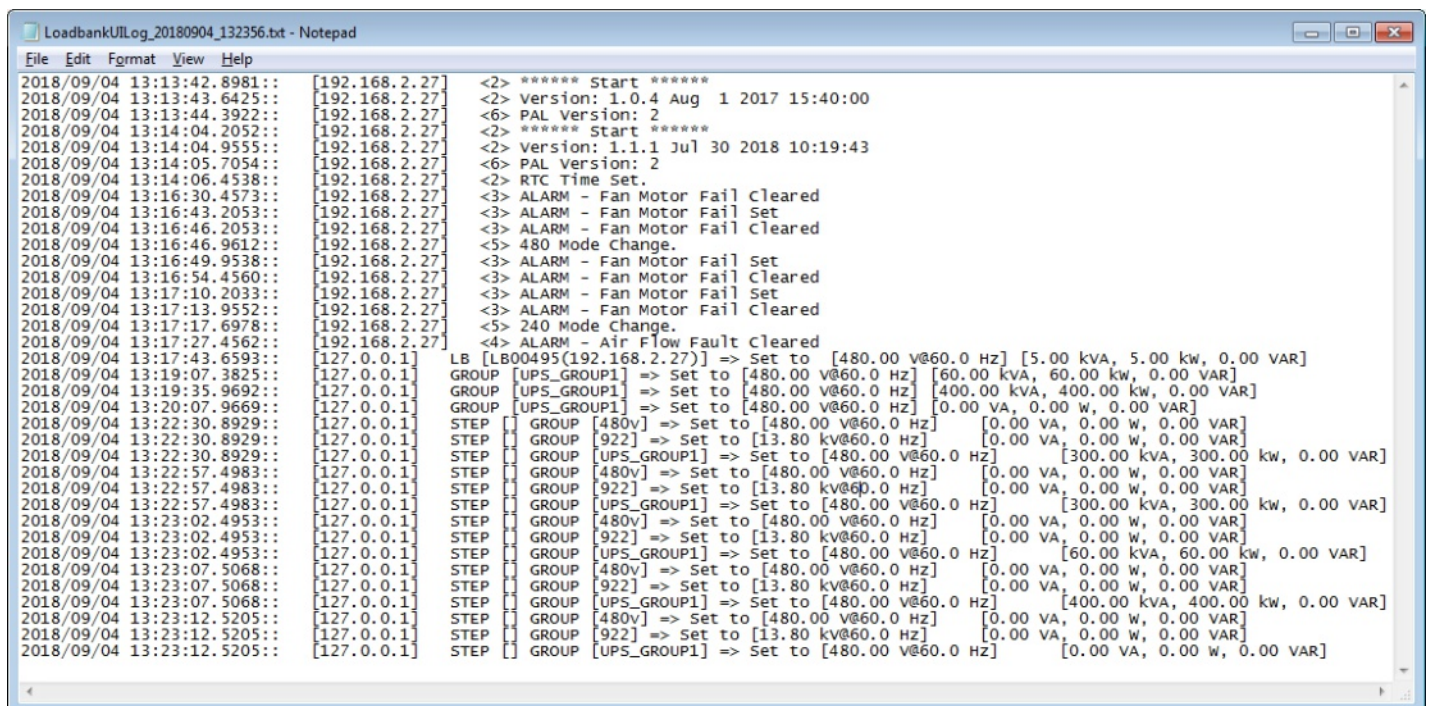
## Enable Group Trending Logs:

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 window explorer to logs directory** or :

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



Each CSV file is a group name
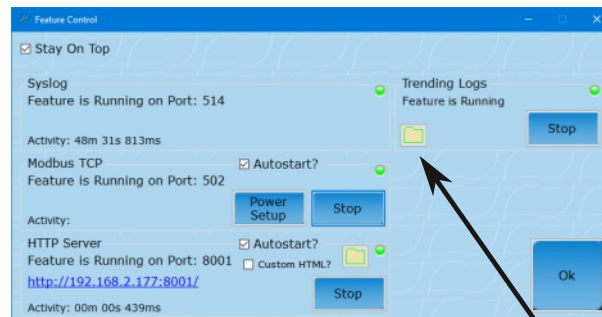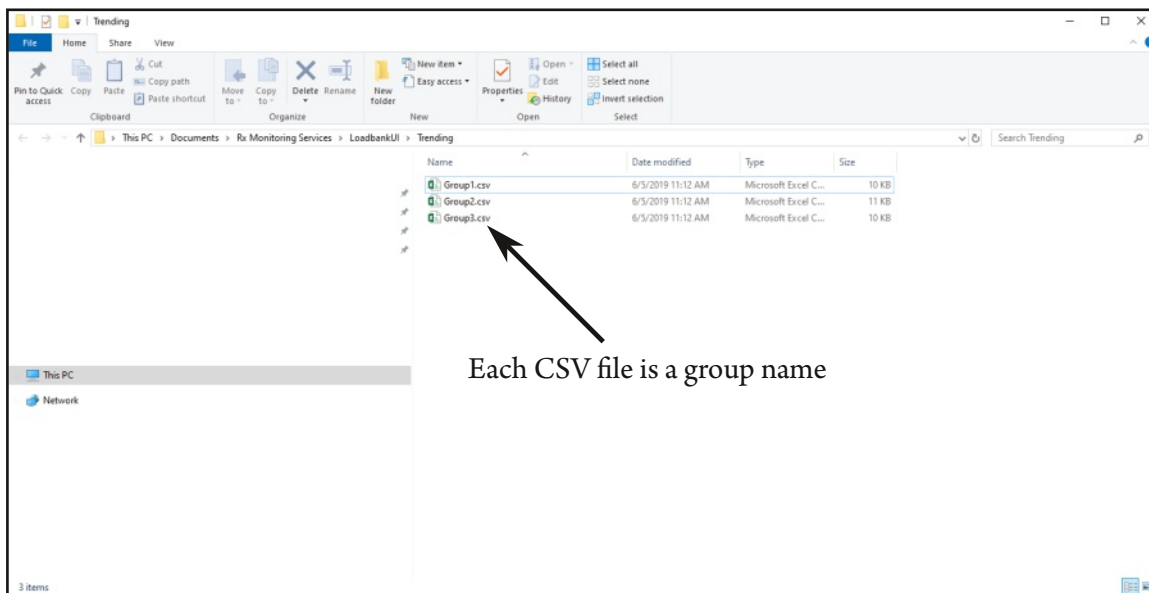
Output File Format (CSV):

Imports directly to Microsoft Excel



| DateTime | ActiveUnits | GroupName | VoltMode | TapPositionFrequency | RatedVoltage | MaxKW | MaxKVAR | OffsetKW | OffsetKVAR | AppliedKW | ActiveKW | AppliedKVAR | ActiveKVAR |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 10/17/2019 10:12 | 2 | UPS1B | 480 | 60 | 480 | 1200 | 0 | 4.592014 | 0 | 5 | 4.59201367 | 0 | 0 |

## 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.

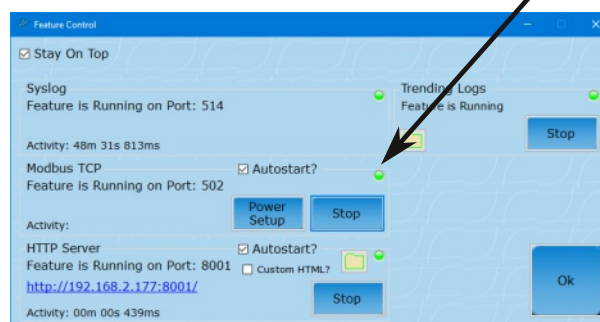## Enable Modbus TCP Server:
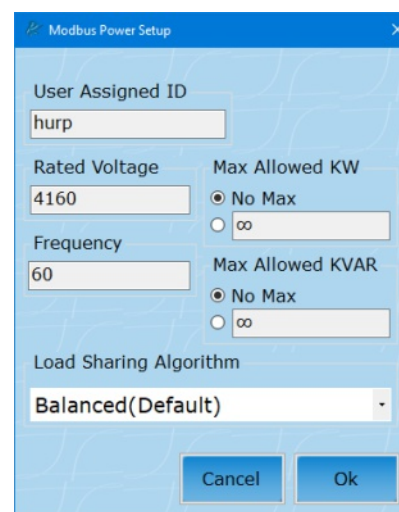
Click "Feature Control" to enable feature

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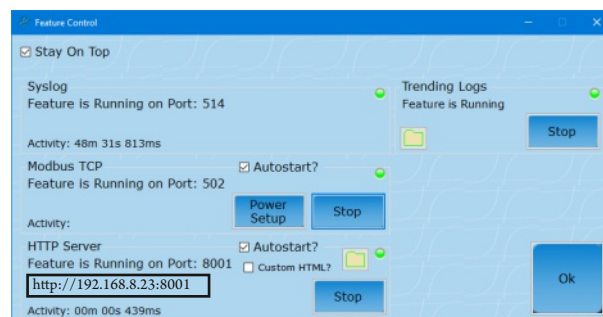
The web address is the computers IP address on port 8001:

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.
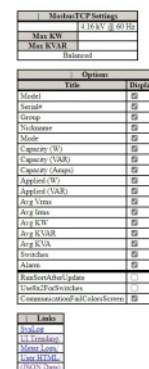


**Default Website Option:** Scoll to bottom of page.

**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:**



| 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 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | OhmsMeter | OHM007 | -- | | | | | 0 | | | 389.13 | 0.00 | 0.00 | 0.00 | 0.00 | | |
| | LPH400 | LB01572 | -- | | 480 | 400.0 k | | 481 | | | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | | |
| | LPH400 | LB01451 | -- | | 480 | 400.0 k | | 481 | | | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | | |
| | LPH400 | LB01568 | -- | | 480 | 400.0 k | | 481 | | | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | | |
| | 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.