

Installation Manual

Bulk Trilogy Power Core



Flatpack2 Power System

Delta Part No. 5017445000

Doc. No. 370084.033, Issue 1

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Safety and Recommended Practices

For use in restricted access locations only
Only suitable for mounting on concrete or other non-combustible surface



WARNING: HAZARDOUS VOLTAGE AND ENERGY LEVELS CAN PRODUCE SERIOUS SHOCKS AND BURNS. Only authorized, qualified, and trained personnel should attempt to work on this equipment. Refer to datasheets for full product specifications.



WARNING: For safety, the power supply is required to be reliably connected to PROTECTIVE GROUND. The equipment is to be connected to 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. Equipment is intended for deployments where an external Surge Protective Device (SPD) is utilized. The output of the power supply is not intended to be accessible due to energy hazards. Rack mounting must be performed in accordance with instructions provided by the manufacturer to avoid potential hazards.



NOTICE: This product is intended to be protected by a surge protector that meets the applicable criteria or GR-974-CORE. Failure to utilize the appropriate surge protector could result in susceptibility to lightning surges or create a potential hazard due to power faults.



WARNING: The use of 3000W rectifiers in 2000W systems can exceed the rating of the system. Before installing 3000W rectifiers, verify that your system is rated to accommodate them. For rectifier specifications, refer to Table 1 on page 15.



WARNING: Keep hands, hardware and tools clear of fans. Fans are thermostatically controlled and will turn on automatically as a function of temperature.

CAUTION: All rectifiers employ internal double pole/neutral fusing. Fuses are not field-replaceable.

WARNING: HIGH LEAKAGE CURRENT! Earth connection is essential before connecting supply.

Observe all local and national electrical, environmental, and workplace codes.

Each power shelf should be fed from a dedicated AC branch circuit of a terra neutral (TN) or isolated terra (IT) power system.

A readily accessible disconnect device shall be incorporated in the building installation wiring for all AC connections. Select wall breakers according to national and local electric codes.

Use Underwriters Laboratories (UL)-listed, double-hole lugs for all DC connections to prevent lug rotation and inadvertent contact with other circuits. Terminal strip connections require only single-hole lugs.

Wire rated for 90°C is recommended for all DC connections. In practice, wires of a size larger than the minimum safe wire size are selected for loop voltage drop considerations. Follow national and local codes as well as company standards for wire sizing.

Alarm contacts are rated for a maximum voltage of 60 V, SELV (Safety Extra Low Voltage) and a maximum continuous current of 1A. Connection and mounting torque requirements are listed in Table 6.

Heat dissipation greater than the objectives listed in GR-63-CORE may occur. Additional equipment room cooling may be required.

Eltek does not recommend shipping the power shelf with rectifiers installed. Rectifiers should be shipped in separate boxes.



WARNING: Protection of persons against electric shock:

Power cabling may be performed only by qualified personnel in accordance with local and national electric codes. Improper wiring can cause physical damage or injury. Input voltage from the power supply might be present. Improper connection may cause damage or serious injury. Ensure that the power supply source switch is in the OFF position. Use a voltmeter to check the presence of voltage from the supply. Ensure that all breakers are in the OFF position – in the system, devices, and at supply. Improper wiring may cause bodily injury and equipment damage. Before performing maintenance, either unplug or disconnect the equipment from the power supply source in order to reduce the risk of electric shock or other possible hazards. In cases where power cannot be removed, use insulated tools and blankets to cover exposed connections.

When working on electrical equipment in and for applications in Germany, regulations for the prevention of electrical accidents – as stated in DIN VDE 0105 – are summarized in the following five safety rules:

1. De-energize
2. Secure from re-energizing (“lockout”)
3. Verify that the equipment is de-energized
4. Ground and short-circuit
5. Insulate or cover any live or energized areas of nearby equipment

These five safety rules should be followed in order before starting work on electrical systems.

Only qualified electricians are to work on this equipment.

FCC Compliance Statement

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

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

WARNING: Changes or modifications to this unit not expressly approved by Eltek could void the user's authority to operate this equipment, as unauthorized changes may invalidate FCC compliance.

1. Specifications

Engineering specifications for the different items within the Trilogy Power System are covered in the following topics:

- Overview (see section below)
- References (see page 9)
- System Specifications (see page 9)
- System Dimensions (See page 10)
- Rectifier Specifications (see page 15)
- Input Specifications (see page 16)
- DC Output Specifications (see page 17)

Overview

The Trilogy bulk product line consists of systems that include:

- Power cores with Flatpack2 rectifier modules:
- A Smartpack Touch controller.

The systems can be used in open relay racks or cabinet applications requiring up to 600A, with 24V or 48V equipment. Systems have a rated voltage range of 100 – 250V or 100 – 277V, depending on rectifiers used, with an operating temperature of –40°C to 50°C, depending on rectifiers used.



Figure 1 – Trilogy with Bulk DC Load Output System

References

This manual provides an overview of and installation guidelines for Bulk Trilogy power systems. Additional information regarding system components is found in the following documents:

- *Datasheet: Bulk Trilogy Power Core with Smartpack Touch*, Doc. No. 370084.DS3
- *Configuration Guide: Eltek Controllers*, Doc. No. 370013.063
- *Smartpack2 Touch Ports and Navigation*, Doc. No. 370135.033
- The printed copy of the parameters that shipped with your system

Additional product information is available online at eltek.sharefile.com.

System Specifications

Bulk Trilogy power cores are available with various options. System specifications include:

- System output voltage: 24V or 48V
- System output capacity: 600A)
- Rectifier type (24V 1800W, 48V/2000W, or 48V/3000W)
- Rack mounting width (19" and 23")

System Dimensions

System dimensions may vary, depending upon options chosen. Maximum configuration dimensions are illustrated in the following figures.

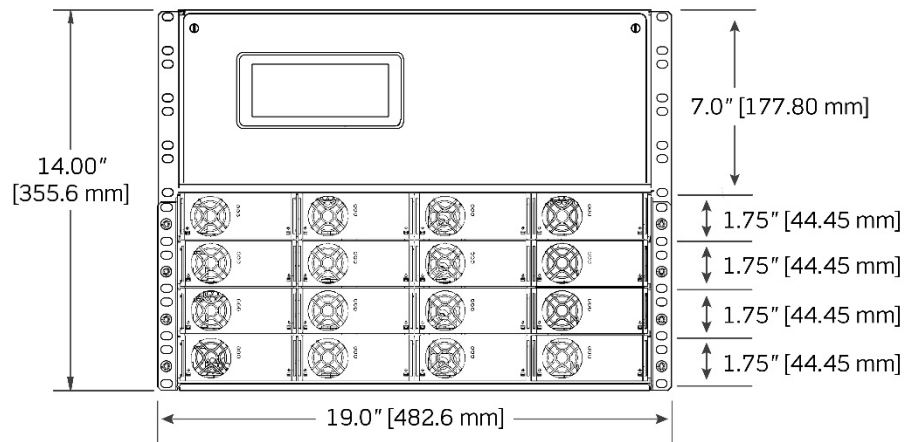


Figure 2 - BulkTrilogy Dimensions (front view)

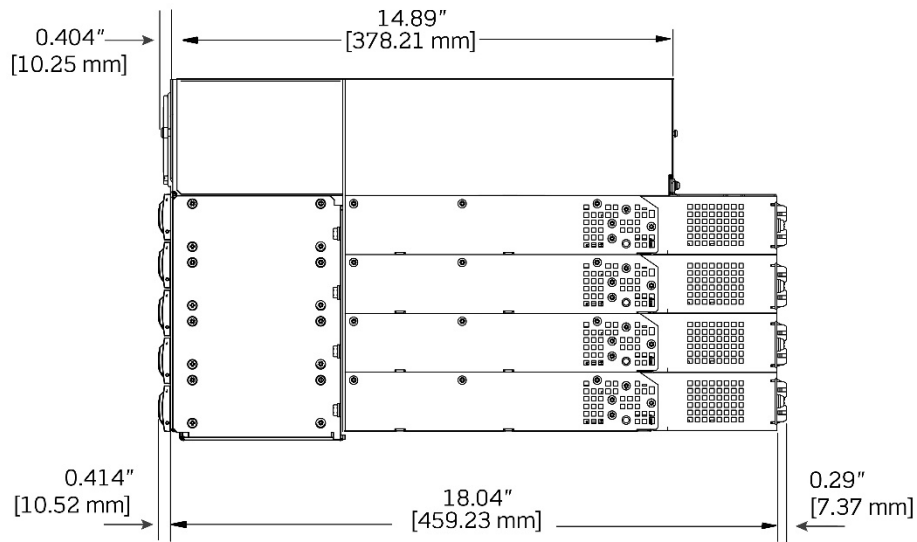


Figure 3 - BulkTrilogy Dimensions (side view)

Controller Specifications

Controller specifications are covered in the following sections

- Overview (next section)
- Customer Interfaces (page 12)

Overview

The controller is included in the system, but also provides configurability to meet the customer's needs.



Figure 4 - Bulk Trilogy with Distribution Door Open

The basic components include:

- Smartpack2 Touch Controller (page 12)
- Smartpack2 Basic Controller (page 13) or Smartpack2 Basic Industrial Controller (page 14)
- I/O Monitor2 Module

All components are installed in the factory. Eltek also provides CAN NODES to expand controller operations. These devices are installed in the field, outside of the power system. The devices are numerous and varied in functionality and are outside the scope of this document.

For more information on controller configuration, see *Configuration Guide: Eltek Controllers*, Doc. No. 370013.063.

Customer Interfaces

Customer interfaces include the following:

- Smartpack2 Touch Controller (below)
- Smartpack2 Basic Controller (page 13) or Smartpack2 Basic Industrial Controller (page 14)
- I/O Monitor2 Module (page 14)

Smartpack2 Touch Controller

The Smartpack2 Touch controller is the primary control unit. It is located in the front door of the power core. It consists of a color touch screen, as well as a USB ports and an Ethernet port. Through it, most system status information and parameters can be viewed and modified. It is mounted in the front door.



Figure 5 – Smartpack2 Touch Controller

Configurable parameters can be changed from the screen, or using the web browser interface. For additional information, see the *Configuration Guide: Eltek Controllers*, Doc. No. 370013.063.

Smartpack2 Basic Controller

The Smartpack2 Basic Controller is a connection point for internal component wiring, and it also includes three temperature probe connections.

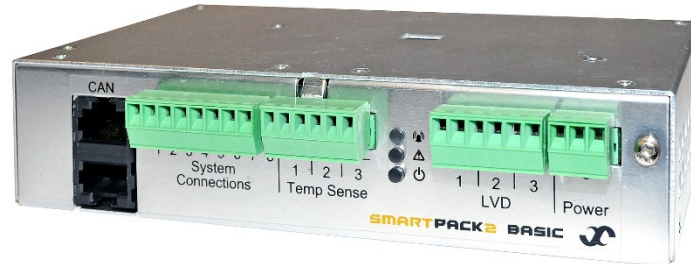


Figure 6 – Smartpack2 Basic Controller

Features of the Basic Controller include the following:

- 2 sense inputs for internal monitoring, 1 voltage sense and 1 current sense
- 3 configurable multipurpose inputs (for temperature/digital inputs, or analog signals)
- 2 configurable inputs for load and battery fuse monitoring
- 3 LVD control outputs, configurable for latching and non-latching contactors
- 2 CAN ports for serial communication (CAT5 cables , or RJ45 CAN bus termination plug)
- LED indicators

Maximum wire size for input/output connections is 16 AWG (1.5 mm²). Maximum current consumption is 1.6A.

For additional information, refer to “Install Temperature Probes” (page 24).

Smartpack2 Basic Industrial Controller

The Smartpack2 Basic Industrial Controller is the unit that monitors and controls the power system's internal functions and supplies power for connected CAN nodes. LVD and Sense inputs to this unit are internal only and terminated by the factory.

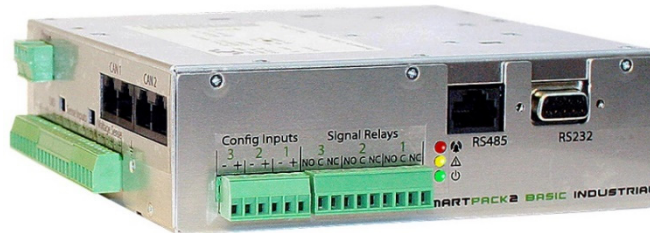


Figure 7 – Smartpack2 Basic Industrial Controller

Customer inputs to the Basic Industrial Controller include the following:

- 3 configurable inputs for temperature/voltage/current measurements
 - NO/NC, Pull Up/Down, Diode Matrix: -10V to +10V (2mV full range)
 - Current measurements: 4 – 20 mA (external sense resistor 100 – 500 Ω)
 - Temperature measurements: NTC probe
- 2 relay outputs (#2 and #3) – 0-220V, 30W (max. 1A), configurable
- RS-232C and RS-45 ports for serial communication

Maximum wire size for input/output connections is 16 AWG (1.5 mm²). Maximum current consumption is 1.6A.

For additional information, refer to “Install Temperature Probes” (page 24).

I/O Monitor2 Module

Customer connections for the I/O Monitor2 Monitor include the following:

- 6 configurable inputs for voltage/current measurement
 - NO/NC, Pull Up/Down, Diode Matrix
 - Voltage range, 0 – 75V (78 mV res)
- 6 configurable relay outputs
 - Normally activated/deactivated
 - Dry/Form C, max. 1A/60W/75V

Maximum wire size for input/output connections is 16 AWG (1.5 mm²). Maximum CAN power consumption is 3.4W. See the section, “Make Alarm Connections” (page 22) for installation details, and for default output relay alarm assignments.



Figure 8 - I/O Monitor2

For additional information, refer to “Make Alarm Connections” (page 22).

Rectifier Specifications

Flatpack2 rectifiers are hot-plug/hot-swap modules. Latches on the right and left of the front face facilitate installation and extraction only; they are not for carrying the rectifier. The latches must be locked down during operation.



Figure 9 - Flatpack2 HE 48V/3000W Rectifier

Table 1 - Flatpack2 Rectifier Specifications

Part No.	Nominal DC Voltage (V DC)	DC Output Voltage (V DC Range)	Max DC Output Current (A)	Maximum DC Output Power (W)	Rated Input Voltage (V)	Operational Input Voltage (V)
241115.105.VC*	48	43.5 – 57.6	41.7	2000	100 – 250	185 – 300 (full power) 85 – 185 (de-rated)
241119.105.VC	48	43.5 – 57.6	62.5	3000	100 – 277	176 – 305 (full power) 85 – 176 (de-rated)
241115.205.VC*	24	21.7 – 28.8	75	1800	100 – 250	185 – 300 (full power) 85 – 185 (de-rated)

*Accepts DC input.

Table 2 - Flatpack2 Rectifier Temperature De-Rating

Rectifier	Output Power		
	45°C	55°C	65°C
241115.105.VC 48V/2000W	2000W	1783W	1567W
241119.105.VC 48V/3000W	3000W	2721W	2410W
241115.205.VC 24V/1800W	1800W	1600W	1400W

Assumes Nominal Input

NOTE: Heat dissipation greater than the objectives listed in GR-63-CORE may occur. Additional equipment room cooling may be required.

NOTE: Values listed in the table are per rectifier rather than the sum of a fully-populated shelf.

Table 3 - Heat Dissipation

Part No.	Typical load (50%) at nominal input	Maximum load (100%) at nominal input
	BTU/hr	BTU/hr
241115.105.VC 48V/2000W	138	366
241119.105.VC 48V/3000W	234	637
241115.205.VC 24V/1800W	165	467

Assumes Nominal Input

Input Specifications

Input connections are made on the rear of the system using either push-on or plug-in connectors. Connector ratings and cables are summarized in the following table.

Table 4 - AC Input Connection

Description	Ratings	Wire Required	Application
Push-on, 0.250 wide	19A/250VAC 19A/420VDC	Minimum #12 AWG, 300V, 90°C Minimum #12 AWG, 600V, 90°C	All models ²
AMP MATE-N-LOK™ connector	19A/300VAC	Linecord ¹	All models, up to 3000W modules

1. Contact Eltek Sales for linecord information.

2. This may only be used if mounted in a fire and electrical enclosure in accordance with UL safety requirements.

Eltek recommends that this product be protected by a surge protector that meets the applicable criteria of GR-974-CORE. Failure to utilize this appropriate surge protector could result in susceptibility to lightning surges or create a potential hazard due to power faults.



WARNING: Some rectifiers will not operate on a DC voltage input. Verify model using Table 1 (page 15). Do not mix AC and DC input in the same system.

DC Output Specifications

DC Output specifications are covered in the following topics:

- Bulk Panel Distribution (page 17)
- DC Output Wire Sizing (page 18)
- DC Lug Requirements (page 18)

Bulk Panel Distribution

The Bulk DC panel is an alternative to a breaker panel. There are eight landings per polarity. Each landing consists of two, $\frac{3}{8}$ "-16 studs with 1" spacing. Tongue width for lugs is 1.6". The system has a removable top cover to provide access to the DC connections (see Figure 10). The wires are routed out the rear.

This type of distribution can be used with either positive-grounded or negative-grounded systems. Therefore, a specific output is not designated for DC ground. Ordinarily, DC grounding is obtained at the external distribution, and therefore all eight positions can be used for outputs. If DC grounding is not provided by external distribution, one position must be designated as a ground, instead of an output.

Note: The DC ground wire must always be equal to or greater than the largest wire used in the system.

A chassis ground location is provided on the inside of the distribution, located next to the negative output connections. Ground studs are $\frac{1}{4}$ -20 x $\frac{5}{8}$ ".

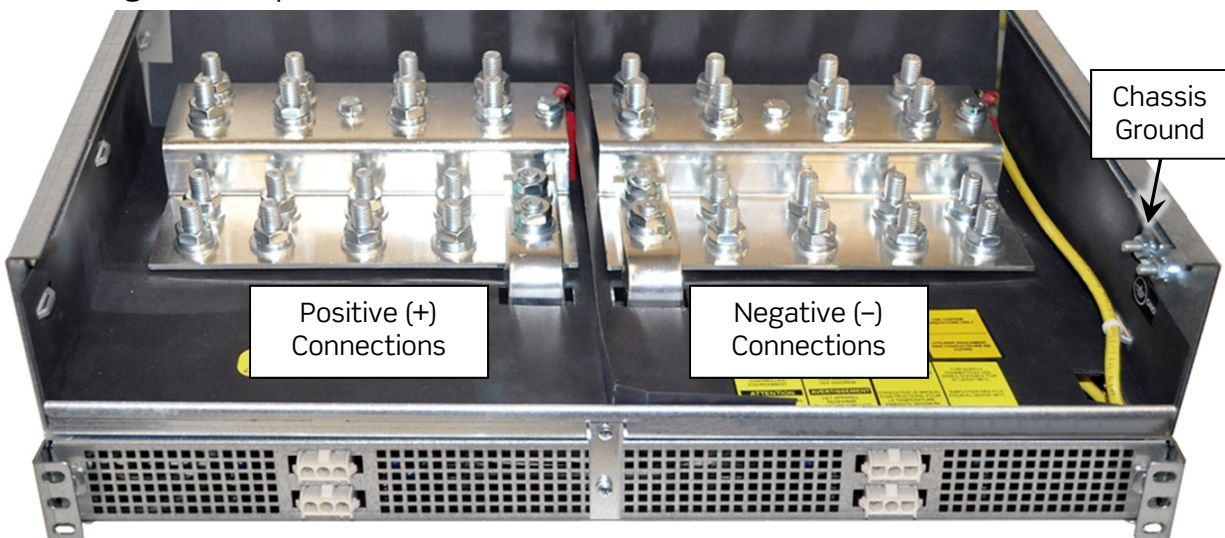


Figure 10 - Bulk DC Load Output Bus Bar Connections

DC Output Wire Sizing

There are two main considerations for sizing a DC wire: ampacity and voltage drop. Ampacity refers to the safe current-carrying capacity of a wire as specified by organizations such as the National Fire Protection Association (NFPA), which publishes the National Electrical Code (NEC). Voltage drop is the amount of voltage loss in a length of a wire due to ohmic resistance of the conductor. A DC wire may be sized for either ampacity or voltage drop, depending on loop length and conductor heating. In general, for ampacity considerations, wires of length less than 50 feet are selected, and for voltage drop considerations, wires of length more than 50 feet are selected. Therefore, you may need to select wire sizes larger than those required by ampacity alone. The NEC provides ampacity values for various wire sizes, wire bundles, insulation temperature-rated wires, and temperature derating.

The size of wires connected to the bulk outputs must be capable of carrying the full ampacity of the installed rectifiers, plus any allowance for voltage drop and temperature.

DC Lug Requirements

Connections for Trilogy Bulk systems are made $\frac{3}{8}$ " studs. Depending on the distribution type of your system, connections may vary.

Table 5 lists lug part numbers that can be used for bulk connections. Burndy lugs are not required, but are listed for convenience, as parts compatible with Trilogy systems. The part numbers are for lugs used with flex conductor cable. Consider the type of wire and your company's requirements when determining the exact type of lug.

Table 5 – Lug Part Numbers for 3/8" Connections

Wire Size	Burndy Lug	Description
AWG	Part number	
2	YAZV2C2TC38FX	Double hole lug with 3/8" holes with 1" centers
1	YAZV1C2TC38FX	Double hole lug with 3/8" holes with 1" centers
1/0	YAZV252TC38FX	Double hole lug with 3/8" holes with 1" centers
2/0	YAZV262TC38FX	Double hole lug with 3/8" holes with 1" centers
3/0	YAZV272TC38FX	Double hole lug with 3/8" holes with 1" centers
4/0	YAZV282TC38FX	Double hole lug with 3/8" holes with 1" centers
350	YAZ342NT38FX	Double hole lug with 3/8" holes with 1" centers

2. Installing the System

The installation procedure for the Trilogy System includes the following tasks.

1. Unpack the system (see page 21).
2. Mount the system (see page 22).
3. Make Alarm Connections (see page 22).
4. Install Temperature Probes (see page 24).
5. Connect Input (see page 25).
6. Install Modules (see page 27).
7. Make DC Output Bulk Panel Connection (see page 29).
8. Power Up System (see page 30).

Prepare for Installation

Before installing the system, note the following rack safety requirements:

- **Elevated Operating Ambient:** If installed in a closed or multi-unit rack assembly, the operating ambient temperature of the rack environment may be greater than room ambient. Therefore, consideration should be given to installing the equipment in an environment compatible with the maximum ambient temperature (T_{ma}) specified by the manufacturer.
- **Reduced Air Flow:** Installation of the equipment in a rack should be such that the amount of air flow required for safe operation of the equipment is not compromised.
- **Mechanical Loading:** Mounting of the equipment in the rack should be such that a hazardous condition is not achieved due to uneven mechanical loading.
- **Circuit Overloading:** Consideration should be given to the connection of the equipment to the supply circuit and the effect that overloading of the circuits might have on over-current protection and supply wiring. Appropriate consideration of equipment nameplate ratings should be used when addressing this concern.
- **Reliable Earthing:** Reliable earthing of rack-mounted equipment should be maintained. Particular attention should be given to supply connections other than direct connections to the branch circuit (e.g. use of power strips).

Required Tools

The power system is designed to be installed with a minimum number of commonly available tools.

- Standard wrench and/or socket set (7/32", 5/16", 7/16", 9/16")
- #1 Philips screwdriver
- Flatblade screwdrivers (1/16", 3/32", and ¼")
- Torque wrench
- Wire cutters / strippers
- Multimeter

Torque Settings

Table 6 shows recommended torque settings for mechanical and electrical connections according to screw or nut size. Not all screw sizes listed are necessarily present.

Table 6 – Recommended Torque Settings

Screw or Nut Size	Torque (in-lbs)
#8-32	22
#10-32	37
#12-24	50
1/4" -20	65
5/16" -18	135
3/8" -16	240
I/O Monitor terminal block	3
Temperature probe terminal block	3

Unpack the System

Before unpacking the power system, note any physical package damage that could indicate potential damage to the contents. After removing the system from boxes and packing material, inspect for any shipping or other damage. Contact the shipping service immediately if you notice any damage.

Have all tools, wires, cables, and hardware within easy reach. The electronics in the system are sensitive to contaminants. Therefore, to the extent possible, ensure a clean work environment (free of debris, dust, and foreign material). Care should be taken during the installation process to prevent exposure of the equipment to wire clippings. If possible, rectifiers should remain sealed in their shipping boxes until the shelf wiring is complete.

Mount the System

Eltek recommends installing the system in a rack that is mounted on a floor made of a non-combustible material and of sufficient strength to withstand an earthquake. The plant employs front to back airflow.

NOTE: For safety agency compliance, the system must be in a fire and electrical enclosure.

CAUTION: Use capable assistance when lifting and mounting the system.

If you have purchased a system that is already mounted in a rack, move to the next section, “Make Alarm Connections.”

To mount the system in a rack, use the following instructions:

1. Lift the system up to the desired location in the rack.
2. Secure the system to the rack using #12-24 screws.
3. Torque the screws, according to the values found in Table 6 on page 21.

Make Alarm Connections

Prior to making alarm connections, review the section about “Controller Specifications,” beginning on page 11, specifically “I/O Monitor2 Module,” on page

14. Make input and output connections to the terminal blocks on the I/O Monitor2. Terminals are numbered from left to right.

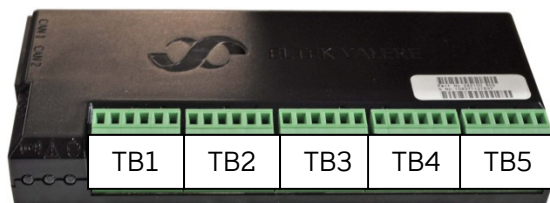


Figure 11 - I/O Monitor2 Terminal Blocks

Table 7 - I/O Monitor2 Terminals (from left to right)

Terminal Block	1						2						3						4						5					
Terminal	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30
Designation	Input 1 (-)	Input 1 (+)	Input 2 (-)	Input 2 (+)	Input 3 (-)	Input 3 (+)	Input 4 (-)	Input 4 (+)	Input 5 (-)	Input 5 (+)	Input 6 (-)	Input 6 (+)	Output 1 (NC)	Output 1 (C)	Output 1 (NO)	Output 2 (NC)	Output 2 (C)	Output 2 (NO)	Output 3 (NC)	Output 3 (C)	Output 3 (NO)	Output 4 (NC)	Output 4 (C)	Output 4 (NO)	Output 5 (NC)	Output 5 (C)	Output 5 (NO)	Output 6 (NC)	Output 6 (C)	Output 6 (NO)

Table 8 - Default Alarm Output Relay Assignments

Alarm	Relay 1 (Major)	Relay 2 (Minor)	Relay 3 High Voltage	Relay 4 Low Voltage	Relay 5 RFA	Relay 6 (Critical)
Power Major	X					
Power Minor		X				
High Voltage (HV1)		X	X			
High Voltage (HV2)	X		X			
Battery Discharge		X		X		
Very Low Voltage (Battery Discharge)	X			X		X
Rectifier Alarm		X			X	
Dual Rectifier Alarm	X				X	
Controller Fail	X					
DC 1 Fuse Alarm	X					X
AC Mains	X					

To make alarm I/O connections:

1. Locate the I/O Monitor2. It is found in the controller chassis, which is located on the left side of the controller compartment (Figure 4, page).
2. Strip alarm wires back 0.25 in (6-7 mm).
3. Make input/output alarm connections, using Table 7 as a reference for terminal designations. Maximum wire size is 16 AWG (1.5 mm²). Torque each connection according to the values found in Table 6, page 21.

NOTE: Each of the five terminal blocks can be removed from the I/O Monitor2 by pulling them straight up from the unit. This makes terminations easier to make. Simply plug the block back into the I/O Monitor2 after making alarm connections.

Alarm inputs and outputs can be configured through either the touch screen or with the browser interface, by connecting the Smartpack2 Touch controller to a computer, using an Ethernet connection after turn-up.

Note: See the printed copy of the default configuration that shipped with your system. For steps to configure the controller, see *Configuration Guide: Eltek Controllers* (Doc. No. 370013.063). If you make any changes to the default configuration, Eltek recommends that you make a backup copy of your configuration, by following the instructions in the *Configuration Guide*.

For additional information about configuring the controller, see “Controller Configuration,” on page 31.

Install Temperature Probes

Prior to connecting temperature probes, review the section about “Controller Specifications,” beginning on page 11. Make temperature probe connections, according to the controller present in your system:

To install temperature probes:



Figure 12 – Temperature Probe Inputs

1. Identify temperature probe connections that are necessary for your installation.
2. Connect the red wire of the temperature probe to the positive (+) input; connect the black wire of the temperature probe to the negative (-) input.
3. Torque each connection according to the values found in Table 6 on page 21.
4. If batteries are present, route the temperature probe cable to the batteries, and connect to the positive terminal at the center of the string.
5. Repeat steps, as necessary, for additional connections.
6. For instructions to enable temperature probe, see the *Configuration Guide: Eltek Controllers*, Doc. No. 370013.063.

CAN Node Connections

Both the Basic Controller and the Basic Industrial Controller have CAN ports for connections to other CAN devices. If you are installing any additional CAN devices, follow the instructions that are provided with those devices.

Note: If connecting the Basic Industrial Controller to a CAN device, use **only** the **CAN2** ports; do not use the CAN1 ports for making connections to additional CAN devices.

Connect Input

Before making input connections, read the following “Input Warnings,” and then proceed to “Input Connections” on page 26.

Input Warnings



WARNING: HIGH-LEAKAGE CURRENT IS PRESENT. EARTH CONNECTION IS ESSENTIAL BEFORE CONNECTING THE SUPPLY.

NOTICE: Hazardous energy is present in the system once the AC service panel circuit breakers are activated. Exercise caution when opening doors and accessing equipment when the system is powered.



WARNING: Electrical connections should be made only by qualified personnel. Current draw, temperature, voltage drop, and wire ampacity must be correctly calculated for safe operation. Always observe industry safety

standards and codes (e.g., NEC) as well as local and company requirements. Always use insulated tools when working on live circuits. *Never work alone.*



WARNING: Protection of persons against electric shock:

Improper connection may cause damage or serious injury. Make sure the AC service panel circuit breakers feeding the system are OFF and locked out during installation, especially while making cable connections. Use a voltmeter to check the presence of voltage from the supply. Ensure that all power switches are in the OFF position – in the system, devices, and at supply. Improper wiring may cause bodily injury and equipment damage. Before performing maintenance, either unplug or disconnect the equipment from the power source in order to reduce the risk of electric shock or other possible hazards.



WARNING: Shock hazard! Make sure all power sources are off or deactivated before making electrical connections. AC mains should remain off until all electrical connections are terminated and verified.

Input Connections

Prior to making input connections, review the section, “Input Specifications,” on 16.

Rectifier inputs are made to the rear of the system, using AMP MATE-N-LOK connectors. Each module is directly connected to the AC Input power.

To make input connections,

1. Route AC cables to the rear of the system.
2. Make push-on or plug-in connections, corresponding to the rectifiers being fed within each shelf.
3. Secure cables to the brackets on the rear of the shelves.

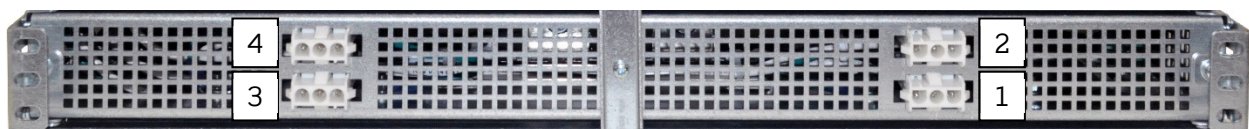


Figure 13 – AMP MATE-N-LOK Connections

Install Modules

Before installing modules, review the information applicable to your system in “Rectifier Specifications,” on page 15.

To install Flatpack2 modules:



Figure 14 - Handle Release

1. Activate input power to the shelf by inserting plugs into receptacles, or by turning on input breakers.
2. Release the handles by inserting a small flat-blade screwdriver into the release slots and pressing the tip upward; extend each handle.
3. Insert the first module into position # 1 by sliding it fully into the power shelf (providing support from underneath), so that it makes proper contact.



Figure 15 - Inserting the Modules

- The rectifier LEDs illuminate, with the green light remaining on. Fans are regulated by ambient temperature and will turn on or off as needed.
 - The controller screen is momentarily blank, and then moves to the main menu, showing **System Normal**; the green controller LED is also on. If any alarms are activated, refer “Basic Troubleshooting” on page 34.
4. While the system is powered, verify polarity with a multimeter. If the polarity does not match expectations, stop the installation procedure and call Eltek tech support.
 5. Install additional modules individually, in sequence, according to the position numbers indicated in Figure 15. Wait for each module to display the green LED, before installing the next module.

This procedure establishes the proper module IDs within the controller. The IDs are retained (based on serial numbers) in the controller, even through loss of power. After all modules are installed, proceed to the next step.

6. Lock each rectifier into place, by pressing the handles into the locked position.
7. Power down the system, by turning off exterior input breakers or removing plugs from receptacles, leaving modules installed.

Make DC Output Bulk Panel Connections

Before making connections, review the “DC Output Specifications” section, beginning on page 17. The installation of the DC output connections are described in the following sections.



WARNING: Electrical connections should be made only by qualified personnel. Current draw, temperature, voltage drop, and wire ampacity must be correctly calculated for safe operation. Always observe industry safety standards and codes (e.g., NEC) as well as local and company requirements. Always use insulated tools when working on live circuits. Never work alone.



NOTICE: If there are no breakers or fuses in line with the battery bus, an external battery breaker or fuse is needed.

Before making connections to the Bulk Panel, review the section, “Bulk Panel Distribution,” page 17.

To make bulk load connections:

1. Ensure that power is OFF.
2. Loosen the thumb screws and lower the front distribution door. (The cover cannot be removed, to access the connections, until the distribution door is open.)
3. Remove top cover, by sliding it out through the front slot.

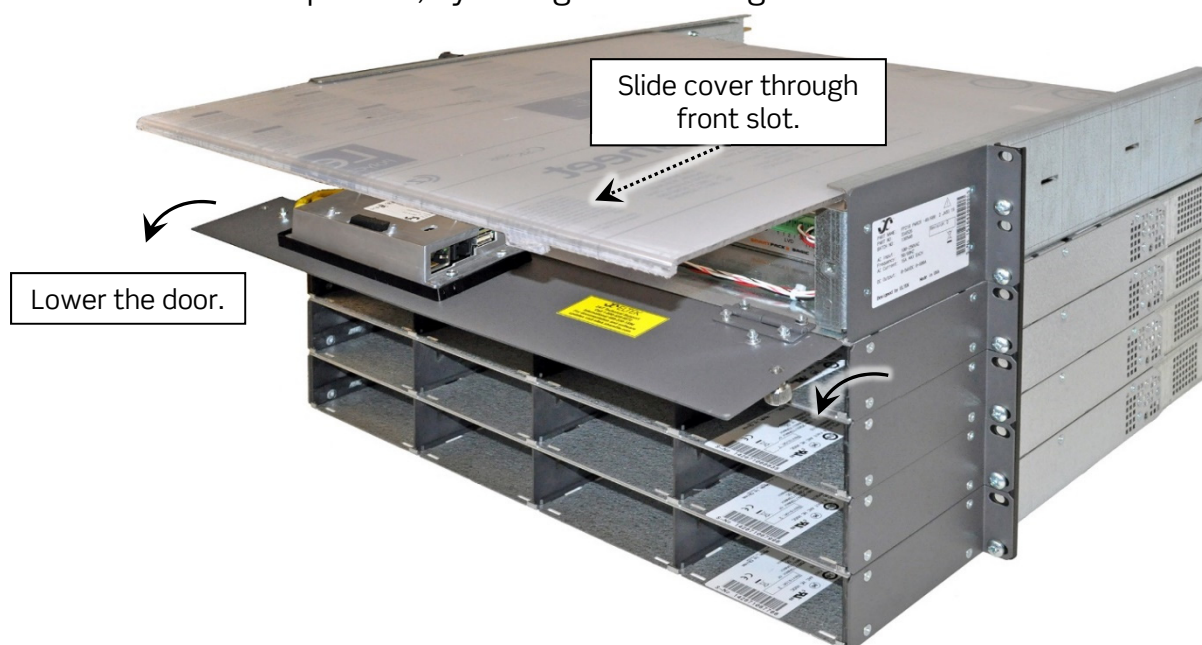


Figure 16 - Remove Top Cover

Note: The cover is shipped with a protective film; if you have not yet removed the film from the cover, you can do so at this point.

4. Connect ground wire to chassis ground.
5. Route lugged DC wires from external distribution panel or customer equipment, through the rear of the power system, to the internal bus bars.



Figure 17 – Bulk Load Connections

6. Make positive and negative connections to busbar inside the distribution panel.
7. Secure DC wires with cable ties, or lacing string, using the cable lacing rail on the metal panel beneath the cables.
8. Torque connections according to the torque values in Table 6 on page 21.

Power Up System

When you power up the system, the bulk connections will be live connections. Therefore, prior to powering up the system, verify that connections and equipment are ready to activate.

To power up the system, complete the following steps:

1. Activate input power to the shelf by turning on input breakers.
 - The rectifier LEDs illuminate, with the green light remaining on. Fans are regulated by ambient temperature and will turn on or off as needed.
 - The controller screen displays the Eltek logo, and then moves to the main status screen.
2. Before turning batteries ON, lower the float voltage to match the measured battery voltage. Float voltage can be set from the front display using the following path: **System Config > System Voltages > Reference Voltage**. For

more information, refer to the *Configuration Guide: Eltek Controllers*, Doc. No. 370013.063

Note: Changing the float voltage requires logging in as administrator. The default login information is:

Username: **admin**

Password: **admin**

3. Activate the battery breakers or install the battery bus bar link onto the batteries.

Note: In systems with bulk battery bus bars, the battery breaker will be external from the system.

4. Return float voltage to battery manufacturer's (or site) specifications, using the controller, as described in step 2.

Note: In systems with bulk output bus bars, the load breakers will be external from the system.

5. Check the controller for alarms. If any alarm LEDs are lit, tap the alarm icon in the upper left corner of the screen to obtain details about the alarm(s). If alarms are active, refer to "Basic Troubleshooting" on page 34.

Note: See the printed copy of the default configuration that shipped with your system. For steps to configure the controller, see *Configuration Guide: Eltek Controllers* (Doc. No. 370013.063). If you make any changes to the default configuration, Eltek recommends that you make a backup copy of your configuration, by following the instructions in the *Configuration Guide*.

Controller Configuration

Controller specifications are covered in the earlier section, "Controller Specifications," on page 11. For information regarding controller configuration, see the printed copy of the default configuration that shipped with your system.

The Smartpack2 Touch Controller provides maximum flexibility for direct monitoring, and to configure the controller. Most functions can be accessed using the touch screen and, for ease of use, a mouse and/or keyboard can be plugged into the USB ports on the controller, in order to navigate and enter parameters on the screen.

If you prefer a larger screen, you can connect a computer to the controller, using the Ethernet port on the face of the controller, and employ the web browser interface, as with other Eltek controllers. For an explanation of common tasks

performed through the browser interface, see the *Configuration Guide: Eltek Controllers*, Doc. No. 370013.063. For more extensive information, you can also consult the *User Guide: Eltek Controller Web Interface* (Doc. No. 370035.013).

In order to make changes, log in as administrator. The default login credentials are:

User name: **admin**

Password: **admin**

The Smartpack2 Touch screen utilizes the same basic interface as the browser version, except that the Touch controller displays the information in an adaptive format fitted to the smaller screen of the controller. The main navigational difference is that the left menu bar in the browser interface becomes a sub-menu in the Touch interface; the submenu must be accessed first on the Touch screen, in order to select the associated configuration options. The configuration options are the same as the browser interface, although you may have to scroll further down a page to see all the options.

If you make any changes to the default configuration, Eltek recommends that you make a backup copy of your configuration, by following the instructions in the *Configuration Guide*.

As an example of controller configuration: I/O Monitors have six configurable inputs and six output relays. Using the web browser interface, you can set the six programmable inputs. In the browser interface, go to **Alarm Conf. > Power System > Inputs**.

The **I/O Unit x Input Configuration** section provides configuration for the input terminals of the I/O Monitors.

The ProgInput XX.Y section monitors the following parameters in up to six inputs: relays, voltage, diode matrix, clock.

Power System					
Mains					
Rectifier					
Load					
Battery					
Control System					
Inputs					
Outputs					
SP2 Touch 1 Input Configuration					
SP2 BasicInd 1 Input Configuration					
I/O unit 1 Input Configuration					
#	Edit	Description	Enable	Status	
1		ProgInput 81.1	☐		
2		ProgInput 81.2	☐		
3		ProgInput 81.3	☐		
4		ProgInput 81.4	☐		
5		ProgInput 81.5	☐		
6		ProgInput 81.6	☐		

Figure 18 – I/O Input Configuration

For basic tasks used to configure the controller, see *Configuration Guide: Eltek Controllers* (Doc. No. 370013.063).

3. Basic Troubleshooting

Problems and Solutions

In case of alarm conditions, verify the following:

- All AC and DC connections are secured properly.
- All rectifiers are installed and seated properly.
- The controller is installed and seated properly.

Additional product information is available online at **eltek.sharefile.com**.

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.

Replacement Items

The controller and rectifiers are designed as modular, field-replaceable units. The following sections outline the procedure to replace these items.

Replacing a Controller

The controller(s) can be replaced with the system powered.

Note: Prior to replacing the controller, it is useful to obtain a backup of the configuration file (.xml) from the existing controller if possible. This file can be used to upload the configuration to the new controller using a USB memory stick, a laptop computer, or over a network. For more details see the *Configuration Guide: Eltek Controllers* (Doc. No. 370013.06) and the *User Guide: Eltek Controller Web Interface* (Doc. No. 370035.013).

To replace the hardware:

1. Disconnect all cables.
2. Remove hardware (such as Smartpack2 Touch, Basic Controller, I/O Monitor).
3. Mount replacement hardware.
4. Reconnect all cables.

Note: Controller(s) will power up (Green LED).

After completing the hardware replacement, configure the controller, using either the display or the browser interface. If you have a backup of your previous configuration (.xml file), you can upload the configuration to the new controller. For more details, see the *Configuration Guide: Eltek Controllers* (Doc. No. 370013.06) or *User Guide: Eltek Controller Web Interface* (Doc. No. 370035.013).

Replacing a Module

To replace a rectifier, perform the following steps:

To remove a Flatpack2 module:

1. Release the handles by inserting a small flat-blade screwdriver into the release slots and pressing up.
2. Use the handles to pull the module out just far enough to where the body can be gripped.
3. Slide the module out the rest of the way. Do not carry it by the handles. Flatpack2 modules weigh just over 4 lbs (1.9 kg) each.



Figure 19 - Release Handles on Modules

4. If removing a rectifier without installing a replacement, reset the number of modules from the controller. For details about resetting the number of modules, see the *Configuration Guide: Eltek Controllers* (Doc. No. 370013.063).

To install a Flatpack2 module:

1. Release the handles by inserting a small flat-blade screwdriver into the release slots and pressing the tip upward; extend each handle.
2. Slide the module firmly into the shelf.
3. Latch the handles to lock the module in place.

4. Revision Table

Revision	Published	Description
1	12/06/2019	First release.

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



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



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