



PERTRONIC RESIDENTIAL FIRE CONTROL PANEL FH1/FR1 TECHNICAL MANUAL

Valid For FH1/FR1:

PCB Hardware

1.0+

PCB Firmware

1.7.0

ISSUE 2.0

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Acronyms:

Acronym	Definition	Comment
AVF	Alarm Verification Facility	A facility designed to minimise 'false alarms' by ensuring multiple operation of smoke detectors before the alarm is raised.
DBA	Direct Brigade Alarm	
EOL	End of Line	End of line termination, normally 10K Ω Resistor used to monitor the presence and integrity of the detector circuit
LED	Light Emitting Diode	
MCP	Manual Call-Point	
OC	Open-circuit	
PCB	Printed Circuit Board	
SC	Short-circuit	



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1. INTRODUCTION

1.1 FH1/FR1 Single Zone Fire Alarm Panel

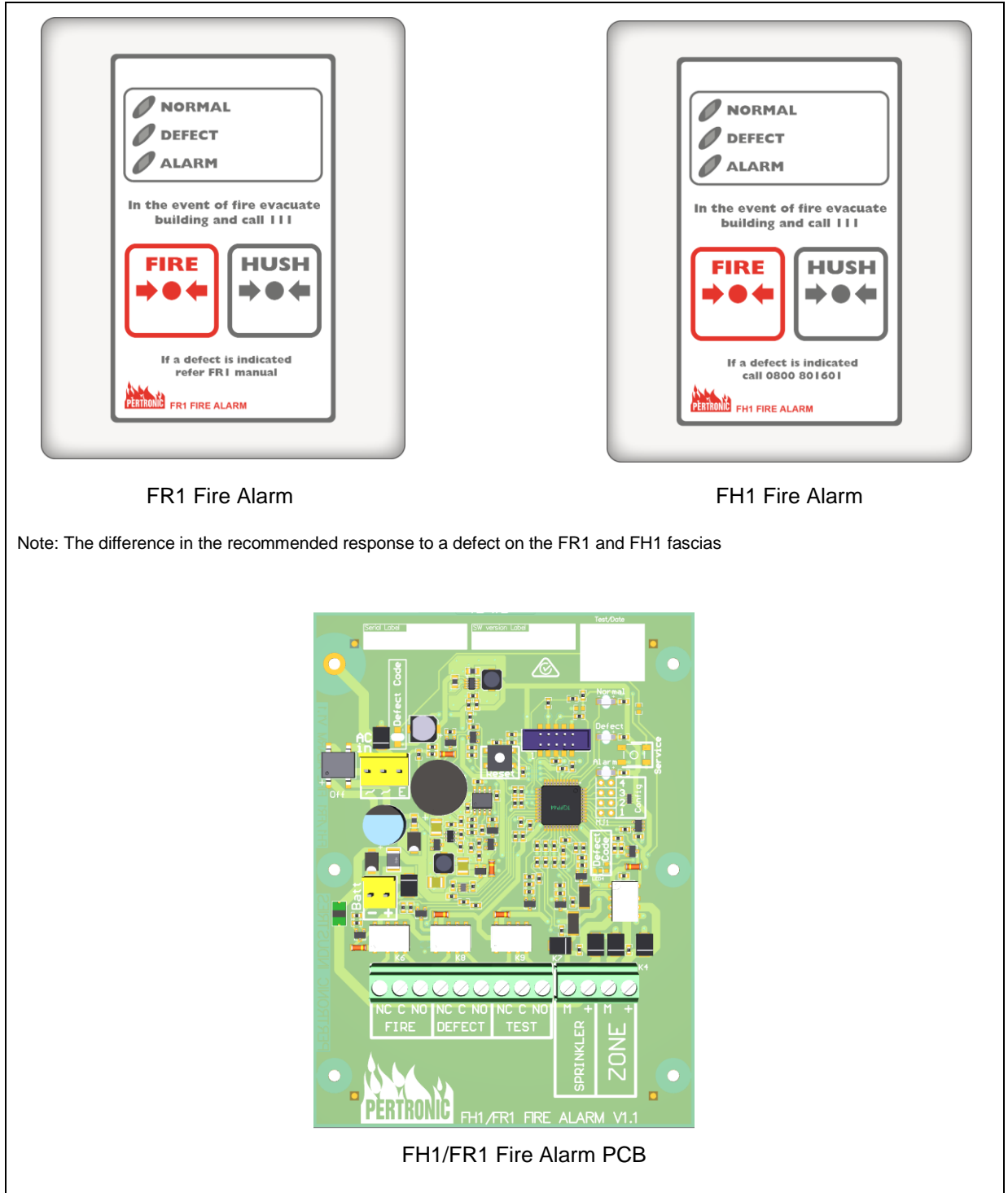


Figure 1-1: FR1 and FH1 Fire Alarms



1.2 Functional Description

The Pertronic Residential Control Panel (FH1/FR1) is a single zone Fire Alarm system for non-brigade calling domestic applications. It has been designed in accordance with NZS4514:2009.

1.3 Specifications

Housing:	Flush or Surface mount options	
Dimensions:	150 x 122 x 70	H x W x D mm
Weight:	0.9 kg	Includes battery
Power Supply:	230 Vac, 4 W	13.7 Vdc @ 20 °C 120 mA
	Battery Charger:	Automatic 24-hour battery test. Temperature compensated to ensure optimum battery care
	Internal Battery:	12 Vdc, 1.2 Ah Gelcell (plug ended termination to ease maintenance and replacement)
2-Wire Circuit (Zone1) :	Single zone: terminated with a 10 kΩ, EOL Resistor to provide 'Normal' system indication. The circuit acts as both a conventional detector circuit in the monitoring mode and a signal circuit when the panel is in 'Alarm' to drive sounders, strobes and other alerting devices (Max loading 150mA). The circuit accepts smoke detectors, indicating heat detectors, indicating Manual Call-Points and Alerting devices. <ul style="list-style-type: none">• Smoke detectors have Alarm Verification (AVF).• Heat detectors and Manual Call-Points respond within 1 second. Zone circuit 'self-test' on start-up and every 24 hours	
Notes	<ul style="list-style-type: none">• System Sensor 1151 and 2151 smoke detectors require a B401R (Resistor Base) due to Zone Voltage reversal when the panel is in 'Alarm'.• Alerting devices connect in reverse polarity to the detection circuit, so that they do not operate while the panel is 'Normal', but do operate when the panel is in 'Alarm' and voltage reversal occurs.	
Sprinkler Input: (SPR)	Separate monitored input for connection to DBA / Sprinkler system. The SPR input can be either latched or non-latched. The non-latched option ensures adherence to NZS 4512:2020; that is the panel is not permitted to silence a sprinkler generated alarm and the alarm indicator must not be latched	
Output Relays:	Fire, Defect, Test	Clean contact NC,C,NO 24 V 2 A DC
Supplementary Functions:	Integrated piezo buzzer for 'Alarm' and 'Defect' warning Zone-circuit 'Self-Test' Earth Leakage monitoring Battery Absent' detection circuitry Battery and Charger voltage monitoring	
DC Current Consumption:	'Normal'	15 mA
	'Defect' (Mains OFF)	5 mA
	'Alarm'	31 - 150 mA
		Max current load 150mA



1.4 Operational Description

1.4.1 Installed Equipment

The Pertronic FH1/FR1 Fire Alarm Control Panel is a compact unit designed primarily for domestic use.

The Pertronic FH1/FR1 is a 2-wire system which supports on the same circuit the operation of conventional detectors, MCP's and alerting devices. It is designed to be flush or surface mounted using the appropriate mounting housings.

The Fire Alarm system comprises the following components connected to the Pertronic FH1/FR1 Fire Alarm Control Panel:

- Fire/smoke detection components (smoke or heat detectors, manual call-points)
- Integrated or separate visual and/or audible alerting devices
- Optional sprinkler connection

1.4.2 Equipment Operation

The Fire panel constantly monitors the fire alarm system, indicating the status of the system with LEDs on the front panel:

NORMAL:

The green LED (steady) indicates the system is 'Normal', provided there are no defects or alarms present.

DEFECT:

The yellow LED flashes to indicate a fault exists within the panel equipment or installation. A buzzer inside the Fire panel sounds for the duration of a defect however it may be silenced for a period of 24hours by operating the HUSH key.

ALARM:

The red LED flashes and a buzzer inside the control panel sounds to indicate one or more smoke/heat detectors, manual call-points or sprinkler inputs have been activated.

Occupants are warned that the Fire panel has been activated by external audible and/or visual alerting devices.

1.4.3 Hush Facility

If the Fire panel has been accidentally activated (e.g. burnt toast, tobacco smoke, steam, etc), pressing the Hush button will mute the warning devices (sounders and visual alerting devices) for 2 minutes. After the 'Hush' period, the circuit is reset.

If the 'Alarm' condition re-occurs, the alerting devices re-activate, otherwise the panel returns to 'Normal'.

Note:

The 'Hush' button is monitored and if operated incorrectly the buzzer will sound until the button is released.



1.4.4 Outputs for Monitoring Equipment

The FH1/FR1 panel provides the following outputs that can be interfaced to monitoring equipment

- **FIRE:** A clean contact relay output will become active whenever an alarm condition is present. This output remains latched until the alarm condition has been reset or hushed.
- **DEFECT:** A clean contact relay output will become active whenever a defect is present. The relay output returns to the “normal” state once defects are cleared.

Note: The defect relay is not latched.

- **TEST:** A clean contact relay output will become active whenever the FH1/FR1 panel is in the Test mode.

2. SYSTEM FEATURES

2.1 Front Panel Indication:

The front panel display consists of three indicator LEDs.

- Normal:** In the absence of any of Alarm or Defect, the 'Normal' LED is ON steady. When the Alarm and/or Defect LEDs are ON, the Normal LED is OFF.
- Defect:** Normally OFF, flashes when a Defect exists
Refer to Section 2.11 for details of Defect (system Fault Indication) conditions. The Defect LED does not latch.
The Defect and Alarm LEDs may be ON simultaneously
- Alarm:** Normal: LED is OFF
Alarm: LED flashes at the rate of 400 mS ON, 400 mS OFF
The Alarm LED latches

2.2 Front Panel Controls:

The front panel controls are as follows:

- FIRE:** Pressing the FIRE key for longer than 0.5 seconds will initiate a Fire event; the sounders will operate, the internal buzzer will sound and the Fire Relay will operate. This condition can be reset by pressing the HUSH key.
- HUSH:** Pressing the HUSH key will silence smoke detector alarms, and deactivate the Fire key, if it is active. The Sprinkler input will be deactivated if the sprinkler input is configured as latched but remain active if the sprinkler input is configured to be non-latched

2.3 Zone Circuit

The Zone circuit is configured to accept Smoke Detectors, Indicating Heat Detectors and Indicating Manual Call-Points and, on reversing the polarity of the circuit, to drive alerting devices such as sounders and strobes.

- The 12 V supplied to the circuit directly from the battery (via current limiting circuitry) enables a range of detector types to be used, subject to the compatibility limitations described in Section 3
- The Zone circuit is terminated with a 10 k Ω , 1% End-of-Line (EOL) resistor.

- In the 'Normal' state the voltage across the terminals (M-Value) must lie between 0.75 and 2.1 Vdc; typically 1.5v for a heavily loaded circuit and 1.0v for one that is lightly loaded (Refer to Section 6.1).
- A hard short-circuit (less than 1.4 V across the detector circuit) or an open-circuit (less than 0.75 V between M+ and 0 V) will produce a 'Defect' signal (Section 6.1).

2.3.1 Smoke Detectors

- Smoke detectors must be 12 V compatible
- When a smoke detector is activated, the voltage across the terminals (M+ and 0v) will typically measure between 5 v and 7 v and must exist for around 1 second for the detector's activation to be recognised as 'Smoke Detector' by the panel. This Alarm Verification Facility (AVF) provides substantial protection against transient 'false alarm' activation.
- A hard short-circuit or open-circuit will produce a 'Defect' signal (Section 6.1).

2.3.2 Heat Detectors and Manual Call Points

- Indicating Heat detectors and Indicating Manual Call-Points (MCPs) activate within 1 second to signal an 'Alarm' condition.
- Indicating Heat detectors and Indicating Manual Call-Points (NZS 4512:2010) clamp the detector line to approximately 2.3v when activated (or 11.4 v measured between the M+ and 0v terminals), and must exist for 1 second for the detector to be recognised as a 'Fire Detector' by the panel. (Refer to Section 6.1).

2.3.3 Sounders, Strobes and other alerting devices

- FH1FR1 panels use reverse polarity in the alarm state to power alerting devices such as sounders and strobes. Alerting devices must, therefore, be connected with their polarity reversed, that is '+' to '-' and '-' to '+', as shown in Figure 7-2
- As strobes draw a comparatively high current, care must be taken when designing systems that include strobes. For example, the

2.4 Sprinkler (SPR) Circuit

The FH1/FR1 provides a monitored circuit specifically for connecting to a sprinkler system (DBA).

- The Sprinkler circuit must be terminated with a 10kΩ EOL resistor and a 1k8Ω Alarm resistor. It can detect both open and short circuit fault conditions.
- In the "Normal" state the M-value must lie between 0.75 and 2.1 Vdc. (Refer to Figure 6-2)
- To activate the Sprinkler circuit the M-Value must lie between 2.1 and 12.3 Vdc.
- The SPR input has two operating modes, latched and non-latched (NZS 4512:2020), set by inserting or removing a jumper across CFG2 (refer to Figure 2-1)

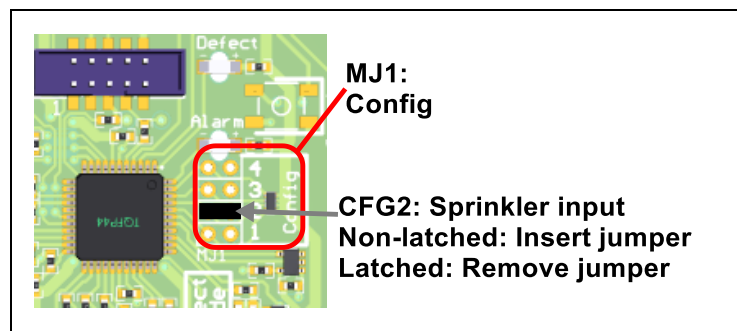


Figure 2-1: Configuring the SPR circuit



With the jumper inserted, the SPR input is not latched when activated. The Alarm LED does not latch and the HUSH button will not silence sprinkler generated alarms (NZS4512:2020). The alerting devices are silenced when the SPR input is deactivated.

With the jumper removed, the SPR input once activated will latch and operate the alerting devices. They remain on, unless the HUSH button is pressed, and are not silenced when the SPR input is deactivated.

If the jumper is inserted or removed after start-up will cause the FH1/FR1 to reset.

The Alarm LED does extra blinks during start-up if the non-latching option has been selected.

2.5 Hush Facility:

Operation of the Hush button essentially silences the buzzer and sounders when operated.

2.5.1 Operated for less than 0.5 seconds

Any press of the Hush button for less than 0.5 seconds will be ignored by the FH1/FR1.

2.5.2 Operated for 0.5 to 5 seconds

Pressing the Hush button for more than 0.5 seconds but less than 5 seconds will cause the following to occur:

a. For Smoke, MCPs or Heat Alarms

- Silences the evacuation sounders and buzzer
- Turns the Fire relay OFF
- Alarm LED flashes, Normal and Defect LEDs OFF
- Performs a reset after 2 minutes. Normal LED flashes then remains ON, Defect and Alarm LEDs flash and then turn OFF
- Circuit retriggers if MCP still active, Alarm LED flashes

NOTE: The detection circuit is powered down during the hushed alarm period.

b. Local Fire button alarm

- Silences the evacuation sounders and buzzer
- Turns the Fire relay OFF
- Performs a reset immediately
- Normal LED flashes then remains ON
- Latched - Defect and Alarm LEDs flash then remain OFF
- Non-latched - Defect LED flashes then OFF
 - Alarm LED flashes twice then remains OFF

c. Sprinkler Alarm

- Silences the evacuation sounders and buzzer
- Leaves the Fire relay ON until the sprinkler input returns to normal
- Performs a reset when the sprinkler input returns to normal. If the sprinkler returns to normal within the 2 minute Hush period, the reset will be performed after the 2 minutes has expired.

d. Defect state

- Suppresses the defect buzzer for a period of 24 hours.

2.5.3 Operated for 5 to 10 seconds

Pressing the Hush button for more than 5 seconds but less than 10 seconds while in the Normal, Defect or Alarm state will:



- Cause the buzzer to double beep and then turn OFF after 5 seconds have elapsed.
- Cause the Normal LED to flash and, if the button is released before 10 seconds have elapsed, leave the FH1/FR1 in Test Mode (see Section 2.6 below).

2.5.4 Operated for greater than 10 seconds

Pressing the Hush button for longer than 10 seconds will cause the buzzer to sound until the button is released. The system will remain in the normal state during the period the button is pushed.

2.6 Test Mode

The TEST mode is used by maintenance personnel to indicate to a monitoring station that the FH1/FR1 is currently undergoing routine testing.

2.6.1 Entering Test mode

To enter the TEST mode press and hold the HUSH button for at least 5 seconds until a double beep is heard; release the HUSH button. The Normal LED will now flash and the TEST RELAY will operate.

While in Test Mode the FH1/FR1 will:

- Display Current and Historic defect information on the Defect LED
- Turn on the test relay output
- Operate circuit 1 (Zone) in walk test mode (non-latching alarms)
- Operate circuit 2 (dba) in non-latching mode

2.6.2 Exiting Test Mode

To exit the TEST mode press and hold the HUSH key until a double beep is heard. The FH1/FR1 will now reset and return to the Normal state providing that no defects or alarms are present. The TEST mode is exited automatically after 5minutes if no activity is detected.

Note: activity means any change of alarm or defect status.

NOTE: When the FH1/FR1 exits the TEST mode all Historic defect information is cleared.

2.7 Timer Power Supply

The switched-mode power supply provides system power and temperature compensated battery float-charge (13.3 V @ 40 °C to 14.0 V@ -10 °C)

- The power supply provides 13.7 Vdc at 120 mA at 20 °C
- Short-circuit protection is provided.

The FH1/FR1 provides a 24-hour auto-test:

- The power supply test reduces the battery float-charge to 11.2 Vdc for a period of 1 hour every 24 hours to verify correct system operation on the standby battery.
- If the battery voltage falls below 11.5 Vdc during the 1-hour test period, a battery capacity test failure is recorded, the test is aborted and charging voltage immediately applied to the battery. A battery capacity defect is signalled after three consecutive capacity test failures.
- If the panel is in a 'Defect' or 'Alarm' condition, the '24-Hour' tests are not performed.

Note: When the Hush button is used to mute this defect the buzzer will operate again at each successive test until the battery fault is cleared.

2.8 Mains On /OFF Switch

A mains ON / OFF switch is provided for use by service personnel.

The switch is an integral part of the PCB mounting bracket and is located at the top edge of the bracket.



Figure 2-2: Mains ON/OFF Switch

2.9 Buzzer

The internal buzzer pulses when the F1H1 is in 'Alarm', and sounds continuously when in 'Defect'. The Buzzer may be silenced by pressing the HUSH key.

2.10 Earth Failure

Earth monitoring is provided to indicate Earth Leakage faults. The limits for various circuits are shown in the table below.

Type	Limit
0 V	< 50 kΩ
13.7 Vdc	< 50 kΩ
Circuit M	< 10 kΩ
Sprinkler M	< 10 kΩ

Table 2-1: Earth Monitoring

2.11 Defect Indications

The FH1/FR1 system can indicate both current and historic defect information.

2.11.1 Current defects

Current defects are indicated on the DEFECT LED as long as they are present. The type of defect present is indicated by a "long flash" position code shown in the table below. If more than one type of defect is present they will be indicated by the appropriate "long flash" codes.

2.11.2 Historic Defects

Historic Defects are indicated in addition to current defects when the FH1/FR1 is in TEST mode. Defects are indicated by a "long flash" position code which is shown in the table below.

NOTE: The historic defect information is cleared each time service personnel exit the TEST mode.

Current & Historic Defects		
Type	Description	Long Flash Position
Mains	Mains Missing	1
Zone 1	Open or short circuit, High defect	2
Sprinkler	Open or short circuit, High defect	3
DC	DC outside range 12.0 V-14.4V > 10 seconds while charging DC < 11.5 V while running only on Battery	4
Battery	Battery missing for more than 30 seconds	5



	Battery capacity test failed for 3 consecutive 24hour tests	
Earth	Earth defect	6
System	Internal Memory Error (CRC)	7

Table 2-2: Defect Identification

- A short flash signifies no fault for that position.
- There are always 7 flashes in each sequence.
- Multiple defects are indicated by more than one position code on the appropriate Defect LED

NOTE: The flashing of the LEDs observed during start-up has no relationship to Defect coding.



3. DETECTOR COMPATIBILITY

3.1 Circuit Limitations

Smoke Detectors draw a small monitoring current, which places a limit on the number of these devices that can be connected to the detector circuit.

Pertronic Indicating Heat Detectors and Indicating Manual Call-Points draw minimal monitoring current so there is a higher limit on the number of these devices that can be connected to the detector circuit.

Only use devices recommended below:

Recommended Detectors
Pertronic Indicating Heat Detector (IHDB-3) and Indicating Manual Call-Point (CPPIN-3T)
System Sensor Model 2151 Photoelectric Low Profile Smoke Detector
System Sensor Model B401R Resistor Detector Base (required for above detectors)
System Sensor Model 2WTA-B Smoke/Thermal Detectors with inbuilt Sounder

Table 3-1: Recommended Detector List

3.2 Maximum Devices on a Zone

The number and combination of devices that can be connected to a zone is limited by the maximum zone current permitted when the zone polarity is reversed to activate sounder devices—this is 150 mA.

The table below shows the current drawn by devices when the Zone polarity is reversed. To determine the total current for a combination of devices proceed as follows:

- Select the largest current value for one of the required devices from the 'In Alarm' column.
- For the remaining devices select the values from the 'NOT in Alarm' column.
- Combine these results and confirm that they are less than 150 mA.

See the examples shown in Section 3.2.1.

ZONE LOADING –maximum current is 150 mA				
	Device	Loading per Device		Comment
		Device in Alarm Polarity Reversed (mA)	Device NOT in Alarm Polarity Reversed (mA)	
Detectors/ MCP	2WTA-B	30 mA	12 mA	
	2151BPI	12 mA	1 mA	
	CPPIN-3T	5 mA	5 mA	
	IHDB-3	5 mA	5 mA	
Strobes	SR Strobe (15 cd)	125 mA		Max 1 unit only
Sounders	Pertronic PS1 sounder	10 mA	10 mA	
Other	Remote Vibrating Alarm Master Unit Interface	1.5 mA	1.5 mA	Master controls 8 remote units.

Table 3-2: Device Loading Specifications

3.2.1 Zone Loading Examples

11 x 2WTA-B (Smoke Detector / Sounder)

Device	In Alarm Polarity Reversed	NOT in Alarm Polarity Reversed	
1 x 2WTA-B	30 mA	-	30 mA
10 x 2WTA-B	-	10 x 12 mA	120 mA
Total Zone Load			150 mA

12 x 2151(Smoke Detectors) and 12 x PS1(Sounder)

Device	In Alarm Polarity Reversed	NOT in Alarm Polarity Reversed	
1 x 2151	12 mA	-	12 mA
11 x 2151	-	11 x 1 mA	11 mA
12 x PS1	-	12 x 10 mA	120 mA
Total Zone Load			143 mA

4 x 2WTA-B(Smoke Detector / Sounder), 4x IHDB-3 Heat Detector) and 4x PS1(Sounder)

Device	In Alarm Polarity Reversed	NOT in Alarm Polarity Reversed	
1 x 2WTA-B	30 mA	-	30 mA
3 x 2WTA-B	-	3 x 12 mA	36 mA
4 x IHDB-3	-	4 x 5 mA	20 mA
4 x PS1	-	4 x 10 mA	40 mA
Total Zone Load			126 mA



4. RESETTING AFTER ACTIVATION

After activation the panel will require resetting. With the exception of sprinkler input activations, the 'Resident' can perform actions that will reset the panel. The tables below give details of these actions.

The Resident can perform the following:

Activation	Reset Method	Outcome
FIRE button activation	Press the HUSH button (must be at least 1 second)	Panel resets NORMAL, DEFECT, ALARM flash. Panel returns to NORMAL
Smoke Detect Heat Detector External MCP	Press the HUSH button (must be at least 1 second)	Panel resets after 2 minutes NORMAL, DEFECT, ALARM flash. Panel returns to NORMAL
Sprinkler Activation	Reset by service personnel only	

Table 4-1: Panel Reset (Resident)

Service personnel can reset all activations as follows:

Activation	Reset Method	Outcome
FIRE button activation	Press the HUSH button (must be at least 1 second)	Panel resets NORMAL, DEFECT, ALARM flash. Panel returns to NORMAL
Smoke Detect Heat Detector External MCP	Press the HUSH button (must be at least 1 second) OR Press HUSH ≥ 5 seconds to enter Test Mode. Press HUSH ≥ 5 second to exit Test Mode	Panel resets after 2 minutes NORMAL, DEFECT, ALARM flash. Panel returns to NORMAL Entering and exiting test mode gives a faster reset process for service personnel
Sprinkler Activation	Press HUSH ≥ 5 seconds to enter Test Mode. Press HUSH ≥ 5 seconds to exit Test Mode. (Sprinkler System must be restored to Normal for a reset to occur).	Ensure Sprinkler input to panel has returned to normal before attempting to reset panel.

Table 4-2: Panel Reset (Service personnel)

5. TEST MODE

The FH1/FR1 system provides a Test Mode for the use of service personnel. When the unit is in this mode the following functionality is provided:

- Operation of the Test Relay to indicate that the Alarm system is being serviced
- Automatic reset of activated detectors and MCP's (walk test)
- Test of Hush operation
- Testing of Sprinkler input activation
- Indication of historic defects that have occurred since last time Test mode was used.

5.1 Entering TEST MODE

To enter the Test Mode simply press the HUSH for at least 5 seconds.

The buzzer will beep until Test Mode is active at which time the Normal LED will be flashing.

5.2 Testing FIRE

Pressing FIRE will:

- Flash the Alarm LED
- Activate the Fire Relay
- Activate the sounders

Pressing the HUSH function will turn off the sounders and finish the test

5.3 Testing MCP's and Detectors

Operating an MCP or a detector will:

- Flash the Alarm LED
- Operate the Fire relay
- Operate the Sounders
- Reset the device after 5 seconds turning the Fire relay and sounders off

5.4 Testing the Sprinkler input

Operating the Sprinkler input will:

- Flash the Alarm LED
- Operate the Fire relay
- Operate the Sounders

Pressing the HUSH while the Sprinkler input is still active will:

- Silence the sounders. However the Alarm LED will continue to flash

Pressing the HUSH after the Sprinkler input has first been reset will:

- Silence the sounders and turn off the Alarm LED
- Turn off the Fire relay.



The Sprinkler input must be reset and the HUSH pressed again before the Alarm LED will turn off.

5.5 Exiting the TEST MODE

The system will automatically exit Test Mode after 5 minutes or by pressing the HUSH button for at least 5 seconds.

The Normal, Defect and Alarm LED's will flash while the system is returning to Normal operating mode.

6. FH1/FR1 M-VALUE DATUM

6.1 ZONE 1

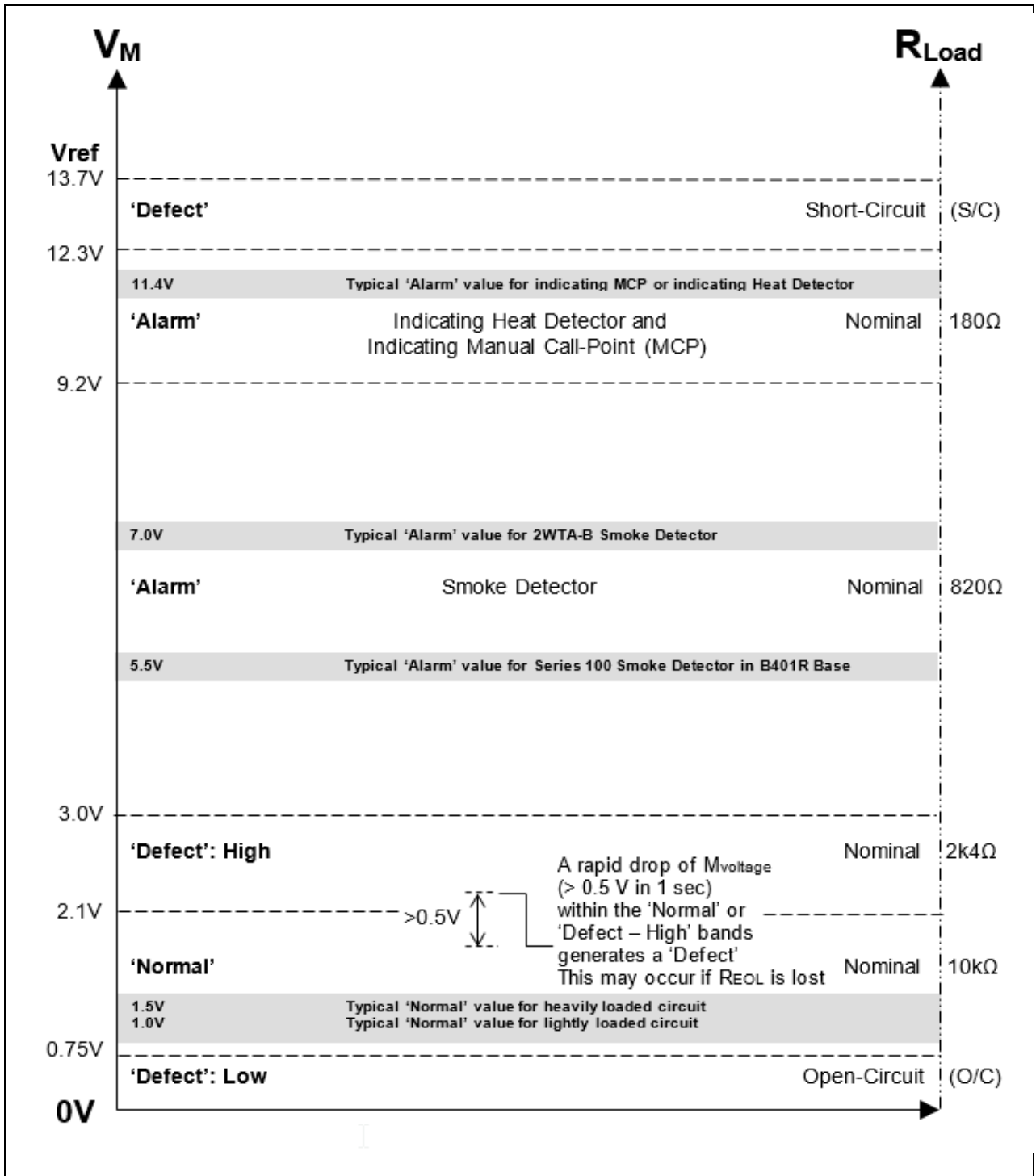


Figure 6-1: Zone M-Value Datum

6.2 SPRINKLER (SPR)

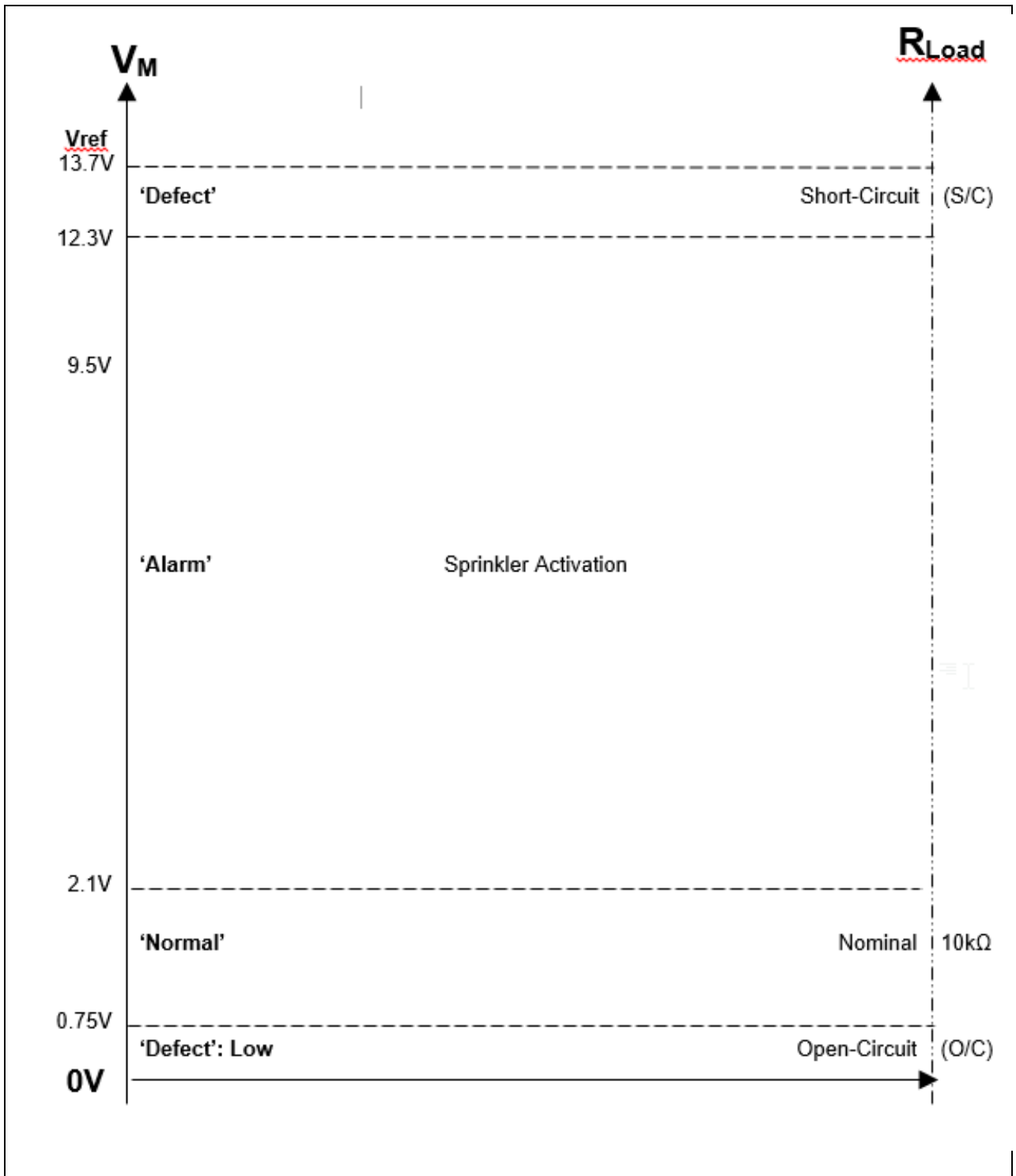


Figure 6-2: Sprinkler M-Value Datum

7. DIAGRAMS

7.1 FH1/FR1 Main Board Layout

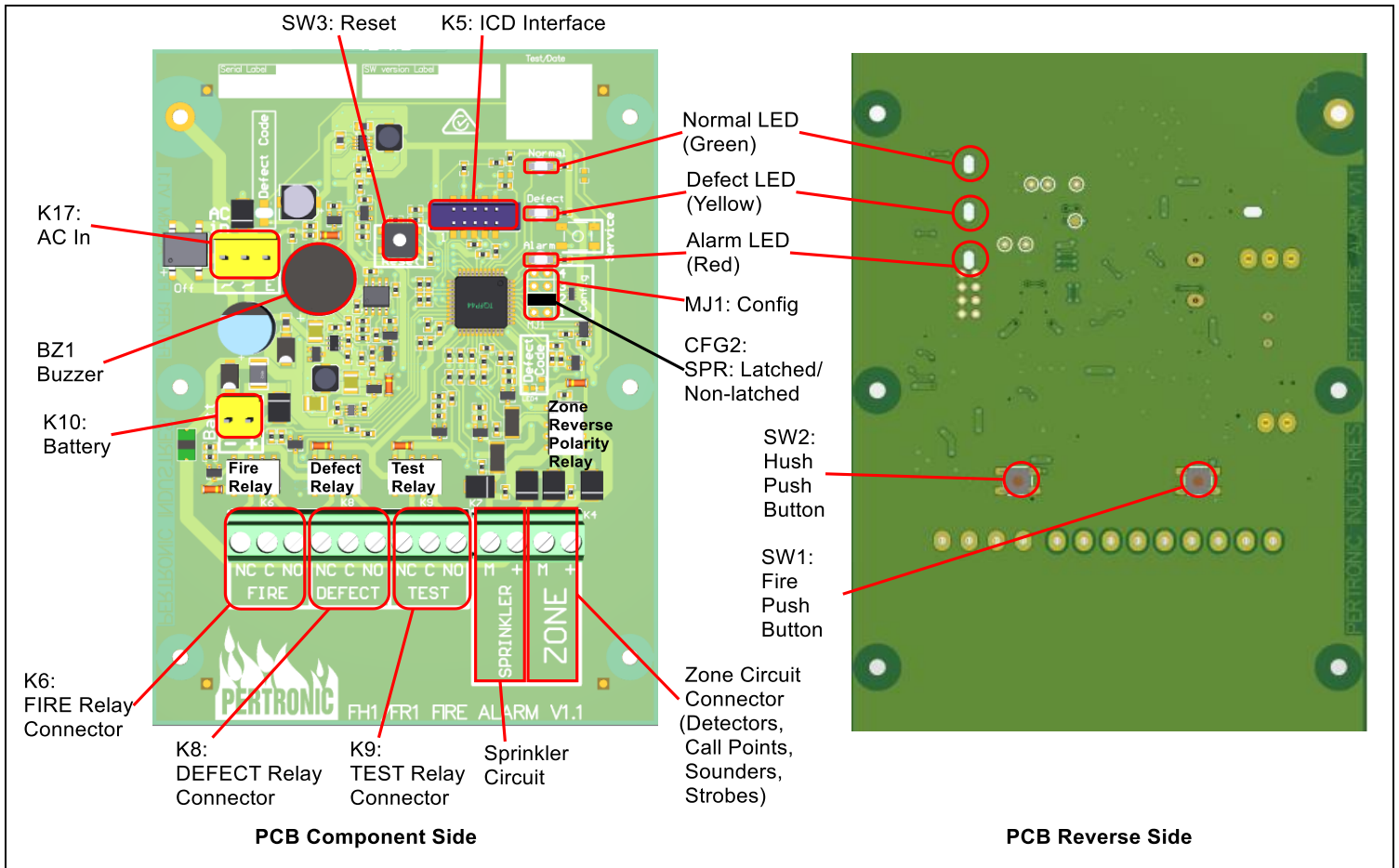


Figure 7-1: FH1/FR1 PCB Layout

7.2 FH1/FR1 System Diagrams

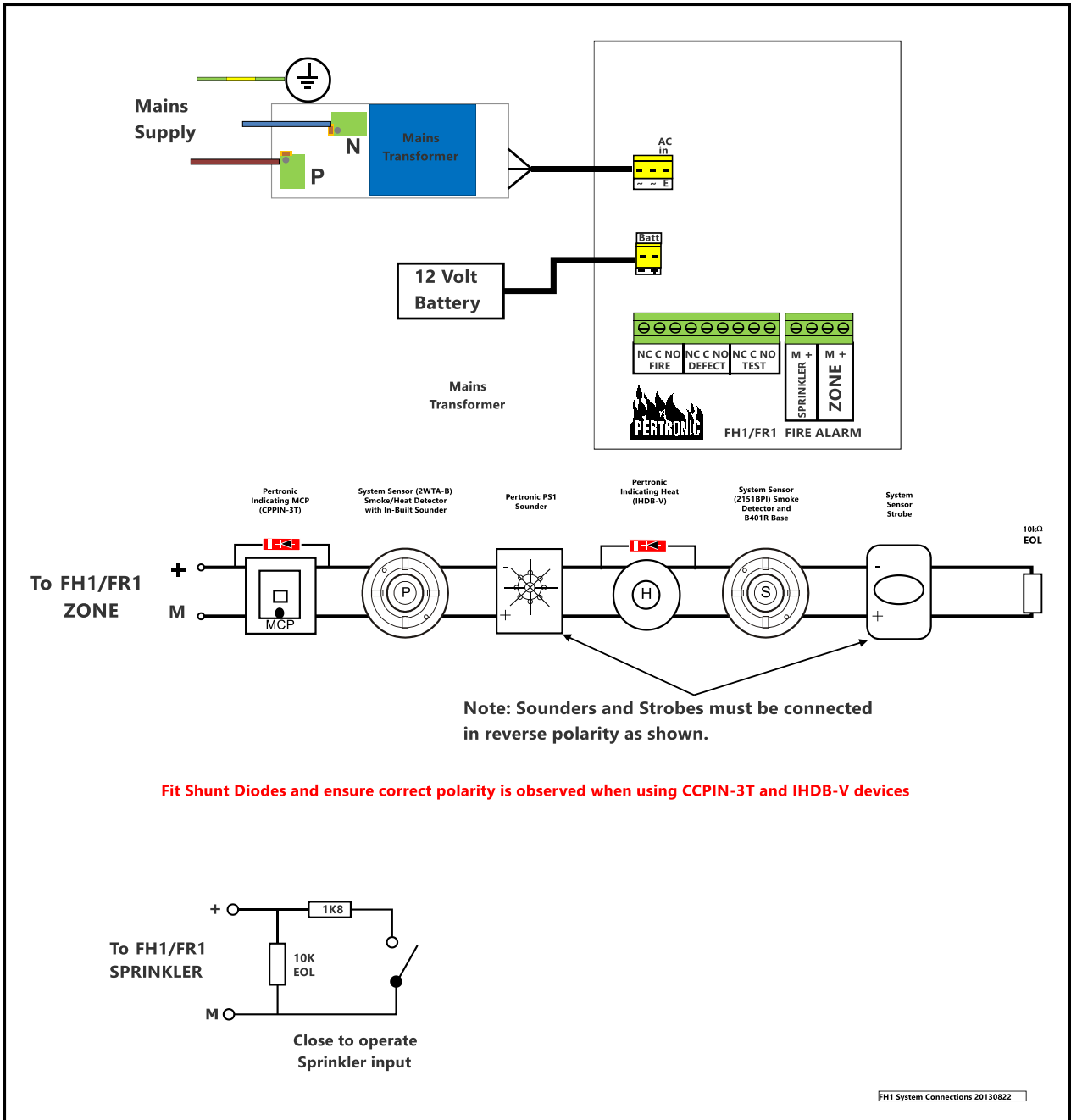


Figure 7-2: FH1/FR1 System Connection Diagram with Indicator Device Shunt Diodes

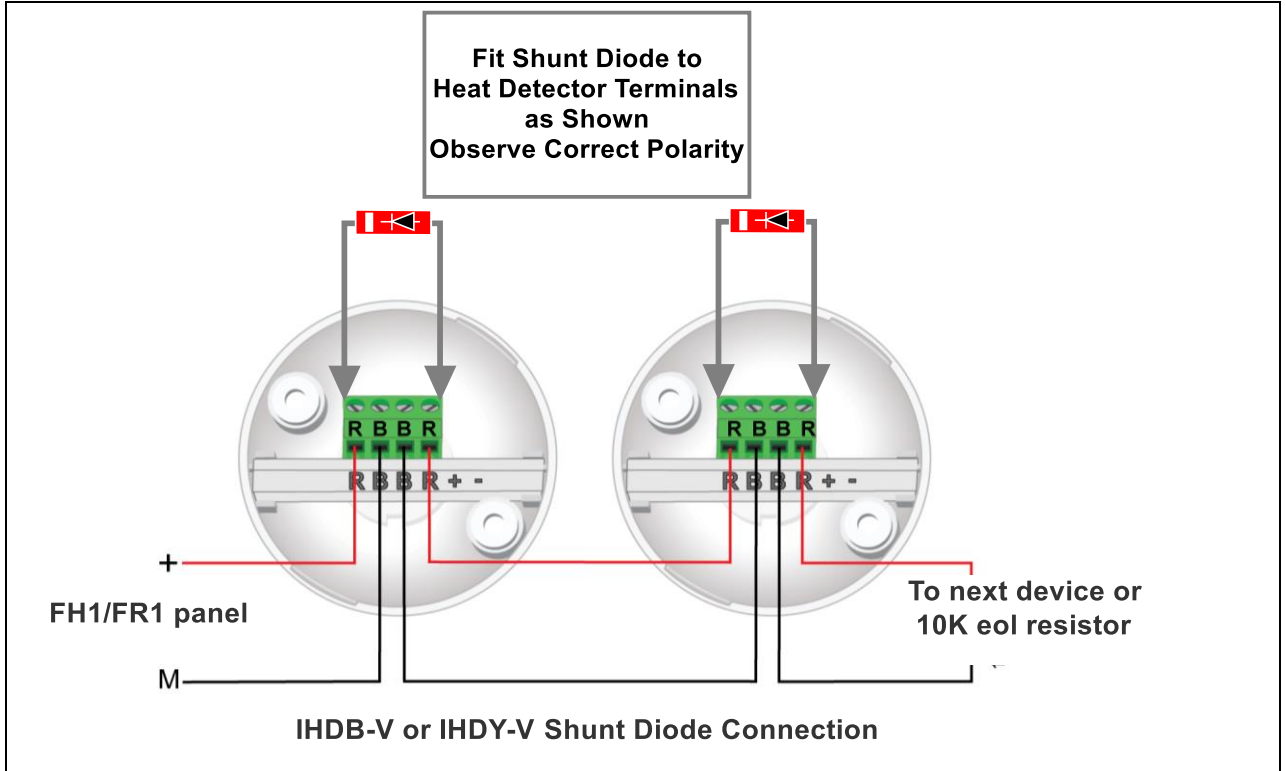


Figure 7-3: Installing Shunt Diodes in Heat Detectors

Indicating Manual Call-Point

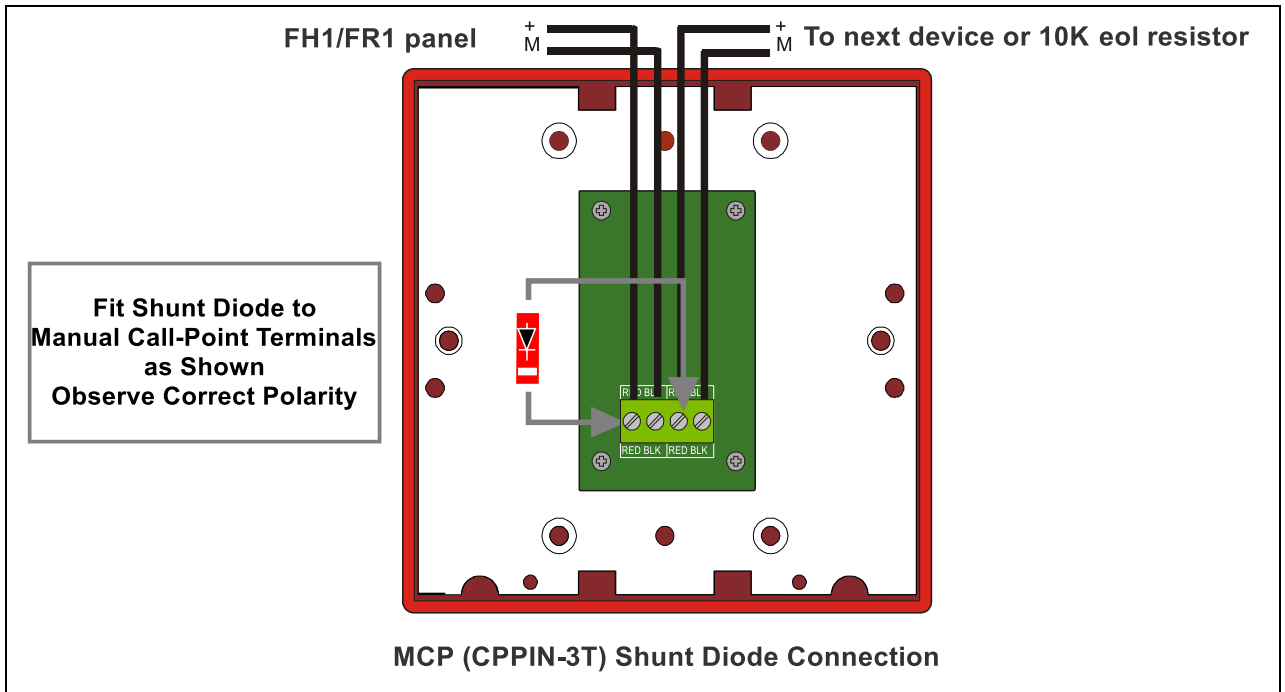


Figure 7-4: Installing Shunt Diodes in Manual Call Points



8. PRODUCT CODES

Description	Product Code
HNZC Flush mount panel w/sprinkler input NZ4514 compliant	FH1-FM
HNZC Surface mount panel w/sprinkler input NZ4514 compliant	FH1-SM
Residential Flush mount panel w/sprinkler input NZ4514 compliant	FR1-FM
Residential Surface mount panel w/sprinkler input NZ4514 compliant	FR1-SM
Braille overlay. Fire & Hush	FH1-BO
Conventional Indicating Call-Point	CPPIN-3T
Indicating Heat Detector, Blue (57°C), Housing NZ	IHDB-3
2W-B, 2 Wire PE I3 Detector + Thermal and Sounder	2WTA-B
2151 Low Pro Photo Detector excluding Base	2151BPI
B401R 2-wire base with current limiting resistor.	B401R
Pertronic Sounder AS2220 Flush- Red	PS1-R
Spectralert Strobe 12/24V	SR
Diode 1N4007	DI1N4007

Table 8-1: Product Codes

Document Change History

Issue Number	Reason for Update	Description of Changes	Author
Issue 1.0 July 2013	First Issue	Not Released	RDB
Issue 1.1 Aug 2013	To cover both models	Changes to cover both FH1 and FR1 models. Added zone loading examples.	RDB
Issue 1.2 Mar 2016	Minor changes	Miscellaneous changes for 1.3 Specification; 2.3 Detector Circuit; 7.3 Indicating Device Shunt Diode Connection. 2.7 Timer Power Supply; 2.11.2 Historic Defects updated temperature compensation information	DS
Issue 2.0 Jun 2024	CN3488		RJK



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