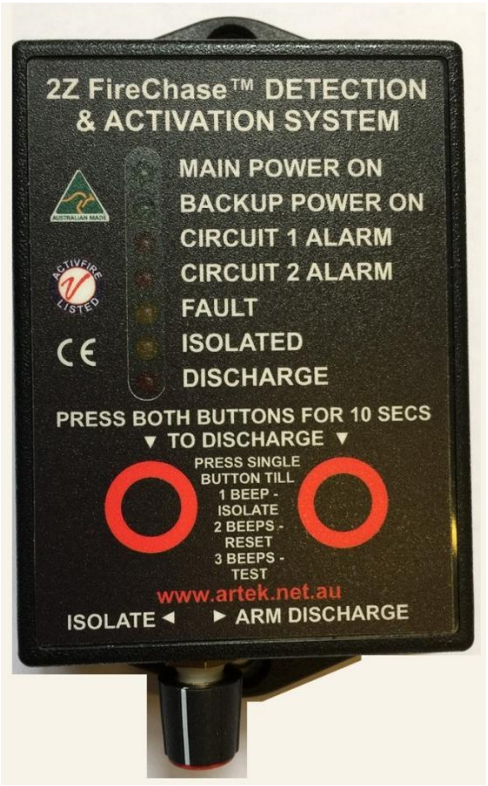
FireChase™ Detection and Actuation System with Isolation Switch

SKU: 101-2ZWDIS



EC Declaration of Conformity

In accordance with EN 45014:1998

2-Zone FireChase Detection & Activation System Model 2ZWDFC in accordance with the following Directive:

73/23/EEC - The Low Voltage Directive and its amending directives

has been designed and manufactured to the latest issues of the following specifications:

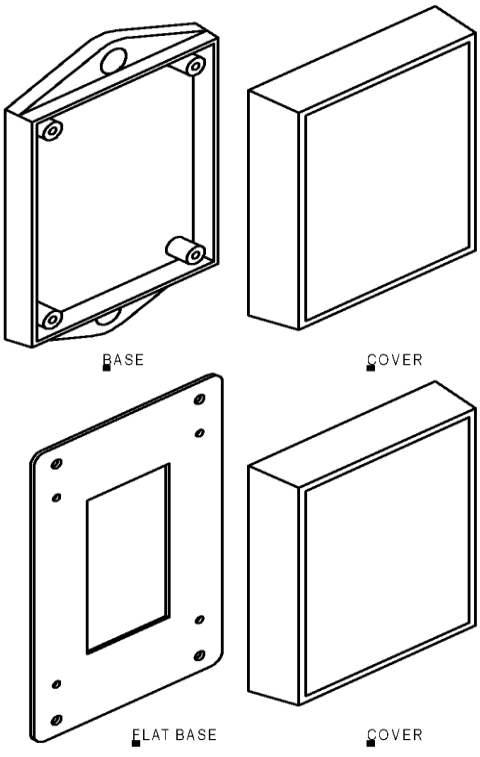
AS 1603-4	Control and Indicating Equipment, Automatic Fire
ISO 7240-2	Detection and Alarm System
AS 3000	SAA Wiring Rules
AS 2546-3	Design and Use of Printed Boards
AS 1981	Stationary Batteries of the Lead-acid Pasted Plate Type

Done in Sydney, on the 23rd of March, 2006.

Table of Contents

1. Specifications

Dimensions	143mm high, 84mm wide, 31mm deep
Enclosure Material	ABS plastics, black colour
Operating Voltage	12-30V DC
Operating Current	53mA on 12V 78mA on 24V
Power Supply Inputs	Main and backup
Number of Fire Detector Zones	2
Acceptable Detectors	All commercial thermal, photo-optical and ionization detectors, manual cell points, and temperature-sensitive detector wires
Detector Operating Voltage	Same as power supply voltage
Max. Number of Detectors per Zone	30
Outputs	Siren, max 0.5A at 12V or 24V DC Discharge, max 2A at 12V DC and 4A at 24V DC
Output Protection	0.5A poly switch resettable fuse on the siren output 4.7-ohm resistor in the discharge output
Fault-Sensing	• Detector wiring open circuit • Siren wiring open circuit • Discharge wiring open circuit • Polyswitch fuse operated • Loss of internal 5V supply • Internal microprocessor malfunction
Director End-of-Line	4K7
Discharge End-of-Line	Diode
Discharge Timing	3K3
Selectable Options	• Manual discharge only • Manual discharge and any single-zone automatic discharge • Manual discharge and zone 1 automatic discharge • Manual discharge and dual-zone automatic discharge
Discharge Timing	10 seconds for manual discharge 20 seconds for automatic discharge
Alarm Sensing Threshold	3.6V
Fault Sensing Threshold	0.53V
Operating Temperature Range	-40° to 85° Celsius



2. Mounting

The panel is mounted vertically by the means of 2 screws through the mounting holes, as shown in the diagram below. It is necessary to complete the wiring and the setting of the DIP switches (used for selecting one of 4 operating modes) before mounting the panel.

Open up the 2 parts of the panel by undoing the 4 screws at the base. There are 12 terminals and a 1/2-way DIP switch on the circuit card in the panel cover. Wiring to the panel can be from the back of the base by drilling a hole of an appropriate size, or from the side of the base by cutting a slot.

A flat base is also available as an accessory for flush-mounting. It is made of 1.5mm steel, and powder-coated matt black. It will reduce the total panel thickness by 11mm.

3. Terminals and Cable Size

Maximum cable size: 1.5mm^2

Terminal 1 – Main supply +ve
Terminal 2 – Main supply –ve
Terminal 3 – Backup supply +ve
Terminal 4 – Backup supply –ve
Terminal 5 – Siren terminal W, –ve on normal, +ve on alarm, end-of-line diode (cathode or bar end)
Terminal 6 – Siren terminal R, +ve on normal, –ve on alarm
Terminal 7 – Discharge terminal W, –ve on normal, +ve on discharge, end-of-3K3
Terminal 8 – Discharge terminal R, +ve on normal, –ve on discharge
Terminal 9 – Zone 1 detector +ve, end-of-line 4K7
Terminal 10 – Zone 1 detector –ve
Terminal 11 – Zone 2 detector +ve, end-of-line 4K7
Terminal 12 – Zone 2 detector –ve

4. Fire Suppressant

Any commercial fire suppressant, such as Pyrogen or FM200, can be used with the panel. Please consult their sales offices for more information. The following description applies to the application of Pyrogen, as it requires special junction boxes for monitoring, if multiple Pyrogen canisters are used.

Pyrogen is a dry-chemical fire suppressant, which is widely used for fire suppression of machinery area. Its method of discharge is by means of a low voltage, low current detonator inside the canister. If a single canister is used, there is no problem, and the wiring is monitored by the panel. When multiple canisters are used, and they are wired in parallel, the panel can only monitor the wiring to the nearest canister, unless special junction boxes (J-boxes) are used. These J-boxes make the canisters appear to have been wired in series for the purpose of monitoring and wired in parallel for the purpose of discharge.

The following J-boxes are available:

- 2-way J-box, for the control of up to 3 Pyrogen canisters.
- 4-way J-box, for the control of up to 5 Pyrogen canisters.

The wiring diagram is explained in **Section 7**, and the J-Box wiring diagram is located on the last page (**page 8**).

5. Discharge Isolation Switch

This is a 2-position rotary switch at the bottom edge of the panel.

In the ISOLATE position, both the positive and negative lines of the discharge circuit are switched open, while maintaining the monitoring of the fire suppressant. This switch adds extra confidence to anyone working in the protected machinery area that there would not be an accidental discharge of the fire suppressant. The switch should be left in the ISOLATE position until a manual discharge is required. If the automatic discharge option is selected during the installation of the panel, this switch should again be left in the ISOLATE position until automatic protection is required.

In the ARM position, the discharge circuit continuity is restored, waiting for the discharge voltage to be applied during a manual or automatic operation.

6. Siren Output

The siren output can be used to operate audio-visual alarms such as strobe lights and sirens for the purpose of fire alert, as well as shutting down exhaust fans and closing ventilation holes to prepare for suppressant discharge. The panel is only capable of supplying 0.5A output at the panel operating voltage. If this output is insufficient, a monitored power-booster relay is available to drive outputs up to 5A. Please refer to **Section 12** for accessories.

7. Wiring

Apart from the main power source, which may be 12 or 24VDC, there should be a backup power source of standby batteries of the same voltage. A diode of sufficient current rating should be wired in order to charge the standby batteries by the main power source charging unit. The panel has no built-in fuses. In-line fuses of sufficient current rating must be provided for both power sources.

All wiring should be done with at least 0.5mm^2 fire-rated cable through metal conduits. Care must be taken so that the cable will never be chafed or cut by the metal conduits, since the power supply negative may be earthed or joined to the same metal surface as the conduit. If thicker wires up to 1.5mm2 are used, use thinner wires to extend to larger terminal blocks where the thicker field wires can be terminated more easily.

The panel monitors the continuity of all wiring, except the power supplies. Short-circuits are not monitored. The principle of end-of-line must be thoroughly understood. The end-of-line (either resistor or diode) draws a small monitoring current through the field wiring, and the loss of this current is monitored as a fault condition.

All detectors have IN and OUT terminals on the detector bases, and the terminals are shorted by the detector heads. The removal of any detector head will open-circuit the field wiring. At the last detector, a 4K7 end-of-line resistor is installed in the OUT terminals.

The monitoring of the siren output is done in a slightly different way. This is necessary because the small monitoring current can cause the sirens to emit a low-volume sound, particularly if they are piezo sirens. The monitoring voltage on the siren output has reversed polarities opposite to those of the normal alarm operation. This allows the use of a diode as the end-of-line, which becomes reverse-biased during normal alarm operation. The diode produces just a small voltage across the sirens, in the order of 0.7V DC, so that it is insufficient to generate any low-volume sound from the sirens during monitoring. The sirens must be wired in the IN-OUT fashion like the detectors, to ensure that the removal of a siren will open circuit the field wiring. The siren terminals are denoted R and W, for RED and WHITE, because they change polarities, and cannot be labelled + and -.The discharge output is monitored also by reversing the polarities. However, this is done for a different reason. If a single fire suppressant canister is used, whether it is Pyrogen or FM200 or others, there is no need for an end-of-line resistor, as the resistance of the discharge detonator or solenoid is sufficient. When more than one canister is used, the J-box described in Section 4 must be installed to allow monitoring of all the canisters. With the polarities of the monitoring voltage, the J-boxes turn the canisters into a series connection. During a discharge operation, the voltage polarities are reversed. This changes the configuration of the canisters into a parallel connection, so that each canister receives the full discharge voltage. The monitoring current in all cases is very low, being 0.4mA for a 24V DC system, and 0.2mA for a 12V DC system. The discharge terminals are also denoted R and W, for RED and WHITE, because they change polarities, and cannot be labelled + and -. Note that each J-box OUT terminals 3 and 4 can be wired to a Pyrogen canister with the same monitoring and discharge capabilities. Hence a 2-way J-box can control 3 canisters and a 4-way J-box, 5 canisters. Thus, one J-box is usually sufficient in most applications.

The diagram on the **last page** (page 8) shows the wiring.

8. Setting the DIP Switches

The 2-way DIP switches on the circuit board next to a terminal block allow one of 4 discharge modes to be selected. These are:

1. Both switches OFF – No automatic discharge, manual discharge only

2. Switch 1 ON, Switch 2 OFF – Any single circuit alarm for automatic discharge; also manual discharge

3. Switch 1 OFF, Switch 2 ON – Circuit 1 alarm for automatic discharge; also manual discharge

4. Both switches ON – Both circuits must be in alarm for automatic discharge; also manual discharge

9. Operation

9.1 Indications

The panel has 7 LED indications. These are:

Green – MAIN POWER ON, in-line fuse OK
Green – BACKUP POWER ON, in-line fuse OK
Red – CIRCUIT 1 ALARM
Red – CIRCUIT 2 ALARM
Amber – FAULT, system fault
Amber – ISOLATED, system isolated
Red – DISCHARGE, flashing if discharge timer is timing, steady if discharge has occurred

Under NORMAL conditions, only the 2 green LEDs should be on.

9.2 Switches

There are 2 modes of operation for the 2 push-buttons switches:

- Any single switch for Isolation, Reset and Test functions
- Both switches together for Manual Discharge function

Single Switch

Pressing any single switch until 1 beep is heard from the panel sounder, then releasing the switch:

The panel is in the isolation mode. The circuits continue to monitor the fire detectors for alarm and fault, and show the alarm and fault indications, but will not operate the siren and the automatic discharge (if automatic discharge is selected by means of the DIP switches). If an alarm or fault condition exists before the switch is pressed, then pressing the switch will silence the siren and the panel sounder, but will not cancel the alarm or fault indication. When a panel is in isolation, any change in the detector status, such as an alarm or a fault occurring, will cause the panel sounder to operate for 1 second as an alert of the status change, but the panel stays in isolation. Pressing any single switch again will remove the isolation condition, and restore the panel to normal.

Pressing any single switch until 1 beep, then 2 beeps, are heard from the panel sounder, then releasing the switch:

The panel is put into the isolation mode at the sound of 1 beep, and the detectors are reset at 2 beeps. The supply voltage to the detectors is removed for 1 second to reset the detectors. Pressing any single switch again will restore the panel to normal.

Pressing any single switch until 1 beep, then 2 beeps, then 3 beeps, are heard from the panel sounder, then releasing the switch:

The panel is put into the isolation mode at the sound of 1 beep, and the detectors are reset at 2 beeps. At 3 beeps the panel is in the TEST mode, at which all the panel LEDs, the panel sounder and the siren output are operated for 2 seconds in order to check if they are healthy. At the end of the test, the panel automatically returns to normal. There is no need to press the switch again.

Both Switches

The manual isolation switch at the bottom of the panel must be turned to ARM DISCHARGE before operating both switches to do a manual discharge of the fire suppressant.

Pressing both switches together for 10 seconds, even when the panel is in electronic isolation, will produce a manual discharge of the fire suppressant. During these 10 seconds before the discharge, the DISCHARGE LED, the panel sounder and the siren will pulsate at 1 Hz. At the end of the 10 seconds when the discharge occurs, the DISCHARGE LED, the panel sounder and the siren will be steady. The panel will return to normal when the switches are released.

Note that the discharge current is maintained for 10 seconds, so that even if the switches are released, there will be sufficient time for the discharge to complete its operation.

9.3 Automatic Discharge

To prevent any accidental discharge of the fire suppressant, the manual isolation switch at the bottom of the panel must be left in the ISOLATE position, until automatic discharge protection is required. It may even be advisable to leave the manual isolation switch in the ISOLATE position all the time, even during the automatic discharge mode of operation. By doing that, there is sufficient time to evacuate the protected area, and to make sure all the ventilation holes are closed, before initiating the discharge by operating the manual switch to the ARM DISCHARGE position.

There are 3 different modes of automatic discharge as indicated in **Section 8**. When the panel receives the alarm condition that initiates the discharge, it will enter the 20-second discharge timing stage. The panel sounder, the siren and the discharge LED on the panel will pulsate at 1 Hz. The timing can be stopped by pressing a single switch once to isolate, and can be resumed by pressing the switch again. The discharge can be cancelled by resetting the detectors.

At the end of the timing, the fire suppressant will be discharged. The panel sounder, the siren and the discharge LED will become steady. The discharge voltage is maintained until a single switch is pressed to isolate the system, or until the manual isolation switch is turned to ISOLATE.

10. Fault Sensing and the Panel Sounder

The panel has a comprehensive fault monitoring system. It detects any open-circuit in the field wiring to the detectors, the siren and the fire suppressant. It also monitors internal malfunctions:

1. Loss of the 5V power supply to the microprocessor – panel sounder continuous
2. Microprocessor malfunction – panel sounder pulsating

In the event of an external fault, the panel sounder is continuous, but can be isolated by pressing a single switch till 1 beep. This is used to differentiate from the loss of the internal 5V supply where the sounder cannot be isolated.

If an external fault does not disable a fire detector, then the panel alarm function is still operating, even though it is in a fault condition. The fault indicator LED remains lit as a reminder that a fault exists.

The panel sounder will operate when there is an alarm, or a fault, or when a switch is pressed. It will also indicate the progress of the discharge timer. When the panel is isolated, the occurrence of an alarm or a fault will also operate the sounder for 1 second as an alert, even though the panel stays isolated.

11. Fault Finding

Since there is only one FAULT indicating LED for a host of possible fault conditions, fault-finding can be difficult unless it is done in a methodical way. In general, there are 2 types of faults, internal – which cannot be isolated, and external – which can be isolated.

11.1 Internal Fault

If a fault occurs and cannot be isolated by pressing a single switch once, then it is an internal fault. This can be:

A) Loss of the internal 5V supply, turning on the fault LED and a steady sounder
B) Loss of the watch-dog circuit, turning on the fault LED and a steady sounder
C) Loss of the microprocessor, turning on the fault LED and a pulsing sounder

Disconnect power to the panel by unplugging the 1-6 connector. Wait a few seconds and then re-plug the 1-6 connector again. By powering down the panel and powering up again, the system may be reset to normal conditions. If the fault persists, the panel will have to be repaired by the manufacturers.

11.2 External Fault

If a fault occurs and can be isolated by pressing a single switch once, then it is an external fault. This can be:

A) loss of a siren/strobe, or an open-circuit in the output wiring
B) loss of a discharge canister, or an open-circuit in the discharge wiring
C) loss of a detector head, or an open-circuit in the detector wiring

Make sure there is no alarm in the system and isolate the panel by pressing a single switch once.

Temporarily short-circuit the siren/strobe output terminals 5 and 6. If the fault disappears, then there is an open-circuit in the output wiring.

Temporarily short-circuit the discharge terminals 7 and 8. If the fault disappears, then there is an open-circuit in the discharge wiring.

Temporarily short-circuit the zone 1 detector terminals 9 and 10. If the fault disappears, then there is an open-circuit in the zone 1 detector wiring.

Temporarily short-circuit the zone 2 detector terminals 11 and 12. If the fault disappears, then there is an open-circuit in the zone 2 detector wiring.

If the fault cannot be fixed or identified, return the panel to the manufacturers for checking and repair.

12. Accessories

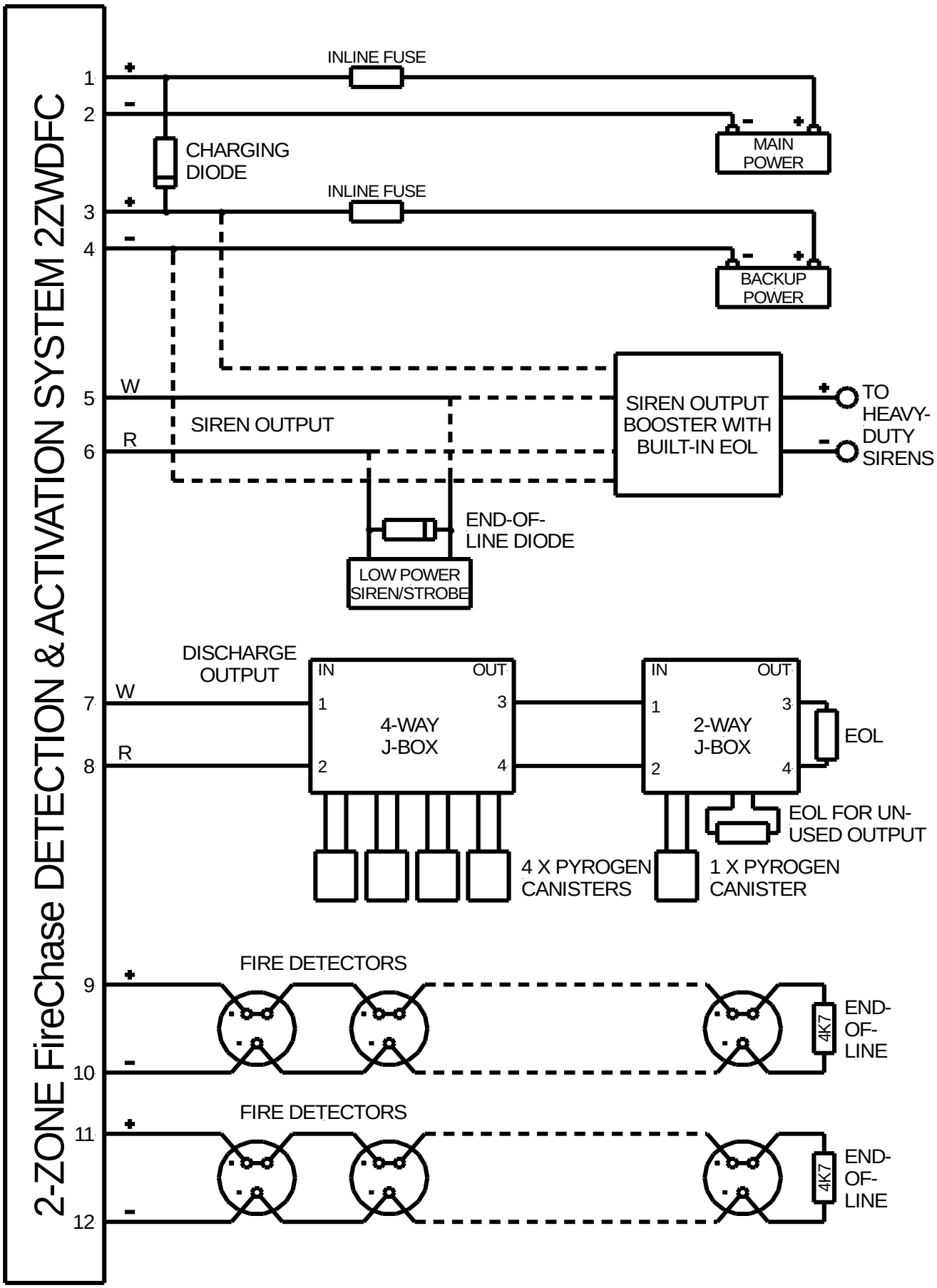
The following accessories are supplied with the panel:

- 2x 4K7 end-of-line resistors for the detector circuits
- 1x 1N4004 end-of-line diode for the siren
- 1x 3K3 end-of-line resistor for the discharge circuit
- 1x 1N5404 charger diode
- 1x Operator’s manual
- 4x Self-tap screws

The following accessories are available:

- Pyrogen 2-way junction box (2-way J-box)
- Pyrogen 4-way junction box (4-way J-box)
- Light-duty combination siren and strobe with built-in end-of-line
- Heavy-duty combination siren and strobe with built-in end-of-line
- Siren output power booster relay
- Fixed-temperature fire wire
- Photo-optical smoke detector
- Ionization smoke detector
- Thermal detector
- Surface-mounted red breakglass for alarm, or yellow breakglass for discharge
- 12V 7AH battery
- Battery box
- Flush-mounting flat base

Wiring Diagram:



13. Contact Information:

Website: artek.net.au
Email: sales@artek.net.au