F4000 Distributed Fire Alarm System

The F4000 is an intelligent distributed fire alarm system, which supports both analogue addressable and conventional (collective) detection. It features a cost-saving responder loop design and powerful control programmability to handle complex applications.

Cost-saving Loop Design

The F4000 fault-tolerant Responder Loop supports various types of intelligent Responders distributed around the protected premises. Detectors, contact inputs, analogue addressable loops, and control outputs wire locally to these Responders. This greatly reduces cabling and easily accommodates alterations and system expansion.

Features / Options

✔ Conventional (collective) and analogue addressable detectors
✔ *SMART SENSE* algorithms
✔ CO fire detectors
✔ Analogue heat detectors programmable for Type A or B
✔ Wide detector compatibility including IS types
✔ Powerful, field-programmable logic equations and timers
✔ LCD FF and optional Zone LEDs
✔ LCD zone description text with LCD point description text option
✔ Event logging to internal history file and printer
✔ Printer logging includes zone text and optional point text
✔ Remote repeater panels, colour graphics displays
✔ "Tandem" mode for dial-in control panel access
✔ High level interface for EWIS, BMS, etc.
✔ Networking option available
✔ Wide Fire Brigade system compatibility
✔ Programmable outputs for Warning System, External Bells and Ancillary Control
✔ Flow switch monitoring and remote testing
✔ AS 1668 air-handling smoke detection and control
✔ Built-in clock/ calendar with automatic daylight saving adjustment
✔ Comprehensive test facilities
✔ Automatic system self tests
✔ Automatic battery connection and capacity tests
✔ Integral charger (2.5A, 6A or 12A)
✔ 19'' rack format cabinets

Easily Expanded

A single F4000 FIP can monitor 508 alarm zone circuits, control 508 programmable outputs, and provide indication for up to 528 zones/ ancillaries. The standard master cabinet is a compact 15U, 19 inch rack type housing the LCD Firefighter Facility. Up to 64 zone indications can be added, with indication for further zones provided using additional 15U cabinets or larger cabinets from the full range available (refer to ''F4000 19'' Rack Mounting System''). The 19 inch cabinets allow other equipment (Gas detection, EWIS etc.) to be housed in the same enclosure. Remote repeater displays, mimics, colour graphic VDU displays and a logging printer may also be connected for system expansion. Interfaces to EWIS and BMS are also available. A comprehensive networking facility adds further flexibility particularly for large wide-area systems (see separate brochure).

Analogue Addressable

Analogue addressable F4000 systems incorporate *SMART SENSE* fire alarm evaluation software to provide enhanced fire detection effectiveness, improved detector maintenance and a reduction in unwanted alarms.
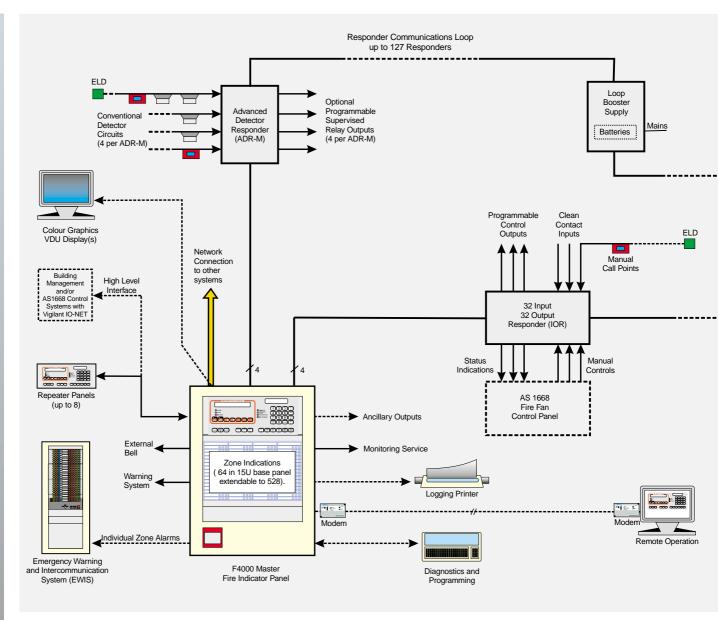
• Analogue detector tracking maintains constant sensitivity to smoke and compensates for soiling and changes in ambient conditions.
• Individual detector identification aids in pinpointing alarm and fault locations.
• Detector pre-alarm sensing allows for early warning of a potential alarm to local staff.
• Tracking, smart filtering and ''dirty alert'' logging reduce unwanted alarms.

Each analogue loop, with up to 198 devices (99 detectors plus 99 addressable modules), is controlled by a dedicated microprocessor.

Fire Alarm Systems

Responder Communications Loop
up to 127 Responders

ELD

Conventional
Detector
Circuits
(4 per ADR-M)

Advanced
Detector
Responder
(ADR-M)

Optional
Programmable
Supervised
Relay Outputs
(4 per ADR-M)

Loop
Booster
Supply

Batteries

Mains

Colour Graphics
VDU Display(s)

Network
Connection
to other
systems

Building
Management
and/or
AS1668 Control
Systems with
Vigilant IO-NET

High Level
Interface

Programmable
Control
Outputs

Clean
Contact
Inputs

ELD

Manual
Call Points

32 Input
32 Output
Responder (IOR)

Status
Indications

Manual
Controls

Repeater Panels
(up to 8)

AS 1668
Fire Fan
Control Panel

External
Bell

Ancillary Outputs

Warning
System

Monitoring Service

Zone Indications
(64 in 15U base panel
extendable to 528).

Logging Printer

Modem

Modem

Remote Operation

Individual Zone Alarms

Emergency Warning
and Intercommunication
System (EWIS)

F4000 Master
Fire Indicator Panel

Diagnostics and
Programming

F4000 System Configuration

Innovative Loop Design

Central to the F4000 system is the innovative ''Responder Loop'' design. Intelligent Responders are distributed at selected points around the protected premises. Alarm zone circuits and control outputs wire locally to these Responders, which in turn are connected by a 4-wire loop to the master FIP.

The loop is fully protected: a partial or complete break, or short, anywhere on the loop is detected and isolated automatically at the adjacent Responders. All system operations are fully maintained even in the presence of the fault condition. This innovative design offers many benefits:

• Cable concentration at master FIP greatly reduced.

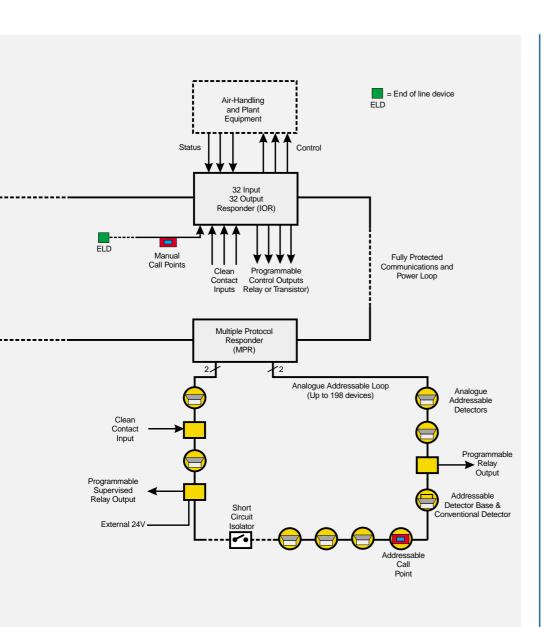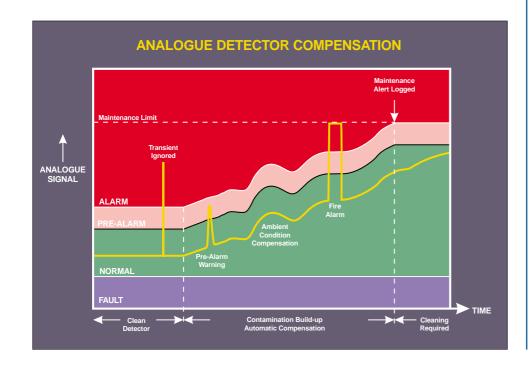• Lower installed cost because the loop design requires less wiring than conventional methods.

• Ideally suited as a main panel upgrade with old sub-panels connecting via Responder inputs.

• High-integrity communications is fully supervised and protected by redundant paths.

• Loop fault sensing and isolation at every Responder.

• System's intelligence pinpoints location of faults rapidly.

• Expansion and alterations are easily accommodated with minimal additional wiring.

• Responder Loop Boosters permit virtually unlimited loop length.

• No additional multicore wiring is required for AS 1668 control, but option also exists to use dedicated IO-NET.

Reliable

• System and input circuits are fully supervised.

• Automatic daily test of system memory, all inputs and analogue detectors verifies that alarms and faults can be generated.

• Automatic battery connection and capacity tests.

• Analogue detector test directly simulates entry of smoke into the detector's sensing chamber.

• Supervisory ''Watchdog'' ensures warning is transmitted in case of FIP or Responder processor failure.

• Powerful on-line diagnostics allow service interrogation of individual analogue devices.

• Analogue loop Short Circuit Isolators available.

• Multiple polling verifies changes in analogue values.

Air-Handling
and Plant
Equipment

Status → ← Control

■ = End of line device
ELD

32 Input
32 Output
Responder (IOR)

ELD

Manual
Call Points

Clean
Contact
Inputs

Programmable
Control Outputs
Relay or Transistor)

Fully Protected
Communications and
Power Loop

Multiple Protocol
Responder
(MPR)

2 / 2

Clean
Contact
Input

Analogue Addressable Loop
(Up to 198 devices)

Analogue
Addressable
Detectors

Programmable
Relay
Output

Programmable
Supervised
Relay Output

Addressable
Detector Base &
Conventional Detector

External 24V

Short
Circuit
Isolator

Addressable
Call
Point

Versatile Input Monitoring

Each zone circuit is individually program-mable to meet the needs of various fire alarm monitoring applications:

- Latching or non-latching zones.
- Standard transient suppression delay (2sec) with ''fast'' option for non-alarm inputs.
- Alarm Verification Facility (AVF). Automati-cally bypassed by Manual Call Point activation, without affecting indication of operated detector.
- AS 1668 air handling (supply and return air detection time delays and AVF).
- Sprinkler flow switch monitoring (preset initial delay). Optional associated flow switch test relay.
- ''Leaky'' circuit option for enhanced performance in damp environments.
- Uncommissioned circuit disable.
- Circuits can be freely mapped to zones, or directly to control outputs.

True Analogue Detection

The F4000's analogue addressable smoke detectors return true analogue values corresponding to the measured quantity of smoke at each location. These values are analysed by *SMART SENSE* software and alarms/ faults (identified for individual detectors) are generated by the local Responder according to programmed parameters. These parameters can be set for each detector, or selected from two preset standards which may also be ''fine tuned'' to affect the detectors globally.

Each analogue loop can support up to 198 devices, or be configured as two analogue lines of up to 40 devices each. Individual detectors may be removed without affecting loop/ line operation (a fault is logged). Other addressable loop devices allow connection of hard contact inputs and programmable relay outputs.

Pre-alarm sensing - earlier than an actual alarm condition - can enable a local alarm to alert staff to take preventative action, perhaps before a fire is fully developed.

Automatic Compensation

True analogue detector tracking is per-formed regularly, compensating for changes in ambient conditions, which would other-wise raise or lower the sensitivity of smoke detectors. This reduces the risk of false alarms and virtually eliminates the need for complex and inflexible night/ day modes and procedures. Soiling or contamination of the analogue detectors is also automatically software-compensated, both up and down, until a preset limit is reached. In this way the detection system maintains constant sensitivity for each analogue detector, reducing the risk of false alarms, and extending the service interval. A ''dirty alert'' is logged when the tracking limit is reached to draw attention to the fact that the detector is contaminated beyond the limit that the system can compensate for and the detector therefore requires cleaning.

ANALOGUE DETECTOR COMPENSATION

Maintenance
Alert Logged

Maintenance Limit

ANALOGUE
SIGNAL

Transient
Ignored

ALARM

PRE-ALARM

Fire
Alarm

Ambient
Condition
Compensation

Pre-Alarm
Warning

NORMAL

FAULT

TIME

Clean
Detector

Contamination Build-up
Automatic Compensation

Cleaning
Required

F4000 Distributed Fire Alarm System

AS 1668 Air-Handling

The F4000 accommodates AS 1668 air-handling controls with ease using its 32 Input/ Output Responder (IOR). Compact and economical Fire Fan Control Panels may be constructed using the IOR to monitor the manual control switches and operate the status indicators. Other Responders around the loop interface directly to the air-handling units themselves.

No extra FIP interface wiring is required to collect zone alarm conditions because these are already available to the F4000's output logic programming.

The Responder Loop carries all the AS 1668 signals - the need for separate wiring is completely eliminated. The F4000's programmable output logic also allows the same air-handling signals to be used for control of other equipment.
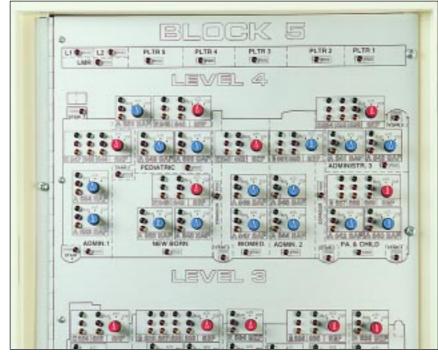
F4000 19" Rack Mounting System

The F4000 FIP system cabinets are in ''19 inch'' rack format. In addition to the standard 15U cabinet, four larger cabinet heights in two depths allow systems to be assembled as required. The 4U master inner door contains the user keypad and LCD. The 7U extender inner door holds multiples of 64 zone indications. Other inner doors and 19 inch rack modules are available including blank doors and panels, modules for mounting AS1668 controls, gas flooding system zone controls, warning system controls and alarm signalling equipment. Custom designed graphic mimic diagrams may also be mounted in the inner door position.
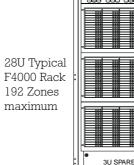
A 450mm(H) x 460mm(W) gearplate allows the mounting of all standard F4000 equipment internally: Main board, Power Supplies, Responders, Loop Booster, I/O Responder complete with termination boards. Other gearplate options include a blank gearplate for mounting other types of equipment, and larger size gearplates for the larger cabinets.
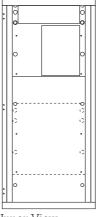
Features

- All-welded construction
- Cabinets available hinged either left or right
- Modular system
- Standard components:
  - Gear plates   - Inner doors
  - Blanking plates (1,2,3,4,5,6,7U)
- 1U document shelves available for both cabinet depths.
- IP65 cabinet options available to special order.

Fire Fan Control Panel

28U Typical F4000 Rack 192 Zones maximum

3U SPARE

Outer View   Inner View

F4000 Rack Cabinet Specifications

Cabinet Size		15U	18U	21U	28U	40U
Number of extender inner doors:						
	Master	1	2	2	3	3
	Extender	2	2	3	4	4
Maximum number of LED displays:						
	Master	64	128	128	192	192
	Extender	128	128	192	256	256
Spare space at bottom:						
	LCD Master	4U	0U	3U	3U	15U
	Extender	1U	4U	0U	0U	12U
Standard size gearplates (max):		1	1	1	2	3
Overall Height (mm):		750	885	1050	1330	1865
Overall Width (mm):		550	575	575	575	575
Overall Depth (mm):	211 (176 internal) 15U.					
	205 or 380 (135 or 310 internal) 18U, 28U, 40U.					
	350 (310 internal) 21U.					
Cabinet Material:	15U cabinet 1.2mm mild steel, other cabinets 1.6mm mild steel.					
Cabinet Finish:	Baked epoxy powdercoat.					
Cabinet Colour:	Cream Wrinkle BFF998CW.					
	(Special colours available on request.)					

F4000 Distributed Fire Alarm System

Easy to Operate

Operation is straighforward with the F4000's keypad and alphanumeric LCD. The 40 character, 2 line LCD zone control panel meets the AS 4428.1 ''Firefighter Facility'' (FF) requirements. It provides clear indication of the alarm location, including the zone number, the operated point or circuit number, and a text description of the alarm zone. If the point text option is installed, a unique text description of the analogue point that caused the alarm can also be displayed. Next and Prev keys allow easy scrolling through the 99 event zone alarm buffer, while all current alarms, faults and isolated zones can be separately recalled. An internal history log stores the previous 900 events, and these can be recalled to the LCD at any time. The optional easy-to-read English language printer output provides a 30 character text description of the zone or point, and a date/ time stamp to allow rapid tracing of events. The printer may be selected to log any or all of: zone events, circuit events, point events, keypad commands. ''Tandem Mode'' enables the panel keypad to be operated from a remote computer for diagnostic or remote monitoring purposes.

Control Panel Facilities

LCD Control Panel (40 char. x 2 lines)
- Firefighter's controls (FF): Acknowledge, Reset, Isolate, Next, Previous, Warning System Isolate, External Bell Isolate.
- Recalls: Alarms, Faults, History (900 events), Zone Status, Point Status, System Status, Activating circuit/ point, Search for percent dirty.
- Alarm Zone functions: Zone Test, Zone Isolate, Zone Reset, One person detector ''in situ test'' (auto-reset).

- Ancillary Control Zone functions: Isolate, Reset, Relay Test.
- System functions: Battery Test, Warning System Test, External Bell Test, Lamp Test, System Test, Brigade Test, System Fault Reset.
- System and individual zone status indications

Repeater Display Panels provide comprehensive remote display and control including: remote FF and/ or zone LEDs; display of activating circuit/ point; zone isolate, reset, test; bells test; status recall of zones, system and history (refer to separate brochure for details on RDU).

Fully Field-Programmable

For very straightforward applications, configuration of the F4000 is automatic. For custom requirements, a portable terminal or laptop computer gives 2-level password-protected access to the F4000's programming facility. System configuration programming provides a wide range of options including networking and operation of remote displays. Freely programmable circuit to zone mapping allows maximum flexibility for custom design of the LED display layout. Powerful control programmability is available through timers, Boolean logic expressions, variables and system state tokens. Virtually any monitoring and control function can be configured in the field using F4000's programming facility. The programmed configuration can be printed for reference or checking, and may also be uploaded to disk for later downloading, if required. Site-specific configuration parameters are stored in nonvolatile EEPROM memory which remains protected even if the system's power supply is removed.
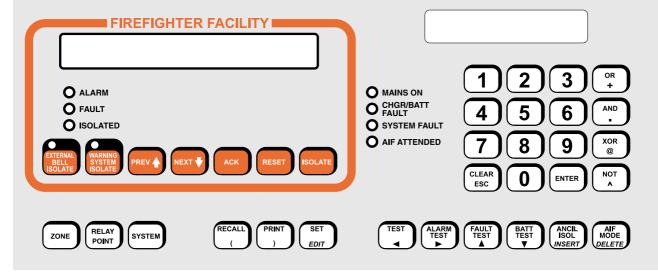
Programming Facilities

The following functions can be accessed using the programming facility:
- Circuit functions:
  - Circuit to Zone mapping
  - Circuit enable/ disable
  - Input monitoring type
- Analogue addressable point functions:
  - Type   - Filtering
  - Fault limit   - Dirty Alert
  - Tracking interval & adjustment
  - Historical maximum/ minimum
  - Sensitivities:
    - Alarm   - Pre-alarm
    - Two global default options or individual adjustment
  - 30 character text name option
- Zone functions:
  - Normal   - Ancillary control
  - Flowswitch   - Latching/ Not
  - Dual hit   - Zone type text
  - Master Alarm/ Indication only
  - Isolatable/ non-isolatable zones
  - Flow switch test relay
  - 30 character text name
- Output logic programming:
  - Variables   - Timers
  - Boolean AND, OR, XOR, NOT
  - Relay to Ancillary mapping
  - Supervision enable/ disable
- System commands:
  - Time/ date   - Configure
  - Upload   - Download
  - Query/ help   - Diagnostics
  - Recall History (900 events)
  - Analogue loop/ line (each MPR)
  - List all off-normal zones
  - Adjust global settings
    - Analogue default sensitivities (2)
    - Flow switch delays
    - Automatic test times
- Repeater Panel Programming
  - Zones to be displayed
  - Display or relay/ mimic driver
  - Global or local key functions
  - Internal or external power supply
  - Zone text download command

Control Panel Layout

F4000 Distributed Fire Alarm System

Specifications

System Capacity

Input Circuits:	Up to 508.
Zone Indications:	Up to 528, freely assignable.
Programmable Outputs:	Up to 508 plus two FIP relays.
Responders:	Up to 127. IOR and MPR may count as more than one depending configuration. MPRs limited to 36.
Analogue Loop:	2 wire loop or line, up to 2km. O/C tolerant. 2-wire S/C isolator available (up to 15 per loop).
Repeater Panels:	Up to 8 (or more without control).

Physical

Cabinet Size (mm):	15U 19'' rack. 750H x 550W x 230D (incl. MCP). Loop Booster 440H x 550W x 220D. For larger rack mount cabinets see inside.
Cabinet Material:	1.2mm mild steel (15U). Baked epoxy powdercoat finish: Cream Wrinkle BFF998CW.
Style:	Wall mounting. Outer door hinges on left (003 key lock) to access controls. Inner door hinges on right.
Shipping Weight:	25kg (without batteries).
Responder Size (mm):	240H x 180W x 50D (ADR-M, MPR).
Responder Material:	1.0mm mild steel, galvanised finish.
Shipping Weight:	ADR-M, MPR: 1.3 kg, ARR-M: 1.4kg.
Temperature:	-5°C to 45°C operating.
Humidity:	Up to 95% RH (non-condensing).

Power Supply (Master FIP and Loop Boosters)

Mains Supply:	240Vac +6% -10%, 50Hz, 150VA.
Internal Battery:	24V sealed lead-acid, capacity up to 40Ah.
Internal Charger:	27.3V (nominal), 2.5A (6A or 12A options) regulated, temperature-compensated.
Battery Monitoring:	Charger high/ low, battery low/ fail. Supervision of battery connection and capacity.

Inputs

ADR-M:	20V nominal, conventional detector circuits.
IOR:	Clean contacts, optionally supervised.
MPR:	Analogue photoelectric and ionization smoke detectors, analogue heat detectors (programmable for Type A or B), addressable base for CO detectors, supervised hard contacts. Other special purpose detectors also available.
Analogue Devices:	Up to 198 devices per analogue loop.
Other Inputs:	Supervised MCP at master & repeaters.

Outputs

Monitoring Service Relays:	Alarm (2), Fault, Stand-by (power supply supervision), Isolated: 2A, 30Vdc resistive.
FIP Relays:	Two relays (one relay 2A, 30Vdc resistive, with built-in supervision, other relay switched 24V, battery backed, 1.5A max.). Programmable for operation as External Bell, Warning System, or Ancillary output. Additional supervision module available.
Responder Relays:	Supervised, individually programmable: 1A, 30Vdc resistive.
I/O Responder:	2A Relays or 100mA, 28V transistor pulldown (1.1V). Programmable supervision.
Analogue Loop:	Addressable supervised relays: 2A resistive, 1A inductive, 30Vdc.
Ancillary Supplies:	24V; battery-backed and non battery-backed, 1.5A max. each (can be expanded).
Display Mimic:	External Alarm LEDs or relays (100mA max.).
Other Outputs:	External Sounder (28V, 200mA max.).

Detector Compatibility

The F4000 is compatible with hard contact devices, the Tyco/ Olsen Series 130 range of addressable analogue smoke and heat detectors, and a wide range of ''20 volt'' industry-standard, conventional detectors.

Approved detectors include the Tyco/ Olsen range and the Minerva M614 Series. A full list of currently approved devices is available on request.

APPROVED

The F4000 is certified to Australian Standard AS 4428.1-1998: ''Fire detection, warning, control and intercom systems - Control and indicating equipment, Part 1: Fire.'' SSL Listing Number afp-398.

The F4000 is approved to New Zealand Standard NZS 4512-1997 (latest amendment): ''Automatic Fire Alarm Systems in Buildings''. FPA/FPIS Listing No. VF/109.

Hong Kong Fire Services Department approved.

Other approvals pending.

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