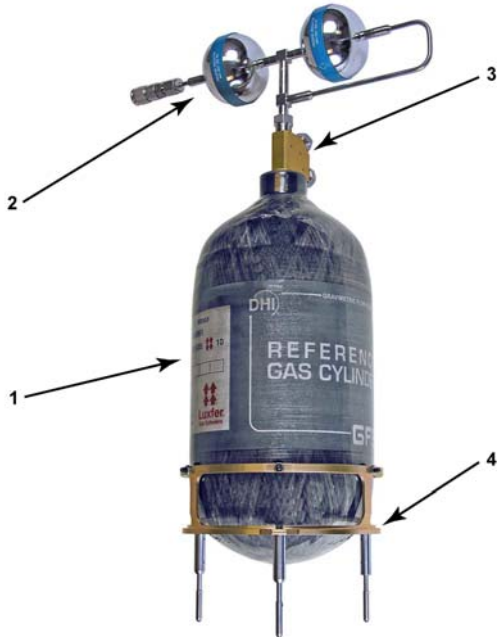




# Installation of Regulator Assembly onto GFS2102 Reference Gas Cylinder Instruction Sheet

The GFS2102 reference gas cylinder assembly includes the reference gas cylinder itself, the regulator assembly, the reference gas cylinder connector, and the cylinder support. (See Figure 1.)



1. Reference gas cylinder
2. Regulator assembly
3. Reference gas cylinder connector
4. Cylinder support

Figure 1. Reference gas cylinder assembly

The reference gas cylinder assembly also comes with a custom fill/carry case to provide a convenient way to store and carry the reference cylinder assembly around the laboratory. This case is designed to allow the user to fill the cylinder while it is resting in the case (with the case lid open) and provides adequate ventilation for the cylinder to cool during and after the filling operation. The reference gas cylinder assembly should NOT be shipped or transported for any distance outside the lab in the fill/carry case while the regulator assembly is installed on the cylinder. If the unit encounters a significant shock while the reference gas cylinder with fully installed regulator assembly is inside the case, the vertical nipple of the regulator assembly could bend under the weight of the regulators, which may cause alignment problems for the cylinder assembly in the GFS system, and may compromise the strength of the tubing in a high pressure section of the regulator assembly.

- ⚠ *Never ship the reference gas cylinder assembly in the fill/carry case while the regulator assembly is installed on the reference gas cylinder. This could lead to damage of the regulator assembly, potentially causing a failure of the regulator assembly tubing under high pressure.*
- ⚠ *Energy stored in high pressure gases can be released unexpectedly and with extreme force. High pressure systems should be assembled and operated only by personnel who have been instructed in proper safety practices.*

## INSTALLING THE REGULATOR ASSEMBLY ON THE REFERENCE GAS CYLINDER

The reference gas cylinder assembly will arrive from the factory with the regulator assembly disconnected from the rest of the cylinder assembly. All parts of the reference gas cylinder assembly are shipped inside the carry/fill case. The regulator assembly is packed in a custom foam cut-out inside the case to protect it from damage. The reference gas cylinder connector is installed in the cylinder. Use the following steps to install the regulator assembly into the reference gas cylinder connector:

1. Remove the reference gas cylinder assembly and the regulator assembly from the carry/fill case. Locate the regulator stem port of the connector. (See Figure 2.)



1. Fill valve
2. Fill port
3. Regulator stem port

Figure 2. Reference gas cylinder connector

- ② Remove the DH200 gland and plug from the regulator stem port of the reference gas cylinder connector and retain the gland.
- ③ The regulator assembly will be packaged with a steel collar that threads onto the regulator stem. If the collar is already on the stem, it must be removed. The collar uses a left-hand thread.
- ④ Slide the gland from step ② onto the regulator stem with the threads facing down (away from the regulators), and thread the collar back onto the stem below the gland. Engage the collar threads fully so that at least one thread shows between the collar and the coned end of the stem.
- ⑤ Place the regulator assembly on the reference gas cylinder assembly with the regulator stem in the cylinder connector's regulator stem port. The position of the regulator assembly should be such that when the fill port and valve on the cylinder connector face toward you, the exit tube of the regulator assembly with the quick connector faces to the right. Hand-tighten the DH200 gland into the cylinder connector.
- ⑥ Tighten the DH200 gland into the reference cylinder connector, using a wrench to hold the cylinder connector. DO NOT use any type of pipe wrench or vise to hold the assembly by the carbon fiber body of the cylinder. You may want to use a cloth or other material to protect the finish on the reference cylinder connector from scratches.

**Note:** It is critical that the final position of the regulator assembly is such that the exit tube is lined up precisely with the leg of the reference cylinder support on the right side of the cylinder. View the whole assembly from the top to be sure they are aligned. Tightening the DH200 gland will rotate the regulator assembly a few degrees clockwise, so it will be necessary to offset the regulator assembly before tightening so that it finishes in the correct position.

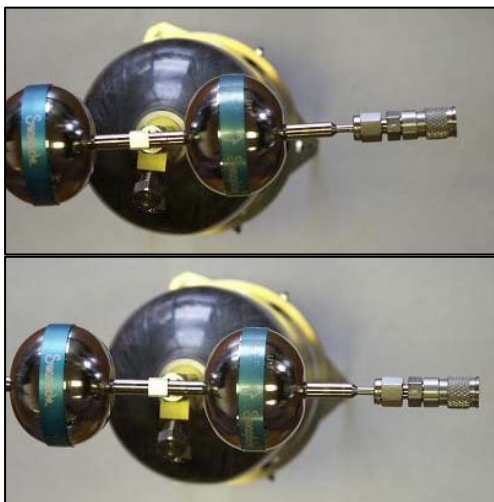


Figure 3. Regulator assembly position before and after tightening

## PREPARING THE REFERENCE GAS CYLINDER ASSEMBLY FOR SHIPMENT

The regulator assembly must be removed from the reference gas cylinder before shipping the assembly, or the regulator assembly stem and/or exit tube are likely to be bent during shipment. Use the following steps to prepare the reference gas cylinder for shipment or long-term storage.

- ① Drain the gas from inside the reference gas cylinder. The gas should be bled from the cylinder through the fill port, using the fill valve to start the gas flow. Use proper precautions for safely bleeding the pressurized gas and venting or disposing of any potentially dangerous gases.
- ② Loosen the DH200 gland from the reference cylinder connector, using a wrench to hold the cylinder connector. DO NOT use any type of pipe wrench or vise to hold the assembly by the carbon fiber body of the cylinder. You may want to use a cloth or other material to protect the finish on the reference cylinder connector from scratches. Unthread the DH200 gland by hand and remove the regulator assembly from the cylinder connector.
- ③ Remove the collar from the regulator stem so that the DH200 gland can also be removed.
- ④ Use the DH200 gland and the originally supplied DH200 plug to seal the regulator stem port of the reference gas cylinder connector so that it remains clean during shipment.
- ⑤ Re-thread the DH200 collar back on to the regulator stem or otherwise package it with the cylinder assembly for shipment.
- ⑥ Locate the custom foam cut-out for shipping the regulator assembly in the reference cylinder assembly fill/carry case. Place the regulator assembly in the foam cut-out and insert into the fill/carry case so that the regulator stem points up and the open side of the foam cut-out faces away from the reference gas cylinder in the case.
- ⑦ Place the reference gas cylinder (with connector and support installed) into the case so that the cylinder connector is supported with the fill port and valve facing up.