

MODEL 5230 EXTINGUISHANT RELEASE CONTROL MODULE

DESCRIPTION

The SST Model 5230 Extinguishant Release Control Module is used to initiate the release of extinguishing or inerting agent in a protected hazard area. The module is available in several versions, all identical in operation, but with front panel markings indicating the type of extinguishing agent being used. The CO₂ modules are typically used to energize an electric solenoid which opens the valve on storage cylinders or tanks. The DELUGE module is typically used to energize a small "pilot valve" which subsequently opens a large deluge valve to release water or foam spray into the protected area. For other types of releasing service, the module is available with suitable markings applied.

Each Model 5230 Extinguishant Release Control Module mounts in one plug-in space in the NOVA-5000 System Rack Assembly. The module may be inserted into or removed from the rack with power applied without triggering the release of extinguishing agent.

LOGIC DIAGRAM

Figure 5230-1 shows, in simplified form, the internal logic in the Extinguisher Control module, and indicates the terminal number assigned with each.

- ! This logic diagram, and all the other logic diagrams in this manual, may be photocopied and used as "paste ups" for making wiring schematics for your NOVA-5000 system. Disk copies of these diagrams, suitable for use in computer aided drafting programs, are also available from Safety Systems Technology at a nominal charge.

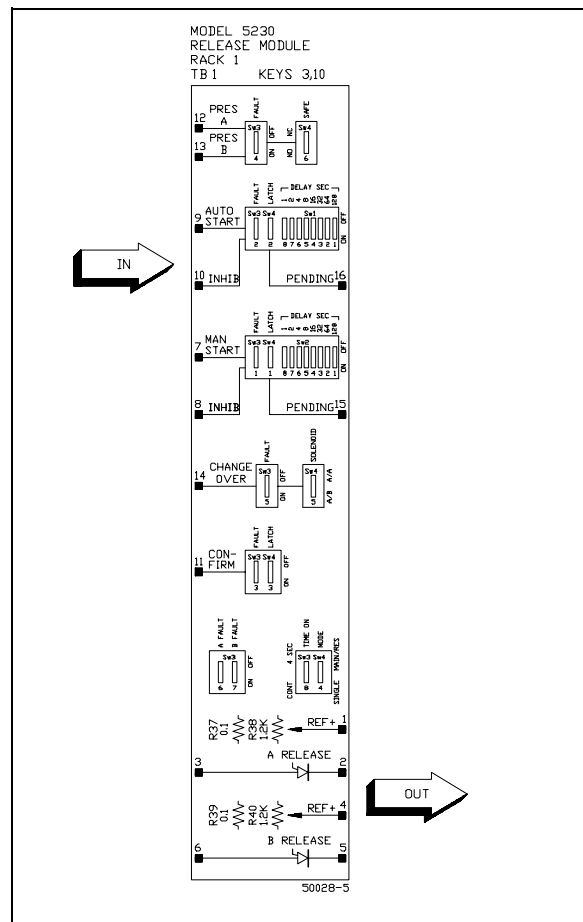


Figure 5230-1 Logic Diagram

INPUT/OUTPUT CONNECTIONS

The physical arrangement of the 16 terminals on the rack back plane are shown in Figure 5230-2. Each of the available signals is described below.

Release Solenoid Outputs — terminals 1 through 6

Two separate release solenoid outputs are provided on the module.

These are Standard Supervised Outputs which drive the two release solenoids. Each output will signal a Fault if an open or short circuit is detected with the output inactive, or open circuit with the output active. After the pre-release time delay has elapsed, the Release Control Module will apply 24 VDC actuating voltage to the releasing devices via these supervised output circuits. Since most release solenoids latch open when energized, this actuating voltage is usually set to be on for only 4 seconds, to prevent excessive current drain when the system is operating from stand-by batteries. If the releasing solenoid requires continuous energization, these outputs may be set to energize the solenoids continuously.

There are two possible modes of operation. If there is only one source of extinguishing agent to be controlled by the module, the DIP switches will be set so that a release signal (either manual or automatic) will **activate both Release Solenoid Outputs**. Output A is connected to the normal releasing solenoid. If a second, redundant releasing solenoid is available, output B would be connected to it for added reliability.

If there are separate **Main and Reserve** sources of extinguishing agent, the two outputs may be set so that Output A will release a main extinguishing system, and Output B releases the reserve system. In this case, the output activated by the manual and automatic inputs will be controlled by the position of the switch connected to the module's Changeover Input.

Note that the time delay between activation of the release start input and the output of voltage to the release solenoids is separately adjustable for the automatic and manual inputs.

- ! **CAUTION:** These outputs are protected against transients with a reverse biased diode. This protects the module from damage under most conditions. However, if the connected output device is highly inductive (such as a deluge solenoid), we recommend a suitable diode, varistor, or surge protector be installed across the solenoid terminals as close to the solenoid as possible.

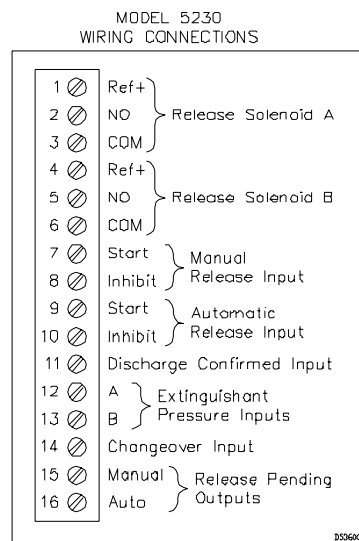


Figure 5230-2

- ! Overcurrent protection for these circuits **is not provided** by the fuses in the module. All wiring to these terminals must be capable of carrying the maximum available current from the system power supplies. If this is not possible, the installer must supply suitable fuses or circuit breakers between the power supply and these circuits.

Manual Release Start Input — terminal 7

This is a Standard Supervised Input, but its fault detection may be disabled by means of a DIP switch on the circuit board. In this condition the input will respond as a Standard Logic Input, except that the input current will be up to 15 mA instead of 1.1 mA for a Standard Input. This input is normally connected, via supervised field wires, to Manual Release Stations, which start extinguishant release when operated by personnel in the protected area. When this input is activated, and if the Manual Inhibit input is not activated, the Manual Release Pending output will be energized immediately and the manual pre-release timer will start. At the end of the timer period (0 to 4.25 minutes) the appropriate release solenoid will be energized.

Manual Inhibit Input — terminal 8

This a Standard Logic Input which, when activated, prevents the Manual channel from operating either of the two solenoid outputs. When this input is energized, a pulse will be transmitted on the module rack back plane, and the Isolate Loop will be opened.

If the pre-release timer is operating when the inhibit input is activated, the timer is immediately reset, and any subsequent enabling of the channel will result in the solenoid output being energized only after the full delay time.

Supervision is not required on this input, since any open circuit fault would not inhibit the release of extinguishing agent.

- ! The Manual Inhibit input is provided for the **unusual case** where it is necessary to inhibit all extinguishant release. It should **not be used** in most instances, as it is usually preferred to keep manual releasing stations active at all times.

Automatic Release Start Input — terminal 9

The “auto start” input is intended for automatic devices which initiate a request for extinguishant without human intervention. Devices with normally open alarm contacts, such as thermal heat detectors, IR or UV Flame Detectors, or similar devices are usually considered reliable enough to connect directly to this circuit. In this application, the related field wiring is fully supervised for open circuit or short circuit faults. When using field detectors that are more prone to “false alarms”, such as smoke detectors, the auto input may be fed from other cross-zoned or voting modules in the NOVA-5000 system.

This is a Standard Supervised Input, but its fault detection may be disabled by means of a DIP switch on the circuit board. In this condition the input will respond as a Standard Logic Input, except that the input current will be up to 15 mA instead of 1.1 mA for a Standard Input. When this input is activated, and if the Automatic Inhibit input is not activated, the Auto Release Pending output will be energized and

the auto channel will start to time for a preset period (the time may be adjusted by means of a DIP switch on the circuit board for up to 4 minutes). At the end of the timer period the appropriate release solenoid will be energized.

Automatic Inhibit — terminal 10

This a Standard Logic Input which, when energized, prevents the Automatic channel from operating either of the two solenoid outputs. When this input is energized, Isolate is signalled on the back plane. This inhibit input is normally controlled by external bypass, abort, or isolate switches. Operation of these switches, prior to the occurrence of an alarm, prevents actual release of extinguishing agent.

The inhibit input may also be momentarily energized during the pre-release time delay; this will reset the pre-release timer and any subsequent enabling of the channel will result in the solenoid output being energized only after the full delay time.

Supervision is not required on this input, since any open circuit fault would not inhibit the release of extinguishing agent.

Discharge Confirmed Input — terminal 11

The **Discharge Confirmed** input is operated by a pressure switch located in the discharge piping, downstream from the discharge valve. Pressure at this point indicates that the valve has opened and extinguishant is being released. This is a standard supervised input, but its fault detection may be disabled by means of a DIP switch on the circuit board. In this condition the input will respond as a Standard Logic Input, except that the input current will be up to 15 mA instead of 1.1 mA for a Standard Input. When energized, it will cause a front panel lamp to flash, and will generate an Alarm Pulse on the back plane. The connection can be arranged to be latching (for a momentary action field switch) or non-latching (for a latching field switch) by setting a DIP switch on the circuit board. If set to Latching mode, the front panel lamp will not extinguish until the reset button is depressed. If non-latching, the lamp will extinguish when the alarm has been acknowledged and the field switch restored to normal position.

Extinguishant Pressure Inputs — terminals 12 and 13

Two **Extinguishant Pressure** inputs are provided which can be fed from pressure switches in the cylinders or supply piping. An open switch indicates that pressure is present, ready for extinguishant release when requested. A closed switch indicates a leak or failure in the system. (The open/closed indications from the pressure switches can be interchanged by setting a DIP switch on the module.)

Each of these is a Standard Supervised Input, but its fault detection may be disabled by means of a DIP switch on the circuit board. In this condition the input will respond as a Standard Logic Input, except that the input current will be up to 15 mA instead of 1.1 mA for a Standard Input. If either input changes to the “extinguishant not ready” condition, it will cause a front panel lamp to flash, will transmit a fault pulse on the back plane, and will open the fault loop.

Changeover Input — terminal 14

It was noted above that two independent release solenoid output circuits are provided on the extinguisher control module. If the two outputs are to connect to two separate extinguishing systems in a Main/Reserve configuration, an external **Changeover** switch may be connected to this input on the module. Operation of this switch determines whether **Output A** or **Output B** will be energized to release the **Main** or the **Reserve** extinguishing system.

NOTE: For Main/Reserve Systems, the changeover input must be activated by setting SW4/4 on the module to OFF or OPEN, and the desired mode of solenoid operation must be set on SW4/5. This is covered fully under *Module Setup Instructions*.

This is a Supervised Input, but its fault detection may be disabled by means of a DIP switch on the circuit board. In this condition the input will respond as a Standard Logic Input, except that the input current will be up to 15 mA instead of 1.1 mA for a Standard Input.

Release Pending Outputs — terminals 15 and 16

When the manual or automatic release start input has been energized, but not inhibited, the corresponding release pending output will be energized. These outputs are energized immediately, and are not affected by the release timers. They may be used to control appropriate alarm signals or equipment shutdowns. These outputs are Standard Logic Outputs.

Typical Wiring Diagram

Refer to the fold-out typical wiring diagram provided in the Reference Information section of this manual for the approved connections for the Model 5230 module. All installations should be made in conformance with this drawing.

MODULE SETUP INSTRUCTIONS

The setup actions detailed here are necessary to match the characteristics of the Module to the field components and the mode of operation required. These settings are made only once. There are no adjustments needing periodic checking or readjustment. The settings are all summarized on the standard wiring diagram and in Figure 5230-4. We suggest that you document the required settings for each Extinguisher Control Module on your wiring diagram by marking the position of each DIP switch with an **x**.

Load Sensing Resistors

There are four resistors (R37, R38, R39, R40) which need to be selected according to the resistance of the extinguisher release solenoids. A package of four (4) resistors is shipped with the module. These resistors are proper for an output load resistance of 10 to 14 ohms. **For any other load resistance, calculate the required resistors and obtain them locally.** These are resistors R37 through R40, which are soldered to the turret terminals provided on the PC Board.

Series Resistors R37 and R39

For an output load resistance of 10 to 14 ohms, install the provided **0.1 ohm** resistors. For other load resistances, calculate the required series resistors as follows:

$$\text{RESISTANCE} = \text{LOAD divided by } 100$$

$$\text{WATTS} = 20 \text{ divided by } \text{LOAD}$$

Example: The load resistance is 12 ohms. The series resistor will therefore be 0.12 ohms, but the nearest value available is 0.1 ohms. The power rating is $20/12$ or 1.7 watts. A 3 watt type is selected. These are the resistors provided with the Module.

Shunt Resistors R38 and R40

For an output load resistance of 10 to 14 ohms, install the provided **1200 ohm** resistors. For other load resistances, calculate the required shunt resistors as follows:

$$\text{RESISTANCE} = \text{LOAD multiplied by } 100$$

$$\text{WATTS} = 20 \text{ divided by } \text{LOAD}$$

Example: The load resistance is 12 ohms. The shunt resistor will therefore be 1200 ohms. The power rating is $20/12$ or 1.7 watts. A 3 watt type is selected. These are the resistors provided with the Module.

See Table 5230-1 for some common values for these resistors.

| TABLE 5230-1 RECOMMENDED PROGRAMMING RESISTORS FOR SOME COMMONLY USED RELEASING DEVICES | | | |
|--|-------------------------|------------------------|------------------------|
| MANUFACTURER AND PART NUMBER | ACTUAL DC RESISTANCE | R37, R39 | R38, R40 |
| Kidde Stackable Head 283949 | 120 ohms | 1.2 ohms 0.25 Watts | 12 kOhms 0.25 Watts |
| Kidde EP Control Head 897494 | 18 ohms | 0.2 ohms 2 Watts | 1800 ohms 2 Watts |
| Kidde Control Head 890181 | 12 ohms | 0.1 ohms 2 Watts | 1200 ohms 2 Watts |

Pre-release Time Delay

The two DIP switches SW1 and SW2 set the length of the pre-release time delay, that is, the time delay between actuation of the module release start input and the activation of the release solenoid. The release time delay, in seconds, associated with each switch section is as follows:

| | | | | | | | | |
|-----------------------------|-----|----|----|----|---|---|---|---|
| Switch Number on SW1 or SW2 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |
| Time Delay in Seconds | 128 | 64 | 32 | 16 | 8 | 4 | 2 | 1 |

The total pre-release time will be the sum of the switches that are set to the ON or CLOSED position. Set SW1 for the desired time delay for the Automatic Release Start circuit. Set SW2 for the desired time delay for the Manual Release Start circuit.

- ! Operation of an Abort switch connected to the inhibit input of the module stops this timer and will delay the release of extinguishing agent as long as the switch is activated. UL requires that the agent be released within 10 seconds after the switch is released. **Therefore, this timer must not be programmed for more than 10 seconds if an abort switch is used.**

Example: If a release time of 30 seconds is required, this is made up of 16 + 8 + 4 + 2. So switches 4, 5, 6 and 7 should be ON, all others OFF.

Fault Detection (Supervision)

Switch SW3 (switches 1 through 7) control whether open- and short-circuit detection is ON or OFF for the appropriate circuit. When ON, we refer to the circuit as “supervised”.

! Circuits **must always be configured with supervision ON** if they are connected through field wiring to remotely located devices. If the inputs are being fed from other system modules, or from switches located in the control room, supervision is not required.

Refer to Fig 5230-4 for the function assigned to each switch. For each circuit that is to be supervised, set the appropriate switch on SW3 to ON or CLOSED. For each circuit that is not being used, set the appropriate switch on SW3 to OFF or OPEN.

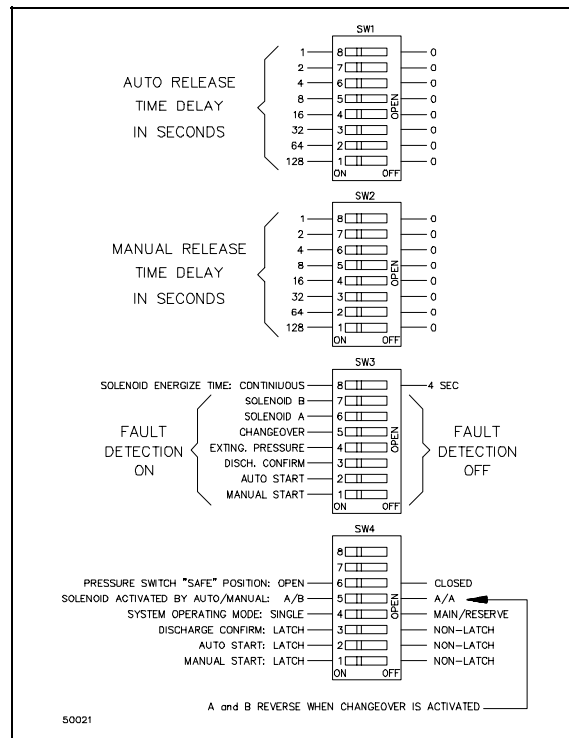


Figure 5230-4 Programming Switch Settings

Solenoid Energize Time

Switch SW3, switch no. 8 controls the time that the release solenoid(s) will be energized. If this switch is ON, the release solenoid(s) are continuously energized from the time the release timer expires to the time when the Model 5230 is reset. If this switch is OFF, the solenoid(s) are energized for 4 seconds only.

Latching/Non-Latching Operation

Manual Start Latch - SW4/1

When this switch is OFF or OPEN, the Manual pre-release timer and release system runs only while the Manual Start input on the Extinguisher Control Module is energized. When the input becomes deenergized, the timer will be reset and the solenoid output, if it is on, is turned off.

When this switch is ON or CLOSED, the Manual Start input will latch on when energized, the pre-discharge timer and release system will operate, and this state will remain until the Module is reset.

Auto Start Latch - SW4/2

This performs the same function for the Auto timer and release system as the Manual Latch for the Manual system.

Discharge Confirmed Latch - SW4/3

This switch should be ON or CLOSED if the Discharge Confirmed pressure switch is a momentary type; OFF or OPEN if the pressure switch is itself latched. If this switch is ON, the Confirm indication on the module front panel will remain until the Module is reset.

Main/Reserve or Single Extinguishing System Operating Modes

If the module controls two sets of extinguishing storage tanks or systems, set the operating mode switches as specified below under Main/Reserve. If there is no standby reserve supply of extinguishant, use the Single System setup.

Single Extinguishing System

For this mode, set SW4/4 to ON or CLOSED. In this mode, both Solenoid outputs are energized for release. This permits the use of a single solenoid connected to Output A, with an optional redundant releasing solenoids or valves connected to Output B. If Solenoid B output is not being used, then set SW3/7 to OFF to suppress fault detection on that circuit. When this switch is ON, the Extinguishant Pressure Switch B and the Changeover Inputs are not operational. Also, the setting of DIP switch SW4/5 has no effect.

Main/Reserve Extinguishing System

For this mode of operation, set SW4/4 to OFF or OPEN. Connect the Main releasing valve or solenoid to Output A on the module, and the Reserve solenoid to output B. There are two "sub-modes" of operation for Main/Reserve systems, depending on how you set DIP switch SW4/5. This switch setting determines which of the two release outputs are energized as listed below.

With Switch SW4/5 OPEN or OFF:

- Automatic Start Input activates the main output A
- Manual Start Input activates the main output A
- Changeover causes manual or automatic to activate reserve output B

With Switch SW4/5 CLOSED or ON:

- Automatic Start Input activates the main output A
- Manual Start Input activates the reserve output B
- Changeover causes manual or automatic to activate the opposite output from those listed above

Extinguishant Pressure Switch Safe Condition

Two inputs are provided on the module to monitor the supply pressure in the Main and Reserve extinguishing systems. Low pressure here would indicate a leak in a storage cylinder, or failure of a pump.

When switch SW4/6 is ON, the Pressure Switches A and B are expected to be open in the safe or normal condition: closure of a switch will signal the appropriate Fault.

When switch SW4/6 is OFF, the Pressure switches are expected to be closed in the safe or normal condition: opening a switch will signal the appropriate Fault.

Module keying

Before installing each Model 5230 Module into the wired slot in the mounting rack, be sure that the snap in covers have been installed at keying locations 3 and 10 of the rack keying strip. See "Module Keying Instructions" in the mounting rack section of this manual for complete details.

- ! Installation of the keying system is very important. A module can be permanently damaged if it is plugged into a slot which is wired for a different type of module.

Modules may be inserted into or unplugged from the rack at any time, even with the power on. This will not damage the modules nor generate any false alarms, but will of course generate a fault alarm.

OPERATING INSTRUCTIONS

General

The Model 5230 Extinguisher Control Module controls the release of extinguishing agent in a protected hazard area. The agent being used is indicated on the front panel of the module (CO₂, Foam, Deluge, etc.). The module continuously checks the integrity of the system wiring connected to it, and indicates a Fault when there is a failure in the wiring. The module initiates release of the agent by energizing an electric solenoid which opens a valve on the storage cylinders or tanks.

The Model 5230 has two independent release input channels (automatic and manual) which may be controlled independently. When one of the input channels is activated, it will be indicated on the module front panel immediately. Then after a pre-discharge time delay which has been programmed into the module, the extinguishing system will be activated. There are two separate release outputs. In some systems, these will both activate the same extinguishing system. Or if two sources of extinguishant are available (a main and a reserve), one output is connected to each system and a switch is provided to control which system will be activated.

Alarms and faults are indicated as follows:

- When an alarm or fault indication is first detected, the relevant indicator lamp will be illuminated. The red manual alarm and automatic alarm indicators light steady; the other LED's flash when initially activated. Most systems are wired so that an audible alarm sounds at the same time. If the alarm acknowledge button is depressed, any flashing indication becomes steady, and this action will silence the audible alarm on most systems.

When the cause of an alarm or fault is removed, the indication generally operates as follows:

- If the indication is flashing, it remains flashing until it is acknowledged or the module is reset, when it will extinguish.
- If the indication is steady, it will extinguish immediately.
- Some faults and alarms are latched so that they can only be cleared by resetting the module.

Power lamps (green and yellow)

The two lamps at the top of the front panel indicate the status of the power supplies. A green lamp indicates that both of the dual 24V power feeds are within specification. If the yellow lamp is on or flashing, an out-of-tolerance power condition or power failure is indicated. Probable cause is a blown fuse in the module.

Pressure lamps (yellow)

When the left hand lamp, marked "A", is lit, there is low supply pressure in the main extinguishing system. This probably indicates a leak in the storage tanks. If the installation includes a standby "reserve" extinguishing system, the center "B" lamp in the row performs the same function for this system. The right hand "FLT" lamp lights when there is an open or short circuit in the wiring to either the A or B pressure switches used to monitor the supply pressure. When the FLT lamp is on, either the A or B lamp will also be on to indicate which of the two circuits are reporting a fault.

Release lamps (red and yellow)

The release lamps show the status of the two release inputs to the module. The upper row of lamps are for the "automatic" release input. This input is activated by field sensors and detectors that operate automatically, such as smoke, flame or heat detectors. The lower row of lamps are for the "manual" release input, which is activated by manually operated alarm stations in the protected area. The function of the lamps is the same for both inputs.

When the red lamp lights, it indicates that the input has been activated. Once the input has been activated, a timer starts to run, at the end of which time the appropriate extinguisher system is released.

The yellow "INH" lamp indicates that the channel is inhibited, due to the operation of an external inhibit, abort or lockout switch. This will prevent release of extinguishant, and if energized after an input has been initiated, will stop and hold the timer for that channel.

The yellow "FLT" lamp indicates that there is an open or short circuit fault on that input.

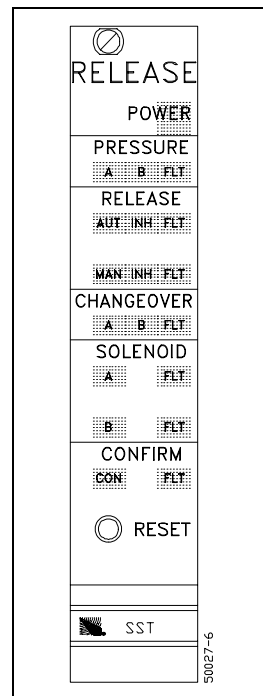


Figure 5230-5 Front Panel

Changeover lamps (green and yellow)

This facility is used only when the module is connected to selectively release either a Main or Reserve extinguishing system. When the green "A" lamp is lit, any request for extinguishant will release the Main system. If the main system has already been released or is not working, the changeover switch should be operated, causing the "A" lamp will go out and the "B" lamp to light. The "B" indicates that the reserve system is now available for release.

- ! NOTE: Changeover occurs only when the manual and automatic start inputs are not activated. Input must be restored to normal (for latching inputs, reset button must be pushed) for changeover to occur.

The yellow "FLT" lamp indicates if there is an open or short circuit fault on the wiring to the changeover switch.

Solenoid lamps (red and yellow)

There are two separate solenoid outputs on the module, which are used to activate solenoid operated valves in the extinguishing system. The red lamp marked "A" will light whenever actuating voltage is applied to the **Main** releasing system. The red "B" light indicates voltage to a second releasing solenoid. If there is a reserve extinguishing system, this B output would activate that system. If there isn't a reserve system, the B output can be used to operate a second solenoid on the main system for redundancy. The "FLT" lamps indicate an open or short circuit fault on the relevant solenoid circuit.

Confirm lamps (red and yellow)

When the pressure switch in the extinguisher manifold is activated by the flow of extinguishant, the red "CON" lamp will flash, and a system Alarm will be activated. This lamp can be acknowledged in the normal way.

Reset pushbutton

At the bottom of the panel is the Reset pushbutton. When operated all alarms and faults are cleared, the pre-discharge timers are reset, and all lamps on the module are tested.