



**EMERSON**<sup>TM</sup>

Original Instructions  
4000875 - REV. 02



# LPX

## Power Supply

# Operating Manual

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**BRANSON**

## Manual Change Information

At Branson, we strive to maintain our position as the leader in ultrasonics plastics joining, metal welding, cleaning and related technologies by continually improving our circuits and components in our equipment. These improvements are incorporated as soon as they are developed and thoroughly tested.

Information concerning any improvements will be added to the appropriate technical documentation at its next revision and printing. Therefore, when requesting service assistance for specific units, note the Revision information found on the cover of this document, and refer to the printing date which appears on this page.

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## Foreword

Congratulations on your choice of a Branson Ultrasonics Corporation system!

The Branson LPX Power Supply system is process equipment for the joining of plastic parts using ultrasonic energy. It is the newest generation of product using this sophisticated technology for a variety of customer applications. This Operating Manual is part of the documentation set for this system, and should be kept with the equipment.

Thank you for choosing Branson!

## Introduction

This manual is arranged into several structured chapters which will help you find the information you may need to know to safely handle, install, set up, program, operate, and/or maintain this product. Please refer to the [Table Of Contents](#) and/or the [Index](#) of this manual to find the information you may be looking for. In the event you require additional assistance or information, please contact our Product Support department (see [1.5 How to Contact Branson](#) for information on how to contact them) or your local Branson representative.



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# Table Of Contents

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## Chapter 1: Safety and Support

1.1	Safety Requirements and Warnings . . . . .	2
1.2	General Precautions . . . . .	4
1.3	Regulatory Compliance . . . . .	6
1.4	Warranty . . . . .	7
1.5	How to Contact Branson . . . . .	8
1.6	Returning Equipment for Repair . . . . .	9
1.7	Obtaining Replacement Parts . . . . .	12

## Chapter 2: Introduction

2.1	Principle of Operation . . . . .	14
2.2	Front Panel Controls and Indicators . . . . .	15
2.3	Back Panel Connections . . . . .	20

## Chapter 3: Delivery and Handling

3.1	Delivery and Handling . . . . .	22
-----	---------------------------------	----

## Chapter 4: Technical Specifications

4.1	Technical Specifications . . . . .	24
4.2	System Performance Benchmark . . . . .	29
4.3	Branson Power Supply Setup Form . . . . .	30

## Chapter 5: Installation and Setup

5.1	Installation Checklist . . . . .	32
5.2	System Component Description . . . . .	33
5.3	Assembling the Equipment . . . . .	38
5.4	Input Power Requirements . . . . .	41
5.5	Electrical Connections to Equipment . . . . .	42
5.6	Guards and Safety Equipment . . . . .	44
5.7	Ultrasonic Test . . . . .	45

## Chapter 6: Operation

6.1	Front Panel Controls . . . . .	48
6.2	System Modes . . . . .	49
6.3	Main Screen Navigation . . . . .	50
6.4	System Configuration Registers . . . . .	52
6.5	Operational Sequence . . . . .	55
6.6	Save/Recall Weld Preset . . . . .	66

## Chapter 7: Maintenance

7.1	Maintenance and Troubleshooting . . . . .	70
7.2	Reconditioning the Stack Interface . . . . .	72
7.3	Troubleshooting Charts . . . . .	76
7.4	Alarms/Errors . . . . .	79
7.5	Spare Parts List . . . . .	80



---

# List Of Figures

---

**Chapter 1: Safety and Support**

Figure 1.1 Safety Label found on the back of the LPX Power Supply . . . . . 3

**Chapter 2: Introduction**

Figure 2.1 LPX Power Supply . . . . . 14

Figure 2.2 Front-Panel Controls. . . . . 15

Figure 2.3 Back Panel of LPX Power Supply. . . . . 20

**Chapter 3: Delivery and Handling****Chapter 4: Technical Specifications**

Figure 4.1 EU Declaration of Conformity. . . . . 27

Figure 4.2 UK Declaration of Conformity. . . . . 28

**Chapter 5: Installation and Setup**

Figure 5.1 Connecting Tip to Horn . . . . . 40

**Chapter 6: Operation**

Figure 6.1 LPX Power Supply User Interface . . . . . 48

**Chapter 7: Maintenance**

Figure 7.1 Reconditioning Stack Mating Surface . . . . . 73

Figure 7.2 LPX Power Supply Interconnect Diagram. . . . . 78





# List Of Tables

## Chapter 1: Safety and Support

Table 1.1	Branson Contacts . . . . .	11
-----------	----------------------------	----

## Chapter 2: Introduction

Table 2.1	Front Panel Controls and Indicators . . . . .	16
Table 2.2	LCD Icons . . . . .	18
Table 2.3	Connections to the LPX Power Supply . . . . .	20

## Chapter 3: Delivery and Handling

### Chapter 4: Technical Specifications

Table 4.1	Environmental Specifications . . . . .	24
Table 4.2	Input Voltage . . . . .	24
Table 4.3	Current Rating Fusing . . . . .	24
Table 4.4	Maximum Power Limit . . . . .	25
Table 4.5	Dimensions and Weight . . . . .	25
Table 4.6	System Performance Benchmark . . . . .	29

### Chapter 5: Installation and Setup

Table 5.1	20 kHz LPX Power Supply Converter Compatibility . . . . .	33
Table 5.2	30 kHz LPX Power Supply Converter Compatibility . . . . .	34
Table 5.3	40 kHz LPX Power Supply Converter Compatibility . . . . .	34
Table 5.4	LPX Power Supply Converter Part Numbers . . . . .	35
Table 5.5	Start Cable Part Numbers . . . . .	35
Table 5.6	RF Cable Part Numbers . . . . .	36
Table 5.7	Handheld Welder Part Numbers . . . . .	36
Table 5.8	Maximum Power/Duty Cycle . . . . .	37
Table 5.9	Setup Procedure . . . . .	38
Table 5.10	Connecting the horn to the converter . . . . .	39
Table 5.11	Stud Torque Values, Torque Wrench Part Numbers . . . . .	39
Table 5.12	Connecting the tip to the horn . . . . .	40
Table 5.13	User I/O Pin-Out (DB9F) provided for customer-designed interface . . . . .	43
Table 5.14	Ultrasonic Test . . . . .	45

### Chapter 6: Operation

Table 6.1	System Modes and Description . . . . .	49
Table 6.2	Modify Registers . . . . .	52
Table 6.3	Register Settings . . . . .	52
Table 6.4	Energy Mode Parameters . . . . .	55
Table 6.5	Energy Mode Operational Sequence . . . . .	55
Table 6.6	Time Mode Parameters . . . . .	59
Table 6.7	Time Mode Operational Sequence . . . . .	59
Table 6.8	Continuous Mode Parameters . . . . .	63
Table 6.9	Continuous Mode Operational Sequence . . . . .	63
Table 6.10	Saving a Weld Preset in Memory . . . . .	66
Table 6.11	Recalling a Weld Preset from Memory . . . . .	67

## Chapter 7: Maintenance

Table 7.1	Torque Specifications . . . . .	74
Table 7.2	System Trouble Analysis Chart . . . . .	76
Table 7.3	Alarms/Errors . . . . .	79
Table 7.4	Spare Parts List. . . . .	80

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# Chapter 1: Safety and Support

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<b>1.1</b>	<b>Safety Requirements and Warnings</b> . . . . .	<b>2</b>
<b>1.2</b>	<b>General Precautions</b> . . . . .	<b>4</b>
<b>1.3</b>	<b>Regulatory Compliance</b> . . . . .	<b>6</b>
<b>1.4</b>	<b>Warranty</b> . . . . .	<b>7</b>
<b>1.5</b>	<b>How to Contact Branson</b> . . . . .	<b>8</b>
<b>1.6</b>	<b>Returning Equipment for Repair</b> . . . . .	<b>9</b>
<b>1.7</b>	<b>Obtaining Replacement Parts</b> . . . . .	<b>12</b>

## 1.1 Safety Requirements and Warnings

This chapter contains an explanation of the different Safety Notice symbols and icons found both in this manual and on the product itself and provides additional safety information for ultrasonic welding. This chapter also describes how to contact Branson for assistance.

### 1.1.1 Symbols Found in this Manual

These symbols used throughout this manual warrant special attention:

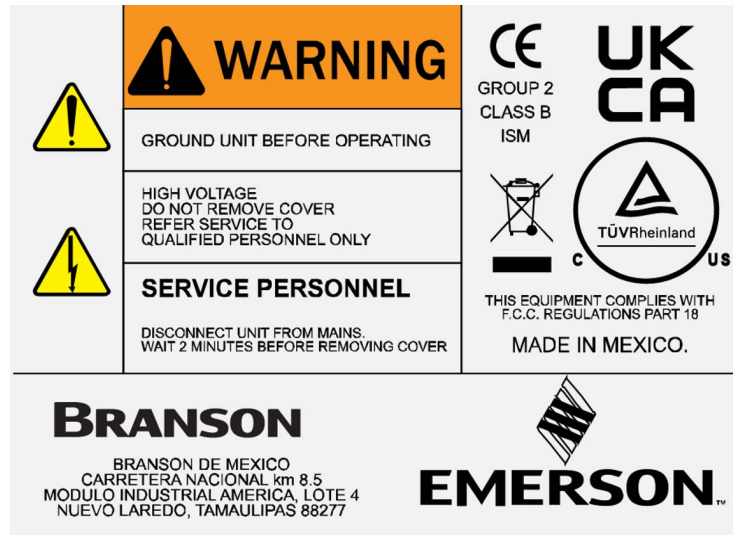
<b>WARNING</b>	<b>Indicates a possible danger</b>
	If these risks are not avoided, death or severe injury might result.
<b>CAUTION</b>	<b>Indicates a possible danger</b>
	If these risks are not avoided, slight or minor injury might result.
<b>NOTICE</b>	<b>Indicates a possible damaging situation</b>
	If this situation is not avoided, the system or something in its vicinity might get damaged. Application types and other important or useful information are emphasized.

## 1.1.2 Symbols Found on the Product

The LPX Power Supply has several warning labels on it to alert the user of items of concern or hazard.


The following warning symbols appear on the LPX Power Supply.

**Figure 1.1** Safety Label found on the back of the LPX Power Supply



## 1.2 General Precautions

Observe the following safety considerations when operating the LPX Power Supply:


CAUTION	General Warning
	<ul style="list-style-type: none"> <li>• Make sure that the equipment is properly grounded. <b>DO NOT</b> operate if it is not.</li> <li>• Units are equipped with a three-conductor cord, and must be plugged into a three-prong grounding-type wall receptacle. <b>DO NOT</b> under any circumstances remove the power cord ground prong.</li> <li>• <b>DO NOT</b> operate the equipment with the cover removed. High voltage is present within the equipment.</li> <li>• <b>DO NOT</b> turn on ultrasonics without the converter and horn attached.</li> <li>• <b>DO NOT</b> cycle the welding system if either the RF cable or converter is disconnected.</li> <li>• <b>DO NOT</b> touch the horn or tip when ultrasonics are active. When handling, removing, or attaching a horn or tip, be sure that the ON/OFF switch on the back of the unit is set to OFF. See <a href="#">Figure 2.3 Back Panel of LPX Power Supply</a>. Touching the horn or tip while the unit is on can result in serious personal injury (frictional burn).</li> <li>• <b>DO NOT</b> position the equipment so that it is difficult to operate the ON/OFF switch.</li> </ul>

### 1.2.1 Intended Use of the System

The LPX Power Supply can be used in conjunction with a Portable Hand Held Tool, as well as ultrasonic stacks with standard and knurled horns and tips, spot welding tips, and cutting blades to accomplish a wide variety of plastic and textile cutting and joining processes. Indoor use only.

### 1.2.2 Emissions

When being processed, certain plastic materials can emit toxic fumes, gases or other emissions that can be hazardous to the operator's health. Where such materials are processed, proper ventilation of the workstation is required. Check your materials suppliers for recommended protection when processing their materials.

WARNING	Corrosive Material Hazard
	<p>Processing of many materials, such as PVC, can be hazardous to an operator's health and could cause corrosion/damage to the equipment. Use proper ventilation and take protective measures.</p>


## 1.2.3 Safe Operation


Setup and Operation instructions are found in [Chapter 6: Operation](#) of this manual.


For safe operation, please ensure that all people using this equipment follow those instructions and observe all **CAUTION** and **WARNING** notices.

Make sure that the equipment is properly grounded. **DO NOT** operate if it is not.

Periodically test the equipment as described in [4.2 System Performance Benchmark](#).

CAUTION	Loud Noise Hazard
	<p>On certain applications, sound level emissions over 80dB have can be generated. To prevent the possibility of hearing loss, use appropriate hearing protection.</p>

NOTICE	
	<p>Sound level and frequency of the noise emitted during the ultrasonic assembly process may depend upon a. type of application, b. size, shape and composition of the material being assembled, c. shape and material of the holding fixture, d. welder setup parameters and e. tool design. Some parts vibrate at an audible frequency during the process. Some or all of these factors may result in sound levels of over 80dB. In such cases operators may need to be provided with personal protective equipment. See 29 CFR (Code of Federal Regulations) 1910.95 Occupational Noise Exposure. For all other countries, follow your local regulations.</p>

CAUTION	General Warning
	<p>Never touch the horn or tip when ultrasonics are active. Touching the horn or tip while the unit is on can result in serious injury. When you handle, remove, or attach a horn or tip, always make sure that the ON/OFF switch on the back of the unit is set to OFF. See <a href="#">2.3 Back Panel Connections</a>.</p>

## 1.2.4 Setting Up the Workplace

Measures for setting up a workplace for safe operation of the ultrasonic welder are outlined in [Chapter 5: Installation and Setup](#).

## **1.3 Regulatory Compliance**

This product meets electrical safety requirements and EMC (Electromagnetic Compliance) requirements for North America, Great Britain and the European Union.

All units comply with WEEE/RoHS requirements.



## 1.4 Warranty

For warranty information please reference the warranty section of Terms and Conditions found at: [www.emerson.com/branson-terms-conditions](http://www.emerson.com/branson-terms-conditions).

## 1.5 How to Contact Branson

Branson is here to help you. We appreciate your business and are interested in helping you successfully use our products. To contact Branson for help, use the following telephone numbers, or contact the field office nearest you (business hours from 8 a.m. to 4 p.m. Central and Eastern Time Zones):

- **North American Headquarters (all Departments):** (203) 796-0400
- **Parts Store (direct number):** (877) 330-0406
- **Repair department:** (877)-330-0405
- **For emergency after-hours service (5 p.m. – 8 a.m. EST):** (203) 796-0500 (US phone numbers only)

Tell the operator which product you have and which person or department you need ([Table 1.1](#)). If after hours, please leave a voice message with your name and return telephone number.

### 1.5.1 Before Calling Branson for Assistance

This manual provides information for troubleshooting and resolving problems that could occur with the equipment (see [Chapter 7: Maintenance](#)). If you still require assistance, Branson Product Support is here to help you. To help identify the problem, use the following questionnaire which lists the common questions you will be asked when you contact the Product Support department.

Before calling, determine the following information:

1. Your company name and location.
2. Your return telephone number.
3. Have your manual with you. If troubleshooting a problem, refer to [Chapter 7: Maintenance](#).
4. Know your equipment model and serial numbers (found on a gray data label on the units). Information about the horn (part number, gain, etc.) or other tooling may be etched into the tooling. Software- or firmware-based systems may provide a BOS or software version number, which may be required.
5. What tooling (horn) and booster are being used?
6. What are the setup parameters and mode?
7. Is your equipment in an automated system? If so, what is supplying the "start" signal?
8. Describe the problem; provide as much detail as possible. For example, is the problem intermittent? How often does it occur? How long before it occurs if you are just powering up? If an error is occurring, which error (give error number or name)?
9. List the steps you have already taken.
10. What is your application, including the materials being processed?
11. Have a list of service or spare parts you have on hand (tips, horns, etc.)
12. Notes:

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## 1.6 Returning Equipment for Repair

Before sending equipment for repair, provide as much information with the equipment to help determine the problem with the system. Use the following page to record necessary information.

NOTICE	
	<p>To return equipment to Branson, you must first obtain an RGA number from a Branson representative, or the shipment may be delayed or refused.</p>

If you are returning equipment to Branson for repair, you must first call the Repair department to obtain a **Returned Goods Authorization** (RGA) number. (If you request it, the repair department will fax a Returned Goods Authorization form to fill out and return with your equipment).

Branson Repair Department, C/O Zuniga Logistics, LTD

12013 Sara Road, Killam Industrial Park

Laredo, Texas 78045 U.S.A.

Direct telephone number: (877) 330-0405

Fax number: (877) 330-0404

- Provide as much information as possible that will help identify the need for repair
- Carefully pack the equipment in original packing cartons
- Clearly label all shipping cartons with the RGA number on the outside of cartons as well as on your packing slip, along with the reason for return
- Return general repairs by any convenient method. Send priority repairs by air freight
- You must prepay the transportation charges FOB Laredo, Texas, U.S.A.

### 1.6.1 Get an RGA Number

RGA#

---

If you are returning equipment to Branson, please call the Repair Department to obtain a Returned Goods Authorization (RGA) number. (At your request, the Repair Department will fax an RGA form to fill out and return with the equipment).

## 1.6.2 Record Information About the Problem

Before sending equipment for repair, record the following information and send a copy of it with the equipment. This will greatly increase Branson's ability to address the problem.

1. Describe the problem; provide as much detail as possible. For example, is the problem intermittent? How often does it occur? How long before it occurs after powering up?

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2. Is your equipment in an automated system?

---

3. If the problem is with an external signal, which signal?

---

4. If known, include plug/pin # (e.g., P29, pin #3) for that signal:

---

5. What are the Weld Parameters?

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---

---

6. What is your application? (Type of weld, plastic material, etc.):

---

---

7. Name and phone number of the person most familiar with the problem:

---

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Contact the Branson office prior to shipping the equipment.

For equipment not covered by warranty, to avoid delay, include a Purchase Order.

Send a copy of this page with the equipment being returned for repair.

## 1.6.3 Departments to Contact

Call your local Branson Representative, or contact Branson by calling and asking for the appropriate department, as indicated in [Table 1.1](#) below.

**Table 1.1** Branson Contacts

What you need help with or information about	Whom to Call	At this Phone Number...
Information about new welding systems or components.	Your local Branson Rep or Branson Customer Service.	203-796-0400 Ext 384
Application and setup questions on the welding system.	Welding Applications Lab.	203-796-0400 Ext 368
Application assistance on the horns and tooling.	ATG Lab.	203-796-0400 Ext 495
Technical questions about the welding system.	Welding Product Support.	203-796-0400 Ext 355, 551
Technical questions about horns and tooling.	ATG Lab.	203-796-0400 Ext 495
Ordering new parts.	Parts Store.	877-330-0406
RGA's, request for repair, status of a repair.	Welding Repair Department.	877-330-0405
System automation/hookup information.	Product Support.	203-796-0400 Ext 355, 551

My Local Branson Representative's name is:

---

I can reach this representative at:

---

## 1.6.4 Pack and Ship the Equipment

- Carefully pack the system in original packing material to avoid shipping damage. Plainly show the RGA number on the outside of cartons as well as inside the carton along with the reason for return. Make a list of all components packed in the box. KEEP YOUR MANUAL
- Return general repairs by any convenient method. Send priority repairs by air freight. Prepay the transportation charges FOB the repair site

NOTICE	
	Items that are sent Freight Collect will be refused.

## 1.7 Obtaining Replacement Parts

You can reach Branson Parts Store at the following telephone numbers:

Branson Part Store

Direct telephone number: 877-330-0406

Fax number: 877-330-0404

Many parts can be shipped the same day if ordered before 2:30 p.m., Eastern time.

A parts list is found in [Chapter 7: Maintenance](#) of this manual, listing descriptions and EDP part numbers. If you need replacement parts, coordinate the following with your purchasing agent:

- Purchase order number
- Ship to information
- Bill to information
- Shipping instructions (air freight, truck, etc.)
- Any special instructions (for example, "Hold at the airport and call"). Be sure to give a name and phone number
- Contact name information

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## **Chapter 2: Introduction**

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<b>2.1</b>	<b>Principle of Operation</b> .....	<b>14</b>
<b>2.2</b>	<b>Front Panel Controls and Indicators</b> .....	<b>15</b>
<b>2.3</b>	<b>Back Panel Connections</b> .....	<b>20</b>

## 2.1 Principle of Operation

The LPX Power Supply converts AC line voltage to 20, 30 or 40 kHz electrical energy. This high frequency electrical energy is supplied to a converter where it is transformed to mechanical motion at ultrasonic frequencies. The heart of the converter is a lead zirconate titanate electrostrictive element which, when subjected to an alternating voltage, expands and contracts. The converter vibrates in a longitudinal direction and transmits this motion, either directly or through an amplitude-modifying booster, to the horn. The horn, an acoustic tool, transfers this vibratory energy directly to the parts being assembled.

**Figure 2.1** LPX Power Supply



The LPX Power Supply is a constant amplitude device. As the load or pressure on the horn face increases, the power supply develops more power to maintain the set amplitude. When the horn is operated in air, minimum power is required to maintain amplitude.

For any given application, more power results when a horn of higher gain or larger radiating surface (mass) is used, or when any horn is driven at higher amplitude levels.

The LPX Power Supply offers 3 operating modes to control how ultrasonic energy is applied: Continuous, Time, and Energy. Ground Detect is an optional control feature that can be ordered and factory installed for the LPX Power Supply.

By setting various operation parameters, you can precisely control the way in which ultrasonics are applied. You can:

- Specify the time duration of the weld cycle
- Adjust the amplitude setting between 10% and 100% of maximum amplitude
- Set the maximum allowable energy for the weld cycle, so that ultrasonics will stop automatically when the specified energy is reached
- Stop ultrasonics when the horn contacts metal (Ground Detect option)



## 2.2 Front Panel Controls and Indicators

This section describes the controls that you use to operate the LPX Power Supply. These controls allow for accuracy and repeatability of control settings. A detailed description of how and when to use each front panel control, the valid formats for the data that you enter, and the response you receive from the system when you use each of these controls is provided in [Chapter 6: Operation](#).

The LPX Power Supply is equipped with a keypad and LCD on the front panel of the unit. With the keypad, you can set functional modes of operation and input digital parameters. Availability of the various functions depends on the mode or state of the system. If an error condition exists, the Alarm icon will flash and the beeper will sound three times.

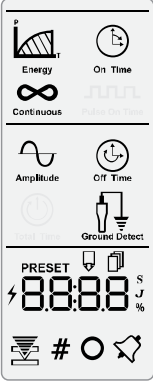





Some functions of the LPX Power Supply can be controlled through the external input connector located on the rear of the unit. [Table 2.3](#) describes the back panel of the unit.

### 2.2.1 LPX Power Supply Front Panel



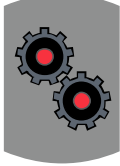


**Figure 2.2** Front-Panel Controls



**Table 2.1** Front Panel Controls and Indicators

Reference	Description
	<p><b>LCD</b></p> <p>The LCD allows for easy navigation, configuration, and for communicating weld settings and results.</p> <p>The LCD is divided into three sections:</p> <p>The Top section is used to highlight the current weld mode when running and to select the weld mode when configuring the system.</p> <p>The Middle section is used to indicate available parameters for each weld mode and to indicate which parameter corresponds with the value shown on the LCD bottom section.</p> <p>The Bottom section is used to display and edit parameter and register values; to select presets and registers; to display real time weld data; and to indicate alarms or that a weld is in progress.</p> <p>For a detailed description of the display icons refer to <a href="#">Table 2.2</a>.</p>
	<p><b>Up/Down Arrow Keys</b></p> <p>Press Up/Down Arrow keys to select weld modes and registers, and to set register and parameter values. Digit selection is circular, for each digit pressing Up Arrow key from 9 takes you to 0. Pressing Down from 0 takes you to 9.</p>
	<p><b>Left/Right Arrow Keys</b></p> <p>Press Left/Right Arrow keys to select weld modes and to move horizontally through digits when setting parameter or register values.</p>
	<p><b>Enter Key</b></p> <p>Press Enter key to accept weld mode, weld parameters, register and preset selection; and to accept register and preset values.</p>
	<p><b>Save Preset Key</b></p> <p>Press the Save Preset key to select a memory location to save the current weld settings. For more information on saving weld presets see <a href="#">6.6 Save/Recall Weld Preset</a>.</p>
	<p><b>Recall Preset Key</b></p> <p>Press the Recall Preset key to select a weld preset from available memory locations. For information on saving presets see <a href="#">6.6 Save/Recall Weld Preset</a>.</p>

**Table 2.1** Front Panel Controls and Indicators

Reference	Description
	<p><b>ESC Key</b></p> <p>Press the ESC key to return without saving weld mode, parameter, or register changes.</p>
	<p><b>Alarm Reset Key</b></p> <p>Press the Alarm Reset key to reset alarms.</p>
	<p><b>Mode/Configuration Key</b></p> <p>Press one time to modify Weld settings. For information on modifying weld settings see <a href="#">6.2 System Modes</a>.</p> <p>Press a second time to select a configuration register. For information on configuring the system registers see <a href="#">6.4 System Configuration Registers</a>.</p> <p>Press a third time to return to the ready state.</p>
	<p><b>Test Key</b></p> <p>Press and hold Test key to turn on sonics. Test performs a seek and then ramps the amplitude to the current setting.</p>
	<p><b>Start/Stop Key</b></p> <p>Press and hold Start/Stop key to turn ultrasonics on. By Default, the user must continue to hold the Start/Stop key throughout the duration of the process cycle. To configure as a start/stop toggle switch, see <a href="#">6.4 System Configuration Registers</a>.</p>

## 2.2.2 LCD Description

Table 2.2 LCD Icons


















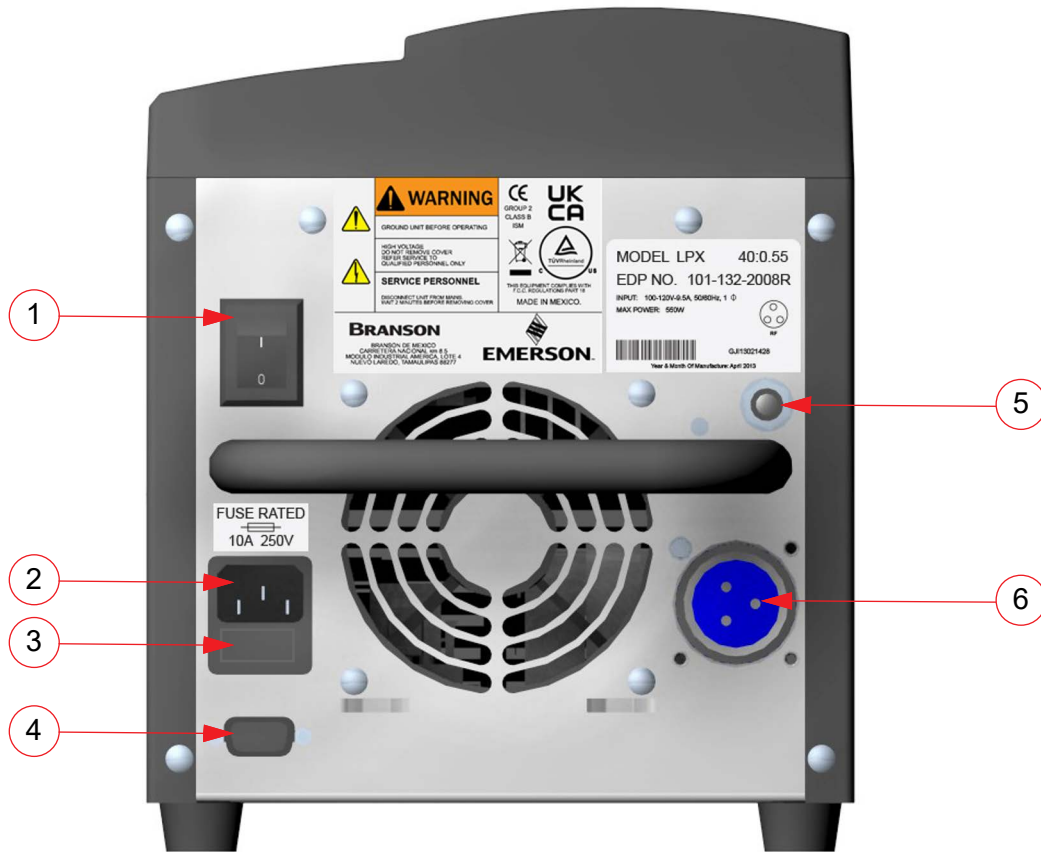
Reference	Description
	<p><b>Numeric Display</b></p> <p>Displays parameter settings, parameter values, register numbers, register settings, and preset numbers.</p>
	<p><b>Energy Mode Icon</b></p> <p>Indicates the power supply is running in Energy mode. For more information on setting up and running in Energy mode, <a href="#">6.5.1 Energy Mode</a>.</p>
	<p><b>Time Mode Icon</b></p> <p>Indicates the power supply is running in On Time mode. For more information on setting up and running in Time mode, see <a href="#">6.5.2 Time Mode</a>.</p>
	<p><b>Continuous Mode Icon</b></p> <p>Indicates the power supply is running in Continuous mode. For more information on setting up and running in Continuous mode, see <a href="#">6.5.3 Continuous Mode</a>.</p>
	<p><b>Amplitude Icon</b></p> <p>When blinking, indicates the value shown on the numeric display corresponds to the amplitude setting.</p>
	<p><b>Off Time Icon</b></p> <p>When blinking, indicates the value shown on the numeric display corresponds to the off time setting.</p> <p>Visible only if available for the current weld mode.</p>
	<p><b>Ground Detect Icon</b></p> <p>When blinking, indicates the value shown on the numeric display corresponds to the current weld mode scrub time setting.</p> <p>Visible only if available for the current weld mode.</p> <p><b>NOTICE</b> Ground Detect icon is only visible if installed.</p>
	<p><b>Preset and Save Icons</b></p> <p>Indicates the number shown on the numeric display corresponds to the memory location where the current weld settings are to be saved. For more information on saving and recalling weld presets see <a href="#">6.6 Save/Recall Weld Preset</a>.</p>

Table 2.2 LCD Icons

Reference	Description
PRESET 	<b>Preset and Recall Icons</b> Indicates the number shown on the numeric display corresponds to a memory location from where weld settings are to be recalled. For more information on saving and recalling weld presets see <a href="#">6.6 Save/Recall Weld Preset</a> .
	<b>Sonics Active Indicator</b> Indicates ultrasonics is running.
	<b>Seconds Icon</b> Indicates that the value shown on the numeric display represents time.
	<b>Joules Icon</b> Indicates that the value shown on the numeric display represents energy.
	<b>Percentage Icon</b> Indicates that the value shown on the numeric display represents a percentage.
	<b>Configuration Icon</b> Indicates the power supply is currently being configured.
	<b>Register Number Icon</b> Indicates the value shown on the numeric display corresponds to a register number. Use Up/Down Arrow keys to select a register. For more information see <a href="#">6.4 System Configuration Registers</a> .
	<b>Register Value Icon</b> Indicates the value shown on the numeric display corresponds to the contents of a register. Use Up/Down Arrow keys to modify the register value. For more information see <a href="#">6.4 System Configuration Registers</a> .
	<b>Alarm Icon</b> A flashing icon which indicates an alarm condition.

## 2.3 Back Panel Connections

**Figure 2.3** Back Panel of LPX Power Supply



**Table 2.3** Connections to the LPX Power Supply

Item	Name	Function
1	Power Switch	Turns the unit on/off.
2	IEC/C14 Power Connector	To connect the power supply to a grounded electrical power source using the provided detachable line cord.
3	Fuse Holder	Provides access to a replaceable protective fuse.
4	User I/O J2 Connector	Connects the power supply to a PLC controller for remote control.
5	Ground Detect Terminal (Optional)	Factory installed option used to detect contact between the horn and an anvil which has been isolated from ground.
6	3 pin RF Connector	Connects the power supply to the ultrasonic converter.

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## **Chapter 3: Delivery and Handling**

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**3.1 Delivery and Handling ..... 22**

## 3.1 Delivery and Handling

The LPX Power Supply has no special handling constraints. On receipt of your LPX Power Supply, take the following steps:

1. Inspect the carton for signs of damage
2. Open the carton and locate the packing list
3. Carefully unpack the components and check them against the packing list
4. Save all packing materials in case the equipment needs to be shipped
5. Inspect the components for any damage that may have occurred during shipping

Report all shipping damage to your carrier.



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## **Chapter 4: Technical Specifications**

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<b>4.1</b>	<b>Technical Specifications . . . . .</b>	<b>24</b>
<b>4.2</b>	<b>System Performance Benchmark . . . . .</b>	<b>29</b>
<b>4.3</b>	<b>Branson Power Supply Setup Form . . . . .</b>	<b>30</b>

## 4.1 Technical Specifications

### 4.1.1 Environmental Specifications

The LPX Power Supply has the following environmental specifications.

**Table 4.1** Environmental Specifications

Environmental Condition	Acceptable Range
Operating Temperature	+41° F to +122° F (+5° C to +40° C)
Storage Temperature	-13° F to +131° F (-25° C to +55° C) (short time exposure not to exceed +158° F (70° C) in 24 hours)
Relative Humidity	Maximum 90%, non-condensing
Altitude	Up to 3280ft (1000m)
Pollution degree	2
Overvoltage category	II

### 4.1.2 Electrical Specifications

The following tables list input voltage and current requirements for the LPX Power Supply.

**Table 4.2** Input Voltage

Line Voltage
100 to 120 V -8%, +10% @ 50/60Hz
200 to 240 V -10%, +5% @ 50/60Hz

**Table 4.3** Current Rating Fusing


Model	Power	Current Rating
20 kHz	150 W	2 Amp Max. @ 100 to 120 V / 10 Amp fuse
	150 W	1 Amp Max. @ 200 to 240 V / 10 Amp fuse
	550 W	9.5 Amp Max. @ 100 to 120 V / 10 Amp fuse
	550 W	6 Amp Max. @ 200 to 240 V / 10 Amp fuse
30 kHz	550 W	9.5 Amp Max. @ 100 to 120 V / 10 Amp fuse
	550 W	6 Amp Max. @ 200 to 240 V / 10 Amp fuse


**Table 4.3** Current Rating Fusing

Model	Power	Current Rating
40 kHz	150 W	2 Amp Max. @ 100 to 120 V / 10 Amp fuse
	150 W	1 Amp Max. @ 200 to 240 V / 10 Amp fuse
	550 W	9.5 Amp Max. @ 100 to 120 V / 10 Amp fuse
	550 W	6 Amp Max. @ 200 to 240 V / 10 Amp fuse

**Table 4.4** Maximum Power Limit

Model	Power	Maximum Power
20 kHz	150 W	170 W
20 kHz	550 W	635 W
30 kHz	550 W	635 W
40 kHz	150 W	170 W
40 kHz	550 W	635 W

NOTICE	
	High duty cycles require additional cooling for the converter. For information on converter cooling refer to <a href="#">Table 5.8</a> .


NOTICE	
	550 W, 40 kHz cannot be run continuously over 400 W or failure could occur.

### 4.1.3 Physical Description

This section describes the physical dimensions of the LPX Power Supply.

**Table 4.5** Dimensions and Weight

Length	Width	Height	Weight
13.7" (348mm)	8" (203mm)	9.5" (242mm)	14.5 lb (6.5 kg)

NOTICE	
	Add 3" (76mm) for cable clearance.

## 4.1.4 Declaration of Conformity

**Figure 4.1** EU Declaration of Conformity

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**EU DECLARATION OF CONFORMITY**  
According to Low Voltage Directive 2014/35/EU,  
EMC Directive 2014/30/EU,  
and RoHS Directive 2011/65/EU.

We, the manufacturer

**BRANSON DE MEXICO**  
Carretera Nacional km 8.5  
Modulo Industrial America, Lote 4  
Nuevo Laredo, Tamaulipas 88277  
Mexico

represented in the community by

BRANSON ULTRASONICS, a.s.  
Piestanska 1202  
91501 Nove Mesto nad Vahom  
Slovak Republic

expressly declare under our sole responsibility that the following electrical equipment product:

Ultrasonic Assembly System consisting of a

SFX Models: **SFX** (150, 250 or 550)  
used with converter model: **4C15, 102C, or 4C15HH**, or

LPX Models: **LPX** (20:0.15, 20:0.55, 30:0.55, 40:0.15 or 40:0.55)  
used with converter model: **2CH1, 2CH2, 2CH3, 402, 902R, CR30, CH30, CP30, KTJ, 4TH or 4TP**

in the state in which it was placed on the market, fulfills all the relevant provisions of

Low Voltage Directive **2014/35/EU**  
EMC Directive **2014/30/EU**  
RoHS Directive **2011/65/EU**

The object of this declaration is in conformity with relevant Union harmonization legislation. The electrical equipment product, to which this declaration relates, is in conformity with the following standards:

EN 61010-1:2010+A1:2019  
EN 55011:2016/A11:2020  
EN 61000-6-2:2005/AC:2005  
EN 61000-3-2:2019  
EN 61000-3-3:2013

Nuevo Laredo, Tamaulipas, MX  
March 14, 2022

DocuSigned by:  
*Luis Benavides*  
01B235BF CDE147C  
Luis Benavides  
Product safety Officer

**Figure 4.2** UK Declaration of Conformity

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## UK DECLARATION OF CONFORMITY

We, the manufacturer

**BRANSON ULTRASONICS CORPORATION**

Carretera Nacional km 8.5  
Modulo Industrial America, Lote 4  
Nuevo Laredo, Tamaulipas 88277  
Mexico

expressly declare under our sole responsibility that the following electrical equipment product:

Ultrasonic Assembly System consisting of a

SFX Models: **SFX** (150, 250 or 550)  
used with converter model: **4C15, 102C, or 4C15HH, or**

LPX Models: **LPX** (20:0.15, 20:0.55, 30:0.55, 40:0.15 or 40:0.55)  
used with converter model: **2CH1, 2CH2, 2CH3, 402, 902R, CR30, CH30, CP30, KTJ, 4TH or 4TP**

in the state in which it was placed on the market, fulfills all the relevant provisions of:

Electrical Equipment (Safety) Regulations **2016**  
Electromagnetic Compatibility Regulations **2016**  
Restriction of the Use of Certain Hazardous Substances in Electrical and Electronic Equipment Regulations **2012**.

The electrical equipment product, to which this declaration relates, is in conformity with the following designated standards:

BS EN 61010-1:2010+A1:2019  
BS EN 55011:2016/A11:2020  
BS EN 61000-6-2:2005/AC:2005  
BS EN 61000-3-2:2019  
BS EN 61000-3-3:2013


Nuevo Laredo, Tamaulipas, MX  
March 14, 2022

DocuSigned by:  
*Luis Benavides*  
0182358141E147C  
Luis Benavides  
Product safety Officer

## 4.2 System Performance Benchmark

Each application and system configuration is slightly different. System performance will vary when you change setup parameters and if your horn or tips change, and can affect the results of your process. Creating a benchmark of your setup and performance can be useful at a later date in identifying a change in performance, and can also help in recreating your exact setup.

The following steps are used to record acceptable system performance, and part acceptance.

NOTICE	
	Make copies of the following page and keep it on file for future reference.

Use the following steps to create and record a benchmark for your exact setup.

**Table 4.6** System Performance Benchmark

Step	Action
1	Make a copy of the LPX Power Supply Setup Form provided on the following page.
2	Identify your product type and the part of the product the process is being applied to. Set up the LPX Power Supply (be ready to run), and prepare your sample.
3	Record the serial numbers and horn information of the LPX Power Supply unit, Horn, Converter, Portable Hand Tool, and any special equipment. Special information about the Horns is etched into the horn.
4	Turn the LPX Power Supply system On.
5	Select Mode of operation. Set On time, Energy (Joules), and Off/Hold time.
6	Set your desired Amplitude.
7	Ready piece to be processed.
8	Initiate Start for ultrasonics On through the User I/O on the rear of the unit, or through Hand Held.
9	Check part quality, and if necessary, change parameters and repeat process until piece is satisfactory.
10	When satisfied with the welded part, observe % Power and record along with other parameters on the LPX Power Supply Setup Form.
11	Note any special adjustments, settings, operating modes, or other system variables that will be helpful at a later time in re-creating your setup.
12	Turn the system off.
13	Place the filled-in form in a safe place for future reference.

## 4.3 Branson Power Supply Setup Form

Make a copy of this form and use it to record a benchmark for your system's setup.

Date:

---

Operator:

---

Power Supply Model:

---

Unit Model/Serial Number:

---

Product:

---

Part being Processed:

---

Converter Serial Number:

---

Hand Held Tool Serial Number:

---

Horn Type:

---

Parameters, Mode, Amplitude:

---

% Power (LED read-out):

---

Other Setup:

---

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## **Chapter 5: Installation and Setup**

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<b>5.1</b>	<b>Installation Checklist . . . . .</b>	<b>32</b>
<b>5.2</b>	<b>System Component Description . . . . .</b>	<b>33</b>
<b>5.3</b>	<b>Assembling the Equipment. . . . .</b>	<b>38</b>
<b>5.4</b>	<b>Input Power Requirements . . . . .</b>	<b>41</b>
<b>5.5</b>	<b>Electrical Connections to Equipment . . . . .</b>	<b>42</b>
<b>5.6</b>	<b>Guards and Safety Equipment . . . . .</b>	<b>44</b>
<b>5.7</b>	<b>Ultrasonic Test . . . . .</b>	<b>45</b>

## 5.1 Installation Checklist

The LPX Power Supply is shipped with an appropriate power cordset. Additional items required to operate the power supply in a system are detailed in [5.2 System Component Description](#).

The unit should be positioned away from radiators and heating vents. A fan inside the unit maintains a safe operating temperature in the power supply by circulating air over the components. Therefore, place the unit so that the air intake at the back of the power supply is not blocked. Periodically, unplug the unit and clean the air intake and also the air exhaust underneath the power supply to ensure that dust or dirt is not restricting the flow of air.

If the LPX Power Supply is to be used for remote operation, ensure that the unit is situated within full view of the operator, to prevent injury or equipment damage through an accidental or automatic start-up.

A Fan Filter Kit (EDP 101-063-934) is available (factory installed only), and is recommended for use in areas that are high in airborne contamination.

## 5.2 System Component Description

### 5.2.1 Components

The standard system components consist of:

- LPX Power Supply
- Power cord

Components required to set up an ultrasonic welding system:

- Converter
- Horn (and tips)
- RF Cable (if required)
- Tool Kit

### 5.2.2 20 kHz Converter Compatibility

**Table 5.1** 20 kHz LPX Power Supply Converter Compatibility

Unit	Frequency /Power	Hand Held Systems		Automation Components		
		Hand Held Welder	Converter	Converter	RF Cable	Start Cable
20:0.15:2CH	20 kHz @ 150W	HT-215 HK-215	TW1 TW2 TW3	2CH1 2CH2 2CH3	J934C	J913* J911**
				TW1 TW2 TW3		
20:0.55:902	20 kHz @ 550W	PT-250	402	902R	J931 J931C	

\* 2-pin cable for User I/O Port.

\*\* 9-pin cable for User I/O Port.

## 5.2.3 30 kHz Converter Compatibility

**Table 5.2** 30 kHz LPX Power Supply Converter Compatibility

Unit	Frequency /Power	Hand Held Systems		Automation Components		
		Hand Held Welder	Converter	Converter	RF Cable	Start Cable
30:0.55:2CR	30 kHz @ 550W	PT-350 HT-350	Built-in	CR30 CH30 CS30 CP30	J934C	J913* J911**

\* 2-pin cable for User I/O Port.

\*\* 9-pin cable for User I/O Port.

## 5.2.4 40 kHz Converter Compatibility

**Table 5.3** 40 kHz LPX Power Supply Converter Compatibility

Unit	Frequency /Power	Hand Held Systems		Automation Components		
		Hand Held Welder	Converter	Converter	RF Cable	Start Cable
40:0.15:4C	40 kHz @ 150W	HT-415	KTJ	4C	8' Built-in	J913* J911**
				KTR	J938	
40:0.15:4T	40 kHz @ 550W	PT-480 HT-480	Built-in	4TR	J934 (3-pin)	
				4TH 4TP	J934 (SHV)	
40:0.55:4T	40 kHz @ 550W			4TR	J934 (3-pin)	
				4TH 4TP	J934C (SHV)	

\* 2-pin cable for User I/O Port.

\*\* 9-pin cable for User I/O Port.

## 5.2.5 Converter Part Numbers

**Table 5.4** LPX Power Supply Converter Part Numbers

Converter	Part Number	Used With	Tool Kit EDP Number
2CH1	101-135-127R	20:0.15:2CH	101-063-208R Wrench only: 201-118-010 Bench Fixture*: 149-085-057
2CH2	101-135-128R		
2CH3	101-135-129R		
TW1	101-135-015R		
TW2	101-135-016R		
TW2**	159-023-313R		
TW3	101-135-031R		
402	101-135-014R	20:0.55.902	
902R	101-135-048R		
CR30	101-135-081R	30:0.55:2CR	101-063-636R
CH30	101-135-071R		
CS30	159-135-110R		
CP30	159-135-111R		
4C	101-135-126R	40:0.15.4C	101-063-176R
KTJ	101-135-046R		
KTR	101-135-045R		
4TR (3-pin)	101-135-042R	40:0.15.4T 40:0.55.4T	
4TH (SHV)	101-135-067R		
4TP (SHV)	101-135-068R		

\*Bench Fixture used with wrench to facilitate tool removal/attachment.

\*\*TW2 pinned, for use in automation.

## 5.2.6 Start Cable Part Numbers

**Table 5.5** Start Cable Part Numbers

Start Cable	Cable Length	Part Number
J911	8'	101-240-020R
	15'	101-240-015R
	25'	101-240-010R
J913	25'	101-240-072R

## 5.2.7 RF Cable Part Number

**Table 5.6** RF Cable Part Numbers

RF Cable	Cable Length	Part Number
J934	8'	101-240-034
	15'	101-240-035
J934C	8'	101-240-179
	15'	101-240-181
J931	8'	101-240-017
	15'	101-240-012
	25'	101-240-007
J931C	8'	101-240-176
	15'	101-240-177
	25'	101-240-178
J937	8'	100-246-1218
J938	8'	100-246-1219

## 5.2.8 Handheld Welder Part Numbers

**Table 5.7** Handheld Welder Part Numbers

Product	Grip Type	Part Number
HT-215	Barrel	101-136-010R
HK-215	Pistol	159-136-009R
PT-250	Pistol	101-136-014R
PT-350	Pistol	125-135-141R
HT-350	Barrel	125-135-174R
HT-415	Barrel	101-136-011R
PT-480	Pistol	159-135-133R
HT-480	Barrel	159-135-134R

## 5.2.9 Maximum Power/Duty Cycle

**Table 5.8** Maximum Power/Duty Cycle

Freq/Pwr Rating	Converter	Max. Power With Cooling	Max. Power Continuous With Cooling
20 kHz @ 150W	CH, TW	50% 10 second on/off	75 W
20 kHz @ 550W	402, 902	100% 10 second on/off	250 W
30 kHz @ 550W	CR, CS, CH, CP	100% 2 second on/off	250 W
40 kHz @ 150W	4TR, 4TH, 4TP, 4TJ	100% 10 second on/off	150 W
	KTJ, KTR, 4C	70% 10 second on/off	150 W
40 kHz @ 550W	4TR, 4TH, 4TP, 4TJ	70% 10 second on/off	250 W

Converter performance and reliability can be adversely affected if the converter ceramics are subjected to temperatures above 140° F (60° C). The converter front driver temperature should not exceed 122° F (50° C).

To prolong converter life and maintain a high degree of system reliability, the converter should be cooled with clean, dry, compressed air, particularly if your application calls for continuous ultrasonic operation. Converter cooling is especially critical in 40 kHz applications.

Use one of the following procedures to determine if a converter is operating close to the maximum allowable temperature. Check converter temperature immediately after substantial machine operation and without power applied to the horn.

- Press a pyrometer probe (or similar temperature measuring device) against the front driver of the converter assembly. Wait for the probe to reach the temperature of the shell. If the temperature is 120° F (49° C) or higher, the converter requires a cooling air stream
- If a temperature measuring device is unavailable, use your hand to feel the shell of the converter. If the converter is hot to touch, the converter requires a cooling air stream

High duty cycles will require additional cooling for the converter (Use Vortec or equivalent air conditioning systems). The system average power must be limited to the specified continuous maximum. Higher peak power (to the minimum acceptable power limit) with the listed on time may be obtained if appropriate off time insures that the average Continuous Duty Max Power is not exceeded.

## 5.3 Assembling the Equipment

The LPX Power Supply unit is pre-assembled and requires no special tools, however other components must be connected to the unit in order for the system to operate. Some assembly of the ultrasonic horn is required, as described in the following sections.

### 5.3.1 Setup Procedure

To set up your LPX Power Supply, take the following steps:

**Table 5.9** Setup Procedure

Step	Action
1	Connect the tip, horn, and converter, following the procedure in <a href="#">5.3.2 Connecting Tips, Horns, and Converters</a> .
2	Mount the converter/horn assembly in a stand, into the proper hand held device, or other suitable support.
3	Set the ON/OFF switch on the back of the unit to the OFF position.
4	<p>Plug the line cord into the unit, and then into an appropriate electrical power outlet, ensuring that the power supply is grounded to prevent electrical shock.</p> <p><b>NOTICE</b> A plug meeting local electrical codes may be required.</p>

To remove a horn, use spanner wrenches supplied in the appropriate kit. Never attempt to remove a horn by holding the converter housing in a vise. If necessary, secure the largest portion of the horn in a soft-jawed vise. See [5.3.2 Connecting Tips, Horns, and Converters](#).




## 5.3.2 Connecting Tips, Horns, and Converters

### Connecting the Horn to the Converter

To connect the horn to the converter, take the following steps:

**Table 5.10** Connecting the horn to the converter

Step	Action
1	Clean the contacting surfaces of the converter and horn, and remove any foreign matter from the threaded stud and threaded hole.
2	For 20 kHz and 30 kHz assemblies, insert a single Mylar washer between the mating surfaces. For 40 kHz assemblies only, coat one of the mating surfaces completely with a very thin film of silicone grease (without additives), using an amount about the size of a paper match head. Excessive silicone grease can diminish performance.
3	Thread the horn stud into the converter and tighten, using spanner wrenches.

CAUTION	General Warning
	Do not use silicone grease with Mylar washers. Use only 1 (one) Mylar washer of the correct inside and outside diameters at each interface (20 kHz and 30 kHz).

**Table 5.11** Stud Torque Values, Torque Wrench Part Numbers

20 kHz	30 kHz	40 kHz
220 inch-pounds (24.85 Nm)	220 inch-pounds (24.85 Nm)	95 inch-pounds (8 Nm)
Wrench EDP 101-063-787	Wrench EDP 101-063-787	Wrench EDP 101-063-618

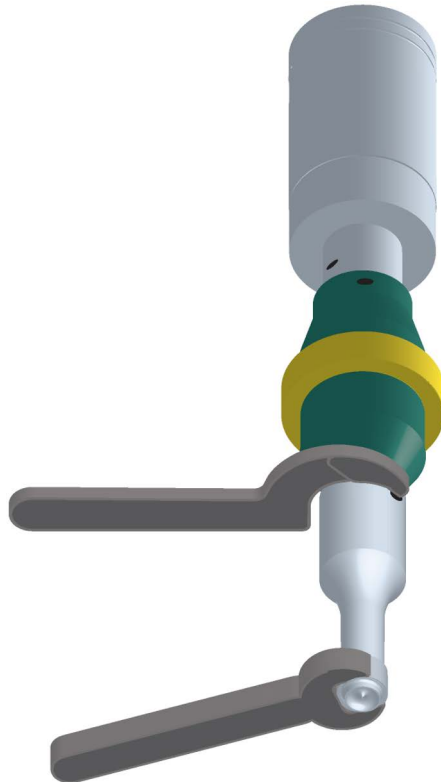
## Connecting the Tip to the Horn

To attach the tip to the horn, take the following steps:

**Table 5.12** Connecting the tip to the horn

Step	Action
1	Clean contacting surfaces of the horn and tip, and remove any foreign matter from the threaded stud and threaded hole.  <div style="background-color: yellow; padding: 2px;"><b>CAUTION</b></div> The tip must be installed clean and dry, or the power supply may not tune and operate correctly.
2	Hand-assemble the tip to the horn.
3	Using a spanner wrench on the horn and an open-end wrench on the tip, tighten the tip. See <a href="#">Figure 5.1</a> . Torque specifications for the various threaded tips follow:  1/4-20 — tighten at 90 inch-lbs./10.16 Newton-meters 3/8-24 — tighten at 180 inch-lbs./20.33 Newton-meters

**Figure 5.1** Connecting Tip to Horn




## 5.4 Input Power Requirements

The input power requirements for the LPX Power Supply are:

- 100 - 120 VAC, 50/60 Hz (North American and Japanese models)
- 200 - 240 VAC, 50/60 Hz (Export models only, including Japan, optional for North America)


The LPX Power Supply is equipped with an IEC-type power cord connector. The unit requires a single-phase, three-wire, 50/60 Hz power source. Check data tag for voltage requirements for your unit.

<b>WARNING</b>	<b>High Voltage Hazard</b>
	<p>To prevent the possibility of electrical shock, always plug the LPX Power Supply unit into a grounded power source.</p>

The system is fuse-protected with a replaceable glass fuse, 5x20mm, slow-blow type (refer to the data tag on the system) located on the rear of the unit, as part of the IEC power connector. Under normal operating conditions, this fuse should not fail. If it is necessary to replace the fuse, remove the power cord connector, and snap open the fuse holder located at the base of the connector. If the fuse blows again, contact your local Branson Service Center or Branson Product Support.

## 5.5 Electrical Connections to Equipment

All of the connections to the LPX Power Supply are made to the rear of the unit using industry-standard connectors. Refer to [Figure 2.3](#) for connector locations.

WARNING	High Voltage Hazard
	If your cordset does not match your main power receptacle, verify that you have the correct voltage available. Do not connect the system if the voltage rating of the unit is incorrect for your location, as this can damage the unit and void warranty.

### 5.5.1 Power Cord

North American units are shipped with a 3-conductor 117 Volt cordset (NEMA 5-15P to IEC jack). It connects to an IEC-type connector on the rear of the unit. The plug end connects to your main voltage receptacle, which should be properly fused (depending on your site requirements). It requires a conventional NEMA 5-15R receptacle for installation.

All units are shipped with a standard Harmonized cordset having an IEC-type jack.

## 5.5.2 User I/O Connection

The LPX Power Supply is equipped with a standard external connection to allow you to design and connect your own custom interface for controlling the unit. The User I/O interface can be useful when you need to activate the LPX Power Supply remotely, for example, when the operator must start and stop the unit from another room for safety reasons.

**Table 5.13** User I/O Pin-Out (DB9F) provided for customer-designed interface


Pin	Function	Signal Type	Signal Range	Values
1	Alarm/Error Reset	Input	0 V to 24 V $\pm$ 10%	Apply 0 V to reset alarms/errors
2	Start/Stop	Input	0 V to 24 V $\pm$ 10%	Apply +24 VDC to start/stop the cycle
3	Sonics On	Output	0 V to 24 V $\pm$ 10% 20 mA	0 V indicates the function is active
	Cycle Running			See Register 19 in <a href="#">6.4 System Configuration Registers</a> .
	End of Cycle Pulse			
4	Alarm/Error	Output	0 V to 24 V $\pm$ 10% 20 mA	0 V indicates an alarm/error occurred
5	Ready	Output	0 V to 24 V $\pm$ 10% 20 mA	0 V indicates the system is ready
6	+24 V Source	Output	0 V to 24 V $\pm$ 10% 125 mA Max	+24 V Source from power supply
7	+24 V Return	I/O Signal Return	0 V Ground	Return for all pins
8	+External Seek	Input	0 V to 24 V $\pm$ 10%	Apply +24 VDC to perform a seek
9	-External Seek			

1. All voltages and currents measured with respect to Pin 7, Common, except Seek +/-, which is measured Pin 8 (+) to Pin 9 (-)

2. Outputs should never drive impedances less than 1.6 K $\Omega$

## 5.6 Guards and Safety Equipment

Although the LPX Power Supply operates outside the normal range of human hearing, some applications can create audible noise above 80dB. If an uncomfortable level of noise is present, the operator should wear ear protection for safe operation.

<b>CAUTION</b>	<b>General Warning</b>
	To avoid injury or accident, never touch the Ultrasonic Horn while the System is turned on, and do not allow the Horn to come in contact with solid vessels or supports.

The User I/O may be used to remotely control the power supply. If this is the case, you must design in whatever safety precautions are appropriate to your User I/O circuit design to prevent unexpected start-up, which can cause personal injury and can cause equipment damage.

## 5.7 Ultrasonic Test

The Test key on the front panel of the LPX power supply is used to verify that the unit is functioning (providing ultrasonic energy to the converter and horn).

Before testing the LPX system, always make sure that the horn is not touching anything. The system also performs several self-tests when it is first turned on.

**Table 5.14** Ultrasonic Test

Step	Do this...	To obtain this result
1	Set up the LPX system following the instructions in this manual. If no horn is currently installed, mount a horn to the converter.	Prepare the LPX system to operate, if it was not previously assembled.
2	After you have connected the converter/horn to the converter cable and verified all other connections are as desired, turn the unit On, and observe the self-test displays.	Verify that the system passes all its self-tests, observing that there are no error messages on the front panel display. The LPX system advances to the ready (rdy) mode and shows 'rdy' on the display (see <a href="#">2.2 Front Panel Controls and Indicators</a> ).
3	Adjust the Amplitude control to approximately 50% (observe the value on the front panel display). See <a href="#">Chapter 6: Operation</a> to adjust the amplitude.	Ensures that ultrasonic energy will be at a mid-range.
4	Verify that the horn is not touching anything. Press the Test key on the front panel. Observe the front panel display.	Verifies the ultrasonic output of the system. You may hear a soft, high-pitched sound. The display will show the output power value. The test will run for 2 seconds, then stop.
5	If no alarms occurred during the Test, you may either proceed with using the system or turn the unit off. If an error occurs, see <a href="#">7.4 Alarms/Errors</a> for more information.	Verification that the LPX system is operating and is ready to be set up for your experiment or processing needs.

**NOTICE**

See [7.3 Troubleshooting Charts](#) if you have difficulties performing the above steps.





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## **Chapter 6: Operation**

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<b>6.1</b>	<b>Front Panel Controls</b> . . . . .	<b>48</b>
<b>6.2</b>	<b>System Modes</b> . . . . .	<b>49</b>
<b>6.3</b>	<b>Main Screen Navigation</b> . . . . .	<b>50</b>
<b>6.4</b>	<b>System Configuration Registers</b> . . . . .	<b>52</b>
<b>6.5</b>	<b>Operational Sequence</b> . . . . .	<b>55</b>
<b>6.6</b>	<b>Save/Recall Weld Preset</b> . . . . .	<b>66</b>

## 6.1 Front Panel Controls

### 6.1.1 Power Switch


The Power switch for the system is located on the rear upper left of the unit. It is a simple rocker switch, on/off operation. When powered-up, the front panel LCD display will turn on and the unit's fan will run.

### 6.1.2 User Interface

The user interface on the front panel of the LPX Power Supply allows you to enter parameters for both System Setup and Operation of the unit.

**Figure 6.1** LPX Power Supply User Interface



CAUTION	General Warning
	<p>Do not use a sharp or pointed object to press the front panel controls. The soft-touch membrane front panel can be permanently damaged.</p>

## 6.2 System Modes

You can control the way in which ultrasonics are applied to your sample by setting the unit to operate in one of three different standard modes, (and one optional mode). You determine the mode and specify operating parameters for your welding process. The three standard system modes, and one optional mode, are described below:

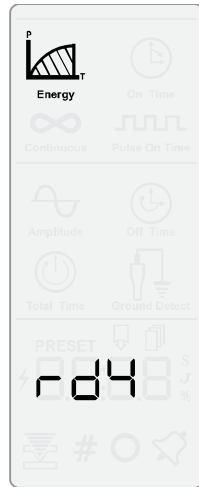
**Table 6.1** System Modes and Description

Mode	Description
Energy	In this mode, ultrasonics are determined by the calculated amount of Joules (1 Joule = 1 watt x 1 second) expended during a cycle. Ultrasonics will remain on until the required amount of energy is reached or until the timeout period has been reached unless a STOP condition occurs.
Time	In this mode, ultrasonics are applied to the sample for a specified period of time. Ultrasonics will remain on until the timeout period has been reached unless a STOP condition occurs.
Continuous	Ultrasonics are applied to the sample until you stop the cycle. In this mode the user controls the timing of ultrasonics manually. The power supply starts when a START condition is received and stops when a STOP condition is received.
Ground Detect Cutoff	Optional mode that allows you to switch to a scrub time (cutting fabric) or turn off ultrasonics when the horn touches an anvil which has been isolated from earth ground. Limits to stop ultrasonics in this mode can be set in Continuous, Time, and Energy modes respectively.

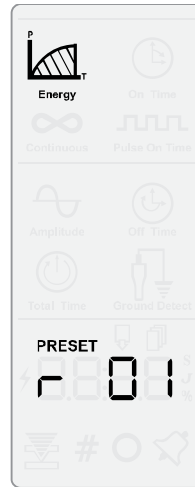
## 6.3 Main Screen Navigation

### 6.3.1 Ready Screen

After power up, the display will go into the ready state and display "rdy" for the ready state if not running from a preset or "r" and a preset number for the ready state when running from a preset.



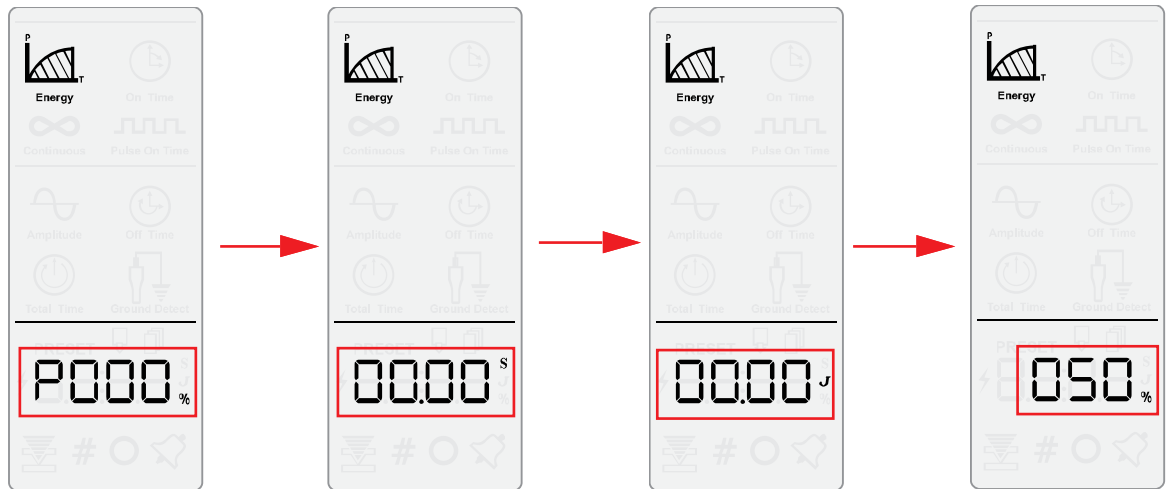
The LCD will display rdy when running without selecting a preset.



The LCD will display r 01 through r 10 when running from a preset.

### 6.3.2 Previous Weld Results

To view the previous weld result, press the Left/Right Arrow key while on the ready screen to display the power, weld time, energy and amplitude while LPX Power Supply is running.



While on the ready screen, press the Right key to display the peak power.

Press the Right key again to display the total time/weld time.

Press the Right key again to display the accumulated energy in Joules.

Press the Right key to display the amplitude. Press the Right key again to return to the ready screen.

## 6.4 System Configuration Registers

To access and modify the system configuration registers:

**Table 6.2** Modify Registers

Step	Action
1	Press the Configuration Key two times while on rdy screen.
2	Use the Up and Down keys to select the register to modify, then press the Enter key to confirm the selection.
3	Use the Up and Down keys to set the desired parameter, then press enter to confirm the entered value.
4	Press the ESC key to return to the rdy screen.

The table below shows the register number along the description and parameters.

**Table 6.3** Register Settings

Register	Description	Parameters
1	<p><b>Software Version</b></p> <p>Shows the current software version installed on the unit.</p>	N/A
2	<p><b>Panel Trigger</b></p> <p>In OFF position, the user must control the Start/Stop function through the 9-pin D-Shell connector on the back of the power supply enclosure. This mode disables the Start/Stop key from starting a cycle, but will always permit it stopping a cycle. Test key is not disabled.</p> <p>In ON position, the Start/Stop function is controlled at the front panel of the unit only. The Start/Stop function is disabled at the 9-pin D-shell connector at the back of the LPX power supply enclosure.</p>	0 (OFF) Default 1 (ON)
3	<p><b>Pulse Start</b></p> <p>In ON position the user must press the Start/Stop key for a minimum duration of 10 ms to initiate a cycle. After 10 ms the Start/Stop key can be released allowing the system to continue through the intended cycle. Releasing and pressing the Start/Stop key again will abort the current process cycle.</p> <p>In OFF position the user must continue to hold the Start/Stop key throughout the duration of the process cycle. If the Start/Stop key is released during a cycle then the cycle is aborted.</p> <p><b>NOTICE</b> In both modes the Start/Stop key must be released before the next cycle can be started.</p>	0 (OFF) Default 1 (ON)

**Table 6.3** Register Settings

Register	Description	Parameters
4	<p><b>Auto Reset</b></p> <p>In OFF position the alarm/error must be reset either by the front panel Reset key or through the external 9-pin connector. The controls will not function and no parameters can be changed, the cycle result when the alarm/error occurred will be shown until the Reset signal has been given.</p> <p>In ON position a Reset signal is not required. The Start signal can be given directly after the alarm/error has occurred. After the alarm/error has occurred the operator can access all functions of the LPX system. The overload will need to be cleared before making any changes.</p>	<p>0 (OFF) Default</p> <p>1 (ON)</p>
5	<p><b>Trigger Beeper</b></p> <p>The beeper will sound when ultrasonics are activated.</p>	<p>0 (OFF)</p> <p>1 (ON) Default</p>
6	<p><b>Error Beeper</b></p> <p>The beeper will sound if an error is encountered.</p>	<p>0 (OFF)</p> <p>1 (ON) Default</p>
7	<p><b>Alarm Beeper</b></p> <p>The beeper will sound if an alarm is activated.</p>	<p>0 (OFF)</p> <p>1 (ON) Default</p>
8	<p><b>Configuration Lock</b></p> <p>In the ON position system settings are locked. Access to ultrasonic cycle parameter modification; system configuration registers; and saving/loading cycle configurations is no longer permitted.</p> <p>In the off position access is unrestricted to all parameters, system settings, and cycle configurations.</p> <p><b>NOTICE</b></p> <p>To turn off Configuration Lock, power down the power supply, then press and hold down the Mode/Configuration key while turning on the unit to access the register settings.</p>	<p>0 (OFF) Default</p> <p>1 (ON)</p>
9	<p><b>Seek @ Power Up</b></p> <p>In the OFF position, the seek @ power up will not occur.</p> <p>In the ON position, the seek @ power up will occur. When the system performs a Seek function the ultrasonic stack is run at low amplitude to tune to the ultrasonic converter's operating frequency.</p>	<p>0 (OFF)</p> <p>1 (ON) Default</p>

**Table 6.3** Register Settings

Register	Description	Parameters
11	<p><b>Timeout Seconds</b></p> <p>Set timeout seconds. 0-9 seconds.</p>	Default: 9
12	<p><b>Timeout Milliseconds</b></p> <p>Set timeout milliseconds. 00-99 milliseconds.</p>	Default: 99
13	<p><b>Ground Detect</b></p>	0 (OFF) Default 1 (ON)
14	<p><b>Digital Pot</b></p> <p>Use the Up/Down Arrow keys and the Left/Right Arrow keys to enter the desired value. Move to the left of the numerical digits and press Up/Down to change between positive and negative value.</p> <p>-/+400Hz for 20 kHz -/+600Hz for 30 kHz -/+800Hz for 40 kHz</p>	Default: 000
16	<p><b>Cold Start</b></p> <p>Restores the settings of the power supply back to its original condition.</p>	0 (OFF) Default 1 (ON)
17	<p><b>Ready Screen Lock</b></p> <p>In OFF position, the Left/Right Arrow key will be disabled while on ready screen and runtime parameters can't be accessed.</p> <p>In ON position, the Left/Right Arrow key will display runtime parameters while on ready screen.</p>	1 (OFF) 2 (ON) Default
19	<p><b>Cycle Status Signal</b></p> <p>Configure the behavior of the cycle status signal (pin 3). This pin can be configured to function as:</p> <p><b>Sonics On</b> Output will be active during a cycle only while sonics are running.</p> <p><b>Cycle Running</b> Output will be active during the complete cycle.</p> <p><b>End of Cycle Pulse</b> Output will generate a 250 ms pulse at the end of the cycle.</p>	0 (Sonics On) 1 (Cycle Running) Default 2 (End of Cycle Pulse)



## 6.5 Operational Sequence

### 6.5.1 Energy Mode


In this mode, ultrasonics are determined by the calculated amount of Joules (1 Joule = 1 watt x 1 second) expended during a cycle. Ultrasonics will remain on until the required amount of energy is reached or until the timeout period has been reached unless a STOP condition occurs.

The following table shows the parameters of Energy mode, along the default, max. and min. values.

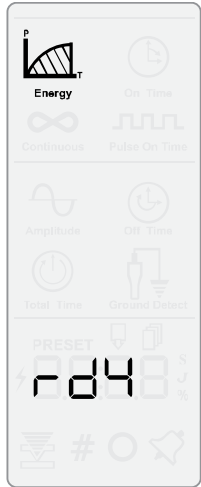
**Table 6.4** Energy Mode Parameters

Parameter	Default	Max. Value	Min. Value
Energy	1 J	9999 J	1 J
Amplitude	50%	100%	10%
Off Time	0.05 s	9.99 s	0.05 s
Ground Detect	0.05 s	0.99 s	0.00 s


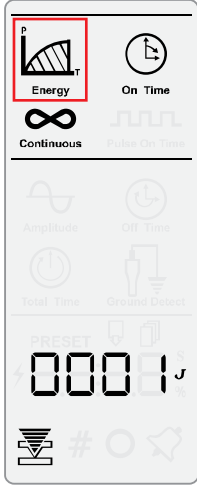
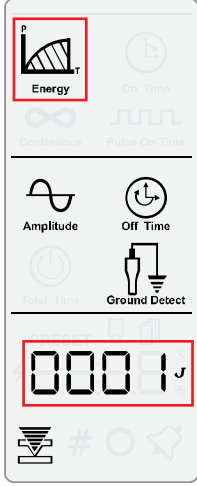
Entering an illegal value will generate 3 beeps. The system will not accept out-of-range parameters. (See [7.4 Alarms/Errors](#) for further details).

NOTICE	
	<p>You can return to the ready screen without saving any change by pressing the ESC key at any time.</p>

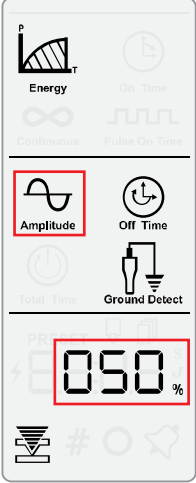
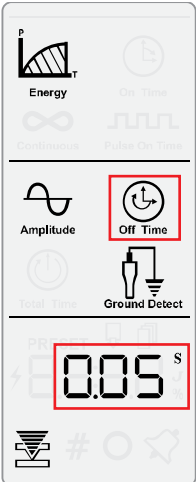
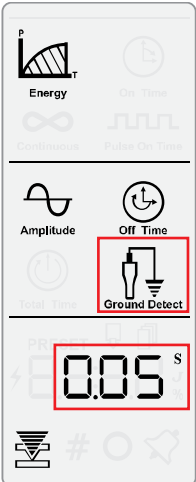
**Table 6.5** Energy Mode Operational Sequence

Step	Action	Reference
1	Turn on power, wait for the LCD to show ready and current mode.	

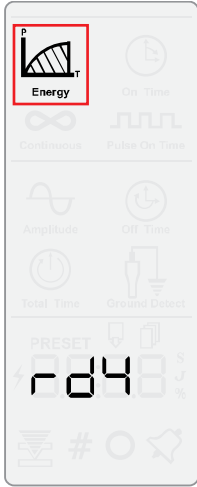

**Table 6.5** Energy Mode Operational Sequence

Step	Action	Reference
2	Press the Mode/Configuration key once to get into mode selection. Current selected mode icon will blink.	
3	<p>Use the Up/Down Arrow keys and the Left/Right Arrow keys to select Energy Mode, then press the Enter key to confirm the selection. You will be directed to the parameters area.</p> <p><b>NOTICE</b> Only the weld control modes will be visible.</p>	
4	<p>Energy icon and parameter numbers will flash. Use the Up/Down Arrow keys and the Left/Right Arrow keys to enter the desired value, then press the Enter key to confirm the selected value.</p> <p><b>NOTICE</b> Only the parameters associated with the selected mode will be displayed.</p> <p><b>NOTICE</b> Reference image showing default Energy setting of 1 Joule.</p>	

**Table 6.5** Energy Mode Operational Sequence

Step	Action	Reference
5	<p>Amplitude icon will flash. Press the Enter key to change the parameters.</p> <p>Amplitude parameter numbers will flash. Use the Up/Down Arrow keys and the Left/Right Arrow keys to enter the desired value, then press the Enter key to confirm the selected value.</p> <p><b>NOTICE</b> Reference image showing default Amplitude setting of 50%.</p>	
6	<p>Off Time icon will flash. Press the Enter key to change the parameters.</p> <p>Off Time parameter numbers will flash. Use the Up/Down Arrow keys and the Left/Right Arrow keys to enter the desired value, then press the Enter key to confirm the selected value.</p> <p><b>NOTICE</b> Reference image showing default Off Time setting of 0.05 sec.</p>	
7	<p>Ground Detect icon will flash. Press the Enter key to change the parameters.</p> <p>Ground Detect parameter numbers will flash. Use the Up/Down Arrow keys and the Left/Right Arrow keys to enter the desired value, then press the Enter key to confirm the selected value.</p> <p><b>NOTICE</b> These parameters will only be visible if the unit has the optional Ground Detect feature installed.</p> <p><b>NOTICE</b> Reference image showing default Ground Detect setting of 0.05 sec.</p>	

**Table 6.5** Energy Mode Operational Sequence

Step	Action	Reference
8	You will be returned to the ready screen. The LCD will show the Energy mode icon.	
9	<p>To start ultrasonics, press and hold the Start/Stop key. Release the Start/Stop key to stop ultrasonics.</p> <p>If using an user I/O interface, send a Start signal by shorting pins 2 and 6 to start ultrasonics. Open pins 2 and 6 to stop ultrasonics.</p>	

## 6.5.2 Time Mode


In this mode, ultrasonics are applied to the sample for a specified period of time. Ultrasonics will remain on until the timeout period has been reached unless a STOP condition occurs.

The following table shows the parameters of On Time mode, along the default, max. and min. values.

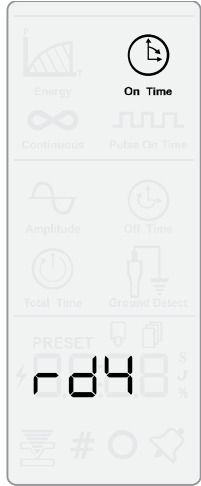
**Table 6.6** Time Mode Parameters

Parameter	Default	Max. Value	Min. Value
On Time	0.05 s	9.99 s	0.05 s
Amplitude	50%	100%	10%
Off Time	0.05 s	9.99 s	0.05 s
Ground Detect	0.05 s	0.99 s	0.00 s

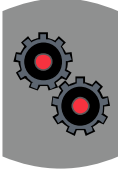
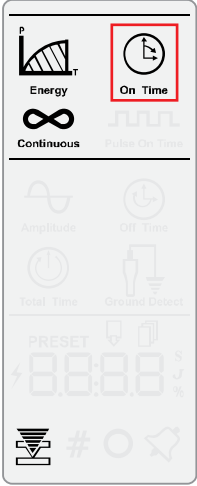
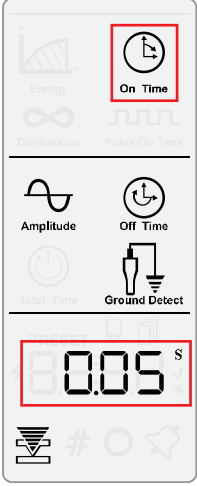
Entering an illegal value will generate 3 beeps. The system will not accept out-of-range parameters. (See [7.4 Alarms/Errors](#) for further details).

NOTICE	
	<p>You can return to the ready screen without saving any change by pressing the ESC key at any time.</p>

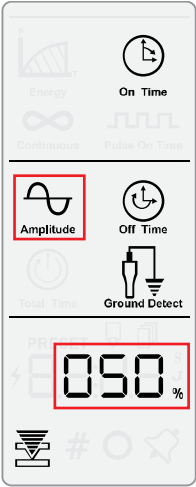
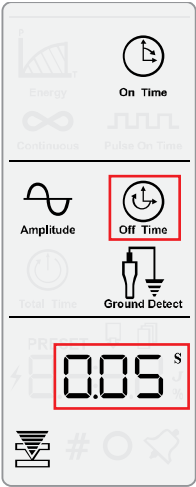
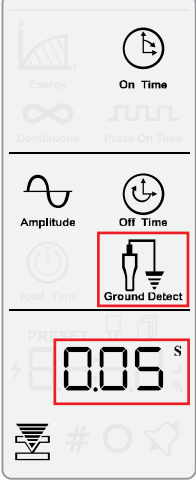
**Table 6.7** Time Mode Operational Sequence

Step	Action	Reference
1	Turn on power, wait for the LCD to show ready and current mode.	

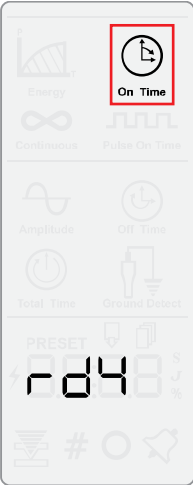

**Table 6.7** Time Mode Operational Sequence

Step	Action	Reference
2	Press the Mode/Configuration key once to get into mode selection. Current selected mode icon will blink.	
3	<p>Use the Up/Down Arrow keys and the Left/Right Arrow keys to select On Time Mode, then press the Enter key to confirm the selection. You will be directed to the parameters area.</p> <p><b>NOTICE</b> Only the weld control modes will be visible.</p>	
4	<p>On Time icon and parameter numbers will flash. Use the Up/Down Arrow keys and the Left/Right Arrow keys to enter the desired value, then press the Enter key to confirm the selected value.</p> <p><b>NOTICE</b> Only the parameters associated with the selected mode will be displayed.</p> <p><b>NOTICE</b> Reference image showing default On Time setting of 0.05 sec.</p>	

**Table 6.7** Time Mode Operational Sequence

Step	Action	Reference
5	<p>Amplitude icon will flash. Press the Enter key to change the parameters.</p> <p>Amplitude parameter numbers will flash. Use the Up/Down Arrow keys and the Left/Right Arrow keys to enter the desired value, then press the Enter key to confirm the selected value.</p> <p><b>NOTICE</b> Reference image showing default Amplitude setting of 50%.</p>	
6	<p>Off Time icon will flash. Press the Enter key to change the parameters.</p> <p>Off Time parameter numbers will flash. Use the Up/Down Arrow keys and the Left/Right Arrow keys to enter the desired value, then press the Enter key to confirm the selected value.</p> <p><b>NOTICE</b> Reference image showing default Off Time setting of 0.05 sec.</p>	
7	<p>Ground Detect icon will flash. Press the Enter key to change the parameters.</p> <p>Ground Detect parameter numbers will flash. Use the Up/Down Arrow keys and the Left/Right Arrow keys to enter the desired value, then press the Enter key to confirm the selected value.</p> <p><b>NOTICE</b> These parameters will only be visible if the unit has the optional Ground Detect feature installed.</p> <p><b>NOTICE</b> Reference image showing default Ground Detect setting of 0.05 sec.</p>	

**Table 6.7** Time Mode Operational Sequence

Step	Action	Reference
8	You will be returned to the ready screen. The LCD will show On Time mode icon.	
9	<p>To start ultrasonics, press and hold the Start/Stop key. Release the Start/Stop key to stop ultrasonics.</p> <p>If using an user I/O interface, send a Start signal by shorting pins 2 and 6 to start ultrasonics. Open pins 2 and 6 to stop ultrasonics.</p>	



## 6.5.3 Continuous Mode


In this mode, ultrasonics are applied to the sample until you stop the cycle. The user controls the timing of ultrasonics manually. The power supply starts when a START condition is received and stops when a STOP condition is received.

The following table shows the parameters of Continuous mode, along the default, max. and min. values.

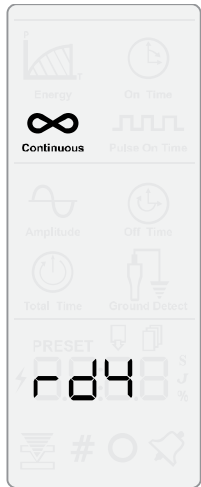
**Table 6.8** Continuous Mode Parameters

Parameter	Default	Max. Value	Min. Value
Amplitude	50%	100%	10%
Ground Detect	0.05 s	0.99 s	0.00 s

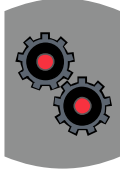
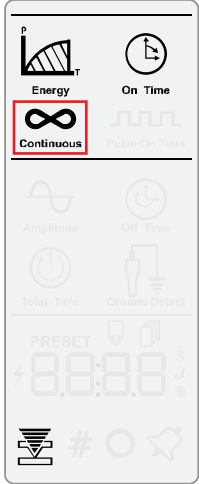
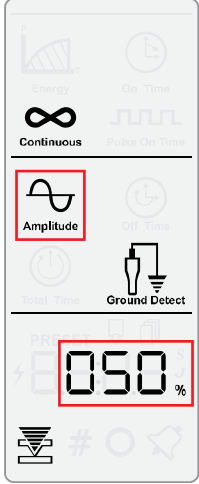
Entering an illegal value will generate 3 beeps. The system will not accept out-of-range parameters. (See [7.4 Alarms/Errors](#) for further details).

NOTICE	
	<p>You can return to the ready screen without saving any change by pressing the ESC key at any time.</p>

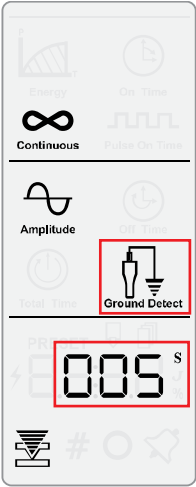
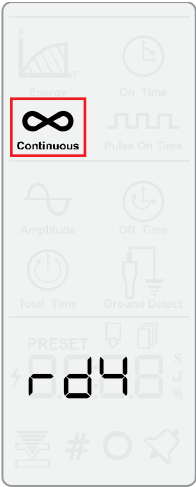

**Table 6.9** Continuous Mode Operational Sequence


Step	Action	Reference
1	Turn on power, wait for the LCD to show ready screen and current mode.	

**Table 6.9** Continuous Mode Operational Sequence

Step	Action	Reference
2	Press the Mode/Configuration key once to get into mode selection. Current selected mode icon will blink.	
3	Use the Up/Down Arrow keys and the Left/Right Arrow keys to select Continuous Mode, then press the Enter key to confirm the selection. You will be directed to the parameters area.	
4	<p>Amplitude icon will flash. Press the Enter key to change parameters.</p> <p>Amplitude parameters numbers will flash. Use the Up/Down Arrow keys and the Left/Right Arrow keys to enter the desired value, then press the Enter key to confirm the selected value.</p> <p><b>NOTICE</b> Only the parameters associated with the selected mode will be displayed.</p> <p><b>NOTICE</b> Reference image showing default Amplitude setting of 50%.</p>	

**Table 6.9** Continuous Mode Operational Sequence


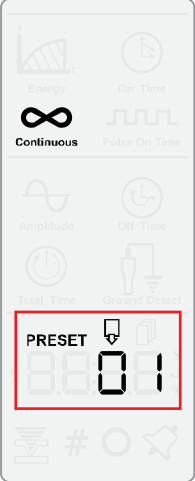
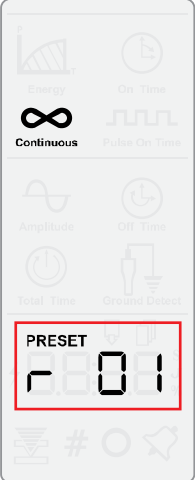
Step	Action	Reference
5	<p>Ground Detect icon will flash. Press the Enter key to change the parameters.</p> <p>Ground Detect parameter numbers will flash. Use the Up/Down Arrow keys and the Left/Right Arrow keys to enter the desired value, then press the Enter key to confirm the selected value.</p> <p><b>NOTICE</b> These parameters will only be visible if the unit has the optional Ground Detect feature installed.</p> <p><b>NOTICE</b> Reference image showing default Off Time setting of 0.05 sec.</p>	
6	<p>You will be returned to the ready screen. The LCD will show Continuous Mode icon.</p>	
7	<p>To start ultrasonics, press and hold the Start/Stop key. Release the Start/Stop key to stop ultrasonics.</p> <p>If using an user I/O interface, send a Start signal by shorting pins 2 and 6 to start ultrasonics. Open pins 2 and 6 to stop ultrasonics.</p>	


WARNING	General Warning
	<p>Do NOT touch the vibrating horn, or place the vibrating horn against solid objects. Touching or holding the horn can result in burns or injury, and contacting solid materials with the vibrating horn or tip can cause breakage.</p>

## 6.6 Save/Recall Weld Preset


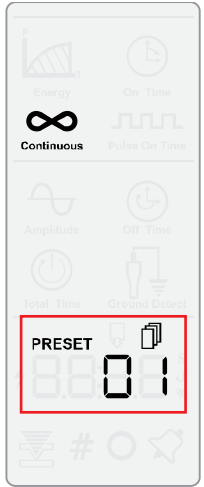
Once you have configured a set of parameters for a given weld mode, you can save that setup/configuration as a Preset. Up to 10 Presets may be saved, using the Save and Recall functions described in the following table. Presets are saved and recalled using a number, 01 to 10. Presets save all parameters for the setup. Presets are saved until they are overwritten or cleared, and are maintained in memory even if the system is turned off or unplugged.

**Table 6.10** Saving a Weld Preset in Memory

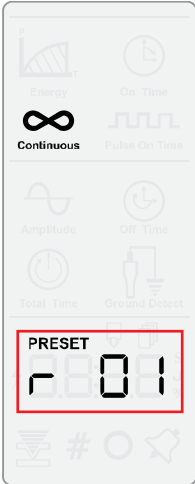
Step	Action	Reference
1	<p>Set the desired mode and parameters. For more information see <a href="#">6.5 Operational Sequence</a>.</p> <p>Press the Save Preset key while on the ready screen.</p>	
2	<p>Preset and Save icon and digits will appear on the LCD.</p> <p>The digits under the Preset icon shows the preset number. Select the preset number using the Up/Down Arrow keys, then press the Enter key.</p>	
3	<p>This will save the current settings to the number selected and will return to the ready screen with the selected preset value displayed.</p>	


NOTICE	
	<p>Press the ESC key to exit the preset mode without saving the preset.</p>

**Table 6.11** Recalling a Weld Preset from Memory

Step	Action	Reference
1	Press the Recall Preset key while on the ready screen.	
2	<p>Preset and Recall icons and digits will appear on the LCD.</p> <p>The digits under the Preset icon shows the Preset number. Select the preset number using the Up/Down Arrow keys, then press the Enter key.</p> <p><b>NOTICE</b> Weld Mode icon will show the Weld Mode associated with the displayed preset number while navigating to the desired preset number.</p>	

**Table 6.11** Recalling a Weld Preset from Memory

Step	Action	Reference
3	This will recall the saved preset and return to the ready screen with the selected preset value displayed.	

NOTICE	
	Press the ESC key to exit the preset mode without recalling the preset.

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## **Chapter 7: Maintenance**

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<b>7.1</b>	<b>Maintenance and Troubleshooting</b> .....	<b>70</b>
<b>7.2</b>	<b>Reconditioning the Stack Interface</b> .....	<b>72</b>
<b>7.3</b>	<b>Troubleshooting Charts</b> .....	<b>76</b>
<b>7.4</b>	<b>Alarms/Errors</b> .....	<b>79</b>
<b>7.5</b>	<b>Spare Parts List</b> .....	<b>80</b>


## 7.1 Maintenance and Troubleshooting

The LPX Power Supply is a self-contained system that requires no internal servicing, except for a protective fuse, and there are no user serviceable parts inside the unit. The ultrasonic tooling (horns and tips) may require periodic inspection and maintenance to ensure optimum performance. The tooling components are subject to wear and may require replacement after a period of time, depending on the application.

If you have a problem operating your unit, refer to [Table 7.2](#) in this chapter to locate the symptom that most clearly describes your problem.

### Tip Erosion


Horn tips do wear. The rate of wear depends on the material being welded, and the amount of use.

NOTICE	
	The frequency of operation is very sensitive to the weight of the tip. If the weight of the tip is outside specified limits, the power supply can overload.

### General Cleaning

It is good practice to keep your LPX Power Supply clean and free of contamination.

1. Unplug the power cord, the RF cable, and the User I/O cable
2. Use a damp soft cloth with a mild detergent to remove any contamination on the outside of the unit

CAUTION	General Warning
	Care should be taken so that no water or other liquid enters the unit.

3. Care should be taken so that excessive force is not exerted on the membrane/keypad area
4. Reconnect cables and replug power cord when dry



## **Power Output Loss**

There are several conditions that can cause a decrease in or loss of power output, including:

- Operating with a faulty power supply or poor electrical connection
- Operating with a loose horn-converter connection
- Operating with a cracked or corroded horn/tip assembly


If your unit indicates a decrease in power output, first check the Converter Cable connections, then take the following steps to ensure that the horn/tip assembly is not loose or cracked or corroded.

Fretting corrosion refers to a black, crusty build-up, resulting from friction between metal parts that appears on the mating metal surfaces. Corrosion can reduce or alter system performance. Examine all mating surfaces (tip to converter, tip to horn) and wipe the surfaces clean with a clean cloth or paper towel.

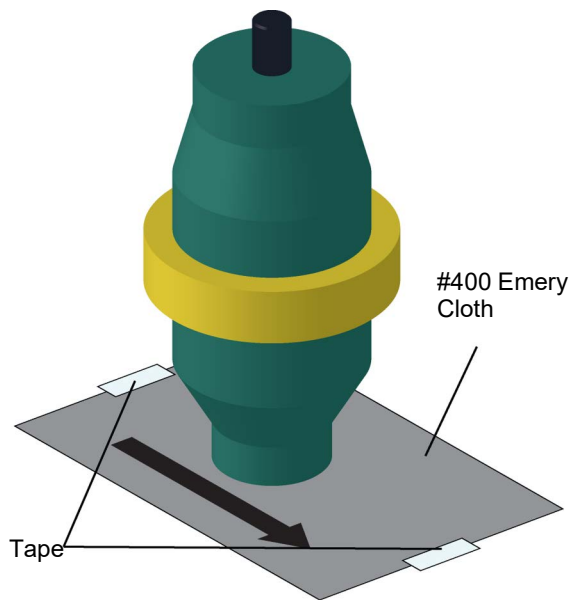
## 7.2 Reconditioning the Stack Interface


Ultrasonic system components work most efficiently when the mating surfaces of the Converter-and-Horn combination (also called a "Stack") are flat, in solid contact, and free from fretting corrosion. Fretting corrosion refers to a black, crusty build-up, resulting from friction between metal parts, that appears on the Stack mating surfaces. Poor contact between mating surfaces wastes power output, makes tuning difficult, increases noise and heat, and may cause damage to the converter.

### 7.2.1 Refacing the Mating Surfaces

NOTICE	
	Never clean the Converter or Horn mating surfaces with a buffing wheel.


1. Disassemble the Converter/Horn Stack and wipe the mating surfaces with a clean cloth or paper towel
2. Examine all mating surfaces. If any mating surface shows corrosion or a hard, dark deposit, recondition it
3. If necessary, remove the threaded stud from the part
4. Tape a clean sheet of #400 (or finer) grit emery cloth to a clean, smooth, flat surface (such as a sheet of plate glass)

**Figure 7.1** Reconditioning Stack Mating Surface

NOTICE	
	<p>Be careful to avoid tilting the part and losing flatness of the surface. Doing so may make the system inoperative, due to improper mating surfaces.</p>

## Lapping Procedure

5. Holding the part to recondition, place the interface surface on the emery cloth. Grasp the part at the lower end, with your thumb over the spanner-wrench hole, and lap the part in a straight line across the emery cloth

NOTICE	
	<p>Do not apply downward pressure. The weight of the part alone provides sufficient pressure.</p>

6. Rotate the part 120 degrees (1/3) to the next hole
7. Stroke the part an equal number of times at each rotation (2 or 3)
8. Pick up the part and lap it once or twice in the same direction
9. Rotate the part 120 degrees, placing your thumb over the spanner-wrench hole, and lap the part the same number of times as described above
10. Rotate the part another 120 degrees to the next spanner-wrench hole, and repeat the lapping procedure

Re-examine the mating surface. If necessary, repeat steps 5 through 10 until you remove most of the contaminant. This should not require more than two to three complete rotations for an aluminum horn or booster; a titanium component may require more rotations.

## 7.2.2 Horn Tip Cleaning

Take the following steps to clean the horn's tip threads:

1. If the horn has a replaceable tip, remove it and clean its threads in alcohol
2. Swab out the end of the horn threads with a cotton swab and alcohol
3. Make sure both the horn and the tip are clean and completely dry before you reassemble them


Refer to the Tip installation procedures for information on tightening the Tips. This is found in [5.3.2 Connecting Tips, Horns, and Converters](#).

4. Use a spanner wrench on the horn and an open-end wrench on the tip to install the tip using the following torque specifications
  - 1/4-20 — tighten at 90-inch-lbs/10.16 Newton-meters
  - 3/8-24 — tighten at 180 inch-lbs/20.33 Newton-meters

## 7.2.3 Stud Reinsertion

The Stud is intended to be a use-only-once part, as it has knurls on its end which 'bite' into the relatively softer horn material. The studs are also specially designed to withstand ultrasonic stresses. Studs can only be re-used with aluminum horns. If you must re-use a stud from an aluminum horn, follow the following procedure:

1. Clean the threads and the horn of the previous shavings
2. Using a file card or wire brush, clean any chips from the knurled end of the stud
3. Using a clean cloth or towel, clean the threaded hole
4. Examine the knurled end of the stud. If worn, replace the stud. Examine the stud and threaded hole for stripped threads. Do not use a damaged ultrasonic horn or converter

<b>NOTICE</b>	
	Threaded studs cannot be re-used in titanium horns.

5. Clean the stud and the threaded hole before reinserting it
6. Apply one drop of Loctite to the stud and insert it into the horn
7. Re-tighten the stud. Use the following torque specifications:

**Table 7.1** Torque Specifications

Stud Size	Torque Specification	Stud EDP Number
3/8-24 x 1-1/4 in	290 in lbs/33 Nm	100-098-121
3/8-24 x 1-1/2 in	290 in lbs/33 Nm	100-098-120
1/2-20 x 1-1/4 in	450 in lbs/51 Nm	100-098-370
1/2-20 x 1-1/2 in	450 in lbs/51 Nm	100-098-123

After the Stud has been reinserted, you can reassemble the Horn to the Converter. Follow the same procedure as found in the Installation section of this manual. See [5.3 Assembling the Equipment](#).

## 7.3 Troubleshooting Charts

Use the following troubleshooting charts for possible problem conditions and resolutions. The charts are based on the assumption that the proper setup and operation instructions have been followed and/or the system was working and then developed a problem.

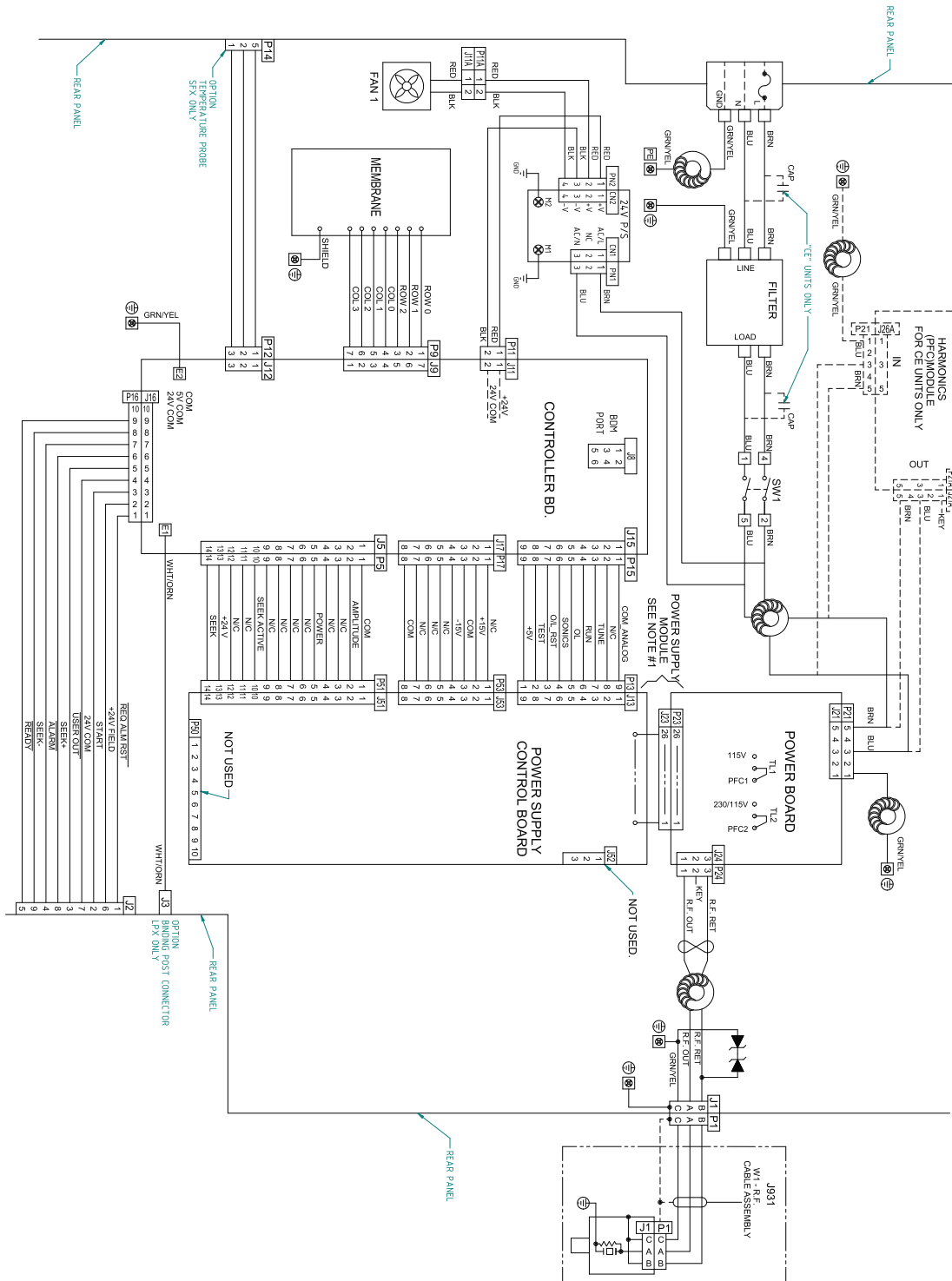
**Table 7.2** System Trouble Analysis Chart

Symptom	Probable Cause	Corrective Action
Main power fuse fails or circuit breaker trips when system is plugged into electrical outlet.	<ul style="list-style-type: none"> <li>• Cordset has failed</li> </ul>	<ul style="list-style-type: none"> <li>• Replace cordset</li> </ul>
	<ul style="list-style-type: none"> <li>• Power Switch has failed</li> <li>• Line filter has failed</li> </ul>	<ul style="list-style-type: none"> <li>• Return for repair</li> </ul>
Display screen does not appear when unit is turned on. Fan does not operate.	<ul style="list-style-type: none"> <li>• System is unplugged or main power is missing</li> </ul>	<ul style="list-style-type: none"> <li>• Correct power problem</li> </ul>
	<ul style="list-style-type: none"> <li>• Unit fuse has blown (it should not under normal conditions)</li> </ul>	<ul style="list-style-type: none"> <li>• Replace fuse</li> </ul>
	<ul style="list-style-type: none"> <li>• Cordset has failed</li> </ul>	<ul style="list-style-type: none"> <li>• Replace cordset</li> </ul>
	<ul style="list-style-type: none"> <li>• Power Switch has failed</li> <li>• Line filter has failed</li> <li>• Unit failed due to connection to incorrect input voltage</li> </ul>	<ul style="list-style-type: none"> <li>• Return for repair</li> </ul>
Fan does not operate when system is turned on. Display screen appears.	<ul style="list-style-type: none"> <li>• Fan motor has failed</li> </ul>	<ul style="list-style-type: none"> <li>• Return for repair</li> </ul>
Fuse fails when system is turned on.	<ul style="list-style-type: none"> <li>• Fuse is under-rated</li> <li>• Mains Voltage is incorrect</li> <li>• Fan motor has failed</li> <li>• Power supply module has failed</li> <li>• Unit failed due to connection to incorrect input voltage</li> </ul>	<ul style="list-style-type: none"> <li>• Verify voltage source is correct. Damage may occur if connected to wrong voltage source</li> <li>• Replace fuse with correct value and retry; or return for repair</li> </ul>
Ultrasonic power is not delivered to the horn.	<ul style="list-style-type: none"> <li>• Power supply module has failed</li> <li>• Digital controls have failed</li> <li>• Failed RF cable</li> <li>• Failed Converter</li> </ul>	<ul style="list-style-type: none"> <li>• Return for repair</li> </ul>
Unusual noise from Horn when ultrasonics are on.	<ul style="list-style-type: none"> <li>• Horn or Tip is loose, or it is contacting a solid object</li> </ul>	<ul style="list-style-type: none"> <li>• Reposition horn</li> <li>• Remove, examine, and clean tip; reinstall tip</li> </ul>
	<ul style="list-style-type: none"> <li>• Horn or tip has failed</li> </ul>	<ul style="list-style-type: none"> <li>• Replace horn or tip</li> </ul>

**Table 7.2** System Trouble Analysis Chart

Symptom	Probable Cause	Corrective Action
Ultrasonic power is absent or inconsistent, or power supply overloads.	<ul style="list-style-type: none"> <li>Foreign material is between horn surface and replaceable tip. If horn is hot to the touch, problem may exist with corroded tip-to-horn interface</li> </ul>	<ul style="list-style-type: none"> <li>Remove, examine, and clean tip; reinstall tip</li> <li>Replace tip if corrosion is excessive</li> </ul>
	<ul style="list-style-type: none"> <li>Tip is loose or worn out</li> <li>Horn is loose or has failed</li> </ul>	<ul style="list-style-type: none"> <li>Tighten or replace defective tip or horn</li> </ul>
	<ul style="list-style-type: none"> <li>Horn stud is loose or has failed</li> </ul>	<ul style="list-style-type: none"> <li>Loose or broken studs must be replaced</li> <li>Replace defective horn</li> </ul>
	<ul style="list-style-type: none"> <li>Converter cable connection is loose or has failed</li> </ul>	<ul style="list-style-type: none"> <li>Tighten connector to Converter</li> <li>Return unit for repair if cable has failed</li> </ul>
	<ul style="list-style-type: none"> <li>Converter has failed</li> </ul>	<ul style="list-style-type: none"> <li>Replace defective Converter, return for repair</li> </ul>
	<ul style="list-style-type: none"> <li>Power supply or controls have failed</li> </ul>	<ul style="list-style-type: none"> <li>Return for repair</li> </ul>
Slight electric shock when touching a metal part of the system or lab equipment contacting the system.	<ul style="list-style-type: none"> <li>System is not properly grounded</li> </ul>	<ul style="list-style-type: none"> <li>Correct electrical ground to system</li> </ul>
	<ul style="list-style-type: none"> <li>Cordset has failed or had Ground lead removed</li> </ul>	<ul style="list-style-type: none"> <li>Replace cordset</li> </ul>
User I/O signals are not working correctly.	<ul style="list-style-type: none"> <li>User I/O is not configured correctly</li> <li>customer-provided User I/O components have failed or are no longer functioning</li> </ul>	<ul style="list-style-type: none"> <li>Verify and correct connections - See <a href="#">5.5.2 User I/O Connection</a></li> </ul>
	<ul style="list-style-type: none"> <li>Outputs of User I/O failed</li> </ul>	<ul style="list-style-type: none"> <li>Return unit for repair</li> </ul>
User I/O signals are working correctly, but still overloads.		<ul style="list-style-type: none"> <li>Call Product Support</li> </ul>


**Figure 7.2** LPX Power Supply Interconnect Diagram





## 7.4 Alarms/Errors

When the system encounters an error condition, an error message is displayed on the LCD of the LPX power supply, and the Alarm/Error icon will appear on the LCD.

NOTICE	
	Press the Reset key to reset alarms/errors.

**Table 7.3** Alarms/Errors

Alarm/Error	Alarm/Error Code	Description
Overload	E0:20	Will occur if the analog controller overload signal is active (current/voltage/temperature/frequency beyond normal operating specifications).
Invalid entry	E2:06	Will occur if a parameter or register setting is outside of its valid range.
Timeout	E2:08	Will occur if cycle timeout is reached. See <a href="#">6.4 System Configuration Registers</a> for more information.
Time ON + Time OFF > Total Time	E2:09	Will occur if the current cycle preset has a Time ON + Time OFF setting higher than the Total Time value at the moment the cycle begins.
Start still active after end of cycle	E6:01	Will occur if Start signal or start button press are detected at power-up or if the signal is not removed within 2 seconds after the last ultrasonic cycle finished.
Ground detect active in ready	E6:05	If ground detect register is set to ON, error will occur when the horn touches an anvil which has been isolated from earth ground before the cycle begins.
RAM failure	EA:01	During power-up and preset recalling memory is verified. This alarm will result if EEPROM failure is detected.

## 7.5 Spare Parts List

Review the following Spare Parts list if you need replacement parts.

**Table 7.4** Spare Parts List

Item	Description	EDP
Cordsets	CORDSET 250V 10A DETACHABLE	CPN-030-007
	CORDSET 3 COND DETACHABLE	200-030-030
	CORDSET 220V	000-087-062
	CORD SET 3 CON 250V 10A RVV	200-030-029
Replacement Fuses	10 A (for model 250, 117V or 200-245V)	200-049-112R
Converters	ASSY CONVERTER 2CH1 (33U)	101-135-127R
	ASSY CONVERTER 2CH2 (75U)	101-135-128R
	CONVERTER 2CH3 (125U)	101-135-129R
	CONVERTER TW-1 (75u) LOW GAIN	101-135-015R
	CONVERTER TW-2 (125u)HIGH GAIN	101-135-016R
	CONVERTER TW-2 (125u) PINNED	159-023-313R
	CONVERTER TW-3 (33u) TI FRT DR	101-135-031R
	CONVERTER 402	101-135-014R
	CONVERTER 902R	101-135-048R
	CONVERTER 30KHZ CR-30	101-135-081R
	CONVERTER 30KHZ CH-30	101-135-071R
	ASSY CONV 30khz Solid Mount	159-135-110R
	CONV CP30 30khz PLATEN	159-135-111R
	CONVERTER ASSY 4C15	101-135-126R
	40 Khz KTJ Converter	101-135-046R
	40Khz KTR Converter	101-135-045R
	CONV 4TR 40KHZ (CONN)	101-135-042R
	CONVERTER MODEL 4TH	101-135-067R
CONV 4TP 40KHZ PLATEN	101-135-068R	
Kit Tools	KIT TOOL 20KHZ	101-063-208R
	KIT TOOL 30khz	101-063-636R
	KIT TOOL 40KHZ	101-063-176R

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# Index

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**A**

Amplitude display, numeric 48  
Auto Reset 53

**B**

Benchmark 29  
Branson  
    how to contact 8

**C**

Cleaning 6  
Compliance with RFI guidelines 6  
Component description 33  
Configuration Lock 53  
Connecting the tip to the horn 40  
Connecting tips, horns, and converters 39  
Continuous Mode 49  
Controls 15  
Converters  
    connecting 39

**E**

Electrical connections to equipment 42  
Emissions 4

**F**

Front Panel Controls 48  
Fuse 41

**G**

Guards and safety equipment 44

**H**

Horn  
    connecting tip to 40  
horns  
    connecting 39  
how to contact Branson 8

**I**

Input power requirements 41  
Installation and setup 31  
Installation checklist 32  
Intended use 4  
Introduction 13

## **M**

- Maintenance 69
- Membrane front panel 48
- Modes 49

## **N**

- Navigation 50

## **O**

- Operation 47
- Overload 79
- Overview 14

## **P**

- Panel Trigger 52
- Power output loss 71
- Power requirements
  - input 41
- Power Switch 48
- Precautions 4
- Pulse Start 52
- PVC Materials 4

## **R**

- RAM 79

## **S**

- Safety
  - PVC Materials 4
- Safety considerations 4
- Safety equipment 44
- Seek @ Power Up 53
- Setting up the workplace 5
- Setup 29, 30, 31
- Setup procedure 38
- System
  - intended use of 4
- System component description 33

## **T**

- Test 45
- Tip erosion 70
- Tips
  - connecting 39
- Troubleshooting 70

## **U**

- User I/O 43

## **W**

- Warranty statement 7
- Workplace
  - setting up 5