

# Multihead Hydraulic Swaging Unit (MHSU)

## Setup and Operating Instructions



Up to 1 in./25 mm MHSU with base



1 in./25 mm and over MHSU with base (also for use with 5/8 and 3/4 in. Alloy 2507 super duplex fittings as well as 1/2 in. (316 SS only) and 3/4 in. medium-pressure tube fittings)

### READ AND UNDERSTAND THESE INSTRUCTIONS BEFORE USING THE MHSU.

#### Definitions

Statements and symbols are used in this document to identify safety concerns. Read the definitions below before setting up and operating the MHSU.



#### **WARNING!**

Statements that identify conditions or practices that could result in personal injury or loss of life.



#### **CAUTION!**

Statements that identify conditions or practices that could result in damage to the equipment or other property.

#### Safety Precautions



#### **WARNING!** **EYE PROTECTION**

Safety glasses must be worn when setting up and operating the MHSU.



#### **CAUTION!**

Do not tamper with or alter any components of the MHSU.



#### **CAUTION!**

Do not operate MHSU unless all tooling is installed and the tubing, nut and ferrules are properly positioned within tooling.



#### **WARNING!**

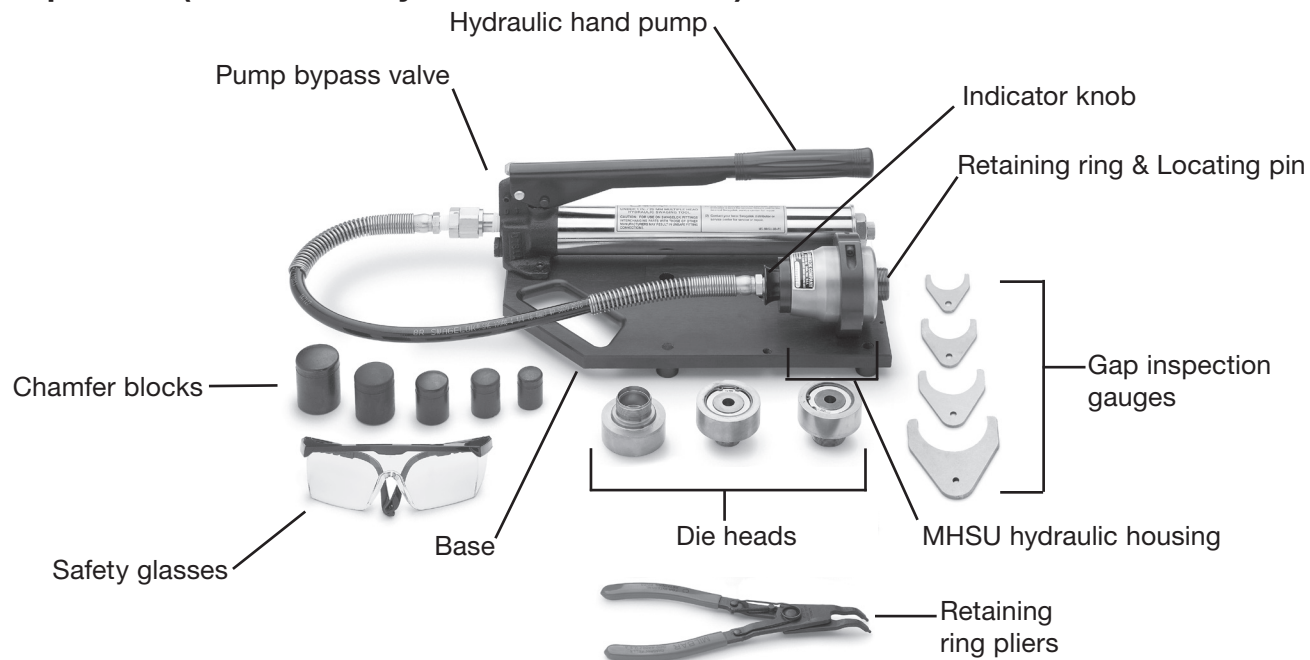
Do not use the MHSU and return the MHSU to your authorized Swagelok representative if any signs of excessive fluid leakage or a malfunction occurs.



#### **WARNING!**

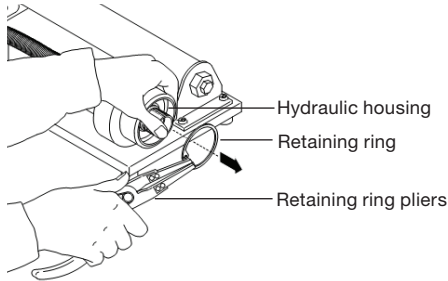
Do not use the hand pump after the indicator knob releases. Failure to stop pumping after the indicator knob releases may affect fitting performance.

## Components (Unit with Body Die Heads and Base)



## Setup

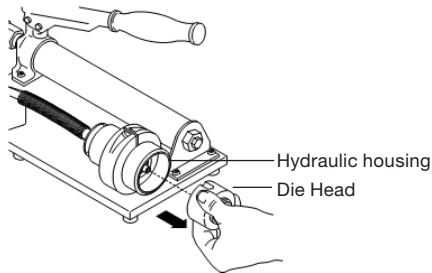
1. Remove the **retaining ring** from the **hydraulic housing** of the MHSU body using the **retaining ring pliers**.



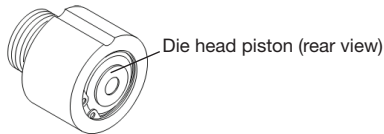
### CAUTION!

Use caution when releasing the retaining ring from the pliers.

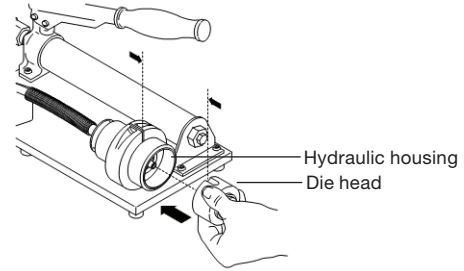
2. Remove the previously installed **die head** from the **hydraulic housing**.



3. Select the appropriate size die head.
4. Check the die head for any visible damage. Check the **piston** for proper movement by depressing the piston, so it travels toward the threaded end until it stops, then release the piston and verify it returns to its original location and contacts the retaining ring, before inserting the die head into the hydraulic housing.

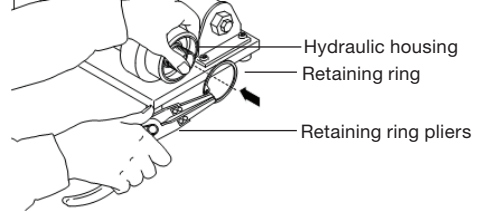


5. Install the selected **die head** into the **hydraulic housing** and align the notch on the die head with the locating pin on the hydraulic housing.



6. Reinstall the **retaining ring** into the **hydraulic housing** using the **retaining ring pliers**.

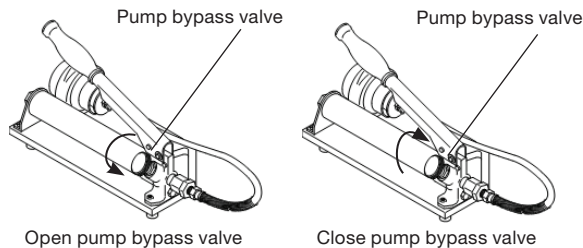
Note: Visually verify that the retaining ring is fully inserted into the hydraulic housing.



7. Refer to the Recommended Minimum Wall Thickness of Tubing for use with the MHSU table in the Troubleshooting section for information on recommended tubing size.

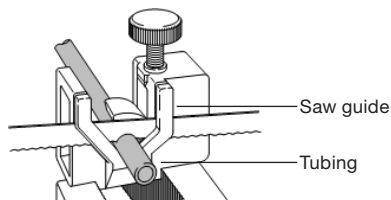
## Operation

1. Open the **pump bypass valve** by turning the pump bypass valve knob counterclockwise at least one-half to one turn. It may be necessary to first close the valve completely by turning the pump bypass valve knob clockwise until it stops.

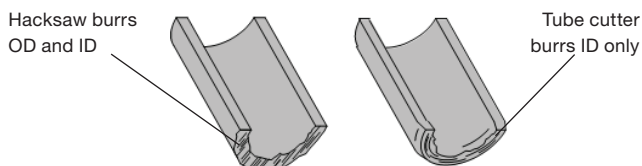


2. Prepare tube ends by deburring or using the Swagelok chamfer block as follows.  
Note: The chamfer block procedure should be followed when using up to and including one inch tubing.

- A. Cut **tubing** squarely. Use of a Swagelok tube **saw guide** is recommended.



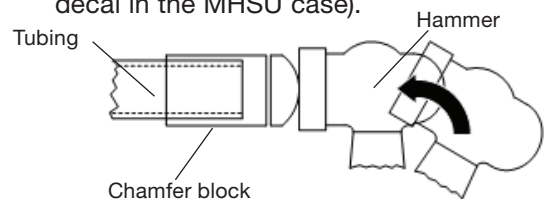
- B. Remove any **burrs**. Use of Swagelok tube deburring tools is recommended.



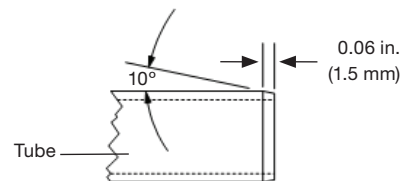
### WARNING!

Failure to deburr the OD of the tube could prevent the tube from properly resting against the piston shoulder. ID burrs could break off and cause damage in other components of the system.

- C. For sizes up to and including one inch **tubing**, use the **chamfer blocks** provided. Insert cut end of tubing into the chamfer block and while firmly holding the tubing, strike the chamfer block with a **hammer** to coin the end (as shown on the instruction decal in the MHSU case).

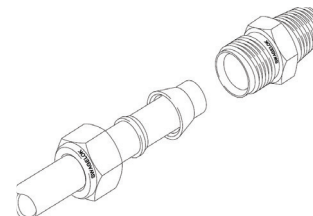


- D. If a file is used on the OD, make a 10° x 0.06 in. (1.5 mm) chamfer.



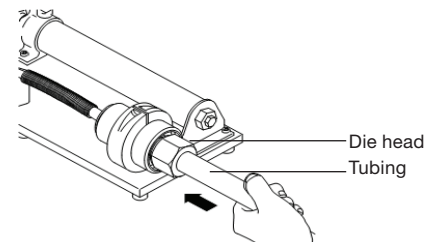
Chamfer tubing larger than 1 in. with a file

3. Insert tubing into the Swagelok end fitting to be pre-swaged. Disassemble the nut from the end connection, leaving the nut and ferrules on the tubing. The orientation of the nut, rear ferrule, and front ferrule should be as shown.

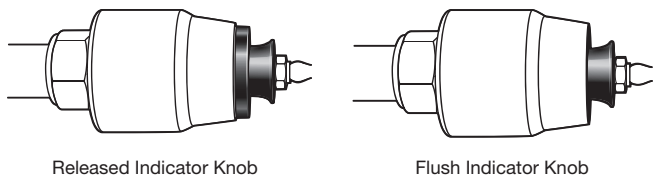
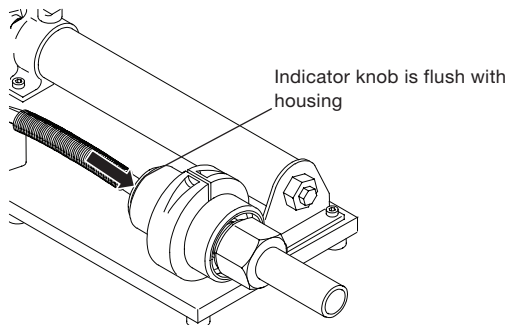


Nut and ferrule in the correct order on the tubing

4. Insert the **tubing** into the **die head** until it rests firmly against the piston shoulder. Tighten the nut until finger-tight and all die threads are covered by the nut.

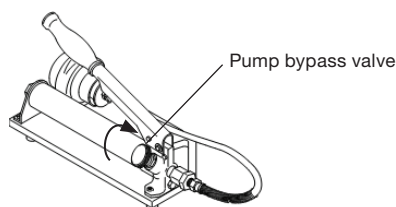


5. Push the indicator knob forward until it snaps into place. The **indicator knob** shoulder should be flush with the hydraulic housing.



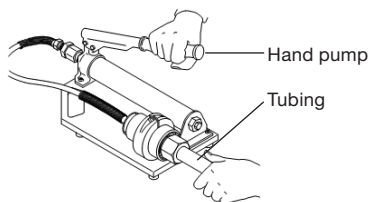
Note: If the indicator knob does not snap into place or is not flush with the housing the piston may not be fully retracted. This problem may be caused by the bypass valve being closed or by the piston binding. Do not proceed until unit is functioning properly. Contact your authorized Swagelok sales and service representative for further assistance.

6. Close the **pump bypass valve** to the finger-tight position by rotating valve pump bypass knob



clockwise until it stops.

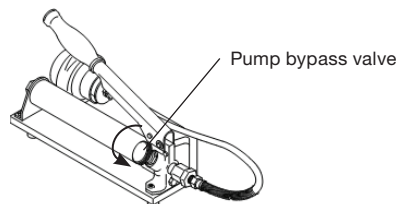
7. While holding the **tubing** against the piston shoulder, increase the hydraulic pressure by using the **hand pump** until the indicator knob is released.



8. Mark the tubing at the back of the nut.

Note: This mark will be used later to ensure the nut has been sufficiently hand tightened when assembled to the fitting body.

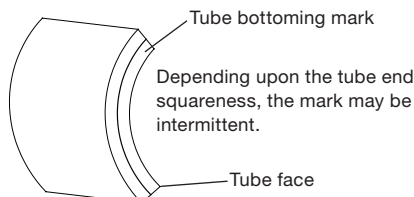
9. Open the pump bypass valve by turning the **pump bypass valve** knob 1/2 to 1 turn counterclockwise.



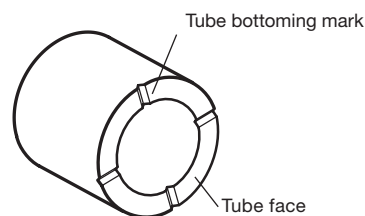
10. Unthread the Swagelok nut and remove the preswaged assembly from the housing.

11. Inspect the tube end for a radial or cross hatch indentation **bottoming mark**. This indentation indicates the tubing was properly bottomed in the MHSU. If there is not a visible indentation, the preswaged assembly should not be used.

Note: The MHSU should only be used to preswage a set of ferrules one time. If the ferrules were insufficiently preswaged, they should be discarded and the process started again with a new set of ferrules.



or

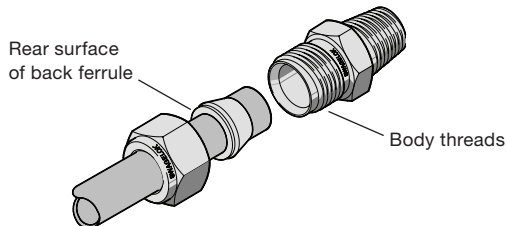


## WARNING!

Do not use the hand pump after the indicator knob releases. Failure to stop pumping after the indicator knob releases may affect fitting performance.

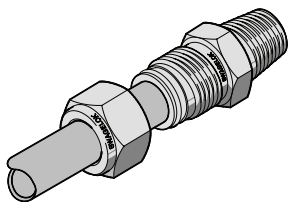
12. Fittings over 1 in. or 25 mm only: Lubricant must be applied when installing Swagelok tube fittings in these sizes. A packet of lubricant is provided with the fitting.

Apply the lubricant packaged with the fitting lightly to the **body threads** and the **rear surface of the back ferrule**. For gas service also apply lightly to the front angled surface of the front ferrule.



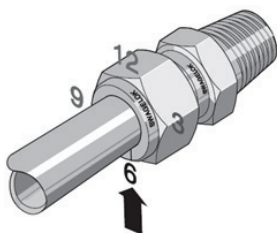
13. Install the preswaged assembly into the fitting body. Turn the nut onto the fitting body until it is finger-tight.

Note: The line marked on the tubing in step 8 should now be visible. If not visible, tighten the nut with a wrench until the line is visible.



14. For 1/2 in. (316 SS only) and 3/4 in. medium-pressure tube fittings: Mark the nut at the 6 o'clock position. Hold the fitting body stable and tighten the nut one-third turn with a wrench. See [Instructions for Swagelok Medium-Pressure Tube Fittings, MS-CRD-0096](#), for additional information and alternative installation by torque method.

All other fittings: Mark the nut at the 6 o'clock position. Hold the fitting body stable and tighten the nut one-half turn with a wrench.



Mark the nut at 6 o'clock



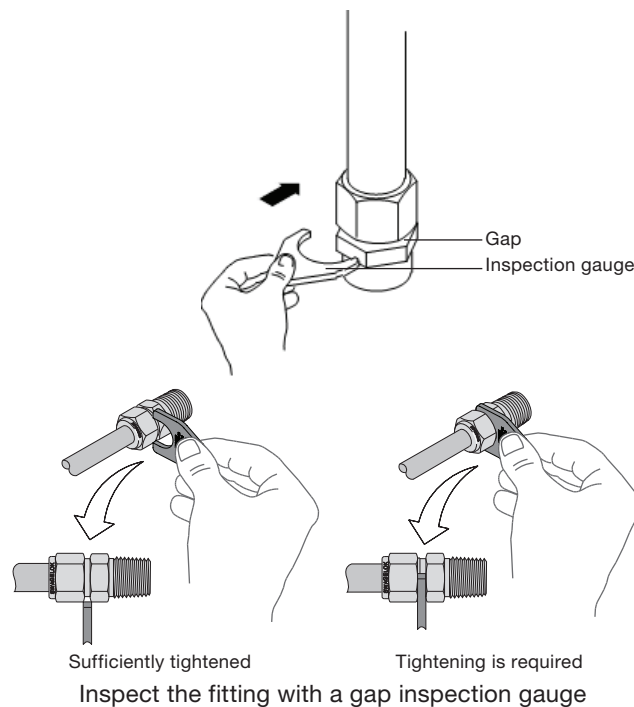
### CAUTION!

Use the Swagelok MHSU gap inspection gauge to ensure the fitting has been sufficiently tightened.


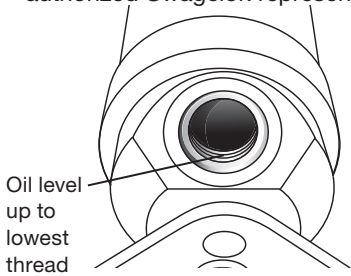
## Gauging Instructions

Position the Swagelok MHSU gap inspection gauge adjacent to the **gap** between the nut and body hex.

- If the gauge will not enter the gap, the fitting is sufficiently tightened.
- If the gauge will enter the gap, additional tightening is required.



## Troubleshooting

| Symptom  | Cause  | Remedy  |
|--|--|---|
| Tubing is difficult to remove from the MHSU.                 | There has been normal tube expansion.  | Rock the tubing gently back and forth.<br><br> <b>CAUTION!</b><br>Do not rotate the tubing.   |
|  | Tube wall thickness may be below the recommended level.  | Refer to the <b>Recommended Minimum Wall Thickness</b> table.   |
| The indicator knob fails to release.                         | Oil may need to be added   | <p>Place the unit on a horizontal surface. Check the oil level, fill to the lowest thread if necessary. It is recommended to use 10W, AW-46 grade hydraulic oil or equivalent with an antifoaming additive.</p> <p>If oil reservoir is full and symptom persists, return the unit to your authorized Swagelok representative.</p>  <p>Oil level up to lowest thread</p> <p>Proper Oil Level</p> |
| The die head piston does not return fully after swaging.     | The die head piston may be damaged.  | Return the unit to your authorized Swagelok representative.   |
| The Swagelok nut does not cover all of the die head threads. | Bypass valve is closed.  | Verify the bypass valve is open.  |
|  | The die head piston is not returning fully after swaging.  | Verify the die head piston is not binding in the body die. If there is binding, return the unit to your authorized Swagelok representative.   |
| The pump is failing to build pressure.                       | The oil level is incorrect.<br>Too much or too little oil prevents the pump from working properly. | Add or remove oil as necessary with the unit on a horizontal surface. It is recommended to use 10W, AW-46 grade hydraulic oil or equivalent with an antifoaming additive.   |
| There is oil around the pump.                                | There has been normal wear to the pump components.   | A small amount of leakage is acceptable. If oil is dripping or there is a puddle, return the unit to your authorized Swagelok representative.   |



### Recommended Minimum Wall Thickness of Tubing for use with the MHSU



#### CAUTION!

Use of tubing below the recommended minimum wall thickness may result in the tube sticking in the die head.

| Swagelok Tube Fittings |                                      |  |
|------------------------|--------------------------------------|--|
| Fractional Tubing      |                                      |  |
| Tooling Size<br>in.    | Tubing Wall, in.                     |  |
|                        | Steel, Alloy 400,<br>Grade2 Titanium | Stainless Steel,<br>Alloy (C-276, 600,<br>6M0, 825, 625) |
| 1/2                    | 0.049                                | 0.065  |
| 5/8                    | 0.065                                |  |
| 3/4                    |                                      |  |
| 7/8                    |                                      |  |
| 1                      | 0.083                                |  |
| 1 1/4                  |                                      | 0.095  |
| 1 1/2                  |                                      |  |
| 2                      | 0.095                                | 0.109  |

| Alloy 2507 Super Duplex Fittings  |
|---|
| 1/4 through 1/2 in. fittings—not approved for use with MHSU   |
| 5/8 and 3/4 in. fittings—use 1 in./25 mm and over MHSU with appropriate 5/8 and 3/4 in. super duplex dies |

| Swagelok Tube Fittings |                                      |  |
|------------------------|--------------------------------------|--|
| Metric Tubing          |                                      |  |
| Tooling Size<br>mm     | Tubing Wall, mm                      |  |
|                        | Steel, Alloy 400,<br>Grade2 Titanium | Stainless Steel,<br>Alloy (C-276, 600,<br>6M0, 825, 625) |
| 12                     | 1.5                                  | 1.5  |
| 14                     |                                      |  |
| 15                     |                                      | 1.8  |
| 16                     |                                      |  |
| 18                     | 2.0                                  | 2.0  |
| 20                     |                                      |  |
| 22                     |                                      |  |
| 25                     |                                      |  |
| 28                     | 2.2                                  | 2.2  |
| 30                     |                                      |  |
| 32                     |                                      |  |
| 38                     |                                      | 2.5  |
| 50                     |                                      |  |

| Medium-Pressure Tube Fittings  |
|--|
| 1/4, 3/8, 1/2 (Alloy 625 and 2507), and 9/16 in. fittings—not approved for use with MHSU                                     |
| 6, 10, and 12 mm fittings—not approved for use with the MHSU   |
| 1/2 in. (316 SS only) and 3/4 in. fittings—use 1 in./25 mm and over MHSU with appropriate 1/2 or 3/4 in. medium-pressure die |

Refer to Swagelok [Gageable Tube Fittings and Adapter Fittings catalog, MS-01-140](#), for additional information.

Refer to Swagelok [Tube Fitters manual, MS-13-03](#), for additional information.

Refer to Swagelok [Tubing Data catalog, MS-01-107](#), for additional information.

Translations available on [swagelok.com](http://swagelok.com)

### Warranty Information

Swagelok products are backed by The Swagelok Limited Lifetime Warranty. For a copy, visit [swagelok.com](http://swagelok.com) or contact your authorized Swagelok representative.

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