## Operator's Manual

# POWER WAVE® MANAGER

**Register your machine:**
www.lincolnelectric.com/register

**Authorized Service and Distributor Locator:**
www.lincolnelectric.com/locator

**Save for future reference**

Date Purchased

Code: (ex: 10859)

Serial: (ex: U1060512345)

**Need Help? Call 1.888.935.3877**
to talk to a Service Representative

**Hours of Operation:**
8:00 AM to 6:00 PM (ET) Mon. thru Fri.

**After hours?**
Use "Ask the Experts" at lincolnelectric.com
A Lincoln Service Representative will contact you no later than the following business day.

**For Service outside the USA:**
Email: globalservice@lincolnelectric.com

**IM8002** | Issue Date Jul - 21


**THE LINCOLN ELECTRIC COMPANY**
22801 St. Clair Avenue • Cleveland, OH • 44117-1199 • U.S.A.
Phone: +1.216.481.8100 • www.lincolnelectric.com

# THANK YOU FOR SELECTING A QUALITY PRODUCT BY LINCOLN ELECTRIC.

## PLEASE EXAMINE CARTON AND EQUIPMENT FOR DAMAGE IMMEDIATELY

When this equipment is shipped, title passes to the purchaser upon receipt by the carrier. Consequently, claims for material damaged in shipment must be made by the purchaser against the transportation company at the time the shipment is received.

## SAFETY DEPENDS ON YOU

Lincoln arc welding and cutting equipment is designed and built with safety in mind. However, your overall safety can be increased by proper installation ... and thoughtful operation on your part. **DO NOT INSTALL, OPERATE OR REPAIR THIS EQUIPMENT WITHOUT READING THIS MANUAL AND THE SAFETY PRECAUTIONS CONTAINED THROUGHOUT.** And, most importantly, think before you act and be careful.

**⚠ WARNING**

This statement appears where the information must be followed exactly to avoid serious personal injury or loss of life.

**⚠ CAUTION**

This statement appears where the information must be followed to avoid minor personal injury or damage to this equipment.

## KEEP YOUR HEAD OUT OF THE FUMES.

**DON'T** get too close to the arc. Use corrective lenses if necessary to stay a reasonable distance away from the arc.

**READ** and obey the Safety Data Sheet (SDS) and the warning label that appears on all containers of welding materials.

**USE ENOUGH VENTILATION** or exhaust at the arc, or both, to keep the fumes and gases from your breathing zone and the general area.

**IN A LARGE ROOM OR OUTDOORS**, natural ventilation may be adequate if you keep your head out of the fumes (See below).

**USE NATURAL DRAFTS** or fans to keep the fumes away from your face.

If you develop unusual symptoms, see your supervisor. Perhaps the welding atmosphere and ventilation system should be checked.

## WEAR CORRECT EYE, EAR & BODY PROTECTION

**PROTECT** your eyes and face with welding helmet properly fitted and with proper grade of filter plate (See ANSI Z49.1).

**PROTECT** your body from welding spatter and arc flash with protective clothing including woolen clothing, flame-proof apron and gloves, leather leggings, and high boots.

**PROTECT** others from splatter, flash, and glare with protective screens or barriers.

**IN SOME AREAS**, protection from noise may be appropriate.

**BE SURE** protective equipment is in good condition.

Also, wear safety glasses in work area **AT ALL TIMES.**

## SPECIAL SITUATIONS

**DO NOT WELD OR CUT** containers or materials which previously had been in contact with hazardous substances unless they are properly cleaned. This is extremely dangerous.

**DO NOT WELD OR CUT** painted or plated parts unless special precautions with ventilation have been taken. They can release highly toxic fumes or gases.

### Additional precautionary measures

**PROTECT** compressed gas cylinders from excessive heat, mechanical shocks, and arcs; fasten cylinders so they cannot fall.

**BE SURE** cylinders are never grounded or part of an electrical circuit.

**REMOVE** all potential fire hazards from welding area.

**ALWAYS HAVE FIRE FIGHTING EQUIPMENT READY FOR IMMEDIATE USE AND KNOW HOW TO USE IT.**

# SECTION A: WARNINGS

### CALIFORNIA PROPOSITION 65 WARNINGS

**WARNING:** Breathing diesel engine exhaust exposes you to chemicals known to the State of California to cause cancer and birth defects, or other reproductive harm.

- Always start and operate the engine in a well-ventilated area.
- If in an exposed area, vent the exhaust to the outside.
- Do not modify or tamper with the exhaust system.
- Do not idle the engine except as necessary.

**For more information go to www.P65 warnings.ca.gov/diesel**

**WARNING: This product, when used for welding or cutting, produces fumes or gases which contain chemicals known to the State of California to cause birth defects and, in some cases, cancer. (California Health & Safety Code § 25249.5 *et seq.)***

**WARNING: Cancer and Reproductive Harm www.P65warnings.ca.gov**

**ARC WELDING CAN BE HAZARDOUS. PROTECT YOURSELF AND OTHERS FROM POSSIBLE SERIOUS INJURY OR DEATH. KEEP CHILDREN AWAY. PACEMAKER WEARERS SHOULD CONSULT WITH THEIR DOCTOR BEFORE OPERATING.**

Read and understand the following safety highlights. For additional safety information, it is strongly recommended that you purchase a copy of "Safety in Welding & Cutting - ANSI Standard Z49.1" from the American Welding Society, P.O. Box 351040, Miami, Florida 33135 or CSA Standard W117.2. A Free copy of "Arc Welding Safety" booklet E205 is available from the Lincoln Electric Company, 22801 St. Clair Avenue, Cleveland, Ohio 44117-1199.

**BE SURE THAT ALL INSTALLATION, OPERATION, MAINTENANCE AND REPAIR PROCEDURES ARE PERFORMED ONLY BY QUALIFIED INDIVIDUALS.**

## FOR ENGINE POWERED EQUIPMENT.

1.a. Turn the engine off before troubleshooting and maintenance work unless the maintenance work requires it to be running.

1.b. Operate engines in open, well-ventilated areas or vent the engine exhaust fumes outdoors.

1.c. Do not add the fuel near an open flame welding arc or when the engine is running. Stop the engine and allow it to cool before refueling to prevent spilled fuel from vaporizing on contact with hot engine parts and igniting. Do not spill fuel when filling tank. If fuel is spilled, wipe it up and do not start engine until fumes have been eliminated.

1.d. Keep all equipment safety guards, covers and devices in position and in good repair. Keep hands, hair, clothing and tools away from V-belts, gears, fans and all other moving parts when starting, operating or repairing equipment.

1.e. In some cases it may be necessary to remove safety guards to perform required maintenance. Remove guards only when necessary and replace them when the maintenance requiring their removal is complete. Always use the greatest care when working near moving parts.

1.f. Do not put your hands near the engine fan. Do not attempt to override the governor or idler by pushing on the throttle control rods while the engine is running.

1.g. To prevent accidentally starting gasoline engines while turning the engine or welding generator during maintenance work, disconnect the spark plug wires, distributor cap or magneto wire as appropriate.

1.h. To avoid scalding, do not remove the radiator pressure cap when the engine is hot.

## ELECTRIC AND MAGNETIC FIELDS MAY BE DANGEROUS

2.a. Electric current flowing through any conductor causes localized Electric and Magnetic Fields (EMF). Welding current creates EMF fields around welding cables and welding machines

2.b. EMF fields may interfere with some pacemakers, and welders having a pacemaker should consult their physician before welding.

2.c. Exposure to EMF fields in welding may have other health effects which are now not known.

2.d. All welders should use the following procedures in order to minimize exposure to EMF fields from the welding circuit:

2.d.1. Route the electrode and work cables together - Secure them with tape when possible.

2.d.2. Never coil the electrode lead around your body.

2.d.3. Do not place your body between the electrode and work cables. If the electrode cable is on your right side, the work cable should also be on your right side.

2.d.4. Connect the work cable to the workpiece as close as possible to the area being welded.

2.d.5. Do not work next to welding power source.

## ELECTRIC SHOCK CAN KILL.

3.a. The electrode and work (or ground) circuits are electrically “hot” when the welder is on. Do not touch these “hot” parts with your bare skin or wet clothing. Wear dry, hole-free gloves to insulate hands.

3.b. Insulate yourself from work and ground using dry insulation. Make certain the insulation is large enough to cover your full area of physical contact with work and ground.

**In addition to the normal safety precautions, if welding must be performed under electrically hazardous conditions (in damp locations or while wearing wet clothing; on metal structures such as floors, gratings or scaffolds; when in cramped positions such as sitting, kneeling or lying, if there is a high risk of unavoidable or accidental contact with the workpiece or ground) use the following equipment:**

- Semiautomatic DC Constant Voltage (Wire) Welder.
- DC Manual (Stick) Welder.
- AC Welder with Reduced Voltage Control.

3.c. In semiautomatic or automatic wire welding, the electrode, electrode reel, welding head, nozzle or semiautomatic welding gun are also electrically “hot”.

3.d. Always be sure the work cable makes a good electrical connection with the metal being welded. The connection should be as close as possible to the area being welded.

3.e. Ground the work or metal to be welded to a good electrical (earth) ground.

3.f. Maintain the electrode holder, work clamp, welding cable and welding machine in good, safe operating condition. Replace damaged insulation.

3.g. Never dip the electrode in water for cooling.

3.h. Never simultaneously touch electrically “hot” parts of electrode holders connected to two welders because voltage between the two can be the total of the open circuit voltage of both welders.

3.i. When working above floor level, use a safety belt to protect yourself from a fall should you get a shock.

3.j. Also see Items 6.c. and 8.

## ARC RAYS CAN BURN.

4.a. Use a shield with the proper filter and cover plates to protect your eyes from sparks and the rays of the arc when welding or observing open arc welding. Headshield and filter lens should conform to ANSI Z87. I standards.

4.b. Use suitable clothing made from durable flame-resistant material to protect your skin and that of your helpers from the arc rays.

4.c. Protect other nearby personnel with suitable, non-flammable screening and/or warn them not to watch the arc nor expose themselves to the arc rays or to hot spatter or metal.

## FUMES AND GASES CAN BE DANGEROUS.

5.a. Welding may produce fumes and gases hazardous to health. Avoid breathing these fumes and gases. When welding, keep your head out of the fume. Use enough ventilation and/or exhaust at the arc to keep fumes and gases away from the breathing zone. **When welding hardfacing (see instructions on container or SDS) or on lead or cadmium plated steel and other metals or coatings which produce highly toxic fumes, keep exposure as low as possible and within applicable OSHA PEL and ACGIH TLV limits using local exhaust or mechanical ventilation unless exposure assessments indicate otherwise. In confined spaces or in some circumstances, outdoors, a respirator may also be required. Additional precautions are also required when welding on galvanized steel.**

5. b. The operation of welding fume control equipment is affected by various factors including proper use and positioning of the equipment, maintenance of the equipment and the specific welding procedure and application involved. Worker exposure level should be checked upon installation and periodically thereafter to be certain it is within applicable OSHA PEL and ACGIH TLV limits.

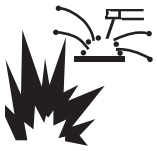
5.c. Do not weld in locations near chlorinated hydrocarbon vapors coming from degreasing, cleaning or spraying operations. The heat and rays of the arc can react with solvent vapors to form phosgene, a highly toxic gas, and other irritating products.

5.d. Shielding gases used for arc welding can displace air and cause injury or death. Always use enough ventilation, especially in confined areas, to insure breathing air is safe.

5.e. Read and understand the manufacturer’s instructions for this equipment and the consumables to be used, including the Safety Data Sheet (SDS) and follow your employer’s safety practices. SDS forms are available from your welding distributor or from the manufacturer.

5.f. Also see item 1.b.

## WELDING AND CUTTING SPARKS CAN CAUSE FIRE OR EXPLOSION.



6.a. Remove fire hazards from the welding area. If this is not possible, cover them to prevent the welding sparks from starting a fire. Remember that welding sparks and hot materials from welding can easily go through small cracks and openings to adjacent areas. Avoid welding near hydraulic lines. Have a fire extinguisher readily available.

6.b. Where compressed gases are to be used at the job site, special precautions should be used to prevent hazardous situations. Refer to "Safety in Welding and Cutting" (ANSI Standard Z49.1) and the operating information for the equipment being used.

6.c. When not welding, make certain no part of the electrode circuit is touching the work or ground. Accidental contact can cause overheating and create a fire hazard.

6.d. Do not heat, cut or weld tanks, drums or containers until the proper steps have been taken to insure that such procedures will not cause flammable or toxic vapors from substances inside. They can cause an explosion even though they have been "cleaned". For information, purchase "Recommended Safe Practices for the Preparation for Welding and Cutting of Containers and Piping That Have Held Hazardous Substances", AWS F4.1 from the American Welding Society (see address above).

6.e. Vent hollow castings or containers before heating, cutting or welding. They may explode.

6.f. Sparks and spatter are thrown from the welding arc. Wear oil free protective garments such as leather gloves, heavy shirt, cuffless trousers, high shoes and a cap over your hair. Wear ear plugs when welding out of position or in confined places. Always wear safety glasses with side shields when in a welding area.

6.g. Connect the work cable to the work as close to the welding area as practical. Work cables connected to the building framework or other locations away from the welding area increase the possibility of the welding current passing through lifting chains, crane cables or other alternate circuits. This can create fire hazards or overheat lifting chains or cables until they fail.

6.h. Also see item 1.c.

6.I. Read and follow NFPA 51B "Standard for Fire Prevention During Welding, Cutting and Other Hot Work", available from NFPA, 1 Batterymarch Park, PO box 9101, Quincy, MA 022690-9101.

6.j. Do not use a welding power source for pipe thawing.

## CYLINDER MAY EXPLODE IF DAMAGED.

7.a. Use only compressed gas cylinders containing the correct shielding gas for the process used and properly operating regulators designed for the gas and pressure used. All hoses, fittings, etc. should be suitable for the application and maintained in good condition.

7.b. Always keep cylinders in an upright position securely chained to an undercarriage or fixed support.

7.c. Cylinders should be located:

- Away from areas where they may be struck or subjected to physical damage.
- A safe distance from arc welding or cutting operations and any other source of heat, sparks, or flame.

7.d. Never allow the electrode, electrode holder or any other electrically "hot" parts to touch a cylinder.

7.e. Keep your head and face away from the cylinder valve outlet when opening the cylinder valve.

7.f. Valve protection caps should always be in place and hand tight except when the cylinder is in use or connected for use.

7.g. Read and follow the instructions on compressed gas cylinders, associated equipment, and CGA publication P-I, "Precautions for Safe Handling of Compressed Gases in Cylinders," available from the Compressed Gas Association, 14501 George Carter Way Chantilly, VA 20151.

## FOR ELECTRICALLY POWERED EQUIPMENT.

8.a. Turn off input power using the disconnect switch at the fuse box before working on the equipment.

8.b. Install equipment in accordance with the U.S. National Electrical Code, all local codes and the manufacturer's recommendations.

8.c. Ground the equipment in accordance with the U.S. National Electrical Code and the manufacturer's recommendations.

**Refer to http://www.lincolnelectric.com/safety for additional safety information.**

# Table of Contents

# Preface

## *Typographical Conventions Used*

Before using this guide, it is important to understand the typographical conventions used to identify and describe information.

### Cross-References

Cross-references to chapters, sections, page numbers, headings, etc. are shown in an *italic typeface*.

e.g., Refer to *Text You Type Using the Keyboard* on page 1.

### Text You Type Using the Keyboard

Text that you type using the keyboard is shown in a `Courier typeface`.

e.g., Type `John Smith` in the *Name* field.

### Keys You Press and Buttons You Click

Keys that you press on the keyboard and buttons/icons that you click with the mouse are shown in a **bold sans-serif typeface**.

e.g., Press **Enter**.

e.g., Click **OK** to continue.

### Menus You Select

Menus and the selections you make from the menus are shown in a **bold sans-serif typeface**.

e.g., Select **Start** > **Control Panel** from the main computer menu.

e.g., Select **Tools** > **Options** from the menu.

### Dialog Box, Application Window Titles, and Field Names

The titles of dialog boxes and application windows are shown in *italics*. Field names and selections made from drop-down menus, etc. are also shown in *italics*.

e.g., The *Print Preview* window opens.

e.g., Select *All Shifts* from the drop-down list.

# *Notes, Warnings, and Tips*

Notes, stops and tips appear throughout the manual. They provide additional information that is important for you to know about the topic.

| | |
|---|---|
| **NOTE** | **A note is an important piece of information.** |

| | |
|---|---|
| **STOP** | **You should definitely read the information in a stop table. It could help you prevent a situation from which you cannot recover.** |

| | |
|---|---|
| **TIP** | **A tip table helps you with some interesting or useful information about using the program.** |

# Revision History

| Date | Change Description |
|---|---|
| March 2021 | Made the following updates reflecting the new version:<br>· Added *300C* to the list of Compatible Equipment.<br>· Updated *User Memories* section for process-based memories used in *PIPEFAB*™ and *300C* systems.<br>· Updated *USB Operator Key* section to show the power source Supervisor level option.<br>· Updated screenshots in *CheckPoint*™ *Configuration* to reflect removal of obsolete *Email Setup* tab.<br>· Update screenshots in *Weld Mode Settings* to reflect the addition of the *Export To CSV* option.<br>· Updated third-party software license information. |
| July 2020 | Made the following updates reflecting the new version:<br>§ Runs under the Microsoft® .NET 4.6.1 framework, requiring Windows 7 SP1 or later.<br>§ Added *PIPEFAB*™ to list of Compatible Equipment.<br>§ Updated *User Memories* section to include process-based memories used in *PIPEFAB*™ system.<br>§ Updated *Calibration* section to include Feedforward calibration.<br>§ Updated *Settings* section under *Miscellaneous* to add *Burnback* and *Touch Sense* timers.<br>§ Removed obsolete *E-Mail Setup* section.<br>§ Updated screenshots throughout manual to reflect changes.<br>§ Added Release date and LEAL version to About window. |
| July 2019 | Made the following updates reflecting the new version:<br>§ Added a section for MQTT.<br>§ Out-of-Limits Actions Tab is now called *Limit Settings*.<br>§ Added option to specify Required Limits in *Limit Settings*. |
| March 2018 | Made the following updates reflecting the new version:<br>§ Added a section about USB Operator Keys. |
| September 2017 | Made the following updates reflecting the new version:<br>§ Added sections for Wi-Fi and Bluetooth.<br>§ Updated *Water Cooler* section under *Accessories* and added Pump Enable Flags.<br>§ Updated *Settings* section under *Miscellaneous* and added *Sleep and* |

| Date | Change Description |
|---|---|
| | *Hibernate* and checkbox for *Fault if no Smart Cooler*.<br>§ Added section describing Ethernet ArclincXT settings under *Network Settings*.<br>§ Changed naming from Production Monitoring™ to CheckPoint™ where applicable.<br>§ Updated screenshots throughout manual to reflect changes. |
| July 2017 | Made the following updates reflecting the new version:<br>§ Added a section about Weld Mode "Favorites."<br>§ Added *Power Wave® R450* and *Power Wave® E500* to list of Compatible Equipment. |
| December 2016 | Made the following updates reflecting the new version:<br>§ Added support for Microsoft® Windows 10<br>§ Updated connection screenshots and added a tip to reflect new *Trouble Connecting* link<br>§ Added tip to right-click and copy fields in the *System Status* section<br>§ Adjusted text to reflect multiple weld set support in the *System Status* section<br>§ Updated *Water Cooler* section under *Accessories*<br>§ Added *Sense lead loss action* setting to the *Miscellaneous* section<br>§ Added Custom Weld Sets to the *Miscellaneous* section<br>§ Added Weld Set Load feature to *Power Sources* section<br>§ Edited Weld Profile Training section for clarity<br>§ Changed *AutoDrive SA* option throughout manual to *AutoDrive S/SA* and adjusted text accordingly<br>§ Updated FANUC appendix<br>§ Made edits to reflect minor screen updates and behaviors |
| July 2015 | Made the following updates reflecting the new version:<br>§ Added *Retract Start Ramping* option to the *Miscellaneous* section<br>§ Updated *WeldView* section to emphasize use by direction of Lincoln Electric support personnel<br>§ Added note under *Cable Settings and Tests* to indicate the settings and tests do not support the Power Wave® STT® Module or a Power Wave® Advanced Module<br>§ Added document numbers next to references of other user manuals |
| April 2015 | Made the following updates reflecting the new version:<br>§ Updated *Calibration Tab (AutoDrive® SA)* section<br>§ Updated *Observer* section<br>§ Updated screenshots throughout manual to reflect changes |

| Date | Change Description |
|---|---|
| March 2015 | Made the following updates reflecting the new version:<br>§ Added *Legacy Applications* section to the *Introduction* chapter<br>§ Updated *Power Source Settings* chapter to reflect change to the *Select weld controller* item on the screen<br>§ Updated *Miscellaneous* section<br>§ Added the *Accessories* chapter<br>§ Added AutoDrive® SA calibration instructions to the *Feeder Settings* chapter<br>§ Updated screenshots throughout manual to reflect changes |
| June 2014 | Made the following updates reflecting the new version:<br>§ Added new *Convert engineering units to Metric* option to *Preferences*<br>§ Added port information to the *Ethernet Connection* section<br>§ Updated the *Trace Tab* section<br>§ Reorganized and updated *Wire Feeder* section to reflect changes made to *Feeder settings, User Memories* and to the support for multiple feed heads<br>§ Added Lincoln Electric Memory USB Drive information to *Wire Feeder* section and to *Backup/Restore* section<br>§ Updated the *Observer* section<br>§ Updated screenshots throughout manual to reflect changes |
| July 2013 | Initial Release as IM8002 |

# Introduction

Power Wave® Manager is an application that allows you to configure and manage a multitude of settings and configuration options within the full range of the Lincoln Electric Power Wave® line of Welding Power Sources. It also provides in-depth diagnostics of the welding power source's hardware and firmware to help identify and eliminate issues with welding or configuration.

Depending on how your company is organized and who is configuring your power sources, you install Power Wave® Manager on a computer with some kind of cable or network access to the Welding Power Sources on the floor. This could be a laptop you use to walk the floor and configure the power sources. Or you might choose to install the software on a desktop computer.

## *System Requirements*

Minimum hardware requirements for the computer on which you install Power Wave® Manager:

- 256 MB of system RAM
- 1.0 GHz processor speed
- 1024 x768 display resolution
- 50 MB free disk space
- Connection to a Lincoln Electric Welding Power Source or compatible Welding Power Source through an Ethernet or Wi-Fi network or serial (RS-232) cable

Power Wave® Manager runs under the Microsoft® .NET 4.6.1 framework. Therefore, it can run on the following versions of Microsoft® operating systems:

- Windows 10
- Windows 8
- Windows 7 SP1
- Windows Server 2012 R2

You must be logged in to the computer as a user with Administrator privileges in order to install Power Wave® Manager.

# Compatible Equipment

Power Wave® Manager may be used with any Welding Power Source in the Lincoln Electric Power Wave® family that utilizes the digital controls platform. This list includes, but is not limited to:

- Power Wave® 355M
- Power Wave® 405M
- Power Wave® 455M, 455M/STT, 455R (and corresponding CE models)
- Power Wave® 655
- Power Wave® AC/DC 1000, AC/DC 1000 SD
- Power Wave® i400
- Power Wave® C300 and C300 CE
- Power Wave® E500
- Power Wave® S350 and S350 CE
- Power Wave® R450 and R450 CE
- Power Wave® R500
- Power Wave® S500 and S500 CE
- Power Wave® S700
- PIPEFAB™
- Power Wave® 300C

The program may also be used to diagnose and modify settings in the following Welding Power Sources outside the Power Wave® family that also use the digital common controls platform:

- Invertec® V350, V450
- Power MIG 300
- Power MIG 350MP

**NOTE | The Power Wave® Manager application is not compatible with legacy Power Wave® models such as the Power Wave® 450.**

**NOTE | Not all Welding Power Source models have an Ethernet port. However, you can upgrade some models to utilize Ethernet by adding the Communication Interface module, available from Lincoln Electric as K2207-2 or K2436-1 (depending on the Power Wave® model).**

**Connecting to robotic applications could vary from the information in this manual. Please refer to the appropriate**

**Operators Manuals for more information.**

# Legacy Applications

Power Wave® Manager functionality replaces a set of applications that individually served the same purpose. Support for these legacy applications will be discontinued with version 1.0.2.6 of Power Wave® Manager. The following table provides a cross-reference between the legacy application and the appropriate screen in Power Wave® Manager, as well as any notes on continued support.

> **TIP** | **You should use Power Wave® Manager for Welding Power Sources that utilize ArcLink® (page 8.2). Legacy utility applications are only for use with LincNet support.**

| Legacy Application | Power Wave® Manager Screen | Application Still Supported? |
|---|---|---|
| diagnostics.exe | System Status (page 5.1)<br>Calibration (page 6.1)<br>Cable Settings and Tests (page 6.4)<br>DeviceNet (page 8.4)<br>Lookup Error (page 10.1) | Yes. However, it is included for LincNet support only. Application was moved to a folder called LincNet. |
| observer.exe | Observer (page 10.9)<br>DeviceNet (page 8.4) | Yes. This utility contains some functionality unique to older power sources such as the AC/DC 1000. |
| snapshot.exe | Snapshot (page 10.2) | No |
| weldmanager.exe | System Status (page 5.1)<br>Ethernet (page 8.13)<br>Feeder Settings (page 9.8)<br>Setup Parameters (page 9.1)<br>User Settings (page 9.5)<br>Backup/Restore (page 10.6)<br>Miscellaneous (page 6.9) | Yes. However, it is included for LincNet support only. Application was moved to a folder called LincNet. |
| weldview.exe | WeldView (page 10.3) | Yes. However, it is included for LincNet support only. Application was moved to a folder called LincNet. |

THIS PAGE INTENTIONALLY LEFT BLANK.

# Connecting the Power Source

Any time you need to connect the Power Wave® Manager application to a Welding Power Source to do any configuration, you connect your computer to the power source using one of four methods:

- A direct connection between your computer and the Welding Power Source using a physical Ethernet cable from your computer to the port on the power source.
- An existing company network connection (using either Ethernet cable or over Wi-Fi)
- A Bluetooth connection.
- A USB/serial port connection.

## *IP Addresses*

An IP (Internet Protocol) address is the location of the Welding Power Source on the network (e.g., 10.23.10.91). Any device on the network that wants to communicate with the Welding Power Source must use the IP address to make the connection.

IP addresses can be set up as dynamic (where the computer network automatically assigns an IP address to the machine) or static (where an IT department assigns a specific address to each device on the network). Power Wave® Manager can handle either scenario (page 4.4); however, it is best to check with your local IT department for the policies used on your network.

## *Ethernet Connection*

The Ethernet connection is the recommended method of connecting your computer to your power source. (The Ethernet port on your computer and on the Welding Power Source is an RJ-45 jack, which resembles a wider telephone jack.)

For an Ethernet connection, your computer can be physically connected to the Welding Power Source over the network in one of the following ways:

- Direct connection between the computer and the Welding Power Source (which may require a crossover cable on older computers/power sources). Plug one end of the Ethernet cable to the port on your computer and the other end into the Ethernet port of the Welding Power Source.
- Computer and Welding Power Source connected to the same network switch.
- Computer and Welding Power Source on the same corporate network (may include switches and routers)

> **NOTE |** **Not all Welding Power Source models have an Ethernet port. However, you can upgrade some models to utilize Ethernet by adding the Communication Interface module, available from Lincoln Electric as K2207-2 or K2436-1 (depending on the Power Wave® model).**
>
> **Connecting to robotic applications could vary from the information in this manual. Please refer to the appropriate Operators Manuals for more information.**

# Wi-Fi Connection

If the Welding Power Source you are trying to connect to has a Wi-Fi module and your computer also has a Wi-Fi radio and both are enabled then you can connect to the Welding Power Source over Wi-Fi.

For a Wi-Fi connection, your computer can be connected to the Welding Power Source over the Wi-Fi network in one of the following ways:

- Direct connection between the computer and the Welding Power Source where the Wi-Fi module of the Welding Power Source is acting as its own Wi-Fi Access Point (AP) and the device mode is said to be in 'Configuration' mode. The Wi-Fi Module is factory set initially to 'Configuration' device mode when the Welding Power Source first ships and is used to configure the settings for the local or corporate Wi-Fi network. Once configured the Device Mode should be changed to "Normal".
- Computer and Welding Power Source on the same local or corporate Wi-Fi network (may include switches and routers) where the Wi-Fi module is in "Normal' Device Mode.

> **NOTE |** **Not all Welding Power Source models have a Wi-Fi module. However, you can upgrade some models to utilize an optional Wi-Fi module by adding the PowerMeter UI module, available from Lincoln Electric as K4352-X (depending on the Power Wave® model).**
>
> **Connecting to robotic applications could vary from the information in this manual. Please refer to the appropriate Operators Manuals for more information.**

# Bluetooth Connection

If the Welding Power Source you are trying to connect to contains a Wi-Fi Kit K4352-X module which supports Wi-Fi/Bluetooth and your computer also has Bluetooth, you can connect to the Welding Power Source over Bluetooth.

> **NOTE |** **The Bluetooth option is slower than either Wi-Fi or Ethernet (hard-wired) connections and cannot be used to upload**

**Custom Weld Sets or be used with Checkpoint.**

Before connecting with Power Wave® Manager, the PC must be paired with the power source. To do this, ensure the Bluetooth radio is on and double click the Bluetooth icon in the tray on your Windows PC, as in Figure 2.1.

**Figure 2.2.1 Bluetooth icon in System Tray**

This will bring up a window like the one shown below in Figure 2.2, showing all currently paired Bluetooth devices. Click the "Add a device" button on the top left to pair a new device.

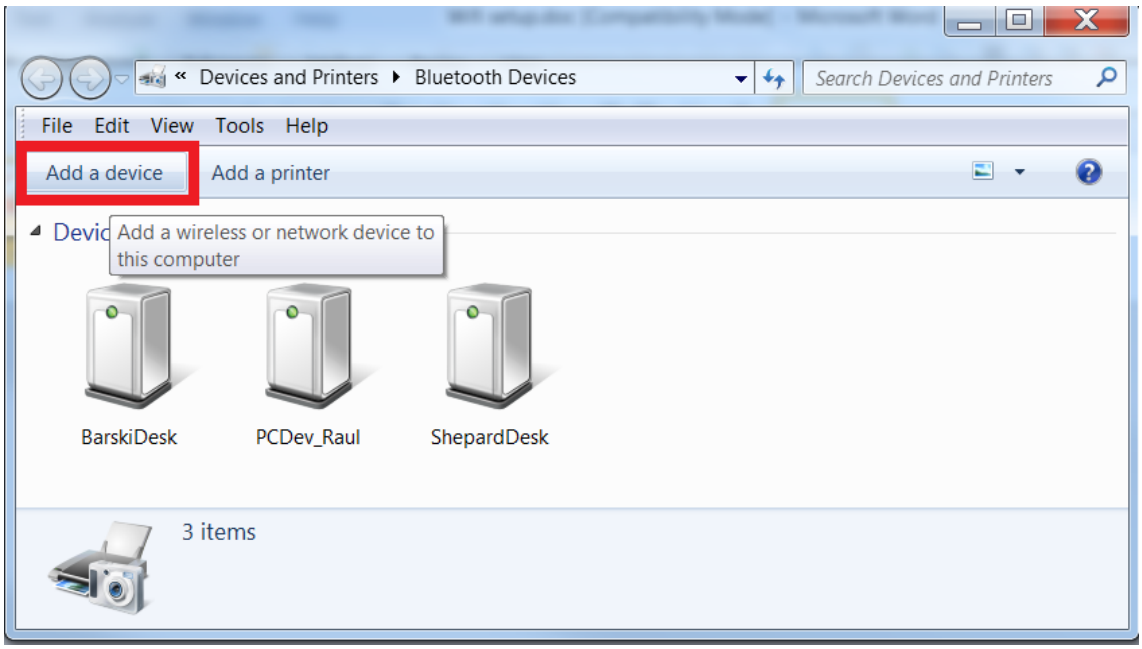



**Figure 2.2.2 Add a Device**

The PC will search for all discoverable Bluetooth devices that are in range and display them in a window like that shown in Figure 2.3. If CheckPoint™ has already been setup, and the machine has been given a machine name, this name will appear in the window, if not "Lincoln Electric" will appear. If no devices are found, try moving the PC closer to the power source or turning off the PC's Bluetooth radio and then turning it back on and rescanning.

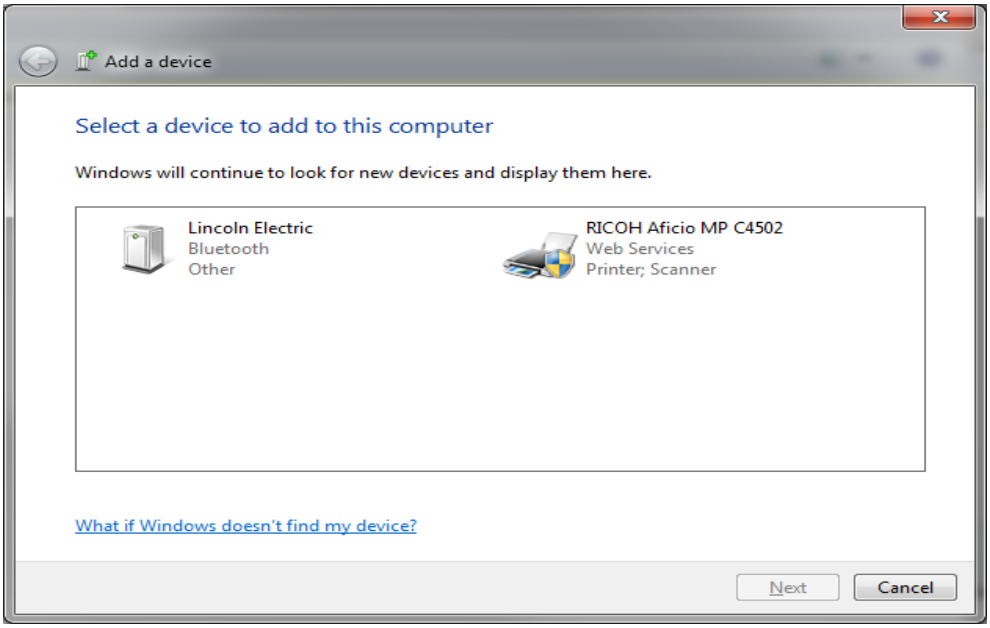



**Figure 2.2.3 Select the Device**

To pair with the Welding Power Source, simply double click the name. Windows will automatically install any necessary drivers. After this is done, a confirmation box like the one in Figure 2.4 will be displayed, confirming that pairing was successful.

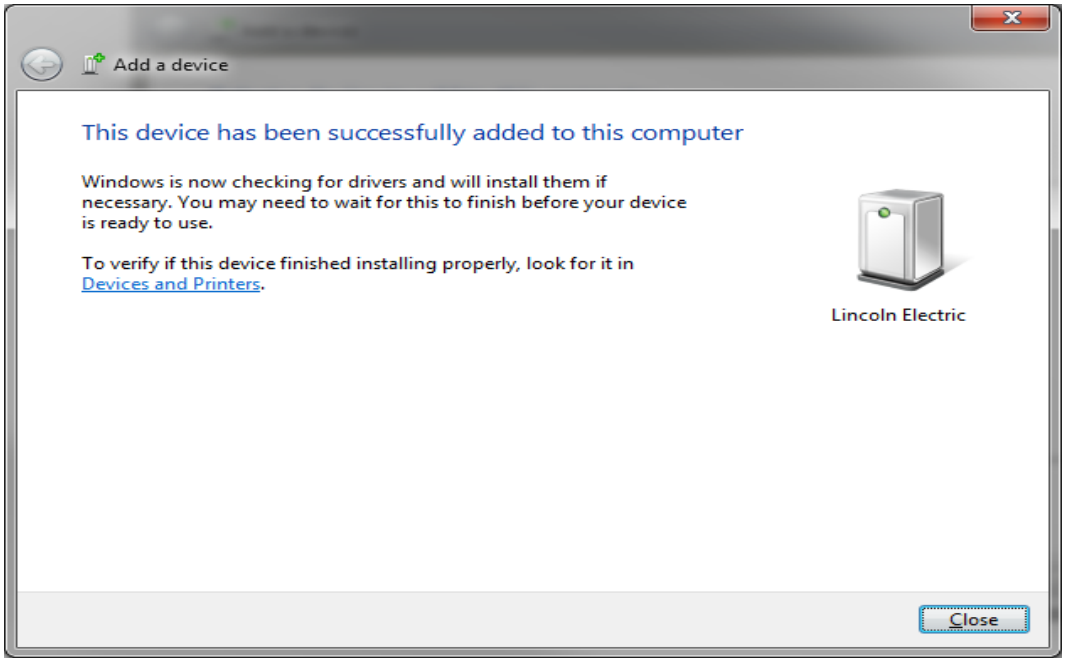



**Figure 2.2.4 Success adding the device**

The power source should now be displayed in the window of paired devices as shown in Figure 2.5. Right click the one you intend to connect to and select “Properties”.

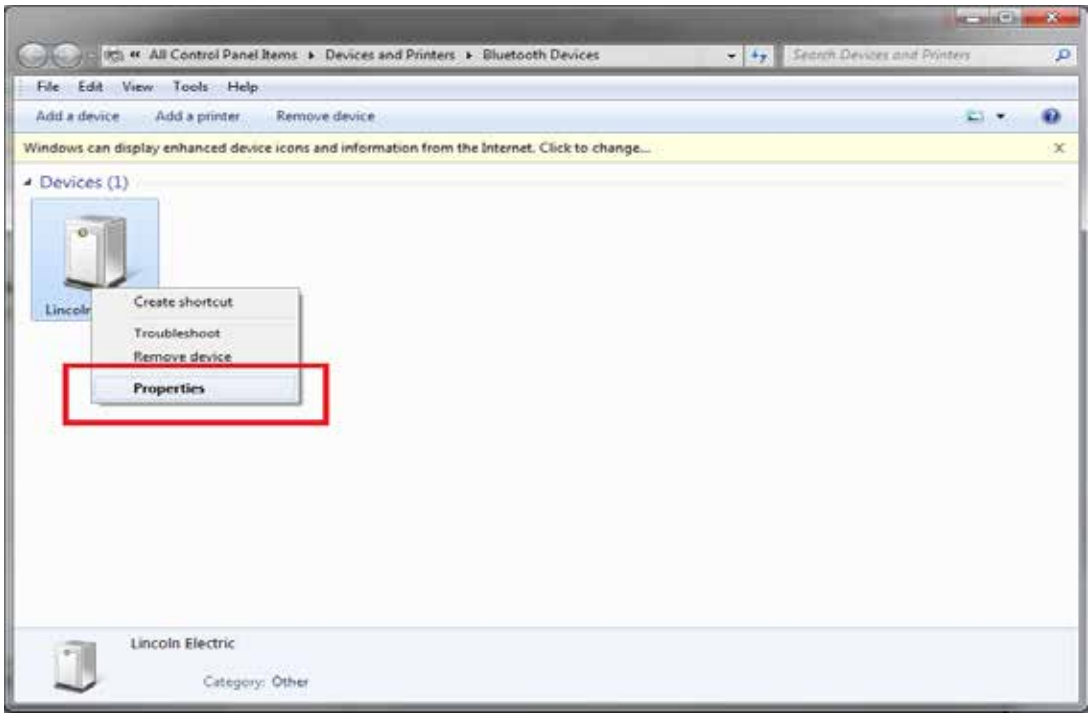



**Figure 2.2.5 Bluetooth devices**

Select the “Hardware” tab and note what is listed below. It should appear as “Standard Serial over Bluetooth link (COM#) “. The COM# (in the case of the example below COM8) is what will be needed to connect via Power Wave® Manager. All of these windows can now be closed.

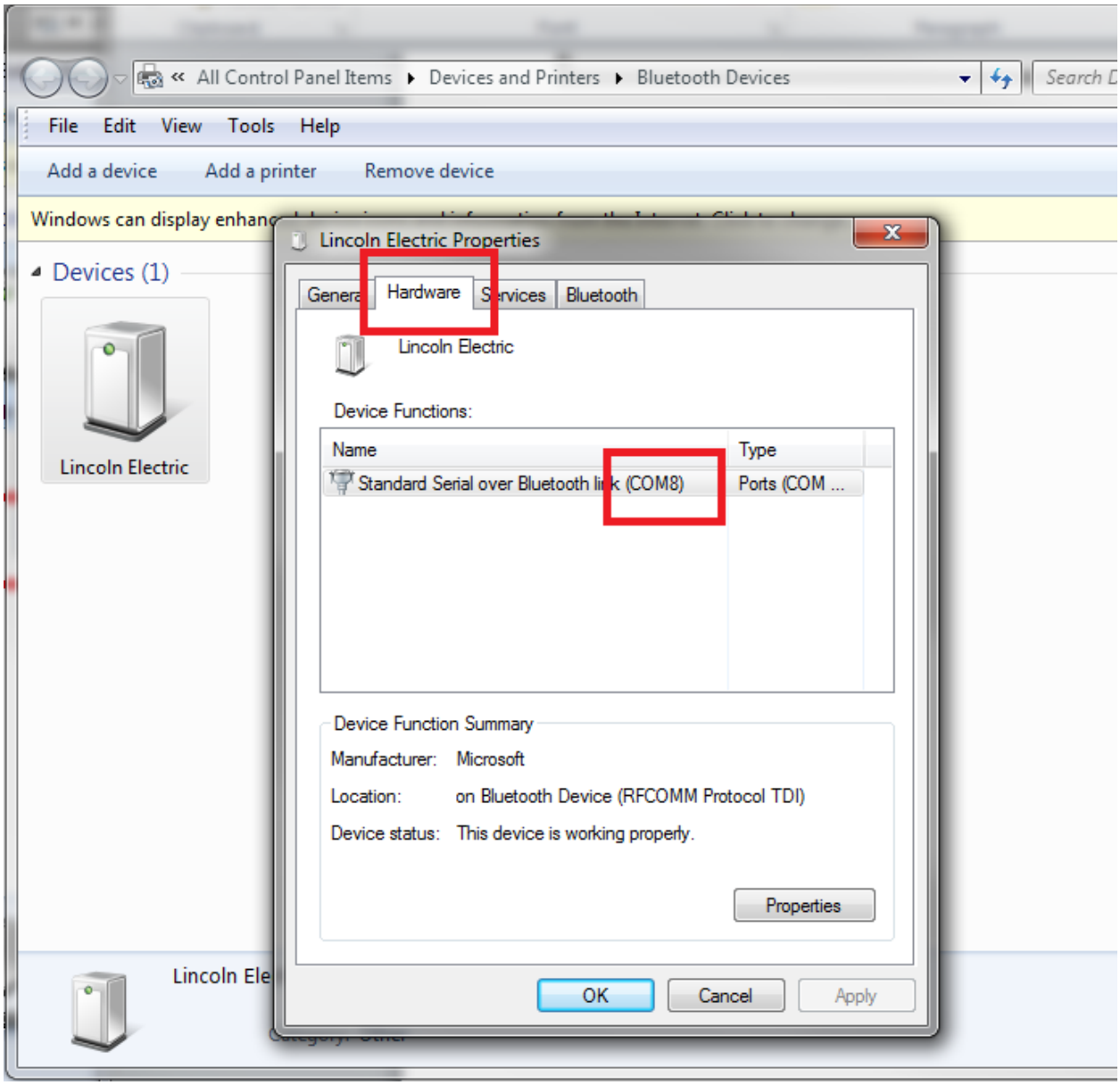



**Figure 2.2.6 Bluetooth COM #**

On the "Connect" screen of Power Wave® Manager, shown in Figure 2.7, select the "Connect through Bluetooth". From the dropdown select the COM port that matches the number from the previous step. The format of the selection will be COM# - "DEVICE NAME" "BLUETOOTH ADDRESS"
Click the Connect button to connect using Bluetooth.

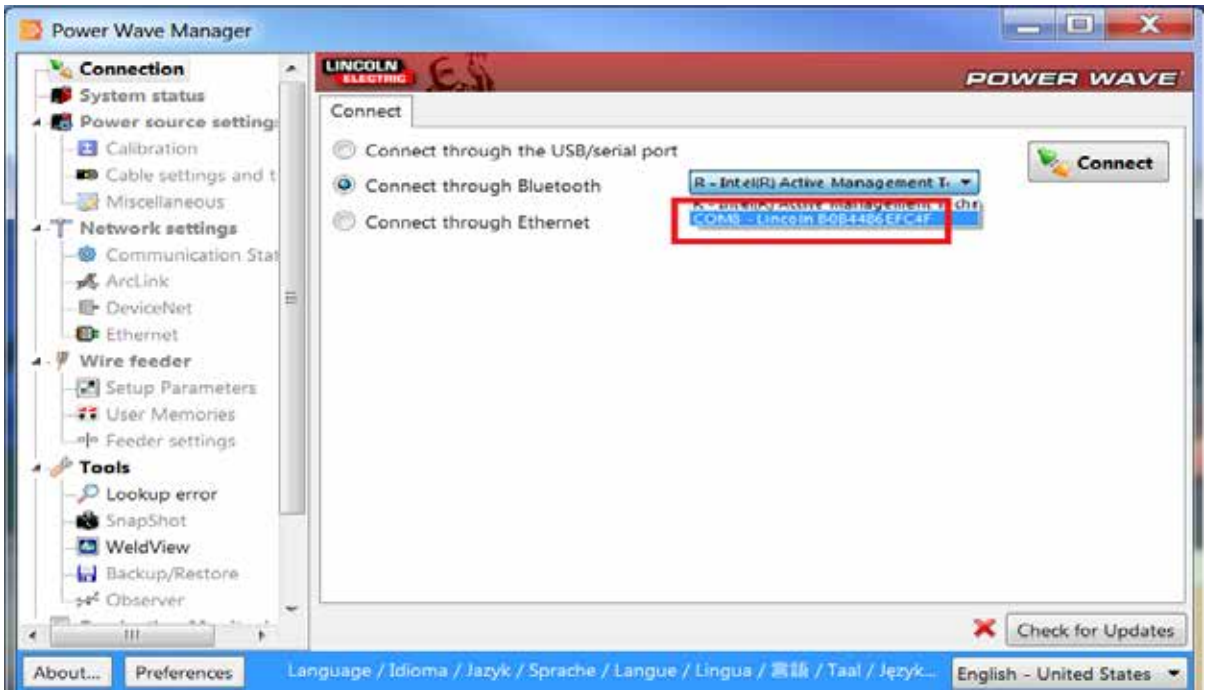



**Figure 2.2.7 Connection Screen in Power Wave® Manager**

You will need to add a separate entry for each Welding Power Source you wish to connect to via Bluetooth. Each will be displayed as its Bluetooth item/COM port that can be connected to from Power Wave® Manager.

# *Serial Cable Connection*

If the Welding Power Source you are trying to connect to has a serial port and your computer also has a serial port that is a DE-9 male connector (a nine-pin connector also referred to as a DB9), you can connect to the Welding Power Source with a nine- to 25-pin serial cable. The serial port on the Welding Power Source is a DB-25 female connector (25 pins).

**Figure 2.8 Serial Cable Connection**

This cable is available at Lincoln Electric automation division as part number AD1207-2. It is also available at various electronics retailers and online stores by searching for the keywords “DB9 to DB25 modem cable”.

If your computer does not have a serial port, you will need to purchase a “USB to Serial” adapter that converts one of your computer’s USB ports to a serial port. If you are using a “USB to Serial” adapter, make sure the drivers for the adapter are properly installed.

THIS PAGE INTENTIONALLY LEFT BLANK.

# Installing Power Wave® Manager

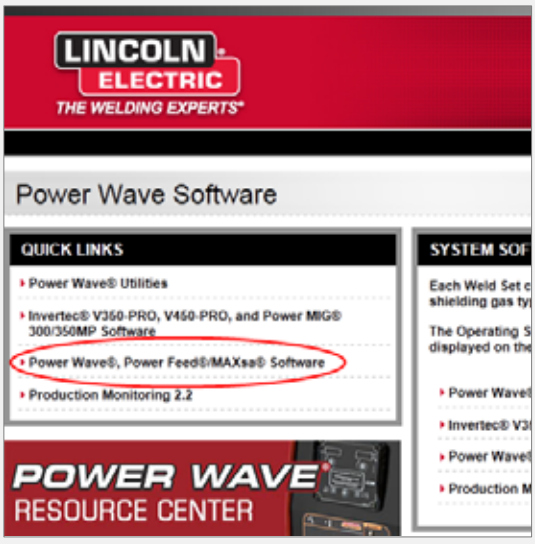
Once you have physically connected the Welding Power Source and your computer, you must perform two main steps to install Power Wave® Manager:

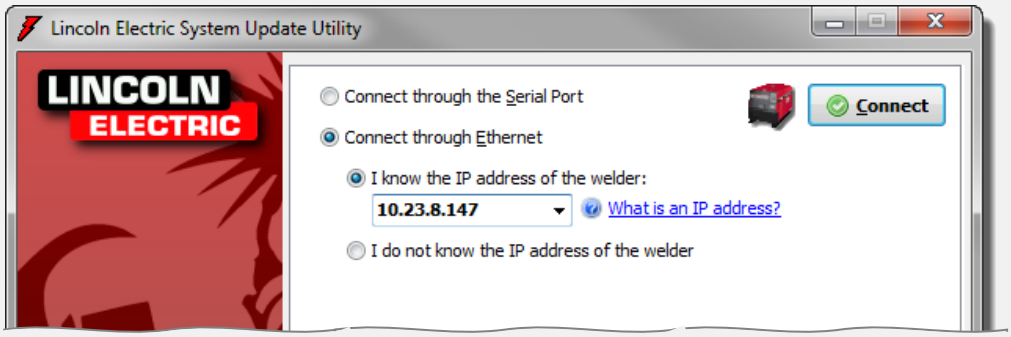
- Update the firmware on each power source you connect to
- Install the Power Wave® Manager software on the computer(s) you want to use to connect to the power source

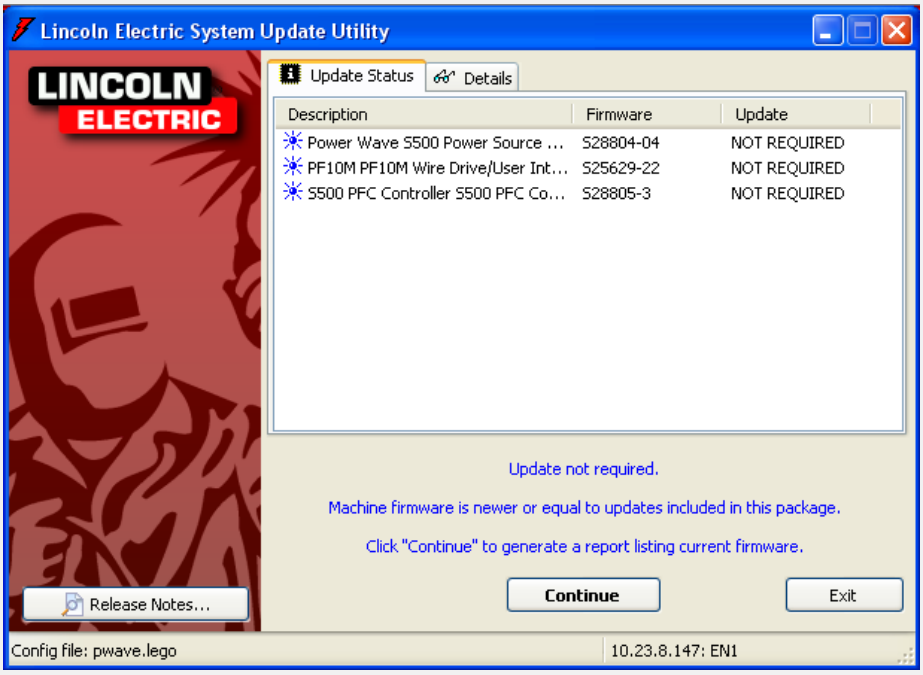
## *Update Welding Power Source Firmware*

"Firmware" is the memory and programming code within the Welding Power Source that is the control program for the machine. Making sure you have the latest firmware ensures that you have the latest features available for the power source, including the most recent version of the Production Monitoring™ and CheckPoint™ software.

To install the latest firmware:

| Procedure | Details |
|---|---|
| ***1.*** Log in to the computer as a user with administrative privileges. | Contact your IT department if you do not have administrator privileges. |
| ***2.*** Open your browser and go to www.powerwavesoftware.com. | The *Power Wave Resource Center* displays.<br>  |
| ***3.*** In the *Quick Links* section, click the *Power Wave®, Power Feed®/MAXsa® Software* link. | The system displays a page containing the **Download Power Wave® Bundle-FREE** button.<br>  |
| ***4.*** Enter your e-mail address in the *Email* field and place a check mark next to the privacy terms. | |

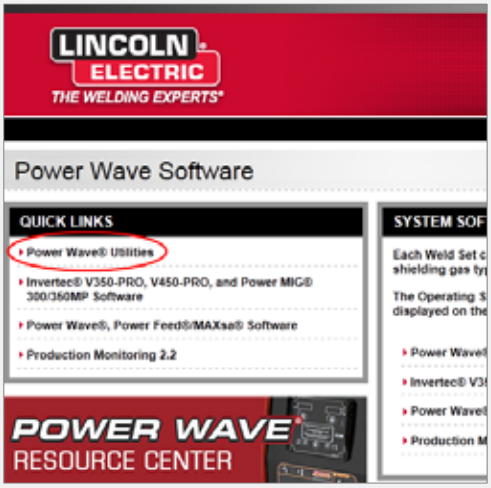
| Procedure | Details |
|---|---|
| ***5.*** Click the **Download Power Wave® Bundle-FREE** button to download the file. | |
| ***6.*** Run the downloaded file. | **NOTE \| Depending on your Windows version, you may have to click** Run **or** Allow **to permit your system to execute the file.**<br>**The system opens the *Lincoln Electric System Update Utility* window where you tell the utility how to find the Welding Power Source you want to update.** |
|  | |
| ***7.*** Choose the *Connect through Ethernet* option and enter the IP address of the Welding Power Source you want to update. | **TIP \| If there is an IP address already displayed, it is the IP address of the last Welding Power Source that was connected. Be sure you enter the correct address for the current Welding Power Source you want to update.**<br>You can enter the IP address for the Welding Power Source in one of two ways:<br>§ Type the specific IP address into the *I know the IP address of the welder* field.<br>§ Choosing the *I do not know the IP address of the welder* option. The update utility scans your network and displays a list of Welding Power Source IP addresses on the same subnet.<br>**NOTE \| If this Welding Power Source has older firmware, the IP address will not show up using this method.**<br>**TIP \| If you run into a problem, please refer to the *Troubleshooting* section (Appendix A).** |
| ***8.*** Click the **Connect** button once you have entered the IP address for the power source | The software scans the Welding Power Source to verify if the firmware currently on the machine |

| Procedure | Details |
|---|---|
| you are updating. | is up to date.<br>**TIP \| You can also see this information under** System Status **>** Module Information **>** Software Version **in Power Wave® Manager.** |
|  | |
| ***9.*** If the firmware is not up to date, you must click **Continue** to update the Welding Power Source. | The system proceeds with the update.<br>If the firmware is already up to date, you will receive the message *Update not required* and you can click **Exit** to close the window. |
| ***10.*** Exit the program once the firmware has finished updating. | |
| ***11.*** Repeat steps 3 through 10 for each power source you need to update. | |

# *Installing Power Wave® Manager*

Once you update the Welding Power Source(s), you need to upgrade to the latest version of Power Wave® Manager. If installing Power Wave® Manager for the first time, these instructions are also for you. Power Wave® Manager is a software application that allows you to manage a multitude of settings and configuration options within the Lincoln Electric Power Wave® family of Welding Power Sources. It also provides in-depth diagnostics of the Welding Power Source's hardware and firmware to help identify and eliminate issues with welding or configuration.

> **TIP** | **If you already have Power Wave® Manager installed, you can simply open the software. Depending on your version of the software, the system automatically checks for and installs any updates. If it doesn't do this automatically, you can click the** Check for Updates **button. If the software updates, you can skip ahead to the next section.**

| Procedure | Details |
|---|---|
| ***1.*** Log in to the computer as a user with administrative privileges. | Contact your IT department if you do not have administrator privileges. |
| ***2.*** Open your browser and go to www.powerwavesoftware.com. | The *Power Wave Resource Center* displays.<br>  |
| ***3.*** In the *Quick Links* section, click the *Power Wave® Utilities* link. | The system displays a page containing the **Download Power Wave® Utilities FREE** button.<br>  |
| ***4.*** Enter your e-mail address in the *Email* field and place a check mark next to the privacy terms. | |
| ***5.*** Click the **Download Power Wave® Utilities FREE** button to download the file. | |

| Procedure | Details |
|---|---|
| ***6.*** Run the downloaded file. | **NOTE \| Depending on your Windows version, you may have to click** Run **or** Allow **to permit your system to execute the file.**<br><br>**TIP \| If you haven't logged in as a user with administrative privileges, you may have to download the file, open the location where you downloaded it, right-click the file and select** Run as administrator**.**<br><br>The system displays the *Installer Language* dialog. |
| ***7.*** Select your language from the drop-down and click **OK**. | If you are running an older version of Power Wave® Manager, the system prompts you to remove the old version. Click **OK** to allow the installer to remove the old version.<br><br>If this is a new installation (or once the old version is removed), the system displays the installation welcome window.<br><br>  |
| ***8.*** Click **Next** on the *Welcome* screen to move to the License Agreement and continue the installation. | |
| ***9.*** You must accept the License Agreement and click **Next** to continue. | |
| ***10.*** Leave the default value in the *Destination Folder* field and click **Install**. | The system extracts files and installs Power Wave® Utilities on your computer. Once it is complete, the final page of the *Setup Wizard* opens. |
| ***11.*** Click the **Finish** button to exit the installer. | Congratulations! You have installed Power Wave® Manager and can now configure your Welding Power Source. |

THIS PAGE INTENTIONALLY LEFT BLANK.

# Overview of Power Wave® Manager

Power Wave® Manager is a software application that allows you to configure and manage the Power Wave® family of Welding Power Sources. Once you connect to a Welding Power Source, you have a multitude of tools at your disposal.

## *Setting Preferences*

When you first open Power Wave® Manager, the system may prompt you to set a *Preferences* folder. This folder houses weld training files and is the backup location used for storing weld logs, backups, SnapShots and other files. Simply choose a folder on your computer where Power Wave® Manager can store these files. Your computer must have permissions to access to this folder (whether specific to your user account or a user group of which your account is a member). If you do not, Power Wave® Manager prompts you again to select a folder. Check with your local IT department if you need permissions to the folder to which you want to save files.

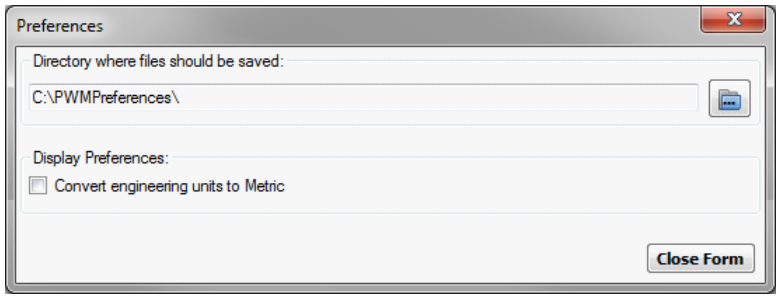



**Figure 4.1 Preferences**

On the *Preferences* window, you can also choose to have the engineering units displayed in Power Wave® Manager as metric or English. Power Wave® Manager uses this setting only when there is no User Interface device setting that determines what units to use. The system defaults your unit preference to the Windows® operating system locale.

> **NOTE |** **When Power Wave® Manager connects to a Welding Power Source with a User Interface device, the *P.1 Wire Feed Speed Units* parameter on the User Interface overrides the setting in Power Wave® Manager.**

# Connecting to the Welding Power Source

Once you have physically connected the Welding Power Source to the computer via an Ethernet cable or via Wi-Fi or Bluetooth or with a USB/serial cable (Chapter 2), you can open Power Wave® Manager and connect to the software within the power source. When you first open Power Wave® Manager, the system displays the *Connection* section (Figure 4.2). From here you can choose your connection method: Ethernet (hard-wired or Wi-Fi), Bluetooth or a USB/serial connection.


**Figure 4.2 Available Connection Methods**

## Ethernet Connection

The preferred method of connecting your computer to the Welding Power Source is through an Ethernet connection, via Ethernet cable or Wi-Fi; even if you do not know the specific IP address of the power source. Power Wave® Manager can help you find it. The steps below walk you through connecting to the power source.

> **NOTE |** **Windows®-based applications that connect to a Welding Power Source through an Ethernet connection need to have ports 4320 and 4321 open. In addition, power sources sending data to CheckPoint™ need to send to port 80 on the CheckPoint™ server.**

> **TIP |** **If you have trouble connecting, click *Trouble Connecting* to display suggestions to help you connect.**

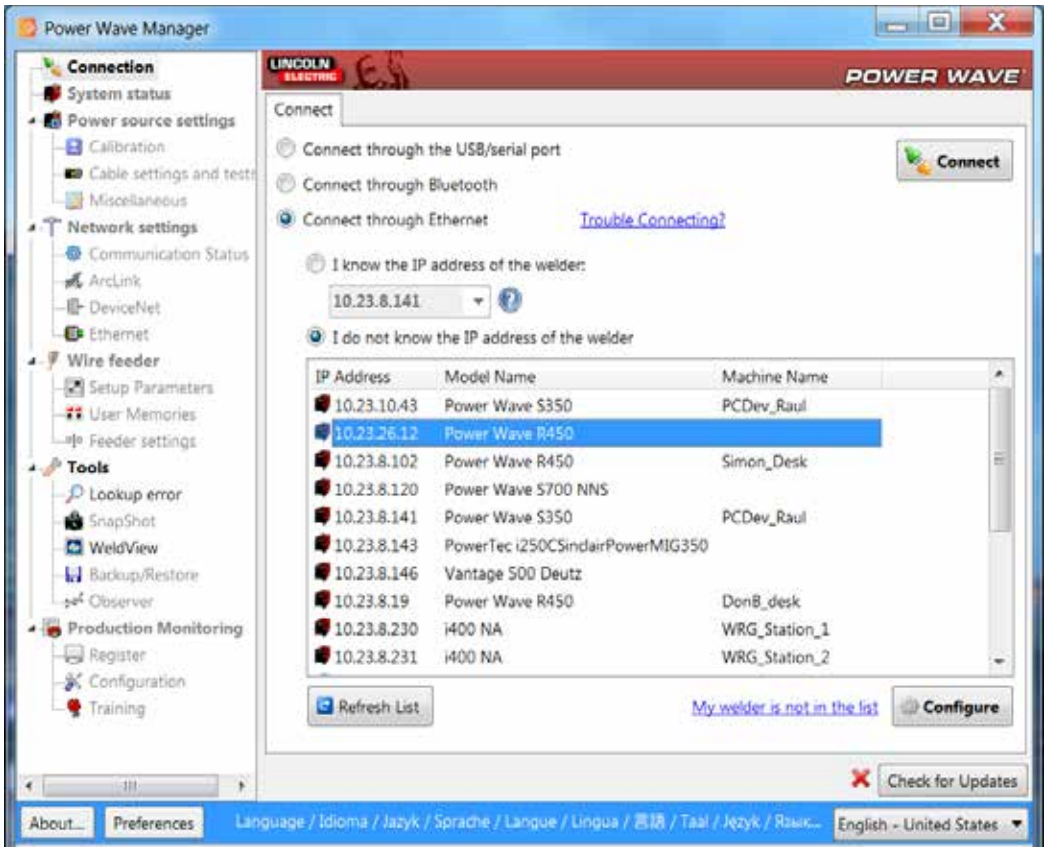



**Figure 4.3 Connecting Using an Ethernet Connection**

To connect the Power Wave® Manager application to the power source through an Ethernet connection:

| Procedure | Details |
|---|---|
| ***1.*** Open Power Wave® Manager. | Generally, you can select **Start** > **All Programs** > **Lincoln Electric** > **Power Wave® Manager** from the computer's main menu.<br><br>When Power Wave® Manager is opened; it automatically displays the **Connect** tab for you (Figure 4.3). |
| ***2.*** If using Wi-Fi, log in to the Wi-Fi network. | If you are intending to use Wi-Fi to connect to your Power Source, then you need to first login the PC to the Wi-Fi network the Power Source is on. |
| ***3.*** Choose the *Connect through Ethernet* option. | |
| ***4.*** Choose *I know the IP address of the welder* (if you know the network address) and type the IP address in the text field.<br><br>OR<br><br>Choose *I don't know the IP address of the welder* if you need to scan the network to | An IP address is a numeric identifier for a device on a network, similar to a phone number, and is composed of four numbers (each ranging from 0 to 255). All devices that participate on the network must each have a unique IP address.<br><br>For example, *10.23.10.90* is a valid IP address. |

| Procedure | Details |
|---|---|
| find the welder's address. See page 4.4 for more information on finding the IP address. | **NOTE \| If there is an IP address already displayed in the text field, it is the IP address of the last Welding Power Source that was connected. Be sure you enter the correct address for the current Welding Power Source you want to update.** |
| ***5.*** Click the **Connect** button. | The system attempts to connect to the Welding Power Source. If the connection is established successfully, the software automatically displays the *System status* section for you (Chapter 5).<br><br>If Power Wave® Manager could not connect to the Welding Power Source, there may be a couple of solutions you can try. Please refer to Appendix A for more information. |

## Finding the IP Address of a Welder

If you don't know the IP address of a Welding Power Source or if you are having trouble connecting when you enter a specific IP address, you can have Power Wave® Manager scan your network for welders. When you choose the *I do not know the IP address of the welder* option on the **Connect** tab, the system automatically begins scanning your network for power sources. Once it completes the scan, Power Wave® Manager displays the results in the list, along with the model name and machine name.

Simply click on each Welding Power Source in the list until you see the green status light on the Welding Power Source you want start to blink rapidly. Click **Connect**. See Appendix A for common reasons you may experience problems connecting to the power source.

> **NOTE \| The Welding Power Source must be on the same subnet as the Power Wave® Manager application in order to retrieve the IP address when using this option.**

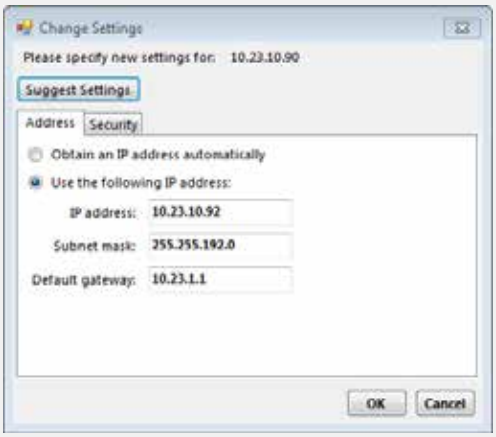
## Modifying the Ethernet or Wi-Fi Settings of a Power Source

In some circumstances, it is necessary to change the Ethernet settings of the Welding Power Source. For example, you may be moving the Welding Power Source from one location to another on a network, or a Welding Power Source fails to connect even though it appears in the list.

> **STOP \| When you click the** OK **button, the Welding Power Source resets and stops welding. Be sure to only click this button if the power source is not currently welding.**

> **STOP \| If the Welding Power Source is currently part of a network, contact your network administrator to verify you can make changes to the Ethernet settings of the power source.**

To change the network settings (including the IP address) on a power source:

| Procedure | Details |
|---|---|
| ***1.*** On the **Connect** tab of Power Wave® Manager, choose *I do not know the IP address of the welder* and select the power source from the list. | |
| ***2.*** Verify the selected Welding Power Source has a blinking green status light. | This helps you ensure you change the settings on the intended Welding Power Source. |
| ***3.*** Click the **Configure** button. | The *Change Settings* window opens.   |
| ***4.*** Make your changes. | If your computer is directly connected to the Welding Power Source using an Ethernet cable, or Wi-Fi you may click the **Suggest Settings** button. This will automatically generate the proper network settings for the Welding Power Source that would make it ready to communicate with your computer. |
| ***5.*** Click **OK**. | The Welding Power Source then resets and accepts its new network settings. |

## Serial Connection

Once you have the computer and power source physically connected through a serial cable setup, simply choose the *Connect through the USB/serial port* option on the **Connect** tab of Power Wave® Manager (Figure 4.2 on page 4.2) and select the appropriate communication port from the list. Follow the onscreen instructions to establish a connection to the power source.

## Bluetooth Connection

If your computer and the power source were previously paired via Bluetooth setup, simply choose the *Connect through Bluetooth* option on the **Connect** tab of Power Wave® Manager (Figure 4.2 on page 4.2) and select the appropriate communication port from the list. Otherwise see the Bluetooth Connection section of Chapter 2. Follow the onscreen instructions to establish a connection to the power source.

# Navigating Power Wave® Manager

When you open Power Wave® Manager, the navigation tree down the left side allows you to access configuration options for the power source to which you have connected. Click the menu item in the navigation tree to display the available options on the right side of the window.

By default, Power Wave® Manager starts up in the *Connection* section and allows you to connect to a power source. In order to access the other menu items of Power Wave® Manager (with the exception of *Lookup Error* and *WeldView*), you must connect to a power source.


**Figure 4.4 Power Wave® Manager**

# Language Selection

Power Wave® Manager has built-in support for multiple languages. By default, the program automatically detects the language used by your operating system and switches the language of the interface accordingly. For example, on a Japanese installation of Windows, Power Wave® Manager automatically switches to using Japanese text and messages.

If you would like to change the language used by Power Wave® Manager, select the appropriate language from the *Language* drop-down (Figure 4.5).

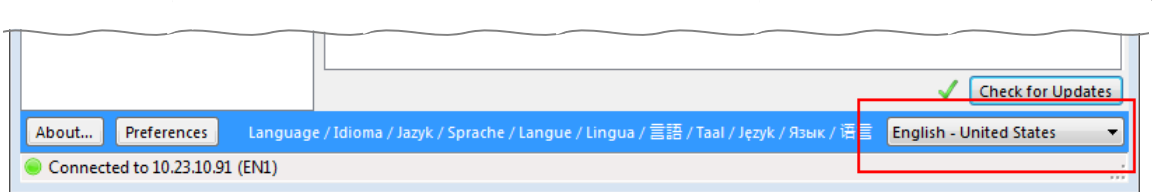



**Figure 4.5 Changing the Language of Power Wave® Manager**

# System Status

When Power Wave® Manager first establishes a connection to the Welding Power Source, it switches to the *System status* section and provides you with in-depth information about the Welding Power Source. With the *System status* section, you can review each component of the Welding Power Source, review a module if there is a problem and create a SnapShot file for troubleshooting.

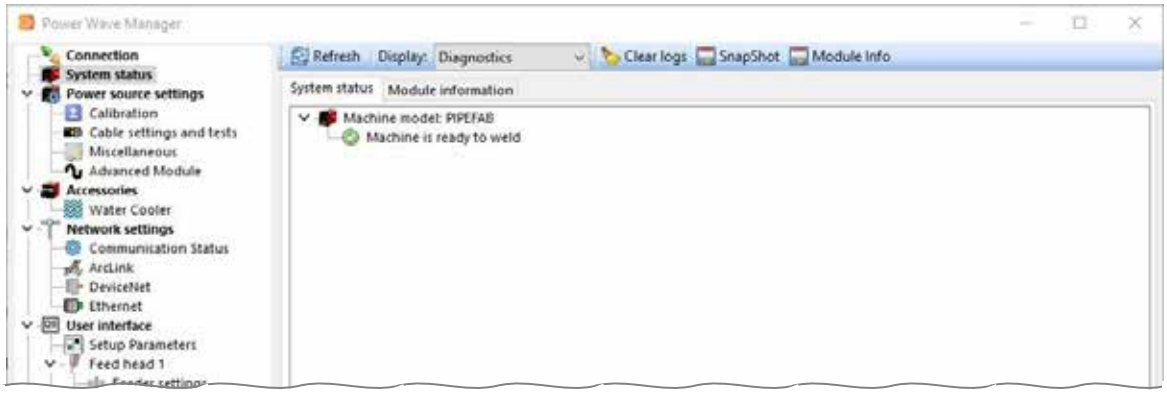



**Figure 5.1 System Status**

## *Tool Bar*

At the top of the *System status* section (Figure 5.1), there is an action bar that allows you to change your display, clear the history and save a SnapShot of the current activity on the power source.

- **Refresh** button: This button allows you to rescan the Welding Power Source for problems. The most recent results are displayed on the **System status** tab.
- *Display* drop-down: The *Display* drop down allows you to switch between *Diagnostics* (page 5.3) and *Detailed Status* (page 5.4).
- **Clear logs** button: This button deletes the Event and Fatal Event log histories in all modules of the Welding Power Source. The system records the date and time the logs were cleared and displays this information under the appropriate component.

> **STOP** | **When you click the** Clear logs **button, the Welding Power Source resets and stops welding. Be sure the power source is not currently welding.**

> **TIP** | **When you click the** Clear logs **button, Power Wave® Manager uses the date and time of the local host computer, rather than the date and time on the selected Welding Power Source.**

- **SnapShot** button: This button allows you to save a file that contains detailed configuration and debugging information collected from each module in the Welding Power Source. This

can help Lincoln Electric Support to troubleshoot any possible issues that cannot be easily resolved. See page 10.2 for more details.

§ **Module Info button:** This button allows you to save a file containing information for all the modules in the system.

# System Status Tab

The **System status** tab displays any problems that may be present in any of the components of the Welding Power Source, including hardware, firmware and software (e.g., DeviceNet module, wire drives, or user interfaces).

> **TIP** | **Right-click an entry to copy the details to paste into an e-mail or other document.**

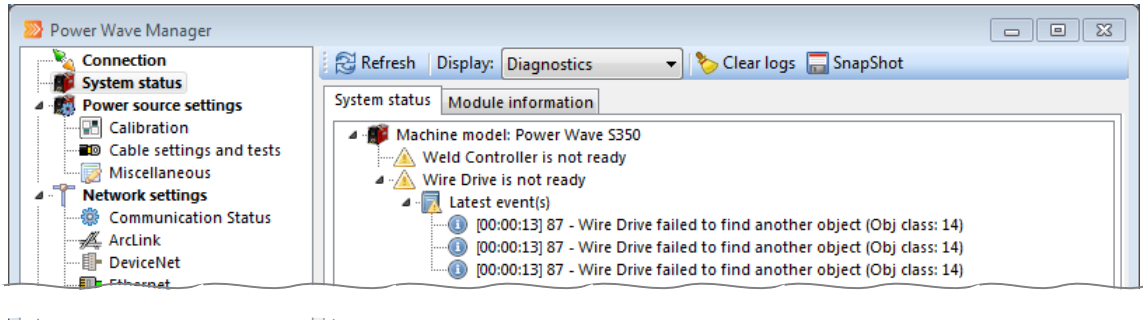



**Figure 5.2 System Status Tab**

## Diagnostic Display

Power Wave® Manager automatically runs a diagnostic on the Welding Power Source when you connect to a power source and displays the *System status* section for you when the connection is successful. If there are no problems with the Welding Power Source, the **Ready** icon ( ) displays and indicates that the machine is ready to weld (Figure 5.1 on page 5.1).

If the program detects an event or a malfunction in the Welding Power Source, it will attempt to determine which component caused the malfunction and displays the **Error** icon ( ), along with any error codes or log entries to help you correct the problem.

> **TIP** | **To retrieve more information about a certain error code, refer to the *Lookup error* section on page 10.1. You can also double-click the icon next to the error, and the system automatically takes you to the *Lookup error* section.**

Each event has a time stamp and a description. For modules that have a real-time clock, such as a robot or Ethernet module, the time stamp will indicate the time of the event. Otherwise, the time stamp indicates the amount of time that passed since the Welding Power Source powered up before the power source experienced the error.

For example, in Figure 5.2, the Weld Operator powered up the power source and 13 seconds later, the event occurred.

## Detailed Status Display

If you see error icons and need to look into the problems further, you can select *Detailed status* from the *Display* drop-down and view additional information for each component connected to the Welding Power Source. In Figure 5.3, all components are ready to weld, except two (the *Weld Controller* and the *User Interface*). Click the arrow ( ▷ ) in front of each component to review the details if there are any available.

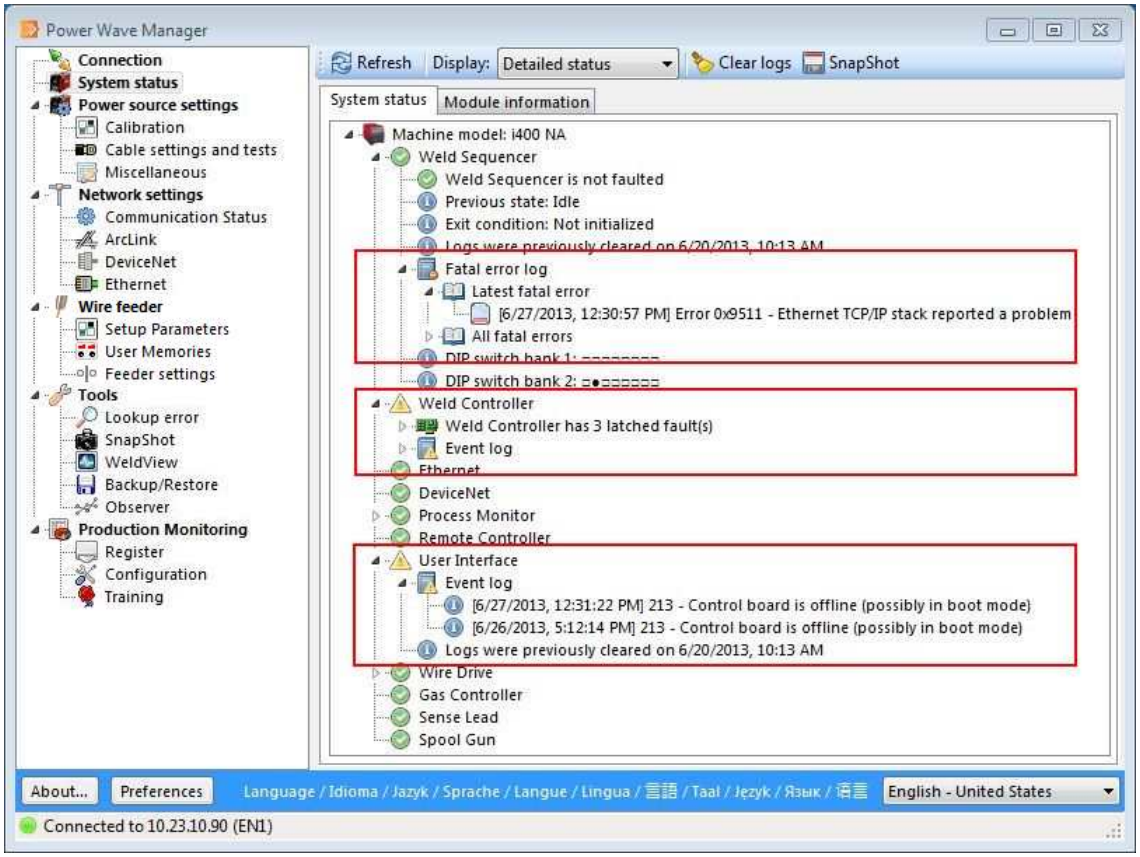



**Figure 5.3 Detailed Status**

There are two types of error logs: a Fatal Error Log and an Event Log. These are historical histories for the component and could include log entries from a previous issue. When you expand the component displaying the **Error** icon ( ⚠ ), Power Wave® Manager displays the number and description of the error or event (Figure 5.3). These log entries can provide additional information to help you find the cause of any problems.

> **NOTE |** **An event does not always indicate a malfunction. An event can be posted as an informational entry. Even components that are ready to weld may have events recorded in their log.**

# Module Information Tab

The **Module information** tab displays information about each hardware module attached to the Welding Power Source. This information includes versions of the hardware and firmware of each module, serial numbers, Weld Set name(s), and miscellaneous information such as firmware revision numbers and checksums. Many of the details are useful when calling Lincoln Electric Support. You can switch between different sub-tabs to view information about the corresponding hardware module.

> **TIP** | **The *Software Version* is important to know when updating the firmware on the Welding Power Source. See step 8 on page 3.2.**

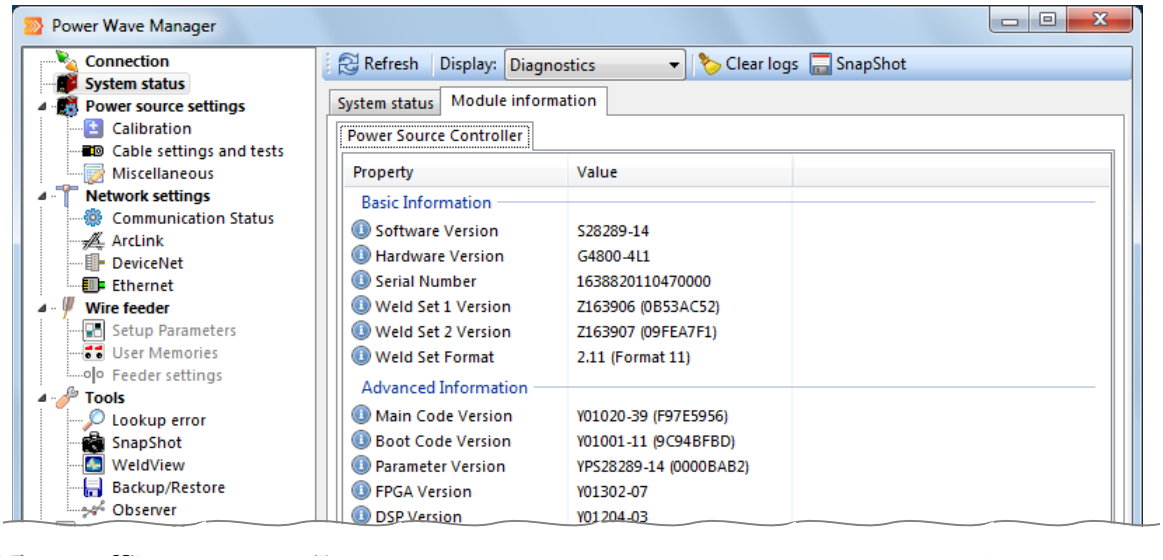



**Figure 5.4 Module Information Tab**

# Power Source Settings

The *Power source settings* section consists of various subsections that contain settings for the Welding Power Source component of the welding system. You will access the Power Source Settings when you first set up your Welding Power Source, but once you have your Welding Power Sources set up and welding, you will use this section infrequently. You may need to recalibrate the machine over time or as processes change.

## *Calibration*

The *Calibration* section allows you to calibrate the Welding Power Source by adjusting the amperage and voltage outputs so that they match setpoint values. You can also use this function to activate the Welding Power Source output for other troubleshooting purposes. To change the amperage setpoint, you can click the up or down arrows ( ) next to the *Amperage setpoint* field or type the specific value directly in the field.

Some systems, such as the PIPEFAB™, require feedforward calibration as shown in **Figure 6.2**.

> **NOTE | Calibration settings are not available on some machines, such as the Power Wave® E500. For these machines, refer to the operator's manual for the calibration procedure.**

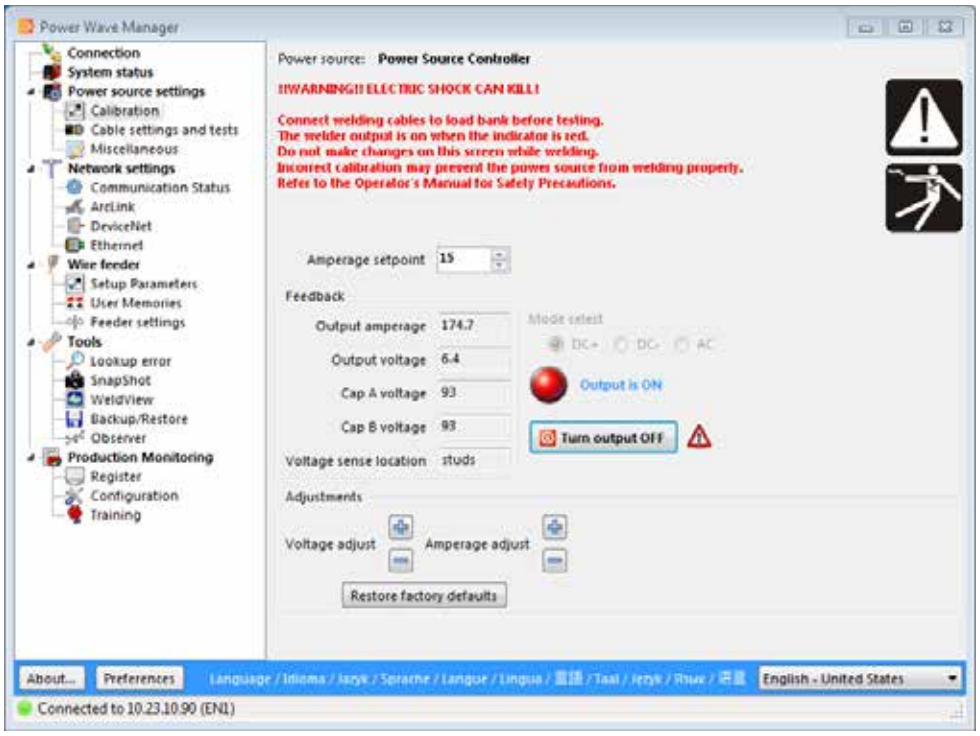



**Figure 6.1 Calibration**

**STOP | Buttons on this tab control the output of the Welding Power Source. Be sure to exercise all appropriate safety procedures when performing actions on this tab. Be careful that the Welding Power Source is not currently welding before calibrating.**

The following is the recommended procedure for calibrating your power source:

| Procedure | Details |
|---|---|
| ***1.*** Attach Welding Power Source output cables to a 300A/30V resistive grid load. | |
| ***2.*** Open Power Wave® Manager. | |
| ***3.*** Connect to the power source. | |
| ***4.*** Display the *Calibration* section. | |
| ***5.*** Click the **Turn output ON** button. | The **Turn Output ON** button enables the output of the Welding Power Source. When you turn the output on, the indicator will begin to flash red ( ), and values will appear under *Feedback* for: *Output amperage*, *Output voltage*, *Capacitor* |

| Procedure | Details |
|---|---|
| | *voltages* and *Voltage sense location*. |
| ***6.*** Use the plus and minus icons ( and ) to the right of *Amperage adjust* (Figure 6.1) to calibrate the Welding Power Source to the value you set in Power Wave® Manager. | This adjusts the actual measured values on the Welding Power Source to match Power Wave® Manager. |
| ***7.*** Use the plus and minus icons ( and ) to the right of *Voltage adjust* (Figure 6.1) to calibrate Power Wave® Manager to the Welding Power Source. | This adjusts the feedback in Power Wave® Manager to match the Welding Power Source.<br>**STOP \| Do not calibrate voltage at voltages greater than 50V.** |
| ***8.*** Click the **Turn output OFF** button. | The **Turn Output OFF** button disables the Welding Power Source's output. |

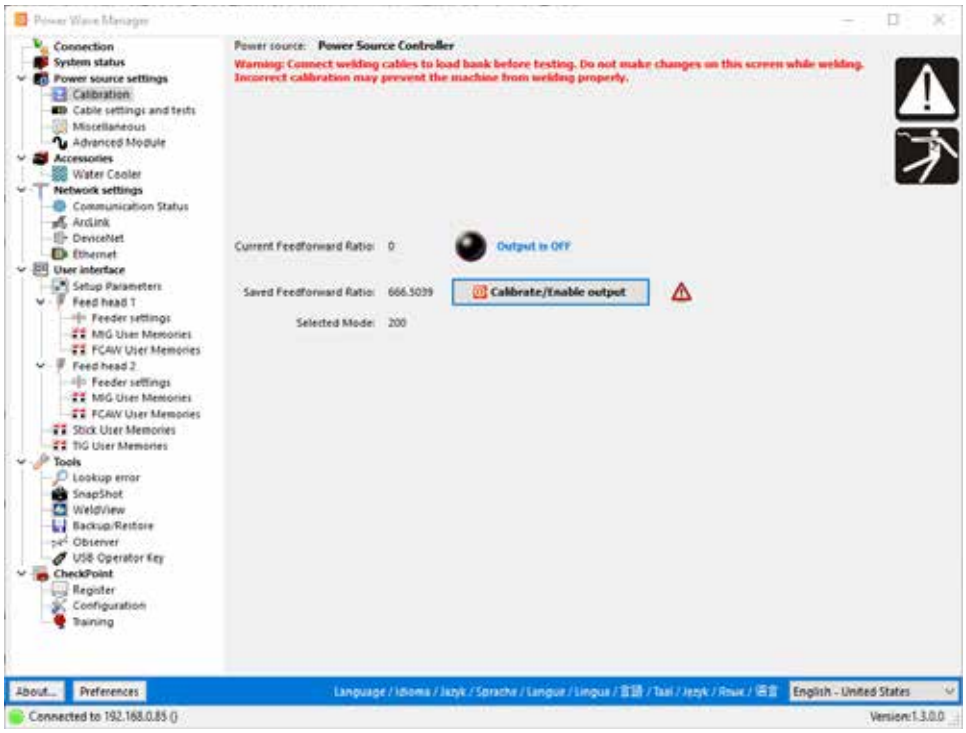



**Figure 6.2 Feedforward Calibration**

The following is the recommended Feedforward calibration procedure:

| Procedure | Details |
|---|---|
| ***1.*** Attach Welding Power Source output cables to a resistive grid load. | |
| ***2.*** Open Power Wave® Manager. | |
| ***3.*** Connect to the power source. | |
| ***4.*** Display the *Calibration* section. | |
| ***5.*** Click the **Calibrate/Enable output** button. | The **Calibrate/Enable output** button enables the output of the Welding Power Source. When you turn the output on, the indicator will begin to flash red ( ), and the output will remain on until Current Feedforward Ratio is determined. |
| ***6.*** Output will be turned off automatically once calibration is complete. | |

# Cable Settings and Tests

The *Cable settings and tests* section allows you to configure and test your welding cables and sense leads for the Welding Power Source to which you are connected.

## Sense Lead Settings Tab

Use these settings to enable or disable automatic hardware sense lead selection or to modify the behavior through manual settings. For most applications, the *Automatic hardware sense lead selection* is the best method to use. This method reduces the chance of fairing and losing tips due to sense lead losses.

> **NOTE |** **The** Sense lead settings **tab is only available for those Welding Power Sources that do not have DIP switches for modifying the sense lead location. The settings are also not available for Welding Power Sources that do not support changing the sense lead selection.**

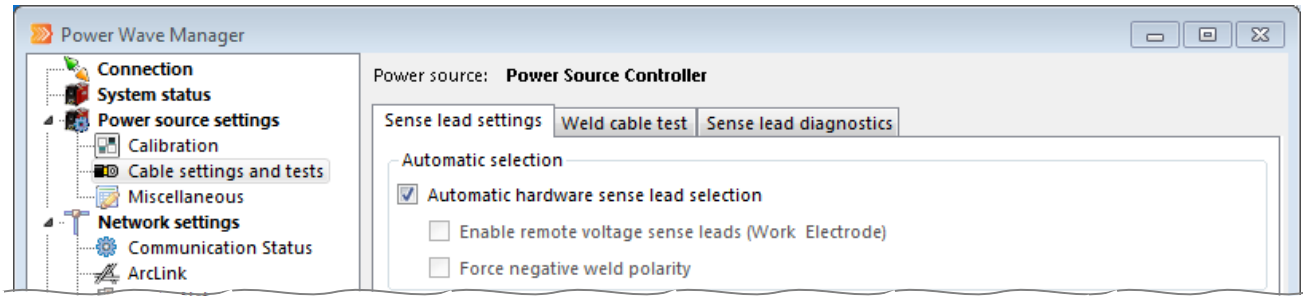



**Figure 6.3 Sense Lead Settings Tab**

### *Enabling Work Sense Lead*

You can configure the system to force sense arc voltage from the work sense lead (21 lead) instead of the negative output stud. This requires connecting to the voltage sense connector and attaching the work lead to the work.

To enable the work sense lead:

| Procedure | Details |
|---|---|
| **1.** Remove the check mark from the *Automatic hardware sense lead selection* checkbox. | |
| **2.** Place a check mark in the *Enable remote voltage sense leads* checkbox. | |
| **3.** Click the **Apply settings** button. | |

### *Enable Negative Welding Polarity*

If negative welding polarity is required for the Welding Power Source, such as in some Innershield™ applications, you may need to configure the correct voltage sense location manually.

> **NOTE | If the system is already configured to sense arc voltage at the remote voltage sense leads, no changes are required.**

To enable negative welding polarity:

| Procedure | Details |
|---|---|
| **1.** Remove the check mark from the *Automatic hardware sense lead selection* checkbox. | |
| **2.** Place a check mark in the *Force negative weld polarity* checkbox. | |
| **3.** Click the **Apply settings** button | **NOTE | If the sense lead selection is specified for a welding procedure, that selection will have precedence over the settings you set here. Therefore, some welding processes, such as TIG (GTAW), stick (MMAW), and SMAW, will override the Power Wave® Manager settings.** |

## Weld Cable Test Tab

The **Weld cable test** tab (Figure 6.4) allows you to measure the resistance and the inductance of your welding circuit. This can be used to determine how setup changes affect the welding circuit. In order to run this test, the contact tip must be shorted to the work piece.

> **STOP | Do not trigger the power source during this test. The power source will be triggered for a short time. Please verify output is turned off, and short contact tip to work before proceeding.**

> **NOTE | The *Weld cable test* does not support the Welding Power Source when connected to a Power Wave® STT® Module or a Power Wave® Advanced Module. To perform a cable test, you must disconnect the accessory and set up the power source as if the accessory were not in use. Please refer to the power source's *Operator Manual* for cable guidance.**
>
> **NOTE | The weld cable test is not available on the Power Wave® E500.**

Click the **Perform test** button to begin the inductance and resistance test.

> **STOP | When you perform this test, the Welding Power Source's output will be turned on for a very short time (100 milliseconds).**

Once the test is complete, Power Wave® Manager displays the values that were calculated based on the downloaded weld trace. The resistance value appears in the *Resistance* field (measured in milliohms) and the inductance value appears in the *Inductance* field (measured in microhenries) (Figure 6.4).

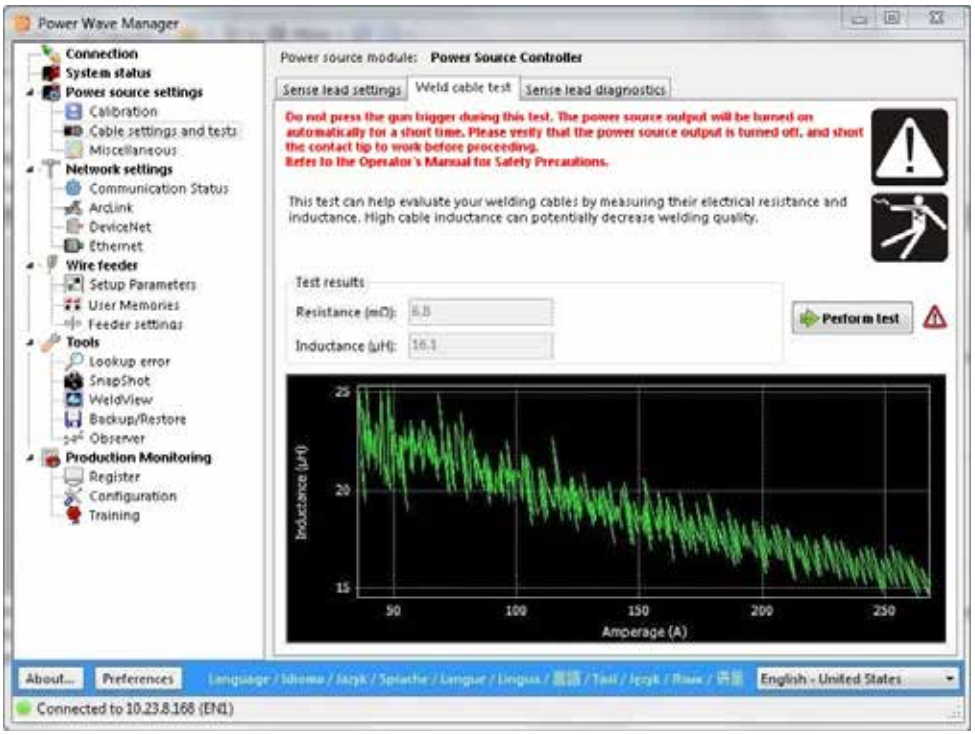



**Figure 6.4 Weld Cable Test Tab**

> **TIP | It is good practice to record the results of these tests when the welding system is operating well. You can then use those values to compare to values taken when there are welding problems on the same weld cell. This may help isolate the problem when the old and new numbers are significantly different.**

## Sense Lead Diagnostics Tab

The **Sense lead diagnostics** tab helps you troubleshoot arc starting problems or erratic arc behavior by testing and changing the location of the sense lead temporarily. Over time, the constant movement of equipment, such as robot motion, can cause arc voltage sense leads to detach. The settings on this tab allow you to test and verify the connectivity and reliability of the voltage sense selection currently set. This is done by a process of testing voltage sense starting at the studs, then incrementally moving to the remote voltage sense locations.

> **NOTE |** **Any changes made in this tab are temporary and are reset when the power to the Welding Power Source is turned off.**

> **TIP |** **The software disregards the *Sense lead loss action* setting (page 6.9) when operating older welding equipment and firmware that does not support this functionality.**

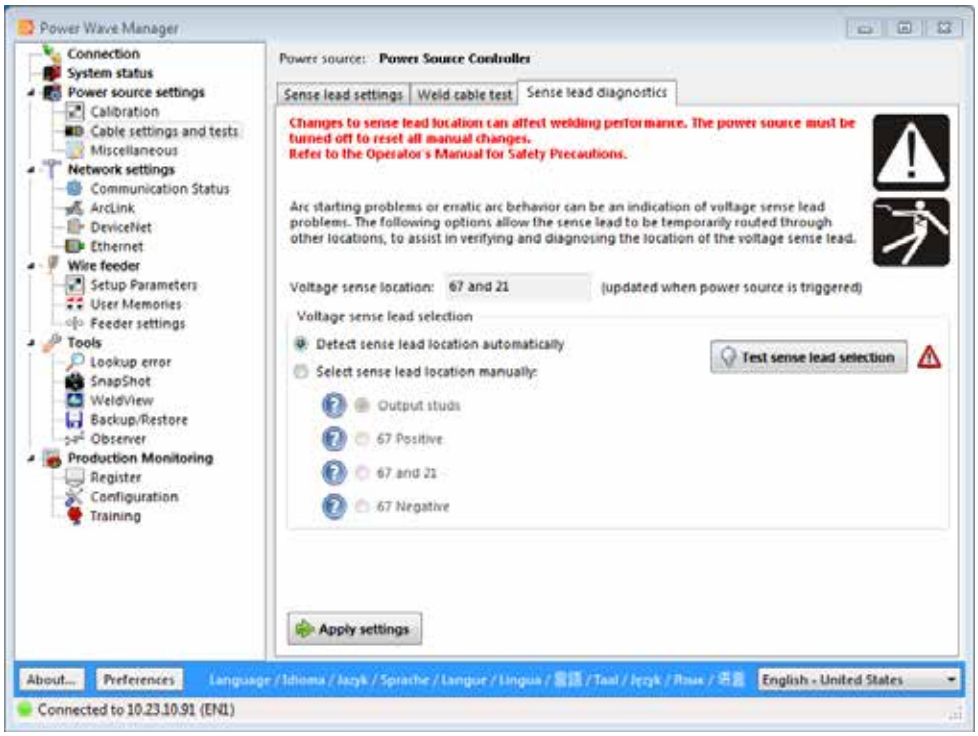



**Figure 6.5 Sense Lead Diagnostics**

> **NOTE |** **You cannot perform this test with ServoTorch.**

## *Automatic Test*

Power Wave® Manager can also help you troubleshoot sense lead issues. The software automatically attempts to detect the sense lead location by turning on the Welding Power Source's output in an open circuit voltage (OCV) mode and reading back voltage. The system does this while stepping through the various manual sense lead locations, determining which location is most likely the one being used.

> **STOP |** **Make sure your welding circuit is open before performing this test.**

To perform the automatic test, choose the *Detect sense lead location automatically* option in Power Wave® Manager and click the **Test sense lead selection** button.

### *Manual Test*

You can use Power Wave® Manager to force the Welding Power Source to sense voltage from the location you choose.

To manually test your sense leads, choose the *Select sense lead location manually* option and choose one of the following options. Click the **Apply settings** button to force the power source to use the selected sense lead combination for voltage feedback then go ahead and make a weld to perform your manual test. This procedure is useful to troubleshoot a system where wire is burning back to the tip. A broken or missing sense lead is typically the cause if the machine welds properly when "Output studs" is selected manually. Note these settings are not permanent and will revert to automatic voltage sensing when the machine resets or if power is removed. Then you can repeat for each option you want to test.

- *Output studs*: This configuration utilizes arc voltage sensing from inside the Welding Power Source and does not require polarity to be configured.
- *67 Positive* or *67 Negative*: Choose the option depending on the welding polarity in which your system is configured to operate.
- *67 and 21*: Use this option to test both remote voltage sense leads.

> **STOP |** **When you have completed testing, cycle the power to the Welding Power Source (off then back on) to clear any changes made to the voltage sense location. Be careful that no welding is currently in progress.**

# *Miscellaneous*

In the *Miscellaneous* section under *Power source settings*, you can synchronize the date and time on the power source. You can also see the lifetime arc time for the power source. You can also set a couple of options for the selected power source.

## Settings for Power Source

If the Welding Power Source supports the following features, you can use the **Settings** tab to set some features on the power source.

> **STOP |** **If you make changes to the power source options and click** Apply settings **button, the Welding Power Source resets automatically. Be careful that no welding is currently in progress.**

> **NOTE |** **Any time you make changes to the options in this section, be sure you click the** Apply settings **button to commit your changes.**

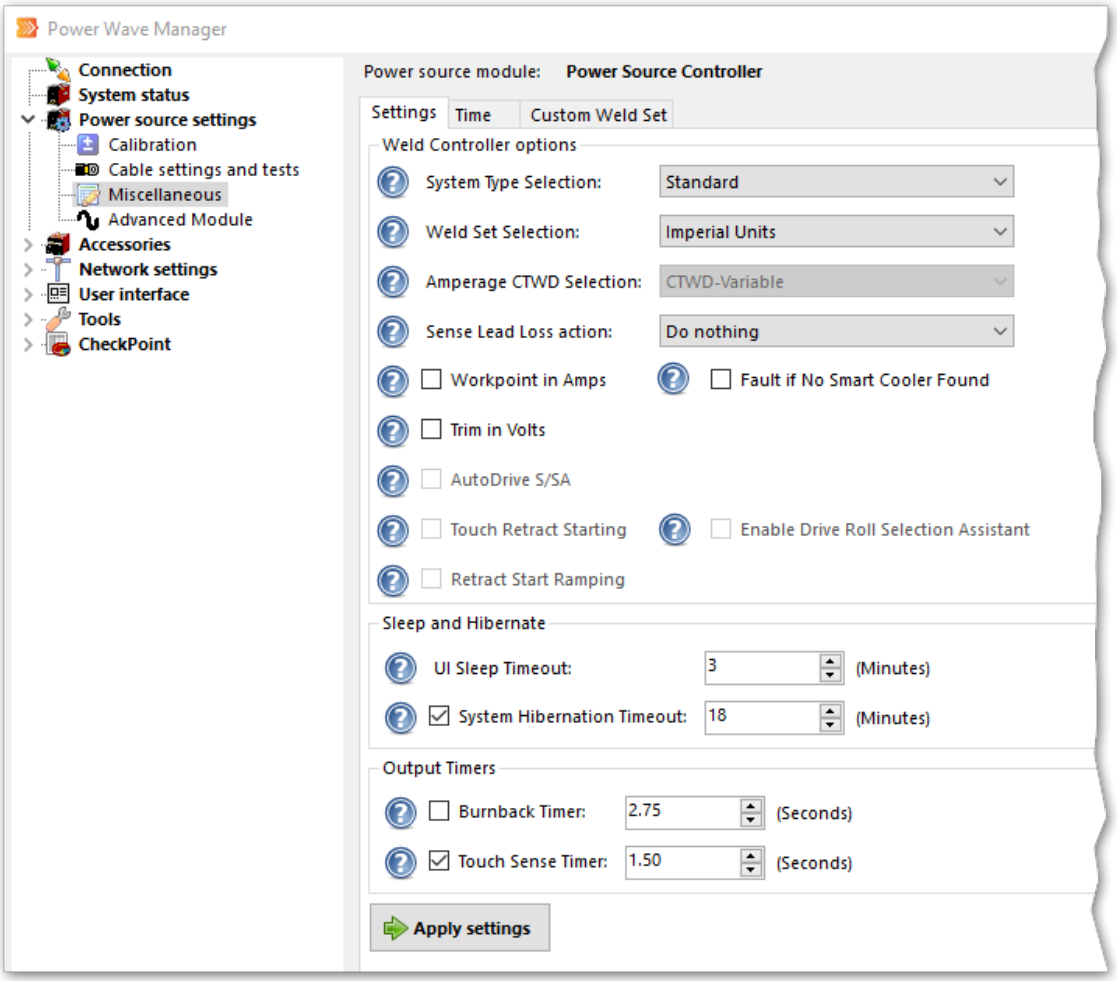



**Figure 6.6 Miscellaneous Section: Settings Tab**

**Table 6.1 Weld Controller Options on the Settings Tab**

| Field | Description |
|---|---|
| *System Type Selection* | For Welding Power Sources that support this feature, this setting allows you to display to the Weld Operator only those Weld Modes associated with a certain type of metal to be welded.<br><br>Any Weld Modes that are not part of the list for the selected *System Type* are "hidden" and cannot be selected by the operator.<br><br>If you would like to set the power source back to a standard system and display all available Weld Modes, simply select *Standard* from the drop-down.<br><br>Other options available depend on the individual power source to which you have connected.<br><br>**TIP \| If you do not see the *System Type* drop-down, either your Welding Power Source does not support the feature or you need to update the firmware on the power source. See page 3.1 for updating the firmware.** |

| Field | Description |
|---|---|
| *Weld Set Selection* | This setting allows you to select which Weld Set you want to use on the Welding Power Source. The Welding Power Source could contain two weld sets: one that uses imperial units and one that uses metric (SI units). You could also have a user-defined Weld Set loaded on the power source. Simply select the one that contains the Weld Modes you want to use. |
| *Amperage CTWD Selection* | Power Wave® Manager activates the *Amperage CTWD Selection* option (Contact Tip to Work Distance) on power sources that support this feature. Select the method Power Wave® Manager should use to look up the wire feed speed that produces the appropriate amps. |
| *Workpoint in Amps* | Use this option to base the output level on amps instead of wire feed speed. |
| *Trim in Volts* | You can use this to set the output level based on voltage instead of a unitless control. |
| *AutoDrive S/SA* | This is a servo control setting. It is automatically set upon detection of AutoDrive® S or AutoDrive® SA servo controllers by the power source if it supports this feature. To clear this setting and return the power source to standard operation, remove the check mark from the checkbox. |
| *Touch Retract Starting* | The *Touch Retract Starting* option allows robots to control arc starts by moving the wire down until it touches the work piece, generating a low current, then pulling the wire back until the arc is lit. The robot then commands the wire to move forward for normal welding. Retract settings are stored in the weld set and are mode dependent (a different set of values for each mode). *Touch Retract Starting* is used in conjunction with the *AutoDrive S/SA* servo control setting. |
| *Retract Start Ramping* | *Retract Start Ramping* works in conjunction with the *Touch Retract Starting* setting to ramp the Workpoint, trim, and AutoDrive® S or AutoDrive® SA Servo's wire feed speed to create smoother transitions from the "starting to weld" state. When this setting is disabled, no ramping will occur even if ramping values are defined for the selected Weld Mode.<br><br>**STOP \| You must update firmware and weld sets to the most current version to support this feature.**<br><br>**NOTE \| If you restore a backup taken prior to v1.0.2.6 of Power Wave® Manager, the *Retract Start Ramping* option will be unchecked.** |
| *Enable Drive Roll Selection Assistant* | When using the AutoDrive S/SA, it is important to select the drive roll setting that matches the drive roll type you are using. To make this easier for users who change their setup frequently, when this setting is enabled, the system will automatically configure itself for the appropriate drive roll based on the electrode type and size of the selected weld mode.<br><br>Note that modes using an unsupported electrode type or size for this |

| Field | Description |
|---|---|
| | feature will be hidden and will not be able to be used unless this feature is disabled. |
| *Sense Lead Loss Action* | Sense Lead Loss Action allows you to define the behavior of the Welding Power Source when it detects the loss of the Sense Lead. You have the following options:<br>§ *Do nothing*: No action is taken on a loss detection of the Sense Lead.<br>§ *Alarm*: The power source will log Event 53 (sense lead loss) in the event log. The Weld Operator is allowed to continue welding.<br>§ *Fault System*: The power source will log Event 53 (sense lead loss) in the event log, display an error on the User Interface, and turn off the welding output.<br>**NOTE \| When performing sense lead diagnostics (page 6.7), the power source temporarily ignores any setting you made in the *Sense Lead Loss Action* drop-down.**<br>**NOTE \| If you restore a backup taken prior to v1.0.2.8 of Power Wave® Manager, the *Sense Lead Loss Action* option will be set to *Do Nothing*.** |
| *Fault if No Smart Cooler found* | If this checkbox is checked then the Power Source will log an event and/or fault on startup if a Smart Cooler is not found in the system. Set this to false (unchecked) if a Smart Cooler is not used. This option is only supported on certain power sources. The checkbox will be disabled (or not displayed) when it is not supported. |
| *UI Sleep Timeout* | The *UI Sleep Timeout* specifies the amount of time (in minutes) that the User Interface, UI, can remain inactive before it will go to sleep. When set to zero, the timer UI Sleep Mode is disabled.<br>**TIP \| If you do not see the UI Sleep Timeout setting, your Welding Power Source does not support the feature.** |
| *System Hibernation Timer* | The *System Hibernation Timer* is the amount of time (in minutes) the system can remain inactive before going into hibernation. The minimum value is 15 minutes. This timer is enabled if the checkbox is checked.<br>**TIP \| If you do not see the System Hibernation Timeout setting, or it is disabled, your Welding Power Source does not support the feature.** |
| *Burnback Timer* | The *Burnback Timer* defines the time in seconds before turning off weld controller output after the wire feeder stops. This timer is enabled if the checkbox is checked. |
| *Touch Sense Timer* | The Touch Sense Timer defines the maximum time in seconds allowed for Touch Sense. This timer is enabled if the checkbox is checked. |

## Time Information from the Power Source

The *Power Source time* section on the **Time** tab displays the current time on the Welding Power Source's internal clock. The power source uses this when recording internal events, errors, and information that it sends to CheckPoint™.


**Figure 6.7 Miscellaneous Section: Time Tab**

> **NOTE | The Production Monitoring™ and CheckPoint™ applications, if present, periodically set the clock on the Welding Power Source to match the time of the Production Monitoring™ server or the CheckPoint™ data center, whichever is applicable.**

If the time shown on the Welding Power Source does not match the time on your local computer, you can manually synchronize the clocks. Simply click the **Synchronize** button and the software changes the time on the Welding Power Source to match the time on your computer.

> **NOTE | The** Synchronize **button is not available when CheckPoint™ is enabled. The power source updates the time automatically from the CheckPoint™ data center.**

The *Time Format* section allows the Power Source to use either local time or UTC Time format. UTC Time is Universal Time Coordinated or Universal Coordinated Time which is the time standard commonly used across the world. When CheckPoint™ is enabled the Time Format will be locked to UTC Time and cannot be changed. The format is used in various places including for timestamping the Event and Fatal Logs. However, the displayed current time on that tab is always displayed in local time format.

The *Arc time* section displays the total amount of time that the Welding Power Source has generated an arc over its lifetime. The time appears in HH:MM:SS format (hours, minutes, and seconds). If the number of hours is greater than 23, place a check mark in the *Show days* checkbox to convert the hours into days and display the result.

## Custom Weld Set Installation

You can now install custom weld sets to support *.weldsetv11 (Format 11) weld sets into or from Format 11 Welding Power Sources. To select the custom Weld Set, simply click the **Select File** icon ( ) and select the appropriate file. Click the **Install** button to install and Load the Custom Weld Set File to the Welding Power

Source. Power Wave® Manager adds the custom Weld Set to the power source and then prompts you to make it the default Weld Set.

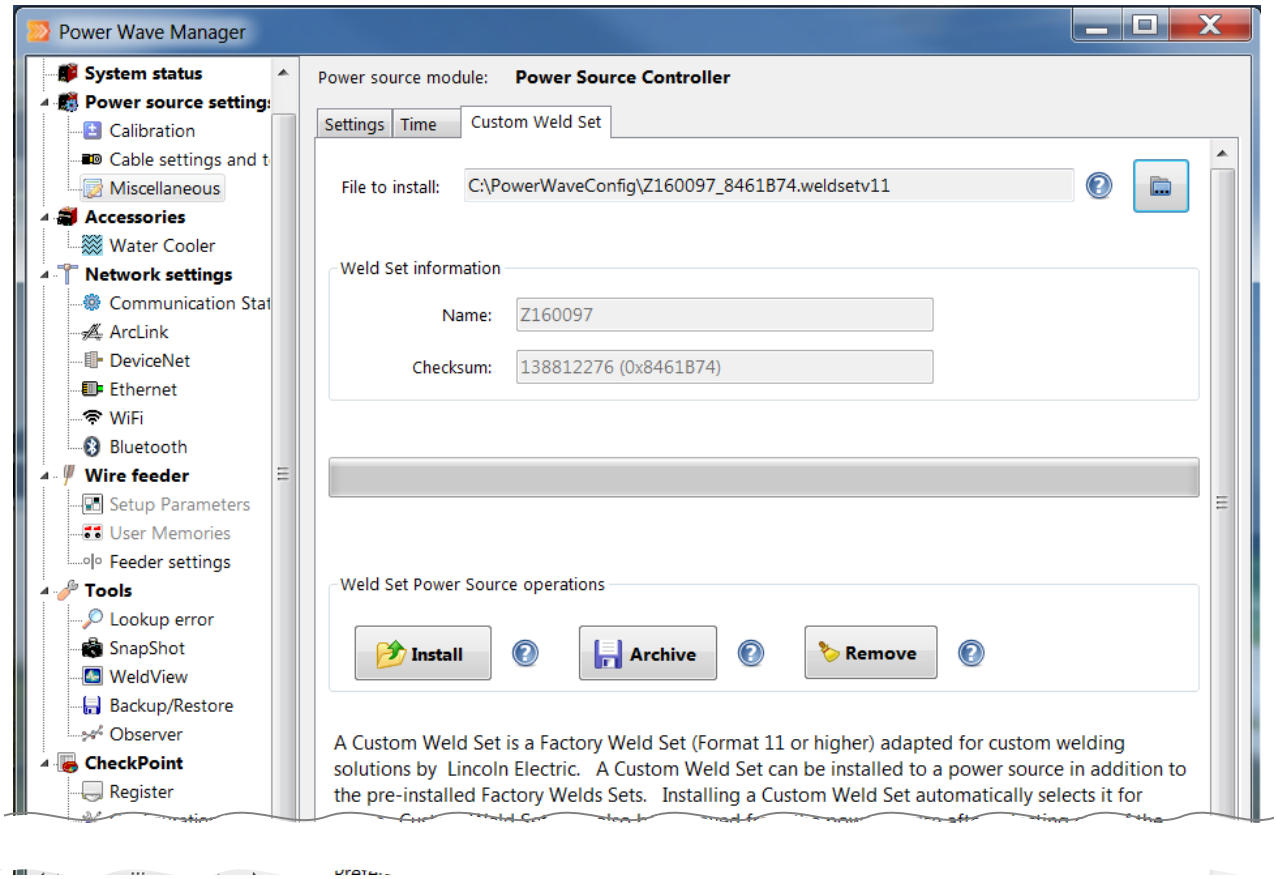



**Figure 6.8 Custom Weld Set tab**

If a Custom Weld Set is already loaded into your Power Source you can make a backup of that file by clicking the **Archive** button and it will read the file from the Power Source and then save the Weld Set locally. Click the **Remove** button to delete the Weld Set from the Welding Power Source. Click the **Help** icons ( ) for more information.

# *Weld Mode Settings*

The Weld Mode Favorites feature allows you to select a subset of the available weld modes in the Power Wave®. This can be useful if you only use a few weld modes and do not want unused modes to appear on a user interface or a robot teach pendant.

> **NOTE | The Weld Mode Favorites feature is only available in the Power Wave c300, s350, s500, R450, i400, and s700.**

To enable weld mode favorites, navigate to the *Weld Mode Settings* section under *Power Source Settings*. You will see a list of weld modes with checkboxes.

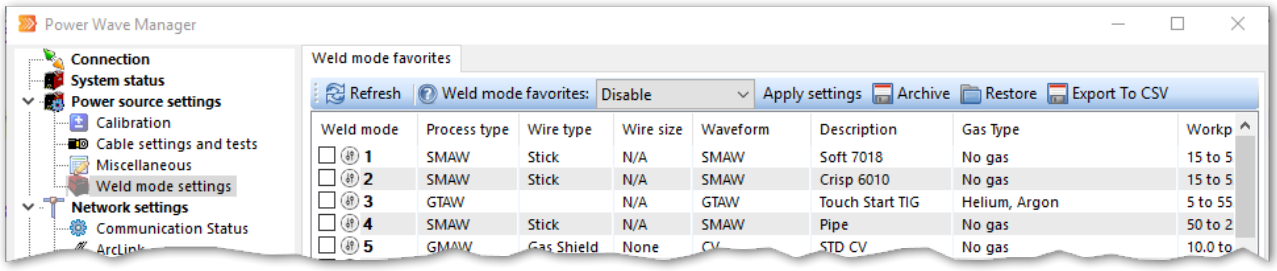



**Figure 6.9 Weld Mode Favorites tab**

Use the checkboxes to select the modes you want to include in your favorites list. In the example, four weld modes have been selected: modes 10, 11, 12, and 13. When you have made all of your selections, select **Enable** from the *Weld Mode Favorites* dropdown menu, then click the **Apply Settings** button. The power source will restart.

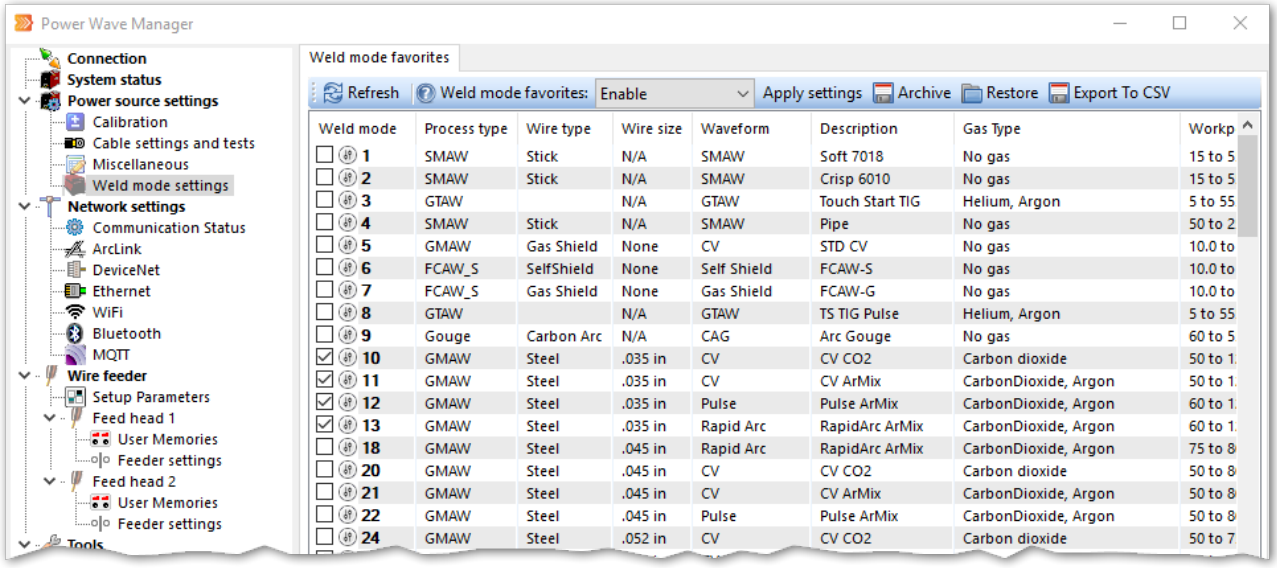



**Figure 6.10 Selecting weld mode favorites**

Once the power source has restarted, the weld mode list will contain only the modes you selected as favorites. Modes other than the favorites will not be available on a robot teach pendant or user interface.

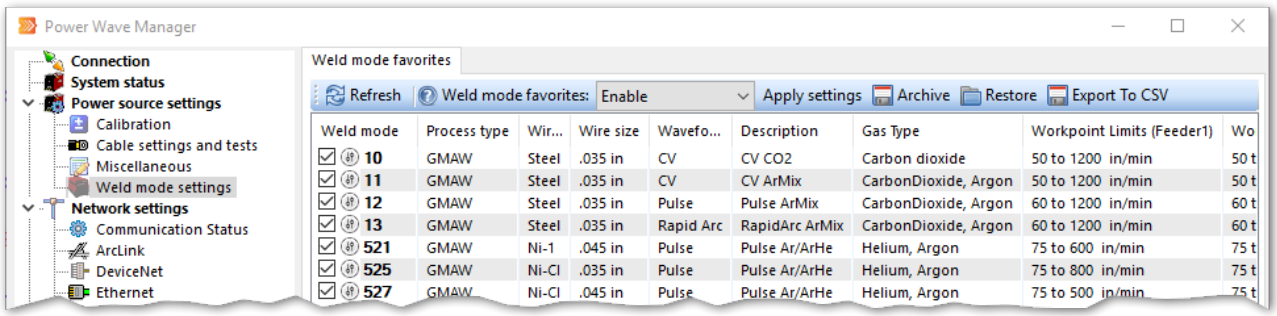



**Figure 6.31 Only “favorite” modes are visible**

If you would like to save the list of favorites to your computer, either for backup purposes or to copy them to another power source, click the **Archive** button. In the *Save file...* window that appears, select the location and filename to give to the list of favorites. When you click the **Save** button, the list of favorites will be saved to the file you specified.

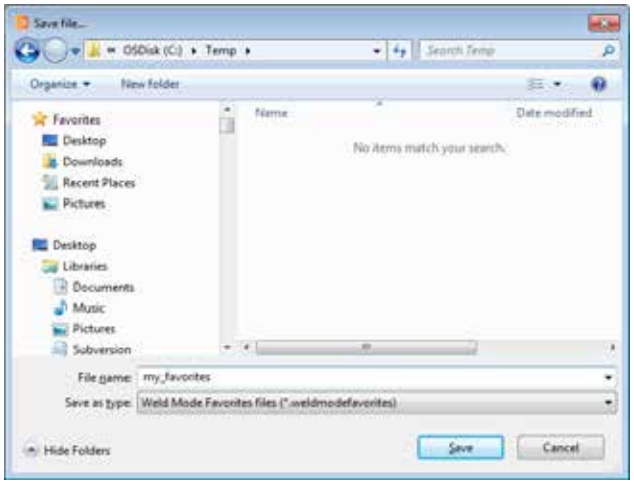



**Figure 6.42 Saving weld mode favorites**

You can restore the list of favorites later, or to a different power source, by clicking the **Restore** button and selecting the previously-saved file.

To bring back all of the weld modes and disable the weld mode favorites feature, select **Disable** from the *Weld mode favorites* dropdown menu, then click **Apply Settings**. The power source will restart. Once it has restarted, all of the weld modes in the machine's firmware will again be available.

To export the list of weld modes to a format that can be imported into a spreadsheet, select **Export To CSV**.

THIS PAGE INTENTIONALLY LEFT BLANK.

# Accessories

If the Welding Power Source to which you are connected has accessory units added, those accessories or add-ons appear in the *Accessories* section. A sub section appears for each connected accessory or group of accessories. You can configure and perform diagnostics with Power Wave® Manager.

> **STOP | Modifying accessory settings is highly technical. If you are uncomfortable with making changes, contact your local IT support for assistance. You should also consult the appropriate Lincoln Electric Operator Manual for each accessory you have installed.**

> **NOTE | The *Accessories* section only appears if there is an accessory connected to the power source. Power Wave® Manager groups similar accessories together.**

## Advanced Module

With the Advanced Module accessory, Power Wave® Manager allows you to engage the high-frequency generator for a fixed time duration. You can also test the TIG gas solenoid.

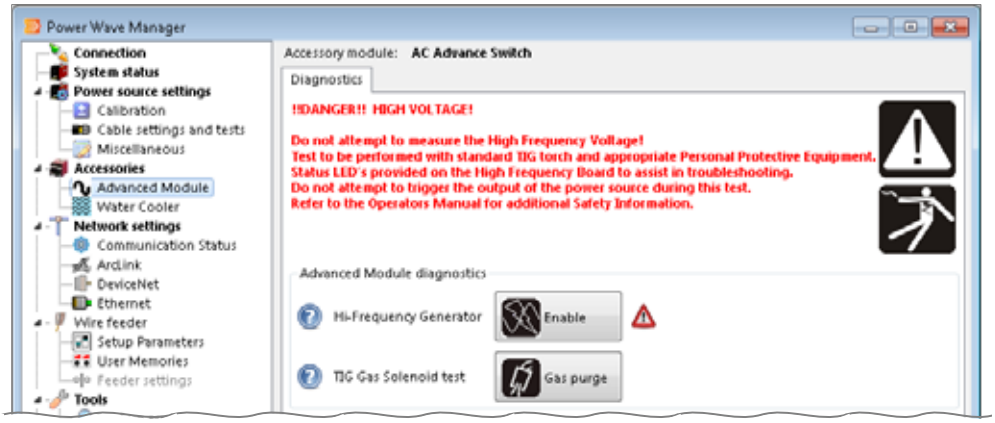



**Figure 7.1 Accessories Example**

## Water Cooler

The Water Cooler menu items provide diagnostics and configuration support for Water Cooler accessories such as Cool Arc® 55 S Water Cooler.

### Diagnostics Tab

The diagnostics for the Cool Arc® 55 accessory allow you to test the coolant pump.

- *Water Cooler Pump test (Turn Pump On/Off)*: Click this button to manually turn on/off the water cooler.
- *Water Cooler Flow status*: Status indicator tells you if the water cooler flow is active (green) or not (red).
- *Linger Time*: Enter the amount of time (in minutes) that the water cooler should run after welding stops.
- *Fault if No Smart Cooler Found*: Place a check mark in this option to force the Welding Power Source to fault if it does not detect a Smart Cooler in its system on startup of the Power Source.
- *Factory Reset*: Click this button to reset the Water Cooler settings back to factory defaults.

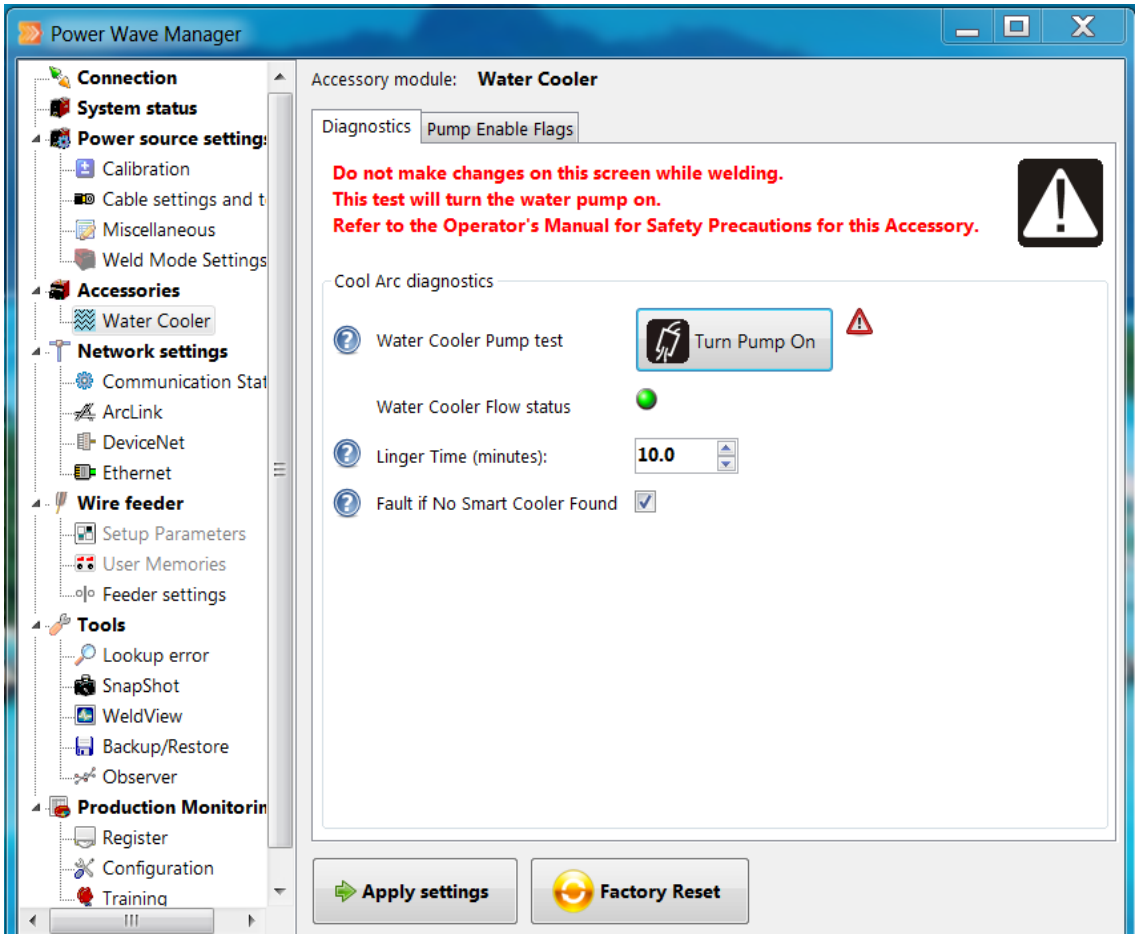



**Figure 7.2 Water Cooler Options**

**STOP | Be sure to exercise all appropriate safety procedures when performing actions on this tab. Be careful that the power source is not currently welding before clicking any buttons, especially those that display the caution icon ( ⚠ ). Refer to the *Operator Manual* for the accessory or add-on.**

## Pump Enable Flags Tab

The **Pump Enable Flags** tab allows viewing and configuration of the Coolant Pump Enable Flags. These are only available on certain Smart Water Cooler modules. If not supported, this tab will not be displayed. If a pump enable flag is checked, the power source will turn on the Coolant Pump during welding for Weld modes of that Process Type. If you don't want the pump on during welding for a certain Process Type then uncheck the associated checkbox and click the Apply Settings button.

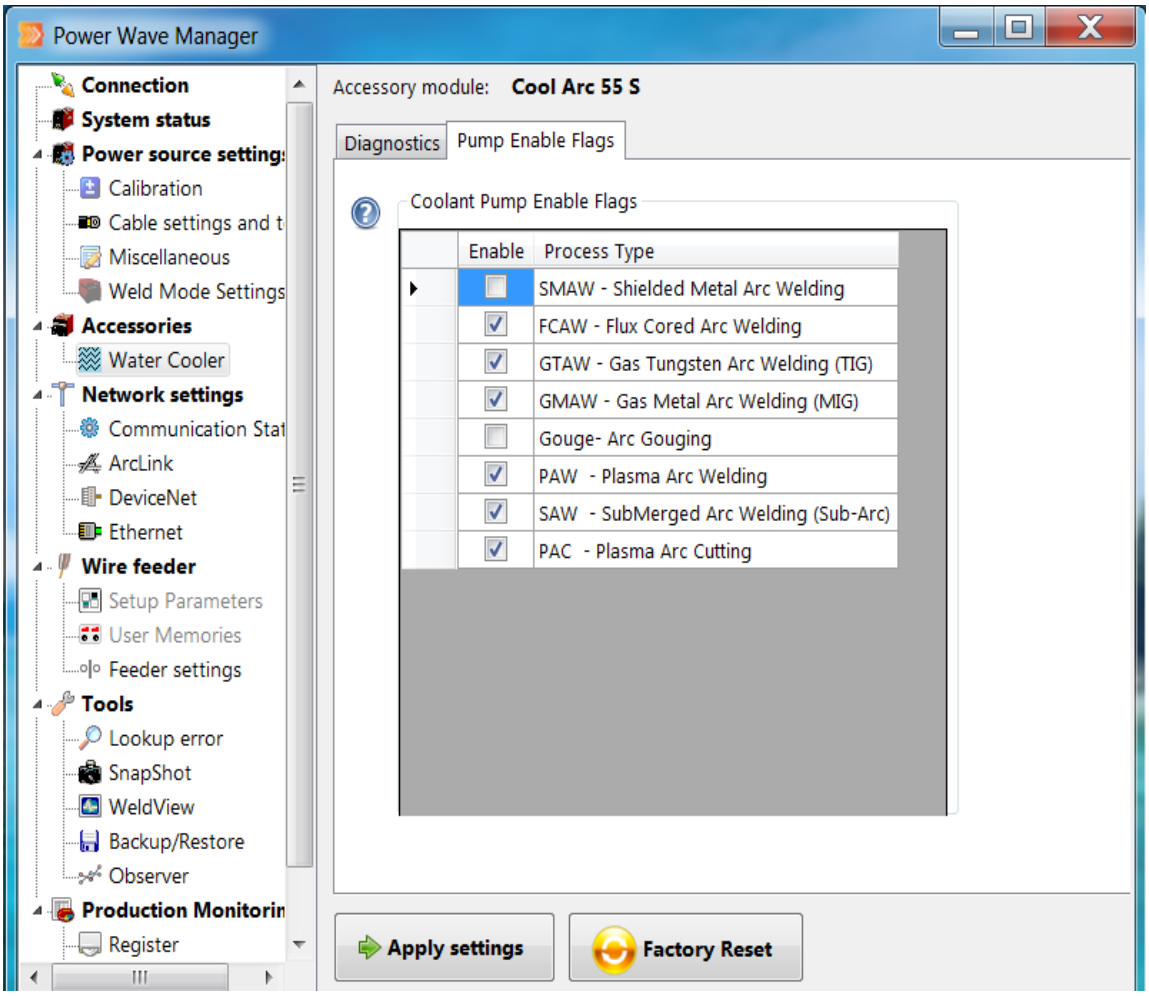



**Figure 7.3 Water Cooler Pump Enable Flags**

To restore the factory settings of the pump enable flags click the *Factory Reset* button.

> **NOTE | You can only see these options when currently connected to a Smart Cooler such as a Cool Arc 55S**

# Network Settings

The *Network settings* section provides you with the flexibility to configure the connection of the Welding Power Source to other equipment. You can connect various components through the use of ArcLink® technology, DeviceNet communications, and/or Ethernet connections. The *Network settings* section allows you to review and monitor these settings.

## *Communication Status*

Under *Communication Status*, Power Wave® Manager displays an active graph and provides you with the real-time communication status of the various components connected to this Welding Power Source. This section is useful for identifying problems or errors in communication. Use the checkboxes at the bottom of the graphs to add or remove graphs from your displays.

**NOTE | The graphs displayed for you depend on the hardware connected to and supported by the Welding Power Source.**

**TIP | "Tx" means "transmitted" and "Rx" means "received".**

**TIP | Click the colored squares under *CheckPoint Communications* to view more detailed information.**


**Figure 8.1 Connection Status**

# ArcLink

The *ArcLink* section provides you with an overview of all the welding system components connected to this Welding Power Source using the ArcLink® technology. This section of Power Wave® Manager also provides you with the opportunity to "pair" devices together if they haven't automatically paired themselves. (See page 8.3 for more on pairing.)

## Mapping Status Tab

The **Mapping status** tab provides you with the logical layout (or "mapping") of the components connected to the power source with an ArcLink® connection. The display shows the current mapping of the system and the serial numbers of the components.

> **TIP** | **If you have recently connected a new component to the power source, click the** Refresh **button to display the most up to date ArcLink® connection information.**

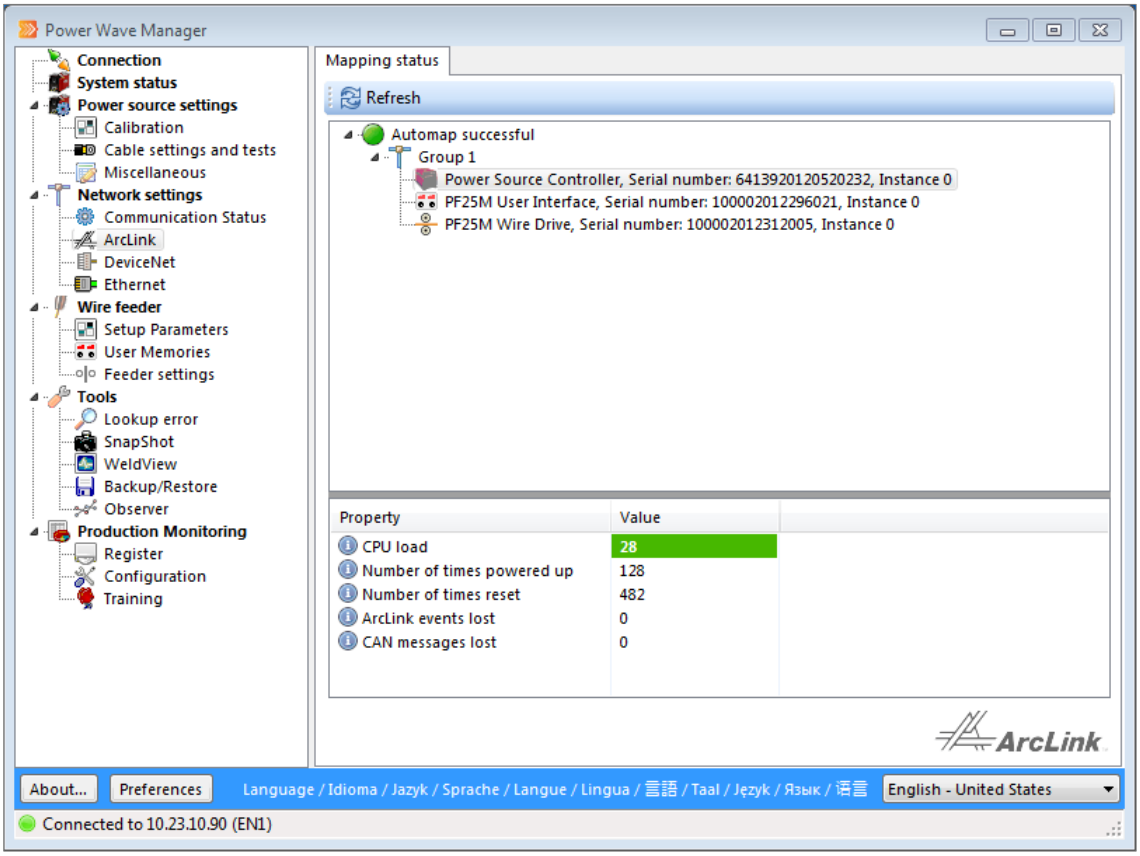



**Figure 8.2 Mapping Status**

If you click on a component, the system displays the available history for that specific component at the bottom of the window. You can see how many times the unit has powered up, how many times it was reset, and several other pieces of information.

## Pairing Setup

Certain Lincoln Electric components can be “paired” together, such as dual-head wire feeders and user interfaces. The system usually pairs these automatically for you. However, if there was a problem with pairing between two or more components, Power Wave® Manager displays the **Pairing setup** tab (Figure 8.3).

> **NOTE | If automatic pairing was successful, you will not see the** Pairing setup **tab.**


**Figure 8.3 Pairing Setup Tab**

Each module that requires one or more other modules to be paired with it will be shown in the list on the left, with “slots” that can be filled by modules from the list on the right.

To pair two modules together:

| Procedure | Details |
|---|---|
| ***1.*** Click an unused slot under the module you want to pair with another. | Power Wave® Manager displays any other modules on the right side that are available for you to pair it with. |
| ***2.*** Click the module on the right and drag it over to the left and drop it over the unused slot. | You can also click the arrow buttons between the two panes to move the modules back and forth. |
| ***3.*** Click the **Apply settings** button. | |

# DeviceNet

The *DeviceNet* section allows the setup and verification of the DeviceNet connections of various modules to the Welding Power Source.

> **NOTE |** **Modifying DeviceNet settings is highly technical. If you are uncomfortable with making changes, contact your local IT support for assistance. You should also consult the appropriate Lincoln Electric Operator Manual for the module you have installed.**

## Multiple DeviceNet Modules

If the system to which a Welding Power Source is connected contains more than one DeviceNet module (e.g., a Power Wave® connected to a robot teach pendant), you can select the module you want to review from the drop-down list. This allows you to configure settings for each module.

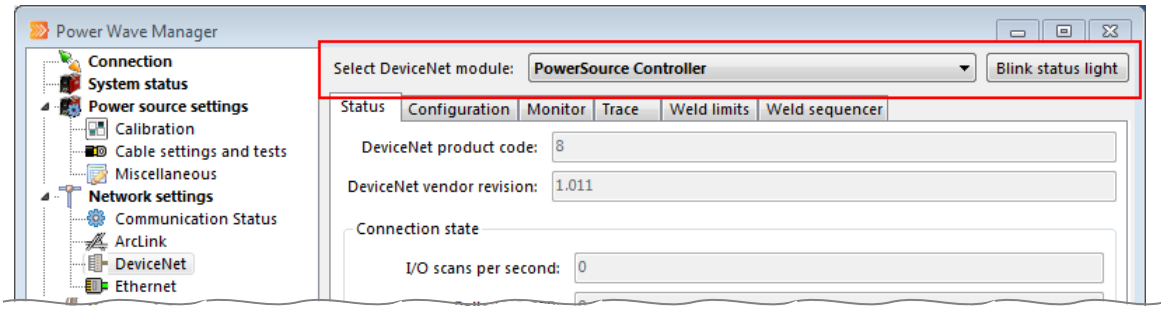



**Figure 8.4 Multiple DeviceNet Module Drop-down**

If you're not sure the selection in the drop-down refers to the actual DeviceNet module you want to review, click the **Blink status light** button. This causes the green light on the selected machine to start blinking rapidly so you can visually identify the module.

## Status Tab

The **Status** tab displays basic information about the DeviceNet interface on the Welding Power Source, as well as any errors currently present on the interface. Remember: You can select each module connected using DeviceNet from the *Select DeviceNet module* drop-down at the top of the window to see information about that specific module.

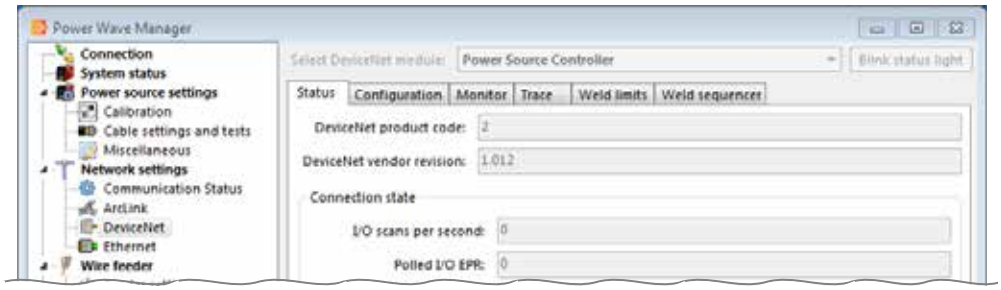



**Figure 8.5 Status Tab**

## Configuration Tab

Use the **Configuration** tab to review and/or edit options for the DeviceNet interface connected to this Welding Power Source. Power Wave® Manager reads these options from the connected Welding Power Source and displays them here. The available fields depend on the DeviceNet module. Table 8.2 explains each of the fields in more detail.

> **NOTE | For more information on setting up the DeviceNet interface, refer to the *DeviceNet Interface Specification Document (Y50031)* included with the Power Wave® Utilities installation.**

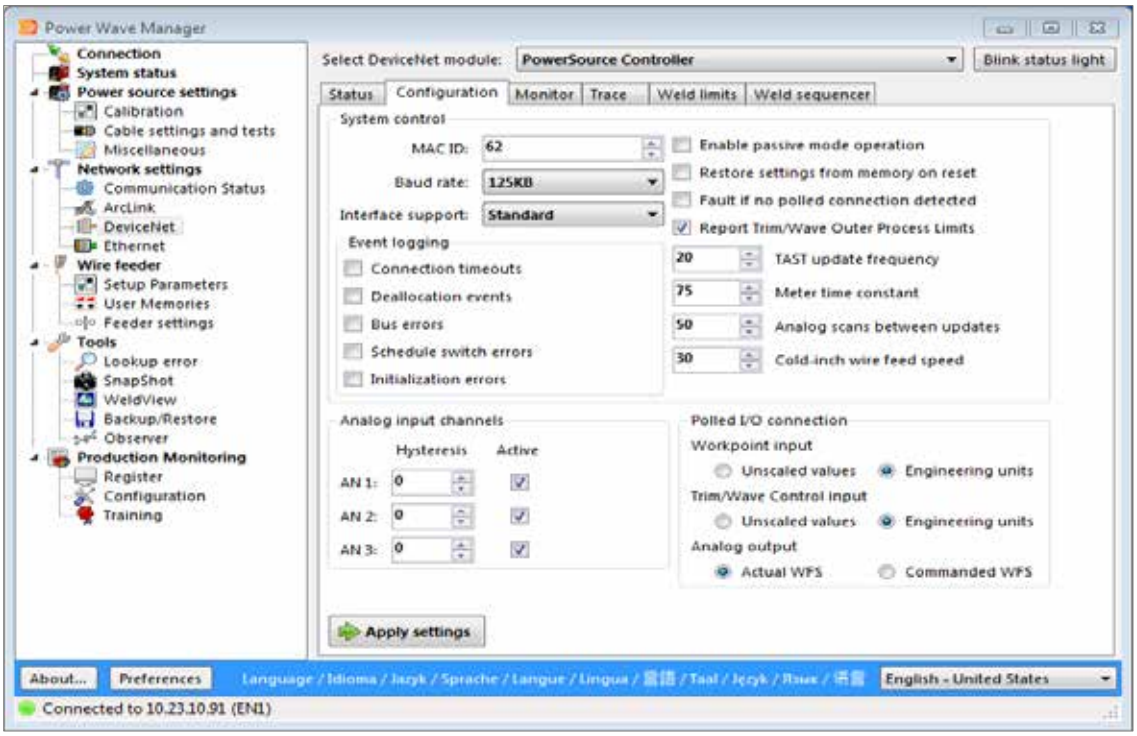



**Figure 8.6 Configuration Tab**

**Table 8.2 Fields on the Configuration Tab**

| Field | Description |
|---|---|
| **System Control** | |
| *MAC ID* | This field displays the current media access control (MAC) ID of the DeviceNet interface installed on this Welding Power Source.<br><br>For the following power sources, the *MAC ID* is usually set by a DIP switch located on the gateway board, but you can also set the MAC ID from Power Wave® Manager: PW455, PW455M, ACDC1000, PW655, and Welding Power Sources that use the K2436-1 Ethernet/DeviceNet Communication Interface.<br><br>For other Welding Power Sources that do not have a DIP Switch, you must use Power Wave® Manager to set the *MAC ID* of the DeviceNet interface. |

| Field | Description |
|---|---|
| | **STOP \| If you change the MAC ID, you must cycle the power to the Welding Power Source (off then back on) in order for the change to take effect. Be careful not to cycle the power while the power source is currently welding.** |
| *Baud Rate* | This field displays the current baud rate configured in the DeviceNet interface installed on this Welding Power Source.<br><br>For the following power sources, the *Baud Rate* is usually set by a DIP switch located on the gateway board, but you can also set the baud rate from Power Wave® Manager: PW455, PW455M, ACDC1000, PW655, and Welding Power Sources that use the K2436-1 Ethernet/DeviceNet Communication Interface.<br><br>For other Welding Power Sources that do not have a DIP Switch, you must use Power Wave® Manager to set the *Baud Rate* of the DeviceNet interface.<br><br>**STOP \| If you change the Baud Rate, you must cycle the power to the Welding Power Source (off then back on) in order for the change to take effect. Be careful not to cycle the power while the power source is currently welding.** |
| *Event Logging* | The *Event Logging* checkboxes allow you to control the types of issues that create a log entry when they occur on this DeviceNet module. |
| *Enable passive mode operation* | Place a check mark in this checkbox when you need to use the DeviceNet connection only to monitor system operation. When you enable passive mode, the polled inputs from DeviceNet have no effect on the system except for the *Weld Output disable* bit and the *Production Monitoring Fault Reset* bit. |
| *Restore settings from memory on reset* | DeviceNet will automatically restore weld schedule values on power up that are not accessible from a polled connection. These include weld mode, strike, restrike, cold-inch wire feed speeds, and times for preflow, postflow and burnback. (This feature does not apply to second-generation AC/DC 1000 power sources.)<br><br>**NOTE \| If the system contains a user interface with a memory panel or a robot/PLC that restores settings on power up, do not check this box.** |
| *Fault if no polled connection detected* | This option disables welding if a polled DeviceNet connection is not present. Place a check mark in this checkbox when a DeviceNet master controls the machine. |
| *Report Trim/Wave Outer Process Limits* | When you choose to report the *Trim/Wave Control input* in *Engineering units* and these inputs are dependent on the *Workpoint*, place a check mark in this checkbox to report back the high and low limits of the *Trim* and *Wave Control* parameters. Typically, this item is checked.<br><br>If there is no check mark in this checkbox, the returned limits will be based on the *Workpoint*. As the *Workpoint* changes, the acceptable range for the *Trim* and *Wave Control* change as well, removing the check mark from this box also reports back that acceptable range. |

| Field | Description |
|---|---|
| *TAST update frequency* | This parameter is used for Through the Arc Seam Tracking (TAST). The lower the number the more often the feedback is updated, but higher the system load on the boards. In general, if TAST is being used, this frequency is set to a value between 10 and 20. Otherwise, a value of 100 is usually acceptable. This value is only relevant for the PW455, 455M, 655, 355, and ACDC1000. |
| *Meter time constant* | This parameter sets the filtering of the feedback data. The default value of 400 is usually used unless TAST is being done. With TAST, this field is usually set to a value around 75. This value is only relevant for the PW455, 455M, 655, 355, and ACDC1000. |
| *Analog scans between updates* | This determines how often the analog input channels (i.e., workpoint, trim, and wave control) update the system in terms of polled I/O scans. For example, if you enter 50, every 50th I/O scan will be accepted.<br>The setting of this item depends on how often the Welding Power Source is scanned. For systems with a scan rate of 200 or more, the default is generally 50. For systems with very low scan rates, such as 10 Hz, a setting as low as 2 might be needed. |
| *Cold-inch wire feed speed* | This parameter sets the feed speed of the wire while cold-inching or jogging the wire. This value is used for either cold-inching forward (Jog +) or cold-inching reverse (Jog -). This value is in units of inches per minute (IPM). |
| **Polled I/O Connection** | |
| *Workpoint input* | This indicates whether the values passed to the system through the analog DeviceNet channels for the *Workpoint* parameter are raw values or scaled engineering values. For most applications, choose *Engineering units*.<br>For example, when the *Workpoint* is in inches per minute and you choose *Engineering units*, a value between 50 and 800 might be expected to be commanded on the DeviceNet analog input for the *Workpoint*. This would represent a value of 50 to 800 inches per minute.<br>When you choose the *Unscaled values* option, the commands for *Workpoint* range from 0 to 32767, corresponding to the minimum and maximum *Workpoint* of the selected Weld Mode. |
| *Trim/Wave Control input* | This indicates whether the values passed to the system through the analog DeviceNet channels for the *Trim* and *Wave Control* parameters are raw values or scaled engineering values.<br>For example, when the *Trim* is in volts and you choose *Engineering units*, a value between 75 and 520 might be expected to be commanded on the DeviceNet analog input for the *Trim*. This would represent a value of 7.5 to 52.0 volts.<br>When you choose the *Unscaled values* option, the commands for *Trim* and *Wave Control* range from -32768 to 32767 with 0 representing a nominal value. A great majority of applications will require *Trim* and *Wave Control* command values to be set near the nominal value. |

| Field | Description |
|---|---|
| *Analog output* | This setting controls the value that is reported by the power source's third analog feedback. The options that appear vary depending on the machine. A great majority of applications will use the default *Actual WFS* option.<br>§ *Actual WFS*: This option reports the actual wire feed speed of the feeder through the third analog feedback.<br>§ *Commanded WFS*: Typically used for non-Lincoln Electric wire feeders, this option sends the recommended wire feed speed through the third analog feedback.<br>§ *Wire Drive Motor Current*: Mainly for diagnostics, this output sends the current driving the motor. If the current deviates from the current expected, this could indicate a problem such as the wire being stuck or that the machine just isn't running efficiently.<br>Basically, non-AC/DC machines use either the *Actual WFS* option or the *Wire Drive Motor Current* option. AC/DC machines use either the *Actual WFS* option or the *Commanded WFS* option. The appropriate options are visible for that machine. |
| **Analog Input Channels** | |
| *Analog input channels* | These values indicate the magnitude of change that must occur on the first three polled I/O analog DeviceNet channels before the Welding Power Source will respond to the change. In the case of a command value that is sourced from an A/D whose output may differ slightly, this configuration prevents unintended parameter changes.<br>The attribute is not useful for command values whose source is completely digital and should be set to 0. One exception is when the Welding Power Source has an Analog Interface module. In this case, set these values to a 30. Input channels will be ignored if their *Active* boxes are unchecked in which case the Welding Power Source will assign default values to the associated parameters. |
| **Interface Support** | |
| *Interface support* | This field only appears for AC/DC 1000 SD machines. It sets how the DeviceNet interface behaves for the machine. The two available options are *Standard* and *Legacy AC/DC 1000*:<br>§ Choose the *Standard* option to make the DeviceNet interface operate like a standard MIG interface. The DeviceNet master must initialize all sequencer state items.<br>§ Choose the *Legacy AC/DC 1000* option to make the DeviceNet interface operate like an AC/DC1000 DeviceNet interface where certain sequencer state items are fanned out to other states, duplicating what was done in the older AC/DC1000 DeviceNet |

| Field | Description |
|---|---|
| | interface. |

## Monitor Tab

The **Monitor** tab contains detailed information about the polled input/output data coming to and from the Welding Power Source's DeviceNet interface. This is a troubleshooting tool for those customers implementing a DeviceNet connection to the Welding Power Source. For detailed information about the data on this tab, refer to the *DeviceNet Interface Specification Document (Y50031)* included with the Power Wave® Manager installation. You can find the document under the **Start** menu of the computer.

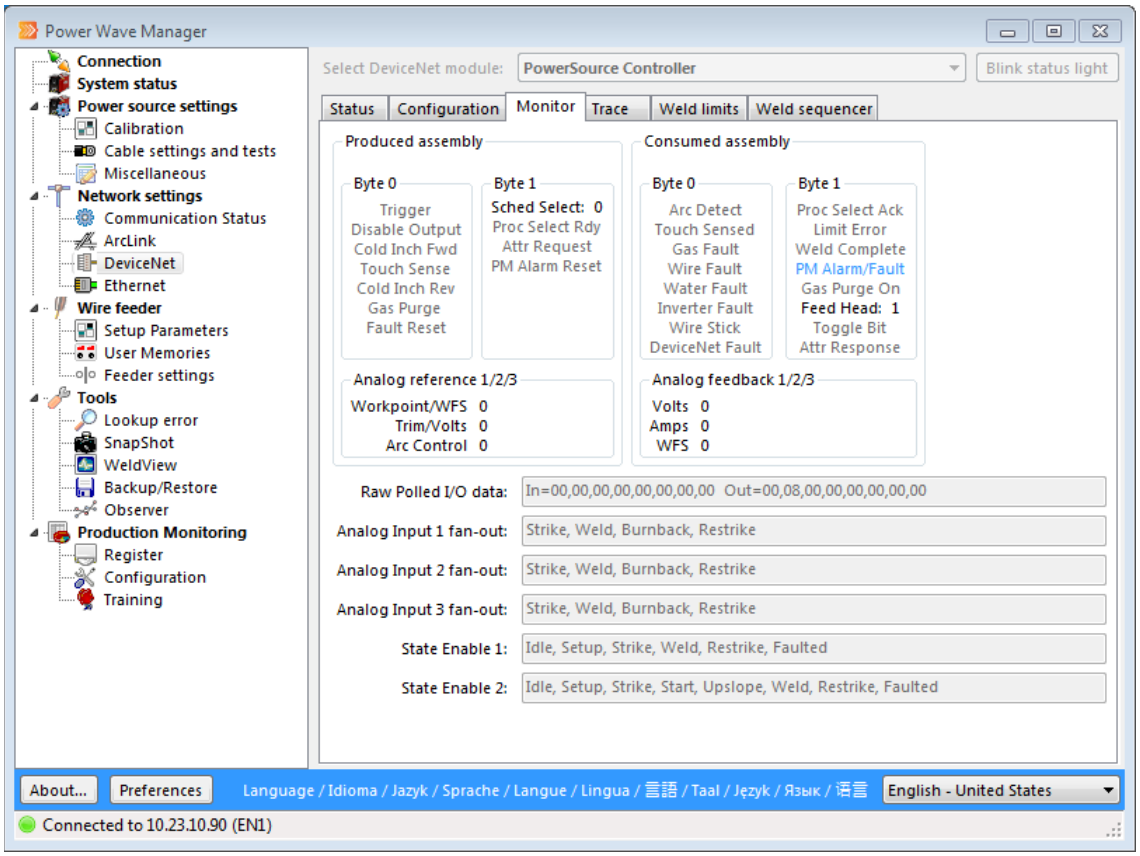



**Figure 8.7 Monitor Tab**

## Trace Tab

This tab allows you to record the DeviceNet network traffic coming to and from the Welding Power Source's DeviceNet interface and create a file you can send to Lincoln Electric support or keep for reference in the future. This is extremely useful for troubleshooting communication issues. By default, Power Wave® Manager reads the information from the Welding Power Source when you first enter the tab.

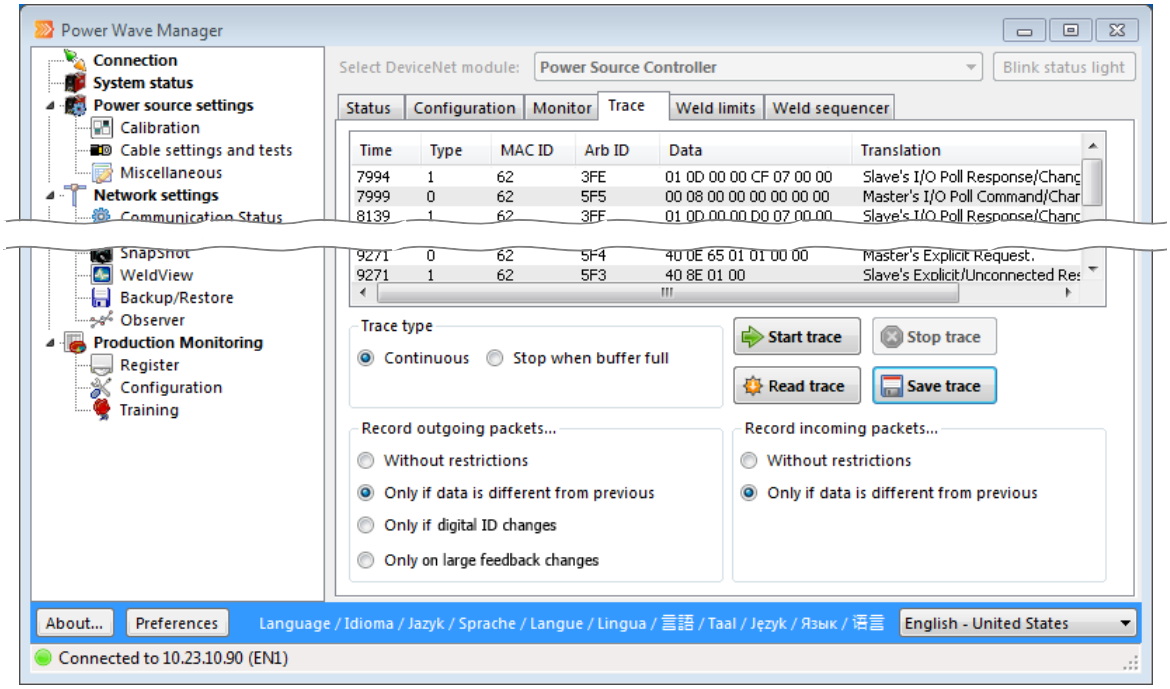



**Figure 8.8 DeviceNet Trace Tab**

Simply set your options and click the **Start trace** button when you're ready to capture DeviceNet messages. Click the **Stop trace** button when you have the information you need. Power Wave® Manager downloads the recorded messages from the DeviceNet module and displays them in the list, with all relevant fields decoded. Table 8.3 explains your options in more detail.

> **NOTE** | **The** Read trace **button allows you to transfer the buffered data from the Welding Power Source into Power Wave® Manager manually if needed.**

> **TIP** | **Click the** Save trace **button to export the data to a file that you can send to Lincoln Electric Support for troubleshooting or keep for your own reference in the future.**

**Table 8.3 Options on the Trace Tab**

| Field | Description |
|---|---|
| *Trace type* | This option helps you control how much data you collect with the trace.<br>§ *Continuous*: Choose this option if you want the trace to keep recording data until you click the **Stop trace** button, regardless how long the trace is.<br>§ *Stop when buffer full*: Choose this option if you want the trace to stop automatically when the buffer on the power source is full of data. |
| *Record outgoing packets* and *Record incoming packets* | The options in these sections allow you fine tune the amount of data being buffered. Data buffers can only hold so much data. If you carefully choose the type of messages you want to trace, you can fit more messages into the trace.<br>§ *Without restrictions*: Choose this option to run the trace wide open and including all data. This option fills the buffer very quickly with fewer messages.<br>§ *Only if data is different from previous*: Choose this option to include only those DeviceNet messages whose ID is different from the previous message.<br>§ *Only if digital ID changes*: Choose this option to include only those DeviceNet messages where the ID on the message is different from the previous message.<br>§ *Only on large feedback changes*: Choose this option to include only those DeviceNet messages where there were major differences in the file. |

## Weld Limits Tab

The **Weld limits** tab displays a list of all available Weld Modes supported by the Welding Power Source to which you are currently connected, as well as basic information for each mode. The Weld Sequencer applications, and the *User Memories* and the *Observer* sections in Power Wave® Manager refer to this tab when you select Weld Modes.

When you click on a Weld Mode, Power Wave® Manager displays the types of controls associated with it (e.g., *Workpoint*, *Trim*, *and Wave Control*) and the outer limits of each control. These appear below the list of Weld Modes (Figure 8.9). You can use this section to verify that the correct Weld Mode information is being read over the DeviceNet connection.

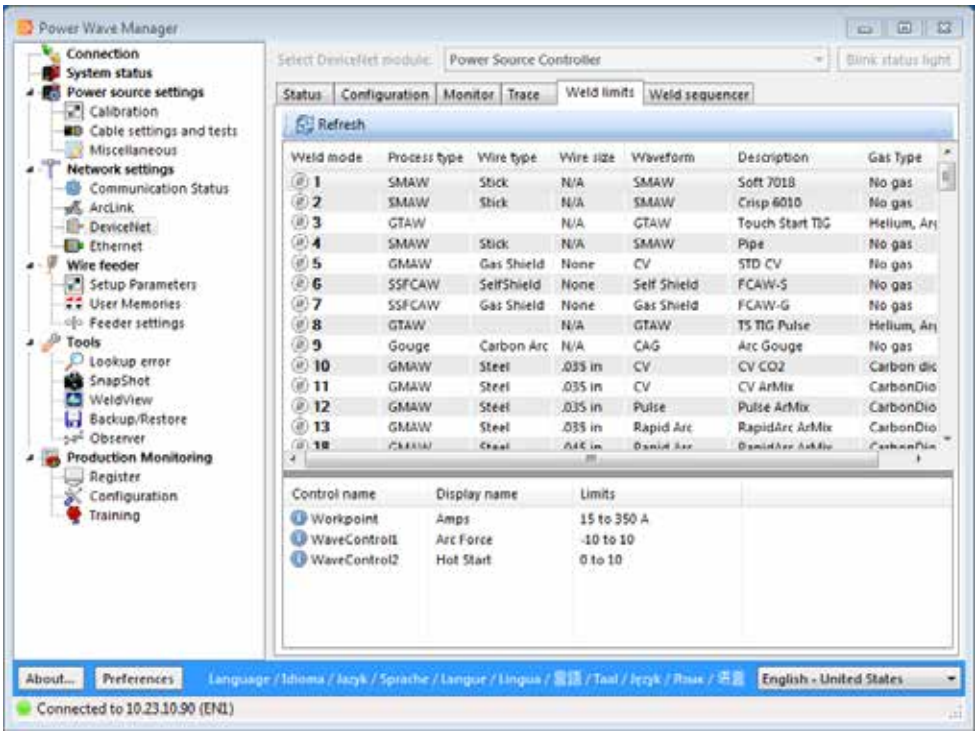



**Figure 8.9 Weld Limits Tab**

> **NOTE | Updating the firmware on the Welding Power Source may cause the limits of some procedures to change.**

## Weld Sequencer Tab

The **Weld sequencer** tab contains advanced configuration settings for the Weld Sequencer component of the system. It presents an array of sequencer-controlled system attributes, grouped by welding state. This useful diagnostic tool can help you verify that the settings are correct. If you need to modify a system variable, double-click the appropriate cell. Refer to the DeviceNet documentation provided by Lincoln Electric for more information.

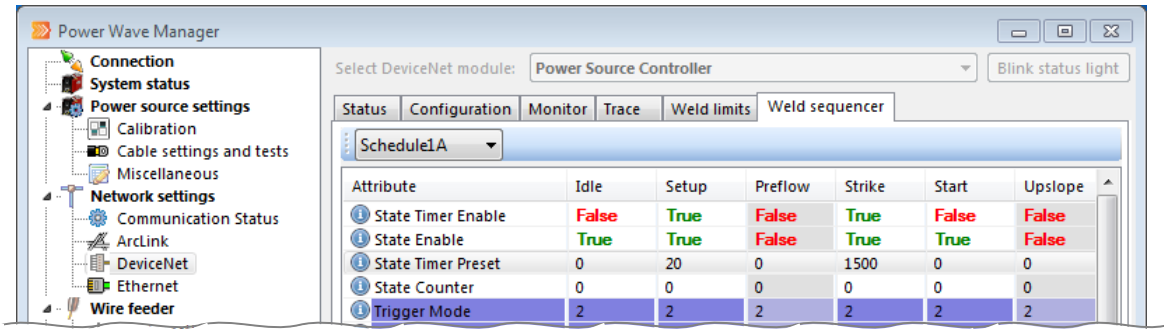



**Figure 8.10 Weld Sequencer Tab**

# *Ethernet*

This section provides options for configuring the network settings for the modules connected to the Welding Power Source through an Ethernet connection.

## Multiple Ethernet Modules

If the system to which a Welding Power Source is connected contains more than one Ethernet module (e.g., a Power Wave® AC/DC 1000 connected to a System Interface module or a Power Wave® R450 containing a Wi-Fi Kit K4352-X which is a Wi-Fi unit with an Ethernet port), you can select the module you want to review from the drop-down list. This allows you to configure settings for each module connected to the power source.

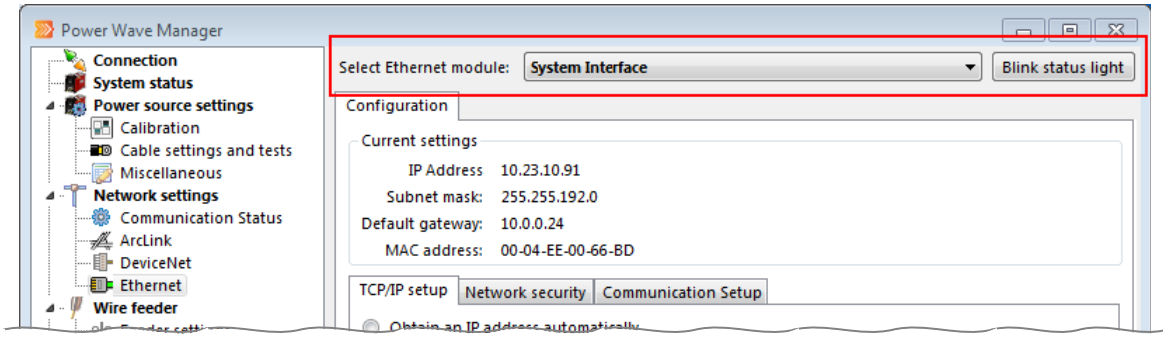



**Figure 8.11 Multiple Ethernet Module Drop-down**

If you're not sure the selection in the drop-down refers to the actual Ethernet module you want to review, click the **Blink status light** button. This causes the status light of the selected module to start blinking rapidly so you can visually identify the module.

## Configuration

The top portion of the *Configuration* section displays the Welding Power Source's current network settings, including IP address, subnet mask and default gateway. (Table 8.4 explains the data under *Current settings* in more detail.) The sub-tabs in this section allow you to make modifications to these connection settings, as well as configure the address of the machines you want to allow access to the Welding Power Source and adjust the communication speed of the power source over the network.

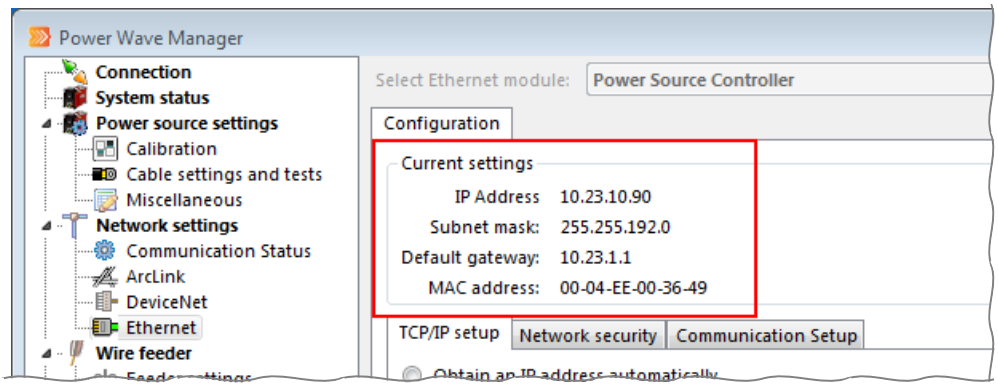



**Figure 8.12 Configuration Tab**

**Table 8.4 Fields under Current Settings**

| Field | Description |
|---|---|
| *IP Address* | This is the location of this Welding Power Source on the computer network. Any device on your network that wants to communicate with the Welding Power Source must use the power source's address to make the connection. |
| *Subnet mask* | This number is assigned by your local IT department. A subnet is a section of a computer network. Subnets are used to divide up large networks into small sections for ease of management, increased performance and increased security. |
| *Default gateway* | This is the IP address of a router or other device that allows communication with addresses that are outside your local area network. |
| *MAC address* | This field displays the current media access control (MAC) ID of the module selected in the drop-down at the top of the window. |

### *TCP/IP Setup Sub-Tab*

On the **TCP/IP setup** tab, you can configure the IP address of the power source, changing from the current address to a new IP. Generally, you may need to use Dynamic Host Configuration Protocol (DHCP) to find an open IP address for initial configuration, for use prior to system integration, or for mobile or remote welding equipment. Generally, though, you need to use the static IPs, subnets and gateway addresses assigned by your IT department for most fixed production equipment. A static IP is recommended but not required for CheckPoint™.

**STOP | Assigning an incorrect IP address to the Welding Power Source may cause it to be unreachable on the network.**

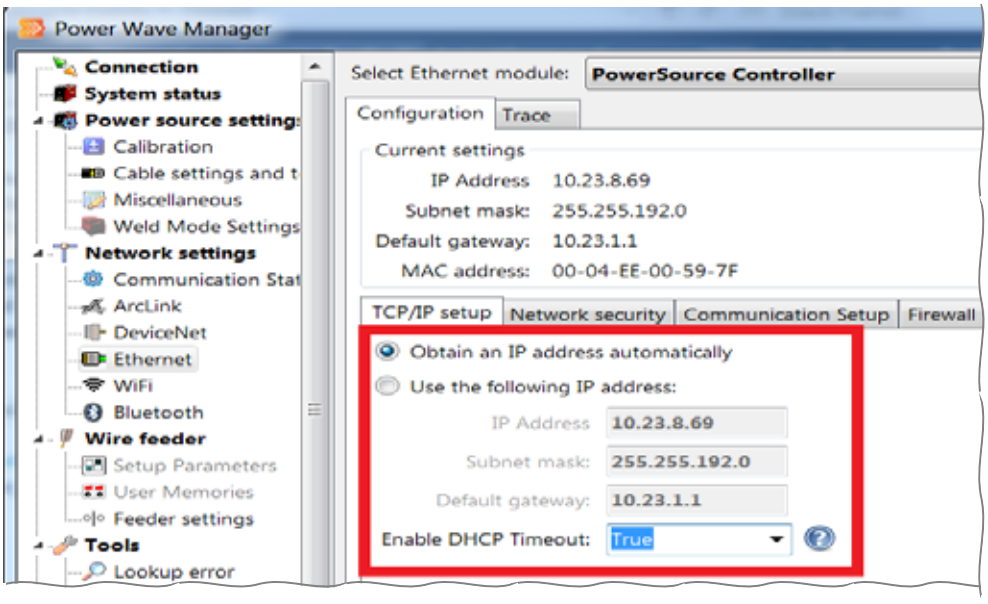



**Figure 8.13 TCP/IP Setup Tab**

Simply choose the *Obtain an IP address automatically* option if you want the Welding Power Source to assign the IP address automatically using a dynamic IP address.

> **STOP** | **If you choose this option, the Welding Power Source obtains a different IP address every time it connects to a network.**

If you want to assign a specific address to this Welding Power Source, choose the *Use the following IP address* option and enter the appropriate information. (Table 8.4 on page 8.14 explains these fields in more detail.)

The *Enable DHCP Timeout* option is only available with newer firmware. If DHCP is setup with the *Obtain an IP address automatically* option then if the *Enable DHCP Timeout* checkbox is set **True** and the DHCP Server fails or is not available then a timeout will occur after 3 minutes and the Power Source will revert to use the static IP settings. If this option is **False** then DHCP will never timeout the connection when the DHCP Server fails or is not available. In this case your Power Source will be displayed as existing at IP Address 0.0.0.0.

Once you have configured the network settings, click the **Apply settings** button and cycle the power to the Welding Power Source (off then back on) in order for the new settings to take effect.

> **NOTE** | **If you have modified the Welding Power Source's IP address and would like to modify more settings, you will need to connect to the Welding Power Source using the new address. (See page 4.2 for connecting to a power source.)**

> **TIP** | **If you cannot connect to the Welding Power Source, refer to Appendix A for troubleshooting options.**

### *Network Security Sub-Tab*

The **Network Security** tab allows the configuration of a range of IP addresses that are allowed to connect to the Welding Power Source, as well as another range of addresses that are allowed to modify parameters on the Welding Power Source (the latter range is a subset of the first). This provides some control over the components and modules (e.g., controllers, wire feeders, user interfaces) that can connect to this Welding Power Source.

NOTE: Network security settings are not available on all Power Wave® machines.

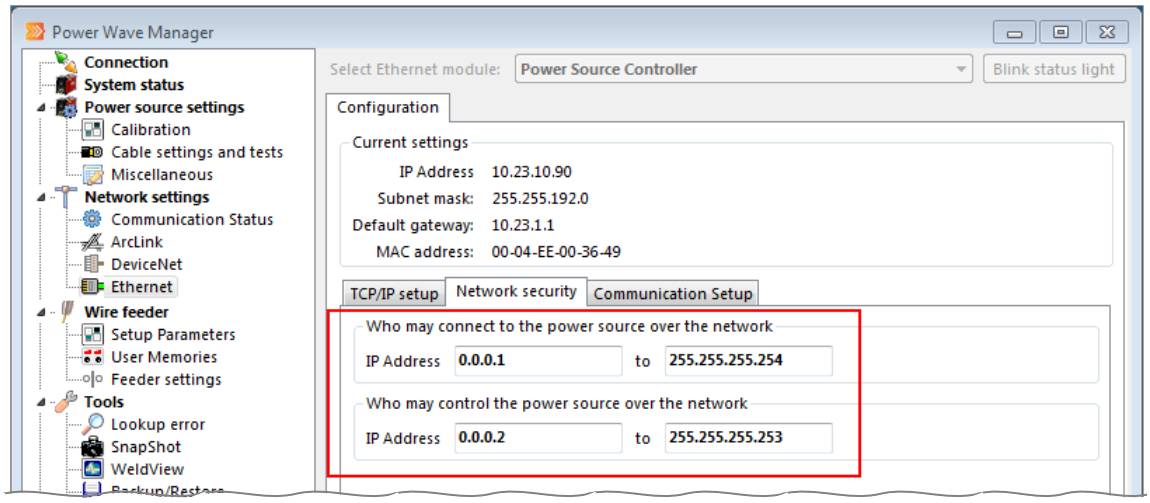



**Figure 8.14 Network Security Tab**

For each of the two ranges, the user can select either all addresses, addresses only within the machine's subnet, or a custom range of addresses.

For example, if the custom range is from 192.168.1.0 to 192.168.1.255, a computer whose IP address is 192.168.1.10 will be able to access this machine, but a computer whose IP address is 192.168.**2**.1 will not.

## *Communications Setup – Speed and Duplex*

Network speed (how fast your network can transmit data) and the duplex setting (the two-way communication allowed on that network) dictate how effective the communication is between your Welding Power Source and the network. The speed and duplex of the Welding Power Source should match the speed and duplex of your network. Welding Power sources are shipped with default settings that operate properly with most networks. You typically do not need modify this setting.

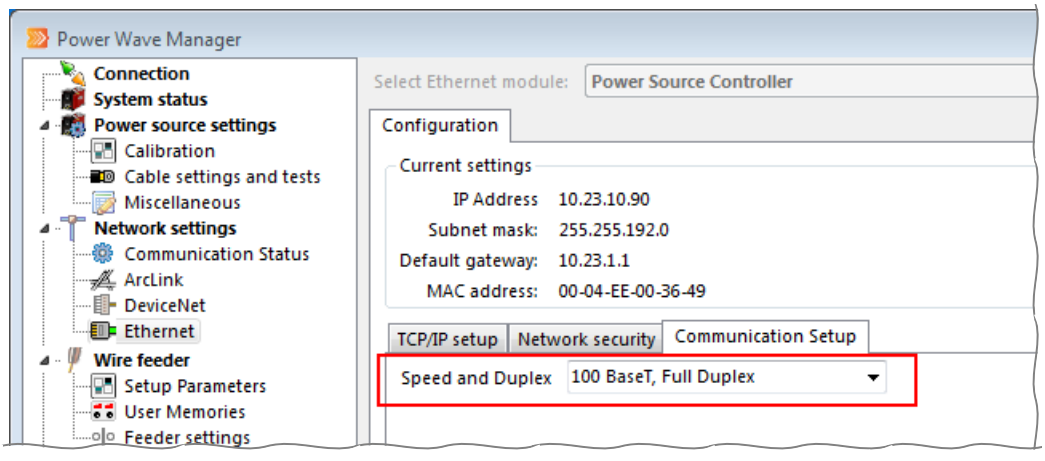



**Figure 8.15 Communication Setup Tab**

You have the following options if you ever need to make adjustments:

- § 100 BaseT, Full Duplex (default)
- § 10 BaseT, Full Duplex

§ 100 BaseT, Half Duplex

§ 10 BaseT, Half Duplex

> **STOP | Assigning an incorrect network speed and duplex on the Welding Power Source may cause it to become unreachable on the network. If you are unsure about what values to assign to the Welding Power Source, consult your network administrator.**

## *Communication Setup - ArclincXT*

The ArclincXT section allows setup of ArclincXT used mainly for welding control over Ethernet by external controllers such as robots. ArclincXT may not be available on all Welding Power Sources and is only supported over specific Ethernet ports and not over Wi-Fi. Specifically it is currently only supported over the back Ethernet port. The following figure displays these configurable settings.

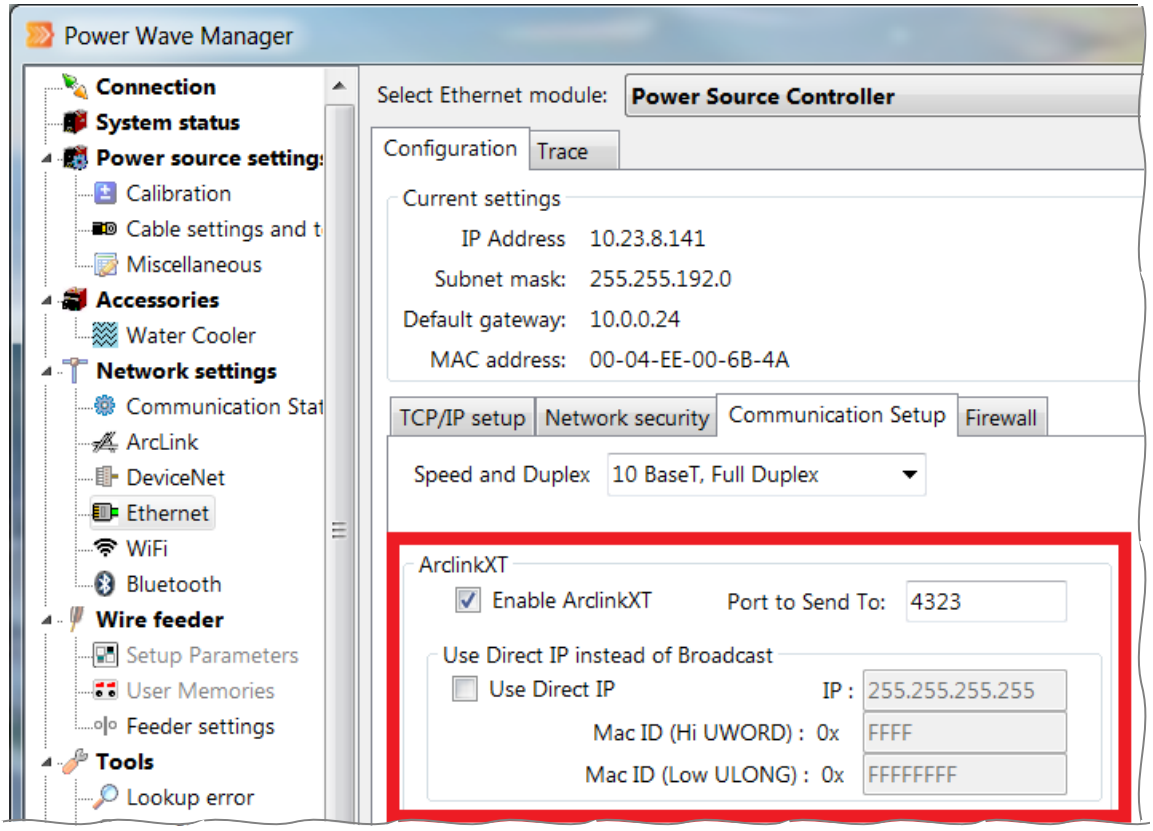



**Figure 8.16 ArclincXT settings**

You have the following options if you ever need to make adjustments for ArclincXT:

**Table 8.5 Fields under Ethernet ArclincXT**

| Field | Description |
|---|---|
| *Enable ArclincXT* | This setting enables XT or not for the selected Ethernet module. |

| Field | Description |
|---|---|
| *Port to Send To* | This number sets the IP port that the Welding Power Source will send Ethernet XT messages to. The default is IP port 4323. |
| *Use Direct IP* | This checkbox specifies to use Direct IP instead of Broadcast when checked. Normally the Welding Power Source will broadcast certain messages that act like “Is anyone out there” or “Reset” for example. Certain external controllers/robots do not support reading these broadcast messages so for these controllers you can check the *Use Direct IP* checkbox and the Welding Power Source will then send directed Ethernet messages instead of broadcast messages. When the welder sends a direct IP message, it will then use the IP and Mac ID settings to know where to send to. |
| *IP* | This field allows you to set the IP Address of the module you want to direct the ArclincXT traffic to when the *Use Direct IP* checkbox is checked. |
| *MAC ID (Hi and Low)* | These fields allow you to set the media access control (MAC) ID of the module you want to direct the ArclincXT traffic to when the *Use Direct IP* checkbox is checked. |

## *Firewall Tab*

The *Firewall* tab allows configuration of the internal firewall available on some Power Wave® machines. The Firewall settings allow you to filter out unneeded traffic not intended for that power source. If you are experiencing intermittent network communication problems or you are connected to a network with a lot of traffic then this option may help. Select *Enable Firewall* and click Apply settings to enable the firewall.

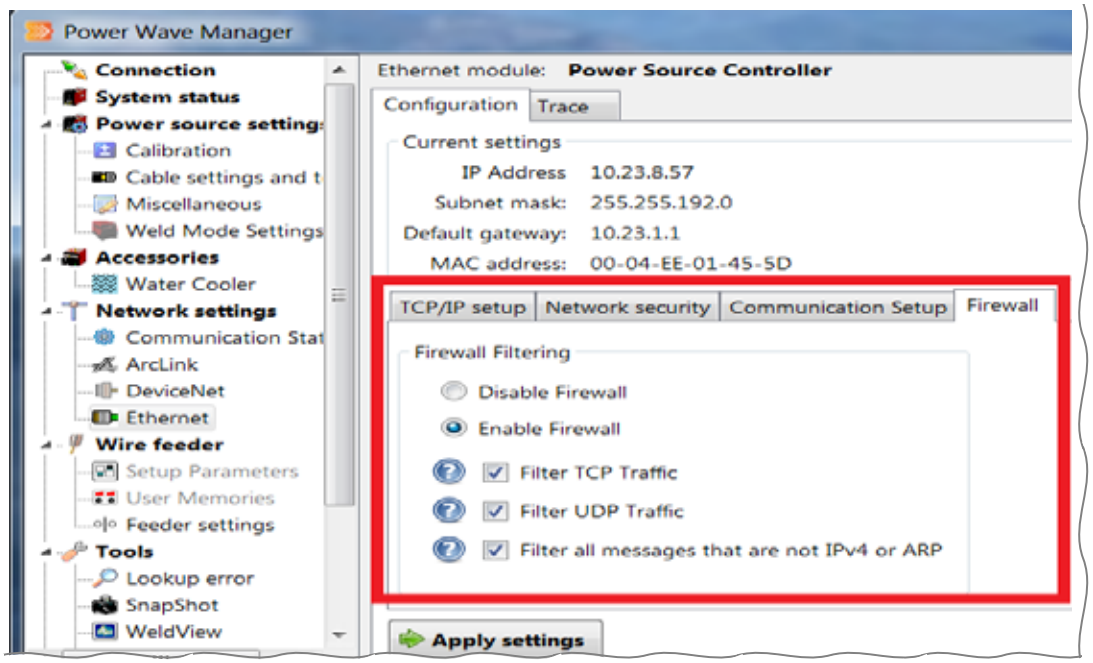



**Figure 8.17 Firewall Tab**

## Trace Tab

This tab allows you to record the ArclincXT network traffic existing between the Welding Power Source's Ethernet interface and the robot. You can use this tab to create a file you can then send to Lincoln Electric support or keep for future reference. This is extremely useful for troubleshooting communication issues. By default, Power Wave® Manager reads the information from the Welding Power Source when you first enter the tab.

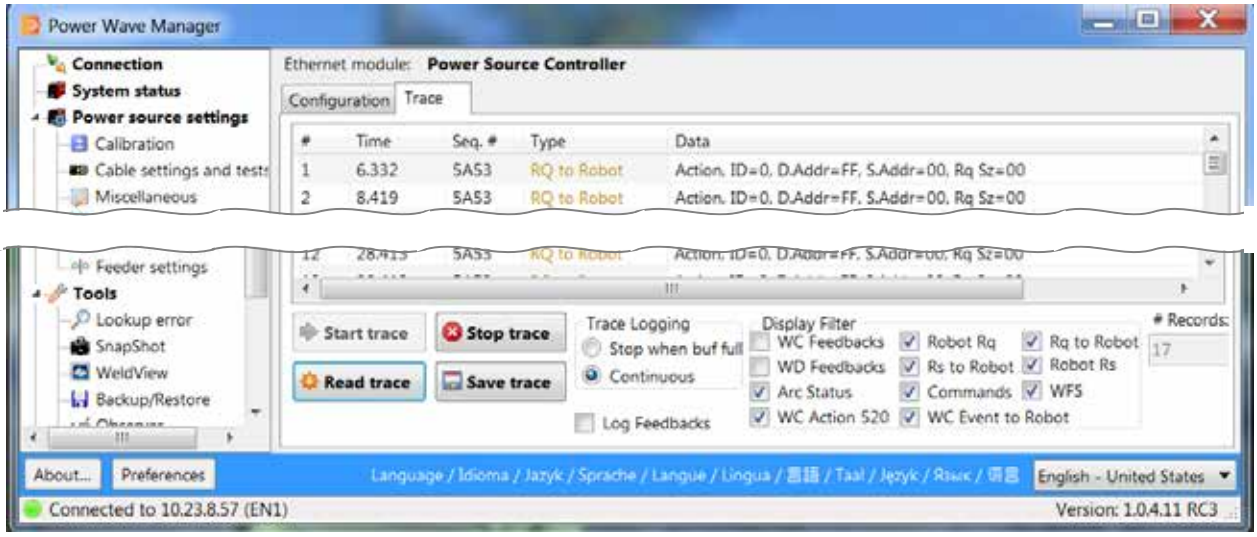



**Figure 8.18 Ethernet/ArclincXT Trace Tab**

Simply set your options and click the **Start trace** button when you're ready to capture ArclincXT messages. Click the **Stop trace** button when you have the information you need. Power Wave® Manager downloads the recorded messages from the Ethernet module and displays them in the list, with all relevant fields decoded. Table 8.3 explains your options in more detail.

> **NOTE** | **The Trace buffer might not show all the traffic between the welder and robot. Performing a Wireshark trace with a managed Ethernet switch that can capture all the data is the preferable method, over this trace method. The Trace buffer is limited in its size, so care must be exercised when trying to capture a particular message.**

> **NOTE** | **The** Read trace **button allows you to transfer the buffered data from the Welding Power Source into Power Wave® Manager manually if needed.**

> **TIP** | **Click the** Save trace **button to export the data to a file that you can send to Lincoln Electric Support for troubleshooting or keep for your own reference in the future.**

**Table 8.6 Options on the ArclincXT Trace Tab**

| Field | Description |
|---|---|
| *Trace Logging* | This option helps you control how much data you collect with the trace.<br>§ *Stop when buffer full*: Choose this option if you want the trace to stop automatically when the buffer on the power source is full of data.<br>§ *Continuous*: Choose this option if you want the trace to keep recording data until you click the **Stop trace** button, regardless how long the trace is. While recording, once the trace buffer has reached its end, it will wrap around, dropping off the oldest data and replacing it with the newest record. |
| *Log Feedbacks* | This option will enable the record of high speed feedback records in the log. Usually this is not checked since this will fill the buffer up quickly, but might be need if want to see the actual welding feeding values. |
| *Display Filter* | The options in this section allow you fine tune the amount of data being buffered. These options set what records are displayed in the above window. |
| *# Records* | This entry shows the current number of Trace records that can be read. |

# *Wi-Fi*

This section provides options for configuring the Wi-Fi settings of power source systems that contain a K4352-X module. If the system to which a Welding Power Source is connected contains a Wi-Fi Module then the Wi-Fi tab will be displayed under the *Network settings* tree node. Click on this *Wi-Fi* tab to bring up the *Wi-Fi Status* tab for the unit. The Wi-Fi screens let you view or configure the wireless network setup.

## Status Tab

The *Status* tab displays the current state of the Wi-Fi Module in your system. All values are read-only and display what is currently being used by the system. This tab displays Wi-Fi connection statistics such as the current status of the Wi-Fi as well as Device Properties. This tab also allows you to view Advanced Diagnostics by checking the *Display* checkbox. If Certificate Files have been added as on a corporate network a check will appear in the checkbox of the appropriate certificate/key that was previously sent to the Wi-Fi module.

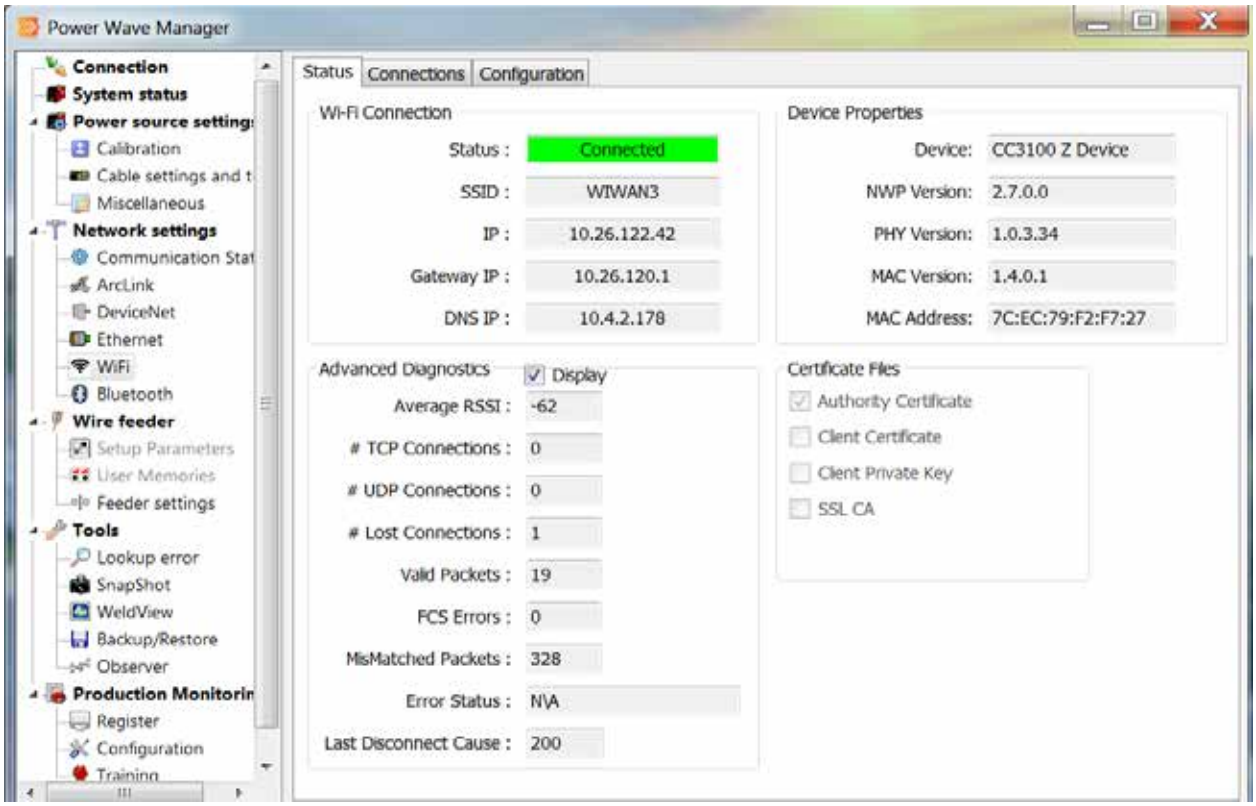
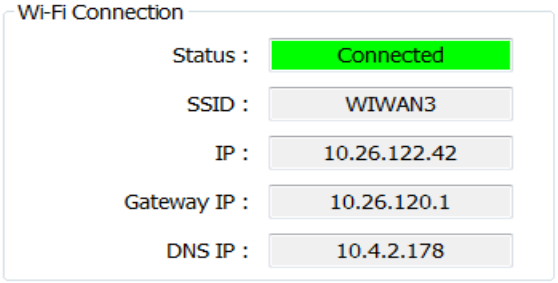
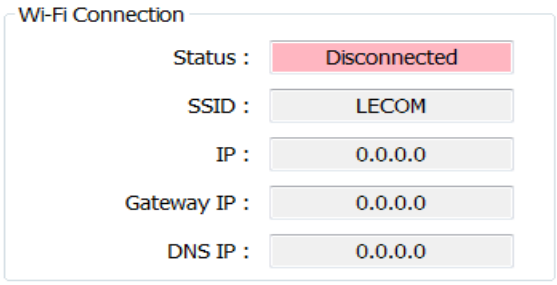
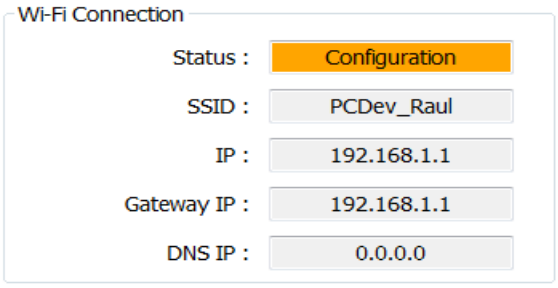
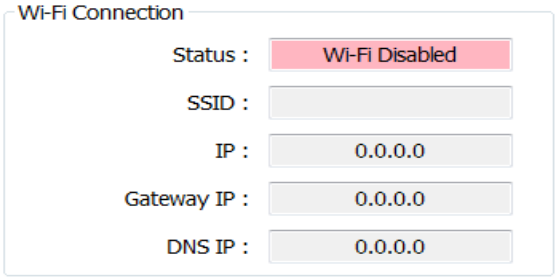



**Figure 8.19 Wi-Fi Status Tab**

The following table describes the important status fields.

**Table 8.7 Fields under Wi-Fi Status tab**

| Field | Description |
|---|---|
| *Status* | Current Status of the Wi-Fi Unit:<br>· **Connected** – Wi-Fi unit was setup and is currently connected (logged in) to the local or corporate network with name SSID and IP shown, this means your PC can then connect to 10.26.122.42 over Wi-Fi:<br>  <br><br>· **Disconnected** – Wi-Fi Unit is either not configured or setup correctly and/or no network is currently connected. Since it is not logged in to a network, no connection can be made to this Wi-Fi unit. |

| Field | Description |
|---|---|
| |  <br>· **Configuration** – Wi-Fi Unit is acting as an Access Point (AP) for you to connect to and configure the Welding Power Source. This occurs when the unit is placed into 'Configuration" mode. The SSID will be the name of your power source; this will be the name to search for when browsing for the Wi-Fi network from your PC. This mode cannot be used to get out to the internet and this cannot be used for Checkpoint or other functionality that requires Internet access. You would then connect to 192.168.1.1.<br>  <br>· **Wi-Fi Disabled**- the Wi-Fi Radio is turned off and disabled, no Wi-Fi connection can take place with this unit.<br>  |
| *SSID* | The name of the local or corporate network the Wi-Fi unit is connected to in 'Normal' Device Mode, else this is the name of the network when it is acting as a Wi-Fi Access Point in 'Configuration' mode. |
| *IP* | This is the IP Address of the Wi-Fi unit on the Wi-Fi network. Any device on your network that wants to communicate with the Welding Power Source using Wi-Fi must use this address to make the connection. |
| *Gateway IP* | This is the IP address of a router or other gateway device that allows communication with addresses that are outside your local area network. |
| *DNS IP* | This is the IP address of the network DNS Server. |

| Field | Description |
|---|---|
| *Device* | This field displays the device name returned from the Wi-Fi unit. This name is static and not modifiable. |
| *NWP Version* | This field displays the NWP Version returned from the Wi-Fi unit. |
| *PHY Version* | This field displays the PHY Version returned from the Wi-Fi unit. |
| *MAC Version* | This field displays the MAC Version returned from the Wi-Fi unit. |
| *MAC address* | This field displays the current media access control (MAC) ID of the Wi-Fi unit of the Module within the Welding Power Source system. |
| *Advanced Diagnostics Display* | This checkbox is used to toggle the display of the Advanced Diagnostics fields described below. |
| *Average RSSI* | This field displays the Wi-Fi signal strength indication returned from the Wi-Fi unit. This is a negative number.<br>0 = disconnected |
| *# TCP Connections* | This field displays the number of active TCP Connections currently used with the Wi-Fi unit. |
| *# UDP Connections* | This field displays the number of active UDP Connections currently used with the Wi-Fi unit. |
| *# Lost Connections* | This field displays the number of times a Wi-Fi connection was dropped since the Wi-Fi unit last powered up. |
| *Valid Packets* | This field displays the Number of valid packets reported from the Wi-Fi unit. |
| *FCS Errors* | This field holds the number of FCS (frame check sequence) error packets dropped |
| *MisMatched Packets* | This field holds the number of packets that have been received but filtered out by one of the HW filters. |
| *Error Status* | This field holds the ASCII String containing any recent error message returned from internal network stack of the Wi-Fi unit. |
| *Last Disconnect Cause* | This field shows the last reason for a dropped or failed connection, and can be helpful in diagnosing Wi-Fi network connection problems. For a description of these codes see Appendix A. |
| *Certificate Files* | This section displays the current certificate files being used to gain access to the local or corporate network. |

**NOTE | If Wi-Fi radio is disabled you cannot make changes to any of the Wi-Fi settings.**

## Connections Tab

The *Connections* tab displays the current connection type and allows you to edit the direct connection settings for the Welding Power Source's current Wi-Fi network.

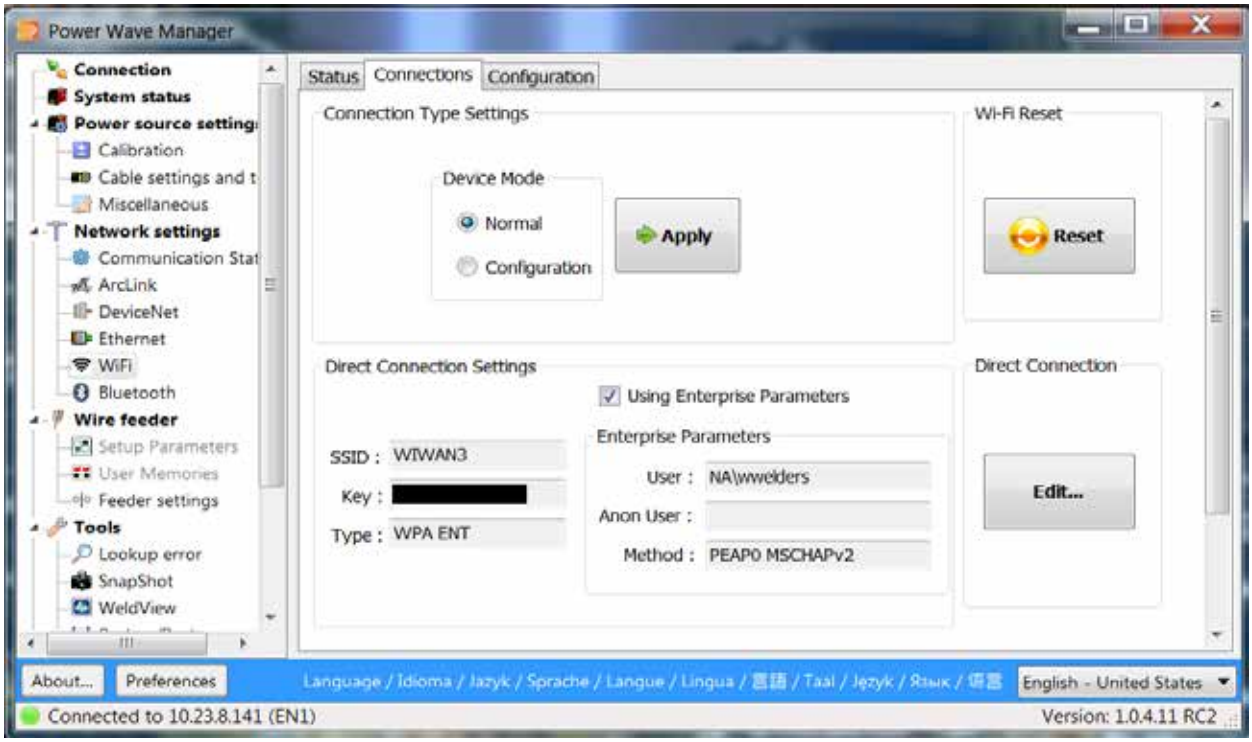



**Figure 8.20 Wi-Fi Connections Tab**

### *Device Mode*

The Device Mode defines what mode the Wi-Fi unit will behave in: Normal or Configuration. In Configuration mode the Wi-Fi unit acts as a Wi-Fi Access Point (AP) and is used initially to connect with in order to setup the Power Source. In Normal Mode, this allows connections to existing local and corporate Wi-Fi networks and is the normal mode of operation. To change the device mode, select which mode is desired and click the *Apply* button.

### *Direct Connection Settings*

The Direct Connection Settings display the current settings used for logging into one wireless local or corporate network. The current connection settings are displayed in the *Connections* tab like in Figure 8.20.

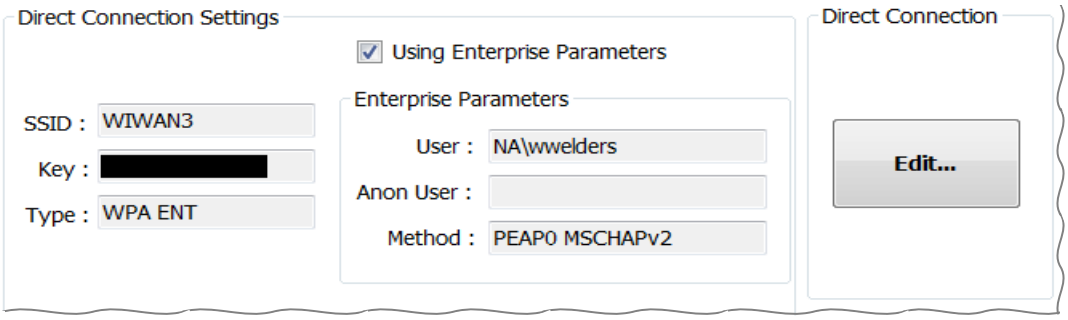



**Figure 8.21 Direct Connection Settings**

To edit these settings click the *Edit…* button. The *Edit Direct Connection* dialog will appear as shown below in Figure 8.22 for which you can select the desired Wi-Fi network you wish the Wi-Fi unit on the Power Source to connect with and then enter the login credentials for connecting directly to that network.

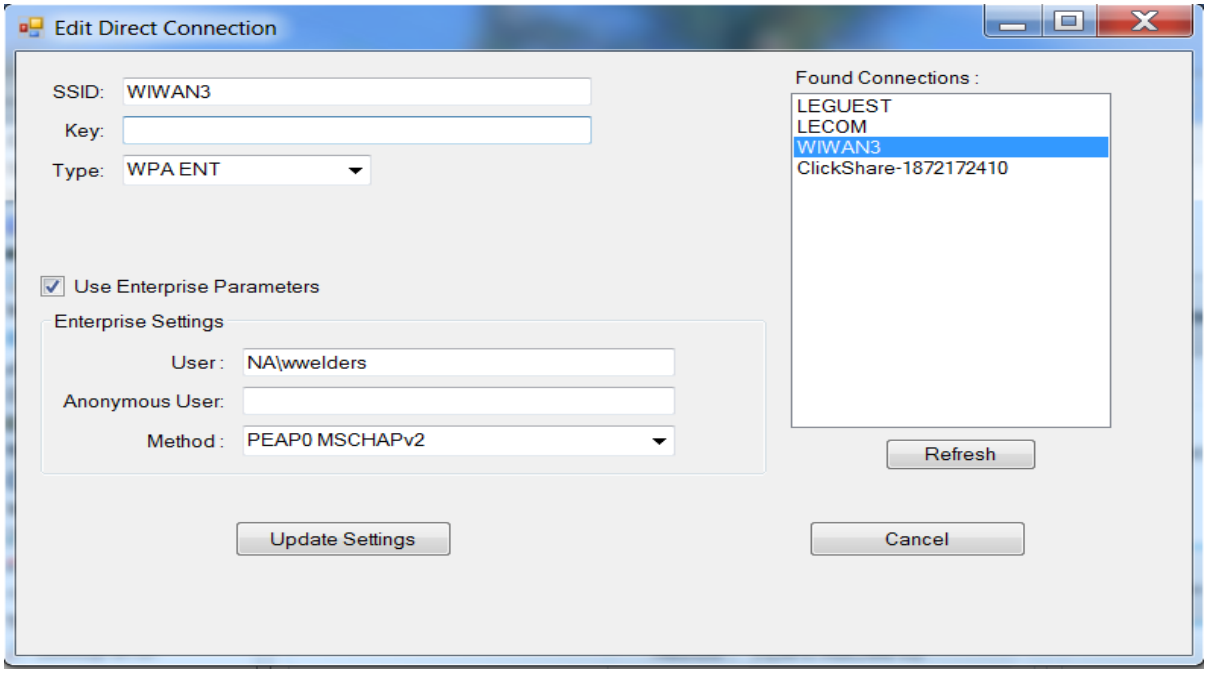
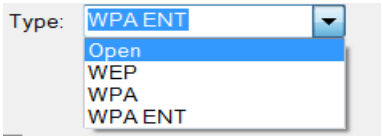
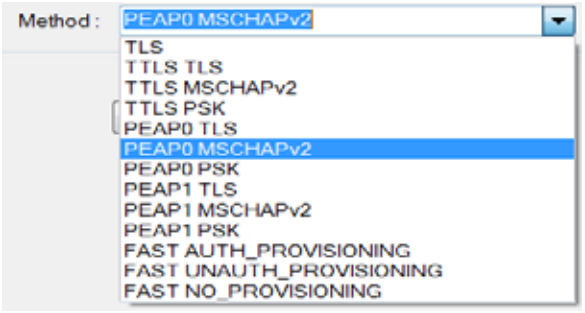



**Figure 8.22 Edit Direct Connection**

The Refresh button will cause the Wi-Fi unit to search for and display a list of all wireless networks that are within range of the power source. This list is only updated on clicking the refresh button. Selecting a network SSID from this box automatically adds its SSID to the corresponding field to the left.

**Table 8.8 Fields to edit in Direct Connection**

| Field | Description |
|---|---|
| *SSID* | Select the desired network to connect to in the 'Found Connections" list box to populate this field or enter the name of the local or corporate network you wish the Wi-Fi unit to connect when in 'Normal' Device Mode. |
| *Key* | Enter the Wireless network key or password used to login to this network. Your router contains a unique wireless network name (SSID) and password for wireless access. |

| Field | Description |
|---|---|
| *Type* | Enter the type of network security that the network/router uses. Talk to your IT department to determine what to use for this setting.<br>  |
| *Use Enterprise Parameters* | Check this option if the network uses enterprise parameters for login to the network. Talk to your IT department to determine what to use for this setting. |
| *User* | If enterprise parameters are required, enter the user for the Enterprise login |
| *Anonymous User* | If enterprise parameters are required, and anonymous login is supported, enter the name of the Anonymous user for the Enterprise login (optional, if required) |
| *Method* | If enterprise parameters are required, select one of the following Security methods to use for the Enterprise login.<br>  |

When you have completed making edits click the *Update Settings* button to have them saved to the Wi-Fi unit. Click *Cancel* to cancel any edits.

### *Wi-Fi Reset*

The Wi-Fi Reset button is used to apply any changes in the Wi-Fi unit made to the Direct Connection Settings. Click the *Reset* button for any changes made to take effect. This will cause the currently connected network (if any) to be disconnected and an attempt will be made to connect with the network using the settings from the Direct Connection settings.


**Figure 8.23 Wi-Fi Reset Button**

## Configuration Tab

Within the *Configuration* tab, you can configure the Wi-Fi connection type, change static settings such as the Wi-Fi IP address of the power source or download any certificate files that may be required on a corporate network. This tab also allows you to enable or disable the Wi-Fi radio and set an operator lockout for the UI.

Generally, you use Dynamic Host Configuration Protocol (DHCP) and let the Wi-Fi network assign the Wi-Fi unit a unique IP Address. Generally, though, you will not need to use the static IPs, subnets and gateway addresses unless they are assigned by your IT department for fixed production equipment. A static IP is recommended for CheckPoint™ and required for older versions of Production Monitoring™.

> **STOP | Assigning an incorrect IP address to the Welding Power Source may cause it to be unreachable on the network.**

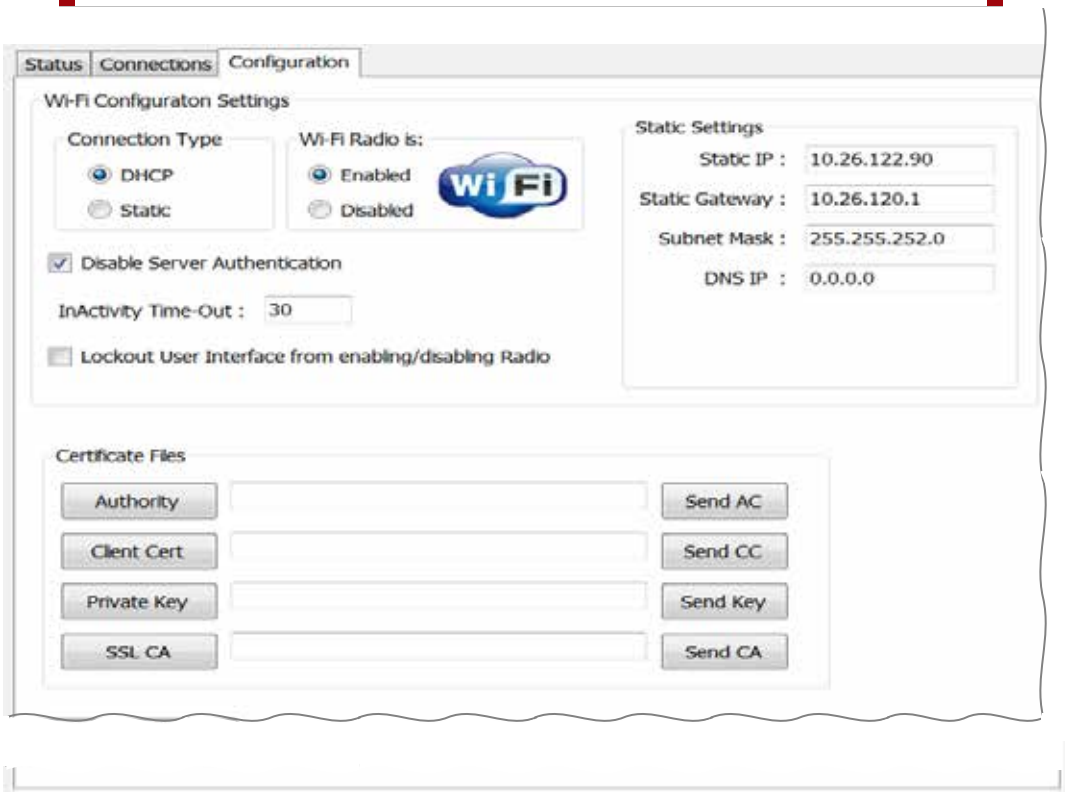



**Figure 8.24 Wi-Fi Configuration Tab**

### *Connection Type*

Simply choose the Connection Type *DHCP* option if you want the Wi-Fi network/router to assign the IP address automatically using a dynamic IP address.

> **STOP | If you choose the DHCP option, the Welding Power Source may obtain a different IP address every time it connects to a network.**

If you want to assign a specific address to this Welding Power Source, choose the Connection Type *Static* option and enter the appropriate information. In this case you will also need to statically assign the Static Gateway, Subnet Mask and DNS IP.

### Static Settings

The *Static Settings* section allow configuration of the static settings on the Wi-Fi radio. If the Connection Type is set to Static then you can setup the static IP Address, Static Gateway, Subnet Mask and DNS IP Address.

(Table 8.4 on page 8.14 explains these fields in more detail.)

Once you have configured the network settings, click the **Apply settings** button and the Welding Power Source will automatically reset in order for the new settings to take effect.

> **NOTE |** **If you have modified the Welding Power Source's IP address and would like to modify more settings, you will need to connect to the Welding Power Source using the new address. (See page 4.2 for connecting to a power source.)**

> **TIP |** **If you cannot connect to the Welding Power Source, refer to Appendix A for troubleshooting options.**

### Wi-Fi Radio

The *Wi-Fi Radio* section allows the Wi-Fi radio to be enabled or disabled on the Wi-Fi unit. Select the desired option and click **Apply Settings** and the Welding Power Source will automatically reset in order for the new settings to take effect.

### Wi-Fi Configuration Settings

The remaining Wi-Fi Configuration Settings are described below in Table 8.9.

**Table 8.9 Fields to edit in W-Fi Configuration Settings**

| Field | Description |
|---|---|
| *Disable Server Authentication* | Select this checkbox to disable the Wi-Fi unit from periodically checking server authentication. |
| *Inactivity Time-Out* | Select the amount of time to wait with no wireless activity before closing a connection (the default time is 30 seconds). If in an area where the Wi-Fi goes in and out frequently or has a very poor connection, this time may need to be adjusted so that all available connections are not getting used up, resulting in not being able to connect periodically. |
| *Lockout User Interface from enabling/disabling Radio* | Allows you to configure the User Interface (UI) so that an operator at the UI cannot enable or disable the Wi-Fi radio. Check this box to lockout the user from changing this setup option in the UI. |
| *Certificate Files* | Allows you to add in any required certificate or key files the network may require. If a Certificate of Authority, Client Certification, or Private Key is needed to access a wireless network they can be added in the "Certificate |

| Field | Description |
|---|---|
| | Files" section. The SSL CA section is not currently supported. Click the button of the file to add to add browse to the correct file. Click the associated **Send** button to send the file to the power source. This file will be saved on the power source, so it will only need to be sent once. Sending a new file overwrites any existing file of the same type.<br>Contact your IT Network Administrator for more information. |

# Bluetooth

Bluetooth is now supported as a method of connecting to the power source if a hardwire connection is not available if you have the communication module installed. A Bluetooth connection can be made natively from any PC with a Bluetooth radio without any additional updates. This section provides options for configuring the Bluetooth settings of a power source that contains a Wi-Fi module K4352-X. If the system to which a Welding Power Source is connected contains a Bluetooth Module then the Bluetooth tab will be displayed under the *Network settings* tree node. Click on this tab to bring up the *Bluetooth Status* tab for the unit. The Bluetooth screens let you view or configure the Bluetooth settings.

## Status Tab

The *Status* tab displays the current Bluetooth Connection status and Bluetooth Properties. All values on this screen are read-only and display what is currently being used by the system. This tab displays Bluetooth connection statistics such as the current status of the Bluetooth as well as Bluetooth Device Properties.

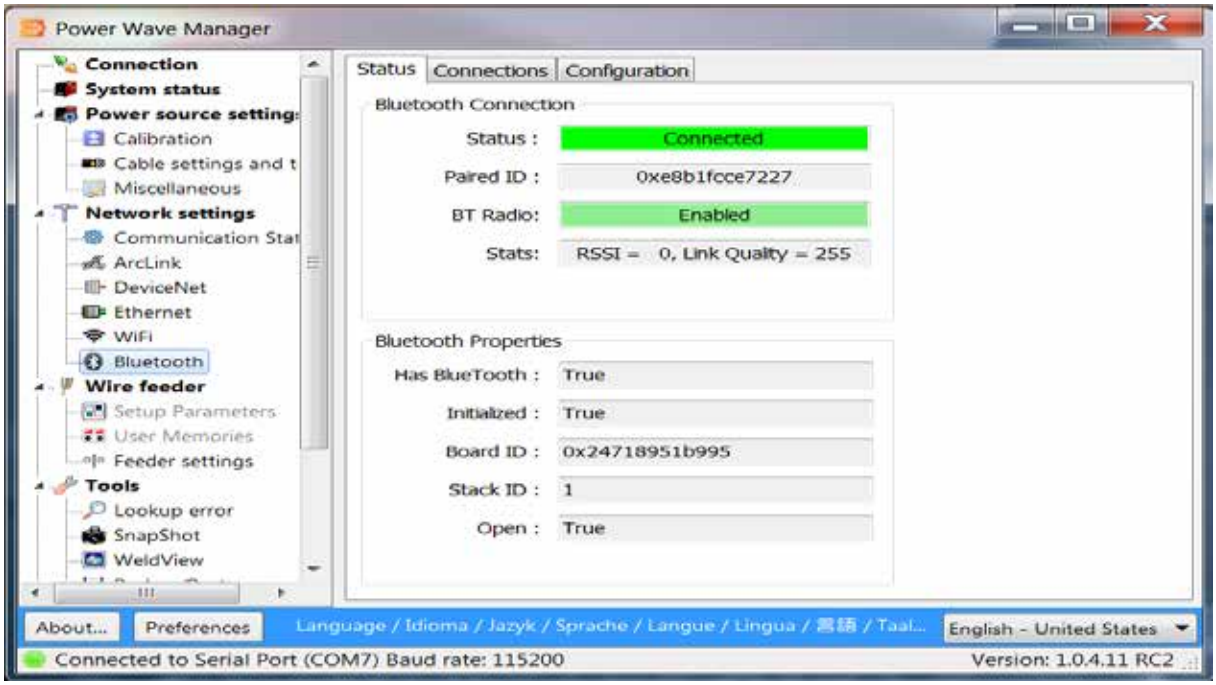
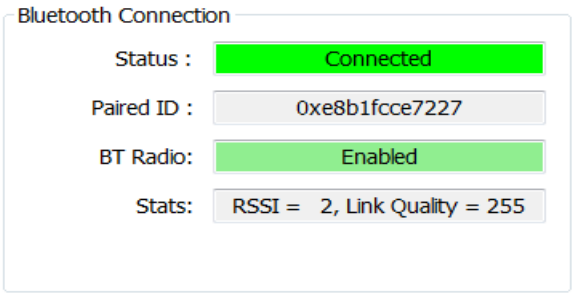
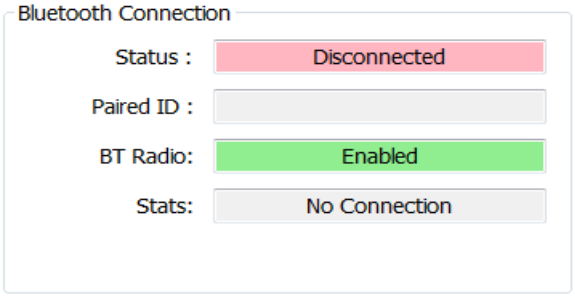
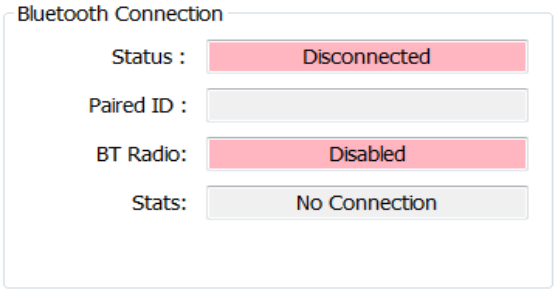



**Figure 8.25 Bluetooth Status Tab**

The following table describes the important status fields.

**Table 8.10 Fields under Bluetooth Status tab**

| Field | Description |
|---|---|
| *Status* | Current Status of the Bluetooth Unit:<br>· **Connected** – Bluetooth unit was enabled and is currently paired to an external Bluetooth partner shown:<br>  <br>· **Disconnected** – Bluetooth Unit is enabled but is currently not being used or is otherwise not being paired with at the moment.<br>  <br>· **Disabled**- Bluetooth Radio is turned off and disabled, no Bluetooth connection can take place with this unit.<br>  |
| *Paired ID* | The Bluetooth ID of the device that is currently paired with the Bluetooth unit. |
| *BT Radio* | State of the Bluetooth radio: enabled or disabled. |
| *Stats* | Displays various statistics such as RSSI and Link Quality. Representation of signal quality of current Bluetooth connection. Must have an active connection to be valid.<br>RSSI – How many dB above or below the RSSI is relative to the limits of the Golden Receive Power Range. 0 if inside the GRPR.<br>Link Quality – 0 to 255 where higher is better |

| Field | Description |
|---|---|
| *Has Bluetooth* | Indicates if the Wi-Fi unit has Bluetooth or not. |
| *Initialized* | Indicates if the Bluetooth stack has been opened and initialized. |
| *Board ID* | Displays the ASCII representation of the Bluetooth ID (Bluetooth version of MAC address) |
| *Stack ID* | Displays the stack ID of currently opened server. |
| *Open* | Displays whether a Bluetooth server has been successfully opened and is ready to receive requests. |

**NOTE | If Bluetooth radio is disabled or enabled the machine will be automatically reset after the Apply Changes button is pressed. Any welding would be interrupted.**

## Connections Tab

The *Connections* tab simply displays the Bluetooth current pairing configuration which displays the last 5 Paired IDs similar to that displayed in Figure 8.26.

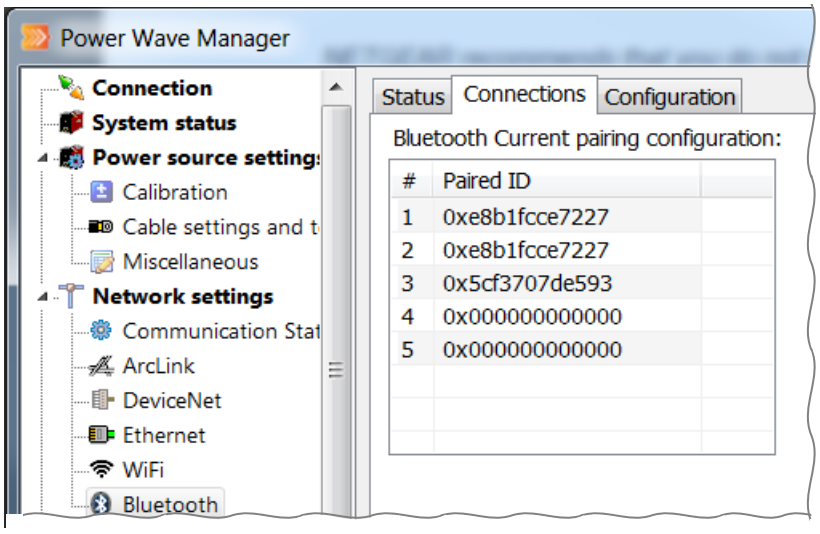



**Figure 8.26 Bluetooth Connections Tab**

## Configuration Tab

The *Configuration* tab allows you to enable or disable the Bluetooth radio and set a lockout in the UI.

Note, you cannot use Bluetooth for CheckPoint™ or Production Monitoring™.

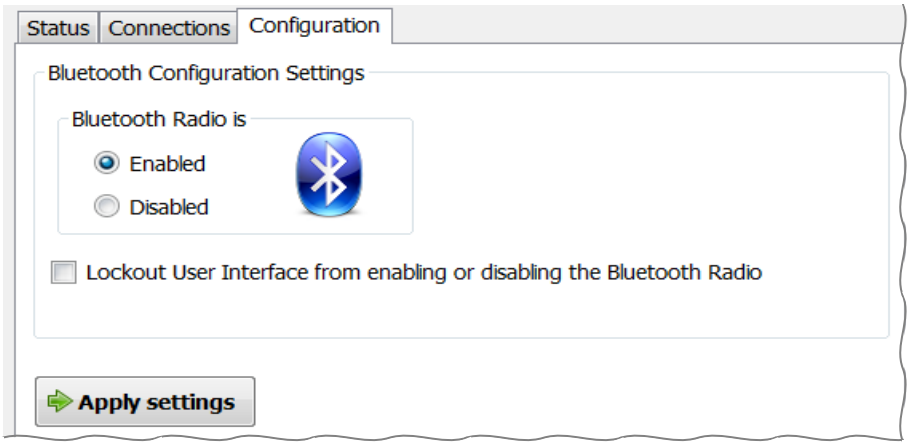



**Figure 8.27 Bluetooth Configuration Tab**

## *Bluetooth Radio*

The *Bluetooth Radio* section allows the Bluetooth radio to be enabled or disabled on the unit. Select the desired option and click **Apply settings** and if you are disabling the radio then the Welding Power Source will automatically reset in order for the new settings to take effect.

> **STOP | You cannot disable the Bluetooth radio while you are connected over Bluetooth to the same device. This may require a restart of Power Wave Manager and would corrupt the Windows Bluetooth Device software which would require you to remove and add the Bluetooth device again from Windows.**

## *Bluetooth Configuration Settings*

The remaining Bluetooth Configuration Settings are described below in Table 8.11.

**Table 8.11 Fields to edit in Bluetooth Configuration Settings**

| Field | Description |
|---|---|
| *Lockout User Interface from enabling/disabling the Bluetooth Radio* | Allows you to configure the User Interface (UI) so that an operator at the UI cannot enable or disable the Bluetooth radio. Check this box to lockout the user from changing this setup option in the UI. |

Click **Apply Settings** if any changes were made and need to be stored.

# MQTT

MQTT is now a supported messaging protocol for systems that have an MQTT-supported G8814 Wi-Fi module. If the system to which a Welding Power Source is connected supports MQTT, then the MQTT tab will be displayed under the *Network settings* tree node. Click on this tab to bring up the MQTT Settings screen. This screen allows you to view or configure the MQTT settings and monitor the connection status.

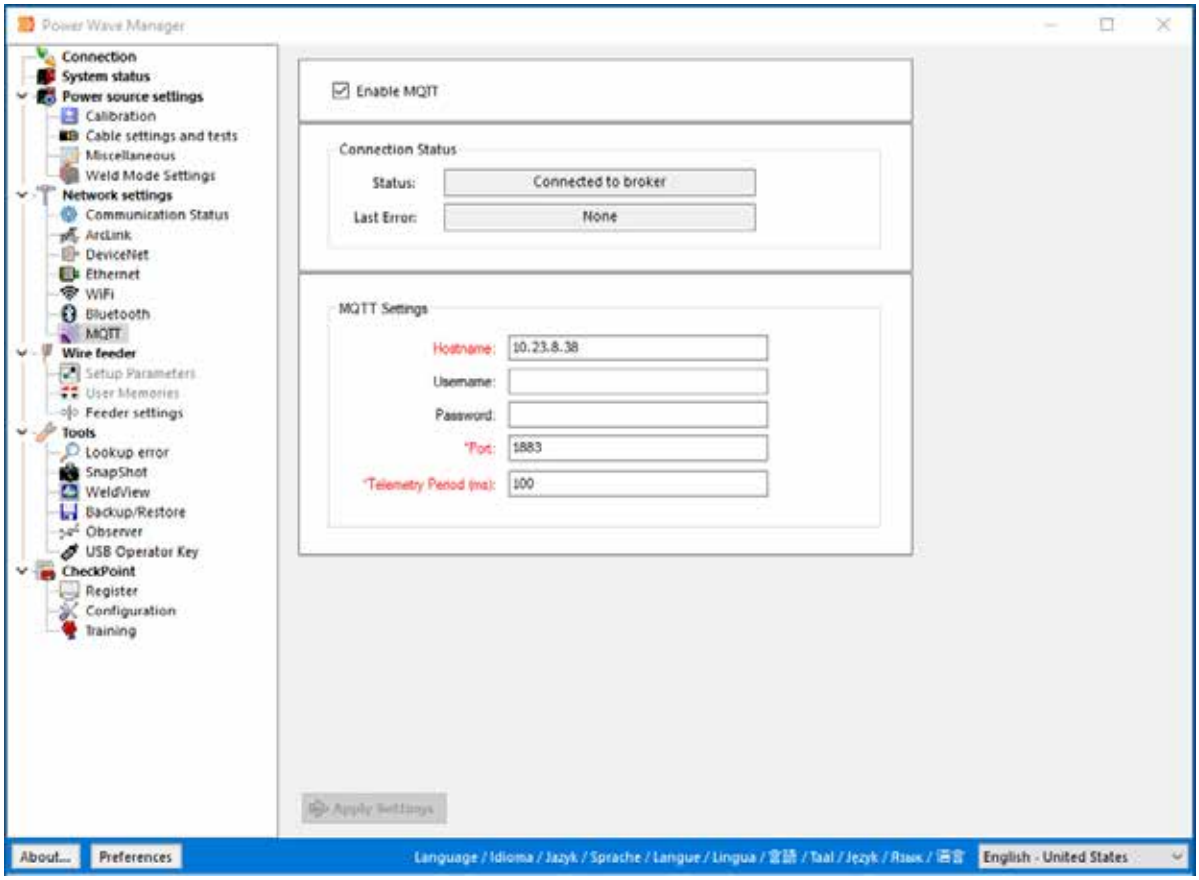



**Figure 8.28 MQTT Settings Tab**

The following tables describe the MQTT fields.

**Table 8.12 MQTT Connection Status**

| Field | Description |
|---|---|
| *Status* | Current Connection Status:<br>· Setup Network interface<br>· Initializing MQTT client<br>· Waiting for network<br>· Connecting to host |

| | |
|---|---|
| | · Connecting to broker<br>· Connected to broker |
| *Last error* | Displays a description of the last error to aid in troubleshooting. |

**Table 8.13 MQTT Settings**

| Field | Description |
|---|---|
| *Hostname* | The hostname or IP address of the MQTT broker. |
| *Username* | (Optional) The username to use with the MQTT broker. |
| *Password* | (Optional) The password for the MQTT broker. |
| *Port* | The network port to connect to. |
| *Telemetry Period (ms)* | Sets the time between the machine publishing messages on the telemetry topic. |

Click **Apply Settings** if any changes were made and need to be stored.

# Wire Feeder

The *Wire Feeder* section contains settings and diagnostic information for any wire feeders and user interfaces attached to the Welding Power Source to which you are currently connected with Power Wave® Manager.

## *Setup Parameters*

The **Setup Parameters** section allows the user to modify several User Interface parameters and security settings. The parameters and settings available on this tab vary depending on the User Interface connected. Please refer to the appropriate *Operator Manual* for more detailed information on these parameters.

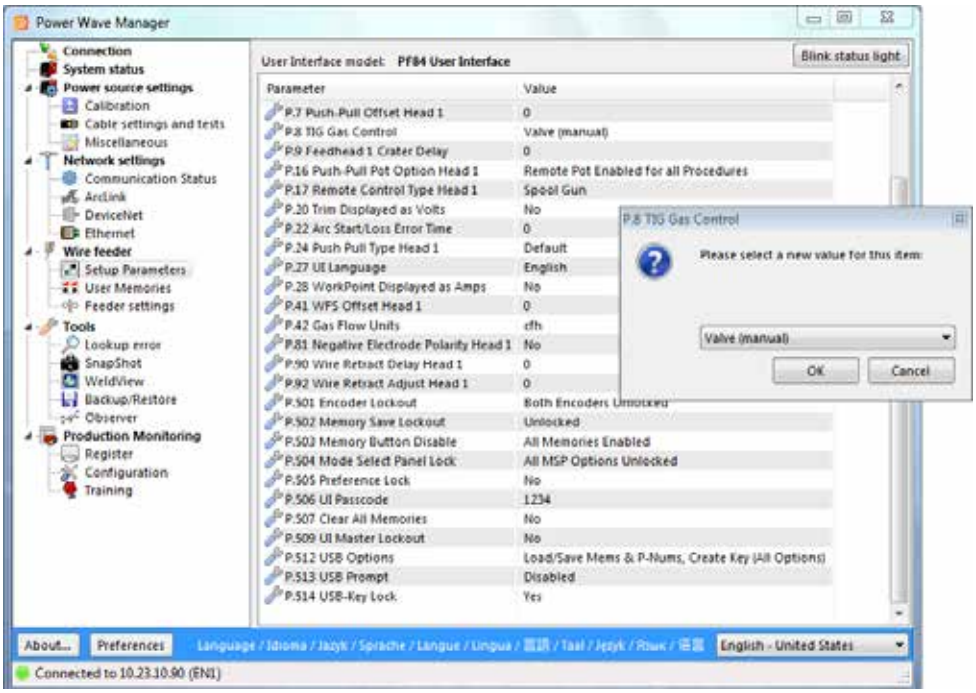



**Figure 9.1 Setup/Security Settings Tab**

To change a parameter, double-click the parameter to open the edit window (Figure 9.1). Simply make your change and click **OK**.

> **TIP** | **If you do not see the parameters you expect, be sure you have upgraded to the latest system software. See page 3.1 for details on updating the firmware.**

# Multiple User Interfaces

If there are more than one User Interface connected to this Welding Power Source, Power Wave® Manager creates a new section for each feed head containing the *User Memories* and *Feeder settings* sections in the main menu for that feed head (Figure 9.2). Simply click the *User Memories* or *Feeder settings* heading to select the feed head you want to review.

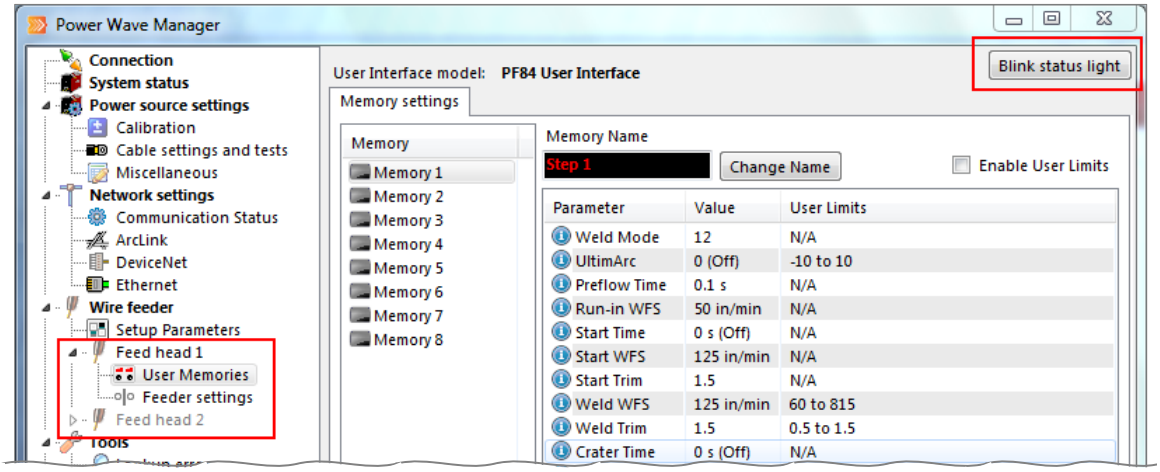



**Figure 9.2 Multiple User Interfaces**

If you're not sure the feeder you have selected refers to the actual user interface you want to review, click the **Blink status light** button. This causes the green status light on the User Interface to start blinking rapidly, and you can verify you have the correct device selected in Power Wave® Manager.

# User Memories

If the Welding Power Source to which you have connected has a user interface module attached, the *User interface* section of Power Wave® Manager provides you the ability to configure that module, including integration of specific welding process configurations (i.e., sequences, schedules, procedures, profiles, and modes).

## Memory Settings

The *Memory Settings* section allows you to configure any of the memory buttons that exist on the User Interface module(s) attached to your welding system. Memory buttons allow you to preset weld settings for those welds commonly performed using this power source. Figure 9.3 shows the memory settings for a typical User Interface module.

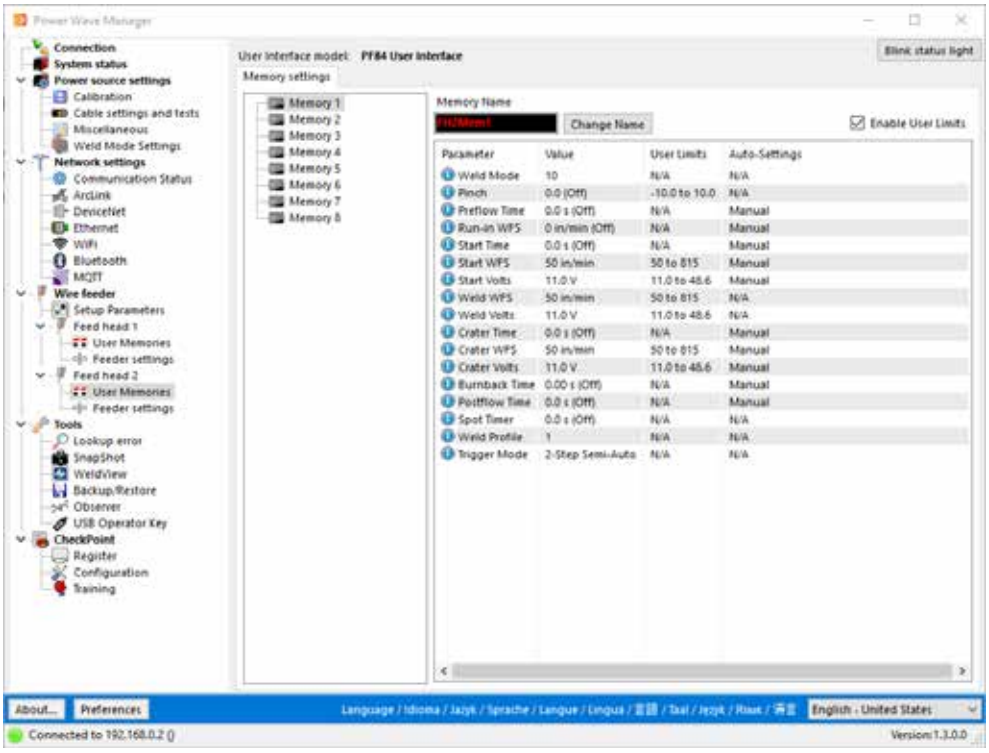



**Figure 9.3 Memory Settings**

Some systems, such as the PIPEFAB™ and 300C, use process-specific memories, as shown in Figure 9.4. Selecting the desired User Memories on the left (GMAW/MIG, FCAW, SMAW/Stick, or GTAW/TIG) will display the associated memory settings. For multiple feed head systems, there are a set of GMAW/MIG and FCAW memories for each feed head.

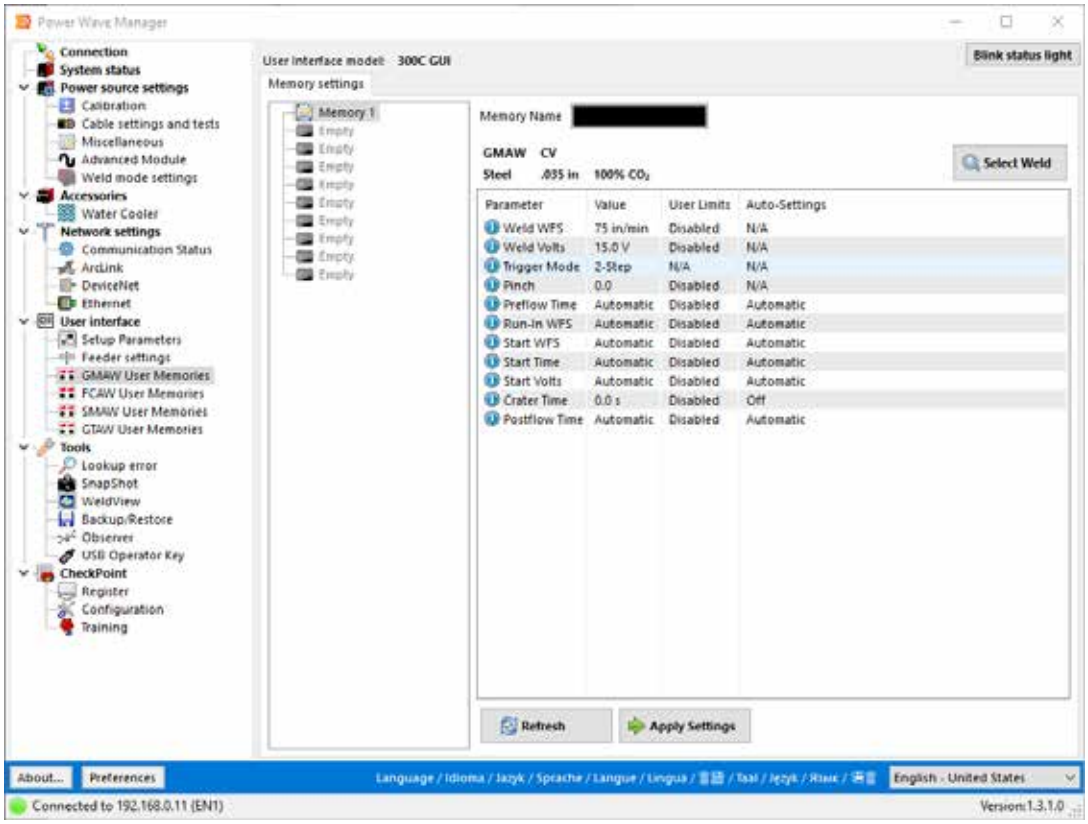



**Figure 9.4 Memory Settings, Process-based User Interface**

## Memory Buttons

The number of memory slots that appear on the **Memory Settings** tab depends on the number of buttons on the physical User Interface. To edit a memory button, simply click the memory button to select it (e.g., *Memory 1* in Figure 9.3). The parameters currently set for that memory button appear on the right.

Each memory button has text that displays on the Mode Select Panel of the User Interface. To change this text, click the **Edit** button next to the *Memory name* field in Power Wave® Manager. Enter the new name and click **OK**.

## Memory Parameters

To edit a parameter, double-click the entry. The parameter's edit window opens (Figure 9.5). Simply enter a new value and click **OK**. The Weld Modes and parameters that are available for the memory buttons vary depending on the individual User Interface. Please refer to the appropriate *Operator Manual* for details on the memory parameters for your User Interface.

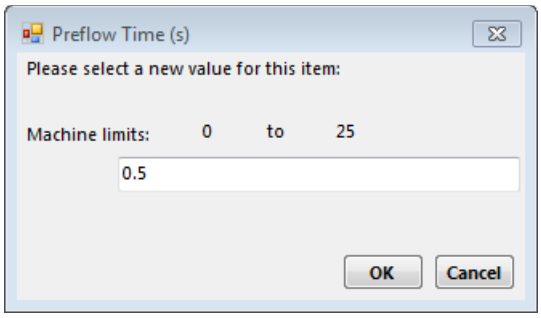



**Figure 9.5 Editing Memory Parameters**

### *Weld Procedure Parameters*

If the User Interface supports process-based memories, the weld process will be shown under the memory name. Also, for wire-based processes, the wire type, wire size and gas mix will be shown. Click **Select Weld** to change the weld procedure (**Figure 9.6**). The options displayed in this dialog depend on the weld process selected. Click **OK** to apply the changes to the selected memory location.

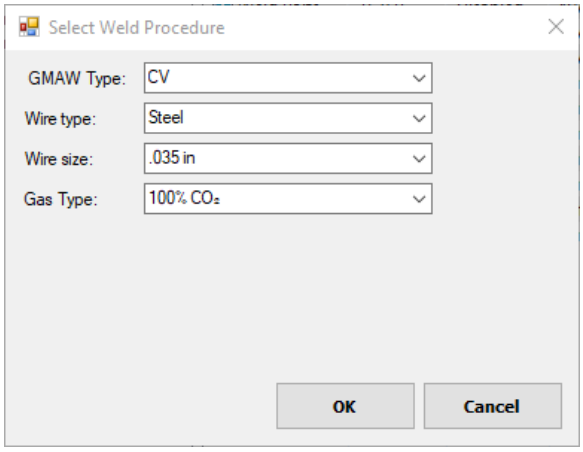



**Figure 9.6 Selecting a Weld Procedure**

## User Limits

If you have a check mark in the *Enable User Limits* checkbox, the User Interface enables the *User limits* fields for certain parameters and enforces the values defined in the those fields (Figure 9.5). With this checked, if you enter a value that is above the upper limit, Power Wave® Manager automatically changes that value to match the upper limit when you click **OK**. The same is true if you enter a value that is below the lower limit. The system automatically changes that value to match the lower limit.

For example, if the upper *User limit* is 410 and you enter a value of 654, Power Wave® Manager automatically changes the value to 410. If the lower *User limit* is 60 and you enter a value of 50, Power Wave® Manager automatically changes the value to 60.

If this is not checked, the values in the *User limits* fields have no effect.

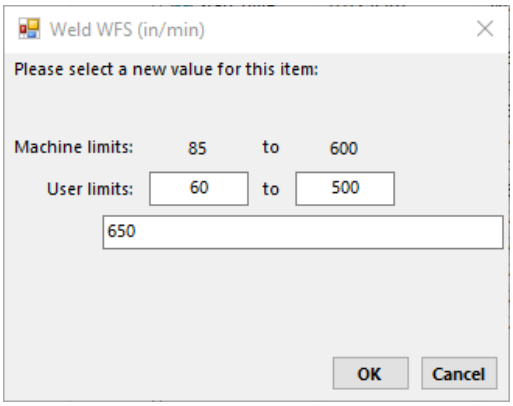



**Figure 9.7 Entering a Limit Higher than the User-Specified Limit**

The *Machine limits* displayed represent the **absolute** limits of this parameter. The *User limits*, as well as the entered value, must be within this range. When finished modifying the parameter, click **OK** to write the new settings to the machine.

For systems with a User Interface that supports *process-based* memories, no *Enable User Limits* checkbox is shown. Instead, double-click in the User Limits column of the desired memory parameter to bring up the settings dialog. De-select **Auto** (if selected) and check the **Enable** checkbox to enable user limits. Enter the limits in the fields provided.

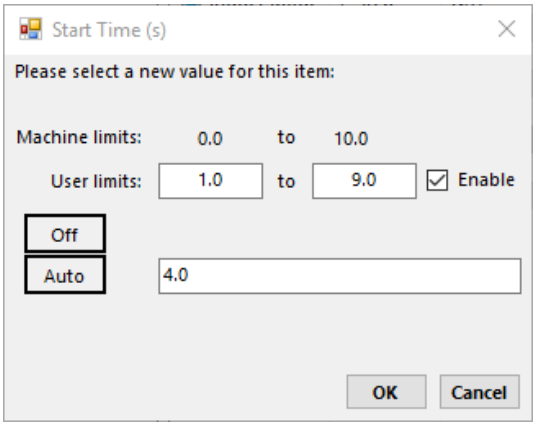



**Figure 9.8 Entering a Limit Higher than the User-Specified Limit**

## Auto Settings

The *Auto Settings* column on the **Memory Settings** tab (Figure 9.3 on page 9.3) is only available with those Welding Power Sources that are Auto Settings capable. Auto Settings provides automatic control of certain weld settings such as *Preflow Time*, *Run-In WFS*, *Start Time*, *Crater Time*, *Burnback Time* and *Postflow Time*.

This “automatic control” automatically turns a weld setting on or off and sets it to the correct value, based on the Weld Mode and workpoint. If the Weld Mode or workpoint is changed, any enabled automatic setting will change accordingly.

If the Power Source supports Auto Settings, the *Auto-Settings* column is visible and displays one of the following values for the parameter:

- *N/A*: Automatic control is not available; the Weld Mode does not contain auto settings for that parameter.
- *Manual*: Automatic control is available for this parameter, but it is currently disabled. You have the ability to edit the *Value* of this parameter (setting controlled by the user).
- *Automatic*: Automatic control is available for this parameter, and it is currently enabled. You cannot edit the *Value* of this parameter (setting controlled by the power source).
- *Off*: Indicates the parameter is currently off/disabled.

For systems with a User Interface that supports *process-based* memories, the parameter auto-settings can also be selected from the parameter edit window (Figure 9.8). Selecting *Off* turns the parameter off and selecting *Auto* turns on automatic control for the parameter. Deselecting both enables manual control, allowing editing of the *Value* of the parameter.

> **NOTE | Changing the *Auto Settings* selection of any of the *Start* or *Crater* parameters changes the settings selection of all the *Start* or *Crater* selections.**

> **NOTE | Please refer to the *Operator Manual* for your wire feeder for more in-depth information.**

# Feeder Settings

In the *Feeder Settings* section, you can fine tune the behavior of the wire feeders connected to this Welding Power Source.

## Settings Tab

Under the **Settings** tab, you can change the feed head and gear type. Table 9.1 explains the fields in more detail. Be sure to click **Apply settings** when finished to commit your changes.

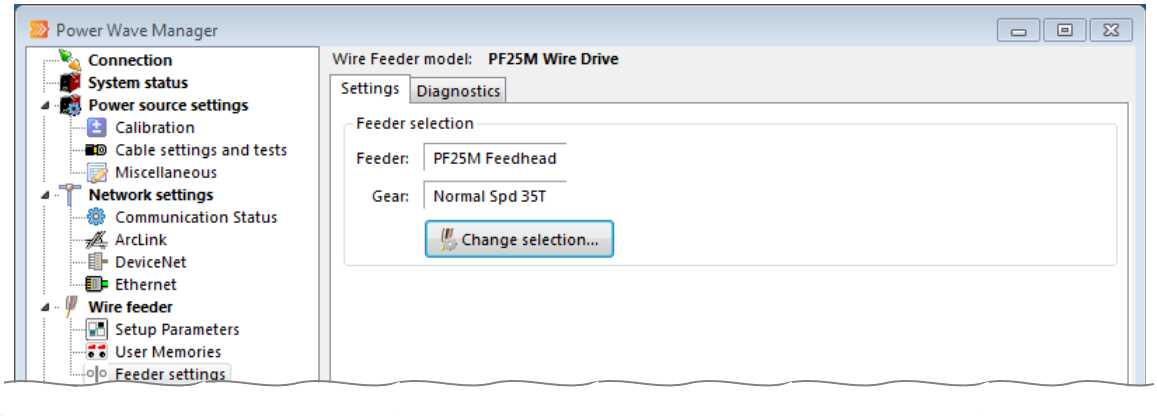



**Figure 9.9 Wire Feeder Settings Tab**

**Table 9.1 Fields on the Settings Tab**

| Field | Description |
|---|---|
| *Feeder Selection* | If you need to change the feeder or the gear ratio, click the **Change selection** button and make your selections from the drop-downs. This process could take some time and disable certain functions in Power Wave® Manager until the process is complete.<br>**STOP \| Power Wave® Manager resets the Welding Power Source when you click** OK **to change feeder or gear ration. Be sure the machine is not welding.**<br>**NOTE \| The *Feeder selection* options are only available for feeders that support custom selections and are not available if the wire feeder requires the use of DIP switches to make these selections.** |

## Diagnostics Tab

You can use the **Diagnostics** tab to troubleshoot and verify the operational state of your wire feeder. If you have multiple wire feeders connected to this welding power source, you can click the appropriate *Feeder settings* menu item (Figure 9.2 on page 9.2) to access settings and diagnostics for that feed head.

**STOP | Buttons on this tab control the wire feeder powered by the Welding Power Source. Be sure to exercise all appropriate safety procedures when performing actions on this tab.**

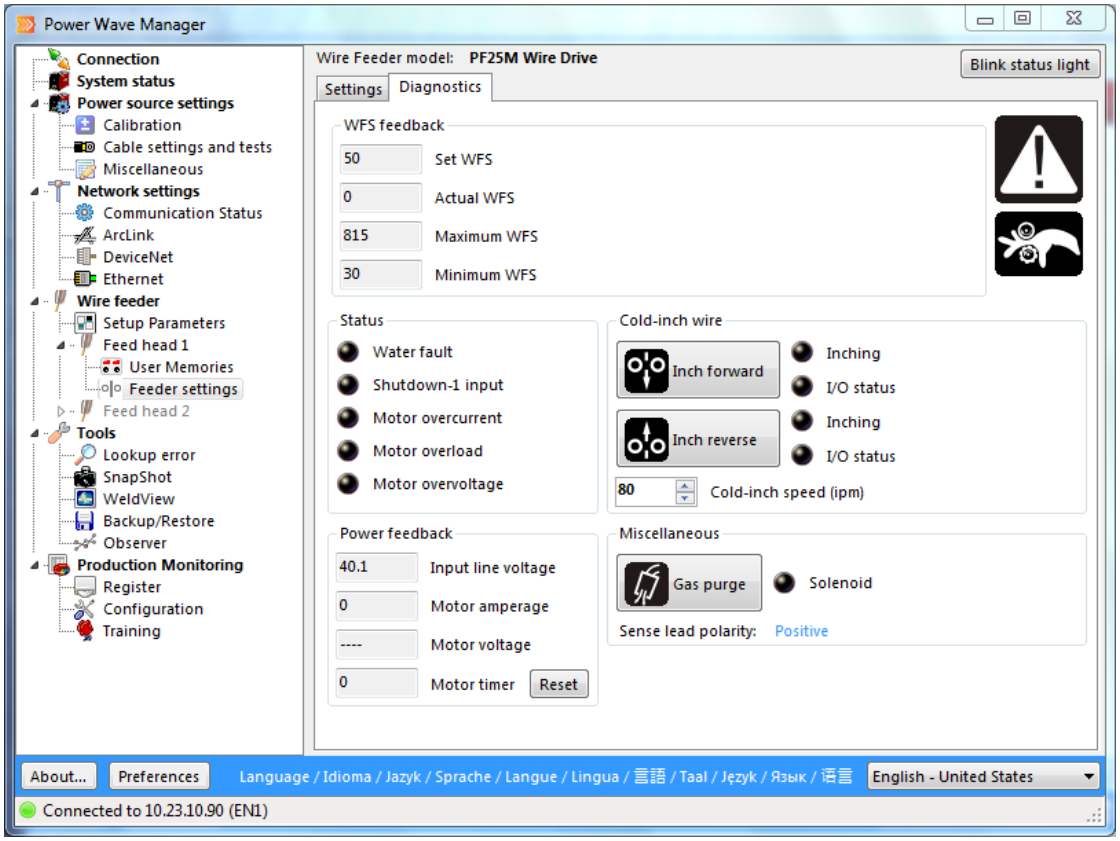



**Figure 9.10 Diagnostics Tab**

**Table 9.2 Fields on the Diagnostics Tab**

| Option | Description |
|---|---|
| *WFS feedback* | The fields in the *WFS feedback* section displays the wire feed speed information coming from the wire feeder. This includes:<br>§ *Set WFS*: This is the wire feed speed that was set in the Weld Profile being used for the weld or that was set manually on the machine by the Weld Operator.<br>§ *Actual WFS*: This field displays the actual speed at which the feeder feeds the wire into the weld.<br>§ *Maximum WFS*: This field displays the uppermost limit to the wire feeder's speed capability. This is the highest speed at which the wire feeder can make a successful weld.<br>§ *Minimum WFS*: This field displays the lowest limit to the wire feeder's speed capability. This is the slowest speed at which the wire feeder can make a successful weld. |
| *Status* | These indicators display the current status of the wire feeder to which you are connected. (This section contains different options than illustrated if using the AutoDrive® SA servo controller.) |
| *Cold-inch Wire* | In the *Cold-inch Wire* section, you can use the **Inch forward** and **Inch reverse** buttons to feed the wire through the feeder without welding. The *Inching* and *I/O status* indicator lights let you know that the machine is in use and the input/output communication status.<br>**NOTE \| Inch reverse may not be available on some machines.**<br>The *Cold-inch speed (ipm)* field allows you to set the speed at which the machine feeds when you click the inching buttons. This defaults from the current speed on the wire feeder. |
| *Power feedback* | The fields in the *Power feedback* section provide you with the power details for the wire feeder so you can keep your eyes on the power as you diagnose. |
| *Miscellaneous* | In the *Miscellaneous* section, the **Gas purge** or **Flux fill** button (depending on your system) allows you to prepare the wire feeder. The *Solenoid* indicator lets you know when the feeder is active when using the button.<br>*Gas Flow Rate* and *Gas Type* fields show you what's in use by the wire feeder. (These options are only available with the Power Feed® 84 with a gas flow sensor installed.)<br>The *Sense lead polarity* field displays the polarity for the machine to which you are connected. |

## Calibration Tab (AutoDrive® S/AutoDrive® SA)

The **Calibration** tab appears only when there is a check mark in the *AutoDrive S/SA* option under **Power source settings** > **Miscellaneous** (page 6.9). This tab allows you to calibrate the connected AutoDrive® S or AutoDrive® SA servo controllers to produce the correct wire feed speed accurately, as measured using an external wire feed speed meter.

The AutoDrive® S/AutoDrive® SA operates using two servo controllers working in a push-pull configuration. Calibration of the unit is critical to its operation. The unit is calibrated after the initial installation, and it generally will not need to be adjusted. However, neglected or improperly calibrated machines may not yield satisfactory weld performance.

**TIP | To ensure optimal performance, you should check the calibration of the AutoDrive® S/AutoDrive® SA wire feed speed yearly.**

**STOP | Buttons on this tab control the wire feeder powered by the Welding Power Source. Be sure to exercise all appropriate safety procedures when performing actions on this tab.**

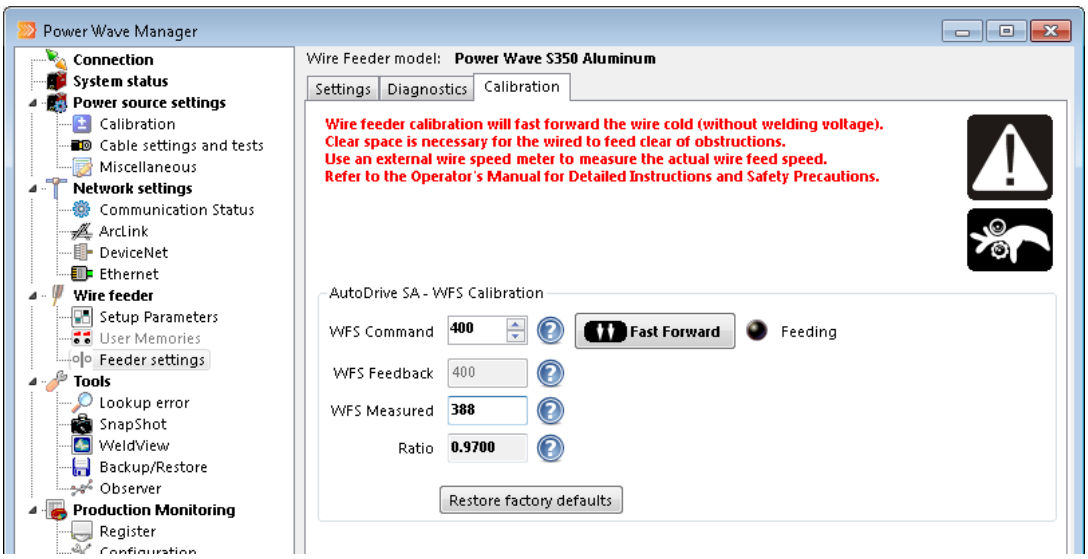



**Figure 9.11 Calibration Tab**

To calibrate the AutoDrive® S/AutoDrive® SA wire feed speed:

| Procedure | Details |
|---|---|
| ***1.*** Point the torch head away from the work piece. | |
| ***2.*** Verify there is wire in the torch. | |

| Procedure | Details |
|---|---|
| ***3.*** Clear any obstructions around the wire and the torch head. | Power Wave® Manager runs the wire cold (without welding voltage). |
| ***4.*** Open Power Wave® Manager. | |
| ***5.*** Connect to the power source. | See page 4.2 for details. |
| ***6.*** Select **Wire feeder** > **Feeder settings** from the navigation tree in Power Wave® Manager. | |
| ***7.*** Click the **Calibration** tab (Figure ). | **TIP \| The** Calibration **tab appears only when there is a check mark next to *AutoDrive S/SA* on the** Settings **tab under** Power source settings **>** Miscellaneous**.** |
| ***8.*** In the *WFS Command* field, enter the wire feed speed you want to use. | This is the speed at which the wire cold feeds. Use a minimum of 200 ipm. |
| ***9.*** Place an external wire feed speed meter on the wire right at the contact tip of the torch. | |
| ***10.*** Click and hold the **Fast Forward** button. | For as long as you hold the button down, the wire feeds at the speed set in the *WFS Command* field. The *Feeding* indicator turns green when active. |
| ***11.*** With the external meter, determine the actual wire feed speed. | **TIP \| To take an accurate reading, wait a few seconds for the external meter to stabilize.** |
| ***12.*** Release the **Fast Forward** button. | Wire feeding stops. |
| ***13.*** Enter the measured wire feed speed in the *WFS Measured* field and press **Enter** on the keyboard. | Power Wave® Manager automatically calculates the offset ratio.<br>**TIP \| If the *WFS Measured* field is blank, the value displayed in the *Ratio* field is the value currently saved or applied in the Welding Power Source.** |
| ***14.*** Click the **Apply settings** button to store the new calibration. | Congratulations! You have calibrated the wire feed speed for the AutoDrive® S/AutoDrive® SA unit.<br>**TIP \| If the calibration does not work properly, click the** Restore factory defaults **button to revert to the original default settings.** |

THIS PAGE INTENTIONALLY LEFT BLANK.

# Tools

The *Tools* section of Power Wave® Manager provides you with the ability look up any error codes you receive from a Welding Power Source, create backup and troubleshooting files and view the weld as it is being made.

## *Lookup Error*

The *Lookup error* section allows you to obtain information about any error code given by a Welding Power Source (Figure 10.1). When a Welding Power Source is in a faulted condition, it flashes an error code using the *Status* light and blinking in red and green. Please refer to the *Operator Manual* for the Welding Power Source for more detailed information on interpreting the error code on the specific power source.

> **TIP** | **The *Lookup error* section is available even if you are not connected to a Welding Power Source.**

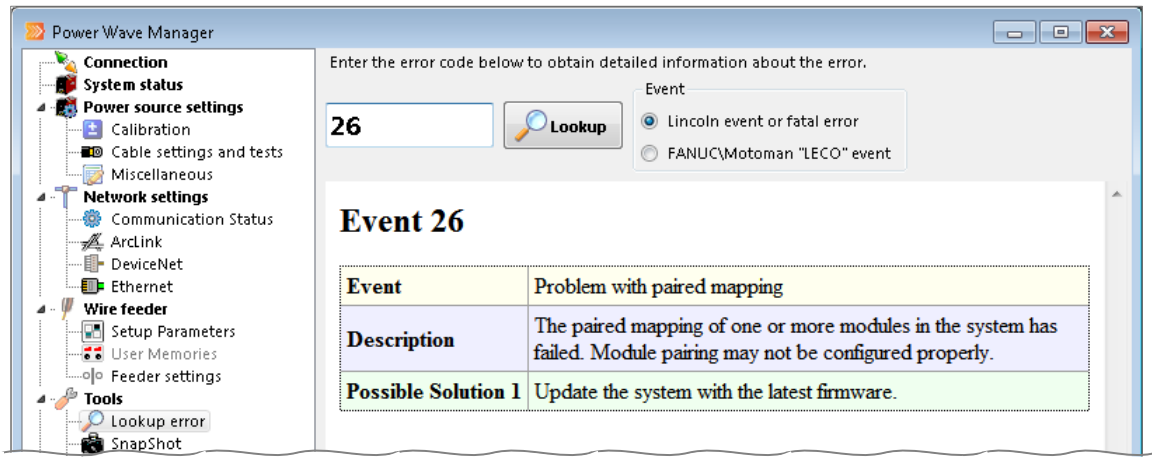



**Figure 10.1 Lookup Error Tool**

To look up a certain error code, choose the type of error from the *Event* options, type in the error code number in the text field and click the **Lookup** button. The system displays a description of the error, as well as possible solutions or a possible course of action to resolve the error.

# SnapShot

A SnapShot is a small file that contains very detailed configuration and troubleshooting information collected from each module in the Welding Power Source, including the User Interface memories. This can help Lincoln Electric Support to troubleshoot any possible issues that cannot be easily resolved.

When a problem or issue occurs with the Welding Power Source, record a SnapShot of the Welding Power Source, clear the logs (in the *System status* section, page 5.1), and attempt to reproduce the issue. If you can reproduce the issue, record another SnapShot and send both files to Lincoln Electric Support for analysis.

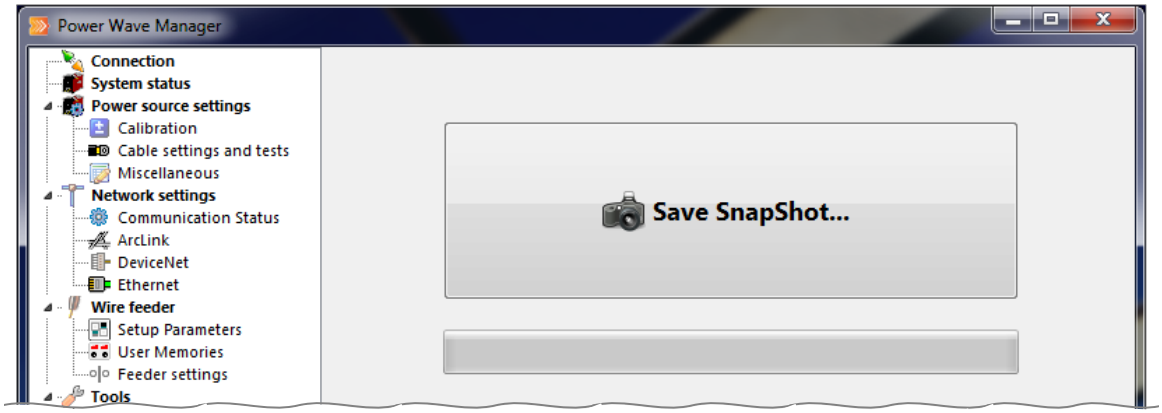



**Figure 10.2 Saving a Troubleshooting File**

To save a SnapShot of the Welding Power Source:

| Procedure | Details |
|---|---|
| ***1.*** Click the **SnapShot** menu option under the **Tools** menu. | |
| ***2.*** Click the **Save SnapShot...** button. | The *Save SnapShot* dialog opens. |
| ***3.*** Leave the default path and click **Save**. | **TIP \| The default path is the directory set under the** Preferences **button (page 4.1).**<br>The system begins generating the file. Depending on the amount of data, this process could take several minutes.<br>Once complete, Power Wave® Manager displays a confirmation that the file was created successfully. |
| ***4.*** Click **OK**. | Once you save the file, you can e-mail it to Lincoln Electric Support for analysis to the e-mail address they provide to you. |

# *WeldView*

WeldView is a diagnostic utility that you should use only under the direction and guidance of Lincoln Electric Technical or Engineering Support. This tool allows you to capture a high-speed trace of a weld performed by your Welding Power Source. The trace is a series of data points that the machine stores while welding. Each record consists of several variables, including amperage and voltage at the time that the record was written. Lincoln Electric can use the weld trace to troubleshoot or fine tune welding performance by examining the waveform of the weld during starting and ending.

> **TIP** | **For collection and monitoring of production data, you should use the Lincoln Electric software CheckPoint™ or Production Monitoring™. These were designed to provide comprehensive details of production welding, along with user-friendly reporting.**

> **TIP** | **If the** Acquire new weld trace **and** Read trace from power source **buttons are disabled, the feature may not be supported by the connected Welding Power Source.**

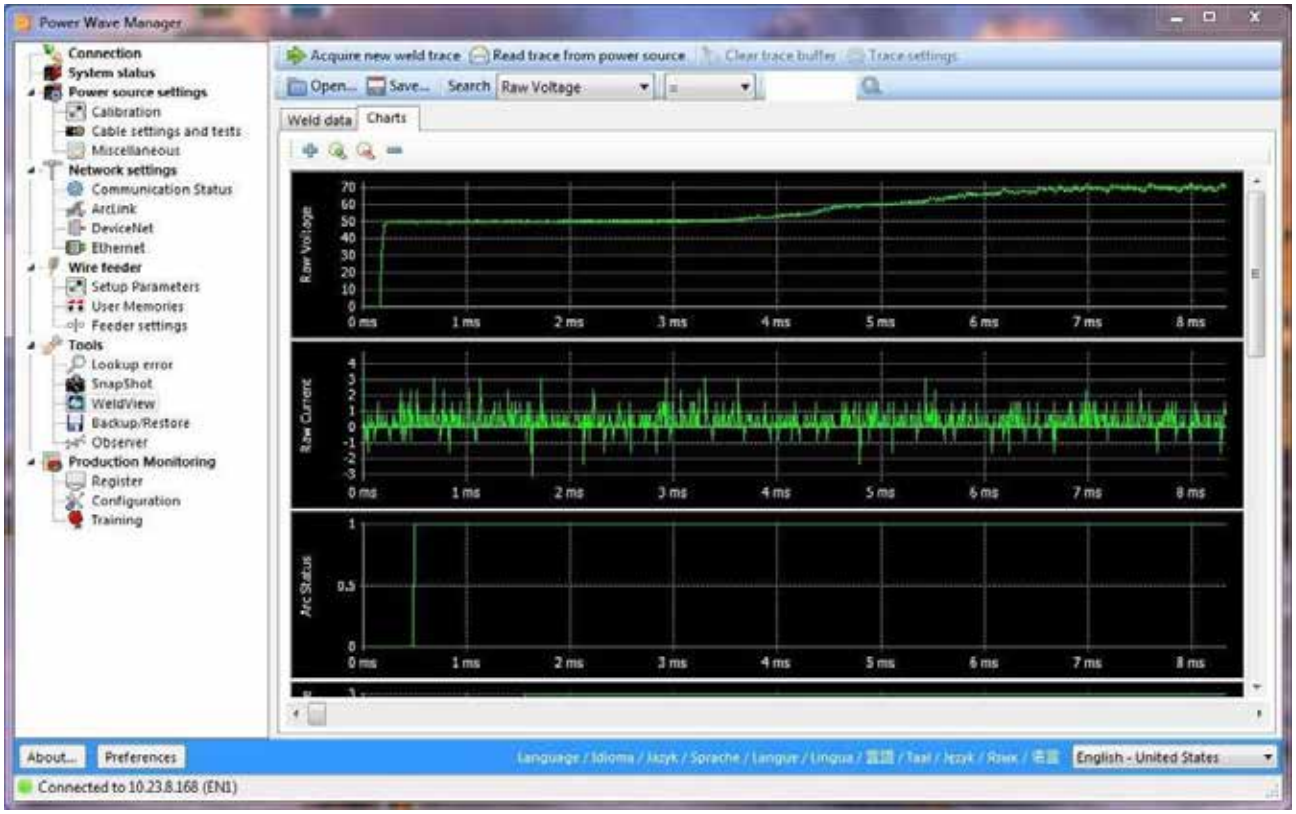



**Figure 10.3 WeldView**

## Creating a Weld Trace

The WeldView Wizard allows you to fully configure the trace before starting it, including the trace frequency, the event that begins the trace (i.e., the trigger event), and if you want to record an extra channel with the trace.

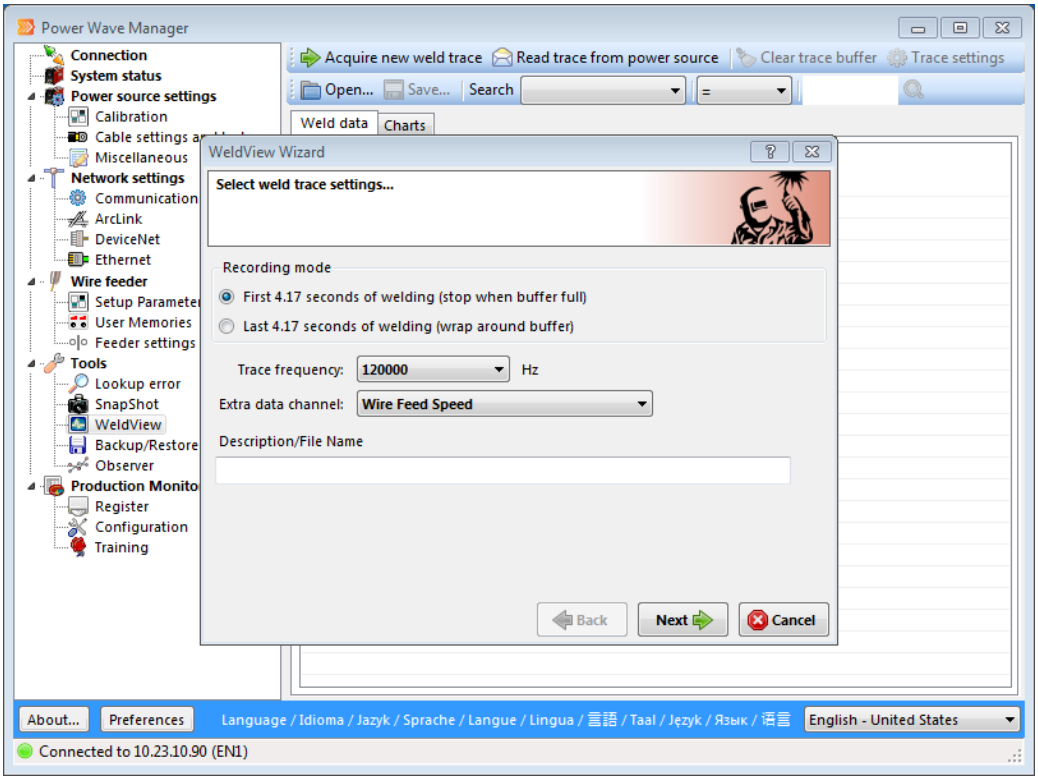



**Figure 10.4 WeldView Wizard**

To capture a weld trace:

| Procedure | Details |
|---|---|
| **1.** Select to **Tools** > **WeldView** from the navigation tree. | |
| **2.** Click the **Acquire new weld trace** button on the top toolbar. | The *WeldView Wizard* window opens to the trace settings step (Figure 10.4). |
| **3.** Choose your trace settings and click **Next**. | The trigger settings step displays.   |

| Procedure | Details |
|---|---|
| **4.** If you want the trace to begin only when a specific event occurs, place a check mark in the *Use trigger* checkbox. | You can skip to step 7 if you do not want to use a trigger. Make sure there is no check mark in the *Use trigger* checkbox. |
| **5.** Select the event from the drop-down. | |
| **6.** Enter the specific value of the event in the text field. | |
| **7.** Click **Next**. | The *Perform weld* step displays. |
| **8.** Make the weld with the power source. | The status light on the Welding Power Source changes to solid green to indicate the machine is currently welding. |
| **9.** Once you complete the weld, click the **Next** button. | The power source transfers the data to Power Wave® Manager and displays it on the **Weld data** and **Charts** tabs.<br>TIP \| **To transfer the data from the power source manually or re-read the last trace made, simply click the** Read trace from power source **button.** |

## Weld Data Tab

On the **Weld data** tab, Power Wave® Manager displays the data collected from the weld trace in tabular form. Scroll through the data to review the information (Figure ).

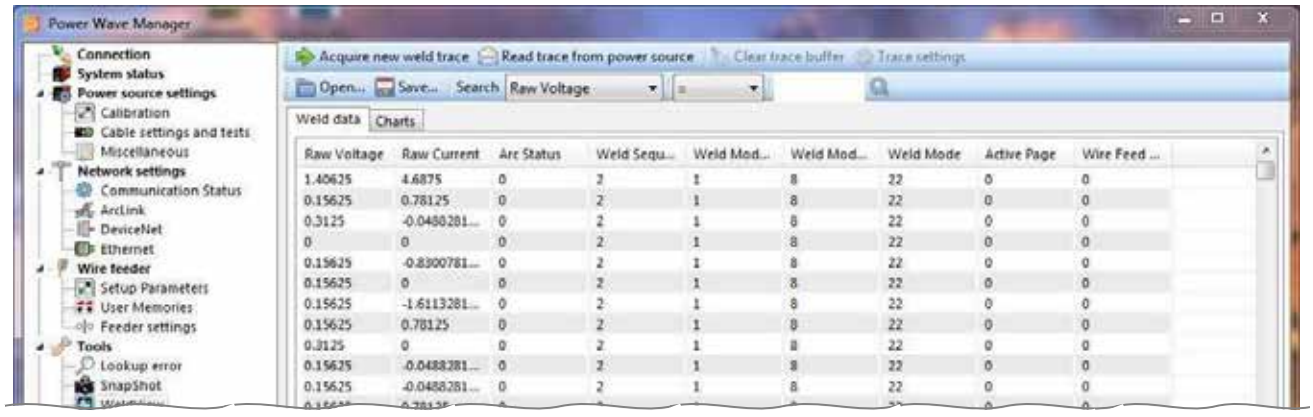



**Figure 10.5 WeldView Data in Tabular Form**

## Charts Tab

The **Charts** tab (Figure 10.3 on page 10.3) displays a line graph for each aspect of the weld you traced, including raw voltage, raw current and more. You can scroll through the charts to review the information. If you want to review the charts in more detail, click the zoom icons. The **Zoom in** icon ( ) displays the

data in smaller segments of time. The **Zoom out** icon ( ) condenses data and displays the time segments in larger segments.

For example, if your chart currently displays one second of data segmented every millisecond and you click the **Zoom in** icon, the chart begins to expand that one second into parts of a second. When you click the **Zoom out** icon, the display condenses again to show you the data segmented every millisecond. (Displays vary depending on the weld data.)

You can also click the **Max Zoom** icon ( ) to quickly display the most time segments or click the **Min Zoom** icon ( ) to view the fewest time segments.

# Backup/Restore

The *Backup/Restore* section of Power Wave® Manager allows you to save Welding Power Source settings (e.g., memory configuration, lockout parameters, and network settings) to a backup file. You can use this file to restore the saved settings at a later time to the same Welding Power Source or to a different power source (e.g., if you want to configure each power source the same way).

## Backing Up a Power Source

The **Backup** tab (Figure 10.6) provides you with the list of information in various categories that you will save when you click the **Backup** button. Click through the sub-tabs to see what the backup file could contain. The backup file will include the information if that information exists on the Welding Power Source.

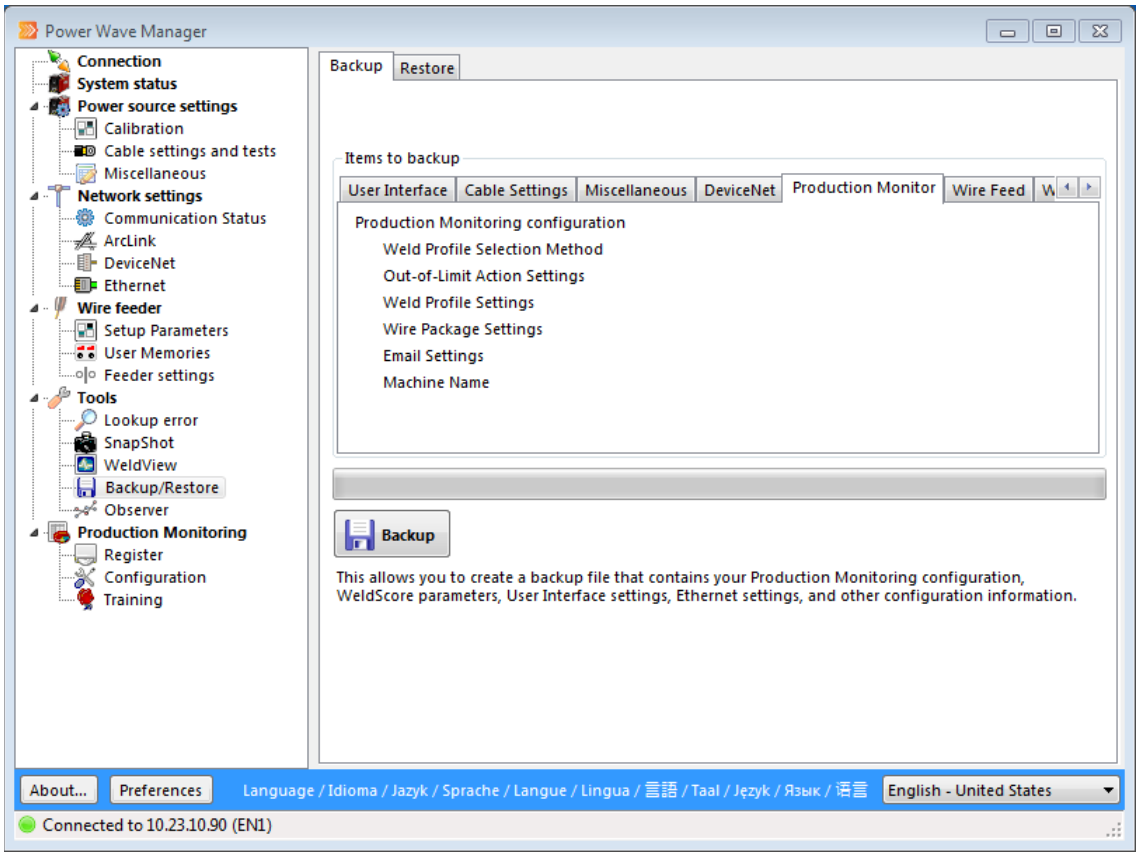



**Figure 10.6 Backup Tab**

To create a backup of the Welding Power Source to which you are currently connected:

| Procedure | Details |
|---|---|
| ***1.*** Click the *Backup/Restore* menu item. | |
| ***2.*** On the **Backup** tab, click the **Backup** button. | The program prompts you for a location where you would like to save the file. The default location is the path you established under the **Preferences** button (page 4.1). The file name defaults to the serial number of the control board in the Welding Power Source plus the current date and time. |
| ***3.*** Click **OK**. | The system creates the backup file. The backup could take a few moments. |

## Restoring a Backup

You can use a backup file to restore the same power source to a previous state, or you can use a backup file to quickly configure another power source as you set up your production line. When you use a backup file, you choose the settings you want to restore, and the process overwrites the existing settings on the connected power source.

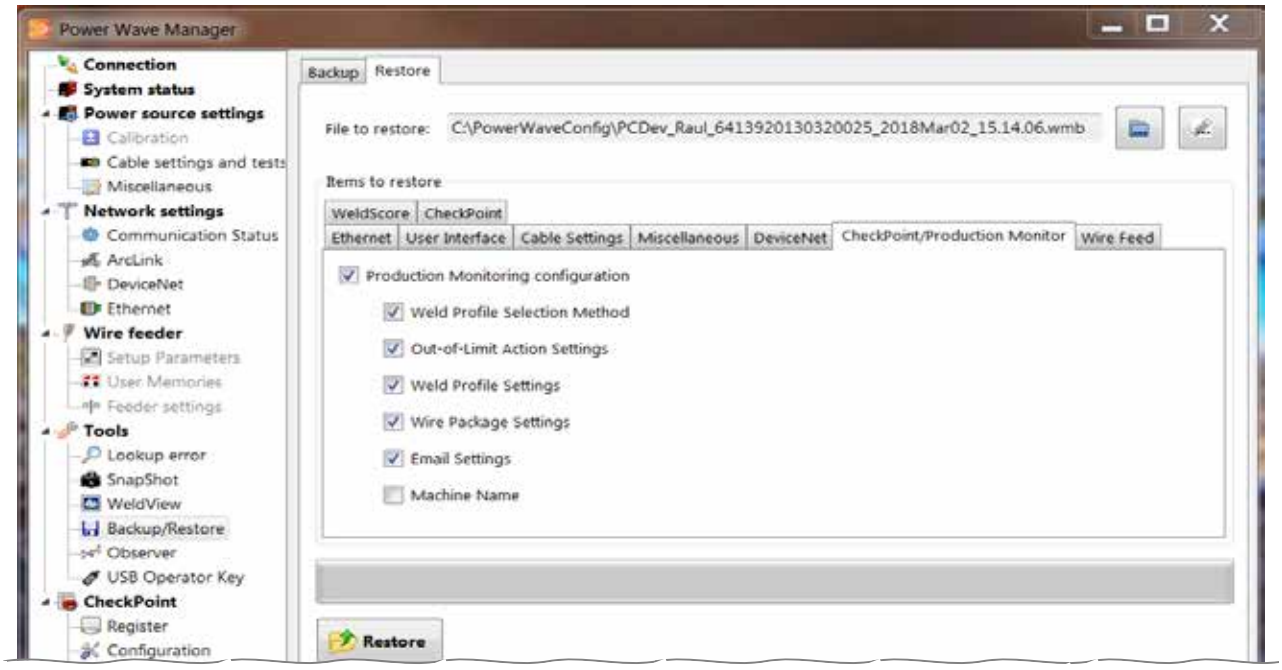



**Figure 10.7 Restoring to a Backup File**

To load a settings file and overwrite the existing settings on this Welding Power Source:

| Procedure | Details |
|---|---|
| ***1.*** Click the *Backup/Restore* menu item. | |
| ***2.*** Click the **Restore** tab. | The system displays the categories of settings you can restore. |
| ***3.*** Click the **Browse** icon ( ) next to the *File to restore* field. | The *Open file* dialog appears. |
| ***4.*** Navigate to and select the backup file you want to load into this power source. | The file extension for a backup file is WMB (Figure 10.7). |
| ***5.*** Click **Open**. | The system loads the file and displays the settings you can restore. |
| ***6.*** Click the tab for the category of settings you want to restore. | |
| ***7.*** Place a check mark next to each setting you want to upload to the connected power source. | **STOP \| Use caution when restoring the *TCP/IP configuration* option. Only one machine can have a specific IP address on the network. Restoring the same IP address to more than one machine can cause problems on your network. We recommend to restore *TCP/IP configuration* only to the machine from which it was originally backed up.**<br>**After an IP address is restored, the machine must be reset in order for the setting to take effect. Be sure the machine is not welding when you reset.** |
| ***8.*** Repeat steps 7 and 6 for each category containing settings you want to restore. | |
| ***9.*** Click the **Restore** button. | Power Wave® Manager overwrites the selected settings on the connected power source with the new settings.<br>**STOP \| Depending on the categories and settings you choose to restore, the Welding Power Source may reset and interrupt welding. Be sure the power source is not currently welding.** |

### Lincoln Electric Memory USB Drive

If you use a USB drive to back up a User Interface device, the **Backup/Restore** section contains additional buttons that allow you to back up and restore from the USB drive. When you use these buttons, the functionality of this section automatically uses the USB for the destination/source for the backup/restore.

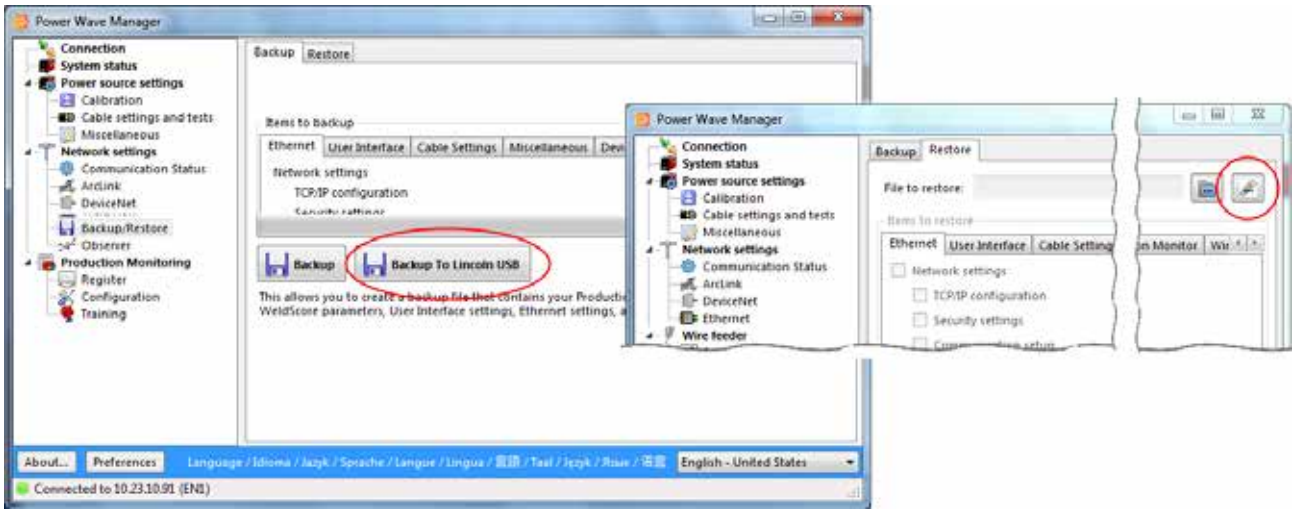



**Figure 10.8 Additional Buttons for Use with a USB Drive**

# *Observer*

While WeldView gives a detailed view of a portion of a weld with a short duration, the Observer tool graphs welding feedback at a slower rate over the course of several entire welds. When you begin a weld, Power Wave® Manager displays a real-time view of the weld. The Observer tool also allows you to change some basic welding parameters including the *Group Schedule*, *Weld Mode*, *Workpoint*, *Trim* and other values.

### Charts Tab

Power Wave® Manager produces the plots on the **Charts** tab by periodically reading feedback values from the Welding Power Source as it welds (Figure 10.9). The data updates whenever the Welding Power Source output is on. The graphs display *Amperage*, *Voltage*, *Wire Feed Speed*, *WeldScore®* (if available), and *Global Scale Factor*.

> **TIP** | **The checkboxes at the bottom control which graphs you can see on the** Charts **tab. Remove the check mark to hide the graph. Replace the check mark to display it again.**

You can click the **Schedule 1A** and **Schedule 1B** tabs to view the data for each schedule. (For those with multiple feed heads, a drop-down appears above the **Schedule** tabs to allow you to view the appropriate weld procedure group.) See page 10.12 for more details on using Power Wave® Manager to control the active schedules on the Welding Power Source.

The *Information* section of the **Charts** tab displays the status of various system components connected to this Welding Power Source (if supported). When the indicator is green, this means the status is good. If there is a fault, the respective gray indicator changes to red.

The *Arc detect* indicator changes to green when it detects an arc and yellow if the output is on but the system cannot detect any arc (e.g., when there is not enough voltage to create an arc).

> **NOTE | The *Welding Outputs* section displays the last numerical value being plotted on each selected chart to the left.**

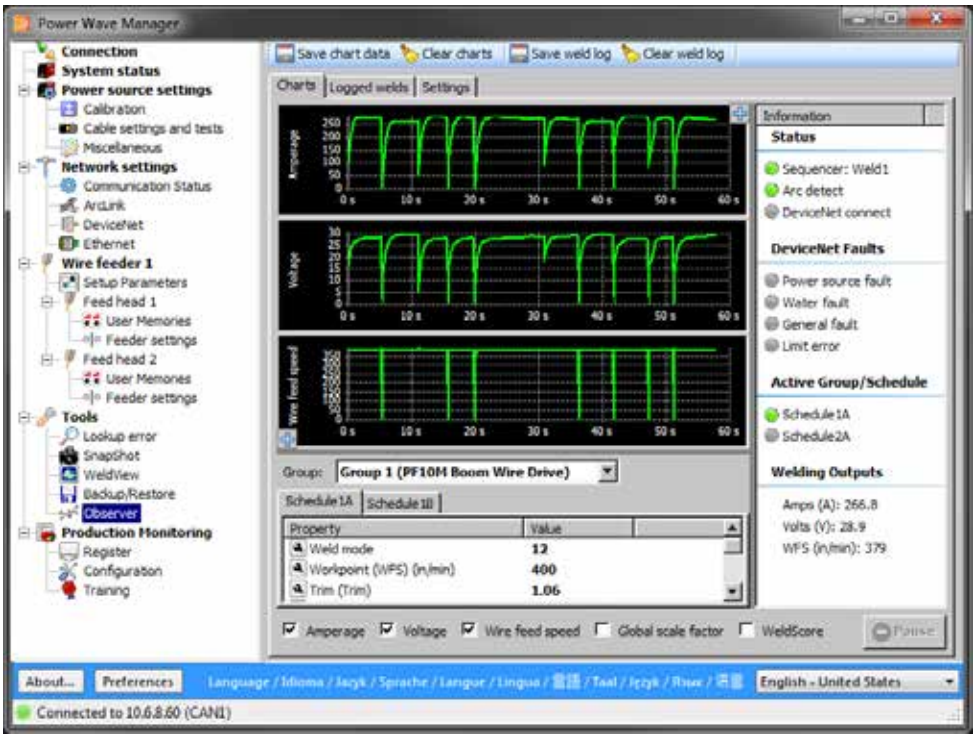



**Figure 10.9 Observer Tool**

> **TIP | To save the data in the charts to a tab-delimited text file, click the** Save chart data **button on the top toolbar. Click the** Clear charts **button to clear the data from the screen and start fresh.**

> **TIP | Click the plus icon ( ) at each corner of the chart to collapse the panel next to it (if available).**

## Logged Welds Tab

The **Logged Welds** tab displays a list of the welds that were made during the Observer session. The Observer session begins when you click into the *Observer* section of Power Wave® Manager. The session ends when you close Power Wave® Manager or disconnect the power source. Each weld that you create during this time appears on the **Logged welds** tab when the Welding Power Source's output turns off after you complete the weld.

> **TIP** | **The Observer tool samples welding data from the Welding Power Source every 200 – 250 ms, which can miss rapid arc status transitions. For details on rapid arc logged welds, use** Format 3 **under** Production Monitoring **>** Register **>** Diagnostics **(page 11.4) or review logged welds using the Production Monitoring™ or CheckPoint™ software.**

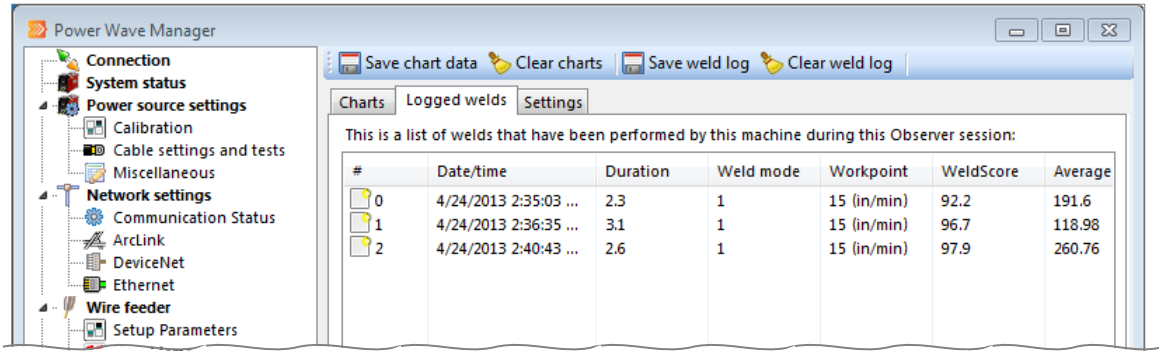



**Figure 10.10 Logged Welds Tab**

> **TIP** | **To save the log to a tab-delimited text file, click the** Save weld log **button on the top toolbar. To clear the log, click the** Clear weld log **button.**

**Table 10.1 Columns on the Logged Welds Tab**

| Field | Description |
|---|---|
| *Date/time* | This column represents the date and time that the weld began. |
| *Duration (s)* | This column represents the length of time (in seconds) from the time listed in the *Date/time* column to the time the Welding Power Source stopped welding. |
| *Weld mode* | This column displays the number of the Weld Mode used for this weld. |
| *Workpoint* | This column displays the value of the workpoint variable for this weld. By default, the engineering units display in imperial format. If you would like Power Wave® Manager to convert and display the units in metric, see page 4.1 for details on setting your preference. |
| *WeldScore* | The application displays the WeldScore® for this weld. A value appears here only if you used a Weld Profile for this weld and there was a training model created for that Weld Profile. |
| *Average amps* | Hundreds of times per second, the Welding Power Source takes a measurement of the arc current being used while the welder is active for this weld. When the weld is complete, the power source averages those measurements together. The *Average amps* column displays that average value for this weld. |

| Field | Description |
|---|---|
| *Average volts* | Hundreds of times per second, the Welding Power Source takes a measurement of the arc voltage being used while the welder is active for this weld. When the weld is complete, the power source averages those measurements together. The *Average volts* column displays that average arc voltage value for this weld. |

## Settings Tab

The **Settings** tab allows you to identify which weld sequencer states are modified when you change a welding setting on the **Charts** tab (such as *Workpoint* or *Trim*). Place a check mark next to the appropriate states.

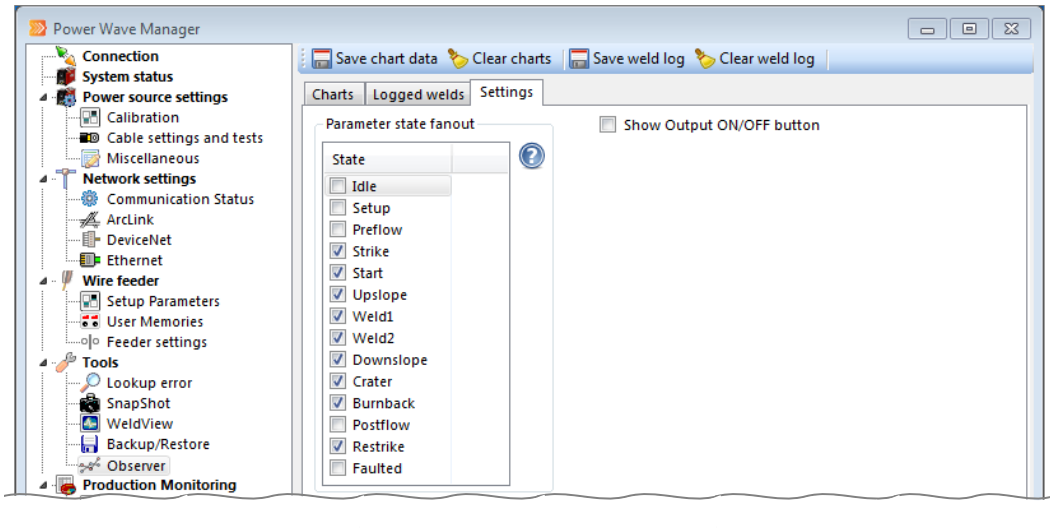



**Figure 10.11 Settings Tab**

If you want to control the machine's output from within Power Wave® Manager, place a check mark next to the *Show Output ON/OFF button* option. This displays a button in the toolbar allowing you to turn the output of the Welding Power Source on or off. (The button will also display the schedule that is currently active.) A **Make Active** button also appears on the **Charts** tab above the **Schedules** tabs allowing you to change which schedule is active on the power source. Choose the appropriate tab and click **Make Active**.

For safety, you must press and hold the **Ctrl** key on the keyboard while clicking the **Turn output ON** button or the **Make Active** button. This prevents accidental changes.

> **STOP | Use extreme caution when controlling the output from Power Wave® Manager. The output does not automatically shut off if you change screens or exit the program.**

# *USB Operator Key*

The USB Operator Key form is a tool that provides you the ability to create and save operator keys on a USB drive that can later be used to unlock a Power Source for a designated operator. The operator keys can only be created through Power Wave® Manager.

## Operator Keys

The Operator Key is a single file that can be used to store an Operator ID (Name), the USB Serial Number of the USB drive that the key was made for and a list of Power Sources that the key can be used on (if you want to enable that). The operator key will only be accepted if the serial number in the file matches the serial number of the inserted USB drive. The Operator key is encrypted and includes a validation section to prevent unauthorized parties from modifying the file outside of PWM.

This file differs from the license key in that the license key only contains a USB serial number and the Silicon Serial Number for a single UI. For a single USB drive to unlock a large number of wire feeders, a large number of license keys would need to be created and distributed. Conversely, a single Operator key can contain the same list of authorized Power Sources in addition to other data.

In order to create an operator key using PWM, the USB drive must be inserted in the PC. A connection to a Power Source is not required in order to create a basic operator key that contains the Operator ID and USB serial number or to remove or modify information from an existing key.

> **NOTE | In order to add a Power Source to an Operator Key, PWM must be connected with a live connection to the desired Power Source.**
>
> **NOTE | Any Power Source you wish to add an Operator Key for will need to be named. This can be done by connecting to the Power Source and selecting the *CheckPoint* | *Register* tab and then setting the Power Source name and then clicking *Apply Settings* button.**

The name of the operator key can be modified by the customer without invalidating the file as long as the file extension remains ".opr". Only one operator key is allowed on each USB drive. Power Wave Manager will not permit more than one operator key from being saved to a USB drive. If the UI panel discovers more than one operator key on the USB drive, all keys will be ignored.

## License Key Lockout

To allow for maximum flexibility for customers to use Operator and License keys as they see fit, the Power Source can be unlocked by either Operator or License keys. The Operator Key will always unlock any of the Power Sources that are listed in the Operator Key.

If the Machine Name is not found in the Operator key, the UI will search for a matching old style License key. In this case, if there were multiple locked wire drives connected to the same Power Source, only the UI from the license key will be unlocked. If the customer wishes to migrate away from separate license keys, setting the "Prevent use of External License Key File" option in the Operator key will prevent the UI from searching the separate license keys.

## System Impact

The USB operator key feature saves operator specific data on a USB Drive, allowing the data to follow the operator to the machine that they are working on. When the operator's USB drive is inserted in a wire feeder, the Operator ID from the drive is loaded into the Power Source, allowing the performed welds to be traced to that operator. When the USB drive is removed, the operator ID in the Power Source is cleared. The USB drive should be removed from the UI before powering off the system.

The UI will clear the Operator ID that is reported to checkpoint if the UI had previously overwritten the Operator ID. If a wire feeder is not paired with a USB object, the UI will not set or clear the Operator ID.

The USB Operator Key form is displayed below in Figure 10.12.

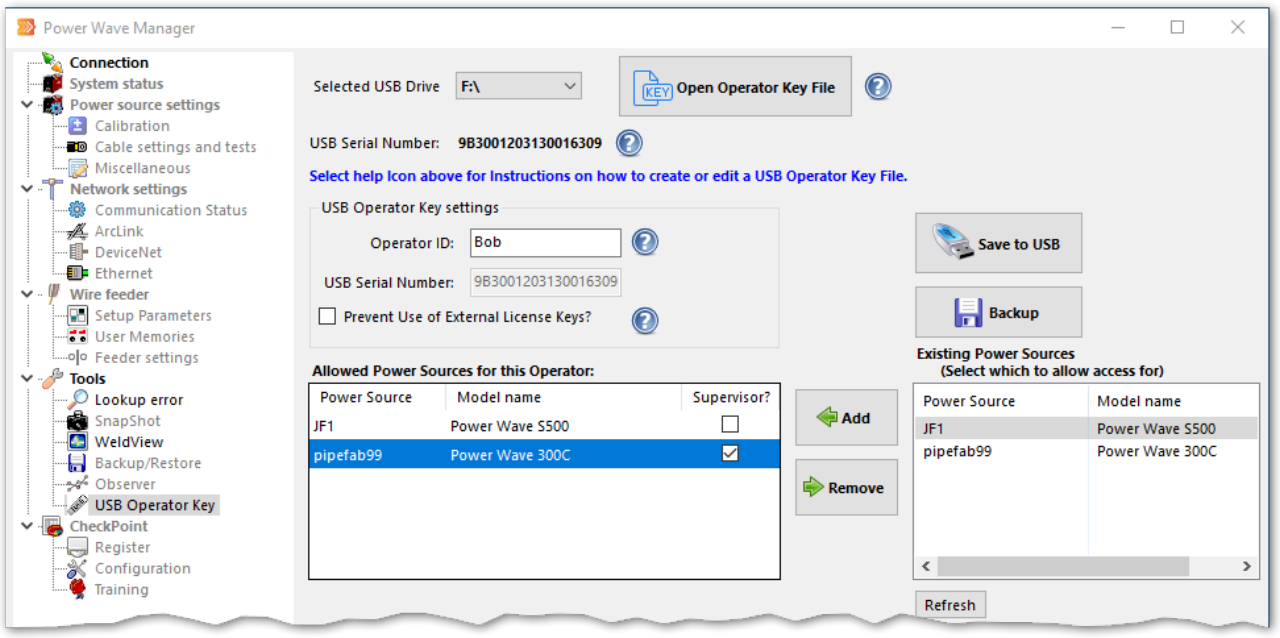



**Figure 10.12 USB Operator Key Tab**

**STOP | You will need to use Power Wave® Manager to create and modify USB Operator Keys. You cannot simply copy Operator files from one USB drive to another since the Serial number embedded in the Operator File will not match that of the USB Drive.**

**When the operator inserts a USB Drive into a Power Source that does not contain a valid operator key, the dot matrix display will display the following message for two seconds.**

```
|    USB Key     |
|  Not Accepted  |
```

The steps to create or modify a USB Operator Key are provided in the following procedural table:

| Procedure | Details |
|---|---|
| ***1.*** Click the *USB Operator Key* menu item. | Optionally, you can first connect to a Power Source then click the *USB Operator Key* menu item. |
| ***2.*** Insert the USB Key into the PC and then select that USB Drive. | |
| ***3.*** Click the **Open Operator Key File** icon (  ) to open an existing key file or simply enter new USB Operator Key settings for a new key. | Once the key is inserted and/or a USB drive is selected the form will automatically open the existing operator key file and display its information in the form. |
| ***4.*** Enter new or modify existing information in the form such as Operator ID (or Operator Name) for this key. Select the checkbox for "*Prevent Use of External License Keys*?" if old style license keys are to be ignored and thus the old keys will not unlock access to a power source if this is checked. | Operator Name will initially be pulled from the connected Power Source. The name cannot contain any spaces, tabs or whitespace. |
| ***5.*** Select the power source you wish this user to have access to and then click Add (  Add ) | Add any Power sources you wish to allow the operator access to by adding the name from the *Existing Power Sources* list view to the *Allowed Power Sources for this Operator* list view.<br>TIP \| If you do not see any Power Sources listed in the *Existing Power Sources* list then you will need to connect directly to it in order for it to show up in the list. |
| ***6.*** To limit the use of the power source to supervisor level, check the box in the **Supervisor** column. | |
| ***7.*** If you wish to not allow (or no longer allow) a user to have access to a Power Source, then select it in the *Allowed Power Sources for this Operator* and click Remove button (  ). | Remove any power sources you do not wish to allow the operator access by removing the name from the *Allowed Power Sources for this Operator* list view. |
| ***8.*** Click the **Save to USB** button (  ) to save your new or modified settings to the USB Drive. | Power Wave® Manager first removes all other key files in the USB folder before saving the selected settings to the new key file. Settings are saved with a filename equal to the Operator's ID and an "opr" file extension. Only one (1) OPR file can exist in the USB Drive folder. |
| ***9.*** Click the **Backup** button (  ) to back up your new or modified settings locally to your hard | Power Wave® Manager can back up your key file locally in case the USB stick or key file ever becomes damaged or lost. In that case, you can quickly |

| Procedure | Details |
| --- | --- |
| drive or networked drive. | recreate this USB operator file to a new USB Key in by first opening this backup file and then selecting the new USB drive and then selecting *Save To USB*, which will save your file to that new USB drive. |

THIS PAGE INTENTIONALLY LEFT BLANK.

# CheckPoint™

You use the *CheckPoint* section of Power Wave® Manager to help you configure the Production Monitoring™ or CheckPoint™ software on this Welding Power Source (whichever is applicable). You also use this section to configure Weld Profiles and create training models for the Welding Power Source.

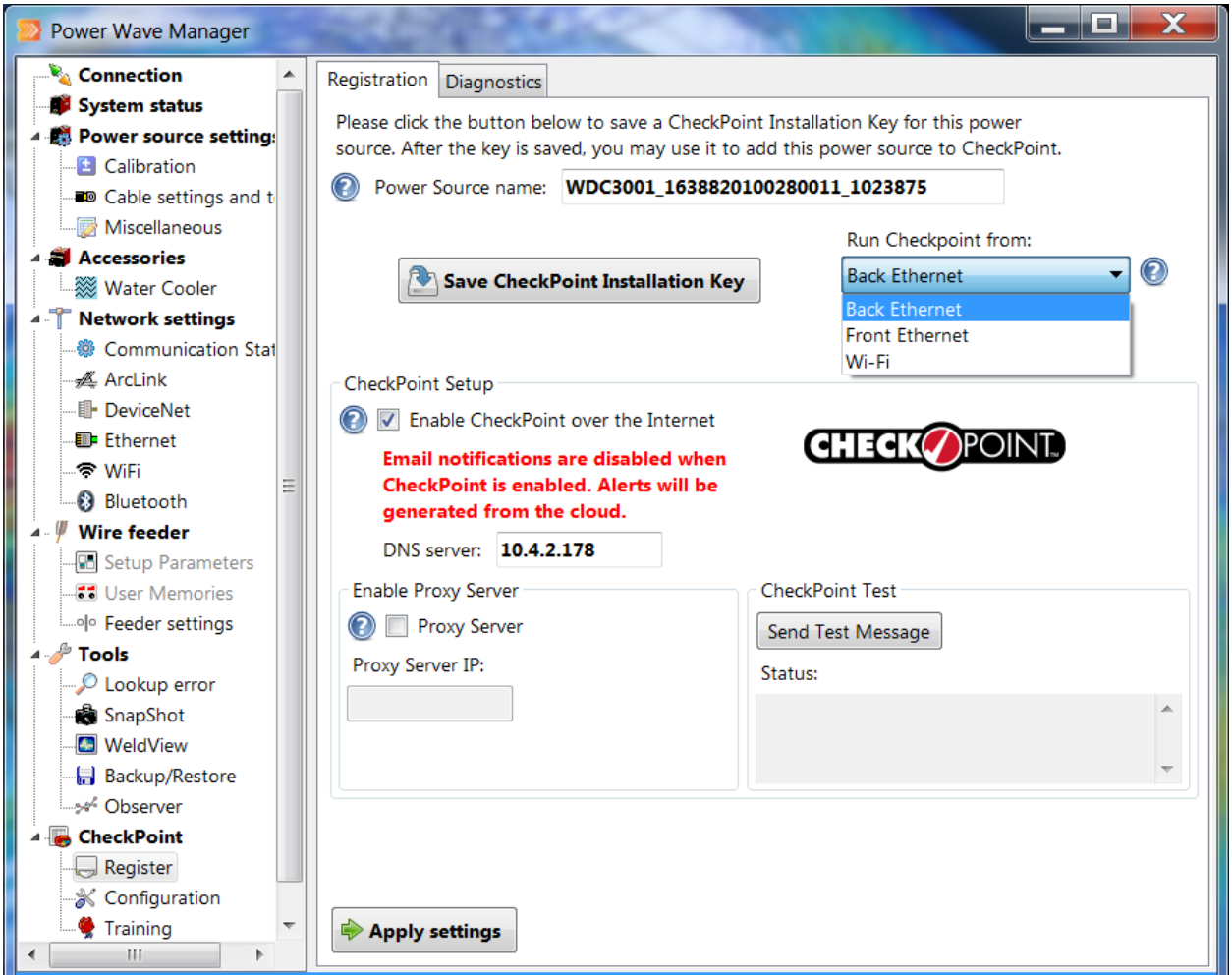



**Figure 11.1 Installation Section**

> **NOTE |** **If you do not see the *CheckPoint* section in the navigation tree, you probably have an older version of Power Wave® Manager. See page 3.4 for information on installing the latest version.**

# Register

The *Register* section in Power Wave® Manager allows you to perform some of the necessary installation procedures for the Production Monitoring™ and CheckPoint™ applications, as well as review the current welds in the memory of the Welding Power Source. For more information on either of these applications, refer to the *Production Monitoring™ User Manual* (IM8001) or the *CheckPoint™ User Manual* (IM8000), whichever is relevant for your power source model.

## Saving an Installation Key File

Each individual power source has a unique installation key file. The system uses these files to register the equipment in Production Monitoring™ or CheckPoint™. The steps below walk you through how to save the installation key file for the Welding Power Source. Each Welding Power Source you add to Production Monitoring™ or CheckPoint™ needs its own key file.

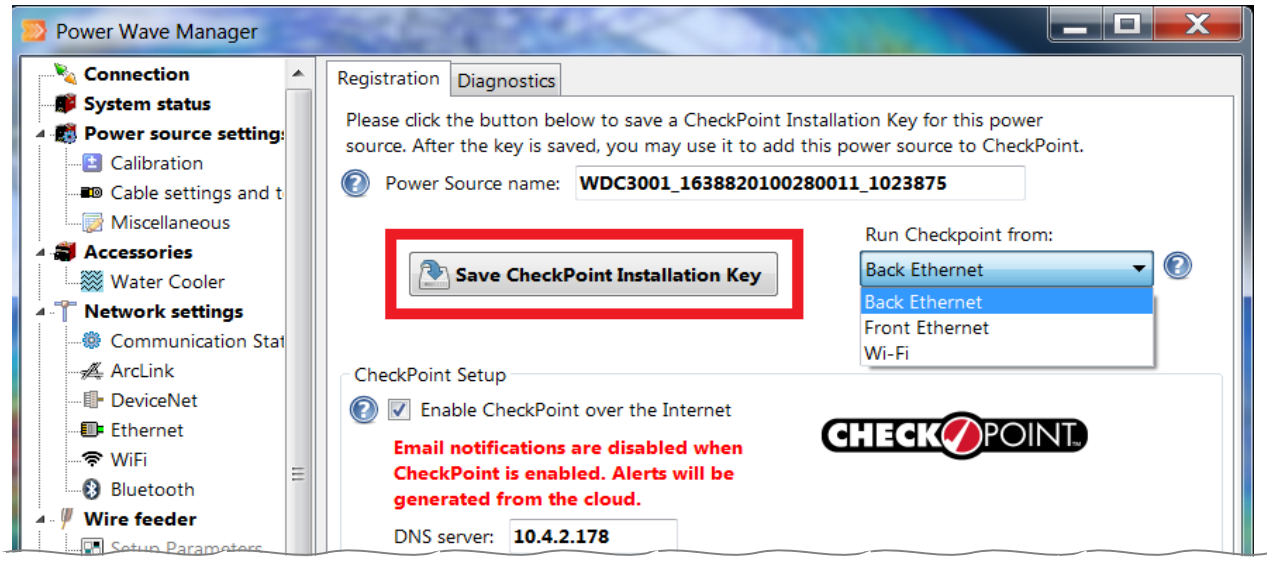



**Figure 11.2 Save an Installation Key File**

On the **Registration** tab of Power Wave® Manager (Figure 11.2), if Wi-Fi module is present you will be presented with a combination box to select the port that Checkpoint will be running over as *Back Ethernet*, *Front Ethernet* or *Wi-Fi.* Select the correct port and then simply click the **Save CheckPoint Installation Key** button and save the file on your computer or network. Close Power Wave® Manager when finished.

> **STOP | It is recommended that you do not change the text in the *Power Source name* field, especially after creating files from the power source (e.g., training files or backups). Power Wave® Manager uses the *Power Source name* to organize and name weld training, backups, SnapShot files, weld logs, calibration logs, and more. If you change a name, you will have to find and load files manually.**

## Run CheckPoint From

When a Wi-Fi K4352-X kit is present in your system, you are presented with a combination box which displays the 3 available options or communication ports to choose from. To change this setting, select the desired port (Back Ethernet, Front Ethernet or Wi-Fi) to run CheckPoint™ from and then click the **Apply Settings** button. The port will need to have been setup on an existing network (with internet access) in order for Production Monitoring/ CheckPoint™ to work correctly. To verify this is setup correctly with access to the CheckPoint™ server, simply click the **Send Test Message** button in the Checkpoint Test section as shown in Figure 11.3 and if the return states '200 OK' then the communication port is verified.

## CheckPoint™ Setup

The options in the *CheckPoint Setup* section of this tab allow you to enable CheckPoint™ for the Welding Power Source to which you are currently connected and to verify that connection. For more in-depth details on setting up CheckPoint™, please refer to the *CheckPoint™ User Manual* (IM8000).

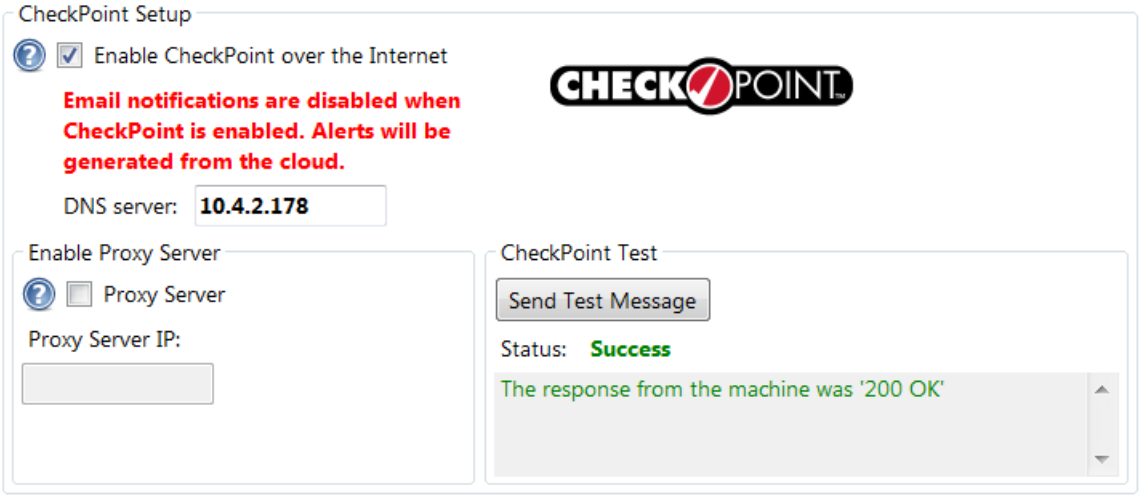



**Figure 11.3 CheckPoint Setup Tab**

## Diagnostics Tab

The **Diagnostics** tab provides you with a way to view a list of welds that the power source currently has in its memory since the last time it powered on (the *Number of welds in memory* field), as well as a way to reset the machine if there is an *Alarm Latch* detected from an out-of-limits condition (click the **Reset fault** button). At the top of the tab, Power Wave® Manager displays the current status of the monitoring software on the power source.

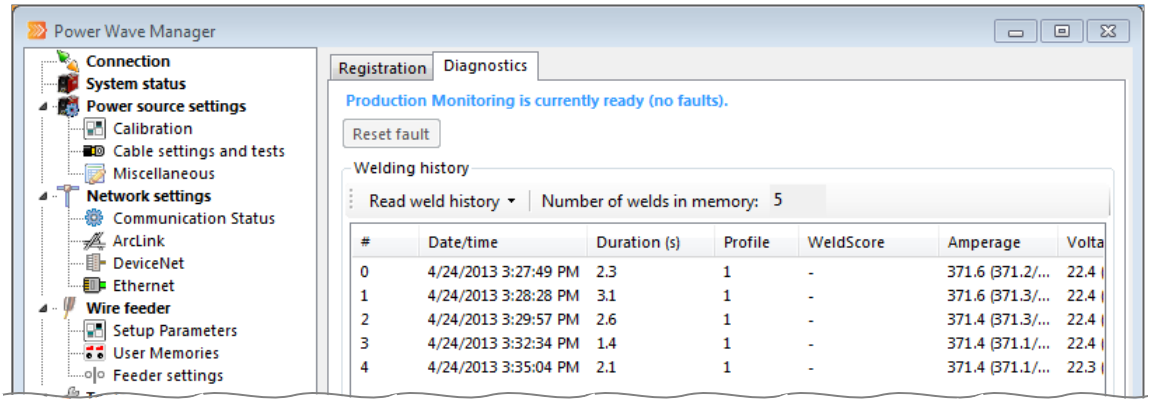



**Figure 11.4 Diagnostics Tab**

You can view the list of welds in a few different formats, depending on your Welding Power Source. From the **Read weld history** drop-down menu, simply select the highest number format that works with your Welding Power Source:

- **Format 1** displays basic information about each weld.
- **Format 2** includes more detailed information about each weld.
- **Format 3** includes the most information about each weld, including WeldScore® and part serial numbers.

# *Configuration*

The *Configuration* section allows you to set up the Weld Profiles needed on this Welding Power Source, set up e-mail notifications from the power source, manage the consumables used by the power source and more.

> **NOTE | When you finish changing configuration options on one or more tabs, be sure to click the** Apply settings **button to commit your changes. Otherwise, you will lose your new settings.**

## Weld Profiles

One of the principal goals of Production Monitoring™ or CheckPoint™ is to report on welds that are outside of user-defined limits with respect to WeldScore®, current, voltage, wire feed speed and duration. This goal would be simple to implement if the Welding Power Source were to perform only one type of weld over and over. However, in practical applications, this is not the case. The assembly of many different industrial components requires welds of varying type and length.

Weld Profiles allows the Welding Power Source to apply different limit settings for each weld that is performed on a certain part. A Weld Engineer creates a Weld Profile for each weld needed to make a part. The Weld Profile configures the power source to complete a certain type of weld within certain limits needed to obtain a specified level of quality. The Weld Profile is selected through a system controller, user interface or other device prior to initiating each weld, as required by the production sequence.

As an example, consider a part that requires 10 different welds for proper assembly. The Weld Engineer begins by configuring 10 of the available Weld Profiles, with proper limit settings for each of the different welds. The Weld Operator can then begin welding the part, selecting the proper Weld Profile for each of the 10 welds.

There are several ways of selecting the Weld Profile:

- Based on welding set point
- Through DeviceNet (using a PLC)
- Through an ArcLink®-compatible controller
- Through memory buttons on the power source's User Interface

The Welding Power Source can compare the limits stored in a Weld Profile to the real-time data values collected while performing a weld and take various actions if the weld exceeds these limits (page 11.6).

Power Wave® Manager provides up to 32 Weld Profiles on supported second-generation Welding Power Sources and up to 200 Weld Profiles on some supported third-generation power sources. In order to make use of the 200 Weld Profiles on third-generation Welding Power Sources, be sure you have the latest version of the Welding Power Source firmware (page 3.1) and the latest version of the Power Wave® Manager software (page 3.4).

## Weld Profile Selection Tab

The **Weld Profile selection** tab allows you to configure how this Welding Power Source chooses the Weld Profile to use for a weld. Table 11.1 explains each option in more detail. Simply choose the appropriate option and click the **Apply settings** button.

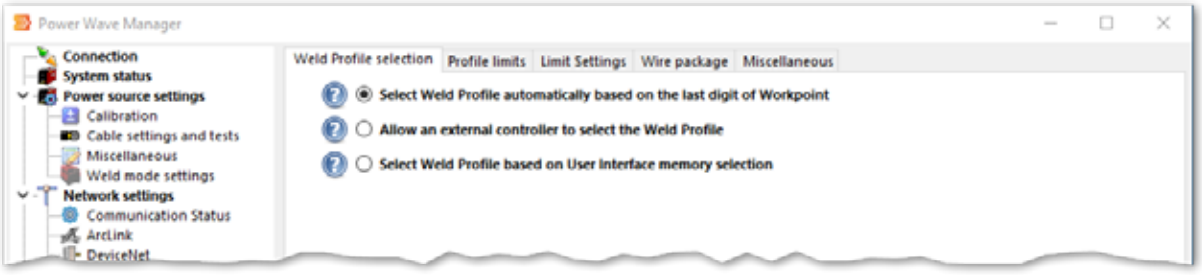



**Figure 11.5 Example Weld Profile Selection Tab**

> **TIP** | **If an option does not appear on the** Weld Profile selection **tab, the Welding Power Source to which you are connected does not support that feature.**

**Table 11.1 Options on the Weld Profile Selection Tab**

| Field | Description |
|---|---|
| *Select Weld Profile automatically based on the last digit of the Workpoint* | When you choose this option, the last digit of the welding set point becomes the Weld Profile number currently in use.<br><br>For example, if the welding set point is set to 125, the Power Wave® will use Weld Profile 5 for the given weld. If the last digit of welding set point is zero (0), the Power Wave® will use Weld Profile 10.<br><br>With this method, the user can access only 10 of the available Weld Profiles in Power Wave® Manager, constricting procedure adjustments. Despite these limitations, this method is simple and effective, and may be the preferred choice for many applications. |
| *Allow an external controller to select the Weld Profile* | When you choose this option for selecting the Weld Profile, you tell the Welding Power Source to provide an external controller (e.g., DeviceNet controller such a PLC or an ArcLink® controller FANUC® RJ3iB v6.4) with direct access to all Weld Profile numbers on the power source. The controller must be one that communicates to the power source over a DeviceNet or ArcLink® network. |
| *Select Weld Profile based on User Interface memory selection* | When you choose this option, you have configured the Welding Power Source to use the memory buttons on the connected User Interface to select the Weld Profile.<br><br>This method offers ease of use and straightforwardness in selecting the Weld Profile, but the number of Weld Profiles that can be selected are limited by the number of physical buttons on the User Interface. For example, if there are only six memory buttons on the User Interface, the Weld Operator can only choose from six Weld Profiles.<br><br>With this configuration chosen, if the Weld Operator does not choose a memory button before performing the weld, the power source uses the last Weld Profile by default. On second-generation Welding Power Sources and third-generation power sources that have not upgraded, this means *Profile 32*. On third-generation Welding Power Sources that support this feature, this means *Profile 200*. See page 11.4 for more details on Weld Profiles. |
| *Select Weld Profile based on Analog Interface I/O* | When you select this option, the I/O from the analog interface is configured to choose the Weld Profile. |

## Limit Settings Tab

On the **Limit Settings** tab, you tell this Welding Power Source what action to take when a weld exceeds limits established on the **Profile limits** tab (page 11.9). You can also provide the Welding Power Source with a short amount of tolerance time before it takes that action. If a limit is marked as required, it must be enabled in a weld profile in order for the system to weld. The *Out-of-limits tolerance* fields represent the total accumulative amount of time the weld can be outside the limit before the selected action occurs.

When setting the *Out-of-limit tolerance* for WeldScore®, remember that the sample rate is 0.25 seconds. You should choose a tolerance value according to the fewest number of samples you want to include. For example, a value of 0.3 seconds in the *Out-of-limit tolerance* field only ensures one sample. A value of 0.6 seconds ensures two samples. And so on. We recommend no less than three to five samples, which means setting your tolerance between 0.8 seconds to 1.3 seconds (or greater as appropriate).

A warning level may be set for each limit to define a percentage of the difference in the high and low profile limit that will trigger a warning. For example, if the high limit is 500 and the low limit is 480 and the percentage is set at 10, then the warning level will be set at 2 from the low or high limits. (500 – 480) = 20, then (20 * 10%) = 2. The High Warning limit will be 500 - 2 = 498 and the low warning level will be 480 + 2 = 482. Note: Duration only has a high warning level and WeldScore only has a low warning level.

**STOP |** **If you set the *Out-of-limit tolerance* field for a long time period, any welds that are shorter than this tolerance will never trigger the action you select.**

**For example, John at Advanced Manufacturing set the tolerance for the *Action on voltage limit* to 2.0 seconds (where the normal range might be 0.5 to 1.5 seconds). The welds made yesterday each took around one second to complete. There was a problem with the welder, and the arc voltage ran too low all day. Since the voltage was not out of limits longer than 2.0 seconds for over the course of each weld, no one knew until the end of the day and all parts had to be scrapped and redone.**

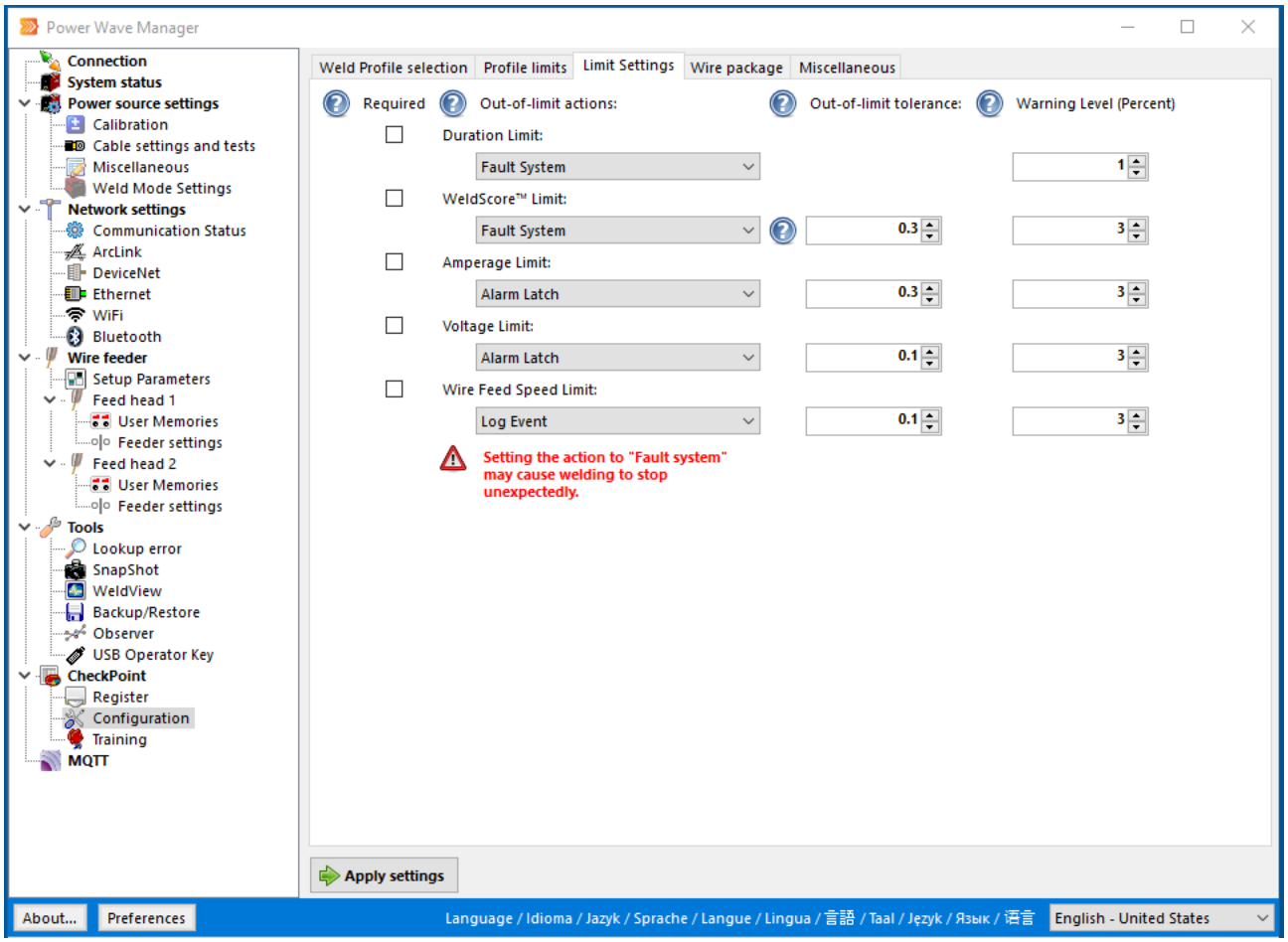



**Figure 11.6 Limit Settings Tab**

> **TIP** | **If the *Action on WeldScore limit* value field is grayed out, either the power source does not support WeldScore® or the power source has older firmware that needs to be updated. See page 3.1 for details on upgrading the power source's firmware.**

**Table 11.2 Available Actions When a Weld is Out of Limits**

| Field | Description |
|---|---|
| *Log Event* | This option tells the Welding Power Source to create an event log entry to record that the weld was out of limits. The power source continues welding, even if the weld does not meet limits set on the Weld Profile. |
| *Fault System* | If you select this option, the power source will stop the weld currently in progress when it detects the weld has gone outside the limits set by the Weld Profile. The Weld Operator can make adjustments and begin welding again. |
| *Alarm Latch* | When you select this option, a weld that goes outside the limits set by the Weld Profile causes the power source to enter into a faulted state when the weld ends (also known as a "latched fault"). In order for the power source to continue welding, the Weld Operator must clear the fault.<br><br>You can reset an *Alarm Latch* fault on the **Diagnostic** tab under **Production Monitoring** > **Register** (page 11.4), or by cycling the power to the Welding Power Source (off then back on). |

## Profile Limits Tab

The **Profile limits** tab is where you set limits or adjust trained limits for every Weld Profile available to the Welding Power Source. Each power source stores all Weld Profiles that are available, but it can only access the profiles based on the choice you make on the **Weld Profile selection** tab (page 11.5). You can set the profile limits manually on the **Profile limits** tab or you can teach the power source what you consider to be a weld within limits.

> **STOP** | **Be sure you plan your Weld Profiles before you begin. See page 12.1 for more details.**

> **STOP** | **For information on training a weld for a Weld Profile, please refer to Chapter 12.**

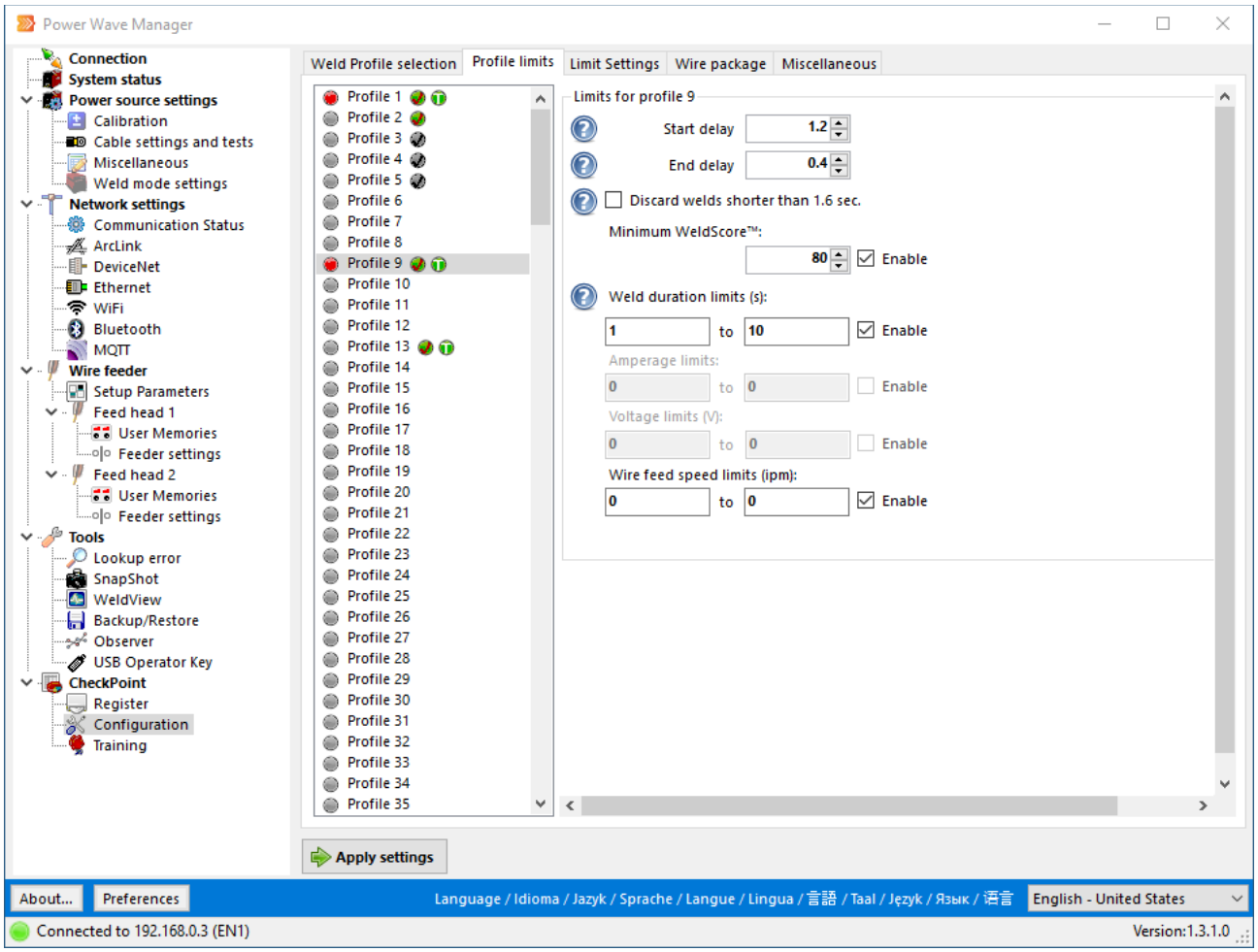



**Figure 11.7 Profile Limits Tab**

To change settings in a particular Weld Profile, simply click the Weld Profile to select it and make changes to the fields on the right. Place a check mark in the *Enable* checkbox to tell the power source to use that limit for the profile. (If the values are zero (0) or there is no check mark next to *Enable*, the system automatically ignores the limit.) Remember to click the **Apply settings** button to commit your changes. Table 11.3 explains each of the limits available.

> **NOTE | When you enable the *Minimum WeldScore* option, you can only set the *Weld duration limit* and/or the *Wire feed speed* limit. Since you must train a weld in order for WeldScore® to be effective, the trained weld already includes the amperage and voltage limits.**

Next to each Weld Profile in the list are icons that represent each limit available in that Weld Profile: WeldScore ( ), Time ( ), Amperage ( ), Voltage ( ), and Wire Feed Speed ( ).

- § If the Weld Profile contains an active limit (i.e., a check mark in the *Enabled* checkbox) with values greater than zero (0), the green icon appears next to that Weld Profile number.
- § If the WeldScore® limit is not enabled and there is a value entered in the field, the icon appears but is gray. An example can be seen above with Profile 10.

§ If the limit is not enabled or the value for the limit is zero (0), the icon does not appear.

> **TIP | If you have made changes to a Weld Profile and have not clicked the** Apply settings **button, the gray icon ( ) at the beginning of the Weld Profile changes to a red icon ( ).**

**Table 11.3 Limits Available for Each Weld Profile**

| Field | Description |
|---|---|
| *Start delay* | This is the amount of delay the power source should use when applying limits at the beginning of this weld. The *Start delay* is the amount of time (in seconds) that the power source should wait, directly after the start of a weld, before it begins to apply the limits entered for this Weld Profile. This option is necessary because the start of a weld is often unpredictable and may fall out of limits easily. (The *Start delay* must be within the range of 0.1 seconds to 10.0 seconds.)<br>**NOTE \| The combined *Start delay* and *End delay* times must be 0.7 seconds or greater if the Production Monitoring firmware on the power source is at revision 4. If the total is less than 0.7, Power Wave® Manager automatically adjusts the *Start delay* value so the total equals 0.7 seconds.**<br>**If the Production Monitoring firmware revision is 5 or greater, the combined *Start delay* and *End delay* times must be 0.4 or greater. If the total is less than 0.4, Power Wave® Manager automatically adjusts the *Start delay* value accordingly.** |
| *End delay* | This is the amount of delay the power source should use when applying limits at the end of this weld. The *End delay* is the amount of time (in seconds) directly before the end of a weld that the power source should stop applying the limits entered for this Weld Profile. This option is necessary because, at the end of a weld, the set points for the Welding Power Source are often different than the rest of the weld (e.g., if the power source is in a burn-back state). The *End delay* must be within the range of 0.1 seconds to 10.0 seconds. |
| *Discard welds shorter than "n" seconds*<br>(where "n" is the *Start delay* time plus the *End delay* time) | Place a check mark next to this option to tell Production Monitoring™ or CheckPoint™ that it should not record welds where the duration of the weld is shorter than the combined Start delay and End delay times.<br>If this option is unchecked, welds that are greater than 0.4 seconds but less than the Start plus End delay time will be recorded but will be marked as a Short Weld. |
| *Minimum WeldScore* | Every quarter of a second, the Welding Power Source compares the performance of the current weld against the trained weld for the selected Weld Profile. When the weld is complete, the power source averages those measurements together for an overall WeldScore®.<br>The *Minimum WeldScore* field allows you to enable the action you selected for WeldScore® on the **Out-of-limit actions** tab (page 11.6). If the overall WeldScore® for the weld falls below the value you enter here, the system |

| Field | Description |
|---|---|
| | performs the action you selected in the *Action on WeldScore limit* drop-down on the **Limit Settings** tab.<br><br>Even if you do not have the alerts enabled, the power source still calculates WeldScore® on machines that support this value (if a training model exists for that Weld Profile) and displays the value in the system.<br><br>**NOTE \| The default, as well as minimum, value for this setting is 80. If you need to set a minimum WeldScore® limit of less than 80 to prevent your welds from triggering limit alerts, either the training was performed incorrectly or a variable has changed since the original training was done. The Weld Profile should be retrained instead of lowering the minimum WeldScore® value.**<br><br>**NOTE \| If the *Minimum WeldScore* field is grayed out, either the power source does not support WeldScore® or the power source has older firmware that needs to be updated. See page 3.1 for details on upgrading the power source's firmware.** |
| *Weld duration limits (s)* | Enter the minimum and maximum amount of time (in seconds) that you consider acceptable for a weld made using this Weld Profile. If the overall duration of the weld falls below the minimum value or above the maximum value set for the weld, the system considers that "out of limit". When this happens, the power source performs the action you selected in the *Action on duration limit* drop-down on the **Limit Settings** tab (page 11.6). |
| *Amperage limits* | Enter the minimum and maximum amps for the arc current you consider acceptable for a weld made using this Weld Profile. If the overall amperage used to make the weld falls below the minimum value or above the maximum value set for the weld, the system considers that "out of limit". When this happens, the power source performs the action you selected in the *Action on amperage limit* drop-down on the **Limit Settings** tab (page 11.6). |
| *Voltage limits (V)* | Enter the minimum and maximum volts for the arc voltage you consider acceptable for a weld made using this Weld Profile. If the overall voltage used to make the weld falls below the minimum value or above the maximum value set for the weld, the system considers that "out of limit". When this happens, the power source performs the action you selected in the *Action on voltage limit* drop-down on the **Limit Settings** tab (page 11.6). |
| *Wire feed speed limits (ipm)* | Enter the minimum and maximum speed (in inches per minute) for the wire feeder that you consider acceptable for a weld made using this Weld Profile. If the overall wire feed speed used to make the weld falls below the minimum value or above the maximum value set for the weld, the system considers that "out of limit". When this happens, the power source performs the action you selected in the *Action on wire feed speed limit* drop-down on the **Limit Settings** tab (page 11.6). |

## Wire Package Tab

In order for Power Wave® Manager, Production Monitoring™ or CheckPoint™ to notify you when the consumable on the Welding Power Source is running low or to allow the monitoring software to calculate a variety of values, you need to enter the details of the consumable into the power source. You use the **Wire package** tab in Power Wave® Manager to do this. Simply enter the details of the consumable and click the **Apply settings** button. Table 11.4 explains the fields in more detail.

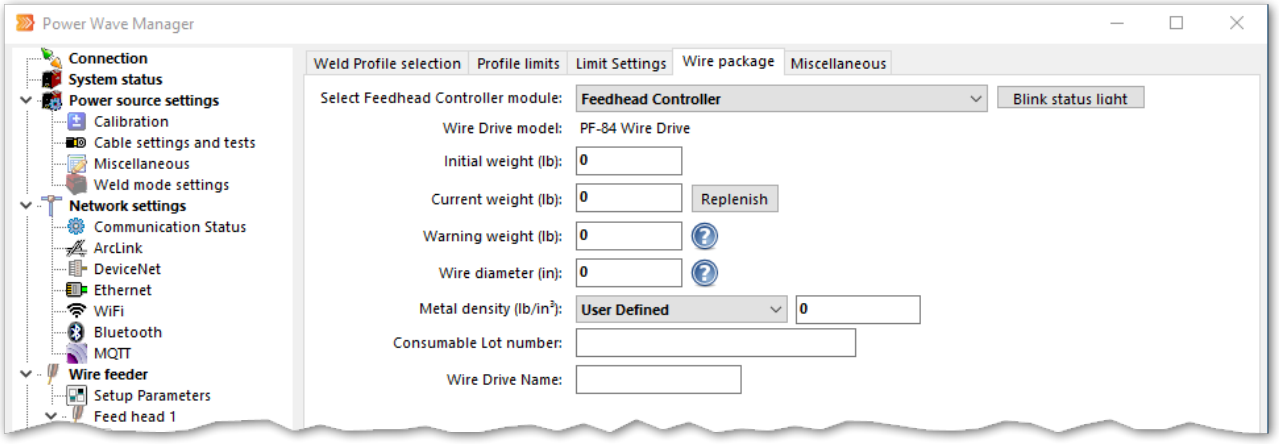



**Figure 11.8 Wire Package Tab**

Once you restock the power source after it runs out, click the **Replenish** button to reset the *Current weight* field to the same value as the *Initial weight* field, provided the new wire is the same. Remember to click the **Apply settings** button to commit the change to the power source.

**Table 11.4 Fields on the Wire Package Tab**

| Field | Description |
|---|---|
| *Select Feedhead Controller module* | Select feedhead controller in multiple wire drive systems. |
| *Initial Weight* | Enter the original weight of the wire package, as indicated on the container. |
| *Current weight* | If the package is partially used, you can enter the current weight of the package in this field. However, if the package is new, this weight should be the same as the *Initial weight* field. |
| *Warning weight* | The power source can generate notifications to replace the wire package when it gets low. You can set the alert for Production Monitoring™ on the **E-mail setup** tab (page **Error! Bookmark not defined.**) and in each user's account in the main CheckPoint™ application. Both applications rely on the value entered in the *Warning weight* field. |
| *Wire diameter* | Enter the diameter of the wire loaded for the power source. The power source uses the diameter of the wire when calculating several values that it sends to Production Monitoring™ or CheckPoint™. |

| Field | Description |
|---|---|
| *Metal density* | From the drop-down, select the density of the metal from which the wire is composed. If none of the available options apply to the wire loaded into the power source, select *User Defined Density* from the drop-down and enter the density value in the text field that appears. |
| *Consumable Lot number* | Enter the consumable lot number, if desired. |
| *Wire Drive Name* | Enter a wire drive name, if desired. |

## Miscellaneous Tab

The **Miscellaneous** tab displays the part serial number, operator ID and consumable lot number currently being used by the Welding Power Source for the welds that it makes. These numbers can come automatically from a robotic system, an external controller, or the mobile app, but you can update the numbers manually in Power Wave® Manager if necessary.

Click inside the appropriate field and type the serial number. Click the **Update** button to commit your changes. Once you update with the new number, Power Wave® Manager displays it in the *Current value* field. (You can also click **Apply settings** to commit changes made to all serial numbers.)

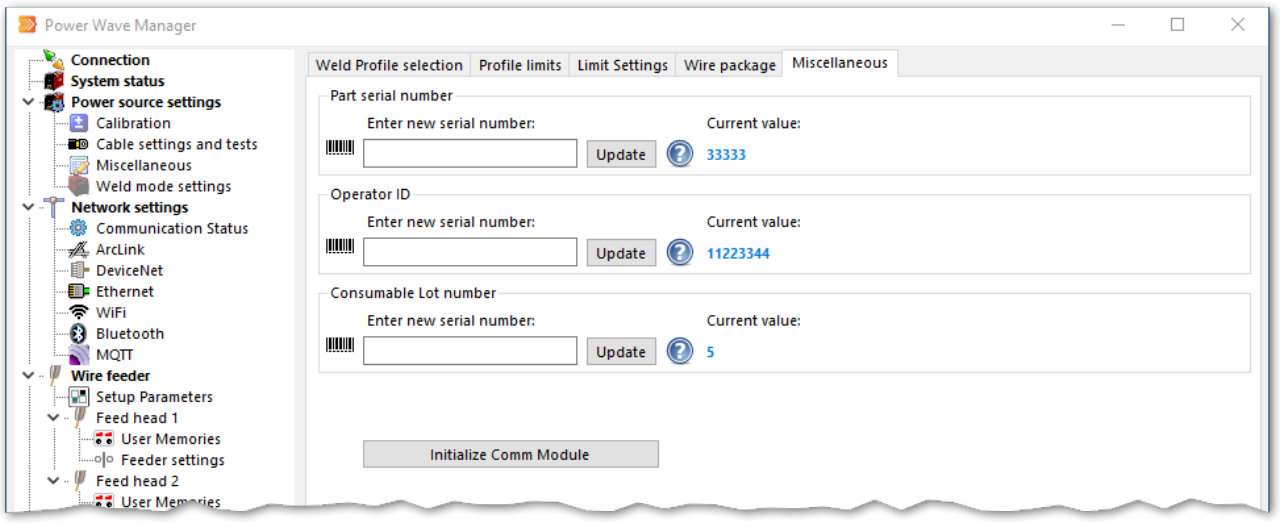



**Figure 11.9 Miscellaneous Tab**

# Training

For third-generation Welding Power Sources, you need to create training models in order to use WeldScore®. For second-generation power sources (which do not support WeldScore®), training models simply help you set limits for current, voltage and wire feed speed. You use both the **Profile limits** tab (page 11.9) and the *Training* section (this chapter) to maintain your Weld Profiles.

> **NOTE |** **The minimum recommended weld duration for calculating WeldScore® is 2.5 seconds. This includes a *Start Delay* between 1.0 and 1.5 seconds and an *End Delay* of 0.25 seconds (page 11.11), with at least 1.0 to 1.5 seconds of steady welding. Weld durations less than a total of 2.5 seconds tend not to produce a reliable WeldScore®.**

## *Before You Begin Training a Weld*

Before you begin setting up your Weld Profiles and creating training models, you need to do some planning. Planning the Weld Profiles helps make sure that they provide that consistent and repeatable process so important for an accurate WeldScore®. Be sure you have completed the following before you begin teaching welds on the Welding Power Source:

- Read through this *Training* chapter in its entirety. Be sure you fully understand the nature of WeldScore® and how to create a training model.
- Determine how many Weld Profiles you need.
- Decide which Weld Profile numbers you want to use on this Welding Power Source.
- Decide how many example welds you want to train for each Weld Profile you want to use. If you train a small number of consistent and repeatable welds, you create a low tolerance for variability in production. A larger number of training welds allows a bit of flexibility when making welds in production.
- Plan the attributes of each example weld in terms of parameter settings and physical changes. Remember: You want to create an acceptable average for the training model using these individual training welds. (Page 12.4 explains the welds to train in more detail.)

# WeldScore®

WeldScore®, a feature available in all third-generation Welding Power Source models (including the Power Wave® i400, C300, S350, S500 and AC/DC 1000 SD), is a process-analysis system based on consistent and repeatable welding conditions modeled from training welds. This process-analysis system can be used to support a weld quality control program. It assigns a score to welds on a 0% to 100% scale that indicates the acceptability of the weld. The score is based on a comparison to previously trained welding conditions. A weld with a score of 85% to 90% or above can be considered, with a reasonable amount of confidence, to be an acceptable weld. WeldScore® can be used independently on the power source or together with Production Monitoring™ or CheckPoint™.

> **NOTE |** **WeldScore® is not a guarantee of quality and is not intended to replace a quality control system. WeldScore® only tells you how well the current weld matches the trained weld. It was not designed to tell you "why" the welds differ.**

## How WeldScore® Works

Traditional weld-monitoring systems measure current and voltage and must then guess what the Welding Power Source is trying to do before attempting to determine how well it is actually doing it. WeldScore® is built right into the Welding Power Source control system, which gives the control system a significant advantage by removing the guesswork involved with how the power source should be functioning. In addition to traditional current and voltage measurements, WeldScore® also looks at 30 to 40 additional variables that help to make it more reliable and accurate than traditional weld monitoring systems.

Consistency and repeatability are the keys to make effective use of WeldScore®. The WeldScore® value is an excellent indicator that a weld was produced that did not match the trained conditions and that further inspection is required. A welding engineer would need to inspect the weld and review welding parameters like average voltage, amperage, and wire feed speed (which are available in CheckPoint). Based on the welding engineer's experience and inspection of the weld, all this information can be used to help understand what might have happened to cause the low WeldScore®.

In order to assign a score, the Welding Power Source must first be taught what is considered to be an acceptable weld. This is done through the training section of Power Wave® Manager. When a score is assigned to a future weld, it is done by comparing it to the taught weld. Therefore, it is necessary to teach the Welding Power Source every weld for which a WeldScore® is desired. Some examples of when new training is required include changes in wire feed speed, voltage, joint type or position.

> **NOTE |** **The minimum recommended weld duration for calculating WeldScore® is 2.5 seconds. This includes a *Start Delay* between 1.0 and 1.5 seconds and an *End Delay* of 0.25 seconds (page 11.11), with at least 1.0 to 1.5 seconds of steady welding. Weld durations less than 2.5 seconds tend not to produce a reliable WeldScore®.**

WeldScore® is able to accommodate both welds with very tight tolerances and welds that have some acceptable process variation. If the welds taught to the Welding Power Source all have very little variation, then the only welds that will receive a passing WeldScore® are ones that meet that very tight tolerance.

Likewise, if there is room for some variation (e.g., small changes in electrical stickout) and the acceptable variations are used in the training process, then WeldScore® will assign passing scores to welds that fall within those variations.

### Where to Use WeldScore®

WeldScore®, like any statistical analysis method or technique, requires a controlled process. WeldScore® works best with a consistent and repeatable process. It will produce the most accurate results with single-pass welds or welds with a small number of passes because, as more passes are used, the process inherently becomes less repeatable. If there are a large number of variables that are allowed, a significant amount of variation, the criteria may be too broad for the WeldScore® to be a meaningful value.

### Meaning of the WeldScore® Value

An instantaneous WeldScore® value is calculated every 0.25 seconds. The average of these scores over the entire weld is reported as an overall score displayed on the User Interface, in Production Monitoring™ or in CheckPoint™.

Keep in mind that this overall WeldScore® is an average over the entire weld. A weld could still have a high WeldScore® even if there is a problem for a short portion of the weld time. For example, if a 50-inch weld has a score of 95% for 49 inches, but a score of 45% for the last inch, the overall score will be a 94%. However, that last inch is actually problematic and not acceptable.

The Out-of-Limit features in Power Wave® Manager alert you when the WeldScore® goes below the minimum you set for a defined moving window of time. This helps ensure the integrity of the overall WeldScore®. See pages 11.6 and 11.9 for more details on these features.

## *Weld Profile Training*

You use Weld Profile Training to create training files for the welds you consider acceptable when a Weld Operator uses that specific Weld Profile. Training helps you generate limits for current, voltage, wire feed speed and duration for a Weld Profile automatically. Training a weld also generates the necessary data in order to use WeldScore®. You generally perform three to five training welds in the same manner as they would be made in normal production. This provides you with a good average on the weld and allows a bit of flexibility when making welds in production. If you make any welds during training that are outside of the acceptable limits, you can simply remove those welds from the training.

> **STOP |** **You must train a Weld Profile in order for the power source to provide a WeldScore®.**

If your intent is to train a weld to implement WeldScore® (available on third-generation machines), due to the volume of data required when training for WeldScore®, the longest weld you can perform for training is up to 60 seconds (one minute) in duration for a meaningful WeldScore®. Otherwise, the power source begins to overwrite the old data in the buffer and the WeldScore® for that Weld Profile will not be accurate.

> **NOTE |** **To maintain accuracy, Weld Profile training excludes from WeldScore® calculations any welds with a duration less than 2.0 seconds (including start and end delays). These welds do, however, contribute to Weld Profile limits.**

On second-generation power sources that do not support WeldScore®, you can still use training models to help you set limits for current, voltage, wire feed speed and duration. The longest weld you can train is up to 1260 seconds (21 minutes) before the power source begins to overwrite the data in the buffer. When you create those training files for each Weld Profile, the power source calculates the limits for you automatically. You can adjust those calculated limits under **Production Monitoring** > **Configuration** > **Profile limits** in Power Wave® Manager (page 11.9).

# Welds to Train

You should train each Weld Profile that is being used for shorter welds where the welds are consistent and repeatable. The longer the weld, the less consistent and the less repeatable it becomes. You must train any Weld Profile you want to use to implement WeldScore®. WeldScore® works by comparing production welds to welds that have been trained. In order for an accurate score to be assigned, you should train between three to five welds at each allowable production extreme for each Weld Profile.

For example, John at Advanced Manufacturing has a weld where the electrical stickout is allowed to vary from 5/8" to 3/4". He trained five welds, one at each of these stickouts.

Only train the allowable extremes for the weld. For example, if the stickout can increase to 1" but you consider this out of limits for an acceptable weld, do not include this in the training. The purpose of training is to demonstrate to the Welding Power Source the types of welds you consider acceptable.

# Training Profiles

Be sure you are connected to the Welding Power Source on which you want to train the welds and that all components are working properly.

> **STOP** | **Be sure you have read *Before You Begin Training a Weld* on page 12.1 before you continue.**

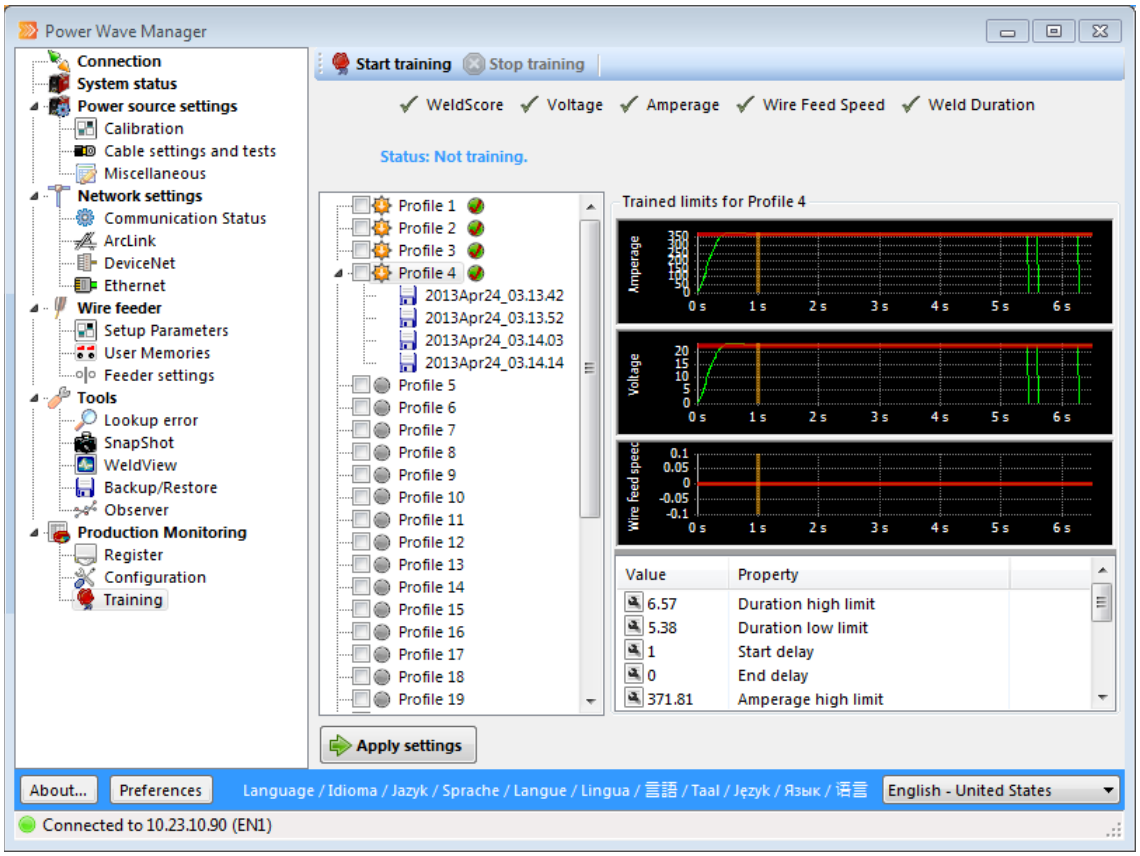



**Figure 12.1 Weld Training Window**

For any Weld Profiles in the list with existing limits, green icons appear that represent each limit recorded for that profile: WeldScore ( ), Time ( ), Amperage ( ), Voltage ( ), and Wire Feed Speed ( ).

- If the Weld Profile contains an active limit (i.e., a check mark in the *Enabled* checkbox) with values greater than zero (0), the green icon appears next to that Weld Profile number.
- If the WeldScore® limit is not enabled and there is a value entered in the field, the icon appears but is gray.
- If a limit is not enabled or the value for the limit is zero (0), the icon does not appear.

> **TIP** | **Generally when you create a training model for a Weld Profile, only the** WeldScore**,** Time **and** Wire Feed Speed **icons appear, and sometimes only the** WeldScore **icon, depending on how you have chosen to use the Weld Profile.**

When a Weld Profile has one or more training files associated with it, the gray icon ( ) next to the Weld Profile number appears as a star icon ( ). Click the plus icon ( ) to expand the Weld Profile and view the training files created. The training files use the date and time naming convention and are stored in the folder selected under the **Preferences** button (page 4.1). See page 12.8 for details on viewing the limits calculated for the Weld Profile and for the individual training files.

To train a Weld **Profile**:

| Procedure | Details |
|---|---|
| ***1.*** Click **Production Monitoring** > **Training** in the navigation tree of Power Wave® Manager. | The *Training* section opens (Figure 12.1). |
| ***2.*** Click the **Start training** button at the top of the window. | The system goes into Training Mode and does not record new weld history. This helps maintain production data integrity for the Production Monitoring™ and CheckPoint™ software applications.<br>**NOTE \| The system clears any unsaved weld history data from the Production Monitoring™ server computer or the CheckPoint™ data center.** |
| ***3.*** Click **Yes** to send the power source into Training Mode. | The top of the window now displays the text: *Waiting for next weld to start*. |
| ***4.*** Use the method you chose under **Production Monitoring** > **Configuration** > **Weld Profile selection** to select the Weld Profile you want to train. | For example, if you chose *Select Weld Profile based on User Interface memory selection* as the method for changing profiles on the Welding Power Source, then select the correct memory selection on the machine and weld.<br>**STOP \| DO NOT select the profile in the software for training. Use the correct method designated for this machine.**<br>See page 11.5 for details on the **Power Wave® Manager selection** tab. |
| ***5.*** Physically make all the welds necessary to set the accepted values for this Power Wave® Manager (typically between three to five welds). | If you have short welds to train, you can train them in succession with a short pause in between. If, however, you have long welds to train, train them one at a time and verify the data has transferred before beginning the next training weld.<br>**NOTE \| After you complete a training weld, the computer must read the data from the Power Wave® Manager. If you start a new weld before Power Wave® Manager reads this data, the new weld may not be recorded.**<br>**In general, it takes about one second to read data from every 63 seconds of welding. This means a very long training weld lasting 21 minutes could take up to 20 seconds to be transfer to the computer.** |

| Procedure | Details |
|---|---|
| ***6.*** Repeat steps 4 and 5 for each Weld Profile you want to train during this session. | Power Wave® Manager adds a check mark next to each profile you have trained during this session and changes the gray icon ( ) to a star icon ( ). Each weld training file you add appears with a red icon ( ) to indicate unsaved training data. |
| ***7.*** Once you have finished training the Weld Profile(s), click the **Stop training** button at the top of the window. | |
| ***8.*** Click **OK** when prompted to take the power source out of training mode. | The system finishes processing all the data and displays the information under each Weld Profile (Figure 12.1 on page 12.5). |
| ***9.*** Click the **Apply settings** button. | This process takes some time and disables certain functions in Power Wave® Manager until the process is complete.<br>**NOTE \| Power Wave® Manager also resets the Welding Power Source when you save the Weld Profiles to the machine.** |
| **Enable WeldScore® Alerts** | |
| ***1.*** Select **Production Monitoring** > **Configuration** from the navigation tree. | |
| ***2.*** Click the **Profile limits** tab. | |
| ***3.*** Select the Weld Profile. | |

| Procedure | Details |
|---|---|
| **4.** Place a check mark in the *Enable* checkbox next to the *Minimum WeldScore* value. | The gray WeldScore icon ( ) should change to a green icon ( ). |
| **5.** Repeat steps 3 and 4 for each Weld Profile where you want to monitor WeldScore®. | |
| **6.** Click **Apply settings**. | Power Wave® Manager saves the changes to the Welding Power Source. |

# Viewing the Calculated Limits for a Weld

If there are welds trained for a Weld Profile, you will see an arrow icon ( ) next to the Weld Profile in the *Training* section. Click the icon to expand the Weld Profile. This displays the welds that were trained.

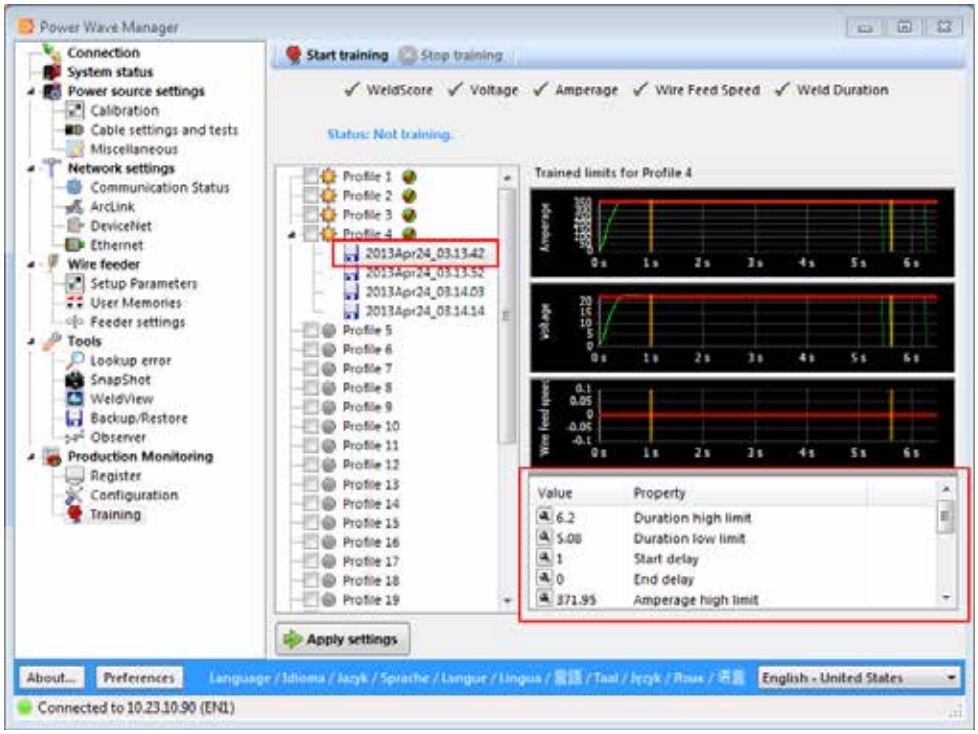



**Figure 12.2 Welds Trained for a Weld Profile**

To view the limits calculated for the Weld Profile, simply click the Weld Profile number to select it. Power Wave® Manager displays the limits under the graphs (Figure 12.2). If you would like to see the limits recorded for each trained weld for that profile, simply click the weld to select it. Power Wave® Manager also displays these limits under the graphs.

The graph displays the selected weld. The green line indicates a weld greater than 2.0 seconds. Power Wave® Manager includes in WeldScore® calculations those welds greater than 2.0 seconds. To maintain accuracy, Weld Profile training excludes from WeldScore® calculations any welds with a duration less than 2.0 seconds. They do, however, contribute to Weld Profile limits. These welds appear on the graph in blue.

# Deleting a Trained Weld from a Weld Profile

When you perform welds to create training models, you may accidentally create a weld that is not an acceptable example. You may also have an existing trained weld in a Weld Profile that throws off the limits for that profile. Power Wave® Manager allows you to remove individual training files from the Weld Profile.

> **STOP | You cannot undo this action. Once you select** Delete training weld data file **from the pop-up menu, the file is deleted from the Weld Profile.**

| Procedure | Details |
|---|---|
| ***1.*** Right-click the Weld Profile. | |
| ***2.*** Select **Delete training weld data file** from the pop-up menu. | |
| ***3.*** Click **OK** when prompted to delete the file. | |
| ***4.*** Click the **Apply settings** button. | Power Wave® Manager saves the changes to the Welding Power Source. |

# Clearing Training Data

There may be times when you need to start over with a Weld Profile or you just need to remove all of the training data for the profile. You can clear the training data, as well as any limits you entered manually on the **Profile limits** tab under **Production Monitoring** > **Configuration**.

To clear data for a Weld Profile:

| Procedure | Details |
|---|---|
| ***1.*** Right-click the Weld Profile. | |
| ***2.*** Select **Remove all welds and clear the training model** from the pop-up menu. | |
| ***3.*** Click **OK** to confirm you want to clear the data. | Power Wave® Manager clears data on the Welding Power Source and resets the machine.<br>**NOTE | This process could take some time. Power Wave® Manager disables certain functions until the process is complete.** |
| ***4.*** Click **OK** when prompted that the machine has been reset. | |

# Loading a Weld File

If you need to load an existing weld training file from the *Preferences* folder (page 4.1), you can easily do so with Power Wave® Manager.

| Procedure | Details |
|---|---|
| **1.** Right-click the Weld Profile to which you want to load the file. | |
| **2.** Select **Load training weld data file** from the pop-up menu. | |
| **3.** Navigate to the weld data file you want to load. | |
| **4.** Select the file and click **Load**. | The system adds the training file to the profile. |
| **5.** Click **Apply settings**. | Power Wave® Manager saves the changes to the Welding Power Source. |

# Copying a Weld File

If you need to copy a weld training file from one Weld Profile to another Weld Profile on the Welding Power Source, Power Wave® Manager allows you to do this.

| Procedure | Details |
|---|---|
| **1.** Right-click the Weld Profile you want to copy. | |
| **2.** Select **Copy training weld data file** from the pop-up menu. | The system prompts you for the profile to which you would like to save the copy. |
| **3.** Select the appropriate Weld Profile and click **OK**. | |
| **4.** Click **Apply settings**. | Power Wave® Manager saves the changes to the Welding Power Source. |

# Troubleshooting

Sometimes, when working with a software program or installing software, you need a little extra information to help troubleshoot and solve the problem. There are some common minor issues you might be able to fix without a call to support.

> **NOTE | If you continue to have trouble, please contact your local IT department or Lincoln Electric Power Wave® support. For support in the USA or Canada, dial 1.877.837.8145. You can also e-mail support at: powerwavesupport@lincolnelectric.com.**

## *Cannot Connect to a Power Source*

There are multiple reasons you may not be able to connect to the IP address of a power source or why the IP address may not show up in the list of addresses. Here are some possibilities.

### IP Address or Other Ethernet Settings on the Welding Power Source Are Invalid

To correct this issue, you need to connect directly to the Welding Power Source through a temporary connection and change the permanent Ethernet settings.

> **TIP | See Chapter 2 for more details on cables and connecting to the Welding Power Source. You can also use a serial connection as an alternative.**

| Procedure | Details |
|---|---|
| ***1.*** Contact your local IT department for the correct Ethernet settings for the Welding Power Source. | |
| ***2.*** Temporarily disconnect the Welding Power Source from the network. | |
| ***3.*** Plug an Ethernet cable into the computer running Power Wave® Manager. | **TIP \| You may need to use a cross-over cable with some older computers in order to make the connection.** |
| ***4.*** Plug the other end of the Ethernet cable into the Welding Power Source. | **TIP \| Microsoft Windows assigns a temporary IP address to the computer and the Welding Power Source so they can communicate.** |
| ***5.*** Open Power Wave® Manager. | |

| Procedure | Details |
|---|---|
| ***6.*** On the **Connect** tab, choose *I do not know the IP address of the welder*. | |
| ***7.*** Click the **Refresh List** button. | Only one IP address should appear. |
| ***8.*** Select the welder and click **Connect**. | **TIP \| When you select the power source, the green status light on the machine should begin to blink.**<br>The system automatically takes you to the **System status** section in Power Wave® Manager. |
| ***9.*** Click **Connection** in the navigation tree. | |
| ***10.*** Select the welder and click **Configure**. | |
| ***11.*** Edit the Ethernet settings to those provided by your IT department. | See page 4.4 for more details on the settings available. |
| ***12.*** Click **OK**. | The Welding Power Source resets and accepts its new network settings. |
| ***13.*** Unplug the Ethernet cable from the Welding Power Source. | |
| ***14.*** Reconnect the Welding Power Source to the plant network again. | The new settings should take effect. |

## Ethernet Settings Seem Valid but Still Cannot Connect

If you have checked the Ethernet settings, and they are valid, use the following information to verify communications and physical connections:

- Check the physical network connections to the computer and the power source. Check for a solid green or yellow light near each Ethernet jack. If you see a light, the physical connections are probably not the issue.
- Cycle the power to the Welding Power Source (off then back on). The power source could still have a residual network connection in its memory under some circumstances.

If you continue to have trouble connecting, verify the following:

- Do you have multiple Ethernet adapters enabled? This could cause issues. Verify that the Ethernet communications are going through a single adapter. To do this, temporarily disable any additional adapters.
- If you are using an Ethernet cable connection, try to temporarily disable any wireless communication on the computer. This could help the computer to directly connect to the Welding Power Source through the cable without interference.
- If the computer is running some type of security software or firewall, this may block the IP address of the Welding Power Source. Check with your local IT department.

## Wi-Fi Last Disconnect Codes

If you have a PowerMeter UI module in your system, which includes Wi-Fi, and you are having connection issues with your Wi-Fi unit, you can check the "Last Disconnect Code" from the *Status* tab of the *Wi-Fi* node in Power Wave Manager and lookup the code below for and explanation of the issue.

| Code | Explanation | What to Check |
|---|---|---|
| 2 | Authentication not valid. | Check connection settings (SSID, key, type, login credentials). |
| 4 | Disassociated due to inactivity. | |
| 5 | Disassociated because access point is too busy. | Check access point settings. Contact local IT. |
| 6 | Not authorized or authenticated to access this access point. Specifically, a class 2 frame received from a non-authenticated station. | Check connection settings (SSID, key, type, login credentials). Also check to ensure all certificates and security files have been loaded. Or the access point may have a white list that could need to have a MAC address added. |
| 7 | Not authorized or authenticated to access this access point. Specifically, a class 3 frame received from a non-authenticated station. | Check connection settings (SSID, key, type, login credentials). Also check to ensure all certificates and security files have been loaded. Or the access point may have a white list that could need to have a MAC address added. |
| 15 | Handshake timeout. Most likely cause is poor signal strength. | Move the unit to an area with better Wi-Fi signal. |
| 23 | Authentication failed. | Check connection settings (SSID, key, type, login credentials). Also check to ensure all certificates and security files have been loaded. |
| 105 | Poor connection due to weak Wi-Fi signal or significant noise interference. | Move the unit to an area with better Wi-Fi signal. Also check for potential noise sources near to the receiver. |
| 106 | Poor connection due to low quality Wi-Fi signal. | Move the unit to an area with better Wi-Fi signal. Switch to a different Wi-Fi network. |
| 109 | Wi-Fi signal lost. Most commonly because of weak Wi-Fi signal. | Move the unit closer to a Wi-Fi access point. |
| 200 | User initiated a disconnect. | |
| 255 | User password is incorrect | Edit the direct connection settings with the correct password for your SSID. |

# FANUC Information

## FANUC Robotic Applications

When connecting to Welding Power Sources that provide welding power for FANUC robot controllers it is important to understand the connection path between the computer running Power Wave® Manager and the Power Wave® Welding Power Source (Figure B.1).

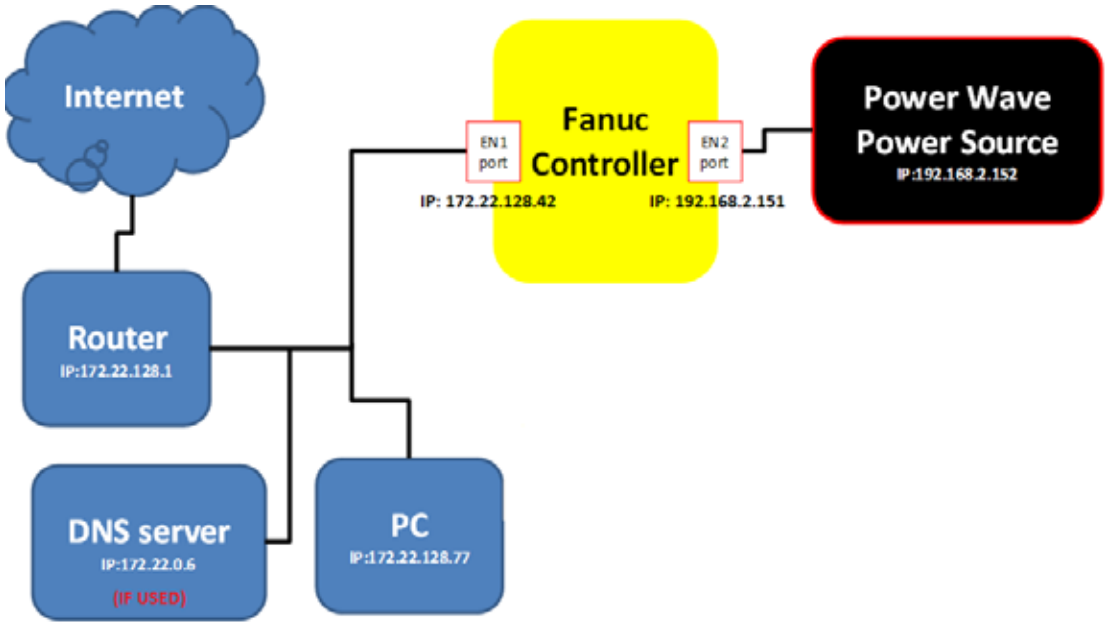



**Figure 12.3 Example of FANUC to Power Wave® Connection**

FANUC robot controllers act as a proxy server between Power Wave® Manager and the connected Power Wave® Welding Power Source. FANUC robot controllers include two Ethernet ports:

- Port 1 (CD38A) is for general usage and normally connected to a building network.
- Port 2 (CD38B) is connected to the Power Wave® Welding Power Source.

When you connect Power Wave® Manager to the Power Wave® power source, the most convenient way to do this is to connect the computer running Power Wave® Manager to the same network as Port 1 of the robot controller.

When you start Power Wave® Manager, choose the *I know the address of the welder* option on the **Connection** tab and enter the IP address assigned to Port 1 of the robot controller. When you click **Connect**, the FANUC built-in proxy server will connect to the Power Wave® Welding Power Source.

For more detailed information, please refer to the ArcTool Setup and Operations manual for your FANUC robot.

### Prerequisites

Site IT administrators will have to perform the following tasks:

- § Assign and record static IP address for FANUC robot and provide Subnet Mask and Default Gateway
- § The firewall needs to allow TCP port 80 outbound to ws.lincolnecheckpoint.com (where Lincoln Welding Power Source is sending information).
- § If the DNS server setting on the welder is set to a DNS server on the internet, the customer firewall would also need to allow UDP port 53 (DNS) outbound.
- § From a networking perspective, the welder needs to have DNS setup so it can resolve the name: ws.lincolncheckpoint.com
- § The server has to allow the robot static IP address through the firewall, i.e. robot address (or addresses list) has to be placed in a “safe” or “allowed” list within the firewall

Person(s) implementing the Production Monitoring™/CheckPoint™ features shall:

- § Have a basic knowledge of Microsoft Windows operating systems
- § Have a basic understanding of networking schemes
- § Have an advanced knowledge of FANUC robots with ArcTool Application operating system
- § Have an advance knowledge of Lincoln Electric Power Wave® with ArcLink-XT communication

## Requirements

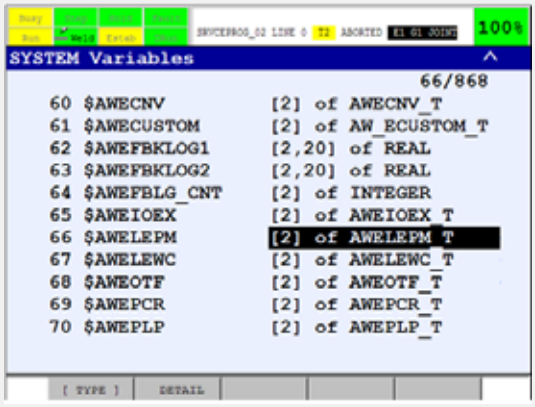
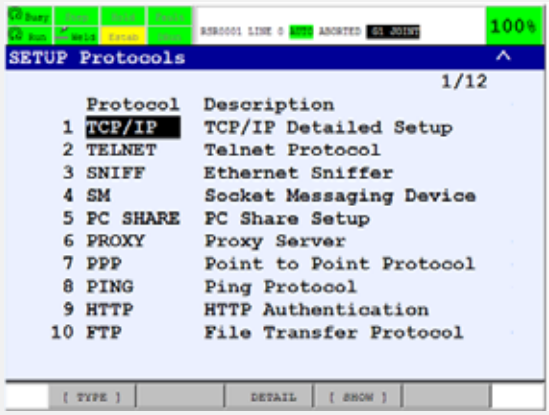
When Production Monitoring™/CheckPoint™ features are used on a FANUC welding robot, the following requirements have to be met:

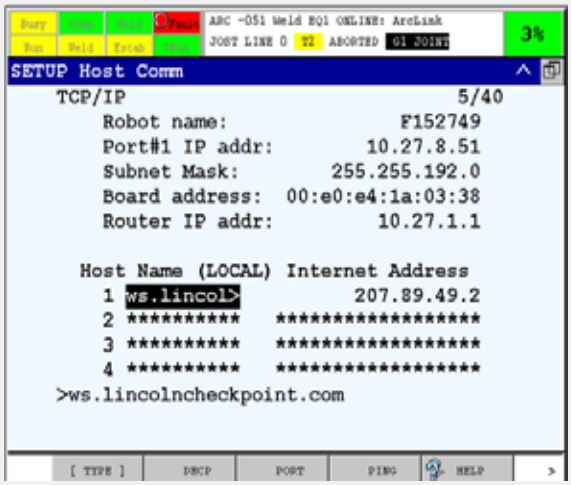
- § FANUC robot must have an ArcTool® Application operating system.
- § FANUC robot must have an RTL-R787 “Lincoln America Package AD1253-77” software (free of charge for Lincoln Electric customers) or an RTL-R788-AT “Arc Production Monitor Option” software (fee applies).
- § Lincoln Power Wave® with ArcLink-XT has to be connected to FANUC robot.

## Enabling Lincoln Features and Configuring FANUC Robot

The following points are important when enabling and configuring Production Monitoring™/CheckPoint™ features:

- § Make sure valid static IP address, Subnet Mask and Default Gateway numbers are obtained from site IT administrators.
- § Make sure to confirm that the site does not use a Proxy Server (most likely) but if it does, obtain the site Proxy Server IP Address.

| Procedure | Details |
|---|---|
| ***1.*** Go to the **System Variables**. | |
| ***2.*** Select **$AWELEPM[n]**. | where n is a Power Wave number in case more than one is connected<br>  |
| ***3.*** Make sure **$PM_EXISTS** is **TRUE**. | |
| ***4.*** Scroll up to **$PM_ENABLE** and set it to **TRUE**. |  |
| ***5.*** Go to SETUP Host Comm TCP/IP and enter the IP address, Subnet Mask and Router IP Address (same as Default Gateway) in corresponding fields. |  |

| Procedure | Details |
|---|---|
| **6.** Enter CheckPoint™ cloud *Host Name (LOCAL)* as *ws.lincolncheckpoint.com* and *Internet Address* as *207.89.49.2* |  <br>In an unlikely scenario when LAN/WAN Proxy Server is used, go to Proxy Setup, set Enable to TRUE and enter its IP Address. |

## Enabling Lincoln Software/Configuring Power Source

The following points are important when enabling and configuring Production Monitoring™/CheckPoint™ features and configuring the Welding Power Source.

- Make sure Lincoln Power Wave is connected to and communicates with Fanuc robot.

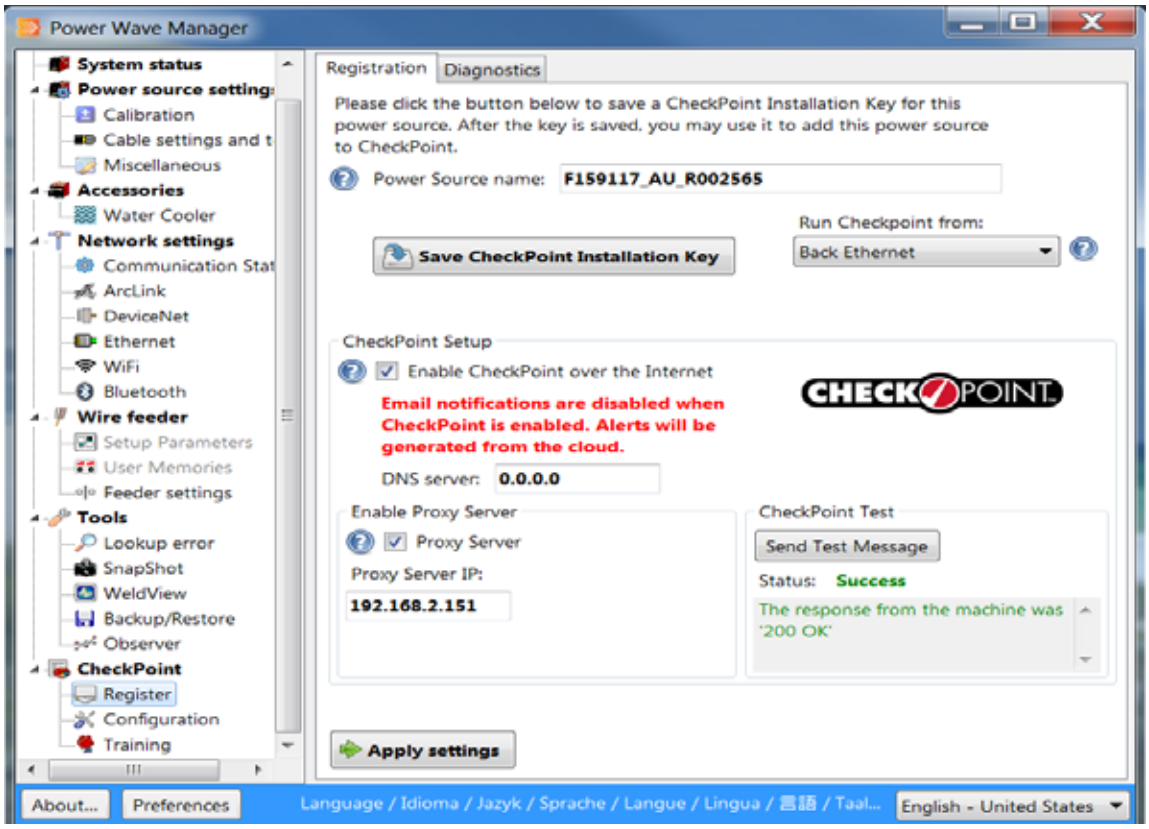
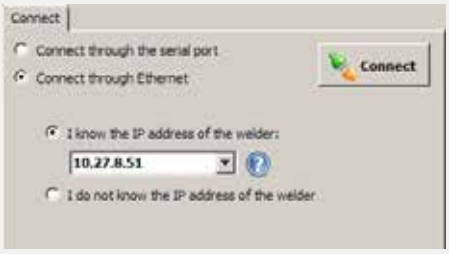



**Figure 12.4 Registering Welding Power Source**

| Procedure | Details |
|---|---|
| ***1.*** Open Power Wave Manager. | |
| ***2.*** Choose *I know the IP address of the welder*. |  |
| ***3.*** Type the IP address of FANUC robot port 1 and click the **Connect** button. | If multiple Power Wave(s) are connected, an additional selection window will pop up and these steps must be performed separately for every one of them.<br>  |
| ***4.*** When connected, scroll down to *Production Monitoring* section and select *Register*. | See Figure B.2. |
| ***5.*** Type the Power Source name as you want it to appear on the cloud. | |
| ***6.*** Place a check mark in the *Enable CheckPoint over the Internet* option. | |
| ***7.*** Enter IP address *0.0.0.0* in the *DNS Server* field. | |
| ***8.*** Place a check mark next to the *Proxy Server* option. | |
| ***9.*** Enter *192.168.2.151* in the *Proxy Server IP* field. | FANUC robot Port 2 is a proxy for this configuration. |
| ***10.*** Click the **Apply Settings** button to update the power source. | |

| Procedure | Details |
|---|---|
| ***11.*** Click the **Send Test Message** button. | A status of "Success" confirms communication with the CheckPoint™ data center.<br>A status of "Failure" indicates errors in hardware, software or configuration or your company IT security blockage (the most likely cause of failure). |
| ***12.*** When the status is "Success", click the **Save Production Monitoring Key** button and save the key file. | You will need this key one time when registering this Power Wave on the cloud. |

# *Production Monitoring™/CheckPoint™*

Production Monitoring™/CheckPoint™ is a tool within the Welding Power Source that sends weld process data to a CheckPoint™ cloud for monitoring, collection and storage. It can use robot programs and macros to monitor and check various parameters, for example if the welds are within the limits set in the Weld Profile. These programs will then generate alarms or other desired actions to alert the robot operator, maintenance personnel and supervisors if a weld process has exceeded predetermined limits.

There are numerous data fields available for an immediate retrieval and usage by TP programs, PMC or PLC logic, HMI and other external devices and interfaces. Below is a list of most commonly utilized data fields:

- Instantaneous WeldScore — $awelepm[1].$i_weldscore
- Average WeldScore — $awelepm[1].$a_weldscore
- Arc ON Hours — $awepor[1].$arc_on_hour
- Arc ON Minutes — $awepor[1].$arc_on_min
- Weld Amperage Feedback — $awepor[1].$amps_fdbk
- Weld Voltage Feedback — $awepor[1].$volts_fdbk
- Wire Feed Speed Feedback — $awepor[1].$wfs_fdbk
- Weld Power — $awepor[1].$power
- Weld True Energy — $awepor[1].$true_energy
- Weld Heat Input — $awepor[1].$heat_input
- Weld Speed — $awepor[1].$wld_spd_val
- On-The-Fly Speed (OTF) — $mcr_grp[1].$otf_speed
- TP Program Name — $aweweldstat[1].$prog_name
- Weld ID Number — $aweweldstat[1].$weld_id_num
- Weld Duration — $aweweldstat[1].$weld_time
- Weld Distance — $aweweldstat[1].$weld_dist
- Total Heat Input — $aweweldstat[1].$weld_heat

**NOTE | Production Monitoring™/CheckPoint™ determines if the**

**weld is within specified limits. It does not determine if the weld is acceptable or not.**

## Adding Alarm/Alert Programs to Welding TP Programs

**NOTE | Production Monitoring™/CheckPoint™ software is always running on a background constantly passing data from the welding power source to the CheckPoint™ cloud.**

In order to snatch and manipulate Alarm/Alert data locally at the robot, two TP programs can be run at the time of the weld. One program titled PM_SEL[n] initiates data manipulations before the weld and another program titled PM_VER[n] compares data after the weld (where "n" is a weld profile).

```
1:  J P[1] 100% CNT100
2:  CALL PM_SEL(1)
3:  J P[3] 100% FINE
WELD START [1]
4:  L P[4] 40 in/min FINE
WELD END [1]
5:  CALL PM_VER(1)
6:  J P[1] 100% CNT100
```

## Alarm/Alert Programs

Whenever a weld goes out of limits, the system posts an alarm to the top of the teach pendant screen. It may be desirable for additional actions to take place such as a warning light to illuminate. Six additional programs are installed in the robot for ease of adding additional actions to take place. These programs are titled *ALERT_1* through *ALERT_5*, and *ALERT_10*. They are used as follows:

- *ALERT_1* Weld Profile Runt occurred
- *ALERT_2* Weld Profile Time Limit occurred
- *ALERT_3* Weld Profile I (current) Limit occurred
- *ALERT_4* Weld Profile V (voltage) Limit occurred
- *ALERT_5* Weld Profile WFS (wire feed speed) occurred
- *ALERT_10* Invalid Profile has been selected

Below is an example TP program ALERT_3 modification to turn a light ON for 5 seconds:

```
1:  !Weld Profile ;
2:  !Current Limit Occurred! ;
3:  DO[8:RED_LIGHT]=PULSE,5.0sec ;
```

This program turns on *Digital Output [8]* if a Current Limit occurs. *DO[8]* may be wired to an indicator light to alert the operator if a Current Limit has occurred. It can be also used as a signal to a local or remote PLC or HMI.

## Adding Consumables Usage Programs to Welding TP Programs

In order to retrieve and manipulate consumables welding wire usage data locally at the robot, TP program titled CONS_CHK1 (where "1" is Power Wave #1) can be run as a MACRO tied to DI[110] on demand or at the end of each weld.

```
1:  J P[1] 100% CNT100
2:  CALL PM_SEL(1)
3:  J P[3] 100% FINE
WELD START [1]
4:  L P[4] 40 in/min FINE
WELD END [1]
5:  CALL PM_VER(1)
6:  CALL CONS_CHK1
7:  J P[1] 100% CNT100
```

Program CONS_CHK1 retrieves weights from Power Wave #1 attributes and compares actual weight of consumables to the warning and alarm weights.

```
1:  CALL RD_AL_AT(1,17,1051)
2:  R[130:E1InitWireWeight]=$ARCLINK_ATR.$REAL_VALUE
3:  CALL RD_AL_AT(1,17,1050)
4:  R[131:E1CurWireWeight]=$ARCLINK_ATR.$REAL_VALUE
5:  CALL RD_AL_AT(1,17,1052)
6:  R[132:E1WireWarnWeight]=$ARCLINK_ATR.$REAL_VALUE
7:  IF
(R[131:E1CurWireWeight]<R[132:E1WireWarnWeight]),DO[112:CONS_WEIGHT_WARNI
NG]=(ON)
8:  IF
(R[131:E1CurWireWeight]>=R[132:E1WireWarnWeight]),DO[112:CONS_WEIGHT_WARN
ING]=(OFF)
9:  IF
(R[131:E1CurWireWeight]<R[138:E1AlrmWeightChng]),DO[115:CONS_WEIGHT_ALARM
]=(ON)
10: IF
(R[131:E1CurWireWeight]>=R[138:E1AlrmWeightChng]),DO[115:CONS_WEIGHT_ALAR
M]=(OFF)
```

This TP program stores weights data in robot numeric registers R[130], R[131] and R[132] and, in case of "LOW CONSUMABLES" events, turns ON DO112 (warning) and DO115 (alarm). For reference: 1050 – current weight, 1051 – initial weight, 1052 – warning weight. All this data can be easily incorporated locally on an HMI (Figure B.3).

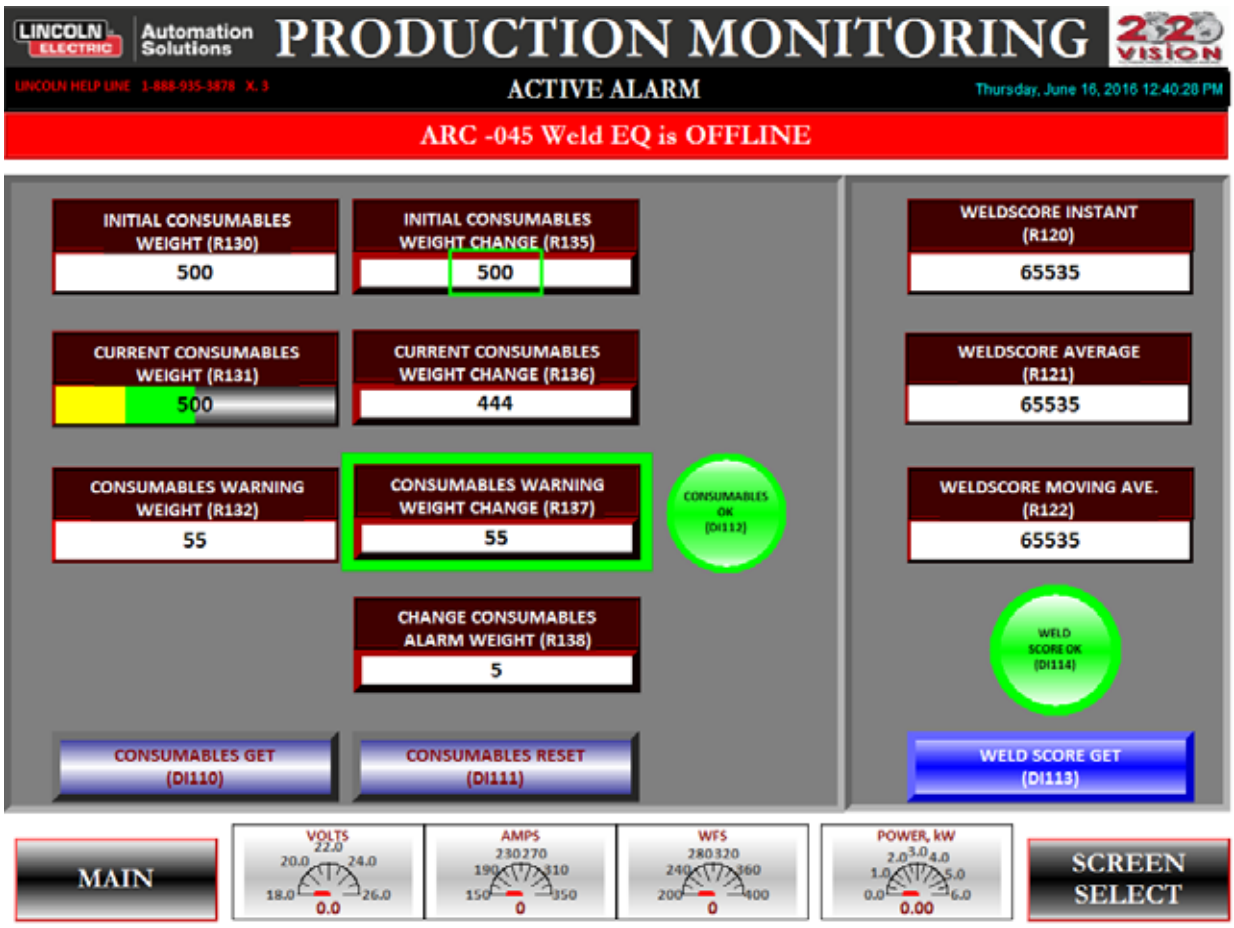



**Figure 12.5 Production Monitoring™ on HMI**

## FANUC Programs Required to Operate Production Monitoring™/CheckPoint™

The following is a list of programs related to Production Monitoring™/ CheckPoint™ on the FANUC robot.

- WR_AL_AT.PC
- RD_AL_AT.PC
- PM_PART
- PM_PROF
- PM_SEL
- PM_VER
- ALERT_1, ALERT_2, ALERT_3, ALERT_4, ALERT_5, ALERT_10
- CONS_CHECK
- CONS_RESET

# *FANUC® Robot ArcTool Application*

FANUC ArcTool application software provides enhanced support for Production Monitoring™/CheckPoint™. Its features are available when either the Lincoln America Package R787 or the Arc Production Monitor

Package R788 software option is installed in the robot controller. There is an additional J599 option entitled "Arc Analog Meter" that provides a display of Current, Voltage, Wire Feed Speed, and WeldScore® in real time on the teach pendant that may be used.

When the Lincoln America Package R787 is installed on the robot controller, the following functions are provided through the teach pendant:

- Weld Profile selection
- Part serial number setting
- Production Monitoring™ error handling
- Wire usage monitor setup
- WeldScore® display

## Weld Profile Selection

The Arc Production Monitor option allows you to specify the Weld Profile for each weld in the TP program by calling a macro and passing the profile number as an argument ( a "1" in the example below). The macro is placed ahead of the ARC START or WELD START instruction in the TP program:

```
1.J P[1] 100% FINE;
2.SET_PM_PROF(1);
3.J P[2] 20 % FINE Weld Start [1,1];
4.L P[3] WELD SPEED CNT 100;
```

FANUC robot supports up to four Welding Power Sources and, if your robotic welding system consists of multiple welding equipment, there will be four versions of the Set_PM_PROF macro as follows:

```
SET_PM_PROF_E1
SET_PM_PROF_E2
SET_PM_PROF_E3
SET_PM_PROF_E4
```

Select the appropriate macro for the weld equipment you are using to set the weld profile so your TP program will look like this example:

```
1.J P[1] 100% FINE;
2.SET_PM_PROF_E1(1);
3.J P[2] 20 % FINE Weld Start [1,1];
4.L P[3] WELD SPEED CNT 100;
```

## Part Serial Number Selection

The Lincoln Production Monitoring™ feature includes support for a serial number that is associated with each weld. You can set the serial number from a Teach Pendant program by using the SET_PM_PART macro and passing the serial number as an argument. The serial number can be directly entered or can be indirectly referenced by a register, string register, or group input. The instruction format appears as follows:

```
1.J P[1] 100% FINE;
```

```
2. SET_PM_PART(ABC1234567) ;
3. SET_PM_PROF[1];
4. J P[2] 20 % FINE Weld Start [1,1];
5. L P[3] WELD SPEED CNT 100;
```

Different serial number entry formats include:

```
SET_PM_PART(ABC1234567) ;
SET_PM_PART(R[n]);
SET_PM_PART(SR[n]);
SET_PM_PART(GI[n]);
```

FANUC robot supports up to four welding power sources and, if your robotic welding system consists of multiple welding equipment, there will be four versions of the Set_PM_PART macro as follows:

```
SET_PM_PART_E1
SET_PM_PART_E2
SET_PM_PART_E3
SET_PM_PART_E4
```

Select the appropriate macro for the weld equipment you are using to set the serial number.

## Production Monitoring™ Error Handling

The Lincoln Production Monitoring™ feature allows you to specify three response actions when an out-of-tolerance error is encountered:

**Table B.1 Production Monitoring™ Error Handling**

| *Lincoln Error* | *Robot Behavior* |
|---|---|
| Log Event | Post Warning error and turn on user-defined Digital Output |
| Alarm Latch | Post Warning error, turn on user-defined Digital Output, allow current weld to complete but prohibit starting next weld until user reset. |
| Fault System | Post Pause error, turn on user-defined Digital Output, execute Burnback, Wire Stick Check, and stop welding. |

These errors are posted to the teach pendant error line, as well as added to the alarm log, and appear as follows (for example):

**LECO-866 PM V alarm (hi:1, lo:0, wp:10)**

This message means there was a Production Monitoring™ alarm caused by the arc voltage exceeding the specified threshold in Weld Profile 10.

The detail display from the alarm log menu shows additional information as follows:

**ARC-097 25.50V, 162.1A, Pos 71.2mm**
**WARN 19-Sept-11 12:51**

The detail reports the current, voltage, and weld distance from the arc start position when the error was posted.

Digital Output for an alarm can be set in this system variable:

`$AWELEPM[n].$ALARM_PNUM = 57` (to trigger digital output `DO[57]` for example)

Digital Output for a fault can be set in this system variable:

`$AWELEPM[n].$FAULT_PNUM = 58` (to trigger digital output `DO[58]` for example)

## Wire Monitor Setup Menu

Another feature of Lincoln Production Monitoring™ allows you to monitor the filler wire used and post an alarm when the wire supply is below a user-specified threshold. The Arc Production Monitor option includes a **Wire Status** menu for setting the warning threshold value and for resetting the wire supply. The **Wire Status** menu can be found by pressing the **STATUS** pendant key, then selecting **F1 (TYPE)** and choosing **Wire**. The menu appears as shown in Figure B.4.

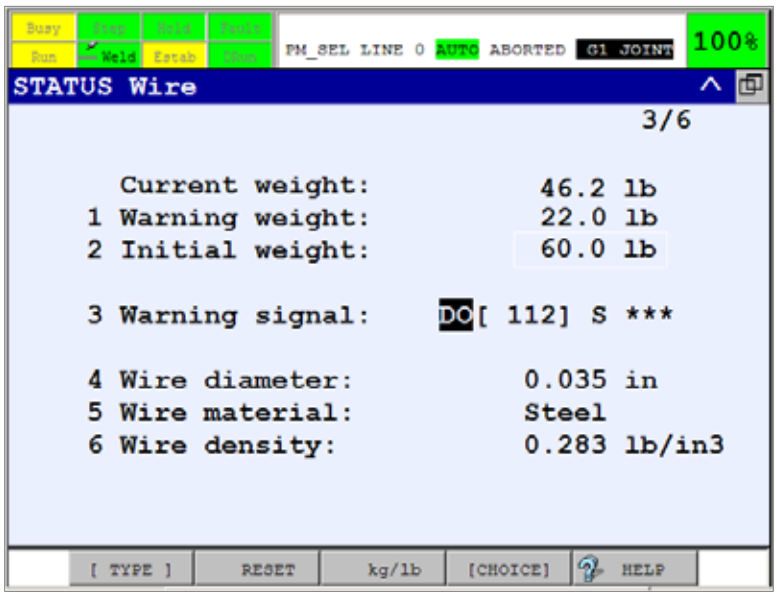



**Figure 12.6 Wire Monitor Setup**

At the top of the **Wire** menu, the **Current weight** of the wire supply is displayed. Each of the settings for this menu can be changed by moving the cursor to the respective line and entering the desired value. The **Wire Material** entry on line 5 allows you to select from the **F4 (CHOICE)** key as shown in Figure B.5.

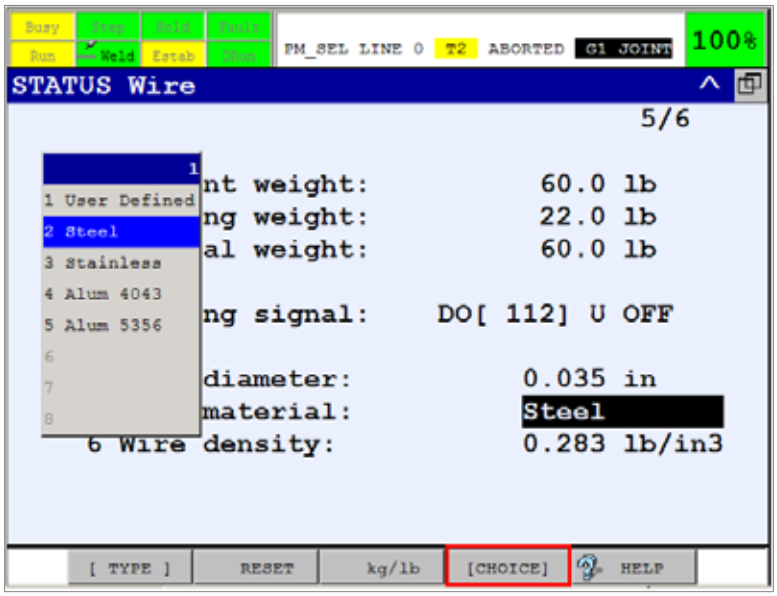



**Figure 12.7 Changing a Setting**

The wire density is automatically entered for the listed materials and you can specify a different value by choosing the **User Defined** material choice.

When the **Warning weight** is reached, the Digital Output specified on the **Warning signal** line will turn on (`DO[112]` in this example). It can be reset by changing the **Warning weight** or by pressing **F2, RESET** to restore the initial weight value.

> **NOTE |** **Consumables welding wire weight is being calculated and entirely depends on the accuracy of the entries on the STATUS wire screen.**

## WeldScore® Display

WeldScore® can be displayed on the robot Teach Pendant when the Arc Analog Meter option (J599) is installed on the robot controller. You can also create your own teach pendant menu that includes the display of WeldScore® by pointing the display control to the system variable `$AWELEPM[equip_num].$I_WELDSCORE`. (Refer to the FANUC *iPendant Controls* reference manual for details about creating your own menus on the teach pendant.)

The Arc Analog Meter option allows you to display the weld current, voltage, and wire feed speed as graphical representations of an analog meter. The Arc Analog Meter display is selected by pressing the **STATUS** key, followed by the **F1 (TYPE)** key and selecting the **Anlg Meter** option from the list. Select either **F2 (METER1)** or **F4 (METER2)** to display a pop-up menu to choose WeldScore® as a displayed variable.

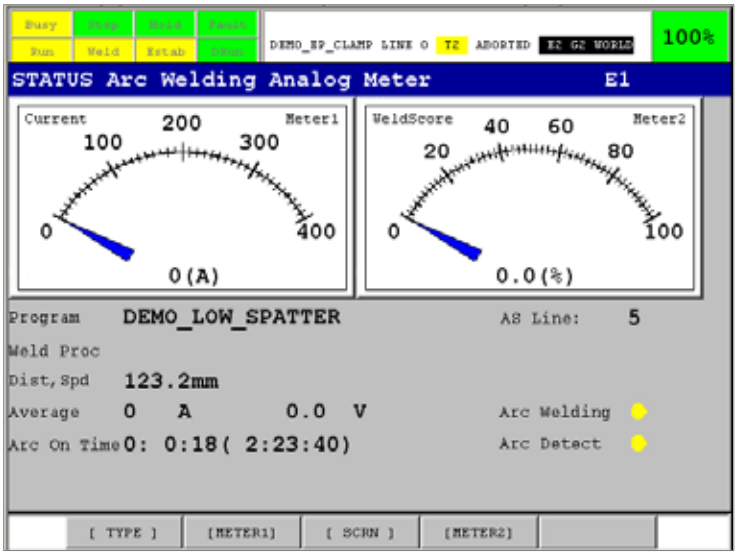



**Figure 12.8 Arc Analog Meter**

While welding, these meters display the actual values of the selected parameters. At the end of the weld, the WeldScore® meter displays the average value for the previous weld.

# License Information

## Third Party Software Attributions and Licenses

Lincoln Electric products may use software provided by third parties, including open source software. The following copyright notices and licenses apply to various components that are distributed with Lincoln Electric products, however this Lincoln Electric product may not necessarily use each of the third party software components listed below. Licensee must fully agree and comply with the applicable license terms. The third party license terms apply only to the respective software to which each license pertains, and do not apply to this Lincoln Electric product or any Lincoln Electric proprietary software provided for use with the product.

### *NLog*



Redistribution and use in source and binary forms, with or without modification, are permitted provided that the following conditions are met:

- Redistributions of source code must retain the above copyright notice, this list of conditions and the following disclaimer.
- Redistributions in binary form must reproduce the above copyright notice, this list of conditions and the following disclaimer in the documentation and/or other materials provided with the distribution.
- Neither the name of Jaroslaw Kowalski nor the names of its contributors may be used to endorse or promote products derived from this software without specific prior written permission.

### *wyUpdate*

# Glossary

***ArcLink®***: This is a communications protocol developed by Lincoln Electric for use in a welding system. This protocol takes into account specific needs of a welding system and the interaction of the multiple components that make up the network.

***Asset***: An asset is entry in the Asset Tree on the left side of the Production Monitoring™ or CheckPoint™ screen. An asset can be either a single Welding Power Source or a Group of power sources. In a manufacturing facility, the asset in Production Monitoring™ or CheckPoint™ could represent a single power source, station or line within the plant.

***Bandwidth***: The amount of information that wires and cables can handle, just like a pipe full of water and materials. The pipe can only hold so much before the flow slows down and eventually clogs.

***Board Serial Number***: Each component in an ArcLink® system has a unique number that allows it to be identified from the other components. In Lincoln Electric systems, this is used to verify what component is being referenced in software.

***Criteria***: A user-supplied piece of information used to sort or filter the data in a report.

***DeviceNet***: A standard industrial networking protocol usually used by a PLC to control networked devices in a Master/Slave relationship.

***DNS***: Domain Name Service used for translating host names to an IP address so that networked equipment can be given an alphanumeric name instead of a number. See Host Name for an example of what a DNS server does.

***E-mail***: Electronic Mail, an electronic message that is transferred over a communications network, or the Internet.

***Ethernet***: A telecommunications networking protocol used to connect computers to each other.

***Firmware***: The memory and programming code within the Welding Power Source that provides the control program for the Welding Power Source.

***Front End***: The "front end" to a software program is the part of the application with which you, as the user, interact (e.g., buttons you click, windows that display).

***Host Name***: Alphanumeric name that is used to represent networked equipment at a specific IP address. An example would be www.google.com instead of 216.239.37.99.

***HTML***: Hyper Text Markup Language, the document format used for web pages on the Internet.

***Intranet***: An internal website to your company that no one on the outside can access unless given user names and passwords to do so.

***IP Address***: A number that identifies a device on the network. This number is a 32-bit numeric address written as four octets separated by periods also referred to as "dots." The numbers range from zero to 255. An example would be 192.168.1.45.

***Latched Alarm***: Prevents the Welding Power Source from making another weld until the alarm has been acknowledged. This setting can be utilized for verifying a welding setup before making another weld.

***Module Number***: The Welding Power Source consists of modules that communicate with each other to create a welding system. The module number is the name given to each one of these devices.

***Octet***: A number ranging from zero to 255 used in IP addresses.

***PLC***: Programmable Logic Controller, a specialized device used in the control of industrial processes.

***Port***: In a specific network such as a TCP or a UDP network, a port is an endpoint to a logical connection. The port number defines what type of information will be transmitted. An example would be port 80 for HTML data or port 25 for e-mail data.

***Proxy Server***: A proxy is a server that stands between an external network (such as the Internet) and an organization's internal (private) networks. It serves as a firewall and prevents external users from directly accessing the internal information resources, or even knowing the location of those resources. All external requests for information are intercepted by the proxy server and checked for their validity. Only authorized requests are passed on to the internal server. This security, however, comes at the cost of inconvenience to genuine users and slower performance.

***Rejected Weld***: A weld that was either not consistent enough or long enough to apply statistical equations to generate reasonable limit information.

***Robotic Feeder I/O***: The PF10R feed head comes with an External I/O Connector that can be reconfigured through Power Wave® Manager to reroute the I/O from its normal operation to be utilized as a Weld Profile selection.

***Shift Times***: A Production Monitoring™ or CheckPoint™ feature used to trigger events at a specific time of day that will allow the tracking of usage and clearing out of Weld Totals and Weld History. There are a total of 6 shift times that can be utilized on a daily basis.

***Short Weld***: Welds with a duration that is less than the sum of the *Start Delay* time plus the *End Delay* time.

***SMTP***: Simple Mail Transfer Protocol, the standard protocol used for sending e-mail through an e-mail server.

***Spreadsheet Application***: A computer tool such as Microsoft Excel that arranges values into rows and columns.

***Subnet***: A section of a network. Subnets are used to divide up large networks into small sections for ease of management, increased performance and increased security.

***Tab-Delimited Text File***: Generic text file format that is used for arranging data in a spreadsheet. Most spreadsheet applications can import this file format with little or no conversion by the user.

***TCP***: Transmission Control Protocol, used in the transmission of data between two devices. It is a more reliable protocol than UDP since it controls the delivery of data and verifies the order in which the data is sent.

***UDP***: User Datagram Protocol, used in the transmission of data between two or more devices. It is a faster protocol than TCP, but it does not guarantee data delivery or the order in which the data is sent.

***Weld History***: Data on welds that the Welding Power Source has made. This statistical data includes information on current, voltage, wire feed speed, duration and weld status.

***Weld Mode***: A particular process that is selected in the Welding Power Source. The Welding Power Source has a weld table that contains a large variety of processes that the system can use to define welding procedures. Each process is listed as a Weld Mode.

***Weld Profile***: A configurable set of limit settings that Welding Power Source compares to welding data it collects as it welds.

***Weld Totals***: A cumulative count of welds performed in each Weld Profile. Each total count includes the number of welds, and a count of each variable that was out of limits per Weld Profile.

***Welding Set Point***: A value that the Welding Power Source utilizes to regulate its output levels.

|  |  |  |  |
|---|---|---|---|
| **WARNING** | ● Do not touch electrically live parts or electrode with skin or wet clothing.<br>● Insulate yourself from work and ground. | ● Keep flammable materials away. | ● Wear eye, ear and body protection. |
| Spanish<br>**AVISO DE PRECAUCION** | ● No toque las partes o los electrodos bajo carga con la piel o ropa mojada.<br>● Aislese del trabajo y de la tierra. | ● Mantenga el material combustible fuera del área de trabajo. | ● Protéjase los ojos, los oídos y el cuerpo. |
| French<br>**ATTENTION** | ● Ne laissez ni la peau ni des vêtements mouillés entrer en contact avec des pièces sous tension.<br>● Isolez-vous du travail et de la terre. | ● Gardez à l'écart de tout matériel inflammable. | ● Protégez vos yeux, vos oreilles et votre corps. |
| German<br>**WARNUNG** | ● Berühren Sie keine stromführenden Teile oder Elektroden mit Ihrem Körper oder feuchter Kleidung!<br>● Isolieren Sie sich von den Elektroden und dem Erdboden! | ● Entfernen Sie brennbarres Material! | ● Tragen Sie Augen-, Ohren- und Körperschutz! |
| Portuguese<br>**ATENÇÃO** | ● Não toque partes elétricas e electrodos com a pele ou roupa molhada.<br>● Isole-se da peça e terra. | ● Mantenha inflamáveis bem guardados. | ● Use proteção para a vista, ouvido e corpo. |
| Japanese<br>**注意事項** | ● 通電中の電気部品、又は溶材にヒフやぬれた布で触れないこと。<br>● 施工物やアースから身体が絶縁されている様にして下さい。 | ● 燃えやすいものの側での溶接作業は絶対にしてはなりません。 | ● 目、耳及び身体に保護具をして下さい。 |
| Chinese<br>**警 告** | ● 皮肤或濕衣物切勿接觸帶電部件及銲條。<br>● 使你自己與地面和工件絕緣。 | ● 把一切易燃物品移離工作場所。 | ● 佩戴眼、耳及身體勞動保護用具。 |
| Korean<br>**위 험** | ● 전도체나 용접봉을 젖은 헝겁 또는 피부로 절대 접촉치 마십시요.<br>● 모재와 접지를 접촉치 마십시요. | ● 인화성 물질을 접근 시키지 마시요. | ● 눈, 귀와 몸에 보호장구를 착용하십시요. |
| Arabic<br>**تحذير** | ● لا تلمس الاجزاء التي يسري فيها التيار الكهربائي أو الالكترود بجلد الجسم أو بالملابس المبللة بالماء.<br>● ضع عازلا على جسمك خلال العمل. | ● ضع المواد القابلة للاشتعال في مكان بعيد. | ● ضع أدوات وملابس واقية على عينيك وأذنيك وجسمك. |

**READ AND UNDERSTAND THE MANUFACTURER'S INSTRUCTION FOR THIS EQUIPMENT AND THE CONSUMABLES TO BE USED AND FOLLOW YOUR EMPLOYER'S SAFETY PRACTICES.**

**SE RECOMIENDA LEER Y ENTENDER LAS INSTRUCCIONES DEL FABRICANTE PARA EL USO DE ESTE EQUIPO Y LOS CONSUMIBLES QUE VA A UTILIZAR, SIGA LAS MEDIDAS DE SEGURIDAD DE SU SUPERVISOR.**

**LISEZ ET COMPRENEZ LES INSTRUCTIONS DU FABRICANT EN CE QUI REGARDE CET EQUIPMENT ET LES PRODUITS A ETRE EMPLOYES ET SUIVEZ LES PROCEDURES DE SECURITE DE VOTRE EMPLOYEUR.**

**LESEN SIE UND BEFOLGEN SIE DIE BETRIEBSANLEITUNG DER ANLAGE UND DEN ELEKTRODENEINSATZ DES HERSTELLERS. DIE UNFALLVERHÜTUNGSVORSCHRIFTEN DES ARBEITGEBERS SIND EBENFALLS ZU BEACHTEN.**

|  |  |  |  |
|---|---|---|---|
| ● Keep your head out of fumes.<br>● Use ventilation or exhaust to remove fumes from breathing zone. | ● Turn power off before servicing. | ● Do not operate with panel open or guards off. | **WARNING** |
| ● Los humos fuera de la zona de respiración.<br>● Mantenga la cabeza fuera de los humos. Utilice ventilación o aspiración para gases. | ● Desconectar el cable de alimentación de poder de la máquina antes de iniciar cualquier servicio. | ● No operar con panel abierto o guardas quitadas. | Spanish<br>**AVISO DE PRECAUCION** |
| ● Gardez la tête à l'écart des fumées.<br>● Utilisez un ventilateur ou un aspirateur pour ôter les fumées des zones de travail. | ● Débranchez le courant avant l'entretien. | ● N'opérez pas avec les panneaux ouverts ou avec les dispositifs de protection enlevés. | French<br>**ATTENTION** |
| ● Vermeiden Sie das Einatmen von Schweibrauch!<br>● Sorgen Sie für gute Be- und Entlüftung des Arbeitsplatzes! | ● Strom vor Wartungsarbeiten abschalten! (Netzstrom völlig öffnen; Maschine anhalten!) | ● Anlage nie ohne Schutzgehäuse oder Innenschutzverkleidung in Betrieb setzen! | German<br>**WARNUNG** |
| ● Mantenha seu rosto da fumaça.<br>● Use ventilação e exhaustão para remover fumo da zona respiratória. | ● Não opere com as tampas removidas.<br>● Desligue a corrente antes de fazer serviço.<br>● Não toque as partes elétricas nuas. | ● Mantenha-se afastado das partes moventes.<br>● Não opere com os paineis abertos ou guardas removidas. | Portuguese<br>**ATENÇÃO** |
| ● ヒュームから頭を離すようにして下さい。<br>● 換気や排煙に十分留意して下さい。 | ● メンテナンス・サービスに取りかかる際には、まず電源スイッチを必ず切って下さい。 | ● パネルやカバーを取り外したままで機械操作をしないで下さい。 | Japanese<br>**注意事項** |
| ●頭部遠離煙霧。<br>●在呼吸區使用通風或排風器除煙。 | ●維修前切斷電源。 | ●儀表板打開或沒有安全罩時不準作業。 | Chinese<br>**警 告** |
| ● 얼굴로부터 용접가스를 멀리하십시요.<br>● 호흡지역으로부터 용접가스를 제거하기 위해 가스제거기나 통풍기를 사용하십시요. | ● 보수전에 전원을 차단하십시요. | ● 판넬이 열린 상태로 작동치 마십시요. | Korean<br>**위 험** |
| ● ابعد رأسك بعيداً عن الدخان.<br>● استعمل التهوية أو جهاز ضغط الدخان للخارج لكي تبعد الدخان عن المنطقة التي تتنفس فيها. | ● اقطع التيار الكهربائي قبل القيام بأية صيانة. | ● لا تشغل هذا الجهاز اذا كانت الاغطية الحديدية الواقية ليست عليه. | Arabic<br>**تحذير** |

**LEIA E COMPREENDA AS INSTRUÇÕES DO FABRICANTE PARA ESTE EQUIPAMENTO E AS PARTES DE USO, E SIGA AS PRÁTICAS DE SEGURANÇA DO EMPREGADOR.**

使う機械や溶材のメーカーの指示書をよく読み、まず理解して下さい。そして貴社の安全規定に従って下さい。

請詳細閱讀並理解製造廠提供的説明以及應該使用的銀捍材料，並請遵守貴方的有関勞動保護規定。

이 제품에 동봉된 작업지침서를 숙지하시고 귀사의 작업자 안전수칙을 준수하시기 바랍니다.

اقرأ بتمعن وافهم تعليمات المصنع المنتج لهذه المعدات والمواد قبل استعمالها واتبع تعليمات الوقاية لصاحب العمل.

## CUSTOMER ASSISTANCE POLICY

The business of The Lincoln Electric Company is manufacturing and selling high quality welding equipment, consumables, and cutting equipment. Our challenge is to meet the needs of our customers and to exceed their expectations. On occasion, purchasers may ask Lincoln Electric for advice or information about their use of our products. We respond to our customers based on the best information in our possession at that time. Lincoln Electric is not in a position to warrant or guarantee such advice, and assumes no liability, with respect to such information or advice. We expressly disclaim any warranty of any kind, including any warranty of fitness for any customer's particular purpose, with respect to such information or advice. As a matter of practical consideration, we also cannot assume any responsibility for updating or correcting any such information or advice once it has been given, nor does the provision of information or advice create, expand or alter any warranty with respect to the sale of our products.

Lincoln Electric is a responsive manufacturer, but the selection and use of specific products sold by Lincoln Electric is solely within the control of, and remains the sole responsibility of the customer. Many variables beyond the control of Lincoln Electric affect the results obtained in applying these types of fabrication methods and service requirements.

Subject to Change – This information is accurate to the best of our knowledge at the time of printing. Please refer to www.lincolnelectric.com for any updated information.

**THE LINCOLN ELECTRIC COMPANY**
22801 St. Clair Avenue • Cleveland, OH • 44117-1199 • U.S.A.
Phone: +1.216.481.8100 • www.lincolnelectric.com