



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

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.

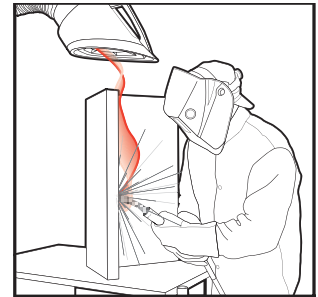
READ and obey the Material Safety Data Sheet (MSDS) and the warning label that appears on all containers of welding materials.

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

Diesel Engines

Diesel engine exhaust and some of its constituents are known to the State of California to cause cancer, birth defects, and other reproductive harm.

Gasoline Engines

The engine exhaust from this product contains chemicals known to the State of California to cause cancer, birth defects, or other reproductive harm.

ARC WELDING CAN BE HAZARDOUS. PROTECT YOURSELF AND OTHERS FROM POSSIBLE SERIOUS INJURY OR DEATH. KEEP CHILDREN AWAY. PACE-MAKER 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 W117.2-1974. 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 Z87.1 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.



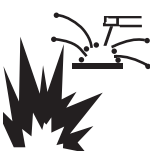
FUMES AND GASES CAN BE DANGEROUS.



- 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 with electrodes which require special ventilation such as stainless or hard facing (see instructions on container or MSDS) 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. In confined spaces or in some circumstances, outdoors, a respirator may 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 material safety data sheet (MSDS) and follow your employer's safety practices. MSDS forms are available from your welding distributor or from the manufacturer.
- 5.f. Also see item 1.b.



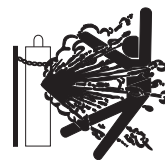
WELDING AND CUTTING SPARKS CAN CAUSE FIRE OR EXPLOSION.



- 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-1, "Precautions for Safe Handling of Compressed Gases in Cylinders," available from the Compressed Gas Association 1235 Jefferson Davis Highway, Arlington, VA 22202.



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.



**Welding Safety
Interactive Web Guide
for mobile devices**

Get the free mobile app at
<http://gettag.mobi>

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Glossary

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
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 central server.

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 network or serial (RS-232) cable

Power Wave® Manager runs under the Microsoft® .NET 2.0 framework. Therefore, it can run on the following versions of Microsoft® operating systems:

- Windows 7
- Windows Vista
- Windows XP Service Pack 2
- Windows 2000 Service Pack 4
- Windows 98 Second Edition

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 1000SD
- Power Wave® i400
- Power Wave® C300
- Power Wave® S350
- Power Wave® S500

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. The application also does not support dual wire feeding system.

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.

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 physically connect your computer to the power source using one of three methods:

- A direct connection between your computer and the Welding Power Source using an Ethernet cable from your computer to the port on the power source.
- An existing company network connection.
- A serial 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 as a static IP address (where an IT department assigns a specific address to each device on the network). Power Wave® Manager can handle either scenario (page 4.3); 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. This is the preferred method.
- 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.

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 2.1 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.

Installing Power Wave® Manager

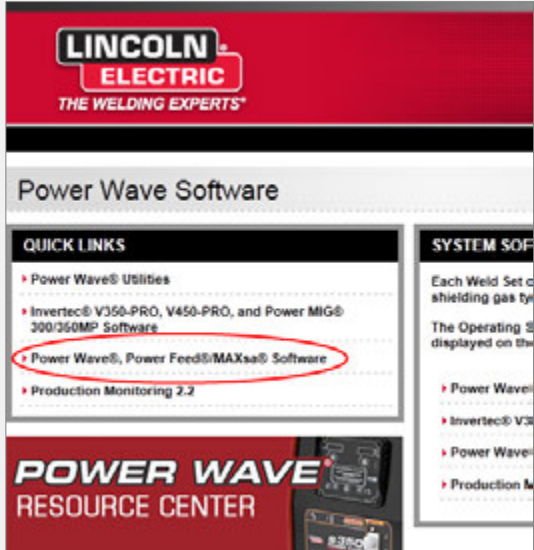
Once you have physically connected the Welding Power Source and your computer, you must perform two main steps to install Power Wave® Manager:

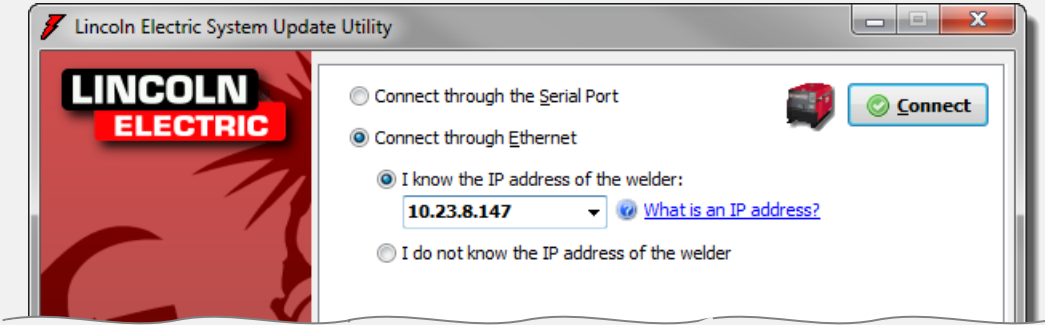
- Update the firmware on each power source you connect to
- Install the Power Wave® Manager software on the computer(s) you want to use to connect to the power source

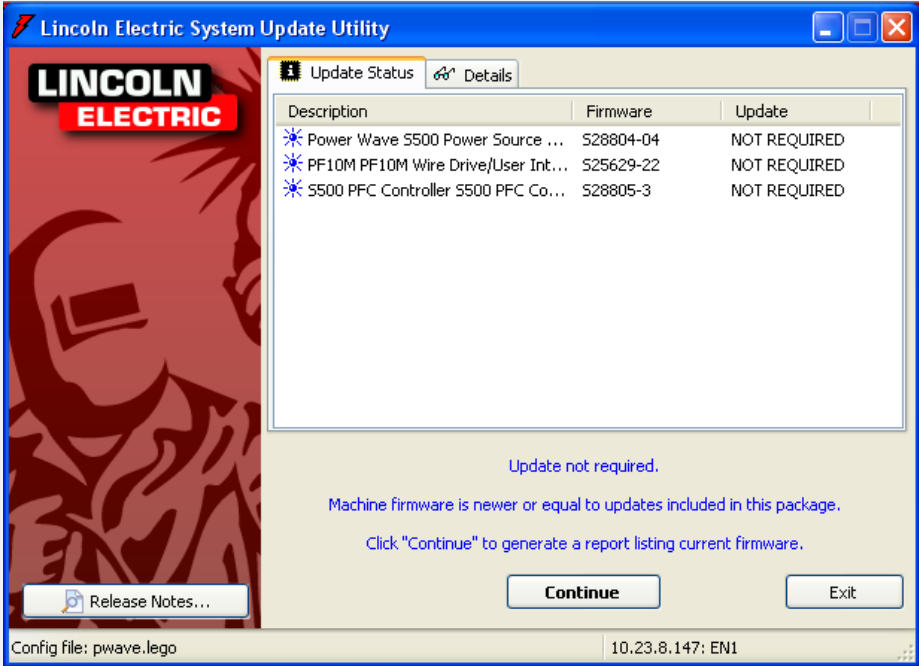
Update Welding Power Source Firmware

“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 <i>Login</i> page displays.
3. Enter your username and password in the <i>Email</i> and <i>Password</i> fields and click Sign In . OR Click the <i>Register Today</i> link to create an account.	If you’re creating a new account, follow the onscreen instructions and return to this step when finished. Once you log in, the system displays the <i>Power Wave Resource Center</i>. 

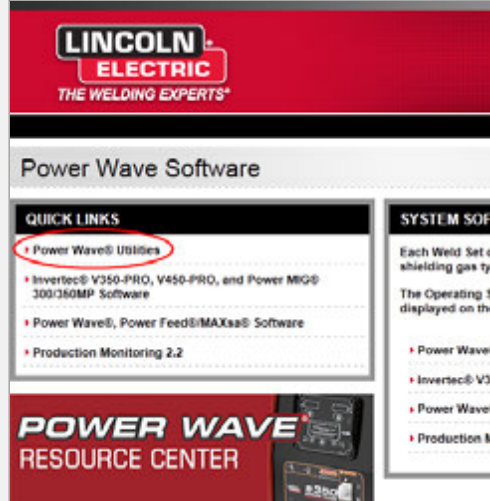
Procedure	Details
4. In the <i>Quick Links</i> section, click the <i>Power Wave®</i>, <i>Power Feed®/MAXsa® Software</i> link.	The system displays a page containing the Download Power Wave® Bundle-FREE button.  File Size: 11.1 MB / Last Updated: 08-20-12
5. Click the Download Power Wave® Bundle-FREE button to run the update.	NOTE Depending on your Windows version, you may have to click Run or Allow to permit your system to launch the file. The system opens the <i>Lincoln Electric System Update Utility</i> window where you tell the utility how to find the Welding Power Source you want to update.
	
6. Choose the <i>Connect through Ethernet</i> 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. You can enter the IP address for the Welding Power Source in one of two ways: ▪ Type the specific IP address into the <i>I know the IP address of the welder</i> field. ▪ Choosing the <i>I do not know the IP address of the welder</i> option. The update utility scans your network and displays a list of Welding Power Source IP addresses on the same subnet. NOTE If this Welding Power Source has older firmware, the IP address will not show up using this method. TIP If you run into a problem, please refer to

Procedure	Details
7. Click the Connect button once you have entered the IP address for the power source you are updating.	the Troubleshooting section (Appendix A). The software scans the Welding Power Source to verify if the firmware currently on the machine is up to date. TIP You can also see this information under System Status > Module Information > Software Version in Power Wave® Manager. See Figure 5.4 on page 5.4.
	
8. If the firmware is not up to date, you must click Continue to update the Welding Power Source.	The system proceeds with the update. If the firmware is already up to date, you will receive the message <i>Update not required</i> and you can click Exit to close the window.
9. Exit the program once the firmware has finished updating.	
10. Repeat steps 4 through 9 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 <i>Login</i> page displays.
3. Enter your username and password in the <i>Email</i> and <i>Password</i> fields and click Sign In .	These are the same credentials you used when updating the Welding Power Source firmware. Once you log in, the system displays the <i>Power Wave Resource Center</i>. 
4. In the <i>Quick Links</i> section, click the <i>Power Wave® Utilities</i> link.	The system displays a page containing the Download Power Wave® Utilities FREE button.

Procedure	Details
	 File Size: 13.2 MB / Last Updated: 01-31-12 NOTE Depending on your Windows version, you may have to click Run or Allow to permit your system to launch the file. 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. The system displays the <i>Installer Language</i> dialog.
5. Click the Download Power Wave® Utilities FREE button to run the update. 6. 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. If this is a new installation (or once the old version is removed), the system displays the installation welcome window. 
7. Click Next on the <i>Welcome</i> screen to move to the License Agreement and continue the installation.	
8. You must accept the License Agreement and click Next to continue.	
9. Leave the default value in the <i>Destination Folder</i> field and click Install.	The system extracts files and installs the Power Wave® Utilities on your computer. Once it is complete, the final page of the <i>Setup Wizard</i> opens.

Procedure	Details
10. Click the Finish button to exit the installer.	Congratulations! You have installed Power Wave® Manager and can now configure your Welding Power Source.

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 a Preferences Folder

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.

Connecting to the Welding Power Source

Once you have physically connected the Welding Power Source to the computer with an Ethernet cable or a serial cable setup (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 4.1). From here you can choose your connection method: Ethernet or a serial connection.

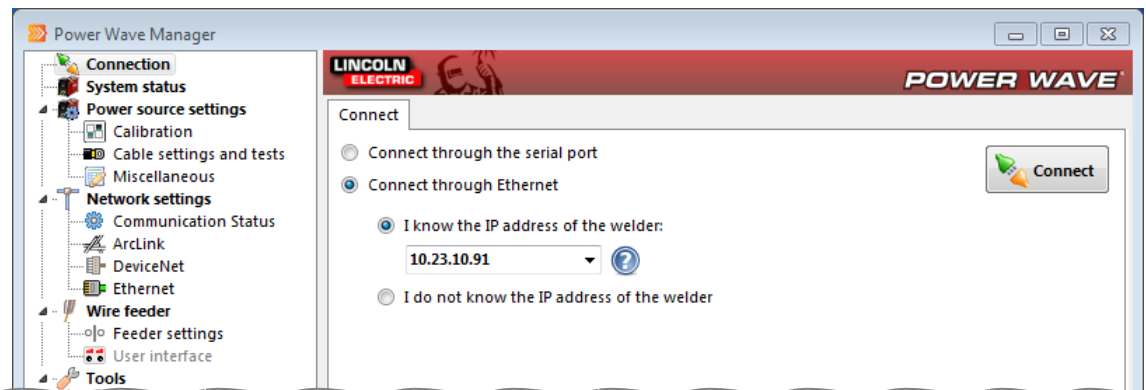


Figure 4.1 Available Connection Methods

Ethernet Connection

The preferred method of connecting your computer to the Welding Power Source is through an Ethernet connection, 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.

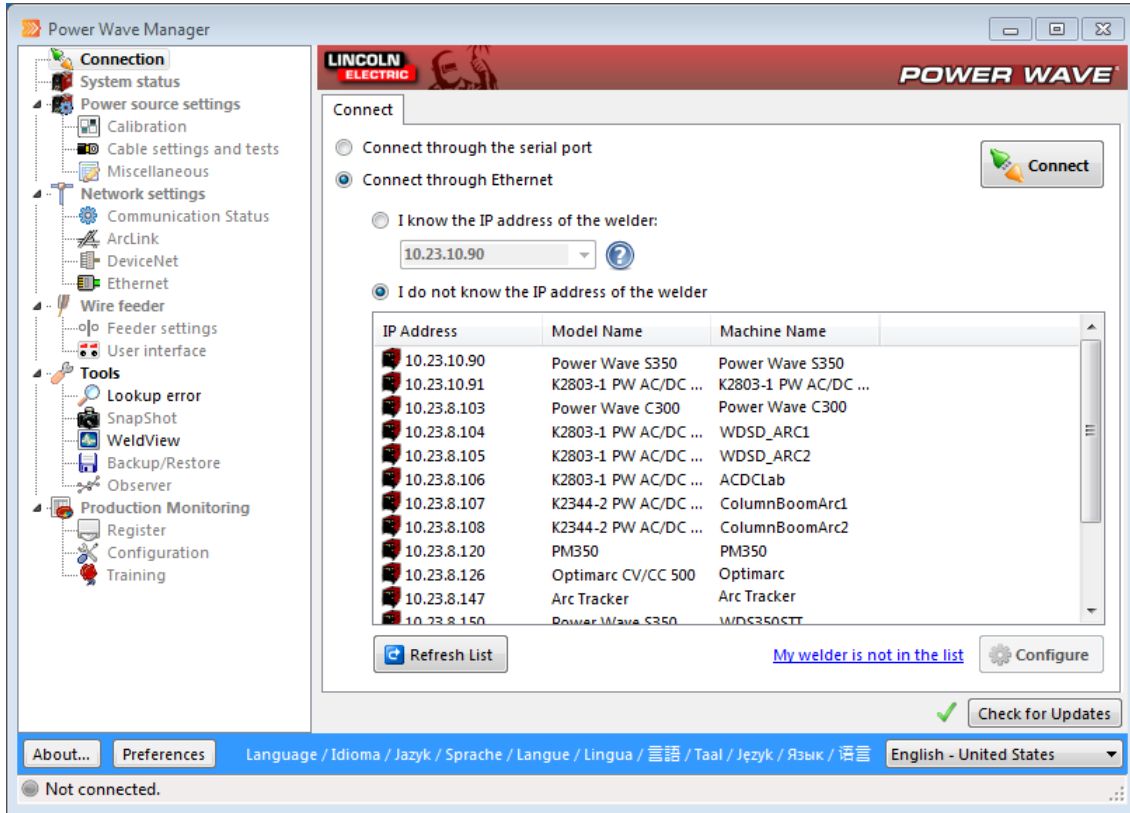


Figure 4.2 Connecting Using an Ethernet Connection

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. When Power Wave® Manager opens, it automatically displays the Connect tab for you (Figure 4.2).
2. Choose the <i>Connect through Ethernet</i> option.	

Procedure	Details
3. Choose <i>I know the IP address of the welder</i> (if you know the network address) and type the IP address in the text field. OR Choose <i>I don't know the IP address of the welder</i> if you need to scan the network to find the welder's address. See page 4.3 for more information on finding the IP address.	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. For example, <i>10.23.10.90</i> is a valid 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.
4. 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 <i>System status</i> section for you (Chapter 5). 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.

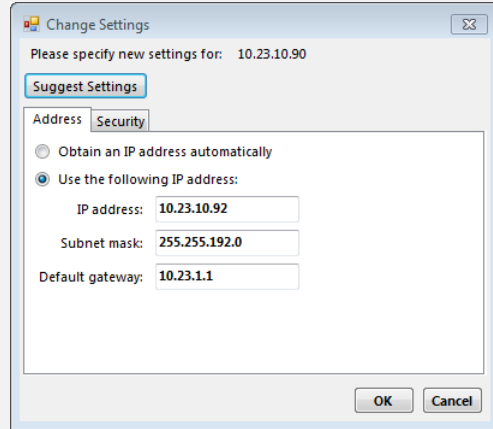
Modifying the Ethernet Settings of a Power Source

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>I do not know the IP address of the welder</i> 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 <i>Change Settings</i> window opens. 
4. Make your changes.	If your computer is directly connected to the Welding Power Source using an Ethernet cable, 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 serial port* option on the **Connect** tab of Power Wave® Manager (Figure 4.1 on page 4.1). Follow the onscreen instructions to establish a connection to the power source.

Navigating Power Wave® Manager

When you launch 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.

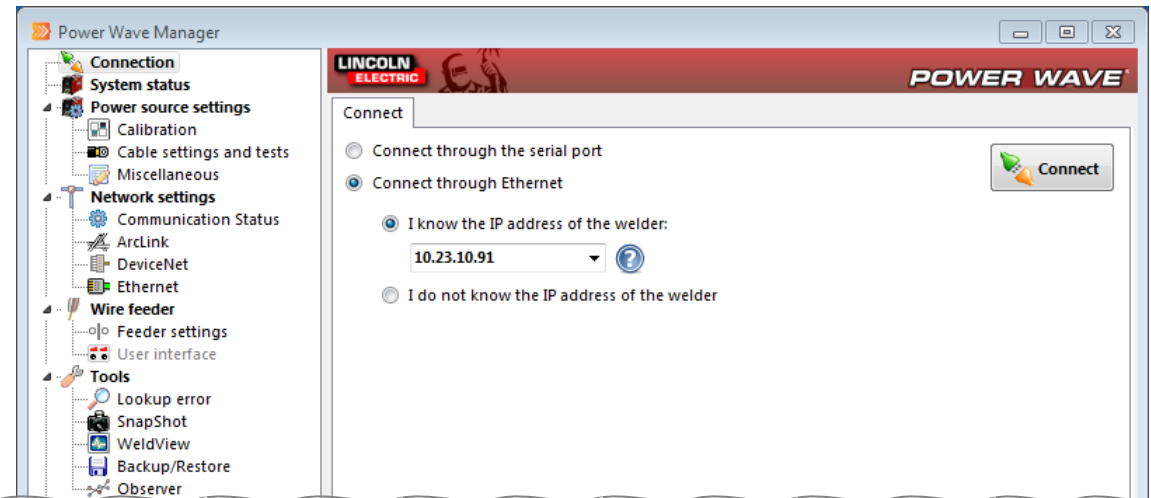


Figure 4.3 Power Wave® Manager

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 4.4).

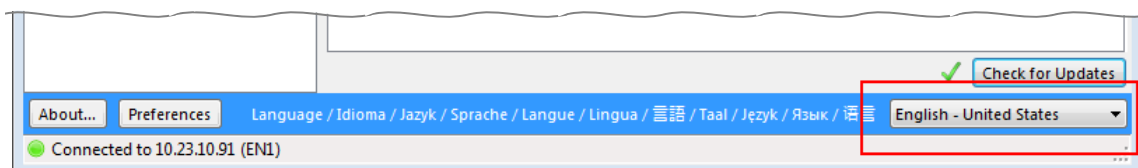


Figure 4.4 Changing the Language of Power Wave® Manager

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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.

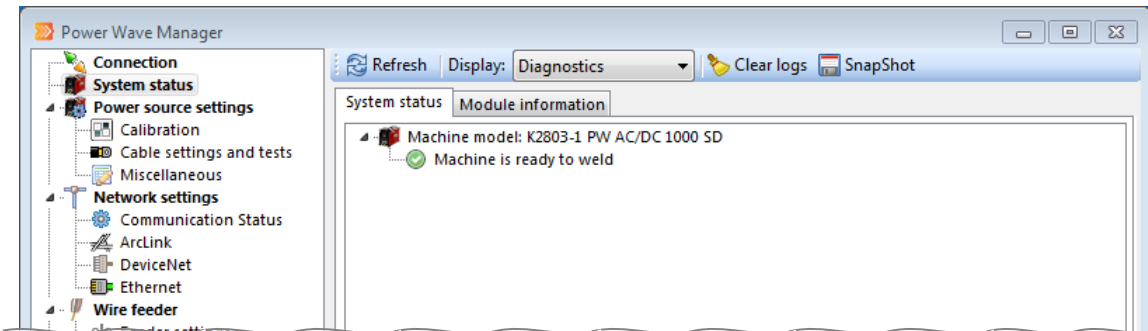


Figure 5.1 System Status

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 5.2) and *Detailed Status* (page 5.3).
- **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 9.2 for more details.

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).

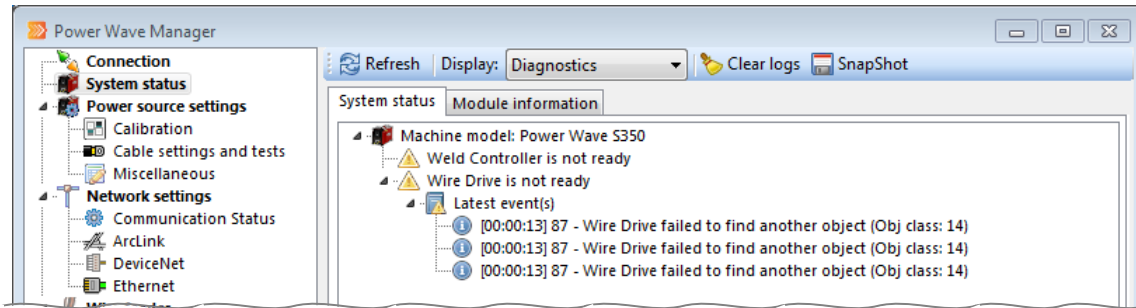


Figure 5.2 System Status Tab

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 9.1. 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.

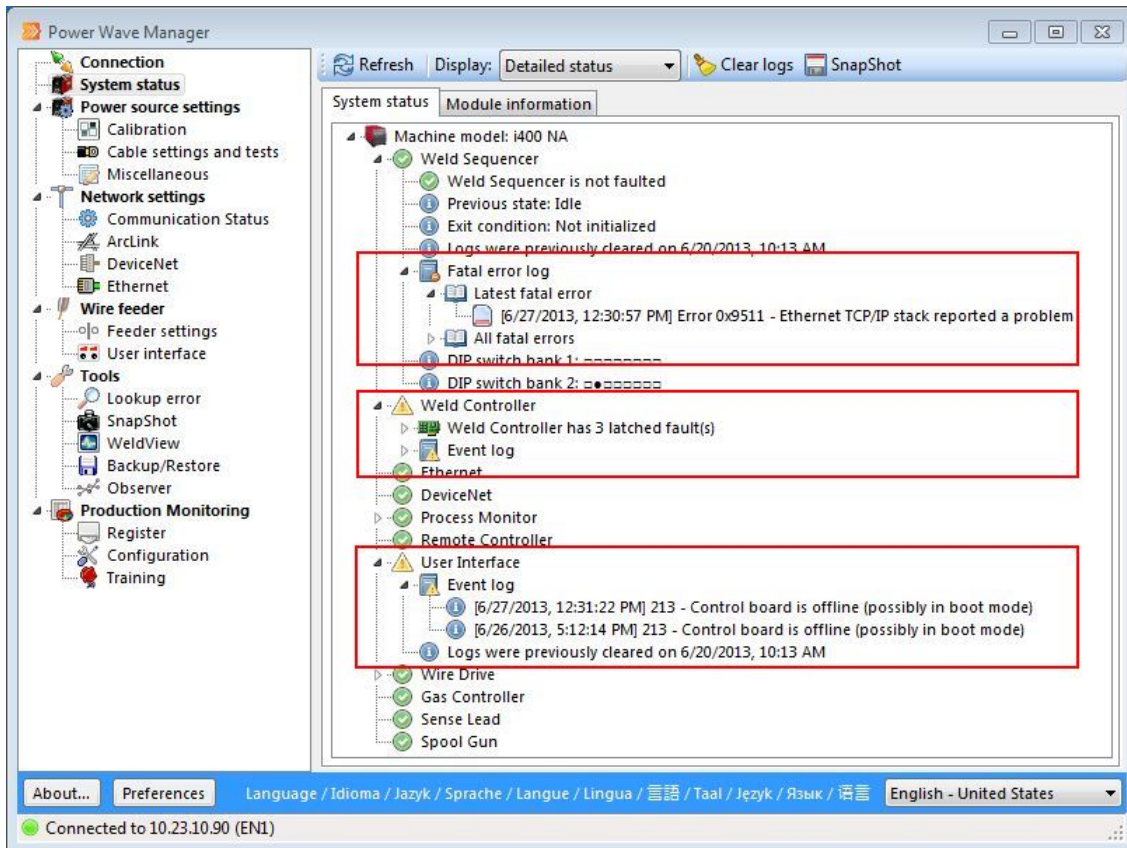


Figure 5.3 Detailed Status

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, and miscellaneous information such as firmware revision numbers and checksums. 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 7 on page 3.3.

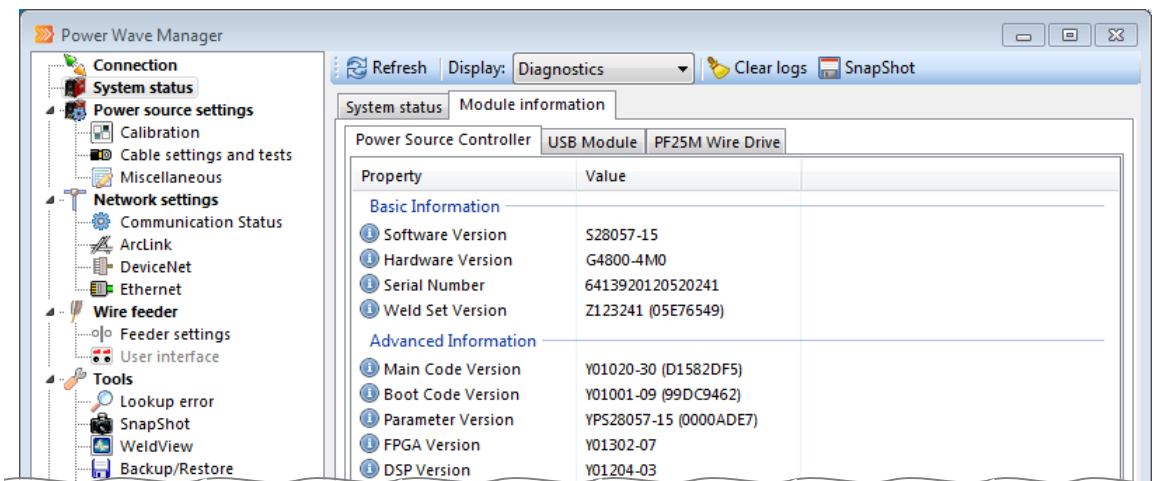


Figure 5.4 Module Information Tab

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.

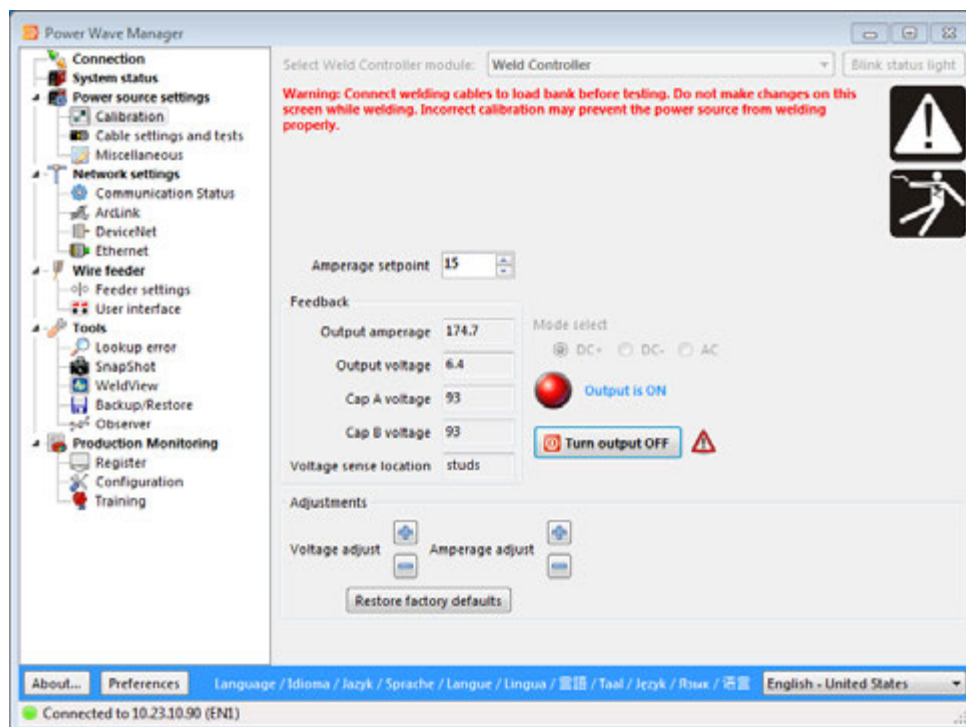


Figure 6.1 Calibration

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 <i>Calibration</i> 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 <i>Feedback</i> for: <i>Output amperage</i> , <i>Output voltage</i> , <i>Capacitor voltages</i> and <i>Voltage sense location</i> .
6. Use the plus and minus icons (⊕ and ⊖) to the right of <i>Amperage adjust</i> (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 <i>Voltage adjust</i> (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. 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.

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.

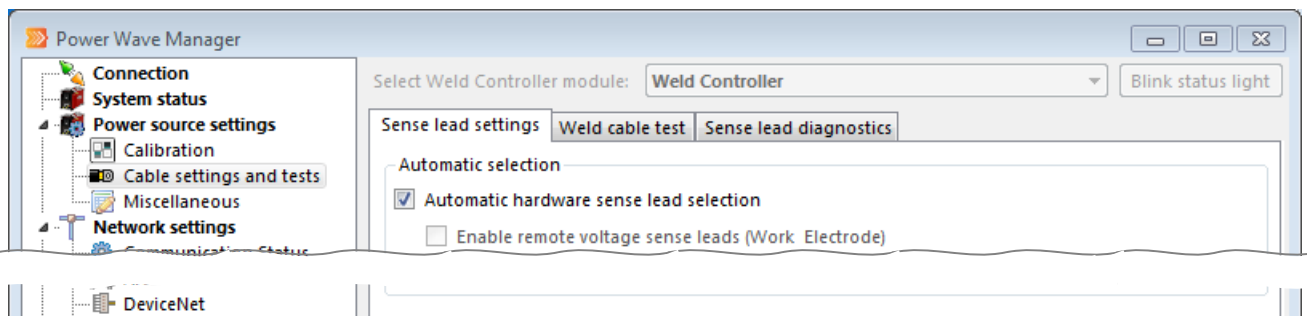


Figure 6.2 Sense Lead Settings Tab

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 <i>Automatic hardware sense lead selection</i> checkbox.	
2. Place a check mark in the <i>Enable remote voltage sense leads</i> 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 <i>Automatic hardware sense lead selection</i> checkbox.	
2. Place a check mark in the <i>Force negative weld polarity</i> 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 6.3) 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.



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 6.3).

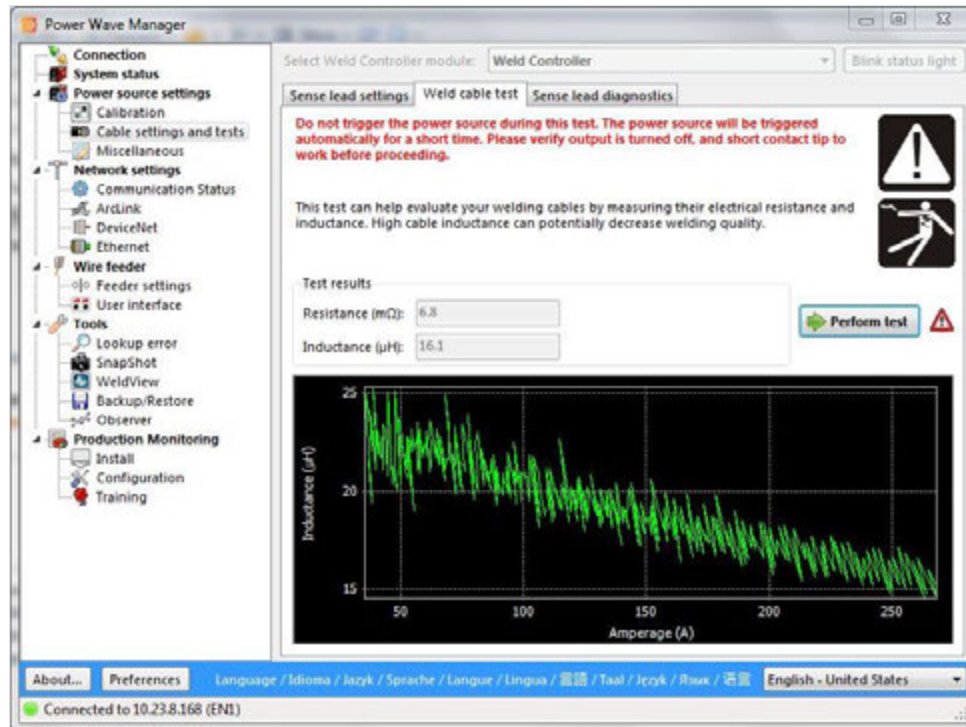


Figure 6.3 Weld Cable Test Tab

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.

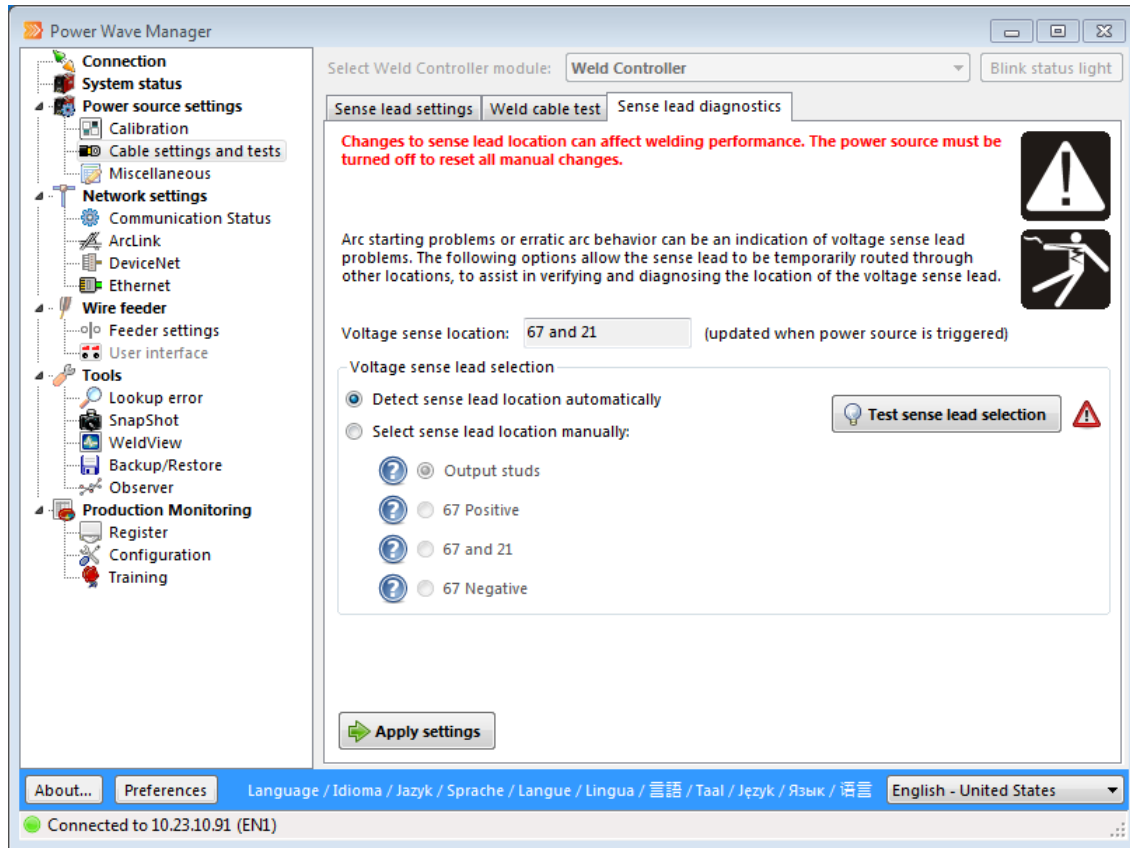


Figure 6.4 Sense Lead Diagnostics

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

If you know want to step through each sense lead manually, you can use Power Wave® Manager to test them individually and force the Welding Power Source to sense voltage from the location you choose.

To perform the test, choose the *Select sense lead location manually* option and choose one of the following options. Click the **Apply settings** button to confirm your choice and click the **Test sense lead selection** button to perform the test. 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 weld controller.

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

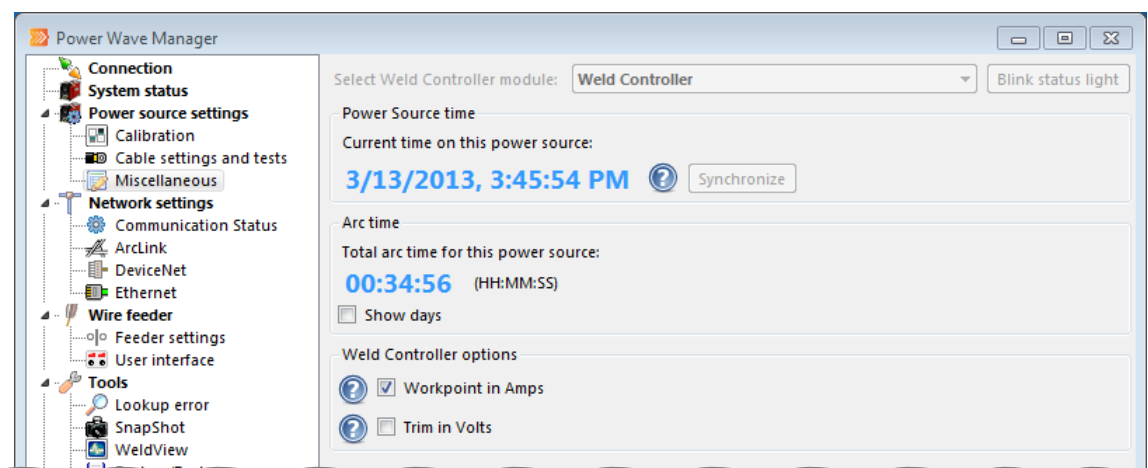


Figure 6.5 Miscellaneous Section

Time Settings on the Power Source

The *Power Source time* section 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 Production Monitoring™ and CheckPoint™.

NOTE | The Production Monitoring™ and CheckPoint™ application, if present, periodically sets 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.

Total Welding Lifetime

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.

Weld Controller

If the Welding Power Source supports the following features, you can use the *Weld Controller* section to set a couple of control options:

- *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.

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

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”.



Figure 7.1 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 7.3 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.

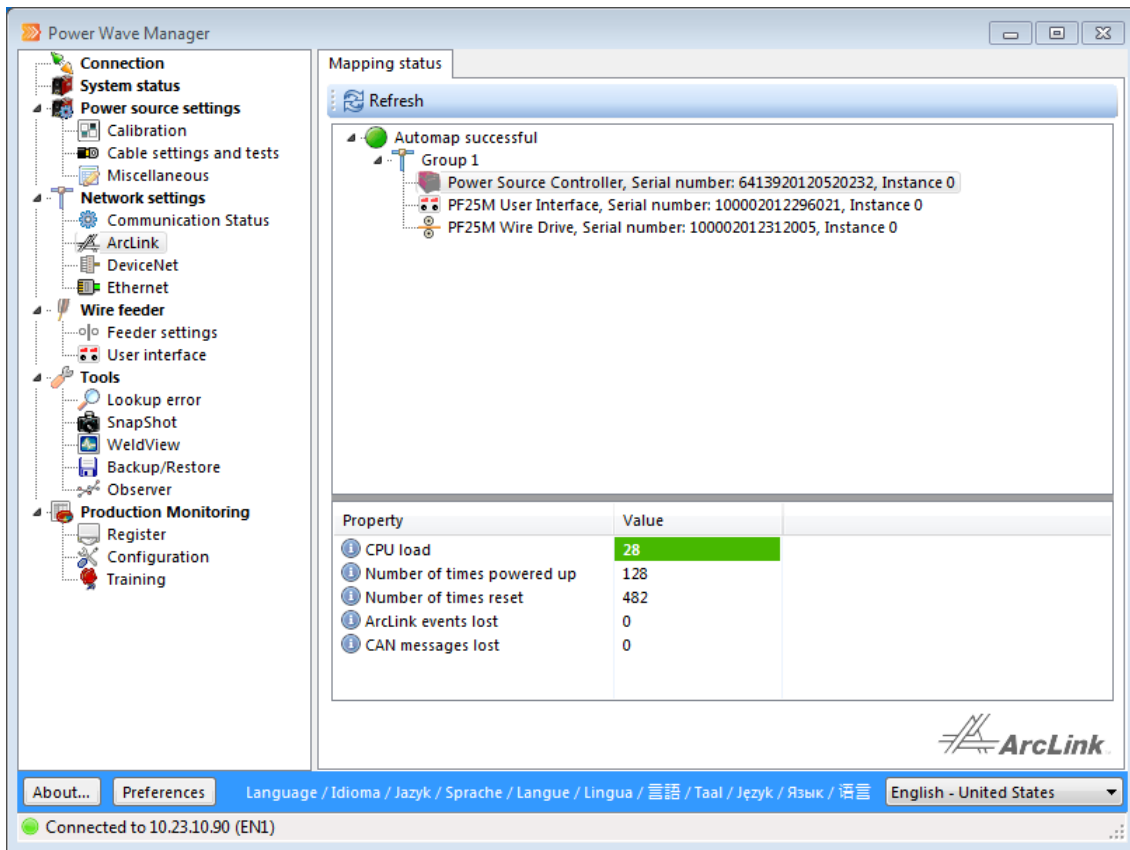


Figure 7.2 Mapping Status

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 7.3).

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

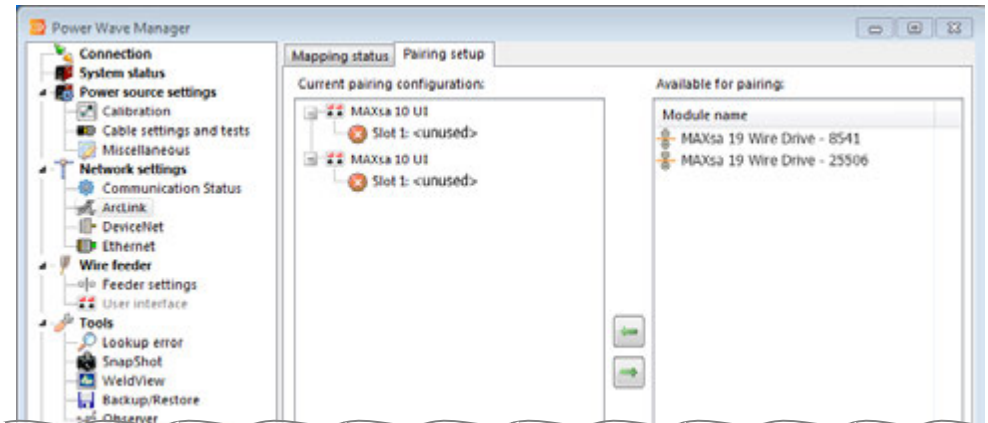


Figure 7.3 Pairing Setup Tab

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.

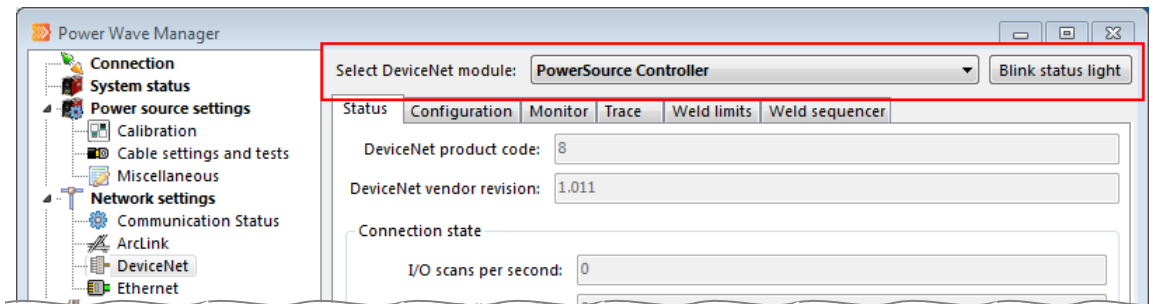


Figure 7.4 Multiple DeviceNet Module Drop-down

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.

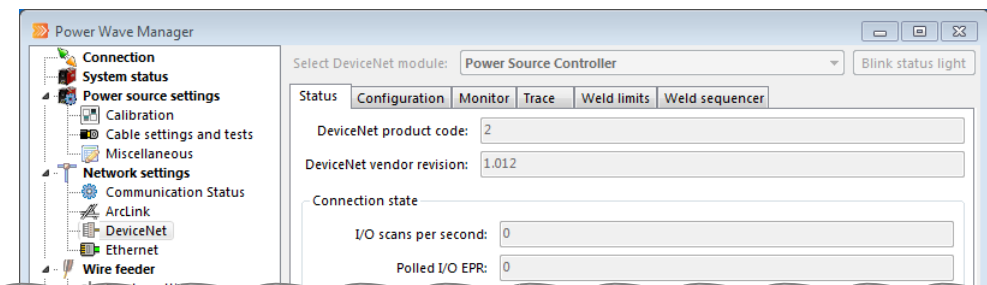


Figure 7.5 Status Tab

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 7.1 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.

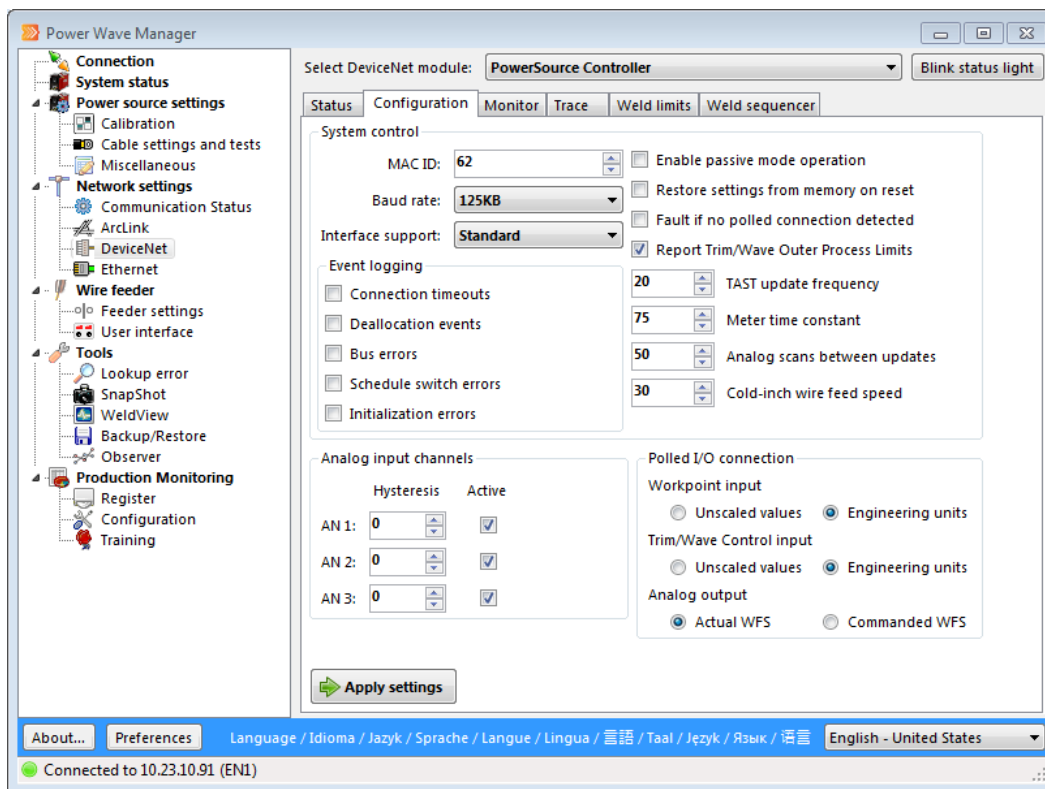


Figure 7.6 Configuration Tab

Table 7.1 Fields on the Configuration Tab

Field	Description
System Control	
<i>MAC ID</i>	This field displays the current media access control (MAC) ID of the DeviceNet interface installed on this Welding Power Source. For the following power sources, the <i>MAC ID</i> 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. For other Welding Power Sources that do not have a DIP Switch, you must use

Field	Description
	Power Wave® Manager to set the <i>MAC ID</i> of the DeviceNet interface. 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.
<i>Baud Rate</i>	This field displays the current baud rate configured in the DeviceNet interface installed on this Welding Power Source. For the following power sources, the <i>Baud Rate</i> 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. For other Welding Power Sources that do not have a DIP Switch, you must use Power Wave® Manager to set the <i>Baud Rate</i> of the DeviceNet interface. 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.
<i>Event Logging</i>	The <i>Event Logging</i> checkboxes allow you to control the types of issues that create a log entry when they occur on this DeviceNet module.
<i>Enable passive mode operation</i>	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 <i>Weld Output disable</i> bit and the <i>Production Monitoring Fault Reset</i> bit.
<i>Restore settings from memory on reset</i>	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. 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.
<i>Fault if no polled connection detected</i>	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.
<i>Report Trim/Wave Outer Process Limits</i>	When you choose to report the <i>Trim/Wave Control input</i> in <i>Engineering units</i> and these inputs are dependent on the <i>Workpoint</i>, place a check mark in this checkbox to report back the high and low limits of the <i>Trim</i> and <i>Wave Control</i> parameters. Typically, this item is checked. If there is no check mark in this checkbox, the returned limits will be based on the <i>Workpoint</i>. As the <i>Workpoint</i> changes, the acceptable range for the <i>Trim</i> and <i>Wave Control</i> change as well, removing the check mark from this box also reports back that acceptable range.

Field	Description
<i>TAST update frequency</i>	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.
<i>Meter time constant</i>	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.
<i>Analog scans between updates</i>	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. 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.
<i>Cold-inch wire feed speed</i>	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

<i>Workpoint input</i>	This indicates whether the values passed to the system through the analog DeviceNet channels for the <i>Workpoint</i> parameter are raw values or scaled engineering values. For most applications, choose <i>Engineering units</i>. For example, when the <i>Workpoint</i> is in inches per minute and you choose <i>Engineering units</i>, a value between 50 and 800 might be expected to be commanded on the DeviceNet analog input for the <i>Workpoint</i>. This would represent a value of 50 to 800 inches per minute. When you choose the <i>Unscaled values</i> option, the commands for <i>Workpoint</i> range from 0 to 32767, corresponding to the minimum and maximum <i>Workpoint</i> of the selected Weld Mode.
<i>Trim/Wave Control input</i>	This indicates whether the values passed to the system through the analog DeviceNet channels for the <i>Trim</i> and <i>Wave Control</i> parameters are raw values or scaled engineering values. For example, when the <i>Trim</i> is in volts and you choose <i>Engineering units</i>, a value between 75 and 520 might be expected to be commanded on the DeviceNet analog input for the <i>Trim</i>. This would represent a value of 7.5 to 52.0 volts. When you choose the <i>Unscaled values</i> option, the commands for <i>Trim</i> and <i>Wave Control</i> range from -32768 to 32767 with 0 representing a nominal value. A great majority of applications will require <i>Trim</i> and <i>Wave Control</i> command values to be set near the nominal value.

Field	Description
<i>Analog output</i>	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 <i>Actual WFS</i> option. ▪ <i>Actual WFS</i>: This option reports the actual wire feed speed of the feeder through the third analog feedback. ▪ <i>Commanded WFS</i>: Typically used for non-Lincoln Electric wire feeders, this option sends the recommended wire feed speed through the third analog feedback. ▪ <i>Wire Drive Motor Current</i>: 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. Basically, non-AC/DC machines use either the <i>Actual WFS</i> option or the <i>Wire Drive Motor Current</i> option. AC/DC machines use either the <i>Actual WFS</i> option or the <i>Commanded WFS</i> option. The appropriate options are visible for that machine.
Analog Input Channels	
<i>Analog input channels</i>	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. 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 <i>Active</i> boxes are unchecked in which case the Welding Power Source will assign default values to the associated parameters.
Interface Support	
<i>Interface support</i>	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 <i>Standard</i> and <i>Legacy AC/DC 1000</i>: ▪ Choose the <i>Standard</i> option to make the DeviceNet interface operate like a standard MIG interface. The DeviceNet master must initialize all sequencer state items. ▪ Choose the <i>Legacy AC/DC 1000</i> 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 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.

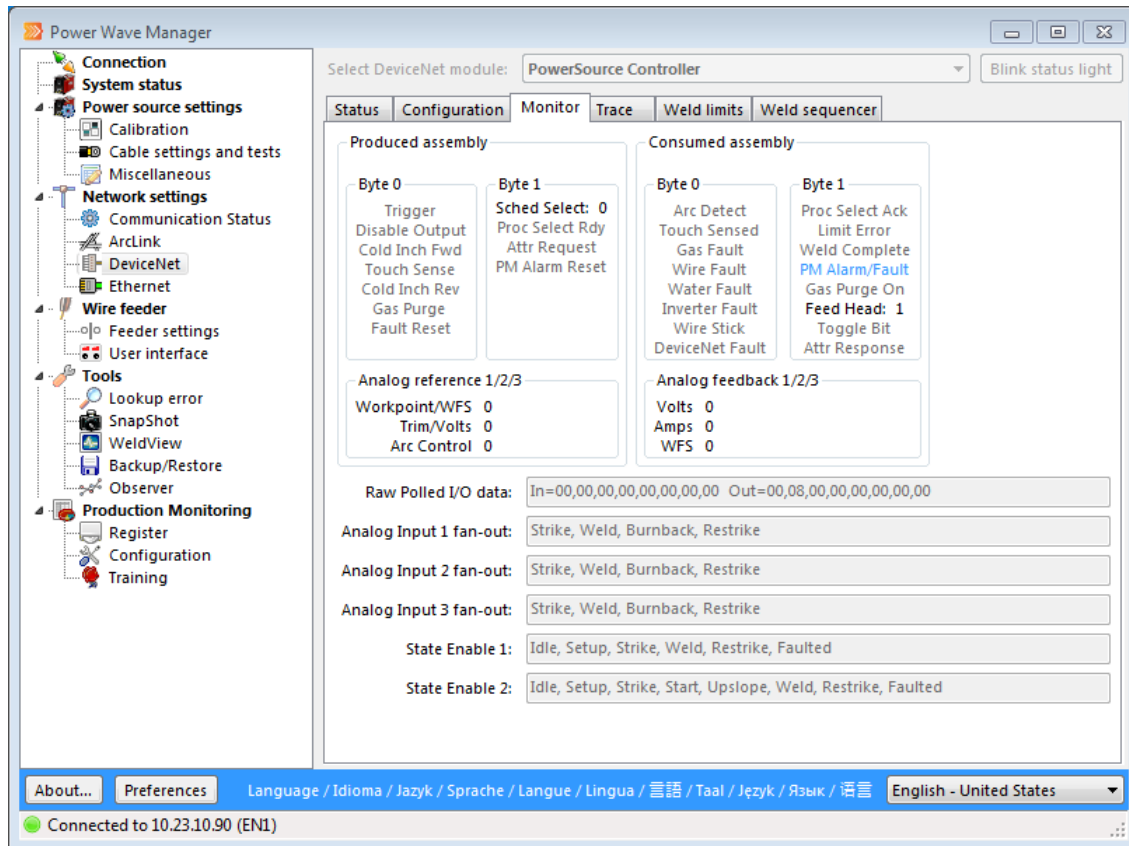


Figure 7.7 Monitor Tab

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.

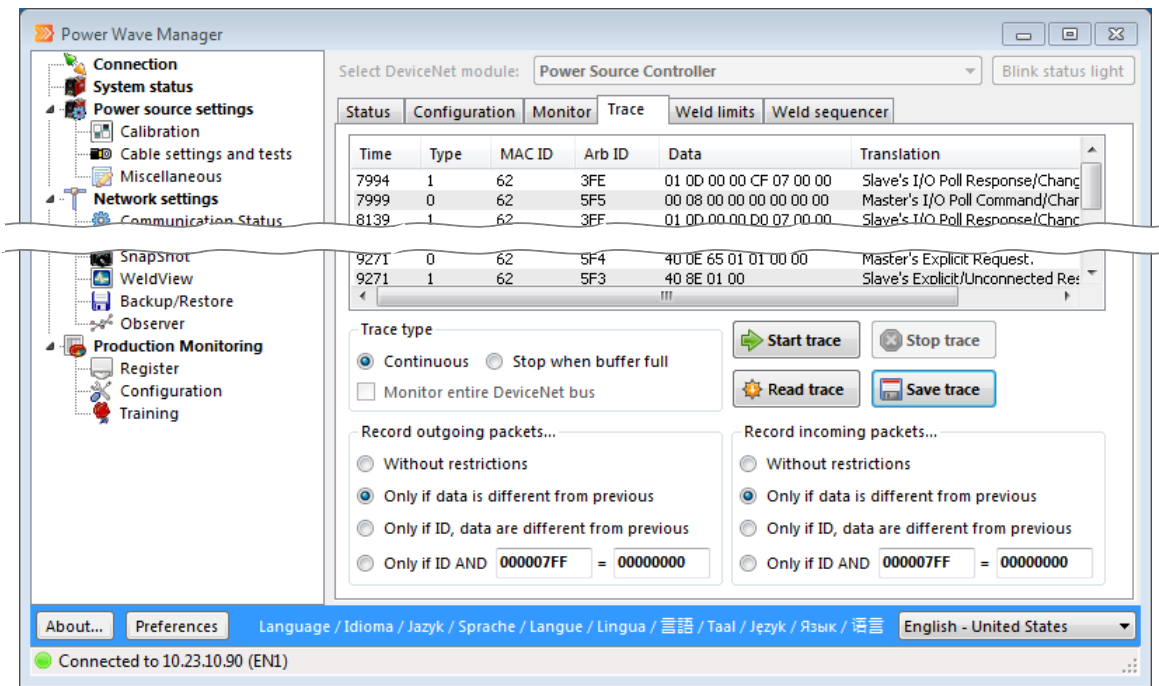


Figure 7.8 Trace Tab

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 7.2 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 7.2 Options on the Trace Tab

Field	Description
<i>Trace type</i>	This option helps you control how much data you collect with the trace. ▪ <i>Continuous</i>: 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. ▪ <i>Stop when buffer full</i>: Choose this option if you want the trace to stop automatically when the buffer on the power source is full of data.
<i>Record outgoing packets and Record incoming packets</i>	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. ▪ <i>Without restrictions</i>: Choose this option to run the trace wide open and including all data. This option fills the buffer very quickly with fewer messages. ▪ <i>Only if data is different from previous</i>: Choose this option to include only those DeviceNet messages whose ID is different from the previous message. ▪ <i>Only if ID, data are different from previous</i>: Choose this option to include only those DeviceNet messages where both the ID and the data are different from the previous message. ▪ <i>Only if ID AND _____ = _____</i>: Choose this option to include only specific messages in the trace.

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.

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 7.9). You can use this section to verify that the correct Weld Mode information is being read over the DeviceNet connection.

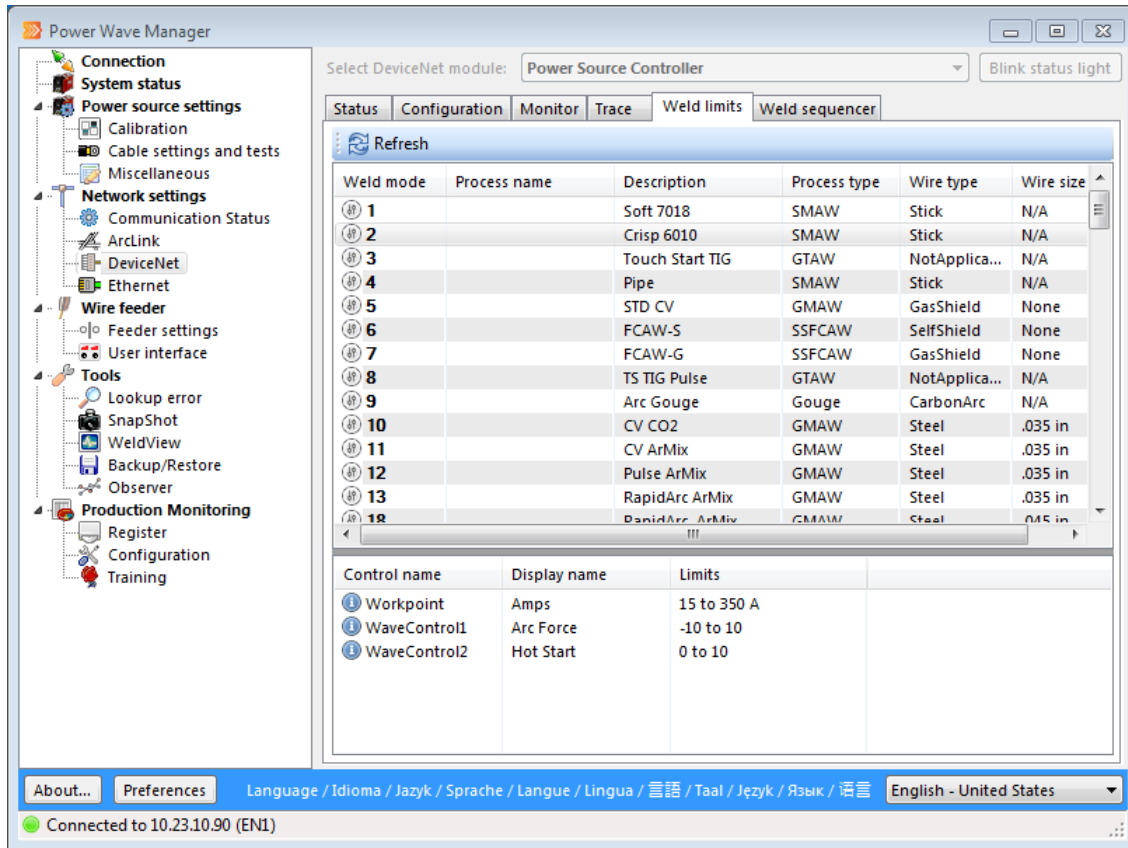


Figure 7.9 Weld Limits Tab

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.

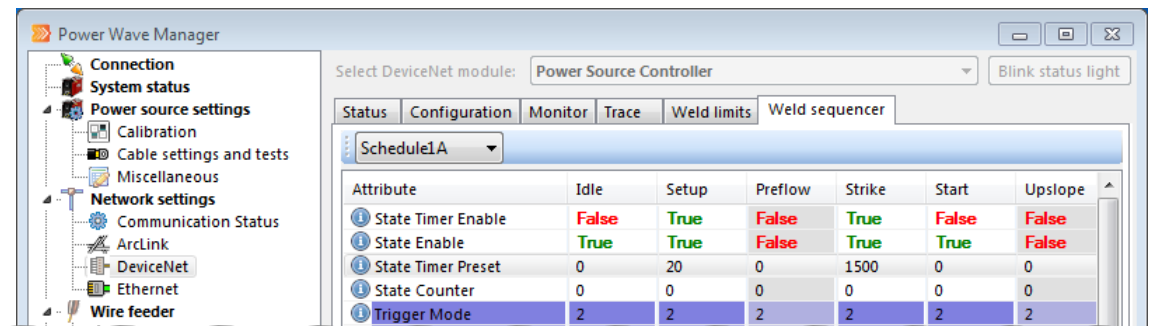


Figure 7.10 Weld Sequencer Tab

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), 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.

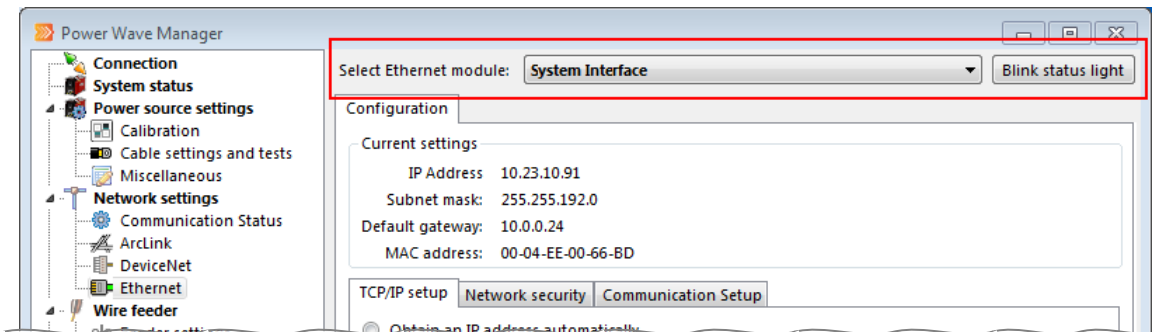


Figure 7.11 Multiple Ethernet Module Drop-down

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 7.3 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.

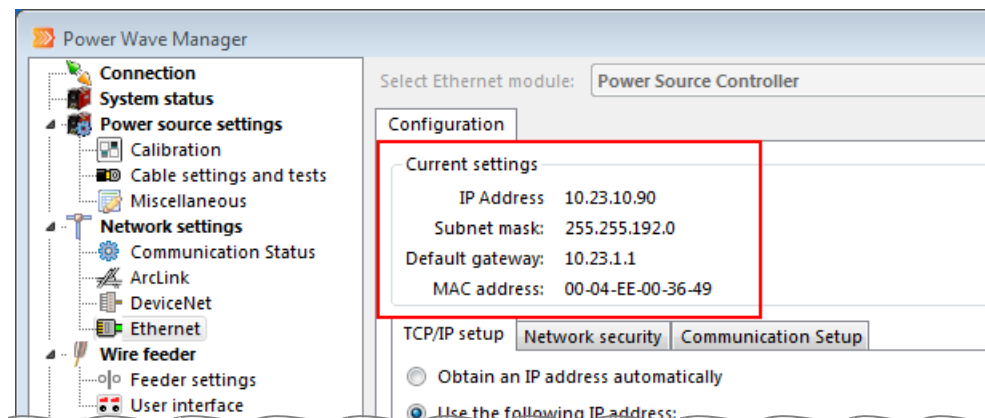


Figure 7.12 Configuration Tab

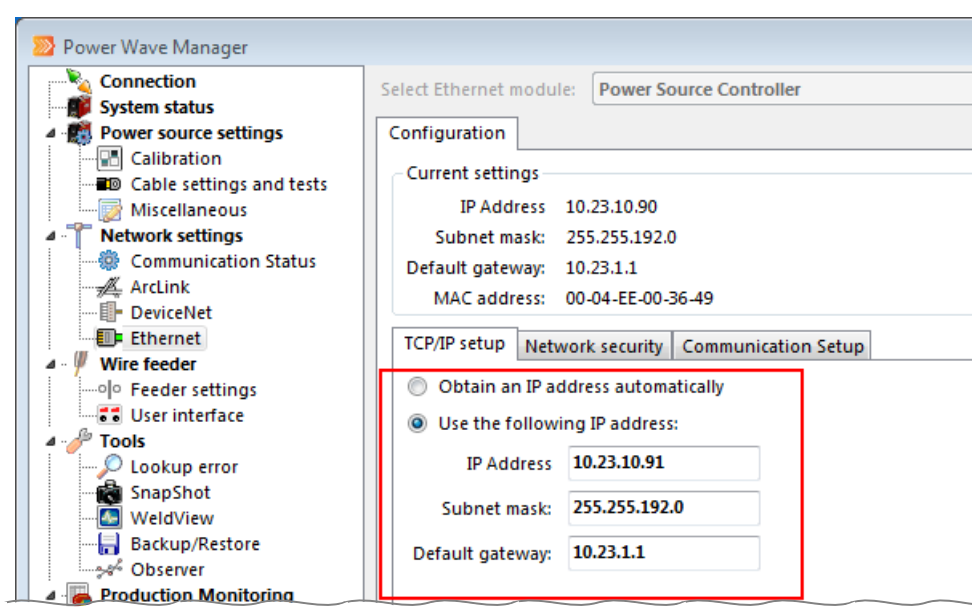
Table 7.3 Fields under Current Settings

Field	Description
<i>IP Address</i>	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.
<i>Subnet mask</i>	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.
<i>Default gateway</i>	This is the IP address of a router or other device that allows communication with addresses that are outside your local area network.
<i>MAC address</i>	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 a static IPs, subnets and gateway addresses assigned by your IT department for most fixed production equipment. A static IP is required for Production Monitoring™ and CheckPoint™.

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

**Figure 7.13** 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 7.3 on page 7.14 explains these fields in more detail.)

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 4.1 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.

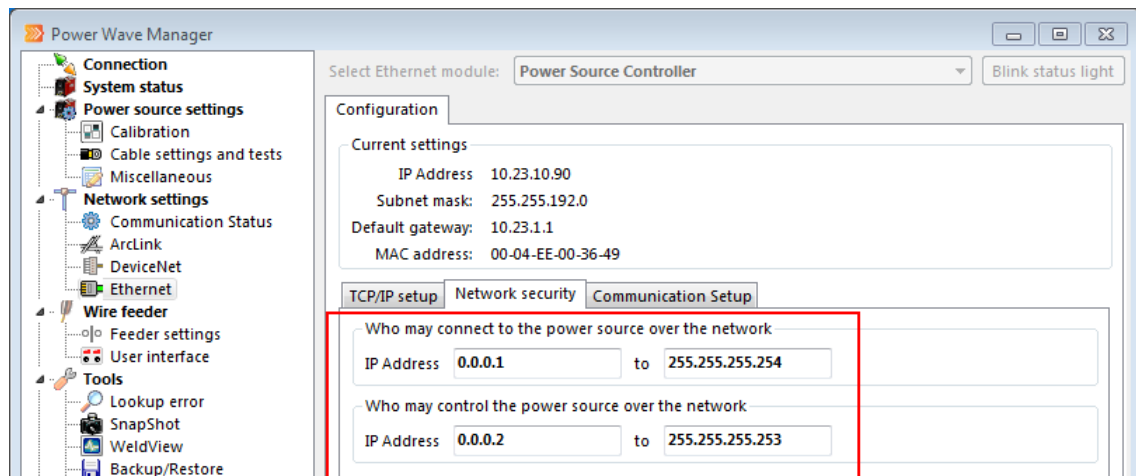


Figure 7.14 Network Security Tab

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 Tab

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.

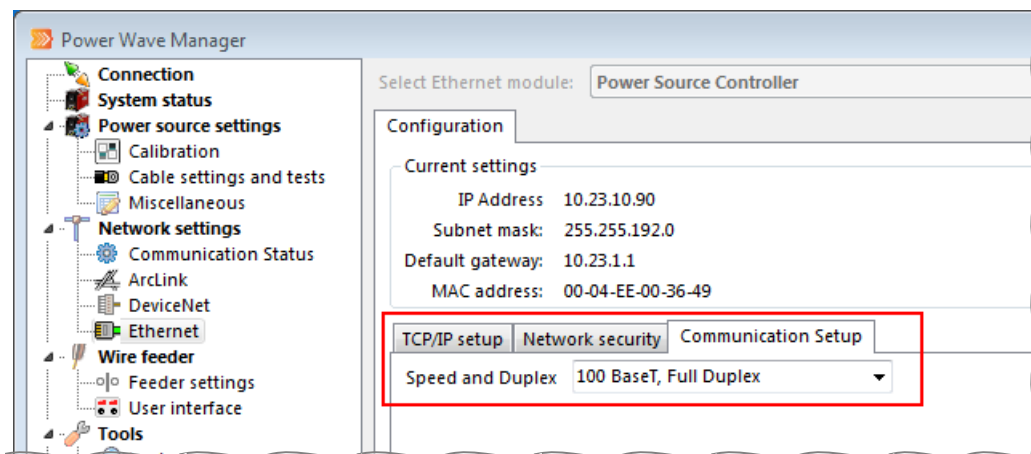


Figure 7.15 Communication Setup Tab

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.

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.

Feeder Settings

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

Multiple Wire Feeders

If the system to which you have connected (using Power Wave® Manager) contains more than one wire feeder module, Power Wave® Manager displays the different modules in the *Select Wire Feeder module* drop-down. Click the drop-down and select the wire feeder for which you would like to view settings.

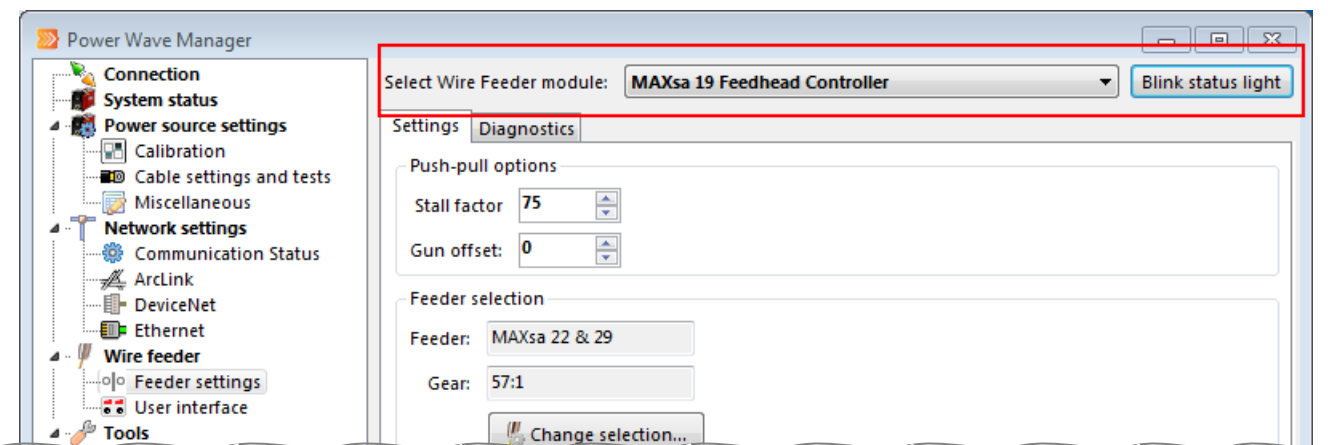


Figure 8.1 Multiple Wire Feeder Module Drop-down

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

Settings Tab

Under the **Settings** tab, you can change the stall factor and gun offset for push-pull operation, as well as change the feed head and gear type. Table 8.1 explains the fields in more detail.

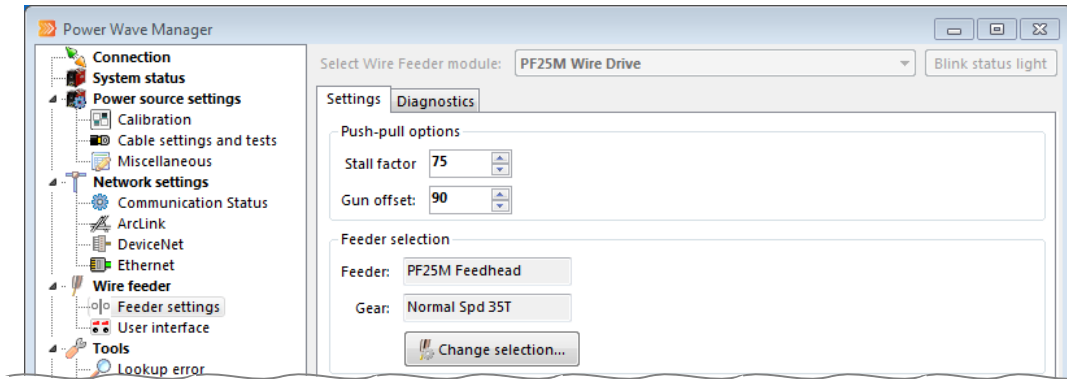


Figure 8.2 Wire Feeder Settings Tab

Table 8.1 Fields on the Settings Tab

Field	Description
<i>Stall factor</i>	The <i>Stall factor</i> controls the stall torque of the push motor when using a push-pull gun. The wire feeder is factory set to not stall unless there is a large resistance to feeding wire. The stall factor can be reduced to stall more easily and possibly prevent the feeder wire from bird nesting. Increasing the stall factor raises the motor torque and decreasing the stall factor lowers the motor torque. Do not increase the stall factor more than necessary. A high stall factor may increase the occurrence of bird nesting and a low stall factor may cause the wire to burn back to the tip. NOTE If you are experiencing bird nests, check for other feeding problems before adjusting the stall factor.
<i>Gun offset</i>	The push-pull <i>Gun offset</i> option adjusts the wire feed speed calibration of the pull motor. The procedure should only be performed when other possible corrections do not solve the push-pull feeding problems. Refer to the <i>Operator Manual</i> for your wire feeder for more information.
<i>Feeder and Gear</i>	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. 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. NOTE The <i>Feeder selection</i> 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 select the wire feeder from the *Select Wire Feeder module* drop-down at the top of the window (Figure 8.1 on page 8.1).

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.

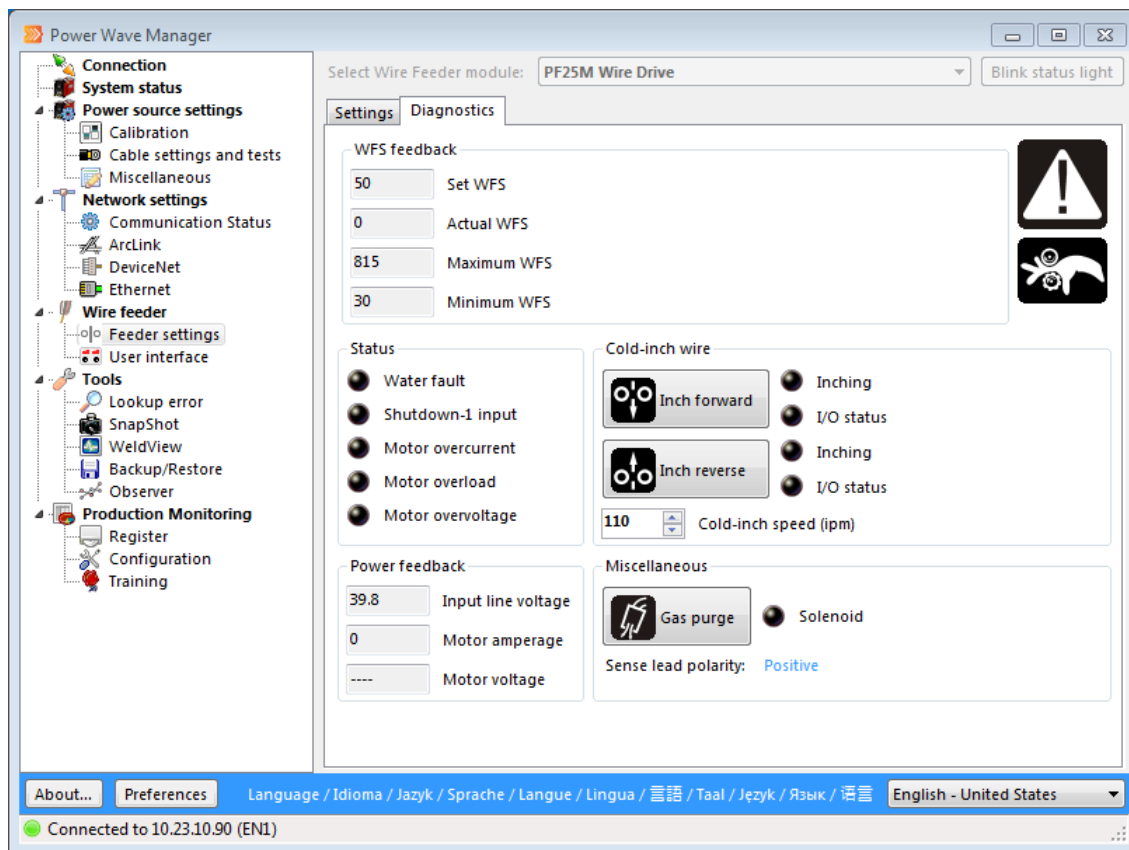


Figure 8.3 Diagnostics Tab

Table 8.2 Fields on the Diagnostics Tab

Option	Description
<i>WFS feedback</i>	The fields in the <i>WFS feedback</i> section displays the wire feed speed information coming from the wire feeder. This includes: ▪ <i>Set WFS</i>: 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. ▪ <i>Actual WFS</i>: This field displays the actual speed at which the feeder feeds the wire into the weld. ▪ <i>Maximum WFS</i>: 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. ▪ <i>Minimum WFS</i>: 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.
<i>Status</i>	These indicators display the current status of the wire feeder to which you are connected.
<i>Cold-inch Wire</i>	In the <i>Cold-inch Wire</i> section, you can use the Inch forward and Inch reverse buttons to feed the wire through the feeder without welding. The <i>Inching</i> and <i>I/O status</i> indicator lights let you know that the machine is in use and the input/output communication status. The <i>Cold-inch speed (ipm)</i> 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.
<i>Power feedback</i>	The fields in the <i>Power feedback</i> section provide you with the power details for the wire feeder so you can keep your eyes on the power as you diagnose.
<i>Miscellaneous</i>	In the <i>Miscellaneous</i> section, the Gas purge or Flux fill button (depending on your system) allows you to prepare the wire feeder. The <i>Solenoid</i> indicator lets you know when the feeder is active when using the button. The <i>Sense lead polarity</i> field displays the polarity for the machine to which you are connected.

User Interface

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).

Multiple User Interfaces

If there are more than one User Interface connected to this Welding Power Source, the User Interface section provides a drop-down at the top of the window so you can select which User Interface to configure.

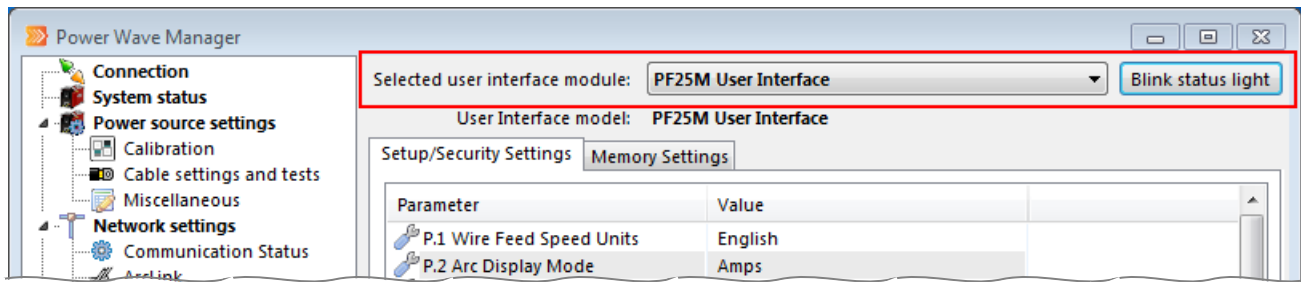


Figure 8.4 Multiple User Interface Drop-down

If you're not sure the selection in the drop-down 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.

Setup/Security Settings Tab

The **Setup/Security Settings** tab 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.

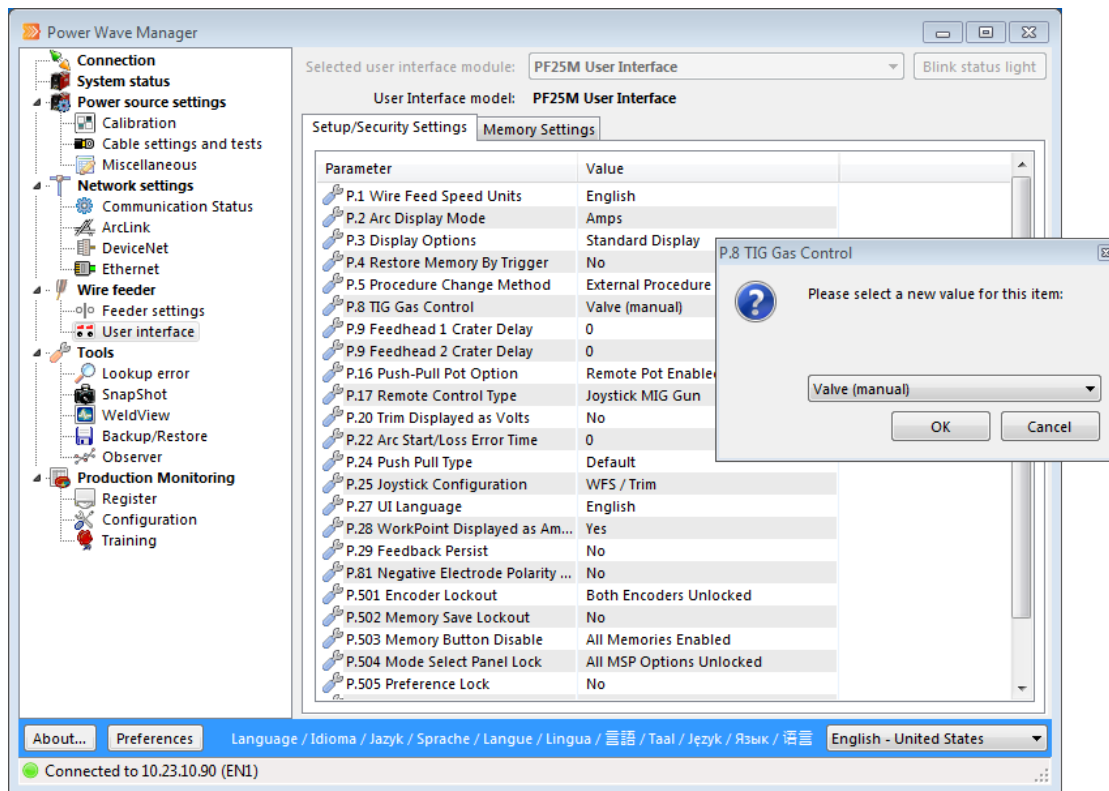


Figure 8.5 Setup/Security Settings Tab

To change a parameter, double-click the parameter to open the edit window (Figure 8.5). Simply make your change and click **OK**.

Memory Settings Tab

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.

NOTE | If the User Interface is a dual feed head system, click the appropriate feed head button at the top of the list to access the memory buttons specific to that feed head.

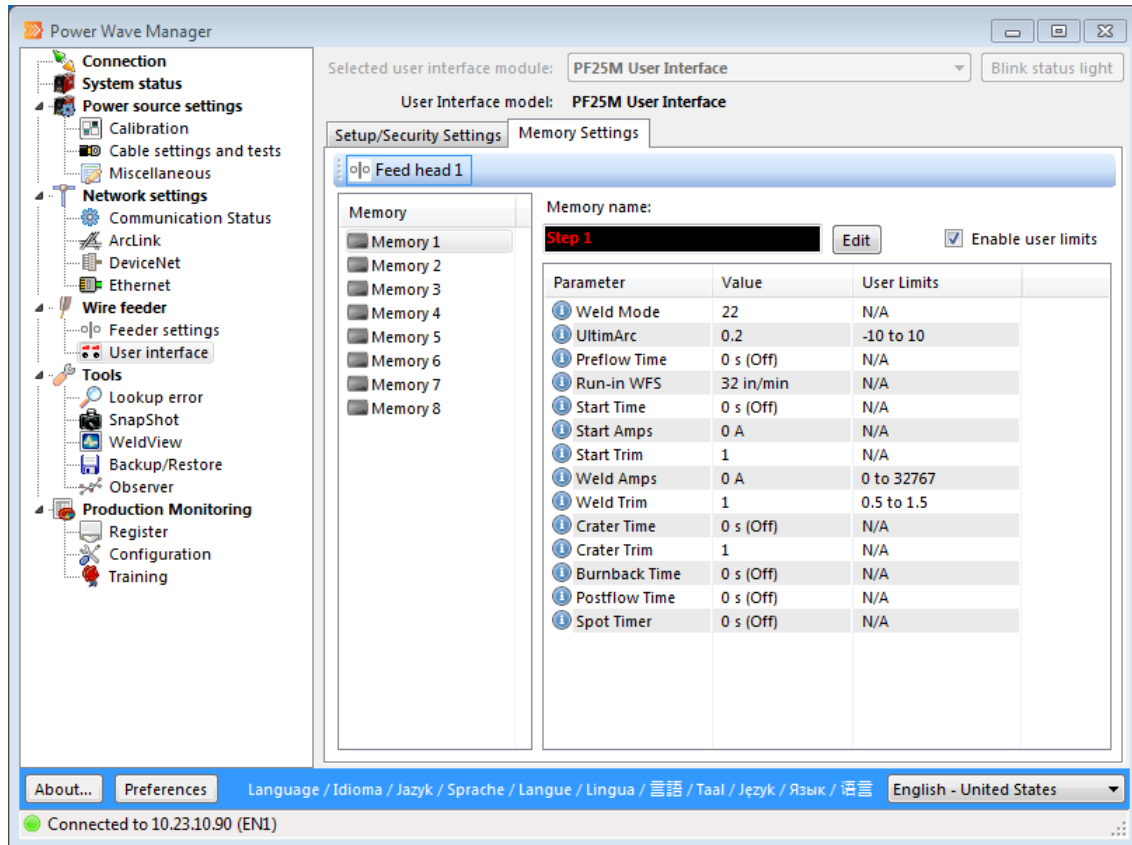


Figure 8.6 Memory Settings Tab

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 8.6). 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 8.7). 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.

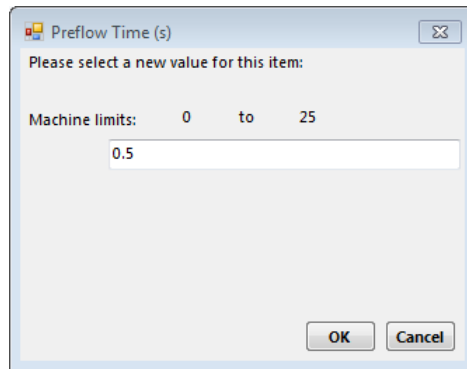


Figure 8.7 Editing Memory Parameters

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 those fields (Figure 8.8). 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.

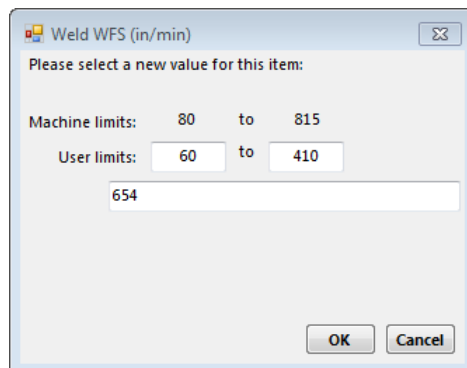


Figure 8.8 Entering a Limit Higher than the User-Specified Limit

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.

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Tools

The *Tools* section of Power Wave® Manager provides you with the ability look up an 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 9.1). 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.

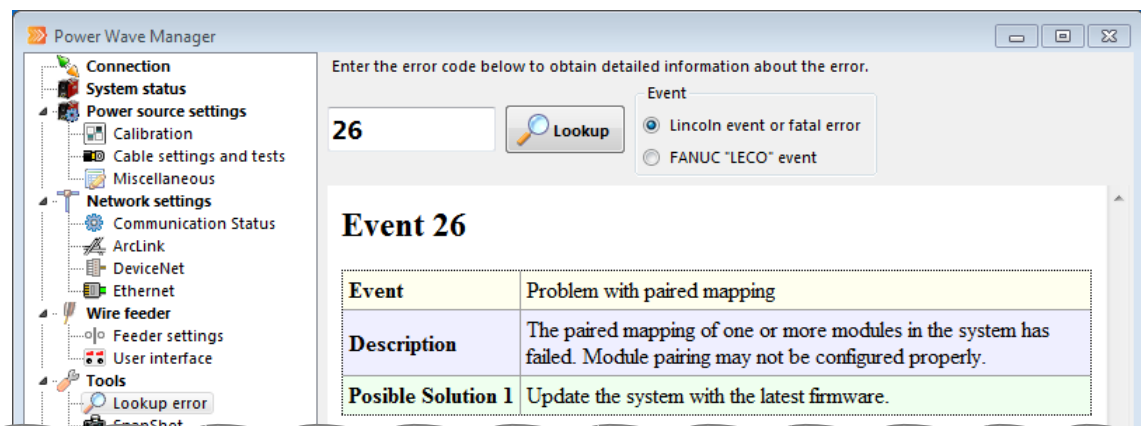


Figure 9.1 Lookup Error Tool

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.

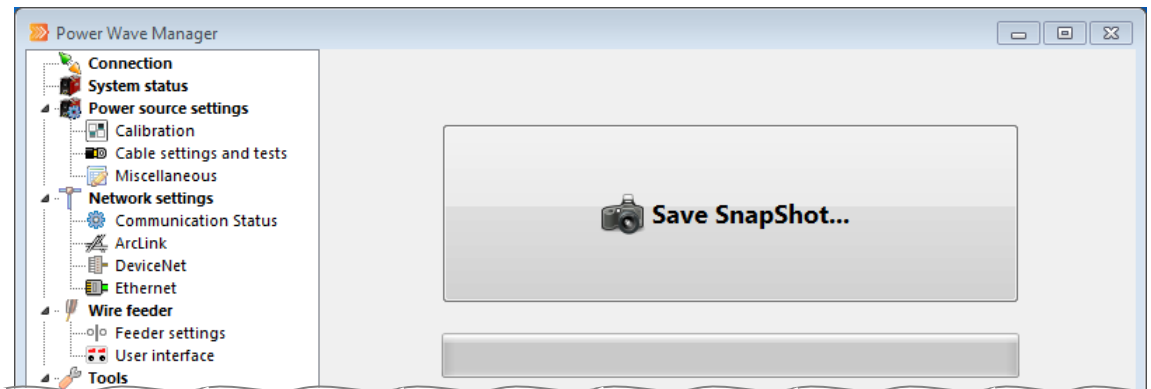


Figure 9.2 Saving a Troubleshooting File

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 <i>Save SnapShot</i> 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). The system begins generating the file. Depending on the amount of data, this process could take several minutes. 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 feature of Power Wave® Manager that 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. You can use the weld trace to troubleshoot or fine tune welding performance by examining the waveform of the weld during starting and ending.

NOTE | Lincoln Electric service personnel may request a weld trace to aid in resolving welding issues. Click the Save button to save a trace file that you can send to Lincoln Electric Support for evaluation.

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.

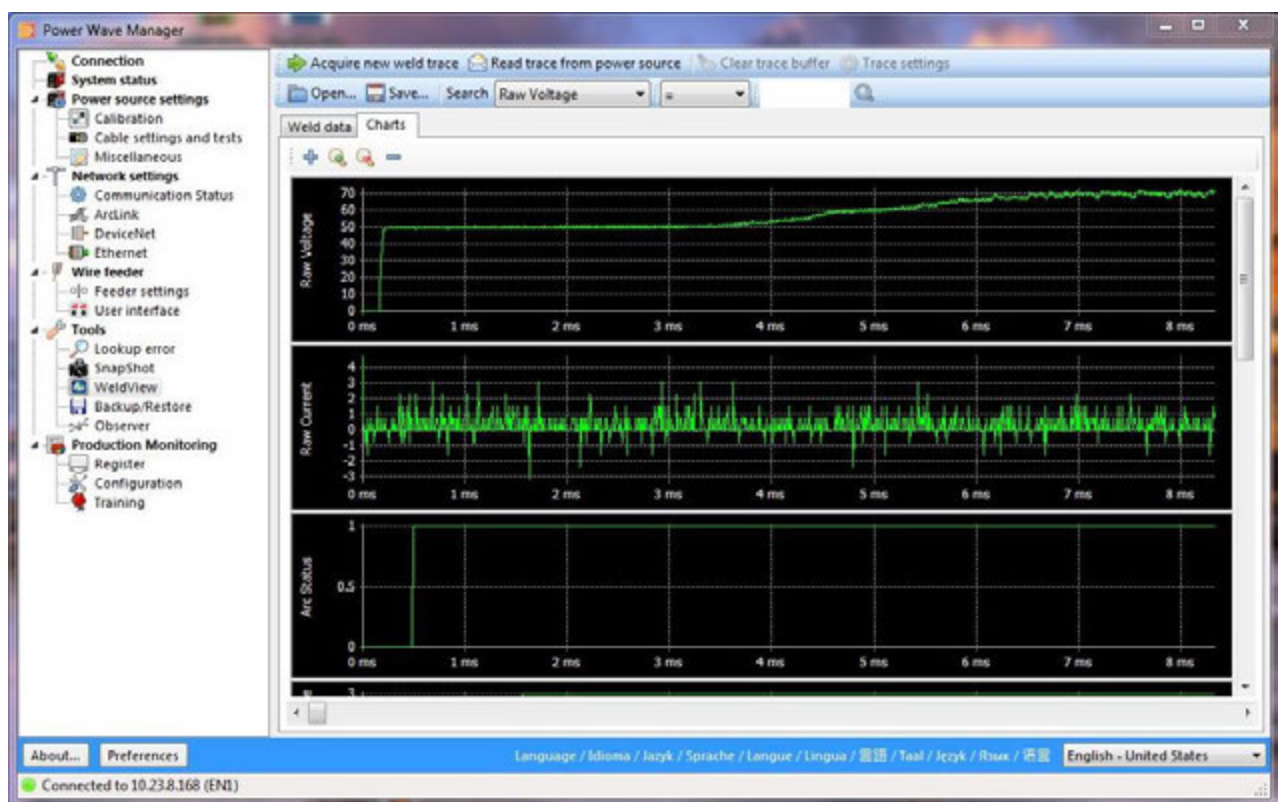


Figure 9.3 WeldView

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.

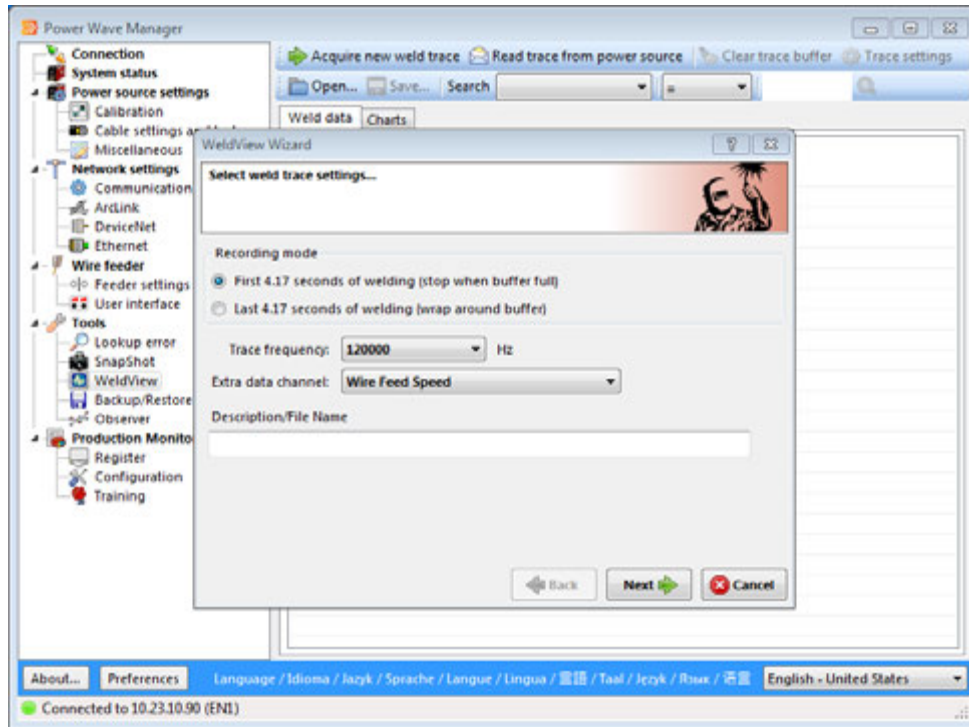
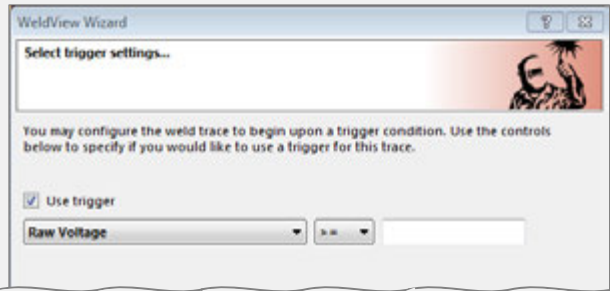


Figure 9.4 WeldView Wizard

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 <i>WeldView Wizard</i> window opens to the trace settings step (Figure 9.4).
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 <i>Use trigger</i> 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 <i>Use trigger</i> 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 <i>Perform weld</i> 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. 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 9.5).

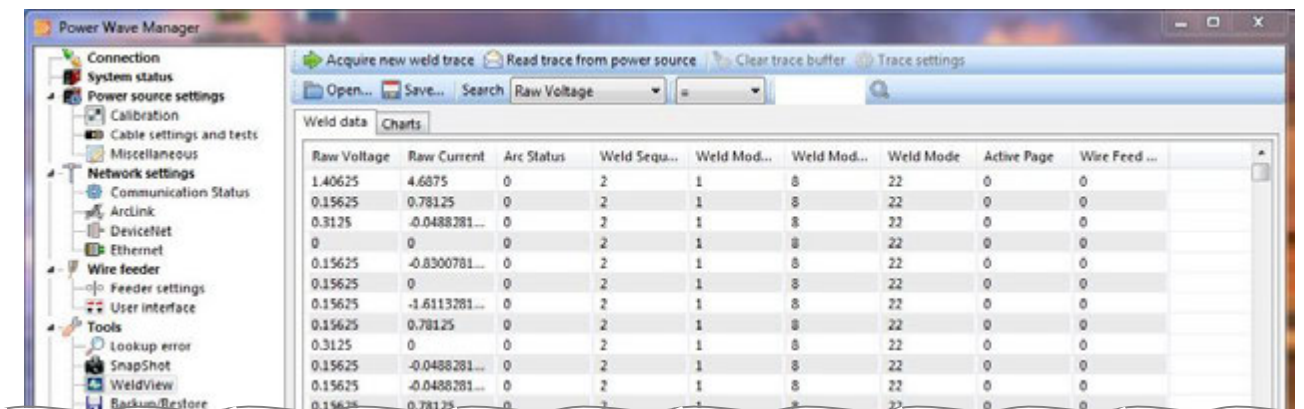


Figure 9.5 WeldView Data in Tabular Form

Charts Tab

The **Charts** tab (Figure 9.3 on page 9.3) 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 9.6) 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.

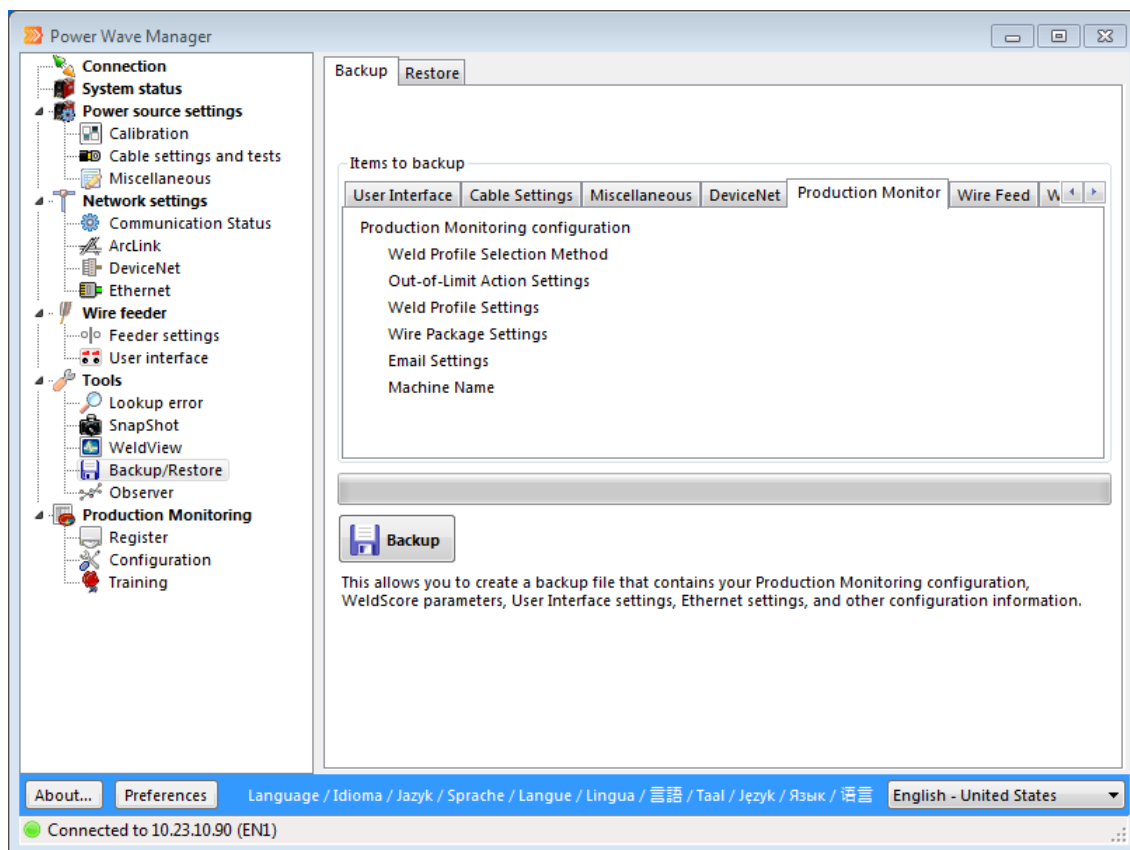


Figure 9.6 Backup Tab

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

Procedure	Details
1. Click the <i>Backup/Restore</i> 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.

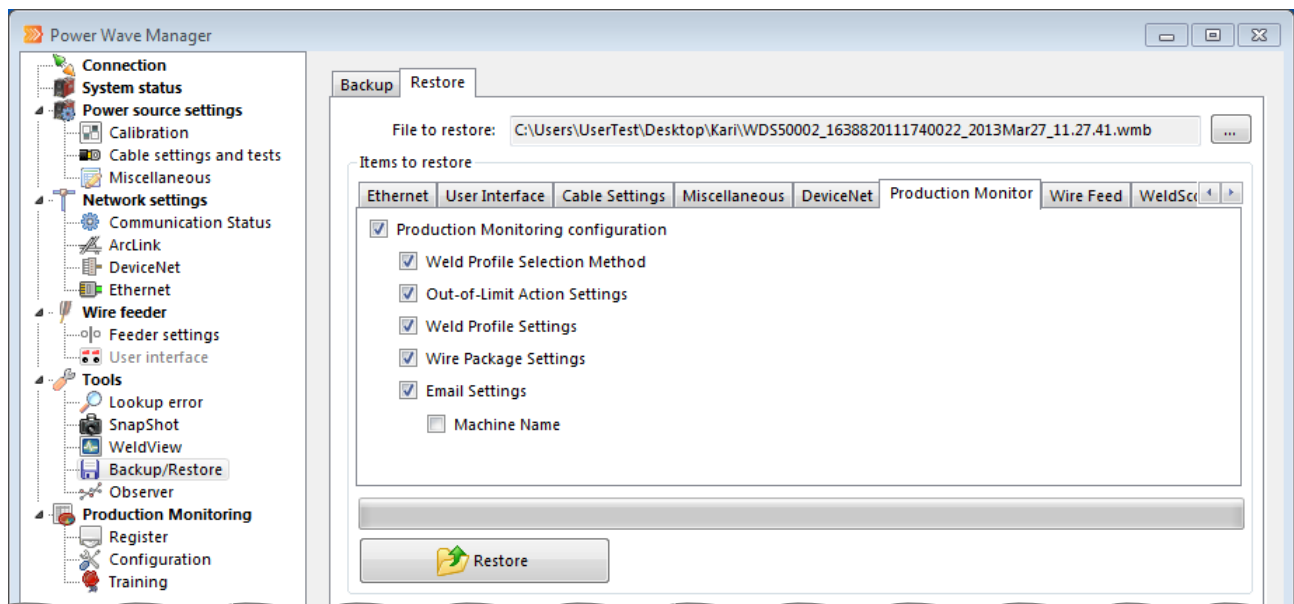


Figure 9.7 Restoring to a Backup File

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

Procedure	Details
1. Click the <i>Backup/Restore</i> 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 <i>File to restore</i> field.	The <i>Open file</i> 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 9.7).
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 <i>TCP/IP configuration</i> 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. It is recommended to restore <i>TCP/IP configuration</i> only to the machine from which it was originally backed up. 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. 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.

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 9.8). 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.

The *Information* section of the 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).

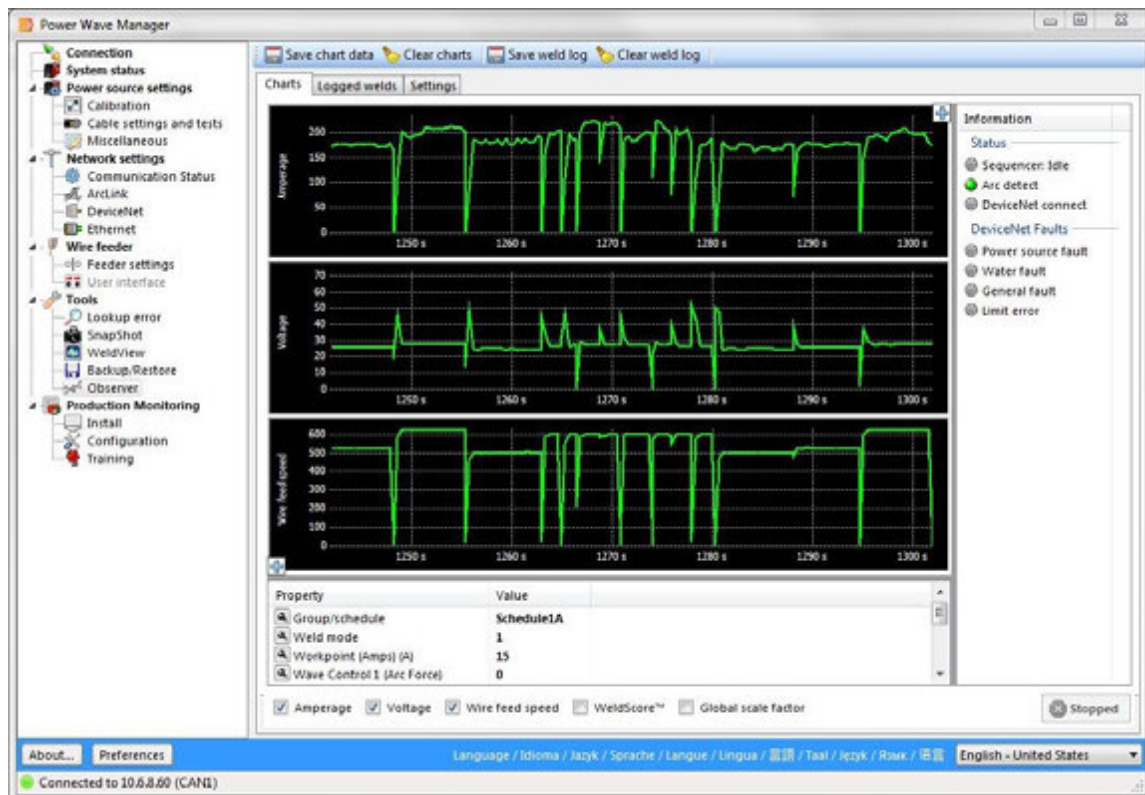


Figure 9.8 Observer Tool

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.

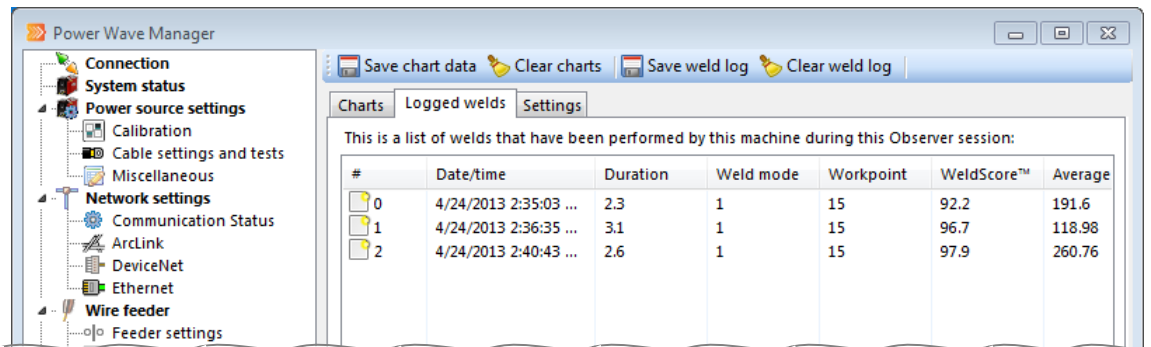


Figure 9.9 Logged Welds Tab

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 9.1 Columns on the Logged Welds Tab

Field	Description
<i>Date/time</i>	This column represents the date and time that the weld began.
<i>Duration (s)</i>	This column represents the length of time (in seconds) from the time listed in the <i>Date/time</i> column to the time the Welding Power Source stopped welding.
<i>Weld mode</i>	This column displays the number of the Weld Mode used for this weld.
<i>Workpoint</i>	This column displays the value of the workpoint variable for this weld.
<i>WeldScore™</i>	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.

Field	Description
<i>Average amps</i>	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 <i>Average amps</i> column displays that average value for this weld.
<i>Average volts</i>	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 <i>Average volts</i> 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.

NOTE | In order to see a parameter in the charts for the weld, you must choose the signal before you begin welding. Adding the signal after completing the weld does not create any data to display.

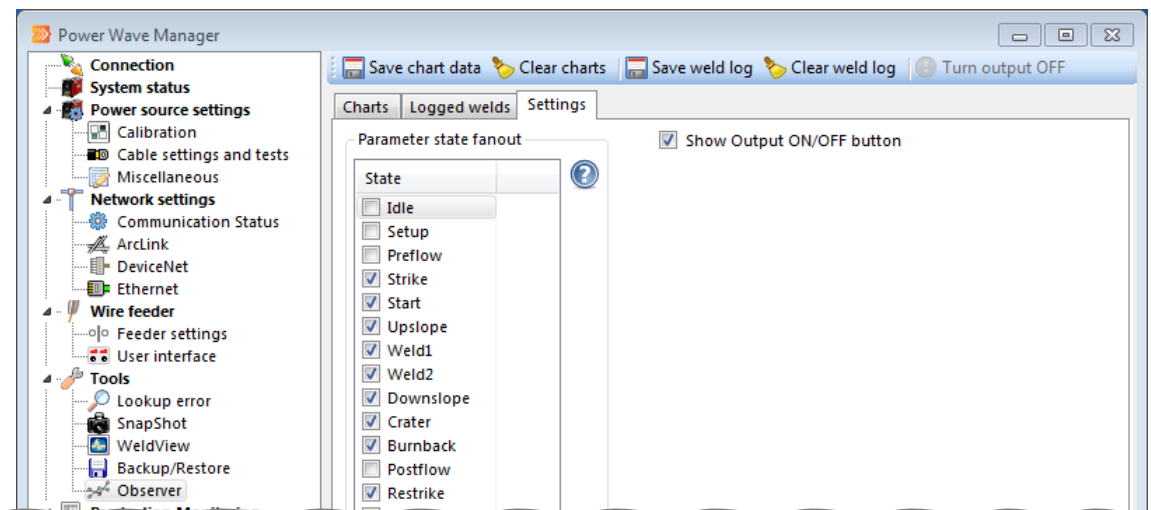


Figure 9.10 Settings Tab

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. For safety, you must press and hold the **Ctrl** key on the keyboard while clicking the button in order for it to turn the power source on or off.

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 Power Wave® Manager.

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Production Monitoring

You use the *Production Monitoring* 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.

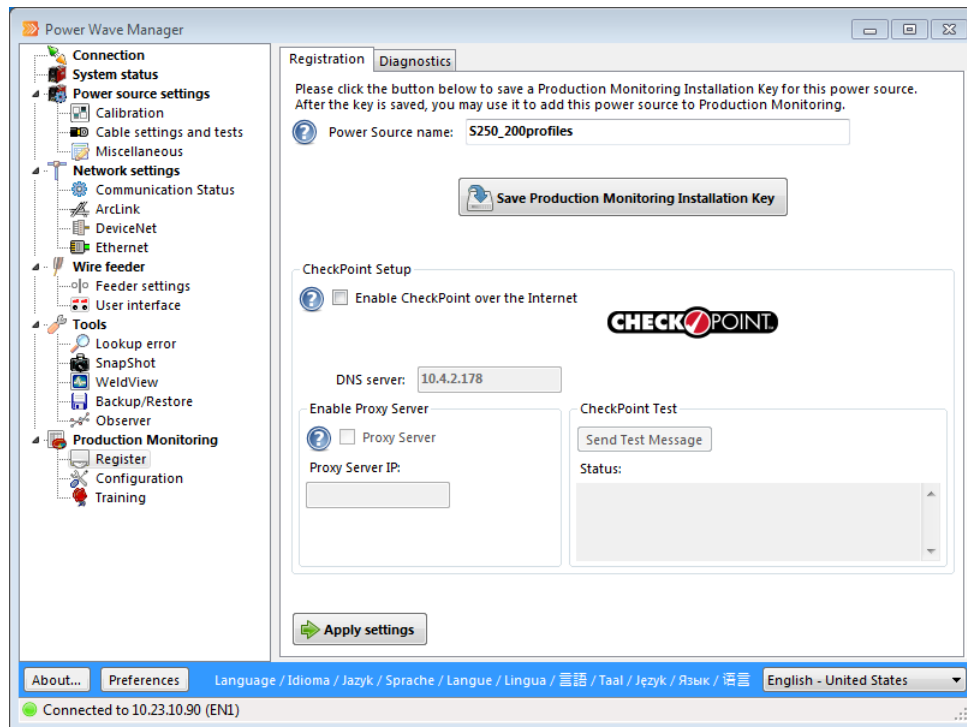


Figure 10.1 Installation Section

NOTE | If you do not see the *Production Monitoring* 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* or the *CheckPoint™ User Manual*, 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.

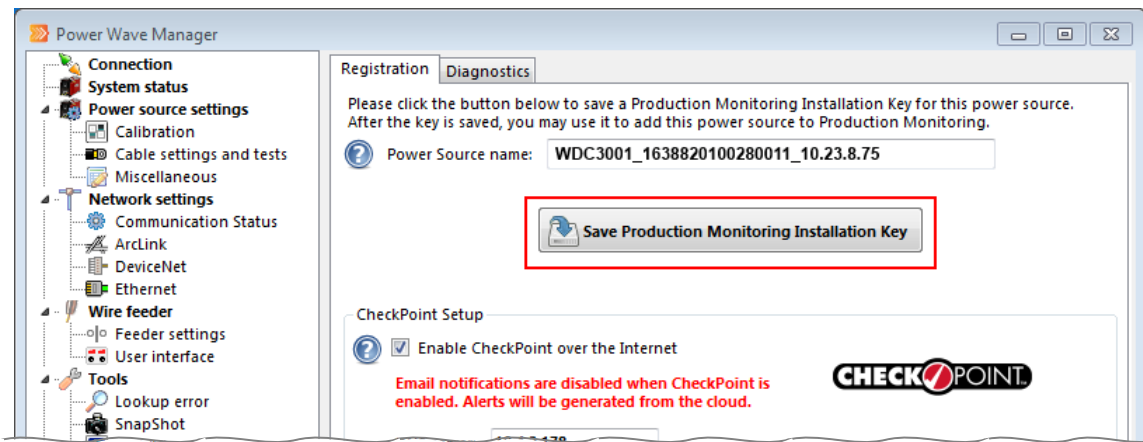


Figure 10.2 Save an Installation Key File

On the **Registration** tab of Power Wave® Manager (Figure 10.2), simply click the **Save Production Monitoring 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.

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*.

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.

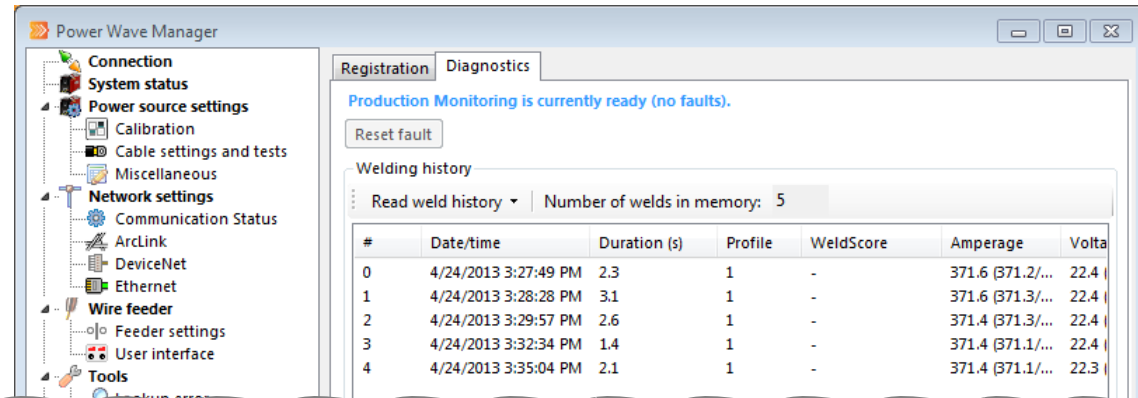


Figure 10.3 Diagnostics Tab

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 (page 10.4):

- 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 10.5).

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 10.1 explains each option in more detail. Simply choose the appropriate option and click the **Apply settings** button.

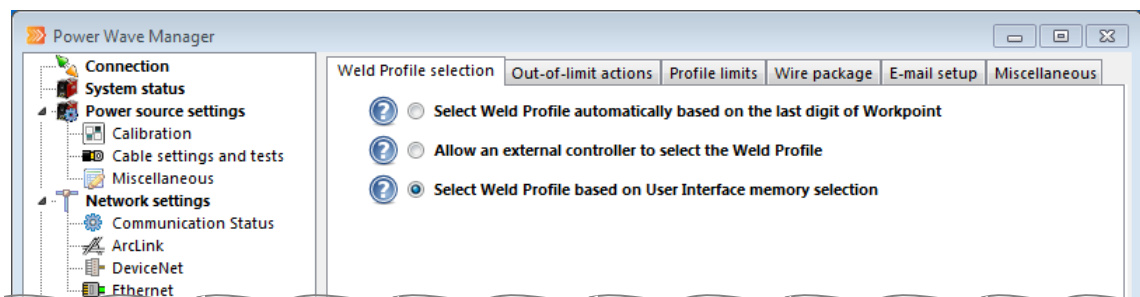


Figure 10.4 Example Weld Profile Selection Tab

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 10.1 Options on the Weld Profile Selection Tab

Field	Description
<i>Select Weld Profile automatically based on the last digit of the Workpoint</i>	When you choose this option, the last digit of the welding set point becomes the Weld Profile number currently in use. 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. 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.
<i>Allow an external controller to select the Weld Profile</i>	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.
<i>Select Weld Profile based on User Interface memory selection</i>	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. 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. 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 <i>Profile 32</i>. On third-generation Welding Power Sources that support this feature, this means <i>Profile 200</i>. See page 10.3 for more details on Weld Profiles.
<i>Select Weld Profile based on Analog Interface I/O</i>	When you select this option, the I/O from the analog interface is configured to choose the Weld Profile.

Out-of-Limit Actions Tab

On the **Out-of-limit actions** tab, you tell this Welding Power Source what action to take when a weld exceeds limits established on the **Profile limits** tab (page 10.7). You can also provide the Welding Power Source with a short amount of tolerance time before it takes that action. 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).

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.

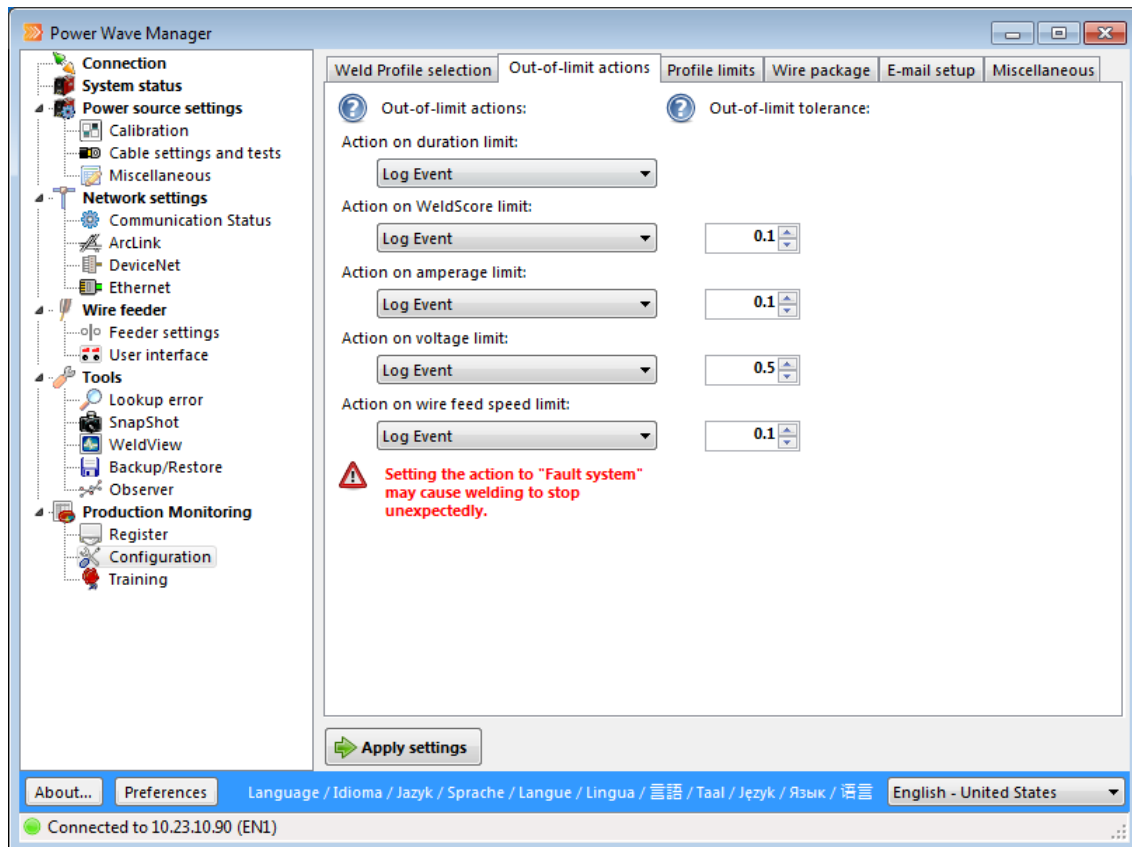


Figure 10.5 Out-of-Limits Tab

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 10.2 Available Actions When a Weld is Out of Limits

Field	Description
<i>Log Event</i>	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.
<i>Fault System</i>	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.
<i>Alarm Latch</i>	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. You can reset an <i>Alarm Latch</i> fault on the Diagnostic tab under Production Monitoring > Register (page 10.3), 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 10.4). 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 11.1 for more details.

STOP | For information on training a weld for a Weld Profile, please refer to Chapter 11.

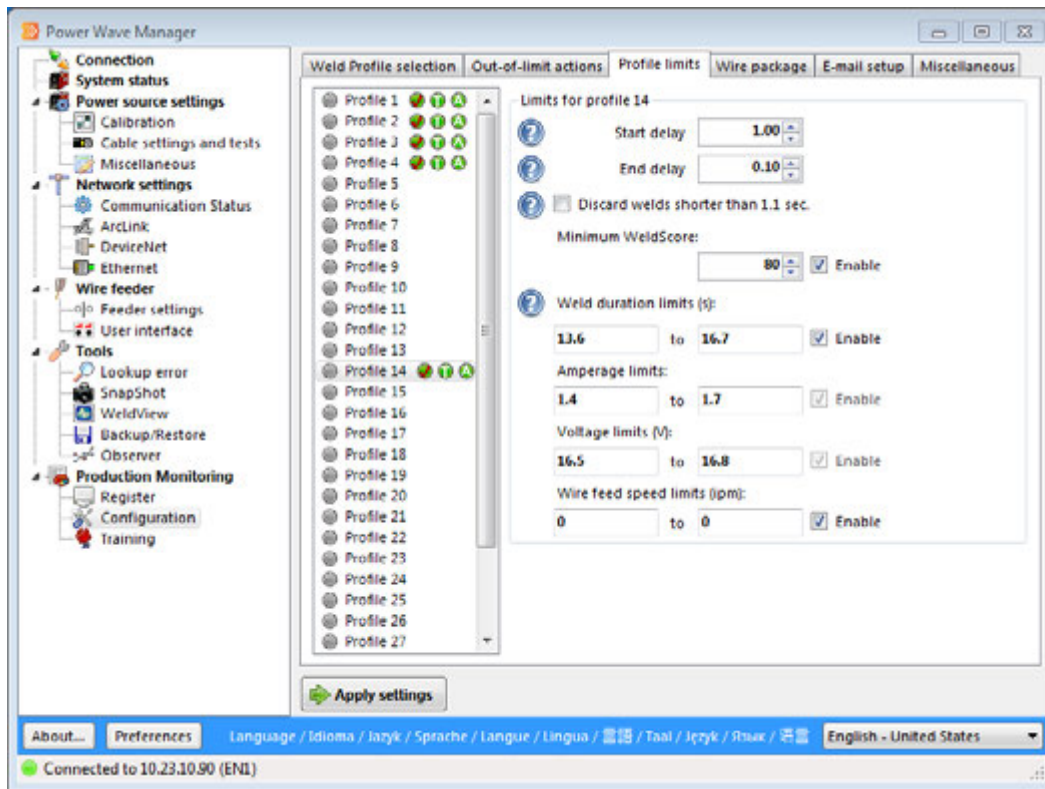


Figure 10.6 Profile Limits Tab

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 10.3 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.
- 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 10.3 Limits Available for Each Weld Profile

Field	Description
<i>Start delay</i>	This is the amount of delay the power source should use when applying limits at the beginning of this weld. The <i>Start delay</i> 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 <i>Start delay</i> must be within the range of 0.1 seconds to 10.0 seconds.) NOTE The combined <i>Start delay</i> and <i>End delay</i> 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 <i>Start delay</i> value so the total equals 0.7 seconds. If the Production Monitoring firmware revision is 5 or greater, the combined <i>Start delay</i> and <i>End delay</i> times must be 0.4 or greater. If the total is less than 0.4, Power Wave® Manager automatically adjusts the <i>Start delay</i> value accordingly.
<i>End delay</i>	This is the amount of delay the power source should use when applying limits at the end of this weld. The <i>End delay</i> 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 <i>End delay</i> must be within the range of 0.1 seconds to 10.0 seconds.
<i>Discard welds shorter than “n” seconds</i> (where “n” is the <i>Start delay</i> time plus the <i>End delay</i> 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. 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.
<i>Minimum WeldScore</i>	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™. The <i>Minimum WeldScore</i> field allows you to enable the action you selected for WeldScore™ on the Out-of-limit actions tab (page 10.5). If the overall WeldScore™ for the weld falls below the value you enter here, the system performs the action you selected in the <i>Action on WeldScore limit</i> drop-down on the Out-of-limit actions tab. 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

Field	Description
	for that Weld Profile) and displays the value in the system. 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. NOTE If the <i>Minimum WeldScore</i> 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.
<i>Weld duration limits (s)</i>	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 <i>Action on duration limit</i> drop-down on the Out-of-limit actions tab (page 10.5).
<i>Amperage limits</i>	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 <i>Action on amperage limit</i> drop-down on the Out-of-limit actions tab (page 10.5).
<i>Voltage limits (V)</i>	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 <i>Action on voltage limit</i> drop-down on the Out-of-limit actions tab (page 10.5).
<i>Wire feed speed limits (ipm)</i>	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 <i>Action on wire feed speed limit</i> drop-down on the Out-of-limit actions tab (page 10.5).

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 10.4 explains the fields in more detail.

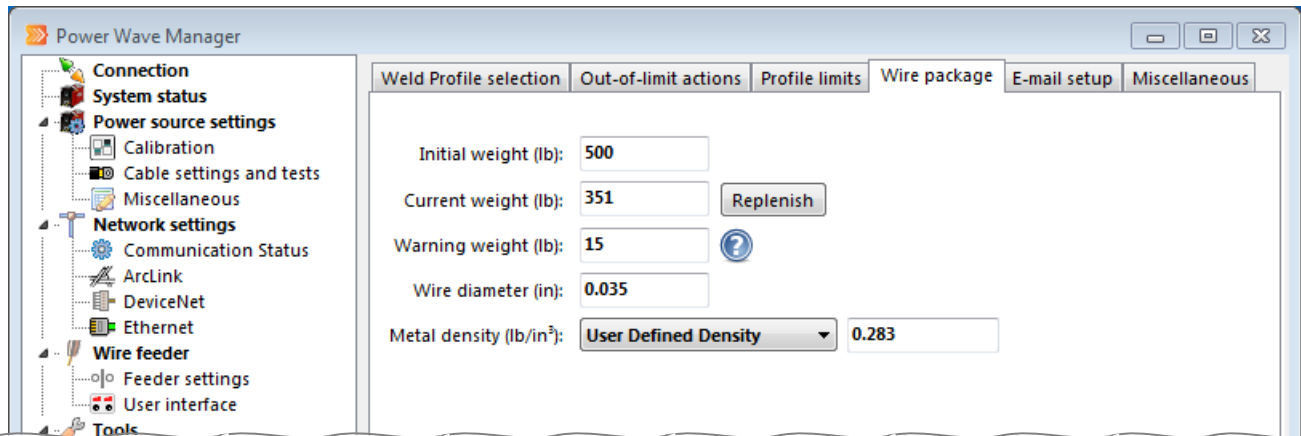


Figure 10.7 Wire Package Tab

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 10.4 Fields on the Wire Package Tab

Field	Description
<i>Initial Weight</i>	Enter the original weight of the wire package, as indicated on the container.
<i>Current weight</i>	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 <i>Initial weight</i> field.
<i>Warning weight</i>	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 10.12) and in each user's account in the main CheckPoint™ application. Both applications rely on the value entered in the <i>Warning weight</i> field.
<i>Wire diameter</i>	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™.
<i>Metal density</i>	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 <i>User Defined Density</i> from the drop-down and enter the density value in the text field that appears.

E-mail Setup Tab

The **E-mail setup** tab provides you with the ability to configuration e-mail alerts (such as system events and wire package warnings) for up to 12 e-mail addresses. This requires collecting a bit of information before you begin.

NOTE | When you enable CheckPoint™, the options on this tab are disabled. E-mail notifications are processed from the data center rather than by the power source. Please refer to the *CheckPoint™ User Manual* for more information.

Before setting up the Welding Power Source to send e-mails, collect the following information:

- List of e-mail addresses that will receive e-mail alerts
- IP address (or host name) of the SMTP e-mail server
- IP address (or host name) of the DNS server the power source should use for e-mail
- Port number on which the e-mail server receives e-mail

TIP | Contact your local IT department for assistance on obtaining the information about the e-mail server or the DNS server.

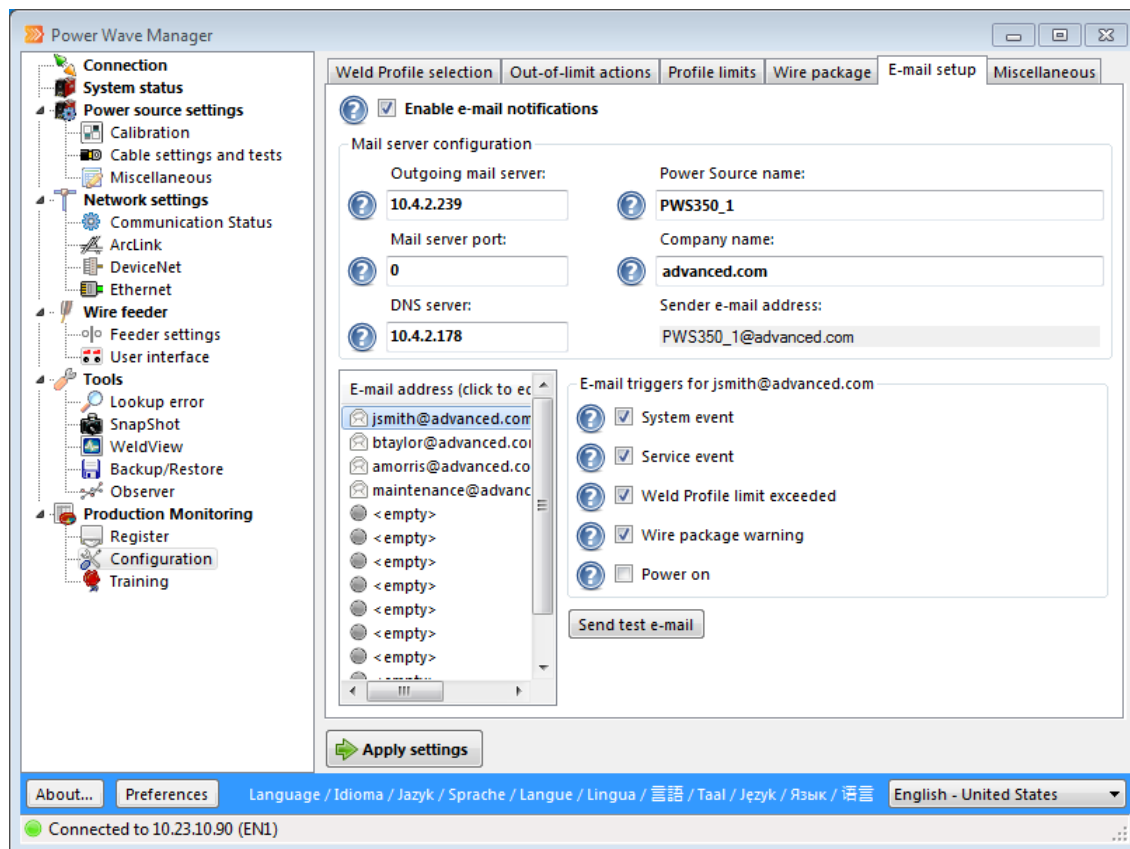


Figure 10.8 E-mail Setup Tab

Mail Server Configuration

The following options allow you to configure the Welding Power Source to send e-mail notifications to the addresses in the Address Book (page 10.13). Table 10.5 explains these options in more detail.

Table 10.5 Configuration Options on the E-mail Setup Tab

Field	Description
<i>Enable e-mail notifications</i>	Place a check mark in the <i>Enable e-mail notifications</i> checkbox to turn on the e-mail functions of this power source.
<i>Outgoing mail server</i>	Enter the IP address of the e-mail server on your network.
<i>Mail server port</i>	Enter the port number that the SMTP service uses to connect to the e-mail server. The standard port number for SMTP servers is 25. Only change this number if recommended by your local IT department.
<i>DNS server</i>	Enter the IP address of your network's DNS server. This is only required if you specified a host name for your mail server, rather than an IP address. If you are unaware of this information, contact your local IT department.
<i>Power Source name and Company name</i>	The power source combines these two fields into an e-mail address for the power source and uses this address for e-mail alerts it generates. Enter the company's domain name in the <i>Company name</i> field. There is generally no need to change the <i>Power Source name</i> field, as it defaults to the current power source's name (from the Registration tab) automatically, helping you maintain a consistent naming convention and ensuring all files using this name can be easily found and loaded.
<i>Sender E-mail Address</i>	Power Wave® Manager combines the <i>Power Source name</i> and <i>Company name</i> fields to produce an e-mail address for the power source. When the Welding Power Source sends an e-mail alert to addresses in the address book, this e-mail address appears as the sender of the e-mail.

Address Book

The Welding Power Source contains an internal address book, capable of storing up to 12 different e-mail addresses (62 characters in length or less). You can configure each address to receive an e-mail notification when one or more events occur within the Welding Power Source (*E-mail Triggers* on page 10.14).

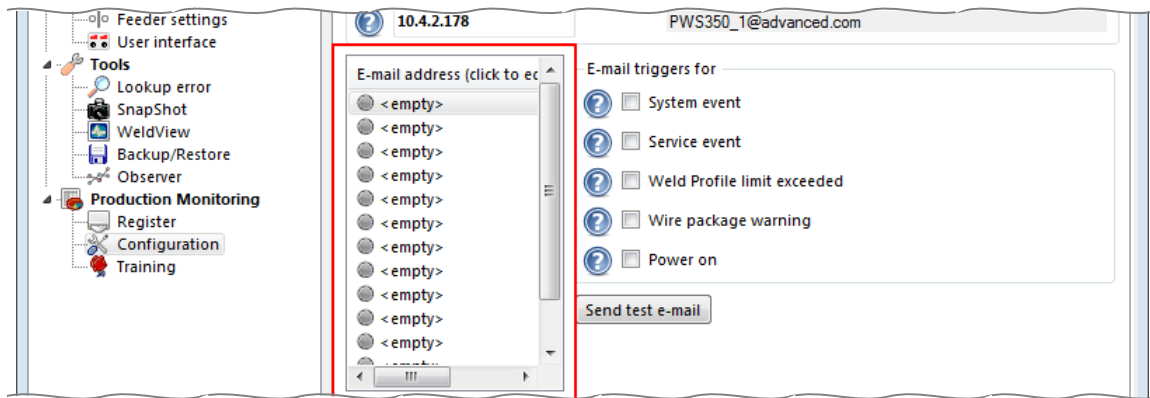


Figure 10.9 Address Book

To add a user to the address book, click *<empty>* slot in the address list to activate a text field. Type the address and press **Enter** on the keyboard.

To edit an address, simply click on the address and begin typing. Press **Enter** on the keyboard to commit your changes.

To delete an address, click on the address and press the **Delete** key on your keyboard.

TIP | E-mail addresses can contain uppercase and lower case letters, the digits 0 through 9, the characters ! # \$ % * / ? | ^ { } ` ~ & ' + - = _

The address can contain the period character “.” provided that it is not the first or last character in the local part of the address. It also cannot appear two or more times consecutively.

E-mail Triggers

In the *E-mail triggers* section, you can select which event(s) in the Welding Power Source generate an e-mail notification to the address selected on the left. Each time the event occurs that e-mail address will receive an e-mail.

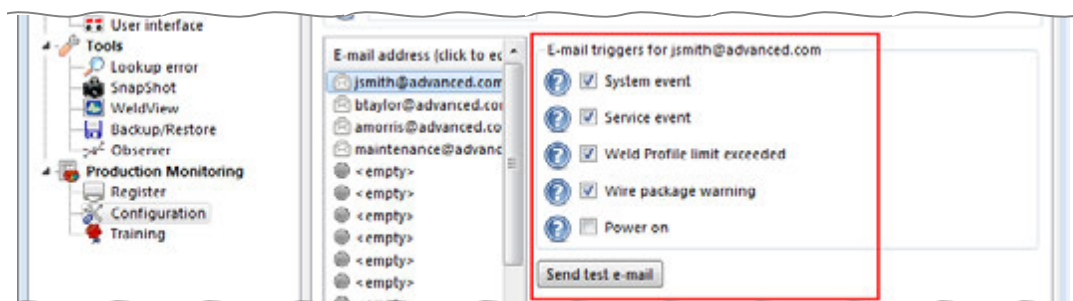


Figure 10.10 E-mail Triggers

For example, if you have a check mark next to the *Weld Profile limit exceeded* option (Figure 10.10) and a Weld Operator completes a weld whose WeldScore™ is below the minimum score allowed, the

power source will generate an e-mail. If the Weld Operator completes the next weld and the WeldScore™ is again below the minimum, the power source generates another e-mail.

To assign an e-mail trigger to an e-mail address, simply make sure you have the e-mail address selected and place a check mark in the checkbox next to the appropriate options. Table 10.6 explains each one in a little more detail.

Table 10.6 E-mail Triggers

Field	Description
<i>System event</i>	When a System Event occurs within the Welding Power Source (e.g., a thermostat fault), when it is reprogrammed with new software, or when one of its hardware components is replaced, removed, or added, the power source sends an e-mail if there is a check mark next to this option.
<i>Service event</i>	To trigger an e-mail to this e-mail address when a service event occurs, place a check mark next to this option. The power source uses these events for specific troubleshooting and reports them during general operation.
<i>Weld Profile limit exceeded</i>	When a completed weld has exceeded one or more of the limits defined in a given Weld Profile, the power source sends an e-mail message.
<i>Wire package warning</i>	When the consumable package reaches the limit set in the <i>Warning weight</i> field (page 10.11), the power source sends an e-mail to this address when there is a check mark next to this option.
<i>Power on</i>	Choosing this trigger causes the power source to send out an e-mail when the power source is turned on or reset.

Sending an E-mail Test

Once you have established your e-mail settings and entered the person's address into Power Wave® Manager, you can test the e-mail address to make sure the recipient receives e-mail notifications properly.

To test the e-mail settings, simply click the address in the *E-mail address* list and click the **Send test e-mail** button. The Welding Power Source attempts to send out an e-mail as soon as you click the test button, but the amount of time it takes for the recipient to receive the e-mail depends on the e-mail server in your company. If the recipient hasn't received the e-mail within about half an hour, verify the address and try again, or contact your IT administrator for assistance.

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.)

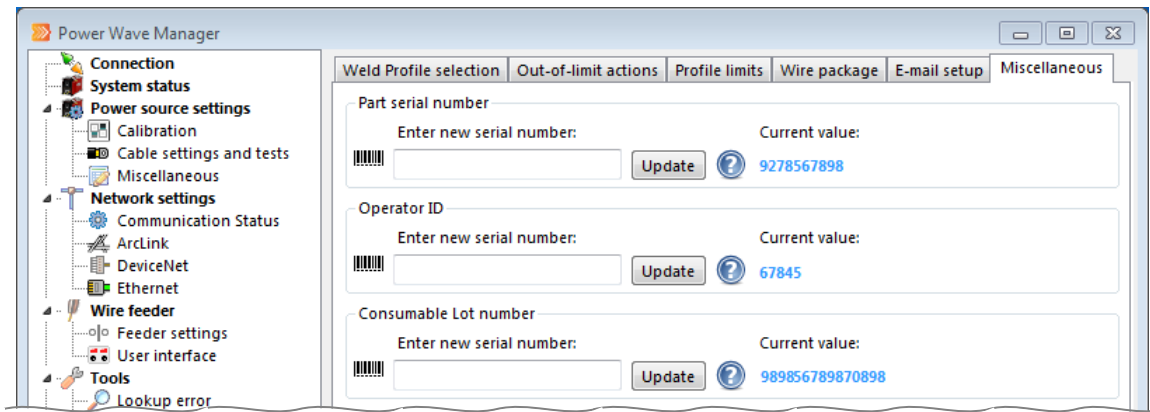


Figure 10.11 Miscellaneous Tab

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 10.7) and the *Training* section (this chapter) to maintain your Weld Profiles.

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 11.3 explains the welds to train in more detail.)

WeldScore™

WeldScore™, a new feature available in all third-generation Welding Power Source models (including the Power Wave® i400, C300, S350, S500 and AC/DC 1000 SD), 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.

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 your use of WeldScore™ effective. 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.

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 10.5 and 10.7 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.

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 10.7).

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 11.1 before you continue.

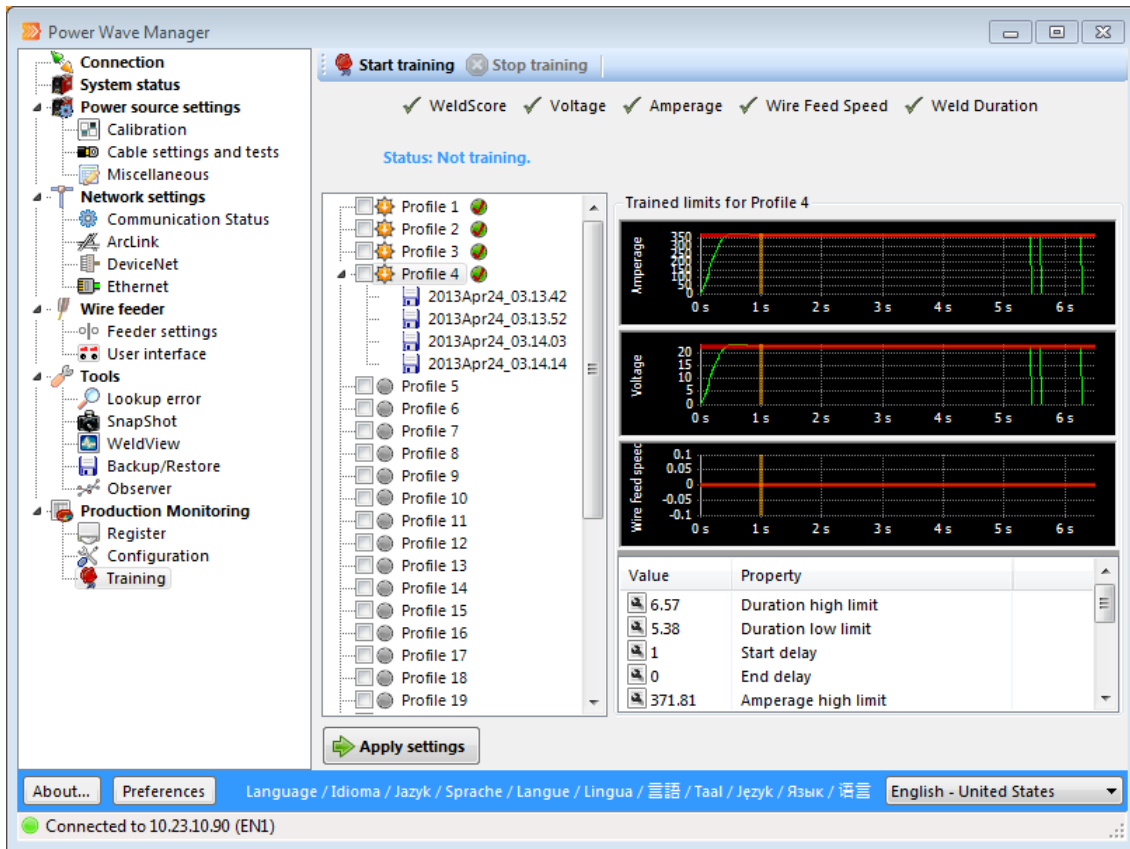


Figure 11.1 Weld Training Window

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 11.7 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 <i>Training</i> section opens (Figure 11.1).
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. 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: <i>Waiting for next weld to start.</i>
4. Select the Weld Profile you want to train by using the method chosen for this Welding Power Source on the Weld Profile selection tab under Production Monitoring > Configuration .	See page 10.4 for details on the Weld Profile selection tab.
5. Physically make all the welds necessary to set the accepted values for this Weld Profile (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. NOTE After you complete a training weld, the computer must read the data from the Welding Power Source. If you start a new weld before Power Wave® Manager reads this data, the new weld may not be recorded. 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 11.1 on page 11.4).
9. Verify there is a check mark next to each Weld Profile you want to save to the Welding Power Source and click the Apply settings button.	This process takes some time and disables certain functions in Power Wave® Manager until the process is complete. 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.	
4. Place a check mark in the <i>Enable</i> checkbox next to the <i>Minimum WeldScore</i> 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.

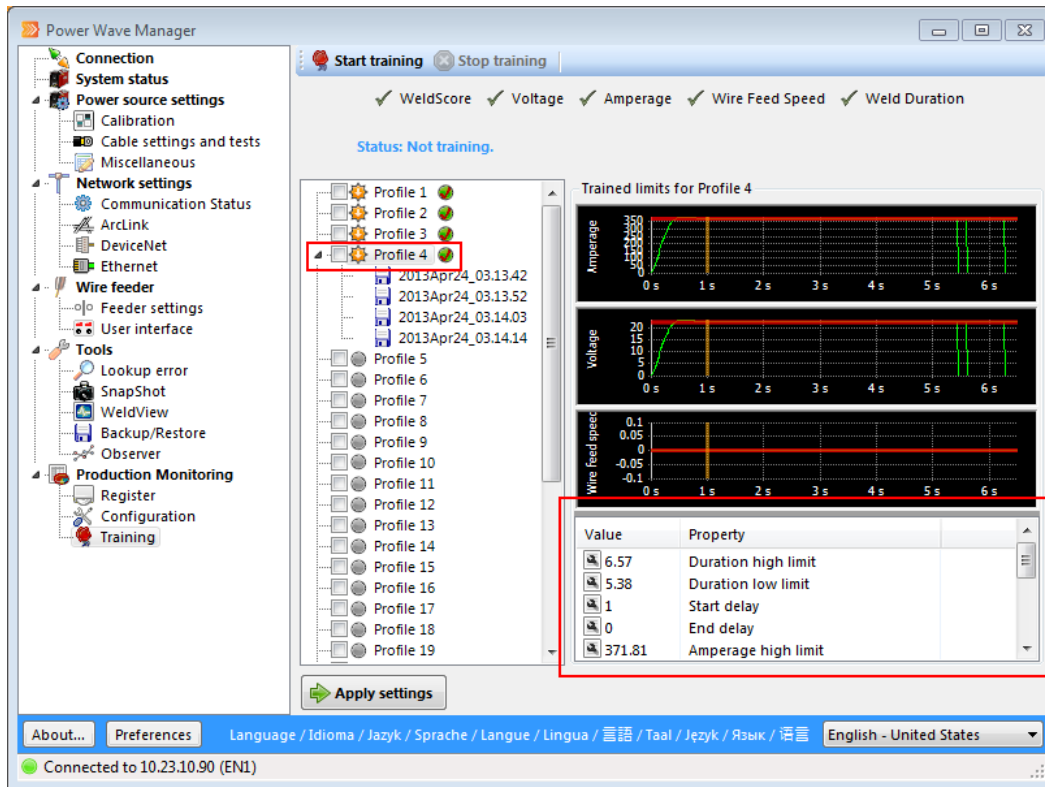


Figure 11.2 Welds Trained for a Weld Profile

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 11.2). 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.

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. 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.

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Troubleshooting

Inevitably, there will be an issue when working with a software program or installing software that 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 Production Monitoring support. For support in the USA or Canada, dial 1.800.691.5797. The direct dial number is 1.727.786.0121. You can also e-mail support at: support@lincolnelectricproductionmonitoring.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. Launch Power Wave® Manager.	

Procedure	Details
6. On the Connect tab, choose <i>I do not know the IP address of the welder</i> .	
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. 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 4.3 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.

FANUC Robots

FANUC Systems and IP Addresses

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® power source.

The FANUC robot controller acts as a proxy server for messages between Power Wave® Manager and the connected Power Wave® Welding Power Source. FANUC R-30iA and R-30iB robot controllers include two Ethernet ports:

- Port 1 is normally connected to a building network.
- Port 2 is connected to the local 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. The proxy server will pass messages to the Power Wave® Welding Power Source.

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

FANUC® Robot Application (Prior to v7.70P/21)

Production Monitoring™/CheckPoint™ is a tool within the Welding Power Source that sends weld process data to a remote computer for monitoring. You can also use it to alert the robot operator if a weld process has exceeded predetermined limits. You can monitor the following limits: WeldScore™, current, voltage, wire feed speed and time. If the robot exceeds the limits set for the weld, an alarm can be generated at the robot to alert the operator.

Production Monitoring™/CheckPoint™ uses programs already loaded into the robot to monitor and to check if the weld is within the limits set in the Weld Profile. These programs will then generate an alarm or other desired action to alert the robot operator.

NOTE | Production Monitoring™/CheckPoint™ determines if a weld is within specified limits. It does not determine if the weld is good or bad.

Page B.8 discusses support for Production Monitoring™/CheckPoint™ in a FANUC robot starting with the v7.70P/21 release.

Requirements

When you want to implement Production Monitoring™/CheckPoint™ for the FANUC robot, you need to make sure you have met the following requirements:

- ArcTool® Software

The robot must have ArcTool® software version 6.40-1M or later installed. This version includes two programs, *WR_AL_AT.VR* and *RD_AL_AT.VR* that form the basis of Production Monitoring™/CheckPoint™ robotic interface. These two program names are seen in the *Select Menu* program listing along with the all other programs in the robot's memory.

- KAREL Software

The KAREL software function must be enabled. KAREL is a FANUC software tool that performs functions behind the scenes, out of view, during normal robot operations.

To check to see if it is enabled:

Procedure	Details
1. Press the Menu key.	
2. Cursor to line <i>0-next</i> and press Enter .	
3. Cursor to line <i>System</i> and press Enter .	
4. Press F1-Type key.	
5. Cursor to line <i>Variables</i> and press Enter .	
6. Cursor down to line <i>\$KAREL_ENB</i> and set the value to <i>1</i> if it isn't already and press Enter .	

- Registers

Nine registers need to be set aside and dedicated for Production Monitoring™/CheckPoint™ use. By default, the robot has 200 registers available for use to perform math functions. (This can be increased to 500 if needed.) This manual will use registers 1 through 9 for examples.

- Ethernet Module

The Welding Power Source must have the Ethernet module installed, set up and running on a network. A network connection can also be established to the Welding Power Source through the robot, providing it has been set up, configured, and is running on a network. Refer to FANUC® documentation for more information.

NOTE | Production Monitoring™/CheckPoint™ e-mail functionality is only available when the Welding Power Source is directly connected to the network.

NOTE | If the robot is an E-model, an E-Cell for example, the network connection must be directly to the Welding Power Source external Ethernet module.

- Production Monitoring™/CheckPoint™ Installed and/or Set up

For Production Monitoring™, the software from the Production Monitoring™ CD has been installed on a computer connected to the same network as the Welding Power Source or the robot.

If using CheckPoint™, be sure your company's account has been created and the robot's IP registered in the data center. Please refer to the appropriate User Manual for detailed information.

Setting Limits

Before Production Monitoring™/CheckPoint™ is enabled for the robot, limits have to be established ahead of time. Power Wave® Manager has a built-in tool to simplify this task called Weld Profile Training. By running a series of test welds, the Training function will collect data and automatically calculate a set of limits that can be used as a starting point and adjusted as needed. See Chapter 11 for more in-depth information.

Adding Production Monitoring™/CheckPoint™ to Welding Programs

Two programs, also already installed in the robot, will be run at the time of the weld: one to select the Weld Profile titled *PM_SEL* and one to compare data titled *PM_VER*. They will be listed in the *Select key* program listing along with all other programs. Through the use of a *CALL* instruction, *PM_SEL* will be selected and run just before the *ARC START* point is recorded. After the *ARC END* point instruction, *PM_VER* will be selected and run. When these two instructions are entered, a Weld Profile number (1 through 32) will be identified as part of the instruction.

Here is a sample weld program:

```

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

```

To teach the Production Monitoring™/CheckPoint™ instructions:

Procedure	Details
1. Press F1-INST .	
2. Cursor to the line CALL and press Enter .	
3. At new submenu, cursor to line Call Program and press Enter .	A list of programs appears.

Procedure	Details
4. Cursor to PM_SEL or PM_VER and press Enter .	
5. With the cursor now just past the PM_SEL or PM_VER , press F4-Choice .	
6. Cursor to Constant and press Enter .	The word “Constant” now appears on the line.
7. Select the Weld Profile number you want to assign and press Enter .	Instruction is now complete and should appear similar to the example program above. Now, whenever this program is run, that Weld Profile will be monitored.

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

The program names have already been created but it is the end user’s responsibility to set these programs up as needed and to install the necessary electrical and mechanical interfaces necessary to allow these programs to work. Refer to the *FANUC® Controller Electrical Connection and Maintenance Manual* for interfacing instructions.

Here is an example program:

```

ALERT_4
1: DO[1] = ON
2: WAIT UI[6] = ON
3: DO[1] = OFF
END

```

This program turns on *Digital Output [1]* if a Voltage Limit occurs. *DO[1]* may be wired to an indicator light to alert the operator if a Voltage Limit has occurred. The light will remain on until *User Input [6]* is received, which may be triggered by a reset switch located near the indicator light. Then *Digital Output [1]* turns off, turning off the indicator light.

Erroneous Low Time Limit Alarms

A low time limit can occur if the duration of the weld is less than the sum of the *Start* and *End* delays as set by someone like a Weld Engineer during the setup of Weld Profiles (page X). When the TorchMate and Touch Sensing options are used, the momentary touch the wire makes at the part or at the TorchMate block is enough to cause a low time limit to be generated. If these become a nuisance, it is possible to turn off Production Monitoring™/CheckPoint™ prior to running a Touch Sensing routine or running *TorchMate Adjust* and then turn it back on again prior to making a weld.

Two programs are installed in the robot to turn Production Monitoring™/CheckPoint™ on or off: *PM_OFF* and *PM_ON*. These are entered as a *CALL* instruction.

To avoid tampering with the original *TorchMate Adjust* program, it may be desirable to create a new program titled *TorchMate*, for example, that begins with a line to turn off Production Monitoring™/CheckPoint™, followed by the *TorchMate Adjust* instruction, and finishing with a line that turns Production Monitoring™/CheckPoint™ on again, ready for the next weld.

Here is a sample program:

```
TORCHMATE
1: CALL PM_OFF
2: Torchmate Adjust
3: CALL PM_ON
END
```

Teach the two *CALL* instructions as shown above.

To teach the *TorchMate Adjust* instruction:

Procedure	Details
1. Press F1-INST .	
2. Cursor to line <i>Macro</i> and press Enter .	
3. At new submenu, cursor to line <i>TorchMate Adjust</i> and press Enter .	

FANUC Program References (Prior to v7.70P/21)

The following sections are simply a list of the code and programs related to Production Monitoring™/CheckPoint™ on the FANUC robot. For more in-depth information about the FANUC robots, please refer to the FANUC operator manuals as appropriate.

Programs Installed to Operate Production Monitoring™/CheckPoint™

- WR_AL_AT.computer
- RD_AL_AT.computer
- PM_SEL
- PM_VER
- PM_OFF

- PM_ON
- ALERT_1, ALERT_2, ALERT_3, ALERT_4, ALERT_5, ALERT_10

Listing of Program PM_SEL

```

1:  R[1] = AR[1] - 1;
2:  IF R[1]<0 OR R[1]>31, CALL ALERT(10);
3:  LBL[1];
4:  ! set profile selection
5:  CALL WR_AL_AT(1,17,1008,R[1],3,4);
6:  ! verify that the write was ok
7:  IF R[3]<>0,JMP LBL[1];
8:  IF R[4]<>0,JMP LBL[1];
9:  ! read limit counts
10: R[1] = R[1] * 25;
11: R[1] = R[1] + 2013;
12: ! Get runt counts
13: LBL[3];
14: CALL RD_AL_AT(1,17,R[1]);
15: IF $ARCLINK_ATR.$STATUS<>0 JMP LBL[3];
16: R[5] = $ARCLINK_ATR.$INT_VALUE;
17: R[1] = R[1] + 1;
18: ! Get Time Limit counts
19: LBL[4];
20: CALL RD_AL_AT(1,17,R[1]);
21: IF $ARCLINK_ATR.$STATUS<>0 JMP LBL[4];
22: R[6] = $ARCLINK_ATR.$INT_VALUE;
23: R[1] = R[1] + 1;
24: ! Get I Limit counts
25: LBL[5];
26: CALL RD_AL_AT(1,17,R[1]);
27: IF $ARCLINK_ATR.$STATUS<>0 JMP LBL[5];
28: R[7] = $ARCLINK_ATR.$INT_VALUE;
29: R[1] = R[1] + 1;
30: ! Get V Limit counts
31: LBL[6];
32: CALL RD_AL_AT(1,17,R[1]);
33: IF $ARCLINK_ATR.$STATUS<>0 JMP LBL[6];
34: R[8] = $ARCLINK_ATR.$INT_VALUE;
35: R[1] = R[1] + 1;
35: ! Get WFS limit counts
37: LBL[7];
38: CALL RD_AL_AT(1,17,R[1]);
39: IF $ARCLINK_ATR.$STATUS<>0 JMP LBL[7];
40: R[9] = $ARCLINK_ATR.$INT_VALUE;
END

```


Listing of Program PM_VER

```

1:  R[1] = AR[1] - 1;
2:  IF R[1]<0 OR R[1]>31, CALL ALERT(10);
3:  R[1] = R[1] * 25;
4:  R[1] = R[1] + 2013;
5:  ! Get runt counts
6:  LBL[3];
7:  CALL RD_AL_AT(1,17,R[1]);
8:  IF $ARCLINK_ATR.$STATUS<>0 JMP LBL[3];
9:  IF R[5] <> $ARCLINK_ATR.$INT_VALUE, CALL ALERT(1)
10: R[1] = R[1] + 1;
11: ! Get Time Limit counts
12: LBL[4];
13: CALL RD_AL_AT(1,17,R[1]);
14: IF $ARCLINK_ATR.$STATUS<>0 JMP LBL[4];
15: IF R[6] <> $ARCLINK_ATR.$INT_VALUE, CALL ALERT(2)
16: R[1] = R[1] + 1;
17: ! Get I Limit counts
18: LBL[5];
19: CALL RD_AL_AT(1,17,R[1]);
20: IF $ARCLINK_ATR.$STATUS<>0 JMP LBL[5];
21: IF R[7] <> $ARCLINK_ATR.$INT_VALUE, CALL ALERT(3)
22: R[1] = R[1] + 1;
23: ! Get V Limit counts
24: LBL[6];
25: CALL RD_AL_AT(1,17,R[1]);
26: IF $ARCLINK_ATR.$STATUS<>0 JMP LBL[6];
27: IF R[8] <> $ARCLINK_ATR.$INT_VALUE, CALL ALERT(4)
28: R[1] = R[1] + 1;
29: ! Get WFS limit counts
30: LBL[7];
31: CALL RD_AL_AT(1,17,R[1]);
32: IF $ARCLINK_ATR.$STATUS<>0 JMP LBL[7];
33: IF R[8] <> $ARCLINK_ATR.$INT_VALUE, CALL ALERT(5)
END

```

Listing of Program PM_OFF

```

1: CALL WR_AL_AT(1, 17, 999, 0, 0, 0)
END

```

Listing of Program PM_ON

```

1: CALL WR_AL_AT(1, 17, 999, 1, 0, 0)
END

```

FANUC® Robot Application (v7.70P/21 or Later)

This section reviews FANUC support for Production Monitoring™/CheckPoint™ starting with the ArcTool v7.70P/21 release or later. See page B.1 for information on supporting Production Monitoring™/CheckPoint™ in a FANUC robot prior to the v7.70P/21 release. Refer to the *FANUC ArcTool Setup and Operations Manual* for full details about configuring the software and using this feature with the FANUC robot.

ArcTool v7.70P/21 and later provides enhanced support for Production Monitoring™/CheckPoint™. The new 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 option entitled “Arc Analog Meter” option J599 that provides a display of WeldScore™, current, voltage and wire feed speed 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
- Proxy server support for weld data forwarding to the CheckPoint™ cloud server
- Wire usage monitor setup

If the Arc Production Monitor Package R788 is installed, the full suite of Internet Connectivity and Customization (R558) features and the Arc Analog Meter option J599 are installed as well.

Procedure: Enabling Arc Production Monitor

Conditions

The following conditions must be met:

- The robot controller is configured with ArcTool V7.70P/21 or later, and the option list includes either the Lincoln America Package R787 or the Arc Production Monitor Package R788 option.
- The controller is powered on and running at Cold Start (normal operating condition).

Procedure

Procedure	Details
1. Go to the System Variables menu by pressing: MENU > 0 (Next) > 6 (System) > F1 (Type) > Variables	
2. Move the cursor to \$AWELEPM and press ENTER .	If you have more than one weld equipment in your system, there will be an index for each equipment, so the first equipment will appear as \$AWELEPM[1] .

Procedure	Details
3. Press Enter again to display the variables in this structure.	
4. Change the state of <code>\$PM_ENABLE</code> from <code>FALSE</code> to <code>TRUE</code> .	

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. The macro call is placed ahead of the `Arc Start` or `Weld Start` instruction in the TP program. For example, a TP program may appear as follows:

```

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

If you are using the Weld Procedures method for programming welding, the TP program will appear as follows:

```

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;
etc.
```

In either case, the macro instruction to set the Production Monitoring™ Weld Profile number is:

```
SET_PM_PROF(profile_number);
```

where **(profile_number)** is an integer in the range of 1 to the maximum number of profiles available.

This macro is selected in the TP program editor by selecting **MACRO** from the instruction list and then choosing the macro name from the list that follows. If your system includes multiple weld equipment, there is a specific macro for each equipment and will display as “SET_PM_PROF_E1”, “SET_PM_PROF_E2”, etc.

After selecting the `SET_PM_PROF` macro, add the Weld Profile number by pressing **F4 (CHOICE)**, selecting **Constant** and entering the desired profile number.

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;
etc.

```

Alternate serial number entry formats include:

```

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

```

If your robotic welding system includes the Multi-Equipment feature, 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. You add the serial number to the macro call by selecting **F4 (CHOICE)** and choosing the desired entry method from the pop-up list.

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**

<i>Lincoln Error</i>	<i>Robot Behavior</i>
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.

You identify the Digital Output port number for an alarm (log event and alarm latch) by setting the system variable:

```
$AWELEPM[equip]$. $ALARM_PNUM
```

The Digital Output port number for a fault level alarm is set in:

```
$AWELEPM[equip]$. $FAULT_PNUM
```

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 11.3.

Busy	Ready	Ready	Ready	WP_TEST_G1 LINE 0	T2	ABORTED	E1 G1 WORLD	100%
Run	Weld	Scab	Stop					
STATUS Wire								E1
								5/6
Current weight:				14.9 lb				
1 Warning weight:				14.9 lb				
2 Initial weight:				15.0 lb				
3 Warning signal:				DO[33] U OFF				
4 Wire diameter:				0.045 in				
5 Wire material:				Steel				
6 Wire density:				0.283 lb/in3				
[TYPE] RESET kg/ lb [CHOICE] ? HELP								

Figure 11.3 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 11.4.

STATUS Wire		E1
		5/6
1 User Defined	Current weight:	14.9 lb
2 Steel	Warning weight:	14.9 lb
3 Stainless	Initial weight:	15.0 lb
4 Alum 4043	Warning signal:	DO[33] U OFF
5 Alum 5356	Wire diameter:	0.045 in
6	Wire material:	Steel
7	Wire density:	0.283 lb/in ³
8		

At the bottom of the screen, there are buttons: [TYPE], RESET, kg/lb, [CHOICE], and HELP.

Figure 11.4 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. It can be reset by changing the **Warning weight** or by pressing **F2, RESET** to restore the initial weight value.

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.

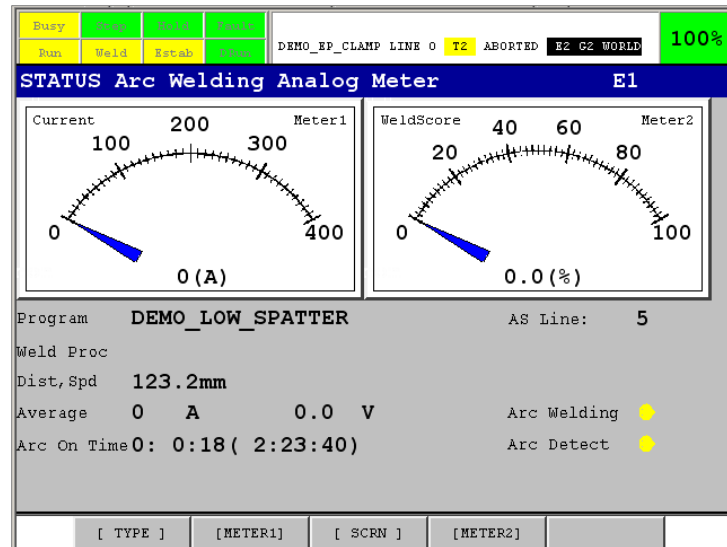


Figure 11.5 Arc Analog Meter

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.

Proxy Server Function for CheckPoint™ Cloud Server Data Storage

When the robot controller Ethernet Port 1 is connected to a network that allows access to the Internet, messages from the Lincoln Power Wave® Welding Power Source can be forwarded to a user-specified Proxy Server, which forwards these messages to the CheckPoint™ cloud server that acts as the repository for welding data.

The **Proxy Server** option appears in the collection of **Host Communication** options available on the Teach Pendant and is selected by pressing **MENU > SETUP > Host Comm** and then selecting the item labeled **Proxy Server** (Figure 11.6).

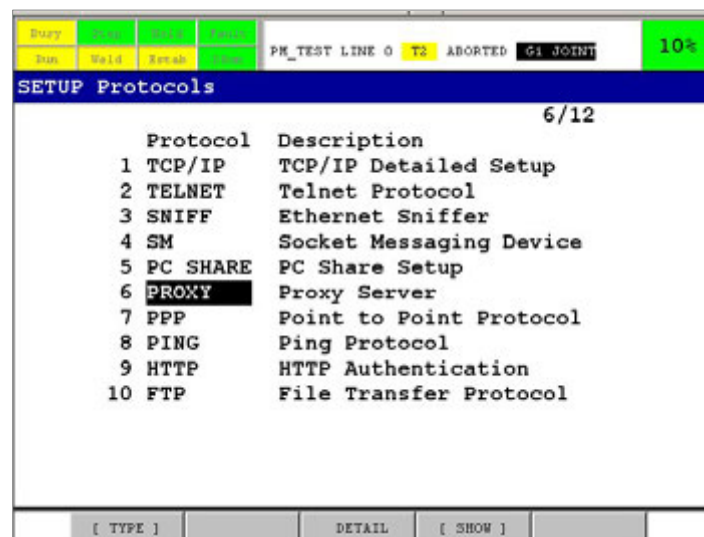


Figure 11.6 Proxy Server Function

Pressing **ENTER** yields Figure 11.7.

Proxy Setup	
1/11	
External Proxy	
Enable :	TRUE
Server :	172.22.194.19
Port :	8080
Exceptions :	
1)	*.frc.com
2)	pderob*
3)	
4)	
5)	*****
[TYPE]	TRUE FALSE

Figure 11.7 Enable Proxy Server

Enable the **Proxy Server** function by placing the cursor on the line labeled **Enable** and pressing **F4 (TRUE)**. Move the cursor to the line labeled “Server” and enter the IP address of the Proxy Server in your local area network. If you do not know the IP address of the Proxy Server, consult with your IT department or the person who handles the network configuration at your site. Exceptions that do not need the proxy server function can be entered in the **Exceptions** list.

It is also necessary to add the **Host Name** and **Address** of the Lincoln CheckPoint™ server in the **TCP/IP** menu. After configuring the **Proxy Server** menu, press the **PREVIOUS** key to return to the main **Host Comm** menu (Figure 11.8).

SETUP Protocols	
1/12	
Protocol	Description
1 TCP/IP	TCP/IP Detailed Setup
2 TELNET	Telnet Protocol
3 SNIFF	Ethernet Sniffer
4 PC SHARE	PC Share Setup
5 RIPE	ROS Ethernet Packets
6 PROXY	Proxy Server
7 PPP	Point to Point Protocol
8 PING	Ping Protocol
9 HTTP	HTTP Authentication
10 FTP	File Transfer Protocol
[TYPE]	DETAIL [SHOW]

Figure 11.8 TCP/IP Menu

Move the cursor to the **TCP/IP** item and press **F3 (DETAIL)** or **Enter** to display the detail menu (Figure 11.9).

```

SETUP Host Comm
TCP/IP 5/40
Robot name: ARCROB01
Port#2 IP addr: 192.168.2.151
Subnet Mask: 255.255.255.0
Board address: 00:e0:e4:0f:72:d0
Router IP addr: 172.22.64.1

Host Name (LOCAL) Internet Address
1 ws.lincoln 216.26.175.3
2 *****
3 *****
4 *****
>ws.lincolncheckpoint.com
  
```

Figure 11.9 Enter Host Name and IP Address

In the **Host Name** table in the lower section of the menu enter the following:

- Host Name (local): ws.lincolncheckpoint.com
- Internet Address: 216.26.175.3

NOTE | The Host Name and IP address of the cloud server may be different than the values shown above. Please consult Lincoln Electric for details about this data.

Upon completion of these entries, cycle power on the robot controller and Power Wave®.

Reference: \$AWELEPM System Variable

Here follows the listing of the \$AWELEPM system variable structure:

```

$AWELEPM[1] 1/30
1 $PM_ENABLE TRUE
2 $PM_EXISTS TRUE
3 $WP_NUM 1
4 $WP_NUM_CFG 2
5 $I_WELDScore 95
6 $A_WELDScore 0
7 $PART 'ABC123456789>
8 $OPER '123456789012345678>
9 $CONS '123456789012345678>
10 $PART_CFG 2
11 $OPER_CFG 0
12 $CONS_CFG 0
13 $DEBUG 0
  
```

14	\$WP_NUM_MAX	200
15	\$ALARM	0
16	\$LATCH_ALARM	0
17	\$FAULT	0
18	\$ALARM_PTyp	2
19	\$ALARM_PNUM	0
20	\$FAULT_PTyp	2
21	\$FAULT_PNUM	0
22	\$TRUE_ENERGY	21504.000
23	\$WIR_LO_PTyp	2
24	\$WIR_LO_PNUM	0
25	\$WIRE_LOW	FALSE
26	\$WIRE_IN_KG	FALSE
27	\$PART_MAXLEN	32
28	\$PREV_ENERGY	0.000
29	\$WELD_ENERGY	21504.000
30	\$LOG_ENERGY	TRUE

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.

NOTES

			
● Keep your head out of fumes. ● 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. ● 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 AVISO DE PRECAUCION
● Gardez la tête à l'écart des fumées. ● 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 ATTENTION
● Vermeiden Sie das Einatmen von Schweißrauch! ● 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 WARNUNG
● Mantenha seu rosto da fumaça. ● Use ventilação e exaustão para remover fumo da zona respiratória.	● Não opere com as tampas removidas. ● Desligue a corrente antes de fazer serviço. ● Não toque as partes elétricas nuas.	● Mantenha-se afastado das partes moventes. ● Não opere com os painéis abertos ou guardas removidas.	Portuguese ATENÇÃO
● ヒュームから顔を離すようにして下さい。 ● 換気や排煙に十分留意して下さい。	● メンテナンス・サービスに際りかかる際には、まず電源スイッチを必ず切して下さい。	● 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 注意事項
● 頭部遠離煙霧。 ● 在呼吸區使用通風或排風設備。	● 維修前切斷電源。	● 儀表板打開或沒有安全罩時不準作業。	Chinese 警告
● 얼굴로부터 열접가스를 멀리하십시오. ● 호흡지역으로부터 용접가스를 제거하기 위해 기스제거기나 분동기를 사용하십시오.	● 보수전에 전원을 차단하십시오.	● 판넬에 밀린 상태로 작동하지 마십시오.	Korean 위험
● بعد رأسك بعيداً عن الدخان. ● استعمل التهوية أو جهاز ضغط الدخان للخارج لكي تبعد الدخان عن المنطقة التي تتنفس فيها.	● اقطع التيار الكهربائي قبل القيام بأية صيانة.	● لا تشغيل هذا الجهاز إذا كانت الاغطية التعويدية الواقية ليست عليه.	Arabic تحذير

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