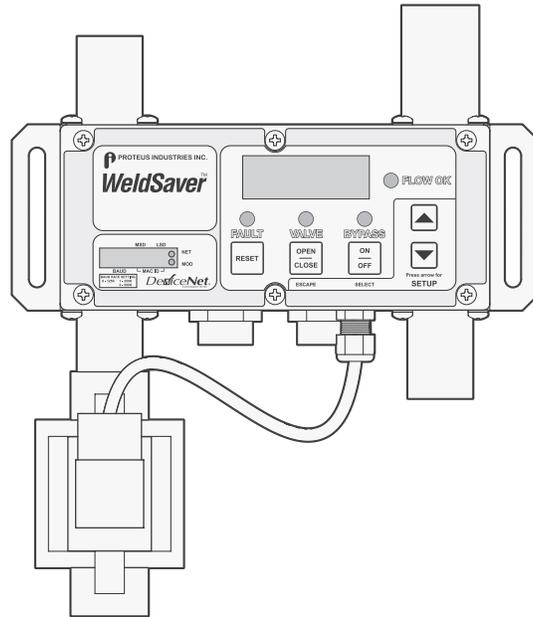


WeldSaver[™]

With Vortex Flow Sensing



TECHNICAL REFERENCE MANUAL

DEVICENET MODELS

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1 OVERVIEW

Introduction

This document provides comprehensive technical information about the Proteus WeldSaver™ coolant flow controller and leak detector featuring a DeviceNet™ interface and vortex flow sensing technology. The product features, specifications, and operating instructions described herein apply to standard WeldSaver products and may not be valid for customized versions. For model-specific product information, please refer to the specification sheet provided with your WeldSaver instrument or visit www.proteusind.com/wsv.

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 to 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 the 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

In the Detroit, MI area, local support is available from:

MJM Sales, Inc.
45445 Mound Road, Suite 117
Shelby Township, MI 48317
TEL: (248) 299-0525
FAX: (248) 299-0528
E-mail: sales@mjmsales.com

Warranty

Proteus WeldSaver products are manufactured under ISO 9001-certified processes and are warranted to be free from defects in materials and workmanship for two (2) 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.

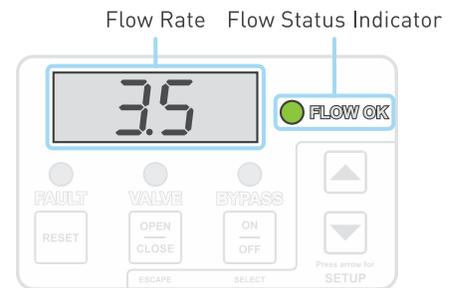
2 FEATURES AND FUNCTIONS

What It Is and What It Does

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

» It's a Flow Meter

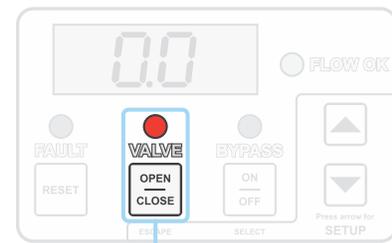
The large, bright digital display indicates the measured flow rate through the system in liters per minute (LPM) or gallons per minute (GPM), or as a value relative to a user-selected trip-point value.



» It's a Flow Valve

Coolant flow to the weld cell can be turned ON and OFF using the keypad or remotely from the weld controller.

A valve status indicator on the keypad shows whether the solenoid valve is open or closed.

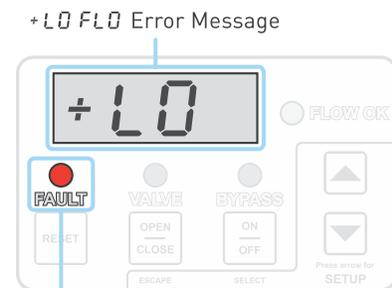


Valve Status Indicator and Control Key

» It's a Flow Monitor

Coolant flow is continuously monitored and compared against programmed trip-point values.

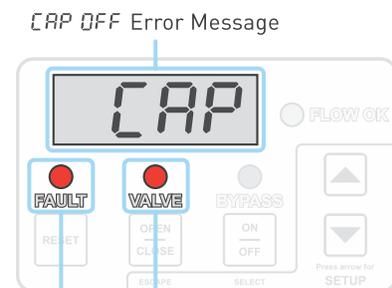
Flow status information is indicated using the digital display and LED status indicators on the keypad and is communicated to the weld controller via DeviceNet network.



FAULT Status Indicator

» It's a Very Fast Leak Detector

In the event of a weld-cap loss or other break in the coolant flow circuit, the leak is detected and coolant flow is shut off in less than 1 second.



Status Indicators

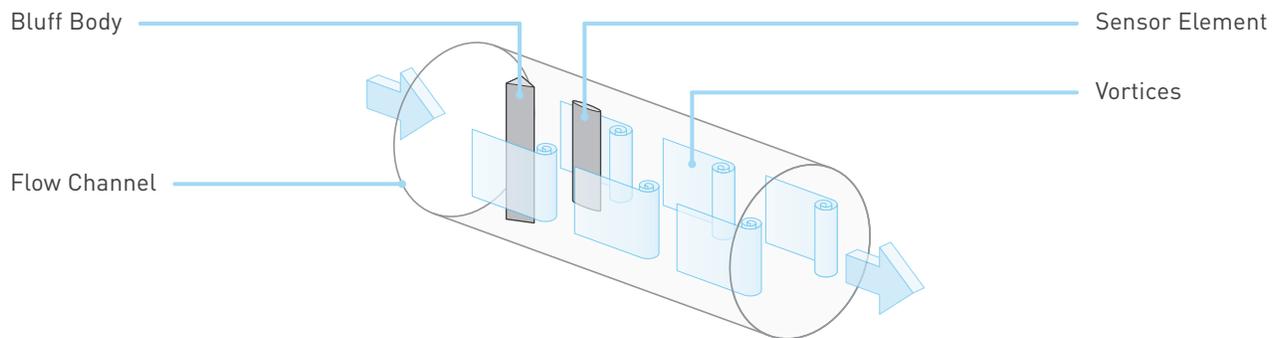
2 FEATURES AND FUNCTIONS

Flow Sensing and Measurement

The WeldSaver's coolant supply and return channels are equipped with sensitive and rugged vortex flow sensors.

As liquid flows around a bluff body inside each flow channel, swirling vortices are formed and carried downstream at the velocity of the flowing liquid. Alternating localized high- and low-pressure zones characteristic of a vortex stream are detected by a piezoelectric crystal that produces a small pulse each time a vortex passes the sensor element. The number of vortices formed is directly proportional to the linear velocity of the liquid passing through the instrument.

The frequency produced by the vortex flow sensor in the supply channel is measured by a microcomputer to calculate the actual flow rate of the liquid.



Flow Comparison

The WeldSaver's microcomputer continuously compares the measured inlet flow rate with the Flow Alarm (-FLD) and Flow Fault (+FLD) trip point values as selected by the operator.

- » When the measured flow rate is greater than the Flow Fault value, the microcomputer indicates the Flow OK status on the keypad.
- » When the measured flow rate is less than the Flow Alarm value, but greater than the Flow Fault value, the microcomputer indicates the Flow Alarm status (-LD FLD) on the display.
- » When the measured flow rate is less than the Flow Fault value, but greater than the Flow Alarm value, the microcomputer indicates the Flow Fault status (+LD FLD) on the display.
- » When the measured flow rate is less than both the Flow Fault and Flow Alarm values, the trip point with the lower programmed value determines the status that will be indicated on the display. The Flow Alarm (-FLD) trip point is the lower value by default.

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

Cap-Loss Detection

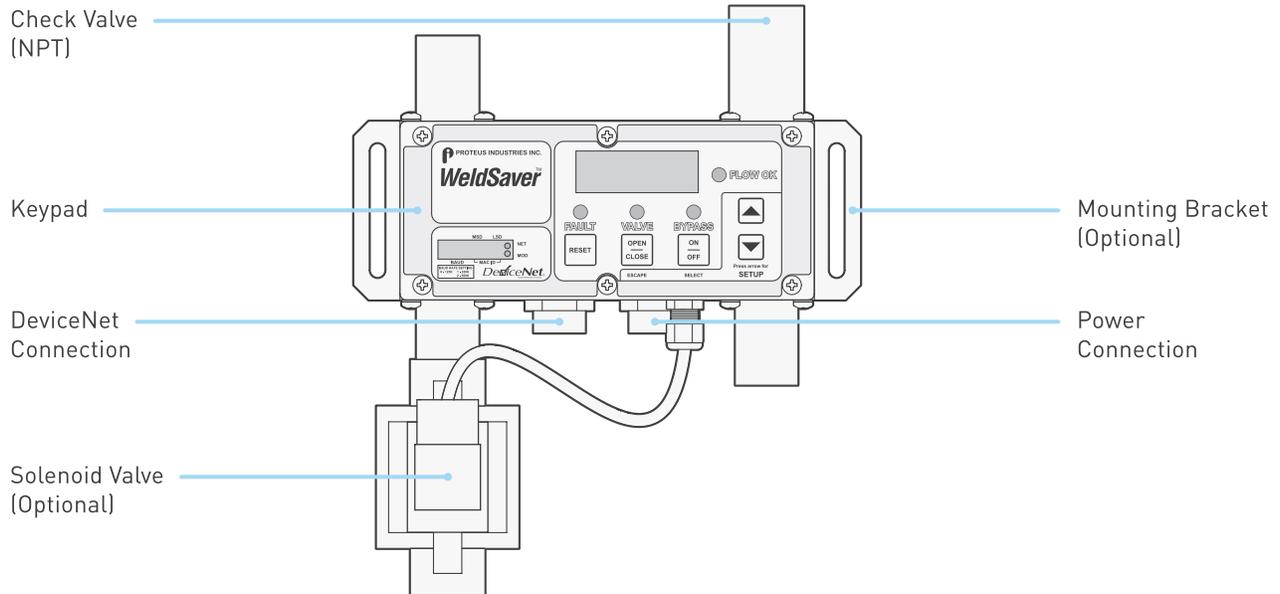
The WeldSaver's microcomputer uses a patented algorithm to continuously monitor the output frequencies of both the supply and return flow sensors. This algorithm is able to detect the loss of a weld cap or other catastrophic loss of flow continuity in less than 0.3 seconds.

- » When a cap loss event is detected, the microcomputer indicates the Cap Off Fault (CAP OFF) on the display, shuts off coolant flow, and signals the weld controller.

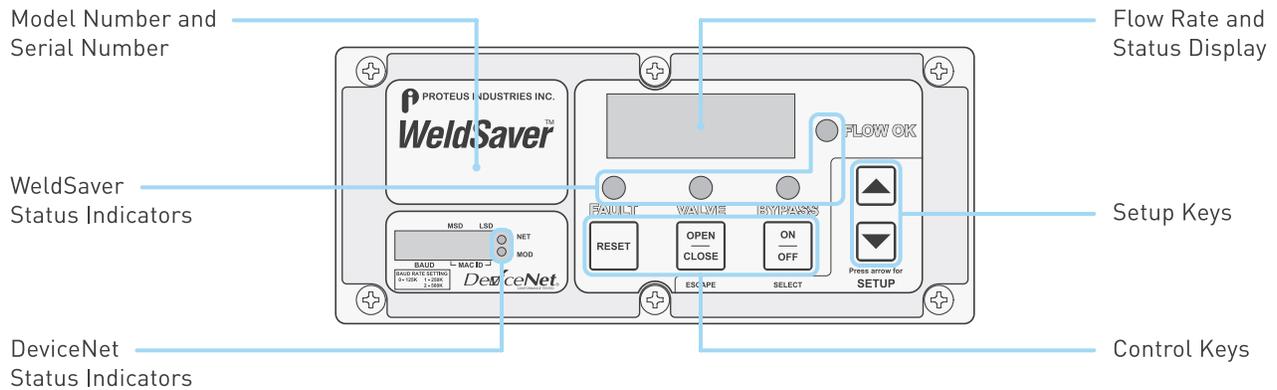
The weld controller makes a decision to shut down weld operations.

2 FEATURES AND FUNCTIONS

Functional Components



Keypad



Key Functions

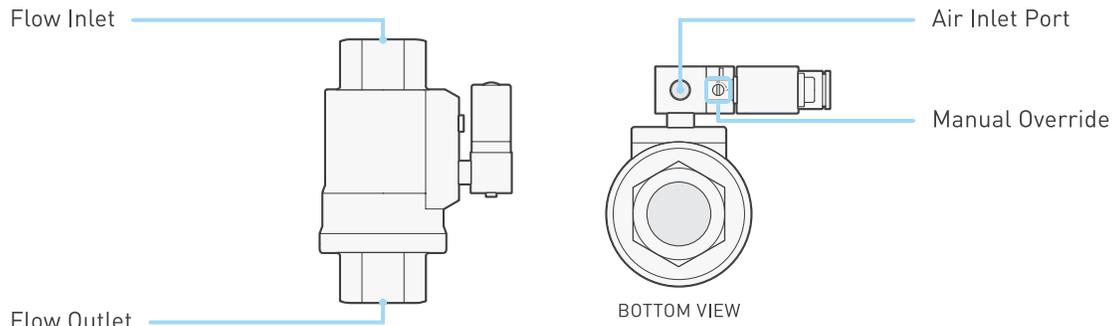
KEY	FUNCTION	KEY	FUNCTION
	The RESET key clears fault conditions to restore coolant flow and the leak detection function.		The UP ARROW key is used in setup mode for moving up the parameter menu and for increasing parameters values.
	The VALVE key opens and closes the solenoid valve to stop and restore coolant flow. It also functions as the ESCAPE key in setup mode.		The DOWN ARROW key is used in Setup Mode for moving down the parameter menu and for decreasing parameters values.
	The BYPASS key turns Bypass Mode on and off to enable or disable the leak detection function. It also functions as the SELECT key in setup mode.		

2 FEATURES AND FUNCTIONS

Optional Solenoid Valve

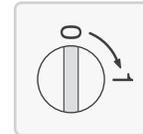
WeldSaver™ products are available with an optional electric or pneumatic solenoid valve for shutting off coolant flow. Both versions feature a manual override function.

» Pneumatic Solenoid Valve



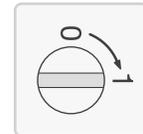
Normal Operation

- › The solenoid valve is functional when the slot in the screw is in the vertical **0** position.
- › During normal operation, the valve enables the control of flow through the system, either locally using the WeldSaver keypad or remotely from the weld controller.



Manual Override

- › The valve can be bypassed by depressing the screw and turning it 90° clockwise to the horizontal **1** position.
- › In the manual override state, water can flow through the system to allow leak testing without engaging 24 VDC electrical power.



Valve Configuration	Normally closed (NC)
Inlet Port Connection Size	G 1/8" (ISO 288)
Control Media	Compressed air (filtered and lubricated)
Control Media Temperature	0–50 °C / 32–122 °F
Air Pressure Requirement	420–800 kPa / 61–116 psig

WARNING!



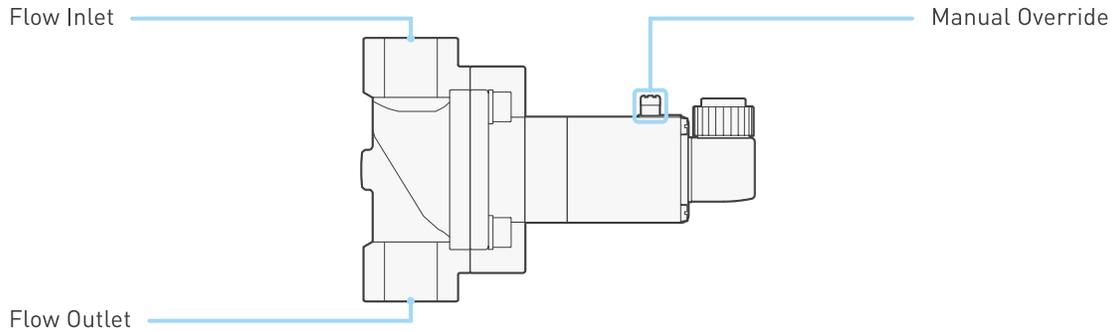
Do NOT exceed the pressure limit of your instrument.

Operation above the rated pressure can cause failure and create a hazard to operators and equipment.

2 FEATURES AND FUNCTIONS

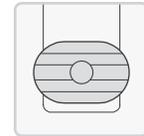
Optional Solenoid Valve (Continued)

» Electric Solenoid Valve



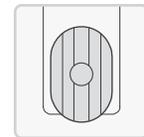
Normal Operation

- > The solenoid valve is functional when the slot in the knob is in a **horizontal** position.
- > During normal operation, the valve enables the control of flow through the system, either locally using the WeldSaver keypad or remotely from the weld controller.



Manual Override

- > 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.



NOTE



Due to pressure drop inherent in the design of the electric solenoid valve, WeldSaver products equipped with an electric valve have a reduced upper flow limit of 30 LPM / 8 GPM.

3 SPECIFICATIONS AND PERFORMANCE

Performance Characteristics

Base Model Number	WS2VG50	WS2VN13
Flow Range*	6.0 – 50 LPM	1.5 – 13 GPM
Connections	G 3/4" (BSPP)	3/4" NPT
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	
Leak Response Time	~300 ms at most sensitive condition; ~1 sec. at sensitivity setting "FAS"	
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	± 3% of flow range	
Repeatability	± 1% of flow range from 0.1 to 1.0 × flow range	
Operating Environment	Indoor use only	
Ambient Temperature	4.0 – 50 °C / 39 – 122 °F	
Max. Relative Humidity	80%	
Enclosure Protection	IP66 / NEMA 4X	
Input Power Voltage	+24 VDC ± 10%	
Input Power Consumption	Pneumatic solenoid valve: < 12.0 VA at normal flow; < 9.6 VA with valve closed Electric solenoid valve: < 16.8 VA at normal flow; < 9.6 VA with valve closed	
Max. Rated Input Current	0.75 A	

*The stated flow ranges are valid for products equipped with a pneumatic solenoid valve and products with no solenoid valve installed. Products equipped with an electric solenoid valve have a reduced upper flow limit of 30 LPM / 8 GPM.

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 your instrument.
Operation above the rated temperature can cause failure and create a hazard to operators and equipment.

WARNING!



Do NOT exceed the pressure limit of your instrument.
Operation above the rated pressure can cause failure and create a hazard to operators and equipment.

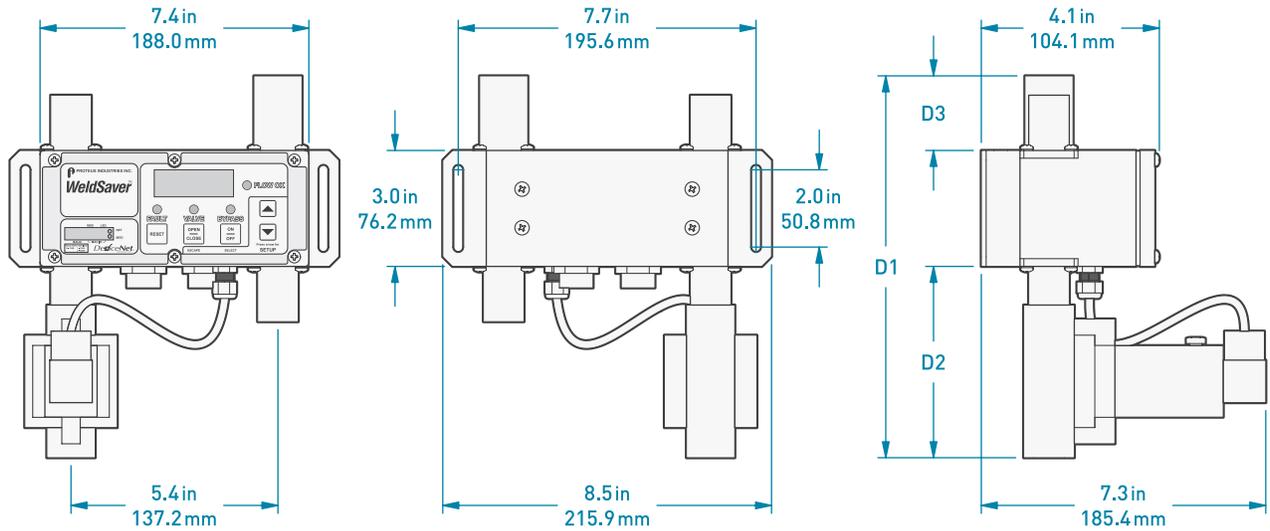
3 SPECIFICATIONS AND PERFORMANCE

Wetted Materials

COMPONENT	MATERIAL
Flow body • Fittings • Check valve (NPT models)	304 Stainless steel
Check valve (metric models) • Electric solenoid valve (optional)	Brass
Pneumatic solenoid valve (optional)	Nickel-plated brass
Bluff body	PPA (Polyphthalamide PA6T/6I; 40% glass fiber)
Sensor element	ETFE (Ethylene tetrafluoroethylene)
O-rings	EPDM (Ethylene propylene diene monomer)

Dimensions

Product dimensions for standard models are provided below for reference only. (Shown with optional mounting bracket and electric solenoid valve.) To request dimensional drawings or solid models of customized products, please contact WeldSaver Technical Support.



BASE MODEL NUMBER	D1	D2	D3
WS2VG50	345.4 mm / 13.6 in	170.2 mm / 6.7 in	99.1 mm / 3.9 in
WS2VN13	261.6 mm / 10.3 in	137.2 mm / 5.4 in	48.3 mm / 1.9 in

3 SPECIFICATIONS AND PERFORMANCE

Compliance and Certifications

» DeviceNet Conformance

DeviceNet Conformance Tested™ in compliance with ODVA specifications.



» CE Compliance

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



» Environmental Compliance

Restriction of Hazardous Substances (RoHS) Directive 2011/65/EU



» 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.

4 INSTALLATION AND SETUP

Tools Required

- » Adjustable wrenches
- » Pipe wrenches
- » Teflon®-based pipe sealant
- » 4 × Mounting bolts to fit #8-32 mounting holes
OR
2 × M5x12 screws for models with optional mounting bracket

Pneumatic Connections

NOTE	
	WeldSaver products equipped with a normally closed (N.C.) pneumatic solenoid valve require connection to a compressed air supply to enable flow through the valve.

1. Clear the air line of all contaminants.
2. Disconnect the air supply and depressurize the air line.
3. Connect the air line to the G 1/8" inlet port on the pneumatic solenoid valve. (Refer to page 5 for the inlet location.)
4. Reconnect the air supply and confirm that the pneumatic connection is secure and leak-free.

Plumbing Connections

The typical response of the WeldSaver, and thus its calibration, may be affected by the inner diameter (ID) of the incoming pipe as well as any devices attached to the inlet connections and any nearby upstream devices.

NOTE	
	The inner diameter (ID) of the inlet piping or the through-hole of any connecting element must be greater than or equal to 15.0 mm / 0.59 in. Expanding flow profiles create flow conditions in which the accuracy and the short-term stability of the WeldSaver may be compromised. For assistance with installations involving elbows or other possible flow restrictions, please contact WeldSaver Technical Support.

1. Flush the cooling system.

CAUTION!	
	Thoroughly flush the cooling system BEFORE connecting the WeldSaver. Failure to remove contaminants or other debris from the coolant lines and any components or equipment installed in the cooling circuit may result in damage to the WeldSaver's flow sensors or the clogging of smaller orifices in the system.

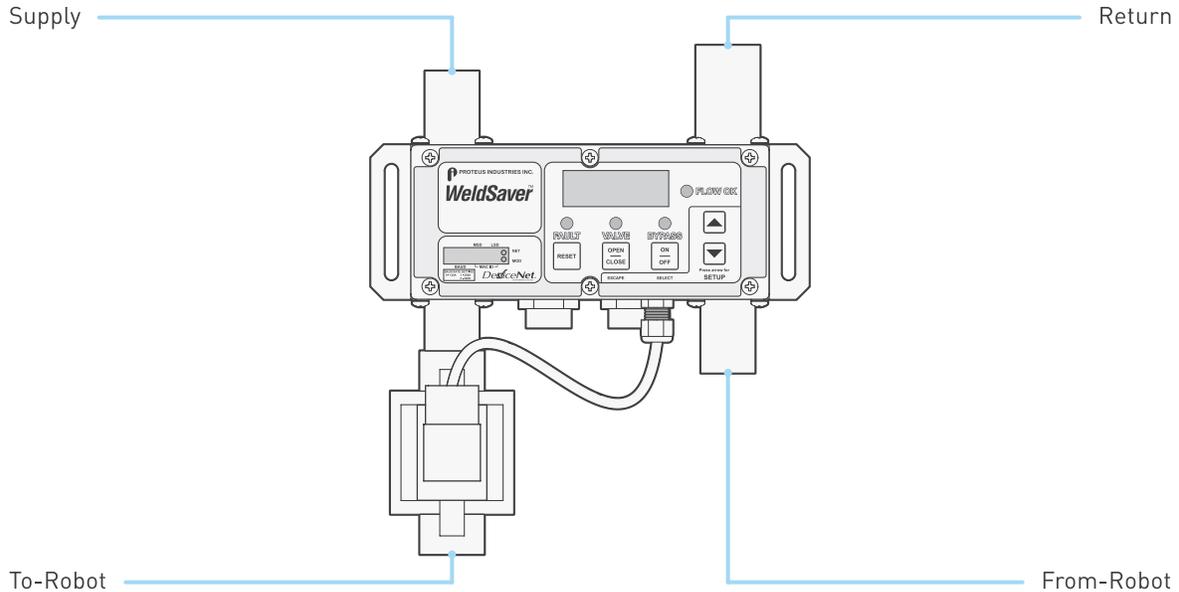
2. Lubricate all pipe threads using a non-hardening pipe sealant, such as Teflon® paste, to help simplify installation and seal plumbing connections.

CAUTION!	
	Do NOT allow excess pipe sealant to enter the flow sensors! Excess material may foul the WeldSaver's flow sensors or clog smaller orifices in the system.

4 INSTALLATION AND SETUP

Plumbing Connections (Continued)

3. Refer to the diagram below to identify the WeldSaver plumbing connections.



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!



Ensure that the correct hoses have been connected to the WeldSaver To-Robot and From-Robot connections.

Check hose labels or trace water flow to confirm that the WeldSaver is connected to the water circuit cooling the weld gun.

If the hose connections are not correct, the WeldSaver may NOT be able to detect the loss of a weld cap or other loss of flow continuity.

5. Adjust pipe connections as required for proper alignment of the WeldSaver.
6. Engage the solenoid valve manual override to enable flow. (See pages 5–6 for more information.)
7. Turn water ON slowly.

WARNING!



The WeldSaver body is NOT insulated!

When using the WeldSaver with hot liquids, use personal protective equipment.

8. Check for leaks at all connections to the WeldSaver.
9. Eliminate all leaks before proceeding.
10. Disengage the solenoid valve manual override for normal operation.

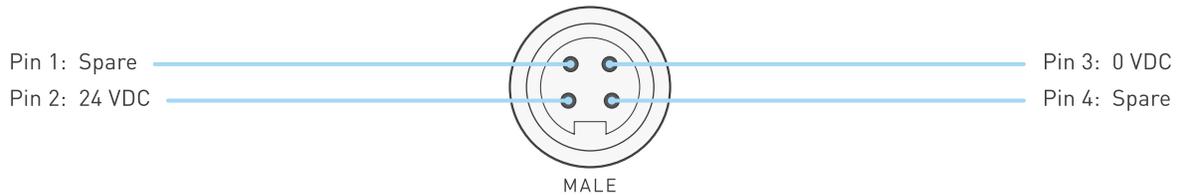
4 INSTALLATION AND SETUP

Electrical Connections

NOTE	
	The WeldSaver must be connected to 24 VDC auxiliary power, DeviceNet 24 VDC power, and a functional DeviceNet controller to perform correctly. Proteus highly recommends connecting the WeldSaver to certified DC power supplies only.

NOTE	
	The wiring information below applies to standard WeldSaver products and may not be valid for customized versions. For model-specific product information, please refer to the specification sheet provided with your instrument or visit www.proteusind.com/wsv .

1. Refer to the wiring diagram below for the 4-pin 24 VDC power connector on the bottom of the WeldSaver body.



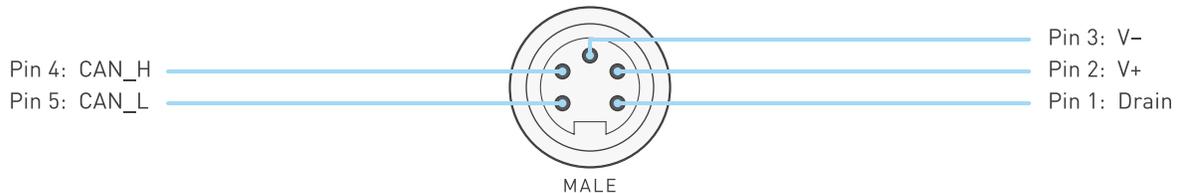
2. Confirm that the power cable has 24 VDC present between pins 2 and 3.

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.

DeviceNet Connections

1. Refer to the wiring diagram below for the 5-pin DeviceNet connector on the bottom of the WeldSaver body.



2. Confirm that the DeviceNet cable has 24 VDC present between pins 2 and 3.
3. Connect the DeviceNet cable to the bus leading to the weld controller.
4. Connect the DeviceNet cable to the 5-pin connector on the bottom of the WeldSaver body.

4 INSTALLATION AND SETUP

DeviceNet Operation

The WeldSaver is a general-purpose discrete I/O device that operates as a Group 2 Only Server on the DeviceNet network. It supports Explicit messaging, Polled I/O messaging, Change-of-State (COS) messaging, and Cyclic messaging of the predefined master/slave connection set. It does not support the Explicit Unconnected Message Manager (UCMM).

NOTE



Standard WeldSaver products are configured with a default MAC ID (node address) of **48** and a default baud rate of **500 kBd**.

Input/Output Data

The WeldSaver DeviceNet interface provides discrete 8 digital inputs and 2 analog inputs to the DeviceNet master, and receives 4 discrete digital outputs.

DATA	BYTE(S)	NAME	DESCRIPTION	VALUE
Input	1	Input States	Operational status and diagnostic information	8-bit integer (bitmap below)
	2-3	Supply Flow Rate	Measured supply flow rate in GPM or LPM	1/100th of flow value (analog)
	4-5	Return Flow Rate	Measured return flow rate in GPM or LPM	1/100th of flow value (analog)
Output	1	Output States	Controls WeldSaver operating mode	8-bit integer (bitmap on page 14)

» Input States Bitmap

BIT	NAME	DESCRIPTION
0	OK to Weld	0: Flow rate is below Flow Fault limit. (See page 20). Unsafe to weld. 1: Flow rate is above established limit for welding. Safe to weld.
1	Valve Closed	0: Solenoid valve is open. 1: Solenoid valve is closed.
2	Bypass Mode	0: Leak detection is enabled. (See page 20.) 1: Leak detection is disabled.
3	Flow Alarm	0: Flow rate is below Flow Alarm limit. (See page 20.) 1: Flow rate is above Flow Alarm limit.
4	Cap Loss	0: Normal operation. 1: Weld-cap loss or other break in coolant circuit has been detected. (See page 21.)
5	Valve Fault	0: Normal operation. 1: Control valve failed to respond to command to turn off coolant flow. (See page 21.)
6	Flow Sensor Fault	0: Normal operation. 1: No frequency is detected from flow sensor(s). (See page 21.)
7	Power OK	0: No auxiliary power to device. 1: Normal operation.

4 INSTALLATION AND SETUP

Input/Output Data (Continued)

» Output States Bitmap

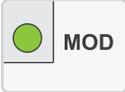
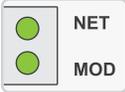
BIT	NAME	DESCRIPTION
0	Reset	Clears fault conditions to restore coolant flow and leak detection function.
1	Water Off	Closes solenoid valve to stop coolant flow.
2	Bypass Mode	Turns Bypass Mode on to disable leak detection function.
3	Idle	Activates solenoid valve maintenance cycling: control valve will close for one second, once per hour.
4	Not used	
5	Not used	
6	Not used	
7	Not used	

Electronic Data Sheet (EDS)

To request the Electronic Data Sheet (EDS) file for your WeldSaver model, please contact WeldSaver Technical Support.

5 FUNCTIONAL TESTING

Power and DeviceNet Connectivity

-  Turn power to the DeviceNet bus ON.
 -  The MOD status indicator will turn GREEN.
 -  The NET status indicator will turn GREEN and flash momentarily until the DeviceNet Master allocation sequence has completed, at which point it will stop flashing and remain solid GREEN.
 -  When both the MOD and NET status indicators are solid GREEN, the WeldSaver is ready for normal operation.

Flow Detection

-  Turn 24 VDC power ON.
 -  If the coolant flow is OFF or if the flow rate is less than the Flow Alarm value, the digital display will indicate a FLOW ALARM (-LO FLOW) condition.
 -  The indicated flow rate will be 0.0 (if the flow is OFF) or the actual flow rate.
-  Turn the coolant flow ON or increase it until it reaches the optimum system flow rate.
-  Press the RESET key.
 -  The FLOW ALARM condition will reset and the FLOW OK status indicator will turn GREEN.
 -  The indicated flow rate will be the actual flow rate.

Valve Shut-Off

-  Press the VALVE key.
 -  The WeldSaver will turn the coolant flow OFF. The VALVE status indicator will turn RED.
 -  The display will indicate a flow rate of 0.0.

5 FUNCTIONAL TESTING

Valve Shut-Off (Continued)

-  Press the VALVE key again.
 The WeldSaver will restore the coolant flow.
The VALVE status indicator will turn OFF.
 The display will indicate the actual flow rate.

Bypass Mode

-  Press the BYPASS key.
 The leak detection function will turn OFF.
 The BYPASS status indicator will turn AMBER.
-  Press the BYPASS key again.
 The leak detection function will turn ON.
 The BYPASS status indicator will turn OFF.

Cap-Off Detection

NOTE



The DeviceNet controller (weld controller) must be operating for this test to be performed.

-  Remove a weld cap to create a leak in the system.
 The WeldSaver will turn the coolant flow OFF.
The FLOW OK status indicator will turn OFF.
 The display will indicate the CAP OFF condition (CAP OFF).
-  Reinstall the weld cap and confirm that it is properly secured to the weld gun.

5 FUNCTIONAL TESTING

Cap-Off Detection (Continued)

3.



Press the RESET key.



The WeldSaver will restore the coolant flow.
The FLOW OK status indicator will turn GREEN.



The display will indicate the actual flow rate.

6 PARAMETER SETUP

WeldSaver Control Parameters

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

» Flow Alarm Trip Point

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

» Flow Fault Trip Point

This is the lowest 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.

» 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.

» Absolute or Relative Flow Rate Display

The liquid flow rate can be displayed as an absolute value (*AbS*) or as a value relative to the programmed Flow Fault (*-rEL*) or the Flow Alarm (*+rEL*) values.

» Factory Default Value Restore

The WeldSaver parameter settings can be conveniently restored to the factory default values.

Setup Menu and Factory Default Values

» WS2VG50 BASE MODELS

SYMBOL	DESCRIPTION	UNITS	SELECTABLE VALUES					DEFAULT
<i>-FLD</i>	Flow Alarm Trip Point	LPM	0.0 to 49.4* in increments of 0.76					7.6 LPM
<i>+FLD</i>	Flow Fault Trip Point	LPM	0.0 to 49.4* in increments of 0.76					11.4 LPM
<i>rSP</i>	Leak Response Sensitivity		-SLO	SLO	nor	FAS	+FAS	Normal
<i>StA</i>	Startup Stabilization Delay	Seconds	1	2	4	8	16	2 sec.
<i>LEA</i>	Startup Leak Threshold	LPM	1.9	3.8	5.7	7.6	9.5	3.8 LPM
<i>dSP</i>	Flow Rate Display		AbS	-rEL	+rEL			Absolute
<i>rSt</i>	Parameter Restore		no	YES				

*The upper limit of 49.4 LPM is valid for products equipped with a pneumatic solenoid valve and products with no solenoid valve installed. Products equipped with an electric solenoid valve have a reduced upper limit of 29.6 LPM.

6 PARAMETER SETUP

Setup Menu and Factory Default Values (Continued)

» WS2VN13 BASE MODELS

SYMBOL	DESCRIPTION	UNITS	SELECTABLE VALUES					DEFAULT
-FLD	Flow Alarm Trip Point	GPM	0.0 to 13.0* in increments of 0.2					2.0 GPM
+FLD	Flow Fault Trip Point	GPM	0.0 to 13.0* in increments of 0.2					3.0 GPM
rSP	Leak Response Sensitivity		-SLO	SLO	nor	FAS	+FAS	Normal
StA	Startup Stabilization Delay	Seconds	1	2	4	8	16	2 sec.
LEA	Startup Leak Threshold	GPM	0.5	1.0	1.5	2.0	2.5	1.0 GPM
dSP	Flow Rate Display		AbS	-rEL	+rEL			Absolute
rSt	Parameter Restore		no	YES				

*The upper limit of 13.0 GPM is valid for products equipped with a pneumatic solenoid valve and products with no solenoid valve installed. Products equipped with an electric solenoid valve have a reduced upper limit of 8.0 GPM.

Adjusting Control Parameter Values

1. Enter setup mode by pressing either the UP ARROW or DOWN ARROW key.
 - » The control parameter at the top of the parameter menu will appear on the display.

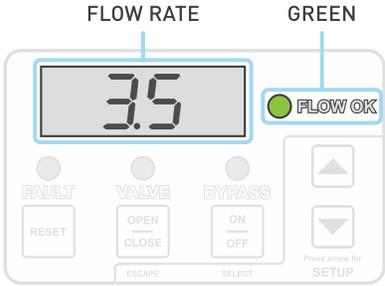
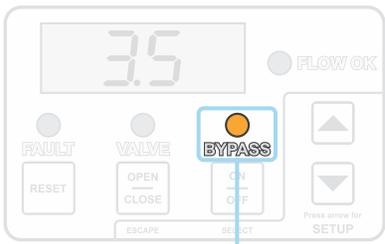
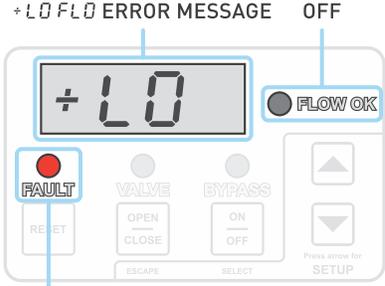
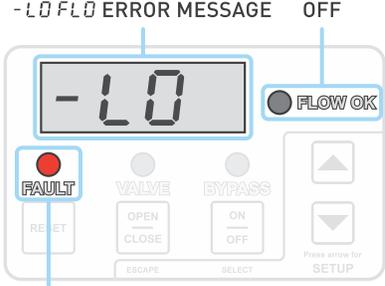
NOTE	
	While in setup mode, any delay of more than 30 seconds between keystrokes will cause the WeldSaver to automatically exit setup mode without saving any changes.

2. Select the parameter that you wish to adjust by pressing the UP ARROW or DOWN ARROW keys to move up or down the parameter stack until the symbol for the desired parameter is displayed.
3. Press the SELECT (BYPASS) key to enter edit mode for the displayed parameter.
 - » The current value of the selected parameter will be displayed.
4. Press the UP ARROW or DOWN ARROW keys to increase or decrease the value of the selected parameter.
 - » The allowed values for each control parameter are shown on pages 18–19 of this document.
5. Exit setup mode.
 - » To save the new control parameter value and return to normal operation, press the SELECT key.
 - » To return to normal operation WITHOUT saving any changes, press the ESCAPE (VALVE) key.
 - » After either key is pressed, the display will momentarily display a scrolling dash and then return to the liquid flow rate indication.

NOTE	
	When setup mode is exited, the WeldSaver will remember the last parameter that was accessed or shown on the menu. If setup mode is entered again within 10 minutes, this parameter will display at the top of the menu. After 10 minutes of inactivity has passed, the Flow Alarm Trip Point (-FLD) parameter will return to the top of the menu.

If you wish to adjust the value of more than one control parameter, press the UP ARROW or DOWN ARROW key to return to setup mode, and follow steps 1 through 5 above for each additional parameter.

7 STATUS CONDITIONS

STATUS CONDITION	KEYPAD INDICATION
<p>OK TO WELD</p> <p>The normal operating condition in which flow conditions are within the established limits for welding.</p> <p>The display indicates the actual liquid flow rate.</p> <p>The FLOW OK status indicator is GREEN.</p>	 <p>FLOW RATE GREEN</p> <p>3.5 FLOW OK</p> <p>FAULT VALVE BYPASS</p> <p>RESET OPEN/CLOSE ON/OFF</p> <p>ESCAPE SELECT Press arrow for SETUP</p>
<p>BYPASS MODE</p> <p>Leak detection is disabled. Flow monitoring is still functional.</p> <p>The BYPASS status indicator is AMBER.</p> <p>To exit Bypass Mode and enable leak detection, press the BYPASS key.</p>	 <p>3.5 FLOW OK</p> <p>FAULT VALVE BYPASS</p> <p>RESET OPEN/CLOSE ON/OFF</p> <p>ESCAPE SELECT Press arrow for SETUP</p> <p>AMBER</p>
<p>FLOW FAULT</p> <p>The display indicates $+LO, FLO$, the actual flow rate, and a blank screen at one-second intervals.</p> <p>» Flow has fallen below the Flow Fault flow rate</p> <ol style="list-style-type: none"> 1. Stop welding until sufficient flow is reestablished. 2. Check the Flow Fault ($+FLO$) setting. Correct if necessary. 3. If the Flow Fault setting is OK, increase the flow rate if possible. 4. If the flow rate cannot be increased, reduce the Flow Fault setting. 	 <p>+LO FLO ERROR MESSAGE OFF</p> <p>+LO FLOW OK</p> <p>FAULT VALVE BYPASS</p> <p>RESET OPEN/CLOSE ON/OFF</p> <p>ESCAPE SELECT Press arrow for SETUP</p> <p>RED</p>
<p>FLOW ALARM</p> <p>The display indicates $-LO, FLO$, the actual flow rate, and a blank screen at one-second intervals.</p> <p>» Flow has fallen below the Flow Alarm flow rate</p> <ol style="list-style-type: none"> 1. Check the Flow Alarm ($-FLO$) setting. Correct if necessary. 2. If the Flow Alarm setting is OK, increase the flow rate if possible. 3. If the flow rate cannot be increased, reduce the Flow Alarm setting. 	 <p>-LO FLO ERROR MESSAGE OFF</p> <p>-LO FLOW OK</p> <p>FAULT VALVE BYPASS</p> <p>RESET OPEN/CLOSE ON/OFF</p> <p>ESCAPE SELECT Press arrow for SETUP</p> <p>RED</p>

7 STATUS CONDITIONS

STATUS CONDITION	KEYPAD INDICATION
<p>CAP OFF FAULT</p> <p>The display indicates <i>CAP, OFF</i>, the actual flow rate, and a blank screen at one-second intervals.</p> <ul style="list-style-type: none"> » The WeldSaver has detected the loss of a weld cap and the coolant flow has been shut off Replace the weld cap and press the RESET key to restart the coolant flow. » Welding has stopped, but the weld caps are still in place (false cap-loss event) Reduce the Leak Sensitivity Response (<i>LER</i>) setting and press the RESET key to restart the coolant flow. 	<p><i>CAP OFF</i> ERROR MESSAGE OFF</p>  <p>RED RED</p>
<p>FLOW SENSOR FAULT</p> <p>The display indicates <i>CAP, OFF, 005</i>, and a blank screen at one-second intervals.</p> <ul style="list-style-type: none"> » There is no frequency input from the flow sensors to the WeldSaver electronics Replace the flow sensors. <div data-bbox="240 953 922 1096" style="border: 1px solid black; padding: 5px; margin-top: 10px;"> <p style="text-align: center;">NOTE</p> <div style="display: flex; align-items: center;"> <div style="text-align: center; margin-right: 10px;">  </div> <p>The indicated flow rate is always 0.05 in the event of a flow sensor fault.</p> </div> </div>	<p><i>CAP OFF</i> ERROR MESSAGE OFF</p>  <p>RED RED</p>
<p>VALVE FAULT</p> <p>The control valve failed to respond to a command to turn off the coolant flow. The indicated flow rate does not decrease to 0.00.</p> <p>The display indicates <i>CAP, OFF</i>, the actual flow rate, and a blank screen at one-second intervals.</p> <p>The VALVE status indicator flashes at 1-second intervals.</p> <ul style="list-style-type: none"> » The solenoid valve manual override is engaged Disengage manual override (see pages 5–6). » The solenoid valve is fouled Clean or replace the solenoid valve. 	<p><i>CAP OFF</i> ERROR MESSAGE OFF</p>  <p>RED FLASHING RED</p>

8 TROUBLESHOOTING

■ The digital display and all WeldSaver and DeviceNet status indicators are OFF

» DeviceNet 24 VDC power is not present

1. Confirm the presence of 24 VDC at pins 2 and 3 of the 5-pin DeviceNet connector on the bottom of the WeldSaver body.
2. If 24 VDC is present but the problem persists, replace the electronics board.

■ The MOD status indicator is GREEN, but the digital display and all WeldSaver status indicators are OFF

» 24 VDC power is not present

1. Confirm the presence of 24 VDC at pins 2 and 3 of the 4-pin power connector on the bottom of the WeldSaver body.
2. If 24 VDC is present but the problem persists, replace the electronics board.

■ The NET status indicator is OFF

» The DeviceNet network is not powered/not online (not a WeldSaver error)

Confirm the DeviceNet network configuration settings.

■ The NET status indicator is FLASHING GREEN continuously

» The DeviceNet network is online, but not connected (not a WeldSaver error)

Confirm the DeviceNet network configuration settings.

■ The NET status indicator is RED

» The DeviceNet network has a critical link failure (not a WeldSaver error)

Confirm the DeviceNet network configuration settings.

■ The WeldSaver does not respond when the keypad keys are pressed

» Keypad failure

Replace the keypad assembly.

■ The WeldSaver does not detect a cap-off condition

» The unit is in Bypass Mode

Press the BYPASS key to exit Bypass Mode and enable leak detection.

» The Leak Response setting is too slow

1. Enter setup mode and select the Leak Response (*rSP*) parameter from the menu.
2. Press the UP ARROW key to select a faster response value.
3. Press the SELECT key to save the new value and return to normal operation.

8 TROUBLESHOOTING

■ The WeldSaver does not detect a cap loss immediately after reset

» The Startup Leak Detection Threshold setting is too high

1. Enter setup mode and select the Startup Leak Detection Threshold (*LER*) parameter from the menu.
2. Press the DOWN ARROW key to select a lower threshold value.
3. Press the SELECT key to save the new value and return to normal operation.

■ A FLOW ALARM or CAP OFF FAULT is detected immediately after replacing a weld cap

» The Startup Stabilization Delay setting is too short

1. Enter setup mode and select the Startup Stabilization Delay (*SSD*) parameter from the menu.
2. Press the UP ARROW key to select a higher delay value.
3. Press the SELECT key to save the new value and return to normal operation.

■ The WeldSaver does not shut off coolant flow

» The solenoid valve manual override function is engaged

Disengage manual override (see pages 5–6).

» 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.

■ The flow rate reduces over time

» A filter in the flow circuit is clogged

Clean or replace the 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. Enter setup mode and select the Leak Response (*LR*) parameter from the menu.
2. Press the DOWN ARROW key to select a lower response value.
3. Press the SELECT key to save the new value and return to normal operation.

■ Coolant flow is shut off, the display indicates a flow rate of 0.00, and the VALVE status indicator is RED

» The valve is closed

Press the VALVE key to open the valve.



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