

Twin Cylinders Assembly

Here is the XS Scuba recommended procedure to assemble a set of doubles. The process should take about 30 to 60 minutes if this is the first time you have assembled doubles. We recommend the actual assembly procedure be performed by only one individual, to avoid the possibility of working at cross purposes.

1. Drain any gas pressure from cylinders until both are completely empty.
2. Remove boots and any unnecessary decals or stickers from sides of cylinders.
3. Skip this step if you have purchased an XS Scuba doubles package. Disassemble the manifold into its three primary components (outboard valves and center isolator). Make certain the isolator lock nuts are hand tight against the center of the body and note the orientation of the notched nut and its valve.
4. Skip this step if you have purchased an XS Scuba doubles package. Install one outboard modular valve into each cylinder, as tight as possible **BY HAND ONLY**, avoid use of wrenches. The DIN-to-yoke adapter inserts should remain installed in 200-Bar valves during doubles assembly. Improper use of a wrench during installation of the valve can warp the opening of the valve face, particularly with 300-Bar valves.
5. Perform this step only if you have purchased an XS Scuba doubles package. The outboard modular valves were previously installed on the cylinders and the manifold ports were plugged by XS Scuba. The manifold port plug is the large hex head nut opposite and in line with the valve handwheel. Use a small adjustable wrench to remove the manifold port plugs from both of the modular valves. Be sure to retain the port plugs should you ever wish to reconfigure the cylinders as singles. **IMPORTANT:** The modular valve with the handwheel 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.
6. Place the cylinders on the table or flat surface upon which you are working, parallel to one another and with the valve orifices facing upward.
7. Carefully orient the center isolator so that its threads correctly match those of the outboard modular valves. (This is important; serious manifold damage may result otherwise.) The notched lock nut on the isolator (indicating threads that turn opposite the normal direction) will be on your left as you face the opening of the valves, i.e. on the divers right when the doubles set is on the divers back.
8. Slowly turn the isolator in the direction that causes it to thread itself into both outboard modular valves simultaneously. This is very important: If one side does not engage, you must back the isolator all the way out and begin again. Be patient.

This will almost certainly require several attempts.

9. When the isolator threads engage properly, turning this center unit draws the tops of the cylinders together. To keep the cylinders parallel to one another as this happens, stop periodically to gently tap the bottom of the cylinders together. You can tell when to do so because the isolator becomes difficult to turn when the cylinders are no longer in proper alignment. (This also helps explain why it is important you avoid using wrenches for this step and turn the isolator only by hand; any resistance you feel tells you that something is wrong.)

10. Repeat slowly turning the isolator and tapping the cylinders as often as necessary until you reach a point where no more than 1/8-inch of threads shows on each side of the center section.

11. Make certain the isolator knob is positioned at approximately the desired angle. (Again, if necessary, it is permissible to have as much as 1/8-inch/3mm worth of threads showing on each side of the isolator section; this may be necessary to ensure adequate clearance between tanks for the bolts.) Now you are ready to install the tank bands and bolts.

12. Remove all the nuts and washers from the all-thread shafts (headless bolts)--except the aircraft nut (the nut with the nylon insert).

13. On the end of each shaft, opposite the aircraft nut, install a wing nut (turned upside down) followed by a regular nut. Lock these nuts against one another. This enables you to hold the shaft without damaging any threads.

14. Place a 1/2-inch box-end wrench (or a 1/2-inch deep socket wrench) on the aircraft nut and another 1/2-inch wrench on the regular nut. Turn the aircraft nut until it is positioned so that approximately 1/8-inch of shaft protrudes from its top. Unlock the regular nut from the wing nut and take them both off the shaft.

15. Very carefully and gently pull the cylinders to the edge of the table. Let the cylinders extend beyond the edge so that the portion where the upper band will go is exposed. Make sure the valve orifices face upward. Take great care that the cylinders are maintained parallel to each other and no force is applied that might cause the isolator to be bent or warped.

16. Place the top band right at, or just below, the shoulder of each cylinder. (The shoulder is part of the cylinder where the side begins to turn toward the valve.)

17. Place a flat washer on the end of the shaft with the aircraft nut. Push the shaft up through the band's bolt hole from below. On the other end of the shaft, place a flat washer, followed by the lock washer and regular nut. Put one 1/2-inch wrench on the aircraft nut, the other on the regular nut. Tighten the regular nut until the band is moderately snug.

18. Turn the cylinders around so their bottom ends are exposed. Position the bottom band so that the bolts will be spaced 11 inches apart, when measured center to center. Repeat the previous step to install the bolt in the lower band and check the spacing with your backplate.

19. Examine the entire assembly. The bolts should not extend past the outside edges of the bands. If the cylinders are parallel to one another (or reasonably close) and able to lie flat, finish tightening the nuts until they are snug. Do not over tighten, doing so will cause the bands to warp.

20. Some divers prefer that the isolator bar be locked into place, others prefer that it be able to turn freely. If you prefer to lock the isolator in place, turn the center unit lock nuts so that they rest snugly against the outboard modular valves. Lock them carefully in place with a wrench. Do so gently; these components are brass and easily damaged by unnecessary force.

21. 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 then 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.