SIMPLEX®

ELECTRA

Portable Load Bank

This manual was last revised:

June 8, 2021

For up-to-date information on this product or others,
please contact Simplex at 800-637-8603 or
visit us on the web at www.simplexdirect.com.

Table of Contents

I. WARNINGS AND CAUTIONS

I-A. Safety Information Symbols:

This General warning symbol points out important information that, if not followed, could endanger personal safety and/or property.

This Explosion warning symbol points out potential explosion hazards.

This Fire warning symbol points out potential fire hazards.

This Electrical warning symbol points out potential electrical shock hazards.

I-B. Cautions:

This load bank is high-powered, technical, industrial equipment operating at dangerous voltages and temperatures. It is capable of damaging itself, property or personnel if improperly used. It is not a consumer product.

It must be installed, connected and operated by personnel properly trained and experienced in its use. An operator's manual is supplied with each load bank and available online at www. simplexdirect.com. The operator must be familiar with its contents and have access to it during operation.

- **High Voltage:** Turn off and disconnect power source before opening this equipment
- **High Temperature:** Allow hardware to cool before servicing or opening this equipment.
- **Rotating Equipment:** Ensure that the fans have stopped before opening this unit.
- **For Operator Safety:** Make sure this equipment is properly grounded when in use.

All compression-type connections on fuse blocks, load blocks, and contactors should be checked for tightness frequently. This check should be established as part of routine maintenance.

The following cautions should be observed before and during operation:

- Check intake and exhaust screens as well as fan and load elements for foreign objects.
- Position and install the load bank with consideration given to large cubic airflow requirements, exhaust temperature, and velocity. Do not point exhaust at any nearby surface or object that may be adversely affected by high temperature. This includes but is not limited to painted surfaces, tar paper and asphalt roofs, water sprinkler heads, fire alarms, and volatile material.

- Do not use in confined spaces. The load bank may have to compete with cooling air requirements of a nearby running engine generator set where cooling air intake to a confined space may not be adequate for both engine and load bank. Be especially careful not to bounce hot exhaust air off nearby obstructions for re-circulation through the load bank.
- Verify that all control switch positions are set correctly for your intended usage before connecting the load bank to the source to be tested.
- The load cables carry high amperage. Be constantly aware of possibility of inductively heating adjacent ferrous objects to temperatures sufficient to damage cable insulation.
- Always connect the safety ground cable to a proper ground. Do not rely on a possible grounded neutral somewhere else in the system.
- Do not let the load bank run unattended for long periods of time.
- Do not store or operate in rain unless adequate protection is provided.
- Routinely inspect all components and electrical connections for tightness and integrity.
- Repair any damaged or degraded components and wiring without delay.
- If technical assistance, service, or parts are needed, please call 800-837-8603 (24 Hours).

- All hardware covered by this manual have dangerous electrical voltages and can cause fatal electrical shock. Avoid contact with bare wires, terminals, connections, etc. Ensure all appropriate covers, guards, grounds, and barriers are in place before operating the equipment. If work must be done around an operating unit, stand on an insulated dry surface to reduce the risk of electrocution.
- Do not handle any kind of electrical device while standing in water, while barefoot, or while your hands or feet are wet.
- If people must stand on metal or concrete while installing, servicing, adjusting, or repairing this equipment, place insulative mats over a dry wooden platform. Work on the equipment only while standing on such insulative mats.
- The National Electrical Code (NEC), Article 250 requires the frame to be connected to an approved earth ground and/or grounding rods. This grounding will help prevent dangerous electrical shock that might be caused by a ground fault condition or by static electricity. Never disconnect the ground wire while the load bank is in use.
- Wire gauge sizes of electrical wiring, cables, and cord sets must be adequate to handle the maximum electrical current (ampacity) to which they will be subjected.
- Before installing or servicing this (and related) equipment, ensure that all power voltage supplies are completely turned off at their source. Failure to do so can result in hazardous and possibly fatal electrical shock.
- In case of accident caused by electric shock, immediately shut down the source of electrical power. If this is not possible, attempt to free the victim from the live conductor. AVOID DIRECT CONTACT WITH THE VICTIM. Use a nonconducting implement, such as a dry rope or board, to free the victim from the live conductor. If the victim is unconscious, apply first aid and seek immediate medical attention.
- Never wear jewelry when working on this equipment. Jewel- ry can conduct electricity resulting in electric shock or may get caught in moving components causing injury.

- Keep a fire extinguisher near the hardware at all times. Do NOT use any carbon tetra-chloride type extinguisher. Its fumes are toxic, and the liquid can deteriorate wiring insulation. Keep the extinguisher properly charged and be familiar with its use. If there are any questions pertaining to fire extinguishers, please consult the local fire department.

- The illustrations in this manual are examples only and may differ from your load bank.
- Load Bank warranty is void if incorrectly cooled.

II. DESCRIPTION AND SPECIFICATION

II-A. Overview of use

The Simplex Electra is a large-capacity, high-performance portable load bank designed to test AC generators and UPS systems.

The Electra portable load bank is a self-contained testing system. In addition to test instrumentation, the load bank includes connection cables, high-capacity cooling system, rugged load elements, complete load-application control devices, and automatic system protection devices. Lifting eyes, forklift channels, and moving handles make transporting the unit easier. A hinged cover protects the 8-inch touchscreen control panel.

II-B. Load Elements

The Electra load bank utilizes specially designed “Powr-Web” resistive elements. High temperature, ceramic clad, stainless steel rods rigidly support the elements.

II-C. Control System

The load back is controlled by a programmable logic controller with a touchscreen interface.

Multiple Electra and dynaMITE units may be connected to increase system capacity.

Fan and control power is supplied either through the testing source or an external supply.

The control system automatically connects control contactors for applied voltage, detects control power source and volt- age, and detects cooling fan motor and motor connection.

II-D. Cooling System

The load elements are cooled by a forced air system. This system consists of a direct-driven, shrouded aluminum fan blade. Air flows vertically through the load bank, from the sides to the top, through screened intake and exhaust vents.

II-E. Specification

Capacity

Electra 450: 450KW at 240/480V, 338KW at 208/416V, 282KW at 380V, 300KW at 240V, 1-ph

Electra 500: 500KW at 240/480V, 375KW at 208/416V, 313KW at 380V, 333KW at 240V, 1-ph

Electra 550: 550KW at 240/480V, 413KW at 208/416V, 345KW at 380V, 367KW at 240V, 1-ph

	Electra 600: 600KW at 240/480V, 450KW at 208/416V, 376KW at 380V, 400KW at 240V, 1-ph **Electra 650:** 650KW at 240/480V, 488KW at 208/416V, 407KW at 380V, 434KW at 240V, 1-ph **Electra 700:** 700KW at 240/480V, 525KW at 208/416V, 439KW at 380V, 467KW at 240V, 1-ph
Power Factor	1.0
Full Load Amps:	**Electra 450:** 1082 at 240, 541 at 480V **Electra 500:** 1202 at 240, 601 at 480V **Electra 550:** 1322 at 240, 661 at 480V **Electra 600:** 1442 at 240, 721 at 480V **Electra 650:** 1563 at 240, 782 at 480V **Electra 700:** 1683 at 240, 842 at 480V
Load Type:	Resistive
Cooling System	**Electra 450:** Airflow: 9,000 CFM, Motor: 3 HP, Air Temp. Rise: 290°F max. **Electra 500:** Airflow: 10,500 CFM, Motor: 3 HP, Air Temp. Rise: 325°F max. **Electra 550-700:** Airflow: 12,500 CFM, Motor: 5 HP, Air Temp. Rise: 350°F max.
Voltages	Dual: 240/480V, 3-ph. Operational at any voltage to 480V AC maximum, single or 3-phase
Frequency	50, 60Hz standard Connection 3-wire plus ground Time Rating Continuous
Ambient Air Temperature	120°F

Fault Rating	Fuses are rated 200KAIC. The load bank has a 5KAIC short circuit current rating.
Insulation Rating	600V, 150°C
Fan/Control Power	230/460V, 3-ph, 60Hz 190/380V, 3-ph, 50Hz Switchable internal (generator) - external 230/460-115V control power transformer internal to Load Bank 15' external power cord
Digital Load Step Control	Nominal 5.0 kw resolution: direct enter any load value and controller will apply load within nominal 5kw resolution.
Dimensions	34"W x 79.6"H x 60"D
Weight	1,675 lbs.

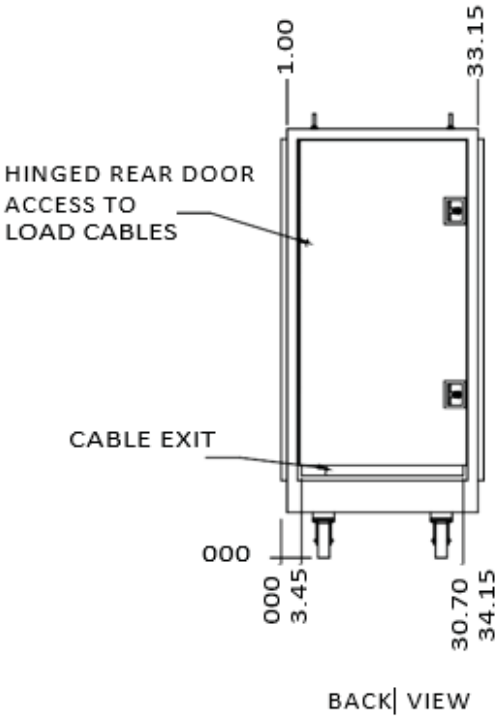
II-F. Current Draw at Specified Resolutions

KW	50	100	150	200	250
208V	240A	481A	721A	962A	1202A
240V	208A	417A	625A	833A	1042A
208V	139A	278A	416A	555A	694A
240V	120A	241A	361A	481A	601A
416V	69A	139A	208A	278A	347A
480V	60A	120A	180A	241A	301A
KW	**300**	**350**	**400**	**450**	**500**
208V	1442A	1683A	1923A	2163A	2404A
240V	1250A	1458A	1667A	1875A	2083A
208V	833A	972A	1110A	1249A	1388A
240V	722A	842A	962A	1083A	1203A

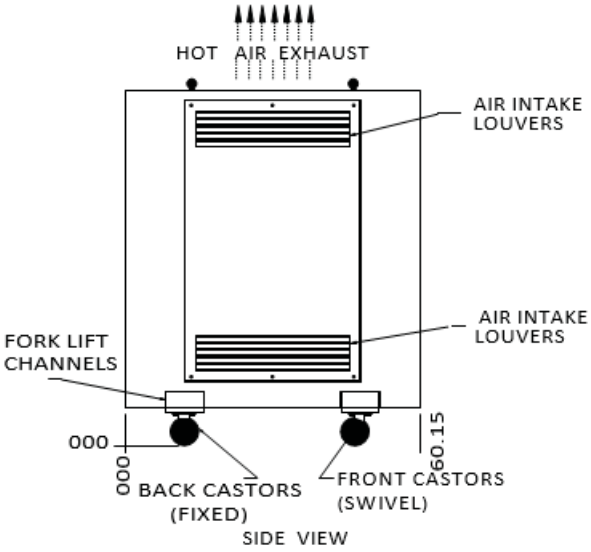
416V	416A	486A	555A	625A	694A
480V	361A	421A	481A	541A	601A
KW	**550**	**600**	**650**	**700**	
208V	2644A	2885A	3125A	3365A	
240V	2292A	2500A	2708A	2917A	
208V	1527A	1665A	1804A	1942A	
240V	1323A	1443A	1564A	1684A	
416V	763A	833A	902A	972A	
480V	662A	722A	782A	842A	

These measurements are based on ideal numbers. They do not take into account control power draw, power cable resistance, voltage droop, etc.

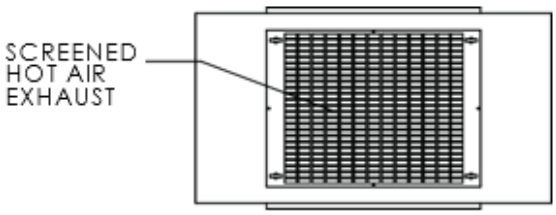
II-G. Product Dimensions



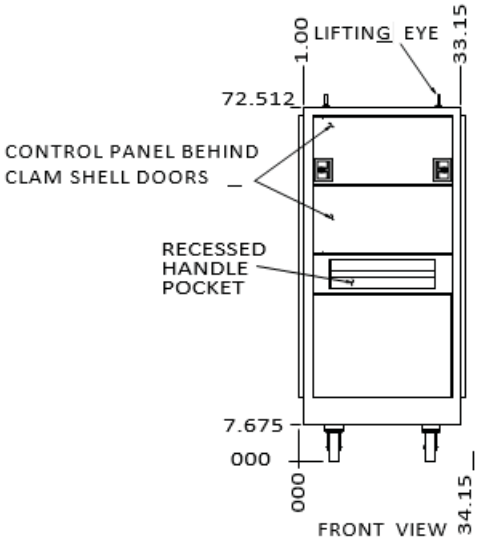
BACK VIEW



SIDE VIEW



TOP VIEW



FRONT VIEW

III. UNPACKING

III-A. Included Components and Parts

The following items are included with your load bank. If any of the following are not included, please contact your Simplex representative or call Simplex Direct, Inc., at 800-637-8603.

1. Load bank
2. Manual
3. Electrical drawings package

III-B. Primary Inspection

Preventative visual inspection of the shipping crate and the load bank is advised. Physical or electrical problems due to handling and vibration may occur. Never apply power to a load bank before performing this procedure. The following five-point inspection is recommended before installation and as part of a 6-month maintenance schedule or as a load bank is relocated:

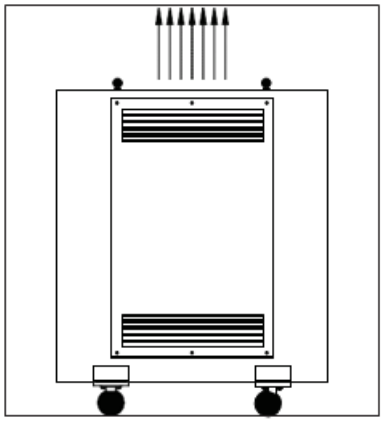
1. If the crate shows any signs of damage, examine the load bank in the corresponding areas for signs of initial problems.
2. Check the entire outside of the cabinet for any visual damage, which could cause internal electrical or mechanical problems due to reduced clearance.
3. Inspect all relays and control modules. Make sure all components are secure in their bases and safety bails are in place. Spot check electrical connections for tightness. If any loose connections are found, inspect and tighten all remaining connections.
4. Examine all accessible internal electrical components such as fuses, contactors, and relays. Check lugged wires at these components.
5. Visually inspect the element chamber for foreign objects, broken ceramic insulators, and mechanical damage.

Call Simplex if you have any problems during installation.
24-hour contact at 800-637-8603

IV. INSTALLATION

IV-A. Load Bank Placement

Figure 1: Airflow Diagram



Proper placement of the load bank is essential for the operators' safety and maintaining the integrity of the load bank.

A vertical forced-air system cools the load elements in the load bank. The system discharges through the top of the cabinet (see Figure 1.)

The load bank must be positioned to allow for a 6-foot intake clearance on all sides. Position the unit in a location where nothing is above it.

Never point the exhaust at nearby surfaces or objects that may be damaged by high temperatures. Never bounce hot exhaust air off nearby objects and allow it to recirculate through the cooling system.

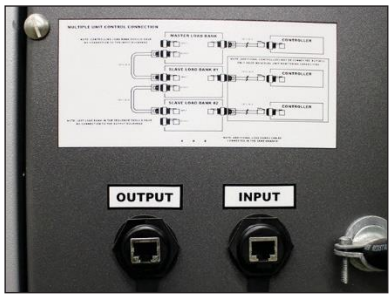
Because the unit generates a lot of heat, never operate near sprinkler systems.

Operating the load bank in a confined space will recycle hot exhaust air through the cooling system, which can cause severe damage.

The load bank may compete with nearby generators for cooling air.

IV-B. Wiring the Load Bank

Figure 2: Ethernet Ports



1. Confirm the test source is properly grounded and ground the load bank to its own independent ground.
2. Verify the Fan Circuit Breaker is in the "Off" position.
3. If you will be connecting multiple Electra or dynaMITE load banks, use customer-supplied CAT-5, CAT-5E or CAT-6 ethernet cables to create a network by connecting the output of the master load bank to the input of the first slave load bank (see Figure 2). Connect as many Electra or dnyaMITE load banks as desired by daisy-chaining load banks in the same manner (see Figure 4).
4. If you will be using the test source to provide control

Figure 3: Fan/Control Power Receptacle

and fan power, plug the Fan/Control Power Plug into the receptacle on the back of the load bank (see **Figure 3 on page 13**). If you will be using external power, plug the Control Power Plug into a 230/460V, 3-phase, 60Hz, 20A receptacle.

5. Open the controller cover on the front of the load bank to access the HMI (see Figure 5).
6. Remove the HMI by turning the twist locks on each side of the controller until they are vertical and pulling out on the handles.
7. With the HMI screen's facing you, the port area is on the bottom right side (See Figure 6).
8. Using a CAT-5, CAT-5E or CAT-6 ethernet cable, connect the HMI to the main load bank via the port in the controller mounting area (see Figure 7). If other load banks are connected in Step 3, controllers can be connected to them, but they will only provide monitoring for the unit they are connected to.
9. Using the supplied control power cord, connect the HMI controller to the load bank's receptacle in the controller mounting area or a 120V, 1-phase, 60Hz outlet.
10. Using the cables provided, connect the load bank to the testing source.
11. Turn the Fan Circuit Breaker on.

Figure 4: Load Bank Network

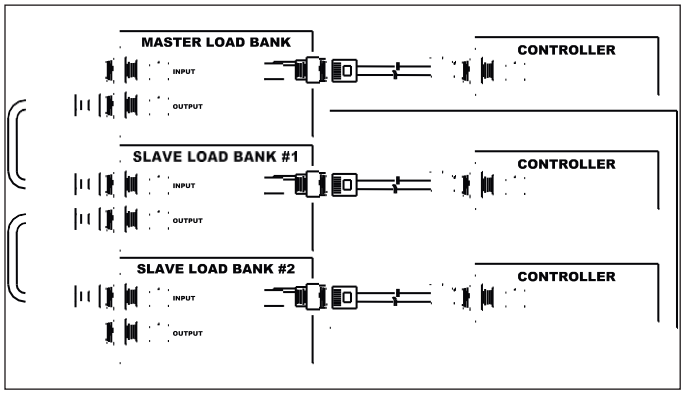
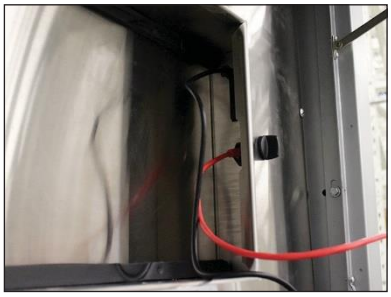


Figure 5: HMI Controller

Figure 6: HMI Port Area

Figure 7: Load Bank HMI Connection



V. OPERATING INSTRUCTIONS

V-A. Conducting a Test

1. If you wish to enable data logging, insert a USB thumb drive into the port underneath the HMI screen.
2. Start up the generator set or otherwise bring the test source on line.
3. Press the "Control Power" to switch it to the "On" position on the Main Screen (see Figure 8). If multiple units are networked, the Main Screen is only available via the Master Load Bank. Slave units will only display the single-unit monitoring screen (see Figure 9).
4. Make sure the fan is spinning, check the air intake for obstructions, confirm air flow and investigate any unusual noises.
5. Make sure no errors are registered in the "System" area in the bottom left of the screen. If any errors are indicated, consult the troubleshooting section on page 17 for more information on how to resolve them.
6. Adjust the voltage and frequency of the generator.
7. Press the "KW to Apply" button and enter the desired load (see Figure 10).
8. Press the "Apply" button.
9. Monitor and adjust load steps as needed.

Figure 8: Main Screen

Figure 9: Single Unit Monitoring Screen

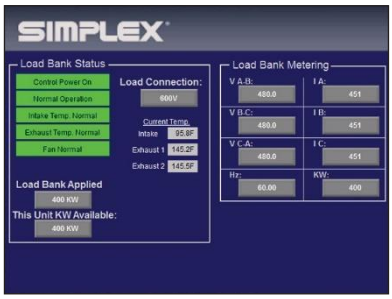


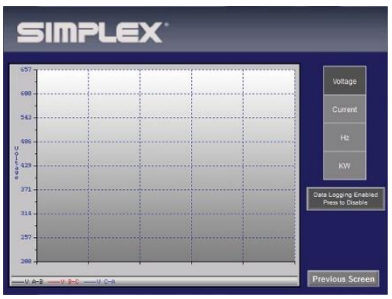
Figure 10: Numeric Keypad

V-B. Metering Line Trends Screen

While the load bank is operating, pressing the Metering Line Trends button in the bottom right corner of the screen will bring up the Metering Line Trends screen. This screen provides a graph displaying voltage, current, frequency, and kilowatts detected by the load bank.

If you want to record this data, insert a USB drive into the port below the screen and press the "Data Logging Disabled" button. When you are done, press the button again and the load bank will write the data in a tab-delimited format to the thumb drive.

Figure 11: Metering Lines Trend Screen



V-C. Single-Unit Monitoring

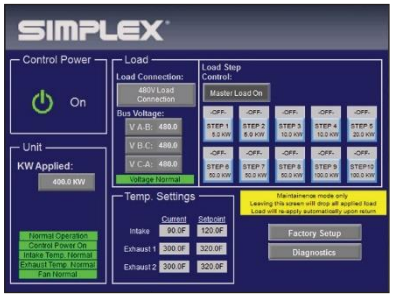
If you have networked multiple load banks together, you can monitor just the master load bank by pressing the "Load Bank Monitoring" button. This will bring up the single-unit monitoring screen (Figure 9).

V-D. Shutdown

1. Remove all load by pressing the Remove button on the main screen.
2. Allow the cooling fan to run for approximately five minutes to provide a thorough cooldown for the entire system.
3. Press the "Control Power" button to switch it to the "Off" position.
4. Turn off the test source.
5. Disconnect the cables and store them in the cable compartment.
6. Disconnect the controller(s) and ethernet cable(s) and store them appropriately.

V-E. Maintenance Mode

Figure 12: Maintenance Mode



While the load bank's control power is turned off, pressing the "Maintenance Mode" button in the bottom right corner of the screen will make the unit enter maintenance mode (Figure 12).

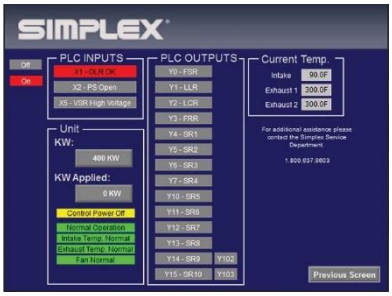
On this screen you can see the values the temperature sensors are reading, the voltages of the three phases, and check the operation of the unit's load steps by activating them individually.

Any load that you activate on the maintenance screen will be dumped when you leave the screen.

The Factory Setup screen can be accessed from maintenance mode, but it is intended for Simplex service representatives only and is password protected.

V-F. Diagnostics Screen

Figure 13: Diagnostics Screen



From the maintenance mode screen, you can enter the Diagnostics screen (Figure 13), which displays the status of the load bank's programmable logic controller. This screen can be useful when working with the Simplex Service Department should a problem arise with your load bank.

VI. ALARMS AND WARNINGS

VI-A. Sensors

Electra load banks are protected by four types of sensors.

1. Intake temperature, which checks the incoming air to ensure the load elements can be adequately cooled.
2. Exhaust temperature, which checks the temperature of the air coming out the load bank to ensure the load elements are being adequately cooled.
3. Fan pressure, when ensures the fan blades are forcing air into the load element chamber.
4. Fan current, which ensures the fan motor isn't overloaded or jammed.

Unresolved cooling may result in damage to load bank.

VI-B. Alarms

If the Electra registers an alarm, the green "Normal Operation" indicator on the main screen will change to a red "Load Bank Failure" notification and the unit will dump the load. Details about the alarm can be found on the Maintenance screen, accessible by pressing the "Maintenance Mode" button.

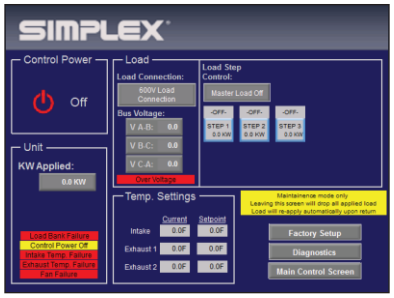
The Electra load bank's HMI can alert you to four alarms:

- **Load Bank Failure:** Indicates that there is a problem with the load bank that must be resolved immediately.
- **Exhaust Temp. Failure:** Air leaving the load bank is too hot.
- **Fan Failure:** Either the fan is not pushing cooling air into the element chamber or the fan motor is overloaded.
- **Over Voltage:** Indicates that the load bank has been connected to a power source that produces a higher voltage than the unit is configured for.

The load bank will alert you to alarms by turning the status areas for the alarm on the home screen from green to red.

Figure 14: Failure Indicator

Figure 15: Alarm Indicators



VI-C. Warnings

The Electra features one warning: Intake Temp Failure. This warning will not disable the unit and dump the load as with the alarms, but the issue should be investigated and resolved as soon as possible.

VII. MAINTENANCE/TROUBLESHOOTING

VII-A. General Maintenance

The load bank has been designed to require minimum maintenance. All components have been chosen for a long, reliable life. Two basic intervals of maintenance are required: each operation and either every 50 hours or 6 months (whichever comes first).

VII-B. Each Operation

The air intake screens and louvers, fan and cooling chamber, and exhaust openings must be checked for any obstructions or foreign objects.

Due to the high volume of air circulated, paper and other items can be drawn into the air intake. Clear the area around the load bank of any debris that may be sucked into the intake area.

During load bank operation, ensure that air is exiting from the exhaust vent.

The load branches should be checked for blown fuses or opened load resistors. To check the fuses or load resistors, operate the load bank from a balanced 3-phase source and check the three line currents. The three current readings should be essentially the same. If a sizable difference is indicated, one or more load fuses or load resistors may have malfunctioned.

Remove all power before servicing the load bank.
Never operate or service a load bank that is not grounded.

VII-C. Troubleshooting

Any of the alarms detailed on page 17 will result in the load bank entering a failure state and dumping the load. All load steps are locked out until the problem is corrected. Until the failure is investigated and corrected, the load cannot be reapplied. For possible solutions to the problems causing the alarms, please consult the "Alarms and Warnings" section on Page 17. If the load bank still won't operate, please call the Simplex service department at 800-637-8603 ext. 4.

VII-D. Intake Temp. Failure

- Clear intake screen located on bottom of unit.
- Move load bank to cooler location or wait to conduct test on cooler day, if possible.

VII-E. Exhausts Temp. Failure

- The unit needs to be serviced. Please call the Simplex service department at 800-637-8603 ext. 4.
- Move the unit to an area that allows for proper air circulation. See “Load Bank Placement” on page 13 for more information.

VII-F.

- Clear intake screen located on bottom of unit.
- Make sure nothing has jammed the fan blades.

VII-G. Over Voltage

- Connect load bank to appropriate voltage source.

Contact Simplex
for all your Load Bank and Fuel Supply needs.

Simplex, Inc.
5300 Rising Moon Road
Springfield, IL 62711

800-637-8603
www.simplexdirect.com