



POLARIS

**2.5KW-150KW
STATIONARY LOAD BANK**

Last Revision Date: June 8, 2021

For the most up-to-date information for this product and others, please contact Simplex, Inc. at (800) 637-8603 or visit us on the web at <http://www.simplexdirect.com>.

Many of the illustrations and instructions in this manual refer to the standard configuration for this product. If you have requested customizations, the drawings provided with your order take precedence; please refer to them for details specific to your order. If you have any questions, please contact Simplex at 800-637-8603.

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1 WARNINGS AND CAUTIONS

SAFETY INFORMATION SYMBOLS

The following images indicate important safety information:



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.

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. Do not allow the load bank's feet to sink into soft surfaces thereby cutting off bottom air intake. 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 recirculation 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.
- 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. Jewelry 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.
- Main Disconnect to be provided by installer, rated 600V maximum, sized 150% maximum of rated current.
- Load Bank warranty is void if incorrectly cooled.



2 NAMEPLATES AND PLACARDS

FUSE REPLACEMENT CHART
F1-F2: **XA, XXXV, 200KAIC
KLDL-X**
F3: **XA, XXXV, 200KAIC
KLDL-X**
F4: **XA, XXXV, 200KAIC
KLDL-X**

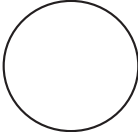
W.O.# XXXXX
Environmental Type-3R Polaris-XXX

SIMPLEX®

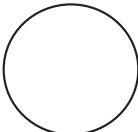
FUSE REPLACEMENT CHART
RF1-RF6: **XA, XXXV, 200KAIC
JLLS-X**
RF7-RF12: **XA, XXXV, 200KAIC
JLLS-X**
HF1: **XA, XXXV, 200KAIC
KLKR-X**

W.O.# XXXXX
Environmental Type-3R Polaris-XXX

SIMPLEX®



**POWER
AVAILABLE**



**COOLING
FAILURE**

**STATUS
INDICATORS**

SIMPLEX®
(800) 637-8603
www.simplexdirect.com

W.O.#: XXXXX
MODEL: POLARIS XXX
ENCLOSURE: TYPE 3R
SHORT CIRCUIT
CURRENT RATING: 5 kA
LARGEST MOTOR FLA: 2.0A
POWER CIRCUIT:
VOLTAGE: XXXVAC, 3-PH, 60HZ
FULL LOAD AMPS: XXXA

Polaris-XXX **FORCED AIR COOLED RESISTIVE LOAD BANK**

CAPACITY: XXXKW AT 1.0 P.F.
VOLTAGE: XXXVAC
CONNECTION: 3-PHASE, 3-WIRE
FREQUENCY: 60HZ
FAN POWER: XXXVAC
CONTROL POWER:
XXX
FULL LOAD AMPS: XXXA
FAN MOTOR CURRENT: 2.0A

COOLING: FORCED AIR
AIRFLOW: 3500CFM
MAXIMUM AIR INTAKE TEMP: 150°F
NOMINAL AIR TEMP RISE: 30-120°F
SHORT CIRCUIT
CURRENT RATING: 5kA
LOAD BANK ENCLOSURE: TYPE-3R
SERIAL NUMBER: 86847-14-43



WARNING

High Voltage: Turn off and disconnect power source before opening any compartment
High Temperature: Allow equipment to cool before servicing or opening any compartment
Rotating Equipment: Assure that fan has stopped before opening any compartment
For Operator Safety: Make sure this equipment is properly grounded when in use

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

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POLARIS



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(800) 637-8603
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W.O.#: XXXXX
MODEL: POLARIS XXX
REMOTE ENCLOSURE: TYPE 4X
CONTROL POWER:
XXXV @ XA

MOTOR DISCONNECT ONLY

**DISCONNECT INCOMING POWER
SOURCE PRIOR TO SERVICING.**

**MOTOR OVERLOAD DEVICE:
TURN OFF THEN ON TO RESET.**

3 DESCRIPTION AND SPECIFICATION

The Simplex Polaris load bank is a test instrument designed to apply a power load to a generator or other source to ensure your facility has backup power when it needs it.

Load banks provide a way to perform routine maintenance exercise to assure long-term reliability and readiness of a standby generator. With exercise load banks like the Polaris, the detrimental effects of unloaded operation of diesel engine generators are significantly reduced.

Standard Polaris units are designed to operate in ambient temperatures between 5 and 125 degrees Fahrenheit. For colder temperatures, an Arctic Duty load bank is required.

FEATURES

The Polaris is a stationary load bank designed for recurring testing. With optional equipment, it can also provide complementary load when your facility isn't drawing enough to prevent "wet-stacking" the generator or prevent motors generating reverse power from damaging the generator.

The Human-Machine Interface control panel (HMI) can be mounted on the load bank or in a location of your choice for convenient testing.

The Polaris supports the MODBUS protocol, implemented as either RS485 MODBUS RTU or MODBUS TCP/IP, for external control and monitoring.

Through its Dry Contact terminals, the Polaris load bank can be integrated into your facility's systems to report its status.

SAFETY

The Polaris is equipped with sensors to ensure the unit doesn't get hot enough to damage itself, its surroundings, or personnel.

You can also install a switch or other circuit in a location of your choice to dump the load should the generator be needed during testing.

SPECIFICATIONS

The Polaris load bank is available in three different sizes and a number of load configurations. Please consult the tables on the following two pages to determine the specifications of your unit.

		Kilowatts				
		27.5	50	75	100	150
1-phase	208V	136	245	365	N/A	N/A
	240V	119	212	317	N/A	N/A
3-phase	208V	80	142	212	282	N/A
	240V	75	125	185	245	365
	480V	35	60	90	120	180
	600V	30	52	76	100	148

Table 1 Maximum amperage draw

		Kilowatts				
		27.5	50	75	100	150
1-phase	208V	Small, 2.5KW	Medium, 5KW	Large, 5KW	N/A	N/A
	240V	Small, 2.5KW	Medium, 5KW	Large, 5KW	N/A	N/A
3-phase	208V	Medium, 2.5KW	Medium, 5KW	Large, 5KW	Large, 10KW	N/A
	240V	Small, 2.5KW	Medium, 5KW	Large, 5KW	Large, 10KW	Large, 25KW
	480V	Small, 2.5KW	Medium, 5KW	Large, 5KW	Large, 10KW	Large, 25KW
	600V	Small, 2.5KW	Medium, 5KW	Large, 5KW	Large, 10KW	Large, 25KW

Table 2 Enclosure size and step resolution

Please consult the tables on these pages to determine the specifications for your Polaris load bank.

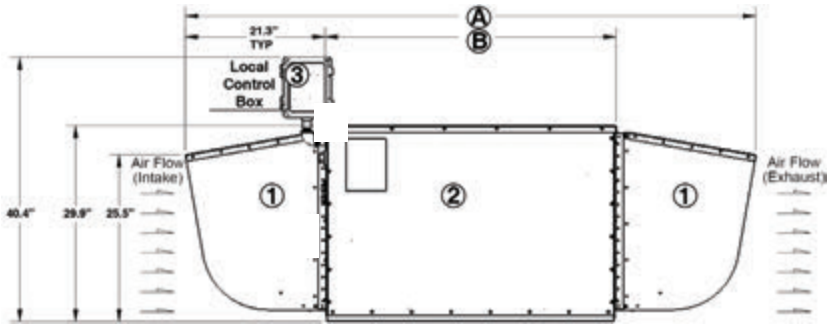


Figure 1 Top View with Local Control Box

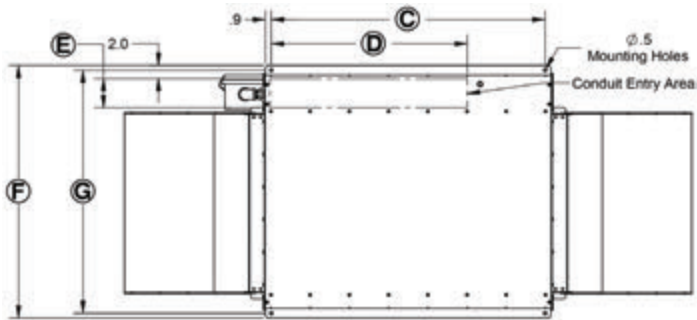


Figure 2 Bottom View

Reference	Small	Medium	Large
A	64.9"	74.9"	86.9"
B	22.3"	32.3"	44.3"
C	19.9"	29.9"	41.9"
D	11.0"	19.0"	30.0"
E	4.5"	4.0"	4.5"
F	32.8"	38.8"	38.8"
G	31.3"	37.3"	37.3"

Table 3 Polaris Dimensions

Please consult the tables on these pages to determine the specifications for your Polaris load bank.

4 UNPACKING

INCLUDED COMPONENTS

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. Human-Machine Interface (HMI)
3. Manual
4. Electrical Drawings Package

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 the 50-hour / 6-month maintenance schedule or as a load bank is relocated:

If any problems are observed during Primary Inspection, call Simplex 24 hours a day at 800-637-8603

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.

5 INSTALLATION

LOAD BANK LOCATION

Polaris load banks are generally intended for outdoor installation. A forced air system, which discharges out the side of the unit, cools the load elements. Load banks require large quantities of air circulation to adequately cool. Install the load bank in an area that provides sufficient circulation. Before conducting load tests, a review of site conditions by trained personnel is recommended.

The load bank requires at least a 7.5-foot side clearance and a 3-foot clearance on the front and back (see **Figure 3 Clearance Requirements**). The load bank should be placed in a secure area accessible by trained personnel only.

Because the unit generates a lot of heat, never operate it 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.

It may compete with nearby generators for cooling air.

Improperly installing this unit may result in damage or destruction of the load bank, adjacent equipment, and the building housing the unit.

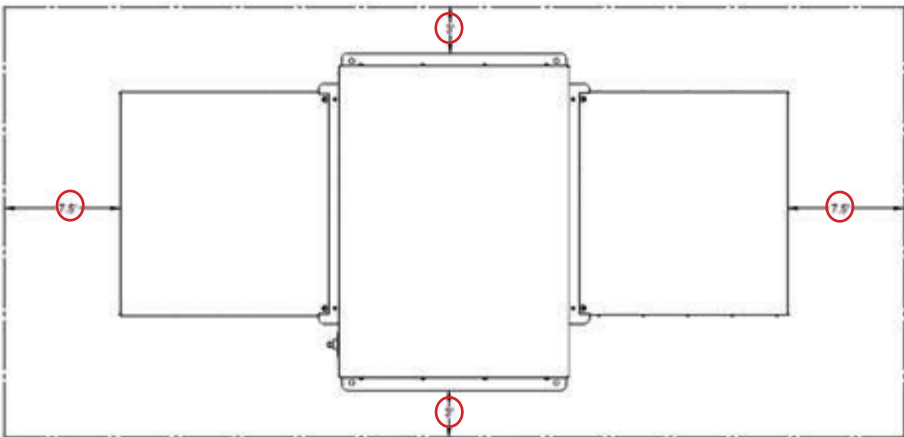


Figure 3 Clearance Requirements

CONNECTING POWER

Pull, drill, or cut holes in the Conduit Entry Area, located in the bottom of the load bank's control panel enclosure, to bring in the source's power cables. See **Figure 6**, **Figure 7**, and **Figure 8 on page 13** to find the Conduit Entry Area for each of three enclosure sizes.

1. Confirm the test source is properly grounded and ground the Load Bank by connecting the Grounding Block to an earth ground or grounding rod. (See **Figure 4 Grounding Block**.)
2. Connect the source's power output to the Main Load Block with appropriately sized cables (see **Figure 5 Main Load Block**).



Figure 4 Grounding Block

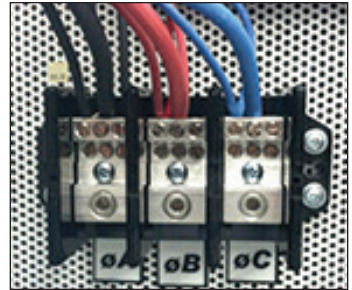


Figure 5 Main Load Block

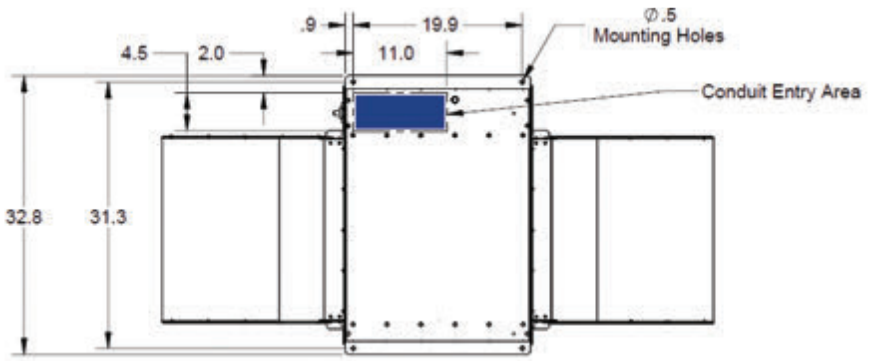


Figure 6 Conduit Entry Area - Small

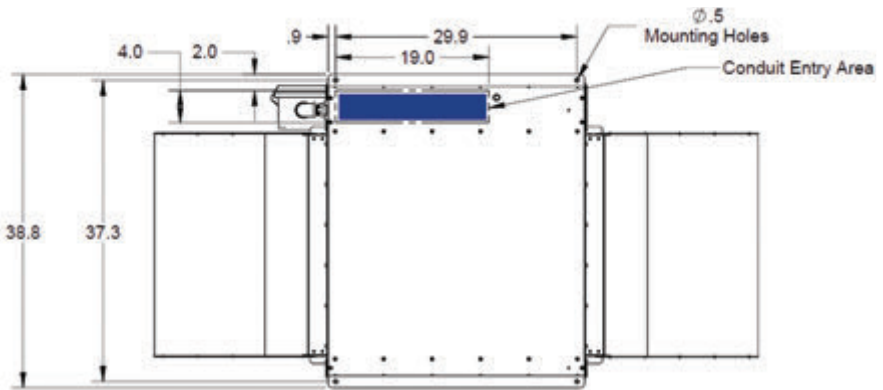


Figure 7 Conduit Entry Area - Medium

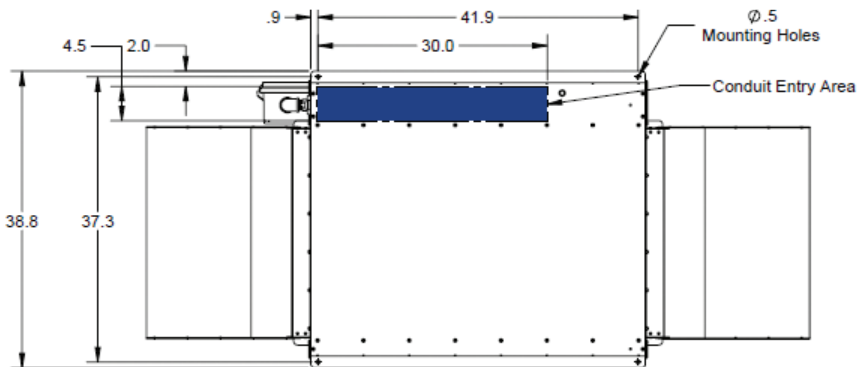


Figure 8 Conduit Entry Area - Large

INSTALLING A LOCAL HMI

To install a local control panel, you must remove the plate covering the access hole on the unit (Figure 9), attach the control panel assembly to the unit (Figure 11), and wire the HMI to the unit as indicated in your electrical drawings package.

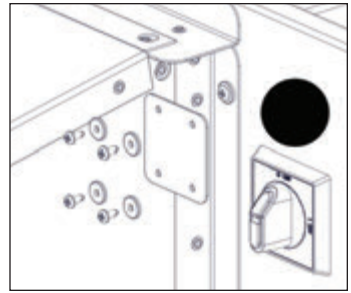


Figure 9 Access panel

INSTALLING A REMOTE HMI

Mount the HMI where desired.

3. Connect the HMI to the load bank by swinging the HMI's screen out to expose the TB-H terminal block (see Figure 9 Access panel) and wiring it to the load bank.

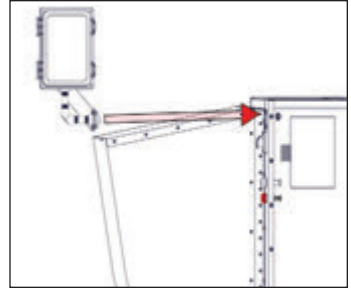


Figure 11 Affixing panel

A. Using a Belden 9841 or equivalent cable, make the following connections between the HMI's TB-H terminals to the load bank's Serial Adapter (see Figure 10 Serial Adapter).



Figure 12 HMI TB-H

1. TB-H-3 → TB-COM-4
2. TB-H-5 → TB-COM-5
3. Wire shielding → TB-COM-6

B. Using a copper wire, 14AWG or larger, rated at 60C or higher, connect the HMI's TB-H-1 to the load bank's TB-DC 1 terminal and the HMI's TB-H-2 to the load bank's TB-DC 3 terminal (see Figure 13 TB-DC).



Figure 10 Serial Adapter

LOAD DUMP AND AUTOMATIC MODE INSTALLATION

1. If the Load Dump feature is desired, remove the factory-installed jumper at TB-R-1-2 and connect customer-supplied Load Dump contacts to TB-R-1-2 (See **Figure 14 Load Dump Jumper**). To dump the load, open the customer-supplied contact. To enable load, close the customer-supplied contact.
2. If Automatic Mode is installed, installing a switch connecting TB-R-3-4, the terminals immediately next to the Load Dump jumper in Figure 14, will enable Contact Closure Mode (see **page 27** for more information on Contact Closure Mode.)



Figure 13 TB-DC

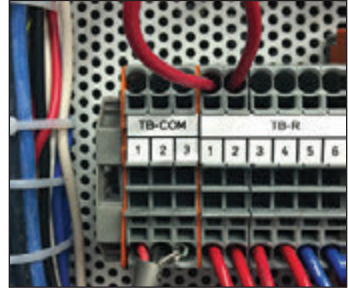


Figure 14 Load Dump Jumper

INSTALLING CURRENT TRANSFORMERS

If your load bank is equipped with Metering, Automatic Mode or Regenerative Mode options, you will have to install Current Transformers on your power cable. The current transformers must be placed and oriented correctly to ensure they accurately detect the current.

- For metering mode, install the current transformers on the load bank leg of your power system (see [Figure 17 on page 17.](#))
- For Automatic Mode, install the current transformers on the power source leg of your power system (see [Figure 18 on page 17.](#))
- For Regenerative Mode, install the current transformers on the normal load leg of your power system (see [Figure 19 on page 17.](#))

Orient the current transformers so that the XI or HI on the ring is facing the power source ([Figure 15 CT Orientation.](#)) If multiple current transformers are installed, ensure that they face the same way.

When the current transformers are installed, connect them to the load bank by connecting the white wire of the first current transformer to TB-CT-1 and the black wire to TB-CT-2. If a second current transformer is installed, connect its white wire to TB-CT-3 and its black wire to TB-CT-4 (see [Figure 16 TB-CT.](#))



**Figure 15
CT Orientation**

When installing a current transformer, ensure that the XI or HI on the ring is facing the power source.

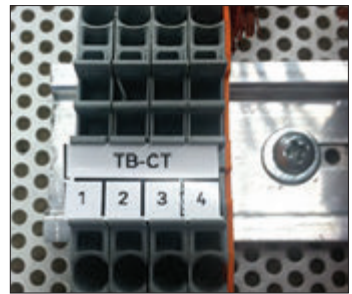


Figure 16 TB-CT

Figure 17
Current
Transformer
placement for
Metering

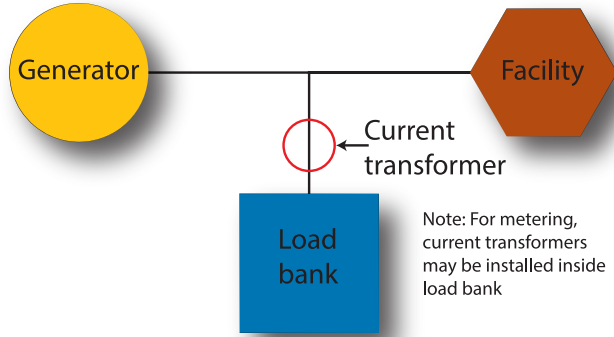


Figure 18
Current
Transformer
placement for
Automatic
Mode

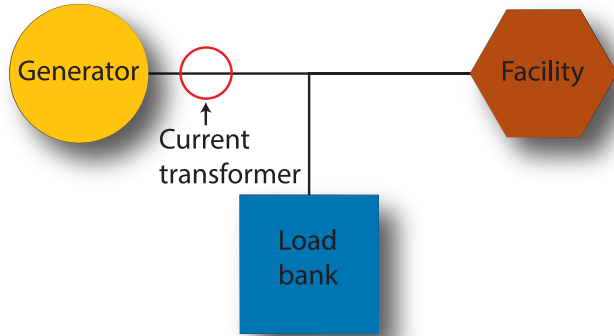
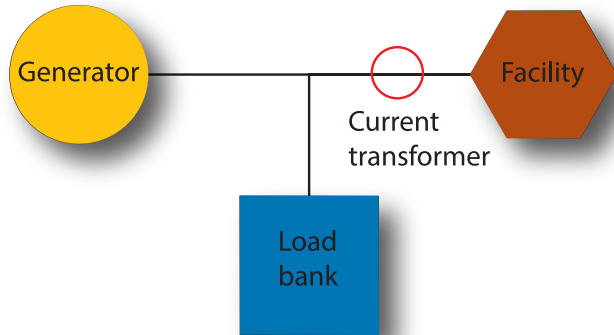


Figure 19
Current
Transformer
placement for
Regenerative
Mode



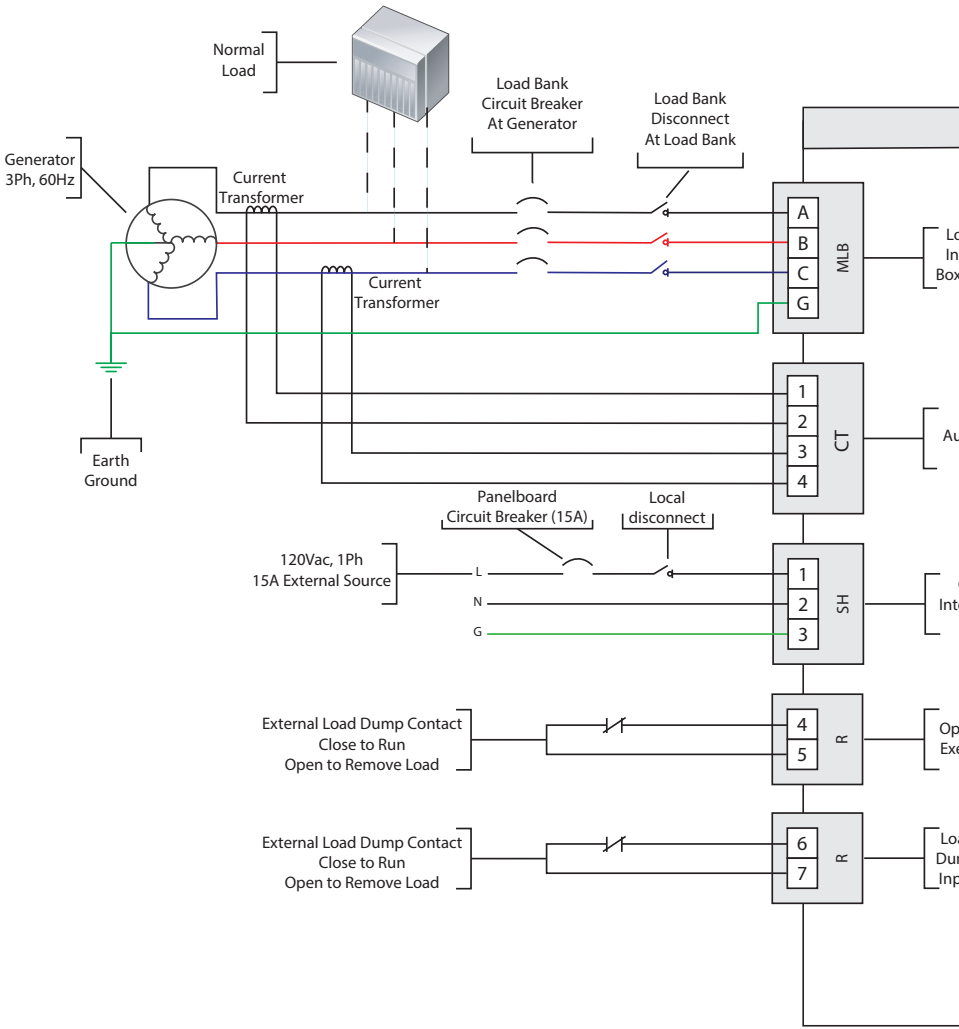
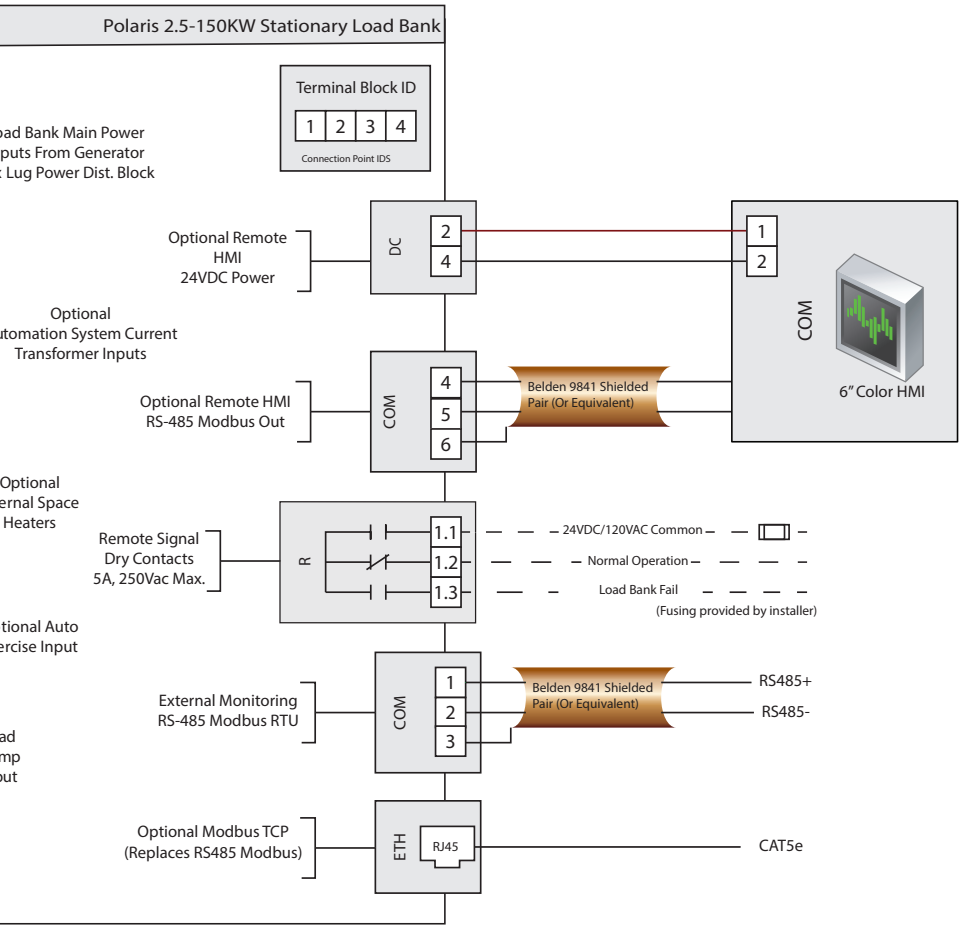


Figure 20 Connection diagram



MODBUS INSTALLATION

The Polaris load bank supports the MODBUS protocol, implemented either as RS485 or TCP/IP (which is an optional upgrade).

To implement MODBUS, connect the load bank to your facility's systems as follows:

For RS485:

1. Connect the RS485+ line to TB-COM-1
2. Connect the RS485- line to TB-COM-2
3. Connect the wire shielding to TB-COM-3

For MODBUS TCP/IP (optional upgrade)

1. Plug a CAT5e cable into the ethernet jack on the MODBUS Serial Converter (see [Figure 23](#).)

The Polaris MODBUS control set is implemented as detailed in [“Appendix B — MODBUS controls”](#) on page 38.

INSTALLING HEATERS

Polaris load banks are equipped with space heaters for cold weather operation and to prevent condensation, which can damage the unit. The heaters require a dedicated power source independent of control power at all times to prevent startup failure due to cold environments.

To run power to the heaters:

1. Run a 120V, 15A, 1-phase power cable into the control panel.
2. Connect the Line leg of the power cable to SH-1
3. Connect the Neutral leg of the power cable to SH-2

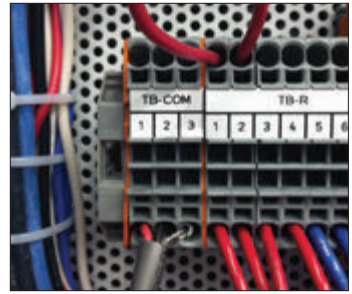


Figure 22 TB-COM

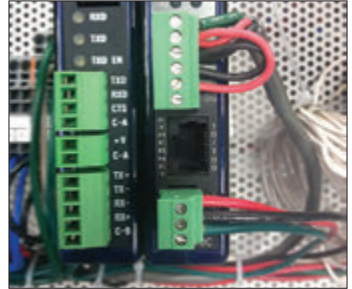


Figure 23 MODBUS
Serial Converter



Figure 21 TB-SH

4. Connect the Ground leg of the power cable to SH-3

The heaters are set at 50 degrees Fahrenheit. If a different temperature is required, adjust the red thermostat on the front of the heater.

BMS/BAS INSTALLATION

The Polaris provides a set of Remote Signal Dry Contacts, which provide an alarm if the load bank has failed.

To use the dry contacts, wire three cables to TB-R-1.1-1.3. Continuity between TB-R-1.1 and TB-R-1.2 indicate normal load bank operation, and continuity between TB-R-1.1 and TB-R-1.3 indicate load bank failure.



Figure 24 TB-R

6 OPERATING INSTRUCTIONS

OPERATING THE LOAD BANK

Before operating the load bank, ensure that the unit is wired properly based on the instructions from “Connecting power” on page 12.

The first time using the load bank, the welcome screen (Figure 25 Welcome Screen) will appear. After a few seconds, that screen will be replaced with the main screen (See Figure 26 Main Screen.)

APPLYING A LOAD

The load bank applies loads based on its step resolution. If you enter a value the unit cannot apply, it will apply the closest load it can without exceeding the value you entered. For example, if you enter 64.9KW on a load bank with a step resolution of 5KW, the load bank will apply 60KW.

To conduct an operation, turn on the control power by pressing the “Control Power” button on the screen, the F1 - Control Power button, or the F1 function key. This will turn on the load bank and its fan.

Press the F2 Load button or the F2 function key to go to the Manual Load Entry screen (see Figure 27 Manual Load Entry Screen.) Here you can enter a load value and apply it.

To begin applying a load, press the Master Load switch on the screen, the F2 - Master Load button, or the F2 function key. Then press the Load To Apply field on the HMI screen. A numeric keypad will come on the screen (see “Figure 28 Numeric Keypad” on page



Figure 25 Welcome Screen



Figure 26 Main Screen



Figure 27 Manual Load Entry Screen

23.) Type in the load you wish to apply, measured in kilowatts, and press ENT. If you make a mistake entering the load, you can press BS to backspace over a value, CLR to clear the field and type a new number, or ESC to return to the previous screen without changing the applied load.

To change the load being applied, press the Load to Apply field again and enter a new value.



Figure 28 Numeric Keypad

BLOCK LOADING

To conduct a block load test, simply enter the load as described above before activating the Master Load switch.

ENDING AN OPERATION

When your operation is concluded, press the Master Load switch on the screen, the F2 - Master Load button on the screen, or the F2 function key to remove the load from the source. To turn off the load bank, press the Control Power switch on the screen, the F1-Control Power button on the screen, or the F1 function key. The load bank will enter Cooldown Mode, during which time the unit's fan will continue to run for the duration of the cooldown delay. (See "Figure 29 Cooldown Mode" on page 23.) You can cancel Cooldown Mode by pressing "Cancel," but doing so risks

You can change the cooldown delay on the setup screen (F5 Setup or the F5 function key from the main menu), but this is not recommended.



Figure 29 Cooldown Mode



Figure 30 Metering Screen

damage to the load bank.

METERING

If your load bank has the Metering option installed, you can monitor the aspects of the power generated by the source as measured by the load bank by pressing “F4 Metering” on the screen or the F4 function key. On the Metering screen, you can see the voltage and amperage of the power source in the first two rows, as well as the kilowatts being generated, the power factor, and the frequency of the power (see **“Figure 30 Metering Screen” on page 23.**) Pressing “F4 Back” or the F4 function key will return you to the main screen.

7 AUTOMATIC MODE

The Polaris load bank can be optionally equipped with an automatic mode, which will extend your generator's life by protecting it against wet-stacking.

OVERVIEW

The load bank adds and drops load in increments equal to its step resolution.

Automatic Mode adds load when the load bank detects that your facility isn't drawing enough power to keep the generator operating in its optimal range.

When your load bank is installed, a set of current transformer rings will be installed on your generator's power lines to monitor the load on your system (see [page 16](#)). When the load bank detects that the power draw has dropped below the preset minimum value, it begins adding load until the draw on the generator is within the designated range. Should the load bank determine that the power draw has increased beyond the preset maximum value, it begins removing load until the draw is back within the designated range.



Figure 31 System Setup Screen

SETTING UP AUTOMATIC MODE

Before you activate Automatic Mode, you must configure the load bank to interact with your generator. Enter the Setup Screen by pressing the F5 Setup button on the screen or the F5 function key.

On the setup screen will be a number of options specific to Automatic Mode. (See [Figure 31 System Setup Screen](#).)

The values you will need to set up this mode are specific to your generator.

- **Current Transformer:** Sets the Current Transformer Ratio. Because this value is based on the current transformers and the specifications of your generator, it is set at installation and should not normally be changed.
- **Startup Delay:** Dictates how long the load bank will wait before adding load once it has detected that the power draw of your facility has dropped below the minimum KW value.
- **Step Up Delay:** Determines the speed at which the load bank will add sequential load steps.

- **Step Down Delay:** Determines the speed at which the load bank will remove sequential load steps.
- **Auto Mode:** Changes between two options: load regulate, which automatically adds load to the generator, and Contact Closure, which adds load when a contact has been closed on a separate controller.
- **Minimum KW:** The lower limit of the desired load range.
- **Maximum KW:** The upper limit of the desired load range.

To change any of the values except Auto Mode, press the value and a numeric keypad will come up. Use it to enter a new value the same way you would enter a load to apply. (See “Applying a load” on page 22 for more information about using the numeric keypad.)

To change the Auto Mode, simply press the text underneath it, and it will toggle between Load Regulate and Contact Closure.



Figure 32
Automatic Mode



Figure 33 Auto Mode
Running

This screen depicts a load bank in Automatic Mode. In this example, the unit is stepping up — adding load — because the load, 27.5KW, is below the minimum of 100KW.

ENTERING AUTOMATIC MODE

When your load bank is configured, return to the main screen by pressing the “F5 Back” button of the F5 function key on the HMI. From the Main screen, press the “F3 Auto” button or the F3 function key to enter the Automatic Mode screen.

On the Automatic Mode screen, you can press the “Auto Mode” switch, the “F2 Enable” button or the F2 function key to put the

load bank into Automatic Mode. Once this mode is enabled, the load bank will monitor your generator and step the load up or down as necessary. The same metering screen described in **“Metering” on page 24** is available from this screen. Once configured and enabled, your load bank can remain in Automatic Mode indefinitely.

CONTACT CLOSURE MODE

Contact Closure Mode allows for the load bank to be controlled by your system to conduct generator testing.

To enable Contact Closure Mode, install a switch connecting TB-R-3 and 4, as detailed on **page 17**. This mode uses the same settings as Automatic Mode (see **“Setting Up Automatic Mode” on page 28** for more information). When the contact is closed, the load bank will step up to the maximum load. When the contact is open, the load bank will step down to the minimum load.

8 REGENERATIVE MODE

The Polaris load bank can be optionally equipped with Regenerative Mode, which will protect your generator from motors such as elevators and ski lifts feeding power back into the system.

OVERVIEW

When motors dedicated to lifting people or objects lower them, they can sometimes generate reverse power. This power, if allowed to feed back into the system, can seriously damage or even destroy generators. A load bank set up for regenerative mode will detect this reverse current and add load to the system to absorb it before it can feed into the generator.



Figure 34
Regenerative Setup

The load bank adds and drops load in increments equal to its step resolution. To determine your unit's step resolution, consult the table **“Enclosure size and step resolution” on page 8**.

HOW REGENERATIVE MODE WORKS

To configure a load bank for Regenerative Mode, you must install current transformers near the motor being monitored. These will detect when the motor generates electricity. For more information, see **“Installing Current Transformers” on page 16**.

In Regenerative Mode, the load bank watches for the power to drop below four checkpoints, called Banks 1-4. Banks 1 and 2 can be any value up to the generator's maximum. Bank 3 must always be 0KW. Bank 4 must be a negative number. Entering a positive value for Bank 4 will prompt an error message.

Regenerative Mode works as follows:

1. The load bank monitors the load near the motor through current transformers.
2. When the load, measured in kilowatts, drops below Bank 1, the load bank waits for the duration of the Bank 1 On Delay, then generates 25% of its capacity.
3. If the load continues to drop past the Bank 2 checkpoint, the

- load bank waits for the duration of the Bank 2 On Delay, then generates 50% of its capacity.
- If the load drops below 0KW, meaning the motor is generating power, the load bank immediately begins generating 75% of its capacity. There is no On Delay for Banks 3 and 4.



Figure 35
Regenerative Mode

- If the load continues to drop and crosses the Bank 4 threshold, which is a negative number, the load bank begins generating 100% of its capacity.
- If the load then begins to increase and crosses the Bank 4 checkpoint, the load bank waits for the duration of the Bank 4 Off Delay and drops to 75% of its capacity.
- Similarly, if the load rises past the Bank 3 threshold, the load bank waits for the duration of the Bank 3 Off delay and drops to 50% of its capacity.
- As the load continues to increase and passes Banks 2, the load bank will drop to 25% of its capacity immediately.
- When the load passes Bank 1, the load bank will immediately drop to 0%, no longer generating load.



Figure 36 Auto Mode Running

This screen depicts a load bank in Regenerative Mode. In this example, the unit is generating 75% of its load because the measured power has dropped to -3KW, crossing Bank 3 but not yet less than Bank 4.

Before you activate Regenerative Mode, you must configure the load bank to interact with your power system. Enter the Setup Screen by pressing the F5 Setup button on the screen or the F5 function key.

SETTING UP REGENERATIVE MODE

The values you will need to set up this mode are specific to your generator. Consult the generator's documentation before configuring your load bank.

ENTERING REGENERATIVE MODE

On the setup screen will be a number of options specific to Regenerative Mode. (See “[Figure 34 Regenerative Setup](#)” on page 28.)

- **Current Transformer:** Sets the Current Transformer Ratio. This value is set at installation and should not normally be changed.
- **Bank 1 - Bank 4 KW:** Sets checkpoints at which the load bank will add load to the system. Bank 3 will always be 0KW, and Bank 4 must be a negative value.
- **Bank 1 and Bank 2 On Delay:** Dictates how long the load bank will wait before adding load once the detected current reaches the Bank 1 and Bank 2 checkpoints.
- **Bank 3 and Bank 4 Off Delay:** Determines how long the load bank will wait before removing load from the system once the power system has reached the Bank 3 and Bank 4 checkpoints.

To change any of the values, press the value and a numeric keypad will come up. Use it to enter a new value the same way you would enter a load to apply. (See “[Applying a load](#)” on page 22 for more information about using the numeric keypad.)

When your load bank is configured, return to the main screen by pressing the “F5 Back” button of the F5 function key on the HMI. From the Main screen, press the “F3 Auto” button or the F3 function key to enter the Regenerative Mode screen.

On the Regenerative Mode screen, you can press the “Auto Mode” switch, the “F2 Enable” button or the F2 function key to put the load bank into Regenerative Mode. Once this mode is enabled, the load bank will monitor your load and step the load up or down as needed. The same metering screen described in “[Metering](#)” on page 24 is available from this screen.

Once configured and enabled, your load bank can remain in Regenerative Mode indefinitely.

9 ALARMS AND WARNINGS

ALARMS

The Polaris load bank's HMI features three alarms:

- **Cooling Fan:** Indicates the status of the cooling fan
- **Exhaust Temp:** Indicates whether the cooling system is operating correctly
- **Load Dump:** Indicates whether the Load Dump feature has been activated

The load bank will alert you to these alarms by turning the status areas for the alarm on the home screen from green to red and displaying the alarm signal in white text.

If any of these alarms are triggered, the unit will dump the load and the procedure cannot continue until the problem has been corrected.

WARNINGS

The Polaris features one warning: Cooling Fan Standby. When this warning is triggered, the Cooling Fan status area will turn yellow.

Polaris load banks do not dump load when a warning is triggered, but the problem should be investigated as soon as possible.



Figure 37
Cooling Fan Failure



Figure 38
Exhaust Temp High



Figure 39
Load Dump Activated

Topic	Error message	Cause	Solution
Cooling Fan	Standby	Motor Disconnect Switch activated	Reset Motor Disconnect Switch
	Failure	Motor not turning	Check fan blades for obstructions Check wiring to motor
Exhaust Temp	High	Fan blades not spinning	Tighten screws on fan blade hub
		Air intake blocked	Clear intake vents of debris
Load Dump	Activated	Load Dump switch activated	Clear customer-supplied Load Dump switch
		Load Dump jumper loose	Replace Load Dump jumper

Table 4 Common Troubleshooting Solutions

10 MAINTENANCE/TROUBLESHOOTING

GENERAL MAINTENANCE

All electrical connections should be tightened every 48 hours of use. Cooling fan motors are permanently lubricated and do not require maintenance.



Always remove all power from the load bank and all fan/control power before servicing the load bank. Never operate or service a load bank that is not grounded.

TROUBLE SHOOTING

Although Polaris load banks are designed with trouble-free operation in mind, some problems can arise. Please consult the following table for solutions to common issues before contacting a Simplex service representative.

Problem	Solution
Load bank wired to source but won't turn on	<p>Ensure load bank is wired to source correctly</p> <p>Remove faceplate and check for and replace any blown fuses</p> <p>Remove faceplate and tighten any loose relays, contactors, lugged wires, etc.</p>
Load bank overheating	<p>Clear intake and exhaust vents of any debris</p> <p>Ensure load bank was not installed too close to generator or any other source of exhaust</p> <p>Ensure load bank was installed in a location that allows sufficient cool air intake</p> <p>Make sure ambient temperature isn't too high to allow for cool air flow</p>
HMI not displaying data	<p>Ensure HMI power connections are wired correctly</p> <p>Check HMI serial cable connections</p>

Table 5 Troubleshooting

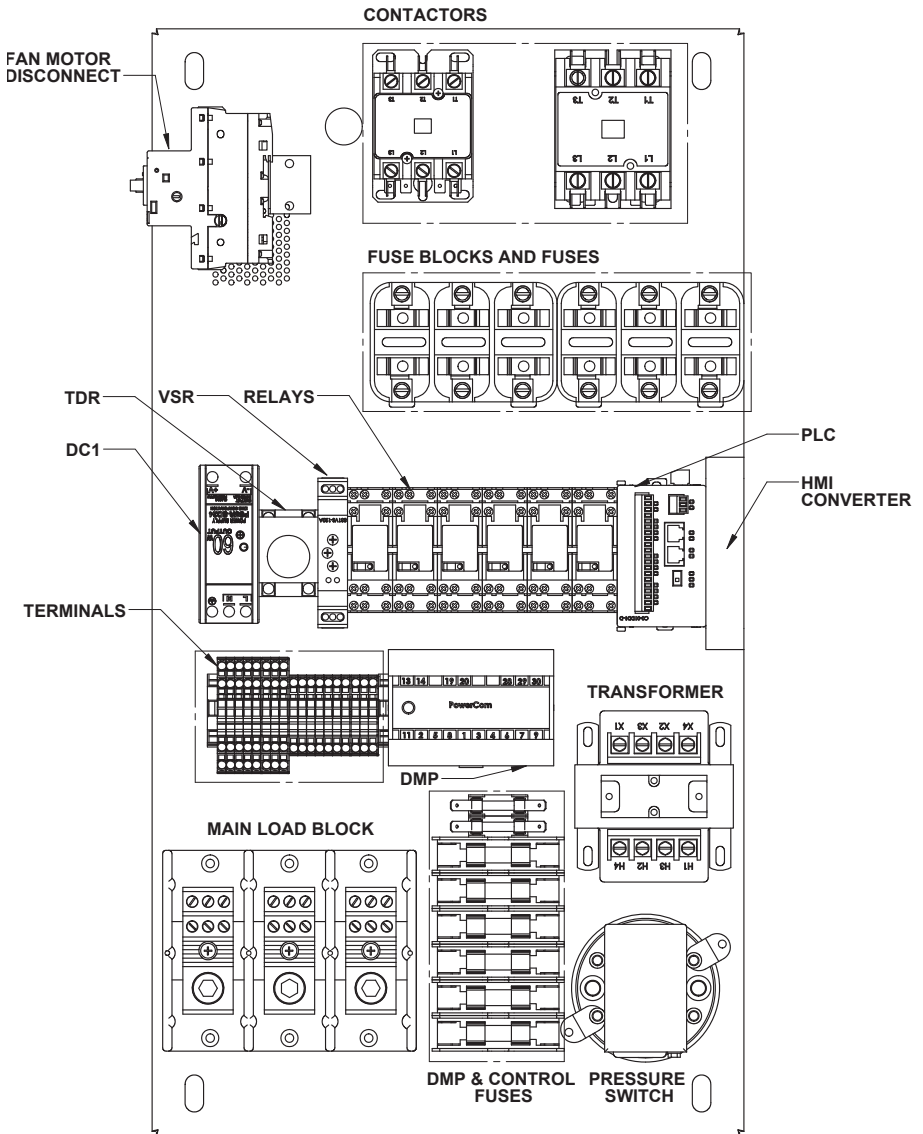


Figure 40 Subpanel Layout- Small

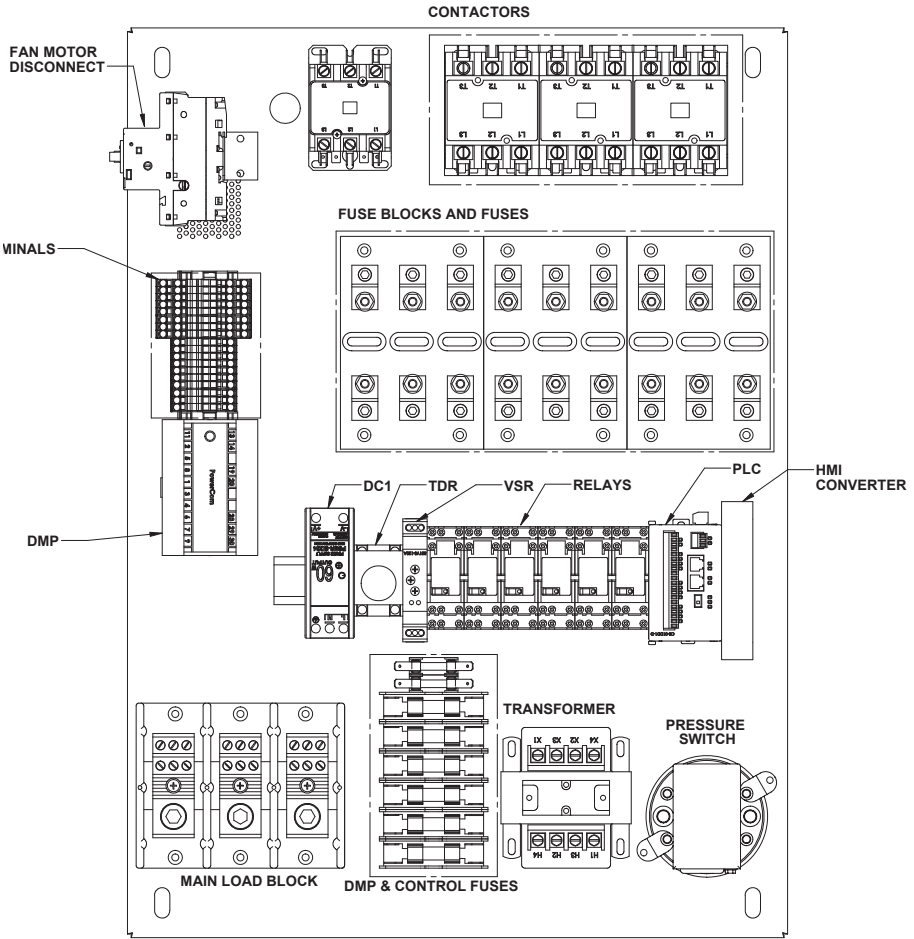


Figure 41 Subpanel Layout - Medium

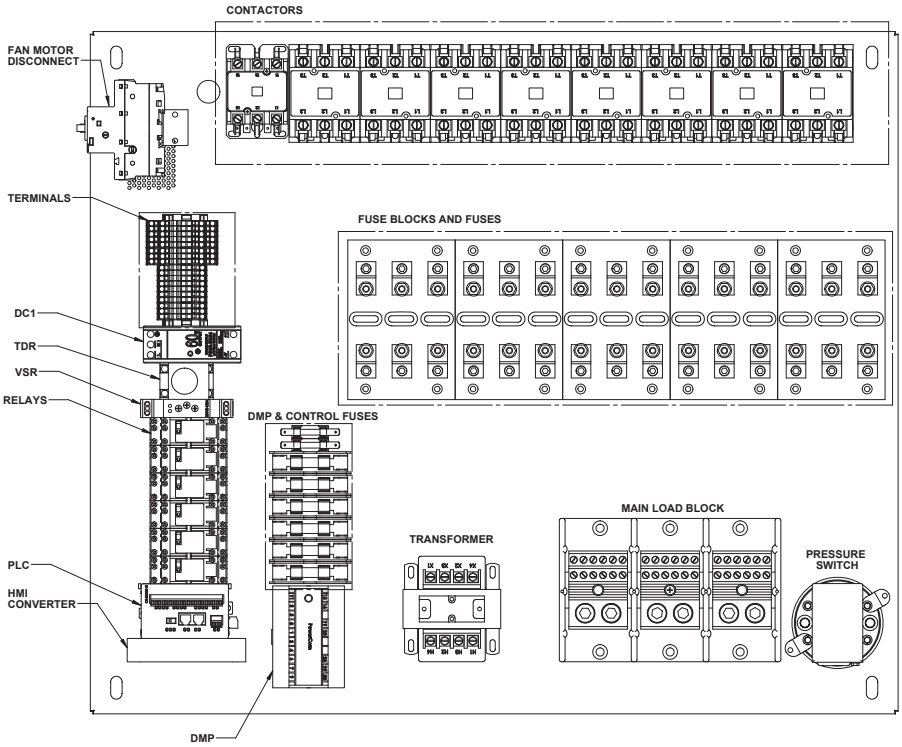


Figure 42 Subpanel Layout - Large

APPENDIX A — MODBUS CONTROLS

Name	Type	Function Code	Address
Activate Fan	Coil	01	16586
Apply Load	Coil	01	16704
Cancel Cooldown	Coil	01	16487
KW To Apply	Floating Point	03	28911

Table 6 MODBUS Controls (Read/Write)

Table 7 MODBUS Indications (Read only)

Name	Type	Function Code	Address
Exhaust Alarm	Coil	01	16484
Fan Failure Alarm	Coil	01	16485
Load Dump Activated	Coil		16486
Fan Running	Coil	01	8193
Applied Load	Floating Point	03	29077
Regulate Mode Active ^a	Coil	01	16705
Regenerative Sensing Mode Active ^b	Coil	01	16706
Vab ^c	Floating Point	03	28673
Vbc ^c	Floating Point	03	28675
Vac ^c	Floating Point	03	28677
Va ^c	Floating Point	03	28679
Vbc ^c	Floating Point	03	28681

(a) Load Banks with Automatic Load Regulation Only

(b) Load Banks with Regenerative Power Sensing Only

(c) Load Banks with Any Automation Option Only

Table 5 MODBUS Indications (Cont.)

Name	Type	Function Code	Address
Vc ^c	Floating Point	03	28683
Ia ^c	Floating Point	03	28685
Ib ^c	Floating Point	03	28687
Ic ^c	Floating Point	03	28689
Watts ^c	Floating Point	03	28691
VA ^c	Floating Point	03	28693
VAR ^c	Floating Point	03	28695
Power Factor ^c	Floating Point	03	28697
Watt-Hours ^c	Floating Point	03	28699
VAR-Hours ^c	Floating Point	03	28701
Hz	Floating Point	03	28703

- (a) Load Banks with Automatic Load Regulation Only
- (b) Load Banks with Regenerative Power Sensing Only
- (c) Load Banks with Any Automation Option Only

MODBUS CONTROL DIRECTIONS

1. Ensure that “Regulate Mode Active” (16705) and “Regenerative Sensing Mode Active” (16706) are OFF, indicating that the load bank is ready for Modbus Control
2. Turn “Activate Fan” (16586) ON to energize the cooling fan
3. Verify fan is running by checking that “Fan Running” (8193) is ON
4. Write the desired amount of KW to apply to “KW To Apply” (28911)
5. Turn “Apply Load” (16704) ON to energize the desired amount of load
6. Verify applied load by reading value at “Applied Load” 29077. The load bank will apply as much load as possible to reach the “KW To Apply” value, without exceeding it.
7. Monitor other values as desired.
8. Turn “Apply Load” off to de-energized the load
9. Turn “Activate Fan” OFF to stop the cooling fan. Load bank will continue to operate cooling fan for Cooldown Time set on HMI.
10. Cooldown mode has ended and cooling fan has stopped when “Fan Running” is OFF
11. Cooldown mode can be stopped by writing ON then OFF to “Cancel Cooldown” (16487)



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

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