

OPERATION MANUAL

PATENT *System 88i*

FIRE ALARM PANEL



COMPLIES WITH

Singapore Standard: **SS SS645: 2019**

British Standard : **BS EN54-2: 1998/A1:2006**

: **BS EN54-4: 1998/A2:2006**

Rev 1.0

September 2025

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1 Introduction

This manual provides essential guidance for operators on the proper use and basic operation of the Fire Alarm Panel (FAP). It is not intended to replace professional servicing or to provide detailed installation instructions, but to support day-to-day operation and to ensure continued reliability and performance of the system. It is strongly recommended that a maintenance agreement should be established with a competent and qualified fire alarm service contractor who is trained to work on this equipment. In compliance with SS 645 requirements, all maintenance and servicing should be carried out at prescribed intervals, and accurate records should be maintained.

Arrangements should also be made for qualified service personnel to always be available on call to attend to emergencies, ensuring uninterrupted system performance and Authorities compliance.

For detailed procedures on inspections, testing, and preventive care, please refer to the Routine Maintenance section of this manual.

2 System Overview

2.1 Description of Fire Alarm Panel

The PATENT System 88i Conventional Fire Alarm Panel is a robust and highly reliable solution designed for fire detection and alarm signalling in diverse environments, including residential, commercial, and industrial applications. The system may comprise a single control panel or multiple networked panels to perform the core functions of signal processing, event indications and initiation of auxiliary control outputs. In accordance with fire safety practice, the fire panel is typically installed within the Fire Command Centre (FCC) or at a prominent, readily accessible location clearly visible from the main entrance of the premises.

The system consists of input devices, output devices, and main and/or sub fire panels.

Input Devices

Input devices are responsible for detecting fire-related conditions or initiating alarms. These may include:

- Manual Call Points (MCPs): For manual activation of the alarm system.
- Automatic Detectors: Such as flow switches, heat detectors, smoke detectors, beam detectors, and flame detectors.

Activation of any input device changes the system status, which is then processed and displayed at the FAP.

Output Devices

Output devices are designed to provide audible and visual alarms to building occupants. Common devices include:

- Alarm Bells
- Strobe Lights
- Sounders or Sirens

These outputs usually operate as a common activation, However, under situations where special system design consideration is required, activations may be customised to reflect the cause-and-effect configuration of the system.

Together, these input devices, FAPs and output devices form the backbone of the fire alarm system.

The PATENT System 88i operates on a conventional “zone” basis. Each zone represents a group of input devices protecting a specific area of the premises. When a fire or fault condition occurs, the corresponding zone indicator on the panel identifies the affected location. To support quick response, a zoning diagram (zone plan) is provided, showing the location and demarcation of the areas / zones being protected.

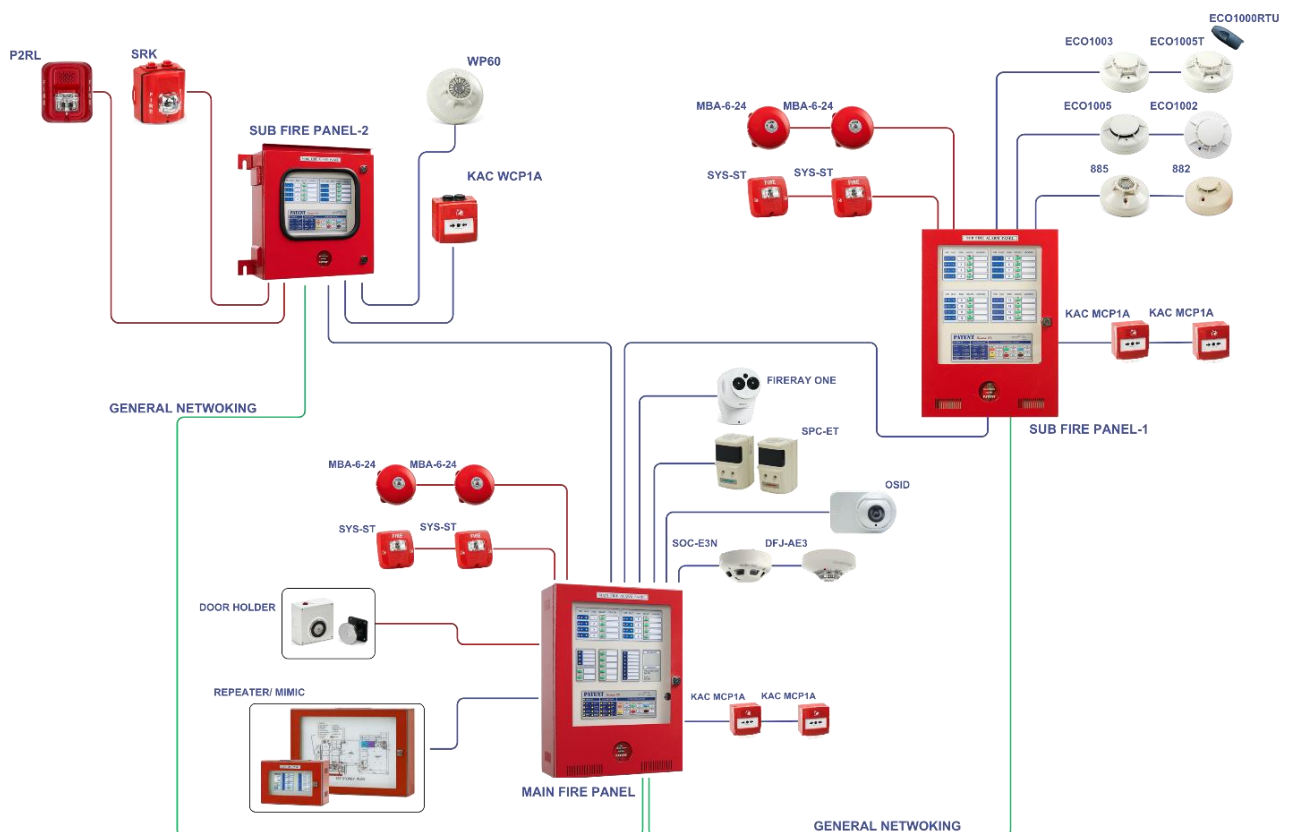


Figure 1 System 88i architecture

System Integrity and Power Supply

The System 88i Fire Panel is equipped with continuous monitoring features to supervise:

- Detection Circuits (cabling continuity)
- Alarm Circuits (cabling continuity of output devices)

This ensures system integrity and early detection of faults such as open or short circuits.

To safeguard reliability during power outages, the system incorporates an automatic battery backup capable of maintaining full operation for a minimum of 24 hours standby, followed by 30 minutes in full alarm condition, in compliance with SS 645:2019 requirements.

2.2 Features

The PATENT System 88i conventional fire alarm panels provide cost effective and dependable means of fire detection, alarm, monitoring and ancillary controls. The system is simple to operate and without proprietary system protocol. Retrofit works can be carried by any trained fire contractor. The System 88i is designed by PATENT in-house engineers, coupled with local production, panels & modules can be custom-built to suit specific design configurations and replacement needs.

Technical Features

- 4 to 128 Zones in Multiples of 4 zones
- Listed under Product Listing Scheme, certified by TÜV SÜD PSB
- Complies to SS 645 and EN54 Parts 2 & 4
- Clean short in detection zone signifies fault condition
- Diagnostic charger monitoring facilities with distinctive indications
- Fail-safe changeover fault contacts under total power loss condition
- 2 minutes time-out on first alarm
- Separate supervised sounders and visual alarm devices (VAD) alarm outputs
- Distinct indicators to denote deactivation of sounders and VADs
- Alarm / fault resound functions
- Supervised interface to fire alarm routing equipment (DECAM)
- Supervised cabling integrity between fire alarm and EVC systems
- Provision to interface fire alarm audio / visual outputs with EVC evacuation scenarios

Optional Add-Ons Features

- Alphanumeric display with events logging
- Alarm Verification Feature (AVF) to reduce incidence of false alarms
- Extendable 8-Way Status Monitoring Module for monitoring status of pump, tank water levels, fans and valves
- Extendable 5-Way Auxiliary Control Relay Module
- Extendable 4-Way Status Monitoring with 2-Way Control Relay Module
- Vandal deterrent battery bracket

2.3 Specifications

Mains Input Voltage	110V ac – 253V ac		
Charger capacity	2A dc – 22A dc (based on charger/battery capacity calculation)		
Nominal Voltage	27.5V dc		
Battery Type	2 x 12V Sealed Lead Acid in Serie (based on charger/battery capacity calculation)		
Zone detection	6k8Ω (Normal) 470Ω (Fire)		
Fault Monitoring	Detection Line, Power Supply, Alarm Output, Earth leakage		
Fire & Fault Relay Output	No/NC (30V dc / 1A Contact Rating)		
2 Sounders & 1 VAD	24V dc (1A Each)		
2 Auxiliary Output	24V dc (or) Voltage Free Contact		
Enclosure	Galvanised Mild Steel powder coated with red and acrylic viewable screen		
Access key	6229688 or 200 Series		
Humidity (non-condensing)	Up to 95% RH		
Operating Temperature	-5°C to +40°C		
Standards complied with	EN54-2: 1998/A1:2006 EN54-4: 1998/A1:2006 SS 645: 2019		
IP rating	IP 30 Upon request, higher IP rating enclosure can be made		
Dimension			
Standard Panel	Charger	Battery Space	Dimensions (mm)
PS88i 4/8 Zone	2A	7AH	420H x 350W x 145D
PS88i 12/16 Zone	2A	7/12AH	500H x 350W x 145D
PS88i 20/24 Zone	4A	7/12AH	570H x 350W x 145D
PS88i 28/32 Zone	4A	12AH	670H x 350W x 145D
Note: Enclosures can be custom-built to various dimensions to suit the requirement.			

2.4 Main Base Control Board

Main Base Control P88i-BCBC-3 board PCB layout and terminations are shown in Figure below.

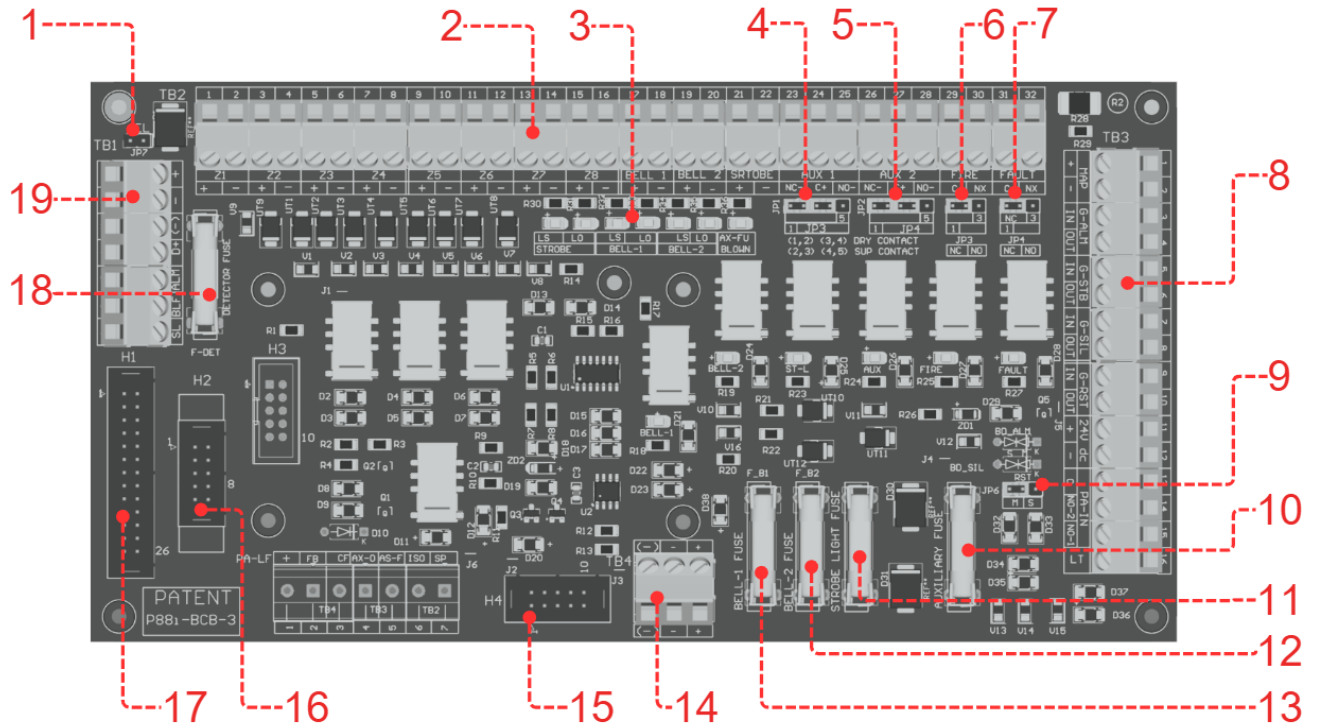


Figure 2 Main Base Control Board

1. JP1, Earth link Jumper
2. TB2, Zone terminations, Audio/Visual alarm output terminations, Auxiliary control output terminations, fire output terminations & fault output terminations
3. LED indicators for Audio/Visual circuit fault status

ID	Label	Type	Description	LED Colour
STROBE	LS	Indicator	Visual Line (Strobe) Short Circuit Fault	Red
	LO	Indicator	Visual Line (Strobe) Open Circuit Fault/ Missing EOL/ Fuse Blown	Amber
BELL-1	LS	Indicator	Audio Line (Bell-1) Short Circuit Fault	Red
	LO	Indicator	Audio Line (Bell-1) Open Circuit Fault/ Missing EOL/ Fuse Blown	Amber
BELL-2	LS	Indicator	Audio Line (Bell-2) Short Circuit Fault	Red
	LO	Indicator	Audio Line (Bell-2) Open Circuit Fault/ Missing EOL/ Fuse Blown	Amber
AX-FU BLOWN		Indicator	Auxiliary Supply Output Fuse Blown	Amber

4. Jumper setting for Auxiliary control output 1 (Dry Contact or Supply Contact)
5. Jumper setting for Auxiliary control output 2 (Dry Contact or Supply Contact)
6. Jumper setting for fire output (Normally Closed or Normally Open)
7. jumper setting for fault output (Normally Closed or Normally Open)
8. TB3, MAP output terminations, General Networking terminations

9. Jumper setting (reset) for main or sub fire panel
10. Auxiliary supply fuse (2A, fast blow glass fuse, 5x20mm)
11. Visual alarm (Strobe) circuit fuse (2A, fast blow glass fuse, 5x20mm)
12. Audio alarm (Alarm bell) circuit-1 fuse (2A, fast blow glass fuse, 5x20mm)
13. Audio alarm (Alarm bell) circuit-2 fuse (2A, fast blow glass fuse, 5x20mm)
14. TB4, 24VDC connection to Charger Control Board
15. H4, 10 Way ribbon connection to Charger Control Board
16. H2, 10 Way ribbon connection to Zone Control Board
17. H1, 26 Way ribbon connection to Front System Control Board
18. Detector (Zone circuits) fuse (2A, fast blow glass fuse, 5x20mm)
19. TB1, Optional extension boards termination

2.5 Charger Control Board

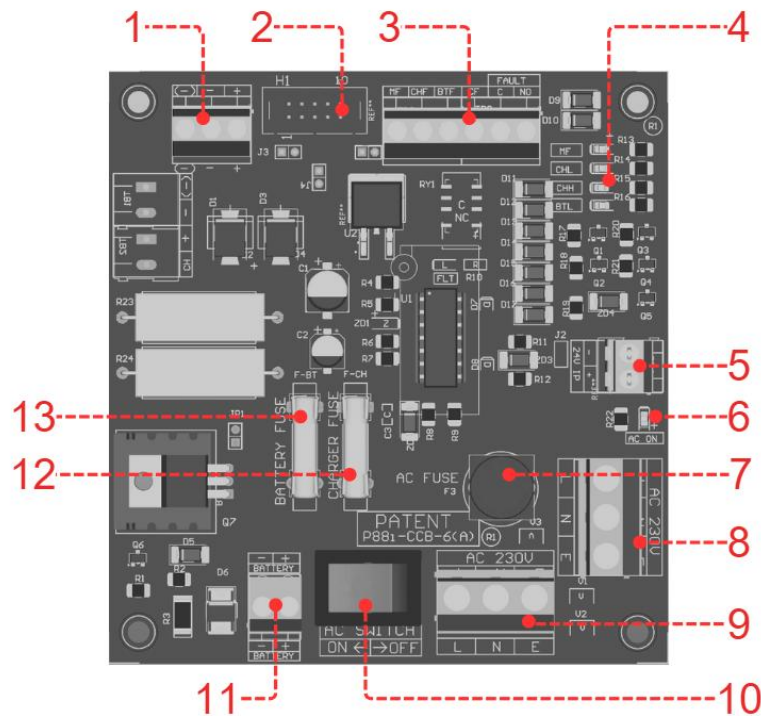


Figure 3 Charger Control Board

1. 24Vdc connection to Main Base Control Board
2. H1, 10 Ways ribbon connection to Main Base Control Board
3. Optional fault output terminations
4. LED indicators for Power Supply Status

ID/Label	Type	Description	LED Colour
MF	Indicator	Mains failure	Amber
CHL	Indicator	Charger Low (Charging Voltage $\leq 20\text{Vdc}$)	Amber
CHH	Indicator	Charger High (Charging Voltage $\geq 30\text{Vdc}$)	Red
BTL	Indicator	Battery Low (Battery Voltage $\leq 20\text{Vdc}$)	Amber

5. 24Vdc connection from Switch Mode Power Supply
6. Power On LED indicator
7. AC fuse (2A~5A, fast blow Glass fuse, 5x20mm)
8. 230Vac connection to Switch Mode Power Supply
9. Mains 230Vac termination
10. AC Power ON/OFF Switch
11. Battery termination
12. Charger fuse (2A~6A, fast blow Glass fuse, 5x20mm)
13. Battery fuse (2A~6A, fast blow Glass fuse, 5x20mm)

2.6 Front System Control Board

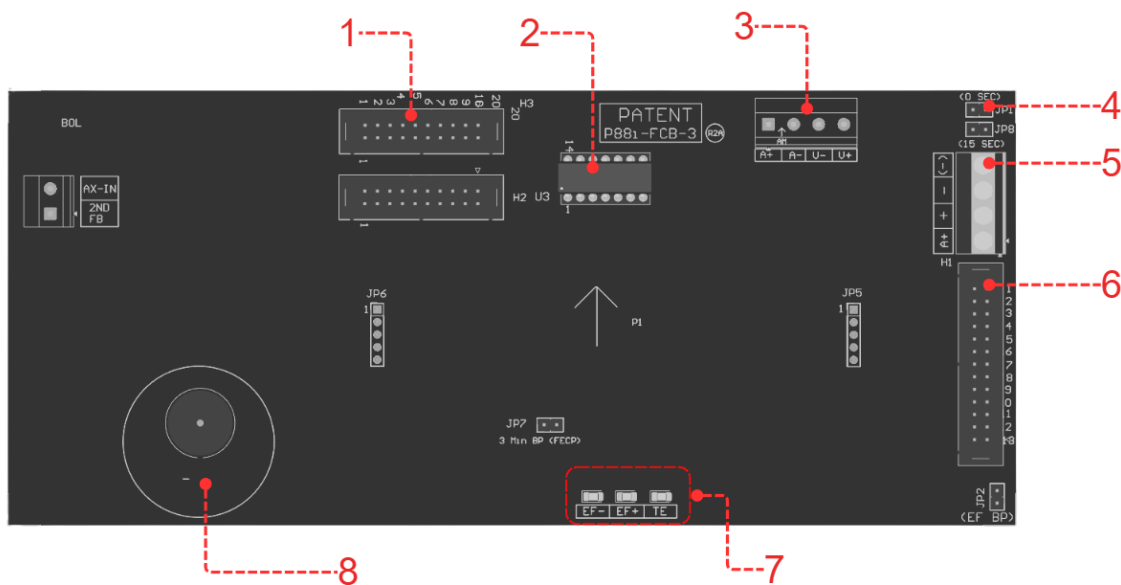


Figure 4 Front System Control Board

1. 20 Ways Ribbon connection to Zone Control Board
2. Main microcontroller for Front System Control
3. Optional Voltage Meter & Ampere Meter termination
4. Bypass jumper for immediate Silence Control
5. 24Vdc connection to Charger Control Board
6. 26 Ways ribbon connection to Main Base Control Board
7. Indicators for Positive Earth Fault, Negative Earth Fault & Time end indicator for Silence Control

ID/Label	Type	Description	LED Colour
EF-	Indicator	Negative Earth leakage fault	Amber
EF+	Indicator	Positive Earth leakage fault	Red
TE	Indicator	Time End (3mins Timer Ended for Silence Control)	Red

8. Panel internal buzzer

2.7 Zone Control Board

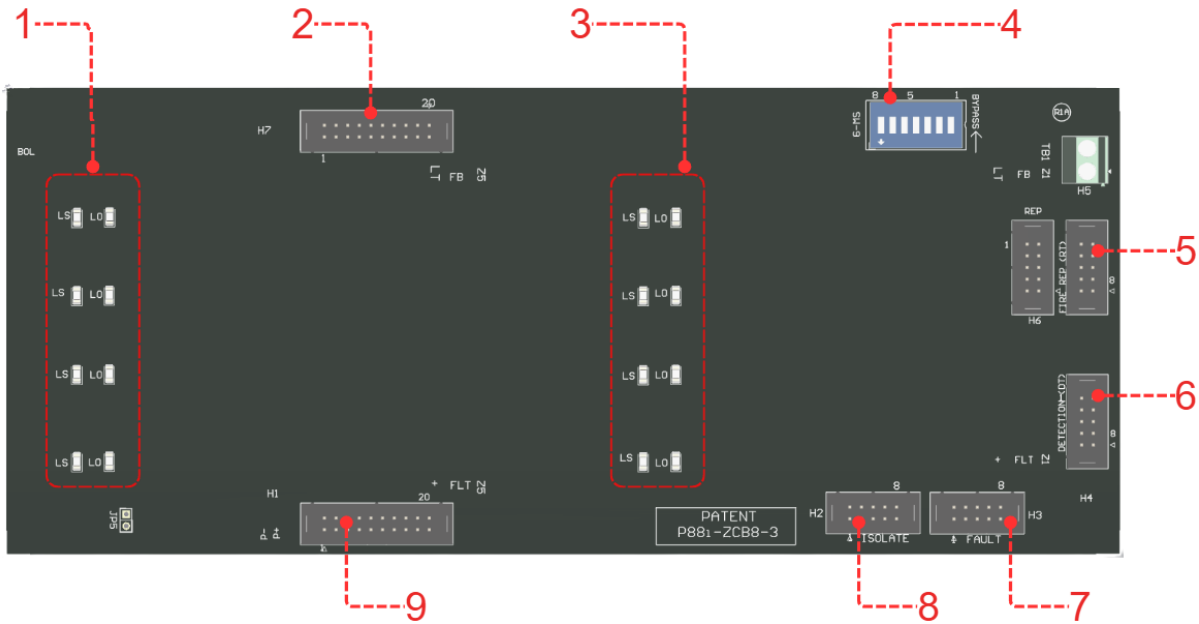


Figure 5 Zone Control Board

1. Indicators for Zone 5-8 Circuit Open Circuit Fault & Short Circuit Fault
2. Optional 20 Ways ribbon connection for extension
3. Indicators for Zone 1-4 Circuit Open Circuit Fault & Short Circuit Fault

ID	Label	Type	Description	LED Colour
Zone 1 – 8	LS	Indicator	Respective Zone Short Circuit Fault	Red
	LO	Indicator	Respective Zone Open Circuit Fault/ Missing EOL/ Detector fuse blown	Amber

4. Optional 8 Ways DIP switch to bypass individual zone's Alarm Verification Feature
5. Optional 10 Ways ribbon connection for zone fire repeater
6. 10 Ways ribbon connection to Main Base Control Board or extension Detector Termination Board
7. Optional 10 Ways ribbon connection for zone fault repeater
8. Optional 10 Ways ribbon connection for zone isolate repeater
9. 20 Ways ribbon connection to Front System Control Board

3 Installation Instructions

3.1 Connecting the AC Power Supply

The PATENT System 88i fire panel requires AC 230 Volts to be connected to 230Vac input terminals at Charger Control Board as per Figure 6 AC230V termination.

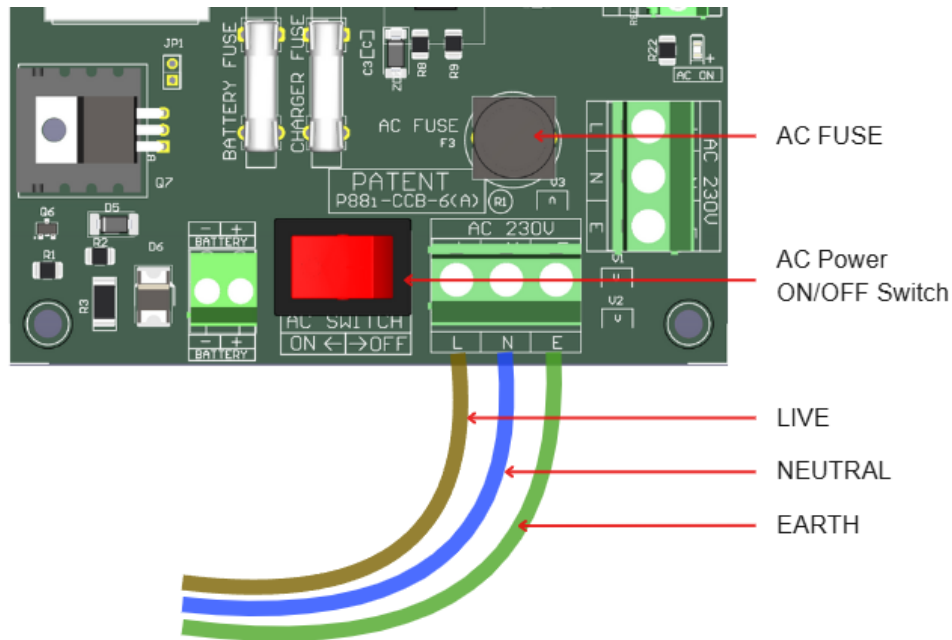


Figure 6 AC230V termination

⚠ WARNING:

Ensure the external, main power breaker OFF, AC power switch at Charger Control Module OFF and Batteries are disconnected until installation is completed.

3.2 Connecting Batteries

The PATENT System 88i fire panel is engineered to operate reliably on standby battery power in the event of a disruption to the AC mains supply, in compliance with Singapore Standard SS 645:2019 standards for fire alarm systems. The fire panel is equipped with two 12V sealed lead acid (SLA) batteries connected in series, achieving a nominal standby voltage of 24V DC. Battery charger settings and size of batteries in amp hours (AH) may vary based on actual system configuration.

⚠ WARNING:

There is a risk of explosion if an incorrect type of battery is used. Ensure batteries are connected in correct polarity.

When connecting the battery cables, a brief electrical spark may occur if the system is powered on without an active AC mains supply (230V). To minimise the risk of electrical arcing and ensure safe installation, it is strongly recommended that the AC mains power is switched on before connecting the

batteries. If AC mains power is unavailable, temporarily remove the battery fuse from the Charger Control Module before connecting the batteries. Reinstall the fuse once the connection is complete.

For details of batteries termination refer to Figure 7 Batteries termination.

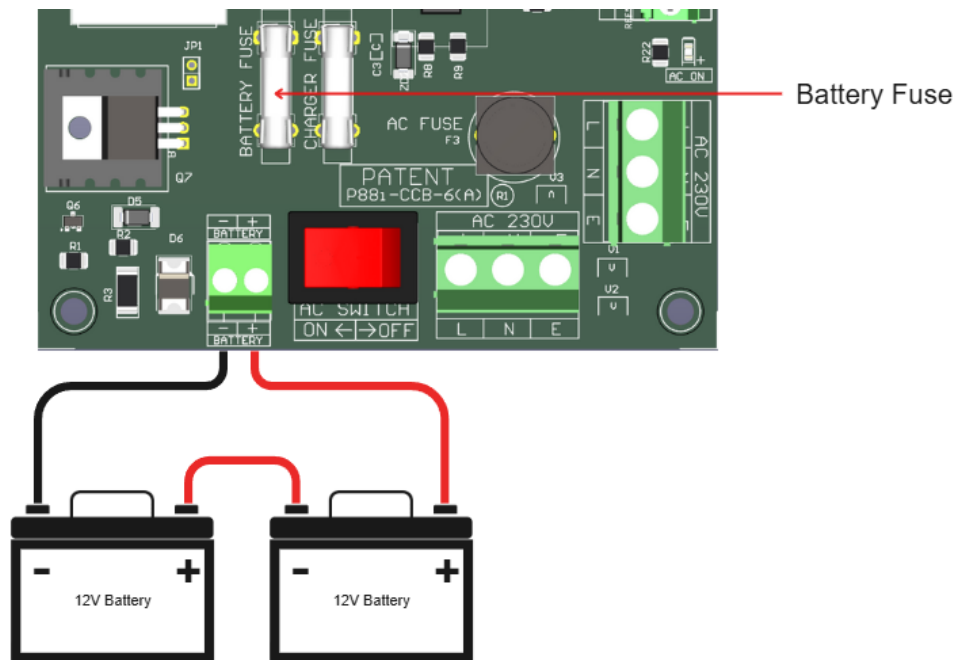


Figure 7 Batteries termination

3.3 Connecting Zone Devices

Connect the positive and negative cables from field devices such as Manual Call Points/ Detectors to the zone terminal. Wire the detectors to each other as per Figure 8 Zone terminations.

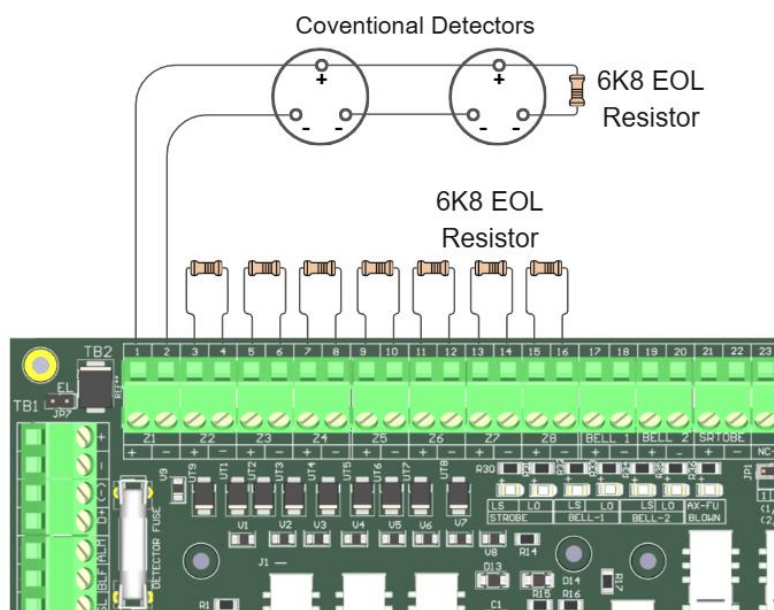


Figure 8 Zone terminations

Ensure the 6k8Ω (6.8kΩ) End of Line (EOL) resistor is connected across the terminals of last device in the circuit. Leave the 6k8Ω (6.8kΩ) End of Line (EOL) resistors in place for unused zones.

Note: for Zone Devices such as Manual Call Points/ Detectors installation instructions refer to documentation supplied with these devices.

3.4 Connecting Audio/Visual Alarm Devices

Connect Audio/ Visual Alarm Devices such as bells and strobes to respective outputs at Main Base Control Module or Extension Modules. Refer to Figure 9 Audio/ Visual alarm output terminations

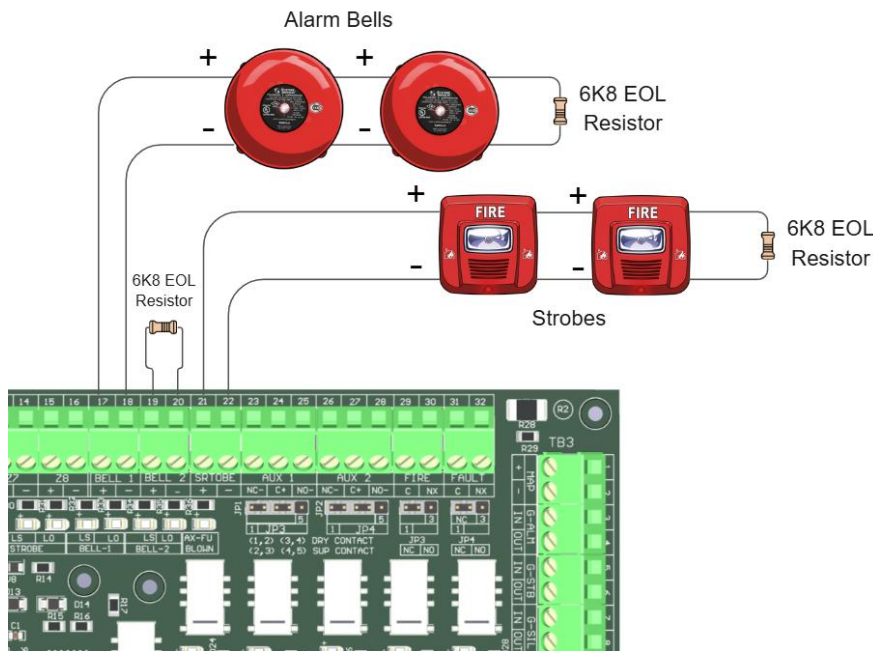


Figure 9 Audio/ Visual alarm output terminations

Note: According to Singapore Standard SS645:2019, Audio and Visual Alarm shall be separately controlled if the system is integrated with Emergency Voice Communication System.

If there are multiple devices, connect the positive and negative cables running from previous device to the next.

Fit a 6k8Ω (6.8kΩ) End of Line (EOL) resistor across the last device of the circuit. Leave the 6k8Ω (6.8kΩ) End of Line (EOL) resistor in place if the alarm circuits are unused.

Note: The maximum current rating for each circuit is 2.0A.

3.5 Connecting Auxiliary Controls

The auxiliary control outputs of the System 88i Fire Alarm Panel are designed to activate ancillary devices whenever a fire alarm condition is triggered. Each output can be configured as either a voltage-free contact or a 24 Vdc powered contact, selectable through dedicated jumper pin settings. Refer to Figure 11 Auxiliary output jumper settings.

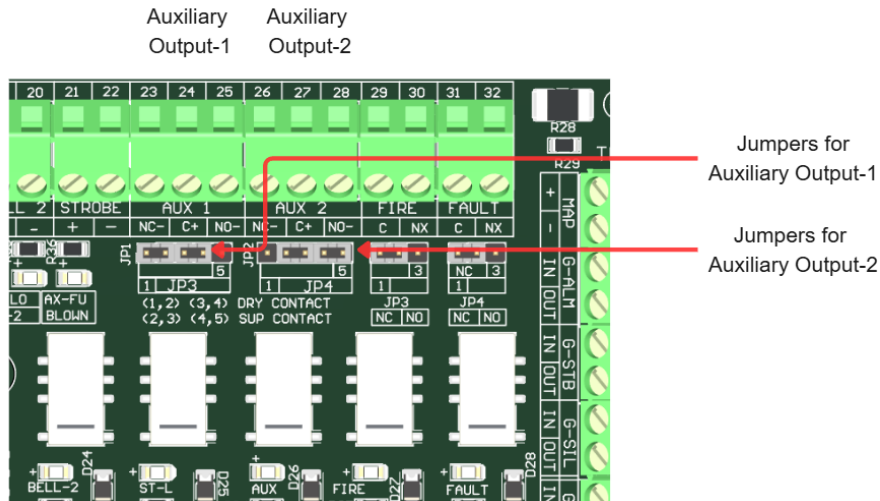


Figure 10 Auxiliary output terminations

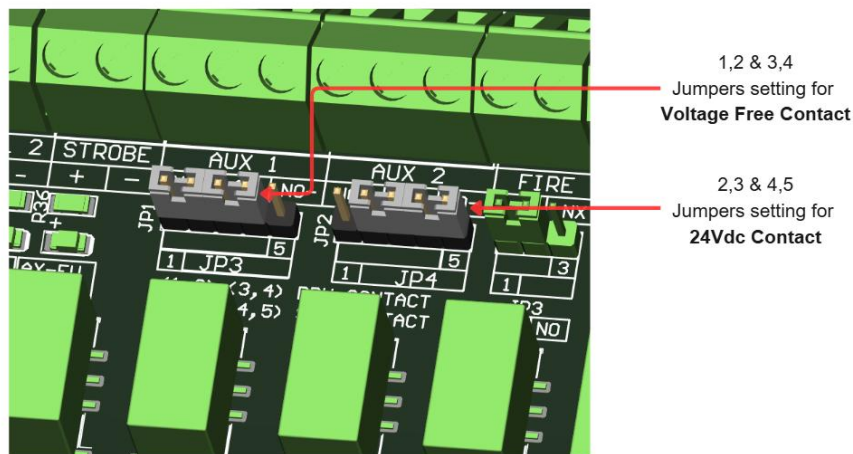


Figure 11 Auxiliary output jumper settings

Typical applications include:

- Lift homing (returning lifts to designated recall floors)
- Air Handling Unit (AHU) shutdown to prevent smoke spread
- Magnetic door release
- Fire shutter operation
- Signal interface to third-party systems such as sprinkler or smoke control systems

Note: If 24Vdc powered contact is used, the maximum current rating for the auxiliary control is 2.0A.

3.6 Connecting Networked System

When a system comprises multiple fire panels, they can be networked together through interconnection. In this configuration, the panels are assigned as a Main Fire Panel (MAP) and Sub Fire Panels (SAP), operating collectively as one system. If a zone in a Sub Fire Panel goes into fire condition, the corresponding SAP zone will also be activated on the Main Fire Panel, and all of network connected panels will activate the alarm devices. Alarm acknowledgment can only be performed either at the

Main Fire Panel or at the Sub Fire Panel where the fire originated. The Sub Fire Panel must be reset first before the Main Fire Panel can be reset.

In networking system, Sub Fire Panels are individually linked to Main Fire Panel's zones. The Main Fire Panel displays the general fire and fault status of each Sub Fire Panel in its assigned zones. The termination of MAP output at Sub Fire Panel can be referred to below Figure 12 MAP output termination of Sub Fire Alarm Panel

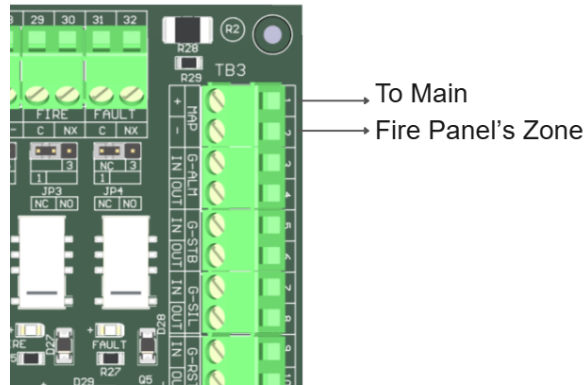


Figure 12 MAP output termination of Sub Fire Alarm Panel

To have full networking capabilities such as General Alarm¹, General Strobe², General Silence³ and General Reset⁴, additional networking connections are required between all the fire panels in the system.

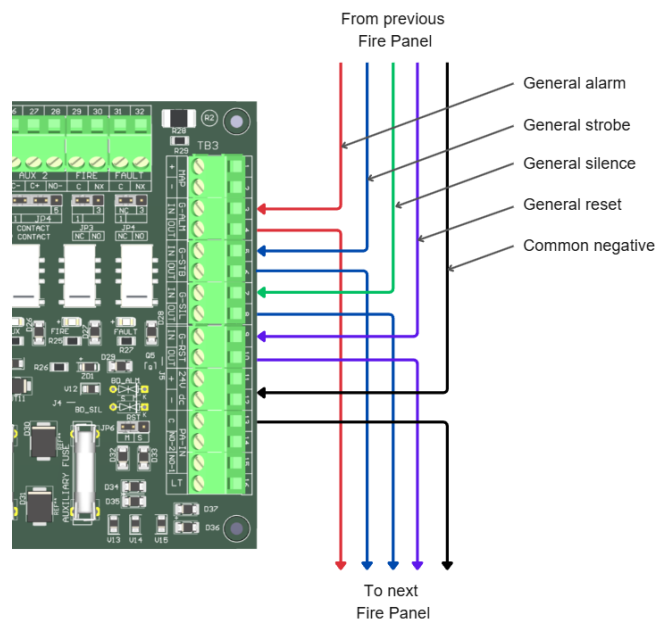


Figure 13 General networking terminations

¹ General Alarm- Activates all audio alarm outputs simultaneously across all fire panels in the system.
² General Strobe- Activates all visual alarm outputs simultaneously across all fire panels in the system.
³ General Silence- Using the Silence Control at the Main Fire Panel or any activated Sub Fire Panel deactivates all alarm outputs across the system.
⁴ General Reset- Using the Reset Control at the Main Fire Panel resets the entire system.

Reset Jumper Configuration

The reset jumper must be set according to the panel's configuration:

For details termination refer to Figure 13 General networking terminations & Figure 14 General reset jumper setting (Main)

Main Position – The panel operates as the Main Fire Panel, providing general reset control over all interconnected panels.

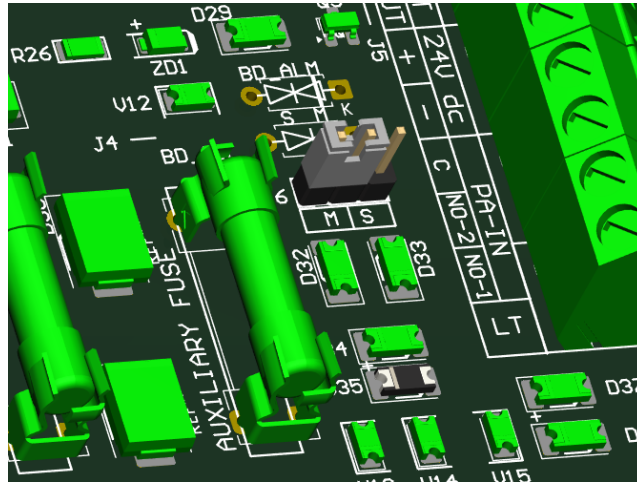


Figure 14 General reset jumper setting (Main)

Sub Position – The panel operates as a Sub Fire Panel, allowing local reset control only.

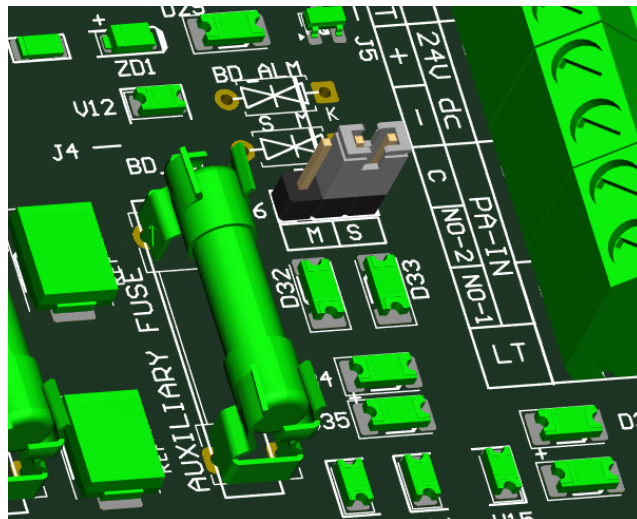


Figure 15 General reset jumper setting (Sub)

4 Operation Instructions

4.1 User Interface

4.1.1 General

The PATENT System 88i fire panel provides a clear and intuitive interface for monitoring and controlling the fire alarm system. System status is conveyed through dedicated LED indicators, while user control is managed via push-button switches.

To ensure ease of operation, the LED indicators and control switches are logically grouped by function. This arrangement enables operators to quickly identify system conditions and perform appropriate actions with minimal delay.

The zone control board, which accommodates up to the first four detection zones, is positioned prominently in the upper section of the panel (see **Figure 16 Standard 4 Zone System 88i, door closed**). Additional zone control boards can be incorporated as required, providing scalability to support larger installations. The Front Control Board is strategically positioned at the lower section of the panel to facilitate ease of access and operation. This will ensure that authorised personnel can comfortably perform system management tasks during both routine checks and emergency situations.

Each push-button switch corresponds to a specific control function, ensuring that once engaged, the operator has clear tactile confirmation of the selected state. This enhances operational confidence and supports consistent response during emergency conditions.



Figure 16 Standard 4 Zone System 88i, door closed



Figure 17 Standard 4 Zone System 88i, door open

4.1.2 Zone Control Board

The Zone Control Board are available in two configurations: 4-zone and 8-zone variants. This modular design enables the system to be expanded in increments of four zones. The Zone Control Board are constructed in four simple columns to show status/information such as zone-fire, zone-fault, zone-isolate and zone-location of each zone. Its control features and indicators are listed as shown on **Table 1 Zone Control Facilities**.

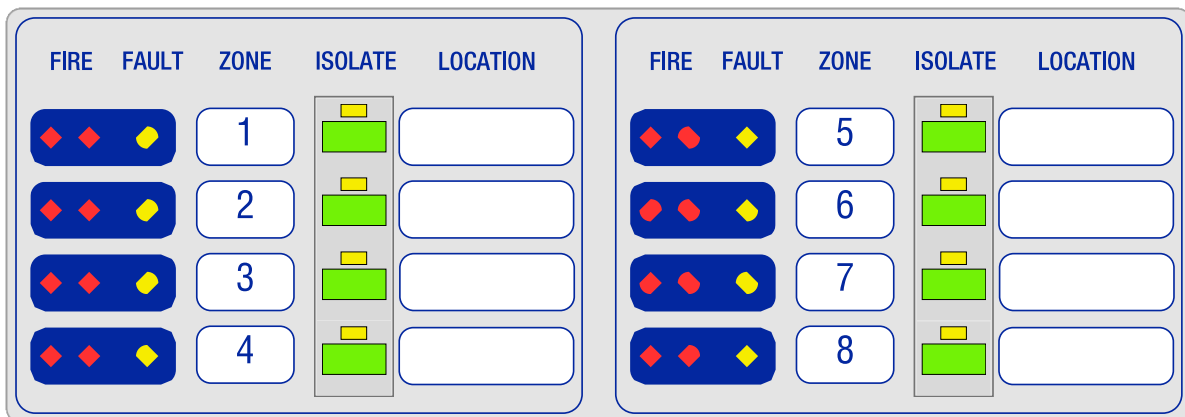


Figure 18 Zone Control Board (8 Zones)

Table 1 Zone Control Facilities

Feature	Label	Type	Description	LED Colour
Zone Control	Fire	Indicator	Zone in Fire condition	Red
	Fault	Indicator	Zone in fault condition	Amber
	Isolate (Green)	Indicator	Zone in isolated condition	Amber
		Control	To isolate zone fire & fault (integrated LED on switch will illuminate when isolated)	N/A
	Location	Texts	Zone location label texts	N/A

4.1.3 Front System Control Board

The Front System Control Board is equipped with all required indicators and controls in accordance with Singapore Standard SS 645. The control board is arranged in a structured layout to present system status information and controls. A detailed listing of the System Front Control Board facilities is provided in **Table 2 System Front Control Facilities**.

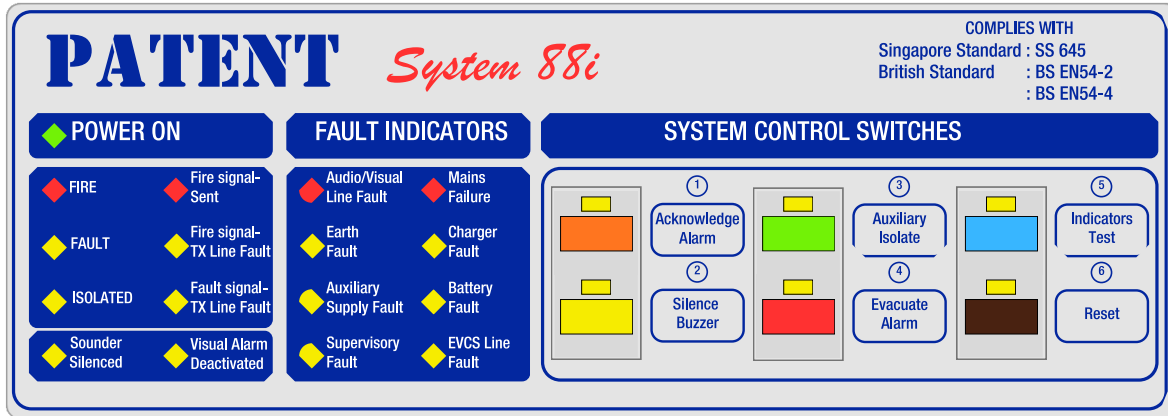


Figure 19 System Front Control Board

Table 2 System Front Control Facilities

Feature	Label	Type	Description	LED Colour
Front System Control	Power On	Indicator	System energised by Mains and/or Standby Battery	Green
	Fire	Indicator	General Fire Indicator, System in fire condition	Red
	Fault	Indicator	General Fault Indicator, System in fault condition	Amber
	Isolated	Indicator	General isolated Indicator, System in isolated condition	Amber
	Fire Signal Sent (Optional)	Indicator	Fire signal to Alarm Remote Monitoring Station (ARMS aka DECAM) is sent	Red
	Fire Signal TX Line Fault (Optional)	Indicator	Open/short circuit at fire signal transmit line to ARMS/DECAM	Amber
	Fault Signal TX Line Fault (Optional)	Indicator	Open/short circuit at fault signal transmit line to ARMS/DECAM	Amber
	Sounder Silenced	Indicator	Audio alarm devices are being silenced	Amber
	Visual Alarm Deactivated	Indicator	Visual alarm devices are deactivated	Amber
	Audio/Visual Line Fault	Indicator	Audio/ visual alarm supervised output fault	Amber
	Earth Fault	Indicator	Field input/output cables shorted to ground	Amber
	Auxiliary Supply Fault	Indicator	Built-in auxiliary 24Vdc supply fuse blow at Main Base Control Module	Amber
	Supervisory Fault	Indicator	Supervised CPU/components fault	Amber

	Mains Failure	Indicator	230V ac Mains input supply failure	Amber
	Charger Fault	Indicator	Charger fuse blown/ charger voltage high or low	Amber
	Batter Fault	Indicator	Back up batteries disconnected/ fuse blown/ batteries voltage high or low	Amber
	EVCS Line Fault	Indicator	Emergency Voice Communication System interface lines fault	Amber
	Acknowledge Alarm (Orange)	Indicator	The alarm condition has been acknowledged	Amber
		Control	To deactivate alarm (Both Audio & Visual)	N/A
	Buzzer Silence (Yellow)	Indicator	Buzzer has been silence	Amber
		Control	To silence buzzer (Any fire & fault events)	N/A
	Auxiliary Isolate (Green)	Indicator	Auxiliary isolate control is activated	Amber
		Control	To isolate built-in auxiliary output control function at Main Base Control Module	N/A
	Evacuate Alarm (Red)	Indicator	Evacuate alarm control is activated	Amber
		Control	To raise alarm manually for emergency evacuation (Both Audio & Visual)	N/A
	Indicators Test (Blue)	Indicator	Indicators test control is activated	Amber
		Control	To test working condition of all LED indicators and buzzer	N/A
	Reset (Brown)	Indicator	Reset control is activated	Amber
		Control	Reset all the fire and faults	N/A

4.2 Controls & Operation

4.2.1 Isolation

There are two different types of isolation provided in the system.

4.2.1.1 Zone Isolation

Each zone is equipped with a dedicated latching push-button switch (Green) for isolation control. This feature allows the operator to isolate both fire and fault detection on the respective zone circuit when required.

- To isolate the zone circuit, press **ISOLATE** button of respective zone once.
- The integrated LED indicator (Amber) turns ON to confirm that the isolation function for that zone has been activated.
- The general **ISOLATED** LED indicator (Amber) at System Front Control module turns ON.
- Internal buzzer will emit intermittent “Beep” at 15 seconds intervals to remind isolation state.
- To re-enable zone isolation, press ISOLATE button respective zone again.

Note: Zone isolation must be carried out before a fire condition is registered on the affected zone circuit. Attempting to isolate after a fire status has been detected will not override the active alarm display at Zone Control Module.

Note: Zone isolation is intended only for authorised testing or troubleshooting purposes. The fire alarm system must always stay in its normal, non-isolated state to fully protect the premises.

4.2.1.2 Auxiliary Output isolation

Every standard panel of System 88i is equipped with minimum of one auxiliary control output facility. Similar to zone controls, a latching push-button switch (Green) is provided for isolation of the output.

- To isolate the auxiliary control output, press the **AUXILIARY ISOLATE** button once.
- The integrated LED indicator (Amber) turns ON to confirm that the isolation function has been activated.
- The general **ISOLATED** LED indicator (Amber) at System Front Control module turns ON.
- Internal buzzer will emit intermittent “Beep” at 15 seconds intervals to remind isolation state.
- To re-enable auxiliary control output, press the **AUXILIARY ISOLATE** button again.

The Auxiliary Output Isolate control is particularly useful during routine fire alarm testing, as it allows the auxiliary outputs to be temporarily disabled. This prevents the activation of connected devices (such as fans, lifts, or door releases) when their operation is not required during the test procedure.

Note: Auxiliary output isolation should only be used during authorised testing procedures and must be restored immediately afterwards.

4.2.2 Silence buzzer

The silence buzzer control button (Yellow) is located at System Front Control module. This control is non-latching type, and the buzzer will be re-enabled automatically by a new fire or fault event. The internal buzzer in System 88i will sound for both fire alarm and fault condition.

- To silence buzzer, press **SILENCE BUZZER** button
- The integrated LED indicator (Amber) turns ON when the buzzer is silenced.
- Internal buzzer will emit intermittent “Beep” at 15 seconds intervals for reminding purpose of existing fire or fault state.
- If new fire or fault event occurs in the system, the integrated LED indicator of **SILENCE BUZZER** button turns OFF and the internal buzzer will resound again.

The internal buzzer and silence buzzer LED will resume back to normal automatically once fault has been rectified or fire alarm has been reset.

4.2.3 Silence alarm

In accordance with Singapore Standard SS 645, the alarm system can only be silenced after a minimum of three (3) minutes of continuous operation, unless it is connected to an approved Emergency Voice Communication (EVC) System. Any attempt to silence the alarm before this period will have no effect.

Once the initial 3-minute period has expired, the alarm can be silenced by performing the following procedure:

- Press the **ACKNOWLEDGE ALARM** button (Orange) for approximately 1 second.

- The integrated LED indicator (Amber) on the Acknowledge Alarm switch will illuminate.
- The **SOUNDER SILENCED** and **VISUAL ALARM DEACTIVATED** LEDs will illuminate.
- All external sounders will be silenced, and all visual alarm devices will deactivate.
- The control panel will remain in the fire state until it is manually reset.

4.2.4 Evacuation

The operator can raise an evacuate alarm in the event of emergency from the panel by carrying out the following. To activate the evacuation,

- Press **EVACUATE ALARM** control button (Red). This control is latching type and must be pressed again to restore the system to normal.
- The integrated LED indicator (Amber) will illuminate.
- All external sounders and visual alarm devices will activate.

4.2.5 Indicator test

The indicator test control button (Blue) is provided to test the working condition of LEDs (visible) and internal buzzer (audible) indicators of the panel. To initiate the test,

- Press the **INDICATORS TEST** control and hold it.
- All the indicators turn ON and the internal buzzer will sound.
- Release the control after the check.

4.2.6 Reset

Before performing a system reset, the cause of the alarm must be investigated, recorded, and fully rectified. In the case of a false alarm, operators must ensure that no fire incident is present before proceeding with the reset.

Note: The system cannot be reset until the alarm has been acknowledged.

To reset the system:

- Ensure that all affected devices have been restored to normal condition.
- Press and hold the **RESET** control button (Brown) for **approximately 3 seconds**.
- Upon completion of the reset, the panel will return to its normal operating state, provided that no other active events are present and the original cause of the alarm has been rectified.

5 Fire

5.1 General Fire Alarm

The control panel reports an alarm condition whenever an input device—such as a manual call point, detectors, or pressure/flow switch—is activated. Under this state, the following indications and responses will occur:

- The twin **Zone FIRE** LED indicators (Red) for the affected zone will illuminate.
- The general **FIRE** LED indicator (Red) on the System Front Control Module will illuminate.
- The **FIRE SIGNAL SENT** LED indicator (Red) will illuminate (only applicable if a DECAM module is connected).
- The panel buzzer will sound.
- All external sounders will operate, and visual alarm devices will be activated.
- A fire signal will be transmitted to the alarm monitoring station (applicable only for automatic fire alarm systems).
- All configured auxiliary control functions (e.g., lift homing, air-handling unit shutdowns) will be activated.

5.2 Emergency Operation Instructions

Identify the affected zone by referring to the zoning diagram. Proceed immediately to the indicated location to investigate the cause of the alarm.

IF A FIRE IS DISCOVERED

- Call 995 immediately to notify the Singapore Civil Defence Force (SCDF). If it is safe to do so, attempt to control or extinguish the fire using the nearest fire hose reel or extinguisher.
- This should be done only when personal safety is not endangered.

IF IT IS A FALSE ALARM

- Ensure there is absolutely no fire incident at the reported location.
- Call the respective alarm monitoring company to notify them of the false alarm.
- Press the **ACKNOWLEDGE ALARM** control button (Orange) to silence the external sounders.
- Press the **SILENCE BUZZERV** control button (Yellow) to silence internal buzzer.
- Re-instate the affected zone to normal.
- Press and hold the **RESET** control button (Brown) to re-instate the system to normal operation.

TO RAISE AN EVACUATE ALARM

- Press the **EVACUATE ALARM** control button (Red). All sounders and visual alarm devices (Strobe light) will activate.
- To cancel, press the same control button again to de-activate.

6 Faults

The System 88i fire panel is equipped with a self-diagnostic feature that checks a wide range of possible faults and indicates accordingly. In the event of a fault the following will be observed.

- The respective fault LED indicator (Amber) will illuminate.
- The general **FAULT** LED indicator (Amber) will illuminate.
- The Internal buzzer will sound.
- The general fault output will be activated at Main Base Control Module.

The following section shows a list of all possible fault indications in System 88i fire panel. There is also an explanation to each fault.

Fire Signal TX Line Fault (Optional)

Fire Signal TX Line to Remote Alarm Monitoring Station aka DECAM has open/short circuit or 3 k Ω End-of-Line (EOL) resistor is missing.

Fault Signal TX Line Fault (Optional)

Fault Signal TX Line to Remote Alarm Monitoring Station aka DECAM has open/short circuit or 3 k Ω End-of-Line (EOL) resistor is missing.

Audio/Visual Line Fault

Alarm sounder output line or visual alarm (Strobe Light) output line has open/short circuit or 6.8 k Ω End-of-Line (EOL) resistor is missing.

Note: EOL resistor must be placed at the last alarm device of the circuit.

Both audio and visual alarm output circuits are built with fuses (2Amp) for protection purpose. Broken circuits, missing EOL and fuse blown condition will be categorised as Line Open fault (LO) and output cables shorted condition will be categorised Line Short fault (LS). Differentiation of Line Open and Line Short condition for respective output lines can be observed by red LED indicator (LS) and Amber LED indicator (LO) on Main Base Control Board/ or optional extended output modules.

Earth Fault

Earth fault is detected in system.

Earth voltage is normally around 15V when measured with 0V as reference.

If earth voltage is,

- 0V to earth < 10V = Earth fault (minus).
- 0V to earth > 22V = Earth fault (plus).

Depend on the type of Earth fault, a clear red LED indicator/ earth fault(plus) or amber LED indicator/ earth fault(minus) will be shown at the back of System Front Control Board.

Check all cables (for damage, etc.) connected to fire panel.

Auxiliary Supply Fault

Auxiliary 24Vdc supply fuse blown at Main Base Control Board. This fuse is fast blown typed with 2A rating.

Ensure connected load supply does not exceed the specific rating.

Supervisory Fault

Microprocessors failure at Front System Control Board, Main Base Control Board

Mains Failure

The fault is detected if,

- there is no mains input, i.e. no 230Vac is supplied to Fire Control Panel.
- Mains AC fuse has blown at Charger Control Board. (Model A/B & C).

Charger Fault

Batteries charging function is not working. It could be due to

- Mains Failure, no 230Vac is available
- Charger fuse has blown at Charger Control Board.
- Charger voltage high/ low. Check proper charger voltage has been set on Charger Control Board. (Normal charger voltage = 27.5Vdc)

Battery Fault

Secondary power supply is not available.

- Back up batteries are not connected.
- Battery fuse has blown at Charger Control Board.
- Back up battery voltage high/low.

2 x 12V Sealed Lead-Acid batteries in series connection are used for back-up. Wide range of batteries capacity can be used with appropriate Charger Control Board.

EVCS Line Fault (Optional)

When integration with an Emergency Voice Communication System (EVCS) is required, the optional interface module (P88i-PAIC-1) shall be installed.

The P88i-PAIC-1 provides:

- Two supervised output circuits, and
- Two supervised input circuits,

for direct interfacing with the EVCS. All supervised circuits are terminated with a 10 k Ω End-of-Line (EOL) resistor.

An EVCS line fault will be indicated if any of the following conditions occur:

- Line open condition
- Line short condition
- Missing or incorrect EOL termination

7 Routine Maintenance

7.1 Introduction

To ensure the fire alarm system always remains reliable and fully operational, it shall be subjected to routine testing and servicing. Maintenance activities must only be undertaken by competent personnel who are appropriately trained and equipped with suitable test instruments.

7.2 Maintenance Responsibilities

The system owner is responsible for ensuring that the fire alarm system is consistently always maintained and remains in full working order. This responsibility includes organising for the system to be inspected, tested, and serviced in line with the requirements of SS645:2019 – Code of Practice for Installation and Servicing of Electrical Fire Alarm Systems.

If there is any conflict between the guidelines outlined in this manual and those imposed by the local authority, the local authority's regulations shall take precedence.

7.3 Operator Duties – Logbook Entries

A record must be maintained alongside the fire alarm system. This shall be used to record the following details:

- All alarm activations (including genuine, practice, test, or false alarms)
- All faults detected
- All service tests conducted
- All maintenance activities performed

A format is recommended in SS645: 2019.

The operator is responsible for documenting every event generated by the system and serves as the official record of the maintenance carried out on fire alarm system and must be kept current by both the operator and service personnel.

7.4 Routine Checks and Tests

Routine maintenance procedures are categorised as follows:

- Daily Checks
- Weekly Checks
- Monthly Checks
- Annual Checks

7.4.1 Daily Checks

The following checks are to be performed each day by the system operator to confirm the fire alarm system is functioning correctly:

1. Ensure that only the green "POWER ON" LED indicator is illuminated. All other indicators should be OFF, and the control panel should remain silent. If a fault is present, the panel internal buzzer will sound, and the relevant indicator will illuminate.
2. Record any faults detected in the logbook.
3. Identify the area(s) affected by any fault and assess whether additional fire patrols are necessary.
4. Investigate the cause of any fault, including reviewing activities immediately prior to its occurrence.
5. Silence the internal buzzer.
6. Notify the maintenance contractor and arrange for corrective action as required.

7.4.2 Weekly Checks

Weekly checks of the fire alarm system should be performed either by the system operator or the appointed maintenance contractor. The following steps are recommended:

1. Indicators Test: Conduct an indicators test (refer to Section **4.2.5 Indicator test**) to confirm the correct operation of all LED indicators and internal buzzer.
2. Isolate Auxiliary Functions: Temporarily isolate auxiliary functions (refer to Section **4.2.1.2 Auxiliary Output isolation**) to prevent unintended activations during testing.
3. Simulate Fire Alarm: Activate one detector to simulate a fire alarm. Each week, select a different zone for testing to ensure comprehensive system coverage.
4. Note: Notify the alarm monitoring company prior to testing and verify that alarm signals are received after the test.
5. Sounder and Panel Indications: Confirm that all sounders operate correctly and that panel indications correspond to those described in Section **5.1 General Fire Alarm**.
6. Silence and Reset: Silence and reset the panel as outlined in Sections **4.2.3 Silence alarm** and **4.2.6 Reset**.
7. Initiate an evacuate alarm (refer to Section **4.2.4 Evacuation**) and subsequently restore the system to normal operating conditions.
8. Battery Voltage: Measure and record the battery voltage using a multi-meter.
9. Switch Positions: Ensure all switches are returned to their correct operating positions.
10. Rectify Faults: Immediately address and rectify any faults identified during testing.
11. Record Keeping: Document all tests performed in the system logbook.

7.4.3 Monthly Checks

In addition to weekly checks, the following inspections and tests shall be carried out monthly:

1. Zone Simulation: Simulate fire, fault conditions in each zone, one at a time. After acknowledging and resetting each zone, proceed to the next. Verify that all auxiliary functions operate correctly. Reset the system upon completion.
2. Alarm Silencing Test: Repeat the simulation in all zones but silence each zone before activating the next one. Confirm that alarms resound when a new zone is triggered. Reset the system after completing the tests.
3. Detector Line Fuse Removal: Remove the detector line fuse. Confirm the buzzer activates and that the "FAULT" and amber LO indicators illuminate at the back of Zone Control Module. Replace the fuse and reset the system.
4. Detector Line Short Test: Short the detector line of each zone in turn. Confirm buzzer activation and that the red LS indicator for the respective zone illuminates at the back of Zone Control Module. Ensure the buzzer clears when the short is removed.
5. Bell Line Fuse Removal: Remove the bell line fuse. Confirm buzzer activation, "SOUNDER FAULT" indicator, and amber LO indicators illuminate. Replace the fuse and reset the system.
6. Zone Isolation Test: Isolate one zone (refer to Section **4.2.1.1 Zone Isolation**). Activate a device in that zone and confirm that no alarm is generated. Restore the zone to normal operation.
7. Battery Inspection: Inspect the battery condition and terminals. Verify that only sealed lead-acid batteries of the correct capacity are used.
8. Battery Supply Disconnection: Disconnect the battery supply. Confirm illumination of the "POWER ON" and "BATTERY FAULT" indicators and that the buzzer sounds. Reconnect the battery and reset the system.
9. Mains Supply Disconnection: Disconnect mains supply. Confirm that the "POWER ON", "MAINS FAULT", and "CHARGER FAULT" indicators illuminate and that the buzzer sounds. Verify the standby battery maintains the system supply. Restore mains power and reset the system.
10. Earth Leakage Test: Apply a short between the detector line (positive) and earth. Confirm buzzer activation, "EARTH FAULT" indicator, and red "+" indicator illumination. Repeat for the negative line and confirm amber "-" indicator.
11. Panel Condition: Inspect the panel to confirm it is clean and in operational condition.
12. Component and Cabling Inspection: Visually inspect all components, terminations, and cabling to ensure integrity.
13. Component Replacement: Replace any defective components.
14. Repair Documentation: Record all circuits requiring repair in the logbook and arrange for corrective action.
15. Switch Position Verification: Ensure all switches are returned to their correct operating positions.
16. Test Completion Recording: Record completion of monthly tests in the logbook.

7.4.4 Annual Checks

Annual maintenance shall include all checks specified in Sections **7.4.1 Daily Checks**, **7.4.2 Weekly Checks** and **7.4.3 Monthly Checks**, plus the following:

1. Service personnel must test at least 20% of installed devices each year, ensuring the selection is spread across zones so that all devices are tested at least once within a 5-year period.
2. Testing may be performed either:
 - a. On-site, or
 - b. By removal and replacement with a pre-calibrated device verified by the supplier.
3. Confirm operation and voltage output of all automatic voltage-regulated supply.
4. Inspect detectors for contamination or blockages (such as paint, dust, or coatings). Clean or replace as required.
5. Note: In certain environments, smoke detectors may need to be cleaned and adjusted more frequently than once per year.
6. Document all identified faults and confirm in the logbook that annual testing has been completed.

8 Internal Layout Diagram

The internal layout drawings and connection diagrams presented in this manual are provided for reference purposes only. Please note that these diagrams, along with other technical specifications and data, may be updated without prior notice as part of ongoing development and improvement.

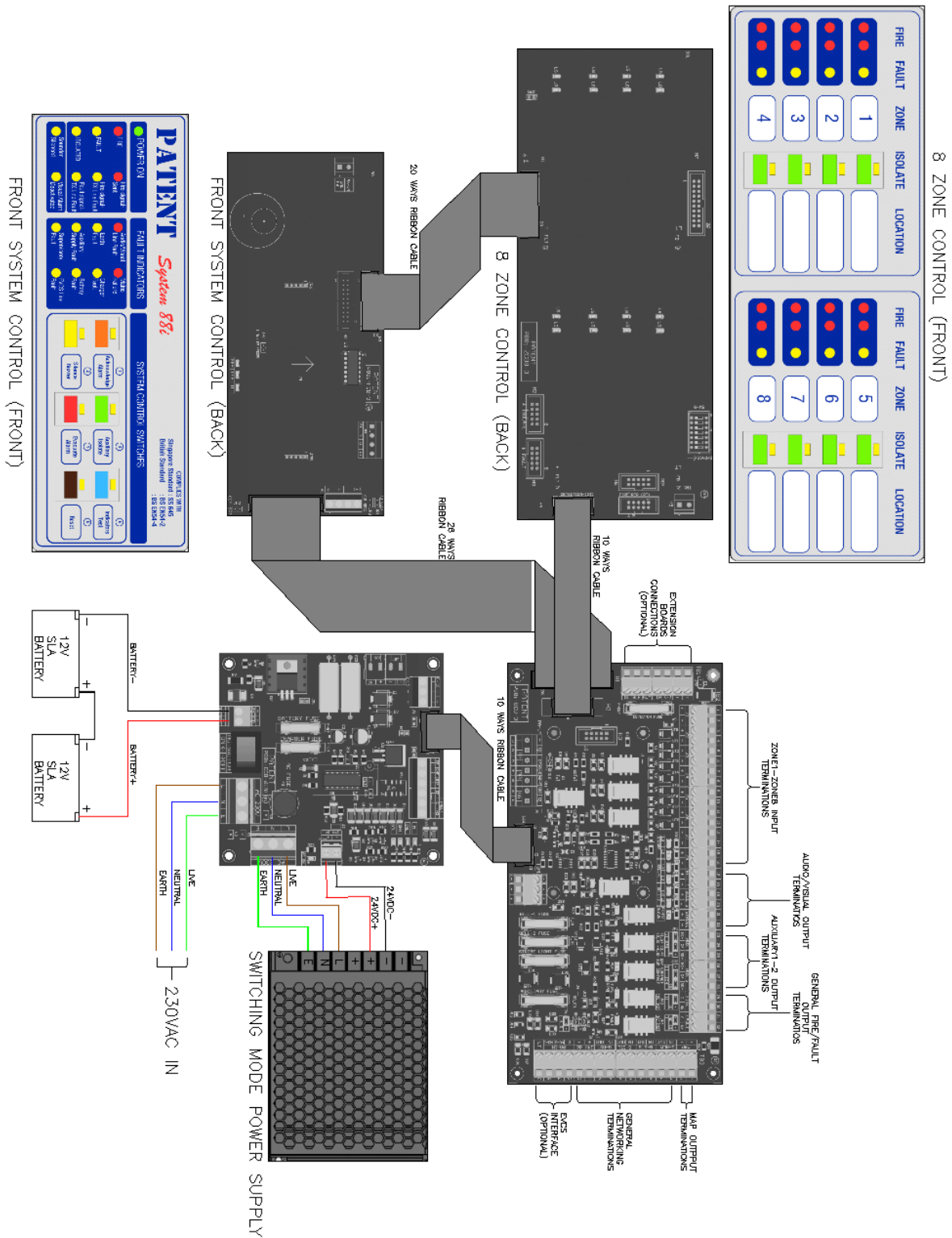


Figure 20 Typical Internal Layout Diagram of Standard System 88i 8Zone Fire Panel

9 Operation Manual Revision History

Issue	Date	Description	Written By	Checked By
Rev 0	01/01/2019	Original System 88i Manual	H.Z.	H.Z.
Rev 1	07/10/2025	Upgraded Version System 88i Manual	N.S.	H.Z.

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