Operation /Technical Manual

# FT2FP

# Dual Zone Fire Control & Indication Equipment

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# DOCUMENT HISTORY

| Issue | Date | Description | Written By | Checked By | Approved By |
|---|---|---|---|---|---|
| Draft | 01 July 2008 | Original Document. | W. Zhong | A. Shenouda | |
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| 1.1 | 17 May 2010 | Update block wiring diagram | A.Shenouda | | |

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- Manual part number and revision (found on the front cover)
- Page number
- Brief description of the content which you think should be improved or corrected
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## READ AND OBSERVE THE FOLLOWING WARNINGS PRIOR TO OPERATING THE CIE

**WARNING:** Improperly operating the CIE may cause serious consequences including fatal injury, personal harm, damage or loss of property and equipment and interruption to the site normal functions.

**WARNING:** Contact the Fire Brigade immediately in the case of a fire alarm regardless of whether the CIE supports fire alarm routing equipment or automatic fire protection equipment.

**WARNING:** Always perform installation, maintenance and service in accordance with all the relevant standards and regulations.

**WARNING:** Always install and operate in accordance with Brooks equipment instructions.

**WARNING:** Any controls provided by the CIE are for fire protection purposes only. Do not rely on the CIE to operate external equipment for any other purposes.

**WARNING:** The Brooks CIE monitors the wiring conditions by using the end of line devices. However it is not capable of detecting the internal conditions of any associated external equipment unless the system is specially arranged to monitor those conditions. The external equipment shall be operated and maintained according to its own specific operation and maintenance procedures.

# 1. ABOUT THIS MANUAL

## 1.1 PURPOSE

This manual is designed to be the reference point for the Brooks Dual Zone Fire Control & Indication Equipment (CIE) and provides the technical and operational instructions to the installer / user. The document is intended to be used by the end user, service and commissioning personnel. It provides detailed information required for installation, commissioning and operation.

The manual provides the following details for the Brooks Dual Zone Fire Control & Indication Equipment:

- Technical instructions
- Operating instructions
- Indicators and controls
- Input and output cabling and connectivity.
- Power supply calculation documents
- Datasheets
- Block wiring diagrams

## 1.2 REFERENCED DOCUMENTS

| | |
|---|---|
| AS7240.2 | Fire detection and alarm systems<br>Part 2: Control and indicating equipment (ISO7240-2:2003, MOD) |
| AS7240.4 | Fire detection and alarm systems<br>Part 4: Power supply equipment (ISO7240-4:2003, MOD) |
| NZS4512-2003 | New Zealand Standard<br>Fire Detection and Alarm Systems in Buildings |
| AS1670.1-2004 | Fire detection, warning, control and intercom systems-System<br>Design and commissioning – Part 1: Fire |
| AS/NZS 3000-2007 | Australian / New Zealand Standard<br>Electrical Installations (Known as Australian/New Zealand Wiring Rules) |

# 2. FT2FP TECHNICAL DESCRIPTIONS

## 2.1 SYSTEM OVERVIEW

A typical Brooks FT2FP system is comprised of the following:

- Brooks FT2FP Dual Zone Control module (SUB922) and Display Modules (SUB923)
- Switch Mode AC/DC Power Supply and backup batteries
- Brooks voice / tone warning speakers
- Optional Panasonic web server for remote monitoring of the CIE.

The zone control module (SUB922) and the zone display module (SUB923) provide the two-zone fire panel functions which are required by Australian Standards AS7240.2 & AS7240.4. In addition, the main control module provides RS232 output to connect to an optional web server for remote monitoring over Ethernet.

The standard FT2FP CIE is fitted with a 60 Watt DIN rail switch mode power supply (2.2A @ 27.5V) and can house up to 2x 12Ah sealed lead acid (SLA) batteries made by BB Batteries. A battery and power supply calculation should be performed to verify the suitability of this standard product for use in the intended application, refer to Appendix D on page 27.

## 2.2 FEATURES

The Brooks FT2FP dual zone control and indicating equipment has the following features:

- An intelligent microprocessor based system for the two zones CIE functions to meet the requirements of the Australian standard AS7240.2.
- Fully supervised power supply to meet the requirements of the Australian standard AS7240.4.
- Intuitive indication and controls via the well-grouped LED indicators and switches.
- Fully supervised zone input circuits.
- Fully supervised 24V output for alarm devices rated @1A maximum. The output, once activated, can be disabled separately via the silence (alarm device) switch.
- Common Alarm dry-contact relay output rated @ 2A maximum.
- Common Fault (Defect) dry-contact relay output rated @ 2A maximum.
- Common Isolate dry-contact relay output rated @ 2A maximum.
- Two user configurable programming dry-contact relay outputs rated @ 2A maximum.
- Provision for connection of an optional Panasonic web server to provide Ethernet connectivity with web pages and email alerts.
- Transient suppression protection comprising metal oxide varistors (MOV) and transorbs to all inputs and outputs.

**Note:** ***the current rating mentioned above is the maximum current capacity of the outputs, a power supply calculations must be performed to ensure that the power supply capacity is sufficient to run the system in full alarm condition without exceeding the maximum current rating of the power supply.***

## 2.3 SPECIFICATIONS

Table 1 General Specifications

| Feature | | Specification |
|---|---|---|
| Mains Power Supply | | 230V AC, +/- 20%. Wattage 70W (maximum 2.5 A@27.5V) |
| Standby Battery | | 2 x 12V sealed lead acid batteries up to 12 AH (BB Battery BP series) refer to power supply calculations, APPENDIX D on page 27 |
| System Access Security | | **Access Level 1:** General - Outer door locked no access to controls. All status LED indicators viewed through transparent panel on the outer door.<br>**Access Level 2:** Operator - Outer door opened via a 003 key. Front panel controls are accessible.<br>**Access Level 3:** Technician - Outer door opened via a 003 key, inner door opened via tool. Panel circuitry, power supply, batteries and wiring termination accessible. |
| Operating Temperature | | 0°C to +40°C. |
| Operating Humidity | | 5-95%, non-condensing. |
| Enclosure | IP Rating | IP31 |
| | Material | 1.5mm zinc anneal steel powder coated oyster. |
| | Dimension | 400mm H x 320mm W x 165mm D (with door closed) |
| | Weight | 10Kg. ( without backup battery and web server) |
| Design Standards | | AS7240.2-2004, AS7240.4-2004 |
| Applications | | Not suitable for use within any hazardous locations unless applying proper safety techniques according to the related hazard regulations. Installed in an indoor environment only. |

## 2.4 OPERATION

### 2.4.1 DISPLAY LAYOUT

The FT2FP dual zone CIE display is shown in Figure 2.

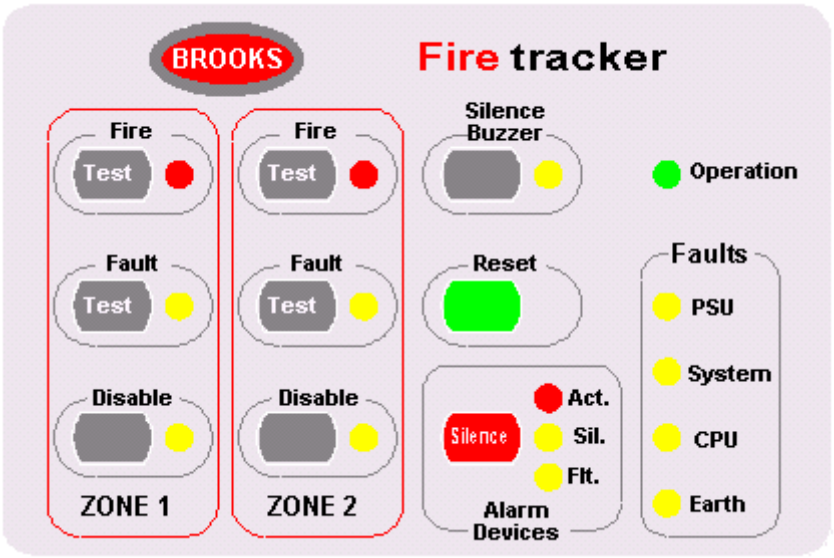



Figure 1 FT2FP Dual Zone CIE display layout

All the control buttons and LEDs on the front display of the control panel are a pushbutton covered with a polycarbonate overlay decal which is labeled with the buttons function.

Whilst the system is in the normal condition, only the “Operation” (green) LED will be visible.

All other LED indications will be off.

## 2.4.2 CIE CONTROLS

The system controls can be carried out by operating the momentary push-button switches on the front display. The system controls are detailed in the following table.

Table 2 System Controls

| Location | Control | Condition | Description |
|---|---|---|---|
| FT2FP CIE | Zone 1 or 2 Alarm Test | Zone 1 or 2 is not in alarm or fault condition. | Perform Zone 1 or 2 Alarm Test (internal to the CIE only). The alarm test state will be cancelled automatically when the internal test is completed. |
| | Zone 1 or 2 Fault Test | Zone 1 or 2 is not in alarm or fault condition. | Perform Zone 1 or 2 Fault Test (internal to the CIE only). The fault test state will be cancelled automatically when the internal test is completed. |
| | Zone 1 or 2 Disable | Zone1 or 2 is in any condition. | Disable or re-enable Zone 1 or Zone 2. |
| | Silence Alarm Devices | Output for alarm devices is in the active state. | Disable or re-enable alarm devices. |
| | System Reset | CIE is in Fault or Alarm conditions. | Reset alarm condition, alarm devices must be silenced first.<br>Reset fault conditions.<br>Any condition which has not been rectified will re-activate. |
| | LED Test | Press and hold both Silence Buzzer and Reset buttons.<br>Correct operation of this function can only be expected when the system is in “normal” status. | When the control is activated:All LEDs, except the CPU Fault LED, illuminate.The buzzer turns on continuously. |

### 2.4.3 INDICATING PATTERNS

The CIE buzzer uses the following patterns to indicate the system conditions.

Table 3 Buzzer Indicating Patterns

| Name | Period | On Time | Off Time |
|---|---|---|---|
| Pulsing | 3s | 2s | 1s |
| Key Pressed | 40ms | 40ms | Always OFF, only one beep when pressed |
| Continuous | Buzzer sounds continuously | | |

The CIE LED indicators use the following flash patterns to signal the system conditions.

Table 4 LED Flash Patterns

| Name | Flash times |
|---|---|
| Flash fast | One flash every 0.5sec |
| Flash 1 | One flash every 2.5sec |
| Flash 2 | Two flashes every 2.5sec |
| Flash 3 | Three flashes every 2.5sec |
| Steady ON | Steady illumination |

### 2.4.4 CIE INDICATIONS

The dual zone CIE condition indicating LEDs and flash patterns are described in the following table 5. The default state of the LED indicators and the buzzer is OFF, if it is not defined below.

Table 5 CIE Indicating LEDs and flash Pattern

| Type | CIE Conditions | LED Name | LED Color | LED Pattern | Buzzer Pattern |
|---|---|---|---|---|---|
| Fire | Zone 1 alarm | Zone 1 Alarm | Red | Fast Flash | Pulsing |
| | Zone 2 alarm | Zone 2 Alarm | Red | Fast Flash | Pulsing |
| Fault | Different fault conditions | Different fault indicators | Yellow | Based on fault types | Continuous |
| Test | Zone 1 alarm test | Zone 1 Alarm | Red | Steady ON | Off |
| | Zone 2 alarm test | Zone 2 Alarm | Red | Steady ON | Off |
| | Zone 1 fault test | Zone 1 Fault | Yellow | Steady ON | Off |
| | Zone 2 fault test | Zone 2 Fault | Yellow | Steady ON | Off |
| Disablement | Zone 1 disabled | Zone 1 Disable | Yellow | Steady ON | Off |
| | Zone 2 disabled | Zone 2 Disable | | | |
| Operation | System running | Operation | Green | Steady ON | Off |
| Silence Alarm Devices | Alarm devices output activated | Silence Alarm Devices – “Act.” | Red | Steady ON | N/A |
| | Alarm devices output de-activated | Silence Alarm Devices – “Sil.” | Yellow | Steady ON | |
| Silence Buzzer | Buzzer is silenced manually | Silence Buzzer | Yellow | Steady ON | OFF |
| LED Test | The system is in the LED test conditions | All the LEDs except the CPU Fault LEDs | N/A | Steady ON | Continuous |

### 2.4.5 FAULT INDICATIONS

Many fault LED indicators have multiple indicating patterns to provide more information on the causes of the faults. The fault LED indicating patterns are detailed in table 6.

Table 6 Display Fault LED Indications

| LED Indicator | LED Pattern | Description |
|---|---|---|
| Zone Fault | Steady ON | Multiple faults detected. |
| | Flash 1 | Zone open circuit fault. |
| | Flash 2 | Zone short circuit fault. |
| | Flash 3 | Zone test fault. A fault is detected during the zone alarm/fault test. |
| Alarm Devices Fault (Flt.) | Steady ON | Multiple faults detected. |
| | Flash 1 | Alarm devices open circuit fault. |
| | Flash 2 | Alarm devices short circuit fault. |
| CPU Fault | Steady ON | CPU fault condition detected. |
| System Fault | Steady ON | Multiple faults detected |
| | Flash 1 | FT2FP communication fault (only if the Panasonic web server is installed) |
| | Flash 2 | FT2FP display module fault |
| | Flash 3 | Monitored power supply output failed |
| PSU Fault | Steady ON | Multiple power supply faults detected. |
| | Flash 1 | Mains high fault. |
| | Flash 2 | Mains low or charger low fault. |
| | Flash 3 | Battery low fault |
| Earth Fault | Steady ON | Multiple faults detected. |
| | Flash 1 | A leakage between the GND (-ve) and the earth is detected. |
| | Flash 2 | A leakage between the +24V and the earth is detected. |

## 2.5 CIE INPUTS AND OUTPUTS

### 2.5.1 FIRE DETECTION ZONE INPUTS

The zone specifications and the compatible devices are listed in table 8.

#### 2.5.1.1 ZONE INPUT CIRCUIT SPECIFICATIONS

Table 7 Zone Input

| Item | Description |
|---|---|
| Number of zones in one CIE | 2 zones |
| Number of detectors per zone | 0 – 40, including MCPs if any |
| Maximum number of detectors in alarm per zone | Up to 2 detectors per zone, including MCPs, heat and/or smoke detectors. |
| Zone current per zone | 0 – 51mA |
| Typical Zone quiescent current per zone | 5mA |
| Typical zone input resistance in alarm conditions per zone | 560 Ohm |

The typical zone input circuit is shown in figure 3 as follow.

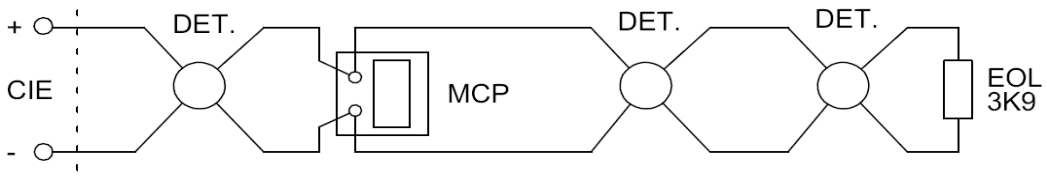



Figure 2 Zone Input Circuit

Each zone input circuit is fully supervised for open circuit and short circuit faults. The End Of Line (EOL) resistor type is 3K9, 1W, 1%, metal film.

#### 2.5.1.2 ZONE INPUTS COMPATIBLE ACTUATING DEVICES

Table 8 Compatible devices

| Part No. | Description |
|---|---|
| 4350 | Conventional multi detector |
| 4352 | Conventional photoelectric smoke detector |
| 6295 | Conventional enclosed heat detector 60 degrees |
| 6296 | Conventional enclosed heat detector 80 degrees |
| 6297 | Conventional enclosed heat detector 100 degrees |
| 6298 | Conventional enclosed heat detector 120 degrees |
| 4318 | Conventional combination heat detector Type A/B |
| 4375 | Conventional heat detector 60 degrees |
| 4376 | Conventional heat detector 80 degrees |
| MRCSRR | Red MCP c/w 470 or 680 Ohm series alarm resistance. |

## 2.5.2 CONTROL INPUT AND OUTPUT

### 2.5.2.1 NON SUPERVISED OUTPUTS

The standard FT2FP module provides the following five non-supervised outputs:

- Alarm relay output, changeover voltage free contacts
- Fault relay output, changeover voltage free contacts
- Isolate relay output, changeover voltage free contacts
- Programmable Relay 1 output, changeover voltage free contacts
- Programmable Relay 2 output, changeover voltage free contacts

The current carry capacity of each relay contacts is 2A. @ 30V DC.

Each relay has three terminals for the Normally Open, Normally Close and Common connections.

The Programmable Relay 1 and 2 are user configurable. Refer to the DIP switch configuration section.

### 2.5.2.2 ALARM DEVICES OUTPUT

FT2FP control module provides 22-30V DC supervised output which can be used to activate warning devices such as sounders, strobes, etc. The front display of FT2FP has a segregated section for warning system output which includes a disable facility with LED to confirm switch operations, fault and fire indications.

The warning system output can also be used to control external relays to control ancillary equipment. Figure 4 shows the connection diagram and the EOL resistor. Series diode must be fitted if the ancillary devices have no polarity.

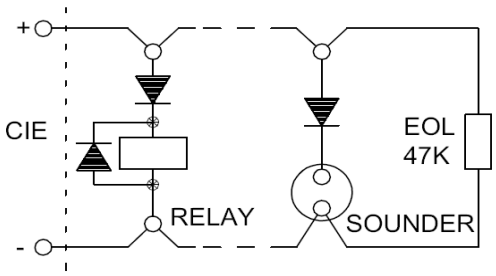



Figure 3 Typical Relay or Sounder Control Circuit

The alarm devices output is 22-30V DC, maximum current is 1A. The output is fully supervised for open and short circuit faults. The EOL resistor type is 47K, 1/2W or 1W, 1%, metal film.

### 2.5.2.3 EXTERNAL BUZZER

The FT2FP control module has an internal PCB mounted buzzer which meets the buzzer sound level requirement of 65dB at 1 meter distance. If the internal buzzer sound level is insufficient, an external buzzer can be installed to the CIE front plate. To disable the PCB mounted buzzer, the resistor R8 on the FT2FP control board needs to be removed.

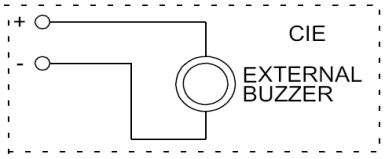



Figure 4 External Buzzer Circuit

### 2.5.2.4 DIP SWITCH CONFIGURATIONS

One 4-way DIP switch on the FT2FP control module (SUB922) is provided for system configuration. The designation of the switch is SW1.

Table 9 FT2FP Control Module DIP (4-way) Switch Configurations

| Purpose | Switch Number | Status | Description |
|---|---|---|---|
| Programmable relay controls | SW3-SW4 | SW3 OFF<br>SW4 OFF | Both Relay 1 and Relay 2 activate in common alarm conditions |
| | | SW3 ON<br>SW4 OFF | Relay 1 activates only when the Zone 1 is in alarm conditions,<br>Relay 2 activates only when the Zone 2 is in alarm conditions. |
| | | SW3 OFF<br>SW4 ON | Relay 1 activates only when the system is in common alarm conditions.<br>Relay 2 activates only when the system is in common fault conditions. |
| | | SW3 ON<br>SW4 ON | Relay 1 activates only when one of the two zones is in alarm conditions,<br>Relay 2 activates only when both zones are in alarm conditions. |
| Zone alarm verification | SW2 | SW2 ON | Enable alarm verification |
| | | SW2 OFF | Disable alarm verification. (default setting) |
| Zone latch | SW1 | SW1 ON | Zone alarm is non-latching |
| | | SW1 OFF | Zone alarm is latching (default setting) |

## 2.6 POWER SUPPLY UNIT (PSU)

### 2.6.1 PSU SPECIFICATIONS

The main power source of the standard FT2FP CIE is a 60W DIN rail switch mode power supply, the maximum current capacity is up to 2.1A @ 28V DC. The PSU supports the following:

- Total current required for the internal circuits
- Battery charging current
- Maximum current required to drive external loads
- Current required for optional web server and any additional loads.

**WARNING:** The maximum CIE current capacity shall not be exceeded in any applications. Otherwise the fuses on the control board may blow and the CIE hardware may be damaged. Check system design against the power supply and battery calculation spreadsheet in APPENDIX D on page 27.

Table 10 Basic mains power supply requirement

| Characteristics | Typical | Range |
|---|---|---|
| Input Voltage Range | 230V AC | 170-264VAC |
| Input Voltage Frequency | 50Hz | 47- 63 Hz |
| Output Voltage | 27.5V | +/- 1% |
| AC Input Current | < 2A | Varies based on the applications |
| DC Output Current | 2.1A @ 28V | Varies based on the applications |

Larger power supplies can be used depending on the applications.

The output voltage of the power supply is factory set, it may need to be checked and calibrated on-site.

The calibration procedure is as follows.

- Use a calibrated and certified multimeter to measure the DC voltage of the battery connection (between TB1 POWER IN + and POWER IN -) on the FT2FP main control board or the battery terminals.
- Adjust the AC/DC power supply potentiometer until the multimeter reading stabilized between 27.3V – 27.5V DC.

**WARNING: 240V AC.** Care must be taken when adjusting the AC/DC power supply.

The standard FT2FP system accommodates up to 12AH batteries.

**WARNING: It is recommended to use BP series Batteries manufactured by BB Battery.**

### 2.6.2 PSU SUPERVISION

The CIE constantly monitors the mains power supply, battery charger voltage and batteries and will initiate a PSU fault if the voltage of the charger or batteries exceeds the limits as per the following table.

Table 11 Typical Power Supply Supervision Characteristics

| Characteristics | Threshold |
|---|---|
| Secondary Low Fault | 24V, Measured on the battery terminals |
| Battery Automatic Cut Off | 20.7V, Measured on the battery terminals, when the mains is not available. |
| Main Power High Fault | 30.5V, Measured on the main power source output terminals |
| Main Power Low Fault | 22.1V, Measured on the main power source output terminals |
| Secondary Charging Voltage Low Fault | 24.3V, Measured on the battery terminals |
| Automatic Battery Test | The system automatically runs on battery only for one hour every 70 hours and closely monitors battery voltage during this period. The test terminates automatically when any power supply fault or an alarm condition being detected. |

### 2.6.3 PSU CURRENT CALCULATIONS

The following shall be calculated according to the application requirements of the related current standards, such as AS7240.2, AS1670.1, NZS4512 2003.

1. Battery capacity calculation
2. AC/DC power supply current capacity requirement

The typical system current consumptions are listed below.

- Quiescent Current, $I_Q$ = 35 mA
- Alarm Current, $I_A$ = 120 mA

The alarm state current is measured when two zones are in high priority alarm conditions, all the outputs are activated. The quiescent state current is measured when all the common condition relays except the common fault relay are de energized. No power output current has been included.

**WARNING:** The current consumption data above does not include any current supplied to the external devices. The actual current consumption shall be re-calculated based on the actual system configurations. Refer to the power and battery calculation spreadsheet in APPENDIX D on page 27.

# 3. INSTALLATION AND COMMISSIONING

The installation and commissioning of Brooks FT2FP CIE shall be carried out by qualified installers following the requirements of all the related current standards and regulations, such as AS1670.1, AS/NZ 3000 and AS/ACIF S-009. Additional procedures detailed in this chapter shall also be followed.

If any measurement is required during the installation and commissioning, only a calibrated and certified multimeter shall be used. The CIE test results and maintenance history shall be recorded in the form provided in APPENDIX E on page 28, APPENDIX F on page 29 and APPENDIX G on page 30.

## 3.1 VISUAL INSPECTION

Before applying any power to the panel, the following visual inspection shall be performed:

- Check cabinet general appearance
- Check all modules firmly mounted and secured
- Check mains cabling correctly terminated
- Check earthing correctly terminated and secured
- Check all ribbon cables firmly secured
- Check all field cables and detector connections for correct polarity.
- Check that EOL resistors are fitted to each detector circuit at the last detector. Ensure the resistance value is correct as per the drawings.
- Check that EOL resistors are fitted to every supervised output at the last device. Ensure the resistance value is correct as per the drawings.
- Check all the jumpers and DIP switches are set correctly.

## 3.2 RESISTANCE CHECK

Before applying any power to the system, resistance checks shall be carried out as per APPENDIX E – commissioning record on page 28. The multimeter readings and inspection results shall be recorded in the related spreadsheet shown in APPENDIX E – commissioning record on page 28.

## 3.3 FUNCTIONAL TESTING

This section describes the system testing and commissioning procedures to ensure that the FT2FP is fully functional. All field wiring shall be terminated in FT2FP main control module.

### 3.3.1 FT2FP CIE TEST

#### 3.3.1.1 POWER SUPPLY CHECK

Before applying any power to the CIE, the voltage of each battery shall be measured, if the voltage is less than 10.7V, the battery shall be replaced since it could have been deeply discharged or over its allowed life cycle.

Turn ON the mains isolate switch and measure the voltage across the battery leads without physical connection to the batteries, The DC voltage shall be 27.3V – 27.6V (factory set). If the voltage is not within the specified limits, adjust the trimpot of the switch mode power supply until the voltage becomes within 27.3-27.6V.

Connect the batteries, only the green “Operation” LED shall be ON, any other indicators and the buzzer must be OFF

#### 3.3.1.2 ALARM TEST

1. Press the “Fire” test button of zone 1, the buzzer will sound and the fire LED illuminates steady for approximately 3 seconds then turns OFF and the buzzer silences. No other LEDs shall be illuminated.
2. Repeat step 1 for zone 2.
3. Using a smoke can, spray a detector in zone 1 input (680Ω resistor can be used to simulate zone alarm), check the following:
    - Zone 1 “Fire” LED flashes once every 0.5 second as well as silence alarm devices “Act.” LED
    - Audible Alert tone is activated (if Brooks sounder is used).
    - Press “Silence Buzzer” button, the buzzer should silence.
    - Press “Silence Alarm Devices” (if audible sounders are used) then press “Reset” to reset the alarm.

      **Note:** *The alarm “Reset” must be preceded by “Silence Alarm Devices”, this sequence shall be followed.*
4. Repeat Step 3 for Zone 2 while zone 1 is not active.

### 3.3.2 FAULT TEST

1. Press zone 1 and zone 2 “Fault Test” button, “Zone Fault” LED of each zone illuminates steady for approximately 3 seconds.
2. Remove a detector head or end of line resistor, the corresponding “Zone Fault” LED flashes once every 2.5 seconds (open circuit),
3. Simulate short circuit across a zone, the “Fault” LED of that zone flashes twice every 2.5 seconds,
4. Remove the end of line resistor of the Alarm Device output (may be labeled as ACF on the early version of the PCBs), the “Silence Alarm Devices Flt.” LED flashes once every 2.5 Seconds. For short circuit test, the LED flashes twice every 2.5 seconds.

# 4. APPENDICES

## 4.1 APPENDIX A - CONNECTIONS

The following are the connection details and printed circuit board layouts of the FT2FP Control Modules. The connection details to the remaining boards and equipment (PSU, display boards, LCS, and Warning Signs) are shown in the block wiring Diagrams in on page 34.

### 4.1.1 FT2FP MAIN CONTROL MODULE

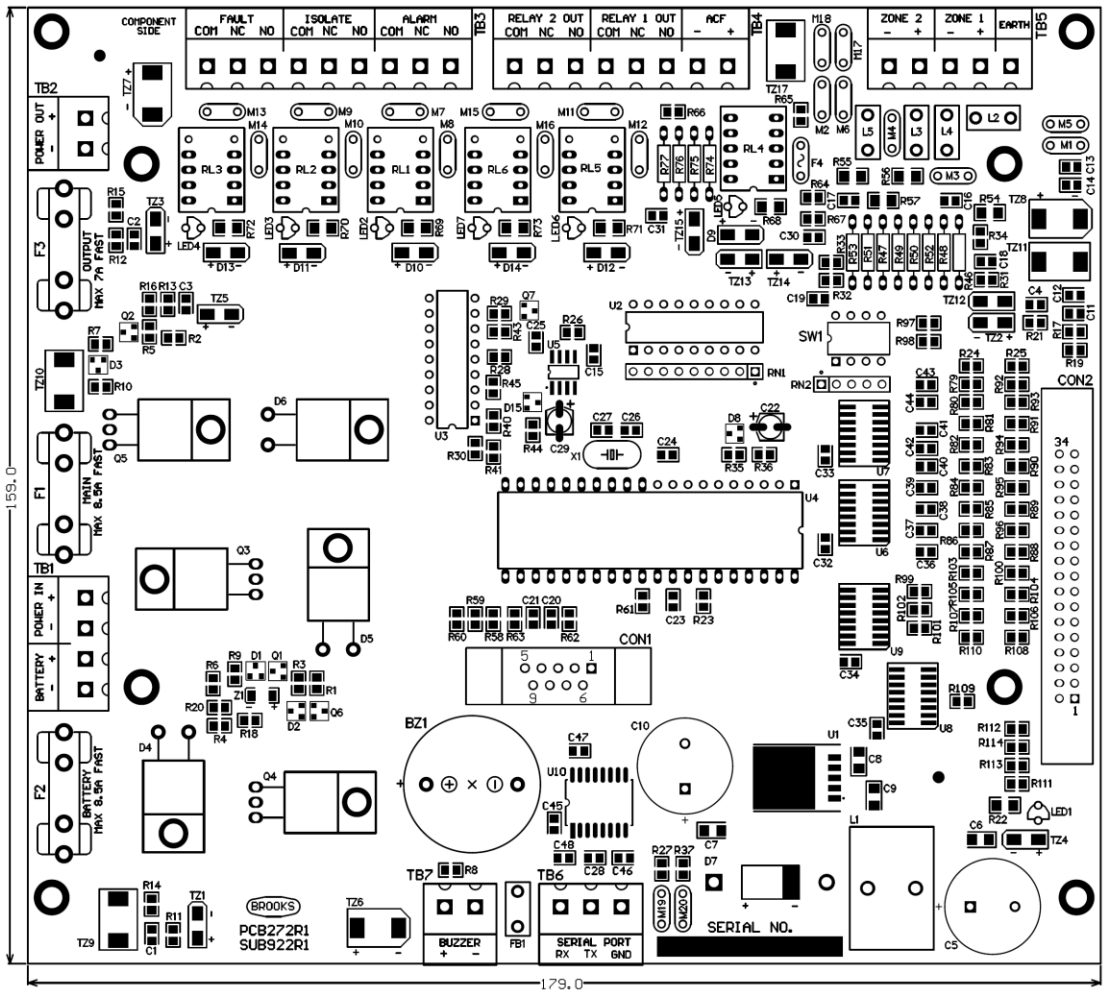



Figure 5 FT2FP Control Module PCB Layout

Table 12 FT2FP Control Board Connections

| Designator | Type | Pin | Label | Description |
|---|---|---|---|---|
| TB1 | Removable screw terminal block | + | POWER IN | Power Input from the AC/DC power supply.<br>22-27.6V DC, <= 2.2A |
| | | - | | |
| | | + | BATTERY | External battery connection<br>22-27.6V DC, <= 2.2A |
| | | - | | |
| TB2 | Removable screw terminal block | + | POWER OUT | Power output to the Gas Module power input<br>22V-27.6V DC, <= 2.2A |
| | | - | | |
| TB3 | Removable screw terminal block | NO | ALARM | Alarm relay output<br>Dry-contact output. <= 2A, < 30V |
| | | NC | | |
| | | COM | | |
| | | NO | FAULT | Fault relay output<br>Dry-contact output. <= 2A, < 30V<br>NOTE - Relay is normally energized |
| | | NC | | |
| | | COM | | |
| | | NO | ISOLATE | Disablements relay output ,<br>Dry-contact output. <= 2A, < 30V |
| | | NC | | |
| | | COM | | |
| TB4 | Removable screw terminal block | + | ACF (Used as Alarm Device Output) | 22V-27.6V DC, <= 1A |
| | | - | | |
| | | NO | RELAY 1 OUT | Zone alarm 1 relay output.<br>Dry-contact output <= 2A, < 30V |
| | | NC | | |
| | | COM | | |
| | | NO | RELAY 2 OUT | Zone alarm 2 relay output.<br>Dry-contact output <= 2A, < 30V |
| | | NC | | |
| | | COM | | |
| TB5 | Removable screw terminal block | N/A | EARTH | Solid Earth connection shall be provided. |
| | | + | ZONE 1 | Compatible with approved detectors and MCPs.<br>With the following features,<br>• Alarm latching or non latching<br>• Alarm Verification enabled or disabled. |
| | | - | | |
| | | + | ZONE 2 | |
| | | - | | |
| TB6 | Removable screw terminal block | RX | SERIAL PORT | Receive Pin. Connects to Web Server TXD (S) |
| | | TX | | Send Pin. Connects to Web Server RXD (R) |
| | | GND | | Ground. Connects to Web Server GND (G) |
| TB7 | Removable screw terminal block | + | BUZZER | External buzzer output,<br>An external buzzer is required only when the sound level of the internal buzzer is insufficient. |
| | | - | | |
| CON1 | DB9 female connector | N/A | N/A | Not used in FT2FP. |
| CON2 | IDC 34 connector | N/A | N/A | Connect to the FT2FP Display Board. |

## 4.2 APPENDIX B – SYSTEM FUSE DETAILS

The system fuses are listed as follows.

Table 13 Fuse Specifications

| Board | Designator | Circuit Protected | Specification |
|---|---|---|---|
| FT2FP Control Board SUB922R1 | F1 | Main power input | M205, glass sealed, fast blow or very fast blow, 2A, defined by the application. |
| | F2 | Battery power input | M205, glass sealed, fast blow or very fast blow, 2A, defined by the application. |
| | F3 | Power output | M205, glass sealed, fast blow or very fast blow, 1A, defined by the application. |
| | F4 | ACF | Resettable, poly fuse, 1.1A, <= 30V DC. |

# 5. APPENDIX C - CABLE TYPES AND CALCULATIONS

## 5.1 GENERAL REQUIREMENT

The CIE cable type and cable installation shall follow all the application related current standards and regulations, such as the AS/NZ 3000, AS/ACIF S-009, AS1670, NZS4512 and AS4655 standards.

## 5.2 REAL CABLE RESISTANCE

The maximum system cable length is mainly determined by the cable cumulated resistance. The cumulative cable resistance is the total resistance of all installed copper wire used in the related circuit loop, including both the supplying path and the returning path.

The cable resistance character is generally specified in ohms per meter by the cable manufacturer. However in the cable calculations, the real cable resistance shall be used, which includes the following modifications of the manufacturer specified value.

1. The manufacturer specified value shall be doubled for twisted-pair cables.
2. The total cable length shall include both the supply path and the return path. The manufacturer specified value shall be doubled for multiple core cable so that both the supply and the return paths are considered.

For example, if the manufacturer specified cable resistance of a twisted pair cable is 0.05 Ohms per meter, the real cable resistance per meter will be 0.05 X 2 X 2 = 0.2 Ohms per meter. If the cable length is 100 meters, the cable cumulated resistance is 0.2 X 100 = 20 Ohms.

## 5.3 ZONE CABLE

The zone cables are required to have less than 50 Ohms of the total cumulated cable resistance. The cable maximum length is calculated by the following equation.

$$L_{MAX} = 50 / R_{RPM} \quad \textbf{(Equation 1)}$$

While $L_{MAX}$ - the maximum cable length,

$R_{RPM}$ - the real resistance per meter.

For example, if the manufacturer specified cable resistance of a two-core cable is 0.02 Ohms per meter, the real resistance will be 0.04 Ohms per meter and the maximum zone cable length will be 50 / 0.04 = 1250 meters.

## 5.4 OUTPUT CABLE

For each dry-contact outputs, the cable length shall be determined by the connected equipment or devices and the total cumulated cable resistance should be less than 50 Ohms.

For each power output, the maximum cable length can be calculated by the following equation.

$$L_{MAX} = (V_{LOWEST} - V_{WORKING}) / (R_{RPM} \times I_{MAX}) \quad \textbf{(Equation 2)}$$

While $L_{MAX}$ - the maximum cable length,

$V_{LOWEST}$ - the lowest power supply voltage,

$V_{WORKING}$ - the minimum working voltage of the output device,

$I_{MAX}$ - the maximum current,

$R_{RPM}$ - the real resistance per meter.

The lowest voltage of the system power supply is fixed at 22V. For example, the device minimum working voltage is 18V, the maximum current is 0.5A and the real cable resistance is 0.04 Ohms per meter. The calculated maximum cable length will be (22 - 18) / (0.04 x 0.5) = 200 meters.

## 5.5 REQUIREMENTS AND REFERENCE CABLE TYPES

The requirements and the reference cable types are listed in the following table. To achieve the specified maximum distance specified in the table, equivalent or better type of the cables shall be used.

Table 14 Cable Types for Different Connections

| Connection | Requirement | Cable Specifications | Maximum Cable Length |
|---|---|---|---|
| Zone circuits | Use Equation 1 | Two core, Red, 1mm$^2$ conductive area, Specified Cable Resistance 0.02 Ohm/m, Real Cable Resistance 0.04 Ohms / m | 1250 meters |
| Dry-contact output | Use Equation 1. Shall also meet the external equipment requirement. | Two core, Red, 1mm$^2$ conductive area Specified Cable Resistance 0.02 Ohm/m, Real Cable Resistance 0.04 Ohms / m | The shorter distance of either 1250 meters or the length required by the external equipment |
| Alarm Devices Output | Use Equation 2 | Two core, Red, 1.5mm$^2$ conductive area Specified Cable Resistance 0. 0128 Ohm / m, Real Cable Resistance 0. 0256 Ohm/m | 156 meters with up to 1A current and the lowest voltage of 18V |

## 5.6 APPENDIX D – POWER & BATTERY CALCULATION SPREEDSHEET

In order to configure the Brooks dual zone fire control and indication equipment, a power calculation shall be performed.

The following table shows the quiescent and alarm current of FT2FP, different warning signs, ancillary and optional equipment.

Table 15 Table of current consumption

| System Components | Description | Quiescent Current (mA) | Alarm Current (mA) |
|---|---|---|---|
| FT2FP | Standard FT2FP system | 35 | 120 |
| B24V-SPEAK | Brooks 24V Alert / Evac / Voice Module | 0 | 135 |
| Strobes | Red or yellow strobes | N/A | Depends on selected strobe type |

The current consumption shown in the above table is calculated at the nominal voltage (24V DC) in normal state (quiescent) state and in the alarm state (active) with ambient temperature at 25 degree Celsius.

In normal conditions, the power supply shall be capable of delivering the total current consumption of the system including the battery charging current. In alarm, the power supply shall deliver the total current in alarm condition excluding the battery charging current. FT2FP is fitted with 60 Watt DIN rail switch mode power supply which can deliver up to 2.2A @ 27.5V.

As per AS1670.1, the battery capacity requirement shall be determined as follow:

$C_{20} = 1.25\ [(I_Q \times T_Q) + F_C\ (I_A \times T_A)]$

Where $C_{20}$ = Battery Capacity in AH at 20h discharge rate

$I_Q$ = Total system quiescent current in Ampere

$T_Q$ = Quiescent standby power source time, normally 96 hours (non-monitored systems)

$F_C$ = Capacity de-rating factor

$I_A$ = Total system alarm current in Ampere

$T_A$ = Alarm load standby power source time, normally 0.5 hour

**WARNING**: It is strongly recommended to use the BP series batteries made by BB Battery .

Example:

The battery calculation for a standard FT2FP system with 1A ancillary loads in alarm would be calculated as follow (based on the previous table):

Battery Capacity = 1.25 x {(0.035x96) + 2 x [1x0.5}

= 1.25 x (3.36 + 1)

= 5.45AH

A 7AH battery will be sufficient for this example

If 24 hours standby is required, the battery capacity required is 2.3 AH

## 5.7 APPENDIX E – COMMISSIONING RECORD

Table 16 Resistance Check

| Module | Feature | Probe + | Probe - | Expected Resistance Range (Ohms) | Result |
|---|---|---|---|---|---|
| FT2FP Module | Power input | TB1 POWER IN + | TB1 POWER IN - | 8K - 54K | |
| | Battery | TB1 BATTERY+ | TB1 BATTERY- | 30K – 100K | |
| | Power outputs | TB2 24V OUT + | TB2 24V OUT - | Reducing gradually (caused by capacitor charging) | |
| | Zone 1 input | ZONE + | ZONE - | 2.5K – 5K | |
| | | ZONE - | ZONE + | 2.5K – 5K | |
| | Zone 2 input | ZONE + | ZONE - | 2.5K – 5K | |
| | | ZONE - | ZONE + | 2.5K – 5K | |
| | Alarm device relay output (labeled as ACF on the PCB) | TB4 ACF- | TB4 ACF+ | 10K – 54K | |
| | | TB4 ACF+ | TB4 ACF- | > 24 | |
| | Earth | TB5 EARTH | TB1 POWER IN + | 30K – 150K | |
| | | TB5 EARTH | TB1 POWER IN - | 30K – 150K | |
| | Alarm conditional relay | Follow the requirements of the equipment connected. Vision inspection of the connections. | | | |
| | Fault conditional relay | | | | |
| | Isolate conditional relay | | | | |
| | Zone 1 alarm relay | | | | |
| | Zone 2 alarm relay | | | | |

Table 17 Pre-commissioning Battery Cell Voltage Measurement Record

| Battery | Multimeter Probe + | Multimeter Probe - | Expected Voltage | Multimeter Readings (V) |
|---|---|---|---|---|
| Battery 1 | Battery + | Battery - | > 10.7V | |
| Battery 2 | Battery + | Battery - | > 10.7V | |
| Battery 3 9if any) | Battery + | Battery - | > 10.7V | |
| Battery 4 (if any) | Battery + | Battery - | > 10.7V | |

Table 18 Power ON AC/DC Power Supply Calibration Record

| Multimeter Probe + | Multimeter Probe - | Expected Voltage | Initial Measured Voltage (V) | Calibrated Voltage (V) |
|---|---|---|---|---|
| TB1 –(Battery +) of the main control board | TB1 – (Battery -) of the main control board | 27.3V – 27.5V | | |

## 5.8 APPENDIX F – EQUIPMENT RECORD

Table 19 Equipment record

| Description | | Record |
|---|---|---|
| FT2FP Model No. | | |
| FT2FP Serial No. | | |
| FT2FP Date of Manufacturing | | |
| FT2FP Main Control Module | Serial No. | |
| | Firmware version | |

## 5.9 APPENDIX G – MAINTENANCE RECORD

Table 20 Maintenance record

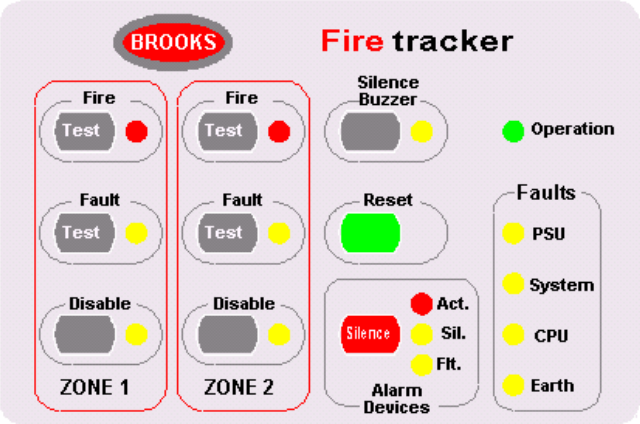
| No. | Description | Technician Name | Signature & Date |
|---|---|---|---|
| 1 | | | |
| 2 | | | |
| 3 | | | |
| 4 | | | |
| 5 | | | |
| 6 | | | |
| 7 | | | |
| 8 | | | |
| 9 | | | |
| 10 | | | |
| 11 | | | |

## 5.10 APPENDIX H –SPARE PARTS LIST

Table 21 FT2FP panel parts

| Component | Item Description |
|---|---|
| BAPS24V60W | SM Power Supply 24V/2.5A Adj. |
| CA109M | 16 Way Ribbon Cable Assembly 650mm |
| CA125 | 34 Way Ribbon Cable Assembly 1 Meter |
| SUB922 | FT2FP Main Control Module |
| SUB923 | FT2FP Display Module PCB273 Rev1 |

## 5.11 APPENDIX I FT2FP DATA SHEETS




## General

The Brooks FT2FP is a complete two-zone conventional CIE with power supply, PSU supervision and all inputs and outputs required for remote monitoring in a metal enclosure with 003 lockable door.

The FT2FP has been designed to comply with the Australian standard AS7240.2 and AS7240.4 as well as the NZ standard NZ4512. FT2 is a single control and termination module that contains two zone circuits, power supply supervision and inputs / outputs required for a complete two zone CIE.

## Features

- An Intelligent microprocessor based system which provides reliable two zone fire detection, three conditional relay outputs, one alarm devices output (ACF) and two zone relay outputs.
- Fully supervised 24V@1A output for alarm devices with separate disable control and indication.
- Built-in dual power sources. The battery backup power source is capable of supplying power to the system for 96 hours in quiescent conditions followed by 30 minutes in alarm conditions using only 7AH batteries.
- Intuitive indication and controls via the well-grouped LED indicators and momentary switches.
- Two zone fire detection with configurable latching / non latching and Alarm Verification Facility (AVF) features.
- Two configurable zone relay dry-contact outputs with can be activated by either the common alarm / fault conditions or the individual zone alarm conditions.
- Three general condition dry-contact relay outputs to indicate alarm, fault and disable conditions.
- Optional web server to provide Ethernet connectivity.

## Specification

| Feature | | Specification |
|---|---|---|
| Mains Power Supply | | 240V AC, +/- 20%. 60W, which is based on the system power supply calculations. Larger power supplies may be fitted |
| Backup Battery | | 2 x 12V sealed lead acid batteries 7 AH (enclosure can accommodate up to 12AH). Standard 7AH Batteries can supply sufficient power for 96 hours in quiescent conditions followed by 30 minutes in alarm. |
| System Access | | Access Level 1: General – Outer door locked no access to controls. All status LED indicators viewed through transparent plate on the outer door.<br>Access Level 2: Operator – Outer door opened via 003 key. Front panel controls are accessible.<br>Access Level 3: Technician – Outer door opened via a 003 key, inner door opened via tool. Panel circuitry, power supply, batteries and wiring termination accessible. |
| Operating Temperature | | 0°C to +40°C. |
| Operating Humidity | | 5-95%, non-condensing. |
| Enclosure | IP Rating | IP31 |
| | Enclosure Material | 1.5mm zinc anneal steel powder coated oyster. |
| | Dimension | 400mm H x 320mm W x 165mm D |
| | Weight | 10 Kg. ( without backup battery ) |
| Design Standard | | AS7240.2-2004, AS7240.4-2004 and NZ4512-2003 |
| Applications | | Not suitable for use in any hazardous locations. Installed to in-door environment only.<br>Weather proof enclosures are available on request |

# 6. FT2FP BLOCK WIRING DIAGRAM

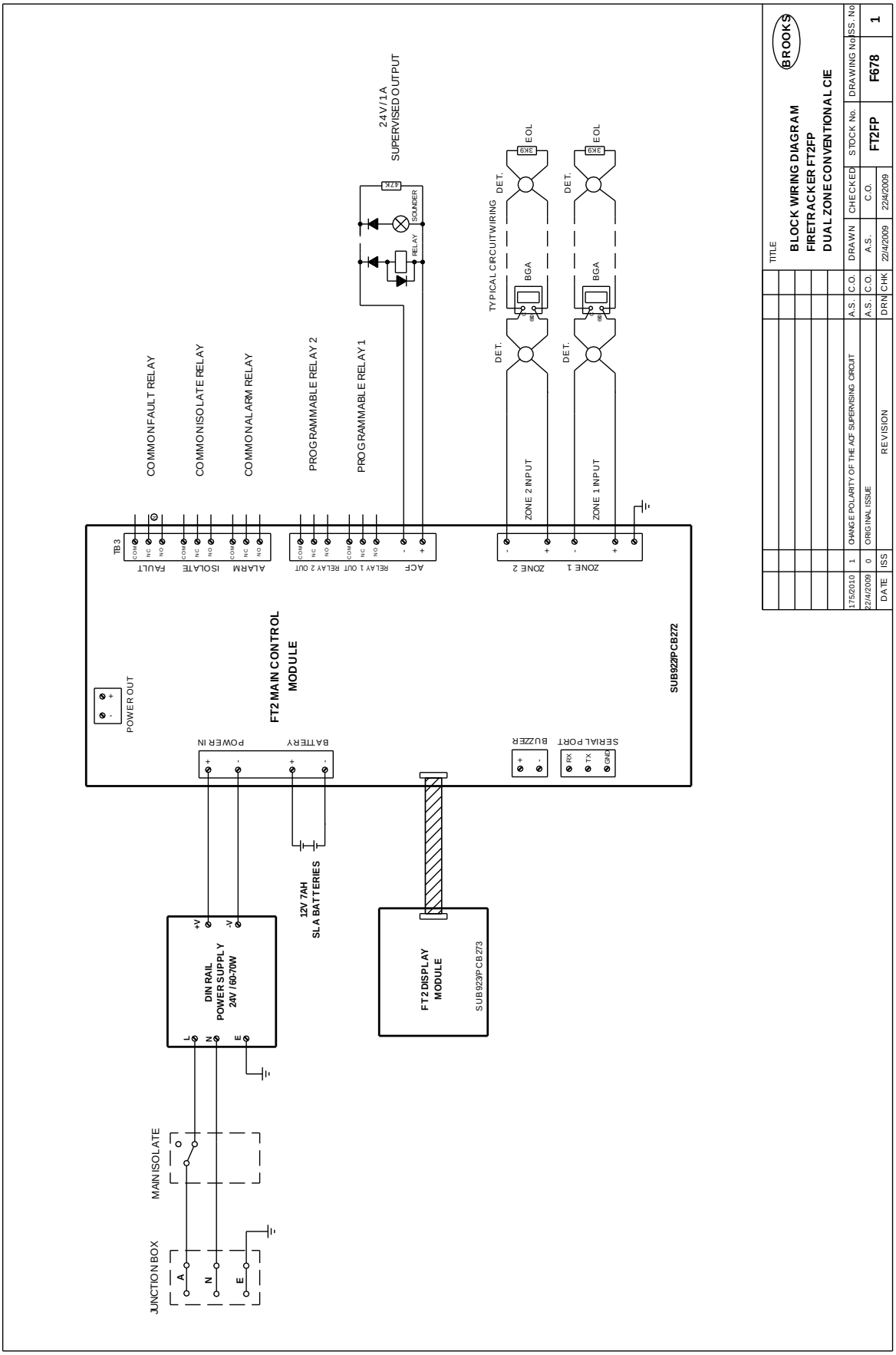



Figure 6 FT2FP Block Wiring Diagram

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