

Premier EX^{plus}
FIRE ALARM & GAS EXTINGUISHING CONTROL PANEL

**2 ZONE, 1 AREA EXTINGUISHANT
CONTROL PANEL**

**OPERATION AND INSTALLATION
MANUAL**

INTRODUCTION

The Premier EX Plus is a 2 zone, single area panel for controlling the release of extinguishing gases in the event of a fire.

It has first & second stage sounder (400 mA each) and relay outputs, and has a 1 amp bottle output to drive the extinguishant. The bottle output has a timer delay which is selectable from 30 seconds to 4 minutes in 15 second increments.

It has the ability to be connected to an addressable loop, where it will answer as a zone monitor & give a different return code (analogue value) for each panel state.

Up to 16 of these can be connected per loop, to give centralised monitoring of a large extinguishing system.

OPERATION

Normal Operations

With the “CONTROL” Key in the “ON” position and under normal conditions the system will be silent and the green “POWER LED” illuminated. The power LED will pulse when the EX plus is connected to an addressable loop.

The system may either be in “Automatic” or “Manual” mode of operation. This will be evident by the illumination of either the “Automatic” or “Manual” LED. In automatic or manual mode, an alarm can be silenced and the relevant LED will be illuminated.

First Stage Alarm

On detection of a “FIRE” in either Zone 1 or Zone 2, the zone fire LED will be illuminated and the internal buzzer will be on. The first stage LED and first stage sounder will be on. The first stage relay output will be active.

To silence the sounder, turn the keyswitch to ON position, and press silence button. The panel’s internal tone and fire LEDs will remain active until the cause of the alarm has been removed, and the panel has been reset

A first stage alarm can be created manually by turning the keyswitch to the on position and pressing the 1st STAGE ALARM button.

Second Stage Alarm

As soon as a “FIRE” is detected in the second Zone, the second stage alarm is initiated. The two-zone alarm LEDs will be illuminated as well as first, second and Gas Imminent LEDs. The second stage cannot be silenced and after a delay period, (set internally) the extinguishing output will be initiated releasing the extinguishing agent. This will be followed by the “GAS FIRED” indication, indicating that the extinguishing agent has been released.

Once the second stage alarm has been initiated, it is advisable to evacuate and Seal the protected area prior to the release of the extinguishing agent.

Operation of the “Manual Release” call point will initiate the second stage alarm. Lift the flap and push the operating element.

Manual Mode

In this mode operation, Zone Fire and Fault alarms are still in operation, and first & second stage sounders will operate, but the bottle output to the extinguishing agent will not operate.

Reset

To reset panel from an alarm condition, press Silence then Reset.

The panel can NOT be reset from a fault condition. All faults are non latching, so when a fault clears from the panel it will be automatically cleared from the display.
























Faults

The relevant LED will illuminate and the internal tone will sound. Pressing the “Silence” button, with the control key “ON”, will silence the tone. If there are any faults, call an Engineer.

INDICATIONS & CONTROLS

PANEL INDICATIONS

The Premier EX Plus has the following LED indications:-

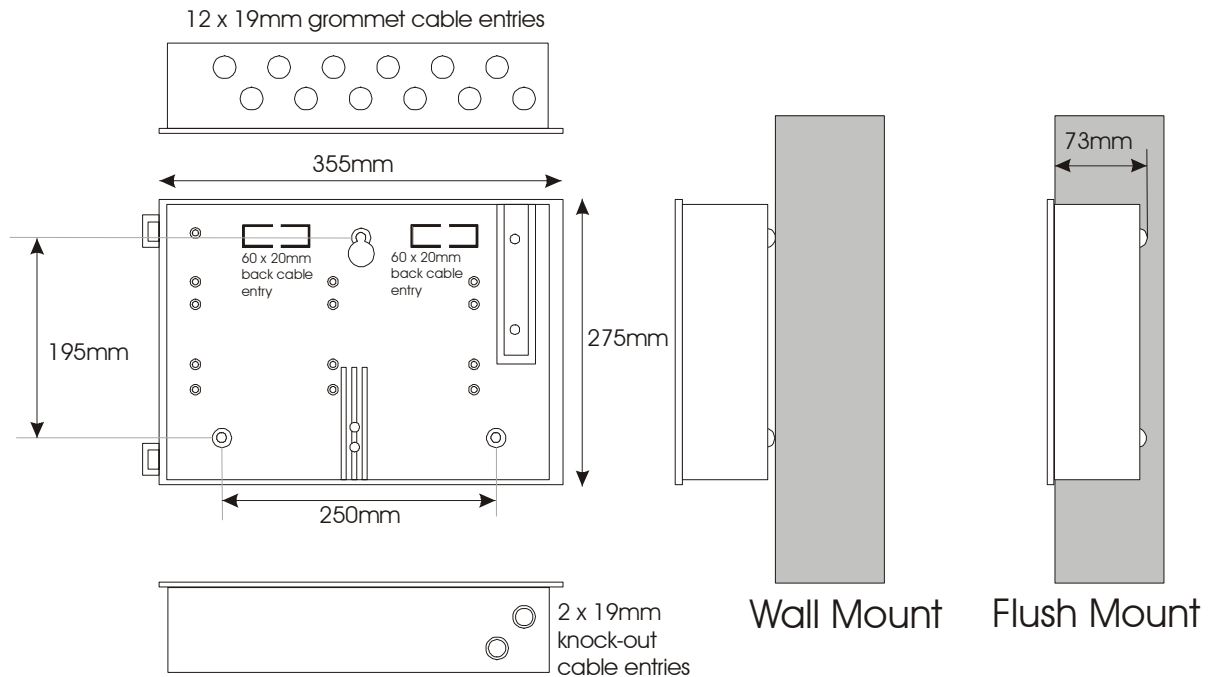
| | | | | | |
|---------------------------------|---|--------|---------------------------------------|---|--------|
| * Power |  | Green | * 2 nd Stage sounder fault |  | Yellow |
| * Charger fault |  | Yellow | * Timer fault |  | Yellow |
| * Battery fault |  | Yellow | * Bottle fault |  | Yellow |
| * Zone 1 fire |  | Red | * Zone 1 fault |  | Yellow |
| * Zone 2 fire |  | Red | * Zone 2 fault |  | Yellow |
| * Manual release fault |  | Yellow | * Hold/Abort fault |  | Yellow |
| * Auto/Manual fault |  | Yellow | * Gas Fired fault |  | Yellow |
| * Manual Release |  | Red | * Hold/Abort |  | Green |
| * Automatic |  | Green | * Manual |  | Yellow |
| * 1 st Stage Alarm |  | Red | * 2 nd Stage Alarm |  | Red |
| * Gas Imminent |  | Red | * Gas Fired |  | Red |
| * 1 st Sounder fault |  | Yellow | | | |

PANEL CONTROLS

- Activate controls (2 position key switch).
- Auto/Manual (toggle action).
- Reset/LED test button.
- Start 1st stage alarm (evacuate).
- Silence (tone and/or 1st stage alarm).

FIXING THE BACK BOX TO THE WALL

Figure 2: Plan view inside the enclosure without PCBs. Side view for surface / flush installation.



Fix the enclosure to the wall using the three mounting holes provided.

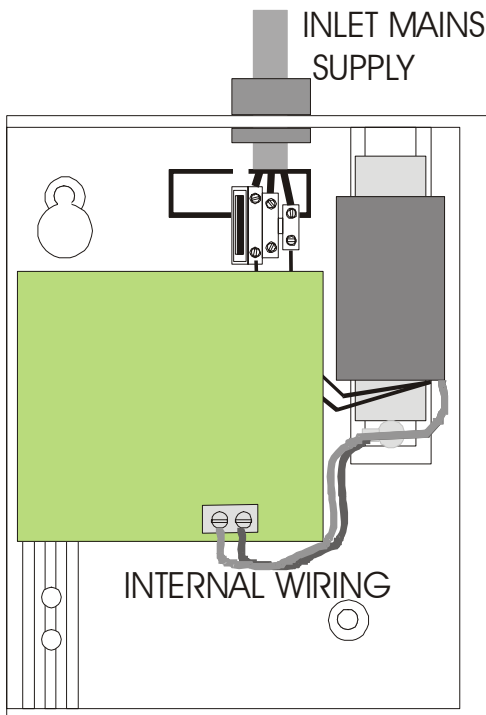
Check the build & condition of the wall to decide a suitable screw fixing.

The mounting holes are designed for No 8 roundhead or countersunk woodscrews (or similar).

Remove any debris from the enclosure.

Take care not to damage the FACP during installation.

CONNECTING THE MAINS POWER



The panel should be connected to 220-240V AC by a 3A rated spur to the fuse box with 1.5mm² to 2.5mm² 3-core cable. Nothing else should be connected to this supply

The connections are:-

Live to fuse,
Earth to centre connection,
Neutral to far connection

The Mains is protected by a quick blow 20mm 2A HBC fuse. (Also known as HRC)

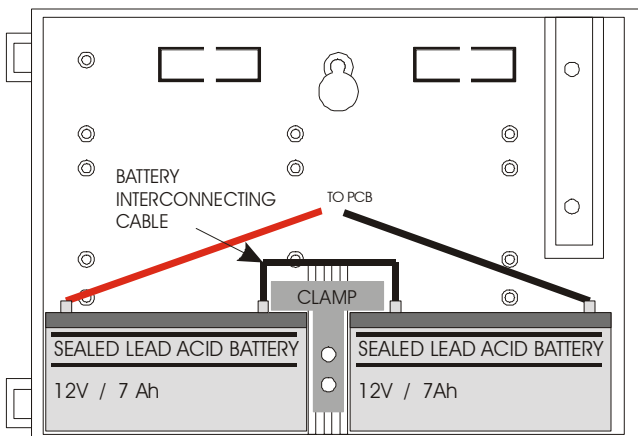
The incoming mains cable should be kept separate from the zone cables to help minimise mains interference.

MAKE SURE ANY SPARE ENTRY HOLES ARE COVERED WITH THE PLASTIC GROMMETS PROVIDED

It is advisable to apply power to the panel before connecting any devices, to check for correct operation, and to familiarise yourself with the fire alarm panels controls.

Figure 3: Power Supply PCB layout and Mains connection details

CONNECTING THE BATTERIES



Although there are many sizes of suitable battery, the sizes we usually recommend are 12V 7Ah, and the enclosure has been designed to hold this size battery.

To calculate the exact requirement, use the battery calculation guide.

If batteries larger than 7Ah are required, a separate battery box will have to be used

BATTERY CONNECTIONS

The two 12 Volt batteries are wired in **series** to give 24 Volts.

The **+ve** of one battery is connected to the **red** battery lead.

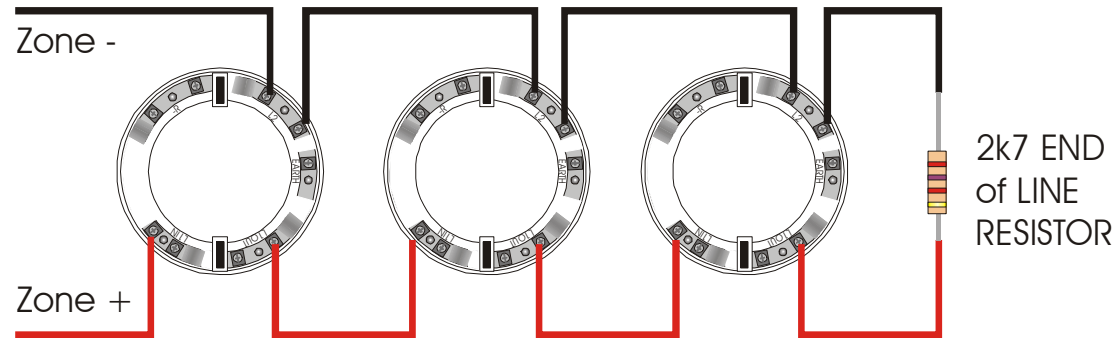
The **-ve** of the other battery is connected to the **black** battery lead.

The -ve of the first battery is connected to the +ve of the second battery using the link wire supplied.

WIRING CONNECTIONS

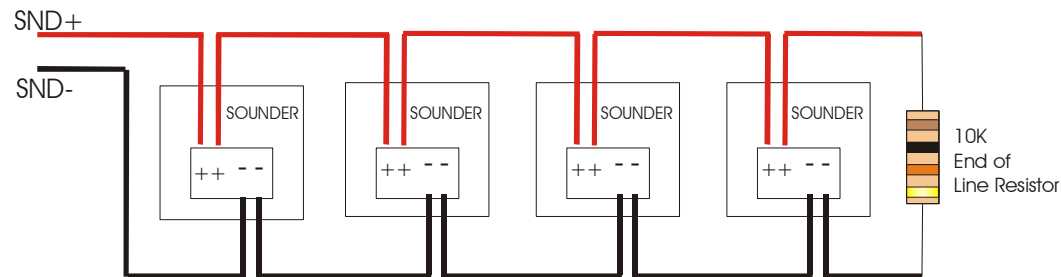
DETECTION ZONE WIRING

The Premier EX Plus has 2 conventional detection zones which are wired as:-

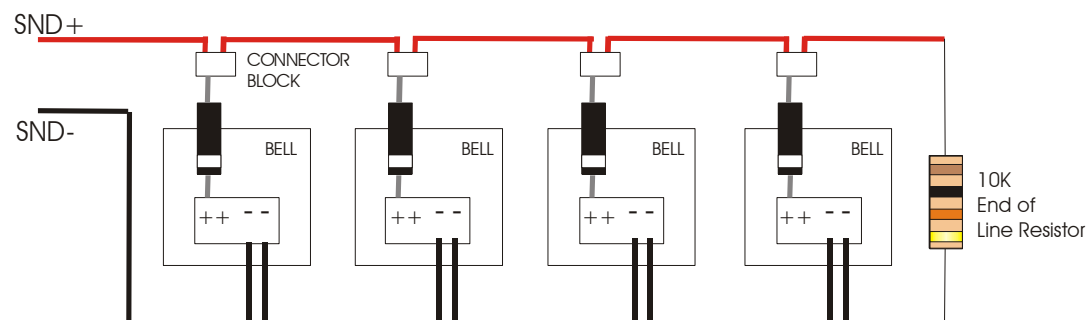


SOUNDER CIRCUIT WIRING

Connect electronic sounders as shown.



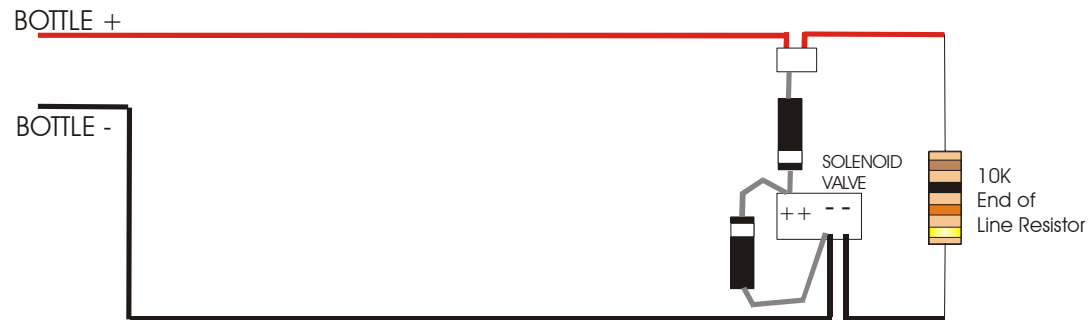
Some types of old Mechanical bells, or other devices may need to be polarised with a 1N4001 diode (or similar). If the panel shows a short circuit under normal conditions, when the line has been checked as ok, polarising diodes may be needed.



NOTE: THE FIRST & SECOND STAGE SOUNDERS SHOULD HAVE DIFFERENT TONES IN ORDER TO DISTINGUISH FIRST & SECOND STAGE ALARMS.

BOTTLE CIRCUIT WIRING

Depending on the solenoid or actuator used, a polarising diode and a Back EMF protection diode may need to be fitted



REMOTE INPUT CIRCUIT WIRING

The Premier EX Plus has the following Remote Inputs:-

- Manual Release
- Hold / Abort
- Auto / Manual
- Gas Fired

They will connect to various devices, but always to a normally open contact



SET UP

BOTTLE OUTPUT TIMER DELAY.

This panel may be shipped with the timer setting in the “fault condition”. This is to force the user to select a timer delay, rather than relying on a default setting.

| TIME DELAY | SWITCH 5 | SWITCH 6 | SWITCH 7 | SWITCH 8 |
|------------------|----------|----------|----------|----------|
| FAULT CONDITION | OFF | OFF | OFF | OFF |
| 30 SECONDS | OFF | OFF | OFF | ON |
| 45 SECONDS | OFF | OFF | ON | OFF |
| 1 MINUTE | OFF | OFF | ON | ON |
| 1 MIN 15 SECONDS | OFF | ON | OFF | OFF |
| 1 MIN 30 SECONDS | OFF | ON | OFF | ON |
| 1 MIN 45 SECONDS | OFF | ON | ON | OFF |
| 2 MINUTE | OFF | ON | ON | ON |
| 2 MIN 15 SECONDS | ON | OFF | OFF | OFF |
| 2 MIN 30 SECONDS | ON | OFF | OFF | ON |
| 2 MIN 45 SECONDS | ON | OFF | ON | OFF |
| 3 MINUTE | ON | OFF | ON | ON |
| 3 MIN 15 SECONDS | ON | ON | OFF | OFF |
| 3 MIN 30 SECONDS | ON | ON | OFF | ON |
| 3 MIN 45 SECONDS | ON | ON | ON | OFF |
| 4 MINUTE | ON | ON | ON | ON |

LOOP ADDRESS SETTING

When connecting the EX Plus to an addressable loop, the panel address must be set. The default setting is address 1 (all switches off). If you require a different address, then select an address by setting the switches as shown below. (Note that on a loop, only 1 device can be set to a given address. 2 devices with the same address will cause a double address fault)

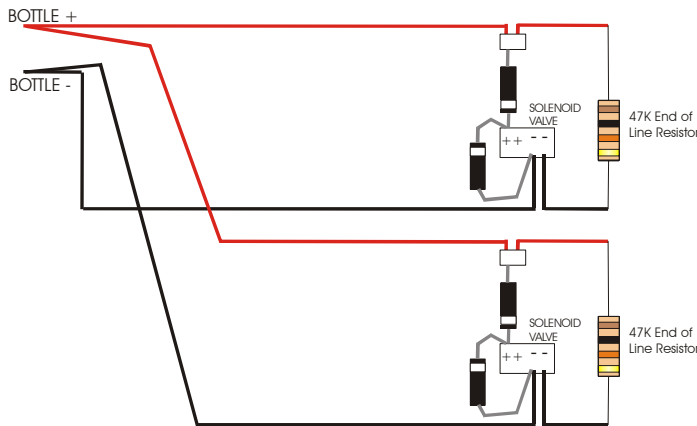
| ADDRESS | SWITCH 1 | SWITCH 2 | SWITCH 3 | SWITCH 4 |
|---------|----------|----------|----------|----------|
| 1 | OFF | OFF | OFF | OFF |
| 2 | OFF | OFF | OFF | ON |
| 3 | OFF | OFF | ON | OFF |
| 4 | OFF | OFF | ON | ON |
| 5 | OFF | ON | OFF | OFF |
| 6 | OFF | ON | OFF | ON |
| 7 | OFF | ON | ON | OFF |
| 8 | OFF | ON | ON | ON |
| 9 | ON | OFF | OFF | OFF |
| 10 | ON | OFF | OFF | ON |
| 11 | ON | OFF | ON | OFF |
| 12 | ON | OFF | ON | ON |
| 13 | ON | ON | OFF | OFF |
| 14 | ON | ON | OFF | ON |
| 15 | ON | ON | ON | OFF |
| 16 | ON | ON | ON | ON |

CONFIGURATION FOR CONNECTING MULTIPLE SOLENOID.

Occasionally the panel may be required to connect to more than one solenoid valve.

To connect to 2 valves (total output less than 1.5A)

In this scenario, it is possible to fit the 2 circuits into the bottle output, and replace the single 10K end of line with 2 x 47K end of line resistors (& change the bottle fuse to a suitable value).



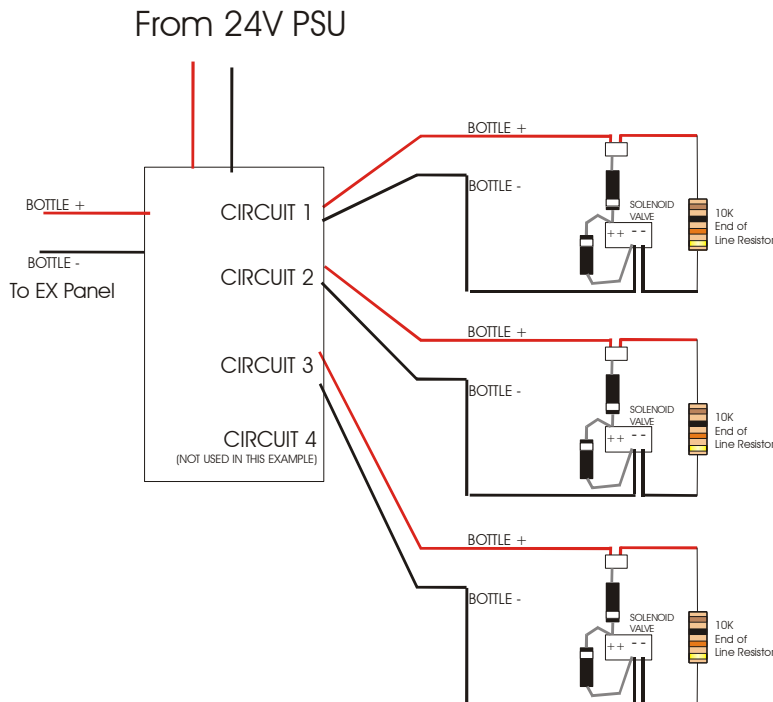
NOTE:

The Premier EX has a total peak power output of 2 Amps. The Bottle Output rating can only be increased if the load on the other circuits (Aux supply & sounder 1 & 2) is reduced.

If either circuit has a fault the panel will report it.
(It may be advisable to place a fuse in both of the positive lines to protect from a short circuit on 1 circuit disabling both circuits)

To connect to 2 or more valves (total output > 1.5A)

In this scenario, using a 4 way bell splitter and a 24V, 5A power supply would allow up to 4 solenoid valves each taking 1A to be operated.



FAULT FINDING

ZONE FAULT

Zone Open Circuit

- Check for breaks in the cable
- Check that correct value EOL is fitted
- Check that no heads have been removed

Zone Short Circuit

- Check for short circuit in the cable (especially to cable screen)
- Check for correct value EOL.
- Check that only detectors have been fitted to the zone.

No Zone Open Circuit shown when Detector Removed

- Check that diode bases have not been used (The EX plus is not compatible with diode bases)

No Voltage on the Zone (when Mains Fails)

- The EX will turn off the detection zone when the batteries are too flat to operate reliably

SOUNDER FAULT

Sounder Open Circuit

- Check for breaks in the cable
- Check that correct value EOL is fitted
- Check sounder fuses

Sounder Short Circuit

- Check for short circuit in the cable (especially to cable screen)
- Check for correct value EOL.
- Check that ALL devices are polarised.

BOTTLE FAULT

Bottle Open Circuit

- Check for breaks in the cable
- Check that correct value EOL is fitted
- Check sounder fuses

Bottle Short Circuit

- Check for short circuit in the cable (especially to cable screen)
- Check for correct value EOL.
- Check that ALL devices are polarised.

TIMER FAULT

- A time delay for the bottle output has not been programmed. Set a delay according to the set-up section.

CHARGER FAULT

- Check that mains is present.
- Check mains fuse
- Check Charger fuse

BATTERY FAULT

- Check that 2 x 12V SLA batteries are connected in SERIES.
- Check battery voltage
- Check battery fuse.

MANUAL RELEASE FAULT

- Check for breaks in the cable
- Check that correct value EOL is fitted

HOLD ABORT FAULT

- Check for breaks in the cable
- Check that correct value EOL is fitted

AUTO/MANUAL FAULT

- Check for breaks in the cable
- Check that correct value EOL is fitted

GAS FIRED FAULT

Yellow LED only

- Check for breaks in the cable
- Check that correct value EOL is fitted

RED & Yellow LEDs

- Check for Short Circuit on the line.
- Check the Gas Fired output from the bottle (usually weigh scales)

ENCLOSURE SPECIFICATIONS

The premier EX Plus enclosure is made from flame retardant ABS. It is suitable for surface mounting, or semi flush mounting.

It has numerous cable entry points as listed below.

| DESCRIPTION | VALUE |
|----------------------|---------------------------------|
| ENCLOSURE SIZE | 355 x 275 x 100 mm |
| TOP CABLE ENTRIES | 12 x 19mm DIA GROMMETED ENTRIES |
| BOTTOM CABLE ENTRIES | 2 x 19mm KNOCKOUT ENTRIES |
| REAR CABLE ENTRIES | 2 SNAP OUTS, 60 x 20mm |

ELECTRICAL SPECIFICATIONS

| | |
|--|--|
| Mains Voltage | 230 Vac. 59/60Hz +15%, -10%. |
| Charger Voltage | 25 – 30 Vdc (set internally to 27.6V) |
| Battery Voltage | 24V SLA (2 x 12V) |
| Battery Space | 7.0 AH maximum |
| Mains Supply Protection | 3.15 AF HRC 20 x5mm fuse |
| Charger Voltage Protection | 1.6 AT 20 x 5mm glass fuse |
| Battery Supply Protection | 3.15 AT 20 x 5mm glass fuse |
| Reverse battery protection | Battery fuse |
| | |
| Sounder Output (1 st and 2 nd stage) | 24 Vdc nominal |
| Sounder Output protection | 400mAF 20 x 5 mm glass fuse |
| Sounder EOL | 10K |
| Max sounder circuit resistance | 25 R |
| | |
| Auxiliary Supply Output | 24 Vdc nominal |
| Auxiliary Supply protection | 1 AT 20 x 5 mm glass fuse |
| Auxiliary Relay contacts (1 st and 2 nd stage) | 30Vac / dc 1.0 A each |
| | |
| Bottle Output | 24 Vdc nominal |
| Bottle Output protection | 1.0AT 20 x 5 mm glass fuse |
| Bottle end of line | 10K |
| | |
| Zone Voltage | 20 Vdc nominal |
| Quiescent Zone current | 8 mA per circuit |
| Zone end of line | 2K7 |
| Max Zone circuit resistance | 100 R |
| | |
| Max resistance other circuits | 100 R |
| Quiescent battery current (tone muted) | 72 mA nominal |
| Quiescent bat current (tone not muted) | 85 mA nominal |
| Max total load current (Snd 1 & 2 , Bottle) | 1.6 A (although each may be to fuse rating) |
| Circuits monitored for O/C and S/C | Bottle output, 1 st and 2 nd stage snd outputs, Zones 1 and 2. |
| Circuits monitored for O/C only | Hold/Abort Auto/Manual, Gas fired, Manual release. (S/C gives active condition although a resistance of up to 500 R will still give an active condition) |

FUSE RATINGS

| | |
|---------------------------|------------|
| Mains Fuse | 3.15 A HBC |
| Charger Fuse | 1.6A T |
| Battery Fuse | 3.15A T |
| First Stage Sounder Fuse | 400 mA F |
| Second Stage Sounder Fuse | 400 mA F |
| Bottle Fuse | 1A T |
| Aux 28V Fuse | 1A T |

ANALOGUE VALUES (RETURN CODES)

When the Premier EX Plus is connected to an addressable loop, it will reply with an analogue value depending on its condition. The following table shows what each analogue value means:-

| ANALOGUE VALUE | PANEL CONDITION | INDICATION ON CENTRAL PANEL |
|----------------|--|-----------------------------|
| 0 | BATTERY FAULT CHARGER FAULT | FAULT |
| 1 | ZONE 1 OPEN CIRCUIT FAULT ZONE 1 SHORT CIRCUIT FAULT | FAULT |
| 2 | ZONE 2 OPEN CIRCUIT FAULT ZONE 2 SHORT CIRCUIT FAULT | FAULT |
| 3 | BOTTLE OUTPUT OPEN CIRCUIT FAULT BOTTLE OUTPUT SHORT CIRCUIT FLT | FAULT |
| 4 | 1ST STAGE SND OPEN CIRCUIT FAULT 1ST STAGE SND SHORT CIRCUIT FAULT 2ND STAGE SND OPEN CIRCUIT FAULT 2ND STAGE SND SHORT CIRCUIT FAULT | FAULT |
| 5 | AUTO/MAUAL LINE O/C FAULT HOLD/ABORT LINE O/C FAULT MAUAL RELEASE LINE O/C FAULT GAS FIRED LINE O/C FAULT GAS FIRED LINE S/C FAULT | FAULT |
| 16 | NORMAL CONDITION – AUTOMATIC | NORMAL |
| 17 | NORMAL CONDITION – MANUAL | NORMAL |
| 47 | 1 ST STAGE ALARM – MANUAL START | PRE-ALARM |
| 48 | ZONE 1 – 1 ST STAGE ALARM | PRE-ALARM |
| 49 | ZONE 2 – 1 ST STAGE ALARM | PRE-ALARM |
| 64 | SECOND STAGE ALARM | ALARM. |

STAND BY BATTERY CALCULATION

In order to calculate the standby battery size required, the following formula can be used:-

$$\text{Battery Size (Standby time in Amp Hours)} = 1.25 \times [(T_{\text{ALM}} \times I_{\text{ALM}}) + (T_{\text{SBY}} \times (I_{\text{QP}} + I_{\text{QZ}}))]$$

Where:

T_{ALM} = Maximum time in hours required for the alarm [$\frac{1}{2}$ hour is most common time]

I_{ALM} = Total Alarm Current in amps for all alarm devices connected to the alarm circuits

T_{SBY} = Standby time in hours for the system after mains failure [normally 24, 48 or 72 hr]

I_{QP} = Quiescent current in amps of control panel in fault condition [because of mains failure]

I_{QZ} = Quiescent current in amps of all detection zones. Eg Ion detector 0.00005 Amp (50 μA) , Optical Detector = 0.0001 Amp (100 μA)

T_{BOT} = Time in hours the bottle output is active [Output switches off after 3 minutes]

I_{BOT} = Current in amps taken by the bottle output (solenoid etc)

Typical Example:

A system comprises of 2 ionisation detectors on zone 1, 2 optical detectors on zone 2, 1 sounder on 1st stage snd, and 1 sounder (different tone) on 2nd stage sounder. The solenoid will use 1 amp when active. The required standby is 24 hours. It will need to operate in alarm for $\frac{1}{2}$ hour before operating the bottle.

Calculate the battery size required.

$$T_{\text{ALM}} = 0.5 \text{ Hr}$$

$$I_{\text{ALM}} = 0.025 + 0.085 = 0.11\text{A} \quad [\text{For 1 sounder @ 25 mA. Most alarm Devices show their operating current}]$$

$$T_{\text{BOT}} = 0.05\text{Hr} \quad [\text{the bottle output switches off after 3 minutes}]$$

$$I_{\text{BOT}} = 1 \text{ A}$$

$$T_{\text{SBY}} = 24 \text{ Hr}$$

$$I_{\text{QP}} = 0.085\text{A} \quad [\text{Current drawn during mains fail, with internal buzzer active}]$$

$$I_{\text{QZ}} = 2 \times 50 \mu\text{A} + 2 \times 100 \mu\text{A} = 0.0003\text{A} \quad [\text{The quiescent current for an ionisation detector is 50 } \mu\text{A} \text{ \& } 100 \mu\text{A} \text{ for an optical}]$$

Therefore using the equation:

$$\text{Battery Size (Standby time in AHr)} = 1.25 \times [(T_{\text{BOT}} \times I_{\text{BOT}}) + (T_{\text{ALM}} \times I_{\text{ALM}}) + (T_{\text{SBY}} \times (I_{\text{QP}} + I_{\text{QZ}}))]$$

$$\text{Battery Size (Standby time in AHr)} = 1.25 \times [(0.05 \times 1) + (0.5 \times 0.11) + (24 \times (0.085 + 0.0003))]$$

$$\text{Battery Size (Standby time in Amp Hours)} = 1.25 \times [0.05 + 0.055 + (24 \times 0.0853)]$$

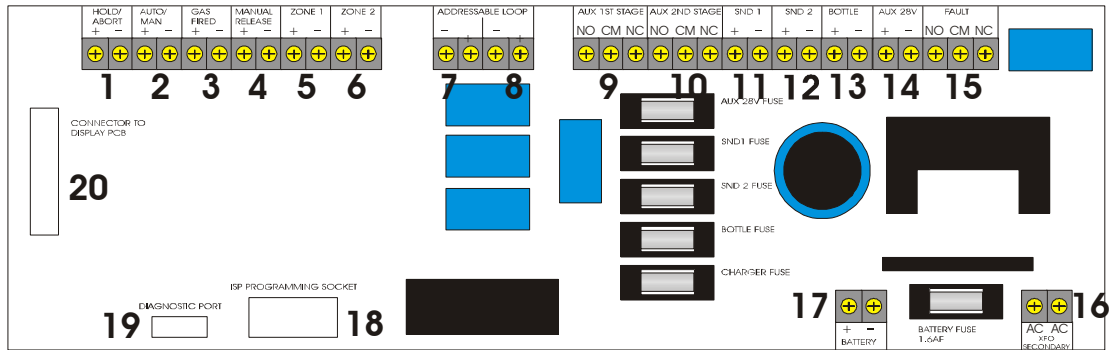
$$\text{Battery Size (Standby time in Amp Hours)} = 1.25 \times [0.105 + 2.047]$$

$$\text{Battery Size (Standby time in Amp Hours)} = 1.25 \times 2.152$$

$$\text{Battery Size (Standby time in Amp Hours)} = 2.69 \text{ Amp Hours}$$

This system would require a minimum of 2.69Ah batteries, so we would recommend using 3Ah batteries OR 7Ah batteries.

CONNECTIONS



| Conn | Label | Function |
|------|--------------------|---|
| 1 | HOLD/ABORT | TO CONNECT AN ABORT SWITCH TO STOP THE BOTTLE OUTPUT |
| 2 | AUTO / MAN | TO CONNECT A REMOTE SWITCH TO TOGGLE BETWEEN AUTO & MANUAL MODES |
| 3 | GAS FIRED | TO CONNECT THE BOTTLE OUTPUT SWITCH TO CONFIRM THAT THE GAS HAS BEEN FIRED |
| 4 | MANUAL RELEASE | TO CONNECT A MANUAL RELEASE CALL POINT. WHEN THIS IS ACTIVATED IT STARTS THE SECOND STAGE SOUNDERS & STARTS THE BOTTLE TIMER. |
| 5 | ZONE 1 | DETECTION ZONE 1 |
| 6 | ZONE 2 | DETECTION ZONE 2 |
| 7 | ADDR LOOP IN | TO CONNECT TO AN ADDRESSABLE PANEL FOR CENTRAL MONITORING. |
| 8 | ADDR LOOP OUT | TO CONNECT TO AN ADDRESSABLE PANEL FOR CENTRAL MONITORING. |
| 9 | FIRST STAGE RELAY | VOLT FREE CONTACT. ACTIVATES ON FIRST STAGE ALARM |
| 10 | SECOND STAGE RELAY | VOLT FREE CONTACT. ACTIVATES ON SECOND STAGE ALARM |
| 11 | SND 1 | FIRST STAGE ALARM OUTPUT |
| 12 | SND 2 | SECOND STAGE ALARM OUTPUT |
| 13 | BOTTLE | BOTTLE OUTPUT TO SOLENOID VALVE |
| 14 | AUX 28V | AUXILIARY 28 V |
| 15 | FAULT RELAY | NORMALLY ENERGISED FAULT RELAY -VOLT FREE |
| 16 | XFO SECONDARY | 30V AC FROM TRANSFORMER SECONDARY |
| 17 | BATTERY | TO CONNECT 2 X 12V SLA BATTERIES |
| 18 | ISP PORT | TO PROGRAM THE MICROPROCESSOR |
| 19 | DIAGNOSTIC PORT | FOR USE DURING PCB TESTING |
| 20 | DISPLAY CONNECTOR | 14 WAY RIBBON CONNECTOR TO DISPLAY PCB |