ENGINEERING SPECIFICATION

MR-2320-R

PRE-ACTION/DELUGE AND AGENT RELEASE CONTROL PANEL

PART 1.0 GENERAL

* 1. DESCRIPTION:

1. This section of the specification includes the furnishing, installation, connection, and testing of the fire alarm equipment required to form a complete, coordinated and operational pre-action, deluge and/or an agent releasing system. It shall be capable of being used in single-hazard or dual-hazard applications with or without cross-zoning. It shall include but not be limited to a Fire Alarm Control Unit (FACU), alarm initiating devices, alarm notification appliances, releasing devices, auxiliary control devices, annunciators, polarity reversal/city tie and/or digital alarm communications to remote/central stations and wiring as shown on the drawings and specified herein. The complete installation shall be in accordance with the project specifications and as indicated on the project drawings.
2. The fire alarm system shall comply with the requirements of NFPA 72 National Fire Alarm and Signaling Code standard for Local Protected Premises Signaling Systems except as modified by the local Authority Having Jurisdiction and supplemented by this specification. The system field devices shall be supervised either electrically and/or through software driven processes.
3. The FACU, FACU accessories and FACU compatible field devices shall be manufactured or supplied 100% by a single North American based manufacturer whose quality management system is ISO 9001:2015 certified.
4. The FACU and associated field devices system shall comply with the following standards as applicable.

Underwriter’s Labs (ULI):

* 1. UL 38 Manually Actuated Signaling Boxes
  2. UL 217 Smoke Detectors, Single and Multiple Station
  3. UL 228 Door Closers–Holders for Fire Protective Signaling Systems
  4. UL 268 Smoke Detectors for Fire Protective Signaling Systems
  5. UL 268A Smoke Detectors for Duct Applications
  6. UL 346 Waterflow Indicators for Fire Protective Signaling Systems
  7. UL 464 Audible Signaling Appliances
  8. UL 521 Heat Detectors for Fire Protective Signaling Systems
  9. UL 864 Standard for Control Units for Fire Protective Signaling Systems
  10. UL 1481 Power Supplies for Fire Protective Signaling Systems
  11. UL 1638 Visual Signaling Appliances
  12. UL 1971 Signaling Devices for Hearing Impaired
  13. UL 2017 General-Purpose Signaling Devices and System
  14. UL 2075 Standard for Gas and Vapor Detectors and Sensors

National Fire Protection Association (NFPA):

1. NFPA 12 CO2 Extinguishing Systems (High Pressure Only)
2. NFPA 12A Halon 1301 Extinguishing Systems
3. NFPA 12B Halon 1211 Extinguishing Systems
4. NFPA 13 Sprinkler Systems
5. NFPA 15 Water Spray Fixed Systems
6. NFPA 16 Foam-Water Deluge and Foam-Water Spray Systems
7. NFPA 17 Dry Chemical Extinguishing Systems
8. NFPA 17A Wet Chemical Extinguishing Systems
9. NFPA 72 National Fire Alarm and Signaling Code
10. NFPA 101 Life Safety Code
11. NFPA 2001 Clean Agent Fire Extinguishing Systems
12. The FACU shall be UL ANSI 864, 10th Edition Listed. Systems listed to UL ANSI 864, 9th edition (or previous revisions) shall not be accepted.
13. The installation company shall employ NICET (minimum Level II Fire Alarm Systems) certified technicians on site to guide the final check-out and to ensure the system’s integrity.
    1. SCOPE
14. A new, microprocessor controlled, pre-action, deluge and/or agent released control system shall be installed in accordance with the project specifications and drawings.
15. Basic Performance:
16. Initiating devices shall be connected to the FACU initiating device circuits.
17. The FACU initiating device circuits shall support Class A or Class B wiring configuration.
18. The initiating device circuits, notification appliance circuits and releasing appliance circuits shall not require twisted or shielded cabling.
19. The FACU notification appliance circuits shall support either Class A or Class B wiring configuration.
20. Releasing circuits shall be wired to supervise the solenoid coil.
21. A single ground fault or open circuit on the system initiating device circuits shall not cause system malfunction, loss of operating power or the inability to report an alarm.
22. The FACU RS-485 bus shall support Class B wiring configuration.
23. All circuits shall be power limited per UL 864 requirements except for wiring to MR-2300-PR, city tie box.
24. The secondary power source of the FACU shall be capable of providing at least 24 hours of backup power with the ability to power the system for an additional 5 minutes in an alarm condition, at the end of the 24-hour backup period.
25. Basic System Operation
26. When an off normal condition occurs (Alarm, Supervisory, or Trouble) the respective LED on the FACU shall illuminate.
27. A piezo sounder shall activate at the FACU during any off normal condition until the BUZZER SILENCE buttons are pressed by an authorized user.
28. A Red LED shall illuminate when an alarm condition exists.
29. An Amber (yellow) LED shall illuminate when a Supervisory or Trouble condition exists.
30. An Amber (yellow) LED shall illuminate when the Abort circuit is active.
31. A Red LED shall illuminate when the releasing circuit is active.
32. A pre-release LED shall flash red at a fast rate, when the release timer is started and turn off when the release timer expires or the system is reset.
33. An Alarm condition shall have priority over all other signals.
34. In response to a fire alarm condition, the following functions shall immediately occur:
    * 1. A programmed delay timer shall be started.
      2. Warning signals shall be activated.
      3. If abort is activated, the timer shall stop, warning signals shall turn off.
      4. Manual release shall override abort.
      5. At completion of the delay timeout, alarm signals shall turn on, the release solenoid(s) shall be activated.
35. The FACU shall include two event history logs comprised of a 200-event alarm log for alarm related events and a 200-event general log for all other events that stores all off-normal conditions and actions along with a time and date stamp of when they occurred.
36. The system shall notify an approved remote supervising station (central station, proprietary or remote) via means deemed acceptable by the local Authority Having Jurisdiction (AHJ).
    1. SUBMITTALS:

A. General

* 1. Two (2) copies of all submittals shall be submitted to the Architect/Engineer for review.
  2. All references to manufacturer’s model numbers and other pertinent information herein are intended to establish minimum standards of performance, function, and quality. Equivalent compatible UL-listed equipment from other manufacturers may be substituted for the specified equipment if the minimum standards are met.
  3. For equipment other than that specified, the contractor shall provide proof that the proposed substitute equipment equals or exceeds the form, feature, function, performance, and quality of the specified equipment.

1. Shop Drawings
   1. Drawings shall be provided that include all field devices that are installed as part of the fire alarm system including the circuit, location, and type for each. Whenever possible, the drawings shall reflect other components of the building such as air diffusers, HVAC returns, lights, etc., to determine compliance.
   2. Include manufacturer's name(s), model numbers, ratings, power requirements, equipment layout, device arrangement, complete wiring point-to-point diagrams, and conduit layouts.
   3. Show annunciator layout, configurations, and terminations.
   4. The drawings shall include conductor counts and wire sizes for each circuit.
   5. The location and mounting configuration of the FACU, remote power supplies, and terminal cabinets shall be indicated on the drawings.
2. Other Documentation
   1. In addition to the shop drawings, the following information shall also be included with the submittal:  
      1. Complete operating and maintenance manuals listing the manufacturer's name(s).
      2. Manufacturer’s technical datasheets for each piece of equipment that will be installed.
      3. Standby battery calculations for the FACU and any remote power supply or other panels that include their own standby batteries.
      4. Voltage drop calculations showing the worst-case end of line voltage for all notification appliance circuits.
      5. Detailed description of the overall operation of the system or a sequence of operations matrix.
      6. Proof of factory training and certification of the supervising technician assigned to the project.
      7. Proof of factory training and certification of a service technician employed by the installation company that can be onsite to troubleshoot and repair any service-related problems with the system within 4 hours of being notified of the problem.
3. Software Modifications
4. Provide the services of a qualified technician to perform all system software modifications, upgrades or changes. Response time of the technician to the site shall not exceed 4 hours.
5. Provide all hardware, software, programming tools and documentation necessary to modify the fire alarm system on site. Modification includes addition and deletion of devices, circuits, zones and changes to system operation and custom label changes for devices or zones. The system structure and software shall place no limit on the type or extent of software modifications on-site. Modification of software shall not require power-down of the system or loss of system fire protection while modifications are being made.
6. Provide firmware updates through USB Interface.
   1. WARRANTY:
7. All of the main fire alarm system components including control panels, detectors, modules, and notification devices furnished under this contract shall include a warranty from the manufacturer for a minimum period of at least three (3) years from the date of purchase. All other materials, labor and work performed under this contract shall be free of defects and shall remain so for a period of one (1) year from the date of acceptance. The full cost of materials and labor to correct any defects during these warranty periods shall be included in the installed price of the system.
   1. MAINTENANCE:
8. Maintenance and testing shall be on a semi-annual basis or as required by the local codes and AHJ. A preventative maintenance schedule shall be provided by the contractor describing the protocol for preventative maintenance. The schedule shall include:
   1. Systematic testing and complete inspection of the entire fire alarm system including control panels, field devices, including smoke detectors, heat detectors, manual pull stations, sprinkler system switches, wiring terminations, remote panels, remote annunciators, power supplies, terminal boxes and all other fire alarm accessories, in accordance with NFPA 72. Cleaning and adjusting of these devices shall be conducted at this time.
   2. An inspection and test of system power supplies, batteries, circuit breakers and fuses as well as a load test of the batteries shall be conducted in accordance with NFPA 72.
   3. Placing the system into an alarm condition and checking each notification device for proper operation.
   4. Removing devices from the FACU initiating device and notification appliance circuits to confirm a trouble condition occurs.
   5. Input and output mapping shall be tested to ensure proper sequence of operation.
   6. Signal transmission shall be tested to the Monitoring Station.
   7. Following each periodic maintenance and test, the owner shall be provided with a detailed report of the test results including any deficiencies found.

1.6 POST CONTRACT EXPANSIONS:

1. The contractor shall have the ability to provide parts and labor to expand the system specified, if so requested, for a period of five (5) years from the date of acceptance.
2. When submitting the fire alarm system bid package, the contractor shall provide a quote for the expansion of the system by 10%. The quote shall include all costs for a complete installation including labor and materials for 1/10th of the number of devices used in the original overall specification and installation. The pricing shall be itemized to show single lot individual pricing of each item.
3. The prices quoted for system expansion will remain valid for 1 year from the date of completion.
4. The system expansion pricing shall be all inclusive and include costs for programming or reprogramming the system as needed.
5. Submittals that do not include a quote for expansion will be rejected.
   1. APPLICABLE STANDARDS AND SPECIFICATIONS:
6. The specifications and standards listed below form a part of this specification. The system shall fully comply with the latest issue of these standards, if applicable.
7. National Fire Protections Association (NFPA)  
   * 1. NFPA 13 Sprinkler Systems
     2. NFPA 12 CO2 Extinguishing Systems (High Pressure Only)
     3. NFPA 12A Halon 1301 Extinguishing Systems
     4. NFPA 12B Halon 1211 Extinguishing Systems
     5. NFPA 13 Sprinkler Systems
     6. NFPA 15 Water Spray Fixed Systems
     7. NFPA 16 Foam-Water Deluge and Foam-Water Spray Systems
     8. NFPA 17 Dry Chemical Extinguishing Systems
     9. NFPA 17A Wet Chemical Extinguishing Systems
     10. NFPA 70 National Electric Code (NEC)
     11. NFPA 72 National Fire Alarm and Signaling Code
     12. NFPA 101 Life Safety Code
     13. NFPA 2001 Clean Agent Fire Extinguishing Systems
     14. NFPA 5000 Building Construction and Safety Code

C. State and Local Building Codes

D. All requirements of the local Authority Having Jurisdiction (AHJ)

* 1. APPROVALS/CERTIFICATIONS:

1. The system shall have the proper approvals/certifications from the following recognized agencies:
2. UL - Underwriters Laboratories Inc. (a Nationally Recognized Test Lab – NRTL)
3. ULC – Underwriters Laboratories Inc. of Canada
4. CSFM - California State Fire Marshall
5. MEA - Material Equipment Acceptance (NYC)
6. FM – Factory Mutual

PART 2.0 – PRODUCTS:

* 1. EQUIPMENT AND MATERIALS:

1. All equipment and components shall be new and the manufacturer’s current model. The materials, appliances, equipment and devices shall be tested and listed/certified for its intended purpose by a recognized national listing testing laboratory.
2. All equipment and components shall be installed in strict compliance with the manufacturer’s recommendations as indicated in the installation manuals and wiring diagrams for the system.

All equipment attached to walls and ceilings shall be securely fastened. Ceiling mounted devices shall not be supported solely by suspended ceilings. Fasteners and supports shall be adequate to support the required load.

1. A back box shall be used for mounting all equipment. A listed and compatible back box shall be used on all outdoor devices and/or those devices installed in locations subject to moisture.
2. All equipment shall be manufactured by an ISO 9001 certified company.
3. All equipment shall be readily available through wholesale distribution outlets to licensed installation contractors that are independent of the manufacturer.
   1. CONDUIT AND WIRE:
4. Conduit:  
   1. The conduit or raceway shall be installed in accordance with the National Electrical Code, state and local requirements.
   2. Where required, all wiring shall be installed in conduit or raceway. Conduit fill shall not exceed 40% on the interior cross-sectional area where three or more cables are contained within a signal conduit.
   3. All conduit and raceway shall be listed/certified by a recognized national testing laboratory.
   4. Cable must be separated from any open conductors of power, or Class 1 circuits, and shall not be placed in any conduit, junction box or raceway containing these conductors, per the National Electric Code.
   5. Conduit size shall be ¾ inches minimum.
   6. Conduit shall not enter the fire alarm control unit, or any other remotely mounted control panel equipment or backboxes, except where conduit entry is specified by the FACU manufacturer.
   7. With the exception of telephone connections, wiring for low voltage control, alarm, notification, emergency communication and similar power-limited auxiliary functions, may be run in the same conduit as initiating circuits. All circuits shall be provided with transient suppression devices and the system shall be designed to permit simultaneous operation of all circuits without interference or loss of signals.
5. Wire:
   1. All fire alarm wiring shall be new.
   2. Wiring shall be in accordance with local, state and national codes (e.g., NEC Article 760) and as recommended by the manufacturer of the fire alarm system. All wires shall be color coded. Number and size of conductors shall be as recommended by the fire alarm system manufacturer, but not less than 18 AWG for Initiating Device Circuits and 16 AWG (1.63 mm) for Notification Appliance Circuits.
   3. All wire and cable shall be listed/certified by a recognized national testing laboratory for use with a protective signaling system.
   4. Wire and cable not installed in conduit shall have a fire resistance rating suitable for the installation as indicated in NEC 760 (e.g., FPLR).
   5. All field wiring shall be supervised for open circuits and earth ground faults.
   6. The FACU RS-485 wiring bus shall be capable of operating system devices up to 4000 feet away from the main panel, without the use of additional power supplies, boosters or signal amplifiers.
6. Terminal Boxes, Junction Boxes, and Cabinets  
   1. All terminal boxes, junction boxes and accessory cabinets shall be listed for their intended purpose.
   2. All boxes shall be sized and installed in accordance with NFPA 70.
7. Primary AC Power and Grounding
   1. The FACU shall be connected to a separate dedicated AC branch circuit 120VAC, 60Hz, 3A, maximum 20 amperes or 240VAC, 50Hz, 1.5A, maximum 10 amperes. This circuit shall be labeled at the main power distribution panel as FIRE ALARM. FACU primary power wiring shall be 12 AWG. The control panel cabinet shall be grounded securely to either a cold-water pipe or grounding rod.
   2. FIRE ALARM CONTROL UNIT (FACU)
8. The FACU shall be a Secutron model MR-2320-R Pre-Action/Deluge and Agent Release Control Panel.
9. Overview and Features:  
   1. The fire alarm system shall include, but not be limited to, a microprocessor based LED fire alarm control panel consisting of system cabinet(s), main chassis with power supply, stand-by batteries, initiating device circuits (IDCs), notification appliance circuits (NACs), releasing appliance circuits, optional (external) DACT, optional city tie/reverse polarity module, optional relay modules, detection and signaling devices, Class A converter modules for both IDCs and NACs, remote annunciator assemblies and miscellaneous peripheral devices that may be required. The system and all associated equipment shall be fully approved, certified and listed by Underwriters Laboratories Inc., (ULI).
   2. The FACU shall be field configurable to support three releasing type functions: Pre-Action Sprinkler, Deluge Sprinkler and Agent Releasing.
   3. The FACU shall support a minimum of 14 pre-configured modes of operation.
   4. The FACU shall have three (4) form C relays dedicated to Common Alarm/Hazard Alarm 1, Common Alarm/Hazard Alarm 2, Common Trouble, and Common Supervisory. These relays shall have a contact rating of 1.0 Amps at 28VDC.
   5. The FACU shall have a power supply capable of providing a maximum of 5 amps of system power to field devices and shall provide 300mA of resettable 24 VDC regulated and 500mA of non-resettable 24 VDC power.
   6. The MR-2320-R shall have four (4) programmable output circuits that can be programmed as conventional NACs (Notification Appliance Circuits) or as RACs (Releasing Appliance Circuits). Notification Appliance Circuit configuration shall be capable of being wired in Class A or Class B. Releasing circuit configuration shall be capable of being wired in Class B. Output circuits shall be programmable for the following:  
      1. Continuous
      2. Escalating Tones
      3. ANSI Temporal 3
      4. California Code
      5. March Time
      6. Two Stage
      7. Releasing
   7. Through the use of external sync modules, the FACU NACs shall synchronize notification appliances from multiple manufacturers including at a minimum:
      1. MGC
      2. System Sensor
      3. Gentex
      4. Wheelock
      5. Amseco
      6. Faraday
   8. The FACU shall include an integral user interface that includes 16 system status LED indicators, 10 system control buttons, 6 initiating circuit alarm status LEDs, 6 initiating circuit trouble LEDs, 4 notification/releasing circuit LEDs, and 10 disconnect buttons (6 for initiating device circuits and 4 for notification/releasing circuits.
   9. The FACU shall be housed in a UL listed key locked cabinet with sufficient space to house up to 12 AH, rechargeable batteries.
   10. The FACU shall support an external Digital Alarm Communicating Transmitter (DACT) via relay contacts.
   11. The FACU shall include the following features:  
       1. Initiating device circuits/zones fully programmable as: (non-verified) Alarm, Agent Release/Waterflow, Non Latching Supervisory, Latching Supervisory, Manual Release Input, Abort Input or Abort/Manual Release Combination Input depending on the Mode of Operation selected.

* (Non-Verified) Alarm - A Non-Verified alarm is a “normal” type of alarm that can have pull stations, smoke detectors, or heat detectors attached to it. Activation of any of these devices will immediately result in an alarm condition in the Fire Alarm Control Panel. An Alarm condition causes the associated Circuit Status LED and the Common Alarm LED to illuminate red.
* Agent Release/Water Flow Alarm - Water Flow Alarms are identical to normal Non-Verified Alarms except that any NACs programmed to these circuits (all are by default) are Non-Silenceable. Also, if Water Flow Retard Operation is enabled, these circuits are sampled every one second. If ten samples are active within any 15-second interval, the Water flow Alarm is confirmed and processed. An alarm condition causes the associated Circuit Status LED and the Common Alarm LED to illuminate red.
* Non-Latching Supervisory - Activation on these circuits will cause the Circuit Status LED and the amber Common Supervisory LED to illuminate. The buzzer will sound at a fast rate. If the circuit activation is removed, the Supervisory condition will clear (as long as there are no other Supervisory conditions in the system) and the Circuit Status LED will turn off.
* Latching Supervisory - Activation on these circuits will cause the Circuit Status LED and the amber Common Supervisory LED to illuminate. The buzzer will sound at a fast rate. If the circuit activation is removed, the Supervisory condition will NOT clear.
* Abort Input (Switch) - When the hazard area is in alarm (pre-discharge) state and the release timer is running, the activation of the corresponding Abort Switch will pause the releasing timer. The release process is held while the Abort Switch is pressed. Releasing the Abort Switch will resume the releasing timer and the corresponding hazard area goes into Alarm (pre-discharge) state again. The value of the release timer after Abort Switch is released depends on the type of Abort Delay in the configuration. When the release timer expires, the corresponding releasing circuit is activated. When the panel is in normal condition, activation of the Abort Switch will cause a trouble signal and the corresponding zone amber LED turns on at slow flash rate.
* Manual Release Switch - Activation of the Manual Release Switch of a hazard area will activate the corresponding releasing circuit. If the corresponding Manual Release Delay is non-zero, the releasing circuit will be activated after the Manual Release Delay expires.
  + 1. Release Timer

Use this function to set the programmable timer that delays the activation of the releasing circuits. This timer starts immediately after receiving a confirming alarm (cross-zoned hazard area) or a single alarm (non-cross-zoned hazard area). When the timer expires, the releasing circuit activates. Value: 0 to 60 seconds in five second increments.

* + 1. Abort Delay

Use this function to set how the Abort Switch operates with the Release Timer. Note that if the Release Timer is set to zero, the Abort Switch does not operate. In Standard UL mode, the release timer will stop and hold when the Abort Switch is pressed. When the switch is released, the Release Timer restarts from whichever is greater: the remaining time on the timer or 10 seconds. In IRI mode, the switch works in the same way as it does in Standard UL mode, except that the switch will function only if it is pressed and held before the second alarm comes in. In NYC mode, pressing the Abort Switch will reset to the Release Timer and add 90 seconds to the configured timer duration. After the Abort Switch is released, the Release Timer will restart. In Local Juris. (Local Jurisdiction Delay), pressing the Abort Switch will reset the Release Timer back to its configured value. After the switch is released, the Release Timer will restart.

* + 1. Manual Release Delay

Use this function to set the time delay of activation of corresponding releasing circuit(s) after activation of the manual release switch. Value: 0 to 30 seconds in five second increments.

* + 1. Soak Timer

Use this function to set the length of time for which the releasing circuit is active. When the soak timer expires, the control panel automatically shuts off the activated releasing circuit. A setting of 0 seconds means that the soak timer is disabled and the releasing circuit is active continuously.

* + 1. Two LEDs per initiating device circuit, one for Trouble (amber), and one dual color (amber/red) LED for Supervisory (amber) and Alarm (red).
    2. Fourteen (14) programmable modes of operation including:
       1. Mode 1: Agent Release, Single Hazard, Cross-zoned, Combined Release
       2. Mode 2: Agent Release, Single Hazard, Not Cross-zoned, Combined Release
       3. Mode 3: Agent Release, Dual Hazard, Cross-zoned, Split Release (for legacy applications with AHJ approval)
       4. Mode 4: Agent Release, Dual Hazard, Not Cross-zoned, Split Release (for legacy applications with AHJ approval)
       5. Mode 5: Pre-action/Deluge, Single Hazard, Cross-zoned, Combined Release
       6. Mode 6: Pre-action/Deluge, Single Hazard, Not Cross-zoned, Combined Release
       7. Mode 7: Pre-action/Deluge, Dual Hazard, Cross-zoned, Split Release
       8. Mode 8: Pre-action/Deluge, Dual Hazard, Not Cross-zoned, Split Release
       9. Mode 9: Agent Release, Single Hazard, Cross-zoned, NYC abort
       10. Mode 10: Agent Release, Single Hazard, Not Cross-zoned, Combined Release
       11. Mode 11: Agent Release, Single Hazard, Cross-zoned, Combined Release
       12. Mode 12: Pre-action/Deluge, Single Hazard, Cross Zoned, Combined Release
       13. Mode 13: Pre-action/deluge, Single Hazard, Not Cross Zoned, Combined Release
       14. Mode 14: Pre-action/deluge, Single Hazard, Not Cross Zoned, Combined Release
    3. Single and Two Stage operation.
    4. i3 Series Protocol - the MR-2320-R has the i3 Series protocol built-in. The panels support the two-wire i3 Series smoke detectors (2W-B/2WT-B).
    5. Each IDC, NAC and RAC can be individually disconnected/disabled via the keypad and LED display with Password Access.
    6. Signal Silence options include Signal Silence, Signal Silence Inhibit, Auto Signal Silence and Silence Inhibit.
    7. RS-485 Interface for Remote LED Annunciators and Remote Smart Relay Modules.
    8. Optional modules for additional internal relay circuits and City Tie/Polarity Reversal.
    9. Programmable from the integral user interface using the CFG-300 configuration tool.
    10. Two event history logs comprised of a 200-event alarm log for alarm related events and a 200-event general log for all other events that stores all off-normal conditions and actions along with a time and date stamp of when they occurred.
    11. One person walk-test capability with all devices tested during walk-test mode recorded in the event history buffer.
    12. Optional trim rings for semi-flush mounting.

1. Operator Control Interface
2. The FACU shall provide all the controls and indicators used by the system operator and may also be used to program all system operational parameters.
3. The display shall contain an LED type display, an internal buzzer and dedicated LEDs for the annunciation of system status including:
   1. AC On LED

The AC ON LED is on steady green while the main AC power is within acceptable levels. It is turned off when the level falls below the power-fail threshold.

* 1. Common Alarm LED

The red Alarm Indicator will illuminate whenever the panel detects an alarm condition on any initiating device circuit. Since all alarms are latched until the panel is reset, the indicator will remain ON until then.

* 1. Common Supervisory LED

The amber Supervisory Indicator turns ON steady when there is a Supervisory Alarm in the Panel caused by any Latching or Non-Latching Supervisory Circuit. The indicator is turned OFF when all Non-Latching Supervisory Circuits are restored and there are no active Latching Supervisory Circuits. Latching Supervisory Alarms remain active until the Panel is reset.

* 1. Common Trouble LED

The amber Trouble Indicator flashes at the Trouble Flash Rate when the panel detects any trouble condition. It turns OFF when all Non-Latching Troubles are cleared.

* 1. Battery Trouble LED

Flashes amber at a slow rate, when the battery voltage is lower than the specified threshold or the battery is off-line. Flashes amber at a fast rate when there is a trouble on the battery charger circuit.

* 1. Remote Trouble LED

Flashes amber at a slow rate as a result of any remote trouble condition.

* 1. Ground Fault LED

Flashes amber at a slow rate when there is a ground fault detected in the system.

* 1. CPU Fail LED

The amber CPU FAIL LED flashes approximately ¼ second every 2 seconds to indicate a processor failure on the main board. In addition, the buzzer sounds in time with the CPU FAIL LED until the fault is corrected.

* 1. Abort LED

Illuminates steady amber when the abort circuit is active.

* 1. Released LED

Illuminates steady red when the releasing circuit(s) is active.

* 1. System Reset LED

Turns on steady amber during the system reset process.

* 1. Signal Silence LED

Flashes amber at a slow rate when the notification appliance circuits are silenced.

* 1. Auxiliary Disconnect LED

Flashes amber at a slow rate when the auxiliary disconnect function is active.

* 1. Lamp Test LED

Illuminates steady amber when the lamp test button is pressed.

* 1. Buzzer Silence LED

Flashes amber at a slow rate when the buzzer is silenced.

* 1. Pre Release LED

Flashes red at a fast rate when the release timer is started, turns off when the release timer expires or the system is reset.

* 1. Zone 1 to Zone 4
* Alarm LED (red) turns on steady when an alarm is detected
* Supervisory LED (amber) turns on steady when the circuit is active
* Trouble LED (amber) turns on at slow flash rate when in trouble or bypassed
  1. Zone 5 and Zone 6
* Alarm LED & Trouble LED The zone type and LED behavior varies upon the configuration.

Steady when turned on.

* 1. Out1 and Out2 (NACs)
     + - Trouble LED (amber) turns on at slow flash rate when in trouble or bypassed.
  2. Out3 and Out4 (RACs)
* Trouble LED (amber) turns on steady when the circuit is bypassed turns on at slow flash

rate when in trouble.

* 1. Buzzer

The buzzer is activated by any of the following events:

Fire Alarm: Steady

Supervisory Alarm: Fast Flash

Trouble: Trouble Flash Rate

If the Buzzer is turned ON in response to a Non-Latching Trouble or Supervisory, it will be turned OFF if the condition causing it goes away and there is no other reason for it to be ON.

1. The operator control interface shall include the following operator control buttons:
   1. Initiating Device Circuit (IDC) Bypass Switches

These six bypass switches are used to bypass each individual initiating device circuit. Bypass is a toggle switch that will bypass and un-bypass in a sequence whenever the switch is pressed. When the IDC is bypassed, a trouble is generated and the system will not respond to any trouble or alarm on the bypassed IDC. If the bypassed IDC is active and the Bypass Switch is pressed for un-bypassing, the Alarm LED will flash at the fast rate for 10 seconds. During these 10 seconds, pressing the Bypass Switch can bypass the active IDC again. After 10 seconds, the bypassed alarm will be processed.

* 1. Notification Appliance Circuits (NACs) and Releasing Appliance Circuits (RACs) Bypass Switches

These four switches are used to bypass the NAC and releasing circuits. Each switch is a toggle switch and pressing it again will un-bypass the individual circuit, the trouble LED turns off.

* 1. System Reset Button

The System Reset button resets the Fire Alarm Control Panel and all Circuits. In particular, the system reset button:

* + - * + Resets all Latching Trouble Conditions
        + Resets all Initiating and Releasing Circuits
        + Resets 4-Wire Smoke Supply
        + Turns off all Indicating Circuits
        + Turns off Signal Silence Indicator
        + Stops and resets all Timers
        + Processes inputs as new events
        + Does not affect Aux Disconnect
    1. Signal Silence Button

Activation of the Signal Silence button when the panel is in alarm turns on the Signal Silence indicator and deactivates any Silenceable Notification Appliance Circuits. Non-Silenceable Circuits are unaffected. Signals will re-sound upon any subsequent alarm. Subsequent operation of signal silence resounds all Silenceable devices. This button does not function during any configured Signal Silence Inhibit Timer period.

* + 1. Auxiliary Disconnect Button

Activating the Auxiliary Disconnect button activates the Auxiliary Disconnect function. The Auxiliary Alarm Relay is always disconnected with this button. The Common Alarm Relay, the Common Supervisory relay and all correlated alarm relays may be disconnected as selected through configuration. Activating the Auxiliary Disconnect button also causes the Common Trouble LED to illuminate steady, the common trouble relay to send a trouble message and the trouble buzzer to flash at the trouble flash rate. Pressing the Auxiliary Disconnect button again de-activates this function and the system will go back to normal.

* + 1. Lamp Test Button

Activation of the Lamp Test button causes all front panel Indicators to steadily illuminate and turns the buzzer ON steady. If Lamp Test is active for more than 10 seconds, Common Trouble is activated.

* + 1. ALM/SUP/TBL/BLDG AUDIBLE SIL Button (Buzzer Silence)

Activation of the ALM/SUP/TBL/BLDG AUDIBLE SIL button while the buzzer is sounding silences the buzzer. The buzzer will resound if there is a subsequent event. Pressing the button when the buzzer is not sounding has no effect.

* + 1. IDC / NAC / RAC (Zone) Disconnect Buttons

Circuit (Zone) Disconnect pushbuttons are provided for all IDC, NACs and RACs on the Fire Alarm Control Panel. These pushbuttons are located beside their respective indicating LED.

Pressing a Circuit Disconnect pushbutton bypasses the associated circuit and turns on its Trouble Indicator, activating Common Trouble. Pressing a releasing circuit disconnect pushbutton bypasses the associated releasing circuit and turns on its LED, activating common supervisory. While a Circuit is disconnected, all changes in status (alarms and troubles) on that circuit are ignored. The panel does not activate disconnected indicating circuits. Circuit Disconnect pushbuttons are toggle switches; therefore, pressing an activated switch a second time will un-bypass (reconnect) the circuit.

Disconnecting an active Latching IDC (including Alarms, Water flow Alarm, Sprinkler Alarm, General Alarm, and Latching Supervisory) does not affect its status until the panel is reset. Disconnecting an active Non-Latching IDC (including Non-Latching Supervisory and Trouble-Only) causes them to behave as if the alarm situation has disappeared. Disconnecting an active IDC immediately deactivates the circuit.

When an IDC Disconnect pushbutton is returned to the normal state (by pressing it again in order to un-bypass the circuit), the panel checks the state of the circuit. If the circuit is active, the Status Indicator flashes for 10 seconds at the Fast Rate without processing the input. If the Circuit is not re-bypassed by then, it will be processed as a new input.

* 1. SYSTEM COMPONENTS

A. Compatible FACU Accessories

1. MR-2300-A Six Initiating Device Circuit Class “A” Converter Module.
2. The MR-2300-A converts six Class “B” circuits on the MR-2320-R main board to Class “A” circuits. The MR-2300-A is equipped with wire leads to connect to the MR-2320 main board. It mounts to the right of the main board Class “B” initiating device circuits.

2. MR-2300-NC2 Two Notification Appliance Circuit Class “A” Converter Module

1. The MR-2300-NC2 converts two Class “B” notification appliance circuits on the MR-2300 main board to Class “A” circuits. The MR-2300-NC2 is equipped with wire leads to connect to the MR-2320 main board. It mounts to the right of the main board Class “B” notification appliance circuits.

3. MR-2306-R6 Relay Circuit Adder Modules

1. The MR-2306-R6 provides six configurable relay circuits, rated @ 28 VDC, 1 amp (resistive). Each circuit can be configured as a Normally Open (N.O.) or Normally Closed (N.C.) contact. Each relay is equipped with an LED that is lit when the relay is energized. The relays can be configured as relay per zone (1 to 1), Common on Alarm, Common on Supervisory or programmable for logical or adjacent zone configuration. An adjacent zone configuration will turn on adjacent zone when configured zone is active. A chaining configuration allows for multiple relays to turn on.
2. The MR-2306-R6 may be connected to the MR-2320-R main board. It may be configured for single or dual hazard applications.

4. MR-2300-PR Polarity Reversal/City Tie Module

1. The MR-2300-PR provides outputs for city box and polarity reversal applications. As a city tie module, the MR-2300-PR provides an interface between the control panel NACs and a master box. It provides off-premises signal transmission for systems that must comply with NFPA requirements for Auxiliary Protective Systems. As a polarity reversal module, the MR-2300-PR provides an interface between the control panel and a reverse polarity receiver. It provides off-premises signal transmission for systems that must comply with NFPA requirements.

5. MR-2312-ATR Remote LED Annunciator

1. The MR-2312-ATR provides 16 points of LED annunciation. It contains bi-colored LEDs which are auto-configurable for either Alarm (red) or Supervisory (amber). The LED annunciator has indicators for A.C. On, Common Trouble and Signal Silence and control switches for System Reset, Signal Silence, Lamp Test and Buzzer Silence. The MR-2312-ATR is equipped with a keyswitch which allows for enabling and disabling of the Common Control functions. Both models are available in a red finish and mount in a 4-gang electrical box.
2. RAM-1032TZDS Remote LED Annunciator

a. The RAM-1032TZDS Remote LED Annunciator provides 32 points of LED annunciation. The RAM-1032TZDS comes standard with bi-colored LEDs which are automatically configured for either Alarm (Red) or Supervisory (Amber) and individual trouble LEDs. The RAM-1032TZDS has indicators for A.C. On, Common Trouble and Signal Silence and controls for System Reset, Lamp Test, Fire Drill, Buzzer Silence and Signal Silence. In addition it allows for the control switches to be disabled on a per function basis. The RAM-1032TZDS mounts in an MMX-BB-1001R enclosure.

7. MR-2312-SR12 Smart Relay Module

1. The MR-2312-SR12 provides twelve configurable relay circuits, rated @ 28 VDC, 1 amp (resistive). Each circuit can be configured as a Normally Open (N.O.) or Normally Closed (N.C.) contact. Each relay is equipped with an LED that is lit when the relay is energized. The relays can be configured as relay per zone (1 to 1), Common on Alarm, Common on Supervisory or programmable for a logical or adjacent zone configuration. An adjacent zone configuration will turn on an adjacent zone when the configured zone is active. A chaining configuration allows for multiple relays to turn on. The MR-2312-SR12 is DIP switch configurable and connects to the RS-485 bus. The MR-2312-SR12 comes complete with a red enclosure and a CAT-30 lock and key.

8. MR-2300-T

1. Remote trouble indicator.
   1. MP-320R/MP-320W Solenoid EOL Module
      1. Solenoid EOL modules are used to supervise the solenoid coil. Model MP-320R comes with a red mounting plate and model MP-320W comes with a white plate.
   2. Manual Release/Abort Stations
      1. Manual release/abort stations shall be non-coded, non-breakglass type.
      2. Manual release stations must be designed so that after an actual activation, they latch and cannot be restored to normal except by manual reset.
      3. Abort stations shall include a momentary ("dead-man") switch that may be manually held in to cause abort of the release process.

B. Compatible FACU Field Devices

1. Photoelectric Smoke Detectors
2. The smoke detector shall be one of the models listed below as required and as specified on the project plans:
3. SD-100-2WP / 2-Wire Photoelectric Smoke Detector and Remote LED Output. Includes 6-inch base.
4. SD-100-4WP / 4-Wire Photelectric Smoke Detector. Includes 6-inch base.
5. SD-100-2WT-6K / 2-Wire Photoelectric Smoke Detector with Heat Sensor and Remote LED Output. Includes 6-inch base.
6. SD-100-4WT-6K / 4-Wire Photoelectric Smoke Detector w/Heat Sensor. Includes 6-inch base.
7. i3 Series, models 2W-B/2WT-B

2. Pullstations

1. The pullstation shall be one of the models listed below as required and as specified on the project plans:
   1. MRM-MPG1U - Single Stage Manual Pull Station. C/W Glass Rod, Durable Extruded Aluminum Construction, Attractive, Low-Profile Design, Standard Single Gang Mount, Glass Rod Optional (one provided).
   2. MRM-710U - Key Resettable Die Cast Double Action Pull Station. Dual Action, Key resettable, Terminal connectors, Gold plated SPST contacts, Optional auxiliary contacts, High-gloss red enamel finish. Mounts on standard single gang box, Secutron’s MRM-700 surface metal backbox or MRM-700WP weather protected backbox.
   3. MRM-810U – Manual Pull Station. Single Stage, LEXAN material, Closed-fist operation (ADA – Americans with Disability Act), Symbols and icons in place of words. Symbols are raised to be easily recognized by touch. Accessible from the front for wiring while mounted. Mounts on a single gang backbox. Reset key (included). Temperature range: -40ºC to 66ºC / -40ºF to 151ºF.

3. Notification Appliance Devices

1. Audible Notification Appliances
2. All audible sounding devices shall operate on regulated, full wave rectified, 24 VDC and be UL listed as compatible with the FACU.
3. All audible devices shall be programmed to sound in the ANSI Temporal 3 sound pattern.
4. Audible appliances shall be MGC FH-400 devices.
5. Visual Notification Appliances
6. All visual notification appliances shall operate on regulated, full wave rectified, 24 VDC and be UL listed as compatible with the FACU.
7. All visual notification appliances shall support an adjustable candela feature that is set for the appropriate coverage area per NFPA 72.
8. Visual notification appliances shall meet UL and ADA requirements.
9. Visual notification appliances shall be MGC FS-400 series devices.
10. Audible/Visual Notification Appliances
11. All audible/visual notification appliances shall operate on regulated, full wave rectified, 24 VDC and be UL listed as compatible with the FACU.
12. All audible/visual notification appliances shall support an adjustable candela feature that is set for the appropriate coverage area per NFPA 72.
13. All audible/visual notification appliances shall be programmed to sound in the ANSI Temporal 3 sound pattern.
14. All audible/visual notification appliances shall meet UL and ADA requirements.
15. Audible/visual notification appliances shall be MGC FHS series devices.

C. Waterflow Switches

1. Waterflow Switches shall be an integral, mechanical, non-coded, non-accumulative retard type.
2. Waterflow Switches shall have an alarm transmission delay time which is conveniently adjustable from 0 to 60 seconds.

D. Sprinkler and Standpipe Valve Supervisory Switches

* + 1. Each sprinkler system water supply control valve riser, zone control valve, and standpipe system riser control valve shall be equipped with a supervisory switch. Standpipe hose valves, and test and drain valves shall not be equipped with supervisory switches.
    2. PIV (post indicator valve) or main gate valves shall be equipped with a supervisory switch.
    3. The switch shall be mounted so as not to interfere with the normal operation of the valve and adjusted to operate within two revolutions toward the closed position of the valve control, or when the stem has moved no more than one-fifth of the distance from its normal position.
    4. The supervisory switch shall be contained in a weatherproof aluminum housing, which shall provide a 3/4 inch (19 mm) conduit entrance and incorporate the necessary facilities for attachment to the valves.
    5. The switch housing shall be finished in red baked enamel.
    6. The entire installed assembly shall be tamper proof and arranged to cause a switch operation if the housing cover is removed, or if the unit is removed from its mounting.

1. Batteries

1. Batteries used for backup power to the main FACU, or remote power supply panels, shall be of the sealed lead acid, maintenance free type.

2. Batteries shall be sized according to the power requirements of the FACU and be capable of operating the system in standby mode for a minimum of 24 hours followed by 5 minutes in alarm condition.

3. Battery calculations shall be supplied showing the calculated standby battery size after factoring in a minimum 20% efficiency/derating factor.

PART 3.0 EXECUTION

3.1. INSTALLATION:

1. Installation shall be in accordance with the NEC, NFPA 72, local and state codes, as shown on the drawings, and as recommended by the major equipment manufacturer.
2. All conduit, junction boxes, conduit supports and hangers shall be concealed in finished

areas and may be exposed in unfinished areas. Smoke detectors shall not be installed prior

to the system programming and test period. If construction is ongoing during this period,

measures shall be taken to protect smoke detectors from contamination and physical

damage.

1. All fire detection and alarm system devices, control panels and remote annunciators shall

be semi-flush mounted when located in finished areas and may be surface mounted when

located in unfinished areas.

1. Manual pull stations shall be suitable for surface mounting or semi-flush mounting as

shown on the plans, and shall be installed not less than 42 inches (1067 mm), nor more

than 48 inches (122 mm) above the finished floor.

3.2. TEST:

1. The service of a competent, NICET level II technician shall be provided to technically

supervise and participate during all of the adjustments and tests for the system. All testing

shall be in accordance with NFPA 72.

1. Before energizing the cables and wires, check for correct connections and test for short

circuits, ground faults, continuity, and insulation.

1. Close each sprinkler system flow valve and verify proper supervisory alarm at the FACU.
2. Verify activation of all waterflow switches.
3. Open initiating device circuits and verify that the trouble signal actuates.
4. Open and short notification appliance circuits and verify that the trouble signal actuates.
5. Open release solenoids and verify response of trouble signals.
6. Ground all circuits and verify response of trouble signals.
7. Verify the installation is in accordance with the approved drawings.
8. Test audibility of all audible notification appliances and that the output volume is in accordance with NFPA 72.
9. Test all visual notification appliances for synchronization and proper operation.
10. Check installation, supervision, and operation of all devices using the walk test feature.
11. Each of the alarm conditions that the system is required to detect should be introduced on

the system. Verify the proper receipt and the proper processing of the signal at the FACU

and the correct response.

1. When the system is equipped with optional features, the manufacturer's manual shall be

consulted to determine the proper testing procedures. This is intended to address such

items as input to output response, alarm verification, silence inhibit, and similar such features.

3.3. FINAL INSPECTION:

1. At the final inspection, a minimum NICET Level II technician shall demonstrate that the

system functions properly in every respect.

3.4. INSTRUCTION:

1. Instructions shall be provided as required for operating the system. Hands-on

demonstrations of the operation of all system components and the entire system including

program changes and functions shall be provided.

1. The contractor or installing dealer shall provide a user manual indicating "Sequence of

Operation."

1. A user operating instruction sheet shall be prominently displayed next to the FACU in accordance with NFPA 72 and UL 864 Standard requirements.