



**FCI INI-7100 Series Fire Alarm Network**  
**Engineer/Architect Specification**  
Part No. 9020-0543

Version 1.1  
Modified June 3, 2004

Fire Control Instruments, Inc.  
16 Southwest Park  
Westwood, Ma 02090

Copyright 2001  
All Rights Reserved  
Published in the USA

## **SECTION 1 GENERAL**

### **1.1 GENERAL CONDITIONS**

- A. The Contractor shall furnish all equipment, materials, tools, labor, drawings and all associated documentation necessary for a complete networked fire alarm system, ready for operational turn-over in accordance with the requirements of the NFPA-72 and the authorities having jurisdiction. The Contractor shall provide all devices and equipment required by the drawings and specifications. The Contractor may not delete any equipment or devices without submission and approval of a request for information detailing all deletions. The Contractor also may not change types of coverage without submission and approval of a request for information detailing the reason for change.

### **1.2 QUALITY**

- A. To ensure reliability and complete compatibility, all Items of the Fire Alarm System, including control panels, power supplies, as well as all initiating and indicating devices, shall be listed by Fire Control Instruments. FCI by Underwriters Laboratories inc. (UL) and shall bear the "UL" label. Partial listing shall not be acceptable.
- B. The equipment and installation supervision furnished shall be listed as an approved distributor of Fire Control Instruments, and shall produce proof of factory training within 14 calendar days of award of the contract.

### **1.3 SYSTEM DESCRIPTION**

- A. The successful bidder shall furnish and install a complete Networked Fire Alarm System, with all wiring, programming, and connections as described on the drawings and this document. The Networked System shall be wired in a supervised, 2-wire fashion utilizing classes and styles as per NFPA 72. The System shall be a TRUE peer to peer network including:
- Control panels (7100)
  - Network interface cards (INI)
  - Remote annunciators (LCD-7100)
  - Double action manual stations (MS-7)
  - Analog photoelectric smoke sensors (ASD-PL)
  - Analog addressable duct sensors (AD-P)
  - Analog addressable laser and multi-criteria sensors (ASD-LS, MCS Acclimate Series)
  - Addressable monitor modules (AMM, MMI Series)
  - Addressable control modules (AOM, MMO Series)
  - Synchronized Strobes and Combination horn/strobes
  - All wiring, connections to devices, boxes, junction boxes and all other necessary material, accessories and mounting hardware.

#### **1.4 STANDARDS**

A. The system shall conform to the latest editions of the following codes and standards:

- Life Safety Code 101
- Fire Alarm Codes NFPA 72
- National Electrical Code 70
- Americans with Disabilities Act (ADA)
  
- NFPA 12 - Carbon Dioxide Extinguishing Systems
- NFPA 12A - Halon 1301 Fire Extinguishing Systems
- NFPA 13 - Installation of Sprinkler Systems
- NFPA 15 Water Spray Fixed Systems
- NFPA 16 - Deluge Foam-Water Sprinkler Systems
- NFPA 16A - Installation of Closed Head Foam-water Sprinkler Systems
- NFPA 17 - Dry Chemical Extinguishing Systems
- NFPA 17A - Wet Chemical Extinguishing Systems
- NFPA 72 - National Fire Alarm Code:
  - Central Station Fire Alarm Systems (7100D)
  - Local Fire Alarm Systems
  - Auxiliary Fire Alarm Systems
  - Remote Station Fire Alarm Systems (7100D)
  - Proprietary Fire Alarm Systems (7100D)
- NFPA 90A, Installation of Air Conditioning and Ventilating Systems
- Life Safety Code NFPA 101, Safety to Life from Fire in Buildings and Structures
- NFPA 750 Water Mist Fire Protection Systems
- NFPA 2001 Clean Agent Fire Extinguishing Systems

#### **1.5 WARRANTY**

A. The manufacturer shall guarantee all system equipment for a period of one (1) year from the date of final acceptance.

#### **1.6 INTERFACING**

A. Coordinate with the appropriate contractors for interfacing to building systems as required on the drawings including but not limited to, Elevator interface, HVAC interface, and Security system interface.

#### **1.7 SUBMITTALS**

A. Submit 10 copies of shop drawings and product data sheets in accordance with all sections of this document.

- The submittal shall include certification from Fire Control Instruments (FCI) verifying that the distributor is an authorized agent, who is qualified and trained by the manufacturer in the proper installation, operation and service of the system.

B. The Contractor shall include the following information in the equipment submittal.

1. A complete list of all supplied equipment including the quantities and model numbers used, along with catalog data sheets on each component.
2. Complete drawings including the following:
  - A. Floor plans showing all control panels, annunciators, power supplies, initiating devices, notification appliances, and control devices.
  - B. Wiring diagrams showing points of connection and terminals used for connection to the system devices and panels. This shall include.
    1. Any recommendations and precautions, for installing the system devices.
    2. Drawings of each control panel and power supply showing interconnections and field terminations, including contact ratings, and interfaces to other systems.
  - C. Battery capacity calculations for each control panel and power supply.
  - D. Loading calculations showing total draw and capacity of each circuit.

## **C. OPERATION AND MAINTENANCE MANUALS**

1. Before final acceptance testing, submit a five (5) complete sets of operation and maintenance manuals along with five (5) sets of as-built drawings. The operation and maintenance manuals shall include:
  - A. Building name and address.
  - B. The name and phone number of the contractor, system manufacturer, and system supplier.
  - C. The actual operation and maintenance manual supplied by the system manufacturer.

## **1.8 FIRE ALARM SYSTEM FUNCTIONALITY**

- A. Provide a complete, electrically supervised networked analog/addressable fire alarm and control system, with analog initiating devices.
- B. The system shall be a multiprocessor based control panels model FCI-7100, communicating over a peer-to-peer token ring network with a capacity of up to 64 nodes.
- C. Each node shall incorporate two (2) Signaling Line Circuits (SLC), with the capacity to support up to 99 analog addressable detectors and 98 addressable modules per SLC.
- D. SLC circuits shall be capable of supporting laser sensors (ASD-LS) with a sensitivity setting as low as .2 percent obscuration, and the MCS Acclimate 2 sensor with intelligent compensation and integral thermal sensor.
- E. The control panels shall have the capability to accept firmware upgrades via laptop computer, without the requirement of replacing microchips.
- F. The network shall be based on a peer-to-peer token ring technology operating at 625 K baud, using Style 4, 6 or 7 wiring.
- G. The network shall include the capability of using either twisted pair wiring, a pair of fiber-optic cables up to 200 microns, or both, to maximize flexibility in system configuration.
- H. Each network node shall be capable of being programmed off-line using Windows based software supplied by Fire Control Instruments (FCI). Each node shall also be capable of being downloaded by connecting the laptop computer into any other node in the system.
- I. Each network node shall be capable of being grouped with any number of additional nodes to produce a "Region", allowing that group of nodes to act as one, while retaining the peer-to-peer functionality. Master /slave configurations are not acceptable.
- J. Each network node shall be capable of annunciating all events within its "Region" or annunciating all events from the entire network, on the front panel LCD without any additional equipment.
- K. Each network node shall be capable of having an integral digital alarm communication transmitter (DACT) that can report events in either its region, or the entire network to a single account.
- L. Each 7100 panel shall be capable of storing its entire program, and allow the installer to activate only the devices that are installed during construction, without further downloading of the system.
- M. Each system shall be provided with four (4) levels of password protection with up to sixteen (16) passwords.
- N. Each node shall be capable of using up to 125 "Network Groups" to allow control between different nodes.

## **SECTION 2 PRODUCT OPERATION**

### **2.1 Multiprocessor-Based**

The system shall be of multiprocessor design to allow maximum flexibility of capabilities and operation.

### **2.2 Field Programmable**

The system shall be capable of being either front-panel programmed or by means of a Field Configuration Program (FCP) allowing programming to be downloaded via computer from any node on the network.

### **2.3 RS-232C Serial Output**

A supervised RS-232C serial port shall be provided to operate remote printers and/or video terminals, accept a downloaded program from a computer, or provide an 80-column readout of all alarms, troubles, location descriptions, time, date, etc. The communication shall be standard ASCII code operating at a 9600-baud rate.

### **2.4 Control-by-Event (CBE) Program**

Operation of a manual station or automatic activation of any smoke sensor, heat sensor, or waterflow device shall activate the system control-by-event program to cause:

1. All notification appliances to sound in a temporal pattern and strobes to flash.

**OR**

All notification appliances to sound in a march-time code pattern and strobes to flash.

**OR**

All notification appliances to sound in a continuous pattern and strobes to flash.

2. Shut down all air-handling units as specified herein.
3. The "SYSTEM ALARM" LED shall flash and the panel sounder shall pulse.
4. Indicate on the 80-character alphanumeric panel display the description of the specific analog/addressable device in alarm. The display shall be of the liquid crystal type (LCD), clearly visible in the dark or in poor light conditions.

**AND/OR**

5. Close all magnetically held doors automatically.
6. Energize programmed solenoids for activating sprinkler or extinguishing systems.
7. Perform any additional function as specified herein or as shown on the plans.
8. Notify the Fire Department.

## **2.5 General System Operation**

When an alarm occurs, the control panel as well as any other control panel in the same region, or any control panel programmed as a global annunciator shall indicate the alarm condition until manually reset. An alarm may be acknowledged by pressing the "ALARM ACKNOWLEDGE" switch. This shall silence the panel sounder, and change the "ALARM" LED from flashing to steadily lit.

All notification appliances may be silenced by operating the "SIGNAL SILENCE" switch on any panel in the same region or from any panel programmed as a global annunciator. This shall steadily light the "SYSTEM SILENCED" LED. If a subsequent alarm is activated, the notification appliances shall "resound" until again silenced. Once silenced, all notification appliances may be restored again by operating the "SIGNAL SILENCE" switch. Waterflow zones shall be non-silenceable.

## **2.6 Alarm Verification**

Smoke sensor alarm verification shall be a standard option while allowing any dry contact device (i.e.: manual stations, heat detectors, etc.) to create an immediate alarm. This feature shall allow smoke sensors that are installed in environments prone to nuisance or unwanted alarms to operate per the following sequence:

Smoke Sensor Alarm - @ time = 0.

Pre-Alarm Window - 15 seconds; a distinctive pre-alarm indication shall be displayed.

Reset - 5 seconds (occurs at end of pre-alarm window).

Alarm Verification Window - 90 seconds; the system shall respond to a second alarm from the same smoke sensor as a system alarm.

System Ready - no alarm verification.

**NOTE:** The verification sequence is suspended once a system alarm is activated.

## **2.7 Alarm Signals**

All alarm signals shall be automatically latched or "locked in" at the control panel until the operated device is returned to normal and the control panel is manually reset. When used for waterflow, the "SIGNAL SILENCE" switch shall be bypassed.

## **2.8 Electrically Supervised**

Each signaling line circuit and notification appliance circuit shall be electrically supervised for opens, shorts and ground faults.

The occurrence of any fault shall activate the system trouble circuitry but shall not interfere with the proper operation of any circuit that does not have a fault condition.

A yellow "SYSTEM TROUBLE" LED shall light and the system audible sounder shall steadily sound when any trouble is detected in the system. Failure of power, opens or short circuits on the notification appliance or signaling line circuits, disarrangement in system wiring, failure of the microprocessor or any identification module, or system ground faults shall activate this trouble circuit.

A trouble signal may be acknowledged by operating the "ALARM ACKNOWLEDGE" switch. This shall silence the sounder. If subsequent trouble conditions occur, the trouble circuitry will resound.

During an alarm, all trouble signals shall be suppressed with the exception of lighting the yellow "SYSTEM TROUBLE" LED.

## **2.9 Drift Compensation - Analog Smoke Sensors**

System software shall automatically adjust each analog smoke sensor approximately once each week for changes in sensitivity due to the effects of component aging or environment (i.e.: dust). Each sensor shall maintain its actual sensitivity under adverse conditions to respond to actual alarm conditions while ignoring the factors, which generally contribute to nuisance alarms.

The system trouble circuitry shall activate, display "DIRTY DETECTOR" and "VERY DIRTY DETECTOR" indications and identify the individual unit that has been compensated beyond its acceptable limits.

### **2.10 Analog Smoke Sensor Test**

System software shall automatically test each analog smoke sensor a minimum of three times daily. The test shall be a recognized functional test of each ionization chamber (analog ionization sensors) and photocell (analog photoelectric sensors) as required annually by NFPA 72. Failure of a sensor shall activate the system trouble circuitry, display a "Test Failed" indication, and identify the individual unit.

### **2.11 Dual - Mode Walk Test**

The control unit shall provide a Dual-Mode Zoned Walk Test Program, which shall enable an individual to test the alarm/supervision status of each sensor or module connected to the system. During walk test, the control unit shall automatically reset after an alarm condition enabling the technician to continue testing the system without requiring a return to the control panel.

During an Audible walk test; placing a device in alarm will cause four pulses on the notification appliance circuits.

Operation of a supervisory switch will cause three pulses, while removal or disconnection of an initiating device will cause two pulses. All tests will be recorded by a printer for reference.

A Silent walk test will record all tests by a printer for reference while not activating the notification appliance circuit(s).

### **2.12 Printed Circuit Boards, Control Panel Components**

The control unit shall be housed in a steel cabinet.

All groups of circuits or common equipment shall be clearly marked. The control unit shall be red in color and shall include the following features:

a. A solid-state power transfer circuit that shall switch to standby power automatically and instantaneously if normal power fails or falls below 15% of normal ("brown out" conditions). This circuit shall allow the batteries to be effectively "floated" on the operating system to avoid upsetting normal microprocessor operation and minimize resultant nuisance troubles and/or alarms. This circuit shall be physically isolated from the power supply to facilitate service.

b. A ground fault detector to detect positive or negative grounds on the signaling line circuits, notification appliance circuits and power circuits. A ground fault indication shall occur on the display and the general trouble devices shall operate as specified herein but shall not cause an alarm.

c. Lightning protection shall be a standard feature of the fire alarm control panel and shall be incorporated in the power supply circuit, common control circuits and notification appliance circuits. Systems that require an optional module to provide this protection shall not be considered equal.

d. Individual overcurrent protection shall be provided for the following: smoke detector (resettable) power, main power supply, battery standby power, and auxiliary (non-resettable) output.

e. A common reset and lamp test switch, labeled "SYSTEM RESET/LAMP TEST" shall be provided on the panel.

### **2.13 City Connection**

The fire alarm system shall be connected via leased telephone lines to a central station or remote station.

**OR**

The fire alarm system shall be connected to a local energy city master box.

**OR**

The fire alarm system shall be connected via Digital Alarm Communicator Transmitter (DACT) and telephone lines to a central station or remote station.

The panel shall contain a disconnect switch to allow testing of the system without notifying the fire department.

#### **2.13.1 Remote Station Option**

The fire department shall be consulted as to the authorized remote station serving the municipality.

The fire alarm system shall transmit both alarm and trouble signals with the alarm having priority over the trouble signal.

The contractor shall be responsible for all installation charges, while the customer shall be responsible for the line lease charges.

### **2.13.2 Local Energy City Master Box Option**

The fire alarm system shall be connected to a local energy city master box via an optional Municipal Circuit Option Module (MCOM).

The city master box shall be coded and timed in accordance with the requirements of the fire department.

The box shall be (surface/flush) mounted and located as specified by the building engineer and the fire department.

### **2.13.3 Central Station Option**

The fire alarm control panel shall provide an integral Digital Alarm Communicator Transmitter (DACT) for signaling to a Central Station. The DACT shall contain a "Dialer-Runaway" feature preventing unnecessary transmissions as the result of intermittent faults in the system and shall be Carrier Access Code (CAC) compliant, accepting up to 20-digit central station telephone numbers.

The fire department shall be consulted as to the authorized central station companies serving the municipality.

The fire alarm system shall transmit both alarm and trouble signals with the alarm having priority over the trouble signal.

The contractor shall be responsible for all installation charges, while the customer shall be responsible for the line lease charges.

## **SECTION THREE: SYSTEM COMPONENTS**

The 7100 System shall consist of the following units, components, and peripheral devices, each of which is described in detail in this section:

- System Cabinet
- Basic System Module
- Intelligent Network Interface (INI)
- Peripheral Devices (Manual Stations, Smoke sensors, heat sensors, etc.).

### **OPTIONAL:**

- Class A Option Module (CAOM)
- Municipal Circuit Option Module (MCOM)
- Printer Transient Module (PTRM)
- Integral Digital Alarm Communicator Transmitter (DACT) (Model 7100-D)

### **3.1 System Cabinet**

The system cabinet shall be either surface or semi-flush mounted with a texture finish and shall consist of three parts: backbox, backplate, and door. The system cabinet houses the 7100 microprocessor and related system circuitry.

The cabinet shall be of dead-front steel construction; the door shall be of molded plastic. The system components shall be installed on a hinged mounting plate, which may be removed to facilitate installation and testing of field wiring. A minimum of a 1-inch wiring gutter space shall be provided behind the mounting plate. Wiring shall be terminated on removable terminal blocks to allow field servicing of all modules without disrupting system wiring.

### **3.2 LED Indicator and Outputs**

A green "AC ON" LED on the lamp cluster shall indicate the presence of primary power.

Power supply outputs shall be as follows:

24 VDC Non-resettable, 0.25 amp. max. power-limited.

24 VDC Resettable, 0.25 amp. max. power-limited.

NOTE: Maximum combined output for both shall be 0.25 amperes.

### **3.3 Battery Charger**

The power supply shall contain a battery charger with a maximum average charging current of 1 ampere.

If the system loses AC power, a System Trouble shall occur. The output shall be supervised and overcurrent protected. The charger shall be capable of maintaining sealed lead-acid batteries up to 31-ampere/hour capacity.

### **3.4 Batteries**

Batteries shall be of sufficient capacity to provide power for the entire system upon loss of normal AC power for a period of sixty (60) hours with five (5) minutes of alarm signaling at the end of this sixty-hour period as required by NFPA 72, Auxiliary Systems.

## **OR**

Batteries shall be of sufficient capacity to provide power for the entire system upon loss of normal AC power for a period of twenty-four (24) hours with five (5) minutes of alarm signaling at the end of this twenty four hour period as required by NFPA 72, Local Systems.

### **3.5 Connections and Circuits**

Connections to the light and power service shall be on a dedicated branch circuit in accordance with the National Electrical Code (NEC). The circuit and connections shall be mechanically protected. The circuit disconnecting means shall be accessible only to authorized personnel and shall be clearly marked "FIRE ALARM CIRCUIT CONTROL."

### **3.6 Basic System Module**

Enclosed within the system cabinet, the basic system module shall contain the power supply, microprocessor, memory, system-operating software stored on a non-volatile EPROM, system configuration memory stored on a non-volatile EEPROM, and the circuits necessary to support a fire alarm system. Volatile memory shall not be acceptable.

The module shall function as the system control center, processing all messages from the field devices (supervisory, trouble, alarm).

### **3.7 Microprocessor**

The microprocessor shall execute all supervisory programming to detect and report the failure or disconnection of any module or peripheral device. An isolated "watchdog" circuit shall monitor the microprocessor and upon failure shall activate the system trouble circuits on the display.

The microprocessor shall access the system program, for all control-by-event (CBE) functions. The system program shall not be lost upon failure of both primary and secondary power.

### **3.8 Signaling Line Circuits**

The basic system module shall provide communication with all analog/addressable devices (initiation/control) connected to the 7100 via two-(2) signaling line circuits. Each signaling line circuit shall be capable of being wired Class B, Style 4. Class A, Style 6 operation shall be possible with installation of the optional Class A Operating Module (CAOM). The circuits shall be capable of operating in an NFPA Style 7 mode when equipped with the CAOM module and isolator modules or sensor bases.

Each circuit shall communicate with a maximum of ninety-nine (99) analog sensors and ninety-eight (98) addressable monitor/control devices.

The first ninety-nine device addresses (1-99) on each circuit shall be dedicated to analog sensors, while addresses 101-198 shall be reserved for monitor/control devices.

### **3.9 Real-Time Clock**

The basic system module shall contain a real-time clock capable of monitoring all real-time programming and all time control functions.

### **3.10 Notification Appliance Circuits**

Two (2) independent notification appliance circuits shall be provided on the basic module, polarized and rated at 1.5 amperes DC per circuit, individually overcurrent protected and supervised for opens, grounds, and short circuits.

They shall be capable of being wired Class B, Style Y. With installation of the optional Class A Option Module (CAOM), they shall be capable of being wired Class A, Style Z. Power output shall be regulated so that any UL Listed notification appliances with an operating voltage range of 17-26 VDC may be installed on the circuits.

Specifications are as follows:

#### **Voltage Current**

24 VDC Regulated 1.5 amps: Maximum alarm

### **3.11 Trouble Dry Contacts**

Trouble dry contacts (Form C) shall be provided rated 2 amps @ 30 VDC (resistive) and shall transfer whenever a system trouble occurs.

### **3.12 Alarm Dry Contacts**

Alarm dry contacts (Form C) shall be provided rated 2 amps @ 30 VDC (resistive) and shall transfer whenever a system alarm occurs.

### **3.13 FCI Approved Sensors**

Only FCI approved compatible sensors, that are UL Listed or FM Approved for use with the 7100 system shall be used. The table below identifies by part number those approved, acceptable models.

### **Model Description**

ASD-I, IL2 Analog ionization sensor  
ASD-P, PL2 Analog photoelectric sensor  
ASD-PTL2 Analog photoelectric sensor with 135 ° F thermal unit  
ASD-LS Analog laser sensor  
MCS-Acclimate 2 Multi-Criteria sensor  
ADP Analog photoelectric duct sensor  
ATD/-L2 Addressable thermal sensor, Fixed Temperature  
ATD-R/-RL2 Addressable thermal sensor, Rate of Rise  
ADB-FL Standard analog plug-in base  
B501BH/BHT Base/Horn assembly  
DH500 Analog duct housing (Use with ASD-IL or ASD-PL)  
M500X Isolator Module  
B524BI Isolator Base

### **3.14 Display**

The system display shall furnish audible and visual annunciation of all alarms and trouble signals. Dedicated LEDs shall be provided to indicate:

#### **LED Function**

Green AC Power On  
Red Alarm  
Yellow Supervisory  
Yellow System Trouble  
Yellow Power Fault  
Yellow Ground Fault  
Yellow NAC 1 Silenced  
Yellow NAC 2 Silenced  
Yellow System Silenced

The 80-character alphanumeric display shall provide status of all analog/addressable sensors, monitor and control points), and a 12-key keypad which shall permit selection of functions. The display shall be of the liquid crystal type (LCD), clearly visible in the dark and under all light conditions.

The panel shall contain four (4) functional keys and three (3) programming buttons:

- Alarm Acknowledge
- Trouble Acknowledge
- Signal Silence
- System Reset/Lamp Test
- Programming Buttons:
- Menu/Back
- Back Space/Edit
- OK

### **3.15 INTELLIGENT NETWORK INTERFACE (INI)**

The Intelligent Network Interface shall provide interconnection of up to 64 Model 7100 control panels.

The interface to the network shall be a token passing, peer-to-peer configuration operating at 625K baud. The interface to the 7100 panel shall be interconnected via a harness through the RS-232 port and operate at a speed of 9600 baud.

The interface board shall have the option of being ordered in either wire, fiber-optic, or wire/fiber-optic configurations as determined by field conditions.

Fiber-optic configurations shall use “ST” type connectors and be able to operate with up to 200-micron fiber-optic cable, but optimize for 62.5/125.

The interface shall have a jumper to allow selection of ground detection of wiring when used in the wire mode.

The interface shall have integral LED’s to display current status of the board.

## **SECTION FOUR: PERIPHERAL DEVICES: (Specifier choose as required)**

### **4.1 Analog Photoelectric Smoke Sensors, FCI Model ASD-PL, PL2**

a. Analog photoelectric sensors shall have a low profile and be capable of being set at five sensitivity settings of “LOW, LOW MEDIUM, MEDIUM, MEDIUM HIGH, and HIGH” levels.

**b.** Automatic and manual functional sensitivity and performance tests shall be possible without the need for generating smoke. This method shall test all sensor circuitry and a “Failed Test” indication shall display for any failed test.

**c.** Two LEDs providing 360-degree visibility of operating status and alarm indication shall be provided on each sensor. The LEDs shall pulse periodically indicating that the sensor is receiving power and communication is taking place. This feature shall be field programmable. Upon alarm, these LEDs shall light continuously. An alarm output shall be available for remote annunciation.

**d.** The system shall check the sensitivity of each sensor periodically. If a sensor alarm threshold sensitivity has changed, due to aging and/or dust accumulation, the system shall automatically compensate for this change (drift compensation).

**e.** Each sensor shall allow for the setting of two sensitivity levels. These levels may be programmed so that when the building is occupied, a sensor will be less sensitive than when the building is unoccupied. This feature permits sensors to be more reliable and at the same time reduces/minimizes unwanted alarms. This feature shall also provide for programmable weekend days, where the sensor will remain at an unoccupied sensitivity level.

**f.** The sensor screen and cover assembly shall be removable for field cleaning.

**g.** Each sensor shall be interchangeable with the ASD-IL2 and ATD-L/-RL2 sensors via adapter and twistlock mounting base, to ensure matching the proper sensor to the potential hazards of the areas being covered. In all cases the system shall recognize when an improper sensor type has been installed in a previously programmed sensor type location.

**h.** The ASD-PTL sensor shall contain, in addition to the above, a 135 ° FT thermal sensor.

**OR**

#### **4.2 Analog Ionization Smoke Sensors, FCI Model ASD-IL2**

**a.** Analog ionization sensors shall have a low profile and contain dual ionization chambers. Each sensor shall be capable of being set at seven (7) sensitivity settings ranging from 3.0 to 1.0 %/ft equivalent obscuration, with a predefined setting of 3.0%.

**b.** Automatic and manual functional sensitivity and performance tests shall be possible on all sensors without the need for generating smoke. This test method shall test all sensor circuitry and a “Failed Test” indication shall display for any failed test.

**c.** Two LEDs providing 360-degree visibility of operating status and alarm indication shall be provided on each sensor. The LEDs shall pulse periodically indicating that the sensor is receiving power and communication is taking place. This feature shall be field programmable. Upon alarm, these LEDs shall light continuously. An alarm output shall be available for remote annunciation.

**d.** The system shall check the sensitivity of each sensor periodically. If a sensor alarm threshold sensitivity has changed, due to aging and/or dust accumulation, the system shall automatically compensate for this change (drift compensation).

**e.** Each sensor shall allow for setting of two sensitivity levels. These levels may be programmed so that when the building is occupied, a sensor will be less sensitive than when the building is unoccupied. This feature permits sensors to be more reliable and at the same time reduces/minimizes unwanted alarms. This feature shall also incorporate programmable weekend days, where the sensor will remain at an unoccupied sensitivity level.

**f.** The sensor screen and cover assembly shall be removable for field cleaning.

**g.** Each sensor shall be interchangeable with the ASD-PL2 and ATD-L/-RL2 sensors via adapter and twistlock mounting base, to ensure matching the proper sensor to the potential hazards of the areas being covered. In all cases the system shall recognize when an improper sensor type has been installed in a previously programmed sensor type location.

#### **4.3 Addressable Thermal Sensor, FCI Model ATD-L/ATD-RL2 Series**

**a.** Addressable thermal sensors shall have a low-profile and operate on the combination “rate-of-rise” and “fixed temperature” principles with the fixed temperature set point at 135° F. FCI Model ATD-RL2. They shall contain dual thermistor sensing circuitry for fast response.

**OR**

Addressable thermal sensors shall have a low profile and operate on the “fixed temperature” principle with the sensor having a set point of 135° F. FCI Model ATD-L2. They shall contain dual thermistor sensing circuitry for fast response.

**b.** Two LEDs providing 360-degree visibility of operating status and alarm indication shall be provided on each sensor. The LEDs shall pulse periodically indicating that the sensor is receiving power and communication is being supplied. This feature shall be field programmable. Upon alarm, the LEDs shall light continuously. An alarm output shall be available for remote annunciation.

**c.** Each sensor shall be interchangeable with the ADS-PL2 and ASD-IL2 sensors via adapter and twistlock mounting base, to ensure matching the proper sensor to the potential hazards of the areas being covered. In all cases

the system shall recognize when an improper sensor type has been installed in a previously programmed sensor type location.

#### **4.4 Addressable Monitor Module, AMM-2**

An addressable monitor module with an initiating circuit wired Class B, Style B shall be furnished to provide an address for individual, normally open (N.O.) contact devices.

#### **4.5 Addressable Dual Monitor Module, AMM-2I**

An addressable monitor module with two (2) initiating circuits wired Class B, Style B shall be furnished to provide two addresses for individual, normally open (N.O.) contact devices.

#### **4.6 Addressable Monitor Module, AMM-4**

An addressable monitor module with an initiating circuit capable of being configured either Class A, Style D or Class B, Style B shall be furnished to provide an address for an individual, normally open (N.O.) contact device, or a collective address for a group of such devices.

The AMM-4 module shall contain a yellow status LED that shall flash when in a quiescent mode and light continuously when in alarm. The LED shall be field programmable not to provide quiescent status indication, if so desired.

#### **4.7 Addressable Subloop Monitor Module, AMM-4S**

An addressable monitor module with an initiating circuit capable of being configured Class B, Style B shall be furnished to provide a collective address for up to twenty (20) model CPD/PSD or System Sensor 1151, 2151, 1451, 2451, 1400 or 2400 conventional two-wire smoke detectors, or 301T thermistor heat detectors.

The AMM-4S module shall contain a yellow status LED that shall flash when in a quiescent mode and light continuously when in alarm. The LED shall be field programmable not to provide quiescent status indication, if so desired.

#### **4.8 Addressable Output Module, AOM-2R/S**

An addressable output module shall be connected to the same signaling line circuit as the analog/addressable monitor devices and shall provide a DPDT relay output (2 Form "C" 2 amp @ 24 VDC, resistive only) for the AOM-2R. The AOM-2S shall provide a notification appliance circuit output (1 amp @ 24 VDC, requiring separate power input) or a solenoid energizing circuit or releasing service. The AOM-2R/S module shall contain a yellow status LED that shall flash when in a quiescent mode and light continuously when activated. The LED shall be field programmable not to provide quiescent status indication if so desired.

#### **4.9 Fault Isolator Module - Model (M500X)**

This module enables part of the signaling line circuit to continue operating when a short circuit occurs on a section of it. An LED flashes in the normal condition and lights during a short circuit condition. The module automatically restores the entire circuit to the normal condition when the short circuit is removed. This module may be used in multiple in any combination with other modules, providing circuit operation is similar to that of NFPA Style 7. It does not require an address on the signaling line circuit.

#### **4.10 Manual Fire Alarm Station:**

##### **Double Action Manual Station, MS-7**

Furnish and install a manual station (MS-7) as indicated. Each station shall be of the addressable double action type, requiring an outer door to be lifted to expose the actuator door. Upon pulling forward of the actuator door, the unit shall lock into a readily observable "alarm" position.

#### **4.11 Automatic Initiating Devices**

Two-wire smoke detectors approved for use with the AMM-4S Addressable Sub-loop Monitor module are as follows: (Maximum of 20 detectors per module).

##### **a. Photoelectric Area Smoke Detectors, FCI Models PSD-7155, PSD-7156**

Smoke detectors shall be of the photoelectric type and designed for two-wire installations. They shall be factory set to detect smoke at a nominal 3.0% light obscuration per foot. A special sensitivity tester shall allow a direct readout of actual detector sensitivity in percent obscuration per foot using a standard digital voltmeter.

To minimize nuisance alarms, detectors shall contain a screen protecting the sensing chamber from dust and insects, and equipped with self-compensating circuitry to provide maximum stability against the effects of aging, dust, and film accumulation. The detector shall be equipped with a pulsed LED power supervisory indicator and full

functional test feature. The detectors shall be interchangeable with the CPD-7051 detector via twistlock mounting base to ensure matching the proper detection to the potential hazards of the areas being protected. An alarm output shall be available for remote annunciation. A Model PSD-7156 shall contain an integral 135 °F heat detector that shall operate independently of the smoke detector circuitry.

**OR**

**Photoelectric Area Smoke Detectors, FCI Model 301PL**

Smoke detectors shall have a low profile and be of the photoelectric type with a nominal sensitivity of 3.0%/ft. and a nominal signal to noise ratio of 2.0. It shall be possible to perform a functional sensitivity and performance test on these detectors without the need for generating smoke. The test method shall test all detector circuits. Alarm indication shall be provided by a latching LED, which shall pulse periodically indicating that power is being supplied to the detector. An alarm output shall be available for remote annunciation.

A special test meter shall be available to check the sensitivity of the detectors. Metering points shall be accessible on the exterior of the detectors.

The detectors shall not alarm when exposed to wind gusts up to 2500 feet per minute. The detector screen and cover assembly shall be removable for field cleaning. Wire connections shall be made by a clamping plate and screw.

The detectors shall be interchangeable with the 301IL detectors via twistlock mounting base to ensure matching the proper detection to the potential hazards of the areas being covered.

**OR**

**Photoelectric Area Smoke Detector, System Sensor Models 2400**

Smoke detectors shall be of the photoelectric type and have a nominal sensitivity of 3.0%/ft. It shall be possible to perform a functional test on these detectors without the necessity of generating smoke. The test method shall test all detector circuits.

An alarm indication shall be provided by a latching LED, which shall pulse periodically indicating that power is being supplied to the detector. An alarm output shall be available for remote annunciation.

The detector screen and cover assembly shall be removable for field cleaning. Wire connections shall be made by a clamping plate and screw. A Model 2400T detector shall contain an integral 135° F heat detector that shall operate independently of the smoke detector circuitry.

**b. Ionization Area Smoke Detector, FCI Model CPD-7051**

Smoke detectors shall be of the dual chamber, ionization type, shall operate with 0.7 microcurie or less of Americium 241 and designed for two-wire installations. They shall have 360-degree angle orientation (circumference) smoke entry characteristics, permitting maximum response to both visible and invisible products of combustion from any direction. A special sensitivity tester shall allow a direct readout of actual detector sensitivity in percent per foot using a digital voltmeter. The detectors shall be capable of operation in air velocities up to 2,000 FPM and at altitudes up to 7,500 feet without adjustments.

To minimize nuisance alarms, they shall be equipped with gated output circuitry requiring three different and simultaneous signals before detector actuation. They shall be interchangeable with the PSD-7155/7156 Photoelectric Detector via twist-lock mounting base to ensure matching the proper detection to the potential hazards of the areas being covered.

**OR**

**Ionization Area Smoke Detectors, FCI Model 301IL**

Smoke detectors shall have a low profile and be of the dual chamber, ionization type, with a nominal sensitivity of 1.5%/ft. It shall be possible to perform a calibrated sensitivity and performance test on the detector without the necessity of generating smoke. The test method shall test all detector circuits. A special test meter shall be available to check the sensitivity of the detectors. Metering points shall be accessible on the exterior of the detectors.

An alarm indication shall be provided by a latching LED, which shall pulse periodically indicating that power is being supplied to the detector. An alarm output shall be available for remote annunciation.

The detector shall be capable of operation in air velocities up to 2,500 FPM and at altitudes up to 10,000 feet without adjustments.

The detector screen and cover assembly shall be removable for field cleaning. Wire connections shall be made by a clamping plate and screw.

The detectors shall be interchangeable with the 301PL detectors via twistlock mounting base to ensure matching the proper detection to the potential hazards of the areas being covered.

**OR**

**Ionization Area Smoke Detectors, System Sensor Model 1400**

Smoke detectors shall be of the dual chamber, ionization type, and have a nominal sensitivity of 1.5%/ft. It shall be possible to perform a functional test on these detectors without the need for generating smoke. The test method shall test all detector circuits.

An alarm indication shall be provided by a latching LED, which shall pulse periodically indicating that power is being supplied to the detector. An alarm output shall be available for remote annunciation.

The detectors shall not alarm when exposed to wind gusts up to 300 feet per minute.

The detector screen and cover assembly shall be removable for field cleaning. Wire connections shall be made by a clamping plate and screw.

**c. Duct Smoke Detectors, FCI Model DH-60**

The contractor shall furnish and install where shown on plans photoelectric (DH-60/PSD-7155D) or ionization (DH-60/CPD-7051D) duct smoke detectors wired in a two or four-wire configuration. The detectors shall be UL Listed under UL Standard 268A for duct smoke detectors and allow remote functional testing without generating smoke.

**OR**

**Four-wire Duct Smoke Detectors, FCI Model 301DH-4**

The contractor shall furnish and install where shown on plans, duct smoke detectors equipped with either ionization (301I-DH) or photoelectric (301P) plug-in detector heads wired in a 4-wire configuration. The detectors shall be UL Listed under UL Standard 268A for duct smoke detectors and allow remote functional testing without generating smoke.

**OR**

**Two-wire Duct Smoke Detectors, FCI Model 301DH-2**

The contractor shall furnish and install where shown, duct smoke detectors equipped with either ionization (301I-DH) or photoelectric (301P) plug-in detector heads wired in a 2-wire configuration. The detector shall be UL Listed under UL Standard 268A for duct smoke detectors and allow remote functional testing without generating smoke.

**d. Rate of Rise Heat Detector, FCI Model 600 Series**

Rate of rise heat detectors shall function on both the “rate of rise” and “fixed temperature” principles of operation. They shall be of low profile design, white in color and be provided with locking base for mounting on a standard electrical box.

**OR**

**Rate of rise heat detectors FCI Model 500 Series**

Rate of rise heat detectors shall function on both the “rate of rise” and “fixed temperature” principles of operation. These detectors shall also be available in explosion-proof and combined weather/moisture-proof versions.

The explosion-proof models shall be UL and FM approved/listed for Class I, Groups C and D, and Class II, Groups E, F and G

**OR**

**e. Fixed Temperature Heat Detectors, FCI Model 600 Series**

Fixed temperature detectors shall function on the “fixed temperature” principle of operation. They shall be provided either with SPST or DPST contact arrangements and temperature set points of 135 or 200 °F. These detectors shall be of low profile design, white in color, and be provided with locking base for mounting on a standard electrical box.

**OR**

**Fixed temperature detectors, FCI Model 500 Series**

Fixed temperature detectors shall function on the “fixed temperature” principle of operation. They shall have temperature set points of 136 or 190 °F. These detectors shall also be available in explosion-proof and combined weather/moisture-proof versions. The explosion-proof models shall be UL and FM approved/listed for Class I, Groups C and D, and Class II, Groups E, F & G

**OR**

**Fixed temperature detectors, FCI Model FL Series**

Fixed temperature detectors shall function on the “fixed temperature” principle of operation. They shall have temperature set points of 135 or 200 °F, and have a replaceable, plug-in detecting element.

**4.12 Optional Remote Serial Annunciator (LCD-7100)**

Furnish and install where shown on the plans a remote serial annunciator, Model LCD-7100. The annunciator shall provide an 80-character display, which shall duplicate all information on the basic system display with the exception of menus. It shall also contain the following function keys: Alarm Acknowledge, Trouble Acknowledge, Signal Silence, System Reset/Lamp Test and System Drill Test.

The cabinet shall contain a keylock, which will enable the switches only when placed in the “ON” position, with the exception of the Trouble Acknowledge, which is used to silence the local trouble audible sounder. The annunciator shall also contain the following LED’s: Alarm, Supervisory, System Trouble, Power Fault, System Silenced, NAC #1 Silenced, NAC #2 Silenced.

The annunciator shall mount on a standard three-gang surface or flush electrical box. The 7100 Series control panel shall accommodate up to five (5) remote LCD-7100 annunciators, which can be located up to 4,000 feet from the control panel.

#### **4.13 Optional LED Driver Module (LDM-7100)**

Furnish and install a serial LED Driver Module, LDM-7100, capable of driving up to 33 remote LEDs. As many as three modules may be installed inside a remote, Listed annunciator allowing the annunciation of up to 99 points per annunciator. The annunciator shall be capable of operation up to 4,000 feet from the control panel.

The panel shall be capable of accommodating up to five (5) such annunciators.

### **SECTION FIVE: AUXILIARY FUNCTIONS**

#### **5.1 HVAC Control**

Designated HVAC units shall be controlled through four-wire duct type smoke detectors as shown on the plans.

**OR**

Designated HVAC units shall be controlled through the auxiliary contacts of the control panel after an alarm has been initiated from any zone as shown on the plans.

**OR**

Designated HVAC units shall be controlled through the auxiliary zone contacts of the control panel after an alarm has been initiated from the particular zone that is designated to control HVAC units as shown on the plans. The disconnect switch shall be supervised.

**OR**

Designated HVAC units shall be controlled via addressable output modules programmed to cover the desired areas.

#### **5.2 Electromagnetic Door Holders**

Electromagnetic door holders shall be provided to hold fire and smoke barrier doors open until released by an alarm. The holders shall have approximately 35 lb. (15.9 kg) holding power and offer fail safe operation.

The holders shall be capable of operation on 12 VDC, 24 VAC, 24 VDC, or 120 VAC without need of any configuration.

Furnish and install FCI Model FM-900 Series where shown on plans.

All holders shall be released via the control panel after an alarm has been initiated from any zone. All circuits shall be separately fused.

### **SECTION SIX: WIRING**

#### **6.1 Installers' Responsibilities**

The installer shall coordinate the installation of the fire alarm equipment with the manufacturer or his authorized distributor.

All conductors and wiring shall be installed according to the manufacturer's recommendations.

It shall be the installer's responsibility to coordinate with the supplier, regarding the correct wiring procedures before installing any conduits or conductors.

#### **6.2 Installation of System Components**

System components shall be installed in accordance with the latest revisions of the appropriate NFPA Standards, the requirements contained herein, National Electrical Code, local and state regulations, the requirements of the fire department and other applicable authorities having jurisdiction (AHJ).

All wire used on the fire alarm system shall be U.L. Listed as fire alarm protection signaling circuit cable per the National Electrical Code, Article 760.

### **SECTION SEVEN: WARRANTY AND FINAL TEST**

#### **7.1 General**

The contractor shall warrant all equipment and wiring free from inherent mechanical and electrical defects for one year (365 days) from the date of final acceptance.

#### **7.2 Final Test**

Before the installation shall be considered completed and acceptable by the awarding authority, a test of:

1. The contractor's job foreman, in the presence of a representative of the manufacturer, a representative of the owner, and the fire department shall operate every installed device to verify proper operation and correct annunciation at the control panel.
2. At least one half of all tests shall be performed on battery standby power.
3. Where application of heat would destroy any detector, it may be manually activated.
4. The signaling line circuits and notification appliance circuits shall be opened in at least two (2) locations to verify the presence of supervision.
5. When the testing has been completed to the satisfaction of both the contractors' job foreman and the representatives of the manufacturer and owner, a notarized letter co-signed by each attesting to the satisfactory completion of said testing shall be forwarded to the owner and the fire department.
6. The contractor shall leave the fire alarm system in proper working order, and, without additional expense to the owner, shall replace any defective materials or equipment provided by him under this contract within one year (365 days) from the date of final acceptance by the awarding authority.
7. The fire department must be notified prior to the final test in accordance with local requirements.

### **7.3 Operating and Instruction Manuals**

Operating and instruction manuals shall be submitted prior to testing of the system. Four (4) complete sets of operating and instruction manuals shall be delivered to the owner upon completion.

#### **7.3.1 "As-Built" Drawings**

A complete set of reproducible "as-built" drawings showing installed wiring, color coding, and wire tag notations for exact locations of all installed equipment, specific interconnections between all equipment and internal wiring of the equipment shall be delivered to the owner upon completion of the system.

#### **7.3.2 Testing Instructions**

Complete, accurate, step-by-step testing instructions giving recommended and required testing frequency of all equipment, and methods for testing each individual piece of equipment shall be delivered to the owner upon completion of the system.

#### **7.3.3 Maintenance Instructions**

Maintenance instructions shall be complete, easy to read, understandable, and shall provide the following information:

1. Instructions for replacing any components of the system, including internal parts.
2. Instructions for periodic cleaning and adjustment of equipment with a schedule of these functions.
3. A complete list of all equipment and components with information as to the address and telephone number of both the manufacturer and local supplier of each item.
4. User operating instructions shall be provided prominently displayed on a separate sheet located next to the control unit in accordance with UL Standard 864.

The contractor shall warrant all equipment and wiring free from inherent mechanical and electrical defects for one year (365 days) from the date of final acceptance.