NAFFCO
PASSION TO PROTECT

FM200 Fire Suppression System

UL FM

An Introduction to NAFFCO

NAFFCO FZCO is among the world's leading manufacturers and suppliers of top-tier firefighting equipment, fire protection systems, fire alarms, security and safety engineering systems worldwide. Since its humble beginnings, NAFFCO has grown from its headquarters in Dubai, UAE to expand to serving over 100 countries around the world.

One Stop Shopping for All Your Fire Safety and Security Needs

Today's companies recognize the importance and convenience of having multiple safety services available under one roof, a "one-stop shopping" source for all types of fire protection systems. As the undisputed leader in firefighting technology and fire safety solutions, NAFFCO has worked in both the private and government sectors, as well as manufacturing plants, hospitals, stadiums, malls and other organizational projects, delivering comprehensive fire safety and engineering solutions.

NAFFCO is associated with globally renowned international companies in the fire protection industry such as Esser, Secutron, Megalights, Evax, Fike, Central, Shield, Mueller, Giacomini, RB Pumps, Bombas, Ideal Pumps, Joslyn Pumps, Peerless Pumps.

At NAFFCO we are passionate about sustaining, upgrading and improving any means of safety, by having over 2 million square foot of manufacturing space, over 450 engineers, and following all the latest technology available. We live by our passion, the passion to protect.

FM-200® CLEAN AGENT FIRE SUPPRESSION SYSTEM

CLEAN AGENT: HFC-227ea (FM-200®)
CHEMICAL NAME: Heptafluoropropane ASHRAE Designation HFC-227ea
TRADE NAME: FM-200® (DuPont™)

PHYSICAL PROPERTIES

Chemical Name	Heptafluoropropane (CF_3CHFCF_3)
Molecular Weight	170.03
Boiling Point @ 760 mm Hg	3.9°F (-15.6°C)
Freezing Point	-204°F (-131.1°C)
Critical Temperature	215°F (101.7°C)
Critical Pressure (psia)	422 psia (2912 kPa)
Critical Volume (ft^3/lbm) (cc/mole)	0.0258 (274)
Critical Density (lbm/ft^3)	38.8 (621 kg/m^3)
Specific Heat, Liquid (BTU/lb-F°) @ 77°F (25°C)	0.283 (1.184 kj/kg/°C)
Specific Heat, Vapor (BTU/lb-°F) @ constant pressure of 1 ATM @ 77•F (25•C)	0.1932 (0.808 kj/kg/°C)
Heat of Vaporization (BTU/lb) at Boiling Point	57.0 (132.6 kj/kg)
Thermal Conductivity (BTU/h ft°F) of Liquid @ 77°F (25°C)	0.040 (0.069 w/m°C)
Viscosity, Liquid (lb/ft/hr) @ 77°F (24°C)	0.443 (0.184 centipoise)
Vapor Pressure (psia) @ 77°F (25°C)	66.4 (457.7 kPa)
Ozone Depletion Potential	0
Estimated Athmospheric Lifetime (years)	31 - 41
LC50 (Rats; 4hrs - ppm)	>788,000

FEATURES

- Colorless, odorless, liquified compressed gas, stored as a liquid.
- Electrically-nonconductive.
- Discharge as 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.

USE and LIMITATIONS

FM200 system shall be used on the following Class of Hazards:	FM200 systems shall "NOT" be used on fire involving the following materials:
Class A & C: Electrical and Electronic Hazards Telecommunication 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: Cellulo 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

AGENT STORAGE CONTAINER: FM-200®

FEATURES

- Pressure Vessel to hold agent until activated.
- 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
- Container Color Options
  White (Default)
  Red
- Fill Increments
  1.0 lbs (0.5 kg)
- Fill Range
  40 to 70 lbs/ft3 (630 to 1121 kg/m3)

**If container temperatures exceeds 130°F (54.4°C), valve will open automatically, this also fulfills the pressure relief valve requirements in accordance with DOT regulations.*

PRODUCT APPROVALS

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Container		Fill range		Valve Size	Tare Weight	Dimension (approximate)		Mounting Position
Size Lb. (L)	P/N	Minimum lbs. (kg)	Maximum lbs. (kg)	in. (mm)	lbs. (kg)	Diameter in. (mm)	Height in. (mm)	
20* (8)	NF-70.263	12 (5.5)	21 (9.5)	1 (25)	21 (9.5)	7.0 (178)	22.375 (568.3)	Upright - Horizontal
35* (15)	NF-70.264	22 (10.0)	38 (17.0)	1 (25)	31 (14.5)	7.0 (178)	32.5 (825.5)	Upright - Horizontal
60* (27)	NF-70.265	39 (18.0)	68 (30.5)	1 (25)	52 (23.6)	10.75 (273)	28 (711.2)	Upright - Horizontal
100* (44)	NF-70.266	63 (28.5)	108 (49.0)	1 (25)	77 (34.9)	10.75 (273)	38.75 (984.3)	Upright - (Valve Up)
150/150i (61)	NF-70.267	87 (39.5)	150 (68.0)	3 (80)	150 (68.0)	20.0 (508)	23.63 (600.1)	Upright/ Inverted
215 (88)	NF-70.268	124 (56.5)	216 (98.0)	3 (80)	155 (70.3)	20.0 (508)	28.87 (733.3)	Upright - (Valve Up)
375 (153)	NF-70.269	217 (98.5)	378 (171.5)	3 (80)	225 (102.1)	20.0 (508)	42.5 (1079.5)	Upright - (Valve Up)
650 (267)	NF-70.270	378 (171.5)	660 (299.0)	3 (80)	385 (174.6)	24.0 (610)	50.625 (1286)	Upright - (Valve Up)
1000 (423)	NF-70.271	598 (271.5)	1045 (474.0)	3 (80)	550 (249.5)	24.0 (610)	70 (1778)	Upright - (Valve Up)

IMPULSE VALVE

FEATURES

- 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).
- Agent Discharge Port allows agent release from container and also fulfills the pressure relief valve requirements in accordance with DOT regulations.
- Agent Fill Port is used to fill (refill) and pressurize the container and also used for the Low Pressure Switch.
- Actuator Port is 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.

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MODEL NF-06-520

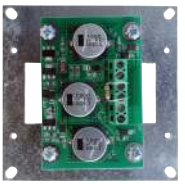
COMPONENT	MATERIAL
Valve Body	Brass
Rapture Disc Assembly	Hastelloy C276/316SST

IMPULSE VALVE OPERATOR (IVO) KIT
MODEL: NF-70-279

1


3


2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FEATURES

- Provides the means to electrically or manually activate the 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 NAFFCO control panel or manually by depressing red strike buttom.
- NAFFCO 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.

PRODUCT APPROVALS

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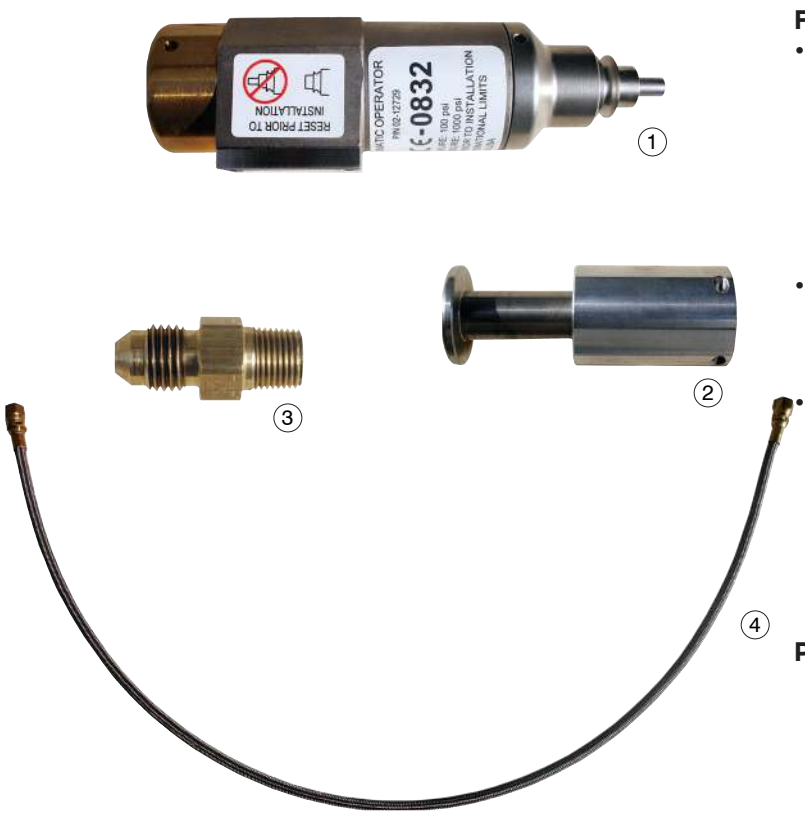
ITEM No.	MODEL	DESCRIPTION
1	NF-02-12728	Impulse Valve Operator (IVO)
2	70-286	Reset Tool
3	02-12755	Wire Lead (3' long.) w/ Connector
4	NF-10-2748	Impulse Releasing Module Assembly (IRM)
Normal Supply Voltage		24 VDC
Current Consumption		0 Amps (for Battery Calculation)
Electrical Consumption		DIN Connector 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)

IMPULSE VALVE PNEUMATIC OPERATOR (IVPO) KIT
MODEL: NF-70-280



FEATURES

- The Impulse Valve Pneumatic Operator (IVPO) provides the means to pneumatically activate the 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 IVPO is installed in systems utilizing multiple clean agent containers..
- NAFFCO Clean Agent Containers with IVPO are operated by pneumatic pressure from Container with Impulse Valve Operator (IVO).

PRODUCT APPROVALS

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ITEM No.	MODEL	DESCRIPTION
1	NF-02-12729	Impulse Valve Pneumatic Operator (IVPO)
2	70-286	Reset Tool
3	02-4543	⅛" x ¼" JIC Adaptor
4	02-4977	¼" JIC x 3.0' lg. Actuation Hose
IVPO Material		Stainless Steel (Body) / Brass (End Cap)
Pneumatic Connection		⅛" NPT
Temperature Range		32°F to 130°F (0°C to 54.4°C)

IMPULSE RELEASE MODULE

FEATURES

- The Impulse Releasing Module provides the primary interface between the supervised releasing circuit(s) of a NAFFCO fire suppression system and the Impulse Valve Operator (IVO); which is used to release the fire suppressant agent from an impulse valve container.
- The IRM is equipped with three capacitors that receive a constant charging current from the releasing circuit of the control panel. When fully charged, the module is capable of firing a single IVO.
- Upon circuit activation, the output circuit reverses its output voltage polarity, causing the energy in the capacitors to be released to the Impulse Valve Operator.
- Each IRM is equipped with a red LED to provide positive indication that the module is in the active (release) state.

MODEL	NF-10-2748
CURRENT CONSUMPTION	+24V Supervisory: 20.0 ma (during capacitor charging), 3.0 ma (after capacitor is charged) -24V Activated: -37.0 ma (LED active)
TEMPERATURE	32°F to 130°F (0° to 54.4°C), 93% maximum humidity
MODULE WIRING	Control panel to IRM connections are supervised and power-limited Impulse Valve Operator connection is non-supervised and power-limited
COMPATIBLE ACTUATION DEVICES	NF-02-12728, Impulse Valve Operator (IVO)
COMPATIBLE RELEASING PANELS	NAFFCO Single Hazard Panel*

**Note: A maximum of six IRM's, wired in parallel,can be connected to each panel's releasing circuit.*

LOW PRESSURE SWITCH

FEATURES

- Continuously monitors 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.
- Installed in the fill port on the container with an Impulse Valve.
- Can be installed when the container is charged without the concern of agent/pressure loss.

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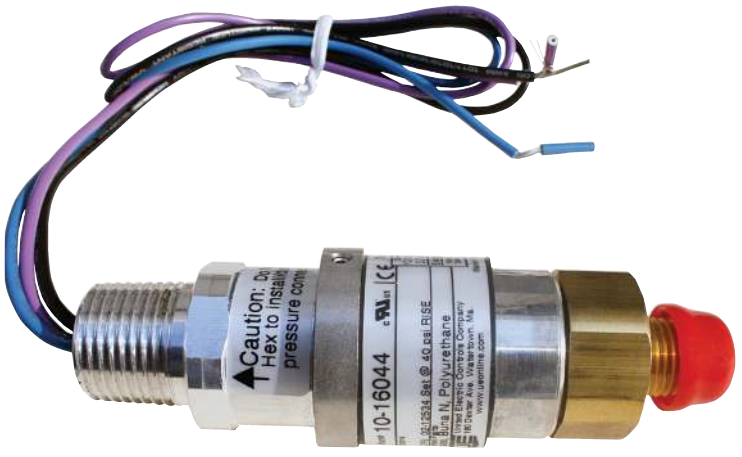
MODEL	02-12533
TEMPERATURE LIMITS	+32 to +130°F (0 to 54.4°C)
ENCLOSURE CLASSIFICATION	NEMA 4
CONTACT RATING	Single pole, double throw; 5 amps resistive, 3 amps inductive @ 30VDC
BODY MATERIAL	Aluminum with irridite finish
WEIGHT	6.5 ounces
PRESSURE CONNECTION	M10 x 1-6G
ELECTRICAL CONNECTION	1/2” NPT (15 mm)
PRESSURE SETTING	288 psig (20 bar) (decreasing)

DISCHARGE PRESSURE SWITCH



FEATURES

- Used to provide a positive pneumatic confirmation to the control system that the NAFFCO Fire Suppression system has been discharged.
- When a system is discharged manually (by Impulse Valve Operator (IVO) with Strike Button), the discharge pressure switch is required to provide the input to the control system needed to activate various audio/visual warning devices and auxiliary relays.
- The switch is operated pneumatically using the agent pressure in the discharge piping network.

PRODUCT APPROVALS

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MODEL	02-12534
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
BODY MATERIAL	Aluminum with irridite finish
WEIGHT	6.5 ounces
PRESSURE CONNECTION	¼" NPT (6 mm)
ELECTRICAL CONNECTION	½" NPT (15 mm)
PRESSURE SETTING	40 psig (3 bar) (increasing)

ENGINEERED DISCHARGE NOZZLES

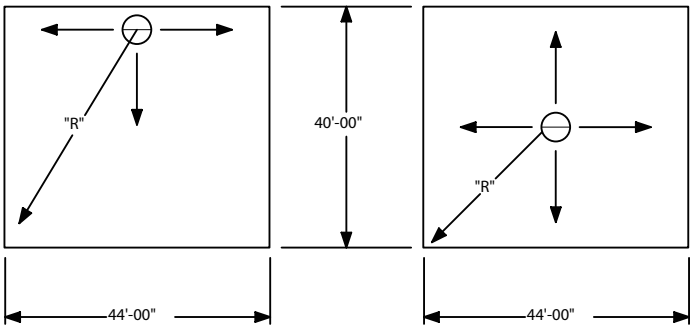
360° Nozzle

180° Nozzle

FEATURES

- 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 NAFFCO 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 NAFFCO factory.

NOZZLE SIZE AND AREA COVERAGE



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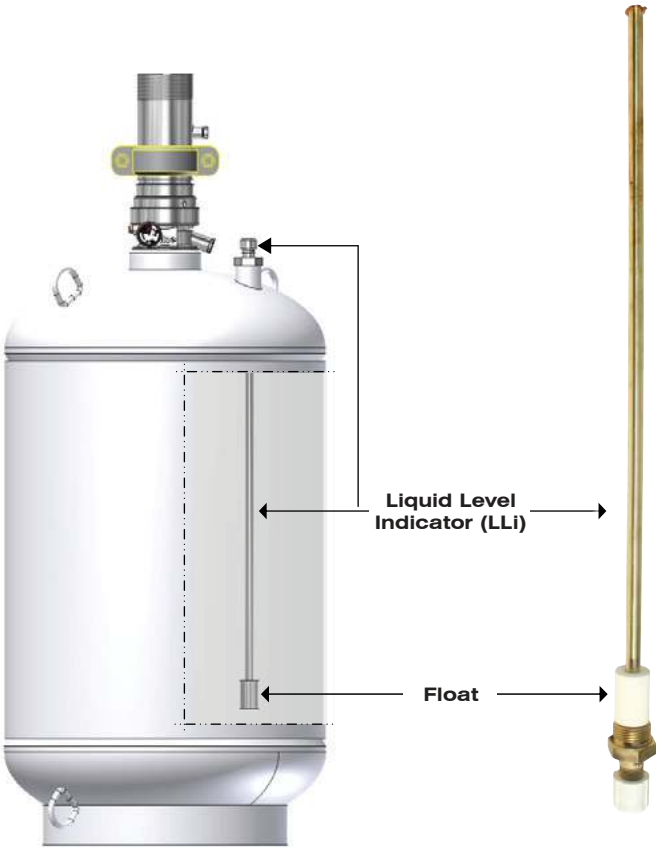
NOZZLE SIZE - ⅜" - 2" (10 - 50 MM)		
Nozzle Type	Radius "R" Dimensions ft.(m)	Ceiling Height Range ft. (m)
180°	45.67 (13.92)	1.0 to 16.0 (0.3 to 4.9)
360°	29.67 (9.04)	1.0 to 16.0 (0.3 to 4.9)

NOZZLE SIZE		180° NOZZLE	360° NOZZLE
(NPT)	(MM)	Model Number	Model Number
⅜"	(10)	NF-80-060	NF-80-052
¾"	(20)	NF-80-062	NF-80-054
1¼"	(32)	NF-80-064	NF-80-056
2"	(50)	NF-80-066	NF-80-058

LIQUID LEVEL INDICATOR (LLI)



FEATURES

- Provides a means of verifying the weight of agent in a container without having to remove the container and weigh it on a calibrated scale.
- Enables the inspector to determine the weight of agent with the container safely secured in its installed position.
- Furnished on the 150, 215, 375, 650 and 1000 lb. (44, 61, 88, 153, 267 and 423 L) containers.

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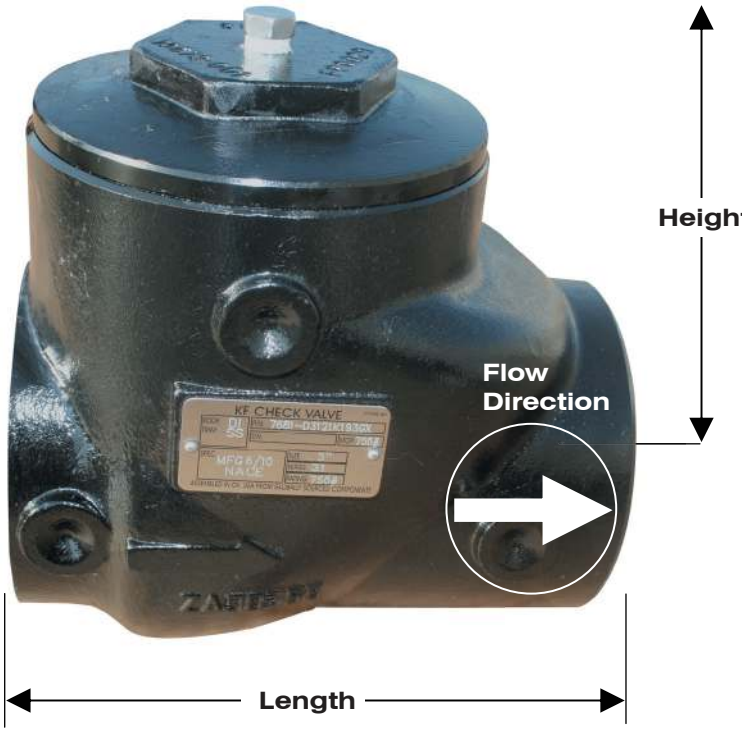
CONTAINER SIZE lb. (L)	LLi PART NUMBER
150 (61)	NF-70-1353-14
215 (88)	NF-70-1353-18
375 (153)	NF-70-1353-27
650 (267)	NF-70-1353-38
1000 (423)	NF-70-1353-49

CHECK VALVE



FEATURES

- Used to prevent agent loss from the open end of a manifold and/or piping system in the event that one or more containers are removed for servicing / maintenance.
- Required for multiple containers connected in a manifold arrangement and for containers used
- in a main / reserve system, without the need for redundant piping systems, to prevent agent loss and to ensure personnel safety if the system is operated when any containers are removed for maintenance. All containers must be the same size & same weight.

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CHECK VALVE DATA		DIMENSIONS		APPROXIMATE WEIGHT	EQUIVALENT LENGTH
MODEL	DESCRIPTION	HEIGHT	LENGTH		
02-2980	1" (25 mm) Check Valve	3.75" (95 mm) (maximum)	4.25" (108 mm)	9 lbs. (4.1 kg)	2.0' (0.61 m)
02-4158	2" (50 mm) Check Valve	4.5" (144 mm) (maximum)	6" (152 mm)	12 lbs. (5.4 kg)	4.0' (1.22 m)
02-4157	3" (80 mm) Check Valve	6" (152 mm)	8" (203 mm)	31 lbs. (14.1 kg)	4.5' (1.37m)
CHECK VALVE DATA		Carbon Steel			
WORKING PRESSURE		750 psi (50 bar)			
THREAD TYPE		Female NPT (Both Ends)			

NOTE: *Check Valves have threaded female connections on both ends; therefore piping leading into and exiting from must be threaded.*

IMPORTANT NOTE: *The Check Valves must be installed with the flow arrow pointing in the direction of discharge. If revised, the system will not charge.*

CAUTION / ADVISORY SIGNS – HFC-227ea

PRODUCT APPROVALS

LISTED

APPROVED

CAUTION – AREA PROTECTED BY HFC-227ea SIGN
Model 02-10139

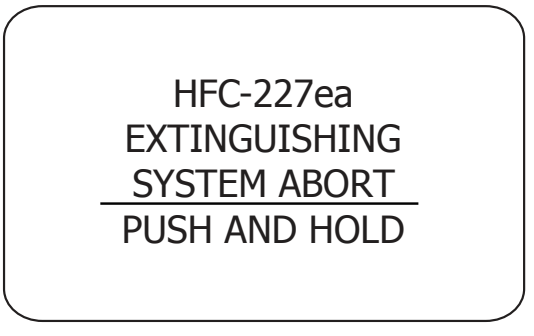
SYSTEM RELEASE SIGN
Model 02-10137

CAUTION – SYSTEM DISCHARGE ALARM SIGN
Model 02-10138

MAIN / RESERVE SIGN
Model 02-10107

CAUTION – EXIT AREA SIGN
Model 02-10105

SYSTEM ABORT SIGN
Model 02-10106



NAFFCO Single Hazard Panel ½

FEATURES

- The NAFFCO Single Hazard Panel is a compact, cost-effective, conventional fire alarm and suppression releasing panel.
- The NAFFCO Single Hazard Panel is designed for use with NAFFCO Clean Agent Fire Suppressant and sprinkler (pre-action/deluge).

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PART NUMBER	DESCRIPTION
NF-10-063-m-c-p	Control System m: 1 = all modes c: R = red, G = gray p: 2 = 240VAC
10-2452 - m	Controller Printed Circuit Board
	m: 1 = all modes
10-2450	Class A Input Module
10-2448	Class A Output Module
10-2204	CRM4 Relay Module
10-2190-b	Battery Assembly AH selection
	b: 1 = 7 AH, 2 = 18 AH
02-3468	Battery 12VDC, 33 AH
10-2154-C	Battery Enclosure 33 AH, where C= R for Red; G for Gray
A02-0252	Battery 12 VDC, 40 AH (requires 66AH enclosure)
10-2236-C	Battery Enclosure 66 AH, where C= R for Red; G for Gray

NAFFCO Single Hazard Panel 2½

GENERAL
- Microprocessor-controlled.
- Power-limited on all circuits except power connections (P1).
- Four operational modes:
    1. Clean agent release.
    2. Clean agent release with sprinkler operation.
    3. Sprinkler operation.
    4. Industrial releasing.
- Ten system status LEDs to provide positive indication of system status.
- Seven segment diagnostic LED for trouble and event occurrences.
- System configuration via dip-switches.
- Local piezo with distinct event tones.
- Reset switch.
- Audible silence switch.
- Disable Mode for audible and release circuits, and relays.

GENERAL
- Integral power supply at 24VDC nominal;
    1.0 Amp total normal standby.
    4.0 Amp alarm

- Selection of 120, or 240VAC power input at 50 or 60 hertz.
- Re-settable and non-re-settable special application power output
- Battery/Earth fault supervision.
- 7 AH to 40 AH battery options, up to 90 hours (Factory Mutual) standby.

ENCLOSURE
- Steel enclosure 21” high by 14.35” wide by 4” deep (Back-box dimensions)
- Enclosure is equipped with a .50” wide lip to facilitate flush mounting
- Removable door for easy installation
- Enclosure is available in Red or Gray.

INITIATING DEVICE CIRCUITS
- Up to two 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.
- Three Style B initiating device circuits capable of monitoring closed contact devices.
- Optional Class A module that converts all five initiating device circuits to Style D wiring and operation.

FEATURES
- The controller is shipped from the factory pre-configured for Clean Agent suppression operation.

- 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

PRODUCT APPROVALS

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NOTIFICATION APPLIANCE CIRCUITS
- Three Style Y notification appliance circuits rated at 2.0 amps each.
- Optional Class A module that converts all five output circuits to Style Z (3 NAC, 2 releasing).

RELEASING CIRCUITS
- One Agent Release circuit with maximum of 6 IRM’s
- One Solenoid release circuit which can activate one 24V or two 12V solenoids
- Model NF-10-063-1 provides option to use both releasing circuits simultaneously.

RELAYS
- General Alarm, Supervisory and Trouble relays
- Two Optional CRM4 modules to add eight more SPDT dry relay contact outputs.

SPRINKLER MONITORING POINTS
- Waterflow input
- Supervisory input

INPUT DEVICES

PHOTO ELECTRIC DETECTOR 63-1024

LIGHT SOURCE	GaAlAs Infrared Emitting Diode
RATED	17.7 - 30.0 VDC
WORKING VOLTAGE	15.0 - 33.0 VDC
MAXIMUM VOLTAGE	42 VDC
SUPERVISORY CURRENT	45mA @ 24 VDC
SURGE CURRENT	160mA max. @ 24 VDC
ALARM CONTENT	150mA max. @ 24 VDC
AIR VELOCITY RANGE	0 - 4000 fpm
AMBIENT TEMPERATURE	32°F to 120°F (0°C to 49°C)
COLOR & CASE MATERIAL	Bone PC/ABS Blend
SENSITIVITY TEST FEATURE	Automatic Sensitivity window verification test

HEAT DETECTOR 60-1030

RESPONSE	Temperature 135° ± 7.5°F,Temperature 190° ± 7.5°F
RATED VOLTAGE	17.7 - 30.0 VDC
WORKING VOLTAGE	15.0 - 33.0 VDC
MAXIMUM VOLTAGE	42 VDC
SUPERVISORY CURRENT	40mA @ 24 VDC
SURGE CURRENT	160mA max. @ 24 VDC
ALARM CONTENT	150mA max. @ 24 VDC
AMBIENT TEMPERATURE	32°F to 120°F (0°C to 49°C)
CONTACT RATING	N/O Contacts, 150mA max. @ 24V
COLOR & CASING MATERIAL	Bone PC/ABS Blend

CONVENTIONAL BASES

67-1034

67-1036

67-1035

67-1037

4" and 6" BASES	ALARM CURRENT
67 - 1034 or 67-1036	43mA (70mA @ 33.0V Max.) (430Ω)
67-1035 or 67-1037	93mA (136mA @ 33.0V Max.) (220Ω)

Serving Over 100 Countries Worldwide

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