Overpressure Relief Valve

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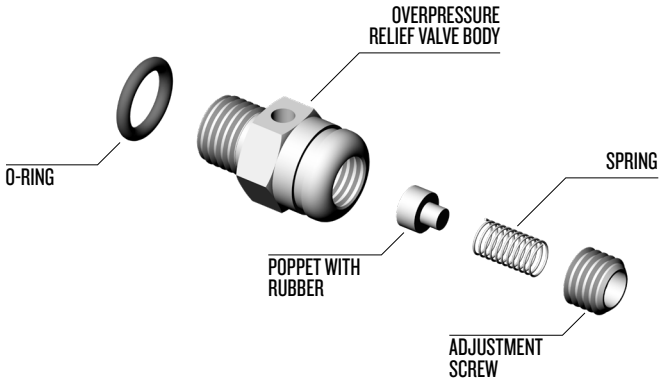
1.1 Overpressure Relief Valve Overhaul Procedures

1.1.1 Overpressure Relief Valve

The overpressure relief valve (OPRV) should ***always*** be used on all Emergency Gas Supply (EGS/bail-out) first stage regulators to prevent the hose from rupturing if the first stage happens to develop a slight leak, causing the pressure to creep. The Kirby Morgan OPRV body is made of stainless steel.



Overpressure Relief Valve Component Breakdown

The basic components last a long time, but the valve should be disassembled, cleaned, and inspected at least once a year or whenever it fails testing. The valve should be tested monthly. Cleaning and overhaul is easily performed using a nylon toothbrush and a solution of 50% vinegar and 50% fresh water. Cleaning for 15 minutes in an ultrasonic sink, if available, with the 50% vinegar and 50% fresh water solution is highly recommended.

Repair parts are available by purchasing P/N 225-017 overpressure relief valve rebuild kit. Replacement parts include the O-ring, poppet with rubber, spring, and adjustment screw. The O-ring should be replaced at least annually. The other parts require replacement only if worn or damaged. A detailed illustrated drawing of the valve is located in this module and can also be found in the P/N 225-017 Overpressure Relief Valve Rebuild Kit instructions. The following text refers to the drawing "Overpressure Relief Valve Component Breakdown" on page OPRV-1.

Tools Required:

- Torque Wrench
- ½" Open-End Wrench Attachment for Torque Wrench
- ⅛" Allen Wrench
- Nylon Toothbrush
- Vinegar and Fresh Water
- Mild Dish Soap
- Ultrasonic Sink, if Available
- Magnifying Glass

1.1.2 Overpressure Relief Valve Disassembly and Cleaning

1. Turn off the gas supply to the first stage regulator, then bleed off any remaining pressure. Remove the first stage regulator from the air/breathing gas source so it cannot be accidentally turned on, i.e., pressurized. Make sure the intermediate pressure in the regulator hose is also fully drained of pressure.

2. Remove the overpressure relief valve from the regulator body using the ½" open-end wrench.

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3. Remove, cut, and discard the overpressure relief valve body O-ring.

4. Using the ½″ open-end wrench to hold the overpressure relief body, use the ⅛″ Allen wrench to remove the Allen head adjustment screw. Then, shake out the spring and poppet.

5. Place all parts in the solution of 50% vinegar and 50% fresh water and allow to soak for 15 to 30 minutes. If using an ultrasonic sink, reduce time to 15 minutes.

⚠ WARNING

Do not use cleaning solvents (i.e. mineral spirits, bleach, etc.) when cleaning the overpressure relief valve. The use of cleaning solvents may lead to failure of the overpressure relief valve.

6. Using the nylon toothbrush, brush all components to remove corrosion and mineral deposits. Then, rinse with fresh water and blow or air dry.

7. Using the magnifying glass, carefully inspect all components for excessive corrosion and/or damage. Replace the spring and/or adjustment screw if either part is excessively corroded or shows signs of wear and/or damage.

Inspect the poppet for nicks, cuts, and wear and replace if any damage is found. If the overpressure relief valve body is damaged, then the entire overpressure relief valve (P/N 200-017) should be replaced.

NOTE

A deep groove in the poppet is normal. Replacement is only necessary if the rubber seat is deteriorated, cut, and/or chipped.

1.1.3 Overpressure Relief Valve Reassembly

1. After cleaning, inspection and/or parts replacement, reassemble the valve by installing the poppet, spring, and adjustment screw. Tighten the adjustment screw down until it is approximately ½ thread from being flush with the top of the valve body.

2. Lightly lubricate the new O-ring, then install on the valve body.

3. Test the overpressure relief valve according to the test procedure below.

1.1.4 Overpressure Relief Valve Lift Check/Setting

VIDEO

How To: Perform Overpressure Relief Valve Lift Check

Tools Required:

- HP Air Source at least 500 psig (34.4 bar).
- Main Gas Supply Hose
- Mild Dish Detergent
- ½″ Open-End Wrench
- ⅛″ Allen Wrench

The purpose of lift checking the bleed/relief valve is to ensure it operates correctly, allowing excess pressure to escape if the first stage develops a slight leak. Without the bleed/relief valve, high-pressure gas will continue to build up until the emergency supply hose ruptures, potentially causing injury and complete loss of the Emergency Gas System (EGS). This procedure outlines the steps needed to readjust the bleed/relief valve after cleaning, overhauling, or testing it.

In the past, the OPRV was typically tested using a first-stage scuba or bailout regulator. The procedure outlined below uses regulated gas from a supply panel to allow more precise control of the test gas pressure and to eliminate the risk of undue stress on the scuba or bailout first-stage regulator.

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⚠ WARNING

Ensure the overpressure relief valve is only installed in a low-pressure port of the first stage regulator. Installation in a high-pressure port will lead to loss of EGS supply and possible serious personal injury if the valve fails.

This procedure explains the steps necessary for readjusting the overpressure relief valve after it is cleaned, overhauled or any time the valve is tested.

⚠ WARNING

Do not use oxygen, or mixed gas containing more than 23% oxygen by volume, for lift checking the overpressure relief valve. The use of oxygen, or mixed gas, in a high-pressure supply system not designed and cleaned for oxygen service, can result in a fire or explosion causing serious injury or death.

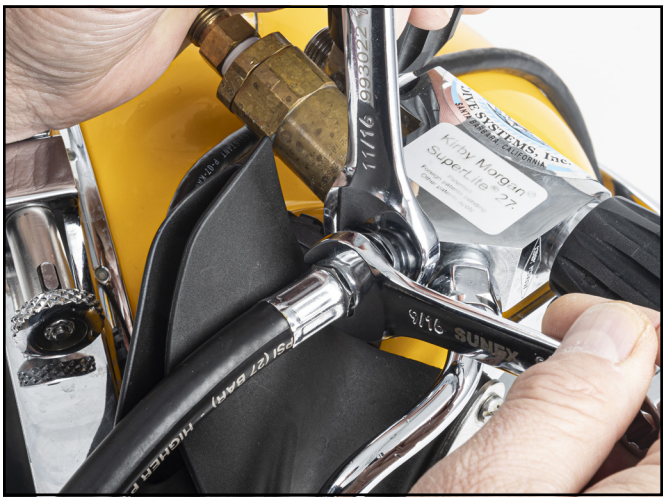
NOTE

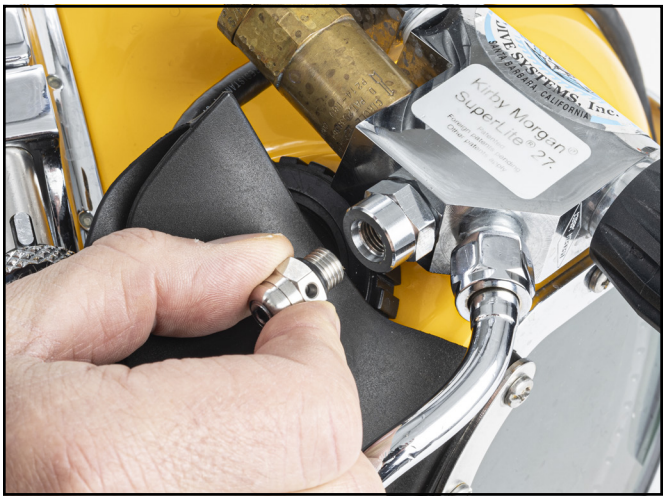
If the adjustment screw on the overpressure relief valve is rotated too far, too fast, the overpressure relief valve will pop open. This could possibly require the air to be secured at the cylinder or supply source to reset the seat before the adjustment can be accomplished.

NOTE

The overpressure relief valve can be installed in any first stage regulator, providing the first stage has an intermediate setting of 135–165 p.s.i.g. (9.3–11.4 bar).

1. Install the OPRV in the low-pressure port located on the bottom of all KMDSI Side Blocks and torque it with a ½-inch open-end wrench or crows-foot. See "Torque Specs" module.





2. Connect the umbilical to the helmet's umbilical adapter on the one-way valve. Ensure the EGS valve on the helmet is closed.

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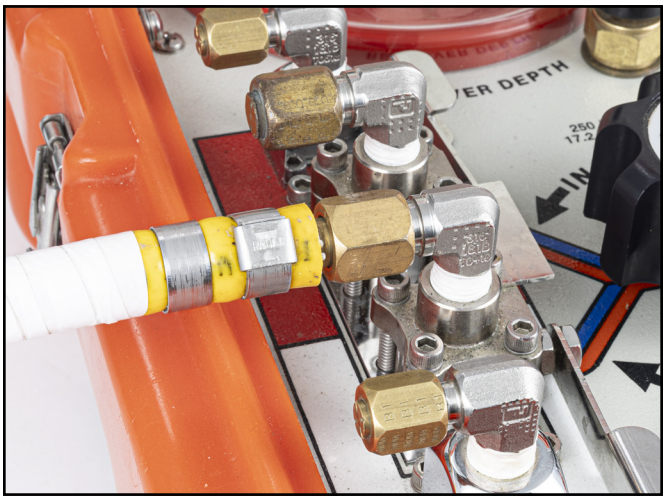
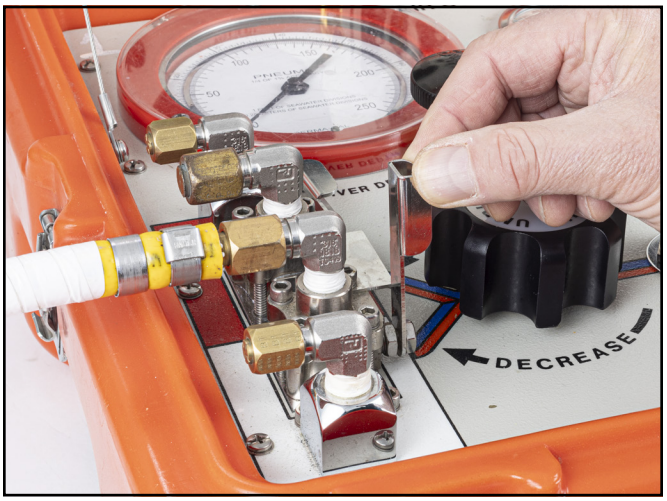
3. Connect the topside end of the umbilical to the diver's control console/rack box.

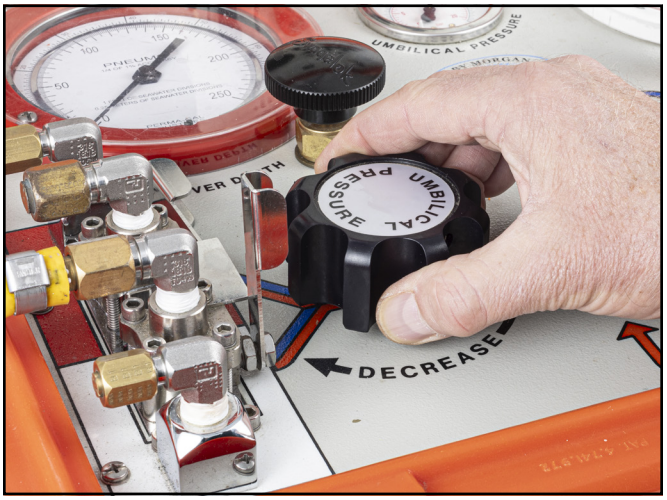


4. Wet the OPRV with soapy water to help identify when gas flow begins.

5. Open divers' umbilical gas supply valve on the console, then slowly increase the umbilical pressure using the hand-loader/regulator on the console so that a very slight flow of gas is traveling to the helmet.



6. Gradually increase umbilical pressure until the umbilical pressure gauge shows 180 psig (12.4 bar). If the overpressure relief valve begins venting before reaching 180 psig (12.4 bar), indicated by small bubbles or a "popping" sound, turn the adjustment screw located at the top of the OPRV clockwise using an ⅛" Allen wrench, or until all leakage stops as shown with soapy water. Make small adjustment turns, about 1⁄16 to ⅛ turn. If pressure exceeds 200 psig (13.8 bar) without the relief valve releasing bubbles or popping, slowly turn the screw counterclockwise 1⁄16 of a turn at a time until bubbles appear.



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NOTE

If the adjustment screw on the bleed/relief valve's hex nut is turned too far or too quickly, the bleed/relief valve will pop open unexpectedly. This could require securing the air at the cylinder to reset the seat before making the adjustment.

7. Continue this process as needed until the overpressure relief valve consistently begins to form bubbles at a pressure between 180 and 200 psig (12.4–13.8 bar). After the valve has just bubbled or popped off, turn the console regulator back until the pressure drops to 145 psig (10 bar), vent the umbilical pressure by opening the steady flow valve, and then close the steady flow valve.

8. Re-wet the overpressure relief valve, then gradually increase umbilical pressure using the console regulator to recheck the lift pressure. The overpressure relief valve should begin forming bubbles between 180–200 psig (12.4–13.8 bar). After the final adjustment, back out on the console regulator until the pressure drops to 145 psig (10 bar).

Spray the overpressure relief valve with soapy water to ensure there are no leaks.

9. After a successful leak check, proceed with monthly and pre-dive maintenance inspections.

1.1.5 Troubleshooting the Overpressure Relief Valve

PROBLEM

Valve pops open and will not stop flowing.

CHECK

If while setting the overpressure relief valve the valve pops open and will not stop flowing, secure the air supply valve and allow the overpressure relief valve to reseat. Try the procedure again, ensuring that the supply valve is only slightly cracked open, allowing full test pressure but minimizing high flow potential.

PROBLEM

After resetting the first stage to 135 p.s.i.g. (9.3 bar), the valve continues to leak.

CHECK

This indicates the seating surface of the relief valve body or the poppet is either dirty or damaged. Usually, cleaning both the metal seating surface in the valve body and cleaning the poppet will fix the problem.

If, after cleaning, the problem persists, replace the poppet and spring then retest the unit. If the seat continues to leak, then replacement of the overpressure relief valve, P/N 200-017, will be necessary.

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