STAT -X INSTALLATION AND OPERATION MANUAL

FOR MARINE APPLICATIONS

Unit D4, Hays Bridge Business Centre, Brickhouse Lane, Godstone, Surrey, RH9 8JW, U.K
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Reg No: 4069200 England and Wales. VAT No: 790777970 Directors: M. Bresnahan P. Baker

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FPX108M SOLO-ULTRA FIRE CONTROL PANEL FOR MANUAL ONLY ACTIVATION OF STAT-X AEROSOL FIRE SUPPRESSION GENERATORS

The FPX108M Solo Ultra panel offers both fire detection (single zone for protected area using conventional marine approved heat and smoke detectors) and fire suppression (Stat-X). The panel fascia is simply displayed in a way to show fire detection on the left and fire suppression on the right. The FPX108M Solo-Ultra fire control panel fault monitors both fire detection and fire suppression circuits. To activate the Stat-X generators there is a two-stage operation: 1, remove tamper evident tag to reveal activation button. 2, press activation button. The panel is pre-set with a 30 second time delay whilst activating a sounder/strobe in the protected space.

FEATURES SUMMARY

- Automatic fire detection system to raise the alarm (fire alarm) for a single zone.
- Can activate multiple Stat-X Aerosol Generators.
- Stat-X generators are installed within the protected space.
- Uses conventional marine approved heat and smoke detectors.
- Visual and audible alarm indications at/on the panel display.
- External sounder/strobe for both fire detection and fire suppression.
- Manual activation - Panel is pre-set for manual only operation.
- Manual activated button has tamper evident removable tag.
- 30 seconds pre-set time delay upon activation of fire suppression.
- Full fault monitoring of fire detectors and fire suppression generators.
- Vault Free Contact for signalling upon activation of fire suppression system.
- Main and secondary power supply inputs.
- 12 or 24VDC (12 VDC is limited to the quantity of detectors/generators used).

Marine Fire Safety

FPX108M SOLO-ULTRA PANEL FEATURES

If there is an open/short circuit fault on the "Detector loop" or if one of the smoke or heat detectors has been removed from its base, the "Fault" LED will be activated and the panels internal "Fault" audible alarm will beep.

If there is an open circuit fault on the "Fire Suppression" circuit or if an isolate key switch has been installed and used, the Fire Suppression "Fault" LED will be activated, and the panels internal "Fault" audible alarm will beep.

The green "On" LED will be illuminated when there is power to the panel. If secondary back up power supply is used the LED will flash.

In the event of a fire detector being activated the "Fire Alarm" LED will be activated, and the panel's internal audible alarm will beep.

When the manual activation button has been pressed the "Activation" LED will intermittently flash whilst the activation pre-discharge internal alarm beeps as it counts down to the activation of the Stat-X aerosol generators. Once the aerosol generators have been activated the LED will stay constant, as will the internal audible alarm.

Mute button can be pressed to mute the fire alarm external sounder/strobes. This only mutes the external sounder/strobes and does not mute the panels visual and audible alarm sounder. It does not mute the fire suppression sounder/strobe in the protected space.

Manual activate button for the activation of the aerosol fire suppression generators within the protected area. Will immediately activate the sounder/beacon within the protected space and will start the pre-discharge countdown to actual activation.

FPX108M SOLO-ULTRA complete with tamper tag attached. To access the activation button, simply pull the bottom of the tag to remove it to reveal the activation button. The tag can be replaced once removed but will clearly show "VOID" on the underside to indicate that it has been "tampered" with.

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VOLUME OF AREA TO PROTECT

It is very important to have an accurate measurement of the overall volume of your protected space. The Stat-X aerosol fire suppression system supplied is designed to work on a total flooding operation. To calculate the volume, the following calculation should be used in conjunction with any relevant corrective factors.

Measure the overall length
Measure the overall Width
Measure the overall Depth
Calculate: LENGTH x WIDTH x DEPTH.

Measurements should be taken at the longest, widest and deepest points. This will give an indication of the overall maximum volume of the protected space.

Corrective factors

Do not reduce any of the overall volume for equipment like engines, generators, etc. This type of equipment may be able to draw in the aerosol gas and this could dilute the concentration required per m^3. Keeping the concentration level the same as for an area clear of machinery will help the distribution of the particles around the machinery within the area. Larger sealed equipment may be deducted from the overall volume, such as fuel tanks. This will depend on the positioning of them.

Un-sealable openings

Calculate the overall percentage of openings in the overall surface area (vents, gaps, exhausts/extraction equipment, etc). If the calculated percentage is over 2%, a corrective factor may be required. Contact your supplier for further information.

Design Concentration levels

In accordance with MCA certification (Ref: MS 47/11/1042) and testing which has been carried out to determine the design quantities for both Class B and Class A fires. Class B requires a minimum design concentration of $58g/m^3$ and Class A requires a minimum design concentration of $72g/m^3$.

In accordance with NFPA 2010 (2020) Standard for fixed aerosol fire extinguishing systems, the maximum design concentration to be used should not exceed $100g/m^3$. If it is required for the design concentration level to exceed this, then it is no longer deemed safe as an occupied space.

IF YOU ARE UNSURE ABOUT HOW TO CORRECTLY DETERMINE THE VOLUME OF THE PROTECTED SPACE, PLEASE CONTACT MARINE FIRE SAFETY FOR TECHNICAL ASSISTANCE.

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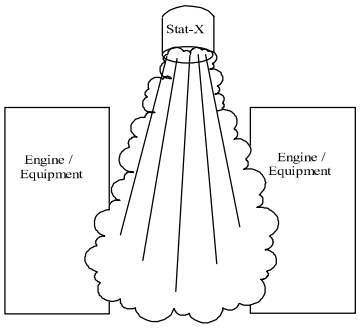
PRIOR TO INSTALLATION OF FPX108M SOLO ULTRA PANEL AND STAT-X GENERATOR/S

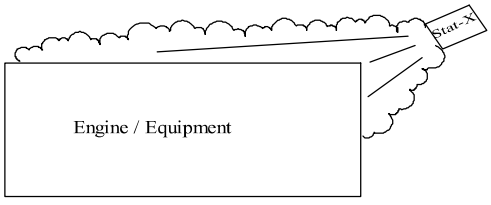
- **Ensure you have read the whole of this manual. If you are in any doubt regarding any part of the installation process, please stop and contact Marine Fire Safety before proceeding, who will be able to offer technical advice.**
- Ensure that engines/machinery is switched off and that there are no hot pieces of equipment near to where the Stat-X generator/s is to be fitted.
- Ensure that you can safely access the protected area to carry out the installation.
- Check the overall volume is correct.
- Check that all equipment required are in good working order and not damaged or any parts missing.
- Ensure that the areas where the installation will be carried out is free of dirt, grease and other similar substances.
- Check that you have all the necessary tools and equipment required for the installation including any appropriate PPE.
- **Ensure there is no power to any part of the system until commissioning is ready to be carried out by a competent/trained engineer.**

POSITIONING OF THE STAT-X GENERATORS

- For maximum effectiveness, placement of the Stat-X aerosol generator/s is extremely important. They should be positioned as high up as possible, near to/on the deckhead with the aerosol exit ports directed in a downwards direction (approximately 35 – 90 degree angle) as shown below, this will allow the aerosol particles to freely flow and egress naturally around the protected space and any equipment in it.

- For maximum effectiveness and distribution of the aerosol gas particles the aerosol generator should be positioned so the flow does not impinge directly on to any bulkheads or equipment as this will block the ability for the particles to flow freely and egress around the protected space. Although the aerosol will not cause any damage to working machinery, it is still recommended that the guideline for safe working distances are adhered to (See Safe Working/Installation Distances).





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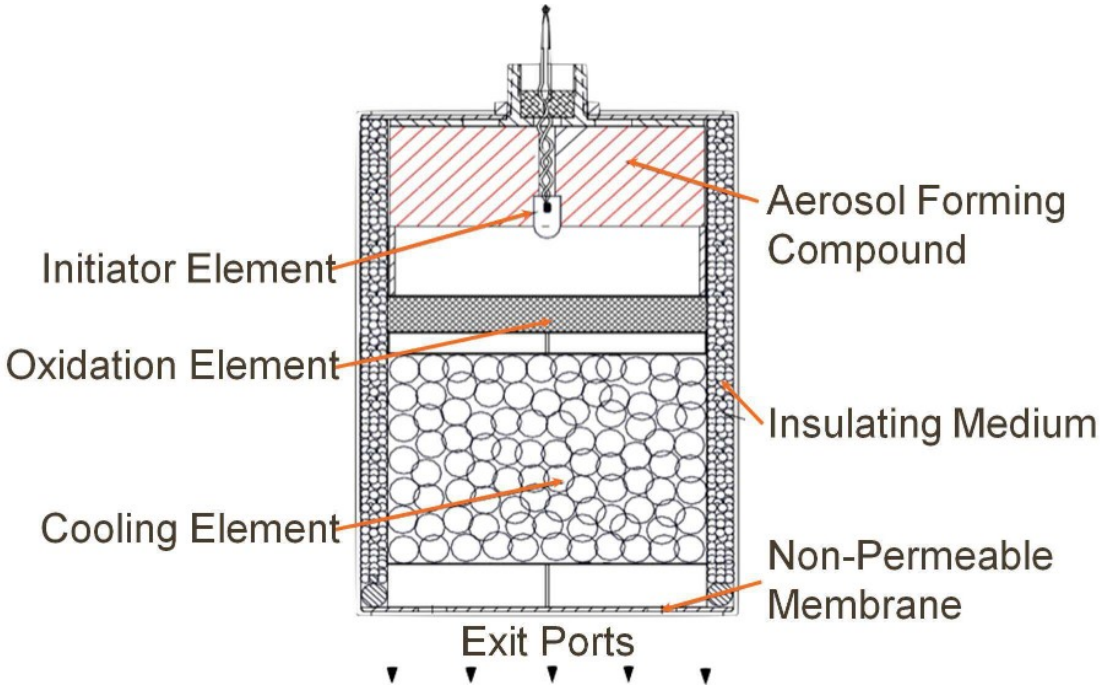
SAFE WORKING/INSTALLATION DISTANCES

Model	Clearance (C - Zone)	Maximum fixing height	Maximum protective area m^3 in accordance with MCA tests
G30	0.1m Minimum	1.1m	$0.5m^3$
G60	0.2m Minimum	1.8m	$1.0m^3$
G100	0.2m Minimum	2.0m	$1.7m^3$
G250	0.3m Minimum	2.0m	$4.3m^3$
G500	0.5m Minimum	2.5m	$8.6m^3$
G1000	1.0m Minimum	3.0m	$*17.2m^3$
G1500	1.0m Minimum	4.0m	$*25.8m^3$
G2500	1.5m Minimum	4.0m	$*43.1m^3$
In some applications, to protect larger areas, it may be considered better to use multiples of smaller units. Contact Marine Fire Safety for information/requirements.			

STAT-X AEROSOL GENERATOR COMPONENTS



C-ZONE AREA

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INSTALLATION REQUIREMENTS FOR STAT-X AEROSOL GENERATORS

- Assess the area and find a suitable location for the Stat-X generator/s, high up in the protected space, preferably on the deckhead.
- It is important to ensure that the position of the Stat-X generator gives a free and unimpeded area for the aerosol gas to exit the generator and allow an efficient egress around the protected space and machinery within it.
- If using multiple aerosol generators, these should be evenly spread around the protected space.
- Fix the bracket in its position using screws or bolts. It is very important that a good solid fixing is achieved to take the weight of the generator/s.
- Install a junction box near to each bracket, close enough to house the activation lead. Access to the junction box will be required for commissioning/annual maintenance.
- The Stat-X generator will come with the bracket clip already fitted, insert this into the U shape section of the bracket.
- Once the required discharge angle of the Stat-X generator is achieved, tighten the nuts on each side using the shake washer plus standard washer, ensuring a tight fixing.
- Connect the activation lead to the Stat-X generator and feed the open end into the junction box using a gland
- **DO NOT CONNECT THE STAT-X ACTIVATION LEAD TO THE SUPPLY FROM THE PANEL**

Example

- Installed Stat-X unit, 45-degree angle with junction box fitted to side of bracket.

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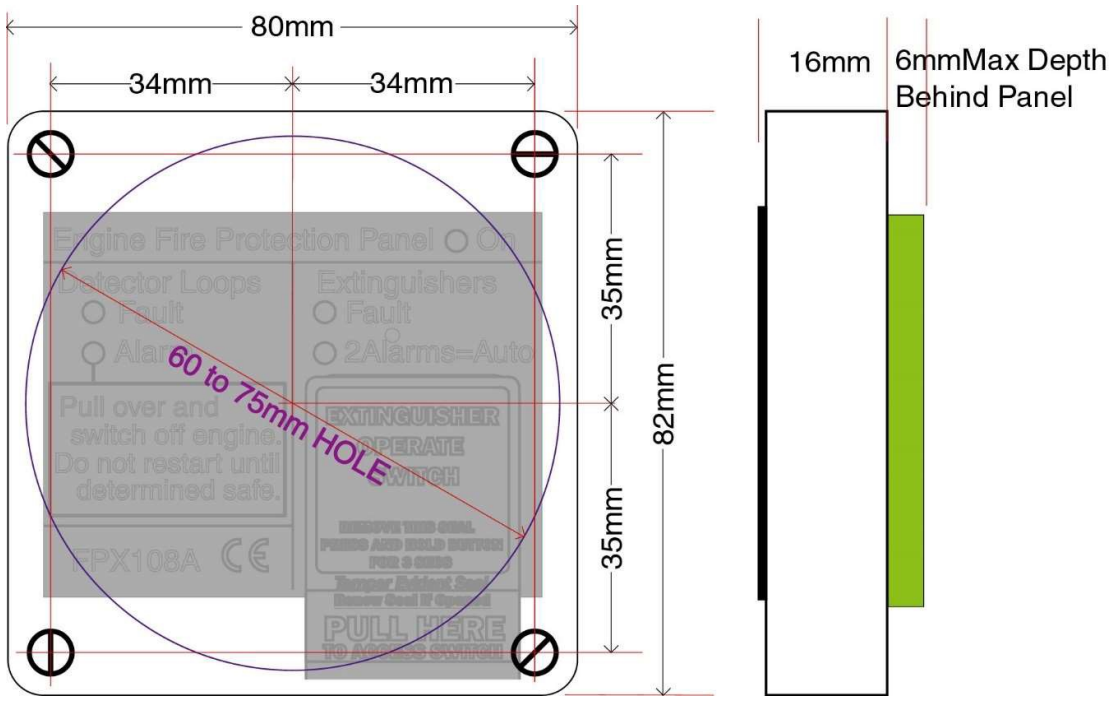
INSTALLATION REQUIREMENTS FOR THE FPX108M SOLO-ULTRA PANEL

- Find a suitable position for mounting the panel, taking into consideration the cut out and clearance required for the wiring to the back of the panel.
- The power supply to the FPX108M Solo Ultra panel requires a minimum of a positive single pole thermal breaker of between 5 - 10amp on 24VDC supplies.
- Do not power up the panel/system until commissioning is ready to be carried out by a competent/qualified engineer.
- Where possible, cables installed for the FPX108 Solo Ultra panel should avoid being installed in the same cable runs for VHF radio and antenna cables, to avoid any risk of interference.
- Loop 2 (A and B) should **NOT** be utilized for detectors, but instead a 10K resistor should be installed between the Loop 2 A and B terminals (panel is supplied with 10K resistor installed between Loop 2 A and B terminals).
- Do not adjust the dip switches on the rear of the panel, these are pre-set for manual only activation and to facilitate a 30 second pre-discharge countdown (See dip switch settings).
- Once the system has been tested and commissioned the tamper tag should only be removed for activating the system.
- The following template is not to scale but indicates the measurements required for installation of either flush/surface mounting.



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WIRING OF THE FPX108 SOLO ULTRA PANEL WITH STAT-X AEROSOL GENERATORS

- Marine Fire Safety Ltd recommends stranded tinned copper multi-core 0.75mm^2 – 1.5mm^2 cable. The cable should be designed for fixed installations in ships & offshore platforms, in areas where cables are expected to operate during a fire. The cable should conform to BS7917 – Flame Retardant and Fire Resistant, and IEC 60332-3A & IEC 60331.
- This cable must be shielded to ensure the greatest possible degree of protection to the units. The cable shielding should run along the entire generator loop and be terminated in the 108 panel common negative (recommended location above Firex A & B).

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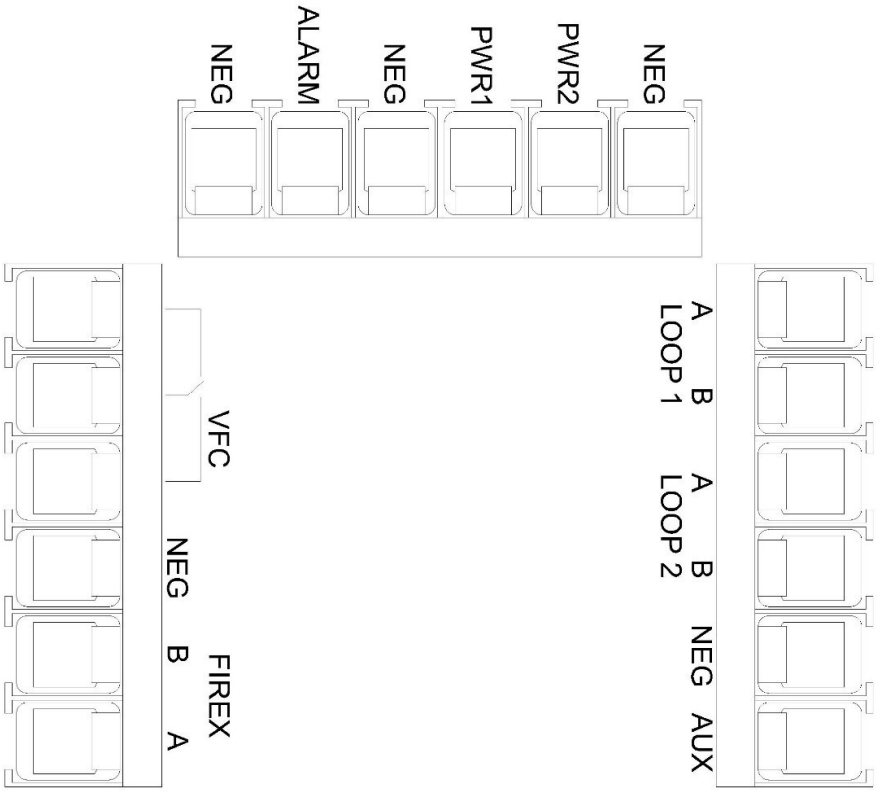
FPX108M SOLO ULTRA WIRING TERMINALS (as set out on the back of the panel)



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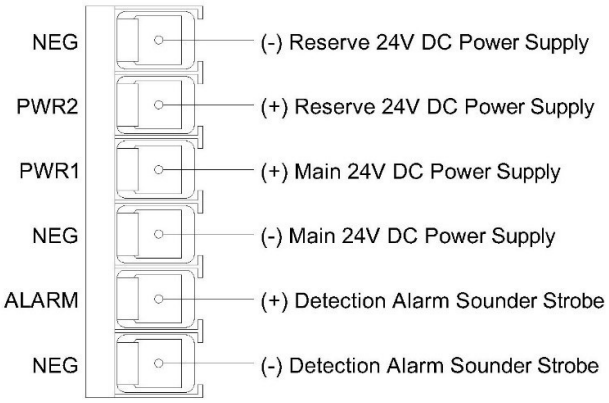

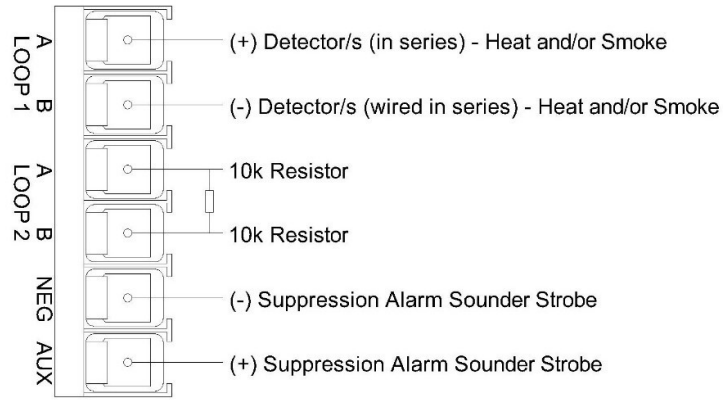

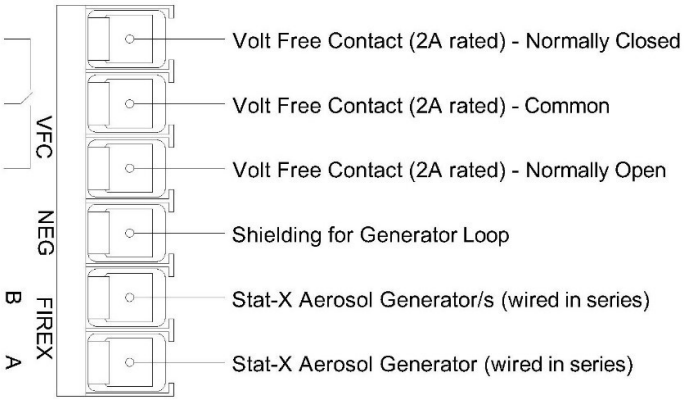

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- MAIN 24V DC POWER SUPPLY – PWR1

  The panel requires a clean 24VDC power supply for its main source of power. This should be supplied from a 5 – 10Amp breaker on the 24VDC board. The green "on" LED on the panel will be constant when using the main power supply.

- RESERVE 24V DC POWER SUPPLY – PWR2*

  If required, the panel can accept a reserve power supply. This should be from a different power supply to the main one and from a separate 5 – 10Amp breaker. The green "on" LED on the panel will flash and the panel will beep when the reserve power supply is being utilised.

- DETECTION ALARM SOUNDER STROBE

  This is for raising the alarm when the heat or smoke detector installed within the protected space has been activated. It is recommended that there is a detection alarm sounder/strobe in the wheelhouse (near to the panel location) and one in the protected space. *See detection sounder strobe wiring diagram*.

- DETECTION LOOP 1 – SMOKE DETECTOR

  Detection Loop 1 is used for connecting to the smoke detector installed within the protected space as part of the FPX108M Solo Ultra/Stat-X system. This circuit is fully fault monitored. When using more than one detector, wire them in series. *See detector base wiring diagram*.

- DETECTION LOOP 2 – HEAT DETECTOR

  Detection Loop 2 is used for connecting to the heat detector installed within the protected space as part of the FPX108M Solo Ultra/Stat-X system. This circuit is fully fault monitored. When using more than one detector, wire them in series. *See detector base wiring diagram*.

- SUPPRESSION ALARM SOUNDER STROBE**

  This is a pre-discharge alarm sounder/strobe installed within the protected space to alert personnel of an imminent discharge of the Stat-X generators. The sounder/strobe will activate for a 30 second duration whilst the pre-discharge timer counts down to activation.

- VOLT FREE CONTACT (VFC)

The Volt Free Contact is rated for a maximum of 2 Amps. It is operated immediately (there is no time delay on the VFC) upon activation of the Stat-X Aerosol Generators by pressing the activation button. When the panel is reset the Volt Free Contact will also reset.

- STAT-X AEROSOL GENERATORS

  Firex A and B are used for wiring to the Stat-X Aerosol Generators. When using more than one Stat-X generator, these should be wired in series.

- STAT-X AEROSOL SHIELDING

  The shielding from the Stat-X cable loop should be run along the entire series loop and terminated in the negative terminal on the panel above the Stat-X loop.

Where possible always use the main power supply. In earlier versions when using Reserve 24VDC power supply, activation is immediate with no time delay. **In earlier versions the suppression sounder strobe will have to be operated via the VFC. Check with Marine Fire Safety regarding what model you have.

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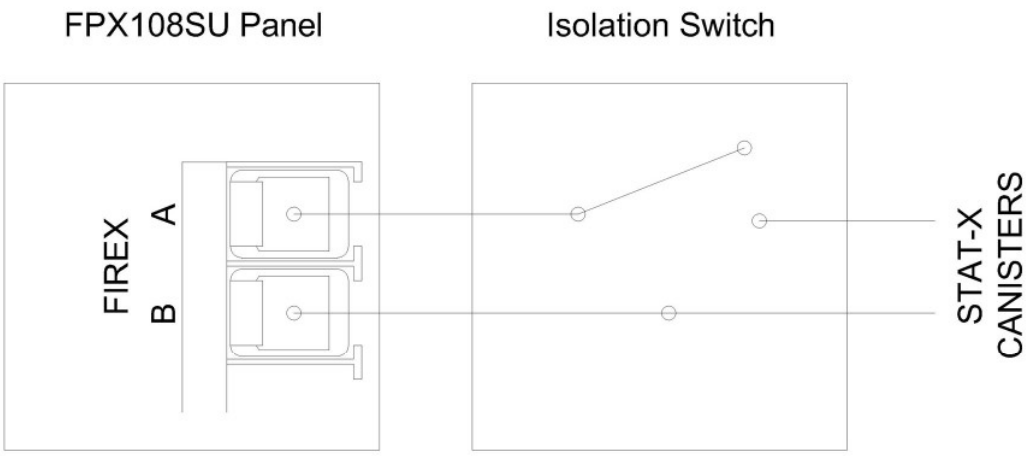
- ISOLATION SWITCH

An isolation switch should be fitted in the Firex A feed to the Stat-X canisters in order that the system can be isolated when personnel are working inside the protected space. Once the isolation switch is engaged the panel will show a fault and sound the internal buzzer.



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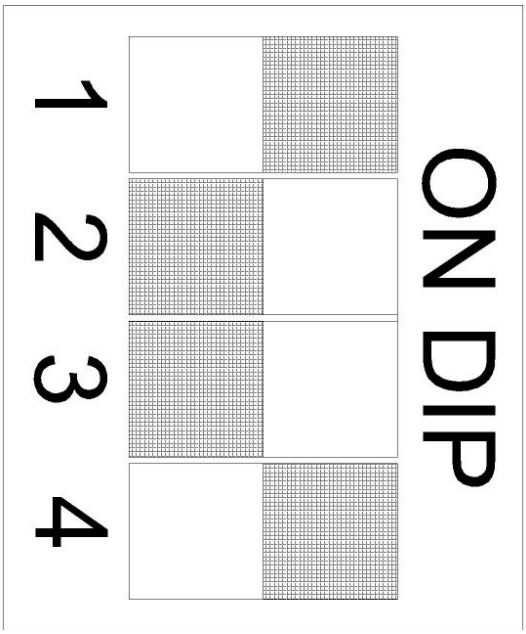
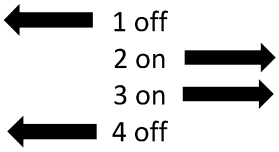
DIP SWITCH CONFIGURATION



The DIP Switches will determine the pre-discharge time delay and the FPX108M Solo Ultra panel is supplied with the DIP Switches pre-set for a 30 second time delay. It is important that unless specifically discussed and approved by Marine Fire Safety, the DIP Switch configuration should stay as pre-set to the 30 second time delay.

Prior to installation, please check the DIP Switch settings on the rear of the panel are set as per the illustration above (DIP Switches shown above in white and when looking at the back of the panel with the DIP Switches at the bottom right side of the panel). The DIP switches should be as follows:



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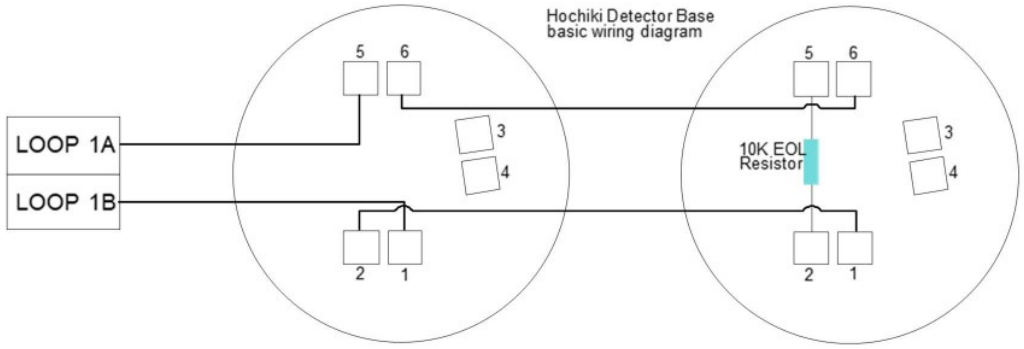
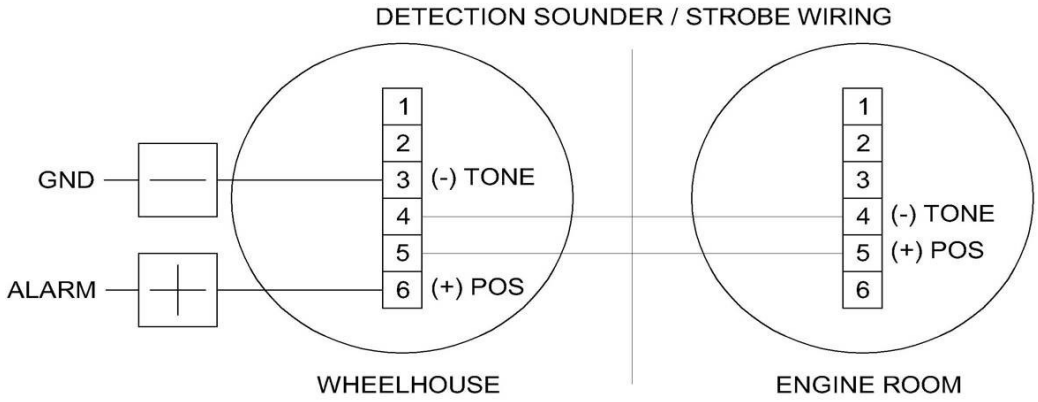
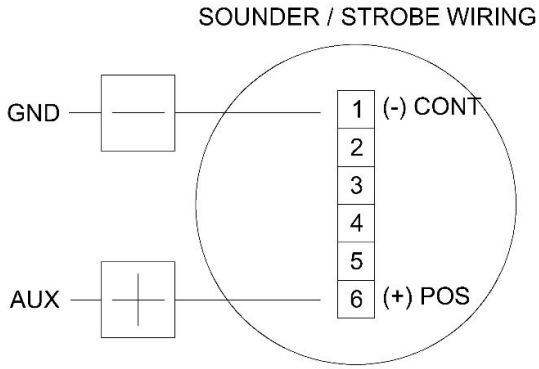
DETECTOR BASE WIRING DIAGRAM (MED Hochiki detector base)



DETECTION SOUNDER STROBE WIRING DIAGRAM (MED CC VTB 32EM sounder strobe)



SUPPRESSION SOUNDER STROBE WIRING DIAGRAM (MED CC VTB 32EM sounder strobe)



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WIRING STAT-X GENERATORS

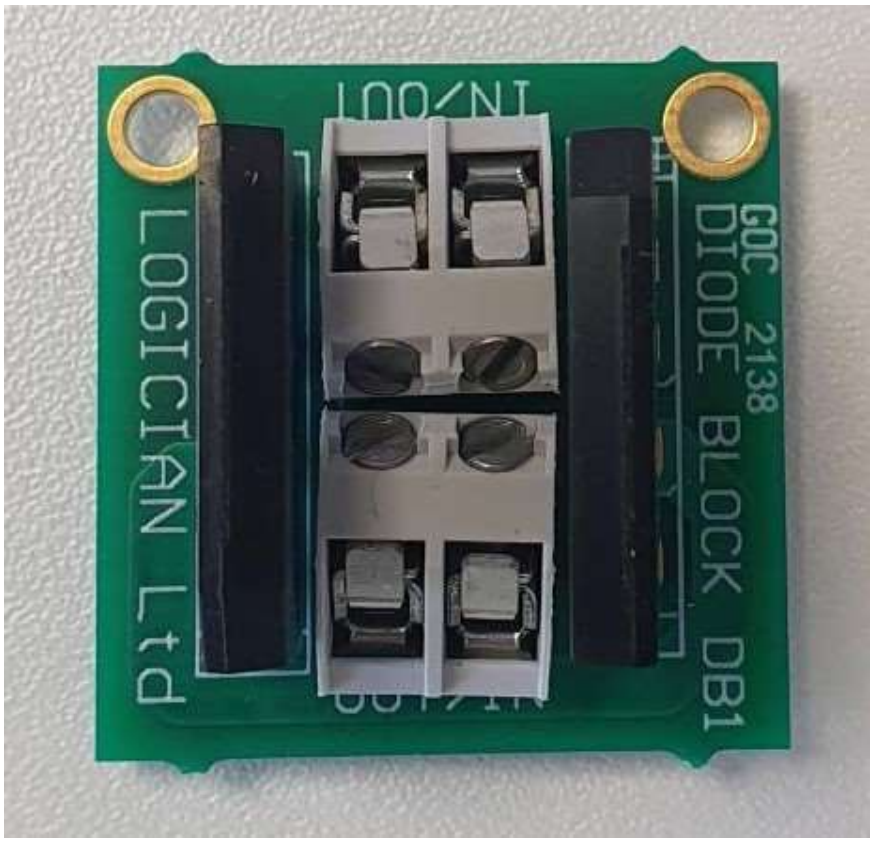
DO NOT CONNECT THE STAT-X GENERATORS UNTIL COMMISSIONING HAS BEEN COMPLETED BY A QUALIFIED ENGINEER. FOR TESTING USE MANUFACTURERS TEST MATCH HEADS.

Once the Stat-X generators have been installed within the protected space, Marine Fire Safety recommend installing a junction box within 500mm of each of the Stat-X generator/s, this Is to enable the connection between the Stat-X lead and the wiring from the panel. This junction box will need to be accessed for annual maintenance.

The Stat-X generators are non-pole sensitive and should be wired in SERIES, see the example below of wiring for multiple Stat-X generators in series.

MULTI GENERATOR WIRING

All systems where there are more than one generator should have the diode blocks fitted. There should be one diode block for each generator;



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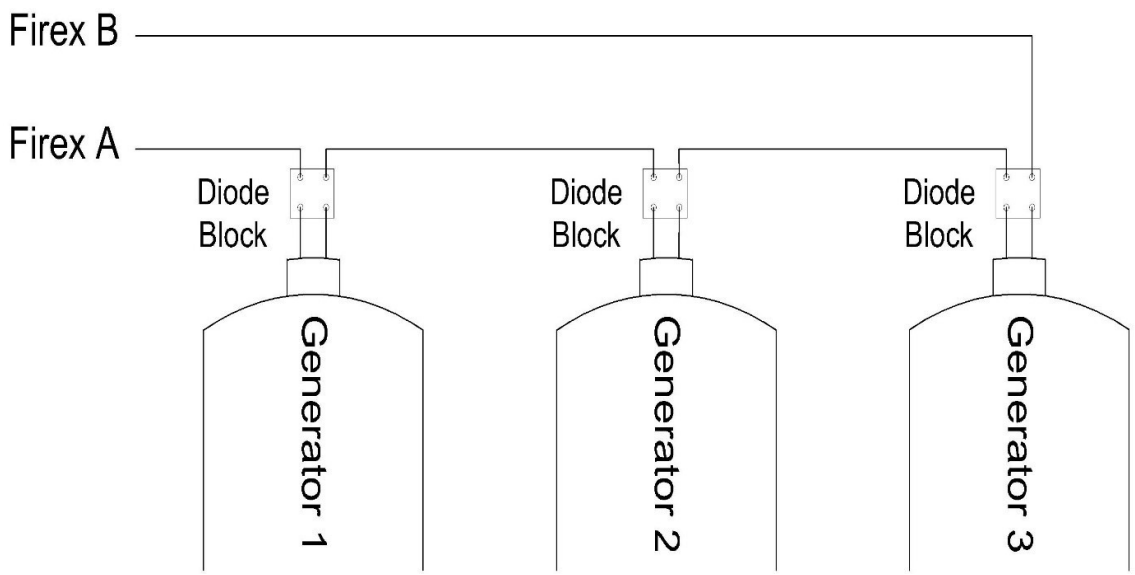
STAT-X GENERATORS WIRED IN SERIES

Generators should be wired as follows;



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CONNECTING STAT-X GENERATORS AFTER COMMISSIONING

- Isolate the power supply/s to the system.
- Replace the tamper evident tag on the FPX108 Solo Ultra panel fascia.
- Connect the Stat-X activation lead adaptor/s to the back of the Stat-X generator/s.
- In the junction box, connect the stripped end of the Stat-X activation lead/s to the cable from the Firex A/Firex B terminals on the FPX108 Solo Ultra panel.
- Remove all personnel from the protected space prior to switching the power back on.
- Switch power to the system back on.
- Ensure there are no faults showing on the panel.

ELECTRICAL SPECIFICATION (at 24VDC supply unless otherwise stated)

Power Supply	Operating Voltage	11 to 32V DC
	Quescent Current Ign Off	8.5mA Typ (excluding external load currents)
	Ign On	16mA Typ (excluding external load currents)
	Maximum Alarm Current Draw	100mA (excluding external load currents)
	Max current draw	3A (including extinguisher operate current)
	Parked current draw	8.5mA Typ
Suppressor Activation	Discharge Current	1A to 4A depending on voltage and number of suppressors (StatX = 1.8 Ohms nominal each unit) Up to 2 units on 12V, 4 units max on 24V
	Current/Time Limit	Output is Vin via switch with 6 Ohms in series. Constant I2T limit = 9 Amp2*Seconds
	Monitoring current	<4mA, Fault if loop R>300, 12Vmax o/c voltage
AuxIn (Override key)	Monitoring current	1.2mA Nominal
	Sense Logic	Norm S/C, >1K active typ.
Sensor Loop Inputs 1+2	Max Output voltage	12VDC regulated, filtered and transient protected
	Output current limit	25mA per loop
	Alarm condition threshold	<700 Ohms Nominal
	Fault condition threshold	Approximately 20K Ohms
	End Of Line Resistor	10K Ohms
	Fault monitoring	Open circuit or ground fault = fault indication
Alarm Output	Relay Contacts	2A @ VinDC (Vin thru NO relay circuit)
VFC Output	Relay Contacts (volt free)	2A @ 24VDC (relay changeover circuit)
Mechanical	Dimensions	H=82mm * W=83mm * D=25mm
	Mounting	75mm diameter round hole, retained by four #6*25 self tapping screws
	Connections	Via 3 * 6 way terminal block accepting <1mm^2 wires with ferrules

The FPX108M SOLO-ULTRA has effectively eliminated spurious activation costs which are regularly caused by the inherent characteristics of microprocessors, semiconductor power switches and inquisitive fingers. The FPX tamper evident tag technology and strict electronic design rules have proven highly effective. To eliminate the inherent hazards of microprocessor control the FPX108 Solo Ultra uses a fully parallel path programmable logic device, which is coded using a language called VHDL, commissioned by US DOD and used for high reliability and safety critical applications.

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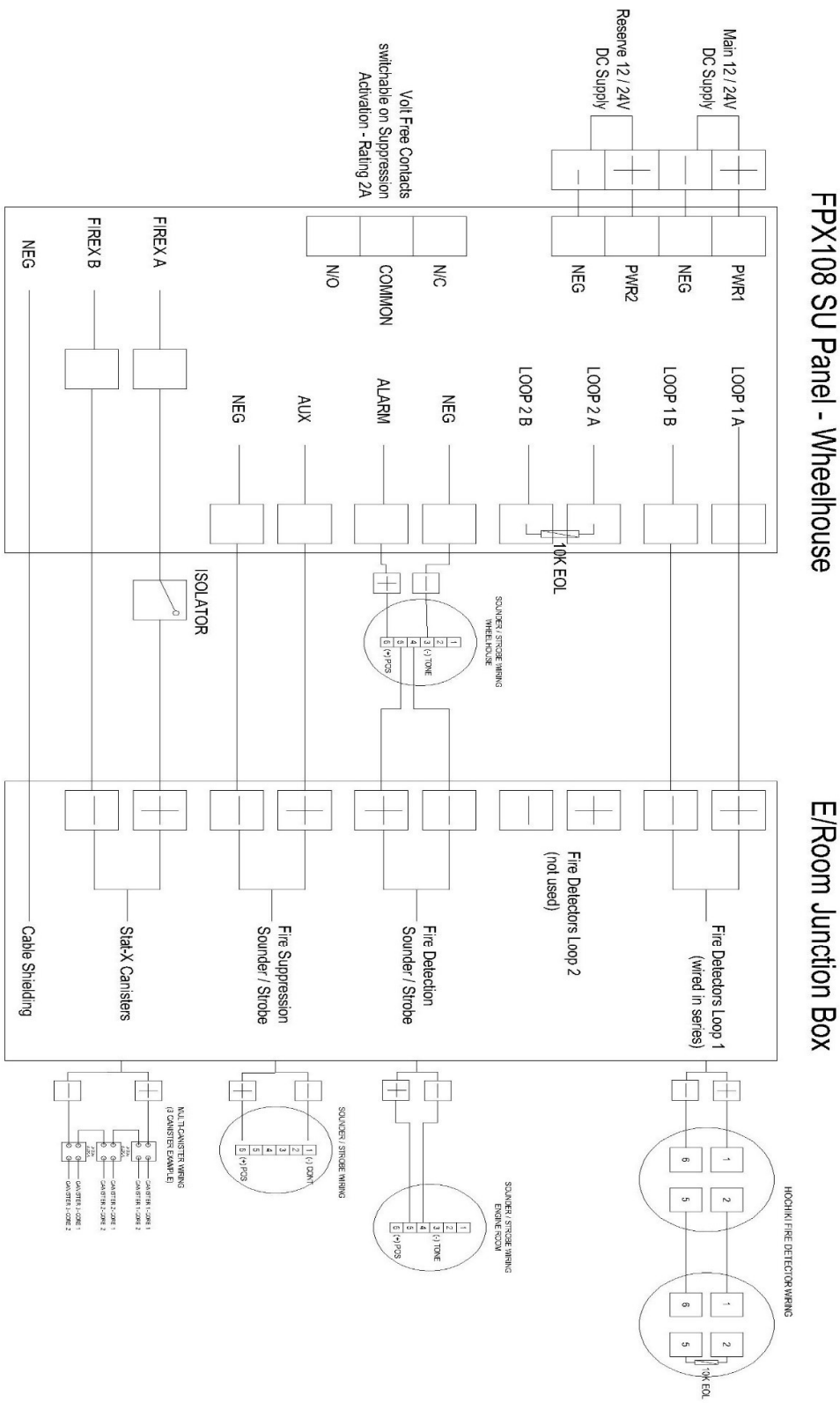
Reg No: 4069200 England and Wales. VAT No: 790777970 Directors: M. Bresnahan P. Baker



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HOW STAT-X WORKS

The aerosol produced upon activation of the Stat-X system suppresses fire by a combination of chemical and physical mechanisms similar to the Halons without any negative effect on the environment. Because of the aerosol's ultra-fine particle size (approximately 2 micron) there is a dramatic increase in the surface area interaction between the agent and the fire. Unlike gaseous agents the aerosol does not decompose in the presence of fire nor does it extinguish by oxygen deprivation. The aerosol is considered non-toxic to humans when applied in normal design concentrations necessary to extinguish most fires; however, certain safety restrictions should be observed when applying and handling the generators. Exposure to the aerosol should be limited and unnecessary exposure to the particulate should be avoided. Exposure to the aerosol is generally of less concern than is exposure to the decomposition products of a fire.

EXTINGUISHING MECHANISM

"Fire propagation" radicals (OH, H, and O) are essential elements in the propagation of the fire. Stat-X suppresses the fire (primarily) by chemical interference with these free radicals within the fire zone – thus interrupting the on-going fire reaction.

Potassium radicals (K) are the main active component of Stat-X aerosol. They are very active and react with these "propagation radicals" – much like the bromine radicals did in Halons. The chemical reaction may be represented as follows, for example:

K + OH = KOH

KOH + H = K + H2O

K + OH, etc…

In addition, the flame propagation radicals recombine on the surface area of the ultra-fine aerosol particulate to further interfere with flame propagation: **O + H = OH**, **H + OH = H2O**

Generally, fire by-products can be unknown, potentially harmful, and pose the biggest risk to equipment, facilities, and personnel. Stat-X agent itself is extremely effective. To clean most spaces other than electronic equipment there is little need to do more than ventilate and vacuum the area. Still, any signs of accumulated fire by-product or agent residue should be washed from bare metal or slight surface discoloration may occur. This includes blades and casings of fan units. Also, if housekeeping was lax existing dirt may have blown around and been re-deposited during discharge or ventilation. A thorough inspection and cleaning of the hazard space is the best way to ensure no unwanted residue remains. Small amounts of particulate may be deposited during discharge and may stain walls and floor surfaces.

Note: The aerosol fire suppressant solid particulates contain potassium, an alkali salt. Initially following a discharge, settled particulates are highly deliquescent and will attract moisture in the air. This can cause surfaces covered by residue to become temporarily moist or wet at a high pH level until the particulates dry due to evaporation. Certain metals susceptible to

corrosion such as unprotected copper, aluminum, or bronze may experience accelerated surface oxidation or discoloration.

MAINTENANCE AND REPLACEMENT

The aerosol generators have an installed service life of 10+ years and should be replaced 10 years from the date code in the bottom right corner of the product label, or as identified on the maintenance label (Note: There is a grace period of 1 year to ensure a full 10 year service life). The date code is represented alphabetically for the year and the number represents the month of the year the product was shipped from the manufacturer's factory: A = 2001. B = 2002. C = 2003. D = 2004. E = 2005, etc. 1 = January. 2 = February. 3 = March. 4 = April. 5 = May, etc Example: D4 = April 2004

WEEKLY / MONTHLY INSPECTION (Crew)

Visual inspection of the FPX108 panel and Stat-X generators. If there are any faults on the FPX108 panel, or there is damage to any of the Stat-X generators, contact Marine Fire Safety immediately.

ANNUAL INSPECTION

All commissioning, maintenance and annual inspection work is to be carried out by a "qualified engineer" from Marine Fire Safety.

POST DISCHARGE AND SYSTEM RECOMMISSIONING

As with any fire suppression product, cleaning of residue and recommissioning of facilities and equipment will vary depending upon factors existing before, during and after discharge.

WARNING: DO NOT ENTER PROTECTED SPACE WITH AN OPEN FLAME OF LIGHTED CIGARETTE. THE POSSIBLE PRESENCE OF FLAMMABLE VAPORS MAY CAUSE RE-IGNITION OR EXPLOSION. ENSURE FIRE IS COMPLETELY EXTINGUISHED PRIOR TO VENTILATING THE PROTECTED SPACE. VENTILATE THOROUGHLY OR USE APPROVED SELF-CONTAINED BREATHING APPARATUS BEOFRE ENTERING. DO NOT TOUCH DISCHARGED AEROSOL GENERATORS FOR AT LEAST 15 MINUTES POST DISCHARGE AS THE GENERATORS METAL SURFACES MAY BE HOT ENOUGH TO CAUSE INJURY TO UNPROTECTED SKIN.

RECOMMENDED PROCEDURE (follow step by step)

1. After discharge, allow a minimum agent hold time of 10 - 15 minutes before ventilating the protected space.
2. Always have a back-up portable fire extinguisher on hand for use in the unlikely event of the fire re-igniting.
3. Ventilate the protected space thoroughly by forced ventilation or by leaving open doors and hatches. Note: If incoming air is high in humidity, dehumidification is recommended after space is ventilated. Agent residue not cleaned up after discharge can absorb humidity and may create surface film or cause surface metal discoloration.
4. If it is necessary to enter the protected space prior to it being fully ventilated, suitable respiratory equipment should be worn to avoid unwanted inhalation of fire by-products and fire suppression agent.
5. Inspect that all fire is extinguished and there are no localised hot spots or other sources of re-ignition present.
6. Any minor amounts of agent residue not removed during ventilation should be thoroughly vacuumed, blown, brushed or washed away using an acetic acid/water solution of approximately 3.5% (by volume). All residue should be removed within 24 hours if possible.
7. Occasionally agent may agglomerate onto equipment or surfaces near the aerosol generator discharge ports. Inspect for agent discharge and clean as above in point 6.
8. Spent aerosol generators will remain hot to touch for some time after discharge. They can be removed once cooled sufficiently to be handled following clean up procedures have been completed.
9. Dispose of spent generators within local authority guidelines.
10. Stat-X units must be replaced like for like with new Stat-X units to comply with the system requirements.
11. **CONTACT YOUR AUTHORISED STAT-X SUPPLIER (Marine Fire Safety Ltd) FOR REPLACEMENT STAT-X AEROSOL GENERATORS AND SYSTEM RECOMMISSIONING. AFTER A DISCHARGE THE SYSTEM WILL REQUIRE A FULL TEST CARRIED OUT BY A TRAINED AND AUTHORISED STAT-X ENGINEER.**

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