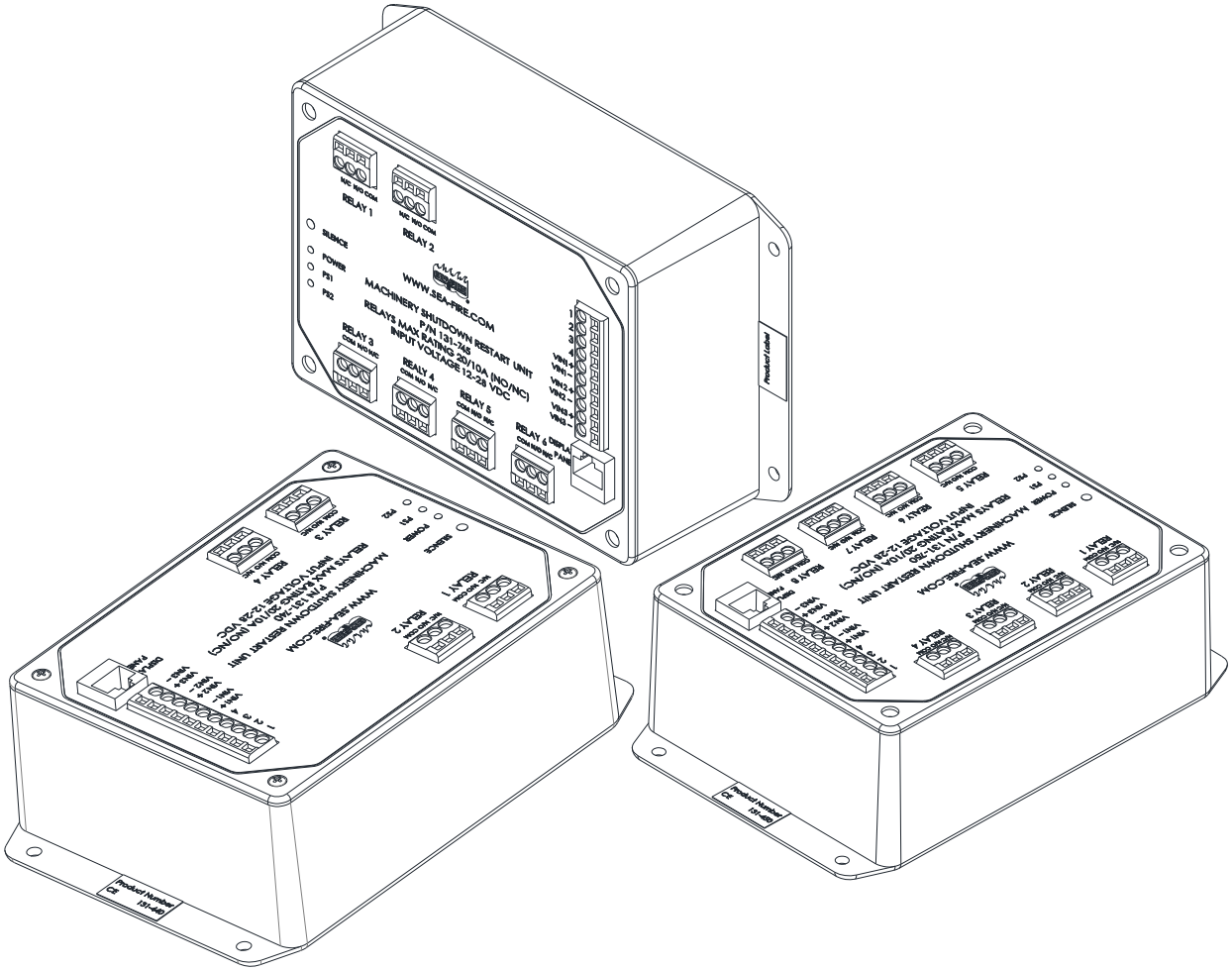
Machinery Shutdown Restart System (MSRS) Installation Instructions Owner's Manual

PN: 131-740 (4 Relay Circuits), PN: 131-745 (6 Relay Circuits), and PN: 131-750 (8 Relay Circuits)



***Warning**: This Sea-Fire Machinery Shutdown Restart System has been designed and tested for use with Sea-Fire automatic and manual Fire Suppression Systems. Installation must be accomplished by or under the supervision of a qualified marine electrician who is familiar with American Boat and Yacht Council (ABYC) or other recognized and accepted marine standards and practices.*

Caution: Do not install this device in fuel storage compartments. See the installation section of this manual for further details.

Read this manual thoroughly and comply with all instructions, warnings, and cautions prior to installation.

THIS MANUAL IS AN INTEGRAL PART OF THE SYSTEM AND AS SUCH, THE SYSTEM MUST BE INSTALLED AND MAINTAINED ACCORDINGLY.

RETAIN THIS MANUAL FOR REFERENCE

Your Onboard Safe Choice
A Division of Metalcraft, Inc.

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123-652 REV -

1 GENERAL SPECIFICATIONS

Operating Voltage: 12 - 32 VDC
Backup Power Supply: 12 - 32 VDC
Power Supply Protection: 3A Fuses
Internal Voltage Protection - 3 diodes
Pressure Switch - 2 normally closed inputs
Visual Indications - POWER - Green
PS1 - Red
PS2 - Red
Buzzer: 85 dB @ 10 cm
Standby Power Consumption (All three Models)
13 VDC, 100 mA
28 VDC, 100 mA
Discharged Power Consumption
PN: 131-740: 13 VDC, 370 mA
28 VDC, 180 mA
PN: 131-745: 13 VDC, 570 mA
28 VDC, 260 mA
PN: 131-750: 13 VDC, 750 mA
28 VDC, 350 mA

Enclosure Material: Grey flame retardant ABS
Flame Rating: UL94-5VA (with textured cover)
Enclosure Protection level: Ingress protection 66 (IP66)
Operating Temperature: -7°C/20°F to 54°C/130°F
Storage Temperature: -7°C/20°F to 54°C/130°F
Display Connection: CAT-5 VIA RJ45 Socket
Relays: 5 VDC Form C – Normally Open (N/O) 20A
Normally Closed (N/C) 10A
Connectors - Wago 739, Max wire size 12AWG/2.5 mm
Dimensions: 7.29 (W) x 4.72(H) x 2.37(D) inch
185.17(W) x 119.89(H) x 60.20(D) mm
Weight: .6 kg / 1.3 lb.
Mounting: Surface
Compliant: RoHS, CE

1.1 Features

- Fully automatic machinery shutdown system
- Shutdown override mode
- Power-On visual indication
- Pressure Switch (PS1) Visual and audible indication (Agent Discharge)
- Pressure Switch (PS2) Visual and audible indication (Sensor Switch Warning)
- Compact construction
- Optional Time Delay reset function

2 OPERATION

The Machinery Shutdown Restart unit is a low voltage microcontroller unit designed to integrate with the Sea-Fire Fire Suppression System to shut down the engine(s), blower(s), generator(s), damper(s) and other machinery in the protected space should fire or extreme overheating cause the Sea-Fire automatic Fire suppression system to discharge. The machinery shutdown will ensure that the fire suppression agent, in its proper concentration, will remain in the enclosed compartment and not be ingested or reduced by the running machinery.

Immediately upon agent discharge, the MSRS PS1 closed loop circuit opens, activating the alarm and energizing all the relays. Energizing the relays will change the state of the internal contacts and shut down all the machinery connected to the MSRS unit. The PS1 LED on the Unit and the DISCHARGE LED on the Display Panel illuminate. The activated alarm can be silenced by pressing the **SILENCE** button on the MSRS unit or on the connected Display Panel.
After a discharge or loss in cylinder pressure resulting in an opened PS1 loop, simultaneously pressing the **SILENCE** and the **“ ”** buttons will put the MSRS into override enabling all the machinery connected to the MSRS to restart. The MSRS can only be properly reset after the discharged agent cylinder has been refilled/replaced and then the **SHUTDOWN RESET** buttons pressed to put the unit back into the standby mode. In the standby mode, only the green POWER LED on the MSRS and the Display Panel will remain on.

If there is a High-Temperature, Low-Pressure or an Auxiliary Discharge sensor switch connected to the PS2 terminals, when the sensor switch opens, the alarm activates and both the PS2 LED on the unit and the Second Zone LED on the Display Panel illuminate. There will be no change to the relays' state. The activated PS2 circuit alarm can be silenced by pressing the **SILENCE** button on the MSRS box or on the connected Display Panel. Reset the unit after the PS2 circuit condition has been remedied by pressing the **SHUTDOWN RESET** buttons. The unit is now in standby mode.

3 MSRS INSTALLATION

CAUTION: Make sure all power sources are shut down before installation.

Install the MSRS unit in a conveniently accessible and well-ventilated location. The MSRS should not be exposed to environmental temperatures (in excess of 54°C/130°F) for an extended period. This will affect the service life of the MSRS unit and may cause premature failure.

3.1 Installation Location

- It is important that the MSRS unit be installed in a location that will not build up heat or be exposed to external heat sources.
- If installed in a box or cabinet, the enclosure should have sufficient ventilation.
- When installed in the engine room, the MSRS should be installed with sufficient protection from the hazards of that space, but must still have a way to dissipate heat and not be overheated by other sources.

WARNING: Do not install the MSRS Unit in a sealed enclosure.

3.2 Mounting the MSRS Unit

Use the MSRS unit 4 mounting screw holes (screw not included) to mount the unit. Connect the Display Panel to the MSRS unit via the RJ45 socket using the CAT-5 cable. Longer CAT-5 cables (10', 20', 50', 100' and 150') are available to increase the distance between the MSRS and the Display Panel. Refer to the Display Panel installation manual for the correct installation instruction.

3.3 MSRS Unit Wiring Installation

Use a minimum of 16 American Wire Gauge (AWG) (SAE J3788 or J1128) according to American Boat and Yacht Council (ABYC) [or equivalent international standard] marine grade wire to connect all devices and power to the MSRS. Connect the wire to the MSRS unit by pushing a 1/8" flathead screwdriver into the square opening on the top of the terminal block. This opens the spring cage allowing a stripped wire to be installed into the round hole on the connector. See Figure 1.

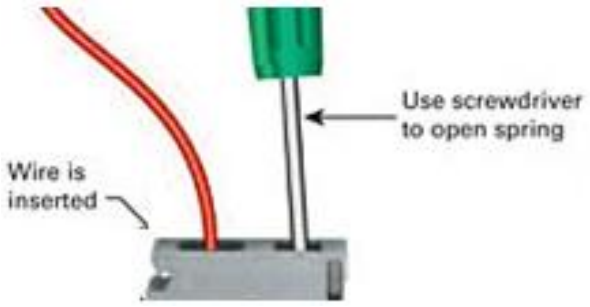


Figure 1 Terminal Block Slot

Properly ground all the Machinery connected to the MSRS unit.

3.3.1 ELECTRICAL INPUT/OUTPUT CONNECTIONS

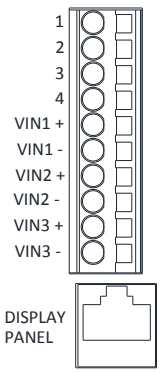


Figure 2: Input/output Terminal Block

3.3.1.1 MSRS Pressure Switch (PS1) Terminals 1 and 2 connection

- Install one of the wires from the Cylinder Low-Pressure Switch or from the Discharge Pressure Switch to the terminals marked "**1**" and the other wire to the terminal marked "**2**". See Figure 2.

3.3.1.2 MSRS Pressure Switch (PS2) Terminals 3 and 4 connection

- The MSRS unit has a wire jumper installed across PS2 terminals from the factory. If the MSRS PS2 terminals are being used, remove the wire jumper. Leave the wire jumper in-place if the PS2 terminals are not being used.
- Install one of the wires from the High Temp Sensor or the Cylinder Low-Pressure Supervisory Switch to the terminal marked "**3**" and the other wire to the terminal marked "**4**". See Figure 2.
    - Low-Pressure Switch/Auxiliary Cylinder Supervisory Switch - When the pressure in the cylinder drops to an unserviceable (low) pressure, the switch shall open activating the early warning alarm.
    - Temperature Sensor – When the temperature in the protected zone goes above the fixed temperature of the sensor, the sensor shall open activating the early warning alarm.

3.3.1.3 Power Supply Terminals – Main Supply, Backup Supply, and Generator

- The MSRS Unit has 3 diode-protected inputs but only one power source is needed to operate the MSRS and should be connected to **V IN1+** and **V IN1-**. See Figure 2.
    - If available, a backup power source should be connected to one of the additional power source inputs.
- Connect the MSRS unit to the power source(s) using a 5A circuit breaker with an ON/OFF switch. Use the breaker switch to turn the MSRS Unit OFF when all the machinery is OFF and to turn the MSRS Unit ON if any machinery is ON.

3.3.1.4 RJ45 Port

- The RJ45 socket connects the Display Panel to the MSRS unit via a supplied CAT-5 cable. Install one end of the CAT-5 cable into the MSRS unit RJ45 socket and the other end into one of the Display Panel RJ45 socket.
    - Connect Multiple Display Panels to the MSRS unit by using the available RJ45 socket on the back of the Display Panel.

Check the Display Panel Installation Manual on how to correctly connect and use the Display Panel.

Compatible Display Panels: "Fire Suppression System Monitor and Engine Shutdown Control"

Part Number	Display Panel indicators and shape
131-460	Power and Discharge Indication, Rectangle
131-461	Power and Discharge Indication, Round
131-462	Power, Discharge, and High Temp Indication, Rectangle
131-463	Power, Discharge, and High Temp Indication, Round
131-464	Power, Discharge, and Aux Zone Indication, Rectangle
131-465	Power, Discharge, and Aux Zone Indication, Round
131-466	Power, Discharge, and Low-Pressure Indication, Rectangle
131-467	Power, Discharge, and Low-Pressure Indication, Round

3.3.1.5 Multiple Cylinder Supervisory Switch Connection to the MSRS PS1

- When connecting more than one pre-engineered cylinder supervisory pressure switch to the MSRS Unit, connect all the supervisory pressure switches in series. Connect the leading switch wire to Terminal marked **"1"** and the trailing wire of the last pressure switch to Terminal marked **"2"** (See Figure 2).

- When connecting more than one Engineered System cylinder supervisory switch to the MSRS unit, connect all the cylinder supervisory switches in series. Connect the leading switch wire to Terminal marked **"3"** and the trailing wire of the last pressure switch to Terminal marked **"4"** (See Figure 2).

- When connecting more than one Engineered System discharge pressure switch, reference the engineered fire suppression manual and electrical circuit diagram provided as part of the system.

3.3.1.6 Engine or Machinery connection

- Refer to the Original Equipment Manufacturers (OEM) Engine or the machinery Installation manual for the correct method of connection to relays of the MSRS unit. Equipment manufacturers have a variety of methods to control their equipment.
- The following section provides the basic operation of the relays in the MSRS unit.

4 Relay Operation:

This section provides the basic operation of the relays in the ESRS unit.

4.1. Relay Contact Specification

Table 1 Relay Contact Specification

Item	**Value**
Contact	SPDT (1 Form C)
Contact Current	10A NC / 20A NO
Contact Voltage VAC (Maximum allowable)	277VAC

- **N/C –** Normally Closed Contact
- **N/O –** Normally Open Contact
- **COM –** Common Terminal

4.2. Relay De-Energized State

When the MSRS is operational and in the standby mode, all the relays should be in the de-energized state.

- The N/C and the COM terminals are connected.
- The N/O terminal is open.

4.3 Relay Energized State

When the MSRS is operational and is in the shutdown state, all the relays should be in the energized state.

- The N/C terminal is open.
- The N/O and the COM terminals are connected.

4.4 Relay 20 Second Reset

Automatic reset timer functions are optional in the MSRS. Please contact Sea-Fire Marine for additional information regarding the setting of the relay 20 second timer.

5 INSTALLATION CHECK

1. Check that all the Machinery wires installed in the MSRS terminal blocks are correct and secure as described above and from the machinery's installation manuals.
2. Apply power to the MSRS. The Green Power LED on the MSRS Unit and Display Panel should illuminate.
3. Start vessel engine(s) and all other machinery connected to / controlled by the MSRS.
4. Press the " " Dimmer Button on the Display Panel and the Green Power LED intensity on the panel and the MSRS Unit shall change. Press again to return to full brightness.
5. Open the "PS1" circuit loop. The relays should energize, all connected machinery should shut down, the alarm should sound and the red "PS1" LED on the MSRS Unit should illuminate as well as the red Discharge LED on the Display Panel.
6. Press the "SILENCE" button on the Display Panel or on the MSRS Unit to silence the alarm.
7. With the PS1 circuit still open, put the MSRS into override by simultaneously pressing the "SILENCE" and the " " buttons on display panel.
   a. The connected machinery should be able to be restarted.
   b. The red Discharged LED on the Display Panel and the red PS1 LED on the MSRS unit will remain illuminated.
8. Reset the unit by closing the PS1 circuit loop and simultaneously press the "SILENCE" and the " " buttons.
9. The Green power LED on display panel and MSRS Unit should be the only LEDs lit.

The PS2 circuit:

1. If applicable, open "PS2" circuit. The alarm should sound and both the "PS2" LED on the MSRS Unit and the Second Zone (Low Pressure, High Temp or Aux Discharge) LED on the Display Panel should illuminate. The Relays should remain in the de-energized state.
2. Reset the unit by closing the PS2 circuit and simultaneously press the "SILENCE" and the " " buttons.
3. The green POWER LED on the Display panel and the MSRS unit should be the only LEDs lit.
4. Use one of the Display Panels in a multiple Display Panel chain to reset the MSRS unit.

6 COMMON PROBLEM TROUBLESHOOTING GUIDE

Troubleshooting Guide		
⚠ **Caution: Turn off all power sources before installation, prior to removing or servicing.**		
Problem	**Possible Cause(s)**	**Action**
1. The Power LED on the Unit does not come on.	• There is no input power source. • The MSRS power converter is damaged.	• Recycle power to the MSRS unit. • Check input voltage source connected to the MSRS.
2. The Alarm and the PS1 LED are on.	• There is no continuity across terminal 1 and 2. • Cylinder has discharged or has a loss of pressure.	• Check the Cylinder pressure gauge. • Check for continuity across terminals 1 and 2 with pressure switch wires connected.
3. The Alarm and the PS2 LED are on but there is a wire jumper across terminals 3 and 4.	• The jumper across terminal 3 and 4 is not making good contact with the terminals.	• Recycle power to the MSRS unit. • Remove and re-install jumper.
	• The MSRS has an internal fault.	• Recycle power to the MSRS unit. • Replace the MSRS unit.
4. The PS1 and the PS2 LED are on, the Alarm does not silence AND the unit does not reset.	• The MSRS has an internal fault.	• Replace the MSRS unit.
5. The SILENCE button on the MSRS unit does not silence the alarm.	• The MSRS SILENCE tactile switch on the MSRS unit has failed.	• Ensure that the tactile switch on the MSRS unit clicks when pushed in.
	• The MSRS SILENCE tactile switch on the MSRS is fully depressed under the faceplate	• Use a small pointed object to re-center pin until it re-seats above the faceplate.
6. The Unit override does not work.	• The MSRS did not receive the signal from the Display Panel.	• Check the CAT-5 cable and clean the CAT-5 jack. • Replace Display Panel.

Note: **If discharge occurs, contact SEA-FIRE Customer Support for assistance in locating an approved filling location.**

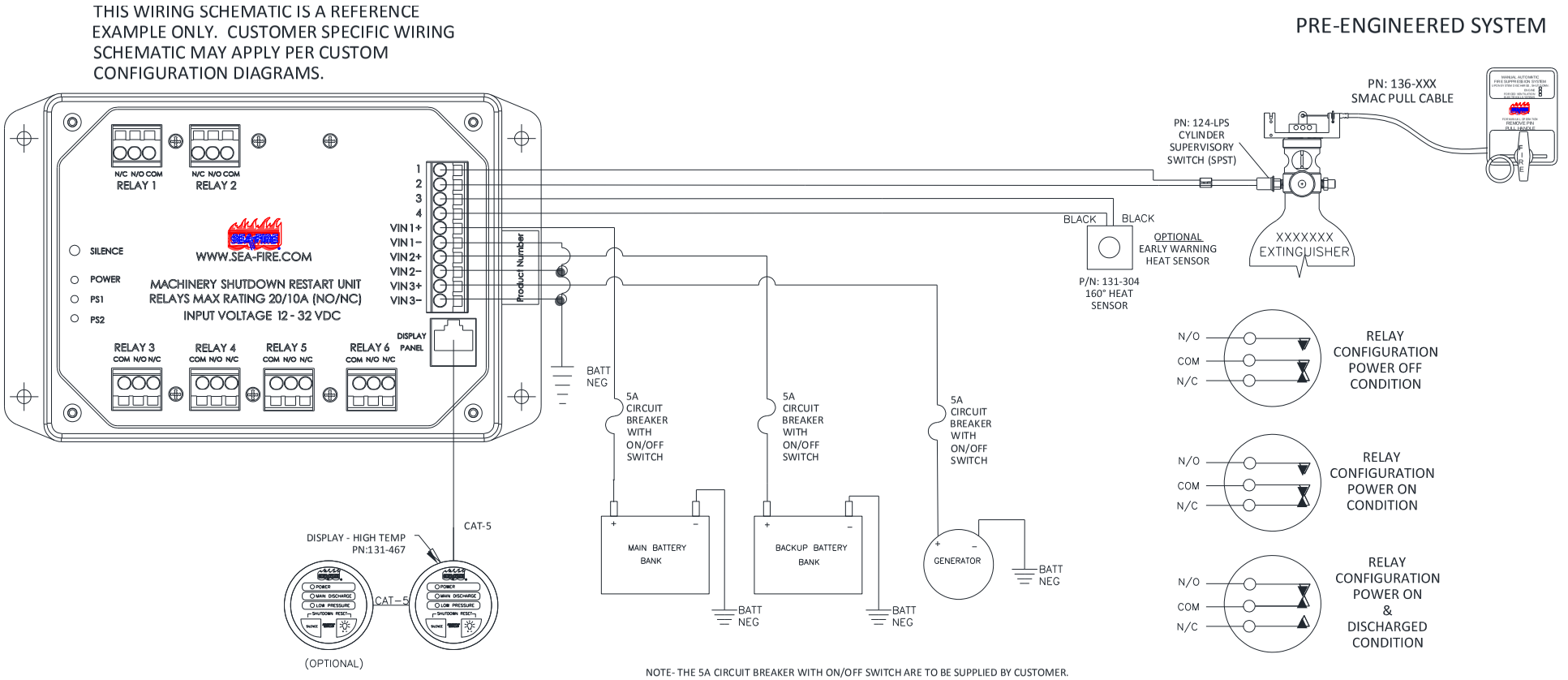
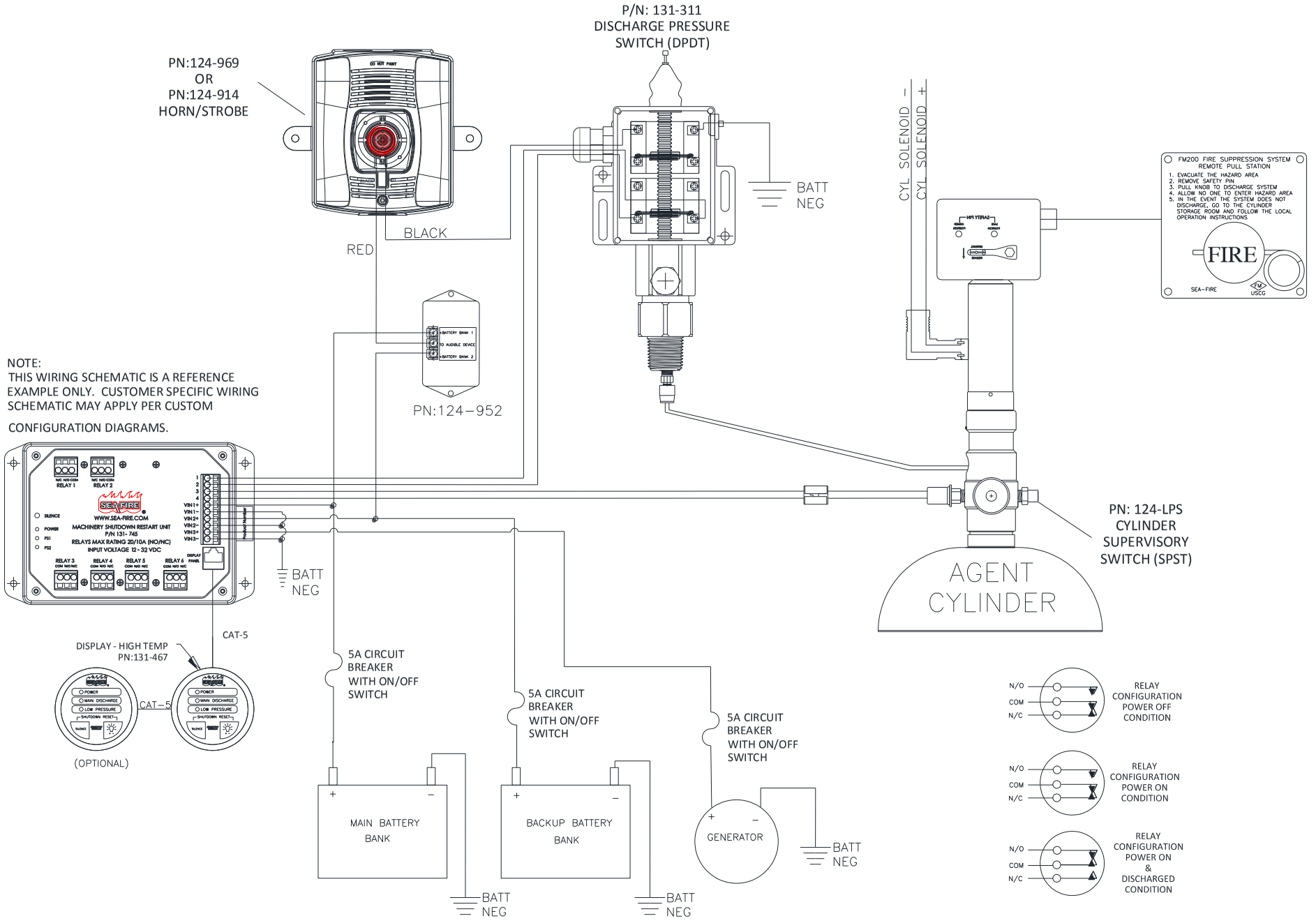


FIGURE 3: EXAMPLE ESRS 131-745 PRE-ENGINEERED WIRING SCHEMATIC



NOTE- THE 5A CIRCUIT BREAKER WITH ON/OFF SWITCH ARE TO BE SUPPLIED BY CUSTOMER.

FIGURE 4: EXAMPLE MSRS 131-745 ENGINEERED WIRING SCHEMATIC

OWNERS RECORD
Installation Date _____
Installer _____

ONE YEAR LIMITED WARRANTY

We guarantee to the original retail purchaser of the Sea-Fire Machinery Shutdown Restart System for a period of one (1) year after retail purchase against defective material and faulty workmanship. Any Engine Interrupt System found to be defective during the warranty period will be replaced or repaired free of charge upon the prepaid return of the defective system.

This warranty provides specific legal rights and you may have other rights, which vary from country to country.

For More Information Call
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