

SECTION 28 13 00 - ACCESS CONTROL SYSTEMS

PART 1 - GENERAL

1.1 SUMMARY

- A. The conditions of the General Contractor (General, Supplementary and other Conditions) and the General Requirements are made part of this section. The complete installation shall conform to the requirements set forth by the National Electrical Code, all State and Local Building Codes as required by the "Authority Having Jurisdiction" and the requirements of the owner.
- B. Case requires at a minimum that all exterior doors be equipped with card access or electronic door position monitoring.
- C. All equipment and materials provided shall be new and unused and of the most current model or revision. All components of this system shall be installed in a workmanlike manner, following security industry "best practices" and in strict adherence to the manufacturer's specifications and applicable codes. Wire and conduit shall be installed consistent with the following Case building standards.
 - 1. Attachment 28 13 00.01 – Door and Door Frame Details.
 - 2. Attachment 28 13 00.02 – Typical ACS Layout.
 - 3. Attachment 28 13 00.03 – Installation Standards.
- D. The Security System Vendor shall be responsible for all costs associated with the installation of this equipment.

1.2 RELATED DOCUMENTS

- A. Divisions 00 and 01 contain additional provisions that apply to this Section and shall be reviewed thoroughly.

1.3 WORK INCLUDES

- A. Furnish and install all equipment, accessories and materials in accordance with these specifications and drawings to provide a complete and operating Access Control System.
- B. The scope of work for the Electrical Contractor shall include, but not be limited to providing the following:
 - 1. Raceway systems required for complete rough-in.
 - 2. Communication field wiring outside the SER (Satellite Equipment Room).
 - 3. 120 volt emergency power, grounding, wire management raceways and fire resistant backboards located in the SER.
- C. The scope of work for the Security System Subcontractor shall include, but not be limited to providing the following:
 - 1. Local control panels within the SER.

2. Card readers.
 3. Exit motion sensors.
 4. Magnetic door locks.
 5. Door monitor contacts.
 6. Request-to-exit devices.
 7. Sounders and key-switches.
 8. Panic buttons
 9. Termination of all field wiring including the card readers.
 10. Termination of communication field wiring within the SER.
 11. Testing and programming of local system.
 12. Reprogramming of existing host computer.
 13. Interface with ADA door operators where applicable.
- D. Any material and/or equipment necessary for the proper operation of the access control system not specified or described herein shall be deemed part of this specification.

1.4 ACCEPTABLE MANUFACTURERS

Access Control System (ACS) shall be manufactured by Lenel Systems International, Inc.

Acceptable representatives:

1. Zenith Systems, 5055B Corbin Drive, Bedford Heights, Ohio 44128. Phone: 216-518-3813. Contact: Marty Jeric: mjeric@zenithsystemsllc.com
 2. Convergent, 7792 Capital Blvd. Macedonia, Oh 44056 Contact: TJ Ammond: tj.ammond@convergent.com 330-748-8409
 3. Presidio Corp. 4960 Blazer Parkway. Dublin Oh 43017. Contact Joey Maniaci jmaniaci@netechcorp.com. 740-725-4227
 4. Siemens Industry 5350 Transportation Blvd. Garfield Hts Oh 44125 Contact Richard Boepple 216-816-5132 richard.boepple@siemens.com
- B. All access control hardware and software shall be of a single manufacturer including controller panels, and input and output terminal modules.
- C. All published specifications of the system manufacturer shall be considered as being a part of this specification, even though they have not been written in complete detail.
- D. The base bid shall be based on the products specified. Any substituted product and/or system shall not be accepted without prior approval from the Owner within 10 days of bid date.

1.5 RELATED WORK SPECIFIED ELSEWHERE

- A. Electrical General Provisions
- B. Basic Materials and Methods
- C. Fire-Stopping

- D. Door, door frame and door hardware shall be coordinated with Architect and Owner. All doors that are monitored or provided with access control devices shall be provided with mechanical panic hardware that has the ability to be manually locked in the event of failure by the Access Control System.

1.6 SUBMITTALS

- A. Submittals shall include installation and wiring diagrams and instructions for installation, operation and maintenance, to be suitable for inclusion in the Maintenance Manuals.
- B. Submittals shall include a complete Bill of Material, identifying each component, counts, manufacturer, model number, and unit price, extended price per unit, materials and labor. Case Western Reserve University will review and must approve all submittals and the Bill of Material before equipment is ordered. Costs for shipping, handling, etc. shall be clearly defined as a separate line item.
- C. Submittals shall include descriptive literature for all system components, size and type of recommended conduit and wiring, and sequence of system operation.
- D. Submittals shall include testing and commissioning procedures for the specified system, including report forms that will be provided in a final commissioning report.
- E. Provide final commission report specified in 1.5 D.
- F. Submittals shall include battery calculations.

PART 2 - PRODUCTS

2.1 GENERAL PROVISIONS

- A. Wiring tag requirements: all wiring throughout this project will be tagged using a numerical numbering system and be recorded in an Excel spreadsheet listing cable number, location, wire type, and function. A legend of wiring numbering scheme will accompany this spreadsheet. This document will be provided in both hard copy and electronically as an Excel spreadsheet.
- B. All low voltage control, data, and other cables will be terminated using terminal strips, with crimp type lugs, no "b style crimp connectors" or wire nuts will be allowed.

2.2 SYSTEM DESCRIPTION

- A. The system shall allow for access to the facility by use of card readers at the locations indicated on the Drawings.
- B. The system shall allow for monitoring of doors indicated on the Drawings.
- C. The system shall provide for computer based configuration so as to allow the greatest control of access both during configuration and ongoing operation.
- D. All Access Control System local control panels shall be located within the SER.

2.3 OPERATION REQUIREMENTS

- A. The Access Control System (ACS) shall be capable of integrating multiple building functions including access control, alarm management and intrusion detection.
- B. The system shall be listed by Underwriters Laboratories for UL 294 Access Control Systems and shall carry the UL labels as required.
- C. Control circuits shall be low-voltage Class 2 type only.
- D. The system shall be modular in nature, and shall permit expansion of both capacity and functionality through the addition of control panels, card readers, sensors, etc.
- E. The system shall incorporate the necessary hardware, software, and firmware to collect, transmit, and process alarm, tamper and trouble conditions, access requests, and advisories in accordance with the security procedures of the facility. The system shall control the flow of authorized personnel traffic through the secured areas of the facility.
- F. The user interface at the host computer (server) and at the operator workstation terminal computers shall be existing to remain.
- G. ACS shall interface with the building fire alarm system as supplied by others. This interface is to interconnect to the electromagnetic locking hardware power supplies to remove power from all electromagnetic locking hardware in the event of a fire alarm. This permits free egress from the facility on the event of a fire alarm.
- H. ACS shall interface with electric doors utilized for ADA access. This interface is to interconnect to the electric door contact in its respective control panel to provide opening of door when card reader is utilized.
- I. Installed ACS must interconnect with the request to exit devices and emergency exit devices as may be required by local code provided by the locking hardware supplier.
- J. Installed ACS must be capable of interconnection to the owner provided dedicated Ethernet LAN/WAN network for connection to remote building Main and/or Terminal Controllers.
- K. Where more than two door leaves are within a bank of exit doors, only two shall be provided with access control as specified herein. The balance of the door leaves shall be provided with magnetic door locks and door monitor switches only.

2.4 APPLICATION SOFTWARE REPROGRAMMING

- A. The existing application software in the host computer shall be reprogrammed to accommodate the local subsystem installed under this Contract.
- B. The software reprogramming shall be Owner defined and shall include, but not be limited to the following:
 - 1. Event Viewer, Event Archiving.
 - 2. Time Zones.
 - 3. Holidays.
 - 4. Door Access Group Privilege Levels.
 - 5. Assigning Access Group Levels.

6. Door and Reader Configuration.
7. Request-to-Exit.
8. Input and Output Configuration.
9. Device Configuration.
10. Operator Interface, Alarm Handling and Overrides.
11. Facility Maps & Graphics.
12. Card Holder Database Configuration.
13. Personal Identification Numbers.
14. Duress Code.
15. Operator Privilege Levels.
16. Reports, Personnel Report, Event Archived History Reports.
17. Operator On-line Help.
18. Query Status of System Components.
19. Filter and Use of Filters.
20. Backup and Restoration.
21. On-line Maintenance.

2.5 HARDWARE REQUIREMENTS

A. Intelligent System Controller: [See Attachment 28 13 00.04 – LNL-4420 Cut Sheet.](#)

1. The LNL-4420 Intelligent System Controller (ISC) by Lenel is designed for advanced access control applications. As the access control engine for the OnGuard system, the ISC provides power and functionality. The ISC can communicate to the host computer in a single- or dual-path configuration of Ethernet, dial-up or direct connect RS-485 communication. Multiple combinations of Input Control Modules, Output Control Modules and Card Reader Interface Modules (up to 64 devices) can be configured.
 - a. On-board high-speed Ethernet 10/100Base-T upstream port provides up to 8 times higher throughput than serial-to-Ethernet converters. DHCP and fixed IP addressing supported.
 - b. DNS device naming through DHCP extended commands
 - c. Host dual path communication enabled - on-board Ethernet TCP/IP, direct wire (RS-485, 2-wiremultidrop capable), or dial-up communications
 - d. 15 MB of available on-board, non-volatile flash memory
 - e. Battery-backed, non-volatile storage of 50,000 events
 - f. Firmware stored in flash memory, background download of firmware updates supported
 - g. 12 or 24 VDC input power
 - h. Supports up to 16 different formats (8 card formats and 8 asset formats)
 - i. Biometric template storage support for Schlage Recognition Systems®, Bioscrypt®, and Identix®
 - j. Enhanced anti-passback capabilities
 - k. Up to 32,000 access level permissions
 - l. 255 holidays with grouping
 - m. 255 timezones, each with 6 intervals
 - n. Elevator control support for up to 128 floors
 - o. Alarm masking
 - p. Individual extended held open and strike times (ADA required)
 - q. Up to 9-digit user PIN codes
 - r. Status LEDs for heartbeat & battery status, upstream and downstream communication, and memory write status

- s. Two dedicated inputs for tamper and power failure status
- t. Advanced Encryption Standard (AES) 128-bit algorithm for communications
 - 1) The ISC on-board memory shall be 15 MB.
 - 2) Each ISC shall be provided with built-in hardware to support hard-wired communications between ISC(s) of up to 4000 feet.
 - (a) The ISC shall communicate upstream at 38.4 kbps via RS-232/RS-485 multi-dropped configurations, modem dial-up communications, Ethernet TCP/IP or Token Ring type networks.
 - (b) Each ISC shall have four downstream 2-wire RS-485 channels or two 4-wire RS-485 channels.
 - (c) Communications between the ISC and the Host Server shall be via Ethernet TCP/IP at 10Mbps.
 - 3) A single ISC shall serve up to 64 readers or 32 devices. Each control module (#LNL-1100 or #LNL-1320) shall use one device address.
 - 4) Provide a minimum of #18 AWG wiring for the power supply.

B. Input Control Module: **See Attachment 28 13 00.05 – LNL-1100 Cut Sheet.**

1. Lenel #LNL-1100 Input Control Module (ICM) shall provide high-speed acknowledgement of critical alarm points in monitored areas with operational characteristics as follows:
 - a. AC input: 12 VAC+/- 15%, 350mA RMS; DC input: 12VDC+/- 15%, 500mA.
 - b. 3-volt lithium battery back-up, type BR2325.
 - c. Operating temperature range: 0° to 70° C.
 - d. Operating humidity range: 0% to 95%, non-condensing.
 - e. Grade B, A, and AA Line Supervision.
 - f. Elevator Control; support for 64 floors.
 - g. Status LED's for heartbeat and host communications.
 - h. UL 294 listed and labeled.
2. The ICM shall have 16 configurable input control points and 2 output control relays. It shall support normally open, normally closed, supervised and non-supervised circuits. The input circuits shall be scanned using an analog to digital converter. The digitized input status signal shall be software monitored and controlled, so that each input point can be programmed as a supervised or non-supervised alarm point. The output relays shall be configured for fail-safe or fail-secure operation.
 - a. Alarm Inputs: Two non-supervised inputs (normally closed contacts) for cabinet tamper and power fault monitoring. are. The inputs shall be shorted if they are not used.
 - b. Alarm Outputs: Two Form-C relay contacts, 5A 30VDC or 125VAC, resistive.
 - c. For Supervised Inputs, end-of-line (EOL) resistors shall be 1000 ohm, 1% tolerance.
See Attachment 28 13 00.06 – EOL Resistor Diagram.
3. The ICM shall communicate directly with ICS either by 2-wire or 4-wire RS-485 communication. Provide Belden #9841 or equivalent for RS-485 (2-wire) communication and Belden #9842 or equivalent for RS-485 (4-wire) communication. Each ICM module shall be individually addressed for increased reporting capabilities from software applications.

4. Provide a minimum of #18 AWG wiring for the power supply.
- B. Dual Reader Interface: [See Attachment 28 13 00.07 – LNL-1320 Dual Reader Cut Sheet.](#)
1. Lenel #LNL-1320 Dual Reader Interface (DRI) shall provide support for up to 64 access control card readers, keypads, or readers with keypads that use standard Wiegand Data1/Data0 or Clock/Data communications with operational characteristics as follows:
 - a. AC input: 12 VAC+/- 15%, 600mA RMS; DC input: 12VDC+/- 15%, 450mA.
 - b. 3-volt lithium battery back-up, type BR2325.
 - c. Operating temperature range: 0° to 70° C.
 - d. Operating humidity range: 0% to 95%, non-condensing.
 - e. Status LED's for heartbeat and host communications.
 - f. UL 294 listed and labeled.
 2. Lock, unlock, and facility code offline access modes shall be supported on all readers connected to the DRI. Each DRI shall support up to eight different card formats as well as issue codes for both magnetic and Wiegand card formats.
 3. DRI shall interface with electric doors utilized for ADA access. This interface is to interconnect to the electric door contact in its respective control panel from a contact closure on the DRI.
 4. As many as 32 DRI modules shall be capable of being multi-dropped up to 4,000 feet away from the ISC. The ICM shall communicate directly with ICS either by 2-wire or 4-wire RS-485 communication. Provide Belden #9841 or equivalent for RS-485 (2-wire) communication and Belden #9842 or equivalent for RS-485 (4-wire) communication. Each DRI module shall be individually addressed for increased reporting capabilities from software applications.
 5. The DRI shall include eight inputs that support normally open, normally closed, supervised, and non-supervised circuits. In addition, six output relays support fail-safe or fail-secure operation. [See Attachment 28 13 00.08 – Typical 1320 Wiring.](#)
 - a. Alarm Inputs: Two non-supervised inputs (normally closed contacts) for cabinet tamper and power fault monitoring. Eight supervised inputs to be used for Request-to-Exit and door status. Two programmable auxiliary inputs. The inputs shall be shorted if they are not used.
 - b. Alarm Outputs: Six Form-C relay contacts, 5A 30VDC or 125VAC, resistive.
 6. Provide a minimum of #18 AWG wiring for the power supply.
 7. Contact protection circuits shall be used to prevent premature contact failure. Arrangement shall be per the manufacturer's recommendation.
- C. Output Control Module: [See Attachment 28 13 00.09 – LNL-1200 Cut Sheet.](#)
1. Lenel #LNL-1200 Output Control Module (OCM) shall provide high-speed device control via relay operation with operational characteristics as follows:
 - a. a. AC input: 12 VAC+/- 15%, 350mA RMS; DC input: 12VDC+/- 15%, 500mA.
 - b. 3-volt lithium battery back-up, type BR2325.
 - c. Operating temperature range: 0° to 70° C.
 - d. Operating humidity range: 0% to 95%, non-condensing.
 - e. Grade B, A, and AA Line Supervision.

- f. Elevator Control; support for 64 floors.
 - g. Status LED's for heartbeat and host communications.
 - h. UL 294 listed and labeled.
2. The OCM shall have 16 programmable Form-C 5 A, 30 VDC contacts for load switching that can be configured for fail-safe or fail-secure operation. Each relay supports "On," "Off," and "Pulse" Lenel OnGuard software commands.
 3. The OCM shall communicate directly with ICS either by 2-wire or 4-wire RS-485 communication. Provide Belden #9841 or equivalent for RS-485 (2-wire) communication and Belden #9842 or equivalent for RS-485 (4-wire) communication. Each ICM module shall be individually addressed for increased reporting capabilities from software applications.
 4. Provide a minimum of #18 AWG wiring for the power supply.
- D. Fire Door Release:
1. Power distribution to mag locks shall be via an Altronix MOM-5 PDM.
 2. The Altronix MOM-5 shall also serve as the interface to the fire panel and is to be wired according to [Attachment 28 13 00.10 – Fire Panel Interface](#).
- E. Power Supplies:
1. Power Supply shall be Altronix ULX series and shall be rated 12 VDC with required output continuous supply current; 120 VAC input. Power Supply shall be UL listed.
 2. The sum of the total device current requirements shall not exceed 80% of the power supplies continuous current output rating.
 3. Provide enclosure with lock to house open frame transformer, power supply and UPS and UPS batteries.
 4. Batteries shall be rechargeable sealed lead-acid type rated @ 12 VDC.
 5. Provide sufficient batteries to back-up system for:
16 hours at academic and administration buildings.
24 hours at residence buildings.
 6. Provide separate Power Supply at each SER installation for:
 - a. Local control panels and modules.
 - b. Field devices.
- F. Enclosures:
1. System logic boards shall be mounted in a LNL – CTX-6. [See Attachment 28 13 00.11 – LNL-CTX6](#).

2.6 CARDS AND CARD READERS

- A. Cards shall be furnished and programmed by the Owner.
- B. Proximity Card Access Readers: [See Attachment 28 13 00.12 – Allegion aptiQ Cut Sheet](#).
1. Provide Allegion aptiQ Card Access Reader.
 2. All readers shall be configured with the reader electronics mounted separately, on the “secure” side of the door such that only the reader head is mounted in the reader housing on

- the “entry” side of the door.
3. The reader shall communicate with the ISC through the #LNL-1320 DRI and shall interpret the Wiegand communication (Data 1/Data 0 or Clock and Data) from the reader and sends the signal back to the ISC via RS-485 communication.
 4. The reader shall be located no more than 500 feet away from the DRI.

2.7 REQUEST-TO-EXIT DEVICE - PRIMARY

- A. Provide an exit motion sensor which employs passive infrared technology to initiate door release. The device shall have an adjustable detector face to allow for precise pattern configuration and adjustment.
- B. The exit motion sensor shall operate at 12 VDC and shall have a SPDT relay for shunting alarm or access control wiring.
- C. Provide Bosch DS160. [See Attachment 28 13 00.15 – DS160, Request to Exit Detectors.](#)

2.8 REQUEST-TO-EXIT DEVICE - SECONDARY

- A. Provide a hand operated request to exit device. Device type shall be specified by door by the Case security coordinator.
- B. Activating the device shall release a magnetic door lock and send a request to exit signal through a relay output. The release of a magnetic door lock shall be facilitated by breaking 12 VDC power within the security junction box as shown on the Drawings. The relay shall be DPDT, rated 1 amp at 24VDC.
- C. Alarm Controls #PS2-111. [See Attachment 28 13 00.14 – RTE Push Button Alarm Controls.](#)

2.9 MAGNETIC DOOR LOCK

- A. Provide 12 VDC electromagnetic door locks with 1600 lbs. of holding force.
- B. Locks shall not exceed 0.67 amps of current draw with residual magnetism within one second of 4 LBF, and inductive kick-back not to exceed 53 volts peak.
- C. Where required, locks shall include filler plates, angle brackets or glass door brackets as required for door and frame assembly as recommended by manufacturer. Coordinate installation with General Contractor and Architect.
- D. Provide Locknetics #390 Series. [See Attachment 28 13 00.16 – Locknetics 390 Mag Lock.](#)

2.10 DOOR MONITOR SWITCH

- A. Provide ¾ inch diameter recessed door switch set for door monitoring.
- B. Door switch shall be of solid construction with 12 inch #22 AWG leads.
- C. Color shall be white or mahogany as selected by the Architect or Owner. Coordinate installation with General Contractor and Architect.

- D. Provide Sentrol 1078. [See Attachment 28 13 00.17 – Recessed Door Contacts.](#)

2.11 PIEZO SOUNDER

- A. Provide electronic piezo sounder at doors as indicated on Drawings.
- B. Sounder shall be 3 to 28 VDC and provide sound power output of 93dBA at 1 meter.
- C. Sounder shall be installed within a flush two-gang outlet box along with key switch to silence sounder. Provide #304 stainless steel coverplate and mount each device in ½ inch diameter knockout.
- D. Provide AMSCO #PAL-328N with Black Finish. [See Attachment 28 13 00.18 – PAL-328 Piezo Sounder.](#)

2.12 SILENCE KEY SWITCH

- A. Provide key switch to silence piezo sounder. [See Attachment 28 13 00.19 – Piezo and Key Switch Wiring.](#)
- B. Switch shall be keyed for A126 key. Coordinate exact key requirements with Case security coordinator.
- C. Switch shall be installed within a flush two-gang outlet box along with sounder; see requirements above.
- D. Provide C & K #Y-141-7U-2C2-WCNQ. [See Attachment 28 13 00.20 – Key Switch.](#)

2.13 PANIC BUTTON

- A. Provide panic button complete with keyed reset feature where indicated on the plans.
- B. Switch shall be installed within a flush one-gang outlet box. Switch shall be provided with a stainless steel backplate.
- C. Switch shall be provided with blue operator and “EMERGENCY” lettering.
- D. Provide STI #SS2400E. [See Attachment 28 13 00.21 – Panic Buttons.](#)

2.14 ELECTRICAL MATERIALS

- A. Conduits and boxes shall be concealed and flush mounted. Interconnecting conduit and necessary pullboxes shall be run throughout the building in accordance with the NEC.
- B. Conduits shall be 3/4" trade size, minimum, unless otherwise noted on the Drawings or within these Specifications. Where sizes are not shown, conduits shall be as required to accommodate the number and type of conductors in accordance with the National Electrical Code wiring tables, but shall not be smaller than 3/4".
- C. Panel Backboards:
 - 1. Where indicated on the Drawings, mount equipment within the SER Room on a panel

backboard. Backboards shall be 4 feet wide x 8 feet high x 3/4 inches thick AC plywood, painted with two (2) coats of fire retardant gray paint on both sides prior to installation.

2. Backboard shall be mounted six inches above the finished floor with outlet boxes mounted at 18 inches above finished floor.

2.15 WIRE AND CABLE

- A. Control wire for security device interconnections shall be multi-conductor cables, shielded stranded copper type with PVC jacket, UL type CMR. Provide West Penn or equal by Belden with sizes and color-coding as indicated below.
 1. To Card Reader: 8-conductor #22 AWG w/shield
 2. To Door Junction Box for field devices: 12-conductor #22 AWG
 3. To Magnetic Lock: 4-conductor #18 AWG
See Attachment 28 13 00.22 – Wiring Color Codes.
 4. Between Fire Alarm Panel and ACS Panel: 4-conductor #18 AWG
Red/Black – Alarm Indication
Green/White – Trouble Indication

PART 3 - EXECUTION

3.1 ELECTRICAL MATERIALS AND METHODS

- A. Wire and Cable:
 1. Leave 8 inches free wire at all outlet boxes for wiring device connection.
 2. Contractor shall provide ten (10) feet of extra ACS control cable at the ACS panel within the SER.
 3. ACS control cable shall not be run with other system wiring in a common raceway. ACS control cable shall be continuous from the field devices to the panel without splices except within the door security junction box indicated on the Drawings.
 4. Tag each end of all control and communication wiring with "Brady Tags" or equal.
- B. Power and Grounding:
 1. Provide a dedicated 120 volt, 20 amp circuits for the system as shown on the Drawings.
 2. Connect all network system power supplies and equipment cabinets to the Technology system ground bus (located in the SER) utilizing a #12 AWG solid grounding conductor.

3.2 TRAINING AND INSTRUCTION

- A. Provide three (3) complete printed operational manuals in a format as provided by the equipment manufacturer. Instructions shall be simplified to permit operation of the system by non-technical personnel.

3.3 MOUNTING HEIGHTS

- A. The equipment height shall be as noted on the Drawings. Care must be taken to ensure that mounting heights set forth by the Americans with Disability Act (ADA) for said items are met.

3.4 COMMISSIONING

- A. After all Work is completed, and prior to requesting the commissioning report specified in 1.5 D, here after known as the Acceptance Test, Contractor shall conduct a final inspection, and pre-test all equipment and system features required for project. Contractor shall correct any deficiencies discovered as the result of the inspection and pre-test.
- B. Contractor shall submit a request for the Acceptance Test in writing to the Owner's Project Manager, no less than fourteen days prior to the requested test date. The request for Acceptance Test shall be accompanied by a certification from Contractor that all work is complete and has been pre-tested, and that all corrections have been made.
- C. During Acceptance Test, Contractor shall demonstrate all equipment and system features to the security systems coordinator. Contractor shall remove covers, open wiring connections, operate equipment, and perform other reasonable work as requested by the coordinator.
- D. Any portions of the work found to be deficient or not in compliance with the Drawings and Specifications will be rejected. The security systems coordinator will prepare a list of any such deficiencies observed during the Acceptance Test. Contractor shall promptly correct all deficiencies. Upon correction of deficiencies, Contractor shall submit a request in writing to Owner's Project Manager for another Acceptance Test.

3.5 WARRANTY

- A. The Contractor shall guarantee this system in its entirety to be free from mechanical and electrical defects for a period of one (1) year from the date of the completed and owner approved acceptance test.
- B. The Equipment Supplier shall make available to the Owner a maintenance contract proposal.
- C. The Contractor's guarantee shall cover all costs associated with the troubleshooting, repair, and replacement of defective work, including costs of labor, transportation, lodging, materials, and equipment.
- D. The Guarantee shall not cover any damage to material or equipment caused by accident, misuse, or unauthorized modification or repair by the Owner.

3.6 SERVICE CONTRACT PROPOSAL

- A. The bidder shall include an optional service contract proposal at the time of bid. The proposal shall include:
 - 1. Respond to emergency service requests on-site, if required.
 - 2. Replace or repair defective components as required.
 - 3. Manufacturer's recommended preventive maintenance.
 - 4. Second year and five year maintenance contract with the price shown for each year and all payment terms and conditions.
 - 5. The service contract shall be optional and the Owner shall have the right to accept or reject the contract, and accept only the warranty service as described above, at no additional cost.

END OF SECTION



CASE

CASE WESTERN RESERVE UNIVERSITY

Drawing Name:

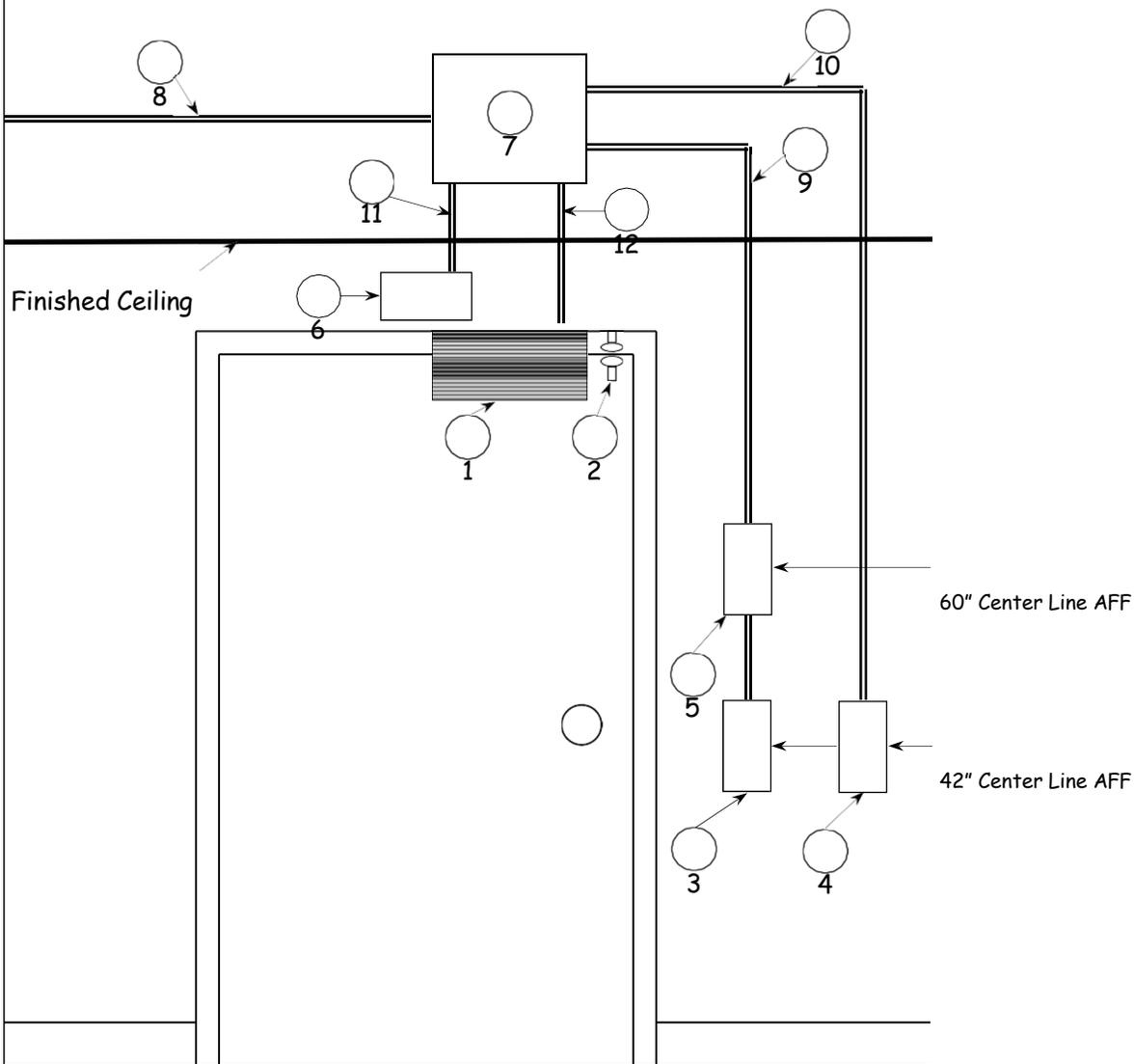
Typical Access Control Single Door Detail

Drawn

CFV

Date:

5/18/04



- 1 Magnetic Lock
- 2 Door Position Contacts
- 3 Single Gang Box — For RQE Push Button (Secure Side Of Door)
- 4 Single Gang Box — For Card Reader (Public Side Of Door)
- 5 Single Gang Box — For Piezo & Key Switch (Secure Side Of Door)
- 6 Horizontal Single Gang Box — For RQE Motion Sensor (Secure Side Of Door)
- 7 8" X 8" X 4" Security Junction Box
- 8 1" Conduit To SER Room Filled With 1 ea — 12/C #22, 4/C #18. And 8/C #22 Shielded Pulled Through To Item 4.
- 9 3/4" Conduit Filled With 2/C #22 To Item 5 And 4/C #22 To Item 3
- 10 3/4" Conduit Filled With 8/C #22 Pulled Through Item 7.
- 11 1/2" Conduit Filled With 4/C #22.
- 12 3/4" Conduit Stubbed Into Top Of Door Frame Filled With 1 ea. 2/C #18 and 2/C #22.



CASE

CASE WESTERN RESERVE UNIVERSITY

Drawing Name:

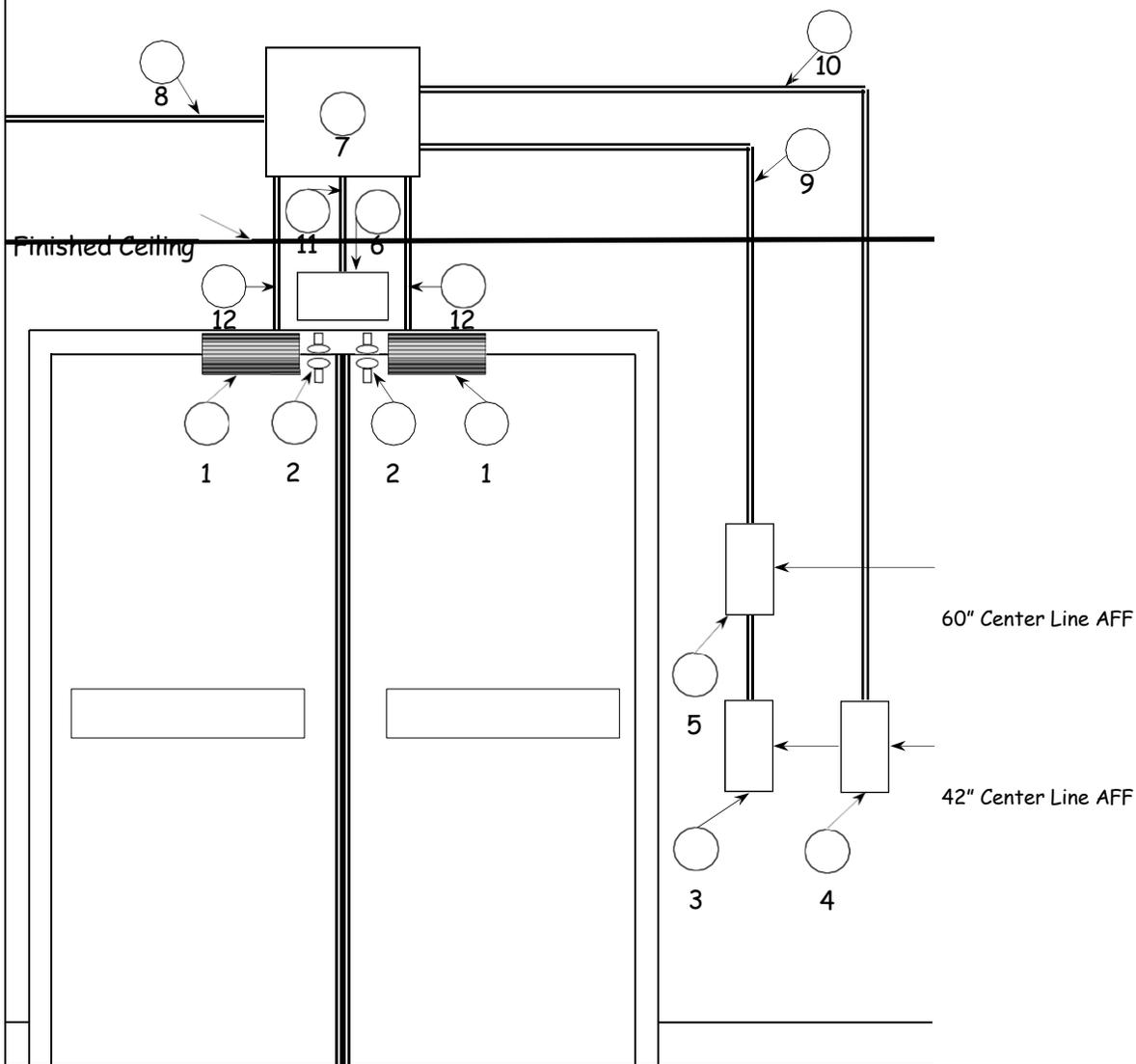
Typical Access Control Double Door Detail

Drawn By:

CFV

Date:

5/18/04



- 1 Magnetic Locks
- 2 Door Position Contacts
- 3 Single Gang Box — For RQE Push Button (Secure Side Of Door)
- 4 Single Gang Box — For Card Reader (Public Side Of Door)
- 5 Single Gang Box — For Piezo & Key Switch (Secure Side Of Door)
- 6 Horizontal Single Gang Box — For RQE Motion Sensor (Secure Side Of Door)
- 7 8" X 8" X 4" Security Junction Box
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- 10 3/4" Conduit Filled With 8/C #22 Pulled Through Item 7.
- 11 1/2" Conduit Filled With 4/C #22.
- 12 3/4" Conduit Stubbed Into Top Of Door Frame Filled With 1 ea. 2/C #18 and 2/C #22.



CASE

CASE WESTERN RESERVE UNIVERSITY

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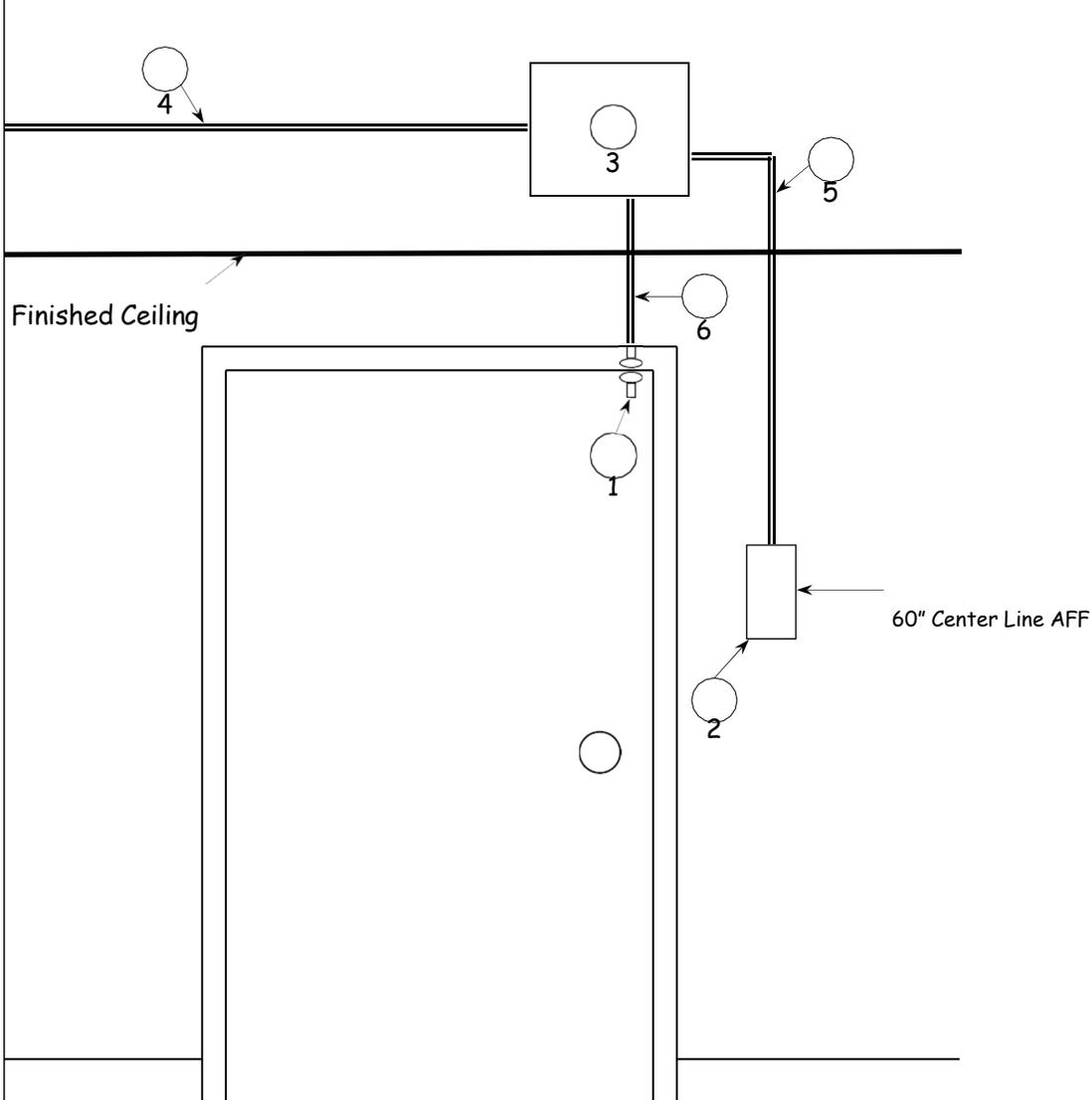
Typical Monitored Door Detail

Drawn

CFV

Date:

5/18/04



- 1 Door Position Contacts
- 2 Single Gang Box — For Piezo & Key Switch (Secure Side Of Door)
- 3 4" X 4" X 4" Security Junction Box
- 4 3/4" Conduit To SER Room Filled With — 12/C #22.
- 5 1/2" Conduit Filled With 2/C #22.
- 6 1/2" Conduit Filled With 2/C #22.



CASE

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Drawing Name:

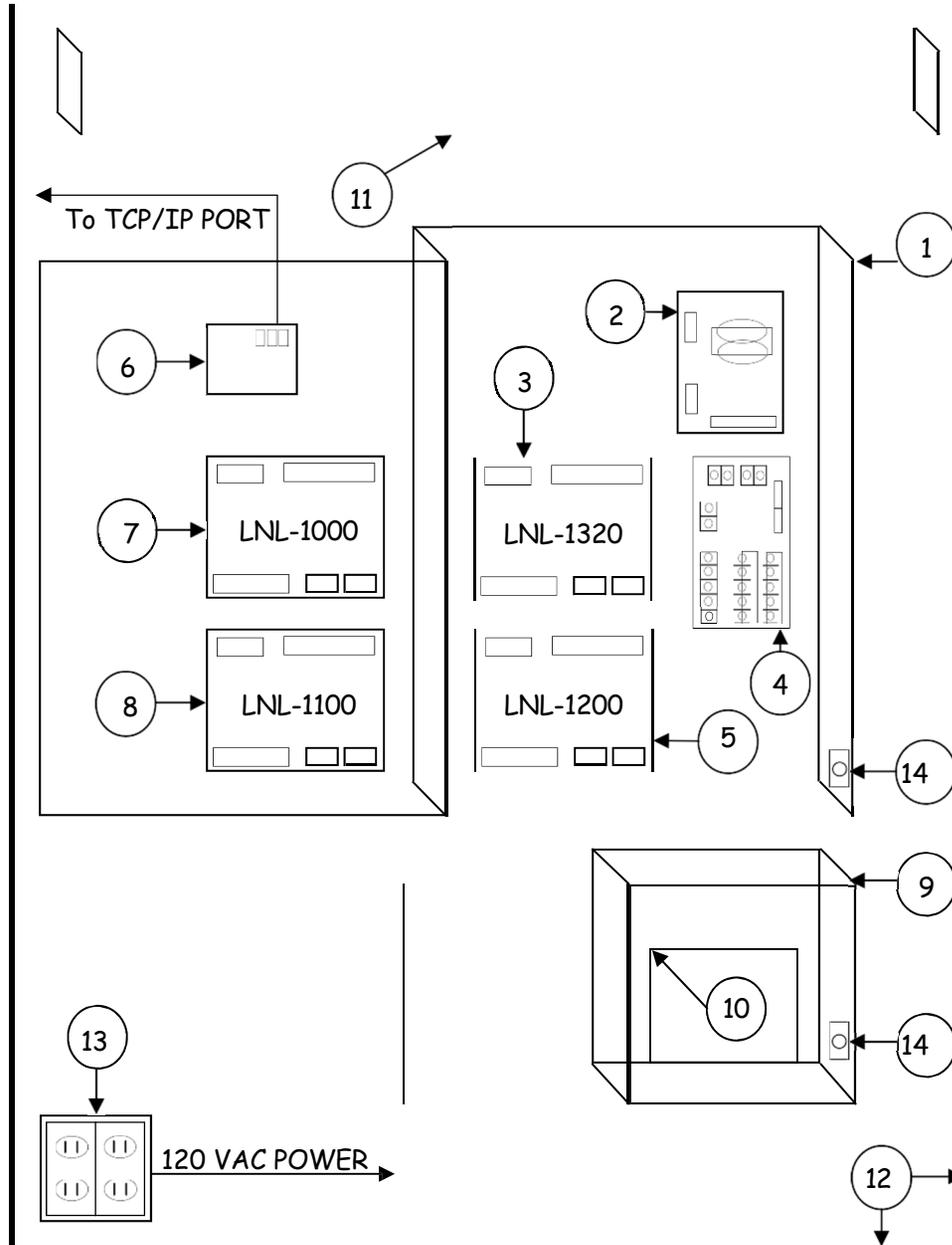
Typical Access Control System Panel Detail

Drawn By:

CFV

Date:

5/18/04



- 1 Lenel LNL-CTX6 Enclosure
- 2 Altronix ULX Series Power Supply
- 3 Lenel LNL-1320 Dual Reader Interface
- 4 Altronix MOM-5 Power Dist. & Fire Door Release
- 5 Lenel LNL-1200 16 Output Control Module
- 6 Lantronix MSS-100 Ethlan Interface
- 7 Lenel LNL-1000 Intelligent System Controller
- 8 Lenel LNL-1100 16 Input Control Module
- 9 Mier BW-310 Battery Enclosure
- 10 Backup Battery
- 11 4 X 4 Panduit Wire Management Duct
- 12 4' X 8' Fire Rated Plywood Backboard
- 13 Double Duplex Receptacle
- 14 Cabinet Tamper Switch

Access Control System Installation Standards

A. Raceways

1. Securely mount to permanent structure per NEC requirements. Conditions will determine type of raceway to be used (i.e., EMT, rigid, watertight, wiremold).
2. Securely fasten all connectors.

B. Wiring

1. Use the standard cable types for all projects. Substituting a different cable must be approved by CASE prior to use.
2. Use proper gauge wire for each application. Consider power requirements and distance. Wire should be sized for 80% of its capacity.
3. No exposed wiring within 4 feet of the floor surface.
4. Consider electrical interference when routing cable. No cabling is to be run within 12 inches of high voltage wiring. No cabling is to be run parallel to high voltage wiring.
5. Non conduit wiring must be properly secured to structure per NEC guidelines. Never lay cables across the top of the ceiling.
6. Maintain fire wall and floor penetration ratings using proper sealant per NEC requirements.
7. Cables shall be run between devices without splices. If a splice is required, each wire is to be soldered and the splice will be covered with heat shrink tubing.
8. There shall be no taped splices.
9. All splices are to be done in a junction box or appropriate enclosure. The use of terminal blocks is required in larger enclosures.
10. All wires shall be labeled at both ends and at all splice points using permanent, machine generated tags.
11. Spade connectors shall be used on all wires being placed under a screw terminal that is not rated for stranded wire.

C. End of Line Supervision

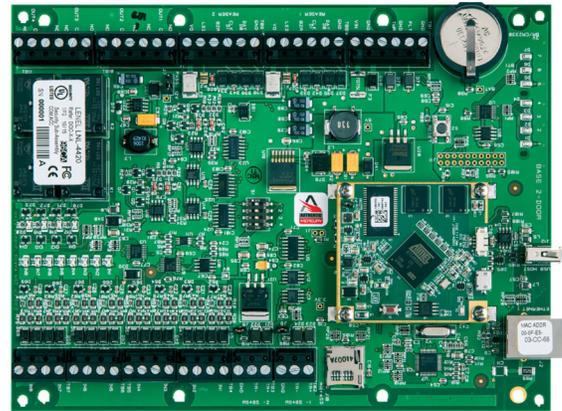
When line supervision is required, devices must be installed at the "*End of The Line*". 1K ohm +/- 1% resistors shall be used.

D. General

1. All areas must be cleaned at the end of each day.
2. At a minimum, work areas are to be left broom clean.
3. Secure all materials and equipment at the end of each day. CASE shall not be responsible for lost or stolen items.
4. Understand and comply with job site safety requirements. Safety shoes, hard hats, eye and ear protection shall be worn as required.

LNL-4420

Advanced Dual Reader Controller



Overview

The LNL-4420 is an Advanced Dual Reader Controller by Lenel that provides a single-board solution for interfacing up to 64 doors, plus auxiliary inputs and outputs, to an OnGuard® system.

The LNL-4420 controller enables Ethernet connection directly from an entry location to the OnGuard server. The controller is scalable for most access control applications. In addition, other I/O and reader interface modules can be added on the controller's two downstream ports, further expanding its capabilities. In the event of communication loss, the LNL-4420 controller can maintain most of its local functionality until the server connection is restored.

The LNL-4420 controller can act as an interface to building automation systems via the ASHRAE BACnet™ protocol. Through the OnGuard software, up to 63 total BACnet points can be defined. These can be a mix of physical inputs connected to the board and virtual outputs. Virtual outputs can be set and read from a connected BACnet client, allowing two-way state exchange with a variety of building control systems. This information can be used by both OnGuard and the external system for status reporting, and as inputs to control logic.

Utilizing its 32-bit processor and a multiple-application operating system, the LNL-4420 controller can communicate upstream to the host computer through its Ethernet port. The LNL-4420 controller can store up to 500,000 cardholders in non-volatile flash memory, and supports selective download for larger cardholder databases. The two downstream RS-485 two-wire ports can be used to connect up to 64 devices (64 doors) in many combinations of LNL-1100, LNL-1200, LNL-1300, LNL-1320, LNL-500B, LNL-500W, Schlage PIM-400 wireless interface, or Assa Abloy Apero® wireless devices.

Each LNL-4420 controller supports up to eight different card formats. The LNL-4420 controller also includes eight inputs — four designated for door interface support and four for general-purpose inputs.

Features & Functionality

Controller Functionality

- BACnet protocol support via up to 63 total inputs and virtual outputs
- Support for DHCP and fixed IP addressing
- DNS device naming through DHCP extended commands
- 16 MB of available on-board, non-volatile flash memory for badge data, plus dedicated storage for future apps and extensions
- Battery-backed, non-volatile storage of 50,000 events
- Firmware stored in flash memory, background download of firmware updates supported
- Support for up to 16 different formats (8 card formats and 8 asset formats)
- Biometric template storage support for Bioscrypt® and ANSI/INCITS 378 templates
- Advanced anti-passback capabilities
- Up to 32,000 access level permissions
- Elevator control support for up to 128 floors
- Individual extended held open and strike times (ADA required)
- A dedicated input for cabinet tamper and power failure status
- Advanced Encryption Standard (AES) 128-bit algorithm for communications

Reader Interface Functionality

- Support for Data1/Data0, Clock/Data, Unsupervised F2F and OSDP-compatible RS-485 readers and keypads, including OSDP Secure Channel (SC) encrypted communications

Extended Functionality

- Optional onboard HID® FIPS-201 Embedded Authentication

LNL-4420

Specifications

Power Supply

Primary Power	12 or 24 VDC \pm 10%. 500 mA maximum (reader current not included)
Memory and Clock Backup Battery	3 V lithium, type BR2325, BR2330, CR2330

Communication Ports

Host Communications	Ethernet Port, 10/100Base-TX
SIO Downstream Ports	Two each, 2-wire RS-485, 9600 to 38.4 Kbps async

Inputs

Tamper and Power Fail Monitors	Unsupervised, dedicated
Door position, REX	4, each programmable as normally open or normally closed, supervised or unsupervised circuits
AUX	4, each programmable as normally open or normally closed, supervised or unsupervised circuits

Outputs

Relay Outputs	Four Form-C 5A@30 VDC, resistive, relay outputs: two for strike, two for auxiliary outputs
---------------	--

Reader Interface

Reader Power (Jumper Selectable)	DC output: 12 VDC, +/- 10% regulated, current limited to 150mA for each reader
	12 to 24 VDC, +/- 10% (input voltage pass through) current limited to 150 mA for each reader
Data Inputs	TTL: Wiegand Data1/Data0, Magnetic Clock/Data, Unsupervised F2F single-wire protocol (Note: Supervised F2F supported on connected door controllers but not for the two onboard ports)
	RS-485: 9600 baud, Bioscrypt RS-485 or OSDP (Open Supervised Device Protocol); OSDP Secure Channel, Transparent Mode and biometric templates supported
Building Automation Interface	Supports ASHRAE BACnet™ protocol

Environmental

Operating Temperature	32° to 158° F (0° to +70° C)
Storage Temperature	-67° to +185° F (-55° to +85° C)
Humidity	0 to 95% Relative Humidity, Non-Condensing (RHNC)

Mechanical

Dimensions	6.0" x 8.0" x 1.0" (152mm x 203mm x 25mm)
Weight	10.65 oz. (302g) nominal

Ordering Information

Part No.	Description
LNL-4420	Advanced Dual Reader Controller



lenel.com/access-hardware

(866) 788-5095

Specifications subject to change without notice.

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2016/10 (LI-2020)



LNL-1100



Lenel Input Control Module

Overview

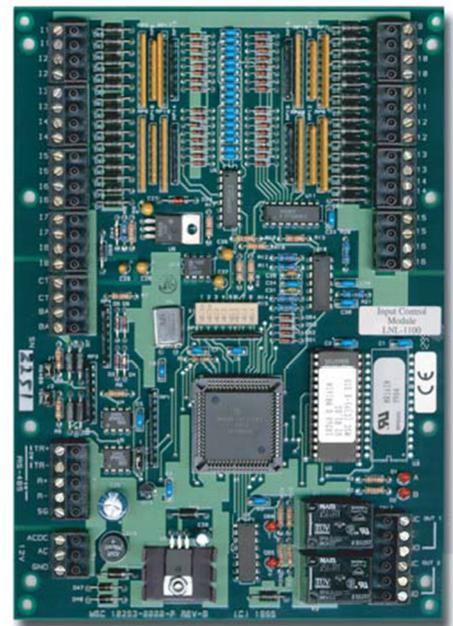
The Lenel Input Control Module (ICM) provides the access control system with high-speed acknowledgement of critical alarm points in monitored areas. The ICM communicates directly with the Intelligent System Controller (ISC) either by 2-wire or 4-wire RS-485 communication. The ICM has 16 configurable input control points and 2 output control relays. It supports normally open, normally closed, supervised and non-supervised circuits.

The input circuits are scanned using an analog to digital converter. The digitized input status signal is software monitored and controlled, so that each input point can be programmed as a supervised or non-supervised alarm point.

The output relays can also be configured for fail-safe or fail-secure operation. Each relay supports "On," "Off," and "Pulse" Lenel OnGuard software commands.

Features and Functionality

- Grade B, A, and AA Line Supervision
- 12 VAC or 12 VDC input power
- 16 programmable supervised or non-supervised contacts
- Two Form-C 5 A, 30 VDC contacts for load switching
- Two dedicated inputs for tamper and power failure status
- Onboard termination jumpers
- DIP switch selectable addressing
- Elevator control, support for 64 floors
- Status LED for host communication and heartbeat
- Variable Resistor Values for Line Supervision
- Downloadable Firmware
- UL 294 listed and CE approved
-



Mechanical and Architectural Characteristics and Wiring

Requirements

The acceptable power supply is either 12 VDC or 12 VAC. Locate the power source as close as possible to the LNL-1100. Use a minimum of 18 AWG (one twisted pair) wiring for the power supply.

Communications

Communication with the Intelligent System Controller is via a 2-wire or 4-wire RS-485 interface. The interface allows multi-drop communication on a single ISC port, up to 4000 feet per port. Use twisted pair(s) with a minimum of 24 AWG and a shield for communication. The 2-wire or 4-wire communications with end-of-line termination are jumper-selectable.

Recommended cabling for RS-485 (2-wire) communication is Belden 9841 or equivalent.

Recommended cabling for RS-485 (4-wire) communication is Belden 9842 or equivalent.

Recommended plenum cabling for RS-485 communication is Belden 88102 or equivalent.

Sixteen software configurable alarm inputs can be used for alarm device monitoring. Each of these inputs can, via the Lenel OnGuard Access Control software, be configured as either N/O (normally open) or N/C (normally closed) in combination with either supervised or non-supervised wiring.

For supervised inputs, end-of-line (EOL) resistors are included with each LNL-1100 (1000 ohm, 1% tolerance).

Alarm Inputs

Two non-supervised inputs are for cabinet tamper and power fault monitoring. Normally, the contacts are closed. The inputs must be shorted if they are not used.

Alarm Outputs

Two Form-C relay contacts, 5 A 30 VDC or 125 VAC, resistive.

Options

Power Supplies and Enclosures

LNL-AL400ULX Lenel UL Listed 4 A, 110 VAC Power Supply - 12 VDC or 24 VDC 4 A output (switch selectable), 120 VAC input, continuous supply current with enclosure (12 x 16 x 4.5 in.), lock and open frame transformer, tamper switch, UPS capable (Battery Optional) (UL Approved)

LNL-AL600ULX-4CB6 Lenel UL Listed Power Supply - 12 VDC or 24 VDC 6 A output (switch selectable), 120 VAC (1.6 amps) input, continuous supply current with enclosure (18 x 24 x 4.5 in.), lock and open frame transformer, tamper switch, UPS capable (Battery Optional), UL Approved

ABT-12 Battery Kit - 12 VDC, 12 AH battery (PS-12120)

Specifications

* The ICM is for use in low voltage, power limited, class 2 circuit only.

Primary Power (DC or AC):

DC input: 12 VDC \pm 15%. 350 mA
AC input: 12 VAC \pm 15%. 350 mA RMS

Environmental:

Temperature: Operating: 0° to +70° C (32° to 158° F)
Storage: -55° to +85° C (-67° to 185° F)

Humidity: 0 to 95% RHNC

Mechanical:

Dimension: 6 x 8 x 1 in. (152 x 203 x 25 mm)

Weight: 10 oz. (290 g) nominal

Approvals:

UL 294 and UL 1076 Listed

LENEL®

Always OnGuard™

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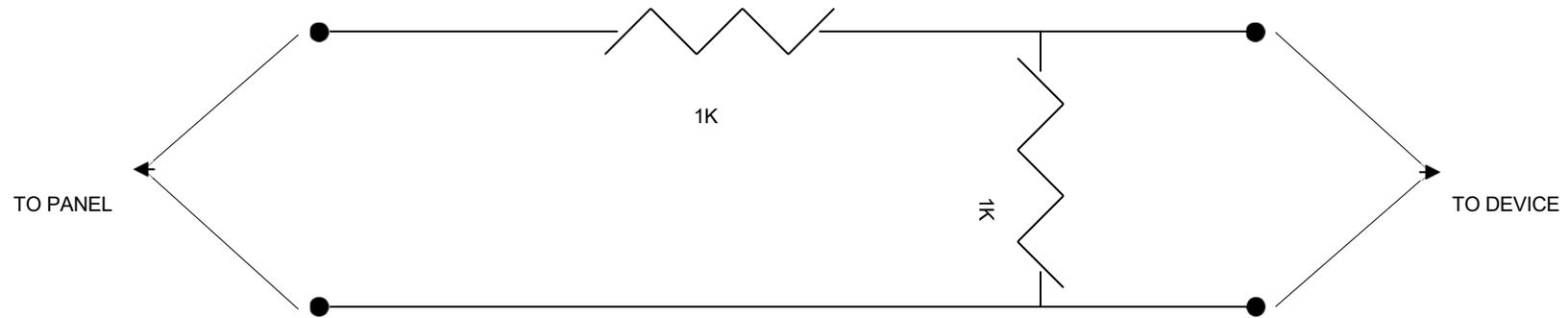
Level E.O.L. Resistors

Drawn

CFV

Date:

4/27/04



LNL-1320

Lenel Dual Reader Interface Module

Overview

Lenel Systems International offers a Dual Reader Interface (DRI) module for business access control solutions. Most access control card readers, keypads, or readers with keypads that use standard Wiegand Data1/Data0 or Clock/Data communications are supported. Lock, unlock, and facility code offline access modes are supported on all readers connected to the DRI. Each DRI supports up to eight different card formats as well as issue codes for both magnetic and Wiegand card formats.

The DRI provides a vital link between the Intelligent System Controller (ISC) and the card reader attached to the interface. As many as 32 DRI modules can be multi-dropped using RS-485 2-wire or 4-wire communication up to 4000 feet per port away from the ISC. Each DRI module is individually addressed for increased reporting capabilities with Lenel OnGuard Access Control software applications. The DRI includes eight inputs that support normally open, normally closed, supervised, and non-supervised circuits. In addition, six output relays support fail-safe or fail-secure operation.

Features and Functionality

- 12 VAC or 12 VDC power supply
- Reader communications (Clock/Data or Wiegand Data1/Data0) - more than 150 different readers approved for use
- Downloadable firmware
- Six Form-C 5 A at 30 VDC relay outputs
- Up to 16 different formats (8 card and 8 asset)
- Issue code support for Magnetic and Wiegand formats
- Door contact supervision (Open/Closed)
- REX push-button monitor
- Strike Control output
- Bi-color status LED support and 2-wire LED support
- Beeper control
- Dedicated tamper and power failure circuits
- Support for offline reader access mode
- Onboard jumpers for termination
- Onboard jumpers for 5 VDC or 12 VDC reader support
- DIP switch selectable addressing
- UL 294 listed and CE approved



Lenel Systems International, Inc.

Total Security Knowledge Management Solutions.

Mechanical and Architectural Characteristics and Wiring

Requirements

The hardware is configured using several jumpers and a set of eight DIP switches. The acceptable power supply is either 12 VDC or 12 VAC. Locate the power source as close as possible to the LNL-1320. Use a minimum of 18 AWG (one twisted pair) wiring for the power supply.

Communications

Communication to the Intelligent System Controller is via a 2-wire or 4-wire RS-485 interface. The interface allows multi-drop communication on a single ISC port up to 4000 feet each. Use twisted pair(s) with a minimum of 24 AWG and a shield for the communications. The 2-wire or 4-wire communications with end-of-line termination are jumper-selectable.

Recommended cabling for RS-485 (2-wire) communications is Belden 9841 or equivalent.

Recommended cabling for RS-485 (4-wire) communications is Belden 9842 or equivalent.

Recommended plenum cabling for RS-485 communications is Belden 88102 or equivalent.

Alarm Inputs

Eight supervised inputs are normally used for REX (Request to EXit), door status, and two programmable auxiliary inputs. Two non-supervised inputs are for cabinet tamper and power failure monitoring. Normally, the door contact is closed and REX is open. The inputs must be shorted if they are not used.

Alarm Outputs

Six Form-C relay contacts, one 5 A at 30 VDC, resistive, normally used for door contacts or four auxiliary output relays.

Note

To minimize premature failure of the contact and to increase system reliability, contact protection circuits **MUST BE USED**. The protection circuits must be located as close to the load as possible (within 12 inches, or 30 cm), as circuit effectiveness decreases at greater distances.

Options

Power Supplies and Enclosures

LNL-AL400ULX	Lenel UL Listed 4 A, 110 VAC Power Supply - 12 VDC or 24 VDC 4 A output (switch selectable), 120 VAC input, continuous supply current with enclosure (12 x 16 x 4.5 in.), lock and open frame transformer, tamper switch, UPS capable (Battery Optional) (UL Approved)
LNL-AL600ULX-4CB6	Lenel UL Listed Power Supply - 12 VDC or 24 VDC 6 A output (switch selectable), 120 VAC (1.6 amps) input, continuous supply current with enclosure (18 x 24 x 4.5 in.), lock and open frame transformer, tamper switch, UPS capable (Battery Optional), UL Approved
ABT-12	Battery Kit - 12 VDC, 12 AH battery (PS-12120)

Specifications

* The DRI is for use in low voltage, power limited, class 2 circuit only.

Primary Power (DC or AC):

DC input:	12 VDC \pm 15%. 450 mA
AC input:	12 VAC \pm 15% 600 mA RMS
Reader Output Voltage:	5 VDC or 12 VDC

Environmental:

Temperature:	Operating: 0° to +70° C (32° to 158° F) Storage: -55° to +85° C (-67° to 185° F)
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Humidity:	0 to 95% RHNC
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Mechanical:

Dimension:	6 x 8 x 1 in. (152 x 203 x 25 mm)
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Weight:	10 oz. (290 g) nominal
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Approvals:

UL 294 & UL 1076 Listed



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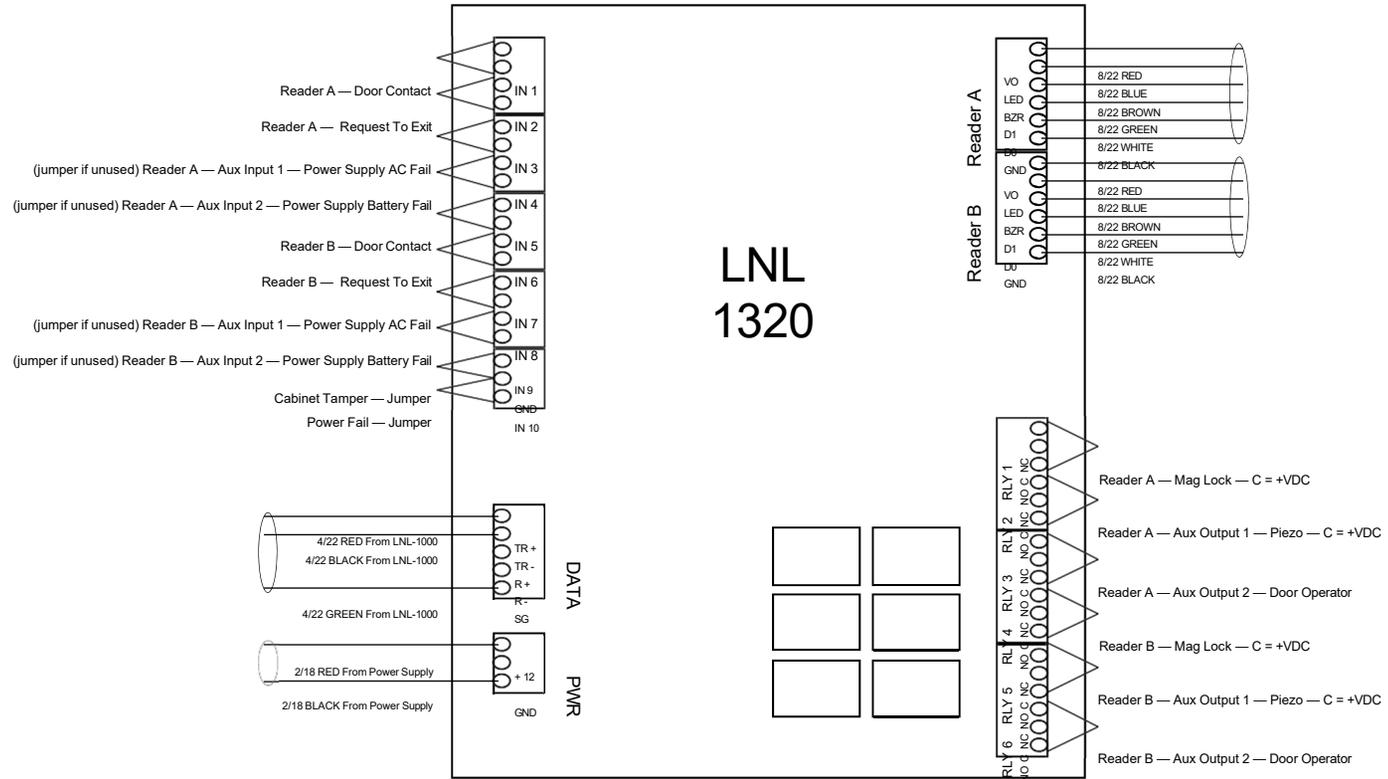
Lenel 1320 Dual Reader Interface
Standard Wiring

Drawn By:

CFV

Date:

4/15/04





LNL-1200



Lenel Output Control Module

Overview

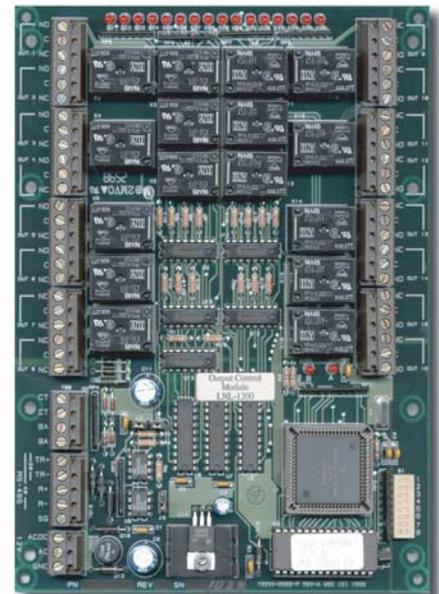
The Lenel Output Control Module (OCM) communicates directly with the Intelligent System Controller (ISC) either by 2-wire RS-485 or 4-wire RS-485 communication. Each OCM is an individually addressed device, and counts as a single device on all Intelligent System Controllers.

The OCM, like other Lenel hardware products, can be operated by either 12 VAC or 12 VDC power. Each OCM includes dedicated tamper and power failure input contacts.

The OCM has 16 programmable output relays that can be configured for fail-safe or fail-secure operation. Each relay supports "On," "Off," and "Pulse" Lenel OnGuard software commands.

Features and Functionality

- 16 Form-C 5 A, 30 VDC contacts for load switching
- 12 VAC or 12 VDC input power
- Two dedicated digital inputs for tamper and power failure status
- RS-485 communications, multi-dropped (2-wire or 4-wire RS-485)
- Up to 16 OCMs per Intelligent System Controller
- Onboard termination jumpers
- DIP switch selectable addressing
- Status LEDs for communication to the host, heartbeat and relay status
- Elevator control, support for 64 floors
- UL 294 listed and CE approved



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Total Security Knowledge Management Solutions.

Mechanical and Architectural Characteristics and Wiring

Requirements

The acceptable power supply is either 12 VDC or 12 VAC. Locate the power source as close as possible to the LNL-1200. Use a minimum of 18 AWG (one twisted pair) wiring for the power supply.

Communications

Communication with the Intelligent System Controller is via a 2-wire or 4-wire RS-485 interface. The interface allows multi-drop communication on a single ISC port, up to 4000 feet per port. Use twisted pair(s) with a minimum of 24 AWG and a shield for communication. The 2-wire or 4-wire communications with end-of-line termination are jumper-selectable.

Recommended cabling for RS-485 (2-wire) communication is Belden 9841 or equivalent.
Recommended cabling for RS-485 (4-wire) communication is Belden 9842 or equivalent.
Recommended plenum cabling for RS-485 communication is Belden 88102 or equivalent.

Alarm Inputs

Two non-supervised inputs are for cabinet tamper and power fault monitoring. Normally, the contacts are closed. The inputs must be shorted if they are not used.

Alarm Outputs

Two Form-C relay contacts, 5 A 30 VDC or 125 VAC, resistive.

Note

To minimize premature failure of the contact and to increase system reliability, contact protection circuits **MUST BE USED**. The protection circuits must be located as close to the load as possible (within 12 inches, or 30 cm), as circuit effectiveness decreases at greater distances.

Options

Power Supplies and Enclosures

LNL-AL400ULX	Lenel UL Listed 4 A, 110 VAC Power Supply - 12 VDC or 24 VDC 4 A output (switch selectable), 120 VAC input, continuous supply current with enclosure (12 x 16 x 4.5 in.), lock and open frame transformer, tamper switch, UPS capable (Battery Optional) (UL Approved)
LNL-AL600ULX-4CB6	Lenel UL Listed Power Supply - 12 VDC or 24 VDC 6 A output (switch selectable), 120 VAC (1.6 amps) input, continuous supply current with enclosure (18 x 24 x 4.5 in.), lock and open frame transformer, tamper switch, UPS capable (Battery Optional), UL Approved
ABT-12	Battery Kit - 12 VDC, 12 AH battery (PS-12120)

Specifications

* The OCM is for use in low voltage, power limited, class 2 circuit only.

Primary Power (DC or AC):

DC input: 12 VDC \pm 15%. 500 mA
AC input: 12 VAC \pm 15%. 600 mA RMS

Environmental:

Temperature: Operating: 0° to +70° C (32° to 158° F)
Storage: -55° to +85° C (-67° to 185° F)

Humidity: 0 to 95% RHNC

Mechanical:

Dimension: 6 x 8 x 1 in. (152 x 203 x 25 mm)

Weight: 16 oz. (454 g) nominal

Approvals:

UL 294 & UL 1076 Listed

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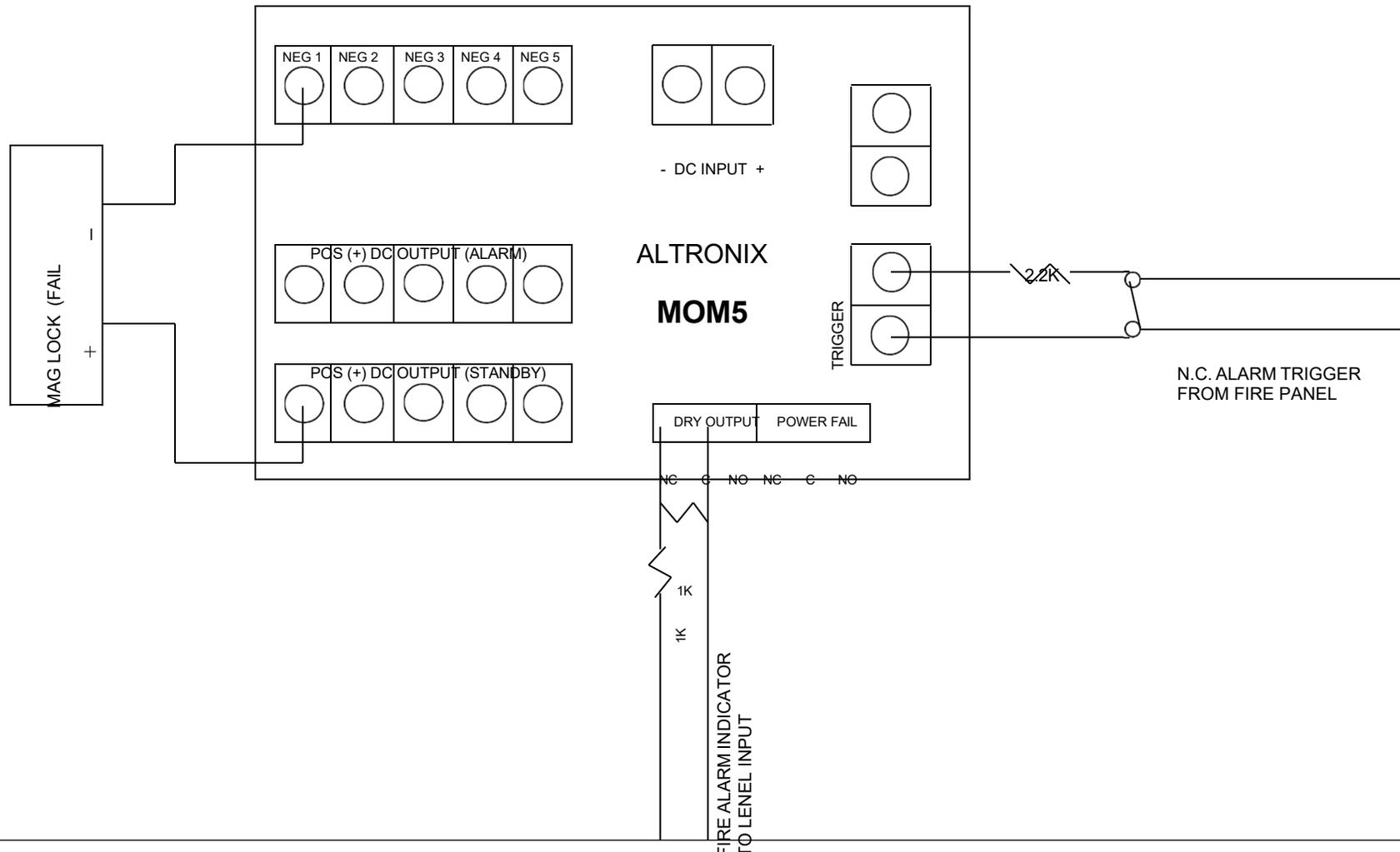
Lenel system interface to fire alarm panel with N.C. dry trigger contacts

Drawn By:

CFV

Date:

4/7/04





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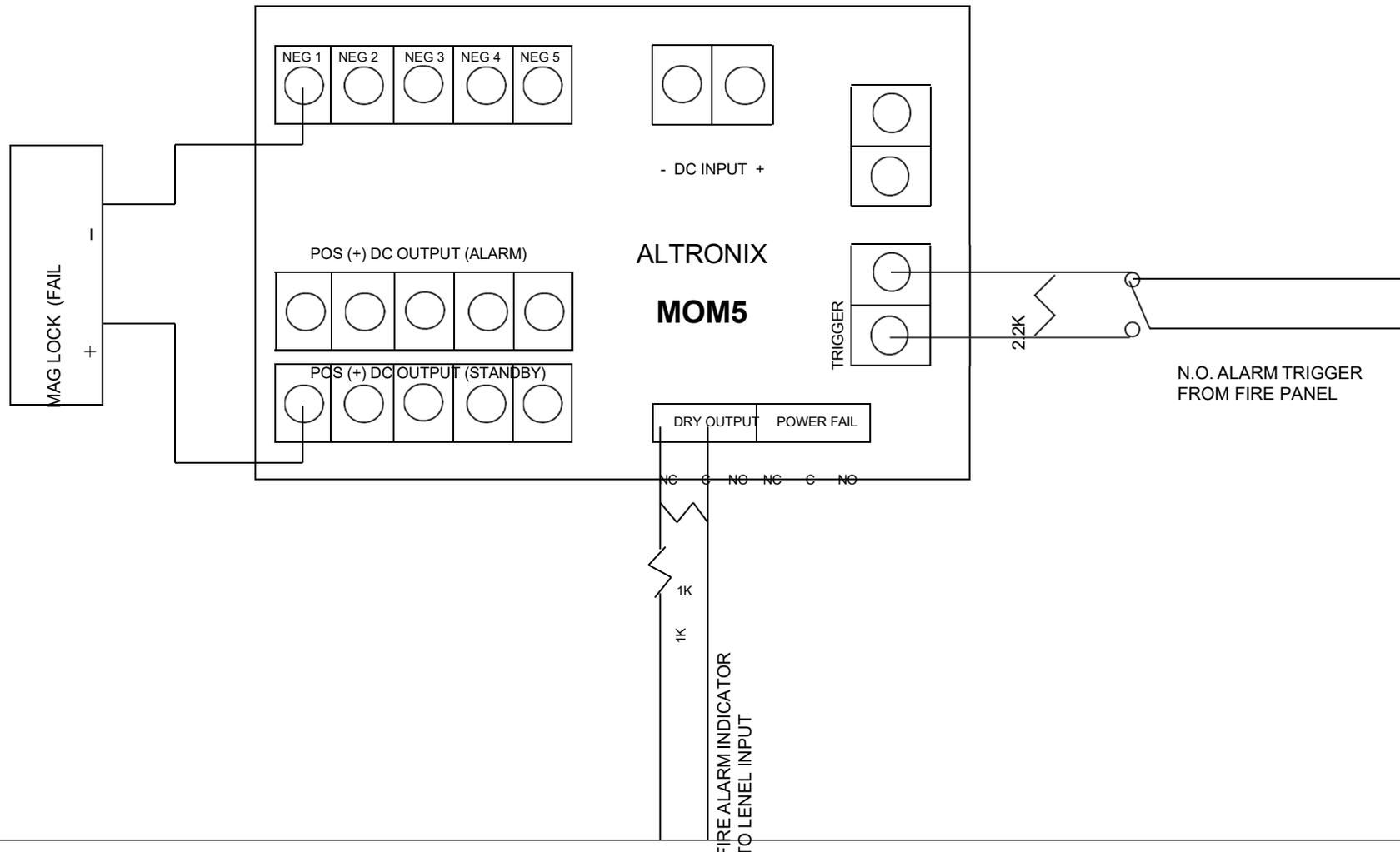
Lenel system interface to fire alarm panel with N.O. dry trigger contacts

Drawn By:

CFV

Date:

4/7/04



LNL-CTX-6

Lenel Systems International, Inc.

1212 Pittsford-Victor Road Pittsford NY 14534 USA

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rev. 0603



Includes

LNL-CTX-6 enclosure (Gray with Lenel logo)

Tamper switch

Lenel Lock with two keys

Forty-eight stand-offs and Forty-eight screws

Installation Instructions

UL294 and UL1076 approvals

Can accommodate up to 6 Lenel Access Control

Ordering Information

Part Number

LNL-CTX-6

Description

Cabinet only, with Lock [24" H x 18" W x 4.5" D]



Multi-technology readers



Overview

Schlage® multi-technology readers are designed to simplify your access control solutions. Transition your system from proximity to smart card technology at your own pace without having to change out readers as new technologies are available. Schlage readers handle all applicable ISO standards (14443A, 14443B, 15693), are FIPS 201 compliant and are versatile enough to read 125 kHz proximity and 13.56 MHz contactless smart cards in a single unit. Schlage multi-technology readers interface with Schlage smart credentials (MIFARE Classic®, MIFARE Plus® and MIFARE® DESFire® EV1) and can read the card serial numbers (CSN) of a variety of smart cards from other manufacturers, making your next upgrade in technology simple and seamless. Additionally, Schlage readers are already NFC compatible and able to communicate with NFC-enabled phones whenever you're ready to take that step.

Schlage multi-technology readers use an open architecture platform designed to work with industry standards and common access control system interfaces. Multiple Schlage reader form factors are designed to fit a variety of placement needs, with an attractive modern design which will complement any facility's architecture and décor. Schlage readers are very easy to install with the quick-connect design and a standard wiring color scheme that most technicians are already accustomed to. But if you do have questions, you'll never worry about lack of service or assistance. As always, our knowledgeable sales and support staff is ready to assist you with any design or technology questions you may have.

Note: Magnetic stripe multi-technology readers also available.

Features and benefits

- Accommodates interior, exterior, metal, and non-metal installation environments
- Recognizes most proximity credentials, and Schlage smart credentials (MIFARE Classic, MIFARE Plus and MIFARE DESFire EV1)
- FIPS 201 compliant
- NFC compatible, reads Schlage and aptiQ® mobile credentials
- Quick-connect design for easy installation
- Simple wiring – color scheme is identical to most readers in the market
- Easy-to-install mounting bracket
- Tri-state LED (red, green, amber) visual indicator and audio feedback representing status and activity information, easily discernible for the audibly or visually impaired
- Wiegand output for simple interface with most access control panels
- Multiple reader cover color options
- Limited lifetime warranty
- Multi-technology readers may also be ordered with RS-485 capability



Model*	PR10	SM10	MT11	MT15	MTK15
Reader type	Proximity – mini-mullion†	Smart – mini-mullion†	Multi-technology – mullion	Multi-technology – single gang	Multi-technology with keypad – single gang
Frequency	125 kHz	13.56 MHz	13.56 MHz and 125 kHz		
FIPS 201 compliant	No		Yes		
Standard default PIV output	N/A		75 bit PIV**		
Standards	N/A		ISO 14443A, 14443B, 15693		
Certifications	FCC Certification · IC Certification · UL 294 Listed · RED Directive (15 EU Countries) · CE Mark · IP65				
Voltage range	5-16 VDC				
Power supply	Linear DC				
Current requirement (at 12 VDC and 25 c; mAmps)	Avg. 65 mA Peak 110 mA	Avg. 95 mA Peak 195 mA	MT11 Avg. 100 mA Peak 170 mA	MT11-485 Avg. 115 mA Peak 145 mA	MT15 & MT15-485 Avg. 120 mA Peak 200 mA
Read range	Proximity: Up to 3" (7.5 cm)	MIFARE Classic: Up to 4" (10 cm) MIFARE Plus: Up to 1.5" (3.8 cm) DESFire EV1: Up to 2" (5.1 cm)		Proximity: Up to 5" (12.7 cm) MIFARE Classic: Up to 4" (10 cm) MIFARE Plus: Up to 1" (2.5 cm) MIFARE DESFire EV1: Up to 2" (5.1 cm) PIV credential: Up to 2.5" (6.5 cm)	
Cable specification	18 AWG, 5 conductor stranded/shielded				
System interfaces	Wiegand	Wiegand / Clock & Data	Wiegand / Clock & Data / RS-485*** (OSDP)		
Cabling distance	Wiegand output: 500 ft. (152 m)				
Physical dimensions (H x W x D)	4.26" x 1.72" x 0.81" 10.8 cm x 4.4 cm x 2.1 cm	4.26" x 1.72" x 0.81" 10.8 cm x 4.4 cm x 2.1 cm	5.91" x 1.72" x 0.81" 15 cm x 4.4 cm x 2.1 cm	5.1" x 3.25" x 0.76" 12.9 cm x 8.3 cm x 1.9 cm	5.1" x 3.25" x 0.76" 12.9 cm x 8.3 cm x 1.9 cm
Operating temperatures	-40° to 158°F (-40° to 70°C)				
Weight	4.1 oz	3.9 oz	5.7 oz	9.1 oz	9.3 oz
Material	PBT Polymer				
Technologies supported in default mode					
Schlage Proximity	■		■	■	■
XceedID® Proximity	■		■	■	■
HID® Proximity	■		■	■	■
GE/CASI ProxLite®	■		■	■	■
AWID® Proximity	■		■	■	■
LenelProx®	■		■	■	■
Schlage/aptiQ mobile		■	■	■	■
Schlage/aptiQ/XceedID smart cards using MIFARE Classic		■	■	■	■
Schlage smart cards using MIFARE Plus		■	■	■	■
Schlage/aptiQ smart cards using MIFARE DESFire EV1		■	■	■	■
DESFire® CSN		■	■	■	■
HID iCLASS® CSN		■	■	■	■
Inside Contactless PicoTag® CSN		■	■	■	■
ST Microelectronics® CSN		■	■	■	■
Texas Instruments Tag-It® CSN		■	■	■	■
Phillips I-Code® CSN		■	■	■	■

Color options†



- * Some features and benefits listed on the front may not be applicable to the smart-only and proximity-only readers.
- ** Other output options available through configuration.
- *** RS-485 model numbers include "-485" after the original model number. For example, MT11-485 is the RS-485 version of the multi-technology mini-mullion reader. Multi-drop, Open Standard Device Protocol (OSDP).
- † Lead time may apply for non-standard colors

About Allegion

Allegion (NYSE: ALLE) is a global pioneer in safety and security, with leading brands like CISA®, Interflex®, LCN®, Schlage®, SimonsVoss® and Von Duprin®. Focusing on security around the door and adjacent areas, Allegion produces a range of solutions for homes, businesses, schools and other institutions. Allegion is a \$2 billion company, with products sold in almost 130 countries. For more, visit www.allegion.com.





CASE

CASE WESTERN RESERVE UNIVERSITY

Drawing Name:

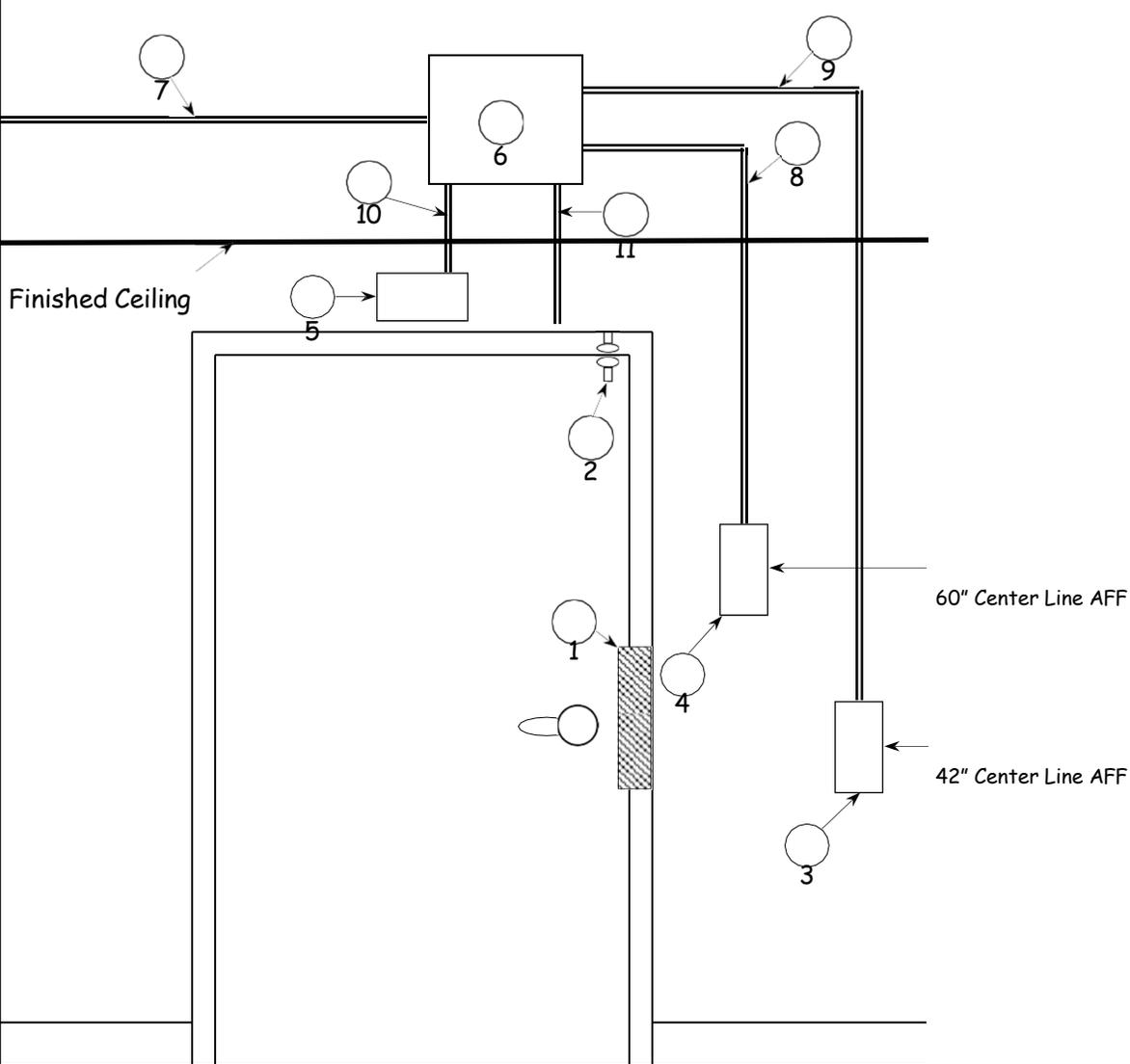
Typical Access Control Single Door Detail W/Door Strike

Drawn

CFV

Date:

10/7/04



- 1 Electrified Door Strike
- 2 Door Position Contacts
- 3 Single Gang Box — For Card Reader (Public Side Of Door)
- 4 Single Gang Box — For Piezo & Key Switch (Secure Side Of Door)
- 5 Horizontal Single Gang Box — For RQE Motion Sensor (Secure Side Of Door)
- 6 8" X 8" X 4" Security Junction Box
- 7 1" Conduit To SER Room Filled With 1 ea — 12/C #22*, 2/C #12*. And 8/C #22* Shielded Pulled Through To Item 4.
- 8 3/4" Conduit Filled With 2/C #22* To Item 5
- 9 3/4" Conduit Filled With 8/C #22* Pulled Through Item 7.
- 10 1/2" Conduit Filled With 4/C #22*.
- 11 3/4" Conduit Stubbed Into Top Of Door Frame Filled With 1 ea. 2/C #12* pulled to Item 1, and 2/C #22* pulled to Item 2.

* All wire shall be Honeywell / Genesis listed part number or equivalent. (<http://www.genescable.com>)

Jacketed Cables Unshielded Stranded 2C/22—#1102 4C/22—#1104

6C/22—#1107 12C/22—#1113 2C/18—#1118 4C/18—#1119 2C/12—#1129

Jacketed Cables Shielded Stranded 8C/22—#1207



CASE

CASE WESTERN RESERVE UNIVERSITY

Drawing Name:

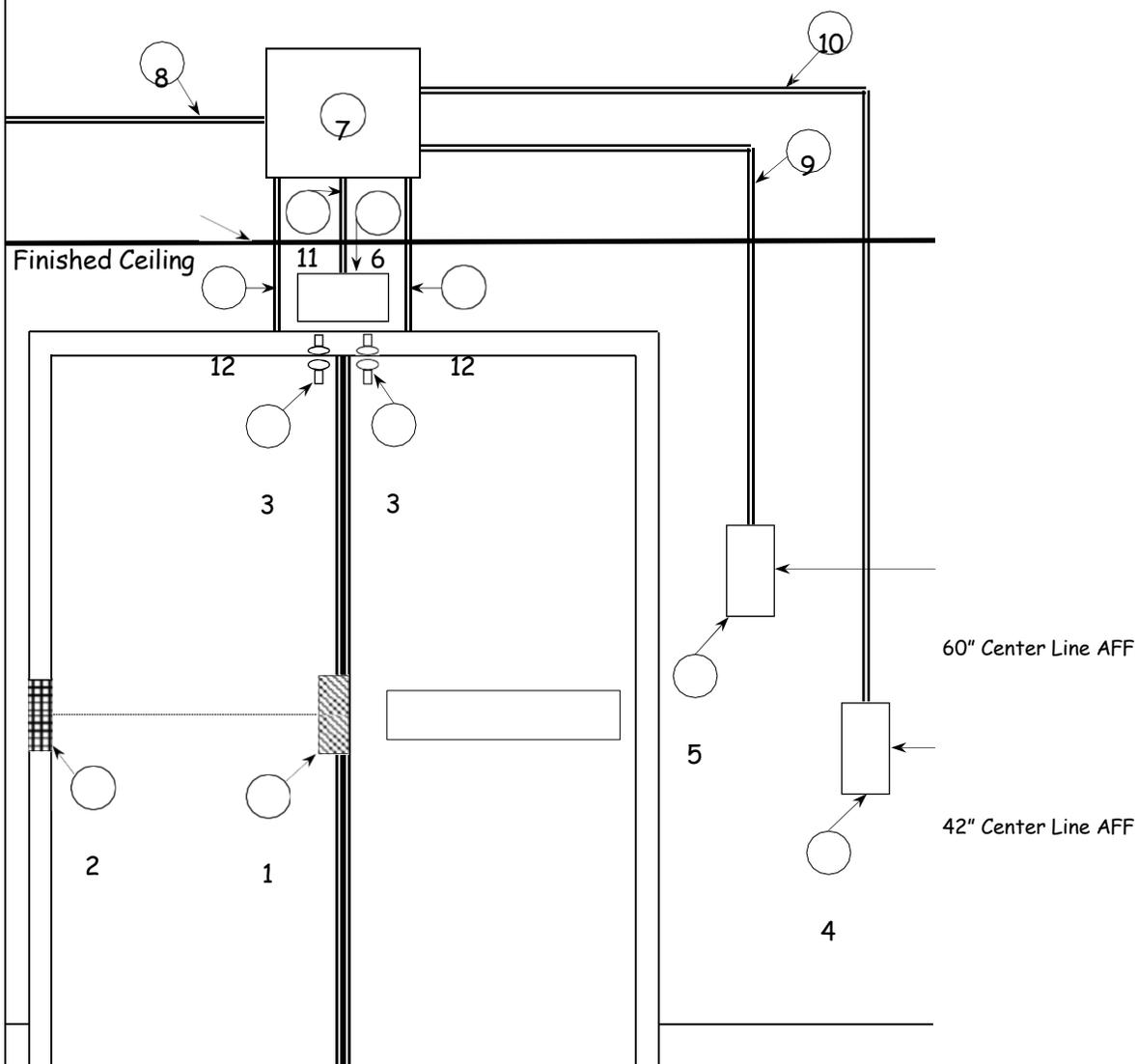
Typical Access Control Double Door Detail
W/Door Strike W/O Center Mullion

Drawn By:

CFV

Date:

10/7/04



- ① Electrified Door Strike
- ② Power Transfer Hinge
- ③ Door Position Contacts
- ④ Single Gang Box — For Card Reader (Public Side Of Door)
- ⑤ Single Gang Box — For Piezo & Key Switch (Secure Side Of Door)
- ⑥ Horizontal Single Gang Box — For RQE Motion Sensor (Secure Side Of Door)
- ⑦ 8" X 8" X 4" Security Junction Box
- ⑧ 1" Conduit To SER Room Filled With 1 ea — 12/C #22*, 2/C #12*. And 8/C #22* Shielded Pulled Through To Item 4.
- ⑨ 3/4" Conduit Filled With 2/C #22* To Item 5
- ⑩ 3/4" Conduit Filled With 8/C #22* Pulled Through Item 7.
- ⑪ 1/2" Conduit Filled With 4/C #22*.
- ⑫ 3/4" Conduit Stubbed Into Top Of Door Frame Filled With 2/C #12* pulled to item 2, and 2/C #22* pulled to item 3.

* All wire shall be Honeywell / Genesis listed part number or equivalent. (<http://www.genescable.com>)

Jacketed Cables Unshielded Stranded 2C/22—#1102 4C/22—#1104

6C/22—#1107 12C/22—#1113 2C/18—#1118 4C/18—#1119 2C/12—#1129

Jacketed Cables Shielded Stranded 8C/22—#1207



CASE

CASE WESTERN RESERVE UNIVERSITY

Drawing Name:

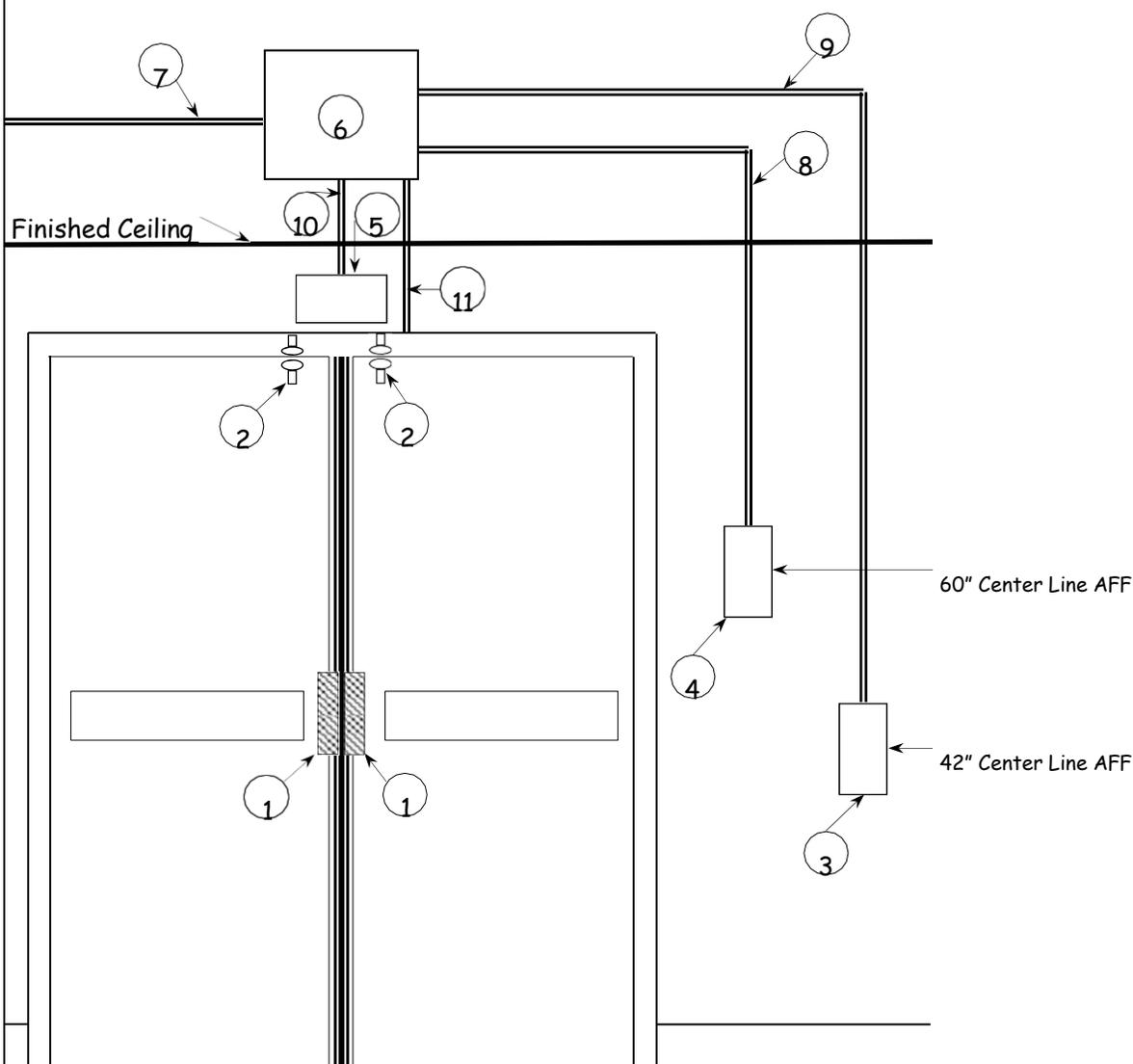
Typical Access Control Double Door Detail
W/Door Strike W/Center Mullion

Drawn By:

CFV

Date:

10/7/04



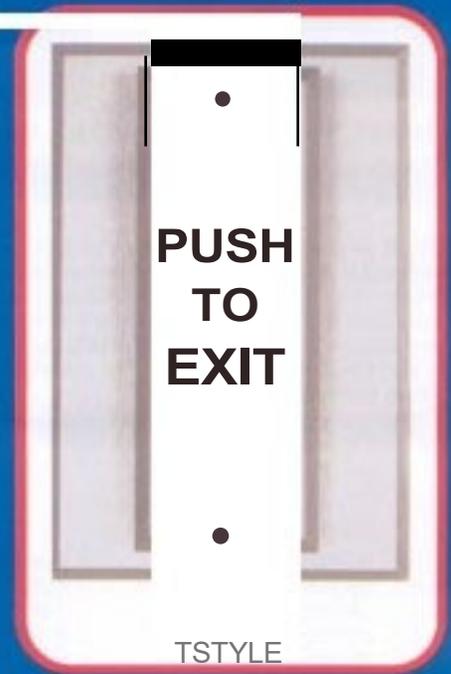
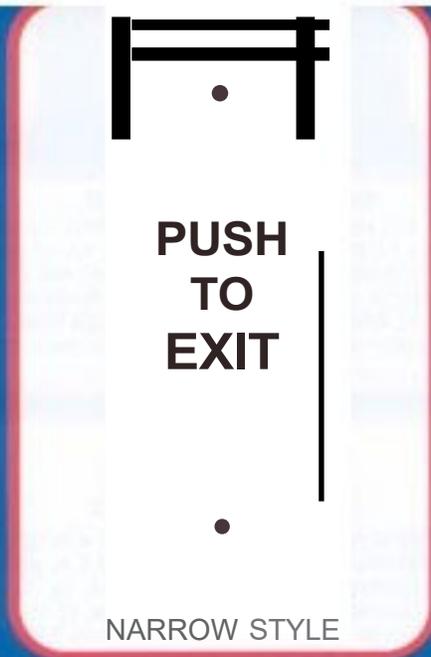
- ① Electrified Door Strike
- ② Door Position Contacts
- ③ Single Gang Box — For Card Reader (Public Side Of Door)
- ④ Single Gang Box — For Piezo & Key Switch (Secure Side Of Door)
- ⑤ Horizontal Single Gang Box — For RQE Motion Sensor (Secure Side Of Door)
- ⑥ 8" X 8" X 4" Security Junction Box
- ⑦ 1" Conduit To SER Room Filled With 1 ea — 12/C #22*, 2/C #12*, And 8/C #22* Shielded Pulled Through To Item 3.
- ⑧ 3/4" Conduit Filled With 2/C #22* To Item 4
- ⑨ 3/4" Conduit Filled With 8/C #22* Pulled Through Item 6.
- ⑩ 1/2" Conduit Filled With 4/C #22*.
- 11 3/4" Conduit Stubbed Into Top Of Door Frame Filled With 2/C #12* pulled to item 1, and 2/C #22* pulled to item 2.

* All wire shall be Honeywell / Genesis listed part number or equivalent. (<http://www.genescable.com>)
 Jacketed Cables Unshielded Stranded 2C/22—#1102 4C/22—#1104
 6C/22—#1107 12C/22—#1113 2C/18—#1118 4C/18—#1119 2C/12—#1129
 Jacketed Cables Shielded Stranded 8C/22—#1207

PUSH PLATE

EXIT RELEASE STATIONS

FOR ACCESS CONTROL APPLICATIONS



- NARROW STYLE
- T STYLE
- SINGLE GANG STYLE
- COLOR FILLED ENGRAVED LEGENDS
- HEAVY DUTY SOLID ALUMINUM PLATES
- ANODIZED TO INHIBIT CORROSION
- VANDAL RESISTANT MOUNTING
- PNEUMATIC TIME DELAY SWITCH MODELS
- SINGLE POLE AND DOUBLE POLE SWITCH MODELS
- FIVE ARCHITECTURAL FINISHES
- CUSTOM ENGRAVING AVAILABLE



ALARM CONTROLS CORPORATION
DEER PARK, NEW YORK
11729



DS160 Series High Performance Request-to-exit Detectors



- ▶ **Door monitor with sounder alert**
- ▶ **Sequential Logic Input (SLI)**
- ▶ **Internal vertical pointability**
- ▶ **Wrap-around coverage pattern with precise pattern control**
- ▶ **Up to 64 second adjustable latch time**
- ▶ **Selectable relay trigger mode**
- ▶ **Selectable fail-safe or fail-secure modes**
- ▶ **Adjustable sounder volume**
- ▶ **Activation LED**

The DS160 Series consists of the DS160 Detector (light gray) and the DS161 Detector (black) specifically designed for Request-to-exit (REX) applications. With features such as timers, door monitor with sounder alert, and pointable coverage, the DS160 and DS161 have the flexibility to meet the most stringent REX requirements. The exclusive Sequential Logic Input (SLI) provides added security that is not offered in any other REX device.

Sounder Alert

An integrated sounder can be programmed to activate if the door is left open too long. The sounder volume is fully adjustable to 85 dB.

Keycard Input

The keycard input allows the sensor relay to be controlled from an external source, such as an access control system or card reader.

Functions

Sequential Logic Input (SLI)

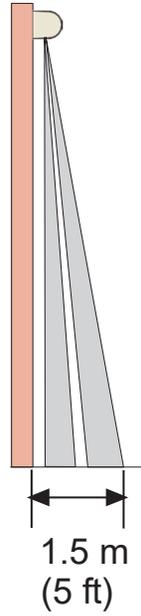
The SLI terminal allows connection of a second device to require sequential detection. This eliminates the possibility that an object that is slid through the door or underneath the door will activate the detector. This input can also be used to lock the sensor if motion is present outside the premises.

Door Monitor

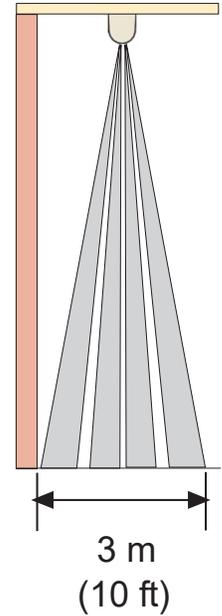
The sensor can monitor a door contact to allow special control of the internal relay. For example, if the door is opened within the relay time period, the sensor can be programmed to halt the timer. If the door is not opened within a specific time period, the relay can be programmed to deactivate.

Certifications and Approvals

Region	Certification	
Europe	CE	89/336/EEC, EN55022: 1998 +A1: 2000 +A2: 2003, EN50130-4: 1996 +A1: 1998 +A2: 2003, EN61000-4-2: 1995 +A1: 1998 +A2: 2001, EN61000-4-3: 2002 +A1: 2003, EN61000-4-4: 1995 +A1: 2000 +A2: 2001, EN61000-4-5: 1995 +A1: 2001, EN61000-4-6: 1996 +A1: 2001 +A2: 2001, EN61000-4-11:1994 +A1: 2001, EN60950-1: 2001 2004/108/EC; EN 50130-4:1996 +A1:1998 +A2:2003; EN 60950-1:2006
USA	UL	ALVY: Access Control Systems Units (UL294)
Europe	Complies with EN50131-1 Grade 2	



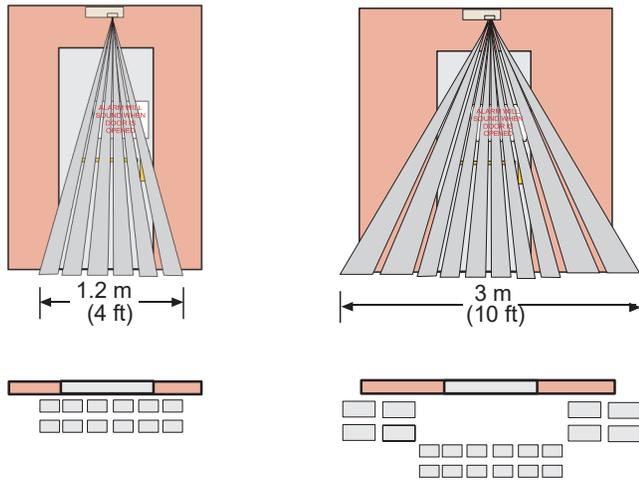
Side View



The higher that you mount the unit, the larger the coverage area. Do not mount the DS160/DS161 more than 4.6 m (15 ft) above the floor.

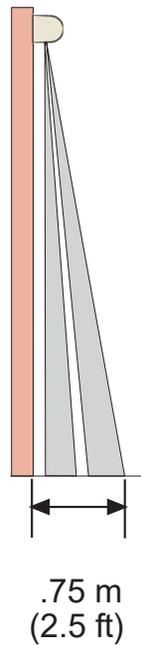
Side view of coverage pattern with the unit mounted at 4.6 m (15 ft) above the floor with the lens pointed straight down.

Installation/Configuration Notes

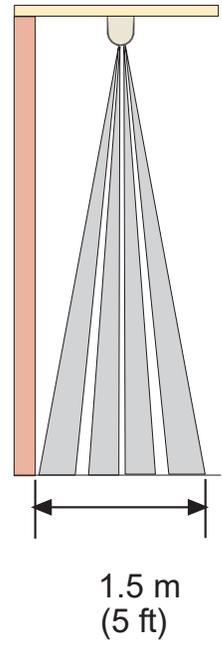


Front View

Mounted on wall above door and mounted on ceiling .75 m (2.5 ft) in front of the door.



Side View



The higher that you mount the unit, the larger the coverage area. Do not mount the DS160/DS161 more than 4.6 m (15 ft) above the floor.

Side view of coverage pattern with the unit mounted at 4.6 m (15 ft) above the floor with the lens pointed straight down.

Coverage Information

The coverage (detection area) varies depending on the mounting height above the floor, angle of the lens, and whether the unit is mounted on a wall above the door or on the ceiling. The coverage is 2.4 m x 3 m (8 ft x 10 ft)

The coverage patterns for the detector at a height of

2.3 m (7.5 ft) are shown. The coverage pattern increases or decreases with height and detector alignment.

Note When you mount the unit on the wall and the

lens points straight down, some detection zones point toward the wall and do not

detect movement.

The diagrams depict views of the coverage pattern with

the detector mounted at 2.3 m (7.5 ft) above the floor

with the lens pointed straight down. Zones that are pointed toward the wall are not shown.

Technical Specifications

Environmental

Operating Temperature: -29°C to +49°C (-20°F to +120°F)
For UL Certificated installations, 0°C to +49°C
(+32°F to +120°F)

Radio Frequency Interference (RFI) Immunity: No alarm or setup on critical frequencies in the range from 26 MHz to 1000 MHz at 50 V/m

Complies with Environmental Class II (EN50130-5)

Mechanical

Dimensions: 4.5 cm x 17.1cm x 4.4 cm
(1.80 in. x 6.75 in. x 1.75 in.)

Material: High impact ABS plastic enclosure

Modes

Power Loss Default: Programmable fail-safe or fail-secure modes.

Timer: Programmable reset accumulative or non-reset counting mode.

Electrical

Current Draw: 8 mA nominal standby current, 39 mA at 12 VDC in alarm

Voltage: 12 VAC or VDC to 30 VAC or VDC

Alarm Output: Two Form C relay contacts each rated 1 A at 30 VAC or VDC for resistive loads

Indicators: 1 activation LED

Relay Latch Time: Adjustable from 0.5 sec to 64 sec.

Ordering Information

DS160 Request-to-exit Detector

DS160

Light gray enclosure. For use in request-to-exit (REX) applications. Provides 2.4 m x 3 m (8 ft x 10 ft) coverage, timers, door monitor

with sounder alert, and pointable coverage.

DS161 Request-to-exit Detector

DS161

Black enclosure. For use in request-to-exit (REX) applications. Provides 2.4 m x 3 m (8 ft x 10 ft) coverage, timers, door monitor

with sounder alert, and pointable coverage.

Accessories

TP160 Trim Plate

TP160

A light gray trim plate used when mounting

the detector over a standard single-gang box.

TP161 Trim Plate

TP161

A black trim plate used when mounting the sensor over a standard single-gang box.

www.boschsecurity.com

Americas:

Bosch Security Systems, Inc.
130 Perinton Parkway
Fairport, New York, 14450, USA
Phone: +1 800 289 0096
Fax: +1 585 223 9180
security.sales@us.bosch.com
www.boschsecurity.us

Europe, Middle East, Africa:

Bosch Security Systems B.V.
P.O. Box 80002
5600 JB Eindhoven, The Netherlands
Phone: + 31 40 2577 284
Fax: +31 40 2577 330
emea.securitysystems@bosch.com
www.boschsecurity.com

Asia-Pacific:

Robert Bosch (SEA) Pte Ltd, Security Systems
11 Bishan Street 21
Singapore 573943
Phone: +65 6258 5511
Fax: +65 6571 2698
apr.securitysystems@bosch.com
www.boschsecurity.com

Represented by

-AG&ORCE 390+

(IGH SECURITY ,OCK



THE 390+ SURFACE MOUNTED ELECTROMAGNETIC LOCK IS IDEAL FOR HIGH SECURITY APPLICATIONS. ITS MODULAR DESIGN EMPLOYS A STANDARDIZED CIRCUIT BOARD WITH EASY-TO-INSTALL CONNECTORS, ADJUSTABLE MOUNTING BRACKETS, INTEGRATED MOUNTING SCREWS, AND SLIDE-IN ARCHITECTURAL FINISH PLATES. A NEW ARMATURE HOUSING HOLDS THE ARMATURE IN PLACE, ELIMINATING THE NOISE AND SAGGING KNOWN WITH ARMATURES, INCREASING THE OVERALL RELIABILITY OF THE PRODUCT. THE ARMATURE HOUSING ALSO PROVIDES AN AESTHETICALLY PLEASING LOOK OVER TRADITIONAL ARMATURE MOUNTINGS, BLENDING INTO THE SURROUNDING ENVIRONMENT MORE EASILY. FINALLY THE ARMATURE HOUSING HOLDS THE MAGNETS FOR THE \$3- OPTION WITHOUT HAVING TO MOUNT AN ADDITIONAL PLATE TO THE ARMATURE, ENSURING QUICKER, MORE RELIABLE INSTALLATIONS.

CERTIFICATIONS. THE 390+ EXCEEDS UL 156.23 GRADE 1 STANDARDS WITH 1650 POUNDS OF DIRECT HOLDING FORCE, IS UL LISTED AS AN AUXILIARY LOCK FOR A 3 HOUR FIRE-RATED OPENING AND FOR BURGLARY RESISTANCE.

1650 LBS
(HOLDING FORCE)



CONFIGURATIONS

- 390+ (SINGLE) FOR HOLLOW METAL, ALUMINUM OR WOOD DOORS AND FRAMES AND GLASS DOORS
- 392+ (DOUBLE) FOR PAIRS OF HOLLOW METAL, ALUMINUM OR WOOD DOORS AND FRAMES WITHOUT A MULLION, AND PAIRS OF GLASS DOORS
- 391+ (SPLIT ARMATURE) FOR PAIRS OF HOLLOW METAL, ALUMINUM OR WOOD DOORS AND FRAMES WITHOUT A MULLION

LOCK BODY DIMENSIONS

390+/391+	(: 2-3/4v	7: 10-1/2v	\$: 1-11/16v
392+	(: 2-3/4v	7: 20-5/8v	\$: 1-11/16v

(HOLDING FORCE)

390+ (SINGLE)	1650 POUNDS
392+ (DOUBLE) EACH SIDE	1650 POUNDS
391+ (SPLIT ARMATURE) EACH SIDE	825 POUNDS

ELECTRICAL SPECIFICATIONS

120V 60/40%	12 OR 24 VDC
50/20% 20/10%	12VDC 12VDC, 24VDC

5 Year Limited Warranty



90%
11-95%

APPLICATIONS. THE 390+ IS AVAILABLE FOR SINGLE, INSWINGING OR OUTSWINGING, HOLLOW METAL, ALUMINUM, AND WOOD DOORS AND FRAMES AND GLASS DOORS. THE 392+ IS AVAILABLE FOR PAIRS OF HOLLOW METAL, ALUMINUM, AND WOOD DOORS AND FRAMES AND GLASS DOORS WITHOUT A MULLION. THE 391+ WITH SPLIT ARMATURE IS USED WITH PAIRS OF HOLLOW METAL, ALUMINUM, AND WOOD DOORS AND FRAMES WITHOUT A MULLION. A 1200 POWERMISER (07-) OPTION WITH 1200 POUNDS OF HOLDING FORCE IS ALSO AVAILABLE FOR LIMITED POWER APPLICATIONS. ALL MODELS EASILY INTERFACE WITH ELECTRONIC ACCESS CONTROL SYSTEMS, AUTOMATIC DOOR OPERATORS AND FIRE OR OTHER HAZARD SENSING SYSTEMS FOR EGRESS AND EMERGENCY EGRESS.

390+ SUGGESTED ARCHITECTURAL SPECIFICATION:

LOCKS SHALL BE FIELD SELECTABLE DUAL VOLTAGE 12/24 VDC 390+ SERIES ELECTROMAGNETS MANUFACTURED BY LOCKNETICS OR APPROVED EQUAL. LOCKS SHALL MEET UL 156.23-1992 GRADE 1 HIGHEST CLASSIFICATION CRITERIA INCLUDING A MINIMUM HOLDING FORCE OF 1650 LBS., RESIDUAL MAGNETISM WITHIN ONE SECOND OF 4%, & MAXIMUM AND INDUCTIVE KICK-BACK NOT TO EXCEED 53 VOLTS PEAK. LOCKS SHALL BE POWERED BY FILTERED AND REGULATED 5, LISTED POWER SUPPLIES, INSTALLED AND WIRED IN ACCORDANCE WITH MANUFACTURER'S INSTALLATION INSTRUCTIONS. FAILURE TO SUPPLY SPECIFIED POWER SUPPLIES MAY VOID WARRANTY. LOCKS USED ON LABELED FIRE DOOR ASSEMBLIES SHALL BE UL LISTED AS AUXILIARY LOCKS, RATED FOR 1-LABEL OPENINGS AND FOR BURGLARY RESISTANCE. WHERE SCHEDULED, LOCKS SHALL BE EQUIPPED WITH CONCEALED SENSORS TO MONITOR LOCK STATUS AND DOOR STATUS. LOCKS SHALL BE SURFACE MOUNTED AND WHERE SCHEDULED INCLUDE HOUSING COVERS THE FULL WIDTH OR HEIGHT OF THE OPENING. TWO ELECTROMAGNETS FOR PAIRS OF DOORS SHALL BE MOUNTED IN A COMMON HOUSING. HOUSINGS SHALL NOT PROJECT MORE THAN 2-3/4 INCHES INTO THE DOOR OPENING. LOCKS SHALL BE FURNISHED WITH AN ADJUSTABLE MOUNTING BRACKET FOR ACCURATE INSTALLATION. LOCKS SHALL BE FURNISHED WITH AN INTEGRAL CIRCUIT BOARD WITH TERMINAL STRIP FOR ACCURATE WIRING. LOCKS FOR INSWING DOORS SHALL BE PROVIDED WITH A TOP JAMB BRACKET WITH NO EXPOSED SCREWS OR FASTENING DEVICES. WHERE REQUIRED, PROVIDE MOUNTING ACCESSORIES INCLUDING FINISH PLATES, ANGLE BRACKETS, GLASS DOOR BRACKETS, INSWING DOOR ADAPTER BRACKETS ETC. FOR PROPER INSTALLATION WITH ALL TYPES OF DOOR AND FRAME ASSEMBLIES ACCORDING TO MANUFACTURER'S RECOMMENDATIONS. LOCKS SHALL CARRY A MANUFACTURER'S WARRANTY OF NOT LESS THAN FIVE (5) YEARS.

**Intrusion Alarm Systems****Recessed 3/4" steel door - GE Sensors****Resources**[> Product Information](#)**Buy**[> Where To Buy](#)**Related****Products/Accessories**[> Recessed 1225](#)[> Recessed 1015](#)[> Recessed 1058](#)[> Recessed 1065](#)[> Recessed 1072](#)[> Recessed 1075](#)[> Recessed 1078](#)[> Recessed 1078CT](#)[> Recessed 1078T](#)[> Recessed 1075T](#)[> Recessed 1125](#)[> Recessed 1125T](#)[> Recessed 1275](#)[> Recessed R1075](#)[> Recessed R1078/R1078C](#)[> Recessed R1125](#)[> Recessed R1125T](#)[> Recessed 1055](#)**Description**

The Sentrol 1078 Series Steel Door contacts are designed specifically for use in the steel doors commonly found in commercial building applications. The unique housing design features a rugged unibody construction with flexible ribbed sides for quick, secure installation without gluing. The magnet housing isolates the magnet from the surrounding steel for maximum gap distances, both make and break.



An optional Rare Earth magnet is available. It is designed for use in metal entry/exit doors with a channel in the top of the door. The magnet eliminates the need to cut a mounting hole in the door channel. The flexible magnet housing can be compressed to accommodate a variety of channel widths for quick, easy installation.

Features and Benefits

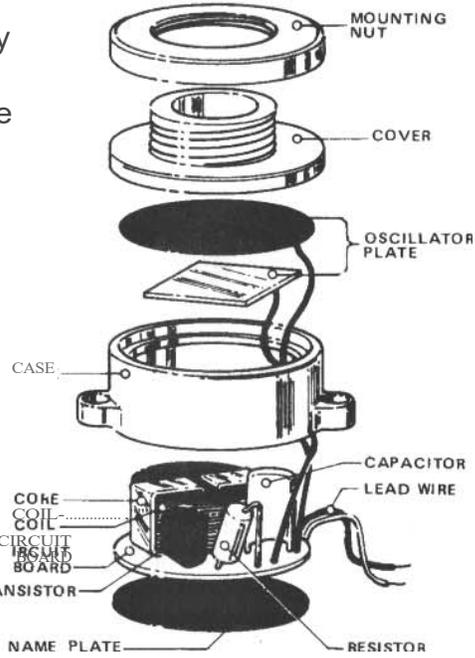
- 3/4" diameter for easier drilling in metal
- Self-lock mounting
- Rugged construction
- Attractive, added security of recessed installation



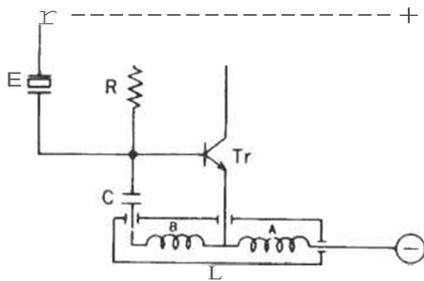


The PAL-328 series Piezo buzzers operate when an audible frequency is applied from a transistor to an oscillator plate containing a piezo-electric element and a metallic vibrating plate.

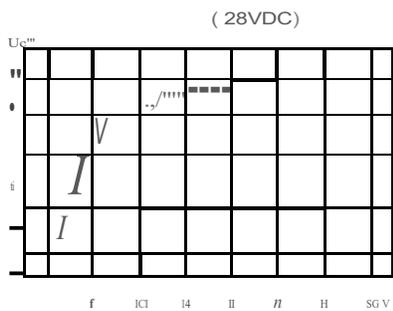
It is important when installing the PAL Series Buzzer within any enclosed area to remove any obstruction in front of the buzzer for it may deflect and prevent the sound of the buzzer from reaching the outside. Any object too close to the buzzer may minimize the sound of the buzzer. Please observe these points when installing the buzzer, and determine experimentally for the best location.



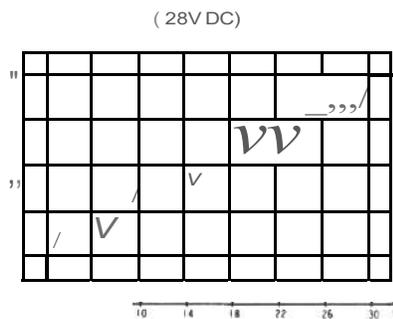
■ Circuit Diagram



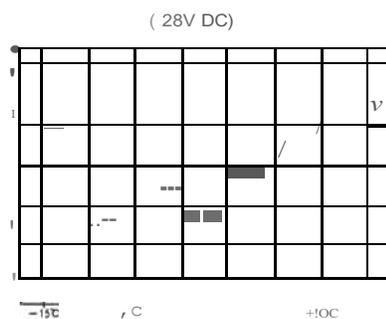
■ Sound Output - Voltage



■ Voltage - Current



■ Current - temperature



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EAST COAST OFFICE & WAREHOUSE

30 F CHAPIN ROAD, PINEBROOK, NEW JERSEY 07058



CASE

CASE WESTERN RESERVE UNIVERSITY

Drawing Name:

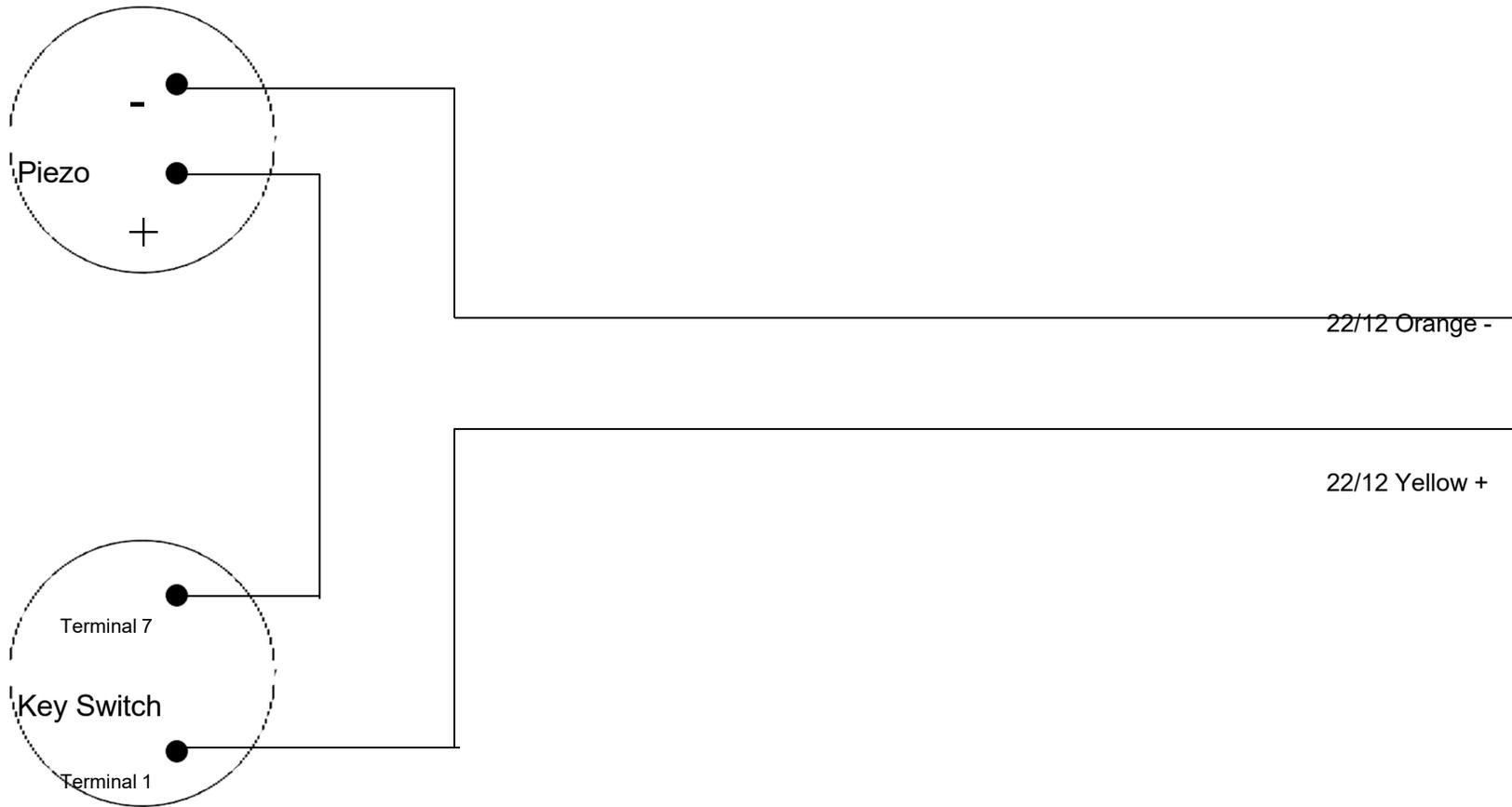
Standard Door Piezo & Key Switch Wiring

Drawn By:

CFV

Date:

4/5/04



Key Switch = ITT Industries Y1417U2C2WCNQE
Digikey Part # CKC8026-ND

3 Position Single Pole Switch wired as above = center position on

C&K Y Series 4 & 6 Tumbler Switchlocks

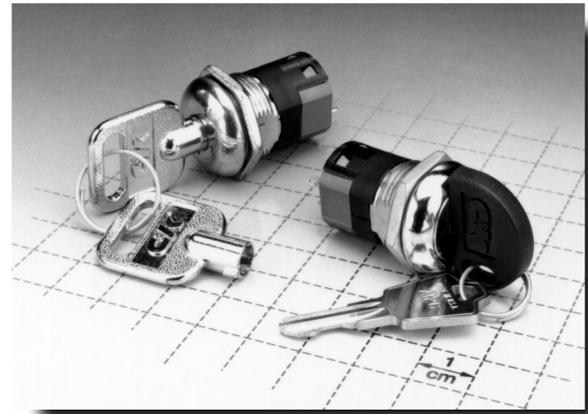


Features/Benefits

- **Anti-static switch**—exceeds 20 KV DC static resistance
- **Momentary models available**
- **Miniature profile**
- **Wire leads and harnesses available**

Typical Applications

- **Point-of-sale terminals**
- **Cash registers**
- **Computers**



Switchlock

Build-A-Switch

Our easy Build-A-Switch concept allows you to mix and match options to create the switch you need. Below is a complete listing of options shown in catalog. To order, simply select desired option from each category and place in the appropriate box. Switchlocks with standard options are shown on page H-4. Available options are shown and described on pages H-5 thru H-10. For additional options not shown in catalog, consult Customer Service Center.

Typical Example: Y 1 0 0 1 3 — 2 — C — 2 — 0 3 — N — Q — —

Switch and Lock Function

Y10013 (STD.) SP, ° 45 Index
Y1011U (STD.) SP, ° 90 Index

Keying

Y20013 DP, 45° Index
Y1001C SP, ° 45 Index
Y2001C DP, 45° Index
Y1001U SP, 45° Index
Y2001U DP, 45° Index
Y10082 SP, 45° Index

2 (STD.) Two nickel plated brass keys (4 tumbler) or two die cast zinc alloy keys with chrome plating (6 tumbler)
J One nickel plated brass key with plastic insert molded round head and one nickel plated brass key
T One nickel plated brass key with plastic

Y20082 DP, 45° Index
Y100AA SP, 45° Index
Y200AA DP, 45° Index

insert molded square head and one nickel plated brass key

Lock Type

Y100AB SP, 45° Index
Y10113 SP, ° 90 Index
Y20113 DP, ° 90 Index
Y1011C SP, ° 90 Index
Y2011C DP, ° 90 Index
Y2011U DP, ° 90 Index
Y14173 SP, ° 90 Index
Y1417C SP, ° 90 Index
Y1417U SP, ° 90 Index

A (STD.) 4 Tumbler lock (YX0B models)
C (STD.) 4 Tumbler lock with detent
V (STD.) 6 Tumbler tubular lock
N 4 Tumbler lock with anti-static switch (YX0B models)
R 4 Tumbler lock with detent and anti-static switch
W 6 Tumbler tubular lock with anti-static switch

Lock Finish

2 (STD.) Stainless steel facing
1 Nickel with removable dress nut
4 Polished nickel with removable dress nut

Y10812 SP, 45° Index, mom **B** Gloss black facing
Y20812 DP, 45° Index, mom **F** Polished nickel facing

Y10882 SP, 45° Index, mom **T**
Y20882 DP, 45° Index, mom **0.3** (STD.) Solder lug with
Y108AD SP, 45° Index, mom **0.1** Solder lug with notch
Y208AD DP, 45° Index, mom **0.2** PC Thru-hole
Y108AH SP, 45° Index, mom **0.7** Solder lug with hole

Mounting/Lock Style

N (STD.) With nut
D With clip
L With removable dress nut and latch pawl

Y208AH DP, 45° Index, mom. (Y190XX models only)

R With removable dress nut

Y108AJ SP, 45° Index, mom. **WC** Wire lead

Contact Material

Y208AJ DP, 45° Index, mom.
Y19073 SP w/common, ° 90Index

Y1907C SP w/common, ° In9d0ex
Y1907U SP w/common, ° In9d0ex
Y19001 SP w/common, ° In9d0ex
Y1900A SP w/common, ° In9d0ex
Y1900S SP w/common, ° In9d0ex

Q (STD.) Silver **Seal**
B Gold **NONE** (STD.) No seal **Key Color**

G Gold over silver **E** Epoxy seal

NONE (STD.) Nickel plated brass
 chrome plated zinc alloy
1 White
2 Black
3 Red
T Beige



C&K Y Series 4 & 6 Tumbler Switchlocks



Specifications

CONTACT RATING: Q contact material: 4 AMPS @ 125 V AC or 28 V DC; 2 AMPS @ 250 V AC (UL/CSA). See page H-10 for additional ratings.

ELECTRICAL LIFE: 10,000 make-and-break cycles at full load.

CONTACT RESISTANCE: Below 10 milliohms typ. initial @ 2-4 V DC, 100 mA, for both silver and gold plated contacts.

INSULATION RESISTANCE: 10^9 ohms min.

DIELECTRIC STRENGTH: 1,000 V RMS min. @ sea level.

INDEXING: 45° or 90°, 2-4 positions (4&5 tumbler switchlocks).
45°, 3 positions; or 90°, 2 positions (6 tumbler tubular switchlocks).
Other functions available, consult Customer Service Center.

STATIC RESISTANCE: Anti-static models exceed 20 KV DC static resistance @ sea level, lock body to terminals.

Materials

LOCK: Zinc alloy with stainless steel facing, std. (4 tumbler lock and 6 tumbler tubular lock).

KEYS: Two nickel plated brass keys, with code number, std. (4 tumbler lock). Two die cast chrome plated zinc alloy keys, std. (6 tumbler lock).

SWITCH HOUSING: Glass filled polyester (UL 94V-0).

CONTACTS AND TERMINALS: Q contact material: Copper, silver plated. See page H-10 for additional contact materials.

MOUNTING NUT: Zinc alloy or steel, nickel or bright zinc plated.

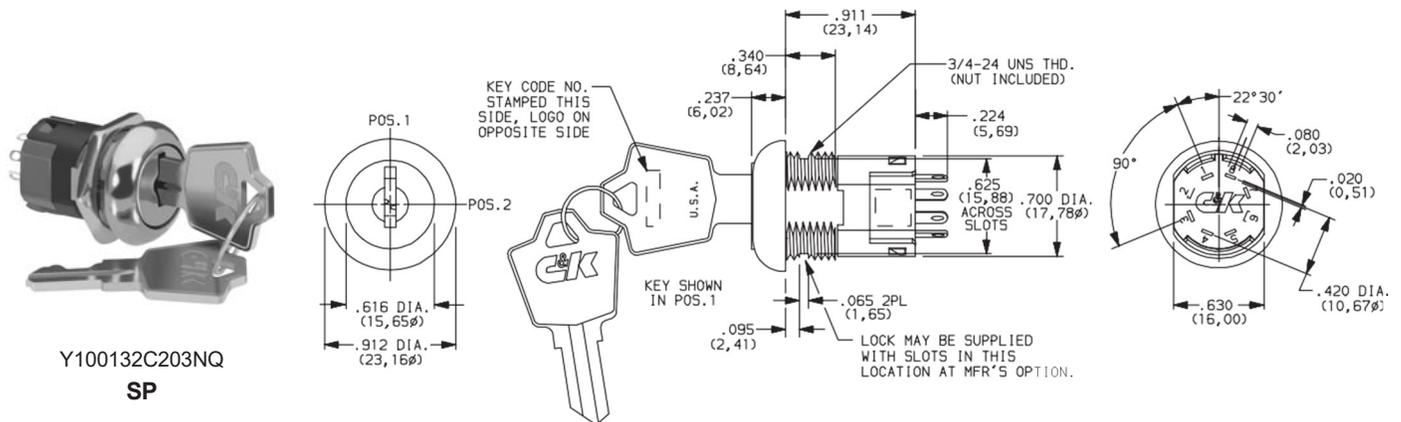
MOUNTING CLIP: Steel, nickel or bright zinc plated.

DRESS NUT: Brass, nickel plated.

TERMINAL SEAL: Epoxy.

NOTE: Specifications and materials listed above are for switchlocks with standard options. For information on specific and custom switchlocks, consult Customer Service Center.

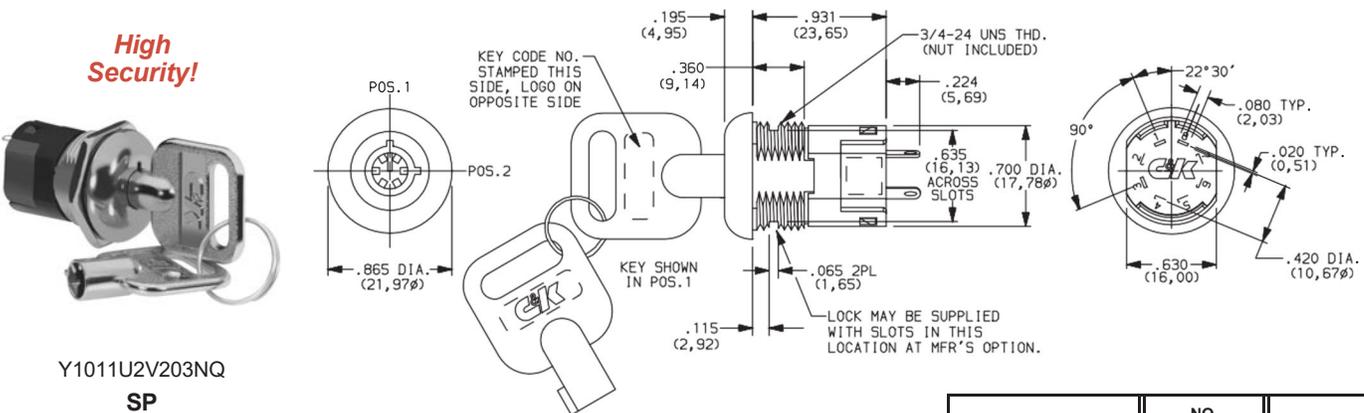
SWITCHLOCKS WITH STANDARD OPTIONS



Y100132C203NQ
SP

PART NUMBER	NO. TUMBLERS	INDEXING
Y100132C203NQ	4	45°

NOTE: For panel mounting information, see page H-10.



Y1011U2V203NQ
SP

PART NUMBER	NO. TUMBLERS	INDEXING
Y1011U2V203NQ	6	90°

NOTE: For panel mounting information, see page H-10.



C&K Y Series 4 & 6 Tumbler Switchlocks

SWITCH AND LOCK FUNCTION



H

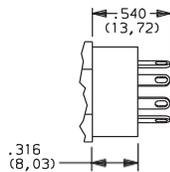
Switchlock

SINGLE & DOUBLE POLE SWITCHES									
NO. TUMBLERS	NO. POLES	MODEL NO.	CONNECTED TERMINALS				KEY PULL POSITIONS	LOCK CONFIGURATION	INDEXING
			POS. 1	POS. 2	POS. 3	POS. 4			
4 & 6	SP DP	Y10013 Y20013	8-1 8-1, 4-5	1-2 1-2, 5-6	2-3 2-3, 6-7		Position 1		45°
4	SP DP	Y1001C Y2001C	8-1 8-1, 4-5	1-2 1-2, 5-6	2-3 2-3, 6-7		Position 3		
4 & 6	SP DP	Y1001U Y2001U	8-1 8-1, 4-5	1-2 1-2, 5-6	2-3 2-3, 6-7		Positions 1 & 3		
4	SP DP	Y10082 Y20082	8-1 8-1, 4-5	1-2 1-2, 5-6	7-8 7-8, 3-4		Position 1		
4	SP DP	Y100AA Y200AA	8-1 8-1, 4-5	1-2 1-2, 5-6	7-8 7-8, 3-4		Positions 1, 2 & 3		
4	SP	Y100AB	8-1	1-2	2-3	3-4	Positions 1, 2, 3 & 4		
4 & 6	SP DP	Y10113 Y20113	8-1 8-1, 4-5	1-3 1-3, 5-7			Position 1		90°
4	SP DP	Y1011C Y2011C	8-1 8-1, 4-5	1-3 1-3, 5-7			Position 2		
4 & 6	SP DP	Y1011U Y2011U	8-1 8-1, 4-5	1-3 1-3, 5-7			Positions 1 & 2		
4	SP	Y14173	7-1	1-3	6-7		Position 1		
4	SP	Y1417C	7-1	1-3	6-7		Positions 2 & 3		
4	SP	Y1417U	7-1	1-3	6-7		Positions 1, 2 & 3		

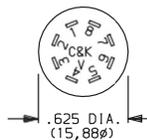
SINGLE & DOUBLE POLE MOMENTARY SWITCHES									
NO. TUMBLERS	NO. POLES	MODEL NO.	CONNECTED TERMINALS				KEY PULL POSITIONS	LOCK CONFIGURATION	INDEXING
			POS. 1	POS. 2	POS. 3	POS. 4			
4	SP DP	Y10812 Y20812	8-1 8-1, 4-5	1-2 1-2, 5-6			Position 1		45° Mom.
4	SP DP	Y10882 Y20882	8-1 8-1, 4-5	1-2 1-2, 5-6	7-8 7-8, 3-4		Position 1		

LEGEND

- ▲ = Momentary Positions (45°)
- = Detent Positions (45° or 90°)
- ⊙ = Key pull possible in these positions.
- = Stop Positions



TERMINAL NUMBERS



Terminal numbers molded on bottom of housing.

All models with all options when ordered with 'G' or 'Q' contact material.

NOTE: Other 3 position momentary models available, consult Customer Service Center.



C&K Y Series 4 & 6 Tumbler Switchlocks

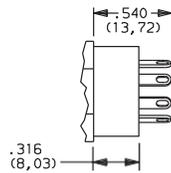
SWITCH AND LOCK FUNCTION



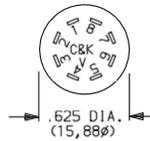
SINGLE & DOUBLE POLE MOMENTARY SWITCHES									
NO. TUMBLERS	NO. POLES	MODEL NO.	CONNECTED TERMINALS				KEY PULL POSITIONS	LOCK CONFIGURATION	INDEXING
			POS. 1	POS. 2	POS. 3	POS. 4			
4	SP DP	Y108AD Y208AD	8-1 8-1, 4-5	1-2 1-2, 5-6	7-8 7-8, 3-4		Positions 1&3		45° Mom.
4	SP DP	Y108AH Y208AH	8-1 8-1, 4-5	1-2 1-2, 5-6	7-8 7-8, 3-4		Position 1		
4	SP DP	Y108AJ Y208AJ	8-1 8-1, 4-5	1-2 1-2, 5-6	7-8 7-8, 3-4		Position 3		

LEGEND

- ▲ = Momentary Positions (45°)
- = Detent Positions (45° or 90°)
- ⊙ = Key pull possible in these positions.
- ⊙ = Stop Positions



TERMINAL NUMBERS



Terminal numbers molded on bottom of housing.

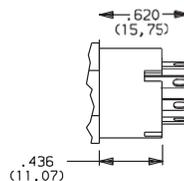
All models with all options when ordered with 'G' or 'Q' contact material.

NOTE: Other 3 position momentary models available, consult Customer Service Center.

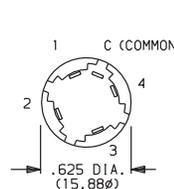
SINGLE POLE SWITCHES WITH COMMON									
NO. TUMBLERS	NO. POLES	MODEL NO.	CONNECTED TERMINALS				KEY PULL POSITIONS	LOCK CONFIGURATION	INDEXING
			POS. 1	POS. 2	POS. 3	POS. 4			
4	SP	Y19073					Position 1		90°
		Y1907C	C-1	C-2	C-4		Positions 2 & 3		
		Y1907U					Positions 1, 2 & 3		
		Y19001					Positions 1 & 3		
		Y1900A	C-1	C-2	C-3	C-4	Positions 2 & 4		
		Y1900S					Positions 1, 2, 3 & 4		

LEGEND

- = Detent Positions (45° or 90°)
- ⊙ = Key pull possible in these positions.
- ⊙ = Stop Positions



TERMINAL NUMBERS



TERM.)

Terminal numbers marked on insulator.

All models with all options when ordered with 'G' or 'Q' contact material.

NOTE: Epoxy seal not available. Removable dress nut not available with Y1900A models.



C&K Y Series 4 & 6 Tumbler Switchlocks

SWITCH AND LOCK FUNCTION

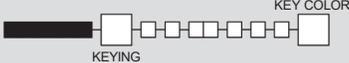


H

Switchlock

AVAILABLE OPTION COMBINATIONS															
MODELS	LOCK TYPES						TERMINATIONS					MOUNTING/LOCK STYLES			
	A	C	N	R	V	W	01	02	03	07	WC	D	L	N	R
YX0013		•			•	•	•	•	•		•	•		•	•
YX001C		•					•	•	•		•			•	•
YX001U		•		•	•	•	•	•	•		•	•		•	•
YX0082		•		•			•	•	•		•			•	•
YX00AX		•		•			•	•	•		•			•	•
YX0113		•		•	•	•	•	•	•		•			•	•
YX011C		•		•			•	•	•		•			•	•
YX011U		•		•	•	•	•	•	•		•	•		•	•
Y141XX		•		•			•	•	•		•			•	•
YX0812	•		•				•	•	•		•			•	•
YX08AH	•		•				•	•	•		•			•	•
Y190XX		•		•			•	•	•	•	•			•	•
YX08AD	•		•				•	•	•		•			•	•
YX08AJ	•		•				•	•	•		•			•	•

KEYING

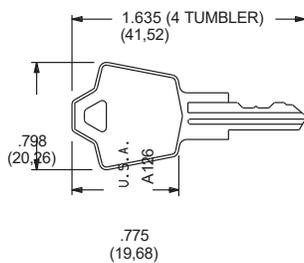


OPTION CODE	KEYING OPTIONS	CODE NO. ON KEY	CODE NO. ON LOCK
2	(STD.) 2 NICKEL PLATED BRASS KEYS (4 TUMBLER) or 2 DIE CAST CHROME PLATED ZINC ALLOY KEYS (6 TUMBLER)	YES	NO
J	1 NICKEL PLATED BRASS KEY WITH PLASTIC INSERT MOLDED ROUND HEAD AND 1 NICKEL PLATED BRASS KEY	YES	YES
T	1 NICKEL PLATED BRASS KEY WITH PLASTIC INSERT MOLDED SQUARE HEAD AND 1 NICKEL PLATED BRASS KEY	YES	NO

OPTION CODE	KEY COLOR
NONE	(STD.) NICKEL PLATED BRASS (4 TUMBLER) OR CHROME PLATED ZINC ALLOY (6 TUMBLER)
1	WHITE
2	BLACK
3	RED
T	BEIGE

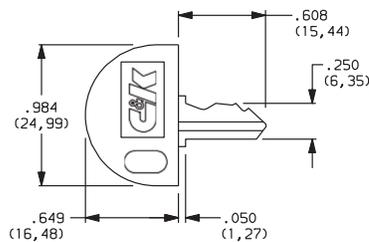
NOTE: All orders keyed alike, standard. For more than one key code, master keying, replacement keys, or other special features, consult Customer Service Center.

NICKEL PLATED BRASS KEY



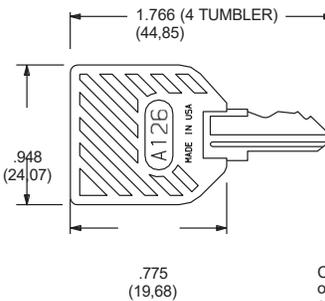
Key part number: 115140126

NICKEL PLATED BRASS KEY WITH PLASTIC INSERT MOLDED ROUND HEAD



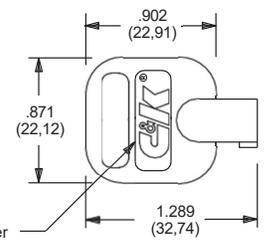
Key part number: 16564112602

NICKEL PLATED BRASS KEY WITH PLASTIC INSERT MOLDED SQUARE HEAD



Key part number: 11599112602

CHROME PLATED ZINC ALLOY KEY



Key part number: 1110801

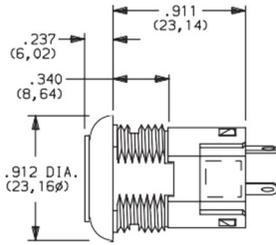


C&K Y Series 4 & 6 Tumbler Switchlocks

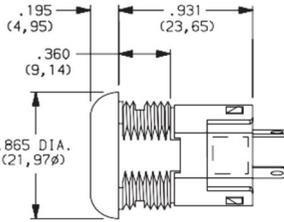


LOCK TYPE

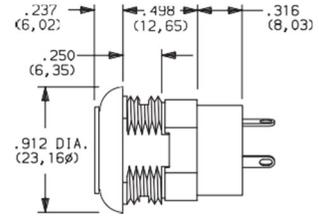
C (STD.) 4 TUMBLER LOCK WITH DETENT



V (STD.) 6 TUMBLER TUBULAR LOCK



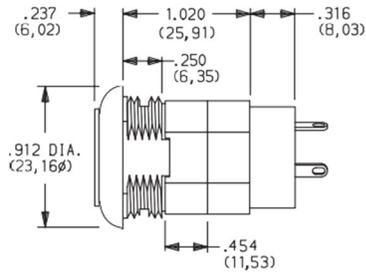
A 4 TUMBLER LOCK (MOMENTARY MODELS ONLY)



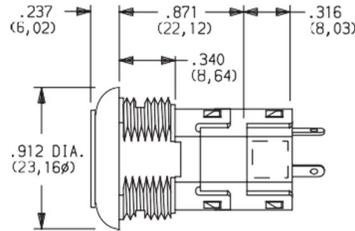
Available with Lock Finish '2' only.

SHORT ANTI-STATIC LOCK TYPES

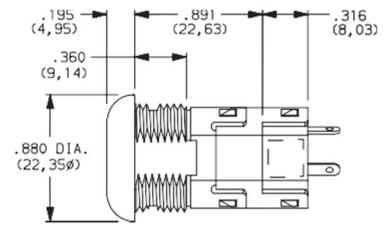
N 4 TUMBLER LOCK WITH SHORT ANTI-STATIC SWITCH (MOMENTARY MODELS ONLY)



R 4 TUMBLER LOCK WITH DETENT AND SHORT ANTI-STATIC SWITCH



W 6 TUMBLER TUBULAR LOCK WITH ANTI-STATIC SWITCH



Available with Lock Finish '2' only.

NOTE: For available option combinations, see chart on page H-10.
U.S. Pat. No. 4,639,562 Exceeds 20 KV DC static resistance @ sea level, lock body to terminals.

LOCK FINISH

2 (STD.) STAINLESS STEEL

1 NICKEL

4 POLISHED NICKEL

8 GLOSS BLACK

F POLISHED NICKEL



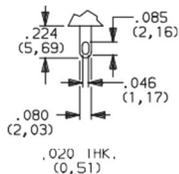
Available with
Lock Types 'V' & 'W' only.

NOTE: For available option combinations, see page H-10.

TERMINATIONS

03 (STD.) SOLDER LUG WITH HOLE

All Models Except Y190



01 SOLDER LUG WITH NOTCH

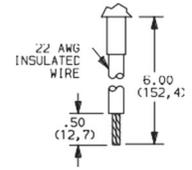
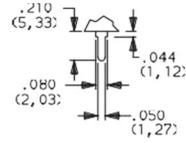
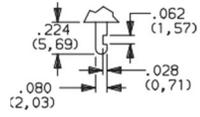
02 PC THRU-HOLE

WC WIRE LEAD

1015.

.020 THK.
(0,51)

.020 THK.
(0,51)



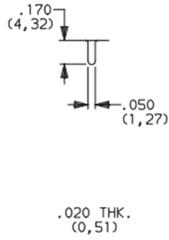
B
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C&K Y Series 4 & 6 Tumbler Switchlocks

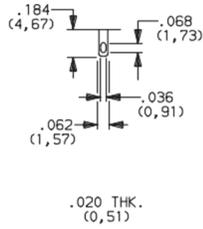


TERMINATIONS

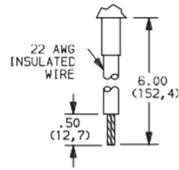
02 PC THRU-HOLE



07 SOLDER LUG WITH HOLE

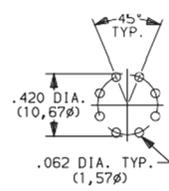


WC WIRE LEAD



Black wire standard, other colors and lengths available, consult Customer Service Center. UL style 1015.

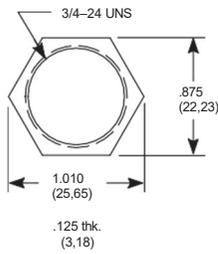
PC MOUNTING



Y190 Model Only

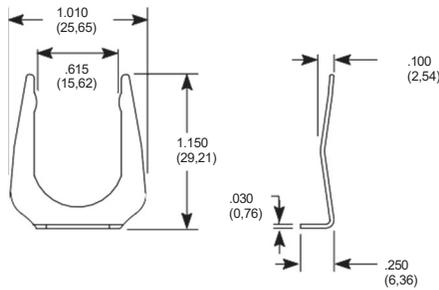
MOUNTING/LOCK STYLE

N (STD.) WITH NUT



Nut part number: 175050700

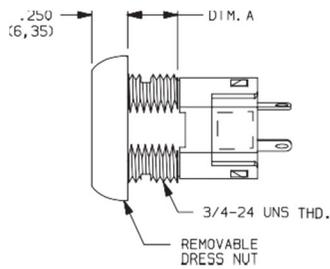
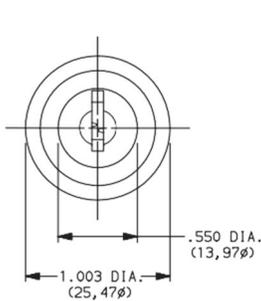
D WITH CLIP



Clip part number: 175050300

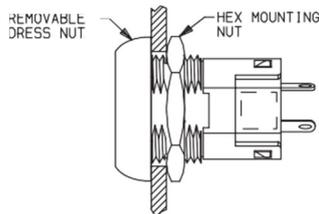
OPTION CODE	MOUNTING STYLE	PANEL THICKNESS
N	(STD.) WITH NUT	.085-.105 (2,16-2,67)
D	WITH CLIP	.085-.105 (2,16-2,67)

R REMOVABLE DRESS NUT



TYPICAL INSTALLATION

Install hex nut with enough clearance to allow for dress nut and panel. Place switch through cutout in rear of panel. Install and tighten dress nut by hand, then tighten hex nut. Always tighten assembly with back of panel hex nut to avoid damaging front of panel.



LOCK DIMENSIONS	
LOCK TYPES	DIMENSIONS
A, N	.270 (6,68)
C & R	.360 (9,14)

NOTE: Removable dress nut not available with Y1900A model.

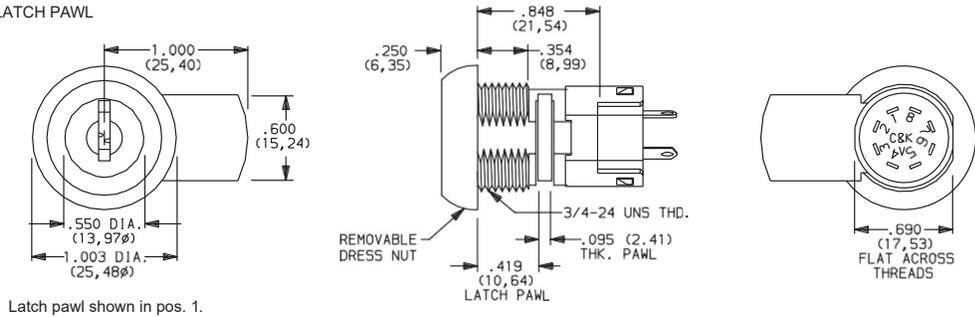


C&K Y Series 4 & 6 Tumbler Switchlocks



MOUNTING/LOCK STYLE

L REMOVABLE DRESS NUT WITH LATCH PAWL



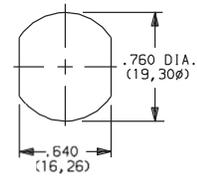
Latch pawl shown in pos. 1.

Mounting Information (All Models)

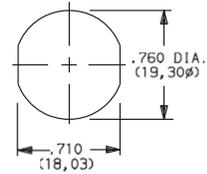
MOUNTING STYLES	PANEL THICKNESS		
	A, N LOCK TYPES	C, R LOCK TYPES	V, W LOCK TYPES
D	.065-.085 (1, 65-2, 16)		.085-.105 (2, 16-2, 67)
N	.105 (2, 67) max.	.195 (4, 95) max.	.215 (5, 46) max.
L	.215 (5, 46) max.		
R	.125 (3, 18) max.	.215 (5, 46) max.	

MOUNTING STYLES	AVAILABLE OPTION COMBINATIONS										
	LOCK FINISHES					LOCK TYPES					
	1	2	4	8	F	A	C	N	R	V	W
D	-	-	-	-	-	-	-	-	-	-	-
N	-	-	-	-	-	-	-	-	-	-	-
R	-	-	-	-	-	-	-	-	-	-	-
L	-	-	-	-	-	-	-	-	-	-	-

PANEL MOUNTING



For models with 'N' or 'D' mounting styles.



For models with 'R' or 'L' mounting style.

CONTACT MATERIAL

OPTION CODE	CONTACT AND TERMINAL MATERIAL	RATINGS	
Q (STD.)	SILVER ²	POWER	4 AMPS @ 125 V AC OR 28 V DC; 2 AMPS @ 250 V AC (UL/CSA).
B	GOLD ¹	LOW LEVEL/DRY CIRCUIT	0.4 VA MAX. @ 20 V AC OR DC MAX.
G	GOLD OVER SILVER ³	LOW LEVEL/DRY CIRCUIT OR POWER	0.4 VA MAX. @ 20 V AC OR DC MAX. OR 4 AMPS @ 125 V AC OR 28 V DC; 2 AMPS @ 250 V AC (UL/CSA).

CONTACT MATERIAL/APPLICATION RECOMMENDATIONS — SEE CHART, PAGE L-31.

¹ CONTACTS & TERMINALS: Copper, with gold plate over nickel plate.

² CONTACTS & TERMINALS: Copper, silver plated (std. with all termination options).

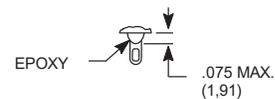
³ CONTACTS & TERMINALS: Copper, with gold plate over silver plate.

All models with all options when ordered with 'G' or 'Q' contact material.

SEAL

NONE (STD.) NO SEAL

E EPOXY SEAL



STI SERIES 2000 STOPPER STATIONS

Standard and custom, ADA compliant, low/high voltage switches

These North American style, ADA compliant, multi-purpose push-button switches cover a wide range of applications both indoors and outdoors. They're called Stopper Stations because they incorporate a unique, patented design that helps dramatically to stop accidental activation. A number of standard models are available for speedy delivery or we can create custom units to meet your needs exactly. Either way, you have your choice of any of five universal colors identifying switch usage, wording and language.

They work as great as they look

Because of their superior, patented design combined with quality construction throughout, you can expect outstanding performance for years to come. In fact, many STI customers are surprised to find that all this quality is available at no increase in price. Plus, customers appreciate the option to protect the switches with STI protective covers which carry a lifetime guarantee against breakage in normal use. For indoor applications, you can order your Stopper Station with a pre-alarm cover to help stop malicious activation.



SS-2004



SS-2204



SS-2400



SS-2107X



SS-2301



SS-2403E



Features

- Unique, curved design helps protect against accidental activation.
- Stainless steel backplate.
- 5VA flammability rating on backplate and spacer.
- Station housing molded of super-tough polycarbonate.
- Illuminated button ratings are 0.125 amps @ 250 VDC or 7 amps @ 250 VAC.
- Your choice of colors—red, green, yellow, white or blue.
- Raised standard or custom vinyl labeling.
- Polycarbonate tested -40°F (-40°C) to 120°F (49°C).
- Wording in virtually any language.
- Interchangeable or replaceable N.O. or N.C., SPST gold-plated contact blocks rated for 3 amps @ 600 VAC or 1 amp @ 250 VDC.
- ADA compliant.
- Lifetime guarantee against breakage of polycarbonate cover (one year on electronic components).



Safety Technology International, Inc.
2306 Airport Road · Waterford, Michigan 48327-1209
Phone: 248-673-9898 · Fax: 248-673-1246
Toll Free: 800-888-4STI · E-Mail: info@sti-usa.com

Web: www.sti-usa.com

Safety Technology International (Europe) Ltd.

Unit 3 Olton Wharf · Richmond Road · Olton

Solihull · B92 7RN · England · Telephone: 44 (0) 121 707 2999

Facsimile: 44 (0) 121 707 8999 · E-mail: info@sti-europe.com Web:

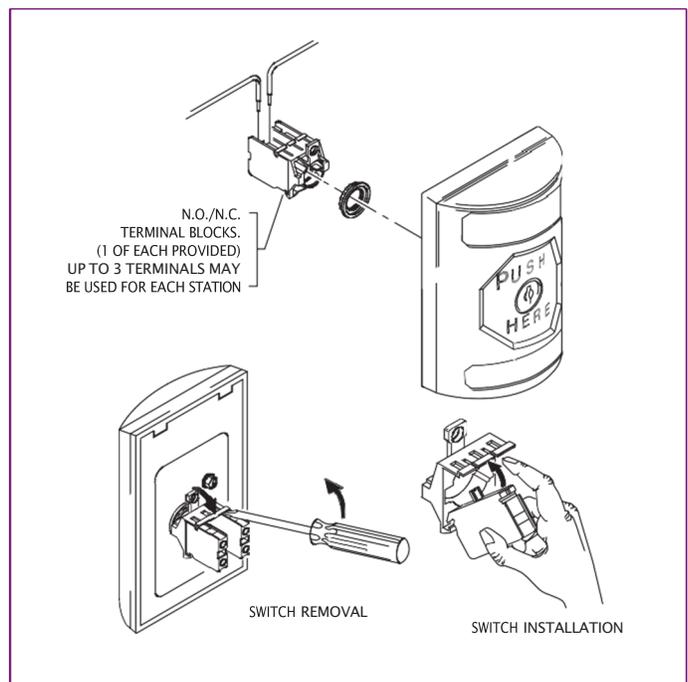
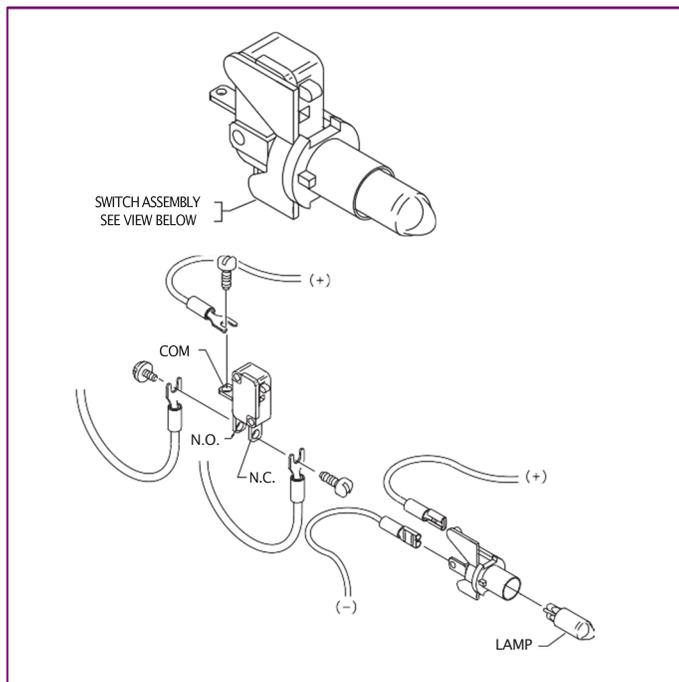
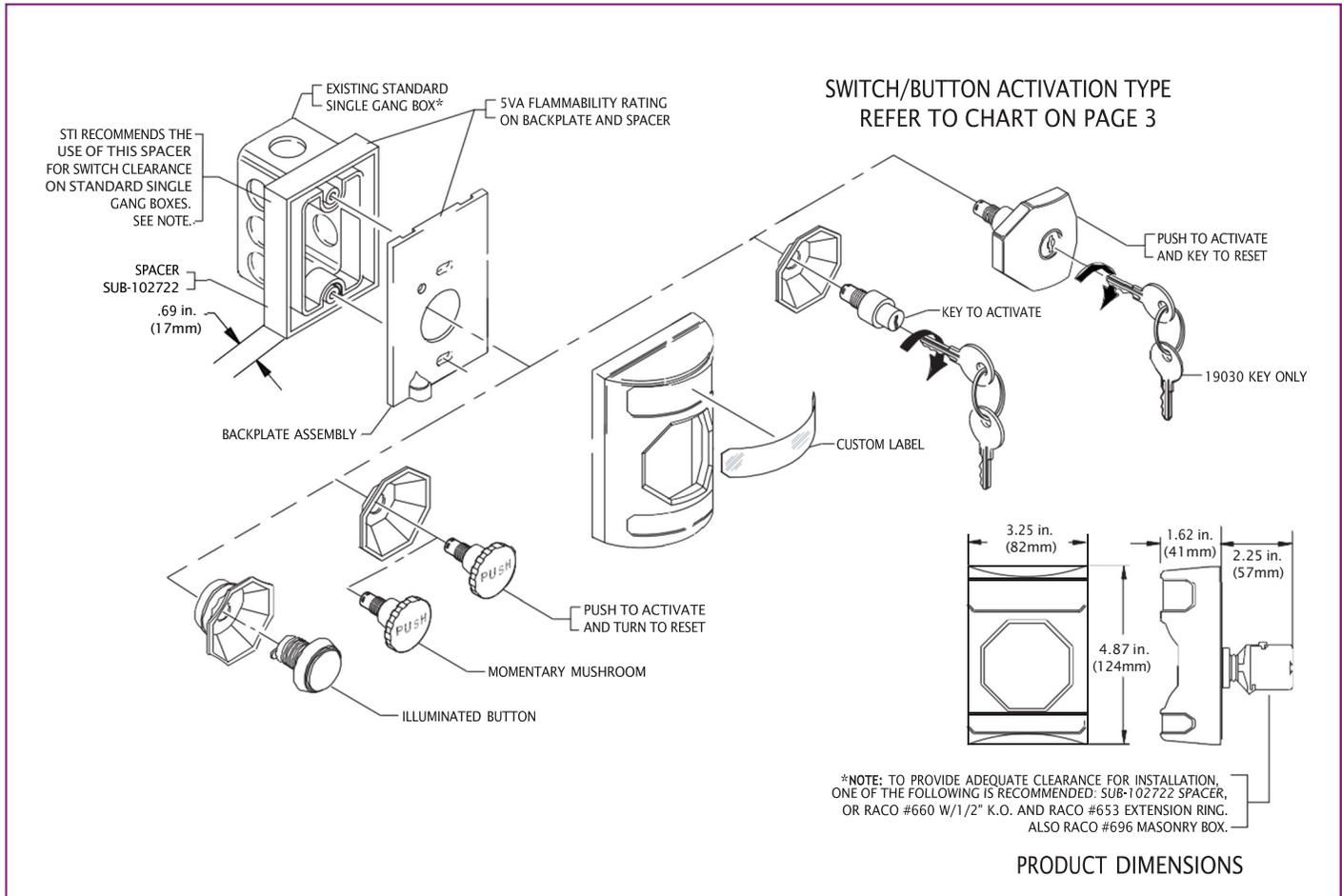
www.sti-europe.com

Dimensions and Technical Information

Testing Approvals

It has been tested and approved or listed by:

- Underwriter Laboratories No. S7255
- Canadian Underwriter Laboratories No. S7255
- ADA compliant





CASE

CASE WESTERN RESERVE UNIVERSITY

Drawing Name:

Card Access Door — Standard Wire Usage

Drawn By:

CFV

Date

4/7/04

Card Reader — 8/22 Shielded

- RED— +VDC
- BLACK— -VDC
- WHITE— DATA*
- GREEN— DATA*
- BLUE— LED
- BROWN— BEEP
- YELLOW— TAMPER
- ORANGE— TAMPER

- * LITTON CONVERSIONS— GREEN = DATA 1 WHITE = DATA 0
- * NEW INSTALLATIONS— GREEN = DATA 0 WHITE = DATA 1

WHEN USING THE MR-10-OT READER—ORANGE & YELLOW ARE SPARES

Peripheral Devices — 12/22

- RED— RQE +VDC
- BLACK— RQE -VDC
- GREEN— DOOR CONTACT
- WHITE— DOOR CONTACT
- BLUE— REX CONTACT
- BROWN— REX CONTACT
- YELLOW— PIEZO +VDC
- ORANGE— PIEZO -VDC
- VIOLET— SPARE
- SLATE— SPARE
- PINK— SPARE
- TAN— SPARE

Mag Locks — 18/4

- RED— LOCK +VDC
- BLACK— LOCK -VDC
- GREEN— SPARE
- WHITE— SPARE

SECTION 28 23 00 - VIDEO SURVEILLANCE SYSTEMS

CLOSED CIRCUIT TELEVISION (CCTV) INTERNET PROTOCOL (IP) CAMERA SYSTEM

1.0 CLOSED CIRCUIT TELEVISION (CCTV)

1.1 GENERAL DESCRIPTION

The CCTV IP-camera system shall include be one of the following types:

AXIS Q6035-E-1080P – PTZ Outdoor

AXIS P3346 – Fixed Outdoor/Indoor

The CCTV IP-camera system will be capable of user selectable video compression rates of H.264, MPEG-4 or MJPEG.

1.2 CLOSED CIRCUIT-TELEVISION (CCTV) IP CAMERA EQUIPMENT

The CCTV communications subsystem will provide for two basic functions: (1) the exchange of control and status data from the local control to the IP-camera and the pan tilt zoom (PTZ) unit on which the IP-camera is mounted, and (2) the transmission of images from the video IP-camera to the local control.

Video images will be generated at the CCTV Site at the rate of no less than thirty frames per second according to the applicable Multi-stream H.264, MPEG-4 and motion JPEG. Images captured by the IP camera will be continually transmitted via hardwired communication to the IP-camera control unit.

1.3 FUNCTIONAL PROVISIONS

The CCTV will include, but not be limited to, the following components and features:

- Password Protection: Programmable settings with optional password protection
- Open API for software integration
- A CCTV IP camera with auto focus zoom lens in an outdoor dome attached to the IP-camera-lowering device.
- A domed, watertight, environmental housing with an integrated positioner for pan and tilt unit
- and CCTV IP-camera, as determined per IP-camera site by the Department and as detailed herein, within the plan set, and/or in the Contract;
- Domed mounting hardware of the vertical or adapted wall mounting type with no exposed camera control wiring;
- IP-Camera site Exterior Ethernet Cat-6 STP or equal composite cabling;
- Junction boxes as required herein, within the plan set, and/or in the Contract;
- IP-Camera control electronics and equipment (i.e., hardware and software);
- A IP-CCTV assembly with azimuth positioning capabilities;

- Exterior Ethernet STP Cat-6 or equal composite , power, and data/video cables for power supply, images, and camera controls;
- Transient voltage suppression and protection;
- IP-Camera Controller.

1.4 IP-CAMERA ASSEMBLY ELECTRICAL PROVISIONS

The IP-camera assembly will be furnished with any and all equipment required for a fully functional system, including all appropriate power and communication cables as defined by the manufacturer. The power cables will be sized to meet the applicable National Electrical Code (NEC) requirements. The communication cables from the IP-camera assembly to the network communication devices will be appropriate for the technology employed (e.g., fiber optic, twisted pair,) and will meet the minimum size and/or bandwidth requirements defined by the manufacturer. The Exterior camera CAT-6 STP or equal composite cable will be outdoor NEC rated.

All devices supplied as system components will accept, as a primary power source, of 120 volts alternating current (VAC)/60 Hertz (Hz) input, excluding cameras. Any device that requires source input other than 120 VAC/60 Hz, such as cameras, PTUs, and dome heaters/blowers that operate at 24 volts, will be furnished with the appropriate means of conversion.

1.5 PROTOCOL

At a minimum, the following supported Protocols will be provided for the IP-Camera:

- IP, HTTP, UPnP, SNMP, RTSP, RTP, TCP, UDP, IGMP, DHC, H.264, MPEG-4, MJPEG

1.6 IP-CAMERA ASSEMBLY PERFORMANCE PROVISIONS

1.6.1 IP-CAMERA IMAGE SENSOR PROVISIONS

The CCTV IP-camera image sensor will be a day/night camera that provides color images during daytime and black and white (monochrome) images during nighttime both with manual or automatic control capabilities. The IP-camera video output will be compliant with **ITU-T Video Coding Experts Group (VCEG)** and **ISO/IEC Moving Picture Experts Group (MPEG)** standards. The IP-camera sensor will be a Charge-Coupled Device (CCD) with 1/4 inch Progressive Scan.

The minimum resolution supported will be NTSC: 700x480 to 176x120. The CCTV assembly will provide video images with minimal quality/bandwidth degradation in various environmental conditions. The CCTV assembly will provide low light-level sensitivity to achieve desired levels of operation at night.

The IP-Cameras will include frame integration to enhance night viewing. Minimum illumination at (COLOR) 0.5 lux at 30 IRE and (B/W) .008 lux at 30 IRE. Make a videotape that verifies the CCTV IP-camera performance during night conditions at five CCTV IP-camera locations. The selected five locations will be approved by the Department before making the videotape. This field demonstration test will be performed and the results approved by the CASE representative before the IP-camera selection is finalized.

The IP-camera will support the following image settings:

- Wide Dynamic Range (WDR),
- Electronic Image Stabilization (EIS),

- Manual shutter time color, brightness, contrast, sharpness
- Text and image overlay and privacy mask

The IP-camera will support automatic shutter time/speed that is selectable allow setting to yield optimal results under low lighting conditions without blooming or smearing.

The IP-camera sensor will support automatic and manual iris adjustment. The IP-camera will support Automatic Gain Control (AGC). The IP-camera assembly will be capable of generating and overlaying lines of English language text on the video image. A minimum of twenty alphanumeric characters per line will be supported. Control (enable, disable, and edit) of this feature will be available remotely and at the site using a laptop computer. The text messages will be stored in non-volatile memory. The IP-Camera ID text will consist of one line of text. Sector text will consist of text messages that change based on the position of the IP-camera within a sector. A minimum of eight uniform sectors will be provided.

The IP-camera will include privacy zones so that the operator cannot view scenes at preprogrammed camera positions. This prevents viewing the windows of private homes, hotels, or other buildings in the vicinity of the camera. The privacy zones will be user definable. There will be a minimum of eight privacy zones. Provide a IP-camera interface compatible with the communication equipment.

1.6.2 IP-CAMERA LENS PROVISIONS

The IP-camera lens will be motorized, and be mechanically or electrically protected from overrunning in extreme positions. Integrated camera/lens combination may be substituted.

Optical zoom range will be 35X. Digital zoom range will be 1X through 12X with a smooth transition from optical to digital zoom.

The lens will have an automatic iris capability with manual override.

The zoom lens will be selected automatically or manually to provide a minimum focal length of 0.14 to 3.2 inches (3.5 to 81 mm) that provides the full coverage of the corridor mainlines and shoulders. The minimum focusing distance will be a distance of 4 feet (1.2 m). The lens will also have a minimum aperture of f/1.2 and a 1/4 inch [0.6 cm] with 10 preset position points. The iris, zoom and focus will be controlled from the central location via HTTP protocol. The motors controlling the iris, zoom and focus will not be damaged due to overload at travel limits. The IP-camera lens will support optical zooming ranging from 2.5° telephoto (max) to 25° wide angle (min). The IP-camera will support automatic focus adjustments, with manual override. Vibration or ambient temperature changes will not affect the automatic iris function, focus mechanism, and zoom mechanism.

The IP-camera/lens combination will support automatic recovery from over and under voltage conditions, when power is returned to normal values. The lens will return to the last position prior to the over/under voltage condition.

The dome lens will be optically clear, impact resistant and acrylic. The acrylic dome lens will not yellow, introduce appreciable light loss, or distort over a 10-year service life when exposed to anti-icing chemicals. Certification of meeting this requirement will be required. The dome lens will be of anti-fog design with nominal light loss of no greater than 5 percent and geometric distortion of no more than 1 percent.

1.6.3 IP-CAMERA PAN/TILT UNIT (PTU)/POSITIONER PROVISIONS

The PTU will be a doom integrated motorized, remotely controlled device that allows the operator to point the IP-camera into a pan (horizontal vectoring) range with the following requirements:

- 360° Continuous rotation capability in either direction. Software limits provided for pan mode.
- 90° of tilt movement, video rotation at 90° down with auto-flip.
- Pan Speed (Operator Control): Variable from 0.1°/s to 80 °/s
- Pan Speed (Preset Control): minimum 200°/s
- Tilt Speed (Operator Control): Variable from 0.1°/s to 40 °/s
- Tilt Speed (Preset Control): 60°/s
- Minimum sixty-four preset positions with repeatability within $\pm 0.1^\circ$

1.6.4 IP-CAMERA CONTROLLER

The IP-camera controller will provide a single point interface for control and video communications. It will also provide a single point interface for prime power that provides power protection, conversion, and distribution to the IP-camera assembly.

1.7 IP-CAMERA ENVIRONMENTAL ENCLOSURE PROVISIONS

The CCTV IP-camera assembly will meet NEMA Type 4X and IP66 environmental standards and include an unpressurized dome-type housing enclosure with an minimum ambient operating temperature of -40 to 140 °F (-40 to 60 °C) with 100 percent relative humidity that provides complete protection for the camera and zoom lens assembly from moisture and airborne contaminants. The enclosure will protect the camera electronics and zoom lenses from blowing rain at storm rates, blowing sand, blowing dust, temperature, and solar loading, with an internal heater and blower. The enclosure will be corrosion resistant, and mountable in a manner, which leaves no exposed cabling. The maximum outside diameter of the dome will be a minimum of 11.1 inches (280 mm), with a maximum overall dimension of 15 X 15 in (380 x 380 mm).

The dome-type housing's lower section will be site-coated with Rain-X or an equivalent product prior to final acceptance;

1.8 IP-CAMERA CONSTRUCTION PROVISIONS

Furnish all tools, equipment, materials, supplies, and manufactured articles, and perform all operations and equipment integration necessary to provide a complete, fully operational IP-camera site as depicted herein, within the plan set, and/or in the Contract.

Provide CASE with a written inventory by location including serial numbers of items received and the condition in which they were received. Once received, the equipment becomes the Contractor's responsibility. Provide all labor and equipment necessary to move inventory out of the designated storage facility and to transport it to the installation location. All items will be installed in accordance with the manufacturer's instructions or as directed by a CASE representative.

Messenger wire (if required) will be used for all overhead wiring of IP-camera cable. Cables will be attached to messenger wire as per plan sheet TC-24.81.

If it is determined that radio frequency interference (RFI) is inducing noise and degrading the quality of the video images being transmitted by the IP-camera assembly or its components, if required by the Department, furnish and install ferrite coils or other radio frequency (RF) suppression devices for RFI dampening. This installation and the placement of these RF suppression devices will be as recommended by the manufacturer. The furnishing and installation of these devices will be an ancillary cost to the IP-camera assembly pay item.

1.9 IP-CAMERA TESTING PROVISIONS

Testing process will include IP-camera cable testing and IP-camera local control testing.

CASE will be notified at least fourteen working days prior to installation of the IP-camera assembly so that the CASE representative can be present to establish the appropriate CCTV settings.

1.9.1 IP-CAMERA CABLE TESTING PROVISIONS

Furnish all equipment, appliances, and labor necessary to test the installed IP-camera cable between the IP-camera assembly and the network communication device. Before any connections are made.

- Verify exterior IP-camera CAT-6 STP cable is outdoor NEC rated and is compliant to Telecommunications Industry Association (TIA). International Organization for Standards (ISO/IEC) creates and maintains standards for telecommunication cabling.
- Perform a cable analysis to ANSI/TIA-568-C.2 standards of category 6 cabling and continuity test on the IP-camera cable, which must not exhibit any discontinuities, such as openings, shorts, crimps, or defects;
- Replace any cable that fails to meet these parameters, or if any testing reveals defects in the cable, and retest new cable as specified above; and
- Furnish all test equipment.

1.9.2 IP-CAMERA LOCAL CONTROL TESTING

The following local field operational tests will be performed at the IP-camera assembly field site in accordance with the test plans. A computer will provide IP-camera control and positioning. After the IP-camera assembly, including the camera hardware, power supply, and connecting cables, has been installed:

- Verify that physical construction has been completed as detailed herein, within the plan set, and/or in the Contract;
- Inspect the quality and tightness of ground and surge protector connections;
- Check the power supply voltages and output;
- Connect devices to the power source;
- Verify installation of specified cables and connections between the IP-camera, PTU, and IP-camera control receiver;
- Connect to IP-camera through a laptop Ethernet connection and establish communication with IP-camera via TCP/IP-HTTP protocols.
- Set the IP-camera address;
- Verify the presence of industry compliant video image i.e. H.264 with local or remote laptop/computer,. Exercise the pan, tilt, zoom, focus, iris opening, and manual iris control selection, and the operation, low pressure alarm (if present), preset positioning, and power on/off functions;
- Observe the video picture on a laptop/computer,; Demonstrate IP-camera sensitivity at low light levels to meet the provisions;
- Demonstrate the pan/tilt speed and extent of movement to meet the provisions;

- Verify proper voltage of all the power supplies.

1.10 VENDOR AND MANUAL PROVISIONS

Provide a training and maintenance manual for the IP-camera assembly and the CCTV networks, including detailed provisions and information regarding the following CCTV system components.

Weight and dimensions;

Resolution;

Sensitivity;

Power consumption;

Optical zoom range;

Digital zoom range;

Zoom and focus presets;

Pan/tilt presets;

Ethernet connection;

Security;

Supported network protocols;

Video Compression;

Frame Rate;

Number of video streams and stream outputs;

IP-Camera control interface as required by recommended Standard

10/100 Base-T RJ-45 Ethernet, etc.;

Operating temperature and relative humidity; and General maintenance procedures

Provide documentation detailing the technical and operational aspects of the completed system. This will include device manuals, system diagrams, cabling diagrams, any and all field engineering notes specific to each installed IP-camera assembly, and any other documentation as required by CASE.

1.11 WARRANTY

Equipment furnished under this Specification will be guaranteed to perform according to these specifications and to the manufacturer's published specifications. Equipment will be warranted for a minimum of five (5) years from time of installation against manufacturer's defects and/or failure in design, materials or workmanship. Unless otherwise specified in the invitation for bids, warranty coverage will become effective on the date of final acceptance of the system by CASE. The CCTV IP-camera system manufacturer(s) will assign to CASE all manufacturer's normal warranties or guarantees, on all such electronic, electrical and mechanical equipment, materials, technical data, and products furnished for and installed on the project. Defective equipment will be repaired or replaced, at the manufacturer's option, during the warranty period at no cost to CASE. The manufacturer will provide replacement parts and/or complete unit(s) within ten (10) business days after notification by CASE.

END OF SECTION

SECTION 28 31 10 - FIRE DETECTION AND ALARM SYSTEMS - GENERAL

1.1 GENERAL

- A. Case Western Reserve University (CWRU) Protective Services coordinates the testing, maintenance and upgrading of all campus Fire Detection and Alarm Systems. The interfacing of all building Fire Detection and Alarm Systems to the campus Central Monitoring System (Lenel) or to any monitoring system will be done in coordination with CWRU Protective Services. All Fire Detection and Alarm Systems equipment shall be coordinated with the design of the facility and the stated operational use of the facility, and shall be approved by Protective Services.

1.2 GENERAL SCOPE OF WORK

- A. An Addressable Fire Detection and Alarm System shall be provided throughout the building to satisfy all National, State and Local Codes, including ADA Guidelines.
- B. In existing buildings where the Fire Detection and Alarm System is being replaced, the new system shall be completely installed, tested, and approved prior to the disconnection and removal of the old system. After the new system has become operational, Contractor shall remove the existing system in its entirety and repair all finished surfaces to a "like new" condition.
- C. The Fire Detection and Alarm Systems shall include a main control panel with battery back-up, a remote annunciator panel, all devices, backboxes, and amplifiers/power supplies required.
- D. All Fire Detection and Alarm Systems shall report to the local security system panel for release of all electro-magnetically locked doors and notification to the Fire Department.
- E. All Fire Detection and Alarm System devices and equipment shall be flush mounted in finished areas unless otherwise noted. All masonry walls shall be channeled, patched and painted to match existing finishes, as directed by CWRU.

1.3 REQUIRED LOCATIONS

- A. In addition to the location of devices required by the OBC and NPFA 72, fire alarm initiating and annunciating appliances shall be provided as follows:
 - 1. Area Smoke Detectors:
 - a. Communication Closets.
 - b. Corridors/Atriums.
 - c. Electrical Rooms.
 - d. Elevator Machine Rooms and Lobbies.
 - e. Laboratories.
 - f. Mechanical Rooms.
 - g. Residence Hall Suites.
 - h. Rooms with high value equipment or research material.
 - i. Storage Rooms.

- j. SER Rooms.
2. Audible or Visual Annunciating Appliances:
- a. Classrooms.
 - b. Lecture Halls.
 - c. Resident Room Suites.
 - d. Toilet Rooms.
 - e. Elevator Lobbies and Cars

1.4 FIRE ALARM PERFORMANCE MATRIX

- A. See **Attachment 28 31 10.01** for the “Fire Alarm Performance Matrix”, sometimes referred to as the “Sequence of Operation.”

1.5 SPECIAL CONDITIONS

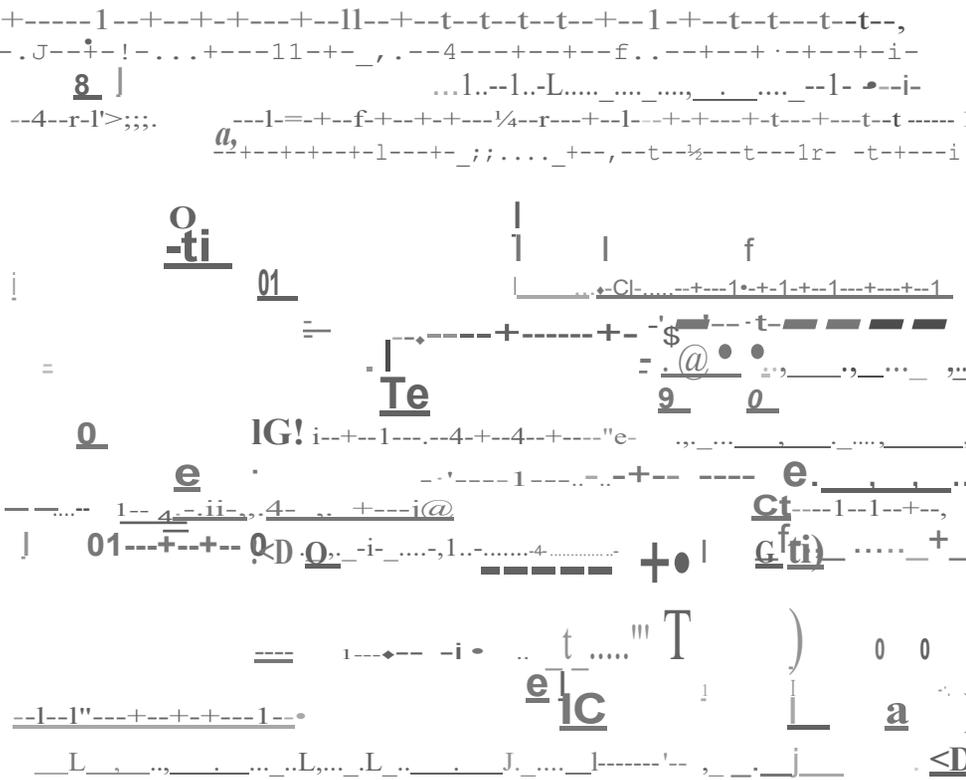
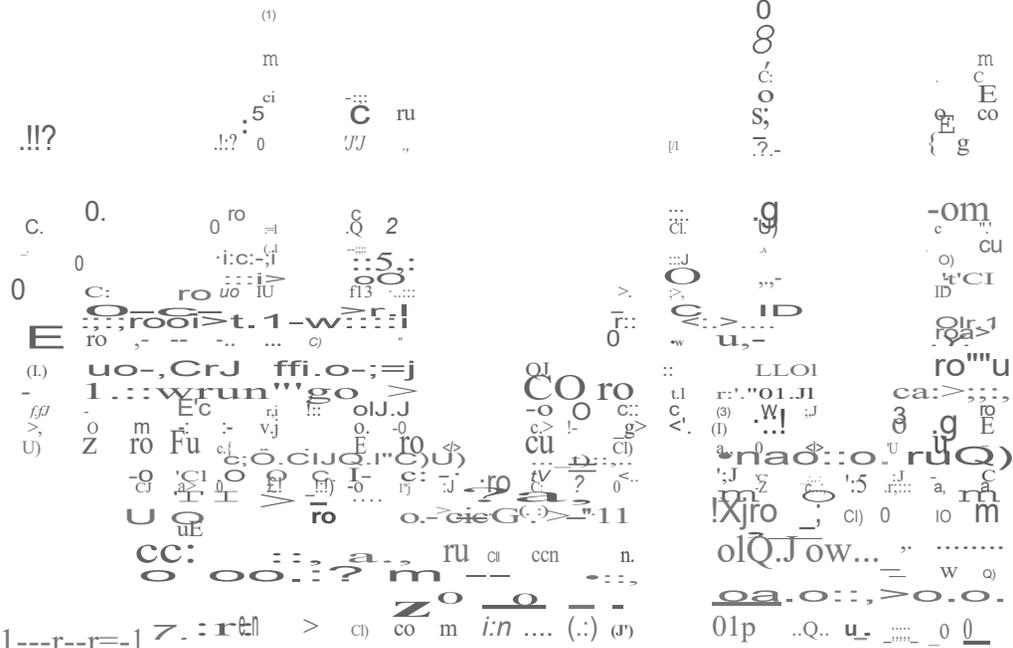
- A. In renovation work, while the intent is to provide a complete and operational Fire Detection and Alarm System upgrade, the building may contains sensitive finishes that need to be considered. Contractor shall utilize extreme care while working near sensitive finishes and shall provide protection as directed by Owner. Such protection shall include relocation and storage of removable artwork and covering of all permanent artwork. All methods of protection shall be approved by the owner prior to commencing work. All liabilities for damage occurring during the project shall be borne by the Contractor under a separate agreement with the Owner.
- B. Buildings may be utilized for individual testing. If that is the case, Contractor shall coordinate with the Owner to allow for the accessibility of testing areas and Contractor shall work operations around the testing areas.
- C. All wiring shall be in conduit. The minimum conduit size for all wiring is 1/2”. The use of wiremold is permitted on stone walls or ceilings with plaster on concrete. Wiring shall be concealed in all stud walls or suspended ceilings. All wiremold shall be painted to match adjacent surfaces. Above accessible ceilings, plenum rated wiring may be utilized, except in residence halls. The wiring shall be supported by wall mounted bridal rings at approximately 36” on center.
- D. Exposed conduits in unfinished spaces shall have a band of red paint every five feet.
- E. Contractor shall provide (3) copies of the Operating and Maintenance Manual for the fire alarm system. These manuals shall include all cut sheets and wiring diagrams as provided by equipment manufacturer.
- F. The Fire Detection and Alarm System shall provide a general evacuation signal throughout the building when activated.
- G. Fire Detection and Alarm System testing shall be completed during normal business hours, and pre-scheduled with CWRU.

END OF SECTION

S-y s t e r n I n p u t s

l o c a t i o n

- 1 Rate of Rise/135°F Fixed Heat Detector Attic
- 2 135°F Fixed Heat Detector AHJc
- Rate Compensating Detector Basement Storage
- 4 Rate of Rise/135°F Fixed Heat Detector 1st Floor Storage
- 5 Thermal-Rated Cable Detector 1st Floor Storage
- 6 Manual Pull Station 3rd Floor West
- 7 Sprinkler Valve Tamper Switch 2nd Floor Sprinklers
- 8 Water Flow Switch 2nd Floor Sprinklers
- 9 Ionization Smoke Detector 1st Floor West Wing
- 10 Ionization Smoke Detector 1st Floor Center
- 11 Ionization Smoke Detector 1st Floor East Wing
- 12 Gas Detector (Liquid or Natural Gas) Basement Mechanical Room
- 13 Ionization Smoke Detector 3rd Floor Restaurant
- 14 Infrared Flame Detector 1st Floor South
- 15 Ionization Smoke Detector 3rd Floor South
- 17 Beam Detector (CICClO) Atrium 2nd Level
- 18 Duct Detector with Sample 13rd Floor HVAC Return
- 19 Hourly Detector (In-Outlet Mounted) HVAC Supply



FIRE ALARM
PERFORMANCE MATRIX

SECTION 28 31 20 - FIRE DETECTION AND ALARM SYSTEMS - DEMOLITION

1.1 RELATED DOCUMENTS

- A. Divisions 00 and 01 contain additional provisions that apply to this Section and shall be reviewed thoroughly.

1.2 TIMING AND COORDINATION OF DEMOLITION

- A. Existing Fire Detection and Alarm Systems shall remain in use until new Fire Detection and Alarm Systems have been installed, tested, and approved. After complete installation, testing, and approval of new Fire Detection and Alarm Systems, Contractor shall disconnect and remove all existing Fire Detection and Alarm Systems, in their entirety, and repair all finished surfaces to a “like new” condition.

1.3 SCOPE OF WORK

- A. “Electrical equipment” and “electrical work”, as used in this section, shall refer to Fire Detection and Alarm System devices, conduit, wire and all other power and communication system devices.
- B. Contractor shall remove and/or relocate all existing electrical work made necessary because of project alterations as indicated or implied on the Contract Documents of all trades. All existing electrical equipment and systems not affected by these changes shall remain and shall be protected whether shown on the Drawings or not.
- C. Contractor shall maintain existing circuit continuity as described in the Specifications and on the Drawings, or as required for continued operation of the electrical equipment and systems.
- D. Electrically disconnect equipment shall be removed at the point of power source. Conduit and wiring from equipment shall be removed completely back to the point of power source.
- E. Where building systems or circuits are interrupted because of the demolition work, they shall be rerouted or relocated, modified and reconnected to provide a continuous system.
- F. All cutting, patching, finishing, etc., for removed and relocated electrical equipment shall be included as part of the Electrical Work. All holes and damage caused by the demolition work shall be properly patched with suitable materials to match existing surfaces. All painting shall cover a wall from corner to corner and floor to ceiling and shall cover the ceiling from wall to wall or break in the ceiling plane.
- G. All existing equipment indicated to be salvaged by the Owner shall be carefully removed and stored on site by the Contractor for review by the Owner. All equipment acceptable to the Owner shall be delivered by the Contractor to the Owner’s storage facility and all other materials, equipment and debris shall become the property of the Contractor and shall be removed from the site.

- H. In all cases where existing branch circuit conduit and wiring is to be re-used within the remodeled area, the Contractor shall test for grounding continuity and shall test the existing branch circuit wiring as though new, in accordance with the testing procedures outlined elsewhere in these Specifications.
- I. All empty conduits from demolished fire alarm wiring shall be disconnected and removed. Where conduits are embedded in the structure, cap existing empty conduits, provide blank cover plates and plug open knockouts in existing electrical equipment.
- J. Properly dispose of all ionization type smoke detectors during demolition work as required by Local, State and Regional Codes.
- K. Properly dispose of batteries during demolition work as required by Local, State and Regional Codes.

END OF SECTION

SECTION 28 31 30 - FIRE DETECTION AND ALARM SYSTEMS – EQUIPMENT

1.1 RELATED DOCUMENTS

- A. Divisions 00 and 01 contain additional provisions that apply to this Section and shall be reviewed thoroughly.

1.2 WORK INCLUDES

- A. Provide Addressable / Voice Fire Detection and Alarm System.
- B. For use in high rise buildings requiring voice evacuation. Replace voice devices with horns in other buildings.
- C. CWRU Protective Services coordinates the testing, maintenance and upgrading of all campus fire systems. The interfacing of all building fire alarm systems to the campus Central Monitoring System (Lenel) or to any monitoring system will be done in coordination with CWRU Protective Services. All fire alarm equipment will be coordinated with the design of the facility and the stated operational use of the facility, and shall be approved by Protective Services.

1.3 QUALITY ASSURANCE

- A. All Fire Detection and Alarm Systems (the System) shall be the product of a single manufacturer, shall bear the Underwriter's Laboratory (UL) label, and shall meet the requirements of the NEC, NFPA, ASME/ANSI and all State and Local Codes. All control equipment shall be listed under UL category UOJZ as a single control unit. All System components shall be FM approved.
- B. All System control equipment shall be provided with transient protection to comply with UL864 requirements.
- C. All System controls shall be UL listed for Power Limited Applications.
- D. Entire System shall conform to the latest requirements of the Americans with Disabilities Act (ADA).
- E. State of Ohio Certification for installation of each complete System shall be provided to the Owner prior to the start of any installation.

1.4 ACCEPTABLE EQUIPMENT MANUFACTURERS

- A. System:
 - 1. Simplex.
 - 2. Fire Control Instruments.

- B. All associated equipment shall be from the same manufacturer whenever possible.

1.5 DESCRIPTION OF WORK

- A. Furnish and install a complete, operating, multiplexed, Addressable/Voice Fire Detection and Alarm System (the System) as specified herein. Include sufficient wiring, conduit, terminations, electrical boxes, and all other necessary material for a complete operating system.
- B. The System shall be microprocessor based and shall allow for loading and editing special instructions and operating sequences. The System shall be capable of on-site programming to accommodate system expansion and facilitate changes in operation. All software operations shall be stored in a non-volatile programmable memory within the System Control Panel. Loss of primary and secondary power shall not erase the instructions stored in memory. Full flexibility for selective input/output control functions based on ANDing, ORing, NOTing, timing, and special coded operations shall also be incorporated in the resident software programming of the system.
- C. The programmable software shall allow for full configuration of initiating circuits such that additional hardware shall not be necessary to accommodate changing sensing of normally open contact devices to sensing of normally closed contact devices, changing sensing of normally open contact devices to sensing of a combination of current limited and non-current limited devices on the same circuit and being able to differentiate between the two, and changing from a non-verification circuit to a verification circuit. The software shall allow for configuration of indicating appliance and control circuits so that hardware shall not be necessary to accommodate changing a non-coded indicating appliance circuit to a coded circuit.
- D. The System shall have the capability of recalling alarms and trouble conditions in chronological order for the purpose of recreating an event history.
- E. Existing Buildings: All panels and peripheral devices shall be furnished to the Contractor by the Owner. The System shall be by Fire Control Instruments as represented by Continental Fire and Security, Inc. (Mr. Terrence Kovacs, 216-749-5522).
- F. New Buildings: All panels and peripheral devices shall be furnished by the Contractor. The System shall be by Fire Control Instruments as represented by Continental Fire and Security, Inc. (Mr. Terrence Kovacs, 216-749-5522).
- G. All panels and peripheral devices shall display the manufacturer's name on each component. The catalog numbers specified under this section are those of Simplex Time Recorder Co.
- H. Fire Control Instruments, FCI, (as distributed by Continental Fire and Security) shall be an acceptable alternate manufacturer.

1.6 DESCRIPTION OF OPERATION

- A. The Fire Detection and Alarm System (the System) alarm operation after activation of any manual station, automatic detection device, or sprinkler flow switch shall be as follows:

1. All alarm indicating devices shall operate until the System is reset.
 2. All audible alarm indicating devices shall sound a continuous fire alarm signal (custom voice message or tone) until the System is reset.
 3. All visible alarm indicating devices shall flash continuously until the System is reset.
 4. All doors normally held open by door control devices shall release.
 5. A supervised signal to notify the campus security service shall be activated.
 6. All smoke dampers shall close.
 7. If a Smoke Control System is a part of the Work, then it shall be activated. For high rise buildings, atrium spaces, etc. verify requirements with Mechanical Engineer and local Fire Marshall having jurisdiction.
 8. All mechanical air handling units with duct smoke detectors shall shutdown in accordance with NFPA 90. For high rise buildings, atrium spaces, etc. verify requirements with Mechanical Engineer and local Fire Marshall having jurisdiction.
 - a. Provide duct smoke detectors in return ductwork (Per Ohio Mechanical Code, 606.2.1) and supply ductwork (Per NFPA 90A, 4-4.2(1)) for all air handling units with greater than 2,000 CFM of supply air distribution.
 - b. Upon reset of the fire alarm system, mechanical air handling units shall sequentially start up to minimize power demand.
 - c. "On/Off/Auto" switches with software for the automatic mode shall be provided in the Control Panel, with separate and distinct "on" and "off" LED indicators. Manual control shall override the automatic function.
 - d. The alarm activation of any elevator control smoke detector shall, in addition to the other operations listed, cause the elevator cabs to be recalled according to the following sequence:
 - e. If the alarmed detector is on any floor other than the main level of egress, the elevator cabs shall be recalled to the main level of egress.
 - f. If the alarmed detector is on the main egress level, the elevator cabs shall be recalled to the predetermined alternate recall level as determined by the local authority having jurisdiction.
 - g. All elevator control detectors shall be wired directly to the elevator controller through dedicated contacts on the detector base, and they shall be monitored by an addressable interface module.
 9. The alarm activation of any elevator control heat detector shall, in addition to the other operations listed, cause the power to the elevator controllers to shutdown.
 10. All security system doors shall unlock.
 11. All Sprinkler and Fire Suppression Control Panels shall be monitored and/or activated as described on the Drawings.
- B. If a part of the Scope of the Work, all alarms shall be displayed on an alphanumeric LED display. The system alarm LED shall flash on the Control Panel (and the Remote Annunciator) until the alarm has been acknowledged. Once acknowledged, this same LED shall latch on. A subsequent alarm received from another zone shall flash the system alarm LED on the Control Panel (and the Remote Annunciator). The LED display shall show the new alarm information. A pulsing alarm tone shall occur within the Control Panel (and the Remote Annunciator) until the event has been acknowledged.
- C. The activation of any system smoke detector shall initiate an Alarm Verification operation whereby the Control Panel will reset the activated detector and wait for a second alarm activation. If, within one (1) minute after resetting, a second alarm is reported from the same or

any other smoke detector, the system shall process the alarm as described previously. If no second alarm occurs within one minute the system shall resume normal operation. The Alarm Verification shall operate only on smoke detector alarms. Other activated initiating device signals shall be processed immediately. The alarm verification operation shall be selectable by zone.

1. The Control Panel shall have the capability to display the number of times a detector has gone into a verification mode. Should this smoke verification tally reach a pre-programmed number, a trouble condition shall occur.
- D. The Control Panel shall have a dedicated supervisory service LED and a dedicated supervisory service acknowledge switch.
1. If a part of the Scope of the Work, the activation of any standpipe or sprinkler valve supervisory tamper switch shall activate the system supervisory service audible signal and illuminate the LED at the Control Panel (and the Remote Annunciator). Differentiation between valve tamper activation and opens and/or grounds on the initiation circuit wiring shall be provided.
 2. Pressing the Supervisory Service Acknowledge Key will silence the supervisory audible signal while maintaining the Supervisory Service LED "on" indicating the off-normal condition.
 3. Restoring the valve to the normal position shall cause the Supervisory Service LED to extinguish, indicating restoration to normal.
- E. A manual evacuation (drill) switch shall be provided to operate the alarm indicating appliances without causing other control circuits to be activated. Should a true alarm occur while in the drill mode, all alarm functions would occur as described previously.
- F. The system shall have a single key that will allow the operator to display all alarms, troubles, and supervisory service conditions including the time of each occurrence.
- G. All doors normally held open by door control devices shall not have battery back-up and shall release upon AC power failure.
- H. The actuation of the "Enable Walk Test" program at the Control Panel shall activate the "Walk Test" mode of the system which shall cause the following to occur:
1. The security system circuit connection shall be bypassed.
 2. Control relay functions shall be bypassed.
 3. The Control Panel shall show a trouble condition.
 4. The alarm activation of any initiation device shall cause the audible signals to activate voice annunciation of the device's zone or system address.
 5. The Control Panel shall automatically reset itself after signaling is complete.
 6. Any momentary opening of an initiating or indicating appliance circuit wiring shall cause the audible signals to sound for 4 seconds indicating a trouble condition.
 7. The system shall have the capacity of 8 (minimum) distinctive walk test groups, such that only a portion of the system need be disabled during testing.
- I. The system shall contain independently supervised initiating device circuits. The alarm activation of any initiation circuit shall not prevent the subsequent alarm operation of any other initiation circuit. The system shall contain two spare initiating device circuits.

- J. There shall be supervisory service initiation device circuits for connection of all sprinkler valve supervisory (tamper) switches. Device activation shall cause a supervisory alarm at the Control Panel.
- K. There shall be independently supervised and independently fused indicating appliance circuits for alarm indicating devices. Disarrangement conditions of any circuit shall not affect the operation of other circuits.
- L. Auxiliary manual controls shall be supervised so that an "off normal" position of any switch shall cause an "off normal" system trouble.
- M. Each independently supervised circuit shall include a discrete LED readout to indicate disarrangement conditions per circuit.
- N. The incoming power to the system shall be supervised so that any power failure must be audibly and visually indicated at the Control Panel (and the Remote Annunciator). A green "power on" LED shall be displayed continuously while incoming power is present.
- O. If a part of the Scope of the Work, the system batteries shall be supervised so that a low battery condition or disconnection of the batteries shall be audibly and visually indicated at the Control Panel (and the Remote Annunciator).
- P. The System Modules shall be electrically supervised for module placement. Should a module become disconnected the system trouble indicator shall illuminate and the audible trouble signal shall sound.
- Q. The system shall have provisions for disabling and enabling all circuits individually for maintenance or testing purposes.
- R. There shall be independent supervision for opens of any mechanical system control output wiring. A discrete trouble LED readout per output circuit shall be provided for indication. A ground condition of any mechanical system control output wiring shall indicate a common ground trouble at the Control Panel.
- S. The Control Panel shall receive 120 VAC power as indicated on the Drawings.
- T. The system shall be provided with sufficient battery capacity to operate the entire system upon loss of normal 120 VAC power in a normal supervisory mode for a period of twenty-four (24) hours with 5 minutes of alarm operation at the end of this period. The system shall automatically transfer to the standby batteries upon power failure. All battery charging and recharging operations shall be automatic.
- U. All external circuits requiring system operating power shall be 24VDC and shall be individually fused at the Control Panel.
- V. If a part of the Scope of the Work, the Sprinkler System Fire Pump shall be monitored, with visual signals at the Fire Alarm Control Panel to indicate "Fire Pump Running", "Loss of Fire Pump Power", and "Fire Pump Phase Reversal". (Duplicate signals shall be provided at the Remote Annunciator).

1.7 FIRE DETECTION AND ALARM PANEL

- A. The Control Panel shall be flush or surface mounted. The Control Panel construction shall be modular with solid state, microprocessor based electronics. It shall display only those primary controls and displays essential to operation during a fire alarm condition. Keyboards shall not be required to operate the system during fire alarm conditions. An integral audible device shall sound during Alarm, Trouble or Supervisory conditions. This audible device shall sound differently during each condition to distinguish one condition from another without having to view the panel. This audible device shall also sound during each keypress to provide an audible feedback to ensure that the key has been pressed properly.
- B. The primary controls such as: 80 character LED display, alarm LED, supervisory service LED, trouble LED, power on, Alarm Acknowledge key, Supervisory Acknowledge key, Trouble Acknowledge key, Alarm Silence key, and System Reset key shall be visible through a front access panel.
- C. A minimum of five programmable secondary control switches and LED's shall be available behind an access door.
- D. The Control Panel shall provide for testing, condition listing, point activation/deactivation, software revisions and point listings. For maintenance purposes all points shall be available from the point lists menu.
- E. The Control Panel shall have a 2 line x 40 character liquid crystal display.
- F. Under normal condition the front panel shall display a "System is Normal" message and the current time and date. Should an abnormal condition be detected the appropriate LED (Alarm, Supervisory or Trouble) shall flash. The panel audible signal shall pulse for alarm conditions and sound steady for trouble and supervisory conditions. The LED shall display the following information relative to the abnormal condition of a point in the system: 40 character custom location label, type of device (smoke, pull station, waterflow), and point status (alarm, trouble).
- G. System Reset:
 - 1. The SYSTEM RESET button shall be used to return the system to its normal state after an alarm condition has been remedied. The LED display shall step the user through the reset process with simple English Language messages. The message "SYSTEM RESET IN PROGRESS" shall first be displayed followed by the message "SYSTEM RESET COMPLETED"; and finally, "SYSTEM IS NORMAL" should all alarm conditions be cleared.
 - 2. Should an alarm condition continue to exist the message "SYSTEM RESET IN PROGRESS" shall be followed by the message "SYSTEM RESET ABORTED" and the system shall remain in an abnormal state. System control relays shall not reset. The tone alert and the Alarm LED shall be on. The display shall indicate the total number of alarms and troubles present in the system along with a prompt to use the ACK keys to review the points. These points shall not require acknowledgment if they were previously acknowledged.
 - 3. Should the Alarm Silence/Reset Inhibit function be active, an Alarm Silence or System Reset key press shall be ignored. The message "ALARM SILENCE/SYSTEM RESET INHIBITED" shall be displayed for a short time to indicate the action was not taken. As feedback to the operator, the message "ALARM SILENCE/SYSTEM RESET

ALLOWED" shall be displayed when the inhibit function times out.

- H. The system shall be capable of logging and storing 300 events in an alarm log and 300 events in a trouble log. These events shall be stored in a battery protected random access memory. Each recorded event shall include the time and date of that event's occurrence.
- I. The system shall be capable of being tested by one person. While in the testing mode the alarm activation of an initiating device circuit shall be silently logged as an alarm condition in the historical data file. The panel shall automatically reset itself after logging of the alarm. The momentary disconnection of an initiating or indicating device circuit shall be silently logged as a trouble condition in the historical data file. The Control Panel shall automatically reset itself after logging of the trouble condition. The Control Panel shall be capable of supporting up to 8 separate testing groups whereby one group of points may be in a testing mode and the other (non-testing) groups may be active and operate as programmed per normal system operation. After testing is complete, testing data may be retrieved from the system in chronological order to ensure device/circuit activation.
- J. There shall be four (4) access levels with level 4 being the highest level. Level 1 actions shall not require a passcode. Passcodes shall consist of up to ten (10) digits. Changes to passcodes shall only be made by authorized personnel. Access to a level will only allow the operator to perform all actions within that level plus all actions of lower levels, not higher levels.
- K. Provide cabinets of sufficient size to accommodate the equipment. Cabinets shall be equipped with locks and transparent door panels providing freedom from tampering yet allowing full view of the various lights and controls.

1.8 REMOTE ANNUNCIATOR

- A. The Remote Annunciator shall be serial LED type. The Annunciator shall be flush mounted. The Annunciator shall have a beige enamel finish and shall provide two line by 40 character LED display. The Annunciator shall provide a common alarm and trouble circuit consisting of:
 - 1. Control switches for: alarm silence, trouble silence, system reset manual evacuation, and other control functions duplicating the Control Panel switches. A key "enable" switch shall be provided to activate or deactivate the control switches.
 - 2. Tone Alert - Duplicates the Control Panel tone alert during alarm & trouble conditions.
 - 3. System trouble LED.
 - 4. Power on LED.

1.9 PERIPHERAL DEVICES

- A. Magnetic door holders shall have an approximate holding force of 35 lbs and be 24VDC. The door portion shall have a stainless steel pivotal mounted armature with shock absorbing nylon bearing. Unit shall be capable of being either surface, flush, semi-flush, or floor mounted as required. Door holders shall be UL listed.
 - 1. Provide wall extension kits at locations required.

1.10 ADDRESSABLE NETWORK COMMUNICATION SYSTEM

- A. The system shall provide communication with initiating and control devices individually. All of these devices shall be individually annunciated at the Control Panel. Annunciation shall include the following conditions for each point:
 - 1. Alarm.
 - 2. Trouble.
 - 3. Open.
 - 4. Short.
 - 5. Device missing/failed.
- B. All addressable devices shall have the capability of being disabled or enabled individually.
- C. Up to 127 addressable devices may be multidropped from a single pair of wires. Systems that require factory reprogramming to add or delete devices are unacceptable.
- D. The communication format shall be a completely digital poll/response protocol to allow tapping of the circuit wiring. A high degree of communication reliability must be obtained by using error checking routines for address codes and for the data transmission portion of the protocol. Systems that do not utilize full digital transmission protocol are not acceptable.
- E. Each addressable device must be uniquely identified by an address code entered on each device at time of installation. The use of jumpers to set an address will not be acceptable due to the potential of vibration and poor contact. Device identification schemes that do not use uniquely set addresses but rely on electrical position along the communication channel are unacceptable. The system must verify that the proper type device is in place and matches the desired software configuration.
- F. Wiring types shall be approved by the equipment manufacturer.
- G. Addressable Device Types
 - 1. The Control Panel shall be capable of communicating with all types of addressable devices.
 - 2. Addressable smoke and heat detector heads shall be pluggable into their bases. The bases shall contain electronics that communicate the detector status (normal, alarm, trouble) to the Control Panel over two wires. The same two wires shall also provide power to the base and detector. Different detector heads (smoke or heat) shall be interchangeable. Upon removal of the head, a trouble signal will be transmitted to the Control Panel.
 - a. Analog Addressable Smoke and Heat Detectors
 - 1) The smoke detectors shall be of the photoelectric type and shall communicate actual smoke chamber values to the Control Panel.
 - 2) The heat detectors shall sense within a temperature range of 32°F to 158°F. The Control Panel shall be capable of sensing either a set point of 135°F, or a rate-of-rise of 15°F per minute for fire sensing. For utility sensing, a set point may be chosen within the stated range and the Control Panel programming shall be capable of using that information to determine specific responses such as warning of failure of local temperature controls.

- 3) The detectors shall be listed to UL Standard 268 and shall be documented as compatible with the control equipment to which they are connected. They shall be listed for both ceiling and wall mount applications.
- 4) Each base shall contain an LED that shall flash each time it is scanned by the Control Panel (once every 4 seconds). When the Control Panel determines that a detector is in an alarm or a trouble condition, the Control Panel shall command the LED on the base to illuminate continuously, indicating the abnormal condition.
- 5) Each detector shall contain a magnetically actuated test switch to provide for easy alarm testing.
- 6) Each detector shall be scanned by the Control Panel for its type identification to prevent inadvertent substitution of another detector type. The Control Panel shall operate with the installed device but shall initiate a "Wrong Device" trouble condition until the proper type is installed or the programmed detector type is changed.
- 7) The detector's electronics shall be immune from false alarms caused by EMI and RFI.
- 8) Smoke detectors shall be smoke density measuring devices having no self contained alarm set point (fixed threshold). The alarm decision for each detector shall be determined by the Control Panel. The Control Panel shall determine the condition of each detector by comparing the current sensor value to the stored values.
- 9) The Control Panel shall maintain a moving average of the detector's smoke chamber value to automatically compensate (move the threshold) for dust and dirty conditions that could affect detection operations. The system shall automatically maintain a constant smoke obscuration sensitivity for each detector (via the floating threshold) by compensating for environmental factors. Photoelectric smoke obscuration sensitivity shall be adjustable to within 3% of either limit of the UL window (0.5% to 4.0%) to compensate for any environment.
- 10) The system shall automatically indicate when an individual smoke or heat detector needs cleaning. When a detector's average value reaches a predetermined level, a "DIRTY SENSOR" trouble condition shall be audibly and visibly indicated at the Control Panel for the individual detector. Additionally, the LED on the base shall continuously illuminate. If a "DIRTY SENSOR" is left unattended, and its average value increases to a second predetermined value, an "EXCESSIVELY DIRTY SENSOR" trouble condition shall be indicated at the Control Panel for the individual detector. To prevent false alarms, these "DIRTY" conditions shall not decrease the amount of smoke obscuration necessary for smoke detector activation. For scheduling of maintenance, the Control Panel shall be able to generate an "ALMOST DIRTY" indication for any detector approaching a "DIRTY" trouble condition.
- 11) The Control Panel shall continuously perform an automatic self-test routine on each detector which shall functionally check the electronics and ensure the accuracy of the values being transmitted to the Control Panel. Any detector that fails this test shall indicate a "SELF TEST ABNORMAL" trouble condition with the detector location at the Control Panel.
- 12) An operator at the Control Panel, having a proper access level, shall have the capability to manually access the following information for each detector:

- a) Primary status.
 - b) Device type.
 - c) Present average value.
 - d) Present sensitivity selected.
 - e) Peak detection values.
 - f) Sensor range (normal, dirty, etc.).
 - g) Values shall be in “percent of smoke obscuration” format so that no interpretation is required by the operator.
- 13) Detectors shall be compatible with other addressable detectors, addressable manual stations, and addressable interface modules on the same circuit. The detectors shall also fit into a non-addressable base that is capable of being monitored by an addressable interface module.
- 14) For elevator control smoke and heat detectors, provide (1) N.O. and (1) N.C. auxiliary contact. The detector shall be monitored through an addressable interface module.
3. Analog addressable photoelectric duct smoke detectors shall be non-polarized 24VDC type which obtains operating power from the supervisory current in the fire alarm detection loop.
- a. The detectors shall be capable of being reset at the Control Panel.
 - b. For maintenance purposes, it shall be possible to clean the duct housing sampling tubes by accessing them through the duct housings front cover.
 - c. To minimize false alarms, voltage and RF transient suppression, a smoke signal verification circuit, and an insect screen shall be provided.
 - d. Auxiliary SPDT relays and key operated test stations shall be installed.
 - e. Lengths of sample tubes shall be as dictated by ductwork shown on the Mechanical Drawings.
 - f. Furnish alarm indicators with a remote test switch for all duct detectors located above suspended ceilings (For use in atriums, and large open areas with high ceilings).
4. Photoelectric Projected Beam Detectors shall have a separate transmitter and receiver and shall be capable of long range coverage of up to 350 ft. and shall have six (6) sensitivity settings. Automatic compensation for lens contamination shall be incorporated. The detectors shall include a normal status indicator (Green Pulsing LED), and alarm indicator (Red LED), and a trouble indicator (Amber LED).
5. Addressable pull stations shall contain electronics that communicate the station's status (alarm, normal) to the Control Panel over two wires which also provide power to the pull station. The address shall be set on the station. They shall be manufactured from high impact red Lexan. The station shall mechanically latch upon operation and remain so until manually reset by opening with a key common to all system locks. Pull stations shall be double action, semi-flush mounted unless otherwise indicated.
- a. Protective Shield: Provide a tamperproof, clear polycarbonate shield and red frame that easily fits over manual pull stations. When shield is lifted to gain access to the station, a battery powered piercing warning horn shall be activated. The horn shall be silenced by lowering and realigning the shield. The horn shall provide 85 db at 10 feet and shall be powered by a 9 VDC battery. Provide in gymnasiums and other areas as identified by the University.

- b. Provide wire guards for gym area devices.
 - c. Provide humidity gaskets for devices in locker area, pool area, and pool pump room.
6. Addressable interface modules shall be used for monitoring or control of devices and systems as described on the Drawings.
- a. An addressable interface module shall be provided for interfacing normally open direct contact devices to an addressable initiating circuit.
 - b. The modules shall be capable of mounting in a standard electrical outlet box. The modules shall include cover plates to allow surface or flush mounting.
 - c. Addressable interface modules shall be supervised and uniquely identified by the Control Panel. Device identification shall be transmitted to the Control Panel for processing according to the program instructions. Should a module become non-operational, tampered with, or removed, a discrete trouble signal, unique to the device, shall be transmitted to, and annunciated at, the Control Panel.
 - d. The modules shall be capable of being programmed for individual locations on the addressable device initiating circuit. The modules shall be compatible with addressable manual stations and addressable detectors on the same addressable initiating circuit.
7. Audible/Visible Notification
- a. Audible/Visible devices shall be horizontal wall mount. The devices shall be UL listed to Standard 1971 and have a circumpolar light output allowing mounting in either vertical or horizontal positions. The devices shall be rated as follows:
 - 1) In corridors or rooms of 400 square feet or less, provide not less than 75 cd as required by the ADA.
 - 2) In rooms or areas greater than 400 square feet where only one device is used, provide not less than 110 cd.
 - 3) In sleeping rooms, provide not less than 110 cd.
 - a) The light unit shall be of ABS polycarbonate and the lens of high grade, optical quality LEXAN. For optimized light distribution, the xenon flash tube shall be installed perpendicular to the device's back plane. A special compound reflector shall be utilized to maximize and best distribute the light pattern in key axis directions.
 - b) The effect of the illuminated visible devices shall be observable in a circumpolar pattern. The visible devices shall be labeled with the word "FIRE" in a contrasting color and the height of each character shall be a minimum of 5/8". In its quiescent state, the word "FIRE" shall be visible.
 - c) All visible devices shall flash in a synchronized pattern.
 - d) The audible portion of the devices shall be a speaker or electronic horn.
 - e) Devices shall be semi-flush mounted (unless otherwise indicated on the Drawings)
 - f) Provide wire guards for gym area devices.
 - g) Provide humidity gaskets for devices in locker area, pool area, and pool pump room.

8. Visible Only Notification

- a. Visible only devices shall be vertical wall mount. The devices shall be UL listed to Standard 1971 and have a circumpolar light output allowing mounting in either vertical or horizontal positions or on the ceiling. The devices shall be rated as follows:
 - 1) In corridors or rooms of 400 square feet or less, provide not less than 75 cd as required by the ADA.
 - 2) In rooms or areas greater than 400 square feet where only one device is used, provide not less than 110 cd.
 - 3) In sleeping rooms, provide not less than 110 cd.
- b. The light unit shall be of ABS polycarbonate and the lens of high grade, optical quality LEXAN. For optimized light distribution, the xenon flash tube shall be installed perpendicular to the device's back plane. A special compound reflector shall be utilized to maximize and best distribute the light pattern in key axis directions.
- c. The effect of the illuminated visible devices shall be observable in a circumpolar pattern. The visible devices shall be labeled with the word "FIRE" in a contrasting color and the height of each character shall be a minimum of 5/8". In its quiescent state, the word "FIRE" shall be visible.
- d. All visible devices shall flash in a synchronized pattern.
- e. Devices shall be semi-flush mounted unless otherwise indicated.
 - 1) Provide wire guards for gym area devices.
 - 2) Provide humidity gaskets for devices in locker area, pool area, and pool pump room.

- H. In all high rise buildings unless otherwise directed by the Owner, all devices shall be supervised for trouble conditions. The Control Panel shall be capable of displaying the type of trouble condition (open, short, device missing/failed). Should a device fail, it shall not hinder the operation of other system devices.

1.11 ONE-WAY COMMUNICATION

- A. Provide one-way voice communication with tone generating capabilities.
- B. A Central Audio Control Module shall be provided for the alarm message/tone generation, main and remote microphone connections, and mixer/pre-amplifier circuits. Continuous supervision shall be provided. Audio outputs shall have individual gain control.
- C. A hand-held, push-to-talk microphone shall be provided recessed within a protective panel-mounted enclosure. The microphone shall be a dynamic communication type microphone with a frequency range of 200 Hz to 4000 Hz and shall be equipped with a self-winding five foot coiled cable. An LED indicator shall be provided to indicate the microphone push-to-talk button has been pressed and speaker circuits are ready for transmission. The microphone shall be supervised in the event of disconnection.
- D. An Audio Control Switch Module shall be provided for the audio functions. These switches

and associated LED indicators shall be supervised in the event of disarrangement or failure.

- E. Audio power amplifiers shall be provided with self-contained filtered 24VDC power supplies, transformers and amplifier monitor circuits. The amplifiers shall provide a 25V RMS output with a frequency response of 120 Hz to 12,000Hz. Provide a sufficient quantity of amplifiers to operate all system speakers simultaneously plus twenty (20) percent spare capacity.
- F. In addition, provide at least one back-up amplifier capable of automatically replacing any failed amplifier.
- G. Provide speaker circuits which are capable of supplying audio signals at 25V RMS derived from the system amplifiers. Supervision for open, short and ground fault conditions shall be provided. Individual and distinct trouble indications shall be provided for each fault. Provide one circuit for each zone or area of distinct communication.
- H. Tones - Digitized tones for alarm or auxiliary requirements shall be provided. The Owner shall have the ability to select one of the tones from the following list.
 - 1. A Slow Whoop shall be a slowly ascending tone from 200 Hz to 830 Hz in 2.5 seconds.
 - 2. A Wail shall ascend and descend from 600 Hz to 940 Hz.
 - 3. A Beep shall be a 470 Hz tone. The time duration shall be 0.7 seconds on and 0.7 seconds off.
 - 4. A Horn shall be a continuous 470 Hz tone.
 - 5. A Stutter shall be a 470 Hz tone which is on for 100 milliseconds and off for 100 milliseconds.
 - 6. A Hi/Low shall be a free running tone with a high frequency of 544 Hz and a low frequency of 440 Hz. The on time (Hi) shall be 100 milliseconds while the off time (low) shall be 400 milliseconds.
- I. Pre-recorded digitized voice message capability shall be provided for automatic transmission to building occupants during alarm conditions. Three (3) custom messages shall be provided, one for alarm, one for testing, one for weather advisory, etc. The message player shall not rely on a tape or other mechanical means of transmitting the evacuation message. Systems that do use tape players must provide a backup player designed to automatically operate should the primary device jam or otherwise fail to operate. A standard evacuation message shall be provided under this Contract. However, the message player must be capable of transmitting customized messages of up to 4 minutes long. A self-contained speaker shall provide testing of the messages without disturbing the occupants of the facility.
- J. Should a two-way Fire Fighters Voice Communication System be provided, a method for remote fire fighters communication patch-in to the one-way voice communication speakers shall be provided. Manual operation shall be provided at the Firefighters Voice Communication System Central Control Station.
- K. Automatic Voice Evacuation Sequence:
 - 1. The audio alarm signal shall consist of an alarm tone for a maximum of 10 seconds followed by automatic pre-selected voice evacuation messages. At the end of each voice evacuation message, the alarm tone shall resume. The alarm tones shall sound until the system has been reset.

L. Manual Voice Paging Sequence:

1. In all high rise buildings unless otherwise directed by the Owner, the System shall be configured to allow selective voice paging. Upon activation of any speaker manual control switch, two (2) seconds of tone shall sound over the speakers indicating an impending voice message will occur.

1.12 TWO-WAY FIREFIGHTERS COMMUNICATION

- A. Provide a two-way Firefighters Voice Communication System between the Central Control Station and Remote Emergency Telephone Jacks. All wires between the Central Control Station and remote emergency telephone jacks shall be continuously supervised. Any fault which occurs shall be reported visually and audibly at the Central Control Station. Provide one of the following:
 1. The Central Control Station shall be an integral part of the Main Fire Alarm Control Panel.
 2. The Central Control Station shall be a Remote Firefighters Command Station as located on the Drawings.
- B. A Master Telephone Control Module shall be provided at the Central Control Station for processing of all two-way communication functions. This module shall include an audible alert for call and trouble signaling, a trouble silence switch with ringback, a trouble indication and a supervising monitor circuit.
- C. A Master Telephone Handset with a five (5) foot cord shall be provided and recessed within a protective panel mounted enclosure at the Central Control Station. This enclosure shall also provide locations for the telephone control and flasher/busy tone oscillator.
- D. Provide one line (talk) circuit for each (floor corridor), (elevator cab) and (stairwell). Line (talk) circuit modules shall be provided to electrically supervise for shorts, opens and grounds of circuit wiring. Each line module shall contain a "Call" and "Trouble" indication and a two position switch to enable two-way voice communication.
- E. The Firefighters Communication System shall be capable of handling single or simultaneous conversations with all telephones connected into the system.
- F. The system shall indicate to the person attempting to use a remote telephone that the signal is being received at the Central Control Station and that the lines are intact. As many as six (6) telephones shall be able to be connected into active conversation at the Central Control Station.
- G. Each emergency telephone jack shall be mounted on a stainless steel single gang plate with the words "Fire Emergency Telephone" screened on each.
 1. Provide Emergency Telephone Jacks for installation in each elevator cab by the Elevator Contractor. Required wiring from elevator controls to each elevator cab shall be furnished and installed by the Elevator Contractor.
- H. Provide a minimum of five (5) pluggable emergency telephones within a storage cabinet at the Central Control Station.

- I. Provide actual remote telephones in addition to the jacks in break rod cabinets as shown on the Drawings. These emergency telephones shall be constructed of red cicolac type t, a thermal ABS material and shall be equipped with an armored cable.

1.13 SUBMUTTALS

- A. Submittals shall include installation and wiring diagrams and instructions for installation, operation and maintenance, to be suitable for inclusion in the Maintenance Manuals.
- B. Submittals shall include reproducible vellum floor plans (1/16" scale, minimum) showing device locations and required conduit and wiring connections.
- C. Submittals shall include descriptive literature for all system components, size and type of recommended conduit and wiring, bill of materials, and sequence of system operation.

1.14 PERFORMANCE, WARRANTY, SERVICE AGREEMENT, TESTING, AND CLOSEOUT

- A. Contractor shall furnish and install, in accordance with manufacturer's instructions and contract documents, all system components and devices, wiring, conduit, outlet boxes, etc., as required for a complete, functional System. All final connections shall be made under the direct supervision of the manufacturer's factory trained technical representative.
 1. Above accessible ceilings, plenum rated wiring may be utilized. The wiring shall be supported by wall mounted bridal rings at approximately 36" on center. All wall penetrations shall utilize conduit sleeves with bushings on both ends.
- B. The Riser Diagram shows the intent of these Specifications and shall be used as a guide only. The conduit sizing and number of wires are to be verified with the manufacturer prior to submitting a bid and prior to installation in the building.
- C. Contractor shall guarantee all equipment and wiring to be free of mechanical and electrical defects for a period of one year from the date of acceptance by the Owner. The manufacturer shall furnish, at no additional cost to the owner, a one (1) year contract effective from the date of acceptance for maintenance and inspection service of the manufacturer's equipment. The Owner shall deal with one organization for total system responsibility. The manufacturer shall make available to the Owner an extended Maintenance Contract after the initial year's agreement has expired.
- D. The manufacturer shall provide to the owner during the period of the guarantee, emergency preventative maintenance service on a 24 hour standby basis.
- E. The manufacturer shall maintain an adequate supply of spare parts and a full time service facility with factory trained service technicians to provide supervision of the installation.
- F. Upon completion of the installation and after satisfactory testing of the system by the Contractor in the presence of the equipment supplier, the Contractor shall test the system in the presence of the Architect, Fire Marshall, and/or Owner's Representative, and other authorities having jurisdiction. Provide a written start-up report.

- G. A representative of the system manufacturer shall provide all system programming and testing, and shall instruct the Owner's personnel in the operation and maintenance of the system. The training session shall be video-taped by the Contractor for future Owner use.

- H. Upon completion of the project, Contractor shall provide the Owner the following:
 - 1. One (1) hardcopy of the "as-built" drawings, specifications, and submittals for the Fire Detection and Alarm System showing wiring fill, wire tag numbers, junction boxes and connection of devices.
 - 2. One (1) electronic copy of the "as-built" drawings, specifications, and submittals for the Fire Detection and Alarm System showing wiring fill, wire tag numbers, junction boxes and connection of devices. Provide in an electronic format that is acceptable to the Owner.

END OF SECTION