Quick Start Guide

Smartpack2 Controller Shelf

⚠️ **IMPORTANT: Read installation instructions before connecting to supply!**

The latest version of this document and other Eltek product documents are available online at eltek.sharefile.com.

Related documents include:

- *Smartpack2 Touch Controller Ports and Navigation*, Doc. No. 370135.033
- *Smartpack2 Basic Industrial Controller*, Doc. No. 350025.013
- *Configuration Guide: Eltek Smartpack and Compack Controllers*, Doc. No. 370013.063
- *Eltek Controller Web Interface*, Doc. No. 370035.013

Contact Information

To order parts and request documentation, please contact Customer Service by email at sales.us@deltaww.com or by phone at 1-469-330-1665.

For assistance with technical questions and solutions, please contact Technical Support by email at techsupport.us@deltaww.com or by phone at 1-800-435-4872.

Delta Part No. 5017147601

ELTEK

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IMPORTANT: READ THIS FIRST
SAFETY NOTICES – DC Power Systems

Read and observe all safety statements and requirements before performing any installation or operation work on the power equipment.

Failure to comply with the safety statements and requirements contained in this document may result in injury and/or equipment damage, and it may void the user's authority to operate the equipment.

Full product manuals are available online at: *eltek.sharefile.com*
For use in restricted access locations only.

⚠️ Always follow NEC (National Electrical Code) rules and your local company practices when selecting DC wires and protection devices. For safety, the controller is required to be reliably connected to PROTECTIVE GROUND. The equipment is to be connected to DC supply mains by qualified personnel in accordance with local and national codes (e.g., NEC, CEC, etc.). To avoid risk of being struck by lightning, do not disconnect and reconnect input and output power connectors during lightning storms. Rack mounting must be performed in accordance with instructions provided by the manufacturer to avoid potential hazards.

⚠️ Maximum operational ambient temperature of this equipment is 60°C.

⚠️ **CAUTION:** Even though the product incorporates protection circuitry and other safeguards, it can be damaged, perform poorly or have a reduced lifetime if it is exposed to incorrect treatment during transport, installation or service.

NOTE: Wire rated for 90°C is recommended for all DC connections. Always follow NEC rules and local/company practices when selecting wires and protection devices.

NOTE: Controllers and monitors should be shipped in separate boxes, as provided by Eltek. Rack mounting must be performed in accordance with instruction provided by the manufacturer to avoid potential hazards.

IMPORTANT: Proper ESD protection is required in order to prevent ESD damage to the equipment.

NOTE: The alarm contacts are rated for a maximum voltage of 60 V, SELV (Safety Extra Low Voltage) and a maximum continuous current of 0.5A.

⚠️ Do not attempt to open or otherwise service these controllers. Return defective units to Eltek.

FCC Compliance Statement

This equipment complies with Part 15 of FCC Rules. Operation is subject to the following two conditions:

1. This system may not cause harmful interference, and
2. This system must accept any interference received, including interference that may cause undesired operation.

WARNING: Changes or modifications to this unit not expressly approved by the party responsible for the compliance could void the user's authority to operate this equipment.

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Overview

The Smartpack2 Controller Shelf is designed for systems with 10 – 75 VDC. It incorporates the Smartpack2 Touch Controller and Smartpack2 Basic Industrial Controller. It can be used to replace an existing controller to take advantage of the new features of the Smartpack2 Touch controller. It can also be used for additional monitoring with existing systems, for example, load currents and battery symmetry voltage.

Mounting the System

The controller shelf mounts in a standard 19″ rack. It can be mounted in 23″ racks with a 2U extender, ordered separately (Part No. 503457).

Removing the Cover

Note: Prior to making controller connections, ensure that power is OFF at the breaker or DC source.

⚠️ **WARNING:** Opening the equipment may cause terminal injury – even if the mains DC supply is disconnected. Hazardous voltages may be present inside, as large capacitors may still be charged.

Remove the top cover in order to access the controllers and make the connections.

Slide cover through front slot.

Lower the door.
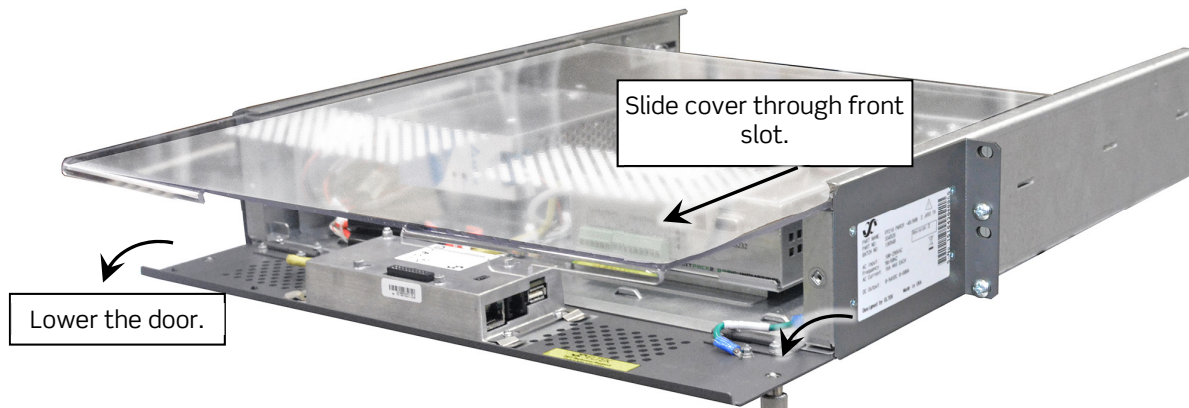
Figure 1 – Removing the Cover

Making Controller Connections

The controller shelf comes with a prewired connection from the Smartpack2 Touch Controller to the Basic Industrial Controller (CAT 5 cable), with other ports on the controllers terminated. To install the controller shelf, complete the following tasks:

- Connecting the Basic Industrial Controller to Rectifier Shelf (see next section)
  Note: If you are connecting this shelf to Eltek rectifiers, complete this task. Otherwise, skip to the next section.

- Making Controller Connections to the Basic Industrial System (see page 4)

![ELTEK]

Connecting the Basic Industrial Controller to Rectifier Shelf

If you are connecting this shelf to Eltek rectifiers, connect the Basic Industrial Controller to the rectifier shelf using a standard CAT 5 cable. A CAT 5 cable, of appropriate length can be ordered from Eltek.

To connect the Basic Industrial Controller to the rectifier shelf:

1. Remove the terminator from the first CAN2 port of the Basic Industrial Controller. (Retain the terminator for Step 4 in this procedure.)

2. Connect one end of the CAT5 cable into the open CAN port of the Basic Industrial Controller (the port from which the terminator was removed).

3. Route the CAT5 cable to an open CAN port on the back of the rectifier shelf.

4. Terminate the adjacent CAN port on the rectifier shelf, using the terminator removed in step 1.

Table 1 – CAT5 Cable Accessories Available from Eltek

Part No.	Description
308E25637400	30 m (98 ft) cable (RJ45)
308E25923000	15 m (49 ft) cable (RJ45)
308E23070300	10 m (33 ft) cable (RJ45)
3072570053	Termination Plug
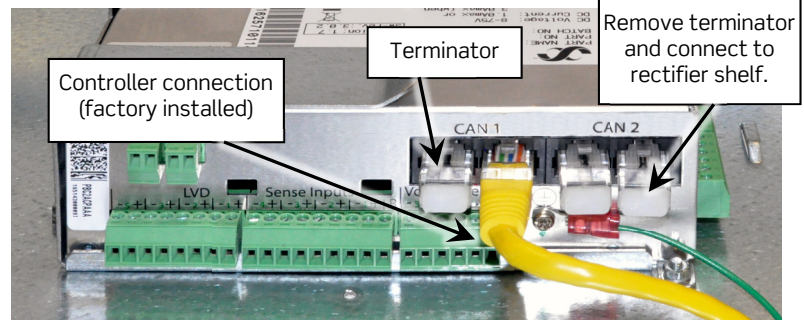
Figure 2 – CAN Ports on Basic Industrial Controller

Making Controller Connections to the Basic Industrial System

Make the following connections to the Basic Industrial Controller

- Power Connections, page 5
- Voltage Sense Connections, page 5
- Temperature/Programmable Input Connections, page 5
- Fuse Alarm Connections, page 5
- Current Sense Connections, page 6
- System Reference Connection, page 6
- LVD Connections, page 7
- Alarm Relays, page 7

Maximum wire size for input/output connections is 16 AWG (1.5 mm^2).

Figure 3 – Smartpack2 Basic Industrial Controller Connections

Note: Terminal blocks can be removed from the controller in order to make connections. Torque all connections to 3 in-lbs. After making connections, replace the terminal blocks on the controller.

Power Connections

This section explains how to make connect power connections to the controller. The operating voltage of the controller is 10 – 75 VDC; if power is outside this range, use external power supply to provide 10 – 75 VDC. It is recommended to use a 2A fuse between the power source and the input on the controller.

1. Route input power wires from the power source to the **Power** terminal block on the controller.
2. Remove the **Power** terminal block from the controller (Figure 4).
3. Use a jumper to connect inputs 1 and 2 on the terminal block.
4. Connect input power wire to the terminal block.
5. Replace the terminal block on the controller.

    Note: Do NOT power up the controller until all connections in the following sections are complete.
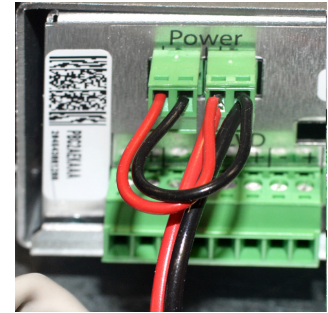
Figure 4 – Power Connections

Voltage Sense Connections

This section explains how to make Voltage Sense connections to the controller. The Voltage Sense connections can be connected from the output of the power system or the batteries to the controller. The maximum Voltage Sense value is 420 VDC. Although not necessary, a fuse can be installed to protect the wire between the power source and the Voltage Sense input on the controller.

1. Route wires to the **Voltage Sense** terminal block on the controller (Figure 3).
2. Remove the terminal block from the controller.
3. Connect input wires to **Voltage Sense 1** on the terminal block (Figure 3).
4. Replace the terminal block into the controller.

Temperature/Programmable Input Connections

Install temperature probes or NO/NC alarms to the **Config Inputs** on the Smartpack2 Basic Industrial Controller; see Figure 3.

1. Remove the **Config Inputs** terminal block from the controller.
2. Insert the wires from temperature probe or NO/NC alarms into the terminal block.

    Note: Temperature probes are not polarity sensitive, so either wire can be inserted into the positive connection for a temperature probe.

3. Repeat step 2 for additional temperature probes or NO/NC alarms
4. Replace the terminal block into the controller.
5. If using temperature probes, route your temperature probe cable(s) from the controller to the batteries and connect the sensor-end of the temperature probe cable to the battery post at the midpoint of the battery string, or in between the battery blocks at the midpoint of the battery string, if using a temperature probe without a lug.
6. To activate temperature probe inputs, follow the steps in the *Configuration Guide: Eltek Controllers* (Doc. No. 370013.063). For information about NO/NC alarms, see the *User Guide: Eltek Web Interface* (Doc. No. 370035.013).

Fuse Alarm Connections

To install a fuse alarm from an external distribution panel, make connections to the **Sense Inputs** connections on the Smartpack2 Basic Industrial Controller; see Figure 3. Do NOT use a wet alarm signal on a 380V-to-48V converter. All other alarm connections can use wet alarm signals, provided they are the same voltage (do not mix -48V and +24V).

1. Remove the **Sense Inputs** terminal block from the controller (Figure 3).

2. Insert the wire(s) from the external fuse panel into the connection(s) of the terminal block.

   For Battery fuses, make connections to **Sense Input #3**. For dry signals, the connections can be made in any order. For **wet** signals:
   - On Negative systems, connect to the Positive pin.
   - On Positive systems, connect to the Negative pin.

   For Load fuses, make connections to **Sense Input #4**. For dry signals, the connections can be made in any order. For **wet** signals:
   - On Negative systems, connect to the Positive pin.
   - On Positive systems, connect to the Negative pin.

3. Replace the terminal block into the controller. If connecting a shunt to the current sense input, move to the next section, and replace the terminal block after making current sense connections.

   Note: To configure fuse alarms, follow the instructions in "Configuring Fuse Alarms," page 8.

Current Sense Connections

To monitor a current shunt from an external distribution panel, make connections to the **Sense Inputs** on the Smartpack2 Basic Industrial Controller; see Figure 3. The system can accept either a Load shunt or a Battery shunt, or both, in either the positive or negative leg. If monitoring two shunts, they must be in the same leg.

Note: If you need to monitor shunts in both legs, contact Eltek Sales, for information about adding a FlexiMonitor.

1. If not already removed, remove the Sense Inputs terminal block from the controller (see Figure 3).

2. Connect the shunt to inputs **1** or **2** of the **Sense Inputs** terminal block.
   - For systems with shunt in the negative leg:
     - Route the connection closest to the rectifier to the Negative (−) input.
     - Route the connection closest to the Load or Battery to the Positive (+) input.
   - For systems with shunt in the positive leg:
     - Route the connection closest to the rectifier to the Positive (+) input.
     - Route the connection closest to the Load or Battery to the Negative (−) input.
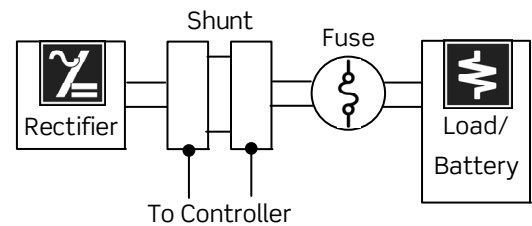
Figure 5 – Shunt Connections

   Note: To configure current sense inputs, follow the instruction in "Configuring Current Sense Inputs," page 10.

3. Replace the terminal block into the controller.

After making current sense connections, follow the instructions in "System Reference Connection," next section.

System Reference Connection

If you connected a shunt (as covered in the previous section), complete the following task to connect the System Reference to the controller. If there is no shunt, connect to the Negative.

To make the System Reference connection to the controller:

1. Connect a wire to the same leg to which the shunt is connected.
2. Run the wire to Input R of the **Sense Inputs** terminal block (Figure 3).
3. Replace the terminal block on the controller.

LVD Connections

To control an LVD contactor make connections to the **LVD** inputs on the Smartpack2 Basic Industrial Controller; see Figure 3. The controller can utilize both latching and non-latching contactors; and can accept either a Load contactor, a Battery contactor, or both.

1. Remove the **LVD** terminal block from the controller (Figure 3).
2. Insert the wire(s) from the external LVD contactor into the connection(s) of the terminal block. Input **1** for **LVBD** and input **2** for LVLD #1, and input **3** for LVLD #2
3. Route wires from the power source to Inputs on the **LVD** terminal block. Eltek recommends a fuse on the power wire.

   Note: The Smartpack2 Basic Industrial requires a power source to operate the LVDs. This source (10 – 420VDC, Max. 1A) does not need to be the same power source that supplies the controller, but the voltage of the power source must match the rating of the LVD coil.
4. Replace the terminal block into the controller.
5. To configure LVD settings, follow the instruction in "Configuring LVD Settings," page 13.

Alarm Relays

To monitor alarm relays, make connections to the **Signal Relays** connections on the Smartpack2 Basic Industrial Controller; see Figure 3.

1. Remove the **Signal Relays** terminal block from the controller (Figure 3).
2. Insert the wire(s) from the alarm transport gear into the connection(s) of the terminal block. Connections can be Normally Open or Normally Closed.
3. Replace the terminal block into the controller.
4. To configure alarms, follow the instruction in the *Configuration Guide: Eltek Controllers*, Doc. No. 370013.063.

Connecting the Ground

Make the ground connection using a minimum of #14 AWG wire. Connect to the ground terminals at the inside rear left of the chassis. The terminals are ¼" studs on 5/8" center. Torque to 55 in-lbs.

Ground terminals

Replacing the Cover

After verifying that all connections are secure; then replace the cover(s).

Configuring the Controller

Once all connections are made, plug in power connectors and apply power to the controller.

After powering up, confirm the system voltage in the web browser interface at **Commands › System Commands › Choose system voltage**. If the default voltage does match your system, choose the correct system voltage from the menu list, and click **Apply** next to **Set Default Configuration**.

![ELTEK logo]
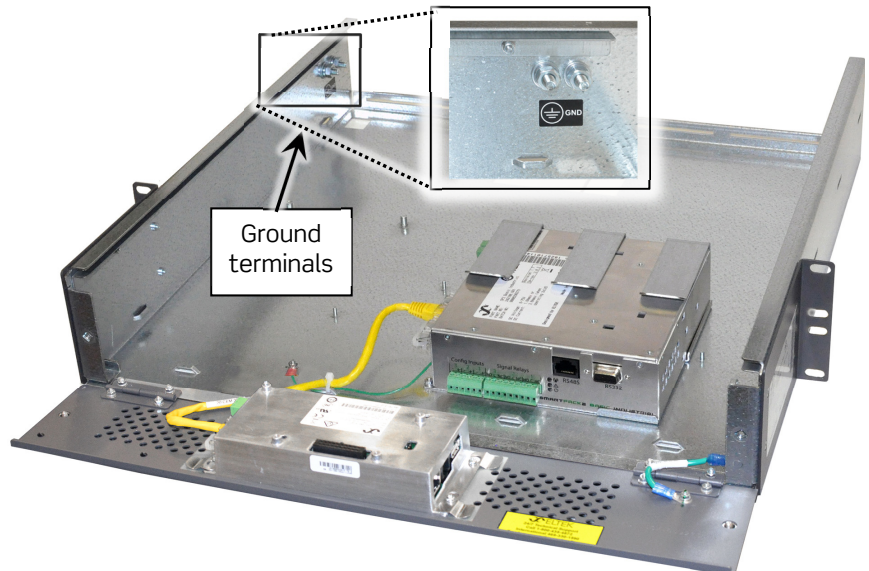
Note: If you are unfamiliar with the browser interface, see the *Configuration Guide: Eltek Controllers*, Doc. No. 370013.063.

Routine tasks associated with alarm relays and activating temperature probe inputs are covered in the *Configuration Guide: Eltek Controllers*. Additional tasks which may apply to your system are covered in the following sections. (Further details may be found in the *User Guide: Eltek Controller Web Interface*, Doc. No. 370035.013.)

- Configuring Fuse Alarms, next section
- Configuring Current Sense Inputs, page 13
- Configuring LVD Settings, page 13
- Backing up the Controller Profile. Page 15

Configuring Fuse Alarms
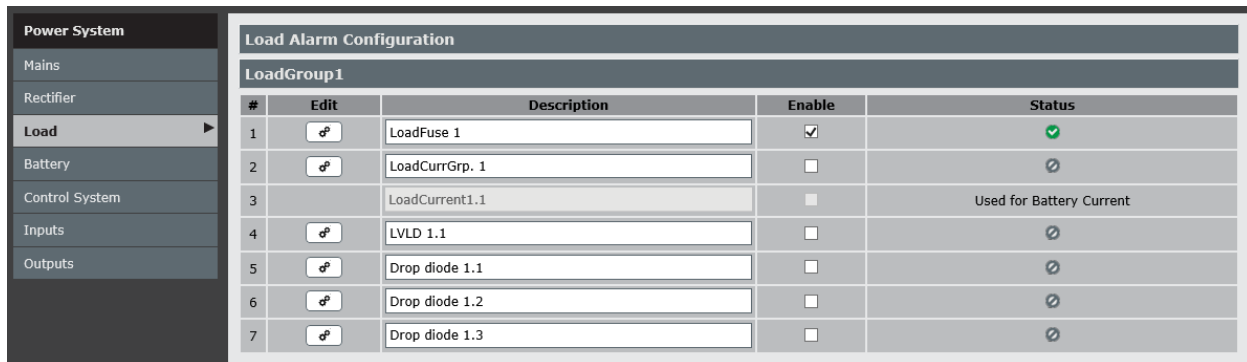
Fuse alarms are covered in the following sections.

- Configuring Load Fuses (next section)
- Configuring Battery Fuses, page 9

Configuring Load Fuses

To configure a Load fuse (or circuit breaker) monitor input:
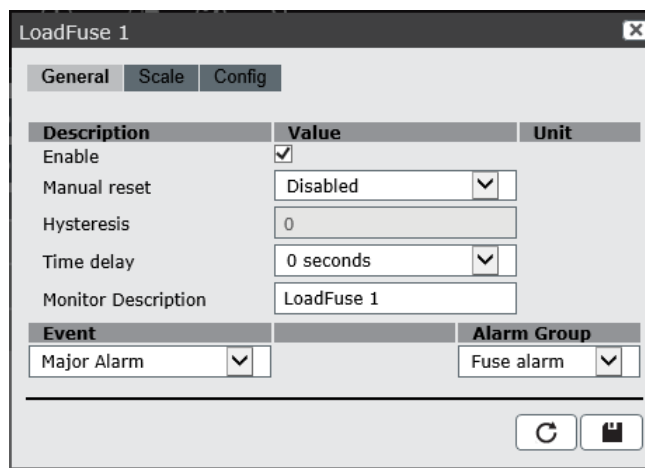
1. On the web browser interface, go to **Alarm Conf.** > **Load** > **LoadGroup 1**, and click on the edit button (gears) next to **LoadFuse 1** to expand it.

Figure 7 – Load Fuse Configuration

2. Click the check box next to **Enable** to enable the alarm monitor.

Figure 8 – Load Monitor Fuse General Tab

3. If desired, change the **Event** and **Alarm Group** assignments (the default assignment is a **Major Alarm** event assigned to the **Fuse alarm** Alarm Group).

4. Click **Save** (disk) to preserve your changes.

5. Click the **Config** tab.

6. Select the type of input for the fuse (or circuit breaker) (**Normally Open**, **Normally Closed**).

   - For wet signals, choose **Normally Closed**.

   - For dry signals, choose either **Normally Open** or **Normally Closed**, based upon the signal from the protection device.

   Note: **Normally Closed** (NC) means that the fuse alarm relay is closed when there is no alarm. **Normally Open** (NO) means that the fuse alarm relay is open when there is no alarm.

7. Click **Save** (disk) to preserve your changes.
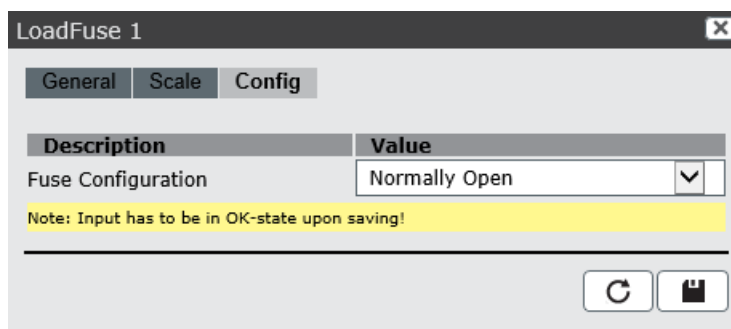
Figure 9 – Load Monitor Fuse Configuration Tab

If connecting a battery fuse, complete the task in the next section. Otherwise complete the additional tasks that apply to your system.

Configuring Battery Fuses

Note: By default, battery parameters are disabled. During the following steps, the Battery parameters are enabled. Use the instructions in the *Configuration Guide: Eltek Controllers* (Doc. No. 370013.063), to configure the battery parameters.

To configure a Battery fuse (or circuit breaker) monitor input:

1. On the web browser interface, go to **System Conf.** › **Battery**

2. On the **General Battery configuration** page, set the **Number of banks** to **1**, and **Save** the change (disk).
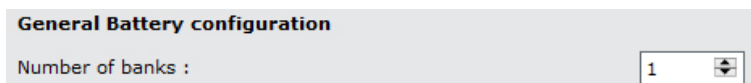
Figure 10 – Number of Battery Banks

   Note: After choosing **Save**, additional parameters appear. Set applicable parameters at this time.

3. Next, go to **Alarm Conf.** › **Battery** › **Battery Bank 1**, and click on the edit button (gears) next to **BattFuses1** to expand it.
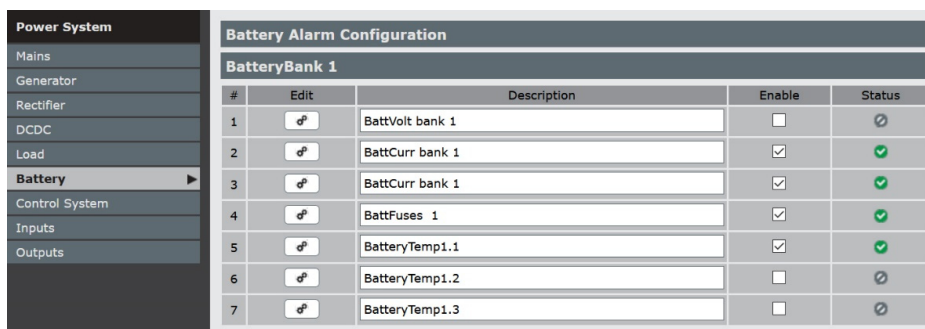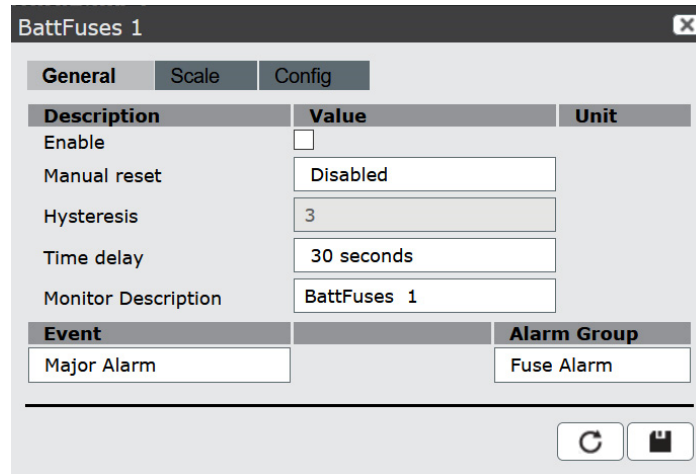
Figure 11 – Battery Fuse Configuration

4. Click the check box next to **Enable** to enable the alarm monitor.

Figure 12 – Battery General Tab

5. If desired, change the **Event** and **Alarm Group** assignments (the default assignment is a **Major Alarm** event assigned to the **Fuse alarm** Alarm Group).

6. Click **Save** (disk) to preserve your changes.

7. Click the **Config** tab.

8. Select the type of input for the fuse (or circuit breaker) (**Normally Open**, **Normally Closed**).

   - For wet signals, choose **Normally Closed**.

   - For dry signals, choose either **Normally Open** or **Normally Closed**, based upon the signal from the protection device.

   Note: **Normally Closed** (NC) means that the battery alarm relay is closed when there is no alarm. **Normally Open** (NO) means that the battery alarm relay is open when there is no alarm.

9. Click **Save** (disk) to preserve your changes.

Figure 13 – Load Monitor Fuse Configuration Tab

Configuring Current Sense Inputs

Configuration of sense inputs is covered in the following sections.

   - Sense Inputs for Load Shunts
   - Sense Inputs Battery Shunts

Sense Inputs for Load Shunts

If connecting a load shunt to the controller, use the following steps to configure the controller settings:

1. On the web browser interface, go to **Alarm Conf.** > **Load** > **LoadGroup1**, and click on the **Edit** button (gears) next to **LoadCurrent1.1** to expand it.
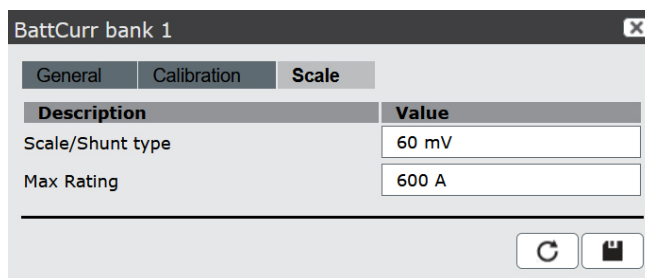
10
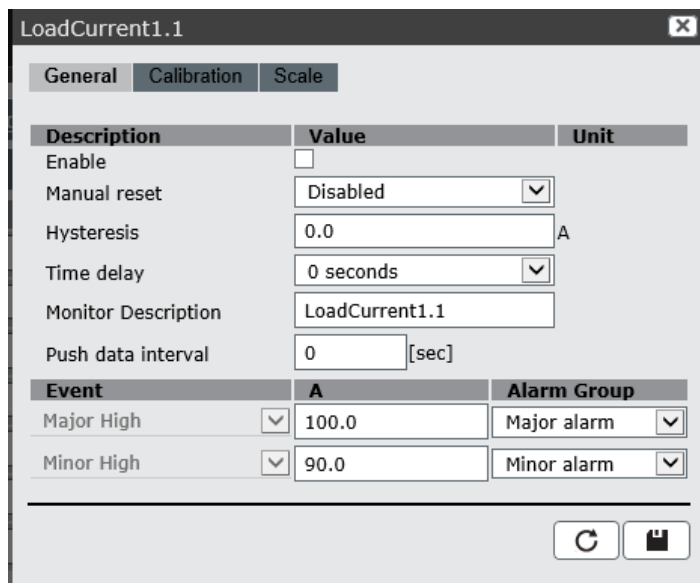
Figure 14 – Load Current Settings

2. Click the check box next to **Enable** box to enable the alarm monitor.

3. If desired, change the **Event** and **Alarm Group** assignments.

4. Click **Save** (disk) to preserve your changes.
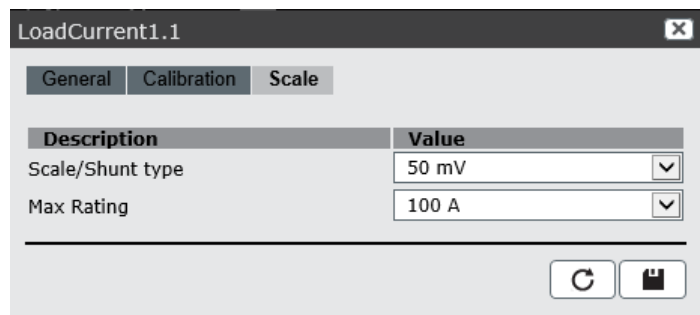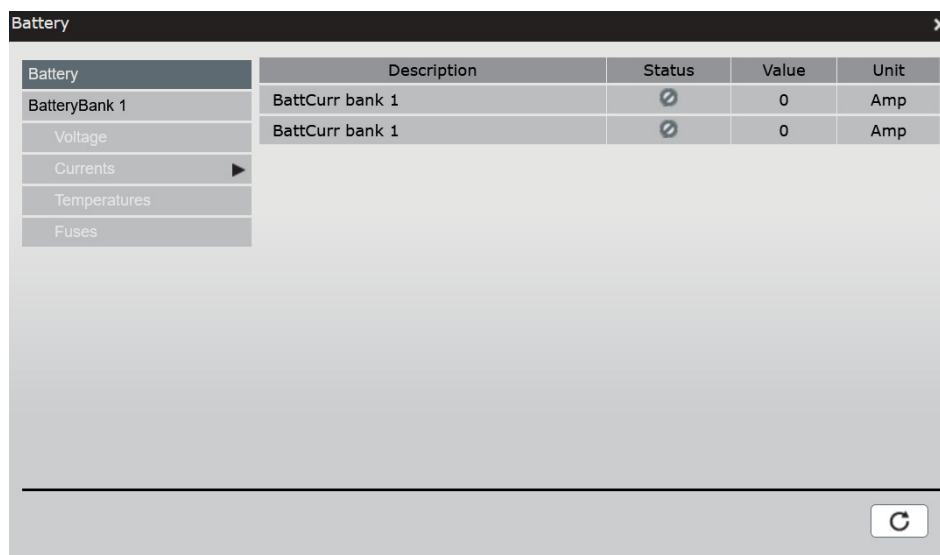

Figure 15 –Enabling Load Current Alarm Monitor

5. Click the **Scale** tab set the **Scale/Shunt type** and **Max Rating** for your shunt

6. Set the **Scale/Shunt type** and **Max Rating** for your shunt

7. Click **Save** (disk) to preserve your changes.

Figure 16 –Load Shunt Scale Settings

8. On the home page, click on the **Load Icon (** ⚡ **)** › **LoadGroup1**. Compare **LoadCurrent1.1** to a calibrated meter. If the value is not the same, contact Tech Support. Do not attempt to calibrate before contacting Tech Support.

Figure 17 – Load Current Confirmation

Sense Inputs for Battery Shunts

If connecting a battery shunt to the controller, use the following steps to configure the controller settings:

1. On the web browser interface, go to **Alarm Conf. › Battery › Battery Bank 1**, and click on the **Edit** button (gears) next to **BattCurrent1.1** to expand it. Refer to the previous section, "Configuring Battery Fuses," page 9, for information on enabling battery banks.

Figure 18 – Battery Current Settings

2. Click the check box next to **Enable** box to enable the alarm monitor.

3. If desired, change the **Event** and **Alarm Group** assignments.

4. Click Save (disk) to preserve your changes.

Figure 19 – Enabling Battery Current Alarm Monitor

5. Click the **Scale** tab set the **Scale/Shunt type** and **Max Rating** for your shunt.

Figure 20 – Battery Shunt Scale Settings

6. On the home page, click on the **Battery Icon (⊟)** › **Battery Bank 1** › **Currents**. Compare **BattCurrent1.1** to a calibrated meter. If the value is not the same, contact Tech Support. Do not attempt to calibrate before contacting Tech Support.

Figure 21 –Battery Current Confirmation

Configuring LVD Settings
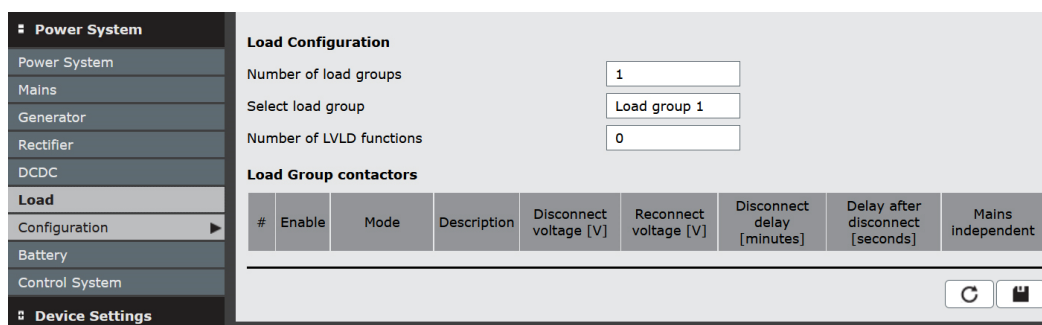
Configuration of LVD settings is covered in the following sections.

- Configuring a Load LVD, next section
- Configuring a Battery LVD, page 14

Configuring a Load LVD

To configure a load LVD:

1. On the web browser interface, go to **System Conf.** › **Load** › **Configuration**.

2. Set the number of **LVLD functions** to **1** or more, depending on the number of contactors in your system.
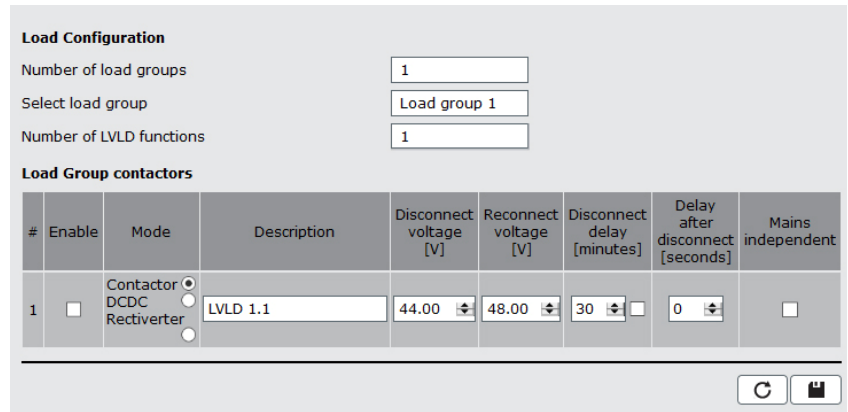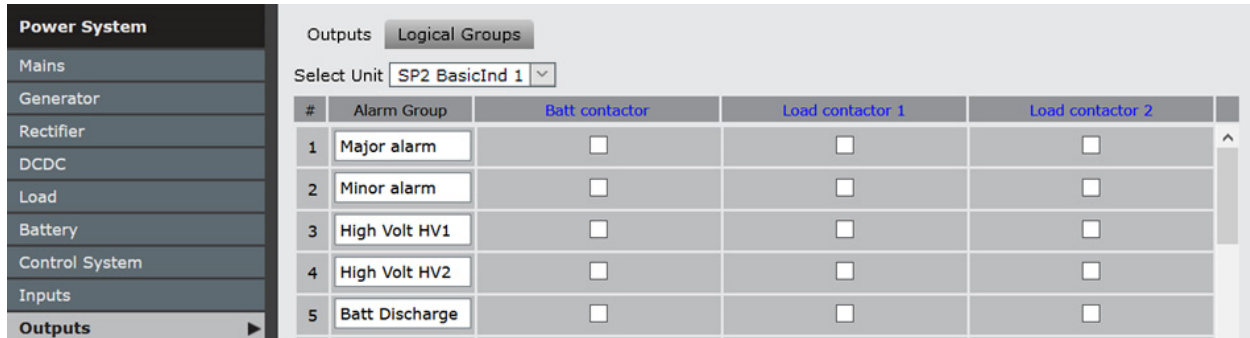
Figure 22 –Load LVD Configuration

3. On the **Load Configuration** page, click **Enable**, and make any other changes to the LVLD parameters.

   Note: For additional information on these parameters, see the *User Guide: Eltek Controller Web Interface*, Doc. No. 370035.013.

4. Click **Save** (disk) to preserve your changes.

Figure 23 – Load Configuration Page

5. Go to **Alarm Conf. ›Outputs › Select Unit › SP2 BasicInd 1**, and click the **Load Contactor 1** heading.
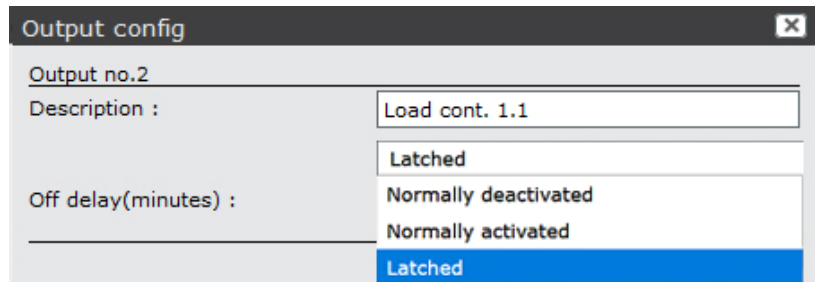
Figure 24 –Choosing Load Contactor

6. From the menu list, choose the type of contactor used in your system:

   - **Normally deactivated** – a non-latched contactor that is normally open and closed on activation.
   - **Normally activated** – a non-latched contactor that is normally closed and open on activation.
   - **Latched** – a latched contactor that is opened and closed by a pulse signal.
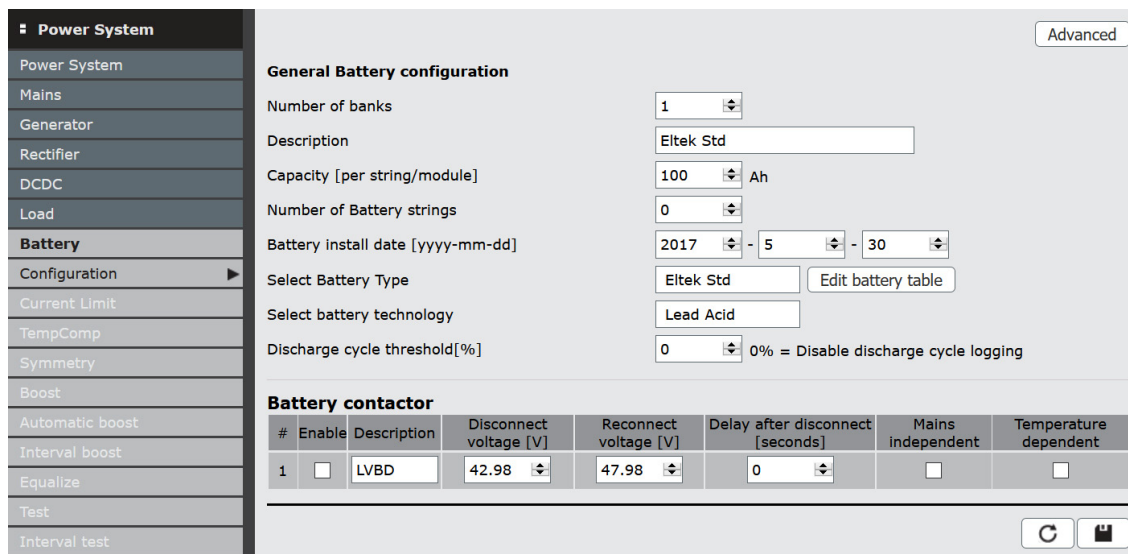
Figure 25 –Choosing Load Contactor Type

7. Click **Save** (disk) to preserve your changes.

Configuring a Battery LVD

To configure a battery LVD:

1. On the web browser interface, go to **System Conf. › Battery › Configuration**.

Figure 26 –Load LVD Confirmation

2. On the **Battery Configuration** page, click **Enable** for the **Battery contactor**, and make any other changes to the LVBD parameters.

    Note: For additional information on these parameters, see the *User Guide: Eltek Controller Web Interface,* Doc. No. 370035.013.

3. Click **Save** (disk) to preserve your changes.

4. Go to **Alarm Conf. ›Outputs › Select Unit › SP2 BasicInd 1**, and click the **Batt Contactor** heading.
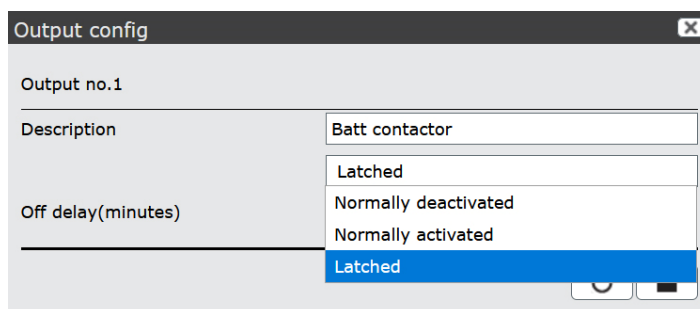
Figure 27 –Choosing Battery Contactor

5. From the menu list, choose the type of contactor used in your system:

    - **Normally deactivated** – a non-latched contactor that is normally open and closed on activation.
    - **Normally activated** – a non-latched contactor that is normally closed and open on activation.
    - **Latched** – a latched contactor that is opened and closed by a pulse signal.

6. Click **Save** (disk) to preserve your changes.

Figure 28 –Choosing Batt Contactor Type

Backing up the Controller Profile

After programming your configuration, make a backup of your profile, following the instructions in the *Configuration Guide: Eltek Controllers* (Document No. 370013.063).
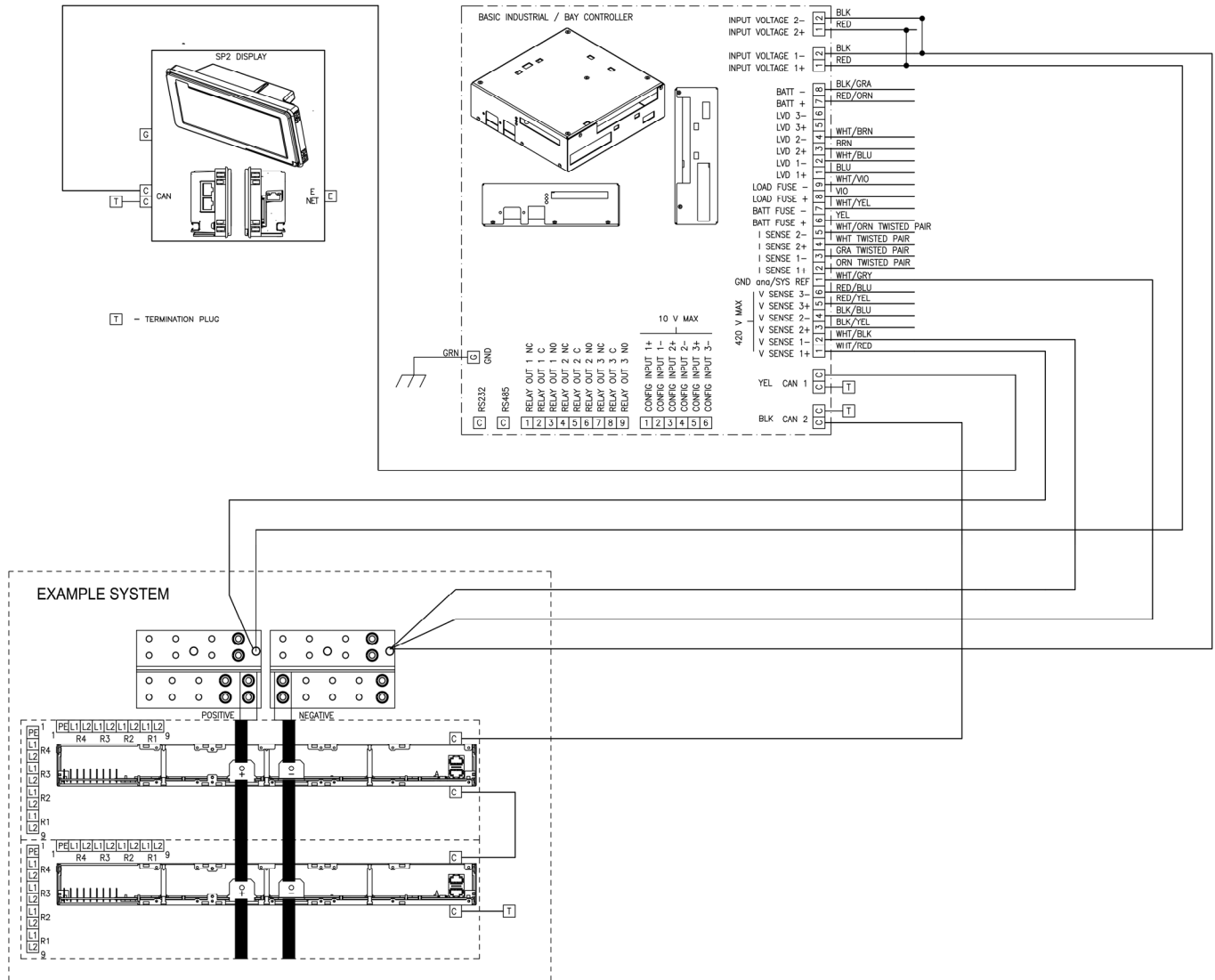
Figure 29 – Example System

For assistance with technical questions and solutions, please contact Technical Support by email at techsupport.us@deltaww.com or by phone at 1-800-435-4872.

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24/7 Technical Support
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International 469-330-1590
For documentation and software
updates visit eltek.sharefile.com

Ordering information: sales.us@deltaww.com, (469) 330-9100