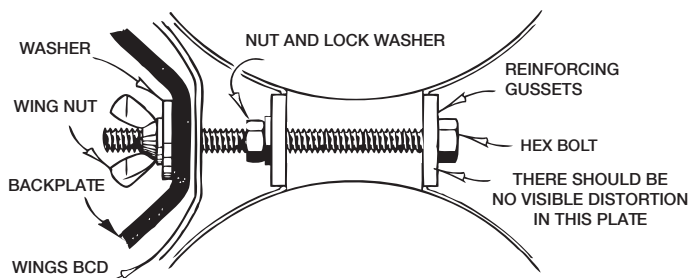


ASSEMBLY DIAGRAM



CAUTION

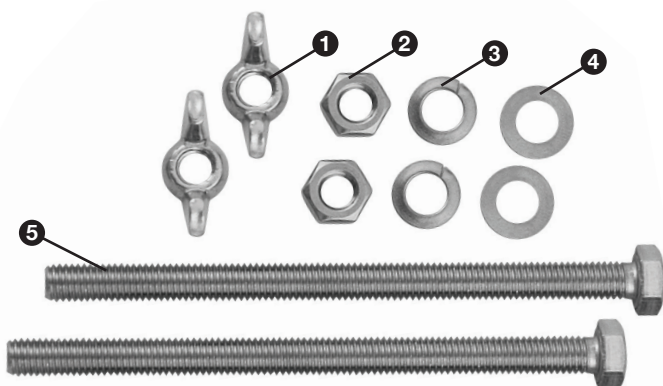
Don't over-tighten band bolts.

Distortion in the reinforcing plates under the nut can compromise critical spacing that these bands provide to protect your manifold

Galling can be minimized with the following measures:

- Clean the nuts and bolts
 - o Scrub the threads with a toothbrush and detergent. Rinse thoroughly. Make sure that there is no visible debris.
- The most common stainless steel galling occurs with nylon insert lock nuts. Avoid using these.
- Use a lubricant
 - o The best lubricant for this job is a molybdenum (moly) disulfide, which readily available at most hardware and auto parts stores.
 - o The most common household option is 3-in-1 Oil
 - o Apply the lubricant to the bolt threads ahead of the nut
- Go slowly. Spending an extra five minutes installing the nuts on to the bolts can prevent hours of headache hacksawing the bolts off and the expense of replacing the hardware.
 - o The idea is to try to prevent the buildup of heat
 - o When installing, you may want to try rotating the nut on 3 revolutions then back one, etc. You must do likewise during removal of the nuts too.

PARTS INCLUDED



- ① (2) - Wing Nuts
- ② (2) - Hex Nuts
- ③ (2) - Split Lock Washers
- ④ (2) - Flat Washers
- ⑤ (2) - Fully Threaded, Hex Bolts



IMPORTANT NOTICE ABOUT THREAD GALLING

Galling, often referred to as a cold-welding process, can occur when the surfaces of male and female threads are placed under pressure. Stainless steel fasteners are particularly susceptible to thread galling. During the tightening of the fastener, pressure builds between the contacting thread surfaces and breaks down the protective oxide coatings. With the absence of the oxide coating, the metal high points of the threads are exposed to one another, which increases friction. The combination of these two events can generate enough heat to fuse and seize the nut and bolt together.

Minor galling may cause only slight damage to the thread surface and the installer may still be able to remove the fastener. However, in severe cases galling can completely weld the nut and bolt together and prevent removal of the fastener. If the tightening process is continued once galling begins, the fastener may be twisted off or have its threads stripped.

Turn the page to learn how to control galling during installation of you bands.

Installation Guide

Compatibility – Make sure the bands you have selected are sized correctly for your tanks and the manifold you intend to install. These bands are designed to maintain the center-to-center spacing of 8.46 in. (251 mm). Additionally, the width of the band should be proportional to the height of the cylinders. Eight-inch diameter tanks greater than 117 cu. ft., require the stability provided by a pair of 3" wide bands. The tanks you choose to double up must be the same height. Steel cylinders in the same size series can vary slightly in height, and should not vary more than ¼ inch.

Bolt Length - Ensure the bolt length is sufficient to accommodate the thickness of your backplate, wing, washer and wing nut without protruding to the point of damaging your exposure suit. Also note, for maximum stability, your backplate should not bottom-out against the nuts before contacting the cylinders. Assemble as shown on the back of this sheet.

Installing the Manifold – Install the outboard modular valves. If present, remove the manifold port plugs. The manifold port plugs are the large hex head plugs opposite the valve hand wheel. Be sure to retain the port plugs should you ever wish to reconfigure the cylinders as singles.

 **Note:** The modular valve with the hand wheel on the typical side has a manifold port plug that is notched to indicate that it turns in the clockwise direction to remove. The other modular valve manifold port plug turns in the usual counter-clockwise direction to remove.

Set the cylinders on a table or flat working surface, placing them parallel to one another and with the valve orifices facing upward.

When installing a 3-piece adjustable manifold, it is critically important to center the crossbar between the outboard valves. Carefully orient the crossbar so that its threads correctly match those of the outboard valves. The notched lock nut on the crossbar (indicating threads that turn opposite the normal direction) will be on your left as you face the opening of the valves. Slowly turn the crossbar in the direction that causes thread engagement into both outboard valves simultaneously.

 **Note:** If one side does not engage, you must back the crossbar all the way out and begin again. Be patient as this may require several attempts.

When the crossbar threads engage properly, turning the center bar draws the tops of the cylinders together. Keep the cylinders parallel to one another by stopping periodically to gently tap the bottom of the cylinders together. You can tell

when tapping the cylinders together is necessary because the crossbar becomes difficult to turn when the cylinders are no longer in proper alignment. This explains why it is important you avoid using wrenches for this step and turn the crossbar only by hand; any resistance you feel tells you that something is wrong.

Repeat slowly turning the crossbar and tapping the cylinders as often as necessary until you reach a point where approximately 1/8-inch of threads are visible on each side of the center section. Make certain the isolator handwheel is positioned at approximately the desired angle.

Positioning Bands on Cylinder – While the cylinders are laying parallel, on their side, slide the top band up the cylinders until it is just below the shoulder of each cylinder. Make sure that the manifold crossbar can still rotate freely by hand. If it cannot, the cylinder band spacing is not matching the manifold spacing, so you will need to lengthen or shorten the manifold accordingly. Position the bottom band so that the bolts will be spaced exactly 11 inches apart, when measured center-to-center.

Tightening Bands – Insert the band bolts from underneath the bands. Place a split washer on top followed by a hex nut.

 **Caution:** Heed warnings regarding galling on the other side of this document! Go slowly, keep the hardware clean, and use proper lubricant! Examine the entire assembly. If the cylinders are parallel to one another and able to lie flat, then alternately tighten the nut on each band bolt until they are snug. Do not over-tighten to the point where there is visible distortion in the reinforcing plates under the nuts.

You should have two flat washers and two wing nuts which are used to hold the backplate in place against the cylinders. You may place one washer and one wing nut on each shaft to store them with the doubles set until you need to mount the plate.

Position the center isolator handwheel in place. Turn the crossbar jam nuts so that they rest snugly against the outboard modular valves. Snug them in place with a wrench. The recommended torque is 85 in. lbs.

Assembly is now complete. Leaks are unlikely, but if you wish to check, then fill the cylinders with gas. Check for leaks by immersing them in water, or if that's not convenient, spray them with soapy water. Look closely for bubbles forming around the cylinder neck where it mates with the valve, burst disk plugs, manifold ports, hand wheels and outlets.

 **Warning** – If you find the need to move or loosen the tank bands later, after the tanks have been pressurized, it is critically important to drain all the gas from your tanks before loosening the band bolts. Never loosen the bands on cylinders that are pressurized.



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