HFC 227ea

Model FG & FD Fire Extinguishers

Installation Instructions
Owner's Manual

This manual is an integral part of the system approval and the extinguisher must be installed and maintained in accordance with all listed requirements.

U.S. Coast Guard approved / FM approved
No. 162.029 / 237 / 0

Read and comply with these instructions, warnings and limitations before installing.

Suitable for use on:

FG Models:	0°F (-18°C) to 130°F (54°C)
FD Models:	20°F (-7°C) to 130°F (54°C)

Always maintain this owner's manual
nearby for operator reference.

Owner's Manual PN: 123-194, Revision E
Printed in the USA

WARNING

CONCENTRATED AGENT AND BY-PRODUCT OF APPLICATION TO FIRE ARE TOXIC. AVOID BREATHING OF FUMES OR PROLONGED EXPOSURE. ACCIDENTAL DISCHARGE DURING HANDLING OR INSTALLATION MAY CAUSE SERIOUS INJURY. BEFORE ATTEMPTING TO INSTALL THIS DEVICE, READ AND COMPLY WITH INSTRUCTIONS, WARNINGS, AND LIMITATIONS CONTAINED IN THIS MANUAL. DO NOT LIFT, CARRY OR HANDLE BY SENSOR VALVE / DETECTOR. THE SENSOR / VALVE DETECTOR IS VISUALLY DESCRIBED IN FIGURE 8 OF THIS MANUAL. DO NOT DROP. KEEP AWAY FROM HEAT. KEEP AWAY FROM CHILDREN.
A MATERIAL SAFETY DATA SHEET (MSDS) IS INCLUDED IN THIS MANUAL.

WARNING

PRIOR TO PERFORMING MAINTENANCE WITHIN THE PROTECTED COMPARTMENT, ALWAYS INSTALL THE SAFETY PIN INTO THE SUPPRESSION SYSTEM TRIGGER ASSEMBLY TO AVOID ACCIDENTAL DISCHARGE. UPON COMPLETION OF MAINTENANCE, REMOVE THE SAFETY PIN FROM TRIGGER ASSEMBLY, AND STORE IN DESIGNATED LOCATION AS DESCRIBED STEP 6 OF CABLE INSTALLATION SECTION OF THIS MANUAL.

Installation Manuals currently available in English, German, Italian, and Spanish. Other languages available from your local distributor.

Installation Handbücher momentan verfügbar auf Englisch, Deutsch, Italiener, und Spanisch. Andere Sprachen, die verfügbar sind von Ihrem örtlichen Verteiler.

Manuales de la instalación actualmente disponible en inglés, alemán, italiano, y español. Otros idiomas disponibles de su distribuidor local.

Manuali di installazione attualmente disponibile in inglese, tedesco, italiano e spagnolo. Le altre lingue disponibili dal suo distributore locale

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Application

HFC-227ea (CF3CHFCF3), the extinguishing agent, used in all Sea-Fire "FG" and "FD" series fire extinguishers, is a suitable EPA accepted alternate replacement for Halon. HFC-227ea is an electrically nonconductive and residue free extinguishing agent that requires no cleanup.

These features and the versatility of design make the "FG" and "FD" series fire extinguisher models ideal for a broad range of applications. These applications would include marine, commercial and industrial use where electrical or flammable liquids are the likely source of fire.

Sea-Fire "FG" and "FD" series have passed a rigid testing program and carry a Factory Mutual Global (FM) and United States Coast Guard (USCG) approval for fire suppression applications in marine pleasure craft, un-inspected vessels, and Subchapter "T" inspected vessels, subject to the approval of the local Officer in Charge, Marine Inspection (OCMI). This would include many applications such as **unoccupied** engine and generator rooms, electrical compartments, paint and flammable storage lockers.

Limitations

Sea-Fire "FG" and "FD" model series HFC-227 ea automatic fire extinguishers are designed and tested to extinguish Class B (flammable liquid) and Class C (electrical) fires in enclosed compartments only. Any openings (doors or hatches) will allow discharging agent to escape and will seriously affect the ability of agent to extinguish the fire.

Sea-Fire "FG" and "FD" extinguishers are designed to induce a minimum atmospheric concentration of 8.7 percent within the protected compartment. This is equivalent to a 30% safety factor on a 6.7% Minimum Extinguishing Concentration (MEC). In addition to gasoline and diesel fuel, other flammable liquids with MEC values equal to or below 6.7% for HFC-227ea may be protected by Sea-Fire "FG" and "FD" systems.

The specification table in this manual lists the minimum and maximum approved compartment volume (size) allowable for each model (per NFPA 2001, UL 2166, FM 5600*). Volume can be determined by multiplying the compartment's **length x width x height which equals the volume in cubic feet or meters (LxWxH=V).**

*NFPA 2001: Standard on Clean Agent Fire Extinguishing Systems; UL 2166: Halocarbon Clean Agent Extinguishing System Units; FM 5600: Approval Standard for Clean Agent Extinguishing Systems

Models described in this manual are stock available in 25 Cubic Feet (0.7 Cubic meters) intervals. Systems are available in 1 Cubic Feet (0.03 Cubic meters) intervals if desired. Exact calculations and/or measurements of the protected space should be accomplished if ordering these models. The Specification Table shows the area of protection range available for ordering within each basic model. For simplicity, throughout this manual, only the stock sizes will be noted.

"FG" and "FD" systems are designed for only one cylinder (single nozzle) to protect the entire space. Using two cylinders to achieve combined coverage is not acceptable.

CAUTION: NEVER INSTALL A UNIT WITH A VOLUME RATING LESS THEN THE GROSS VOLUME OF THE COMPARTMENT TO BE PROTECTED. DO NOT DEDUCT FOR ENGINES, REMOVABLE TANKS OR OTHER EQUIPMENT.

Exception: If the boat manufacturer has placed a permanently affixed label in the engine compartment specifying the gross volume less the volume of permanently installed tankage, then this volume may be used to determine the proper size extinguisher. Check the specification table for proper application before making installation.

Sea-Fire Marine offers all models compliant to applicable European Directives. Systems will be shipped as requested. For orders requested compliant to CE directives, a Declaration of Conformance (DOC) shall be included.

System Operations

Sea-Fire units described in this manual are automatically actuated by a temperature sensitive UL listed glass bulb tested in accordance with UL 199. These bulbs are manufactured and tested to be activated at a minimum temperature of approximately 175°F (79°C) when immersed in a liquid bath or approximately 220°F (104°C) when tested using an air bath. The actual activation temperature of the bulb in a fire scenario is influenced by numerous factors including air velocity, rate of temperature rise, air flow, location, etc. The discharge temperature ranges (approximate) are shown in the specification table, pages 20 – 21, and on the label attached to each unit.
These systems have been tested to United States Coast Guard (USCG), UL 2166 and FM 5600 requirements for Automatic Extinguisher Unit Automatic Operation Fire Tests.

* UL 199: Standard for Safety of Automatic Sprinklers for Fire Protection Service.

Discharge Temperature Ranges (approximate):
FG 25 – 75: 200 - 250°F (93 - 121 °C)
FG 100 – 240: 175 - 225°F (79 – 107°C) FD 150 – 1500: 175 - 225°F (79 - 107°C)

CAUTION: IN CASE OF SUPPRESSION SYSTEM DISCHARGE, DO NOT RUSH TO OPEN THE PROTECTED COMPARTMENT. THE PROTECTED SPACE MUST BE KEPT CLOSED FOR AT LEAST 15 MINUTES TO ALLOW THE FIRE TO BE EXTINGUISHED AND SURFACES COOLED SUFFICIENTLY TO PREVENT REFLASH. STOP BLOWERS AND SECURE HATCHES. HAVE A PORTABLE EXTINGUISHER AVAILABLE AND USE CARE WHEN OPENING COMPARTMENT.

Avoid breathing fire related fumes or vapor.

Note: It is important to retain the designed vapor concentration within the compartment to insure complete fire outage. Upon discharge, engines(s) and all powered ventilation (blowers) must be shut down.

Supervisory Pressure Switch

Sea-Fire "FG" and "FD" series extinguishers are equipped with a factory installed pressure switch which is intended for cylinder pressure supervision and may also be used to control other electrical functions (engine shutdown, air exchange equipment etc.).

When using the pressure switch as an electrical disconnect for any equipment shutdown function, a means of overriding (bypassing, shunting) the pressure switch must be provided in order to return the affected equipment to an operational mode after extinguisher discharge has occurred. The pressure switch is a single pole single throw (SPST) type that is normally closed (NC) with the system in the charged condition. Discharge or loss of system pressure will release the contacts to an open state thereby cutting off any electrical current flow.
Never use pressure switch for electrical loads over rated capacity.

Switch Specifications 4.0 AMPS at 12 VDC, 2.0 AMPS at 28 VDC
For applications requiring larger load capacities, contact the factory.

System Status Indicator Light Operation

All Sea-Fire pre-engineered fire suppression systems approved for marine applications are packaged with an indicator light and faceplate. The indicator light (unless replaced by another Sea-Fire device: i.e.: display panel) must be installed for system supervision and operator awareness. When properly installed, activation of electrical power to the system will illuminate the light indicating normal charge condition. System discharge or loss of pressure will immediately turn off the indicator light. In the event that the indicator light is not lit when power is applied, check for the following conditions:

1. Check pressure indicator gauge for proper range.
2. Check fuse and indicator light and replace if defective (lamp replacements available from factory).
3. Check for loose electrical connections.
4. Remove and weigh system cylinder as described in **System Maintenance Section** of the manual.

Pressure Relief Assembly (Burst Disk)

All models are protected from over pressure of system. FG Models 25 – 240 and FD 150 – 1000 are protected by the design of the glass bulb temperature / pressure relationship. Sea-Fire Marine maintains a Department of Transportation (DOT) Special Permit, DOT-SP-11598 for these models.

FD Models 1025 – 1500 have a definite purpose Pressure Relief Device (designed and manufactured per CGA S.1-1) installed on the manifold. Do not remove or perform any maintenance on this device. Removing or loosening this device will cause the contents under pressure to escape.

Interaction with Engines, Generators and Powered Ventilation (Blowers)

Sea-Fire offers optional engine interrupt systems which will automatically shut down engines, generators and powered ventilation upon discharge of the fire suppression system. They are available with 4, 6 or 8 control circuits and operate between 9 – 32 volts DC. Shutdown may be accomplished by interruption of the electrical circuit between the ignition switch and the engine coils.

It is the responsibility of the system designer/installer to comply with the following instructions on Diesel and Gasoline Engines / generators.

Diesel Engines or Generators, Powered Ventilation (Blowers)

USCG, and American Boat and Yacht Council (ABYC) – Standard A-4, Fire Fighting Equipment (Section A-4.7.3.3) both require the following:

> The system shall be designed and installed so that the engine(s), generator(s), and blower(s) located in the protected space shut down automatically and after discharge the minimum required design concentration must remain.

Gasoline Engines or Generators

It is optional to automatically shut down gasoline engines and generators, but it is highly recommended. In the case of engine compartment fire, you must still manually shut down engine(s) or generator(s) before manual discharge, or immediately after automatic discharge of the fire suppression system.

Relationship to Portable Fire Extinguishers

Reminder: Sea-Fire pre-engineered systems shall be considered as supplementary to the number of portable fire extinguishers required on-board and are designed and intended for enclosed unoccupied compartment installations that are not subject to direct weather or water.

Manual Discharge Capability

US Coast Guard approval requires the installation of manual discharge capability on all systems installed in compartments of 1,000 cubic feet and larger. Sea-Fire offers manual discharge cables for this purpose. Models with manual cable connections are designated as "M" following the system size. "M" designates manual/automatic. "A" alone designates automatic only.

Installation

Read entire instruction manual and cylinder nameplate prior to installation.

These installation instructions are intended to cover most normal installations. Additional technical or application information can be obtained by contacting:

Sea-Fire Marine - USA		Sea-Fire Europe, LTD
Baltimore, Maryland	or	Hampshire
Tel: 410 687-5500		United Kingdom
Website: www.Sea-Fire.com		Website: www.Sea-Fire.co.uk

Only one system (cylinder) may be used to protect a compartment. If more than one suppression system is used to achieve the required amount of agent concentration, there is no guarantee that several suppression systems will actuate simultaneously as each suppression system operates independently. Several suppression systems may be used only if each independent suppression system is capable of protecting the entire volume of the compartment.

CAUTION:

1. **DO NOT INSTALL IN AN AREA DESIGNATED FOR OCCUPANCY.**
2. **ACCIDENTAL DISCHARGE MAY CAUSE SERIOUS INJURY.**
3. **HANDLE THE CYLINDER WITH EXTREME CARE.**
4. **WEAR EYE PROTECTION.**
5. **DO NOT LIFT OR CARRY CYLINDER BY THE MANIFOLD OR ACTUATOR COMPONENTS.**
6. **DO NOT ATTEMPT TO LOOSEN OR REMOVE ANY EXTINGUISHER COMPONENTS.**

I. Cylinder Installation:

Step 1 Carefully remove cylinder from carton and visually check for damage in shipment.

Step 2 To ensure that the cylinder is operational, both the weight and pressure indicator must conform with the cylinder specification as shown on the nameplate. Weigh cylinder (less bracket) on an accurate calibrated scale before installing. Record date and weight on tag provided for this purpose.

Step 3 Do's and Don'ts

Do place Unit:	Don't place unit:
a. As high as possible, no more than 3 feet below the ceiling, on compartment bulkhead for mounting.	a. Near a fresh air or ventilation duct supply opening.
b. With detector head near the area in which a fire is most likely to occur. This would be on the fuel line side of the engine, near the carburetor, or fuel pump.	b. Near access door.
c. At the centerline of the bulkhead wall (left to right).	c. To underside or inside of access door or panel.
d. Against forward bulkhead.	d. Extremely close to the turbocharger or exhaust system.
e. Vertical or horizontal as described per model.	e. Where an accumulation of standing water could block sensor or cause corrosion.
f. Between the engines when two engines are to be protected.	f. On underside of cover or compartment hatch that could be thrown clear due to possible explosion.
g. Avoid immediate obstructions to the discharge orifices.	g. Too close to a room corner or large obstruction.

Step 4 Loosen mounting bracket cylinder holding straps (Figure 1) and remove extinguisher from bracket. Although the sensor valve / detector is protected, care should be exercised to avoid striking the sensor valve / detector.

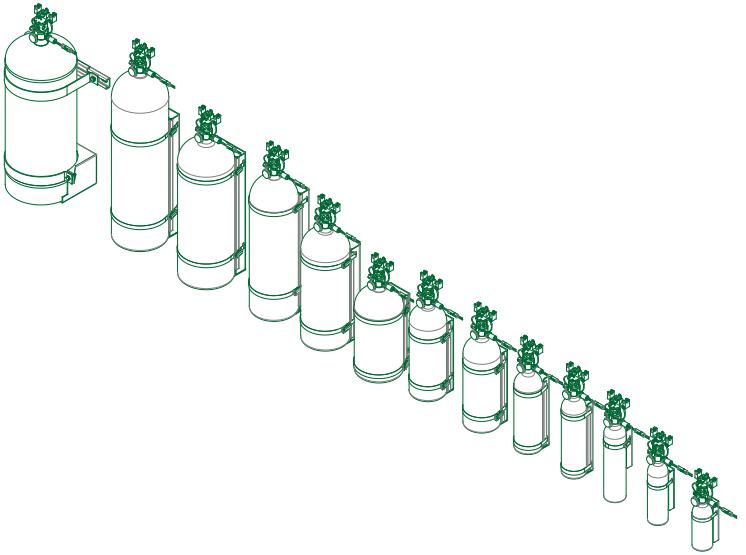
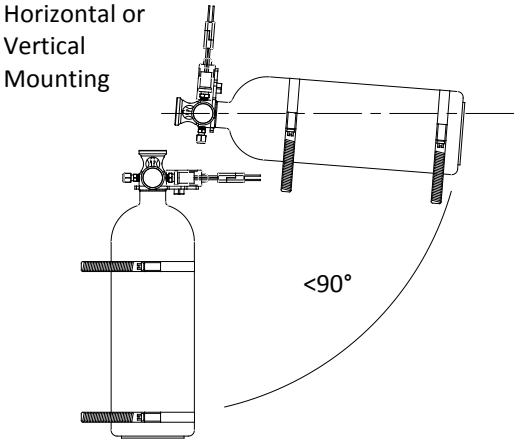


Figure 1

MODELS FG 25 - 240 AND FD 150 – FD 1000 MAY BE INSTALLED HORIZONTAL OR VERTICAL.



MODELS FD 150 THRU 1000 AND FG 25 THRU 240 MAY BE MOUNTED VERTICAL OR HORIZONTAL

MODELS FD 1025 THRU FD 1500 MUST BE INSTALLED VERTICAL ONLY

Figure 2

WARNING: WHEN INSTALLING CYLINDER IN HORIZONTAL POSITION, THE ACTUATOR (TOP OF CYLINDER) MUST NEVER BE LOWER THAN THE BOTTOM OF THE CYLINDER OR PROPER DISCHARGE OF AGENT WILL NOT OCCUR (SEE FIGURE 2 ABOVE).

Step 5 Locate bracket in desired position (Vertical-sensor Valve / Detector Head Up, or Horizontal, Figure 2). Ensure bulkhead or mounting surface is solid enough to hold the weight of the unit. Fasteners are not included. Use medium strength (Grade 5, Property Class 8.8) or better grade material. Use minimum 5/16" (M8) diameter [recommend 3/8" (M10) diameter] fasteners for all but 130-249 bracket assemblies. 130-249 minimum hardware size is ¼" (M6) diameter. All mounting holes must be utilized. See table below for qty and hole size in respective bracket. Using the bracket as a template, mark and drill holes in bulkhead and install bracket ensuring that all fasteners are thoroughly tight.

Step 6 Carefully attach cylinder to bracket. Sensor valve / detector head should point towards engine or center of the compartment. Nameplate and gauge should be visible. Tighten bracket straps so that the cylinder body is firmly and securely held in place by its bracket (worm drive clamps must be torqued to 75-85 in-lbs., (6-7 ft.-lbs.). Ensure 180° discharge orifices do not face the wall.

Depending on the model, the bracket strap will be different:

Types

A Screw drive coil, Phillips / hex drive. ---------- FG 25 – 75 and FD 150 – 1000

B Buckle / wire form clamp style. ---------- FG 76 – 240

C Two piece bracket / saddle assembly. --------- FD 1025 – 1500

Brackets		
Model	Assembly	Mounting Holes (Qty x Dia)
FD 150 - 225	130-250	4 x .39" (9.9 mm)
FD 250 - 350	130-251	
FD 375 - 500	130-252	
FD 525 - 600	130-253	
FD 625 - 1000	130-254	
FD 1025 - 1500	130-009	13 x 7/16" (10.7 mm)

Brackets		
Model	Assembly	Mounting Holes (Qty x Dia)
FG 25 - 75	130-249	2 x .29" (7.2 mm)
FG 100	130-011	4 x .281" (7.1 mm)
FG 125	130-012	
FG 150 - 240	130-013	

II. Cable Assembly Installation

CAUTION: TO AVOID KINKING OF CABLE, DO NOT PUSH CABLE TO RETRACT THE CORE.

Note: Steps 2 and 6 show optional installations for 135-XXX or 136-XXX series cables.

CAUTION: TO PREVENT ACCIDENTAL DISCHARGE DURING CABLE INSTALLATION, VERIFY THAT THE MANUAL DISCHARGE LEVER SAFETY PIN IS PROPERLY INSTALLED.

Step 1 Select the proper location for remote pull station.

a. Manual discharge release pull stations should never be installed in the protected compartment.
b. Locate discharge pull handle at the helm station with full view and easy access by the operator.
c. The area selected must be structurally secure and provide at least twelve (12) inches (305 mm) of clearance at the rear of the panel to facilitate cable hardware.

Step 2 Installing cable along routing between cable ends-

a. Do not install cable in area where the possibility of physical abuse is likely. Where practical, follow the same cable path as installed by boat manufacturer (if a replacement cable).

b. Route the cable to allow it to lie in its most natural state. The cumulative bends in the cable run and minimum bend radius must adhere to the following table depending on cable series installed:

Cable Series	Maximum Cumulative bends (Degrees)	Maximum No. of 90 degree bends	Minimum Bend Radius
135-X##	360	4	12 in (305 mm)
136-X##	720	8	5 in. (127mm)

c. Use extreme care when bending cable to avoid kinking. Selection of the correct size Sea-Fire cable length will reduce excess cable coil.

d. Position the cable in its routing, but do not secure at this time. Steps 3A thru 3F must be completed prior to securing cable in its final location.

- Do not connect cable to the cylinder at this time.

Step 3 Mounting cable faceplate and release (T) handle.

Confirm faceplate supplied with cable and/or cylinder assembly. The faceplate heading should be "MANUAL/AUTOMATIC" (Figure 3).

Manual/Automatic systems use faceplate 124-026

Figure 3

a. Using the faceplate (Figure 3, Figure 4) as a template, mark and drill a 13/32inch (10.4 mm) hole.

b. Remove the protective backing from the faceplate. While aligning the holes, place even pressure upon the faceplate. To insure a good bond, the temperature should be in excess of 50°F (10°C).

c. Following the diagram in Figure 4, install the jam nut and lock washer on the cable end – outer. Screw the jam nut to the end of the threads. Insert the cable end through the panel and faceplate hole. Pull the cable end – inner (threaded shaft) out to its fullest travel. Install ferrule by screwing onto the cable end – outer until it bottoms out. Use pliers on the back side – holding the cable end – outer while turning the ferrule. Use pliers with rubber tips or other non-scratching grip. Do not over tighten.

d. With cable end – inner (threaded shaft) out to its fullest travel, place rubber O-ring over threads on shaft. Hold the cable end-inner from rotating using the Safety pin in cross hole (see Figure 4 – Page 11) or by using needle nose pliers. Install the T- Handle on the cable end – inner, screwing it on until it bottoms out. Do not over tighten.

e. Pull on the cylinder (S-hook) end of the cable to retract the handle into the ferrule. It may be necessary to slightly push on the T-handle to seat the O-ring. Align the cross holes in the T-Handle and ferrule and insert the safety pin through both items so that the end of the safety pin shows out the far side. Leave the safety pin inserted through the T-handle/Ferrule, but do not install the red safety tie at this time.
f. Turn the T-handle/Ferrule so that the word **FIRE** is vertical or oriented as needed.
g. This action will result in the entire cable rotating along its length. Ensure that the cable is allowed to rotate and remain in a natural state.
h. Tighten the jam nut behind the instrument panel to lock in the position and orientation of the T-handle/Ferrule.

Step 4 Securing cable in place

a. Secure the cable along its length.
   i. Nylon cable ties should be used for cable securing. Fasten and support the cable on straight runs only. Do not secure at locations where cable bends.
   ii. At the cylinder/actuator S-Hook end:
      a. The cable should have a minimum straight length of 6 inches (15 cm) before making any bends. The cable should be secured on a straight run before making a bend.
      b. The cable should be secured within 6 inches to 18 inches (15 cm – 46 cm) of the cylinder. Some flexibility will be needed to move the cable for servicing the cylinder.

CAUTION: FAILURE TO FOLLOW THESE INSTRUCTIONS MAY PLACE UNDUE PRESSURE ON THE HAIRPIN COTTER PIN, CAUSING IT TO MALFUNCTION.

   iii. Do not install cables with other wiring. Do not use tie wire around the cables.

b. Temporarily remove safety pin and test cable operation. **Never push cable.** Pull from cylinder (S hook) end, then, pull T handle and repeat. Cable must move freely without friction or binding. Reinstall safety pin and confirm that release handle is now locked in place.

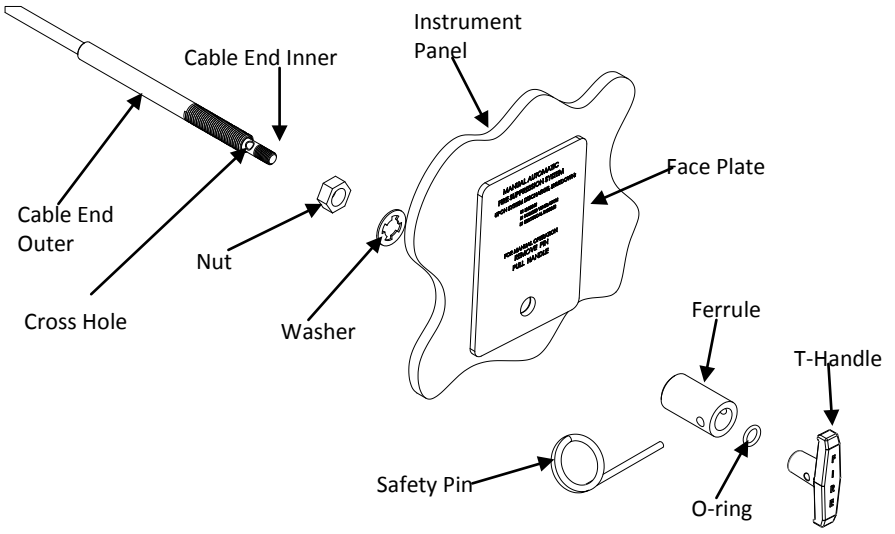


Figure 4

CAUTION: ACCIDENTAL DISCHARGE DURING HANDLING OR INSTALLATION MAY CAUSE SERIOUS INJURY. DO NOT REMOVE FACTORY INSTALLED SAFETY (PULL) PIN FROM CYLINDER SENSOR VALVE / DETECTOR UNTIL INSTALLATION IS COMPLETED AND CHECKED.

Step 5 Installation Verification and Test Requirement.

Specification / Regulation

- U.S.C.G – Navigation and Vessel Inspection (NVIC 6-72, Section V, Page 71) requires a maximum of 40 lbs. of force required at T handle (pull station) to activate system discharge.
- NFPA 12A - Operating devices. Para. 1-8.3.7 maximum of 40 lbs. of force required at T handle (pull station) to activate system discharge.
- Sea-Fire - minimum of 10 lbs. of force required at the S hook (extinguisher) to activate system discharge.

Test Procedure

CAUTION: DO NOT PUSH (FIRE) T-Handle while installing cable assembly to avoid kinking the cable core. Pull S-Hook at opposite end to retract the T-Handle.

After the initial routing of cable assembly is completed:

a. Attach a scale (PN: 128-212 Cable Test Fixture) to the S-hook (cylinder end) in place of the cylinder Release assembly.
b. Attach a scale (PN: 128-092 Digital Scale) to the T-handle (pull station) end of the cable assembly. A handle hook, PN: 128-115 is available to facilitate attaching the scale. (Scales available from Sea-Fire or others may be used)
c. Pull on the T-handle scale, monitoring the displayed force, until 10 lbs (4.5Kg) is shown on the S-hook (cylinder end) scale.
d. Ensure that the required force at the T-handle (pull station) does not exceed 40 lbs. (18.2 Kg) to achieve 10 lbs. (4.5 Kg).
    i. If less than 40 lbs. (at the pull station) of force achieves the 10 lbs. (at cylinder), complete the cable assembly installation per Step 6.
    ii. If greater than 40 lbs. of force was exerted to achieved 10 lbs., the cable routing should be inspected and likely changed. Repeat inspection.
e. Remove both scales. Pull on the S-Hook at the cylinder to retract the cable.
f. Reinstall safety pin and confirm that release handle is now locked in place.
g. Attach the tamper resistant round plastic tie to the safety pin by passing tie through the safety pin ring and around the cable assembly. Insert the end of the tie into cable end and pull up snug. The tie provides a means of deterring accidental discharge and determining if manual actuation has occurred.

CAUTION: DO NOT USE NYLON CABLE TIES IN PLACE OF THE TAMPER RESISTANT TIE FOR SAFETY PIN.

Note: Limit the quantity, and tightness of tie downs to avoid restriction.

Note: The maximum of bends/ turns, and minimum bend radius per turn as outlined in step 2(b) must be followed.

Step 6: 136 Series (Bi-directional) Cables Connecting cable assembly to cylinder (Figure 6A-6F).

Note: The cable may be installed from either direction using the existing Bi-Directional hardware installed on the system.

a. Confirm that the cylinder is mounted in its bracket, the cable pull handle end is installed and the cable is correctly routed to the cylinder.
b. Insert the "S" hook [Fig 5-A] into the actuator lever from the front side (over top of the 2 mounting screws in the Release Bracket [Fig 6-B]. After the "S" hook is connected to the lever, align the groove in the cable end-outer [Fig 5-B] with the slot in the Release Bracket assembly [Fig 6-C].
c. Insert the Hairpin Cotter Pin provided with the cable into the release bracket, over top of the cable end [Fig 6-D].
    - There may be a slight bend (bump) in the cable between where it is attached to the actuator lever and where the cable end - outer is clipped into the Release Bracket. This is normal.
    - ⚠ <u>There should not be tension in the cable pulling on the lever</u>. Tension on the lever can cause the cylinder to discharge when the safety pin is removed.
d. With Step c successfully complete, use care to remove the factory installed safety pin from the actuator assembly [Fig 6-E].
e. Store the safety pin in the hole of the Release Bracket behind the actuator lever as a back-stop in farthest hole from cable/hook assembly [Fig 6-F].
f. Ensure the safety pin is completely installed through the bracket.

⚠ **WARNING – DO NOT INSTALL THE SAFETY PIN BETWEEN THE LEVER AND THE CABLE. THIS WILL PREVENT THE CABLE FROM ACTUATING THE SYSTEM.**

g. The fire suppression system extinguisher is now fully operational.

Step 6: 135 Series (Single-directional) Cables Connecting cable assembly to cylinder (Figure 6-G, 6-H, and 6-I).

Note: The cable may be installed from only one direction using this cable and the mounting system.

a. Before attaching cable to the cylinder, check that the cylinder bracket is located correctly and firmly mounted and the actuator lever safety pin is inserted.
b. With the cylinder strapped in its bracket, pass the S-Hook and the outer cable conduit - cable end completely through the hole in the release bracket.
c. Insert the S-Hook through the hole in the actuator lever. After making this connection, move the cable end back and align the groove with the slot in the release bracket.
d. Insert the Hairpin Cotter Pin that is provided with cable assembly. The cable assembly must be locked to the release bracket or accidental discharge can occur.
e. Using care, remove the factory installed actuator lever safety pin from the cylinder and store it in the nylon retainer provided on the cylinder neck (Figure 6-I).
f. The Sea-Fire manual / automatic extinguisher is now fully operational.

⚠ **CAUTION – ALWAYS INSTALL SAFETY PIN IN CYLINDER ACTUATOR LEVER [FIG 6-A] WHEN PERFORMING SERVICE OR MAINTENANCE ON SYSTEM. BE SURE TO REMOVE SAFETY PIN FROM ACTUATOR LEVER UPON COMPLETION OF SERVICING.**

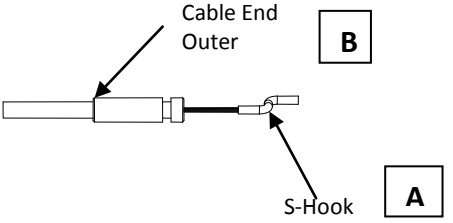


Figure 5 -- SMAC Cable S-Hook End

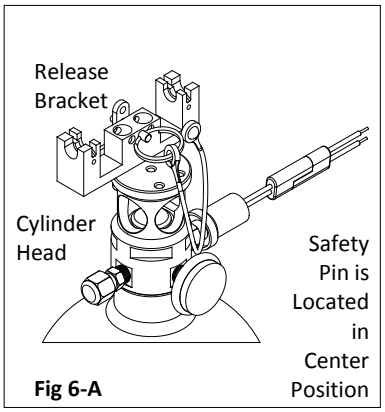


Fig 6-A

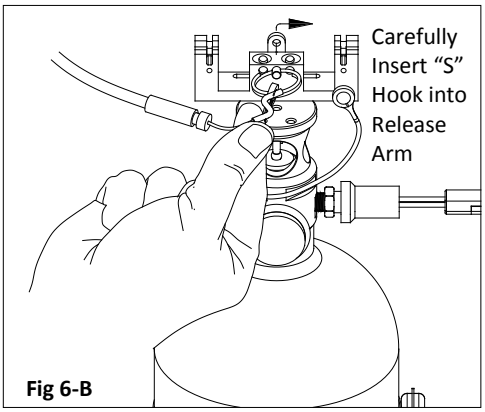


Fig 6-B

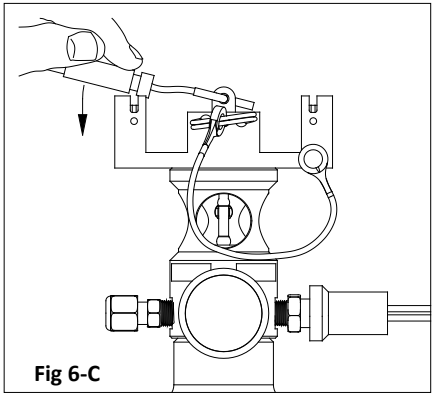


Fig 6-C

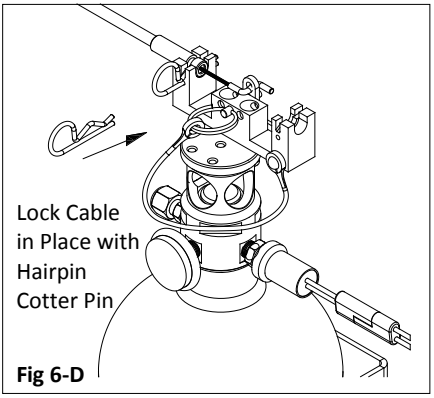


Fig 6-D

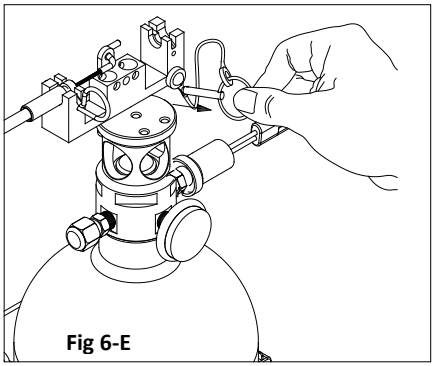


Fig 6-E

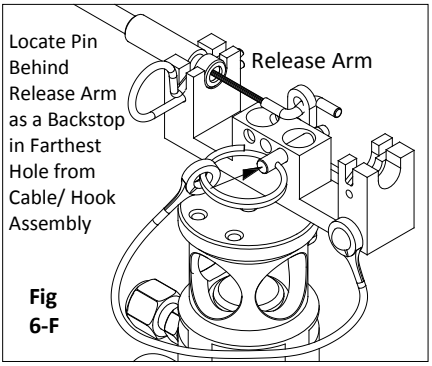
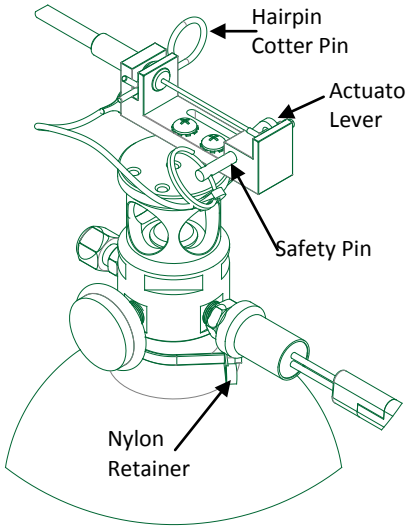
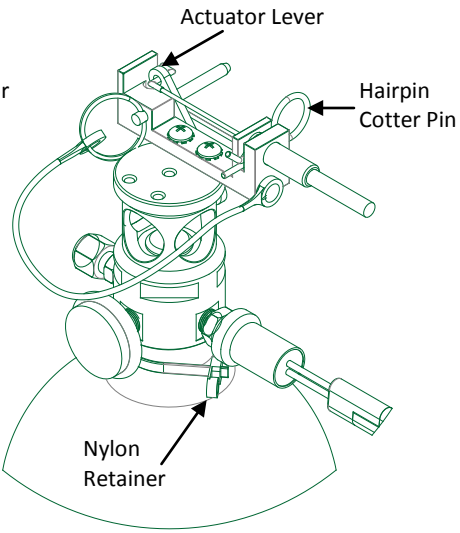


Fig 6-F

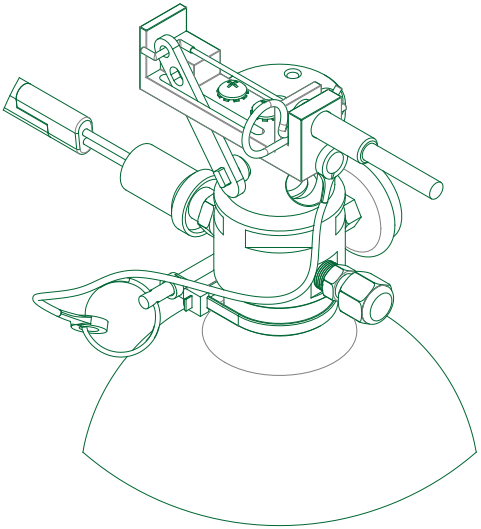
Bi Directional Release Bracket Cable Connection



Left Hand Pull Release Bracket
Figure 6-G



Right Hand Pull Release Bracket
Figure 6-H



Safety Pin Stored in Nylon Retainer
Figure 6-I

Reminder: Always install safety pin in cylinder actuator lever (Figure 6-A, 6-G and 6-H) when performing service or maintenance on system. Be sure to remove safety pin from actuator lever upon completion of servicing.

III. System Status Indicator Light Installation

Select a location at the helm on or near the console that is in full view of the helmsman. The location selected must have access for electrical wiring. Remove the adhesive protective cover from back of indicator faceplate and attach. For proper adhesion, surface must be clean and dry and temperature must be above 50ºF (10ºC). Use the preformed faceplate hole as a template and carefully drill a 5/16 inch (8 mm) hole. Insert indicator light wire (see Figure 7).

CAUTION: PRIOR TO WIRING INDICATOR LIGHT, TURN OFF ELECTRICAL POWER BY SWITCHING OFF CIRCUIT BREAKER, REMOVING FUSE OR DISCONNECTING POSITIVE BATTERY TERMINAL. FAILURE TO DISCONNECT ELECTRICAL POWER WHILE MAKING ELECTRICAL CONNECTION CAN RESULT IN INJURY FROM FIRE OR ELECTRICAL BURNS.

The standard indicator light is rated for 12 VDC (contact factory for other voltages). Wire in accordance with the American Boat and Yacht Council (ABYC), Standard E-9, Direct Current Electrical System on Boats, copies of which may be obtained from ABYC, Edgewater, MD, USA, 21037, +1 (410) 956-1050.

Supplies, which are not included with your Sea-Fire system and should be at hand before the indicator light installation, are as follows:

1. Five (5) ampere in-line fuse and holder.
2. Sufficient length of insulated minimum 16 AWG stranded wire.
3. Crimp on wire connectors.
4. Crimp pliers, hand tools.

Attach one wire lead from the in-line fuse (C) to the ignition terminal on the started switch. Connect other lead from the in-line fuse to the indicator light (D). Connect remaining indicator lead (E) to one of the Sea-Fire cylinder pressure switch connector wires (F). Connect the remaining cylinder pressure switch lead (G) to common ground, which may be the negative battery bus at the control panel, or directly to the engine block (see Figure 7).

CAUTION: ELECTRICAL SYSTEMS VARY FROM VESSEL TO VESSEL AND THESE DIRECTIONS MAY NOT BE APPLICABLE FOR YOUR INSTALLATION. SHOULD YOU HAVE ANY DOUBTS OF SAFELY ACCOMPLISHING THIS INSTALLATION, CONTACT A QUALIFIED MARINE ELECTRICIAN OR SEA-FIRE MARINE USA AT (410) 687-5500 FOR TECHNICAL ASSISTANCE.

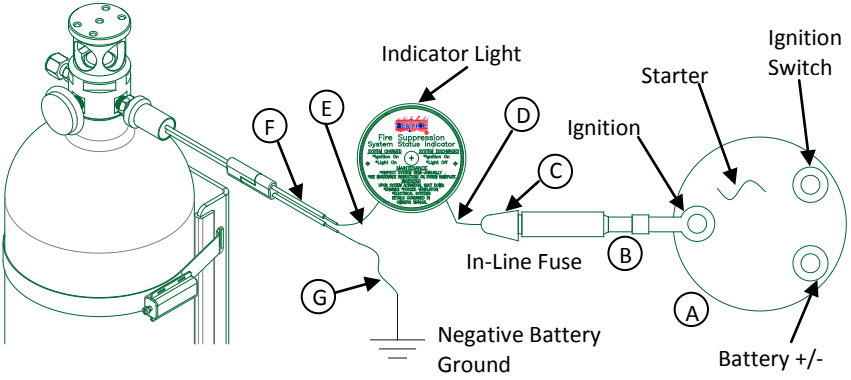


Figure 7

System Maintenance / Inspection
Cylinder Inspection / Cylinder Testing

The following instructions are according to applicable regulatory agencies. These regulations change periodically and may be different from rules in place when this system and manual were shipped. Confirm requirements with Sea-Fire, local authorities having jurisdiction or applicable agency. All inspections must be performed by an authorized/Qualified inspector (Current RIN for DOT) and other requirements per local authorities as applicable.

NFPA 2001 – Clean Agent Fire Extinguisher Systems:

All models, all cylinders:

- If more than 5 years has elapsed since the date of the last test and inspection, the cylinder shall not be recharged without retesting. The test shall be permitted to consist of a complete visual inspection as described in 49 CFR (explained below per cylinder type).
- Cylinders continuously in service without discharging shall be given a complete external visual inspection every 5 years or more frequently if required. The visual inspection shall be in accordance with Section 3 of CGA C-6, except that cylinders need not be emptied or stamped while under pressure.

49 CFR – Transportation (DOT) – Cylinder Requalification (Hydrostatic testing via proof pressure and volumetric testing; visual inspection methods)

Models FG 25 – 240 built with DOT 39 NRC/TC-39M cylinders:
These are non-refillable and are non-reusable. They do not require/ are not allowed to be tested for re-use. The systems may remain in service indefinitely as long as all other serviceability requirements are met. Systems with these cylinders, per 49 CFR requirements, are clearly marked, "Federal law forbids transportation if re-filled – penalty up to $500,000 fine and 5 years imprisonment (49 U.S.C. 5124).

Models FD 150 – 1000 built with DOT 3AL/TC-3ALM cylinders and **FD Models 1025 – 1500** built with DOT 4BW/TC 4BWM welded steel cylinders:
Both of these cylinder types are reusable and must be periodically tested and re-qualified. The periodic inspection interval for both DOT 3AL and DOT 4BW cylinders filled as a Fire suppression system with the agent as supplied is 12 years from the date stamped on the cylinder. However, a cylinder filled before its re-qualification date (becomes due), and remains filled, may remain in service without testing until it is emptied for any reason (reference 49 CFR 180.205 (c).

- Correlation to NFPA 2001 (5 year) requirement. In both standards, if the cylinder is not already empty, it does not need to be emptied solely for inspection purposes. If the cylinder has more than 5 years of service, and has been emptied for whatever reason, it needs to be inspected per NFPA 2001 guidelines listed above.
- For DOT 4BW/ TC 4BWM welded steel cylinders only, a visual inspection in accordance with CGA C-6 or C-6.3, as appropriate, may be performed instead of the periodic hydrostatic tests. When this test method is applied, the subsequent inspection comes due after 5 years.
  - Applicable tests methods for DOT 4BW cylinders are by Proof Pressure Test which yields a subsequent test requirement after 7 years and a Volumetric Expansion test using the Water Jacket Method which yields a subsequent test requirement after 12 years.
- For DOT 3AL/TC 3ALM cylinders, visual inspections are not authorized to replace hydrostatic testing.
  - The only test method for DOT 3AL cylinders is the Volumetric Expansion test using the Water Jacket Method which yields a subsequent test requirement after 12 years.

For systems compliant to European Directives, (EC), specific cylinders may be used different than DOT / TC approved systems. International requirements need to be followed as well as other requirements according to the local authorities having jurisdiction (AHJ).

Models FG 25 – 240 with EC approval are designated as "CE" marked in accordance with the Pressure Equipment Directive (PED) 97/23/EC. Those cylinders are built to technical specifications either BS EN12205 or ISO 11118. These systems are not refillable. Systems with these cylinders are not serviceable and therefore have no periodic inspection requirements. (Reference ISO 11118 and PED Directive 97/23/EC). Models with these cylinders, per European Agreement Governing the International Carriage of Dangerous Goods by Road (ADR) requirements, are clearly marked, "DO NOT REFILL".

Models FD 150 – 1500 with EC approval are designated as "CE" marked in accordance with the Pressure Equipment Directive (PED) 97/23/EC. These systems are refillable.

- **FD 150 – 1000** have seamless aluminum cylinders built to technical standards either BS EN 1975 or ISO 7866. Systems with π marked cylinders built to ISO standard 7866 are to be maintained in accordance with ISO 10461, Gas Cylinders – Seamless Aluminum – Alloy Gas Cylinders – Periodic Inspection and Testing. Systems with π marked cylinders built to BS EN 1975 are to be maintained in accordance with BS EN 1802.
- **FD Models 1025 – 1500** have welded steel cylinders built to technical standard EN 13322-1. These cylinders need to be maintained in accordance with BS EN 1803.

Summarizing these standards, there is no general requirement to periodically inspect a cylinder if the contents have not been used, even if the test interval has lapsed. In the event that contents have discharged, leaked or otherwise been exhausted, the inspection interval is 10 years from the manufacture date stamped on the cylinder. TPED Directive 96/36/EC also has requirements for periodic inspection.

<u>WARNING:</u> DO NOT ATTEMPT TO DISASSEMBLE ANY PART OR COMPONENT OF THE EXTINGUISHER. THIS UNIT IS PRESSURIZED AND SERIOUS INJURY COULD RESULT. CONTACT THE FACTORY OR AN AUTHORIZED DEALER FOR SERVICE INFORMATION.

Agent Weight Inspection

Weigh cylinder to insure ample extinguisher agent (every 6 months, minimum).
All fire suppression systems containing liquefied gas require periodic weighing to ensure a fully charge unit. Pressure gauges indicate the ability to discharge the agent but not the quantity of extinguishing agent. The cylinder (less bracket) must be weighed on at least a semi-annual basis and be replaced immediately if gross weight has decreased by the quantity noted on the specification label. The specification label (shown below) identifies the Model Type, Work Order #, Discharge Temperature Range, Agent Weight, Maximum Volume Protected, Gross Weight, and Manufacturer Date:

MODEL W.O.XXXXXX
FD XXXM MANUAL/AUTO
DISCHARGE TEMPERATURE RANGE:
175 - 225 F (79 - 107 C)
CONTAINS: X.XX LBS (X.XKG) FM200
MAXIMUM VOLUME PROTECTED
XXX CU. FT. (X.X CU. METERS)
GROSS WEIGHT
XX LBS. X OZS. (XX KGS)
REPLACE IMMEDIATELY IF GROSS WEIGHT DECREASES BY X OZS. OR MORE
MANUFACTURE DATE: XX/XXXX REV: X

MODEL W.O.XXXXXX
FG XXXA AUTOMATIC
DISCHARGE TEMPERATURE RANGE:
XXX - XXX F (XX - XXX C)
CONTAINS: X.XX LBS (X.XKG) FM200
MAXIMUM VOLUME PROTECTED
XXX CU. FT. (X.X CU. METERS)
GROSS WEIGHT
XX LBS. X OZS. (XX KGS)
REPLACE IMMEDIATELY IF GROSS WEIGHT DECREASES BY X OZS. OR MORE
MANUFACTURE DATE: XX/XXXX REV: X

Pressure Gauge Inspection

Frequently check gauge for proper pressure, (every 6 months, minimum).

Reading the Pressure Gauge (Inspection)

The green section of the gauge is designed to show proper filling and pressurization at 70°F (21°C). Per applicable design standards, this is defined as ± 10% of nominal fill pressure.

Sea Fire systems are rated for operating temperatures from 0°F (-17°C) or 20°F (-6°C) up to 130°F (54°C). Note: This is storage and ambient operating temperature. A fire condition would obviously reach higher temperatures, with the system activating at 175°F (79°C).

The red section of the gauge, above and below the green section, indicate the acceptable pressure readings for temperatures below and above 70°F (21°C). The table located on the included tags show the pressure of the system at corresponding temperatures.

To inspect a unit when the ambient temperature is other than 70°F (21°C), measure the ambient temperature and find the corresponding nominal pressure in the table. Read the tip of the yellow pointer and determine what the internal pressure is by counting the division lines and adding or subtracting for each line segment from the black centerline marked, either 240 psi (16 bar) or 360 psi (24 bar).

For FG models (charged to 240 psi): Each line segment within the green and red zones are equal to 20 psi (1 bar).

For FD models (charged to 360 psi): Each line segment within the green pie is equal to 10 psi (0.68 bar). Each line segment within the red sections is equal to 20 psi (1 bar).

- Compare the actual reading to the reference table (see tag). The pressures should be within ± 20 psi (1 bar) of each other (one segment).
- Note: this allowance takes into account allowing for gauge manufacturing tolerance, temperature reading accuracy and the ability to precisely see the pointer location.
- If the yellow pointer is in either the white zone on the gauge, to the left “REPLACE” or to the right “OVERCHARGE”, the unit is likely not functional and may require replacement.
- If time and serviceability permits, a suspect unit may be verified by stabilizing the temperature of the unit at 70°F (21°C) for a minimum of 4 hours and reading the pressure gauge at that point.

Indicator Light Inspection

Before operating, visually check to insure indicator light or alternate display is operational, and cylinder pressure indicator is in the normal range.

Glass Bulb (Temperature Sensor) Inspection

Never paint or obstruct the cylinder manifold or sensor valve/detector, as this will adversely affect its operating characteristic.

Check for presence of glass bulb. Figure 8 shows two states: Charged (Intact) and Discharged (Activated).

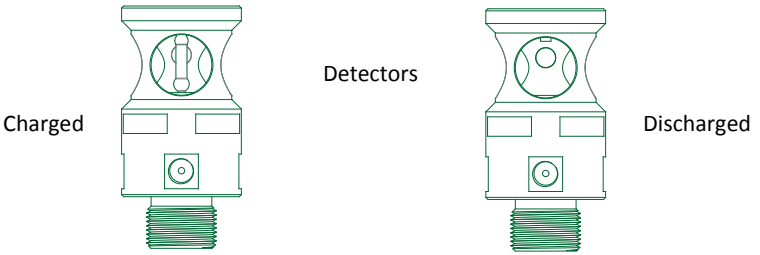


Figure 8

Cable inspection

Manual activation cables should be checked for proper operation every 6 months while cylinder inspection is being performed. Cable runs should be visually checked to ensure no damage has been done to the cable. (No excessive wear or pinching exists).

Take safety pin out of 'backstop' position in the release bracket and place into center hole, securing release arm. Disengage 'S'-hook from release arm, remove pin from fire release handle, and test cable for smooth operation. Re-assemble in reverse order (see Figure 6, page 14).

Additional Servicing

Further servicing of Sea-Fire pre-engineered systems is reserved to competent individuals who have completed training by Sea-Fire Marine personnel and Service Manual 123-253 is available to these individuals.

Specification Table
Sea-Fire "FG" Series Automatic Fire Extinguishers

FG Model		Area of Protection		Minimum HFC-227 ea		Maximum HFC-227 ea		Cylinder Diameter		Installation Dimension Requirements					
	Man /	CU FT	CU M							W		H		D	
Auto	Auto	Range	Range	LBS	KG	LBS	KG	IN	MM	IN	MM	IN	MM	IN	MM
FG 25A	FG 25M	22-25	0.62-0.7	0.95	0.43	1.1	0.5	2.9	74	5	127	11.9	302	4.3	109
FG 50A	FG 50M	30-50	0.85-1.4	1.3	0.58	2.2	1	2.9	74	5	127	15	381	4.3	109
FG 75A	FG 75M	51-75	1.4-2.1	2.2	1	3.3	1.5	3.5	89	5	127	17.8	452	4.4	112
FG100A	FG100M	76-100	2.1-2.8	3.3	1.5	4.3	2	3.5	89	5	127	18.1	460	4.5	114
FG125A	FG125M	101-125	2.8-3.5	4.3	2	5.4	2.5	4.25	108	5	127	18.2	462	5.1	130
FG150A	FG150M	135-150	3.8-4.2	5.4	2.5	6.5	3	5.25	133	5.5	140	19.8	503	6.1	155
FG175A	FG175M	151-175	4.2-5.0	6.5	3	7.6	3.5	5.25	133	5.5	140	19.8	503	6.1	155
FG200A	FG200M	176-200	5.0-5.7	7.6	3.5	8.7	3.9	5.25	133	5.5	140	19.8	503	6.1	155
FG225A	FG225M	201-225	5.7-6.4	8.7	3.9	9.7	4.4	5.25	133	5.5	140	19.8	503	6.1	155
FG240A	FG240M	226-240	6.4-6.8	9.7	4.4	10.4	4.7	5.25	133	5.5	140	19.8	503	6.1	155

Operating Temperature Range: 0°F to 130°F (-18°C to 54°C)

Discharge Temperature Range: FG 25 through FG 75: 200 - 250°F (93 - 121°C)
FG 100 through FG 240: 175 - 225°F (79 - 107°C)

- All FG Models approved for vertical or horizontal mounting.
- All FG Models are available with multiple approved cylinders, DOT/TC and CE.
- All FG Models are non-refillable (non-serviceable)
- ABYC, A-4, Fire Equipment Standard: Fixed fire extinguishing systems (August 1, 2009) shall be capable of both Automatic and Manual operation.
- FG model systems are designed for only one cylinder (single nozzle) to protect the entire space. Using two cylinders to achieve combined coverage is not acceptable.

Abbreviations:

CU FT = Cubic Feet
CU M = Cubic Meters
KG = Kilograms
LBS = Pounds
IN = Inches
MM = Millimeters

Specification Table
Sea-Fire "FD" Series Automatic Fire Extinguishers

FD Model		Area of Protection		Minimum HFC-227 ea		Maximum HFC-227 ea		Cylinder Diameter		Installation Dimension Requirements					
										W		H		D	
Auto	Man / Auto	CU FT Range	CU M Range	LBS	KG	LBS	KG	IN	MM	IN	MM	IN	MM	IN	MM
FD 150A	FD 150M	126-150	3.5-4.2	5.4	2.4	6.5	2.9	5.2	132	6.2	157	19.9	505	6.1	155
FD 175A	FD 175M	151-175	4.2-5.0	6.5	2.9	7.6	3.4	5.2	132	6.2	157	19.9	505	6.1	155
FD 200A	FD 200M	176-200	5.0-5.7	7.6	3.4	8.7	3.9	5.2	132	6.2	157	19.9	505	6.1	155
FD 225A	FD 225M	201-225	5.7-6.4	8.7	3.9	9.7	4.4	5.2	132	6.2	157	19.9	505	6.1	155
FD 250A	FD 250M	226-250	6.4-7.1	9.7	4.4	10.8	4.9	6.9	175	7.4	188	19.2	488	8	203
FD 275A	FD 275M	251-275	7.1-7.8	10.8	4.9	11.9	5.4	6.9	175	7.4	188	19.2	488	8	203
FD 300A	FD 300M	276-300	7.8-8.5	11.9	5.4	13	5.9	6.9	175	7.4	188	19.2	488	8	203
FD 325A	FD 325M	301-325	8.5-9.2	13	5.9	14	6.4	6.9	175	7.4	188	19.2	488	8	203
FD 350A	FD 350M	326-350	9.2-9.9	14	6.4	15.2	6.9	6.9	175	7.4	188	19.2	488	8	203
FD 400A	FD 400M	351-400	9.9-11.3	15.2	6.9	17.3	7.9	6.9	175	7.7	196	23.8	605	7.8	198
FD 450A	FD 450M	401-450	11.3-12.7	17.3	7.8	19.5	8.7	6.9	175	7.7	196	23.8	605	7.8	198
FD 500A	FD 500M	451-500	12.7-14.2	19.5	8.8	21.7	9.8	6.9	175	7.7	196	23.8	605	7.8	198
FD 550A	FD 550M	501-550	14.2-15.6	21.7	9.8	23.8	10.8	6.9	175	7.6	193	27.8	706	7.8	198
FD 600A	FD 600M	551-600	15.6-17.0	23.8	10.8	26	11.8	6.9	175	7.6	193	27.8	706	7.8	198
FD 650A	FD 650M	601-650	17.0-18.4	26	11.8	28.2	12.8	8	203	8.6	218	28.1	714	9.2	234
FD 700A	FD 700M	651-700	18.4-19.8	28.1	12.7	30.3	13.8	8	203	8.6	218	28.1	714	9.2	234
FD 750A	FD 750M	701-750	19.8-21.2	30.3	13.7	32.5	14.8	8	203	8.6	218	28.1	714	9.2	234
FD 800A	FD 800M	751-800	21.2-22.7	32.5	14.7	34.6	15.8	8	203	8.6	218	28.1	714	9.2	234
FD 850A	FD 850M	801-850	22.7-24.1	34.6	15.7	36.8	16.7	8	203	8.6	218	32.9	836	9.2	234
FD 900A	FD 900M	851-900	24.1-25.5	36.8	16.7	39	17.7	8	203	8.6	218	32.9	836	9.2	234
FD 950A	FD 950M	901-950	25.5-26.9	39	17.7	41.1	18.7	8	203	8.6	218	32.9	836	9.2	234
FD1000A	FD1000M	951-1000	26.9-28.3	41.1	18.6	43.3	19.7	8	203	8.6	218	32.9	836	9.2	234
	FD1050M	1001-1050	28.3-29.8	43.3	19.6	45.5	20.7	10	254	16.3	414	30	762	11.1	282
VM	FD1100M	1051-1100	29.8-31.1	45.5	20.5	47.6	21.7	10	254	16.3	414	30	762	11.1	282
EO	FD1150M	1101-1150	31.1-32.6	47.6	21.6	49.8	22.6	10	254	16.3	414	30	762	11.1	282
RUO	FD1200M	1151-1200	32.6-34.0	49.8	22.6	52	23.6	10	254	16.3	414	30	762	11.1	282
TNN	FD1250M	1201-1250	34.0-35.4	52	23.6	54.1	24.6	10	254	16.3	414	30	762	11.1	282
ITL	FD1300M	1251-1300	35.4-36.8	54.1	24.5	56.3	25.6	10	254	16.3	414	30	762	11.1	282
CIY	FD1350M	1301-1350	36.8-38.2	56.3	25.5	58.5	26.6	10	254	16.3	414	30	762	11.1	282
AN	FD1400M	1351-1400	38.2-39.6	58.5	26.5	60.6	27.6	10	254	16.3	414	30	762	11.1	282
LG	FD1450M	1401-1450	39.6-41.1	60.6	27.5	62.8	28.5	10	254	16.3	414	30	762	11.1	282
	FD1500M	1451-1500	41.1-42.5	62.8	28.5	65	29.5	10	254	16.3	414	30	762	11.1	282

Operating Temperature Range: 20°F to 130°F (-7°C to 54°C)

Discharge Temperature Range: FD 150 through FD 1500: 175 - 225°F (79 - 107°C)

- Models FD 150 through FD 1000 approved for vertical or horizontal mounting.
- Models FD 1050 through FD 1500 are for vertical mounting only.
- All FD models are refillable.
- FD models are only offered in either US DOT/TC or European CE (not both).
- US Coast Guard approval requires the installation of manual discharge capability on all systems installed in compartments of 1,000 cubic feet (28.3 cubic meter) and larger.
- ABYC, A-4, Fire Equipment Standard: Fixed fire extinguishing systems (August 1, 2009) shall be capable of both Automatic and Manual operation.
- FD model systems are designed for only one cylinder (single nozzle) to protect the entire space. Using two cylinders to achieve combined coverage is not acceptable.

Abbreviations:

CU FT = Cubic Feet KG = Kilograms LBS = Pounds
CU M = Cubic Meters IN = Inches MM = Millimeters

Three (3) Year "FG" and "FD" Series Limited Warranty

We warrant to the original retail purchaser, the FD and FG suppression systems for a period of three (3) years after retail purchase against defective material and faulty workmanship. Any system found to be defective during the warranty period will repaired if possible, or replaced free of charge if classified as non-refillable (according to the product label) upon the ***prepaid*** return of the defective system to Sea-Fire facility or authorized service party. Proof of purchase required, otherwise date of manufacturer on extinguisher specification label will apply. This warranty gives you specific legal rights which may vary by state or country.

The foregoing warranty is made in lieu of all other warranties with respect to the system including any implied warranty of merchantability or fitness for a particular purpose. No person is authorized to give any other warranty, or assume for Sea-Fire Marine any other liability in connection with the sale or installation of its products. Replacement of the system will be the sole remedy with respect to any loss or damage to property. Buyer is not relying on seller's judgment regarding buyer's particular requirements and buyer has had an opportunity to inspect the product to buyer's satisfaction.

Conditions

All Sea-Fire products are leak tested after manufacture and shipped in perfect working order. Damage noted upon receipt of shipment should be addressed as a shipping claim, the filing of which is the sole responsibility of the consignee for which the total compensatory award will be limited to that appropriated by the carrier. Insured freight costs are the responsibility of the consignee. Missing component parts and damage noted upon installation are typically the result of mishandling during the installation process and will not qualify for warranty coverage. Incidents of accidental discharge are not indicative of product failure – heed product warnings to avoid injury and / or associated costs. **No returns will be processed without proper return authorization.**

Out of Warranty Replacements / Recharges

Sea-Fire "FG" Model Series cylinders comply with US DOT Specification 39 and PED. These cylinders are **not refillable**. The discharge cylinder will be replaced with a comparable Sea-Fire extinguisher upon ***prepaid*** return of the discharged system for one-half of the current suggested list price.

Sea-Fire "FD" Model Series cylinders comply with DOT Specification 4B/360, 4BW/500, and 3AL/1000 TPED which allows discharged cylinders to be **refilled** and serviced. The discharged extinguisher may be refilled upon the ***prepaid*** return of the discharged system. Contact factory or an authorized dealer for detail.

Return to: Sea-Fire Marine - USA
Baltimore, Maryland
Website: www.Sea-Fire.com

or

Sea-Fire Europe, LTD
Hampshire
United Kingdom
Website: www.Sea-Fire.co.uk

Fire Extinguisher/System
MATERIAL SAFETY DATA SHEET

Section 1 – Company and Chemical Identification

Metalcraft / Sea-Fire Marine **Emergency Phone: 1-800-535-5053** **International Phone: 352-323-3500**
9331-A Philadelphia Road Phone: 1-800-445-7680
Baltimore, Maryland 21237 Date: April 2010
http://www.Sea-Fire.com Product Name: **Fire Extinguisher / System**

Section 2 – Hazardous Ingredients / Identity

C.A.S.	INGREDIENT NAME	OSHA PEL	ACGIH TLV	OSHA STEL
431890	HEPTAFLUOROPROPANE	NOT ESTAB.	NOT ESTAB.	NOT ESTAB.

Section 3 – Hazard Identification

Emergency Overview: HEPTAFLUOROPROPANE is a colorless, odorless gas. Direct eye or skin contact with the liquid or cold gas can cause chilling or possibly frostbite of exposed tissues. Inhalation of high concentrations can be harmful or fatal due to oxygen deprivation and/or heart irregularities. Fire Extinguisher cylinders are pressurized. Although unlikely, a cylinder could be propelled and cause bodily injury and/or property damage if the valve is broken due to improper handling or storage.

Section 4 – First Aid Measures

Skin contact: Flush with water**,** treat for frostbite if necessary by gently warming affected areas. Consult a physician.
Eye contact: Immediately flush eyes with plenty of water for at least 15 minutes. Consult an ophthalmologist.
Inhalation: Remove victim(s) to fresh air, as quickly as possible. If not breathing, qualified personnel should administer artificial respiration. Get medical attention. If breathing is difficult, administer oxygen.
Ingestion: No first aid should be needed. Not considered a potential route of exposure.

Section 5 – Fire Fighting Measures

Flammability: Not flammable.
Conditions of flammability: Will not burn.
Extinguishing media: Use appropriate extinguishing media for surrounding fire.
Keep cylinders cool with water spray applied from a safe distance.

Section 6 – Accidental Release Measures

Evacuate the area and ventilate. Do not enter areas where high concentrations may exist (especially confined or poorly ventilated areas) without appropriate protective equipment including a self-contained breathing apparatus.

Section 7 – Handling and Storage

Handle, transport and store carefully and securely to avoid accidental knocking over or other severe physical impacts. Do not expose to direct heat sources. Do not over-pressurize.

Section 8 – Exposure Controls/Personal Protection

Respiratory: None
Protective Gloves: Leather gloves are recommended when handling cylinders.
Eye Protection: Eye protection is recommended when handling cylinders.
Other Protective Clothing or Equipment: Safety shoes are recommended when handling cylinders.
Work Hygienic Practices: Wash thoroughly after handling. Wash contaminated clothing before reuse.

Section 9 – Physical & Chemical Properties

Appearance: Colorless gas **Physical State**: Gas
Odor: Odorless **Solubility in Water**: 260 mg/L

Section 10 – Stability and Reactivity

Stability: Stable under normal conditions of handling and use.
Conditions to Avoid: None

Section 11 – Toxicological Information

VALUE (LD50 or LC50)	Animal	Routes	Components
>788.696 ppm/4H	Rat	Acute Inhalation	1.1.1.2.3.3.3 Heptafluoropropane

The human health hazards of this product are expected to be similar to other liquefied gases including N2, C02, CFCs, HCFCs, and HBFCs. Therefore, direct eye or skin contact with the liquid or cold gas can cause chilling or possibly frostbite of exposed tissues. Inhalation of high concentrations can be harmful or fatal due to oxygen deprivation and/or heart irregularities (arrhythmias). Misuse of the products by deliberately inhaling high concentrations of this gas could cause death without warning. Persons with preexisting cardiac or central nervous system disorders may be more susceptible to effects of an overexposure.

Section 12 – Ecological Information

No ecological information is available.

Section 13 – Disposal Considerations

Dispose of waste and empty cylinders as allowed by current Local, State/Province, or Federal laws and regulations.

Section 14 – Transport Information

Proper Shipping Name: Heptafluoropropane
ID Number: UN3296
Hazard Class: 2.2
Packing Group: N/A
Labels: Non-flammable gas
Packing Instructions: 200

Section 15 – Regulatory Information

U.S. Federal Regulations: The components of this product are either on the TSCA Inventory or exempt (i.e. impurities, a polymer complying with the exemption rule at 40 CFR 723.250) from the Inventory.
State Regulations: None Known

Section 16 – Other Information

NFPA Codes:

Health:	1	Flammability:	0
Reactivity:	0	Other:	X

NMIS Codes:

Health:	1	Flammability:	0
Reactivity:	0	Protection:	X

DISCLAIMER OF EXPRESSED AND IMPLIED WARRANTIES:

Metalcraft / Sea-Fire Marine, Inc. has taken reasonable care in preparing this document, however, since the use of this information and the conditions of use of the product are not within the control of Metalcraft / Sea-Fire Marine, Inc., it is the user's obligation to determine the conditions of safe use of this product. The information in this document is offered with no warranties or representations as to accuracy or completeness and it is the responsibility of each individual to determine the suitability of the information for their particular purpose(s).

NOTES:

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