FIKE PRE-ENGINEERED
FM-200 CLEAN AGENT ®
FIRE SUPPRESSION SYSTEM
WITH
SHP PRO ®
CONTROL SYSTEM

SUBMITTAL DOCUMENTS

VERIZON WIRELESS
EQUIPMENT ROOM – GENERATOR SHELTER
23 Church Avenue
Peaks Island, ME 04108

Interstate FIRE PROTECTION

FIKE PRE-ENGINEERED
FM-200 CLEAN AGENT ®
FIRE SUPPRESSION SYSTEM
WITH
SHP PRO ®
CONTROL SYSTEM

ENGINEERING SPECIFICATIONS

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SECTION 1 – GENERAL CONDITIONS

I. SCOPE:

This specification outlines the requirements for a “Total Flood” Clean Agent Fire Suppression System utilizing DuPont™ FM-200® (*also known by its ASHRAE designation HFC-227ea*) as the fire extinguishing agent and with a SHP PRO™ detection and control system. The work described in this specification includes all engineering, labor, materials, equipment and services necessary, and required, to complete and test the suppression and detection system.

II. APPLICABLE STANDARDS AND PUBLICATIONS:

The design, equipment, installation, testing and maintenance of the clean agent System shall be in compliance and accordance with the applicable requirements set forth in the latest edition of the following codes, standards, and third party approval agencies:

1) NFPA No. 2001 - Clean Agent Fire Extinguishing Systems

2) NFPA No. 70 - National Electrical Code

3) NFPA No. 72 - National Fire Alarm Code

4) FM Approvals

5) Underwriters Laboratory

6) Requirements of the Authority Having Jurisdiction (AHJ)

The standards listed, as well as all other applicable codes and standards shall be used as "minimum" design standards. Also to be considered are the requirements of the "Authority Having Jurisdiction" and good engineering practices.

III. REQUIREMENTS:

The Clean Agent Fire Suppression System installation shall be made in accordance with the drawings, specifications and applicable standards. Should a conflict occur between the drawings and specifications, the specifications shall prevail.

IV. EXCLUSIONS:

The work listed below shall be provided by others, or under other sections of this specification:

1) 120 VAC or 240 VAC power supply to the system control panel.
2) Interlock wiring and conduit for shutdown of HVAC, dampers and/or electric power supplies, relays or shunt trip breakers.
3) Connection to local/remote fire alarm systems, listed central alarm station(s).

V. QUALITY ASSURANCE:

A) MANUFACTURER:

1) The manufacturer of the clean agent system hardware and detection components shall have a minimum of 10 years experience in the design and manufacture of similar types of suppression systems and who refer to similar installations providing satisfactory service.
2) The name of the manufacturer, part numbers and serial numbers shall appear on all major components.
3) All devices, components and equipment shall be the products of the same manufacturer.
4) All devices, components and equipment shall be new, standard products of the manufacturer’s latest design and suitable to perform the functions intended.
6) All devices and equipment shall be U.L listed or FM approved.
7) Locks for all cabinets shall be keyed alike.

B) INSTALLER:

1) The installing contractor shall be trained by the supplier to design, install, test and maintain a clean agent system.

2) The installing contractor shall be an experienced firm regularly engaged in the installation of automatic clean agent, or similar, fire suppression systems in strict accordance with all applicable standards.

3) The installing contractor must have a minimum of five (5) years experience in the design, installation and testing of clean agent, or similar, fire suppression systems. A list of systems of a similar nature and scope shall be provided on request.

4) The installing contractor shall show evidence that his company carries a minimum $2,000,000.00 liability and completed operations insurance policy.
These limits shall supersede limits required in the general conditions of the specifications.

5) The installing contractor shall maintain, or have access to, a clean agent recharging station. The installing contractor shall provide proof of his ability to recharge the largest clean agent system within 24 hours after a discharge. Include the amount of bulk agent storage available.

6) The installing contractor shall be an authorized stocking distributor of the clean agent system equipment so that immediate replacement parts are available from inventory.

7) The installing contractor shall show proof of emergency service available on a twenty-four hour, seven-day-a-week basis.

C) SUBMITTALS:

1) The installing contractor shall submit the following design information and drawings for approval prior to starting work on this project:

   a) Field installation layout drawings having a scale of not less than 1/8”=1’-0” (1:100m) detailing the location of all agent storage tanks, pipe runs including pipe sizes and lengths, control panel(s), detectors, manual pull stations, abort stations, audible and visual alarms, etc.

   b) Auxiliary details and information such as maintenance panels, door holders, special sealing requirements and equipment shutdowns.

   c) Separate layouts, or drawings, shall be provided for each level, (i.e.; room, underfloor, and above ceiling) and for mechanical and electrical work.

   d) A separate layout or drawing, shall show isometric details of agent storage containers, mounting details and proposed pipe runs and sizes.

   e) Electrical layout drawings shall show the location of all devices and include point-to-point conduit runs and a description of the method(s) used for detector mounting.

   f) Provide an internal control panel wiring diagram which shall include power supply requirements and field wiring termination points.

   g) Provide calculations for the battery stand-by power supply taking into consideration the power requirements of all alarms, initiating devices and auxiliary components under full load conditions.

   h) A complete sequence of operation shall be submitted detailing all alarm devices, shutdown functions, remote signaling, damper operation, time delay and agent discharge for each zone or system.

2) Submit drawings and system component data sheets for approval to the local Fire Prevention Agency, owners Insurance Underwriter, and all other Authorities Having Jurisdiction before starting installation. Submit approved plans to the Architect/Engineer for record.

SECTION 2 – AGENT REQUIREMENTS

VI. SYSTEM DESCRIPTION AND OPERATION:

A) The system shall be a Pre-Engineered Clean Agent Fire Suppression System utilizing FM-200 as the fire extinguishing agent supplied by:

Fike Corporation

704 South 10th Street

Blue Springs, MO 64015

B) The Clean Agent Fire Suppression System shall provide a minimum design concentration of 7%, by volume, in all areas and/or protected spaces, at the minimum anticipated temperature within the protected area. Per NFPA 2001, the system design shall not exceed a maximum exposure limit concentration level of 10.5%, by volume, unless provisions for room evacuation, before agent release, are provided. All personnel should be able to leave the protected space prior to the discharge or at least within 5 minutes of the commencement of discharge.

C) The system shall be complete in all ways. It shall include all mechanical and electrical installation, all detection and control equipment, agent storage containers, suppression agent, system actuation equipment, discharge nozzles, pipe and fittings, manual release and abort stations, audible and visual alarm devices, auxiliary devices and controls, shutdowns, alarm interface, caution/ advisory signs, functional checkout and testing, training and all other operations necessary for a functional U.L. Listed and/or F.M. Approved Clean Agent Fire Suppression System.

D) Provide two (2) inspections during the first year of service. Inspections shall be made at 6 month intervals commencing when the system is first placed into normal service.

E) The general contractor shall be responsible for sealing and securing the protected spaces against agent loss and/or leakage during the 10 minute "hold" period.

F) The system(s) shall be actuated by a combination of ionization and/or photoelectric detectors installed in accordance with the guidelines stated in NFPA 72.

G) Detectors shall be wired in Sequential Detection method of operation, standard Cross-Zoned detection, or single detector release. No other detection / wiring arrangements will be acceptable.

H) Automatic operation of each protected area shall be as follows:

1) Actuation of one (1) detector, within the system, shall:
    a) Illuminate the "ALARM" lamp on the control panel face.
    b) Energize an alarm bell and/or an optional visual indicator.
    c) Transfer sets of 5 Amp rated auxiliary contacts which can perform auxiliary system functions such as:
        1) Operate door holder/closures on access doors.
        2) Transmit a signal to a fire alarm system.
        3) Shutdown HVAC equipment.
    d) Light an individual lamp on an optional graphic annunciator.

2) Actuation of a 2nd detector, within the system, shall:
    a) Illuminate the "PRE-DISCHARGE" lamp on the control panel face.
    b) Energize a pre-discharge horn or horn/strobe device.
    c) Shut down the HVAC system and/or close dampers.
    d) Start time-delay sequence (not to exceed 60 seconds).
    e) System abort sequence is enabled at this time.
    f) Light an individual lamp on an optional graphic annunciator.

3) After completion of the time-delay sequence, the Clean Agent Fire Suppression System shall activate and the following shall occur:
    a) Illuminate a "RELEASE" lamp on the control panel face.
    b) Shutdown of all power to high-voltage equipment
    c) Energize a visual indicator(s) outside the hazard in which the discharge occurred.

d) Energize a "System Release" audible device. (Optional)

4) The system shall be capable of being actuated by manual discharge devices located at each hazard exit. Operation of a manual device shall duplicate the sequence description above except that the time delay and abort functions SHALL be bypassed. The manual discharge station shall be of the electrical actuation type and shall be supervised at the main control panel.

5) The system shall be capable of providing a “PRE-ALARM” feature that can give advanced warning of a possible alarm condition.

VII MATERIALS AND EQUIPMENT:

A) GENERAL REQUIREMENTS:

The Clean Agent Fire Suppression System materials and equipment shall be standard products of the supplier's latest design and suitable to perform the functions intended. When one or more pieces of equipment must perform the same function(s), they shall be duplicates produced by one Manufacturer.

1) All devices and equipment shall be U.L. Listed and/or F.M. Approved.

B) AGENT STORAGE AND DISTRIBUTION:

Each system shall have its own supply of clean agent.

1) The system design can be modular, central storage, or a combination of both design criteria utilizing a fast acting rupture disc valve. The valve shall contain a scored, non-fragmenting, rupture disc to provide immediate total discharge of the suppression agent.

2) Systems shall be designed in accordance with the manufacturer's guidelines.

3) Each supply shall be located within the hazard area, or as near as possible, to reduce the amount of pipe and fittings required to install the system.

4) The clean agent shall be stored in FIKE P/N 70-XXX Series Agent Storage Containers. Containers shall be super-pressurized, with dry Nitrogen, to an operating pressure of 360 psi @ 70° F (25 bar @ 21° C). Containers shall be of high-strength alloy steel construction and conform to NFPA 2001.

5) Containers shall be actuated by the following methods:

   a) Single container applications (Electric) – By an Impulse Valve Operator (IVO) wired through a Fike P/N 10-2748 Impulse Releasing Module (IRM). This method allows mechanical release.

   b) Multiple container applications (Electric / Pneumatic) – The 1st container is operated by an Impulse Valve Operator (IVO) wired through a Fike P/N 10-2748 Impulse Releasing Module (IRM). 6 additional containers equipped with Impulse Valve Pneumatic Operator(s) (IVPO) can be operated by the pressure from the 1st container. This method allows mechanical release.

   c) Multiple container applications (Electric) – By Impulse Valve Operators (IVO) wired through a Fike P/N 10-2748 Impulse Releasing Modules (IRM), located at each agent storage container. (maximum 6 container system). This method does not allow mechanical release.

6) Each container shall have a pressure gauge and low pressure switch to provide visual and electrical supervision of the container pressure. The low pressure switch shall be wired to the control panel to provide an audible and visual "Trouble" alarm in the event the container pressure drops below 288 psi (19 bar). The pressure gauge shall be color coded to provide an easy, visual indication of container pressure.

7) Each container shall have a pressure relief provision that automatically operates when the internal temperature exceed 150° F (66° C).

8) Engineered discharge nozzles shall be provided, within the manufacturer's guidelines, to distribute the suppression agent throughout the protected spaces. The nozzles shall be FIKE P/N 85-XXX designed to provide proper agent quantity and distribution.

   a) Nozzles shall be available in NPT sizes ¼” – 2.0” (8mm- 50mm). Each size shall be available in 180° and 360° distribution patterns.

9) Distribution piping, and fittings, shall be installed in accordance with the manufacturer's requirements, NFPA 2001 and approved piping standards and guidelines. All distribution piping shall be installed by qualified individuals using good, accepted practices and quality procedures. All piping shall be adequately supported and anchored at all directional changes and nozzle locations.
    a) All piping shall be reamed, blown clear and swabbed with suitable solvents to remove burrs, mill varnish and cutting oils before assembly.
    b) All pipe threads shall be sealed with Teflon tape pipe sealant applied to the male thread ONLY.

SECTION 3 – ELECTRICAL REQUIREMENTS

A) CONTROL PANEL:

1) The control panel shall be a SHP PRO Conventional Control Panel, P/N 10-063-M-C-P, manufactured by Fike Corporation, Blue Springs, MO.
    1) The SHP PRO Control System, and its components, shall be UL listed and FM approved for releasing service and be suitable for Deluge/Pre-action sprinkler service.
    2) The SHP PRO Control System shall perform all functions necessary to operate the system detection, actuation and auxiliary functions, as outlined.
    3) The SHP PRO Control System shall be capable of providing 7AH or 40AH battery standby power supplies.
    4) The SHP PRO Control System shall be microprocessor based with hardware and software integration designed to guarantee reliability.
    5) The SHP PRO Control System shall support Cross Zoned, Sequential, Single Detector Release and Manual Release detection/actuation methods.
    6) The SHP PRO Control System shall provide the following capabilities and functions:
        a) Three (3) Class B (Style Y) notification appliance circuits rated for 2.0 amps @ 24 VDC.
        b) Up to two (2) Style B initiating device circuits capable of sequential alarm, cross-zone, or single detector release operation with an overall system capacity of 50 detectors maximum.
        c) Three (3) Style B initiating device circuits capable of monitoring closed contact devices.
        d) Optional Class A module that converts all five initiating device circuits to Style D wiring and operation.
        e) Optional Class A module that converts all five output circuits to Style Z (3 NAC, 2 Releasing)
        f) Eight (10) Status LEDs plus alpha-numeric display for troubleshooting: AC normal; alarm; pre-discharge; release; supervisory; trouble; panel silenced; abort; release disabled; and ground fault.
        g) Programmable pre-discharge and discharge timers
        h) Resettable and continuous auxiliary output power
        i) Five (5) optional Abort types
        j) Intelligent Transistor protection to prevent noise spikes and microprocessor failure from inadvertently activating release outputs
        k) A dedicated Disarm switch for release outputs
        l) Dedicated alarm and trouble contacts programmable for alarm, trouble, pre-discharge, discharge, abort, supervisory or water flow functions, depending on panel configuration.
        m) Two (3) Form “C” relays, rated at 2 amps, are provided on the SHP PRO™ panel board. Installation of up to two (2) optional CRM4 Relay Module (P/N 10-2204) will provide up to eight (8) additional 2 amp relays.
        n) Multiple input power source - 120 VAC or 240 VAC
        o) 4.0 amp @ 24 VDC power supply to operate high current draw horns and strobes.
        p) Available in either Red or Gray finish

B) DETECTORS:

The detectors bases shall be System Sensor i3 photoelectric detectors, model 2WB, FIKE P/N 63-1029

C) MANUAL RELEASE (Electric):

The electric manual release switch shall be a dual action device which provides a means of manually discharging the Clean Agent Fire Suppression System when used in conjunction with the Fike SHP PRO Control System.

1) The Manual Release Switch shall be a Fike P/N 10-1638.
2) The Manual Release Switch shall be a dual action device requiring two distinct operations to initiate a system actuation.
3) Manual actuation shall bypass the time delay and abort functions, shall cause the system to discharge and shall cause all release and shutdown devices to operate in the same manner as if the system had operated automatically.
4) A Manual Release Switch shall be located at each exit from the protected hazard and shall have an advisory sign, Fike P/N 02-10312, provided at each location.
5) The Manual Release shall be connected to a FRCM which is programmed for the intended function.

D) ABORT STATION (Optional):

The optional Abort Station shall be the "Dead Man" type and shall be located next to each manual switch.

1) "Locking" or "Keyed" abort stations **shall not** be permitted.
2) The Abort Station shall be a Fike P/N 10-1639.
3) The Abort Station shall be supervised and shall indicate a trouble condition at the SHP PRO Control Panel, if depressed, and no alarm condition exists.
4) The (optional) Abort Station shall be located adjacent to each manual station and can be furnished in combination with a Manual Release Switch or in combination with a Manual Release Switch and (optional) Digital Countdown Timer (Fike P/N 20-046).
5) The Abort Station shall be connected to a FRCM which is programmed for the intended function.

E) AUDIBLE and VISUAL ALARMS:

Alarm audible and visual signal devices shall operate from the SHP PRO Control Panel.

1) The Horn/Strobe devices shall be Fike P/N 20-123-50, or equal in quality, performance and features. An FM-200 label shall be attached to the strobe lens when required.
2) The visual alarm unit shall be a Fike P/N 20-1579 Vertical Strobe device, or equal in quality, performance and features. An FM-200 label shall be attached to the strobe lens when required.
3) A Strobe device shall be placed outside, and above, each exit door from the protected space. Provide an advisory sign at each light location.

F) CAUTION and ADVISORY SIGNS:

Provide signs, as required, to comply with NFPA 2001 and the recommendations of the equipment supplier:

1) Entrance sign: One (1) required at each entrance into a protected space. (Fike P/N 02-10139)
2) Manual Discharge sign: One (1) required at each manual discharge station. (Fike P/N 02-10317)
3) Flashing Light sign: One (1) required at each flashing light over each exit from a protected space.

G) AUXILIARY PANELS: (Optional)

1) A Graphic Annunciator panel will be mounted adjacent to the SHP PRO control panel. The graphic annunciator shall show a scale layout of the protected area(s) and have indicator lamps to locate each system detector and/or other system components. The panel shall have a lamp test switch located on the panel face. Other panel options shall be available. Scale shall not be less than 1/8” = 1’-0” (1:100 m).

H) SYSTEM and CONTROL WIRING:

All system wiring shall be furnished and installed by the contractor.

1) All wiring shall be installed in electrical metallic tubing (EMT), or conduit, and must be installed and kept separate from all other building wiring.
2) All system components shall be securely supported independent of the wiring. Runs of conduit and wiring shall be straight, neatly arranged, properly supported, installed parallel and perpendicular to walls and partitions.
3) The sizes of the conductors shall be those specified by the manufacturer. Color coded wire shall be used. All wires shall be tagged at all junction points and shall be free from shorts, earth connections (unless so noted on the system drawings), and crosses between conductors. Final terminations between the SHP PRO control panel and the system field wiring shall be made under the direct supervision of a factory trained representative.
4) All wiring shall be installed by qualified individuals, in a neat and workmanlike manner, to conform to the National Electrical Code, Article 725, and Article 760, except as otherwise permitted for limited energy circuits, as described in NFPA 72 -1993 edition. Wiring installation shall meet all local, state, province and/or country codes.
5) The complete system electrical installation, and all auxiliary components, shall be connected to earth ground in accordance with the National Electrical Code.

I) SYSTEM INSPECTION and CHECKOUT:

After the system installation has been completed, the entire system shall be checked out, inspected and functionally tested by qualified, trained personnel, in accordance with the manufacturer's recommended procedures and NFPA standards.

1) All containers and distribution piping shall be checked for proper mounting and installation.
2) All electrical wiring shall be tested for proper connection, continuity and resistance to earth.
3) The complete system shall be functionally tested, in the presence of the owner or his representative, and all functions, including system and equipment interlocks, must be operational at least five (5) days prior to the final acceptance tests.

    a) Each detector shall be tested in accordance with the manufacturers recommended procedures, and test values recorded.
    b) All system and equipment interlocks, such as door release devices, audible and visual devices, equipment shutdowns, local and remote alarms, etc. shall function as required and designed.
    c) Each SHP PRO control panel circuit shall be tested for trouble by inducing a trouble condition into the system. shall be tested for trouble by inducing a trouble condition into the system.

J) TRAINING REQUIREMENTS:

Prior to final acceptance, the installing contractor shall provide operational training to each shift of the owners personnel. Each training session shall include system SHP PRO Control Panel operation, manual and (optional) abort functions, trouble procedures, supervisory procedures, auxiliary functions and emergency procedures.

K) OPERATION and MAINTENANCE:

Prior to final acceptance, the installing contractor shall provide complete operation and maintenance instruction manuals, four (4) copies for each system, to the owner. All aspects of system operation and maintenance shall be detailed, including piping isometrics, wiring diagrams of all circuits, a written description of the system design, sequence of operation and drawing(s) illustrating control logic and equipment used in the system. Checklists and procedures for emergency situations, troubleshooting techniques, maintenance operations and procedures shall be included in the manual.

L) RECORD DRAWINGS:

Upon completion of each system, the installing contractor shall provide system Record Drawings to the owner. The drawings shall show actual installation details including all equipment locations (i.e.: control panel(s), agent container(s), detectors, alarms, manuals and aborts, etc.) as well as piping and conduit routing details. Show all room or facilities modifications, including door and/or damper installations completed. One (1) copy of reproducible engineering drawings shall be provided reflecting all actual installation details.

M) ACCEPTANCE TESTS:

1) At the time Record Drawings and maintenance/operations manuals are submitted, the installing contractor shall submit a "Test Plan" describing procedures to be used to test the control system(s). The Test Plan shall include a step-by-step description of all tests to be performed and shall indicate the type and location of test apparatus to be employed. The tests shall demonstrate that the operational and installation requirements of this specification have been met. All tests shall be conducted in the presence of the owner and shall not be conducted until the Test Plan has been approved.
2) The tests shall demonstrate that the entire control system functions as designed and intended. All circuits shall be tested: automatic actuation, solenoid and manual actuation, HVAC and power shutdowns, audible and visual alarm devices and manual override of abort functions. Supervision of all panel circuits, including AC power and battery power supplies, shall be tested and qualified.
3) A room pressurization test shall be conducted, in each protected space, to determine the presence of openings, which would affect the agent system concentration levels. The test(s) shall be conducted using the Retro-Tec Corp. Door Fan system, or equivalent, with integrated computer program. All testing shall be in accordance with NFPA 2001, current edition.
4) If room pressurization testing indicates that openings exist which would result in leakage and/or loss of the extinguishing agent, the installing contractor shall be responsible for coordinating the proper sealing of the protected space(s) by the general contractor or his sub-contractor or agent. The general contractor shall be responsible for adequately sealing all protected space(s) against agent loss or leakage. The installing contractor shall inspect all work to ascertain that the protected space(s) have been adequately and properly sealed.

   Copies of successful test results shall be submitted to the owner for record.
5) Upon acceptance by the owner, the completed system(s) shall be placed into service.

N) WARRANTY:

1) All FIKE system components furnished, and installed under this contract, shall be guaranteed against defects in design, materials and workmanship for the full warranty period which is standard with the manufacturer, but in no case less than one (1) year from the date of system acceptance.

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POWER CALCULATIONS

VERIZON WIRELESS
EQUIPMENT ROOM – GENERATOR SHELTER
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POWER CALCULATIONS
EQUIPMENT ROOM

SINGLE HAZARD PANEL SHP PRO

Table 1

NORMAL (STANDBY) OPERATION

P/N		Quan.	x	mA		Totals
10-2452	**Controller**	1	x	135	=	135
	Auxillary Output	0	x	24	=	0
10-2204	**CRM4 Module**	1	x	0	=	0
	TOTAL NORMAL STANDBY CURRENT (mA)				=	**135**

Note: Controller Current includes power for the maximum number of two wire detectors.

Table 2

ALARM OPERATION

P/N		Quan.	x	Amps		Totals
10-2452	**Controller**	1	x	0.135	=	0.135
10-2204	**CRM4 Module (@ Relay)**	4	x	0.1	=	0.4
20-123-116	**Bell**	0	x	0.016	=	0
20-123-50	**Horn\Strobe**	1	x	0.208	=	0.208
20-123-46	**Strobe**	1	x	0.18	=	0.18
	TOTAL ALARM CURRENT DRAW (Amps)				=	**0.923**

Note: Controller Current includes power for 6 Impulse Val;ve Releasing Modules.

AMPERE - HOUR CALCULATIONS

				Totals
Total Standby Current (Standby Battery Current Total from Table 1 converted to amps)	x	**Standby Time** (24,60,90 Hours)	=	
0.135	x	**24**	=	3.24
Total Alarm Current Draw	x	**Req. Alarm Time** (5 min = 5, 10 min = 10, 15 = 15 min)	=	
0.923	x	**15**	=	0.249
Sum of Standby Current & Alarm Current Draw:			=	**3.489**
Multipy By Derating Saftey Margin Factor			x	1.2
Battery Size, Total Ampere Hours Required (Rounded Up)			=	**4.2**
DESIGNED BATTERY SIZE (Ampere-Hours) TO BE INSTALLED			=	**7**

Notes: Standby Current shall not exceed 1.000 Amps.
Alarm Current shall not exceed 4.135 Amps.

POWER CALCULATIONS
GENERATOR SHELTER

Table 1

NORMAL (STANDBY) OPERATION

P/N		Quan.	x	mA		Totals
10-2452	**Controller**	1	x	135	=	135
	Auxillary Output	0	x	24	=	0
10-2204	**CRM4 Module**	1	x	0	=	0
	TOTAL NORMAL STANDBY CURRENT (mA)				=	**135**

Note: Controller Current includes power for the maximum number of two wire detectors.

Table 2

ALARM OPERATION

P/N		Quan.	x	Amps		Totals
10-2452	**Controller**	1	x	0.135	=	0.135
10-2204	**CRM4 Module (@ Relay)**	4	x	0.1	=	0.4
20-123-116	**Bell**	0	x	0.016	=	0
20-123-50	**Horn\Strobe**	1	x	0.208	=	0.208
20-123-46	**Strobe**	1	x	0.18	=	0.18
	TOTAL ALARM CURRENT DRAW (Amps)				=	**0.923**

Note: Controller Current includes power for 6 Impulse Val;ve Releasing Modules.

AMPERE - HOUR CALCULATIONS

Total Standby Current (Standby Battery Current Total from Table 1 converted to amps)		**Standby Time** (24,60,90 Hours)		Totals
0.135	x	**24**	=	3.24
Total Alarm Current Draw		**Req. Alarm Time** (5 min = 5, 10 min = 10, 15 = 15 min)		
0.923	x	**15**	=	0.249
		Sum of Standby Current & Alarm Current Draw:	=	**3.489**
		Multipy By Derating Saftey Margin Factor	x	1.2
		Battery Size, Total Ampere Hours Required (Rounded Up)	=	**4.2**
		DESIGNED BATTERY SIZE (Ampere-Hours) TO BE INSTALLED	=	**7**

Notes: Standby Current shall not exceed 1.000 Amps.
Alarm Current shall not exceed 4.135 Amps.

SHP PRO ®
CONTROL SYSTEM

COMPONENTS

VERIZON WIRELESS
EQUIPMENT ROOM – GENERATOR SHELTER
23 Church Avenue
Peaks Island, ME 04108

SHP PRO

DESCRIPTION

The Fike SHP PRO™, (P/N 10-063) is a Conventional Control system designed to provide a sophisticated, reliable conventional detection system for use with clean agent extinguishing, sprinkler pre-action/deluge, watermist, waterflow alarm and fire alarm systems. It is a microprocessor based system which can be easily configured for a wide range of suppression applications.

The SHP PRO is designed for use with Fike Clean Agent Fire Suppressant, CO2, or sprinkler (pre-action/deluge) suppression systems. The main controller contains all electronics required for a complete detection and control system suitable for most applications. Optional modules, which plug into the main circuit board, are available to add increased functionality to the system.

The SHP PRO provides 10 Status LEDs (AC Normal, Alarm , PreDischarge, Release, Supervisory, Trouble, Panel Silenced, Abort, Release Disabled, Ground Fault) for instant feedback. A diagnostic LED display is provided to help trouble shoot any potential field problems, provide current status and retain stored events. A Reset and Silence switch is provided to allow control of the system outputs and operation.

APPROVALS

- UL S2203
- FM 3017159
- CSFM 1765-0900: 135
- MEA 461-04-E

Data Sheet

The SHP PRO can be configured for either one or two conventional detection circuits. The detection circuits can be configured for sequential detection, cross zone or single detector release.

Depending on the configuration selected, the SHP PRO also provides up to three initiating circuits to monitor contact devices (Abort, Manual Release, Waterflow or Supervisory switches). Four different abort types are available including a special NYC option. All five initiating circuits can be converted to Class A operation via the SHP PRO Class A Input Module, P/N 10-2450. All SHP PRO initiating circuits are inherently power limited. A twelve position dip switch is used to set all options.

Three notification appliance circuits, rated for 2 amps @ 24 VDC are available. Depending on the configuration, each circuit will provide distinct signaling for Alarm, PreDischarge, or Release conditions. Separate Agent Release and Solenoid circuits are provided to operate the suppression system. A dedicated Disable switch is provided for release and audible outputs. All output circuits, including solenoid and agent release circuits, are power limited.

The SHP PRO provides dedicated alarm, trouble and supervisory SPDT contacts for annunciation and control. If additional outputs are required, up to two CRM4 Relay Modules can be added. (P/N 10-2204)

The SHP PRO is available in multiple hardware configurations, depending on the input power source (120 or 240 VAC), enclosure color (Gray or Red), and mode of operation (Clean Agent, Clean Agent/Sprinkler, Sprinkler, Watermist, Solenoid Releasing). The system comes equipped with a 4.0 amp @ 24 VDC power source.

The system has been designed to comply with the following standards:

- NFPA 12 Carbon Dioxide
- NFPA 12A Halon 1301 Extinguishing Systems
- NFPA 13 Installation of Sprinkler Systems
- NFPA 15 Water Spray Fixed Systems
- NFPA 16 Deluge, Foam-water and Foam-spray Systems
- NFPA 70 National Electric Code
- NFPA 72 Installation, Maintenance and Use of Protective Signaling Systems
- NFPA 2001 Clean Agent Fire Extinguishing Systems

Form No. D.1.07.01-5

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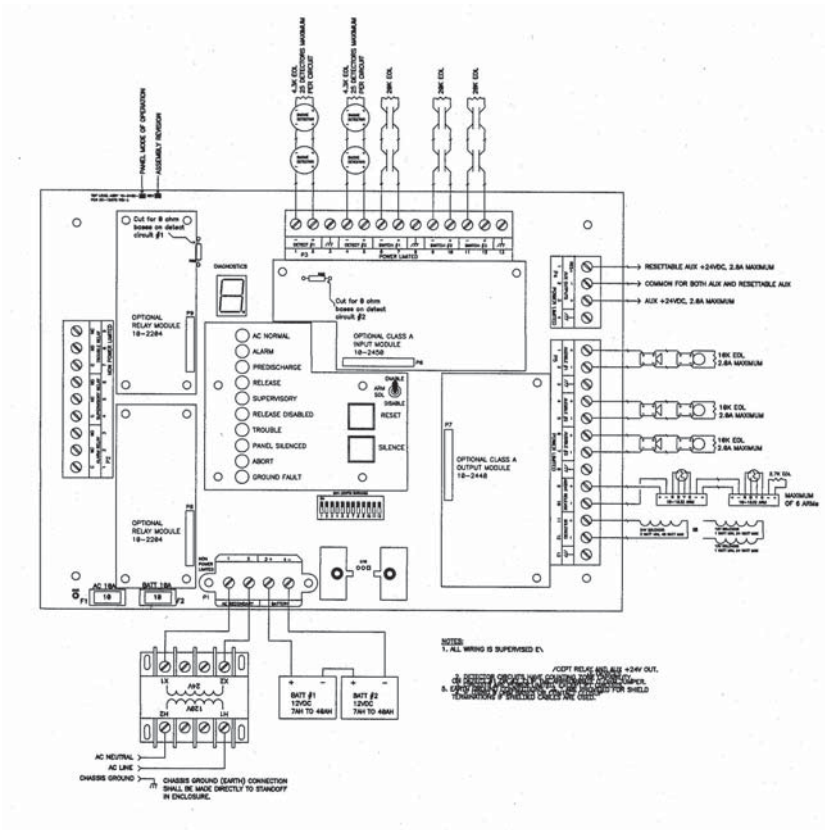
FEATURES

- Suitable for multiple types of Suppression: Clean Agent, Carbon Dioxide, Pre-Action Sprinkler/Deluge, and Watermist Systems
- Microprocessor based with hardware and software integration designed to guarantee reliability
- Cross zone, sequential manual release, abort, water flow and supervisory detection types
- Three Class B, Style Y notification appliance circuits rated for 2.0 amps @ 24VDC
- Dedicated release circuits compatible with agent release or solenoid actuation
- Five Class B, Style B initiating circuits
- Optional Class A modules for notification appliances/releasing circuits and initiating circuits
- Alpha-numeric LED display for status and troubleshooting
- Programmable pre-discharge and discharge timers
- Resettable and continuous auxiliary output power
- Integral 4.0 amp power supply
- Small surface or flush mount enclosure with removable door
- Approved for releasing device service and sprinkler supervisory
- Built-in Gentex and System Sensor synch protocol
- Steel enclosure 21" x 14.35" x 4"
- Enclosure equipped with .50" wide lip for flush mounting

SHP PRO™ WIRING DIAGRAM



COMPONENTS

- 10-063-X-X-X
- 10-063-X-X-X
  A B C

A: 1-Clean Agent/All Modes
2-Sprinkler only

B: R-Red
G-Gray

C: 1- 120 VAC
2- 240 VAC

- 10-2452-1 PCB Assy, SHP PRO, Clean Agent, All Modes
- 10-2452-2 PCB Assy, SHP PRO, Sprinkler Only
- 10-2450 Class A Input Module
- 10-2448 Class A Output Module
- 10-2204 CRM4 Relay Module
- 10-2190-1 Battery Assembly (Qty 2), 7AH, w/ wiring assembly
- 10-2190-2 Battery Assembly (Qty. 2), 18AH, w/ wiring assembly

Rechargeable Sealed Lead-Acid Battery

PS-1270

12 Volt 7.0 Amp. Hrs.

Features:

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

PERFORMANCE SPECIFICATIONS

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

Nominal Capacity

20 hour rate (350mA to 10.50 volts) ..... 7.0 A.H.

10 hour rate (650mA to 10.50 volts) ..... 6.5 A.H.

5 hour rate (1.2A to 10.20 volts) ..... 6.0 A.H.

1 hour rate (4.5A to 9.00 volts) ..... 4.5 A.H.

15 min rate (14A to 9.00 volts) ..... 3.5 A.H.

Approximate Weight..... 4.85 pounds (2.20 kg)

Energy Density (20 hour rate)..... 1.43 Watt-hours/cubic inch (87.3 Watt-hours/l)

Specific Energy (20 hour rate)..... 14.7 Watt-hours/pound (32.4 Watt-hours/kg)

Internal Resistance (Fully Charged Battery)..... 22 milliohms (approximately)

Maximum Discharge Current (≤ 7 Min.)..... 21 amperes

Maximum Short-Duration Discharge Current (≤ 10 Sec.)..... 70 amperes

Terminal configurations .....Quick disconnect tabs, "**F1**": 0.187" x 0.032", mate with AMP. INC. FASTON "187"
Quick disconnect tabs, "**F2**": 0.250" x 0.032", mate with AMP. INC. FASTON "250"

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

1 Month..... 97%

3 Months..... 91%

6 Months..... 83%

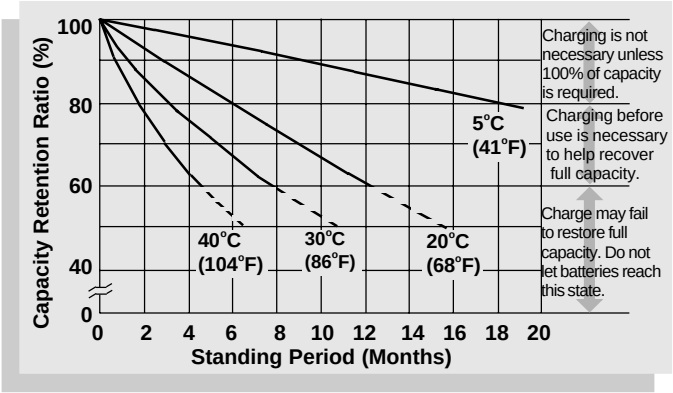
Operating Temperature Range

Charge..... -4°F (-20°C) to 122°F (50°C)

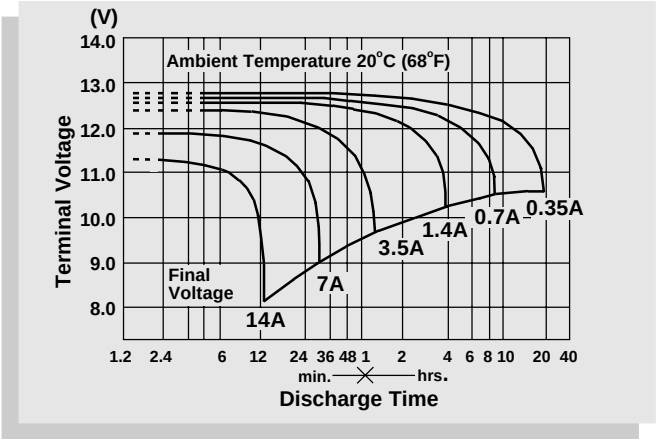
Discharge..... -4°F (-20°C) to 140°F (60°C)

Case..... ABS Plastic

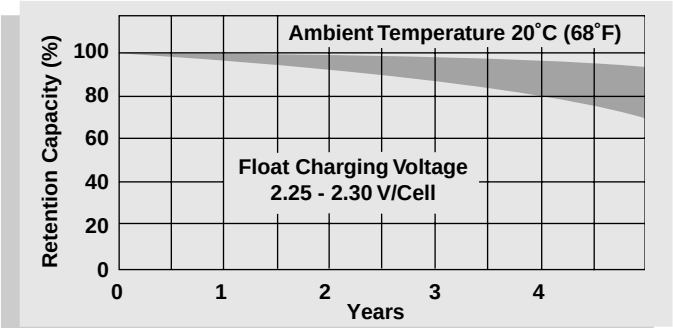
Shelf Life and Storage



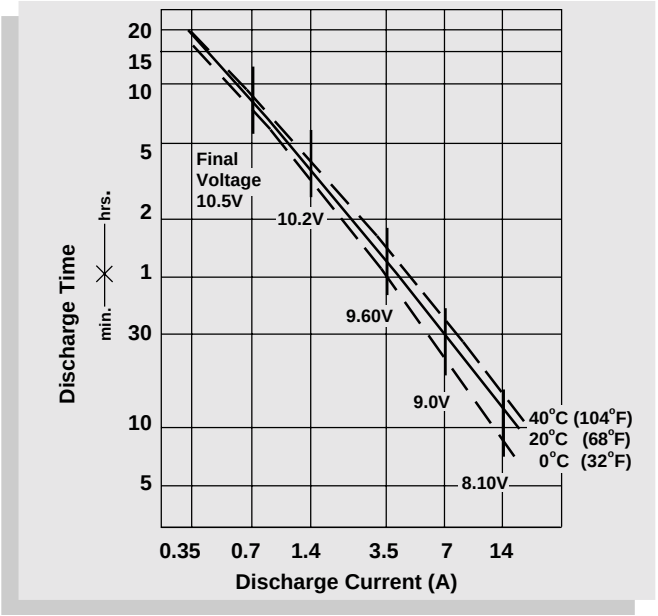
Discharge Characteristics



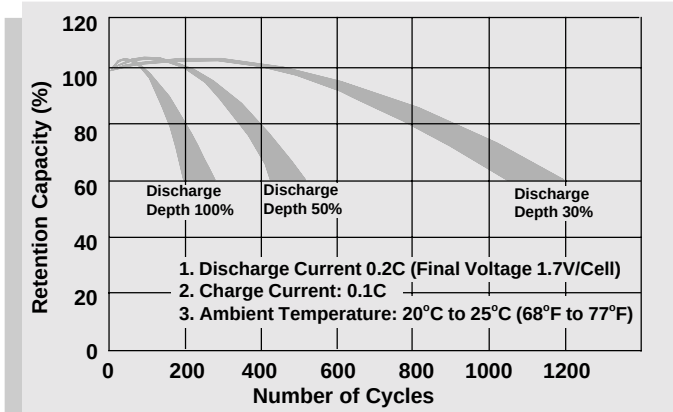
Life Characteristics in Stand-By Use



Discharge Time vs. Discharge Current



Life Characteristics in Cyclic Use



CHARGING

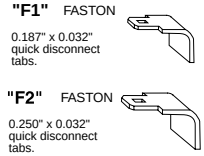
Cycle Applications: Limit initial current to 2.1A. Charge until battery voltage (under charge) reaches 14.40 to 14.70 volts at 68°F (20°C). Hold at 14.40 to 14.70 volts until current drops to approximately 70mA. Battery is fully charged under these conditions, and charger should either be disconnected or switched to "float" voltage.

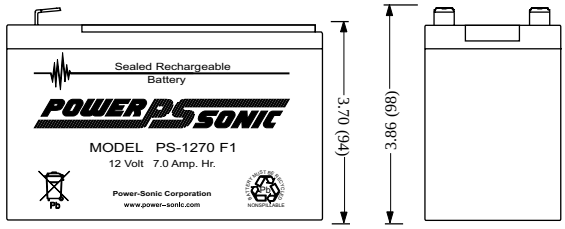
"Float" or "Stand-By" Service: Hold battery across constant voltage source of 13.50 to 13.80 volts continuously. When held at this voltage, the battery will seek its own current level and maintain itself in a fully charged condition.

NOTE: Due to the self-discharge characteristics of this type of battery, it is imperative that they be charged after 6-9 months of storage, otherwise permanent loss of capacity might occur as a result of sulfation.

Physical Dimensions: in. (mm)

Terminals





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

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FM39170

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11/04 1M

RELAY MODULE

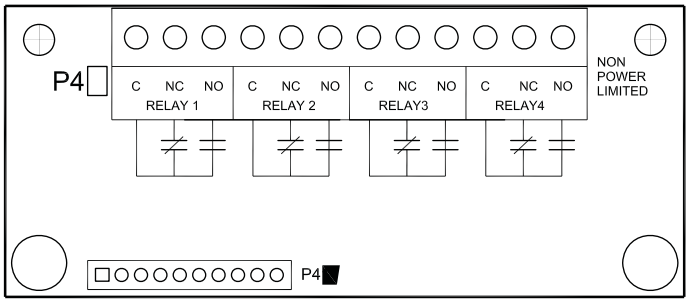
DESCRIPTION

The Relay Module (CRM4), P/N 10-2204, provides 4 additional independently programmed relays. CyberCat, Cheetah Xi, or SHP Control Panels can support 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. It interfaces to the main control board using four standoffs supplied with the CRM4.

SPECIFICATIONS

Standby Current:	0mA
Alarm Current:	0.010A per relay
Dimensions:	3-1/2" L x 1-1/2" H x 2" D
Weight:	0.10 lbs

WIRING DIAGRAM



APPROVALS

- UL - S2203
- FM - OB4A7AY
- MEA - 307-05-E
- CSFM - 7165-0900:137

Data Sheet

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Photoelectric Smoke Detectors

System Sensor i3™ series smoke detectors represent significant advancement in conventional detection. The i³ family is founded on three principles: installation ease, intelligence, and instant inspection.

Features

- Plug-in detector line, mounting base included
- Large wire entry port
- In-line terminals with SEMS screws
- Mounts to octagonal and single-gang back boxes, 4-square back boxes, or direct to ceiling
- Stop-Drop 'N Lock attachment to base
- Removable detector cover and chamber
- Built-in remote maintenance signaling
- Drift compensation and smoothing algorithms
- Simplified sensitivity measurement
- Wide-angle, dual-color LED indication
- Loop testing via EZ Walk feature
- Built-in test switch

Installation ease. The i³ line redefines installation ease with its plug-in design. This allows an installer to pre-wire bases (included with heads). The large wire entry port and in-line terminals provide ample room for neatly routing the wiring inside the base. The base accommodates a variety of back box mounting methods as well as direct mounting with drywall anchors. To complete the installation, i³ heads plug into the base with a simple Stop-Drop 'N Lock™ action.

Intelligence. i³ detectors offer a number of intelligent features to simplify testing and maintenance. Drift compensation and smoothing algorithms are standard with the i³ line to minimize nuisance alarms. 2-wire i³ detectors can generate a remote LED-indicated maintenance signal when connected to the 2W-MOD2 loop test/maintenance module or a panel equipped with the i³ protocol. The SENS-RDR, a wireless device, displays the sensitivityof i³ detectors in terms of percent-per-foot obscuration.

Instant inspection. The i³ series provides wide-angle red and green LED indicators for instant inspection of the detector's condition: normal standby, out-of-sensitivity, alarm, or freeze trouble. When connected to the 2W-MOD2 loop test/maintenance module or a panel with the i³ protocol, the EZ Walk loop test feature is available on 2-wire i³ detectors. This feature verifies the initiating loop wiring by providing LED status indication at each detector.

Agency Listings

UL LISTED	FM APPROVED		MEA approved	MSFM approved	ETL C US
S911	3011446	7272-1653:152	290-01-E	2093	3180932

Smoke Detector Specifications

Architectural/Engineering Specifications

Smoke detector shall be a System Sensor i³ Series model number_____, listed to Underwriters Laboratories UL 268 for Fire Protection Signaling Systems. The detector shall be a photoelectric type (Model 2W-B, 4W-B) or a combination photoelectric/thermal (Model 2WT-B, 4WT-B) with thermal sensor rated at 135°F (57.2°C). The detector shall include a mounting base for mounting to 3½-inch and 4-inch octagonal, single-gang, and 4-inch square back boxes with a plaster ring, or direct mount to the ceiling using drywall anchors. Wiring connections shall be made by means of SEMS screws. The detector shall allow pre-wiring of the base and the head shall be a plug-in type. The detector shall have a nominal sensitivity of 2.5 percent-per-foot nominal as measured in the UL smoke box. The detector shall be capable of automatically adjusting its sensitivity by means of drift compensation and smoothing algorithms. The detector shall provide dual-color LED indication that blinks to indicate power up, normal standby, out of sensitivity, alarm, and freeze trouble (Model 2WT-B, 4WT-B) conditions. When used in conjunction with the 2W-MOD2 module, 2-wire models shall include a maintenance signal to indicate the need for maintenance at the alarm control panel and shall provide a loop testing capability to verify the circuit without testing each detector individually.

Electrical Specifications

Operating Voltage	Nominal: 12/24 V non-polarized Minimum: 8.5 V Maximum: 35 V
Maximum Ripple Voltage	30% peak to peak of applied voltage
Standby Current	2-wire: 50 μA maximum average; 4-wire: 50 μA maximum average
Maximum Alarm Current	2-wire: 130 mA limited by control panel; 4-wire: 20 mA @12 V, 23 mA @ 24 V
Peak Standby Current	2-wire: 100 μA; 4-wire: n/a
Alarm Contact Ratings	2-wire: n/a; 4-wire: 0.5 A @ 30 V AC/DC

Physical Specifications

Dimensions (including base)	5.3 inches (127 mm) diameter; 2.0 inches (51 mm) height
Weight	6.3 oz (178 g)
Operating Temperature Range	2W-B and 4W-B: 32°F to 120°F (0°C to 49°C); 2WT-B and 4WT-B: 32°F to 100°F (0°C to 37.8°C)
Operating Humidity Range	0 to 95% RH non-condensing
Thermal Sensor	135°F (57.2°C) fixed
Freeze Trouble	2WT-B and 4WT-B only: 41°F (5°C)
Sensitivity	2.5%/ft nominal
Input Terminals	14 to 22 AWG
Mounting	3½-inch octagonal back box 4-inch octagonal back box Single-gang back box 4-inch square back box with a plaster ring Direct mount to ceiling

LED Modes			Power-Up Sequence for LED Indication	
LED Mode	**Green LED**	**Red LED**	**Condition**	**Duration**
Power up	Blink every 10 seconds	Blink every 10 seconds	Initial LED status indication	80 seconds
Normal (standby)	Blink every 5 seconds	off		
Out of sensitivity	off	Blink every 5 seconds		
Freeze trouble	off	Blink every 10 seconds		
Alarm	off	Solid		

Ordering Information

Model	Thermal	Wiring	Alarm Current
2W-B	No	2-wire	130 mA max. limited by control panel
2WT-B	Yes	2-wire	130 mA max. limited by control panel
4W-B	No	4-wire	20 mA @ 12 V, 23 mA @ 24 V
4WT-B	Yes	4-wire	20 mA @ 12 V, 23 mA @ 24 V

Accessories

2W-MOD2	2-wire loop test / maintenance module	RT	Removal / replacement tool
SENS-RDR	Sensitivity reader	A77-AB2	Retrofit adapter bracket, 6.6 inch (16.76 cm) diameter

SYSTEM SENSOR®

3825 Ohio Avenue • St. Charles, IL 60174
Phone: 800-SENSOR2 • Fax: 630-377-6495

A05-0318-007 • 6/09 • #2169

METAL CONVENTIONAL MANUAL PULL STATIONS

Data Sheet

DESCRIPTION

Fike's conventional line of metal pull stations are high quality, cost-effective series of manual fire alarm and suppression pull stations. They are designed to meet multiple applications with the installer and end-user in mind. The come in a variety of languages and models ranging from single and dual action to explosion proof and institutional versions as well to meet your specific application.

This family of pull stations provides conventional and intelligent control panels such as the CyberCat and Cheetah Xi, with an alarm initiating input signal. Its innovative design, durable construction, and multiple mounting options make them simple to install, maintain, and operate.

FEATURES

- Aesthetically pleasing, highly visible design
- Painted Die Cast Housing
- 14 Gauge Plated Steel Back Plate
- Corrosion Inhibited Surface
- 4 Position Terminal Block
- Single Gang Mounting
- 10 Amp Snap Action Switch
- Key lock access
- Easy glass rod replacement, no additional tools required
- Single and Dual Action models available
- "Fire" and "Fire Suppression Release" models available
- Explosion and Institutional models available
- Available in English, Spanish, and Portuguese

APPROVALS

- UL
- FM
- CSFM

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SPECIFICATIONS

Electrical

Switch:	10 amp @ 120vac
Gold Contact:	1.0 amp @ 120vac
Key Switch:	0.5 amp @ 30vdc

Dimensions

Standard:	Width	3.200in
	Length	4.750in
	Depth	0.875in
RMS-DAH:	Width	3.325in
	Length	4.750in
	Depth	1.625in
RMS-LP/LPH:	Width	3.200in
	Length	4.750in
	Depth	1.500in

Weight

Standard:	15.5oz
RMS-DAH:	1 lb 9oz
RMS-LP/LPH:	1 lb 4oz

Mount

Single gang

ORDERING INFORMATION

Fike P/N	Mfg P/N	Description
Fire Alarm		
20-1833	RMS-1T-KL	SPST Single Action RSG Keyed Metal “Fire” Manual Pull Station
20-1834	RMS-1T-KL-PT	SPST Single Action RSG Keyed Metal Portuguese “Fire”(FOGO) Manual Pull Station
20-1835	RMS-1T-KL-ES	SPST Single Action RSG Keyed Metal Spanish “Fire”(Fuego) Manual Pull Station
20-1836	RMS-1T-KL-LP	SPST Dual Action RSG Keyed Metal “Fire” Manual Pull Station
20-1837	RMS-1T-KL-LP-PT	SPST Dual Action RSG Keyed Metal Portuguese “Fire”(FOGO) Manual Pull Station
20-1838	RMS-1T-KL-LP-ES	SPST Dual Action RSG Keyed Metal Spanish “Fire”(Fuego) Manual Pull Station
Suppression		
20-1839	RMS-1T-KL-LP-S	SPST Dual Action RSG Keyed Metal “Fire Suppression Release” Manual Pull Station
20-1840	RMS-1T-KL-LP-S-PT	SPST Dual Action RSG Keyed Metal Portuguese “Fire Suppression Release”(Disparo de Supressao de Fogo) Manual Pull Station
20-1841	RMS-1T-KL-LP-S-ES	SPST Dual Action RSG Keyed Metal Spanish “Fire Suppression Release”(Descarga Sistema de Supresion) Manual Pull Station
Weatherproof		
20-1842	RMS-1T-KL-LP-WP	Weatherproof SPST Dual Action RSG Keyed Metal “Fire” Manual Pull Station
Explosion Proof		
20-1843	RMS-EXP-1T-KL-LP	Explosion proof SPST Dual Action RSG Keyed Metal “Fire” Manual Pull Station
Institutional		
20-1844	RMS-1T-KL-KO	Institutional “Fire” Key Operated Only Manual Pull Station
Spare Parts		
20-1092	RMS-GR	Glass rod replacement

Form No. P.1.158.01 January, 2012 Specifications are subject to change without notice.

CONTROL ACCESSORIES

MANUAL RELEASE SWITCH - 10-1638

DESCRIPTION

The Manual Release Switch is a dual actuation device which provides a means of manually discharging the automatic fire extinguishing system when used in conjunction with the Fike Control Panel.

To operate the Manual Release Switch pull the spring clip safety pin (breaking the seal) and depress the button. The switch will remain engaged until released by unlocking the button with a key. A single normally open contact block is provided. The front housing of the Release Switch is constructed of stainless steel with the keyed red plastic release button centered and bordered in black trim. The dimensions of this component are 4-1/2" wide, 4-9/16" high and 2-3/8" deep, and it may be mounted to a standard 4" electrical box or others. (Reference Data Sheet P.1.71.01).

SYSTEM ABORT SWITCH - 10-1639

DESCRIPTION

The System Abort Switch is designed to be used in conjunction with other system equipment. It provides a temporary manual means by which the system actuation circuit may be interrupted, when operated prior to the circuit actuation. The unit employs a momentary contact push button switch. While depressed, the switch causes the agent release circuit to be manually delayed. Upon release of the Abort Switch, the release circuit will follow the specific configuration of the system control panel.

The Abort Switch may be mounted to a standard 4" electrical box or others (Reference Data Sheet P.1.71.01).

MAIN-RESERVE SWITCH - 10-1640

DESCRIPTION

The "Main" to "Reserve" switch is used with systems that incorporate main and reserve (back-up) agent storage. The switch may utilize 1 or 2 Form "C" Contact blocks which will provide an electrical path to either the "Main" or "Reserve" releasing modules.

Following a system discharge, reset any field devices. Once all devices are in a stand-by status the Main-Reserve Switch may be moved to the "Reserve" position. The Control Panel may then be reset to ta normal mode for uninterrupted Fike protection. The empty "main" containers can be removed for recharge. After the containers in the "Main" system have been recharged, the switch may be returned to the "Main" position.

The switch may be mounted to a standard 4" electrical box or others
(Reference Data Sheet P.1.71.01).

APPROVALS

- UL Listed
- FM Approved
- CSFM Approved
- BSA

Data Sheet

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KEYED ABORT SWITCH - 10-1642

DESCRIPTION

The System Abort Switch is designed to be used in conjunction with other system equipment. It provides a temporary manual means by which the actuation circuit may be interrupted before automatic actuation occurs. The unit employs a keyed contact switch with two positions, normal and abort. While in the extreme left hand position the Abort Switch is in the "normal" mode. In the extreme right hand position the release circuit is manually delayed.

The Keyed Abort Switch may be mounted to a standard 4" electrical box or others (Reference Data Sheet P.1.71.01).

Note: Keyed abort is not recognized by approval/listing agencies.

KEYED REMOTE RESET - 10-1641

DESCRIPTION

The Keyed Remote Reset Switch provides a method for resetting the Control Panel from a remote location. To reset the Control Panel simply insert the key and turn in a clockwise direction. Upon release of the key the spring loaded switch will return to its original position.

The front housing of the Keyed Remote Reset Switch is constructed of stainless steel and is 4-1/2" wide, 4-9/16" high and 2-3/8" deep. It may be mounted to a standard 4" electrical box or others (Reference Data Sheet P.1.71.01)

Note: All numbers in this section reference switches and stainless steel face plates only, back box assemblies are not provided. All switches are CSA approved.

SELECTABLE CANDELA EVACUATION SIGNALS

Data Sheet

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 professtional 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.

Strobe *Horn/Strobe* *Horn*

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

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

Form No. P.1.62.01-1

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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.

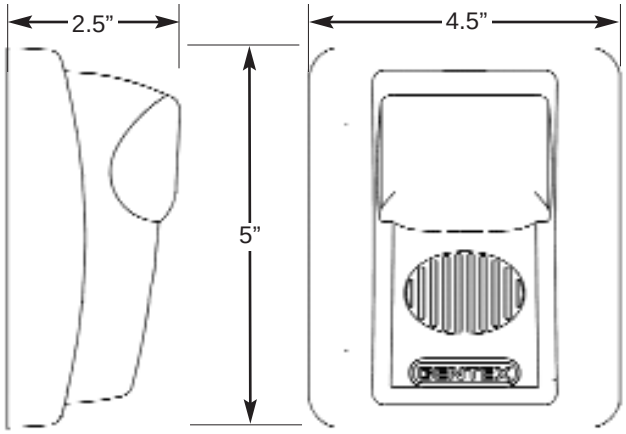
Fike does not recommend using a coded or pulsing signaling circuit with any of our strobe products (see Gentex Technical Bulletin Number 014)

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

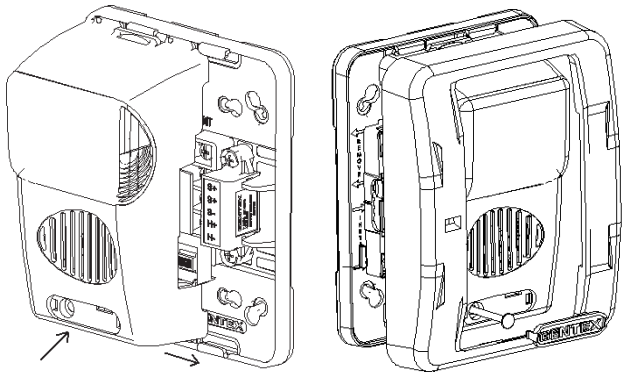
** Operating the horn in this mode at this voltage will result in not meeting the minimum UL reverberant sound level required for public mode fire protection service. These settings are acceptable only for private mode fire alarm use. Use the high dBA setting for public mode application (not applicable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

Dimensions

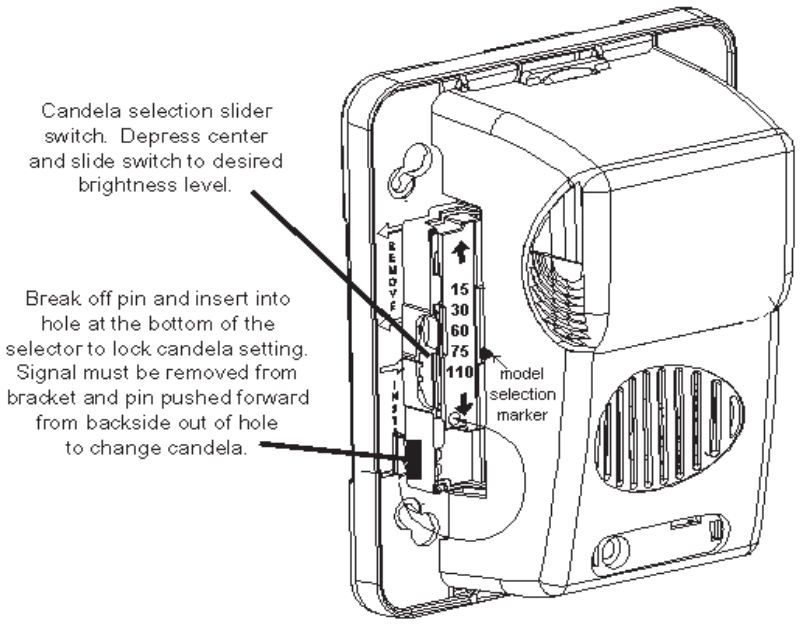


Mounting SuperSlide

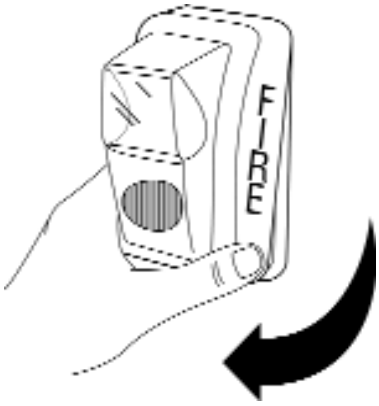


Die Cast Metal Mounting Plate: Mounts to a single gang, double gang 4” square boxes or GSB box.

Switch Locations

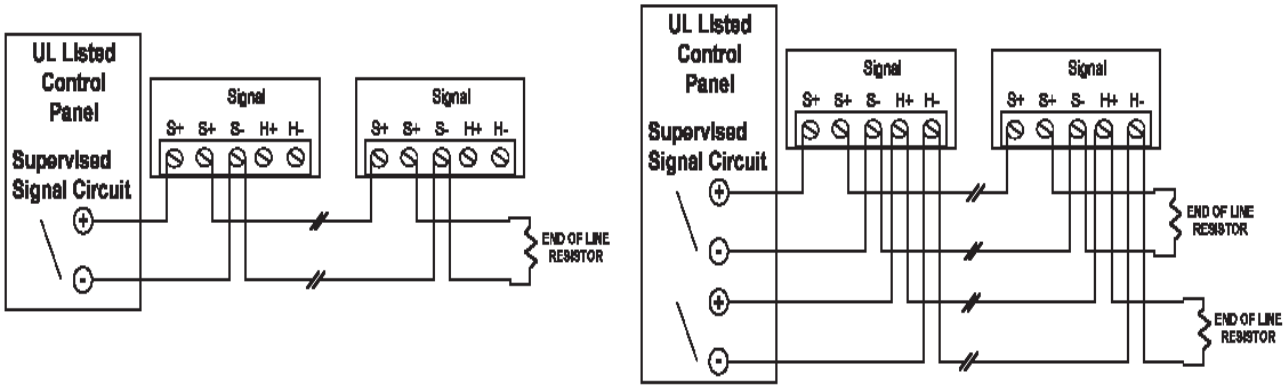


Removing Bezel

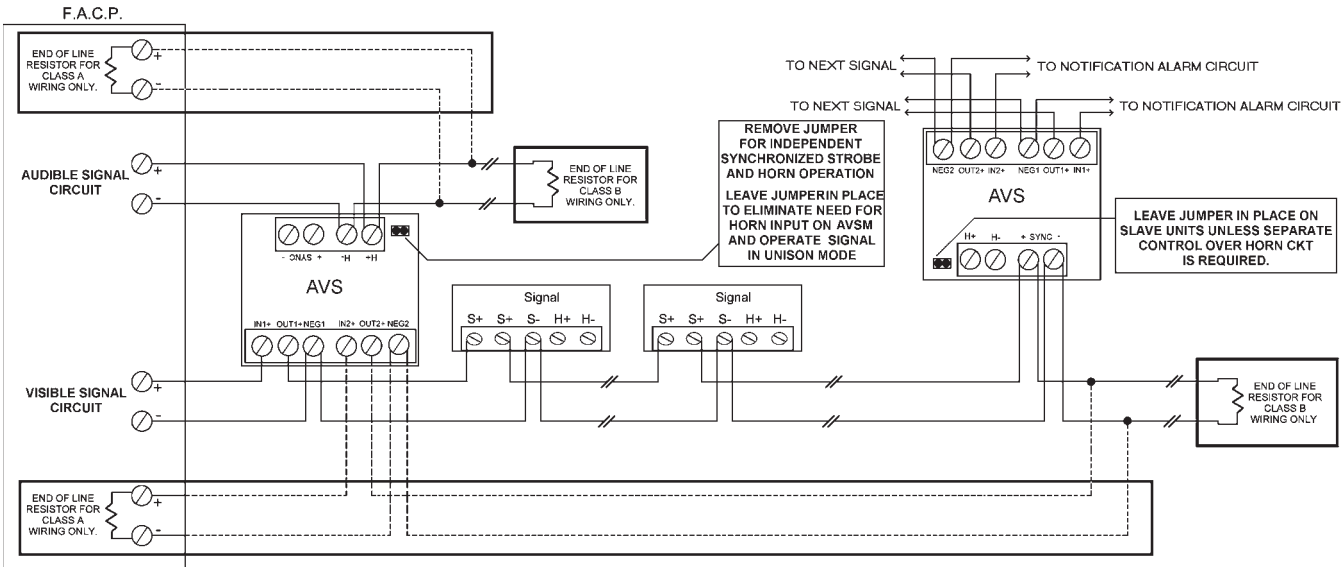


Grip both sides of bezel and pull in a downward and outward motion.

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 1971and/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 of 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.

FM-200 CLEAN AGENT ®
FIRE SUPPRESSION SYSTEM

COMPONENTS

VERIZON WIRELESS
EQUIPMENT ROOM – GENERATOR SHELTER
23 Church Avenue
Peaks Island, ME 04108

HFC-227EA AGENT

COMPONENT SHEET

CLEAN AGENT

Chemical Name	Heptafluoropropane
ASHRAE Designation	HFC-227ea
Listings and Approvals	UL Listed / FM Approved
FEATURES AND BENEFITS	Colorless, odorless, liquefied compressed gas
	Stored as a liquid
	Electrically-nonconductive
	Discharges as a gaseous vapor (due to its relatively low boiling point)
	Zero ozone depleting potential
	Low global warming potential
	Included on the U.S. EPA Significant New Alternative Policy (SNAP) rules

EXTINGUISHING METHOD

HFC-227ea extinguishes a fire primarily through Heat Absorption that occurs as the agent changes from a liquid to a vapor during discharge. In addition, HFC-227ea also disrupts the combustion reaction which aids in the extinguishment of a fire. It is important to note, HFC-227ea does not use the depletion of oxygen to extinguish a fire.

USE AND LIMITATIONS

HFC-227ea system shall be used on the following Class of Hazards:	**HFC-227ea systems shall "NOT" be used on fires involving the following materials:**
Class A & C: Electrical and Electronic Hazards Telecommunications Facilities High value assets, where the associated down-time would be costly	Chemicals or mixtures of chemicals that are capable of rapid oxidation in the absence of air. (Examples include: Cellulose Nitrate and Gunpowder)
	Reactive metals such as Lithium, Sodium, Potassium, Magnesium, Titanium, Zirconium, Uranium, and Plutonium
Class B: Flammable liquids and gases	Metal hydrides such as Sodium Hydride and Lithium Aluminum Hydride
	Chemicals capable of undergoing auto-thermal decomposition. (Examples: Organic Peroxides and Hydrazine)

EXPOSURE LIMITATIONS

Hazard Type	Design Concentration	Maximum Human Expose Time
Normally Occupied Space	6.25% to 10.5%	5 minutes
Not Normally Occupied Space	11.0% to 12.0%	30 seconds

NOTE: Fike does not recommend HFC-227ea systems to be used in any normally occupied spaces where the design concentration required is above **10.5%.**

WARNING: 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.

PHYSICAL PROPERTIES OF HFC-227ea

Chemical Name	1,1,1,2,3,3,3-Heptafluoropropane
Chemical Formula	CF_3 $CHFCF_3$
CAS No.	431-89-0
Molecular Wt.	170.03
Boiling Point, 1 atm, ^oC (^oF)	-16.4 (2.5)
Melting Point, ^oC (^oF)	-131 (-204)
Critical Temperature, ^oC (^oF)	101.6 (214.9)
Critical Pressure, kPa (psia)	2930 (424.7)
Critical Density, kg/m^3 (lb/ft^3)	621 (38.77)
Liquid Density @ 25 ^oC (77^oF), kg/m^3 (lb/ft^3)	1386 (86.53)
Vapor Density @ 25 ^oC (77^oF) and 1atm, kg/m^3 (lb/ft^3)	7.148 (0.4462)
Specific Heat, Liquid (Cp) @ 25^oC (77^oF), kJ/kg- ^oC (Btu/lb ^oF)	1.247 (0.2979)
Specific Heat, Vapor (Cp) @ 25^oC (77^oF), kJ/kg- ^oC (Btu/lb ^oF) and 1 ATM	0.8136 (0.1945)
Vapor Pressure, Saturated @ 25^oC (77^oF), kPa (psia)	453.3 (65.7)
Heat of Vaporization @ B.P., kJ/kg (Btu/lb)	132.6 (56.7)
Thermal Conductivity, Liquid @ 25^oC (77^oF),W/m- ^oC (Btu/hr-ft ^oF)	0.0533 (0.0308)
Thermal Conductivity, Vapor @ 25^oC (77^oF),W/m- ^oC (Btu/hr-ft ^oF)	0.0127 (0.0073)
Viscosity, Liquid (lb/ft-hr) @ @ 25^oC (77^oF), cP (lb/ft-hr)	0.2442 (0.5907)
Relative dielectric strength @ 1atm, 25 ^oC (N_2 =1)	2.00
Solubility of Water in HFC-227ea @ 20 ^oC (68 ^oC), ppm	600
Ozone Depletion Potential	0.0
Global Warming Potential, GWP (100 yr. ITH. For CO2, GWP = 1)	2900

AGENT STORAGE CONTAINER WITH HFC-227EA

COMPONENT SHEET

CONTAINER DATA / SPECIFICATIONS

Purpose	Pressure Vessel to hold agent until activated	
Listings and Approvals	UL Listed / FM Approved	
Container Super – Pressurization Level	360 psig at 70°F (24.8 bar at 21°C) after filling with dry nitrogen	
Container Storage Temperature Limitation	32°F (0°C) Minimum	130°F (54.4°C) Maximum
Container Rating	DOT 4BW500	TC 4BWM534
Container Actuation Methods	Electric / Pneumatic / Manual	
NOTE: If container temperatures exceeding 130°F (54.4°C), valve will open automatically, this also fulfills the pressure relief valve requirements in accordance with DOT regulations.		
Container Color Options	White (Default)	Red
Fill Increments	1.0 lbs.	0.5 kg
Fill Range	40 to 70 lbs/ft^3	630 to 1121 kg/m^3

Container		Fill Range		Valve Size	Tare Weight	Dimensions (approximate)		Mounting Position
Size	P/N	Minimum	Maximum			Diameter	Height	
Lb. (L)		lbs. (kg)	lbs. (kg)	in. (mm)	lbs. (kg)	in. (mm)	in. (mm)	
5 (2)	70-272	3 (2.0)	5 (2.5)	1 (25)	11 (5.0)	4.2 (102)	16.2 (411.5)	Upright (Valve Up)
10 (4)	70-273	6 (3.0)	10 (4.5)	1 (25)	15 (6.8)	4.2 (102)	27.24 (691.9)	Upright (Valve Up)
20 (8.5)	70-263	12 (5.5)	21 (9.5)	1 (25)	21 (9.5)	7.0 (178)	22.50 (571.5)	Upright – Horizontal
35 (15)	70-264	22 (10.0)	38 (17.0)	1 (25)	31 (14.1)	7.0 (178)	33.75 (857.3)	Upright – Horizontal
60 (27)	70-265	39 (18.0)	68 (30.5)	1 (25)	52 (23.6)	10.75 (273)	28.13 (714.4)	Upright – Horizontal
100 (44)	70-266	63 (28.5)	108 (49.0)	1 (25)	77 (34.9)	10.75 (273)	39.63 (1006.5)	Upright (Valve Up)
150 / 150i (61)	70-267	87 (39.5)	150 (68.0)	3 (80)	150 (68.0)	20.0 (508)	24.25 (616.0))	Upright – Inverted
215 (88)	70-268	124 (56.5)	216 (98.0)	3 (80)	155 (70.3)	20.0 (508)	30.13 (765.2)	Upright (Valve Up)
375 (153)	70-269	217 (98.5)	378 (171.5)	3 (80)	225 (102.1)	20.0 (508)	43.38 (1101.7)	Upright (Valve Up)
650 (267)	70-270	378 (171.5)	660 (299.0)	3 (80)	385 (174.6)	24.0 (610)	50.50 (1282.7)	Upright (Valve Up)
1000 (423)	70-271	598 (271.5)	1045 (474.0)	3 (80)	550 (249.5)	24.0 (610)	71.88 (1825.6)	Upright (Valve Up)

ITEMS SUPPLIED WITH CONTAINER ASSEMBLY

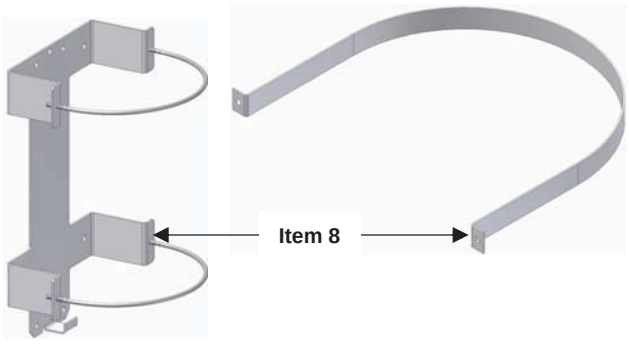
Item Number	Description	Component Sheet
1	Victaulic Coupling & Nipple	06-432-1-7
2	Impulse Valve	06-432-1-1
3	Pressure Gauge	06-433-1-3
4	Liquid Level Indictor (LLi)	06-432-1-2
5	LLi Boss (see note 1)	n/a
6	Nameplate (see note 2)	n/a
7	Siphon Tube (see note 3)	n/a
8	Mounting Straps & Brackets	06-432-1-4

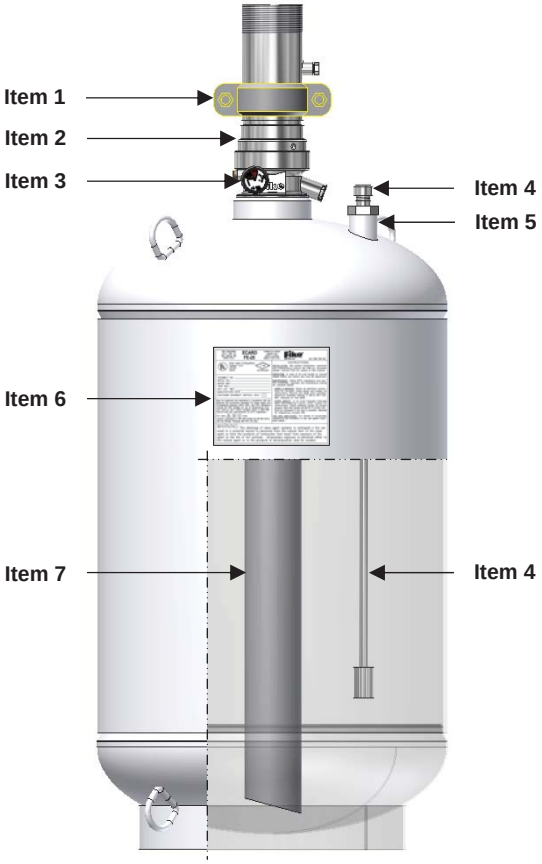
NOTES:

1) 100 thru 1000 lb. (44 thru 423 L) containers are equipped with a LLi Boss.

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 nameplate 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 & 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.





IMPULSE VALVE

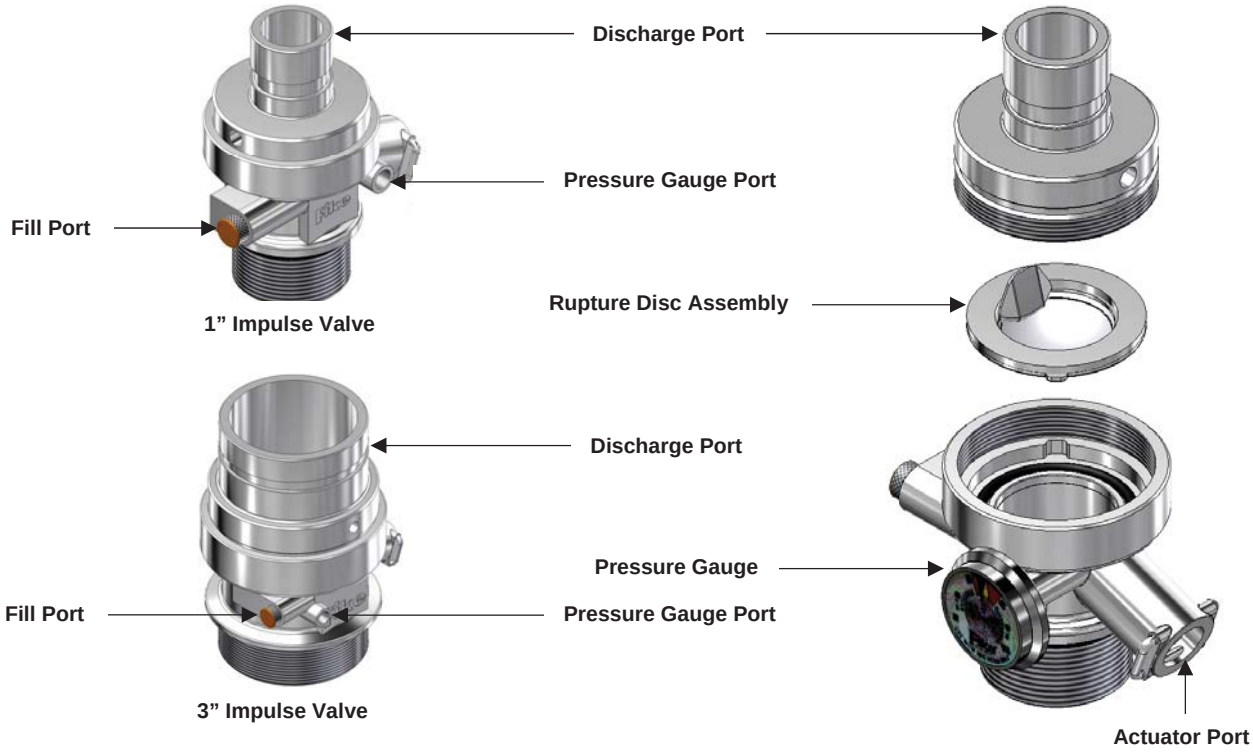
COMPONENT SHEET

The 1” & 3” Impulse Valves are a rupture disc (metal diaphragm), pressure operated device that allows the agent to be released from the container and into the protected enclosure via the associated piping network and discharge nozzle(s).

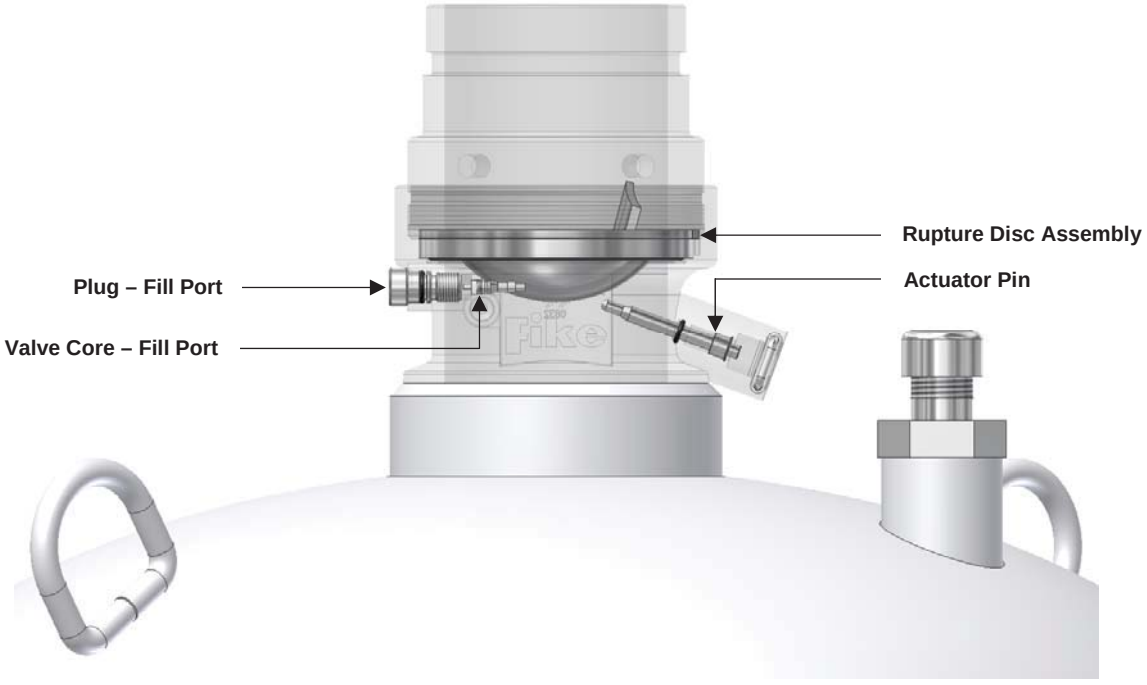
Fike Impulse Valves are equipped with four ports:

- Agent Discharge Port allows agent release from container and also fulfills the pressure relief valve requirements in accordance with DOT regulations.
- Agent Fill Port used to fill (refill) and pressurize the container and also used for the Low Pressure Switch.
- Actuator Port used to connect an Impulse Valve Operator (IVO) with Manual Strike Button for electric and manual actuation of the container or an Impulse Valve Pneumatic Operator (IVPO) for pneumatic operation.
- Pressure Gauge Port is used to connect a Pressure Gauge that will monitor internal container pressure, also equipped with an orifice plug that allows the pressure gauge to be removed safely when the container is pressurized.

COMPONENT	MATERIAL
Valve Body	Brass
Rupture Disc Assembly	Hastelloy C276/ 316SST
Listings and Approvals	UL Listed & FM Approved



Internal View – 1” Impulse Valve



Internal View – 3” Impulse Valve

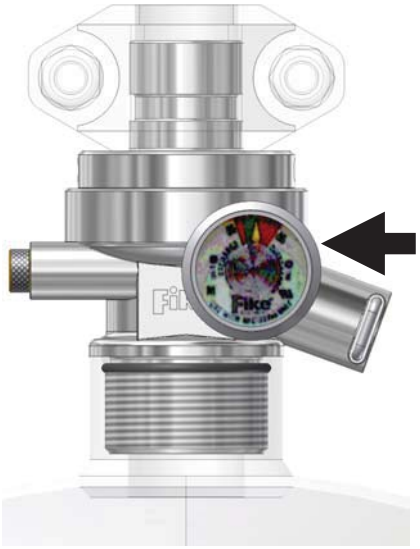
PRESSURE GAUGE – HFC-227EA

COMPONENT SHEET

All Fike Clean Agent Fire Suppression containers with HFC-227ea agent are provided with a pressure gauge (p/n 02-3594) to indicate the internal container pressure.

The pressure gauge scale is calibrated to show the actual pressure and is color-coded to show operating range, under-pressure range, and over-pressure range.

This gauge can be removed/replaced on a charged container without removing the agent first. This port works by allowing a small controlled amount of leakage past its internal threads. This provides enough flow to operate the pressure gauge while being small enough to allow the gauge to be removed safety.



Listings and Approvals UL Listed / FM Approved

INSTALLATION

The pressure gauge is installed on the container at the factory before the container is filled / shipped.

The container pressure needs to be checked as a part of the installation procedure. They should read 360 PSIG at 70°F (24.8 bar at 21°C). For temperatures other than 70°F (21°C), reference Figure 1 – Temperature vs. Pressure Chart.

Figure 1 – Temperature vs. Pressure Chart

US Standard		**Metric**	
Temperature (°F)	**Pressure** (psig)	**Temperature** (°C)	**Pressure** (bar)
32	288	0	19.9
40	303	4	20.9
50	321	10	22.1
60	340	16	23.4
70	360	21	24.8
80	381	27	26.2
90	402	32	27.7
100	425	38	29.3
110	449	43	31.0
120	475	49	32.8
130	502	54	34.6

REPLACEMENT PROCEDURE

The following procedure is used to replace the pressure gauge on a charged container.

CAUTION: When replacing a pressure gauge, do not allow the pressure port to remain open (disconnected) for an extended period of time. A significant quantity of agent could be lost from the container.

Step	Procedure
1	Place Teflon tape on the male thread connection of the replacement pressure gauge(s). **DO NOT** overlap the end of the connection – the first thread should be uncovered.
2	Remove the old pressure gauge.
3	Install the new pressure gauge.
4	Check the assembly for leaks using a suitable leak test device.

NOTE: Refer to the Recharge Manual for recommendations and leak test procedures.

LOW PRESSURE SWITCH

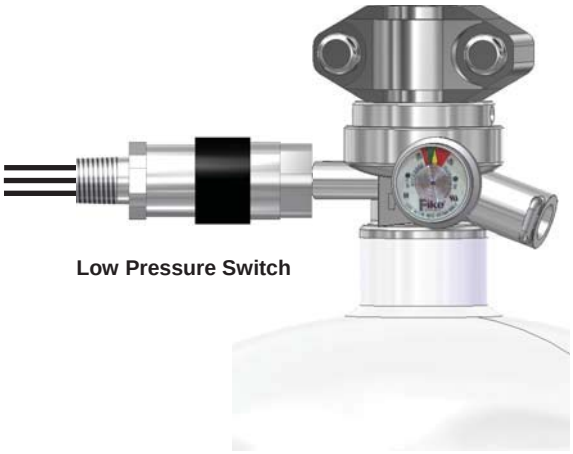
COMPONENT SHEET

Fike offers an optional Low Pressure Switch (LPS) for the purpose of continuously monitoring the container pressure for a low-pressure condition.

If the pressure inside the container drops below 288 psig (1986 kPa), the switch contacts will transfer and invoke a “supervisory” indication on the control panel.

The LPS is an optional item and must be ordered separately. This device is installed in the fill port on the container with an Impulse Valve.

The LPS can be installed when the container is charged without the concern of agent / pressure loss.



Low Pressure Switch

Container w/ Impulse Valve

SPECIFICATIONS – LOW PRESSURE SWITCH	
Part Number	02-12533
Temperature Limits	+32 to +130°F (0 to 54.4°C)
Enclosure Classification	NEMA 4
Contact Rating	Single pole, double throw; 5 amps resistive, 3 amps inductive @ 30VDC (can be wired for normally open or normally closed operation)
Body Material	Aluminum with irridite finish
Weight	6.5 ounces
Pressure Connection	M10 x 1-6G
Electrical Connection	1/2” NPT (15 mm)
LPS Length (approximate)	4 3/8” (111 mm) Long (including both connectors)
Wire Leads	(3) 18 gauge x 4.0 ft. (1.2m) long Violet (Common), Blue (N.O.), Black (N.C.)
Pressure Setting	288 psig (20 bar) (decreasing)
Listings and Approvals	UL Listed & FM Approved

MOUNTING STRAPS & BRACKETS

COMPONENT SHEET

Mounting Straps / Brackets are used to secure containers to a wall or other suitable mounting surface. These devices are supplied with each container purchased in accordance with the information shown below.

Mounting hardware is supplied by system installer.

CAUTION: Anchoring into plaster, sheetrock wall or any other facing material is NOT acceptable.

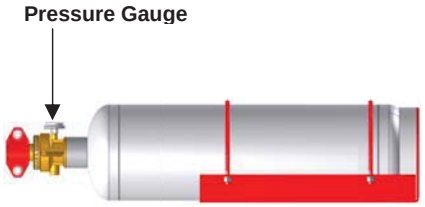
CONTAINER SIZE lb. (L)	**BRACKET PART NUMBER**
5 (2)	70-2135-X
10 (4)	70-2135-X
20 (8.5)	70-1372-X
35 (15)	70-1372-X
60 (27)	70-1070-X
100 (44)	70-1345-X
150 (61)	70-2146-X
150i (61)	70-2147-X
215 (88)	70-1310-X
375 (153)	70-1310-X
650 (267)	70-1384-X
1000 (423)	70-1384-X
Material	Carbon Steel
Bracket Color (see note)	White (Standard)
	Red
Listings and Approvals	UL Listed & FM Approved

NOTE: Container brackets have 2 paint options (White or Red). When ordering a container bracket the paint option must be specified. For a bracket painted white enter part number – W and for bracket painted red enter part number – R.

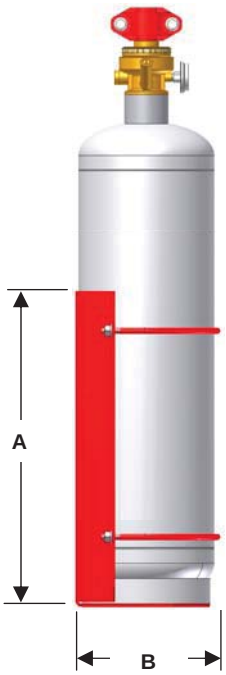
Example: 20 lb. container bracket painted white, the part number is 70-1372-W.

MOUNTING DETAILS – 5, 10, 20 & 35 LB. (2L, 4L, 8.5L & 15L) CONTAINERS

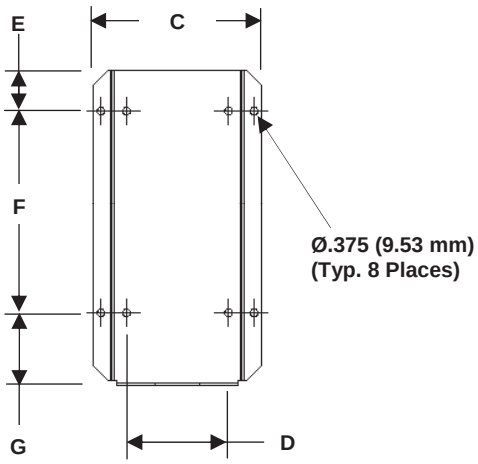
DIMENSION	CONTAINER SIZE				NOTES
	5 lb. (2L) in. (mm)	**10 lb. (4L)** in. (mm)	**20 lb. (8.5L)** in. (mm)	**35 lb. (15L)** in. (mm)	
A	12.3 (313)	12.3 (313)	16.3 (414)	16.3 (414)	When mounting the 20 & 35 lb. (8.5L to 15L) containers in the horizontal position (wall mount or sub-floor mount), the container valve "Pressure Gage" **MUST** point up. Failure to comply with this requirement will result in an incomplete discharge.
B	4.2 (102)	4.2 (102)	7.0 (178)	7.0 (178)	
C	5.7 (145)	5.7 (145)	8.2 (209)	8.2 (209)	
D	3.0 (76)	3.0 (76)	5.0 (127)	5.0 (127)	
E	2.5 (63.5)	2.5 (63.5)	3.0 (76)	3.0 (76)	
F	8.0 (203)	8.0 (203)	9.7 (246)	9.7 (246)	
G	n/a	n/a	3.6 (91)	3.6 (91)	
NOTE: All dimensions are approximate.					
MOUNTING POSITION	Upright (Valve Up)	Upright (Valve Up)	Upright – Horizontal	Upright – Horizontal	



IMPORTANT NOTE: The 5 & 10 lb. (2 & 4L) containers must be mounted in the vertical (valve up) position; they can NOT be mounted in the horizontal position. If mounted in horizontal position will result in an incomplete discharge.



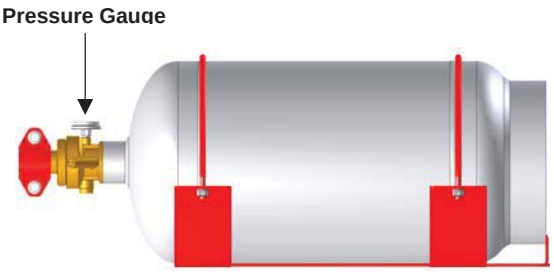
Side View

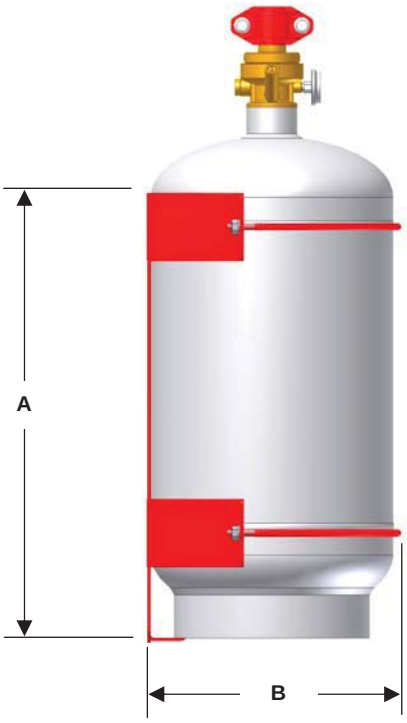


Front View

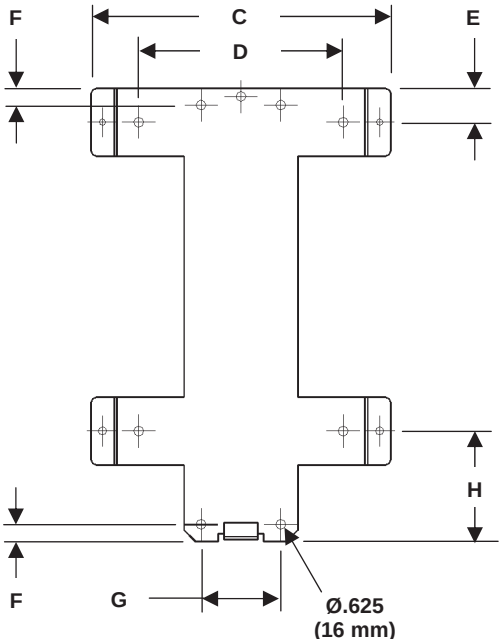
MOUNTING DETAILS – 60 LB. (27L) CONTAINERS

DIMENSION	in. (mm)	NOTES
A	20.00 (508)	When mounting the 60 lb. (27L) container in the horizontal position (wall mount or sub-floor mount), the container valve "Pressure Gage" **MUST** point up. Failure to comply with this requirement will result in an incomplete discharge.
B	10.75 (273)	
C	13.19 (335)	
D	9.00 (229)	
E	1.50 (38)	
F	0.75 (19)	
G	3.50 (89)	
H	4.88 (124)	
NOTE: All dimensions are approximate.		
MOUNTING POSITION	Upright – Horizontal	





Side View



Front View

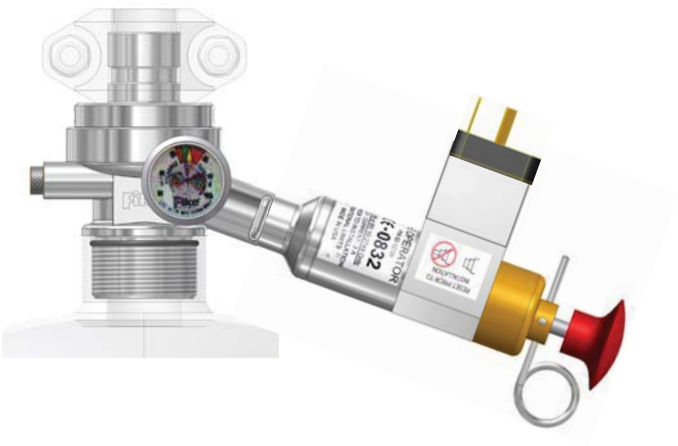
IMPULSE VALVE OPERATOR (IVO) KIT

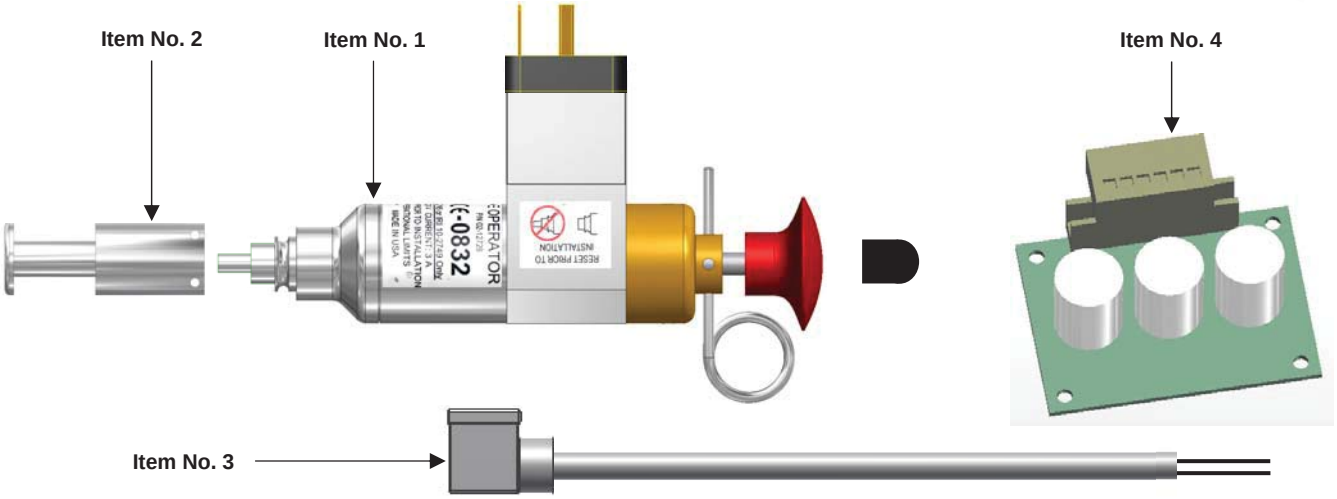
COMPONENT SHEET

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 buttom.

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.





SPECIFCATIONS – IMPULSE VALVE OPERATOR (IVO) KIT		
Item No.	**Part Number**	**Description**
1	02-12728	Impulse Valve Operator (IVO)
2	70-286	Reset Tool
3	02-12755	Wire Lead (5’ lg.) w/ Connector
4	10-2748	Impulse Releasing Module Assembly (IRM)
Normal Supply Voltage		24 VDC
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°F to 130°F (0°C to 54.4°C)
Listings & Approvals		UL Listed & FM Approved

PIPE AND FITTINGS

COMPONENT SHEET

Pipe and fittings used in Clean Agent System piping network must conform to the requirements as outlined in NFPA 2001, latest edition.

PIPING MATERIALS

Piping materials must conform to the requirements as outlined in NFPA 2001, latest edition. The thickness of the piping wall shall be calculated in accordance with ASME B31.1 Power Piping Code. For Fike Clean Agent System, w/ 360 psig (24.8 bar) working pressure, use a minimum piping design pressure of 500 psig (34.4 bar) at 70°F (21°C).

CAUTION: Cast iron pipe, steel pipe conforming to ASTM A120, or nonmetallic pipe **shall not** be used.	
The following piping materials and configurations are acceptable:	Schedule 40 Threaded, Welded & Grooved
	Schedule 80 Threaded & Welded

The following piping types and grades are acceptable for pipe configurations utilizing threaded, welded or grooved end connections:

Pipe Schedule	NPS Pipe Size	Wall Thickness	Grade / Type					
			A-106C	A-53B A-106B	A-53B	A-53A A-106A	A-53A	A-53F
			Seamless	Seamless	ERW	Seamless	ERW	Furnace
40	3/8	0.091	✓	✓	✓	✓	✓	✓
	1/2	0.109	✓	✓	✓	✓	✓	✓
	3/4	0.113	✓	✓	✓	✓	✓	✓
	1	0.133	✓	✓	✓	✓	✓	✓
	1 1/4	0.140	✓	✓	✓	✓	✓	✓
	1 1/2	0.145	✓	✓	✓	✓	✓	✓
	2	0.154	✓	✓	✓	✓	✓	✓
	2 1/2	0.203	✓	✓	✓	✓	✓	✓
	3	0.216	✓	✓	✓	✓	✓	✓
	4	0.237	✓	✓	✓	✓	✓	✓
	6	0.280	✓	✓	✓	✓	✓	✓

FITTING MATERIALS

Fitting materials **MUST** conform to the requirements outlined in NFPA 2001, latest edition.

FITTINGS SIZE	FITTING CLASS
Up to 3" NPT	Class 300 malleable or ductile iron
Over 3" NPT	1000 lb. ductile or forged steel
All pipe sizes	Class 300 flanged

NOTE: All grooved fittings must be UL Listed and conform to the pressure requirements outlined in NFPA 2001, latest edition. Cast Iron fittings are **NOT** acceptable.

PIPE SIZE CHANGE

Pipe size changes, to increase or decrease the size, can be done at three different locations in the piping network:

Pipe Size Change at a Tee	When the change in pipe size is done at a tee, this is accomplished by using either a reducing tee or a standard tee and reducing fittings. All reducers must be concentric bell reducers or concentric reducing couplings.
Pipe Size Change at an Elbow	When the change in pipe size is done at an elbow, this is accomplished by using either reducing elbows or a standard elbow with concentric bell reducers or concentric reducing couplings.
Pipe Size Change at a Coupling	When the change in pipe size accomplished at a coupling, only concentric bell reducers or concentric reducing couplings can be used.

NOTE: Reducing bushings, weld-o-let, and hole-cut fittings **"ARE NOT"** acceptable.

DISCHARGE NOZZLES – HFC-227EA

COMPONENT SHEET

The function of the Fike discharge nozzle is to control the agent flow and distribute the agent throughout the protected enclosure in a uniform, predetermined pattern and concentration.

The discharge nozzle size refers to the size of schedule 40 or 80 pipe that it can be connected to.

The discharge nozzle is mounted to allow the agent to be discharge on a horizontal axis.

The nozzle orifice area is determined be performing a hydraulic calculation using the Fike Engineered Flow Calculation program.

Nozzle 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.

360° Nozzle

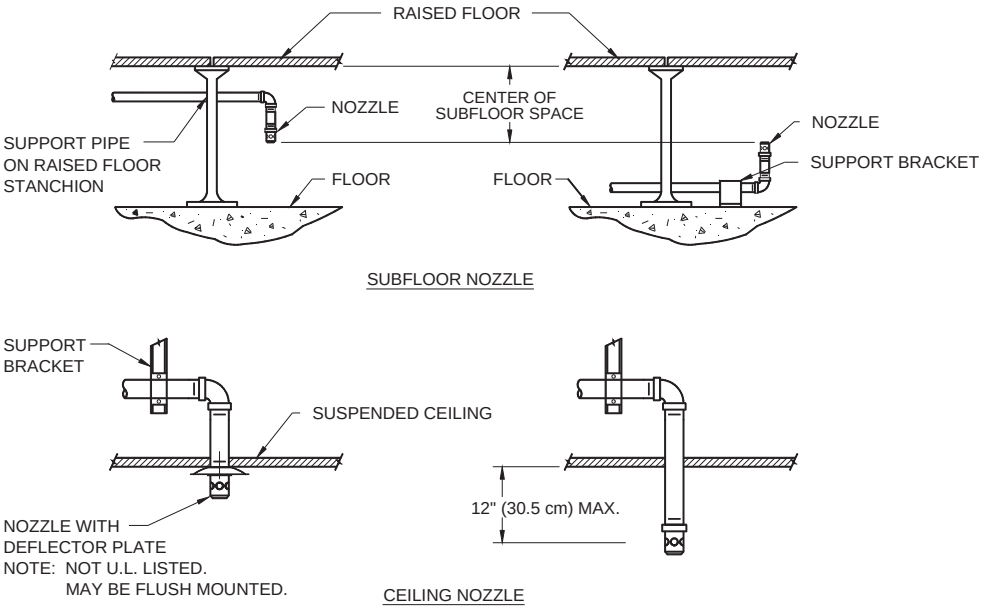
180° Nozzle

Nozzle Size in. (mm)	**360° Engineered Nozzles** (12 Orifices)			**180° Engineered Nozzles** (11 Orifices)			**Nozzle Length** (Approx.) in. (mm)
	Part Number	**Drill Diameter** (in)		**Part Number**	**Drill Diameter** (in)		
		Minimum	**Maximum**		**Minimum**	**Maximum**	
3/8 (10)	80-052-XXXX	0.0670	0.1250	80-060-XXXX	0.0670	0.1285	1.56 (40)
1/2 (15)	80-053-XXXX	0.0810	0.1590	80-061-XXXX	0.0860	0.1660	1.88 (48)
3/4 (20)	80-054-XXXX	0.1065	0.2090	80-062-XXXX	0.1130	0.2210	2.19 (56)
1” (25)	80-055-XXXX	0.1360	0.2660	80-063-XXXX	0.1440	0.2812	2.50 (64)
1 1/4 (32)	80-056-XXXX	0.1820	0.3480	80-064-XXXX	0.1875	0.3680	3.13 (79)
1 1/2” (40)	80-057-XXXX	0.2090	0.4130	80-065-XXXX	0.2188	0.4219	3.38 (86)
2 (50)	80-058-XXXX	0.2720	0.5312	80-066-XXXX	0.2812	0.5469	3.75 (95)
Material		Aluminum (anodized with a dull gray finish to prevent corrosion)					
Listings and Approvals		UL Listed / FM Approved					

INSTALLATION

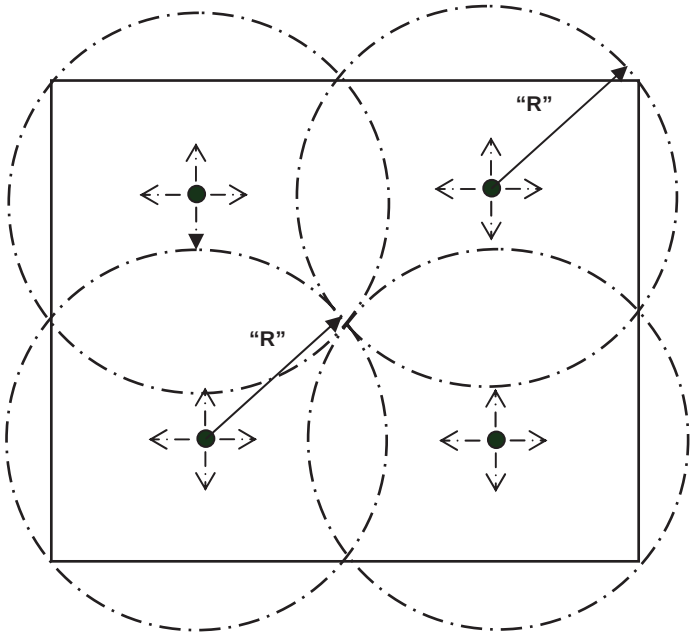
Always verify the nozzle identification number (stamped on the closed end of the nozzle) matches the nozzle part number listed on the system installation plans. All nozzle locations should be within 1'- 0" (0.3m) of their intended locations on the system plans. Discharge Nozzles must be mounted in the vertical position and can face either up or down.

CAUTION: The piping should be blown clear to remove chips, mill scale, or metal shavings before the nozzles are installed.



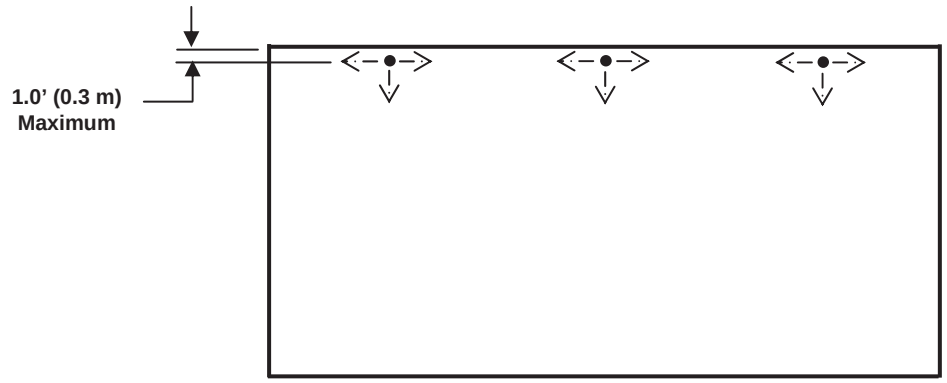
360° NOZZLES

360° Nozzles should be located in a symmetrical, or near symmetrical, pattern within the protected area. Nozzle patterns need to overlap, to adequately cover the area without any “blind spots” due to nozzle locations. Apply to all Nozzle types.



180° NOZZLES

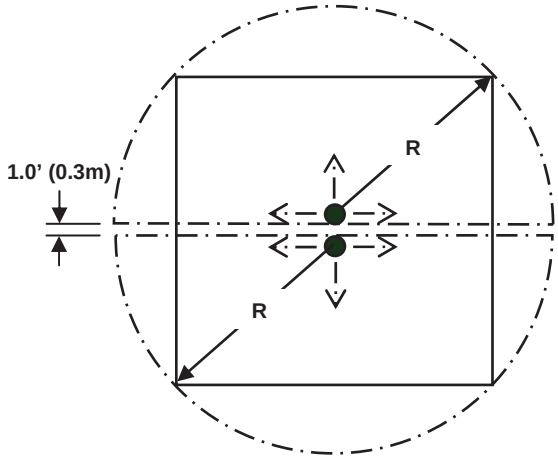
180° Nozzles should be located in a symmetrical, or near symmetrical, pattern within the protected area. 180° Nozzles should be located along the perimeter of the area – discharging along the perimeter and toward the opposite side. These nozzles can be located a maximum of 1'-0" (0.3 m) out from the wall.



180° NOZZLES – BACK to BACK APPLICATION

180° Nozzles can be installed in a back to back arrangement within the following limitations:

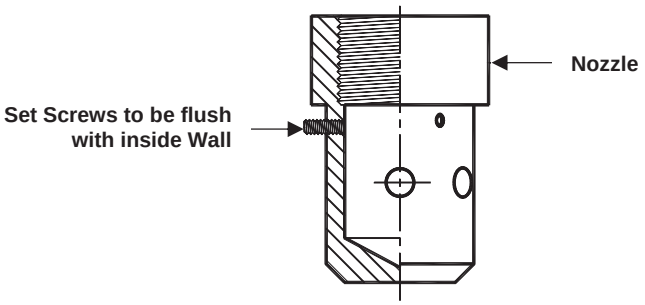
- Maximum distance between nozzles = 1.0' (0.3 m)
- Agent supplied and flow rate from both nozzles are the same.
- Pipe size from tee to both nozzles is the same.
- Pipe lengths from tee to each nozzle are within 10% of each other.



NOZZLE SET SCREW

Verify the Set Screws found on the side of the nozzle are in place after system installation.

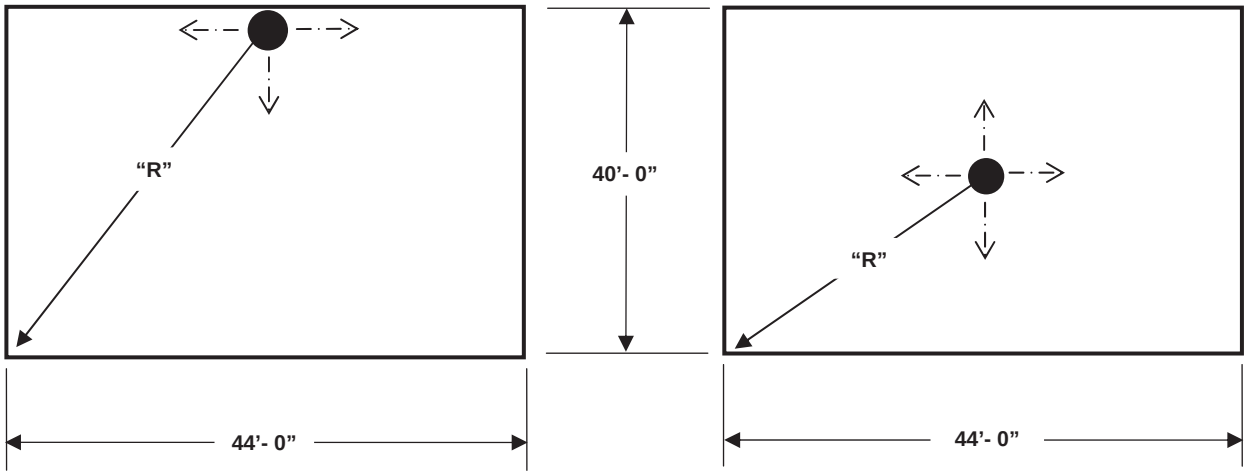
WARNING: Failure to have the setscrews in place will affect agent distribution and possibly the system's ability to suppress the fire.



NOZZLE AREA COVERAGE

Nozzle Size – 3/8” – 2” (10 – 50 mm)		
Nozzle Type	**Radius “R” Dimension** ft. (m)	**Ceiling Height Range** ft. (m)
180°	45.67 (14)	1.0 to 16.0 (0.3 to 4.9)
360°	29.67 (9)	1.0 to 16.0 (0.3 to 4.9)

Maximum Distance	180° Nozzle	360° Nozzle	Note
Below Ceiling	1.0 (0.3 m)	1.0 (0.3 m)	Maximum distance above highest point of protection when stacking nozzles.
Away from Sidewall	1.0 (0.3 m)		



CAUTION / ADVISORY SIGNS FOR HFC-227EA

COMPONENT SHEET

Caution / Advisory Signs are used to provide the necessary information to personnel in the area and to comply with NFPA 2001 requirements.

The caution lettering and backgrounds meet the requirements of ANSI Z535.

The signs are made from flame retardant, Lexan™ polycarbonate material. Each sign has an adhesive backing for mounting purposes.

Listings and Approvals UL Listed / FM Approved

Optional Item – Caution / Advisory signs must be ordered separately

CAUTION – AREA PROTECTED BY HFC-227ea SIGN – p/n 02-10139

Provided to alert personnel that the room is protected with an HFC-227ea system and that they should not enter the area during or after discharge.

The sign also indicates the requirement that all doors serving the protected area must be kept closed at all times.

The sign is 13.0” (330 mm) x 10.0” (254 mm), with black lettering on a yellow background for Caution and black lettering on a white background for Sign text.

CAUTION – SYSTEM DISCHARGE ALARM SIGN – p/n 02-10138

Provided to alert personnel that the room is protected with an HFC-227ea system and to evacuate the area when t he alarms sound.

This sign is provided to alert personnel that the room is protected with an HFC-227ea system and that they should not enter the area when the alarm sounds.

The sign is 9.0” (229 mm) x 6.0” (154 mm), with black lettering on a yellow background for Caution and black lettering on a white background for Sign text.

CAUTION – EXIT AREA SIGN – p/n 02-10105

Provided to explain the presence of notification devices that are located inside the protected space.

This sign explains that the HFC-227ea system will soon be discharged if the strobe light is flashing, and appropriate actions should be taken.

This sign should be placed at each strobe light location.

The sign is 9.0” (229 mm) x 6.0” (154 mm), with black lettering on a yellow background for Caution and black lettering on a white background for Sign text.

SYSTEM RELEASE SIGN – p/n 02-10137

Provided to identify each system release station associated with the HFC-227ea system.

This reduces the risk of a manual discharge station being mistaken for a fire alarm pull station.

This sign should be placed at each manual release station location for positive identification. This sign is 4.0” (102 mm) x 2.25” (57 mm), with black lettering on a white background.

MAIN / RESERVE SIGN – p/n 02-10107

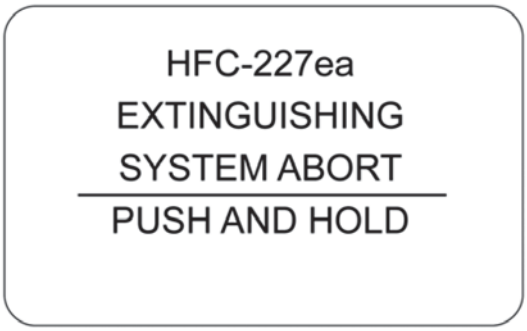
Provided to identify each system main/reserve station associated with the HFC-227ea system.

This sign clearly identifies the purpose of the switch.

This sign should be placed at each main/reserve station location for positive identification.

This sign is 4.0” (102 mm) x 2.25” (57 mm), with black lettering on a white background.

SYSTEM ABORT SIGN – p/n 02-10106



Provided to identify each system abort station associated with the HFC-227ea system.

This reduces the risk of an abort station being mistaken for a manual release or fire alarm pull station.

This sign should be placed at each abort station location for positive identification.

The sign is 4.0” (102 mm) x 2.25” (57 mm).

FIKE PRE-ENGINEERED
FM-200 CLEAN AGENT ®
FIRE SUPPRESSION SYSTEM
WITH
SHP PRO ®
CONTROL SYSTEM

MSDS

VERIZON WIRELESS
EQUIPMENT ROOM – GENERATOR SHELTER
23 Church Avenue
Peaks Island, ME 04108

The MSDS format adheres to the standards and regulatory requirements of the United States and may not meet regulatory requirements in other countries.

Material Safety Data Sheet

FM-200

6402FR Revised 28-FEB-2008

CHEMICAL PRODUCT/COMPANY IDENTIFICATION

Material Identification

FM-200 is a registered trademark of DuPont.

CAS Number	:	431-89-0
Formula	:	CF3 CHF CF3
Molecular Weight	:	170.03
CAS Name	:	Propane, 1,1,1,2,3,3,3-Heptafluoro-

Tradenames and Synonyms

FM200
FE-227
2-Hydroperfluoropropane
Propane, 1,1,1,2,3,3,3-Heptafluoro-
HFC-227eaHP
2-Hydroheptafluoropropane
Heptafluoropropane
2-H-heptafluoropropane
1,1,1,2,3,3,3-Heptafluoropropane
R-227
R227
HFC-227ea

Company Identification

MANUFACTURER/DISTRIBUTOR

DuPont Fluoroproducts
1007 Market Street
Wilmington, DE 19898

PHONE NUMBERS

Product Information	:	1-800-441-7515 (outside the U.S. 302-774-1000)
Transport Emergency	:	CHEMTREC 1-800-424-9300(outside U.S. 703-527-3887)
Medical Emergency	:	1-800-441-3637 (outside the U.S. 302-774-1000)

COMPOSITION/INFORMATION ON INGREDIENTS

Components

Material	CAS Number	%
1,1,1,2,3,3,3-Heptafluoropropane	431-89-0	99.95

HAZARDS IDENTIFICATION

Potential Health Effects

Based on animal data, overexposure to FM-200 by inhalation may cause suffocation, if air is displaced by vapors, and irregular heart beat with a strange sensation in the chest, "heart thumping," apprehension, lightheadedness, feeling of fainting, dizziness, weakness, sometimes progressing to loss of consciousness and death.

FM-200 may cause frostbite if liquid or escaping vapor contacts the skin.

FM-200 may cause "frostbite-like" effects if the liquid or escaping vapors contact the eyes.

In one study, human volunteers were selected to inhale FM-200 at a concentration of 6000 ppm but the study was terminated due to a rise in pulse rate that was believed to be unrelated to the chemical. In a subsequent study with human volunteers inhaling concentrations up to 8000 ppm no clinically significant effects were observed for any of the measured laboratory parameters.

Individuals with preexisting diseases of the cardiovascular system or nervous system may have increased susceptibility from excessive exposures.

Carcinogenicity Information

None of the components present in this material at concentrations equal to or greater than 0.1% are listed by IARC, NTP, OSHA or ACGIH as a carcinogen.

FIRST AID MEASURES

First Aid

INHALATION

If inhaled, immediately remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Call a physician.

SKIN CONTACT

Treat for frostbite if necessary by gently warming affected area.

EYE CONTACT

In case of contact, immediately flush eyes with plenty of water for at least 15 minutes. Call a physician.

(FIRST AID MEASURES - Continued)

INGESTION

Ingestion is not considered a potential route of exposure.

FIRE FIGHTING MEASURES

Flammable Properties

1,1,1,2,3,3,3-Heptafluoropropane is not flammable, however in the presence of a flame or ignition source it may decompose to form toxic hydrogen fluoride or carbonyl fluoride.

Non-flammable.

Extinguishing Media

Use media appropriate for surrounding material.

Fire Fighting Instructions

Self-contained breathing apparatus (SCBA) may be required if cylinders rupture or release under fire conditions. Keep cylinders cool with water spray applied from a safe distance.

ACCIDENTAL RELEASE MEASURES

Safeguards (Personnel)

NOTE: Review FIRE FIGHTING MEASURES and HANDLING (PERSONNEL) sections before proceeding with clean-up. Use appropriate PERSONAL PROTECTIVE EQUIPMENT during clean-up.

Evacuate personnel, thoroughly ventilate area, use self-contained breathing apparatus. Keep upwind of leak - evacuate until gas has dispersed.

Initial Containment

Use forced ventilation to disperse vapors.

HANDLING AND STORAGE

Handling (Personnel)

Do not breathe gas. Avoid contact with eyes, skin, or clothing. Wash thoroughly after handling. Wash clothing after use.

Storage

Store in a clean, dry place. Store below 52 C (126 F).

EXPOSURE CONTROLS/PERSONAL PROTECTION

Engineering Controls

Use only with adequate ventilation. Keep container tightly closed.

Personal Protective Equipment

EYE/FACE PROTECTION

Wear safety glasses or coverall chemical splash goggles.

RESPIRATORS

Wear NIOSH approved respiratory protection, as appropriate.

PROTECTIVE CLOTHING

Where there is potential for skin contact have available and wear as appropriate impervious gloves, apron, pants, and jacket.

Exposure Guidelines

Exposure Limits

FM-200

AEL * (DuPont)	: 1000 ppm, 8 & 12 Hr. TWA

* AEL is DuPont's Acceptable Exposure Limit. Where governmentally imposed occupational exposure limits which are lower than the AEL are in effect, such limits shall take precedence.

PHYSICAL AND CHEMICAL PROPERTIES

Physical Data

Boiling Point	: -16.4 C (2.5 F)
Melting Point	: -131 C (-204 F)
Vapor Pressure	: 65.7 psia @ 25 C (77 F) (453.3 kPa)
Liquid Density	: 1.386 g/cm3 @ 25 C (77 F) (86.53 lb/ft3)
Critical temperature	: 101.6 C (214.9 F)
Critical pressure	: 424.7 psia (2930 kPa)
Odor	: None.

(PHYSICAL AND CHEMICAL PROPERTIES - Continued)

Form : Liquefied Gas

STABILITY AND REACTIVITY

Chemical Stability

Stable at normal temperatures and storage conditions.

Avoid sources of heat or open flame.

Incompatibility with Other Materials

Incompatible with strong reducing agents such as alkali metals (e.g., sodium, potassium), alkali-earth metals (e.g., magnesium, calcium), and powdered aluminum or zinc.

Decomposition

Decomposes by reaction with high temperature (open flames, glowing metal surfaces, etc.) forming hydrofluoric acid, carbonyl fluorides, carbon monoxide and carbon dioxide.

Polymerization

Polymerization will not occur.

TOXICOLOGICAL INFORMATION

Animal Data

FM-200:

Inhalation 4 hour LC50: > 788,698 ppm in rats

Repeated exposure of rats by inhalation for 4 weeks at concentrations up to 50,000 ppm revealed no toxicologically significants effects. The NOEL for this study was 50,000 ppm. A 90-day inhalation study in rats did not find any exposure related effects at 105,000 ppm. The NOEL for this study was 105,000 ppm.

Cardiac sensitization, a potentially fatal disturbance of heart rhythm associated with a heightened sensitivity to the action of epinephrine, occurred in dogs at 105,000 ppm. The NOAEL for cardiac sensitization was 90,000 ppm. In a different study to evaluate cardiac sensitization in dogs, concentrations of 90,000, 105,000, and 140,000 ppm caused a dose-related increase in incidence and severity; at 90,000 ppm efffects were minimal or mild in nature.
Inhalation studies in rabbits and rats do not suggest developmental toxicity at concentrations up to

(TOXICOLOGICAL INFORMATION - Continued)

105,000 ppm. Tests have shown that FM-200 does not cause genetic damage in bacterial or mammalian cell cultures. Tests in animals for carcinogenicity or reproductive toxicity have not been conducted.

DISPOSAL CONSIDERATIONS

Waste Disposal

Treatment, storage, transportation, and disposal must be in accordance with applicable Federal, State/Provincial, and Local regulations. Incinerate material in accordance with Federal, State/Provincial and Local requirements.

TRANSPORTATION INFORMATION

Shipping Information

DOT

Proper Shipping Name	: Heptafluoropropane
Hazard Class	: 2.2
I.D. No. (UN/NA)	: UN 3296
DOT Label(s)	: Nonflammable Gas

REGULATORY INFORMATION

U.S. Federal Regulations

TSCA Inventory Status : Listed.

TITLE III HAZARD CLASSIFICATIONS SECTIONS 311, 312

Acute	: Yes
Chronic	: No
Fire	: No
Reactivity	: No
Pressure	: No

OTHER INFORMATION

NFPA, NPCA-HMIS

NFPA Rating

Health	: 1
Flammability	: 0
Reactivity	: 1

NPCA-HMIS Rating

Health	: 1
Flammability	: 0

(Continued)

Reactivity : 0

Personal Protection rating to be supplied by user depending on use conditions.

The data in this Material Safety Data Sheet relates only to the specific material designated herein and does not relate to use in combination with any other material or in any process.

Responsibility for MSDS : MSDS Coordinator
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This information is based upon technical information believed to be reliable. It is subject to revision as additional knowledge and experience is gained.

End of MSDS