Original Instructions
BU-4001546 - REV. 01

EMERSON

DCX F-PFN

Power Supply

PROFINET

User Manual

Branson Ultrasonics Corporation
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BRANSON

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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 products. 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. Therefore, when requesting service assistance for specific units, note the revision information found on this document.

Copyright and Trademark Notice

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Table of Contents

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Chapter 1: Safety

1.1 Safety Information

Observe the following safety information in these operating instructions; this information will warn you about risks and their consequences.

WARNING	Indicates a possible danger
	If these risks are not avoided, death or severe injury might result.

CAUTION	Indicates a possible danger
	If these risks are not avoided, slight or minor injury might result.

NOTICE	Indicates a possible damaging situation
	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.

1.2 System Information Labels

1.2.1 Power Supply

Figure 1.1 System Information Label - Power Supply

Table 1.1 System Information Label - Power Supply

Item	Description	Item	Description
1	Power supply model	5	System input
2	EDP number	6	
3	Serial number	7	System maximum power
4	Barcode	8	Month & year of manufacture

1.3 Safety Labels

NOTICE	
	Only Branson service personnel or Branson trained representatives are allowed to open, maintain and service the system. Unauthorized tampering with, modifying, or opening the unit will void the warranty.

1.3.1 Power Supply

Figure 1.2 Safety labels on the power supply

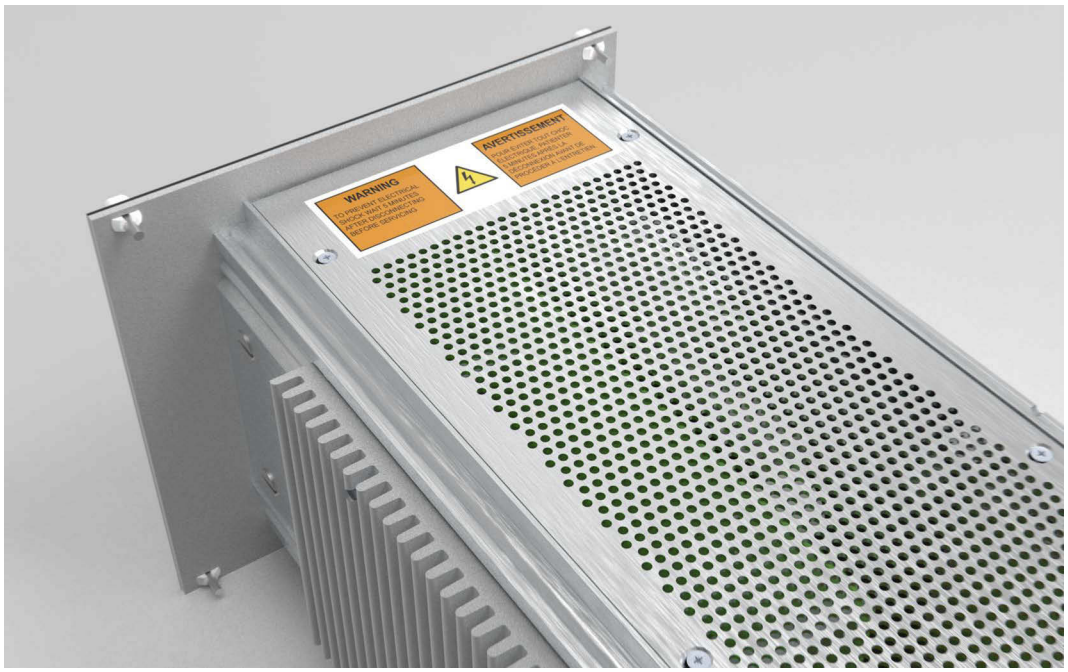
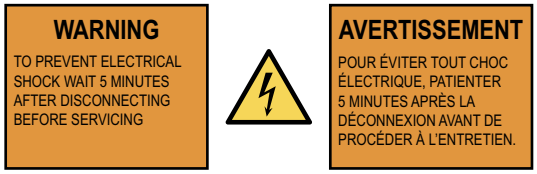
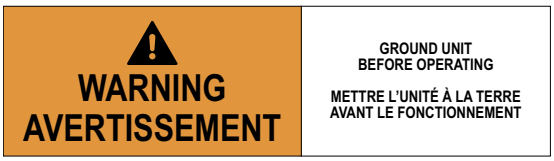


Table 1.2 Safety labels on the power supply

Label	Description
	**High Voltage Hazard** To prevent electrical shock wait 5 minutes after disconnecting before servicing. **Service Personnel** Disconnect unit from mains. Wait 5 minutes before removing cover.
	**High Voltage Hazard** Hazardous voltage inside will cause death or severe injury. De-energize system before removing covers. Authorized personnel only.
	**High Voltage Hazard** Ground unit before operating.

1.4 General Precautions

Ensure that the DCX F-PFN power supply installation is performed by qualified personnel and in accordance with local standards and regulation.

WARNING	Electrical Hazard
	Risk of electric shock from high-voltage components. Contact with live electrical parts can cause severe injury. • Always plug the power supply into a properly grounded power source. • Do not operate the system with covers or safety guards removed. • Disconnect power before performing any maintenance or service. • Inspect power cords and connectors regularly for damage; replace if defective. • Do not cycle the welding system if either the RF cable or converter is disconnected.

CAUTION	Crush Hazard
	Risk of injury from horn downforce and ultrasonic vibrations. Fingers or hands caught under the horn or between components can be crushed or severely injured. • Keep hands and other body parts away from the area beneath the horn at all times. • Do not place fingers or objects between the horn and the fixture during operation. • When using larger horns, avoid situations where fingers could be pinched between the horn and the fixture. • Ensure the system is powered off and locked out before performing adjustments or maintenance near the horn.

CAUTION	Loud Noise Hazard
	High noise levels and audible vibrations during ultrasonic welding. Prolonged exposure can cause hearing damage or loss. Noise levels depend on several factors: • Type of application • Size, shape, and composition of the material being assembled • Shape and material of the holding fixture • Welder setup parameters • Tool design Some parts may vibrate at audible frequencies during the process, creating uncomfortable noise. • When noise levels exceed permissible limits, provide operators with appropriate hearing protection as required by local regulations. • Implement engineering or administrative controls to reduce noise where feasible. • Limit time spent near the machine during extended production runs.

CAUTION	Corrosive Material Hazard
	Electrolyte leakage from the battery may contain corrosive substances. Contact with leaked electrolyte can cause eye injury, skin irritation, or respiratory issues if inhaled. • Handle batteries carefully to prevent damage or leakage. • Wear appropriate personal protective equipment (PPE), such as gloves and safety goggles, when handling batteries. • Do not attempt to open, crush, or incinerate batteries. **First Aid Measures:** • **Eye Contact:** Flush the eyes with plenty of clean water for at least 15 minutes immediately, without rubbing. Get immediate medical treatment. If appropriate procedures are not taken, this may cause eye injury. • **Skin Contact:** Wash the affected area under tepid running water using a mild soap. If appropriate procedures are not taken, this may cause sores on the skin. Get medical attention if irritation develops or persists. • **Inhalation:** Remove to fresh air immediately. Get medical treatment immediately.

CAUTION	Eye Protection Required
	Risk of eye injury from debris or dust during ultrasonic welding operations. Failure to protect eyes can result in irritation or serious eye injury. • Always wear safety glasses when operating or working near the welder. • Ensure protective eyewear is clean and in good condition before use. • Do not operate the system if proper eye protection is not available.

1.4.1 Emissions

Because of the various types of toxic or injurious gases that may be liberated during the welding based on the material being processed, sufficient ventilation should be provided to prevent a concentration of these gases in excess of 0.1 ppm. Check with your materials suppliers for recommended protection when processing their materials.

CAUTION	Hazardous Emissions
	Processing certain materials (e.g., PVC) during ultrasonic welding can release hazardous fumes and particulates. Inhalation of these emissions may pose health risks to operators and can cause corrosion or damage to equipment. • Identify materials being processed and assess potential emission hazards. • Use proper ventilation systems to remove fumes from the work area. • Wear appropriate personal protective equipment (PPE), such as respirators, when required. • Follow all applicable safety regulations and material safety data sheet (MSDS) recommendations.

1.4.2 Intended Use of the System

The DCX F-PFN power supply components are designed to be used as part of an ultrasonic welding system. These are designed for a wide variety of welding or processing applications.

If the equipment is used in a manner not specified by Branson, the protection provided by the equipment may be impaired.

NOTICE	
	Branson Ultrasonics Corporation designs and manufactures machines giving the first priority to safety precautions, to allow customers to use the machines safely and effectively. Only trained personnel should operate the equipment. Untrained operators can misuse the equipment or ignore safety instructions that can result in personal injury or equipment damage. It is essential that all operators pay attention to safety instructions when operating the equipment. • To be considered a trained operator, it is mandatory to read and understand this user manual in its entirety. Operating the equipment without full knowledge of the procedures, safety precautions, and maintenance requirements outlined in this manual may result in improper use and potential hazards. • If the equipment is used in a manner not specified by Branson, the protection provided by the equipment may be impaired. • The DCX F-PFN power supply is designed for indoor use only. • This equipment is designed to be operated by one (1) person only.

1.4.3 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.

1.4.4 Regulatory Compliance

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

1.5 EU Declaration of Conformity

Figure 1.3 EU Declaration of Conformity

EU DECLARATION OF CONFORMITY

CE

We, the manufacturer

BRANSON ULTRASONICS CORPORATION
120 Park Ridge Rd.
Brookfield, CT 06804
USA

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 an Ultrasonic Power Supply, model:

0.80 DCX(S, A, f-EIP, f-DP or f-pfn) 40 RACKMT
1.50 DCX(S, A, f-EIP, f-DP or f-pfn) 30 RACKMT
1.25 DCX(S, A, f-EIP, f-DP or f-pfn) 20 RACKMT
2.50 DCX(S, A, f-EIP, f-DP or f-pfn) 20 RACKMT
4.00 DCX(S, A, f-EIP, f-DP or f-pfn) 20 RACKMT
DCX RM 222 STD
DCX RM 240 STD
DCX RM 222 B
DCX RM 240 B
DCX RM 480 STD
DCX RM 315 STD
DCX RM 211 STD
DCX RM 480 B
DCX RM 315 B
DCX RM 211 B
P/S 2.20 DCX STD 20 SIG
0.40DCX(s, v, a, f-dp, f-eip or f-pfn)40(VRT, V, H or HOR)
0.80DCX(s, v, a, f-dp, f-eip or f-pfn)40(VRT, V, H or HOR)
0.75DCX(s, v, a, f-dp, f-eip or f-pfn)30(VRT, V, H or HOR)
1.50DCX(s, v, a, f-dp, f-eip or f-pfn)30(VRT, V, H or HOR)
1.25DCX(s, v, a, f-dp, f-eip or f-pfn)20(VRT, V, H or HOR)
2.50DCX(S+, s, v, a, f-dp, f-eip or f-pfn)20(VRT, V, H or HOR)
4.00DCX(S+, s, v, a, f-dp, f-eip or f-pfn)20(VRT, V, H or HOR)
4.00DCXs20HD -V
P/S 0.8 DCX S HD 40 VRT
1.50 DCX-S HD 30 (HOR or VRT)
1.50 DCX-S HD 30 VRT
4.00DCXs20HD -H
P/S 0.8 DCX S HD 40 HOR
P/S 4.0KW 20KHZ DCX S LIM RES
1.6DCX(a, f-dp, f-eip or f-pfn)40(B2H or B2V)

used with converter model: CR-20S, CR-20C, CH-20C, CS-20S, CS-20C, CR-30, CR-30C, CH-30, CH-30C, CS-30S, CS-30C, CR-40C, 4TH, 4TP or 932, and associated cables.

in the state in which it was placed on the market, fulfills all the relevant provisions and their amendments 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

Luis Benavides
Luis Benavides (Feb 17, 2026 14:02:32 CST)

Brookfield, CT, USA

Director of Engineering, Systems / Product Safety Officer

1.6 UK Declaration of Conformity

Figure 1.4 UK Declaration of Conformity

UK CA

UK DECLARATION OF CONFORMITY

We, the manufacturer

BRANSON ULTRASONICS CORPORATION
120 Park Ridge Rd.
Brookfield, CT 06804
USA

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

Ultrasonic Assembly System consisting of an Ultrasonic Power Supply, model:

0.80 DCX(S, A, f-EIP, f-DP or f-pfn) 40 RACKMT	0.40DCX(s, v, a, f-dp, f-eip or f-pfn)40(VRT, V, H or HOR)
1.50 DCX(S, A, f-EIP, f-DP or f-pfn) 30 RACKMT	0.80DCX(s, v, a, f-dp, f-eip or f-pfn)40(VRT, V, H or HOR)
1.25 DCX(S, A, f-EIP, f-DP or f-pfn) 20 RACKMT	0.75DCX(s, v, a, f-dp, f-eip or f-pfn)30(VRT, V, H or HOR)
2.50 DCX(S, A, f-EIP, f-DP or f-pfn) 20 RACKMT	1.50DCX(s, v, a, f-dp, f-eip or f-pfn)30(VRT, V, H or HOR)
4.00 DCX(S, A, f-EIP, f-DP or f-pfn) 20 RACKMT	1.25DCX(s, v, a, f-dp, f-eip or f-pfn)20(VRT, V, H or HOR)
DCX RM 222 STD	2.50DCX(S+, s, v, a, f-dp, f-eip or f-pfn)20(VRT, V, H or HOR)
DCX RM 240 STD	4.00DCX(S+, s, v, a, f-dp, f-eip or f-pfn)20(VRT, V, H or HOR)
DCX RM 222 B	4.00DCXs20HD -V
DCX RM 240 B	P/S 0.8 DCX S HD 40 VRT
DCX RM 480 STD	1.50 DCX-S HD 30 (HOR or VRT)
DCX RM 315 STD	1.50 DCX-S HD 30 VRT
DCX RM 211 STD	4.00DCXs20HD -H
DCX RM 480 B	P/S 0.8 DCX S HD 40 HOR
DCX RM 315 B	P/S 4.0KW 20KHZ DCX S LIM RES
DCX RM 211 B	1.6DCX(a, f-dp, f-eip or f-pfn)40(B2H or B2V)
P/S 2.20 DCX STD 20 SIG	

used with converter model: CR-20S, CR-20C, CH-20C, CS-20S, CS-20C, CR-30, CR-30C, CH-30, CH-30C, CS-30S, CS-30C, CR-40C, 4TH, 4TP or 932, and associated cables.

in the state in which it was placed on the market, fulfills all the relevant provisions and their amendments 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:

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

Luis Benavides
Luis Benavides (Feb 17, 2026 14:02:48 CST)

Brookfield, CT, USA

Director of Engineering, Systems / Product Safety Officer

Chapter 2: Introduction

2.1 Overview

The DCX F-PFN consists of a power supply, an actuator, HMI and a converter-booster-horn stack. The system can perform a variety of ultrasonic welding operations, including: inserting, staking, spot welding, swaging, degating. It is designed for use in manual production systems.

Figure 2.1 DCX F-PFN Power Supply

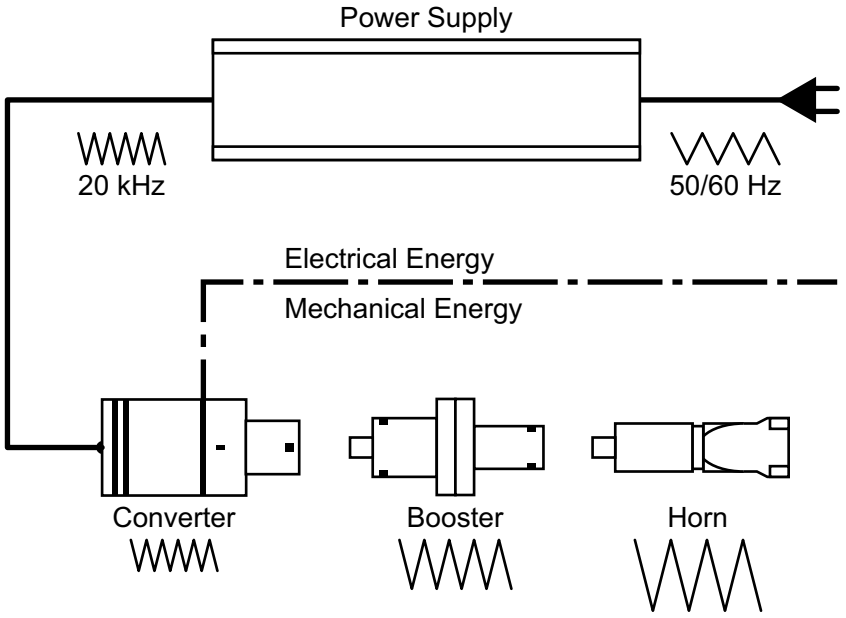
2.2 Principle of Operation

Thermoplastic parts are welded ultrasonically by applying high-frequency vibrations to the parts being assembled. The vibrations, through surface and intermolecular friction, produce a sharp rise in temperature at the welding interface.

When the temperature is high enough to melt the plastic, there is a flow of material between the parts. When the vibrations stop, the material solidifies under pressure and a weld results.

Most plastics welders operate at a frequency above the range of human hearing (18 kHz) and are thus called ultrasonic.

Figure 2.2 How does ultrasonic welding work?



2.2.1 Benefits of ultrasonic welding

Ultrasonic welding exhibits unique welding properties that include:

- Low heat build up during the ultrasonic process (no annealing of materials)
- Compensation for normal surface variations of the material
- Ability to weld large areas using minimal energy
- Ability to weld thin materials to thick materials
- Low cost per weld

2.3 Power Supply

The DCX F-PFN consists of an ultrasonic power supply module and a system controller. The ultrasonic power supply module converts conventional 50/60 Hz line current to 20 kHz, 30 kHz or 40 kHz electrical energy. The system controller monitors and controls the welding system.

The power supply provides the following features:

- **Autotuning:** Branson power supply tuning ensures that the system is running at peak efficiency
- **Digital Amplitude Setting:** This feature allows you to set the exact amplitude necessary for your application, allowing increased range and setting repeatability over analog systems
- **Ethernet:** Provides plant-wide network systems using open, industry-standard networking technologies. This combination of well-accepted standards provides the functionality required to support both information data exchange as well as control applications
- **Frequency Offset:** This process feature allows a user to set an offset relative to the starting frequency, for certain specific applications, where the force imparted on the fixture or anvil causes a frequency shift in the stack's operation. You should only use this feature when advised to do so by Branson
- **Horn Signature:** Using the DCX F-PFN Power Supply Web Page Interface, you may scan your ultrasonic stack to view its operating frequency on your computer, using digital readouts to give you the best picture of the stack's operation
- **LCD (Liquid Crystal Display):** Provides a clear visual interface to monitor and configure the system
- **Line Regulation:** Maintains converter amplitude by regulating for variances in the line voltages
- **Load Regulation:** Maintains converter amplitude over the full range of rated power
- **Membrane Keys:** Front panel controls are designed for high reliability and immunity from factory dust and oils
- **User ID and Passcodes:** Allows for keeping track of user access to the DCX F-PFN Power Supply Web Page Interface
- **Ramp Starting:** The starting of the DCX F-PFN power supply and horn is done at a rate that helps reduce electrical and mechanical stress on the system. The horn start rate may be adjusted for some tough-to-start applications
- **Seek:** Ensures operation at resonance; minimizes tuning errors; and operates the stack at low amplitude (10%), then provides a means of sensing and storing the resonant operating frequency value
- **Start-up Diagnostics:** At start-up, the controls test the major internal components
- **System Protection:** Protects the power supply by providing six levels of protection: Voltage, Current, Phase, Temperature, Power and Frequency
- **Timed Seek:** When enabled, will do a Seek once every minute to update horn resonant frequency to memory. This is especially useful when the welding process affects the actual temperature of the horn, causing a resonant frequency shift
- **True Wattmeter:** The controls on the power supply include a true wattmeter for accurate measurement of power and energy
- **Web Page Interface:** Provides access, via Profinet connection, to power supply information, diagnostics, and configuration web pages.

2.4 Actuator

The DCX F-PFN power supply can interface with actuator signals, only when operating in manual mode.

2.5 The Ultrasonic Stack

Figure 2.3 Ultrasonic Stack

2.5.1 Converter

The converter is mounted in the actuator as part of the ultrasonic stack. The ultrasonic electrical energy from the power supply is applied to the converter (sometimes called the transducer). This transforms the high frequency electrical oscillations into mechanical vibrations at the same frequency as the electrical oscillations. The heart of the converter are piezoelectric ceramic elements. When subjected to an alternating voltage, these elements alternately expand and contract, resulting in better than 90% conversion of electrical to mechanical energy.

Figure 2.4 Converter

2.5.2 Booster

Success in ultrasonic assembly depends on the right amplitude of movement at the horn face. Amplitude is a function of horn shape, which is largely determined by the size and form of the parts to be assembled.

The booster can be used as a mechanical transformer to increase or decrease the amplitude of vibrations applied to the parts through the horn. The booster is a resonant half-wave section of aluminum or titanium. It is mounted between the converter and the horn, as part of the ultrasonic stack. It also provides a clamping point for rigid stack mounting.

Boosters are designed to resonate at the same frequency as the converter with which they are used. Boosters are usually mounted at a nodal (minimum vibration) point of axial motion. This minimizes the loss of energy and prevents vibration from being transmitted into the actuator.

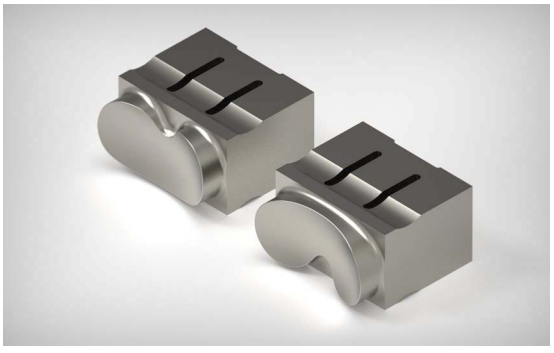
Figure 2.5 Booster

2.5.3 Horn

The horn is selected or designed for a specific application. Each horn is tuned typically as a half-wave section that applies the necessary force and vibration uniformly to the parts to be assembled. It transfers ultrasonic vibrations from the converter to the workpiece. The horn is mounted to the booster as part of the ultrasonic stack.

Depending on their profile, horns are referred to as stepped, conical, exponential, bar, or catenoidal. The shape of the horn determines the amplitude at the face of the horn. Depending on the application, horns can be made from titanium alloys, aluminum, or steel. Titanium alloys are the best materials for horn fabrication due to their high level of strength and low loss. Aluminum horns are usually chrome- or nickel-plated or hardcoated to reduce wear. Steel horns are for low amplitude requiring hardness, such as ultrasonic insertion applications.

Figure 2.6 Horn



2.6 Models Covered

This manual covers all models of the DCX F-PFN power supply.

Table 2.1 Models Covered in this Manual

Frequency	Power	EDP
20 kHz	1250 W	BU-1046936
	2500 W	BU-1046933
	4000 W	BU-1046934
30 kHz	1500 W	BU-1046937
40 kHz	800 W	BU-1046935

2.7 Compatibility with other Branson Products

Table 2.2 Power Supply Compatibility with Branson Converters

Model	Converter
20 kHz/1250 W 20 kHz/2500 W 20 kHz/4000 W	CR-20S CR-20C CH-20S (932 AH SPL) CH-20C CS-20S CS-20C
30 kHz/750 W 30 kHz/1500 W	CR-30S CR-30C CH-30S CH-30C CS-30S CS-30C
40 kHz/400 W 40 kHz/800 W	CR-40S (4TH) CR-40C 4TP

2.8 Controls and Indicators

2.8.1 DCX F-PFN Power Supply Front Panel

Figure 2.7 DCX F-PFN Power Supply Front Panel Controls and Indicators

Table 2.3 DCX F-PFN Power Supply Front Panel Controls and Indicators

Reference	Description
	**LCD** For detailed information refer to Figure 2.8 LCD Description and Table 2.4 LCD Description.
	**Up/Down Keys** Use to adjust the amplitude of ultrasonic vibrations (10% to 100%). Also used to adjust weld mode parameters, select registers and edit register values.
	**Alarm Reset Key** Use the Reset key to reset alarms. When changing system registers, use the Reset key to set a register back to its default value after entering the register and before editing the value.

Table 2.3 DCX F-PFN Power Supply Front Panel Controls and Indicators

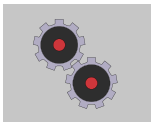
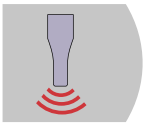
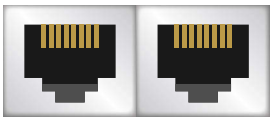
Reference	Description
	**Configuration Key** Use the Configuration key to change system registers. For information on using the Configuration key to set system registers see 7.5 Configuring the Power Supply Registers.
	**Ultrasonics Test Key** Use the Test key to perform an ultrasonic test. Test performs a seek and then ramps the amplitude to the current setting.
	**PROFINET Connectors** Use the PROFINET Connector to connect the DCX F-PFN power supply to a master/slave PROFINET network. For more information, refer to Chapter 5: Installation and Setup and Chapter 7: Operation.
	**Ethernet Port** Use the Ethernet Port to connect to the DCX F-PFN Web Page Interface.
	**Power-On Indicator** Lights when the power supply is connected to main power and the power switch is on.
	**24 V Indicator** Lights when 24 VDC are supplied to the DCX F-PFN power supply.
	**PROFINET Status Indicator** Indicate the status of the PROFINET module. For more information see Chapter 7: Operation.

Figure 2.8 LCD Description

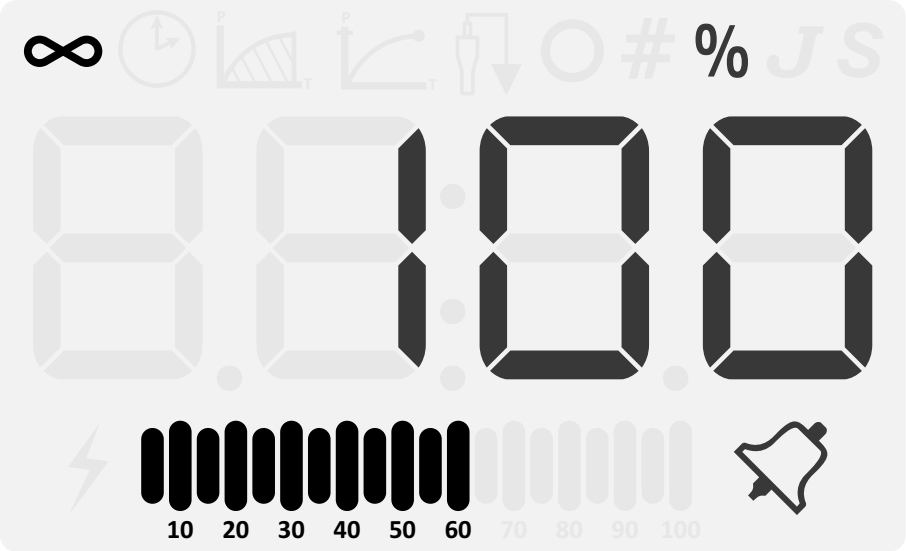


Table 2.4 LCD Description

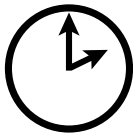
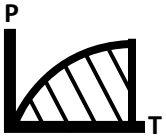
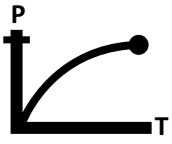
Reference	Description
8.8.8.8	**Numeric Display** Displays the Power Supply amplitude settings, weld time settings, weld energy settings, peak power settings, scrub time settings, register numbers, register values or alarm numbers.
∞	**Continuous Mode Icon** Indicates the power supply is running in Continuous mode. When in Continuous mode, the amplitude setting is shown on the numeric display in conjunction with the **%** icon. The amplitude setting may range from 10% to 100%. For more information see Chapter 7: Operation.
	**Time Mode Icon** Indicates the power supply is running in Time mode. When in Time mode, the weld time setting is shown on the numeric display in conjunction with the **S** icon. The weld time setting can range from 10 ms to 30 seconds. For more information see Chapter 7: Operation.
	**Energy Mode Icon** Indicates the power supply is running in Energy mode. When in Energy mode, the weld energy setting is shown on the numeric display in conjunction with the **J** icon. The energy setting may range from 1 Joule to 9999 Joules. For more information see Chapter 7: Operation.
	**Peak Power Mode Icon** Indicates the power supply is running in Peak Power mode. When in Peak Power mode, the peak power percentage is shown on the numeric display in conjunction with the **%** icon. The peak power setting may range from 1% to 100% of the maximum power supply output power. For more information see Chapter 7: Operation.

Table 2.4 LCD Description

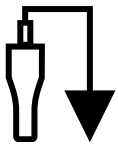
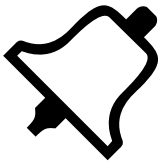
Reference	Description
	**Ground Detect Mode Icon** Indicates the power supply is running in Ground Detect mode. When in Ground Detect mode, the scrub time setting will be shown on the numeric display in conjunction with the **S** icon. Scrub time setting may range from 1 millisecond to 500 milliseconds.For more information see Chapter 7: Operation.
	**Sonics Active Indicator** Indicates ultrasonics is running.
	**Time Icon** Indicates that the value shown on the numeric display represents time in seconds.
	**Joule Icon** Indicates that the value shown on the numeric display represents energy.
	**Percentage Icon** Indicates that the value shown on the numeric display represents a percentage. When in Peak Power mode, the value shown on the numeric display represents a percentage of the power supply rated power. If not in Peak Power mode, the value shown on the numeric represents the amplitude setting.
	**Number Sign Icon** Indicates that the value shown on the numeric display is a register number. Use up and down keys to select a register. For more information see 7.5 Configuring the Power Supply Registers.
	**Circle Icon** Indicates that the value shown on the numeric display is a register value. Use up and down keys to modify the register value. For more information see 7.5 Configuring the Power Supply Registers.
	**Alarm Icon** A flashing icon which indicates and alarm condition.

Table 2.4 LCD Description

Reference	Description
	**Power/Frequency Bar-Graph** Shows the true percentage of ultrasonic power during a weld cycle. The bar-graph can be configured to show the peak power or the memory frequency at the end of each weld or test cycle. For instructions on how to modify this setting see 7.5 Configuring the Power Supply Registers. For detailed bar-graph description and bar-graph reading examples, see 7.7.2 Frequency Bar-Graph Interpretation.

2.9 DCX F-PFN Power Supply Connections

Figure 2.9 DCX F-PFN Power Supply Connections

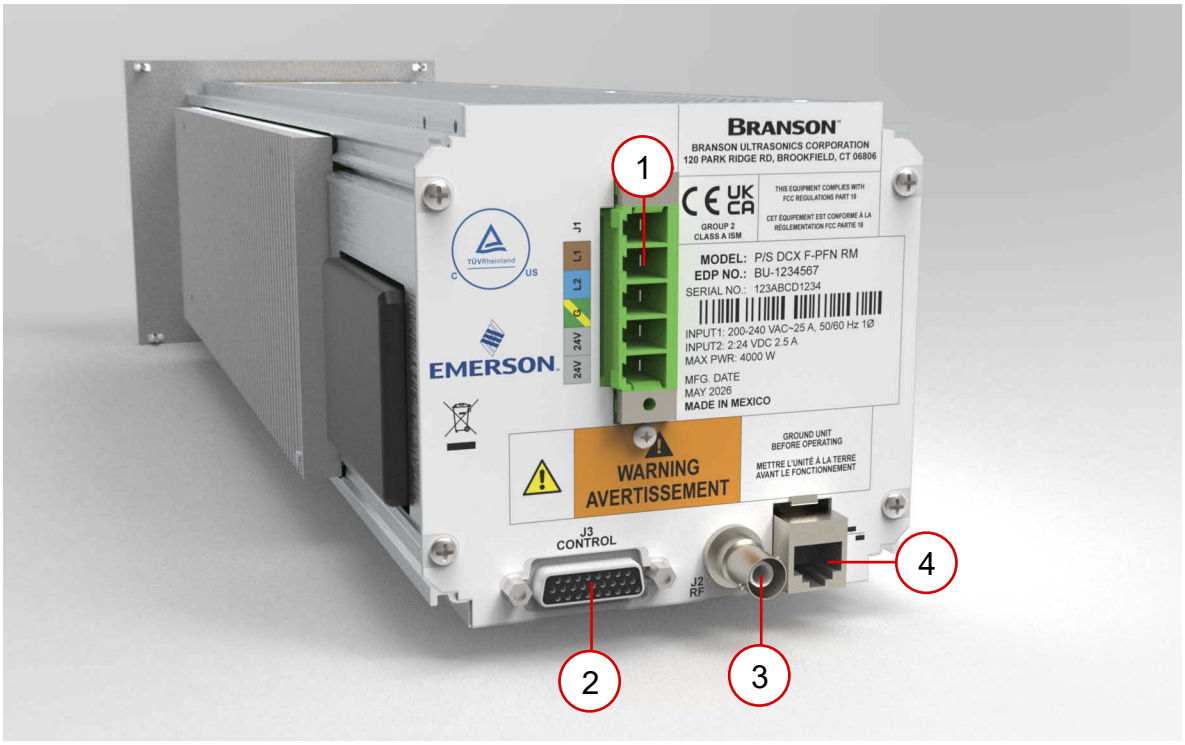


Table 2.5 Connections to the DCX F-PFN Power Supply

Item	Name	Function
1	Line Input Connector	Detachable connector block for connecting the input power. For wiring details refer to Chapter 5: Installation and Setup.
2	RF Connector	SHV connector for RF cable, which provides ultrasonic energy to the converter.
3	User I/O Connector	Provides the necessary input/output signals to interface with actuators, user automation or control interfaces. For detailed information on interfacing with the DCX F-PFN power supply refer to Chapter 5: Installation and Setup.
4	Ethernet Port	Use the Ethernet Port to connect to the DCX F-PFN Web Page Interface.

2.10 Glossary

The following terminology may be encountered when using or operating a DCX F-PFN power supply.

Table 2.6 Glossary

Name	Description
Actuator	The unit which houses the converter/booster/horn stack assembly in a rigid mounting, allowing the stack to move up and down, either mechanically or pneumatically, applying force to the part at a user-adjustable force and velocity.
Alarm	Visual indication of error.
Amplitude Control	The ability o set amplitude digitally or by an external control.
Amplitude	The peak-to-peak movement at the horn face. Always expressed as a percentage of the maximum.
Booster	A one-half-wavelength-long resonant metal section mounted between the converter and horn, sometimes having a change in cross-sectional area between the input and output surfaces. The booster mechanically alters the amplitude of vibrations received from the converter, and imparts the new amplitude to the horn.
Clamping Force	The pounds or kilograms exerted by the horn onto the workpiece.
Cold Start	Restores the settings of the power supply back to its original condition.
Converter	The device that converts electrical energy into mechanical vibrations at a high frequency (an ultrasonic rate).
Counters	A record of the number of preset cycles recorded in the power supply.
Degating	Removing a molded part from its runner system.
Energy Director	A triangular-shaped projection of plastic material which concentrates the ultrasonic energy at the joint interface of a plastic part.
PROFINET (PROFINET Industrial Protocol)	A communications protocol designed for use in process control and industrial automation applications.
External Amplitude Control	Enables you to access real-time amplitude control directly via the user I/O connector.
External Frequency Control	Enables you to access real-time frequency offset control directly via the user I/O connector.
Fieldbus	Computer network protocols for industrial two way communications used for real-time distributed control.
Fixture	A device for holding a part in position for assembly.
Flasg	Material displaced from the joint area.
Forming	Reshaping a section of thermoplastic.
Fretting Corrosion	A black surface condition, that results from friction between metal parts, that appears on the converter-booster-horn stack mating surfaces.
Frequency	The operating frequency of the ultrasonic stack. The frequency stored is measured at the end of the ultrasonic portion of the cycle (when ultrasonics are terminated).
Frequency Offset	An offset factor applied to the ultrasonic frequency stored in the power supply.
Gain	The ratio of output to input amplitude of a horn or booster.
Horn	A bar or metal section, usually one half-wavelength-long which transfers vibratory energy to the workpiece.

Table 2.6 Glossary

Name	Description
Horn Amplitude	The peak-to-peak displacement of a horn at its work face.
Horn Signature	A scan to enhance selection of operating frequency and control parameters.
Insertion	The process of embedding a metal component in plastic.
Interface	1. The contact surface of two mating parts. 2. The connection between two pieces of equipment.
Joint	The weld surfaces.
Parameter	A unique factor or element which affects the welding operation in a particular mode.
Parameter Range	Valid range of parameters accepted for a particular setup.
Power Supply	The electronic instrument in an ultrasonic assembly system which changes conventional 50/60 Hz electrical power into high frequency electrical power at 20 kHz, 30 kHz or 40 kHz.
Seek	The activation of ultrasonics at a low-level (10%) amplitude, for the purpose of finding the resonant frequency of the stack.
Staking	The process of melting and reforming a plastic stud to mechanically lock a dissimilar material in place.
Swaging	The process of capturing another component of an assembly by melting and reforming a ridge of plastic.
Thermoplastic	A polymer which undergoes a reversible change of state when subjected to heat.
Thermoset	A polymer which undergoes an irreversible change when subjected to heat.
Token	Token is a concept that applies to who can make a change to the preset. If the fieldbus has gotten the token, then only the fieldbus can perform a change. However, if fieldbus has not gotten the token (or has released the token), then the preset can be changed by any other means, for example, via Web Page or front panel controls.
Ultrasonic Power	Presence of ultrasonic power at the horn face.
Ultrasonic Welding	The use of ultrasonic vibrations to generate heat and subsequently melt the mating surfaces of two thermoplastic parts. When ultrasonic vibrations stop, the molten material resolidifies, and a weld occurs.
User ID	A unique 12 character long alphanumeric ID used to keep track of user access to the web page interface.
Weld System	A combination of components required to perform an ultrasonic operation. Usually consists of a power supply, converter, booster, and horn, with either an actuator or a handheld device, or in a fixed, mounted location.

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Chapter 3: Delivery and Handling

3.1 Shipping and Handling

CAUTION	
	The power supply may be heavy. Handling, unpacking, and installation may require the assistance of a colleague or the use of lifting platforms or hoists.

3.1.1 Environmental Specifications

The DCX F-PFN power supply is an electronic unit that converts line voltage to ultrasonic energy and responds to user input for regulating the weld process. Its internal components are sensitive to static discharge, and many of its components can be harmed if the unit is dropped, shipped under improper conditions, or otherwise mishandled.

The following environmental guidelines should be respected in the shipping of the power supply.

Table 3.1 Shipping Specifications

Environmental Condition	Acceptable Range
Storage / Shipping Temperature	-25°C to +55°C
	-13°F to +131°F
Shock / Vibration (transit)	45 g shock / 0.5 g and (3 to 100 Hz) vibration per ASTM 3332-88 and 3580-90
Drop Test	ISTA Procedure 1 & 2A (while packaged)
Humidity	Maximum 95%, non-condensing

3.2 Receiving

The DCX F-PFN power supply is a sensitive electronic device. Many of its components can be harmed if the unit is dropped or otherwise mishandled.

Scope of Delivery

Branson equipment is carefully checked and packed before dispatch. It is recommended, however, that you follow the procedure below upon receiving your DCX F-PFN power supply.

Inspect the Power Supply when it is delivered, take the following steps.

Table 3.2 Inspect the Power Supply

Step	Action
1	Verify that all parts are complete according to the packing slip.
2	Check the packing and the unit for damage (visual inspection).
3	Report any damage claims to your carrier immediately.
4	Determine if any component has become loose during shipping and, if necessary, tighten screws.

NOTICE	
	If the goods delivered have been damaged during shipping, please contact the forwarding agent immediately. Retain packing material (for possible inspection or for sending back the unit).

3.3 Unpacking the Power Supply

NOTICE	
	If there are any visible signs of damage to the shipping containers or the product, or you later discover hidden damage, NOTIFY YOUR CARRIER IMMEDIATELY. Save the packing material.

The power supply is fully assembled. It is shipped in a sturdy cardboard box. Some additional items are shipped in the box with the power supply. Note orientation of packaging material in case return/repack is necessary. When unpacking the power supply, take the following steps:

Table 3.3 Unpacking the Power Supply

Step	Action
1	Unpack the power supply as soon as it arrives. Save the packing material.
2	Verify you have all of the equipment ordered. Some components are packed inside other boxes.
3	Inspect the controls, indicators, and surface for signs of damage.
4	Remove the cover of the power supply to check if any components became loose during shipping.

3.4 Take Inventory of Small Parts

Table 3.4 Small Parts included with the Power Supply Assemblies

Part or Kit	20 kHz	30 kHz	40 kHz
Mylar®* plastic film Washer Kit	X	X	
Silicone Grease			X
Spanners (2)	X	X	X

* Mylar is a registered trademark of DuPont Teijin Films.

3.4.1 Cables

The RF cable connects the power supply to the converter. For automated systems you will also need a user I/O cable to monitor and control the power supply. Check your invoice for cable types and cable lengths.

Table 3.5 DCX F-PFN Power Supply Cables

P/N	Description
100-240-383	Cable, RF 8 ft (2.5 m)
100-240-384	Cable, RF 15 ft (4.5 m)
100-240-385	Cable, RF 25 ft (7.5 m)
100-240-387	Cable, RF right angle 8 ft (2.5 m)
100-240-388	Cable, RF right angle 15 ft (4.5 m)
100-240-389	Cable, RF right angle 25 ft (7.5 m)
100-240-392	Cable, User I/O 25 ft (7.5 m)
100-240-393	Cable, User I/O 50 ft (15 m)
200-240-396	Cable Ethernet Cat 5e 7 ft (2.1 m)

3.5 Returning Equipment

If you are returning equipment to Branson Ultrasonic Corporation, please call your Customer Service Representative to receive approval to return the goods. Refer to 10.2 Contact Us for more information.

Chapter 4: Technical Specifications

4.1 Environmental Specifications

NOTICE	
	Environmental specifications are subject to change without notice.

The DCX F-PFN power supply has the following environmental specifications:

Table 4.1 Environmental Specifications

Environmental Condition	Acceptable Range
Ambient Operating Temperature	+5°C to +40°C
	+41°F to +104°F
Storage / Shipping Temperature	-25°C to +55°C
	-13°F to +131°F
Operating Altitude	1000 m
	3280 ft
Humidity	95% maximum, non-condensing.
IP Rating	20 Protected against solid objects larger than 12.5 mm; no protection against water.
Pollution Degree	2 Only non-conductive pollution occurs; temporary conductivity caused by condensation may be expected.
Overvoltage Category	II Equipment intended to be supplied from the building wiring.

4.2 Electrical Specifications

NOTICE	
	Electrical specifications are subject to change without notice.

4.2.1 Electrical Input Operating Voltages

Table 4.2 Electrical Input Operating Voltages

Power Supply Rating	Input Operating Voltage
All Models	200 V to 240 V Nominal (180 V Min.* to 253 V Max.), 50 Hz or 60 Hz, Single Phase
	24 VDC, 2.5 A

* 200 V Min. for 4 kW units.

4.2.2 Power Requirements

Table 4.3 Power Requirements

Frequency	Power Output	System Input Power Requirements
20 kHz	1250 W	200-240V~7 A 50/60Hz, Single Phase/15 A Breaker
	2500 W	200-240V~14 A 50/60Hz, Single Phase/25 A Breaker
	4000 W	200-240V~25 A 50/60Hz, Single Phase/25 A Breaker
30 kHz	1500 W	200-240V~10 A 50/60Hz, Single Phase/15 A Breaker
40 kHz	800 W	200-240V~5 A 50/60Hz, Single Phase/10 A Breaker

4.2.3 Continuous Duty Maximum Power

Table 4.4 Continuous Duty Maximum Power

Frequency	Power Output	Continuous Duty 30% Max. Power
20 kHz	1250 W	375 W
	2500 W	750 W
	4000 W	1200 W
30 kHz	1500 W	450 W
40 kHz	800 W	240 W

NOTICE	
	High duty cycles require additional cooling for the converter. For information on converter cooling refer to 5.7 Converter Cooling in Chapter 5: Installation and Setup.

NOTICE	
	System average power must be limited to the specified continuous maximum. Duty cycle for each power and frequency is 1 second on and 2.4 seconds off.

4.3 Physical Description

This section describes the physical dimensions of the DCX F-PFN power supply.

NOTICE	
	All dimensions are approximate.

Table 4.5 Dimensions and Weights of DCX F-PFN Power Supply

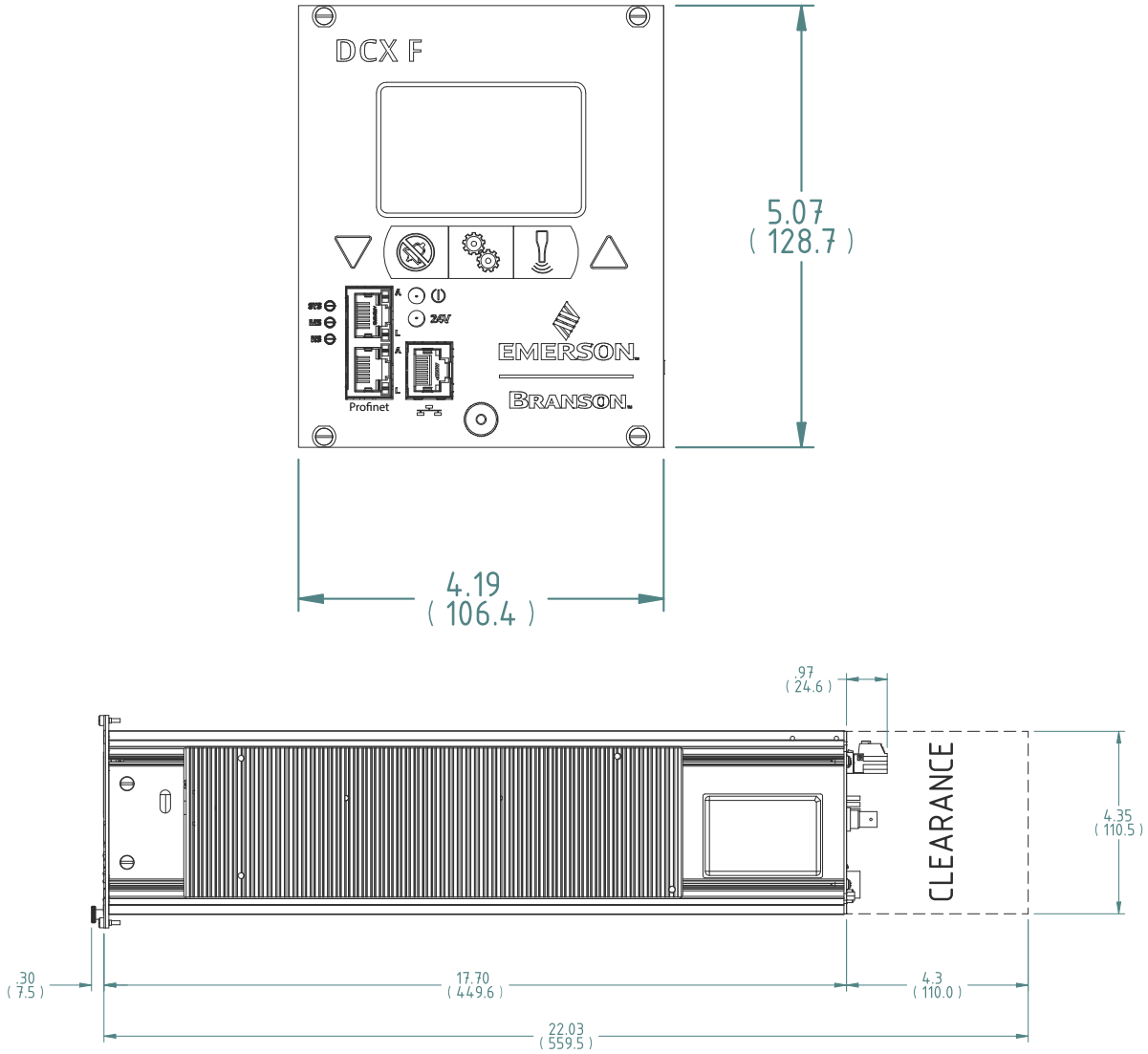
Size	Width	Height	Depth	Weight
Small	106 mm 4.2″	128 mm 5.07″	560 mm 22″	3.6 kg 8 lb
Medium	142 mm 5.6″			5.4 kg 12 lb
Large	213 mm 8.4″			6.8 kg 15 lb

4.4 Dimensional Drawings

Refer to the illustrations on the pages that follow for dimensional drawings of both models. All dimensions are approximate and may vary slightly.

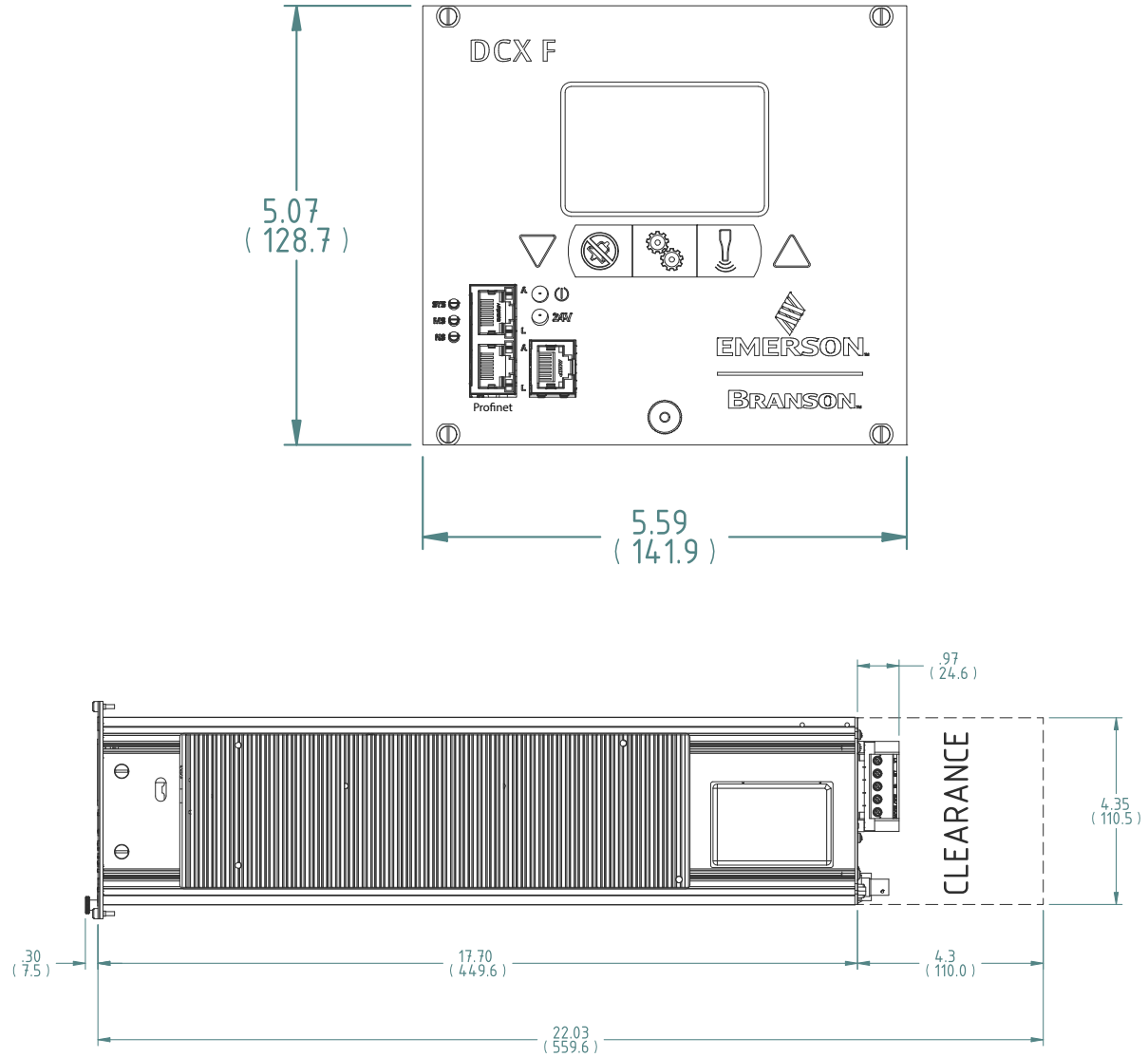
4.4.1 DCX F-PFN Power Supply - Small

Figure 4.1 DCX F-PFN Power Supply Dimensional Drawing - Small



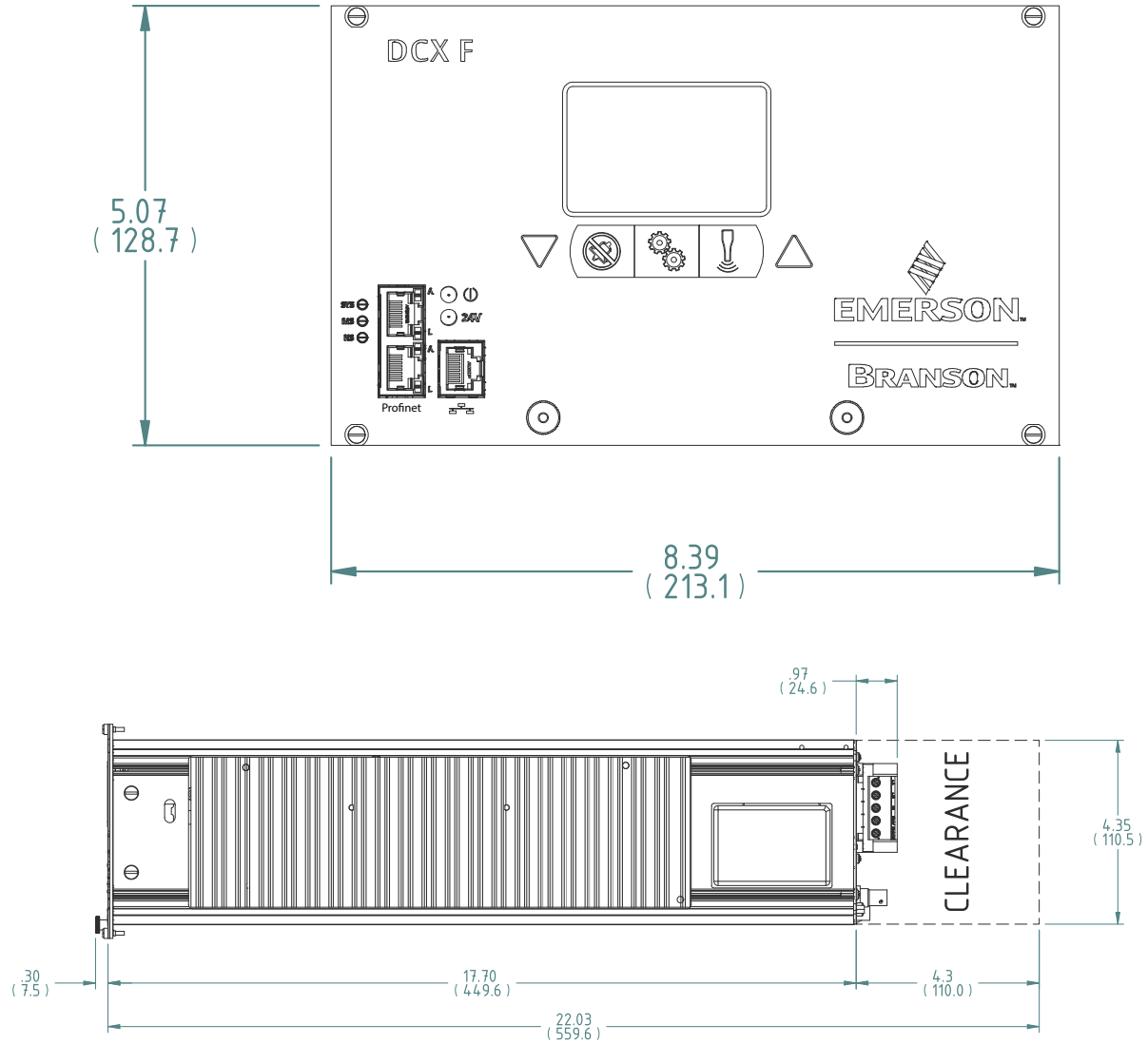
4.4.2 DCX F-PFN Power Supply - Medium

Figure 4.2 DCX F-PFN Power Supply Dimensional Drawing - Medium



4.4.3 DCX F-PFN Power Supply - Large

Figure 4.3 DCX F-PFN Power Supply Dimensional Drawing - Large



Chapter 5: Installation and Setup

5.1 About Installation

This chapter is intended to help the installer with the basic installation and setup of your new DCX F-PFN power supply.

CAUTION	Heavy Object
	The power supply, and related components are heavy. Handling, unpacking, and installation may require the assistance of a colleague or the use of lifting platforms or hoists.

International safety-related labels are found on the power supply. Those that are of importance during installation of the system are identified in 1.2 System Information Labels.

5.2 Installation Requirements

This section covers the location requirements, mounting options, power supply dimensions, environmental requirements, and electrical requirements, to help you plan and execute your installation successfully.

5.2.1 PROFINET Wiring Considerations

It is recommended to use as a minimum Cat5 Ethernet cable on new installations with a maximum cable length of 100 m (328 ft). If existing cabling is of lower category, maximum data rate may be limited.

5.2.2 Installing the DCX F-PFN Power Supply in a Customer Rack

The power supply units can be installed in any rack complying with the 19” industrial standard.

For successful installation in a rack, the respective demands on the electric and cooling system have to be met.

- If multiple drawers are to be installed in a rack we recommend to provide three phase power to the rack in order to provide each drawer with a dedicated supply and one phase to each drawer
- Particular care has to be taken that the heat generated during operation is dissipated. The heat generated depends on the power output by the module and the ambient conditions
- The heat sink of the module is mounted on the right. Make sure that the cooling device is mounted in a way allowing the cooling air to pass freely on this side
- For each group of four power supply modules installed one cooling drawer is required. The cooling drawers must be installed directly under the power supplies in order to ensure sufficient cooling
- In case a filter element is used to clean the intake air, regular inspection and cleaning of the filter depending on the ambient conditions is required to maintain the airflow volume
- To prevent thermal overload, the system is protected by thermoswitches which are reset automatically after cooling down

NOTICE	
	Three 105 CFM fans must be placed directly underneath each unit for cooling.

5.2.3 Location

The power supply should be accessible for parameter changes and settings. The power supply should be located in an area away from radiators or heating vents.

The DCX F-PFN power supply must not be positioned so that is difficult to plug in or unplug the main power plug.

5.2.4 Environmental Requirements

Verify the DCX F-PFN power supply is operated in an environment that meets the temperature and humidity requirements indicated in Table 4.1 Environmental Specifications.

5.2.5 Electrical Input Power Ratings

Connect the power supply to a single-phase, grounded, 3-wire, 50 Hz or 60 Hz 200 V to 240 V power source. Table 4.3 Power Requirements lists the current and breaker ratings for the various models.

5.2.6 Pneumatic Requirements

Your welding system may require a cooling air stream for the converters. In continuous operations, or applications with longer duty cycles, it may be necessary to cool the horn as well as the converter.

Typically 80 cubic feet (2.26 m^3) per hour of clean, dry, compressed air are required to cool most welding operations.

To verify the 80 cubic feet (2.26 m^3) per hour cooling air stream required for your welding system, refer to 5.7 Converter Cooling.

5.3 Installation Steps

WARNING	High Voltage Hazard
	To prevent the possibility of an electrical shock: • Ensure the power source is disconnected before beginning work on line connections. • Ensure the power switch on the back of the unit is in the OFF position before making any electrical connections. • Always plug the power supply into a grounded power source. • To prevent the possibility of an electrical shock, ground the power supply by securing an 8 gauge grounded conductor to the ground screw located next to the air outlet. • Ensure power supply installation is performed by qualified personnel and in accordance with local standards and regulations.

All persons who are involved with installation, commissioning, operation and maintenance must have the required qualification, strictly follow this operating manual.

Basic installation notes:

- To avoid problems associated with EMI, you should route high power lines (AC and Ultrasonic RF) away from low power lines (controls signals)
- You should consider future troubleshooting and repair when installing all wiring. All wiring should be either color coded or tagged with industrial wire tags
- The minimum cable bend radius is 5 times the cable outer diameter for RF cables
- The minimum cable bend radius is 10 times the cable outer diameter for user I/O & Ethernet cables
- Ground wires should not be shared with other equipment
- All inductive coils must be suppressed with appropriate devices, such as diodes or RC networks

5.3.1 Mount the Power Supply

The cable lengths are limited based on the operating frequency of the welding system. Performance and results can suffer if the RF cable is crushed, pinched, damaged or modified. Contact your Branson Representative if you have special cable requirements.

Do not place the power supply on the floor or in other locations that will allow dust, dirt or contaminants to be drawn into the power supply.

NOTICE	
	Do not block exhaust and intake air circulation, which is needed to maintain a safe operating temperature.

5.3.2 Mounting Considerations

In addition to the considerations mentioned above, the LCD's viewing angle should be taken into account when selecting a location for your DCX F-PFN power supply. The LCD is designed to be viewed from the top. Please refer to Figure 5.1 LCD Viewing Angle below when selecting a location for your DCX F-PFN power supply.

Figure 5.1 LCD Viewing Angle

NOTICE	
	Optimal viewing angle is 25° above the normal to the display (indicated by 0°).

5.3.3 Electrical Connections

Figure 5.2 DCX F-PFN Power Supply Connections

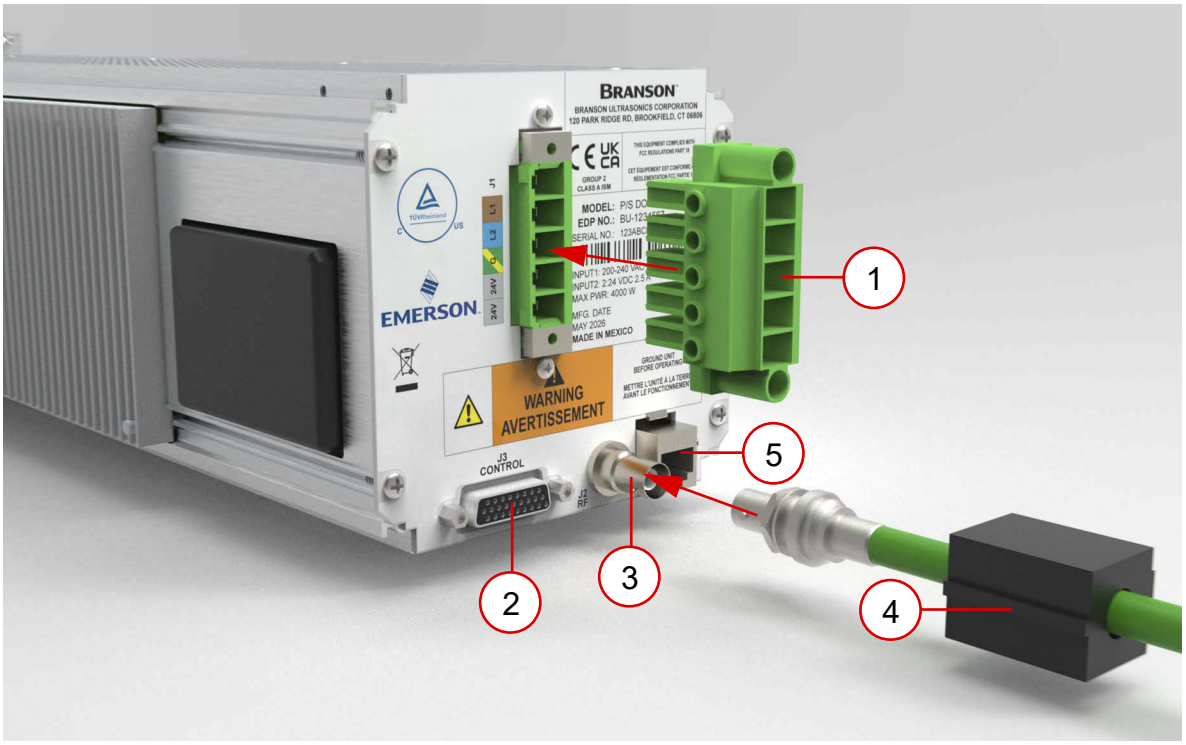


Table 5.1 DCX F-PFN Power Supply Connections

Item	Description
1	Input Power Connector
2	User I/O Connectors
3	RF Connector
4	RF Cable (Ferrite End)
5	Ethernet Port

5.4 User I/O

The user I/O is an interface for automation. It provides the ability to make your own interface for your automation, actuator interface, special control, or reporting needs.

CAUTION	Equipment Damage Risk
	Failure to isolate unused wires or incorrect wiring can cause the system controller board to fail. • Individually isolate all unused wires from each other. • Verify wiring connections are correct before applying power.

CAUTION	Equipment Damage Risk
	Incorrect wiring of Ground pins or +24 VDC pins can cause the system controller board to fail. • Ensure Ground pins are wired correctly. • Ensure +24 VDC pins are wired correctly. • Verify all connections before applying power.

5.4.1 Power Supply I/O Connection

The interface cable has a 26-pin HD male D-Sub connector on one end, and wires on the other end. Pins are wired to ICEA standard color code.

Figure 5.3 Power Supply User I/O Cable Identification and Wire Color Diagram

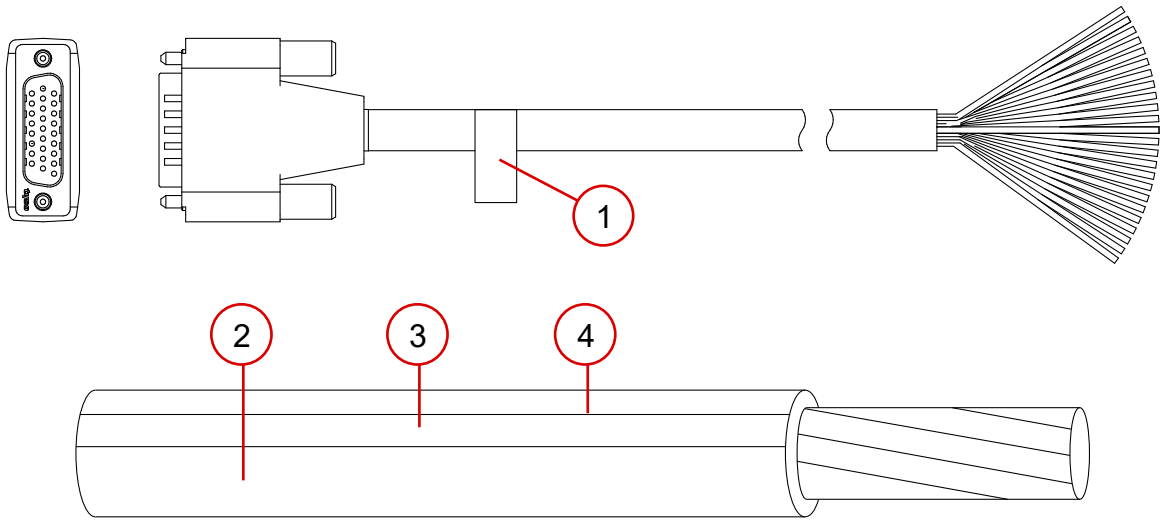


Table 5.2 User I/O Cable

Item	Description	Item	Description
1	Part number	3	Stripe
2	Insulation	4	Dot

5.4.2 User I/O Cable Pin Assignments

Table 5.3 User I/O Cable Pin Assignments

Pin	Input/Output (All I/O are user definable)	Available Function	Signal Type	Signal Range	Color
1	Digital in 1*	See Table 5.4 Digital Input Functions	Discrete Input	0 V to 24 V +/-10%, 12 mA	Blk
2	Digital in 2*				Wht
3	Digital in 3*				Red
4	Digital in 4*				Grn
5	+24 V	N/A	24 V Source	24 V +/-10%, 250 mA Max	Orn
6					Blu
7	Digital out 1	See Table 5.5 Digital Output Functions	Discrete Output	0 V to 24 V, -10%, 25mA Max	Wht/Blk
8	Digital out 2				Red/Blk
9	Digital out 3				Grn/Blk
10	Digital out 4				Orn/Blk
11	Digital in 5*	See Table 5.4 Digital Input Functions	Discrete Input	0 V to 24 V +/-10%, 12 mA	Blu/Blk
12	Digital in 6*				Blk/Wht
13	Digital in 7*				Red/Wht
14	GND	N/A	24 V Ground	0 V	Grn/Wht
15					Blu/Wht
16	Digital in 8*	See Table 5.4 Digital Input Functions	Discrete Input	0 V to 24 V +/-10%, 12 mA	Blk/Red
17	Analog in 1	See Table 5.6 Analog Input Functions	Analog Input	0 V to +10 V, 2 mA	Wht/Red
18	Analog in 2				Orn/Red
19	Digital out 5	See Table 5.5 Digital Output Functions	Discrete Output	0 V to 24 V +/-10%, 12 mA Max	Blu/Red
20	Digital out 6				Red/Grn
21	Digital out 7				Orn/Grn
22	Digital out 8				Blk/Wht/Red
23	Digital in 9*	See Table 5.4 Digital Input Functions	Discrete Input	0 V to 24 V +/-10%, 12 mA	Wht/Blk/Red
24	Analog out 1	See Table 5.7 Analog Output Functions	Analog Output	0 V to 10 V +/-5%, 1 mA Max	Red/Blk/Wht
25	Analog out 2				Grn/Blk/Wht
26	Analog GND	N/A	Analog Ground	0 V	Orn/Blk/Wht

*Input signal should be kept at least 5 ms.

5.4.3 Digital Input Functions

Table 5.4 Digital Input Functions

Function	Description
ACT-Actuator Present	Must be active at power up to activate TRS, ULS, Interlock, Part in Place.
ACT-Cycle Abort	Will immediately terminate the current weld cycle and not accept another External Start until removed. Reset required is user settable.
ACT-Ground Detect	Will start scrub time. When scrub time expires, ultrasonics will be turned off.
ACT-Interlock In Place	Prevents a cycle from starting until the signal becomes active.
ACT-Part In Place	When enabled, signal must be active before weld cycle is started.
ACT-Trigger Switch (TRS)	Indicates the power supply to start ultrasonics.
ACT-Upperlimit Switch (ULS)	Tells the power supply that the actuator is at home position.
RF-Feedback A, B, C, D	Indicates which relay the RF switch has changed to. Bit 0 to bit 3 are binary coded values indicating the selected RF switch. It can also be uncoded. This function is user settable.
RF-Status Feedback	Indicates the RF switch has changed to the proper relay. **NOTICE** Single value. Not coded/uncoded like RF-Feedback A, B, C, D.
STD-Cable Detect	When enabled 24 volts must be present on pin at all times. If 24 volts is removed, suggesting that the cable has been removed, ultrasonics will not be allowed to run and will stop if already running.
STD-Display Lock	Locks the front panel display controls. Registers are read only when signal is active.
STD-External Amp Step Trigger	When set to +24 V sets amplitude to Amplitude 2. If set again to 0 V during a weld cycle will set amplitude back to Amplitude 1. Used only if amplitude stepping is turned on and set to external input.
STD-External Horn Scan	Starts horn scan. Signal must be maintained during the scan.
STD-External Reset	Resets alarm conditions.
STD-External Seek	Activates ultrasonic energy at 10% amplitude for the purpose of finding the ultrasonic stack resonant frequency.
STD-External Sonics Delay	Delays the start of ultrasonics even if a trigger occurs. This can be used to enable an external operation to be complete before continuing the cycle (e. g. test device or part marking operation). If the delay is maintained for 1 minute, the cycle is aborted and all inputs must be cycled again.
STD-External Start	Activates ultrasonic energy at the currently set amplitude. **NOTICE** DCX F-PFN power supply must be in ready mode before External Start. **WARNING** When using 0 V to activate ultrasonics (External Start signal), it is recommended to assign one input as Cable Detect to prevent sonics from activating if 24 V is lost by accident.
STD-External Test	Performs a test cycle. Signal must be maintained.

Table 5.4 Digital Input Functions

Function	Description
STD-Load New Preset	Loads a weld preset as defined by Recall Preset Bits 1-32.
STD-Memory Clear	Centers the power supply start frequency.
STD-Recall Preset 1, 2, 4, 8, 16, 32	Bit 0 to bit 5 for preset recall binary code. This code will be used to recall a preset when Load Preset input is activated.
STD-Sonics Disable	Prevents ultrasonics from coming on. If active throughout a weld cycle, the cycle will be performed but without ultrasonics. Should the weld mode be time indeterminate (energy, power, etc) then the weld time will extend to the cutoff time.
STD-Start Cycle	Starts a cycle.

5.4.4 Digital Output Functions

Table 5.5 Digital Output Functions

Function	Description
ACT-Actuator Home	Indicates that a ULS input has been received.
ACT-Afterburst Delay	Indicates if the weld cycle is in the Afterburst Delay state.
ACT-Afterburst Time	Indicates if the weld cycle is in the Afterburst state.
ACT-End of Hold Time	Indicates the system has reached the end of Hold since the cycle started.
ACT-Holdtime	Indicates if the weld cycle is in the Hold Time state.
RF-Select A-D	Output to select stacks 1 to 4 or a binary coded value (bit 0-3) to select RF relay.
STD-Amp1 Amp2	If output is 0 V, indicates the amplitude setting is Amplitude 1. If output is 24 V, indicates the amplitude setting is Amplitude 2.
STD-Confirm Preset Change	Output will go active when a preset has been recalled.
STD-Custom Alarm	Indicates a Custom Alarm has occurred. This function is user defined.
STD-Cycle Okay	Output will go inactive with cycle start input, and will go high at the end of the cycle if no alarms occurred.
STD-Cycle Start Out	Indicates start signal is active. It will stay active through weld time and hold time.
STD-General Alarm	Indicates an alarm occurred. This function is user configurable.
STD-Minus Energy Limit Alarm	Indicates the weld did not reach the minimum energy set.
STD-Minus Time Limit Alarm	Indicates the weld time has not reached the minimum time set.
STD-Minus Peakpower Limit Alarm	Indicates the weld has not reached the minimum peak power set.
STD-Overload Alarm	Indicates an overload alarm has occurred.
STD-Plus Energy Limit Alarm	Indicates the weld has exceeded the maximum energy set.
STD-Plus Time Limit Alarm	Indicates the weld time did exceed the maximum time set.
STD-Plus Peakpower Limit Alarm	Indicates the weld has exceeded the maximum peak power set.
STD-Ready	If active, indicates the system is ready to start a weld cycle, enter test mode, or start a horn scan. If inactive, it indicates the system is already cycling, in test mode, performing a horn scan, or has a reset-required alarm.
STD-Seek/Scan Out	Indicates either a seek or a horn scan is in progress.
STD-Sonics Active	Indicates sonics are active.
STD-Start Signal Release	If output is active, it indicates the start signal can be removed. If output is inactive, it indicates start signal is either inactive or that it cannot yet be removed.

Table 5.5 Digital Output Functions

Function	Description
STD-Status	To be used to drive an external beeper. Single 0.5 second beeps will occur when trigger is received. Three Beeps indicate an alarm occurred (e.g. overload alarm). Beeps 0.5 seconds on, 0.5 seconds off long are in between each beep.
STD-Weldcycle Complete	Indicates if a weld cycle is no longer in process.

5.4.5 Analog Input Functions

Table 5.6 Analog Input Functions

Function	Description		Valid Range
Amplitude In	Controls the amplitude of ultrasonic energy that will be delivered by the power supply.		1 V to 10 V* (10% to 100%)
Custom Input 1, 2	Define an analog voltage that can be used to create a cutoff. Voltage must be exceeded to produce the cutoff.		0 V to 10 V
Frequency Offset	Controls the frequency offset to the power supply operating frequency. Actual offset depends on the power supply operating frequency:		1 V to 9 V* (5 V is zero offset)
	Frequency	**Offset Range**	
	20 kHz	+/- 400 Hz	
	30 kHz	+/- 600 Hz	
	40 kHz	+/- 800 Hz	

* If the input signals are not within their valid range, or if left unconnected, the power supply will use 50% amplitude and zero frequency offset, respectively.

5.4.6 Analog Output Functions

Table 5.7 Analog Output Functions

Function	Description			Valid Range
Amplitude Out	Provides a 0 V to 10 V output signal proportional to amplitude (0% to 100%).			0 V to 10 V (0% to 100%)
Power Out	Provides a 0 V to 10 V output signal proportional to ultrasonic power output (0% to 100%).			0 V to 10 V (0% to 100%)
Frequency Out	Provides a 0 V to 10 V output signal that indicates memory plus offset. Actual frequency depends on the power supply operating frequency:			0 V to 10 V (5 V is zero offset)
	Frequency	**Lower Limit (0 V)**	**Upper Limit (10 V)**	
	20 kHz	19,450 Hz	20,450 Hz	
	30 kHz	29,250 Hz	30,750 Hz	
	40 kHz	38,900 Hz	40,900 Hz	

5.4.7 Default Branson User I/O Connector PIN Assignments

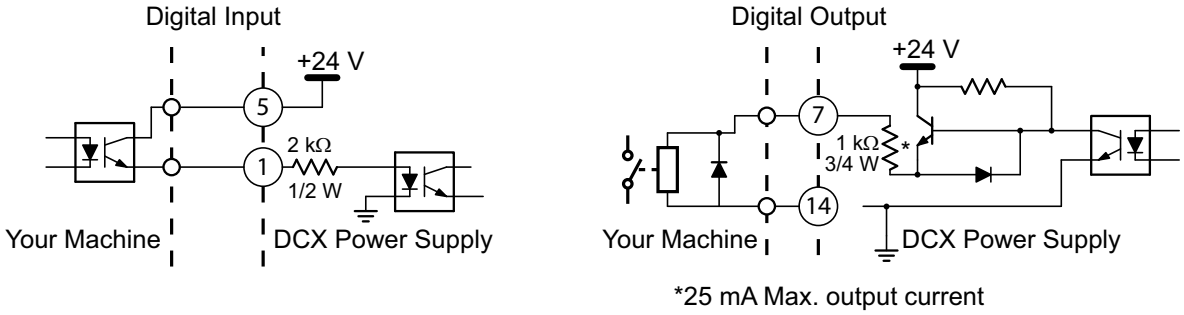
Table 5.8 Default Branson User I/O Connector PIN Assignments

Pin	Function	I/O Type	Values
1	STD-External Start	Input Digital	Apply +24 VDC to run cycle **NOTICE** DCX F-PFN power supply must be in ready mode before External Start.
2	STD-External Seek	Input Digital	Apply +24 VDC to perform a seek
3	STD-External Reset	Input Digital	Apply +24 VDC to reset alarm
4	STD-Memory Clear	Input Digital	Apply +24 VDC to clear memory
5 6	+24 VDC Source	I/O Signal Source	+24 V, 250 mA max. (sourced from the customer supplied 24 V external power supply).
7	STD-Ready	Output Digital	+24 V indicates the system is ready
8	STD-Sonics Active	Output Digital	+24 V indicates ultrasonics are active
9	STD-General Alarm	Output Digital	+24 V indicates an alarm occurred
10	STD-Seek/Scan Out	Output Digital	+24 V indicates either Seek or a Scan is in progress
11	STD-Recall Preset 1	Input Digital	Bit 0 for preset recall binary code
12	STD-Recall Preset 2	Input Digital	Bit 1 for preset recall binary code
13	ACT-Ground Detect	Input Digital	Bit 2 for preset recall binary code
14 15	+24 VDC Return and I/O Return	I/O Signal Return	Return for all pins except pins 17, 18, 24, and 25
16	ACT-Cycle Abort	Input Digital	Bit 3 for preset recall binary code
17	Amplitude In	Input Analog	1 V to + 10 V (10% to 100%)*
18	Frequency Offset	Input Analog	1 V to + 9 V (5 V is zero offset)
19	STD-Confirm Preset Change	Output Digital	Indicates amplitude setting 0 V for Amplitude 1, +24 V for Amplitude 2
20	STD-Overload Alarm	Output Digital	+24 V indicates an overload alarm occurred.
21	STD-Plus Peak Power Limit Alarm	Output Digital	+24 V indicates start signal can be removed.
22	STD-Minus Peak Power Limit Alarm	Output Digital	+24 V indicates a load new preset request has occurred and the preset was successfully recalled.
23	STD-Display Lock	Input Digital	+24 V must be present for ultrasonics to be enabled.
24	Power Out	Output Analog	0 V to + 10 V (0% to 100%)
25	Amplitude Out	Output Analog	0 V to + 10 V (0% to 100%)
26	Analog Signal Return	Analog Signal Return	Return for pins 17, 18, 24, and 25

* If the input signals are not within their valid range, or if left unconnected, the power supply will use 50% amplitude and zero frequency offset, respectively.

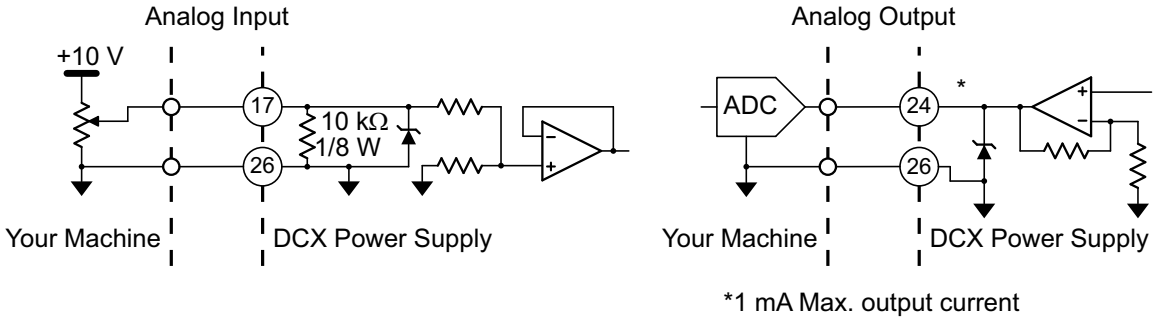
5.4.8 Typical Digital I/O Wiring Examples

Figure 5.4 Typical Digital I/O Wiring Examples



5.4.9 Typical Analog I/O Wiring Examples

Figure 5.5 Typical Analog I/O Wiring Examples



5.4.10 Output Power (RF Cable) Connection

Ultrasonic energy is delivered to the SHV connector on the power supply, which is then transmitted to the converter via the RF cable.

To reduce electromagnetic interference (EMI), RF cables are equipped with a ferrite core (plastic case) on one end. This end is meant to be connected to the power supply.

WARNING	High Voltage Hazard
	Operating the System with the RF Cable disconnected or damaged can present an electrical shock hazard.

WARNING	High Voltage Hazard
	To avoid the possibility of electrical shock, converters need to be properly grounded.

NOTICE	
	To avoid the possibility of EMI, ensure the RF connection to the power supply is made with the cable end that has the ferrite core box attached (see Figure 5.6 RF Cable Connection).

Figure 5.6 RF Cable Connection

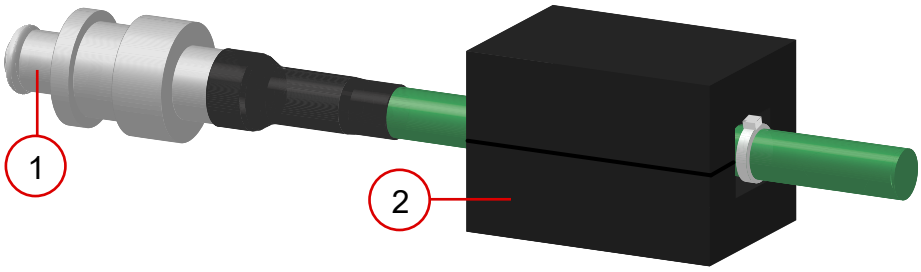


Table 5.9 RF Cable Connection

Item	Description
1	To Power Supply
2	Ferrite Core Box

5.4.11 Input Power Connection

WARNING	High Voltage Hazard
	Ensure all electrical power is off when wiring input power to your DCX F-PFN power supply connector block. To prevent the possibility of an electrical shock, ground the power supply by securing an 8 gauge grounded conductor to the ground screw located next to the air outlet.

WARNING	High Voltage Hazard
	If miss-wired, the power supply can present an electrical shock hazard.

NOTICE	
	The power supply can be permanently damaged if it is connected to the incorrect line voltage, or if the connection is mis-wired.

Use the following procedure to connect the power supply to a 24 VDC 2.5A external power supply and to a single-phase, grounded 3-wire, 50 Hz or 60 Hz 200 V to 230 V power source. The 24 VDC power supply must be safety certified and agency approved.

Table 5.10 Input Power Connection

Step	Action
1	Detach the connector block on the back of the power supply.
2	Use two properly sized wires (according to local standards) to connect a 24 VDC 2.5A power supply as shown on Figure 5.2 DCX F-PFN Power Supply Connections.
3	Use three properly sized wires (No. 12 gauge, 2.5 mm or according to local standards) to connect the line 1, line 2, and ground to the connector block as shown on Figure 5.2 DCX F-PFN Power Supply Connections. Choose wires according to the current rating as specified in Table 4.3 Power Requirements and on the label located on the back of the unit. Be sure to use agency approved wiring and use sleeving or tubing on each wire for double insulation.
4	Secure an 8 gauge grounded conductor to the ground screw located next to the air outlet.
5	Connect the converter-booster-horn stack to the power supply using the RF cable. See 5.4.10 Output Power (RF Cable) Connection.
6	Ensure the power of the unit is disconnected. Plug the connector block back into the power supply. Tighten the two securing screws.
7	Connect the power supply to a single-phase, grounded, 3-wire, 50 Hz or 60 Hz 200 V to 230 V power source.

5.5 Power Supply Setup

Certain power supply configurations can be modified from the factory setting if needed. Although not usually requiring modifications from the factory setting, the following features are selectable:

- **Afterburst:** Allows for a short activation of ultrasonics at the end of the weld cycle to reliably release parts from the horn
- **Cutoffs:** Allows for setting parameter values for immediately terminating a weld cycle: Time (S); Energy (J); Peak Power (%); Frequency Low (Hz); Frequency High (Hz); Custom Input1 (V); and Custom Input2 (v)
- **End of Weld Store:** Provides an option for selecting if the stack frequency is stored at the end of each weld cycle
- **Energy Brake:** Allows the user to set the power supply to reduce the amplitude before the sonics are shut off
- **Frequency Offset:** Allows for varying the start frequency by way of external controls (analog signal applied though the user I/O analog input) or setting a fixed value using the web page interface. This is useful for certain applications, where the force applied on the fixture or anvil causes a frequency shift in the stack's operation
- **Limits:** Allows for setting up limits within a weld mode: +/- Continuous; +/- Time (s); +/- Energy (J); or +/- Peak Power (%)
- **Mode:** Allows for selecting the weld mode from the different available options: Continuous; Time (s); Energy (J); Peak Power (%); and Ground detect
- **Power Up:** Allows an option to configure the power supply to perform a seek on power up; a horn scan on power up; or to perform no action at power up
- **Seek Ramp:** Provides a selection for different power supply seek ramp times
- **Seek Time:** Provides an option for selecting seek duration
- **Start Ramp:** Provides a selection for different start ramp times. This controls how fast the amplitude of the horn rises from 0 to 100. Long ramp times may be useful when using large horns or high gain stacks
- **Timed Seek:** Provides an option for monitoring, and storing the operating frequency at timed intervals (60 seconds). Periodic frequency seeks may be helpful when welder is not used for long periods of time. Seeks are timed from the moment sonics was last activated
- **Weld Amplitude:** Allows for varying the amplitude (10% to 100%) using the front panel LCD, the web page interface, or by way of external controls (analog signal applied though the user I/O analog input). Via the web page interface scrub amplitude, afterburst amplitude, and amplitude stepping options may also be configured

For instruction on how to change the power supply settings refer to 7.5 Configuring the Power Supply Registers in Chapter 7: Operation.

5.6 Assembling the Acoustic Stack

CAUTION	
	The following procedure must be performed by a setup person. If necessary, secure the largest portion of a square or rectangular horn in a soft jawed vise. NEVER attempt to assemble or remove a horn by holding the converter housing or the booster clamp ring in a vise.

CAUTION	
	Do not use silicone grease with Mylar plastic film washers. Use only 1 (one) Mylar plastic film washer of the correct inside and outside diameters at each interface.

NOTICE	
	The use of a Branson torque wrench or the equivalent is recommended. P/N 101-063-787 for 20 kHz, and 30 kHz systems and 101-063-618 for 40 kHz systems.

Figure 5.7 Assembling the Acoustic Stack

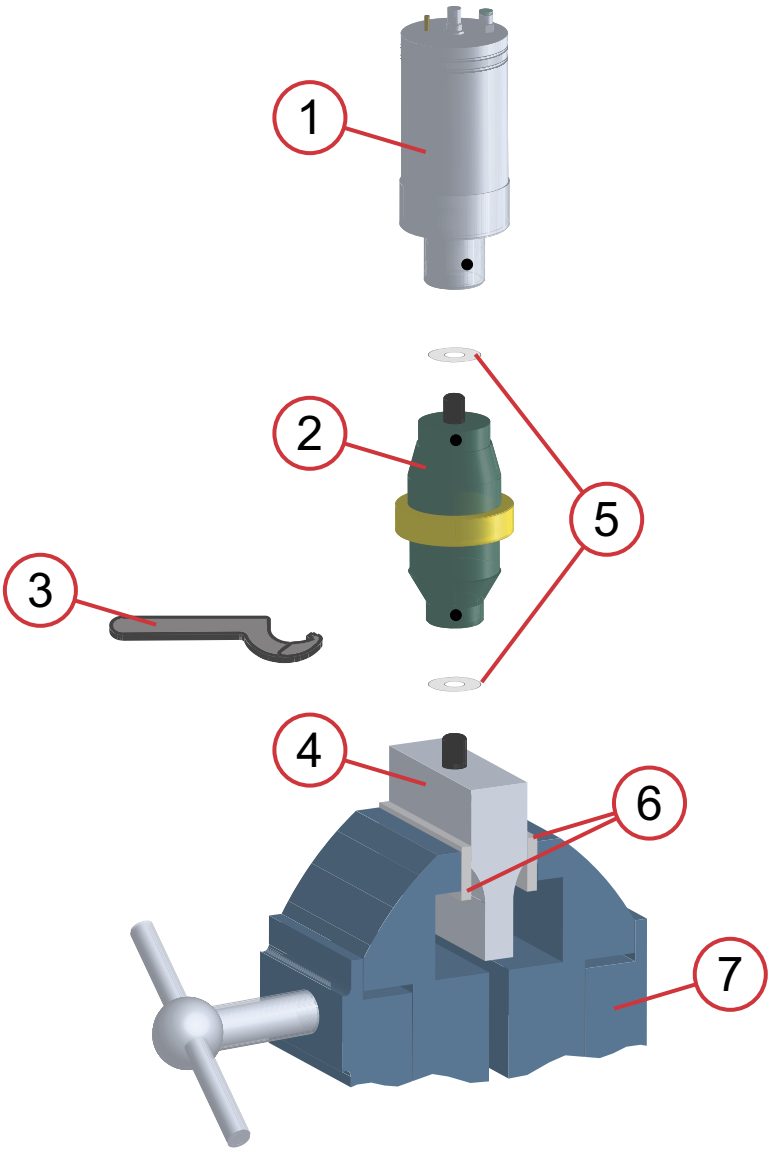


Table 5.11 Acoustic Stack Description

Item	Description
1	Converter
2	Booster
3	Spanner (provided)
4	Horn
5	See stack assembly procedure
6	Vise Jaw protectors (aluminum or soft metal)
7	Vise

Table 5.12 Stack Torque Values

Frequency	Torque
20 kHz	220 in·lb (24.85 N·m)
30 kHz	185 in·lb (21 N·m)
40 kHz	95 in·lb (10.73 N·m)

Table 5.13 Tools

Tool	EDP Number
20 kHz, and 30 kHz Torque Wrench Kit	101-063-787
40 kHz Torque Wrench	101-063-618
20 kHz Spanner Wrench	101-118-039
30 kHz Spanner Wrench	201-118-033
40 kHz Spanner Wrench	201-118-024
Silicone Grease	101-053-002
Mylar Plastic Film Washers (20 kHz)	100-063-357
Mylar Plastic Film Washers (30 kHz)	100-063-632

5.6.1 For a 20 kHz System

Table 5.14 20 kHz System

Step	Action
1	Ensure that the mating surfaces of the converter, booster, and horn are clean, and that the threaded holes are free of foreign material.
2	Install a single Mylar plastic film washer (matching the size of the washer to the stud) to each interface.
3	Assemble the converter to the booster and the booster to the horn.
4	Torque to 220 in·lb (24.85 N·m) at each interface.

5.6.2 For a 30 kHz System

Table 5.15 30 kHz System

Step	Action
1	Ensure that the mating surfaces of the converter, booster, and horn are clean, and that the threaded holes are free of foreign material.
2	Install a single Mylar plastic film washer (matching the size of the washer to the stud) to each interface.
3	Assemble the converter to the booster and the booster to the horn.
4	Torque to 185 in·lb (21 N·m) at each interface.

5.6.3 For a 40 kHz System

Table 5.16 40 kHz System

Step	Action
1	Ensure that the mating surfaces of the converter, booster, and horn are clean, and that the threaded holes are free of foreign material.
2	Coat each interface surface with a thin film of silicon grease - but do not apply silicon grease to a threaded stud or tip.
3	Assemble the converter to the booster and the booster to the horn.
4	Torque to 95 in·lb (10.73 N·m) at each interface.

5.6.4 Connecting Tip to Horn

1. Ensure that the mating surfaces of the tip and horn are clean. Remove any foreign matter from the threaded stud and hole.
2. Hand assemble the tip to the horn. Assemble dry. Do not use any silicone grease.
3. Use the spanner wrench and an open-end wrench (refer to Figure 5.8 Connecting Tip to Horn) and tighten to the following torque tip specifications:

Figure 5.8 Connecting Tip to Horn

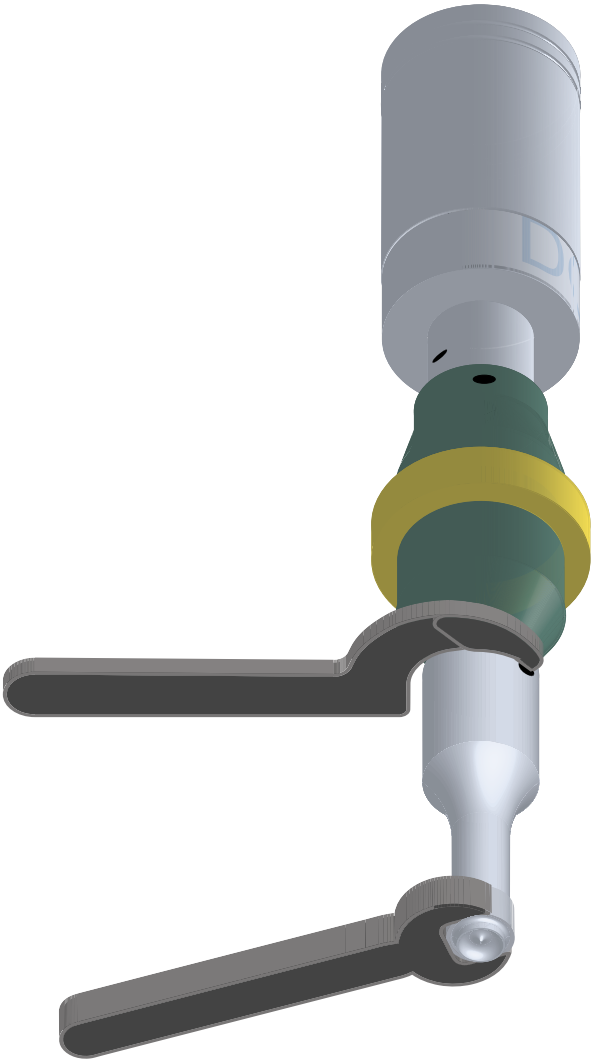


Table 5.17 Tip to horn torque values

Tip Thread	Torque
1/4 - 28	110 in·lbs (12.42 N·m)
3/8 - 24	180 in·lbs (20.33 N·m)

5.7 Converter Cooling

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 require additional cooling for the converter. System average power must be limited to the specified continuous maximum. Higher peak power, up to the maximum acceptable power limit, with an on time of up to 10 seconds may be obtained, if appropriate off time ensures that, on average, the continuous duty maximum power is not exceeded.

Table 5.18 Continuous Duty Max. Power & Full Power Duty Cycle

Configuration	Continuous Duty Max. Power	Full Power Duty Cycle
20 kHz/1250 W	375 W	1 s on 2.4 s off (30% Duty Cycle)
20 kHz/2500 W	750 W	1 s on 2.4 s off (30% Duty Cycle)
20 kHz/4000 W	1200 W	1 s on 2.4 s off (30% Duty Cycle)
30 kHz/1500 W	450 W	1 s on 2.4 s off (30% Duty Cycle)
40 kHz/800 W	240 W	1 s on 2.4 s off (30% Duty Cycle)

If converter cooling is required, use the following steps:

Table 5.19 Converter Cooling Procedure

Step	Action
1	Start with a 50 psi (345 kPa) air source or higher from a 0.06 in (1.5 mm) I.D. orifice.
2	Perform a run of welding operations.
3	Immediately after completing the welding run, check the converter temperature.
4	If the converter is still too hot, increase the diameter of the orifice in small increments until the temperature falls within the ranges in the chart.

A 0.06 in (1.5 mm) orifice at 50 psi (345 kPa) will result in a reading of 80 ft^3 (2.26 m^3) per hour. This should be sufficient to cool most operations requiring a cooling air stream. In continuous welding operations, or applications with longer duty cycles, it may be necessary to cool the horn as well as the converter. Horns may require cooling because of the heat transfer from contacting the work piece.

5.8 Testing the Installation

To test the power supply follow the procedure described in 7.8 Ultrasonics Test Procedure in Chapter 7: Operation.

5.9 Still Need Help?

Branson is pleased that you chose our product and we are here for you! If you need parts or technical assistance with your DCX F-PFN power supply, call your local Branson representative. Please refer to 10.2 Contact Us for more information.

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Chapter 6: Converters and Boosters

6.1 Converters and Boosters

A variety of converters and boosters available for use with the DCX F-PFN power supply are illustrated in the following pages.

WARNING	High Voltage Hazard
	To avoid the possibility of electrical shock, converters need to be properly grounded.

6.2 20 kHz

6.2.1 20 kHz Converter

Figure 6.1 20 kHz typical Converter Dimensions

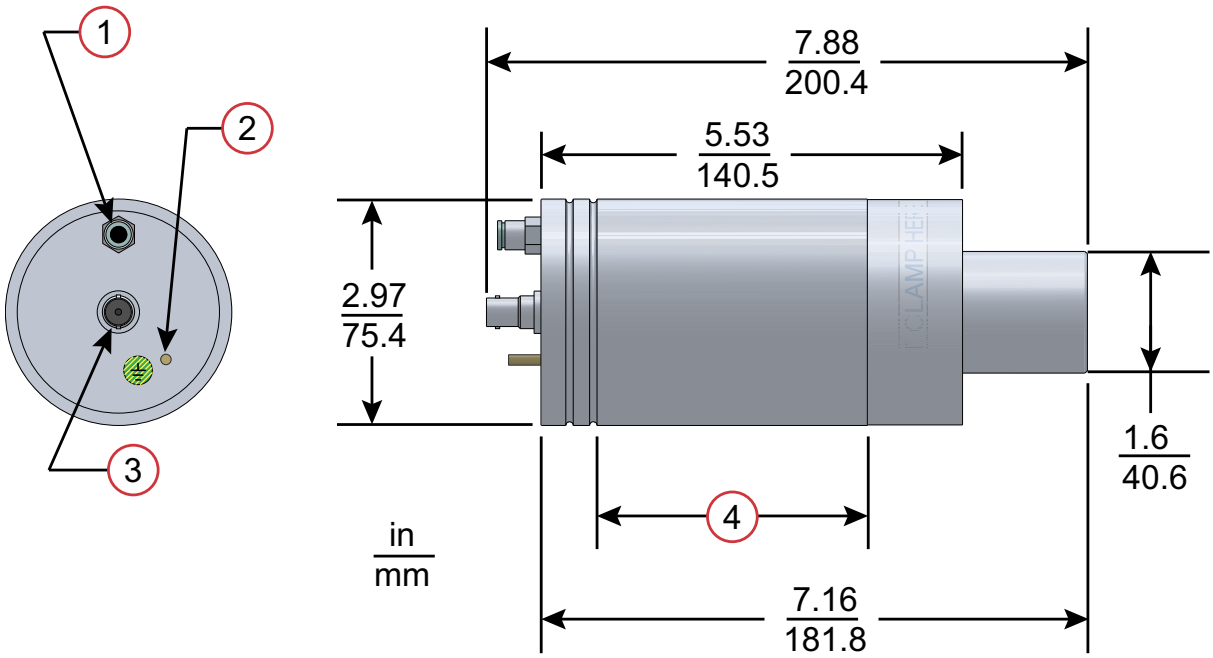

Table 6.1 20 kHz Converter

Item	Description
1	Air inlet
2	Ground stud
3	SHV connector
4	Grip area

6.2.2 20 kHz Booster

Figure 6.2 20 kHz Booster Dimensions

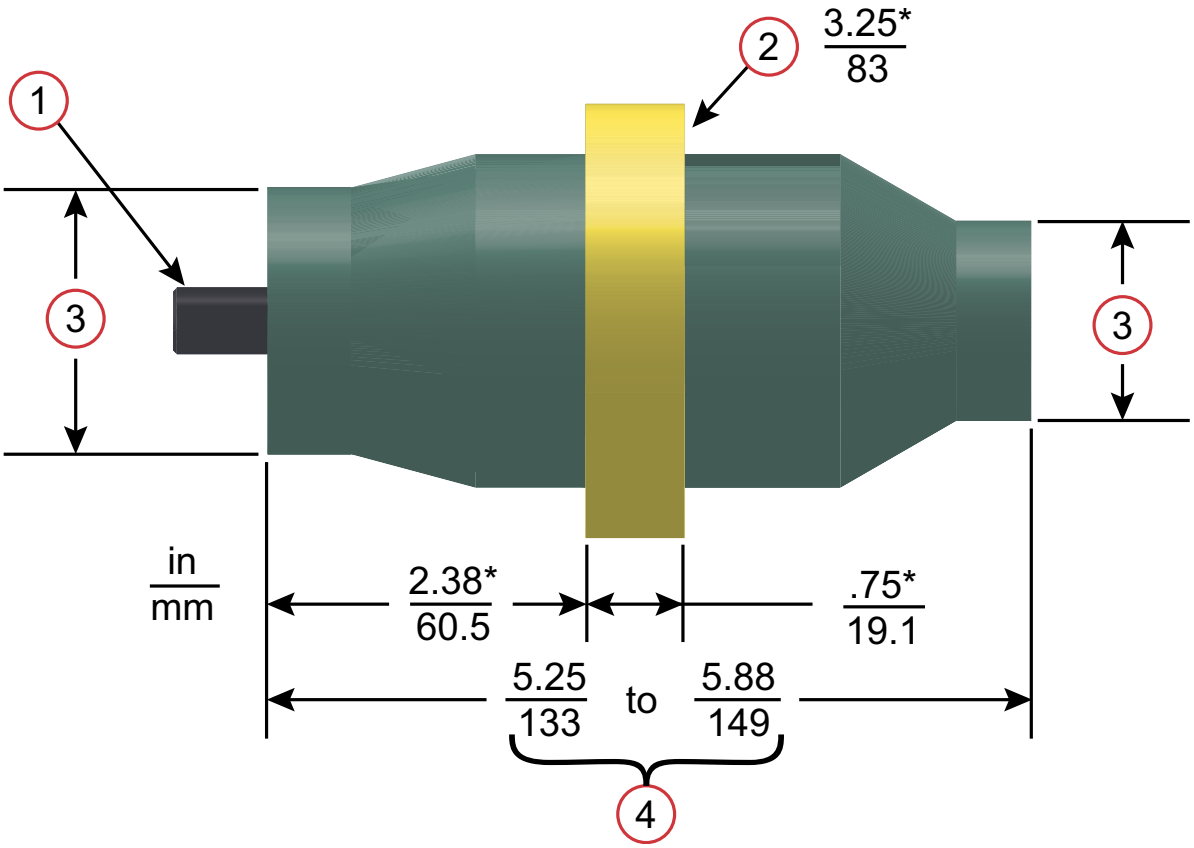

Table 6.2 20 kHz Booster

Item	Description
1	1/2 - 20 x 1 - 1/4 stud (Ti boosters) 1/2 - 20 x 1 - 1/2 stud (Al boosters)
2	Grip Ring Diameter
3	Variable
4	Varies with tuning and gain

* These dimensions do not vary.

6.2.3 20 kHz Stack

Figure 6.3 20 kHz Converter/Booster/Horn, Typical Dimensions

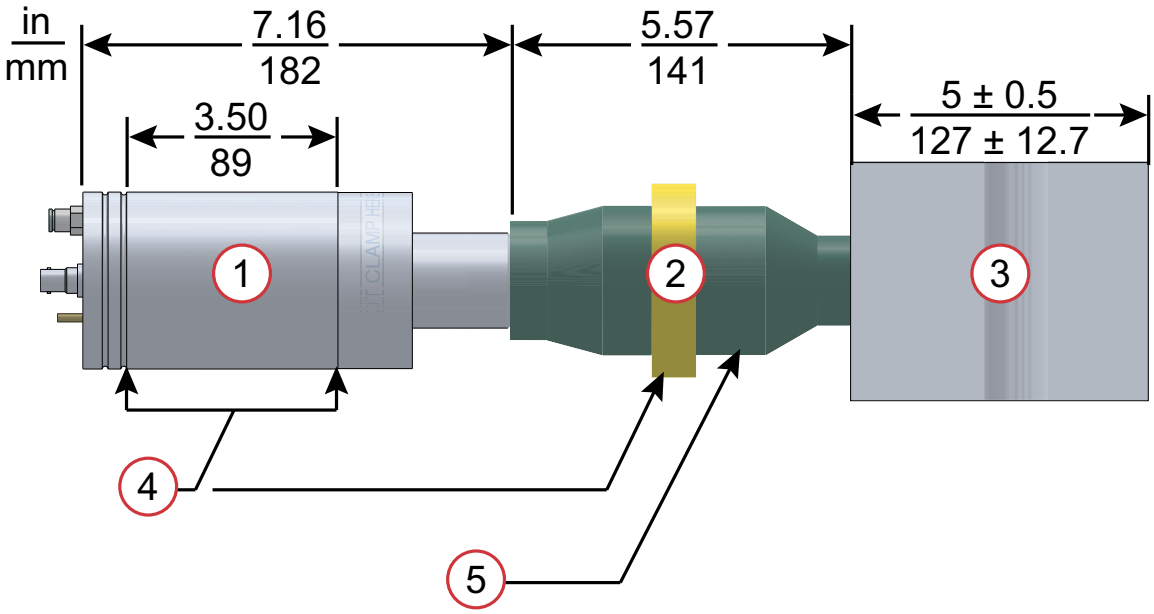

Table 6.3 20 kHz Converter/Booster/Horn

Item	Description
1	Converter
2	Booster
3	One-half wavelength horn
4	Recommended clamping area
5	Booster front end diameter will vary with amplitude

* Overall horn length can vary beyond these typical dimensions depending on the application.

6.3 30 kHz

6.3.1 30 kHz Converter

Figure 6.4 30 kHz Converter Dimensions

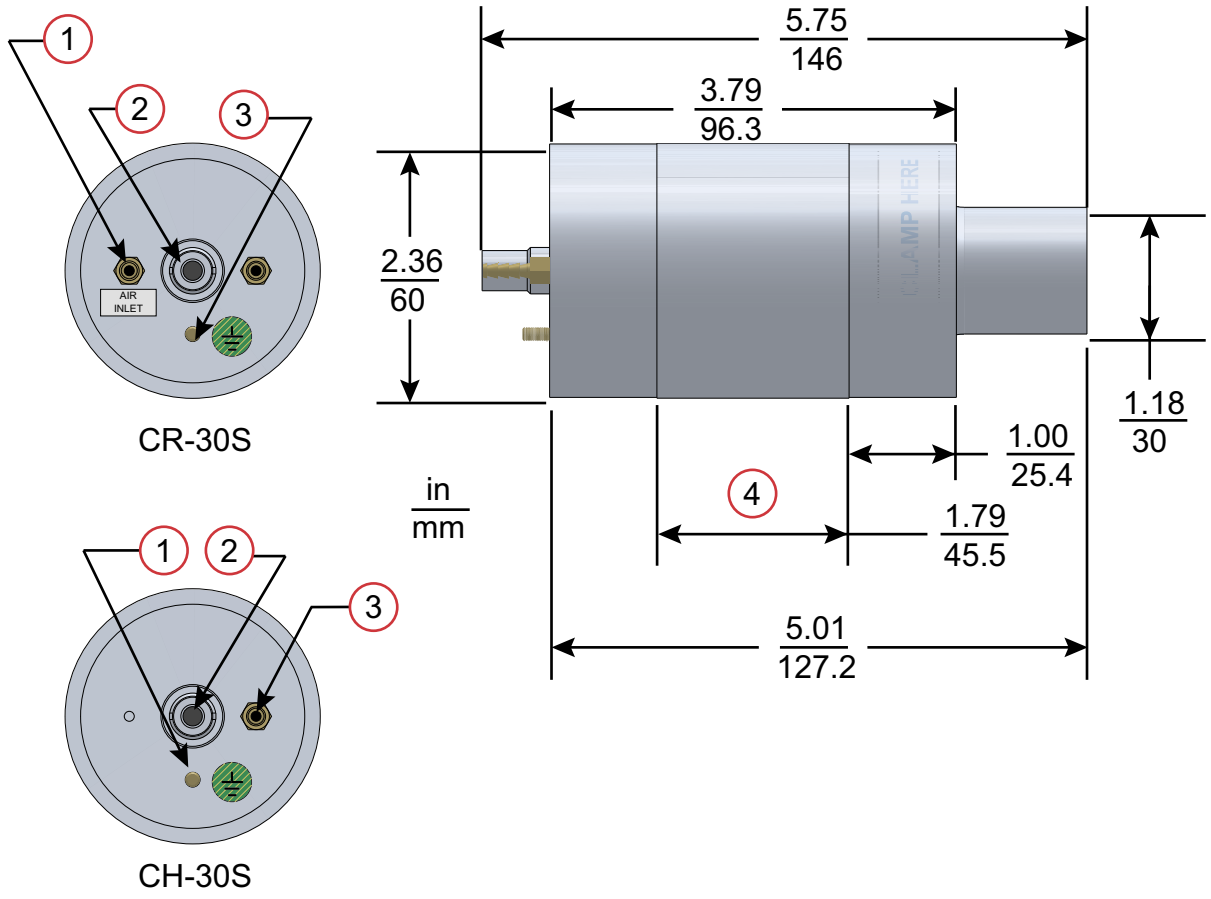

Table 6.4 30 kHz Converter

Item	Description
1	Air inlet
2	SHV connector
3	Ground stud
4	Grip area

CR-30S and CH-30S are dimensionally identical, and differ only in their respective cooling feature.

CR-30S has flow through cooling, and CH-30S has closed loop cooling (air circulates in the converter and returns to its source).

6.3.2 30 kHz Booster

Figure 6.5 30 kHz Booster Dimensions

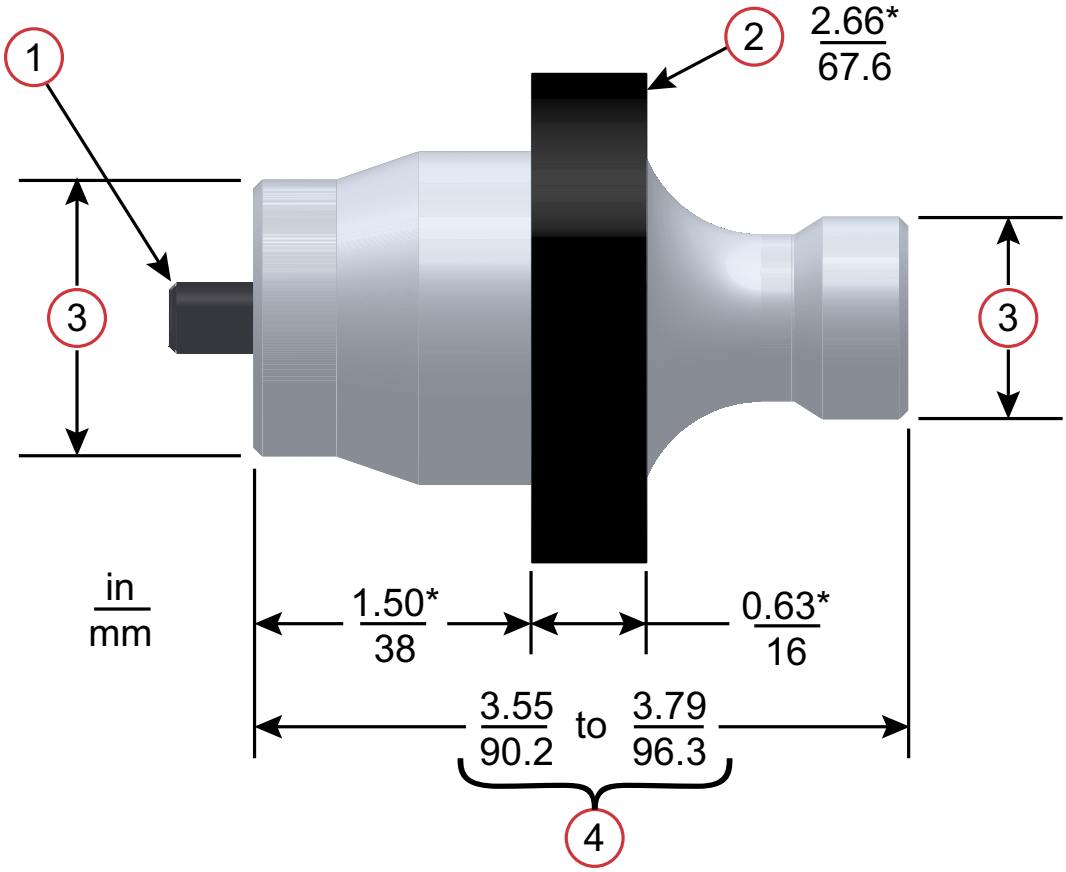

Table 6.5 30 kHz Booster

Item	Description
1	3/8 - 24 x 1 - 1/4 stud
2	Grip Ring Diameter
3	Variable
4	Varies with tuning and gain

* These dimensions do not vary.

6.3.3 30 kHz Stack

Figure 6.6 30 kHz Converter/Booster/Horn, Typical Dimensions

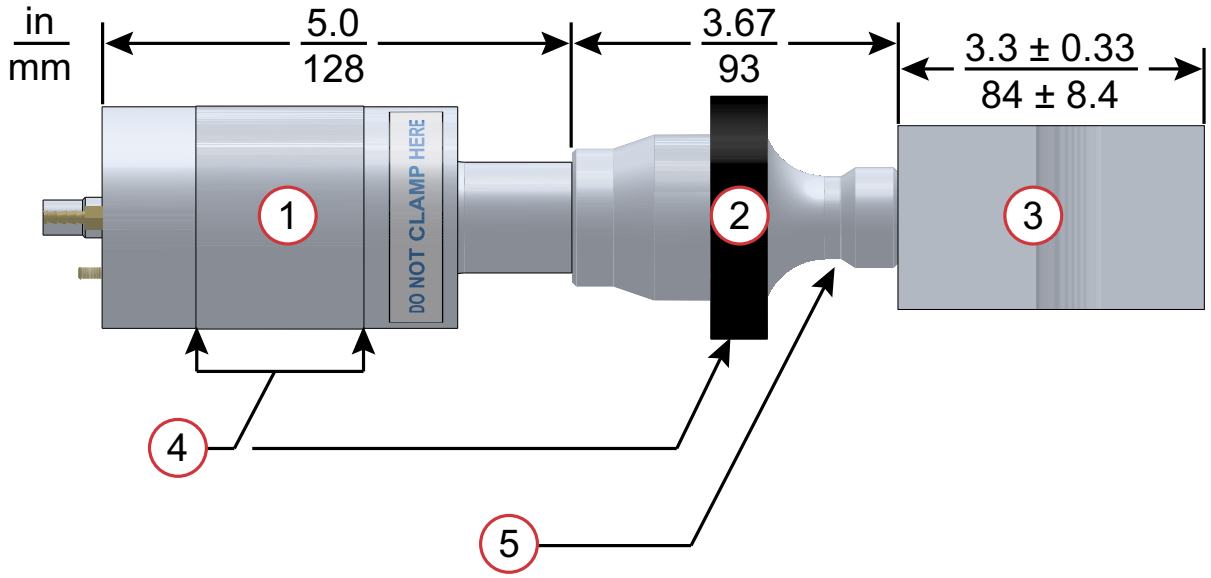

Table 6.6 30 kHz Converter/Booster/Horn

Item	Description
1	Converter
2	Booster
3	One-half wavelength horn
4	Recommended clamping area
5	Booster front end diameter will vary with amplitude

* Overall horn length can vary beyond these typical dimensions depending on the application.

6.4 40 kHz

6.4.1 40 kHz Booster

Figure 6.7 40 kHz Booster Dimensions

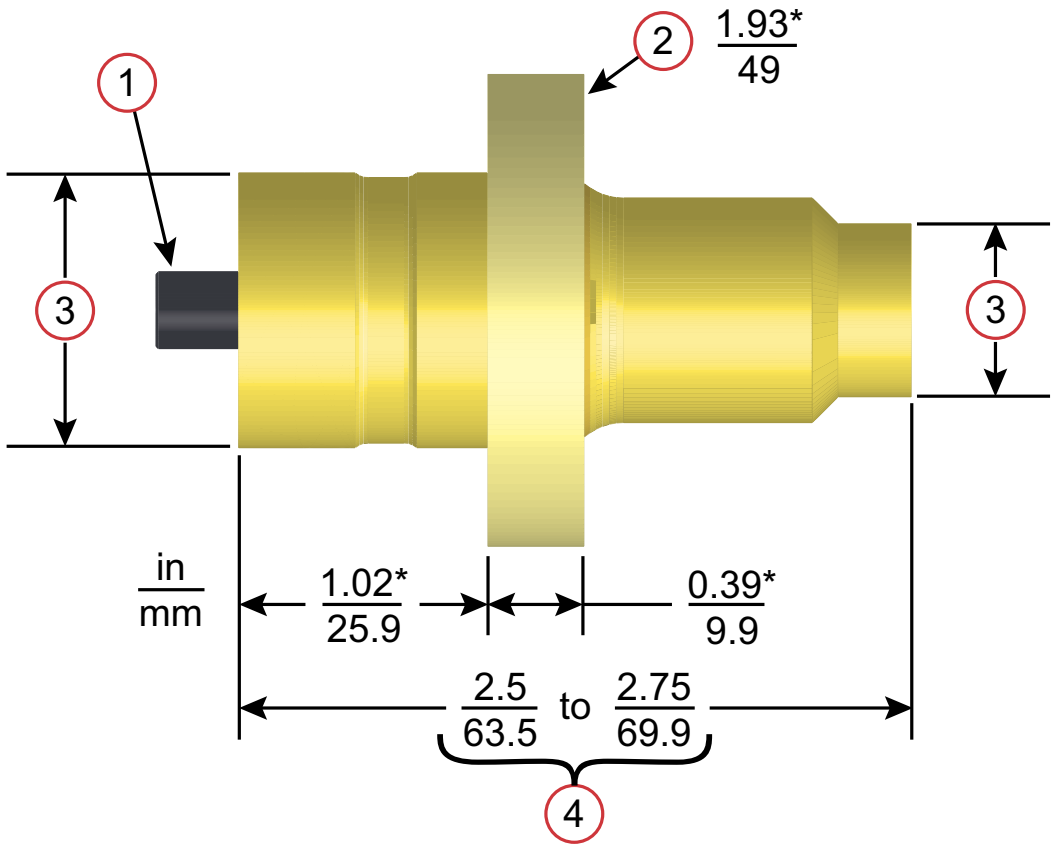

Table 6.7 40 kHz Booster

Item	Description
1	M8 x 1 - 1/4 stud (Ti boosters) M8 x 1 - 1/2 stud (Al boosters)
2	Grip ring diameter
3	Variable
4	Varies with tuning and gain

* These dimensions do not vary.

6.4.2 40 kHz Stack

Figure 6.8 40 kHz Converter/Booster/Horn, Typical Dimensions

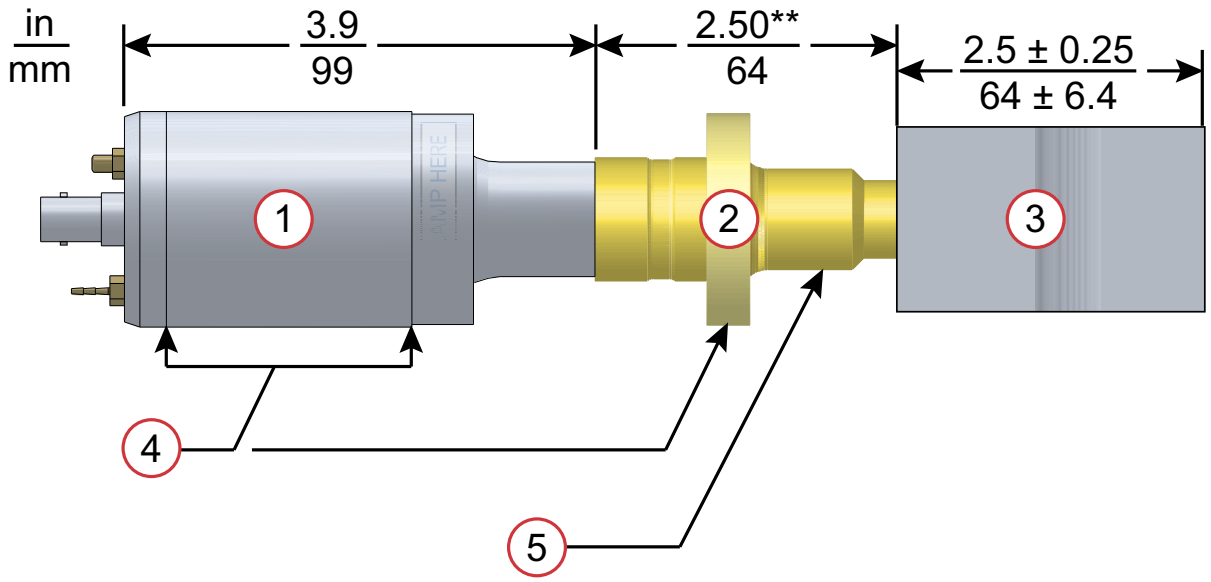

Table 6.8 40 kHz Converter/Booster/Horn

Item	Description
1	Converter
2	Booster
3	One-half wavelength horn
4	Recommended clamping area
5	Booster front end diameter will vary with amplitude

* Overall horn length can vary beyond these typical dimensions depending on the application.
** Dimension varies with tuning and gain.

6.5 Component Functional Description

6.5.1 Ultrasonic Stack

6.5.1.1 Converter

The converter is mounted in the customer's automation as part of the ultrasonic stack. The ultrasonic electrical energy from the power supply is applied to the converter (sometimes called the transducer). This transforms the high frequency electrical oscillations into mechanical vibrations at the same frequency as the electrical oscillations. The heart of the converter are piezoelectric ceramic elements. When subjected to an alternating voltage, these elements alternately expand and contract, resulting in better than 90% conversion of electrical to mechanical energy.

6.5.1.2 Booster

It is important to be able to modify the horn face amplitude for successful ultrasonic assembly. The booster provides a means to modify the amplitude. It is designed to couple different ratios of ultrasonic energy to the horn, which will in turn increase or decrease the amplitude at the face of the horn. This is accomplished by varying the ratios of the masses of the input and output half sections of the booster.

The booster is a resonant half-wave section of aluminum or titanium. It is mounted between the converter and the horn, as part of the ultrasonic stack. It also provides a clamping point for rigid stack mounting.

6.5.1.3 Horn

The horn is selected or designed for a specific application. Each horn is tuned typically as a half-wave section that applies the necessary force and vibration uniformly to the parts to be assembled. It transfers ultrasonic vibrations from the converter to the workpiece. The horn is mounted to the booster as part of the ultrasonic stack.

Depending on their profile, horns are referred to as stepped, conical, exponential, bar, or catenoidal. The shape of the horn determines the amplitude at the face of the horn. Depending on the application, horns can be made from titanium alloys, aluminum, or steel. Titanium alloys are the best materials for horn fabrication due to their high level of strength and low loss. Aluminum horns are usually chrome- or nickel-plated or hard-coated to reduce wear. Steel horns are for low amplitude requiring hardness, such as ultrasonic insertion applications.

6.5.1.4 Solid Mount Boosters

The solid mount booster is a one-half wave-length resonant section made exclusively of titanium. It is mounted between the converter and the horn, modifying the amplitude of vibration applied to the horn and providing a clamping point.

The solid mount booster is superior to prior versions in that deflection is minimized. This is the result of a redesigned clamp-ring which employs a metal-to-metal press fit rather than an O-ring assembly.

The advantage this booster offers is its improved rigidity. For continuous applications, this means more energy delivered to the product, while in plunge applications, improved alignment is possible. The solid mount provides improved positional alignment and will benefit continuous applications where high force, high side load, or high cycle rates are necessary. In plunge welding applications, overall deflection is reduced by an average of 0.0025 in. (0.064 mm) over a wide variety of materials, joint designs, and operating conditions. The results of this testing in combination with information drawn from field testing indicate that the solid mount will benefit plunge applications where precision alignment is necessary (such as staking, swaging, or insertion) or where concentricity/ parallelism is critical.

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Chapter 7: Operation

7.1 Setting Primary Parameters

After analyzing your specific application, you can determine the Weld Mode to use to weld your parts. A Weld Mode is a set of parameters that governs the weld. (Contact the Branson Ultrasonics Applications Laboratory for more information on determining the best mode for welding your application. See 10.2 Contact Us.

There are five Weld Modes to choose from Continuous, Time, Energy, Peak Power, and Ground Detect Modes. The following table describes each mode:

Table 7.1 Summary of Weld Modes

Weld Mode	Description
Continuous Mode	On this mode, ultrasonic energy will be delivered continuously while the start signal is present.
Time Mode	You select the length of time (in seconds) that ultrasonic energy will be transmitted to your parts.
Energy Mode	You select the amount of energy (in Joules) that will be transmitted to your parts. (A Joule is one Watt-Second.)
Peak Power Mode	You select the peak power level (as a percentage of full power) at which the weld is terminated.
Ground Detect Mode	The DCX F-PFN power supply provides ultrasonic energy until the horn comes in contact with your electrically isolated fixture or with the anvil, providing that you made an electrical connection between the actuator and your fixture or anvil. **NOTICE** Ground detect signal is required to terminate the weld and enter scrub time.

NOTICE	
	In these modes, cutoffs can be used as secondary controls.

7.1.1 Continuous Mode

In this mode, ultrasonic energy will be delivered continuously while the start signal is present. Within Continuous Mode, you can also select several other parameters, ranging from afterburst to limits and cutoffs. For more information on setting the optional parameters within Continuous Mode, or any other welding mode, refer to the DCX A/F Series Web Page Instruction Manual.

Table 7.2 Continuous Mode Operational Sequence

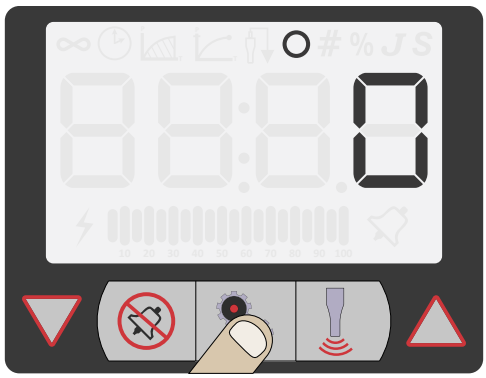
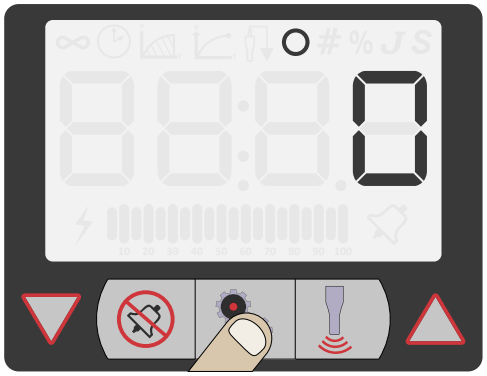
Step	Action	Reference
1	Press the Configuration key until the number icon (#) appears on the LCD. The power supply will display register 101 at every power up.	
2	Press and release the Up/Down arrow keys to select register 138. For a detailed description of available registers refer to Table 7.26 Power Supply Registers.	
3	Once you have reached register 138, press the Configuration key. The register value will be displayed; this is indicated by the circle icon.	

Table 7.2 Continuous Mode Operational Sequence

Step	Action	Reference
4	Use the Up/Down arrow keys to select value 0 (Continuous mode), then press the Configuration key to confirm the selection.	
5	Continuous mode icon and amplitude value will be displayed.	

7.1.2 Time Mode

You can use Time Mode to select the length of time that ultrasonic energy is applied to your parts. Within Time Mode, you can also select several other parameters, ranging from afterburst to limits and cutoffs. For more information on setting the optional parameters within Time Mode, or any other welding mode, refer to the DCX A/F Series Web Page Instruction Manual.

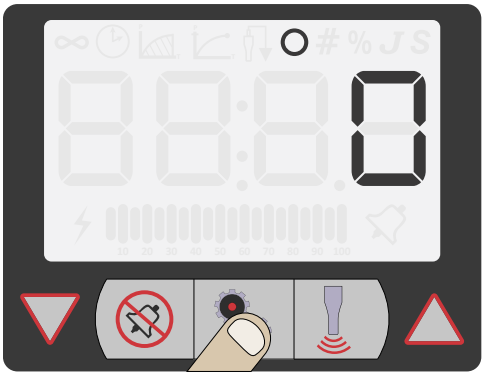
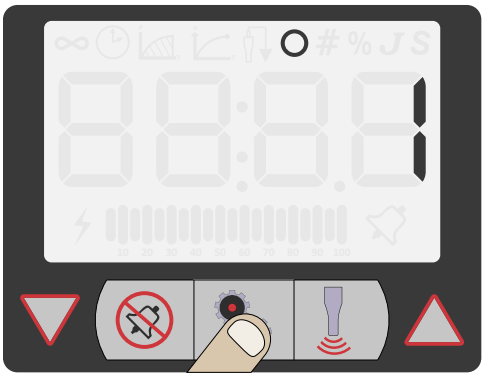
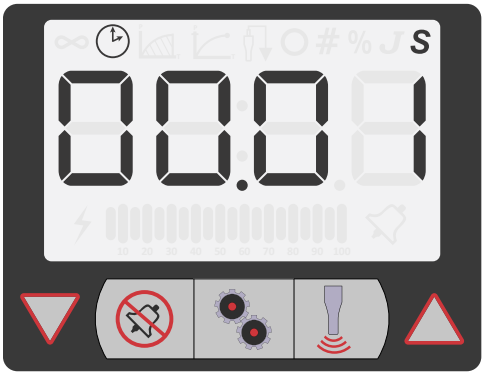
Table 7.3 Time Mode Parameters

Parameter	Default	Max. Value	Min. Value
Time	0.010 seconds	30 seconds	0.010 seconds

Table 7.4 Time Mode Operational Sequence

Step	Action	Reference
1	Press the Configuration key until the number icon (#) appears on the LCD. The power supply will display register 101 at every power up.	
2	Press and release the Up/Down arrow keys to select register 138. For a detailed description of available registers refer to Table 7.26 Power Supply Registers.	

Table 7.4 Time Mode Operational Sequence

Step	Action	Reference
3	Once you have reached register 138, press the Configuration key. The register value will be displayed; this is indicated by the circle icon.	
4	Use the Up/Down arrow keys to select value 1 (Time mode), then press the Configuration key to confirm the selection.	
5	Time mode icon and parameter value will be displayed. Use the Up/Down keys to enter the desired parameter value, then press the Configuration key to confirm the selected value.	

7.1.3 Energy Mode

You can use Energy Mode to select the amount of ultrasonic energy that is applied to your parts. Within Energy Mode, you can also select several other parameters, ranging from afterburst to limits and cutoffs. For more information on setting the optional parameters within Energy Mode, or any other welding mode, refer to the DCX A/F Series Web Page Instruction Manual.

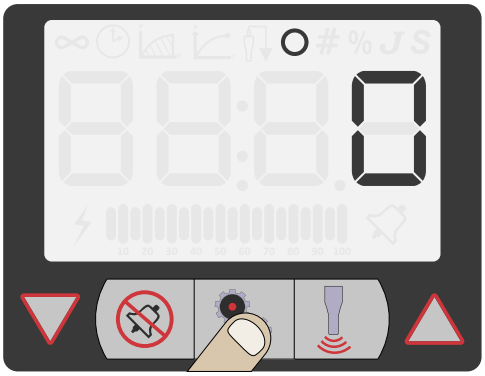
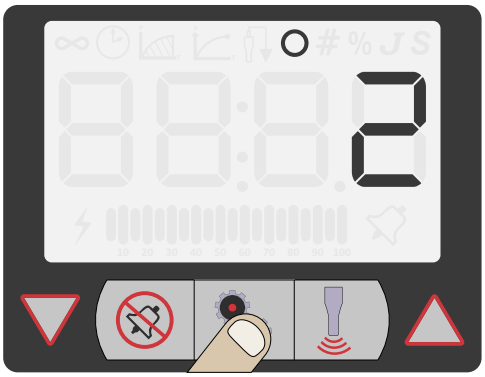
Table 7.5 Energy Mode Parameters

Parameter	Default	Max. Value	Min. Value
Energy	500 Joules	9999 Joules	0.1 Joules

Table 7.6 Energy Mode Operational Sequence

Step	Action	Reference
1	Press the Configuration key until the number icon (#) appears on the LCD. The power supply will display register 101 at every power up.	
2	Press and release the Up/Down arrow keys to select register 138. For a detailed description of available registers refer to Table 7.26 Power Supply Registers.	

Table 7.6 Energy Mode Operational Sequence

Step	Action	Reference
3	Once you have reached register 138, press the Configuration key. The register value will be displayed; this is indicated by the circle icon.	
4	Use the Up/Down arrow keys to select value 2 (Energy mode), then press the Configuration key to confirm the selection.	
5	Energy mode icon and parameter value will be displayed. Use the Up/Down keys to enter the desired parameter value, then press the Configuration key to confirm the selected value.	

7.1.4 Peak Power Mode

You can use Peak Power Mode to select the maximum percentage of the total available power that will be used to process your welds. When the power level you set is reached, ultrasonics will be terminated. From within Peak Power Mode, you can also select several other parameters, ranging from afterburst to limits and cutoffs. For more information on setting the optional parameters within Peak Power Mode, or any other welding mode, refer to the DCX A/F Series Web Page Instruction Manual.

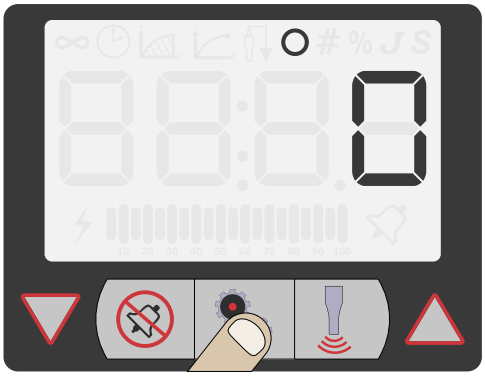
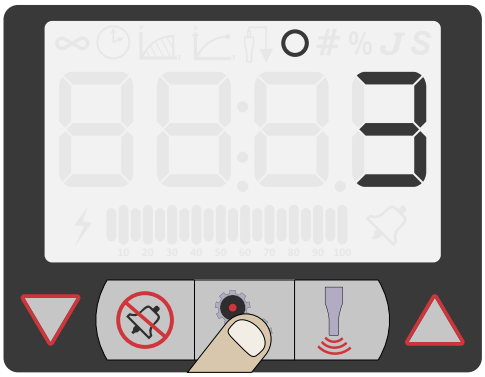
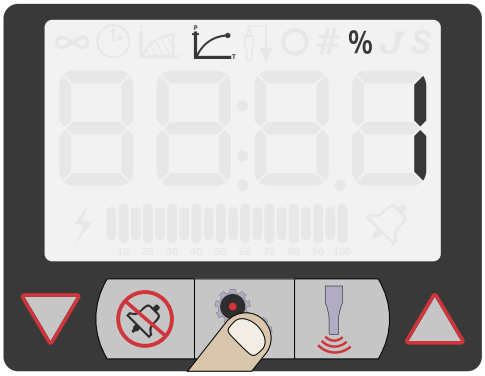
Table 7.7 Peak Power Mode Parameters

Parameter	Default	Max. Value	Min. Value
Peak Power	1%	100%	1%

Table 7.8 Peak Power Mode Operational Sequence

Step	Action	Reference
1	Press the Configuration key until the number icon (#) appears on the LCD. The power supply will display register 101 at every power up.	
2	Press and release the Up/Down arrow keys to select register 138. For a detailed description of available registers refer to Table 7.26 Power Supply Registers.	

Table 7.8 Peak Power Mode Operational Sequence

Step	Action	Reference
3	Once you have reached register 138, press the Configuration key. The register value will be displayed; this is indicated by the circle icon.	
4	Use the Up/Down arrow keys to select value 3 (Peak Power mode), then press the Configuration key to confirm the selection.	
5	Peak Power mode icon and parameter value will be displayed. Use the Up/Down keys to enter the desired parameter value, then press the Configuration key to confirm the selected value.	

7.1.5 Ground Detect Mode

You can use Ground Detect Weld Mode to have ultrasonic energy turn off when the horn comes in contact with your electrically isolated fixture or anvil.

From within Ground Detect Mode, you can also select several other parameters, ranging from Hold Time (in seconds) to Suspect and Reject Limits. For more information on setting the optional parameters within Ground Detect Mode, or any other welding mode, refer to the DCX A/F Series Web Page Instruction Manual.

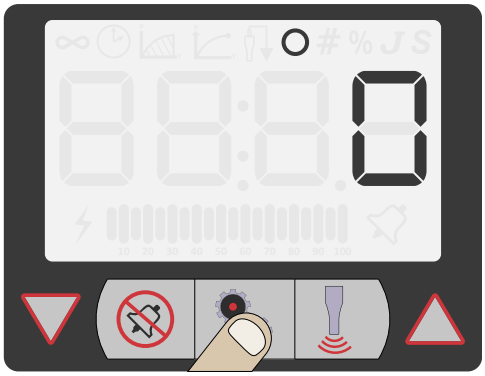
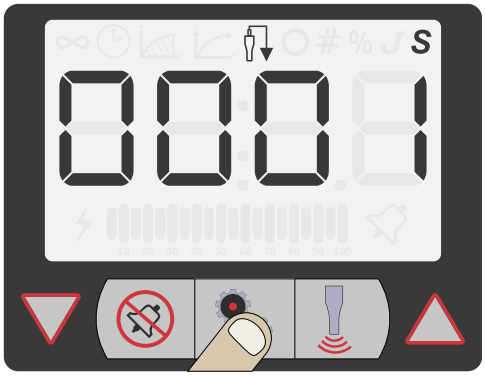
Table 7.9 Ground Detect Mode Parameters

Parameter	Default	Max. Value	Min. Value
Ground Detect	0.001 seconds	0.500 seconds	0.001 seconds

Table 7.10 Ground Detect Mode Operational Sequence

Step	Action	Reference
1	Press the Configuration key until the number icon (#) appears on the LCD. The power supply will display register 101 at every power up.	
2	Press and release the Up/Down arrow keys to select register 138. For a detailed description of available registers refer to Table 7.26 Power Supply Registers.	

Table 7.10 Ground Detect Mode Operational Sequence

Step	Action	Reference
3	Once you have reached register 138, press the Configuration key. The register value will be displayed; this is indicated by the circle icon.	
4	Use the Up/Down arrow keys to select value 4 (Ground Detect mode), then press the Configuration key to confirm the selection.	
5	Ground Detect mode icon and parameter value will be displayed. Use the Up/Down keys to enter the desired parameter value, then press the Configuration key to confirm the selected value.	

7.2 Setting Limits

NOTICE	
	Register 114 (Limits) must be set to On before proceeding. See 7.5 Configuring the Power Supply Registers for more information.

7.2.1 Time Window Limit High

Table 7.11 Time Window Limit High Parameters

Parameter	Default	Max. Value	Min. Value
Time Window Limit High	30.00s	30.00s	0.010s

NOTICE	
	Minimum value should be higher than the window limit low value.

NOTICE	
	Set value to 0 to set the window limit high to off.

NOTICE	
	Time window limits must be set in multiples of 1.

Table 7.12 Time Window Limit High Operational Sequence

Step	Action	Reference
1	Press the Configuration key until the number icon (#) appears on the LCD. The power supply will display register 101 at every power up.	
2	Press and release the Up/Down arrow keys to select register 158. For a detailed description of available registers refer to Table 7.26 Power Supply Registers.	
3	Once you have reached register 158, press the Configuration key. The register value will be displayed; this is indicated by the circle icon. Use the Up/Down arrow keys to select the desired time window limit high value, then press the Configuration key to confirm the selection. **NOTICE** Register 114 (Limits) must be set to On before proceeding. Otherwise, the value of the limits cannot be changed.	

7.2.2 Time Window Limit Low

Table 7.13 Time Window Limit Low Parameters

Parameter	Default	Max. Value	Min. Value
Time Window Limit Low	0s	30.00s	0.010s

NOTICE	
	Maximum value should be lower than the window limit high value.

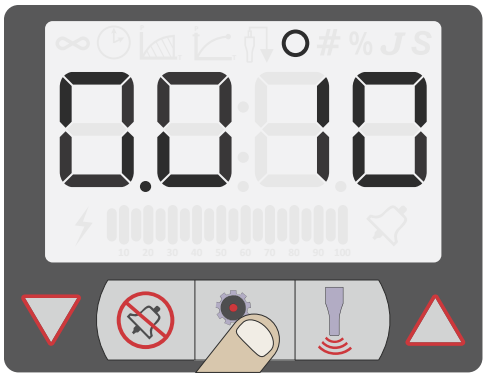
NOTICE	
	Set value to 0 to set the window limit high to off.

NOTICE	
	Time window limits must be set in multiples of 1.

Table 7.14 Time Window Limit Low Operational Sequence

Step	Action	Reference
1	Press the Configuration key until the number icon (#) appears on the LCD. The power supply will display register 101 at every power up.	

Table 7.14 Time Window Limit Low Operational Sequence

Step	Action	Reference
2	Press and release the Up/Down arrow keys to select register 159. For a detailed description of available registers refer to Table 7.26 Power Supply Registers.	
3	Once you have reached register 159, press the Configuration key. The register value will be displayed; this is indicated by the circle icon. Use the Up/Down arrow keys to select the desired time window limit low value, then press the Configuration key to confirm the selection. **NOTICE** Register 114 (Limits) must be set to On before proceeding. Otherwise, the value of the limits cannot be changed.	

7.2.3 Energy Window Limit High

Table 7.15 Energy Window Limit High Parameters

Parameter	Default	Max. Value	Min. Value
Energy Window Limit High	0J	9999J	0.1J

NOTICE	
	Minimum value should be higher than the window limit low value.

NOTICE	
	Set value to 0 to set the window limit high to off.

NOTICE	
	Energy window limits must be set in multiples of 1.

Table 7.16 Energy Window Limit High Operational Sequence

Step	Action	Reference
1	Press the Configuration key until the number icon (#) appears on the LCD. The power supply will display register 101 at every power up.	

Table 7.16 Energy Window Limit High Operational Sequence

Step	Action	Reference
2	Press and release the Up/Down arrow keys to select register 160. For a detailed description of available registers refer to Table 7.26 Power Supply Registers.	
3	Once you have reached register 160, press the Configuration key. The register value will be displayed; this is indicated by the circle icon. Use the Up/Down arrow keys to select the desired energy window limit high value, then press the Configuration key to confirm the selection. **NOTICE** Register 114 (Limits) must be set to On before proceeding. Otherwise, the value of the limits cannot be changed.	

7.2.4 Energy Window Limit Low

Table 7.17 Energy Window Limit Low Parameters

Parameter	Default	Max. Value	Min. Value
Energy Window Limit Low	0J	9999J	0.1J

NOTICE	
	Maximum value should be lower than the window limit high value.

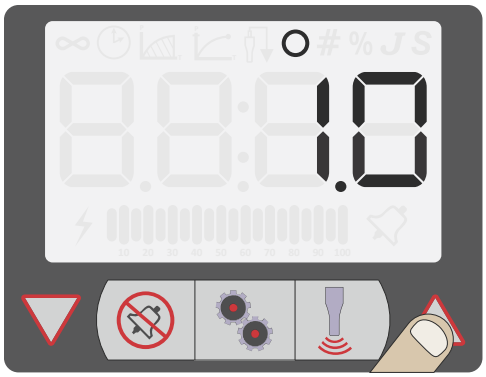
NOTICE	
	Set value to 0 to set the window limit high to off.

NOTICE	
	Energy window limits must be set in multiples of 1.

Table 7.18 Energy Window Limit Low Operational Sequence

Step	Action	Reference
1	Press the Configuration key until the number icon (#) appears on the LCD. The power supply will display register 101 at every power up.	

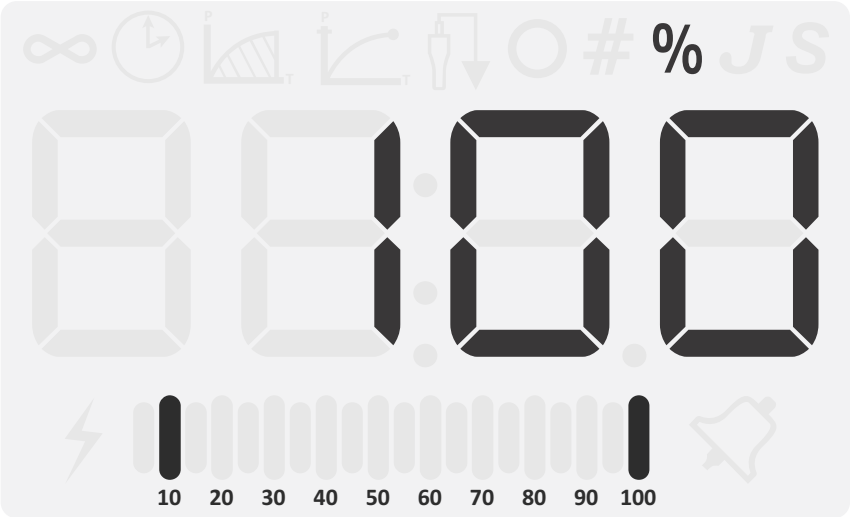
Table 7.18 Energy Window Limit Low Operational Sequence

Step	Action	Reference
2	Press and release the Up/Down arrow keys to select register 161. For a detailed description of available registers refer to Table 7.26 Power Supply Registers.	
3	Once you have reached register 161, press the Configuration key. The register value will be displayed; this is indicated by the circle icon. Use the Up/Down arrow keys to select the desired energy window limit low value, then press the Configuration key to confirm the selection. **NOTICE** Register 114 (Limits) must be set to On before proceeding. Otherwise, the value of the limits cannot be changed.	

7.2.5 Setting Power Window Limits

If power window high or power window low limits are enabled, it will display a single slowly blinking segment for the high limit and a single slowly blinking segment for the low limit in the bar-graph. In case of a window limit alarm, the respective segment will blink faster.

Figure 7.1 Power Window Limits



7.2.6 Power Window Limit High

Table 7.19 Power Window Limit High Parameters

Parameter	Default	Max. Value	Min. Value
Power Window Limit High	0%	100%	1%

NOTICE	
	Minimum value should be higher than the window limit low value.

NOTICE	
	Set value to 0 to set the window limit high to off.

NOTICE	
	Power window limits must be set in multiples of 1.

Table 7.20 Power Window Limit High Operational Sequence

Step	Action	Reference
1	Press the Configuration key until the number icon (#) appears on the LCD. The power supply will display register 101 at every power up.	
2	Press and release the Up/Down arrow keys to select register 162. For a detailed description of available registers refer to Table 7.26 Power Supply Registers.	
3	Once you have reached register 162, press the Configuration key. The register value will be displayed; this is indicated by the circle icon. Use the Up/Down arrow keys to select the desired power window limit high value, then press the Configuration key to confirm the selection. **NOTICE** Register 114 (Limits) must be set to On before proceeding. Otherwise, the value of the limits cannot be changed.	

7.2.7 Power Window Limit Low

Table 7.21 Power Window Limit Low Parameters

Parameter	Default	Max. Value	Min. Value
Power Window Limit Low	0%	100%	1%

NOTICE	
	Maximum value should be lower than the window limit high value.

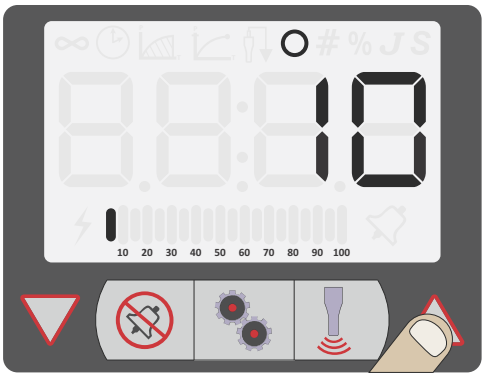
NOTICE	
	Set value to 0 to set the window limit high to off.

NOTICE	
	Power window limits must be set in multiples of 1.

Table 7.22 Power Window Limit Low Operational Sequence

Step	Action	Reference
1	Press the Configuration key until the number icon (#) appears on the LCD. The power supply will display register 101 at every power up.	

Table 7.22 Power Window Limit Low Operational Sequence

Step	Action	Reference
2	Press and release the Up/Down arrow keys to select register 163. For a detailed description of available registers refer to Table 7.26 Power Supply Registers.	
3	Once you have reached register 163, press the Configuration key. The register value will be displayed; this is indicated by the circle icon. Use the Up/Down arrow keys to select the desired power window limit low value, then press the Configuration key to confirm the selection. **NOTICE** Register 114 (Limits) must be set to On before proceeding. Otherwise, the value of the limits cannot be changed.	

7.2.8 Using the Web Page Interface

Window limits can be set to a user specified value using the web page interface. For more information, refer to the DCX A/F Rack Mount Series Web Page Interface Instruction Manual.

7.3 Setting the Amplitude

7.3.1 Using the Front Panel Controls

At power up the DCX F-PFN power supply will display the last amplitude setting on the LCD. It can also be set to show weld mode.

Figure 7.2 LCD at Power Up

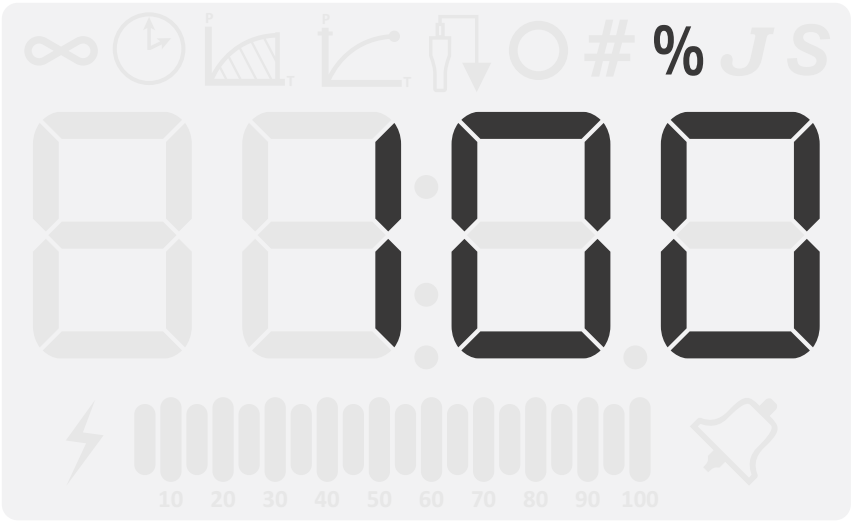
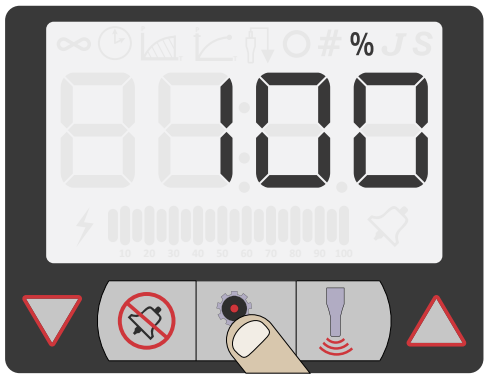


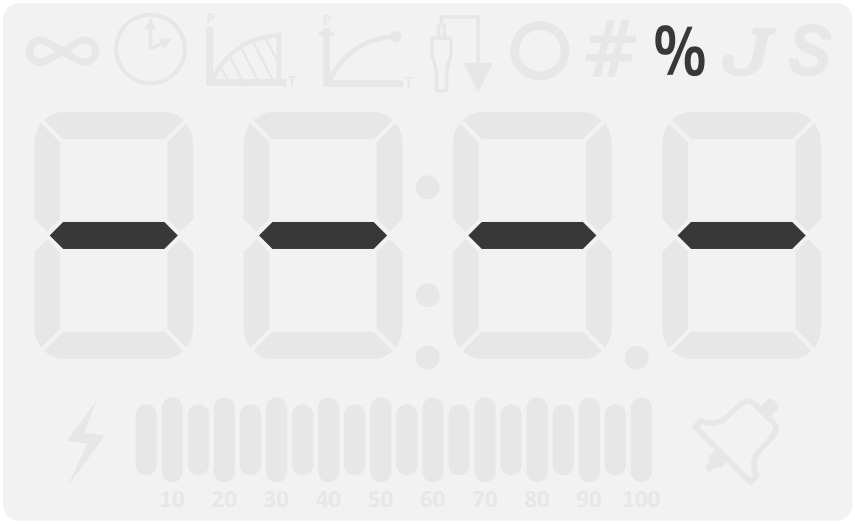
Table 7.23 Setting the Amplitude Using the Front Panel Controls

Step	Action	Reference
1	Press the Configuration key until the percentage icon (%) and no mode icons are displaying on the LCD.	
2	Press and release the Up or Down arrow keys to select the desired amplitude at 1% increments. Press and hold down the Up or Down arrow keys and the Amplitude will auto increment at 1% increments every quarter of a second. After holding down an arrow key for four straight seconds, the amplitude will auto increment at 5% increments every quarter of a second.	

7.3.2 Using External Amplitude Control

When External Amplitude Control is enabled, the front panel amplitude control is disabled and the LCD displays four dashes (see Figure 7.3 LCD when in External Amplitude Control Mode below).

Figure 7.3 LCD when in External Amplitude Control Mode



The ultrasonic amplitude can be controlled using one of the two analog input pins on the user I/O connector (pins 17 and 18) or through the Ether/Net IP interface.

7.3.3 Using the Web Page Interface

The ultrasonic amplitude can be set to a user specified value using the web page interface. For more information, refer to the DCX A/F Series Web Page Instruction Manual.

7.4 Resetting the Power Supply Alarms

You need to reset the weld system when you get an overload. When there is an overload, the alarm icon appears on the front panel LCD and the General Alarm output on the user I/O connector becomes active. The procedure for resetting the power supply depends on the power supply alarm settings. Refer to Table 7.24 Resetting the DCX F-PFN Power Supply for reset procedures.

Table 7.24 Resetting the DCX F-PFN Power Supply

Alarm Setting	Reset Procedure
Reset Required	Press the front panel Reset key. You can also send an External Reset signal.
No Reset Required	Remove and re-apply the start signal.

For more information on interfacing the DCX F-PFN power supply using the user I/O connections refer to 5.4.1 Power Supply I/O Connection in Chapter 5: Installation and Setup.

7.5 Configuring the Power Supply Registers

At power up the DCX F-PFN power supply will display the last amplitude setting, this is indicated by the percentage icon (%) on the LCD. Refer to Figure 7.2 LCD at Power Up.

Table 7.25 Steps to Configure the Power Supply Registers

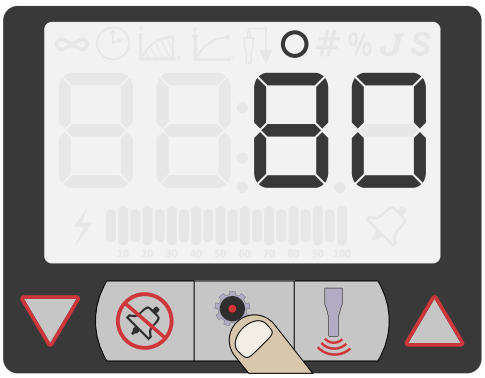
Step	Action	Reference
1	Press the Configuration key until the number icon (#) appears on the LCD. The power supply will display register 101 at every power up.	
2	Press and release the Up or Down arrow keys to select the desired register. For a detailed description of available registers refer to Table 7.26 Power Supply Registers.	
3	Once you have reached the desired register, press the Configuration key. The register value will be displayed, this is indicated by the circle icon.	

Table 7.25 Steps to Configure the Power Supply Registers

Step	Action	Reference
4	Press and release the Up or Down arrow keys to enter the desired value at 1 increments. Press and hold down the Up and Down arrow keys and the value will auto increment at 1 increments every quarter of a second. After holding down an arrow key for four straight seconds, the value will auto increment at 5 increments every quarter of a second. Or press the Reset key to enter the default value. For detailed default values of available registers refer to Table 7.26 Power Supply Registers.	
5	Press the Configuration key to save the value. The current amplitude setting will be displayed only for continuous mode. For all the other modes, it will display the primary parameter of that mode.	

7.5.1 Power Supply Registers

Table 7.26 Power Supply Registers

Register	Description	Default Value	Max. Value	Min. Value
101	Software version	N/A	N/A	N/A
102	Bar graph identification after weld complete 0=Power 1=Frequency	0	1	0
104	External amplitude control - user analog input or fieldbus 0=Off 1=On	0	1	0
105	Start ramp time (ms)	80	1000	10
106	Store frequency at end of weld 0=Off 1=On	1	1	0
107	Power up seek/scan 0=Off 1=Seek, 2=Scan	1	2	0
108	Seek ramp time (ms)	80	1000	10
109	Timed seek (every 60 seconds) 0=Off 1=On	0	1	0
110	Seek time (ms)	500	1000	10
111	External Frequency Offset 0=Off 1=On	0	1	0
112	Frequency Offset Value	0		
113	Cutoffs 0=Off 1=On	0	1	0
114	Limits 0=Off 1=On	0	1	0
115	Restore Defaults 0=Off 1=Just weld preset 2=System defaults	0	2	0
116	IP Address - 1	192	255	0
117	IP Address - 2	168	255	0
118	IP Address - 3	10	255	0

Table 7.26 Power Supply Registers

Register	Description	Default Value	Max. Value	Min. Value
119	IP Address - 4	100	255	0
120	Gateway for IP Address - 1	192	255	0
121	Gateway for IP Address - 2	168	255	0
122	Gateway for IP Address - 3	10	255	0
123	Gateway for IP Address - 4	1	255	0
124	Subnet Mask for IP Address - 1	255	255	0
125	Subnet Mask for IP Address - 2	255	255	0
126	Subnet Mask for IP Address - 3	255	255	0
127	Subnet Mask for IP Address - 4	0	255	0
128	DHCP Settings 0=Server 1=Client 2=Static 3=Restore Registers 116-128 to default	2	3	0
134	Backlight Timeout (s) 0=Always on	600	9999	0
135	Auto scroll step size	5	50	1
136	Power on display 0=Weld Mode 1=Amplitude	1	1	0
138	Weld Mode 0=Continous 1=Time 2=Energy 3=Peak Power 4=Ground Detect	0	4	0
139	MAC Address 1	N/A	FFFF	0
140	MAC Address 2	N/A	FFFF	0
141	MAC Address 3	N/A	FFFF	0
142	Ethernet IP Address - 1	192	255	0
143	Ethernet IP Address - 2	168	255	0
144	Ethernet IP Address - 3	10	255	0
145	Ethernet IP Address - 4	101	255	0
146	Gateway for Ethernet IP Address - 1	192	255	0
147	Gateway for Ethernet IP Address - 2	198	255	0
148	Gateway for Ethernet IP Address - 3	10	255	0
149	Gateway for Ethernet IP Address - 4	1	255	0
150	Subnet Mask for Ethernet IP Address - 1	255	255	0

Table 7.26 Power Supply Registers

Register	Description	Default Value	Max. Value	Min. Value
151	Subnet Mask for Ethernet IP Address - 2	255	255	0
152	Subnet Mask for Ethernet IP Address - 3	255	255	0
153	Subnet Mask for Ethernet IP Address - 4	0	255	0
154	Restore registers 142–154 to default.	0	1	0
158	+Time Limit 0: Select to disable limit 0.010-30.00s: Set -Time Limit	0	30.00s	0.010s
159	-Time Limit 0: Select to disable limit 0.010-30.00s: Set +Time Limit	0	30.00s	0.010s
160	+Energy Limit 0: Select to disable limit 0.1-9999J: Set -Energy Limit	0	9999J	0.1J
161	-Energy Limit 0: Select to disable limit 0.1-9999J: Set +Energy Limit	0	9999J	0.1J
162	+Power Limit 0: Select to disable limit 1-100%: Set -Power Limit	0	100%	1%
163	-Power Limit 0: Select to disable limit 1-100%: Set +Power Limit	0	100%	1%

7.6 Save/Recall Presets

If you wish to save your current weld cycle settings for later use, you can save it into a preset location. 32 preset locations are available. Preset settings are saved until they are over-written, and are maintained in memory even if the system is turned off or unplugged.

7.6.1 Save Preset

Table 7.27 Save Preset

Step	Action	Reference
1	Set the desired weld mode and parameters. See 7.1 Setting Primary Parameters for more information.	
2	Press the Configuration key until the preset location screen (Pr:XX) appears on the LCD.	
3	Press the Up or Down arrow keys to select the desired preset location to use. Once you have reached the desired preset location, press the Configuration key to select it. You will be returned to the main screen.	

Table 7.27 Save Preset

Step	Action	Reference
4	While on the main screen, press and hold the Reset key. While holding down the Reset key, press the Configuration to save your current control mode and parameters into the selected preset location (Pr:XX). The LCD will blink twice to confirm that the preset was saved correctly.	

7.6.2 Recall Preset

Table 7.28 Recall Preset

Step	Action	Reference
1	Press the Configuration key until the preset location screen (Pr:XX) appears on the LCD.	
2	Press the Up or Down arrow keys to select the desired preset location to recall. Once you have reached the desired preset location, press and hold the Reset key. While holding down the Reset key, press the Configuration for 3 seconds to recall the selected preset location (Pr:XX). The LCD will blink twice to confirm that the preset was recalled correctly.	
3	You will be returned to the main screen with the recalled preset location settings.	

7.7 LCD Bar-Graph

While ultrasonic power is active the LCD will always display the power value on the 20-segment LCD bar-graph as a percentage of the maximum output power.

At the end of a weld or test cycle, the bar-graph is factory set to represent the cycle's peak power as a percentage of the maximum output power.

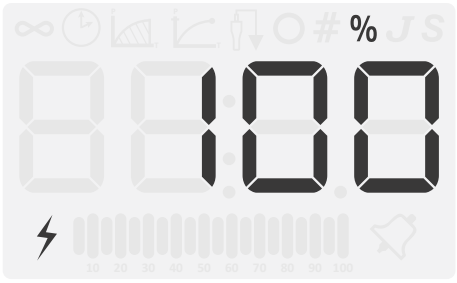
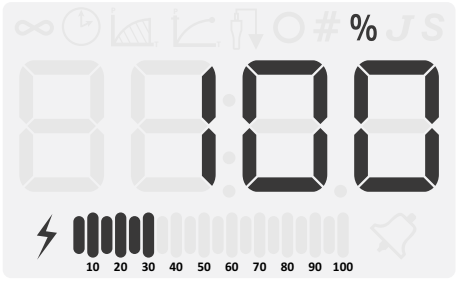
The power supply can also be configured to show a single bar on the LCD bar-graph to represent the stack operating frequency stored at the end of each weld or test cycle. This option can be used to troubleshoot operating frequency changes as a result of heating effects, coupling, tooling wear, etc.

For information on how to set the power supply registers see 7.5 Configuring the Power Supply Registers.

7.7.1 Power Bar-Graph Interpretation

The lightning bolt left of the bar-graph indicates ultrasonic power is running. Each of the segments represent 5% increments of the maximum output power. The segments will only appear if the output power has exceeded the value represented. For example if the power is 4% only the lightning bolt will be on. When it reaches 5% the first bar-graph segment will appear.

Table 7.29 Power Bar-Graph Interpretation Examples

Description	Reference
In this example only the lightning bolt appears left of the bar-graph. This means power is between 0% and less than 5%. If the power supply is 800 W the actual output power is between 0 W and less than 40 W.	
In this example the first six segments appear on the bar-graph. This means power is between 30% and less than 35%. If the power supply is 800 W, the actual output power is between 240 W and less than 280 W.	

7.7.2 Frequency Bar-Graph Interpretation

The actual frequency depends on the power supply's operating frequency. Use Table 7.30 to Table 7.32 below to interpret frequency bar-graph readings.

NOTICE	
	If there is a test overload or an external memory reset signal is received, then the 50% segment will be displayed and blinking.

Table 7.30 Frequency Bar-Graph Interpretation - 20 kHz (50 Hz Segment)

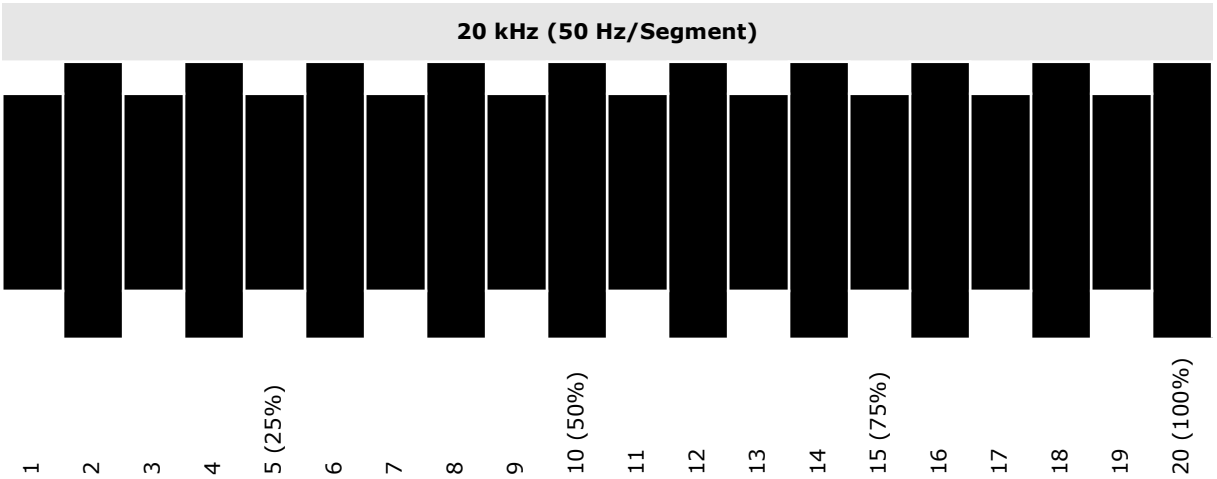


Table 7.31 Frequency Bar-Graph Interpretation - 30 kHz (76 Hz Segment)

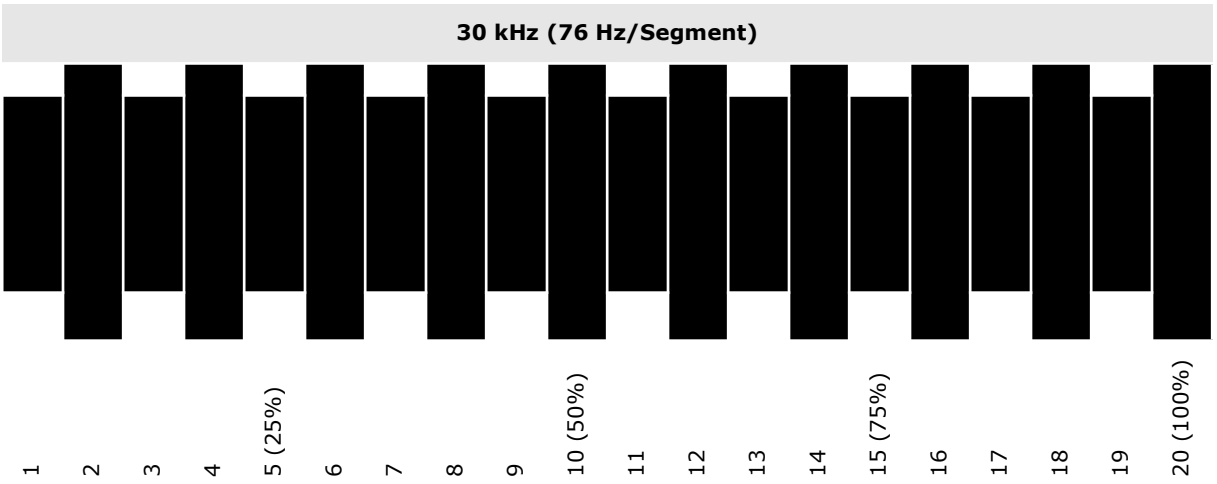


Table 7.32 Frequency Bar-Graph Interpretation - 40 kHz (100 Hz/Segment)

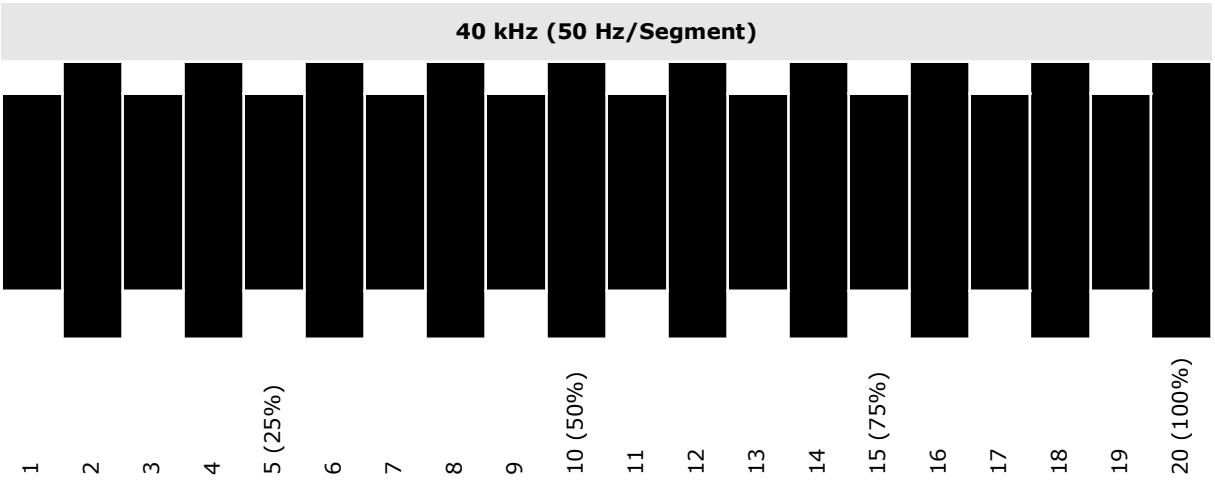
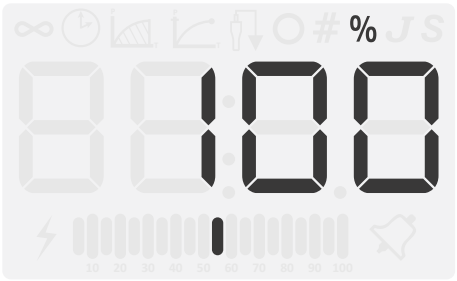
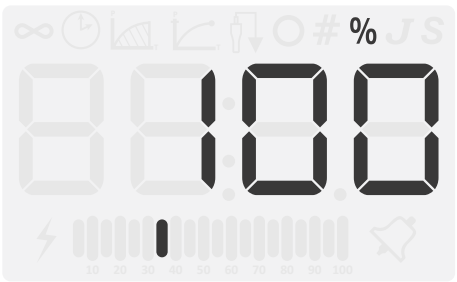


Table 7.33 Frequency Bar-Graph Interpretation Examples

Description	Reference
In this example the bar is located in the 11th segment. If the power supply is a 20 kHz unit, the stack is running in the frequency range of 19,975 Hz to 20,024 Hz.	
In this example the bar is located in the 7th segment. If the power supply is a 20 kHz unit, the stack is running in the frequency range of 19,775 Hz to 19,824 Hz.	

7.8 Ultrasonics Test Procedure

The Ultrasonics Test function measures ultrasonic power dissipated by the ultrasonic stack with no load. The ultrasonics test procedure involves an automatic matching of the frequency of the power supply to the frequency of the converter-booster-horn stack.

WARNING	High Voltage Hazard
	Ensure that no one is in contact with the horn when testing the power supply. Do not cycle the welding system if either the RF cable or converter is disconnected.

WARNING	High Voltage Hazard
	Ensure the power supply is properly connected, as indicated in 5.3 Installation Steps.

7.8.1 Using the Front Panel Controls

NOTICE	
	To use the front panel controls, the DCX F-PFN power supply unit must be in manual mode.

Table 7.34 Power Supply Ultrasonic Test Procedure (Front Panel)

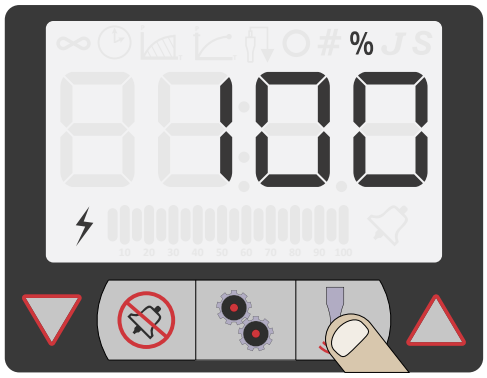
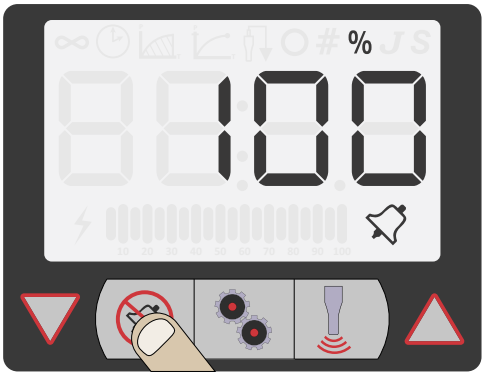
Step	Action	Reference
1	Press the test key for 1-2 seconds, then release. The Sonics Active indicator appears while the test key is pressed. If the power supply alarm indicator does not appear, the test procedure is finished.	

Table 7.34 Power Supply Ultrasonic Test Procedure (Front Panel)

Step	Action	Reference
2	If the alarm indicator appears, press the alarm reset key and repeat step 2 one time only. If the alarm persists, refer to 9.6 Troubleshooting. See Appendix A: Alarms for additional information.	

7.9 Using the I/O Connections

Table 7.35 Power Supply Ultrasonic Test Procedure (User I/O)

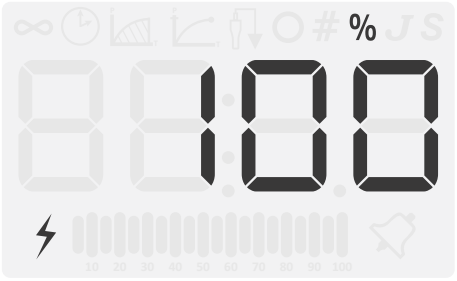
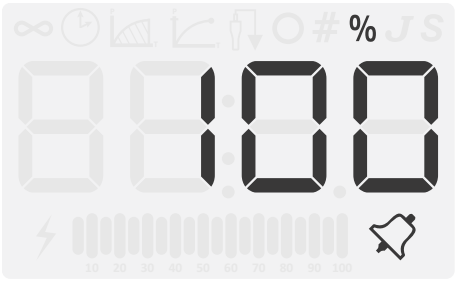
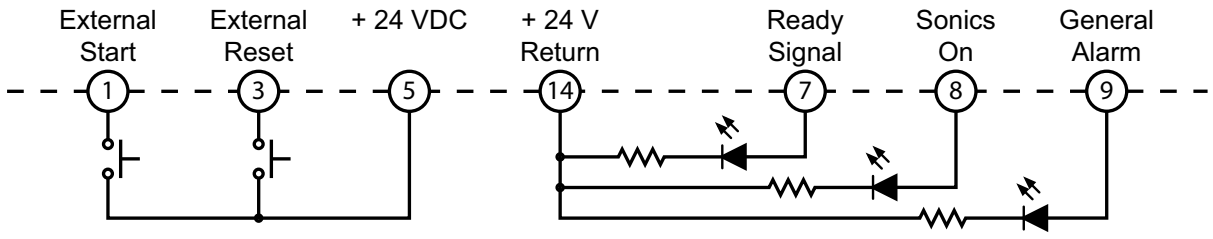
Step	Action	Reference
1	Wire the necessary I/O signals as shown on Figure 7.4 Test Connections, or using a similar setup.	Refer to Figure 7.4 Test Connections below.
2	Send an External Test signal for 1-2 seconds. The Sonics Active output will become active and the Sonics Active indicator appears while the External Start Signal is present. If the General Alarm output/ alarm indicator does not become active, the test procedure is finished. **NOTICE** Power supply must be in manual mode.	
3	If the General Alarm output/alarm indicator becomes active, send an External Reset signal and repeat step 2 one time only. If the alarm persists, refer to 9.6 Troubleshooting.	

Figure 7.4 Test Connections



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Chapter 8: PROFINET Operation

8.1 PROFINET

The DCX F-PFN power supply is controlled via a PROFINET IO interface. The parameters of the DCX F-PFN power supply, for example, are also configured via PROFINET IO.

8.1.1 LED Status Indicator

To get a fast overview about the status of the DCX F-PFN power supply, three LEDs are placed in front of the unit. The subsequent table describes the meaning of LEDs.

Figure 8.1 LED Status Indicator

Table 8.1 DCX F-PFN Power Supply LED Status Indicator

LED	Color	State	Description
SYS	Green	On	Operating system running.
	Green/Yellow	Flashing (green/yellow)	Bootloader is waiting for firmware.
	Yellow	On	Bootloader is waiting for software.
	Off	Off	Power supply for the device is missing or hardware defect.

Table 8.1 DCX F-PFN Power Supply LED Status Indicator

LED	Color	State	Description
MS	 Off	Off	No error.
	 Red	Flashing (1 Hz, 3 s)	DCP signal service is initiated via the bus.
	 Red	On	Watchdog timeout; channel, generic or extended diagnosis present; system error.
NS	 Off	Off	No error.
	 Red	Flashing (2 Hz)	No data exchange.
	 Red	On	No configuration; or low speed physical link; or no physical link.
LINK Ch0 & CH1	Green	On	The device is linked to the Ethernet.
	Off	Off	The device has no link to the Ethernet.
ACT Ch0 & Ch1	Yellow	Flickering (load dependant)	The device sends/receives Ethernet frames.
	Off	Off	The device does not send/receive Ethernet frames.

8.1.2 PROFINET Specifications

The PROFINET interface has the following technical specifications:

- Maximum number of total cyclic input data: 1440 bytes
- Maximum number of total cyclic output data: 1440 bytes
- Maximum number of submodules: 256 submodules
- Acyclic communication: Read/Write Record
- Alarm Types: Process Alarms, Diagnostic Alarm
- Diagnosis Entries: Up to 256 application diagnosis records of type Channel or Extended Channel Diagnosis
- Identification & Maintenance: I&M0 Read: Either built in for Slot 0 / Subslot 1 or pass through to application for any submodule.
- I&M1-5 Read/Write: Either built in for Slot 0 / Subslot 1 or pass through to application for any submodule.
- Topology recognition: physical device
- IO Connection type: Cyclic, minimum 1 ms
- Additional supported features: DCP
- Baud Rates: 100 MBit/Sec
- Data transport layer: Ethernet II, IEEE802.3
- Profinet IO specification: V2.3 (advanced startup) is implemented V2.2 (legacy startup) is supported

8.2 PROFINET Overview

NOTICE	
	This section assumes that the user has a fundamental understanding of the various Siemens PLC platforms and Siemens software packages. It is not intended to serve as an instructional manual for the above items. Because of the variety of uses for the products described in this publication, those responsible for the application and use of this equipment must satisfy themselves that all necessary steps have been taken to assure that each application and use meets all performance and safety requirements, including any applicable laws, regulations, codes and standards. The illustrations, charts, sample programs and layout examples shown in this section are intended solely for purposes of example. Since there are many variables and requirements associated with any particular installation, Branson does not assume responsibility or liability for actual use based upon the examples shown in this publication.

8.2.1 PROFINET Protocol

The Industrial Ethernet Protocol PROFINET was originally developed by Siemens and is now managed by PI (PROFIBUS & PROFINET International). It is a well-established Industrial Ethernet communication system with real-time and deterministic capabilities. PROFINET has a strong presence in Europe and is widely adopted by major manufacturers as a plant-wide communication system for factories worldwide. PROFINET is standardized in the international standard IEC 61158, and PROFINET devices are certified by PI for interoperability and conformance.

PROFINET extends commercial off-the-shelf Ethernet to industrial automation by defining application profiles and communication classes that support both cyclic real-time data exchange and acyclic information transfer. It allows system integrators and users to apply the same engineering tools and profiles for plug-and-play interoperability among devices from multiple vendors and across multiple sub-nets. Combined with PROFIBUS and PROFINET, the PI technologies promote transparency from sensors and actuators up to enterprise software, enabling seamless integration in Industry 4.0 environments.

This manual describes the implementation and usage of DCX F-PFN communication with a Siemens PLC using PROFINET. The document focuses on demonstrating how a Siemens SIMATIC controller can exchange data with a Branson DCX F-PFN power supply for monitoring, control, and parameter access.

The examples and instructions provided in this manual are developed using TIA Portal with a SIMATIC S7-1212C AC/DC/Relay PLC. Through PROFINET communication, the Siemens PLC can control and monitor one or more DCX F-PFN power supplies. Cyclic data exchange is used for real-time control signals and status information, while acyclic communication can be utilized to access detailed system data, such as weld results and configuration parameters.

CAUTION	
	The DCX F-PFN power supply should always be powered up after the PLC is powered and ready. It is recommended to use the first scan bit of the PLC to energize an external relay for connecting the 24VDC power to the BAS power supply.

8.3 PROFINET Certification

Figure 8.2 PROFINET Certification

PROFIBUS • PROFINET

Certificate

PROFIBUS Nutzerorganisation e.V. grants to

Emerson Electric Co.
12001 Technology Dr., 55344 Eden Prairie, MN, USA

the Certificate No: **Z14353** for the PROFINET IO Device:

Model Name:	DCX f pfn RM
Revision:	SW/FW: V4.9.7; HW: 3
Identnumber:	0x01B1; 0x1000
GSD:	GSDML-V2.43-BransonUltrasonics-DCX_RM-20260303.XML
DAP:	DCX DAP, 0x00002081

This certificate confirms that the product has successfully passed the certification tests with the following scope:

☑ PNIO_Version	V2.43
☑ Conformance Class	B
☑ Optional Features	Legacy, MRP Client
☑ Netload Class	II
☑ PNIO_Tester_Version	Version 2.45.0
☑ Tester	PROFI Interface Center, Johnson City, USA; PN404-2

This certificate is granted according to the document:
"Framework for testing and certification of PROFIBUS and PROFINET products".
For all products that are placed in circulation by **March 30, 2029** the certificate is valid for life.

Karlsruhe, May 06, 2026

(Official in Charge)

Board of PROFIBUS Nutzerorganisation e. V.

(Xaver Schmidt)

(Frank Moritz)

PROFI NET

8.4 Message Type Definitions

8.4.1 Acyclic Message

Acyclic messages contain addressing and service information that directs the receiving device to perform a certain service (action) on a specific part (e.g., an attribute) of a device. Acyclic message data can be sent or received from any available instance in the PROFINET device being communicated to. Acyclic messages allow for easy management of different data types.

8.4.2 Cyclic (I/O) Message

Cyclic messages do not carry address and/or service information; the consuming node(s) already know what to do with the data based on the connection ID that was assigned when the connection was established. Cyclic messages are so named because the meaning of the data is implied by the connection ID. When a Cyclic message procedure is setup for a specific device. All data sent to or received from the device must be of the same type.

8.5 System Requirements

8.5.1 Hardware

- PLC (Siemens SIMATIC S7 1200 / Siemens SIMATIC S7 1500).
- PROFINET IO device.
- Ethernet switch.

8.5.2 Software

- Siemens TIA Portal installed.
- Device GSDML file for the PROFINET device.

8.5.3 Network

- PLC and PROFINET device connected on the same Ethernet network.

8.6 Configuring the DCX F-PFN Settings

The DCX F-PFN power supply supports flexible configuration of its PROFINET network settings to simplify integration into industrial automation environments.

For this setup, the device's IP address and station name can be configured using two methods:

1. Via the Web Page: The DCX F-PFN power supply device allows manual entry of the PROFINET station IP address directly through the integrated web screens.
2. Via DCP Protocol from the PROFINET Controller (PNC): The device also supports automatic configuration using the Discovery and Basic Configuration Protocol (DCP) initiated by the PROFINET controller. During commissioning, the controller can assign the device name and IP address based on the configuration in the engineering tool (e.g., Siemens TIA Portal). This enables seamless integration without manual intervention.

Both configuration methods ensure that the DCX F-PFN power supply is uniquely identifiable and correctly addressable on the PROFINET network.

8.6.1 Configuration Via Web Page

The DCX F-PFN power supply IP settings for PROFINET are found in the **CONFIGURATION > COMMUNICATION** screen. The IP Address, Subnet Mask and Gateway settings can be changed here.

NOTICE	
	An Ethernet cable connection between the DCX F-PFN power supply system and a PC or PLC is required before the IP Address can be viewed or modified. After making changes to the network settings, the DCX F-PFN power supply system must be power cycled for the changes to take effect.

Table 8.2 Configuring DCX F-PFN Power Supply

Step	Instructions
1	From the main menu, go to **CONFIGURATION > COMMUNICATION**
2	Change the network settings as needed for compatibility with your network configuration.
3	Press the **Save** button to save the new settings.
4	Turn off the DCX F-PFN power supply, wait a few moments, and then turn power back on.

Figure 8.3 Configuring DCX F-PFN Power Supply

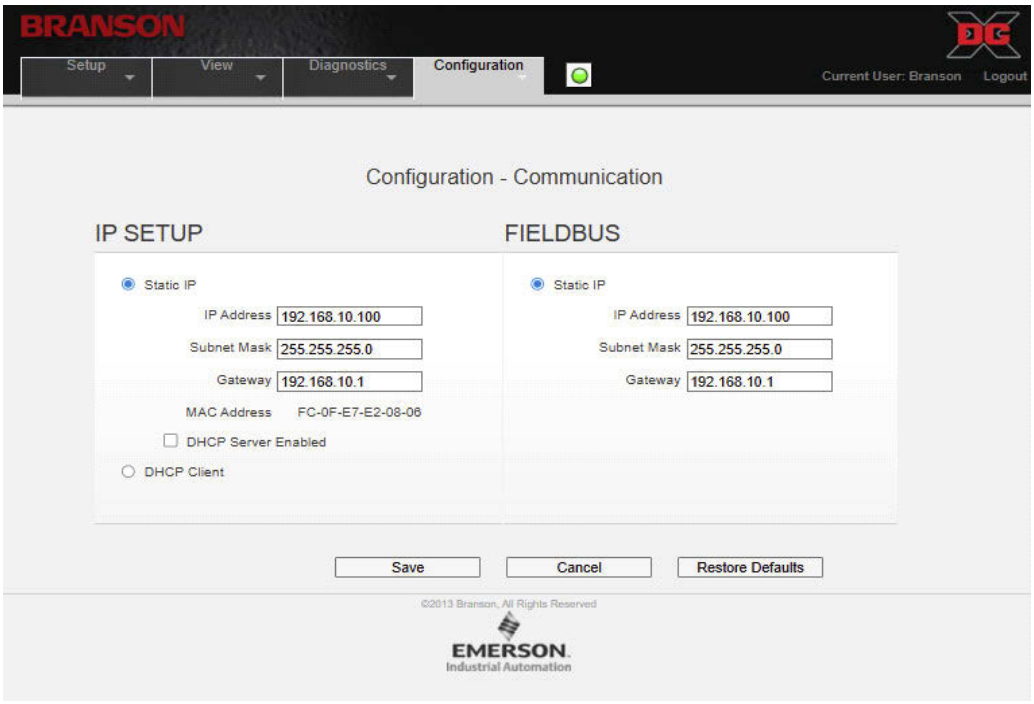


Table 8.3 Default Settings

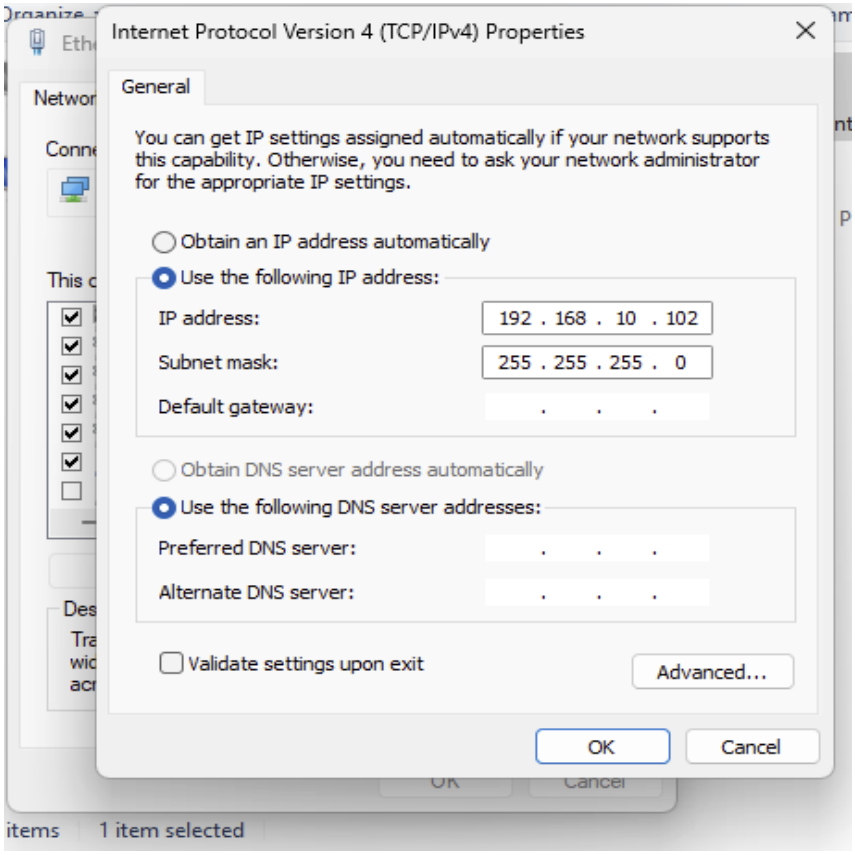
Settings	Default
IP Address	192.168.10.100
Subnet Mask	255.255.255.0
Gateway	192.168.10.1

8.7 DCX F-PFN PROFINET Connectivity Testing

After the DCX F-PFN PROFINET address and Station Name is set, connectivity can be tested using the PC/Laptop Ping Command Prompt. Before testing, the PC/Laptop's Ethernet IP must be set to the same subnet as the DCX F-PFN power supply PROFINET address.

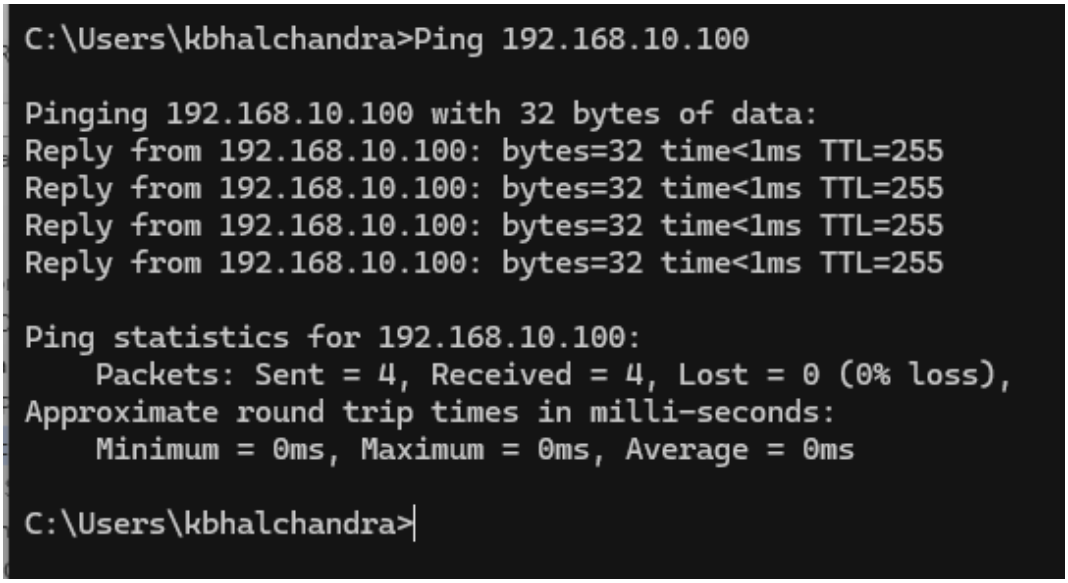
8.7.1 Configuring the PC/Laptop for Testing

Table 8.4 Configuring the PC/Laptop for Testing

Step	Instructions
1	Connect an Ethernet cable between the DCX F-PFN PROFINET port and the PC/Laptop Ethernet port. A USB to Ethernet Adapter.
2	Set the Static IP Address for the PC/Laptop: • Go to Settings > Network & Internet > Change Adapter Options • Double clicks on the Local Area Network icon and select Properties • Double clicks on Internet Protocol Version 4 (TCP/IPv4) • Change the last octet of the IP address to be different than the DCX F-PFN power supply setting. For example, if the DCX F-PFN power supply is 192.168.10.100, set the PC/Laptop to 192.168.10.102 • Set the Subnet Mask to 255.255.255.0 • Select OK and Close 

8.7.2 Using Ping for Connectivity Testing

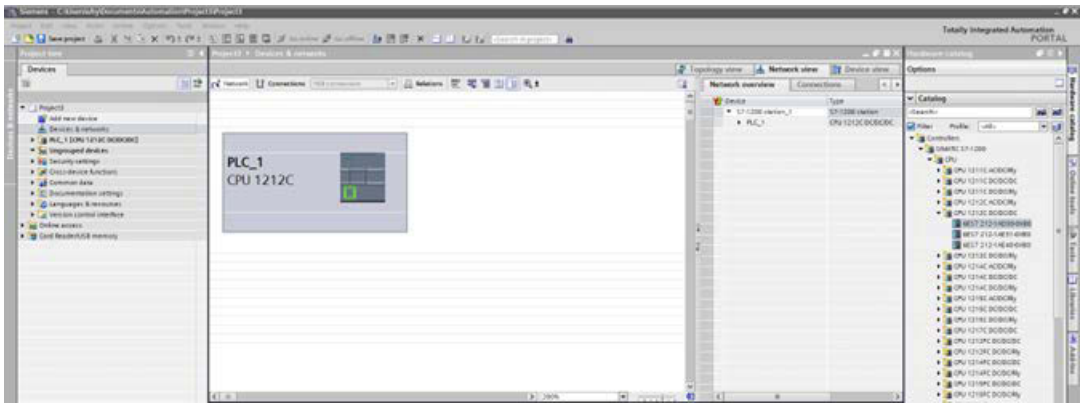
Table 8.5 Configuring the PC/Laptop for Testing

Step	Instructions
1	In the Windows Start Menu type "cmd" to bring up the Command Prompt and open it.
2	In the Command Prompt type: Ping (IP Address of the DCX F-PFN PROFINET), e.g. Ping 192.168.10.100
3	Review the results. • If "Reply from" is received, the connectivity is good • If "Request timed out" is received, no connection was made: Verify IP setting Verify the PC/Laptop IP setting Verify a good cable connection between the DCX F-PFN power supply and PC/Laptop Power cycle the DCX F-PFN power supply Repeat ping command until a "Reply from" is established 

8.8 Setting up a PLC with a PROFINET Device in TIA Portal

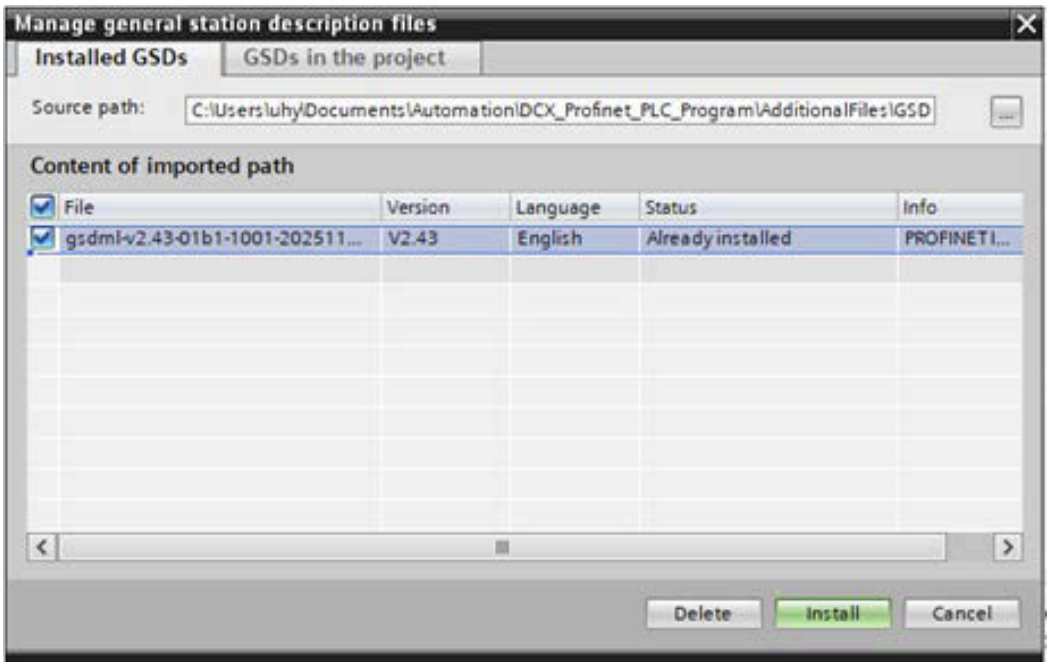
8.8.1 Create a new TIA Portal Project and add the PLC to the Project

Table 8.6 Create a new TIA Portal Project and add the PLC to the Project

Step	Instructions
1	Create new project.
2	Open *Devices & Networks* in the project workspace.
3	Click *Add new device* to add a PLC to the project.
4	From the hardware catalog, select the required controller model, such as a CPU from the Siemens SIMATIC S7-1200 series. Click Add.
5	The PLC will now appear in *Device View*, where further hardware configuration can be performed. 

8.8.2 Install GSDML file to TIA Portal

Table 8.7 Install GSDML file to TIA Portal

Step	Instructions
1	Go to *Options -> Manage general station description files* (GSD).
2	Click Install and browse to the location of the required GSD (.xml) or GSX file.
3	If a device image is required, make sure the corresponding .bmp file is in the same folder as the GSD/GSX file before installing.
4	Select the file and complete the installation.
5	Verify that the GSD/GSX file is installed successfully without errors.
6	Close the GSD manager; the hardware catalogue updates automatically. 

8.8.3 Add the Installed PROFINET Device and Verify All Modules

Table 8.8 Add the Installed PROFINET Device and Verify All Modules

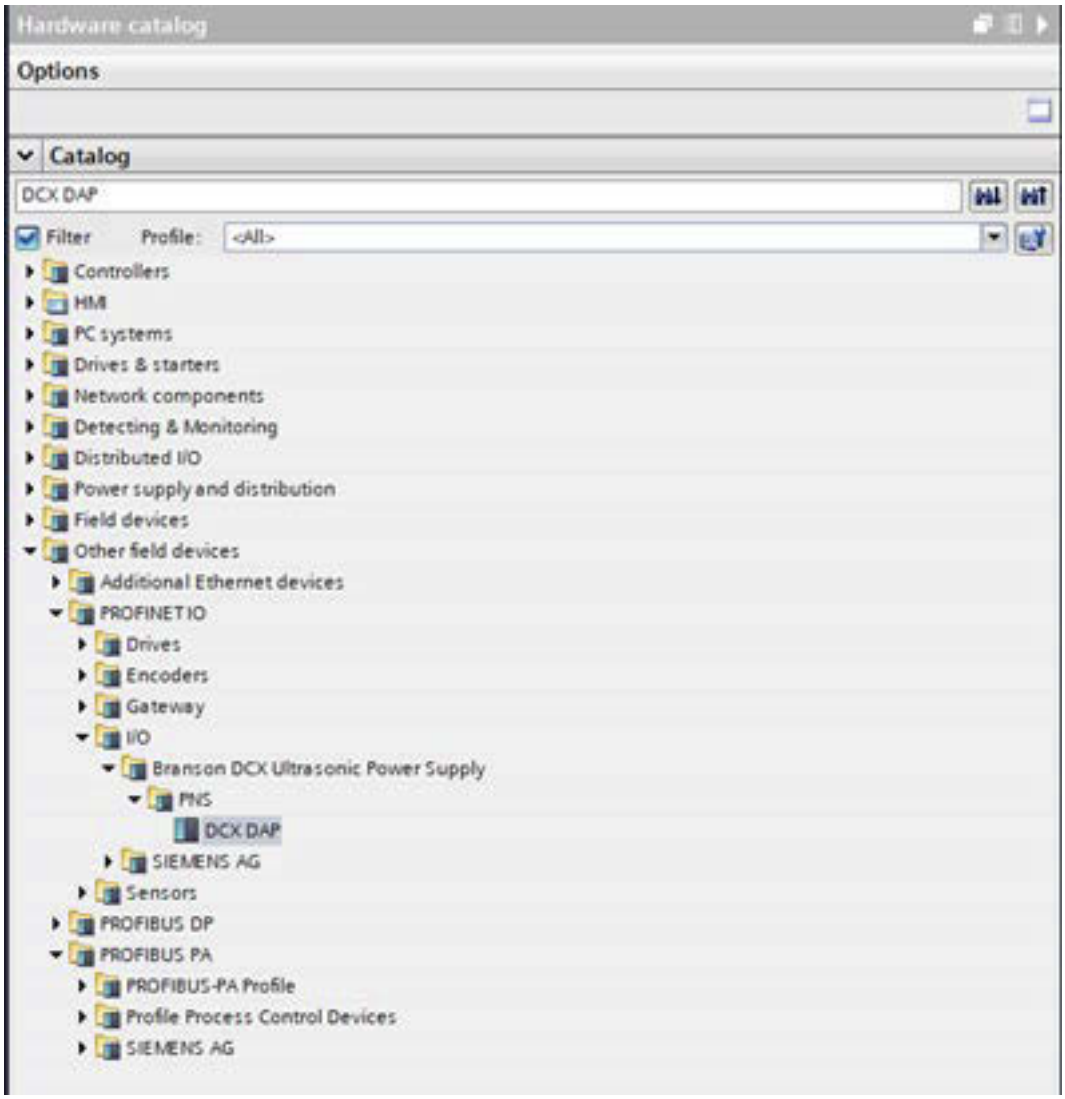
Step	Instructions
1	In *Network View*, locate the installed device under *Other field devices -> DCX DAP* and use it in the project. 

Table 8.8 Add the Installed PROFINET Device and Verify All Modules

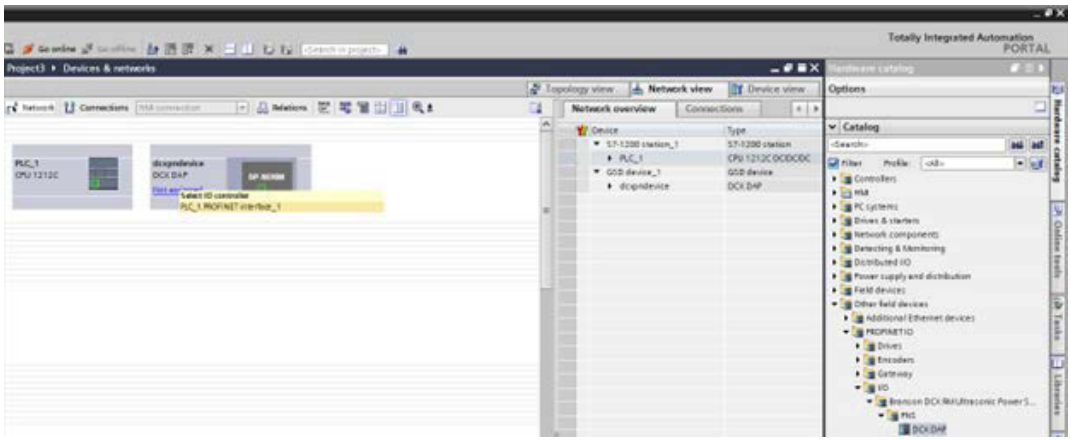
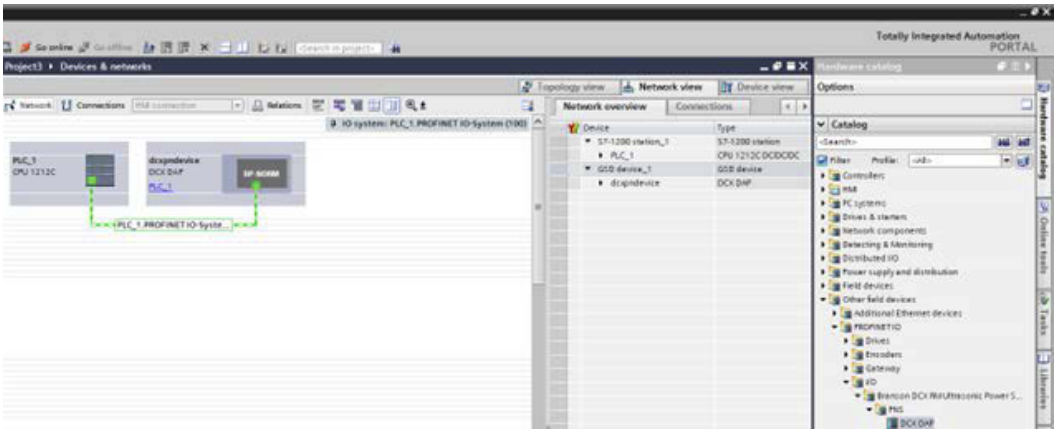
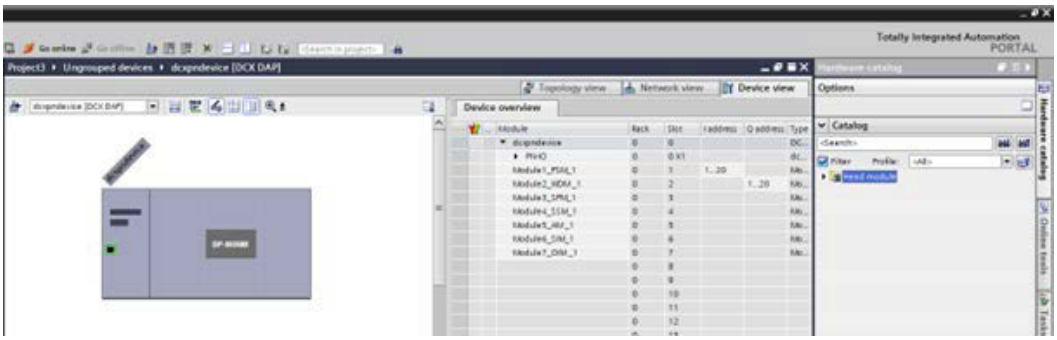
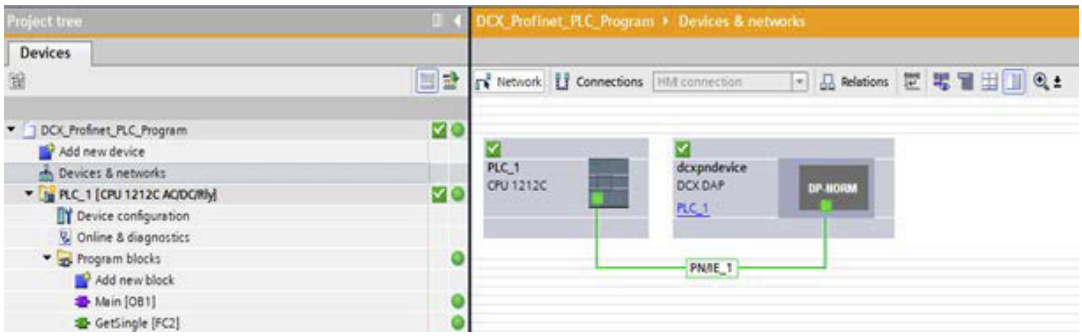
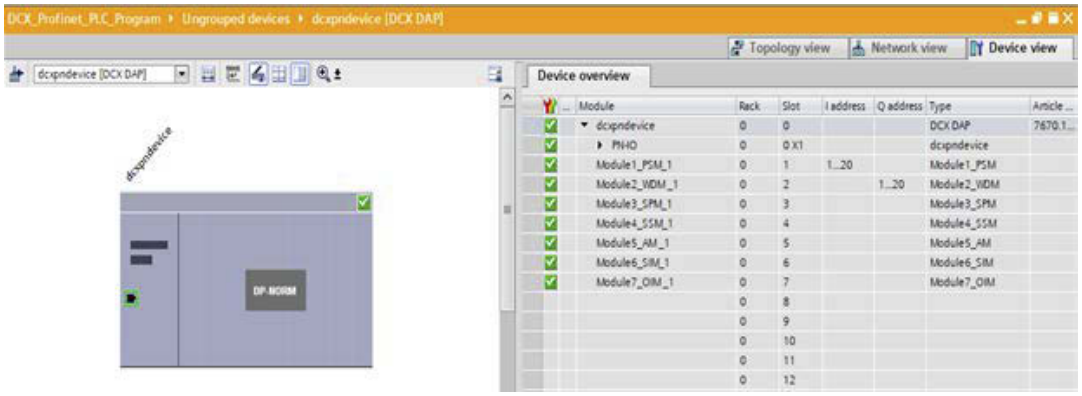
Step	Instructions
2	Other Field devices -> PROFINET IO -> I/O -> select the Device than drag and drop the PN device under *Devices & Network* window as shown in below figure. 
3	Click *Not assigned* on the device and assign it to the controller by selecting the controller's name and network name, once connected, a dashed green line should appear between the controller and the device. 
4	Double click on DCX F-PFN device and verify the modules by ensuring all configured show no errors. 

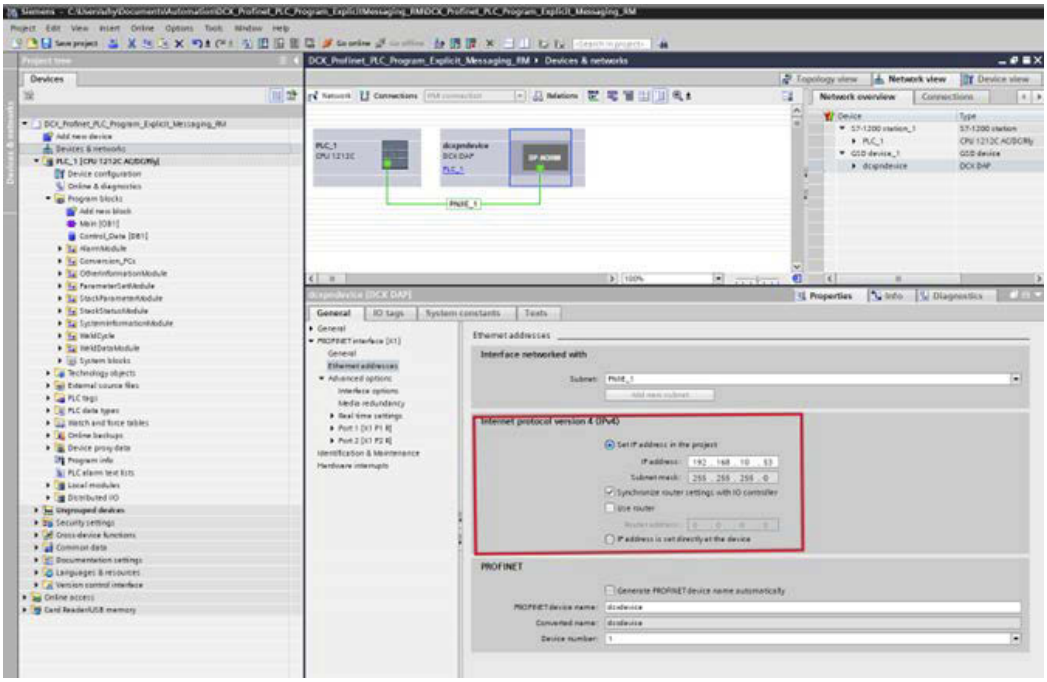
Table 8.8 Add the Installed PROFINET Device and Verify All Modules

Step	Instructions
5	Confirm that the PROFINET network status shows no communication errors by going to *Online mode*. When communication is established correctly, green check marks will appear in front of all modules of the Branson device, indicating proper operation.  

8.9 Setting Up the PROFINET Device's IP Address and Device Name

8.9.1 Assigning IP Address

Table 8.9 Assigning IP Address

Step	Instructions
1	Go to *Devices & Networks* and click on *DCX DAP*.
2	In the *Properties* window, under the *General* tab, select *Ethernet Addresses*.
3	Change the IP address as required.
4	Save the project.
5	Compile the project.
6	Click on *Download to Device*. 

8.9.2 Assigning Device Name

Table 8.10 Assigning Device Name

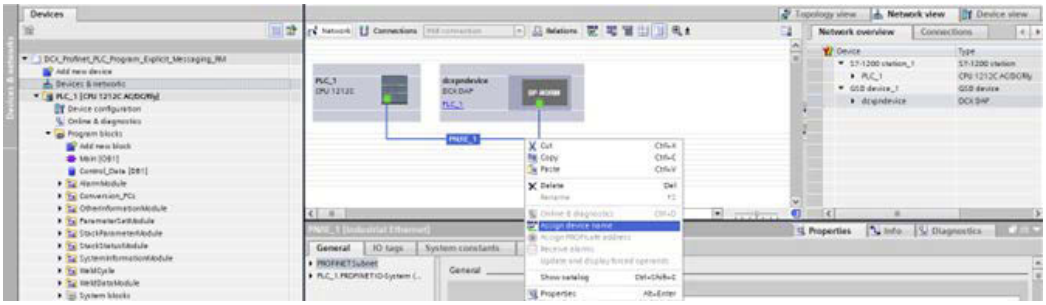
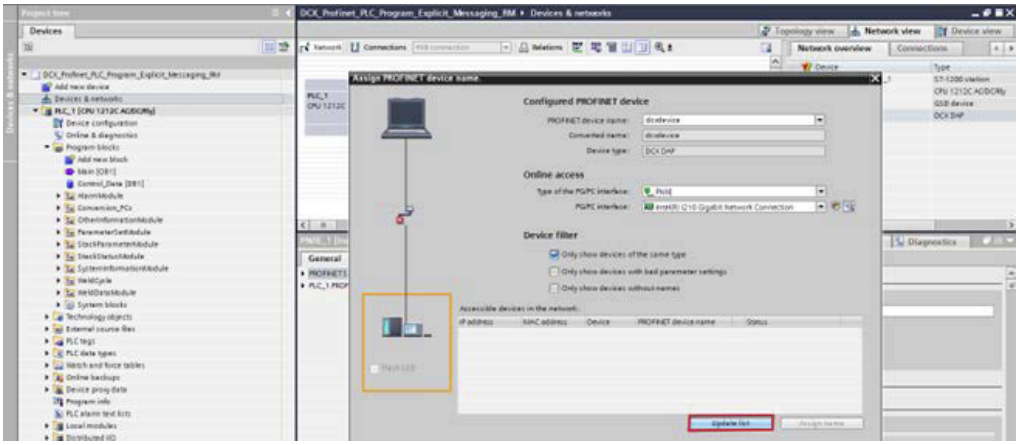
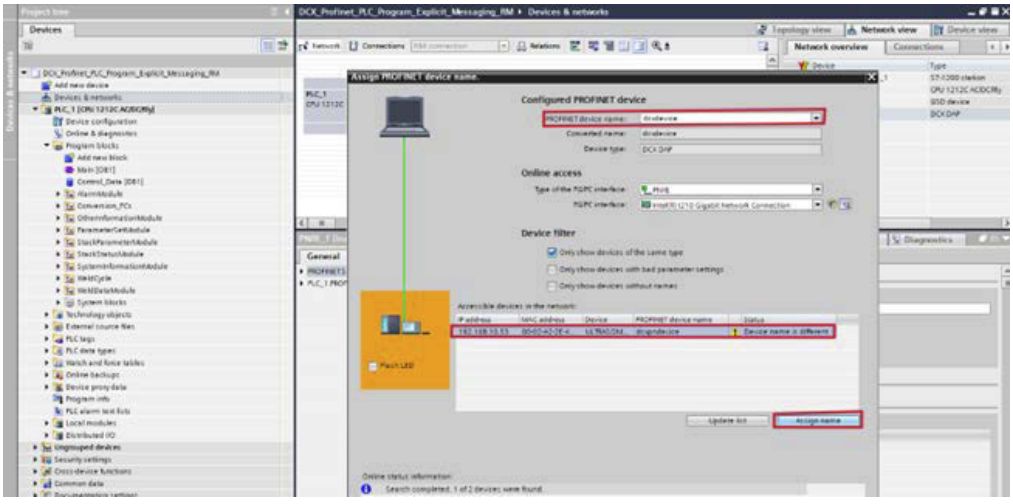
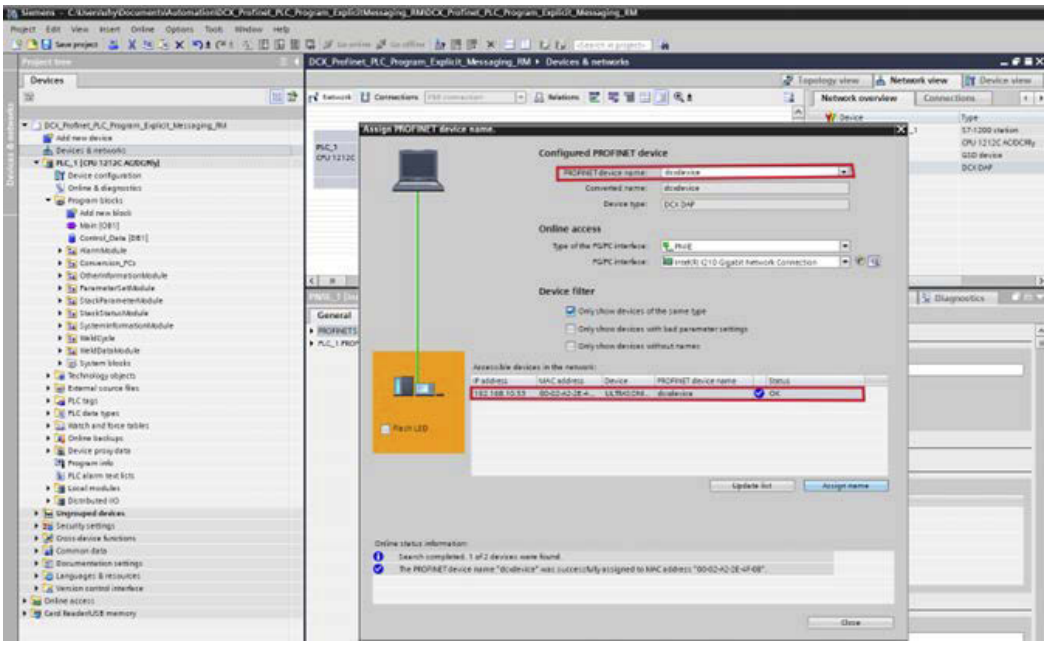
Step	Instructions
1	Go to *Devices & Networks* and click on *DCX DAP.* Then, in the *Properties* window under the *General* tab, update the PROFINET device name as shown in the highlighted area.
2	Right click on the DCX device and then select *Assign device name* from the menu. 
3	Ensure the device name is correct under *Configured PROFINET Device*. Then click on the *Update List* button to find the DCX F-PFN device on the network. 
4	The available devices on the network are updated in the list. Select the device from the updated list, then click the *Assign Name* button to change the device name. 

Table 8.10 Assigning Device Name

Step	Instructions
5	Afterward, you can verify that the device name has been updated. A confirmation log indicating that the PROFINET device name was successfully assigned will be displayed under *Online Status Information*. 

8.10 Control Token

Weld modes and their parameter settings can be configured and used following one of the following methods.

- **The DCX F-PFN Webpage:** The webpage is used to configure the weld mode and its parameters. It is then saved as a weld preset and can be recalled using cyclic communication. If process changes are needed, they are made to the zero preset using the webpage.
- **Acyclic Communication:** The PLC messages to the zero preset the weld mode and its parameters. The results of this is the same as method one above, except the process changes are made remotely through Profinet messaging.

To eliminate potential conflict for control between the two methods, Webpage vs. Acyclic Communication, a control token is used. The token is treated as an object, and by messaging it can be moved between the DCX F-PFN and the PLC. This allows the PLC to claim or give up control of the weld process settings.

Red icon indicates the PLC has the token and only it can make weld process changes.

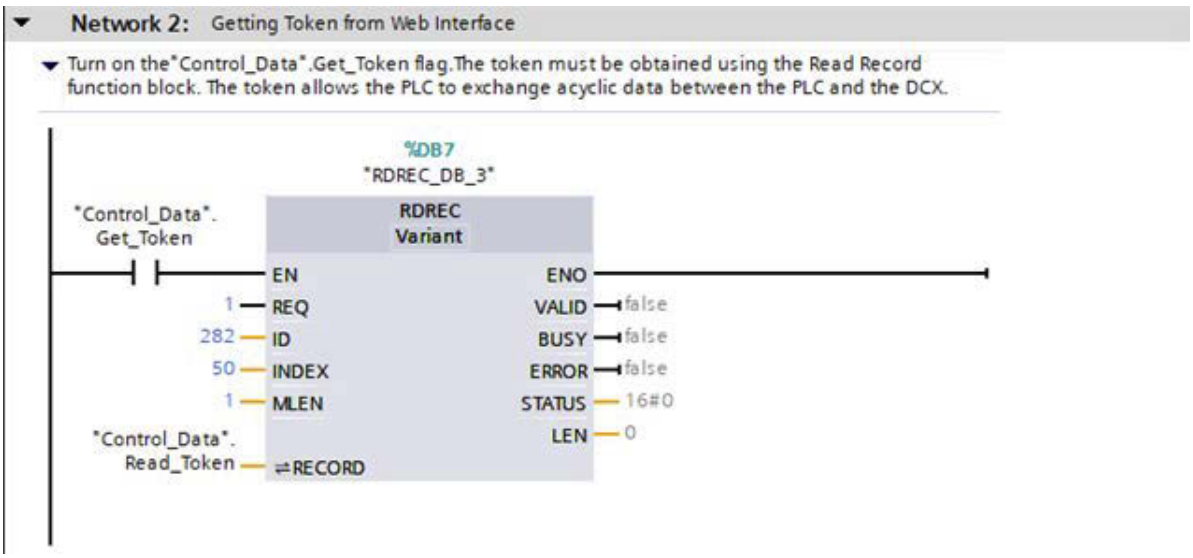
Green icon indicates the webpage has the token and only it can make weld process changes.

Figure 8.4 Control Token

8.11 Getting Token

To write to acyclic data, Token must be obtained. Token allows the PLC exchange of acyclic data between the PLC and DCX F-PFN. The following is an example for establishing Token using acyclic data. In Online mode, Right Click on Get_Token variable and modify the value to 1.

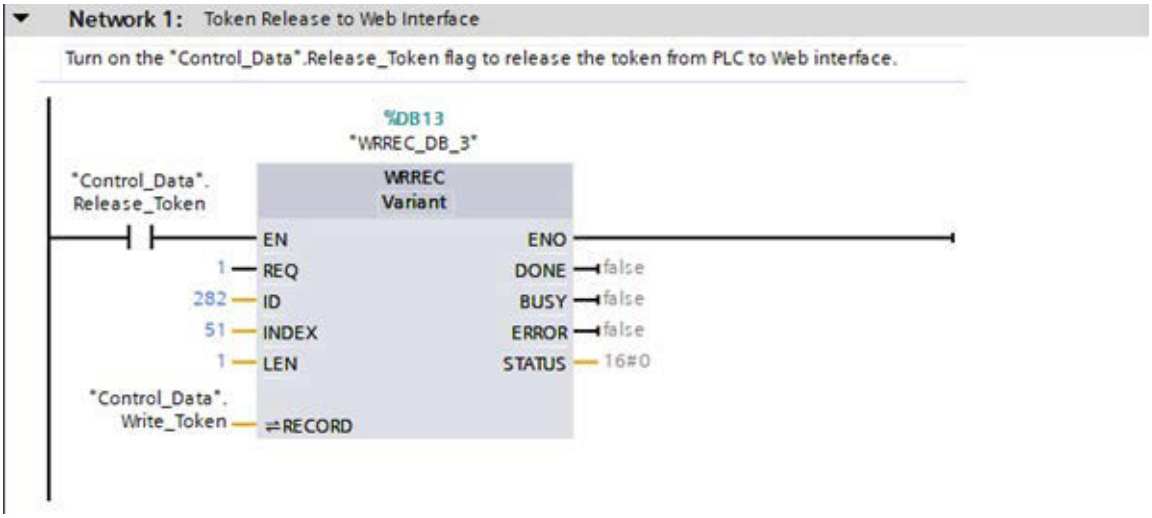
Figure 8.5 Getting token using acyclic data



8.12 Release Token

The Release Token operation is performed using a Write Record instruction in a PLC program. Writing this value releases the token and returns control of the weld process parameters back to the DCX F-PFN Web interface. In Online mode, Right Click on Release_Token variable and modify the value to 1.

Figure 8.6



Chapter 9: Maintenance

9.1 General Maintenance Considerations

NOTICE	
	There are no customer replaceable components inside the system. Have all servicing done by a qualified Branson technician.

NOTICE	
	When performing maintenance on the welder, make sure that no other automated systems are active.

WARNING	
	Use LOTO (Lock Out Tag Out) lockable plug cover over line cord plug during any maintenance.

9.2 DCX F-PFN Power Supply Preventive Maintenance

The following preventive measures help assure long term operation of your Branson DCX F-PFN Power Supply equipment.

9.2.1 Periodically Clean the Equipment

NOTICE	
	Use only anti-static vacuum cleaners to prevent damage from electrostatic discharge to your power supply.

Periodically disconnect the unit from power, remove the cover and vacuum out any accumulated dust and debris. Remove material adhering to:

- Power supply heat sink cooling fins
- Transformers
- Circuit boards
- Cooling intake vents
- Exhaust ports

External covers may be cleaned with a damp sponge or cloth using a solution of mild soap and water. Do not allow cleaning solution to enter the unit.

To prevent rust in areas of high humidity, exposed steel surfaces, may require a very light film of rust preventing oil, such as WD-40®*.

* WD-40 is a registered trademark of WD-40 Manufacturing Company.

9.3 Recondition the Stack (Converter, Booster and Horn)

NOTICE	
	Never clean the converter-booster-horn stack mating surfaces by using a buffing wheel or by filing.

Welding system components work most efficiently when the converter-booster-horn stack mating surfaces are flat, in solid contact, and free from fretting corrosion. Poor contact between mating surfaces wastes power output, makes tuning difficult, increases noise and heat, and may cause damage to the converter.

For standard 20 kHz and 30 kHz products, a Branson Mylar polyester film washer should be installed between the horn and booster, and horn and converter. Replace the washer if torn or perforated. Stacks using Mylar plastic film washers should be inspected every three months.

Stacks used with silicone grease, as with certain 20 kHz, 30 kHz and all 40 kHz products, should be periodically reconditioned to eliminate fretting corrosion. A stack using silicone grease should be inspected every two weeks for corrosion. When experience is gained for specific stacks, the inspection interval can be adjusted to a longer or shorter period as required.

9.3.1 Stack Reconditioning Procedure

To recondition stack mating surfaces, take the following steps:

Table 9.1 Stack Reconditioning Procedure

Step	Action
1	Disassemble the converter-booster-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).
5	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. Do not apply downward pressure — the weight of the part alone provides sufficient pressure.
6	Lap the part, two or three times, in the same direction against the emery cloth.
7	Rotate the part 120 degrees, placing your thumb over the spanner-wrench hole, and repeat the lapping procedure in Step 6.
8	Rotate the part another 120 degrees to the next spanner-wrench hole, and repeat the lapping procedure in Step 6.
9	Re-examine the mating surface. If necessary, repeat Steps 2-5 until you remove most of the contaminant. Remember, this should not require more than two to three complete rotations for an aluminum horn or booster; a titanium component may require more rotations.

Table 9.1 Stack Reconditioning Procedure

Step	Action
10	Before re-inserting a threaded stud in an aluminum booster or horn: • Using a file card or wire brush, clean any aluminum bits from the knurled end of the stud. • Using a clean cloth or towel, clean the threaded hole. • Examine the knurled end of the stud. If worn, replace the stud. Also, examine the stud and threaded hole for stripped threads. **NOTICE** Threaded studs cannot be reused in titanium horns or boosters. Replace all studs in these components.
11	Assemble and install the stack.

Figure 9.1 Reconditioning Stack Mating Surfaces

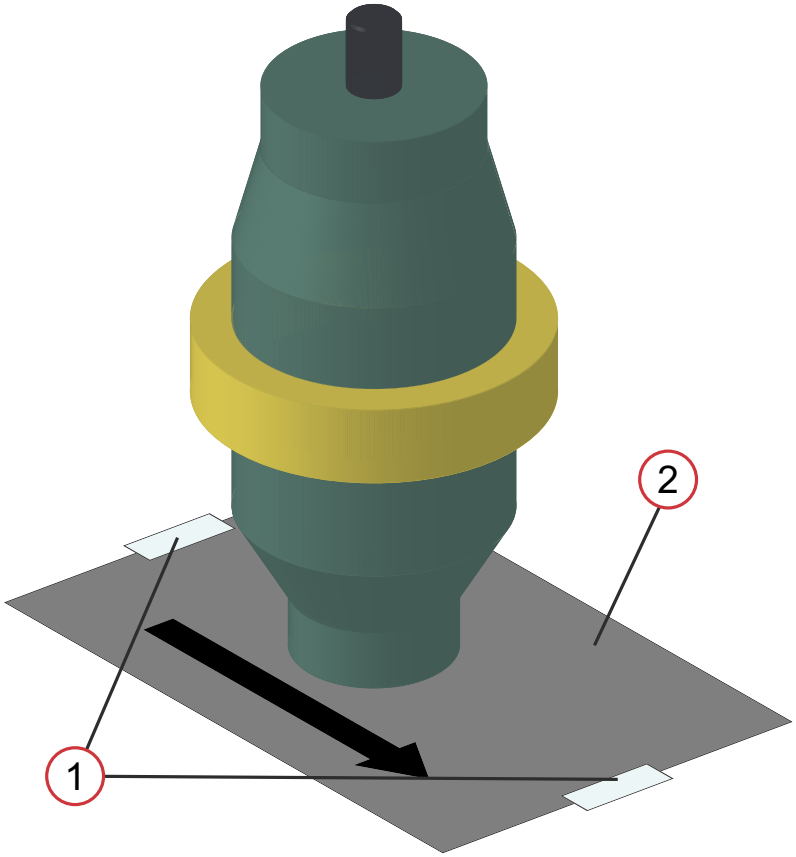


Table 9.2 Reconditioning Stack Mating Surfaces

Item	Description
1	Tape
2	#400 Emery Cloth

9.3.2 Stack Torque Values

Table 9.3 Stack Torque Values

Frequency	Torque
20 kHz	25 N·m
	220 in·lb
30 kHz	21 N·m
	185 in·lb
40 kHz	11 N·m
	95 in·lb

For a 20 kHz System

Table 9.4 Stack Reassembly for a 20 kHz System

Step	Action
1	Clean the mating surfaces of the converter, booster, and horn. Remove any foreign material from the threaded holes.
2	Install the threaded stud into the top of the booster. Torque to 450 in·lb (50.84 N·m). If the stud is dry, apply 1 or 2 drops of a light lubricating oil before installing.
3	Install the threaded stud into the top of the horn. Torque to 450 in·lb (50.84 N·m). If the stud is dry, apply 1 or 2 drops of a light lubricating oil before installing.
4	Install a single Mylar plastic film washer (matching the size of the washer to the stud) to each interface.
5	Assemble the converter to the booster and the booster to the horn.
6	Torque to 220 in·lb (24.85 N·m) at each interface.

For a 30 kHz System

Table 9.5 Stack Reassembly for a 30 kHz System

Step	Action
1	Clean the mating surfaces of the converter, booster, and horn. Remove any foreign material from the threaded holes.
2	Install the threaded stud into the top of the booster. Torque to 290 in·lb (32.76 N·m). If the stud is dry, apply 1 or 2 drops of a light lubricating oil before installing.
3	Install the threaded stud into the top of the horn. Torque to 290 in·lb (32.76 N·m). If the stud is dry, apply 1 or 2 drops of a light lubricating oil before installing.
4	Install a single Mylar plastic film washer (matching the size of the washer to the stud) to each interface.
5	Assemble the converter to the booster and the booster to the horn.
6	Torque to 185 in·lb (21 N·m) at each interface.

For a 40 kHz System

Table 9.6 Stack Reassembly for a 40 kHz System

Step	Action
1	Clean the mating surfaces of the converter, booster, and horn. Remove any foreign material from the threaded holes.
2	Apply a drop of Loctite®* 290 threadlocker (or equivalent) to the studs for the booster and horn.
3	Install the threaded stud into the top of the booster. Torque to 70 in·lb (7.91 N·m). Remove excess Loctite 290 threadlocker from the booster face and let cure for 30 minutes.
4	Install the threaded stud into the top of the horn. Torque to 70 in·lb (7.91 N·m). Remove excess Loctite 290 threadlocker from the horn face and let cure for 30 minutes.
5	Coat each interface surface with a thin film of silicon grease - but do not apply silicon grease to a threaded stud or tip.
6	Torque to 95 in·lb (10.73 N·m) at each interface.

* Loctite is a registered trademark of Henkel Corporation, U.S.A.

9.3.3 Stud Torque Values

Table 9.7 Stud Torque Values

Used on	Stud Size	Torque	EDP #
20 kHz	1/2 in x 20 x 1-1/4 in	450 in·lb, 50.84 N·m	100-098-370
	1/2 in x 20 x 1-1/2 in		100-098-123
30 kHz	3/8 in x 24 x 1 in	290 in·lb, 32.76 N·m	100-298-170R
40 kHz*	M8 x 1.25	70 in·lb, 7.91 N·m	100-098-790

* Add a drop of Loctite 290 threadlocker to the stud. Torque and let cure for 30 minutes before using.

9.4 Recommended Spare Stock

This section provides lists of replacement parts, system cables, and suggested spares.

9.4.1 System Cables

You can order the following cables:

Table 9.8 DCX F-PFN Power Supply System Cables

P/N	Description
100-240-383	Cable, RF 8 ft (2.5 m)
100-240-384	Cable, RF 15 ft (4.5 m)
100-240-385	Cable, RF 25 ft (7.5 m)
100-240-387	Cable, RF right angle 8 ft (2.5 m)
100-240-388	Cable, RF right angle 15 ft (4.5 m)
100-240-389	Cable, RF right angle 25 ft (7.5 m)
100-240-392	Cable, User I/O 25 ft (7.5 m)
100-240-393	Cable, User I/O 50 ft (15 m)
200-240-396	Cable Ethernet Cat 5e 7 ft (2.1 m)

9.4.2 Suggested Spares

Table 9.9 Suggested Spares

Description	EDP#	1-4 Units	6-12 Units	14+ Units
Converter	Refer to Table 9.10 Converters Compatible with the DCX F-PFN Power Supply.	0	1	2
Booster	Refer to Table 9.11 DCX F-PFN Power Supply Compatible Boosters.	0	1	2
Horn	As Ordered	1	1	2
Studs	Refer to Table 9.12 Other Items used with the DCX F-PFN Power Supply.	4	6	8
Mylar Plastic Film Washer Kit	Refer to Table 9.12 Other Items used with the DCX F-PFN Power Supply.	1	1	1

9.4.3 Converters Compatible with the DCX F-PFN Power Supply

Table 9.10 Converters Compatible with the DCX F-PFN Power Supply

Where used	Model	Connector	Part Number
20 kHz / 1250 W 20 kHz / 2500 W 20 kHz / 4000 W	CR-20S	SHV connector	125-135-115R
	CR-20C	SHV connector with 3 ft (0.9 m) cable	159-135-210R
	CH-20S (932 AH SPL)	SHV connector	159-135-075R
	CH-20C	SHV connector with 3 ft (0.9 m) cable	159-135-211R
	CS-20S	SHV connector	159-135-138R
	CS-20C	SHV connector with 3 ft (0.9 m) cable	159-135-209R
30 kHz / 750 W 30 kHz / 1500 W	CR-30S	SHV connectors	101-135-081R
	CR-30C	SHV connector with 3 ft (0.9 m) cable	159-135-213R
	CH-30S	SHV connector	101-135-071R
	CH-30C	SHV connector with 3 ft (0.9 m) cable	159-135-214R
	CS-30S	SHV connector	159-135-110R
	CS-30C	SHV connector with 3 ft (0.9 m) cable	159-135-212R
40 kHz / 400 W 40 kHz / 800 W	4TP	SHV connector (platen mount)	101-135-068R
	CR-40S (4TH)	SHV connector	101-135-067R
	CR-40C	SHV connector with 3 ft (0.9 m) cable	159-135-215R

9.4.4 DCX F-PFN Power Supply Compatible Boosters

Table 9.11 DCX F-PFN Power Supply Compatible Boosters

Type of Booster	Description	Part Number
Solid Mount (1/2-20 horn stud) 20 kHz	Titanium, 1:0.6 (Purple)	101-149-095
	Titanium, 1:1 (Green)	101-149-096
	Titanium, 1:1.5 (Gold)	101-149-097
	Titanium, 1:2 (Silver)	101-149-098
	Titanium, 1:2.5 (Black)	101-149-099
Solid Mount (M8 x 1.25 horn stud) 40 kHz	Titanium, 1:0.6 (Purple)	109-041-178
	Titanium, 1:1 (Green)	109-041-177
	Titanium, 1:1.5 (Gold)	109-041-176
	Titanium, 1:2 (Silver)	109-041-175
	Titanium, 1:2.5 (Black)	109-041-174
Standard Series (1/2-20 horn stud) 20 kHz	Aluminum, 1:0.6 (Purple)	101-149-055
	Aluminum, 1:1 (Green)	101-149-051
	Aluminum, 1:1.5 (Gold)	101-149-052
	Aluminum, 1:2 (Silver)	101-149-053
	Titanium, 1:0.6 (Purple)	101-149-060
	Titanium, 1:1 (Green)	101-149-056
	Titanium, 1:1.5 (Gold)	101-149-057
	Titanium, 1:2 (Silver)	101-149-058
	Titanium, 1:2.5 (Black)	101-149-059
Standard Series (3/8-24 horn stud) 30 kHz	Titanium, 1:2.5 (Black)	101-149-103
	Titanium, 1:2 (Silver)	101-149-104
	Titanium, 1:1.5 (Gold)	101-149-105
	Titanium, 1:1 (Green)	101-149-106
Standard Series (M8 x 1.25 horn stud) 40 kHz	Aluminum, 1:0.6 (Purple)	101-149-087
	Aluminum, 1:1 (Green)	101-149-079
	Aluminum, 1:1.5 (Gold)	101-149-080
	Aluminum, 1:2 (Silver)	101-149-081R
	Aluminum, 1:2.5 (Black)	101-149-082
	Titanium, 1:1 (Green)	101-149-085
	Titanium, 1:1.5 (Gold)	101-149-086
	Titanium, 1:2 (Silver)	101-149-083
	Titanium, 1:2.5 (Black)	101-149-084

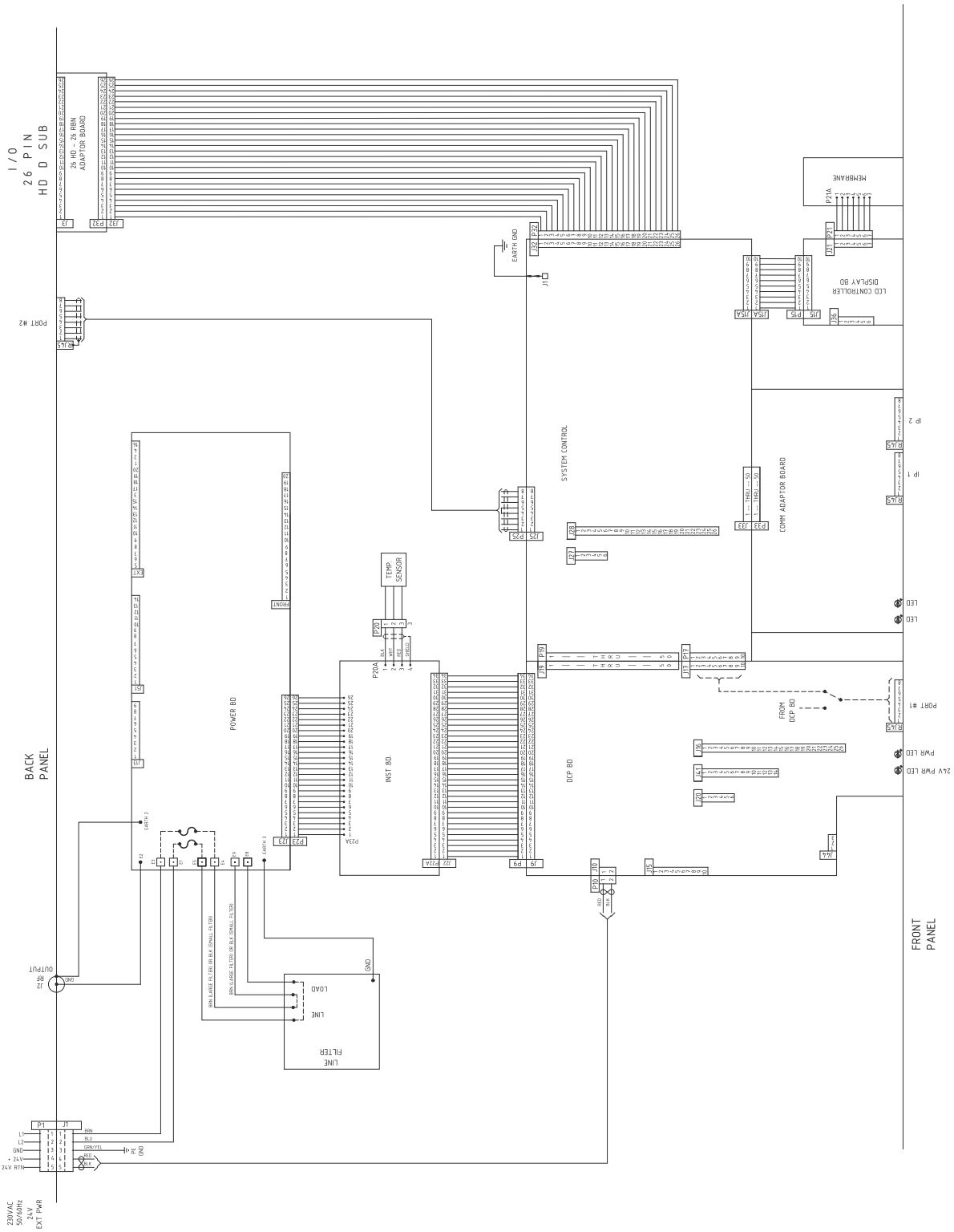
9.4.5 Other Items used with the DCX F-PFN Power Supply

Table 9.12 Other Items used with the DCX F-PFN Power Supply

Product	Description	Part No.
Silicone grease	For use with 40 kHz systems	101-053-002
Mylar Plastic Film Washers (for 20 kHz systems)	Kit, 10 each (1/2 in. and 3/8 in.)	100-063-357
	Kit, 150 each (1/2 in.)	100-063-471
	Kit, 150 each (3/8 in.)	100-063-472
Mylar Plastic Film Washers (for 30 kHz systems)	Kit, 10 each (3/8 in.)	100-063-632
	Kit, 150 each (3/8 in)	100-063-712
Tool Kit	20 kHz (spanner wrench and 10 pc washer kit)	101-063-208R
	30 kHz (spanner wrench and 10 pc washer kit)	101-063-636R
	40 kHz (spanner wrench and silicone grease)	101-063-176R
Spanner wrench	20 kHz	101-118-039
	30 kHz	201-118-033
	40 kHz	201-118-024
Studs	1/2-20 x 1-1/4 (titanium horns)	100-098-370
	1/2-20 x 1-1/2 (aluminum horns, 20 kHz boosters)	100-098-123
	3/8-24 x 1 (30 kHz titanium horns and boosters)	100-298-170R
	M-8 x 1.25 (40 kHz horns and boosters)	100-098-790
Connector Block	Detachable connector block	200-029-1081

9.5 Interconnect Diagram

Figure 9.2 Interconnect Diagram



9.6 Troubleshooting

If you have a problem operating the DCX F-PFN Power Supply, take the following steps:

Table 9.13 Troubleshooting

Step	Action
1	Make sure the converter-booster-horn stack is properly assembled and installed.
2	For instructions on reconditioning stack component surfaces, refer to 9.3 Recondition the Stack (Converter, Booster and Horn).
3	If you need additional help, call your local Branson representative, refer to 10.2 Contact Us for more information.

NOTICE	
	DCX F-PFN Power Supply should be serviced only by qualified technicians using Branson-approved test and repair equipment, repair procedures, and replacement parts. Unauthorized attempts at repair or modification of the power supply will void the warranty.

9.6.1 Common Electrical Problems

Table 9.14 Troubleshooting Common Electrical Problems

Problem	Check	Solution
When touching a component of the weld system, you get a slight electrical shock.	Ensure the Ground cable is connected properly.	N/A
	Inspect the line cables.	If failed, repair or replace.

9.6.2 Ultrasonic Power Problems

Table 9.15 Troubleshooting Ultrasonic Power Problems

Problem	Check	Solution
Ultrasonic power delivered to horn; no indication on bar graph.	Check connector cables, replace if failed.	Replace defective cables.
	Test power supply.	See 7.8 Ultrasonics Test Procedure.
No ultrasonic power generated when Test key pressed; no Alarm indicator.	Failed or missing stack.	Replace.
	RF cable unplugged or failed; replace if failed.	Plug in or replace.
	Test power supply (7.8 Ultrasonics Test Procedure).	If defective, send unit for repair.
Unable to adjust amplitude using the front panel keypad.	Register setting configured to “External Amplitude Control”	Reset if required, See 7.5 Configuring the Power Supply Registers.
Unable to remote control.	User I/O cable	Repair or replace.
	Customer’s switching device	Test/inspect/repair/replace.

9.6.3 Weld Cycle Problems

Table 9.16 Troubleshooting Weld Cycle Problems

Problem	Check	Solution
Full ultrasonic power not delivered.	Unsuitable horn or booster selection.	Contact Branson Applications Lab
	Plastic part material varies.	
	Mold release lubricant in weld area.	
	Unsuitable joint design.	
	Unsuitable or misaligned part fixture.	
	Amplitude setting	Adjust if required.
No ultrasonic power passed to horn.	Power supply overheating; check rack ventilation.	If defective, send unit for repair.
Alarm indicator illuminates when you press the Test key or during the weld cycle.	Check converter-booster-horn stack interface for fretting corrosion.	See 9.3 Recondition the Stack (Converter, Booster and Horn).
	Check for loose or failed horn converter or booster.	Tighten or replace as needed.
	Check for loose or failed horn or booster stud.	
	Failed RF cable	Replace if failed.
Excessively warm horn, booster, and converter; occasional overloads.	Check converter-booster-horn stack mating surfaces for fretting corrosion.	See 9.3 Recondition the Stack (Converter, Booster and Horn).
	Be certain proper cooling has been provided.	If defective, send unit for repair.

9.7 Cold Start Procedure

The power supply internal memory stores the system default settings and the registers that you set. It also provides temporary storage to support the power supply internal functions. A cold start clears and restores all the power supply settings back to the original factory defaults. It is not necessary to perform a cold start during normal operation and servicing, but you might find a cold start helpful when:

- You suspect the system is not operating properly
- You want to make a new setup
- Some system memory registers, such as Software version, will not be cleared by this Cold Start procedure

9.7.1 Performing a Cold Start

NOTICE	
	Using the Cold Start procedure will erase the current Amplitude Setting, the IP address and some of the Registers that you set. Be sure you have a record of your setup if you want to retain it or use the system backup feature from the DCX F-PFN Power Supply Web Page Interface.

Table 9.17 Steps to Perform a Cold Start

Step	Action
1	Turn off the power supply.
2	Connect together pins 4 and 10 on the 26-pin User I/O Connector.
3	Turn on the power supply.
4	After the power up sequence ends, turn off the power supply
5	Disconnect pins 4 and 10 of the 26-pin on User I/O Connector.

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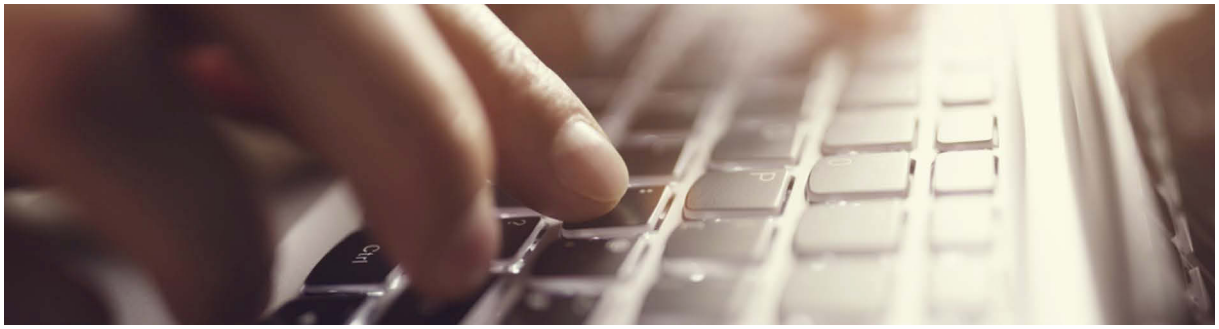
Chapter 10: Support

10.1 Warranty

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

10.2 Contact Us



Our dedicated experts are here to assist you with any questions or concerns you may have, ensuring you get the help you need.

Visit https://www.emerson.com/en-us/contact-us-v2 to find the technical support information, documentation, and software updates you need for your Emerson products and systems.

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Appendix A: Alarms

A.1 Overload Alarms (Group 0)

This group includes all overload alarms that can occur during a weld cycle. This overload group will abort the weld cycle after stopping the sonics.

Table A.1 Overload Alarms (Group 0)

LCD Alarm Code	Fieldbus Bit Assignment	Alarm	Description
E0:01	Bit01	Weld Overload - Phase	This alarm is generated in case of weld phase is out of weld phase limit for weld phase limit time period.
E0:02	Bit02	Weld Overload - Current	This alarm is generated in case of weld current reaches to peak RF current limit of the system.
E0:03	Bit03	Weld Overload - Frequency	This alarm is generated in case of weld frequency is out of weld frequency low and high limit window.
E0:04	Bit04	Weld Overload - Power	This alarm is generated in case of weld power reaches to peak RF power limit of the system.
E0:05	Bit05	Weld Overload - Voltage	This alarm is generated in case of voltage during weld reaches to peak RF voltage limit of the system.
E0:06	Bit06	Weld Overload - Temperature	This alarm is generated in case of temperature inside the system (at the heat sink) reaches to 85° C (±5° C). **NOTICE** Alarm cannot be cleared until the temperature returns below threshold.
E0:11	Bit17	Energy Brake Overload - Phase	This alarm is generated in case of phase is out of weld phase limit for weld phase limit time period during energy breaking.
E0:12	Bit18	Energy Brake Overload - Current	This alarm is generated in case of weld current reaches to peak RF current limit of the system during energy breaking.
E0:13	Bit19	Energy Brake Overload - Frequency	This alarm is generated in case of weld frequency is out of weld frequency low and high limit window during energy breaking.
E0:14	Bit20	Energy Brake Overload - Power	This alarm is generated in case of weld power reaches to peak RF power limit of the system during energy breaking.
E0:15	Bit21	Energy Brake Overload - Voltage	This alarm is generated in case of voltage during weld reaches to peak RF voltage limit of the system during energy breaking.
E0:16	Bit22	Energy Brake Overload - Temperature	This alarm is generated in case of temperature inside the system (at the heat sink) reaches to 85° C (±5° C) during energy breaking. **NOTICE** Alarm cannot be cleared until the temperature returns below threshold.

A.2 Cutoff Alarms (Group 1)

This group includes all cutoff alarms. Cutoff alarms are defined as a limit on a parameter, that when exceeded, will stop ultrasonics. The remaining portion of a weld cycle will continue.

Table A.2 Cutoff Alarms (Group 1)

Alarm Code	Fieldbus Bit Assignment	Alarm	Description
E1:02	Bit02	Energy Cutoff	Energy cutoff alarm is generated if the energy value during sonics on exceeded to the set cutoff value during a weld.
E1:03	Bit03	Power Cutoff	Power cutoff alarm is generated if the peak power value during sonics on exceeded to the set cutoff value.
E1:04	Bit04	Custom Input1 Cutoff	User can configure one of the user analog input as a Custom Input1 and also set a cutoff value from that input. System will generate custom Input1 Cutoff alarm if the user input voltage exceeds from the cutoff value set by user.
E1:05	Bit05	Time Cutoff (Maximum Time-out)	User can set a time cutoff for weld and the alarm will be generated if the sonic on time during weld exceeds to the set value.
E1:06	Bit06	Frequency Low Cutoff	User can set frequency low cutoff (negative offset to be applied from weld start frequency) for weld and the alarm will be generated if the frequency during weld goes below to the weld start frequency minus set value.
E1:07	Bit07	Frequency High Cutoff	User can set frequency high cutoff (positive offset to be applied from weld start frequency) for weld and the alarm will be generated if the frequency during weld goes above to the weld start frequency plus set value.
E1:08	Bit08	Custom Input2 Cutoff	User can configure one of the user analog input as a Custom Input2 and also set a cutoff value from that input. System will generate Custom Input2 cutoff alarm if the user input voltage exceeds from the cutoff value set by user.

A.3 Setup Alarms (Group 2)

This group includes all alarms that can occur during setup.

Table A.3 Setup Alarms (Group 2)

Alarm Code	Fieldbus Bit Assignment	Alarm	Description
E2:03	Bit02	Invalid Preset	Recalling invalid preset. Preset > 32.

A.4 Cycle Modified Alarms (Group 3)

Cycle modified alarms cause the cycle to be modified from the intended parameters. This can be caused by the user or equipment conditions changing. This group of alarms will always abort the cycle.

Table A.4 Cycle Modified Alarms (Group 3)

Alarm Code	Fieldbus Bit Assignment	Alarm	Description
E3:01	Bit01	Trigger Lost During Weld Or Hold	This alarm is generated during a weld cycle in case actuator is present and trigger input is lost before completing the weld (in case of time, energy, peak power and ground detect mode).
E3:02	Bit02	Cycle Aborted Via User I/O	This alarm is generated if user aborts the cycle using cycle abort user input.

A.5 Warning Alarms (Group 4)

Warnings occur when a condition is happening that may have been unexpected. This group of alarms does not abort the cycle. This group includes overloads during afterburst because they do not abort the cycle.

Table A.5 Warning Alarms (Group 4)

Alarm Code	Fieldbus Bit Assignment	Alarm	Description
E4:04	Bit04	Amplitude Step Not Reached	This alarm is generated if Amplitude Stepping is ON but weld cycle finishes before stepping take places.
E4:05	Bit05	Sonics Disabled Via User I/O	This alarm indicates the user has enabled an input pin as "Sonics Disable" and has run a cycle with this input active.
E4:11	Bit17	Afterburst Overload - Phase	This alarm is generated in case of afterburst phase is out of Weld Phase limit for Weld Phase limit time period.
E4:12	Bit18	Afterburst Overload - Current	This Alarm is generated in case of weld current reaches to peak RF current limit of the system during afterburst.
E4:13	Bit19	Afterburst Overload - Frequency	This alarm is generated in case of Weld Frequency is out of Weld Frequency Low and High limit window during afterburst.
E4:14	Bit20	Afterburst Overload - Power	This alarm is generated in case of weld power reaches to peak RF power limit of the system during afterburst.
E4:15	Bit21	Afterburst Overload - Voltage	This alarm is generated in case of weld voltage reaches to peak RF voltage limit of the system during afterburst.
E4:16	Bit22	Afterburst Overload - Temperature	The internal heat sink temperature is greater than allowed. **NOTICE** Alarm cannot be cleared until the temperature returns below threshold.

A.6 Limit Alarms (Group 5)

Limits will be reported at the end of the weld, but, unlike cutoffs, will not stop the sonics or abort the cycle.

Table A.6 Limit Alarms (Group 5)

Alarm Code	Fieldbus Bit Assignment	Alarm	Description
E5:03	Bit03	Power - Minus Limit	This alarm is generated at the end of the cycle in case of Weld peak power is lower than the Power Minus limit.
E5:04	Bit04	Power - Plus Limit	This alarm is generated at the end of the cycle in case of Weld peak power is bigger than the Power Plus limit.
E5:05	Bit05	Time - Minus Limit	This alarm is generated at the end of the cycle in case of Weld time is lower than the Time Minus limit.
E5:06	Bit06	Time - Plus Limit	This alarm is generated at the end of the cycle in case of Weld time is bigger than the time Plus limit.
E5:07	Bit07	Energy - Minus Limit	This alarm is generated at the end of the cycle in case of Weld energy is lower than the energy Minus limit.
E5:08	Bit08	Energy - Plus Limit	This alarm is generated at the end of the cycle in case of Weld energy is bigger than the energy Plus limit.

A.7 Equipment Failure Alarms (Group 6)

Equipment alarms are caused by user equipment malfunction. These alarms occur before a cycle starts and therefore, will prevent a cycle from starting until the malfunction is corrected.

NOTICE	
	Alarm message will not reset until the malfunction is corrected.

Table A.7 Equipment Failure Alarms (Group 6)

Alarm Code	Fieldbus Bit Assignment	Alarm	Description
E6:01	Bit01	Start Input Still Active	This alarm is generated if External Start/ Cycle Start/Trigger signal is active for more than 4 seconds after finishing the weld or while system is waiting to come into ready state.
E6:02	Bit02	Trigger Active While ULS Active	This alarm is generated any time if Trigger and ULS both becomes active.
E6:03	Bit03	Trigger Active In Ready	This alarm is generated if Trigger signal becomes active while system is in ready state and actuator is present.
E6:04	Bit04	ULS Not Active In Ready	This alarm is generated if actuator is present and ULS is not active while system is already in ready state.
E6:05	Bit05	Ground Detect Active In Ready	This alarm is generated if ground detect signal becomes active while system is in ready state.
E6:07	Bit07	Cable Failure - User I/O	The cable detect user I/O feature has been enabled and detected that the assigned pin does not have the voltage applied.
E6:08	Bit08	Field Bus Removed	Communication between the internal field bus card and the internal weld controller has failed.
E6:09	Bit09	Start Input Lost	This alarm is generated when source of cycle start is removed before Trigger comes.
E6:10	Bit16	Cycle Abort In Ready	This alarm is generated if Cycle Abort signal becomes active while system is in ready state.
E6:11	Bit17	ULS Time Out	This alarm is generated if Actuator is present and ULS does not become active with a time-out at the end of the cycle.
E6:12	Bit18	ULS Active During Weld	This alarm is generated if System is waiting for TRS and ULS becomes active. After TRS is active and system jumps to next state of cycle this alarm is generated when ULS becomes active during cycle along with "TRS active while ULS Active" alarm.

A.8 No Cycle Alarms (Group 7)

No cycle alarms are caused by possible mechanical setup errors or user errors. These are usually time out errors because an expected input did not occur in time. They will prevent a cycle from continuing. So although a cycle may have started, the cycle will be aborted.

Table A.8 No Cycle Alarms (Group 7)

Alarm Code	Fieldbus Bit Assignment	Alarm	Description
E7:01	Bit01	ULS Time-Out (Start Of Cycle)	A cycle start has been received but the upper limit switch has not gone inactive within the time-out specified by the system.
E7:02	Bit02	Trigger Time-Out	A cycle has been started, but the trigger input has not gone active within the time-out specified by the system.
E7:03	Bit03	External Sonics Delay Time-Out (User I/O)	The system is waiting for an external user defined input (if configured), but has not received the input within the time-out specified by the system.
E7:04	Bit04	Interlock Not In Place (User I/O)	The system is waiting for a valid status from a user defined Interlock input (if configured), but the input is not active at the time of Cycle start.
E7:05	Bit05	RF Switch Feedback Failure	A feedback signal from the RF switch not was not received within the time specified by the user.
E7:06	Bit06	Part Not In Place (User I/O)	The system is waiting for an external user defined input, but the input is not active at the Cycle Start.
E7:07	Bit07	Stack Number Not Valid For RF Switching	An invalid horn number is being requested from the preset. Any values outside the range of 16 horn numbers will cause an alarm.

A.9 Communication Failure Alarms (Group 8)

This group handles any communication issue that occur between processors. This is generally the result of noisy environments or other conditions that interrupt communications. Physical cable failures will be included in the Hardware Failure group. Because data cannot be transmitted between internal hardware, the cycle will be aborted.

NOTICE	
	Alarm message will not reset until the malfunction is corrected.

Table A.9 Communication Failure Alarms (Group 8)

Alarm Code	Fieldbus Bit Assignment	Alarm	Description
E8:01	Bit01	Modbus Communication Failure	Internal communication failure.
E8:02	Bit02	LCD Communication Failure	Communication between the LCD user interface and the internal weld controller has failed.
E8:03	Bit03	Fieldbus Communication Failure	The field bus was detected at power on, but is no longer responding. Either the cable has been removed or the field bus master has stop working. If the system is powered down and field bus is not detected at power up, then the system can still be used without the field bus.

A.10 Hardware Alarms (Group A)

This group of alarms will deal with internal equipment failures. This will generally be equipment that is supplied by Branson as part in the internal workings of the power supply. Cycles cannot be started if there is a Hardware alarm. If a cycle is in process when the alarm is detected then the cycle is aborted.

NOTICE	
	Alarm message will not reset until the malfunction is corrected.

Table A.10 Hardware Alarms (Group A)

Alarm Code	Fieldbus Bit Assignment	Alarm	Description
EA:01	Bit01	LCD NOVRAM Failure	LCD NOVRAM is not working.
EA:02	Bit02	FRAM or NOVRAM Failure	FRAM or NOVRAM is not working.
EA:03	Bit03	SD RAM Failure	SD RAM is now working.
EA:04	Bit04	Connection Failure - WC to LCD	The physical connection between the WC board and LCD board is missing or broken.
EA:05	Bit05	Connection Failure - WC to DCP	The physical connection between the WC board and DCP board is missing or broken.
EA:06	Bit06	AC Line Voltage Lost	The AC line voltage to the system is lost but the 24 V supply is still present.
			ES bit activated, check ZSW1 Low Byte.

A.11 Non-Cycle Overload Alarms (Group B)

This group deals with overloads that occur outside of a weld cycle. By definition a weld is not in process so the weld cycle counter is not affected and the weld is not aborted.

Table A.11 Non-Cycle Overload Alarms (Group B)

Alarm Code	Fieldbus Bit Assignment	Alarm	Description
Eb:01	Bit01	Seek Overload - Phase	This alarm is generated in case of phase during Seek reaches to peak RF phase limit of the system.
Eb:02	Bit02	Seek Overload - Current	This alarm is generated in case of current during Seek reaches to peak RF current limit of the system.
Eb:03	Bit03	Seek Overload - Frequency	This alarm is generated in case of Frequency during seek is out of Seek Frequency Low and High limit window.
Eb:04	Bit04	Seek Overload - Power	This alarm is generated in case of Power during seek reaches to peak RF Power limit of the system.
Eb:05	Bit05	Seek Overload - Voltage	This alarm is generated in case of Voltage during seek reaches to peak RF voltage limit of the system.
Eb:06	Bit06	Seek Overload - Temperature	This alarm is generated in case of temperature inside the system (at the heat sink) reaches to 85° C (±5° C) during Seek. **NOTICE** Alarm cannot be cleared until the temperature returns below threshold.
Eb:11	Bit17	Test Overload - Phase	This alarm is generated in case of phase during Test reaches to peak RF phase limit of the system.
Eb:12	Bit18	Test Overload - Current	This alarm is generated in case of current during Test reaches to peak RF current limit of the system.
Eb:13	Bit19	Test Overload - Frequency	This alarm is generated in case of Frequency during seek is out of Test Frequency Low and High limit window.
Eb:14	Bit20	Test Overload - Power	This alarm is generated in case of Power during Test reaches to peak RF Power limit of the system.
Eb:15	Bit21	Test Overload - Voltage	This Alarm is generated in case of Voltage during Test reaches to peak RF voltage limit of the system.
Eb:16	Bit22	Test Overload - Temperature	This alarm is generated in case of temperature inside the system (at the heat sink) reaches to 85° C (±5° C) during Test. **NOTICE** Alarm cannot be cleared until the temperature returns below threshold.

Appendix B: PROFINET Modules

B.1 Parameter Set Module (32 Instances)

Each instance refers to the preset number.

Table B.1 Parameter Set Module Specification

Name	Value
Slot	1
Sub-Slot	1
Instance	Write to index 2501 to select the target instance.
Service Type	Read/Write

Table B.2 Parameter Set Module

Index No	Name	Data Type	Data Length (bytes)	Access	Default	Min.	Max.	Format	Unit
1010	Preset Name (Character 1)	INT8	1	Get/Set	64	32	128	-	-
1011	Preset Name (Character 2)	INT8	1	Get/Set	64	32	128	-	-
1012	Preset Name (Character 3)	INT8	1	Get/Set	64	32	128	-	-
1013	Preset Name (Character 4)	INT8	1	Get/Set	64	32	128	-	-
1014	Preset Name (Character 5)	INT8	1	Get/Set	64	32	128	-	-
1015	Preset Name (Character 6)	INT8	1	Get/Set	64	32	128	-	-
1016	Preset Name (Character 7)	INT8	1	Get/Set	64	32	128	-	-
1017	Preset Name (Character 8)	INT8	1	Get/Set	64	32	128	-	-
1018	Preset Name (Character 9)	INT8	1	Get/Set	64	32	128	-	-
1019	Preset Name (Character 10)	INT8	1	Get/Set	64	32	128	-	-
1020	Preset Name (Character 11)	INT8	1	Get/Set	64	32	128	-	-
1021	Preset Name (Character 12)	INT8	1	Get/Set	64	32	128	-	-
1022	Preset Name (Character 13)	INT8	1	Get/Set	64	32	128	-	-
1023	Preset Name (Character 14)	INT8	1	Get/Set	64	32	128	-	-
1024	Preset Name (Character 15)	INT8	1	Get/Set	64	32	128	-	-

Table B.2 Parameter Set Module

Index No	Name	Data Type	Data Length (bytes)	Access	Default	Min.	Max.	Format	Unit
1025	Preset Name (Character 16)	INT8	1	Get/Set	64	32	128	-	-
1026	Preset Name (Character 17)	INT8	1	Get/Set	64	32	128	-	-
1027	Preset Name (Character 18)	INT8	1	Get/Set	64	32	128	-	-
1028	Preset Name (Character 19)	INT8	1	Get/Set	64	32	128	-	-
1029	Preset Name (Character 20)	INT8	1	Get/Set	64	32	128	-	-
1040	Horn number assigned to a preset	UINT8	1	Get/Set	1	1	16	-	-
1060	Weld Mode (0=Continous, 1=Time, 2=Energy, 3=Peak Power, 4=Ground Detect)	INT32	4	Get/Set	0	0	4		
1061	Time	INT32	4	Get/Set	10	10	30000		ms
1062	Energy (Value should be entered 10 times higher)	INT32	4	Get/Set	10	1	99990		0.1xJ
1063	Peak Power	INT16	2	Get/Set	1	1	100		%
1064	Ground Detect Time	INT16	2	Get/Set	1	0	500		ms
1065	Amplitude A	INT16	2	Get/Set	100	10	100		%
1066	Amplitude B	INT16	2	Get/Set	100	10	100		%
1067	Amplitude Profile Criterion (0=Fix, 1=External analog in, 2=Step@Time, 3=Step@Energy, 4=Step@Power, 5=Step@External)	INT32	4	Get/Set	0	0	5	Selection	-
1068	Amplitude Profile Time	INT16	2	Get/Set	10	1	30000		ms
1069	Amplitude Profile Energy (Value should be entered 10 times higher)	INT32	4	Get/Set	10	1	99990		0.1xJ
1070	Amplitude Profile Peak Power	INT16	2	Get/Set	1	1	100		%
1071	Amplitude Start Ramp Time	INT32	4	Get/Set	80	10	1000		ms
1073	Frequency Store at End	INT8	1	Get/Set	1	0	1	Selection	
1074	Frequency Offset	INT32	4	Get/Set	0	-500	500		Hz
1075	Hold time	INT16	2	Get/Set	10	10	30000	0=OFF	ms

Table B.2 Parameter Set Module

Index No	Name	Data Type	Data Length (bytes)	Access	Default	Min.	Max.	Format	Unit
1076	Energy Breaking	INT8	1	Get/Set	1	0	1	Selection	
1077	EB Target Amplitude	INT16	2	Get/Set	3	1	100		%
1078	EB Time	INT16	2	Get/Set	20	10	1000		ms
1079	After Burst	INT8	1	Get/Set	1	0	1	Selection	
1080	AB Amplitude	INT16	2	Get/Set	100	10	100		%
1081	AB Time	INT16	2	Get/Set	100	100	2000		ms
1082	AB Delay	INT16	2	Get/Set	100	100	2000		ms
1084	Scrub Amplitude	INT32	4	Get/Set	100	10	100		%
1086	Time Error High (Cutoff)	INT32	4	Get/Set	6000	10	30000	0=OFF	ms
1087	Energy Error High (Cutoff) (Value should be entered 10 times higher)	INT32	4	Get/Set	1	1	99990	0=OFF	0.1xJ
1088	Peak Power Error High (Cutoff)	INT16	2	Get/Set	10	1	100	0=OFF	%
1089	- Time Limit	INT16	2	Get/Set	10	10	30000	0=OFF	ms
1090	+ Time Limit	INT16	2	Get/Set	30000	10	30000	0=OFF	ms
1091	- Energy Limit (Value should be entered 10 times higher)	INT32	4	Get/Set	1	1	99990	0=OFF	0.1xJ
1092	+ Energy Limit (Value should be entered 10 times higher)	INT32	4	Get/Set	99990	1	99990	0=OFF	0.1xJ
1093	- Peak Power Limit	INT32	4	Get/Set	1	1	100	0=OFF	%
1094	+ Peak Power Limit	INT16	2	Get/Set	100	1	100	0=OFF	%
1095	Frequency Low (Cutoff Relative) (It depends on the power supply operating frequency. Frequency ranges will be added)	INT16	2	Get/Set	20 kHz: 500 30 kHz: 750 40 kHz: 1000	20 kHz: 1 30 kHz: 1 40 kHz: 1	20 kHz: 500 30 kHz: 750 40 kHz: 1000	0=OFF	Hz
1096	Frequency High (Cutoff Relative) (It depends on the power supply operating frequency. Frequency ranges will be added)	INT32	4	Get/Set	20 kHz: 500 30 kHz: 750 40 kHz: 1000	20 kHz: 500 30 kHz: 1 40 kHz: 1	20 kHz: 200 30 kHz: 750 40 kHz: 1000	0=OFF	Hz
1098	CustomAinCutOff	INT32	4	Get/Set	100	0	100	0=OFF	
1099	CustomBinCutOff	INT32	4	Get/Set	100	0	100	0=OFF	

B.2 Weld Data Module (32 Instances)

The weld data for the preset number run.

Table B.3 Weld Data Module Specification

Name	Value
Slot	2
Sub-Slot	1
Instance	Write to index 2501 to select the target instance.
Service Type	Read

Table B.4 Weld Data Module

Index No	Name	Data Type	Data Length (bytes)	Access	Format	Unit
1210	Preset Name (Character 1)	INT8	1	Get	-	-
1211	Preset Name (Character 2)	INT8	1	Get	-	-
1212	Preset Name (Character 3)	INT8	1	Get	-	-
1213	Preset Name (Character 4)	INT8	1	Get	-	-
1214	Preset Name (Character 5)	INT8	1	Get	-	-
1215	Preset Name (Character 6)	INT8	1	Get	-	-
1216	Preset Name (Character 7)	INT8	1	Get	-	-
1217	Preset Name (Character 8)	INT8	1	Get	-	-
1218	Preset Name (Character 9)	INT8	1	Get	-	-
1219	Preset Name (Character 10)	INT8	1	Get	-	-
1220	Preset Name (Character 11)	INT8	1	Get	-	-
1221	Preset Name (Character 12)	INT8	1	Get	-	-
1222	Preset Name (Character 13)	INT8	1	Get	-	-
1223	Preset Name (Character 14)	INT8	1	Get	-	-
1224	Preset Name (Character 15)	INT8	1	Get	-	-

Table B.4 Weld Data Module

Index No	Name	Data Type	Data Length (bytes)	Access	Format	Unit
1225	Preset Name (Character 16)	INT8	1	Get	-	-
1226	Preset Name (Character 17)	INT8	1	Get	-	-
1227	Preset Name (Character 18)	INT8	1	Get	-	-
1228	Preset Name (Character 19)	INT8	1	Get	-	-
1229	Preset Name (Character 20)	INT8	1	Get	-	-
1240	Horn #	-		-	-	-
1260	Weld Mode	INT32	4	Get	-	-
1261	Weld Time	INT16	2	Get	-	ms
1262	Energy (Value should be entered 10 times higher)	INT32	4	Get	-	0.1xJ
1263	Peak Power	INT16	2	Get	-	%
1264	Ground Detect Time	INT16	2	Get	-	ms
1265	Amplitude A	INT16	2	Get	-	%
1266	Amplitude B	INT16	2	Get	-	%
1267	Amplitude Profile Criterion (0=Fix, 1=External analog in, 2=Step@Time, 3=Step@Energy, 4=Step@Power, 5=Step@External)	INT32	4	Get	-	-
1268	Amplitude Profile Time	INT32	4	Get	-	ms
1269	Amplitude Profile Energy (Value should be entered 10 times higher)	INT32	4	Get	-	-
1270	Amplitude Profile Peak Power	INT16	2	Get	-	%
1271	Amplitude Start Ramp Time	INT32	4	Get	-	ms
1273	Frequency Store at End	INT8	1	Get	-	
1274	Frequency Offset	INT32	4	Get	-	Hz
1275	Hold time	INT16	2	Get	-	ms
1276	Energy Breaking	INT8	1	Get	-	
1277	EB Target Amplitude	INT16	2	Get	-	%
1278	EB Time	INT16	2	Get	-	ms

Table B.4 Weld Data Module

Index No	Name	Data Type	Data Length (bytes)	Access	Format	Unit
1279	After Burst	INT8	1	Get	-	
1280	AB Amplitude	INT16	2	Get	-	%
1281	AB Time	INT16	2	Get	-	ms
1282	AB Delay	INT16	2	Get	-	ms
1283	Scrub Time Flag	INT8	1	Get	-	ms
1284	Scrub Amplitude	INT16	2	Get	-	%
1285	Scrub Time	INT16	2			
1286	Time Error High (Cutoff)	INT32	4	Get	-	ms
1287	Energy Error High (Cutoff) (Value should be entered 10 times higher)	INT32	4	Get	-	0.1xJ
1288	Peak Power Error High (Cutoff)	INT16	2	Get	-	%
1289	- Time Limit	INT16	2	Get	-	ms
1290	+ Time Limit	INT16	2	Get	-	ms
1291	- Energy Limit (Value should be entered 10 times higher)	INT32	4	Get	-	0.1xJ
1292	+ Energy Limit (Value should be entered 10 times higher)	INT32	4	Get	-	0.1xJ
1293	- Peak Power Limit	INT16	2	Get	-	%
1294	+ Peak Power Limit	INT16	2	Get	-	%
1295	Frequency Low (Cutoff Relative) (It depends on the power supply operating frequency. Frequency ranges will be added)	INT32	4	Get	-	Hz
1296	Frequency High (Cutoff Relative) (It depends on the power supply operating frequency. Frequency ranges will be added)	INT32	4	Get	-	Hz
1297	Ground Detect Flag	Boolean		Get	-	
1298	CustomAinCutOff	INT32	4	Get	-	
1299	CustomBinCutOff	INT32	4	Get	-	
1306*	Date (DD/MM/YY)	-		-	-	-
1307**	Time (SS:MM:HH)	-		-	-	-
1308***	Cycle Counter	-		-	-	-

Table B.4 Weld Data Module

Index No	Name	Data Type	Data Length (bytes)	Access	Format	Unit
1630	OL - Overload Group 0 (bit 0-31)	UINT32	4	Get	-	-
1631	OL - Overload Group 0 (bit 32-63)	UINT32	4	Get	-	-
1634	CU - Cutoffs Group 1 (bit 0-31)	UINT32	4	Get	-	-
1635	CU - Cutoffs Group 1 (bit 32-63)	UINT32	4	Get	-	-
1638	SE - Setup Group 2 (bit 0-31)	UINT32	4	Get	-	-
1639	SE - Setup Group 2 (bit 32-63)	UINT32	4	Get	-	-
1642	CM - Cycle Modified Group 3 (bit 0-31)	UINT32	4	Get	-	-
1643	CM - Cycle Modified Group 3 (bit 32-63)	UINT32	4	Get	-	-
1646	WA - Warnings Group 4 (bit 0-31)	UINT32	4	Get	-	-
1647	WA - Warnings Group 4 (bit 32-63)	UINT32	4	Get	-	-
1650	LM - Limits Group 5 (bit 0-31)	UINT32	4	Get	-	-
1651	LM - Limits Group 5 (bit 32-63)	UINT32	4	Get	-	-
1654	EQ - Equipment Failure Group 6 (bit 0-31)	UINT32	4	Get	-	-
1655	EQ - Equipment Failure Group 6 (bit 32-63)	UINT32	4	Get	-	-
1658	NC - No Cycle Group 7 (bit 0-31)	UINT32	4	Get	-	-
1659	NC - No Cycle Group 7 (bit 32-63)	UINT32	4	Get	-	-
1662	CF - Comm. Failure Group 8 (bit 0-31)	UINT32	4	Get	-	-
1663	CF - Comm. Failure Group 8 (bit 32-63)	UINT32	4	Get	-	-
1666	TP - Temperature Group 9 (bit 0-31)	UINT32	4	Get	-	-
1667	TP - Temperature Group 9 (bit 32-63)	UINT32	4	Get	-	-
1670	HW - Hardware Group A (bit 0-31)	UINT32	4	Get	-	-
1671	HW - Hardware Group A (bit 32-63)	UINT32	4	Get	-	-

Table B.4 Weld Data Module

Index No	Name	Data Type	Data Length (bytes)	Access	Format	Unit
1674	NO - No Cycle Overload Group B (bit 0-31)	UINT32	4	Get	-	-
1675	NO - No Cycle Overload Group B (bit 32-63)	UINT32	4	Get	-	-
1678	Error Reason	-		Get	-	-
1360	Weld Time	INT16	2	Get		ms
1361	Hold Time	INT16	2	Get		ms
1362	Energy	INT32	4	Get		0.1 J
1363	Peak Power	INT8	1	Get		%
1364	Average Power	INT32	4	Get		%
1365	Average Amplitude 1	UINT8	1	Get		%
1366	Average Amplitude 2	UINT8	1	Get		%
1367	Recalled Res. Frequency	UINT32	4	Get		Hz
1368	Start Frequency	INT32	4	Get		Hz
1369	End Frequency	INT32	4	Get		Hz
1370	Stored Frequency	INT32	4	Get		Hz
1371	Res. Frequency OK	INT32	4	Get	Selection	
1372	End Amplitude Set	INT32	4	Get		%
1373	End Amplitude	INT32	4	Get		%
1374	End PSV	INT32	4	Get		%
1375	End Power	INT32	4	Get		%
1376	End Current	INT32	4	Get		%
1377	End Phase	INT32	4	Get		deg. (°)
1378	End Temperature	INT32	4	Get		°C

*(Date) It's given in the order: day, month, year - for example 180810, 18 Hex = 24 decimal = day
08 Hex = 08 decimal = month 10 Hex = 16 decimal = year, Date = 24/08/16
**(Time) It's given in the order: seconds, minutes, hours - for example 371E0F, 37 Hex = 55 decimal = seconds
1E Hex = 30 decimal = minutes 0F Hex = 15 decimal = hours, Time = 15:30:55
***ID 1308 is a 32 bit long command

B.3 Stack Parameter Module (16 Instances)

There is 1 instance for each horn preset.

Table B.5 Stack Parameter Specification

Name	Value
Slot	3
Sub-Slot	1
Instance	Write to index 2501 to select the target instance.
Service Type	Read/Write

Table B.6 Stack Parameter Module (Seek)

Index No	Name	Data Type	Data Length (bytes)	Access	Default	Min.	Max.	Format	Unit
1460	Time	INT32	4	Get/Set	500	10	1000		ms
1461	Amplitude Set	UINT16	2	Get/Set	10	10	10		
1462	Amplitude Start Ramp Time	INT32	4	Get/Set	80	10	1000		ms
1465	Frequency Offset	INT32	4	Get/Set	0	-500	500		Hz
1467	Frequency Error Low (Relative)	INT32	4	Get/Set	20 kHz: 500	20 kHz: 1	20 kHz: 500	-	Hz
					30 kHz: 750	30 kHz: 1	30 kHz: 750		
					40 kHz: 1000	40 kHz: 1	40 kHz: 1000		
1468	Frequency Error High (Relative)	INT32	4	Get/Set	20 kHz: 500	20 kHz: 500	20 kHz: 200	-	Hz
					30 kHz: 750	30 kHz: 1	30 kHz: 750		
					40 kHz: 1000	40 kHz: 1	40 kHz: 1000		

Table B.7 Stack Parameter Module (Test)

Index No	Name	Data Type	Data Length (bytes)	Access	Default	Min.	Max.	Format	Unit
1475	Amplitude Set A	INT32	4	Get/Set	100	10	100	-	%
1476	Amplitude Profile Criterion	INT32	4	Get/Set	0	0	5		
1477	Amplitude Profile Time	UINT32	4	Get/Set	1	1	30000		
1478	Amplitude Set B	UINT16	2	Get/Set	10	10	100		
1479	Amplitude Start Ramp Time	UINT16	2	Get/Set	10	10	1000		
1485	+ Time Limit	INT32	4						
1486	Frequency Error Low (Relative)	INT32	4	Get/Set	20 kHz: 500	20 kHz: 1	20 kHz: 500	-	Hz
					30 kHz: 750	30 kHz: 1	30 kHz: 750		
					40 kHz: 1000	40 kHz: 1	40 kHz: 1000		
1487	Frequency Error High (Relative)	INT32	4	Get/Set	20 kHz: 500	20 kHz: 500	20 kHz: 200	-	Hz
					30 kHz: 750	30 kHz: 1	30 kHz: 750		
					40 kHz: 1000	40 kHz: 1	40 kHz: 1000		

Table B.8 Stack Parameter Module (Scan)

Index No	Name	Data Type	Data Length (bytes)	Access	Default	Min.	Max.	Format	Unit
1490	Start Frequency (Absolute)	INT32	4	Get/Set	19450	19450	20450	-	Hz
1491	Stop Frequency (Absolute)	INT32	4	Get/Set	19450	19450	20450	-	Hz
1493	Delay Time	INT32	4	Get/Set	10	10	100	-	ms
1494	Max. Amplitude	INT16	2	Get/Set	10	10	50	-	%
1495	Max. Current	INT16	2	Get/Set				-	-
1496	+ Time Limit	INT32	4	Get/Set				-	ms

Table B.9 Common Stack Parameters

Index No	Name	Data Type	Data Length (bytes)	Access	Default	Min.	Max.	Format	Unit
1505	Digital Tune Frequency	INT32	4	Get/Set	20 kHz: 19,950	20 kHz: 19,450	20kHz: 20,450	-	Hz
					30 kHz: 30,000	30 kHz: 29,250	30 kHz: 30,750	-	Hz
					40 kHz: 39,900	40 kHz: 38,900	40 kHz: 40,900	-	Hz

B.4 Stack Status Module (16 Instances)

The horn status for the horn preset number run.

Table B.10 Stack Status Specification

Name	Value
Slot	4
Sub-Slot	1
Instance	Write to index 2501 to select the target instance.
Service Type	Read

Table B.11 Stack Status Module (Seek)

Index No	Name	Data Type	Data Length (bytes)	Access	Format	Unit
1610	Seek Time	UINT16	2	Get	-	ms
1611	Seek Amp	UINT16	2	Get	-	%
1612	Ramp time	UINT16	2	Get	-	ms
1615	Frequency Offset	UINT32	4	Get	-	Hz
1617	Frequency Low	UINT32	4	Get	-	
1618	Frequency High	UINT32	4	Get	-	
1625*	RTC, Date (DD/MM/YY)	-		Get	-	-
1626**	RTC, Time (SS:MM:HH)	-		Get	-	-
1630	OL - Overload Group 0 (bit 0-31)	UINT32	4	Get	-	-
1631	OL - Overload Group 0 (bit 32-63)	UINT32	4	Get	-	-
1634	CU - Cutoffs Group 1 (bit 0-31)	UINT32	4	Get	-	-
1635	CU - Cutoffs Group 1 (bit 32-63)	UINT32	4	Get	-	-
1638	SE - Setup Group 2 (bit 0-31)	UINT32	4	Get	-	-
1639	SE - Setup Group 2 (bit 32-63)	UINT32	4	Get	-	-
1642	CM - Cycle Modified Group 3 (bit 0-31)	UINT32	4	Get	-	-
1643	CM - Cycle Modified Group 3 (bit 32-63)	UINT32	4	Get	-	-
1646	WA - Warnings Group 4 (bit 0-31)	UINT32	4	Get	-	-

Table B.11 Stack Status Module (Seek)

Index No	Name	Data Type	Data Length (bytes)	Access	Format	Unit
1647	WA - Warnings Group 4 (bit 32-63)	UINT32	4	Get	-	-
1650	LM - Limits Group 5 (bit 0-31)	UINT32	4	Get	-	-
1651	LM - Limits Group 5 (bit 32-63)	UINT32	4	Get	-	-
1654	EQ - Equipment Failure Group 6 (bit 0-31)	UINT32	4	Get	-	-
1655	EQ - Equipment Failure Group 6 (bit 32-63)	UINT32	4	Get	-	-
1658	NC - No Cycle Group 7 (bit 0-31)	UINT32	4	Get	-	-
1659	NC - No Cycle Group 7 (bit 32-63)	UINT32	4	Get	-	-
1662	CF - Comm. Failure Group 8 (bit 0-31)	UINT32	4	Get	-	-
1663	CF - Comm. Failure Group 8 (bit 32-63)	UINT32	4	Get	-	-
1666	TP - Temperature Group 9 (bit 0-31)	UINT32	4	Get	-	-
1667	TP - Temperature Group 9 (bit 32-63)	UINT32	4	Get	-	-
1670	HW - Hardware Group A (bit 0-31)	UINT32	4	Get	-	-
1671	HW - Hardware Group A (bit 32-63)	UINT32	4	Get	-	-
1674	NO - No Cycle Overload Group B (bit 0-31)	UINT32	4	Get	-	-
1675	NO - No Cycle Overload Group B (bit 32-63)	UINT32	4	Get	-	-
1678	Error Reason	-		Get	-	-
1680	Time	INT32	4	Get	-	ms
1681	Average Amplitude	INT32	4	Get	-	%
1682	Recalled Digital Tune	INT32	4	Get	-	Hz
1683	Start Frequency	INT32	4	Get	-	Hz
1684	End Frequency	INT32	4	Get	-	Hz
1685	Stored Frequency	INT32	4	Get	-	Hz
1686	Res. Frequency OK	INT32	4	Get	Selection	
1687	End Amplitude Set	INT32	4	Get	-	%
1688	End Amplitude	INT32	4	Get	-	%

Table B.11 Stack Status Module (Seek)

Index No	Name	Data Type	Data Length (bytes)	Access	Format	Unit
1689	End PSV	INT32	4	Get	-	%
1690	End Power	INT32	4	Get	-	%
1691	End Current	INT32	4	Get	-	%
1692	End Phase	INT32	4	Get	-	deg. (°)
1693	End Temperature	INT32	4	Get	-	°C

Table B.12 Stack Status Module (Test)

Index No	Name	Data Type	Data Length (bytes)	Access	Format	Unit
1710	Amplitude1	UINT16	2	Get	-	
1711	AmpStepCondition	UINT32	4	Get	-	
1712	AmplitudeProfileTime	UINT32	4	Get	-	
1713	Amplitude2	UINT16	2	Get	-	
1714	AmplitudeStartRampTime	UINT32	4	Get	-	
1720	TimeErrorHigh	UINT32	4	Get	-	
1721	WeldFreqLow			Get	-	
1722	WeldFreqHigh			Get	-	
1725*	RTC, Date (DD/MM/YY)	-		Get	-	-
1726**	RTC, Time (SS:MM:HH)	-		Get	-	-
1730	OL - Overload Group 0 (bit 0-31)	UINT32	4	Get	-	-
1731	OL - Overload Group 0 (bit 32-63)	UINT32	4	Get	-	-
1734	CU - Cutoffs Group 1 (bit 0-31)	UINT32	4	Get	-	-
1735	CU - Cutoffs Group 1 (bit 32-63)	UINT32	4	Get	-	-
1738	SE - Setup Group 2 (bit 0-31)	UINT32	4	Get	-	-
1739	SE - Setup Group 2 (bit 32-63)	UINT32	4	Get	-	-
1742	CM - Cycle Modified Group 3 (bit 0-31)	UINT32	4	Get	-	-
1743	CM - Cycle Modified Group 3 (bit 32-63)	UINT32	4	Get	-	-
1746	WA - Warnings Group 4 (bit 0-31)	UINT32	4	Get	-	-
1747	WA - Warnings Group 4 (bit 32-63)	UINT32	4	Get	-	-
1750	LM - Limits Group 5 (bit 0-31)	UINT32	4	Get	-	-
1751	LM - Limits Group 5 (bit 32-63)	UINT32	4	Get	-	-
1754	EQ - Equipment Failure Group 6 (bit 0-31)	UINT32	4	Get	-	-
1755	EQ - Equipment Failure Group 6 (bit 32-63)	UINT32	4	Get	-	-

Table B.12 Stack Status Module (Test)

Index No	Name	Data Type	Data Length (bytes)	Access	Format	Unit
1758	NC - No Cycle Group 7 (bit 0-31)	UINT32	4	Get	-	-
1759	NC - No Cycle Group 7 (bit 32-63)	UINT32	4	Get	-	-
1762	CF - Comm. Failure Group 8 (bit 0-31)	UINT32	4	Get	-	-
1763	CF - Comm. Failure Group 8 (bit 32-63)	UINT32	4	Get	-	-
1766	TP - Temperature Group 9 (bit 0-31)	UINT32	4	Get	-	-
1767	TP - Temperature Group 9 (bit 32-63)	UINT32	4	Get	-	-
1770	HW - Hardware Group A (bit 0-31)	UINT32	4	Get	-	-
1771	HW - Hardware Group A (bit 32-63)	UINT32	4	Get	-	-
1774	NO - No Cycle Overload Group B (bit 0-31)	UINT32	4	Get	-	-
1775	NO - No Cycle Overload Group B (bit 32-63)	UINT32	4	Get	-	-
1778	Error Reason	-		Get	-	-
1780	Time	INT32	4	Get	-	ms
1781	Average Amplitude A	INT32	4	Get	-	%
1782	Average Amplitude B	INT32	4	Get	-	%
1783	Recalled Res. Frequency	INT32	4	Get	-	Hz
1784	Res. Frequency OK	INT32	4	Get	Selection	-
1785	Start Frequency	INT32	4	Get	-	Hz
1786	End Frequency	INT32	4	Get	-	Hz
1787	End Amplitude Set	INT32	4	Get	-	%
1788	End Amplitude	INT32	4	Get	-	%
1789	End PSV	INT32	4	Get	-	%
1790	End Power	INT32	4	Get	-	%
1791	End Current	INT32	4	Get	-	%
1792	End Phase	INT32	4	Get	-	deg. (°)
1793	End Temperature	INT32	4	Get	-	°C

Table B.13 Stack Status Module (Scan)

Index No	Name	Data Type	Data Length (bytes)	Access	Format	Unit
1810	Frequency Start	UINT32	4	Get	-	-
1811	Frequency Stop	UINT32	4	Get	-	-
1812	Frequency Step	UINT32	4	Get	-	-
1813	Time Delay	UINT32	4	Get	-	-
1814	Max Amplitude	UINT16	2	Get	-	-
1815	Max Current	UINT8	1	Get	-	-
1816	Time Error High	UINT32	4	Get	-	-
1825*	RTC, Date (DD/MM/YY)	-		Get	-	-
1826**	RTC, Time (SS:MM:HH)	-		Get	-	-
1830	OL - Overload Group 0 (bit 0-31)	UINT32	4	Get	-	-
1831	OL - Overload Group 0 (bit 32-63)	UINT32	4	Get	-	-
1834	CU - Cutoffs Group 1 (bit 0-31)	UINT32	4	Get	-	-
1835	CU - Cutoffs Group 1 (bit 32-63)	UINT32	4	Get	-	-
1838	SE - Setup Group 2 (bit 0-31)	UINT32	4	Get	-	-
1839	SE - Setup Group 2 (bit 32-63)	UINT32	4	Get	-	-
1842	CM - Cycle Modified Group 3 (bit 0-31)	UINT32	4	Get	-	-
1843	CM - Cycle Modified Group 3 (bit 32-63)	UINT32	4	Get	-	-
1846	WA - Warnings Group 4 (bit 0-31)	UINT32	4	Get	-	-
1847	WA - Warnings Group 4 (bit 32-63)	UINT32	4	Get	-	-
1850	LM - Limits Group 5 (bit 0-31)	UINT32	4	Get	-	-
1851	LM - Limits Group 5 (bit 32-63)	UINT32	4	Get	-	-
1854	EQ - Equipment Failure Group 6 (bit 0-31)	UINT32	4	Get	-	-
1855	EQ - Equipment Failure Group 6 (bit 32-63)	UINT32	4	Get	-	-
1858	NC - No Cycle Group 7 (bit 0-31)	UINT32	4	Get	-	-

Table B.13 Stack Status Module (Scan)

Index No	Name	Data Type	Data Length (bytes)	Access	Format	Unit
1859	NC - No Cycle Group 7 (bit 32-63)	UINT32	4	Get	-	-
1862	CF - Comm. Failure Group 8 (bit 0-31)	UINT32	4	Get	-	-
1863	CF - Comm. Failure Group 8 (bit 32-63)	UINT32	4	Get	-	-
1866	TP - Temperature Group 9 (bit 0-31)	UINT32	4	Get	-	-
1867	TP - Temperature Group 9 (bit 32-63)	UINT32	4	Get	-	-
1870	HW - Hardware Group A (bit 0-31)	UINT32	4	Get	-	-
1871	HW - Hardware Group A (bit 32-63)	UINT32	4	Get	-	-
1874	NO - No Cycle Overload Group B (bit 0-31)	UINT32	4	Get	-	-
1875	NO - No Cycle Overload Group B (bit 32-63)	UINT32	4	Get	-	-
1878	Error Reason	-		Get	-	-
1880	Time	INT32	4	Get	-	ms
1881	Start Frequency	INT32	4	Get	-	Hz
1882	End Frequency	INT32	4	Get	-	Hz
1883	End Amplitude	INT32	4	Get	-	%
1884	End PSV	INT32	4	Get	-	%
1885	End Power	INT32	4	Get	-	%
1886	End Current	INT32	4	Get	-	%
1887	End Phase	INT32	4	Get	-	deg. (°)
1888	End Temperature	INT32	4	Get	-	°C

*(Date) It's given in the order: day, month, year - for example 180810, 18 Hex = 24 decimal = day 08 Hex = 08 decimal = month 10 Hex = 16 decimal = year, Date = 24/08/16
**(Time) It's given in the order: seconds, minutes, hours - for example 371E0F, 37 Hex = 55 decimal = seconds

1E Hex = 30 decimal = minutes 0F Hex = 15 decimal = hours, Time = 15:30:55

B.5 Alarm Data Module (1 Instances)

Table B.14 Alarm Module Specification

Name	Value
Slot	5
Sub-Slot	1
Instance	Write to index 2501 to select the target instance.
Service Type	Read

Table B.15 Alarm Module

Index No	Name	Data Type	Data Length (bytes)	Access	Format
200	OL - Overload Group 0 (bit 0-31)	UINT32	4	Get	OEPB
201	OL - Overload Group 0 (bit 32-63)	UINT32	4	Get	OEPB
204	CU - Cutoffs Group 1 (bit 0-31)	UINT32	4	Get	OEPB
205	CU - Cutoffs Group 1 (bit 32-63)	UINT32	4	Get	OEPB
208	SE - Setup Group 2 (bit 0-31)	UINT32	4	Get	OEPB
209	SE - Setup Group 2 (bit 32-63)	UINT32	4	Get	OEPB
212	CM - Cycle Modified Group 3 (bit 0-31)	UINT32	4	Get	OEPB
213	CM - Cycle Modified Group 3 (bit 32-63)	UINT32	4	Get	OEPB
216	WA - Warnings Group 4 (bit 0-31)	UINT32	4	Get	OEPB
217	WA - Warnings Group 4 (bit 32-63)	UINT32	4	Get	OEPB
220	LM - Limits Group 5 (bit 0-31)	UINT32	4	Get	OEPB
221	LM - Limits Group 5 (bit 32-63)	UINT32	4	Get	OEPB
224	EQ - Equipment Failure Group 6 (bit 0-31)	UINT32	4	Get	OEPB
225	EQ - Equipment Failure Group 6 (bit 32-63)	UINT32	4	Get	OEPB
228	NC - No Cycle Group 7 (bit 0-31)	UINT32	4	Get	OEPB

Table B.15 Alarm Module

Index No	Name	Data Type	Data Length (bytes)	Access	Format
229	NC - No Cycle Group 7 (bit 32-63)	UINT32	4	Get	OEPB
232	CF - Comm. Failure Group 8 (bit 0-31)	UINT32	4	Get	OEPB
233	CF - Comm. Failure Group 8 (bit 32-63)	UINT32	4	Get	OEPB
236	TP - Temperature Group 9 (bit 0-31)	UINT32	4	Get	OEPB
237	TP - Temperature Group 9 (bit 32-63)	UINT32	4	Get	OEPB
240	HW - Hardware Group A (bit 0-31)	UINT32	4	Get	OEPB
241	HW - Hardware Group A (bit 32-63)	UINT32	4	Get	OEPB
244	NO - No Cycle Overload Group B (bit 0-31)	UINT32	4	Get	OEPB
245	NO - No Cycle Overload Group B (bit 32-63)	UINT32	4	Get	OEPB

B.6 System Information Module (1 Instances)

Table B.16 System Information Module Specification

Name	Value
Slot	6
Sub-Slot	1
Instance	Write to index 2501 to select the target instance.
Service Type	Read

Table B.17 System Information Module

Index No	Name	Format
150	PS Frequency	Hz
151	PS Wattage	Watts
154	PS Serial Number	-

B.7 Other Information Module (1 Instances)

Table B.18 System Information Module Specification

Name	Value
Slot	7
Sub-Slot	1
Instance	Write to index 2501 to select the target instance.
Service Type	Read/Write

Table B.19 Other Information Module

Index No	Name	Data Type	Data Length (bytes)	Access
50	Get Access Token	UINT8	1	Get
51	Put Access Token	UINT8	1	Get/Set
100	DCP, HW Version	UINT32	4	Get
101	DCP, FPGA-Version	UINT32	4	Get
102	DCP, Bootloader-Version	UINT32	4	Get
103	DCP, Firmware-Version	UINT32	4	Get
110	WC, HW Version	UINT32	4	Get
112	WC, Bootloader-Version	UINT32	4	Get
113	WC, Firmware-Version	UINT32	4	Get
170*	RTC, Date (DD/MM/YY)	UINT32	4	Get/Set
171**	RTC, Time (SS:MM:HH)	UINT32	4	Get/Set

*(Date) It's given in the order: day, month, year - for example 180810, 18 Hex = 24 decimal = day
08 Hex = 08 decimal = month 10 Hex = 16 decimal = year, Date = 24/08/16
**(Time) It's given in the order: seconds, minutes, hours - for example 371E0F, 37 Hex = 55 decimal = seconds
1E Hex = 30 decimal = minutes 0F Hex = 15 decimal = hours, Time = 15:30:55

Table B.20 System Configuration Parameters

Index No	Name	Data Type	Access
950	Clear Memory Before Seek	INT32	Get/Set
951	Clear Memory with Reset	INT32	Get/Set
952	Set Digital Tune with Horn Scan	INT32	Get/Set
953	Clear Memory at Power Up	INT32	Get/Set

Appendix C: Status and Control Words

C.1 Cyclic Messaging - Status and Control Words

C.1.1 DCX Inputs/PLC Outputs (20 words)

Table C.1 DCX Inputs/PLC Outputs (20 words)

Data	Description	Data Type	Access	Unit	Notes
0	STW1 (STW Word 1)	UINT16	W	-	See Table C.2 and Table C.5
1	SWT2 (STW Word 2)			-	
2	External Amplitude			%	
3	Frequency Offset			Hz	
4-19	Reserved				

C.1.1.1 Control Word (STW1)

Table C.2 Control Word (STW1)

	Bit	Name	Description	Notes
STW1	0	RES	Reserved	Not used
	1	ES	Emergency Stop	1=Emergency Stop
	2	RES	Reserved	Not used
	3	RES	Reserved	Not used
	4	HFS0	Stack Preset Number 0	See Table C.3 HFS Bit (Control Word)
	5	HFS1	Stack Preset Number 1	
	6	HFS2	Stack Preset Number 2	
	7	HFS3	Stack Preset Number 3	
	NOTICE HFS stack presets numbers are feedback inputs to indicate RF relay switching state. This is used only in stack sequencing applications. Set HFS to 0 if not using stack sequencing.			
	8	PSN0	Weld Preset Number 0	See Table C.4 PSN Bit (Control Word)
	9	PSN1	Weld Preset Number 1	
	10	PSN2	Weld Preset Number 2	
	11	PSN3	Weld Preset Number 3	
	12	PSN4	Weld Preset Number 4	
	NOTICE Preset 0 is reserved for the running preset. When a preset number is recalled, it is copied to Preset 0 and becomes the running preset.			
	13	RES	Reserved	Not used
	14	MA	Manual/Auto	Set and leave to 1 for Cyclic messaging control Set to 0 for discrete I/O control
	15	RES	Reserved	Not used

C.1.1.2 HFS Bit (Control Word)

Table C.3 HFS Bit (Control Word)

HFS3	HFS2	HFS1	HFS0	Stack Selected
0	0	0	0	No stack change
0	0	0	1	1 (factory default)
0	0	1	0	2
0	0	1	1	3
0	1	0	0	4
0	1	0	1	5
0	1	1	0	6
0	1	1	1	7
1	0	0	0	8
1	0	0	1	9
1	0	1	0	10
1	0	1	1	11
1	1	0	0	12
1	1	0	1	13
1	1	1	0	14
1	1	1	1	15

C.1.1.3 PSN Bit (Control Word)

Table C.4 PSN Bit (Control Word)

PSN4	PSN3	PSN2	PSN1	PSN0	Preset Selected
0	0	0	0	0	Previous preset
0	0	0	0	1	1
0	0	0	1	0	2
0	0	0	1	1	3
0	0	1	0	0	4
0	0	1	0	1	5
0	0	1	1	0	6
0	0	1	1	1	7
0	1	0	0	0	8
0	1	0	0	1	9
0	1	0	1	0	10
0	1	0	1	1	11
0	1	1	0	0	12
0	1	1	0	1	13
0	1	1	1	0	14
0	1	1	1	1	15
1	0	0	0	0	16
1	0	0	0	1	17
1	0	0	1	0	18
1	0	0	1	1	19
1	0	1	0	0	20
1	0	1	0	1	21
1	0	1	1	0	22
1	0	1	1	1	23
1	1	0	0	0	24
1	1	0	0	1	25
1	1	0	1	0	26
1	1	0	1	1	27
1	1	1	0	0	28
1	1	1	0	1	29
1	1	1	1	0	30
1	1	1	1	1	31

C.1.1.4 Control Word (STW2)

Table C.5 Control Word (STW2)

	Bit	Name	Description	Notes
STW2	0	FCT	Weld Function	1 = To run ultrasonics in normal mode
	1	SFCT	Stack Function	See Table C.6 Stack Function
	2	SFCT0	Stack Function 0	
	3	SFCT1	Stack Function 1	
	4	SFCT2	Stack Function 2	
	5	RES	Reserved	Not used
	6	MCLR	Memory Clear	1 = Memory offset will be set to 0
	7	RES	Reserved	Not used
	8	RST	Reset	1 = Reset
	9	ON	Run Ultrasonics	1 = Will turn on ultrasonics based on combination of SFCT or FCT bits. See bits 0-4 from tables below. **NOTICE** Signal must be held for 10ms minimum
	10	RES	Reserved	Not used
	11	RES	Reserved	
	12	GNDDT	Ground Detect	1 = Ground has been detected
	13	APROF	Amplitude Profile	1 = Switch from amplitude 1 to amplitude 2
	14	RES	Reserved	Not used
	15	RES	Reserved	

C.1.1.5 Stack Function

Table C.6 Stack Function

Bit	Name	Test	Scan	Seek
STW2/1	SFCT	1	1	1
STW2/2	SFCT0	1	0	0
STW2/3	SFCT1	0	1	0
STW2/4	SFCT2	0	0	0

C.1.2 Cyclic Message for Run

Table C.7 Cyclic Message for Run

Value	STW1 Bit															
16384d	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	STW2 Bit															
513d	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	1

C.1.3 Cyclic Message for Seek

Table C.8 Cyclic Message for Seek

Value	STW1 Bit															
16384d	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	STW2 Bit															
514d	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
	0	0	0	0	0	0	1	0	0	0	0	0	0	0	1	0

C.1.4 Cyclic Message for Scan

Table C.9 Cyclic Message for Scan

Value	STW1 Bit															
16384d	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	STW2 Bit															
522d	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
	0	0	0	0	0	0	1	0	0	0	0	0	1	0	1	0

C.1.5 Cyclic Message for Reset

Table C.10 Cyclic Message for Reset

Value	STW1 Bit															
16384d	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Value	**STW1 Bit**															
256d	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0

C.1.6 DCX Outputs/PLC Inputs (20 words)

Table C.11 DCX Outputs/PLC Inputs (20 words)

Data	Description	Data Type	Access	Unit	Notes
0	Reserved		R		
1	Reserved				
2	ZSW1 (ZSW Word 1)	UINT16		-	See Table C.12 and Table C.15
3	ZSW2 (ZSW Word 2)			-	
4	Nominal Amplitude Set			%	
5	Amplitude Output			%	
6	Current			%	
7	Power			%	
8	Phase	INT16		°	
9	PWM	UINT16		%	
10	Frequency			Hz	
11	Temperature			C	
12	Reserved				
13	Reserved				
14	Reserved				
15	Reserved				
16	Reserved				
17	Reserved				
18	Reserved				
19	Reserved				

C.1.6.1 Status Word (ZSW1)

Table C.12 Status Word (ZSW1

	Bit	Name	Description	Notes
ZSW1	0	NO-B	Non Cycle Overload Group B	1 = Non cycle overload has occurred
	1	ES	Emergency Stop Active	1 = Emergency stop active
	2	TEE	Future Use	Not used
	3	HFSE		
	4	HFS0	Stack Preset Number 0 Status	See Table C.13 HSF Bit (Status Word)
	5	HFS1	Stack Preset Number 1 Status	
	6	HFS2	Stack Preset Number 2 Status	
	7	HFS3	Stack Preset Number 3 Status	
	8	PSN0	Weld Preset Number 0 Active	See Table C.14 PSN Bit (Status Word)
	9	PSN1	Weld Preset Number 1 Active	
	10	PSN2	Weld Preset Number 2 Active	
	11	PSN3	Weld Preset Number 3 Active	
	12	PSN4	Weld Preset Number 4 Active	
	13	PSCA	Preset Change Complete	1 = Preset change complete
	14	MA	Manual/Auto Mode Active	1 = Auto Mode
	15	OL-0	Overload Group 0	1 = Overload has occurred

C.1.6.2 HSF Bit (Status Word)

Table C.13 HSF Bit (Status Word)

HFS3	HSD2	HFS1	HFS0	Stack Active
0	0	0	0	Not valid
0	0	0	1	1
0	0	1	0	2
0	0	1	1	3
0	1	0	0	4
0	1	0	1	5
0	1	1	0	6
0	1	1	1	7
1	0	0	0	8
1	0	0	1	9
1	0	1	0	10
1	0	1	1	11
1	1	0	0	12
1	1	0	1	13
1	1	1	0	14
1	1	1	1	15

C.1.6.3 PSN Bit (Status Word)

Table C.14 PSN Bit (Status Word)

PSN4	PSN3	PSN2	PSN1	PSN0	Preset Active
0	0	0	0	0	No preset active
0	0	0	0	1	1
0	0	0	1	0	2
0	0	0	1	1	3
0	0	1	0	0	4
0	0	1	0	1	5
0	0	1	1	0	6
0	0	1	1	1	7
0	1	0	0	0	8
0	1	0	0	1	9
0	1	0	1	0	10
0	1	0	1	1	11
0	1	1	0	0	12
0	1	1	0	1	13
0	1	1	1	0	14
0	1	1	1	1	15
1	0	0	0	0	16
1	0	0	0	1	17
1	0	0	1	0	18
1	0	0	1	1	19
1	0	1	0	0	20
1	0	1	0	1	21
1	0	1	1	0	22
1	0	1	1	1	23
1	1	0	0	0	24
1	1	0	0	1	25
1	1	0	1	0	26
1	1	0	1	1	27
1	1	1	0	0	28
1	1	1	0	1	29
1	1	1	1	0	30
1	1	1	1	1	31

C.1.6.4 Status Word (ZSW2)

Table C.15 Status Word (ZSW2)

	Bit	Name	Description	Notes
ZSW2	0	SE-2	Setup Group 2	1 = Setup alarm has occurred
	1	CM-3	Cycle Modified Group 3	1 = Cycle modified alarm has occurred
	2	WA-4	Warning Group 4	1 = Warning alarm has occurred
	3	EQ-6	Equipment Failure Group 6	1 = Equipment failure alarm has occurred
	4	NC-7	No Cycle Group 7	1 = No cycle alarm has occurred
	5	CF-8	Communication Failure Group 8	1 = Communication alarm has occurred
	6	HW-A	Hardware Group A	1 = Hardware alarm has occurred
	7	CU-1	Cutoff Group 1	1 = Cutoff alarm has occurred
	8	TP-9	Future Use	Not used
	9	SM	Future Use	Not used
	10	OFF	Ultrasonics Off and DCX Ready	1 = Ultrasonics off and DCX ready
	11	ON	Ultrasonics Active	1 = Ultrasonics active
	12	OK	End of Weld Cycle Without Error	1 = End cycle without error
	13	LM-5	Limit Group 5	1 = Limit alarm has occurred
	14	MCLR	Memory Clear	1 = Memory offset will be set to 0
	15	RES	Reserved	Not used

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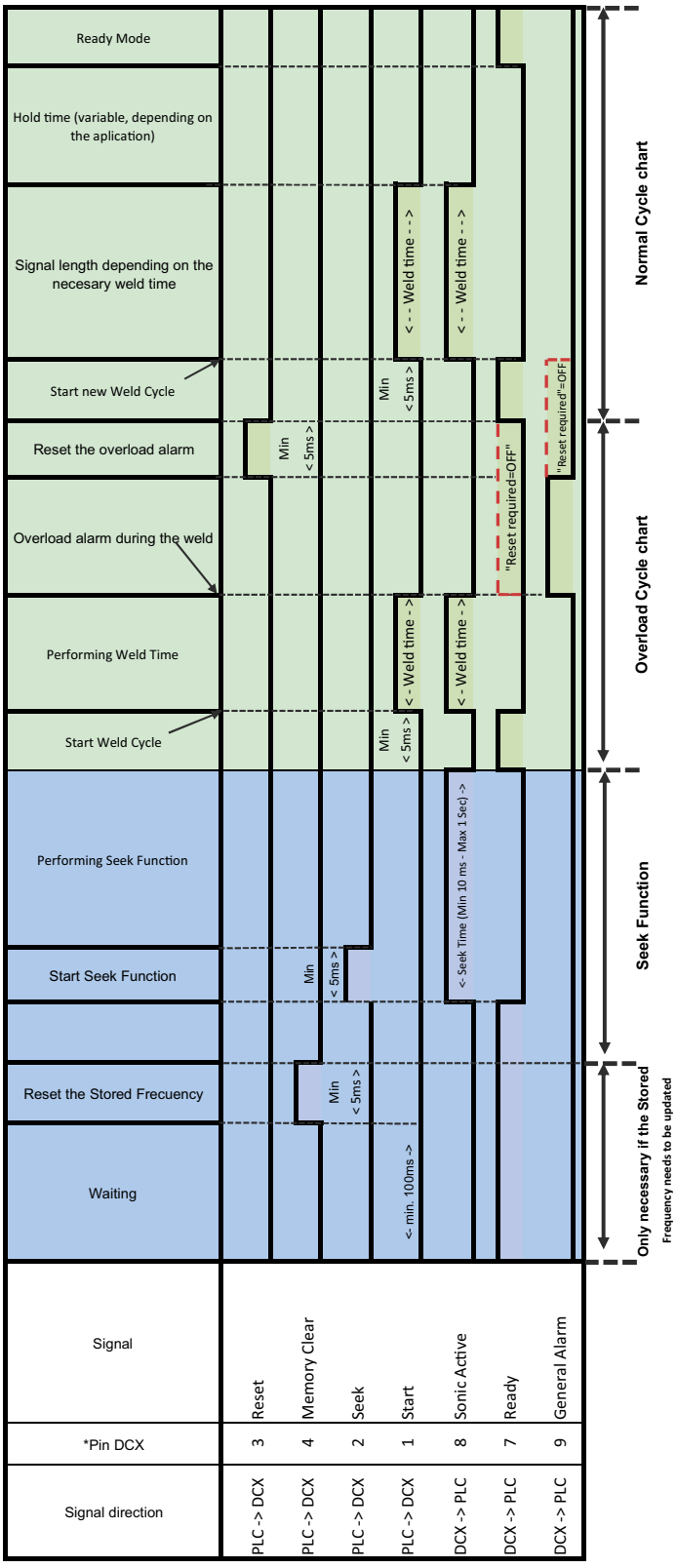
Appendix D: Signal Diagrams

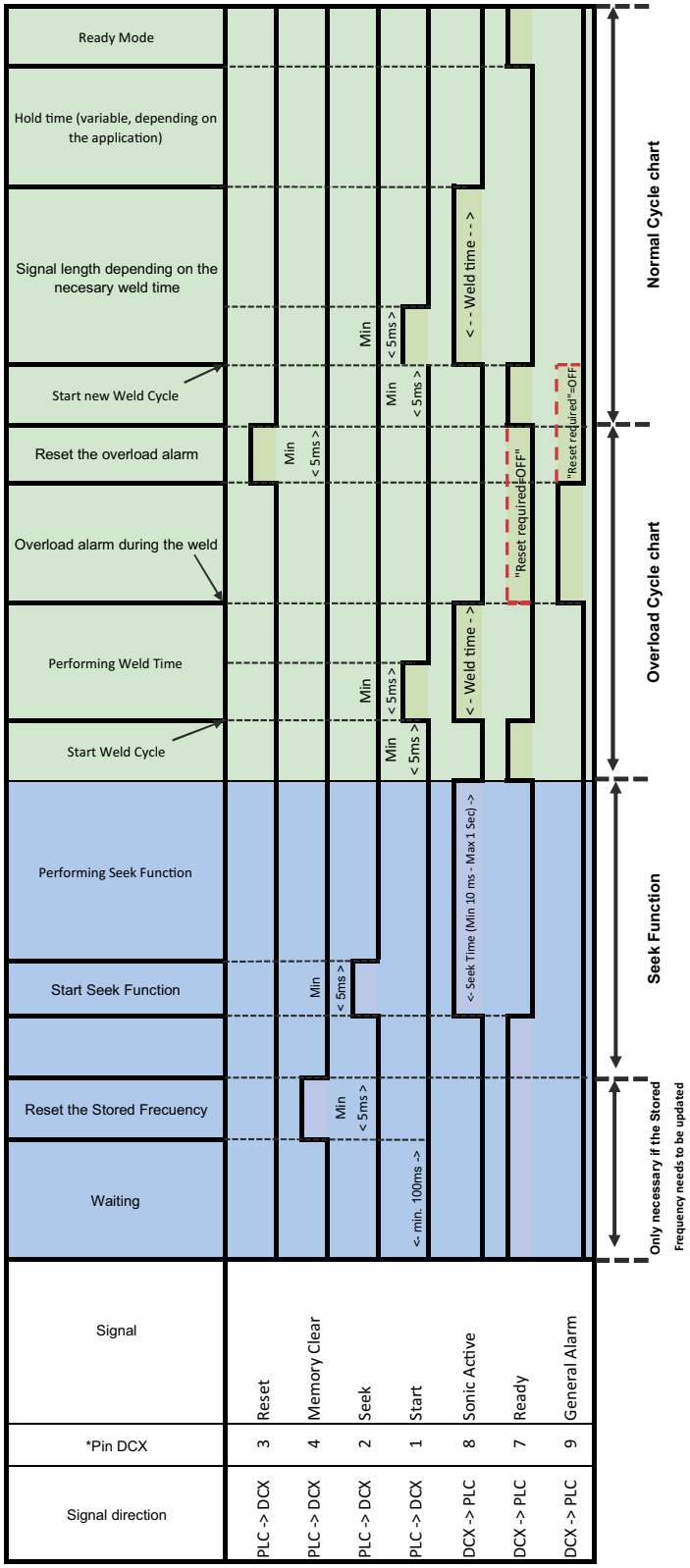
D.1 Signal Diagrams

Figure D.1 Continuous Mode



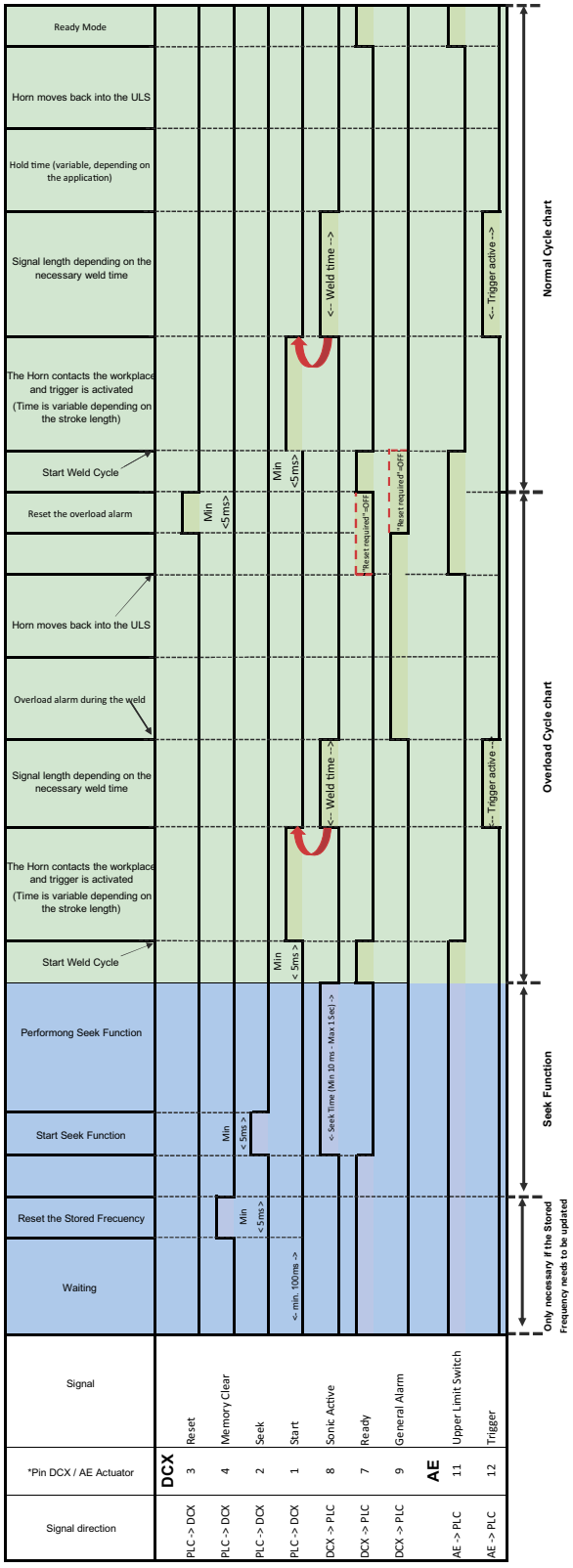
*Inputs/Outputs are configurable on the User I/O Configuration web page.
--- If Reset Required is unchecked for Overload in Alarm web page interface, Ready signal will be enabled after Start switch is released.

Figure D.2 Time Mode



*Inputs/Outputs are configurable on the User I/O Configuration web page.
--- If Reset Required is unchecked for Overload in Alarm web page interface, Ready signal will be enabled when General Alarm becomes active.

Figure D.3 AE Actuator



*Inputs/Outputs are configurable on the User I/O Configuration web page.

↻Start signal should be released by Sonic Active

--- If Reset Required is unchecked for Overload in Alarm web page interface, Ready signal will be enabled when Upper Limit Switch becomes active.

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Original Instructions
BU-4001546 - REV. 01

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