SCOPE OF WORK

Fire Alarm Upgrades

Northern State Prison
Newark, Essex County, NJ

Project No. C1070-00

STATE OF NEW JERSEY

Honorable Philip D. Murphy, Governor
Honorable Tahesha L. Way, Lt. Governor

DEPARTMENT OF THE TREASURY

Elizabeth Maher Muoio, Treasurer

DIVISION OF PROPERTY MANAGEMENT AND CONSTRUCTION

Christopher Chianese, Director

Date: November 27, 2023

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I. OBJECTIVE

The objective of this project is to upgrade the existing fire alarm systems in twenty-one (21) buildings starting with the housing units at Northern State Prison. This project represents phase two of a fire alarm system installation. Phase one was done in project C0954-00. See **Exhibit 'B'** for the project site location map.

II. CONSULTANT QUALIFICATIONS

A. CONSULTANT & SUB-CONSULTANT PRE-QUALIFICATIONS

The Consultant shall be a firm pre-qualified with the Division of Property Management & Construction (DPMC) in the following discipline(s):

- **P043 Fire Detection Systems**

The Consultant shall also have in-house capabilities or Sub-Consultants pre-qualified with DPMC in:

- **P025 Estimating/ Cost Analysis**

As well as, **any and all** other Architectural, Engineering and Specialty Disciplines necessary to complete the project as described in this Scope of Work (SOW).

III. PROJECT BUDGET

A. CONSTRUCTION COST ESTIMATE (CCE)

The initial Construction Cost Estimate (CCE) for this project is $1,275,000.

The Consultant shall review this Scope of Work and provide a narrative evaluation and analysis of the accuracy of the proposed project CCE in its technical proposal based on its professional experience and opinion.

B. CURRENT WORKING ESTIMATE (CWE)

The Current Working Estimate (CWE) for this project is $1,713,750.

The CWE includes the construction cost estimate and all consulting, permitting and administrative fees.

The CWE is the client agency's financial budget based on this project Scope of Work and shall not be exceeded during the design and construction phases of the project unless DPMC approves the change in Scope of Work through a Contract amendment.

C. CONSULTANT'S FEES

The construction cost estimate for this project ***shall not*** be used as a basis for the Consultant's design and construction administration fees. The Consultant's fees shall be based on the information contained in this Scope of Work document and the observations made and/or the additional information received during the pre-proposal meeting.

IV. PROJECT SCHEDULE

A. SCOPE OF WORK DESIGN & CONSTRUCTION SCHEDULE

The following schedule identifies the estimated design and construction phases for this project and the estimated durations.

PROJECT PHASE	ESTIMATED DURATION (Calendar Days)
1. Site Access Approvals & Schedule Design Kick-off Meeting	**14**
2. Survey Phase	**42**
• *Project Team & DPMC Plan/Code Unit Review & Comment*	14
3. Design Development Phase	**42**
• *Project Team & DPMC Plan/Code Unit Review & Comment*	14
4. Final Design Phase	**42**
• *Project Team & DPMC Plan/Code Unit Review & Approval*	14
5. Final Design Re-Submission to Address Comments	**7**
• *Project Team & DPMC Plan/Code Unit Review & Approval*	14
6. DCA Submission Plan Review	**30**
7. Permit Application Phase	**7**
• *Issue Plan Release*	
8. Bid Phase	**42**
9. Award Phase	**28**

10. Construction Phase	**240**
11. Project Close Out Phase	**30**

B. CONSULTANT'S PROPOSED DESIGN & CONSTRUCTION SCHEDULE

The Consultant shall submit a project design and construction schedule with its technical proposal that is similar in format and detail to the schedule depicted in **Exhibit 'A'**. The schedule developed by the Consultant shall reflect its recommended project phases, phase activities, activity durations.

A written narrative shall also be included with the technical proposal explaining the schedule submitted and the reasons why and how it can be completed in the time frame proposed by the Consultant.

This schedule and narrative will be reviewed by the Consultant Selection Committee as part of the evaluation process and will be assigned a score commensurate with clarity and comprehensiveness of the submission.

V. PROJECT SITE LOCATION & TEAM MEMBERS

A. PROJECT SITE ADDRESS

The location of the project site is:

Northern State Prison
168 Frontage Road
Newark, NJ 07114

See **Exhibit 'B'** for the project site location map.

B. PROJECT TEAM MEMBER DIRECTORY

The following are the names, addresses, and phone numbers of the Project Team members.

1. DPMC Representative:

Name:	Nurul Hasan, Project Manager
Address:	Division of Property Management & Construction
	20 West State Street, 3rd Floor
	Trenton, NJ 08608-1206
Phone No:	(609) 633-8265
E-Mail No:	nurul.hasan@treas.nj.gov

2. Department of Corrections:

Name:	Michael Pepenella, Project Manager
Address:	Department of Corrections
	Whittlesey Road, PO Box 863
	West Trenton, NJ 08625
Phone No:	(609) 292-4036 ext. 5287/ 609-954-5464
E-Mail No:	Michael.Pepenella@doc.nj.gov

VI. PROJECT DEFINITION

A. BACKGROUND

Northern State Prison was opened in 1987 and is a maximum security prison. The Prison is located on a 43 acre site and includes in excess of fifty buildings. The Prison currently houses approximately 2,700 incarcerated persons.
See **Exhibit 'B'**

B. FUNCTIONAL DESCRIPTION OF THE SITE

The existing fire alarm system onsite is old, outdated and must be replaced. There are KDR-1000 fire alarm panels throughout the site. The administration building does have a new independent Simplex fire alarm panel in the control center. There are some old conduits that previously served other abandoned security systems in the central control that may be available for new wiring. However, new conduits and wiring may be required.

The following is a list of buildings that have completed upgrades for the fire alarm system under project C0954-00. See **Exhibit 'C'** for a listing of equipment submittals for C0954-00.

Bldg. ID	Building Name
2103	Administration Building/Tower #1 & #5
2121	80-Bed Modular Trailer G
2122	80-Bed Modular Trailer H
2123	80-Bed Modular Trailer I
4152	Administrative Close Supervision Unit
4153	Administrative Close Supervision Unit

The following is a list of buildings that will be part of the fire alarm upgrade for C1070-00. The list is not final and may be added to or subtracted from based on facility needs, code requirements and other factors as determined in the design phase. The highest priority buildings from the below list are the Housing Units (A, B, C, D, E, F)

2109	Housing Unit A
2110	Housing Unit B
2111	Housing Unit C
2112	Housing Unit D
2113	Housing Unit E
2114	Housing Unit F
2104	Chapel
2105	Inmate Dining / Education
2106	Vocational Educ. & State Use Sewing
2107	Food Prep-Vehicle Maintenance-Minimum Housing (Closed)
2108	Hospital/Detention
2118	Maintenance Garage/Warehouse
4151	Minimum Unit 2
4155	Powerhouse
4158	Minimum Unit 2 Support
4159	Refrigerated Trailers (6)
4160	Food Storage Trailers (3)
8186	Clothing Issue Building
8187	Lobby
8188	Gate Building
8189	Vehicle Maintenance Garage

VII. CONSULTANT DESIGN RESPONSIBILITIES

A. NEW FIRE ALARM SYSTEM

1. Survey Phase/Needs Assessment:

Conduct a survey of the buildings to determine the existing conditions of all areas that will be impacted by the installation of the new fire alarm system and the site specific design requirements for this project. This project represents phase two of a fire alarm system installation. Phase one was done in project C0954-00.

The survey/needs assessment shall include, but not be limited to the following:

- Identify all existing fire detection system components, both operable and inoperable, that shall be removed and replaced as part of this project.
- Identify all fire suppression system and flow control valves that require monitoring by the new fire detection system.
- Identify building systems and components that require monitoring (duct work, air handlers, etc.) and any other conditions that need to be monitored by the fire detection system.
- Consult with facility staff and identify the appropriate location for all new remote annunciator panels. Determine the design requirements for space needs, existing equipment relocation, electrical power, tie-in to the main alarm panel, and provisions for a protected environment at each panel site location where required.
- Identify the location and space requirements for the main fire alarm panel.
- Identify the design requirements and exact routing of all new electrical distribution power wiring, if necessary, to the fire detection system and related components and the upgrades required for any existing electrical system component. Reuse existing wiring and conduit if possible.
- Identify all obstructions that must be altered, relocated, or removed in order to install the new fire detection system.
- Identify the requirements for power to run the system and the availability of output devices to enable local as well as remote monitoring.
- Identify the design requirements for backup power, through batteries and/or UPS, so that a loss of power, for any reason will not limit the operation of the detection and annunciation of the system.
- Survey the existing suppression system and make design provisions to tie the suppression system into new panels as necessary.

The survey phase/needs assessment shall be submitted in a bound report (four copies) and shall include an estimate of the construction cost based on the findings of the survey/needs assessment.

2. New System Design Criteria:

Provide the design and specifications to replace all of the existing fire alarm detectors, peripheral devices and panels at the facility with a new non-proprietary system. In addition, address the following as may be applicable. This project shall be completed as a phase two (2) from project C0954-00. The new system have to work and synchronize with the completed system in project C0954-00.

- Protection of the fire alarm system from electrical surges, spikes, sags, over-voltages, brownouts, and electrical noise.
- Addressability of devices and notifications made to the building fire alarm control panels and the facility main fire alarm remote station panel.
- All programmable devices must be able to have their addresses set without special equipment, tools, or programs. Changing of vandalized heads or devices must be able to be completed by facility maintenance staff without the requirement of special software or tools.
- Software requirements and compatibility with new and existing devices.
- New smoke detectors shall be appropriate for the institution and approved by facility staff. Install heat detectors rather than smoke detectors in high humidity locations.
- Tamper proof security covers that meet Department of Corrections requirements and standards shall be provided on all devices that may be accessible to the inmate population.
- As applicable, duct detectors shall be installed so they are accessible for repair or replacement. They shall be located in areas ensuring laminar flow across the detector. Do not locate them downstream of humidity injection points. Each duct detector shall have a LED that can be easily observed and located by the fire company and other interested parties. Each duct sensor shall be self-compensating for the effects of air velocity, temperature, humidity, and atmospheric pressure and not require field adjustments to compensate for the above effects.
- The building fire alarm control panels shall be wired to all peripheral alarm and initiating devices and tied into remote annunciator panels located in a convenient area near the fire department entrance to the buildings and shall be readily accessible and readily visible to fire fighters. The building fire alarm control panels and annunciator panels shall be tied into the existing or a new electrical power source at their location in the building.
- Consult with facility staff and provide additional annunciator panels in locations as needed.
- Provide a riser diagram drawing for the building fire alarm control panels that identifies their connections to the various circuits and peripheral initiating devices.
- Any new low voltage wiring, if necessary, from the fire alarm panels to the peripheral devices shall be concealed and run in wire mold or conduit, whichever is more appropriate for the building conditions, security requirements, efficiency, and cost effectiveness. Any exposed wiring installed above the ceiling shall be plenum fire rated cable in accordance with NEC Article 760 or must be protected in conduit. Protect exposed fire alarm wiring from potential rodent damage.

- The fire detection systems shall have emergency battery backup that is sized in accordance with all applicable codes. The battery supply shall be calculated to operate loads in a supervisory mode for twenty-four (24) hours for central station systems and remote supervisory systems. Batteries shall be sized at 125% of the calculated size to compensate for deterioration and aging during the battery life cycle. Battery calculations shall be submitted to the DPMC Code & Design Review Unit for record.
- Provide a battery charging circuit for each standby battery bank in the system. The charger shall be automatic in design, adjusting the charge rate to the condition of the batteries. All system battery charge rates and terminal voltages shall be read using the fire alarm control panel LCD display in the service mode indicating directly in volts and amps.
- Address redundancy within the system such that a failure of the alarm system within one building does not impact other buildings.
- Provide design and specifications for a self-monitoring fire alarm system. Provide upgrades as necessary to the central control station to meet the requirements of Chapter 8 of NFPA 72 (Supervising Station).
- The building fire alarm panel, annunciators, and each power supply, addressable circuit, audible circuit, visual circuit, amplifier, etc. shall be designed to have 25% spare capacity. System operating hardware shall be functionally expandable by installing additional solid state plug-in modules. Note that the installation of additional plug-in modules shall not require the replacement of existing equipment, components, or accessories.
- The central fire alarm annunciator panel shall be located in the prison's central control room located in the building #1 Administration Building and shall be networked to all the remote building new fire alarm control panels and have the ability to monitor and communicate with all of the buildings' addressable initiating devices. The Consultant shall ensure the prison's central control room in building #1 meets all requirements described in the current NFPA 72 Section 8.4 entitled "Proprietary Supervising Station Systems" and provide a design for any required upgrades to the area to meet the criteria described. The center shall have two separate communications links with local fire authorities.

3. System Tests:

A written "Acceptance Test Procedure" (ATP) for testing the new fire detection system and components, as applicable, shall be prepared by the Consultant in accordance with all applicable codes and standards and included in the specification.

Upon completion of the system installation, the system manufacturer shall be responsible for the performance of the ATP, demonstrating the function of the system and verifying the correct operation of all system components, circuits and programming.

The system test shall be witnessed and approved by the Department of Community Affairs (DCA). The Consultant shall provide ample notification time when arranging the demonstration with DCA, DPMC Project Team members, Client Agency, Contractor, and the equipment manufacturer.

Upon final acceptance of the system, the Contractor shall provide a complete as-built color-coded wiring diagram. The diagram shall include a written statement signed by the Contractor and manufacturer's representative that the diagram has been corrected to include field changes and does represent the system installed.

The fire detection manufacturer shall provide system training to the facility personnel as described in Section VIII, paragraph N of this document.

4. Spare Parts:

A spare parts list shall be prepared and items purchased as part of this project for all critical items necessary for the successful operation of the fire detection system such as detectors, fire alarm fuses, switches, relays, LED lights, etc. Instructions shall be included for the operation and care of the system. Written instructions shall also be included with the final equipment and maintenance brochure.

B. CONTRACTOR USE OF THE PREMISES

Refer to **Exhibit 'D'** to find "General Security Information" for Northern State Prison and work with the Project Team to add any additional special security and policy requirements that must be followed during all work conducted at the facility and include this information in Division 1 of the specification.

Develop procedures for personnel to access the project site and construction areas, and provide the names and phone numbers of approved escorts when needed.

In addition, background checks and PREA (Prison Rape Elimination Act) training will be required. Refer to **Exhibit 'E'**, "Application for Clearance and Issuance of Identification Cards". Include with the application a copy of a valid driver's license or "naturalization papers".

C. DESIGN MEETINGS & PRESENTATIONS

1. Design Meetings:

Conduct the appropriate number of review meetings with the Project Team members during each design phase of the project so they may determine if the project meets their requirements, question any aspect of the contract deliverables, and make changes where appropriate. The Consultant shall describe the philosophy and process used in the development of the design

criteria and the various alternatives considered to meet the project objectives. Selected studies, sketches, cost estimates, schedules, and other relevant information shall be presented to support the design solutions proposed. Special considerations shall also be addressed such as: Contractor site access limitations, utility shutdowns and switchover coordination, phased construction and schedule requirements, security restrictions, available swing space, material and equipment delivery dates, etc.

It shall also be the responsibility of the Consultant to arrange and require all critical Sub-Consultants to be in attendance at the design review meetings.

Record the minutes of each design meeting and distribute within three (3) calendar days to all attendees and those persons specified to be on the distribution list by the Project Manager.

2. Design Presentations:

The minimum number of design presentations required for each phase of this project is identified below for reference:

Survey Phase: One (1) oral presentation at phase completion.

Design Development Phase: One (1) oral presentation at phase completion.

Final Design Phase: One (1) oral presentation at phase completion.

D. EXISTING DOCUMENTATION

Copies of the following documents will be provided to each Consulting firm at the pre-proposal meeting to assist in the bidding process.

- C0716-00 - Replacement of Fire Sprinkler Head.
- C0954-00 - Fire Alarm Upgrade
- D0249-00 - Air-Handling Unit Replacement In Housing Units – NSP

Review these documents and any additional information that may be provided at a later date such as reports, studies, surveys, equipment manuals, as-built drawings, etc. The State does not attest to the accuracy of the information provided and accepts no responsibility for the consequences of errors by the use of any information and material contained in the documentation provided. It shall be the responsibility of the Consultant to verify the contents and assume full responsibility for any determination or conclusion drawn from the material used. If the information provided is insufficient, the Consultant shall take the appropriate actions necessary to obtain the additional information required.

All original documentation shall be returned to the provider at the completion of the project.

VIII. PERMITS & APPROVALS

A. NJ UNIFORM CONSTRUCTION CODE PLAN REVIEW AND PERMIT

The project construction documents must comply with the latest adopted edition of the NJ Uniform Construction Code (NJUCC).

The latest NJUCC Adopted Codes and Standards can be found at:

http://www.state.nj.us/dca/divisions/codes/codreg/

1. NJ Uniform Construction Code (NJUCC) Plan Review

Consultant shall estimate the cost of the NJUCC Plan Review by DCA and include that amount in their fee proposal line item entitled **"Plan Review and Permit Fee Allowance"**, refer to paragraph X.A.

Upon approval of the Final Design Phase Submission by DPMC, the Consultant shall submit the construction documents to the Department of Community Affairs (DCA), Bureau of Construction Project Review to secure a complete plan release.

As of July 25, 2022, the Department of Community Affairs (DCA) is only accepting digital signatures and seals issued from a third party certificate authority. The DCA ePlans site can be found at:

https://www.nj.gov/dca/divisions/codes/offices/ePlans.html

Procedures for submission to the DCA Plan Review Unit can be found at:

https://www.state.nj.us/dca/divisions/codes/forms/pdf_bcpr/pr_app_guide.pdf

Consultant shall complete the "Project Review Application" and include the following on Block 5 as the "Owner's Designated Agent Name":

Joyce Spitale, DPMC
PO Box 235
Trenton, NJ 08625-0235
Joyce.Spitale@treas.nj.gov 609-943-5193

The Consultant shall complete the NJUCC "Plan Review Fee Schedule", determine the fee due and pay the NJUCC Plan Review fees, refer to Paragraph X.A.

The NJUCC "Plan Review Fee Schedule" can be found at:

http://www.state.nj.us/dca/divisions/codes/forms/pdf_bcpr/pr_fees.pdf

2. NJ Uniform Construction Code Permit

Upon receipt of a complete plan release from the DCA Bureau of Construction Project Review, the Consultant shall complete the NJUCC permit application and all applicable technical sub-code sections. The "Agent Section" of the application and certification section of the building sub-code section shall be signed. These documents, with **six (6) sets of DCA approved, signed and sealed construction documents** shall be forwarded to the DPMC Project Manager.

The Consultant may obtain copies of all NJUCC permit applications at the following website:

http://www.state.nj.us/dca/divisions/codes/forms/

All other required project permits shall be obtained and paid for by the Consultant in accordance with the procedures described in Paragraph VIII.B.

3. Prior Approval Certification Letters:

The issuance of a construction permit for this project may be contingent upon acquiring various "prior approvals" as defined by N.J.A.C. 5:23-1.4. It is the Consultant's responsibility to determine which prior approvals, if any, are required. The Consultant shall submit a general certification letter to the DPMC Plan & Code Review Unit Manager during the Permit Phase of this project that certifies all required prior approvals have been obtained.

In addition to the general certification letter discussed above, the following specific prior approval certification letters, where applicable, shall be submitted by the Consultant to the DPMC Plan & Code Review Unit Manager: Soil Erosion & Sediment Control, Water & Sewer Treatment Works Approval, Coastal Areas Facilities Review, Compliance of Underground Storage Tank Systems with N.J.A.C. 7:14B, Pinelands Commission, Highlands Council, Well Construction and Maintenance; Sealing of Abandoned Wells with N.J.A.C. 7:9D, Certification that all utilities have been disconnected from structures to be demolished, Board of Health Approval for Potable Water Wells, Health Department Approval for Septic Systems. It shall be noted that in accordance with N.J.A.C. 5:23-2.15(a)5, a permit cannot be issued until the letter(s) of certification is received.

4. Multi-building or Multi-site Permits:

A project that involves many buildings and/or sites requires that a separate permit shall be issued for each building or site. The Consultant must determine the construction cost estimate for *each* building and/or site location and submit that amount where indicated on the permit application.

5. Special Inspections:

In accordance with the requirements of the New Jersey Uniform Construction Code N.J.A.C. 5:23-2.20(b), Bulletin 03-5 and Chapter 17 of the International Building Code, the Consultant shall be responsible for the coordination of all special inspections during the construction phase of the project.

Bulletin 03-5 can be found at:

http://www.state.nj.us/dca/divisions/codes/publications/pdf_bulletins/b_03_5.pdf

a. Definition:

Special inspections are defined as an independent verification by a certified special inspector for **Class I buildings and smoke control systems in any class building**. The special inspector is to be independent from the Contractor and responsible to the Consultant so that there is no possible conflict of interest.

Special inspectors shall be certified in accordance with the requirements in the New Jersey Uniform Construction Code.

b. Responsibilities:

The Consultant shall submit with the permit application, a list of special inspections and the agencies or special inspectors that will be responsible to carry out the inspections required for the project. The list shall be a separate document, on letter head, signed and sealed.

B. OTHER REGULATORY AGENCY PERMITS, CERTIFICATES AND APPROVALS

The Consultant shall identify and obtain all other State Regulatory Agency permits, certificates, and approvals that will govern and affect the work described in this Scope of Work. An itemized list of these permits, certificates, and approvals shall be included with the Consultant's Technical Proposal and the total amount of the application fees should be entered in the Fee Proposal line item entitled, **"Permit Fee Allowance."**

The Consultant may refer to the Division of Property Management and Construction "Procedures for Architects and Engineers Manual", Paragraph "**9. REGULATORY AGENCY APPROVALS"** which presents a compendium of State permits, certificates, and approvals that may be required for this project.

The Consultant shall determine the appropriate phase of the project to submit the permit application(s) in order to meet the approved project milestone dates.

Where reference to an established industry standard is made, it shall be understood to mean the most recent edition of the standard unless otherwise noted. If an industry standard is found to be revoked, or should the standard have undergone substantial change or revision from the time that the Scope of Work was developed, the Consultant shall comply with the most recent edition of the standard.

IX. ENERGY REBATE AND INCENTIVE PROGRAMS

The Consultant shall review any and all programs on the State and Federal level to determine if any proposed upgrades to the mechanical and/or electrical equipment and systems for this project qualify for approved rebates and incentives.

The Consultant shall review the programs available on the "New Jersey's Clean Energy Program" website at: http://www.njcleanenergy.com as well as federal websites and New Jersey electric and gas utility websites to determine if and how they can be applied to this project.

The Consultant shall identify all rebates and incentives in their technical proposal and throughout the design phase.

The Consultant shall be responsible to complete the appropriate registration forms and applications, provide any applicable worksheets, manufacturer's specification sheets, calculations, attend meetings, and participate in all activities with designated representatives of the programs and utility companies to obtain the entitled financial incentives and rebates for this project.

All costs associated with this work shall be estimated by the Consultant and the amount included in the base bid of its fee proposal.

X. ALLOWANCES

A. PLAN REVIEW AND PERMIT FEE ALLOWANCE

The Consultant shall obtain and pay for all of the project permits in accordance with the guidelines identified below.

1. Permits:

The Consultant shall determine the various permits, certificates, and approvals required to complete this project.

2. Permit Costs:

The Consultant shall estimate the application fee costs for all of the required project permits, certificates, and approvals (excluding the NJ Uniform Construction Code permit) and include that amount in its fee proposal line item entitled **"Plan Review and Permit Fee Allowance"**. A breakdown of each permit and application fee shall be attached to the fee proposal for reference.

NOTE: The NJ Uniform Construction Code permit is excluded since it will be paid for by the State.

3. Applications:

The Consultant shall complete and submit all permit applications to the appropriate permitting authorities and the costs shall be paid from the Consultant's permit fee allowance. A copy of the application(s) and the original permit(s) obtained by the Consultant shall be given to the DPMC Project Manager for distribution during construction.

4. Consultant Fee:

The Consultant shall determine what is required to complete and submit the permit applications, obtain supporting documentation, attend meetings, etc., and include the total cost in the base bid of its fee proposal under the "Permit Phase" column.

Any funds remaining in the permit allowance will be returned to the State at the close of the project.

XI. SOW SIGNATURE APPROVAL SHEET

This Scope of Work shall not be considered a valid document unless all signatures appear in each designated area below.

The client agency approval signature on this page indicates that they have reviewed the design criteria and construction schedule described in this project Scope of Work (including the subsequent contract deliverables and exhibits) and verifies that the work will not conflict with the existing or future construction activities of other projects at the site.

SOW PREPARED BY: Lucy Ibrahim 11/27/2023

LUCY IBRAHIM, PROJECT MANAGER DATE
DPMC PROJECT PLANNING & INITIATION

SOW APPROVED BY: James Wright 11/27/2023

JAMES WRIGHT, MANAGER DATE
DPMC PROJECT PLANNING & INITIATION

SOW APPROVED BY: Michael Pepenella 11/27/2023

MICHAEL PEPENELLA, PROJECT MANAGER DATE
DEPARTMENT OF CORRECTIONS

SOW APPROVED BY: Nurul Hasan 11/29/2023

NURUL HASAN, PROJECT MANAGER DATE
DPMC PROJECT MANAGEMENT GROUP

SOW APPROVED BY: Richard S Flodmand 11/30/2023

RICHARD FLODMAND, DEPUTY DIRECTOR DIV DATE
PROPERTY MGT & CONSTRUCTION

XII. CONTRACT DELIVERABLES

The following are checklists listing the Contract Deliverables that are required at the completion of each phase of this project. The Consultant shall refer to the DPMC publication entitled "Procedures for Architects and Engineers," 3.0 Edition, dated September 2022 available at https://www.nj.gov/treasury/dpmc/Assets/Files/ProceduresforArchitectsandEngineers.pdf for a detailed description of the deliverables required for each submission item listed. References to the applicable paragraphs of the "Procedures for Architects and Engineers" are provided.

Note that the Deliverables Checklist may include submission items that are "S.O.W. Specific Requirements". These requirements will be defined in the project specific scope of work and included on the deliverables checklist.

This project includes the following phases with the deliverables noted as "Required by S.O.W" on the Deliverables Checklist:

- **SURVEY PHASE**
- **DESIGN DEVELOPMENT PHASE**
- **FINAL DESIGN PHASE**
- **PERMIT APPLICATION PHASE**
- **BIDDING AND CONTRACT AWARD**
- **CONSTRUCTION PHASE**
- **PROJECT CLOSE-OUT PHASE**

XIII. EXHIBITS

A. SAMPLE PROJECT SCHEDULE FORMAT
B. PROJECT SITE LOCATION MAP
C. C0954-00 FINAL SUBMITTAL
D. GENERAL SECURITY INFORMATION
E. APPLICATION FOR CLEARANCE

END OF SCOPE OF WORK

Deliverables Checklist
Survey Phase

A/E Name: _____

A/E Manual Reference	Submission Item	Required by S.O.W.		Previously Submitted		Enclosed	
		Yes	No	Yes	No	Yes	No
13.4.1.	A/E Statement of Site Visit						
13.4.2.	Narrative Description of Project						
13.4.3.	Building Code Information Questionnaire						
13.4.4.	Space Analysis						
13.4.5.	Special Features						
13.4.6.	Catalog Cuts						
13.4.7.	Site Evaluation						
13.4.8.	Subsurface Investigation						
13.4.9.	Surveys						
13.4.10.	Arts Inclusion						
13.4.11.	Design Rendering						
13.4.12.	Regulatory Approvals						
13.4.13.	Utility Availability						
13.4.14.	Drawings (6 Sets)						
13.4.15.	Outline Specifications (6 Sets)						
13.4.16.	Current Working Estimate/Cost Analysis						
13.4.17.	Project Schedule						
13.4.18.	Formal Presentation						
13.4.19.	Scope of Work Compliance Statement						
13.4.20.	Survey Phase Deliverables Checklist						
S.O.W. Reference	**S.O.W. Specific Requirements**						
VII.A.1	Survey Report						

This checklist shall be completed by the Design Consultant and included as the cover sheet of this submission to document to the DPMC the status of all the deliverables required by the project specific Scope of Work.

_____ _____

Consultant Signature Date

Deliverables Checklist
Design Development Phase

A/E Name: _____

A/E Manual Reference	Submission Item	Required by S.O.W.		Previously Submitted		Enclosed	
		Yes	No	Yes	No	Yes	No
14.4.1.	A/E Statement of Site Visit						
14.4.2.	Narrative Description of Project						
14.4.3.	Building Code Information Questionnaire						
14.4.4.	Space Analysis						
14.4.5.	Special Features						
14.4.6.	Catalog Cuts						
14.4.7.	Site Evaluation						
14.4.8.	Subsurface Investigation						
14.4.9.	Surveys						
14.4.10.	Arts Inclusion						
14.4.11.	Design Rendering						
14.4.12.	Regulatory Approvals						
14.4.13.	Utility Availability						
14.4.14.	Drawings (6 Sets)						
14.4.15.	Outline Specifications (6 Sets)						
14.4.16.	Current Working Estimate/Cost Analysis						
14.4.17.	Project Schedule						
14.4.18.	Formal Presentation						
14.4.19.	Plan Review/Scope of Work Compliance Statement						
14.4.20.	Design development Phase Deliverables Checklist						
S.O.W. Reference	**S.O.W. Specific Requirements**						

This checklist shall be completed by the Design Consultant and included as the cover sheet of this submission to document to the DPMC the status of all the deliverables required by the project specific Scope of Work.

_____ _____

Consultant Signature Date

DPMC Project No.: C1070-00

Deliverables Checklist
Final Design Phase

A/E Name: _____

A/E Manual Reference	Submission Item	Required by S.O.W.		Previously Submitted		Enclosed	
		Yes	No	Yes	No	Yes	No
15.4.1.	A/E Statement of Site Visit						
15.4.2.	Narrative Description of Project						
15.4.3.	Building Code Information Questionnaire						
15.4.4.	Space Analysis						
15.4.5.	Special Features						
15.4.6.	Catalog Cuts						
15.4.7.	Site Evaluation						
15.4.8.	Subsurface Investigation						
15.4.9.	Surveys						
15.4.10.	Arts Inclusion						
15.4.11.	Design Rendering						
15.4.12.	Regulatory Approvals						
15.4.13.	Utility Availability						
15.4.14.	Drawings (6 Sets)						
15.4.15.	Outline Specifications (6 Sets)						
15.4.16.	Current Working Estimate/Cost Analysis						
15.4.17.	Project Schedule						
15.4.18.	Formal Presentation						
15.4.19.	Plan Review/Scope of Work Compliance Statement						
15.4.20.	Final Design Phase Deliverables Checklist						
S.O.W. Reference	**S.O.W. Specific Requirements**						

This checklist shall be completed by the Design Consultant and included as the cover sheet of this submission to document to the DPMC the status of all the deliverables required by the project specific Scope of Work.

_____ _____

Consultant Signature Date

DPMC Project No.: C1070-00

Deliverables Checklist
Permit Application Phase

A/E Name: _____

A/E Manual Reference	Submission Item	Required by S.O.W.		Previously Submitted		Enclosed	
		Yes	No	Yes	No	Yes	No
16.1.	N.J. UCC Permit Application						
16.4.	Drawings, Signed and Sealed (6 Sets)						
16.5.	Specifications, Signed and Sealed (6 Sets)						
16.6.	Current Working Estimate/Cost Analysis						
16.7.	Project Schedule						
16.8.	Plan Review/Scope of Work Compliance Statement						
16.9.	Permit Application Phase Deliverables Checklist						
S.O.W. Reference	**S.O.W. Specific Requirements**						

This checklist shall be completed by the Design Consultant and included as the cover sheet of this submission to document to the DPMC Project Manager the status of all the deliverables required by the project specific Scope of Work.

_____ _____

Consultant Signature Date

DPMC Project No.: C1070-00

Deliverables Checklist
Bidding and Contract Award Phase

A/E Name: _____

A/E Manual Reference	Submission Item	Required by S.O.W.		Previously Submitted		Enclosed	
		Yes	No	Yes	No	Yes	No
17.1.1.	Notice of Advertising						
17.1.2.	Bid Proposal Form						
17.1.3.	Bid Clearance Form						
17.1.4.	Drawings (6 Sets)						
17.1.5.	Specifications (6 Sets)						
17.1.6.	Construction Schedule						
17.3	Pre-Bid Conference/Mandatory Site Visit						
17.3.1.	Meeting Minutes						
17.4	Bulletins						
17.5	Post Bid Meeting						
17.6.	Contract Award "Letter of Recommendation"						
17.8.	Bid Protests - Hearings						
17.9.	Bidding and Contract Award Phase Deliverables Checklist						
S.O.W. Reference	**S.O.W. Specific Requirements**						

This checklist shall be completed by the Design Consultant and included as the cover sheet of this submission to document to the DPMC the status of all the deliverables required by the project specific Scope of Work.

_____ _____

Consultant Signature Date

Deliverables Checklist
Construction Phase

A/E Name: _____

A/E Manual Reference	Submission Item	Required by S.O.W.		Previously Submitted		Enclosed	
		Yes	No	Yes	No	Yes	No
18.2.	Pre-Construction Meeting						
18.3.	Submittal Log						
18.4.	Construction Schedule						
18.5.	Project Progress Meetings						
18.7.	Contractor's Invoicing and Payment Process						
18.8.	Contractor Submittals						
18.10.	Testing						
18.11.	Shop Drawings (6 Sets)						
18.12.	As-Built & Record Set Drawings (6 Sets)						
18.13.	Change Orders						
18.14.	Construction Photographs						
18.15.	Field Observations						
18.17.	Construction Phase Deliverables Checklist						
S.O.W. Reference	**S.O.W. Specific Requirements**						

This checklist shall be completed by the Design Consultant and included as the cover sheet of this submission to document to the DPMC the status of all the deliverables required by the project specific Scope of Work.

_____ _____

Consultant Signature Date

Deliverables Checklist
Project Close-Out Phase

A/E Name: _____

A/E Manual Reference	Submission Item	Required by S.O.W.		Previously Submitted		Enclosed	
		Yes	No	Yes	No	Yes	No
19.3.	Development of Punch List and Inspection Reports						
19.5.	Determination of Substantial Completion						
19.6.	Correction/Completion of Punch List						
19.7.	Submission of Close-Out Documentation						
19.7.1.	As-Built and Record Sets of Drawing (6 Sets)						
19.8.	Final Payment						
19.9.1.	Contractors Final Payment						
19.9.2.	A/E's Final Payment						
19.10.	Project Close-Out Phase Deliverables Checklist						
S.O.W. Reference	**S.O.W. Specific Requirements**						

This checklist shall be completed by the Design Consultant and included as the cover sheet of this submission to document to the DPMC the status of all the deliverables required by the project specific Scope of Work.

_____ _____

Consultant Signature Date

February 7, 1997
Rev.: January 29, 2002

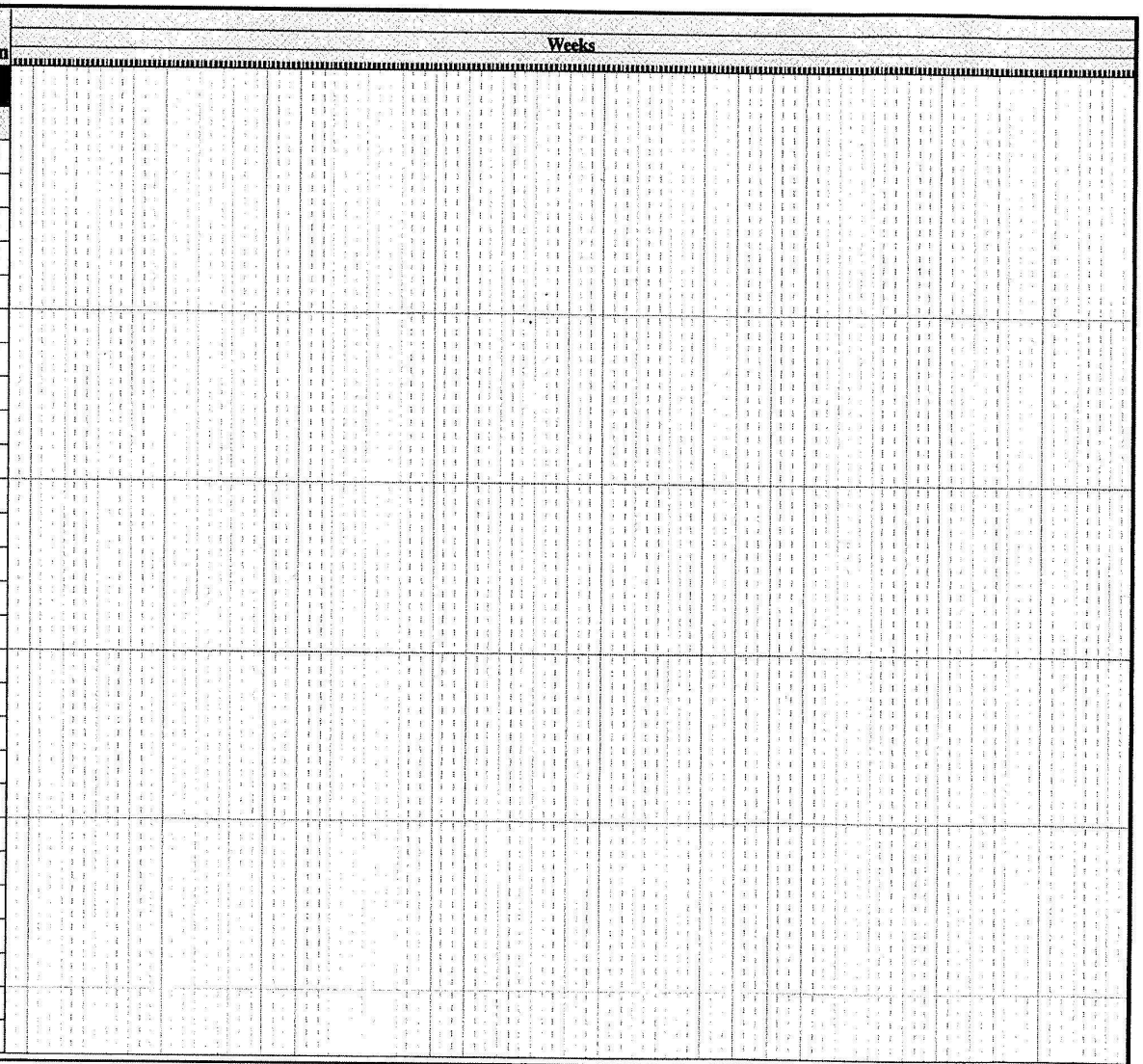
Responsible Group Code Table

The codes below are used in the schedule field "GRP" that identifies the group responsible for the activity. The table consists of groups in the Division of Property Management & Construction (DPMC), as well as groups outside of the DPMC that have responsibility for specific activities on a project that could delay the project if not completed in the time specified. For reporting purposes, the groups within the DPMC have been defined to the supervisory level of management (i.e., third level of management, the level below the Associate Director) to identify the "functional group" responsible for the activity.

CODE	DESCRIPTION	REPORTS TO ASSOCIATE DIRECTOR OF:
CM	Contract Management Group	Contract Management
CA	Client Agency	N/A
CSP	Consultant Selection and Prequalification Group	Technical Services
A/E	Architect/Engineer	N/A
PR	Plan Review Group	Technical Services
CP	Construction Procurement	Planning & Administration
CON	Construction Contractor	N/A
FM	Financial Management Group	Planning & Administration
OEU	Office of Energy and Utility Management	N/A
PD	Project Development Group	Planning & Administration

EXHIBIT 'A'

Activity ID	Description	Rspn
<PROJ>		
Design		
CV3001	Schedule/Conduct Predesign/Project Kick-Off Mtg.	CM
CV3020	Prepare Program Phase Submittal	AE
CV3021	Distribute Program Submittal for Review	CM
CV3027	Prepare & Submit Project Cost Analysis (DPMC-38)	CM
CV3022	Review & Approve Program Submittal	CA
CV3023	Review & Approve Program Submittal	PR
CV3024	Review & Approve Program Submittal	CM
CV3025	Consolidate & Return Program Submittal Comments	CM
CV3030	Prepare Schematic Phase Submittal	AE
CV3031	Distribute Schematic Submittal for Review	CM
CV3037	Prepare & Submit Project Cost Analysis (DPMC-38)	CM
CV3032	Review & Approve Schematic Submittal	CA
CV3033	Review & Approve Schematic Submittal	PR
CV3034	Review & Approve Schematic Submittal	CM
CV3035	Consolidate & Return Schematic Submittal Comment	CM
CV3040	Prepare Design Development Phase Submittal	AE
CV3041	Distribute D. D. Submittal for Review	CM
CV3047	Prepare & Submit Project Cost Analysis (DPMC-38)	CM
CV3042	Review & Approve Design Development Submittal	CA
CV3043	Review & Approve Design Development Submittal	PR
CV3044	Review & Approve Design Development Submittal	CM
CV3045	Consolidate & Return D.D. Submittal Comments	CM
CV3050	Prepare Final Design Phase Submittal	AE
CV3051	Distribute Final Design Submittal for Review	CM
CV3052	Review & Approve Final Design Submittal	CA
CV3053	Review & Approve Final Design Submittal	PR
CV3054	Review Final Design Submitl for Constructability	OCS



NOTE:
Refer to section "IV Project Schedule" of the Scope of Work for contract phase durations.

DBCA - TEST

Sheet 1 of 3

Bureau of Design & Construction Services

EXHIBIT 'A'

Activity ID	Description	Rspn	Weeks
CV3055	Review & Approve Final Design Submittal	CM	
CV3056	Consolidate & Return Final Design Comments	CM	
CV3060	Prepare & Submit Permit Application Documents	AE	
CV3068	Prepare & Submit Bidding Cost Analysis (DPMC-38)	CM	
Plan Review-Permit Acquisition			
CV4001	Review Constr. Documents & Secure UCC Permit	PR	
CV4010	Provide Funding for Construction Contracts	CA	
CV4020	Secure Bid Clearance	CM	
Advertise-Bid-Award			
CV5001	Advertise Project & Bid Construction Contracts	CP	
CV5010	Open Construction Bids	CP	
CV5011	Evaluate Bids & Prep. Recommendation for Award	CM	
CV5012	Evaluate Bids & Prep. Recommendation for Award	AE	
CV5014	Complete Recommendation for Award	CP	
CV5020	Award Construction Contracts/Issue NTP	CP	
Construction			
CV6000	Project Construction Start/Issue NTP	CM	
CV6001	Contract Start/Contract Work (25%) Complete	CON	
CV6002	Preconstruction Meeting	CM	
CV6003	Begin Preconstruction Submittals	CON	
CV6004	Longest Lead Procurement Item Ordered	CON	
CV6005	Lead Time for Longest Lead Procurement Item	CON	
CV6006	Prepare & Submit Shop Drawings	CON	
CV6007	Complete Construction Submittals	CON	
CV6011	Roughing Work Start	CON	
CV6012	Perform Roughing Work	CON	
CV6010	Contract Work (50%+) Complete	CON	
CV6013	Longest Lead Procurement Item Delivered	CON	
CV6020	Contract Work (75%) Complete	CON	

NOTE:
Refer to section "IV Project Schedule" of the Scope of Work for contract phase durations.

DBCA - TEST

Sheet 2 of 3

Bureau of Design & Construction Services

EXHIBIT 'A'

Activity ID	Description	Rspn	Weeks
CV6014	Roughing Work Complete	CON	
CV6021	Interior Finishes Start	CON	
CV6022	Install Interior Finishes	CON	
CV6030	Contract Work to Substantial Completion	CON	
CV6031	Substantial Completion Declared	CM	
CV6075	Complete Deferred Punch List/Seasonal Activities	CON	
CV6079	Project Construction Complete	CM	
CV6080	Close Out Construction Contracts	CM	
CV6089	Construction Contracts Complete	CM	
CV6090	Close Out A/E Contract	CM	
CV6092	Project Completion Declared	CM	

NOTE:
Refer to section "IV Project Schedule" of the Scope of Work for contract phase durations.

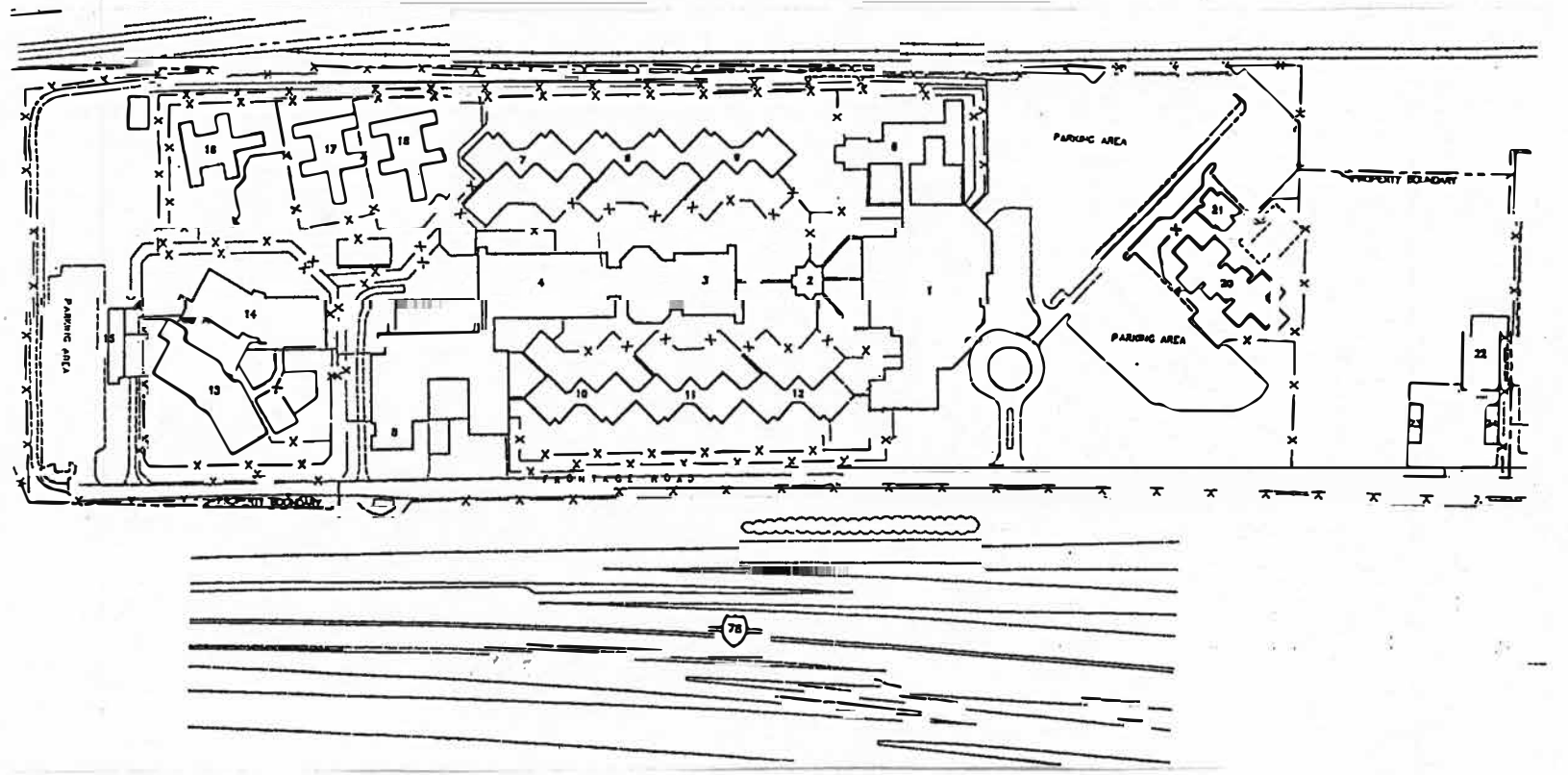
DBCA - TEST

Sheet 3 of 3

Bureau of Design & Construction Services

EXHIBIT 'A'

NORTHERN STATE PRISON, ESSEX COUNTY, NEW JERSEY



Bldg. No.	Bldg. Name	Bldg. No.	Bldg. Name	Bldg. No.	Bldg. Name
01	Admin. Bldg.	11	Housing Unit E	20	Minimum Unit 2
02	Chapel	12	Housing Unit F	21	Minimum Unit 2-Support
03	Dining	13	A.C.S.U.	22	Outside-Warehouse
04	State Use	14	A.C.S.U.	23	Maintenance Office
05	Kitchen	15	A.C.S.U.	24	Maintenance Office/Storage
06	Hospital	16	Aposing Trailers	25	Power House
07	Housing Unit A	17	Aposing Trailers	50	A.C.S.U. Trailers
08	Housing Unit B	18	Aposing Trailers	51	A.C.S.U. Trailers
09	Housing Unit C	19	Traffic Control		
10	Housing Unit D				

DIRECTIONS: From NJ Turnpike, take Exit 14. Take second right marked **FRONTAGE ROAD** after toll booth. Go left onto Frontage Road past **D**ouble Tree Hotel to Northern State Prison.

EXHIBIT 'B'

Northern State Prison

EXHIBIT 'B'

Fire Security Technologies, Inc.
Quality Fire Alarm & Security Systems
1709 Highway 34 • Section #7 • Farmingdale, NJ 07727
Phone (732) 938-2111 • Fax (732) 938-5796
Email: mail@firesecuritytech.com

Northern State Prison
168 Frontage Road
Newark, NJ 07114

Fire Alarm System
Submittal

October 10, 2019

EXHIBIT 'C'

Prepared by: Fire Security Technologies, Inc.
1709 Highway 34, Suite 7
Farmingdale, NJ 07727
Phone: 732-938-2111
Fax: 732-938-5796

*NJ State Division of Consumer Affairs
Fire Alarm License #34BF00010500
*NJ Department of Community Affairs Fire Protection
Permit #P00245

_____

John T. Chrzanowski, ET
*NICET Engineering Technician – Fire Alarm #110642

EXHIBIT 'C'

Table of Contents

General Project Information

Salesperson:

Glen Bellini, (732) 938-2111 x103, glen@firesecuritytech.com

For Engineering contact:

John Chrzanowski, ext 111, john.c@firesecuritytech.com
Michael Tucker, ext 110, michael@firesecuritytecy.com

For Submittals, Release of Equipment:

Gary Perkert, ext 107, gary@firesecuritytech.com

For Scheduling Installation, Start-Up and Final Inspections contact the Service Department:

John Heidel, ext 112, john@firesecuritytech.com

Please contact the Service Department TWO WEEKS IN ADVANCE to schedule a technician for start-up

EXHIBIT 'C'

Cut Sheets for parts listed below:

Equipment to be Provided:

ADMIN

Qty.	Model Number	Description
	Workstation	
1	FW-22LCDWTS	22" Monitor
1	FW-SP4I	Isolated Serial Port Card
1	FW-CGSUL	"Fireworks" Software
1	FW-UL6W	"Fireworks" Workstation
	Fire Panel	
2	3-CPU3	CPU
1	3-CPUDR	Blank Door for CPU-3
2	3-FIBMB2	Fiber Card
2	SMXLO2	Single Mode Transceiver
1	3-RS232	RS232 Communication Card
2	3-SSDC1	Signature Single Driver Controller
1	3-MODCOM	Modem Communicator Dialer
1	3-LCDXL1	LCD Module
1	3-12SY	12 Switch, 12 Yel LED Ctrl Dis Mod
2	3-PPS/M	Primary Power Supply
2	12V10A/EST	12 volt, 10 ah Battery
2	PS12400	12 volt, 40 ah Battery
1	3-LRMF	Blank LRM Filler
4	3-FP	Filler Plate
1	3-CAB14B	Fire Panel Back Box w/ 14 LRM Spaces
1	3-CAB14D	Door Assembly for 3-CAB14
2	3-CHAS7	Chassis Assembly
1	3-XFP	Filler Plate for Inner Door
1	BC-1	Battery Cabinet
1	PT-1S	System Printer
1	3-4ANN	Annunciator
1	RLCM/B	Flush Backbox
2	BPS10A	Booster Power Supply
4	PS1270	12 volt, 7 ah Battery
2	SIGA-CC1S	Single Channel Signature Control Module
39	SIGA-PHD	Smoke / Heat Detector
16	SIGA-HRD	Heat Detector
17	SIGA-PHCD	Heat / CO Detector
55	SIGA-SB	Standard Detector Base
17	SIGA-AB4GT	Sounder Base, Temporal
2	SIGA-TCDR	Pattern Generator, Temporal
10	SIGA-SD	Duct Detector
10	SD-T36	36" Sampling Tube
5	SIGA-GRD	Detector Guard (Smoke)

ADMIN (continued)

5	SIGA-DGMF	Mounting Flange for SIGA-GRD
5	SIGA-DGSB	Detector Guard Surface Mount Adapter
26	SIGA-278	Dual Action Pull Station
5	SIGA-CT1	Single Input Module
35	SIGA-CT2	Dual Input Module
17	SIGA-CR	Control Relay
1	SIGA-CRH	Control Relay, DPDT
8	SIGA-IM	Isolator Module
1	302-EPM-135	Heat Detector, Fixed Temp
1	JALX11	Explosion Proof Body for 302-EPM-135
23	G1RF-HDVM	Horn-Strobe Unit
23	G1RT-FIRE	Trim Plate
36	G1AVRF	LED Horn Strobe
36	G1TR	Trim Ring
1	757-8A-T	Weatherproof Horn-Strobe
1	757A-WB	Weatherproof Back Box
3	PAM1	SPDT Relay

GUARD LEVELS 1 – 5

Qty.	Model Number	Description
1	BPS10A	Booster Power Supply
2	PS1270	12 volt, 7 ah Battery
1	SIGA-CC1S	Single Channel Signature Control Module
2	SIGA-PHD	Smoke / Heat Detector
2	SIGA-SB	Standard Detector Base
2	SIGA-CT2	Dual Input Module
2	G1RF-HDVM	Horn-Strobe Unit
2	G1RT-FIRE	Trim Plate

CHAPEL

Qty.	Model Number	Description
1	BPS10A	Booster Power Supply
2	PS1270	12 volt, 7 ah Battery
1	SIGA-CC1S	Single Channel Signature Control Module
2	SIGA-CT1	Single Input Module
2	RMS-1T-KO	Key Operated Pull Station
1	G1RF-HDVM	Horn-Strobe Unit
1	G1RT-FIRE	Trim Plate
2	DTK-TSS3	SLC Loop Protector
2	DTK-2WHLP24B	Surge Protector

EXHIBIT 'C'

HOUSING UNITS – BLDG 13 & 14

Qty.	Model Number	Description
2	3-CPU3	CPU
2	3-FIBMB2	Fiber Card
2	SMXLO2	Single Mode Transceiver
2	3-RS232	RS232 Communication Card
6	3-SSDC1	Signature Single Driver Controller
2	3-LCD	LCD Module
2	3-12SY	12 Switch, 12 Yel LED Ctrl Dis Mod
4	PS12400	12 volt, 40 ah Battery
4	3-FP	Filler Plate
2	3-CAB7B	Fire Panel Back Box w/ 7 LRM Spaces
2	3-CAB7D	Door Assembly for 3-CAB7
2	3-XFP	Filler Plate for Inner Door
2	BC-1	Battery Cabinet
4	BPS10A	Booster Power Supply
8	PS1270	12 volt, 7 ah Battery
4	SIGA-CC1S	Single Channel Signature Control Module
160	SIGA-PHD	Smoke / Heat Detector
34	SIGA-HRD	Heat Detector
4	SIGA-PHCD	Heat / CO Detector
194	SIGA-SB	Standard Detector Base
4	SIGA-AB4GT	Sounder Base, Temporal
4	SIGA-TCDR	Pattern Generator, Temporal
188	SIGA-SD	Duct Detector
188	SD-T36	36” Sampling Tube
120	SIGA-GRD	Detector Guard (Smoke)
120	SIGA-DGMF	Mounting Flange for SIGA-GRD
120	SIGA-DGSB	Detector Guard Surface Mount Adapter
176	SIGA-LED	Remote Alarm LED
6	SIGA-278	Dual Action Pull Station
10	SIGA-CT1	Single Input Module
26	SIGA-CT2	Dual Input Module
202	SIGA-CR	Control Relay
18	SIGA-IM	Isolator Module
4	RMS-1T-KO	Key Operated Pull Station
8	EC-100R	Reflective Beam Smoke Detector
14	G1RF-HDVM	Horn-Strobe Unit
14	G1RT-FIRE	Trim Plate
28	G1AVRF	LED Horn Strobe
28	G1TR	Trim Ring
2	757-8A-T	Weatherproof Horn-Strobe
2	757A-WB	Weatherproof Back Box
6	PAM1	SPDT Relay

EXHIBIT 'C'

HOUSING UNITS – BLDG 13 & 14- SMOKE PURGE

Qty.	Model Number	Description
2	3-CPU3	CPU
2	3-FIBMB2	Fiber Card
2	SMXLO2	Single Mode Transceiver
2	3-SSDC1	Signature Single Driver Controller
16	3-4/3SGYWR	4x3 Switch, 1grn, 1 Yel, 1 White, 1 Red LEDS
2	3-LDSM	LED Display Support Module
4	PS12880	12 volt, 18 ah Battery
2	3-CAB14B	Fire Panel Back Box w/ 14 LRM Spaces
2	3-CAB14D	Door Assembly for 3-CAB14
4	3-XFP	Filler Plate for Inner Door
56	SIGA-CT2	Dual Input Module
56	SIGA-CRH	Control Relay (High Current)
4	SIGA-IM	Isolator Module

EXHIBIT 'C'

TRAILERS – 16, 17,18

Qty.	Model Number	Description
3	3-CPU3	CPU
3	3-FIBMB2	Fiber Card
6	SMXLO2	Single Mode Transceiver
3	3-IDC8/4	Initiating Device Circuit Module
3	3-RS232	RS232 Communication Card
3	3-SSDC1	Signature Single Driver Controller
3	3-LCD	LCD Module
3	3-12SY	12 Switch, 12 Yel LED Ctrl Dis Mod
6	PS12260	12 volt, 26 ah Battery
3	3-CAB7B	Fire Panel Back Box w/ 7 LRM Spaces
3	3-CAB7D	Door Assembly for 3-CAB7
3	3-XFP	Filler Plate for Inner Door
3	BC-1	Battery Cabinet
3	BPS10A	Booster Power Supply
6	PS1270	12 volt, 7 ah Battery
3	SIGA-CC1S	Single Channel Signature Control Module
114	SIGA-PHD	Smoke / Heat Detector
3	SIGA-PHCD	Smoke / Heat / CO Detector
12	SIGA-HRD	Heat Detector
126	SIGA-SB	Standard Detector Base
3	SIGA-AB4GT	Temporal Sounder Base
3	SIGA-TCDR	Temporal Coder
6	SIGA-SD	Duct Detector
6	SD-T36	36” Sampling Tube
6	SIGA-LED	Remote Alarm LED
39	SIGA-278	Dual Action Pull Station
3	SIGA-CT1	Single Input Module
3	SIGA-CT2	Dual Input Module
6	SIGA-CR	Control Relay
6	SIGA-IM	Isolator Module
33	G4AVRF	LED Horn-Strobe Unit
33	G4TR	Trim Plate
33	GP10	Universal Wiring Plate
6	G1AVRF	LED Horn Strobe
6	G1TR	Trim Ring
3	757-8A-T	Weatherproof Horn-Strobe
3	757A-WB	Weatherproof Back Box
3	PAM-1	SPDT Relay

EXHIBIT 'C'

VISITOR CENTER – PANEL 15

Qty.	Model Number	Description
	Workstation	
1	FW-22LCDWTS	22” Monitor
1	FW-SP4I	Isolated Serial Port Card
1	FW-CGSUL	“Fireworks” Software
1	FW-UL6W	“Fireworks” Workstation
	Fire Panel	
2	3-CPU3	CPU
2	3-FIBMB2	Fiber Card
2	SMXLO2	Single Mode Transceiver
1	3-RS232	RS232 Communication Card
1	3-SSDC1	Signature Single Driver Controller
1	3-LCDXL1	LCD Module
1	3-12SY	12 Switch, 12 Yel LED Ctrl Dis Mod
2	3-PPS/M	Primary Power Supply
2	12V10A/EST	12 volt, 10 ah Battery
2	PS12260	12 volt, 26 ah Battery
2	3-CHAS7	Chassis Assembly
3	3-LRMF	Blank LRM Filler
1	3-CPUDR	Blank Door for CPU-3
3	3-FP	Filler Plate
1	3-CAB14B	Fire Panel Back Box w/ 14 LRM Spaces
1	3-CAB14D	Door Assembly for 3-CAB14
1	3-XFP	Filler Plate for Inner Door
1	BC-1	Battery Cabinet
1	3-4ANN	Annunciator
1	RLCM/B	Flush Box for 3-LCDANN
1	BPS10A	Booster Power Supply
2	PS1270	12 volt, 7 ah Battery
1	SIGA-CC1S	Single Channel Signature Control Module
1	SIGA-PHD	Smoke / Heat Detector
3	SIGA-PHCD	Heat / CO Detector
1	SIGA-SB	Standard Detector Base
3	SIGA-AB4GT	Sounder Base, Temporal
1	SIGA-TCDR	Pattern Generator, Temporal
5	SIGA-SD	Duct Detector
5	SD-T36	36” Sampling Tube
4	SIGA-LED	Remote Alarm LED
2	SIGA-278	Dual Action Pull Station

3	SIGA-CT1	Single Input Module
3	SIGA-CT2	Dual Input Module
5	SIGA-CR	Control Relay
1	RMS-1T-KO	Key Operated Pull Station
6	G4AVRF	LED Horn-Strobe Unit
6	G4TR	Trim Plate
6	GP10	Universal Wiring Plate
1	PAM1	SPDT Relay

SPARE PARTS

15	SIGA-PHD	Smoke / Heat Detector
3	SIGA-HRD	Heat Detector
2	SIGA-PHCD	Heat / CO Detector
10	SIGA-SD	Duct Detector
4	SIGA-278	Dual Action Pull Station
1	RMS-1T-KO	Key Operated Pull Station
8	G1RF-HDVM	Horn-Strobe Unit

EXHIBIT 'C'

EDWARDS
United Technologies

LIFE SAFETY & INCIDENT MANAGEMENT

FireWorks®

Incident Management Platform

S3424

7300-1657:
0213

FDNY
COA 6228

Overview

FireWorks is an incident management command and control platform that comprises hardware, software, and networking components that together provide a powerful and cohesive Mass Notification and Life Safety solution. Sophisticated networking technology allows it to integrate seamlessly with EDWARDS life safety solutions, yet FireWorks remains fully interoperable with third-party equipment, making it ideal for system upgrades or new installations alike.

FireWorks can automatically trigger programmed responses to facility events, or it can act as an operator interface for manual control. The FireWorks user interface provides a clear, concise, and coordinated view of any situation by presenting information strategically.

Five configurable graphical viewports offer simultaneous insight into different aspects of an incident, while the underlying software dynamically manages content in each viewport based on real-time events and user interaction. Facility maps, live video feeds, audio channels, protocol information, and fingertip control over vital equipment all come together instantly within view of an operator facing events that require solid information and split second timing.

Supporting every FireWorks workstation is a sophisticated network backbone – strong enough to handle coordinated critical control functions from as many as fifty client workstations and many other devices, yet flexible enough to manage integration with third-party mass notification systems.

Redundant server options eliminate risk of communications breakdowns by providing alternate data paths that regenerate communications in the event of signal loss. FireWorks can operate on an existing local area network, or provide facility access from anywhere in the world via secured Virtual Private Network (VPN) connections.

Standard Features

- **Widely listed to prevailing Mass Notification and Life Safety standards**
  Readily adopted for standalone or remote applications
- **Dynamic event-driven user interface**
  Easy-to-follow notification and control protocols
- **Software-only standalone versions**
  Cost-effective annunciation where agency listings are not required
- **Agency listed servers, workstations, monitors, accessories**
  Sophisticated command and control for multiple networks
- **Highly Sensitive Smoke Detector (HSSD) support**
  Full command and control integration with *VESDAnet* detectors
- **FW-FAST Automatic System Configuration**
  Generate interactive floorplans from engineering drawings and EDWARDS SDU files.
- **Email event notification to multiple recipients**
  Instant communication with off-site personnel
- **Powerful HTTP/HTTPS communication engine**
  Compatible with DRMNS and many other third-party systems
- **Password-defined user access and event filtering**
  Control who sees what
- **Use native graphic formats to create event maps**
  Import most standard graphic formats – no conversion required
- **Multi-lingual operation**
  Supports English, Spanish, Portuguese, and French
- **Remote real-time WebClient**
  Access system information from anywhere in the world

EXHIBIT 'C'

Application

Scalable Third-party Integration

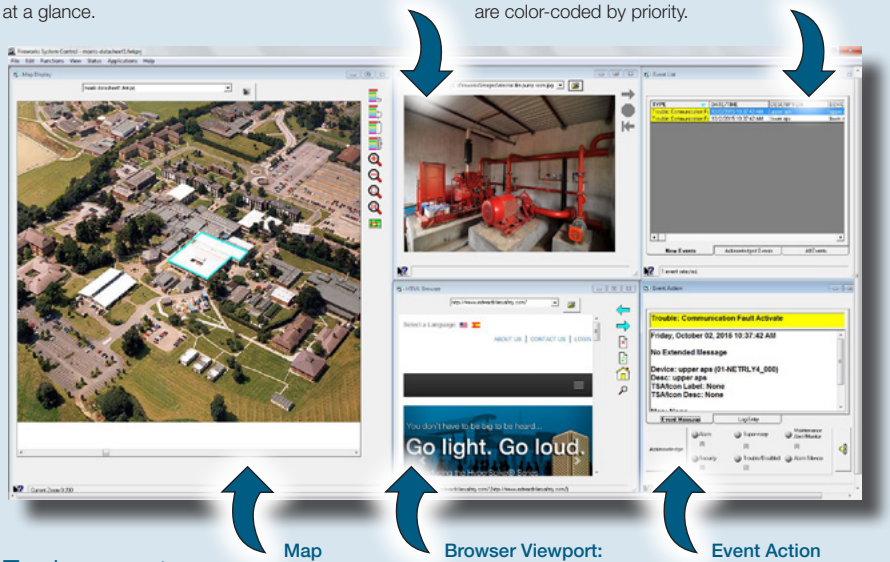
FireWorks is equipped with a powerful HTML/HTTP/HTTPS/XML Command Processor that supports integration for Distributed Recipient Mass Notification Systems (DRMNS) and many other third-party systems. It can also receive information from third-party systems by way of the FW-DARCOM (with Bosch D6600) option and/or with the MN-NETRLY4 input/output modules.

FireWorks systems can send certain UL 2572 V1, Technical Category TC1, TC2, TC3 and TC4 outputs to third-party systems by way of the MN-FVPN VoIP, MN-NETRLY4 and/or Signature Series modules. The EDWARDS APS6A can be easily configured to support most third-party interfaces.

Dynamic Viewports

Image Viewport:
Displays images relevant to the occurrence. Any event, any device, or any combination of devices and events can retrieve instant graphical information that is relevant to the occurrence and can be understood at a glance.

Event List Viewport:
Upon receipt of a change of state, the event information is displayed in the Event List Viewport. If several events are received, all events are displayed in the Event List viewport and are color-coded by priority.



Each operator can customize the system to have anywhere from two to five viewports visible.

Map Viewport:
This gives the user an overview of the event's location in the context of its surroundings and the entire facility.

Browser Viewport:
When the FireWorks workstation is provided with an Internet/network connection, the Browser Viewport can be configured to automatically connect to emergency information sites, network accessible building automation, video streams, and other third-party systems.

Event Action Viewport:
This screen is used to provide instructions on how to respond to the selected event, and also to acknowledge that these instructions have been carried out.

Flexible Email Messaging

To enhance off-premise notification, FireWorks supports connection to a Simple Mail Transfer Protocol (SMTP) mail server, allowing event information to be emailed. This provides the ability to get event information automatically, efficiently and inexpensively to the people who need to know about events in facilities.

Email messages can be configured based on individual events, event categories and more. Certain people can receive all system events, others can receive only alarm conditions, while still others can receive only specific events – the options are easy to configure and also to change.

Valuable Reporting Functions

FireWorks report functionality allows the system administrator or other authorized user to create and retrieve panel reports. Reports include *Panel Status, Disabled Points* and *Sensitivity*. Meanwhile, a full history report generator allows the review of historical panel events.

FireWorks has a versatile *Devices Test Report*. This report allows for devices that have been tested as part of a Service Group to be included in a National Fire Protection Association (NFPA) Fire Alarm And Signaling Code (NFPA 72) formatted report.

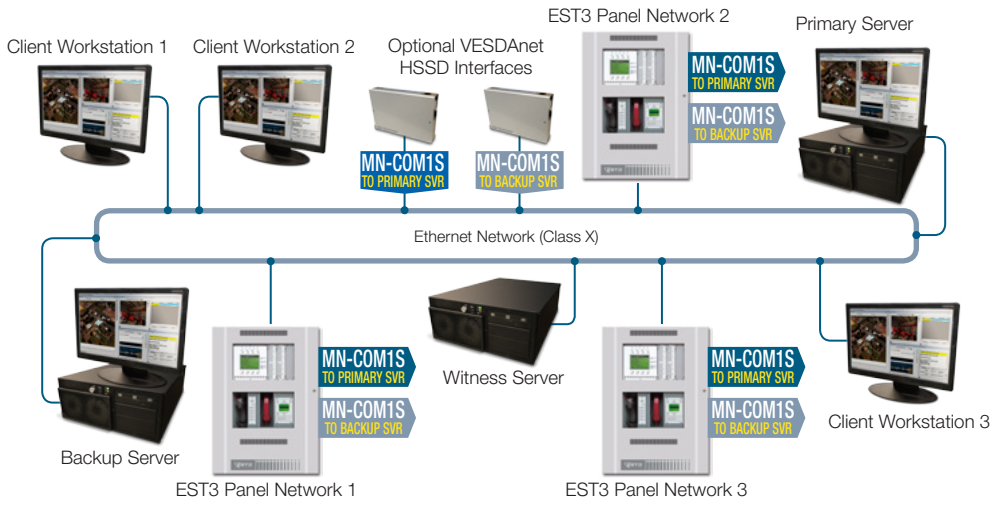
Powerful Network Capabilities

- Up to 15 Graphical Command/Control WorkStations with Non-Redundant Server option
- Up to 50 Graphical Command/Control WorkStations with Redundant Server option
- Up to 15 concurrent Text-Only Web-Client clients
- Up to 125 EST3(X) panel network nodes, with each system node having up to 64 networked panels for a total of 8,000 EST3(X) control panels. Each EST3 control panel can support up to 2,500 individual addressable points, this yields an addressable point count for FireWorks of 20,000,000 unique points just from EST3/3X systems.
- Up to 750 MN-FVPN Voice over Internet Protocol (VoIP) or MN-NETRLY4 Input/Output modules
- Up to 1,000 iO Series panel connections via IPMON with up to 1000 points per system for up to 1,000,000 points from iO systems.
- DACR accounts with FW-DARCOM and Bosch D660 are limited by Bosch software options.
- Up to 20 *VESDAnet* networks with each network having up to 61 detectors in life safety mode (1,220 detectors) or 100 detectors in process monitoring mode (2,000 detectors)

EXHIBIT 'C'

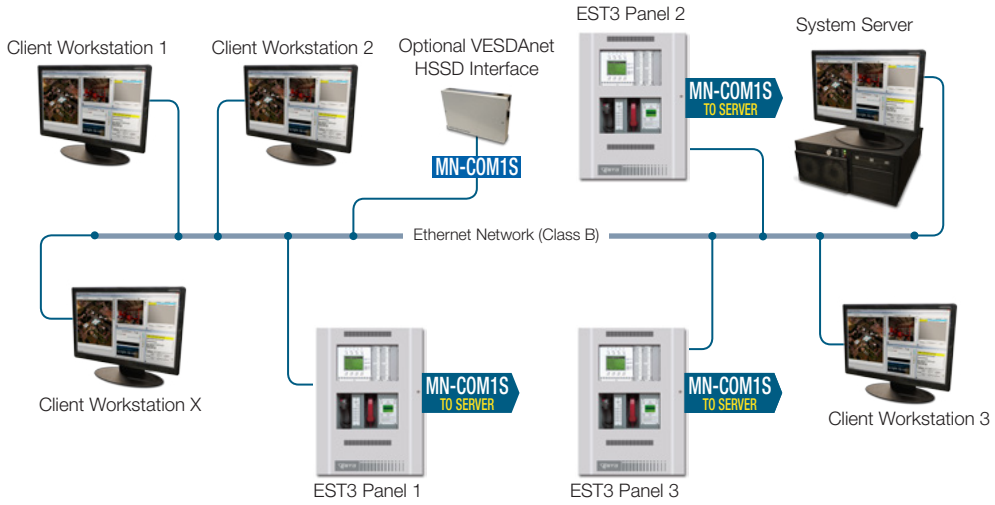
Network Topology

Redundant Network: up to 50 Client Workstations



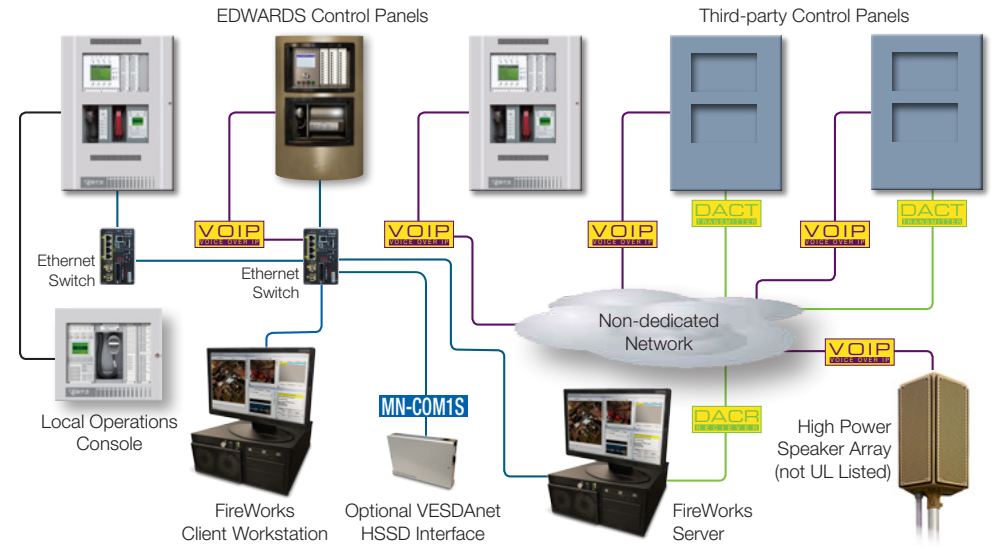
- Utilizes Microsoft configuration requirements
- System will support up to 50 client workstations
- System will have Primary, Backup, and Witness servers with automatic transfer from Primary to Backup
- Servers require a quorum to operate
- Each EST3(X) Panel network requires one MN-COM1S to connect to the Primary Server and one MN-COM1S to connect to the Backup Server
- All connections are supervised and will post faults across the network
- The network must have a dedicated VLAN with priority signaling
- Network switches must have UPS power

Non-redundant Network: up to 15 Client Workstations



- Utilizes Microsoft configuration requirements
- System will support up to 15 client workstations
- Each EST3 network requires one MN-COM1S to connect to the system server
- All connections are supervised and will post faults across the network
- The network must have a dedicated VLAN with priority signaling
- Network switches must have UPS power

Example UL Listed Mass Notification: Scalable Third-party Integration



- Large network capacity for global and enterprise-wide connectivity
- Compatible with third-party networks
- UL/ULC Listed for Mass Notification and Security applications
- Easy-to-navigate event-driven viewport display
- Software-only versions do not require UL listed hardware
- Internet/WAN connectivity
- Monitor and control for single or multi-line networks
- HTTP/HTTPS communications engine
- Automatic email notification to multiple recipients
- Context-sensitive event action instructions
- Create event maps with standard graphic formats
- Digital Alarm Receiver connectivity

EXHIBIT 'C'

Network Options

FW-FAST: Automatic System Configuration

FireWorks Assimilation Systems Technology can significantly reduce the time and expense of programming or modifying a FireWorks system database. This unique and powerful option reads properly formatted AutoCAD® and EDWARDS System Definition Utility (SDU) files to automatically create floorplans with device locations, and panel renderings with pseudo point touch-sensitive areas. Floorplans and panel renderings can then easily be inserted into the FireWorks system.

FW-HSSX1: Aspirated Detection Interface

FireWorks Highly Sensitive Smoke Detector (HSSD) interface provides UL Listed/FM Approved digital command/control integration with Xtralis VESDA® Series smoke detectors for very early fire detection. FireWorks can respond to individual sector/pipe conditions, detector events, as well as minor and major faults across 20 VESDA nodes encompassing as many as 2,000 VESDA detectors. It can also reset and perform certain other control functions of the *VESDAnet* detectors.

FW-DARCOM: Third-party Interoperability

This option allows for a FireWorks system to support Digital Alarm Communicator Receiver (DACR) operation. The DACR can be any Bosch® D6600 DACR that can receive Security Industry Association (SIA) Contact ID or 4/2, or the cost-effective IPMON1000 option. The FW-DARCOM option with the D6600 allows FireWorks to receive, display and process information from most third-party fire alarm and/or security panels.

IPMON1000: Life Safety Integration

When used in conjunction with FW-DARCOM software, this option supports digital connection to up to a total of 1,000 EDWARDS iO Series control panels for receive-only Contact ID operation. Each individual zone or addressable device can display on the FireWorks system.

WebClients: Global VPN Communications

FireWorks systems support an optional real-time WebClient remote read-only text viewing feature that can be accessed from anywhere in the world via a secured Virtual Private Network (VPN) connection, or local network connection. WebClient events mirror the FireWorks system *Event List* and *Event Action* viewports. These events are prioritized and color-coded for easy identification by type and source. Events may also be filtered at the Web Client, and sound files can be added per alarm, supervisory, trouble or monitor event category.

Any number of remote web clients can be deployed by FireWorks. The number of concurrent connections possible is determined by the package option. The WebClient can also run many reports for the remote workstation and print them to a local printer or output them to a .csv file.

Hardware Options

Workstations

The FireWorks FW-UL6W Workstation is a UL 864/ULC S527 Listed and FM Approved hardened industrial workstation that can be used for any Workstation or Witness Server application. The FW-UL6W cannot be used as a Redundant or Non-Redundant System Server. The FW-UL6W has the following specifications:

- i7 4770S processor
- 3.9 GHz
- 8 MB Cache
- QPI speed of 5 GT/S
- 4 core, multi-threaded to 8
- 32 GB RAM
- Standard RAID 1 (dual) 500 GB Solid State Drives
- 2 Network Interface Ports

Servers

The FireWorks FW-UL6S Server is a UL 864/ULC S527 Listed and FM Approved hardened industrial workstation that can be used for any FireWorks – Server, Workstation or Witness Server. The FW-UL6S has the following specifications:

- Dual Xeon capable
- Standard single processor Xeon 2680
- 3.6 GHz
- QPI speed of 8 GT/S
- 10 core, multi-threaded to 20
- 25 MB Cache
- 128 GB RAM per processor
- Standard RAID 1 (dual) 500 GB Solid State Drives
- Standard Hot-swappable dual power supplies
- Standard 3 HDMI video ports
- 4 Network Interface Ports

Monitors

The FireWorks solution family offers 2 UL/ULC Listed/FM Approved monitor options, 22" and 42" touchscreens. Each FireWorks Workstation can support multiple monitors.

The FW-22LCDWTS is a touch screen unit with:

- Up to 1680 x 1050 WSXGA video
- Built-in speakers
- DVI/VGA input
- Desktop mounting

The FW-42LCDWTS is a touch screen unit with:

- Up to 1920 x 1080 video
- Built-in speakers
- DVI/VGA input
- Single or dual horizontal or vertical wall-mounting options

EXHIBIT 'C'

Network Accessories

MN-FNS8C2F3 Managed Ethernet Switch
DATA SHEET E85010-0153

FireWorks can operate on dedicated (recommended) or non-dedicated Ethernet networks.

EDWARDS offers one of the most robust and powerful UL/ULC Listed/FM Approved Managed Ethernet Networking solutions available. MN-FNS Series Managed Ethernet Solutions are powered by Cisco® technologies. Layer 2 and Layer 3 switches/routers are available, along with interface modules that support single or multimode fiber optic media. Class B, Class X, Mesh and Hybrid topologies are fully supported.

UL/ULC Listed/FM Approved MN-FVPN Voice over Internet Protocol (VoIP), MN-NETRLY4 input/output and MN-COM1S Communication Modules are all supported by the FireWorks platforms.

MN-FVPN
Data Sheet
85010-0143

MN-NETRLY4
Data Sheet
85010-0149

MN-COM1S
Data Sheet
85010-0144

FireWorks, along with the EST3(X), can control the crystal-clear and powerful HyperSpike High and Medium Power Speaker Arrays.

See DATA SHEET E85001-0637 for more information.

Always consult the latest Agency Standards, Consensus Standards/Codes and with the Local Authority Having Jurisdiction for system application and installation requirements.

See Ordering Information List for FireWorks Hardware Accessory information and descriptions.

Agency Listing

The FW-UL6W has been investigated against, and found to be in compliance with, the following standards:

- CAN/ULC-S303-M91 Standard for Local Burglar Alarm Units and Systems, 1st edition
- CAN/ULC-S527-11 Standard for Control Units for Fire Alarm Systems, 2nd edition
- CAN/ULC-S559-04 Standard for Equipment for Fire Signal Receiving Centres and Systems, 1st edition
- CSA C22.1-12 Canadian Electrical Code, Part 1
- UL 365 Standard for Police Station Connected Burglar Alarm Units and Systems, 4th edition
- UL 609 Standard for Local Burglar Alarm Units and Systems, 11th edition
- UL 636 Standard for Holdup Alarm Units and Systems, 10th edition
- UL 864 Standard for Control Units and Accessories for Fire Alarm Systems, 10th edition
- UL 1076 Standard for Proprietary Burglar Alarm Units and Systems, 5th edition
- UL 1610 Standard for Central-Station Burglar-Alarm Units, 3rd edition
- UL 1635 Standard for Digital Alarm Communicator System Units, 3rd edition
- UL 2017 Standard for General-Purpose Signaling Devices and Systems, 2nd edition
- UL 2572 Standard for Mass Notification Systems, 1st edition
- NFPA 11 Standard for Low-Expansion Foam Systems, 2010 edition
- NFPA 11A Standard for Medium- and High-Expansion Foam Systems, 2010 edition
- NFPA 12 Standard on Carbon Dioxide Extinguishing Systems, 2011 edition
- NFPA 12A Standard on Halon 1301 Fire Extinguishing Systems, 2009 edition
- NFPA 12B Standard on Halogenated Fire Extinguishing Agent Systems Halon 1211
- NFPA 13 Standard for the Installation of Sprinkler Systems, 2013 edition
- NFPA 15 Standard for Water Spray Fixed Systems for Fire Protection, 2012 edition
- NFPA 16 Standard for the Installation of Foam-Water Sprinkler and Foam-Water Spray Systems, 2011 edition
- NFPA 17 Standard for Dry Chemical Extinguishing Systems, 2013 edition
- NFPA 17A Standard for Wet Chemical Extinguishing Systems, 2013 edition
- NFPA 70 National Electrical Code
- NFPA 72 National Fire Alarm Signaling Code
- NFPA 2001 Standard on Clean Agent Fire Extinguishing Systems, 2012 edition
- FM 3010 Approval Standard for Fire Alarm Signaling Systems, 2010 edition
- UL 2572 security and data protection
- For UL 2572 first edition applications only:
- Approved Security Function for FIPS PUB 140-2: No encryption employed
- Communication Security: Level 1
- Stored Data Security: Level 0
- Access Control Security: Level 2
- Physical Security: Level 1
- Audit Control: Not provided

EXHIBIT 'C'

Ordering Information

System Software	
FW-CGS	Standalone FireWorks Color Graphics Software PIN letter. Allows full 5 view port display. Includes FW-FIREKEYUSB. No common control.
FW-CGSUL	Standalone FireWorks Color Graphics Software PIN letter. Allows full 5 view port display. Includes FW-FIREKEYUSB. With common control.
FW-NCZZFP	Non-Redundant Server Client license. One Hasp PIN Code. Requires one new FW-CGSUL base package, ordered separately.
FW-NSZ5FP	5 seat non-redundant server. One Hasp PIN codes for server only. Order Workstation Client licenses separately. Requires one new FW-CGSUL base package, ordered separately.
FW-NS15FP	15 seat non-redundant server. One Hasp PIN code for server only. Order Workstation Client licenses separately. Requires one new FW-CGSUL base package, ordered separately.
FW-RCZZFP	Redundant Server Client license. Requires one new FW-CGSUL base package, ordered separately.
FW-RSZ5FP	5 seat redundant server for new installations. Three Hasp PIN codes, two Microsoft SQL licenses for servers only. Order Workstation Client licenses separately. Requires one new FW-CGSUL base package, ordered separately.
FW-RS15FP	15 seat redundant server for new installations. Three Hasp PIN codes, and two Microsoft SQL licenses for servers only. Order Workstation Client licenses separately. Requires one new FW-CGSUL base package, ordered separately.
FW-RS25FP	25 seat redundant server for new installations. Three Hasp PIN codes and two Microsoft SQL licenses for servers only. Order Workstation Client licenses separately. Requires one new FW-CGSUL base package, ordered separately.
FW-RS50FP	50 seat redundant server for new installations kit. Three Hasp PIN codes and two Microsoft SQL licenses for servers only. Order Workstation Client licenses separately. Requires one new FW-CGSUL base package, ordered separately.

Upgrade Software	
FW-NCZZWP	Upgrade existing FW-CGSUL license to Non-Redundant Client license. One Hasp PIN Code.
FW-NCZZXP	Upgrade existing FW-CGS license to Non-Redundant Client license. One Hasp PIN Code. Includes one FW-CGSUL base package.
FW-RCZZUP	Upgrade existing Non-Redundant Server Client to Redundant Server Client upgrade. One Hasp PIN code.
FW-RCZZWP	Upgrade existing FW-CGSUL license to Redundant Server Client license. One Hasp PIN Code.
FW-RSZ5UP	Upgrade existing 5 Seat non-redundant server to 5 seat redundant server cluster. Two Hasp PIN codes and two Microsoft SQL licenses for servers only. Order Workstation Client licenses separately.
FW-RS15UP	Upgrade existing 15 Seat non-redundant server to 15 seat redundant server cluster. Two Hasp PIN codes and two Microsoft SQL licenses for servers only. Order Workstation Client licenses separately.

FireWorks Software - Options	
85012-0019	FireWorks Software DVD only.
FW-1S	One Seat WebClient.
FW-4S	Four Seat WebClient (Requires FW-1S).
FW-10S	Ten Seat WebClient (Requires FW-1S & FW-4S).
FW-DARCOM	Pin Code for Communication to DACRs and/or IPMON1000.
FW-FAST	Pin Code for FireWorks Assimilation System Technology (FAST) AutoCAD® reader and panel building option for FireWorks Server or Stand-alone system. Reads AutoCAD ® files and correlates with project SDU to create or update FireWorks database.
FW-HSSD5	Pin Code for Single VESDA HLI Interface software PIN code. Enables connection of one (1) to five (5) VESDA HLI (FW-HSSX1) to FireWorks as nodes. Requires one FW-HSSX1 High Level Interface for each VESDA network if using Stadalone or Non Redundant Server and two if using Redundant FireWorks Servers. Each server must have it's own separate FW-HSSX1.
FW-HSSD20	Pin Code for Single VESDA HLI Interface software PIN code. Enables connection of one (1) to twenty (20) VESDA HLI (FW-HSSX1) to FireWorks as nodes. Requires one FW-HSSX1 High Level Interface for each VESDA network if using Stadalone or Non Redundant Server and two if using Redundant FireWorks Servers. Each server must have it's own separate FW-HSSX1.
FW-IPMON1000	Pin Code for IP Monitoring for 1000 connections to iO Series panels. Requires companion software option FW-DARCOM.

Servers, Workstations	
FW-UL6S	FireWorks Server or Workstation. Single Xeon processor, 128 GB Server RAM. Windows 7 Professional OS (64 bit). 3 HDMI Video outputs. With RAID1 500GB array (dual drives) and dual power supplies.
FW-UL6W	FireWorks Workstation. Single i7 Intel processor. 32 GB RAM. Windows 7 Professional OS (64 Bit). RAID1 configuration with dual 500 GB SSD. Single power supply.

Servers, Workstations Options	
FW-HSSX1	FireWorks to VESDA High Level Interface Module with enclosure. Requires FW-HSSD5 or FW-HSSD20 software. UL/ULC for command/control. Maximum 61 VESDA detectors for Life Safety applications or up to 100 VESDA detectors for process control (non-Life Safety) per FW-HSSX1. 24 VDC.
FW-SP4I	Isolated Serial Port card for FW-UL6W Workstations. Provides four serial ports. Cannot be used on FW-UL6S Servers.
FW-ULVID3	FireWorks FW-UL6S Server video card with 3 HDMI ports. Maximum 2 per workstation or server.
PT-1S	System Printer - Desk Top Style.

EXHIBIT 'C'

Servers, Workstations Installation Accessories

BP1	Blank Panel for 19 inch Enclosure, 1 panel space - 1.75 inch x 19 inch.
BP2	Blank Panel for 19 inch Enclosure, 2 panel spaces - 3.5 inch x 19 inch.
BP3	Blank Panel for 19 inch Enclosure, 3 panel spaces - 5.25 inch x 19 inch.
BP6	Blank Panel for 19 inch Rack /w 2.5 FP spaces, 6 panel spaces - 10.5 inch x 19 inch.
FW-RACKKB	Keyboard Rack mount kit - Black - 2 EIA panel spaces required.
FW-RACKPCUL5	Workstation Rack mount kit for FW-UL6 - 4 EIA panel spaces required comes with slides and rack handles.
FW-UL6CC1	FireWorks FW-UL6W Workstation or FW-UL6S Server computer cable cover kit. Required for UL 1076 (Security) Listed installations.
MFC-A	Fire Control Accessory, Multi-Function Enclosure, 8" X 14" X 3.5", Red.
RKU-61-24B	19 inch Black Rack Mount Cabinet, 24" deep for FW-UL6S or FW-UL6W .
VP-1	Ventilation Panel 1-3/4".
VP-3	Ventilation Panel 3-1/2".

Monitors, Monitor Accessories

FW-22LCDWTS	22" 16:9 LCD 115 Vac 1680x1050 resolution capacitive touch screen with integral speakers. Comes with desk stand cable set and driver disk.
FW-42LCDHMK1	42" wall mount bracket kit - single display, horizontal.
FW-42LCDVMK1	42" wall mount bracket kit - single display vertical.
FW-42LCDVMK2	42" wall mount bracket kit - dual display, vertical.
FW-42LCDWTS	42" 16:9 LCD 115 Vac 1920x1080 resolution surface acoustic wave SAW touch screen. Comes cable set and driver disk. Requires mounting bracket kit.

Network Modules, Accessories

MN-ABPM	Audio Bridge, panel mount - Mounts on MN-BRKT1 or MN-BRKT3.
MN-COM1S	UL 864 Listed FireWorks Communications Ethernet Port, Command & Control. Comes with power and RS232 data cables.
MN-FVPN	Voice Over Internet Protocol (VoIP) encoder/decoder, includes power and audio cable.
MN-NETRLY4	Ethernet controllable multi I/O module. 4 unsupervised inputs & 4 unsupervised outputs. Comes with one MN-NRKB1.
MN-NRBK1	Replacement mounting bracket with end caps for single MN-NETRLY4.
MN-NRMP	Mounting plate to allow up to 2 MN-NETRLY4 modules to be mounted on a MN-BRKT1 bracket.
MN-PASM2	Preamp audio supervision module. Provides Form C dry contact for audio or module failure.
MN-TK10	10 Position, 4 pole terminal kit for use with MN-NETRLY4 or MN-FVPN.

Upgrade Kits and Replacement Parts

FW-HD5RAIDW7	Replacement hard drive (blank) for FWUL5RAIDW7 computer. Does not include OS or other software. UL/ULC Listed.
FW-UL5RAIDUKW7	Upgrade Kit to migrate FWUL5RAID PC to Windows 7 Ultimate 64-bit. Includes Windows 7 Ultimate 64-bit license, 2 pre-loaded 500 GB hard drives, 2 2GB (total 4 GB) memory module and instructions. Must remove existing 1G memory modules from FWUL5RAID. UL/ULC Listed.
FWUL5RAM2G	Additional/replacement 2GB RAM module and instructions for use in FWUL5, FWUL5RAID, FWUL5W7 or FWUL5RAIDW7 computers only. Cannot be used with 1GB modules. Maximum 4 2GB RAM (8 GB total) on motherboard. UL/ULC Listed.
FWHD5W7	Replacement hard drive (blank) for FWUL5W7 computer. Does not include OS or other software. UL/ULC Listed.
FWUL5UKW7	Upgrade Kit to migrate FWUL5 PC to Windows 7 Ultimate 64-bit. Includes Windows 7 Ultimate 64-bit license, 1 pre-loaded Hard 500 GB drives, 2 2GB (total 4 GB) memory module and instructions. Must remove existing 1G memory modules from FWUL5. UL/ULC Listed.
PCCA5	AC cable conduit Adapter for UL5
FW-NCCA5	Network conduit adapter. Use with FW-NIC provides connection for Ethernet cable conduit.
PCWD3	PC watch-dog card for UL5 computers.
FW-NIC	UL/ULC Listed Ethernet 100Base-TX Network Interface Card.

EXHIBIT 'C'

LIFE SAFETY & INCIDENT MANAGEMENT

Contact us...

Email: edwards.fire@fs.utc.com
Web: *Edwards-fire.com*

EDWARDS is a UTC brand.
1016 Corporate Park Drive
Mebane, NC 27302

EXHIBIT 'C'

EDWARDS
United Technologies
LIFE SAFETY & INCIDENT MANAGEMENT

EST3 Base Platform

With Signature Series Fire Alarm

Overview

EST3 is a modular control platform uniquely designed to meet the needs of applications ranging from standalone single panel fire alarm systems to multi-panel networks with unified fire alarm, security, and Mass Notification functions. Each function uses many of the same components, simplifying system layouts.

Virtually all EST3 operating features are software-controlled. A powerful System Definition Utility program helps define system operations in a fraction of the time required by previous methods. This gives EST3 great site flexibility and ensures operational changes and upgrades will be possible years after the initial installation.

EST3 is uniquely designed to meet the life safety needs of any size facility. The function of each panel can be customized by using an extensive selection of plug and play local rail modules.

With support for 64 nodes of up to 2,500 devices each, this network's multi-priority peer-to-peer token ring protocol delivers a fast alarm response time across any size network. Add to that the ability to network panels with fiber or copper connections with an overall length of 160000 ft - that's 30 miles - and you've got virtually unlimited networking options.

The EST3 is modularly listed under the following standards: UL 864 categories: UOJZ, UOXX, UUKL and SYZV, UL 294 category ALVY, UL 609 category AOTX, UL 636 category ANET, UL 1076 category APOU, UL 365 category APAW, UL 1610 category AMCX, UL 1635 category AMCX, UL2572 Mass Notification.
In Canada it is listed to ULC-S527, ULC-S303, and ULC/ORD-C1076.
In Europe it is listed to EN 54-2: 1997 + A1: 2006, EN 54-4: 1997 + A1: 2002 + A2: 2006, and to EN 54-16: 2008.

Standard Features

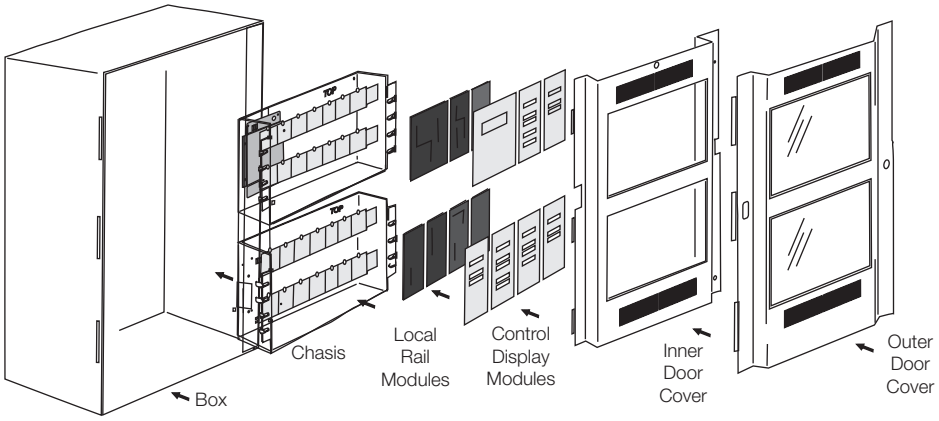
- Listed for Mass Notification/Emergency Communication, Fire, Security, and Emergency Voice Alarm
- Part of an end-to-end audio solution suitable for low frequency signaling in sleeping areas
- 168-character LCD
- Exceptional alarm response times
- Network supports copper, multi-mode fiber, single-mode fiber, or a combination of all three
- Total network wiring over 160,000 feet
- Eight channels of multiplexed digital audio on a single pair of wires or fiber filiment
- Zoned, distributed and banked audio amplifier options
- Local, Proprietary, and Central Station system operations
- In retrofit applications, existing wiring may be used if code compliant
- Supports EDWARDS Signature Series detectors and modules
- Designed in accordance with ISO-9000 quality standards
- UL864 Ninth Edition Listed
- UL2572 Listed for Mass Notification
- Optional earthquake hardening: OSHPD seismic pre-approval for component Importance Factor 1.5

EXHIBIT 'C'

Outstanding Features

EST3 system components are arranged in layers, starting with the backbox and finishing with inner and outer doors. Cabinets are available with room for up to 20 modules and system batteries up to 65 AH. A single 24-volt battery can act as the secondary power supply for all four internal power supplies. Once the backbox is installed, up to four power supplies can be installed in the chassis assembly. The power supplies use a unique paralleling arrangement that ensures the optimum use of each supply. Each supply has the capacity to deliver up to 7 amps at 24 Vdc (28 amps total).

The function of each life safety network panel is determined by the Local Rail Modules (LRMs) plugged into the panel's chassis. An extensive variety of modules are available, including central processing units, input/output circuit modules, communication modules, security modules, and audio amplifier modules.



The top layer of the LRMs is referred to as the user interface layer. This layer is made up of the Main Display Interface module and a system of generic control/display modules. Any control/display module can mount on any LRM. This maximizes flexibility of design for custom systems. The inner and outer doors finish and secure the enclosure.

A single panel can support up to 2,500 addressable points, provide 28 amps @ 24 Vdc and still have room for future expansion. If a single panel is not large enough or you need to distribute functionality throughout the project, then you can network up to 64 panels together!

Networking/Communications

The EST3 Life Safety Network uses a multi-priority peer-to-peer token ring protocol. The protocol gives EST3 the exceptionally fast alarm response time of less than three seconds across the network, virtually independent of the total number of nodes. The EST3 token ring network configuration also affords long distances between panels. The distance between any three panels on #18 AWG (1.0 mm^2) is 5,000 ft (1,523m) for both network control and digital audio signals. Supporting a maximum of 64 panels on a network, the total network length can be in excess of 160000 ft (48768m). Network and audio communication are via RS-485 serial ports. Each two-wire circuit supports Class A (Style 7) or Class B (Style 4) wiring configurations. Fiber optic media is also available.

As an indication of the high level of system integration, off-premise communications is handled by the Modcom modem communicator module. This module provides the Digital Alarm Communicator Transmitter (DACT) function, sending system status signals for up to 255 accounts to up to 80 different central monitoring stations and/or commercial paging carriers.

Digital Audio

EST3 digitized audio can deliver up to eight audio messages *simultaneously* over a single pair of wires! This is plenty of capacity for both live and pre-recorded messages. EST3 easily supports the needs of mass notification messaging, and fire alarm messaging by providing the ability to bring not only pre-recorded messages but also live voice messaging supporting not only evacuation announcments but the messaging needed to support the risks that may require shelter-in-place and relocation messaging.

All audio messages and live pages originate at the Audio Source Unit (ASU) that can store up to 100 minutes pre-recorded audio messages as .wav files. These messages can be automatically directed to various areas in a facility under program control. On the receiving end, zoned amplifiers installed in remote fire alarm cabinets receive and decode the digital messages. The messages are then amplified and sent out to the speakers.

The availability of eight different channels opens a number of new *simultaneous* notification possibilities:

1) Live voice page for MNEC or fire-related instructions;
2) Emergency floor evacuation/notification message;
3) Alert message on floors above and below the emergency;
4) Stairwell evacuation reinforcement message;
5) Elevator cab information messages;
6) Lobby message instructing occupants to exit the building;
7) Concourse instructions to occupants not to enter the lobby;
8) Other instructions to areas not directly affected by the emergency.

Any combination of the eight audio channels can be automatically directed to any or all areas of the building, with total manual override as required. Eight channel capability assures that one message is never interrupted in order to process another, a common fault with two-channel systems. This eliminates any chance of confusing the occupants with conflicting messages.

Survivability is also an integral part of EST3's digitized audio system. Default audio messages are continuously transmitted to all network amplifiers by the ASU. These messages provide audio supervision for the digital audio chain, and act as a default signal if the network data circuit fails or should message control information fail to reach the ASU. If the audio data circuit fails, each amplifier generates a 1KHz temporal (3-3-3) tone that is transmitted during an alarm. In the event of an amplifier failure, a backup audio amplifier is automatically substituted for the failed amplifier in the cabinet, restoring audio capability. In the unlikely event of multiple amplifier failures, the backup amp replaces the amplifier actively processing the highest priority message in the cabinet. When messages are no longer directed to a failed amplifier such as when a high priority page message ends, the backup amp is

EXHIBIT 'C'

dynamically reassigned to the next highest priority failed amplifier actively processing messages

The Firefighters Telephone Control unit (FTCU) provides two-way communications between remotely located phones and the fire command center. The alphanumeric display makes operation intuitive, and a single switch permits the phone signals to be used to issue pages in the facility.

Digitized audio increases notification messaging flexibility, reduces wiring and installation costs, provides enhanced supervision and survivability, and is easy to use.

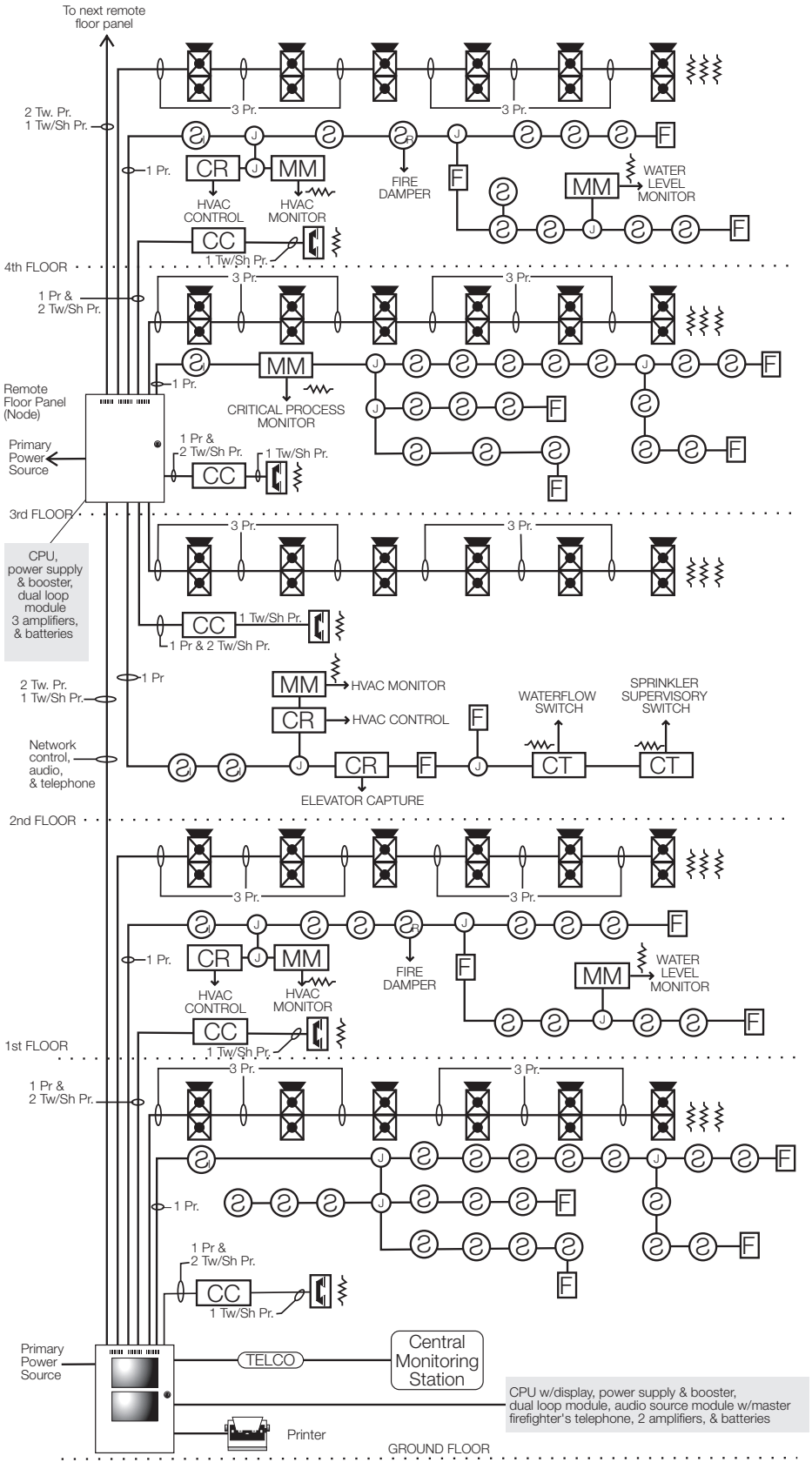
Enhanced Reliability & Survivability

The EST3 uses distributed technology, designed to survive expected and unexpected events including earthquakes. Simple-to-install kits provide internal hardening that meets ;requirements defined by *Uniform Building Code* (UBC 1997); *International Building Code* (IBC 2006); and, *Acceptance Criteria for Seismic Qualification by Shake-Table Testing of Nonstructural Components and Systems* (AC-156). Seismic component importance factor of 1.5 can be met by adding appropriate anchorage for local conditions. There is no need for special installation methods for EST3 field devices including signals and detection devises. By following standard mounting methods, along with any local requirements, seismic Importance Factor 1.5 may be gained in order to further enhance system survivability.

On the initiating side, intelligent Signature Series detectors can make alarm decisions on their own, and do not involve other system components in this important decision-making process. Sensor-based technology must communicate data to a remotely located common panel where alarm decisions are made. Failure of this centralized processor can cripple sensor-based systems. With EST3, a panel CPU failure does not disable a panel's ability to provide protection. In the event of a CPU failure, the intelligent device controllers can still receive alarms and distribute the alarm information to all other modules in the panel. Modules in the panel are capable of responding with a programmed standalone alarm response.

When a network is wired in a Class B configuration, a single break or short on the wiring isolates the system into two groups of panels. Each group continues to function as a peer-to-peer network, working with their combined databases. When wired using a Class A configuration,

Typical Wiring



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Mebane, NC 27302

a single break or short on the network wiring causes the system to isolate the fault, and network communication continues uninterrupted – without any loss of function. Should multiple wiring faults occur, the network reconfigures into many sub-networks and continues to respond to alarm events from every panel that can transmit and receive network messages. Survivability is maximized as responses originating and executed by a single panel are always carried out because a copy of the system database is stored in the panel's memory.

Scheduled maintenance improves system availability, and EST3 is designed to make system maintenance easy. System components are designed to assist in routine and time-consuming service functions.

- EST3 service groups are defined by location, not by system wiring. There is no need to disable an entire floor to test a single device.
- According to their UL listings, Signature Series detectors do not require routine sensitivity testing – a real timesaver.
- Comprehensive internal and external monitoring quickly identifies most problems to a component level, including ground faults that can be identified down to the module.
- Parts are easy to replace. Modules plug in and use automatic addressing and plug-in field wiring. No DIP switches are used.
- Firmware in system modules and Signature devices is easily upgraded as new advances in detection and control technology are made available.
- Advanced system diagnostics are provided in the EST3 System Definition Utility.

User Friendly

A comprehensive survey of users resulted in system features and controls that are easy to use.

The main display interface shows the operator the first and most recent system events – without ever touching a single control! All system events are sent to one of four message queues. Alarm messages are never intermixed with trouble or supervisory signals, eliminating confusion. For more information the *Details* switch provides additional information about the highlighted device. The operator can easily review supervisory, trouble, and monitor messages by simply selecting the appropriate message queue. After a few minutes of inactivity, the system automatically returns to displaying the first and most recent events.

Optional manual control switches and display modules can be arranged on the system operator layer to suit the application. These modules can be used to provide additional HVAC controls, manual selection of audio circuits, or other required manual control functions.

The digital audio system uses only five basic controls to direct all paging messages.

- ALL CALL directs page messages to all zones in the facility.
- Page to EVACUATION automatically directs page messages to the fire area.
- Page to ALERT automatically directs page messages to the areas receiving the alert message.
- All Call Minus automatically directs page messages to the areas NOT receiving the evacuation or alert messages.
- Page by Phone selects the firefighters' telephone system as the source for paging.

The Firefighters' Telephone Control Unit (FTCU) uses an alphanumeric display to indicate the source of incoming calls. Operators simply scroll through the list and hit the "Connect" button when the desired call is highlighted. There is no need to look through rows of lamps and switches to determine the source of calls. Up to five remote locations can be in simultaneous two-way communications with the FTCU.

System Configuration

The powerful EST3 System Definition Utility (SDU) helps define flexible system operations in a fraction of the time required by other systems. Based on an object-oriented system of rules, virtually all EST3 operating features are software-controlled. This gives the designer great flexibility in integrating mass notification, fire, and security functions into a single seamless design.

A report generator provides a complete library of system reports that are invaluable for troubleshooting, including a printout of Signature device connections as the devices are actually wired.

Use of software-based components permits the SDU to add new features to the system. Even the Signature Series devices are capable of upgrading firmware as new detection algorithms become available.

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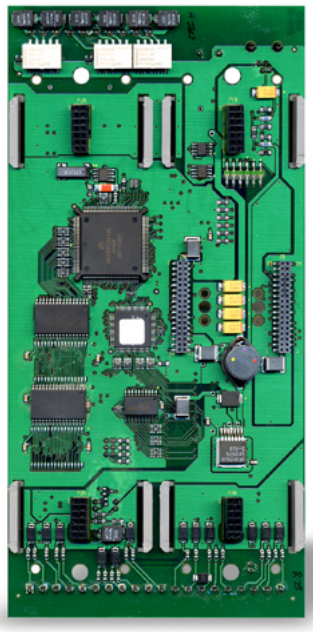
EST3 Central Processor Unit

3-CPU3, 3-RS485A, 3-RS485B, 3-RS232



FM APPROVED
CE
UL
ULC
S3000
7165-1657: 0186
FDNY APPROVED
LPCB

EN 54-2: 1997 + A1: 2006
EN 54-4: 1997 + A1: 2002 + A2: 2006
EN 54-16: 2008

Overview

The 3-CPU3 is the Central Processing Unit Module monitoring the status of all modules and providing the link for network communications. Although each local rail card contains their own microprocessor, the 3-CPU3 provides all inter-module communication and has the ability to download rail module operating parameters. Upon power up the 3-CPU3 automatically learns all local rail module attributes and locations. Site specific software is loaded into the 3-CPU3 which then downloads data to each local rail module. Firmware upgrades are also done from the 3-CPU3 eliminating the need to unplug chips on rail modules.

Mounting must be in the first two local rail spaces of the upper 3-CHAS7 (module chassis). Options for the 3-CPU3 include the addition of an LCD display and User Interface, RS-232 Communication Card, and RS-485 Series Network Communication Cards.

The 3-CPU3 is fully compatible on the same network with the 3-CPU and 3-CPU1 modules.

Standard Features

- Up to 1,000 history events
- RS-485 local rail communications
- Multiplexed audio channels
- Network communication media can consist of twisted copper RS485, short-haul modems and/or single or multimode fiber optic cables
- RS-232 communication card
- Form 'C' contacts for: Alarm, Supervisory and Trouble
- Low voltage memory write protection
- Non-volatile memory

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Application

The 3-CPU3 helps make EST3 an extremely powerful and flexible system. As a single node, stand alone system a single 3-CPU3 controls 1 to 19 additional local rail modules. For larger systems, up to 64 nodes interconnect on a peer-to-peer multi-priority token ring protocol network.

The 3-CPU3 controls all local panel responses to automatic, user initiated, or network reported events. As a network node, it is an equal among peers, there is no master on the network. This gives exceptional response times over the network, less than three seconds.

Each 3-CPU3 provides slots at the back for mounting Network, and RS-232, cards. Removable terminal blocks on the 3-CPU3 support connection of network and audio data wiring. On board common relays also terminate at the 3-CPU3 terminals. To aid in trouble shooting and service, status LEDs monitor local rail, network, RS232 and audio data communications.

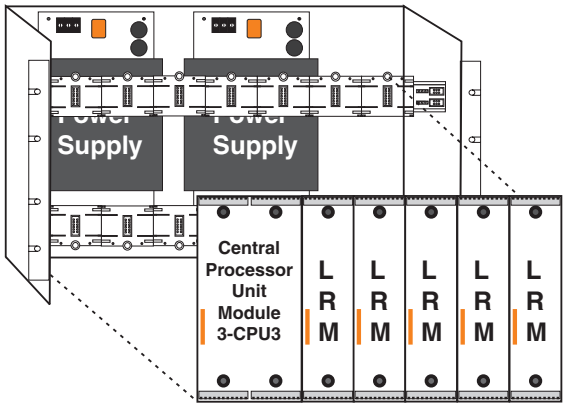
The **Network Communications** card mounts to the back of the Central Processor Unit. The 3-RS485A card provides a Class A (Style 7) or Class B (Style 4) circuit for network communications signals and support for a Class B (Style 4) or Class A (Style 7 - dual Style 4) circuit for the digitized audio signals. The 3-RS485B card provides a Class B (Style 4) or Class A (Style 7) circuit for network communications signals and a second Class B (Style 4) circuit for the digitized audio signals. Network messages received by the Network Communications card are re-transmitted to the next network node. Re-transmission maximizes the wire run lengths between nodes. With 64 nodes miles of network length is possible. Fail safe mechanisms built into the card direct connect the data input and output ports should the network card or its related Central Processor fail. Network communications may be configured via copper or fiber media using the 3-FIBMB.

The **3-RS232 Communication Card** mounts to the back of the 3-CPU3. The 3-RS232 has two optically isolated RS-232 ports. The ports support connection of a printer and/or an external command center. Entire network downloading from one location (to all 64 nodes) is available through the RS-232 card.

Engineering Specification

It must be possible to support a single stand alone node or up to 64 nodes communicating on a peer-to-peer token ring protocol network. Network and digitized audio wiring shall be run in a [choose one: Class A (Style 7) or Class B (Style 4)] configuration. Network alarm response from alarm input to signal activation must be under 3 seconds. All field wiring must be to removable terminal blocks. Status LEDs must be provided for communications of network and internal rail communications. Inter-node communication speed must be programmable. Internal rail communications speed must be programmable.

Installation and Mounting



Data

Maximum resistance between any 3 panels	90 Ohms
Maximum capacitance between any 3 panels	0.3 µF
Maximum distance between any 3 panels via RS485	5,000 ft. (1,524 m)

Capacitance, entire network

Maximum Accumulative Capacitance

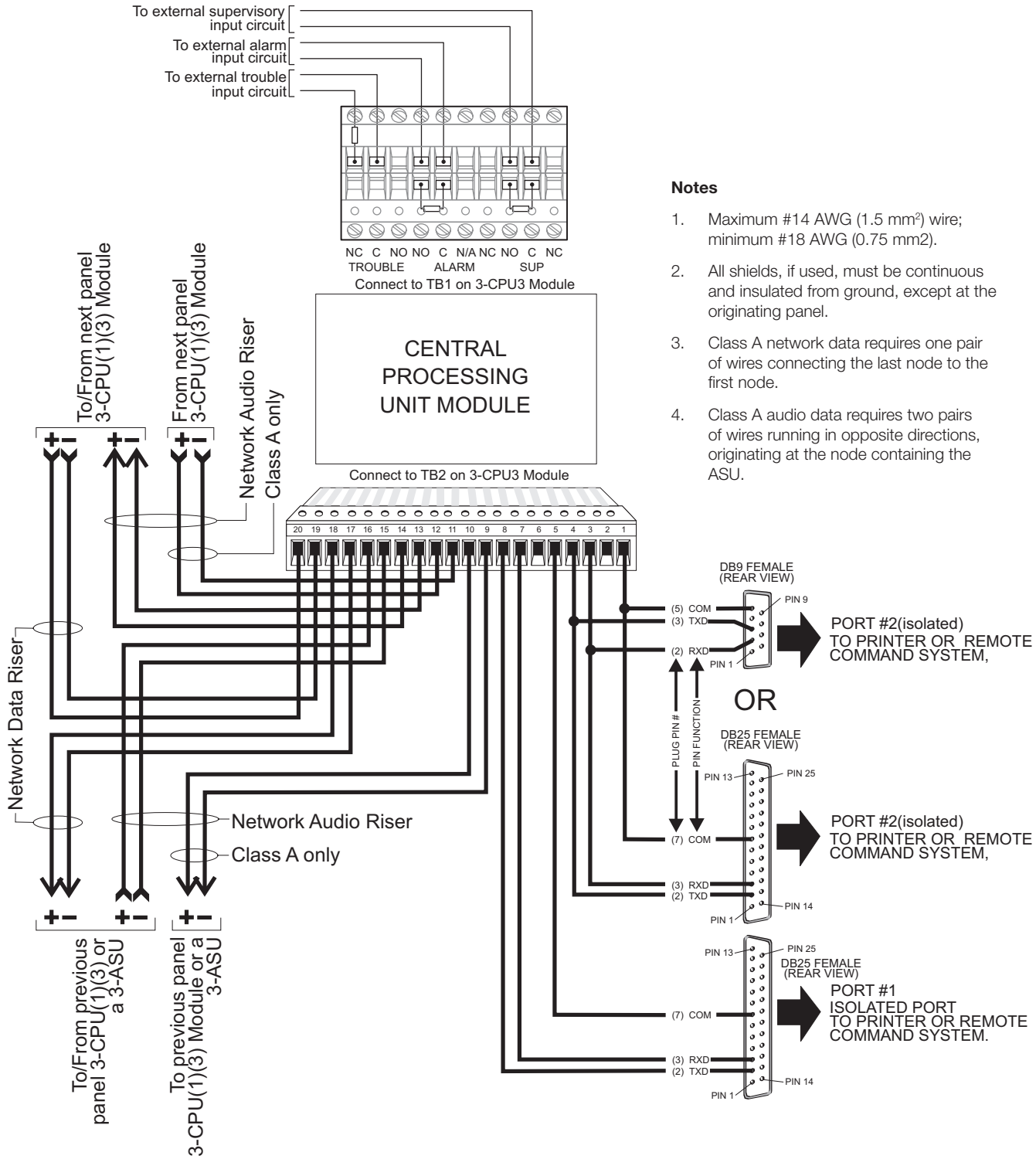
Wire Size	38.4K Baud	19.2K Baud
18 AWG	1.4 µF	2.8 µF
16 AWG	1.8 µF	3.6 µF
14 AWG	2.1 µF	4.2 µF

Audio

Maximum resistance between any 3 panels	90 Ohms
Maximum capacitance between any 3 panels	0.09 µF
Maximum distance between any 3 panels via copper RS485	5,000 ft. (1,524 m)

EXHIBIT 'C'

Typical Wiring



Notes

1. Maximum #14 AWG (1.5 mm^2) wire; minimum #18 AWG (0.75 mm2).
2. All shields, if used, must be continuous and insulated from ground, except at the originating panel.
3. Class A network data requires one pair of wires connecting the last node to the first node.
4. Class A audio data requires two pairs of wires running in opposite directions, originating at the node containing the ASU.

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Mebane, NC 27302

Specifications

3-CPU3

Agency Listings	UL, ULC, CSFM, CE, LPCB EN54*.
Mounting	2 - Left most local rail spaces
Terminal Size	18-12 AWG (1.0mm² to 2.5mm²)
Standby Current	155 mA
Alarm Current	165 mA
Contact Ratings	Nonbypassable Alarm, Supervisory and Trouble Form 'C' 1A at 30 Vdc
Data Down Loading	RJ14 Jack
Operating Environment	0°C - 49°C (32° F - 120° F); 93% at 40° C Non-Condensing

**For EN 54-2: 1997 + A1: 2006, EN 54-4: 1997 + A1: 2002 + A2: 2006, and EN 54-16: 2008 compliant product add suffix -E to model eg. 3-CPU3-E.*

Note: CPU current includes the main power supply, since the CPU and PPS cannot be measured separately.

Option Cards

Catalog number	3-RS232	3-RS485A	3-RS485B
Standby Current	58 mA	98 mA	98 mA
Alarm Current	58 mA	98 mA	98 mA
Communication Ports	Two optically isolated RS-232	Three RS-485 Class A (Style 7)	One Class B (Style 4) or Class A (Style 7) network data circuit and one Class B (Style 4) audio data circuit
Agency Listings	UL, ULC. CSFM, CE, LPCB. EN54*.		
Mounting	Back of 3-CPU3		
Operating Environment	0° C - 49° C (32° F - 120° F); 93% at 40° C Non-Condensing		

**For EN 54-2: 1997 + A1: 2006, EN 54-4: 1997 + A1: 2002 + A2: 2006, and EN 54-16: 2008 compliant product add suffix -E to model eg. 3-RS485A-E*

Ordering Information

Catalog Number	Description	Ship Wt. lb (kg)
3-CPU3	Central Processor Unit Module. Add suffix "-E" for EN54 compliant versions.	0.7lb (0.32kg)
3-RS485A	Network Communications Card, Class A (Style 7). Add suffix "-E" for EN54 compliant versions.	0.33lb (0.15kg)
3-RS485B	One Class A/B network data circuit and one Class B audio data circuit. Add suffix "-E" for EN54 compliant versions.	0.33lb (0.15kg)
3-RS232	RS-232 Communication Card. Add suffix "-E" for EN54 compliant versions.	0.33lb (0.15kg)
3-CPUDR	CPU doors with filler plates. Order separately, one required per CPU where no LCD display is installed.	0.25lb (0.11kg)

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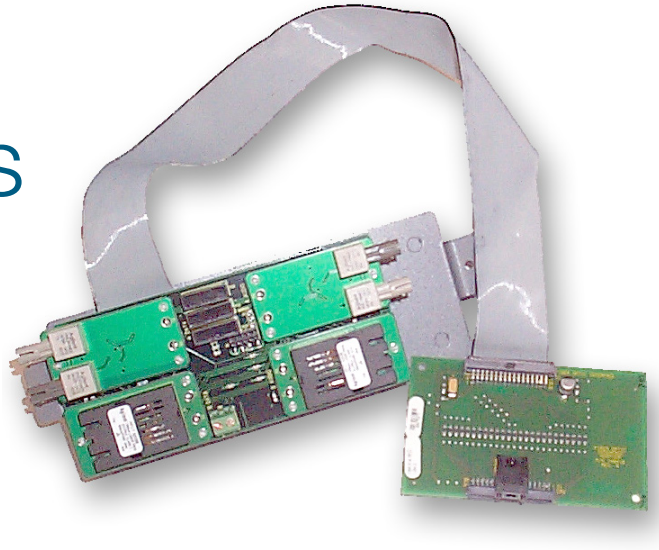
Fiber Optic Communications Interface

3-FIBMB2, SMXLO2, SMXHI2, MMXVR



S3000
7165-1657: 0186
FDNY APPROVED
FM APPROVED

Overview

EST3 networks easily configure to single or multi mode fiber optic or combination fiber optic / copper networks using the 3-FIBMB2 Fiber Optic Communications Interface and the appropriate fiber optic transceivers.

The 3-FIBMB2 electronics card plugs right into the CPU. A ribbon cable connects the 3-CPU directly to the 3-FIBMB2 fiber interface card. The interface card mounts in the ½ footprint space in a 3-CHAS7 chassis or 3-CAB5 enclosure.

The 3-FIBMB2 supports from one to four single or multi mode transceivers that plug into the interface card. Each transceiver provides the transmission and reception capability for the network data or digital audio data to/from a 3-FIBMB2 located in the next network node using single and/or multi mode fiber optic cables.

The 3-FIBMB2 also supports copper wire connections, permitting network data and audio communications format changes from copper to single mode fiber, copper to multi-mode fiber, and single to multi-mode fiber, as job conditions require. All copper and fiber circuits can be configured as supervised Class A or Class B (Style 7 or Style 4) circuits.

The 3-FIBMB2 has a constant output test signal that simplifies installing and testing multi-mode fiber circuits only, reducing setup and troubleshooting time. Secondary power input terminals and an external 24 Vdc source can be used to provide continuous network and audio data to flow through the 3-FIBMB2, when the panel is powered down for servicing.

Standard Features

- Class A or Class B (Style 7 or Style 4) network data connections
- Class A or Class B (Style 7 or Style 4) audio data connections
- Node to node distances:
  Multi-mode: Up to 8,000 ft. (2.4 km) using multi-mode fiber
  Single-mode high power: Up to 24.85 mi (40 km) using single mode fiber driver - model SMXHI2
  Single-mode low power: Up to 8.7mi (14km) using single mode fiber driver- model SMXLO2
- Built-in test signal
- Secondary power input
- Transition from copper to fiber on same network
- Transition from single to multi-mode fiber on same network

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Application

Fiber optics communication links provide a high level of immunity from electrical noise. The circuits are power limited and suitable for use through hazardous atmospheres. Fiber optic circuits also provide a high level of security and are resistant to the effects of moisture. The choice of either single mode or multi mode fiber links is one of cost vs the distances between nodes. System performance is identical with either single or multi mode fiber. *NOTE: The 3-FIBMB2/MMXVR is compatible with 3-FIB(A) multi mode fiber modules.*

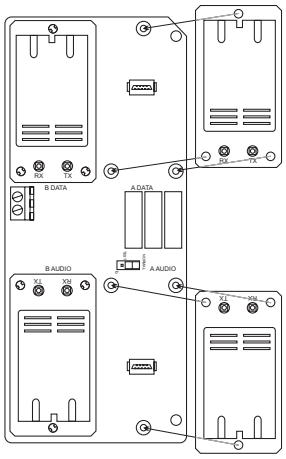
The SMXLO2 standard output single mode transceiver is suitable for distances up to approximately 8.7 miles (14km). The SMXHI2 high output single mode transceiver is available to span distances up to approximately 24 miles (40km).

For multi mode applications, the MMXVR transceiver is suitable for distances up to approximately 8,000ft (2,400m) Actual distances are dependent on the losses in each fiber optic circuit, and should be calculated for each installation. One transceiver is required for each fiber side of both network and audio links. Simply order the required type and number and type of transceiver(s) for your application.

Engineering Specification

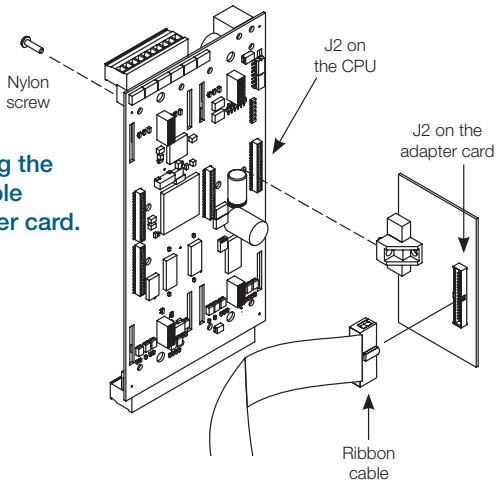
The intra-node communications links for network and digital audio data shall utilize copper and/or fiber optic connections. The fiber optics interface card shall provide Class B (Style 4) or Class A (Style 7) connections. It shall be possible to convert from fiber optic cable to copper wiring or from copper wiring to fiber optic cable at any network panel node. The fiber optics interface card shall have provisions for an external power source input to permit continuous network and audio data to flow through a network node while primary node power is removed for servicing purposes. The fiber optics interface card shall provide a constant output test signal for maintenance and troubleshooting purposes. The fiber optics interface module shall utilize single/multi mode fiber with SC single mode or ST multi-mode connectors.

Installation and Mounting

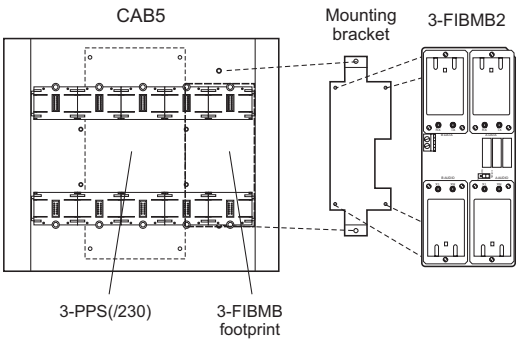


Attaching the transceivers. Any type of transceiver can be mounted in any of the four positions on the board.

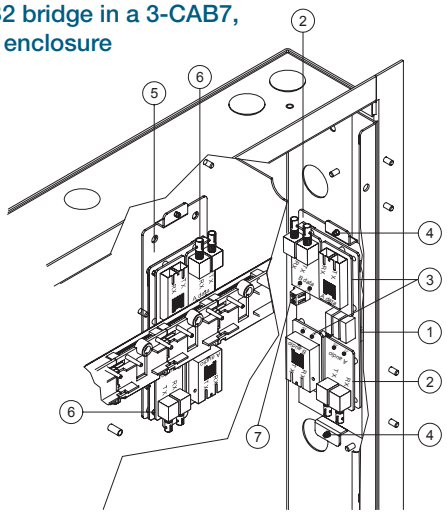
Connecting the ribbon cable and adapter card.



Mounting the bracket and the 3-FIBMB2 to a CAB5 enclosure



Installing the 3-FIBMB2 bridge in a 3-CAB7, 3-CAB14, or 3-CAB21 enclosure



1. 3-FIBMB2 electronics card on a 3-MPFIB mounting bracket
2. MMXVRs in the B data slot and A audio slot on the 3-FIBMB2
3. SMXLO2/SMXHI2 in the A data slot and B audio slot on the 3-FIBMB2
4. Mounting studs
5. Existing 3-FIBMB
6. MMXVR in the A data slot and B audio slot on the 3-FIBMB
7. 24 VDC

Installing the 3-FIBMB2 electronics card in an MFC enclosure

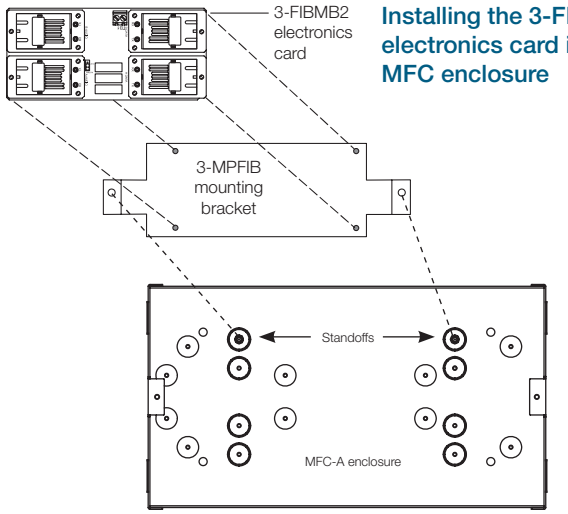
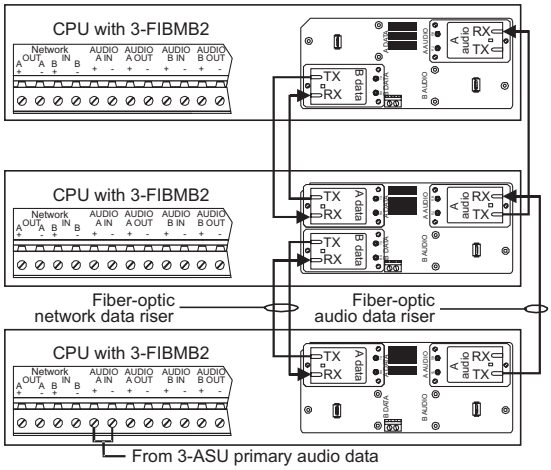


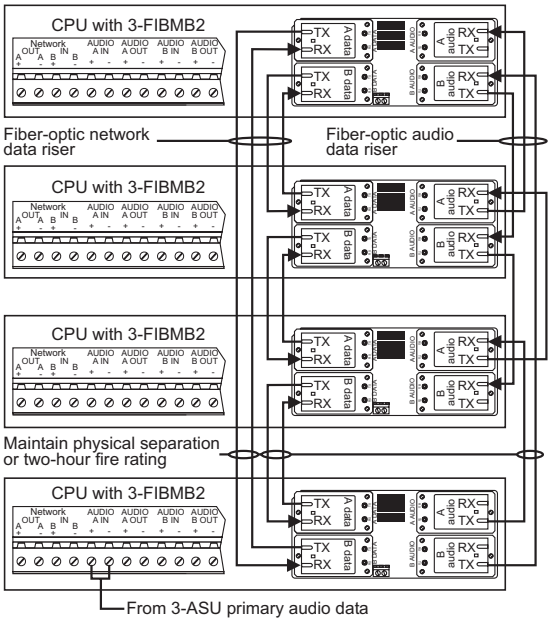
EXHIBIT 'C'

Typical Wiring

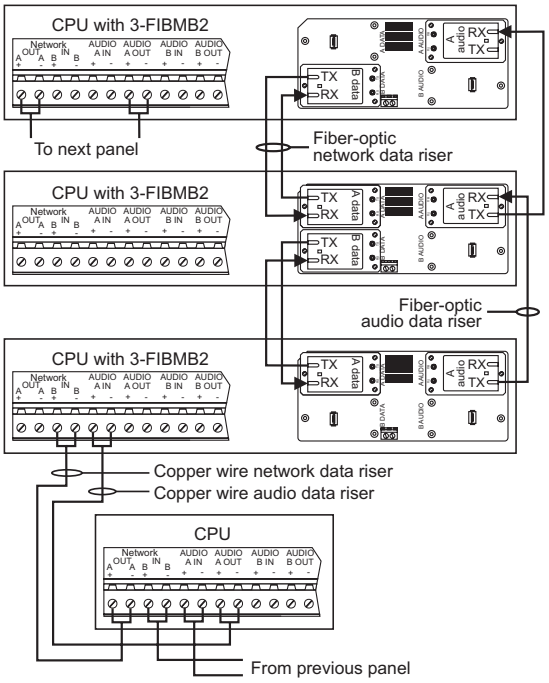
The following wiring diagrams can be used with single or multimode fiber. If using single mode use the SMXLO2 or SMXHI2 transceivers. If using multimode use the MMXVR transceivers.



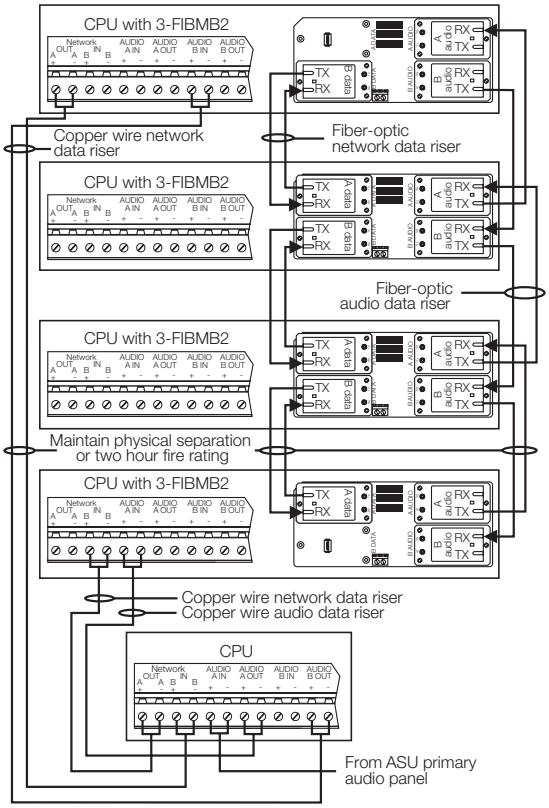
3-FIBMB2 Class B network and audio fiber-optic connections



3-CPU Class A network and audio fiber-optic connections

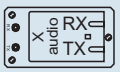


Class B hybrid fiber-optic and copper wire network and audio connections

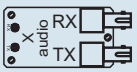


3-CPU hybrid fiber-optic and copper wire network and Class A fiber-optic and copper wire audio connections

Legend



Single mode transceiver



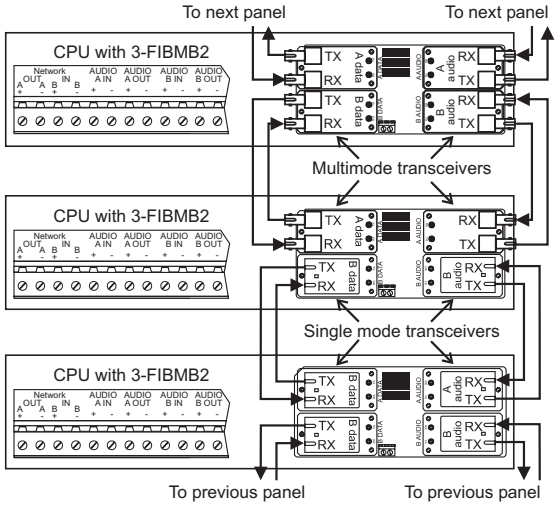
Multimode transceiver

Note: These diagrams are for general information only. For more wiring diagrams and installation details, please refer to *3-FIBMB2 Fiber Optic Interface,* Installation Sheet 3101835.

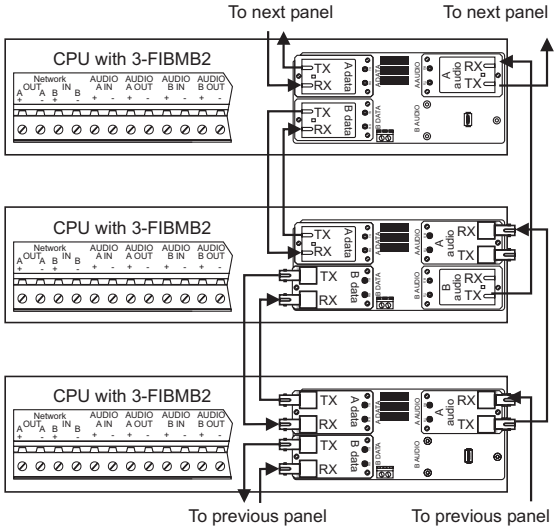
EXHIBIT 'C'

Using single and multimode transceivers

Transition from single mode fiber to multimode fiber requires special configuration for the audio circuit. The following wiring diagrams show how to wire audio circuits in class B and class A using single mode and multimode fiber.



Data and audio circuit for Class A using single mode and multimode fiber



Data and audio circuit for Class B using single mode and multimode fiber

Legend

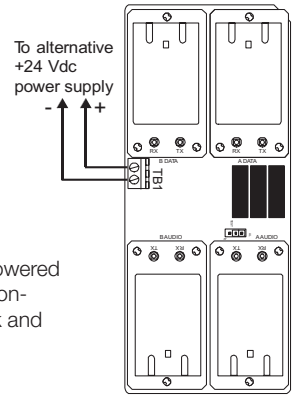
Single mode transceiver

Multimode transceiver

Note: These diagrams are for general information only. For more wiring diagrams and installation details, please refer to *3-FIBMB2 Fiber Optic Interface,* Installation Sheet 3101835.

Wiring alternative power terminals

The 3-FIBMB2 provides a secondary power option, permitting communications to flow through the module, even with panel power disconnected.



Note: In the event a panel needs to be powered down for service; a 24 V battery can be connected to the module to maintain network and audio communications during servicing.

EXHIBIT 'C'

Specifications

Agency Listings	UL, ULC
Installation	Connector J2 of 3-CPU1. Fiber card mounts on ½ footprint 3-CHAS7, 3-CAB5 enclosure, or an MFC-A cabinet.
Compatibility	3-CPU1 and later
Single Mode (network & audio)	
Budget	15 dBm (approximately
SMXLO2	8.7mi. [14km] max).
SMXHI2	25 dBm (approximately 24.85 mi. [40km] max). [1]
Wavelength	1300nm
Cable Type	8.3µ Single Mode
Connector	Duplex SC
Multi mode (network & audio)	
MMXVR Budget	10 dBm (approximately 8,000 ft [2.4 km] max).
Wavelength	820nm
Cable Type	50/125µ , 62.5/125µ or 100/140µ Multi mode
Connector	ST
Network Data Circuit	
Circuit Configuration	Class B (Style 4) or Class A (Style7)
Data Rate	19.2K, or 38.4K Baud
Isolation	From “previous” 3-CPU using copper, total isolation using fiber optics
Digital Audio Data Circuit	
Circuit Configuration	Class B (Style 4) or Class A (Style7)
Data Rate	327K Baud
Isolation	From “previous” 3-CPU using copper, total isolation using fiber optics
Copper Wired Network Data Circuit Segment	
Circuit Length	5.000ft (1,524 m) max. between any three panels
Circuit Resistance	90 Ohms, max.
Circuit Capacitance	0.3µf max.
Wire Type	Twisted pair, 18 AWG (0.75 mm²) min
Copper Wired Audio Data Circuit Segment	
Circuit Length	5.000 ft (1,524 m) max. between any three panels
Circuit Resistance	90 Ohms, max.
Circuit Capacitance	0.09 µf max.
Wire Type	Twisted pair, 18 AWG (0.75mm²) min
Eye Safety	Complies with: FDA CDRH 2 -CFR 1040 Class 1 and IEC 825 Issue 1 1993:11 Class 1; CENELEC EN60825 Class 1
Power Consumption Supervisory and/or Alarm	3-FIBMB2: 105 mA @ 24Vdc Add 79 mA for each SMXLO2 and SMXHI2 Add 20 mA for each MMSVR
Operating Environment	Temperature: 32° F - 120° F (0° C - 49° C) Humidity 93% RH, Non-condensing @ 90° F (32° C)

[1] A minimum fiber attenuation of -8dBm is required when using the SMXHI2 in order to prevent overloading the receiver.

Ordering Information

Catalog Number	Description	Shipping Wt., lb (kg)
3-FIBMB2	Fiber Optic Communications Interface (requires one or more transceivers) c/w mounting bracket for 3-CHAS7 or 3-CAB5 enclosure mounting	1.0(.45)
*SMXLO2	Plug-In standard output single mode transceiver for 3-FIBMB2	0.5(.23)
*SMXHI2	Plug-In high output single mode transceiver for 3-FIBMB2	0.5(.23)
*MMXVR	Plug-In standard output multi mode transceiver for 3-FIBMB2	0.5(.23)

** 1 to 4 transceivers required, depending on application.*

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EXHIBIT 'C'

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United Technologies
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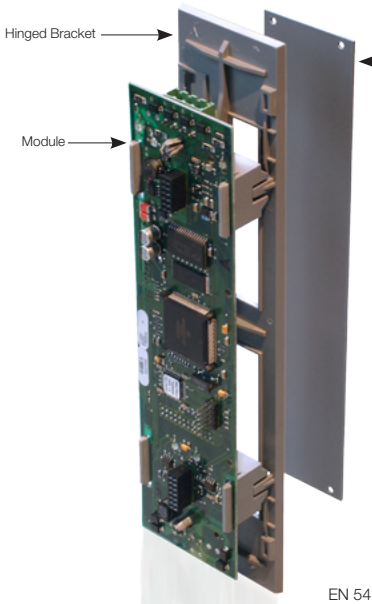
Hardwired Module

3-IDC 8/4



S3000

7165-1657: 0306

FDNY APPROVED

FM APPROVED

CE

EN 54-2: 1997 + A1: 2006
EN 54-4: 1997 + A1: 2002 + A2: 2006
EN 54-16: 2008

Overview

The Initiating Device Circuit module is a local rail module that provides the interface between the EST3 and conventional hardwired circuits. The 3-IDC 8/4 has eight supervised Class B input circuits. Four of the eight configure from input circuits to Notification Appliance Circuits. A wide range of wire sizes are supported by the 3-IDC 8/4 making retrofit easy. Removable field wiring terminals reduce the effort and time needed to trouble shoot field wiring or replace modules.

Any Control Display module will mount in front of the 3-IDC 8/4 allowing great flexibility of system user interface layout.

Standard Features

- Eight supervised Class B hardwired circuits
  - configure as eight input circuits or configure up to four of the eight as Notification Appliance Circuits
- Latching or non-latching by circuit
- Verified or non-verified
- Supports Regulated and Special Application NACs

EXHIBIT 'C'

Application

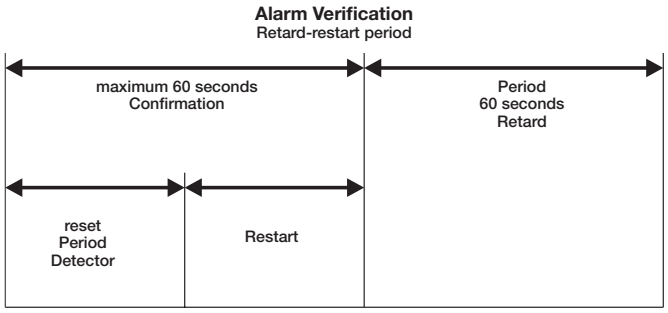
The 3-IDC 8/4 is ideal for retrofit projects where existing wiring, smoke detectors and signals may not need replacing.

Flexibility built right into the IDC module allows connection of normally open contact devices, and traditional 2 wire smoke detectors.

The 3-IDC 8/4 configures for use with N.O. contacts and supports supervised Supervisory and Monitor circuits with latching or non-latching operations. Use the monitor operation with the non-latching function and the circuit serves as a supervised event follower, efficiently covering critical fan and damper operations. Circuits will annunciate on the 3-LCD, control display modules or at any other display device on the network.

Up to 30 photoelectric or 50 ionization smoke detectors are supported per circuit. All circuits may be programmed for non-verified or verified smoke operation. The 3-IDC 8/4 incorporates software selectable impedance ranges for Input Circuit configurations, eliminating conventional smoke detector compatibility problems. Ranges include open circuit, shorted condition and high and low impedance (relative to the main impedance setting), allowing the use of various detectors of similar impedance and European alarm circuit operation.

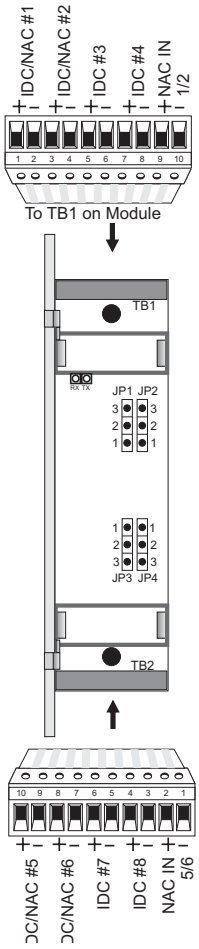
Four of the eight 3-IDC 8/4 circuits are convertible to Class B (Style Y) Notification Appliance Circuits. The circuits employ traditional reversing polarity operation for polarized bells, horns, and strobes. The Notification Appliance circuits are arranged in pairs. Each pair distributes 3.5 Amps at 24 Vdc from the local rail or a single riser. Riser sources supported include 24V @ 3.5 (this should be pulsed (Temporal pattern) for audible signals) or up to 70 Vrms @ 100W audio source for speakers. For Regulated signals, the IDC supports one NAC pair to distribute up to 1 Amp from the 3-PPS primary power supply through the local rail.

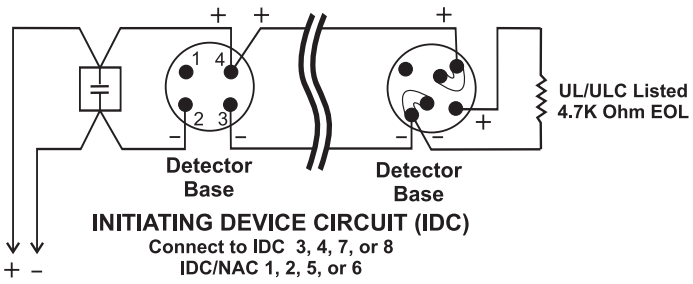


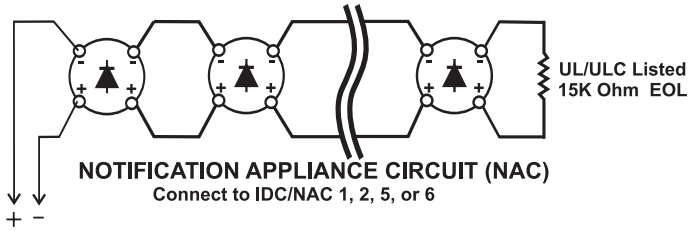
Engineering Specification

The fire panel shall be capable of supporting a variety of conventional smoke detectors with a single module. It must be possible to support polarized bells, horns or strobes. It shall be possible to provide hardwired supervisory and monitor functions with latching or non-latching operations. It shall be possible to display any circuit on an LCD or LED annunciator located anywhere on the network.

Typical Wiring







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Specifications

Agency Listings	UL, ULC, FM, LPCB EN54*.
Terminal Wire Sizes	18-12 AWG (1.0mm² to 2.5mm²)
Current	Standby: 48 mA @ 24 VDC Alarm: 408 mA @ 24 VDC
Maximum Rail or Riser Current Rating	3.5A @ 24 Vdc
Notification Appliance Rating	Special Application: 3.5A @ 24 Vdc Regulated: 1.0A @24Vdc
Audio Riser Rating	100 watts @ 70 Vrms 60 watts @ 25 Vrms
Notification Appliance Circuit EOL	15K Ohm
Initiating Device Circuit EOL	4.7K Ohm
Mounting	One Local Rail Space

* EN 54-2: 1997 + A1: 2006, EN 54-4: 1997 + A1: 2002 + A2: 2006, and EN 54-16: 2008.

Ordering Information

Catalog Number	Description	Ship Wt. lb. (kg)
3-IDC8/4	Initiating Device Circuit Module	0.8 (0.36)
3-FP	Filler Plate, order separately when no LED or LED/Switch module installed.	0.1 (0.05)
3-IDC8/4-E	Initiating Device Circuit Module for EN54 applications	0.8 (0.36)

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Signature Driver Controller Modules

3-SSDC1, 3-SDDC1, 3-SDC1

7165-1657:
0186/0306
S3000
FM APPROVED
FDNY APPROVED

EN 54-2: 1997 + A1: 2006
EN 54-4: 1997 + A1: 2002 + A2: 2006
EN 54-16: 2008

Overview

The 3-SSDC1 and 3-SDDC1 Signature Driver Controller modules provide an intelligent interface between the 3-CPU3 module and Signature Series devices. Each module contains its own microprocessor used to coordinate, process and interpret information received from and sent to Signature devices. Power and communications is received directly from the control panel rail assembly. The 3-SSDC1 Single Signature Driver Controller module supports one Signature Data circuit, while the 3-SDDC1 Signature Dual Driver Controller module supports two Signature circuits. Both modules occupy one rail space in the fire alarm control cabinet and provide removable field wiring terminals to aid installation.

Innovative design gives the 3-SSDC1/3-SDDC1 and Signature devices truly “distributed intelligence”. Signature detectors and modules have their own on-board microprocessor communicating with the loop controller in a fully digital communication format. This increases the accuracy of the information coming to and from the loop controller by reducing the effects of capacitance and noise.

With decentralized intelligence much of the decision making moves from the loop controller to the devices. Advanced fire detection algorithms processed within the Signature devices effectively end unwanted alarms. Environmental compensation and multiple sensing element decision making operations are resident in the devices. Intelligent devices allow the Signature Controllers to execute communication and system functions with greater speed and low baud rates, increasing the accuracy of information transmitted between the loop controller and devices.

Standard Features

- One or two circuit versions
- Dedicated microprocessor control
- Full digital communication
- Specialized communication protocol
  – Less sensitive to cable characteristics
  – Utilize existing wiring in most applications
- Loop alarm in under 750 milliseconds
- Device location supervision
  – Unexpected additional device addresses
  – Missing device addresses
  – Switched device locations
  – Programmed device parameters
- Automatic nonvolatile as-built mapping
  – Stores “actual” and “expected” device data
  – Stores physical connection sequence including “T” taps
- Automatic day/night sensitivity
- Supports up to 250 intelligent Signature detectors and 250 Intelligent Signature Modules
- Up to five 3-SDDC1s per node
  – Total of 10 Signature circuits
- Removable field wiring terminal blocks
- Multiple survival modes — stand alone
- Fully backward compatible with 3-SSDC and 3-SDDC
- Supports the full line of Signature II devices, including carbon monixide detection

EXHIBIT 'C'

Application

Up to 125 detectors and 125 modules are supported over a single pair of wires by the 3-SDC1 Signature Cards that plug into the Signature controller modules. Both Class A wiring (style 6 or style 7) and Class B (style 4) wiring are supported. Loop distances over 11,000 feet (3300m) are possible.

The 3-SSDC1 and 3-SDDC1 use advanced communication formats that provide exceptional response. Using a "BROADCAST POLL" the loop controller checks the entire device circuit for any changes of state. Should one or more devices report a change the 3-SSDC1/3-SDDC1 uses "DIRECT ADDRESS SEARCH" to find reporting device(s). Devices that have entered the alarm state or become active are located nearly instantaneously.

The unique use of "BROADCAST POLLING" combined with "DIRECT ADDRESS SEARCH" ensures that only new information is transmitted allowing a reduced baud rate with fast response time. The low baud rate is ideal for retrofit applications since in most applications existing wiring can be used.

To enhance survivability of the system the 3-SSDC1/3-SDDC1 supports a standalone mode for Signature devices. Two catastrophic failure modes are supported. If the 3-CPU(1/3) fails, the loop controller will continue to poll its devices. If an alarm is detected it will be sent on the local rail communication bus and received by other local rail modules. A common alarm condition throughout the panel will result. If the local rail module (3-SSDC1/3-SDDC1) fails, and a device (smoke or module) detects an alarm, specialized circuitry will make the node aware of the alarm condition. The 3-CPU(1/3) will communicate the alarm condition to the rest of the network. Having multiple redundant modes is paramount in a life safety system.

Every time the 3-SSDC1/3-SDDC1 communicates with a detector a green LED on the detector flashes. Normal green LED activity is not disturbing to building occupants, but can be quickly spotted by a maintenance technician. A red LED on the detector turns on only in the alarm condition.

The 3-SSDC1/3-SDDC1 also supervises the device wiring, physical location of each device and the programmed device characteristics. This EDWARDS/Signature Series unique characteristic is accomplished by "MAPPING" the Signature circuit and committing the map to memory. Upon power up the loop controller will scan device serial numbers and map their physical location sequence on the loop, including "T" taps. After mapping is complete the controller automatically addresses each detector and module through downloading over the loop. There are no switches or dials to set. Each device is assigned a unique soft address generated by the site specific program.

The 3-SSDC1/3-SDDC1 then compares the "Actual" physical device data to the "Expected" site specific program data. If any correlations are different, the loop controller issues a trouble to the CPU identifying the devices which do not match and posting a map fault. Through the 3-CPU3's RS-232 port a graphical map of the loop can be uploaded depicting each device's location on the loop, including branches (T-Taps) and all of the physical attributes associated with the device. This diagnostic information is unparalleled in the fire detection industry and vital for keeping accurate records on how the system was installed.

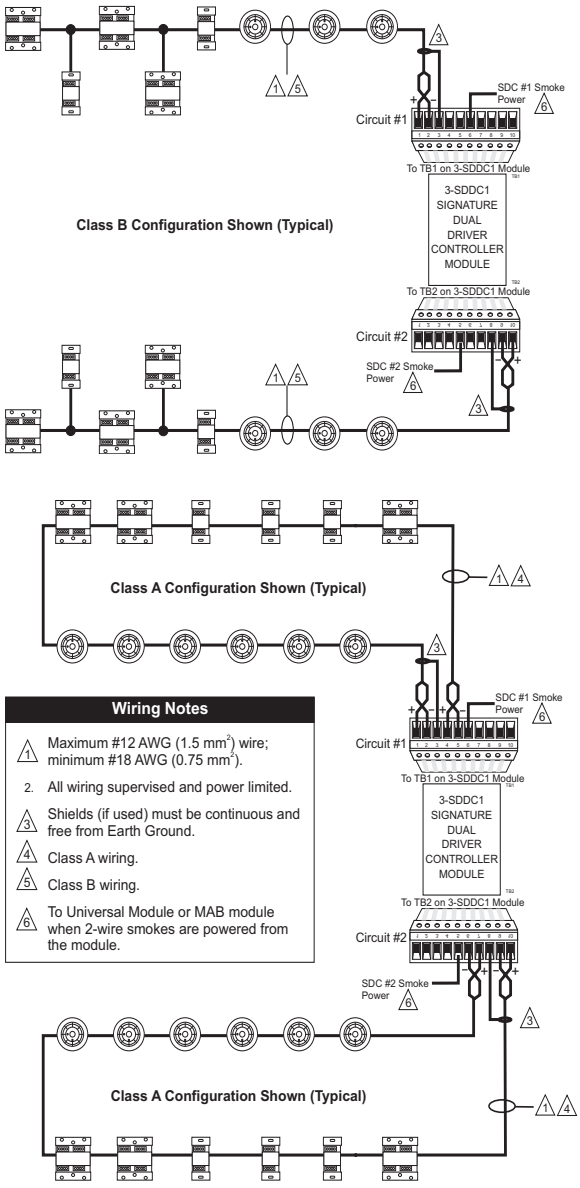
During installation a common problem with analog/ addressable systems is locating ground faults. The 3-SSDC1 and 3-SDDC1 controllers have the ability to locate ground faults by specific module, speeding up the troubleshooting process. Another significant advantage of the 3-SSDC1/3-SDDC1 controllers during commissioning is electronic addressing and mapping. This eliminates duplicate addresses, which are also very difficult for most systems to locate.

During maintenance, should groups of detector heads be removed for service and returned into the wrong smoke detector base (location), the 3-SSDC1/3-SDDC1 will automatically detect the problem. If the attributes of the switched devices are the same, the system will automatically download the correct soft addresses and algorithms to the devices (maintaining location supervision).

If the attributes are not the same the 3-SSDC1/3-SDDC1 will send a map fault indication to the 3-CPU3 and post a trouble indicating the specific devices in fault.

The 3-SSDC1/3-SDDC1 also monitors the Signature Series devices for maintenance and trouble conditions. Each smoke detector contains intelligence to adjust with environmental changes. This expands the amount of time required between cleaning while maintaining a constant alarm threshold. As the detector begins to exhaust the environmental compensation, and reaches the 80% level, the 3-SSDC1/3-SDDC1 will indicate a maintenance alert or dirty condition to the 3-CPU and indicate the specific device requiring cleaning. If cleaning is not performed the detector will continue to operate until all of its environmental compensation is

Typical Wiring



Wiring Notes

1. Maximum #12 AWG (1.5 mm^2) wire; minimum #18 AWG (0.75 mm^2).
2. All wiring supervised and power limited.
3. Shields (if used) must be continuous and free from Earth Ground.
4. Class A wiring.
5. Class B wiring.
6. To Universal Module or MAB module when 2-wire smokes are powered from the module.

EXHIBIT 'C'

utilized. At this point the 3-SSDC1/3-SDDC1 sends a dirty trouble indication to the 3-CPU and posts a trouble condition. If maintenance is still not performed the Signature detector will automatically remove itself from service once the programmed threshold window has been breached (preventing a false alarm).

When a detector includes carbon monoxide (CO) detection, the detector monitors its CO life remaining for the CO sensor element and provides this information automatically to the panel. For maintenance of the system the CO life remaining is also available by simply running a maintenance report at the panel or through the FireWorks graphical interface. A unique CO maintenance signal is automatically generated by the panel when there is 8% (several months) of CO element life remaining. Should the CO sensor element not be replaced after the maintenance signal is reported, an "End of Life" trouble automatically posts on the panel when the CO sensor detection capability is exhausted.

Remote test capability permits devices to be put in alarm, pre-alarm, supervisory, monitor, or security alarm, or trouble from the panel menu or controls. This facilitates testing of smoke and heat detectors as well as monitor and security devices. Fast test is also provided for CO detectors allowing these devices to be tested quickly in the field.

The 3-SSDC1 and 3-SDDC1 local rail modules modules are fully backwards compatible with the 3-SSDC and 3-SDDC local rail modules. 3-SSDC1 and 3-SDDC1 modules provide additional onboard memory to facilitate future Synergy functions. To upgrade a 3-SSDC/3-SDDC to a 3-SSDC1/3-SDDC1 respectively, replace the 3-SSDC/3-SDDC Local Rail Module with a 3-SDDC1-MB Local Rail Module and reuse the 3-SDC Signature Device Cards and filters.

Specifications (Signature Circuits)

Charts assume wire and devices are evenly distributed over length of circuit

Non-twisted, non shielded wire

Device type	# of Detectors	# of Module Addresses	#14 AWG (20pf/foot) (2.53 Ohm/1000ft)	#16 AWG (20pf/foot) (4.02 Ohm/1000ft)	#18 AWG (20pf/foot) (6.38 Ohm/1000ft)
Detectors only	125	0	14,752 feet (4,497 meters)	9,275 feet (2,827 meters)	5,839 feet (1,780 meters)
Modules only	0	125	12,599 feet (3,840 meters)	7,921 feet (2,414 meters)	4,986 feet (1,520 meters)
Detectors and Modules	125	125	5,738 feet (1,749 meters)	3,608 feet (1,100 meters)	2,271 feet (692 meters)
Detectors and Modules with 2-wire smokes	63	55 + 9 SIGA-UM	7,623 feet (2,324 meters)	4,793 feet (1,461 meters)	3,017 feet (920 meters)
Modules with 2-wire smokes	0	107 + 9 SIGA-UM	3,798 feet (1,158 meters)	2,388 feet (728 meters)	1,503 feet (458 meters)

Twisted pair non shielded wire

Device Type	# of Detectors	# of Module Addresses	#14 AWG (38pf/foot) (2.53 Ohm/1000ft)	1.5mm² (36pf/foot) (3.75 Ohm/1000ft)	#16 AWG (36pf/foot) (4.02 Ohm/1000ft)	1.0mm² (25pf/foot) (5.51 Ohm/1000ft)	#18 AWG (25pf/foot) (6.38 Ohm/1000ft)
Detectors only	125	0	13,157 feet (4,010 m)	9,933 feet (3,028 m)	9,275 feet (2,827 m)	6,760 feet (2,061 m)	5,839 feet (1,780 m)
Modules Only	0	125	12,599 feet (3,840 m)	8,483 feet (2,586 m)	7,921 feet (2,414 m)	5,774 feet (1,760 m)	4,986 feet (1,520 m)
Detectors & Modules	125	125	5,738 feet (1,749 m)	3,864 feet (1,178 m)	3,608 feet (1,100 m)	2,630 feet (802 m)	2,271 feet (692 m)
Detectors and modules with 2-wire smokes	63	55 + 9 SIGA-UM	7,623 feet (2,324 m)	5,133 feet (1,565 m)	4,793 feet (1,461 m)	3,494 feet (1,065 m)	3,017 feet (920 m)
Modules with 2-wire smokes	0	107 + 9 SIGA-UM	3,798 feet (1,158 m)	2,558 feet (780 m)	2,388 feet (728 m)	1,741 feet (531 m)	1,503 feet (458 m)

Twisted pair shielded wire

Device Type	# of Detectors	# of Module Addresses	#14 AWG (84pf/foot) (2.53 Ohm/1,000ft)	#16 AWG (82pf/foot) (4.02 Ohm/1,000ft)	#18 AWG (58pf/foot) (6.38 Ohm/1,000ft)
Detectors only	125	0	5,952 feet (1,814 meters)	6,098 feet (1,859 meters)	5,839 feet (1,780 meters)
Modules Only	0	125	5,952 feet (1,814 meters)	6,098 feet (1,859 meters)	4,986 feet (1,520 meters)
Detectors & Modules	125	125	5,738 feet (1,749 meters)	3,608 feet (1,100 meters)	2,271 feet (692 meters)
Detectors and modules with 2-wire smokes	63	55 + 9 SIGA-UM	5,952 feet (1,814 meters)	4,793 feet (1,461 meters)	3,017 feet (920 meters)
Modules with 2-wire smokes	0	107 + 9 SIGA-UM	2,558 feet (780 meters)	2,388 feet (728 meters)	1,503 feet (458 meters)

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Engineering Specification

The communication format between the control panel and analog devices shall be 100% digital.

Loop alarm recognition must be within 750 milliseconds of a device going into the alarm state, with system response time no greater than 3 seconds. All devices shall support remote testing.

It must be possible to wire the circuit as Class A or Class B with non-shielded, non-twisted wire. It must be possible to wire branches (T-taps) with Class B wiring.

The driver controller must be manufactured in accordance with ISO 9001 standards.

The system must have tolerance to multiple failures. There must be a standalone mode of operation that will ensure the system is aware of alarms even if the local rail or main CPU fails.

Specifications (controllers)

Catalog Number	3-SSDC1	3-SDDC1
Installation	1 LRM Space	1 LRM Space
Module Configuration	1 Addressable circuit (3-SDC1 Card) expandable to 2 circuits.	2 Addressable circuits (3-SDC1 Cards)
Operating Current [Note 2]	Standby 144 mA Alarm 204 mA	Standby 264 mA Alarm 336 mA
Operating Voltage	24 Vdc, Nominal	
Address Requirements	Automatic	
Detectors Supported	125 per 3-SDC1 Card	
Modules Supported	125 Module Addresses per 3-SDC1 Card	
2-Wire Smoke Power Output	100 mA per 3-SDC1 Card (not included in *Operating Current* above	
Conventional detectors supported	150 of 100 µA type per circuit.	
Signature Circuit Voltage	20 VDC +/- 5%	
Maximum Signature Circuit Resistance	100 Ohms	
Maximum Signature Circuit Capacitance	0.33 µF	
Communications Format	100% Digital	
Circuit Wiring Styles	Class A or Class B	
Termination	Removable plug-in terminal strip(s) on module	
Permissable Wire Size	18 to 12 AWG (0.75 to 2.5 mm²)	
Agency Listings	UL, ULC (see Note 1); CE, LPCB, EN54 (see Note 3).	
Operating Environment	32 °F (0 °C) to 120 °F (49 °C) 93% RH, non-condensing	

Note 1: Other EST3 components are modularly listed under the following standards:
UL 864 categories: UOJZ, UOXX, UUKL and SYZV, UL 294 category ALVY, UL 609 category AOTX, UL 636 category ANET, UL 1076 category APOU, UL 365 category APAW, UL 1610 category AMCX, UL 1635 category AMCX
ULC-S527, ULC-S301, ULC-S302, ULC-S303, ULC-S306, ULC/ORD-C1076, ULC/ORD-C693
Please refer to EST3 Installation and Service Manual for complete system requirements.

Note 2: Current shown Includes full loop of devices.

Note 3: *For EN 54-2: 1997 + A1: 2006, EN 54-4: 1997 + A1: 2002 + A2: 2006, and EN 54-16: 2008 compliant product add suffix -E to model eg. 3-SSDC1-E (verify device and loop controller compatibility).

Ordering Information

Catalog Number	Description	Shipping Wt. lb (kg)
3-SSDC1	Single Signature Driver Controller. Comes with one 3-SDC1 Device Card. Mounts to Local Rail. *Add suffix "-E" for EN54 compliant versions.*	0.5 (0.23)
3-SDDC1	Dual Signature Driver Controller. Comes with two 3-SDC1s. Mounts to Local Rail. *Add suffix "-E" for EN54 compliant versions.*	0.5 (0.23)
3-SDC1	Signature Device Card - upgrades a 3-SSDC1 to a 3-SDDC1. *Add suffix "-E" for EN54 compliant versions.*	0.25 (0.11)
3-FP	Filler Plate, order separately when no LED or LED/Switch module installed.	0.1 (0.05)

EXHIBIT 'C'

EDWARDS
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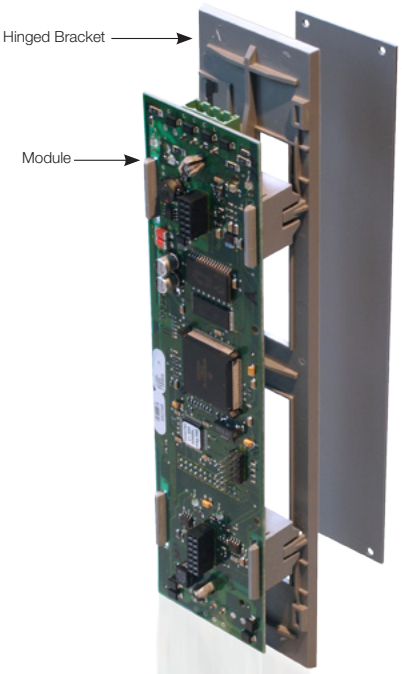
Modem Communicator

3-MODCOM, 3-MODCOMP



S3000

7165-1657:
0186/0306

FDNY APPROVED

FM APPROVED

Overview

The Modem Communicator is a two-way local rail module that performs a variety of off-premise communications functions for the EST3 system.

Using the latest in digital signal processing (DSP) techniques, the Modcom provides off premise communication features unavailable on any other system.

The module has provisions for supervising two loop-start telephone lines. The module features a modular jack for telephone line connections. The Modcom's configuration and firmware can also be updated from any network node.

Modcom series modules occupy a single local rail space and can be mounted in any node on the network. Any EST3 Control/Display module can be mounted on the face of a Modcom series module. Power for the Modcom is supplied by the EST3 system supply.

The Modcom provides an enhanced level of survivability in the event of a network CPU failure by notifying the Central Monitoring Station of the failure and entering a degraded mode of operation. In degraded mode, the Modcom can transmit a default fire alarm message during a fire alarm condition.

Standard Features

- Listed for fire, security and access control
- V.32bis 14.4K full duplex modem
- Digital alarm communicator transmitter supporting: SIA DCS protocol, Contact ID protocol, 3/1 and 4/2 pulse format protocol
- Supports "tap" alphanumeric pager protocol
- Fully programmable messages
- Alarm override of upload/download
- Two phone line capability
- Field upgradable firmware
- Split and multiple reporting to as many as 80 different receivers
- 255 subscriber accounts
- Supports control/display modules
- Supervised by the network controller
- Supports Cellular communications

EXHIBIT 'C'

Application

Two versions of the Modcom are available:

3-MODCOM - Has an internal V.32bis 14.4K baud full duplex modem. The modem permits upload and download of system data remotely via a telephone line. In addition, the 3-MODCOM has a Digital Alarm Communications Transmitter (DACT) or dialer function that transmits network status information to Central Monitoring Stations (CMS) via telephone. Four DACT protocols are available:

1. Digital Communicator Standard (DCS) “SIA forma” Dialer – 300 baud format, which transmits alphanumeric system status data to the CMS;
2. Contact ID;
3. SIA 3/1 dialer; and,
4. SIA 4/2 dialer.

Alarm code content is determined by system rules.

3-MODCOMP – In addition to all modem and dialer (DACT) functions of the 3-MODCOM, the 3-MODCOMP can dial directly into paging systems using Telelocator Alphanumeric Protocol (TAP). Alphanumeric system data can be sent to a single pager or group(s) of pagers. Some pager services can forward messages via e-mail and Fax.

Multiple Priority

Each Modcom can buffer up to 500 events in its event queue. It reviews all active events in the queue and identifies the highest priority event and dials the associated receiver. When the receiver is contacted, the MODCOM will transmit the highest priority message for that receiver. If the message is successfully received, the MODCOM identifies the next highest priority message and the process repeats.

Phone Line Friendly

The Modcom series has been designed for installation on the same phone lines with other devices such as phones and faxes. The module makes its first dial out attempt on either of the two phone lines that is not in use. This prevents unnecessary interruption of calls in progress by the line seizure relays. In the event that both lines are busy, the module seizes line one.

A fixed DACT testing time can be set at an off-hour, e.g. 2:00am, again minimizing interruptions and phone line costs. The call time is programmable, and allows testing of the DACT with the central station.

The Modcom series also has the ability to detect Type 1, Type 2 and Type 3 distinctive ringing patterns, permitting it to share its phone lines with other devices and still have a unique phone number for incoming modem calls.

Multiple Modcoms per Network

Multiple Modcoms can be installed in a single cabinet or located in nodes throughout the network to provide added availability and enhanced redundancy of off premise communications.

Multiple Receiver Capability

In large system applications the EST3 system may be partitioned such that it supports a number of different customers, each using different Central Monitoring Stations and/or paging companies. The Modcom can accommodate up to 255 different accounts using up to 80 different receivers.

The Modcom supports split reporting, a process where the system directs the Modcom to send some events or event types to one receiver, and different events to alternate receivers. The module’s multi-dial reporting capability permits an individual event to be transmitted to multiple receivers, including pagers.

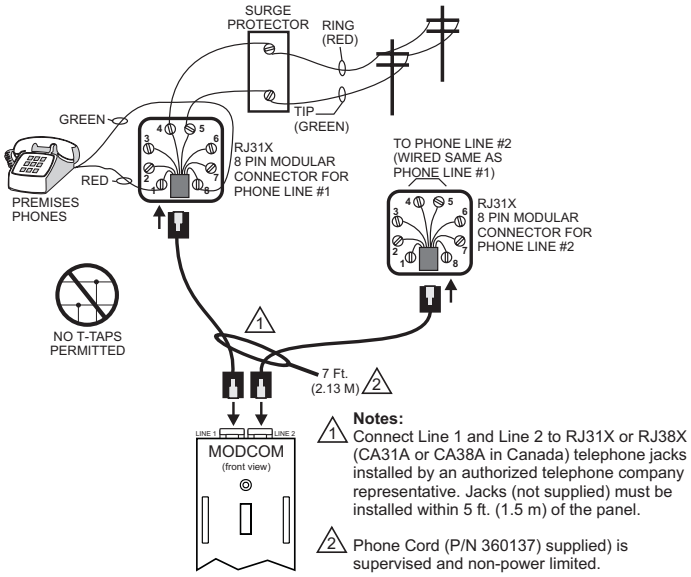
Remote Data Upload/Download

The modem permits data to be downloaded into the memories of the various components making up an EST3 system. Data can be remotely uploaded and downloaded for use with the EDWARDS Access Control Database Program. In the event that an alarm is received during upload/download activity, the Modcom automatically terminates the call and transmits the alarm events to the appropriate receivers. When completed sending the events, the download will continue where it left off.

Engineering Specification

The system shall provided an off premise communications module capable of transmitting system events to multiple Central Monitoring Station (CMS) receivers. The module shall provide the CMS with point identification of system events via 4/2, Contact ID or SIA DCS protocols. <The module shall also be capable of transmitting alphanumeric system activity by event to a commercial paging system using TAP Pager protocol.> The dialer shall have the capability to support up to 255 individual accounts and to send account information to eighty (80) different receivers, each having a primary and secondary telephone access number. System events shall be capable of being directed to one or more receivers depending on event type or location as specified by the system designer. The module shall have a degrade mode capable of transmitting fire alarm signals to the CMS in the event of system CPU failure. The module shall provide a high speed (V.32bis or greater) modem function in order to upload and download system data to/from a remote location.

Typical Wiring



For cellular dialer capture module wiring refer to the installation manual received with the cellular capture module.

EXHIBIT 'C'

Specifications

Agency Listings	UL, FCC Part 68 / CFR 47, ULC. See Note 1.
Installation	Takes up one LRM space in 3-CHAS7
Input Power	24 Vdc @ 60mA standby, 95 mA active
Modem Protocol	ITU - V.32bis 14.4K baud full duplex using standard PC modem compatible data
Dialer Protocol	SIA 3/1 (format P2) and 4/2 (format P3): 20 pulses per second, double round Contact ID (DTMF format) Digital Communications Standard (DCS) “SIA format”: Level 2 (300 baud, Bell 103)
Pager Protocol (3-MODCOMP only)	Telocator Alphanumeric Protocol (TAP), Version 1.8, 300 baud, Bell 103
Telephone	
Dialing	Pulse or Tone (DTMF)
Connector	Two 8-position modular phone jacks
CMS Telephone Numbers	
Quantity	Two per receiver - 160 max.
Available Digits	Up to 24 digits per number
Receivers	Supports up to 80 individual receivers.
Event Buffer	500 events
Operating Environment	32°F (0°C) to 120°F (49°C), 93% RH Non-condensing

Receivers Tested

Format	Manufacturer	Model	Receiver Card
4/2 and 3/1	Ademco	685	685-1 or 685-8
	FBI (Fire Burglary Instruments)	CP220	
	Osborne-Hoffman	OH2000	
	Radionics	D6600	
	Silent Knight	9000	9032
	Sur-Gard	MLR2, SG-SLR	
	MCDI	TLR, TLR+	
Contact ID	Ademco	685	685-8
	Osborne-Hoffman	OH2000	
	Sur-Gard	MLR2, SG-SLR	
	Radionics	D6600	
	Silent Knight	9000	9032
	MCDI	TLR, TLR+	
SIA DCS	Sur-Gard	MLR2, SG-SLR	

Note 1:
The EST3 is modularly listed under the following standards:
UL 864 categories: UOJZ, UOXX, UUKL and SYZV, UL 294 category ALVY, UL 609 category AOTX, UL 636 category ANET, UL 1076 category APOU, UL 365 category APAW, UL 1610 category AMCX, UL 1635 category AMCX
ULC-S527, ULC-S301, ULC-S302, ULC-S303, ULC-S306, ULC/ORD-C1076 and ULC/ORD-C693
Please refer to EST3 Installation and Service Manual for complete system requirements.

Compatible Dialer Capture Modules
Telguard TG-7FS - UL approved Cellular Alarm Communicator for Commercial Fire applications over 3G/4G networks.
DSC 3G3070 - ULC approved Cellular Alarm Communicator for commercial fire applications.

Ordering Information

Catalog Number	Description	Ship Wt. lb (kg)
3-MODCOM	Modem/Dialer (DACT) version	0.5 (0.23)
3-MODCOMP	Modem/Dialer (DACT) w/TAP Pager Protocol	0.5 (0.23)
3-FP	Filler Plate, order separately when no LED or LED/Switch module installed.	0.1 (0.05)

EXHIBIT 'C'

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Contact us...

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Web: *Edwards-fire.com*

EDWARDS is a UTC brand.
1016 Corporate Park Drive
Mebane, NC 27302

EXHIBIT 'C'

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Liquid Crystal Display Module

3-LCD

7165-1657: 0186
S3000
MEA FDNY APPROVED

EN 54-2: 1997 + A1: 2006
EN 54-4: 1997 + A1: 2002 + A2: 2006
EN 54-16: 2008

Overview

The Main Display interface is the primary user interface in the EST3 Life Safety System. The main display interface focuses on the emergency user by putting information important to the user up front. Hands free, the first highest priority event is shown. The display always gives the last highest priority event. Arriving at the panel and without opening the door the first and last alarm is given. Simple to understand lights and switches help the emergency user execute system commands with confidence.

A menu system supports maintenance functions such as disables or reports for use by staff or service personnel.

Standard Features

- Uses simple lights and switches
- Displays information important to user
- Hands free first alarm display
- Last event of highest priority always displays
- Eight lines by 21 character graphic LCD display — 168 characters total
- Multlingual
  Supports English, French, Spanish, and Russian
- Uses queues to sort events
  A queue is a list of messages Alarm, Supervisory, Trouble and Monitor
- Slide in LED and switch labels
  Makes customization for regional language easy

EXHIBIT 'C'

Application

The 3-LCD module mounts to the local rail over the nodes Central Processing Unit Module (3-CPU). The 3-LCD module is optional in any network node.

Ensuring information clarity the 3-LCD uses a backlit high contrast supertwist graphical display. Eight lines of 21 characters provide the room needed to convey emergency information in a useful format.

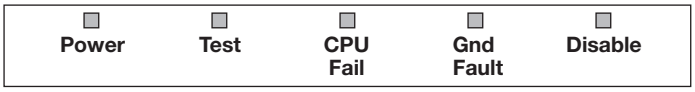
The 3-LCD always displays the last highest priority event even when the user is viewing other message queues. Further message flexibility is provided with EST3's message routing ability. Messages from a node can display at every node on the network or messages can route to specific nodes only. Routing can be initiated at a specific time/shift change. There is no need to have messages display in areas that are not affected by an event.

The 3-LCD can display messages in English, Spanish, French, and Russian. The bilingual display lets the operator select between either of two languages. Consult your representative for available language combinations.

The EST3 system configures for Proprietary, Local or EN54 market operations. The mode of operation is selected through the System Definition Utility (SDU) which may adjust the following operations slightly to fit the system operation selected.

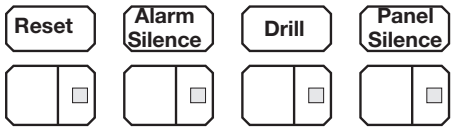
LEDs and Switches

Further enhancing the 3-LCD user interface are easy to read and understand lights and switches. All functions are laid out in a logical order. At the top of the 3-LCD are five system status LEDs. Here determining the general condition of the system is easy.



Power LED: Green, on when AC power is on.

Test LED: Yellow, on when any portion of the system (Group) is under test.



CPU Fail LED: Yellow, on when CPU stops running.

Gnd Fault LED: Yellow, on when a ground exists on the system (group)

Disable LED: Yellow, on when any point or zone is disabled by a user.

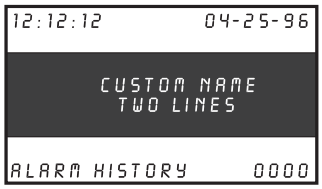
Below the general status LEDs are located four, LED / Switch common controls. The versatility of EST3 allows system designers to define the features as affecting a domain (defined group of nodes) or as global (affects all nodes) across the network. This feature is very useful when configuring systems with multiple buildings on one network. As an example, operating the reset in one building may have adverse effect in other buildings. With EST3 having operational differences between buildings on the same network is not a problem.

Pressing **Reset** starts the system's reset operation. The yellow LED has three flash rates during reset. The LED flashes fast during the smoke power down phase of reset, flashes slow during the restart phase, and turns on steady for the restoral phase. The Reset LED turns off when the system is normal.

Pressing **Alarm Silence** turns off all Notification Appliance Circuits defined as audible. The yellow LED turns on when silence is active via the Alarm Silence switch or via alarm silence software timers.

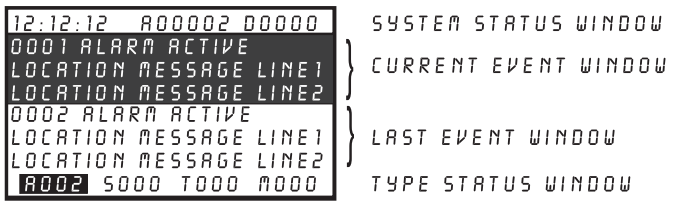
Pressing **Panel Silence** turns off the system's internal audible signal. The yellow LED turns on when panel silence is active. The EST3 panel buzzer has user programmable signal rates for alarm, supervisory, trouble and monitor conditions.

Pressing **Drill** turns on the drill LED and all signals sound evacuation. Drill does not activate city tie connections. Auxiliary relays will not activate unless programmed to do so with drill.



In the center of the 3-LCD is the Liquid Crystal Display. In the normal condition the date and time plus a definable system title display on the LCD. The last line of the display gives an alarm history. This total equals the number of times the system has entered the alarm state from the normal state.

When active events are on display, the LCD formats into four logical windows.

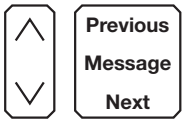


In the system status window, the display shows the time and the status of active and disabled points.

The current event window, lines 2, 3, 4 automatically display the first active event of the highest priority if the user has not taken control of the system. Once the emergency user takes control, this window displays user message selections.

The second line of the display shows system event information. In the example above the display shows the chronological number of the event (0001 is the first alarm) followed by the event type (Alarm Active). EST3 supports over 45 event type messages from which system designers choose. The last two lines of the current event window are custom programmable location message lines with space for 42 characters.

The last event window shows the last highest priority event. This window is always displayed and updated automatically by the system. Here the emergency user can monitor the progress of a fire.

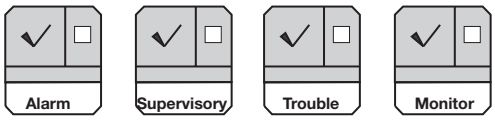


When EST3 is configured for a local mode system viewing the second alarm message is easy, just press the NEXT key. The next message scrolls into the current event window. The last highest priority event always remains on view. No matter what queue the user selects for viewing, the LCD always displays the most recent alarm. A new alarm event resounds the panel audible signal and appears immediately on display without overwriting information the user selected for view.

The final window of the LCD the type status window shows the total number of active events by queue type. A is alarm, S is supervisory, T is trouble, and M is monitor. The number following each letter is the number of active events existing in each queue.

EST3 breaks down event types into queues and automatically displays the first event of the highest priority type.

EXHIBIT 'C'



Priority order is alarm, supervisory, trouble, monitor. By using queues an emergency user does not waste time scrolling through a mixed event list looking for alarms or confusing an alarm message with other message types.

EST3 configures for **Remote proprietary** system operation where every event must be acknowledged by viewing them before the internal buzzer will silence. Or the EST3 will configure for **Local** operation. Here the internal buzzer silences by pressing panel silence. If any events exist in queues that have not been viewed the queue LED continues to flash informing the user of un-seen events.

When all events in a queue are acknowledged or 'seen', the LED associated with the queue turns on steady. If a new event is added to the queue, the EST3 internal buzzer resounds and the queue LED flashes.

EST3 allows device grouping into logical group zones. Here two or more alarm devices (such as detectors or pull stations) make up the zone. When a device in the zone activates, the LCD displays the zone description. Each zone only displays once, regardless of the number of devices active within the zone.

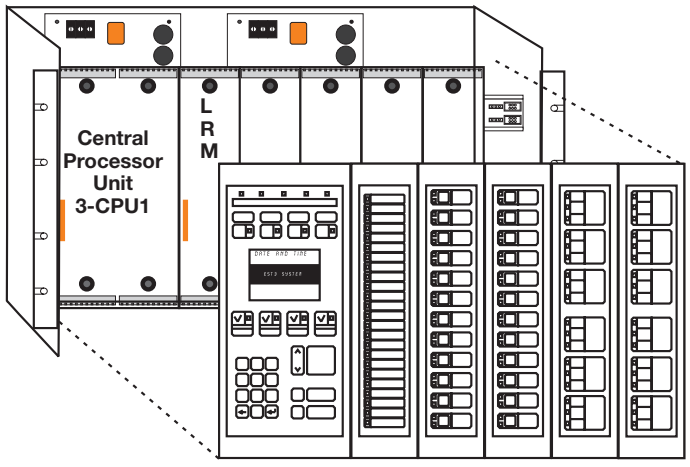
To display device information the user presses the Details key. The device with the lowest address displays in the first window.

If multiple devices are active each is available for viewing by using the arrow associated with the Previous Message Next key and scrolling through the device list.

The common controls easily expand beyond the Main Display interface by adding a Control Display Module and assigning features to its switch controls.

For Maintenance users, the EST3 provides a smooth operating menu system providing powerful tools for system management, reports, and trouble shooting.

Installation and Mounting

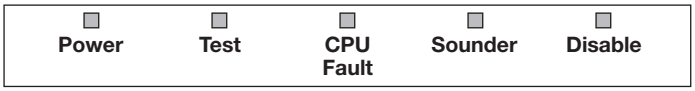


EN54 Compliance

EST3 has passed the British-based Loss Prevention Certification Board (LPCB) certified EST3 control panels and power supplies as having surpassed the requirements of the pivotal EN54 standard, parts two and four as well as part 16. LPCB Certificate #262ab In order to meet these standards, display and control functions have undergone slight modifications for the EN54 marketplace. These differences are highlighted below. All other control and annunciation features remain unchanged.

Note: EN 54-2: 1997 + A1: 2006, EN 54-4: 1997 + A1: 2002 + A2: 2006, and EN 54-16: 2008.

System Status LEDs



Power LED (Green): on when DC power is on.

Test LED (Yellow): on when any portion of the system (Group) is under test.

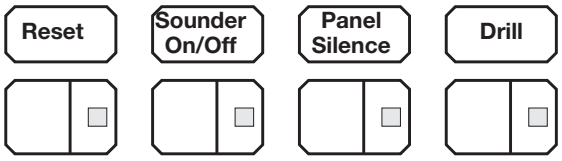
CPU Fault LED (Yellow): on when CPU stops running (processor failures must be manually reset).

Gnd Fault LED: Not available.

Sounder LED (Yellow): flashing indicates fault on sounder circuit. Steady indicates a disabled sounder circuit.

Disable LED (Yellow): on when any point or zone is disabled by a user (disabled conditions have priority over fault conditions).

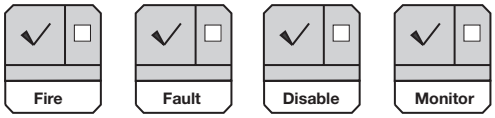
Switch Functions



Pressing **Sounder On/Off** turns off all sounder circuits defined as audible. The yellow LED turns on when silence is activated via the Sounder On/Off or via the alarm silence software timers.

See Page 2 for descriptions of Reset, Panel Silence, and Drill functions.

Event Queues



For EN54 compliance, EST3 configures for remote proprietary system operation. This requires that every event must be acknowledged by viewing them before the internal buzzer will silence. The priority order is Fire, Fault, Disable, Monitor.

EXHIBIT 'C'

LIFE SAFETY & INCIDENT MANAGEMENT

Contact us...

Email: edwards.fire@fs.utc.com
Web: *Edwards-fire.com*

EDWARDS is a UTC brand.
1016 Corporate Park Drive
Mebane, NC 27302

Engineering Specification

The system shall provide a user interface that displays system events in a text format, and supports basic common control LEDs and switches. The Common Control Switches and LEDs provided as minimum will be; Reset switch and LED, Alarm Silence switch and LED, Panel Silence switch and LED, Drill switch and LED. It must be possible to add additional common controls as required through the use of modular display units. The user interface must provide an LCD that will allow custom event messages of up to 42 characters. The interface must provide a minimum of eight lines by 21 characters and provide the emergency user, hands free viewing of the first and last highest priority event. The last highest priority event must always display and update automatically. Events shall be automatically placed in easy to access queues. It shall be possible to view specific event types separately. Having to scroll through a mixed list of event types is not acceptable. The total number of active events by type must be displayed. Visual indication must be provided of any event type which has not been acknowledged or viewed. It must be possible to customize the designation of all user interface LEDs and Switches for local language requirements. It shall be possible to have a custom message for each device in addition to zone messages. Custom device messages must support a minimum of 42 characters each. Instructional text messages support a maximum of 1,000 characters each. The display shall be capable of displaying English, Spanish, French, or Russian messages.

Technical Specifications

Catalog Number	3-LCD
Agency Listings	UL, ULC, FM, CE, LPCB, EN54*.
LCD Display	Eight lines by 21 characters backlit LCD
Mounting	Two local rail spaces on top of 3-CPU
Common Control Switches and LEDs	Reset switch and LED Alarm Silence switch and LED Panel Silence switch and LED Drill Switch and LED
Alarm Current	42mA
Standby Current	40mA

** EN 54-2: 1997 + A1: 2006, EN 54-4: 1997 + A1: 2002 + A2: 2006, and EN 54-16: 2008.*

Ordering Information

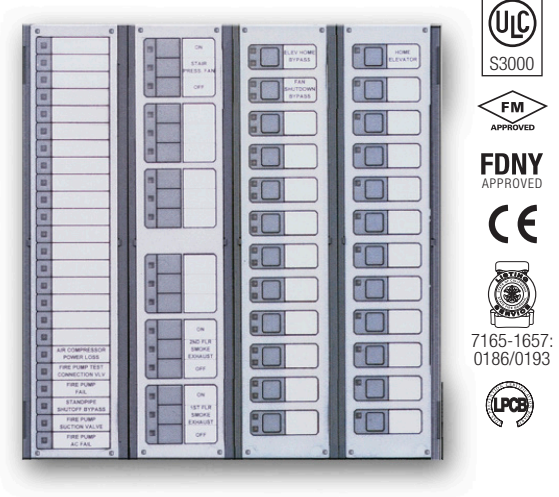
Catalog Number	Description	Shipping Weight, lb. (kg)
3-LCD	Liquid Crystal Display Module Add suffix "-E" for EN54 compliant version	.8 (.36)
3-LKE	UK English Label Kit	.25 (.11)
3-LKF	French Label Kit	.25 (.11)
3-LKR	Russian Label Kit	.25 (.11)
3-LKS	Spanish Label Kit	.25 (.11)

EXHIBIT 'C'

EDWARDS
United Technologies
LIFE SAFETY & INCIDENT MANAGEMENT

Control Display Modules

3-LDSM, 3-24x series, 3-12xx series, 3-6/3S1xxx series



S3000

FM APPROVED

FDNY APPROVED

CE

7165-1657: 0186/0193

EN 54-2: 1997 + A1: 2006
EN 54-4: 1997 + A1: 2002 + A2: 2006
EN 54-16: 2008

Overview

The EST3 Control Display modules provide the emergency user with the simplest of interfaces, lights and switch control. The Control Display modules install over local rail modules. The local rail modules supply the power and drivers via a ribbon cable connection to the control display modules. The displays mount over any local rail module maximizing the flexibility of design layout. When a display module is required where no local rail module exists, an LED Display Support Module 3-LDSM mounts to the local rail providing support for one Control Display Module.

Surface mount technology used to minimize space, also reduces the power requirements of display modules. Slide-in labels keep the control display modules flexible and allow labeling for local languages.

Module lamp test can be programmed to any spare control switch or a local node lamp test is initiated by simultaneously operating the Alarm Silence and Trouble Silence switches on the 3-CPU.

Standard Features

- Programmable LED flash rates
- Membrane style tactile pushbuttons
- Software supported for toggle, and latching interlock switch action
- Slide in labels
- Lamp test

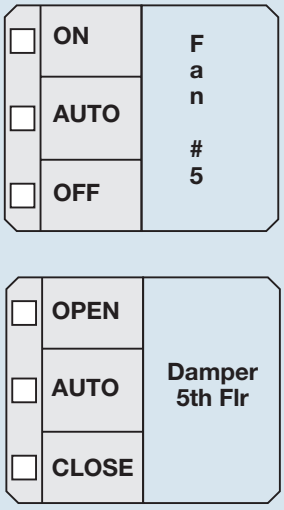
EXHIBIT 'C'

Application Notes

Control Display Modules come in a variety of types providing operational flexibility. There are five types of display modules available with EST3.

Typically alarm zone annunciation appears on any of the first four module types shown. The first module supports simple zone annunciation; the second, zone annunciation with zone disable; the third, alarm and trouble zone annunciation, the fourth alarm and trouble zone annunciation with zone disable. From a simple one LED annunciation point to higher functionality, EST3 fills the requirements.

Simple Control Examples



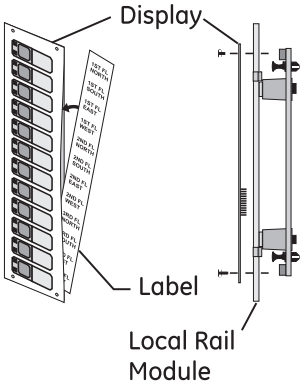
The fifth module is very adaptable to system requirements for audio or remote equipment control. Each module contains 18 LEDs and 18 switches. Each group of three switches has a latching-interlock to support operations that must be kept separated. The interlock is under software control so only one switch is active at a given time. EST3 software makes meeting the wide variety of applications needed with today's codes and building system operations easy.

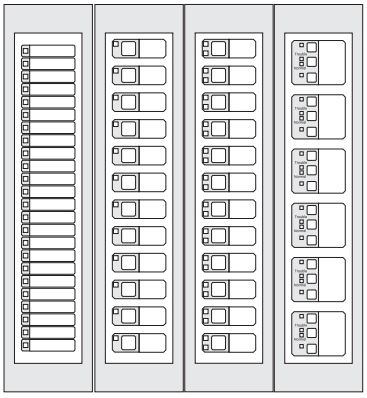
For fan control the emergency user assumes control of the remote device by selecting "On" or "Off." Programming of the switches to multiple relays keeps operational design choices open. The user returns the system control of the remote device to the Life Safety system by simply pressing Auto. The Auto LED programs to its related switch and gives positive feed back to the user by turning on yellow when the system has active control of remote devices.

Individual switch LEDs are also programmable. As an example the "Open" or "On" LED (green) could program to follow its related switch or, program to follow a remote monitor input and provide positive feedback of the remote devices control status. If budget restrictions prevent "sail type" positive feedback, EDWARDS's unique command processing satisfy requirements for positive feedback of HVAC control systems. Any switch command will send a signal to the 3-CPU for processing. While in this state the LED associated with the switch will flash. Once the command has been received by a remote Signature Series Module, the module (since it is intelligent with its own microprocessor) will issue a "Processed" command back to the 3-CPU which will latch the LED associated with the switch "ON" steady. This same process is used for all audio speaker selections ensuring the circuit is connected. A variety of switch and associated LED colors are available to meet the demands of the specifiers application.

Life Safety Systems are generally passive requiring only occasional operation. Yet, in an emergency the user must be able to identify system operation and status quickly and easily. LCD displays are excellent for identifying specific information, but even a large LCD can not display overall "system" status as effectively as LEDs and Switches. The EST3 Control Display modules are designed to provide simple identification and operation of system functions for the emergency user. They provide positive feedback of control activity with unrivaled selection of display configurations and mounting location options.

Installation and Mounting





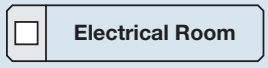
Engineering Specification

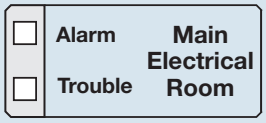
The Life Safety system shall incorporate annunciation of Alarm, Supervisory, Trouble and Monitor operations. Annunciation must be through the use of LED display strips complete with a means to custom label each LED as to its function. Where applicable control of remote smoke control devices must be made available at the control center. Switches with LEDs must provide positive feed back to the operator of remote equipment status. Where voice audio is required a means of paging individual zones must be made. The status of each paging zone must be annunciated. It must be possible to selectively page into specific zones. It shall be possible to manipulate the evacuation of the building from the main control center. It must be possible for the emergency operator to put specific zones into evacuation manually.

EXHIBIT 'C'

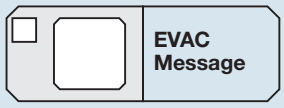
Technical Specifications

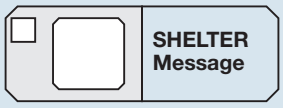
Catalog Number	Number of LEDs	LED Colors	Switches	Applications	Standby Current	Alarm Current
3-LDSM	N/A	N/A	N/A	Provides interface for one Control Display Module	5 mA	



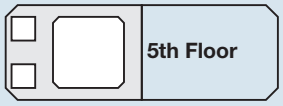


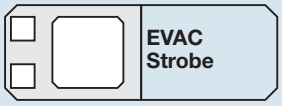
3-24R	24	red	0	Alarm Annunciation	2 mA base + 1.5 mA per active LED
3-24Y		yellow		Supervisory and Trouble Annunciation	
3-24G		green		Monitor Annunciation	
3-12RY		12 red over 12 yellow pairs		Red LEDs Alarm Annunciation Yellow LEDs Supervisory Annunciation	

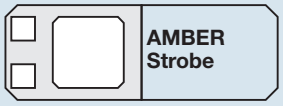




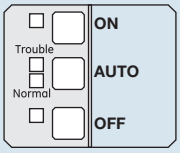
3-12SR	12	red	12	Alarm Annunciation with enable/disable operation	2 mA base + 1.5 mA per active LED
3-12SY		yellow		Supervisory Annunciation with enable/disable operation	
3-12SG		green		Monitor Annunciation, Page select	

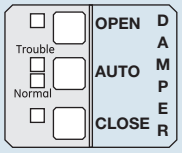




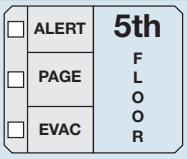


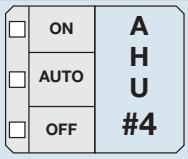
3-12/S1GY	12 groups of two w/ switch	green/ yellow	12	Zone Page select with Trouble Annunciation	2 mA base + 1.5 mA per active LED
3-12/S1RY		red/yellow		Alarm and Trouble Annunciation with enable/disable	
3-12/S2Y		yellow/ yellow		Supervisory and Trouble Annunciation with enable/disable	

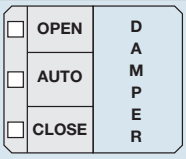




3-4/3SGYWR	4 LEDs	Green /Yellow and White/Red	1 2 3 switches	On-Auto-Off fan and Open-Auto-Close Damper Control with Trouble and Normal LED indicators	2mA base + 1.5mA per active LED







3-6/3S1G2Y	6 groups of 3 w/switch	green/yellow / yellow	Six groups of three	On-Auto-Off fan and Open-Auto-Close Damper Control	2 mA base + 1.5 mA per active LED
3-6/3S1GYR		green/yellow / red		Page and Evacuation select with zone trouble	

Notes:

1) All Control Display Modules are UL and ULC listed.

2) All Control Display Modules mount over one Local Rail Module. If no local rail module exists the 3-LDSM mounts to local rail and supports one control display module.

EXHIBIT 'C'

LIFE SAFETY & INCIDENT MANAGEMENT

Contact us...

Email: edwards.fire@fs.utc.com
Web: *Edwards-fire.com*

EDWARDS is a UTC brand.
1016 Corporate Park Drive
Mebane, NC 27302

Ordering Information

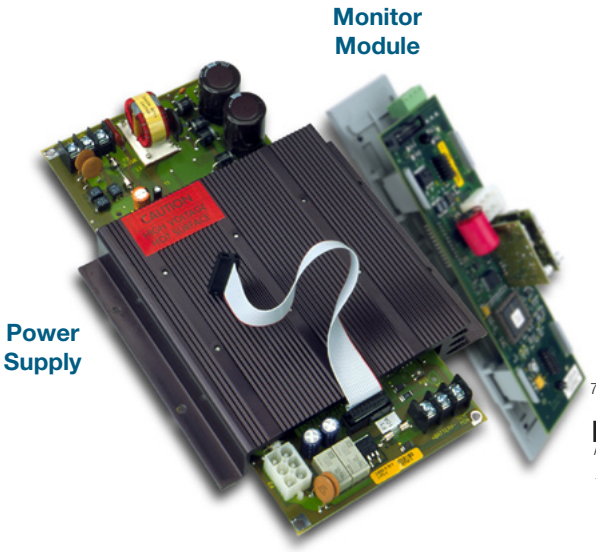
Catalog Number	Description	Shipping Weight
3-LDSM	LED Display Support Module. Add suffix "-E" for EN54 compliant versions.	0.45lb (.2kg)
3-24R	24 Red LED Display Module. Add suffix "-E" for EN54 compliant versions.	
3-24Y	24 Yellow LED Display Module. Add suffix "-E" for EN54 compliant versions.	
3-24G	24 Green LED Display Module. Add suffix "-E" for EN54 compliant versions.	
3-12SR	12 switches with 12 Red LED Display/Control Module. Add suffix "-E" for EN54 compliant versions.	
3-12SY	12 switches with 12 Yellow LED Display/Control Module. Add suffix "-E" for EN54 compliant versions.	
3-12SG	12 switches with 12 Green LED Display/Control Module. Add suffix "-E" for EN54 compliant versions.	
3-12RY	12 Red LED and 12 Yellow LED Display Module . Add suffix "-E" for EN54 compliant versions.	
3-12/S1GY	12 switches with one Green and one Yellow LED per switch Display/ Control Module. Add suffix "-E" for EN54 compliant versions.	0.35lb (.12kg)
3-12/S1RY	12 switches with one Red and one Yellow LED per switch Display/ Control Module. Add suffix "-E" for EN54 compliant versions.	
3-12/S2Y	12 switches with two Yellow LEDs per switch Display/Control Module.	
3-6/3S1G2Y	Six groups of three switches. Each switch with one LED. LEDs provided Green, Yellow, Yellow. Add suffix "-E" for EN54 compliant versions.	
3-4/3SGYWR	12 switches in four groups of three switches, switch one with a green LED, switch two with yellow and white LEDs and switch three with a red LED.	
3-6/3S1GYR	Six groups of three switches. Each switch with one LED. LEDs provided Green, Yellow, Red. Add suffix "-E" for EN54 compliant versions.	

EXHIBIT 'C'

EDWARDS
United Technologies
LIFE SAFETY & INCIDENT MANAGEMENT

EST3 Power Supplies

3-PPS/M series, 3-BPS/M series, 3-BBC/M series



S3000
7165-1657: 0186
FDNY APPROVED
FM APPROVED

EN54-2: (1997) +A1: (2006)
EN54-4: (1997) +A1: (2002) +A2: (2006)
EN54-16:(2008)

Overview

EST3 Power supplies consist of two assemblies, a high efficiency switch mode power supply card and a power supply monitor module. The monitor module mounts to the local rail and distributes the power from its supply to the local rail. The local rail distributes power from all power supplies to other local rail modules and user interface cards resulting in “Shared Power” throughout the system. By paralleling the power supplies on a rail maximum utilization of available power is possible, resulting in fewer power supplies. Up to four power supplies combine in a single enclosure providing up to 28 amps of available power. Battery backup is provided using from one to four sets of batteries, depending on standby power requirements.

Power supplies mount to the back of the chassis units or wall-boxes. The associated power supply monitor module mounts on the local rail providing system power distribution and mounting space for any control display module. Access to auxiliary power is via easily accessible terminal blocks located on the power supply monitor module. Each power supply produces 7 Amps of filtered and regulated power. With four power supplies located in an enclosure (one primary and three booster power supplies) 28 amps of current is available for local rail modules, control display modules and the eight auxiliary 3.5 amp power outputs (two per supply).

Standard Features

- High efficiency switch mode
- Increased power distribution efficiency
  - power supplies parallel allowing up to 28 amps in a single node
- 120 or 230 Vac operation
- 7 AMP filtered and regulated
- Two 3.5 AMP outputs
- Temperature compensated, dual rated battery charger
- Electronic power limiting
- Automatic load testing of batteries
- Fully approved UL, ULC and EN standards (see Specifications section)

EXHIBIT 'C'

Application

The primary power supply provides the system with battery charging and voltage regulation. Software configures the charger to either 10-24 AH batteries or 30-65 AH batteries and controls the high/low charge rates. Batteries mounted in the same enclosure as the power supply, have their charge rate monitored and adjusted based on the local enclosure temperature, keeping charging rates within battery specification. For remote batteries a temperature probe is monitored in the remote battery cabinet and charge rates are adjusted automatically. Battery damage is unlikely to occur when environmental short term conditions are outside of normal operating ranges.

The EST3 power supplies automatically load test batteries by shutting down the battery charger and placing a load across the battery. If the battery voltage is outside the specification range the power supply reports a trouble. The trouble clears if the battery is able to recover and pass future load tests.

Battery leads are electronically short circuit protected. If a short occurs in the battery leads the charger automatically disables itself and causes a trouble. The system will constantly look to see if the short has cleared. If the short clears the system automatically restores.

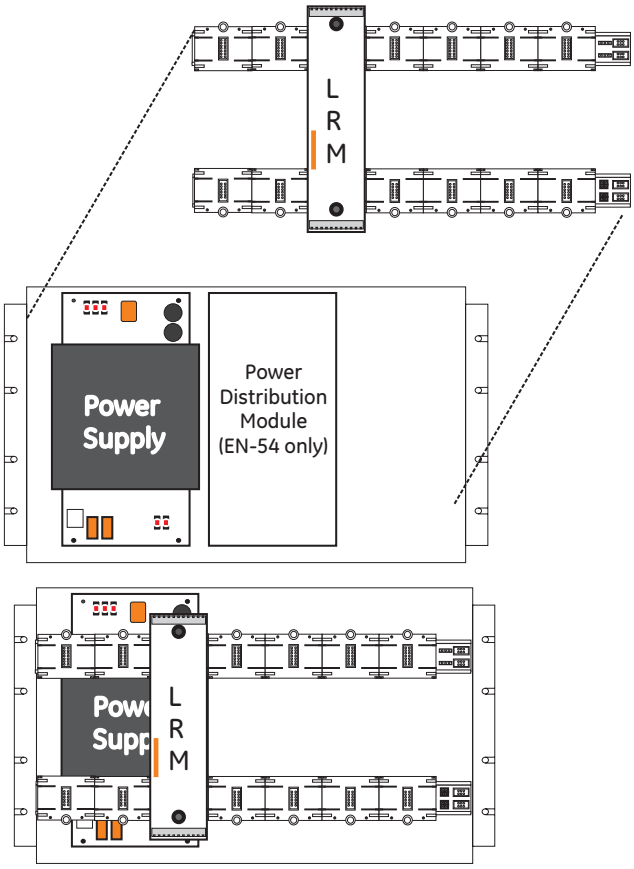
During operation on standby batteries, battery voltage is constantly monitored. A trouble is reported if the battery voltage falls below a specified value.

EST3 power supplies provide specific information back to the 3-CPU(1) designed to help speed trouble shooting of system functions. Should a power supply detect a fault, specific diagnostic codes are available to speed trouble shooting. The 3-LCD will display the power supplies address, a specific trouble code, and a text message describing the specific trouble. Text messages are easy to understand and include items like: Battery Trouble, Aux Power Overload Circuit 1, Aux Power Overload Circuit 2.

Engineering Specification

The fire alarm power supplies must be capable of being paralleled and to load share. Multiple power supplies must be capable of being backed up with a single 24 volt battery set. Each power supply shall be capable of charging up to 65 AH batteries. The power supply must be able to perform an automatic load test of batteries and return a trouble if the batteries fall outside a predetermined range. Power supplies must incorporate the ability to adjust the charge rate of batteries based on ambient temperatures. It shall be possible to adjust for ambient temperature changes in local cabinets as well as remote cabinets.

Installation and Mounting



Power Supply Rules

1. Each battery set needs one charger, either a 3-PPS/M or a 3-BBC/M.
2. Each power supply must be connected to a battery set using an identical length and gauge of wire to keep voltage drops identical.
3. Distribute power supplies and loads evenly across rails.
4. **All battery sets for a panel must be the same capacity (AH), same manufacturer, and same manufacturing date code.**

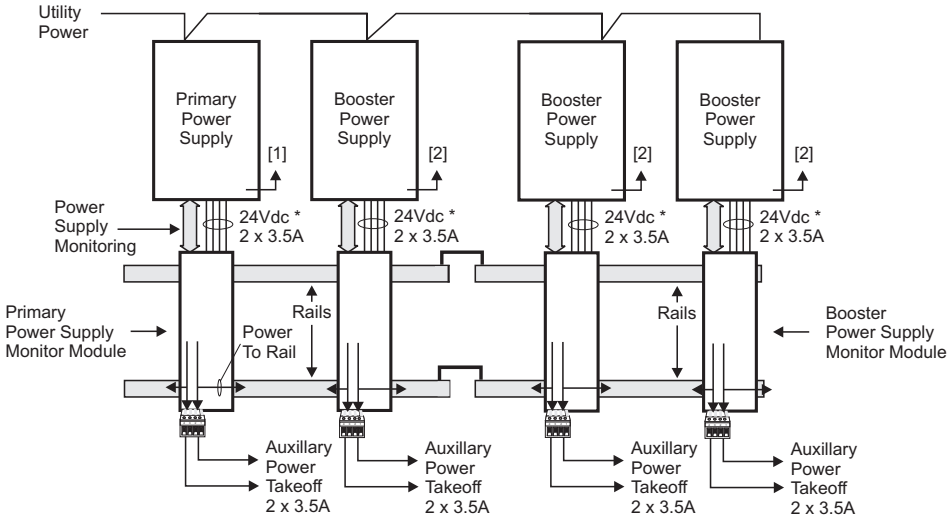
The Table below illustrates the combinations of power supplies and batteries that meet all the power supply rules.

24 VDC Power Supply Output Current

	7A	14A		21A		28A	
Battery Requirements	One Set, 65 AH max	One Set, 65 AH max	Two Identical Sets, 65 AH max	One Set, 65 AH max	Three Identical Sets, 65 AH max	One Set, 65 AH max	Four Identical Sets, 65 AH max
Required Modules	1 3-PPS/M	1 3-PPS/M 1 3-BPS/M	1 3-PPS/M 1 3-BBC/M	1 3-PPS/M 2 3-BPS/M	1 3-PPS/M 2 3-BBC/M	1 3-PPS/M 3 3-BPS/M	1 3-PPS/M 3 3-BBC/M

EXHIBIT 'C'

Typical Wiring



[1] From battery temperature probe terminals.

[2] From battery and from temperature probe terminals if 3-BTSEN-E used.

* Nominal Voltage

Agency Listings

EST3 is listed to the following UL and ULC standards:

UL 864, *Control Units and Accessories for Fire Alarm Systems;* **UL294,** *Access Control System Units;* **UL365,** *Police Station Connected Burglar Alarm Units and Systems;* **UL609,** *Local Burglar Alarm Units and Systems;* **UL636,** *Police Station Connected Burglar Alarm Units and Systems;* **UL1076,** *Proprietary Burglar Alarm Units and Systems;* **UL1610,** *Central Station Burglar Alarm Units;* **UL1635,** *Digital Alarm Communicator System Units;* **UL2017,** *General-Purpose Signaling Devices and Systems;* **ULC-S303-M91,** *Local Burglar Alarm Units and Systems;* **ULC-S527-99,** *Control Units for Fire Alarm Systems;* **ULC/ORD-C1076,** *Proprietary Burglar Alarm Units and Systems;* **CAN/ULC-S559-04,** *Equipment for Fire Signal Receiving Centres and System;* **ULC/ORD-C100,** *Smoke Control System Equipment*

Specifications

Catalog Number	3-PPS/M & 3-BBC/M	3-BPS/M	3-PPS/M-230 & 3-BBC/M-230	3-BPS/M-230	3-PPS/M-230-E & 3-BBC/M-230-E	3-BPS/M-230-E
Agency Approvals	UL, ULC	U L, ULC	UL, ULC	UL, ULC	LPCB EN54*, CE	EN54*
Input Voltage	120 Vac (+10%, -15%), 50-60 Hz		230 Vac (+10%, -15%), 50-60 Hz			
Brownout Level	< or = 102 Vac	96 Vac	< or = 195 Vac	184 Vac	< or = 195 Vac	188 Vac
Current Requirements	3-PPS/M included with 3-CPU3 current 3-BBC/M Alarm: 70 mA Standby: 70 mA	Alarm 50mA Standby 50mA	3-PPS/M-230 included with 3-CPU3 current 3-BBC/M-230 Alarm: 70 mA Standby: 70 mA	Alarm: 50 mA Standby: 50 mA	3-PPS/M-230-E included with 3-CPU3 current 3-BBC/M-230-E Alarm: 70 mA Standby: 70 mA	Alarm: 50 mA Standby: 50 mA
Input Current	3.0 A		1.5 A			
Total Output Current	Special Applications: 7.0 Amps Regulated: 4.5 Amps total (including internal panel and auxiliary outputs). Maximum regulated NAC power via 3-IDC8/4: 1 Amp (see note).					
Battery Charging Capacity	65 AH Sealed Lead-Acid	None	65 AH Sealed Lead-Acid	None	30 AH Sealed Lead-Acid	None
Low Battery Trouble	24 Vdc				22.5 Vdc	
Deep Discharge Cutoff	19.5 Vdc				20.0 Vdc	
Mounting Requirements	1 LRM space, 1 chassis footprint				1 LRM Space + 3-PPS: 2 footprints 3-BBC: 1 footprint	1 LRM space, 1 chassis footprint
Output Voltage	24 Vdc Nominal					
Auxiliary Output Current	Two sources of 3.5 Amps each taken from total output current					
Auxiliary Output Terminal Capacity	18 AWG to 12 AWG (1 mm^2 to 2.5 mm^2)					
Output Protection	Electronic power limiting & heat sink temperature					
Ground Fault Detection	< 10K Ohms					

Note: Each power supply can support 7 Amps with special application devices. Up to one regulated NAC circuit via 3-IDC8/4 can be supported per 3-PPS power supply. Total power supply current available when supporting a regulated NAC is 4.5 Amps. Maximum regulated NAC current available from the 4.5A supply is 1 Amp.

* **EN54-2: (1997) +A1: (2006)** *Control and Indicating Equipment;* **EN54-4: (1997) +A1: (2002) +A2: (2006)** *Power Supply Equipment;* **EN54-16:(2008)** *Voice Alarm Control and Indicating Equipment*

EXHIBIT 'C'

LIFE SAFETY & INCIDENT MANAGEMENT

Contact us...

Email: edwards.fire@fs.utc.com
Web: *Edwards-fire.com*

EDWARDS is a UTC brand.
1016 Corporate Park Drive
Mebane, NC 27302

Ordering Information

Catalog Number	Description	Ship Wt., lb. (kg)
3-PPS/M	Primary Power Supply w/ local rail module 120V 50/60 Hz	5 (2.3)
3-BPS/M	Booster Power Supply w/ local rail module 120V 50/60 Hz	5 (2.3)
3-PPS/M-230	Primary Power Supply w/ local rail module 230V 50/60 Hz	5 (2.3)
3-BPS/M-230	Booster Power Supply w/ local rail module 230V 50/60 Hz	5 (2.3)
3-PPS/ M-230-E	Primary Power Supply w/local rail module 230V 50 Hz, EN54* Certified, CE. Comes with one EFM-2 and 15 ferrite clamps.	5 (2.3)
3-BPS/ M-230-E	Booster Power Supply w/local rail module 230V 50 Hz, EN54* Certified, CE	5 (2.3)
3-BBC/M	Booster/Charger Supply w/local rail module 120V 50/60Hz	5 (2.3)
3-BBC/M-230	Booster/Charger Supply w/local rail module 230V 50/60Hz	5 (2.3)
3-BBC/ M-230-E	Booster/Charger Supply w/local rail module, 230V 50Hz, EN54* Certified, CE	5 (2.3)
3-BBCMON(-E)	Booster/Charger Monitor Module with charger capability (upgrade 3-BPS/M(-230)(-E) to 3-BBC/M-(230)(-E))	5 (2.3)
3-BTSEN	Distribution Module required when battery installed in remote cabinet	.5 (.22)
3-BTSEN-E	Distribution and Temperature Sensor Module. Required in EN54* Markets when battery installed in a remote cabinet.	.5 (.22)
EFM-2	Data filter board, ships with 3-PPS/M-230-E. Provides filtering for network data. For distributed audio applications refer to model EFM-10. Additional ferrite clamp kits may be ordered separately. See European Marketplace Manual P/N 270925 for details on ferrite clamp locations, quantities and wiring.	
EFM-10	Data Filter board order separately for distributed audio. Order one EFM-10 for each node receiving audio in the network. Additional ferrite clamp kits may be ordered separately. See European Marketplace Manual P/N 270925 for details on ferrite clamp locations and quantities.	
7300172	Ferrite Kit includes 2 ferrites for EN54 applications.	
7300173	Ferrite Kit includes 15 ferrites for EN54 applications.	
7300174	Ferrite Kit includes 4 ferrites for EN54 applications.	
7300175	Ferrite Kit includes 8 ferrites for EN54 applications.	
3-FP	Filler Plate, order separately when no LED or LED/Switch module installed.	0.1 (0.05)

* **EN54-2: (1997) +A1: (2006)** *Control and Indicating Equipment;* **EN54-4: (1997) +A1: (2002) +A2: (2006)** *Power Supply Equipment;* **EN54-16:(2008)** *Voice Alarm Control and Indicating Equipment*

EXHIBIT 'C'

EST™
Life Safety & Communications

Sealed Lead-Acid Batteries

Overview

Rechargeable sealed lead-acid batteries are ideal for use as a secondary (standby) power source as defined by NFPA 72. Their low maintenance and high energy density make them ideal for fire alarm signaling applications.

Standard Features

- Rechargeable
- Non-spillable
- Non-hazardous
- Low maintenance
- High energy density

Application

When multiple power supplies are provided, each power supply's battery requirements should be calculated individually. Consult the specific system manual to determine battery capacity requirements.

Safety Information
Due to a battery's low internal resistance and high power density, high levels of short circuit current can develop across battery terminals. Put on protective eye covering and remove all jewelry before working on batteries. Do not rest tools or cables on the battery, and only use insulated tools. Follow all manufacturers installation instructions and diagrams when installing or maintaining batteries.

EXHIBIT 'C'

EDWARDS
A UTC Fire & Security Company

Detection & alarm since 1872

U.S.
T 888-378-2329
F 866-503-3996

Canada
Chubb-Edwards
T 519 376 2430
F 519 376 7258

Southeast Asia
T : +65 6391 9300
F : +65 6391 9306

India
T : +91 80 4344 2000
F : +91 80 4344 2050

Australia
T +61 3 9239 1200
F +61 3 9239 1299

Europe
T +32 2 725 11 20
F +32 2 721 86 13

Latin America
T 305 593 4301
F 305 593 4300

utcfireandsecurity.com

Specifications

Case Material	ABS Thermoplastic
Regulatory Information	DOT Class 60, Batteries, non-hazardous, non-spillable
Operating Environment	32° F to 120° F (0° C to 49° C) 0 to 93% RH, Non-condensing

Ordering Information

Catalog Number	Description	Shipping Weight, lb (kg)
12V1A2	1.2 Ah Sealed Lead Acid Battery - 12 Vdc	1.25 (0.57)
12V4A	4.5 Ah Sealed Lead Acid Battery - 12 Vdc	5 (2.27)
12V6A5	7.2 Ah Sealed Lead Acid Battery - 12 Vdc	6 (2.72)
6V8A	8 Ah Sealed Lead Acid Battery - 6 Vdc	4 (1.81)
6V10A	12 Ah Sealed Lead Acid Battery - 6 Vdc	5 (2.27)
12V10A	11 Ah Sealed Lead Acid Battery - 12 Vdc	10 (4.45)
12V17A	18 Ah Sealed Lead Acid Battery - 12 Vdc	13 (5.90)
12V24A	26 Ah Sealed Lead Acid Battery - 12 Vdc	20 (9.07)
12V40A	40 Ah Sealed Lead Acid Battery - 12 Vdc	32 (14.51)
12V50A	50 Ah Sealed Lead Acid Battery - 12 Vdc	40 (18.14)
12V65A	65 Ah Sealed Lead Acid Battery - 12 Vdc	49 (22.23)

EXHIBIT 'C'

06-21-10

EDWARDS
United Technologies
LIFE SAFETY & INCIDENT MANAGEMENT

EST3 Cabinets and Chassis

3-CAB series, 3-RCC series, 3-CHAS7 series, BC-1

3-CAB Series


3-RCC Series

LPCB
UL
ULC
S3000
7165-1657: 0186
FDNY APPROVED
FM APPROVED
CE

EN 54-2: 1997 + A1: 2006
EN 54-4: 1997 + A1: 2002 + A2: 2006
EN 54-16: 2008

Overview

EST3 has a wide selection of cabinet arrangements allowing the greatest use of EST3's flexible modular design. Lobby enclosure wallboxes are manufactured from #14 AWG cold rolled steel with a gray baked enamel finish. Lobby enclosure doors are manufactured from #14 AWG cold rolled steel and have a modern contoured door design with integral viewing window. The exception is the small lobby enclosure 3-CAB5. The 3-CAB5 wallbox and non-contoured door are #16 AWG cold rolled steel. Lobby enclosure doors come with gray baked enamel or optional red baked enamel finishes. The EST3 lobby enclosures back boxes, doors and chassis units are ordered and shipped separately. The 3-CAB5 lobby enclosure comes complete with door and back box providing space to mount five local rail modules.

The EST3 remote closet cabinet design allows the installation of control panel electronics in electrical closets. The remote closet cabinets have left hand hinged doors and are available with red finish only. Optional display modules used for system diagnostics display, mount behind the closet cabinet door and are not visible with the door closed.

Standard Features

- Right or left hand hinging of doors
- Lag and Keyway holes for quick mounting
- Attack rated door for security applications
- Knockouts for 3/4 inch conduit
- Attractive contour door design on lobby enclosures
- Combination flush or surface mounting lobby enclosure design
- Remote closet cabinets for electrical closet mounting support up to 65 AMP hour batteries
- Optional earthquake hardening: OSHPD seismic pre-approval for component Importance Factor 1.5

EXHIBIT 'C'

Application

Lobby Enclosures

EST3 lobby enclosures provide space for control, monitoring and display modules where they remain visible even with the door closed and secure. Ideal for mounting in lobby's where appearance is important, maximum mounting flexibility is provided with doors that will mount for right or left hand opening. Lobby enclosures come in several sizes to match individual project requirements.

The **3-CAB5 series** semi-flush or surface mounts. A built in rail assembly provides space for up to five local rail modules, no chassis assembly needed. Back space for 1-1/2 footprints gives room for a power supply and a 1/2 footprint module and 10 AH batteries. The local rail module spaces provide room for amplifiers, common control and annunciation modules.

The **3-CAB7** semi-flush or surface mounts and has a contoured front door with viewing window. Space is provided for two 17 AH batteries and one chassis assembly providing seven local rail module spaces.

The **3-CAB14** semi-flush or surface mounting and has a contoured front door with viewing window. Space is provided for two 17AH batteries and two chassis assemblies each providing seven local rail module spaces.

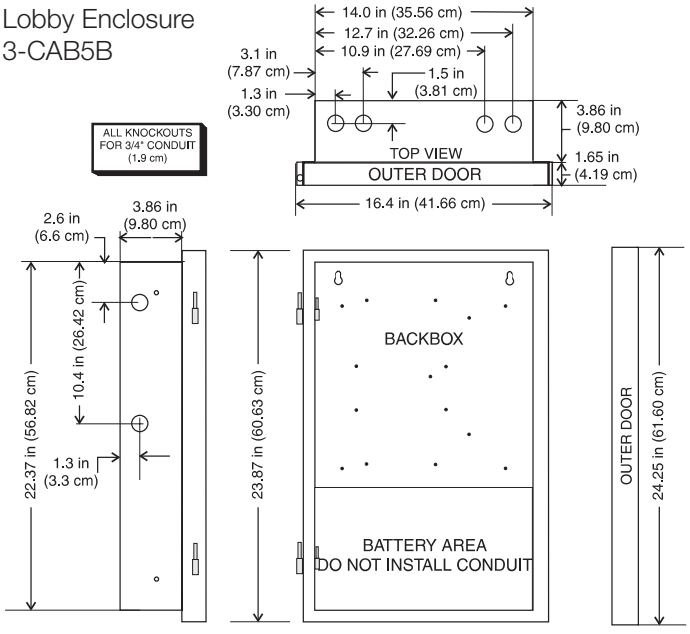
The **3-CAB21** semi-flush or surface mounts and has a contoured front door with viewing window. Space is provided for two 17AH batteries and three chassis assemblies each providing seven local rail module spaces.

Remote Closet Cabinets

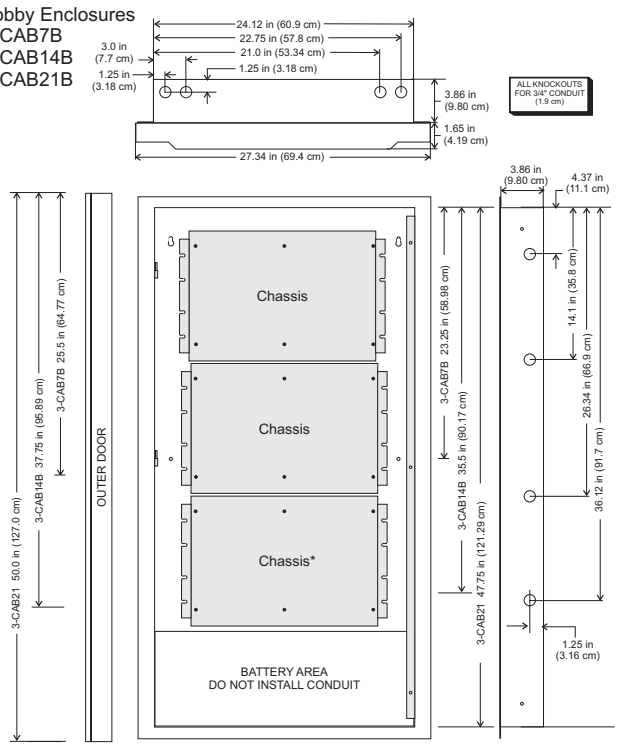
Remote closet cabinets provide an economical way of installing equipment in locations where esthetics are not paramount, like electrical closets. You can have optional display modules used for system diagnostics display mounted behind the front door. These display modules will not be visible with the door closed. Remote closet cabinets are surface mounting and come in sizes providing space for one to three chassis with room for standby batteries. A UL Listed attack rated door having a 2-minute rating is available for the 3-RCC7R cabinet. This door is required for security applications.

Installation and Mounting

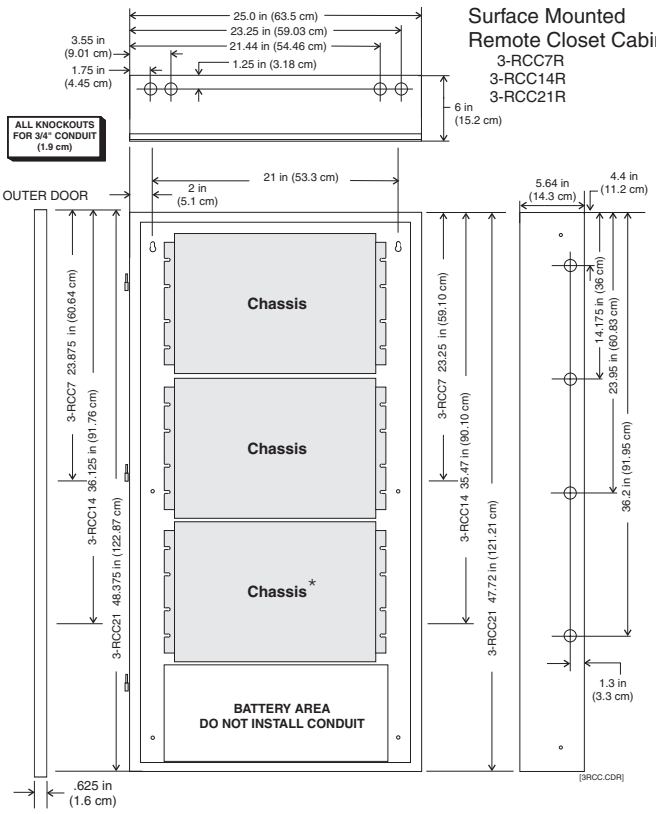
Lobby Enclosure
3-CAB5B



Lobby Enclosures
3-CAB7B
3-CAB14B
3-CAB21B



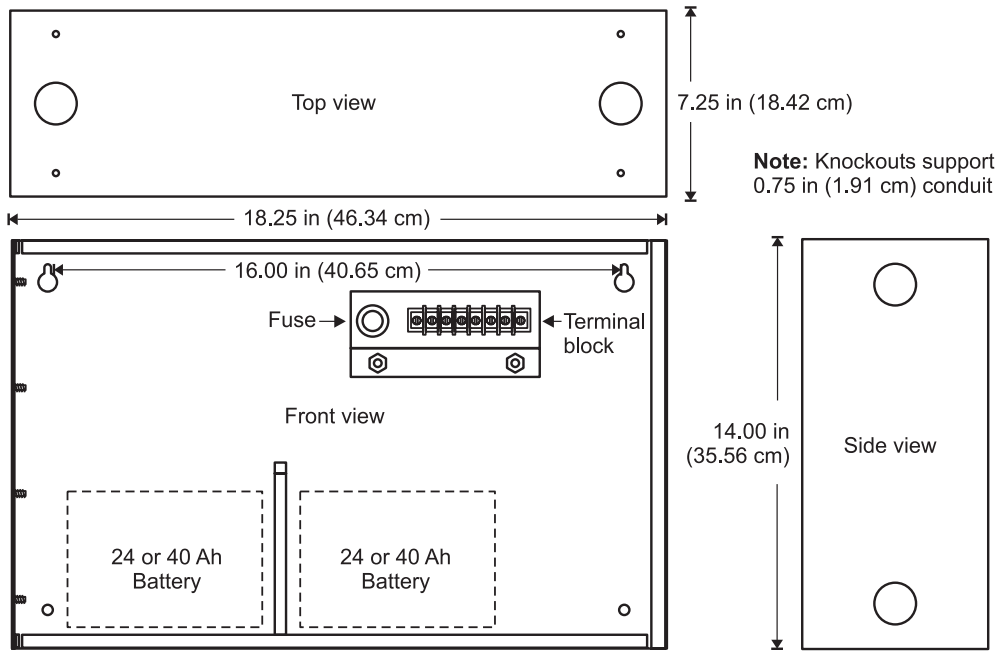
Surface Mounted
Remote Closet Cabinets
3-RCC7R
3-RCC14R
3-RCC21R



* The lower mounting space can be used for an MN-BRKT1 bracket, which holds MNEC interface equipment including an MN-NETSW1 Ethernet network switch, an MN-ABPM Audio bridge, an MN-FVPN VoIP module, and an MN-COM1S Communications module.

EXHIBIT 'C'

BC-1 Dimensions



Ordering Information

Catalog Number	Description	Equipment Mounting Space	Battery Space	Ship Wt. lb. (Kg)
Lobby Enclosures — Outer doors with viewing window				
3-CAB5	Cabinet w/Wallbox, door and chassis	Five local rail modules One footprint and ½ footprint module	Two - 12V10A	30 (13.6)
3-CAB7B	Wallbox only	One Chassis	Four - 6V8A Two - 12V10A Two - 12V17A	30 (13.6)
3-CAB7B-E	Wallbox only, EN54* certified CE	1 Chassis		30 (13.6)
3-CAB7D(R)	Inner and outer doors for 3-CAB7B	N/A		10 (4.5)
3-CAB7D(R)-E	Inner & outer doors for 3-CAB7B, EN54*, CE			10 (4.5)
3-CAB14B	Wallbox only	Two Chassis	Four - 6V8A Two - 12V10A Two - 12V17A	42 (19.1)
3-CAB14B-E	Wallbox only, EN54* certified CE	2 Chassis		42 (19.1)
3-CAB14D(R)	Inner and outer doors for 3-CAB14B	N/A		15 (6.8)
3-CAB14D(R)-E	Inner & outer doors for 3-CAB14B, EN54*, CE			15 (6.8)
3-CAB21B	Wallbox only	Three Chassis	Four - 6V8A Two - 12V10A Two - 12V17A	55 (25)
3-CAB21B-E	Wallbox only, EN54* certified CE	3 Chassis		55 (25)
3-CAB21D(R)	Inner and outer doors for 3-CAB21B	N/A		20 (9.1)
3-CAB21D(R)-E	Inner & outer doors for 3-CAB21B, EN54*, CE			20 (9.1)
Remote Closet Enclosure — No viewing window				
3-RCC7R	Red wallbox and door	One Chassis	Four - 6V8A, Two - 12V10A Two - 12V17A, Two - 12V50A	37.5 (17)
3-RCC7R-E	Red wallbox and door, EN54* certified CE			37.5 (17)
ATCK	Attack rated door for 3-RCC7R	N/A		26 (11.8)
3-RCC14R	Red wallbox and door	Two Chassis	Four - 6V8A Two - 12V10A, Two - 12V17A Two - 12V50A, Two - 12V65[2]	53 (24)
3-RCC14R-E	Red wallbox and door, EN54* certified CE			53(24)
3-RCC21R	Red wallbox and door	Three Chassis		70 (31.8)
3-RCC21R-E	Red wallbox and door, EN54* certified CE			70 (31.8)

more...

EXHIBIT 'C'

EDWARDS
United Technologies
LIFE SAFETY & INCIDENT MANAGEMENT

Contact us...
Email: edwards.fire@fs.utc.com
Web: *Edwards-fire.com*

EDWARDS is a UTC brand.
1016 Corporate Park Drive
Mebane, NC 27302

Chassis Assemblies

3-CHAS7	Takes one chassis space in wallbox, provides space for 7 local rail modules, up to two power supplies, and a ½ footprint module. Add suffix "-E" for EN54 compliant versions.	8.4 (3.8)
3-ASU**	Takes one chassis space in wallbox, provides an audio source unit /w microphone and an inner door filler plate. Add suffix "-E" for EN54 compliant versions.	15 (6.8)
3-ASU/4**	Takes one chassis space in wallbox, provides an audio source unit /w microphone and four local rail module spaces. Add suffix "-E" for EN54 compliant versions.	15 (6.8)
3-ASU/FT**	Takes one chassis space in wallbox, provides an audio source unit /w microphone and Firefighters Telephone. Add suffix "-EN" for EN54 compliant versions	20 (9.1)
3-FTCU**	Takes one chassis space in wallbox, provides Firefighters Telephone Control unit and inner door filler plate. Add suffix "-E" for EN54 compliant versions.	15 (6.8)
MN-BRKT1	Takes one chassis space in wallbox, provides mounting for MNEC interface equipment	4.0 (1.8)
FSB-BRKT2	Mounting bracket for FSB-PC2 communications bridge. Allows FSB-PC2 to mount on the side of a Chass7	1.0 (0.45)

Notes:

1. All lobby enclosures, wallboxes and doors have a textured gray enamel finish; outer doors are available in red by adding the suffix "R" to the catalog number, i.e. 3-CAB7DR.
2. Remote closet cabinets will support 65 AH batteries with the use of the 3-BATS Battery Shelf, which reduces the enclosure's chassis capacity by one chassis.
3. The EST3 is modularly listed under the following standards:
   UL 864 categories: UOJZ, UOXX, UUKL and SYZV, UL 2572, UL 294 category ALVY, UL 609 category AOTX, UL 636 category ANET, UL 1076 category APOU, UL 365 category APAW, UL 1610 category AMCX, UL 1635 category AMCX
   ULC-S527, ULC-S301, ULC-S302, ULC-S303, ULC-S306, ULC/ORD-C1076, ULC/ORD-C693
   Please refer to EST3 Installation and Service Manual for complete system requirements.

** EN 54-2: 1997 + A1: 2006 and EN 54-4: 1997 + A1: 2002 + A2: 2006 EN 54-16: 2008.*

*** Add "-CC" for City of Chicago, add "-E" for EN54 compliant chassis assemblies. For EN54 compliant 3-ASU/FT chassis order 3-ASU/FT-EN, for GOST R compliant order 3-ASU/FT-E.*

Accessories

3-BATS	Battery Shelf for RCC Enclosures. Takes one chassis space. Room for up to one 65 AH or two 50 AH batteries.	3 (1.36)
BC-1	Battery Cabinet - supports up to two 40 amp hour batteries.	
3-BTSEN	Battery sensor/distribution module. Add suffix "-E" for EN54 compliant version.	0.5 (.2)
3-BTSEN-E	Distribution and Temperature Sensor Module. Required in EN54* Markets when battery installed in a remote cabinet.	
BC-1EQ	BC-1 - Seismic Battery hold down for BC-1. Supports up to two 40 Ahr batteries. Order BC-1 Separately.	
3-CABEQ	3-CAB - Seismic Battery hold-down for 3-CAB 7, 14 or 21. Supports two 1 2V batteries from 10 Ah up to 18 Ah. Comes with EST3 Chassis hardening hardware and instructions. Order 3-CAB7, 3-CAB14 or 3-CAB21 separately. See note 1.	
3-RCCEQ50	3-RCC series - Seismic Battery hold-down. Supports one set of two 50 Ah batteries. Comes with EST3 Chassis hardening hardware and instructions. Order 3-RCCxxR separately. See note 1.	
3-RCCEQ65	3-RCC series cabinet - Seismic Battery hold-down. Supports one set of two 65 Ah batteries (one battery in bottom of cabinet, one battery mounted on 3-BATS). Order 3-RCCxxR cabinet and 3-BATS separately. See note 1.	
3-TAMP	Tamper switch for 3-CAB7, 3-CAB14 and 3-CAB21 cabinets. Mounts to side of cabinet.	0.5 (.2)
3-TAMP5	Tamper switch for 3-CAB5. Mounts to side of cabinet.	0.5 (.2)
3-TAMPRCC	3-TAMPRCC Tamper Switch for RCC series cabinets. Mounts to side of cabinet.	0.5 (.2)

1. For earthquake anchorage, including detailed mounting weights and center of gravity detail, please refer to *Seismic Application Guide 3101676*. Approval of panel anchorage to site structure may require local AHJ, structural, or civil engineer review.

EXHIBIT 'C'

Life Safety & Communications

System Event Printer

PT-1S, PT-1P

S3424

7165-1657: 0173

FDNY COA 6086 COA 6087

FM APPROVED

Overview

The PT-1 series printers are high speed, 9-pin dot matrix type which use standard, continuous tractor feed computer paper. The PT-1 series printers are used to permanently record Life Safety System changes of state. All printed entries contain the date, time, event type and a user defined message for each printed event. The printer is required in proprietary type systems. In local, auxiliary or remote station systems the printer is ancillary and is optional. The printer must be backed up by a UPS in a proprietary system. Printer paper may be fed from the rear or bottom of the printer.

Standard Features

- High speed, bi-directional printing
- Serial (model PT-1S) or parallel (model PT-1P) interface
- Front panel setup
- LED Status indicators
- RS-232/USB, Parallel/USB versions
- Printer self-test mode

Application

The PT-1S (serial/USB interface) is used adding print capability to fire control panels that support serial or USB printer interfaces. The PT-1P (Parallel/USB interface) is typically used when the printer is connected a computer graphical user interface.

Installation

The printer is configurable through simple dip switches to support proper operation with the system. Connecting a serial/USB printer may cause a ground fault on some control panels. If this happens, an IOP3-A isolator module may be installed between the printer and the control panel.

EXHIBIT 'C'

Contact us...
Email: edwards.fire@fs.utc.com
Web: *www.est-fire.com*

EST is an **EDWARDS** brand.

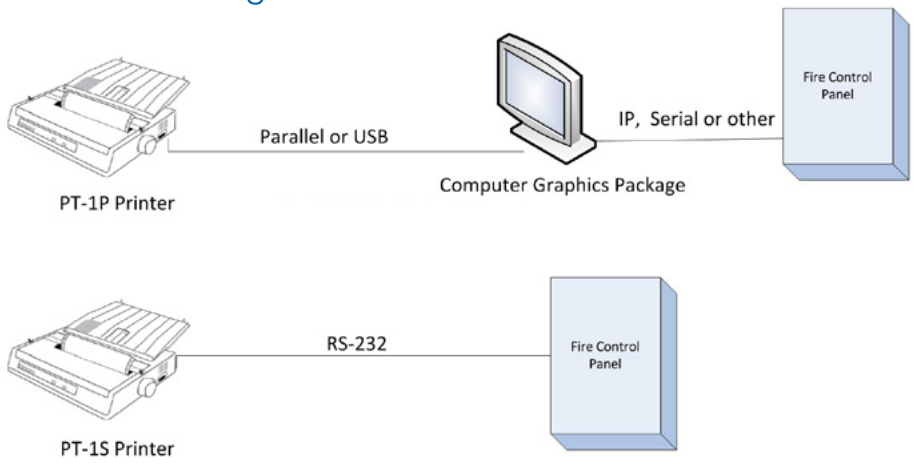
1016 Corporate Park Drive
Mebane, NC 27302

In Canada, contact Chubb Edwards...
Email: inquiries@chubbedwards.com
Web: *www.chubbedwards.com*

Engineering Specifications

The event and status printer shall be a 9-pin, impact, dot matrix printer with a minimum print speed of 232 characters per second. Print parameters shall be set up with a menu drive program in the printer. The printer shall be capable of USB, serial or parallel communications protocol. The communications speed for RS-232 communications protocol shall be adjustable from 300 to 9600 Baud. The serial or parallel cable shall be supervised. The printer shall list the time, date, type and user defined message for each event printed.

Connection Diagram



Specifications

Print Speed	232 cps
Voltage	120 Vac versions and 220 to 240 Vac versions
Power rating	48VA
Frequency	50/60 Hz
MTBF	4000 Hrs @ 25% duty cycle
Size	14.65 x 10.83 x 3.15 inches (37.2 x 27.5 x 8.0 cm)
Weight	9.9 lbs (4.5 kg)
Agency Listings	UL, ULC, MEA, CSFM
Operating Environment	Temperature: 32° - 120°F (0° - 49°C). Relative Humidity: 0 to 93% non-condensing

Ordering Information

Model	Description
PT-1S	Serial Printer
PT-1P	Parallel Printer
PT-1S/220	Serial Printer-220/240 Vac
PT-1P/220	Parallel Printer-220/240 Vac

Related Parts Ordering Information	
IOP3A	Isolated I/O port card

EXHIBIT 'C'

EDWARDS
United Technologies
LIFE SAFETY & INCIDENT MANAGEMENT

EST3 Remote Annunciators

3-ANNCPU3, 3-LCDANN, 3-6ANN, 3-10ANN, 3-EVxxx, 3-4ANN

S3424
7120-1657: 0193
FDNY APPROVED
FM APPROVED

EN54-16:(2008), EN54-2:1997+A1 and EN54-4:1997+A1:2002+A2

Overview

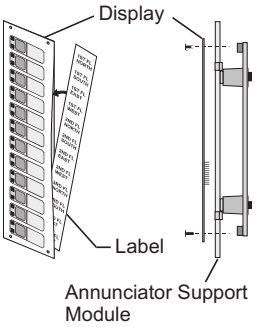
EST3 supports a full range of annunciator options for Mass Notification/Emergency Communication (MNEC), Life Safety and other purposes. Annunciator cabinets are constructed from 16 gauge cold rolled steel. The gray textured enamel finish of the annunciators complements any decor. Both surface and semi-flush mounting cabinet configurations maximize mounting flexibility and esthetic appeal. Cabinet arrangements allow both LED and LCD annunciation to easily combine in a single enclosure. Slide in labeling for LEDs and switches provides designation flexibility for labeling in local languages. For graphic annunciation EST3 offers LED driver boards perfectly suited to operate in most graphic annunciators.

EST3 annunciators are perfect for MNEC applications. They can be used in Central Control Stations (CCS), Autonomous Control Units (ACU), Local Operating Console (LOC) and combination units. In these applications, annunciators are configured to operate as Local Operation Consoles, or even Central Command Stations, from which MNEC is initiated and controlled.

Standard Features

- Standard 3-LCD (168 characters) and large-format 3-LCDXL1 (960 character) display options
- LCD uses queues to sort events
- Variety of wallbox configurations
- Programmable LED flash rates
- Slide-in labels
  Makes customization for regional language easy
- Full line of driver boards for graphic annunciators

Application



Use EST3 remote annunciators when a compact system status display is needed. Annunciator configurations include: LCD only display, LED only displays or combination LED and LCD display in a single enclosure.

The LCD display uses either the 3-LCD or 3-LCDXL1 Liquid crystal display module. The 3-LCD has a 128 x 64 graphical display typically used to display eight lines of 21 characters on its LCD display while the 3-LCDXL1 has a larger 240 x 320 pixel backlit display that supports 24 lines of 40 characters. Both LDC displays provide the room needed to convey emergency information in a useful format.

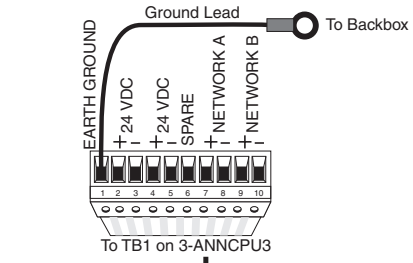
The 3-LCD always displays the last highest priority event even when the user is viewing other message queues. To give the greatest message flexibility EST3 event messages can route to specific annunciators. Routing can be initiated at a specific time/shift change. Messages need only display in areas having to respond to an event.

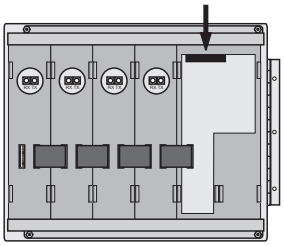
For LED display, the full line of EST3 Control/Display Modules support event display. Control/Display modules install over any annunciator support module maximizing annunciator design flexibility. A Lamptest feature can program to any spare control switch. If an LCD display is installed in the annunciator, simply operate the Alarm Silence and Trouble Silence switches simultaneously to lamptest all LEDs.

EXHIBIT 'C'

Typical Wiring

Rear view 3-ANNCPU3 Field Wiring 3-6ANN Shown



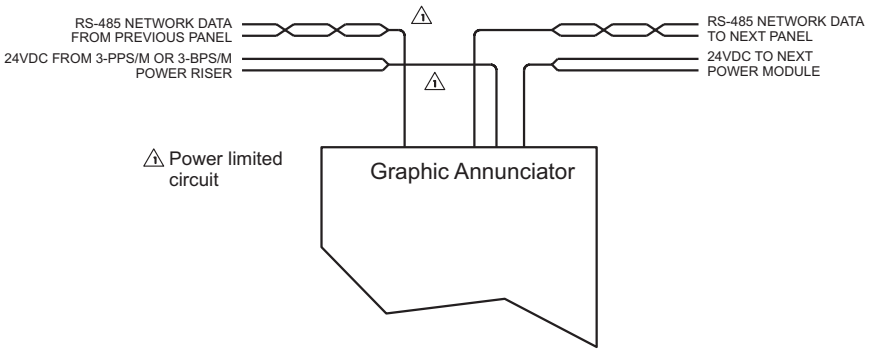


NOTES:
1. All wiring except earth ground supervised and power limited.
2. 24 VDC available from Primary or Booster Power supply.
3. Uses RS-485 Network communication format
4. Network wiring Twisted Pair

Power Riser

Calculate wire size for a maximum 3.4 Vdc total line loss from the 24 Vdc nominal voltage.

Graphic Annunciator Field Wiring



Wire Specifications
Network Data Communications - RS485 Format

Minimum Twisted Pair	18 AWG (0.75 mm²).
Maximum Circuit Resistance	90 Ohms
Maximum Circuit Capacitance	0.3 µF
Maximum Distance between any 3 panels	5,000 ft. (1,524 m).

Capacitance, entire network

Maximum Accumulative Capacitance

Wire Size	38.4K Baud	19.2K Baud
18 AWG	1.4 µF	2.8 µF
16 AWG	1.8 µF	3.6 µF
14 AWG	2.1 µF	4.2 µF

Distance limits are determined using the maximum allowable circuit resistance and capacitance, and manufacturer's cable specifications.

Specifications

Catalog Number	3-ANNCPU3	3-ANNSM	3-LCD	3-LCDXL1
Agency Listings	UL, ULC, FM, CE, LPCB EN54*			UL, ULC, FM
Mounting Space	Two Spaces	One Space	Mounts over 3-ANNCPU	Mounts over 3-ANNCPU plus two spaces.
Communication Format	RS-485	N/A	N/A	N/A
Current @ 24 Vdc Standby Alarm	 144 mA 144 mA	 10mA 10mA	 40mA 42mA	 48mA 50mA
Wiring Termination	Plug in terminal strip	N/A		
Wiring Size	Twisted Pair 18-14 AWG (0.75-1.5 mm²)			
Max. Wire Distance	5000 ft (1524m) between any 3 panels			
Relative Humidity	93% non condensing at 90° F (32° C)			
Temperature Rating	0-49° C (32 - 120° F)			
Wiring Styles	Class A or Class B			

Note: For a complete list of EST3 annunciator display and control modules please refer to EDWARDS literature sheet part number 85010-0055.
** EN54-16:(2008), EN54-2:1997+A1 and EN54-4:1997+A1:2002+A2*

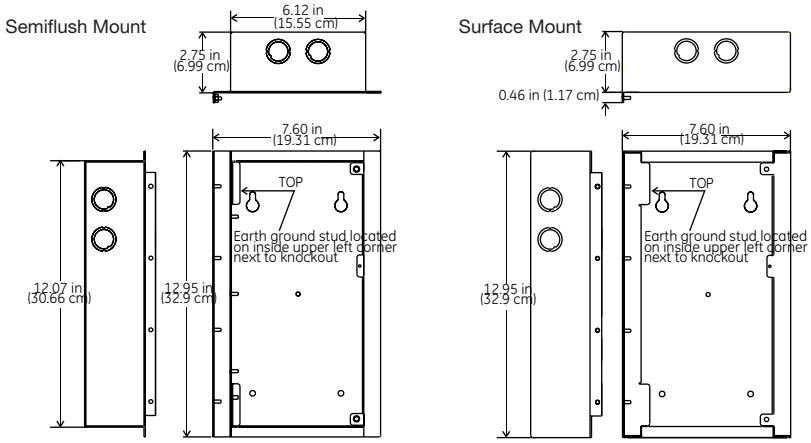
Engineering Specification

The Life Safety system shall incorporate annunciation of Alarm, Supervisory, Trouble and Monitor operations. Annunciation must be through the use of both LED display strips complete with a means to custom label each LED as to its function. Where applicable control switches must be provided. Switches with LEDs must provide positive feed back to the operator of remote equipment status. An LCD display with basic common control LEDs and switches shall be provided. The Common Control Switches and LEDs provided as minimum will be: Reset switch and LED, Alarm Silence switch and LED, Panel Silence switch and LED, Drill switch and LED. It must be possible to add additional common controls as required though the use of modular display / control units. The LCD interface must provide the ability to display custom event messages of a minimum of 40 characters. The LCD must provide the emergency user, hands free viewing of the first and last highest priority event. The last highest priority event must always display and update automatically. System events must automatically be placed in queues. It shall be possible to view specific event types separately. Having to scroll through a mixed list of events types is not acceptable. The total number of active events by type must be displayed. It must be possible to customize the designations of all user interface LEDs and switches for local language requirements. It must be possible to route system event messages to specific annunciator locations.

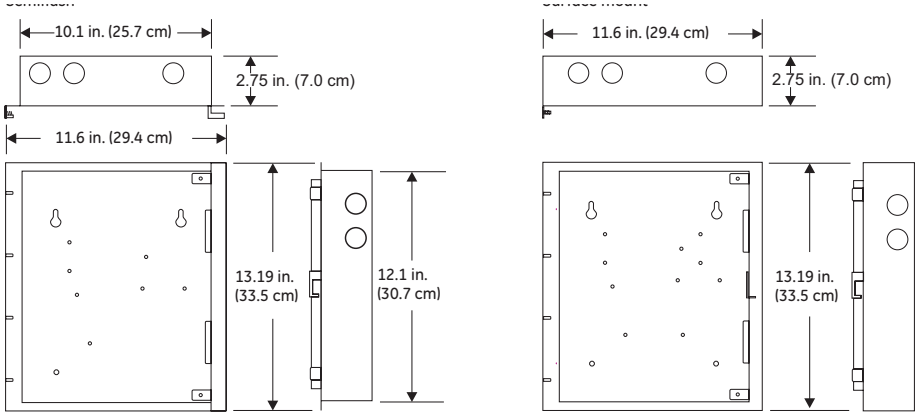
EXHIBIT 'C'

Dimensions

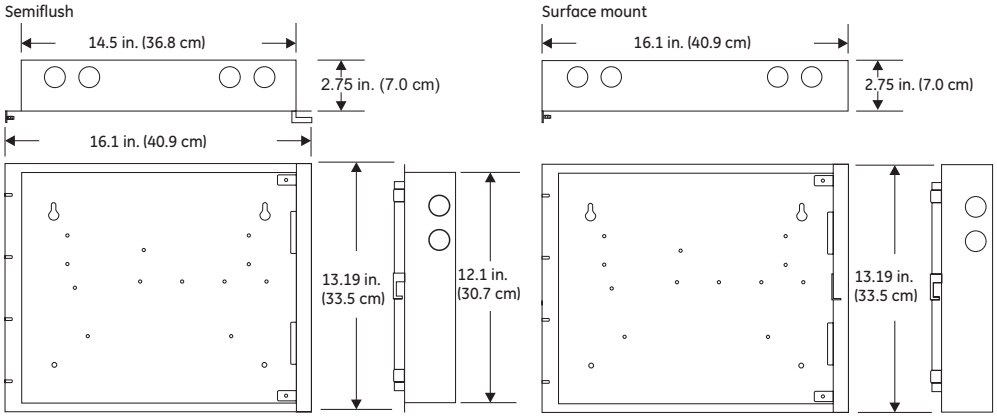
RLCM/B(-S)



4ANN/B(-S)



6ANN/B(-S)



10ANN/B(-S)

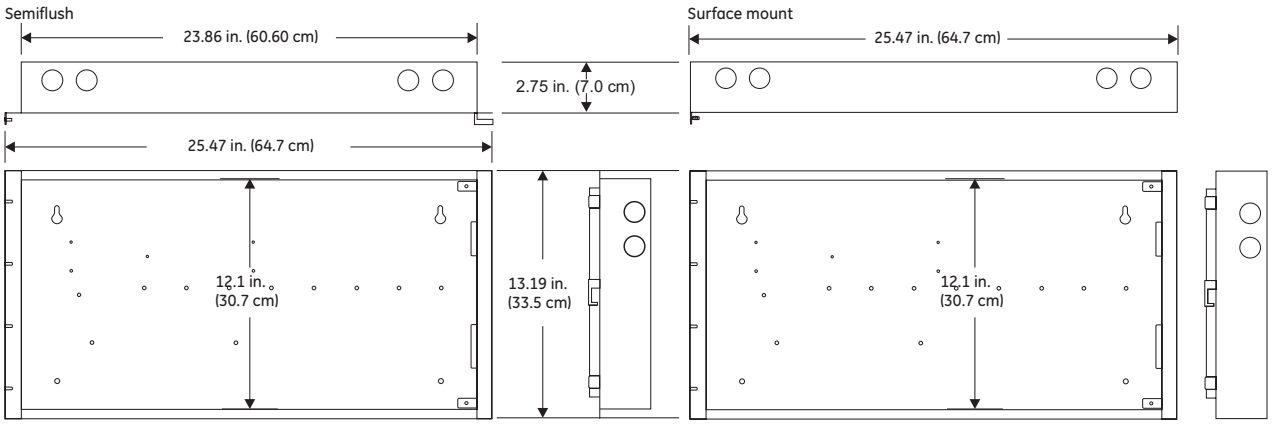


EXHIBIT 'C'

Ordering Information

Catalog Number	Description	Ship Wt. lb (kg)
Command Module Annunciators (c/w CPU, LCD display and doors. Order wallbox separately.)		
3-LCDANN	Remote LCD Command Module Annunciator.	3.8 (1.7)
3-LCDANN-E	Remote LCD Command Module Annunciator. For EN54* market only, CE.	3.8 (1.7)
Base Annunciators (Come with two 3-ANNSM annunciator support modules, a CPU, and doors. Order Display/Control modules, additional support modules & wallbox separately.)		
3-4ANN	Four Position Base Annunciator.	
3-4ANN-E	Four Position Base Annunciator. For EN54* market only, CE.	
3-6ANN	Six Position Base Annunciator.	6.28 (2.85)
3-6ANN-E	Six Position Base Annunciator. For EN54* market only, CE.	6.28 (2.85)
3-10ANN	10 Position Base Annunciator.	10.5 (4.8)
3-10ANN-E	10 Position Base Annunciator. For EN54* market only, CE.	10.5 (4.8)
** EN54-16:(2008), EN54-2:1997+A1 and EN54-4:1997+A1:2002+A2*		
CPU, Support Module, & LCD Displays		
3-ANNCPU3	Annunciator CPU (See Note 1)	1 (.45)
3-CPUDR	CPU doors with filler plates. Order separately, one required per CPU where no LCD display is installed.	0.25 (.11)
3-ANNSM	Annunciator Support Module	.45 (.2)
3-LCD	Liquid Crystal Display Module, eight lines. (See Note 1)	.8 (.36)
3-LCDXL1	Liquid Crystal Display Module, 40 lines mounts in 3-4ANN, 3-6ANN or 3-10ANN anunciators. *Note one 3-LCDXL1KBL, (ordered separately) is required for each 3-LCDXL1 mounting into 3-6ANN or 3-10ANN annunicator boxes.*	
3-LCDXL 1KBL	Cable for 3-LCDXL1 (Use to connect from 3-ANNCPU3 to the first annuciator support model. Not required with 3-4ANN and 3-LCDXL1 applications.)	
Control/Display Modules		
3-CPUDR	Two blank filler plates suitable for any annunciator blank space.	.5 (.22)
3-24R	24 Red LED Display Module (See Note 1)	.35 (.12)
3-24Y	24 Yellow LED Display Module (See Note 1)	.35 (.12)
3-24G	24 Green LED Display Module (See Note 1)	.35 (.12)
3-12SR	12 switches with 12 Red LED Display/Control Module (See Note 1)	.35 (.12)
3-12SY	12 switches with 12 Yellow LED Display/Control Module (See Note 1)	.35 (.12)
3-12SG	12 switches with 12 Green LED Display/Control Module (See Note 1)	.35 (.12)
3-12RY	12 Red LED and 12 Yellow LED Display Module (See Note 1)	.35 (.12)
3-12/S1GY	12 switches with one Green and one Yellow LED per switch (See Note 1)	.35 (.12)
3-12/S1RY	12 switches with one Red and one Yellow LED per switch (See Note 1)	.35 (.12)
3-12/S2Y	12 switches with two Yellow LEDs per switch	.35 (.12)
3-6/3S1G2Y	6 groups of 3 switches. Each switch with one LED: Green, Yellow, Yellow. (See Note 1)	.35 (.12)
3-6/3S1GYR	6 groups of 3 switches. Each switch with one LED: Green, Yellow, Red. (See Note 1)	.35 (.12)
3-REMICA	Remote microphone for use in 3-ANN series annunciator cabinets (See Note 1)	15 (6.8)
3-FP	Filler Plate, order separately one required per 3-ANNSM when no LED or LED/Switch module installed on operator layer.	0.1 (0.05)
Driver Modules, Power Supplies		
3-EVDVR	LED/SWITCH Driver Module, For EDWARDS Graphics	.35 (.12)
3-EVDVRA	LED/SWITCH Driver Module Assembly for Third-party Graphics	.35 (.12)
3-EVPWR	Power Supply for EDWARDS Graphics	.5 (.22)
3-EVPWRA	Power Supply Assembly c/w 19 inch rail mounting chassis assembly space for one 3-ANNCPU3 for Third-party Graphics	2.5 (1.2)
3-EVDVRX	Plastic mounting extrusion 19" mounting - for up to 3 3-EVDVRAs	.35 (.12)
Enclosures		
RLCM/B	Remote Command module flush mount LCD wallbox	2.5 (1.2)
RLCM/B-S	Remote Command module surface mount LCD wallbox	2.5 (1.2)
3-RLCM/D	Inner and outer doors for RLCM/B(-S)	2.0 (0.9)
4ANN/B	Four Position LED/LCD flush mount wallbox.	6.0 (2.7)
4ANN/B-S	Four position LED/LCD surface mount wallbox.	6.0 (2.7)
6ANN/B	Six position LED/LCD flush mount wallbox	7.0 (3.2)
6ANN/B-S	Six position LED/LCD surface mount wallbox	7.0 (3.2)
10ANN/B	Ten position LED/LCD flush mount wallbox	9.0 (4.1)
10ANN/B-S	Ten position LED/LCD surface mount wallbox	9.0 (4.1)
3-4ANN/D	Inner and outer doors for four position wallboxes	2.0 (0.9)
3-6ANN/D	Inner and outer doors for six position wallboxes	2.0 (0.9)
3-10ANN/D	Inner and outer doors for ten position wallboxes	2.5 (1.2)

Note 1: Add suffix "-E" for EN54 compliant versions

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EXHIBIT 'C'

EDWARDS
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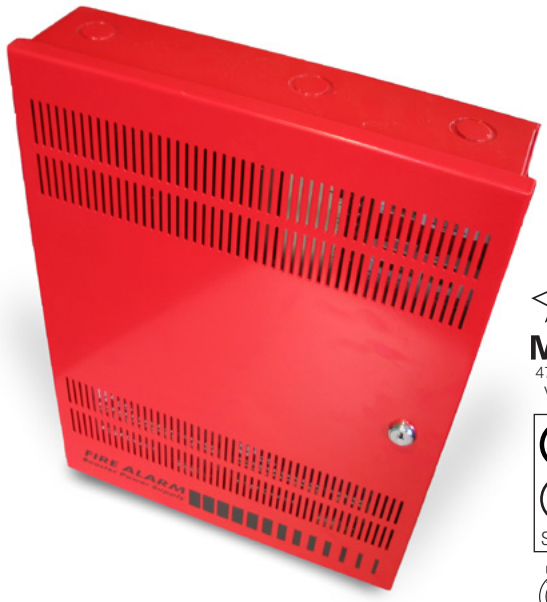
LIFE SAFETY & INCIDENT MANAGEMENT

Remote Booster Power Supplies

BPS6A, BPS10A



FM APPROVED
MEA 476-91-E Vol.13
UL UL S3424
7300-1657: 0229

Overview

The Booster Power Supply (BPS) is a UL 864, 9th Edition listed power supply. It is a 24 Vdc filtered-regulated, and supervised unit that can easily be configured to provide additional notification appliance circuits (NACs) or auxiliary power for Mass Notification/ Emergency Communication (MNEC), as well as life safety, security, and access control applications.

The BPS contains the circuitry to monitor and charge internal or external batteries. Its steel enclosure has room for up to two 10 ampere-hour batteries. For access control-only applications, the BPS can support batteries totaling up to 65 ampere-hours in an external enclosure. The BPS has four Class B (convertible to two Class A) NACs. These can be activated in one or two groups from the BPS's unique dual input circuits.

The BPS is available in 6.5 or 10 ampere models. Each output circuit has a capacity of three amperes; total current draw cannot exceed the unit's rating.

The BPS meets current UL requirements and is listed under the following standards:

Standard (CCN)	Description
UL864 9th ed.ition (UOXX)	Fire Alarm Systems
UL636 (ANET, UEHX7)	Holdup Alarm Units and Systems
UL609 (AOTX, AOTX7)	Local Burglar Alarm Units and Systems
UL294 (ALVY, UEHX7)	Access Control Systems
UL365 (APAW, APAW7)	Police Station Connected Burglar Alarm Units and Systems
UL1076 (APOU, APOU7)	Proprietary Burglar Alarm System Units
UL1610 (AMCX)	Central Station Alarm Unit
ULC-S527 (UOXXC)	Control Units, Fire Alarm (Canada)
ULC-S303 (AOTX7)	Local Burglar Alarm Units and Systems (Canada)
C22.2 No. 205	Signaling Equipment (Canada)

Standard Features

- Allows for reliable filtered and regulated power to be installed where needed
- Cost effective system expansion
- Provides for Genesis and Enhanced Integrity notification appliance synchronization
- Supports coded output operation
- Self-restoring overcurrent protection
- Multiple signal rates
- Can be cascaded or controlled independently
- Easy field configuration
- On-board diagnostic LEDs identify wiring or internal faults
- Standard EDWARDS keyed lockable steel cabinet with removable door
- 110 and 230 Vac models available
- Accommodates 18 to 12 AWG wire sizes
- Optional tamper switch
- Dual battery charging rates
- Optional earthquake hardening: OSHPD seismic pre-approval for component Importance Factor 1.5

EXHIBIT 'C'

Application

The BPS provides additional power and circuits for notification appliances and other 24 Vdc loads. It is listed for indoor dry locations and can easily be installed where needed.

Fault conditions are indicated on the on-board diagnostic LEDs, opening the BPS input sense circuit and the trouble relay (if programmed). While this provides indication to the host system, the BPS can still be activated upon command. A separate AC Fail contact is available on the BPS circuit board, which can be programmed for trouble or AC Fail. There are seven on-board diagnostic LEDs: one for each NAC fault, one for battery fault, one for ground fault, and one for AC power.

The unique dual-input activation circuits of the BPS can be activated by any voltage from 6 to 45 VDC (filtered-regulated) or 11 to 33 Vdc (full-wave rectified, unfiltered). The first input circuit can be configured to activate 1-4 of the four possible outputs. The second input circuit can be configured to control circuits 3 and 4. When outputs are configured for auxiliary operation, these circuits can be configured to stay on or automatically deactivate 30 seconds after AC power is lost. This feature makes these circuits ideal for door holder applications. The BPS also has a separate 200 mA 24 Vdc output that can be used to power internal activation modules.

BPS NACs can be configured for a 3-3-3 temporal or continuous output. California temporal rate outputs are also available on certain models. This makes the BPS ideal for applications requiring signaling rates that are not available from the main system.

In addition to the internally generated signal rates, the BPS can also be configured to follow the coded signal rate of the main system NACs. This allows for the seamless expansion of existing NACs.

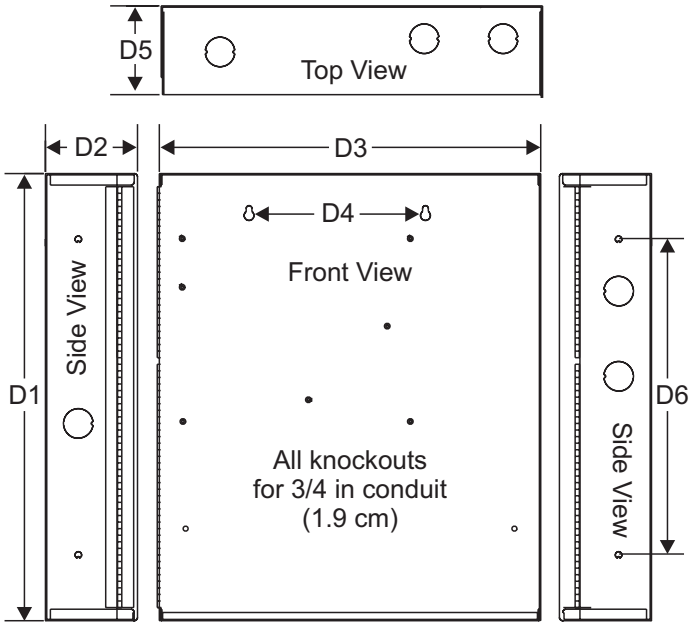
The BPS enclosure has mounting brackets for up to three Signature modules to the right of the circuit board.

Engineering Specification

Supply, where needed, EDWARDS BPS Series Booster Power Supplies (BPS) that are interconnected to and supervised by the main system. The BPS shall function as a stand-alone auxiliary power supply with its own fully-supervised battery compliment. The BPS battery compliment shall be sized to match the requirements of the main system. The BPS shall be capable of supervising and charging batteries having the capacity of 24 ampere-hours for Mass Notification/Emergency Communication (MNEC), life safety and security applications, and the capacity of 65 ampere-hours for access control applications.

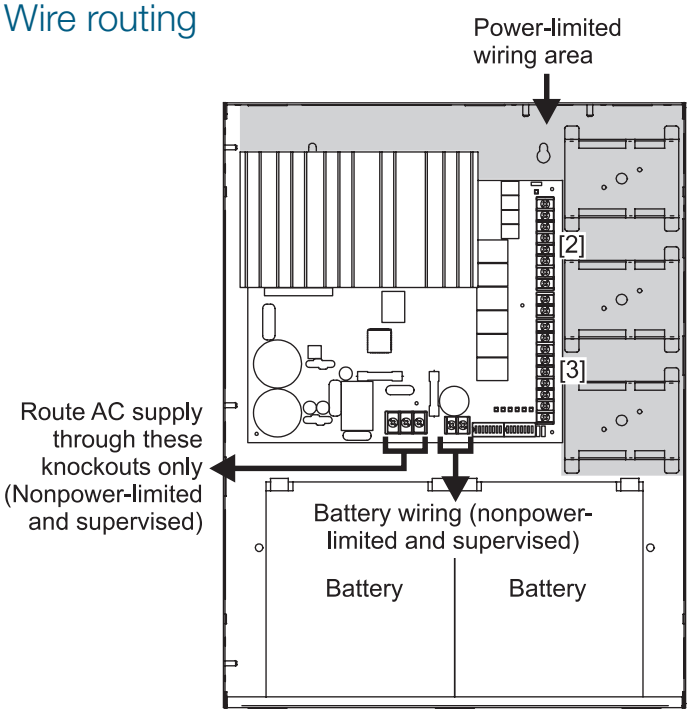
<<The BPS shall be capable of installation for a seismic component Importance Factor of 1.5.>> The BPS shall provide a minimum of four independent, fully supervised Class B circuits that can be field configurable for notification appliance circuits or auxiliary 24 Vdc power circuits. BPS NACs shall be convertible to a minimum of two Class A NACs. Each BPS output circuit shall be rated at 3 amperes at 24 Vdc. Each output circuit shall be provided with automatically restoring overcurrent protection. The BPS shall be operable from the main system NAC and/or EDWARDS Signature Series control modules. BPS NACs shall be configurable for continuous, 3-3-3 temporal or optionally, California rate. Fault conditions on the BPS shall not impede operation of main system NAC. The BPS shall be provided with ground fault detection circuitry and a separate AC fail relay.

Dimensions



D1	D2	D3	D4	D5	D6
17.0 in (43.2 cm)	3.5 in (8.9 cm)	13.0 in (33.0 cm)	6.5 in (16.5 cm)	3.375 in (8.6 cm)	12.0 in (30.4 cm)

Wire routing



Notes

1. Maintain 1/4-inch (6 mm) spacing between power-limited and nonpower-limited wiring or use type FPL, FPLR, or FPLP cable per NEC.

[2] Power-limited and supervised when not configured as auxiliary power. Non-supervised when configured as auxiliary power.

[3] Source must be power-limited. Source determines supervision.

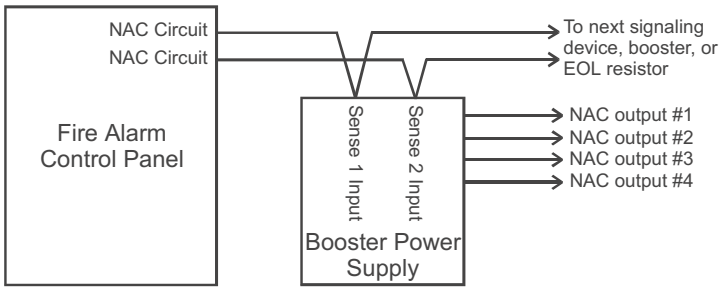
4. When using larger batteries, make sure to position the battery terminals towards the door.

EXHIBIT 'C'

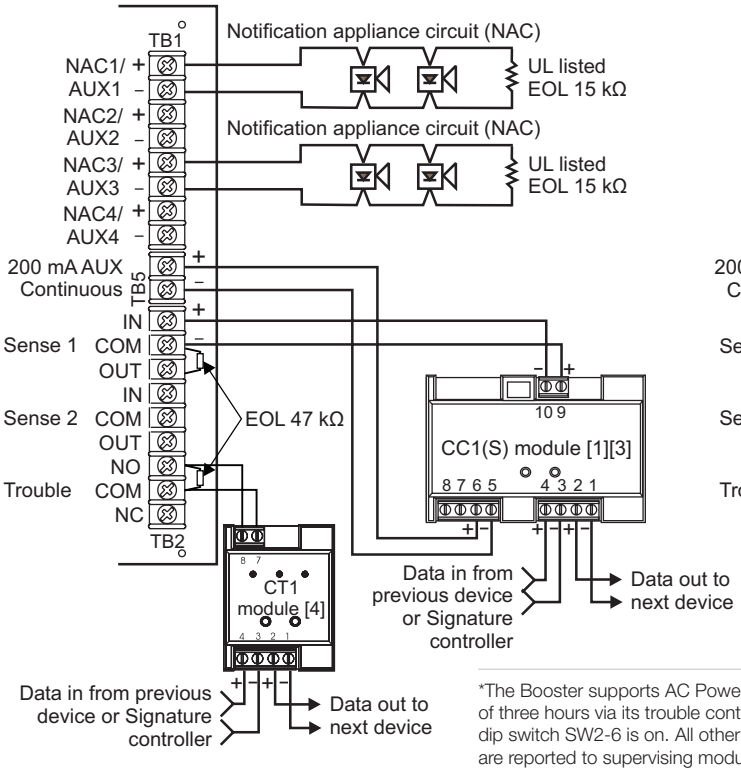
Typical Wiring

Single or cascaded booster anywhere on a notification appliance circuit

Existing NAC end-of-line resistors are not required to be installed at the booster's terminals. This allows multiple boosters to be driven from a single NAC circuit without the need for special configurations.

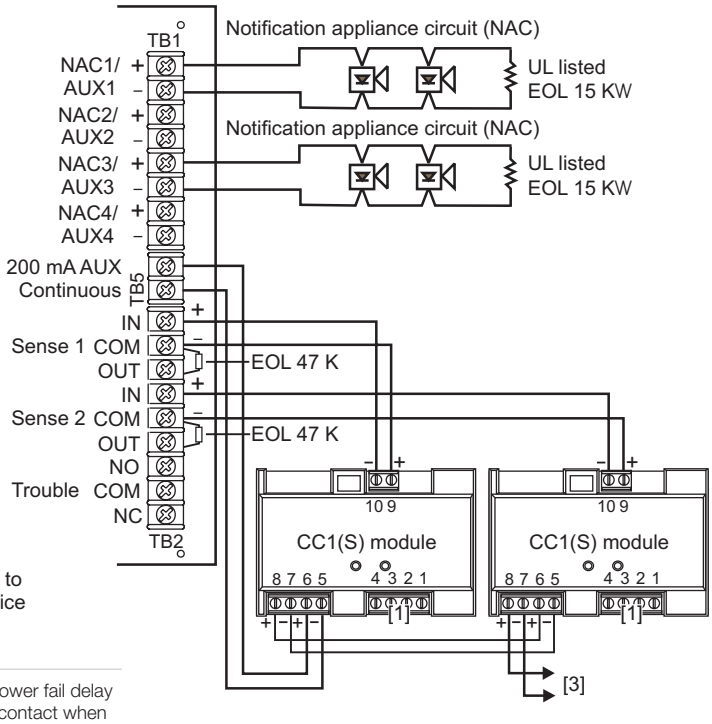


Configuring the Booster for AC Power Fail delay operation*

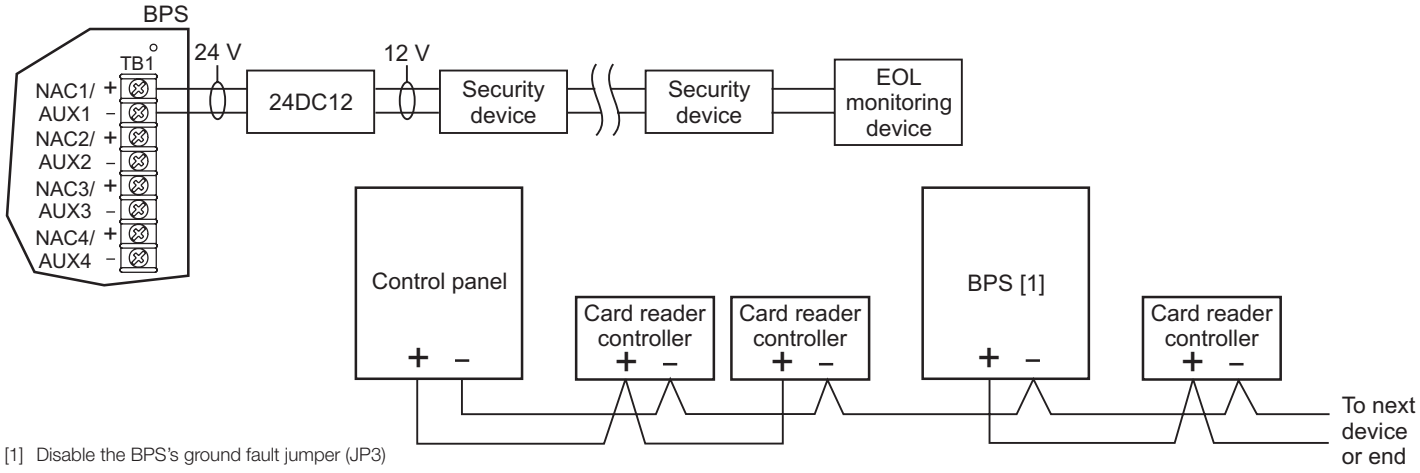


*The Booster supports AC Power fail delay of three hours via its trouble contact when dip switch SW2-6 is on. All other troubles are reported to supervising module or panel without delay via Sense inputs.

Multiple CC1(S) modules using the BPS's sense inputs



Security and access



[1] Disable the BPS's ground fault jumper (JP3)

EXHIBIT 'C'

LIFE SAFETY & INCIDENT MANAGEMENT

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Specifications

Model	6.5 amp Booster	10 amp Booster
AC Line Voltage	120VAC or 220-240VAC 50/60Hz 390 watts	120VAC or 220-240VAC 50/60Hz 580 watts
Notification Appliance Circuit Ratings	3.0A max. per circuit @ 24Vdc nominal 6.5A max total all NACs	3.0A max. per circuit @ 24Vdc nominal 10A max total all NACs
Trouble Relay	2 Amps @ 30Vdc	
Auxiliary Outputs	Four configurable outputs replace NACs 1, 2, 3 or 4. as auxiliary outputs and 200 mA dedicated auxiliary. (See note 2.)	
Input Current (from an existing NAC)	3mA @ 12Vdc, 6mA @ 24Vdc	
Booster Internal Supervisory Current	70mA + 35 mA for each circuit set to AUX	
Booster Internal Alarm Current	270mA	
Signature Mounting Space	Accomodates three two-gang modules.	
Maximum Battery Size	10 Amp Hours (2 of 12V10A) in cabinet up to 24 Amp hours with external battery cabinet for fire and security applications; up to 65 Amp hours for access control applications in external battery box.	
Terminal Wire Gauge	18-12 AWG	
Relative Humidity	0 to 93% non condensing @ 32°C	
Temperature Rating	32° to 120°F (0° to 49°C)	
NAC Wiring Styles	Class A or Class B	
Output Signal Rates	Continuous, California rate, 3-3-3 temporal, or follow installed panel's NAC. (See note 1.)	
Ground Fault Detection	Enable or Disable via jumper	
Agency Listings	UL, ULC, CSFM	

1. Model BPS*CAA provides selection for California rate, in place of temporal.
2. Maximum of 8 Amps can be used for auxiliary output.

Ordering Information

Catalog Number	Description	Shipping Wt. lb (kg)
BPS6A	6.5 Amp Booster Power Supply	13 (5.9)
BPS6AC	6.5 Amp Booster Power Supply (ULC)	13 (5.9)
BPS6A/230	6.5 Amp Booster Power Supply (220V)	13 (5.9)
BPS6CAA	6.5 Amp Booster Power Supply with California rate	13 (5.9)
BPS10A	10 Amp Booster Power Supply	13 (5.9)
BPS10AC	10 Amp Booster Power Supply (ULC)	13 (5.9)
BPS10A/230	10 Amp Booster Power Supply (220V)	13 (5.9)
BPS10CAA	10 Amp Booster Power Supply with California rate	13 (5.9)
Related Equipment		
12V6A5	7.2 Amp Hour Battery, two required	3.4 (1.6)
12V10A	10 Amp Hour Battery, two required	9.5 (4.3)
3-TAMP	Tamper switch	
BC-1EQ	Seismic Kit for BC-1. Order BC-1 separately. See note 3.	
BPSEQ	Seismic kit for BPS6A or BPS10 Booster Power Supplies. See note 3	
BC-1	Battery Cabinet (up to 2 - 40 Amp Hour Batteries)	58 (26.4)
BC-2	Battery Cabinet (up to 2 - 17 Amp Hour Batteries)	19 (8.6)
12V17A	18 Amp Hour Battery, two required (see note 1)	13 (5.9)
12V24A	24 Amp Hour Battery, two required (see note 1)	20 (9.07)
12V40A	40 Amp Hour Battery, two required (see notes 1, 2)	32 (14.5)
12V50A	50 Amp Hour Battery, two required (see notes 1, 2)	40 (18.14)
12V65A	65 Amp Hour Battery, two required (see notes 1, 2)	49 (22.2)

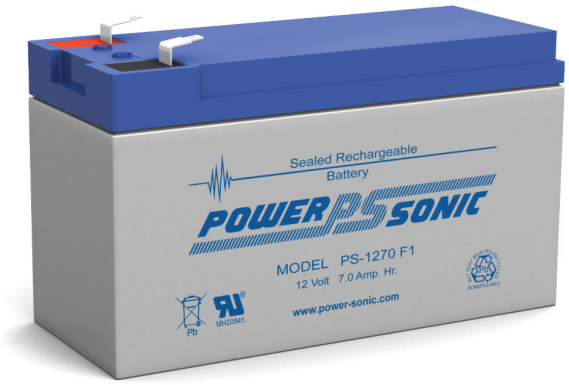
1. Requires installation of separate battery cabinet.
2. BPS supports batteries greater than 24 Amp hours for access control applications only.
3. For earthquake anchorage, including detailed mounting weights and center of gravity detail, refer to Seismic Application Guide 3101676. Approval of panel anchorage to site structure may require local AHJ, structural or civil engineer review.

EXHIBIT 'C'

PS-1270 12 Volt 7.0 AH

Rechargeable Sealed Lead Acid Battery

We've Got The Power.™



Features

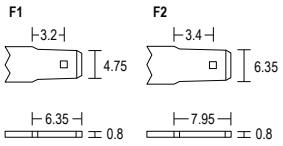
- Absorbent Glass Mat (AGM) technology for superior performance
- Valve regulated, spill proof construction allows safe operation in any position
- Power/volume ratio yielding unrivaled energy density
- Rugged impact resistant ABS case and cover (UL94-HB)
- Approved for transport by air. D.O.T., I.A.T.A., F.A.A. and C.A.B. certified
- U.L. recognized under file number MH 20845

Terminals (mm)

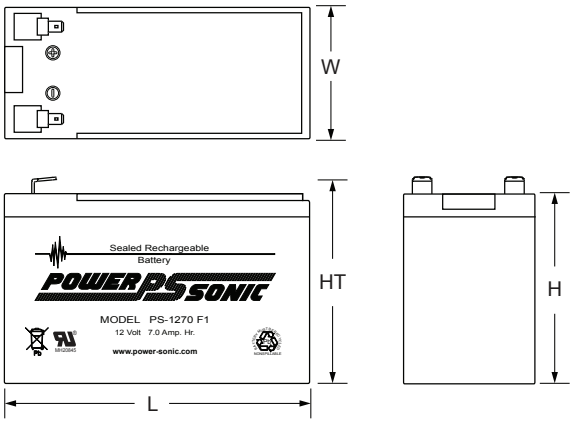
- F1 - Quick disconnect tabs, 0.187" x 0.032"- Mate with AMP. INC. FASTON "187" series

— OR —

- F2 - Quick disconnect tabs, 0.250" x 0.032" - Mate with AMP. INC FASTON "250" series



Physical Dimensions: in (mm)



L: 5.95 (151) **W:** 2.56 (65) **H:** 3.70 (94) **HT:** 3.86 (98)

Tolerances are +/- 0.04 in. (+/- 1mm) and +/- 0.08 in. (+/- 2mm) for height dimensions. All data subject to change without notice.

Performance Specifications

Nominal Voltage ..... 12 volts (6 cells)

Nominal Capacity

20-hr. (350mA to 10.50 volts) ..... 7.00 AH
10-hr. (650mA to 10.50 volts) ..... 6.50 AH
5-hr. (1.2A to 10.20 volts) ..... 6.00 AH
1-hr. (4.5A to 9.00 volts) ..... 4.50 AH
15-min. (14A to 9.00 volts) ..... 3.50 AH

Approximate Weight ..... 4.80 lbs. (2.18 kg)

Energy Density (20-hr. rate) ..... 1.49 W-h/in3 (90.95 W-h/l)

Specific Energy (20-hr. rate) ..... 17.50 W-h/lb (38.58 W-h/kg)

Internal Resistance (approx.) ..... 23 milliohms

Max Discharge Current (7 Min.) ..... 21.0 amperes

Max Short-Duration Discharge Current (10 Sec.)..... 70.0 amperes

Shelf Life (% of nominal capacity at 68°F (20°C))

1 Month 97%
3 Months..... 91%
6 Months 83%

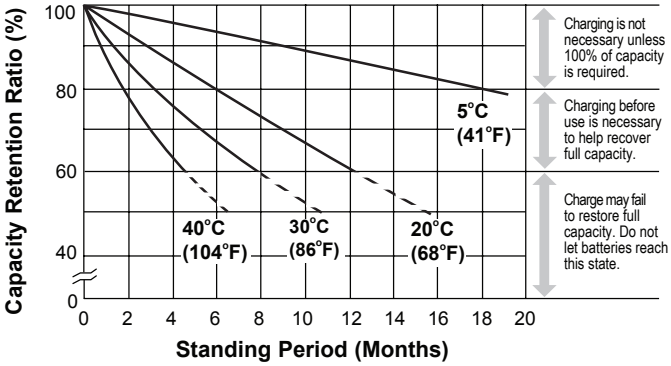
Operating Temperature Range

Charge.. ..... -4°F (-20°C) to 122°F (50°C)
Discharge..... -40°F (-40°C) to 140°F (60°C)

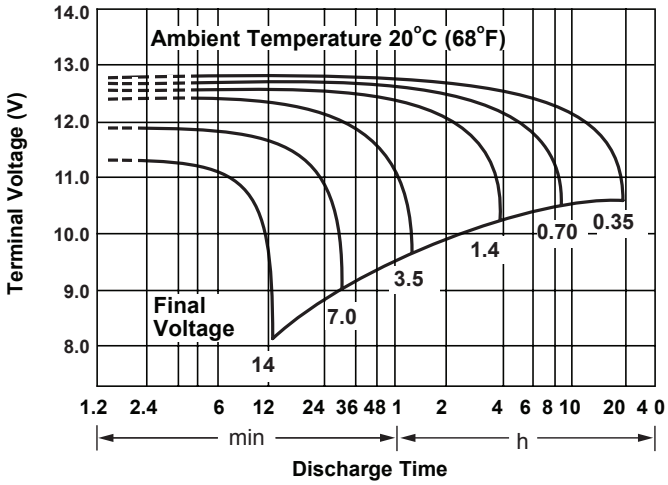
Case ..... ABS Plastic

Power-Sonic Chargers PSC-12800A, 12800A-C

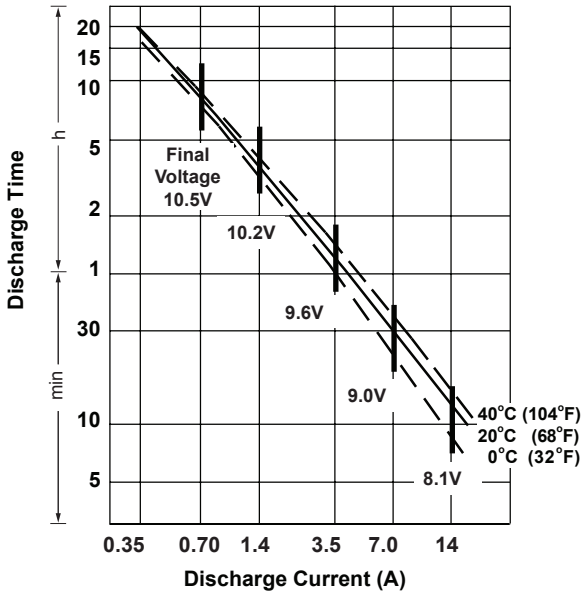
Shelf Life & Storage



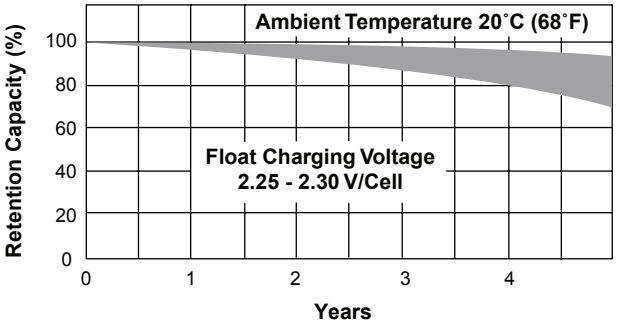
Discharge Characteristics



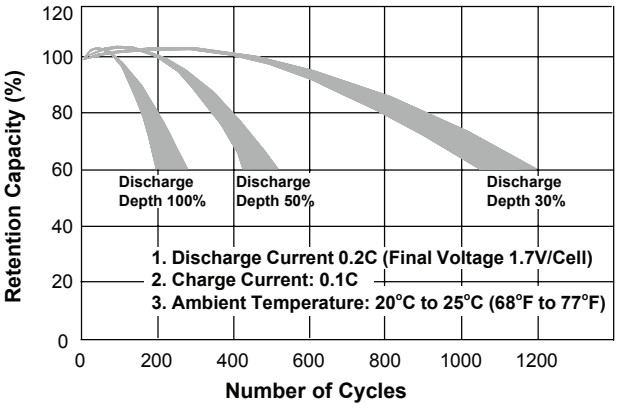
Discharge Time vs. Discharge Current



Life Characteristics in Stand-By Use



Life Characteristics in Cyclic Use



Charging

Cycle Applications: Limit initial current to 2.1A. Charge until battery voltage (under charge) reaches 14.4 to 14.7 volts at 68°F (20°C). Hold at 14.4 to 14.7 volts until current drops to under 70mA. Battery is fully charged under these conditions, and charger should be disconnected or switched to "float" voltage.

"Float" or "Stand-By" Service: Hold battery across constant voltage source of 13.5 to 13.8 volts continuously. When held at this voltage, the battery will seek its own current level and maintain itself in a fully charged condition.

Note: Due to the self-discharge characteristics of this type of battery, it is imperative that they be charged within 6 months of storage, otherwise permanent loss of capacity might occur as a result of sulfation.

Chargers

Power-Sonic offers a wide range of chargers suitable for batteries up to 100AH. Please refer to the Charger Selection Guide in our specification sheets for "C-Series Switch Mode Chargers" and "Transformer Type A and F Series". Please contact our Technical department for advice if you have difficulty in locating suitable models.

Further Information

Please refer to our website www.power-sonic.com for a complete range of useful downloads, such as product catalogs, material safety data sheets (MSDS), ISO certification, etc..

Contact Information

www.power-sonic.com

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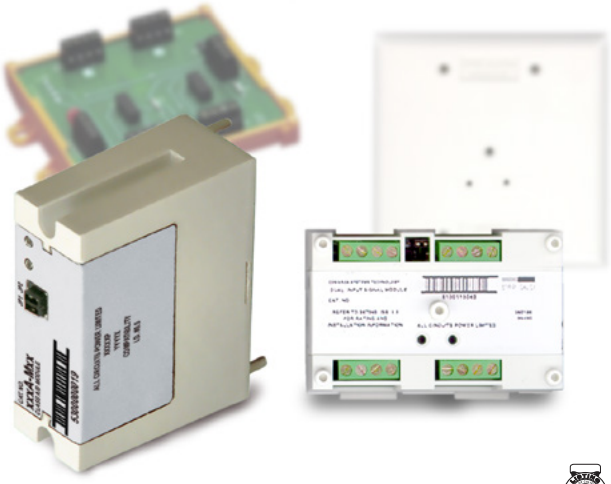
EXHIBIT 'C'

EDWARDS
United Technologies
LIFE SAFETY & INCIDENT MANAGEMENT

Synchronization Output Module

SIGA-CC1S, MCC1S



Patented

FM APPROVED MEA 7300-1657: 0121 S3424

Overview

SIGA-CC1S and MCC1S Synchronization Output Modules are intelligent analog addressable devices that form part of EDWARDS's Signature line of products. The actual operation of the SIGA-CC1S and MCC1S is determined by the "personality code" selected by the installer, which is downloaded to the module from the Signature loop controller during system configuration.

Depending on their assigned personality, Synchronization Output Modules may be used as a signal power riser selector to provide synchronization of fire alarm signals across multiple zones, or for connecting, upon command from the loop controller, supervised Class B signal or telephone circuits to their respective power inputs. The power inputs may be polarized 24 Vdc to operate audible and visible signal appliances or 25 and 70 VRMS to operate audio evacuation speakers and firefighter's telephones.

Standard Features

- **Provides UL 1971-compliant auto-sync output for visual signals**
  Use for connecting a supervised output circuit to a supervised 24 Vdc riser input and synchronizing multiple notification appliance circuits.
- **Functions as an audible signal riser selector**
  Use as a synch module or for connecting supervised 24 Vdc Audible/Visible signal circuits, or 25 and 70 VRMS Audio Evacuation and Telephone circuits to their power inputs.
- **Built-in ring-tone generator**
  When configured for telephone circuits, the SIGA-CC1S generates its own ring-tone signal, eliminating the need for a separate ring-tone circuit.
- **Automatic device mapping**
  Signature modules transmit information to the loop controller regarding their circuit locations with respect to other Signature devices on the wire loop.
- **Electronic addressing**
  Programmable addresses are downloaded from the loop controller, a PC, or the SIGA-PRO Signature Program/Service Tool; there are no switches or dials to set.
- **Intelligent device with microprocessor**
  All decisions are made at the module to allow lower communication speed with substantially improved control panel response time and less sensitivity to line noise and loop wiring properties; twisted or shielded wire is not required.

EXHIBIT 'C'

Application

The SIGA-CC1S mounts to a standard North American two-gang electrical box, making it ideal for locations where only one module is required. Separate I/O and data loop connections are made to each module.

The SIGA-MCC1S is part of the UIO family of plug-in Signature Series modules. It functions identically to the SIGA-CC1S, but takes advantage of the modular flexibility and easy installation that characterize all UIO modules. Two- and six-module UIO motherboards are available. These can accommodate individual risers for each on-board module, or risers that are shared by any combination of its UIO modules. All wiring connections are made to terminal blocks on the motherboard. UIO assemblies may be mounted in EDWARDS enclosures.

Personality Codes

The operation of the SIGA-CC1S is determined by their sub-type code or "Personality Code". The code is selected by the installer depending upon the desired application and is downloaded from the loop controller.

Personality Code 5: Signal Power or Audio Evacuation (single riser). Configures the module for use as a Class B Audible/Visible Signal power (24 Vdc polarized) or Audio Evacuation (25 or 70 VRMS) power selector. The ring-tone generator is disabled. The output circuit is monitored for open or shorted wiring. If a short exists, the control panel inhibits the activation of the audible/visible signal circuit to prevent connection to the power circuit.

Personality Code 6: Telephone with ring-tone (single riser). Configures the module for use as a Telephone power selector. When a telephone handset is plugged into its jack or lifted from its hook, the module generates its own Ring-Tone signal. A separate ring-tone circuit is not needed. The module sends this signal to the control panel to indicate that an off-hook condition is present. When the system operator responds to the call, the ring-tone signal is disabled.

Personality Code 25: Visual Signal Synchronization. This personality code configures the module to provide synchronization of fire alarm signals across multiple zones. It functions as a signal power (24 Vdc) riser selector. The output wiring is monitored for open circuits and short circuits. A short circuit will cause the fire alarm control panel to inhibit the activation of the audible/visual signal circuit so the riser is not connected to the wiring fault.

Warnings & Cautions

This module will not operate without electrical power. As fires frequently cause power interruption, we suggest you discuss further safeguards with your fire protection specialist.

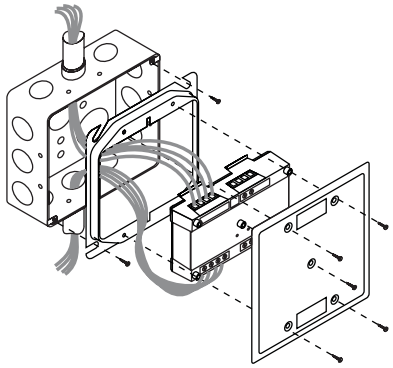
EDWARDS recommends that these modules be installed according to latest recognized edition of national and local fire alarm codes.

Compatibility

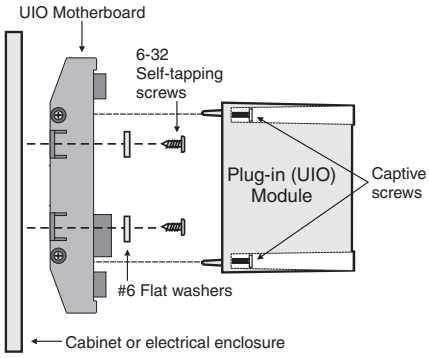
These modules are part of EDWARDS's Signature Series intelligent processing and control platform. They are compatible with EST3, EST3X and iO Series control panels.

Installation

The SIGA-CC1S: mounts to North American 2-1/2 inch (64 mm) deep 2-gang boxes and 1-1/2 inch (38 mm) deep 4 inch square boxes with 2-gang covers and SIGA-MP mounting plates. The terminals are suited for #12 to #18 AWG (2.5 mm^2 to 0.75 mm^2) wire size.



SIGA-MCC1S: mount the UIOxR motherboard inside a suitable EDWARDS enclosure with screws and washers provided. Plug the module into any available position on the motherboard and secure the module to the motherboard with the captive screws. Wiring connections are made to the terminals on the motherboard (see wiring diagram). UIOxR motherboard terminals are suited for #12 to #18 AWG (2.5 mm^2 to 0.75 mm^2) wire size.



Electronic Addressing

The loop controller electronically addresses each module saving valuable time during system commissioning. Setting complicated switches or dials is not required. Each module has its own unique serial number stored in its "on-board memory". The loop controller identifies each device on the loop and assigns a "soft" address to each serial number. If desired, the modules can be addressed using the SIGA-PRO Signature Program/Service Tool.

Testing & Maintenance

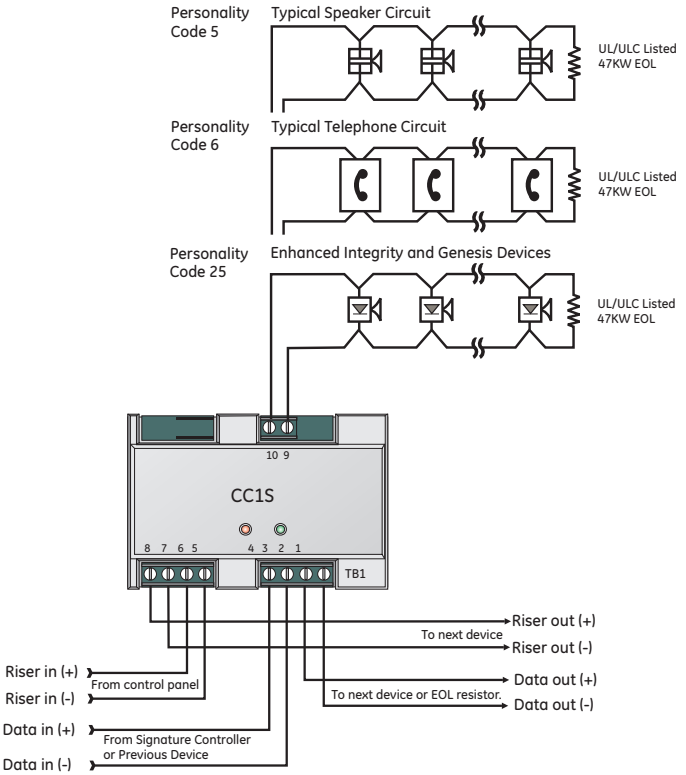
The module's automatic self-diagnosis identifies when it is defective and causes a trouble message. The user-friendly maintenance program shows the current state of each module and other pertinent messages. Single modules may be turned off (de-activated) temporarily, from the control panel.

Scheduled maintenance (Regular or Selected) for proper system operation should be planned to meet the requirements of the Authority Having Jurisdiction (AHJ). Refer to current NFPA 72 and ULC CAN/ULC 536 standards.

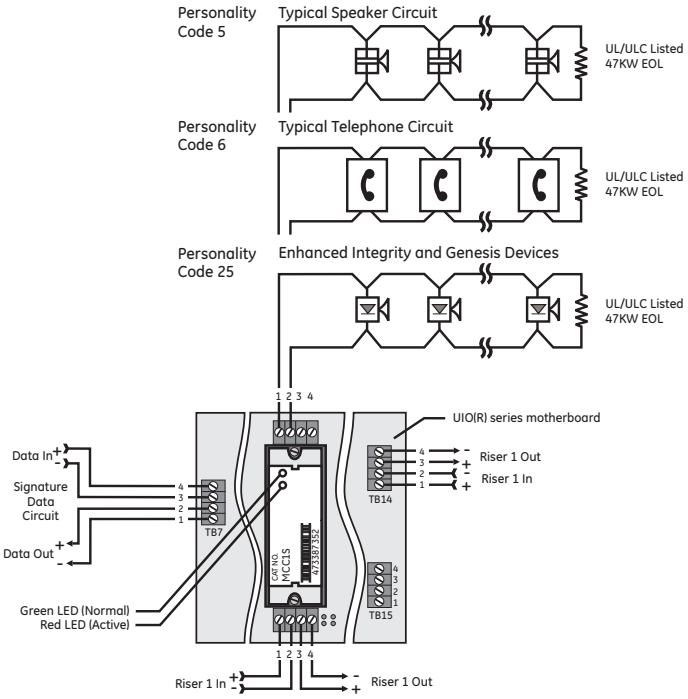
EXHIBIT 'C'

Typical Wiring

SIGA-CC1S (Standard Mount)



SIGA-MCC1S (UIO Mount)



Multiple CC1(S) modules using the BPS's sense inputs

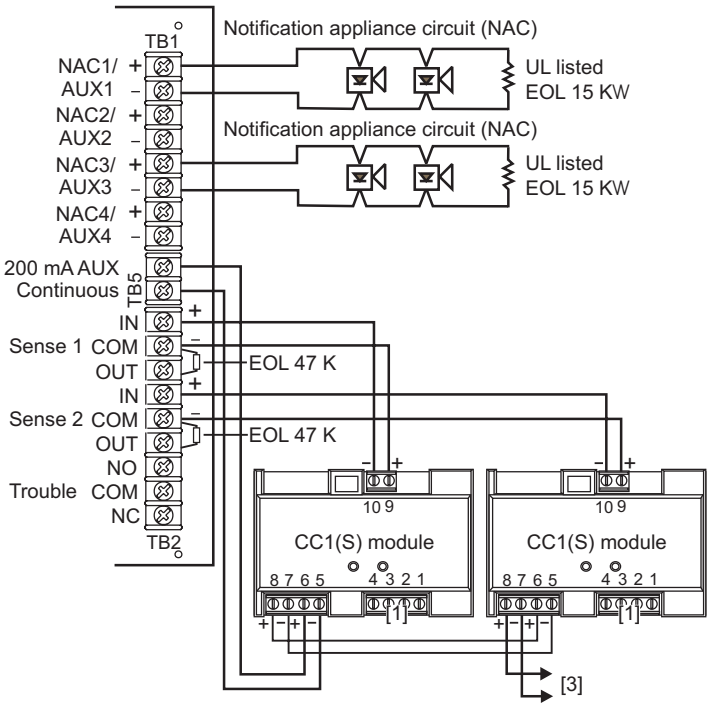


EXHIBIT 'C'

LIFE SAFETY & INCIDENT MANAGEMENT

Contact us...

Email: edwards.fire@fs.utc.com
Web: *Edwards-fire.com*

EDWARDS is a UTC brand.
1016 Corporate Park Drive
Mebane, NC 27302

Specifications

Catalog Number	SIGA-CC1S	SIGA-MCC1S
Mounting	North American 2½ inch (64 mm) deep two-gang boxes and 1½ inch (38 mm) deep 4 inch square boxes with 2-gang covers and SIGA-MP mounting plates	Plugs into UIO2R, UIO6R or UIO6 Motherboards
Description	Synchronization Output Module	
Type Code	50 (factory set)	
Address Requirements	Uses one module address	
Wiring Terminations	Suitable for #12 to #18 AWG (2.5 mm^2 to 0.75mm^2)	
Operating Current	Standby = 223µA Activated = 100µA	
Operating Voltage	15.2 to 19.95 Vdc (19 Vdc nominal)	
Output Rating	24 Vdc = 2 amps 25 V Audio = 50 watts 70 V Audio = 35 watts	
Construction	High Impact Engineering Polymer	
Storage and Operating Environment	Operating: 32°F to 120°F (0°C to 49°C) Storage: -4°F to 140°F (-20°C to 60°C) Humidity: 0 to 93% RH	
LED Operation	Green LED - Flashes when polled Red LED - Flashes when in alarm/ active	
Compatibility	Use with: Signature Loop Controller under EST3 version 2.0 or higher	
Agency Listings	UL, ULC, CSFM, MEA	

Ordering Information

Catalog Number	Description	Shipping Wt. lbs (kg)
SIGA-CC1S	Synchronization Output Module (Standard Mount) - UL/ULC Listed	0.5 (0.23)
SIGA-MCC1S	Synchronization Output Module (UIO Mount) - UL/ULC Listed	0.18 (0.08)

Related Equipment		
27193-21	Surface Mount Box - Red, 2-gang	2 (1.2)
27193-26	Surface Mount Box - White, 2-gang	2 (1.2)
SIGA-UIO2R	Universal Input-Output Module Board w/Riser Inputs - Two Module Positions	0.32 (0.15)
SIGA-UIO6R	Universal Input-Output Module Board w/Riser Inputs - Six Module Positions	0.62 (0.28)
SIGA-UIO6	Universal Input-Output Module Board - Six Module Positions	0.56 (0.25)
235196P	Bi-polar Transient Protector	0.01 (0.05)
MFC-A	Multifunction Fire Cabinet - Red, supports Signature Module Mounting Plates	7.0 (3.1)
SIGA-MP1	Signature Module Mounting Plate, 1 footprint	1.5 (0.70)
SIGA-MP2	Signature Module Mounting Plate, 1/2 footprint	0.5 (0.23)
SIGA-MP2L	Signature Module Mounting Plate, 1/2 extended footprint	1.02 (0.46)

EXHIBIT 'C'

EDWARDS
United Technologies
LIFE SAFETY & INCIDENT MANAGEMENT

Intelligent Multisensor Smoke and Heat Detector

SIGA-PHD

S853

Overview

The Signature Series SIGA-PHD detector brings advanced multi-sensor technology to a practical design that increases efficiency, saves installation time, cuts costs, and extends life safety and property protection capabilities. Continuous self-diagnostics ensures reliability over the long-haul, while environmental compensation helps reduce maintenance costs.

The SIGA-PHD provides an optical smoke sensor and a rate-of-rise heat sensor with a fixed temperature setting. Together these sensors efficiently detect smoldering fires, as well as fast flaming fires.

Like all Signature Series detectors, the SIGA-PHD gathers analog information from its sensing elements and converts this data into digital signals. To make an alarm decision, the detector's on-board microprocessor measures and analyzes smoke and heat sensor readings and compares this information to historical data. Digital filters remove signal patterns that are not typical of fires, thus virtually eliminating unwanted alarms.

Standard Features

Note: *Some features described here may not be supported by all control systems. Check your control panel's Installation and Operation Guide for details.*

- Next Generation Detection Technology
- Integrates optical smoke with rate-of-rise heat sensing
- Wide 0.53 to 3.94 %/ft. (1.7 to 12.35 %/m) smoke obscuration
- Uses existing wiring
- Automatic device mapping
- Sensor Markings Provide Easy Testing Identification
- Up To 250 Total Signature Adresses Per Loop
- Two levels of environmental compensation
- Two levels of dirty detector warning
- Twenty pre-alarm settings
- Five sensitivity settings
- Non-volatile memory
- Electronic addressing
- Environmental compensation
- Automatic day/night sensitivity adjustment
- Bicolor (green/red) status LED
- Standard, relay, fault isolator, and audible mounting bases

EXHIBIT 'C'

Application

Smoke detection

The SIGA-PHD detects extremely small particles of combustion and triggers an alarm at the first sign of smoke. Thanks to its high-performance forward-scattering reflective response technology, the photoelectric smoke sensor responds quickly and reliably to a wide range of fire types, especially slow burning fires fuelled by combustibles typically found in modern multi-use buildings.

Heat detection

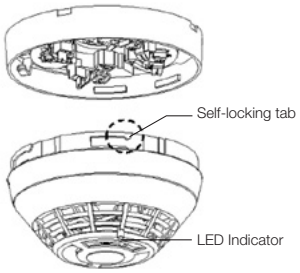
SIGA-PHD's on-board rate-of-rise heat sensor provides a 15 °F (9 °C) per minute for the detection of fast-developing fires while also providing a 135 °F (57.2 °C) fixed detection threshold. The heat sensors monitor the temperature of the air and determines whether an alarm should be initiated.

Compatibility

The SIGA-PHD detector is compatible only with the Signature Loop Controller.

Installation

Signature Series detectors mount to North American 1-gang boxes, 3-1/2 inch or 4 inch octagon boxes, and to 4 inch square electrical boxes 1-1/2 inches (38 mm) deep. They mount to European BESA and 1-gang boxes with 60.3 mm fixing centers. See mounting base installation and wiring for more information.



Testing & Maintenance

Scheduled maintenance (regular or selected) for proper detector operation should be planned to meet the requirements of the Authority Having Jurisdiction (AHJ). Refer to current NFPA 72, NFPA 720, and ULC CAN/ULC 536 standards.

Smoke Sensor Sensitivity

The SIGA-PHD determines when its optical sensor is dirty or defective and can transmit sensitivity data to the loop controller. A sensitivity report can also be printed to satisfy NFPA sensitivity measurements which must be conducted at the end of the first year and every two years thereafter. The availability of maintenance features depends on the fire alarm system used.

Sensing and reporting technology

The microprocessor in each detector provides additional benefits - Self-diagnostics and History Log, Automatic Device Mapping, and Fast, Stable Communication.

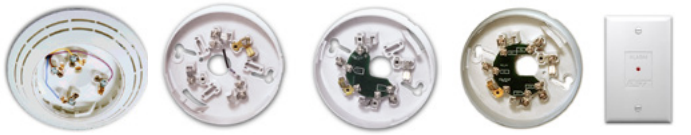
Self-diagnostics and History Log - Each Signature Series detector constantly runs self-checks to provide important maintenance information. The results of the self-check are automatically updated and permanently stored in the detector's non-volatile memory.

Automatic Device Mapping - The loop controller learns where each device's serial number address is installed relative to other devices on the circuit. The mapping feature provides supervision of each device's installed location to prevent a detector from being reinstalled (after cleaning etc.) in a different location from where it was originally.

Fast Stable Communication - On-board intelligence means less information needs to be sent between the detector and the loop controller. Other than regular supervisory polling response, the detector only needs to communicate with the loop controller when it has something new to report.

Accessories

Detector mounting bases have wiring terminals that are accessible from the "room-side" after mounting the base to the electrical box. The bases mount to North American 1-gang boxes and to 3½ inch or 4 inch octagon boxes, 1½ inches (38 mm) deep. They also mount to European BESA and 1-gang boxes with 60.3 mm fixing centers. The SIGA-SB4, SIGA-RB4, and SIGA-IB4 mount to North American 4 inch sq. electrical boxes in addition to the above boxes. They include the SIGA-TS4 Trim Skirt, which is used to cover the "mounting ears" on the base. Sounder bases mount to a 4 inch square boxes only.



SIGA-AB4G/T/LF Audible Base | **SIGA-SB** Standard Base | **SIGA-IB** Isolator Base | **SIGA-RB** Relay Base | **SIGA-LED** Remote LED

Remote LED SIGA-LED - The remote LED connects to the SIGA-SB or SIGA-SB4 Standard Base only. It features a North American size 1-gang plastic faceplate with a white finish and red alarm LED.

SIGA-TS4 Trim Skirt - Supplied with 4 inch bases, it can also be ordered separately to use with the other bases to help hide surface imperfections not covered by the smaller bases.

Sounder Bases - Signature Series sounder bases are designed for use where localized or group alarm signaling is required.

- **SIGA-AB4G** bases provide sounder capability to Signature Series smoke and heat detectors. They are not for use with devices that include a CO sensor.
- **SIGA-AB4GT** bases provide sounder capability to Signature Series smoke and heat detectors, as well as Signature detectors that include a CO Sensor when used with a SIGA-TCDR Temporal Pattern Generator to separate CO (TC4) and Fire (TC3) tone patterns.
- **SIGA-AB4G-LF** bases provide 520 Hz low frequency sounder capability to Signature Series smoke and heat detectors, as well as Signature detectors that include a CO Sensor when used with a SIGA-TCDR Temporal Pattern Generator to separate CO (TC4) and Fire (TC3) tone patterns. The SIGA-AB4G-LF is suitable for applications requiring low frequency audible tones.

EXHIBIT 'C'

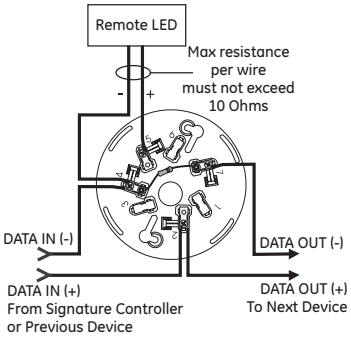
Typical Wiring

The detector mounting bases accept #18 AWG (0.75mm^2), #16 (1.0mm^2), #14 AWG (1.5mm^2), and #12 AWG (2.5mm^2) wire sizes. Sizes #16 AWG (1.0mm^2) and #18 AWG (0.75mm^2) are preferred for ease of installation.

Standard Detector Base, SIGA-SB, SIGA-SB4

This is the basic mounting base for EDWARDS Signature Series detectors. The SIGA-LED Remote LED is supported by this Base.

Term	Description
1	Not Used
2	DATA IN/OUT (+)
3	Not Used
4	DATA IN (-)
4	Remote LED (-)
5	Remote LED (+)
6	Not Used
7	DATA OUT (-)



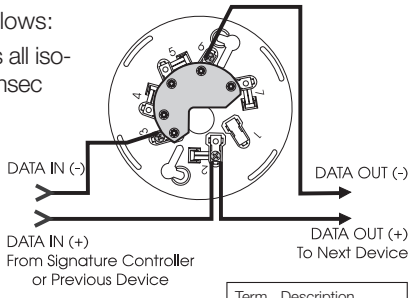
Isolator Detector Base, SIGA-IB, SIGA-IB4

This base includes a built-in line fault isolator for use on Class A circuits. A detector must be installed for it to operate. The isolator base does not support the SIGA-LED Remote LED.

The isolator operates as follows:

- a short on the line causes all isolators to open within 23 msec
- at 10 msec intervals, beginning on one side of the Class A circuit nearest the loop controller, the isolators close to provide the next isolator down the line with power
- when the isolator next to the short closes, it reopens within 10 msec.

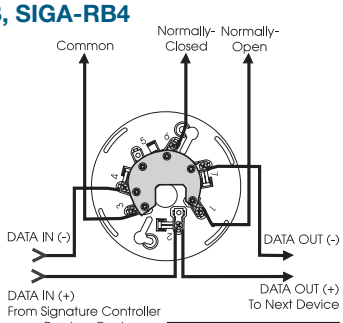
The process repeats beginning on the other side of the loop controller.



Term	Description
1	Not Used
2	DATA IN/OUT (+)
3	DATA IN (-)
4	Not Used
5	Not Used
6	DATA OUT (-)
7	Not Used

Relay Detector Base, SIGA-RB, SIGA-RB4

This base includes a relay. Normally Open or Normally Closed operation is selected during installation. The dry contact is rated for 1 amp (pilot duty) @ 30 Vdc. The relay's position is supervised to avoid accidentally jarring it out of position. The SIGA-RB can be operated as a control relay if programmed to do so at the control panel. The relay base does not support the SIGA-LED Remote LED.

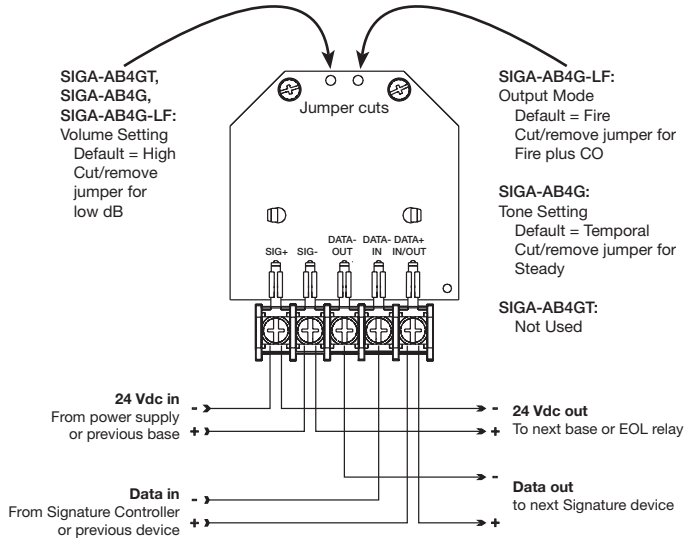


CONTACT RATING
1.0 Amp @ 30 VDC
(Pilot Duty)

Term	Description
1	Normally Open
2	DATA IN/OUT (+)
3	Common
4	DATA IN (-)
5	Not Used
6	Normally-Closed
7	DATA OUT (-)

Audible Sounder Bases, Fire Mode

AB4GT, AB4G, AB4G-LF sounder bases



Warnings & Cautions

- This detector does not operate without electrical power. As fires frequently cause power interruption, discuss further safeguards with the local fire protection specialist.
- This detector does not sense fires in areas where smoke or heat cannot reach the detector. Smoke or heat from fires in walls, roofs, or on the opposite side of closed doors may not reach the detector.
- Photoelectric detectors have a wide range of sensing capabilities, and are best suited for detecting slow, smoldering fires. The heat sensor in this device provides a source of supplemental information. The heat sensor by itself does not provide life safety protection.
- In Canada, install according to the CAN/ULC-S524 *Standard for the Installation of Fire Alarm Systems*, the CSA C22.1 *Canadian Electrical Code*, and the local authority having jurisdiction.
- Upon completion of the original installation and following any modifications or additions to the system, perform a calibrated sensitivity test per NFPA code. Signature Series devices can perform this test and the panel can generate a system sensitivity report.

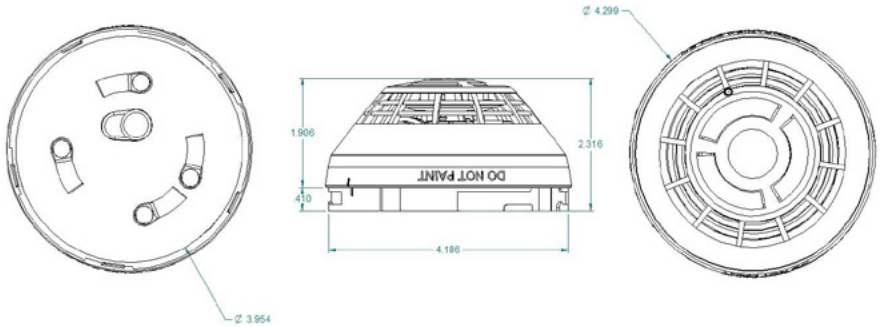
LIFE SAFETY & INCIDENT MANAGEMENT

Contact us...

Email: edwards.fire@fs.utc.com
Web: *Edwards-fire.com*

EDWARDS is a UTC brand.
1016 Corporate Park Drive
Mebane, NC 27302

Dimensions



Specifications

Operating voltage	15.20 to 19.95 VDC
Normal operating current	32 µA
Alarm current	32 µA
Vibration level	10 to 35 Hz, with an amplitude of 0.01 in.
Smoke Sensitivity Range	UL/ULC: 0.53 to 3.94 %/ft. (1.7 to 12.35 %/m) obscuration
Rate-of-rise rating	15°F/min (8°C/min)
Fixed temperature rating	135°F (57.2°C). Actual alarm point 129 to 141°F (53.9 to 60.6°C).
Air velocity	0 to 4,000 ft./min (0 to 20.32 m/s)
Wall mounting	12 in. (305 mm) max. from ceiling
Spacing, heat detectors	Max. 50 ft. (15.2 m) centers
Compatible bases	See Ordering Information
Compatible detector testers	Testifire 1000, Testifire 2000
Operating environment	32 to 100°F (0 to 38°C), 0 to 93% RH, noncondensing
Construction	High Impact Engineering Polymer, White
Storage temperature	-4 to 140°F (-20 to 60°C)
Environmental compensation	Automatic
Agency Listings	CAN/ULC-S529, CAN/ULC-S530, UL 268, UL 268A, UL 521

Ordering Information

Catalog Number	Description	Ship Wt. lbs (kg)
SIGA-PHD	Intelligent Multisensor Smoke and Heat Detector	0.4 (0.16)

Compatible Bases		
SIGA-SB	Detector Mounting Base - Standard	
SIGA-SB4	4-inch Detector Mounting Base c/w Trim Skirt	
SIGA-RB	Detector Mounting Base w/Relay	
SIGA-RB4	4-inch Detector Mounting Base w/Relay, c/w Trim Skirt	0.2 (.09)
SIGA-IB	Detector Mounting Base w/Fault Isolator	
SIGA-IB4	4-inch Detector Mounting Base w/ Fault Isolator, c/w Trim Skirt	
SIGA-LED	Remote Alarm LED (not for EN54 applications)	
SIGA-AB4G-LF	Low Frequency Audible (Sounder) Base for CO and Fire Detectors	0.3 (0.15)
SIGA-AB4GT	Audible (Sounder) Base for CO and Fire Detectors	0.3 (0.15)
SIGA-TS4	Trim Skirt (supplied with 4-inch bases)	0.1 (.04)
SIGA-DMP	Detector Mounting Plate	3.0 (1.4)
SIGA-RTA	Detector Removal Tool	
SIGA-VA	Detector Cleaning Tool	

EXHIBIT 'C'

EDWARDS
United Technologies
LIFE SAFETY & INCIDENT MANAGEMENT

Intelligent Heat Detectors

SIGA-HRD, SIGA-HFD

S853

Overview

The Signature Series smoke detectors bring advanced sensing technology to a practical design that increases efficiency, saves installation time, cuts costs, and extends property protection capabilities. Continuous self-diagnostics ensures reliability over the long-haul, while the latest thermister technology makes these detectors ideal wherever dependable heat detection is required.

The SIGA-HRD is an intelligent fixed temperature/rate-of-rise fire detector. It monitors the temperature of the surrounding air and analyzes the data from the sensor to determine whether to initiate an alarm. The rate-of-rise heat function quickly detects a fast, flaming fire. The fixed-temperature heat function detects fire when the air temperature near the detector exceeds the alarm point.

The SIGA-HFD is an intelligent fixed-temperature heat detector that contains a fixed-temperature heat sensor rated at 135 °F (57.2 °C). It does not have a rate-of-rise function. The heat sensor monitors the temperature of the air in its surroundings and the detector analyzes the data to determine when the air temperature near the detector exceeds the device's alarm point.

Standard Features

Note: *Some features described here may not be supported by all control systems. Check your control panel's Installation and Operation Guide for details.*

- Next Generation Heat Sensing Technology
- 135 °F (57 °C) fixed temperature alarm point (HRD and HFD)
- 15 °F (9 °C) per minute rate-of-rise alarm point (HRD)
- Uses existing wiring
- Automatic device mapping
- Sensor Markings Provide Easy Testing Identification
- Up To 250 Total Signature Devices Per Loop
- Non-volatile memory
- Electronic addressing
- Bicolor (green/red) status LED
- Standard, relay, fault isolator, and audible mounting bases
- 50 foot (15.2 meter) spacing

EXHIBIT 'C'

Application

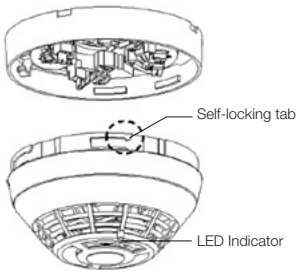
The SIGA-HRD combination fixed temperature/rate-of-rise heat detector provides a 15 °F (9 °C) per minute rate-of-rise heat sensor for the detection of fast-developing fires, as well as a 135°F (57°C) fixed temperature sensor for slow building-fires. The SIGA-HFD fixed temperature detector provides a 135°F (57°C) fixed temperature sensor for slow building-fires.

Compatibility

Signature Series heat detectors are compatible only with the Signature Loop Controller.

Installation

Signature Series detectors mount to North American 1-gang boxes, 3-1/2 inch or 4 inch octagon boxes, and to 4 inch square electrical boxes 1-1/2 inches (38 mm) deep. They mount to European BESA and 1-gang boxes with 60.3 mm fixing centers. See mounting base installation and wiring for more information.



Sensing and reporting technology

The microprocessor in each detector provides additional benefits - Self-diagnostics and History Log, Automatic Device Mapping, and Fast, Stable Communication.

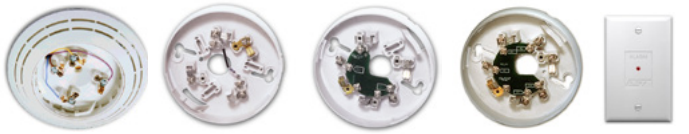
Self-diagnostics and History Log - Each Signature Series detector constantly runs self-checks to provide important maintenance information. The results of the self-check are automatically updated and permanently stored in the detector's non-volatile memory.

Automatic Device Mapping - The loop controller learns where each device's serial number address is installed relative to other devices on the circuit. The mapping feature provides supervision of each device's installed location to prevent a detector from being reinstalled (after cleaning etc.) in a different location from where it was originally.

Fast Stable Communication - On-board intelligence means less information needs to be sent between the detector and the loop controller. Other than regular supervisory polling response, the detector only needs to communicate with the loop controller when it has something new to report.

Accessories

Detector mounting bases have wiring terminals that are accessible from the "room-side" after mounting the base to the electrical box. The bases mount to North American 1-gang boxes and to 3½ inch or 4 inch octagon boxes, 1½ inches (38 mm) deep. They also mount to European BESA and 1-gang boxes with 60.3 mm fixing centers. The SIGA-SB4, SIGA-RB4, and SIGA-IB4 mount to North American 4 inch sq. electrical boxes in addition to the above boxes. They include the SIGA-TS4 Trim Skirt, which is used to cover the "mounting ears" on the base. The SIGA-AB4G mounts to a 4 inch square box only.



SIGA-AB4G/T/LF Audible Base | **SIGA-SB** Standard Base | **SIGA-IB** Isolator Base | **SIGA-RB** Relay Base | **SIGA-LED** Remote LED

Remote LED SIGA-LED - The remote LED connects to the SIGA-SB or SIGA-SB4 Standard Base only. It features a North American size 1-gang plastic faceplate with a white finish and red alarm LED.

SIGA-TS4 Trim Skirt - Supplied with 4 inch bases, it can also be ordered separately to use with the other bases to help hide surface imperfections not covered by the smaller bases.

Sounder Bases - Signature Series sounder bases are designed for use where localized or group alarm signaling is required.

- **SIGA-AB4G** bases provide sounder capability to Signature Series to heat and smoke detectors. They are not intended for use with combination carbon monoxide detectors in Fireplus-CO mode.
- **SIGA-AB4GT** bases provide sounder capability to Signature Series smoke and heat detectors, as well as carbon monoxide detectors when used with a SIGA-TCDR Temporal Pattern Generator.
- **SIGA-AB4G-LF** bases provide 520 Hz low frequency sounder capability to Signature Series smoke and heat detectors, as well as carbon monoxide detectors when used with a SIGA-TCDR Temporal Pattern Generator. The SIGA-AB4G-LF is suitable for applications requiring low frequency audible tones.

Warnings & Cautions

- This detector does not operate without electrical power. As fires frequently cause power interruption, discuss further safeguards with the local fire protection specialist.
- This detector does not sense fires in areas where heat cannot reach the detector. Heat from fires in walls, roofs, or on the opposite side of closed doors may not reach the detector.
- This heat detector by itself does not provide life safety protection Use this detector with ionization and/or photoelectric smoke detectors.
- This detector does not detect oxygen levels, smoke, toxic gases, or flames. Use this device as part of a broad-based life safety program which includes a variety of information sources pertaining to heat and smoke levels, extinguishment systems, visual and audible devices, and other safety measures.
- Independent studies indicate that heat detectors should only be used when property protection alone is involved. Never rely on heat detectors as the sole means of fire protection.

EXHIBIT 'C'

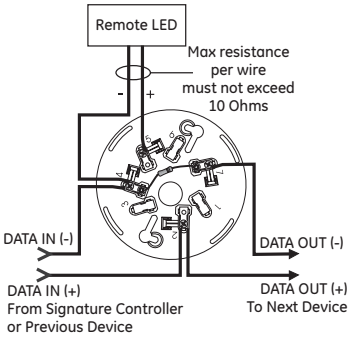
Typical Wiring

The detector mounting bases accept #18 AWG (0.75mm^2), #16 (1.0mm^2), #14 AWG (1.5mm^2), and #12 AWG (2.5mm^2) wire sizes. Sizes #16 AWG (1.0mm^2) and #18 AWG (0.75mm^2) are preferred for ease of installation.

Standard Detector Base, SIGA-SB, SIGA-SB4

This is the basic mounting base for EDWARDS Signature Series detectors. The SIGA-LED Remote LED is supported by this Base.

Term	Description
1	Not Used
2	DATA IN/OUT (+)
3	Not Used
4	DATA IN (-)
4	Remote LED (-)
5	Remote LED (+)
6	Not Used
7	DATA OUT (-)



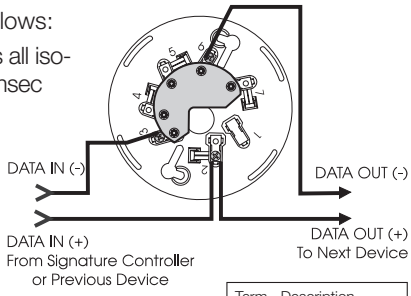
Isolator Detector Base, SIGA-IB, SIGA-IB4

This base includes a built-in line fault isolator for use on Class A circuits. A detector must be installed for it to operate. The isolator base does not support the SIGA-LED Remote LED.

The isolator operates as follows:

- a short on the line causes all isolators to open within 23 msec
- at 10 msec intervals, beginning on one side of the Class A circuit nearest the loop controller, the isolators close to provide the next isolator down the line with power
- when the isolator next to the short closes, it reopens within 10 msec.

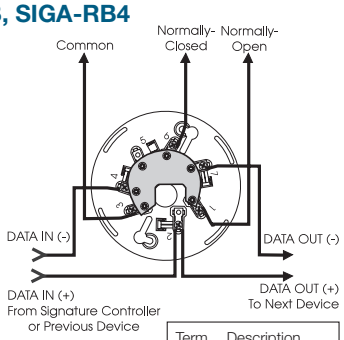
The process repeats beginning on the other side of the loop controller.



Term	Description
1	Not Used
2	DATA IN/OUT (+)
3	DATA IN (-)
4	Not Used
5	Not Used
6	DATA OUT (-)
7	Not Used

Relay Detector Base, SIGA-RB, SIGA-RB4

This base includes a relay. Normally Open or Normally Closed operation is selected during installation. The dry contact is rated for 1 amp (pilot duty) @ 30 Vdc. The relay's position is supervised to avoid accidentally jarring it out of position. The SIGA-RB can be operated as a control relay if programmed to do so at the control panel. The relay base does not support the SIGA-LED Remote LED.



CONTACT RATING
1.0 Amp @ 30 VDC
(Pilot Duty)

Term	Description
1	Normally Open
2	DATA IN/OUT (+)
3	Common
4	DATA IN (-)
5	Not Used
6	Normally-Closed
7	DATA OUT (-)

Audible Sounder Bases, Fire Mode

AB4GT, AB4G, AB4G-LF sounder bases

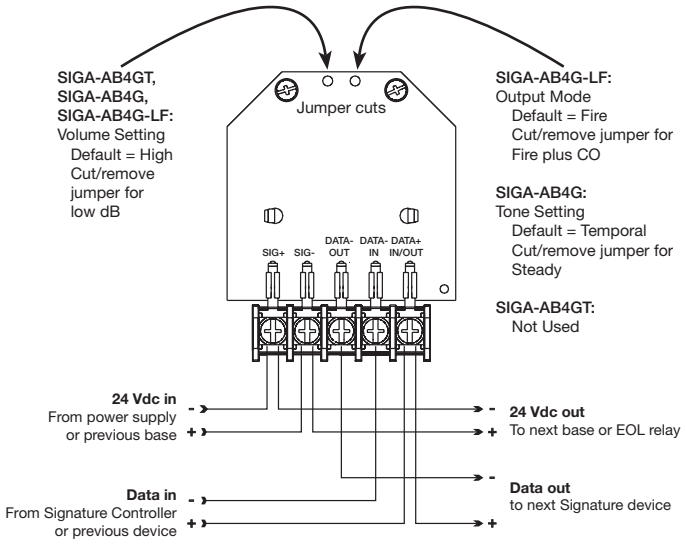


EXHIBIT 'C'

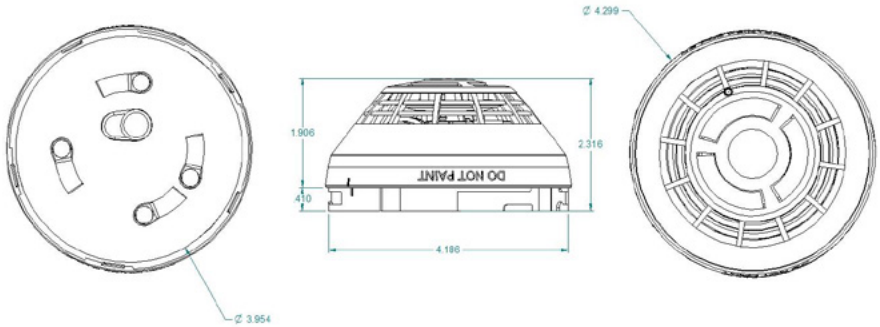
LIFE SAFETY & INCIDENT MANAGEMENT

Contact us...

Email: edwards.fire@fs.utc.com
Web: *Edwards-fire.com*

EDWARDS is a UTC brand.
1016 Corporate Park Drive
Mebane, NC 27302

Dimensions



Specifications

	SIGA- HRD	SIGA-HFD
Operating voltage	15.20 to 19.95 VDC	
Normal operating current	32 µA	
Alarm current	32 µA	
Vibration level	10 to 35 Hz, with an amplitude of 0.01 in.	
Rate-of-rise rating	15°F/min (8°C/min)	NA
Fixed temperature rating	135°F (57.2°C). Actual alarm point 129 to 141°F (53.9 to 60.6°C).	
Maximum spacing	50 ft. (15.2 m) centers	
Compatible bases	See Ordering Information	
Compatible detector testers	Testifire 1000, Testifire 2000	Testifire 2000
Operating environment	32 to 100°F (0 to 38°C), 0 to 93% RH, noncondensing	
Construction	High Impact Engineering Polymer, White	
Storage temperature	-4 to 140°F (-20 to 60°C)	
Agency Listings	CAN/ULC-S530, UL 521	CAN/ULC-S530-M91, UL 521

Ordering Information

Catalog Number	Description	Ship Wt. lbs (kg)
SIGA-HRD	Intelligent fixed temperature/Rate-of-rise heat detector	0.4 (0.16)
SIGA-HFD	Intelligent fixed temperature heat detector	

Compatible Bases		
SIGA-SB	Detector Mounting Base - Standard	0.2 (.09)
SIGA-SB4	4-inch Detector Mounting Base c/w Trim Skirt	
SIGA-RB	Detector Mounting Base w/Relay	
SIGA-RB4	4-inch Detector Mounting Base w/Relay, c/w Trim Skirt	
SIGA-IB	Detector Mounting Base w/Fault Isolator	
SIGA-IB4	4-inch Detector Mounting Base w/ Fault Isolator, c/w Trim Skirt	
SIGA-AB4G	Audible (Sounder) Base for Fire Detectors	0.3 (0.15)
SIGA-AB4G-LF	Low Frequency Audible (Sounder) Base for CO and Fire Detectors	
SIGA-AB4GT	Audible (Sounder) Base for CO and Fire Detectors	
SIGA-LED	Remote Alarm LED (not for EN54 applications)	
SIGA-TS4	Trim Skirt (supplied with 4-inch bases)	0.1 (0.04)
SIGA-TS	Trim Skirt (optional for non 4-inch bases)	
SIGA-RTA	Detector Removal Tool	

EXHIBIT 'C'

EDWARDS
United Technologies
LIFE SAFETY & INCIDENT MANAGEMENT

Intelligent Multisensor Smoke, Heat, CO Detector

SIGA-PHCD

S853

Overview

The Signature Series SIGA-PHCD detector brings advanced multisensing technology to a practical design that increases efficiency, saves installation time, cuts costs, and extends life safety and property protection capabilities. Continuous self-diagnostics ensures reliability over the long-haul, while environmental compensation helps reduce maintenance costs.

The SIGA-PHCD provides the best of all worlds with comprehensive life safety monitoring. The combination of optical smoke detection with rate-of-rise heat sensing technology provides efficient identification of smoldering fires, as well as fast flaming fires. With the added element of CO monitoring, this detector pulls double duty: continually monitoring the environment for signs of fire — as well as its invisible yet deadly companion, carbon monoxide.

Like all Signature Series detectors, the SIGA-PHCD gathers analog information from their sensing elements and converts this data into digital signals. To make an alarm decision, the detector's on-board microprocessor measures and analyzes smoke and heat sensor readings and compares this information to historical data. Digital filters remove signal patterns that are not typical of fires, thus virtually eliminating unwanted alarms. The detector also analyzes the smoke and heat sensors independently from the CO sensor to determine whether to initiate a fire alarm, a life safety CO alarm, or both.

Standard Features

Note: *Some features described here may not be supported by all control systems. Check your control panel's Installation and Operation Guide for details.*

- Next Generation Detection Technology
- Integrates optical smoke with rate-of-rise heat sensing and carbon monoxide detection
- Wide 0.53 to 3.94 %/ft. (1.7 to 12.35 %/m) smoke obscuration
- Sensor Markings Provide Easy Testing Identification
- Uses existing wiring
- Automatic device mapping
- Up To 250 Total Signature Addresses Per Loop
- Two levels of environmental compensation
- Two levels of dirty detector warning
- Twenty pre-alarm settings
- Five sensitivity settings
- Non-volatile memory
- Electronic addressing
- Environmental compensation
- Automatic day/night sensitivity adjustment
- Bicolor (green/red) status LED
- Standard, relay, fault isolator, and audible mounting bases

EXHIBIT 'C'

Application

Smoke detection

The SIGA-PHCD detects extremely small particles of combustion and triggers an alarm at the first sign of smoke. Thanks to its high-performance forward-scattering reflective response technology, the photoelectric smoke sensor responds quickly and reliably to a wide range of fire types, especially slow burning fires fuelled by combustibles typically found in modern multi-use buildings.

Heat detection

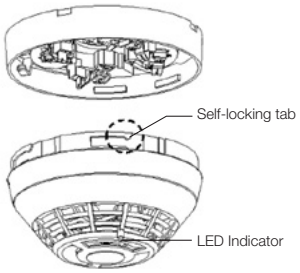
SIGA-PHCD's on-board rate-of-rise heat sensor provides a 15 °F (9 °C) per minute for the detection of fast-developing fires. The heat sensor monitors the temperature of the air and determines whether an alarm should be initiated.

CO Detection

Monitored CO detection, such as that provided by the SIGA-PHCD is becoming mandated with increasing frequency in all types of commercial applications, but particularly in occupancies such as hotels, rooming houses, dormitories, day care facilities, schools, hospitals, assisted living facilities, and nursing homes. Known as the "Silent Killer," CO is odorless, tasteless, and colorless. It claims nearly 500 lives, and results in more than 15,000 hospital visits annually.

Installation

Signature Series detectors mount to North American 1-gang boxes, 3-1/2 inch or 4 inch octagon boxes, and to 4 inch square electrical boxes 1-1/2 inches (38 mm) deep. They mount to European BESA and 1-gang boxes with 60.3 mm fixing centers. See mounting base installation and wiring for more information.



Testing & Maintenance

Scheduled maintenance (regular or selected) for proper detector operation should be planned to meet the requirements of the Authority Having Jurisdiction (AHJ). Refer to current NFPA 72, NFPA 720, and ULC CAN/ULC 536 standards.

Smoke Sensor Sensitivity

The SIGA-PHCD determines when its optical sensor is dirty or defective and can transmit sensitivity data to the loop controller. A sensitivity report can also be printed to satisfy NFPA sensitivity measurements, which must be conducted at the end of the first year and every two years thereafter. The availability of maintenance features depends on the fire alarm system used.

CO Sensor Life

The CO sensor has a 10-year life from the date of manufacture or when the control panel indicates a sensor end-of-life condition, whichever comes first. When the sensor reaches its end of life, the detector signals a "COMMON TRBL ACT" condition on the control panel. Pressing the ***Details*** button on the control panel displays "END OF LIFE ACT" providing verification that it is an end-of-life trouble of the CO sensor. This trouble remains active until the detector is replaced, even if the panel is reset.

Sensing and reporting technology

The microprocessor in each detector provides additional benefits - Self-diagnostics and History Log, Automatic Device Mapping, and Fast, Stable Communication.

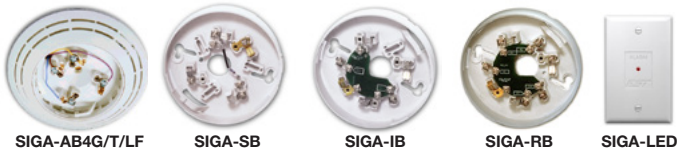
Self-diagnostics and History Log - Each Signature Series detector constantly runs self-checks to provide important maintenance information. The results of the self-check are automatically updated and permanently stored in the detector's non-volatile memory.

Automatic Device Mapping - The loop controller learns where each device's serial number address is installed relative to other devices on the circuit. The mapping feature provides supervision of each device's installed location to prevent a detector from being reinstalled (after cleaning etc.) in a different location from where it was originally.

Fast Stable Communication - On-board intelligence means less information needs to be sent between the detector and the loop controller. Other than regular supervisory polling response, the detector only needs to communicate with the loop controller when it has something new to report.

Accessories

Detector mounting bases have wiring terminals that are accessible from the "room-side" after mounting the base to the electrical box. The bases mount to North American 1-gang boxes and to 3½ inch or 4 inch octagon boxes, 1½ inches (38 mm) deep. They also mount to European BESA and 1-gang boxes with 60.3 mm fixing centers. The SIGA-SB4, SIGA-RB4, and SIGA-IB4 mount to North American 4 inch sq. electrical boxes in addition to the above boxes. They include the SIGA-TS4 Trim Skirt, which is used to cover the "mounting ears" on the base. The SIGA-AB4G mounts to a 4 inch square box only.



SIGA-AB4G/T/LF Audible Base | **SIGA-SB** Standard Base | **SIGA-IB** Isolator Base | **SIGA-RB** Relay Base | **SIGA-LED** Remote LED

Remote LED SIGA-LED - The remote LED connects to the SIGA-SB or SIGA-SB4 Standard Base only. It features a North American size 1-gang plastic faceplate with a white finish and red alarm LED.

SIGA-TS4 Trim Skirt - Supplied with 4 inch bases, it can also be ordered separately to use with the other bases to help hide surface imperfections not covered by the smaller bases.

Sounder Bases - Signature Series sounder bases are designed for use where localized or group alarm signaling is required.

- **SIGA-AB4GT** bases provide sounder capability to the SIGA-PHCD when used with a SIGA-TCDR Temporal Pattern Generator to separate CO (TC4) and Fire (TC3) tone patterns.
- **SIGA-AB4G-LF** bases provide 520 Hz low frequency sounder capability to the SIGA-PHCD when used with a SIGA-TCDR Temporal Pattern Generator to separate CO (TC4) and Fire (TC3) tone patterns. The SIGA-AB4G-LF is suitable for applications requiring low frequency audible tones.

EXHIBIT 'C'

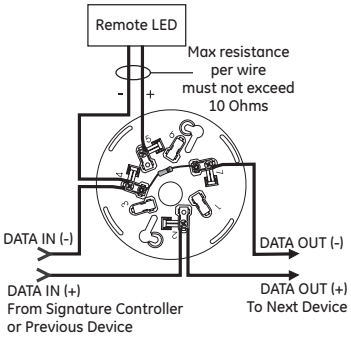
Typical Wiring

The detector mounting bases accept #18 AWG (0.75mm^2), #16 (1.0mm^2), #14 AWG (1.5mm^2), and #12 AWG (2.5mm^2) wire sizes. Sizes #16 AWG (1.0mm^2) and #18 AWG (0.75mm^2) are preferred for ease of installation.

Standard Detector Base, SIGA-SB, SIGA-SB4

This is the basic mounting base for EDWARDS Signature Series detectors. The SIGA-LED Remote LED is supported by this Base.

Term	Description
1	Not Used
2	DATA IN/OUT (+)
3	Not Used
4	DATA IN (-)
4	Remote LED (-)
5	Remote LED (+)
6	Not Used
7	DATA OUT (-)



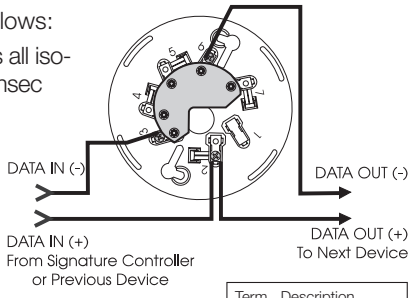
Isolator Detector Base, SIGA-IB, SIGA-IB4

This base includes a built-in line fault isolator for use on Class A circuits. A detector must be installed for it to operate. The isolator base does not support the SIGA-LED Remote LED.

The isolator operates as follows:

- a short on the line causes all isolators to open within 23 msec
- at 10 msec intervals, beginning on one side of the Class A circuit nearest the loop controller, the isolators close to provide the next isolator down the line with power
- when the isolator next to the short closes, it reopens within 10 msec.

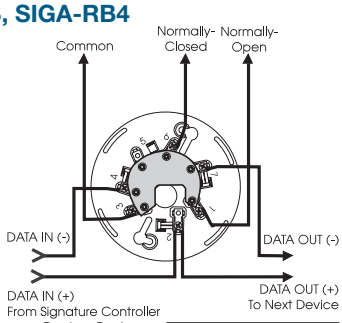
The process repeats beginning on the other side of the loop controller.



Term	Description
1	Not Used
2	DATA IN/OUT (+)
3	DATA IN (-)
4	Not Used
5	Not Used
6	DATA OUT (-)
7	Not Used

Relay Detector Base, SIGA-RB, SIGA-RB4

This base includes a relay. Normally Open or Normally Closed operation is selected during installation. The dry contact is rated for 1 amp (pilot duty) @ 30 Vdc. The relay's position is supervised to avoid accidentally jarring it out of position. The SIGA-RB can be operated as a control relay if programmed to do so at the control panel. The relay base does not support the SIGA-LED Remote LED.

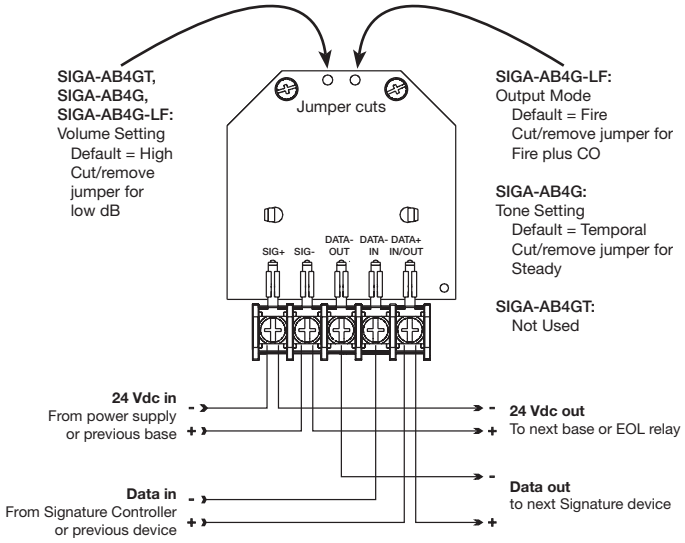


CONTACT RATING
1.0 Amp @ 30 VDC
(Pilot Duty)

Term	Description
1	Normally Open
2	DATA IN/OUT (+)
3	Common
4	DATA IN (-)
5	Not Used
6	Normally-Closed
7	DATA OUT (-)

Audible Sounder Bases, Fire Mode

AB4GT, AB4G, AB4G-LF sounder bases

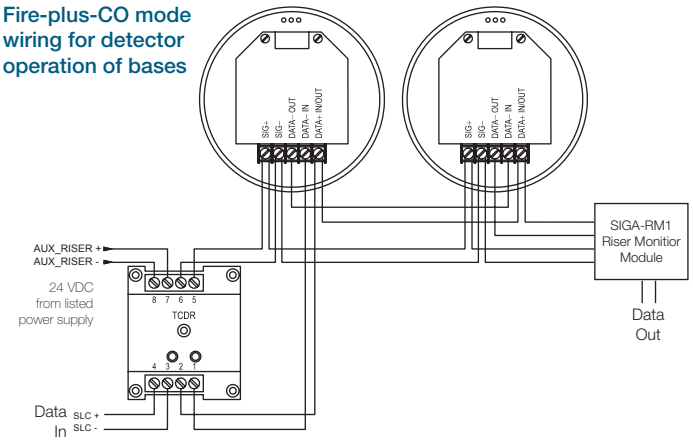


Audible Sounder Bases, Fire-plus-CO Mode

AB4GT and AB4G-LF sounder bases only.

These configurations require a SIGA-TCDR Temporal Pattern Generator to separate CO (TC4) and Fire (TC3) tone patterns.

Fire-plus-CO mode wiring for detector operation of bases



Fire-plus-CO mode wiring for detector and system operation of bases

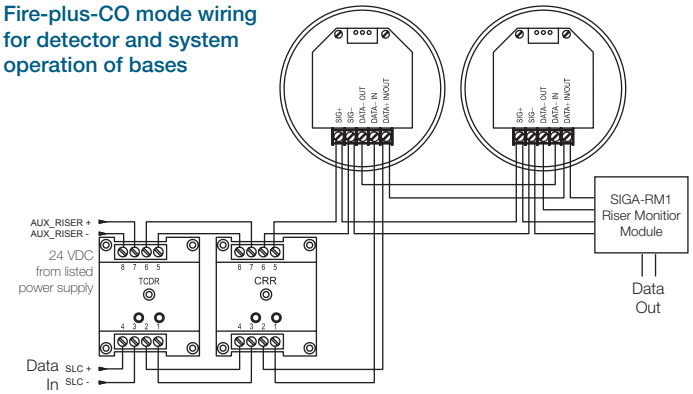


EXHIBIT 'C'

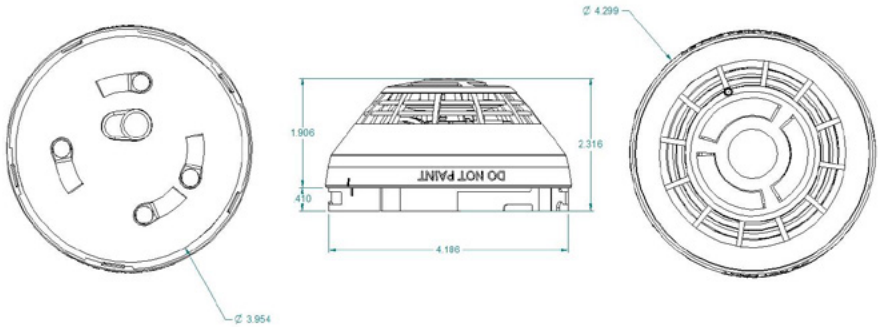
LIFE SAFETY & INCIDENT MANAGEMENT

Contact us...

Email: edwards.fire@fs.utc.com
Web: *Edwards-fire.com*

EDWARDS is a UTC brand.
1016 Corporate Park Drive
Mebane, NC 27302

Dimensions



Specifications

Operating voltage	15.20 to 19.95 VDC
Normal operating current	32 µA
Alarm current	32 µA
Smoke Sensitivity Range	UL/ULC: 0.53 to 3.94 %/ft. (1.7 to 12.35 %/m) obscuration
Rate-of-rise rating	15°F/min (9°C/min)
Fixed temperature rating	135°F (57.2°C). Actual alarm point 129 to 144°F (53.9 to 62.2°C).
Vibration level	10 to 35 Hz, with an amplitude of 0.01 in.
Wall mounting	12 in. (305 mm) max. from ceiling
Spacing, heat detectors	Max. 50 ft. (15.2 m) centers
Compatible detector testers	Testifire 1000, Testifire 2000
Operating environment	32 to 100°F (0 to 38°C), 0 to 90% RH, noncondensing
Construction	High Impact Engineering Polymer, White
Storage temperature	-4 to 140°F (-20 to 60°C)
Environmental compensation	Automatic
UL CO alarm level per UL 2034, CAN/CSA 6.19	70 ppm 60 to 240 minutes; 150 ppm 10 to 50 minutes; 400 ppm 4 to 15 minutes
UL CO false alarm level per UL 2034, CAN/CSA 6.19	30 ppm 30 days 70 ppm 60 minutes
Agency Listings, SIGA-COD	UL 268, UL 521, UL 2075. Evaluated to the CO alarm sensitivity limits of UL 2034.
Agency Listings, SIGA-COD-CA	ULC Listed to CAN/ULC-S529, CAN/ULC-S530, CAN/CSA 6.19.

Ordering Information

Catalog Number	Description	Ship Wt. lbs (kg)
SIGA-PHCD	Multisensor Smoke, Heat, and CO Detector	0.4 (0.16)
SIGA-PHCD-CA	Multisensor Smoke, Heat, and CO Detector, Canadian Market	0.4 (0.16)
Compatible Bases		
SIGA-SB	Detector Mounting Base - Standard	0.2 (.09)
SIGA-SB4	4-inch Detector Mounting Base c/w Trim Skirt	
SIGA-RB	Detector Mounting Base w/Relay	
SIGA-RB4	4-inch Detector Mounting Base w/Relay, c/w Trim Skirt	
SIGA-IB	Detector Mounting Base w/Fault Isolator	
SIGA-IB4	4-inch Detector Mounting Base w/ Fault Isolator, c/w Trim Skirt	
SIGA-LED	Remote Alarm LED (not for EN54 applications)	
SIGA-AB4G-LF	Low Frequency Audible (Sounder) Base for CO and Fire Detectors	0.3 (0.15)
SIGA-AB4GT	Audible (Sounder) Base for CO and Fire Detectors	0.3 (0.15)
SIGA-TCDR	Tone Generator for Detector Sounder Bases with CO mode	0.2 (0.1)
SIGA-TS4	Trim Skirt (supplied with 4-inch bases)	0.1 (.04)
SIGA-RTA	Detector Removal Tool	
SIGA-VA	Detector Cleaning Tool	

Warnings & Cautions

- This detector does not sense fires in areas where smoke or heat cannot reach the detector. Smoke or heat from fires in walls, roofs, or on the opposite side of closed doors may not reach the detector.
- Photoelectric detectors have a wide range of sensing capabilities, and are best suited for detecting slow, smoldering fires. The heat sensor in this device provides a source of supplemental information. The heat sensor by itself does not provide life safety protection.
- Install per NFPA 72 *National Fire Alarm and Signaling Code*, NFPA 720 *Standard for the Installation of Carbon Monoxide (CO) Detection and Warning Equipment*, and UL 2075 *Standard for Gas and Vapor Detectors and Sensors*.

EXHIBIT 'C'

EDWARDS
United Technologies
LIFE SAFETY & INCIDENT MANAGEMENT

Sounder Bases

SIGA-AB4G, SIGA-AB4G-LF, SIGA-AB4GT, SIGA-TCDR


SIGA-AB4G-LF


SIGA-AB4GT


SIGA-AB4G

S853

7300-1657: 0222
7300-1657:0322
7300-1657:0308

Overview

The Signature Series AB4G sounder bases add audible output functions to any Signature Series detector. Bases can operate as independent local alarms, or as part of a zone or system alarm with synchronized audible output.

Three models provide a full range of features that meet application needs and mandated code-compliant requirements:

SIGA-AB4G bases provide sounder capability to Signature Series single-function smoke detectors. They are not intended for use with combination smoke/CO devices in Fire-plus-CO mode.

SIGA-AB4GT bases provide sounder capability to Signature Series single-function smoke detectors, as well as combination smoke/CO detectors when used with a SIGA-TCDR Temporal Pattern Generator.

SIGA-AB4G-LF bases provide 520 Hz low frequency sounder capability to Signature Series single-function smoke detectors, as well as combination smoke/CO detectors in Fire-plus-CO mode when used with a SIGA-TCDR Temporal Pattern Generator. The SIGA-AB4G-LF is suitable for applications requiring low frequency audible tones.

All bases are compatible with first and second generation Signature Series intelligent detectors when properly configured.

SIGA-AB4G sounder bases match the finish of Signature Series devices, and the sound output slots complement the air entry openings of the detector. The result is a compact unit with an attractive appearance.

Standard Features

- **Low frequency model available**
  Code-compliant 520 Hz output.
- **Temporal or steady tone**
  Jumper selects steady or synchronized temporal output.
- **High or low dB output**
  Jumper selects low or high dBA output.
- **Single or group operation**
  Optional polarity reversing module configures base for group alarm output.
- **UL268 and UL464 listed**
  UL listing under smoke detector and audible signal standards allows application as smoke alarm and/or audible signal.
- **Attractive installation**
  Flush mount to a wide selection of North American boxes or surface mount to optional custom-matched box.

EXHIBIT 'C'

Application

Signature Series AB4G sounder bases are for use with Signature Series detectors in applications where localized or group alarm signaling is required. They are listed by Underwriters Laboratories under the UL268 and UL464 standards, allowing their application where both life safety alarms and/or notification appliances are required.

Programming and Field Configuration

Each AB4G base uses the same address and programming label as the detector it supports.

AB4G sounder bases can be set to simply operate according to the state of its detector, or configured through system programming to operate in conjunction with all sounder bases on the same circuit. They can also be controlled by program rules. Available operating modes are determined by the system that supports the Signature data loop.

Bases may be configured in the field for either high or low dB output. When used for fire alarm-only applications (i.e.: not with CO detectors), AB4G bases may be configured for steady or temporal output. The default setting is high dB with temporal output.

Group Activation and Sychronization

AB4G sounder bases on the same circuit may be activated as a group or zone with the use of a SIGA-CRR polarity reversal module, and the group or zone may be synchronized audible output with the use of a G1M-RM signal master.

Combination Smoke/CO Applications

SIGA-AB4GT and SIGA-AB4G-LF audible bases may be used with combination smoke/CO detectors when a SIGA-TCDR is installed on the same Signature data loop.

The output of these bases is field-configurable for Fire Alarm mode, or Fire Alarm plus CO Alarm mode. The SIGA-AB4G-LF has two operating modes: fire output only, where the unit produces a T3 tone; and, a Fire-plus-CO mode. In the Fire-plus-CO mode, the NAC circuit requires a SIGA-TCDR module to generate and synchronize the TC3 and TC4 tones. These two distinctive tones are necessary to differentiate fire alarm signals from CO alarm signals.

Depending on the system supporting the Signature loop, the base can follow the state of the device it supports, or be controlled by program rules.

Low Frequency Applications

The low frequency model (SIGA-AB4G-LF), features a distinctive 520 Hz signal and is ideal for hotels, dormitories, and other commercial sleeping occupancies. This base can be set for low dB output with a jumper cut that reduces audible output by about 4 dB. For commerical sleeping rooms, most codes and standards require 75 dBA-fast at the pillow.

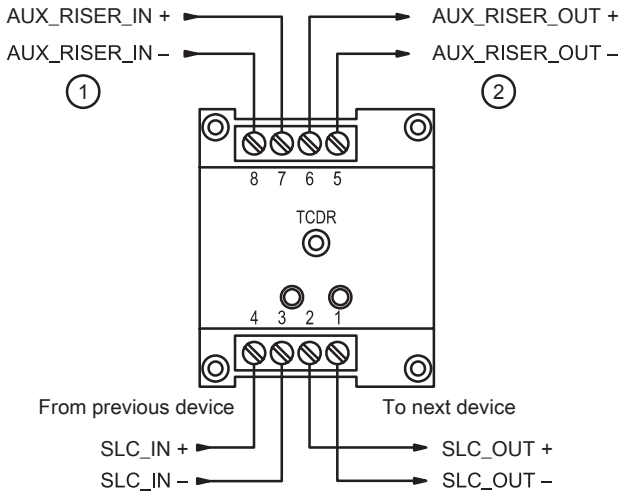
SIGA-TCDR Temporal Pattern Generator

The SIGA-TCDR Temporal Pattern Generator is an addressable device that generates CO and fire signal sound patterns for AB4GT and AB4G-LF sounder bases. The control panel sends synchronization and channel commands to the SIGA-TCDR; the channel selection determines the pattern. In the U.S. Channel 1 is TC3 and Channel 2 is TC4. In Europe, Channel 1 is TC4 and Channel 2 is TC3 (in case both channels are activated Channel 1 has priority). Other markets depend on local requirements.

Temporal patterns

Name	Code	Used for
TC4	NFPA 720	CO
TC3	NFPA 72	Fire

The SIGA-TCDR module uses two addresses on the signaling line circuit (SLC). Address 1 is tied to Channel 1; Address 2 is tied to Channel 2.



1. Use a power-limited and regulated 24 VDC primary or auxiliary power supply that is UL/ULC listed for fire protective signaling systems.
2. Power out to AB4GT sounder base or listed EOL relay and supervising module

Depending on the type of alarm, the panel can select the corresponding pattern and send the activation command to the SIGA-TCDR.

To control all sounder bases in the loop, use a SIGA-CRR module. The panel sends a signal to the SIGA-CRR causing it to reverse polarity. With the polarity on the riser reversed, all the sounder bases on this loop activate. The SIGA-TCDR maintains synchronization by processing the SYNC commands from the loop controller.

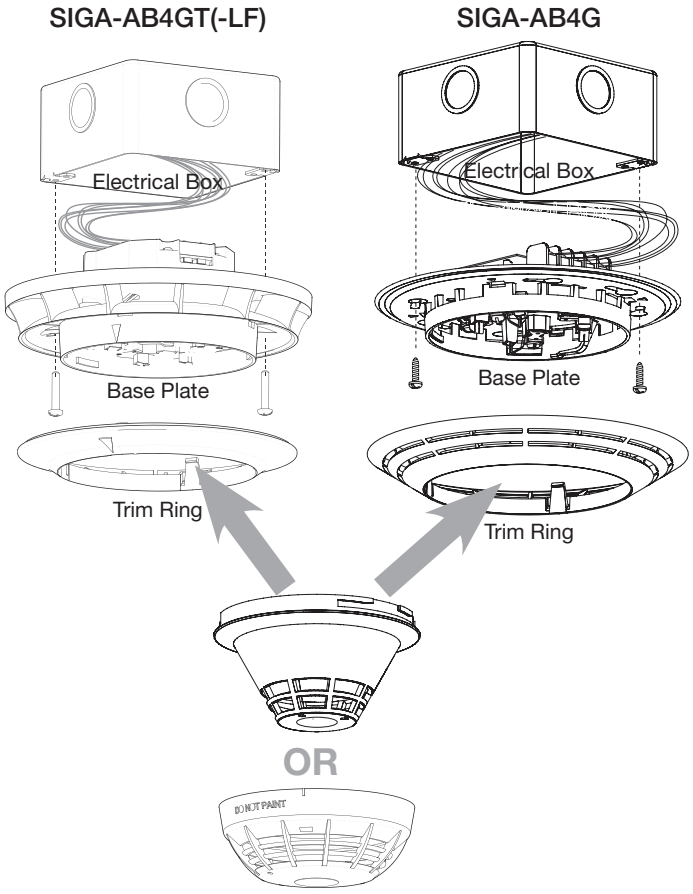
EDWARDS recommends that fire alarm systems and their devices always be installed in accordance with the latest recognized edition of national and local fire alarm codes.

EXHIBIT 'C'

Installation and Mounting

Flush Mounting

The sounder base flush mounts into 2-1/8 inch (54 mm) deep standard North American 4 inch square electric box, North American 4 x 4 inch octagonal concrete ring (mud box), and standard European 100 mm square electric boxes. The terminal block makes field wire connections fast and efficient . After wiring, a simple push and twist motion locks the Signature detector into the base.

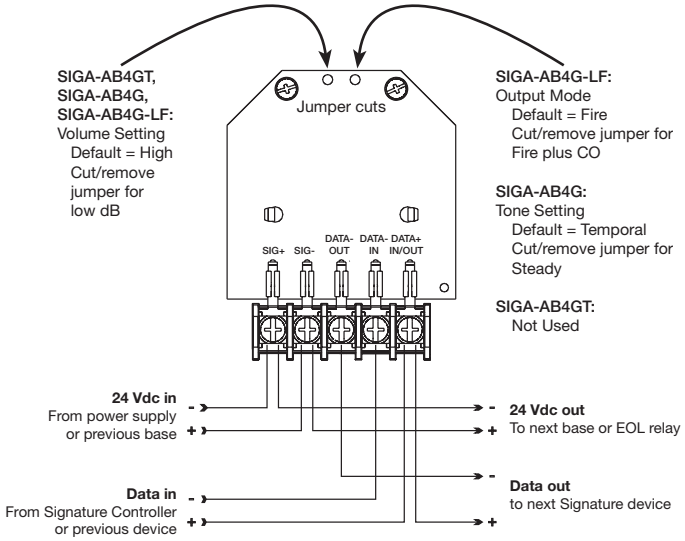


Surface Mounting

AB4G-SB
Optional Surface Box
(6.8” diameter x 1.8” deep)

AB4G-SB: When using the AB4G-SB surface mount box, install a reinforcing plate at every knockout. (Reinforcing plates are included with the box.) Remove the knockout first, and then slide the reinforcing plate into the plastic housing. After the plate is in place, install a conduit connector and nut (not supplied).

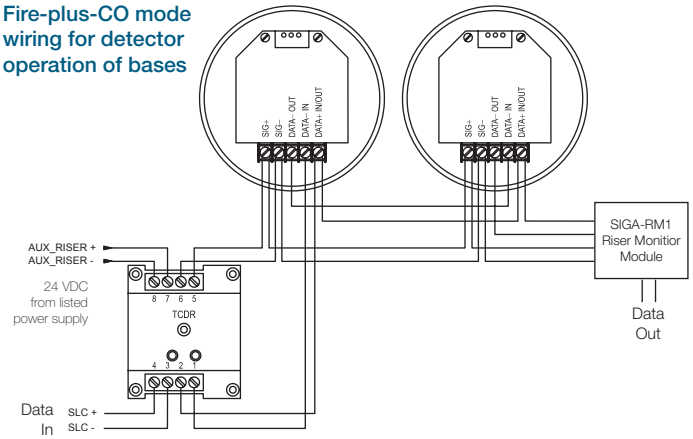
Configuration and Wiring



Typical Wiring, Fire-plus-CO mode

AB4GT, AB4G-LF sounder bases

Fire-plus-CO mode wiring for detector operation of bases



Fire-plus-CO mode wiring for detector and system operation of bases

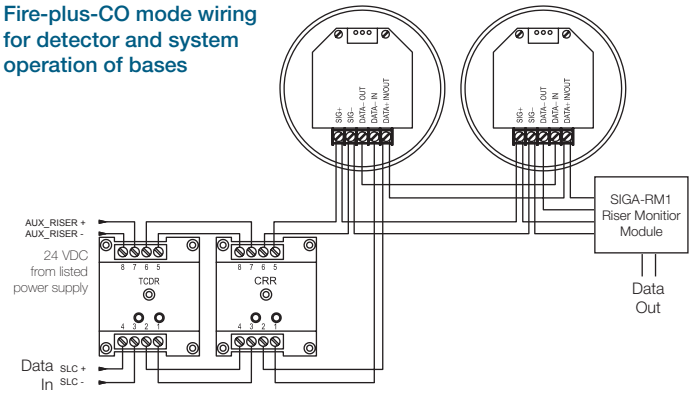


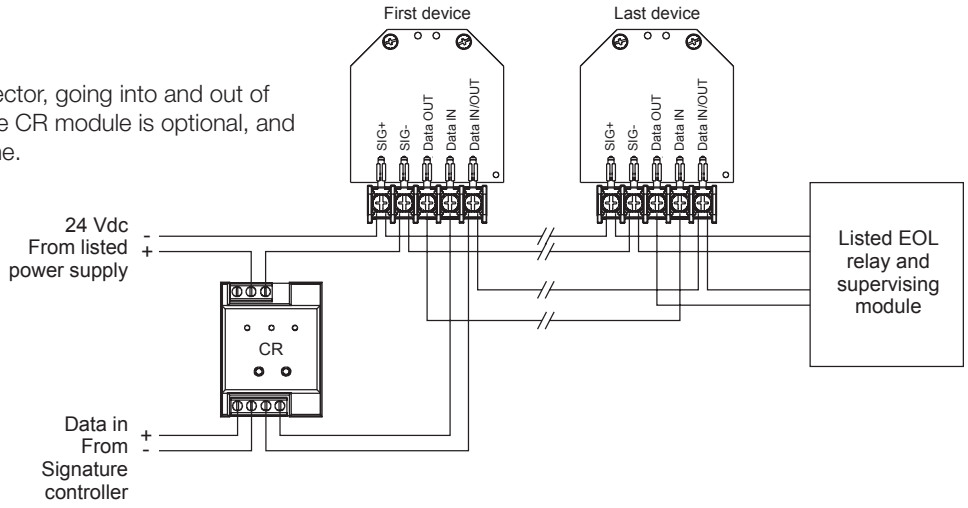
EXHIBIT 'C'

Typical Wiring, Fire mode

AB4G, AB4G-LF sounder bases

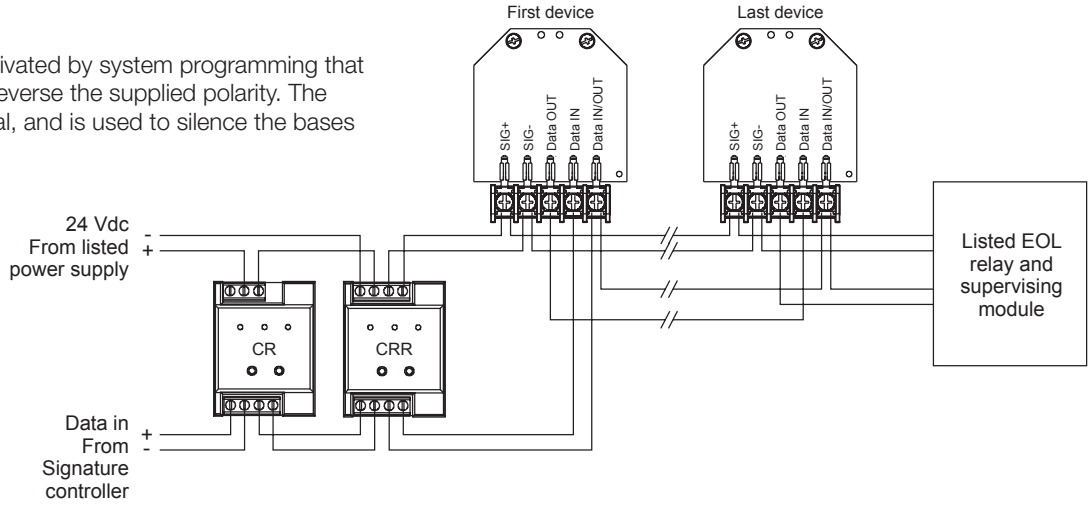
Detector operates the base

The base follows the state of the detector, going into and out of alarm with the detector. The Signature CR module is optional, and is used to silence the bases on the line.



System turns on all bases

All bases on the line can be activated by system programming that triggers the Signature CRR to reverse the supplied polarity. The Signature CR module is optional, and is used to silence the bases on the line.



System turns on bases with synchronization

All bases on the line are activated by system programming that triggers the Signature CRR module. The temporal output is synchronized by the G1M-RM. If the Signature CRR module is not activated, each detector can still operate its base, but the bases will not be synchronized. The Signature CR module is optional, and is used to silence the bases on the line.

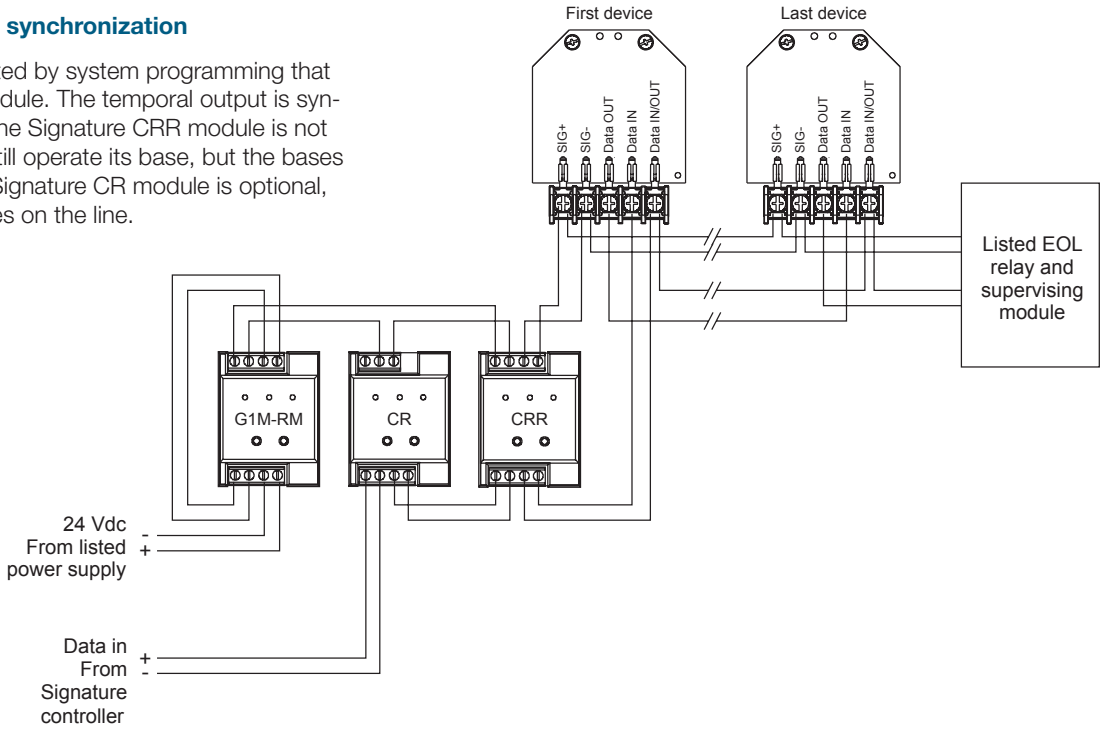


EXHIBIT 'C'

Sound Level Output, AB4G-LF

Signal	Low dBA	High dBA [1]
Nominal Sound Level [2]		
Steady/T3/T4	83	87
Per UL 268, UL 521, UL 2075 (reverberant) [3]		
TC3 (fire pattern)	76.3	80.8
TC4 (CO pattern)	73.0	77.4
Steady	80.9	85.3
Per UL 464 (reverberant) [3]		
TC3 (fire pattern)	70.3	74.8
TC4 (CO pattern)	67.0	71.4
Steady	74.9	79.3

[1] For NFPA 72 and NFPA 720 applications, the high dBA settings can be used for public mode evacuation.

[2] Anechoic chamber @ 10ft

[3] As measured in a UL reverberant room at 10 ft.

Operating Current, AB4G-LF

mA RMS UL/ULC ratings

	Low dBA			High dBA		
Signal	16 VDC	24 VDC	33 VDC	16 VDC	24 VDC	33 VDC
TC3	76.0	76.4	85.6	92.0	76.0	93.6
TC4	112.8	148.0	125.6	107.2	150.0	150.8
Steady	75.2	76.0	92.4	143.0	92.0	97.0

Sound Level Output, AB4G

Signal	Voltage	Low dBA	High dBA
Reverberant room per UL 464*			
Temporal	16 Vdc	71.5	78.1
	24 Vdc	75.5	80.7
	33 Vdc	78.5	83.1
Steady	16 Vdc	75.5	81.7
	24 Vdc	79.5	84.5
	33 Vdc	81.8	86.5
Reverberant room per UL 268			
Temporal	16 Vdc	77.5	84.1
	24 Vdc	81.5	86.7
	33 Vdc	84.5	89.1
Steady	16 Vdc	81.5	87.7
	24 Vdc	85.5	90.5
	33 Vdc	87.8	92.5

dBA = Decibels, A-weighted

*For UL 464 applications low dBA settings are for private mode only.

Operating Current (RMS), AB4G

Voltage	Low dBA	High dBA	Notes
16 VDC	17	28	VDC = Volts direct current, regulated and filtered
24 VDC	24	41	
33 VDC	31	52	
16 VFWR	41	48	VFWR = Volts full wave rectified
24 VFWR	51	60	
33 VFWR	60	66	

Sound Level Output, AB4GT

Signal	Voltage	Low dBA	High dBA
Reverberant room per UL 464 [1]			
TC3 (fire pattern)	16 VDC	80.5	85.2
TC4 (CO pattern)	16 VDC	73.9	77.5
Reverberant room per UL 268 and FM [2]			
TC3 (fire pattern)	16 VDC	86.5	90.8
TC4 (CO pattern)	16 VDC	77.5	84.1
Sound pressure level per CAN/ULC-S525 [3]			
Temporal	24 VDC	95	91
Steady	24 VDC	93	89

[1] For UL 464 applications, low dBA settings are for private mode only.
[2] For UL 268 applications, the high setting must be used for evacuation.
[3] Voltage is regulated and filtered.

Operating current (RMS), AB4GT

Low dBA	High dBA
31 mA	52 mA

EXHIBIT 'C'

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Web: *Edwards-fire.com*

EDWARDS is a UTC brand.
1016 Corporate Park Drive
Mebane, NC 27302

Specifications

	SIGA-AB4G	SIGA-AB4GT	SIGA-AB4G-LF
Riser operating voltage	16 to 33 VDC		
Operating Current	See tables on previous page		
Supervisory Current	DC = 1.46 mA, FWR = 2.15 mA	DC = 1.46 mA	DC = 6.0 mA
Default Output Volume	High dBA		
Default Tone	Temporal	Fire: Steady or TC3; Fire-plus-CO: TC3 or TC4	
Resonant frequency	3.2 kHz		520 Hz +/- 10%
Temporal pattern	0.5 s on, 0.5 s off, 0.5 s on, 0.5 s off, 0.5 s on, 1.5 s off, repeat cycle	As determined by the SIGA-TCDR... Fire: Steady or TC3; Fire-plus-CO: TC3 or TC4	
Compatible detectors	All Signature Series detectors		
Compatible electrical boxes	AB4G-SB surface box for audible base; 4 in. square by 2-1/8 in. (54 mm) deep box; 3-1/2 in. octagonal by 2-1/8 in. (54 mm) deep box; Standard European 100 mm² box		
Wire size	12 to 18 AWG (0.75 to 2.50 mm²)		
Base diameter	6.8 in. (173 mm)		
Base height from box	0.8 in. (21 mm)		1.4 in. (35 mm)
Maximum distance from ceiling	Wall mount — 12 in. (305 mm)		
Environment type	Indoor only		
Operating environment Temperature Relative humidity	 32 to 120°F (0 to 49°C) 0 to 93% noncondensing		
Storage temperature	–4 to 140°F (–20 to 60°C)		
Listings	UL, ULC, CSFM		UL, CSFM

Ordering Information

Catalog Number	Description	Ship Wt., lb. (kg)
SIGA-AB4G-LF	Low Frequency Sounder Base for CO and Fire Detectors	0.3 (0.15)
SIGA-AB4GT	Sounder Base for CO and Fire Detectors	0.3 (0.15)
SIGA-AB4G	Sounder Base for Fire Detectors	0.3 (0.15)
Related Equipment		
SIGA-TCDR	Temporal Pattern Generator	0.2 (0.1)
SIGA-MCRR	Polarity Reversal Relay (Plug-in UIO module)	0.18 (0.08)
SIGA-CRR	Polarity Reversal Relay (Standard mount module)	0.2 (0.1)
SIGA-MCR	Control Relay Module (Plug-in UIO module)	0.18 (0.08)
SIGA-CR	Control Relay Module (Standard mount module)	0.2 (0.1)
SIGA-RM1	Riser Monitor Module	0.2 (0.1)
G1M-RM	Signal Master (1-gang remote mount)	0.2 (0.1)
AB4G-SB	Surface Box for Audible Base	1.0 (0.45)

EXHIBIT 'C'

EDWARDS
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Intelligent Duct Smoke Detector

SIGA-SD

FM APPROVED MEA 3242-1657: 0223 UL ULC S853

Overview

The EDWARDS *SuperDuct* Signature Series smoke detector is the most advanced and most reliable device in its class. Designed for easy installation and superb reliability, *SuperDuct* represents the perfect balance of practical design and advanced technology.

***SuperDuct* detectors** feature a unique design that speeds installation and simplifies maintenance. Removable dust filters, conformally coated circuit boards, and optional water-resistant gaskets keep contaminants away from components, ensuring years of trouble-free service. When cleaning is required, the assemblies come apart easily and snap back together in seconds.

A Signature Series photoelectric sensor is incorporated into the design of each SIGA-SD duct smoke detector. This sensor inherits the power and benefits of this exceptional line of intelligent devices.

Signature Series sensors gather analog information from their smoke sensing elements and convert it into digital signals. The sensor measures and analyses these signals and compares the information to historical readings and time patterns to make an alarm decision. Digital filters remove signal patterns that are not typical of fires, which virtually eliminates unwanted alarms.

WARNING: Duct detectors have specific limitations. Duct detectors are not a substitute for an open area smoke detector. Duct detectors are not a substitute for early warning detection or a replacement for a building's regular fire detection system. Smoke detectors are not designed to detect toxic gases which can build up to hazardous levels in some fires. These devices will not operate without electrical power. As fires frequently cause power interruptions, EDWARDS suggests you discuss further safeguards with your local fire protection specialist.

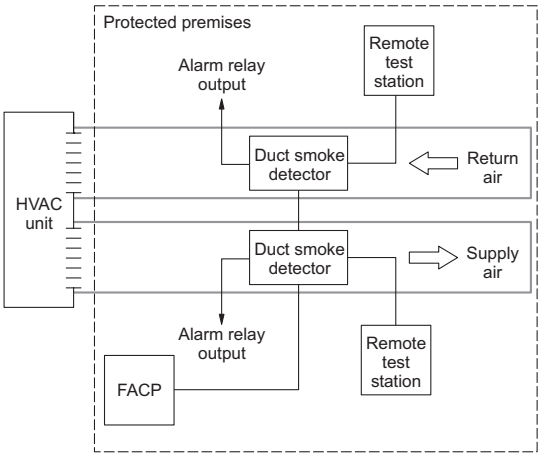
Standard Features

- Less than 2" deep for easy installation and applications where space is tight
- -20°F to 158°F (-29°C to 70°C) operating range with 100 ft/min. to 4,000 ft/min air velocity rating assures reliability under harsh environmental conditions
- Status LEDs remain visible through clear assembly cover
- Cover monitor switch for added security
- Standard sampling tube spacing for easy drop-in migration from other detectors
- Sampling tube can be installed with or without the cover in place and can be rotated in 45-degree increments to ensure proper alignment with duct airflow
- 15.2 to 19.95 Vdc operation
- Magnet-activated test switch
- One Form C auxiliary alarm relay for controlling ancillary equipment (e.g., HVAC controls)
- No special tools required for easy access to field connections
- Signature Series intelligence
- Environmental compensation with differential sensing for reliable, stable, and drift-free sensitivity
- Wide 0.79% to 2.46% obscuration/ft. smoke sensitivity
- Identification of dirty or defective detectors

EXHIBIT 'C'

Application

SuperDuct detectors are ideally suited to duct smoke detection applications where early indication of combustion is required within the confined space of ventilation ductwork. Its primary purpose is to provide early warning of an impending fire and to prevent smoke from circulating throughout the building. It is typically used to detect smoke in the supply side of the HVAC system but can provide supervision of the return side as well.



SuperDuct detectors continually sample air flow in the HVAC duct and initiate an alarm condition whenever smoke is detected. An alarm is activated when the quantity (percent obscuration) of combustion products in that air sample exceeds the detector's sensitivity setting.

Signature Series Intelligence

Like all Signature detectors, the SIGA-SD features electronic addressing and issues a dirty sensor warning when it reaches its preset limit. The dirty sensor warning indicates the sensor is operating within its specified limits but is in need of servicing. When the detector's ability to compensate for environmental changes has reached its limit, the duct smoke detector signals a trouble condition.

The SIGA-SD also uses differential sensing to prevent gradual environmental changes from triggering unwanted alarms. A rapid change in environmental conditions, such as smoke from a fire, causes the detector to signal an alarm state, but dust and debris accumulated over time does not change alarm sensitivity.

Each Signature Series SuperDuct detector contains a microprocessor that performs comprehensive self-diagnostics and stores the results in nonvolatile memory. Stored results include details such as hours of operation, last maintenance date, and number of alarms and troubles. This information can be retrieved and reviewed when desired.

Detector Configuration

The detector assembly cover provides easy access to the smoke sensor, its wiring connections, sample and exhaust tubes, and the smoke chamber itself.

Air enters the detector's sensing chamber through a sampling tube (ordered separately) that extends into the duct and is directed back into the ventilation system through an exhaust tube (included). The difference in air pressure between the two tubes pulls the sampled air through the sensing chamber. When a sufficient amount of smoke is detected in the sensing chamber, the detector initiates an alarm.

The sampling tube may be installed from either the duct side of the assembly or from inside the sensor compartment, as preferred by the installer. (The exhaust tube must be installed from the duct side.) Sampling tubes may be rotated in 45-degree increments so that air-holes can be aligned to allow the unit to be mounted at virtually any angle relative to the air flow.

In installations where the duct smoke detector's controls and indicators are hidden from view, a remote test station or an LED indicator can be connected to the detector to provide these functions.

Remote Test Stations

Labor-saving Remote Test/Reset stations provide alarm testing from the convenience of a remote location. Tests can be performed quickly and safely – without having to climb to the roof. Magnetically-operated and key-operated one-gang models are available. Signature SuperDuct detectors are also compatible with SIGA-LED remote alarm LED.

Air velocity in the duct as low as 100 ft/min. maintains adequate air flow into the sensor smoke chamber through air holes in the air sampling tube and discharges through the exhaust tube. *SuperDuct* air sampling tubes must be installed with the inlet holes facing the airstream. Sampling tubes may be rotated in 45-degree increments so that air-holes can be aligned to allow the unit to be mounted in virtually any angle relative to the airflow.

SuperDuct sensors are engineered to operate optimally under the harsh environmental conditions frequently found in HVAC ductwork. Nonetheless, before installing the detector, test the duct air velocity, temperature, and humidity to verify that it is within the operating range of the *SuperDuct* detector. Consult the *SuperDuct* installation sheet for details.

Dimensions

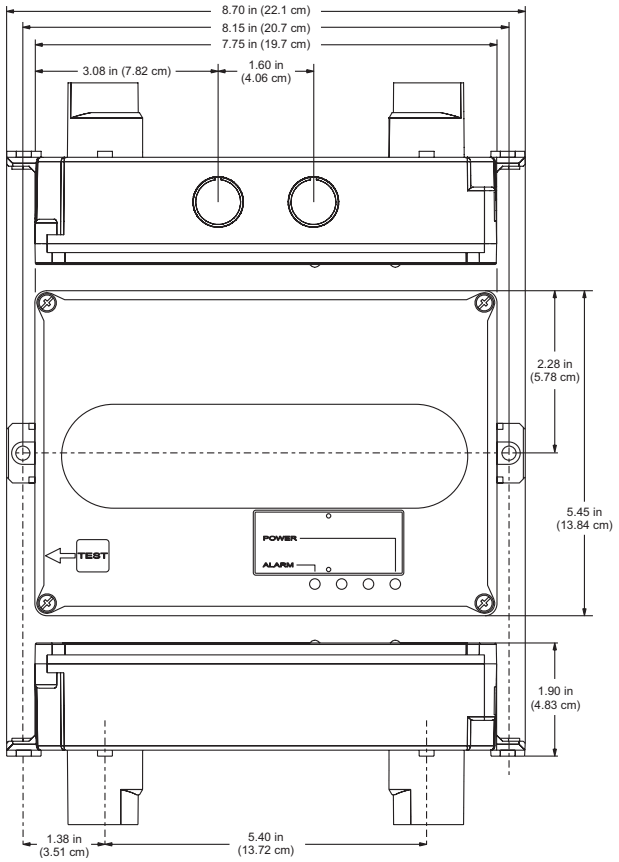
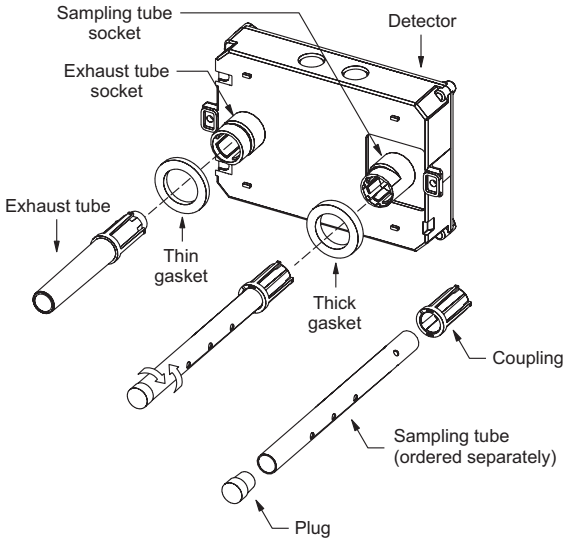
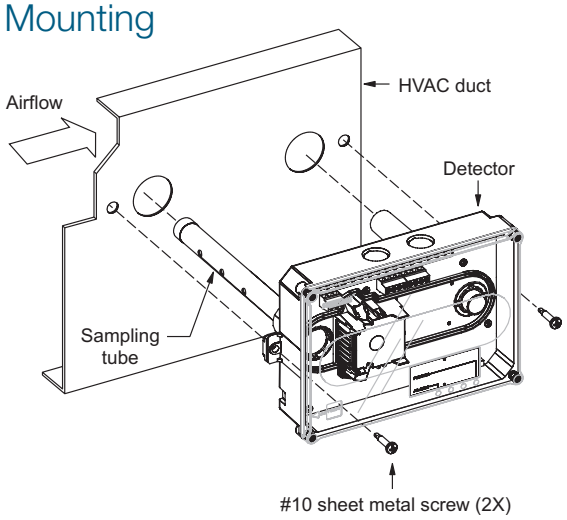


EXHIBIT 'C'

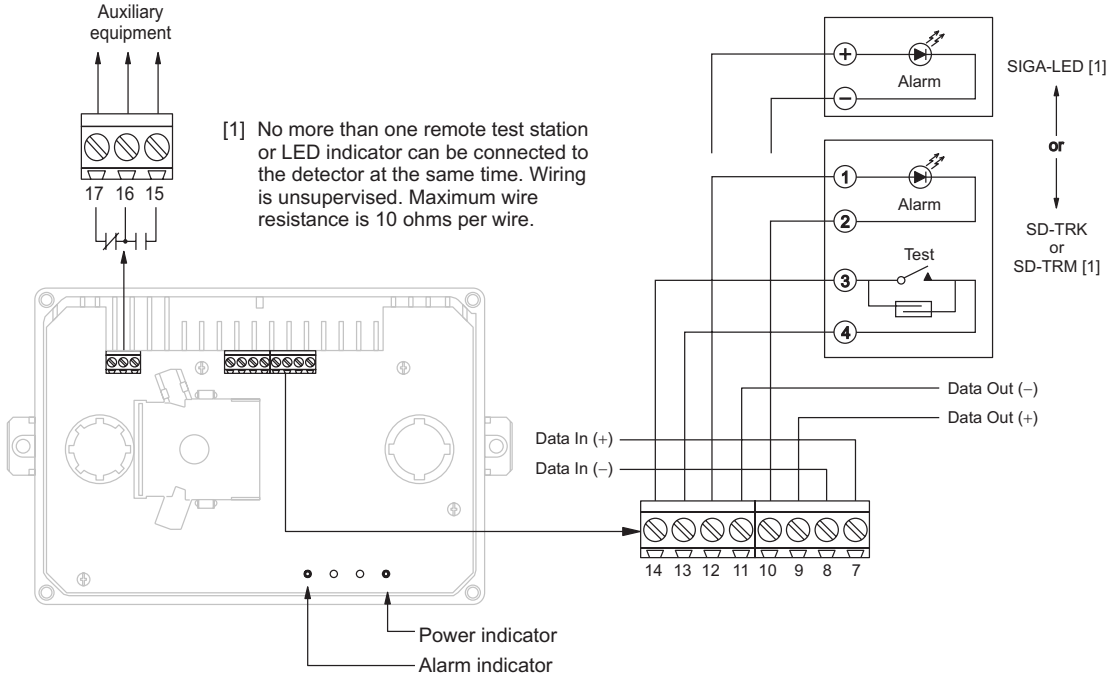
Assembly



Mounting

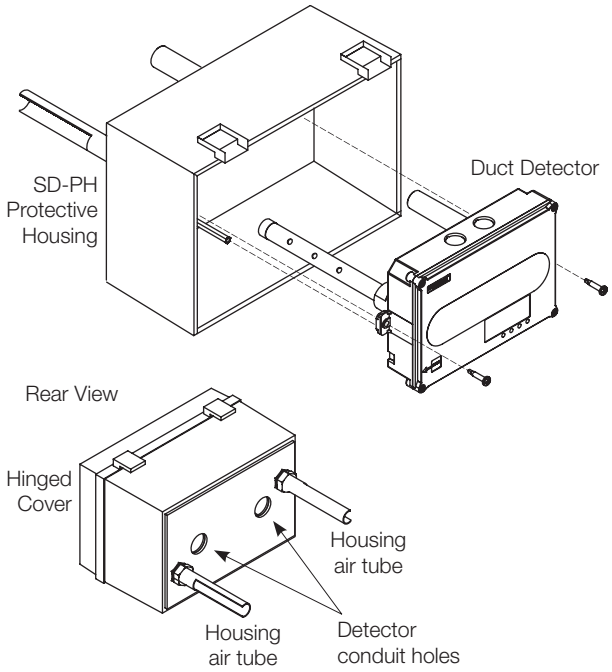


Wiring



High-humidity environments

Use the SD-PH Protective Housing when installing SuperDuct detectors in high-humidity environments. The SD-PH is a weatherized housing that prevents condensation on the device by insulating the detectors and providing circulated air from the monitored HVAC duct. The SD-PH also adds a layer of protection against physical damage to the unit.



The SD-PH is easy to install and service. The hinged and transparent cover provides ready access to the detector, while keeping its status indicators visible at all times.

Note: The SD-PH Protective Housing is weatherized against outdoor air, but it is not intended for direct outdoor exposure.

EXHIBIT 'C'

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Email: edwards.fire@fs.utc.com
Web: *Edwards-fire.com*

EDWARDS is a UTC brand.
1016 Corporate Park Drive
Mebane, NC 27302

Specifications, detector

Dimensions	8.70 x 5.45 x 1.90 inches (221 x 138 x 48 mm)
Wire size	14 to 22 AWG
Detection method	Photoelectric (light scattering principle)
Air velocity rating	100 to 4,000 ft/min and meets the required minimum air pressure differential
Air pressure differential	0.005 to 1.00 inches of water
Sensitivity	0.79 to 2.46 %/ft obscuration
Alarm test response time	5 seconds
LED indicators	Alarm (red), Power (green)
Common alarm relay	Unsupervised and power-limited Quantity: 1 Type: Form C Ratings: 2.0 A at 30 Vdc (resistive)
Operating voltage	15.2 to 19.95 Vdc
Operating current	Standby: 45 µA Alarm: 45 µA Inrush: 1 mA Standalone alarm: 18 mA
Operating environment	Temperature (UL): -20 to 158 °F (-29 to 70 °C). Temperature (ULC): -4 to 120 °F (-29 to 49 °C) Relative humidity: 10 to 93%, noncondensing
Agency listings	UL, ULC, CSFM, FM, MEA

Specifications, test stations

Remote Test/Reset Stations provide alarm test, trouble indication, and reset capability from a remote location. They include a one-gang plate, momentary SPST switch, red alarm LED, and terminal block. Magnetically-operated models (TRM) or key-operated models (TRK) are available.

Compatible electrical boxes	North American 1-gang box Standard 4-in square box, 1-1/2 inches deep, with 1-gang cover
LED indicators	Alarm (red)
LED type	Clear lens
Wire size	14 to 22 AWG
Resistance per wire	10 Ohms, max.
Current requirements	See controller specifications
LED circuit ratings	Voltage: 3 Vdc, max. Current: 30 mA, max.
Switch ratings (SD-TRK)	Voltage: 125 Vdc, max. Current: 4 A, max.
Switch ratings (SD-TRM)	Voltage: 200 Vdc, max. Current: 0.5 A, max.
Compatible detectors	SuperDuct conventional two-wire and Signature duct smoke detectors
Operating environment	-4°F to 158°F (-20°C to 70°C) Humidity: 93% RH, noncondensing
Storage temperature	-4 to 140 °F (-20 to 60 °C)
Agency listings	UL, ULC, MEA, CSFM

Ordering Information

Catalog Number	Description	Ship Wt., lb. (kg)
SIGA-SD	Intelligent SuperDuct Detector	2.4 (1.1)
Accessories		
SD-T8	8-inch sampling tube	0.5 (0.2)
SD-T18	18-inch sampling tube	1.5 (0.7)
SD-T24	24-inch sampling tube	2.7 (1.2)
SD-T36	36-inch sampling tube	3.0 (1.4)
SD-T42	42-inch sampling tube	3.5 (1.6)
SD-T60	60-inch sampling tube	5.8 (2.6)
SD-T78	78-inch sampling tube	7.5 (3.4)
SD-T120	120-inch sampling tube	11.5 (5.2)
SD-PH	Protective housing for high humidity environments	5.5 (2.5)
SIGA-LED	Remote alarm LED	1.0 (0.5)
SD-TRM	Remote test station, magnetic	1.0 (0.5)
SD-TRK	Remote test station, keyed	1.0 (0.5)
SD-VTK	Air velocity test kit (stoppers only, etc)	1.0 (0.5)
SD-GSK	Cover gasket kit	0.5 (0.2)
SD-MAG	Test magnet kit	0.5 (0.2)
SIGA-SDPCB	Replacement PCB/Signature sensor kit	1.0 (0.5)

EXHIBIT 'C'

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United Technologies
LIFE SAFETY & INCIDENT MANAGEMENT

Smoke Detector Guard

SIGA-GRD

SIGA-GRD

S2490

7300-1657:
0503

Overview

The SIGA-GRD Smoke Detector Guard protects Signature Series smoke detectors from damage and tampering without affecting airflow to the detector head. The sophisticated louver configuration on the detector guard allows Signature smoke detectors to be installed at their listed spacing and has no affect on the detector's selected operating sensitivity. The guard is constructed of rugged 16-guage steel and is finished with durable white baked powder coat enamel.

Standard Features

- **Agency listed with Signature Series smoke detectors**
  Tested and listed by Underwriters' Laboratories Inc.
- **Compatible with Signature Series smoke and CO detectors**
  Advanced design does not affect detector sensitivity; does not reduce the listed detector spacing.
- **Rugged, tamper-proof design**
  16-gauge steel louvered construction provides superior physical protection. Special fasteners guard against unauthorized access to the detector.
- **Easy mounting**
  Simple design ensures very fast, very secure installation, yet allows easy removal for detector cleaning and inspection.
- **Flush or surface mount**
  SIGA-DGSB Surface Mount Accessory allows installation over surface mounted conduit and electric boxes.

Application

Detector guards should be used wherever flying objects may accidentally damage the detector, or wherever they may be intentionally damaged or used to conceal contraband. Typical applications include correctional or detention facilities, mental hospitals, industrial or warehousing spaces, sports facilities and gymnasiums.

NFPA 72 Section 5-1.3.1 states "*Where subject to mechanical damage, an initiating device shall be protected. A mechanical guard used to protect a smoke or heat detector shall be listed for use with the detector being used*".

EXHIBIT 'C'

LIFE SAFETY & INCIDENT MANAGEMENT

Contact us...

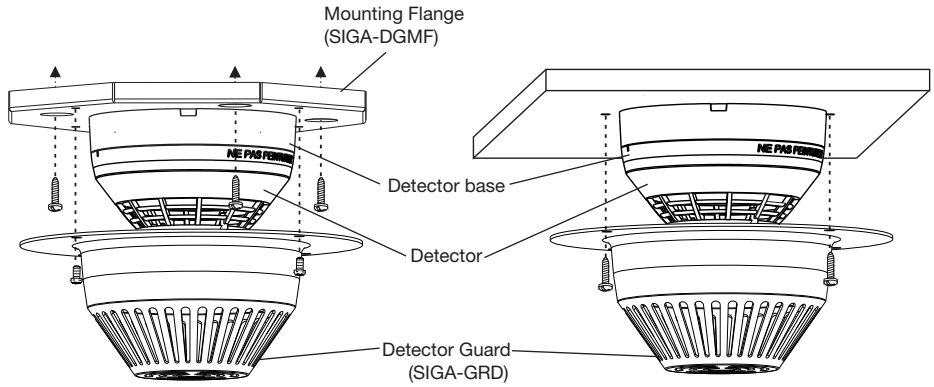
Email: *edwards.fire@fs.utc.com*
Web: *edwards-fire.com*

8985 Town Center Pkwy,
Bradenton, FL 34202

Installation and Mounting

The SIGA-GRD may be mounted one of three ways:

1. Directly to the ceiling, enclosing a detector installed to a flush-mounted electrical box.
2. To the SIGA-DGSB Surface Mount Adapter, which encloses a surface-mount electrical box.
3. To the optional mounting flange. This accessory is useful where the detector guard is removed periodically for inspection.



Specifications

	SIGA-GRD Detector Guard	SIGA-DGSB Detector Guard Surface Adapter
Construction	16 gauge steel	
Dimensions	7.27 inch (184.7mm) diameter x 3.25 inch (82.6mm) high	8.9 inch (225mm) octagonal x 2.25 inch (57mm) high
Finish	White; baked powder coat enamel	
Mounting	Mounts over flush 1-gang, octagon, and four-inch square North American electric boxes	Encloses surface mounted octagon or one-gang electric box
Compatible Detectors	Detectors: SIGA-COD, SIGA-COD-CA, SIGA-PCD, SIGA-PCD-CA, SIGA-PD Bases: SIGA-SB, SIGA-RB, SIGA-IB	
Agency Listings	UL, ULC, CSFM	-

EDWARDS recommends that fire alarm systems and devices always be installed in accordance with the latest recognized edition of national and local fire alarm codes.

Ordering Information

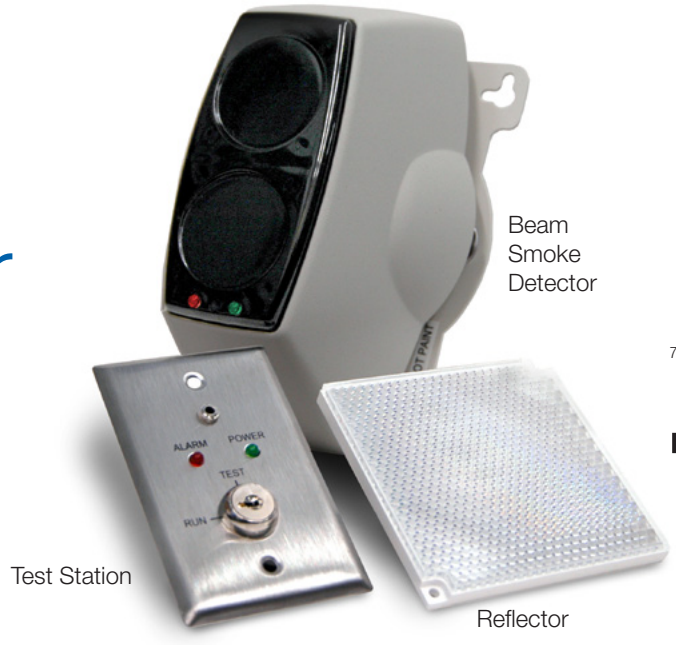
Catalog Number	Description	Ship Wt., lb. (kg)
SIGA-GRD	Smoke Detector Guard	0.8 (0.36)
SIGA-DGSB	Detector Guard Surface Mount Accessory	2 (0.9)
SIGA-DGMF	Mounting Flange (optional)	2. (0.9)

EXHIBIT 'C'

Life Safety & Communications

Reflective Beam Smoke Detector

EC-50R/-100R



S3417

7260-1508: 0102

MEA

Overview

The EC-50R/-100R comprises a transmitter and receiver in a single enclosure and is usually installed between 19 inches and 24 inches below the ceiling. The transmitter emits an invisible infrared light beam that is reflected via a prism mounted directly opposite and with a clear line of sight. The reflected infrared light is detected by the receiver and analyzed. Smoke in the beam path will reduce the received infrared light proportionally to the density of the smoke. The detector analyzes this attenuation or obscuration of light and acts accordingly. Detectors are typically mounted within ±30 feet (9.14 m) of a potential fire source. Consult your Authority Having Jurisdiction for spacing requirements specific to your locality.

Standard Features

- Coverage: 50R range 15 -160 ft (4.6 - 48.8 m); 100R range 160- 330 ft (48.8 - 100 m)
- Microprocessor controlled
- Automatic drift compensation
- Simple alignment
- Selectable alarm thresholds
- 24 Vdc operating voltage
- Latching or non-latching operation
- Low current consumption
- Optional Ground Level Test Station

Operation

Alarm Threshold: Alarm thresholds of 25%, 35% and 50% obscuration can be selected to suit the environment, with 25% the most sensitive setting. The factory default setting is 35 percent and is used for most typical applications. If the received infrared signal reduces to below the selected threshold for approximately 10 seconds, the fire relay is activated.

Fire Alarm: There are two modes to the operation of the fire relay. Auto reset mode will reset the fire relay 5 seconds after the received infrared signal has recovered to a level above the Alarm threshold. Latching mode holds the fire relay active indefinitely after an Alarm condition has occurred. To clear the latched mode, power must be removed from the Detector for a minimum of 5 seconds.

Trouble Alarm: If the infrared beam is obscured rapidly to a level of 90% or greater for approximately 10 seconds, the Trouble relay is activated. Typical causes of trouble include an object being placed in the beam path, transmitter failure, loss of the prism, or sudden misalignment of the detector. The Trouble relay will reset within 2 seconds of the trouble being cleared.

Automatic Gain Control (AGC): The Detector monitors long term degradation of signal strength caused by component aging or build up of dirt on optical surfaces. By comparing the received infrared signal against a standard every 15 minutes, the detector automatically compensates for signal differences of less than 0.7dB/hour. When the detector is showing AGC fault, detector is still capable of generating an alarm, and will display both Alarm and Trouble indications.

EXHIBIT 'C'

Test Stations

The optional Ground Level Test Station facilitates testing of a connected detector from safe and convenient location. The unit is key-operated with a two-position Test/Run switch and includes two dedicated LEDs: one for Alarm indication and one for Power indication.

When the test station key is inserted and turned to the Test position, the Power LED flashes to indicate that power is connected and that the 2-wire data link cable is correctly installed. After several seconds in the test position, the test station initiates an alarm at the detector head, which is indicated by the red LED on the detector and the Alarm LED on the test station. Test mode automatically times out after 20 seconds at which time the detector returns to standby mode, regardless of the test station keyswitch position.

Connection between the test station and the detector is made by means of a 2-wire data link cable. The test station requires a 10.2 - 30 Vdc power connection.

Test Filter: A test filter is supplied with the detector, which is used to verify the alarm threshold. See the installation sheet for details on testing and calibration.

Application

Reflective beam smoke detectors are ideal for large open areas such as warehouses, hotel atriums, industrial plants and school gymnasiums.

An infrared signal is projected out of the transmitter optics to the reflector placed at the opposite end of the detection zone. The signal is reflected back to the receiver where it is analyzed for fire and trouble. The EC-50R/-100R must be positioned correctly to minimize the detection time. The maximum lateral distance either side of the beam is found to be typically 30 feet (9.1 m) for satisfactory detection under flat ceilings, providing a total area coverage of 19,800 square feet (60 feet x 330 feet), or 1844 square metres (18.3 x 100.6 m).

Smoke stratification may be overcome by mounting multiple beam detectors at different heights, one of which will project an infrared beam below the heat layer and into the smoke layer.

Detection time will be longer in a building with a peaked roof if a fire occurs at the fringes of the protected area. If in doubt conduct appropriate smoke tests.

The ideal location and spacing of the Detector is critical in a properly installed and operating fire alarm system. It is recommended that the detectors be located and spaced in accordance with the National Fire Protection Association (NFPA) Standard 72 "The National Fire Code". No liability will be accepted for applications not conforming to NFPA regulations.

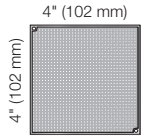
The recommended installation height is approximately 19 to 24 inches (483 to 610 mm) below the ceiling. However, in all installations the National Fire Standards for that country/state must be consulted.

Because of the reflecting properties of the beam, all objects must be kept a minimum of 19 inches (483 mm) away from the centre of the beam path down the entire beam length. If highly reflective surfaces are close to the beam, then greater clearances should be applied.

Reflector Positioning

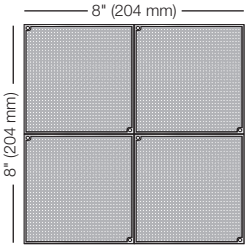
Mount the reflector(s) on a secure surface directly opposite the detector. Ensure that there is a clear line of sight between the detector and the reflector(s), and that no moving objects such as doors or mechanical equipment interfere with the beam path. All objects should be kept a minimum of 19 inches (483 mm) away from the center of the detector beam down the entire length of the beam path. Reflectors should not be mounted on glass or reflective surfaces.

EC-50R detectors should be mounted between 15 and 160 feet (4.6 and 48.8m) from a single reflector.



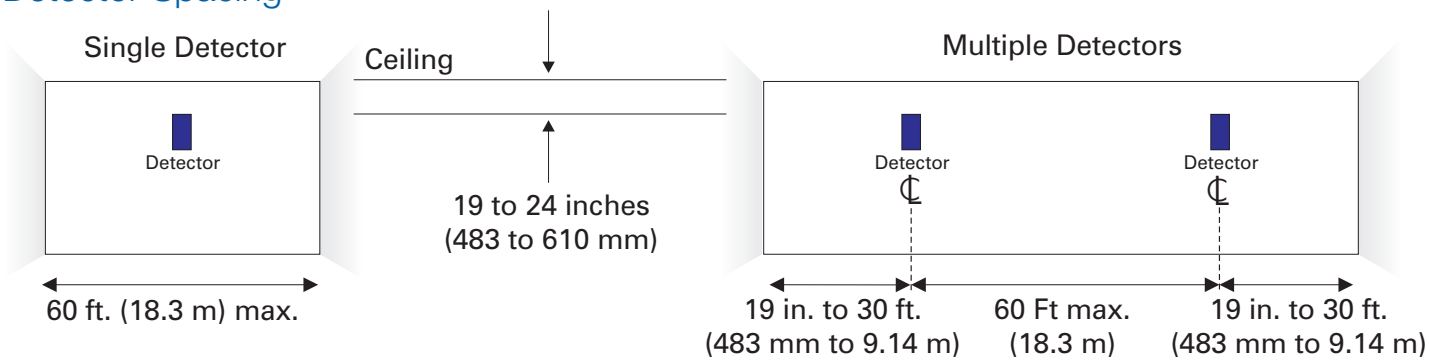
Single reflector

EC-100R detectors should be mounted between 160 and 330 feet (48.8 and 100.6 m) from a group of four reflectors.



Group of four reflectors

Detector Spacing



Detector positioning shown here is recommended for protected areas with flat ceilings. Spacing may vary for areas with high or sloped ceilings. In such cases, verify operation with smoke tests.

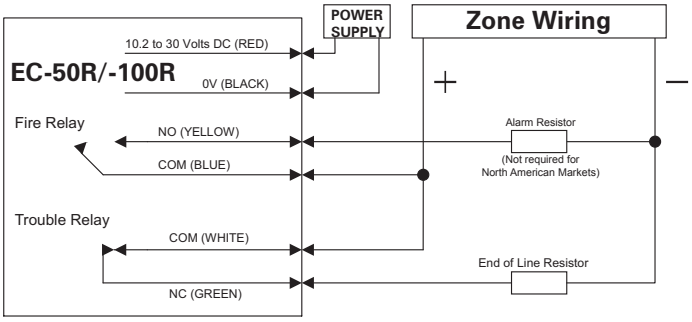
In some cases potential smoke layering may be overcome by installing multiple beam detectors at different heights.

EXHIBIT 'C'

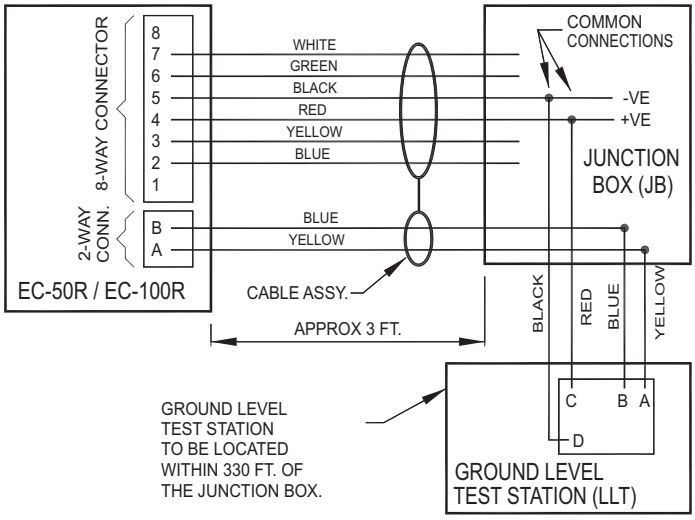
Typical Wiring

The field wiring interface is accessed through the back plate of the detector head. The 8-pin connector is the interface to the field and is numbered left to right. This diagram is an example for a single reflective beam unit installed as the only device on a zone. The correct operation for Fire and Trouble should always be verified. Relays are shown in quiescent (standby) condition. Alarm and End of Line resistor values are determined by the fire alarm control panel and market standard practices.

Zone Wiring



Ground Level Test Station



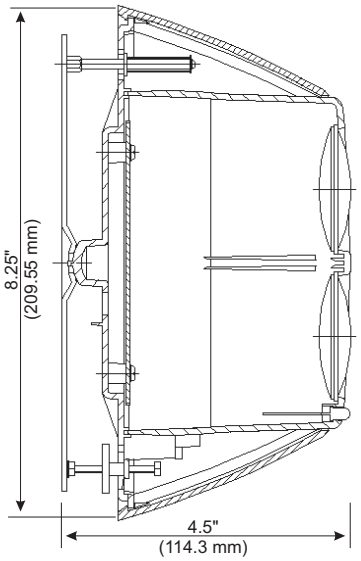
Detector Installation

Install the detector to a secure surface not subject to movement or vibration. Use the template provided to mark and install four fixing points. Secure the rear mounting plate to the four fixing points through the keyholes on the plate.

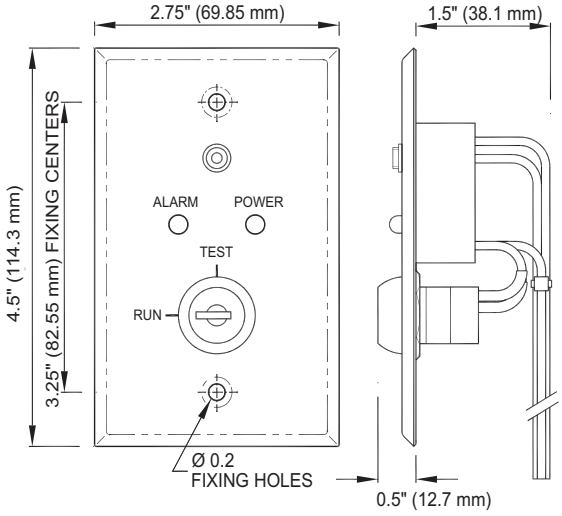
When installing the detector on a wall supported with wood studs, ensure the fixing points are secured directly to the supporting stud. When installing the detector on a wall supported with metal studs, mount a metal plate at least 1/8" (3.2 mm) thick across two studs and secure the detector to the plate.

Dimensions

Detector



Test Station



Reflector

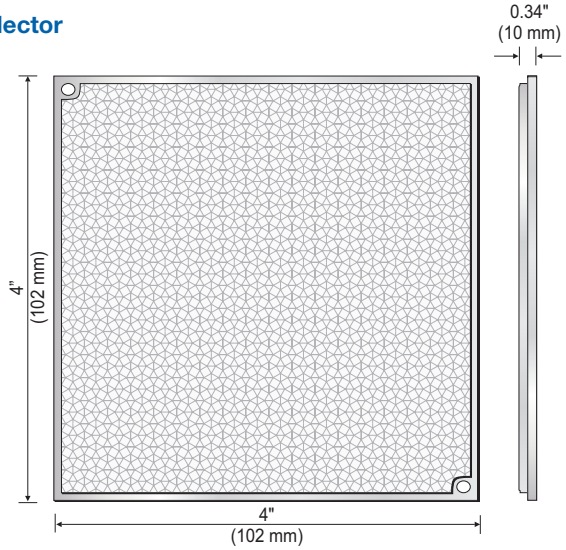


EXHIBIT 'C'

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Engineering Specifications

EC-50R

The projected beam type smoke detector shall be listed to UL 268 and shall consist of an integrated transmitter and receiver. The beam detector shall operate between a range of 15 and 160 feet (4.57 and 48.77 m). It shall feature automatic gain control, which will compensate for gradual signal deterioration due to dirt accumulation on the lenses. The unit shall include a wall mounting bracket. Testing shall be carried out using a calibrated test filter. It shall be possible to test the detector without direct access to it by means of a remotely installed key-operated test station.

EC-100R

The projected beam type smoke detector shall be listed to UL 268 and shall consist of an integrated transmitter and receiver. The beam detector shall operate between a range of 160 and 330 feet (48.77 and 100 m). It shall feature automatic gain control, which will compensate for gradual signal deterioration due to dirt accumulation on the lenses. The unit shall include a wall mounting bracket. Testing shall be carried out using a calibrated test filter. It shall be possible to test the detector without direct access to it by means of a remotely installed key-operated test station.

Ordering Information

P/N	Description	Ship Wt lb (kg)
EC-50R	EC-50R Reflective Beam Smoke Detector c/w test filter and one reflector	2.0 (0.90)
EC-100R	EC-100R Reflective Beam Smoke Detector c/w test filter and four reflectors	2.0 (0.90)
EC-LLT	Ground Level Test Station	1.0 (0.45)
23901-01	Replacement Reflector for EC-50R/-100R	1.0 (0.45)

Technical Specifications

Beam Detector

Compatibility	All Edwards Fire Alarm Control Panels
Power Supply	10.2 Vdc to 30 Vdc (continuous power)
Current	*Standby:* Less than 4 mA *Alarm/Trouble:* Less than 14 mA
Contacts	*Alarm:* Normally Open, rated 2A, 30 Vdc, resistive *Trouble:* Normally Closed, rated 2A, 30 Vdc, resistive
Signal Delay	Alarm and trouble: 10 seconds
Reset Time	>5 seconds (power down)
Dimensions (HxWxD)	8.25 in x 5.1 in x 4.7 in (21 cm x 13 cm x 12 cm)
Weight	1.5 lb (0.68 kg)
Operating Environment	*Temperature:* 32° F to 100° F (0° C to 37° C) *Humidity:* 93%RH, Non-condensing
Beam Coverage	*Width:* 30 ft (9.14 m) either side of beam *Length, EC-50R:* 15 ft to 160 ft (4.57 m to 48.77 m) *Length, EC-100R:* 160 ft to 330 ft (48.77 m to 100 m)
Alarm Thresholds	2.50dB (25%), 3.74dB (35%), 6.02dB (50%) obscuration
Optical Wavelength	880nm
Agency Listings	UL, ULC, CE

Test Station

Operating voltage	10.2 to 30 Vdc
Off current	0 mA
On current	8 mA max (alarm)
Wiring Terminations	Suitable for #12 to #18 AWG (2.5 mm^2 to 0.75 mm^2) wire size. Shielded twisted pair recommended.
Operating temperature	32 °F to 100 °F
Key reference	A126
Humidity	max 93% RH (non condensing)
Agency Listings	UL, MEA, CSFM

EXHIBIT 'C'

EDWARDS
United Technologies
LIFE SAFETY & INCIDENT MANAGEMENT

Manual Pull Stations

SIGA-270, SIGA-270P, SIGA-278

SIGA-270 SERIES

SIGA-278

Patented

MEA FM APPROVED 7150-1657: 0129 S2318

Overview

The SIGA-270 and SIGA-278 series Manual Pull Stations are part of EDWARDS's Signature Series system. The SIGA-270 Fire Alarm Manual Pull Stations feature our very familiar teardrop shape. They are made from die-cast zinc and finished with red epoxy powder-coat paint complemented by aluminum colored stripes and markings. With positive pull-lever operation, one pull on the station handle breaks the glass rod and turns in a positive alarm, ensuring protection plus fool-proof operation. Presignal models (SIGA-270P) are equipped with a general alarm (GA) keyswitch for applications where two stage operation is required. The up-front highly visible glass rod discourages tampering, but is not required for proper operation.

EDWARDS's double action single stage SIGA-278 station is a contemporary style manual station made from durable red colored lexan. To initiate an alarm, first lift the upper door marked "LIFT THEN PULL HANDLE", then pull the alarm handle.

Standard Features

Note: *Some features described here may not be supported by all control systems. Check your control panel's Installation and Operation Guide for details.*

- **Traditional familiar appearance**
  SIGA-270 models feature our familiar teardrop design with simple positive pull action and sturdy die-cast metal body.
- **One stage (GA), two stage (pre-signal), and double action models**
  SIGA-270 models are available for one or two stage alarm systems. The single stage double action SIGA-278 features a rugged Lexan housing with keyed reset mechanism.
- **Break glass operation**
  An up-front visible glass rod on the SIGA-270 discourages tampering.
- **Intelligent device with integral microprocessor**
  All decisions are made at the station allowing lower communication speed while substantially improving control panel response time. Less sensitive to line noise and loop wiring properties; twisted or shielded wire is not required.
- **ADA Compliant**
  Meets ADA requirements for manual pull stations.
- **Electronic Addressing with Non-volatile memory**
  Permanently stores programmable address, serial number, type of device, and job number. Automatically updates historic information including hours of operation, last maintenance date, number of alarms and troubles, and time and date of last alarm.
- **Automatic device mapping**
  Each station transmits wiring information to the loop controller regarding its location with respect to other devices on the circuit.
- **Diagnostic LEDs**
  Status LEDs; flashing GREEN shows normal polling; flashing RED shows alarm state.
- **Designed for high ambient temperature operation**
  Install in ambient temperatures up to 120 °F (49 °C).

EXHIBIT 'C'

Application

The operating characteristics of the fire alarm stations are determined by their sub-type code or “Personality Code”. NORMALLY-OPEN ALARM - LATCHING (Pesonality Code 1**)** is assigned by the factory; no user configuration is required. The device is configured for Class B IDC operation. An ALARM signal is sent to the loop controller when the station’s pull lever is operated. The alarm condition is latched at the station.

Compatibility

Signature Series manual stations are compatible only with EDWARDS’s Signature Loop Controller.

Warnings & Cautions

This device will not operate without electrical power. As fires frequently cause power interruption, we suggest you discuss further safeguards with your local fire protection specialist.

Testing & Maintenance

To test (or reset) the station simply open the station and operate the exposed switch. The SIGA-270 series are opened with a tool; the SIGA-278 requires the key which is supplied with that station.

The station’s automatic self-diagnosis identifies when it is defective and causes a trouble message. The user-friendly maintenance program shows the current state of each Signature series device and other pertinent messages. Single devices may be deactivated temporarily, from the control panel. Availability of maintenance features is dependent on the fire alarm system used.

Scheduled maintenance (Regular or Selected) for proper system operation should be planned to meet the requirements of the Authority Having Jurisdiction (AHJ). Refer to current NFPA 72 and ULC CAN/ULC 536 standards.

Typical Wiring

The fire alarm station’s terminal block accepts #18 AWG (0.75mm^2) to #12 AWG (2.5mm^2) wire sizes. See Signature Loop Controller catalog sheet for detailed wiring requirement specifications.

Wiring Notes

1. Refer to Signature Loop Controller manual for maximum wire distance.
2. All wiring is power limited and supervised.

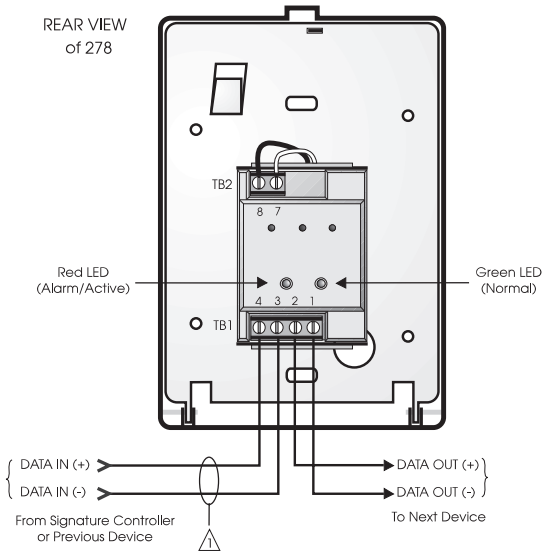

Figure 4. Single Stage Systems

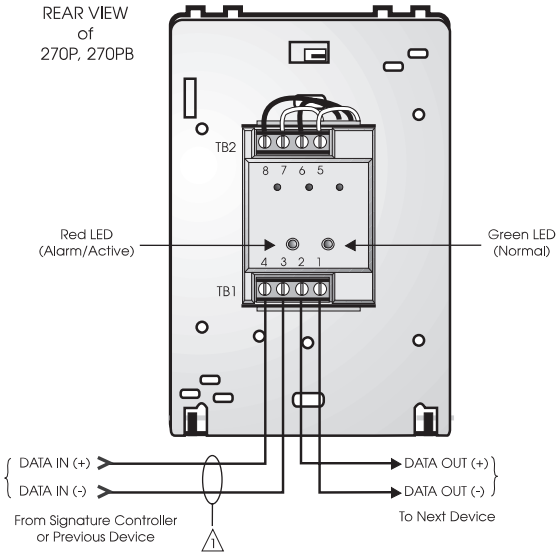

Figure 5. Two Stage Systems

EXHIBIT 'C'

Installation

Single-stage Signature Series fire alarm manual pull stations mount to North American 2½ inch (64 mm) deep 1-gang boxes.

Two stage presignal (270P) models require 1½ inch (38 mm) deep 4-inch square boxes with 1-gang, ½-inch raised covers. Openings must be angular. *Rounded openings are not acceptable.* Recommended box: Steel City Model 52-C-13; in Canada, use Iberville Model CI-52-C-49-1/2.

All models include terminals are suited for #12 to #18 AWG (2.5 mm^2 to 0.75 mm^2) wire size. EDWARDS recommends that these fire alarm stations be installed according to latest recognized edition of national and local fire alarm codes.

Electronic Addressing: The loop controller electronically addresses each manual station, saving valuable time during system commissioning. Setting complicated switches or dials is not required. Each station has its own unique serial number stored in its on-board memory. The loop controller identifies each device on the loop and assigns a "soft" address to each serial number. If desired, the stations can be addressed using the SIGA-PRO Signature Program/Service Tool.

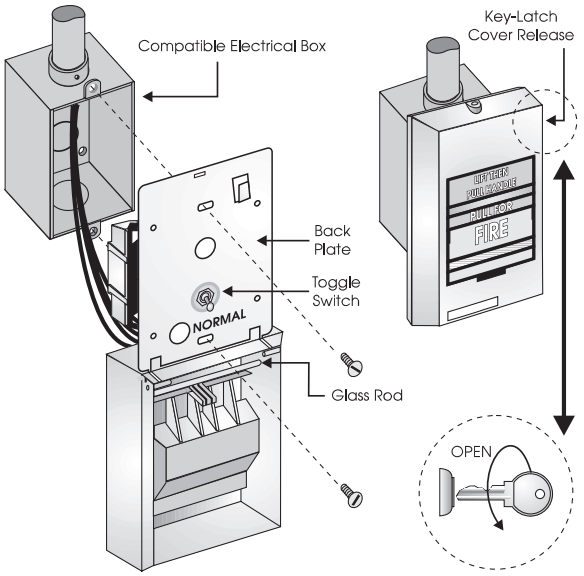

Figure 1. SIGA-278 installation

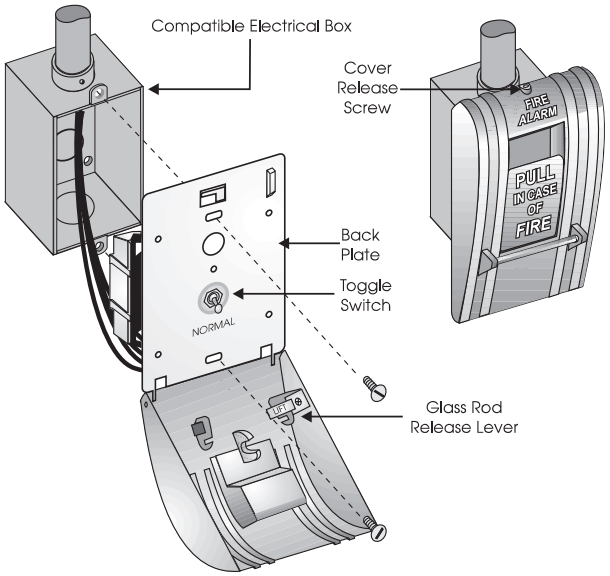

Figure 2. SIGA-270, SIGC-270F, SIGC-270B installation

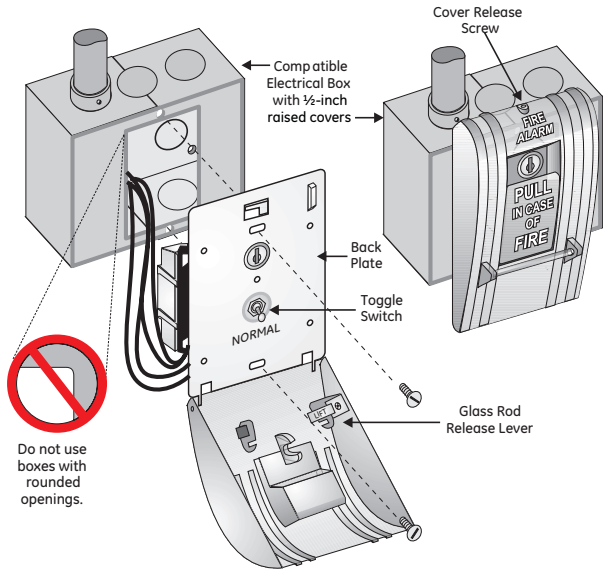

Figure 3. SIGA-270P, SIGC-270PB installation

EXHIBIT 'C'

LIFE SAFETY & INCIDENT MANAGEMENT

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Mebane, NC 27302

Specifications

Catalog Number	SIGA-270, SIGC-270F, SIGC-270B	SIGA-270P, SIGC-270PB	SIGA-278
Description	Single Action - One Stage	Single Action -Two Stage (Presignal)	Double Action - One Stage
Addressing Requirements	Uses 1 Module Address	Uses 2 Module Addresses	Uses 1 Module Address
Operating Current	Standby = 250µA Activated = 400µA	Standby = 396µA Activated = 680µA	Standby = 250µA Activated = 400µA
Construction & Finish	Diecast Zinc - Red Epoxy with aluminum markings		Lexan - Red with white markings
Type Code	Factory Set		
Operating Voltage	15.2 to 19.95 Vdc (19 Vdc nominal)		
Storage and Operating Environment	Operating Temperature: 32ºF to 120ºF (0ºC to 49ºC) Storage Temperature: -4ºF to 140ºF (-20ºC to 60ºC) Humidity: 0 to 93% RH		
LED Operation	On-board Green LED - Flashes when polled On-board Red LED - Flashes w hen in alarm		
Compatibility	Use With: Signature Loop Controller		
Agency Listings	UL, ULC (note 1), MEA, CSFM, FM		

Note: *SIGC-270F, SIGC-270B and SIGC-270PB are ULC listed only. Suffix "F" indicates French markings. Suffix "B" indicates English/French biling ual markings.*

Ordering Information

Catalog Number	Description	Ship Wt. lbs (kg)
SIGA-270	One Stage Fire Alarm Station, English Markings - UL/ULC Listed	1 (0.5)
SIGC-270F	One Stage Fire Alarm Station, French Markings - ULC Listed	
SIGC-270B	One Stage Fire Alarm Station, French/English Markings - ULC Listed	
SIGA-270P	Two Stage (Presignal) Fire Alarm Station, English Markings - UL/ULC Listed	
SIGC-270PB	Two Stage (Presignal) Fire Alarm Station, French/English Markings - ULC Listed	
SIGA-278	Double Action (One Stage) Fire Alarm Station, English Markings - UL/ULC Listed	

Accessories		
32997	GA Key w/Tag - for pre-signal station (CANADA ONLY)	0.1 (.05)
276-K2	GA Key - for pre-signal station (USA ONLY)	
276-K1	Station Reset Key, Supplied with all Key Reset Stations	
27165	12 Glass Rods - for SIGA-270 series (CANADA ONLY)	
270-GLR	20 Glass Rods - for SIGA-270 series (USA ONLY)	
276-GLR	20 Glass Rods - for SIGA-278 series	
276B-RSB	Surface Mount Box, Red - for SIGA pull stations	1 (0.6)

EXHIBIT 'C'

EDWARDS
United Technologies
LIFE SAFETY & INCIDENT MANAGEMENT

Key-operated Fire Alarm Station

RMS-1T-KO

Overview

The RMS-1T-KO Key-operated Fire Alarm Station is ideal for use in buildings such as penal institutions or special needs housing, or anywhere an ordinary pull station would be operated for reasons other than its intended purpose. The RMS-1T-KO station is fitted with a key-operated switch of which the key is not easily duplicated.

The RMS-1T-KO has one Single Pole Normally Open contact rated for 10 amps at 125 Vdc. It features terminal connectors for easy field wiring. The key can be removed in both the “ON” and “OFF” positions.

The RMS-1T-KO Station flush mounts to any standard North American 1-gang electrical box 2-1/2 inch (63mm) deep minimum.

Standard Features

- Tamperproof actuation
- Single-stage operation
- Single-pole N.O. contact
- Terminal connectors
- One-gang flush mounting

EXHIBIT 'C'

LIFE SAFETY & INCIDENT MANAGEMENT

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Web: *edwards-fire.com*

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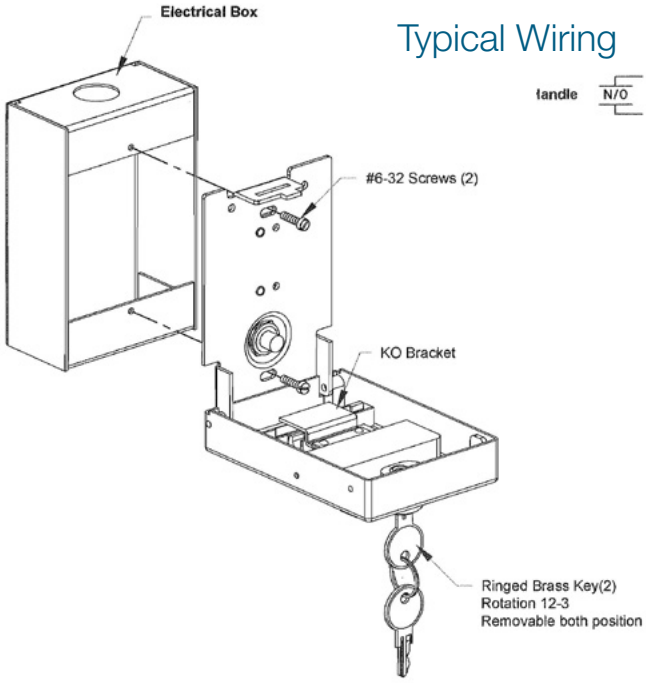
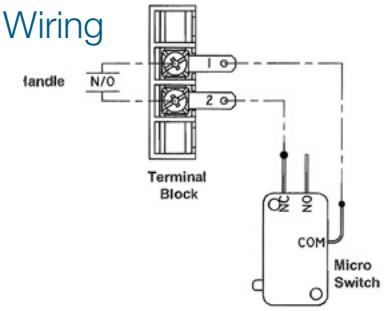
Mebane, NC 27302

Installation

EDWARDS recommends that these Key-operated Fire Alarm Stations always be installed in accordance with the latest recognized editions of local and national fire alarm codes.



Typical Wiring



Specifications

Keyswitch Contacts	Single Pole Normally Open Rating: 10 amp at 125 Vdc
Wire Connection	Terminals
Mounting	Flush to: One-gang 2-1/2 inch (63mm) deep standard North-American electrical box
Operating Environment	Normal Indoor

Ordering Information

Catalog Number	Description	Shipping Weight
RMS-1T-KO	Key-operated Fire Alarm Station — Normally Open	0.3 lb (0.6 lb)

EXHIBIT 'C'

12-18-17

LIFE SAFETY & INCIDENT MANAGEMENT

Input Modules

SIGA-CT1, SIGA-CT1HT, SIGA-CT2, SIGA-MCT2

FM APPROVED MEA

7300-1657: 0121

S3424

Overview

The SIGA-CT1 Single Input Module, SIGA-CT1HT High Temperature Single Input Module and SIGA-CT2/SIGA-MCT2 Dual Input Modules are intelligent analog addressable devices used to connect one or two Class B normally-open Alarm, Supervisory, or Monitor type dry contact Initiating Device Circuits (IDC).

The actual function of these modules is determined by the "personality code" selected by the installer. This code is downloaded to the module from the Signature loop controller during system configuration.

The input modules gather analog information from the initiating devices connected to them and convert it into digital signals. The module's on-board microprocessor analyzes the signal and decides whether or not to input an alarm.

The SIGA-CT1, SIGA-CT1HT and SIGA-CT2 mount to standard North American 1-gang electrical boxes, making them ideal for locations where only one module is required. Separate I/O and data loop connections are made to each module.

The SIGA-CT1HT module operates at an expanded temperature range of 32 ºF to 158 ºF (0 ºC to 70 ºC) for those applications requiring more extreme environmental temperature variation.

The SIGA-MCT2 is part of the UIO family of plug-in Signature Series modules. It functions identically to the SIGA-CT2, but takes advantage of the modular flexibility and easy installation that characterizes all UIO modules. Two- and six-module UIO motherboards are available. All wiring connections are made to terminal blocks on the motherboard. UIO assemblies may be mounted in EDWARDS enclosures.

Standard Features

- **Multiple applications**
  Including Alarm, Alarm with delayed latching (retard) for waterflow applications, Supervisory, and Monitor. The installer selects one of four "personality codes" to be downloaded to the module through the loop controller.
- **SIGA-CT1HT rated for high temperature environments**
  Suitable for attic installation and monitoring high temperature heat detectors.
- **Plug-in (UIO) or standard 1-gang mount**
  UIO versions allow quick installation where multiple modules are required. The 1-gang mount version is ideal for remote locations that require a single module.
- **Automatic device mapping**
  Signature modules transmit information to the loop controller regarding their circuit locations with respect to other Signature devices on the wire loop.
- **Electronic addressing**
  Programmable addresses are downloaded from the loop controller, a PC, or the SIGA-PRO Signature Program/Service Tool. There are no switches or dials to set.
- **Ground fault detection by address**
  Detects ground faults right down to the device level.

EXHIBIT 'C'

Signature Series Overview

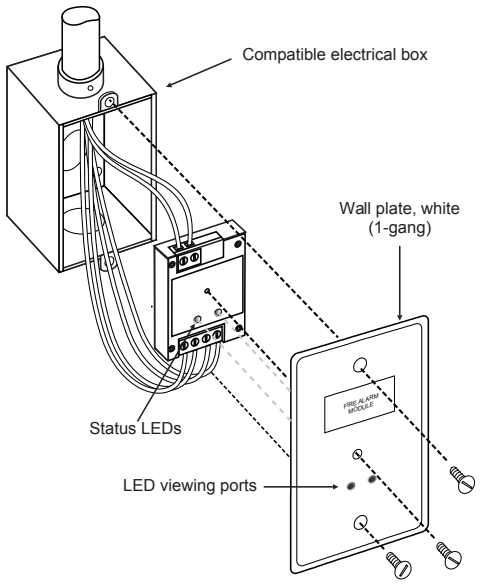
The Signature Series intelligent analog-addressable system from EDWARDS Security is an entire family of multi-sensor detectors and mounting bases, multiple-function input and output modules, network and non-network control panels, and user-friendly maintenance and service tools. Analog information from equipment connected to Signature devices is gathered and converted into digital signals. An onboard microprocessor in each Signature device measures and analyzes the signal and decides whether or not to input an alarm. The microprocessor in each Signature device provides four additional benefits – Self-diagnostics and History Log, Automatic Device Mapping, and Fast, Stable Communication.

Self-diagnostics and History Log – Each Signature Series device constantly runs self-checks to provide important maintenance information. The results of the self-check are automatically updated and permanently stored in its non-volatile memory. This information is accessible for review any time at the control panel, PC, or using the SIGA-PRO Signature Program/Service Tool.

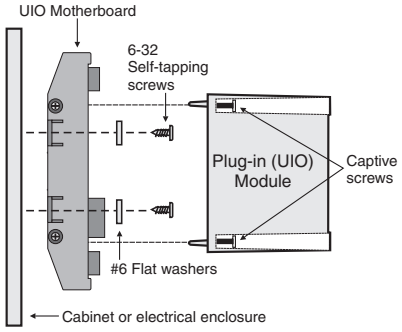
Automatic Device Mapping –The Signature Data Controller (SDC) learns where each device's serial number address is installed relative to other devices on the circuit. The SDC keeps a map of all Signature Series devices connected to it. The Signature Series Data Entry Program also uses the mapping feature. With interactive menus and graphic support, the wired circuits between each device can be examined. Layout or "as-built" drawing information showing branch wiring (T-taps), device types and their address are stored on disk for printing hard copy.

Installation

SIGA-CT1, SIGA-CT1HT and SIGA-CT2: modules mount to North American 2½ inch(64 mm) deep 1-gang boxes and 1½ inch (38 mm) deep 4 inch square boxes with 1-gang covers and SIGA-MP mounting plates. The terminals are suited for #12 to #18 AWG (2.5 mm^2 to 0.75 mm^2) wire size.



SIGA-MCT2: mount the UIO motherboard inside a suitable EDWARDS enclosure with screws and washers provided. Plug the SIGA-MCT2 into any available position on the motherboard and secure the module to the motherboard with the captive screws. Wiring connections are made to the terminals on the motherboard (see wiring diagram). UIO motherboard terminals are suited for #12 to #18 AWG (2.5 mm^2 to 0.75 mm^2) wire size.



Electronic Addressing - The loop controller electronically addresses each module, saving valuable time during system commissioning. Setting complicated switches or dials is not required. Each module has its own unique serial number stored in its on-board memory. The loop controller identifies each device on the loop and assigns a "soft" address to each serial number. If desired, the modules can be addressed using the SIGA-PRO Signature Program/Service Tool.

EDWARDS recommends that this module be installed according to latest recognized edition of national and local fire alarm codes.

Application

The duty performed by the SIGA-CT1 and SIGA-CT2/MCT2 is determined by their sub-type code or "Personality Code". The code is selected by the installer depending upon the desired application and is downloaded from the loop controller.

One personality code can be assigned to the SIGA-CT1. Two personality codes can be assigned to the SIGA-CT2/MCT2. Codes 1, 2, 3 and 4 can be mixed on SIGA-CT2/MCT2 modules only. For example, personality code 1 can be assigned to the first address (circuit A) and code 4 can be assigned to the second address (circuit B).

NORMALLY-OPEN ALARM - LATCHING (Personality Code 1) - Assign to one or both circuits. Configures either circuit A or B or both for Class B normally open dry contact initiating devices such as Pull Stations, Heat Detectors, etc. An ALARM signal is sent to the loop controller when the input contact is closed. The alarm condition is latched at the module.

NORMALLY-OPEN ALARM - DELAYED LATCHING (Personality Code 2) - Assign to one or both circuits. Configures either circuit A or B or both for Class B normally-open dry contact initiating devices such as Waterflow Alarm Switches. An ALARM signal is sent to the loop controller when the input contact is closed for approximately 16 seconds. The alarm condition is latched at the module.

NORMALLY-OPEN ACTIVE - NON-LATCHING (Personality Code 3) - Assign to one or both circuits. Configures either circuit A or B or both for Class B normally-open dry contact monitoring input such as from Fans, Dampers, Doors, etc. An ACTIVE signal is sent to the loop controller when the input contact is closed. The active condition is not latched at the module.

NORMALLY-OPEN ACTIVE - LATCHING (Personality Code 4) - Assign to one or both circuits. Configures either circuit A or B or both for Class B normally open dry contact monitoring input such as from Supervisory and Tamper Switches. An ACTIVE signal is sent to the loop controller when the input contact is closed. The active condition is latched at the module.

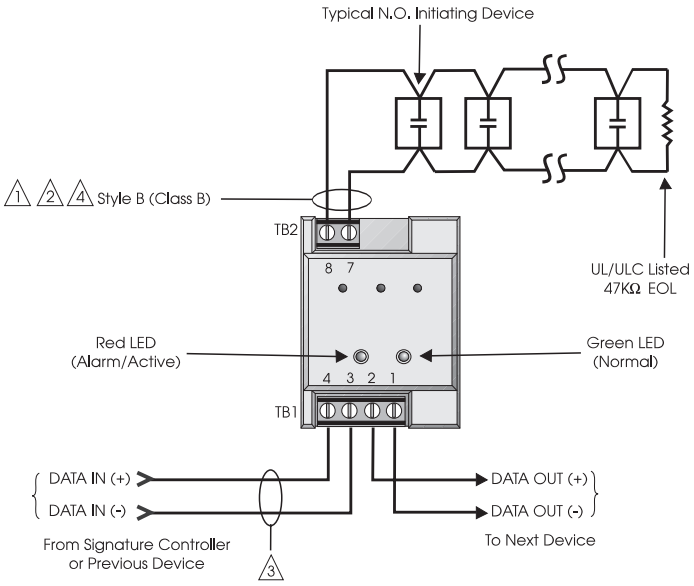
EXHIBIT 'C'

Typical Wiring

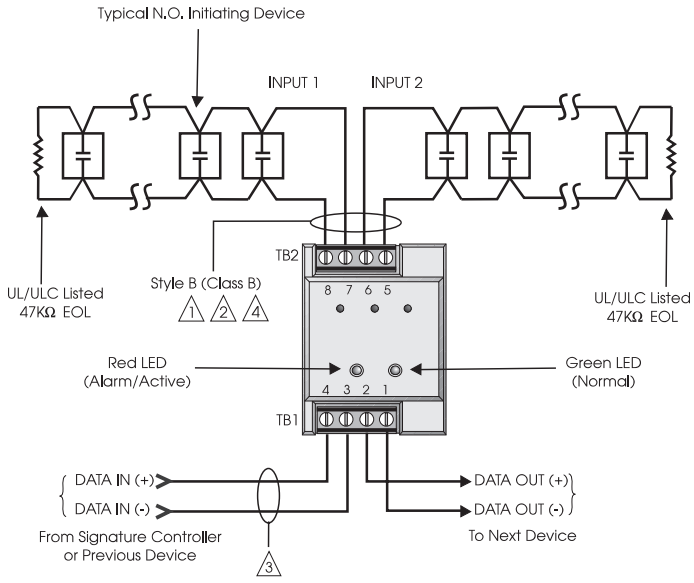
Modules will accept #18 AWG (0.75mm^2), #16 (1.0mm^2), and #14AWG (1.50mm^2), and #12 AWG (2.50mm^2) wire sizes.

Note: Sizes #16 AWG (1.0mm^2) and #18 AWG (0.75mm^2) are preferred for ease of installation. See Signature Loop Controller catalog sheet for detailed wiring requirement specifications.

Initiating (Slave) Device Circuit Wire Specifications		
Maximum Allowable Wire Resistance	50 ohms (25 ohms per wire) per Circuit	
Maximum Allowable Wire Capacitance	0.1µF per Circuit	
For Design Reference:	**Wire Size**	**Maximum Distance to EOLR**
	#18 AWG (0.75 mm^2)	4,000 ft (1,219 m)
	#16 AWG (1.00 mm^2)	
	#14 AWG (1.50 mm^2)	
	#12 AWG (1.50 mm^2)	



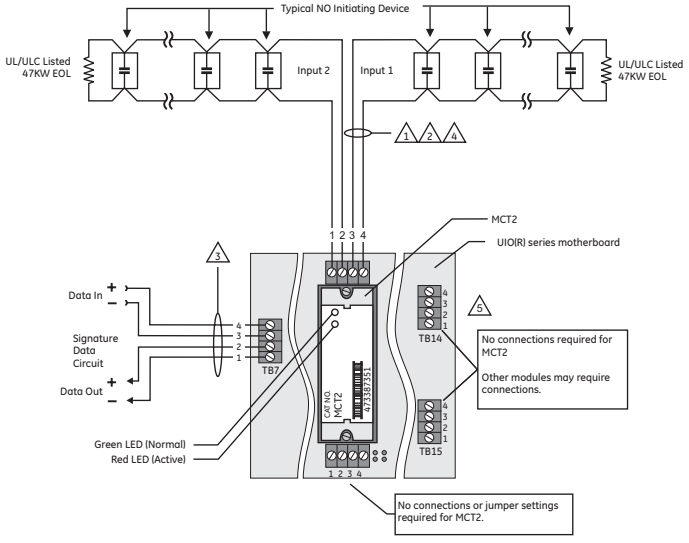
SIGA-CT1, SIGA-CT1HT



SIGA-CT2

NOTES

1. Maximum 25 Ohm resistance per wire.
2. Maximum #12 AWG (2.5 mm^2) wire; Minimum #18 AWG (0.75 mm2).
3. Refer to Signature controller installation sheet for wiring specifications.
4. Maximum 10 Vdc @ 350 µA
5. The SIGA-UIO6R and the SIGA-UIO2R do not come with TB14.
6. All wiring is supervised and power-limited.
7. These modules will not support 2-wire smoke detectors.



SIGA-MCT2

Warnings & Cautions

This module will not operate without electrical power. As fires frequently cause power interruption, we suggest you discuss further safeguards with your local fire protection specialist.

Compatibility

These modules are part of EDWARDS's Signature Series intelligent processing and control platform. They are compatible with EST3, EST3X and iO Series control panels.

EXHIBIT 'C'

EDWARDS
United Technologies
LIFE SAFETY & INCIDENT MANAGEMENT

Contact us...
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Web: *Edwards-fire.com*

EDWARDS is a UTC brand.
1016 Corporate Park Drive
Mebane, NC 27302

Specifications

Catalog Number	SIGA-CT1HT	SIGA-CT1	SIGA-CT2	SIGA-MCT2
Description	Single Input Module		Dual Input Module	
Type Code	48 (factory set) Four sub-types (personality codes) are available		49 (factory set) Four sub-types (personality codes) are available	
Address Requirements	Uses One Module Address		Uses Two Module Addresses	
Operating Current	Standby = 250µA; Activated = 400µA		Standby = 396µA; Activated = 680µA	
Operating Voltage	15.2 to 19.95 Vdc (19 Vdc nominal)			
Construction	High Impact Engineering Polymer			
Mounting	North American 2½ inch (64 mm) deep one-gang boxes and 1½ inch (38 mm) deep 4 inch square boxes with one-gang covers and SIGA-MP mounting plates			UIO2R/6R/6 Motherboard
Operating Environment	32°F to 158°F (0°C to 70°C)	32°F to 120°F (0°C to 49°C)		
Storage Environment	-4°F to 140°F (-20°C to 60°C); Humidity: 0 to 93% RH			
LED Operation	On-board Green LED - Flashes when polled; On-board Red LED - Flashes when in alarm/active.			
Compatibility	Use with Signature Loop Controller			
Agency Listings	UL, ULC, MEA, CSFM			

Ordering Information

Catalog Number	Description	Ship Wt. lbs (kg)
SIGA-CT1	Single Input Module — UL/ULC Listed	0.4 (0.15)
SIGA-CT1HT	Single Input Module High Temperature Operation UL/ULC Listed	0.4 (0.15)
SIGA-CT2	Dual Input Module — UL/ULC Listed	0.4 (0.15)
SIGA-MCT2	Dual Input Plug-in (UIO) Module — UL, ULC Listed	0.1 (0.05)

Related Equipment		
27193-11	Surface Mount Box - Red, 1-gang	1.0 (0.6)
27193-16	Surface Mount Box - White, 1-gang	1.0 (0.6)
SIGA-UIO2R	Universal Input-Output Module Board w/Riser Inputs — Two Module Positions	0.32 (0.15)
SIGA-UIO6R	Universal Input-Output Module Board w/Riser Inputs — Six Module Positions	0.62 (0.28)
SIGA-UIO6	Universal Input-Output Module Board — Six Module Positions	0.56 (0.25)
MFC-A	Multifunction Fire Cabinet — Red, supports Signature Module Mounting Plates	7.0 (3.1)
SIGA-MB4	Transponder Mounting Bracket (allows for mounting two 1-gang modules in a 2-gang box)	0.4 (0.15)
SIGA-MP1	Signature Module Mounting Plate, 1 footprint	1.5 (0.70)
SIGA-MP2	Signature Module Mounting Plate, 1/2 footprint	0.5 (0.23)
SIGA-MP2L	Signature Module Mounting Plate, 1/2 extended footprint	1.02 (0.46)

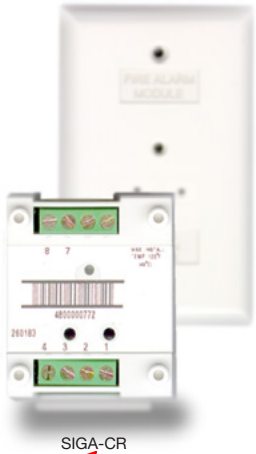
EXHIBIT 'C'

EDWARDS
United Technologies
LIFE SAFETY & INCIDENT MANAGEMENT

Control Relay Modules

SIGA-CR, SIGA-MCR, SIGA-CRR, SIGA-MCRR


SIGA-MCR


SIGA-CR

FM APPROVED MEA 7300-1657: 0121 S3424

Overview

The Control Relay Module and the Polarity Reversal Relay Module are part of the Signature Series system. They are intelligent analog addressable devices available in either plug-in (UIO) versions, or standard 1-gang mount versions.

The SIGA-CR/MCR Control Relay Module provides a Form “C” dry relay contact to control external appliances such as door closers, fans, dampers etc. This device does not provide supervision of the state of the relay contact. Instead, the on-board microprocessor ensures that the relay is in the proper ON/OFF state. Upon command from the loop controller, the SIGA-CR/MCR relay activates the normally open or normally-closed contact.

The SIGA-CRR/MCRR Polarity Reversal Relay Module provides a Form “C” dry relay contact to power and activate a series of SIGA-AB4G Audible Sounder Bases. Upon command from the Signature loop controller, the SIGA-CRR reverses the polarity of its 24 Vdc output, thus activating all Sounder Bases on the data loop.

Standard-mount versions (SIGA-CR and SIGA-CRR) are installed to standard North American 1-gang electrical boxes, making them ideal for locations where only one module is required. Separate I/O and data loop connections are made to each module.

Plug-in UIO versions (SIGA-MCR and SIGA-MCRR) are part of the UIO family of plug-in Signature Series modules. They function identically to the standard mount versions, but take advantage of the modular flexibility and easy installation that characterizes all UIO modules. Two- and six-module UIO motherboards are available. All wiring connections are made to terminal blocks on the motherboard. UIO assemblies may be mounted in EDWARDS enclosures.

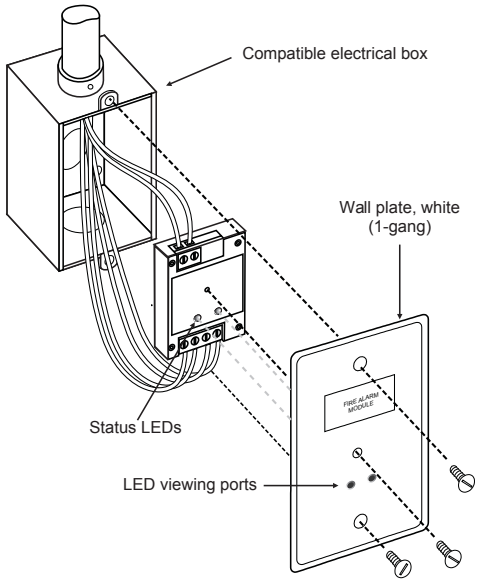
Standard Features

- **Provides one no/nc contact (SIGA-CR/MCR)**
  Form “C” dry relay contact can be used to control external appliances such as door closers, fans, dampers etc.
- **Allows group operation of sounder bases**
  The SIGA-CRR/MCRR reverses the polarity of its 24 Vdc output, thus activating all Sounder Bases on the data loop.
- **Plug-in (UIO) or standard 1-gang mount**
  UIO versions allow quick installation where multiple modules are required. The 1-gang mount version is ideal for remote locations that require a single module.
- **Automatic device mapping**
  Signature modules transmit information to the loop controller regarding their circuit locations with respect to other Signature devices on the wire loop.
- **Electronic addressing**
  Programmable addresses are downloaded from the loop controller, a PC, or the SIGA-PRO Signature Program/Service Tool; there are no switches or dials to set.
- **Intelligent device with microprocessor**
  All decisions are made at the module to allow lower communication speed with substantially improved control panel response time and less sensitivity to line noise and loop wiring properties; twisted or shielded wire is not required.

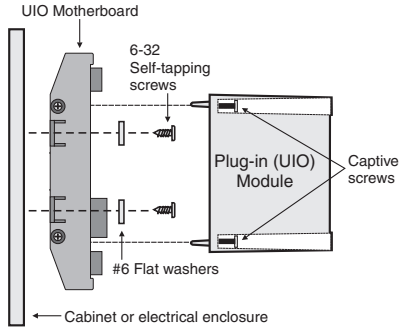
EXHIBIT 'C'

Installation

SIGA-CR and SIGA-CRR: modules mount to North American 2½ inch (64 mm) deep 1-gang boxes and 1½ inch (38 mm) deep 4 inch square boxes with 1-gang covers and SIGA-MP mounting plates. The terminals are suited for #12 to #18 AWG (2.5 mm^2 to 0.75 mm^2) wire size.



SIGA-MCR and SIGA-MCRR: mount the UIO motherboard inside a suitable EDWARDS enclosure with screws and washers provided. Plug the module into any available position on the motherboard and secure the module to the motherboard with the captive screws. Wiring connections are made to the terminals on the motherboard (see wiring diagram). UIO motherboard terminals are suited for #12 to #18 AWG (2.5 mm^2 to 0.75 mm^2) wire size.



Electronic Addressing - The loop controller electronically addresses each module, saving valuable time during system commissioning. Setting complicated switches or dials is not required. Each module has its own unique serial number stored in its onboard memory. The loop controller identifies each device on the loop and assigns a "soft" address to each serial number. If desired, the modules can be addressed using the SIGA-PRO Signature Program/Service Tool.

EDWARDS recommends that this module be installed according to latest recognized edition of national and local fire alarm codes.

Application

The operation of Signature Series control relays is determined by their sub-type code or "Personality Code."

Personality Code 8: CONTROL RELAY (SIGA-CR/MCR) - Dry Contact Output. This setting configures the module to provide one Form "C" DRY RELAY CONTACT to control Door Closers, Fans, Dampers, etc. Contact rating is 2.0 amp @ 24 Vdc; 0.5 amp @ 120 Vac (or 0.25A @ 220 Vac for non-UL applications). Personality Code 8 is assigned at the factory. No user configuration is required.

Personality Code 8: POLARITY REVERSAL RELAY MODULE (SIGA-CRR/MCRR). This setting configures the module to reverse the polarity of its 24 Vdc output. Contact rating is 2.0 amp @ 24 Vdc (pilot duty). Personality Code 8 is assigned at the factory. No user configuration is required.

Compatibility

These modules are part of EDWARDS's Signature Series intelligent processing and control platform. They are compatible with EST3, EST3X and iO Series control panels.

Warnings & Cautions

This module will not operate without electrical power. As fires frequently cause power interruption, we suggest you discuss further safeguards with your local fire protection specialist.

Testing & Maintenance

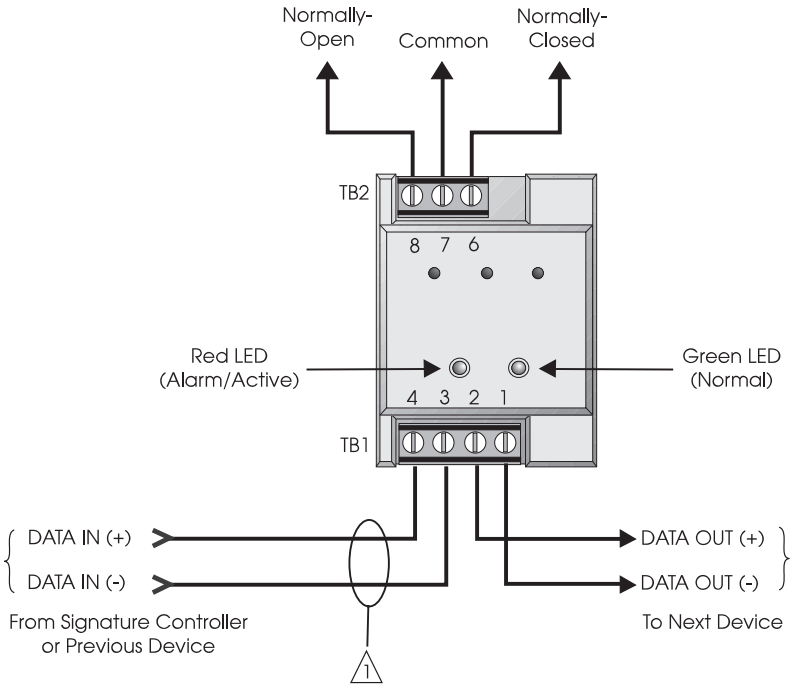
The module's automatic self-diagnosis identifies when it is defective and causes a trouble message. The user-friendly maintenance program shows the current state of each module and other pertinent messages. Single modules may be turned off (deactivated) temporarily, from the control panel. Availability of maintenance features is dependent on the fire alarm system used. Scheduled maintenance (Regular or Selected) for proper system operation should be planned to meet the requirements of the Authority Having Jurisdiction (AHJ). Refer to current NFPA 72 and ULC CAN/ULC 536 standards.

EXHIBIT 'C'

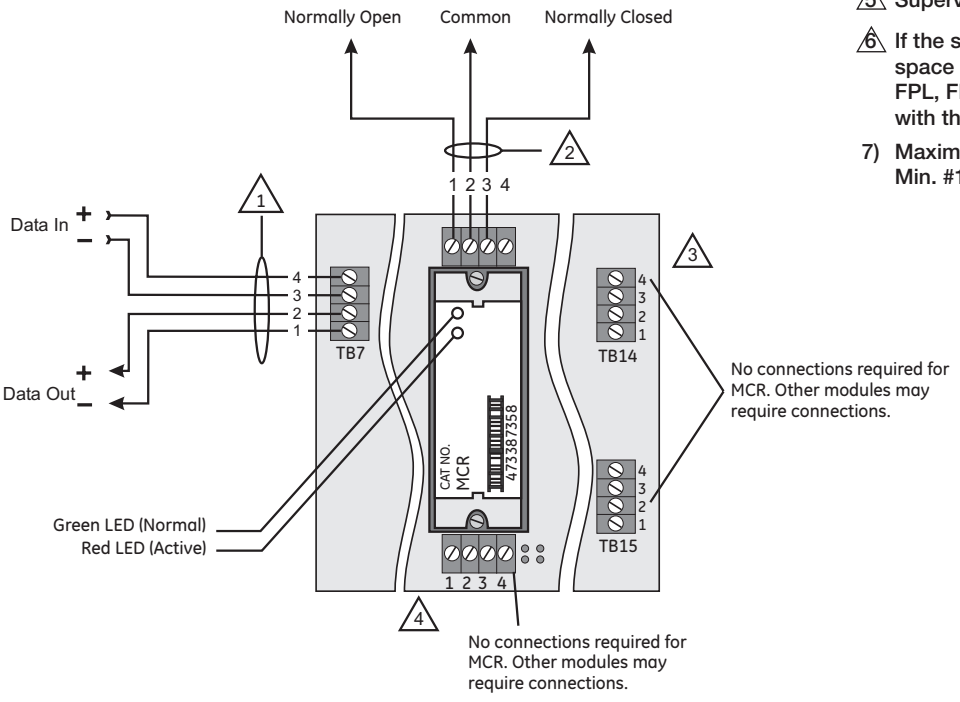
Typical Wiring

Modules will accept #18 AWG (0.75mm^2), #16 (1.0mm^2), #14 AWG (1.50mm^2) and #12 AWG (2.5mm^2) wire sizes.

Note: Sizes #16 AWG (1.0mm^2) and #18 AWG (0.75mm^2) are preferred for ease of installation. See Signature Loop Controller catalog sheet for detailed wiring requirement specifications.



SIGA-CR Control Relay



SIGA-MCR Control Relay

Notes

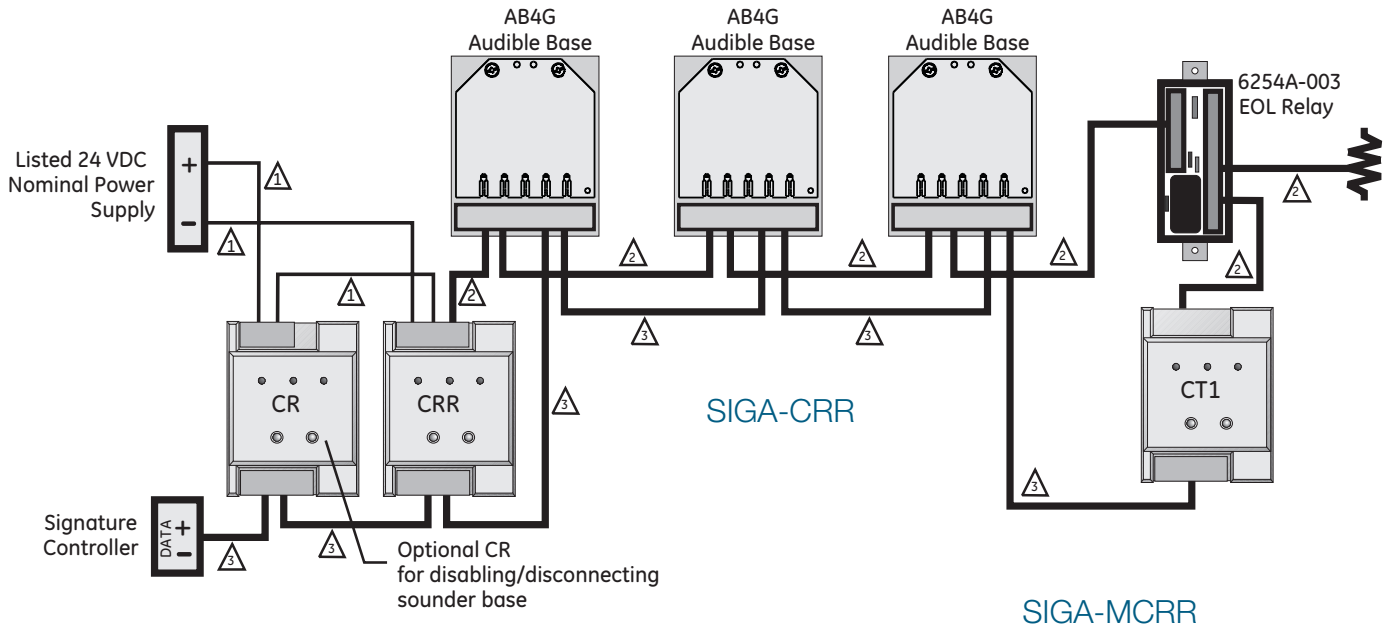
1. Refer to Signature Loop Controller Installation Sheet for wiring specifications.
2. NFPA 72 requires that the SIGA-CR/SIGA-MCR be installed in the same room as the device it is controlling. This requirement may not apply in all markets. Check with your local AHJ for details.
3. The SIGA-UIO6R and the SIGA-UIO2R do not come with TB14.
4. The SIGA-UIO6 does not come with TB8 through TB13.
5. Supervised and power-limited.
6. If the source is nonpower-limited, maintain a space of 1/4 inch from power-limited wiring or use FPL, FPLP, FPLR, or an equivalent in accordance with the National Electrical Code.
7) Maximum #12 AWG (2.5mm^2) wire. Min. #18 (0.75mm^2).

EXHIBIT 'C'

Typical Wiring

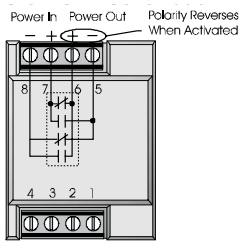
Modules will accept #18 AWG (0.75mm²), #16 (1.0mm²), #14 AWG (1.50mm²) and #12 AWG (2.50mm²) wire sizes.

Note: Sizes #16 AWG (1.0mm²) and #18 AWG (0.75mm²) are preferred for ease of installation. See Signature Loop Controller catalog sheet for detailed wiring requirement specifications.

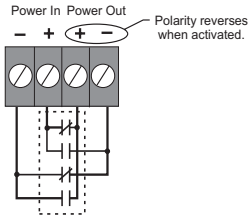


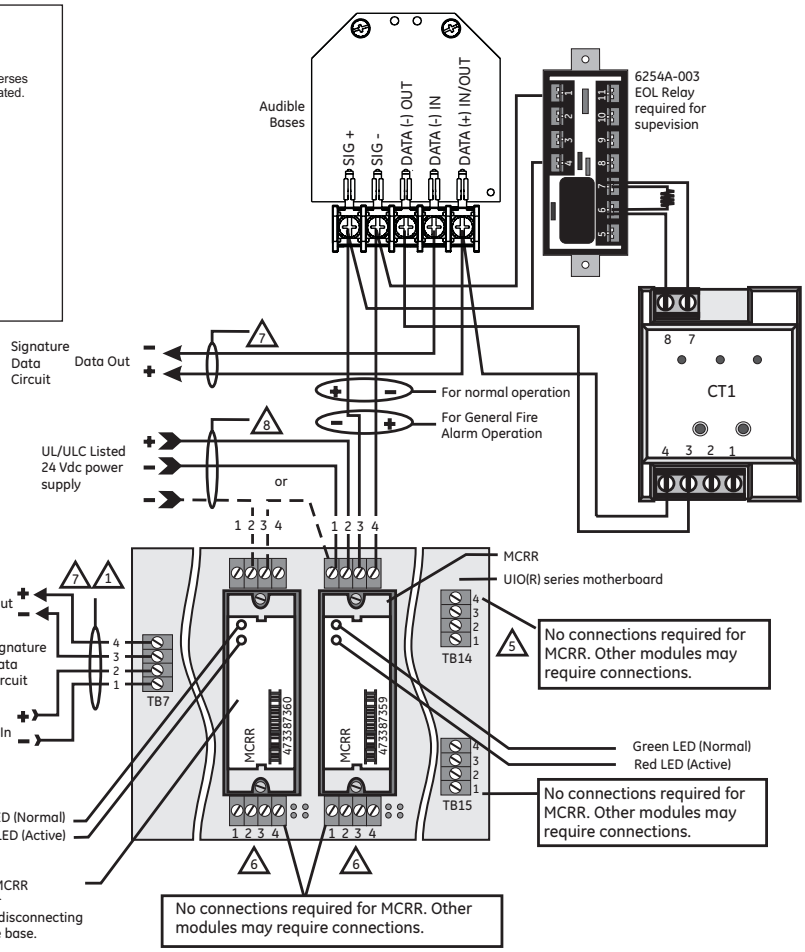
SIGA-MCRR

SIGA-CRR Schematic



SIGA-MCRR Schematic





Notes

1. Refer to the Signature controller installation sheet for wiring.
2. One Pair of Wires (24 Vdc power).
3. One Pair of Wires (Signature Data).
4. Single Wire (24 Vdc power).
5. The SIGA-UIO6R and the SIGA-UIO2R do not come with TB14.
6. The SIGA-UIO6 does not come with TB8 through TB13.
7. Supervised and power-limited.
8. If the source is nonpower-limited, maintain a space of 1/4 inch from power-limited wiring or use FPL, FPLP, FPLR, or an equivalent in accordance with the National Electrical Code.
9. Maximum #12 AWG (2.5 mm²) wire; Minimum #18 AWG (0.75 mm²).
10. End-of-Line Relay must monitor and report power supply trouble to control panel.
11. Class B Data wiring may be “T-tapped.”

EXHIBIT 'C'

Specifications

Catalog Number	SIGA-CR	SIGA-MCR	SIGA-CRR	SIGA-MCRR
Description	Control Relay		Polarity Reversal Relay	
Type Code	Personality Code 8 (Factory Set)		Personality Code 8 (Factory Set)	
Address Requirements	Uses 1 Module Address			
Operating Current	Standby = 75 µA Activated = 75 µA			
Operating Voltage	15.2 to 19.95 Vdc (19 Vdc nominal)			
Relay Type and Rating	Form C, 2 Amps @ 24 Vdc (pilot duty), 0.5 Amps @ 120 Vac and 0.25 Amps @ 220 Vac (220 Vac is non-UL) Not rated for capacitive loads.			
Mounting	North American 2½ inch (64 mm) deep 1-gang boxes and 1½ inch (38 mm) deep 4 inch square boxes with 1-gang covers and SIGA-MP mounting plates	Plugs into UIO2R, UIO6R or UIO6 Motherboards	North American 2½ inch (64 mm) deep 1-gang boxes and 1½ inch (38 mm) deep 4 inch square boxes with 1-gang covers and SIGA-MP mounting plates	Plugs into UIO2R, UIO6R or UIO6 Motherboards
Construction & Finish	High Impact Engineering Polymer			
Storage and Operating Environment	Operating Temperature: 32°F to 120°F (0°C to 49°C) Storage Temperature: -4°F to 140°F (-20°C to 60°C) Humidity: 0 to 93% RH			
LED Operation	On-board Green LED - Flashes when polled On-board Red LED - Flashes when in alarm/active			
Compatibility	Use With: Signature Loop Controller			
Agency Listings	UL, ULC, CSFM, MEA			

Ordering Information

Catalog Number	Description	Ship Weight - lbs (kg)
SIGA-CR	Control Relay Module (Standard Mount)	0.4 (0.15)
SIGA-MCR	Control Relay Module (UIO Mount)	0.18 (0.08)
SIGA-CRR	Polarity Reversal Relay Module (Standard Mount)	0.4 (0.15)
SIGA-MCRR	Polarity Reversal Relay Module (UIO Mount)	0.18 (0.08)
Related Equipment		
27193-11	Surface Mount Box - Red, 1-gang	1 (0.6)
27193-16	Surface Mount Box - White, 1-gang	1 (0.6)
SIGA-UIO2R	Universal Input-Output Module Board w/Riser Inputs - Two Module Positions	0.32 (0.15)
SIGA-UIO6R	Universal Input-Output Module Board w/Riser Inputs - Six Module Positions	0.62 (0.28)
SIGA-UIO6	Universal Input-Output Module Board - Six Module Positions	0.56 (0.25)
SIGA-AB4G	Audible (Sounder) Detector Base	0.3 (0.15)
Accessories		
MFC-A	Multifunction Fire Cabinet - Red, supports Signature Module Mounting Plates	7.0 (3.1)
SIGA-MB4	Transponder Mounting Bracket (allows for mounting two 1-gang modules in a 2-gang box)	0.4 (0.15)
SIGA-MP1	Signature Module Mounting Plate, 1 footprint	1.5 (0.70)
SIGA-MP2	Signature Module Mounting Plate, 1/2 footprint	0.5 (0.23)
SIGA-MP2L	Signature Module Mounting Plate, 1/2 extended footprint	1.02 (0.46)

EXHIBIT 'C'

LIFE SAFETY & INCIDENT MANAGEMENT

Contact us...

Email: edwards.fire@fs.utc.com
Web: *Edwards-fire.com*

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1016 Corporate Park Drive
Mebane, NC 27302

Signature Series Overview

The Signature Series intelligent analog-addressable system from EDWARDS is an entire family of multi-sensor detectors and mounting bases, multiple-function input and output modules, network and non-network control panels, and user-friendly maintenance and service tools. Analog information from equipment connected to Signature devices is gathered and converted into digital signals. An onboard microprocessor in each Signature device measures and analyzes the signal and decides whether or not to input an alarm. The microprocessor in each Signature device provides four additional benefits – Self-diagnostics and History Log, Automatic Device Mapping, and Fast, Stable Communication.

Self-diagnostics and History Log – Each Signature Series device constantly runs self-checks to provide important maintenance information. The results of the self-check are automatically updated and permanently stored in its non-volatile memory. This information is accessible for review any time at the control panel, PC, or using the SIGA-PRO Signature Program/Service Tool. The information stored in device memory includes:

- Device serial number, address, and type
- Time and date of last alarm
- Most recent trouble code logged by the detector — 32 possible trouble codes may be used to diagnose faults.

Automatic Device Mapping –The Signature Data Controller (SDC) learns where each device's serial number address is installed relative to other devices on the circuit. The SDC keeps a map of all Signature Series devices connected to it. The Signature Series Data Entry Program also uses the mapping feature. With interactive menus and graphic support, the wired circuits between each device can be examined. Layout or "as-built" drawing information showing branch wiring (T-taps), device types and their address are stored on disk for printing hard copy. This takes the mystery out of the installation. The preparation of as-built drawings is fast and efficient.

Device mapping allows the Signature Data Controller to discover:

- Unexpected additional device addresses
- Missing device addresses
- Changes to the wiring in the circuit.

Most Signature modules use a personality code selected by the installer to determine their actual function. Personality codes are downloaded from the SDC during system configuration and are indicated during device mapping.

EXHIBIT 'C'

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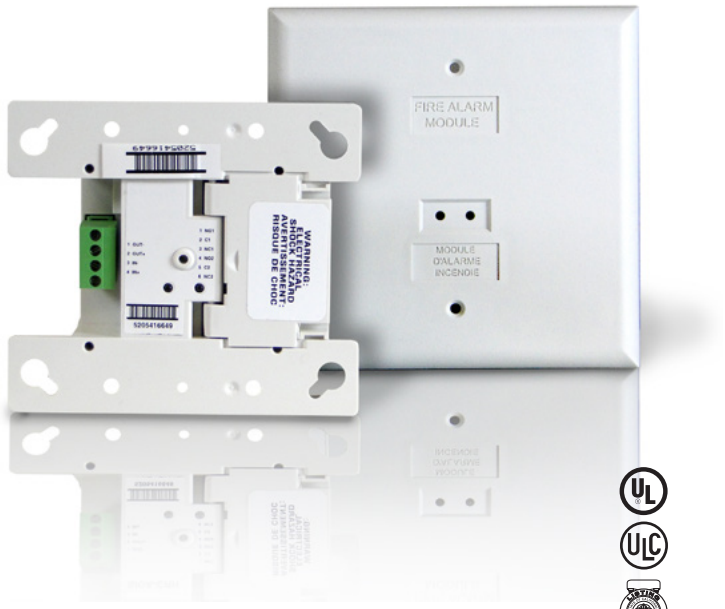
High Power Control Relay Module

SIGA-CRH



Description

The SIGA-CRH High Power Control Relay Module is an addressable device designed for interface applications that require a high voltage, high current relay. Two identical sets of relay terminals are provided. Both sets of relay contacts transfer when the module is activated or restored. The state of the output terminals is not supervised.

The module requires one address on the signaling line circuit (SLC). The address is assigned electronically. There are no address switches to set.

Standard Features

- **High Power Rating**
  120/240 VAC or 24 VDC rated contact can be used to control external appliances such as door closers, fans, dampers etc.
- **Provides one relay with two Form C contacts**
  Relay accepts 12 to 18 AWG (1.0 to 4.0 mm²) wiring from two sources
- **Automatic device mapping**
  Signature modules transmit information to the loop controller regarding their circuit locations with respect to other Signature devices on the wire loop.
- **Removable terminal blocks**
  Easy wiring and module replacement.
- **Electronic addressing**
  Programmable addresses are downloaded from the loop controller or PC; there are no switches or dials to set.
- **Intelligent device**
  Distributed intelligence allows lower communication speed with substantially improved control panel response time and less sensitivity to line noise and loop wiring properties; twisted or shielded wire is not required.

EXHIBIT 'C'

Application

Personality code

Use *Personality Code 8* to configure the SIGA-CRH module:

Personality code 8: Signal - dry contact output. Configures the module as a dry relay contact to control external appliances (door closers, fan controllers, dampers) or equipment shutdown.

Indication

The status LED shows the state of the module through the cover plate:

- Normal: Green LED flashes
- Alarm/active: Red LED flashes

Compatibility

The SIGA-CRH is part of the Signature Series intelligent processing and control platform. It is compatible with EST3, EST3X, and iO Series control panels.

Warnings & Cautions

The SIGA-CRH will not operate without electrical power. As fires frequently cause power interruption, we suggest you discuss further safeguards with your local fire protection specialist.

EDWARDS recommends that this module be installed according to latest recognized edition of national and local fire alarm codes.

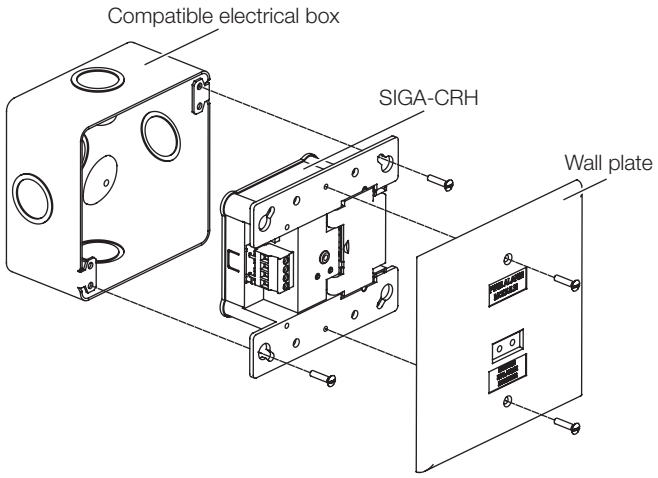
Testing & Maintenance

SIGA-CRH automatic self-diagnosis identifies when it is defective and causes a trouble message. The user-friendly maintenance program shows the current state of each module and other pertinent messages. Single modules may be turned off (deactivated) temporarily, from the control panel. Availability of maintenance features is dependent on the fire alarm system used. Scheduled maintenance (Regular or Selected) for proper system operation should be planned to meet the requirements of the Authority Having Jurisdiction (AHJ). Refer to current NFPA 72 and ULC CAN/ULC 536 standards.

Electronic Addressing

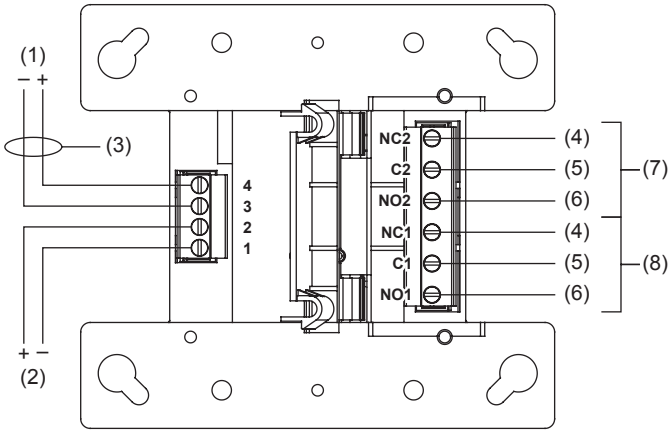
The loop controller electronically addresses the SIGA-CRH, saving valuable time during system commissioning. Setting complicated switches or dials is not required. The module has its own unique serial number stored in its on-board memory.

Installation



Consult the SIGA-CRH High Power Control Relay Module Installation Sheet for details.

Wiring



(1) Signaling line circuit (SLC) from previous device

(2) Signaling line circuit (SLC) to next device

(3) Power-limited and supervised

(4) Normally closed contact (NC)

(5) Common contact (C)

(6) Normally open contact (NO)

(7) Relay terminal set 2.
Not supervised. Power-limited unless connected to a nonpowerlimited source. If the source is nonpower-limited, eliminate the power-limited mark and maintain a minimum of 0.25 in. (6.4 mm) space from power-limited wiring. For other mounting methods, see enclosure and bracket installation sheets to maintain separation of power-limited and nonpower-limited wiring. The wire size must be capable of handling fault current from a nonpower-limited source.

— or —

Use type FPL, FPLR, FPLP, or permitted substitute cables, provided these power-limited cable conductors extending beyond the jacket are separated by a minimum of 0.25 in. (6.4 mm) space or by a nonconductive sleeve or nonconductive barrier from all other conductors. Refer to the NFPA 70 National Electrical Code for more details.

(8) Relay terminal set 1. Identical to (7).

EXHIBIT 'C'

Specifications

SLC operating voltage	15.20 to 19.95 VDC
SLC current	
Standby	75 µA max.
Activated	75 µA max.
Contact ratings [1][2]	
240 V 50/60 Hz	7 A (PF 0.75), 1.5 A (PF 0.35)
120 V 50/60 Hz	7 A (PF 0.75), 3.0 A (PF 0.35)
24 VDC	6 A resistive
Audio switching	0 to 20 kHz [3]
Relay type	2 Form C, programmable
Relay ready delay	
From power up	30 s max. (includes initial state set)
From previous activation	5 s max. (one activation) 8 s max. (two activations, 1 s apart)
Circuit designation	
Signaling line circuits	Class A, Style 6 or Class B, Style 4. Refer to the control panel technical publications for SLC wiring details.
Relay circuits	Class E
Number of SIGA-CRH per SLC	60 max.
Wire size	12 to 18 AWG (1.0 to 4.0 mm^2)
Compatible electrical boxes	North American double-gang × 2-1/8 in. (54 mm) deep box North American standard 4 in. square × 2-1/8 in. (54 mm) deep box
Agency Listings	CAN/ULC-S527, UL 864
Operating environment	
Temperature	32 to 120°F (0 to 49°C)
Relative humidity	0 to 93%, noncondensing
Storage temperature	–4 to 140°F (–20 to 60°C)

[1] Provide external fusing and back-EMF mitigation as required by your application. Do not use the SIGA-CRH in a mixed application, where one set of relay terminals has high-power requirements and the other set carries a low-power signal, as this may result in physical contamination of the low-power signal contacts.

[2] The minimum load required in order to avoid long-term contact oxidation is 100 mA and 12 V.

[3] Power must not exceed the contact ratings shown for a given PF (power factor).

Ordering Information

Catalog Number	Description	Ship Weight lbs (kg)
SIGA-CRH	High Power Control Relay Module	0.4 (0.15)

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Isolator Module

SIGA-IM

S3424

7300-1657: 0121

FM APPROVED

MEA

Overview

The SIGA-IM Isolator Module is part of EDWARDS's Signature Series system. This intelligent device enables part of the Signature data loop to continue operating should a short circuit occur. The module can be wired into a Class A data loop at any point.

If a fault occurs, the isolator cuts power to all devices beyond the isolator on the loop as follows:

- a short on the line causes all isolators to open within 23 msec.
- at 10 msec intervals, beginning on one side of the Class A circuit nearest the loop controller, the isolators close to provide the next isolator down the line with power.
- when the isolator next to the short closes, it reopens within 10 msec.

Once activated, the line fault isolator continuously checks the faulted side of the loop to determine if the short still exists. When the fault is corrected and system reset, the module automatically restores the entire data loop to the normal condition.

The microprocessor in every Signature module provides at least three important benefits — Self-diagnostics and History Log, Automatic Device Mapping, and Fast, Stable Communication.

Self-diagnostics and History Log - Each Signature Series module constantly runs self-checks to provide important maintenance information. This information is automatically updated and permanently stored in the module's non-volatile memory and is accessible for review any time using the SIGA-PRO Signature Program / Service Tool.

Automatic Device Mapping - The Signature loop controller learns keeps a map where each device's serial number address is installed relative to other devices on the data circuit.

Fast Stable Communication - Built-in intelligence means less information needs to be sent between the module and the loop controller. Other than regular supervisory polling response, the module only needs to communicate with the loop controller when it has something new to report.

Standard Features

- **Automatic device mapping**
  Each module transmits wiring information to the loop controller regarding its location with respect to other devices on the circuit.
- **Electronic addressing**
  Addresses are downloaded and permanently stored from a PC, or the SIGA-PRO Signature Program / Service Tool. There are no switches or dials to set.
- **Ground fault detection by address**
  Detects ground faults right down to the device level.
- **2-gang mounting**
- **Designed to ISO 9001 standards**

EXHIBIT 'C'

Testing & Maintenance

The module's automatic self-diagnosis identifies when it is defective and causes a trouble message. The user-friendly maintenance program shows the current state of each module and other pertinent messages. Single modules may be turned off (deactivated) temporarily, from the control panel. Availability of maintenance features is dependent on the fire alarm system used. Scheduled maintenance (Regular or Selected) for proper system operation should be planned to meet the requirements of the Authority Having Jurisdiction (AHJ). Refer to current NFPA 72 and ULC CAN/ ULC 536 standards.

Warnings & Cautions
This module will not operate without electrical power. As fires frequently cause power interruption, we suggest you discuss further safeguardwith your fire protection specialist.

Typical Wiring and Installation

The SIGA-IM module mounts to North American 2-1/2 inch (64 mm) deep 2-gang boxes and 1-1/2 inch (38 mm) deep 4 inch square boxes with 2 gang covers and SIGA-MP mounting plates. The module will accept #18 AWG (0.75mm^2), #16 (1.0mm^2), #14 AWG (1.50mm^2), and #12 AWG (2.50mm^2) wire sizes. *Note: Sizes #16 AWG (1.0mm^2) and #18 AWG (0.75mm^2) are preferred for ease of installation. See Signature Loop Controller catalog sheet for detailed wiring requirement specifications.*

EDWARDS recommends that this module be installed according to latest recognized edition of national and local fire alarm codes.

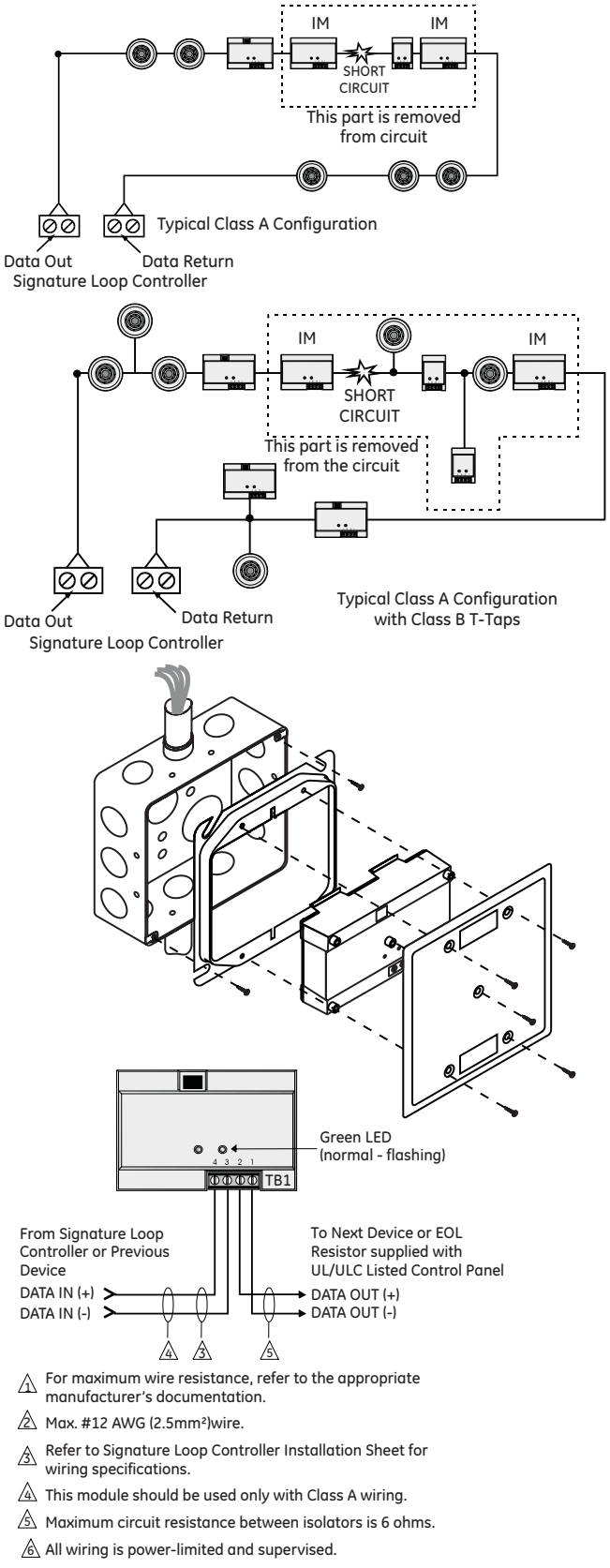
Application

This module should only be used on Class A circuits. The operation of the SIGA-IM is determined by its hardware type code and is assigned at the factory. No user configuration is required.

Compatibility

These modules are part of EDWARDS's Signature Series intelligent processing and control platform. They are compatible with EST3, EST3X and iO Series control panels.

Typical Wiring



1. For maximum wire resistance, refer to the appropriate manufacturer's documentation.
2. Max. #12 AWG (2.5mm²)wire.
3. Refer to Signature Loop Controller Installation Sheet for wiring specifications.
4. This module should be used only with Class A wiring.
5. Maximum circuit resistance between isolators is 6 ohms.
6. All wiring is power-limited and supervised.

EXHIBIT 'C'

Specifications

Description	Isolator Module - factory set hardware type code
Address Requirements	Uses One Detector Address
Circuit Resistance	Six ohms maximum between isolators
Operating Current	Standby = 45µA; Activated = 45µA
Operating Voltage	15.2 to 19.95 Vdc (19 Vdc nominal)
Construction & Finish	High Impact Engineering Polymer 2-gang front plate - White Finish
Storage Environment	Temperature: -4°F to 140°F (-20°C to 60°C)
Operating Environment	Temperature: 32°F to 120°F (0°C to 49°C); Humidity: 0 to 93% RH
LED Operation	On-board Green LED - Flashes when polled (normal)
Compatibility	Use with: Signature Loop Controller
Agency Listings	UL, ULC, CSFM, MEA, FM

Ordering Information

Catalog Number	Description	Ship Wt. lb (kg)
SIGA-IM	Fault Isolator Module - UL/ULC Listed	.5 (.23)
Accessories		
27193-21	Surface Mount Box - 2-gang RED	1 (.4)
27193-26	Surface Mount Box - 2-gang WHITE	
MFC-A	Multifunction Fire Cabinet - Red, supports Signature Module Mounting Plates	7.0 (3.1)
SIGA-MP1	Signature Module Mounting Plate, 1 footprint	1.5 (0.70)
SIGA-MP2	Signature Module Mounting Plate, 1/2 footprint	0.5 (0.23)
SIGA-MP2L	Signature Module Mounting Plate, 1/2 extended footprint	1.02 (0.46)

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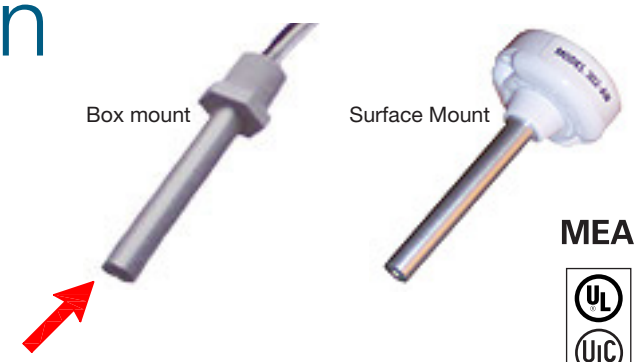
Rate Compensation Heat Detectors

302 Series



MEA

S539, E35018

Overview

Series 302 heat detectors are designed for use in normal environments as well as environments where the detectors are subject to weather, moisture (internal condensation), and explosive atmospheres. They are normally-open devices designed to close an electrical circuit upon activation. All models feature rate compensation and are available with either 135 °F (57.2 °C) or 194 °F (90 °C) ratings. They are self restoring, hermetically sealed, shock and corrosion resistant, and are tamperproof.

Standard Features

- Rate compensation offsets thermal lag
- Self-restoring – no manual reset required
- Explosion proof and weatherproof models available
- Weatherproof models available that do not require a special backbox
- Box mount and surface mount models available

Application

Sensors rated at 135 °F (57.2 °C) will not respond to momentary temperature fluctuations less than 30 °F/minute between 60 °F (16 °C) and 100 °F (38 °C). Sensors rated at 194°F (90 °C) will not respond to momentary temperature fluctuations less than 50 °F/minute between 60 °F (16 °C) and 150 °F (66 °C). 302 Series sensors should not be used in environments where conditions exceed these parameters. Do not install them in hot air ducts, in front of heaters, in paint booths that use heat to cure paint, or any other location subject to temperature fluctuation.

Sensor's Rated Temperature	Minimum Ambient Air Temperature	Maximum Ceiling Temperature
135 °F (57.2 °C)	-40 °F (-40 °C)	100 °F (38 °C)
194 °F (90 °C)	-40 °F (-40 °C)	150 °F (66 °C)

The sensor's aluminum tube acts as a heat collector when sources of heat radiate directly on the tube. Install these sensors out of direct sunlight and away from radiating heat sources including the direct flow from heaters and heat ducts.

EXHIBIT 'C'

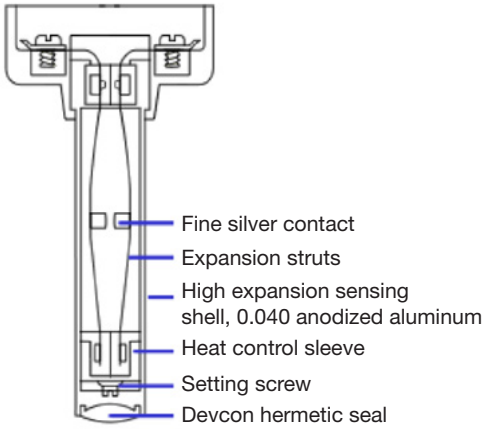
Rate Compensation

302 Series sensors feature rate compensation, which improves performance by offsetting thermal lag, an inherent property of conventional fixed temperature heat sensors.

A slow rate of temperature rise allows the heat to penetrate the inner expansion struts. The tubular shell and the struts expand slowly until the total device has been heated to its rated temperature level of 135 °F (57.2 °C) or 194 °F (90 °C). At this point, the silver contact points close and an alarm is initiated.

When subjected to a rapid rate temperature rise, there is not as much time for heat to penetrate the inner strut. However, the rapid lengthening of the shell allows the struts to come together at a lower level.

When the surrounding air temperature returns to below the rated level, the shell contracts, forcing the contacts to open, thus automatically resetting the sensor.



Typical Wiring

Electrical Rating

Voltage	Current
6-125 VAC	5 amps
6-25 VDC	1 amp
125 VDC	0.5 amp

Maintenance

302 Series heat sensors are low maintenance. Sensors automatically restore when temperatures drop below their rated temperatures. The accumulation of dust and dirt does not normally affect the sensors' operation.

Testing

Testing for operation is simple and can be done before or after the sensor has been installed. Heat the sensor with a hair dryer (do not use any device with an open flame to test sensors). The sensor should operate shortly after the hot air is applied.

Refer to NFPA 72, National Fire Alarm Code and/or the local authority having jurisdiction to determine testing frequency, record keeping, and other testing considerations.

Detector Spacing

Model	302	302-AW	302-ET	302-EPM
UL- Vertical Spacing (all models)	50' x 50' (15.2 x 15.2 m)	50' x 50' (15.2 x 15.2 m)	50' x 50' (15.2 x 15.2 m)	40' x 40' (12.2 x 12.2 m)
UL- Horizontal Spacing (all models)	40' x 40' (12.2 x 12.2 m)	40' x 40' (12.2 x 12.2 m)	40' x 40' (12.2 x 12.2 m)	30' x 30' (9.1 x 9.1m)
FM - Horizontal or vertical spacing.*	30' x 30' (9.1 x 9.1m)	30' x 30' (9.1 x 9.1m)	30' x 30' (9.1 x 9.1m)	Not Listed

Spacing is based on smooth ceilings that are up to 10' (3 m) high. Refer to NFPA 72 for ceilings that are not considered smooth or are higher than 10' (3 m).

* EPM models are not FM approved.

Dimensions

Model	ET	EMP
Tube Length	3" (76.2 mm)	3" (76.2 mm)
Tube Diameter	0.5" (12.7 mm)	0.5" (12.7 mm)
NPT Thread	0.5" (12.7 mm)	0.5" (12.7 mm)
Hex Base	1" (25.4 mm) plastic	1.25" (31.75 mm) brass

WARNING – Use For Property Protection Only: Heat detectors do not protect life against fire and smoke. In most fires, hazardous levels of smoke, heat and toxic gases can build up before a heat sensor would initiate an alarm. Independent studies indicate that heat sensors should only be used when property protection alone is involved. In cases where life safety is a factor, the use of smoke detectors is recommended.

Under no circumstances should heat detectors be relied upon as the sole measure to ensure fire safety. However, if they are spaced in accordance with the specifications found under Application, these sensors can contribute, within an overall fire safety program, to reducing the risk of avoidable property losses.

When used with automatic fire suppression systems such as pre-action and deluge sprinkler systems, carbon dioxide systems, halon systems, and dry chemical systems, at least two sensors should be used to initiate the alarm. This is commonly referred to as cross-zoning or priority matrix zoning and is necessary to eliminate premature discharge of the system. Refer to NFPA 72 for more information.

EXHIBIT 'C'

Ordering Information

Interior applications				Ship Wt.
302-135	Heat Detector - Rate Compensation, Interior Vertical Surface Mount FM & UL, 135 °F (57.2 °C)	For interior mounting.		0.2 lb. (0.09 kg)
302-194	Heat Detector - Rate Compensation, Interior Vertical Surface Mount FM & UL, 194°F (90 °C).			

Moisture & dust proof applications				Ship Wt.
302-AW-135	All-weather Heat Detector - Rate Compensation, Vertical Mounting FM & UL, 135 °F (57.2 °C)	Hermetically sealed for moisture proof or dust proof installations. Requires no special back box when the all-weather leads are properly spliced to “THW” or equivalent type wire and splices are moisture proof. For indoor or outdoor use.		0.2 lb. (0.09 kg)
302-AW-194	All-weather Heat Detector - Rate Compensation, Vertical Mounting FM & UL, 194°F (90 °C)			

Moisture & dust proof applications (box mount)				Ship Wt.
302-ET-135	All-weather Heat Detector - Rate Compensation, Vertical, Box Mount (½" NPT), FM & UL, 135 °F (57.2 °C). Requires STONCO27 or equivalent.	Hermetically sealed for moisture proof or dust proof installations. Requires no special back box. Has plastic hexagonal grip bushing with ½" conduit threads for attachment to threaded hub cover, or any outlet box. For indoor or outdoor use when watertight seal is required, use weatherproof box.		0.2 lb. (0.09 kg)
302-ET-194	All-weather Heat Detector - Rate Compensation, Vertical, Box Mount (½" NPT), FM & UL, 194°F (90 °C). Requires STONCO27 or equivalent.			

Explosion proof applications				Ship Wt.
302-EPM-135	Heat Detector - Rate Compensation, Explosionproof Mounting UL (Not FM approved), 135 °F (57.2 °C). RequiresJALX-11 or equivalent	Explosion proof for installation in hazardous locations. Has hexagonal grip bushing with ½" conduit threads for attachment to threaded hub covers of series JL fixture fitting manufactured by Killark Electric Co., or equivalent. Must be hand tightened only. For indoor use only.		0.3 lb. (0.14 kg)
302-EPM-194	Heat Detector - Rate Compensation, Explosionproof Mounting UL (not FM approved), 194°F (90 °C). RequiresJALX-11 or equivalent.			

Adapter plate			Ship Wt.
AP-P	Decorative white plastic adaptor plate for mounting 302 and 302-AW to any 3" outlet box or 4" octagon outlet box.		0.1 lb. (0.05 kg)

Outlet body	Ship Wt.
Use with standard backboxes and covers such as those manufactured by Killark Electric Co., or equivalent.	

Explosion proof outlet body			Ship Wt.
JALX11	Explosion proof outlet body with cover (½" thread hubs back, four sides and cover) - Killark		3.5 lb. (1.6 kg)

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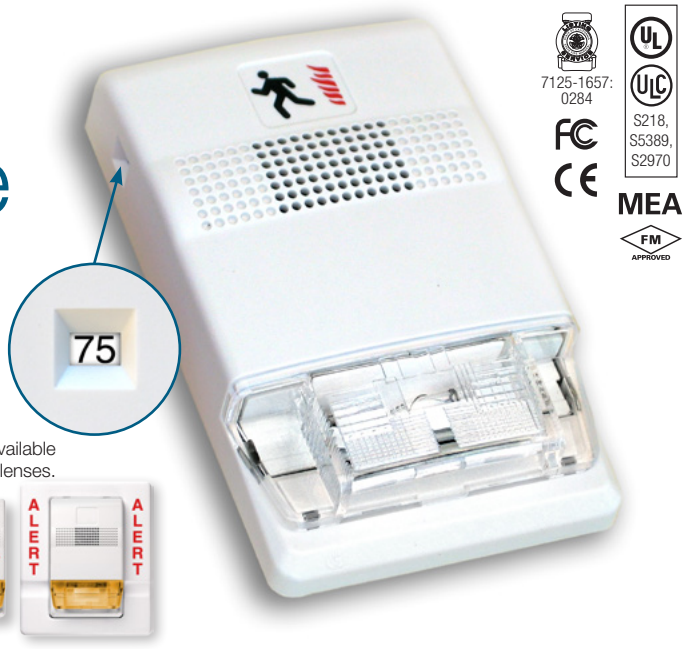
Field Configurable Horns and Strobes

Genesis Series



7125-1657: 0284
S218, S5389, S2970
MEA
FM APPROVED

ECS/MNS appliances available with clear or amber lenses.

Overview

The Genesis line of fire alarm and mass notification/emergency communications (ECS/MNS) signals are among the smallest, most compact audible-visible life safety signaling devices in the world. About the size of a deck of playing cards, these devices are designed to blend with any decor.

Thanks to patented breakthrough technology, EDWARDS Genesis strobes do not require bulky specular reflectors and lenses. Instead, an exclusive cavity design conditions light to produce a highly controlled distribution pattern. Significant development efforts employing this new technology have given rise to a new benchmark in strobe performance – FullLight technology.

FullLight strobe technology produces a smooth light distribution pattern without the spikes and voids characteristic of specular reflectors. This ensures the entire coverage area receives consistent illumination from the strobe flash. As a result, Genesis strobes with FullLight technology go well beyond the UL-1971 and ULC-S526 light distribution requirements.

Genesis strobes and horn-strobes offer selectable candela output by means of a conveniently-located switch on the side of the device. Models are also available that offer fixed 15/75 cd output. The candela output setting remains clearly visible even after final installation, yet it stays locked in place to prevent unauthorized tampering.

Genesis ECS/MNS appliances offer emergency signaling with clear or amber lenses and with optional ALERT housing labels. They are ideal for applications that require differentiation between fire alarm and mass notification alerts.

Standard Features

- **Unique low-profile design**
  - The most compact UL-1971/ULC-S526 listed strobe available
  - Ultra-slim – protrudes less than one inch
  - Attractive appearance
  - No visible mounting screws
- **Four field-configurable options in one device**
  - Select 15, 30, 75, or 110 cd strobe output
  - Select high (default) or low dB horn output
  - Select temporal (default) or steady horn output
  - Select public mode flash rate (default) or private mode temporal flash
- **Fixed 15/75 cd model available**
- **ECS/MNS models available**
- **Easy to install**
  - Fits standard 1-gang electrical boxes – no trim plate needed
  - Optional trim plate accommodates oversized openings
  - Pre-assembled with captive hardware
  - #12 AWG terminals – ideal for long runs or existing wiring
- **Unparalleled performance**
  - Industry's most even light distribution
  - Meets tough synchronizing standards for strobes
  - Single microprocessor controls both horn and strobe
  - Independent horn control over a single pair of wires
  - Highly regulated in-rush current
  - Multiple frequency tone improves sound penetration
  - Field-programmable temporal strobe output option

EXHIBIT 'C'

Application

Genesis strobes are UL 1971-listed for use indoors as wall-mounted public-mode notification appliances for the hearing impaired. Prevailing codes require strobes to be used where ambient noise conditions exceed 105 dBA (87dBA in Canada), where occupants use hearing protection, and in areas of public accommodation as defined in the *Americans with Disabilities Act (see application notes – USA)*.

Combination horn-strobe signals must be installed in accordance with guidelines established for strobe devices. Consult with your Authority Having Jurisdiction for details.

All Genesis strobes exceed UL synchronization requirements (within 10 milliseconds over a two-hour period) when used with a synchronization source. Synchronization is important in order to avoid epileptic sensitivity.

WARNING: These devices will not operate without electrical power. As fires frequently cause power interruptions, further safeguards such as backup power supplies may be required.

Horns

Genesis horn output reaches as high as 99 dB and features a unique multiple frequency tone that results in excellent sound penetration and an unmistakable warning of danger. Horns may be configured for either coded or non-coded signal circuits. They can also be set for low dB output with a jumper cut that reduces horn output by about 5 dB. Horn-only models may be ceiling-mounted or wall-mounted.

The suggested sound pressure level for each signaling zone used with alarm signals is at least 15 dB above the average ambient sound level, or 5 dB above the maximum sound level having a duration of at least 60 seconds, whichever is greater, measured 5 feet (1.5 m) above the floor. The average ambient sound level is, A-weighted sound pressure measured over a 24-hour period.

Doubling the distance from the signal to the ear will theoretically result in a 6 dB reduction of the received sound pressure level. The actual effect depends on the acoustic properties of materials in the space. A 3 dBA difference represents a barely noticeable change in volume.

ECS/MNS Applications

Genesis ECS/MNS strobe appliances bring the same high-performance fire alarm features and unobtrusive design to mass notification applications. Available with amber lenses and optional ALERT housing labels, they are ideal for applications that require differentiation between fire alarm and mass notification alerts.

Installation

Genesis horns and strobes mount to any standard one-gang surface or flush electrical box. Matching optional trim plates are used to cover oversized openings and can accommodate one-gang, two-gang, four-inch square, or octagonal boxes, and European 100 mm square.

Genesis Horn/Strobe with optional trim plate

All Genesis signals come pre-assembled with captive mounting screws for easy installation. Two tabs at the top of the signal unlock the cover to reveal the mounting hardware. The shallow depth of Genesis devices leaves ample room behind the signal for extra wiring. Once installed with the cover in place, no mounting screws are visible.

Field Configuration

Temporal horn and horn-strobe models are factory set to sound in a **three-pulse temporal pattern**. Units may be configured for use with coded systems by cutting a jumper on the circuit board. This results in a **steady output** that can be turned on and off (coded) as the system applies and removes power to the signal circuit. A Genesis Signal Master is required when horn-strobe models are configured for coded systems. Non-temporal, horn-only models sound a steady tone.

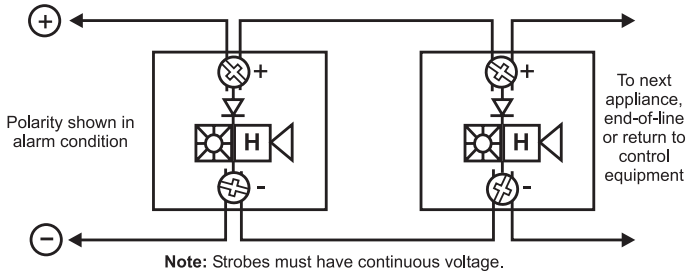
Genesis clear strobes and horn-strobes are shipped from the factory ready for use as **UL 1971 compliant** signals for public mode operation. These signals may be configured for **temporal flash** by cutting a jumper on the circuit board. This battery-saving feature is intended for private mode signaling only.

Genesis clear strobes and horn-strobes may be set for **15, 30, 75, or 110 candela output**. The output setting is changed by simply opening the device and sliding the switch to the desired setting. The device does not have to be removed to change the output setting. The setting remains visible through a small window on the side of the device after the cover is closed.

Horns and horn-strobes are factory set for **high dB output**. **Low dB output** may be selected by cutting a jumper on the circuit board. This reduces the output by about 5 dB.

Wiring

Field wiring terminals accommodate #18 to #12 AWG (0.75 mm² to 2.5 mm²) wiring. Horns, strobes, and combination horn-strobes are interconnected with a single pair of wires as shown below.



Note: Strobes must have continuous voltage.

EXHIBIT 'C'

Current Draw

Strobes, Horn-Strobes

Multi-cd Wall Strobes (G1-VM)

UL Rating	15 cd* RMS	30 cd* RMS	15/75 cd** RMS	75 cd* RMS	110 cd* RMS
16 Vdc	103	141	152	255	311
16 Vfwr	125	179	224	346	392

*G1-VM multi-cd; **G1F-V1575 fixed 15/75 cd

Typical Current	15 cd RMS	30 cd RMS	15/75 RMS	75 cd RMS	110 cd RMS
16 Vdc	85	127	150	245	285
20 Vdc	71	98	123	188	240
24 Vdc	59	82	104	152	191
33 Vdc	46	64	84	112	137
16 Vfwr	119	169	223	332	376
20 Vfwr	103	143	189	253	331
24 Vfwr	94	129	169	218	262
33 Vfwr	87	112	148	179	205

Wall Temporal Horn-strobes – High dB Setting

UL Rating	15 cd* RMS	30 cd* RMS	15/75 cd** RMS	75 cd* RMS	110 cd* RMS
16 Vdc	129	167	172	281	337
16 Vfwr	176	230	269	397	443

*G1-HDVM multi-cd
**G1F-HDV1575 fixed 15/75 cd

Typical Current	15 cd RMS	30 cd RMS	15/75 RMS	75 cd RMS	110 cd RMS
16 Vdc	102	135	160	246	309
20 Vdc	88	109	137	193	248
24 Vdc	81	94	122	161	203
33 Vdc	74	72	106	124	154
16 Vfwr	144	182	247	352	393
20 Vfwr	141	162	220	274	362
24 Vfwr	136	152	203	235	282
33 Vfwr	125	144	196	201	232

Wall Temporal Horn-strobes – Low dB Setting

UL Rating	15 cd* RMS	30 cd* RMS	15/75 cd** RMS	75 cd* RMS	110 cd* RMS
16 Vdc	122	160	146	274	330
16 Vfwr	162	216	231	383	429

*G1-HDVM multi-cd
**G1F-HDV1575 fixed 15/75 cd

Typical Current	15 cd RMS	30 cd RMS	15/75 RMS	75 cd RMS	110 cd RMS
16 Vdc	96	130	158	243	302
20 Vdc	79	104	133	189	241
24 Vdc	68	88	119	156	197
33 Vdc	56	71	100	118	146
16 Vfwr	128	180	241	344	389
20 Vfwr	118	157	213	266	343
24 Vfwr	113	144	195	230	279
33 Vfwr	112	137	182	197	226

Horns

Wall or Ceiling Mounted Temporal Horns (G1-HD)

UL Rating	High dB (RMS)	Low dB (RMS)
16 Vdc	26	19
24 Vdc	36	27
33 Vdc	41	33
16 Vfwr	51	37
24 Vfwr	69	52
33 Vfwr	76	70

Typical Current	High dB RMS	Low dB RMS
16 Vdc	22	17
20 Vdc	24	19
24 Vdc	27	22
33 Vdc	32	26
16 Vfwr	34	30
20 Vfwr	40	34
24 Vfwr	45	38
33 Vfwr	52	47

Wall or Ceiling Mounted Horns (G1-P)

UL Designation	Voltage Range	Max. Current, RMS
Regulated 24 Vdc	16 - 33 Vdc	13 mA
24 fwr	16 - 33 Vfwr	11 mA

Typical Current	RMS
24 Vdc	10
24 Vdc	11
31 Vdc	12
20 Vfwr	9
24 Vfwr	10

Current values are shown in mA.

EXHIBIT 'C'

dBA output

Temporal Horns, Horn-strobes (G1-HD, G1-HDVM series)

High dB Setting	UL464		Average	Peak
	Temporal	Steady	Temporal/ Steady	Temporal/ Steady
16 Vdc	81.4	85.5	91.4	94.2
24 Vdc	84.4	88.6	94.5	97.6
33 Vdc	86.3	90.4	96.9	99.5

Low dB Setting	UL464		Average	Peak
	Temporal	Steady	Temporal/ Steady	Temporal/ Steady
16 Vdc	76.0	80.1	86.3	89.2
24 Vdc	79.4	83.5	89.8	92.5
33 Vdc	82.1	86.5	92.5	95.3

Steady Tone Horns (G1-P series)

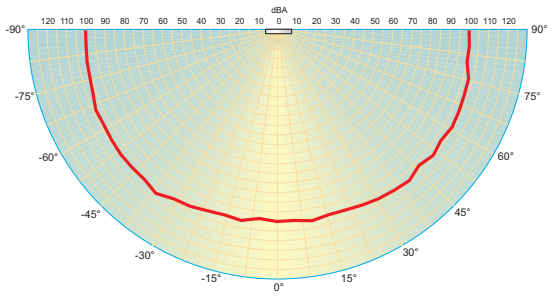
	UL464	Average	Peak
16 Vdc	77 dBA, min	85 dBA	91 dBA
16 Vfwr	77 dBA, min	85 dBA	91 dBA

Notes

1. All values shown are dBA measured at 10 feet (3.01m).
2. UL464 values measured in reverberant room.
3. Average and Peak values are measured in anechoic chamber.

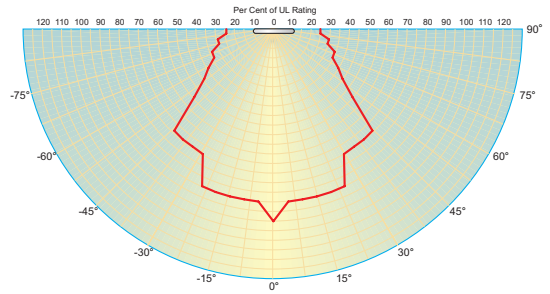
Average Sound Output (dBA)

(High dB setting, anechoic, 24V, measured at 10ft)



Light output - (effective cd)

Percent of UL rating versus angle



Specifications

Housing	Red or white textured UV stabilized, color impregnated engineered plastic. Exceeds 94V-0 UL flammability rating.
Lens	Optical grade polycarbonate (clear)
Mounting (indoor only)	Strobes and horn-strobes are for wall-mount installation only. Horn-only models may be ceiling- or wall-mounted. Flush mount: 2½ inch (64 mm) deep one-gang box Surface mount: Model 27193 surface mount box, wiremold box, or equivalent surface-mount box With optional trim plate: One-gang, two-gang, four-inch square, octagonal, or European single-gang box
Wire connections	Screw terminals: single input for both horn and strobe. #18 to #12 AWG (0.75 mm^2 to 2.5 mm^2) wire size
Operating environment	Indoor only: 32-120°F (0-49°C) ambient temperature. 93% relative humidity
Agency listings/approvals	UL 1971 (S218), UL 1638 (S218), UL 464 (S218), ULC S525, ULC S526, CSFM, CE, FCC, MEA. (All models comply with ADA Code of Federal Regulation Chapter 28 Part 36 Final Rule.)
Dimensions (HxWxD)	Signal: 4-1/2" x 2-3/4" x 13/16" (113 mm x 68 mm x 21 mm) Trimplate: 5" (127 mm); Height – 5-7/8" (149 mm); Depth – ½" (13 mm)
Operating voltage	G1-HD series temporal-tone horns: non-coded, filtered 16-33 Vdc or unfiltered 16-33 Vdc FWR (or coded when horn set to steady tone) G1-HDVM series temporal-tone horn-strobes: non-coded, filtered 16-33 Vdc or unfiltered 16-33 Vdc FWR (or coded (audible NAC only) when used with optional G1M Genesis Signal Master) G1-VM series strobes: non-coded, filtered 16 - 33 Vdc or unfiltered 16-33 Vdc FWR G1-P series steady-tone horns: coded or non-coded, filtered 20-31 Vdc or unfiltered 20-27 Vfwr
Strobe output rating	UL 1971, UL 1638, ULC S526: selectable 15 cd, 30 cd, 75 cd, or 110 cd output UL 1971: 15 cd (fixed 15/75 cd models) UL 1638, ULCS526: 75 cd (fixed 15/75 cd models)
Strobe flash rate	G1-VM strobes and G1-HDVM series temporal-tone horn-strobes: one flash per second synchronized with optional G1M Genesis Signal Master indefinitely within 10 milliseconds. Temporal setting (private mode only): synchronized to temporal output of horns on same circuit
Synchronization Sources	SIGA-CC1S, SIGA-MCC1S, SIGA-CC2A, SIGA-MCC2A, G1M-RM BPS6A, BPS10A, APS6A, APS10A, iO64, iO500, Fireshield Plus 3, 5 and 10 zone. Add G1M for G1-CVM &G1-HDVM devices only.
Horn pulse rate	G1-HD temporal-tone horns and G1-HDVM series temporal-tone horn-strobes: temporal rate synchronized with optional G1M Genesis Signal Master indefinitely within 10 milliseconds. G1-P steady-tone horns: continuous, steady tone only
Temporal audible pattern	½ sec ON, ½ sec OFF, ½ sec ON, ½ sec OFF, ½ sec ON, 1½ sec OFF, then repeat cycle

EXHIBIT 'C'

Candela Output

Lens Color	Rating	Switch Position A	Switch Position B	Switch Position C	Switch Position D
Amber	UL 1638	110 cd	75 cd	30 cd	15 cd
Amber	UL 1971*	88 cd	60 cd	24 cd	12 cd
Clear	UL 1971	110 cd	75 cd	30 cd	15 cd

** Equivalent Rating*

Fire appliances available with white or red housings.

ECS/MNS appliances available with clear or amber lenses.

Ordering Information

Model	Housing	Marking	Lens	Strobe	Horn	Ship Wt. lbs (kg)
Fire Alarm Appliances (c/w running man icon screen printed on housing)						
G1-VM	White	None	Clear	Selectable 15, 30, 75, or 110 cd	Strobe only	0.25 (0.11)
G1F-HD	White	FIRE	Clear	Horn only	Selectable high/low dB	0.25 (0.11)
G1F-HDV1575	White	FIRE	Clear	15/75 cd[1]	Temporal hi/lo dB-24V	0.25 (0.11)
G1F-HDVM	White	FIRE	Clear	Selectable 15, 30, 75, or 110 cd	Selectable high/low dB	0.25 (0.11)
G1F-P	White	FIRE	Clear	Steady Horn (not compatible with Genesis Signal Master)		0.25 (0.11)
G1F-V1575	White	FIRE	Clear	15/75 cd[1]	Strobe only	0.25 (0.11)
G1F-VM	White	FIRE	Clear	Selectable 15, 30, 75, or 110 cd	Strobe only	0.25 (0.11)
G1-HD	White	None	Clear	Horn only	Selectable high/low dB	0.25 (0.11)
G1-HDVM	White	None	Clear	Selectable 15, 30, 75, or 110 cd	Selectable high/low dB	0.25 (0.11)
G1-P	White	None	Clear	Steady Horn (not compatible with Genesis Signal Master)		0.25 (0.11)
G1RF-HD	Red	FIRE	Clear	Horn only	Selectable high/low dB	0.25 (0.11)
G1RF-HDV1575	Red	FIRE	Clear	15/75 cd[1]	Temporal hi/lo dB-24V	0.25 (0.11)
G1RF-HDVM	Red	FIRE	Clear	Selectable 15, 30, 75, or 110 cd	Selectable high/low dB	0.25 (0.11)
G1RF-P	Red	FIRE	Clear	Steady Horn (not compatible with Genesis Signal Master)		0.25 (0.11)
G1RF-V1575	Red	FIRE	Clear	15/75 cd[1]	Strobe only	0.25 (0.11)
G1RF-VM	Red	FIRE	Clear	Selectable 15, 30, 75, or 110 cd	Strobe only	0.25 (0.11)
G1R-HD	Red	None	Clear	Horn only	Selectable high/low dB	0.25 (0.11)
G1R-HDVM	Red	None	Clear	Selectable 15, 30, 75, or 110 cd	Selectable high/low dB	0.25 (0.11)
G1R-P	Red	None	Clear	Steady Horn (not compatible with Genesis Signal Master)		0.25 (0.11)
G1R-VM	Red	None	Clear	Selectable 15, 30, 75, or 110 cd	Strobe only	0.25 (0.11)
ECS/MNS Appliances (no running man icon on housing)						
G1WA-VMA	White	ALERT	Amber	Selectable A, B, C or D	Strobe only	0.25 (0.11)
G1WA-VMC	White	ALERT	Clear	Selectable 15, 30, 75, or 110 cd	Strobe only	0.25 (0.11)
G1WN-VMA	White	None	Amber	Selectable A, B, C or D	Strobe only	0.25 (0.11)
G1WN-VMC	White	None	Clear	Selectable 15, 30, 75, or 110 cd	Strobe only	0.25 (0.11)
Trim Plates						
G1T	White	None	Genesis Trim Plate (for two-gang or 4" square boxes)			0.15 (0.7)
G1RT	Red	None	Genesis Trim Plate (for two-gang or 4" square boxes)			0.15 (0.7)
G1T-FIRE	White	FIRE	Genesis Trim Plate (for two-gang or 4" square boxes)			0.15 (0.7)
G1RT-FIRE	Red	FIRE	Genesis Trim Plate (for two-gang or 4" square boxes)			0.15 (0.7)
G1WT-ALERT	White	ALERT	Genesis Trim Plate (for two-gang or 4" square boxes)			0.15 (0.7)
Surface Boxes						
27193-16	White	N/A	One-gang surface mount box			1 (0.4)
27193-11	Red	N/A	One-gang surface mount box			1 (0.4)

[1] These 15/75 cd models provide fixed output and are not multi-candela devices. The 15 cd output component complies with UL1971, while the 75 cd output component complies with UL 1638.

EXHIBIT 'C'

LIFE SAFETY & INCIDENT MANAGEMENT

Contact us...

Email: edwards.fire@fs.utc.com
Web: *Edwards-fire.com*

EDWARDS is a UTC brand.
1016 Corporate Park Drive
Mebane, NC 27302

EXHIBIT 'C'

EDWARDS
United Technologies
LIFE SAFETY & INCIDENT MANAGEMENT

Genesis LED
G1 Series
Compact Notification Devices

c UL us
S218,
S5389

7125-1657:0506
7135-1657:0502

FC

Overview

Genesis LED G1 Series horns and LED strobes feature a sleek low profile design and energy-efficient technology that makes them less expensive to install and operate by reducing overhead. High performance LEDs require fewer circuits and power supplies. These new appliances are designed with energy-efficiency and life safety in mind.

Genesis LED G1 Series uses high efficiency optics, combined with patented electronics, to deliver a highly controlled and efficiently focused light distribution pattern in exchange for lower current requirements. Strobes feature field-selectable 15, 30, or 75 cd light output.

Compared with Xenon-type strobes, Genesis LED G1 Series appliances need fewer power supplies and often smaller wire gauge, which lightens conduit requirements. They are also backwards compatible with legacy strobes, so there's no need to replace all your existing devices to upgrade to new LED technology. In fact, G1 strobes can be mixed on the same circuit and used in the same field of view as Xenon-based strobes. This makes Genesis LED G1 Series ideal for new installations and retrofits alike.

Field-configurable sound output levels provide the flexibility modern life safety projects demand, while the Genesis LED control protocol keeps multiple strobes on compatible NAC circuits synchronized to well within NFPA 72 requirements.

Serviceability is another area where G1 Series appliances shine. The innovative under-cover diagnostic test points provide easy access to device circuit testing while mounted.

Standard Features

- **High Performance LED Strobe Technology**
  - – Ultra low device current consumption
  - – High efficiency optics
  - – Selectable 15, 30, or 75 cd light output
  - – LED devices may be mixed with legacy Xenon strobes
- **Efficient Audible Output**
  - – Selectable high or low dB horn output
  - – Selectable temporal or steady horn output
  - – Improved audio frequency range for better wall penetration
- **Low-profile Design**
  - – Compact design... single gang mounting
  - – Ultra-slim... protrudes about 1" from the mounting surface
  - – Attractive appearance... no visible mounting screws
- **Multiple "FIRE" Marking Options**
  - – Order English, French, Spanish or no FIRE markings
  - – Change markings at any time with quick-swap covers
- **Easy to Install**
  - – Diagnostic test points streamline device circuit testing
  - – Fits standard 1-gang electrical boxes, no trim ring needed
  - – Optional trim ring available for 4-inch square boxes
  - – Slide switches for field configuration
  - – 12 to 18 AWG in-out screw terminals for quick wiring

EXHIBIT 'C'

Application

Strobes

Genesis LED G1 Series strobes are UL 1971-listed for use indoors as wall-mounted public-mode notification appliances for the hearing impaired. Prevailing codes require strobes to be used where ambient noise conditions exceed 105 dBA (87 dBA in Canada), where occupants use hearing protection, and in areas of public accommodation as defined in the *Americans with Disabilities Act*.

Synchronization is important in order to avoid epileptic sensitivity. All Genesis LED strobes exceed UL synchronization requirements (within 10 milliseconds over a two-hour period) when used with a synchronization source. See the specifications table for a list of compatible sources.

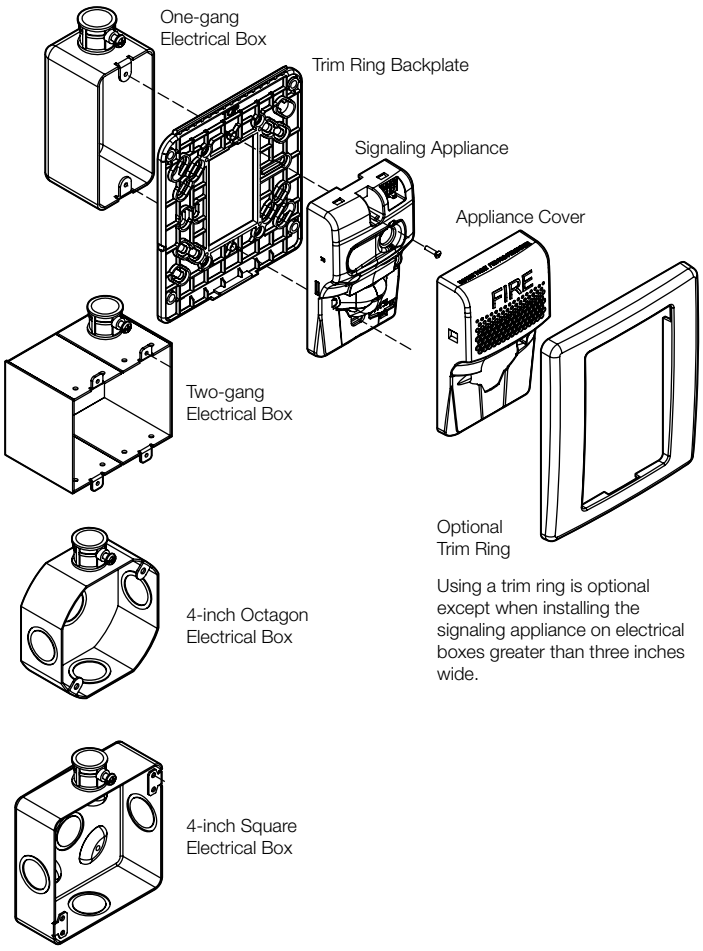
Horns

Genesis LED horn output reaches as high as 92 dBA and features an improved audio frequency range compared with other Genesis LED horns. This results in excellent sound penetration through walls and a clear warning of danger. They can also be set for high or low dBA output. This setting reduces horn output by about 6 dBA. Horn-only models may be ceiling-mounted or wall-mounted and may be configured for either coded or non-coded notification appliance circuits.

The suggested sound pressure level for each signaling zone used with alarm signals is at least 15 dBA above the average ambient sound level, or 5 dBA above the maximum sound level having a duration of at least 60 seconds, whichever is greater. These values are measured at five feet (1.5 m) above the floor. The average ambient sound level is A-weighted, fast response sound pressure measured over a 24-hour period.

Doubling the distance from the signal to the ear will theoretically result in a 6 dBA reduction of the received sound pressure level. The actual effect depends on the acoustic properties of materials in the space. A 3 dBA difference represents a barely noticeable change in volume.

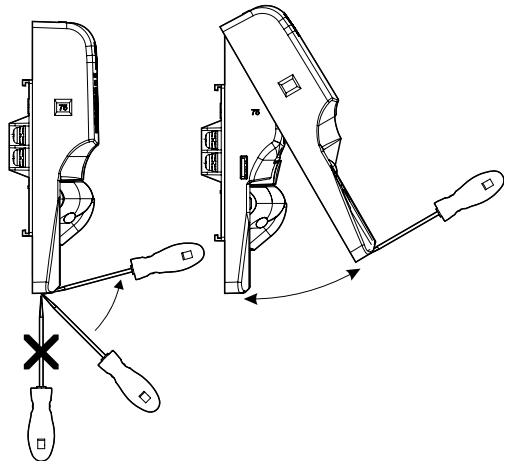
Genesis LED G1 Series horns and strobes mount to any standard one-gang surface or flush electrical box. Matching optional G1T trim rings are available to cover oversized openings and can accommodate one-gang or four-inch square boxes. Optional color matched single-gang surface boxes are also available.



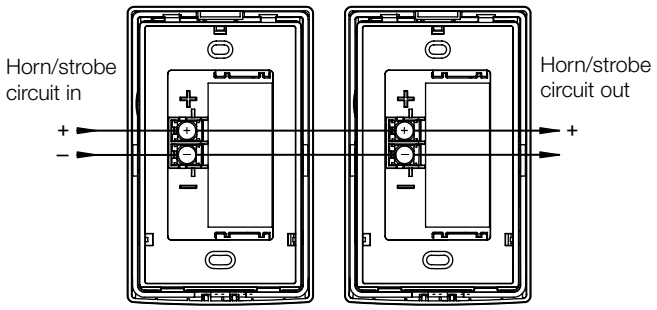
Using a trim ring is optional except when installing the signaling appliance on electrical boxes greater than three inches wide.

Installation

All Genesis LED devices come with mounting screws for easy installation. The tab at the bottom of the device unlocks the cover to reveal the mounting holes. The shallow depth of Genesis LED devices leaves ample room behind them for extra wiring. Once installed with the cover in place, no mounting screws are visible.



Wiring

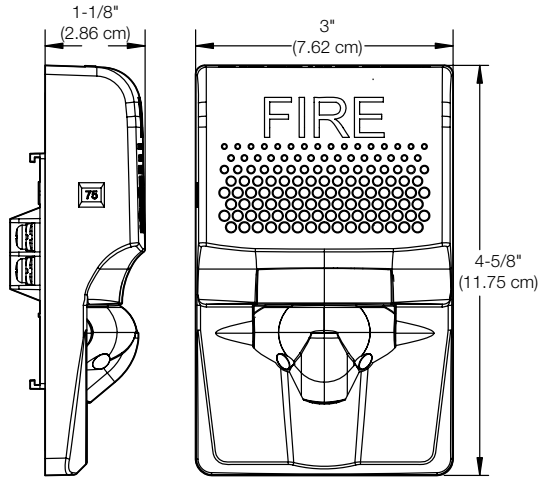


Signal polarity shown in the active condition.

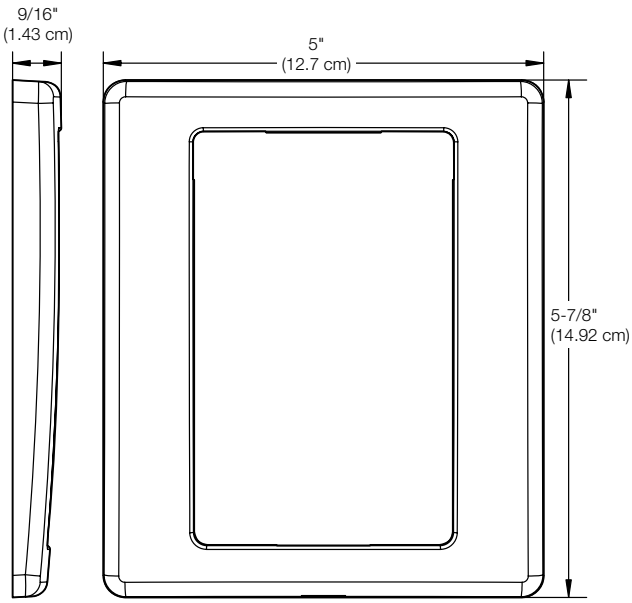
EXHIBIT 'C'

Dimensions

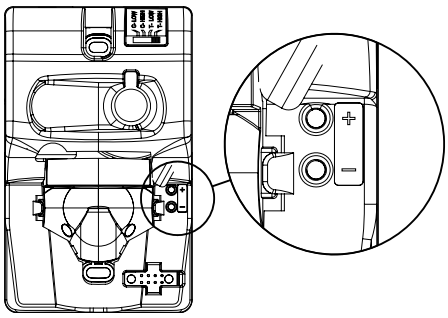
G1 Notification Appliances



G1T Trim Ring



Diagnostics



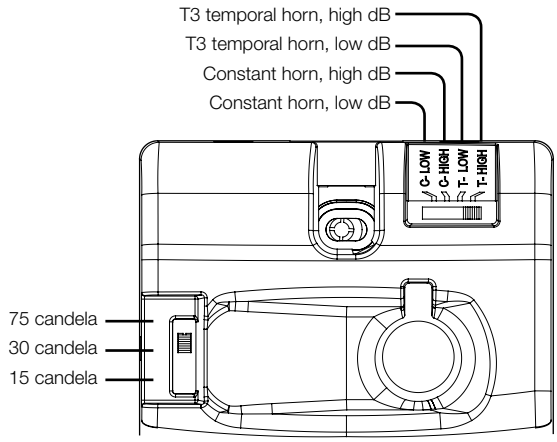
Test points indicated above are used to validate the Notification Appliance Circuit and verify device function.

Field Configuration

Temporal horn and horn-strobe models are factory set to sound in a three-pulse temporal pattern. By sliding the tone selector switch, horn-only units may be configured for constant horn output that can be coded at precise intervals by EDWARDS control panels and control modules.

Horns and horn-strobes are factory set for high dB output. Low dB output may be selected by sliding the tone selector switch. This reduces the output by about 6 dBA.

Genesis LED clear strobes and horn-strobes may be set for 15, 30, or 75 candela output. The output setting is changed by simply removing the cover and sliding the candela switch to the desired setting. The device does not have to be removed from the wall to change the output setting. The setting remains visible through a small window on the left-hand side of the device after the cover is closed.



Operating current

Horns

Sound setting	16 to 33 VDC	16 to 33 VFWR
C-LOW	13 mA	15 mA
C-HIGH	23 mA	29 mA
T-LOW	13 mA	15 mA
T-HIGH	23 mA	29 mA

Strobes

Strobe setting	16 to 33 VDC	16 to 33 VFWR
15, 30, 75	24 mA	32 mA

Horn-Strobes

Strobe setting	Sound setting	16 to 33 VDC	16 to 33 VFWR
15, 30, 75	C-Low, T-Low	35 mA	43 mA
	C-High, T-High	45 mA	55 mA

EXHIBIT 'C'

Sound Output

Reverberant dBA (UL 464)

Sound setting	Horn	Horn-strobe
C-LOW	80	80
C-HIGH	86	86
T-LOW	80	80
T-HIGH	86	86

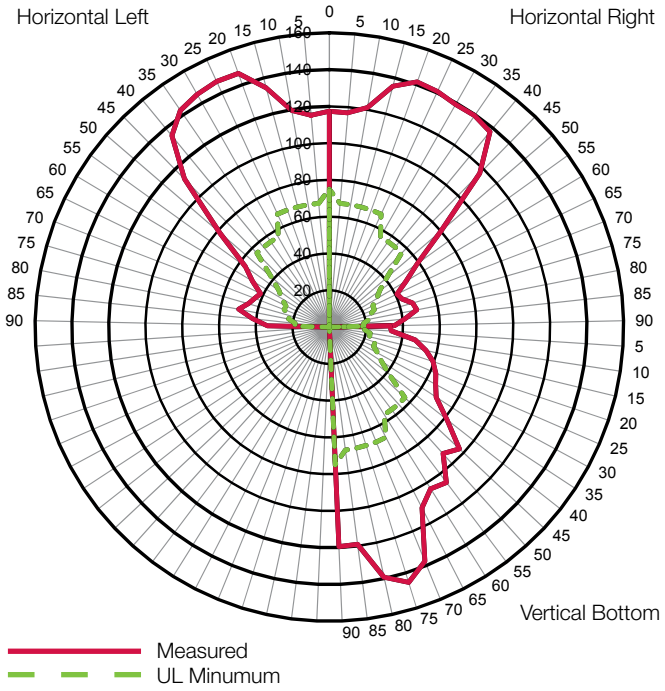
Anechoic dBA (CAN/ULC-S525)

Sound setting	Horn	Horn-strobe
C-LOW	86	86
C-HIGH	92	92
T-LOW	86	86
T-HIGH	92	92

Sound pattern (ULC)

Axis	Angle	Change in output
Horizontal	45° and 115°	-3 dBA
	5° and 130°	-6 dBA
Vertical	65° and 135°	-3 dBA
	45° and 140°	-6 dBA

Light Distribution



Specifications

Operating voltage	16 to 33 VDC, 16 to 33 VFWR
Horn signal type	Constant or T3 temporal
Light output	15, 30, or 75 candela
Strobe flash rate	1 fps (flash per second) approx.
Synchronization	20 Ω max. between any two devices. (To determine allowed wire resistance, refer to these specifications, and the specifications for the synchronized signal source.)
Synchronization sources	EDWARDS CC Series Signal Modules, Booster and Auxiliary Power Supplies, and Intelligent and Conventional Control Panels
Wire size	12 to 18 AWG (0.75 to 2.50 mm^2)
Dimensions (W×H×D)	3 × 4-5/8 × 1-1/8 in. (7.62 × 11.75 x 2.86 cm)
Strobe-to-box center offset	-0.71 inches (-1.8 cm)
Compatible electrical boxes [1]	1-gang, 2-gang, 4-inch octagon, 4-inch square
Trim rings	G1TR, G1TW - Dimensions 5 x 5-7 x 9/16 in. (12.7 x 14 92 x 1.43 cm)
Agency Listings	FCC, ICC, UL1971, UL1638, UL464, CSFM (All models comply with ADA code of federal regulation Chapter 28 Part 36 final rule)
Operating environment Temperature Relative humidity	 32 to 122°F (0 to 50°C) 0 to 93% noncondensing

[1] Electrical boxes must be at least 1-1/2 in. (3.81 cm) deep. Electrical boxes greater than three inches wide require a trim ring.

EXHIBIT 'C'

Ordering Information

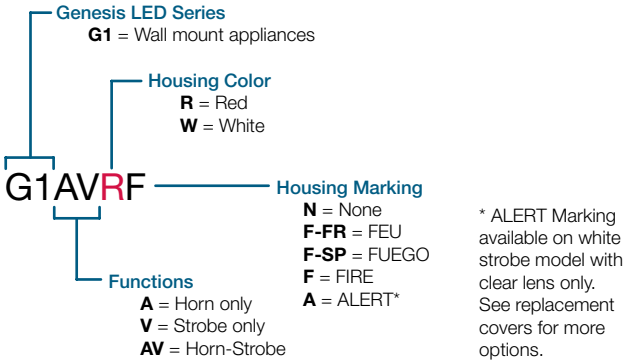
Notification Appliances		Color	Marking
 **Horns** Selectable High/low dB	G1ARF	Red	FIRE
	G1ARF-FR	Red	FEU
	G1ARF-SP	Red	FUEGO
	G1ARN	Red	None
	G1AWF	White	FIRE
	G1AWF-FR	White	FEU
	G1AWF-SP	White	FUEGO
	G1AWN	White	None
 **Strobes** Selectable 15, 30, 75 cd	G1VRF	Red	FIRE
	G1VRF-FR	Red	FEU
	G1VRF-SP	Red	FUEGO
	G1VRN	Red	None
	G1VWA*	White	ALERT
	G1VWF	White	FIRE
	G1VWF-FR	White	FEU
	G1VWF-SP	White	FUEGO
	G1VWN	White	None
 **Horn-strobes** Selectable 15, 30, 75 cd, High/low dB	G1AVRF	Red	FIRE
	G1AVRF-FR	Red	FEU
	G1AVRF-SP	Red	FUEGO
	G1AVRN	Red	None
	G1AVWF	White	FIRE
	G1AVWF-FR	White	FEU
	G1AVWF-SP	White	FUEGO
	G1AVWN	White	None

Replacement Appliance Covers		Color	Marking
 **Horn Covers**	G1ARA-CVR	Red	ALERT
	G1ARF-CVR	Red	FIRE
	G1ARF-FR-CVR	Red	FEU
	G1ARF-SP-CVR	Red	FUEGO
	G1ARN-CVR	Red	None
	G1AWA-CVR	White	ALERT
	G1AWF-CVR	White	FIRE
	G1AWF-FR-CVR	White	FEU
	G1AWF-SP-CVR	White	FUEGO
	G1AWN-CVR	White	None
 **Strobe Covers**	G1VRA-CVR	Red	ALERT
	G1VRF-CVR	Red	FIRE
	G1VRF-FR-CVR	Red	FEU
	G1VRF-SP-CVR	Red	FUEGO
	G1VRN-CVR	Red	None
	G1VWA-CVR	White	ALERT
	G1VWF-CVR	White	FIRE
	G1VWF-FR-CVR	White	FEU
	G1VWF-SP-CVR	White	FUEGO
	G1VWN-CVR	White	None
 **Horn-strobe Covers**	G1AVRA-CVR	Red	ALERT
	G1AVRF-CVR	Red	FIRE
	G1AVRF-FR-CVR	Red	FEU
	G1AVRF-SP-CVR	Red	FUEGO
	G1AVRN-CVR	Red	None
	G1AVWA-CVR	White	ALERT
	G1AVWF-CVR	White	FIRE
	G1AVWF-FR-CVR	White	FEU
	G1AVWF-SP-CVR	White	FUEGO
	G1AVWN-CVR	White	None

Accessories

	G1TR	Trim ring, G1 Series, red		G1TW	Trim ring, G1 Series, white
	27193-11	One-gang surface mount box, red		27193-16	One-gang surface mount box, white

Model Number Syntax, Appliances



* ALERT Marking available on white strobe model with clear lens only. See replacement covers for more options.

Model Number Syntax, Replacement Covers

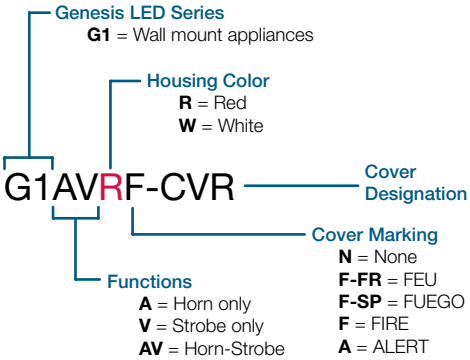


EXHIBIT 'C'

LIFE SAFETY & INCIDENT MANAGEMENT

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EXHIBIT 'C'

EDWARDS
United Technologies
LIFE SAFETY & INCIDENT MANAGEMENT

Genesis LED G4 Series

Wall Mount Notification Devices

c UL us
S218, S5389

Overview

Genesis LED G4 Series horns and LED strobes feature a sleek low profile design and energy-efficient technology that makes them less expensive to install and operate by reducing overhead. High performance LEDs require fewer power supplies, backup power, and batteries. These new appliances are designed with, energy-efficiency, and life safety in mind.

Genesis LED G4 Series uses high efficiency optics, combined with patented electronics, to deliver a highly controlled and efficiently focused light distribution pattern in exchange for lower current requirements. Strobes feature field-selectable 15, 30,75, or 110 cd light output.

Compared with Xenon-type strobes, Genesis LED G4 Series appliances need fewer power supplies and often smaller wire gauge, which lightens conduit requirements. They are also backwards compatible with legacy strobes, so there's no need to replace all your existing devices to upgrade to new LED technology. In fact, G4 strobes can be mixed on the same circuit and used in the same field of view as Xenon-based strobes. This makes Genesis LED G4 Series ideal for new installations and retrofits alike.

Field-configurable sound output levels provide the flexibility modern life safety projects demand, while the Genesis LED control protocol keeps multiple strobes on compatible NAC circuits synchronized to well within NFPA 72 requirements.

Serviceability is another area where G4 Series appliances shine. The universal room side wiring plate allows for pre-installation and electrical wiring as well as checking continuity with the included diagnostics check bar. G4 Series devices can then be easily snapped into place with the confidence of knowing the wiring is correct. The innovative under-cover diagnostic test points provide easy access to device circuit testing while mounted.

Standard Features

- **High Performance LED Strobe Technology**
  - Ultra low device current consumption allows:
    - More devices per circuit
    - Ability to use lower gauge wire
    - Longer wire runs
    - Fewer booster power supplies
  - High efficiency optics
  - Selectable 15, 30, 75, or 110 cd light output
  - LED devices may be mixed with legacy Xenon strobes
- **Efficient Audible Output**
  - Selectable high or low dB horn output
  - Selectable temporal or steady horn output
  - Improved audio frequency range for better wall penetration
- **Low-profile Design**
  - Ultra-slim... protrudes about 1.5" from the mounting surface
  - Attractive appearance... no visible mounting screws
- **Multiple "FIRE" Marking Options**
  - Order English, French, Spanish or no FIRE markings
  - Change markings at any time with replaceable quick-swap covers
- **Easy to Install**
  - Pre-install and pre-wire with convenient universal room side wiring plate
  - Check electrical continuity on room side wiring plate with included diagnostics check bar
  - Diagnostics port streamlines device circuit testing
  - Fits 1-gang, 2-gang, 3.5-inch octagon, and 4-inch square electrical boxes
  - Optional red and white trim plates available
  - Slide switches for field configuration
  - 12 to 18 AWG in-out screw terminals for quick wiring

EXHIBIT 'C'

Application

Strobes

Genesis G4 Series strobes are UL 1971-listed for use indoors as wall-mounted public-mode notification appliances for the hearing impaired. Prevailing codes require strobes to be used where ambient noise conditions exceed 105 dBA (87 dBA in Canada), where occupants use hearing protection, and in areas of public accommodation as defined in the *Americans with Disabilities Act*.

Synchronization is important in order to avoid triggering seizures in people with photosensitive epilepsy. All Genesis strobes exceed UL synchronization requirements (within 10 milliseconds over a two-hour period) when used with a synchronization source. See the specifications table for a list of compatible sources.

Horns

Genesis horn output reaches as high as 92 dBA and features an improved audio frequency range compared with other Genesis horns. This results in excellent sound penetration through walls and a clear warning of danger. Horn only models may be configured for either coded or non-coded notification appliance circuits. They can also be set for high or low dBA output. This setting reduces horn output by about 6 dBA. Horn-only models may be ceiling-mounted or wall-mounted.

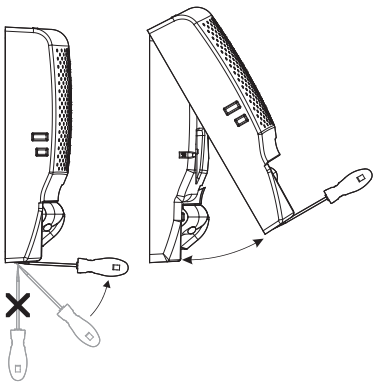
The suggested sound pressure level for each signaling zone used with alarm signals is at least 15 dBA above the average ambient sound level, or 5 dBA above the maximum sound level having a duration of at least 60 seconds, whichever is greater. These values are measured at five feet (1.5 m) above the floor. The average ambient sound level is A-weighted, fast response sound pressure measured over a 24-hour period.

Doubling the distance from the signal to the ear will theoretically result in a 6 dBA reduction of the received sound pressure level. The actual effect depends on the acoustic environment in the space. A 3 dBA difference represents a barely noticeable change in volume.

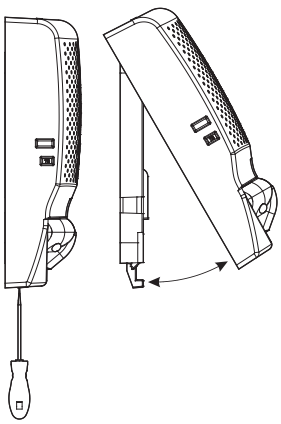
Installation

Genesis G4 horns and strobes mount to the required GP10 room side wiring plate. The GP10 mounting plate is ordered separately from the G4 device in packs of 10 for convenient pre-installing and pre-wiring. The device can be removed easily from the room side wiring plate by pushing up with a screwdriver. The cover can also be removed from the device easily with a screwdriver to access the light and sound output settings and a diagnostics test port for voltage testing.

Removing Cover

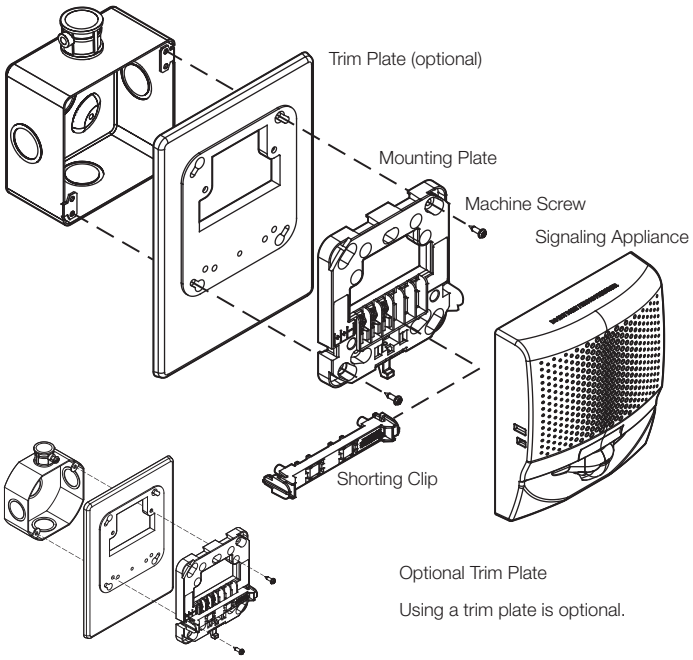


Removing Device



Genesis LED G4 Series horns, strobes, and horn-strobes mount to any standard one-gang, two-gang, 3.5-inch octagon, and 4-inch square electrical box. Matching optional G4T trim rings are available to cover oversized openings. Optional color matched double-gang surface boxes are also available.

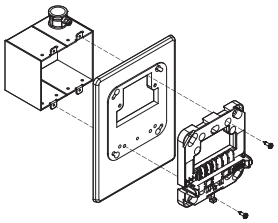
Double Gang Electrical Box



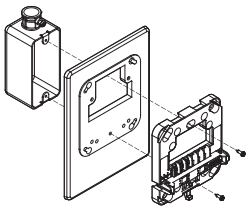
Optional Trim Plate

Using a trim plate is optional.

3.5-inch Octagon Electrical Box



Two-gang Electrical Box



One-gang Electrical Box

Wiring

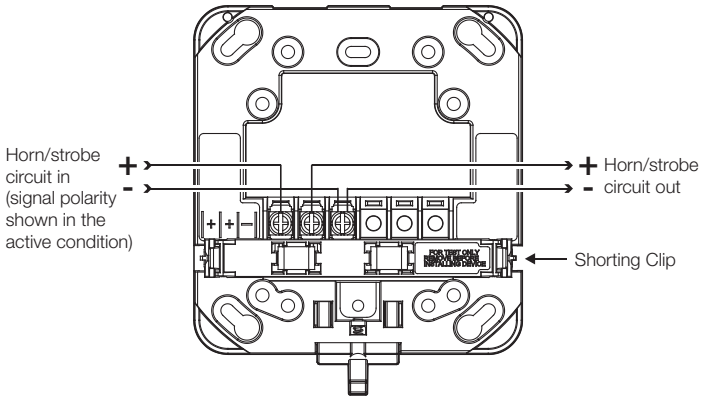
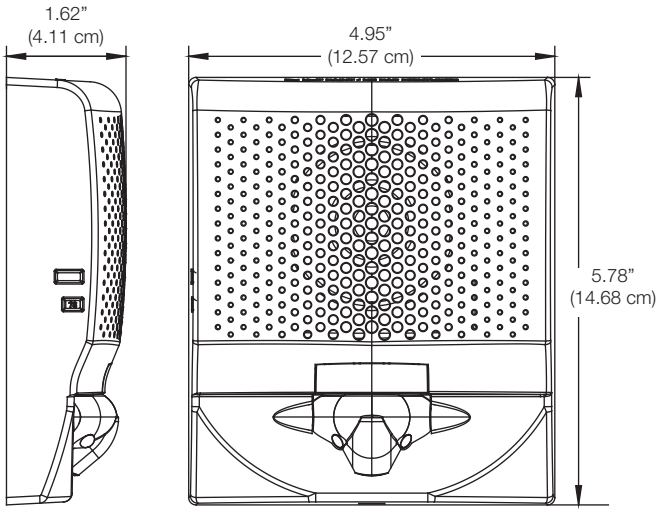


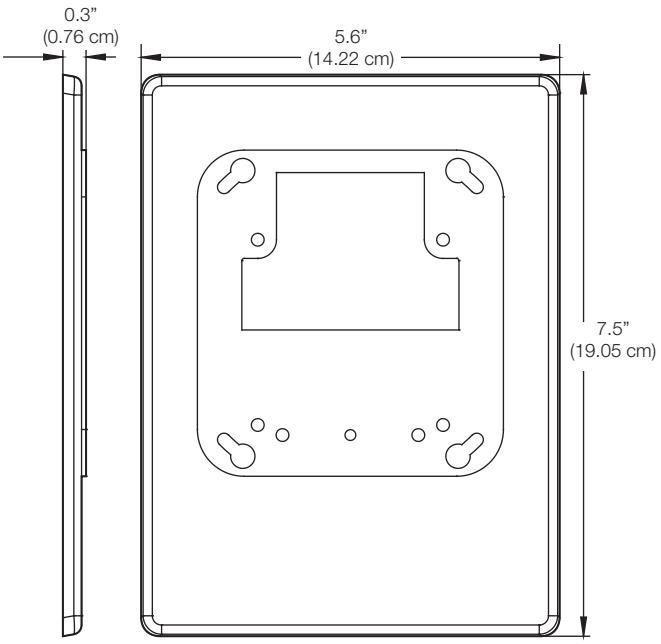
EXHIBIT 'C'

Dimensions

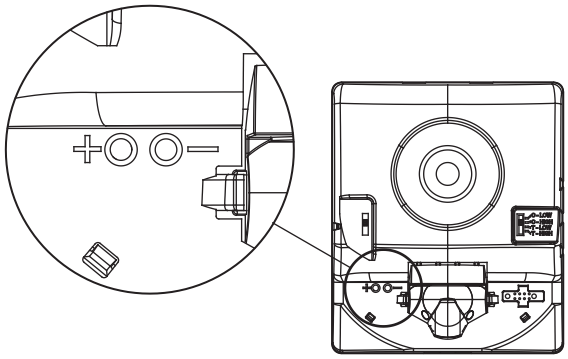
G4 Notification Appliances



G4T Trim Plate (optional)



Diagnostics



Test points indicated above are used to validate the Notification Appliance Circuit and verify device function.

Field Configuration

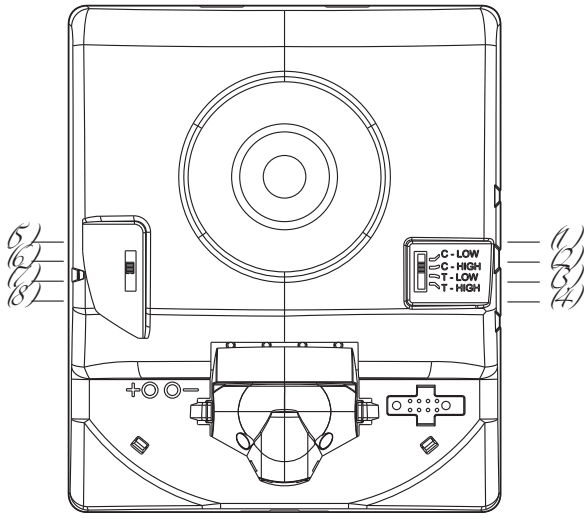
Temporal horn and horn-strobe models are factory set to sound in a three-pulse temporal pattern. By sliding the tone selector switch, horn only models may be configured for constant horn output that can be coded at precise intervals by EDWARDS control panels and control modules.

Note: Temporal 3 coding is the required output for fire notification devices per NFPA 72. Any device coding other than temporal 3 is at the discretion and approval of the local authority having jurisdiction (AHJ).

Horns and horn-strobes are factory set for high dB output. Low dB output may be selected by sliding the tone selector switch. This reduces the output by about 6 dBA.

Genesis LED clear strobes and horn-strobes may be set for 15, 30, 75, or 110 candela output. The output setting is changed by simply removing the cover and sliding the candela switch to the desired setting. The device does not have to be removed from the wall to change the output setting. The setting remains visible through a small window on the left-hand side of the device after the cover is closed.

Light and Sound Output Settings



(1) Constant, low dB
(2) Constant, high dB
(3) T3 temporal, low dB
(4) T3 temporal, high dB
(5) 110 candela
(6) 75 candela
(7) 30 candela
(8) 15 candela

Operating current

Horns

Sound setting	16 to 33 VDC	16 to 33 VFWR
C-Low, T-Low	18 mA	22 mA
C-High, T-High	28 mA	38 mA

Strobes

Strobe setting	16 to 33 VDC	16 to 33 VFWR
15, 30, 75, 110	28 mA	36 mA

Horn-Strobes

Strobe setting	Sound setting	16 to 33 VDC	16 to 33 VFWR
15, 30, 75, 110	C-Low, T-Low	40 mA	48 mA
	C-High, T-High	50 mA	60 mA

EXHIBIT 'C'

Sound Output

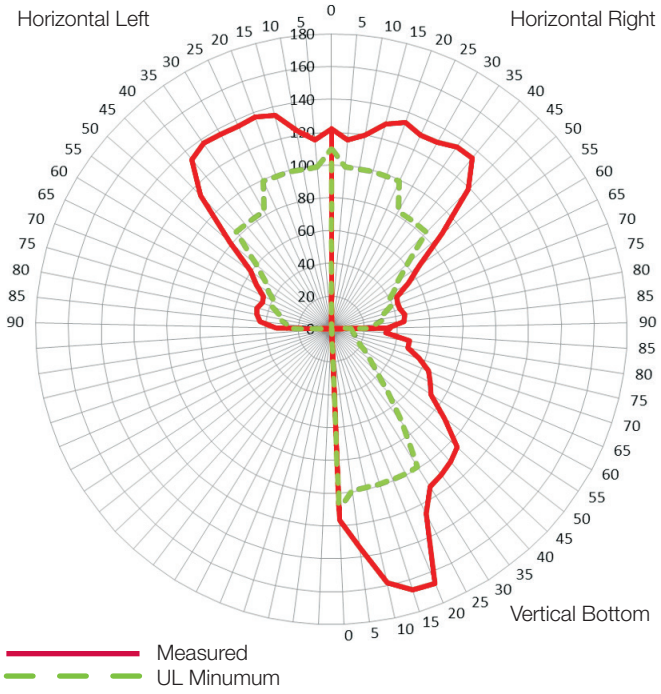
Horn & Horn-Strobe

Sound setting	Reverberant (UL464)	Anechoic (CAN/ULC - 5925)
C-Low, T-Low	80 dBA	86 dBA
C-High, T-High	85 dBA	92 dBA

Sound pattern (ULC)

Axis	Angle	Change in output
Horizontal	135° and 45°	–3 dBA
	150° and 30°	–6 dBA
Vertical	135° and 40°	–3 dBA
	150° and 30°	–6 dBA

Light Distribution



Specifications

Operating voltage	16 to 33 VDC, 16 to 33 VFWR
Horn signal type	Constant or TC3 temporal
Light output	15, 30, 75, or 110 candela
Strobe flash rate	1 fps (flash per second) approx.
Synchronization	20 Ω max. between any two devices. To determine allowed wire resistance, refer to these specifications, and the specifications for the synchronized signal source.
Synchronization Sources	Edwards CC Series Signal Modules, Booster and Auxiliary Power Supplies, Intelligent and Conventional Control Panels
Wire size	12 to 18 AWG (0.75 to 2.50 mm^2)
Dimensions (W×H×D)	4.95 x 5.78 x 1.62 in (12.57 x 14.68 x 4.11 cm)
Strobe-to-box center offset	-1.70 inches (-4.32 cm)
Compatible electrical boxes [1]	1-gang, 2-gang, 3.5-inch octagon, 4-inch square
Trim plates	G4TR, G4TW (5.6 x 7.5 x 0.3 in (14.22 x 19.05 x 0.76 cm))
Operating environment	
Temperature	32 to 122°F (0 to 50°C)
Relative humidity	0 to 93% noncondensing
Storage Temperature	-40 to 158 F (-40 to 70 C)

[1] Electrical boxes must be at least 1-1/2 in. (3.81 cm) deep.

EXHIBIT 'C'

Ordering Information

FOR REFERENCE ONLY

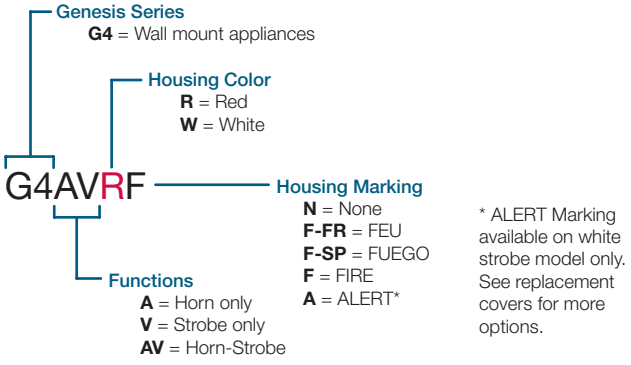
Notification Appliances		Color	Marking
 Horns	G4ARF	Red	FIRE
	G4ARF-FR	Red	FEU
	G4ARF-SP	Red	FUEGO
	G4ARN	Red	None
	G4AWF	White	FIRE
	G4AWF-FR	White	FEU
	G4AWF-SP	White	FUEGO
	G4AWN	White	None
 Strobes	G4VRF	Red	FIRE
	G4VRF-FR	Red	FEU
	G4VRF-SP	Red	FUEGO
	G4VRN	Red	None
	G4VWF	White	FIRE
	G4VWF-FR	White	FEU
	G4VWF-SP	White	FUEGO
	G4VWN	White	None
 Horn-strobes	G4AVRF	Red	FIRE
	G4AVRF-FR	Red	FEU
	G4AVRF-SP	Red	FUEGO
	G4AVRN	Red	None
	G4AVWF	White	FIRE
	G4AVWF-FR	White	FEU
	G4AVWF-SP	White	FUEGO
	G4AVWN	White	None

Replacement Appliance Covers		Color	Marking
 Horn Covers	G4ARA-CVR	Red	ALERT
	G4ARF-CVR	Red	FIRE
	G4ARF-FR-CVR	Red	FEU
	G4ARF-SP-CVR	Red	FUEGO
	G4ARN-CVR	Red	None
	G4AWA-CVR	White	ALERT
	G4AWF-CVR	White	FIRE
	G4AWF-FR-CVR	White	FEU
	G4AWF-SP-CVR	White	FUEGO
	G4AWN-CVR	White	None
 Strobe Covers	G4VRA-CVR	Red	ALERT
	G4VRF-CVR	Red	FIRE
	G4VRF-FR-CVR	Red	FEU
	G4VRF-SP-CVR	Red	FUEGO
	G4VRN-CVR	Red	None
	G4VWA-CVR	White	ALERT
	G4VWF-CVR	White	FIRE
	G4VWF-FR-CVR	White	FEU
	G4VWF-SP-CVR	White	FUEGO
	G4VWN-CVR	White	None
 Horn-strobe Covers	G4AVRA-CVR	Red	ALERT
	G4AVRF-CVR	Red	FIRE
	G4AVRF-FR-CVR	Red	FEU
	G4AVRF-SP-CVR	Red	FUEGO
	G4AVRN-CVR	Red	None
	G4AVWA-CVR	White	ALERT
	G4AVWF-CVR	White	FIRE
	G4AVWF-FR-CVR	White	FEU
	G4AVWF-SP-CVR	White	FUEGO
	G4AVWN-CVR	White	None

Accessories

 GP10	Room Side Wiring Plate (required, ordered separately)	 G4TR	Trim plate, G4 Series, red	 G4TW	Trim plate, G4 Series, white
		27193-21	Two-gang surface mount box, red	27193-26	Two-gang surface mount box, white

Model Number Syntax, Appliances



* ALERT Marking available on white strobe model only. See replacement covers for more options.

Model Number Syntax, Replacement Covers

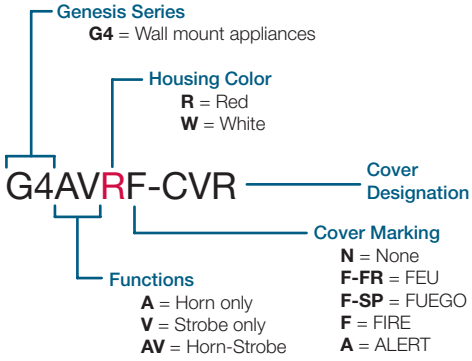


EXHIBIT 'C'

LIFE SAFETY & INCIDENT MANAGEMENT

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Mebane, NC 27302

EXHIBIT 'C'

EDWARDS
United Technologies
LIFE SAFETY & INCIDENT MANAGEMENT

Temporal Horns and Horn-strobes

757 Series

Patented

FM APPROVED MEA UL UL S218 7125-1657: 0184

Overview

Integrity temporal horns and temporal horn-strobes are specially designed for use with compatible life safety communication and control equipment to alert occupants of a life safety event. The horn emits a piercing low frequency sound that is easily heard above moderate ambient noise levels. The flash from its strobe can be noticed from almost any position in the room, corridor, or large open space.

Integrity's rugged plastic housing is made from durable and fire retardant, high impact plastic with a slightly textured surface. Its ingenious mounting plate firmly holds the device in place with a single screw. A separate trim plate is not required. Terminals accept up to #12 AWG (2.5mm^2) wire for polarized connections.

Strobes are shipped with standard wall mount style "FIRE" lens markings. Where ceiling orientation, other languages, or different lens markings are required, EDWARDS offers optional LKW and LKC series Lens Marking Kits. These optional lens markings simply snap on to the strobe. Consult EDWARDS for availability of special lens markings.

Integrity horns and horn-strobes are designed for 16 to 33 Vdc operation and must be connected to signal circuits that output a constant (not pulsed) voltage. A diode is used to allow full signal circuit supervision.

Standard Features

- **UL 1971-listed synchronizing strobe**
  Integrity strobes synchronize to the latest UL 1971 requirements when used with a synchronization source.
- **Adjustable Audible Output**
  Select temporal or continuous tones, and High setting for 98 dBA output or Low setting for 94 dBA sound output.
- **Genesis-compatible**
  All Genesis and Integrity strobes on the same circuit meet UL 1971 synchronization requirements when used with an external control module.
- **Approved for public and private mode applications**
  UL 1971-listed as signaling devices for the hearing impaired and UL 1638-listed as protective visual signaling appliances.
- **Durable red or white Noryl front plate**
  Ideal for outdoor, industrial or harsh environments.
- **Field changeable field markings**
  Lens language or standard "FIRE" marking is easily changed with optional LKW and LKC series lens kits.
- **Easy Installation**
  Flush mount to standard North American 4" square or two-gang box. Integrity's universal mounting plate allows it to be wired and then left hanging free for easy inspection and testing before it is fastened to the electrical box.

EXHIBIT 'C'

Application

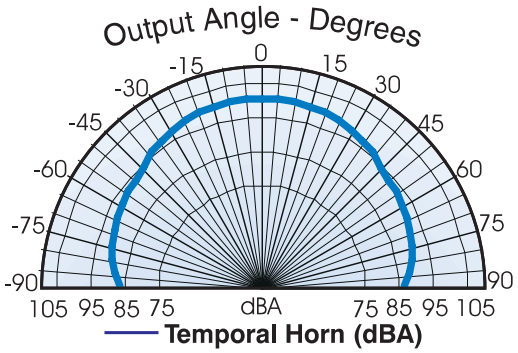
NOTE: The installation of visible and audible signals are subject to national and local standards, codes, and ordinances. Consult your Authority Having Jurisdiction for device installation requirements, application standards, and minimum performance specifications.

Horns

During installation, the horn is configured for steady or temporal tone signal and either low (94 dBA) or high (98 dBA) output. When temporal output is selected all horns on a common two-wire circuit are self-synchronized (see specifications). External control modules are not required for audible synchronization.

Suggested sound pressure level for each signaling zone used with alert or alarm signals is at least 15dB above the average ambient sound level, or 5dB above the maximum sound level having a duration of at least 60 seconds, whichever is greater, measured 5' (1.5m) above the floor. The average ambient sound level is the RMS, A-weighted sound pressure measured over a 24-hour period.

Doubling the distance from the signal to the ear will theoretically result in a 6 dB reduction of the received sound pressure level. The actual effect depends on the acoustic properties of materials in the space. A 3 dBA difference represents a barely noticeable change in volume.



Typical Sound Output Distribution
dBA measured at 10 ft in anechoic chamber
757 Series Temporal Horn ('HIGH' output)

Strobes

EDWARDS strobes are UL 1971-listed for use indoors as wall-mounted public-mode notification appliances for the hearing impaired. Prevailing codes require strobes to be used where ambient noise conditions exceed specified levels, where occupants use hearing protection, and in areas of public accommodation. Consult with your Authority Having Jurisdiction for details.

As part of the Enhanced Integrity line of products, 757 Series strobes exceed UL synchronization requirements (within 10 milliseconds other over a two-hour period) when used with a synchronization source. Synchronization is important in order to avoid epileptic sensitivity.

Integrity strobes are fully compatible with EDWARDS Genesis signals.

NOTE: The flash intensity of some visible signals may not be adequate to alert or waken occupants in the protected area. Research indicates that the intensity of strobe needed to awaken 90% of sleeping persons is approximately 100 cd. EDWARDS recommends that strobes in sleeping rooms be rated at at least 110 cd.

WARNING: These devices will not operate without electrical power. As fires frequently cause power interruptions, further safeguards such as backup power supplies may be required.

Installation and Mounting

All models fit to a standard flush mounted, North-American two-gang electrical box, 2¾ inch (69 mm) minimum. Optional flush trims are not required. For surface mount, use EDWARDS's custom indoor and outdoor surface boxes painted in color-matched red or white epoxy. EDWARDS recommends that fire alarm horn/strobes always be installed in accordance with the latest recognized edition of national and local fire alarm codes.

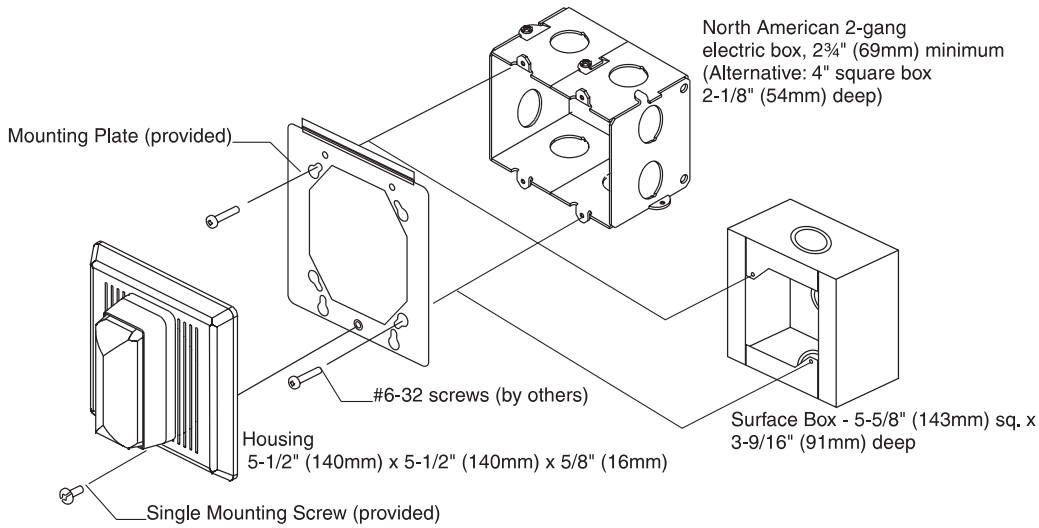
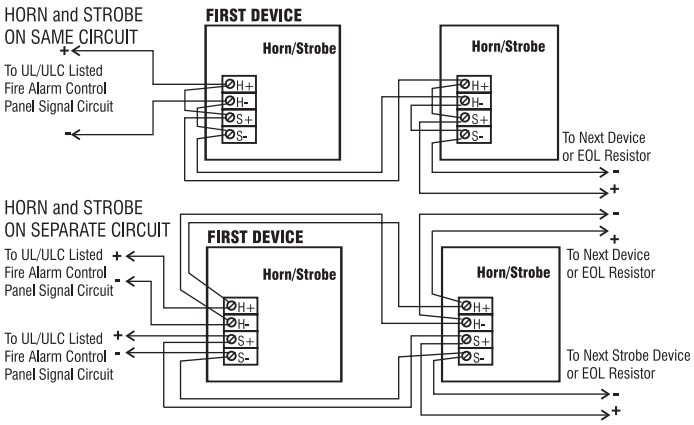


EXHIBIT 'C'

Typical Wiring

The strobe must be connected to signal circuits which output a constant (not pulsed) voltage. The horn can be connected to continuous voltage circuits.



Strobe Operating Current (RMS)

UL Rating	15 cd	15/75 cd	30 cd	75 cd	110 cd
16 Vdc	109	150	130	263	329
16 Vfwr	150	210	189	333	420

Typical Current	15 cd	15/75 cd	30 cd	75 cd	110 cd
24 Vdc	69	90	89	159	180
24 Vfwr	108	128	134	255	260

Vdc: Volts direct current, regulated and filtered

Vfwr: Volts full wave rectified

Current Draw Notes and Comments

1. Current values are shown in mA.
2. UL Nameplate Rating can vary from Typical Current due to measurement methods and instruments used.
3. EDWARDS recommends using the Typical Current for system design including NAC and Power Supply loading and voltage drop calculations.
4. Use the 16 Vdc RMS current ratings for filtered power supply and battery AH calculations. Use the 16 Vfwr RMS current ratings for unfiltered power supply calculations.
5. Fuses, circuit breakers and other overcurrent protection devices are typically rated for current in RMS values. Most of these devices operate based upon the heating affect of the current flowing through the device. The RMS current

dBA Output

Horn-strobes

	UL464		Average - anechoic		Peak - anechoic	
	Temporal	Steady	Temporal	Steady	Temporal	Steady
High dB Output	79.0	85.0	97.0	97.0	102.0	102.0
Low dB Output	75.0	79.0	93.0	93.0	98.0	98.0

determines the heating affect and therefore, the trip and hold threshold for those

Horns

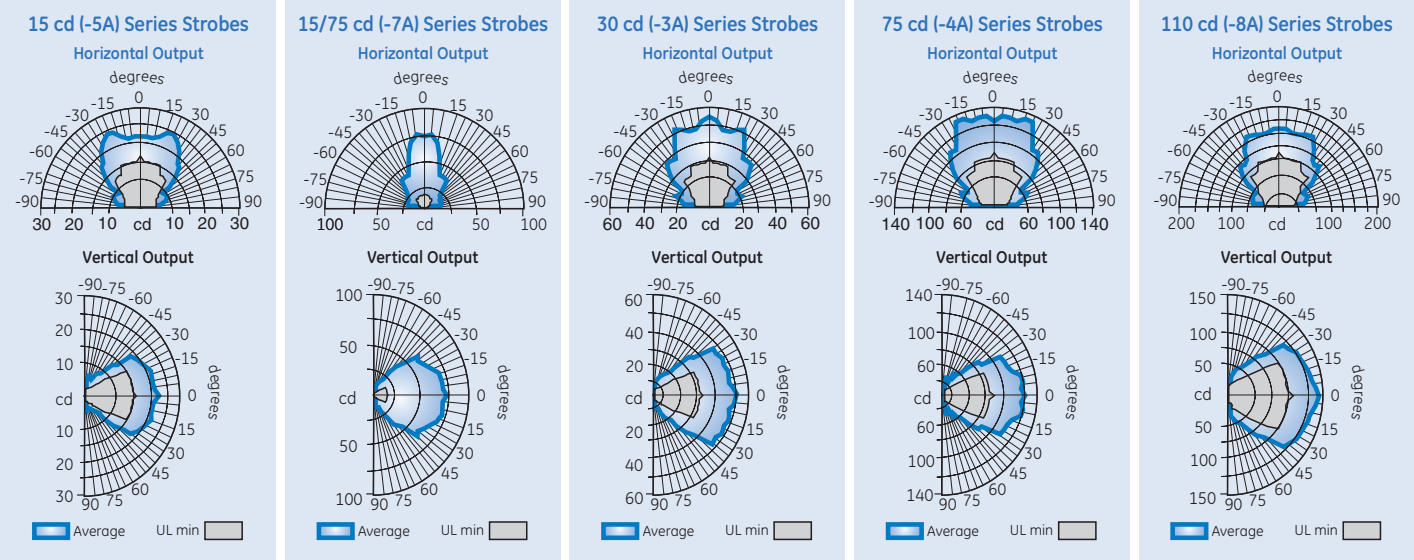
	UL464		Average - anechoic		Peak - anechoic	
	Temporal	Steady	Temporal	Steady	Temporal	Steady
High dB Output	82.0	85.0	98.0	98.0	104.0	104.0
Low dB Output	75.0	82.0	94.0	94.0	99.0	99.0

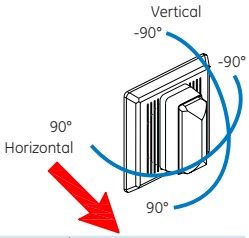
dBA Output Notes and Comments

- All values shown are dBA measured at 10 feet (3.01m).
- UL1480 values measured in reverberation room.
- Average values are measured in anechoic chamber.

EXHIBIT 'C'

Light Output Patterns





Specifications

Rated Strobe Output - candela (cd)	757-1A-T	757-5A-T	757-7A-T	757-3A-T	757-4A-T	757-8A-T
UL 1638	N/A (horn only)	15 cd (indoor only)	75 cd	30 cd	75 cd	110 cd
UL 1971		15 cd (wall mount only)	15 cd wall 15 cd ceiling	30 cd wall 15 cd ceiling	75 cd wall 60 cd ceiling	110 cd wall 60 cd ceiling
ULC S526		15 cd	75 cd	30 cd	75 cd	120 cd
Standalone Synchronization Characteristics (note 2)	Strobe flash at 1 per second within 200 milliseconds on common circuit Horn pulses at temporal rate within 200 milliseconds on common circuit					
Operating Volts	Strobe: 16-33 Vdc or Vfwr Continuous Horn: 16-33 Vdc or Vfwr Continuous					
Horn Output (note 1)	Anechoic: High Setting - 104 dBA (peak)/98 dBA (avg); Low Setting - 99 dBA (peak)/94 dBA (avg) Reverberent: High Setting - 85 dBA (continuous)/82 dBA (temporal); Low Setting - 82 dBA (continuous)/75 dBA (temporal)					
Horn Current	High Output: 40 mA @ 24 Vdc; 55mA @ 24 Vrms FWR Low Output: 20 mA @ 24 Vdc; 28 mA @ 24 Vrms FWR					
Strobe Flash Synchronization	Synchronized at one flash per second. External control module necessary to meet UL 1971 synchronization requirements of 10 milliseconds over a two-hour period.					
Synchronization Sources	G1M-RM, SIGA-CC1S, SIGA-MCC1S, BPS6A, BPS10A					
Strobe Marking	Supplied with LKW-1 “FIRE” red letters, vertical both sides (Wall Mount) - see LKW and LKC series for ceiling style and optional markings.					
Flash Tube Enclosure	Clear LEXAN with white marking sleeve					
Housing	Textured, color impregnated engineered plastics - exceeds 94V-0 UL flammability rating					
Wire Connections	Terminals - separate, polarized inputs for Horn & Strobe, #12 AWG (2.5mm²) maximum					
INDOOR Operating Environment	32-120° F (0-49° C) ambient temperature. 93% relative humidity @ 40° C					
OUTDOOR Operating Environment (must use weatherproof box)	98% relative humidity @ 40° C; -31-150° F (-35-66° C) ambient temperature (757-4A: rated at 48 cd @ -35° C per UL/@ -40° C per ULC) (757-7A: rated at 17.7 cd @ -35° C per UL/@ -40° C per ULC) (757-8A: rated at 70.7 cd @ -35° C per UL/@ -40° C per ULC)					
Mounting - INDOOR	Flush: North-American 2-gang box, 3” high x 4” wide x 2¾” (69 mm) minimum Surface: 757A-SB Back box Bi-directional: 757A-BDF Mounting Frame					
Mounting - OUTDOOR	Surface: 757A-WB Weatherproof Box					
Agency Listings	UL 1971, UL 1638, UL 464, ULC S526, ULC S525, MEA, CSFM, FM (All models comply with ADA Code of Federal Regulation Chapter 28 Part 36 Final Rule)					

Note 1 - Measured at 10 ft (3m) @ 24 Vdc. Subtract 3 dBA for models with strobes. **Note 2 -** Temporal audible pattern is defined as: ½ sec ON, ½ sec OFF, ½ sec ON, ½ sec OFF, ½ sec ON, 1½ sec OFF, then repeat cycle. Integrity audible will not be affected by Genesis signal silence operation when on the same two wire circuit with Genesis horn strobes.

EXHIBIT 'C'

Ordering Information

Catalog Number	Description	Ship Wt., lb. (kg)
Temporal Horns		
757-1A-T*	Temporal Horn, Red	1.7 (0.8)
Temporal Horn-Strobes		
757-7A-T*	Temporal Horn-Strobe, 15/75cd, Red	2.0 (0.9)
757-5A-T*	Temporal Horn-Strobe, 15cd, Red	
757-3A-T*	Temporal Horn-Strobe, 30cd, Red	
757-4A-T*	Temporal Horn-Strobe, 75cd, Red	
757-8A-T*	Temporal Horn-Strobe, 110cd, Red	
Synchronization Sources		
G1M-RM	Genesis Signal Master Remote Mount (1-gang)	0.2 (0.1)
SIGA-CC1S	Synchronization Output Module (Standard Mount) - UL/ULC Listed	0.5 (0.23)
SIGA-MCC1S	Synchronization Output Module (UIO Mount) - UL Listed	0.18 (0.08)
BPS6A	6.5 Amp Booster Power Supply	13 (5.9)
BPS10A	10 Amp Booster Power Supply	13 (5.9)
Mounting Accessories		
757A-SB*	Surface Box, Red, Indoor	1.5 (0.7)
757A-WB*	Weatherproof Box, Red, Surface	
757A-BDF*	Bi-directional Frame, Red	4 (1.8)

** Add -W for White housings.*

Lens Marking Kits (see note 1)		
LKW-1	“FIRE”, Wall Orientation (supplied)	0.1 (.05)
LKW-1R	“FIRE”, Wall Orientation, RED	
LKW-2	“FEU”, Wall Orientation	
LKW-3	“FIRE/FEU”, Wall Orientation	
LKW-4	“SMOKE”, Wall Orientation	
LKW-5	“HALON”, Wall Orientation	
LKW-6	“CO2”, Wall Orientation	
LKW-7	“EMERGENCY”, Wall Orientation	
LKW-8	“ALARM”, Wall Orientation	
LKW-9	“FUEGO”, Wall Orientation	
LKW-10	“ALERT”, Wall Orientation	

Add Suffix “W” to catalog no. for WHITE. (e.g. 757-7A-TW)
Change “W” to “C” for CEILING mount. (e.g. LKC-1)

EXHIBIT 'C'

LIFE SAFETY & INCIDENT MANAGEMENT

Contact us...

Email: edwards.fire@fs.utc.com
Web: *Edwards-fire.com*

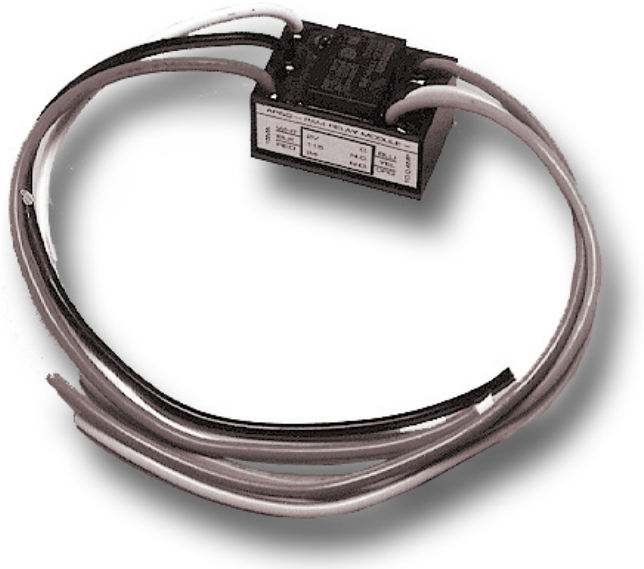
EDWARDS is a UTC brand.
1016 Corporate Park Drive
Mebane, NC 27302

EXHIBIT 'C'

EST™
Life Safety & Communications

Multi-Voltage Control Relay

Model PAM-1



Overview

The PAM-1 Relay is encapsulated multi-voltage device providing 10 Amp Form C contacts. The relay may be energized by one of three input voltages: 24 Vac, 24 Vdc, or 115 Vac.

A red LED is provided which, when illuminated, indicates the relay coil is energized.

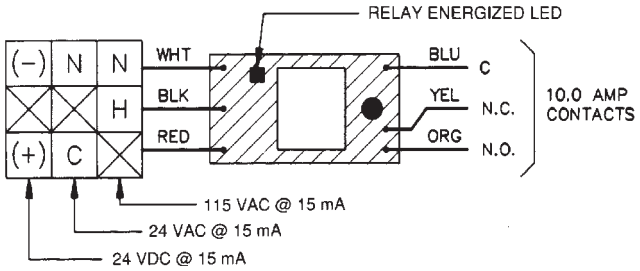
The PAM-1 may be mounted by using the double-sided adhesive tape, the self-drilling screw, or loosely placed in a back box.

The PAM-1 is ideal for applications where remote relays are required for control or status feedback. They are suitable for use with HVAC, Temperature Control, Fire Alarm, Security, Energy Management, and Lighting Control Systems.

Standard Features

- Completely encapsulated 10 Amp relay
- Relay may be energized by one of three input voltages
- Contains a red LED which illuminates when relay coil is energized
- May be mounted by double-sided adhesive tape, self-drilling screw or placed in back box
- Convenient 6 in (150mm) wire leads for electrical connections

Wiring



DATA SHEET 270066
Not to be used for installation purposes. Issue 1.1

EXHIBIT 'C'

EDWARDS
A UTC Fire & Security Company

Detection & alarm since 1872

U.S.
T 888-378-2329
F 866-503-3996

Canada
Chubb-Edwards
T 519 376 2430
F 519 376 7258

Southeast Asia
T : +65 6391 9300
F : +65 6391 9306

India
T : +91 80 4344 2000
F : +91 80 4344 2050

Australia
T +61 3 9239 1200
F +61 3 9239 1299

Europe
T +32 2 725 11 20
F +32 2 721 86 13

Latin America
T 305 593 4301
F 305 593 4300

utcfireandsecurity.com

Specifications

Power Requirments	15 mA per position @ 24 Vdc, 24 Vac, 115 Vac
Relay	UL Recognized SPDT
Contact Rating	10 Amps @ 115 Vac
Ambient Temperature	-58°F to 185°F (-50°C to 85°C)
Approvals	UL Recognized components
Dimensions	1.5 H x 1 W .875 D inches (38.1 x 24.5 x 22.2 mm) with 6 inch (150mm) wire leads 18 AWG (1.00mm²)

Ordering Information

Model	Description
PAM-1	Single SPDT relay with LED double-sided adhesive tape, mounting screw and 6 in (150 mm) leads.

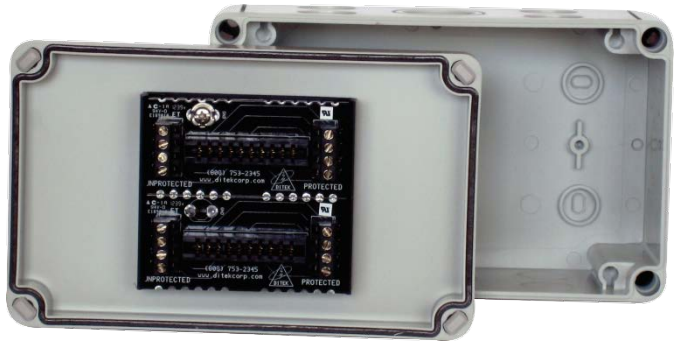
EXHIBIT 'C'

DTK-TSS3 Total Surge Solution

Fire Panel Protection for Signaling And Notification Lines
General Product Specifications

DITEK's Total Surge Solution (TSS) is a range of products that provide total surge protection for addressable and conventional alarm systems.

The TSS3 is a perfect fit for building to building notifier and communications runs. It comes with a prewired four-pair mounting base for loop protection modules. Selecting 5V – 75V DTK-2MHLP modules, or 2MHTP telco modules, provides a custom solution for your system. The TSS3 protects four pairs of SLC, IDC/PIV, or NAC circuits. All protection modules are field-replaceable.



DTK-TSS3

Product Features

- Surge protection for NAC, IDC/PIV, SLC, and Communications circuits
- 20kA surge rated low voltage suppression
- Field replaceable surge modules
- 2MHLP low voltage modules protect two data/signal pairs each. The TSS3, with two 2MHLP modules installed, protects 4 data/signal pairs
- Ten Year Limited Warranty

Low Voltage Protection Features

- Hard-wire base for replaceable suppression modules
- 2MHLP low voltage modules protect two data/signal pairs each.
- Available voltages: 5VDC – 130VDC
- Maximum continuous current: 5A per module
- DTK-2MHLP listed to UL497B
- DTK-2MHTP listed to UL497A

Specifications

- NEMA 4X Enclosure for installation in direct spray or corrosive environments
- Weight: ≈ 4 lb. (1.8 kg)
- Dimensions: 7" x 4" x 4" (178 x 102 x 102mm)
- Operating temperature: -40° F to 175° F (-40°C to 80°C)

Options

- Replacement/custom modules: DTK-2MHLP (select required voltage)
- Replacement/custom modules: DTK-2MHTP (Telco lines)
- DTK-2MHLPTM Test/Bridging module

NOTE: See DTK-2MHLP/DTK-2MHTP Datasheets for detailed specifications on SLC, IDC/PIV, NAC & Dialer Protection

ISO 9001-2000 CERTIFIED Quality Manufacturer

One DITEK Center
1720 Starkey Road
Largo, FL 33771

1-800-753-3345 Direct 1-727-812-5000
Technical Support: 1-888-472-6100
www.ditekcorp.com

EXHIBIT 'C'

Doc Number: SPS-100006-001 Rev 7 04-13

DTK-2MHLP

Voice, Data and Signaling Circuit Modular Surge Protection
General Product Specifications

DITEK's 2MHLP series of signal, data and loop circuit surge protectors provide robust protection in a compact package. Designed for ease of installation, with convenient field-replaceable modules, the **2MHLP** protects two circuit pairs per module. Applications include protection of 4-20mA current loops, alarm panel NAC, SLC and IDC loops, and burglar alarm panels. The DTK-2MHLP is suitable for use on AC and DC circuits.

DTK-2MHLP

Product Features

- Multi-stage, SAD technology, hybrid design provides the best possible protection
- Hard-wire mounting base
- Field replaceable, hot swappable, modular edge card connection design
- Seven voltage levels available to protect all types of voice/data applications
- Two pairs protected per module; when used with mounting base (DTK-MB) modules can be ganged to protect up to ten pairs with a common ground
- Ten Year Limited Warranty

Specifications

Agency Approvals: UL497B
Connection Method – Module: Edge card into DTK-MB mounting base
Base: 10AWG max screw terminals
Max Continuous Current: 5 Amps
Max Surge Current: 20kA
Data Rate: 200kbps (5v) to 2Mbps (130V)
Protection Modes: Line-Ground (All)
Operating Temperature: -40°F - 158°F (-40°C - 70°C)
Maximum Humidity: 95% non-condensing
Dimensions
– **Module**: 1.9"H x 2.1"W x 1.4"D
(48mm x 53mm x 36mm)
– **Module with Base**: 2.6"H x 3.25"W x 1.5"D
(66mm x 83mm x 38mm)
Weight: 1.2 oz (34g) without base;
2.8 oz(79g) with base
Housing: ABS

Selection Guide

Example: DTK-2MHLP24BWB
DTK-2MHLP____B____

Select Voltage: 5, 12, 24, 36, 48, 75
WB: 2MHLP with Single Mounting Base
DTK-MB10: Hardwire mounting base
DTK-MBV: Horizontal wiring across base
Multiple module mounting bases available separately (DTK-MB, DTK-2MB, DTK-3MB, DTK-4MB, DTK-5MB)
Example: (3) DTK-2MHLP36B + (1) DTK-3MB

Performance Data

Model DTK-2MHLP	Service Voltage	MCOV	Typical Let Through Voltage
5B	0-5 Volts	5 Volts	6.8 V
12B	12 Volts	18 Volts	21.6 V
24B	24 Volts	33 Volts	39 V
36B	36 Volts	48 Volts	57 V
48B	48 Volts	64 Volts	76 V
75B	75 Volts	90 Volts	108 V

One DITEK Center
1720 Starkey Road
Largo, FL 33771

800-752-1264 Direct 727-812-5000
Technical Support 1-888-472-6100
www.ditekcorp.com

EXHIBIT C

Doc. Number: SPS-100010-001 Rev 11 02/12

NORTHERN STATE PRISON, ESSEX COUNTY, NEW JERSEY

GENERAL SECURITY INFORMATION

1. The Local Administration of this facility is charge with the responsibility of the custody of their inmates. All non-State employees are responsible and must comply with the following rules for their own protection, as well as the safety of their operation. These rules plus specific facility rules must be adhered to. This building is a medium security facility.

   A. No workman is to fraternize or argue with the inmates. Any difficulties with inmates and/or employee should be handled through the officer on duty at the work station.

   B. Do not give anything to, or take anything from, the inmates.

   C. Lock all cars, trucks and demobilize all vehicles and equipment when unattended.

   D. No photographs are to be taken without permission.

   E. All tools and equipment to remain overnight, will be locked in storage areas. Equipment, such as, ladders and scaffolding will be chained and locked (Contractors supply these items) before leaving.

   F. No firearms, ammunition, hunting knives, or other articles of this nature are permitted on the grounds.

   G. Provide necessary protective drop cloth and barricades to prevent damage to adjacent areas, equipment or surfaces.

   H. Institutional Fire Regulations shall be strictly adhered to; contact Fire Chief when in doubt.

   I. Speed limit and all NO PARKING areas must be obeyed.

   J. Personal items are to be kept locked in vehicle, outside the security perimeter of the facility.

   K. It is the responsibility of the Contractor to know that his tools, and equipment are secured in a designated location at the end of every work day.

EXHIBIT 'D'

L. Unless otherwise required by the facility, the work crews going into the existing facility will check in at approximately 7:30 AM. Passes will be issued by the Gate Officer. An inventory of tools will be completed at this time. The Correctional officer assigned will then escort the workers to the job site.

M. Unless otherwise required by the facility, the hours at work will normally be from 7:30 AM until 4:00 PM. If necessary to work later than this, arrangements will be made through custody personnel through the duty officer, 24 hours in advance. The Contractor will be allowed to work Monday through Saturday, a six (6) day week.

N. Contractor's working crew can provide their own lunch, but will be required to have their lunch break in designated areas. The Contractor to coordinate with the Facility prior to the commencement of work with regard to lunch preferences. Workers will not exit the facility to eat.

O. All tools brought into the facility must be inventoried and a record kept of them on file. Any additions or deletions to the original list must be approved by the assigned custody officer who will initial the change.

P. Tools brought into the security perimeter of the prison will be inventoried before going into and accounted for on the way out by the escort officer.

Q. An escort officer will be assigned to work crews that are working inside of the prison. The escort officer is responsible for the supervision of the high security tools, large electric drills, large hammers, hacksaws, etc. Cooperation with the Officers is imperative.

R. All persons must have some type of positive identification upon entering the prison. A current Driver's License is acceptable, picture I.D. cards will be made at the prison.

S. Contractors will park in an area assigned to them by the facility.

EXHIBIT 'D'

NEW JERSEY DEPARTMENT OF CORRECTIONS
SPECIAL INVESTIGATIONS DIVISION (609) 292-9362
P.O. BOX 863 TRENTON, NEW JERSEY 08625

APPLICATION FOR CLEARANCE AND ISSUANCE OF

IDENTIFICATION CARDS

CIRCLE ONE: **TEMPORARY OR VOLUNTEER** CIRCLE ONE: **NEW RENEWAL**

(PLEASE PRINT LEGIBLY)

NAME: _____ **SS #:** _____
(LAST) (FIRST) (M.I.)

AKA: _____ / _____
(OTHER NAMES USED SUCH AS MAIDEN NAME, ADOPTIONAL, RELIGIOUS, ETC.) (MARKS, SCARS AND TATTOOS)

DATE OF BIRTH : _____/_____/_____ **SEX:** _____ **RACE:** _____ **EYES:** _____ **HAIR:** _____ **HT:** _____ **WT:**_____

PLACE OF BIRTH: _____ **Driver' s Lic. #:** _____
(State Only) (State) (Number)

HOME ADDRESS: _____
(STREET) (CITY) (STATE) (ZIP CODE)

Name of your Department/Agency: _____**Phone #**_____

ADDRESS: _____
(STREET) (CITY) (STATE) (ZIP CODE)

PURPOSE OF VISITATION TO INSTITUTIONS: _____

Have you ever been convicted of any violation of the Criminal Code in this State or in any other Jurisdiction? (Violations include offenses, crimes, misdemeanors, and felonies).

(Circle one) YES NO **If "YES", explain on reverse side.**

Do you presently have any pending criminal charges? YES _____ NO _____ **If "YES", explain on reverse side.**

APPLICANT MUST LIST EXPUNGED CONVICTION(s) INFORMATION, SIGN AND DATE THE "AUTHORIZATION TO RELEASE INFORMATION" FORM LOCATED IN THIS APPLICATION. FALSIFICATION OF APPLICATION MAY RESULT IN THE TERMINATION OF YOUR EMPLOYMENT.

Have you ever engaged in sexual abuse in a prison, jail, lockup, community facility, juvenile facility, or other institution (as defined in 42 U.S.C. 1997)? YES_____ NO_____

If "YES", explain: (Please note the date of incident, date of adjudication and the name and location of the prison, jail, lockup community, facility or institution where the incident occurred).

_____

_____

_____

Have you ever been civilly or administratively adjudicated of engaging or attempting to engage in sexual activity in the community facilitated by force, overt or implied threats of force, or coercion, or if the victim did not consent or was unable to consent or refuse? YES_____ NO_____

If "YES", explain: _____

_____

EXHIBIT 'E'

Have you ever been employed by the NJ Dept. of Corrections in any capacity? YES _____ NO _____ If "YES", explain on reverse side.

Are you currently on an inmate visit list or do you currently have any acquaintances or family members incarcerated in any NJ Dept. of Corrections facilities? YES_____ NO _____ If "YES", explain on reverse side.

****

^ ******** (DO NOT WRITE BELOW THIS LINE, FOR SPONSOR USE ONLY) ********* ^**

Title applicant applying for: _____ Location: _____

Sponsor: _____ Title: _____

Division, Bureau or Unit: _____

Sponsor's signature: _____ Date: _____

Send reply to: _____ Phone: _____

(Print Name)

Applicant Section Continued

NATURE OF CONVICTION	DATE OF CONVICTION	AGE AT TIME OF INCIDENT	NAME & ADDRESS OF POLICE AGENCY OR COURT	DISPOSITION

COMMENTS / EXPLANATIONS: _____

_____

_____

_____

EXHIBIT 'E'

AUTHORIZATION TO RELEASE INFORMATION:

I hereby authorize the release of any and all information regarding me, to the NJ Department of Corrections, at their request, in order that they may determine my suitability for employment.

SIGNATURE OF APPLICANT: _____ DATE: _____

^ ******** DO NOT WRITE BELOW THIS LINE ********** ^**

********** SPECIAL INVESTIGATIONS DIVISION USE ONLY **********

THE ABOVE NAMED APPLICANT'S CRIMINAL HISTORY RECORD INDICATES:

_____	_____	_____
ARREST & CONVICTION	ARREST AND NO CONVICTION	NO RECORD

_____	_____	_____
NAME	TITLE	DATE

EXHIBIT 'E'