FDG-008 and FDX-008W(KI)

Fan Damper Control Modules

NOTE: Use the FX-2000, FleX-Net™, FleX-Net™ FX-4000, MMX™ or MMX™-4000 Fire Alarm Control Panel Manual in conjunction with this document for complete installation information.

Installation and Operation Manual

LT-966 Rev. 3
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Table of Contents

1.0 Smoke Control Systems Utilizing the FX-2000, FleX-Net™, FleX-Net™ FX-4000, MMX™ and MMX™-4000 Fire Alarm Control Panels

1.1 General

The design of a system for the automatic and manual control of smoke in a modern building requires an in-depth understanding of the factors that naturally cause smoke migration within a building structure. Although the fire alarm system and its constituent parts can be effectively utilized to provide an automatic and manual control system for smoke, and a visual representation of the state of the control elements, it is up to the designer to ensure that implementation meets or exceeds the requirements of NFPA 92 Smoke Control Systems Utilizing Barriers and Pressure Differences.

A smoke control system limits the flow of smoke within a premise. The Fire Alarm Control Panel provides control through use of the FDG-008 Graphics Control and/or FDX-008W Fan Damper Control modules for fans and dampers. This grouping of the fire alarm and the FDG-008 (with a graphic display) and/or FDX-008W defines a Firefighter's Smoke-Control Station FSCS. The FSCS provides complete system status and manual override for smoke control.

The first part of smoke control is to contain the smoke in the fire areas and to shut the dampers to stairwells to provide escape paths from the fire. The second part of smoke control is to redirect air (through pressurization and HVAC) utilizing fans.

The FDG-008 Fan Damper Graphics Control module and the FDX-008W Fan Damper Control module have been tested and approved under the following standards:

NFPA 72, 101, 90A, 92, UL 864 (UUKL Smoke Control Category), CAN/ULC-S527.

1.2 Smoke Control Strategy

Smoke control involves activation of fans and dampers to control the movement of smoke. These smoke control systems consist of a fire alarm system (including smoke detectors and monitor modules) and HVAC equipment. This non-dedicated smoke control system shares ventilation control with the building's HVAC system and door control. This smoke control system is able to turn a fan ON or OFF, open or close a damper, and also monitor this activation.

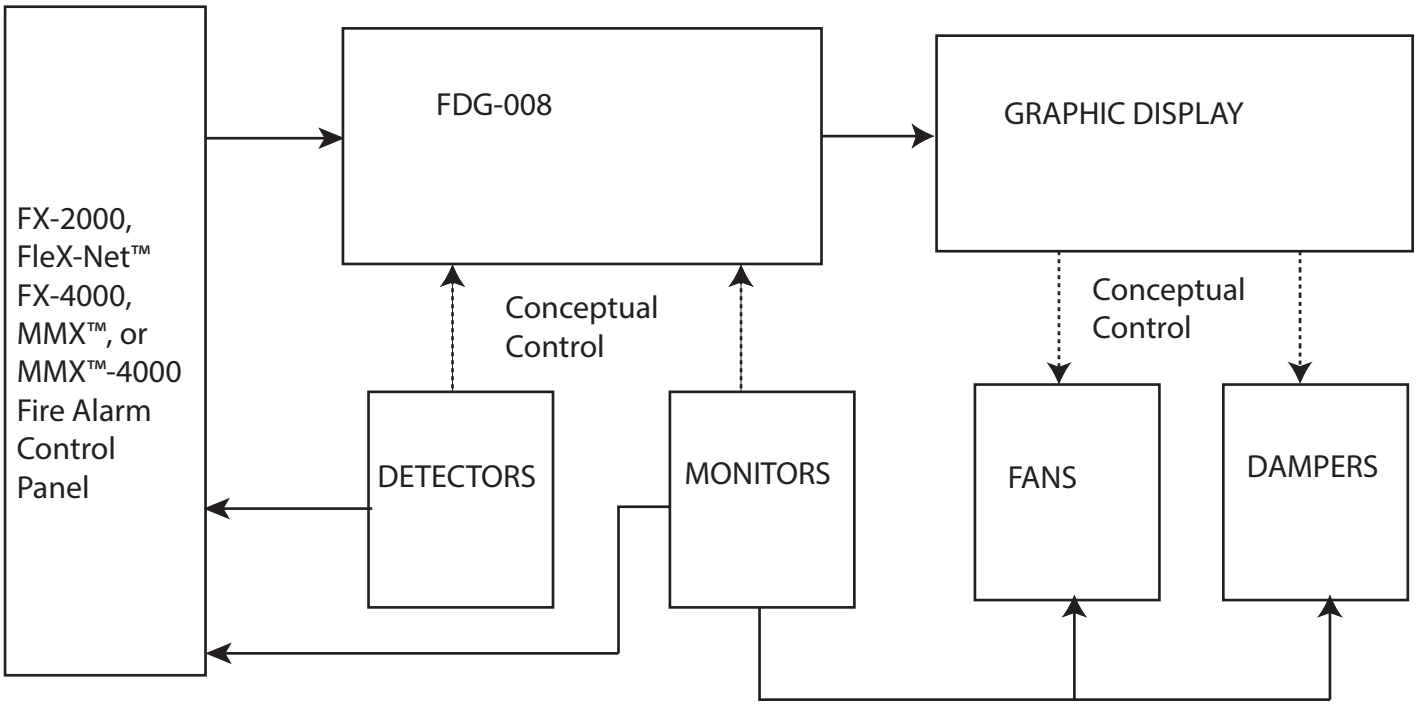


Figure 1 Smoke Control Strategy

The FX-2000 and Network Fire Alarm Control Panels are extremely flexible systems that can be configured to meet every requirement of an NFPA 92 system. This process is readily accomplished using the techniques outlined below and in conjunction with the fire alarm Configurator:

1. To provide automatic control of fans and/or dampers (based upon smoke detector input) to confine the fire to the source area or fire zone.
2. To minimize smoke migration outside of the fire zone.
3. To aid in smoke exhaustion, once the fire has been confirmed to be extinguished.
4. To provide confirmation to the fire department operator as to the position of dampers or the state of fans when these items are commanded to be in a different state, i.e. From "OFF state" to "ON state". This provision can also be from an "ON state" to an "OFF state". There is a timer associated with this confirmation which will prevent troubles from being annunciated while the damper or fan is in transition state provided the timer has not expired.
5. To keep stairwells and vestibules free of smoke to aid occupants in safely evacuating the building structure.
6. To provide a simple to read and operate Fire Fighters' Smoke Control Station (FSCS). This panel will provide system status and controls to fire department personnel to enable

them to effectively view the status of the control system and the fire progress while permitting them to manually change the flow of smoke.

7. Due to the complexity of smoke control during a particular fire, the system provides for only one automatic smoke strategy to be executed based upon the first activation of smoke detectors. The Fire Alarm Control Panel can provide for multiple smoke strategies but only the primary sequence will be executed automatically. All operations outside of the primary sequence can only be operated manually from the FSCS.
8. For **DEDICATED** smoke control systems, wherein some or all of the equipment is only utilized for smoke control, to provide a means to exercise the system at least once a week to confirm proper operation and if not, to register a trouble.

1.3 Display Implementation

LEDs can be set up to monitor the progress of the smoke in the same manner as on a standard fire alarm display. LEDs can also be set up to view the status of the controlled elements utilized in the smoke control system. For example, a single damper can be monitored on one LED as being in the “closed state” and another adjacent LED can be used to monitor when the same damper has moved from the previously “closed state” to an “open state”. This implementation would usually be done with an amber LED used for the ‘closed state” and a green LED used for the “open state”. If using the FDX-008W four LEDs are provided per function. A white LED is used for the auto position. Since in actual operation, the damper may not move to its desired state even though a relay is turned ON to do so, proving inputs are used to confirm the operation. This proving input would be an addressable module mounted adjacent and close-nippled to the proving limit switch. Also provided for the display, is an amber LED for the proving trouble indication. This amber trouble LED will illuminate, in this example, if the damper does not reach its desired state after a specified time period has elapsed.

The LCD of the Fire Alarm Control Panel may be configured to give a more meaningful description of the state or failure of a system component in text. Each component, such as the monitor modules associated with the position of the dampers can be displayed on a separate LED to annunciate wiring faults.

LEDs can also be set up to monitor the status of not only a single piece of equipment such as a damper, but could be set up to monitor a group of devices in a zone such as several dampers.

1.4 Control Implementation

The control of a damper can be arranged on a single three (3) position switch, OFF, AUTO, ON. This switch on an FDX-008W would normally be linked to the 4 indicating LEDs for this simple example, with the AUTO position illuminating the white LED. For each switch, there is an associated addressable relay (or relays as is the case for zone control). When the switch is in the AUTO position (white LED on), the control of the damper is strictly governed by the smoke detectors correlated to its associated relay. Additionally, this relay will only activate, in this example, if the correlated smoke detector is the first to operate in the building since only the primary sequence will operate under automatic control. The OFF and ON positions of the switch are available to the fire station personnel for manually controlling this damper. Sliding the switch from the AUTO position to the OFF position would place the damper in the OFF position regardless of any automatically commanded sequence of control and in a similar manner moving the switch from the AUTO to the ON position would result in the damper moving to the ON state regardless of the automatically commanded sequence of control.

The above explanation was geared toward a single damper operation. However, groups of relays used to control multiple dampers in conjunction with multiple fans can be operated and controlled in a similar fashion.

Notes: An addressable relay is used for control because it can be wired to a control element through a close-nippled connection and still be supervised from the fire alarm control panel.

The FDG-008 Fan Damper Graphics Control Module provides the same control (eight switches and associated LED indicators) as the FDX-008W except through a graphics display.

2.0 FDG-008 Fan Damper Graphics Control Module Mounting Locations

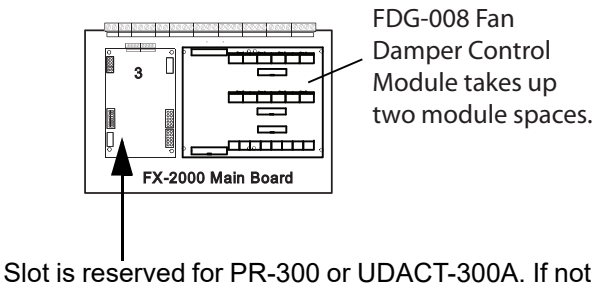
The FDG-008 Fan Damper Graphics Control Module takes up two module spaces in the backbox enclosures. The module mounts with four screws as shown below.

2.1 FX-2003-6/FX-2003-12/N/NDS, FX-4003-12N, MMX-2003-12N/DS and MMX-4003-12N Compact Main Chassis

Mounts in the BBX-1024/DS Enclosure and supports three adder modules.

2.1.1 Exterior View

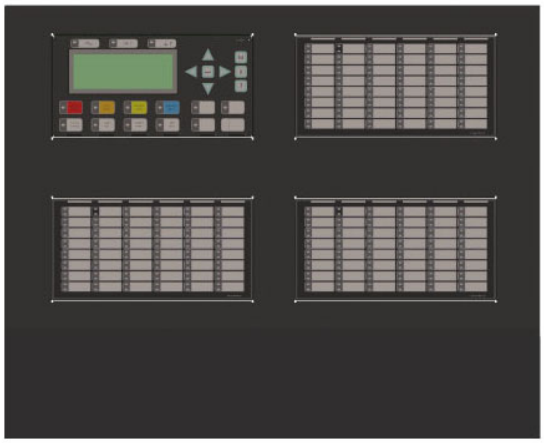
2.1.2 Interior View



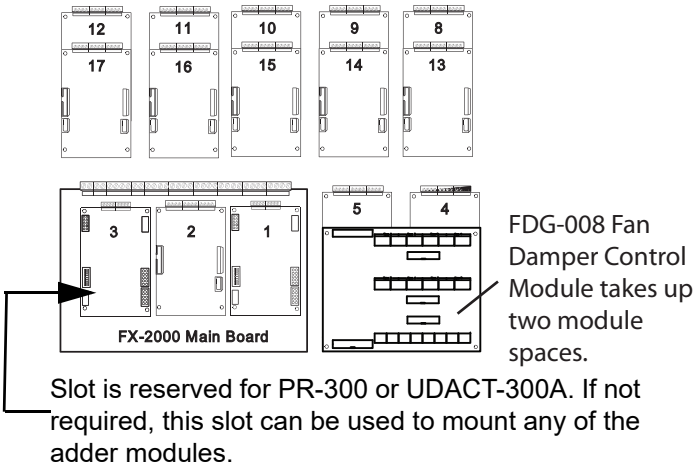
2.2 FX-2017-12/N/NDS, FX-4017-12N, MMX-2017-12N/DS and MMX-4017-12N Mid-size Main Chassis

Mounts in the BBX-1072ADS/ARDS Enclosure, and supports three display modules and 17 adder modules.

2.2.1 Exterior View



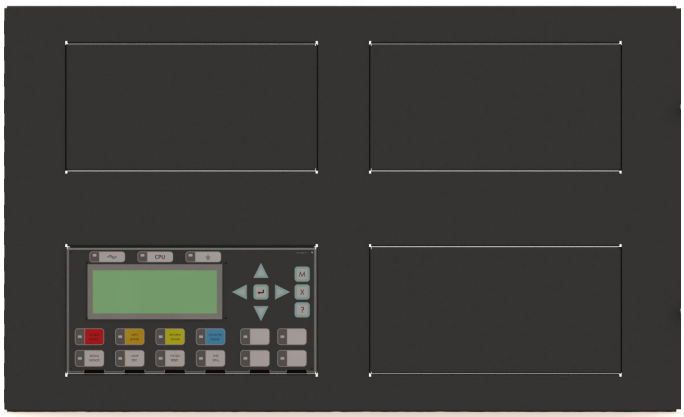
2.2.2 Interior View



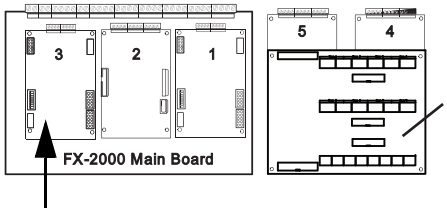
2.3 FX-2009-12/N/NDS, FX-4009-12N, MMX-2009-12N/DS and MMX-4009-12N Large Main Chassis

Mounts and occupies four display positions in BB-5008 or BB-5014 Enclosures, and supports two display modules and nine adder modules.

2.3.1 Exterior View



2.3.2 Interior View



FDG-008 Fan Damper Control Module takes up two module spaces.

Slot is reserved for PR-300 or UDACT-300A. If not required, this slot can be used to mount any of the adder modules.

Note: If the FDG-008 is not integral with the fire alarm main panel, refer to section 5.0 for mounting instructions.

3.0 FDX-008W(KI) Fan Damper Control Modules

There are two models of the Fan Damper Control module. The FDX-008W provides switch control and LED indication of 8 fan damper zones. The FDX-008WKI provides switch control of 7 fan damper zones with terminals for a keyswitch. Both the FDX-008W and the FDX-008WKI provide a DIP switch for configuring the behavior of the LEDs. Both the FDX-008W and the FDX-008WKI are used in conjunction with an FX-2000, FleX-Net™, FleX-Net™ FX-4000, MMX™, or MMX™-4000 Fire Alarm Control Panel.

3.1 Mounting and Wiring

Mount the FDX-008W and FDX-008WKI Fan Damper Control Display modules in any position on the front part of the chassis as shown in the corresponding fire alarm manual.

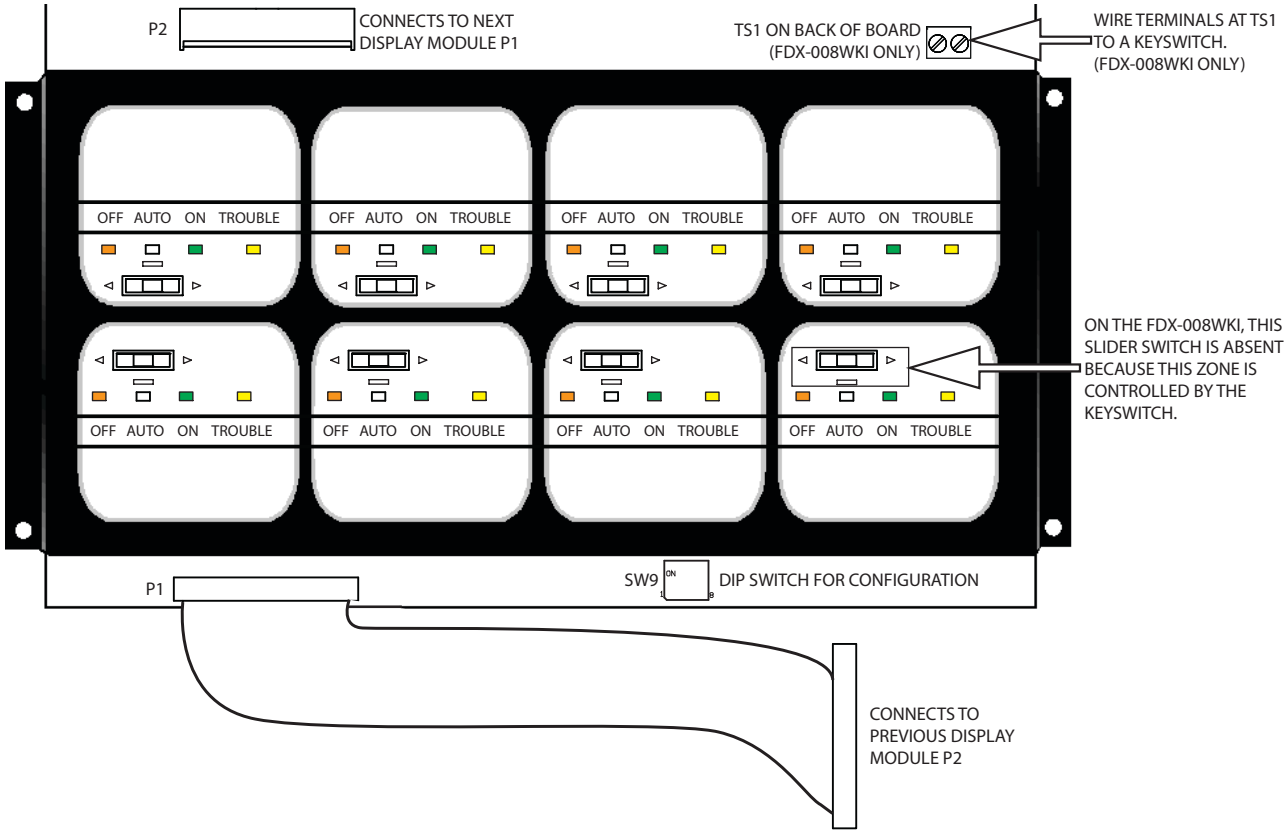


Figure 2 FDX-008W(KI) Fan Damper Control Module Wiring

On the FDX-008WKI, the keyswitch terminals are located on the back of the board. Wire the keyswitch to these two terminals and mount the keyswitch at the main fire alarm control panel. This keyswitch, once activated (by using the key and turning the keyswitch) will allow manual operation of all fan dampers (via both the FDX-008W and FDX-008WKI) in the system.

See section 8.19 for instructions on setting the SW9 DIP switch.

Note: When monitoring fans and dampers remote from the Fire Alarm Panel, the user must choose addressable monitors and/or relays. Only these devices can be located physically close to the switches (of the fans and dampers). Therefore, wiring can be as one enclosure from the End of Line (EOL) side to the fan and/or damper. The wiring from the addressable monitor and/or relay back to the fire alarm control panel is supervised as always.

3.1.1 Fan Damper Operation

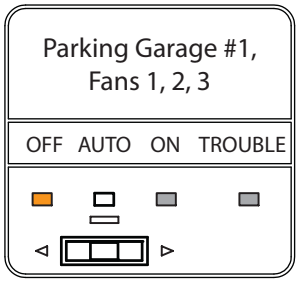
The FDX-008W Fan Damper Control module has eight configurable output circuits, each with a three position switch. The FDX-008WKI operates in the same manner as the FDX-008W except that it provides 7 switches and a terminal block used to connect a keyswitch. In order to operate any of the switches manually, you must activate a keyswitch which is mounted in the main fire alarm panel enclosure. Once the keyswitch is activated, all fan damper switches may be manually selected, regardless of which display it belongs to; FDX-008W or FDX-008WKI.

Each switch has an ON and OFF position, plus an AUTO position. If the switch is placed in the AUTO position the white AUTO LED will illuminate steady and the output will activate as programmed or configured. The output can be manually turned ON or OFF by placing the switch in the ON or OFF position, respectively.

Each switch can be configured to operate multiple fans or dampers. For each switch, there are 3 operations provided; outputs to turn ON, same outputs to turn OFF and inputs to bypass.

An example of the most common use of the FDX-008W or FDX-008WKI Fan Damper Control module is to operate exhaust fans and confirm fan operation (via monitor modules). See Figure 3 on the next page for a block diagram of fan and monitor set up.

3.1.2 Example



As shown in the figure to the right, Parking Garage #1 has 3 exhaust fans. The three position switch is configured to operate (to turn ON) fans 1, 2 and 3 in stairwell #1. The switch is set in the AUTO position (white AUTO LED on steady). Upon activation (via alarm or some other programmed trigger) with the switch in AUTO, the 3 fans (1,2, and 3) in stairwell #1 are turned ON automatically. Monitor modules in the Parking Garage #1 detect that all 3 fans are operating, therefore the ON LED will illuminate steadily. If one of the fans did not turn ON (due to malfunction), the ON and OFF LEDs will flash. The TROUBLE LED will flash amber and the OFF LED will remain steady amber based on feedback from the monitor module (with proving timer) that one or more of the fans is not working.

AUTO LED shows steady for switch in AUTO position.

ON LED shows steady for all outputs operating and confirmed.

OFF LED shows steady for all outputs NOT operating and confirmed.

TROUBLE LED flashes for one or more outputs NOT operating and confirmed.

Note: A bypass function always has priority, so that if a circuit is bypassed by moving the switch manually or by loop bypass, no other action will operate this switch other then again moving the switch manually or by un-bypassing the loop.

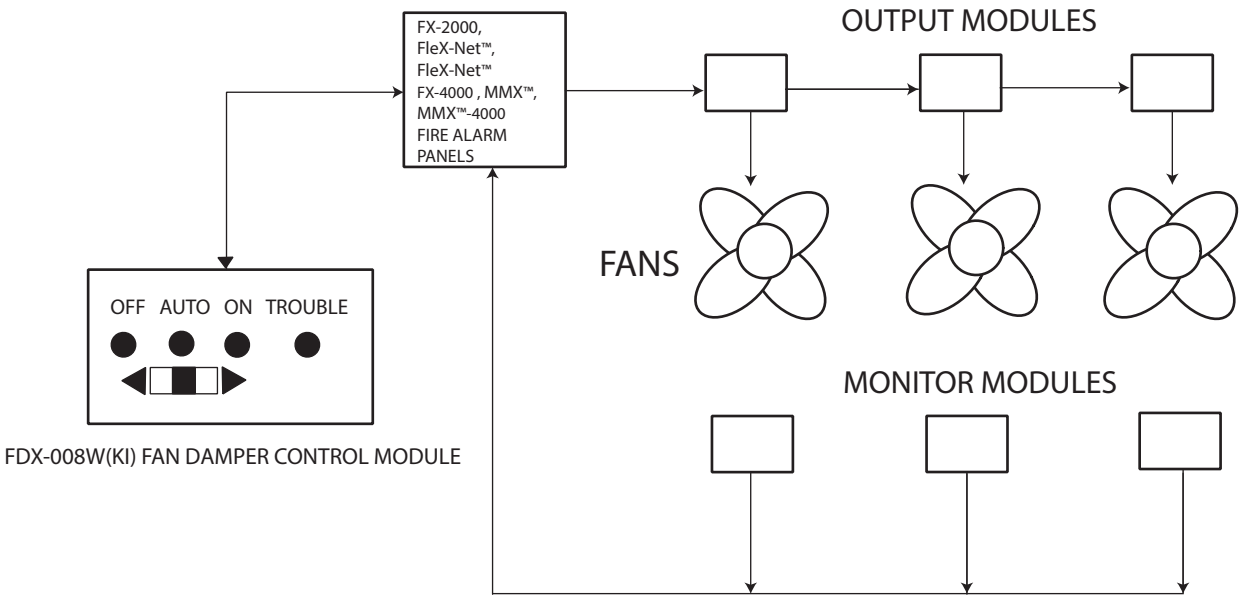


Figure 3 FDX-008W(KI) Block Diagram of Fan and Monitor Set-up

Note: On the FDX-008WKI, there are terminals located behind TS1 on the other side of the board for the convenience of wiring the keyswitch. All fan dampers are controlled by the keyswitch, if connected.

3.2 Configuration for Node Control

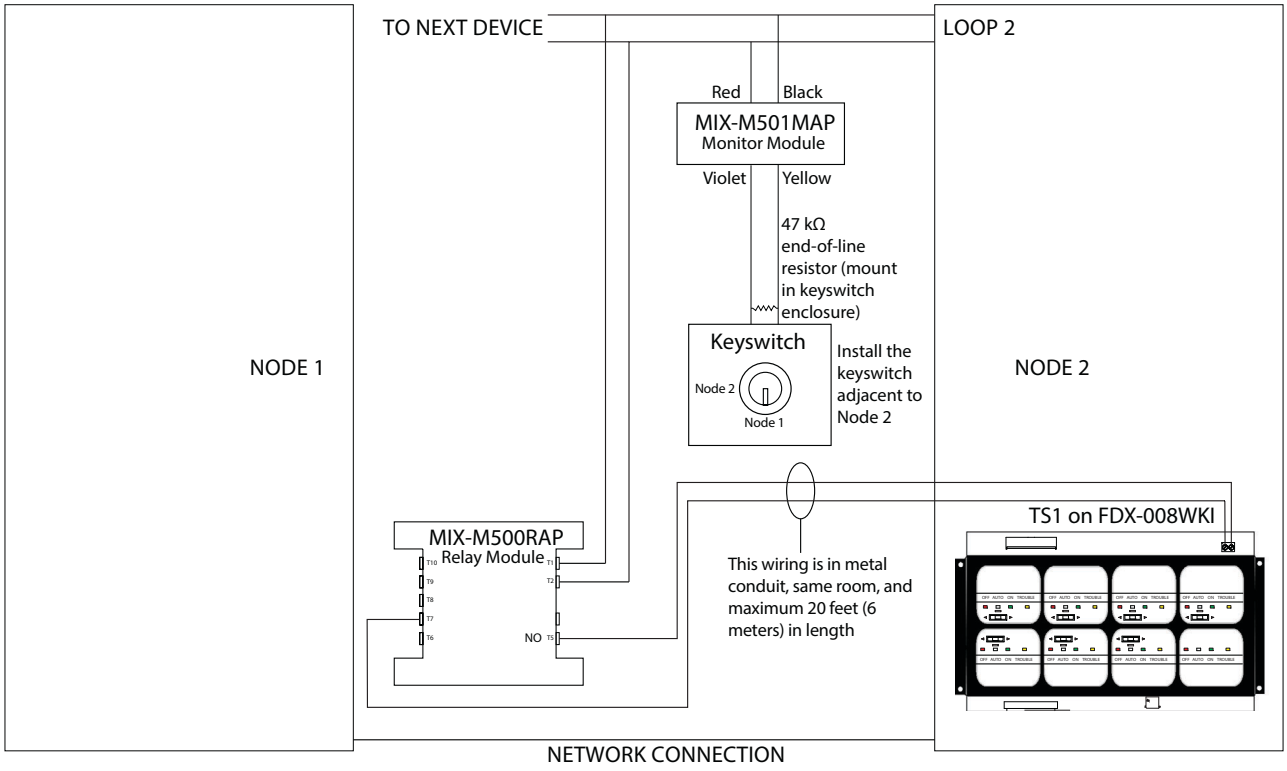


Figure 4 Wiring for Node Control

3.2.1 Configuration

Note: This special configuration is valid for a network of 2 panels in a primary/secondary relationship only.

- Use a UL/ULC listed key switch evaluated for UL 864/ULC-S527, rated minimum 30Vdc, 5A, for example model 10-1638 by Fike, rated 30Vdc, 5A (this model is suitable only for US installations)
- The MIX-M501MAP Input Monitor Module is correlated to the MIX-M500RAP Relay Module
- The MIX-M500RAP N.O. output is connected to TS1 on FDX-008WKI (this wiring must be in metal conduit, same room, and 20 feet (6 meters) in length)
- Idx 7 (TS1) on the FDX-008WKI in Node 2 is programmed as Node Ctrl
- Two Telephone/Page Selectors (QAZT-5302DS or QAZT-5348DS) are required, one in each node
- Idx 20 on both Telephone/Page Selectors is configured as Node Ctrl and correlated to Node 1
- Idx 21 on both Telephone/Page Selectors is configured as Node Ctrl and correlated to Node 2

3.2.2 Functionality

The keyswitch activates the Monitor Module. Because the Monitor Module is correlated to the Relay Module, the N.O. output on the Relay Module closes TS1 on FDX-008WKI in node 2, and since TS1 on FDX-008WKI is programed as Node Ctrl, it sends a command through the network to Node 1 that switches the control to Node 2.

LEDs on the Telephone/Page Selectors indicate whether control is in Node 1 or Node 2.

Optional: The keyswitch can be connected directly and adjacent to TS1 on FDX-008WKI in Node 2 without connecting to a Monitor Module and Relay Module.

4.0 UUKL APPLICATION

For UUKL installation there shall be an addressable monitor for a damper (or fan) closed position and one at the open position point. The time to get from the closed position to the open position is set by configuring the proving timer. The damper example can also be applied to a fan.

UUKL APPLICATION

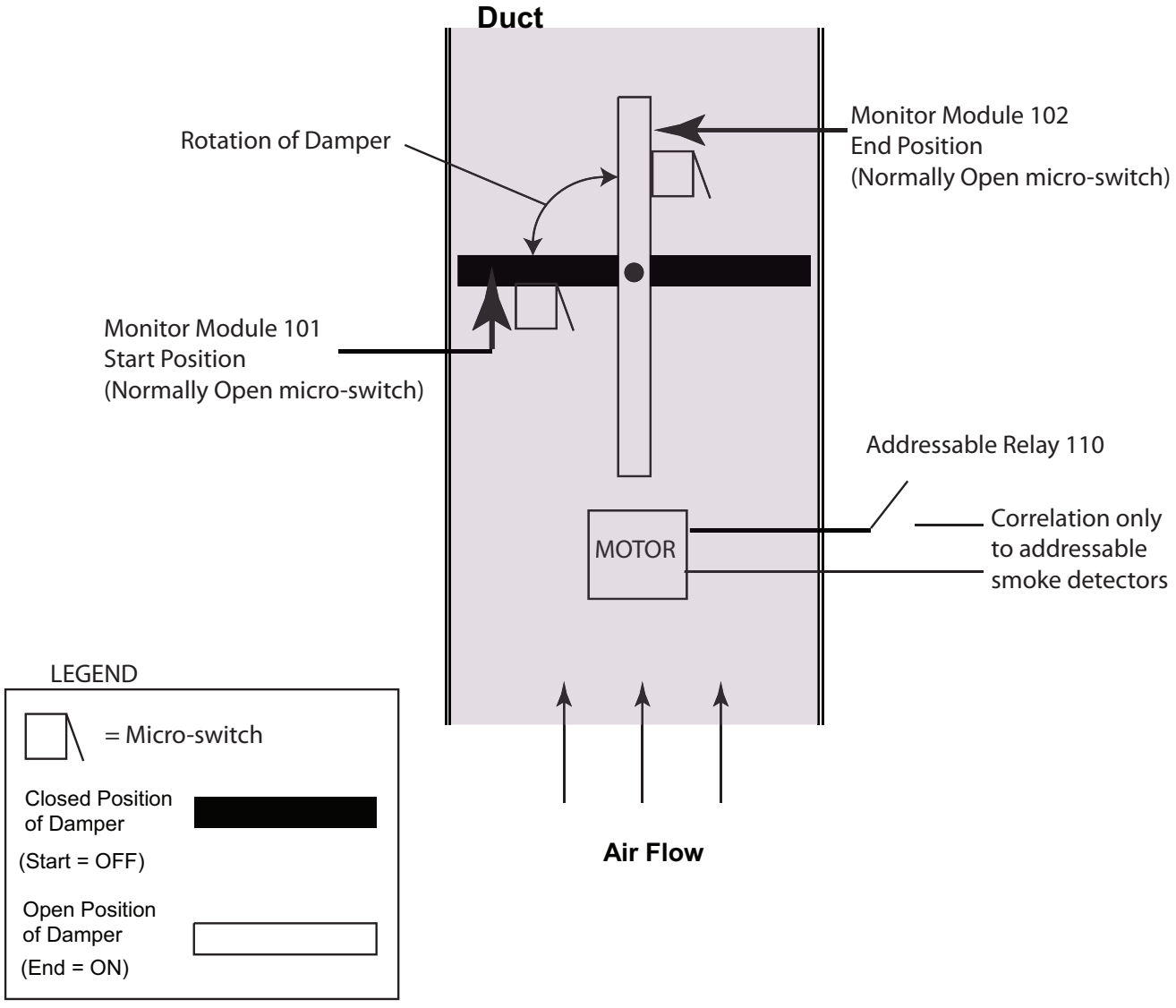


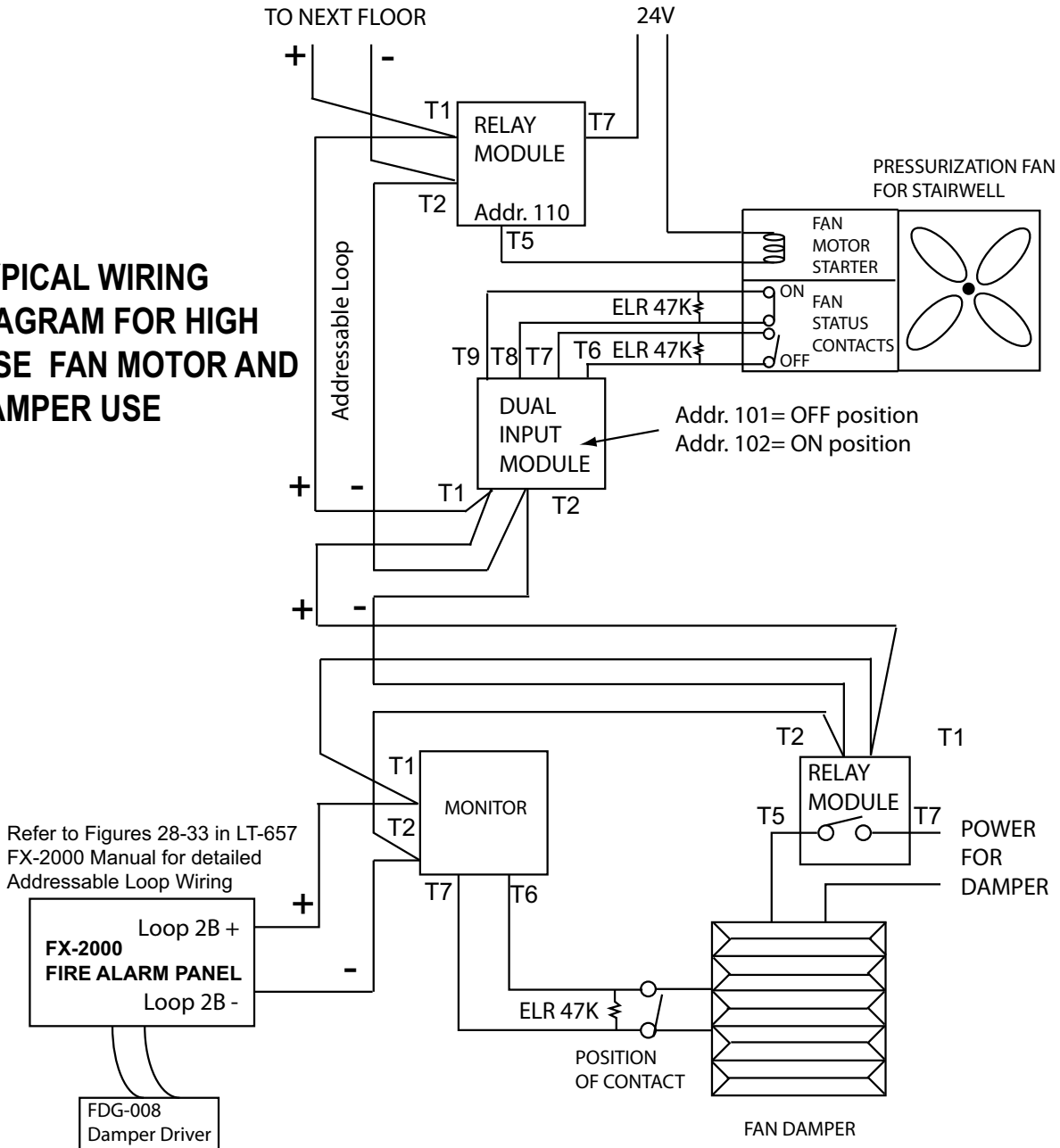
Figure 5 UUKL Application

4.1 Damper Example

What needs to be accomplished with damper for UUKL:

1. To manually control a damper with proving.
2. To automatically control a damper with proving.
3. To visually and simply demonstrate operating status of damper in all phases.
4. To set up time for weekly test for dedicated equipment.

TYPICAL WIRING DIAGRAM FOR HIGH RISE FAN MOTOR AND DAMPER USE



Wire Gauge Table for Copper Wire

AWG GAUGE	Diam. mils	Ohms per 1000 ft	Ft per pound	Feet per Ohm	Max amps	Ampacity
10	102	0.9989	31.82	1001	3.44	32.5
11	91	1.26	40.12	794	2.74	27.3
12	81	1.588	50.59	629.6	2.17	23
13	72	2.003	63.8	499.3	1.72	19.3
14	64	2.525	80.44	396	1.37	16.2
15	57	3.184	101.4	314	1.083	13.6
16	51	4.016	127.9	249	0.853	11.5
17	45.3	5.064	161.3	197.5	0.681	9.6
18	40.3	6.385	203.4	156.6	0.539	8.1

Figure 6 Typical Wiring Diagram

4.2 Configurator Steps

1. The following items need to be incorporated using the fire alarm Configurator:
2. Add a monitor at point 101 for start point of damper
3. Add a monitor at point 102 for end point of damper
4. Add a relay at point 110 for control of relay
5. Add HOA adder to system. **Definition of HOA** (Hand-Off-Auto) is a switch with three positions. The Auto position is in the middle and signifies that control of the associated relay is through programmed operation such as a smoke detector being triggered turns on that relay. The Off position is used by an operator to manually turn off the relay regardless of the program control. The Hand or On position is used by an operator to turn on the relay regardless of the program control. HOA adders are FDX-008W and FDX-008WKI.
6. Add correlations to relay 110 from HOA
7. Add proving to relay 110 of monitors 101 and 102
8. Add smoke correlations to relay 110
9. Set proving time. For this example, use 60 sec.
10. Set up weekly test time.

4.2.1 Proving Circuit Delay Timer

The FX-2000, FleX-Net™, FleX-Net™ FX-4000, MMX™, and MMX™-4000 provides one system wide proving timer. If any fans are used in the system, this timer must be set less than or equal to 60 seconds to comply with UL 864 10th Edition Application. This timer is used to keep track of the time it takes for the damper (or fan) to be activated. If the fan or damper does not reach its final destination within this proving time, there is a trouble indication. Once the fan or damper does reach its final destination the ON LED illuminates and the trouble indication is cleared. According to UL 864 10th Edition, the user shall set the proving time to a maximum of 60 seconds for fans and dampers if both are used in the system. Otherwise, if only dampers are used the proving time shall be set to maximum of 75 seconds. The Configurator allows proving times of 5 seconds to 90 seconds, so with the Authority Having Jurisdiction (AHJ), selection may be outside the 60 or 75 second range as required for slower acting fans and dampers respectively.

4.2.2 Normal Operation (everything working as it should)

At start, OFF LED is illuminated since damper is closed. Under manual control, if the manual switch is moved to the OFF position, since the damper is already off, the display does not alter. The panel goes into trouble because a switch is in the off normal position and LCD states the issue. The main panel trouble LED flashes but the PROVING TRB LED is still off since this is not a proving trouble.

Under manual control, if the manual switch is moved to the ON position, the first thing that happens is the monitor (Addr101) of the OFF Position goes active. At this point, the second monitor(Addr102) is still inactive since it takes some time for the damper to travel from the Closed Position to the Open Position. During the travel time, the LED associated with the OFF Position will flash and the LED associated with ON Position will also flash. These two LEDs will be flashing because the conditions associated with their final states are only partially satisfied. This period of both LEDs flashing indicates that the damper is neither closed nor open but somewhere in between.

Assuming the damper is operating correctly, the damper will reach its final position prior to the proving time expiring and monitor point 102 will be satisfied. When this happens, say at time 50 seconds into the cycle, the OFF LED will cease flashing and extinguish plus the ON LED will cease flashing and turn on steadily.

4.2.3 Abnormal Operation (things do not happen as they should)

Same as normal operation, but damper does not reach its end position within 75 seconds.

Under manual control, since the normal position of the damper is closed, the OFF LED will be illuminated.

Under manual control, if the manual switch is moved to the OFF position, since the damper is already off, the display does not alter. The panel goes into trouble because a switch is in the off normal position and the LCD states the issue. Since this is not a proving trouble, the proving trouble LED does not flash.

Under manual control, if the manual switch is moved to the ON position, the first thing that happens is the monitor (Addr101) of the OFF Position goes active. At this point, the second monitor(Addr102) is still inactive. During the travel time, the LED associated with the OFF Position will flash and the LED associated with the ON Position will also flash. These two LEDs will be flashing because the conditions associated with their individual final sates are not all satisfied. This flashing of both LEDs shows the damper is neither closed nor open.

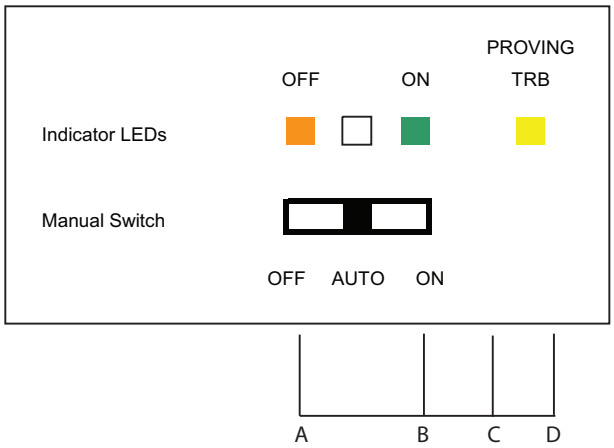
After 75 seconds, since the damper is not operating correctly, the damper has not reached its final position and monitor point 102 (ON Position indicator) is not satisfied. When the 75 second point is passed, the ON LED and the OFF LED will keep flashing since the damper is somewhere in between the closed and open position plus now the Proving Trouble LED will start to flash. The LCD display will show the failure of the monitor 102 to reach its final position.

If the damper does eventually reach its proper final state, say at 90 seconds, the OFF LED will cease flashing and the ON LED will turn on steadily plus the proving trouble LED will stop flashing and remain on steady.

4.2.4 Automatic Operation

The set up is the same only this time, smoke causes the damper to change its position. The only difference with the above is the removal of the off position switch troubles.

Definition of HOA (Hand-Off-Auto) is a switch with three positions. The Auto position is in the middle (white LED illuminates steady) and signifies that control of the associated relay is through programmed operation such as a smoke detector being triggered turns on that relay. The Off position is used by an operator to manually turn off the relay regardless of the program control. The Hand or On position is used by an operator to turn on the relay regardless of the program control.



4.2.5 LED Activity and Time Periods for Normal Operation

AB	No activity, OFF LED is illuminated.
B	Manual switch moved to ON position
BC	Period of damper travel. OFF & ON LEDs flash
C	Damper reaches proper end point
CD	ON LED turns on steady

4.2.6 LED Activity and Time Periods for Abnormal Operation

AB	No activity, OFF LED is illuminated.
B	Manual switch moved to ON position
BC	Period of damper travel. OFF & ON LEDs flash
C	Damper does not reach proper end point
CD	OFF & ON LEDs continue to flash. Proving TRB LED flashes

5.0 FDG-008 Fan Damper Graphics Control Module

The FDG-008 board is used as a graphic driver for smoke control. It can be hard wired or connected to a graphic display using ribbon cables. Up to 8 zones are hard wired into terminals marked A for anode and K for Cathode with green LED ON indication, yellow OFF normal indication and trouble indication. These zones may be connected into the graphic display with ribbon cables from P3 and P4. P5 is the cable connection for the 8 switches for fan damper control which are contained in the graphic display. Fan damper switches may be hard wired using terminals marked SW1, SW2 up to SW8 at the bottom of the FDG-008 board.

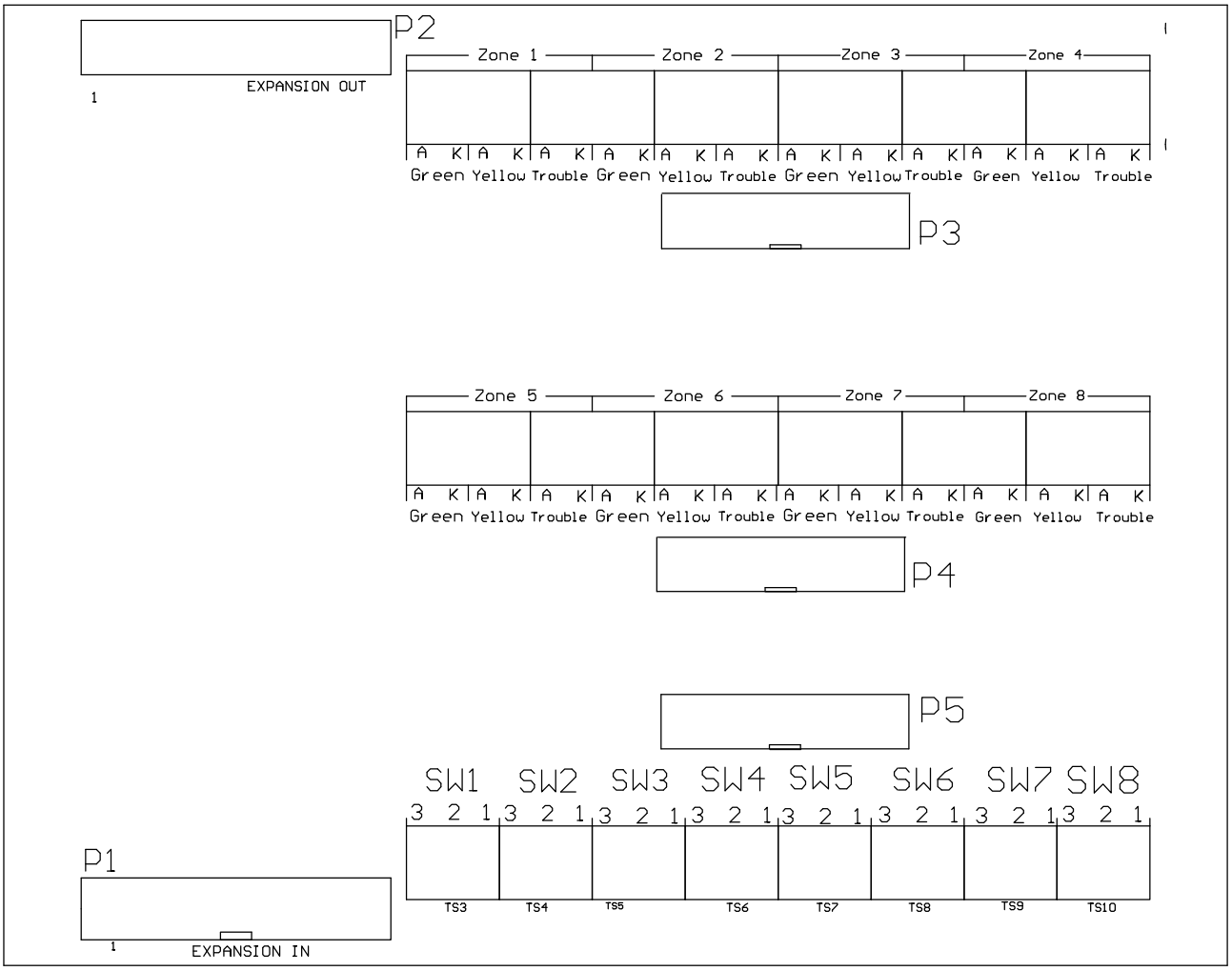


Figure 7 FDG-008 Connectors

Mount the FDG-008 Fan Damper Graphics Control module in any position on the front of the fire alarm chassis as shown in the appropriate fire alarm manual.

The FDG-008 interconnects (within the fire alarm panel) via a ribbon cable from the previous display module to P1 and with a ribbon cable from P2 out to the next module within the fire alarm panel enclosure. It provides 8 configurable output circuits for fan damper control.

The pin layout is shown in the following section to facilitate use of the cable connections with a **Geographics Display Unit (UUKL Listed)**. Set up and programming for the graphic will be factory completed.

6.0 Example of FDG-008, Fire Alarm Control Panel and Graphic

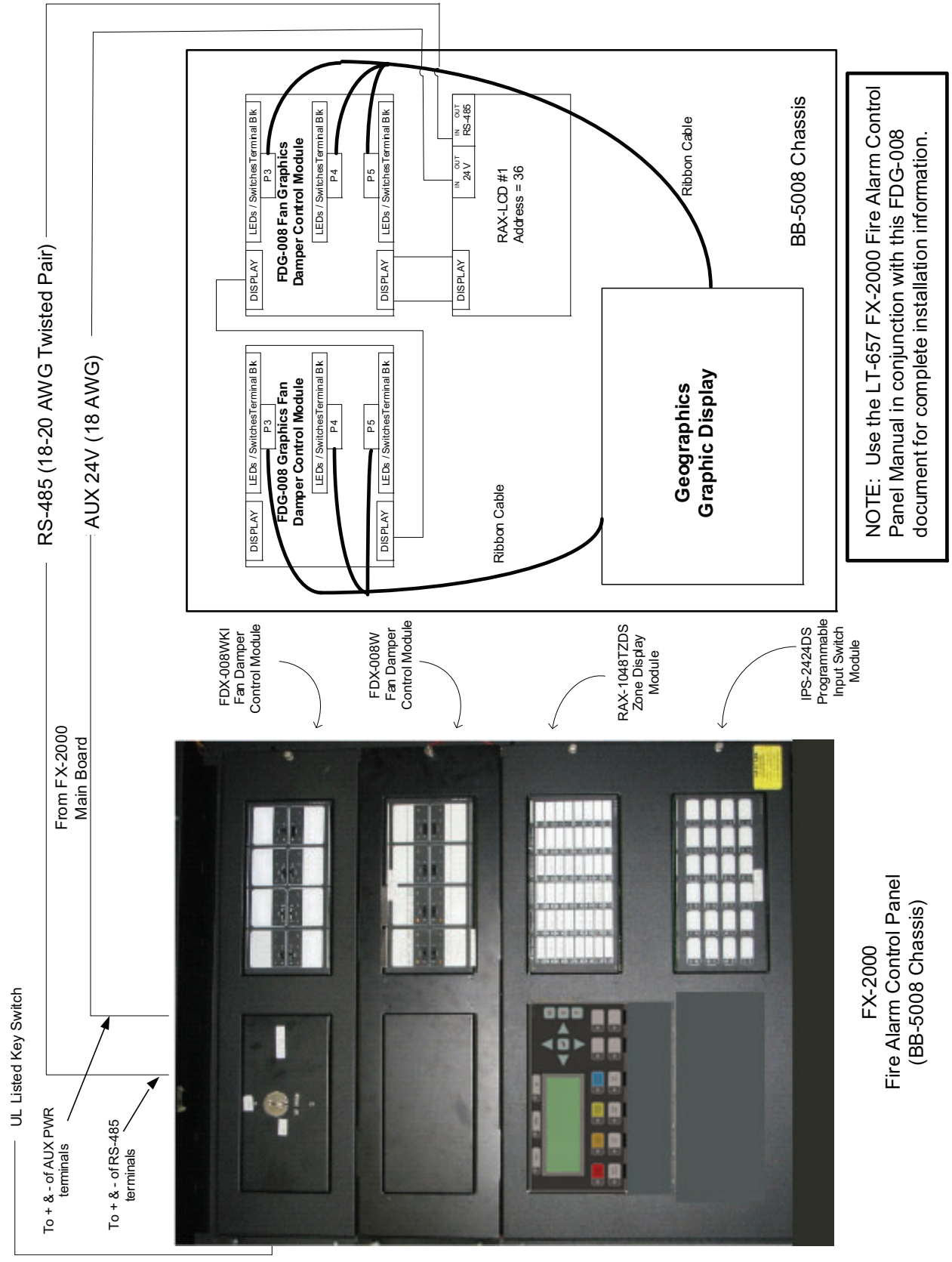
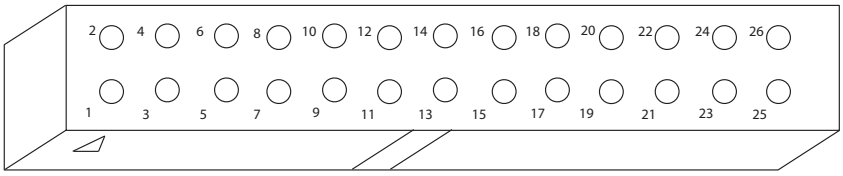


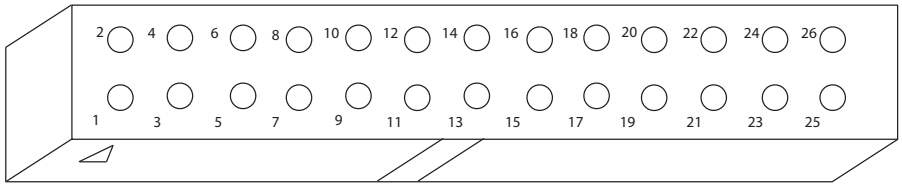
Figure 8 Example Setup with FDG-008

7.0 Pin Layout for P3, P4 and P5 Connectors on FDG-008

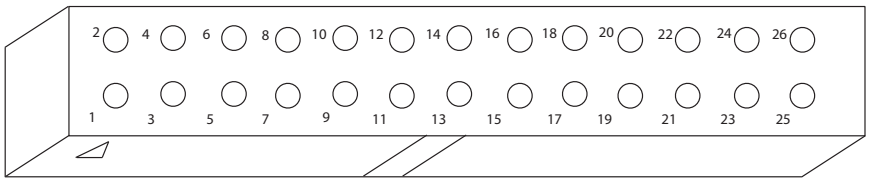
P3 26-Pin Header	Indicator Zone
1	Zone 1 ON-A
2	Zone 1 ON-K
3	Zone 1 OFF-A
4	Zone 1 OFF-K
5	Zone 1 FAULT-A
6	Zone 1 FAULT-K
7	Zone 2 ON-A
8	Zone 2 ON-K
9	Zone 2 OFF-A
10	Zone 2 OFF-K
11	Zone 2 FAULT-A
12	Zone 2 FAULT-K
13	Zone 3 ON-A
14	Zone 3 ON-K
15	Zone 3 OFF-A
16	Zone 3 OFF-K
17	Zone 3 FAULT-A
18	Zone 3 FAULT-K
19	Zone 4 ON-A
20	Zone 4 ON-K
21	Zone 4 OFF-A
22	Zone 4 OFF-K
23	Zone 4 FAULT-A
24	Zone 4 FAULT-K
25	NOT USED
26	NOT USED



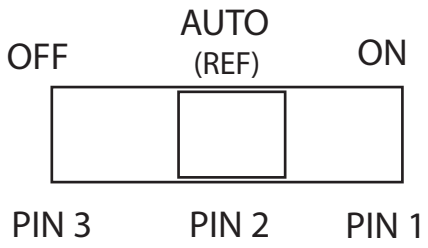
P4 26-Pin Header	Indicator Zone
1	Zone 5 ON-A
2	Zone 5 ON-K
3	Zone 5 OFF-A
4	Zone 5 OFF-K
5	Zone 5 FAULT-A
6	Zone 5 FAULT-K
7	Zone 6 ON-A
8	Zone 6 ON-K
9	Zone 6 OFF-A
10	Zone 6 OFF-K
11	Zone 6 FAULT-A
12	Zone 6 FAULT-K
13	Zone 7 ON-A
14	Zone 7 ON-K
15	Zone 7 OFF-A
16	Zone 7 OFF-K
17	Zone 7 FAULT-A
18	Zone 7 FAULT-K
19	Zone 8 ON-A
20	Zone 8 ON-K
21	Zone 8 OFF-A
22	Zone 8 OFF-K
23	Zone 8 FAULT-A
24	Zone 8 FAULT-K
25	NOT USED
26	NOT USED



P5 26-Pin Header	Switch Zone
1	Switch Zone 1 PIN 1
2	Switch Zone 1 PIN 2
3	Switch Zone 1 PIN 3
4	Switch Zone 2 PIN 1
5	Switch Zone 2 PIN 2
6	Switch Zone 2 PIN 3
7	Switch Zone 3 PIN 1
8	Switch Zone 3 PIN 2
9	Switch Zone 3 PIN 3
10	Switch Zone 4 PIN 1
11	Switch Zone 4 PIN 2
12	Switch Zone 4 PIN 3
13	NOT USED
14	NOT USED
15	Switch Zone 5 PIN 1
16	Switch Zone 5 PIN 2
17	Switch Zone 5 PIN 3
18	Switch Zone 6 PIN 1
19	Switch Zone 6 PIN 2
20	Switch Zone 6 PIN 3
21	Switch Zone 7 PIN 1
22	Switch Zone 7 PIN 2
23	Switch Zone 7 PIN 3
24	Switch Zone 8 PIN 1
25	Switch Zone 8 PIN 2
26	Switch Zone 8 PIN 3



Note: When switch (located on the graphic display) is in the ON position, pins 1 and 2 are connected. When the switch is in the OFF position, pins 3 and 2 are connected and when the switch is in the AUTO position, pins 1 and 3 are NOT connected to pin 2.



The FDG-008 must be configured with the FX-2000, FleX-Net™, FleX-Net™ FX-4000, MMX™, and MMX™-4000 Fire Alarm Configurator. Following are the instructions on configuring the FDG-008 with the FX-2000, FleX-Net™, FleX-Net™ FX-4000, MMX™, and MMX™-4000 Fire Alarm Panel and any graphic display.

8.0 Configuration of the FDG-008 and FDX-008W(KI) for Smoke Control based UUKL

NOTICE TO USERS, INSTALLERS, AUTHORITIES HAVING JURISDICTION, AND OTHER INVOLVED PARTIES					
This product incorporates field-programmable software. In order for the product to comply with the requirements in the Standard for Control Units and Accessories for Fire Alarm Systems, UL 864 and CAN/ULC S527 Standard for Control Units for Fire Alarm Systems, certain programming features or options must be limited to specific values or not used at all as indicated below.					
Program feature or option	Permitted in UL 864? (Y/N)	Permitted in CAN/ULC S527? (Y/N)	Possible settings	Settings permitted in UL 864	Settings permitted in CAN/ULC S527
Proving Timer	YES	YES	5-90 seconds	60 seconds for fans, 75 seconds for dampers. When both fans and dampers are used, the limit is 60 seconds.	60 seconds for fans, 75 seconds for dampers. When both fans and dampers are used, the limit is 60 seconds.
Manual station initiating a smoke control sequence	NO	NO	Set as input	NOT ALLOWED	NOT ALLOWED

8.1 Introduction

Follow instructions under the “Configurator Steps” on page 17 first.

The user interface for Smoke Control is centered on Equipment Sets. Equipment Sets belong to a UUKL Group which oversees all of the Equipment Sets in the Group. **The FX-2000, FleX-Net™, FleX-Net™ FX-4000, MMX™, and MMX™-4000 has a maximum of 24 Equipment Sets or equivalent.**

The proposed sequence for setting up UUKL Equipment set is as follows.

1. Add UUKL capability to the job, effectively adds one UUKL Group
2. Add a 3 position slide switch that will control all relays in the Equipment Set
3. Add the Equipment Set, specifying the Name, Auto Test time and the 3 position slide switch.
4. Add relays to control all of the equipment (fans and dampers) in the set, and their proving inputs (and correlate them to each other)
5. Add the Addressable Smoke Detectors (sensors) that will automatically activate the Smoke Control system. **Only smoke sensors will activate UUKL operation.**
6. Correlate the switch to operate all of the relays
7. Correlate the sensors to operate all of the relays
8. Place the relays in the Equipment Set.
9. Use the Equipment Set view to verify all components.

This document assumes the user is familiar with setting up sensors, relays (with proving) and correlating the relays to a 3 position switch. The procedure is outlined briefly here.

8.2 Add UUKL Group

The stand-alone panel only supports one UUKL Group. To enable UUKL capability, a UUKL Group must be added to the job. To insert a UUKL Group use the Insert Menu or right click in the job tree and choose UUKL Smoke Control. A new item appears in the Job Tree. When this Item is selected a dialog appears in the top, right hand pane. The UUKL Group can be given a name (tag) and the number of subsequent alarms (after which the UUKL state is frozen) can be specified.

Nested beneath the UUKL Group tree item is the Equipment Set tree item.

8.3 Adding 3 Position Switches

Before you can create an Equipment Set you must configure a 3 Position (HOA) switch.

Choose an annunciator, add an HOA Sw Adder if one does not already exist. Assign Auto/Man Switches at the desired locations.

8.4 Add Equipment Set

To insert an Equipment Set, first select the Equipment Sets item in the job tree.

Right click in the list view (top, right-hand pane) or use the insert menu and choose Add Equipment Set.

The resulting dialog has the following fields.

NAME	CONTROL TYPE	DESCRIPTION	DEFAULT
Name	Text Box	A 20 character name for the relay group	
Controlling Switch	Combo Box	A list of all the available 3 position switches that are not already associated with an equipment set	The first available switch
Auto Test Time	ToD, DoW	Day of Week and Time of Day "chooser". Disabled if the check box is un-checked.	Sunday 0300 for the first Equipment Set. Automatically staggered for subsequent sets.

Note: Auto test times are automatically staggered so that no two Equipment Sets have the same time. The first one will be Sunday at 0300, the next Sunday at 0330, etc. You can edit the Day of Week and Time after the Equipment Set has been created.

The new Equipment Set will be listed. The read only tree view, bottom right will show a summary of the components of the set. It will initially be empty.

8.5 Adding Relays

Add as many relays as you need by right clicking and choosing Add Device.

If you intend to place a relay in an Equipment Set it must not have the Aux Reset flag set.

If you intend to place a relay in an Equipment Set, the relay should be correlated to a "proving" input(s).

8.6 "Proving" Inputs

"Proving" can be used independently of UUKL. Proving is used to verify the desired result of energizing a relay. For example, if a relay is wired to apply power to move a damper there could be micro switches at the damper's home position and at the activated position. When the damper leaves its home position that switch would close. When, some seconds later, it reaches its activated position the second switch (N/O normally open) would also close. These switches are configured as monitors.

Example:

- add two input devices of type Input Module and Process Type Monitor.
- Add a relay.
- Select the relay, right click and choose Add Correlations. In addition to correlating the relay to the Switch or Alarm that will energize the relay, you can also specify "Proving" inputs. Select the proving tab and correlate the relay to the two proving monitors you just added.

As with most of Configuration correlations, you can also make the connection from the other direction. That is, you can select the proving monitor inputs and specify the relays they are proving.

8.7 Add Smoke Sensors

Add smoke sensors (process type Alarm) as you normally would.

8.8 “Any of (2 to 6)” Smoke Detector Operation for Smoke Control

This operation may be used in an atrium application where multiple detectors operation is required to start the smoke control strategy but the signaling within the building is based upon the first detector to activate.

If this option is selected, the panel will go into alarm if any detector is activated. The smoke control will not activate until the number of detectors (2 to 6) are activated.

To enable this feature, the smoke detectors belonging to one Equipment Set must have the “Any of (2 to 6)” field selected to choose the number of detectors required to activate the smoke control strategy.

According to section 50.2a of the UL864 Rev. 10 Standard, “Automatic processing and beginning smoke-control strategies, shall be not be greater than 10 seconds from the actuation of a manual command or initiation of a fire alarm condition.” Therefore, approval of the Authority Having Jurisdiction (AHJ) is required if this feature is used.

Installation guidelines require a minimum of two detectors in each protected space and to reduce the detector installation spacing to 0.7 times the linear spacing in accordance with National Fire Alarm Code, NFPA 72. Refer to Figures detailing the Addressable Loop Wiring in the corresponding fire alarm manual.

8.9 Correlate Switch to Relays

Return to the display adder view and correlate the switch to all of the relays.

8.10 Correlate Sensor to Relays

Return to the device list view and correlate the smoke sensors to all of the relays.

8.11 Add Relays to Equipment Set

Return to the Device List view and locate the relays. Using the Equipment Set correlation tab, insert the relays in the Equipment Set.

8.12 Equipment Set Summary View

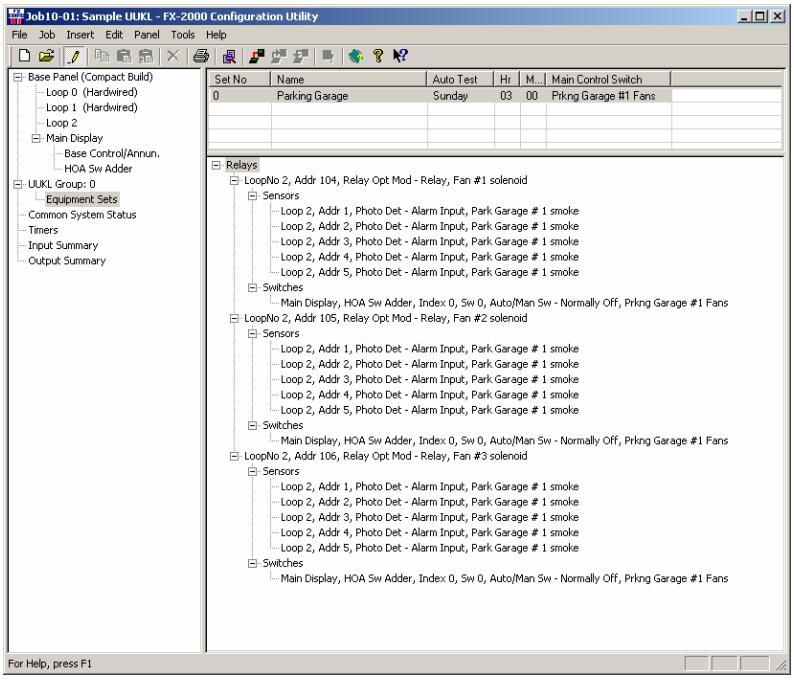


Figure 9 Equipment Set

In this example, the Equipment Set groups three relays (Fan #1, #2 and #3 solenoid). The identical set of smoke sensors is correlated to operate all three fans. Assuming the requirement is for all fans to operate together, the user must ensure that is not possible for any sensor to trigger just one fan.

Similarly with the switch: the user can see from this view that the same switch, “Parking Garage #1 Fans” operates all of the relays. If the user added identical switches at another location and correlated them to the fans, those switches would also be listed. The user must verify that these switches are also correlated to all relays in the set.

8.13 Correlate Detectors to Equipment Set

Click on an equipment set in the top, right pane. One of the tabs on the Add Correlations dialog is "Alarms". Any alarm inputs that the user selects are automatically correlated to **all** of the relays in the equipment set.

Note: The compliment of these correlations is not displayed. That is, if the user selects a detector, they do not see the equipment set with which it is indirectly (through the relays) correlated.

8.14 Delete Detector from Equipment Set

Deleting a detector already causes all of its correlations to be removed.

8.15 Delete Detector Correlations - Outside of Equipment Set View

If the user attempts to remove a detector to relay correlation (from either direction) the deletion will succeed. If you now view the detectors corrected to the Equipment Set, you will only see those detectors that are correlated to ALL of the relays in the set. But individual relays may be correlated to addition detectors.

(This is consistent with other views. If you view the relays and highlight them individually, you will see the full set of detectors correlated to each one. If you highlight multiple relays, the correlation view will shrink to show those detectors that are correlated to all of the relays.)

8.16 Delete Proving Inputs

If a monitor input (used as a proving input) is deleted, then its correlations with any relays are also removed. The user is warned if the relay is part of an equipment set with auto test.

8.17 Delete Proving Correlations

If the correlation between a monitor input and a relay is deleted the user is warned if the relay is part of an equipment set with auto test.

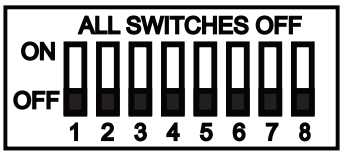
8.18 Delete Switch to Relay Correlations

If the user attempts to break the correlation between a switch and a relay and both the switch and the relay are associated with an Equipment Set the action will succeed. The relay is still listed as part of the Equipment Set but it is not correlated to the switch.

8.19 SW9 DIP Switch Configuration

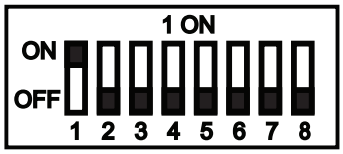
The SW9 DIP switches located at the bottom of the circuit board (see Figure 2) control the behavior of the LEDs.

8.19.1 Default Mode



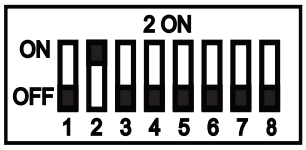
The white LEDs turn off when the sliding switches move away from their center positions.

8.19.2 Fall Back Mode



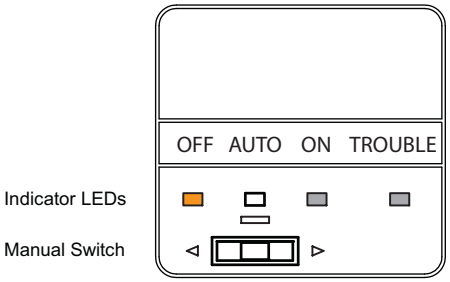
The white LEDs are always off.

8.19.3 Normal Off Mode

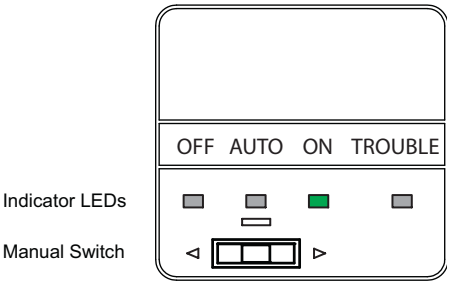


If the switches are configured to be normally off, then the white LED and the amber LED are on by default.

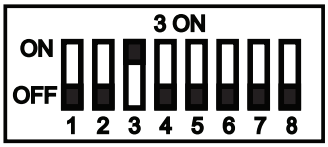
When the sliding switches are moved away from their center positions, the white LEDs turn off, and the amber and green LEDs are under the control of the person operating the sliding switch.



If the fire alarm panel turns the fan or damper on, then only the green ON LED turns on as long as the fan or damper has no issue (all other LEDs are off).

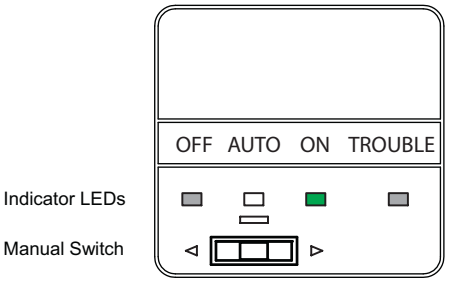


8.19.4 Normal On Mode

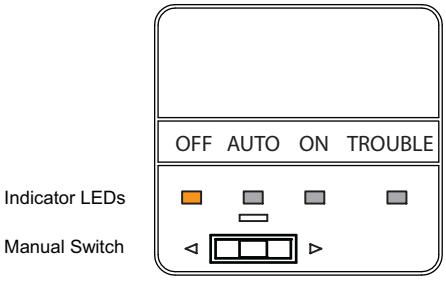


If the switches are configured to be normally on, then the white LED and the green LED are on by default.

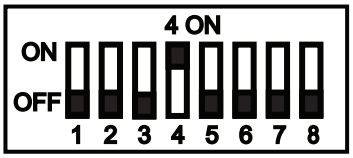
When the sliding switches are moved away from their center positions, the white LEDs turn off, and the amber and green LEDs are under the control of the person operating the sliding switch.



If the fire alarm panel turns the fan or damper off, then only the amber OFF LED turns on as long as the fan or damper has no issue (all other LEDs are off.



8.19.5 MGC Protocol Mode



This mode is not used.

9.0 Specifications & Features

9.1 FDX-008W Fan Damper Control

- 24V DC nominal, range of 20 to 39V DC. (This rating is for battery calculation. 5V are internally provided from the FACP)
- Interconnects via one ribbon cable to P2 of previous display module.
- Provides 8 configurable output circuits or fan damper controls.
- Standby: 15mA Max., Alarm (all LEDs ON): 35mA Max.

9.2 FDX-008WKI Fan Damper Control

- 24V DC nominal, range of 20 to 39V DC. (This rating is for battery calculation. 5V are internally provided from the FACP)
- Interconnects via one ribbon cable to P2 of previous display module.
- Provides 8 configurable output circuits or fan damper controls, 1 output controlled via keyswitch.
- Standby: 15mA Max., Alarm (all LEDs ON): 35mA Max.

9.3 FDG-008 Fan Damper Graphics Control

- 5V DC internally provided by the FX-2000, FleX-Net™, FleX-Net™ FX-4000, MMX™, and MMX™-4000 FACP.
- Interconnects via one ribbon cable to P2 of previous display module.
- Provides 8 configurable output circuits or fan damper controls.
- Standby: 15mA Max., Alarm (all LEDs ON): 35mA Max.

9.4 GEO-MIRCOM Graphical Display

- 5V DC internally provided by the FX-2000, FleX-Net™, FleX-Net™ FX-4000, MMX™, and MMX™-4000 FACP.
- It can interface with the FDG-008 through ribbon cables using connectors P3, P4, and P5 or using wires by using the terminal blocks on the FDG-008.
- 5mA Max. per LED (Standby and Alarm).

10.0 Warranty & Warning Information

WARNING!

Please read this document **CAREFULLY**, as it contains important warnings, life-safety, and practical information about all products manufactured by the Mircom Group of Companies, including Mircom and Secutron branded products, which shall include without limitation all fire alarm, nurse call, building automation and access control and card access products (hereinafter individually or collectively, as applicable, referred to as "**Mircom System**").

NOTE TO ALL READERS:

1. **Nature of Warnings.** The within warnings are communicated to the reader out of an abundance of caution and create no legal obligation for Mircom Group of Companies, whatsoever. Without limiting the generality of the foregoing, this document shall NOT be construed as in any way altering the rights and obligations of the parties, governed by the legal documents that apply in any given circumstance.
2. **Application.** The warnings contained in this document apply to all Mircom System and shall be read in conjunction with:
   a. the product manual for the specific Mircom System that applies in given circumstances;
   b. legal documents that apply to the purchase and sale of a Mircom System, which may include the company's standard terms and conditions and warranty statements;
   c. other information about the Mircom System or the parties' rights and obligations as may be application to a given circumstance.
3. **Security and Insurance.** Regardless of its capabilities, no Mircom System is a substitute for property or life insurance. Nor is the system a substitute for property owners, renters, or other occupants to act prudently to prevent or minimize the harmful effects of an emergency situation. Building automation systems produced by the Mircom Group of Companies are not to be used as a fire, alarm, or life-safety system.

NOTE TO INSTALLERS:

All Mircom Systems have been carefully designed to be as effective as possible. However, there are circumstances where they may not provide protection. Some reasons for system failure include the following. As the only individual in contact with system users, please bring each item in this warning to the attention of the users of this Mircom System. Failure to properly inform system end-users of the circumstances in which the system might fail may result in over-reliance upon the system. As a result, it is imperative that you properly inform each customer for whom you install the system of the possible forms of failure:

4. **Inadequate Installation.** All Mircom Systems must be installed in accordance with all the applicable codes and standards in order to provide adequate protection. National standards require an inspection and approval to be conducted by the local authority having jurisdiction following the initial installation of the system and following any changes to the system. Such inspections ensure installation has been carried out properly.
5. **Inadequate Testing.** Most problems that would prevent an alarm a Mircom System from operating as intended can be discovered by regular testing and maintenance. The complete system should be tested by the local authority having jurisdiction immediately after a fire, storm, earthquake, accident, or any kind of construction activity inside or outside the premises.

The testing should include all sensing devices, keypads, consoles, alarm indicating devices and any other operational devices that are part of the system.

NOTE TO USERS:

All Mircom Systems have been carefully designed to be as effective as possible. However, there are circumstances where they may not provide protection. Some reasons for system failure include the following. The end user can minimize the occurrence of any of the following by proper training, testing and maintenance of the Mircom Systems:

6. **Inadequate Testing and Maintenance.** It is imperative that the systems be periodically tested and subjected to preventative maintenance. Best practices and local authority having jurisdiction determine the frequency and type of testing that is required at a minimum. Mircom System may not function properly, and the occurrence of other system failures identified below may not be minimized, if the periodic testing and maintenance of Mircom Systems is not completed with diligence and as required.
7. **Improper Operation.** It is important that all system users be trained in the correct operation of the alarm system and that they know how to respond when the system indicates an alarm. A Mircom System may not function as intended during an emergency situation where the user is unable to operate a panic or emergency switch by reason of permanent or temporary physical disability, inability to reach the device in time, unfamiliarity with the correct operation, or related circumstances.
8. **Insufficient Time.** There may be circumstances when a Mircom System will operate as intended, yet the occupants will not be protected from the emergency due to their inability to respond to the warnings in a timely manner. If the system is monitored, the response may not occur in time enough to protect the occupants or their belongings.
9. **Carelessness or Safety Hazards.** Moreover, smoke detectors may not provide timely warning of fires caused by carelessness or safety hazards such as smoking in bed, violent explosions, escaping gas, improper storage of flammable materials, overloaded electrical circuits or children playing with matches or arson.
10. **Power Failure.** Some Mircom System components require adequate electrical power supply to operate. Examples include: smoke detectors, beacons, HVAC, and lighting controllers. If a device operates only by AC power, any interruption, however brief, will render that device inoperative while it does not have power. Power interruptions of any length are often accompanied by voltage fluctuations which may damage Mircom Systems or other electronic equipment. After a power interruption has occurred, immediately conduct a complete system test to ensure that the system operates as intended.
11. **Battery Failure.** If the Mircom System or any device connected to the system operates from batteries it is possible for the batteries to fail. Even if the batteries have not failed, they must be fully charged, in good condition, and installed correctly. Some Mircom Systems use replaceable batteries, which have a limited life-span. The expected battery life is variable and in part dependent on the device environment, usage and type. Ambient conditions such as high humidity, high or low temperatures, or large temperature fluctuations may reduce the expected battery life. Moreover, some Mircom Systems do not have a battery monitor that would alert the user in the event that the battery is nearing its end of life. Regular testing and replacements are vital for ensuring that the batteries function as expected, whether or not a device has a low-battery monitor.
12. **Physical Obstructions.** Motion sensors that are part of a Mircom System must be kept clear of any obstacles which impede the sensors' ability to detect movement. Signals being communicated by a Mircom System may not reach the receiver if an item (such as metal, water, or concrete) is placed on or near the radio path. Deliberate jamming or other inadvertent radio signal interference can also negatively affect system operation.

13. **Wireless Devices Placement Proximity.** Moreover all wireless devices must be a minimum and maximum distance away from large metal objects, such as refrigerators. You are required to consult the specific Mircom System manual and application guide for any maximum distances required between devices and suggested placement of wireless devices for optimal functioning.
14. **Failure to Trigger Sensors.** Moreover, Mircom Systems may fail to operate as intended if motion, heat, or smoke sensors are not triggered.
    a. Sensors in a fire system may fail to be triggered when the fire is in a chimney, walls, roof, or on the other side of closed doors. Smoke and heat detectors may not detect smoke or heat from fires on another level of the residence or building. In this situation the control panel may not alert occupants of a fire.
    b. Sensors in a nurse call system may fail to be triggered when movement is occurring outside of the motion sensors' range. For example, if movement is occurring on the other side of closed doors or on another level of the residence or building the motion detector may not be triggered. In this situation the central controller may not register an alarm signal.
15. **Interference with Audible Notification Appliances.** Audible notification appliances may be interfered with by other noise sources such as stereos, radios, televisions, air conditioners, appliances, or passing traffic. Audible notification appliances, however loud, may not be heard by a hearing-impaired person.
16. **Other Impairments.** Alarm notification appliances such as sirens, bells, horns, or strobes may not warn or waken a sleeping occupant if there is an intervening wall or door. It is less likely that the occupants will be alerted or awakened when notification appliances are located on a different level of the residence or premise.
17. **Software Malfunction.** Most Mircom Systems contain software. No warranties are provided as to the software components of any products or stand-alone software products within a Mircom System. For a full statement of the warranties and exclusions and limitations of liability please refer to the company's standard Terms and Conditions and Warranties.
18. **Telephone Lines Malfunction.** Telephone service can cause system failure where telephone lines are relied upon by a Mircom System. Alarms and information coming from a Mircom System may not be transmitted if a phone line is out of service or busy for a certain period of time. Alarms and information may not be transmitted where telephone lines have been compromised by criminal tampering, local construction, storms or earthquakes.
19. **Component Failure.** Although every effort has been made to make this Mircom System as reliable as possible, the system may fail to function as intended due to the failure of a component.
20. **Integrated Products.** Mircom System might not function as intended if it is connected to a non-Mircom product or to a Mircom product that is deemed non-compatible with a particular Mircom System. A list of compatible products can be requested and obtained.

Warranty

Purchase of all Mircom products is governed by:

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