

# 283100S01 FIRE ALARM SYSTEM (HARDWIRED), MANUAL AND AUTOMATIC

## 1. GENERAL

1. Fire alarm system shall be manufactured by Simplex, Notifier or Edwards. Simplex part numbers are provided in this spec for clarification only and do not exclude equivalent part numbers of acceptable manufacturers.
2. System shall meet all applicable sections of the latest revision of all applicable Federal, State and Local codes including but not limited to NFPA codes 72A, 72B, 72C, 72D, 72E, National Electric Code (NEC), Kentucky Building Code (KBC), and Local (LFUCG) codes.
3. Complete system shall be UL listed and each component shall be labeled and installed accordingly. Contractor is expected to install all devices for a complete operating system.
4. System shall have Class B (Type 2) detection and signal circuits.
5. All components of system shall be RFI shielded to prevent false alarms.
6. System shall not produce false alarms when subjected to power line transients and carrier signals. Two common power line carrier frequencies used by the University are the 2340 Hz. clock synchronizing signal and the 3218 Hz. bell ringing signal.
7. Additions to existing Fire Alarm Systems are not recommended, however, this standard does apply to all U.K. Fire Alarm System renovations.

## 2. OPERATION

1. Actuation of any alarm initiating device (except for duct smoke detectors) shall cause all audible, visual, and audio/visual alarm devices to operate continuously until acknowledged or reset. Actuation of duct smoke detectors shall send a supervisory signal to the central receiving station only.
2. Actuation of any alarm initiating device (except for duct smoke detectors) shall automatically cause the following operations where applicable:
  1. Release all magnetically held doors.
  2. Shut-down or reroute air handling systems according to established plans.
  3. Flash lamps located by each signal.
  4. Lower fire curtains.
  5. Close fire dampers.
  6. Indicate on remote annunciators.
  7. Duct smoke detectors shall shut down or reroute "associated" air handling systems according to established plans and shall send a supervisory signal to the central station.

Note: The previous operations shall automatically be restored to normal pre-alarm state when the F.A. Control Panel is reset.

3. System shall operate auxiliary pair of relay contacts for remote connection to a Central Station Monitoring System in accordance with the UK Central Station Fire Alarm System Connection Standard No. 283100S02.

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4. The general alarm devices may be silenced by authorized personnel only by entering a locked control cabinet and operating the proper silencing switch. Operation of this switch shall be indicated by a trouble light and audible signal.

## 3. ZONING

1. Alarm initiating devices shall be grouped in zones in accordance with the Kentucky Building Code and the UK authority having jurisdiction (UK Fire Marshall).
2. A zone in alarm shall be indicated by a lighted red LED on the zone module involved.
3. A zone in trouble shall be indicated by a lighted yellow LED on the zone module involved.
4. Provide dedicated zones connected to all existing and new suppression systems including but not limited to one for each Halon System, CO2 System, Sprinkler Branch Paddle Switch, and Sprinkler Common Water Gong Pressure Switch. Sprinkler zones shall supervise the tamper switch on all valves serving heads in that zone. Sprinkler common alarm zone shall supervise the PIV valve(s).

## 4. EQUIPMENT

1. Control Panel Fire Alarm Only 2001/8001

Control panel shall have a minimum of 20 zone positions with a minimum of 2 spare equipped zones and 2 spare unequipped positions specifically designated for zone expansion to 20 fully equipped identical zones. Fire alarm panel shall be black with red trim unless otherwise specified. Fire alarm panel finish shall be manufacturer applied primer with baked on enamel finish. If the fire alarm is being installed for only part of a building and potential for expansion is indicated, install a control panel with a minimum of 30 possible zone positions. On Fire Alarm and Voice systems, provide mike and a phone line interface for dial up paging. Fire alarm system shall consist of the following modules:

2. Control Module 2001-1007

The control module provides a central location for the operating and indicating functions of the fire alarm system. These functions include system reset, alarm lock-in, alarm resound acknowledge switch, earth LED, system and zone trouble LED, annunciator trouble LED, tone alert, and LED test. All status changes within the system are reported to this module. The information is then processed and transmitted to the appropriate module(s) for disposition.

The 2001-1007 control module is provided with alarm resound. Upon having detected an alarm condition, a zone will report its status to the control module. This alarm condition will cause the alarm LED on the zone to flash at a rate of approximately 150 pulses per minute. Depending upon system operation, it will also cause the sound of alarm signals, the activation of the Central Station connection module, and the operation of the fan control relays. When the acknowledge switch is depressed, the zone's alarm LED will cease to flash and remain illuminated. At this time, the signals will also be silenced. The activation of another zone repeats the entire alarm process, thus causing the signals to "resound".

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## 3. Box Circuit Zone Module 2001-1017

1. The alarm initiating circuit module(s) shall provide electrically supervised normally-open circuits monitoring for alarm (shorts), troubles (opens), and ground faults. The module shall provide alarm and trouble LED's per zone and auxiliary alarm contacts (N/O: 2.0 A Resistive) per zone. It shall allow the mixing of smoke detectors, heat detectors, flow switches, and other initiation devices on the same zone without the use of limiting resistors at manual stations and heat detectors and without using a separate source of power for the detectors.
2. The module shall be completely pluggable for ease of servicing and inherently Power Limited (Limited Energy) with a 100 ohm maximum line resistance. Provide zones as shown on plans plus spare zones for future use.

## 4. Signal Circuit Module 2001-2076

Signal circuit pluggable modules shall be supplied which are capable of supplying 2 amperes of signal capacity of either AC or DC power. It shall supply power via a 2-wire supervised circuit and indicate open or shorted faults on module front by illuminating LED and providing output to system trouble circuit. This module shall be protected by a visible and accessible fuse on module front. Alarm inputs of the common and individual type shall be furnished. Provide number of signal circuit modules required.

## 5. Relay Module 2001-3006

Pluggable relays and their bases complete with terminals for contractor wiring, shall be furnished for control of external equipment. Each relay shall be 4PDT and operate on 24VDC in and 120 VAC out. Contacts shall be rated at 2 amps minimum.

## 6. March Time Coder Module 2001-3044

A dual rate march time module shall be furnished which will provide approximately 20 beats/minute for pre-signal and approximately 120 beats/minute for march time general alarm. The module shall include an LED which flashes at the selected code rate. This unit shall be used for flashing lamp operation.

## 7. Battery Charger Module 2001-3002

An automatic dual-rate battery charger shall be installed in the control panel which shall be capable of charging either a Gel or Wet Cell battery. A constant trickle charge shall continuously be applied to the battery in order to maintain it at a full charge state. A method of adjusting the trickle charge rate shall also be provided in order to supply the selected battery with the exact charge rate it requires. In the event of a failure of the charger, the charger failure LED shall illuminate. Should the battery capacity drop below specified limits, the charger shall automatically change to high rate condition and an LED shall illuminate.

## 8. Power Supply Module 2001-3021

A power supply module shall be furnished supplying 5 amperes (minimum) of continuous filtered power, or 8 amperes intermittent (minimum), of the proper voltage. The power supply shall be capable of furnishing the system power and power for devices such as smoke detectors, auxiliary relays, door holders, etc. It shall contain a normal power LED, battery trouble LED and power

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supply trouble LED, all viewable on front of enclosure. Capability of connecting a voltage regulator shall be included.

## 9. Batteries

Sealed batteries shall be type 2001 Maintenance Free and shall provide twenty-four (24) hour stand-by power.

## 10. Control Panel Cabinet

Control Panel Cabinets shall be comprised of an outer hinged door with a full size tempered glass viewing window. The glass door allows a complete view of all labels, indicating lights and switches. Cabinet shall be tamper resistant, locked enclosure which can be mounted in easy-to-reach public areas such as lobbies or corridors. Install cabinet at Firemen's designated entrance as approved by the UK Authority Having Jurisdiction, (UK Fire Marshall). Flush mount unless otherwise noted.

## 11. Field Installed Auxiliary Relays and Modules

1. All relays added to any standard fire alarm panel or auxiliary panel shall be UL listed plug in type with mounting bases installed and wired for every existing and initial installation spare zone provided or equitable.
2. Provisions shall be made to test all equipped and equitable spare positions for alarm, annunciation, and supervision, during the final acceptance testing of all new and renovated fire alarm systems.

## 5. REMOTE ANNUNCIATOR

1. Provide only when design is such that the Main Fire Alarm Control Panel (FACP) cannot be located near the designated entrance to provide all required annunciation or more than one annunciator is required. Remote annunciator shall be completely free from screws or other fastenings on its face to prevent tampering and shall be cut keyed to match the FACP. At minimum, the main FACP common alarm and trouble and the alarm and trouble for each zone shall be annunciated on the remote annunciator. LED labels shall be permanent, professionally made and shall meet UK Project Manager's approval. Unit shall be flush mounted, factory baked on black enamel with red trim and shall be complete with trouble LEDs and internally mounted silence and reset switches.
2. Where specified, remote annunciator for director's office shall be single zone with indicator lamp, buzzer and silence switch. Simplex No. 4308 or equal.

## 6. HORN AND FLASHING LAMP UNITS

1. Horn and Flashing Lamp Units shall be of the following type:

2903-9002	Audio Visual Units
2901-9833,9806	HORNS
2905-9960	TRIM FOR AUDIO VISUAL UNITS
2975-9145	BOXES FOR AUDIO VISUAL UNITS

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2. Alarm horn shall be 2901-9806 and mount on a common plate with the lamp unit. The unit shall be flush and installed where shown on plans. Provide 180 degree sound direction deflectors on all horns unless otherwise specified.
3. In special animal areas, horns of variable volume and/or tone shall be supplied.
4. In sleeping rooms, provide individual piezo horns or speakers in each room.
5. Provide horn or speaker levels in accordance with NFPA. Design with consideration for sound proofing as a result of fire rated walls or other reasons.
6. Provide at least two (2) signal devices on each level of building.
7. No signal devices are required in storage rooms.

### **7. AREA SMOKE/HEAT DETECTORS**

1. Furnish and install where indicated on the plans, photo-electric smoke detectors, type 2098-9525 base equipped with a 2098-9400 detector head. The detectors shall be interchangeable and compatible with ionization detectors using the same type bases. Their light source shall be a pulsed infrared LED for low power consumption under standby conditions at 24Vdc. An installed detector smoke chamber shall require only 15 seconds disassembly time to make all components readily accessible for cleaning as required for routine maintenance and test. Detectors shall have detector screens to prevent rodents and insects, large enough to cause a false alarm, from entering the detection chamber. Detector circuit and wiring shall be sealed base construction such that moisture condensing in or entering conduit junction box shall not contaminate detector or cause false alarms.
2. Nominal detector sensitivity shall be 1.4% per foot obscuration with a range of 1% to 1.84%. Regardless of sensitivity setting, the detector's stability shall be unaffected by high air velocity. The detector shall be capable of operating on either a 2-wire loop with end-of-line resistor or on a 4-wire loop using 24VDC.

### **8. DWELLING AREA SMOKE/HEAT DETECTORS**

Furnish and install where indicated on the plans, combination 24Vdc photo-electric smoke detectors equipped with 135 degree F fixed temperature detector, rate of rise heat detector and audible alarm. Detectors shall meet specifications for Area Smoke Detectors with the following exceptions in operation and components:

1. Smoke detection shall actuate detector audible alarm only and provide auxiliary contact for central system connection.
2. Smoke detector shall automatically reset when obscuration returns to acceptable levels.
3. Heat detector alarm contacts shall be isolated from smoke alarm output contacts and shall also activate detector audible alarm.
4. Detector shall have inputs for remote actuation of audible alarm and remote reset with dry contacts.

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## 9. COMPUTER ROOM SMOKE/HEAT DETECTORS

Furnish and install where indicated on plans. Detectors shall meet specifications for Area Smoke Detectors with the exception of those smoke detections designated to be ionization type and used to initiate alarms on Halon Systems.

## 10. MISCELLANEOUS SMOKE/HEAT DETECTORS

1. Classrooms: Install area smoke/heat detectors in accordance with this UK Standard.
2. Corridors: Install area smoke/heat detectors in accordance with this UK Standard.

## 11. HEAT DETECTORS

All heat detectors shall be combination rate of rise/136 degrees F. fixed temperature, unless special applications of the areas require other types heat detectors as noted below. All heat detectors shall be equipped with a LED that latches on alarm. Use listed spacing of smoke detectors for all heat detectors to guarantee code compliance should the heat detectors be replaced with spot type smoke detectors in the future.

## 12. MISCELLANEOUS HEAT DETECTORS

1. Office areas: Install combination 135 degree F. fixed temperature/rate of rise detectors with latching LED on alarm.
2. General Storage Areas: Install heat detectors in general storage areas.
3. Mechanical Rooms: Install 135 degree fixed temperature heat detector with latching LED if nominal room temperature is below 135 degree F.
4. Mechanical rooms, autoclave rooms, dishwasher rooms, steam table rooms, and other rooms subject to reach temperature above 135 degree
5. Install 190 degree F fixed temperature heat detectors

## 13. OTHER AREA DETECTORS

1. Flammable storage: Sprinkle with flow switch connection to dedicated zone on FACP or install C02 if absolutely required and connect to dedicated zone on FACP
2. Computer Rooms: Sprinkle with flow switch to dedicated zone on FACP or if absolutely required install Halon system and connect to dedicated zone on FACP

## 14. DOOR HOLDERS

1. Door holders shall be FM 998.
2. All door hardware shall be Yale, Von Duprin or Dorma.
3. Install a smoke detector on each side of any door equipped with a hold open device.

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## 15. BUILDING MAP(S)

Building map(s) shall be provided adjacent to the main and remote annunciator panel(s) and shall consist of printed floor plans with color coded zones. Zone indications shall depict the exact zone number and alphanumeric labeling as shown on the FACP zone labels. Building map shall be a detailed floor plan with all room numbers, fire alarm zones, detectors, horns, alarm initiators, flow switches, sprinkler heads, sprinkler zones, and all other devices shown. "Zone No." shall be in 1/4" high letters. Maps shall be properly oriented and shall be 1/16" = 1' scale or 1/32" = 1' scale with written exception of the owner. Provide durable aluminum frames and all required mounting hardware and mount where indicated on plans. Aluminum frame must be such that it can be removed, disassembled and reassembled to allow replacement or revisions to the prints. The layers of the map in the frame from back of the frame to the front of the frame shall be as follows:

1. 1/8" Plexiglas
2. white backing mat
3. pastel backing color layers for zones
4. inked prints with floor plan, room #s, fire alarm zones, detectors, horns, alarm initiators, flow switches, sprinkler heads, sprinkler zones, and all other devices.
5. Spacer mat to allow print to be suspended from top of frame and reduce washboarding
6. 1/8" ultraviolet blocking plexiglass
7. 1/8" clear lexan to prevent scratching

Building map(s) shall be installed, complete with "as built" corrections before system is left in operation and before the University will consider the project for substantial completion. Before this systems is left operational and reports to the UK Central Station, this map(s) must be in place.

## 16. MANUAL STATIONS

Manual Stations shall be type 2099-9201, flush mounted. A downward pull of the level shall activate a positive snap action switch. The station shall remain activated until reset by means of a cut key. A red surface box shall be furnished for all surface mounted stations.

In high traffic areas and in areas frequently occupied by children, provide pull station device guards to assure protection from accidental bumps, etc.

## 17. FIRE STOPPING

Provide fireproof seals in accordance with U.K. Standard 078400S01.

## 18. LIGHTNING PROTECTION

Provide lightning protection in accordance with U.K. Standard 664000S01.

## 19. SHOP DRAWINGS AND DOCUMENTATION

Provide in accordance with U.K. Standard 010000S01.

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## 20. INSTALLATION AND WIRING

1. In addition to specific instructions provided herein, complete system must be installed in accordance with all applicable sections of the U.K. Construction Standards No. 00000S01-499999SXX
2. The contractor shall furnish and install in accordance with manufacturer's instructions, all wiring, conduit, and outlet boxes required for the installation of a complete system as described herein and shown on the architect's plans.
3. All wiring shall meet the requirements of the national, state, and local electrical codes. The sizes of different wires shall be those specified by the manufacturer or larger as specified in this standard. Color codes shall be used where specified. All wires shall test free from ground and crosses between equipment. Final connections of the control panel shall be made under direct supervision of a representative of the manufacturer.
4. Where fan shut down, elevator recall or special auxiliary functions are required, contractor is to provide wiring diagrams before connections are made.
5. Smoke detectors are not to be mounted within three feet of air outlets.
6. In cases where a detector is installed in a room or closet, the detector shall be mounted as close as possible to the center of the room unless written exception is obtained from the UK Project Manager. One exception, when room has a door opening into a shower or bath, mount the detector as far away from that room door as the code permits to reduce potential false alarms.
7. Mount wall mounted smoke detectors per NFPA, \*Note: normally a minimum of 6 and a maximum of 12 inches from the ceiling to the top of the detector.
8. Smoke detectors to be installed on either side of a set of fire doors should be mounted no more than five feet and no less than twelve inches from the wall section above the door.
9. Visuals should not be obscured by support beams or protrusions on walls. Visuals should not be mounted within three feet of wall mounted lights.
10. Do not power-up system until Manufacturer Field Representative is present.
11. Minimum conduit size is 3/4".
12. Metal raceway used in exterior locations shall be aluminum as manufactured by Wiremold or equivalent unless written exception is obtained from the UK Project Manager.
13. Loads greater than 10 AMPS (for auxiliary functions) shall not be run in conduit with other circuits.
14. Manual Stations shall be installed not more than 4 feet from the floor and five feet from exit or door.
15. Metal components of system shall be grounded. Do not use the conduit as a grounding system for equipment, cabinets or devices. Pull separate grounds wires for this application.
16. Do not use ceiling wire hangers or wire supports to support any equipment or conduit added on this project.



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17. Provide an isolated run of conduit from the 120 VAC power source to the Fire Alarm Panel. If an existing system is being replaced and the existing power is being reused, it is the responsibility of the provider to isolate or verify isolation of the existing 120 VAC power run(s)
18. Do not run any 120 VAC wiring with any DC wiring.

## 21. CONDUIT LOCATION, APPEARANCE AND SUPPORT

All conduit shall be concealed except in University of Kentucky designated mechanical rooms or unless otherwise specified and shown on drawings approved by the UK Project Manager. Conduits which are not concealed must have written approval of the UK Project Manager prior to installation and shall be surface metal raceway (wire mold) unless otherwise noted in the approval. Conduit or tubing shall have supports installed and spaced in accordance with the NEC. Conduit shall be installed with runs parallel or perpendicular to walls, structural members on intersections of vertical planes and ceilings, with right angle turns consisting of cast metal fittings or symmetrical bends. Bends or offsets shall be avoided where possible but where necessary shall be made with approved conduit bending machine. Conduit or tubing which has been crushed or deformed in any way shall not be installed.

## 22. INSTALLER CERTIFICATION

This system must be installed under the supervision of a person certified to install fire alarm systems in the State of Kentucky. All submittals for this project shall list the name, license number, and telephone number(s) of one person with this certification and who is assigned to represent the vendor before, during and after this installation.

## 23. INSPECTION AND TESTING

1. Installer shall provide a certified fire alarm inspector for final checkout and test of every device. Checkout to include checkout of wiring to ensure compatibility with the system and proper operation of every device (alarm and trouble reporting).
2. Installer shall provide final checkout certification letter and inspection reports to UK Project Manager.

## 24. EQUIPMENT REMOVAL AND SALVAGE

1. All removed equipment shall be returned to the U.K. Physical Plant unless proposed disposition is discussed and a written exception is included in the specifications.
2. Removed equipment will be accepted by U.K. at a mutually agreeable acceptance time.
3. Do not use vacated equipment enclosures as junction boxes unless this proposed reuse of equipment is specified in writing under a heading of "Special Conditions".

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## **25. INTERRUPTION OF SERVICE**

1. Any interruption of service of existing Fire Alarm Systems must be authorized in writing by the U.K. Fire Marshall or his/her appointed representative prior to project start, otherwise, the University will assume that existing systems will remain 100% operational at all times and will only have one zone or signal circuit out of service at any time. The maximum down time for any part of the system is 1 hour unless otherwise specified in writing.
2. If problems develop and system cannot be kept operational as this section specifies, contact the U.K. Fire Marshall for his/her recommendation. If the U.K. Fire Marshall request security guard(s) be put on duty until system is back into operation, this will be done at the expense of the contractor.

## **26. SYSTEM GUARANTEE**

System guarantee shall be in accordance with UK Standard 01740S01.

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## 27. WIRING LEGEND

CIRCUITS (Unless Otherwise Specified)	WIRE SIZE-AWG	WIRE COLOR	EOL Value
ALARM CIRCUITS WIRES Stations Smoke Detectors Heat Detectors Waterflow Switch Tamper Switch-Tbl Only	# 18	ORANGE(pos.) BLUE(negative)	3.3KOHM
TROUBLE CIRCUIT WIRING	# 18	BROWN	
COMMON ANNUNCIATOR WIRES	# 18	VIOLET	
POINT ANNUNCIATOR WIRES	# 18	PINK WITH BRADY TAG	
120VAC WIRING	# 12	BLACK	
24VDC	# 14	WHITE (Neutral) RED (Positive) BLACK (Negative)	
PARALLEL SIGNAL WIRES	# 14	RED (Positive) BLACK (Negative)	15K OHM
SERIES SIGNAL WIRES	# 14	YELLOW	NONE
DOOR HOLDER	# 14	BLUE	
FAN SHUT DOWN WIRES	# 14	WHITE (Neutral)	
ELEVATOR CONTROL WIRES	# 14	SELECTED BY CONTRACTOR	
TELEPHONE WIRES	# 22	SELECTED BY CONTRACTOR	
SPEAKER WIRES	# 18	TWISTED/SHIELDED	22K OHM
		TWISTED	15K OHM

### Notes

1. All wire shall be stranded, tinned copper unless otherwise indicated.
2. All shielding is tinned copper braid with additional aluminum sheath unless otherwise noted.
3. All wiring for data lines and voice risers must be Belden 9574, or an equivalent unless otherwise noted on drawings.