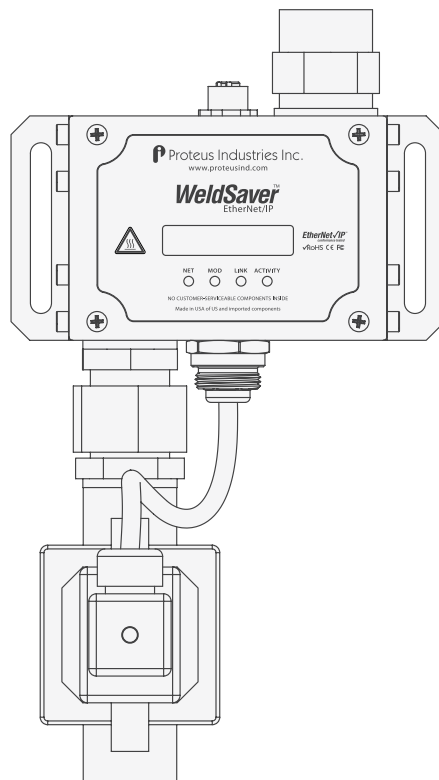


WeldSaverTM

EtherNet/IP



TECHNICAL REFERENCE MANUAL




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Introduction

This document provides comprehensive technical information about the EtherNet/IP™ version of the Proteus WeldSaver. Product features, specifications and operating instructions are unique to this WeldSaver version.


Important Safety Information

Throughout these instructions, **NOTE**, **CAUTION** and **WARNING** statements are used to highlight important operational and safety information.

NOTE	NOTE statements provide additional information that is important to the successful operation of the device.
	
CAUTION!	CAUTION statements identify conditions or practices that could result in damage to equipment or other property.
	
WARNING!	WARNING statements identify conditions or practices that could result in personal injury or loss of life.
	

Taking proper precautions to avoid damage to your instrument's sensors during installation helps ensure consistent, error-free operation, which lowers costs and assists on-time completion of your work.

The safety-related statements contained in these instructions provide an alert to installers and operators to take sensible steps to allow the WeldSaver to operate correctly the first time and every time.

NOTE	
	It is recommended that installation of this product be performed by qualified service personnel only.

Technical Support

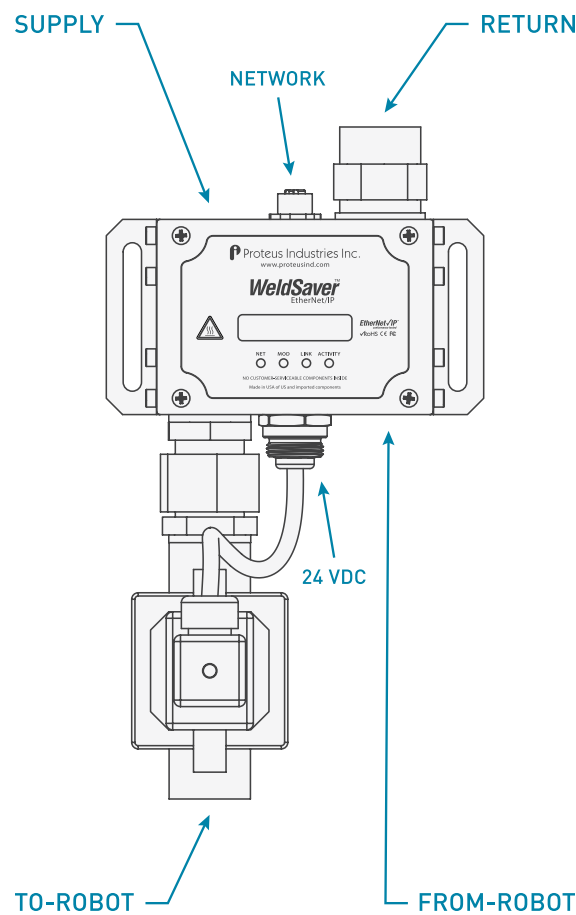
For technical or applications assistance, please contact:

Proteus Industries Inc.
340 Pioneer Way
Mountain View, CA 94041
TEL: (650) 964-4163
FAX: (650) 965-0304
E-mail: weldsaver@proteusind.com

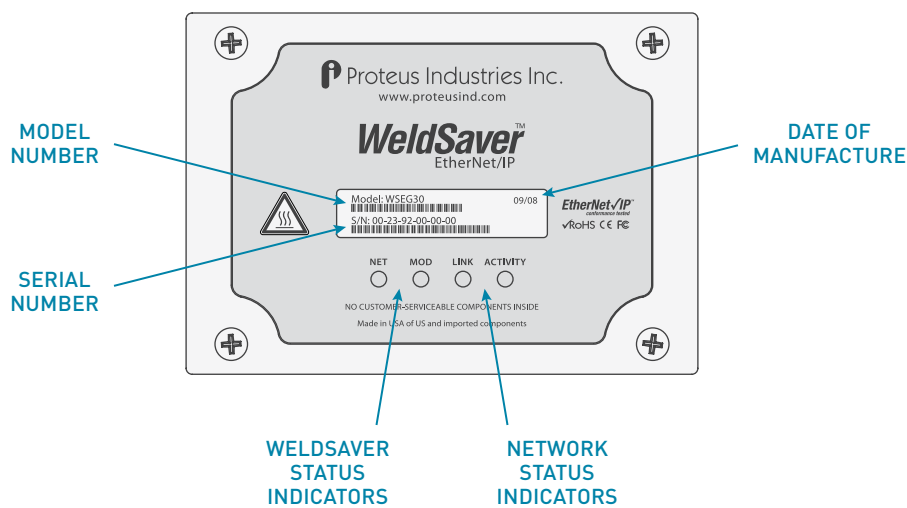
The Proteus 5-Year Warranty

Proteus WeldSavers are manufactured under ISO 9001 certified processes and are warranted to be free from defects in materials and workmanship for two years from the date of shipment. The full text of this limited warranty is available on the Proteus Industries website at www.proteusind.com/warranty.

Functional Components



Front Panel



What It Is and What It Does

The Proteus WeldSaver™ featuring EtherNet/IP™ is a unique water control unit designed to provide multiple functions to monitor and control coolant flow.

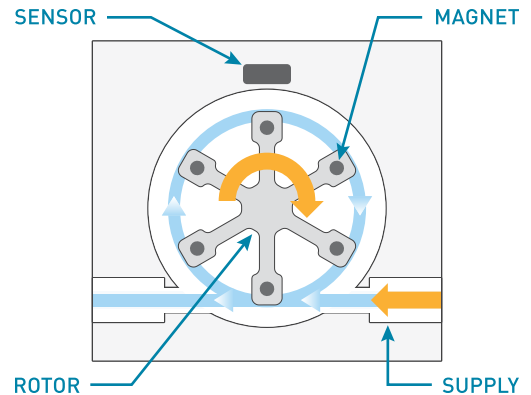


Flow Sensing and Measurement

A sensitive and rugged flow sensor is located in both the supply and return coolant lines.

A six-spoke rotor is mounted on a stainless steel shaft in the cylindrical turbine chamber. Coolant enters the turbine chamber through precision-drilled holes, causing the rotor to spin at a rate that is directly proportional to the linear velocity of the liquid passing through the chamber.

Magnets embedded in the rotors switch a Hall-Effect sensor located outside the turbine chamber. The frequency output of the Hall-Effect sensor is measured by a microcomputer that calculates the flow rate of the liquid.



Flow Comparison

The WeldSaver's microcomputer compares the measured inlet flow rate with the Flow Warning and Flow Fault trip point values as selected by the operator.

When the measured flow rate is greater than the Flow Warning value, the microcomputer sends the signals **diWS_OktoWeld** and **diWS_MinFlow** to the weld controller.

When the measured flow rate is less than the Flow Warning value, but greater than the Flow Fault value, the microcomputer sends only the **diWS_OktoWeld** signal to the weld controller.

When the measured flow rate is less than the Flow Fault value, the microcomputer stops sending the **diWS_OktoWeld** signal.

The weld controller makes decisions affecting weld operations based on the flow status reported by the WeldSaver.

Cap Loss Detection


The WeldSaver's microcomputer uses a patented algorithm to continuously monitor the output frequencies of both the supply and return flow sensors. This algorithm is able to detect the loss of a weld cap or other catastrophic loss of flow continuity in less than 0.3 seconds.

When a cap loss event is detected, the microcomputer shuts off water flow in both the inlet and return lines and sends the digital message **diWS_CapLoss** to the weld controller.

The weld controller makes a decision to shut down weld operations.

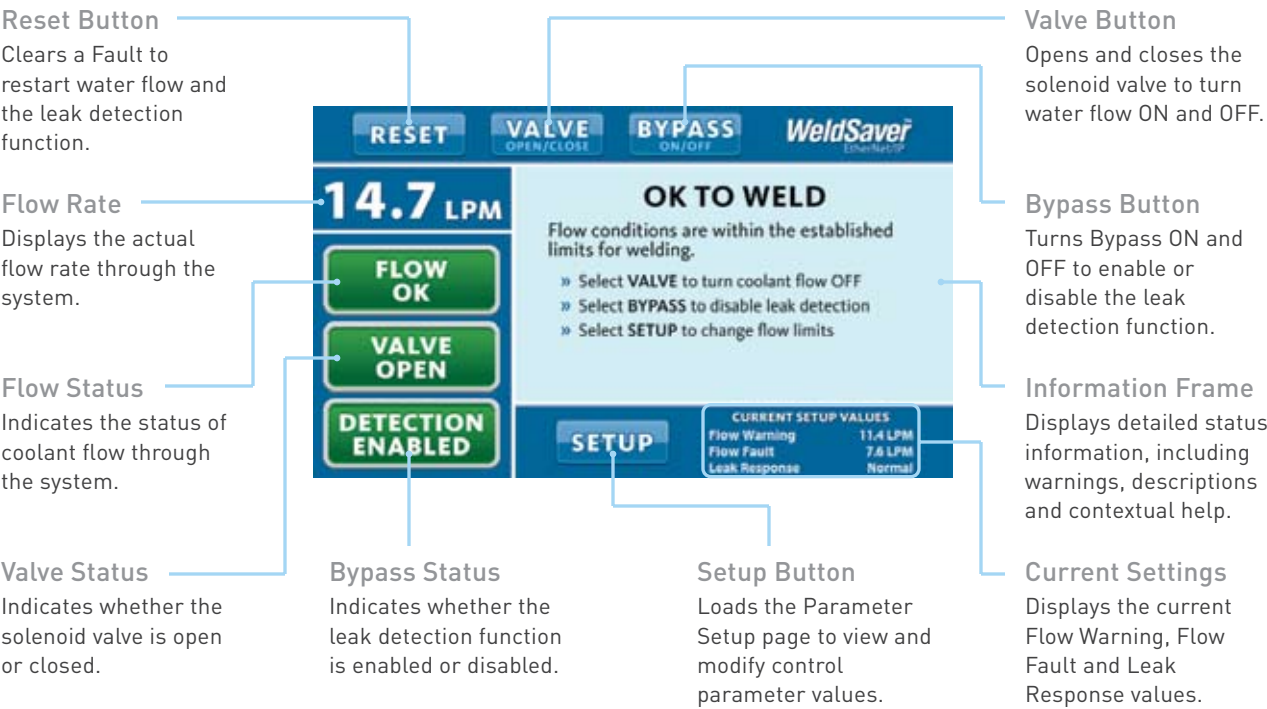
User Interface

The WeldSaver graphical user interface provides information on device status in real time, with clear visual indicators and descriptions. The interface can be accessed over a network using most JavaScript™-enabled web browsers by entering the working IP address of the device.



NOTE

Standard WeldSaver units are programmed with a default IP address of 172.24.1.1.



Performance Characteristics

Model Number	WSENG11	WSEG30	WSEN3	WSEN8
Flow Range	1.0 – 11 LPM	7.5 – 30 LPM	0.5 – 3.0 GPM	2.0 – 8.0 GPM
Connections	G 3/4 (BSPP)		3/4" FNPT	
Pressure Drop	< 15 kPa at 4.0 LPM	< 15 kPa at 14 LPM	< 2.0 psig at 1.0 GPM	< 2.0 psig at 3.6 GPM
Coolant Supply Pressure	83 – 620 kPa / 12 – 90 psig			
Coolant Return Pressure	70 – 350 kPa / 10 – 50 psig			
Differential Pressure	14 – 415 kPa / 2.0 – 60 psig			
Coolant Temperature	4.0° – 110°C / 39° – 230°F			
Operating Environment	4.0° – 50°C / 39° – 122°F			
Leak Response Time	~300 msec at most sensitive condition; ~1 sec at sensitivity setting 4			
Low Flow Response	< 0.2 sec			
Reset / Override Response	< 1.0 sec			
Leak Detection	0.3 – 1.0 sec depending on response time setting			
Leak Sensitivity	Able to detect a loss of flow continuity from 1 to 20 balanced parallel flow paths			
Accuracy - Standard	± 3% of flow range with standard validation			
Accuracy - Validated	± 2% of calibration value			
Repeatability	± 1% of flow range from 0.1 to 1.0 × flow range			

CAUTION!

Do NOT exceed the maximum rated flow rate of your instrument.

EXTENDED OPERATION ABOVE THE RATED MAXIMUM FLOW RATE OF THE INSTRUMENT WILL REDUCE ITS USABLE LIFE.

WARNING!

Do NOT exceed the temperature limit of the flow sensor body or faceplate material.

OPERATION ABOVE THE RATED TEMPERATURE CAN CAUSE FAILURE AND CREATE A HAZARD TO OPERATORS AND EQUIPMENT.

WARNING!

Do NOT exceed the pressure limit of the flow sensor body or faceplate material.

OPERATION ABOVE THE RATED PRESSURE CAN CAUSE FAILURE AND CREATE A HAZARD TO OPERATORS AND EQUIPMENT.

Electrical Requirements

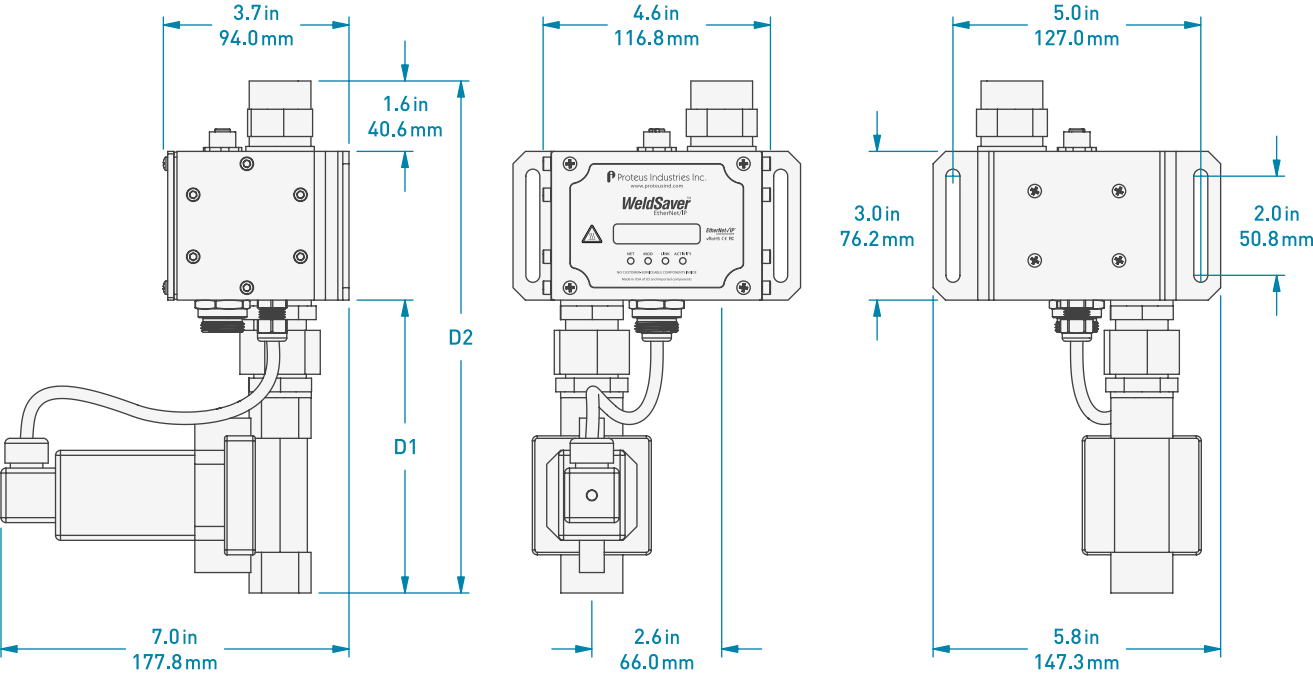
Input Power Voltage	+24 VDC ± 10%
Input Power Consumption	< 16 VA at normal flow; < 8 VA with solenoid valve closed

Wetted Materials

COMPONENT	MATERIAL
Flow Body, Solenoid Valve, Check Valve, Fitting(s)	Brass
Rotor	Kynar®
O-Ring	Viton®
Rotor Shaft	316 Stainless Steel

Dimensional Drawings

Product dimensions for standard WeldSaver EtherNet/IP models are indicated below. Three-dimensional drawings are accessible on the Proteus Industries website at www.proteusind.com/wseip. Solid models are available upon request; please contact Proteus Technical Support.



MODEL NUMBER	CONNECTIONS	FLOW RANGE	D1	D2
WSEG11	G 3/4 (BSPP)	1.0 – 11 LPM	5.9 in 149.9 mm	10.5 in 266.7 mm
WSEG30		7.5 – 30 LPM		
WSEN3	3/4" FNPT	0.5 – 3.0 GPM	6.3 in 160.0 mm	10.9 in 276.9 mm
WSEN8		2.0 – 8.0 GPM		

Compliance and Certifications

» EtherNet/IP Conformance

EtherNet/IP Conformance Tested™ in compliance with ODVA specifications.



» Safety Compliance

EN 61010-1:2001 Safety Requirements for Electrical Equipment for Measurement, Control, and Laboratory Use

» CE Compliance

2004/108/EC Electromagnetic Compatibility
2006/95/EC Low Voltage Directive



» Environmental Compliance

Restriction of Hazardous Substances (RoHS) Directive 2002/95/EC



» Electromagnetic Compatibility

EN 55011:2007 Industrial, Scientific and Medical (ISM) Radio-Frequency Equipment
EN 61326-1:2006 Electrical Equipment for Measurement, Control and Laboratory Use



FCC Part 15 Notice


This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to Part 15 of the FCC rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation.


Physical Installation

Refer to page 7 of this document for product dimensions and fastening locations.


Plumbing Connections

1. Flush the inlet piping.


CAUTION!	
	<p>Flush contaminants and other accumulated construction debris from the upstream pipe BEFORE connecting the WeldSaver.</p> <p>Failure to flush coolant lines may result in the fouling of the WeldSaver's supply flow sensor and the clogging of smaller orifices in the system supply lines, manifolds and the weld gun.</p>

CAUTION!	
	<p>Flush contaminants and other debris from water lines connecting the system, manifold, transformer, SCR and any other water-cooled components BEFORE connecting them to the WeldSaver.</p> <p>Failure to flush these lines may result in the fouling of the WeldSaver's return flow sensor and the clogging of smaller orifices in the system supply lines, manifolds, transformer, SCR, weld gun and any other water-cooled components.</p>

2. Lubricate all pipe threads using a non-hardening pipe sealant, such as Teflon paste, to help simplify installation and seal plumbing connections.


CAUTION!	
	<p>Do NOT allow excess pipe sealant to enter the flow sensors!</p> <p>Excess material may foul the sensors and cause the clogging of smaller orifices in the system's supply lines, manifold, transformer, SCR, weld gun and any other water-cooled components.</p>

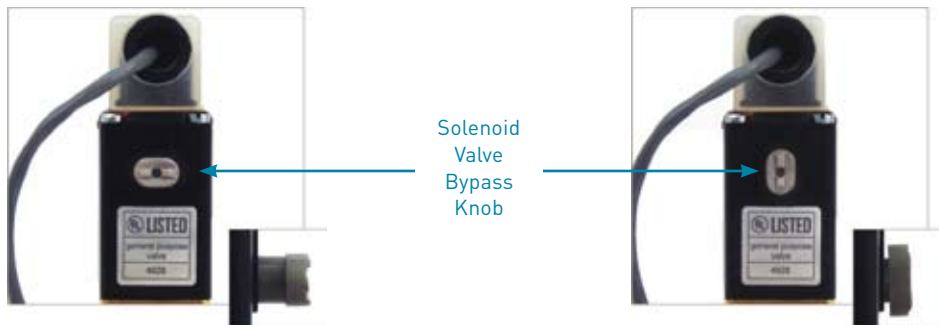
3. Refer to page 2 of this document to identify the water connection ports.
4. Make plumbing connections to the Supply, Return, To-Robot and From-Robot connection ports on the WeldSaver using appropriate pipe fittings and sealing washers.

CAUTION!	
	<p>Ensure that the correct hoses have been connected to the To-Robot and From-Robot connections.</p> <p>Check hose labels or trace water flow to confirm that the WeldSaver is connected to include the water circuit cooling the weld gun.</p> <p>If the hose connections are not correct, the WeldSaver may NOT be able to detect the loss of a weld cap.</p>

Plumbing Connections (Continued)

5. Adjust pipe connections as required for proper alignment of the WeldSaver.
6. Depress the solenoid valve bypass knob and turn it 90° clockwise to a vertical position to enable flow.

NOTE	
	Standard Proteus WeldSaver units are equipped with a solenoid valve featuring a manual override function.




The solenoid valve is functional when the slot in the knob is in a HORIZONTAL position.

During normal operation, the solenoid valve enables the control of flow through the system, either locally using the WeldSaver keypad or remotely from the weld controller.


The solenoid valve can be bypassed by depressing the knob and turning it 90° clockwise to a VERTICAL position.

In the manual override state, water can flow through the system to allow leak testing without engaging 24 VDC electrical power.


7. Turn water ON slowly.

WARNING!	
	<p>The WeldSaver body is NOT insulated!</p> <p>When using the WeldSaver with hot liquids, use proper personal protective equipment.</p>

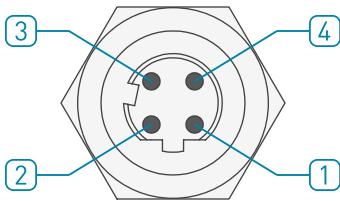
8. Check for leaks at all connections to the WeldSaver.
9. Eliminate all leaks before proceeding.
10. Turn the solenoid valve bypass knob 90° counterclockwise to return it to a horizontal position for normal operation.

NOTE	
	If the solenoid valve bypass knob is left in a vertical position, the valve will NOT function if power to the WeldSaver is turned off.

Electrical Connections


NOTE	
	The WeldSaver must be connected to 24 VDC auxiliary power to perform correctly. Proteus highly recommends connecting the WeldSaver to certified DC power supplies only.

1. Refer to the wiring diagram below for the 24 VDC power connector on the bottom of the WeldSaver body.




PIN	FUNCTION
1	0 VDC
2	+24 VDC
3	NO CONNECTION
4	NO CONNECTION

2. Confirm that the power cable has 24 VDC present between pins 1 and 3.

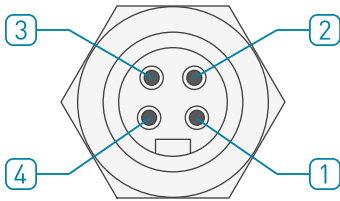
CAUTION!	
	Connect the power cable to the 24 VDC power source BEFORE connecting it to the WeldSaver.

3. Connect the power cable to the 4-pin connector on the bottom of the WeldSaver body.

Network Connections

NOTE	
	The WeldSaver must be connected to an EtherNet network to perform correctly.

1. Refer to the wiring diagram below for the network connector on the top of the WeldSaver body.



PIN	FUNCTION
1	TXD +
2	TXD -
3	RXD +
4	RXD -

2. Connect the RJ-45 end of the EtherNet cable to an EtherNet LAN port or broadband modem port on a computer.
3. Connect the other end of the EtherNet cable to the 4-pin connector on the top of the WeldSaver body.

Power and Network Connectivity

NOTE

A valid EtherNet connection and a JavaScript™-enabled web browser are required to operate the WeldSaver.

If operating the WeldSaver with a Fanuc Robotics iPendant™, refer to the pendant operating manual for instructions on accessing the device over the network.

Standard WeldSaver units are programmed with a default IP address of 172.24.1.1.

1. Turn 24 VDC power ON.

» The NET status indicator will turn GREEN and flash.

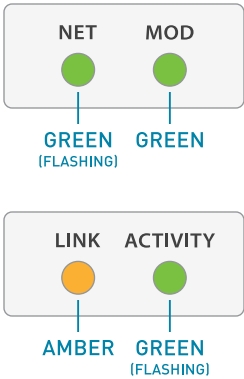
» The MOD status indicator will turn GREEN.
2. Confirm that the WeldSaver has established a valid Ethernet connection.

» The LINK status indicator will be AMBER.

» The ACTIVITY status indicator will be GREEN and flashing.
3. Open the web browser and access the IP address of the WeldSaver.

» The WeldSaver interface will be displayed.

» The status information indicated on the screen will depend on the measured flow rate through the device.



Flow Detection

1. Confirm that 24 VDC power is ON.

» If water is OFF or if the flow rate is less than the Flow Fault value, the display will indicate a FLOW FAULT condition.

» The indicated flow rate will be 0.00 or the actual flow rate.
2. Turn water flow ON or increase it until it reaches the optimum system flow rate.

» The display will indicate the OK TO WELD condition.

Valve Shut-Off

1. Select the VALVE button.

» Water flow will turn OFF and the display will indicate the VALVE CLOSED condition.
2. Select the VALVE button again.

» Water flow will turn ON and the display will indicate the OK TO WELD condition and the actual flow rate.



Bypass Mode

1. Select the BYPASS button.
 - » The leak detection function will turn OFF and the display will indicate the BYPASSED condition.
2. Select the BYPASS button again.
 - » The leak detection function will turn ON and the display will return to the OK TO WELD condition.



Cap Off Detection

1. Remove a weld cap to create a leak in the system.
 - » The WeldSaver will turn water flow OFF and the display will indicate the CAP OFF condition.
2. Reinstall the weld cap and confirm that it is properly secured to the weld gun.
3. Select the RESET button.
 - » The WeldSaver will restore water flow and the display will indicate the OK TO WELD condition and the actual flow rate.



WeldSaver Control Parameters

The WeldSaver features multiple control parameters that can be configured to achieve optimum performance within your system.

» Flow Warning Trip Point

This flow rate at which the welding system should be operated. This flow rate provides sufficient cooling capacity to allow welds to be produced at the desired rate under all ambient temperature conditions.

» Flow Fault Trip Point

This is the lowest flow rate at which the welding system should be operated. Coolant flow lower than this rate does not provide sufficient cooling capacity to allow satisfactory welds to be produced.

» Leak Response Sensitivity

This setting determines how quickly a leak will be detected. Slowing the response reduces sensitivity to false cap-loss events; speeding the response increases sensitivity.

» Startup Stabilization Delay Time

This setting selects the amount of time required to purge air from the cooling system at startup that could otherwise cause false cap-loss events.

» Startup Leak Detection Threshold

This setting checks whether the weld cap is properly in place and is not ejected from the weld shank when water pressure is applied. A low setting gives the most sensitive response to the loss of a weld cap at startup; a high setting gives the least sensitive response.

Factory Default Setup Values

CONTROL PARAMETER	MODEL NUMBER			
	WSEG11	WSEG30	WSEN3	WSEN8
Flow Warning	1.5 LPM	7.6 LPM	0.8 GPM	3.0 GPM
Flow Fault	3.0 LPM	11.4 LPM	0.4 GPM	2.0 GPM
Leak Response	Normal			
Startup Stabilization	2 Sec.			
Startup Leak	1.9 LPM	3.8 LPM	0.5 GPM	1.0 GPM

Adjusting Parameter Values

- 1. Select the SETUP button on the user interface. The Parameter Setup page is displayed, showing the current parameter values.

RESET

VALVE
OPEN/CLOSE

BYPASS
ON/OFF

WeldSaver™
EtherNet/IP

14.7 LPM

FLOW
OK

VALVE
OPEN

DETECTION
ENABLED

PARAMETER SETUP

Flow Warning (LPM)11.4

Flow Fault (LPM)7.6

Leak ResponseNormal


Stabilization Delay (SEC)2

Startup Leak (LPM)3.8

Show Factory SettingsSubmitCancel

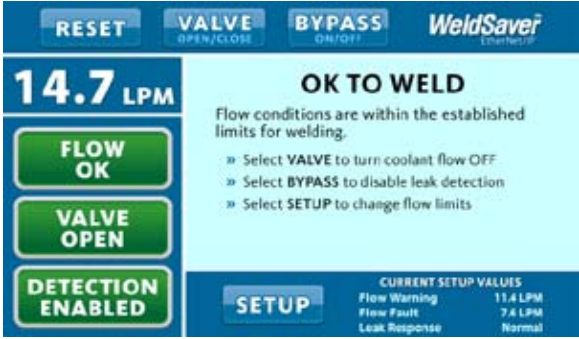
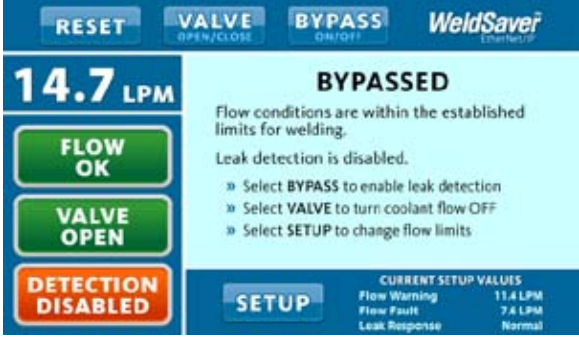
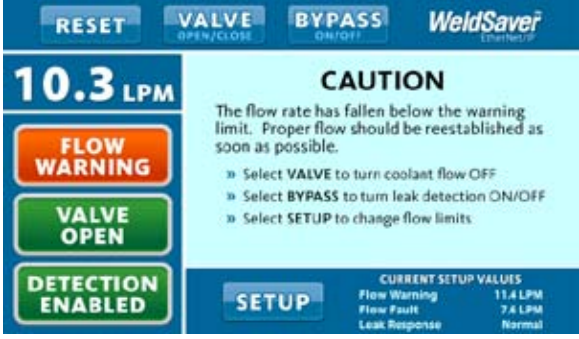
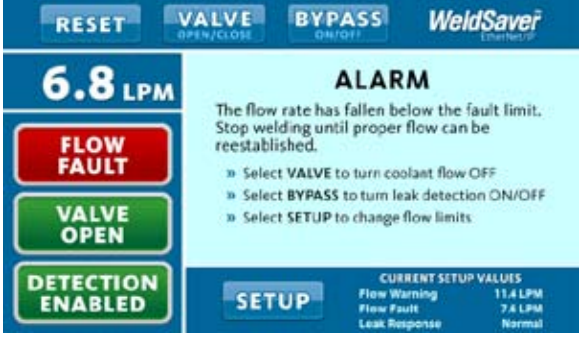
CURRENT SETUP VALUES			
Flow Warning	11.4 LPM	Stabilization Delay	2.0 SEC
Flow Fault	7.6 LPM	Startup Leak	3.8 LPM
Leak Response	Normal		

NOTE



The current parameter values are displayed at the bottom of the Parameter Setup page. The factory default parameter values can be viewed by selecting the **Show Factory Settings** button. To return to the current parameter values display, click the **Show Current Settings** button.

- 2. Adjust parameter values as desired. To change the Flow Warning or Flow Fault settings, enter a new flow limit value in the corresponding text fields; to change the Leak Response, Stabilization Delay or Startup Leak settings, select a new value from the corresponding drop-down menu.
- 3. Select the Submit button to save the new control parameter value(s) and return to normal operation. To return to normal operation WITHOUT saving any changes, select the Cancel button.

STATUS CONDITION	ON-SCREEN DISPLAY
<p>OK TO WELD</p> <p>The standard operating condition in which flow conditions are within the established limits for welding.</p>	
<p>BYPASS MODE</p> <p>Leak detection is disabled. Flow monitoring is still functional.</p> <p>To enable leak detection, select the BYPASS button.</p>	
<p>LOW FLOW WARNING</p> <ul style="list-style-type: none"> Flow has fallen below the Flow Warning flow rate <ol style="list-style-type: none"> Check the Flow Warning setting. Correct if necessary. If the Flow Warning setting is OK, increase the flow rate if possible. If flow rate cannot be increased, reduce the Flow Warning setting. The rotors are slowed by wear or fouling Clean or replace rotors. 	
<p>LOW FLOW FAULT</p> <ul style="list-style-type: none"> Flow has fallen below the Flow Fault flow rate <ol style="list-style-type: none"> Stop welding until proper flow is reestablished. Check the Flow Fault setting. Correct if necessary. If the Flow Fault setting is OK, increase the flow rate if possible. If flow rate cannot be increased, reduce the Flow Fault setting. The rotors are slowed by wear or fouling Clean or replace rotors. 	

STATUS CONDITION	ON-SCREEN DISPLAY
CAP OFF FAULT <ul style="list-style-type: none"> » The WeldSaver has detected the loss of a weld cap and water flow has been shut off Replace the weld cap and select the RESET button to restart water flow. » Welding has stopped, but the weld caps are still in place (false cap-loss event) Reduce the Leak Sensitivity Response setting and select the RESET button to restart water flow. 	
FLOW OFF <p>The coolant flow has been turned off by manual control.</p> <p>Select the VALVE button to turn coolant flow ON.</p>	
VALVE FAULT <p>The control valve failed to respond to the manual command to turn off the coolant flow.</p> <p>Select the VALVE button to disengage the control valve shutoff signal.</p> <ul style="list-style-type: none"> » The solenoid valve manual override is engaged Disengage manual override (see page 9). » The solenoid valve is fouled Clean or replace the solenoid valve. 	
VALVE FAULT with CAP OFF FAULT <p>The WeldSaver has detected a break in the coolant flow circuit, but the control valve failed to shut off the flow.</p> <p>Select the RESET button to clear the fault.</p> <ul style="list-style-type: none"> » The solenoid valve manual override is engaged Disengage manual override (see page 9). » The solenoid valve is fouled Clean or replace the solenoid valve. 	

■ The NET and MOD status indicators are off**» 24 VDC power is not present**

1. Check 24 VDC at pins 2 and 3 of the 4-pin power connector.
2. If 24 VDC is present but the NET and MOD status indicators are off, replace the electronics board.

■ The LINK and ACTIVITY status indicators are off**» The WeldSaver does not have a valid Ethernet connection**

1. Confirm the Ethernet cable connection on top of the WeldSaver unit.
2. Confirm that the EtherNet network is functioning properly.

■ The WeldSaver interface does not display on the web browser**» JavaScript™ is not enabled**

1. Enable JavaScript following the steps necessary for your specific browser. (Refer to your browser's Help menu for assistance.)
2. Select the browser Reload/Refresh button to reload the WeldSaver interface.

■ The WeldSaver interface is not updating status information**» The browser has stopped retrieving status information from the WeldSaver**

1. Select the browser Reload/Refresh button to reload the WeldSaver interface.
2. If the problem persists, check network connections and status.

■ The WeldSaver does not detect a cap-off condition**» The unit is in Bypass mode**

Select the **BYPASS** button to enable leak detection.

» The Leak Response setting is too slow

1. Select the **SETUP** button to enter Parameter Setup.
2. Select a slower Leak Response parameter value from the pull-down menu.
3. Select the **Submit** button to save the new value and return to normal operation.

» The rotors are slowed by wear or fouling.

Clean or replace rotors.

■ The WeldSaver does not detect a cap loss immediately after reset**» The Startup Leak Detection Threshold setting is too high**

1. Select the **SETUP** button to enter Parameter Setup.
2. Select a lower Startup Leak Detection Threshold parameter value from the pull-down menu.
3. Select the **Submit** button to save the new value and return to normal operation.

■ A FLOW FAULT or CAP OFF FAULT is detected immediately after replacing a weld cap**» The Startup Stabilization Delay setting is too short**

1. Select the **SETUP** button to enter Parameter Setup.
2. Select a lower Startup Stabilization Delay parameter value from the pull-down menu.
3. Select the **Submit** button to save the new value and return to normal operation.

» The solenoid valve pilot flow is blocked

Clean or replace the solenoid valve.

» The check valve is blocked or fouled

Clean or replace the check valve.

■ A FLOW WARNING or FLOW FAULT is detected when sufficient flow is present**» Rotors are worn or fouled**

Clean or replace rotors.

■ Flow rate display is erratic**» Rotors are worn or fouled**

Clean or replace rotors.

■ Flow rate reduces over time**» Rotors are worn or fouled**

Clean or replace rotors.

» Filter is clogged

Clean or replace filter.


■ False cap-loss events occur repeatedly at the same step in the weld cycle when rapid robot movement occurs**» The Leak Response setting is too fast**

1. Select the **SETUP** button to enter Parameter Setup.
2. Select a slower Leak Response parameter value from the pull-down menu.
3. Select the **Submit** button to save the new value and return to normal operation.

■ False cap-loss events occur with regularity**» Rotors are worn or fouled**


Clean or replace rotors.

Recommended Maintenance

NOTE	
	Annual cleaning of the WeldSaver is required to maintain reliable operation.

Maintenance of the WeldSaver is ordinarily limited to cleaning the flow sensor chambers and rotors. The frequency at which the WeldSaver requires cleaning or other maintenance is wholly dependent on the quality and cleanliness of the liquid that is passed through the unit.

The first indication of the need for cleaning may be an increasing frequency of false cap-loss events, which can occur when the flow-sensing rotors have become so unbalanced due to wear or fouling that they no longer spin in a uniform manner.

NOTE	
	<p>The accuracy of flow rate measurement affects only the repeatability of the Flow Warning and Flow Fault flow rate settings. The WeldSaver's patented cap-loss detection algorithm is not affected by changes in the response of either of the flow-sensing rotors.</p> <p>Annual replacement of perishable components restores the original flow rate calibration accuracy.</p>


WeldSaver Maintenance Kit


A WeldSaver maintenance kit containing replacements of all perishable components is available from Proteus Industries and our Service Partners around the world. For more information, please contact Proteus Sales at sales@proteusind.com or (650) 964-4163.

Flow Sensor Maintenance Instructions

» Tools Required

3mm Hexagon Wrench (Allen Key)

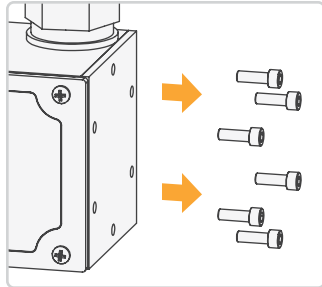
NOTE	
	WeldSaver flow sensor components can be cleaned and replaced without removing the unit from the water circuit.

CAUTION!	
	<p>Water flow to the WeldSaver must be shut off before accessing the flow sensors.</p> <p>Failure to shut off water flow could result in damage to the WeldSaver and other equipment.</p>

Flow Sensor Maintenance Instructions (Continued)

1. Close valves in supply and return lines.

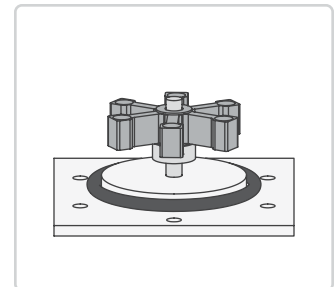
2. Remove and retain the six (6) screws and washers from the faceplate on the right-hand side of the body.



3. Separate the faceplate from the flow sensor body.

4. Carefully remove the faceplate, rotor and shaft from the flow sensor cavity.

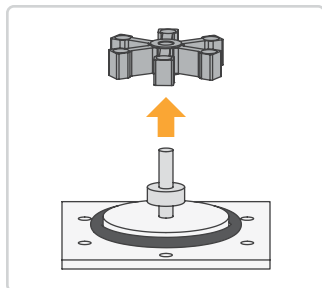
5. Place the faceplate with rotor and shaft on a flat surface.



6. Remove and inspect the rotor.

If the bearing hole is not round or if clearance to the shaft is greater than 0.02 mm, replace the rotor.

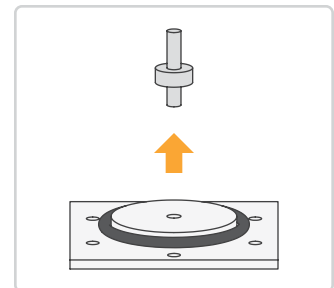
Otherwise, clean with a damp cloth.



7. Remove and inspect the stainless steel shaft.

Replace if worn.

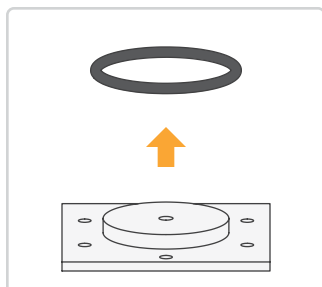
Otherwise, clean with a damp cloth.



8. Remove and inspect the O-ring seal.

Replace if worn or damaged.

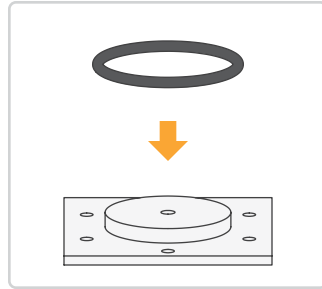
Otherwise, clean with a damp cloth.



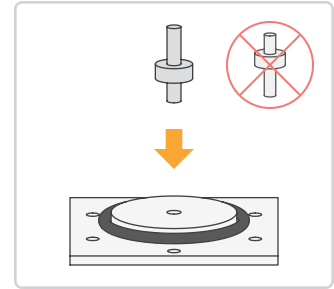
9. Clean the inside of the flow sensor cavity and the inner surface of the faceplate with a damp cloth.

Flow Sensor Maintenance Instructions (Continued)

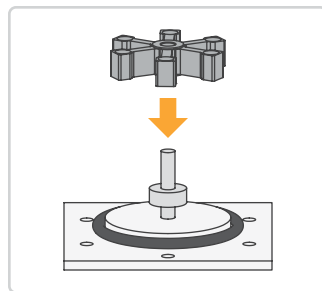
10. Place the O-ring inside the groove on the inner surface of the faceplate.



11. Place the shorter end of the shaft into the hole on the inner side of the faceplate.



12. Place the rotor onto the longer end of the shaft and confirm that it spins freely.

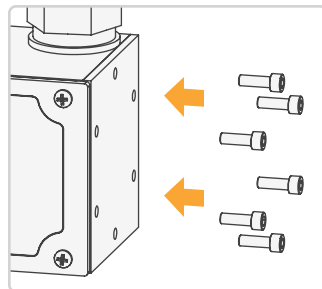


13. Line up the faceplate and rotor with the flow sensor cavity.

14. Carefully insert the rotor into the flow sensor cavity.

15. Confirm that the faceplate is fitted correctly to the WeldSaver body.

16. Fasten and tighten the six (6) retained screws with the securing washers.




17. Repeat steps 2 through 16 with the sensor on the left-hand side of the body.

18. For WeldSaver units fitted with the optional Y-strainer: After both flow sensors have been cleaned or replaced, open the Y-strainer and clean the filter mesh.

19. Open the valves in the supply and return lines to resume flow.

Flow Sensor Maintenance Instructions (Continued)

20. Confirm the new flow rate indication.

NOTE	
	The cleaning of the WeldSaver flow sensor cavities and the cleaning or replacement of the rotors will usually result in a higher flow rate.