



# Solid State HESI Power Unit



**USER MANUAL**

# TABLE OF CONTENTS

<b>1</b>	<b>Introduction</b> .....	<b>2</b>
1.1	Unpacking.....	2
1.2	Purpose .....	2
<b>2</b>	<b>Description</b> .....	<b>3</b>
2.1	Features.....	3
2.2	Technical Specification .....	4
<b>3</b>	<b>Installation</b> .....	<b>7</b>
<b>4</b>	<b>Wiring</b> .....	<b>10</b>
<b>5</b>	<b>Commissioning</b> .....	<b>13</b>
<b>6</b>	<b>Operation</b> .....	<b>13</b>
<b>7</b>	<b>Troubleshooting</b> .....	<b>14</b>
<b>8</b>	<b>Storage</b> .....	<b>15</b>
<b>9</b>	<b>Spare Parts Procurement</b> .....	<b>15</b>
<b>10</b>	<b>Warranty</b> .....	<b>16</b>
<b>11</b>	<b>Forms</b> .....	<b>17</b>
11.1	RMA Form .....	17
11.2	Spare Parts Inquiry Sheet.....	18

## Figures

<b>2-1</b>	<b>Dimensional HESI Drawing</b> .....	<b>5</b>
<b>2-2</b>	<b>Overview HESI Drawing</b> .....	<b>6</b>
<b>3-1</b>	<b>HESI Installation Guide</b> .....	<b>9</b>
<b>4-1</b>	<b>HESI Wiring Diagram</b> .....	<b>12</b>

## User Manual Notes

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### **Warning**

Indicates a procedure or condition that, if not strictly followed, could result in personal injury or death.

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### **Caution**

Indicates a procedure or condition that, if not strictly followed, could result in damage or destruction of equipment.

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### **Attention**

Indicates a procedure, condition, or statement that should be strictly followed in order to achieve optimal performance.

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**Note** Indicates an essential or important procedure or statement.

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**Tip** Provides essential information that only an experienced user would be aware of.

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# 1 Introduction

The Solid State HESI Power Unit was designed to deliver safe and easy ignition. This product can be used in any application that utilizes burners such as but not limited to power generation, oil refineries and metallurgical plants.

Before installing or using the HESI, you must read this manual to avoid damaging the unit or harming the installer.

## 1.1 Unpacking

Please verify that the power unit was not damaged during transport. Ensure you have received the power pack with the correct input power specification. Contact Safe-Fire if you have received the wrong item or the product has been severely damaged.

## 1.2 Purpose

The purpose of this manual is to instruct, properly trained staff on how to install, wire and commission the power pack.

## 2 Description

Safe-Fire's Solid State HESI Power Unit has been engineered to deliver safe and easy ignition. The HESI is comprised of three main components: the power pack, spark rod, and the High Voltage Cable. The spark rod is available in a rigid or flexible format. The flexible rod format is ideal for a variety of boilers including tangential and front-fired. The spark tip is threaded onto the rod, and can easily be replaced as needed.

An optional retractable version is also available for the HESI. The retractable device consists mainly of a pneumatic cylinder, a solenoid valve and a limit switch. The power pack is enclosed in a wall mounted NEMA-4 or 4X enclosure. The power pack will store 33 joules of energy and then release it at approximately 15 Sparks/Second through a High Voltage Cable.

### 2.1 Features

- High Energy Spark
- High Spark Rate
- Reliable Operation

## 2.2 Technical Specifications

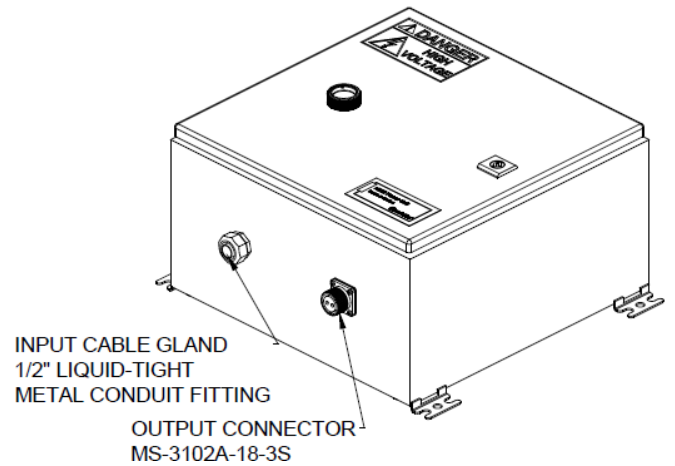
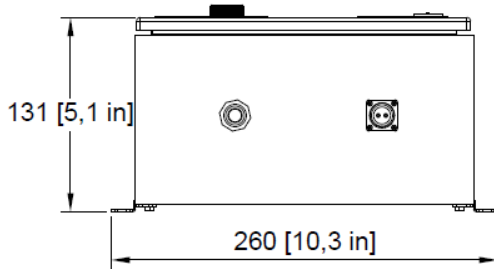
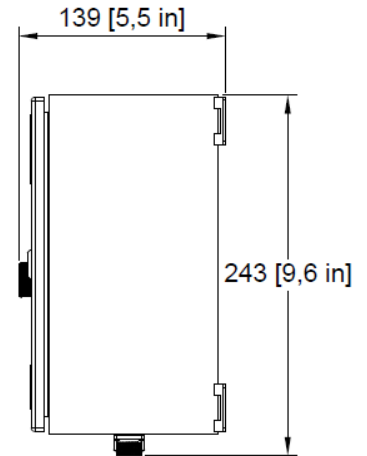
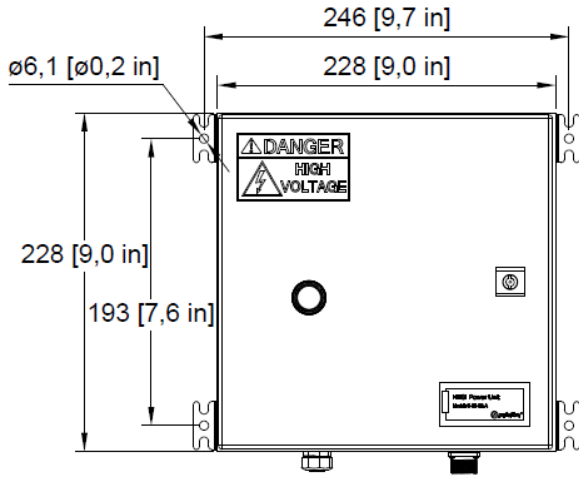
<b>Product Series</b>	S-80-02-A
<b>Exciter Type</b>	Solid State
<b>Stored Energy</b>	33J
<b>Input Power</b>	120VAC $\pm$ 10% @ 13A, 60Hz
<b>Spark Rate</b>	15 Sparks/Second
<b>Operating Temperature</b>	-25°C to 75°C
<b>Duty Cycle</b>	1 Minute On, 5 Minutes Off
<b>Connector Type</b>	MS3102A-18-3S (Amphenol)
<b>Outer Dimension</b>	380x232x380mm (15x9.1x15in)
<b>Mounting Dimensions</b>	410x232x322mm (16.1x9.1x12.7in)
<b>Enclosure Type</b>	NEMA 4, NEMA 4X SST
<b>Power Input Hole</b>	.885" $\pm$ 0.010"
<b>Weight</b>	48.05lbs / 21.79kg



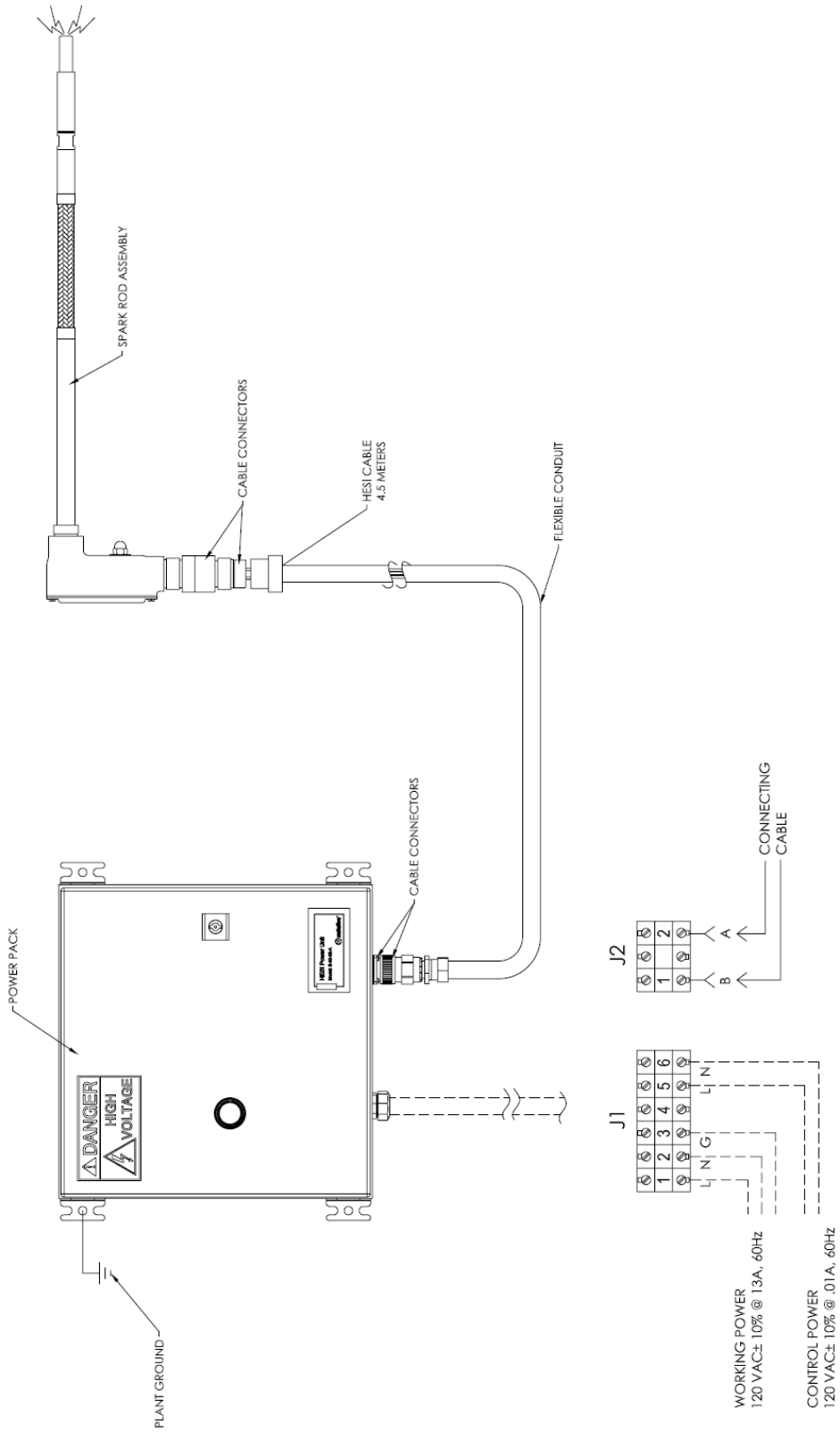
After operating the unit 4 consecutive cycles, at an ambient temperature of 25°C, a 100 minute rest period is recommended to protect the unit from over heating

**Note** To achieve optimal performance the spark tip used in conjunction with the S-80-02-A must have a resistance within the range of 25k $\Omega$  – 100k $\Omega$

## 2-1 Dimensional HESI Drawing



## 2-2 Overview HESI Drawing





### 3 Installation

Please follow the instructions below.

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**Note** Two people will be required to install the power pack

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1. Locate an area for the power pack, that is away from the burner plate and extreme temperatures
- 

**Note** Keep in mind the High Voltage Cable is only 4.5 meters long.

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2. Using a level, mark all of the mounting holes for the power pack
- 

**Note** The length (center to center) between mounting holes is 12.7" in height and 16.1" in length.

---

3. Drill in all of the mounting holes
- 



The power pack weights over 40 lbs. You will need another staff member to help you.

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4. Have one person hold the power pack against the wall will aligning with its mounting holes
5. The second person will then, insert the necessary hardware in the mounting holes (beginning from the bottom), only leaving ¼" gap

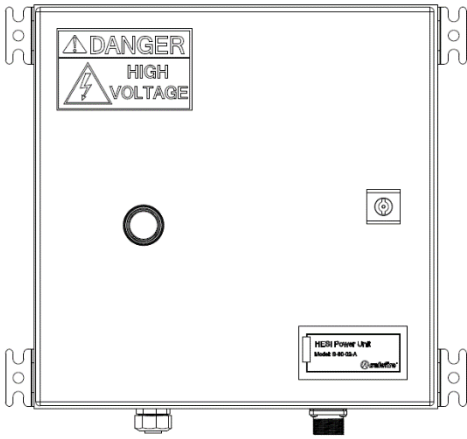
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**Tip** The recommended hardware is a 3/8" screw that is 2" long but the installation does not require for it to be a screw.

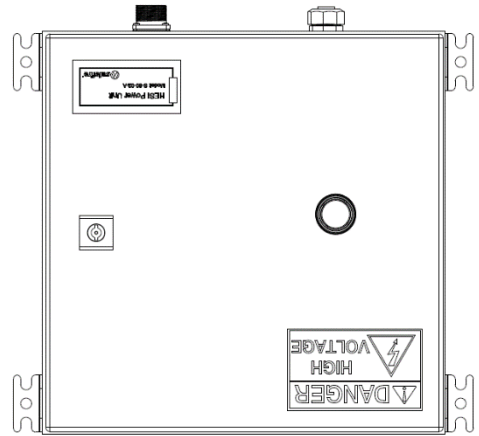
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6. Make sure the power pack is straight by using a level
  
7. Installation is complete but verify the installation is correct by viewing the figure on the following page

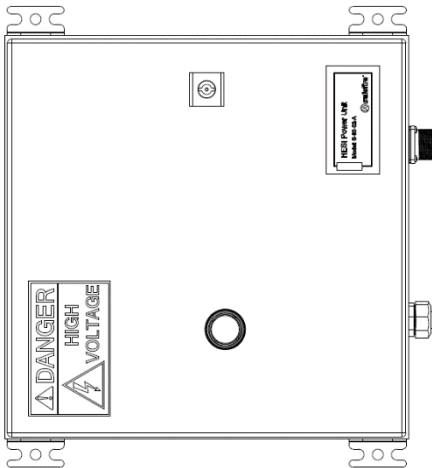
### 3-1 HESI Installation Guide



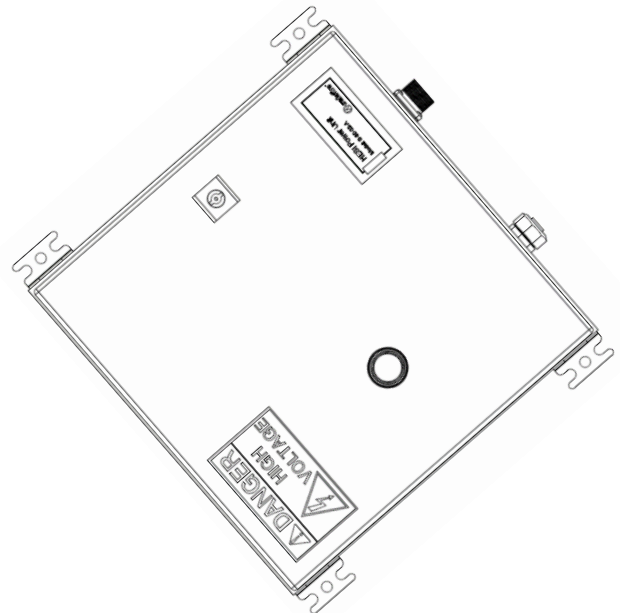
**Correct**



**Incorrect**



**Incorrect**



**Incorrect**

## 4 Wiring

To wire the power pack you will need a flat head screwdriver and an adjustable wrench. Please follow the instructions below.



### **Warning**

Make sure the power cables are not energized when performing this procedure.

1. Open the power pack
2. Unclip the J1 terminal cover
3. Insert your input power and signal wires through the input cable gland
4. Using a flat head screwdriver;

#### Input Power

- Wire the Live(Hot) wire to J1-1
- Wire the Neutral wire to J1-2
- Wire the Ground wire to J1-3

#### Control Power

- Wire the Live(Hot) wire to J1-5
- Wire the Neutral wire to J1-6
- Verify proper wiring by comparing it to **Figure 2-2**



### **Caution**

If you energize the power pack while being miss wired, you run the risk of damaging the unit

5. Re-Clip the J1 terminal cover.
6. Insert the High Voltage Cable into the output connector (bottom right hand of power pack)
7. Hand tighten the threaded connection on the High Voltage cable all the way
8. Tighten the input wire gland (bottom left hand of power pack) with an adjustable wrench
9. Wiring is complete

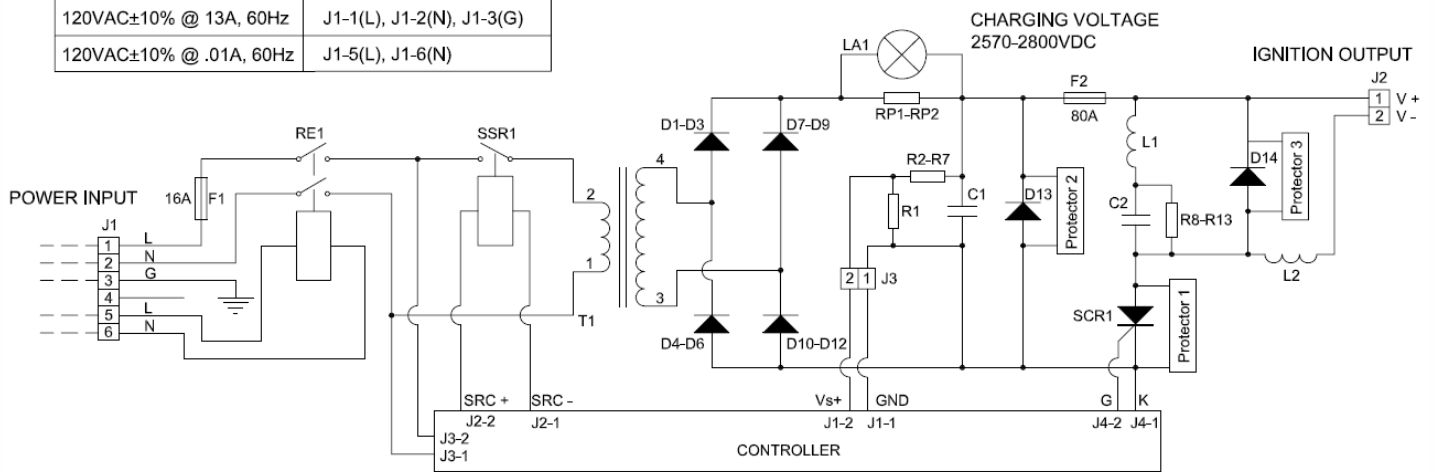
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**Note** The Relay Signal wires control when the HESI turns on and off. The Input Power wires supply the HESI power to function properly.

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**Figure 4-1 HESI Wiring Diagram**

POWER INPUT	TERMINALS CONNECTION
120VAC±10% @ 13A, 60Hz	J1-1(L), J1-2(N), J1-3(G)
120VAC±10% @ .01A, 60Hz	J1-5(L), J1-6(N)



## 5 Commissioning

Once the power pack has been installed and wired, it is ready to be tested.

1. Energize the power pack with the spark rod installed in the guided tube.
2. Visually check if the indicator light flickers on and off as the sparks cycle.
3. The spark rod will approximately release 15 sparks per second. At this rate, the spark cycles may appear as a continuous glow, but you will be able to distinguish the cracking sound from each spark. The spark rod will spark for a duration of 1 minute.
4. Verify that the spark rod is in the desired position for ignition. If it is not, then readjust the spark rod accordingly.
5. Once the power pack has been commissioned with the spark rod, it will be ready to function with a fuel gun.



To prevent any damage to the equipment, do not let the continuous sparking last for more than 1 minute. Let the power pack stand for a minimum of 5 minutes before you start the next round of sparks. After cycling the power pack 4 continuous times, it must rest for 100 minutes.

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## 6 Operation

The Solid State HESI is a high energy spark igniter that should only be used to ignite fuel. It can operate during ignition, oil gun shutdowns and purging. To have optimal ignition, the spark rod must be installed properly. The HESI will energize when it receives a signal from the burner management system.

## 7 Troubleshooting

Issue	Reason	Solution
HESI is energized but there is no spark at the spark rod	<ul style="list-style-type: none"> <li>• Incorrect wiring</li> <li>• Incorrect input power</li> <li>• High Voltage Cable is damaged</li> <li>• Spark Tip has incorrect resistance</li> </ul>	<ul style="list-style-type: none"> <li>• Check the power and coil wiring</li> <li>• Verify the input power needed for your HESI</li> <li>• Check the High Voltage Cable and replace it accordingly</li> <li>• Measure Spark tip Resistance (Resistance must be with 25k<math>\Omega</math> - 100k<math>\Omega</math>) and replace it accordingly</li> </ul>
The spark is not continuous	<ul style="list-style-type: none"> <li>• Spark Tip is damaged</li> <li>• Spark Tip has incorrect resistance</li> <li>• Improper grounding</li> <li>• Internal sparking inside the spark rod</li> </ul>	<ul style="list-style-type: none"> <li>• Check tip and replace if broken or damaged</li> <li>• Measure Spark tip Resistance (Resistance must be with 25k<math>\Omega</math> - 100k<math>\Omega</math>) and replace it accordingly</li> <li>• Check the HESI ground wire and ground the Oil gun</li> <li>• Check if the Spark Tip is the correct size and replace it accordingly</li> </ul>
The Transformer is overheating and/or producing smoke	<ul style="list-style-type: none"> <li>• Incorrect wiring</li> <li>• Incorrect input power</li> <li>• The power unit is not resting after consecutive use</li> </ul>	<ul style="list-style-type: none"> <li>• Check the wiring</li> <li>• Verify the input power needed for your HESI</li> <li>• After operating the HESI 4 consecutive cycles, rest the unit for 100 minutes</li> </ul>



**Attention**

In the unlikely event the issue is not resolved after reading this section, proceed to contact Safe-Fire or your local Safe-Fire representative.



## 8 Storage

If this product were to be stored for long periods between usages, a proper storage environment is required to avoid compromising performance and service life.

- Keep the power pack in a dry and clean area, preferably a storage cabinet
- Do not stack materials or other boxes on top
- The power pack must be kept in an area where the temperature ranges is: -25°C to 75°C;
- The power pack must be kept in an area where the indoor humidity is: 5-90% relative humidity, non-condensing.

## 9 Spare Parts Procurement

If you are in need of any spare parts, please fill out the spare parts form located at the end of this manual and contact your local Safe-Fire representative. Alternatively, you may call Safe-Fire directly at 1-626-960-3800.

## 10 Warranty

For a period of 12 months from the date of shipment, Safe-Fire warrants to the Customer the goods manufactured by Safe-Fire to be free from defects in material and workmanship and to conform to the specifications in Safe-Fire's current published technical data, provided said equipment has been properly installed, commissioned, operated, and maintained. If within one year of shipment, any of the goods fail to so conform, or is found after due inquiry to have been defective in material or workmanship when shipped, and within said period Safe-Fire receives written notice thereof, such defective goods shall, at Safe-Fire's option, either be repaired or replaced by Safe-Fire.

In any and all events, the Customer's remedies shall consist solely and exclusively of those stated above. Safe-Fire disclaims all other warranties, expressed or implied, including but not limited to any warranty of merchantability or of fitness for use by the Customer or its clients. Stated warranty may be voided by any of the following: Improper installation or application of goods; their use with improper wiring, piping or ventilation; improper system design; inadequate inspection or testing; lack of regular maintenance; use of insufficient or unqualified personnel to install, commission, operate or maintain equipment; exposure of the goods to excessive heat, moisture, dust, dirt, corrosion, or any other deleterious condition.

**11 Forms**  
**11.1 RMA Form**

**RMA Maintenance Order**

**NO.**

Company					
Address					
Returned Product Tracking No.		Expected Date of Return			
Part Name		Model & Code		Contract No.	
Date of Malfunctioning		Venue of Occurrence		Unit No.	
<b>Reason of Return:</b>					
<b>Symptom:</b>					
<b>Requirement:</b>					
<b>Other Issues for Assistance:</b>					
<b>Contact Information</b>					
Technical Contact		Phone & Fax		E-mail	
Business Contact		Phone & Fax		E-mail	
<b>Address for Returning Repaired Product</b>					
Business Name					
Address					
Postal Code					
Department					
Received By		Phone			

## 11.2 Spare Parts Inquiry Sheet

### Spare Parts Inquiry Sheet

Company/Organization						
Technical Contact		Phone & Fax		E-mail		
Business Contact		Phone & Fax		E-mail		
Material Code	Material Name	Quantity	Unit No.	Date of Delivery	Purpose	Remarks
					<input type="checkbox"/> Emergency <input type="checkbox"/> Long-term <input type="checkbox"/> Normal standby <input type="checkbox"/> Other	
					<input type="checkbox"/> Emergency <input type="checkbox"/> Long-term <input type="checkbox"/> Normal standby <input type="checkbox"/> Other	
					<input type="checkbox"/> Emergency <input type="checkbox"/> Long-term <input type="checkbox"/> Normal standby <input type="checkbox"/> Other	
					<input type="checkbox"/> Emergency <input type="checkbox"/> Long-term <input type="checkbox"/> Normal standby <input type="checkbox"/> Other	
					<input type="checkbox"/> Emergency <input type="checkbox"/> Long-term <input type="checkbox"/> Normal standby <input type="checkbox"/> Other	
					<input type="checkbox"/> Emergency <input type="checkbox"/> Long-term <input type="checkbox"/> Normal standby <input type="checkbox"/> Other	
<b>Additional Requirement &amp; Specification:</b>						



**U.S.**  
**Safe-Fire, Inc.**

5354 Irwindale Avenue, Unit B  
Irwindale, CA 91706  
[www.safe-fire.com](http://www.safe-fire.com)  
Tel: +1 626 960 3800  
Fax: +1 626 960 4100





## RMA Maintenance Order

**NO.**

Company					
Address					
Returned Product Tracking No.		Expected Date of Return			
Part Name		Model & Code		Contract No.	
Date of Malfunctioning		Venue of Occurrence		Unit No.	
<b>Reason of Return:</b>					
<b>Symptom:</b>					
<b>Requirement:</b>					
<b>Other Issues for Assistance:</b>					
<b>Contact Information</b>					
Technical Contact		Phone & Fax		E-mail	
Business Contact		Phone & Fax		E-mail	
<b>Address for Returning Repaired Product</b>					
Business Name					
Address					
Postal Code					
Department					
Received By		Phone			



## Spare Parts Inquiry Sheet

<b>Company/Organization</b>						
<b>Technical Contact</b>		<b>Phone &amp; Fax</b>			<b>E-mail</b>	
<b>Business Contact</b>		<b>Phone &amp; Fax</b>			<b>E-mail</b>	
Material Code	Material Name	Quantity	Unit No.	Date of Delivery	Purpose	Remarks
					<input type="checkbox"/> Emergency <input type="checkbox"/> Long-term <input type="checkbox"/> Normal standby <input type="checkbox"/> Other	
					<input type="checkbox"/> Emergency <input type="checkbox"/> Long-term <input type="checkbox"/> Normal standby <input type="checkbox"/> Other	
					<input type="checkbox"/> Emergency <input type="checkbox"/> Long-term <input type="checkbox"/> Normal standby <input type="checkbox"/> Other	
					<input type="checkbox"/> Emergency <input type="checkbox"/> Long-term <input type="checkbox"/> Normal standby <input type="checkbox"/> Other	
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					<input type="checkbox"/> Emergency <input type="checkbox"/> Long-term <input type="checkbox"/> Normal standby <input type="checkbox"/> Other	
<b>Additional Requirement &amp; Specification:</b>						