

# **SCOPE OF WORK**

## **Clean Agent Fire Suppression System in JMIS Data Center**

Richard J. Hughes Justice Complex  
Trenton, Mercer County, N.J.

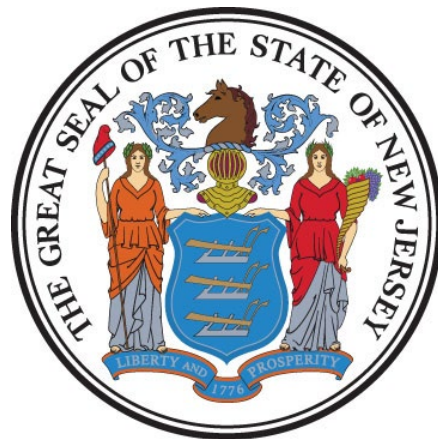
**Project No. A1400-00**

### **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 21, 2023**

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**PROJECT NAME: Clean Agent Fire Suppression System in JMIS Data Center**  
**PROJECT LOCATION: Richard J. Hughes Justice Complex**  
**PROJECT NO: A1400-00**  
**DATE: November 21, 2023**

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## **I. OBJECTIVE**

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The objective of this project is to install a new clean agent fire suppression system in the Judiciary Management Information Services data center at the Richard J. Hughes Justice Complex in Trenton, New Jersey. The existing wet sprinkler system will be replaced with a pre-action sprinkler system and the sprinkler main will be relocated.

## **II. CONSULTANT QUALIFICATIONS**

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### **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):

- **P010 Fire Protection Engineering**

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**

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### **A. CONSTRUCTION COST ESTIMATE (CCE)**

The initial Construction Cost Estimate (CCE) for this project is \$1,001,880.

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 \$1,328,514.

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.

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**IV. PROJECT SCHEDULE**

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**A. SCOPE OF WORK DESIGN & CONSTRUCTION SCHEDULE**

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

<b><u>PROJECT PHASE</u></b>	<b><u>ESTIMATED DURATION (Calendar Days)</u></b>
<b>1. Site Access Approvals &amp; Schedule Design Kick-off Meeting</b>	<b>14</b>
<b>2. Design Development Phase</b>	<b>42</b>
• <i>Project Team &amp; DPMC Plan/Code Unit Review &amp; Comment</i>	<b>14</b>
<b>3. Final Design Phase</b>	<b>42</b>
• <i>Project Team &amp; DPMC Plan/Code Unit Review &amp; Approval</i>	<b>14</b>
<b>4. Final Design Re-Submission to Address Comments</b>	<b>7</b>
• <i>Project Team &amp; DPMC Plan/Code Unit Review &amp; Approval</i>	<b>14</b>
<b>5. DCA Submission Plan Review</b>	<b>30</b>
<b>6. Permit Application Phase</b>	<b>7</b>
• <i>Issue Plan Release</i>	
<b>7. Bid Phase</b>	<b>42</b>
<b>8. Award Phase</b>	<b>28</b>
<b>9. Construction Phase</b>	<b>120</b>

**10. 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.

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**V. PROJECT SITE LOCATION & TEAM MEMBERS**

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**A. PROJECT SITE ADDRESS**

The location of the project site is:

Richard J. Hughes Justice Complex  
25 Market Street  
Trenton, NJ 08611

GPS Coordinates: 40.21343°N, - 74.76388°W

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: Youstina Mansy, Project Manager  
Address: Division of Property Management & Construction  
20 West State Street, 3<sup>rd</sup> Floor  
Trenton, NJ 08608-1206  
Phone No: (609) 633-2077  
E-Mail: [Youstina.Mansy@treas.nj.gov](mailto:Youstina.Mansy@treas.nj.gov)

### **2. State of New Jersey Representative:**

Name: Mark Dae, Chief. Property Management  
Address: Division Property Management & Construction  
20 West State Street, 3<sup>rd</sup> Floor  
Trenton, New Jersey 08625  
Phone No: (609) 984-9711  
E-Mail: [Mark.Dae@treas.nj.gov](mailto:Mark.Dae@treas.nj.gov)

### **3. Richard J. Hughes Justice Complex:**

Name: Perry E. Stalter, Building Manager  
Address: Division of Property Management & Construction  
25 Market Street  
Trenton, NJ 08625  
Phone No: (609) 633-7502  
E-Mail: [Perry.Stalter@treas.nj.gov](mailto:Perry.Stalter@treas.nj.gov)

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## **VI. PROJECT DEFINITION**

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### **A. BACKGROUND**

The Richard J. Hughes Justice Complex is located at 25 Market Street in Trenton, Mercer County, New Jersey. The building complex houses the New Jersey State Supreme Court, the courtroom, chambers and the administrative offices of the State Court System. It is also home to New Jersey Department of Law and Public Safety.

The Richard Hughes Justice Complex was built from 1977-1981. An additional 900 square feet was completed in 2004. The approximate total square footage of the building is 1,070,900 square feet. The modernist designed building is 136.5 feet tall. The building is classified as Business/Assembly-3 Use Group and Type 1-B construction.

## **B. FUNCTIONAL DESCRIPTION OF THE BUILDING**

### **1. General:**

The building can be seen as three buildings in one: two eight-story office buildings around a cube, which houses the courtroom. Indoor bridges connect the fourth, fifth, seventh and eighth floors. The building includes two main entrances from the street leading into the atrium lobby which is open through ten stories to a rooftop skylight. Floors one through eight are office space, chambers and courtrooms. Floor nine is the mechanical penthouse, level P1 is the street level, and P2 is the parking garage below P1. The Judiciary Management Information Services (JMIS) data center is located on Level P-1.

### **2. Judiciary Management Information Services (JMIS) Data Center:**

The JMIS data center is currently served by a wet sprinkler system. The facility is seeking to replace the wet system due to the potential harm a wet system could do to the equipment. This system will be replaced with a pre-action system in the event the proposed clean agent system does not suppress the fire. The sprinkler main will be relocated outside of the data center.

### **3. History:**

In 2018, the State procured the services of Gannett Fleming to perform an assessment and provide recommendations for modifying the JMIS data center fire protections system. Gannett Fleming compared and contrasted five different systems but deferred to the state on recommending a specific system until the state could review the report.

On December 27, 2020, Congress enacted the American Innovation and Manufacturing (AIM) Act, which directs Environmental Protection Agency (EPA) to address hydrofluorocarbons (HFCs) through: Phasing down the production and consumption of HFCs by 85% by 2036. As a result of this Act, two of the options presented by Gannett Fleming could no longer be considered.

In 2022, the State asked Schiller and Hersh Associates, Inc. (S&H) to update the Gannett Fleming study. S&H recommended the 3M NOVEC 1230 (FK-5-1-12) system for the JMIS data center.

## **VII. CONSULTANT DESIGN RESPONSIBILITIES**

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### **A. DESIGN REQUIREMENTS**

The Consultant shall review the studies shown in **Exhibit 'C'** by Schiller and Hersh Associates, Inc. and Gannett Fleming and provide design, specifications, bid/award and construction administration services to provide a new clean agent fire suppression system based on the 3M NOVEC 1230 (FK-5-1-12) system for the Judiciary Management Information Services data center located on the P-1 level of the Richard J. Hughes Justice Complex.

In addition, the Consultant shall provide the same services to install a new pre-action sprinkler system and remove the existing wet sprinkler system in the JMIS data center. The sprinkler main shall be relocated outside of the data center. The consultant may rely on pressure and flow data provided in **Exhibit 'D'** for the design.

The Consultant shall provide required venting into the parking garage with exhaust fans.

Provide for reinforcement of the raised floor as necessary to support the weight of the storage tanks.

### **B. 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:

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

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

## **C. 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.

- DBC Project A452: **Judicial Data Center Renovation**, As-Builts 8/20/1986, Jansen & Rogen Engineers, P.A.
- DPMC Project A0702-00: **JMIS Computer Room**, As-Built 1/20/1995, Barnickel Engineering Corporation
- DPMC Project A1087-00: **Data Center Upgrades**, As-Builts January 24, 2014, Gannett Fleming

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.

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## **VIII. PERMITS & APPROVALS**

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### **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](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](mailto: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](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](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**

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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.

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## **X. ALLOWANCES**

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### **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.

PROJECT NAME: Clean Agent Fire Suppression System in JMIS Data Center  
PROJECT LOCATION: Richard J. Hughes Justice Complex  
PROJECT NO: A1400-00  
DATE: November 21, 2023

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## XI. SOW SIGNATURE APPROVAL SHEET

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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 APPROVED BY: James Wright 11/21/2023  
JAMES WRIGHT, MANAGER DATE  
DPMC PROJECT PLANNING & INITIATION

SOW APPROVED BY: Mark Dae 12/4/2023  
MARK DAE, CHIEF, PROPERTY MANAGEMENT DATE  
OFFICE OF BUILDING MANAGEMENT & OPERATIONS

SOW APPROVED BY: Youstina Mansy 12/11/2023  
YOUSTINA MANSY, PROJECT MANAGER DATE  
DPMC PROJECT MANAGEMENT GROUP

SOW APPROVED BY: Richard S. Flodmand 12/12/2023  
RICHARD FLODMAND, DEPUTY DIRECTOR DIV DATE  
PROPERTY MGT & CONSTRUCTION

## **XII. CONTRACT DELIVERABLES**

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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:

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

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## **XIII. EXHIBITS**

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- A. SAMPLE PROJECT SCHEDULE FORMAT
- B. PROJECT SITE LOCATION MAP
- C. CLEAN AGENT SYSTEM STUDY
- D. PRESSURE AND FLOW DATA

**END OF SCOPE OF WORK**

## 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						
<b>S.O.W. Reference</b>	<b>S.O.W. Specific Requirements</b>						

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  
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						
<b>S.O.W. Reference</b>	<b>S.O.W. Specific Requirements</b>						

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  
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						
<b>S.O.W. Reference</b>	<b>S.O.W. Specific Requirements</b>						

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						
<b>S.O.W. Reference</b>	<b>S.O.W. Specific Requirements</b>						

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						
<b>S.O.W. Reference</b>	<b>S.O.W. Specific Requirements</b>						

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.

<u>CODE</u>	<u>DESCRIPTION</u>	<u>REPORTS TO ASSOCIATE DIRECTOR OF:</u>
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	Respon	Weeks
<b>&lt;PROJ&gt;</b>			
<b>Design</b>			
CV3001	Schedule/Conduct Pre-design/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	
CV2001	Distribute Final Design Submittal for Review	CM	
CV2002	Review & Approve Final Design Submittal	CA	
CV3053	Review & Approve Final Design Submittal	PR	
CV3054	Review Final Design Submittal for Constructability	OCS	

Sheet 1 of 3

**Bureau of Design & Construction Services**

**EXHIBIT 'A'**

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

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Activity ID	Description	Rspn	Weeks			
CV2055	Review & Approve Final Design Submittal	CM				
CV2056	Consolidate & Return Final Design Comments	CM				
CV3060	Prepare & Submit Permit Application Documents	AE				
CV3068	Prepare & Submit Bidding Cost Analysis (DPMC-38)	CM				
<b>Plan Review-Permit Acquisition</b>						
CV4001	Review Constr. Documents & Secure UCC Permit	PR				
CV4010	Provide Funding for Construction Contracts	CA				
CV4020	Secure Bid Clearance	CM				
<b>Advertise-Bid-Award</b>						
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				
<b>Construction</b>						
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				

DRCA - TEST

Sheet 2 of 3

Bureau of Design & Construction Services

# EXHIBIT 'A'

**NOTE:**

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

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Activity ID	Description	Respn	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	

DBCA - TEST

Sheet 3 of 3

Bureau of Design & Construction Services

**EXHIBIT 'A'**

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

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**Project Site Location Map**  
**R. J. Hughes Justice Complex**  
**EXHIBIT 'B'**



Richard J. Hughes Justice Complex  
Clean Agent System Study for the  
JMIS Data Center and Adjoining Spaces  
Agency Consultant Project: J0393-00 Work Order #4  
Date: November 30, 2022

**Background Information:**

S&H was hired via our DPMC agency consulting contract J0393-00 to provide an updated study to the original Gannett Fleming Fire Suppression System Study dated 8/6/2018. This study is included at the end of our report in Appendix D for reference purposes, as some of the details in the original study remain applicable.

S&H performed a preliminary site visit and walk-thru of the facility on 9/28/22 with Mr. Perry Stalter and other Hughes' representatives present.

S&H worked with Oliver Sprinkler and SSI Fire & Explosion Protection to develop the equipment costs and preliminary layout / calculations on the project.

The original Gannett Fleming study did not incorporate the following items, which are required per code and also Factory Mutual (FM), since FM inspects the Hughes facility on an annual basis:

1. The wet sprinkler system cannot be eliminated from the spaces and only have the clean agent suppression system in place. As confirmed with Mr. Peter Buckley, DPMC fire sub-code official, a wet or pre-action sprinkler system is required to be maintained in order for the building to be considered fully sprinklered. Therefore, we are incorporating a new double-interlock, pre-action sprinkler system to be installed in the JMIS data center spaces.
2. Since FM inspects the site on an annual basis, compliance with FM Global Property Loss Prevention Data Sheet 4-9, Halocarbon and Inert Gas (Clean Agent) Fire Extinguishing Systems is required. While a majority of the document does not impact the original study results, section 2.2.9 Supply of Extinguishing Agent indicates that a connected reserve supply of the extinguishing agent is required, if the system cannot be restored within 24 hours. This means that double the amount of tank storage is required. Based on past experience of the vendors, FM Global will most likely approve storing the spare cylinders in adjacent storage area, as opposed to having them connected to a manifold via a manual switch with the primary tanks. Therefore, we are assuming that Hughes will be able to find a storage location onsite for the tanks, so they could be replaced within 24 hours of a discharge.
3. Since the study was published, on December 27, 2020, the American Innovation and Manufacturing (AIM) Act of 2020 was enacted as section 103 in Division S, Innovation for the Environment, of the Consolidated Appropriations Act, 2021 (H.R. 133 (116th):

**EXHIBIT 'C'**

Consolidated Appropriations Act, 2021 [Including Coronavirus Stimulus & Relief]). The AIM Act directs EPA to address HFCs by providing new authorities in three main areas: to phase down the production and consumption of listed HFCs, manage these HFCs and their substitutes, and facilitate the transition to next-generation technologies. This act directly requires FM-200 (HFC-227ea) and ECARO-25 (HFC-125) to be phased down in terms of manufacturing. Therefore, these two options should not be considered for this project. The cost per pound of the agents is expected to significantly increase in the near future.

### **Area Description:**

See attached Appendix A showing the suppression zones and possible tank locations. The existing ceiling height is only 7'9" and the existing raised floor cavity is 14"; this differs from the original Gannett Fleming study.

Zone #1: Main JMIS data center with a raised floor.

Zone #2: Electrical, Conference Area and Storage space; no raised floor.

Zone #3: Office space with raised floor.

### **System Description:**

#### NOVEC 1230 (FK-5-1-12):

Because it is a fluoroketone, 3M Novec 1230 fluid is used globally in many special hazard fire suppression applications. It's a cost-effective and environmentally sustainable Halon 1301 replacement and hydrofluorocarbon (HFC) alternative. Because of this, it has a more than 99.9% lower global warming potential than any halocarbon agent accepted for use in occupied spaces. 3M also offers its 20-year Blue Sky Warranty to help protect system owners from regulatory risk of phase-down or phase-out.

3M Novec 1230 fluid is waterless and discharged as a gas. This makes the agent ideal to extinguish fires in spaces where electronics or irreplaceable, mission critical assets are stored or where continuity of operations is crucial. The agent has the highest margin of occupant safety of any NFPA 2001 clean agent and evaporates quickly, leaving no residue. In addition, it is electrically non-conductive, designed for applications where energized circuits and electronic systems cannot be shut down during an emergency. Because the fluid is transported and stored as a liquid in non DOT-rated containers, it can be shipped overnight by air. Cylinders may be placed in the protected room or remotely. 3M manufactures 3M Novec 1230 fluid in the USA using globally sourced materials.

Placing the tanks in a distributed manner around the main JMIS room (Zone #1) reduces the overall tank size/quantity/pressure and reduces the amount/size of piping. The general layout shown in Appendix A provides an ideal layout for the tanks.

Due to UL listings, the system is not able to use a Siemens fire alarm releasing panel, therefore a Fike Cheetah XI suppression control system panel is required along with

separate smoke detection in the raised floor and at the ceiling. All wiring should be class A.

The system does require venting, so a class 1 damper, louver, duct and pressurization sensing setup would be required into the parking garage. Exhaust fans are not required by code for purge, but are recommended for practical purposes after a discharge occurs.

Given the weight of the 375lb and 1,000 lb tanks, the raised floor system will require reinforcing below with more vertical supports.

Given that FM Global will require spare, fully filled tanks to be stored onsite, the SF required for this storage is approximately 25 SF.

The cost of this system is the least expensive of the possible options, therefore we would recommend the DPMC / Hughes select this system for installation.

#### INERGEN / PROINERT (IG-541 or IG-55):

100% environmentally friendly, people safe agent with zero ozone-depletion potential, zero global warming potential and zero atmospheric lifetime. ProInert agent and associated system components are UL Listed and FM approved.

Because of its unique patented valve assembly, the ProInert agent enters the protected room within the industry required 60 seconds, but at a steady flow rate — preventing destructive turbulence from occurring. This constant flow rate means you can use small-diameter, low pressure (and less expensive) piping from the inert gas container, all the way to the nozzle. And the necessary venting area is much smaller. By using larger tanks, Pro-Inert can save up to 50% of the space required by other manufacturers. ProInert tanks can be filled with IG-55 or IG-541 extinguishant.

IG-55 and IG-541 are a colorless, odorless, electrically non-conductive gas with a density approximately the same as air. IG-55 and IG-541 are stored as pressurized gas within the cylinder assembly. They are available at storage pressures of 200 bar and 300 bar. When discharged into a protected space, IG-55 and IG-541 are clear and does not obscure vision. They leave no residue and has zero ozone depleting potential and zero global warming potential.

While all the tanks could be placed in one location, there would be 80 tanks or more that are required for the system, which would require the conference rooms to be removed so the tanks could be installed within a space of about 160 SF. In order to not bury tanks and make them more accessible, they would probably only be stacked (3) or (4) deep around the perimeter of the walls.

Given the high cost of this system and the additional tanks & storage space, it is not recommended to go with this system.

## **EXHIBIT 'C'**

Water Mist / Nitrogen:

Nitrogen / water mist systems are different from the above chemical suppression systems because they introduce water into the room along with the inert nitrogen gas. Special dispersion heads atomize the water into extremely fine droplets such that no accumulation of water on equipment in the space occurs. Nitrogen is introduced simultaneously and in sufficient quantity to reduce the oxygen levels in the space below that which is required to sustain a fire, but not low enough to pose a threat to human occupants.

The primary concern with a Nitrogen/ Water Mist system is the number of Nitrogen cylinders required to serve a space the size of the data center in question. It was estimated that about 51 cylinders would be required, which would take up about 100 SF of floor space. The secondary concern with this system type is there needs to be parallel piping to each head – one for the water and one high pressure (3,000 psi) for the nitrogen.

FM Global does not specifically recognize this type of system, so special approvals may be required. Although, Hughes had this type of system installed in the recent UPS project, therefore we would assume FM Global would approve it.

The cost of this system is much higher than the NOVEC / FK-5-1-12, therefore we would not recommend consideration of this system.

Summary Table:

System Type	Relative Impact on Environment	Relative Potential Threat to Occupants	Relative Fire Extinguishing Effectiveness	Requires Pressure Venting?	Cost for Parts & Smarts	System Re-fill Cost after Discharge	Downtime after Discharge	Approx. SF Required for System Bottles
FM-200	High (GWP 3220)	5 Minute Exposure	10 Seconds	**Possibly	N/A	High	1-2 days	
ECARO-25	High (GWP 3170)	5 Minute Exposure	10 Seconds	**Not Likely	N/A	High	1-2 days	28 sqft
FK-5-1-12 (Novec)	Low (GWP <1)	5 Minute Exposure	10 Seconds	**Yes	\$ 398,000.00	High	2-4 days	25 sqft
INERGEN/PROINERT	Low (GWP 0)	*5 Minute Exposure	1 Minute	**Yes	\$ 1,100,000.00	Low	5-7 days	160 sqft
NITROGEN / WATER MIST	Low (GWP 0)	*5 Minute Exposure	3 Minutes	No	\$ 1,005,600.00	Low	3-5 days	100 sqft
GWP = Global Warming Potential								
*Inert agents and Hybrid/Mist systems do reduce the oxygen between 12% & 14%								
**Factors like wall strength and room leakage will be factors in determining if a room requires pressure venting								

**Design Considerations:**

Codes: The future design project should take into account the detailed code and standards requirements outlined in the following:

- FM Global Property Loss Prevention Data Sheet 4-9, Halocarbon and Inert Gas (Clean Agent) Fire Extinguishing Systems. There are a significant amount of detailed requirements outlined in this standard that must be followed during design.

- NFPA 2001-2018 – Standard on Clean Agent Fire Extinguishing Systems. There are a significant amount of detailed requirements outlined in this standard that must be followed during design.
- NFPA 13-2019
- NFPA 72-2019.
- NJ ICC code series: 2021 NJ editions.

The following design considerations are based on the NOVEC / FK-5-1-12 system recommendation.

- The existing JMIS data center has a sprinkler main routed through above the ceiling. This sprinkler main should be relocated to be outside the data center.
- The existing JMIS data center has plumbing piping above the ceiling serving the kitchen above and also chilled water lines serving the Liebert CRAC units. It is recommended to add in drip pans and piping to below the raised floor along with sensors in the pans to detect water. This could trigger a local alarm at a constantly attended location or could trigger via the CM3 building HVAC control system.
- All above ceiling and below raised floor openings in the walls / floor deck should be sealed.
- There are VAVs and ductwork above the ceilings. Motorized dampers should be added that will close prior to release of the clean agent suppression system.
- The Liebert CRAC units should be shut-down prior to the release of the clean agent suppression system.
- The clean agent suppression system should be tied into the EPO (emergency power off) system for the data center.
- The clean agent suppression system should have a separate releasing panel that is UL listed with the system. This panel should be monitored by the existing Siemens system. At the least, it should be monitored with trouble, supervisory and alarm signals. If possible, it should be monitored via ContactID in order to provide more detailed status information to the Siemens system.
- Due to the tanks being in the same room as the protection, wiring from the tanks to the control panel should be MI cable or 2-hour rated cable in conduit. Coordinate with FM Global requirements.
- A pre-action sprinkler system is required to be installed. The Siemens panel currently serving the room could be used as releasing panel (verify the new panel is UL listed for releasing) along with heat detectors installed through all three Zones. All wiring must be Class A. The pre-action valve and compressor could be installed in the Zone #2 space after removal of one or both conference areas.

## **EXHIBIT 'C'**

- Reinforce the raised floor system for all heavy tanks.
- Add in exhaust fans in each Zone with a discharge into the P1 parking garage to aid in dissipating the clean agent after discharge.
- All clean agent piping should be high pressure with appropriate high pressure fittings. Confirm final tank pressures before finalizing the piping design.
- Strobes, abort buttons, manual release buttons, signage, etc. should all comply with the referenced standards and codes.

The project phasing is recommended as follows:

1. Install the new pre-action sprinkler system.
2. Remove the wet sprinkler system and relocate the sprinkler main.
3. Install the new clean agent suppression system.

**Budget:**

The following is the estimated budget for the NOVEC / FK-5-1-12 system. We are not estimating the costs of the ProInert or Mist/Nitrogen systems, as they will easily exceed \$1,750,000 for the CCE.

Description	Cost
Pre-Action system, including labor & materials:	\$100,000
Demolition of the wet sprinkler & relocation of main:	\$40,000
Venting louver, damper & ducts:	\$40,000
Purge exhaust fan and ductwork:	\$30,000
Clean agent Parts & Smarts, including spare tanks:	\$398,000
Clean agent piping with labor:	\$150,000
Electrical wiring and fire alarm work:	\$50,000
Existing duct motorized dampers:	\$10,000
General sealing of walls and floors & drain pans:	<u>\$10,000</u>
Sub-Total	\$828,000
General Conditions (15%)	\$124,200
Profit (6%)	<u>\$49,680</u>
Total Construction Cost Estimate (CCE):	\$1,001,880

See attached a DPMC-38 form with the details for the Current Working Estimate (CWE), which totals to \$1,328,514.

**EXHIBIT 'C'**

**Schedule:**

Given the lead-times with equipment with electronics and the phasing / sequence of the project, we would recommend at least 180 days of construction.

**Appendices:**

Appendix A: Data Center Floor Plan with notes and zones

Appendix B: Clean agent system cut sheets

Appendix C: DPMC 38 form.

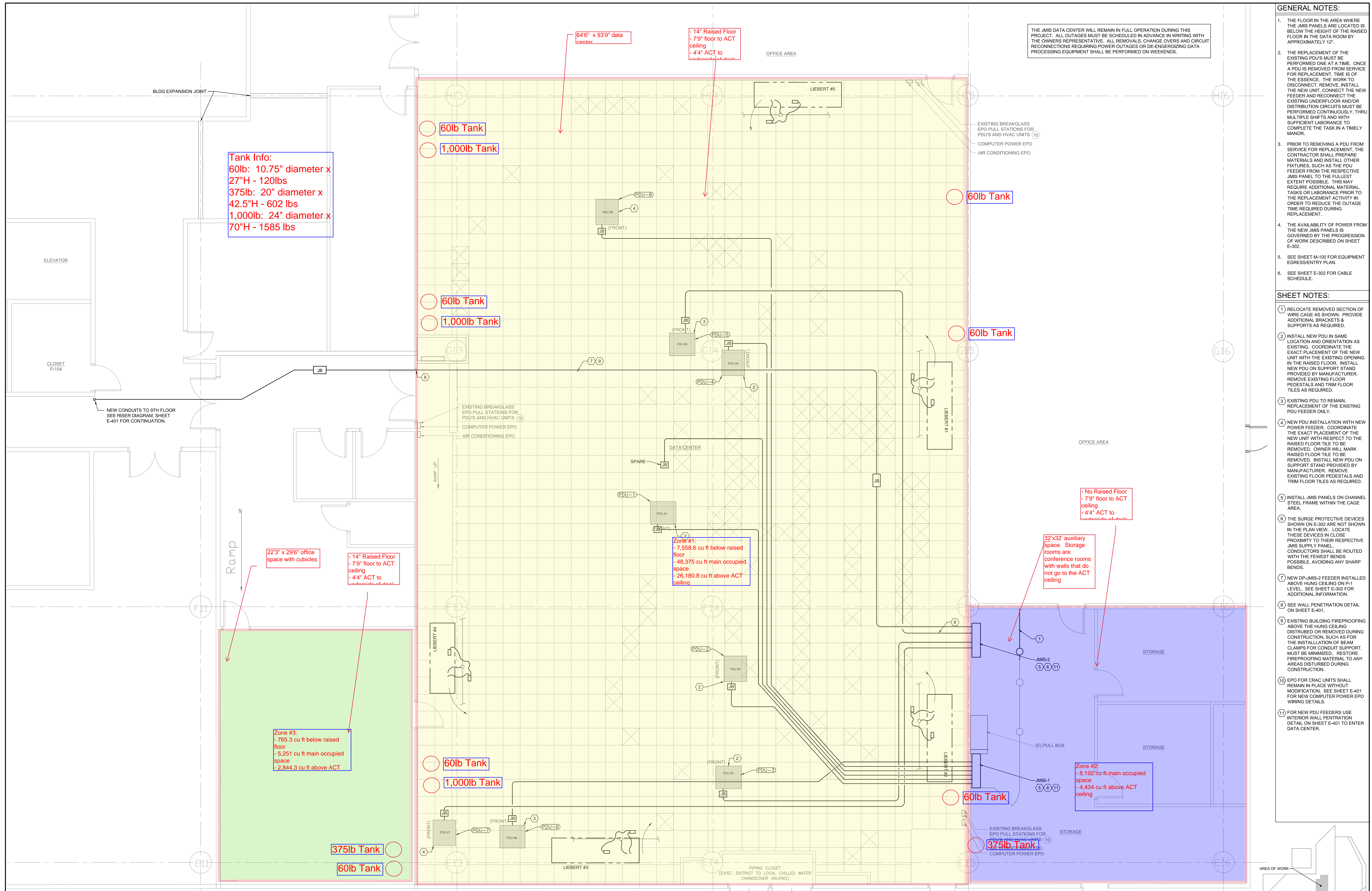
Appendix D: Original Gannett Fleming Fire Suppression System Study dated 8/6/2018.

**End of Report.**

# Appendix A

**EXHIBIT 'C'**





THE JMS DATA CENTER WILL REMAIN IN FULL OPERATION DURING THIS PROJECT. ALL OUTAGES MUST BE SCHEDULED IN ADVANCE IN WRITING WITH THE OWNER'S REPRESENTATIVE. ALL REMOVALS, CHANGE OVERS AND CIRCUIT RECONNECTIONS REQUIRING POWER OUTAGES OR DE-ENERGIZING DATA PROCESSING EQUIPMENT SHALL BE PERFORMED ON WEEKENDS.

**Tank Info:**  
 60lb: 10.75" diameter x 27"H - 120lbs  
 375lb: 20" diameter x 42.5"H - 602 lbs  
 1,000lb: 24" diameter x 70"H - 1585 lbs

**1 DATA CENTER POWER PLAN - P-1 LEVEL**  
 SCALE: 1/4" = 1'-0"

- GENERAL NOTES:**
- THE FLOOR IN THE AREA WHERE THE JMS PANELS ARE LOCATED IS BELOW THE HEIGHT OF THE RAISED FLOOR IN THE DATA ROOM BY APPROXIMATELY 12".
  - THE REPLACEMENT OF THE EXISTING PDUS MUST BE PERFORMED ONE AT A TIME. ONCE A PDU IS REMOVED FROM SERVICE FOR REPLACEMENT, TIME IS OF THE ESSENCE. THE WORK TO DISCONNECT, REMOVE, INSTALL THE NEW UNIT, CONNECT THE NEW FEEDER AND RECONNECT THE EXISTING UNDERFLOOR AND/OR DISTRIBUTION CIRCUITS MUST BE PERFORMED CONTINUOUSLY, THRU MULTIPLE SHIFTS AND WITH SUFFICIENT LABORANCE TO COMPLETE THE TASK IN A TIMELY MANNER.
  - PRIOR TO REMOVING A PDU FROM SERVICE FOR REPLACEMENT, THE CONTRACTOR SHALL PREPARE MATERIALS AND INSTALL OTHER FIXTURES, SUCH AS THE PDU FEEDER FROM THE RESPECTIVE JMS PANEL TO THE FULLEST EXTENT POSSIBLE. THIS MAY REQUIRE ADDITIONAL MATERIAL, TASKS OR LABORANCE PRIOR TO THE REPLACEMENT ACTIVITY IN ORDER TO REDUCE THE OUTAGE TIME REQUIRED DURING REPLACEMENT.
  - THE AVAILABILITY OF POWER FROM THE NEW JMS PANELS IS GOVERNED BY THE PROGRESSION OF WORK DESCRIBED ON SHEET E-302.
  - SEE SHEET M-100 FOR EQUIPMENT EGRESS/ENTRY PLAN.
  - SEE SHEET E-302 FOR CABLE SCHEDULE.

- SHEET NOTES:**
- RELOCATE REMOVED SECTION OF WIRE CAGE AS SHOWN. PROVIDE ADDITIONAL BRACKETS & SUPPORTS AS REQUIRED.
  - INSTALL NEW PDU IN SAME LOCATION AND ORIENTATION AS EXISTING. COORDINATE THE EXACT PLACEMENT OF THE NEW UNIT WITH THE EXISTING OPENING IN THE RAISED FLOOR. INSTALL NEW PDU ON SUPPORT STAND PROVIDED BY MANUFACTURER. REMOVE EXISTING FLOOR PEDESTALS AND TRIM FLOOR TILES AS REQUIRED.
  - EXISTING PDU TO REMAIN. REPLACEMENT OF THE EXISTING PDU FEEDER ONLY.
  - NEW PDU INSTALLATION WITH NEW POWER FEEDER. COORDINATE THE EXACT PLACEMENT OF THE NEW UNIT WITH RESPECT TO THE RAISED FLOOR TILE TO BE REMOVED. OWNER WILL MARK RAISED FLOOR TILE TO BE REMOVED. INSTALL NEW PDU ON SUPPORT STAND PROVIDED BY MANUFACTURER. REMOVE EXISTING FLOOR PEDESTALS AND TRIM FLOOR TILES AS REQUIRED.
  - INSTALL JMS PANELS ON CHANNEL STEEL FRAME WITHIN THE CAGE AREA.
  - THE SURGE PROTECTIVE DEVICES SHOWN ON E-302 ARE NOT SHOWN IN THE PLAN VIEW. LOCATE THESE DEVICES IN CLOSE PROXIMITY TO THEIR RESPECTIVE JMS SUPPLY PANEL. CONDUCTORS SHALL BE ROUTED WITH THE FEWEST BENDS POSSIBLE, AVOIDING ANY SHARP BENDS.
  - NEW DP-JMS-2 FEEDER INSTALLED ABOVE HUNG CEILING ON P-1 LEVEL. SEE SHEET E-302 FOR ADDITIONAL INFORMATION.
  - SEE WALL PENETRATION DETAIL ON SHEET E-401.
  - EXISTING BUILDING FIREPROOFING ABOVE THE HUNG CEILING DISTRIBUTED OR REMOVED DURING CONSTRUCTION, SUCH AS FOR THE INSTALLATION OF BEAM CLAMPS FOR CONDUIT SUPPORT, MUST BE MINIMIZED. RESTORE FIREPROOFING MATERIAL TO ANY AREAS DISTURBED DURING CONSTRUCTION.
  - EPO FOR CRAC UNITS SHALL REMAIN IN PLACE WITHOUT MODIFICATION. SEE SHEET E-401 FOR NEW COMPUTER POWER EPO WIRING DETAILS.
  - FOR NEW PDU FEEDERS USE INTERIOR WALL PENETRATION DETAIL ON SHEET E-401 TO ENTER DATA CENTER.

NO.	DATE	MODIFICATION	DRAWN	CHKD.	APPRVD.
E	3/9/12	ISSUED FOR BID	JLG	KDG	RAK
D	12/16/11	ISSUED FOR PERMIT	JLG	KDG	RAK
C	12/8/11	FINAL DESIGN SUBMISSION #3	JLG	KDG	RAK
B	11/29/11	FINAL DESIGN SUBMISSION #2	JLG	KDG	RAK
A	03/30/10	FINAL DESIGN	XJDK	XJDK	XJAK

**SHAWN FRODOLOSKI**  
 PROFESSIONAL ENGINEER  
 N.J. LIC. NO. 24GE02800000  
 DATE:

**Gannett Fleming**  
 1000 ATRIUM WAY SUITE 300, MOUNT LAUREL, NJ 08054  
 CERTIFICATE OF AUTHORIZATION NO. 24GA28032500  
 MOUNT LAUREL, NJ

**NEW JERSEY**  
 DEPARTMENT OF PROPERTY MANAGEMENT AND CONSTRUCTION  
 ELECTRICAL

**DATA CENTER UPGRADES**  
 DPMC PROJECT NO. A1087-00  
 THE NEW JERSEY DEPARTMENT OF JUSTICE COMPLEX, TRENTON, NJ  
**ELECTRICAL DATA CENTER POWER PLAN**

PHASE	PROJECT NUMBER
AS-BUILT	054547
SCALE:	DATE:
AS SHOWN	01/24/2014
DRAWING NUMBER	<b>E-201</b>

# Appendix B

## CHEETAH® XI INTELLIGENT SUPPRESSION CONTROL SYSTEM

### DESCRIPTION

Fike's Cheetah Xi (P/N 10-068) is a state-of-the-art true intelligent digital peer-to-peer modular suppression control system. It is ideal for all life safety and property protection applications, and is intended for both commercial and industrial use. It is designed with extensive programmability that allows the almost instantaneous relay of information and the ability to perform process management tasks with ease including HVAC shutdowns, Emergency Voice Evacuation, damper control, door closure, elevator recall, security, and CCTV/Building Management Awareness.

This cost-effective panel comes standard with two Signaling Line Circuits (SLC) that support 254 devices each. This is expandable to four loops and a total panel capacity of 1016 devices, with any mix and match of sensors and modules. The Cheetah Xi utilizes extreme intelligence via its Eclipse® based sensors including photoelectric, photoelectric with heat, ionization, photoelectric duct, and heat detectors. It also utilizes Eclipse based modules such as the monitor, mini-monitor, relay, intelligent pull station, releasing and control modules. With Cheetah Xi, every device communicates as a peer on the signaling line circuit. These peers not only communicate up-to-the-second information to the control panel, but also communicate with each other. Each device is capable of generating accurate and highly detailed information. Conventional suppression alarm systems give a general idea of the fire's location, while the Cheetah Xi's intelligent sensors indicate precisely which device is in an alarm state. This intelligence provides incredible speed with response times as little as one-quarter second between manual pull station and notification appliance. It's flexibility allows you to attach the intelligent devices that are required for your specific application.

The System is programmed with either the Windows based field configuration software C-LINX™ or through a comprehensive password protected front-panel keypad programming option. This option allows you to quickly update and adapt to any future requirements or changes in the system such as changes in occupancy or remodeling. The sophisticated control panel circuitry coupled with the software allows you to read specific information and sensitivity levels of the different eclipse devices. The sensors also compensate for any changes due to age, contamination, or other environmental factors.

### SYSTEM OPERATION

The Cheetah Xi Control system operates on a "Zone and State" relationship. In this design, all input and output devices must be assigned to at least one zone (253 are available), each zone defining an area to be protected. Input devices can be assigned up to four zones (one zone is typical) and output devices may be assigned up to 254 zones.

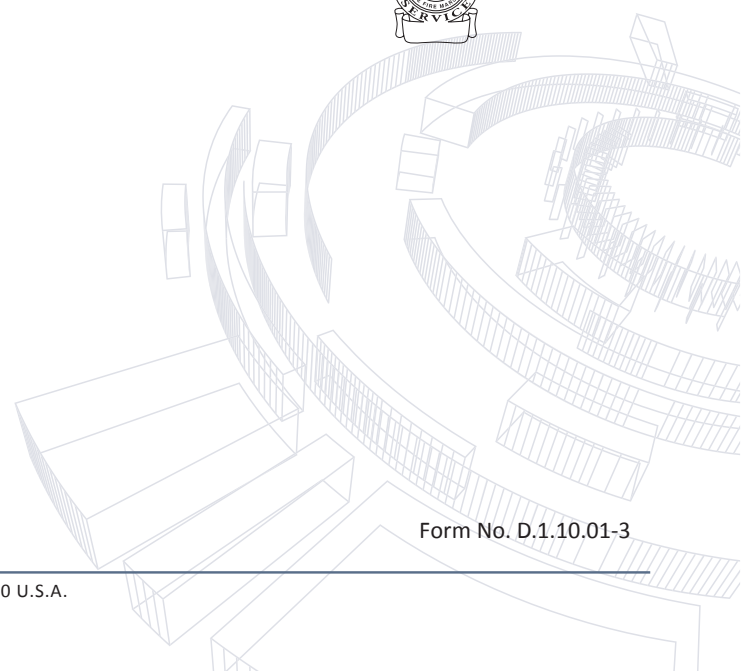
These devices use the SLC signaling line circuits to exchange status information with other devices as well as with the control panel. When an input is activated, it is configured to cause its associated zone to enter into an operational state. Any detection device will cause the associated zone to enter into an alarm state. The output devices are configured to activate to protect and evaluate the endangered zone. This system is completely modular, allowing you the flexibility to design a system that is just right for your application. A typical configuration is shown on page 2 that illustrates the communications of a Cheetah Xi system.



Fike Cheetah Xi

### APPROVALS:

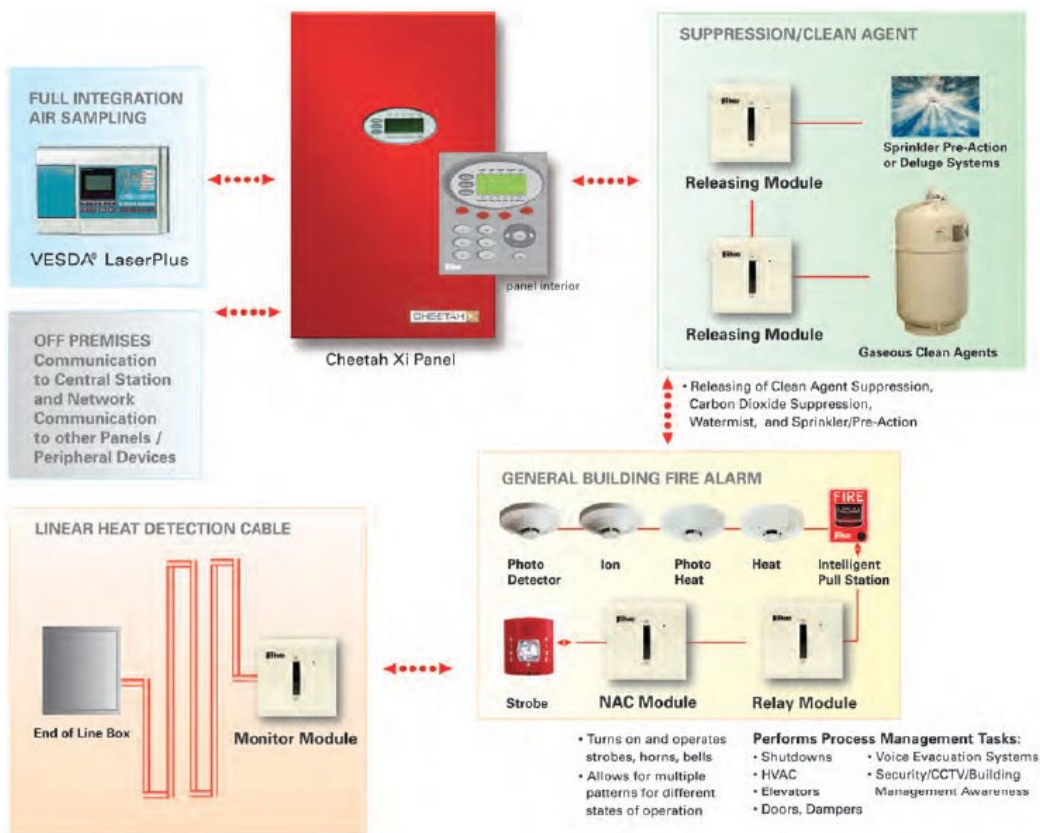
- UL Listed - S2203
- FM Approved - 3023436
- CSFM - 7165-0900:149
- City of New York - 307-05-E
- City of Denver
- State of CA Seismic - OSP-007-10



Form No. D.1.10.01-3



## TYPICAL CONFIGURATION



## STANDARD FEATURES

The Cheetah Xi features are designed to save lives and protect your valuable capital investments through unprecedented speed, intelligence and flexibility. These features include:

- All Cheetah Xi panels come standard with a controller, transformer and enclosure (see ordering information for details)
- 254 user defined zones
- 80 character, backlit LCD display
- Real time clock
- 3200 event history buffer
- Critical process monitoring
- One-person walktest capability
- Disable by zone, device or circuit
- Drill function at panel and remote
- Provides solenoid releasing operation
- Alarm verification
- Easy to add/remove devices
- Diagnostic menus
- Removable terminal blocks for field wiring
- Local piezo with distinct event tones
- 10 Status LEDs to easily identify system status
- Optional point ID DACT Module available
- Supports up to 31 peripheral devices such as Remote Display, LED Graphic, Multi-Interface Module, Ethernet Module and Zone Annunciators

## CHEETAH XI CONTROLLER SPECIFICATIONS

The controller contains the power supply, microprocessor, hardware interface, display and keypad.

### Enclosure

- Steel Enclosure 23.6" H x 14.35" W x 4" D (Back-box dimensions)
- Flush or surface mounting
- Removable door for ease of installation
- Two door options available; with or without lexan cover on oval opening
- Available in red or grey
- Dead Front option available to isolate panel's internal electronics and wiring

### Power

- 6 amps useable alarm power, expandable to 12 amps (2 A standby/expandable to 4)
- Operation from 120VAC/60 Hz or 240 VAC 50/60 Hz transformer
- Two 24V DC, 2A continuous auxiliary power outputs (Expandable to 5 circuits with SPS)
- One 24VDC, 2A resettable auxiliary power output
- Supports up to 75AH of batteries, expandable to 150 AH using SPS
- Controller consumes 0.275A @ 24VDC in normal and alarm mode

### Signaling Line Circuit

- Address devices with Infrared (IR) tool, similar to remote control device
- Two SLC loops, expandable to four, NFPA style 4, 6 or 7
- 254 devices per loop, system maximum 1016 devices with SLM (Supplemental Loop Module)
- True peer-to-peer digital protocol for extremely fast and reliable communications
- Auto-learn function
- Automatic day/night sensitivity adjustment
- Automatic holiday sensitivity adjustment
- Acclimate operation for sensors
- IR Tool provides ability to read sensitivity levels or perform remote test of device
- Devices contain multi-color LED for quick reference of device status
- Sensors provide early warning pre-alarm detection and can also provide a summing feature. (up to eight sensors)
- Maximum Resistance: 70 ohms
- Maximum Capacitance: .60 uf
- 12,000 ft. maximum distance total from panel to last device.

### NAC Circuit

- Two NAC circuits standard
- Rated at 24VDC, 2.0 Amps maximum
- Built-in synch protocol for both System Sensor® and Gentex® devices

## OPTIONAL MODULES AND PERIPHERALS

### Supplemental Power Supply (SPS) (P/N 10-2474-P)\*

The 10-2474-p includes the power supply circuit board and transformer (-1 for 120VAC primary; -2 for 240VAC primary). This module adds up to 2.0A external standby power and 6.0A alarm power (4 A standby/12A alarm total). AC power and standby batteries are supervised. Supports charging up to 75Ah of additional standby battery. Charging may be turned off in configuration if batteries are not required on SPS. Control Board dimensions: 4-1/2" L x 5-1/2" H x 2" D. Weight: 0.66 lbs. Transformer dimensions: 5" L x 3-3/4" H x 3-1/2" D. Weight: 7 lbs.

### Supplemental Loop Module (SLM), (P/N 10-2473)\*

The SLM adds two more SLC loops. Loop specifications and wiring for SLM are the same as the main controller. It interfaces to the main Control Panel using four standoffs supplied with the SLM. Dimensions: 2" L x 6-1/2" H x 1" D. Weight: 0.12lbs.

### Point ID Dact (Digital Alarm Communicator Transmitter) Module (P/N 10-2528)\*

The DACT provides interface with Central Station monitoring systems. It is available with 5 contact zones of connection OR the intelligent serial interface which provides point ID information. The Contact ID form is the preferred reporting format. It provides a four digit account code followed by a three digit event code, a two-digit group number, and a three digit contact number, all of which are used to provide specific point identification. This DACT can also provide an SIA or 4/2 Pulse reporting format. Note: 10-2476 is the same as 10-2528 with enclosure for external mounting. Dimensions: 6-1/2" L x 4" H x 1" D. Weight 0.32 lbs.

### Fike Relay Module (P/N 10-2204)\*

The CRM4 provides 4 additional independently programmed relays. Cheetah Xi Control Panel supports up to 2 CRM4 modules (if either options are not unused) on the main controller board. Each relay may be wired across normally open or normally closed contacts. Dimensions: 3-1/2" L x 1-1/2" H x 2" D. Weight: 0.10 lbs.

### Fike Reverse Polarity Module (CRPM) (P/N 10-2254)\*

The reverse polarity module provides the ability for UL Remote Station supervision. This supervision is typically performed with a direct, leased line connection. It interfaces to the main control board using four standoffs supplied with the RPM. Dimensions: 3-1/2" L x 1-1/2" H x 2" D. Weight: 0.08 lbs.

### 14 Button Remote Display Unit ( P/N 10-2646)\*

The Fike fourteen button remote display (FRD), provides remote annunciation of Fike's intelligent control panels. The FRD is provided with a 80 character, backlit display which performs two display functions. First, it duplicates information provided by the control panel. Additionally the FRD has the capability of viewing system conditions such as alarm, trouble, supervisory, etc. The FRD also includes six buttons (Enter, Escape, +/-, left/right arrow) that are used for navigation through events as well as configuration of the device. Additionally it has eight programmable buttons that can be configured for things such as reset, silence, acknowledge, drill, or process. A key lock is included for additional security access. Dimensions: 9-1/2" L x 4" H x 2-1/4" D. Weight: 0.5 lbs.

\* See ordering information for individual data sheet that gives additional specifications

### **10 Button Remote Display Unit (P/N 10-2631)\***

The Fike ten button remote display (FRD), provides remote annunciation of Fike's intelligent control panels. The FRD is provided with a 80 character, backlit display which performs two display functions. First, it duplicates information provided by the control panel. Additionally the FRD has the capability of viewing system conditions such as alarm, trouble, supervisory, etc. The FRD also includes six buttons (Enter, Escape, +/-, left/right arrow) that are used for navigation through events as well as configuration of the device. Additionally it has four dedicated buttons that perform the following functions: drill, silence, acknowledge, and reset. A key lock is included for additional security access. Dimensions: 7-3/4" L x 4" H x 2-1/4" D. Weight: 0.5 lbs.

### **2 Button Remote Display Unit (P/N 10-2630)\***

The Fike two button remote display (FRD), provides remote annunciation of Fike's intelligent control panels. The FRD is provided with an 80 character, backlit display which performs two display functions. First, it duplicates information provided on the main control panel. Additionally, the FRD has the capability of viewing system conditions such as alarm, trouble, supervisory, etc. Dimensions: 5-3/4" L x 4" H x 1-1/2" D. Weight 0.5 lbs.

### **Fike Zone Annunciator (P/N 10-2667)\***

The Fike twenty zone remote annunciator is used with Fike's intelligent control systems to provide remote annunciation for up to twenty zones at a location remote from the control panel. The module provides a tabular display that incorporates 20 red alarm and 20 yellow trouble/supervisory LEDs. Each LED is programmable and can provide visual indication of alarm, trouble/supervisory conditions for zones or individual points. Communication between the intelligent control panels and remote annunciator is via the RS485 peripheral bus. When an event from the control panel is received the appropriate LED will illuminate based on the annunciator's configuration. Dimensions: 4" W x 5-3/4" H.

### **Fike Network Module (P/N 10-2482)\***

The Network Module provides the ability to network up to 128 control panels. This typically would consist of other Cheetah Xi panels. The Cheetah Xi network uses a "common zone" functionality. Zones 1-254 are common to all panels on the network and any input can be programmed to cause activation of outputs for the same zone, regardless of which panel the devices are connected to. Regardless of zone number, every state (alarm, trouble etc.) that occurs is displayed by all panels on the network. Dimensions: 4-1/2" L x 1-1/2" H x 2" D. Weight: 10 lbs.

### **Fike Fiber Optic Network Card (P/N 10-2624)\***

The Network Module (P/N 10-2624) provides the ability to network up to 128 control panels. This network would typically consist of other Cheetah Xi fire control panels. The network uses a "common zone" functionality. Zones 1-254 are common to all panels on the network and any input will cause activation of all outputs for the same zone, regardless of which panel the devices are connected to (except abort and predischARGE on Cheetah Xi). Regardless of zone number, every state (alarm, trouble etc.) that occurs can be displayed by all panels on the network. Dimensions: 4.15" L x 1-1/2" H x 2" D. Weight: 0.10 lbs.

### **Fike Ethernet Module (P/N 10-2627)\***

This Module provides the ability to remote monitoring of multiple Cheetah Xi panels via Ethernet/IP. This module is connected to the Cheetah Xi via the peripheral connections at P6 and will be configured as a peripheral device. In order to utilize the remote monitoring capability, a network ID must be assigned to each panel for identification purposes. This module connects to the Panel at P6 per ± and also requires 24 volts DC from the panel to P7 24V ±. See the 06-388 Ethernet Module manual for more details. Dimensions: 8" H x 6" W x 3-1/2" D. *Note: 10-074 is the same module with enclosure.*

### **Fike Multi-Interface (P/N 10-2583)\***

The primary function of the multi-interface module is that it is used as a printer interface for the Cheetah Xi control panels. It provides specific event and point information to be communicated from the panel to the printer. It is compatible with either a Epson FX-890 or equivalent IEEE 1284 standard printer or for UL required applications the Keltron 90 series UL listed fire alarm printer. *Note: 10-074 is the same module with enclosure.* It is also approved for the Precise Vision computer or as a gateway to existing Cheetah Classic Network. Dimensions: 8" H x 6" W x 3-1/2" D.

*Note: 10-069 is the same module with enclosure.*

## **PROGRAMMING CONFIGURATION**

### **Software**

All configuration variables can be assigned using C-LINX software. This software provides the designer the capability to provide a pre-engineered design. The user can review the construction plans to assign the zones. The configuration can also be set to identify the exact device circuit operation desired along with the custom message information.

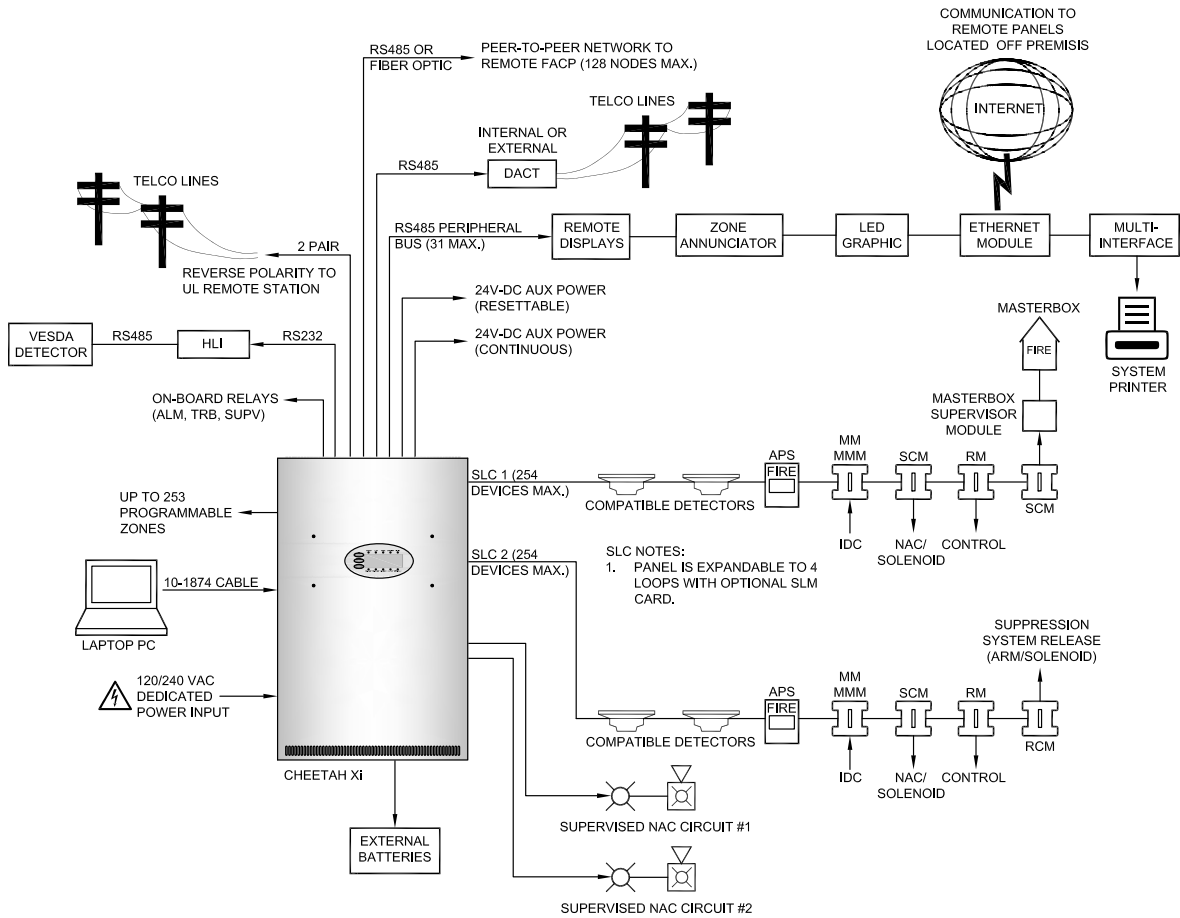
### **IR Configuration Tool (P/N 55-051)\***

This optional hand-held infrared remote control is available on the Cheetah Xi system. This small device can be used in the field to simplify installation, testing and service. It operates with 2 AA batteries. It can read device information such as loop, address, branch, service dates and initiate device test. This tool:

- Communicates bi-directionally with any Cheetah Xi device
- Easily addresses devices by setting the loop and address
- Quickly reads sensitivity levels, date serviced, device type, loop and address, manufacture date
- Immediately records the date serviced
- Instantly initiates walk test of any sensor or module
- Accesses and tests hard-to-reach sensor or module (such as duct detector) through any other device on loop

\* See ordering information for individual data sheet that gives additional specifications

**FIELD WIRING DIAGRAM**



**ORDERING INFORMATION**

File P/N	Description	Individual Datasheet #
10-068-c-p or 10-068-c-p-L	Cheetah Xi System, includes Controller, Enclosure, and Transformer c: (R=Red, G=Grey) p: (1=120V, 2= 240V) L=Lexan	D.1.10.01
10-2542	Cheetah Xi System Controller (included with 10-064-c-p and -L)	D.1.10.01
10-2519-c	Dead Front Option c: (R=Red, G=Grey)	
<b>Optional Modules</b>		
10-2474-p	Supplemental Power Supply p: (1=120V, 2=240Volt)	D.1.12.01
10-2473	Supplemental Loop Module (adds 2 SLC Loops)	D.1.13.01
10-2204	CRM4 - Relay Module	D.1.14.01
10-2254	CRPM - Reverse Polarity Module	D.1.15.10
10-2482	Network Module	D.1.17.01
10-2624	Multi-Mode Fiber Optic Network Module	D.1.21.10
<b>Peripheral Devices</b>		
10-2630	2 Button Expanded Protocol Remote Display	P.1.103.01
10-2631	10 Button Expanded Protocol Remote Display	P.1.107.01
10-2646	14 Button Expanded Protocol Remote Display	P.1.108.01
10-2667	Zone Annunciator	P.1.118.01
10-2627	Ethernet Module	D.1.22.01
10-2583	Multi-Interface Module	P.1.85.01
10-2528	Point ID DACT (Internal Mounting)	D.1.18.01

<b>Intelligent Sensors</b>		
63-1052	Photoelectric Smoke Sensor Non-Isolator Version	P.1.88.01
63-1058	Photoelectric Smoke Sensor Isolator Version	P.1.88.01
63-1053	Photo/Heat Combination Sensor Non-Isolator Version	P.1.89.01
63-1059	Photo/Heat Combination Sensor Isolator Version	P.1.89.01
60-1039	Thermal Sensor Non-Isolator Version	P.1.90.01
60-1040	Thermal Sensor Isolator Version	P.1.90.01
67-033	Ion Sensor Non-Isolator Version	P.1.91.01
67-034	Ion Sensor Isolator Version	P.1.91.01
63-1057	Duct Sensor Non-Isolator Version	P.106.01
63-1062	Duct Sensor Isolator Version	P.106.01
63-1056	Duct Housing	P.106.01
<b>Intelligent Sensor Bases</b>		
63-1054	6" Sensor Base Non-Isolator Version	P.1.98.01
63-1060	6" Sensor Base Isolator Version	P.1.98.01
63-1055	4" Sensor Base Non-Isolator Version	P.1.99.01
63-1061	4" Sensor Base Isolator Version	P.1.99.01
63-1064	Sounder Base	P.101.01
63-1063	Relay Base	P.101.01
<b>Intelligent Modules</b>		
55-045	Mini-Monitor Module Non-Isolator Version	P.1.93.01
55-050	Mini-Monitor Module Isolator Version	P.1.93.01
55-041	4" Monitor Module Non-Isolator Version	P.1.92.01
55-046	4" Monitor Module Isolator Version	P.1.92.01
20-1063	Intelligent Pull Station Non-Isolator Version (Fire)	P.1.65.01
20-1064	Intelligent Pull Station Isolator Version (Fire)	P.1.65.01
20-1343	Intelligent Pull Station Non-Isolator Version (Agent)	P.1.104.01
55-042	Supervised Control Module Non-Isolator Version	P.1.94.01
55-047	Supervised Control Module Isolator Version	P.1.94.01
10-2360	Series Solenoid Diode/Resistor (Needed for solenoids)	
10-2413	Masterbox Interface	
55-043	Relay Module Non-Isolator Version	P.1.95.01
55-048	Relay Module Isolator Version	P.1.95.01
55-052	Release Control Module Non-Isolator Version	P.1.95.01
55-053	Release Control Module Isolator Version	P.1.95.01
10-1832	ARM III Agent Release Module	C.1.04.01
10-2748	Impulse Release Module (IR)	IV.1.15.01
<b>Programming Parts</b>		
55-051	Infrared (IR) Remote Control Tool	P.1.97.01
06-327	C-LINX Software	
10-1874A	Interface Communication Cable (DB9 to RJ11)	
10-1874B	Interface Communication Cable (USB to RJ11)	
02-11139	Communication Cable Converter (USB to DB9)	
10-2477	DACT Programmer	



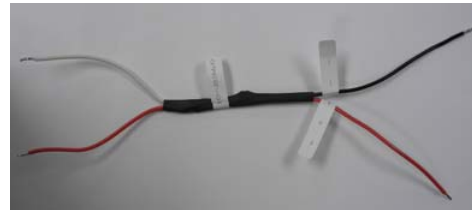


# 10-2360 Supervision and Protection Assembly Installation Instructions



## DESCRIPTION

The 10-2360, Supervision and Protection Assembly is an approved assembly that must be used to connect Fike's Supervised Control Module (P/N 55-042) to a compatible sprinkler releasing solenoid. The assembly allows the control module to supervise the solenoid connection, while protecting the control module from a potential power feedback during solenoid operation. The assembly is equipped with 6" (15.24 cm) wire leads on each side for field wiring connections.



**Exhibit 1: Solenoid Supervision and Protection Assembly**

## COMPATIBILITY

The 10-2360 assembly is compatible with the following Fike control panels: Cheetah Xi, Cheetah Xi 50, CyberCat 254, CyberCat 1016 and CyberCat 50.

## SPECIFICATIONS

Output Circuits: Supervised, Power-limited  
2 amps maximum, 24VDC

Dimensions: 12" long (30.48cm)

Weight: 0.08 lbs. (36 grams)

Operating Temperature: 32°F to 120°F (0°C to 49°C)

Operating Humidity: 93% RH, non-condensing

## LISTINGS AND APPROVALS

Underwriters Laboratories S3217

The following solenoids are compatible water releasing solenoids (see 06-186, Compatibility Document or Factory Mutual Approved groups A-G and other applications):

Skinner	73218BN4UNLVN0C111C2	
Skinner	71395SN2ENJ1N0H111C2	
Skinner	73212BN4TNLVN0C322C2	
ASCO	8210G207	
ASCO	8210A107	
ASCO	R8210A107	
ASCO	T8210A107	
VIKING	11601	VIKING 11595
VIKING	11602	VIKING 04895A
VIKING	11592	VIKING 11596
VIKING	11591	

## PROGRAMMING

Each control panel uses software to configure the Supervised Control Module. The Supervised Control Module MUST be configured for non-silenceable, not active for Drill, and the appropriate activation state (usually ALARM).

## OPERATIONS

During normal standby, the 10-2360 assembly allows supervision of the connected solenoid through the assembly to the supervised control module. During activation, 24 volts is delivered from the supervised control module, through the assembly, to the Solenoid. Components internal to the assembly prevent power feedback from damaging the supervised control module.

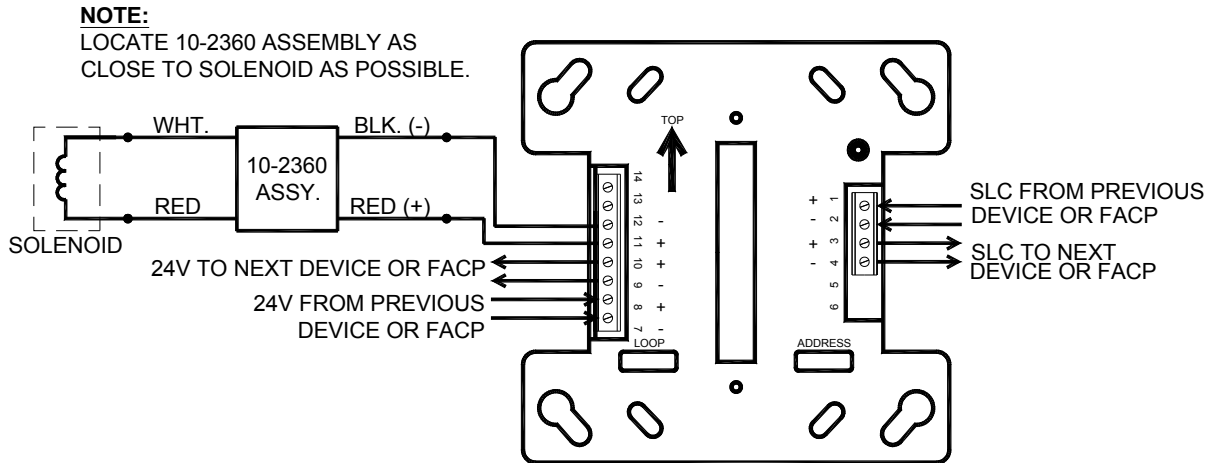
## INSTALLATION INSTRUCTIONS

- 1) If the system is already powered, disable critical functions and power down system.

**⚠ CAUTION**

The control module circuit board contains static sensitive components. Handle the electronics by the edges only and avoid touching the integrated components. Keep the electronics in the protective static bag it was shipped in until time for installation. Always ground yourself with a proper wrist strap before handling the module(s). If the installer is properly grounded at all times, damage due to static discharge will not occur. If the module requires repair or return to Fike, it must be shipped in an anti-static bag.

- 2) Connect the Supervision and Protection assembly as shown Exhibit 2. **The 10-2360 assembly should be located as close to the solenoid as possible.**
- 3) Power up the control panel and test operation with the solenoid disabled (core removed).



All wiring shown is Supervised and Power Limited

**Exhibit 2: Supervised Control Module to Sprinkler Solenoid Wiring**

**STOP WARNING**

Attaching a solenoid directly to the supervised control module without the 10-2360 assembly installed can result in irreparable damage to the module and/or the system control board.

## REMOTE POWER SUPPLY

### DESCRIPTION

Fike's Remote Power Supply (P/N 10-2829) is a 10 amp power supply that can be used to extend the signaling capacity of Fike's fire alarm and suppression control systems. The Remote Power Supply can be activated by a notification appliance circuit (NACs) or optional control modules, or used for standalone applications to supply power to auxiliary devices (i.e., door holders, panel peripheral bus devices, etc.). The Remote Power Supply provides its own AC power connection, battery charging circuit, and battery connections.

### FEATURES

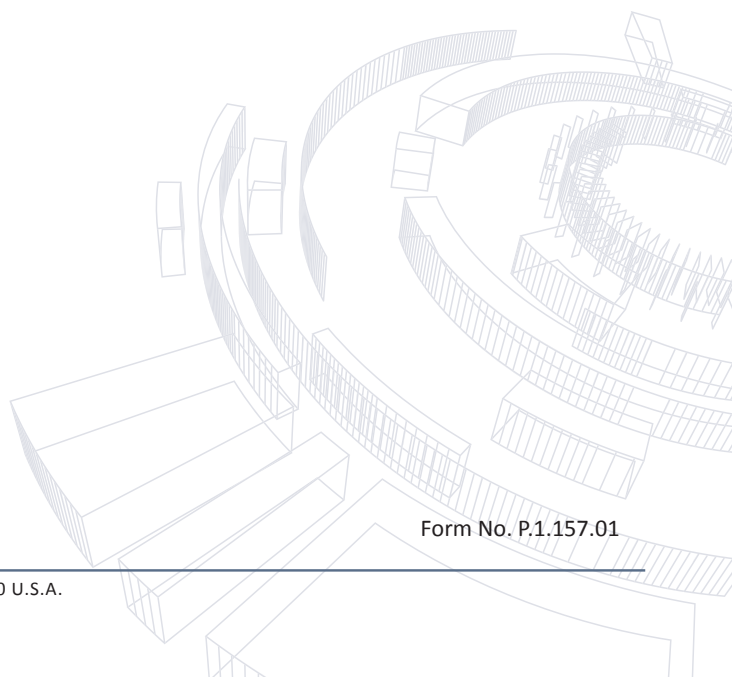
- Regulated, filter power supply's supervised with Form C Trouble Relay - General trouble relay that will de-energize for any trouble condition.
- Output Configurations - 4 power-limited circuits that can be configured for notification appliance circuit (NAC) or auxiliary power supply operation. When used for NAC operation, each circuit can be configured as Class B or Class A, and is rated for 3 amps maximum output, continuous duty. When used for auxiliary power output, a maximum of 10 amps total can be drawn from all four NACs and the AUX output combined.
- Input Configurations - 2 electrically isolated control inputs that provide signal connection from the host control panel or control module. The inputs are triggered by the activation of a NAC or by a 12 or 24 VDC power source. When the control input circuit activates, the Remote Power Supply will activate or deactivate its circuits.
- Auxiliary Output - Dedicated, power-limited, non-resettable (always on), auxiliary power output, 1A maximum output.
- Ground Fault Detection - Circuit board monitors for ground faults between the system power or system ground. If detected, the trouble relay de-energizes.
- Synchronization - Provides two configuration options that allow the Remote Power Supply to be setup as a Generator or Follower for notification appliance synchronization. In the Generator mode, the Remote Power Supply is capable of generating a sync pulse for System Sensor, Gentex, or Wheelock appliances, based on DIP-switch selection. In the Follower mode, the Remote Power Supply will follow the signal (continuous or modulated) provided by the host control panel or control module through the control inputs.
- Enclosure - The Remote Power Supply enclosure is made of 18 gauge steel and is available with a red finish. The enclosure is equipped with a hinged (left side only) outer door equipped with a key lock. The enclosure provides a mounting location for the circuit board, four addressable modules and up to two 12 AH batteries.
- The Remote Power Supply can sync up to 10 power supplies in Follower mode.



*Remote Power Supply*

### APPROVALS:

- UL Listed - S3217



Form No. P.1.157.01

## SPECIFICATIONS

### Enclosure

Steel Enclosure 23.05" H x 14.35" W x 3.25" D (Back-box dimensions)

- Flush or surface mounting
- Removable door for ease of installation
- Available in red finish

### Power

- 10.0 amps useable alarm power
- Supports up to 35AH of battery charging capacity
- Controller consumes 0.035A @ 24VDC in normal standby mode and 0.141 @ 24 VDC in alarm

### Outputs

- 4 NAC or auxiliary output circuits, 24VDC, 3.0 Amps maximum Class A or B
- 1 dedicated auxiliary output rated at 1 amp
- Built-in synch protocol for System Sensor®, Gentex® and Cooper Notification® devices
- When used for auxiliary power output, each circuit is rated for 3 amps, with a combined total of 10 amps @ 120/240 VAC for all 5 outputs

### Operating Environment

- 32 - 120°F (0 - 49°C)
- 93% relative humidity, non-condensing

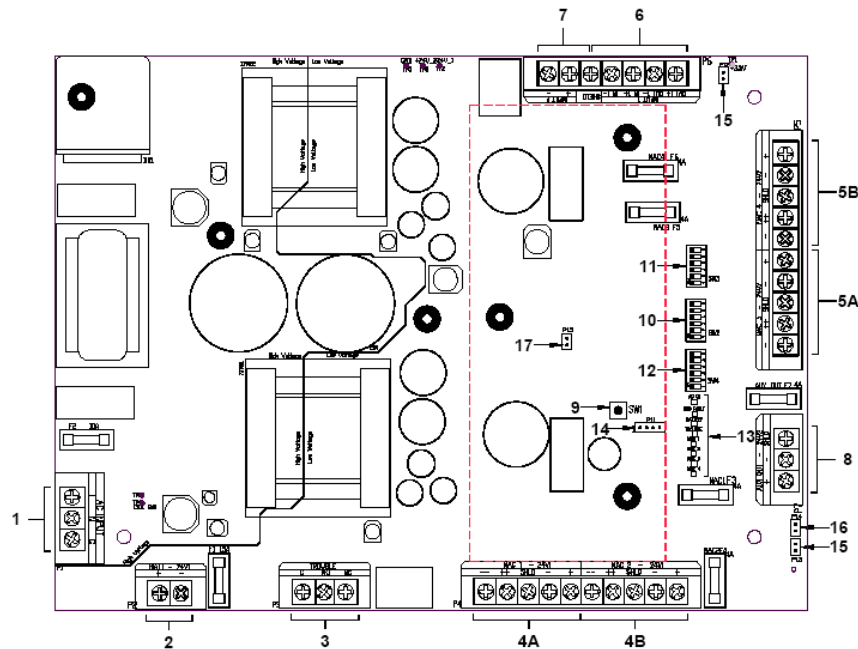
### ENCLOSURE CAPACITY

The remote power supply enclosure provides capacity for mounting the following system components:

- (1) Remote Power Supply Circuit Board
- Up to (2) standby batteries max of 12 AH
- Up to (4) addressable modules
  - Monitor Module (P/N 55-041/55-046)
  - Control Module (P/N 55-042/55-047)
  - Relay Module (P/N 55-043/55-048)

### CIRCUIT BOARD LAYOUT

- 1-AC Input
- 2-Battery Input
- 3-Trouble Relay
- 4-NAC 1 & 2
- 5-NAC 3 & 4
- 6-Input 1
- 7-Input 2
- 8-Aux Out
- 9-Reset Switch
- 10-Configuration Dip Switches (Output 1 & 2)
- 11-Configuration Dip Switches (General Operation)
- 12-Configuration Dip Switches (Output 3 & 4)
- 13-Diagnostic LEDs
- 14-Programming Header (Factory Use Only)
- 15-Ground Fault Jumpers
- 16-Piezo Enable/Disable
- 17-AC Power Input Jumper



ENCLOSURE DIAGRAM

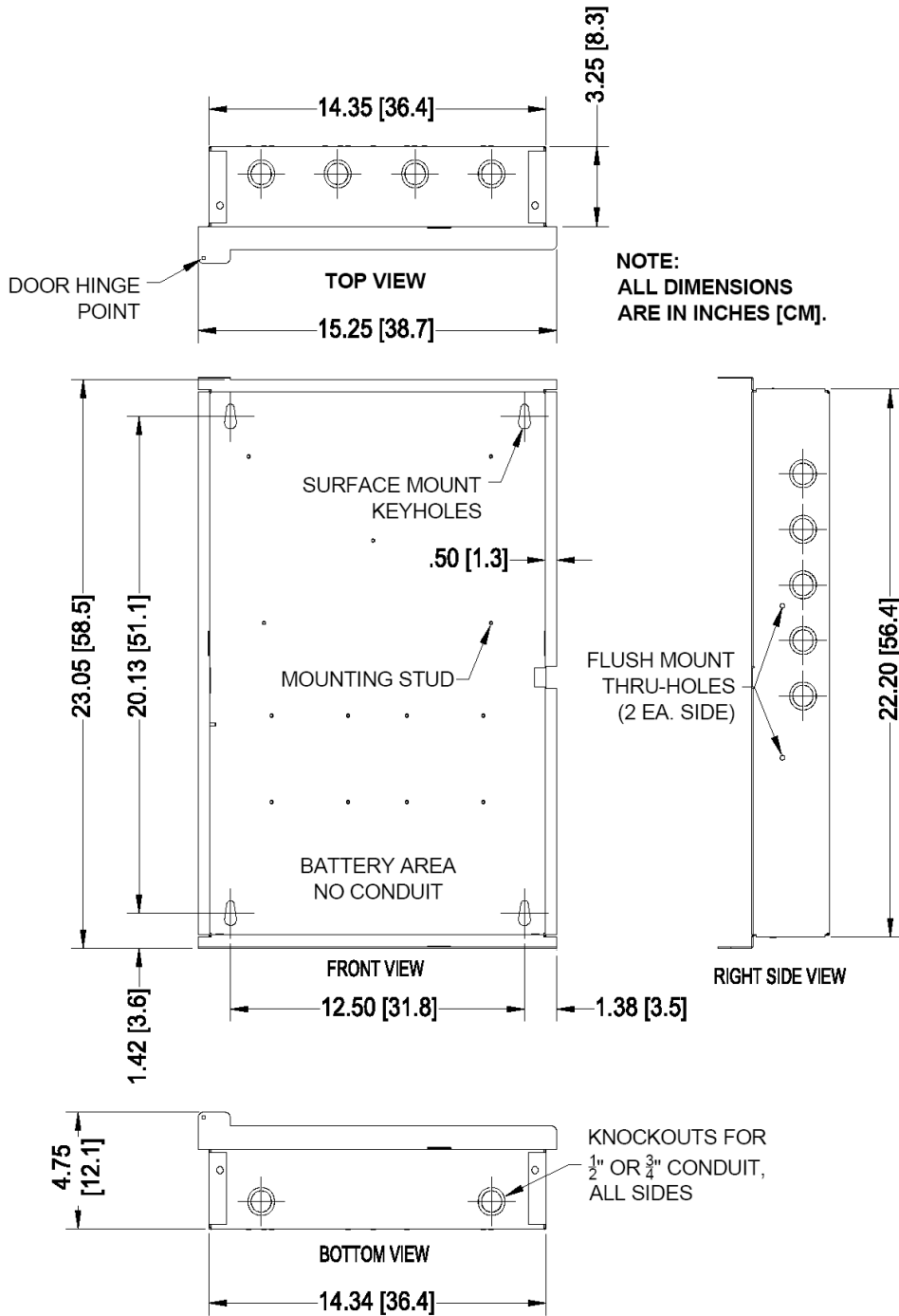


EXHIBIT 'C'

**ORDERING INFORMATION**

Fike P/N	Description
10-2829-1-0-01-0-1-01	Remote Power Supply Kit (includes enclosure and PCB board)
10-2767	Remote Power Supply, circuit board
02-13527	Circuit board, mounting hardware
10-2782-1-0-01-0-1-01	Remote Power Supply Enclosure
02-13061	10 A Glass Tube Fuse, AC input (F2) <sup>1</sup> Mfg. P/N Littlefuse 0477010.MPX
02-4174	15 A Fast Mini Auto Fuse, Battery input (F1)
02-13081	4 A Glass Tube Fuse, NAC outputs (F3-F6)
02-13542	1 A Glass Tube Fuse, AUX Output (F7)
02-12392	Addressable Module, mounting hardware
02-4622	Battery, 12 AH (2 required)
02-2820	Battery, 18 AH (2 required) <sup>2</sup>
02-3468	Battery, 33 AH (2 required) <sup>2</sup>
10-2154	Battery Enclosure, 33 AH
02-1973	NAC Circuit EOL, 1K Ω

*Notes:*

- 1 Must be ordered from Fike or replaced with mfg. part number called out above.
- 2 Batteries larger than 12 AH must be housed in separate battery enclosure.

**OUTPUT CIRCUIT OPERATING MODES**

- Circuit Off - In this mode, the circuit is off and will not activate under any condition.
- 24 V Power Supply - In this mode, the circuit turns on during power up, supplying continuous 24 VDC output to connected devices. Maximum for all 5 outputs is 10 amps @ 120/240 VAC.
  - 24 V NAC, Continuous
    - Generator mode - the NACs turn on upon activation of the selected input circuit (IN 1 or 2). The circuit will provide a continuous 24 VDC output to connected devices. No Sync or selective silence functions available.
    - Follower mode - the NACs turn on upon activation of the selected input circuit (IN 1 or 2). The circuit will provide a continuous 24 VDC output to connected devices. The circuit will follow the operation of the controlling input circuit (IN 1 or 2).
  - 24 V NAC, Protocol
    - Generator mode - the NACs turn on upon activation of the selected input circuit (IN 1 or 2). The circuit will utilize the sync pulse generated by the Remote Power Supply.
    - Follower mode - the NACs turn on upon activation of the selected input circuit (IN 1 or 2). The circuit will utilize the sync pulse provided into the corresponding input circuit (IN 1 or 2).
- 24 V Door Holder, 30 Second Shutdown - In this mode, the circuit turns on during power up supplying continuous 24 VDC output to connected devices. The circuit will turn off immediately upon activation of Input 1. Upon loss of AC power, the circuit will turn off after 30 seconds.
- 24 V Door Holder, <18.4 V - In this mode, the circuit turns on during power up supplying continuous 24 VDC output to connected devices. The circuit will turn off immediately upon activation of Input 1. Upon loss of AC power, the circuit will turn off if the battery supply voltage drops below 18.4 volts.

### MANUAL RELEASE SWITCH



#### FEATURES

- Compatible with Fike suppression control panels
- Stackable, screw-terminal, contact blocks
- Surface or flush mount
- Push-button switch with keyed reset
- Normally open contact block
- 304 stainless steel face plate with etched text

#### General

The manual release switch assembly is used to initiate release of the suppression system and override any active abort switch inputs.

#### Approvals

Underwriters Laboratories (UL)  
 Factory Mutual (FM)  
 California State Fire Marshal (CSFM)

*For exact certification listings, please reference the respective agency web site.*

#### Ordering Information

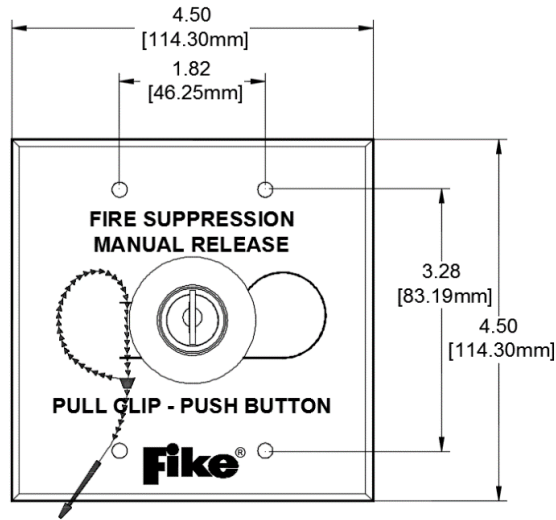
Part Number	Description
10-2963	Manual Release Switch Assembly
10-2982 <sup>1</sup>	Manual Release Switch
10-2964 <sup>1</sup>	304 Stainless Steel Faceplate
02-16365 <sup>2</sup>	Contact Block, Normally Open (NO)
02-16367 <sup>2</sup>	Dummy Contact Block
02-2213 <sup>2</sup>	Security Tie (beaded cable)
02-16376 <sup>2</sup>	Safety Clip
02-2316 <sup>2</sup>	Mounting Screws (4 required)
02-13170 <sup>2</sup>	Key, #0
02-4780 <sup>2</sup>	Contact Block Adapter
02-16401 <sup>2</sup>	Anti-Rotation Ring
02-16402 <sup>2</sup>	Locking Lever Cap
02-12318	Locking Ring Wrench
02-16369 <sup>3</sup>	30mm to 22mm Trim Ring
02-2153	2-Gang Masonry Box, RACO 691
<sup>1</sup> Included in 10-2963 switch assembly.	
<sup>2</sup> Included in 10-2982 switch assembly.	
<sup>3</sup> Allows 22mm switch to be mounted to a 30mm switch face plate.	

#### Specifications

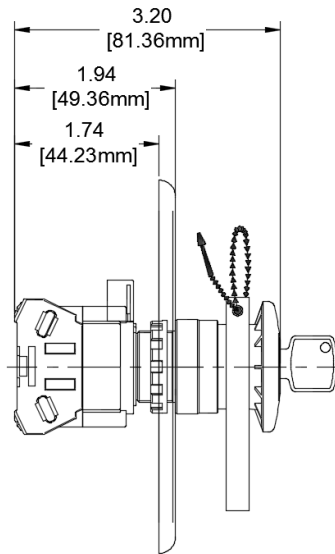
<b>Operating Temperature:</b>	0°C to 49°C (32°F to 120°F)
<b>Operating Humidity:</b>	93% RH, non-condensing
<b>Weight:</b>	0.35 lb. (158 grams)
<b>Mounting:</b>	2-gang masonry box (RACO 691) or equivalent. For indoor use only.
<b>Contact Block Rating:</b>	30VDC @ 5 AMPS
<b>Applicable Wire Size:</b>	Minimum 1 x 22 AWG, max 2 x 14 AWG or 1 x 12 AWG
<b>Compliance:</b>	Restriction of Hazardous Substances (RoHS)

This document is only intended to be a guideline and is not applicable to all situations. Information is subject to Fike's full disclaimer at <http://www.fike.com/disclaimer>.

Product Diagram/Dimensions



Switch Front View



Switch Side View

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### ABORT SWITCH



#### FEATURES

- Compatible with Fike suppression control panels
- Stackable, screw-terminal contact blocks
- 304 stainless steel faceplate with etched text
- Surface or flush mount
- Momentary contact push-button switch
- Normally open and closed contact blocks

#### General

The abort switch assembly is used to temporarily interrupt the release circuit signal when the control panel is in the alarm condition.

#### Approvals

Underwriters Laboratories (UL)  
 Factory Mutual (FM)  
 California State Fire Marshal (CSFM)

*For exact certification listings, please reference the respective agency web site.*

#### Ordering Information

Part Number	Description
10-2965	Abort Switch Assembly
10-2981 <sup>1</sup>	Abort Switch
10-2966 <sup>1</sup>	304 Stainless Steel Faceplate
02-16365 <sup>2</sup>	Contact Block, Normally Open (NO)
02-16366 <sup>2</sup>	Contact Block, Normally Closed (NC)
02-2316 <sup>2</sup>	Mounting Screws (4 required)
02-4780 <sup>2</sup>	Contact Block Adapter
02-16401 <sup>2</sup>	Anti-Rotation Ring
02-16402 <sup>2</sup>	Locking Lever Cap
02-16372 <sup>2</sup>	Yellow Cap
02-12318	Locking Ring Wrench
02-16369 <sup>3</sup>	30mm to 22mm Trim Ring
02-2153	2-Gang Masonry Box, RACO 691

<sup>1</sup>Included in 10-2965 switch assembly.

<sup>2</sup>Included in 10-2981 switch assembly.

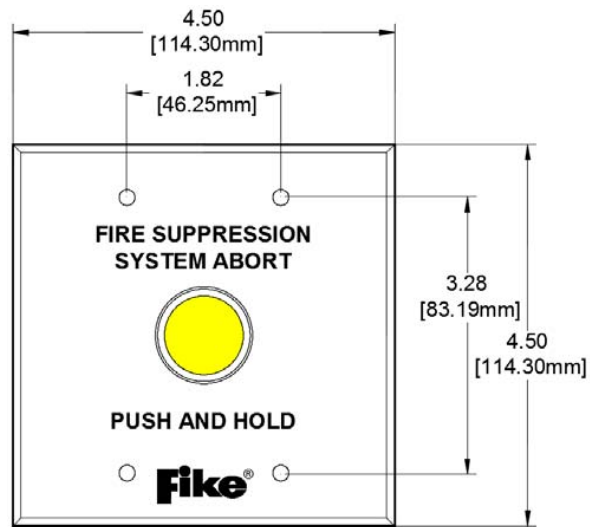
<sup>3</sup>Allows 22mm switch to be mounted to a 30mm switch face plate.

#### Specifications

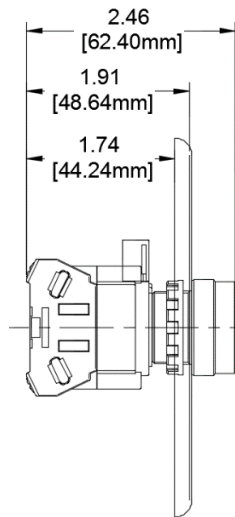
<b>Operating Temperature:</b>	0°C to 49°C (32°F to 120°F)
<b>Operating Humidity:</b>	93% RH, non-condensing
<b>Weight:</b>	0.30 lb. ( 136 grams)
<b>Mounting:</b>	2-gang masonry box (RACO 691) or equivalent. For indoor use only.
<b>Contact Block Rating:</b>	30VDC @ 5 AMPS
<b>Applicable Wire Size:</b>	Minimum 1 x 22 AWG, max 2 x 14 AWG or 1 x 12 AWG
<b>Compliance:</b>	Restriction of Hazardous Substances (RoHS)

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Product Diagram/Dimensions



Switch Front View



Switch Side View

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## SELECTABLE CANDELA EVACUATION SIGNALS

### APPLICATIONS

The Fike Selectable Candela Evacuation Signals, manufactured by Gentex Corporation, are low profile horn, strobe or horn/strobe combination that offer dependable audible and visual alarms and the lowest current available.

The Fike Selectable Candela Evacuation Strobe Horn/Strobe 24VDC offers field selectable candela options of 15, 30, 60, 75, and 110 candela. The 12VDC offers selectable candela options of 15, 30, 60, and 75 candela.

Evacuation horn offers a continuous or synchable temporal 3 in 2400Hz and mechanical tone, a chime as well as a whoop tone. All tones are easy for the professional to change in the field by using switches. The Horn Strobe is shipped from the factory on the temporal lower frequency mode and it comes standard with a rugged cast metal mounting plate.

The Fike Selectable Candela Evacuation Signals have a minimal operation current and a minimum flash rate of 1Hz regardless of input voltage.

Units also come standard with the 4" mounting plate which incorporates the popular SuperSlide feature that allows you to easily test for supervision. Also included is a locking mechanism which secures the product to the bracket without any screws showing.

Appliances are UL 464 and UL 1971, listed for use with fire protective systems and are warranted for three years from date of purchase.

### STANDARD FEATURES

- 24 VDC units have field selectable candela options of 15, 30, 60, 75, and 110 candela
- 12 VDC units have field selectable candela options of 15, 30, 60, and 75 candela
- The horn is available in 12 or 24 Volt
- Prewire Entire System, Then Install Your Signals
- Ease of Supervision Testing (SuperSlide)
- Lower Installation and Operating Costs
- Input Terminals 12 to 18 AWG
- Switch Selection for High or Low dBA
- Switch for Chime, Whoop, Mechanical and 2400Hz Tone
- Switch for Continuous or Temporal 3 (not available on whoop tone)
- Tamperproof Re-entrant Grill
- Surface Mount with the Surface Mount Box
- Synchronize Strobe and/or Horn by Using the AVS Series Control Module
- Silence Horn While Strobes Remain Flashing
- Rugged Die Cast Metal Mounting Bracket
- True Evacuation Tone
- Wide Voltage Range 8-17.5 VDC (12 Volt Models)  
16-33 VDC or FWR (24 Volt Models)
- Available in Red or Off-White



*Strobe    Horn/Strobe    Horn*

### APPROVALS

- Americans with Disabilities Act (ADA 4.28.3)
- BFP (City of Chicago)
- BS+A/MEA #285-91-E
- CSFM 7135-0569:122 (Horn Strobe); 7125-0569:123 (Strobe)
- FM Approved
- NFPA 72
- UL ULC Dual Listed 464, 1971

AVAILABLE MODELS

12 or 24 Volt Low Profile Evacuation Horn, Wall Mount				
Fike P/N	Manf. P/N	Color	Nominal Voltage	dBA @ 10Ft.
20-123-142	904-1239-002	Red	12 VDC	100
20-123-143	904-1241-002	White	12 VDC	100
20-123-27	904-1205-002	Red	24 VDC	100
20-123-28	904-1207-002	White	24 VDC	100

12 or 24 Volt Selectable Candela Low Profile Evacuation Strobe, Wall Mount				
Fike P/N	Manf. P/N	Color	Nominal Voltage	Candela (UL 1971)
20-123-144	904-1235-002	Red	12 VDC	15, 30, 60, 75
20-123-145	904-1237-002	White	12 VDC	15, 30, 60, 75
20-123-146	904-1236-002	Red, Plain (no lettering)	12 VDC	15, 30, 60, 75
20-123-147	904-1238-002	White, Plain (no lettering)	12 VDC	15, 30, 60, 75
20-123-01	904-1321-002	Red	24 VDC	15, 30, 60, 75, 110
20-123-02	904-1319-002	White	24 VDC	15, 30, 60, 75, 110
20-123-46	904-1322-002	Red, Plain	24 VDC	15, 30, 60, 75, 110
20-123-47	904-1320-002	White, Plain	24 VDC	15, 30, 60, 75, 110

12 or 24 Volt Selectable Candela Low Profile Evacuation Horn/Strobe, Wall Mount				
Fike P/N	Manf. P/N	Color	Nominal Voltage	Candela (UL 1971)
20-123-148	904-1231-002	Red	12 VDC	15, 30, 60, 75
20-123-149	904-1233-002	White	12 VDC	15, 30, 60, 75
20-123-150	904-1232-002	Red, Plain	12 VDC	15, 30, 60, 75
20-123-151	904-1234-002	White, Plain	12 VDC	15, 30, 60, 75
20-123-48	904-1317-002	Red	24 VDC	15, 30, 60, 75, 110
20-123-49	904-1315-002	White	24 VDC	15, 30, 60, 75, 110
20-123-50	904-1318-002	Red, Plain	24 VDC	15, 30, 60, 75, 110
20-123-51	904-1316-002	White, Plain	24 VDC	15, 30, 60, 75, 110

Horn Ratings Over Input Voltage Range of 8-17.5V												
Horn Mode	dBA @ 10 Ft. Per UL464 (High)			dBA @ 10 Ft. Per UL464 (Low)			DC (mA) @ Low Setting			DC (mA) @ High Setting		
	8V	12V	17.5V	8V	12V	17.5V	8V	12V	17.5V	8V	12V	17.5V
Temp 3 2400Hz	76	78	81	69*	73	76	10	16	21	16	22	29
Temp 3 Mechanical	75	78	80	68*	72*	75	10	14	20	14	20	26
Temp 3 Chime	62*	63*	64*	60*	62*	63*	7	9	12	8	10	13
Continuous 2400Hz	79	82	84	74*	76	79	10	16	21	16	22	29
Continuous Mechanical	78	81	83	72*	75	79	10	14	20	14	20	26
Continuous Chime	63*	64*	65*	61*	63*	64*	7	9	12	8	10	13
Whoop	78	79	80	71*	74*	77*	20	29	41	45	52	55

Horn Ratings Over Input Voltage Range of 16-33V												
Horn Mode	dBA @ 10Ft. Per UL464 High dB			dBA @ 10 Ft. Per UL464 Low dB			DC (mA)			FWR (mA)		
	16V	24V	33V	16V	24V	33V	16V	24V	33V	16V	24V	33V
Temp 3 2400Hz	78	83	84	71*	75	77	13	19	24	27	37	43
Temp 3 Mechanical	76	81	82	70*	73*	76	11	16	22	23	33	40
Temp 3 Chime	70*	71*	71*	66*	68*	70*	9	12	15	19	24	29
Continuous 2400Hz	81	86	87	74*	78	80	14	21	28	21	42	48
Continuous Mechanical	80	84	85	72*	76	78	13	18	25	27	37	44
Continuous Chime	70*	71*	73*	66*	68*	70*	10	12	15	19	24	30
Whoop	82	83	83	69*	72*	75	43	51	56	51	58	62

NOTES: The Strobe Horn/Strobes are not listed for outdoor use. Operating temperature: 32° to 120°F (0° to 49° C). For nominal and peak current across UL regulated voltage range for filtered DC power and unfiltered (FWR [Full Wave Rectified]) power, see installation manual. 12 volt models are DC only. Fike does not recommend using a coded or pulsing signaling circuit with any of our strobe products (see Gentex Technical Bulletin Number 014)

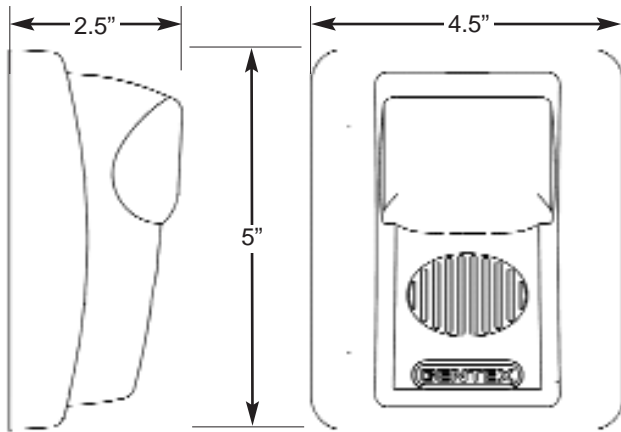
Operating Strobe Current		
Candela	@ 12VDC	2 24VDC
15	106mA	55mA
30	131mA	63mA
60	186mA	88mA
75	237mA	112mA
110	N/A	136mA

\* Operating the horn in this mode at this voltage will result in not meeting the minimum UL reverberant sound level required for public mode fire protection service. These settings are acceptable only for private mode fire alarm use. Use the high dBA setting for public mode application (not applicable when using the chime tone. The chime tone is always private model).

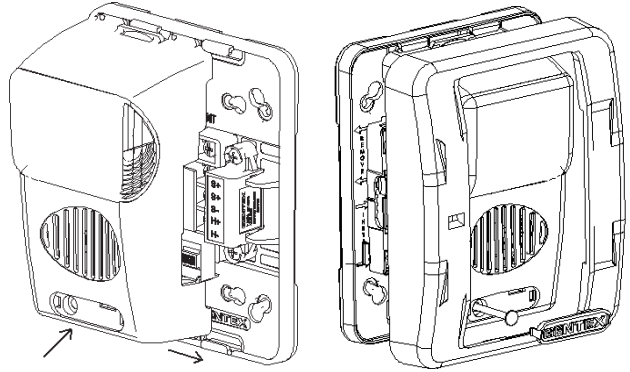
NOTES: The sound output for the temporal 3 tone is rated lower since the time the horn is off is averaged into the sound output rating. While the horn is producing a tone in the temporal 3 mode its sound pressure is the same as the continuous mode.

EXHIBIT 'C'

**Dimensions**

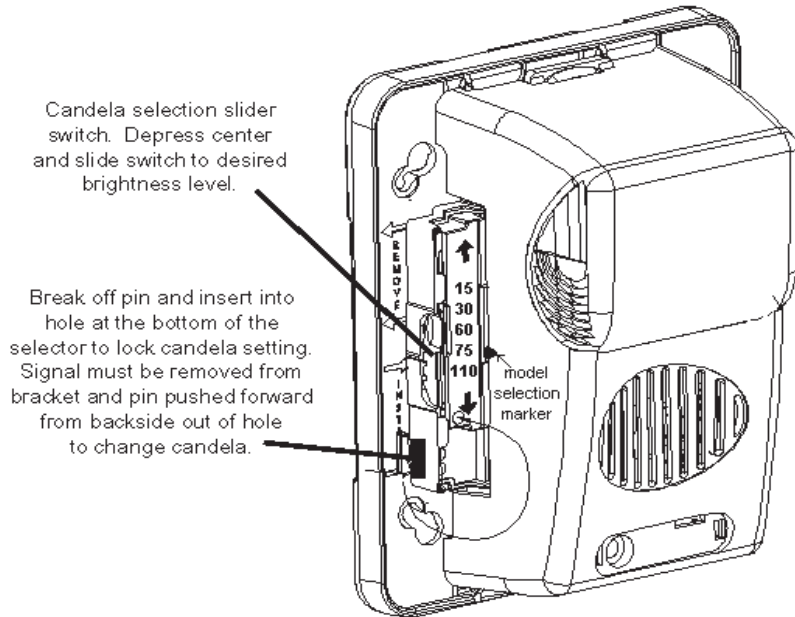


**Mounting SuperSlide**

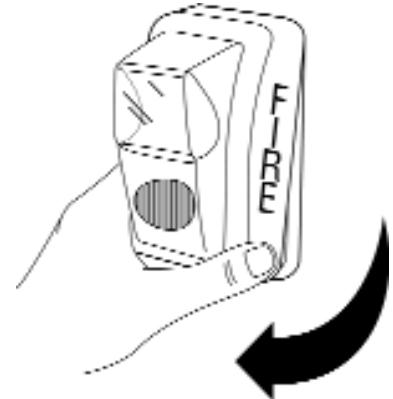


Die Cast Metal Mounting Plate: Mounts to a single gang, double gang 4" square boxes or GSB box.

**Switch Locations**

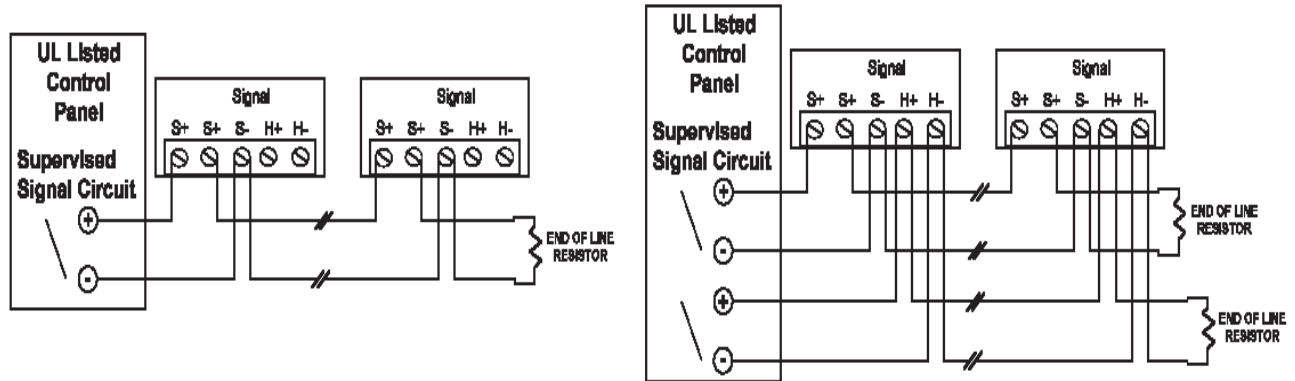


**Removing Bezel**

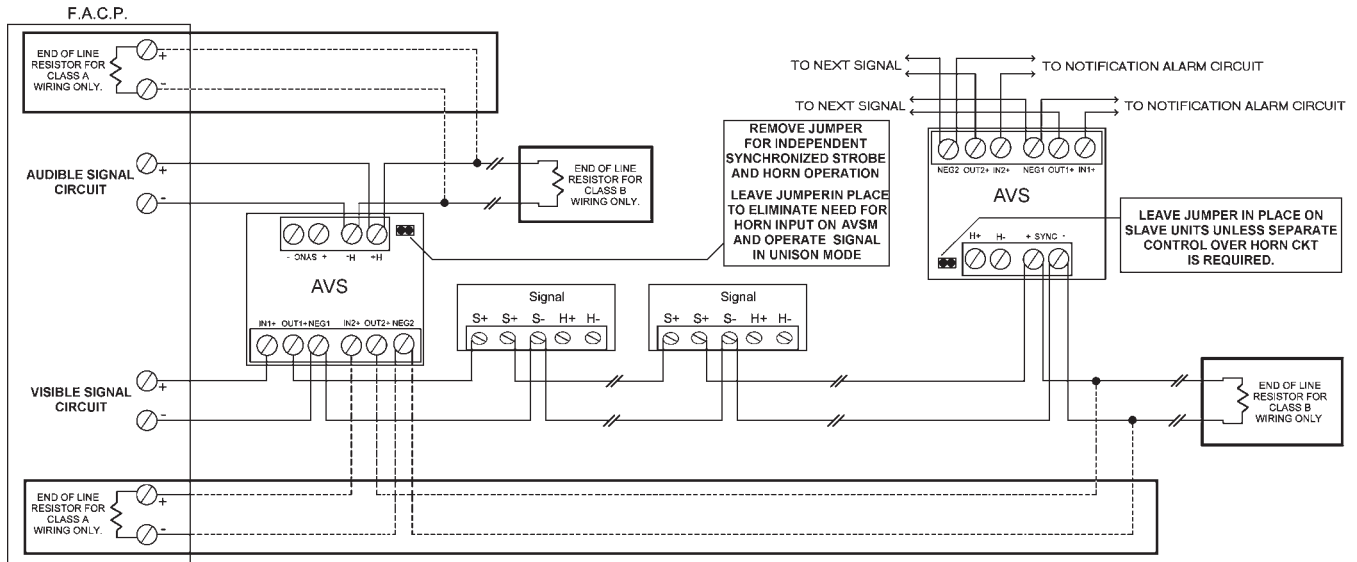


Grip both sides of bezel and pull in a downward and outward motion.

**Conventional Strobe/Horn Strobe Wiring Diagrams**



## Wiring Diagram Strobe/Horn Strobe with AVS Series Synchronization Module



NOTES: See Gentex Technical Bulletin 015 for proper synchronization module for application.  
When synchronizing the Strobe or Horn/Strobe, the AVSM synchronization module MUST be used.

### ARCHITECT AND ENGINEERING SPECIFICATIONS

The audible and/or visible signal shall be a Gentex Selectable Candela Evacuation Signal or approved equal and shall be listed by Underwriters Laboratories Inc. per UL 1971 and/or UL 464. The notification appliance shall also be listed with the California State Fire Marshall (CSFM) and the Bureau of Standards and Appeals (NYC).

The notification appliance (combination audible/visible) shall produce a peak sound output of 100dBA or greater at 12 or 24V as measured in an anechoic chamber. The signaling appliance shall also have the capability to silence the audible signal while leaving the visible signal energized with the use of a single pair of power wires. Additionally, the user shall be able to select either continuous or temporal tone output with the temporal signal having the ability to be synchronized.

Unit shall be capable of being installed so that any unauthorized attempt to change the candela setting will result in a trouble signal at the fire alarm control panel.

The audible/visible and visible signaling appliance shall also maintain a minimum flash rate of 1Hz or greater regardless of power input voltage. The appliance shall have an operating current of 55mA or less at 12 or 24 VDC for the 15Cd strobe circuit.

The appliance shall be polarized to allow for electrical supervision of the system wiring. The unit shall be provided with a mounting bracket with terminals with barriers for input/output wiring and be able to mount to a single gang or double gang box or double workbox without the use of an adapter plate. The unit shall have an input voltage range of 16-33 volts with either direct current or full wave rectified power for 24 volt models or a voltage range of 8-17.5 volts for 12 volt models.

The appliance shall be capable of testing supervision without disconnecting wires. Also the appliance shall be capable of mounting to a surface back box.



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Form No. P.1.62.01-1 August, 2005 Specifications are subject to change without notice.

# EXHIBIT 'C'



## CONTROL MODULE

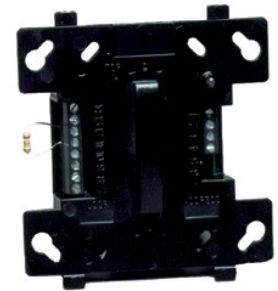
### DESCRIPTION

The Control Module, P/N 55-042 & 55-047, provides a means to switch an external power supply to notification appliances or release solenoids used for sprinkler operation, or to activate Fike's Masterbox Interface module, P/N 10-2413, which is used on a Local Energy Type Auxiliary Fire Alarm System. The module is capable of Class A or Class B wiring. The device will monitor the wiring (while external power is not switched to the auxiliary devices) to the connected device for open and short circuits via an end of line resistor (Class B only). The module will monitor the external power input for loss of power (DC voltage supplies only). The isolator version of the module, P/N 55-047, provides complete short circuit isolation for installations requiring NFPA, Class X wiring.

The module is compatible with Fike's CyberCat® and Cheetah® Xi intelligent control panels. Its operating parameters are configured using the panel's programming software and are stored within non-volatile RAM in the module. This on-board intelligence allows each module to communicate its status directly to other devices connected to the panel. This peer-to-peer digital protocol results in less information that needs to be sent between the module and the host control panel, resulting in faster, more reliable communication.

### SPECIFICATIONS

Normal Operating Voltage:	15 to 30 VDC
Standby Current:	630 uA max. average (continuous broadcasts)
Alarm Current:	2 mA (red LED on)
Maximum NAC Circuit Line Loss:	4 VDC
Power Supply Monitor:	Regulated 24 VDC
	Trouble Range: 0 to 2 VDC
Temperature Range:	32 to 120°F (0 to 49°C)
Humidity:	10 to 93% RH Non-condensing
Dimensions:	4.675"H x 4.275"W x 1.4"D (119 mm H x 109 mm W x 36 mm D)
Accessories:	39kΩ End of Line Resistor P/N 10-2625 (included) Wall cover plate (included) Surface Mount Electrical Box: P/N 20-1347 Control Module Barrier: P/N 20-1346 Series Solenoid Diode/Resistor: P/N 10-2360
Mounting:	Mounts directly on a 4-inch square electrical box with a minimum depth of 2 1/8 inches. For surface mounting, use 20-1347 surface mount box.



### APPROVALS:

- UL - S2203
- FM
- City of New York - 8-05-E
- CSFM - 7165-0900:0137



### OUTPUT RATING

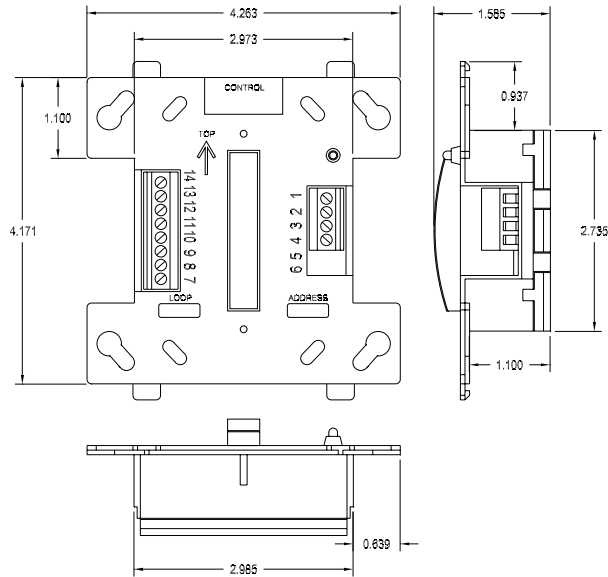
Current Rating	Maximum Voltage	Load Description	Application
2A	25 VAC	PF=0.35	Non-Coded
3A	30 VDC	Resistive	Non-Coded
2A	30 VDC	Resistive	Coded
0.46A	30 VDC	(L/R=20 ms)	Non-Coded
0.7A	70.7 VAC	PF=0.35	Non-Coded
0.9A	125 VDC	Resistive	Non-Coded
0.5A	125 VAC	PF=0.75	Non-Coded
0.3A	125 VAC	PF=0.35	Non-Coded

Form No. P.1.94.01-4

## ORDERING INFORMATION

Fike P/N	Description
55-042	Supervised Control Module - Non-isolator
55-047	Supervised Control Module - Isolator
<b>Accessories</b>	
20-1346	Control Module Barrier
20-1347	Surface Mount Box
55-051	IR Tool
10-2360	Series Solenoid Diode/Resistor
10-2625	39K EOL
13-0192	COVERPLATE

## MODULE DIMENSIONS



## TERMINAL DEFINITIONS

T1	(+) SLC in/out	T8	(+) 24 VDC External Power in/out
T2	(-) SLC in/out	T9	(-) 24 VDC External Power in/out
T3	(+) SLC in/out	T10	(+) 24 VDC External Power in/out
T4	(-) SLC in/out	T11	NAC (+) Class A/B
T5	No Connection	T12	NAC (-) Class A/B
T6	No Connection	T13	NAC (-) Class A
T7	(-) 24 VDC External Power in/out	T14	NAC (+) Class A



## RELAY MODULE

### DESCRIPTION

The Fike Relay Module (P/N 55-043 & 55-048) provides two sets of Form "C" dry relay contacts that switch together (one DPDT relay). These contacts can be used to control external appliances such as dampers, fans, door holders, etc. The module is designed with tri-color LED to indicate device status; flashing GREEN indicates normal operation, flashing RED indicates alarm/active state. The isolator version of the module (P/N 55-048) provides complete short circuit isolation for installations requiring NFPA Style 7 wiring.

The module is compatible with Fike's CyberCat® and Cheetah® Xi intelligent control panels. Its operating parameters are configured using the panel's programming software and are stored within non-volatile RAM in the module. This on-board intelligence allows each module to communicate its status directly to other devices connected to the panel. This peer-to-peer digital protocol results in less information that needs to be sent between the module and the host control panel, resulting in faster, more reliable communication.

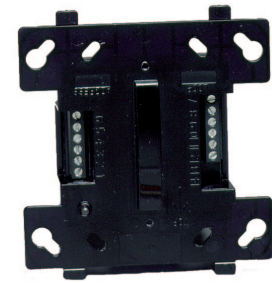
### SPECIFICATIONS

Normal Operating Voltage:	15 to 30 VDC
Standby Current:	0.500 mA max. average (continuous broadcasts)
Alarm Current:	2 mA (red LED on)
Short Circuit Current:	Dry Control Input: 30 mA max. Avg. (5 VDC)
Maximum Resistance:	Dry Contact Input: 100 W
Temperature Range:	32 to 120°F (0 to 49°C)
Humidity:	10 to 93% RH Noncondensing
Dimensions:	4.17"H x 4.26"W x 1.22"D (106 mm H x 108 mm W x 31 mm D)
Accessories:	Wall cover plate (included) Surface Mount Electrical Box: P/N 20-1347 Control Module Barrier: P/N 20-1346
Mounting:	Mounts on a 4" x 4" x 2 1/8" Junction Box for flush mounting or on a surface mount box (P/N 20-1347) for surface mounting

Current Rating	Maximum Voltage	Load Description	Application
3A	30 VDC	Resistive	Non-Coded
2A	30 VDC	Resistive	Coded
1A	30 VDC	Inductive (L/R=2 ms)	Coded
0.5A	30 VDC	Inductive (L/R=5 ms)	Coded
0.9A	70.7 VAC	Resistive	Non-Coded
0.7A	70.7 VAC	Inductive (PF=0.35)	Non-Coded

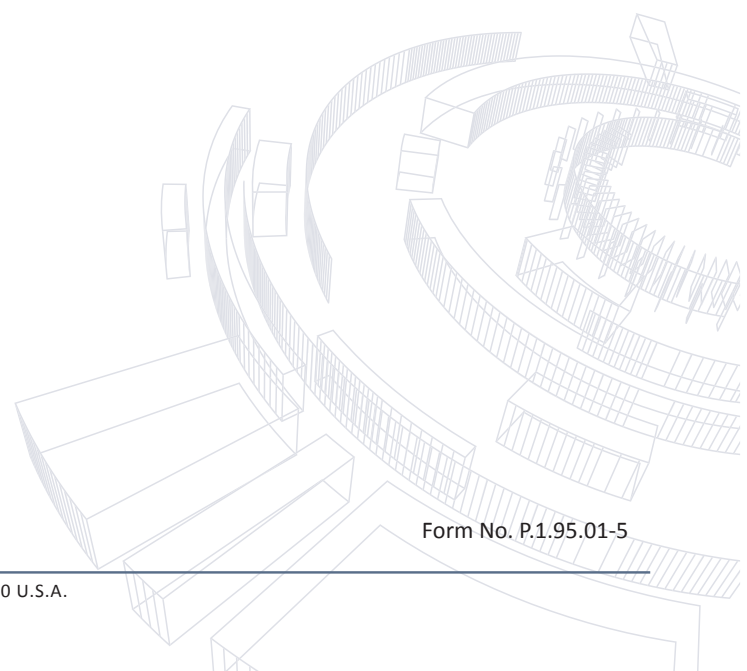
### ORDERING INFORMATION

Fike P/N	Description
55-043	Relay Module - Non-isolator
55-048	Relay Module - Isolator
<b>Accessories</b>	
20-1346	Control Module Barrier
20-1347	Surface Mount Box
55-051	Configuration IR Tool



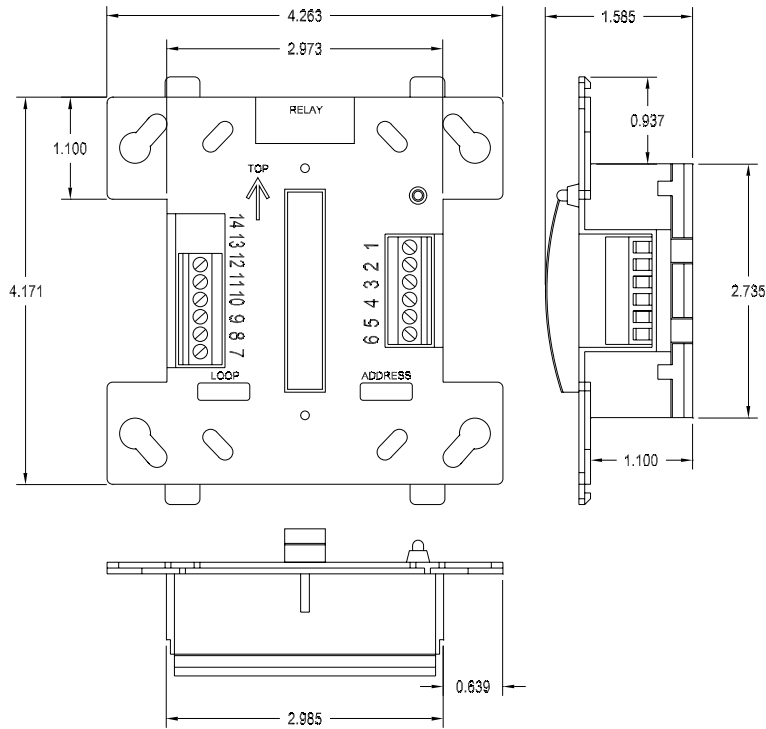
### APPROVALS:

- UL - S3705
- FM - 3021590 (isolator)  
3023166 (non-isolator)
- City of New York - 8-05-E
- CSFM - 7300-2010:0101



Form No. P.1.95.01-5

**MODULE DIMENSIONS**



**TERMINAL DEFINITIONS**

T1	(+) SLC in/out	T7	Normally Closed #1
T2	(-) SLC in/out	T8	Common #1
T3	(+) SLC in/out	T9	Normally Open #1
T4	(-) SLC in/out	T10	Normally Closed #2
T5	(+) Dry Contact Input	T11	Common #2
T6	(-) Dry Contact Input	T12	Normally Open #2

## MINI MONITOR MODULE

### DESCRIPTION

The Mini Monitor Module (P/N 55-045 & 55-050) provides a single, Class B initiating device circuit (IDC) capable of monitoring normally open contact fire alarm and supervisory devices. In addition to monitoring the connected contacts, the module will monitor the wiring to the device for open circuits. The module has a single panel controlled red LED to indicate device status. The isolator version of the module (P/N 55-050) provides complete short circuit isolation for installations requiring NFPA, Style 7 wiring.

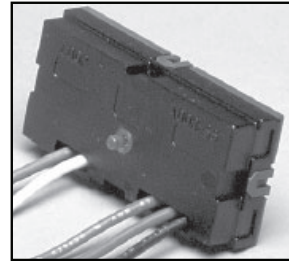
The module is compatible with Fike's CyberCat® and Cheetah® Xi intelligent control panels. Its operating parameters are configured using the panel's programming software and are stored within non-volatile RAM in the module. This on-board intelligence allows each module to communicate its status directly to other devices connected to the panel. This peer-to-peer digital protocol results in less information that needs to be sent between the module and the host control panel, resulting in faster, more reliable communication.

### SPECIFICATIONS

Normal Operating Voltage:	15 to 30 VDC
Standby Current:	485 mA max. (continuous broadcasts)
IDC Voltage:	5.4 VDC max.
Alarm Current:	2 mA (red LED on)
Maximum IDC Wiring Resistance:	100 W
Temperature Range:	32 to 120°F (0 to 49°C)
Humidity:	10 to 93% RH Noncondensing
Dimensions:	1.31" H x 2.73" W x 0.61" D (33 mm H x 69 mm W x 15 mm D)
Wire Length:	6.5 inches (165 mm)
Accessories:	39 kW End of Line Resistor P/N 10-2625 included 14 kW Short Detect Resistor, P/N 10-2530, must be ordered separately
Mounting:	Inside standard electrical box behind monitored device

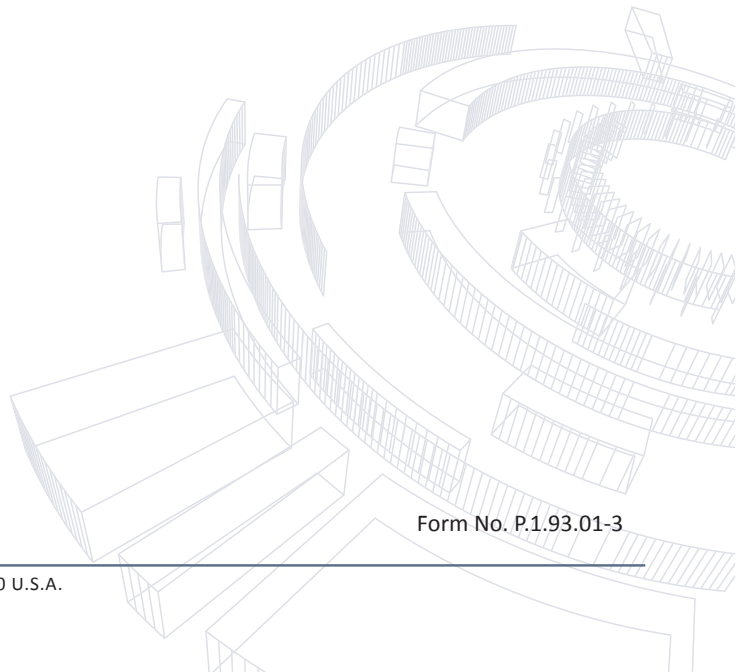
### ORDERING INFORMATION

Fike P/N	Description
55-045	Mini Monitor Module - Non-isolator
55-050	Mini Monitor Module - Isolator
<b>Accessories</b>	
20-1071	Control Module Barrier
20-1072	Surface Mount Box
55-051	Configuration IR Tool



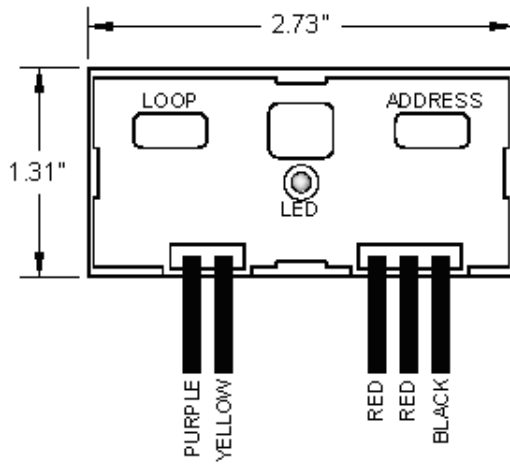
### APPROVALS:

- UL - S3705
- FM - 3021590 (isolator)  
3023166 (non-isolator)
- City of New York - 376-06-E
- CSFM - 7300-0900:140



Form No. P.1.93.01-3

### MODULE DIMENSIONS



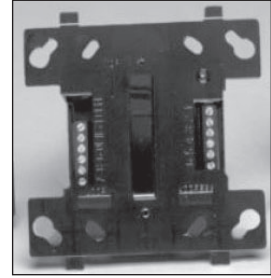
### WIRE COLOR DEFINITIONS

Red	(+) SLC in/out
Red	(+) SLC in/out
Black	(-) SLC in/out
Purple	(+) Supervised Input
Yellow	(-) Supervised Input/(-) SLC in/out

## RELEASING MODULE

### DESCRIPTION

Releasing Control Module (P/N55-052/55-053) is a device programmed to supervise either an agent release module(s) or a solenoid. This module can only be used for one type of application at one time (either supervising up to six agent release modules or one solenoid, but never both simultaneously). This module also monitors the external power input for loss of power. A tri-color LED is located on the front of module to provide instant device status.



### SPECIFICATIONS

SLC: Normal Operating Voltage: 24 VDC Nominal  
Standby Current: 450 mA max. average (continuous broadcasts)  
Activation Current: 6.0 mA (red LED on)  
Normal Operating Voltages: 24 VDC Nominal

External Supply: Standby Current: 450 mA  
Activation Current: 6 mA

Agent Releasing Module: Supervisory Loop Voltage: 20 to 28 V  
Supervisory Loop Current (Normal): 13 mA  
Supervisory Loop Voltage: 3.3 V  
Supervisory Loop Current (Normal): 30 mA

Solenoid: Supervisory Loop Voltage: 3.3 V  
Supervisory Loop Current (Normal): 30 mA

Temperature Range: 32 to 120°F (0 to 49°C)  
Humidity: 10 to 93% RH Noncondensing

Dimensions: 4.17"H x 4.26"W x 1.22D (106 mm H x 108 mm W x 31 mm D)

Accessories: 2.7 kW End of Line Resistor P/N 10-2165 (included)  
Wall cover plate (included)  
Surface Mount Electrical Box P/N 20-1072  
Mounts on a 4" x 4" x 2 1/8" J-Box

Mounting:

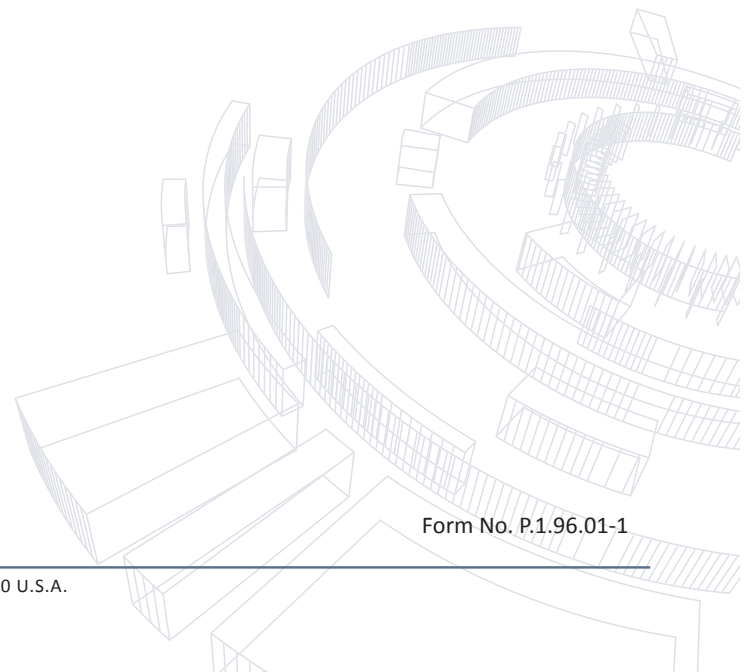
### APPROVALS:

- UL Listed - S2203
- FM Approved - 3023436
- City of New York - 376-06-E
- CSFM - 7300-0900:143



### ORDERING INFORMATION

Fike P/N	Description
55-052	Releasing Module (Cheetah Xi Only) - Non-isolator
55-053	Releasing Module (Cheetah Xi Only) - Isolator
<b>Accessories</b>	
20-1071	Control Module Barrier
20-1072	Surface Mount Box
55-051	Configuration IR Tool



Form No. P.1.96.01-1

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**EXHIBIT 'C'**

## INTELLIGENT PHOTOELECTRIC DETECTOR

### DESCRIPTION

The Intelligent Photoelectric, spot-type smoke detectors, P/N 63-1052 & 63-1058, have sensing chambers that utilize the light scattering principle to detect smoke. The sensing chamber employs features that minimize the effect of settled dust on performance. The detector is designed with tri-color LEDs to indicate detector status. A remote LED annunciator, P/N 02-3868, is available as an accessory. It can be configured to follow the detector LED operation or be independently controlled. The isolator version, P/N 63-1058, provides complete short circuit isolation for NFPA 72, Class X wiring if used with an isolator base.

The detector is compatible with Fike's CyberCat® and Cheetah® Xi intelligent control panels. Its operating parameters are configured using the panel's programming software and are stored within non-volatile RAM in the detector. This on-board intelligence allows each detector to communicate its status directly to other devices connected to the panel. This peer-to-peer digital protocol results in less information that needs to be sent between the detector and the host control panel, resulting in faster, more reliable communication.

### SPECIFICATIONS

Normal Operating Voltage:	15 to 30 VDC
Standby Current:	481µA max. @ 24 VDC (continuous broadcasts)
Alarm Current:	2 mA max. @ 24 VDC (LEDs on)
Humidity Range:	10% to 93% Relative Humidity, non-condensing
Temperature Range:	32°F to 120°F (0°C to 49°C)
Height:	2.1 inches (51 mm) installed in 63-1054 Base
Diameter:	6.1 inches (155 mm) installed in 63-1054 Base
	4.1 inches (104 mm) installed in 63-1055 Base
Weight:	5.2 oz. (147 g)
Detector Spacing:	In compliance with NFPA 72
Velocity Range:	4000 FPM (1219 m/min.)

### ORDERING INFORMATION

Fike P/N	Mfg. Model	Description
63-1052	63-1052	Photoelectric Smoke Detector - Non-Isolator
63-1058	63-1058	Photoelectric Smoke Detector - Isolator
<b>Mounting Bases</b>		
63-1054	EBF	6" Flanged Mounting Base - Non-Isolator
63-1060	EBFI	6" Flanged Mounting Base - Isolator
63-1055	EB	4" Flangeless Mounting Base - Non-Isolator
63-1061	EBI	4" Flangeless Mounting Base - Isolator
63-1063	EBR	Relay Base
63-1064	EBS	Sounder Base
<b>Accessories</b>		
20-1085	F110	Retrofit Flange
02-3868	RA100Z	Remote LED Annunciator
20-1087	XR2B	Detector Removal Tool
02-4986	XP-4	Extension for 20-1087 (5-15 ft)
20-1089	BCK-200B	Black Detector Kit (10 pack)
55-051	EA-CT	IR Tool



### APPROVALS:

- UL - S911
- FM
- MEA - 7-05-E
- CSFM - 7272-2010:0100



Form No. P.1.88.01-4

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**EXHIBIT 'C'**



## PLUG-IN DETECTOR BASE

### DESCRIPTION

The Six Inch Detector Base (P/N 63-1054/63-1060) is designed for use with any of Fike's intelligent CyberCat®/Cheetah® Xi plug-in detectors. The base is approximately 2 inches larger than the sensor head. The base mounts directly to a 3 ½ inch and 4 inch octagon boxes, 4 inch square boxes (with or without plaster ring) and single gang boxes. The base provides terminals for connection of an optional remote LED annunciator (P/N 02-3868).



### SPECIFICATIONS

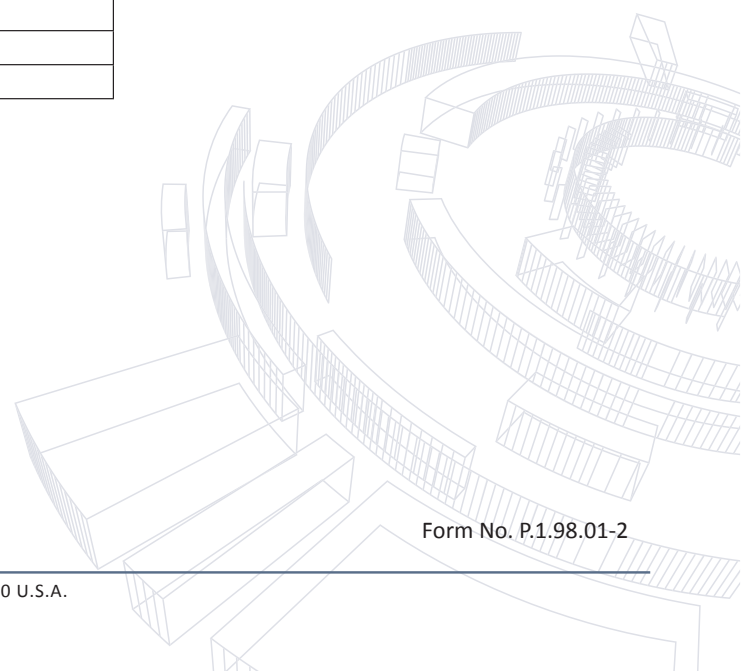
Diameter: 6.1" (155 mm);  
63-1054/63-1061 4.0" (102 mm)  
Wire Gauge: 12 to 18 AWG (0.9 to 3.25 mm<sup>2</sup>)

### ORDERING INFORMATION

Fike P/N	Mfg. Model	Description
<b>Mounting Bases</b>		
63-1054	EBF	6" Flangeless Mounting Base - Non-isolator
63-1060	EBFI	6" Flangeless Mounting Base - Isolator
<b>Accessories</b>		
20-1085	F110	Retrofit Flange
02-3868	RA400Z	Remote LED Annunciator
20-1087	XR2B	Detector Removal Tool (20-1089 included)
02-4986	XP-4	Extension for 02-4985 (5–15 ft)
20-1089	T55-127-000	Detector Removal Head
20-1090	BCL-20B	Black Detector Kit
55-051		Configuration IR Tool
<b>Compatible Sensors</b>		
63-1052		Photo - Non-isolator
63-1058		Photo - Isolator
63-1053		Photo/Heat - Non-isolator
63-1059		Photo/Heat - Isolator
60-1039		Heat - Non-isolator
60-1040		Heat - Isolator
67-033		Ion - Non-Isolator
67-034		Ion - Isolator

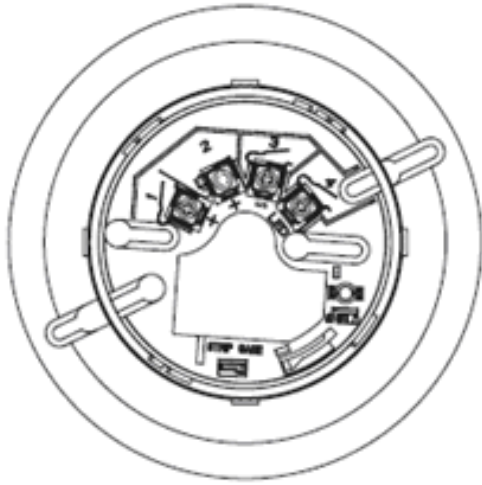
### APPROVALS:

- UL - S911
- FM - 3021590 (non-isolator) 3023166 (isolator)
- City of New York - 9-05-E
- CSFM - 7300-0900:138



Form No. P.1.98.01-2

**TERMINAL LAYOUT**



**TERMINAL DEFINITIONS**

No.	Function
T1	(+) SLC in/out
T2	No Connection
T3	(-) SLC in/out, (-) Remote Annunciator
T4	(+) Remote Annunciator

## INTELLIGENT PHOTOELECTRIC DUCT SENSOR

### DESCRIPTION

The Fike Intelligent Photoelectric Duct, spot-type smoke detector (P/N 63-1057/63-1062\*) utilizes sensing chambers that are designed to respond rapidly to a broad range of fires. The sensing chamber employs features that minimize the effects of settled dust on detector performance.

When combined with a Fike Duct Housing (P/N 63-1158), the detector samples air passing through the duct and allows detection of a developing hazardous condition. When sufficient smoke is sensed, and alarm signal is initiated at the fire control panel monitoring the detector and appropriate action can be taken to shut off fans, blowers, change over air handling systems, etc. The duct housing is equipped with an integral detector base that allows quick twist-in, twist-out installation of the photoelectric detector head. This allows quick and easy cleaning or application changes without removing the duct housing. The detector should not be used in open area applications.

The intelligent detector provides a peer-to-peer digital protocol that allows reliable and fast communication with the host control panel and other intelligent devices over the panels signaling line circuits.

### FEATURES

- Operates over the control panels signaling line circuits (no separate power required)
- Continues sensitivity monitoring from the panel
- Twist-in/twist-out removal
- Tri-color LED for instant indication of device status
- Acclimate functionality
- Operating parameters maintained within non-volatile RAM
- Night and Day sensitivities (0.8 – 3.4% per foot)
- Dual Pre-Alarm thresholds (0.6 – 4.0% per foot)
- Walktest functionality
- Drift compensation functionality

\* P/N 63-1062 provides short circuit isolators

\* Prevents shorts on the signaling line circuit from disabling all devices on the intelligent loop

### SPECIFICATIONS

Normal Operating Voltage:	15 to 30 VDC
Standby Current:	P/N 63-1057: 0.250mA max. @ 24 VDC (continuous broadcasts) P/N 63-1062: 0.481mA max. @ 24 VDC (continuous broadcasts)
Alarm Current:	2 mA max. @ 24 VDC (LEDs and relay active), both sensors
Humidity Range:	10% to 93% Relative Humidity, non-condensing
Temperature Range:	32 to 120°F (0 to 49°C)
Weight:	5.2 oz. (147 g)

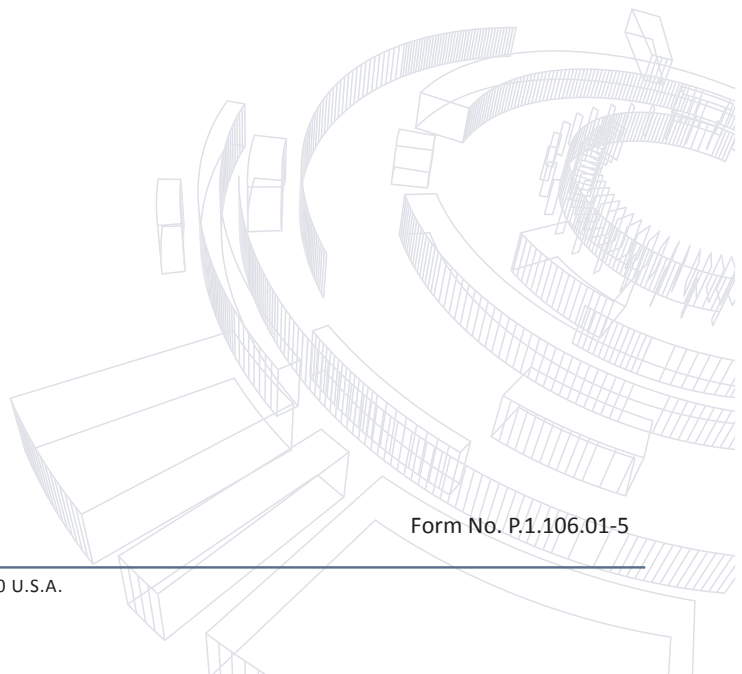
### ORDERING INFORMATION

Fike P/N	Description
63-1057	Photoelectric Duct Smoke Detector - Non-Isolator
63-1062	Photoelectric Duct Smoke Detector - Isolator
63-1158	Eclipse Series Intelligent Duct Smoke Housing



### APPROVALS:

- UL - S4021
- FM - 3021590 (isolator)  
3023166 (non-isolator)
- City of New York - 7-05-E
- CSFM - 7272-2010:0100



Form No. P.1.106.01-5

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**EXHIBIT 'C'**



3825 Ohio Avenue, St. Charles, Illinois 60174  
 1-800-SENSOR2, FAX: 630-377-6495  
 www.systemsensor.com

## DNRECL Eclipse Duct Smoke Detector

### SPECIFICATIONS

Operating Temperature:	-4° to 158° F (-20° to 70° C)
Storage Temperature:	-4° to 158° F (-20° to 70° C)
Humidity:	0% to 95% Relative Humidity Non-condensing
Air Velocity:	300 to 4000 ft./min. (1.5 to 20.3 m/sec.)
Rectangular Footprint Dimensions:	14.38 in L x 5 in W x 2.5 in D (37 cm L x 12.7 cm W x 6.36 cm D)
Square Footprint Dimensions:	7.75 in L x 9 in W x 2.5 in D (19.7 cm L x 22.9 cm W x 6.35 cm D)
Weight:	1.6 pounds; 0.73 kg

Electrical (See applicable detector head installation manual for electrical specifications. Use the Base/Sensor Cross Reference chart at <http://www.systemsensor.com> to determine applicable sensor head.)

Table of Contents	Page
[1] Limitations of Duct Smoke Detectors . . . . .	1
[2] General Description . . . . .	1
[3] Contents of the Duct Smoke Detector Kit . . . . .	1
[4] Detector Installation . . . . .	1
[5] Sampling Tube Installation . . . . .	2
[6] Measurement Tests . . . . .	3
[7] Field Wiring . . . . .	4
[8] Verification of Operation . . . . .	4
[9] Detector Cleaning Procedures . . . . .	5
[10] Sensor Replacement . . . . .	5
[11] Optional Accessories . . . . .	5
Warranty . . . . .	6

ACCESSORY CURRENT LOADS AT 24 VDC		
DEVICE	STANDBY	ALARM
RA400Z/RA100Z	0mA	12mA Max.
RTS451/RTS151	0mA	12mA Max.
RTS451KEY/RTS151KEY	12mA	12mA Max.

### BEFORE INSTALLING

Read the System Sensor Guide for *Proper Use of Smoke Detectors in Duct Applications* (A05-1004), which provides detailed information on detector spacing, placement, zoning, wiring, and special applications. Copies of this manual are available online at [www.systemsensor.com](http://www.systemsensor.com). NFPA Standards 72 and 90A should also be referenced for detailed information.

NOTICE: This manual shall be left with the owner/user of this equipment. IMPORTANT: This detector must be tested and maintained regularly following NFPA 72 requirements. The detector should be cleaned at least once a year.

### [1] LIMITATIONS OF DUCT SMOKE DETECTORS



The National Fire Protection Association has established that DUCT DETECTORS MUST NOT BE USED AS A SUBSTITUTE FOR OPEN AREA DETECTOR PROTECTION as a means of providing life safety. Nor are they a substitute for early warning in a building's regular fire detection system.

System Sensor supports this position and strongly recommends that the user read NFPA Standards 90A, 72, and 101. The DNRECL Air Duct Smoke Detectors are listed per UL 268A.

This device will not operate without electrical power. Fire situations may cause an interruption of power. The system safeguards should be discussed with your local fire protection specialist.

This device will not sense smoke unless the ventilation system is operating and the cover is installed.

For this detector to function properly, it MUST be installed according to the instructions in this manual. Furthermore, the detector MUST be operated within ALL electrical and environmental specifications listed in this manual and the sensor head installation manual. Failure to comply with these requirements may prevent the detector from activating when smoke is present in the air duct.

### [2] GENERAL DESCRIPTION

Smoke introduced into this air duct system will be distributed throughout the entire building. Smoke detectors designed for use in air duct systems are used to sense the presence of smoke in the duct.

Model DNRECL Air Duct Smoke Detector utilizes photoelectric technology for the detection of smoke. This detection method, when combined with an efficient housing design, samples air passing through the duct and allows detection of a developing hazardous condition. When sufficient smoke is sensed, an alarm signal is initiated at the fire control panel monitoring the detector, and appropriate action can be taken to shut off fans, blowers, change over air handling systems, etc. These actions can facilitate the management of toxic smoke and fire gases throughout the areas served by the duct system.

The DNRECL incorporates a sensor cover tamper feature that provides a trouble signal at the panel immediately if the cover is removed or improperly installed. Proper installation of the sensor cover removes the trouble condition.

If programmed with the system control panel, two LEDs on each duct smoke detector light to provide local visible indication.

The DNRECL provides a remote alarm output for use with auxiliary devices, such as the RA400Z/RA100Z remote LED annunciator, as well as remote test capability with the RTS451/RTS151 or RTS451KEY/RTS151KEY Remote Test Stations.

### [2.1] DETECTOR FEATURE SET

- Utilizes plug-in head
- Sampling tubes install from front and rear
- Compatible with existing accessories
- Able to address detector per code switches on sensor head.

### [3] CONTENTS OF THE DUCT SMOKE DETECTOR KIT

1. Sensor/power board assembly and covers (use appropriate sensor per the system control panel)
2. Three #10 sheet metal screws for mounting
3. One test magnet
4. Drilling template
5. One sampling tube end cap
6. One plastic exhaust tube

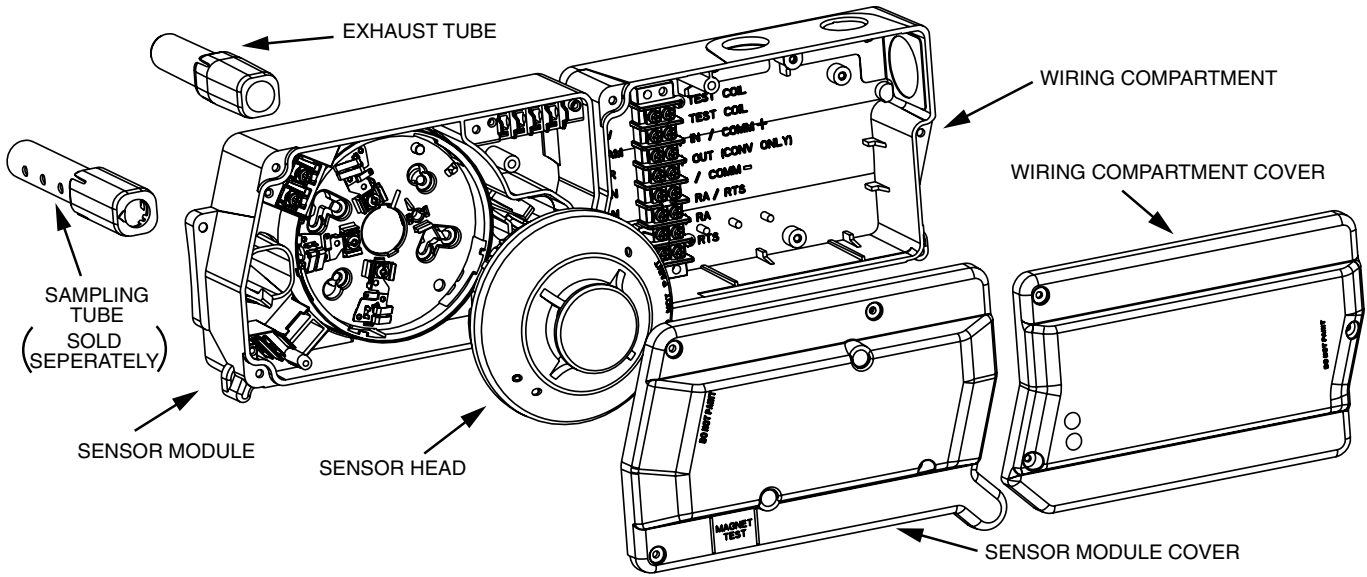
NOTE: A sampling tube must be ordered to complete the installation. It must be the correct length for the width of the duct where it will be installed. See Table 1 on page 3 to determine the inlet tube required for different duct widths.

### [4] DETECTOR INSTALLATION

#### [4.1] VERIFY DUCT AIR FLOW DIRECTION AND VELOCITY

Model DNRECL detectors are designed to be used in air handling systems having air velocities of 300 to 4000 feet per minute. Duct widths from 6 inches to 12 feet can be accommodated. Be sure to check engineering specifications to ensure that the air velocity in the duct falls within these parameters. If necessary, use a velocity meter (anemometer) to check the air velocity in the duct.

**FIGURE 1. EXPLODED VIEW OF DUCT SMOKE DETECTOR COMPONENTS:**



H0569-00

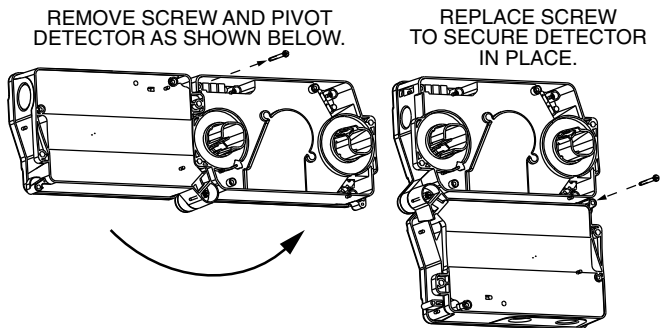
**[4.2] DETERMINE MOUNTING LOCATION AND CONFIGURATION**

On ducts wider than 18 inches it is recommended that the detector be mounted downstream of a bend, obstruction in the duct, or the supply or return air inlet.

Exception: Installation of duct detectors can be on or within a commercial packaged rooftop heating and air-conditioning system, fire/smoke dampers and economizers. They may be mounted in either the supply and/or return air section as determined by local code.

Once a suitable location is selected, determine if the detector is to be mounted in a side-by-side "rectangular" configuration or a top-over-bottom "square" configuration as shown in Figure 2. If mounting in the square configuration, remove the rear attachment screw, rotate the unit at hinge, and replace the screw into the new attachment hole as shown in Figure 2. Do NOT remove the hinge screw during this process. Final installation approval shall be based upon passing differential pressure and smoke entry tests described in the Measurement Tests section.

**FIGURE 2:**



H0550-00

**[4.3] DRILL THE MOUNTING HOLES**

Remove the paper backing from the mounting template supplied. Affix the template to the duct at the desired mounting location. Make sure the template lies flat and smooth on the duct.

**[4.3.1] FOR RECTANGULAR SIDE-BY-SIDE MOUNTING CONFIGURATION:**

Center punch at (4) target centers: (2) "A" for sampling tubes and (2) "B" for the rectangular configuration mounting tabs as shown on mounting template. Drill pilot holes at target "A" centers and cut two 1.375 inch diameter holes using a 1 3/8 inch hole saw or punch. Drill .156 inch diameter holes using a 5/32 inch drill at target "B" centers.

**[4.3.2] FOR SQUARE TOP-OVER-BOTTOM MOUNTING CONFIGURATION:**

Center punch at (4) target centers: (2) "A" for sampling tubes and (2) "C" for the square configuration mounting tabs as shown on mounting template. Drill pilot holes at target "A" centers and cut two 1.375 inch diameter holes using a 1 3/8 inch hole saw or punch. Drill .156 inch diameter holes using a 5/32 inch drill at target "C" centers. If desired, drill an additional .156 inch hole at the location of one of the mounting tabs on the lower housing.

**[4.4] SECURE THE DUCT DETECTOR TO THE DUCT**

Use two (rectangular configuration) or three (square configuration) of the provided sheet metal screws to screw the duct detector to the duct.

CAUTION: Do not overtighten the screws.

**[5] SAMPLING TUBE INSTALLATION**

**[5.1] SAMPLING TUBE SELECTION**

The sampling tube must be purchased separately. Order the correct length, as specified in Table 1, for width of the duct where it will be installed. The sampling tube length must extend at least 2/3 across the duct width for optimal performance.

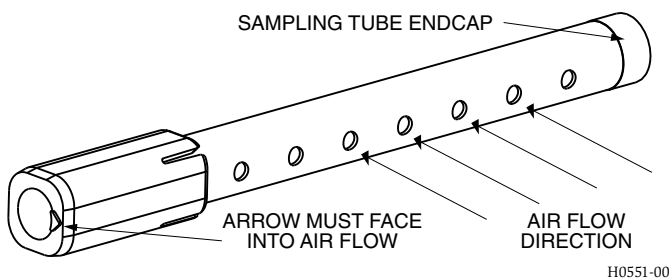
The sampling tube is always installed with the air inlet holes facing into the air flow. To assist proper installation, the tube's connector is marked with an arrow. Make sure the sampling tube is mounted so that the arrow points into the airflow as shown in Figure 3. Mounting the detector housing in a vertical orientation is acceptable provided that the air flows directly into the sampling tube holes as indicated in Figure 3. The sampling tube and exhaust tube can be mounted in either housing connection as long as the exhaust tube is mounted downstream from the sampling tube.

**TABLE 1. SAMPLING TUBES RECOMMENDED FOR DIFFERENT DUCT WIDTHS:**

Outside Duct Width	Sampling Tube Recommended*
Up to 1 ft.	DST1
1 to 2 ft.	DST1.5
2 to 4 ft.	DST3
4 to 8 ft.	DST5
8 to 12 ft.	DST10 (2-piece)

\*Must extend a minimum of 2/3 the duct width

**FIGURE 3. AIR DUCT DETECTOR SAMPLING TUBE:**



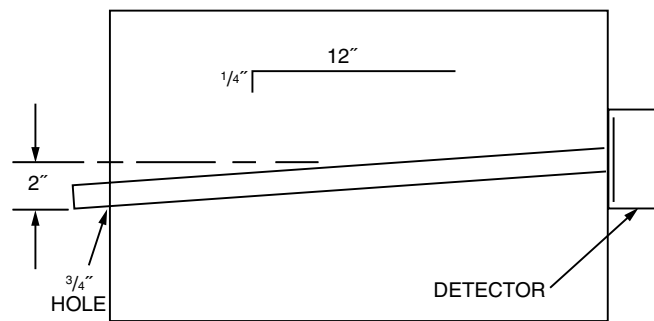
**CAUTION:** The sampling tube end cap, included with the detector, is critical to proper operation of the duct smoke detector. The end cap is needed to create the proper air flow to the sensor of the duct smoke detector. Once any sampling tube length adjustments are made, plug the end of the sampling tube with the provided end cap.

A plastic exhaust tube is included with the unit to be installed if needed. Install into the housing connection that is downstream from the sampling tube connection. The exhaust tube can be installed from the front of the detector or the back. A longer 1 foot exhaust tube, model ETX, is available as an accessory in cases where the molded exhaust tube does not extend at least 2 inches into the duct.

**[5.2] SAMPLING TUBE INSTALLATION**

- For tubes shorter than the width of the duct, slide the sampling tube, with installed end cap, into the housing connection that meets the airflow first. Position the tube so that the arrow points into the airflow as shown in Figure 3. Per NFPA sampling tubes over 3 feet long should be supported at the end opposite of the duct detector. In ducts wider than 8 feet, work must be performed inside the duct to couple the other section of the sampling tube to the section already installed using the 1/2 inch conduit fitting supplied. Make sure that the holes on both sections of the air inlet sampling tube are lined up and facing into the airflow.
- For tubes longer than the width of the air duct, the tube should extend out of the opposite side of the duct. Drill a 3/4 inch hole in the duct opposite the hole already cut for the sampling tube. Ensure that the sampling tube is angled downward from the duct smoke detector to allow for moisture drainage away from the detector. The sampling tube should be angled at least 1/4" downward for every 12" of duct width per Figure 4. There should be 10 to 12 holes spaced as evenly as possible across the width of the duct. If there are more than 2 holes in the section of the tube extending out of the duct, select a shorter tube using Table 1. Otherwise, trim the tube to leave approximately 1 to 2 inches extending outside the duct. Plug the end with the end cap and tape closed any holes in the protruding section of the tube. Be sure to seal the duct where the tube protrudes.

**FIGURE 4.**



**NOTE:** Air currents inside the duct may cause excessive vibration, especially when the longer sampling tubes are used. In these cases, a 3 inch floor flange (available at most plumbing supply stores) may be used to fasten the sampling tube to the other side of the duct. When using the flange/connector mounting technique, drill a 1 to 1 1/4 inch hole where the flange will be used

**[5.3] MODIFICATIONS OF SAMPLING TUBES**

There may be applications where duct widths are not what is specified for the installation. In such cases, it is permissible to modify a sampling tube that is longer than necessary to span the duct width.

Use a 0.193-inch diameter (#10) drill and add the appropriate number of holes so that the total number of holes exposed to the air flow in the duct is 10 to 12. Space the additional holes as evenly as possible over the length of the tube.

**CAUTION:** This procedure should only be used as a temporary fix. It is not intended as a permanent substitute for ordering the correct length tubes.

**[5.4] REMOTE SAMPLING TUBE INSTALLATION**

The detector arrangement can also incorporate the remote mounting of the sampling tube and/or exhaust tube. In this case both the detector, sampling tube and exhaust tube (if included) should be rigidly mounted to withstand the pressure and vibrations caused by the air velocity. The location of the detector's sampling tube should be such that there is uniform airflow in the cross section area.

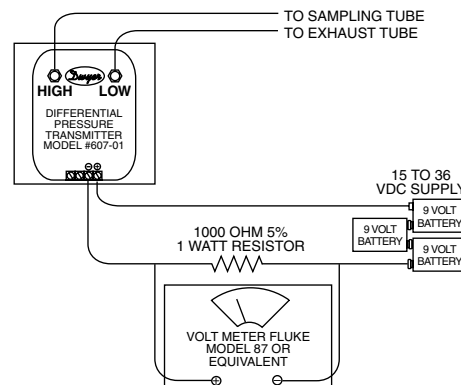
Pressure differential across the sampling and exhaust ports in the detector housing shall be verified to be between 0.01 and 1.11 inches of water. Do so by measuring the pressure difference between the inlet and outlet ports on the detector housing using a manometer as described in the Measurement Tests section of this manual.

**[6] MEASUREMENT TESTS**

**[6.1] AIR FLOW**

The DNRECL is designed to operate over an extended air speed range of 300 to 4000 FPM. To verify sufficient sampling of ducted air, turn the air handler on and use a manometer to measure the differential pressure between the two sampling tubes. The differential pressure should measure at least 0.01 inches of water and no more than 1.11 inches of water. Because most commercially available manometers cannot accurately measure very low pressure differentials, applications with less than 500 FPM of duct air speed may require one of the following: 1) the use of a current-sourcing pressure transmitter (Dwyer Series 607) or 2) the use of aerosol smoke, see below for test descriptions.

**FIGURE 5. PROCEDURE FOR VERIFYING AIR FLOW:**



**[6.2]LOW FLOW AIR FLOW TEST USING DWYER SERIES 607 DIFFERENTIAL PRESSURE TRANSMITTER**

Verify the air speed of the duct using an anemometer. Air speed must be at least 300 FPM. Wire the Dwyer transmitter as shown in **Figure 5**. Connect the leads of the meter to either side of the 1000Ω resistor. Allow unit to warm up for 15 seconds. With both HIGH and LOW pressure ports open to ambient air, measure and record the voltage drop across the 1000Ω resistor (measurement 1), 4.00 volts is typical. Using flexible tubing and rubber stoppers, connect the HIGH side of the transmitter to the sampling tube of the duct smoke detector housing, and the LOW side of the transmitter to the exhaust tube of the duct smoke detector housing. Measure and record the voltage drop across the 1000Ω resistor (measurement 2). Subtract the voltage recorded in measurement 1 from the voltage recorded in measurement 2. If the difference is greater than 0.15 volts, there is enough air flow through the duct smoke detector for proper operation.

**[7]FIELD WIRING; INSTALLATION GUIDELINES**

All wiring must be installed in compliance with the National Electrical Code and the local codes having jurisdiction. Proper wire gauges should be used. The conductors used to connect smoke detectors to control panels and accessory devices should be color-coded to prevent wiring mistakes. Improper connections can prevent a system from responding properly in the event of a fire.

For signal wiring (the wiring between detectors or from detector to auxiliary devices), it is usually recommended that single conductor wire be no smaller than 18 gauge. The duct smoke detector terminals accommodate wire sizes up to 12 gauge. Flexible conduit is recommended for the last foot of conduit; solid conduit connections may be used if desired.

Duct smoke detectors and alarm system control panels have specifications for Signaling Line Circuit (SLC) wiring. Consult the control panel manufacturer's specifications for wiring requirements before wiring the detector loop.

**[7.1]WIRING INSTRUCTIONS**

Disconnect power from the communication line before installing the DNRECL duct smoke detector.

The DNRECL detectors are designed for easy wiring. The housing provides a terminal strip with clamping plates. Wiring connections are made by sliding the bare end under the plate, and tightening the clamping plate screw. See **Figure 6** on below for system wiring.

1. Wire the detector housing per the wiring diagram, see Figure 5.
2. Install the detector head into the base. Push the detector into the base while turning it clockwise to secure it in place.
3. Set the desired address using the IR configuration tool (EA-CT).
4. Test the duct detector as described in the Testing section of this manual.

NOTE: When using the EA-CT tool, the address/loop on a duct detector in sight can be set or changed. However, if the duct detector is being communicated to as a target (out of sight device) through another device (in sight), only the address of the target can be changed. Device in sight must be within 30ft. of the EA-CT in order for it to communicate.

**CAUTION**

Dust covers provide limited protection against airborne dust particles during shipping. Dust covers must be removed before the detectors can sense smoke. Remove detectors prior to heavy remodeling or construction.

**[8] VERIFICATION OF OPERATION**

**[8.1]INSTALL THE COVER**

Install the covers making sure that the cover fits into the base groove. Tighten the seven screws that are captured in the covers. Note that the cover must be properly installed for proper operation of the sensor.

NOTE: Verify sensor cover gasket is properly seated on cover prior to cover installation.

**[8.2] POWER THE UNIT**

Activate the communication line on terminals COM + and COM -.

**[8.3] DETECTOR CHECK**

Standby - If programmed by the system control panel, look for the presence of the flashing LEDs through the transparent housing cover. The LED will flash with each communication.

Trouble - If programmed by the system control panel and the detector LEDs do not flash, then the detector lacks power (check wiring, missing or improperly placed cover, panel programming, or power supply), the sensor head is missing (replace), or the unit is defective (return for repair).

**[8.4]DUCT SMOKE DETECTOR TEST & MAINTENANCE PROCEDURES**

Test and maintain duct smoke detectors as recommended in NFPA 72. The tests contained in this manual were devised to assist maintenance personnel in verification of proper detector operation.

Before conducting these tests, notify the proper authorities that the smoke detection system will be temporarily out of service. Disable the zone or system under test to prevent unwanted alarms.

**[8.4.1]TEST THE UNIT**

Before replacing the duct housing cover, check the detector interconnections, as follows:

A. Functional:

The duct detector head can be functionally tested by using the IR configuration tool (EA-CT). Following the instructions, initiate the detector test sequence. The detector should initiate a walk test message at the fire alarm control panel. Refer to the control panel technical documentation for further information.

B. RTS451/RTS451KEY Remote Test Station:

The RTS451/RTS451KEY Remote Test Station facilitates testing of the duct detector alarm capability. This duct detector cannot be reset by the RTS451/RTS451KEY. It must be reset at the system control panel.

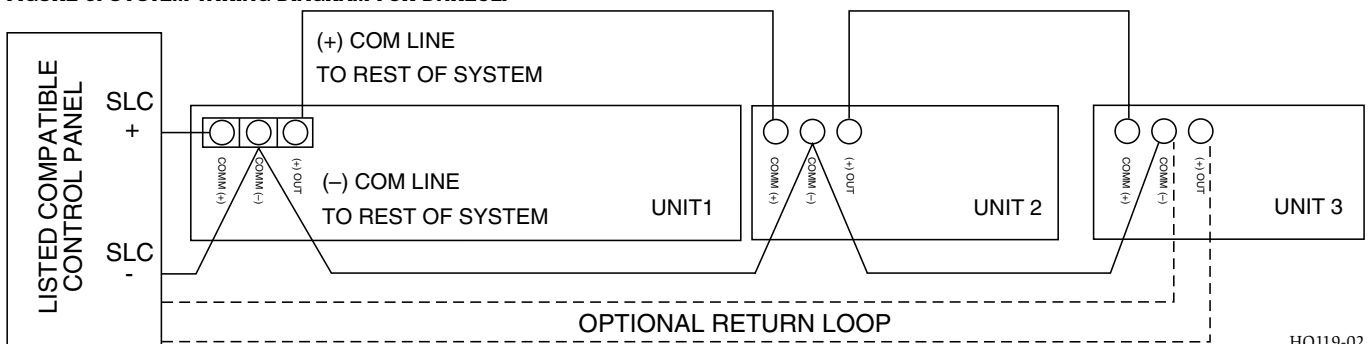
**[8.4.2] THE DETECTOR MUST BE RESET BY THE SYSTEM CONTROL PANEL**

**[8.4.3]SMOKE ENTRY TEST USING AEROSOL SMOKE**

This test is intended for low-flow systems (300-500 FPM). If the air speed is greater than 500 FPM, use a conventional manometer to measure differential pressure between the sampling tubes, as described under Measurement Tests on Page 3.

Drill a ¼ inch hole 3 feet upstream from the duct smoke detector. With the air handler on, measure the air velocity with an anemometer. Air speed must be at least 300 FPM. Spray aerosol smoke\* into the duct through the ¼ inch hole for five seconds. Wait two minutes for the duct smoke detector to alarm. If the duct smoke detector alarms, air is flowing through the detector. Remove the duct smoke detector cover and blow out the residual aerosol smoke from the chamber and reset the duct smoke detector at the panel. Use duct tape to seal the aerosol smoke entry hole. Remember to replace the cover after the test or the detector will not function properly.

**FIGURE 6. SYSTEM WIRING DIAGRAM FOR DNRECL:**



HO119-02



\*Aerosol smoke can be purchased from Home Safeguard Industries at home-safeguard.com, model 25S Smoke Detector Tester, and Chekkit Smoke Detector Tester model CHEK02 and CHEK06 available from SDi. When used properly, the canned smoke agent will cause the smoke detector to go into alarm. Refer to the manufacturer's published instructions for proper use of the canned smoke agent.

**CAUTION**

Canned aerosol simulated smoke (canned smoke agent) formulas will vary by manufacturer. Misuse or overuse to these products may have long term adverse effects on the smoke detector. Consult the canned smoke agent manufacturer's published instructions for any further warnings or caution statements.

**[9] DETECTOR CLEANING PROCEDURES**

Notify the proper authorities that the smoke detector system is undergoing maintenance, and that the system will temporarily be out of service. Disable the zone or system undergoing maintenance to prevent unwanted alarms and possible dispatch of the fire department.

**[9.1] DETECTOR SENSOR**

1. Remove the sensor to be cleaned from the system.
2. Remove the sensor cover by pressing firmly on each of the four removal tabs that hold the cover in place.
3. Vacuum the screen carefully without removing it. If further cleaning is required continue with Step 4, otherwise skip to Step 7.
4. Remove the chamber cover/screen assembly by pulling it straight out.
5. Use a vacuum cleaner or compressed air to remove dust and debris from the sensing chamber.
6. Reinstall the chamber cover/screen assembly by sliding the edge over the sensing chamber. Turn until it is firmly in place.
7. Replace the cover using the LEDs to align the cover and then gently pushing it until it locks into place.
8. Reinstall the detector.

**[9.2] REINSTALLATION**

1. Reinstall the detector in its housing.
2. Restore system power.
3. Perform Detector Check.
4. Notify the proper authorities testing has been completed and the smoke detector system is back in operation.

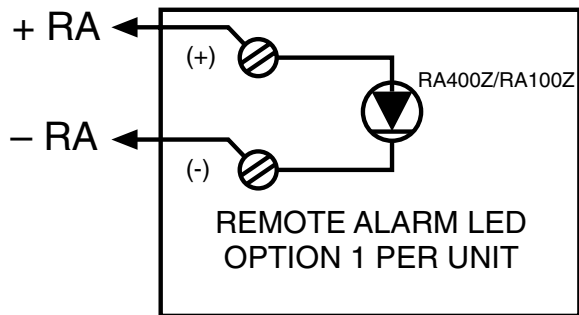
**[10] SENSOR REPLACEMENT**

1. Remove the sensor head by rotating counterclockwise.
2. Pull gently to remove it.
3. To replace the sensor head, align the mounting features and rotate clockwise into place.

**[11] OPTIONAL ACCESSORIES**

Optional accessories include RA400Z/RA100Z, RTS451/RTS151 and RTS-451KEY/RTS151KEY

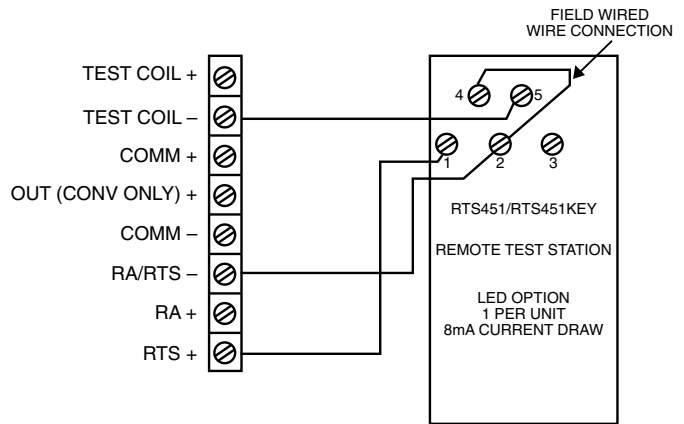
**FIGURE 8. WIRING DIAGRAM FOR DNRECL TO RA400Z/RA100Z:**



H0570-03

Note: Tab on the RA400Z should be broken for use with the intelligent duct smoke detector.

**FIGURE 9: WIRING DIAGRAM FROM DNRECL TO RTS451/RTS151/RTS451KEY/RTS151KEY**



H0571-11

**Please refer to insert for the Limitations of Fire Alarm Systems**

**THREE-YEAR LIMITED WARRANTY**

System Sensor warrants its enclosed product to be free from defects in materials and workmanship under normal use and service for a period of three years from date of manufacture. System Sensor makes no other express warranty for the enclosed product. No agent, representative, dealer, or employee of the Company has the authority to increase or alter the obligations or limitations of this Warranty. The Company's obligation of this Warranty shall be limited to the replacement of any part of the product which is found to be defective in materials or workmanship under normal use and service during the three year period commencing with the date of manufacture. After phoning System Sensor's toll free number 800-SENSOR2 (736-7672) for a Return Authorization number, send defective units postage prepaid to: System Sensor, Returns Department, RA

# \_\_\_\_\_, 3825 Ohio Avenue, St. Charles, IL 60174. Please include a note describing the malfunction and suspected cause of failure. The Company shall not be obligated to replace units which are found to be defective because of damage, unreasonable use, modifications, or alterations occurring after the date of manufacture. In no case shall the Company be liable for any consequential or incidental damages for breach of this or any other Warranty, expressed or implied whatsoever, even if the loss or damage is caused by the Company's negligence or fault. Some states do not allow the exclusion or limitation of incidental or consequential damages, so the above limitation or exclusion may not apply to you. This Warranty gives you specific legal rights, and you may also have other rights which vary from state to state.

## INTELLIGENT NON-RELAY PHOTOELECTRIC DUCT HOUSING

### DESCRIPTION

The Intelligent, Non-relay Photoelectric Duct Housing, P/N 63-1158, is designed to provide a mounting point for the Fike Intelligent Photoelectric Duct Sensor, P/N 63-1057 sold separately. The housing is equipped with an integral detector base that allows quick twist-in, twist-out installation of the detector head. This allows quick and easy cleaning or application changes of the detector without removing the duct housing. The housing features a pivoting housing that fits both square and rectangular footprints capable of mounting to a round or rectangular duct.

An improved cover design isolates the sensor head from the low-flow feature for simple maintenance. A cover tamper feature provides a trouble signal at the control panel immediately if the sensor cover is removed or improperly installed. Proper installation of the sensor cover removes the trouble condition. The housing provides a 3/4 inch conduit knockout and ample space to facilitate easy wiring and mounting of relay module. The duct housing can be customized to meet local codes and specifications without additional wiring.

The duct housing provides a remote alarm output for use with auxiliary devices, such as the remote LED annunciator and remote test stations. See ordering information for part numbers.

### FEATURES

- Photoelectric, integrated low-flow technology (detector head sold separately)
- Air velocity rating from 100 ft/min to 4000 ft/min (1.52 m/s to 20.32 m/s)
- Versatile mounting options: square or rectangular configuration
- Broad ranges for operating temperature -4 to 158°F (-20 to 70°C) and humidity 0% to 95% non condensing
- Patented sampling tube installs from front or back of the detector with no tools required
- New cover tamper signal
- Increased wiring space with a newly added 3/4 inch conduit knockout
- Available space within housing to accommodate mounting of relay module
- Clear cover for convenient visual inspection
- UL 268A listed
- Remote testing capability
- Requires com line power only

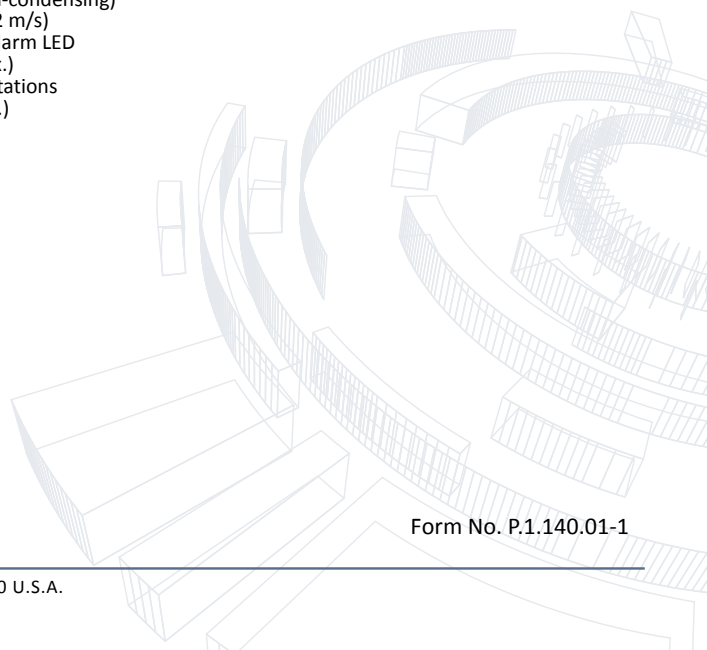
### SPECIFICATIONS

Size:	Rectangular: 14.38 in (37 cm) length; 5 in (12.7 cm) width; 2.5 in (6.36 cm) depth Square: 7.75 in (19.7 cm) length; 9 in (22.9 cm) width; 2.5 in (6.35 cm) depth
Weight:	1.6 lb (0.73 kg)
Operating Temperature Range:	-4 to 158°F (-20 to 70°C)
Storage Temperature Range:	-22 to 158°F (-30 to 70°C)
Operating Humidity Range:	0% to 95% relative humidity (non-condensing)
Air Duct Velocity:	100 to 4000 ft/min (1.52 to 20.32 m/s)
Accessory Current Loads:	02-3868 Remote Annunciator Alarm LED (Standby 0 mA/Alarm 12 mA max.) 02-3869/02-4998 Remote Test Stations (Standby 0 mA/Alarm 12mA max.)



### APPROVALS:

- UL - S4021
- FM
- CSFM - 3242-1653:0209
- MSFM - 2242



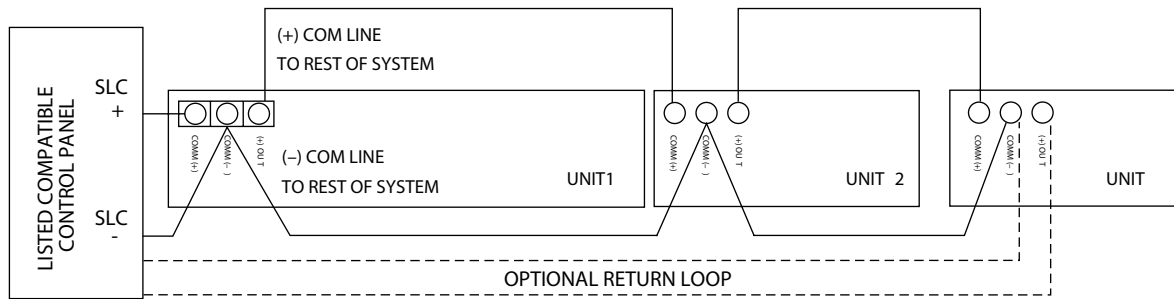
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**ORDERING INFORMATION**

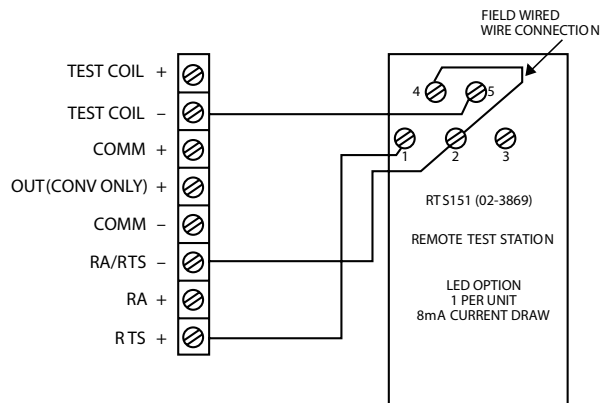
Fike P/N	Mfg. Model	Description
<b>Housing</b>		
63-1158	DNRECL	Intelligent non-relay photoelectric low-flow duct smoke detector
<b>Duct Sensors</b>		
63-1057	ED-PD	Photo duct sensor
<b>Sampling Tubes</b>		
63-1159	DST1	Metal sampling tube duct width up to 1ft (0.3 m)
63-1160	DST1.5	Metal sampling tube duct widths 1 ft to 2 ft (0.3 to 0.6 m)
63-1161	DST3	Metal sampling tube duct widths 2 ft to 4 ft (0.6 to 1.2 m)
63-1162	DST5	Metal sampling tube duct widths 4 t to 8 t (1.2 to 2.4 m)
63-1163	DST10	Metal sampling tube duct widths 8 ft to 12 ft (2.4 to 3.7 m)
<b>Accessories</b>		
13-0125	DH400OE-1	Weatherproof enclosure
20-1811	ETX	Metal exhaust tube duct width 1 ft (0.3 m)
02-4677	P48-21-00	End cap for metal sampling tubes
02-3868	RA100Z	Remote annunciator alarm LED
02-3869	RTS151	Remote test station
02-4998	RTS151KEY	Remote test station with key

**WIRING DIAGRAM**

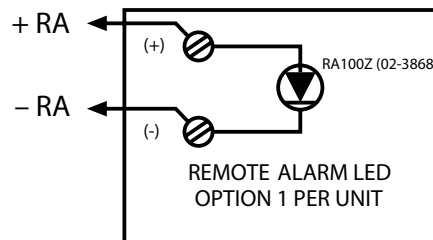
System Wiring Diagram for 63-1158



Wiring Diagram from 63-1158 to 02-3869



Wiring Diagram from 63-1158 to 02-3868



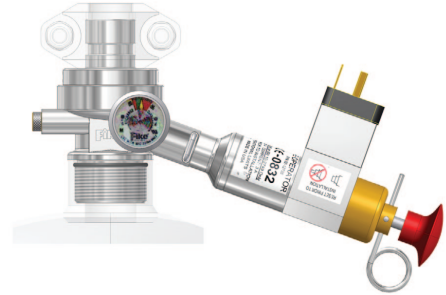
## IMPULSE VALVE OPERATOR (IVO) KIT

### DESCRIPTION

The Impulse Valve Operator (IVO) provides means to electrically or manually activate the Fike Impulse Valve clean agent container by providing the force required to extend a piston that will open the rupture disc, allowing the agent to be released from the container.

The IVO can be activated electrically via a signal from Fike control panel or manually by depressing red strike button.

Fike Clean Agent Containers with Impulse Valve must use an Impulse Releasing Module (IRM) to supervise the agent release circuit wiring (for open and ground fault conditions) from the container to the control panel.



### SPECIFICATIONS

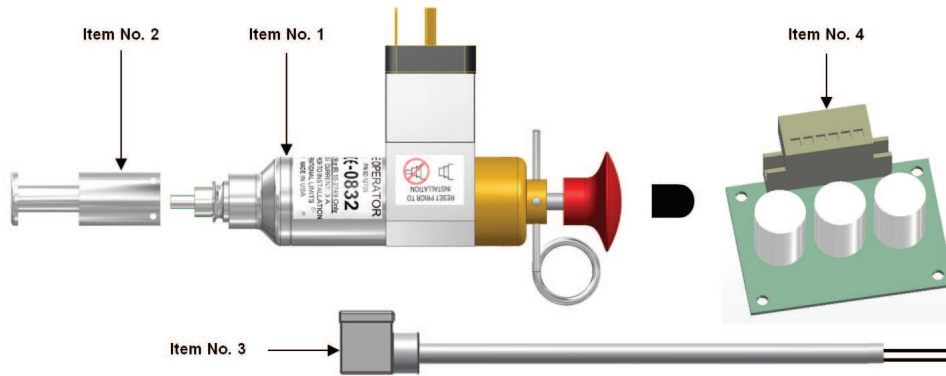
Normal Supply Voltage: 24VDC  
 Current Consumption: 0 Amps (for Battery Calculation)  
 Electrical Connection: DIN connector w/ Cable & ½" NPT for conduit connection  
 IVO Material: Stainless Steel (Body) / Brass (End Cap)  
 Temperature Range: 32 to 130°F (0 to 54.4°C)  
 Environment: Indoor Use Only

### APPROVALS:

- UL Listed
- ULC Listed
- FM Approved

### ORDERING INFORMATION

Item No.	Fike P/N	Description
-	70-279	IVO Kit (includes all items listed below)
1	02-12728	IVO
2	70-286	Reset Tool
3	02-12755	Wire Lead (3' long) with connector
4	10-2748	IRM



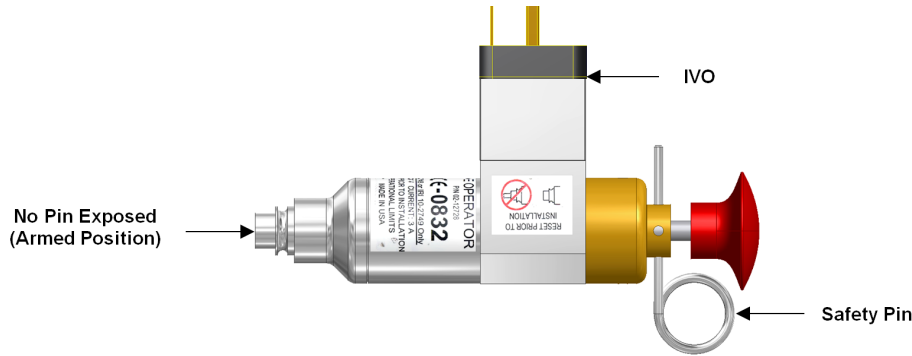
Form No. IV.1.09.01-1

## INSTALLATION

After the electrical / control system has been checked out and no trouble / ground faults are present; proceed with the Actuation System installation.

*Note: This should be the last items completed before the system is placed into operation.*

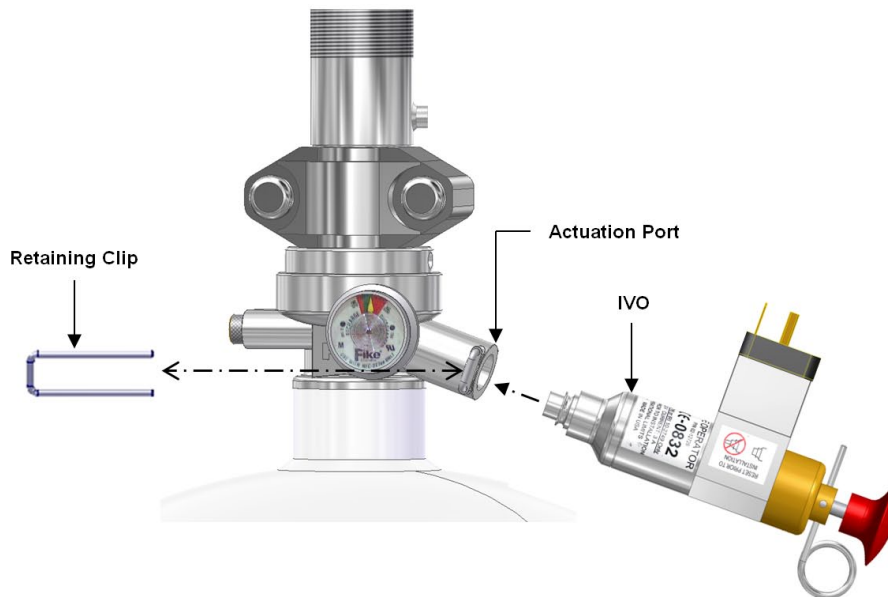
*Important Note: Check to ensure IVO is armed (Firing Pin retracted) and Safety Pin is place before installing to the Impulse Valve on the container.*



Install the wire lead w/ connector (Item no. 3) to the IVO (Item no. 1) connector and secure with set screw.

Install IVO; remove Retaining Clip and Plastic Plug from Impulse Valve Actuation Port.

Insert IVO into Impulse Valve Actuation Port and re-insert Retaining Clip.



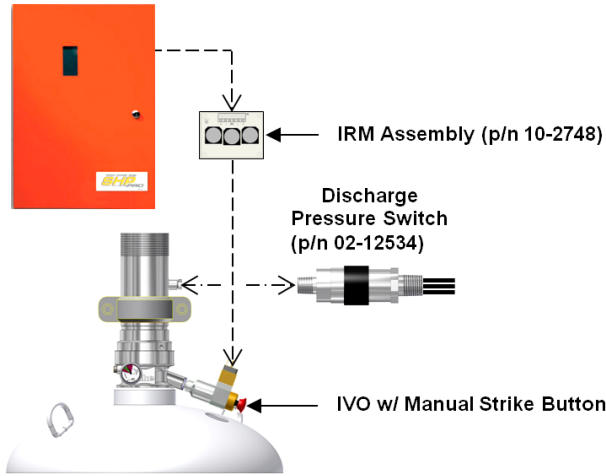
The container is "NOW ARMED".

**ELECTRIC ACTUATION – SINGLE CONTAINER SYSTEM W/ IVO**

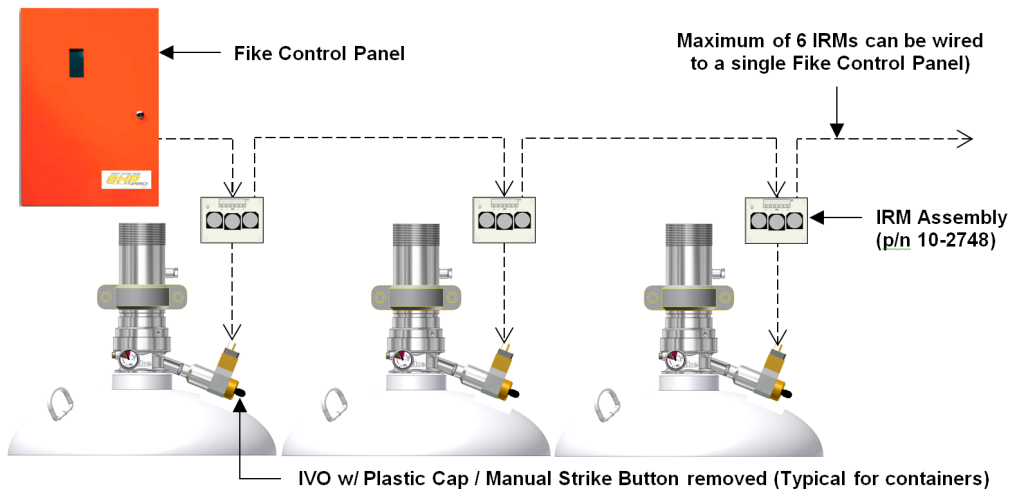
For wiring installation details between Fike Control Panel, IRM and the IVO, reference the Impulse Release Module Product Manual (P/N 06-552).

At this point the IVO can be installed to the Clean Agent Container Impulse Valve. The Discharge Pressure Switch (P/N 02-12534) is required and is wired to the manual release contact in SHP PRO® or to a monitor module in Cheetah® Xi or Xi 50.

*Warning: Do not attempt to install the IVO with the firing pin in the extended position.*



**ELECTRIC ACTUATION – MULTI- CONTAINER SYSTEM W/ IVO**



*Important Note: When utilizing electric actuation (IRM) with multiple containers with IVO, the manual strike button on each IVO must be removed and plastic cap installed. The Discharge Pressure Switch is NOT used. This is to prevent a single container from being discharged in a multiple container system.*

*For wiring installation details between Fike Control Panel, IRM and the IVO, reference the Impulse Release Module (IRM) Product Manual (P/N 06-552).*

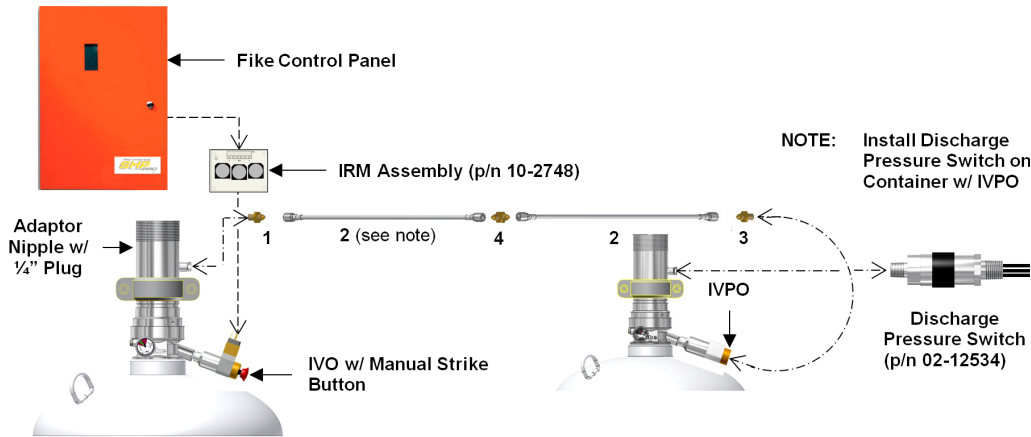
*At this point the IVO can be installed to the Clean Agent Container Impulse Valve.*

*Reference detailed installation instructions on page 2 of this data sheet*

**ELECTRIC & PNEUMATIC ACTUATION – TWO CONTAINER SYSTEM W/ IVO & IVPO**

Item No.	Fike P/N	Description
1	02-4530	¼" NPT x ¼" JIC Adaptor (must be ordered separately)
2	02-4977	¼" JIC x 3.0' lg. Actuation Hose (supplied w/ IVPO kit) (see note)
3	02-4543	1/8" NPT x ¼" JIC Adaptor (supplied w/ IVPO kit)
4	02-12926	¼" JIC Male Adaptor (must be ordered separately)

*Note: This actuation method requires 2 – ¼" JIC x 3.0' lg. Actuation Hoses, 1 hose supplied w/ IVPO kit, the 2nd Actuation Hose must be ordered separately.*



First remove the 1/4" NPT Plug from Adaptor Nipple, then install Actuation System as shown above. Secure Actuation tubing to a solid surface. Anchoring into plaster, sheetrock wall or any other facing material is NOT acceptable. For additional information regarding the installation and resetting of the IVPO, refer to the IVPO Data Sheet IV.1.10.01

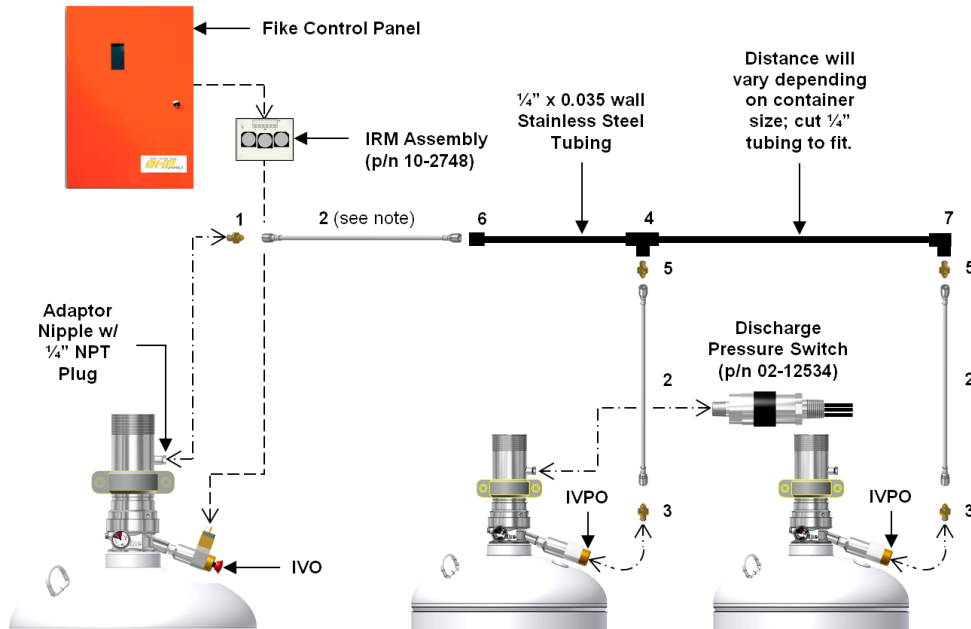
The Discharge Pressure Switch (P/N 02-12534) is required and is wired to the manual release contact in SHP PRO or to a monitor module in Cheetah Xi or Xi 50.

### ELECTRIC & PNEUMATIC ACTUATION – MULTI CONTAINER SYSTEM W/ IVO & IVPO

Item No.	Fike P/N	Description
1	02-4530	1/4" NPT x 1/4" JIC Adaptor (must be ordered separately)
2	02-4977	1/4" JIC x 3.0' lg. Actuation Hose (supplied w/ IVPO kit) (see note)
3	02-4543	1/8" NPT x 1/4" JIC Adaptor (supplied w/ IVPO kit)
4	C02-1359	1/4" Tube Tee (must be ordered separately)
5	C02-1356	1/4" Male JIC x 1/4" Male Tube Adaptor (must be ordered separately)
6	02-12695	1/4" Tube x 1/4" JIC Adaptor (must be ordered separately)
7	02-12696	1/4" Tube Elbow-90° (must be ordered separately)
8	02-12697	1/4" Tube Coupler (not shown) (must be ordered separately)

Note: The Actuation Hose required to connect the 1st container w/ IVO to the Actuation Tubing must be ordered separately.





The illustration above shows the items required to make the proper connection between the Container equipped w/ an IVO and the Container(s) equipped w/ an IVPO. The maximum length of pneumatic actuation line (including Hoses) can not exceed 50 ft. (15.2 m) and up to 6 containers equipped w/ an IVPO.

First remove the 1/4" NPT Plug from Adaptor Nipple, then install Actuation System as shown above. Secure Actuation tubing to a solid surface. Anchoring into plaster, sheetrock wall or any other facing material is NOT acceptable.

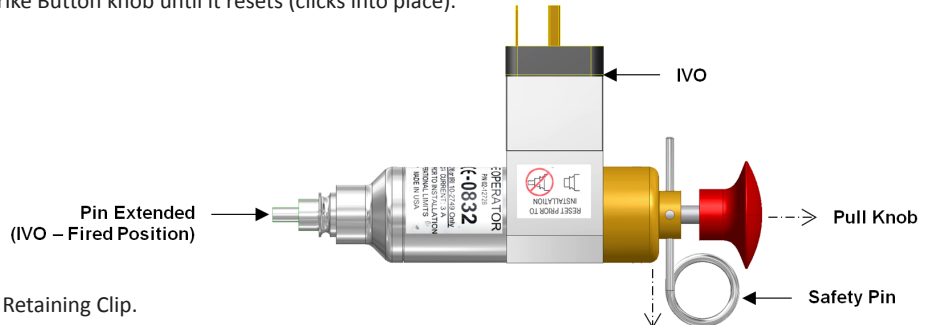
The Discharge Pressure Switch (p/n 02-12534) is required and is wired to the manual release contact in SHP PRO or to a monitor module in Cheetah Xi or Xi 50.

For additional information regarding the installation and resetting of the IVPO, refer to the IVPO Data Sheet IV.1.10.01

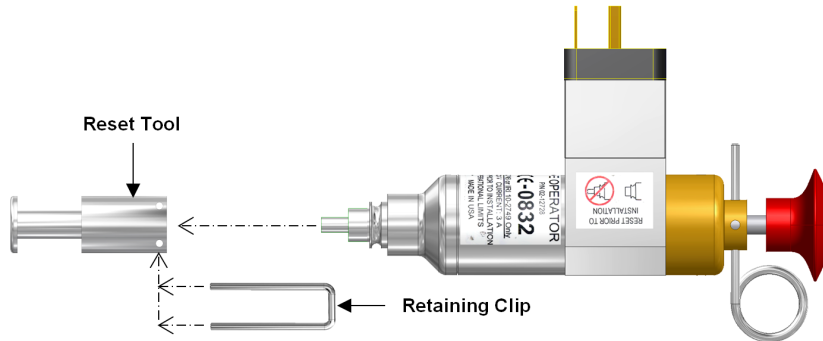
## RESET INSTRUCTIONS

Remove IVO from Impulse Valve by removing Retaining Clip.

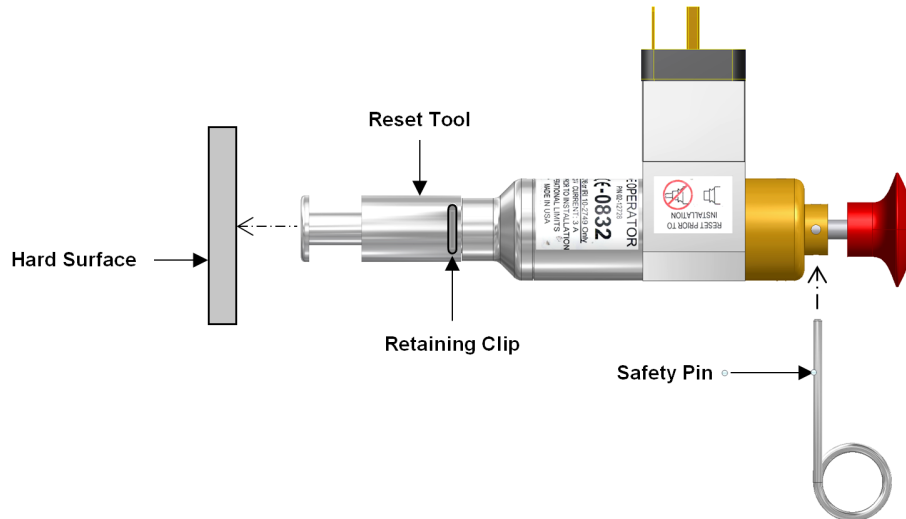
Remove Safety Pin and pull the Manual Strike Button knob until it resets (clicks into place).



Insert IVO into Reset Tool and secure with Retaining Clip.

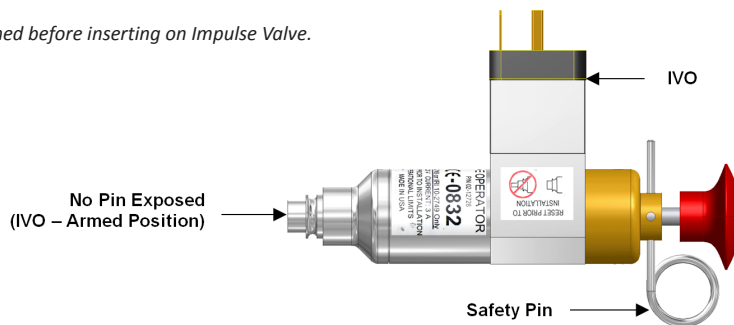


Push Reset Tool button (firmly) against a hard surface until IVO Pin resets (clicks into place).



Insert and secure the Safety Pin, remove Retaining Clip, IVO is reset and ready to be installed on Impulse Valve.

*Important Note: Check IVO to ensure device is armed before inserting on Impulse Valve.*



## Product Detail

### 12.0 Volt 7.2 Ah, Sealed Lead-Acid Battery



**B1272**

### Extended Description:

PowerCell, Maintenance-Free, Rechargeable, Valve Regulated, Absorbed Glass Mat (AGM) Battery

### Attributes

- **Nominal Voltage:** 12.0
- **Nominal Capacity @ 20 hr Rate:** 7.2
- **Length: Inches:** 5.95
- **Length: mm:** 151
- **Width: Inches:** 2.56
- **Width: mm:** 65
- **Height: Inches:** 3.70
- **Height: mm:** 94
- **Height Over Terminal: Inches:** 4.02
- **Height Over Terminal: mm:** 102
- **Unit Weight: lb:** 5.90
- **Unit Weight: kg:** 2.68
- **Case Quantity:** 5
- **Case Weight: lb:** 33.1
- **Terminal Position:** 5
- **Terminal Type:** F1

### Product Links

## Product Detail

12.0 Volt 18.0 Ah, Sealed Lead-Acid Battery



B12180

### Extended Description:

PowerCell, Maintenance-Free, Rechargeable, Valve Regulated, Absorbed Glass Mat (AGM) Battery

### Attributes

- **Nominal Voltage:** 12.0
- **Nominal Capacity @ 20 hr Rate:** 18.0
- **Length: Inches:** 7.13
- **Length: mm:** 181
- **Width: Inches:** 2.99
- **Width: mm:** 76
- **Height: Inches:** 6.57
- **Height: mm:** 167
- **Height Over Terminal: Inches:** 6.57
- **Height Over Terminal: mm:** 167
- **Unit Weight: lb:** 13.82
- **Unit Weight: kg:** 6.27
- **Case Quantity:** 2
- **Case Weight: lb:** 28.4
- **Terminal Position:** 8
- **Terminal Type:** F3

### Product Links

**EXHIBIT 'C'**

## FK-5-1-12 CLEAN AGENT IMPULSE VALVE STORAGE CONTAINERS



### Description

Fike's clean agent containers are painted steel containers available in various sizes and varying fill densities. Each container is fitted with an internal siphon tube, Fike Impulse Valve assembly, pressure gauge, container nameplate and applicable mounting hardware. Refer to page 3 for illustration of items supplied with the container.

The Impulse Valve contains a fast-acting rupture disc that retains the agent within the container until the disc is ruptured by an Impulse Valve Actuator (ordered separately) allowing the agent to be released from the container.

Each container is factory filled with FK-5-1-12 fire extinguishing agent in 1 lb. (0.5 kg) increments up to their required capacity and is then super-pressurized with dry nitrogen to 500 psig at 70° F (34.5 bar at 21°C). Fill density must be specified when ordering. Containers sharing the same manifold must be equal in size and fill density.

### Specifications

Fill Range	30 to 70 lbs/ft <sup>3</sup> (481 to 1121 kg/m <sup>3</sup> )
Fill Increments	1.0 lbs (0.5 kg)
Super Pressurization Level	500 psig at 70°F (34.5 bar at 21°C) after filling with dry nitrogen
Storage Temp Limits*	32°F (0°C) minimum 130°F (54.4°C) maximum
Construction	Carbon steel alloys
Rating	DOT 4BW500 TC 4BWM534
Color Options	Baked enamel finish, white (default) or red**
Actuation Methods	Electric/Pneumatic/Manual

\* If container pressure reaches 720 to 800 psi (49.6 to 55 bar), valve will open automatically. This also fulfills the pressure relief valve requirements in accordance with DOT regulations.

\*\*5 lb. (2 L) and 10 lb. (4 L) containers are white only.

### Reliability

Each container is manufactured in strict accordance with U.S. Department of Transportation (DOT) regulations and has successfully passed testing by Factory Mutual (FM) and Underwriters Laboratories, Inc. (UL). Each container is leak tested and pressure tested to 1000 psig (69 bar) prior to shipment.

### Approvals

Underwriters Laboratories (UL)  
Underwriters Laboratories of Canada (ULC)  
Factory Mutual (FM)

*For exact certification listings, please reference the respective agency web site.*

This document is only intended to be a guideline and is not applicable to all situations. Information is subject to Fike's full disclaimer at <http://www.fike.com/disclaimer>.

## Container Data

Container		Fill Range		Tare Weight	Dimensions (approximate)		Valve Size
Size	P/N	Minimum	Maximum		Diameter	Height	
lb. (L)			lbs. (kg)	lbs. (kg)	lbs. (kg)	in. (mm)	in. (mm)
5 (2)	70-357	3 (1.0)	5 (2.0)	6.2 (2.8)	4.15 (105.4)	12.59 (320)	1 (25)
10 (4)	70-358	5 (2.5)	10 (4.5)	12.5 (5.7)	4.15 (105.4)	23.63 (600)	1 (25)
20 (8.5)	70-359	9 (4.5)	21 (9.5)	20.9 (9.5)	7.0 (178)	21.50 (457)	1 (25)
35 (15)	70-360	17 (7.5)	38 (17.0)	31.1 (14.1)	7.0 (178)	32.50 (826)	1 (25)
60 (27)	70-361	30 (13.5)	68 (30.5)	52.0 (23.6)	10.75 (273)	27.00 (686)	1 (25)
100 (44)	70-362	47 (21.5)	108 (49.0)	74.1 (33.6)	10.75 (273)	38.75 (984)	1 (25)
150 (61)	70-363	65 (29.5)	150 (68.0)	130.1 (59.0)	20.0 (508)	18.75 (476)	3 (80)
215 (88)	70-364	93 (42.5)	216 (98.0)	157 (71.2)	20.0 (508)	28.56 (725)	3 (80)
375 (153)	70-365	163 (74.0)	378 (171.5)	224 (101.6)	20.0 (508)	42.50 (1080)	3 (80)
650 (267)	70-366	283 (128.5)	660 (299.0)	384.9 (174.6)	24.0 (610)	48.69 (1237)	3 (80)
1000 (423)	70-367	449 (203.5)	1045 (474.0)	539.9 (244.9)	24.0 (610)	70.00 (1778)	3 (80)

FLOOR LOADING / AREA BY CONTAINER SIZE											
Container Size		Total Container Weight *		Container Floor Area		Container Floor Loading		Container Floor Area w/Plate **		Container Floor Loading w/Plate ***	
lbs	L	lbs.	kg	ft <sup>2</sup>	m <sup>2</sup>	lbs/ft <sup>2</sup>	kg/m <sup>2</sup>	ft <sup>2</sup>	m <sup>2</sup>	lbs/ft <sup>2</sup>	kg/m <sup>2</sup>
5	2	11	5	0.09	0.009	119	582	4.0	0.36	8	42
10	4	23	10	0.09	0.009	240	1169	4.0	0.36	11	57
20	8.5	42	19	0.27	0.02	157	766	4.0	0.36	16	81
35	15	69	31	0.27	0.02	258	1262	4.0	0.36	23	115
60	27	120	54	0.63	0.06	190	930	4.0	0.36	36	180
100	44	182	83	0.63	0.06	289	1410	4.0	0.36	51	258
150	61	280	127	2.18	0.20	128	627	4.0	0.36	76	381
215	88	373	169	2.18	0.20	171	835	4.0	0.36	99	498
375	153	602	273	2.18	0.20	276	1347	4.0	0.36	156	787
650	267	1045	474	3.14	0.29	333	1624	4.0	0.36	267	1345
1000	423	1585	719	3.14	0.29	504	2463	4.0	0.36	402	2025

**Notes:**

\* Total container weight is based on container tare weight + maximum fill weight

\*\* Plate size = ¼" x 2" x 2" (6.4mm x 0.6m x 0.6m)

\*\*\* Total container weight + 22.5 lbs (10.2 kg) added for plate used to calculate container with plate floor loading

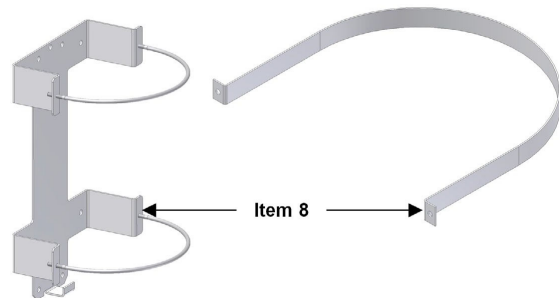
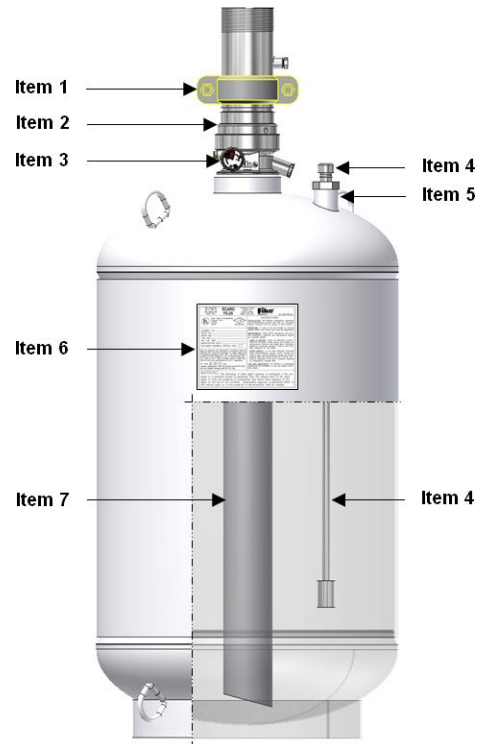
This document is only intended to be a guideline and is not applicable to all situations.  
Information is subject to Fike's full disclaimer at <http://www.fike.com/disclaimer>.

## Items Supplied with Container Assembly

Item No.	Description	Data Sheet
1	Victaulic Coupling & Nipple	n/a
2	Impulse Valve	IV.1.14.01
3	Pressure Gauge	IV.1.29.01
4	Liquid Level Indicator (optional)	IV.1.20.01
5	LLi Boss (see note 1)	n/a
6	Nameplate (see note 2)	n/a
7	Siphon Tube (see note 3)	n/a
8	Mounting Straps & Brackets	IV.1.18.01

### Notes:

- 1) 100 thru 1000 lb. (44 thru 423 L) containers are equipped with an LLi boss that facilitates the installation of an optional Liquid Level Indicator (LLi).
- 2) Fike nameplate provides the information that is specific to each container: Assembly and serial number of the container, weight information: tare, gross and agent and installation, operation and safety information. All containers filled either by the factory or by an Approved Initial Fill Station are provided with a name plate bearing the UL & FM markings.
- 3) Fike Clean Agent containers [except the 150i (Inverted)] are equipped with a siphon tube. The 20, 35 & 60 lb. containers have bent siphon tubes and the 5, 10 and 100 – 1000 lb. containers have straight siphon tubes. All containers with siphon tubes can be mounted upright. The 20, 35 & 60 lb containers can also be mounted horizontally. The 150 container can only be mounted upright and the 150i can only be mounted inverted.



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## FK-5-1-12 CLEAN AGENT

### Description

FK-5-1-12 is a colorless, clear liquid (see Physical Properties Table for additional information). It is stored as a liquid and dispensed into the hazard as an electrically non-conductive gaseous vapor that is clear and does not obscure vision. It leaves no residue and has acceptable toxicity for use in occupied spaces at design concentration.

### Extinguishing Method

FK-5-1-12 extinguishes a fire by heat absorption. The gaseous mixture created when FK-5-1-12 discharges into air has a much higher heat capacity than air alone. The gaseous mixture absorbs large amounts of heat due to the high heat capacity and extinguishes fires by sufficiently cooling the combustion zone. It is important to note, FK-5-1-12 does not use the depletion or displacement of oxygen to extinguish a fire and therefore is safe for use in occupied spaces.

### Approvals

- Underwriters Laboratories (UL)
- Underwriters Laboratories of Canada (ULC)
- Factory Mutual (FM)
- United States EPA Significant New Alternative Policy (SNAP report)

*For exact certification listings, please reference the respective agency web site.*

### Use and Limitations

FK-5-1-12 system can be used on the following Class of Hazards:

- Class A & C:** Electrical and Electronic Hazards  
Telecommunications Facilities  
High value assets, where the associated down-time would be costly
- Class B:** Flammable liquids and gases

FK-5-1-12 systems shall “NOT” be used on fires involving the following materials:

- Chemicals or mixtures of chemicals that are capable of rapid oxidation in the absence of air such as Cellulose Nitrate and Gunpowder
- Reactive metals such as Lithium, Sodium, Potassium, Magnesium, Titanium, Zirconium, Uranium, and Plutonium
- Metal hydrides such as Sodium Hydride and Lithium Aluminum Hydride
- Chemicals capable of undergoing auto-thermal decomposition such as Organic Peroxides and Hydrazine

### Exposure Limitations

The discharge of clean agent systems to extinguish a fire can result in potential hazard to personnel from the natural form of the clean agent or from the products of combustion that result from exposure of the agent to the fire or hot surfaces. Unnecessary exposure of personnel either to the natural agent or to the products of decomposition shall be avoided.

Hazard Type	Design Concentration	Maximum Human Exposure Time
Normally Occupied Space	4.5% to 10%	5 minutes

Fike does not recommend FK-5-1-12 systems to be used in any normally occupied spaces where the design concentration required is above 10%

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## Physical Properties

Chemical Name	Dodecafluoro-2-methylpentan-3-one
ASHRAE Designation	FK-5-1-12
Chemical Formula	CF <sub>3</sub> CF <sub>2</sub> C(O)CF(CF <sub>3</sub> ) <sub>2</sub>
CAS No.	756-13-8
Molecular Wt.	316.04
Boiling Point @ 1 atm (760 mmHg), °C (°F)	49 (120.2)
Melting Point, °C (°F)	-108 (-162.4)
Critical Temperature, °C (°F)	168.66 (335.6)
Critical Pressure, kPa (psia)	1865 (270.44)
Critical Density, kg/m <sup>3</sup> (lb/ft <sup>3</sup> )	639.1 (39.91)
Density, Sat. Liquid, g/ml (lb/ft <sup>3</sup> )	1.60 (99.9)
Density, Gas @ 1 atm, g/ml (lb/ft <sup>3</sup> )	0.0136 (0.851)
Specific Heat, Liquid (Cp) @ 25°C (77°F), kJ/kg-°C (Btu/lb-°F)	1.103 (0.2634)
Specific Heat, Vapor (Cp) @ 25°C (77°F), kJ/kg-°C (Btu/lb-°F) and 1 ATM	0.891 (0.2127)
Vapor Pressure @ 25°C (77°F), kPa (psia)	40.4 (5.85)
Heat of Vaporization @ Boiling Point, kJ/kg (Btu/lb)	88 (37.8)
Thermal Conductivity, Liquid @ 25°C (77°F), W/m-°C (Btu/hr-ft-°F)	0.059 (0.034)
Viscosity, Liquid (lb/ft-hr) @ 25°C (77°F), cP (lb/ft-hr)	0.524 (1.27)
Relative dielectric strength @ 1atm, 25°C (N <sub>2</sub> =1)	2.3
Solubility of Water in FK-5-1-12 @ 70°F, ppm	< 0.001
Ozone Depletion Potential	0
Global Warming Potential, GWP (100 yr. ITH. For CO <sub>2</sub> , GWP = 1)	≤1

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### FK-5-1-12 ENGINEERED DISCHARGE NOZZLES



360° Nozzle



180° Nozzle

#### Description

The discharge nozzles are made of brass and are available in a 180° and 360° discharge patterns. The nozzles are designed to control the agent flow and to distribute the agent throughout the protected enclosure in a uniform, predetermined pattern and concentration.

Six sizes of discharge nozzles are available, 1/2" (15 mm) through 2" (50 mm). The size refers to the size of schedule 40 or 80 pipe that the nozzle can be connected to. Each nozzle has NPT female threads for connection to the pipe network.

When ordering nozzles, orifice size must be specified. The nozzle orifice area is determined by performing a hydraulic calculation using the Fike Engineered Flow Calculation program. Nozzle(s) should not be ordered until the clean agent system pipe network is installed and an "As Built" hydraulic calculation is performed. Nozzle orifice drilling must be done at Fike factory, or at a UL listed nozzle drill station.

#### Approvals

Underwriters Laboratories (UL)  
Underwriters Laboratories of Canada (ULC)  
Factory Mutual (FM)

*For exact certification listings, please reference the respective agency web site.*

#### Ordering

Part Number	Description
80-124-50-XXXX	1/2" (15 mm) 360° nozzle
80-124-75-XXXX	3/4" (20 mm) 360° nozzle
80-124-100-XXXX	1" (25 mm) 360° nozzle
80-124-125-XXXX	1 1/4" (32 mm) 360° nozzle
80-124-150-XXXX	1 1/2" (40 mm) 360° nozzle
80-124-200-XXXX	2" (50 mm) 360° nozzle
80-122-50-XXXX	1/2" (15 mm) 180° nozzle
80-122-75-XXXX	3/4" (20 mm) 180° nozzle
80-122-100-XXXX	1" (25 mm) 180° nozzle
80-122-125-XXXX	1 1/4" (32 mm) 180° nozzle
80-122-150-XXXX	1 1/2" (40 mm) 180° nozzle
80-122-200-XXXX	2" (50 mm) 180° nozzle

Note: -XXXX in part number is the orifice code designation.

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**GEMCOM**

**MAINTENANCE SWITCH**

Effective May 2010  
 PART# **GEM MAINT** Specify **3 POLE OR 4 POLE**  
 Optional Surface Mount Back Box  
 PART# **GEM 2GRB**

**MAINTENANCE SWITCH**

This MAINTENANCE panel is a key switch, which disconnects actuation circuits in the system to prevent accidental discharge during maintenance operations.

Two “LEDS” indicate “SYSTEM ARMED” and “SYSTEM INACTIVE”. When the key is inserted and turned towards “SYSTEM INACTIVE”, the red LED illuminates and the green LED indicating “SYSTEM ARMED” turns off. The key can only be removed in the “SYSTEM ARMED” position.

This panel is also available with the key removable in both the “ARMED” and the “INACTIVE” positions.

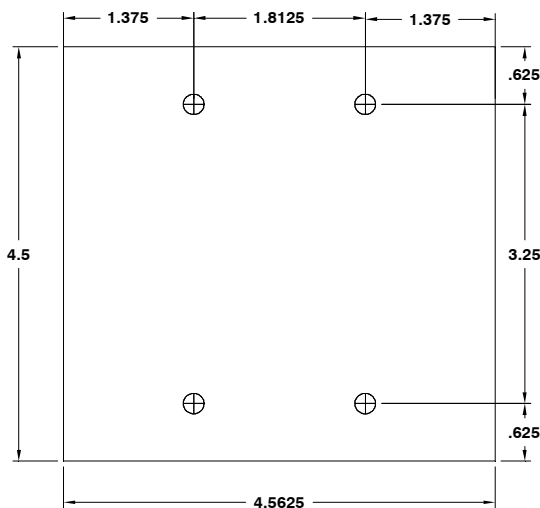
The information is silk-screened on a two-gang stainless steel plate.



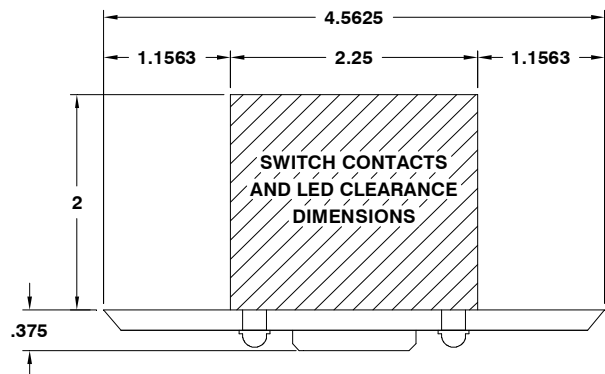
**INSTALLATION**

The 2-Gang plate mounts to GEMCOM’s Part# GEM 2GRB Surface Back Box and operates on 24VDC. This plate can also be flush mounted with a two-gang plaster ring on a deep 4” square 1900 box. Refer to Figures 1 & 2 for dimensions.

**FIGURE 1** 2 GANG PLATE FRONT VIEW



**FIGURE 2** 2 GANG PLATE TOP VIEW





# GEMCOM

## MAINTENANCE SWITCH

Effective May 2010

PART# **GEM MAINT** Specify **3 POLE OR 4 POLE**

Optional Surface Mount Back Box

PART# **GEM 2GRB**

page 2 of 2

### Switch rated at

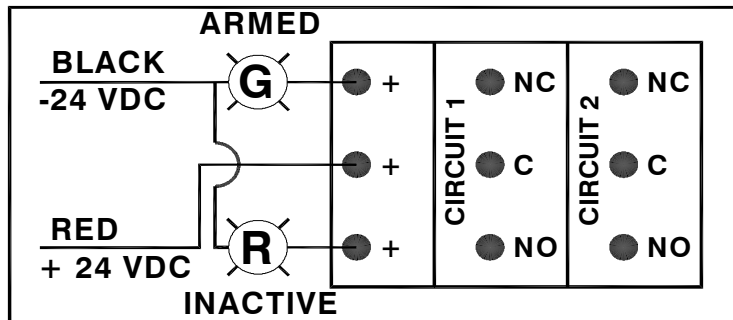
10A 250VAC, 15A 125-250VAC, the DC rating is 15A up to 30VDC.

### LEDS rated at

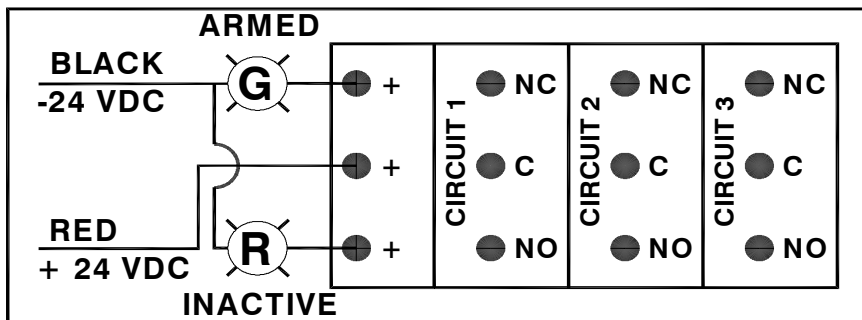
10mA each for a total current draw of 20mA.

Mounting screws supplied: (4) 6-32 x 1/2" and (4) 6-32 x 1"

## 3-POLE WIRING DIAGRAM



## 4-POLE WIRING DIAGRAM



This literature is provided for informational purposes only. Gemcom, INC. assumes no responsibility for the product's suitability for a particular application. The product must be properly applied to work correctly. If you need more information on this product, or if you have a particular problem or question, contact GEMCOM, INC., WILLOW SPRINGS, IL 60480. Telephone: (708) 839-6840

8828 S. Archer Ave. • Willow Springs, IL 60480 • office 708.839.6840 • fax 708.839.0324 • toll-free 888.4.GEMCOM

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# EXHIBIT 'C'

# Appendix C

**EXHIBIT 'C'**

**PROJECT COST ANALYSIS**DPMC NUMBER: J0393-00 WO#4Date: 11/30/2022Project Name: Clean Agent Suppression System in JMIS Data CenterProject Phase:  
**Scope of Work**Location: Hughes Justice Complex, Trenton, NJ**Cost Phase "C" - Construction**

1 General Construction	10,000
2 Structural Steel	0
3 Plumbing	0
4 HVAC	10,000
5 Electrical	50,000
6.a Other Trades (specify): <u>Fire Protection</u>	931,880
6.b Other Trades (specify): _____	0
<b>7 TOTAL CONSTRUCTION COST ESTIMATE (CCE) (Lines 1 thru 6)</b>	<b><u>1,001,880</u></b>

**Cost Phase "D" - Design**

8 Consultant Design Fee	90,000
9 Consultant Construction Administration Fee	60,000
10 Asbestos Remediation Design Fee	0
11 Asbestos Monitoring Fees	0
12 Survey Services	0
13 Testing Services	0
14 Roofing Inspection	0
15 Other (specify): <u>DCA Plan Review Fee</u>	10,320
<b>16 TOTAL DESIGN SERVICES (Lines 8 thru 15)</b>	<b><u>160,320</u></b>

**Cost Phase "K" - Affirmative Action**

17 Affirmative Action (1/2 % of Line 7)	<b><u>5,009</u></b>
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**Cost Phase "M" - Management Fees**

18 DPMC Management Fee (8% of Line 7)	<b><u>80,150</u></b>
---------------------------------------	----------------------

**Cost Phase "N" - Construction Management**

19 Construction Management Services (CM/CPM)	<b><u>0</u></b>
--	-----------------

**Cost Phase "O" - Contingency**

20 Construction (5% of Line 7)	50,094
21 Design (10% of Line 16)	16,032
<b>22 TOTAL PROJECT CONTINGENCY (Lines 20 &amp; 21)</b>	<b><u>66,126</u></b>

**Cost Phase "P" - Permits**

23 U.C.C. (DCA or DPMC) Plan Review Fee	7,514
24 U.C.C. Permit/Field Inspection/C.O. Fee	7,514
25 Soil Conservation	0
26 Other (specify): _____	0
<b>27 TOTAL PERMIT FEES (Lines 23 thru 26)</b>	<b><u>15,028</u></b>

**Cost Phase "R" - Arts Inclusion**

28 Arts Inclusion Allowance	<b><u>0</u></b>
-----------------------------	-----------------

**Cost Phase "B" - Other Costs**

29 Other (specify): _____	0
30 Other (specify): _____	0
<b>31 TOTAL OTHER COSTS (Lines 29 &amp; 30)</b>	<b><u>0</u></b>

**32 CURRENT WORKING ESTIMATE (CWE) (Lines 7+16+17+18+19+22+27+28+31) \$1,328,514****EXHIBIT 'C'**

# Appendix D



*Excellence Delivered **As Promised***

August 6, 2018

Mr. Roger Shaver, Manager, IT Operations  
NJ Department of Law and Public Safety  
25 Market St  
Trenton, NJ 08625-0235

Re: NJ DPMC #J0343, Work Order #4  
Fire Suppression System Study  
Richard J. Hughes Justice Complex  
Draft Report

Dear Mr. Shaver:

In accordance with the Gannett Fleming Agency Consultant Work Order dated April 25, 2018, please find enclosed:

1. 1 copy of the draft evaluation report

These documents were reviewed in accordance with Gannett's QAQC procedures and satisfy the deliverable requirement for a preliminary report.

We appreciate this opportunity to work with you and look forward to any comments you may have upon completion of your review. If you have any questions or need additional information, please contact me at 856.396.2226 x 8175.

Very truly yours,  
Gannett Fleming, Inc.

A handwritten signature in black ink, appearing to read 'T. Peterson'.

Teresa L. Peterson, P.E., C.M.E., LEED AP O&M  
Senior Project Manager  
Enclosure

Gannett Fleming, Inc.

5 Eves Drive • Suite 200 • Marlton, NJ 08053  
t: 856.396-2226 • f: 856.596-8143  
[www.gannettfleming.com](http://www.gannettfleming.com)

**EXHIBIT 'C'**



# FIRE SUPPRESSION ASSESSMENT

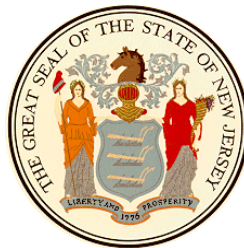
Submitted to:

**State of New Jersey**  
**Richard J Hughes Justice Complex**

25 Market St  
Trenton, Mercer County, New Jersey 08611

**Contract NO. J0343-00**

**STATE OF NEW JERSEY**  
Honorable Phil Murphy, Governor  
Honorable Sheila Oliver, Lieutenant Governor



**Division of Property Management and Construction**  
Christopher Chianese, Director

**DEPARTMENT OF LAW AND PUBLIC SAFETY**  
Gurbir S. Grewal, Attorney General

Submitted by:



***Gannett Fleming***

Suite 200 • 5 Eves Drive • Marlton, New Jersey 08053

July 2018

# EXHIBIT 'C'

**Overview**

Gannett Fleming has been requested to evaluate different options and provide recommendations for modifying the existing RJ Hughes Justice Building Data Center fire protection system in Trenton, NJ. This study was requested in order to help develop a path forward for replacing the existing wet sprinkler system with a chemical suppression system due to the potential harm a wet system could do to the server and network equipment.

We reviewed the construction of the space, identified existing equipment within the space, and discussed potential areas for the new chemical suppression equipment to reside. Vendors supporting five different proposed system options were engaged, and quotes, along with recommendations and details on system requirements were provided. The five different proposed systems include FM200, ECARO-25, NOVEC 1230, INERGEN / PROINERT, and a Hybrid Water Mist/Nitrogen system. These options were selected in part because they have the ability to protect the sensitive server equipment and are safe for humans in the occupied space in the event of a discharge.

Since all five systems are viable options to protect the space, Gannett Fleming would like to defer the decision on which system is to be selected until after this report is reviewed and all considerations are discussed. It is understood that consideration of initial cost, recurring costs, equipment footprint, environmental impact, etc. is subjective and different owners would put different weight on each of the criteria. That aside, below is our initial assessment with regards to the recommended ranking of each system:

**Table 1, General Comparison**

System Type	Rank	Relative Impact on Environment	Relative Potential Threat to Occupants	Relative fire extinguishing effectiveness	Requires Pressure Venting?	Approx. Installed Cost	Approx. Discharge/Maint. Cost	Down-time for discharge	Approx. Square Footage Required
FM-200	3	Low	Low	1	No	\$335,000	\$30,000	24-48 Hrs.	50 SF
ECARO-25	1	Low	Low	2	No	\$332,000	\$25,000	24-48 Hrs.	50 SF
NOVEC-1230	5	None	Very Low	3	No	\$410,000	\$10,000	24-48 Hrs.	50 SF
INERGEN/PROINERT	4	None	Med	5	Yes	\$355,000	\$16,500	7 days	80 SF
NITROGEN / WATER MIST	2	None	Med	4	Yes	\$325,000	\$12,000	24-48 Hrs.	120 SF

Upon review of this report, an agreed upon system can be identified, and the next phase of design can proceed.

**Evaluation Process**

In order to determine the appropriate system for this application, it is necessary to identify the differences between the five systems. These differences include relative fire quenching effectiveness,



spatial considerations such as quantity of cylinders required and size of cylinders, type of distribution piping required, impact of system discharge to environment and personnel within the space, venting requirements, ease and cost of refill after discharge, and initial installed cost of the system.

It should be noted that for all systems, the agent is non-toxic and not harmful to humans who are exposed to it, however the potential for these systems to reduce oxygen levels in the space being served to a hazardously low level must be addressed. In the event of a release, standard protocol is for anyone in the area to immediately vacate the space via the closest exit, so the odds of someone remaining in the space are inherently low, however the chance for someone to become incapacitated during an event and remain in the space still exists at some level. When these systems are sized, the oxygen concentration in the space is typically kept above 12%, where normal breathing air contains approximately 17% oxygen. Exposure to spaces where oxygen levels are reduced causes an increase in respiratory stress, which can increase the threat of losing consciousness and asphyxiation. Calculations must be performed to ensure a discharge is safe for occupants, and safe exposure time limits are often identified.

#### **Area Description (Refer to Appendix A for drawing)**

The server room in question is located on the P-1 Level of the Justice Center. It is approximately 64 feet wide by 94' long and 9' high, contains a raised floor and has a lay-in type ceiling at 9' above the raised floor. Utilities such as data and power cabling, as well as chilled water piping are routed below the raised floor. The interstitial space above the lay-in ceiling contains various ductwork, lighting, cabling, and sanitary sewer piping serving the floor above as well as the wet fire protection piping currently serving the space.

Two adjacent areas, both approximately 25' by 30' with 9' ceilings are also required to be served by clean agent chemical suppression due to the sensitive equipment within each space. These areas do not utilize a raised floor, but have a similar lay-in ceiling as the data center. The walls around each space go to the deck above, creating a sealed volume for the chemical suppression systems to perform. For this reason, the two systems utilizing high pressure cylinders, the INERGEN or PROINERT system and the Nitrogen / Water Mist system will require a pressure relief vent to be installed. This vent would be approximately 4'x4' for the large room and 3'x1' for each of the smaller rooms. The vent would need to be ducted and terminate with a louver at the exterior wall of the building or in an otherwise safe location. Cost for venting can be estimated at approximately \$15,000.

#### **Constructability**

Three areas within the data center have been identified to house the cylinders containing the pressurized clean agent. The first area is along the North wall between a Liebert computer room A/C unit and a door exiting the data center. This area contains approximately 120 square feet of space available. The second proposed area is along the West wall at the North end of the room where approximately 240 square feet are available. Some movable equipment would be relocated. The third proposed area is located along the East wall and provides approximately 100 square feet of usable space. Refer to Appendix A for the proposed area locations.

It is anticipated that the new chemical suppression system distribution piping will be routed in the area left vacant from the removed wet system distribution piping. New distribution piping and heads will be



located and sized by the selected equipment vendor. Where a raised floor is utilized, heads will also be placed in the space below the raised floor. Electrical power will be pulled from the nearest available 120V source to power the system controls. Data cabling will be run from the new system control panel to tie into the existing building fire alarm control system. Electrical costs were not included in the quotes received, are estimated at \$10,000 and included in the approximate installed cost column in Table 1.

A new exhaust fan and associated ductwork serving the three areas is anticipated to be required so that in the event of a discharge, the clean agent or inert gas in the spaces can be removed in an appropriate amount of time. During the next phase of design the need for an additional exhaust fan will be verified, however approximately \$10,000 has been added to the installed cost estimates for this addition.

Demolition costs associated with the removal of the existing wet sprinkler system serving the spaces can be estimated at approximately \$20,000, which has been added to all five system cost estimates.

### System Descriptions

#### FM-200

Overview - FM200, Heptafluoropropane (HFC-227ea), is a gaseous halocarbon used widely as a fire suppression agent, and can be considered the industry standard for protecting areas such as the data center in question. Due to environmental concerns regarding greenhouse gasses, other systems are being considered. This agent leaves no residue and doesn't require costly clean up, and is suitable for use in occupied spaces.

- Effectiveness: FM200 is very effective at extinguishing fires, and ranks #1 for the five systems in this category.
- Initial Cost: For budgetary information, refer to Appendix B – "SH Datasite Protection budgetary pricing worksheet". To install a fully functional FM-200 system by Fike, Inc. or Kidde, Inc. it would cost approximately \$305,000, which includes detection and controls, piping and heads. 120V electrical service for controls power is not included, but estimated at \$10,000 and included in the total price in Table 1, which is typical for all systems.
- Spatial Information: The FM-200 system quoted by Fike, Inc. requires approximately 2400 lbs of HFC-227ea, which would be provided in five pressurized cylinders to serve all three areas. It is anticipated that three large cylinders would serve the main data center and each adjacent space would be served by one smaller cylinder.
- Maintenance: To refill the system in the event of a discharge, the cost would be approximately \$54,600 for the replacement of 2,400 lbs HFC-227ea at \$24/lb, however it is unlikely that the full system would discharge unless all three zones witnessed fires simultaneously. Labor costs for refill have not been considered.

#### ECARO-25

Overview - ECARO-25, Pentafluoroethane (HFC-125), is also a gaseous halocarbon used widely as a fire suppression agent, and was introduced as a Halon replacement after Halon was phased out due Halon's ozone depleting characteristic. ECARO-25 is similar to Halon in density and viscosity, but is not harmful at all to the environment. For this reason, its use as a replacement in existing Halon piping systems



made sense. ECARO-25 requires approximately 10% less agent than FM-200 systems to protect the same volume space. ECARO-25 leaves no residue on equipment, is colorless and odorless, and is safe for use in occupied spaces.

- Effectiveness: ECARO-25 is very effective at extinguishing, and ranks #2 for the five systems in this category.
- Initial Cost: Appendix B – “SH Datasite Protection budgetary pricing worksheet”, provides the cost to install a fully functional ECARO-25 system by Fike, Inc. at approximately \$302,000, which includes detection and controls, piping and heads.
- Spatial Information: The ECARO-25 system quoted by Fike, Inc. requires approximately 2150 lbs of HFC-125, which would be provided in five pressurized cylinders to serve all three areas. It is anticipated that three large cylinders would serve the main data center and each adjacent space would be served by one smaller cylinder.
- Maintenance: To refill the system in the event of a discharge, the cost would be approximately \$45,150 for the replacement of 2,150 lbs of HFC-125 at \$21/lb, however it is unlikely that the full system would discharge unless all three zones witnessed fires simultaneously. Labor costs for refill have not been considered.

#### NOVEC 1230

Overview - NOVEC 1230 is a clean agent fire extinguishant which was developed as a halon replacement and “Greener” HFC alternative. NOVEC 1230 fluid is a Fluoroketone, while chemical clean agents such as FM-200 are HFC’s. NOVEC 1230 has a low global warming potential, and has a high margin of safety for discharge in spaces of human occupancy compared to other clean agents and inert gas systems. NOVEC cylinders are pressurized to 500 psi.

- Effectiveness: Novec 1230 is very effective at extinguishing fires, and ranks #3 for the five systems in this category.
- Initial Cost: Pricing for the system came in at \$380,000, which is the highest of all five systems.
- Spatial Information: The NOVEC 1230 system quoted by Fike, Inc. would require three large cylinders to serve the main data center, and two small cylinders to serve the two smaller spaces.
- Maintenance: Refill is relatively cost effective compared to other systems, and can be performed in 24-48 hours. It is estimated that refilling the system after an event would cost approximately \$10,000.

#### INERGEN / PROINERT

Overview - INERGEN by Tyco, Inc. is an inert gas chemical suppression system that utilizes 52% Nitrogen, 40% Argon, and 8% CO2 to lower oxygen levels within the space to below that which will sustain a fire. The resulting composition of the air still allows safe breathing for occupants for a given amount of time, and the composition of the gasses are inherently safe for equipment in the space. INERGEN is safe for the atmosphere and has no global warming potential.

- Effectiveness: Inergen / Proinert is effective at extinguishing fires, and ranks #5 in this category.
- Initial Cost: Appendix C – “Proinert2 budgetary pricing”, states that the initial cost of this Proinert system would be approximately \$310,000, slightly higher than the initial cost for an FM-200 or ECARO-25 system.
- Spatial Information: The Proinert system quoted by Fike, Inc. stated that approximately forty 12”



diameter, high-pressure cylinders would be required, which will accommodate approximately 80 square feet of floor space.

- Maintenance: Budgetary pricing has determined that the cost to refill each cylinder is approximately \$225. This would bring the refill cost for 40 cylinders to \$9,000. Labor and shipping costs for proprietary replacement cylinders would also need to be considered. There is also a cost of approximately \$7,450 to replace all the hoses in the system every five years. This cost of \$7,450 was included in the overall maintenance cost bringing the total to approximately \$16,500, which is relatively low between the five systems.

### NITROGEN / WATER MIST

Overview - Nitrogen / water mist systems are different from the above chemical suppression systems because they introduce water into the room along with the inert gas. Special dispersion heads atomize the water into extremely fine droplets and in such low quantity that no accumulation of water on equipment in the space occurs. Nitrogen is introduced simultaneously and in sufficient quantity to reduce the oxygen levels in the space below that which is required to sustain a fire, but not low enough to pose a threat to human occupants. The primary concern with a Nitrogen/ Water Mist system is the number of Nitrogen cylinders required to serve a space the size of the data center in question.

- Effectiveness: Nitrogen/ Water Mist is effective at extinguishing fires, and ranks #4 in this category.
- Initial Cost:
- Spatial Information: Victaulic, Inc. stated that no less than fifty 12" diameter high pressure Nitrogen cylinders would be required to serve the data center and adjacent spaces. A water storage tank of approximately 30 gallons will also be required. It is estimated that approximately 120 Square Feet of floor area would be required to accommodate the quoted system. Due to the fact that the Victaulic system requires 50 cylinders, preferred areas #1 and #3 are too small to accommodate the layout, so if this system is desired, then it will need to be installed at location #2 or divided up into a couple different locations. Special design considerations would be required if a custom arrangement was pursued.
- Maintenance: A Nitrogen/ Water Mist system is already in place within the Justice Center serving the UPS room, so the system type is already familiar. Replacement costs are not known, however it can be assumed that they are similar to the PROINERT system replacement and maintenance costs due to the similarity of the systems. It is estimated that maintenance costs are around \$12,000.

### Appendices

Appendix A is drawing M1-01 from a previous mechanical upgrades project that shows the areas of scope. Notes have been added to clarify the proposed acceptable locations for the chemical suppression system equipment, as well as sample blocks showing the number and size of cylinders for each proposed option.

Appendix B is a budget pricing quote obtained from SH Datasite Protection Co. that provides insight into relative installed costs for the FIKE, Inc. systems.

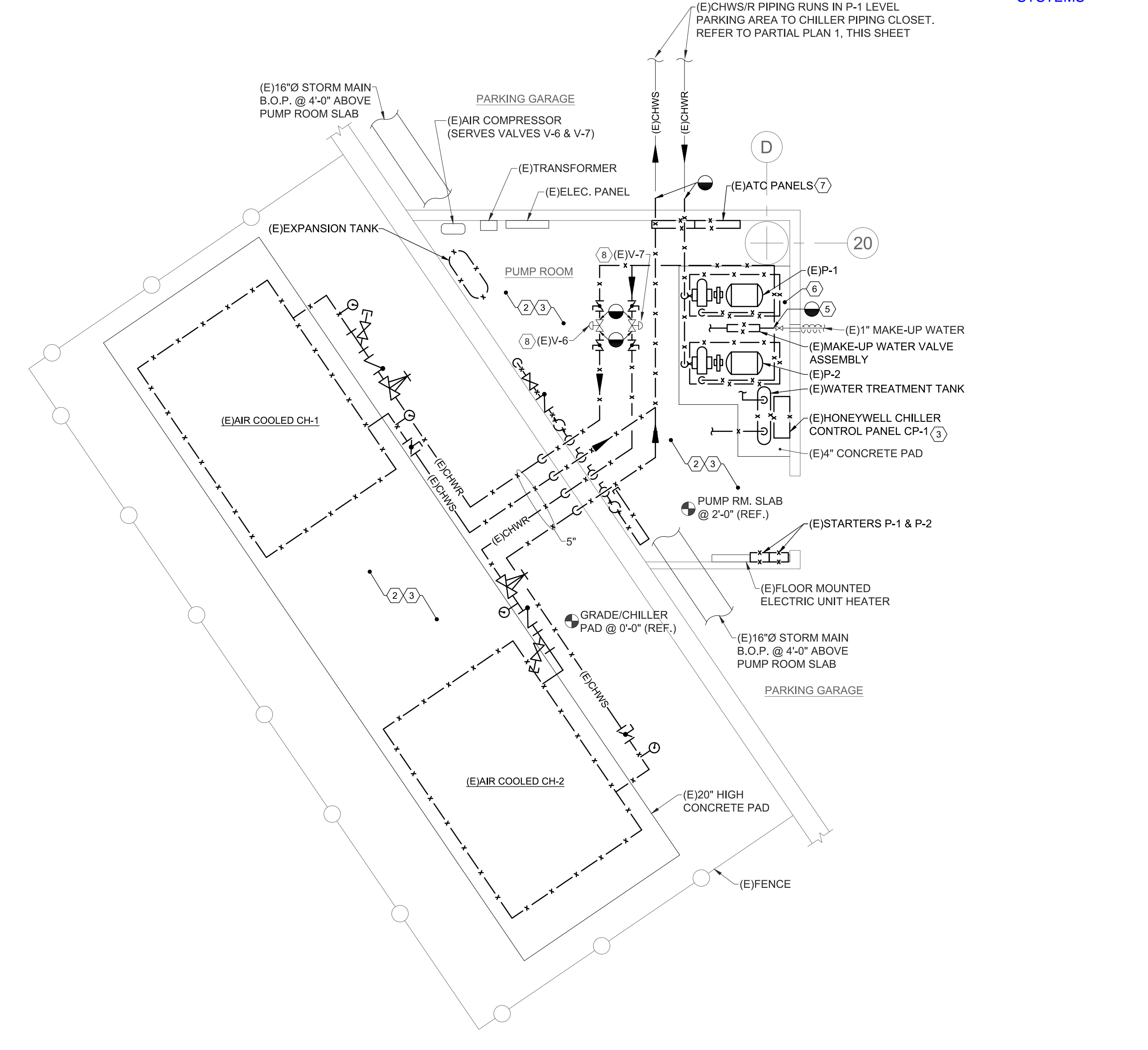
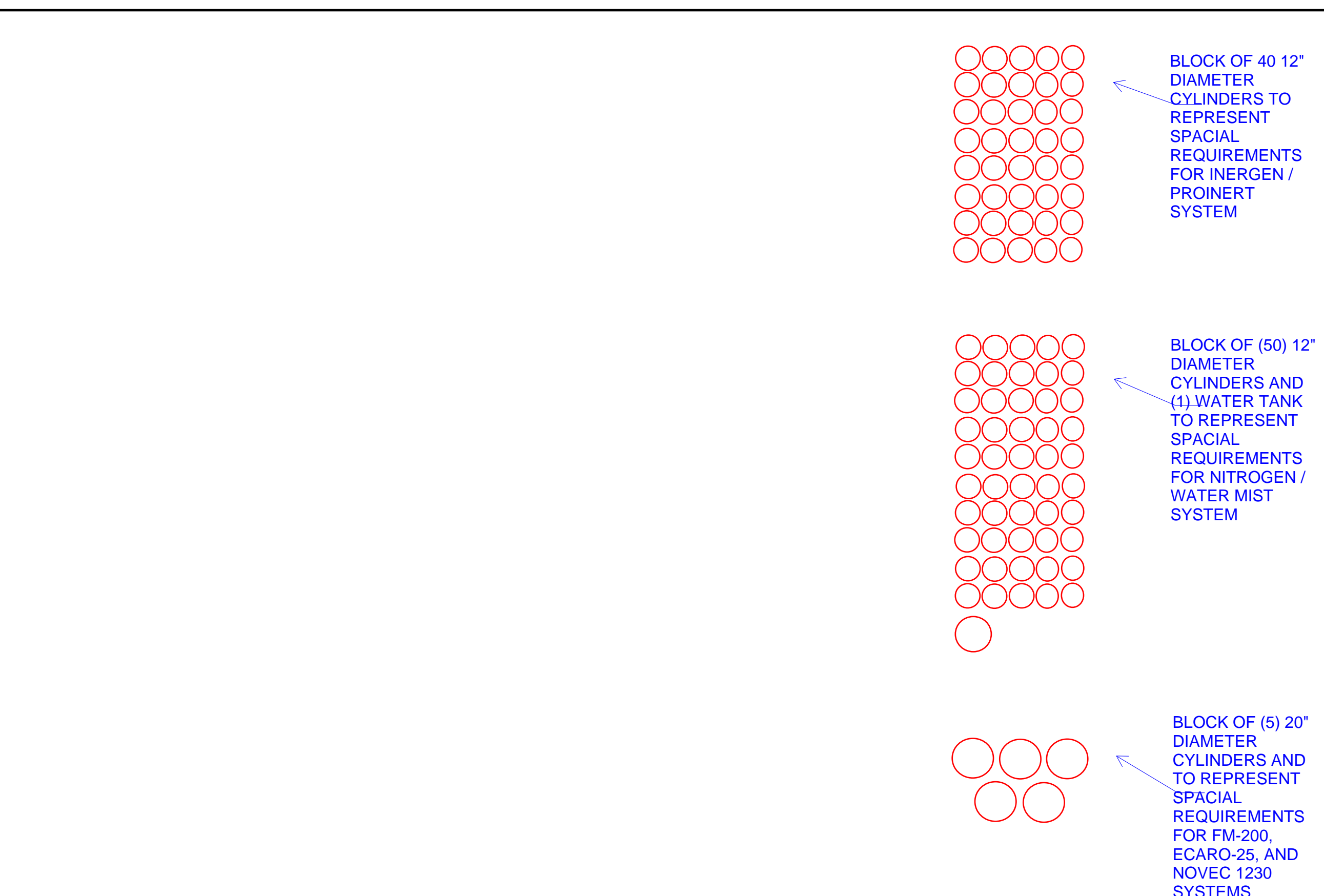
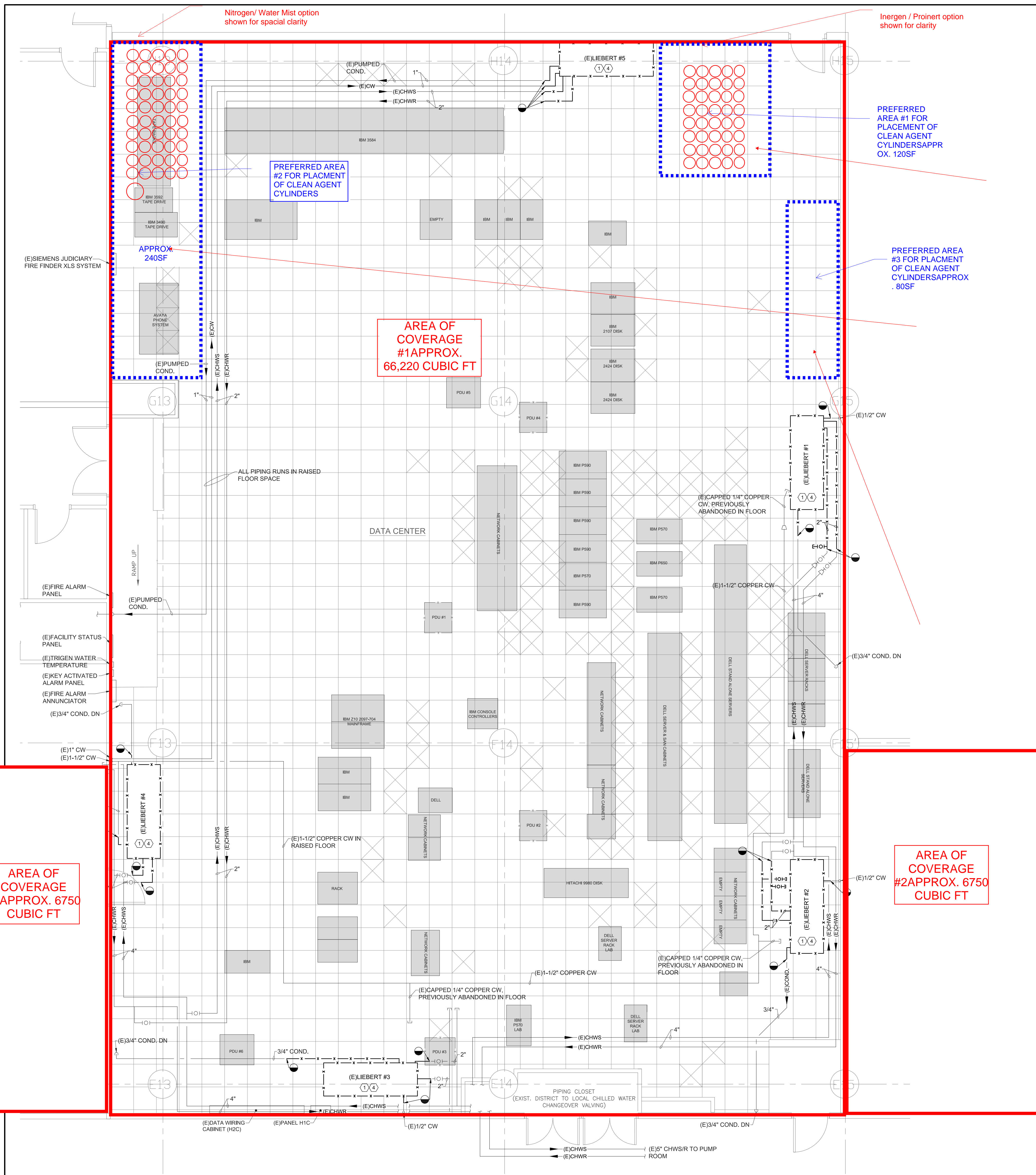


**Gannett Fleming**

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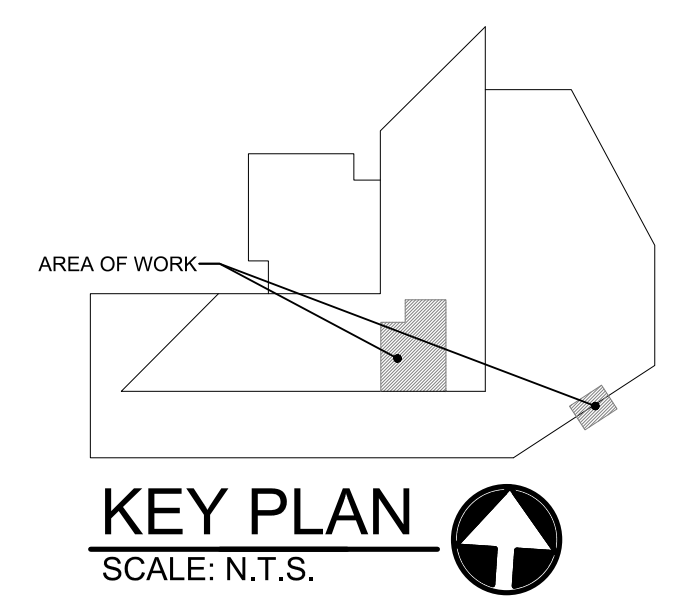
APPENDIX A - DATA CENTER LAYOUT



- SHEET NOTES:**
- DISCONNECT AND REMOVE EXISTING CRAC UNIT AND FLOOR STAND, DISCONNECT AND REMOVE CHWS/R, CW, AND CONDENSATE DRAIN BACK TO LOCATIONS INDICATED. REFER TO DWG. M-100 FOR EQUIPMENT EGRESS PATHS.
  - DISCONNECT AND REMOVE CHILLERS, PIPING, PUMPS, INERTIA BASES, EXPANSION TANK, WATER TREATMENT TANK, ASSOCIATED SUPPORTS, AND CONTROL PANELS. CONCRETE PADS TO REMAIN TO SUPPORT NEW EQUIPMENT.
  - THE REMOVAL OF CHILLERS, PUMPS, ASSOCIATED PIPING, VALVES V-6 AND V-7, CONTROLS, ETC. SHALL BE PHASED SO AS TO PROVIDE CONTINUOUS CHILLED WATER SERVICE TO THE DATA CENTER WITH NO SERVICE INTERRUPTION DURING THE CONSTRUCTION PERIOD. THE FIRST NEW CHILLER AND ASSOCIATED PUMP, PIPING AND CONTROLS SHALL BE FULLY OPERATIONAL, TESTED AND COMMISSIONED PRIOR TO REMOVAL OF THE SECOND CHILLER.
  - THE CRAC UNITS SHALL BE REPLACED ONE BY ONE IN ORDER TO HAVE 4 UNITS OPERATIONAL AT ANY GIVEN TIME DURING THE CONSTRUCTION PERIOD. EACH NEW CRAC UNIT SHALL BE FULLY OPERATIONAL, TESTED AND COMMISSIONED PRIOR TO REMOVAL OF THE NEXT CRAC UNIT.
  - DISCONNECT AND REMOVE MAKE-UP WATER PIPING AND VALVE ASSEMBLY.
  - DISCONNECT AND REMOVE HEAT TRACE CONTROL PANEL AND THERMOSTAT. EXISTING HEAT TRACE JUNCTION BOX SHALL REMAIN FOR CONNECTION TO NEW THERMOSTAT. REFER TO DWG. M-201.
  - EXISTING PNEUMATIC CONTROL PANEL PREVIOUSLY ABANDONED IN PLACE.
  - CAREFULLY REMOVE VALVES V-6 AND V-7 AND STORE FOR RE-INSTALLATION.

**1 DATA CENTER DEMOLITION PLAN - P-1 LEVEL**  
SCALE: 1/4" = 1'-0"

**2 PUMP ROOM AND CHILLERS DEMOLITION PLAN - P-1 LEVEL**  
SCALE: 1/4" = 1'-0"



PROJECT: DATA CENTER UPGRADES, MECHANICAL, DEMOLITION, SHEET: M-101.DWG  
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 12/19/2011

NO.	DATE	MODIFICATION	DRAWN	CHKD.	APPROVD.
D	12/16/11	ISSUED FOR PERMIT	ASC	CLG	DWF
C	12/8/11	FINAL DESIGN SUBMISSION #3	ASC	CLG	DWF
B	11/28/11	FINAL DESIGN SUBMISSION #2	ASC	CLG	DWF
A	9/30/11	FINAL DESIGN	ASC	CLG	DWF

**DISCLAIMER**  
This drawing is and shall remain the property of Gannett Fleming, Inc. Any misuse, reuse, alteration, addition, or deletion of these drawings on project extensions or other projects shall be at the user's sole risk and without liability to Gannett Fleming, Inc. In the event that a conflict arises between the printed drawings and the electronic files, the sealed drawings will govern.

DAVID W. FRENZE  
PROFESSIONAL ENGINEER  
N.J. LIC. NO. 24GE03464000  
DATE:

DESIGNED: CLG  
DRAWN: ASC  
CHECKED: CLG  
APPROVED: DWF

**Gannett Fleming**  
1000 ATRIUM WAY SUITE 300, MOUNT LAUREL, NJ 08054  
CERTIFICATE OF AUTHORIZATION NO. 24GA28032500  
MOUNT LAUREL, NJ

**NEW JERSEY**  
DEPARTMENT OF PROPERTY MANAGEMENT AND CONSTRUCTION  
MECHANICAL

**DATA CENTER UPGRADES**  
DPMC PROJECT NO. A1087-00  
THE NEW JERSEY DEPARTMENT OF JUSTICE COMPLEX, TRENTON, NJ  
**MECHANICAL DEMOLITION PLANS - P-1 LEVEL**

PHASE	PERMIT	PROJECT NUMBER
AS SHOWN <td></td> <td>054547</td>		054547
DATE:	6/13/2011	
DRAWING NUMBER	<b>M-101</b>	

## APPENDIX B - SH DATASITE PROTECTION QUOTES



A Stillwell-Hansen Company

July 19, 2018

Gannett Flemming

For: Trenton Justice Center

**SID #** Re: **Trenton Justice Center –Data Center Renovations**

I would like to thank you for this opportunity to provide you with a rough order of magnitude for the Trenton Justice Complex. Our pricing is based on the drawing from Gannett Flemming (project 54547 dated 6/13/11) Drawing M-101 only. No specifications were provided. We are pleased to provide you with pricing for supplying the detection and control equipment, engineering, installation (electrical and mechanical disciplines), project management, start-up testing, room integrity testing, commissioning, final acceptance testing.

**Option 1 Kidde-** Detection and Control FM-200 (standard Engineering – ECS) – Approx. \$305,000  
**Option 2 Kidde-** Detection and Control FM-200 (Advanced delivery system (ADS) Approx. \$317,000  
**Option 3 Fike** Detection and Control FM-200 (standard Engineering) – Approx. \$305,000  
**Option 4 Fike** Detection and Control Ecaro-25 (standard Engineering) – Approx. \$302,000

**Pricing for NOVEC 1230 (FK5-1-12) is available thru Kidde as ECS and ADS. If the End user is looking for a more environmental agent for suppression, pricing can be provided. There will be a significant cost impact as it requires additional agent/ tanks to cover the spaces listed below.**

### **Rooms included:**

**Zone 1 – Data Center on P-1 level**

**Zone 2 – Protected space adjacent (left) of Data Center**

**Zone 3 - Protected space adjacent (right) of Data Center**

S-H Datasite intends to design and supply the fire alarm detection and control equipment. This will include the fire alarm detection and control devices.

### **Included in this price is the following:**

- 1) Complete design, engineering and drawings for installation of building fire alarm system.
- 2) 4 Submittal packages and 1 electronic copy.
- 3) Equipment for detection and control for the building.
  - a. Detection and control
  - b. Agent, tanks and associated pipe networks and nozzles for suppression.
- 4) Time for project management, programming, startup and final certification will be during normal working hours 7:30 – 3:30 Monday – Friday.
- 5) 1 Functional test to verify complete operation.
- 6) 1 Final test with AHJ for project completion. Any additional testing requested shall be an additional daily charge of \$2,000.00 per man per day.

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3 Fernwood Avenue • P.O. Box 7820 • Edison, NJ 08818-7820 • Phone: 732-225-3222 • Fax: 732-225-4547

# EXHIBIT 'C'



- 7) Pricing assumes shipping to the site of all equipment does not require any special access or shipping requirements; including special shippers to site.
- 8) Technicians to be present during the fire department testing.
- 9) Pricing assumes CAD backgrounds will be provided. Should we need to create our own backgrounds additional cost will be incurred and billed at \$132.00/hour.
- 10) PE seals by a licensed NJ engineer on our submitted drawings for permits will be part of our contract.**

### **Exclusions and Clarifications of the Base Pricing:**

- 1) Permit costs.
- 2) Should site specific training/drug testing be required, an additional cost at \$132.00 per man per hour will be billed through the change order process.
- 3) We are not including any 120v AC to our control panel, motorized dampers or purge panels.
- 4) We will supply relay modules adjacent to all motorized dampers and fresh air intakes to allow for control of motorized fire smoke dampers supplied and installed **by others**, and wired **by others**.
- 5) Price assumes 120v dampers. If 24 V dampers are used, additional power supplies may be required and are not included in this proposal.
- 6) We are excluding all sealing of the rooms, seals and floor sweeps for all doors within the protected space. This is to be covered by the selected GC.
- 7) Door closers, mechanical damper closers not included. We will provide relays to close or shut dampers, doors and HVAC.
- 8) All patching and painting by others.
- 9) Price is based on prevailing wage per our discussion.
- 10) Price assumes AIA billing and certified payroll.
- 11) Price does not include bonding. Should a bond be required, price above will be void.

### **Terms and Conditions**

- Price quotation is valid for 60 days
- Equipment Lead Time: 2 -4 weeks lead time to ship from factory - ARO (After Receipt of Order).
- Please reference quotation number when placing order
- Pricing is F.O.B. factory and allowed to first destination
- This proposal is based on labor performing work during regular business hours. (7:30am to 3:30pm, Monday thru Friday) Work outside this time period will require additional charges unless specifically included in the scope of work.
- Pricing assumes wages are required.
- Payment terms are net 30 days.
- Progress billing per an approved schedule of values.
- Please indicate your tax status (**taxable or non taxable**) please provide documentation if tax exempt.
- Upon issuance of P.O. any cancellation of equipment order can result in a restocking and or cancellation fee up to 100% of the P.O. amount.

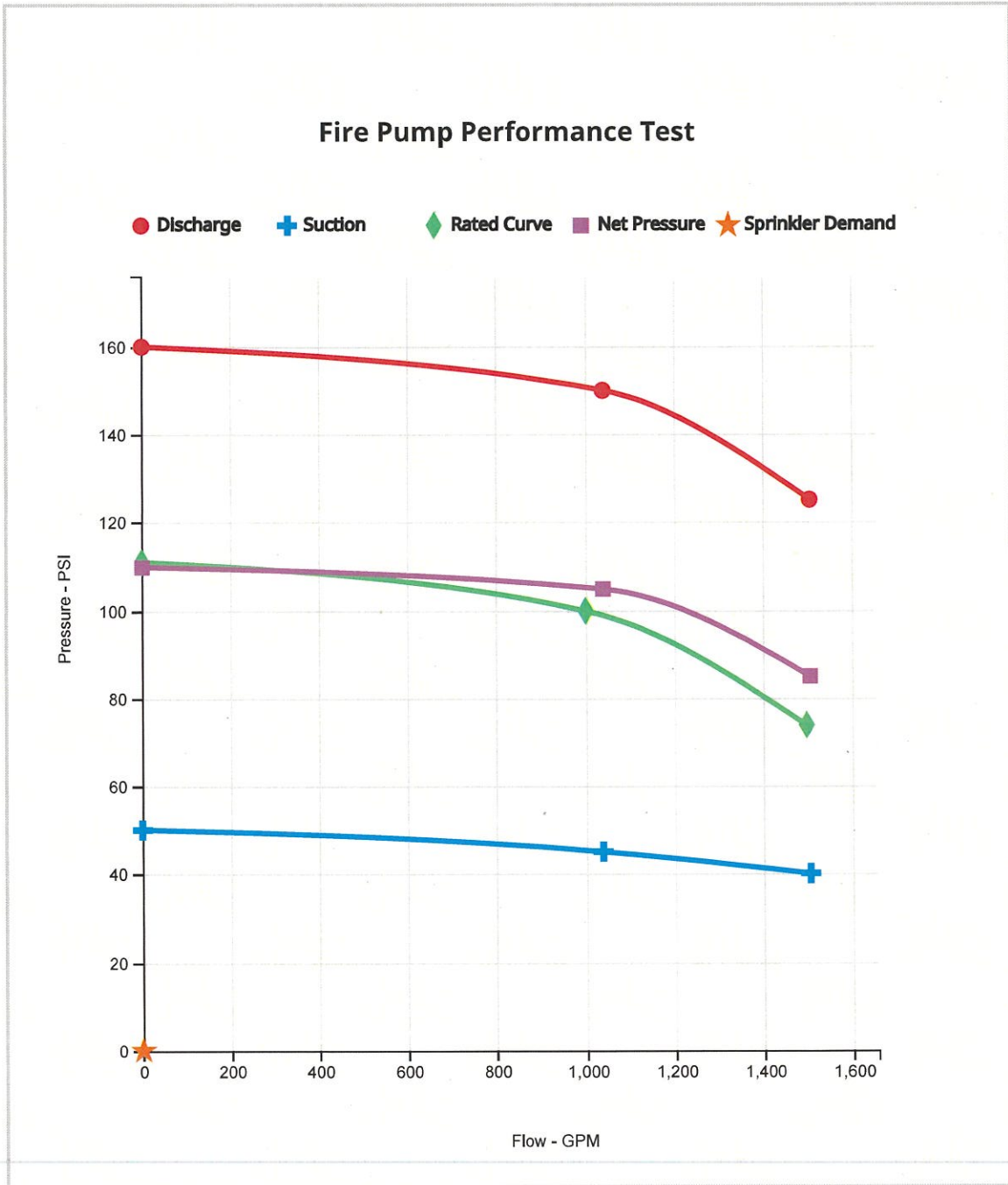
- Special ordered equipment cannot be returned to stock and will be invoiced at 100% of quotation value.
- Billing address and purchasing contact name & number required on P.O.
- Shipping address, contact name, & phone number required on P.O.
- Authorized signed P.O. with corresponding P.O. number required
- Any items and/or work not specifically included in this quotation are excluded
- If acceptance of this proposal is contingent upon a specific completion date, that date must be requested in writing and accepted by S-H Datasite Protection Co., Inc. prior to the commencement of work.

Please review and contact me with any questions. I appreciate your interest in our services and look forward to working with you on this project. We are an approved New Jersey WBE contractor.

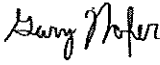
Sincerely,

A handwritten signature in black ink, appearing to read 'Chris Vicidomini', with a long horizontal flourish extending to the right.

Chris Vicidomini





Inspector Signature		Inspector Name	Gary Nofer	Date	01/10/2022
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