

## Fire alarm power supplies – Installation, commissioning and operating manual.

**Models:** STX2405-UL-D: 5A  
STX2405-UL-G: 5A  
STX2402-UL-D: 2A  
STX2402-UL-G: 2A

### INTRODUCTION

The Elmdene STX24xx-UL series provides continuous, reliable power for fire alarm control panel equipment. Featuring an efficient switch-mode design, these power supplies are up to 50% more efficient than traditional linear models, are fully compliant with UL864 10th Edition and support both 110VAC and 240VAC input at 50Hz or 60Hz.

The STX2402 and STX2405 models deliver continuous output of up to 2 amps and 5 amps, respectively and for optimal performance should be installed close to the connected load.

Backup power is supported via batteries ranging from 7Ah to 55Ah. The standard enclosures accommodate up to 17Ah batteries for the -D size enclosure and up to 7Ah batteries for the -G size enclosure. Supported battery capacities larger than this will need to be installed in a separate, suitably sized UL-listed battery enclosure.

Battery health is continuously monitored by the integrated charger, which includes a low voltage disconnect feature to prevent deep discharge damage.

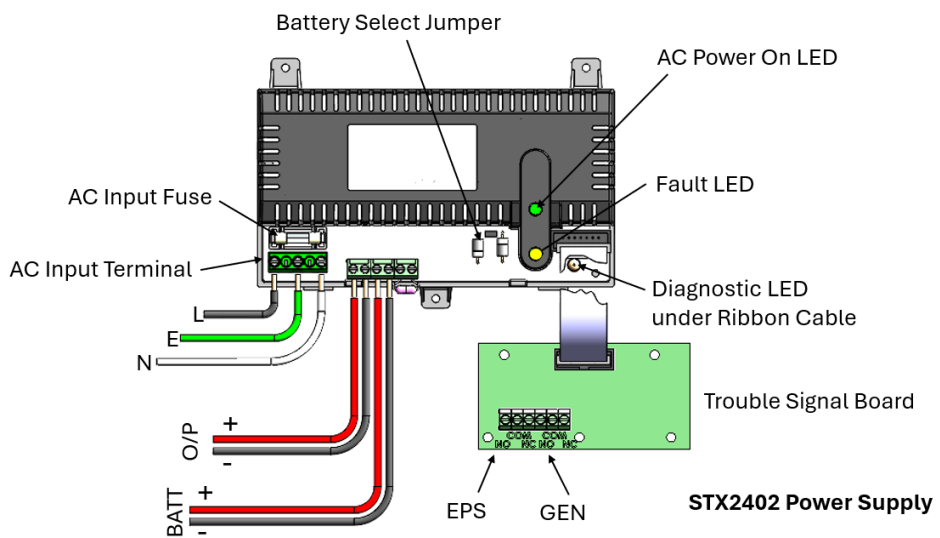
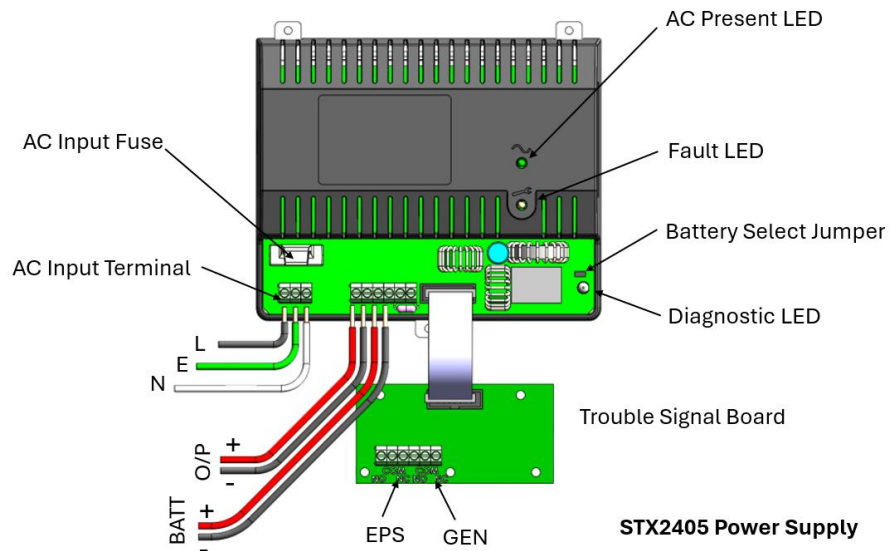
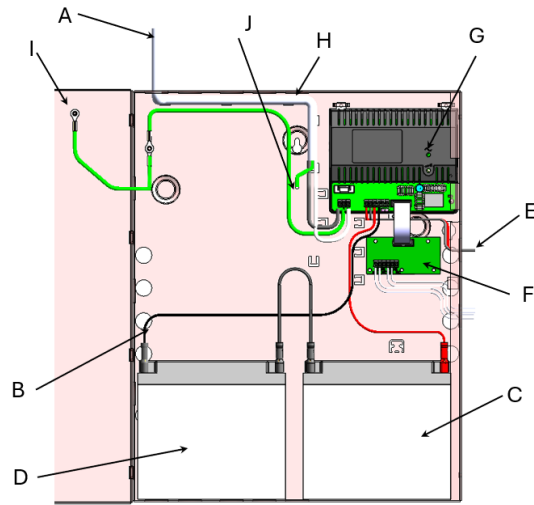
### FEATURES

- UL Listed for Fire Applications only.
- Input voltage: 110/240VAC 50/60Hz
- Output voltage 27.3VDC @2A for STX2402-UL and 24VDC @5A for STX2405-UL
- Supervised Battery Charger: Supports up to 55Ah batteries
  - Selectable battery charge rate optimises battery life.
- Integrated battery cut-off circuitry to protect batteries from deep discharge
- Two Common Trouble Relays (1A at 30VDC)
  - General System Trouble
  - Low input AC Trouble
- Diagnostic LEDs: Indicate Earth Fault, AC status, Charger and Battery Fault.
- Lockable enclosure door.
- Knockouts provided for safe and secure cable entry.

**HARDWARE OVERVIEW**

**LEGEND**

- A: AC Supply Input Cable
- B: Battery Cables
- C: Battery 1
- D: Battery 2
- E: Output Cables
- F: Trouble Signal Board
- G: Power Supply Unit
- H: Enclosure
- I: Cover
- J: Primary Earth



**Figure 1 : Power Supply Layout**

## Connections

Observe correct polarity for O/P & BATT

AC Input Terminal	Connections for AC power input (Supervised)
O/P +/-	Connections for equipment to be powered (Unsupervised)
BATT +/-	Connections to the battery pack (Supervised)
TEMP	Resistor pre-installed. Do not remove
EPS FAULT	Connections on common relay output for External (AC) Power Supply fail. Settable to Normally Open (NO) or Normally Closed (NC) depending on which terminals are wired. 1.0A @ 30 VDC volt-free contact. Power factor 1.0. (Unsupervised)
GEN FAULT	Connections on common relay output for General Fault (Trouble Signal Fault). Settable to Normally Open (NO) or Normally Closed (NC) depending on which terminals are wired. 1.0A @ 30VDC volt-free contact. Power factor 1.0 (Unsupervised)

## OPERATION INSTRUCTIONS

### Normal standby

The STX provides constant power to connected devices and maintains the standby battery in a high state of charge. During normal operation, the LED status will be as follows.

AC power present and batteries fully charged – AC Input LED ON, Diagnostic LED OFF.

AC power present, battery charging – AC Present LED ON, Diagnostic LED Pulsing as per Fault Diagnostic Table

In the event of loss of AC power, battery low, battery disconnected, charger fault, or earth fault, the digital fault signals shown in this manual will be generated and the corresponding trouble relay contact will change state.

### Trouble condition

In the event of loss of AC power or a general PSU fault, the corresponding fault signal contacts will be asserted.

**AC Fail:** When the Power supply detects the AC power input has fallen below an acceptable level, the AC Present LED will turn off, and the power supply will automatically switch to the standby battery for power. The EPS trouble signal relay will also activate.

#### Low Battery:

When the Power supply detects that the battery voltage is low, the diagnostic LED will indicate a double pulse, and the GEN trouble relay will also activate.

#### Other Faults:

Other faults, including battery faults, ground faults, and charger faults, will result in the diagnostic LED flashing as per the Fault Diagnostic Table, and the GEN trouble relay will also be activated.

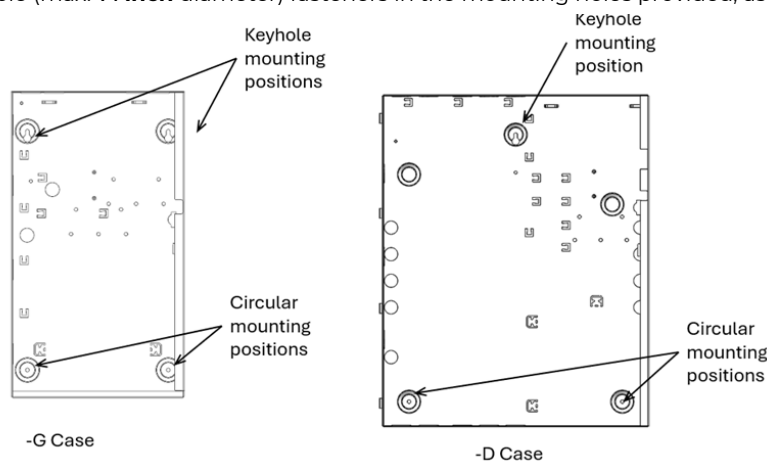
When the trouble condition[s] have been resolved, LEDs and trouble relays will return to their normal state.

## INSTALLATION

These products are for **permanent indoor installation only**, intended for **DC fire alarm systems**, and must be installed according to all applicable safety regulations.

### Mounting

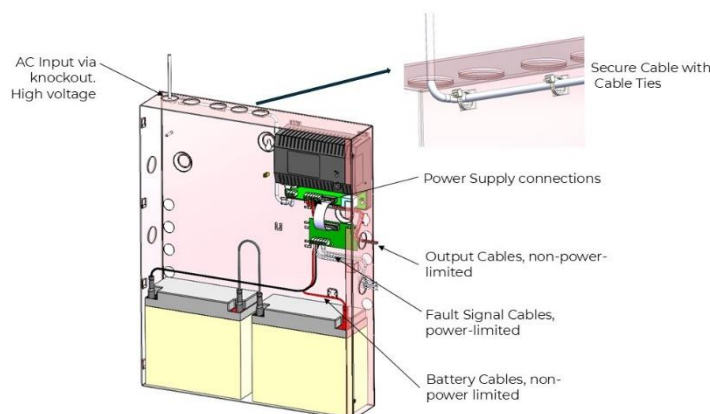
The standard mounting is a surface mount enclosure. The unit must be securely attached to a permanent partition using suitable (max.  $\frac{1}{4}$  inch diameter) fasteners in the mounting holes provided, as shown in Figure 2



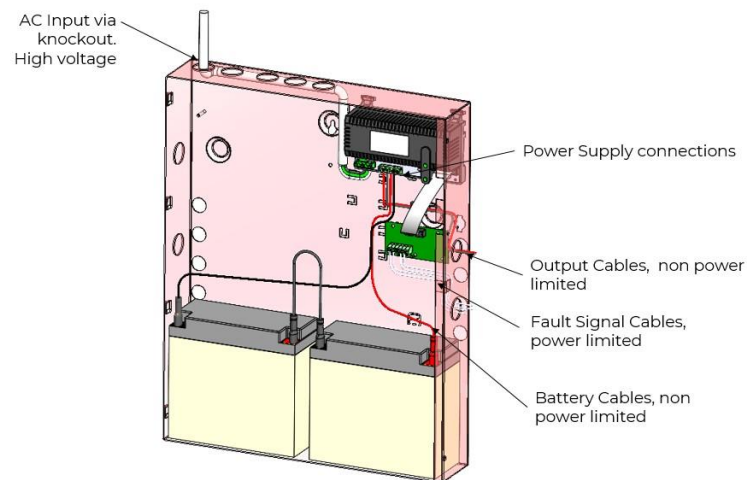
**Figure 2: Mounting Hole Locations**

**Cabling and Wire Routing Requirements:** Refer to **Figure 3: Wire Routing**

- **GEN** and **EPS** trouble relays must only be connected to circuits operating at **less than 30VDC**.
- **The AC input cable** must comply with applicable standards and have a **minimum conductor size equivalent to 14 AWG (0.0641 in<sup>2</sup>)**.
- **Low-voltage output cables** must be sized to carry the rated load current (e.g., **16 AWG (0.06 in<sup>2</sup>)**) and should enter/exit through separate knockouts to the AC input power cable.
- **Knockouts** when removed allow for cable entry/exit and must have appropriately sized UL-listed bushes or glands to prevent abrasion.
- **Secure all cables** with cable ties through the provided saddles.
- Maintain at least **1/4 inch** of separation between **power-limited, non-power-limited, and high-voltage wiring**. See Figure 3 for suggested wire routing.
- Wiring connections limited to **20 feet (6.1 meters)** in conduit and in the same room between the Relay Outputs and Output to Load.



**Figure 3: Wire Routing, STX2405**



**Figure 4: Wire Routing, STX2402**

### Standby Battery Calculation

The system must use two 12VDC Sealed Lead Acid (SLA) type batteries with a capacity range of between 7 to 55 amp-hours and **must be connected in series** to provide a 24VDC voltage. The batteries must both be of the same type, voltage, capacity, and age. If selected batteries are physically larger than can be installed in the STX240x-UL-x enclosures provided, then the batteries can be installed in an approved external battery enclosure. However, the maximum capacity cannot exceed that per the product's specification. External battery enclosure shall be close-nippled to the power supply enclosure.

Note: The 5A STX2405-UL-x has a battery lead with a replaceable in-line fuse fitted.

### Battery capacity calculation & selection

To ensure compliance with UL 864 10th Edition, battery capacity must support a minimum:

- **24 hours** of standby operation, plus **5 minutes** of alarm load.

*Calculation Steps:*

1. **Determine System Standby Load**  
Total standby current (in Amps) × 24 hours = Standby Ah
2. **Determine System Alarm Load**  
Total alarm current × 0.083 hours (5 min) = Alarm Ah; increase if a longer alarm time is desired.
3. **Total Required Capacity**  
Add standby Ah + alarm Ah
4. **Apply Battery De-Rating Margin of 20%**  
Multiply total by 1.20

#### **Battery Calculation Example**

*Standby current is determined to be 0.6A;*

*Alarm current is determined to be 1.8A*

$$(0.6A \times 24h) + (1.8A \times 0.083h) = 14.55Ah$$

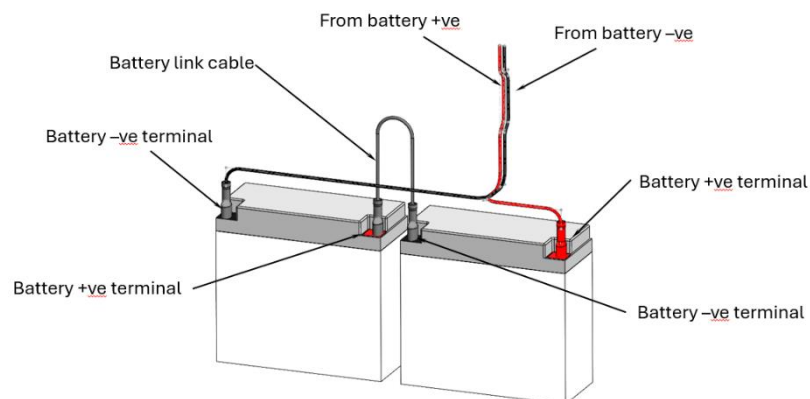
$$14.55 Ah \times 1.20 (margin) = 17.46Ah$$

Always round up capacity when selecting battery → 18Ah capacity SLA batteries are required in this example.

## Installation Steps

**CAUTION** – Ensure AC power is not present before starting installation process

1. Mount the required batteries in the base of the enclosure, with larger batteries fitted in a separate approved battery enclosure. All cabling between the two enclosures, if used, should be routed to use separate case entry/exit holes from other cabling and use suitable UL-listed bushes to protect the cables.



**Figure 4 : Battery Connection**

2. Connect the PCB terminal BATT+ to the positive terminal of battery 1.
3. Connect the PCB terminal BATT- to the negative terminal of battery 2.
4. Connect the batteries in series with the remaining negative of one battery connected to the remaining positive of the other using the battery link cable provided. Refer to **Error! Reference source not found.**

**CAUTION** – Ensure to attach battery cables to correct terminals. Avoid shorting cabling to any other terminal or conductive surface.

5. Verify that the yellow Fault LED does not flash (battery connection detected). Verify that the remote GEN Fault monitor is in a non-fault state.
6. Disconnect the AC input power. Verify that the green AC Input LED extinguishes and the Yellow Fault LED starts to pulse (indicating that the PSU is running from its standby batteries).
7. Verify that the EPS relay should indicate a fault, and the GEN relay should remain in the normal state.
8. Verify that the standby batteries are now driving (supporting) the system load. Perform a full functional test of the system, including full alarm conditions
9. Note: Ensure batteries have sufficient charge to support the system under full load.

## Final Commissioning

1. Reconnect the AC power. Verify that the green AC Input LED illuminates and the yellow Fault LED extinguishes.
2. Verify that the EPS Fault monitor and the GEN Fault monitor both indicate a non-fault state.
3. Disconnect one end of the battery link cable, ensuring that no exposed section of conductor or connector is allowed to contact exposed metalwork, other PSU terminals, or other battery terminals.
4. Verify that, in less than 1 minute, the yellow Fault LED starts to flash, and that the orange Diagnostic LED flashes in a 2-pulse repeating pattern (indicating that battery disconnection was detected).
5. Reconnect the battery link cable and, after a short time, verify that the Fault LED does not flash. (Audible click can be heard as the battery relay closes, then a second click while the charger is tested)
6. Close cover and secure using key locks.

**FAULT DIAGNOSTIC TABLE**

Diagnostic LED (Orange)	AC Presence LED (Green)	Condition	Possible Cause	Action
OFF	ON	Normal Operation	AC power present Battery fully charged	None (No fault)
	OFF	Standby Operation	AC power lost. No faults present Battery driving load	Investigate loss of AC input power
FLASH CONTINUOUS	ON or OFF	No Output	Output fuse blown, Output overload, Output short circuit	Check and replace the output fuse Disconnect the output load and test load
1 PULSE	ON	Battery Charging	No faults active The battery is charging normally, but < 90% of full charge	None (No fault)
2 PULSES	ON	No Battery	Battery disconnected, Battery fuse blown, Battery heavily discharged	Check battery connections. Check the battery fuse Check battery condition Replace the battery if aged
	OFF	Low Battery Volts	Standby Mode Battery almost discharged	Restore AC power
3 PULSES	ON or OFF	Battery Fault	High impedance in the battery connection Battery internal fault	Check battery connections for corrosion. Replace the battery if aged.
4 PULSES	ON or OFF	Charger Fault	Internal failure of the battery charger	Return to the manufacturer
5 PULSES	ON or OFF	Battery Temp Fault	Battery temperature resistor disconnected or damaged PSU running in Safe Mode.	Check temperature resistor connections and the condition of the resistor. Replace if suspect (3K3 ohms)
6 PULSES	ON or OFF	Earth Integrity Fault	Poor connection, or damage to, the earth cable	Check Earth / restore the integrity of the connection

## SPECIFICATION

Table 1 : Product Specifications

	STX2402-UL-x		STX2405-UL-x	
<b>AC Input</b>				
Primary AC voltage	110-240VAC			
Frequency	50-60Hz			
Max Input Current	2.0A		2.2A	
Fuse	T2.0 A, 20mm, 250VAC HRC		T3.15 A, 20 mm, 250VAC HRC	
<b>Output</b>				
Output (VDC)	19.85 – 27.75VDC <i>SPECIAL APPLICATION Potter Electric Signal Company, IDC-6 Initiating device circuit expander</i>		21.75 – 26.25VDC <i>Regulated</i>	
Battery select jumper	Not Fitted	Fitted	Not Fitted	Fitted
Max cont. output current	2A@27.6Vdc	1.8A@27.6Vdc	5A@24Vdc	4.6A@24Vdc
Max. battery charge	0.53A	0.7A	0.7A	1.1A
Battery Size supported	≤ 35Ah	36–55Ah	≤ 38Ah	39–55Ah
Low battery warning threshold	21VDC			
Deep discharge protection (DDP)	19.7VDC			
Battery fuse	2.5 A (PTC resettable fuse)		8 A (Battery Lead In-Line fuse) 20mm Fuse UL RECOGNISED	
<b>Enclosure</b>	STX240x- <b>G</b>		STX240x- <b>D</b>	
Nominal dimensions excl. mounting feet. (W x H x D mm)	251 x 441 x 110		406 x 505 x 81	
Weight (without batteries)	4.0kg		6.2kg	

## MAINTENANCE

This unit is intended for use by Service Personnel only. There are NO USER SERVICEABLE parts, and no regular maintenance is required of the PSU other than annual inspection and/or replacement of the standby batteries.

### Battery Inspection and Test

Standby batteries have a life expectancy of 3 to 5 years when operated at room temperature. Higher ambient temperatures will reduce their life expectancy. Inspect the standby batteries annually to ensure they are free of corrosion and that the integrity of all electrical connections is satisfactory.

Batteries should be tested annually in accordance with the manufacturer's guidance to ensure they are suitable for continued operation.

### Battery Replacement

1. Disconnect AC power and open the front cover of the enclosure.
2. Remove the cable link connecting the two batteries.
3. Disconnect the black lead from the negative terminal of battery 2.
4. Disconnect the red lead from the positive terminal of battery 1.
5. Remove batteries, then place new batteries in the enclosure and retrace steps 4 to 2 above in reverse order.
6. Re-apply AC power and check the product to ensure correct operation.
7. Secure the front cover of the enclosure in place.

**Replacement batteries must both be of the same type, voltage, capacity and age.**

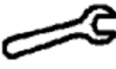




### AC Input Fuse Test and Replacement

1. Disconnect AC power to the enclosure.
2. Open the enclosure and disconnect the red lead from the positive terminal of the first battery.
3. Remove the fuse from the input fuse housing.
4. Check fuse continuity with a suitable test device and replace with an approved fuse if necessary.
5. Place the fuse into the housing and secure it in place.
6. Reconnect the red lead to the positive terminal of the first battery.
7. Reconnect the AC input to the product and check to ensure correct operation.
8. Secure the front cover of the enclosure in place.

### In-Line Battery Lead Fuse Test and Replacement (5A STX2405-UL-x only)

1. Disconnect AC power to the enclosure.
2. Open the enclosure and disconnect the red lead from the positive terminal of the first battery.
3. Remove the fuse from the in-line fuse housing.
4. Check fuse continuity with a suitable test device and if necessary, only replace with an approved fuse as detailed in the specifications section.
5. Place the fuse into the in-line fuse housing and secure it in place.
6. Reconnect the red lead to the positive terminal of the first battery.
7. Reconnect the AC input to the product and check to ensure correct operation.
8. Secure the front cover of the enclosure in place.

## SYMBOL DEFINITIONS

Explanation of symbols: <i>(Not all may apply)</i>			
	Fault Indication		Shock Risk – isolate before attempting access.
	AC Power Present		Do not dispose of it in unsorted waste.
	Protective Earth		
Specifications subject to change without notice			

## SUPPORT

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OPERATING INSTRUCTIONS SHALL BE FRAMED AND PLACED ADJACENT TO THE  
CONTROL UNIT FOR READY REFERENCE

**USER'S NOTES**

**Local Service Representative Contact Details**

Name: \_\_\_\_\_

Address: \_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

Telephone No.: \_\_\_\_\_

**USER NOTES:**