

# **HE-PSU(4.0) Power Supply & Battery Charger**

## **Installation, Commissioning & Operating Manual**

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## 1. GENERAL

The HE-PSU(4.0) is a combined power supply and battery charger designed to be used for fire alarm control and indicating equipment complying with EN54-2 and EN54-4.

## 2. POWER REQUIREMENTS

The HE-PSU(4.0) requires a mains power supply of 230V AC. The maximum input current is 2 Amps. Mains frequency 50Hz.

### 2.1 HE-PSU(4.0) Input/Output Electrical Ratings

Input – 230V AC

Load output - 19V DC min (battery at minimum), 30 V DC max (mains on) max current 2.5 Amps + 1.5A for battery charging.

Maximum ripple 800 millivolts

Battery charging output - 26.4 VDC (at 40°C) 28.9 V DC (at -5°C) 1.5 Amps.

Fault signals - switched negative open collector (with respect to load positive) current limited 100mA max.  
Mains fail  
Battery disconnected (Low battery shut off voltage - 19 V (+/- 1 volt))  
Battery low (Low battery warning voltage - 21 V (+/- 1 volt))  
Earth fault  
Charger fault (high output to battery)  
Fail safe (any one of the above)

These outputs are protected against short circuits.

## 2.2 Fuse Ratings

Input fuse - T2A L250V. Replace only with a fuse of the same type.

Load fuse - self-resetting polyfuse 4 Amp rated. (Not replaceable).

RPSM fuse- Glass antisurge fuse 4A; BS4265

## 2.3 Batteries

Rechargeable, sealed lead acid Yuasa NP or equivalent. Maximum capacity 17 Ah, minimum capacity 7Ah.

Maximum current consumption from battery – 4A.

Quiescent current in mains failure mode - 30 mA.

## 3. INSTALLATION

This product should be installed, commissioned and maintained by trained service personnel in accordance with the following:

- (i) IEE regulations for electrical equipment in buildings
- (ii) Codes of practice
- Statutory requirements
- Any instructions specifically advised by the manufacturer

### 3.1 Environmental Considerations

The operating temperature range should not exceed -5°C to +40°C ( $\pm 2^\circ$ ).

Humidity levels should not exceed 96% (non-condensing).

### 3.2 Mounting

The HE-PSU(4.0) is supplied as an enclosure in portrait orientation with the terminal block to the left. The requirements of EN60950 regarding creepage, clearance, marking and segregation must be taken into consideration and the power supply should remain accessible for fuse replacement and to access screw terminal connections.

The equipment is of Class1 construction so must be permanently and reliably connected to the fixed earth of the installation.

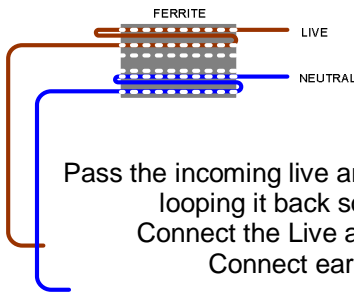
The primary earth of the end use application must be permanently marked with the protective earth symbol (IEC415 No. 5017). A suitable primary disconnecting device must be provided in the end use application.

Battery and load connections must be considered for connection to SELV (safety extra low voltage) circuits only.

The maximum leakage current of the completed and installed equipment must not exceed 3.5mA..

### 3.3 Connecting to the Input

Do not connect a mains supply unless the supply voltage matches that shown on the rating plate.



Pass the incoming live and neutral of the mains cable through the ferrite core at the top of the enclosure looping it back so that there are two turns through it.  
Connect the Live and Neutral to the circuit board as indicated on the PCB on the next page.  
Connect earth to the earth terminal at the top of the enclosure.

**Note:** A minimum cable size of 0.75mm must be used. Maximum cable size is 2.5mm<sup>2</sup>.

Ensure that all wires are fitted into the terminals without any exposed lengths or strands which may give rise to exposure to electrical shock.

This equipment is designed to be operated from 230V 50Hz mains supplies and is of class 1 construction. As such it **must** be connected to a protective earthing conductor in the fixed wiring of the installation and a readily accessible double pole disconnect device meeting the requirements of EN60950/IEC950 which disconnects live and neutral simultaneously shall be incorporated in the fixed wiring as close to the unit as is practical.

If the earth terminal is the primary earth of the end use application then apply the earth symbol (IEC415 No.5017) next to this terminal. Ensure that all screws in the earth terminal block (including those that are not used) are tightened during installation.

### 3.4 Connecting to the Outputs

#### 3.4.1 Load Connections (Terminal Block)

Four terminals are provided for connection of the load. Two + terminals and two - terminals.

The load should be connected using wire rated for at least 4 Amps.

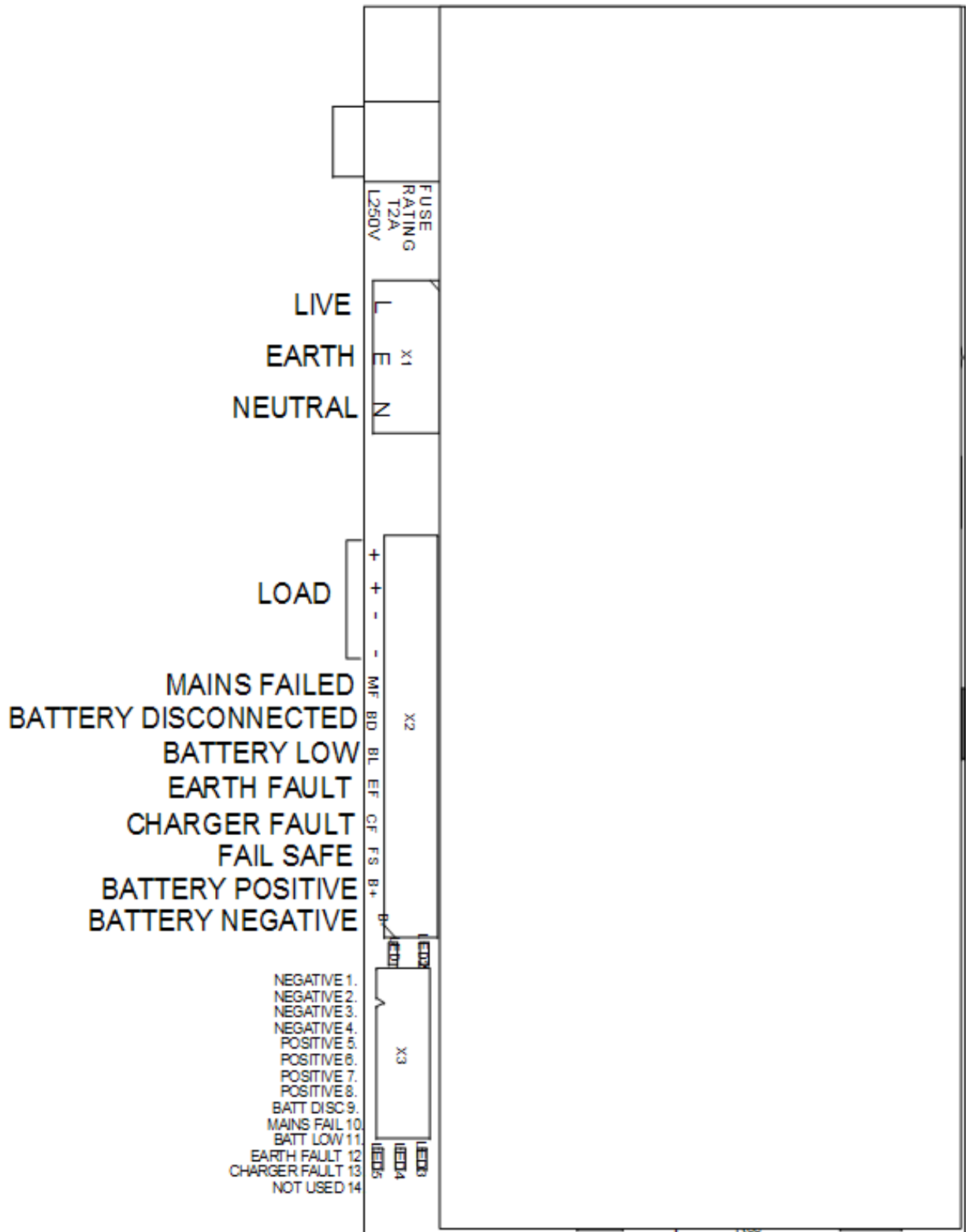
Care must be taken to connect the polarity of the load the correct way around, + on the PSU to + on the load and - on the PSU to - on the load.

**Note:** Maximum cable size is 2.5mm

#### 3.4.2 Load Connections (Ribbon Cable)

An alternative method of connecting to the power supply is via a 14-way ribbon cable.

A standard latching ribbon cable header is provided on the board, which may be used to connect to the load, and fault signals, which are provided on the terminal block. (See below.)



### 3.4.3 Battery Connections

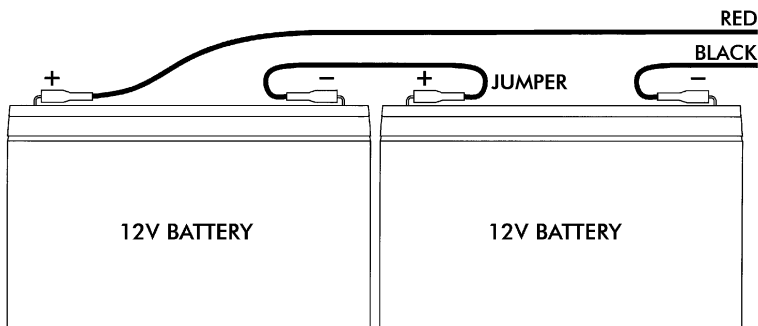
Batteries of even very small capacity are capable of delivering very high currents which can cause fire or injury. Battery connections must therefore be done using extreme caution.

As supplied, the HE-PSU(4.0) has battery leads already wired to the battery terminals on the circuit board. These leads are coloured red for + and black for - .

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As this is a 24-Volt system, there will be two 12 volt batteries which need to be connected in series. This is done using the jumper link provided.

To optimise the service life of the batteries, the battery charger output voltage varies with temperature. To enable optimum temperature compensation, the flying lead thermistor should be attached to one of the batteries.



## 4. COMMISSIONING

Once all connections have been made and checked for safety, switch on the mains power. The load should now be supplied with power and the batteries should be taking a charge.

Check that the load is being supplied by observing the power on lamp on the load (control and indicating equipment). Remove the mains power and ensure that the batteries continue to supply power to the load.

With the mains removed, a negative signal should appear at the terminal MF (mains failed) and the MF LED should light after about 90 seconds. This can be checked by connecting a voltmeter between load + and terminal MF.

Switch the mains back on and disconnect the battery. The load should continue to operate and a negative signal should appear at the terminal BD (battery disconnected) and the BD LED should light after about 30 seconds. Check this with a voltmeter between load + and the terminal BD.

Now connect the load + terminal to earth using a piece of wire. Within 30 seconds a negative should appear at the terminal EF (earth fault) and the EF LED should light.

Disconnect the load + from earth and connect the load - to earth. Within 30 seconds a negative should appear at the terminal EF and the EF LED should light.

With the battery disconnected, measure the output voltage from the power supply battery terminals with a calibrated digital voltmeter. The voltage should be within 0.2 Volts of the value indicated on the voltage/temperature graph (see opposite page.).

This completes the basic commissioning checks.

## 5. MAINTENANCE

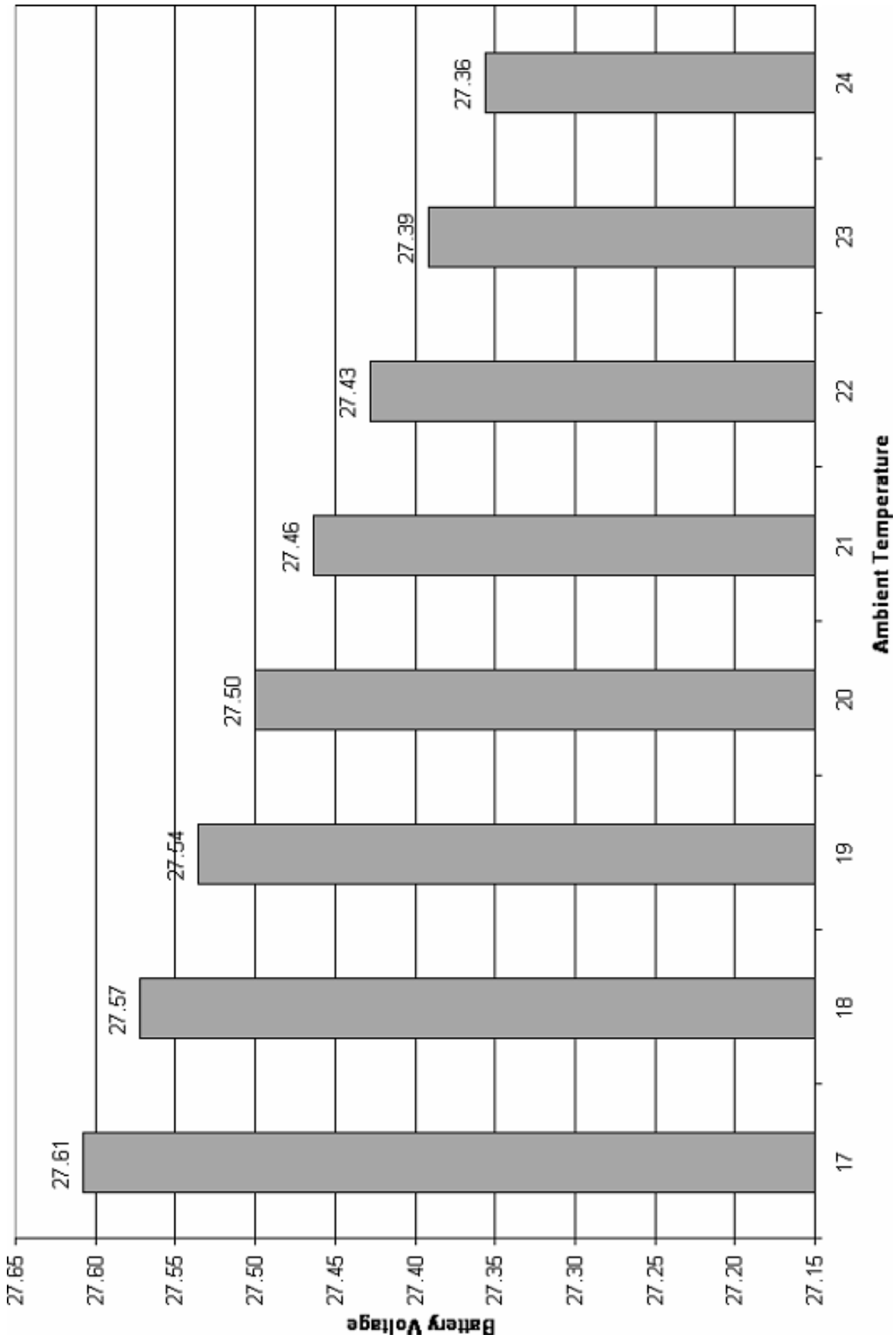
### THIS EQUIPMENT CONTAINS NO USER SERVICABLE PARTS

The power supply requires no maintenance; however, sealed lead acid batteries have a limited lifespan and should be checked periodically in accordance with the manufacturer's recommendations.

It is advisable to check the battery charger output voltage once per year to check that the output has not drifted.

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To do this the batteries should be disconnected and the output voltage measured with a calibrated digital voltmeter. The voltage should be within 0.2 volts of the indicated voltage on the voltage/temperature graph below.



## 6. MOUNTING

The power supply should be mounted on a dry, flat surface.

Screws or bolts of a minimum of 5mm diameter must be used to mount the enclosure in all four mounting positions. The mounting method must be suitable to support 60Kg (3 times the weight of the unit with maximum sized batteries fitted).

It should be positioned in an accessible position as agreed with the end user.

The power supply should not be mounted in another enclosure or near sources of excessive heat.

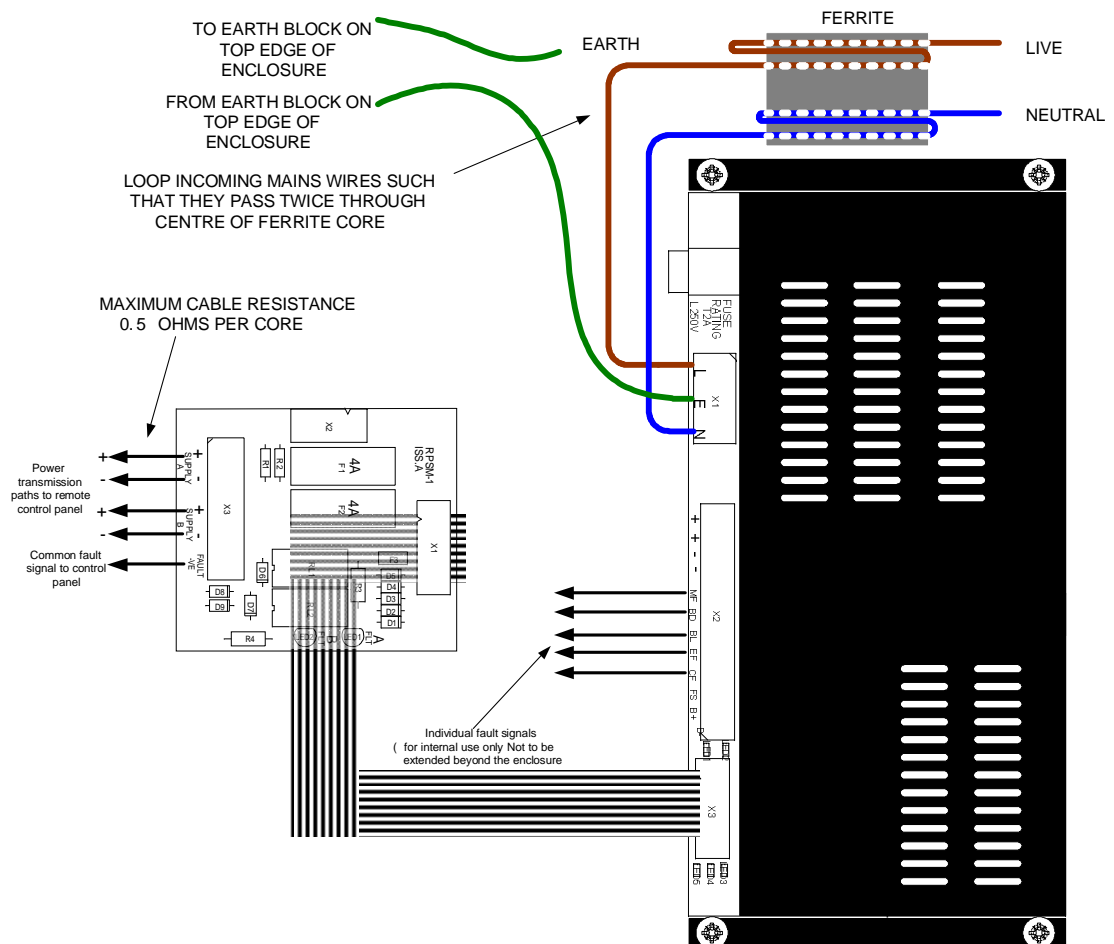
Cables should be connected using suitable cable glands (see section 8) fitted to the knockouts provided. If additional cable entry points are required, all swarf and debris caused by drilling of additional cable entries must be cleared before power is applied.

## 7. WIRING

The HE-PSU(4.0) power supply is capable of housing up to 17Ah sealed lead acid batteries.

To comply with the requirements of EN54-4 there must be two transmission paths from the power supply to the control panel in order that a short circuit in one transmission path will enable the control panel to be supplied with power from the other.

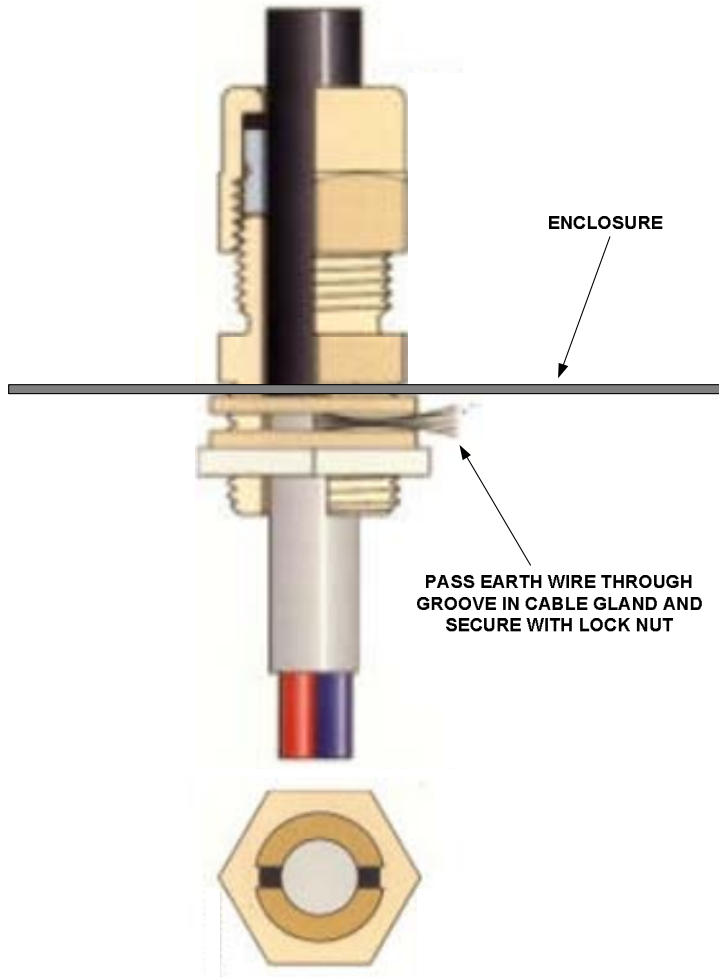
This is facilitated by the RPSM-1 PCB which is mounted in the enclosure. Individual fault outputs are provided on the power supply. A common fault open collector output rated at 100 milliamps maximum is provided on the RPSM-1 board.





## 8. CABLE TERMINATION

All cable entries to the enclosure must be via Pirelli AXT20SK Cable terminating kits or equivalent.



## 9. OPERATING INSTRUCTIONS

The HE-PSU(4.0) is intended for use only as Power Supply Equipment for 24V DC fire detection and alarm systems conforming to EN54-2 and EN54-4.

All mounting, installation, commissioning and maintenance should be carried out strictly in accordance with the instructions contained in the manual.

Under normal operating conditions, none of the LED indicators should be lit and there should be no output on any of the fault output terminals.

Fault conditions are identified by the printed legends on the black ventilated cover of the PSU within the enclosure and relate to the on-board LED indicators.

The switched negative fault outputs may be used to operate 24VDC rated relays or indicators up to the current limit of 100 milliamps per output. The reference voltage for the switched negative outputs is the load positive.



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