HFS ANSI

HYDRAULIC FLANGE SEAL

OPERATING MANUAL

ORIGINAL INSTRUCTIONS











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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

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 (Asia Pacific Headquarters)

316 Tanglin Road #02-01 Singapore 247978

Telephone: +65-9647-2289

Fax: +65-6801-0699

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 (European Headquarters)

Am Langen Graben 8 52353 Düren, Germany

Telephone: +49 (0) 242-191-7712

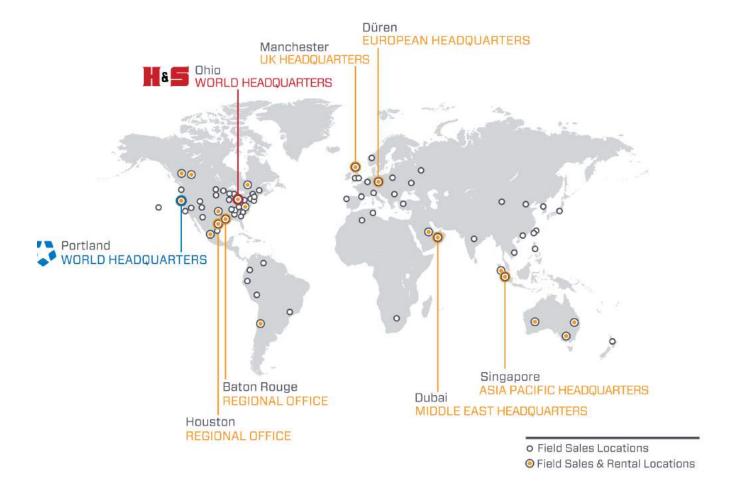
E-mail: info@cpmt.de

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





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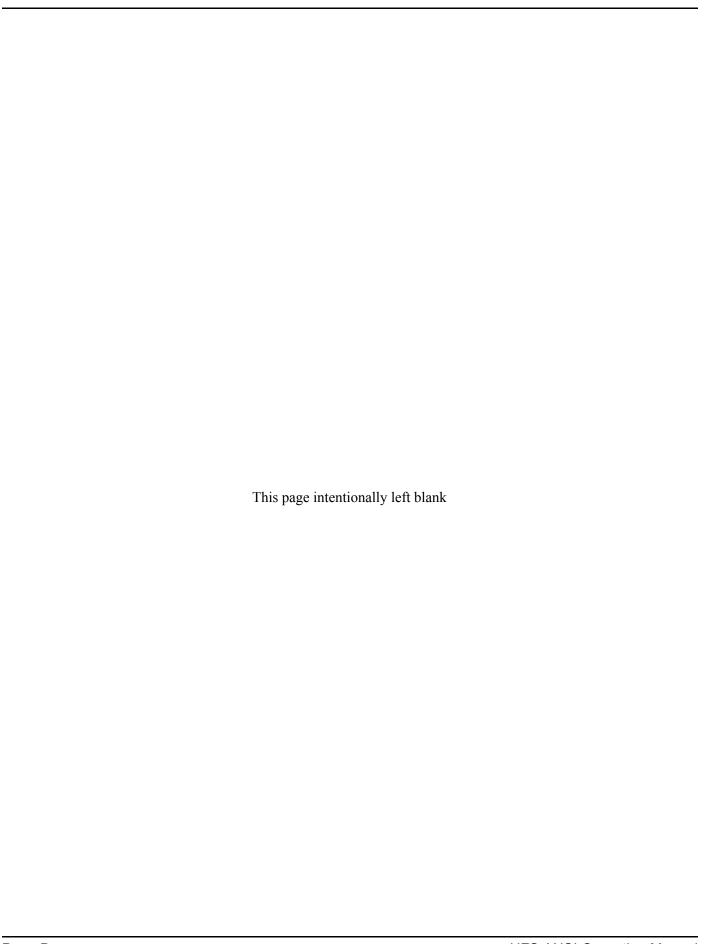
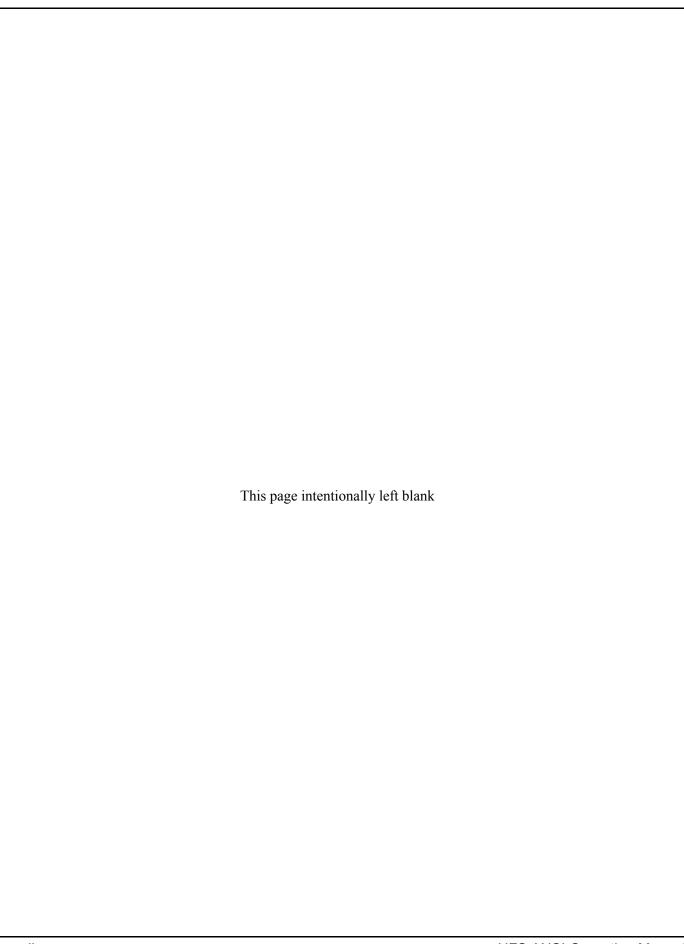




TABLE OF CONTENTS

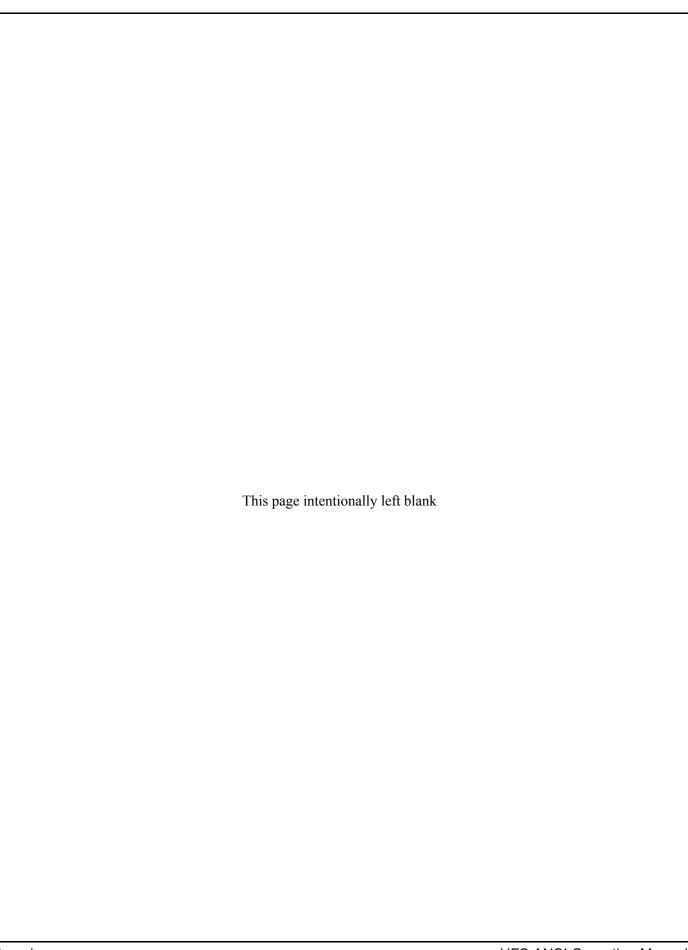
Сна	PTER/SECTION P	AGE
1 IN	TRODUCTION	1
1.1	How to use this manual	1
1.2	SAFETY ALERTS	1
1.3	GENERAL SAFETY PRECAUTIONS	2
1.4	MACHINE-SPECIFIC SAFETY PRECAUTIONS	3
1.5	RISK ASSESSMENT AND HAZARD MITIGATION	4
1.6	RISK ASSESSMENT CHECKLIST	5
1.7	LABELS	6
1.7	7.1 Label identification	6
	7.2 Label location	
2 O	VERVIEW	11
2.1	FEATURES AND COMPONENTS	11
2.2	DIMENSIONS	12
2.3	Specifications	19
2.4	TEMS REQUIRED BUT NOT SUPPLIED	
3 SE	ETUP	21
3.1	RECEIPT AND INSPECTION	21
	LIFTING AND RIGGING	
	CONNECTING THE HFS HYDRAULIC/AIR CONNECTIONS	
4 OI	PERATION	_
4.1	PRE-OPERATION CHECKS	
4.2	CLAMPING THE HFS	23
	CLAMP RELEASING THE HFS	
	AINTENANCE	
	TORAGE AND SHIPPING	
6.1	STORAGE	
6.1	1.1 Short-term storage	
6.1	1.2 Long-term storage	31
6.2	Shipping	
6.3	DECOMMISSIONING	31
ΔΡΡΙ	FNDIX A ASSEMBLY DRAWINGS	33





LIST OF FIGURES

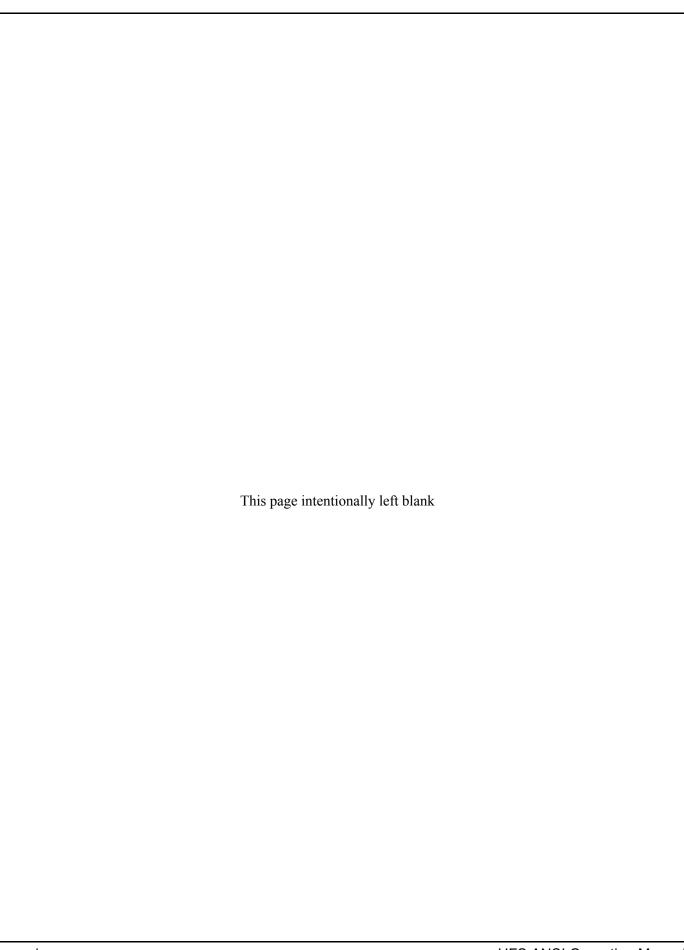
FIGURE	PAGE
1-1 HFS-2 front label locations	7
1-2 HFS-4 front label locations	7
1-3 HFS-6 front label locations	7
1-4 HFS-10 front label locations	
1-5 HFS-14 front label locations	
1-6 HFS-16 front label locations	
1-7 HFS-2 right label locations	
1-8 HFS-4 left label locations	
1-9 HFS-14 back label locations	
1-10 Clamp arm label locations (all HFS models)	
2-1 Components	
2-2 HFS-2 dimensions	
2-3 HFS-4 dimensions	
2-4 HFS-6 dimensions	
2-5 HFS-10 dimensions	
2-6 HFS-14 dimensions	
2-7 HFS-16 dimensions	
3-1 Lifting point identification label	
3-2 HFS-16 ports	
A-1 HFS-2 assembly (P/N 88524)	
A-2 HFS-4 assembly (P/N 88525)	
A-3 HFS-6 assembly (P/N 88527)	
A-4 HFS-10 assembly (P/N 88528)	
A-5 HFS-14 assembly (P/N 88529)	
A-6 HFS-16 assembly (P/N 88530)	39





LIST OF TABLES

TABLE	PAGE
1-1 Risk assessment checklist before set-up	5
1-2 Risk assessment checklist after set-up	
1-3 HFS ANSI labels	6
2-1 Mass specifications	19
3-1 Hoist rings per HFS type	22
4-1 Hydraulic load chart for the HFS-2	24
4-2 Hydraulic load chart for the HFS-4	24
4-3 Hydraulic load chart for the HFS-6	25
4-4 Hydraulic load chart for the HFS-10	25
4-5 Hydraulic load chart for the HFS-14	26
4-6 Hydraulic load chart for the HFS-16	26
5-1 Maintenance intervals and tasks	29
A-1 Spare parts kit	40





1 INTRODUCTION

IN THIS CHAPTER:

1.1 HOW TO USE THIS MANUAL	 	 	-	 	-	 . 1
1.2 SAFETY ALERTS	 	 		 	-	 - 1
1.3 GENERAL SAFETY PRECAUTIONS	 	 		 	-	 . 2
1.4 MACHINE-SPECIFIC SAFETY PRECAUTIONS	 	 		 	-	 . 3
1.5 RISK ASSESSMENT AND HAZARD MITIGATION	 	 		 	-	 - 4
1.6 RISK ASSESSMENT CHECKLIST						
1.7 LABELS	 	 	-	 	-	 - 6
1.7.1 Label identification						
1.7.2 LABEL LOCATION	 	 		 	_	 - 6

1.1 How to use this manual

This manual describes information necessary for the setup, operation, maintenance, storage, shipping, and decommissioning of the HFS ANSI.

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 HFS ANSI 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 here¹:



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



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 produces metal chips 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.

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 valve testers.

The operator must perform an overall review and on-site risk assessment of the intended application. Due to the unique nature of high-pressure valve testing, identifying one or more hazards 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.



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.



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 Portable Machine Tool. 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. HFS ANSI LABELS



1.7.2 Label location

The following figures display the location of the labels on each of the components of the HFS ANSI. For further identification of location placement, refer to the exploded views in Appendix A.



FIGURE 1-1. HFS-2 FRONT LABEL LOCATIONS

Label P/N: 29152, 56300, 80905



FIGURE 1-3. HFS-6 FRONT LABEL LOCATIONS

Label P/N: 29152, 56300, 70554, 80905



FIGURE 1-2. HFS-4 FRONT LABEL LOCATIONS

Label P/N: 29152, 56300, 70554, 80905



FIGURE 1-4. HFS-10 FRONT LABEL LOCATIONS

Label P/N: 29152, 56300, 70554, 80905



FIGURE 1-5. HFS-14 FRONT LABEL LOCATIONS

Label P/N: 29152, 56300, 70554, 80905



FIGURE 1-7. HFS-2 RIGHT LABEL LOCATIONS

Label P/N: 70554, 56300, 80905

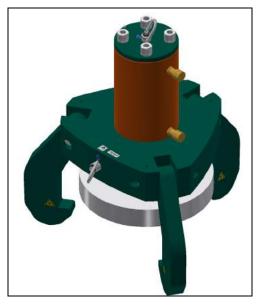


FIGURE 1-6. HFS-16 FRONT LABEL LOCATIONS

Label P/N: 29152, 56300,70554, 80905



FIGURE 1-8. HFS-4 LEFT LABEL LOCATIONS

Label P/N: 29152, 70554, 80905





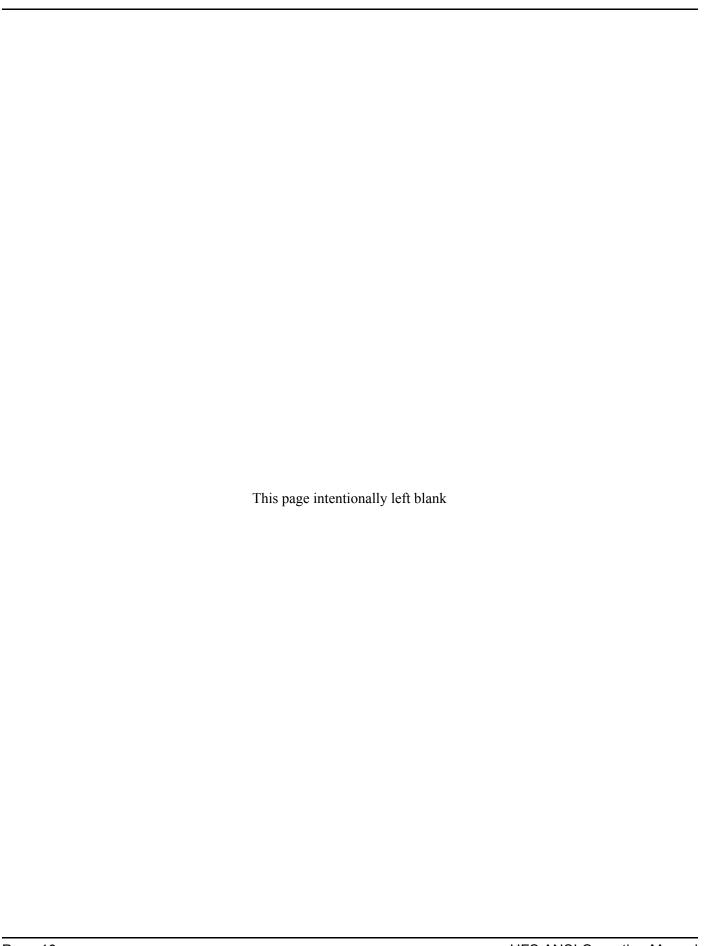
FIGURE 1-9. HFS-14 BACK LABEL LOCATIONS

Label P/N: 29152, 70554, 80905



FIGURE 1-10. CLAMP ARM LABEL LOCATIONS (ALL HFS MODELS)

Label P/N: 80905





2 **OVERVIEW**

IN THIS CHAPTER:

2.1 FEATURES AND COMPONENTS	11	
2.2 DIMENSIONS	12	2
2.3 Specifications	19)
2.4 ITEMS REQUIRED BUT NOT SUPPLIED	19)

2.1 FEATURES AND COMPONENTS

The HFS ANSI is a mobile flange-sealing device commonly used for shell or blind flange testing. The clamping pressure capabilities of the six different types are shown in Table 4-1 on page 24 through Table 4-6 on page 26.

The hydraulic ram presses an O-ring seal plate against a test valve flange seal face while simultaneously gripping the backside of the flange with three clamp arms. This forms a tight seal between the seal plate and the valve flange, enabling the operator to either blind a test valve flange or supply pressure to it through the seal plate without applying a compressive load to the rest of the test valve body.

Principle components include:

Adjustable clamp arms—The three clamp arms are manually adjustable to suit various test valve flange thicknesses and diameters, ensuring that each HFS ANSI is capable of clamping to a specific range of ANSI/ASME Class valve sizes.

Pivoting seal plate—Enables the seal plate to pivot and swivel during clamping for better sealing surface contact with the test valve flange.

Figure 2-1 on page 12 shows the components.

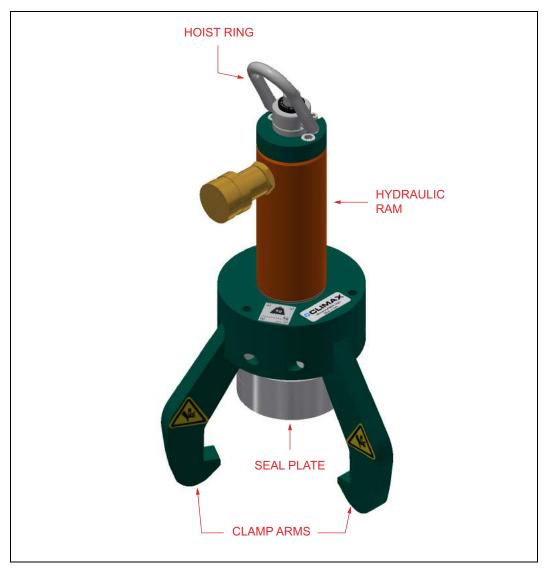


FIGURE 2-1. COMPONENTS

2.2 DIMENSIONS

The following figures show the machine and operating dimensions.



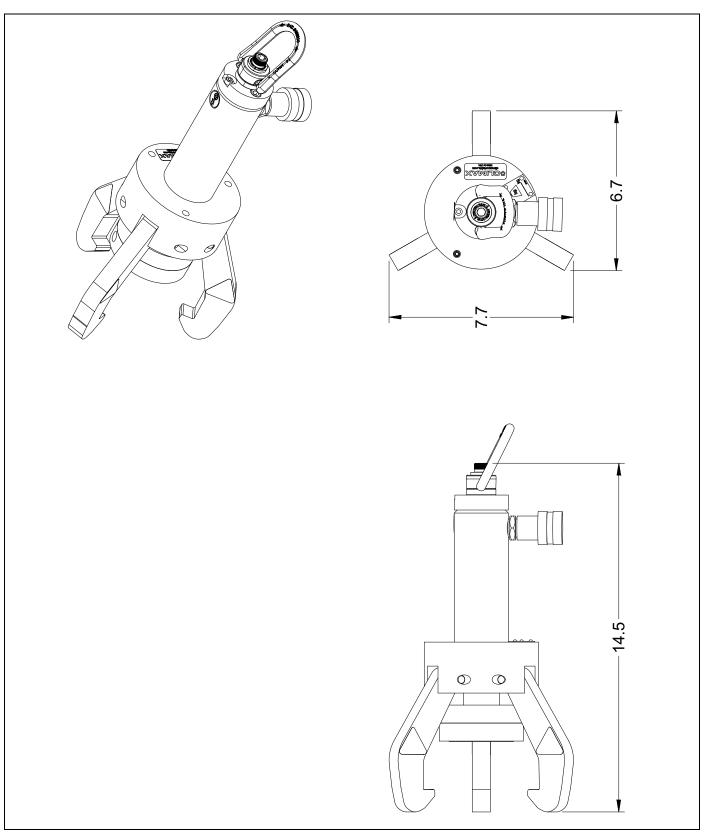


FIGURE 2-2. HFS-2 DIMENSIONS

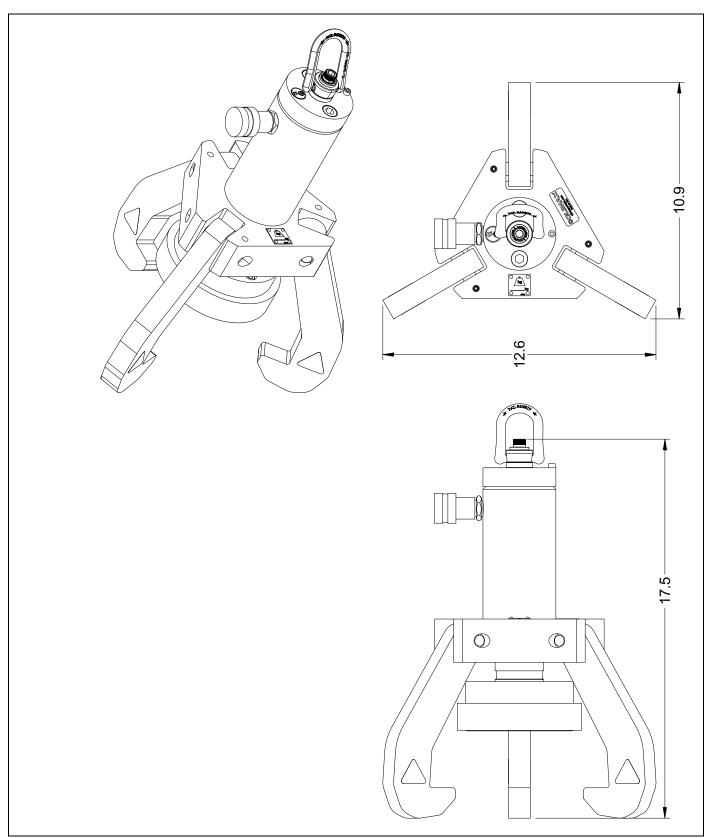


FIGURE 2-3. HFS-4 DIMENSIONS



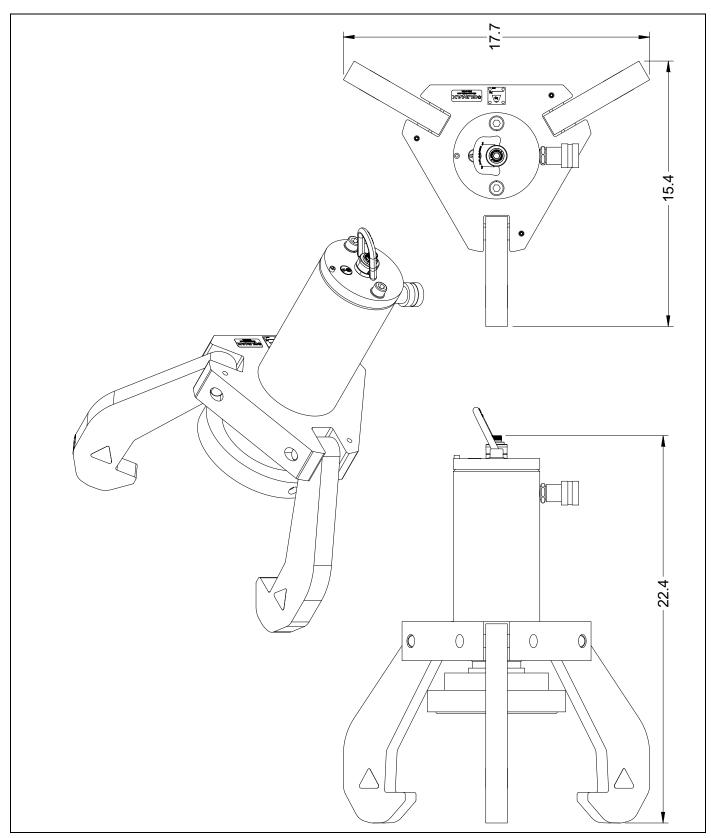


FIGURE 2-4. HFS-6 DIMENSIONS

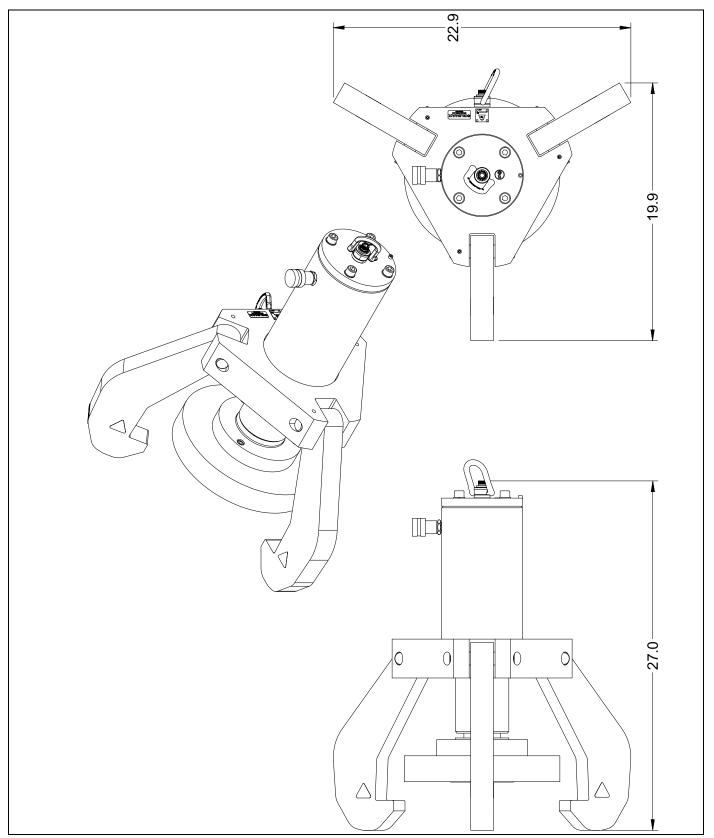


FIGURE 2-5. HFS-10 DIMENSIONS



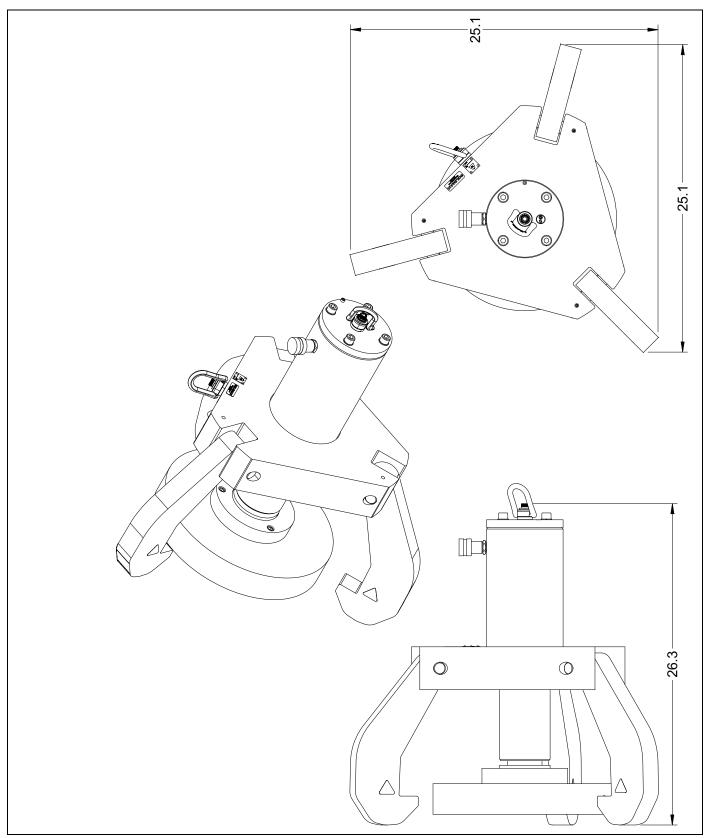


FIGURE 2-6. HFS-14 DIMENSIONS

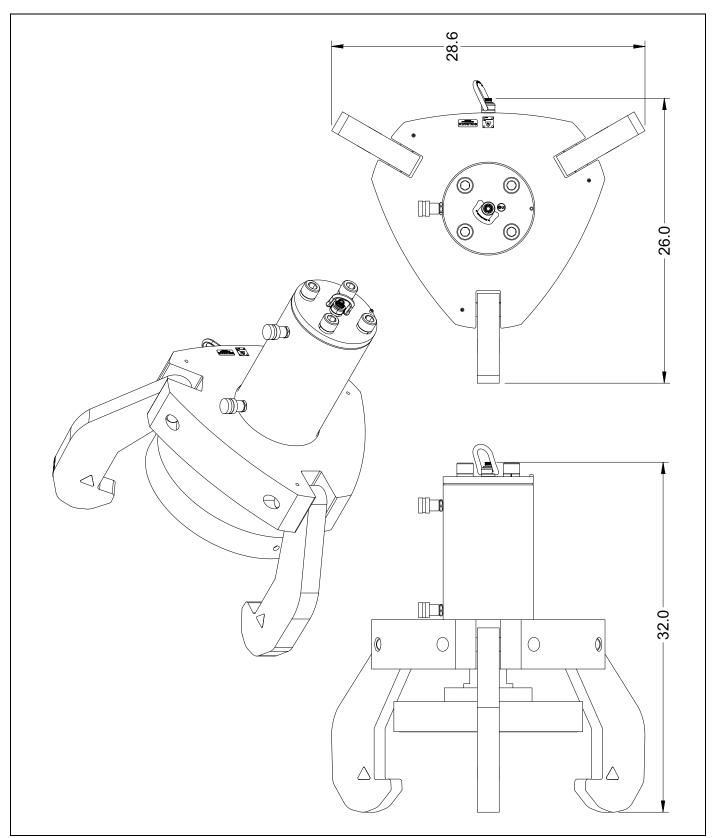


FIGURE 2-7. HFS-16 DIMENSIONS



2.3 SPECIFICATIONS

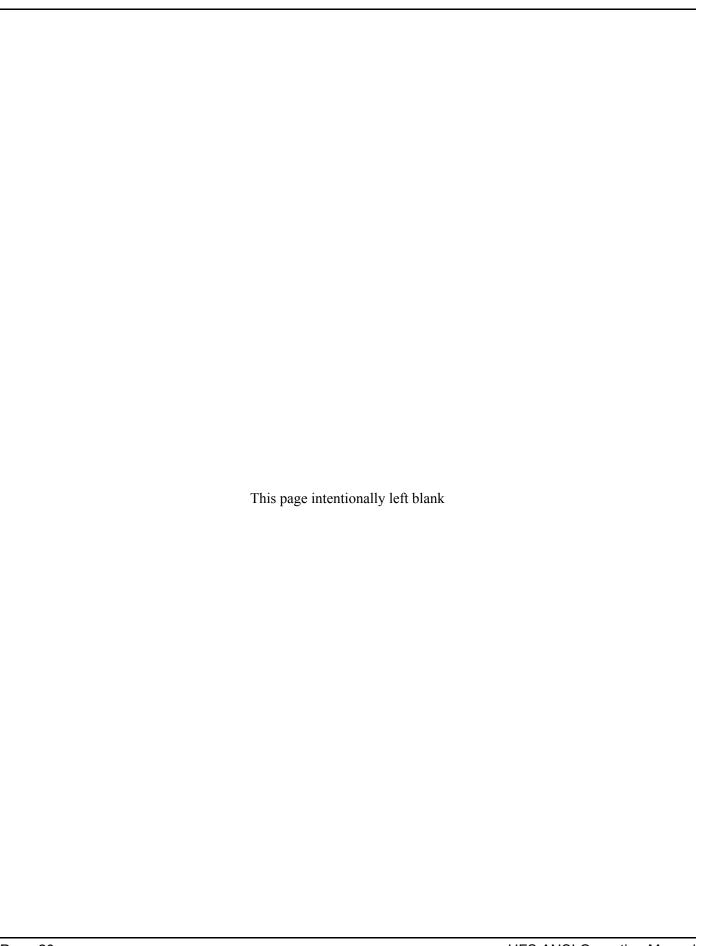
TABLE 2-1. MASS SPECIFICATIONS

Part number	HFS type	Mass in lbs (kg)
88524	HFS-2	26 lbs (12 kg)
88525	HFS-4	68 lbs (31 kg)
88527	HFS-6	155 lbs (70 kg)
88528	HFS-10	342 lbs (155 kg)
88529	HFS-14	493 lbs (224 kg)
88530	HFS-16	879 lbs (399 kg)

2.4 ITEMS REQUIRED BUT NOT SUPPLIED

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

- High-pressure hydraulic source with 10,000 psi working-pressure hose.
- Low-pressure air source (shop air, 100–150 psi [6.9–10.3 bar]) with air hose (for HFS-16)





3 SETUP

IN THIS CHAPTER:

3.1 RECEIPT AND INSPECTION						 	 	 	 -	 -	 	-		-21
3.2 LIFTING AND RIGGING						 	 	 	 -	 -	 	-		-21
3.3 CONNECTING THE HES HYD	ORAULIO	AIR C	ONNE	CTION	IS -	 	 	 	 _	 	 	_	Ι.	-22

This section describes the setup and assembly procedures for the HFS ANSI hydraulic flange seal.

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.

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 LIFTING AND RIGGING

WARNING

Falling or uncontrolled swinging of machinery can cause serious injury or be fatal to the operator and bystanders. Only lift the machine by the hoist rings marked by Figure 3-1.



FIGURE 3-1. LIFTING POINT IDENTIFICATION LABEL

Attach hoist shackles (rated for the lifting loads) to each hoist ring (marked by the label shown in Figure 3-1) according to Table 3-1.

TABLE 3-1. HOIST RINGS PER HFS TYPE

HFS type	Number of hoist rings required
HFS-2	
HFS-4	1
HFS-6	
HFS-10	
HFS-14	2
HFS-16	

3.3 CONNECTING THE HFS HYDRAULIC/AIR CONNECTIONS

A hydraulic line is included with a quick coupler to provide hydraulic pressure for clamping the HFS ANSI.

Connect the HFS hydraulic hose to the top connection port on the HFS ANSI, as shown in Figure 3-2. When clamp pressure is released, the HFS ram will slowly retract.

Shop air (100–150 psi [6.9–10.3 bar]) is used to retract the HFS-16. Connect the HFS retract air hose to the lower port on the HFS-16, as shown in Figure 3-2 (a quick coupler is provided).

The air provides constant pressure in the retract direction and may be left connected throughout the test.

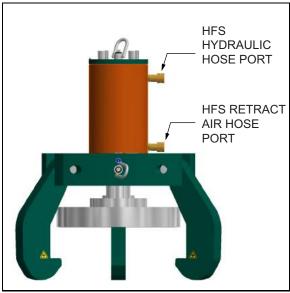


FIGURE 3-2. HFS-16 PORTS



4 OPERATION

IN THIS CHAPTER:

4.1 Pre-operation checks	-23
4.2 CLAMPING THE HFS	-23
4.3 CLAMP RELEASING THE HFS	-27

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 the machine is securely mounted to the workpiece.
- 4. Check that the air and hydraulic hoses are routed and secured to avoid tripping, entanglement, or other damage should an air hose or connection fail.

4.2 CLAMPING THE HFS

Do the following to clamp the HFS:

- 1. Clamp the test valve in the clamp fixture. If testing a 90° valve and using a Calder universal flanged valve (UFV) tester with tilt capability, refer to the UFV manual.
- 2. Check that there is no test pressure or hydraulic pressure to the HFS.
- 3. Refer to the following tables for the range of flange sizes that each HFS is designed to test.

TABLE 4-1. HYDRAULIC LOAD CHART FOR THE HFS-2

Valve size (inches)	O-ring size	ASME class						
		150	<mark>300</mark>	600	900	1500	2500	
		Maximum test pressures psi (bar)						
		430 (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	2-121	400 (28)	800 (55)	1,600 (110)	2,300 (159)	3,900 (269)	6,400 (441)	
3/4	2-121	400 (28)	800 (55)	1,600 (110)	2,300 (159)	3,900 (269)	6,400 (441)	
1	<mark>2-130</mark>	700 (48)	1,600 (110)	3,100 (214)	4,700 (324)	7,800 (538)		
1 1/4	2-130	700 (48)	1,600 (110)	3,100 (214)				
1 1/2	2-230	1,500 (103)	3,600 (248)	7,100 (490)				
2	2-230	1,500 (103)						

TABLE 4-2. HYDRAULIC LOAD CHART FOR THE HFS-4

	O-ring size	ASME class							
Valve size (inches)		150	300	600	900	1500	2500		
		Maximum test pressures psi (bar)							
		430 (31)	1,125 (78)	2,250 (155)	3,375 (233)	5,625 (388)	9,375 (646)		
		Hydraulic pressure required to seal psi (bar)							
2	2-230	700 (48)	1,600 (110)	3,100 (214)	4,600 (317)	7,700 (531)			
3	2-239	1,200 (83)	3,000 (207)	6,000 (414)	9,000 (621)				
4	2-350	2,000 (138)	5,000 (345)						



TABLE 4-3. HYDRAULIC LOAD CHART FOR THE HFS-6

				ASME	class		
Valva		150	300	600	900	1500	2500
Valve size	O-ring		Maximu	m test pr	essures	psi (bar)	
(inches)	size	430 (31)	1,125 (78)	2,250 (155)	3,375 (233)	5,625 (388)	9,375 (646)
		Hydr	aulic pre	ssure re	quired to	seal psi	(bar)
2	2-230						6,000 (414)
3	2-239				4,200 (290)	7,000 (483)	
4	2-350	1,000 (69)	2,400 (165)	4,700 (324)	7,000 (483)		
5	2-358	1,400 (97)	3,400 (234)	6,700 (462)			
6	2-364	1,900 (131)	4,700 (324)	9,300 (641)			

TABLE 4-4. HYDRAULIC LOAD CHART FOR THE HFS-10

				ASME	class		
Valve		150	300	600	900	1500	2500
size	O-ring		Maximu	m test pr	essures	psi (bar)	
(inches)	size	430 (31)	1,125 (78)	2,250 (155)	3,375 (233)	5,625 (388)	9,375 (646)
		Hydr	aulic pre	ssure red	quired to	seal psi	(bar)
3	2-239						6,000 (414)
4	2-350					6,300 (434)	
5	2-358			3,600 (248)	5,400 (372)	8,900 (614)	
6	2-364		2,500 (172)	5,000 (345)	7,500 (517)		
8	2-372	1,700 (117)	4,100 (283)	8,100 (558)			
10	2-379	2,600 (176)	6,300 (434)				

TABLE 4-5. HYDRAULIC LOAD CHART FOR THE HFS-14

				ASME	class		
Valva		150	300	600	900	1500	2500
Valve size	O-ring		Maximu	m test pr	essures	psi (bar)	
(inches)	size	430 (31)	1,125 (78)	2,250 (155)	3,375 (233)	5,625 (388)	9,375 (646)
		Hydr	aulic pre	ssure re	quired to	seal psi	(bar)
8	2-372			8,100 (558)			
10	2-379		6,300 (434)				
12	2-382	3,500 (241)	8,700 (600)				
14	2-383	4,000 (276)					

TABLE 4-6. HYDRAULIC LOAD CHART FOR THE HFS-16

				ASME	class		
Valve		150	300	600	900	1500	2500
size	O-ring		Maximu	m test pr	essures	psi (bar)	
(inches)	size	430 (31)	1,125 (78)	2,250 (155)	3,375 (233)	5,625 (388)	9,375 (646)
		Hydr	aulic pre	ssure re	quired to	seal psi	(bar)
8	2-372				8,200 (565)		
10	2-379			8,500 (586)			
12	2-382	2,400 (165)	5,900 (407)				
14	2-383	2,700 (186)	6,800 (469)				
16	2-385	3,500 (241)					



Do not use a HFS that exceeds the operating specification listed in these tables. HFS models must only be used in the flange sizes and pressure ranges defined. Failure to do so may cause the HFS arms to slip off the flange while clamping or testing, which could result in machine damage or personnel injury.



- 4. Lift the HFS using a crane or hoist. Keep the crane or hoist attached throughout the test.
- 5. Align the seal plate with the top flange of the test valve and hook the HFS arms over the top flange. Check that the HFS arms are fully engaged on the valve flange.
- 6. If using a Calder UFV, refer to the UFV operating manual for the clamping process.

WARNING

Always keep fingers, hands and other body parts clear of the clamp mechanisms. Never put fingers, hands or other parts between the clamp contact surfaces (between the clamp arms and the test valve flange), as this could cause personnel injury.

- 7. Clamp to the pressure specified in Table 4-1 through Table 4-6, which is determined by the following steps:
 - a) Select the correct valve size and O-ring size in the first two columns.
 - 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 for the HFS-2 (see Table 4-1 on page 24): using a 1" 300 class valve size at 1,125 psi test pressure = 1,600 psi clamp pressure.

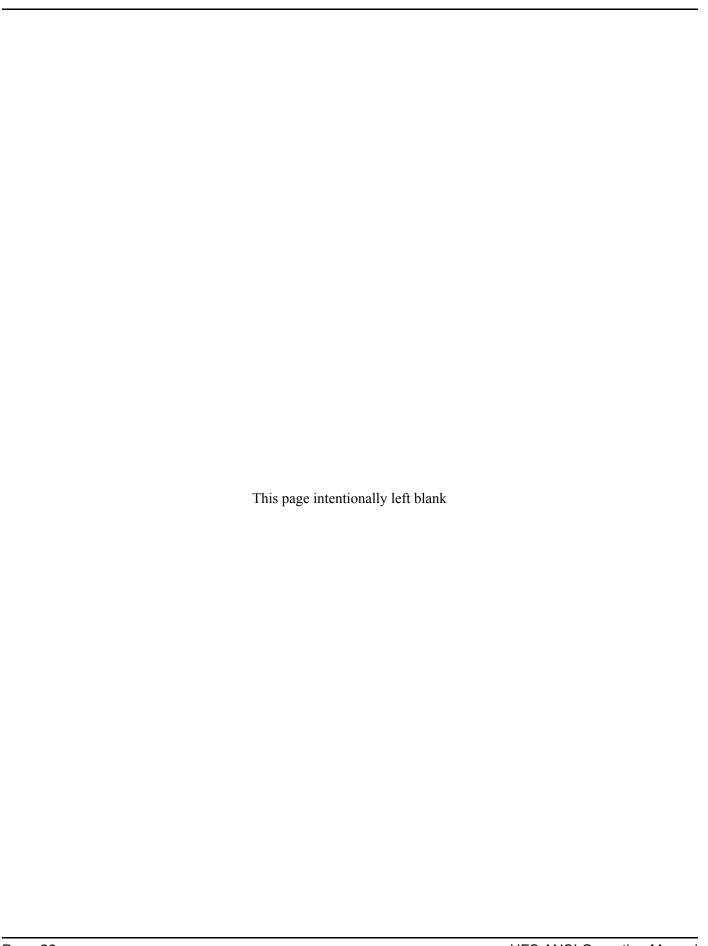
4.3 CLAMP RELEASING THE HFS

Do the following to release the clamp from the HFS:

- 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. Check that there is zero pressure on all of the TEST PRESSURE gauges.
- 4. Check that the HFS is supported with a crane or hoist.
- 5. Release hydraulic pressure to the HFS. If using a Calder UFV, refer to the UFV operating manual for the unclamping process.



Releasing the HFS before depressurization of test pressure could cause machine damage or personnel injury.



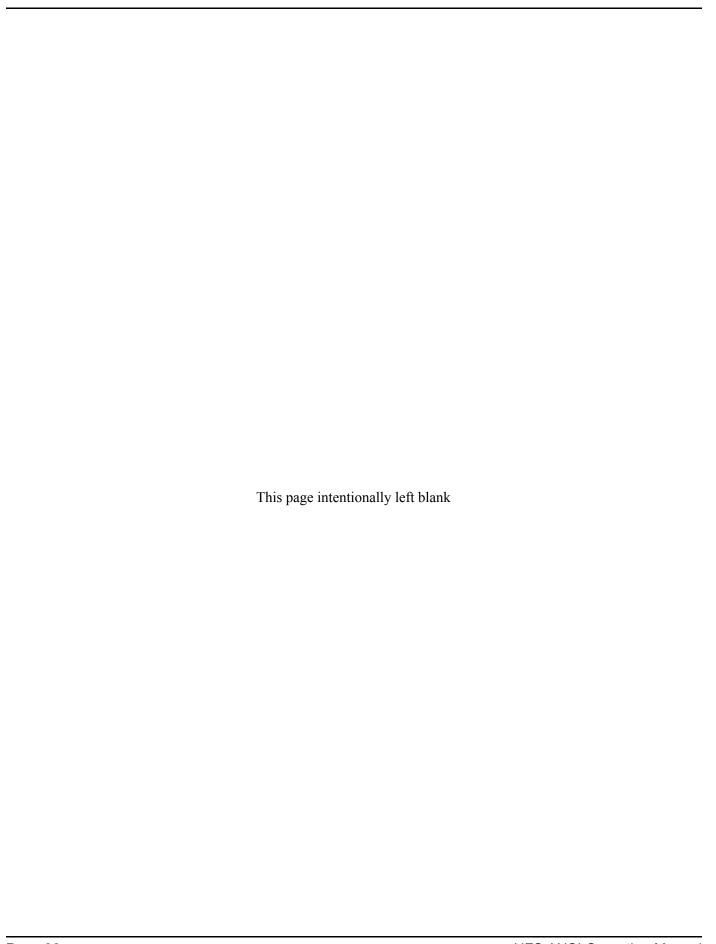


5 MAINTENANCE

Table 5-1 lists maintenance intervals and tasks

TABLE 5-1. MAINTENANCE INTERVALS AND TASKS

Interval	Task
Before each use	Inspect sealing surfaces and O-rings for nick, dings, and chips.
Before and after each use	Clean and inspect sealing surfaces and O-ring grooves.



6 STORAGE AND SHIPPING

6.1 STORAGE

Proper storage of the hydraulic flange seal will extend its usefulness and prevent undue damage.

Before storing, clean the machine with solvent to remove grease and moisture.

Store the hydraulic flange seal in its original shipping container. Keep all packing materials for repackaging the machine.

6.1.1 Short-term storage

Do the following for short-term storage (three months or less):

- 1. Clean the machine with solvent to remove grease and moisture.
- 2. Spray all unpainted surfaces with LPS-2 to prevent corrosion.

6.1.2 Long-term storage

Do the following for long-term storage (longer than three months):

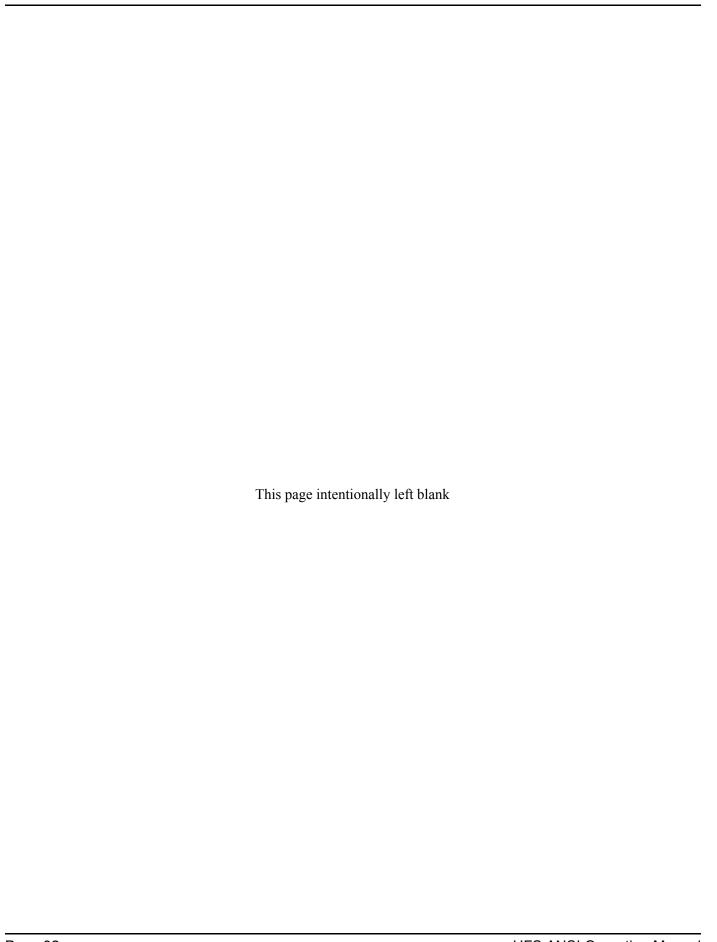
- 1. Follow the short-term storage instructions, but use LPS-3 instead of LPS-2.
- 2. Store the shipping container in an environment out of direct sunlight with temperature < 70°F (21°C) and humidity < 50%.

6.2 SHIPPING

The hydraulic flange seal can be shipped in its original shipping container.

6.3 DECOMMISSIONING

Refer to Appendix A for component assembly information.



APPENDIX A ASSEMBLY DRAWINGS

_	-	
1120	14/160	110+
IJIA	wing	1151

FIGURE A-1. HFS-2 ASSEMBLY (P/N 88524)	 -	-	-	 	-	-	-	 -	 -	-	 -	-	 -	-	-	 -	-34	1
FIGURE A-2. HFS-4 ASSEMBLY (P/N 88525)	 -	-	-	 	-	-	-	 -	 -	-	 -	-	 -	-	-	 -	-35	5
FIGURE A-3. HFS-6 ASSEMBLY (P/N 88527)	 -	-	-	 	-	-	-	 -	 -	-	 -	-	 -	-	-	 -	-36	3
FIGURE A-4. HFS-10 ASSEMBLY (P/N 88528)	 -	-	-	 	-	-	-	 -	 -	-	 -	-	 -	-	-	 -	-37	7
FIGURE A-5. HFS-14 ASSEMBLY (P/N 88529)	 -	-	-	 	-	-	-	 -	 	-	 -	-	 -	-	-	 -	-38	3
FIGURE A-6. HFS-16 ASSEMBLY (P/N 88530)	 -	-	-	 	-	-	-	 -	 	-	 -	-	 -	-	-	 -	-39	9
TABLE A-1. SPARE PARTS KIT	 -	-	-	 	-	-	-	 -	 	-	 -	-	 -	-	-	 -	-40)

			PARTSLIST
ITEM	ΩTY	P/N:	DESCRIPTION
-	4	10588	SCREW DRIVE #2 x 1/4 HOLE SIZE .089
2	1	29152	PLATE MASS CE
3	-	41471	HOIST RING 3/8-16 X .56 1.3 ID 2.18 OD 3.79 OAL 1000 LBS SWIVEL
4	1	51016	(NOT SHOWN) RING SPLIT 1.07 OD X .070 WIRE SS
5	1	26300	LABEL CLIMAX LOGO .66 X 1.75
9	1	70554	LABEL WARNING LIFT POINT ROUND .75"
7	1	77586	O-RING 1-1/16 ID X 1-1/4 OD X 3/32 W NITRILE 90 DUROMETER (2-121)
8	1	27588	O-RING 2-1/2 ID X 2-3/4 OD X 1/8 W NITRILE 90 DUROMETER (2-230)
6	3	79045	PIN HFS-2
10	1	79048	BODY HFS-2
11	1	79052	CYLINDER 10 TON SINGLE-ACTING
12	1	29062	LIFT PLATE HFS-2
13	1	09062	CYLINDER INSERT HFS-2
14	1	79062	SWIVEL RING HFS-2
15	1	99062	SEAL PLATE HFS-2
16	2	89062	(NOT SHOWN) LABEL CLAMPING CHART MODEL HFS-2
17	1	79772	O-RING 1-5/8 ID X 1-13/16 OD X 3/32 W NITRILE 90 DUROMETER (2-130)
18	9	80905	LABEL WARNING - HAND CRUSH / FORCE FROM ABOVE GRAPHIC 1.13
			TALL TRIANGLE YELLOW
19	3	82662	SCREW 1/4-20 X 3/4 SHCS SS
20	2	84971	SCREW 5/16-18 X 3/4 SHCS SS
21	1	85457	SCREW 10-24 X 3/8 SHCS SS
22	3	88599	CLAMP ARM HFS-2
23	3	82988	SCREW 1/4-20 X 1/2 SSSCP SS 18-8
24	1	89104	(NOT SHOWN) LANYARD #10 EYE TO 90 DEG EYE 1/16 DIA X 6 IN
			LONG SS

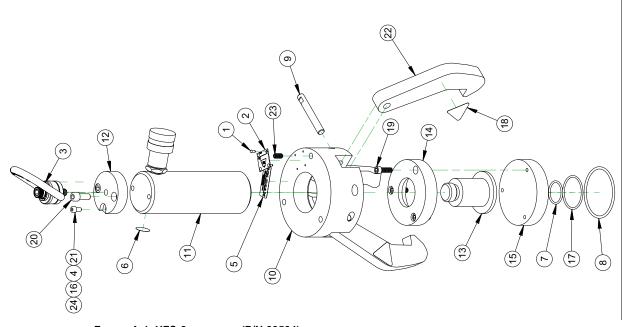


FIGURE A-1. HFS-2 ASSEMBLY (P/N 88524)

ITEM	ΔTΥ	P/N:	PARTS LIST DESCRIPTION
-	4	10588	SCREW DRIVE #2 x 1/4 HOLE SIZE .089
2	-	29152	PLATE MASS CE
3	1	41471	HOIST RING 3/8-16 X .56 1.3 ID 2.18 OD 3.79 OAL 1000 LBS SWIVEL
4	1	51016	(NOT SHOWN) RING SPLIT 1.07 OD X .070 WIRE SS
2	1	26300	LABEL CLIMAX LOGO .66 X 1.75
9	-	70554	LABEL WARNING LIFT POINT ROUND .75"
7	-	77588	O-RING 2-1/2 ID X 2-3/4 OD X 1/8 W NITRILE 90 DUROMETER (2-230)
∞	-	77589	O-RING 3-5/8 ID X 3-7/8 OD X 1/8 W NITRILE 90 DUROMETER (2-239)
6	1	06577	O-RING 4-5/8 ID X 5 OD X 3/16 W NITRILE 90 DUROMETER (2-350)
10	3	22062	PIN HFS-4
11	1	79077	BODY HFS-4
12	1	79082	LIFT PLATE HFS-4
13	1	28062	CYLINDER INSERT HFS-4
14	1	68062	SWIVEL RING HFS-4
15	1	79092	SEAL PLATE HFS-4
16	2	26062	(NOT SHOWN) LABEL CLAMPING CHART MODEL HFS-4
17	9	80905	LABEL WARNING - HAND CRUSH / FORCE FROM ABOVE GRAPHIC
			1.13 TALL TRIANGLE YELLOW
18	3	82668	SCREW 3/8-16 X 1 SHCS SS
19	1	82783	CYLINDER 25 TON SINGLE-ACTING
20	1	85457	SCREW 10-24 X 3/8 SHCS SS
21	2	85923	SCREW 1/2-13 X 1 SHCS 316 STAINLESS
22	3	88601	CLAMP ARM HFS-4
23	3	88678	SCREW 1/4-20 X 1/2 SSSCP SS 18-8
24	-	89104	(NOT SHOWN) LANYARD #10 EYE TO 90 DEG EYE 1/16 DIA X 6 IN
			LONG SS

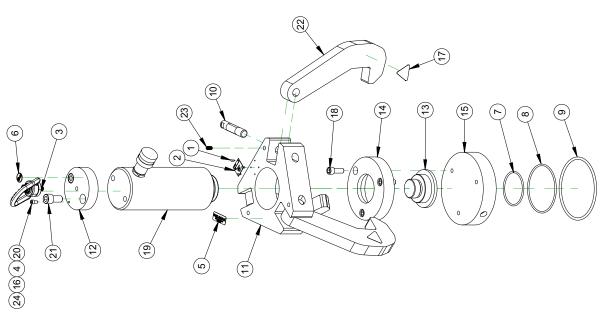


FIGURE A-2. HFS-4 ASSEMBLY (P/N 88525)

			PARTS LIST
ITEM	ΩTY	P/N:	DESCRIPTION
-	4	10588	SCREW DRIVE #2 x 1/4 HOLE SIZE .089
2	-	29152	PLATE MASS CE
3	1	41471	HOIST RING 3/8-16 X .56 1.3 ID 2.18 OD 3.79 OAL 1000 LBS SWIVEL
4	1	51016	(NOT SHOWN) RING SPLIT 1.07 OD X .070 WIRE SS
2	1	26300	LABEL CLIMAX LOGO .66 X 1.75
9	-	70554	LABEL WARNING LIFT POINT ROUND .75"
7	~	77588	O-RING 2-1/2 ID X 2-3/4 OD X 1/8 W NITRILE 90 DUROMETER (2-230)
8	-	77589	O-RING 3-5/8 ID X 3-7/8 OD X 1/8 W NITRILE 90 DUROMETER (2-239)
6	-	77590	O-RING 4-5/8 ID X 5 OD X 3/16 W NITRILE 90 DUROMETER (2-350)
10	7	78456	O-RING 5-5/8 ID X 6 OD X 3/16 W NITRILE 90 DUROMETER (2-358)
11	-	78457	O-RING 6-3/4 ID X 7-1/8 OD X 3/16 W NITRILE 90 DUROMETER (2-364)
12	2	78665	WASHER 1/2 LOCW SS
13	3	66062	PIN HFS-6
14	1	79101	BODY HFS-6
15	1	79102	CYLINDER 55 TON SINGLE-ACTING
16	2	79103	SCREW 1/2-13 X 1-1/4 SHCS SS
17	1	79105	LIFT PLATE HFS-6
18	1	79107	CYLINDER INSERT HFS-6
19	1	79109	SWIVEL RING HFS-6
20	1	79111	SEAL PLATE HFS-6
21	2	79112	(NOT SHOWN) LABEL CLAMPING CHART MODEL HFS-6
22	9	80905	LABEL WARNING - HAND CRUSH / FORCE FROM ABOVE GRAPHIC
			1.13 TALL TRIANGLE YELLOW
23	2	82668	SCREW 3/8-16 X 1 SHCS SS
24	7	85457	SCREW 10-24 X 3/8 SHCS SS
25	3	88603	CLAMP ARM HFS-6
26	3	88678	SCREW 1/4-20 X 1/2 SSSCP SS 18-8
27	٦	89104	(NOT SHOWN) LANYARD #10 EYE TO 90 DEG EYE 1/16 DIA X 6 IN
			LONG SS

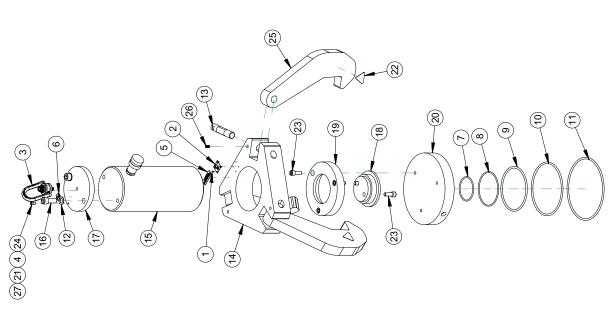


FIGURE A-3. HFS-6 ASSEMBLY (P/N 88527)

			PARTS LIST
ITEM	QTY	P/N:	DESCRIPTION
_	4	10588	SCREW DRIVE #2 x 1/4 HOLE SIZE .089
2	1	29152	PLATE MASS CE
3	2	41471	HOIST RING 3/8-16 X .56 1.3 ID 2.18 OD 3.79 OAL 1000 LBS SWIVEL
4	1	51016	(NOT SHOWN) RING SPLIT 1.07 OD X .070 WIRE SS
2	1	26300	LABEL CLIMAX LOGO .66 X 1.75
9	2	70554	LABEL WARNING LIFT POINT ROUND .75"
7	1	77589	O-RING 3-5/8 ID X 3-7/8 OD X 1/8 W NITRILE 90 DUROMETER (2-239)
8	1	77590	O-RING 4-5/8 ID X 5 OD X 3/16 W NITRILE 90 DUROMETER (2-350)
6	1	78456	O-RING 5-5/8 ID X 6 OD X 3/16 W NITRILE 90 DUROMETER (2-358)
10	1	78457	O-RING 6-3/4 ID X 7-1/8 OD X 3/16 W NITRILE 90 DUROMETER (2-364)
11	1	78458	O-RING 8-3/4 ID X 9-1/8 OD X 3/16 W NITRILE 90 DUROMETER (2-372)
12	1	78513	O-RING 11 ID X 11-3/8 OD X 3/16 W NITRILE 90 DUROMETER (2-379)
13	3	78526	SCREW 3/8-16 X 1 1/4 SHCS SS
14	4	78665	WASHER 1/2 LOCW SS
15	4	79103	SCREW 1/2-13 X 1-1/4 SHCS SS
16	3	79119	PIN HFS-10
17	1	79121	BODY HFS-10
18	1	79125	CYLINDER 100 TON SINGLE-ACTING MODIFIED WITH MOUNTING HOLES
19	1	79128	LIFT PLATE HFS-10 & HFS-14
20	1	79130	CYLINDER INSERT HFS-10 & HFS-14
21	1	79133	SWIVEL RING HFS-10 & HFS-14
22	1	79135	SEAL PLATE HFS-10
23	2	79136	(NOT SHOWN) LABEL CLAMPING CHART MODEL HFS-10
24	9	80905	LABEL WARNING - HAND CRUSH / FORCE FROM ABOVE GRAPHIC 1.13
			TALL TRIANGLE YELLOW
25	1	85457	SCREW 10-24 X 3/8 SHCS SS
26	3	88607	CLAMP ARM HFS-10
27	2	88668	SCREW 3/8-16 X 1-1/2 SHCS FULL THREAD SS 18-8
28	3	88678	SCREW 1/4-20 X 1/2 SSSCP SS 18-8
59	1	89104	(NOT SHOWN) LANYARD #10 EYE TO 90 DEG EYE 1/16 DIA X 6 IN LONG
			SS

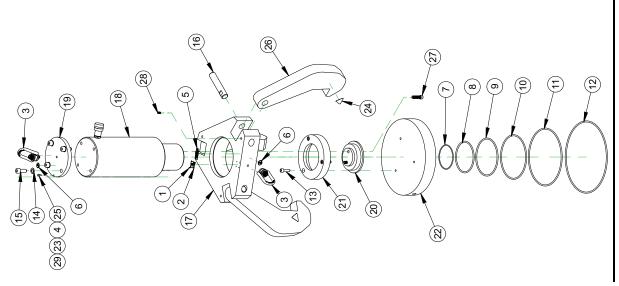


FIGURE A-4. HFS-10 ASSEMBLY (P/N 88528)

			PARTS LIST
ITEM	ΔTY	P/N:	DESCRIPTION
-	4	10588	SCREW DRIVE #2 x 1/4 HOLE SIZE .089
2	-	29152	PLATE MASS CE
က	2	41471	HOIST RING 3/8-16 X .56 1.3 ID 2.18 OD 3.79 OAL 1000 LBS SWIVEL
4	1	51016	(NOT SHOWN) RING SPLIT 1.07 OD X .070 WIRE SS
5	-	26300	LABEL CLIMAX LOGO .66 X 1.75
9	2	70554	LABEL WARNING LIFT POINT ROUND .75"
7	-	78458	O-RING 8-3/4 ID X 9-1/8 OD X 3/16 W NITRILE 90 DUROMETER (2-372)
∞	-	78513	O-RING 11 ID X 11-3/8 OD X 3/16 W NITRILE 90 DUROMETER (2-379)
6	1	78514	O-RING 13 ID X 13-3/8 OD X 3/16 W NITRILE 90 DUROMETER (2-382)
10	3	78526	SCREW 3/8-16 X 1 1/4 SHCS SS
7	-	78590	O-RING 14 ID X 14-3/8 OD X 3/16 W NITRILE 90 DUROMETER (2-383)
12	4	29987	WASHER 1/2 LOCW SS
13	4	79103	SCREW 1/2-13 X 1-1/4 SHCS SS
14	1	79125	CYLINDER 100 TON SINGLE-ACTING MODIFIED WITH MOUNTING HOLES
15	1	79128	LIFT PLATE HFS-10 & HFS-14
16	1	79130	CYLINDER INSERT HFS-10 & HFS-14
17	1	79133	SWIVEL RING HFS-10 & HFS-14
18	3	79143	PIN HFS-14
19	1	79145	BODY HFS-14
20	1	79148	SEAL PLATE HFS-14
21	2	79149	(NOT SHOWN) LABEL CLAMPING CHART MODEL HFS-14
22	9	20608	LABEL WARNING - HAND CRUSH / FORCE FROM ABOVE GRAPHIC 1.13
			TALL TRIANGLE YELLOW
23	-	85457	SCREW 10-24 X 3/8 SHCS SS
24	3	88611	CLAMP ARM HFS-14
25	2	89988	SCREW 3/8-16 X 1-1/2 SHCS FULL THREAD SS 18-8
56	3	82988	SCREW 1/4-20 X 1/2 SSSCP SS 18-8
27	1	89104	(NOT SHOWN) LANYARD #10 EYE TO 90 DEG EYE 1/16 DIA X 6 IN LONG SS

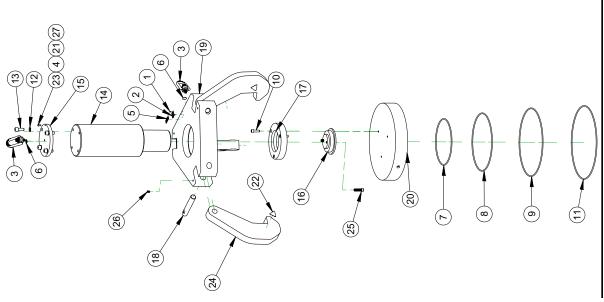


FIGURE A-5. HFS-14 ASSEMBLY (P/N 88529)

			PARTS LIST
ITEM	QTY	P/N:	DESCRIPTION
1	4	10588	SCREW DRIVE #2 x 1/4 HOLE SIZE .089
2	1	29152	PLATE MASS CE
3	2	41471	HOIST RING 3/8-16 X .56 1.3 ID 2.18 OD 3.79 OAL 1000 LBS SWIVEL
4	1	51016	(NOT SHOWN) RING SPLIT 1.07 OD X .070 WIRE SS
2	1	26300	LABEL CLIMAX LOGO .66 X 1.75
9	2	70554	LABEL WARNING LIFT POINT ROUND .75"
7	-	78458	O-RING 8-3/4 ID X 9-1/8 OD X 3/16 W NITRILE 90 DUROMETER (2-372)
8	1	78513	O-RING 11 ID X 11-3/8 OD X 3/16 W NITRILE 90 DUROMETER (2-379)
6	-	78514	O-RING 13 ID X 13-3/8 OD X 3/16 W NITRILE 90 DUROMETER (2-382)
10	1	78590	O-RING 14 ID X 14-3/8 OD X 3/16 W NITRILE 90 DUROMETER (2-383)
11	1	78591	O-RING 16 ID X 16-3/8 OD X 3/16 W NITRILE 90 DUROMETER (2-385)
12	3	79165	PIN HFS-16
13	1	79167	BODY HFS-16
14	1	79168	CYLINDER 150 TON DOUBLE-ACTING
15	4	79170	WASHER 1 LOCW SS
16	1	79172	LIFT PLATE HFS-16
17	1	79174	CYLINDER INSERT HFS-16
18	1	79176	SWIVEL RING HFS-16
19	3	79177	SCREW 1/2-13 X 1-1/2 SHCS SS
20	1	79179	SEAL PLATE HFS-16
21	1	79181	BODY INSERT HFS-16
22	2	79182	(NOT SHOWN) LABEL CLAMPING CHART MODEL HFS-16
23	9	80905	LABEL WARNING - HAND CRUSH / FORCE FROM ABOVE GRAPHIC
			1.13 TALL TRIANGLE YELLOW
24	1	85457	SCREW 10-24 X 3/8 SHCS SS
22	3	88613	CLAMP ARM HFS-16
26	3	88678	SCREW 1/4-20 X 1/2 SSSCP SS 18-8
27	4	88680	SCREW 1-8 X 1-1/2 SHCS SS 18-8
28	1	89104	(NOT SHOWN) LANYARD #10 EYE TO 90 DEG EYE 1/16 DIA X 6 IN
			LONG SS

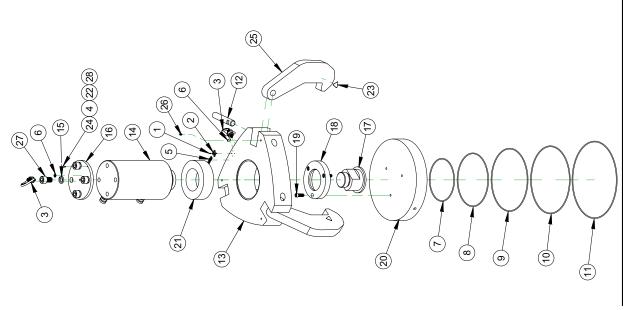


FIGURE A-6. HFS-16 ASSEMBLY (P/N 88530)

TABLE A-1. SPARE PARTS KIT

Part number	Description				
89441	KIT HFS-2 SEAL PLATE O-RINGS				
89442	KIT HFS-4 SEAL PLATE O-RINGS				
89443	KIT HFS-6 SEAL PLATE O-RINGS				
89444	KIT HFS-10 SEAL PLATE O-RINGS				
89445	KIT HFS-14 SEAL PLATE O-RINGS				
89446	KIT HFS-16 SEAL PLATE O-RINGS				

