ENGINEERING SPECIFICATION

MR-2306-DDR (6 ZONE), MR-2312-DDR (12 ZONE)

FIRE DETECTION AND ALARM SYSTEM

PART 1.0 GENERAL

* 1. DESCRIPTION:
1. This section of the specification includes the furnishing, installation, connection, and testing of the digital signal processor (DSP) controlled, fire alarm equipment required to form a complete, coordinated and operational system. It shall include but not be limited to a Fire Alarm Control Unit (FACU), alarm initiating devices, alarm notification appliances, 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 and associated field devices shall be manufactured or supplied 100% by a single North American based manufacturer that is ISO 9001certified.
4. The FACU and associated field devices system shall comply with the following Underwriters Laboratories Inc. (ULI) listing standards as applicable.

	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
5. The FACU shall be UL ANSI 864, 9th Edition Listed. Systems listed to UL ANSI 864, 8th edition (or previous revisions) shall not be accepted.
6. 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
7. An intelligent, DSP controlled, fire alarm detection system shall be installed in accordance with the project specifications and drawings.
8. Basic Performance:
9. Initiating devices shall be connected to the FACU initiating device circuits.
10. The FACU initiating device circuits shall support Class A or Class B wiring configuration.
11. The initiating device and notification appliance circuit’s wiring shall not require twisted or shielded cabling.
12. The FACU notification appliance circuits shall support either Class A or Class B wiring configuration.
13. 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.
14. The FACU RS-485 bus shall support Class B wiring configuration.
15. All circuits shall be power limited per UL 864 requirements except for wiring to MR-2300-PR, city tie box.
16. 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.
17. Basic System Operation
18. When an off normal condition occurs (Alarm, Supervisory, or Trouble) the respective LED on the FACU shall illuminate.
19. A piezo sounder shall activate at the FACU during any off normal condition until the BUZZER SILENCE buttons are pressed by an authorized user.
20. A Red LED shall illuminate when an alarm, pre-alarm or alarm verification condition exists.
21. An Amber (yellow) LED shall illuminate when a Supervisory or Trouble condition exists.
22. A backlit 2-line by 20-character LCD screen shall display all messages that refer to an off-normal condition.
23. An Alarm condition shall have priority over all other signals.
24. 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.
25. In response to a fire alarm condition, the system’s notification appliances and relay-controlled output circuits that are associated through programming with the device initiating the alarm, shall automatically activate.
26. 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 70 National Electric Code (NEC)
		3. NFPA 72 National Fire Alarm Code
		4. NFPA 101 Life Safety Code
		5. 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. CSFM - California State Fire Marshall
4. NYCFD COA (New York City Fire Department - Certificate of Approval)

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. 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-2306-DDR, MR-2312-DDR and shall contain a DSP (Digital Signal Processor).
9. Overview and Features:

	1. The fire alarm system shall include, but not be limited to, a DSP (Digital Signal Processor)/microprocessor based LCD fire alarm control panel consisting of system cabinet(s), main chassis with power supply, with or without UDACT dialer, stand-by batteries, initiating device circuits (IDCs) and notification appliance circuits (NACs), 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 have three (3) form C relays dedicated to Common Alarm, Common Trouble, and Common Supervisory and one (1) form C disconnectable relay dedicated to Auxiliary Alarm. These relays shall have a contact rating of 1.0 Amps at 28VDC.
	3. 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.
	4. The MR-2306-DDR shall have two (2), the MR-2312-DDR shall have four (4) programmable Notification Appliance Circuits rated at no less than 1.7 amps per circuit and capable of being wired in Class A or Class B configuration. These circuits shall be programmable for the following output types:

		1. Continuous
		2. ANSI Temporal 3
		3. California Code
		4. March Time
		5. Two Stage
	5. The FACU NACs shall include the capability to automatically synchronize notification appliances from multiple manufacturers on the same FACU without the need for a synchronization module. Systems that do not allow for multiple brands of strobes to be synchronized on the same panel are not acceptable. The following manufacturers synchronization protocol shall be supported as a minimum:
		1. MGC
		2. System Sensor
		3. Gentex
		4. Wheelock
		5. Amseco
		6. Faraday
	6. The FACU shall include an integral user interface that includes a keypad, a 40-character backlit LCD display and color-coded system status LED’s.
	7. The FACU shall be housed in a UL listed key locked cabinet with sufficient space to house up to 12 AH, rechargeable batteries.
	8. The FACU shall include an integral Digital Alarm Communicating Transmitter (DACT).
	9. The FACU shall include the following features:

		1. Initiating device circuits/zones fully programmable as: Alarm, Verified Alarm, Waterflow Alarm, Sprinkler Alarm, Latching or Non-Latching Supervisory, Monitor and Trouble-Only.
		2. Programmable initiating device circuit (IDC) to notification appliance circuit (NAC) correlation, with default setting being each initiating device circuit is mapped to all notification appliance circuits, or option to map each initiating device circuit to one or more notification appliance circuits based on preferred operation such as silenceable or non silenceable.
		3. Single and Two Stage operation.
		4. i3 Series Protocol - the MR-2306-DDR and MR-2312-DDR FACUs have the i3 Series protocol built-in. The panels support the two-wire i3 Series smoke detectors (2W-B/2WT-B).
		5. Each IDC and NAC can be individually disconnected/disabled via the keypad and LCD 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, Remote LCD 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, local PC or from a remote location.
		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. Alarm verification feature with a programmable timer.
		12. One person walk-test capability with all devices tested during walk-test mode recorded in the event history buffer.
		13. Optional trim rings for semi-flush mounting.
10. Operator Control Interface
11. 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.
12. The display shall contain an LCD alphanumeric, text-type display, an internal buzzer and dedicated LEDs for the annunciation of system status including:
	1. AC On LED

The green A.C. ON Indicator will illuminate steadily as long as the main AC power is above minimum level. The indicator turns OFF when the level falls below the power fail threshold and the panel is switched to standby (battery) power.

* 1. 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. 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. 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. 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. 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 display keypad shall be part of the standard system and have the capability to command all system functions, entry of any alphabetic or numeric information, and field programming. Two different password levels shall be provided to prevent unauthorized system control or programming.
2. The operator control interface shall include the following operator control buttons:
	1. System Reset Button

The System Reset button resets the FACU and all circuits. Activation of the System Reset button shall cause all electronically latched initiating devices, appliances or zones, as well as all associated output devices and circuits, to return to their normal condition.

* 1. Signal Silence Button

Activation of the Signal Silence button when the panel is in alarm deactivates any Silenceable NACs. Non Silenceable NACs are unaffected. Signals will resound upon any subsequent alarm. Subsequent operation of signal silence resounds all Silenceable signals. This button does not function during any configured Signal Silence Inhibit Timer period. It also does not function if the NACs are active as the result of a Fire Drill.

* 1. Fire Drill Button

The Fire Drill button activates all non-Disconnected (un-bypassed) Notification Appliance Circuits but does not transmit any Alarms via the City Tie, Common Alarm Relay or Auxiliary Alarm Relay. Fire Drill activates the signals in the evacuation code programmed. For example, in the Temporal Code, the signals will be pulsed ON for 0.5 seconds, OFF for 0.5 seconds in rounds of 3 and then pause for 1.5 seconds and repeat.

Fire Drill is cancelled by pressing the button again, or if the Panel goes into a real alarm.

* 1. Lamp Test Button

Press the LAMP TEST button to make the front panel indicators steadily illuminate (except for CPU FAIL) and to turn the buzzer on steady. If the lamp test is active for more than 10 seconds, the Common Trouble is activated.

Press and hold the LAMP TEST for 3 seconds to show the information about the system and the firmware version. The first line shows the number of zones and panel type, and the second line shows the software version number.

* 1. Buzzer Silence Button

Activation of the Buzzer Silence 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. 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-2300 main board to Class “A” circuits. The MR-2300-A is equipped with wire leads to connect to the MR-2300 main board. It mounts to the right of the main board Class “B” initiating device circuits. Two MR-2300-A modules are required to convert all twelve initiating device circuits on an MR-2312 series panel.

2. MR-2300-NC4 Four Notification Appliance Circuit Class “A” Converter Module

1. The MR-2300-NC4 converts four Class “B” notification appliance circuits on the MR-2300 main board to Class “A” circuits. The MR-2300-NC4 is equipped with wire leads to connect to the MR-2300 main board. It mounts to the right of the main board Class “B” notification appliance circuits and is used with the MR-2312 series panels.

3. 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-2300 main board. It mounts to the right of the main board Class “B” notification appliance circuits and is used with the MR-2306 series panels.

4. MR-2306-R6/MR-2312-R12 Relay Circuit Adder Modules

1. The MR-2306-R6 provides six configurable relay circuits, rated @ 28 VDC, 1 amp (resistive). The MR-2312-R12 provides twelve Form C configurable relay circuits, rated @ 28 VDC, 1 amp (resistive). On both models 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.

5. 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 indicating circuits 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.

6. MR-2300-LCDR Remote LCD Annunciator

1. The MR-2300-LCDR provides LCD remote annunciation through a 2 line by 20-character LCD display. The MR-2300-LCDR provides control switches for System Reset, Signal Silence, Fire Drill and Acknowledge as well as a numeric keypad to access the menu functions. The common control functions can be disabled on a per function basis. The MR-2300-LCDR has LED indicators for A.C. On, Alarm, Supervisory, Trouble and CPU Fail. The MR-2300-LCDR comes complete with a red enclosure and a CAT-30 Lock and key.

7. 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.

8. 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.

9. UDACT/Digital Communicator

1. The MR-2306-DDR and MR-2312-DDR FACUs are equipped with a fully integrated UDACT/Digital Communicator which allows for the reporting of events to a remote monitoring facility. The UDACT/Digital Communicator can be configured for single or dual line operation and uses the Security Industry Association (SIA) and Contact ID protocols. The UDACT/Digital Communicator is configured via the main display and keypad on the main panel. In addition to its reporting functions, the integrated UDACT/Digital Communicator can be used to connect to the FACU from remote computers for uploading and downloading of configuration data. It also allows for the viewing of the event history logs. The integrated UDACT/Digital Communicator can be configured for either DACT or UDACT operation. In DACT mode, the Digital Communicator reports common alarm, trouble and supervisory information. In UDACT mode, the Digital Communicator reports point specific information.

10. MR-2300-T

1. Remote trouble indicator.

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. 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. Ground all circuits and verify response of trouble signals.
6. Verify the installation is in accordance with the approved drawings.
7. Test audibility of all audible notification appliances and that the output volume is in accordance with NFPA 72.
8. Test all visual notification appliances for synchronization and proper operation.
9. Check installation, supervision, and operation of all devices using the walk test feature.
10. 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.