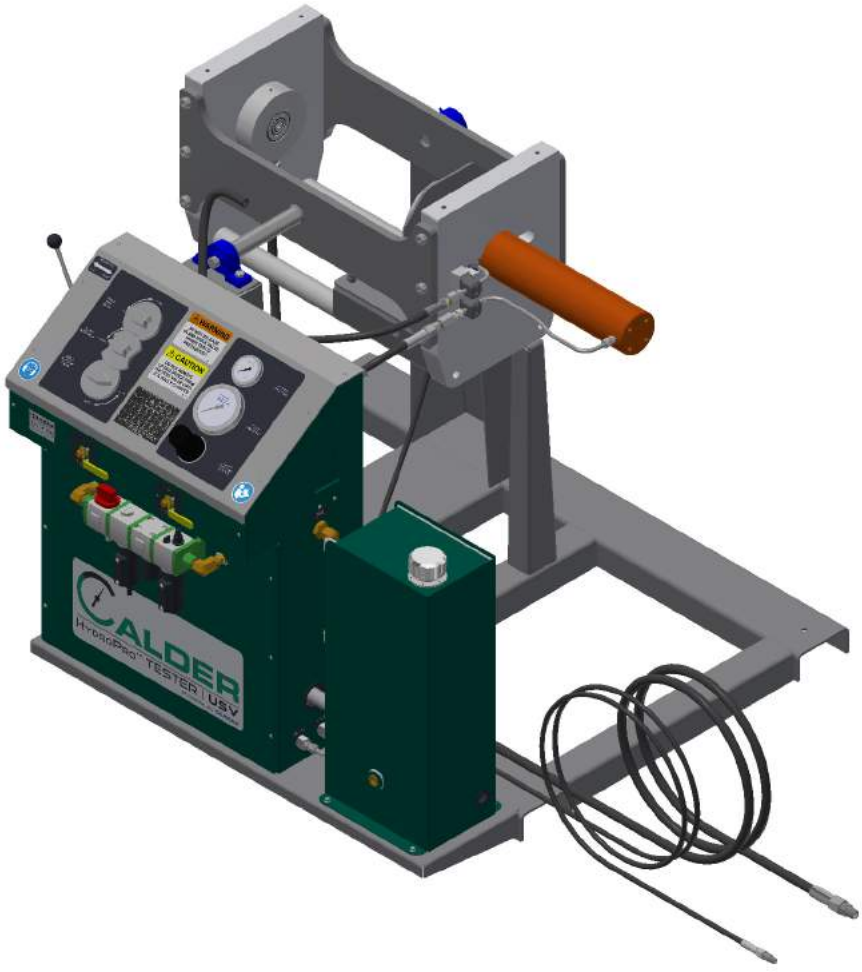
CE

USV-2-25T

HYDRO PRO UNIVERSAL STRAIGHT BODY VALVE TESTER

OPERATING MANUAL

ORIGINAL INSTRUCTIONS



CALDER
VALVE TESTING & REPAIR SYSTEMS BY CLIMAX

P/N 90423
November 2017
Revision 0

CLIMAX | BORTECH CALDER H&S TOOL

At CLIMAX, we value your opinion.

For comments or questions about this manual or other CLIMAX documentation, please e-mail documentation@cpmt.com.

For comments or questions about CLIMAX products or services, please call CLIMAX or e-mail info@cpmt.com. For quick and accurate service, please provide your representative with the following:

- Your name
- Shipping address
- Telephone number
- Machine model
- Serial number (if applicable)
- Date of purchase

CLIMAX World Headquarters

2712 East 2nd Street
Newberg, Oregon 97132 USA

Telephone (worldwide): +1-503-538-2815
Toll-free (North America): 1-800-333-8311
Fax: 503-538-7600

H&S Tool World Headquarters

715 Weber Dr.
Wadsworth, OH 44281 USA

Telephone: +1-330-336-4550
Fax: 1-330-336-9159
hstool.com

CLIMAX | H&S Tool (UK Headquarters)

Unit 7 Castlehill Industrial Estate
Bredbury Industrial Park
Horsfield Way
Stockport SK6 2SU, UK

Telephone: +44 (0) 161-406-1720

CLIMAX | H&S Tool (European Headquarters)

Am Langen Graben 8
52353 Düren, Germany

Telephone: +49 (0) 242-191-7712
E-mail: info@cpmt.de

CLIMAX | H&S Tool (Asia Pacific Headquarters)

316 Tanglin Road #02-01
Singapore 247978

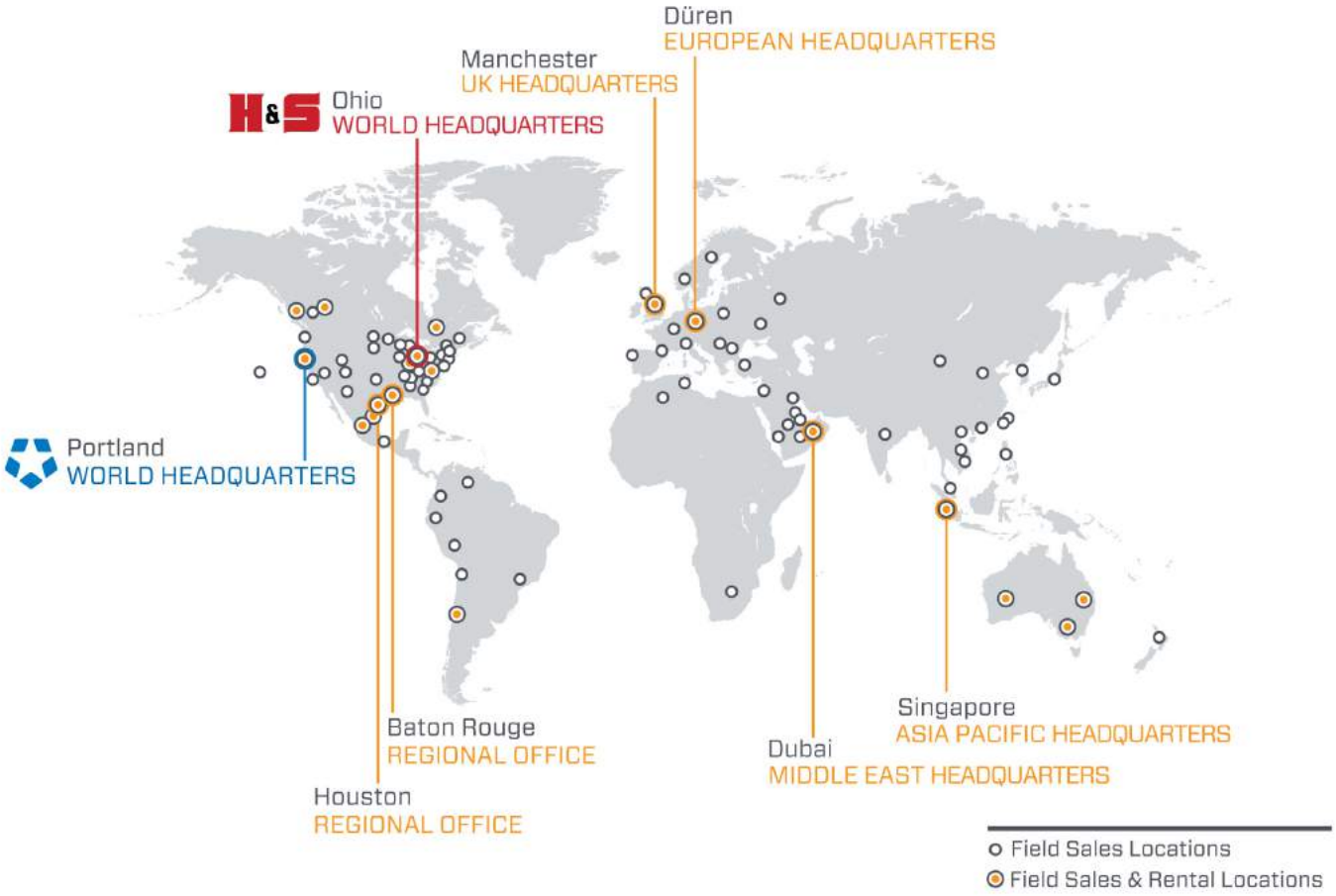
Telephone: +65-9647-2289
Fax: +65-6801-0699

CLIMAX | H&S Tool (Middle East Headquarters)

Warehouse #5, Plot: 369 272
Um Sequim Road
Al Quoz 4
PO Box 414 084
Dubai, UAE

Telephone: +971-04-321-0328

CLIMAX GLOBAL LOCATIONS



CE DOCUMENTATION

DECLARATION OF CONFORMITY

2006/42/EC Machinery Directive

Name of manufacturer or supplier
Climax Portable Machining and Welding Systems

Full postal address including country of origin
2712 E. Second St., Newberg, OR 97132, USA

Description of product
UNIVERSAL STRAIGHT VALVE TESTER; MODEL 600

Name, type or model, batch or serial number
MODEL 600; P/N'S 88572, 88576, 88018,
88271, 87988, 87989, 88573, 88577, 88574,
88578, 88575, 88579, 88591, 88581, 88272,
88273, 88990, 87991, 88592, 88583, 88593,
88586, 88594, 88590, 89021

Standards used, including number, title, issue date and other relative documents
EN 349, EN 3744, EN 11201, EN 12100-1, EN 13849-1, EN 14121-1

Name of Responsible Person within the EU
Tom Cunningham

Full postal address if different from manufacturers
Climax GmBH
Am Langen Graben 8
52353 Duren, Germany

Declaration

I declare that as the Manufacturer, the above information in relation to the supply / manufacture of this product, is in conformity with the stated standards and other related documents following the provisions of the above Directives and their amendments.

Signature of Manufacturer:

Scott J. Thiel

Position Held: **Director of Engineering; Research & Development**

Date: June 21, 2017

CE

LIMITED WARRANTY

CLIMAX Portable Machine Tools, Inc. (hereafter referred to as “CLIMAX”) warrants that all new machines are free from defects in materials and workmanship. This warranty is available to the original purchaser for a period of two years after delivery. If the original purchaser finds any defect in materials or workmanship within the warranty period, the original purchaser should contact its factory representative and return the entire machine, shipping prepaid, to the factory. CLIMAX will, at its option, either repair or replace the defective machine at no charge and will return the machine with shipping prepaid.

CLIMAX warrants that all parts are free from defects in materials and workmanship, and that all labor has been performed properly. This warranty is available to the customer purchasing parts or labor for a period of 90 days after delivery of the part or repaired machine or 180 days on used machines and components. If the customer purchasing parts or labor finds any defect in materials or workmanship within the warranty period, the purchaser should contact its factory representative and return the part or repaired machine, shipping pre-paid, to the factory. CLIMAX will, at its option, either repair or replace the defective part and/ or correct any defect in the labor performed, both at no charge, and return the part or repaired machine shipping prepaid.

These warranties do not apply to the following:

- Damage after the date of shipment not caused by defects in materials or workmanship
- Damage caused by improper or inadequate machine maintenance
- Damage caused by unauthorized machine modification or repair
- Damage caused by machine abuse
- Damage caused by using the machine beyond its rated capacity

All other warranties, express or implied, including without limitation the warranties of merchantability and fitness for a particular purpose are disclaimed and excluded.

Terms of sale

Be sure to review the terms of sale which appear on the reverse side of your invoice. These terms control and limit your rights with respect to the goods purchased from CLIMAX.

About this manual

CLIMAX provides the contents of this manual in good faith as a guideline to the operator. CLIMAX cannot guarantee that the information contained in this manual is correct for applications other than the application described in this manual. Product specifications are subject to change without notice.

TABLE OF CONTENTS

TABLE OF CONTENTS (CONTINUED)

LIST OF FIGURES

FIGURE **PAGE**

This page intentionally left blank

LIST OF TABLES

TABLE **PAGE**

This page intentionally left blank

1 INTRODUCTION

IN THIS CHAPTER:

1.1 HOW TO USE THIS MANUAL

This manual describes information necessary for the setup, operation, maintenance, storage, shipping, and decommissioning of the USV-2-25T.

The first page of each chapter includes a summary of the chapter contents to help you locate specific information. The appendices contain supplemental product information to aid in setup, operation, and maintenance tasks.

Read this entire manual to familiarize yourself with the USV-2-25T before attempting to set it up or operate it.

1.2 SAFETY ALERTS

Pay careful attention to the safety alerts printed throughout this manual. Safety alerts will call your attention to specific hazardous situations that may be encountered when operating this machine.

Examples of safety alerts used in this manual are defined here[1]:

DANGER

indicates a hazardous situation which, if not avoided, ***WILL*** result in death or severe injury.

WARNING

indicates a hazardous situation which, if not avoided, ***COULD*** result in death or severe injury.

1. For more information on safety alerts, refer to *ANSI/NEMA Z535.6-2011, Product safety Information in Product Manuals, Instructions, and Other Collateral Materials*.

⚠ CAUTION

indicates a hazardous situation which, if not avoided, could result in minor or moderate injury.

NOTICE

indicates a hazardous situation which, if not avoided, could result in property damage, equipment failure, or undesired work results.

1.3 GENERAL SAFETY PRECAUTIONS

CLIMAX leads the way in promoting the safe use of portable machine tools and valve testers. Safety is a joint effort. You, the end user, must do your part by being aware of your work environment and closely following the operating procedures and safety precautions contained in this manual, as well as your employer's safety guidelines.

Observe the following safety precautions when operating or working around the machine.

Training – Before operating this or any machine tool, you should receive instruction from a qualified trainer. Contact CLIMAX for machine-specific training information.

Risk assessment – Working with and around this machine poses risks to your safety. You, the end user, are responsible for conducting a risk assessment of each job site before setting up and operating this machine.

Intended use – Use this machine in accordance with the instructions and precautions in this manual. Do not use this machine for any purpose other than its intended use as described in this manual.

Personal protective equipment – Always wear appropriate personal protective gear when operating this or any other machine tool.

Work area – Keep the work area around the machine clear of clutter. Restrain cords and hoses connected to the machine. Keep other cords and hoses away from the work area.

Lifting – Many CLIMAX machine components are very heavy. Whenever possible, lift the machine or its components using proper hoisting equipment and rigging. Always use designated lifting points on the machine.

Lock-out/tag-out – Lock-out and tag-out the machine before performing maintenance.

Moving parts – CLIMAX machines have numerous exposed moving parts and interfaces that can cause severe impact, pinching, cutting, and other injuries. Except for stationary operating controls, avoid contact with mov-

ing parts by hands or tools during machine operation. Remove gloves and secure hair, clothing, jewelry, and pocket items to prevent them from becoming entangled in moving parts.

1.4 MACHINE-SPECIFIC SAFETY PRECAUTIONS

Eye hazard – This machine may produce liquid spray during operation. Always wear eye protection when operating the machine.

Sound level – This machine produces potentially harmful sound levels. Hearing protection is required when operating this machine or working around it.

Hazardous environments – Do not operate the machine in environments where potentially explosive materials, toxic chemicals, or radiation may be present.

Pressurization – Do not over-pressurize the valve test system beyond the limits described in this manual and on machine labels. Do not pressurize the system while the side panels are removed from the test console.

Test gauges – Do not use any gauge above its rating. Do not remove test gauges while the system is pressurized.

Utility service requirements – Do not exceed the pressure ratings stated in this manual and on the machine labels.

⚠ WARNING

This machine is equipped with interlocking valve control knobs to prevent accidental release of clamp pressure while the valve under test is pressurized.

Do not operate this machine if these interlocking knobs are missing, damaged, or altered. Doing so could result in property damage or personnel injury.

1.5 RISK ASSESSMENT AND HAZARD MITIGATION

To achieve the intended results and to promote safety, the operator must understand and follow the design intent, set-up, and operation practices that are unique to Hydro Pro Universal Straight Body Valve Testers.

The operator must perform an overall review and on-site risk assessment of the intended application. Due to the unique nature of hydrostatic testing, identifying one or more hazard that must be addressed is typical.

When performing the on-site risk assessment, it is important to consider the valve tester and the workpiece as a whole.

1.6 RISK ASSESSMENT CHECKLIST

The following checklist is not intended to be an all inclusive list of things to watch out for when setting up and operating this Hydro Pro Universal Straight Body Valve Tester. However, these checklists are typical of the types of risks the assembler and operator should consider. Use these checklists as part of your risk assessment:

TABLE 1-1. RISK ASSESSMENT CHECKLIST BEFORE SET-UP

	Before set-up
☐	I took note of all the warning labels on the machine.
☐	I removed or mitigated all identified risks (such as tripping, cutting, crushing, entanglement, shearing, or falling objects).
☐	I considered the need for personnel safety guarding and installed any necessary guards.
☐	I considered the potential hazards that are inherent in high-pressure valve testing, including the possibility of high velocity fluid escape or workpiece fragmentation, and have installed appropriate protective barriers.
☐	I read the machine assembly instructions (Section 3) and took inventory of all the items required but not supplied (Section 2.3).
☐	I considered how this machine operates and identified the best placement for the controls, cabling, and the operator.
☐	I evaluated and mitigated any other potential risks specific to my work area.

TABLE 1-2. RISK ASSESSMENT CHECKLIST AFTER SET-UP

	After set-up
☐	I checked that the machine is safely installed (according to Section 3).
☐	I identified all possible pinch points, such as those caused by rotating parts, and informed the affected personnel.
☐	I followed the required maintenance checklist (Section 5).
☐	I checked that all affected personnel have the recommended personal protective equipment, as well as any site-required or regulatory equipment.
☐	I checked that all affected personnel understand and are clear of the danger zone.
☐	I evaluated and mitigated any other potential risks specific to my work area.

1.7 LABELS

1.7.1 Label identification

The following warning and identification labels should be on your machine. If any are defaced or missing, contact CLIMAX immediately for replacements.

TABLE 1-3. USV-2-25T LABELS

	P/N 29154 ID plate		P/N 81008 Warning label: wear ear and eye protection
	P/N 85417 Warning label: do not release clamp while pressurized		P/N 87593 Warning label: read the operating manual
	P/N 88808 Calder USV plate		P/N 89122 Warning label: leave lifting device until fully clamped

1.7.2 Label location

The following figures display the location of the labels on each of the components of the USV-2-25T. For further identification of location placement, refer to the exploded views in Appendix A.

FIGURE 1-1. CONSOLE LABEL LOCATIONS

Label P/N: 29154, 81008, 85417, 87593, 88808, 89122

This page intentionally left blank

2 OVERVIEW

IN THIS CHAPTER:

2.1 FEATURES AND COMPONENTS

The USV-2-25T clamp fixture is a valve testing system that hydraulically clamps and seals straight-body valves for hydrostatic and low-pressure air testing. It may be pressurized from a variety of hydrostatic pressure sources up to 9,700 psi (669 bar) and low-pressure air sources up to 125 psi (8.6 bar).

Principle components are shown in Figure 2-1.

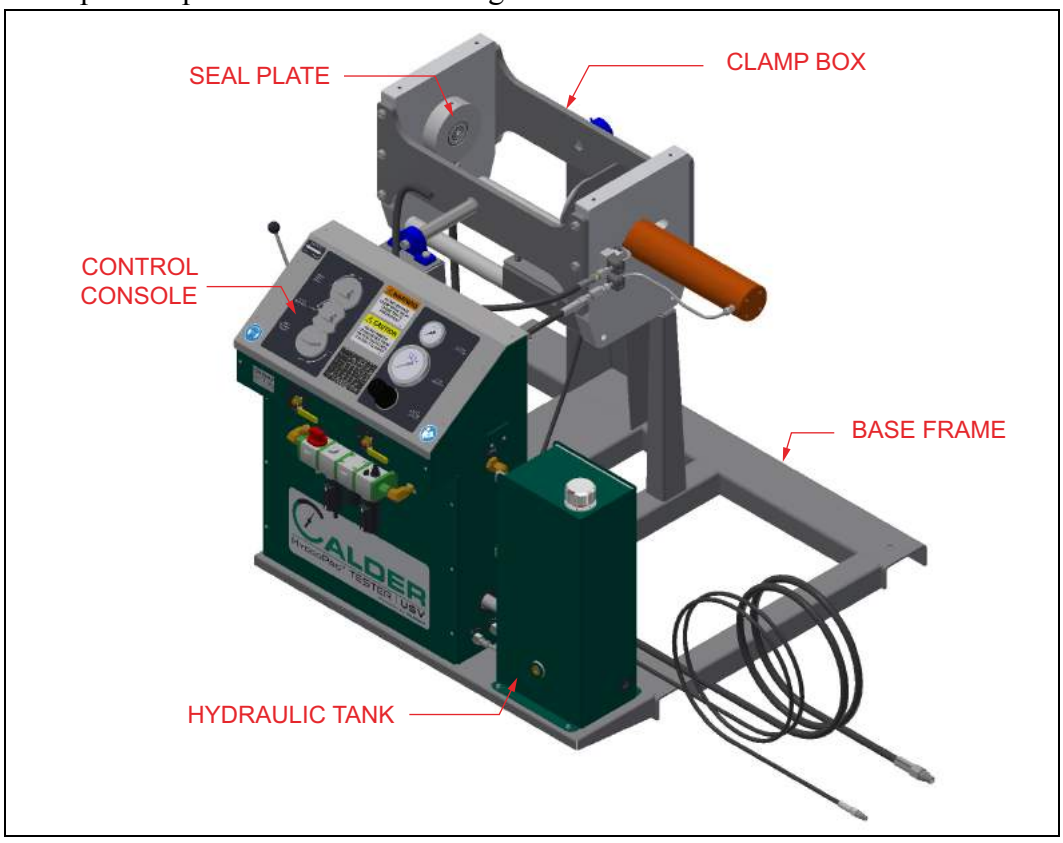


FIGURE 2-1. COMPONENTS

Features include:

Safety interlock– This feature prevents accidental release of valve clamp

hydraulic pressure which the valve under test is pressurized.

Multiple leakage test types–Connection points to both ends of the valve under test equip this machine for shell and seat leakage tests.

Hydraulic tilting–This option is available to tilt the valve under test from horizontal to vertical for optimal valve pre-filling with water.

Easy-out seal plate holder–This option is available for easy change-out of seal plates when different styles of seal plates are used.

2.2 CONTROLS

The USV-2-25T controls are all located on the machine (shown in Figure 2-2).

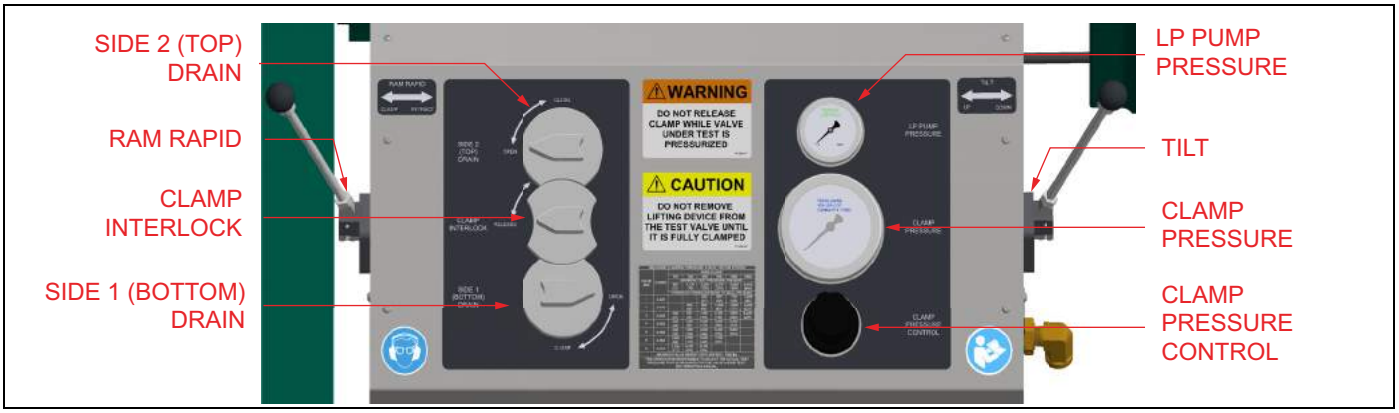


FIGURE 2-2. CONSOLE CONTROLS

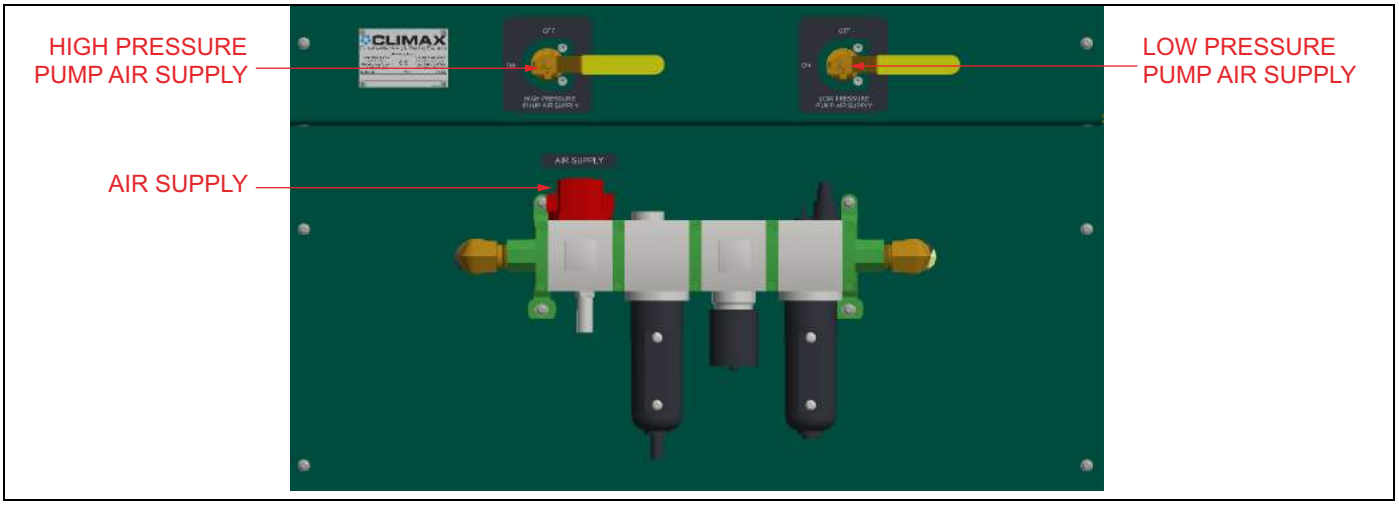


FIGURE 2-3. LOWER CONSOLE CONTROLS

2.3 DIMENSIONS

Figure 2-4 on page 12 shows the machine dimensions.

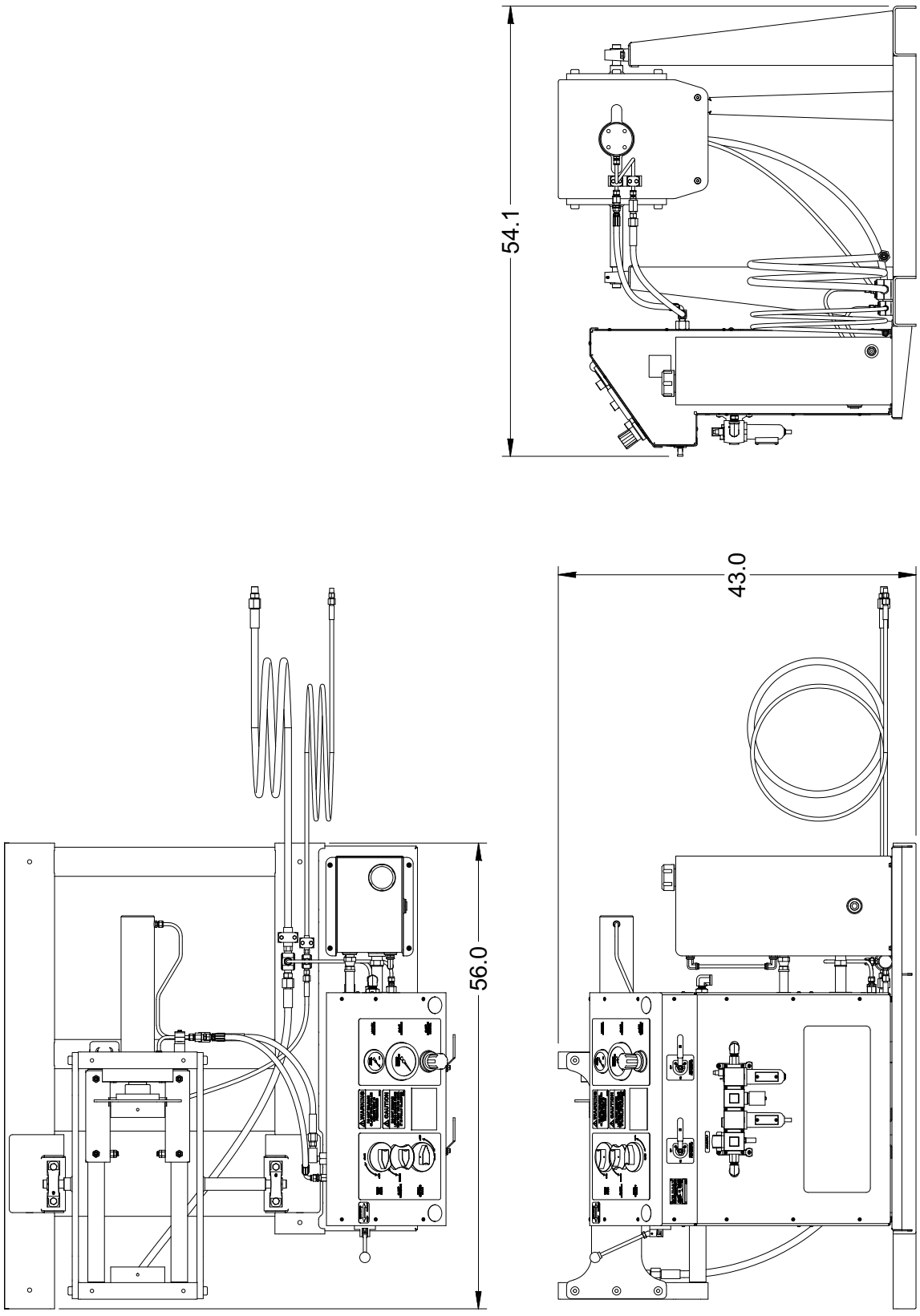


FIGURE 2-4. CLAMP FIXTURE DIMENSIONS

2.4 SPECIFICATIONS

Table 2-1 and Table 2-2 provides the operating specifications. See the marketing literature for additional information.

TABLE 2-1. SPECIFICATIONS

Test media:	Water, air, glycol, water soluble oil blends
Maximum water test pressure:	9,700 psi (669 bar)
Maximum air test pressure:	125 psi (8.6 bar)
Types of valves that can be tested:	Straight pattern ball, globe, gate, butterfly, and check valves[1]
Shop air required:	100–150 psi at 40 scfm (6.9–10.3 bar at 1.13 m^3/min)
Water quick fill:	3 gpm (11 l/min) minimum
Maximum opening between seal plates:	18" (457 mm)
Minimum opening between seal plates:	4" (102 mm)
Maximum inside width:	14" (356 mm)
Hydraulic ram force:	25 tons (22.7 tonnes)
Approximate machine weight	1,300 lbs (590 kg)
Approximate shipped weight	1,500 lbs (680 kg)

1.Special seal plate adapters may be required to seal against the valve or to prevent external loading of the valve body when clamping.

WARNING

Do not use the machine in any application that exceeds these operating specifications. Failure to follow these guidelines could result in personnel injury and property damage, and will void the warranty.

TABLE 2-2. VALVE SIZE AND PRESSURE COVERAGE

Valve size (nominal)	ASME class					
	150	300	600	900	1500	2500
	Maximum test pressure					
	450 psi (31 bar)	1125 psi (78 bar)	2250 psi (155 bar)	3375 psi (233 bar)	5625 psi (388 bar)	9375 (646)
1/2"	X	X	X	X	X	X
3/4"	X	X	X	X	X	X
1"	X	X	X	X	X	X
1-1/2"	X	X	X	X	X	
2"	X	X	X	X	X	

WARNING

The test pressures listed by valve class represent machine capability and may not apply to your valve to be tested. Actual valve test pressures may be lower than the pressures listed in Table 2-2 due to the valve material, intended operating temperature, and potential other factors. Refer to the valve manufacturer's specifications for the correct testing pressure. Failure to do this could result in property damage or personnel injury.

2.5 ITEMS REQUIRED BUT NOT SUPPLIED

The following items are required but not supplied in your CLIMAX product kit:

- Hydraulic oil AW-32
- General purpose air tool oil
- Shop air at 100–150 psi and 40 scfm (6.9–10.3 bar at 1.13 m^3/min)
- Anchor bolts/hardware

3 SETUP

IN THIS CHAPTER:

This section describes the setup and assembly procedures for the USV-2-25T Hydro Pro Universal Straight Body Valve Tester.

3.1 RECEIPT AND INSPECTION

Your CLIMAX product was inspected and tested prior to shipment, and packaged for normal shipment conditions. CLIMAX does not guarantee the condition of your machine upon delivery.

When you receive your CLIMAX product, perform the following receipt checks:

1. Inspect the shipping containers for damage.
2. Check the contents of the shipping containers against the included invoice to make sure that all components have been shipped.
3. Inspect all components for damage, lifting the USV-2-25T with a forklift using the fork points in the base frame.

Contact CLIMAX immediately to report damaged or missing components.

NOTICE

Keep the shipping container and all packing materials for future storage and shipping of the machine.

3.2 SECURING THE TEST STAND

The USV-2-25T must be anchor-bolted through the base frame to the floor before operation.

NOTICE

Do not operate the machine unless it has been anchored to the floor. The floor must be level within ±5°.

WARNING

All units must be stabilized for operator safety. The operator must determine what is necessary to provide a safe environment.

3.2.1 Cement in place (option 1 – recommended)

Cement the anchor bolts into the floor. The exposed threads of the anchor must protrude a minimum of two threads past the nut and washer. See Figure 3-1.

3.2.2 Drill and anchor (option 2)

Drill holes into the floor for an expanding type anchor sleeve. A .5" (12.7 mm) lag bolt will require a minimum of 1.5" (38.1 mm) thread engagement. See Figure 3-1.

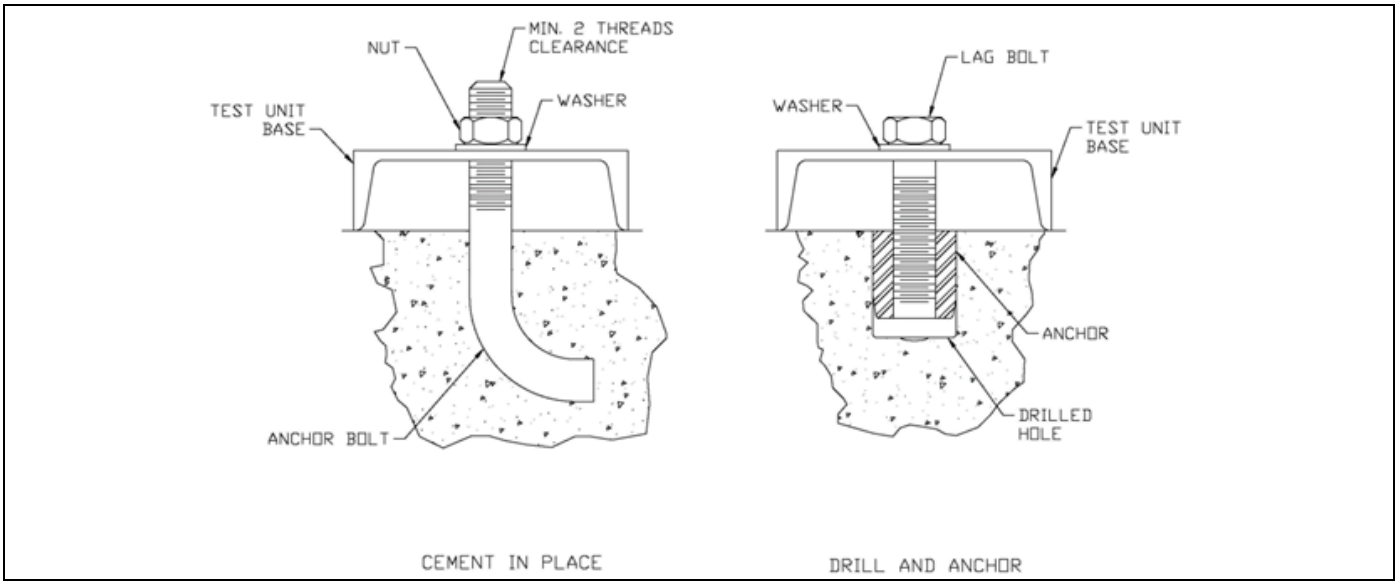


FIGURE 3-1. SECURING THE TEST STAND

3.3 FILLING THE LUBRICATOR AND HYDRAULIC TANK

Do the following to fill the lubricator and hydraulic tank:

1. Check that the lubricator is filled with general purpose air tool oil.
2. Retract the hydraulic cylinders and fill the hydraulic tank with AW-32 hydraulic oil to the top of the sight gauge.

NOTICE

If the hydraulic cylinders are not retracted when filled, the hydraulic tank might later overflow when the hydraulic cylinders are retracted.

NOTICE

The fill level must be visible in the sight tube throughout all modes of operation.

3.4 CONNECTING TO THE TEST PRESSURE SOURCE

The USV-2-25T can be paired with a variety of hydrostatic and low-pressure air pressure sources as long as the hydrostatic and air pressures are within the limits specified in Section 2.4 on page 13.

Typical Calder testing systems include a clamp fixture, such as this Hydro Pro Universal Straight Body Valve Tester, and a test pressure source and control console, such as a Hydro Pro Console. Refer to the operating manual for the Hydro Pro Console (or other pressure source) for setup instructions for that module.

⚠ CAUTION

Always use test pressure hoses rated to the full system working pressure. Failure to do this could result in property damage or personnel injury.

Do the following to assemble the machine:

1. Connect the 1/2" (13 mm)-ID high-pressure inlet hose to the pressure source's primary outlet (that is, the side through which the valve is filled). This is the connection to the lower seal plate when the clamp fixture is tilted up.

NOTICE

If the pressure source has quick fill ability, connect the outlet line from the test pressure source with quick-fill ability to the 1/2" (13 mm)-ID high-pressure inlet hose.

2. Connect the 1/4" (6 mm)-ID high-pressure inlet hose to the pressure source's second pressure outlet. This is the connection to the top plate (when tilted up).

NOTICE

If the pressure source has only one pressure outlet, this hose may be capped or removed and the port plugged.

3.5 CONNECTING THE UTILITIES

Connect shop air to the 1/2" NPT SHOP AIR INLET port. Shop air pressure is 100–150 psi (6.9–10.3 bar). The required shop air volume is 40 scfm (1.13 m^3/min).

Connect a drain hose with a 1/2" (13 mm) minimum inside diameter and rated to the system maximum pressure or higher to the DRAIN OUTLET port. Route the hose to a safe location. The drain line may be connected to the return port of a recirculation system if the recirculation system does not obstruct the drain line's flow.

⚠ CAUTION

Secure the hose end to prevent hose whip when high-velocity fluid travels through the drain hose. Hose whip could result in property damage or personnel injury.

⚠ WARNING

Do not block the DRAIN OUTLET port. High-pressure fluid vented to the drain must be able to flow freely. Blocking the drain could rupture the drain line or fittings prevent the safety interlock from functioning and may result in property damage or personnel injury.

3.6 CONFIGURING THE SEAL PLATES

Machines equipped with the optional easy-out seal plate holders may be configured with different seal plates (such as RTJ seal plates and bore seal adapter plates) before operation.

To remove the seal plates from the easy-out holder, do the following:

1. Check that the clamp box is in the horizontal position (if the machine is equipped with optional tilt)
2. Thread a lifting eye into the seal plate and lift it out of the easy-out holder using a hoist.

To install the seal plates, reverse the removal steps above. Check the condition of the small o-ring at the center of the easy-out holders before installing the seal plates.

4 OPERATION

IN THIS CHAPTER:

4.1 PRE-OPERATION CHECKS

Do the following checks before operating the machine:

1. Complete the risk assessment checklist in Table 1-2 on page 5.
2. Check that the work area is clear of non-essential personnel and equipment.
3. Check all hand tools are removed from inside the machine and the area.
4. Check that the o-ring seals in the seal plates are in good condition (free of nicks, tears, and not brittle).
5. Check that the seal plates are in good condition.

⚠ CAUTION

Damage (such as dents and dings) to the seal plates, especially next to the o-ring seals, could cause the valve under test to fail to form a seal against the plates.

6. Check that the air lubricator has adequate volume of air tool oil.
7. Check that the hydraulic tank has adequate volume of hydraulic oil.
8. Check that the machine has adequate shop air pressure and volume.
9. Check that the L.P. AIR SUPPLY and H.P. AIR SUPPLY valves are closed.
10. Turn on the AIR SUPPLY valve.
11. Check that the appropriate protective barriers are in place.

⚠ WARNING

High-pressure valve testing may result in the sudden, unexpected release of stored energy with the potential to cause property damage or personnel injury. Potential hazards may include the possibility of high-velocity fluid escaping and high-energy projectile impact. The end-user must assess the application and install protective barrier devices, as appropriate.

4.2 CLAMPING A VALVE

WARNING

Before clamping the valve to be tested, check that the valve is rated to the pressure for which it will be tested. Check the valve manufacturer's specifications for the correct test pressure. If the valve is not rated to the test pressure that will be applied, the valve or the machine may be damaged and could result in personnel injury.

WARNING

This machine applies a clamping load across the body of the valve under test. Before clamping the valve to be tested, check that clamping across the valve body is a suitable method to clamp the valve during test, and that it can withstand the clamping force that is required. If the valve cannot withstand the clamping force, this could result in property damage and personnel injury.

Do the following to clamp a valve:

1. Check that the clamp box is tilted down to the horizontal position (if equipped with the tilt option). If the clamp box needs to be repositioned, refer to Section 4.3 on page 23.
2. Open the L.P. PUMP AIR SUPPLY valve, then position the ram using the RAM RAPID control so that the seal plates have an opening large enough for the valve under test to fit between them.

TIP:

The ram may also be advanced by opening the H.P. PUMP AIR SUPPLY valve and increasing pressure using the CLAMP PRESSURE CONTROL regulator. Note that the ram can only be retracted with the CLAMP INTERLOCK in the RELEASE position, which requires the SIDE 1 and SIDE 2 interlock DRAINS to be opened first.

3. Lower the valve under test (typically with an overhead hoist) into the clamp box and position it with its flanges centered on the seal plates.

WARNING

Use chains or straps to lower the valve under test into the clamp box. Do not place hands or any other body part between the seal plates or between the valve and the seal plates, as this could result in bodily injury.

4. Advance the ram using the RAM RAPID control until the seal plates contact and clamp against the valve flanges. At this point the valve is clamped with low pressure only. Continue supporting the weight of the valve with the hoist until full clamp pressure has been applied.

CAUTION

Do not remove the lifting device from the test valve until the test valve is fully clamped. Failure to follow this guideline could result in the test valve falling, causing personnel injury or property damage.

WARNING

Do not crawl under or place any body part underneath the test valve. If the test valve falls, it could result in bodily injury.

NOTICE

When clamping small valves, use RAM RAPID to move the seal plates close to the flanges, then use CLAMP PRESSURE CONTROL to advance the ram and clamp it to the required clamp pressure as described in the following two steps.

5. Determine the clamp pressure required by using the clamping pressure chart located on the control panel (shown in Table 4-1 on page 22) and by following these steps:
   a) Select the correct valve size in the first column.
   b) Select the correct valve class and test pressure from the header rows.
   c) Determine the hydraulic clamping pressure at the intersection of the selected row and column.

   Example (see highlighted cells): using a 2" class 600 valve at 2,250 psi test pressure = 3,100 psi clamp pressure.

TABLE 4-1. USV-2-25T CLAMPING PRESSURE

Valve size (inches)	O-ring size	ASME class					
		150	300	600	900	1500	2500
		Maximum test pressure, psi (bar)[a]					
		450 (31)	1,125 (78)	2,250 (155)	3,375 (233)	5,625 (388)	9,375 (646)
		Hydraulic pressure required to seal, psi (bar)					
1/2"	2-118	200 (14)	300 (21)	600 (41)	900 (62)	1,400 (97)	2,300 (159)
3/4"	2-220	300 (21)	600 (41)	1,200 (83)	1,700 (117)	2,800 (193)	4,700 (324)
1"	2-220	300 (21)	600 (41)	1,200 (83)	1,700 (117)	2,800 (193)	4,700 (324)
1-1/2"	2-330	700 (48)	1,600 (110)	3,100 (214)	4,600 (317)	7,700 (531)	
2"	2-230	700 (48)	1,600 (110)	3,100 (214)	4,600 (317)	7,700 (531)	

a.The operator is responsible to select the actual test pressure that is required for the valve under test.

⚠ CAUTION

The test pressures listed by valve class represent machine capability and may not apply to your valve to be tested. Actual valve test pressures may be lower due to the valve material, intended operating temperature, and potential other factors.

Refer to the valve manufacturer's specifications for the correct testing pressure. Failure to do this could result in property damage or personnel injury.

6. Open the H.P. PUMP AIR SUPPLY valve and increase the CLAMP PRESSURE CONTROL until the clamp pressure gauge reads the required clamp pressure.

⚠ WARNING

During testing, leave the H.P. PUMP AIR SUPPLY valve open and the CLAMP PRESSURE CONTROL at the clamp pressure setting. This allows the pump to compensate for small amounts of leakage in the case that the hydraulic system begins to slowly leak.

Failure to do this could result in a valve becoming unclamped during testing and could cause property damage or personnel injury.

NOTICE

If the H.P. PUMP cycles after the clamp pressure has been set, it may indicate that the hydraulic system has a leak. Perform a hydraulic leakage check (see Section 5 on page 27) and correct any hydraulic leaks.

4.3 TILTING A VALVE

⚠ CAUTION

Seal plates with machines equipped with easy-out holders are held in by gravity, and so they may fall if the clamp box is tilted upright without a valve clamped in the clamp box.

If the machine has easy-out holders, do not tilt the clamp box upright without a valve clamped between the seal plates, as this could result in property damage or personnel injury.

Do the following to tilt a valve:

1. Check that the valve under test is clamped securely to the required clamp pressure.
2. Disconnect the valve under test from the overhead hoist.
3. Check that all personnel are clear of the clamp box and the valve under test, then open the L.P. PUMP AIR SUPPLY valve and use the TILT lever to tilt the valve up or down.
4. Turn off the L.P. PUMP AIR SUPPLY valve after tilting the valve into position.

NOTICE

If the machine is tilted to the vertical position, the clamp cylinder can leak down and cause the hydraulic tank to over flow.

4.4 PRE-TESTING

⚠ CAUTION

Prior to performing a hydrostatic test, check that all air has been vented from the valve under test. Failure to do this could result in property damage or personnel injury.

Do the following for pre-testing:

1. Check that the valve under test is clamped to the correct clamp pressure.

NOTICE

If testing with water and the machine has the tilt option, check that the valve under test is tilted into the upright position. This allows the valve under test to be filled from the bottom up while air is vented out the top.

If the tilt option has not been purchased or if pressurizing with a single line, the valve under test must be vented while filling using an alternate means. This will vary based on valve design.

2. Close the SIDE 1 and SIDE 2 DRAIN valves at the clamp fixture control panel.
3. Fill the valve under test with water by using the Hydro Pro Console test pressure controls (or alternate test pressure source) to fill through the 1/2" (13 mm) line and to vent the air from the valve under test by opening the 1/4" (6 mm) line to drain. Refer to the manual of the Hydro Pro Console (or alternate test pressure source) for specific filling instructions.

4.5 TESTING

This machine is designed to perform high-pressure hydrostatic and low-pressure air tests. Refer to Section 2.4 on page 13 for maximum pressures.

⚠ WARNING

Do not use this machine for high-pressure gas testing, which could result in property damage or personnel injury.

Do the following to complete a valve test:

1. Check that the H.P. PUMP AIR SUPPLY valve is open and that the CLAMP PRESSURE CONTROL is set for the correct clamp pressure.

2. Close the SIDE 1 and SIDE 2 DRAIN valves at the clamp fixture controls, if not already closed.
3. Pressurize the valve under test per the instructions provided with the test pressure source.

WARNING

Do not pressurize the machine above the maximum pressure rating. Refer to Section 2.4 on page 13. Pressurizing the machine above the maximum pressure rating could result in property damage or personnel injury.

WARNING

Do not attempt to release the clamp pressure while the valve under test is pressurized. Releasing a valve under pressure could result in property damage or personnel injury.

4.6 POST-TESTING

Do the following after completing a test:

1. Shut off the test pressure source.
2. Drain the test pressure from the valve under test using the controls at the test pressure source.
3. Drain the water from the valve using low-pressure air, if the test pressure source has this feature.
4. If the clamp fixture has the tilt option, tilt the clamp box and the valve under test to the horizontal position.

4.7 UNCLAMPING A VALVE

WARNING

Do not release the clamp pressure while the valve under test is pressurized. Releasing a valve under pressure could result in property damage or personnel injury.

Do the following to unclamp a valve:

1. Support the valve under test with an overhead hoist.

⚠ CAUTION

Do not release the clamp unless supporting the valve with a hoist or other suitable device. Releasing an unsupported valve could result in property damage or personnel injury.

2. Back off the CLAMP PRESSURE CONTROL to zero.
3. Close the H.P. PUMP AIR SUPPLY valve.
4. Turn the SIDE 1 and SIDE 2 interlock DRAIN valves to OPEN, and then turn the CLAMP INTERLOCK to RELEASE.
5. Open the L.P. PUMP AIR SUPPLY valve and RETRACT the ram using the RAM RAPID controls.
6. Close the L.P. PUMP AIR SUPPLY valve.
7. Lift the valve under test out of the clamp box.

5 MAINTENANCE

5.1 MAINTENANCE CHECKLIST

Table 5-1 lists maintenance intervals and tasks.

TABLE 5-1. MAINTENANCE INTERVALS AND TASKS

Interval	Task
Before each use	Check air lubricator level and refill with general purpose air tool oil as necessary.
	Check hydraulic oil level and refill with AW-32 as necessary.
	Check seal plate O-rings/sealing surface condition.
Periodically	Check the condition of the hoses and replace as necessary.
	Replace the air inlet filter with Air Prep Unit Filter (P/N 87437) as necessary.
	Check for hydraulic leakage (see Section 5.2).
	Grease the pillow block bearings when equipped with the tilt option.

5.2 CHECKING FOR HYDRAULIC LEAKAGE

The hydraulic system must be maintained in a leak-free condition to assure consistent and reliable clamping throughout the test.

Perform the following check periodically or if the hydraulic system is ever suspected of leaking.

⚠ CAUTION

Do not apply test pressure at any time during this check, as that may result in property damage or personnel injury.

Do the following to check for hydraulic leakage:

1. If equipped with the tilt option, place the clamp box in the horizontal position.
2. Select a valve or similar component that can be clamped with more than 5,000 psi (345 bar) of clamping pressure.
3. Clamp the valve in the clamp box to a minimum of 5,000 psi (345 bar), but not more than the test piece can handle.

4. Keep the test piece supported with an overhead hoist, and shut off the H.P. PUMP AIR SUPPLY valve and reduce the CLAMP PRESSURE CONTROL regulator to zero. This will allow the system to leak down if a leak is present without the pump replenishing pressure.
5. Monitor the clamp pressure for a minimum of 10 minutes. Pressure loss must not be more than 100 psi (6.9 bar) in 10 minutes.

6 STORAGE AND SHIPPING

6.1 STORAGE

Proper storage of the Hydro Pro Universal Straight Body Valve Tester will extend its usefulness and prevent undue damage.

Before storing, do the following:

1. Retract the hydraulic cylinders.
2. Drain all water from the lines and dry the machine surfaces.
3. Drain the hydraulic fluid from the tank and lines.
4. Drain the air lubricator.

6.2 DECOMMISSIONING

To decommission the Hydro Pro Universal Straight Body Valve Tester prior to disposal, drain all fluids from the system. Refer to Appendix A for component assembly information.

This page intentionally left blank

APPENDIX A ASSEMBLY DRAWINGS

Drawing list

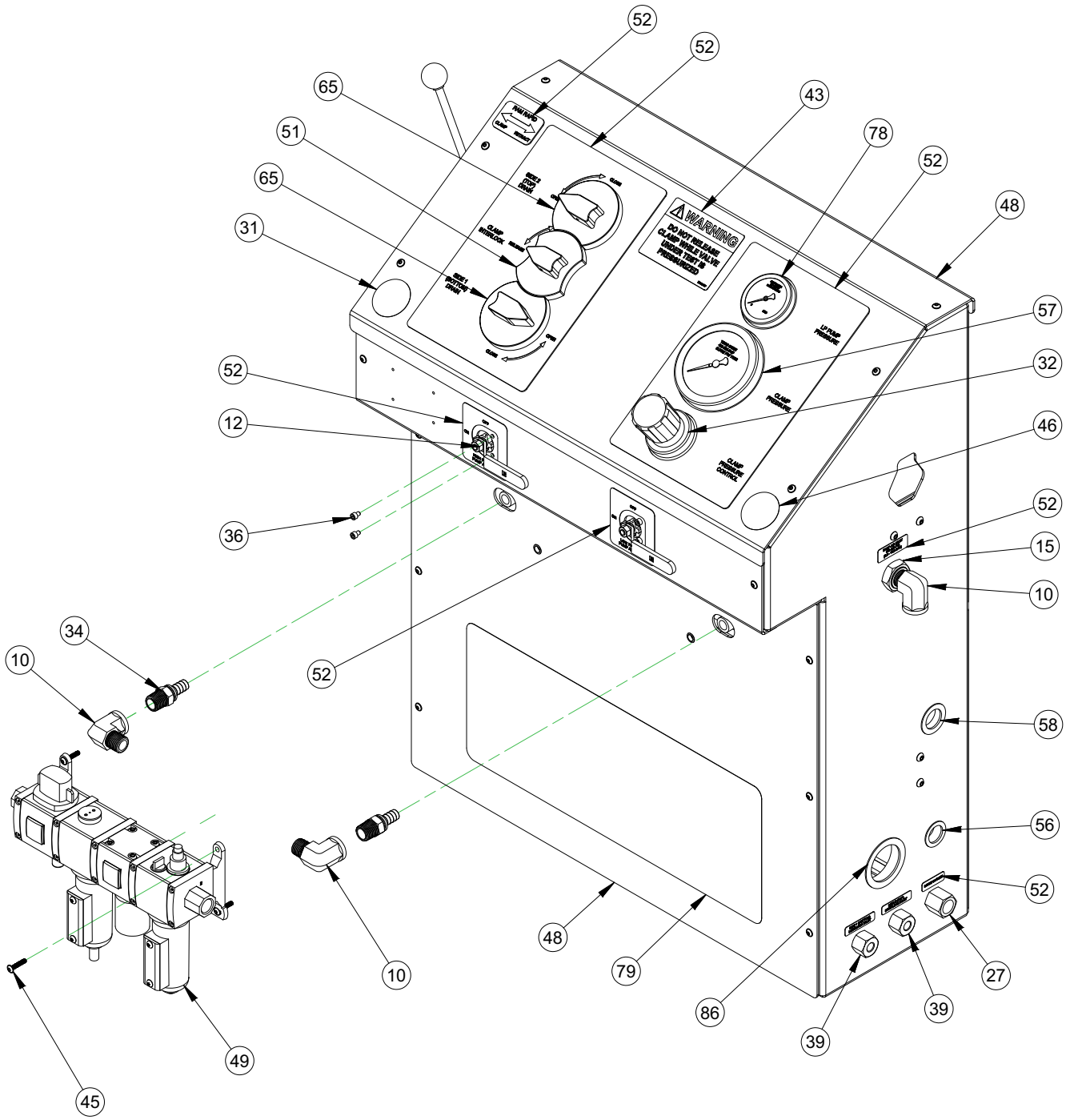


FIGURE A-1. CONTROL CONSOLE USV ASSEMBLY FRONT (P/N 90326)

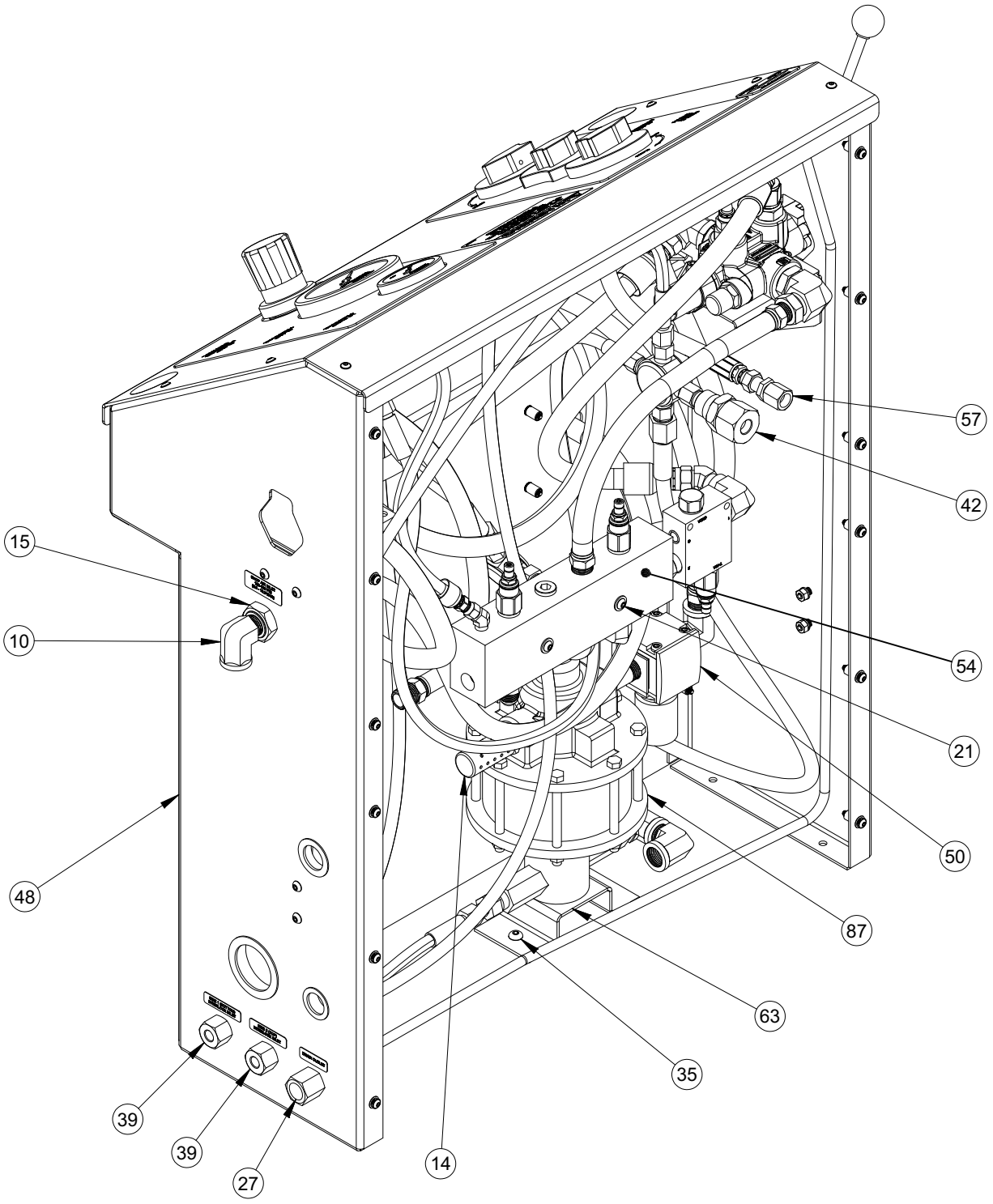


FIGURE A-2. CONTROL CONSOLE USV ASSEMBLY BACK (P/N 90326)

PARTS LIST				
ITEM	QTY	P/N:	DESCRIPTION	SCHEMATIC ID
1	1	12579	FTG PLUG 1/2 NPTM SOCKET	
2	1	12876	FTG REDUCER BUSHING 3/4 NPTM X 1/2 NPTF	
3	2	12974	FTG ELBOW 1/2 NPTM X JIC-8 MALE 90 DEG	
4	1	13211	FTG ELBOW 1/2 NPTM X 1/2 NPTF STREET 90 DEG	
5	1	13253	FTG ADAPTER 1/2 NPTM X #8 JICM	
6	1	13828	FTG ELBOW 1/2 NPTM X 1/2 NPTM 90°	
7	1	14704	FTG NIPPLE 1/2 NPTM X 1/2 NPTM	
8	1	16047	FTG ADAPTER SAE-10M X JIC-8M STRAIGHT	
9	2	33991	PLUG HEX 3/4 NPT BRASS	
10	11	35692	FTG ELBOW 1/2 NPTM X 1/2 NPTF ST 90 DEG BRASS	
11	1	55054	FTG ADAPTER SAE-10 MALE X JIC-6 MALE	
12	2	77389	BALL VALVE 1/2 NPT FEMALE 160 PSI	V-02, V-03
13	1	77394	REGULATOR AIR 1/2 NPT 125 PSI	PCV-03
14	1	77399	HIGH FLOW MUFFLER 3/4 NPTM COMPACT	
15	1	77421	FTG BULKHEAD 1/2 NPTF BRASS	
16	1	77422	FTG TEE 1/2 NPTM X 1/2 NPTF MALE RUN TEE BRASS	
17	2	77427	FTG BARB 1/2 NPTM X 1/2 HOSE 90 DEG ELBOW	
18	1	77461	FTG TUBE TEE UNION 3/8 TUBE	
19	2	77493	FTG CONNECTOR 1/4 NPTM X 3/8 TUBE SS	
20	2	77544	WASHER 1/4 FLTW SS	
21	2	77557	SCREW 1/4-20 X 1/2 BHCS SS	
22	3	77606	NUT 1/4-20 HEX STAINLESS 316	
23	1	77652	GAUGE PRESSURE 4 DIA 0-10000 PSI 1/4 NPTM LOWER BACK MOUNT	PI-02
24	3	77792	VALVE BALL 2 WAY 1/4 NPTF 10000 PSI	V-05, V-06, V-07
25	1	77871	FTG CHECK VALVE 10 KSI 1/2 NPTF	DV-01
26	1	77879	FTG ELBOW 3/4 NPT STREET 90 DEG	
27	1	77911	FTG BULKHEAD 1/2 NPTF X 3/8 TUBE	
28	1	78143	FTG ELBOW SAE-12M X JIC-8M	
29	3	79131	SCREW 1/4-20 X 1-1/2 SHCS SS	
30	1	80974	FTG ELBOW 45 DEG 1/2 NPT MALE 8 JICM	
31	1	81008	LABEL WEAR HEARING AND EYE PROTECTION 2.0 DIA	
32	1	81787	MOUNT NUT REGULATOR PANEL	
33	1	81810	FTG ADAPTER PIPE 9/16 TYPE M X 3/8 NPTM 15000 PSI	
34	12	81917	FTG BARB 1/2 NPTM X 1/2 HOSE SWIVEL BRASS	
35	2	82603	SCREW 5/16-18 X 1/2 BHCS 18-8 SS	
36	4	82641	SCREW 10-24 X 1/4 SHCS SS	
37	144	82847	HOSE LOW PRESSURE PUSH LOK 1/2 ID	
38	1	85072	FTG COUPLING 1/4 NPTF X 1/4 NPTF SS HEAVY WALL 10K PSI	
39	2	85232	FTG BULKHEAD 1/4 NPTF 15000 PSI	
40	1	85259	ADAPTER 9/16 TYPE M X 1/4 MNPT STAINLESS 15 KSI	
41	3	85270	FTG ADAPTER TYPE M12 X 3/8 MNPT 15,000 PSI	
42	1	85407	FTG BULKHEAD 3/8 NPTF X 3/8 NPTF 15000 PSI SS	
43	1	85417	LABEL WARNING - DO NOT RELEASE CLAMP 4-5/8 X 3-1/4	
44	1	85756	FTG PUSH-ON HOSE BARB 3/4 NPTM X 3/4 HOSE 90 DEG	
45	4	87231	SCREW 10-32 X 1 BHSCS FLANGED SS316	
46	1	87593	LABEL WARNING - CONSULT OPERATORS MANUAL 2.0 DIA	
47	1	87608	FTG ADAPTER 9/16 TYPE M X 1/2 NPTM STAINLESS 15 KSI	
48	1	87834	CONSOLE CLAMP FIXTURE USV	
49	1	87836	ASSY AIR PREP UNIT & LUBRICATOR USV	V-01, PCV-01, F-01, L-01
50	1	87838	REGULATOR 1/2 NPTF 7-125 PSIG W/BRACKET & PANEL NUT	PCV-02
51	1	87839	KNOB INTERLOCK CLAMP RELEASE VALVE	
52	1	87887	LABEL OVERLAY SET CLAMP FIXTURE MODEL USV	

FIGURE A-3. CONTROL CONSOLE USV ASSEMBLY PARTS LIST 1 (P/N 90326)

PARTS LIST				
ITEM	QTY	P/N:	DESCRIPTION	SCHEMATIC ID
53	2	88016	VALVE RELIEF DIRECT-ACTING T-10A CAVITY	PRV-01, PRV-02
54	1	88017	MANIFOLD CONSOLE CLAMP FIXTURE	
55	1	88033	FTG NIPPLE 1/2 NPTM X 2-1/2 BRASS	
56	1	88046	GROMMET LOCKING NYLON BLACK 15/16 ID X 1-1/4 PANEL HOLE	
57	1	88047	FTG BULKHEAD 3/8 NPTF X 3/8 JICM	
58	1	88051	GROMMET LOCKING NYLON BLACK 1-1/16 ID X 1-1/2 PANEL HOLE	
59	1	88057	FTG HEX NIPPLE 3/8 NPTM X 3/8 NPTM 15000 PSI	
60	1	88058	FTG CROSS 3/8 FEMALE NPT SS 15,000 PSI	
61	1	88059	FTG TEE 3/8 FEMALE NPT SS 15,000 PSI	
62	1	88060	FTG HEX NIPPLE REDUCING 1/2 NPTM X 3/8 NPTM 15000 PSI SS	
63	1	88088	PUMP BRACKET	
64	2	88091	SCREW 3/8-24 X 5/8 HHCS SS 18-8	
65	2	88097	KNOB INTERLOCK TOP PLATE DRAIN VALVE	
66	1	88201	HOSE ASSY .31 ID 3/4 FEM TYPE M X 46.3 IN OAL 15KSI	
67	1	88202	HOSE ASSY .31 ID 1/4 NPTM X 3/4 FEM TYPE M X 20.9 IN OAL 15KSI	
68	1	88203	HOSE ASSY .23 ID 3/8 NPTM X 9/16 FEM TYPE M X 46 IN OAL 17.4KSI (6/2WL)	
69	1	88204	HOSE ASSY .23 ID 9/16 FEM TYPE M X 60 IN OAL 17.4KSI (6/2WL)	
70	1	88205	HOSE ASSY .23 ID 1/4 NPTM SS X 49.1 IN OAL 17.4KSI (6/2WL)	
71	1	88206	HOSE ASSY .23 ID 1/4 NPTM SS X 41.2 IN OAL 17.4KSI (6/2WL)	
72	1	88207	HOSE ASSY 3 KSI 3/8 JIC-6F X 16.1 OAL STRAIGHT END AND AND 90° END	
73	1	88208	FTG ADAPTER 1/4 NPTM X JIC-8 MALE	
74	1	88209	HOSE ASSY 3 KSI 1/2 JIC-8F X 20.8 OAL STRAIGHT END AND AND 90° END	
75	1	88216	TUBE 3/8 DRAIN CONSOLE	
76	1	88217	TUBE 3/8 DRAIN BOTTOM PLATE	
77	1	88218	TUBE 3/8 DRAIN TOP PLATE	
78	1	88249	GAUGE 1000 PSI 2-1/2 INCH 1/4 MNPT C-CLAMP	PI-01
79	1	88808	LABEL CALDER HYDRO PRO TESTER USV 20 X 8	
80	1	89017	VALVE INLINE W/REVERSE FLOW CHECK	DV-02
81	1	89018	VALVE RELIEF DIRECT ACTING 25 GPM	PRV-03
82	1	89063	HOSE ASSY 3 KSI 1/2 JIC-8F X 24.7 OAL STRAIGHT ENDS	
83	1	89101	FTG ADAPTER 45 DEG 1/4 NPT MALE 4 JICM	
84	1	89102	HOSE ASSY 3 KSI 1/2 JIC-8F X 25.5 OAL STRAIGHT END AND AND 90° END	
85	1	89103	HOSE ASSY 3 KSI 1/4 JIC-4F X 1/4 NPTF X 13.6 OAL STRAIGHT ENDS	
86	1	89113	GROMMET LOCKING NYLON BLACK 1-31/32 ID X 2-1/2 PANEL HOLE	
87	1	90327	PUMP AIR DRIVEN 8,600 PSI OIL SERVICE	P-01
88	1	90479	VALVE HYD CONTROL MANUAL 4-WAY 3 POS SPRING CENTER MOTOR SPOOL SAE PORT	V-04
89	1	90524	FTG ELBOW SAE-12M X 3/4 NPTF STEEL	

FIGURE A-4. CONTROL CONSOLE USV ASSEMBLY PARTS LIST 2 (P/N 90326)

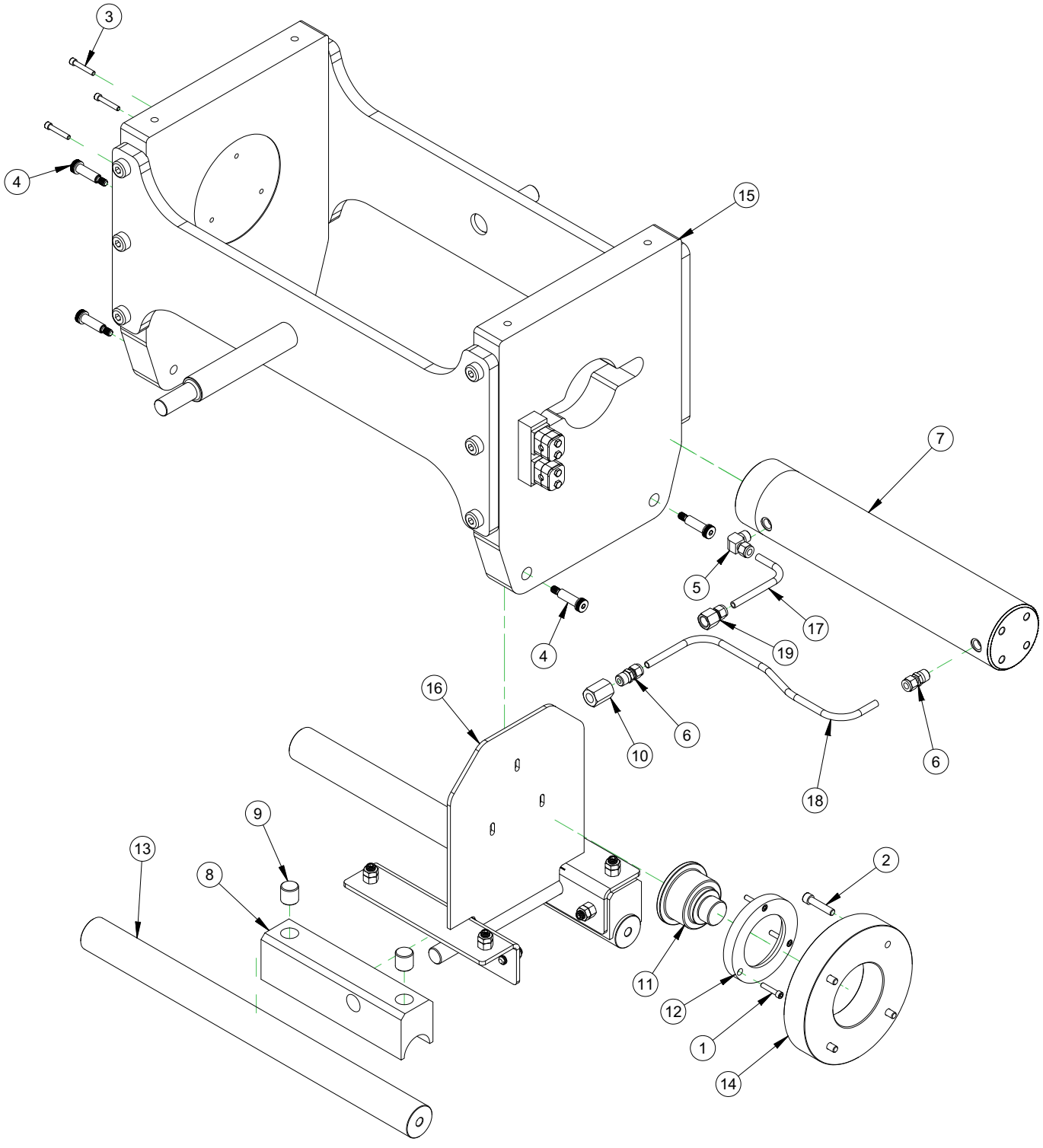


FIGURE A-5. USV-2-25T ASSEMBLY 2 (P/N 90339)

PARTS LIST			
ITEM	QTY	P/N:	DESCRIPTION
1	3	10671	SCREW 1/4-20 X 1-1/4 SHCS
2	4	11211	SCREW 3/8-16 X 1-3/4 SHCS
3	3	11777	SCREW 1/4-20 X 1-1/2 SHCS
4	4	76869	SCREW 1/2 DIA X 1-1/2 X 3/8-16 SHLDCS
5	1	77485	FTG ELBOW 3/8 NPTM X 3/8 TUBE 90 DEG
6	2	83092	FTG CONNECTOR 3/8NPTM X 3/8 TUBE SUPER DUPLEX
7	1	83333	RAM HYDRAULIC 25 TON 14 INCH STROKE
8	2	88186	TROLLEY BLOCK USV
9	4	88187	PIN DOWEL 1 DIA X 1 18-8 SS
10	1	88226	FTG COUPLER 3/8 NPTF X 3/8 NPTF 15000 PSI SS
11	1	90341	CYLINDER HEAD SHORT 25 TON
12	1	90342	SWIVEL RING MODEL USV 25T
13	2	90343	BAR TROLLEY MODEL USV-2-25T
14	1	90344	CYLINDER COLLAR MODEL USV-2-25T
15	1	90345	WELDMENT CLAMP BOX MODEL USV-2-25T
16	1	90346	TROLLEY WELDMENT USV-2
17	1	90395	TUBE 3/8 SS CYLINDER PORT LOWER CLAMP FIXTURE USV-2-25T
18	1	90396	TUBE 3/8 SUPER DUPLEX CYLINDER PORT UPPER CLAMP FIX. USV-2-25T
19	1	90401	FTG CONNECTOR FEMALE 3/8 TUBE X 3/8 FNPT SS

FIGURE A-6. USV-2-25T CLAMP BOX PARTS LIST (P/N 90339)

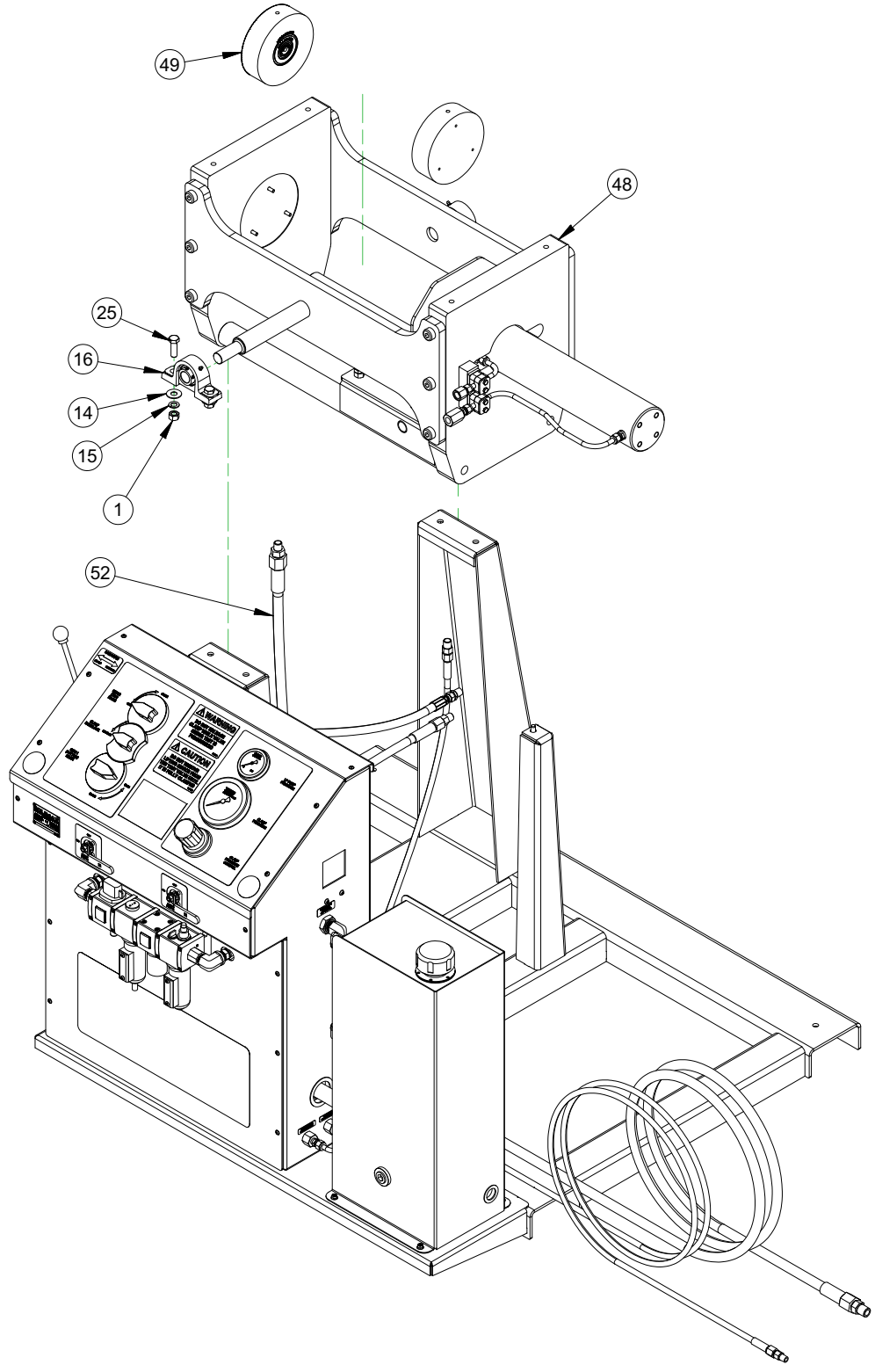


FIGURE A-7. USV-2-25T ASSEMBLY 1 (P/N 90206)

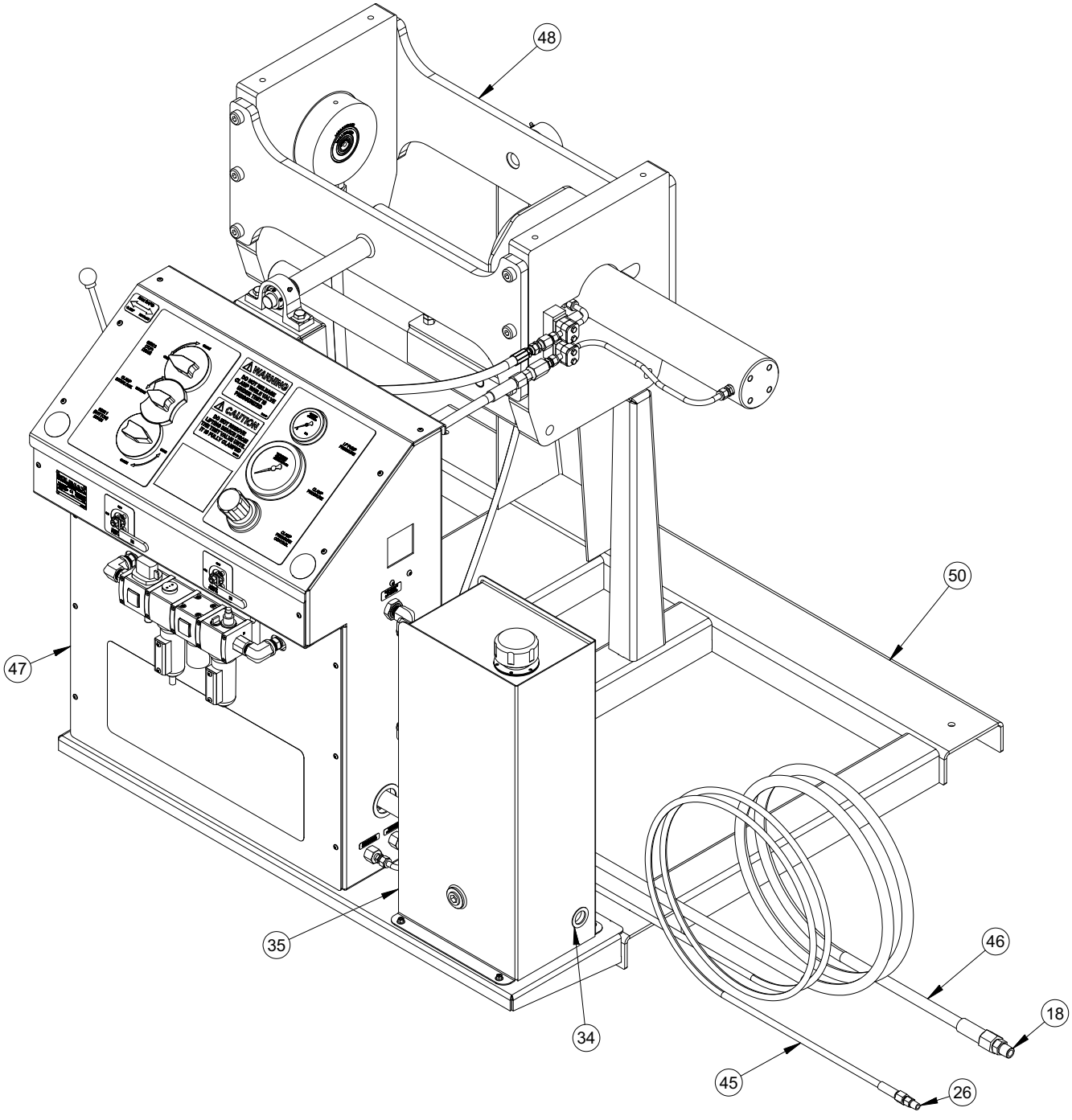


FIGURE A-8. USV-2-25T ASSEMBLY 2 (P/N 90206)

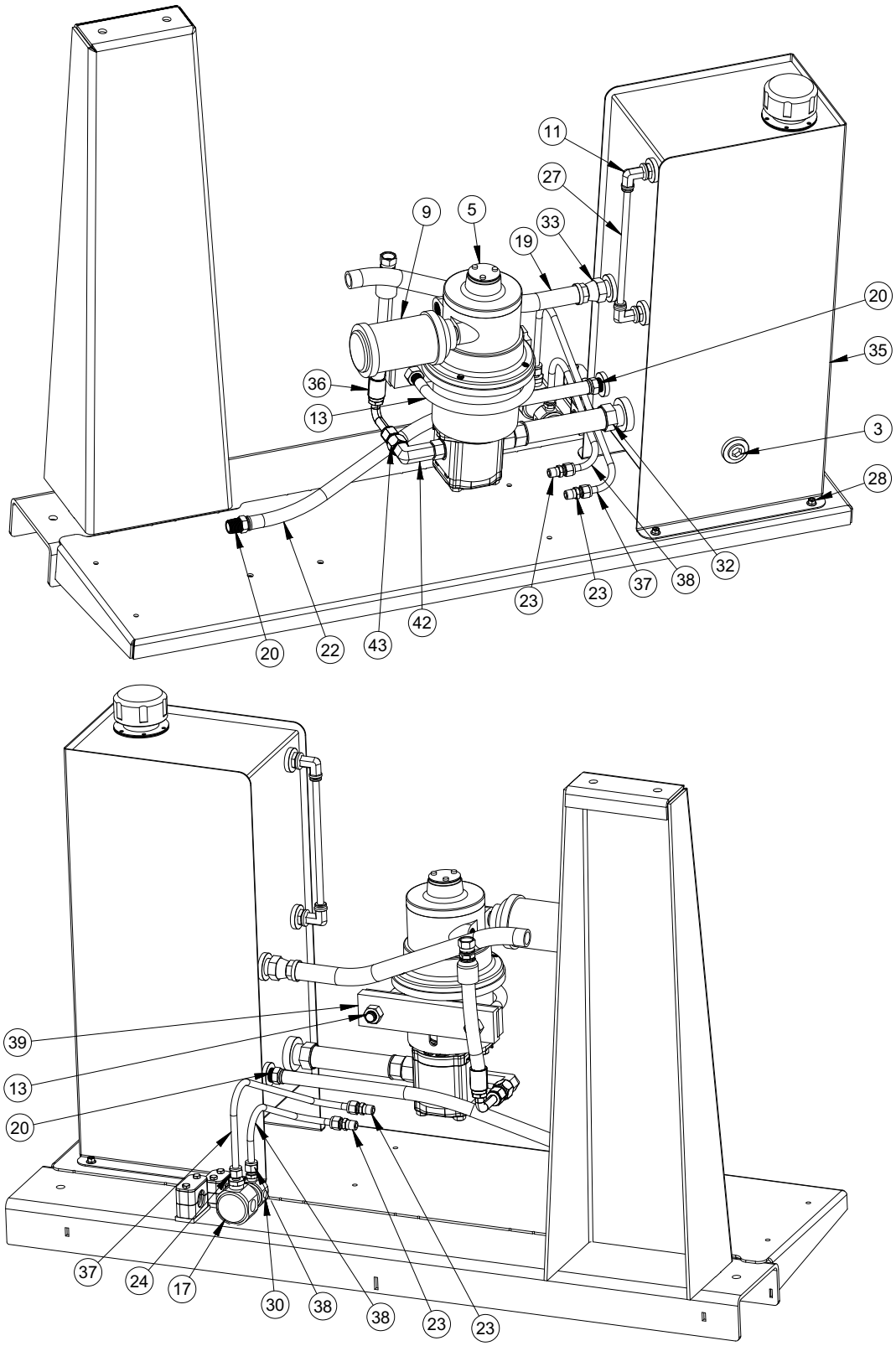


FIGURE A-9. USV-2-25T ASSEMBLY 3 (P/N 90206)

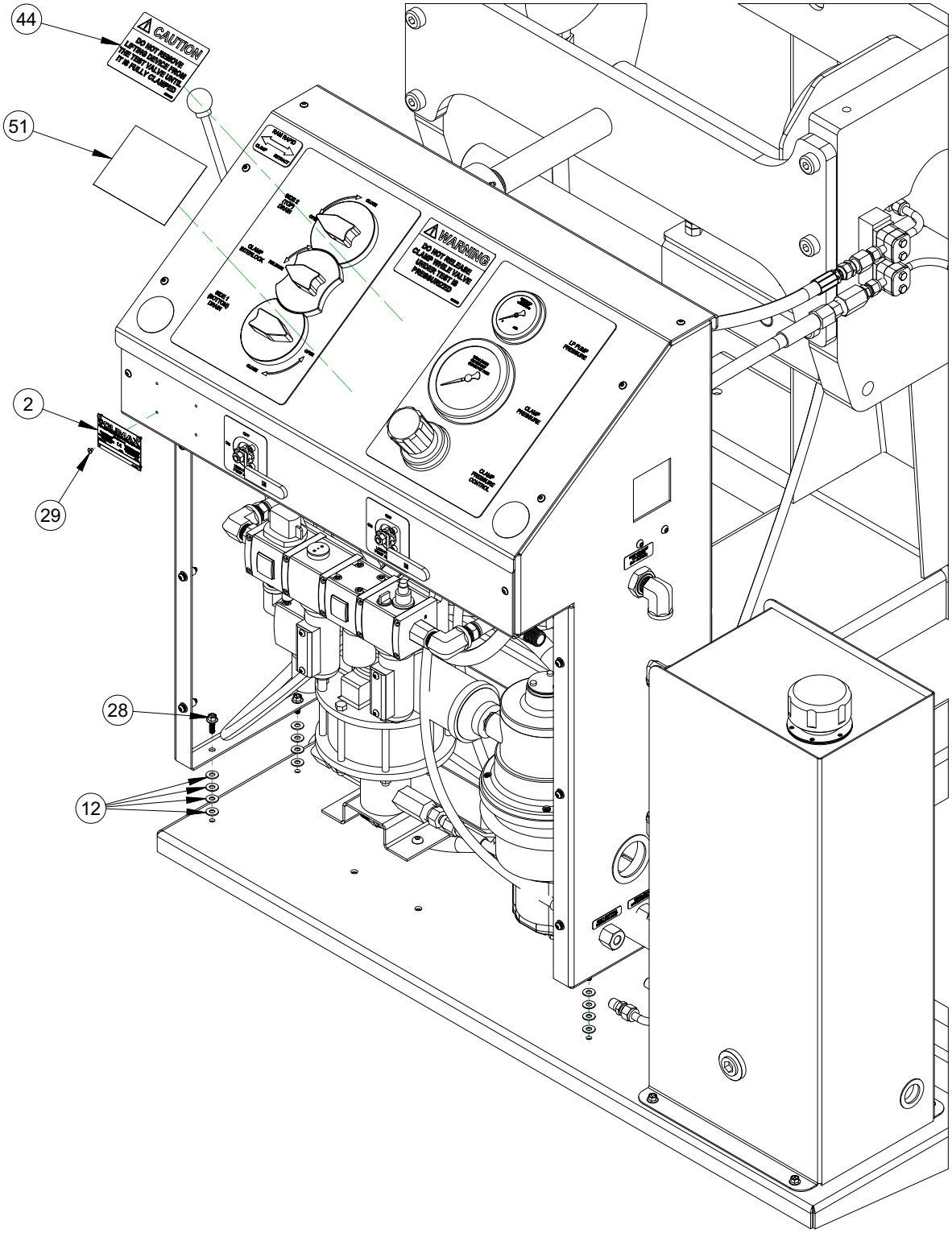


FIGURE A-10. USV-2-25T ASSEMBLY 4 (P/N 90206)

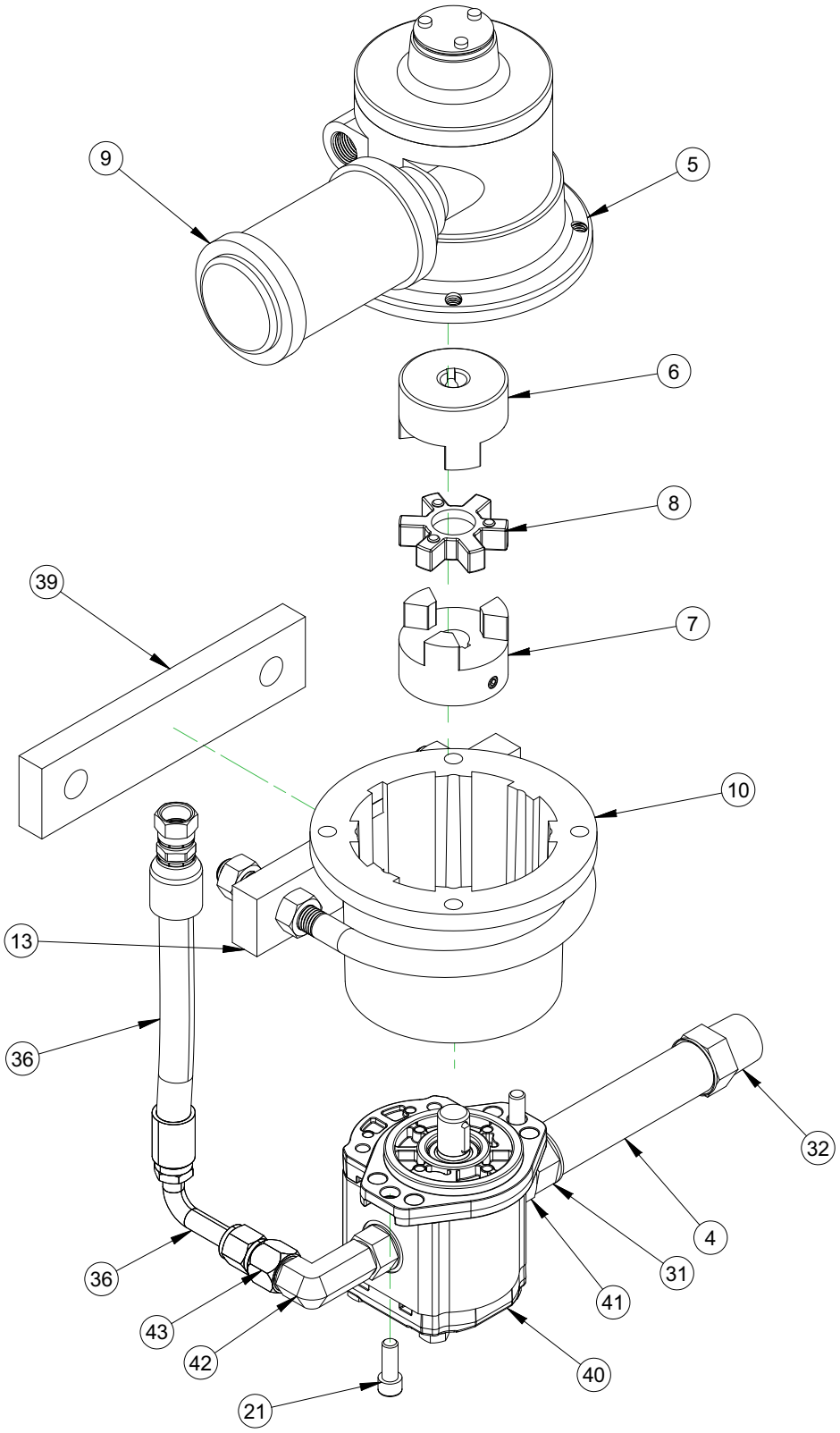


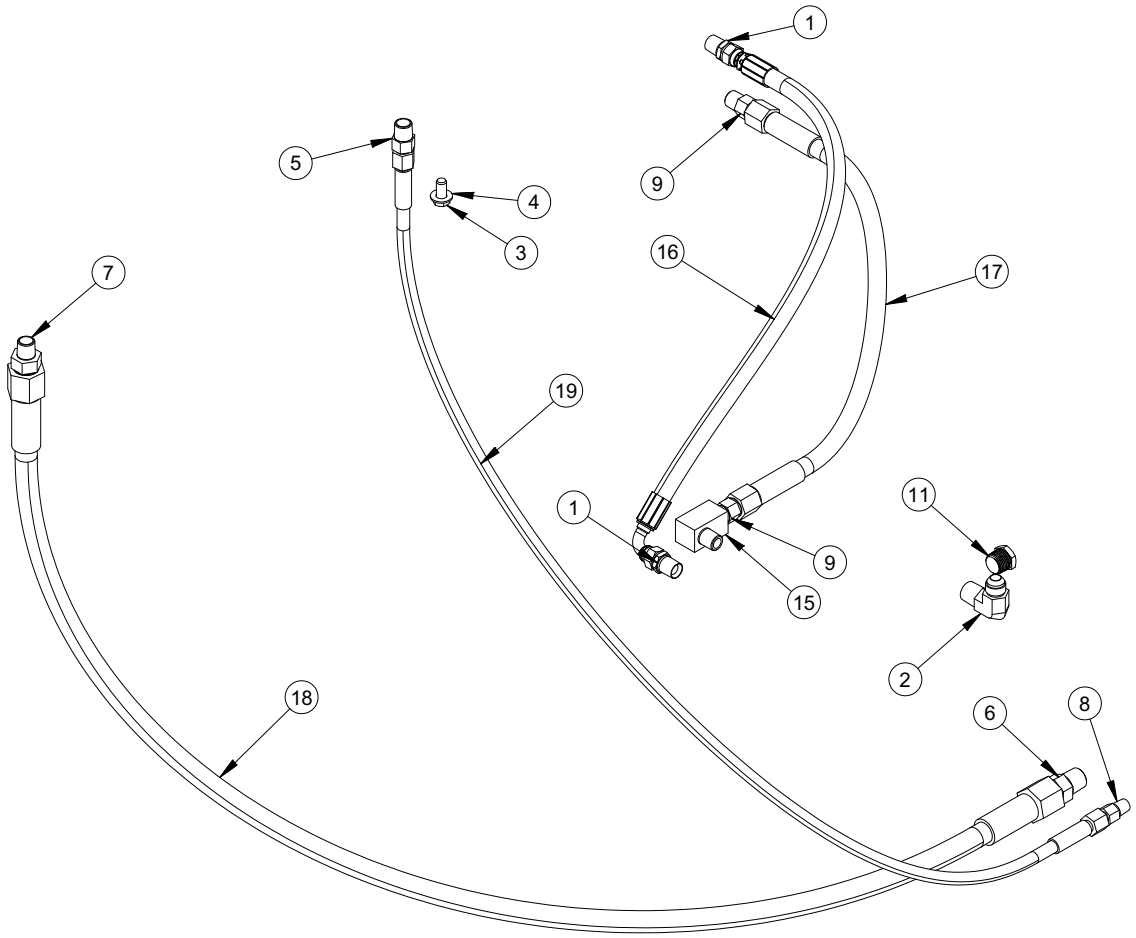
FIGURE A-11. USV-2-25T LP PUMP DETAIL (P/N 90423)

PARTS LIST				
ITEM	QTY	P/N:	DESCRIPTION	SCHEMATIC ID
1	4	10849	NUT 1/2-13 HEX SS	
2	1	29154	PLATE SERIAL YEAR MODEL CE 2.0 X 3.0	
3	1	33991	PLUG HEX 3/4 NPT BRASS	
4	6	55805	HOSE 801 SERIES PUSHLOK 1 INCH ID GRAY	
5	1	77405	MOTOR AIR 1/2 NPTM INLET X 1/2 NPTM OUTLET	M-01
6	1	77406	COUPLING SHAFT 5/8 ID X 2-27/32 FLEXIBLE	
7	1	77407	COUPLING SHAFT 3/4 ID X 2-27/32 FLEXIBLE	
8	1	77408	SPIDER COUPLING SHAFT	
9	1	77409	HIGH FLOW MUFFLER 1/2 NPTM	
10	1	77411	ADAPTER MOTOR TO HYDRAULIC PUMP	
11	2	77459	FTG ELBOW 1/2 NPTM X 3/8 TUBE PRESTOLOC SWIVEL 90 DEG BRASS	
12	16	77544	WASHER 1/4 FLTW SS	
13	1	77561	U-BOLT CLAMPING M16 THREAD FOR 5-13/16 OD 5 PIPE	
14	4	78415	WASHER 1/2 FLTW SS	
15	4	78665	WASHER 1/2 LOCW SS	
16	2	79952	BRG PILLOW BLOCK 1 DIA	
17	1	81871	FTG TEE 1/2 FEMALE NPT SS 15,000 PSI	
18	1	81874	FTG MALE ADAPTER SS 15,000 PSI 1-12 TYPE M X 1/2 MNPT	
19	16	81894	HOSE LOW PRESSURE PUSH-LOK 3/4 ID	
20	2	81917	FTG BARB 1/2 NPTM X 1/2 HOSE SWIVEL BRASS	
21	2	82668	SCREW 3/8-16 X 1 SHCS SS	
22	24	82847	HOSE LOW PRESSURE PUSH LOK 1/2 ID	
23	3	83105	FTG TUBE CONNECTOR 1/4 NPTM X 3/8 TUBE SUPER DUPLEX	
24	1	83671	FTG CONNECTOR 1/2 NPTM X 3/8 TUBE SUPER DUPLEX	
25	4	83911	SCREW 1/2-13 X 1-1/2 HHCS GR 5 ZINC PLATED	
26	1	85259	ADAPTER 9/16 TYPE M X 1/4 MNPT STAINLESS 15 KSI	
27	10	85289	TUBING 3/8 OD X 1/4 ID POLYETHELYNE	
28	8	87076	SCREW 1/4-20 X 3/4 HHCS FLANGE HEAD GR5	
29	4	87775	RIVET BLIND 1/8 DIA SS 316	
30	1	87856	FTG TEE 1/4 NPTF 15 KSI	
31	1	88031	FTG PUSH ON HOSE BARB BRASS 1 HOSE X 3/4 MALE NPT	
32	1	88032	FTG PUSH ON HOSE BARB BRASS 1 HOSE X 1 MALE NPT	
33	1	88040	FTG PUSH-ON HOSE BARB 3/4 HOSE X 3/4 MALE NPT SWIVEL BRASS	
34	1	88051	GROMMET LOCKING NYLON BLACK 1-1/16 ID X 1-1/2 PANEL HOLE	
35	1	88147	RESERVOIR HYDRAULIC	
36	1	88211	HOSE ASSY 3 KSI 1/2 JIC-8F X 11 OAL STRAIGHT END AND AND LONG DROP 90° END	
37	1	88240	TUBE 3/8 SUPER DUPLEX BOTTOM INTERLOCK INLET CLAMP FIXTURE USV	
38	1	88241	TUBE 3/8 SUPER DUPLEX TOP INTERLOCK INLET CLAMP FIXTURE USV	
39	1	88998	SPACER U-BOLT CLAMP	
40	1	89019	PUMP HYDRAULIC SAE-A 11.9 GPM CLOCKWISE DRIVE	P-02

FIGURE A-12. USV-2-25T ASSEMBLY PARTS LIST 1 (P/N 90206)

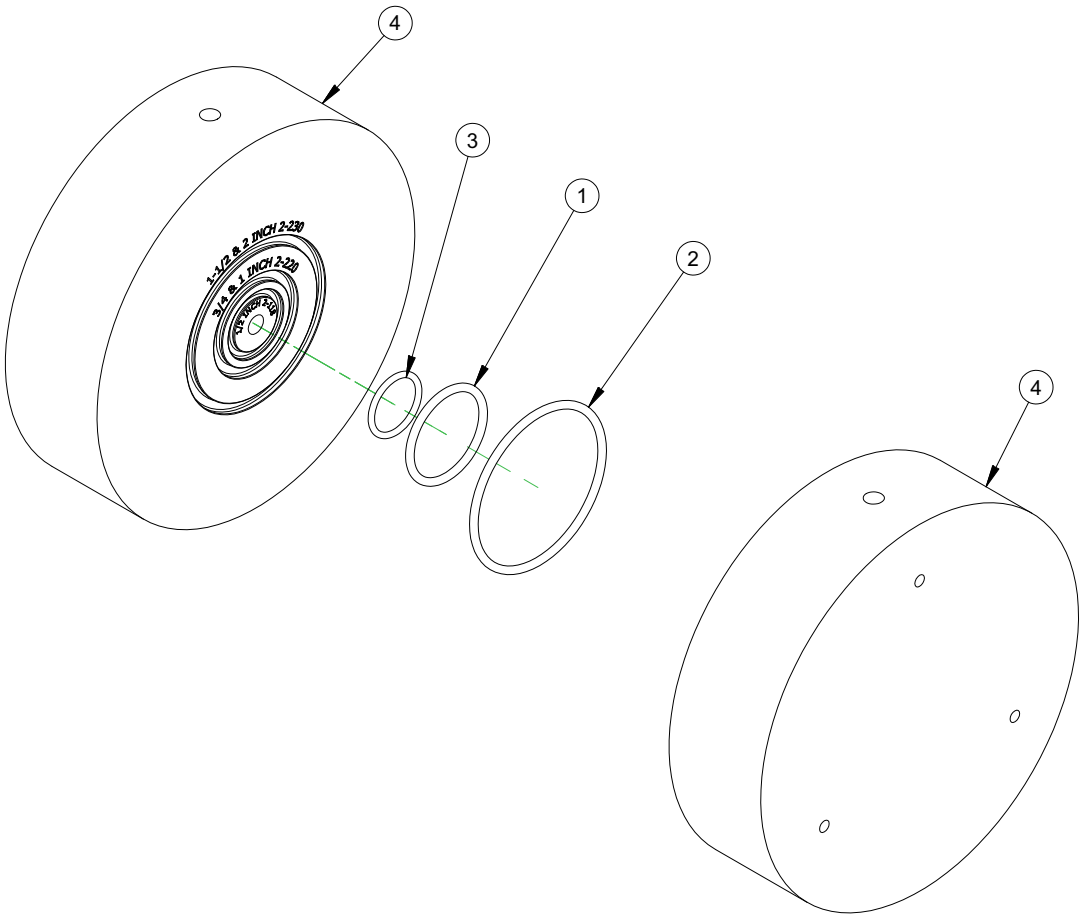
PARTS LIST				
ITEM	QTY	P/N:	DESCRIPTION	SCHEMATIC ID
41	1	89107	FTG ADAPTER SAE-12M (1-1/16-12) ORB X 3/4 FNPT	
42	1	89108	FTG ELBOW SAE-10M (7/8-14) X JIC-10M (5/8)	
43	1	89109	FTG REDUCER JIC-10F (5/8) X JIC-8M (1/2)	
44	1	89122	LABEL CAUTION - DO NOT REMOVE LIFTING DEVICE 4-5/8 X 3-1/4	
45	1	89318	HOSE ASSY .23 ID 1/4 NPTM SS X 9/16 FEM TYPE M SS X 240 IN OAL 17.4KSI (6/2WL)	
46	1	89319	HOSE ASSY .50 ID 1/2 NPTM SS X 1-12 FEM TYPE M SS X 240 IN OAL 15KSI (13/2W)	
47	1	90326	CONSOLE CONTROL USV 25T	
48	1	90339	ASSY CLAMP BOX USV-2-25T	
49	1	90340	KIT - SEAL PLATES STATIONARY 1/2"-2" O-RINGS	
50	1	90347	WELDMENT BASE FRAME MODEL USV-2-25T	
51	1	90415	LABEL CLAMPING CHART USV-2-25T	
52	1	90417	KIT - NON TILT MODEL USV-2-25T	
53	1	90422	(NOT SHOWN) CRATE HYDRO USV-2-25T	
54	1	90423	(NOT SHOWN) MANUAL INSTRUCTION USV-2-25T	

FIGURE A-13. USV-2-25T ASSEMBLY PARTS LIST 2 (P/N 90206)



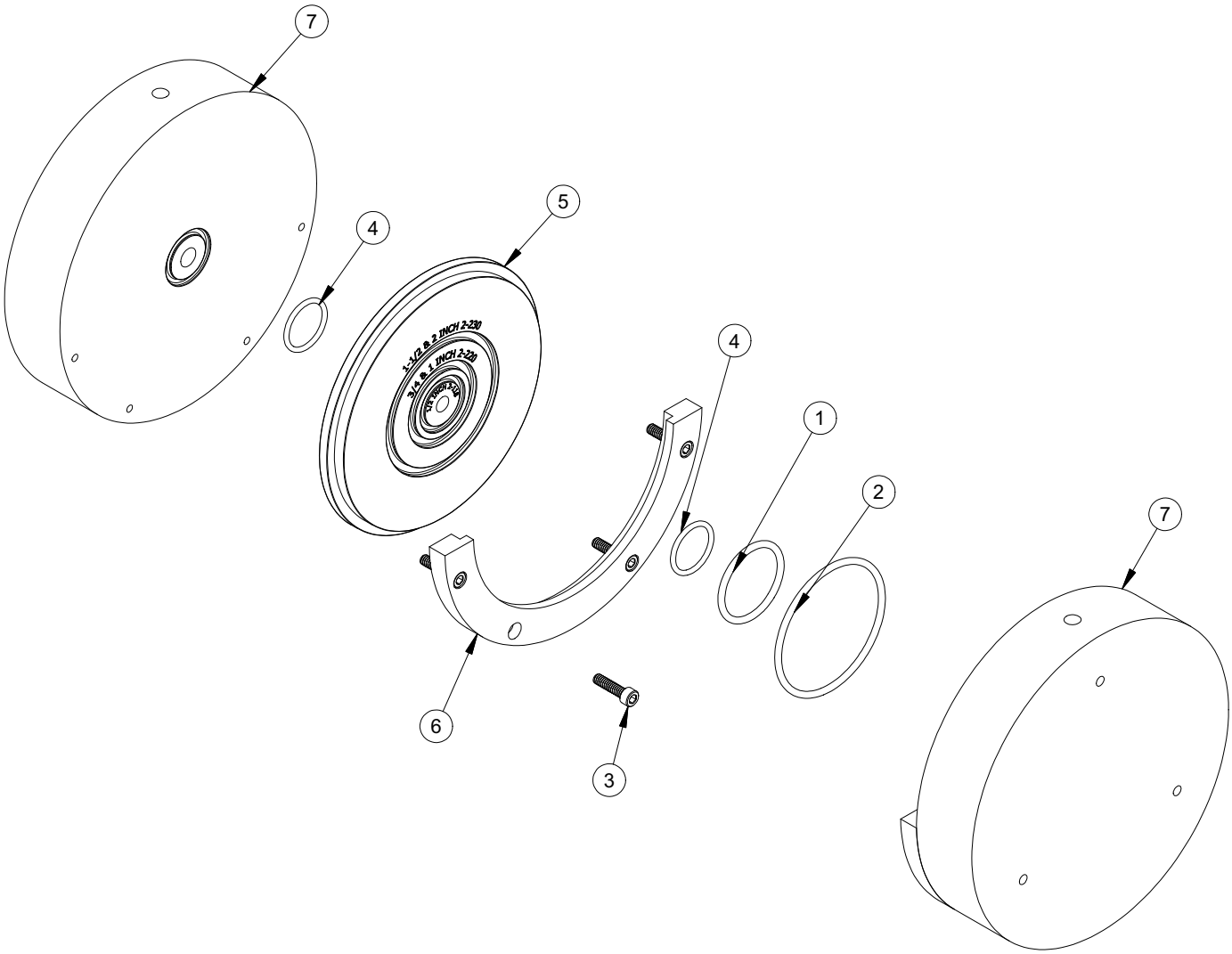
PARTS LIST			
ITEM	QTY	P/N:	DESCRIPTION
1	2	12833	FTG ADAPTER 3/8 NPTM X JIC-6 MALE
2	1	12974	FTG ELBOW 1/2 NPTM X JIC-8 MALE 90 DEG
3	1	70987	SCREW 3/8-16 X 3/4 HHCS ZINC PLATED
4	1	78672	WASHER 3/8 FLTW SS
5	1	81810	FTG ADAPTER PIPE 9/16 TYPE M X 3/8 NPTM 15000 PSI
6	1	81874	FTG MALE ADAPTER SS 15,000 PSI 1-12 TYPE M X 1/2 MNPT
7	1	83109	FTG CONNECTOR MEDIUM PRESSURE 1 TYPE M x 3/8 MNPT
8	1	85259	ADAPTER 9/16 TYPE M X 1/4 MNPT STAINLESS 15 KSI
9	2	85270	FTG ADAPTER TYPE M12 X 3/8 MNPT 15,000 PSI
10	1	85628	(NOT SHOWN) CABLE RESTRAINT HOSE WHIP .57 DIA X 11.81 LONG
11	1	86005	PLUG 1/2 NPT BRASS
12	2	88892	(NOT SHOWN) COLLAR RESTRAINT HOSE WHIP .47 TO .49 DIA
13	2	88894	(NOT SHOWN) COLLAR RESTRAINT HOSE WHIP .79 TO .83 DIA
14	1	88895	(NOT SHOWN) CABLE RESTRAINT HOSE WHIP .89 DIA X 11.81 LONG
15	1	90404	FTG ELBOW 3/8 NPTM X 3/8 NPTF STREET 90 DEG 15KSI
16	1	90407	HOSE ASSY 3 KSI 3/8 JIC-6F X 29 OAL STRAIGHT END AND AND 90° END
17	1	90409	HOSE ASSY .39 ID 3/4 FEM TYPE M SS BOTH ENDS X 24 IN OAL 15KSI (10/2W)
18	1	90411	HOSE ASSY .50 ID 1-12 FEM TYPE M SS BOTH ENDS X 60 IN OAL 15KSI (13/2W)
19	1	90412	HOSE ASSY .23 ID 9/16 FEM TYPE M SS BOTH ENDS X 70 IN OAL 17.4KSI (6/2WL)
20	2	90426	(NOT SHOWN) CABLE RESTRAINT HOSE WHIP .67 DIA X 11.81 LONG

FIGURE A-14. NON-TILT MODEL KIT ASSEMBLY (P/N 90417)



PARTS LIST			
ITEM	QTY	P/N:	DESCRIPTION
1	4	77587	O-RING 1-3/8 ID X 1-5/8 OD X 1/8 W NITRILE 90 DUROMETER (2-220)
2	4	77588	O-RING 2-1/2 ID X 2-3/4 OD X 1/8 W NITRILE 90 DUROMETER (2-230)
3	4	90236	O-RING 7/8 ID X 1 1/16 OD X 3/32 W NITRILE 90 DUROMETER (2-118)
4	2	90348	SEAL PLATE STATIONARY 1/2"-2" O-RINGS

FIGURE A-15. FIXED SEAL PLATES KIT ASSEMBLY (P/N 90340)



PARTS LIST			
ITEM	QTY	P/N:	DESCRIPTION
1	4	77587	O-RING 1-3/8 ID X 1-5/8 OD X 1/8 W NITRILE 90 DUROMETER (2-220)
2	4	77588	O-RING 2-1/2 ID X 2-3/4 OD X 1/8 W NITRILE 90 DUROMETER (2-230)
4	4	90236	O-RING 7/8 ID X 1 1/16 OD X 3/32 W NITRILE 90 DUROMETER (2-118)
5	2	90919	SEAL PLATE STATIONARY 1/2"-2" O-RINGS
6	1	90921	PAIR CRADLE SEAL HEAD EASY OUT 6"
7	2	90922	HOLDER SEAL HEAD EASY OUT 8"
3	8	89117	SCREW 10-24 X 3/4 SHCS SS

FIGURE A-16. SEAL PLATES EASY-OUT O-RING KIT (P/N 90920)

TABLE A-1. SPARE PARTS LIST

Part number	Description	Quantity
77587	O-RING 1-3/8 ID X 1-5/8 OD X 1/8 W NITRILE 90 DUROMETER (2-220)	4
77588	O-RING 2-1/2 ID X 2-3/4 OD X 1/8 W NITRILE 90 DUROMETER (2-230)	4
90236	O-RING 7/8 ID X 1 1/16 OD X 3/32 W NITRILE 90 DUROMETER (2-118)	4
90348	SEAL PLATE STATIONARY 1/2"-2" O-RINGS	2

APPENDIX B SCHEMATICS

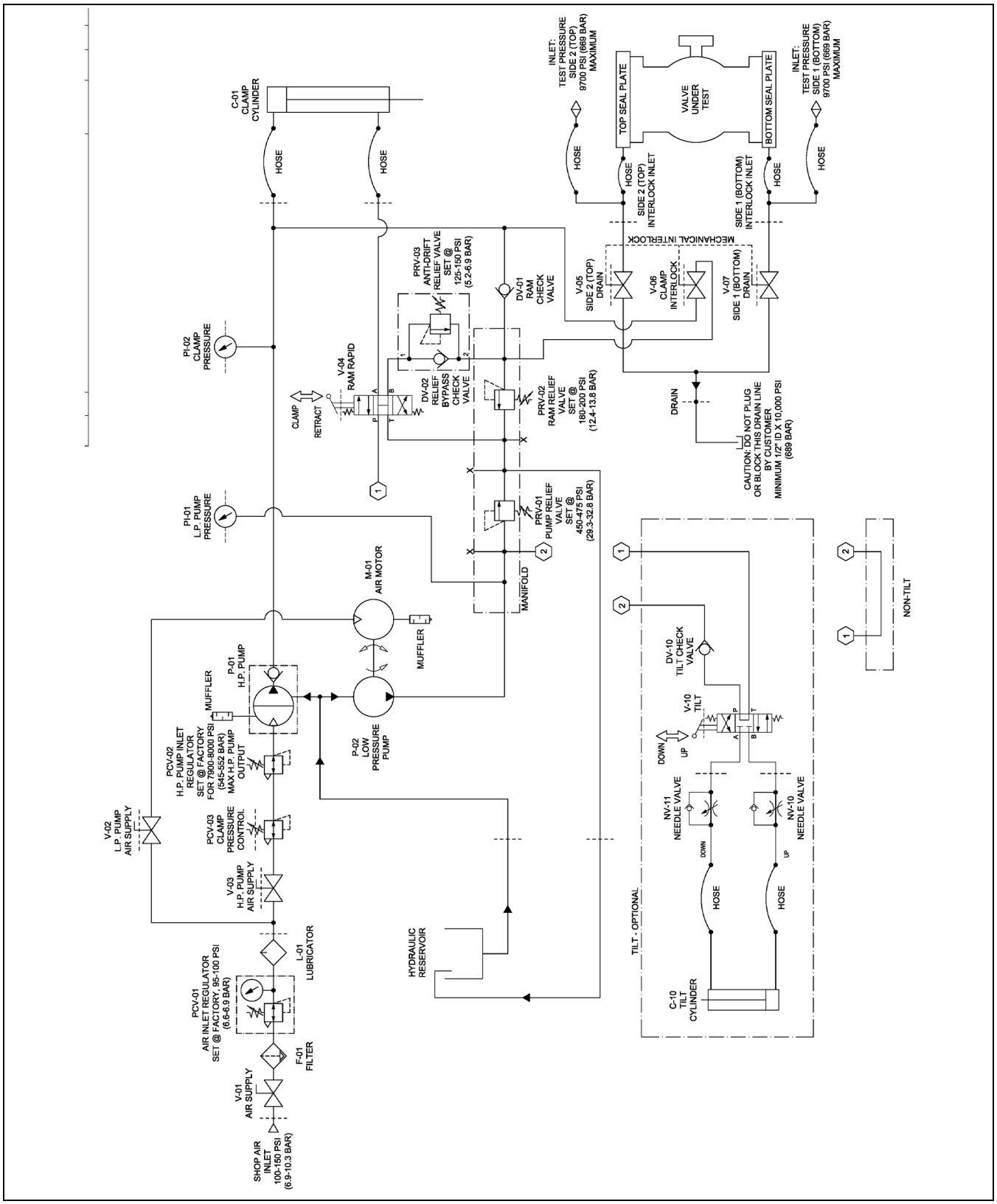


FIGURE B-1. SCHEMATIC P/N 90394

This page intentionally left blank

APPENDIX C SDS

Safety Data Sheet list

MATERIAL SAFETY DATA SHEET
76 Unax AW 32, 46, 68

1. PRODUCT AND COMPANY IDENTIFICATION

Product Name: 76 Unax AW 32, 46, 68

Product Code: 4641032000, 4642046000, 4643068000

Synonyms: 76 Unax AW 32
76 Unax AW 46
76 Unax AW 68

Intended Use: Industrial oil

Chemical Family: Petroleum hydrocarbon

Responsible Party: 76 Lubricants
A Division of ConocoPhillips
600 N. Dairy Ashford
Houston, TX 77079-1175

For Additional MSDSs 800-762-0942

Technical Information: 800-435-7761

The intended use of this product is indicated above. If any additional use is known, please contact us at the Technical Information number listed.

EMERGENCY OVERVIEW

24 Hour Emergency Telephone Numbers:

Spill, Leak, Fire or Accident
Call CHEMTREC
North America: (800)424-9300
Others: (703)527-3887 (collect)

California Poison Control System: (800) 356-3129

Health Hazards/Precautionary Measures: Avoid contact with eyes, skin and clothing. Wash thoroughly after handling.

Physical Hazards/Precautionary Measures: Keep away from all sources of ignition.

Appearance: Clear and bright

Physical form: Liquid

Odor: Mild petroleum

NFPA Hazard Class:

```
Health:      1 (Slight)
Flammability:1 (Slight)
Reactivity:  0 (Least)
```

HMIS Hazard Class

```
Health:          1 (Slight)
Flammability:    1 (Slight)
Physical Hazard: 0 (Least)
```

2. COMPOSITION/INFORMATION ON INGREDIENTS

HAZARDOUS COMPONENTS	% WEIGHT	EXPOSURE GUIDELINE		
		Limits	Agency	Type
Zinc Compound CAS# Proprietary	<1	Not Established		

OTHER COMPONENTS	% WEIGHT	EXPOSURE GUIDELINE		
		Limits	Agency	Type
Lubricant Base Oil (Petroleum) CAS# Various	>99	(See: Oil Mist, If Generated)		
Additives CAS# Proprietary	<1	Not Established		

REFERENCE	EXPOSURE GUIDELINE		
	Limits	Agency	Type
Oil Mist, If Generated CAS# None	5 mg/m3	ACGIH	TWA
	10 mg/m3	ACGIH	STEL
	5 mg/m3	OSHA	TWA
	2500 mg/m3	NIOSH	IDLH
	5 mg/m3	NOHSC	TWA

The base oil for this product can be a mixture of any of the following highly refined petroleum streams: CAS 64741-88-4; CAS 64741-89-5; CAS 64741-96-4; CAS 64741-97-5; CAS 64742-01-4; CAS 64742-52-5; CAS 64742-53-6; CAS 64742-54-7; CAS 64742-55-8; CAS 64742-56-9; CAS 64742-57-0; CAS 64742-62-7; CAS 64742-63-8; CAS 64742-65-0; CAS 72623-85-9; CAS 72623-86-0; CAS 72623-87-1

Note: State, local or other agencies or advisory groups may have established more stringent limits. Consult an industrial hygienist or similar professional, or your local agencies, for further information.

1%=10,000 PPM.

All components are listed on the TSCA inventory.

3. HAZARDS IDENTIFICATION

Potential Health Effects:

Eye: Contact may cause mild eye irritation including stinging, watering, and redness.

Skin: Contact may cause mild skin irritation including redness, and a burning sensation. Prolonged or repeated contact can worsen irritation by causing drying and cracking of the skin leading to dermatitis (inflammation). No harmful effects from skin absorption are expected.

Inhalation (Breathing): No information available. Studies by other exposure routes suggest a low degree of toxicity by inhalation.

Ingestion (Swallowing): No harmful effects expected from ingestion.

Signs and Symptoms: Effects of overexposure may include irritation of the nose and throat, irritation of the digestive tract, nausea and diarrhea.

Cancer: Inadequate evidence available to evaluate the cancer hazard of this material. See Section 11 for carcinogenicity information of individual components, if any.

Target Organs: No data available for this material.

Developmental: No data available for this material.

Pre-Existing Medical Conditions: Conditions aggravated by exposure may include skin disorders.

4. FIRST AID MEASURES

Eye: If irritation or redness develops, move victim away from exposure and into fresh air. Flush eyes with clean water. If symptoms persist, seek medical attention.

Skin: Wipe material from skin and remove contaminated shoes and clothing. Cleanse affected area(s) thoroughly by washing with mild soap and water and, if necessary, a waterless skin cleanser. If irritation or redness develops and persists, seek medical attention.

Inhalation (Breathing): If respiratory symptoms develop, move victim away from source of exposure and into fresh air. If symptoms persist, seek medical attention. If victim is not breathing, clear airway and immediately begin artificial respiration. If breathing difficulties develop, oxygen should be administered by qualified personnel. Seek immediate medical attention.

Ingestion (Swallowing): First aid is not normally required; however, if swallowed and symptoms develop, seek medical attention.

Note To Physicians: High-pressure hydrocarbon injection injuries may produce substantial necrosis of underlying tissue despite an innocuous appearing external wound. Often these injuries require extensive emergency surgical debridement and all injuries should be evaluated by a specialist in order to assess the extent of injury.

5. FIRE FIGHTING MEASURES

Flammable Properties:
Flash Point: >384°F/>196°C (COC)
OSHA Flammability Class: Not applicable
LEL/UEL%: No Data
Autoignition Temperature: No Data

Unusual Fire & Explosion Hazards: This material may burn, but will not ignite readily. If container is not properly cooled, it can rupture in the heat of a fire.

Extinguishing Media: Dry chemical, carbon dioxide, foam, or water spray is recommended. Water or foam may cause frothing of materials heated above 212°F. Carbon dioxide can displace oxygen. Use caution when applying carbon dioxide in confined spaces.

Fire Fighting Instructions: For fires beyond the incipient stage, emergency responders in the immediate hazard area should wear bunker gear. When the potential chemical hazard is unknown, in enclosed or confined spaces, or when explicitly required by DOT, a self contained breathing apparatus should be worn. In addition, wear other appropriate protective equipment as conditions warrant (see Section 8).

Isolate immediate hazard area, keep unauthorized personnel out. Stop spill/release if it can be done with minimal risk. Move undamaged containers from immediate hazard area if it can be done with minimal risk.

Water spray may be useful in minimizing or dispersing vapors and to protect personnel. Cool equipment exposed to fire with water, if it can be done with minimal risk. Avoid spreading burning liquid with water used for cooling purposes.

6. ACCIDENTAL RELEASE MEASURES

This material may burn, but will not ignite readily. Keep all sources of ignition away from spill/release. Stay upwind and away from spill/release. Notify persons down wind of the spill/release, isolate immediate hazard area and keep unauthorized personnel out. Stop spill/release if it can be done with minimal risk. Wear appropriate protective equipment including respiratory protection as conditions warrant (see Section 8).

Prevent spilled material from entering sewers, storm drains, other unauthorized drainage systems, and natural waterways. Dike far ahead of spill for later recovery or disposal. Spilled material may be absorbed into an appropriate absorbent material.

Notify fire authorities and appropriate federal, state, and local agencies. Immediate cleanup of any spill is recommended. If spill of any amount is made into or upon navigable waters, the contiguous zone, or adjoining shorelines, notify the National Response Center (phone number 800-424-8802).

7. HANDLING AND STORAGE

Handling: Do not enter confined spaces such as tanks or pits without following proper entry procedures such as ASTM D-4276 and 29CFR 1910.146. The use of appropriate respiratory protection is advised when concentrations exceed any established exposure limits (see Sections 2 and 8).

Do not wear contaminated clothing or shoes. Use good personal hygiene practices.

High pressure injection of hydrocarbon fuels, hydraulic oils or greases under the skin may have serious consequences even though no symptoms or injury may be apparent. This can happen accidentally when using high pressure equipment such as high pressure grease guns, fuel injection apparatus or from pinhole leaks in tubing of high pressure hydraulic oil equipment.

"Empty" containers retain residue and may be dangerous. Do not pressurize, cut, weld, braze, solder, drill, grind, or expose such containers to heat, flame, sparks, or other sources of ignition. They may explode and cause injury or death. "Empty" drums should be completely drained, properly bunged, and promptly shipped to the supplier or a drum reconditioner. All containers should be disposed of in an environmentally safe manner and in accordance with governmental regulations.

Before working on or in tanks which contain or have contained this material, refer to OSHA regulations, ANSI Z49.1 and other references pertaining to cleaning, repairing, welding, or other contemplated operations.

Storage: Keep container(s) tightly closed. Use and store this material in cool, dry, well-ventilated areas away from heat and all sources of ignition. Store only in approved containers. Keep away from any incompatible material (see Section 10). Protect container(s) against physical damage.

8. EXPOSURE CONTROLS/PERSONAL PROTECTION

Engineering controls: If current ventilation practices are not adequate to maintain airborne concentrations below the established exposure limits (see Section 2), additional engineering controls may be required.

Personal Protective Equipment (PPE):

Respiratory: A NIOSH certified air purifying respirator with a Type 95 (R or P) particulate filter may be used under conditions where airborne concentrations are expected to exceed exposure limits (see Section 2).

Protection provided by air purifying respirators is limited (see manufacturer's respirator selection guide). Use a NIOSH approved self-contained breathing apparatus (SCBA) or equivalent operated in a pressure demand or other positive pressure mode if there is potential for an uncontrolled release, exposure levels are not known, or any other circumstances where air purifying respirators may not provide adequate protection. A respiratory protection program that meets OSHA's 29 CFR 1910.134 and ANSI Z88.2 requirements must be followed whenever workplace conditions warrant a respirator's use.

Skin: The use of gloves impervious to the specific material handled is advised to prevent skin contact and possible irritation (see manufacturers literature for information on permeability).

Eye/Face: Approved eye protection to safeguard against potential eye contact, irritation, or injury is recommended. Depending on conditions of use, a face shield may be necessary.

Other Protective Equipment: A source of clean water should be available in the work area for flushing eyes and skin. Impervious clothing should be worn as needed.

Suggestions for the use of specific protective materials are based on readily available published data. Users should check with specific manufacturers to confirm the performance of their products.

9. PHYSICAL AND CHEMICAL PROPERTIES

Note: Unless otherwise stated, values are determined at 20°C (68°F) and 760 mm Hg (1 atm).
Appearance: Clear and bright
Physical State: Liquid
Odor: Mild petroleum
pH: Not applicable
Vapor Pressure (mm Hg): <1
Vapor Density (air=1): >1
Boiling Point/Range: No Data
Freezing/Melting Point: <-27°F / <-33°C
Solubility in Water: Negligible
Specific Gravity: 0.855-0.871
Percent Volatile: Negligible
Evaporation Rate (nBuAc=1): Negligible
Viscosity: 22-68 cSt @ 40°C / 4.3-8.7 cSt @ 100°C
Bulk Density: 7.13-7.26 lb/gal
Flash Point: >384°F / >196°C (COC)
Flammable/Explosive Limits (%): No Data

10. STABILITY AND REACTIVITY

Stability: Stable under normal ambient and anticipated storage and handling conditions of temperature and pressure.

Conditions To Avoid: Extended exposure to high temperatures can cause decomposition.

Materials to Avoid (Incompatible Materials): Avoid contact with strong oxidizing agents.

Hazardous Decomposition Products: Combustion can yield carbon, nitrogen, sulfur, phosphorus, and zinc oxides.

Hazardous Polymerization: Will not occur.

11. TOXICOLOGICAL INFORMATION

Lubricant Base Oil (Petroleum) (CAS# Various)

Carcinogenicity: The petroleum base oils contained in this product have been highly refined by a variety of processes including solvent extraction, hydrotreating, and dewaxing to remove aromatics and improve performance characteristics. None of the oils used are listed as a carcinogen by NTP, IARC, or OSHA.

12. ECOLOGICAL INFORMATION

Not evaluated at this time

13. DISPOSAL CONSIDERATIONS

This material under most intended uses would become used oil due to contamination by physical or chemical impurities. RECYCLE ALL USED OIL. While being recycled, used oil is regulated by 40 CFR 279. Use resulting in chemical or physical change or contamination may also subject it to regulation as hazardous waste. Under federal regulations, used oil is a solid waste managed under 40 CFR 279. However, in California, used oil is managed as hazardous waste until tested to show it is not hazardous. Consult state and local regulations regarding the proper handling of used oil. In the case of used oil, the intent to discard it may cause the used oil to be regulated as hazardous waste.

Contents should be completely used and containers emptied prior to discard. Rinsate may be considered a RCRA hazardous waste and must be disposed of with care and in compliance with federal, state and local regulations. Large empty containers, such as drums, should be returned to the distributor or a drum reconditioner. To assure proper disposal of small empty containers, consult with state and local regulations and disposal authorities.

14. TRANSPORT INFORMATION

DOT Shipping Description: Not classified as hazardous

15. REGULATORY INFORMATION

EPA SARA 311/312 (Title III Hazard Categories):

Acute Health:	No
Chronic Health:	No
Fire Hazard:	No
Pressure Hazard:	No
Reactive Hazard:	No

SARA 313 and 40 CFR 372:
This material contains the following chemicals subject to the reporting requirements of SARA 313 and 40 CFR 372:

Component	CAS Number	Weight %
Zinc Compound	Proprietary	<1

California Proposition 65:

Warning: This material contains the following chemicals which are known to the State of California to cause cancer, birth defects or other reproductive harm, and are subject to the requirements of California Proposition 65 (CA Health & Safety Code Section 25249.5):

--None Known--

Carcinogen Identification:

This material has not been identified as a carcinogen by NTP, IARC, or OSHA. See Section 11 for carcinogenicity information of individual components, if any.

EPA (CERCLA) Reportable Quantity:

--None--

Canada - Domestic Substances List: Listed

WHMIS Class:

Not regulated
This product has been classified in accordance with the hazard criteria of the Controlled Products Regulations (CPR) and the MSDS contains all the information required by the CPR.

16. OTHER INFORMATION

Issue Date: 02/06/03

Previous Issue Date: 01/01/02
Product Code: 4641032000, 4642046000, 4643068000
Revised Sections: New Format
Previous Product Code: 4641032000
MSDS Number: 722330
Status: Final

Disclaimer of Expressed and Implied Warranties:

The information presented in this Material Safety Data Sheet is based on data believed to be accurate as of the date this Material Safety Data Sheet was prepared. **HOWEVER, NO WARRANTY OF MERCHANTABILITY, FITNESS FOR ANY PARTICULAR PURPOSE, OR ANY OTHER WARRANTY IS EXPRESSED OR IS TO BE IMPLIED REGARDING THE ACCURACY OR COMPLETENESS OF THE INFORMATION PROVIDED ABOVE, THE RESULTS TO BE OBTAINED FROM THE USE OF THIS INFORMATION OR THE PRODUCT, THE SAFETY OF THIS PRODUCT, OR THE HAZARDS RELATED TO ITS USE.** No responsibility is assumed for any damage or injury resulting from abnormal use or from any failure to adhere to recommended practices. The information provided above, and the product, are furnished on the condition that the person receiving them shall make their own determination as to the suitability of the product for their particular purpose and on the condition that they assume the risk of their use. In addition, no authorization is given nor implied to practice any patented invention without a license.


CLIMAX
BORTECH
CALDER
H&S TOOL