

PARTS, SERVICE & REPAIR BULLETIN



PRESSURE REGULATORS

EDGE™
SERIES 2.0

**WARNING**

Read and understand this entire Manual and your employer's safety practices before installing, operating, or servicing the equipment.

While the information contained in this Manual represents the Manufacturer's best judgment, the Manufacturer assumes no liability for its use.

EDGE Series 2.0 PRESSURE REGULATORS
Operating Manual Number 0056-2690

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**Be sure this information reaches the operator.
You can get extra copies through your supplier.**

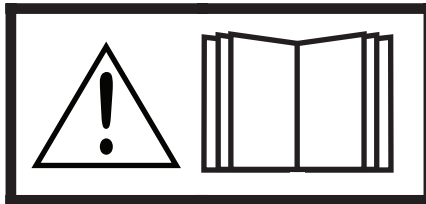
CAUTION

These INSTRUCTIONS are for experienced operators. If you are not fully familiar with the principles of operation and safe practices for arc welding and cutting equipment, we urge you to read our booklet, "Precautions and Safe Practices for Arc Welding, Cutting, and Gouging," Form 52-529. Do NOT permit untrained persons to install, operate, or maintain this equipment. Do NOT attempt to install or operate this equipment until you have read and fully understand these instructions. If you do not fully understand these instructions, contact your supplier for further information. Be sure to read the Safety Precautions before installing or operating this equipment.

USER RESPONSIBILITY

This equipment will perform in conformity with the description thereof contained in this manual and accompanying labels and/or inserts when installed, operated, maintained and repaired in accordance with the instructions provided. This equipment must be checked periodically. Malfunctioning or poorly maintained equipment should not be used. Parts that are broken, missing, worn, distorted or contaminated should be replaced immediately. Should such repair or replacement become necessary, the manufacturer recommends that a telephone or written request for service advice be made to the Authorized Distributor from whom it was purchased.

This equipment or any of its parts should not be altered without the prior written approval of the manufacturer. The user of this equipment shall have the sole responsibility for any malfunction which results from improper use, faulty maintenance, damage, improper repair or alteration by anyone other than the manufacturer or a service facility designated by the manufacturer.



**READ AND UNDERSTAND THE INSTRUCTION MANUAL BEFORE INSTALLING OR
OPERATING.
PROTECT YOURSELF AND OTHERS!**

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SECTION 1

ESS42 Single Stage EDGE™ Series 2.0 Regulators

TECHNICAL DATA

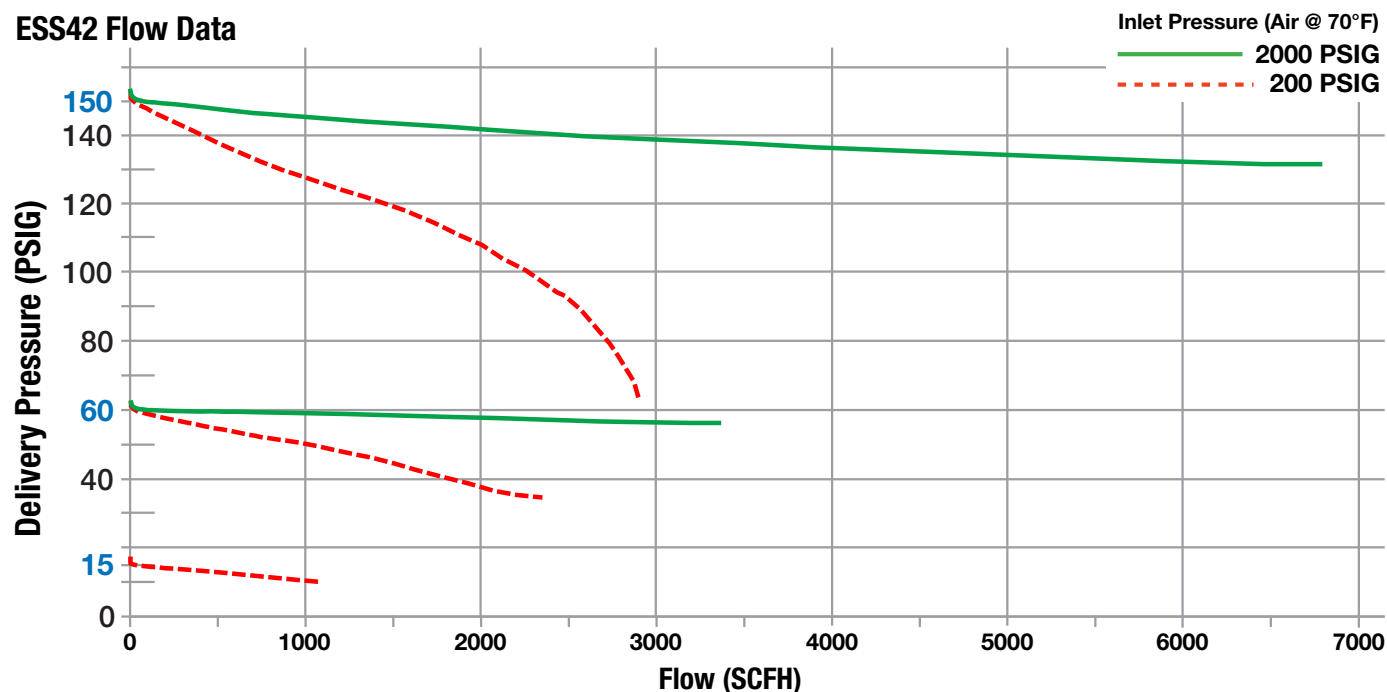
Regulator Type	Single Stage
Delivery Ranges	15 psig (Acetylene), 60 psig, 150 psig
Max. Inlet Pressure	360 psig Acetylene and LP Gas, 3000 psig All Others
Gauges	63mm/40mm ISO 5171 / UL Listed & Recognized as Required
Standards Compliance	CGA E-4, UL 252, ISO 2503, AS4267, ASTM G-175, Others (Depending on Model)
Other Safety	SLAM™ Impact Absorbing Safety Knob, Self Reseating Relief Valve (Excl. Acetylene, LP Gas)
Flow Coefficient (Cv)	0.285
Weight	4 lbs Approx.



Materials of Construction

Body	Forged Brass (CW617N per EN12165)
Bonnet	Die Casting Alloy No. 5, Conforming to ISO 301:1981 ZnAl4Cu1
Gauge Guard	Die Casting Alloy A380
Knob	High Impact ABS (Acrylonitrile Butadiene Styrene)
Diaphragm	AISI 301 Stainless Steel
Seat	3000 psig Inlet Models - Urethane Low Pressure Fuel Gases (Acetylene, Propane, etc.) - Neoprene
Inlet Filter	Sintered, Nickel Plated Bronze

ESS42 Flow Data



SERVICE & REPAIR – BEFORE YOU BEGIN

ESS42 Single Stage EDGE™ Series 2.0 Regulators



Apparatus improperly operated, maintained or repaired can be dangerous!

Service and repair of **VICTOR** apparatus should only be performed by a Qualified Repair Technician. The term “Qualified Repair Technician” refers to repair personnel capable of servicing apparatus in strict accordance with all applicable Victor “Parts & Service Bulletins” and literature. Improper service or repair, or modification of the product, could result in damage to the product or injury to the operator.

Protect your investment! Some parts and accessories manufactured by others may fit **VICTOR** apparatus, but not conform to **VICTOR**'s exacting standards for quality, fit and function. For your own protection and the protection of your investment, specify and use only **VICTOR** genuine parts and accessories. It's the only way to guarantee the level of performance, safety and reliability that you expect from **VICTOR**.

GLOSSARY – COMMONLY USED TERMS

OUTLET PRESSURE: The pressure measured at the Regulator's outlet port.

INLET PRESSURE: The pressure measured immediately at the Regulator's entry.

DROP: A change in outlet pressure from a no-flow to flowing condition while the inlet pressure remains constant.

RISE: An increase in outlet pressure as the inlet pressure decreases.

CREEP: A gradual increase in outlet pressure.

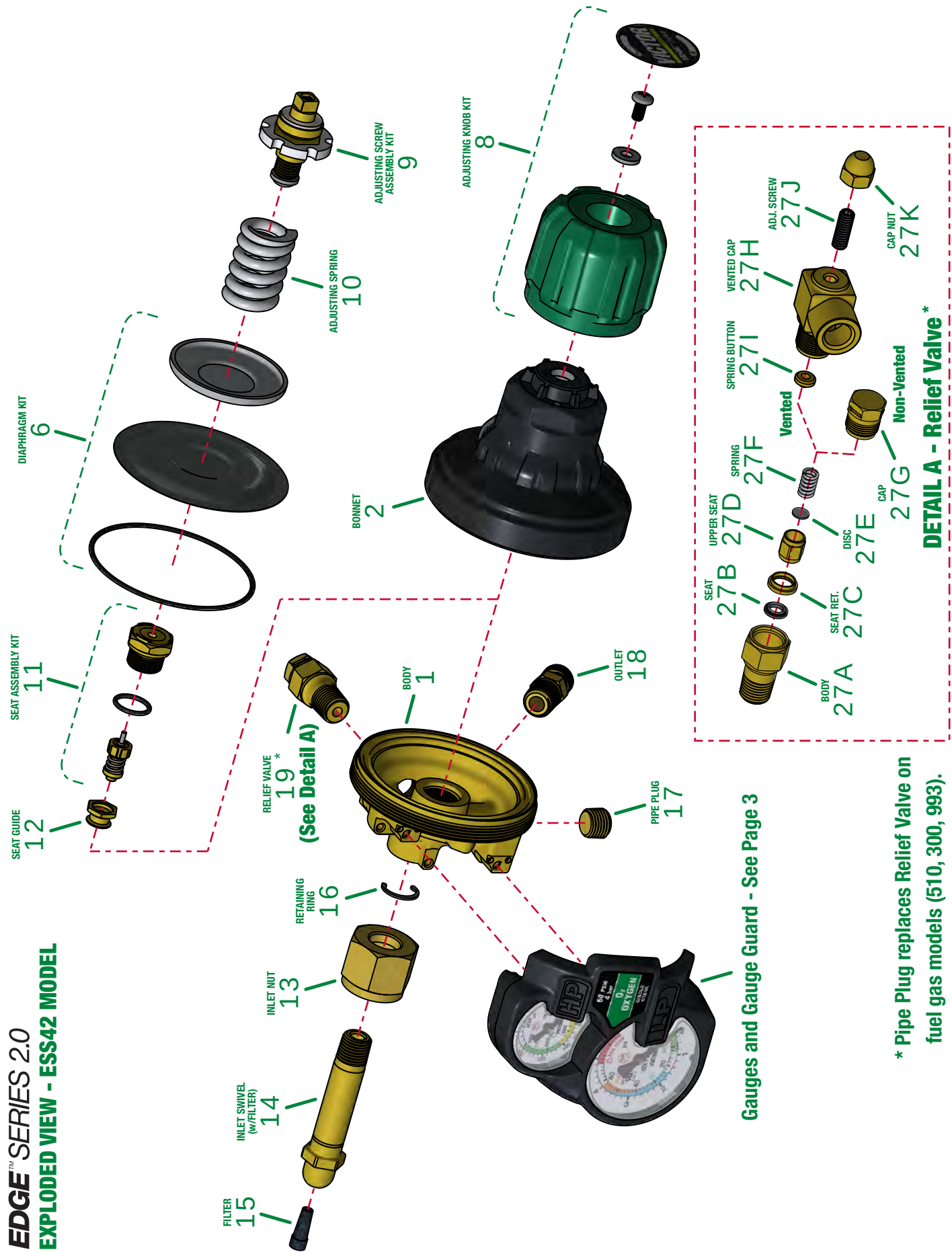
RECOMMENDED TOOLS & SUPPLIES FOR REPAIR PROCEDURES

- Inlet Swivel Assembly Plug (SEE TABLE 1)
- Bench Vise
- 9/16", 11/16", 3/4", 1-5/8" Sockets
- Torque Wrench for 4 - 36 in-lbs ranges
- Torque Wrench for 15 - 50 ft-lbs ranges
- 1/4" Hex Key
- Torx T-8 and T-15 Drivers
- Philips and Flat Head Screwdrivers
- Leverage Bar – Part No. 1420-0299
(To support body and install inlet)
- O-Ring Installation Tool – Part No. 1420-0344
(To ensure proper Gauge O-Ring positioning)
- Oxygen-compatible Teflon® Tape
- Loctite® #222 Threadlocker
- CHRISTO-LUBE® #129 Lubricant.

TABLE 1 – Inlet Swivel Assembly Plugs

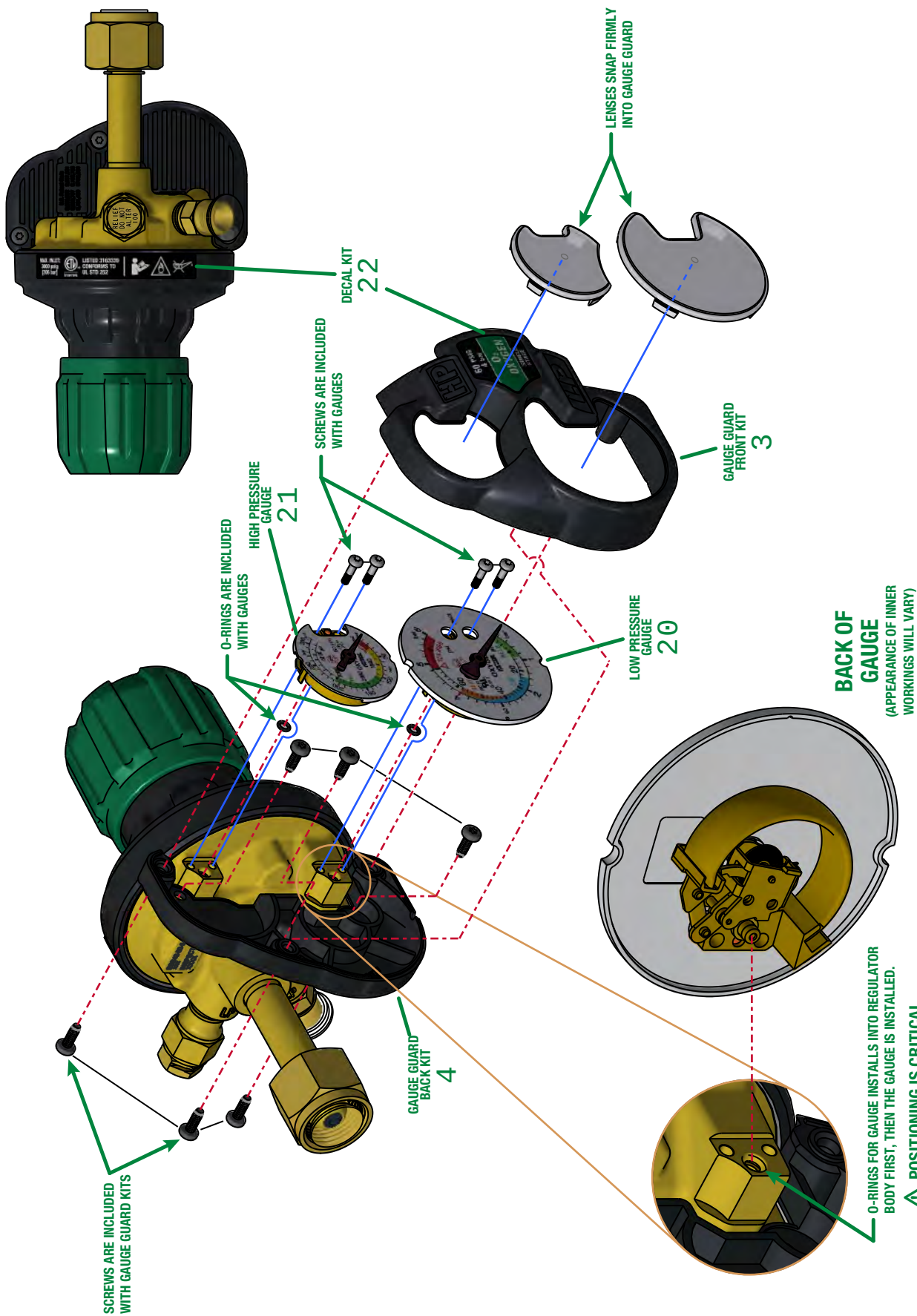
Inlet Connection	Inlet Swivel Assembly Plug P/N
CGA 300	1420-0013
CGA 320	1420-0127
CGA 326	1420-0219
CGA 346	1420-0220
CGA 350	1420-0009
CGA 510	1420-0015
CGA 540	1420-0014
CGA 580	1420-0134
CGA 590	1420-0135
"992" (British BS3)	1420-0145
"993" (British BS2)	1420-0146

EDGE™ SERIES 2.0 **EXPLODED VIEW - ESS42 MODEL**



* Pipe Plug replaces Relief Valve on fuel gas models (510, 300, 993).

EDGE™ SERIES 2.0 **EXPLODED VIEW - ESS42 MODEL**



EDGE™ SERIES 2.0

PARTS TABLES - REFER TO EXPLODED VIEWS

REF. NO.	DESCRIPTION	PART NO.	QTY	CONTENT NOTES
1	Body	0701-0675RP	1	
2	Bonnet	0720-0345RP	1	
3	Gauge Guard Front Kit	0790-0256RP	1	Includes Gauge Guard Front Half, Both Lenses and 3 Mounting Screws
4	Gauge Guard Back Kit	0790-0257RP	1	Includes Gauge Guard Back Half and 3 Mounting Screws
5	Lens Replacement Kit	0790-0258RP	1	Includes Both HP and LP Gauge Lenses
6	Diaphragm Kit	0790-0259RP	1	Includes Diaphragm, Diaphragm Backup Plate and O-Ring Seal
7	Decal, Knob	1415-0791	1	
8	Adjusting Knob Kit	TABLE 1	1	Includes Knob, Screw, Washer and Knob Decal
9	Adjusting Screw Assembly Kit	0790-0260RP	1	Includes Drive Screw, Drive Bushing, Thrust Washer, Screw and Washer
10	Adjusting Spring	TABLE 1	1	
11	Seat Assembly Kit	TABLE 1	1	Includes Nozzle, O-Ring, Seat Assembly, Valve Spring, Gland and Friction Damper
12	Seat Guide	0708-0018	1	
13	Inlet Nut	TABLE 2	1	
14	Inlet Swivel w/Filter	TABLE 2	1	
15	Inlet Filter	0717-0003	1	
16	Retaining Ring	TABLE 1	1	
17	Pipe Plug	1105-0014	1	
18	Outlet Connection	TABLE 2	1	
19	Relief Valve	TABLE 3	1	
20	Gauge, Low Pressure	TABLE 1	1	Includes Mounting Screws & O-Ring
21	Gauge, High Pressure	TABLE 1	1	Includes Mounting Screws & O-Ring
22	Decal Kit	TABLE 1	1	Includes Front Gas Decal and Rear Compliance/Warning Decal

TABLE 1 - Spring, Seat, Gauges, Knob, Decals, Color Coded Items

REF. NO.	DESCRIPTION	15 PSIG Delivery			60 PSIG Delivery			150 PSIG Delivery		
		Acetylene ESS42-15-	Oxygen ESS42-60-540	LP Gas ESS42-60-510LP	Oxygen ESS42-60-540	LP Gas ESS42-60-510LP	Oxygen ESS42-150-540	LP Gas ESS42-150-510LP	Hydrogen ESS42-150-350	Inert Gas ESS42-150-580
8	Adjusting Knob Kit	0790-0243RP	0790-0242RP	0790-0244RP	0790-0242RP	0790-0244RP	0790-0242RP	0790-0244RP	0790-0243RP	0790-0245RP
10	Adjusting Spring	0761-0089 *	0761-0089 *	0761-0077	0761-0098	0761-0077	0761-0098	0761-0098	0761-0098	0761-0098
11	Seat Assembly Kit	0790-0262RP	0790-0261RP	0790-0262RP	0790-0261RP	0790-0262RP	0790-0261RP	0790-0262RP	0790-0261RP	0790-0261RP
16	Retaining Ring	---	1406-0130	---	1406-0130	---	1406-0130	---	---	---
20	Gauge, Low Pressure	1435-0210RP	1435-0212RP	1435-0213RP	1435-0212RP	1435-0213RP	1435-0214RP	1435-0215RP	1435-0215RP	1435-0215RP
21	Gauge, High Pressure	1435-0217RP	1435-0221RP	1435-0218RP	1435-0221RP	1435-0218RP	1435-0221RP	1435-0222RP	1435-0222RP	1435-0222RP
22	Decal Kit	0790-0263RP	0790-0264RP	0790-0266RP	0790-0264RP	0790-0266RP	0790-0265RP	0790-0267RP	0790-0268RP	0790-0271RP

* Spring may include a Spacer Washer on top - be sure to reuse the Spacer Washer if your Regulator included one.

TABLE 2 - Inlet & Outlet

Gas	Inlet Type	I.D. Color	Inlet Nut	Inlet Swivel (w/Filter)	Outlet Connection
Oxygen	CGA 540	GREEN	0967-0044	0967-0034	0950-0068
Oxygen/Nitrogen	992	GREEN	0992-0003	0970-0005	0950-0068
Argon/Helium/Nitrogen	CGA 580	BLACK	0973-0003	0970-0005	0950-0017
Air (Industrial)	CGA 590	BLACK	0974-0003	0970-0005	0960-0014
Air (Breathing)	CGA 346	YELLOW	0972-0015	0972-0010	0960-0014
Carbon Dioxide	CGA 320 *	GREY	0985-0030	0985-0004 *	0950-0017
Hydrogen & Methane	CGA 350	RED	0983-0003	0983-0008	0960-0029
Acetylene	CGA 510	RED	0970-0003	0970-0005	0960-0029
Acetylene	CGA 300	RED	0968-0003	0968-0014	0960-0029
Acetylene	993	RED	0993-0003	0970-0005	0960-0029
LP Gas	CGA 510	ORANGE	0970-0003	0970-0005	0960-0029

* CGA 320 inlet requires inlet washer part number 1408-0065.

TABLE 3 - Relief Valve

REF. NO.	DESCRIPTION	Acetylene, LP Gas	Hydrogen (Vented Relief Valve) ESS42-150-350	All Other Models
	Rel. Valve Nom. Set Pressure -->	---	400	ESS42-60- ESS42-150
27	Relief Valve Complete Assembly or Pipe Plug	Pipe Plug 1105-0014	0600-0071	0600-0007 0601-0004 0601-0004
27A	Body	---	0601-0006	0608-0006 0609-0003
27B	Seat	---	0608-0009	0608-0003 0608-0018
27C	Seat Retainer	---	0609-0006	0609-0003 0609-0003
27D	Upper Seat	---	0608-0021	0608-0018 1406-0016
27E	Disc	---	1406-0017	1406-0016 0610-0006
27F	Spring	---	0610-0014	0610-0006 0614-0004
27G/H	Cap	---	0614-0016	0614-0004 ---
27I	Spring Button	---	0606-0005	---
27J	Adjusting Screw	---	1401-0007	---
27K	Cap Nut	---	1403-0024	---

SERVICE & REPAIR – PROCEDURES

ESS42 Single Stage EDGE™ Series 2.0 Regulators

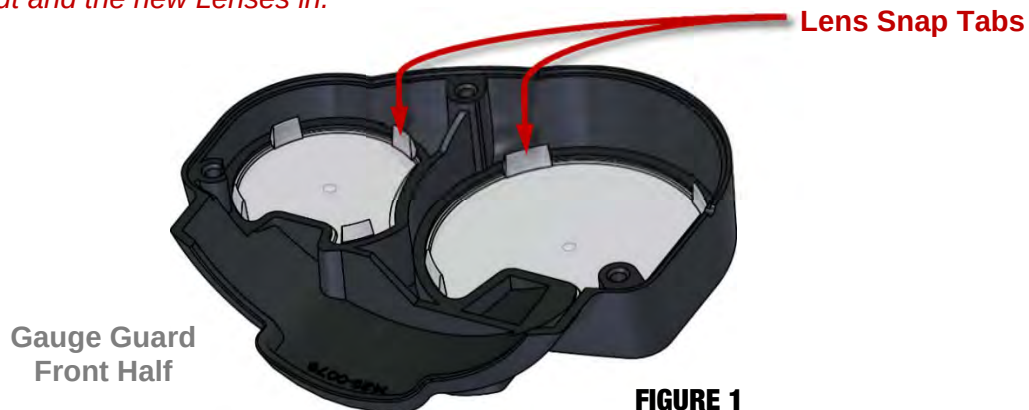
DISASSEMBLY PROCEDURES

➔ Refer to the exploded view for reference numbers **[Shown in brackets]**.

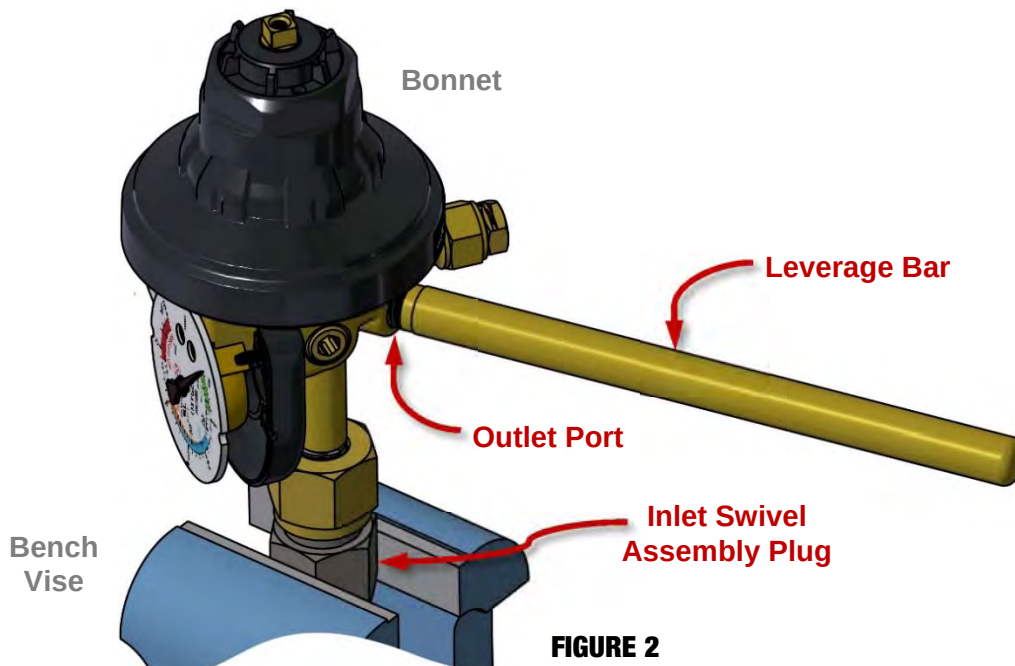
➔ Ensure adjusting knob is backed completely out (counterclockwise) before starting.

1. Mount the Inlet Swivel Assembly Plug in the Bench Vise and firmly attach the Regulator.
2. Remove the front half of the Gauge Guard **[3]** by removing the three Torx Head Screws from the back side.

➔ The Lenses can now be remove/replaced if desired, by simply snapping the old Lenses out and the new Lenses in.



3. Remove the Knob by removing the Knob Decal, then removing the #10-32 Screw and Washer found inside the Knob **[8]**.
4. Remove the Outlet Connection **[18]** from the Body, then remove the Bonnet **[2]**.
➔ To keep the Body from spinning while removing the Bonnet, use Leverage Bar 1420-0299 in the Outlet Port to obtain leverage to hold the Body, as shown in **FIGURE 2**.



5. Remove the Adjusting Screw Assembly [9], Adjusting Spring [10], then remove the Backup Plate, Diaphragm and Diaphragm O-Ring Seal [6].

➔ *Make sure you've got the Thrust Washer. If it's not sitting on top of the Adjusting Screw Assembly, it may still be up inside the Bonnet.*

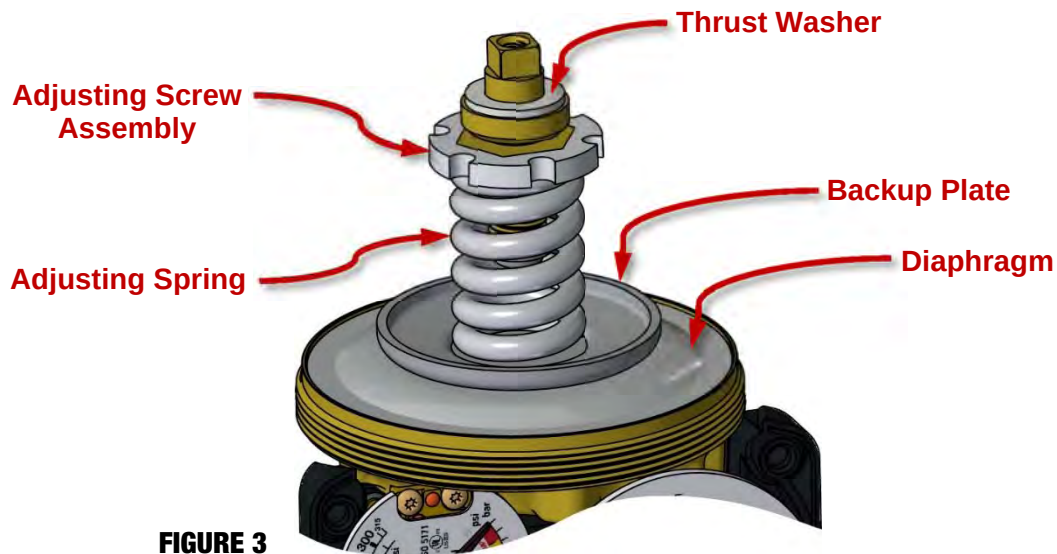


FIGURE 3

6. Remove all the Seat Assembly components (Nozzle w/O-Ring, Seat Assembly, Spring, Gland and Friction Damper) [11], then remove the Seat Guide [12] from the Body.
7. Remove the Relief Valve or Pipe Plug [19], and any other Pipe Plugs [17] (if necessary) from the Body.
8. Remove both HP and LP Gauges [20 and 21] by removing the two Torx Head Screws holding each in place. Note that the Gauge may be “stuck” in the Body on its O-Ring Seal. **DO NOT** pull up forcefully on the Gauge Face, as this can damage the Gauge! If a **LIGHT** pull doesn't pull the gauge out, lightly pry on the brass base underside of the Gauge with a Flat Head Screwdriver, and “rock” it gently to get it to release from the O-Ring Seal and come out.

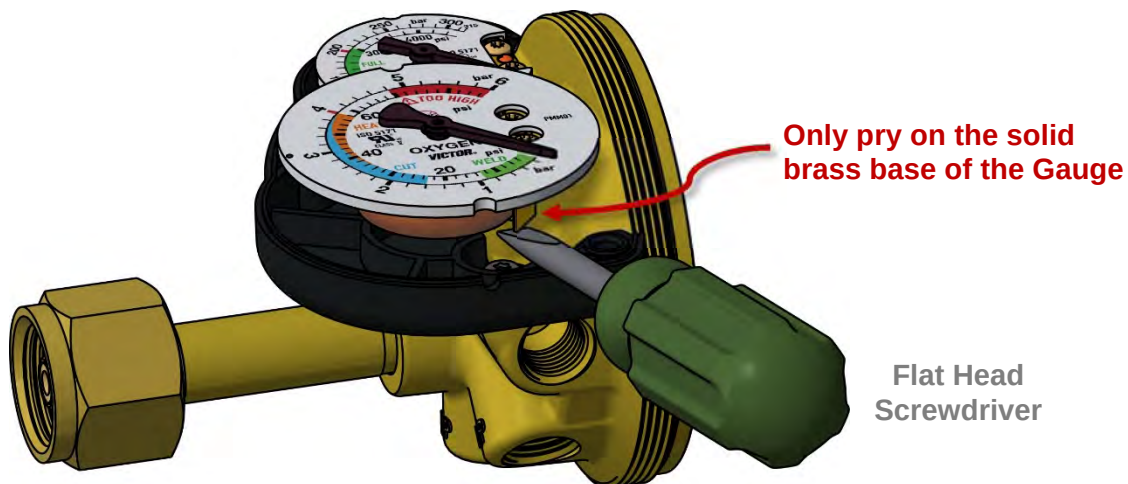
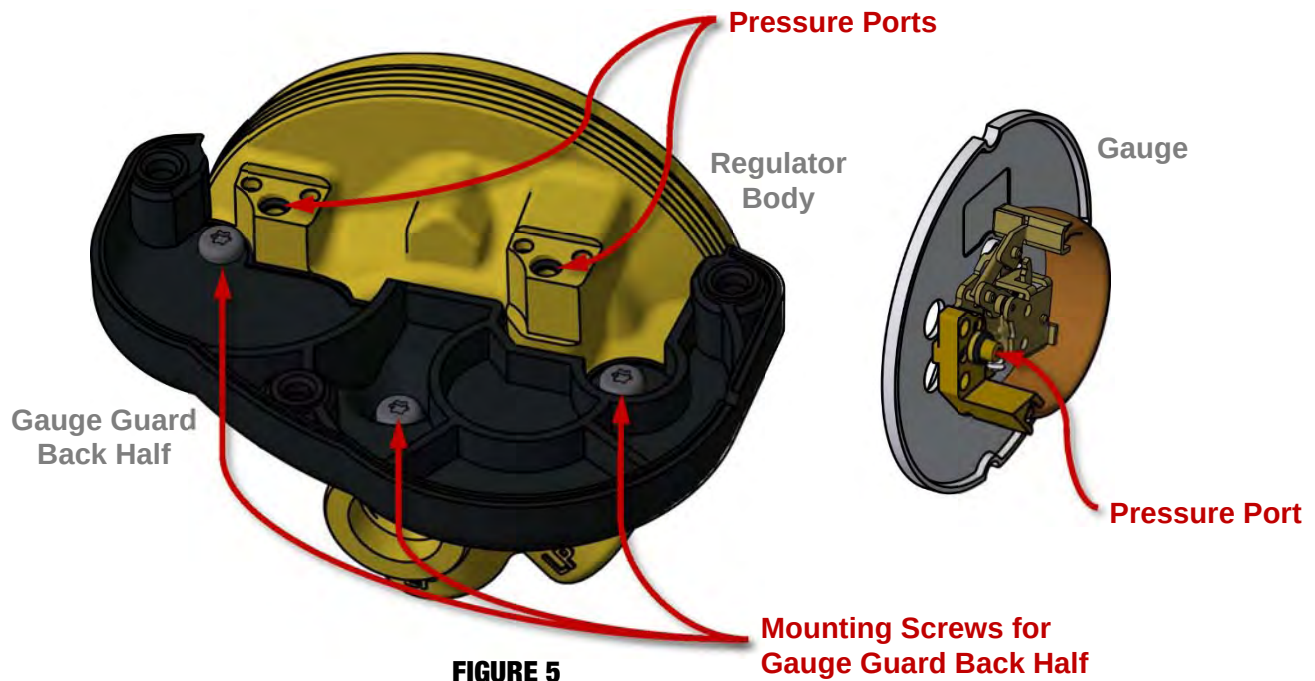


FIGURE 4

➔ *Be careful not to touch any of the inner workings of the Gauge. Handle the Gauge by holding onto the plastic face only.*

9. Carefully remove the Gauge O-Rings, taking care not to scratch any sealing surfaces. There is one O-Ring per Gauge. Typically they will remain in the body after Gauge removal, but if not there, they may also still be on the Pressure Port of the Gauge itself.



10. It is not required to remove the back half of the Gauge Guard [4] for any repairs that may be needed, but if removal is desired, simply remove the three Torx Head Screws holding it in place.
11. Install Leverage Bar 1420-0299 into any $\frac{1}{4}$ NPT port in the Body (if not already there), and use the bar to unscrew the Body off the Inlet Swivel [14].
- ➔ *Watch the Inlet Swivel while trying to turn the Body. If the Swivel is turning **with** the Body, then you need to tighten the Inlet Nut tighter on the Inlet Swivel Assembly Plug.*
12. If necessary, disassemble the Relief Valve as shown in **DETAIL A**.

⚠ CAUTION! You should never reuse the Nozzle O-Ring, Seat Assembly, Friction Damper, Inlet Filter or Diaphragm O-Ring Seal. Replace them with new parts each time you assemble a Regulator.

CLEANING PARTS

It is recommended to clean all metal parts for oxygen service, regardless of Regulator Model being repaired. There are several ways to clean components for oxygen service; the following standards are recommended reading for more detailed information on methods and processes:

- CGA G-4.1 "Cleaning Equipment for Oxygen Service"
- ASTM G-93 "Standard Practice for Cleaning Methods and Cleanliness Levels for Material and Equipment Used in Oxygen-Enriched Environments"
- ASTM G-127 "Standard Guide for the Selection of Cleaning Agents for Oxygen Systems"

For metal parts, **VICTOR** suggests using CCI Enviro spray Liquid, used per the manufacturer's instructions, followed by a hot water rinse and thorough drying. Additional information can be found at <http://www.ccichemical.com>.

DO NOT allow non-metal parts to come in contact with cleaning solvents. Cleaning solvents can cause non-metal parts to swell and/or crack. To clean these parts, use a non-petroleum based mild soap solution, followed by a thorough rinsing in water. Dry parts completely prior to reassembling.

ASSEMBLY PROCEDURES

Refer to the exploded view for reference numbers [Shown in brackets]

⚠ IMPORTANT NOTES ABOUT SEALING PIPE THREADS:

- When using Teflon® tape where noted: Apply two to three layers around the threads, leaving the first thread clean. Insure your Teflon® tape is oxygen-compatible.
- When using Loctite® #222 Threadlocker where noted: Apply two to three drops to the second and third thread, leaving the first thread clean.

1. Install a new Filter [15] into the Inlet Swivel (or replace entire Inlet Swivel w/Filter installed [14]), and apply Teflon® tape to the Inlet Swivel threads.
2. If not already in place, mount the Inlet Swivel Assembly Plug back in the Bench Vise. Firmly attach the Inlet Swivel and Inlet Nut [13] onto the Inlet Swivel Assembly Plug. Install Retaining Ring [16], if equipped.
3. Screw the Body onto the Inlet Swivel, screw the Leverage Bar 1420-0299 into the outlet port of the Body (light hand tight), and then use the Leverage Bar to tighten the Body onto the Inlet Connection. At this point, tighten enough so that the body cannot be turned by hand without the assistance of the Leverage Bar. Final torque for the Inlet Connection will occur in upcoming **STEP 15**.

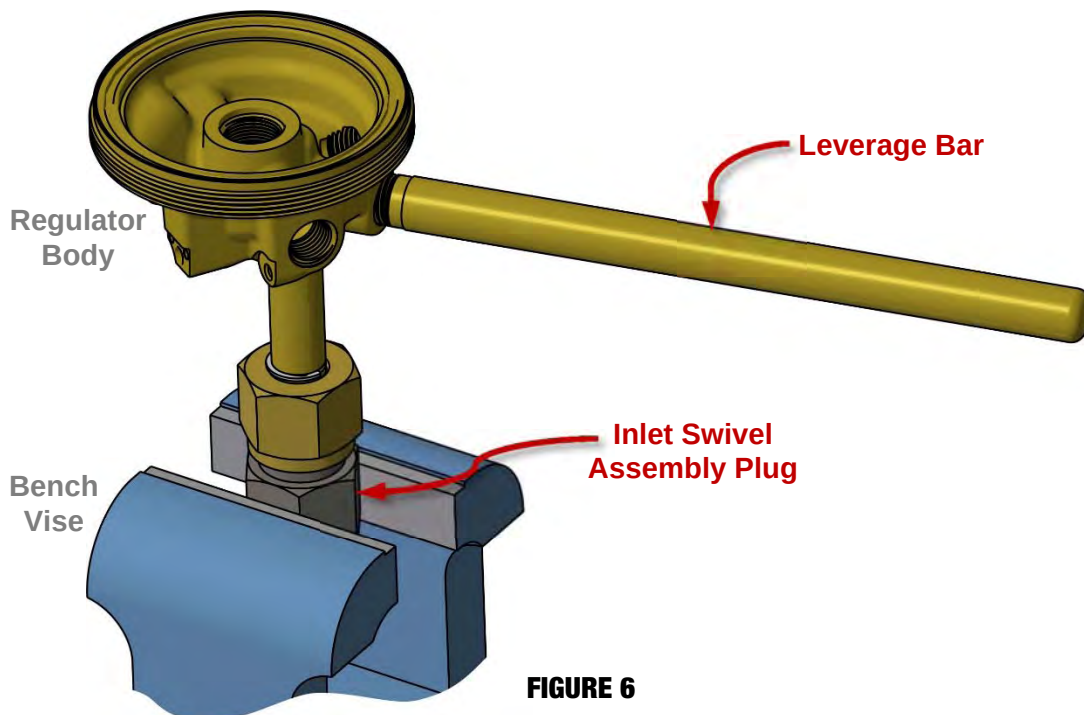


FIGURE 6

4. **Preassemble the Relief Valve (if so equipped):** Assemble (or reassemble) the Relief Valve **[19]** as shown in **DETAIL A**. Use no lubricants or sealants. If your Regulator model has a Pipe Plug instead of a Relief Valve, or if your Relief Valve is already assembled and tested, you can skip to **STEP 8**.
5. To ensure proper Relief Valve performance, perform the following test procedures *before assembling the Relief Valve in the Regulator*.
 - a. Attach the Relief Valve to a 450 PSIG source of oil-free air or dry nitrogen.
 - b. Slowly pressurize the Relief Valve, increasing to the recommended blow-off pressure listed in **TABLE 2** below. Note that **VICTOR** Relief Valves are stamped with their nominal set pressure, in case you're unsure which Relief Valve you have.

Non-Vented Relief Valves:

If the Relief Valve vents before the minimum blow-off pressure is reached, then a second Disc **[27E]** may be added.

If it still vents, then the Spring **[27F]** must be replaced.

Vented Relief Valves:

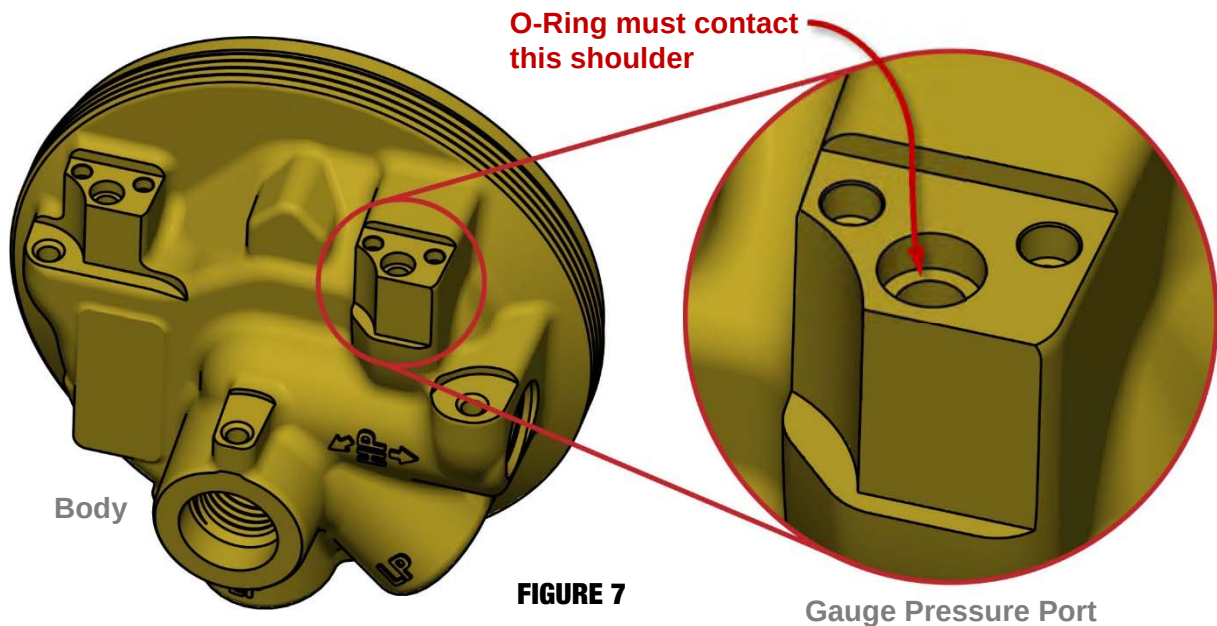
If the Vented Relief Valve fails to vent within the recommended blow-off pressure, reset the Adjusting Screw **[27J]** as necessary and perform this step again. Make sure you fully bleed off all pressure each time you test for blow-off pressure.

TABLE 2 – Relief Valve Blow-off Pressure

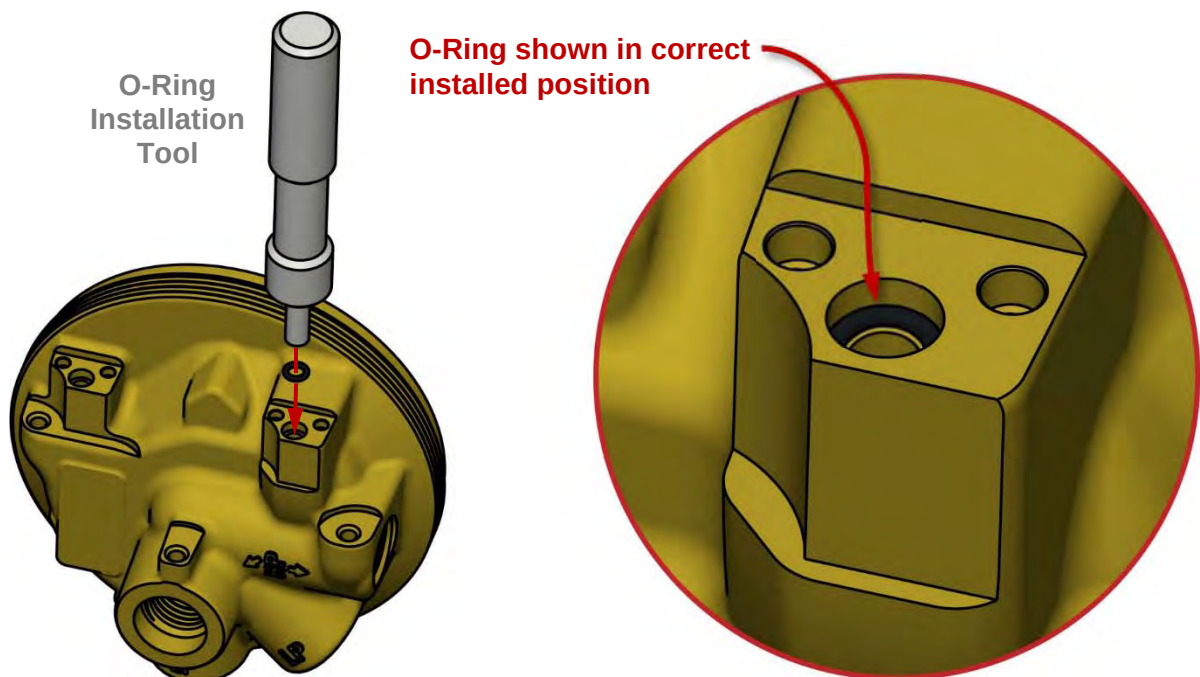
Relief Valve Nominal Set Point	Recommended Blow-off Pressure
60 PSIG	55 to 66 PSIG
100 PSIG	90 to 110 PSIG
200 PSIG	180 to 220 PSIG
300 PSIG	270 to 330 PSIG
400 PSIG	360 to 440 PSIG

6. When all testing is completed, bleed pressure off the Relief Valve. Install the Cap Nut **[27K]** on the Vented Relief Valve.
7. Apply Teflon® tape to the Relief Valve **[19]** threads. Install the Relief Valve (or Pipe Plug) into the Body and torque to 15 ft-lbs MIN.
8. Apply Teflon® tape to any other Pipe Plug **[17]** threads. Install Pipe Plugs into the Body where appropriate, and torque to 15 ft-lbs MIN.
➔ **The Outlet Connection gets installed after STEP 18.**
9. At this point, thoroughly blow out the Body assembly with pressurized oil-free air or dry nitrogen to insure it is completely free of chips and debris.
10. If the back half of the Gauge Guard was removed, reinstall it now using three Torx head screws. Torque Screws to 16 - 20 in-lbs.

11. **Gauge Installation:** The Edge 2.0 regulator uses new Gauge technology that utilizes an O-Ring seal, thereby eliminating messy Teflon® tape and burr/chip generation from pipe threads. While very easy to install, care must be taken to ensure a leak-free installation.
- a. The Gauge O-Ring installs into the **REGULATOR BODY**, not onto the Gauge, and must be carefully pushed down into the Body until it contacts the shoulder shown:



- b. This location is critical for leak-free installation. Use the O-Ring Installation Tool 1420-0344 to push the O-Ring down against the shoulder – it will move easy, and you will feel a positive stop once in position. No lubrication is required on the O-Ring.



- c. Next, install the Gauge itself by simply pushing the Gauge onto the O-Ring and Body. **DO NOT** push on the plastic face of the Gauge. Instead, use your hand grip on the Gauge face as a guide only, and use a Flat Head Screwdriver to push on the exposed brass portion of the Gauge as shown. It doesn't matter which gauge is installed first, but typically it's easier to install the HP Gauge first, since it sits slightly under the larger LP Gauge.
- d. Once the Gauge is pushed in all the way, and the metal face of the Gauge has contacted the face of the Body, the Gauges should naturally hold themselves in position. Now, simply install the two Torx Head Screws included with the Gauges. Torque Screws to 4.0 ± 0.4 in-lbs.

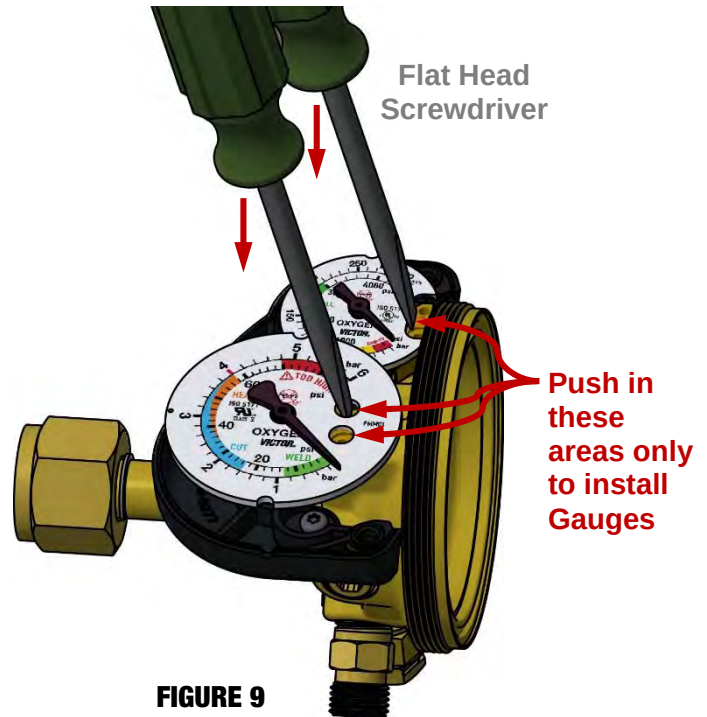


FIGURE 9

12. Install the Seat Guide [12] into the Body – it should slip in freely. Note its orientation when installing – the cupped end with the hex on it should face up.

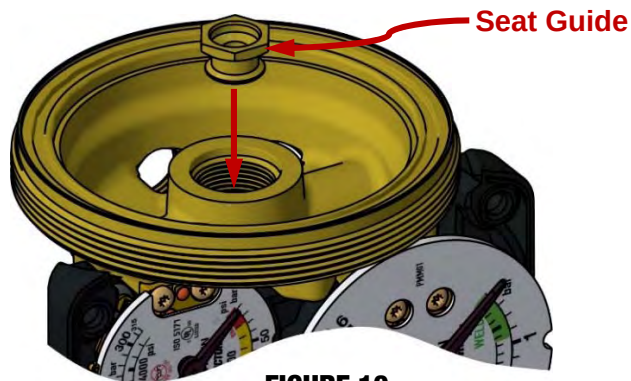


FIGURE 10

13. **Preassemble the seat components [11]:** Push the Friction Damper into the Gland, and then slip the Valve Spring, Gland and Friction Damper onto the shaft of the Seat Assembly.

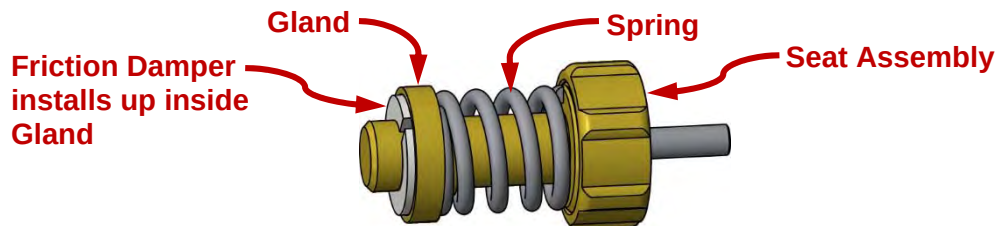
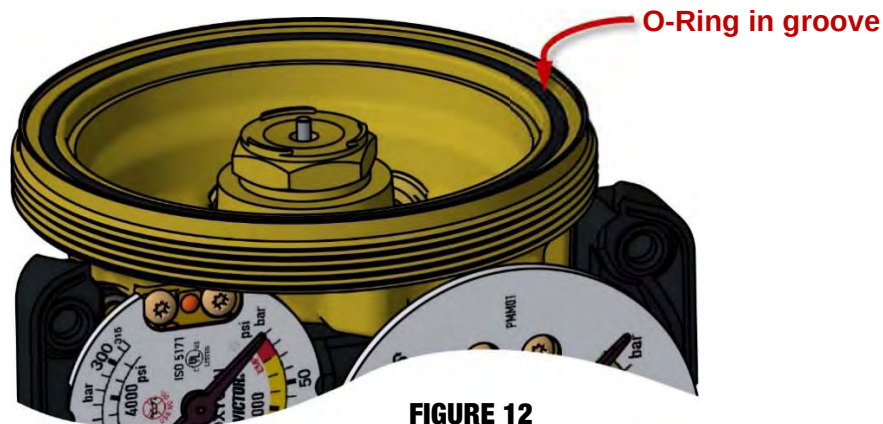


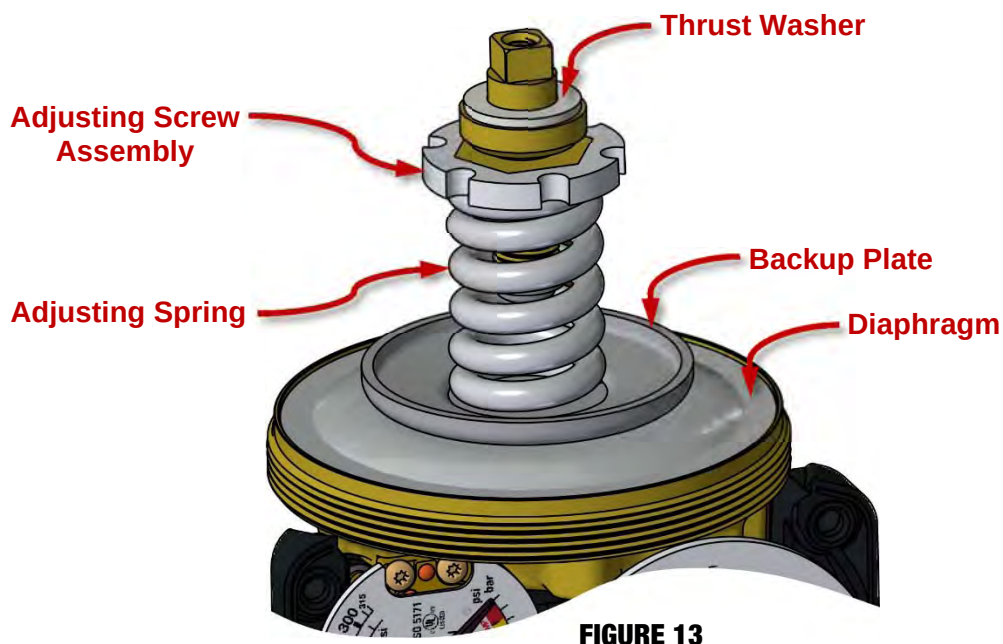
FIGURE 11

- ➔ *The Friction Damper should have enough tension to hold the Gland and the Valve Spring in position on the shaft of the Seat Assembly. If there appears to be no tension (if the parts just seem to want to fall off), then there may be a problem with your Friction Damper, or the Friction Damper may not be firmly pushed up in place inside the Gland.*

14. Install the preassembled seat components into the Regulator Body – with the Friction Damper and Gland fitting down into the cup shape of the Seat Guide.
15. Apply a light coat of CHRISTO-LUBE® #129 Lubricant to the Nozzle O-Ring, and install the new O-Ring onto the Nozzle, taking care to guide it carefully over the Nozzle threads to avoid nicks or tears. Install the Nozzle into the Regulator Body and torque to 15 - 20 ft-lbs. Note that 15 - 20 ft-lbs is the same recommended torque for the Inlet Connection Swivel, so as you torque down the Nozzle, ***you're also finish-tightening the Inlet Swivel to the correct torque value.***
 - ➔ ***Watch the Inlet Swivel while you torque down the Nozzle. If the Swivel is turning with the Body, then you need to tighten the Inlet Nut tighter on the Inlet Swivel Assembly Plug. You want to be sure that the 15 - 20 ft-lbs torque is being applied to both the Nozzle threads and the Inlet Swivel threads.***
16. Apply a light coat of CHRISTO-LUBE® #129 Lubricant to the Diaphragm O-Ring Seal [6], then install the O-Ring into the groove in the top of the Body.



17. Install the Diaphragm onto the Regulator Body, ensuring it is centered within the small lip on the top of the Body. Then install the Backup Plate, Adjusting Spring [10], and Adjusting Screw Assembly [9]. ***Don't forget the Thrust Washer!*** It should be sitting on top of the Adjusting Screw Assembly. Regulator function will be impaired without it.



18. Install the Bonnet [2] onto the Body. Take care while slipping the Bonnet down over the internal components – the ribs inside the Bonnet must slide into the scallops of the Guide Bushing. Torque the Bonnet to 45 - 50 ft-lbs.
 → Use the Leverage Bar 1420-0299 in the open Outlet Port to prevent the assembly from rotating while torquing the Bonnet.
19. Apply **only** Loctite® #222 threadlocker to the Outlet Connection [18] threads. Install the Outlet Connection into the Body and torque to 15 ft-lbs MIN.
20. Apply a small amount of CHRISTO-LUBE® #129 to the top surface of the Bonnet (the surface around the square of the Drive Screw), then slip the Knob [8] into position – the square hole inside the knob mates to the square shaft of the Drive Screw.
21. Install the #10-32 Screw and Washer to hold the Knob on. Torque this Screw to 30 - 36 in-lbs. Then apply the new Knob Decal.
22. Snap new Lenses into the front half of the Gauge Guard [3] (unless already installed), and install the front half of the Gauge Guard onto the regulator using three Torx Head Screws from the back side. Torque Screws to 16 - 20 in-lbs.
23. Apply new Gas I.D. and Compliance Decals [22] as needed to ensure the Regulator maintains clear visual identification.



FIGURE 14

24. Disconnect the Regulator from the Inlet Swivel Assembly Plug. The Regulator is now ready for testing.

TABLE 3 - Torque Specifications Summary

Seat Nozzle / Encapsulated Seat	15 - 20 ft-lbs.
Bonnet	45 - 50 ft-lbs.
Inlet Connection	15 - 20 ft-lbs.
Outlet, Relief Valve, Pipe Plugs	15 ft-lbs. MINIMUM
Gauge Screws (M2.5 Screws Included w/Gauges)	4.0±0.4 in-lbs.
Gauge Guard Screws (M3.5 Thread Forming Screws)	16 - 20 in-lbs.
Adjusting Mechanism Screws (10-32 Thread Self Locking Screws)	30 - 36 in-lbs.

RECOMMENDED TOOLS AND SUPPLIES FOR TEST PROCEDURES

- Test Gun (quick opening on/off valve) with #52 (.0635") restricting orifice
- Valved source of oil-free air or dry nitrogen

TEST PROCEDURES



For your safety, and the safety of others:

- Always test with oil-free air or dry nitrogen only.
- Always wear eye protection while testing a Regulator.
- Always perform *all* of the following test procedures after reassembling a Regulator.

1. Set gas supply to the proper pressure shown in the following table:

TABLE 4 – Edge 2.0 Regulator Test Pressures

Gas Service	Manifold Pressure for Testing
Acetylene & LP Gas	250±20 PSIG
CO ₂ & N ₂ O	1000±100 PSIG
Air, Argon, Hydrogen, Helium, Nitrogen, Oxygen	2000±100 PSIG

2. Attach the Regulator to the gas supply – start the Inlet Nut by hand (do not force), and tighten securely with a wrench to create a seal.
3. **Contamination purge prior to test:**
 - a. Turn the Regulator Adjusting Knob clockwise two or three times until you feel slight tension being applied to the Adjusting Spring.
 - b. Slowly open and close the Gas Supply Valve two or three times to remove contamination that may cause malfunctions. Leave the Gas Supply Valve closed.
 - c. If no flow comes through the Regulator, determine the cause – refer to the **TROUBLESHOOTING CHART** at the end of this section.
4. Turn the Adjusting Knob counterclockwise until it stops, and attach the Test Gun (with a #52 restricting orifice) to the outlet of the Regulator.
5. Open the Gas Supply Valve and close the Test Gun.
 - a. Working pressure will appear on the High Pressure Gauge.
 - b. If the Low Pressure Gauge begins to show pressure building, turn the Gas Supply Valve off and refer to the **TROUBLESHOOTING CHART**.
6. Use the values in the following table for all subsequent tests:

TABLE 5 – Edge 2.0 Regulator Test Values

Edge™ 2.0 Model	A Pressure Set for Leak Test	B Pressure Set for Creep/Drop Test	C Drop Allowance	D Initial Shut-off Allowance
ESS42-15-	15 PSIG	5 PSIG	3 PSIG	1 PSIG
ESS42-60-	60 PSIG	10 PSIG	3 PSIG	2 PSIG
ESS42-150-	150 PSIG	20 PSIG	4 PSIG	3 PSIG

7. LEAK TEST

- a. With the Test Gun closed and the Gas Supply Valve open, adjust the Regulator to deliver **A** PSIG.
- b. Close the Gas Supply Valve and turn the Adjusting Knob one turn counterclockwise.
- c. Observe the Low Pressure and High Pressure Gauges for five (5) minutes:
 1. If the High Pressure Gauge reading drops, there is a leak in the Gas Supply Valve, Inlet Connection, High Pressure Gauge or the plugged high pressure port.
 2. If the Low Pressure Gauge reading drops, there is a leak in the downstream equipment, Low Pressure Gauge, Outlet Connection or Relief Valve port.
 3. If the High Pressure Gauge reading drops at the same time the Low Pressure Gauge reading increases, there is a leak in the Regulator Seat.
- d. If any leaks are found, isolate if possible using a liquid leak detector, disassemble and repair or replace parts as needed, and start the test over again. Refer to **TROUBLESHOOTING CHART** for more detailed cause and possible corrective action information.

8. DROP TEST

- a. With the Test Gun closed and the Gas Supply Valve open, adjust the Regulator to deliver **B** PSIG.
- b. Open the Test Gun and note the new indicated delivery pressure. Drop (indicated pressure static minus indicated pressure flowing) must not exceed **C** PSIG.

9. CREEP TEST / SLOW SHUT-OFF TEST

- a. With the Test Gun closed and the Gas Supply Valve open, adjust the Regulator to deliver **B** PSIG.
 - b. Open and close the Test Gun several times to stabilize the Regulator. Leave the test gun closed.
 - c. Observe the Low Pressure Gauge for five (5) minutes:
 1. During the first minute, an initial shut-off increase of **D** PSIG is permissible.
 2. During the next 4 minutes, no further increase (creep) is allowed.
10. Close the Gas Supply Valve and release all pressure from the Regulator by opening the Test Gun. Turn the Adjusting Knob counterclockwise until it stops.
11. Remove the Test Gun from the Regulator.
12. Remove the Regulator from the gas supply. The Regulator is now ready to use.

TROUBLESHOOTING

CAUSES	POSSIBLE CORRECTIVE ACTIONS
1. No gas flows through the Regulator and the High Pressure Gauge <i>does not</i> indicate pressure.	
a. Inlet or Inlet Filter is plugged.	Blow 40-45 PSIG of air through the Filter in reverse direction of the normal gas flow.
b. Empty Supply Cylinder.	Replace the Cylinder.
2. No gas flows through the Regulator and the High Pressure Gauge <i>does</i> indicate pressure.	
a. Damaged Adjusting Mechanism or missing components.	Check the Drive Screw, Guide Bushing and Thrust Washer – insure they are installed correctly and moving freely in the Bonnet.
b. Adjusting Knob not installed correctly.	Make sure the square of the Drive Screw is properly mated into the square in the Adjusting Knob.
c. Outlet Connection plugged.	Inspect and clear the Outlet Connection of any debris.
d. Broken Adjusting Spring.	Replace the Adjusting Spring.
e. Broken Seat Stem.	Replace the Seat Assembly.
3. Gauges do not indicate pressure but gas flows through the Regulator.	
a. Defective Gauge(s).	Replace Gauge(s).
4. Regulator does not deliver in its designed delivery pressure range.	
a. Incorrect Adjusting Spring used during repair.	Replace with correct Adjusting Spring.
b. Damaged Adjusting Mechanism or missing components.	Check the Drive Screw, Guide Bushing and Thrust Washer – insure they are installed correctly and moving freely in the Bonnet.
5. Regulator hums or clatters while flowing.	
a. Missing Friction Damper.	Install a Friction Damper.
b. Missing Seat Guide.	Install the Seat Guide.
c. Flow exceeds Regulator capacity.	Reduce flow to below the maximum rating of the Regulator.
d. Restriction upstream of the Regulator.	Inspect system and remove restriction.

CAUSES**POSSIBLE CORRECTIVE ACTIONS****6. Regulator experiences excessive drop.**

a. Friction Damper too tight.	Replace the Friction Damper and/or Gland.
b. Wrong size orifice in Test Gun.	Insure the correct orifice is installed in the Test Gun - size #52 (.0635").
c. Partially plugged Inlet Filter.	Clean or replace the Inlet Filter.
d. Incorrect Adjusting Spring used during repair.	Replace with correct Adjusting Spring.
e. Low Cylinder pressure or Manifold test pressure.	Check Cylinder and Manifold pressure and adjust/replace as needed.
f. Flow exceeds Regulator capacity.	Reduce flow to below the maximum rating of the Regulator.

7. Increase in the low pressure gauge reading (creep).

a. Loose Nozzle.	Tighten Nozzle to 15 - 20 ft-lbs torque.
b. Missing or damaged Nozzle O-Ring.	Inspect and install or replace O-Ring as necessary.
c. Accumulation of foreign particles on Seat Assembly or seating surfaces.	Clean seating surfaces and/or replace Seat Assembly.

9. Rapid pressure drop on both High and Low Pressure Gauges.

a. Loose connection – Bonnet to Body.	Re-tighten Bonnet per STEP 18 of assembly procedure.
a. Damaged or missing Diaphragm O-Ring	Replace Diaphragm O-Ring.
b. Loose connection – Regulator to Test Manifold.	Insure Regulator is securely tightened to the Manifold.

9. With the cylinder valve closed, the High Pressure Gauge indicator drops, and there is no immediate increase in pressure indicated on the Low Pressure Gauge.

a. Loose connection – Regulator to Test Manifold.	Insure Regulator is securely tightened to the Manifold.
b. Loose connection – Inlet Swivel to Regulator Body.	Tighten the Swivel using 20 ft-lbs torque.
c. Loose connection – High Pressure Gauge to Regulator Body.	Re-check Gauge Screw torque, O-Ring installation, and verify O-Ring installed properly and not damaged (See STEP 11 of the Assembly Procedure).
d. Loose connection – Bottom Pipe Plug.	Tighten Pipe Plug using 15 ft-lbs torque minimum.
e. Leaking Gauge.	Replace the Gauge.

CAUSES**POSSIBLE CORRECTIVE ACTIONS****10. Low Pressure Gauge indicator slowly drops, and there is no decrease in pressure on the High Pressure gauge when the Manifold Valve is closed.**

b. Test Gun is not attached securely.	Tighten the Test Gun.
c. Loose connection – Low Pressure Gauge to Regulator Body.	Re-check Gauge Screw torque, O-Ring installation, and verify O-Ring installed properly and not damaged (See STEP 11 of the Assembly Procedure).
d. Loose connections at the Regulator Body – Outlet Connection or Relief Valve/Plug	Tighten connections using 15 ft-lbs torque minimum.
e. Loose connection – Bonnet to Body.	Re-tighten Bonnet per STEP 18 of assembly procedure.
f. Damaged or missing Diaphragm O-Ring	Replace Diaphragm O-Ring.
g. Damaged Diaphragm.	Replace Diaphragm.

11. Rapid increase in Low Pressure Gauge reading.

a. Damaged or loose Nozzle.	Replace and/or tighten the Nozzle to 20 ft-lbs torque.
b. Heavy accumulation of foreign particles on Seat Assembly or seating surfaces.	Clean seating surfaces and/or replace Seat Assembly.
c. Missing or damaged Nozzle O-Ring.	Inspect and install or replace O-Ring as necessary.
d. Improper Adjusting Spring (spring too long).	Replace Adjusting Spring.

12. Relief Valve opens at a greater or less than marked pressure (outside a pressure tolerance of $\pm 15\%$ of the marked pressure).

a. Incorrect Spring used.	Replace with correct Spring.
b. Relief Valve not set properly.	Repeat Relief Valve assembly/test procedure STEP 4 .

SECTION 2

ESS32 Single Stage EDGE™ Series 2.0 Regulators

TECHNICAL DATA

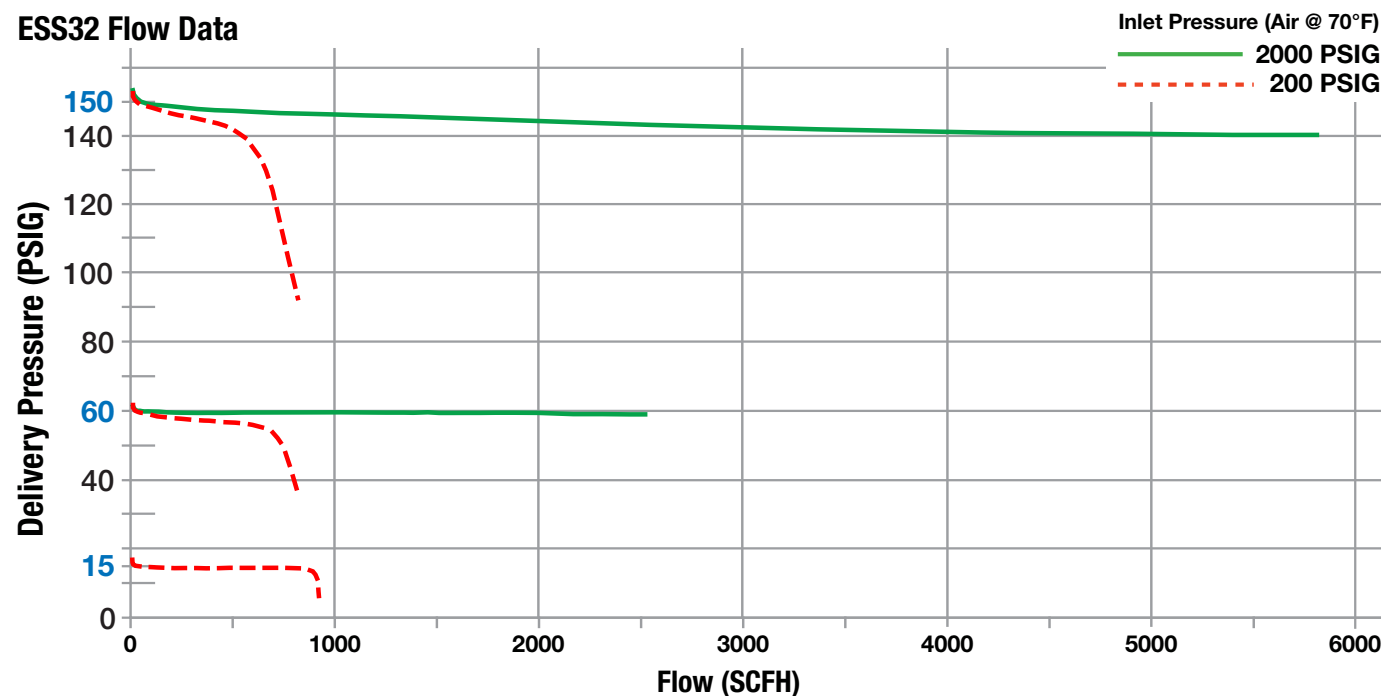
Regulator Type	Single Stage
Delivery Ranges	15 psig (Acetylene), 60 psig, 150 psig
Max. Inlet Pressure	360 psig Acetylene and LP Gas, 3000 psig All Others
Gauges	50mm/40mm ISO 5171 / UL Listed & Recognized as Required
Standards Compliance	CGA E-4, UL 252, ISO 2503, AS4267, ASTM G-175, Others (Depending on Model)
Other Safety	SLAM™ Impact Absorbing Safety Knob, Self Reseating Relief Valve (Excl. Acetylene, LP Gas)
Flow Coefficient (Cv)	0.266 LP Fuel Regulators, 0.141 All Others
Weight	3.5 lbs Approx.



Materials of Construction

Body	Forged Brass (CW617N per EN12165)
Bonnet	Die Casting Alloy No. 5, Conforming to ISO 301:1981 ZnAl4Cu1
Gauge Guard	Die Casting Alloy A380
Knob	High Impact ABS (Acrylonitrile Butadiene Styrene)
Diaphragm	Neoprene w/Nylon Fabric Reinforcement
Seat	3000 psig Inlet Models - Urethane Low Pressure Fuel Gases (Acetylene, Propane, etc.) - Neoprene
Inlet Filter	Sintered, Nickel Plated Bronze

ESS32 Flow Data



SERVICE & REPAIR – BEFORE YOU BEGIN

ESS32 Single Stage EDGE™ Series 2.0 Regulators



Apparatus improperly operated, maintained or repaired can be dangerous!

Service and repair of **VICTOR** apparatus should only be performed by a Qualified Repair Technician. The term “Qualified Repair Technician” refers to repair personnel capable of servicing apparatus in strict accordance with all applicable Victor “Parts & Service Bulletins” and literature. Improper service or repair, or modification of the product, could result in damage to the product or injury to the operator.

Protect your investment! Some parts and accessories manufactured by others may fit **VICTOR** apparatus, but not conform to **VICTOR's** exacting standards for quality, fit and function. For your own protection and the protection of your investment, specify and use only **VICTOR** genuine parts and accessories. It's the only way to guarantee the level of performance, safety and reliability that you expect from **VICTOR**.

GLOSSARY – COMMONLY USED TERMS

OUTLET PRESSURE: The pressure measured at the Regulator's outlet port.

INLET PRESSURE: The pressure measured immediately at the Regulator's entry.

DROP: A change in outlet pressure from a no-flow to flowing condition while the inlet pressure remains constant.

RISE: An increase in outlet pressure as the inlet pressure decreases.

CREEP: A gradual increase in outlet pressure.

RECOMMENDED TOOLS & SUPPLIES FOR REPAIR PROCEDURES

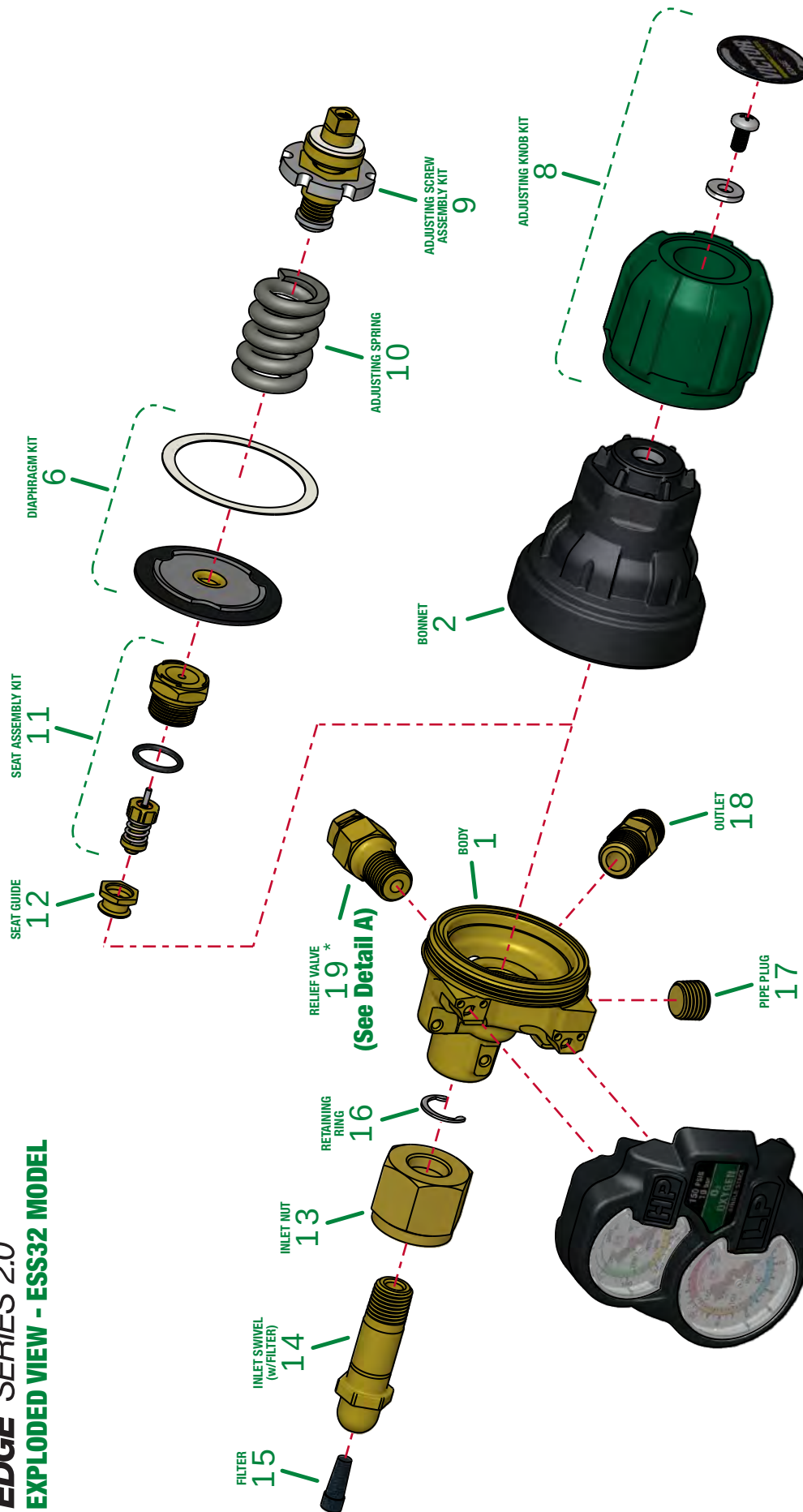
- Inlet Swivel Assembly Plug (SEE TABLE 1)
- Bench Vise
- $\frac{9}{16}$ ", $\frac{11}{16}$ ", $\frac{3}{4}$ ", $1\frac{5}{8}$ " Sockets
- Torque Wrench for 4 - 36 in-lbs ranges
- Torque Wrench for 15 - 50 ft-lbs ranges
- $\frac{1}{4}$ " Hex Key
- Torx T-8 and T-15 Drivers
- Philips and Flat Head Screwdrivers
- Leverage Bar – Part No. 1420-0299
(To support body and install inlet)
- O-Ring Installation Tool – Part No. 1420-0344
(To ensure proper Gauge O-Ring positioning)
- Oxygen-compatible Teflon® Tape
- Loctite® #222 Threadlocker
- CHRISTO-LUBE® #129 Lubricant.

TABLE 1 – Inlet Swivel Assembly Plugs

Inlet Connection	Inlet Swivel Assembly Plug P/N
CGA 300	1420-0013
CGA 320	1420-0127
CGA 326	1420-0219
CGA 346	1420-0220
CGA 350	1420-0009
CGA 510	1420-0015
CGA 540	1420-0014
CGA 580	1420-0134
CGA 590	1420-0135
"992" (British BS3)	1420-0145
"993" (British BS2)	1420-0146

EDGE™ SERIES 2.0 **EXPLODED VIEW - ESS32 MODEL**

ESS32



NOTES

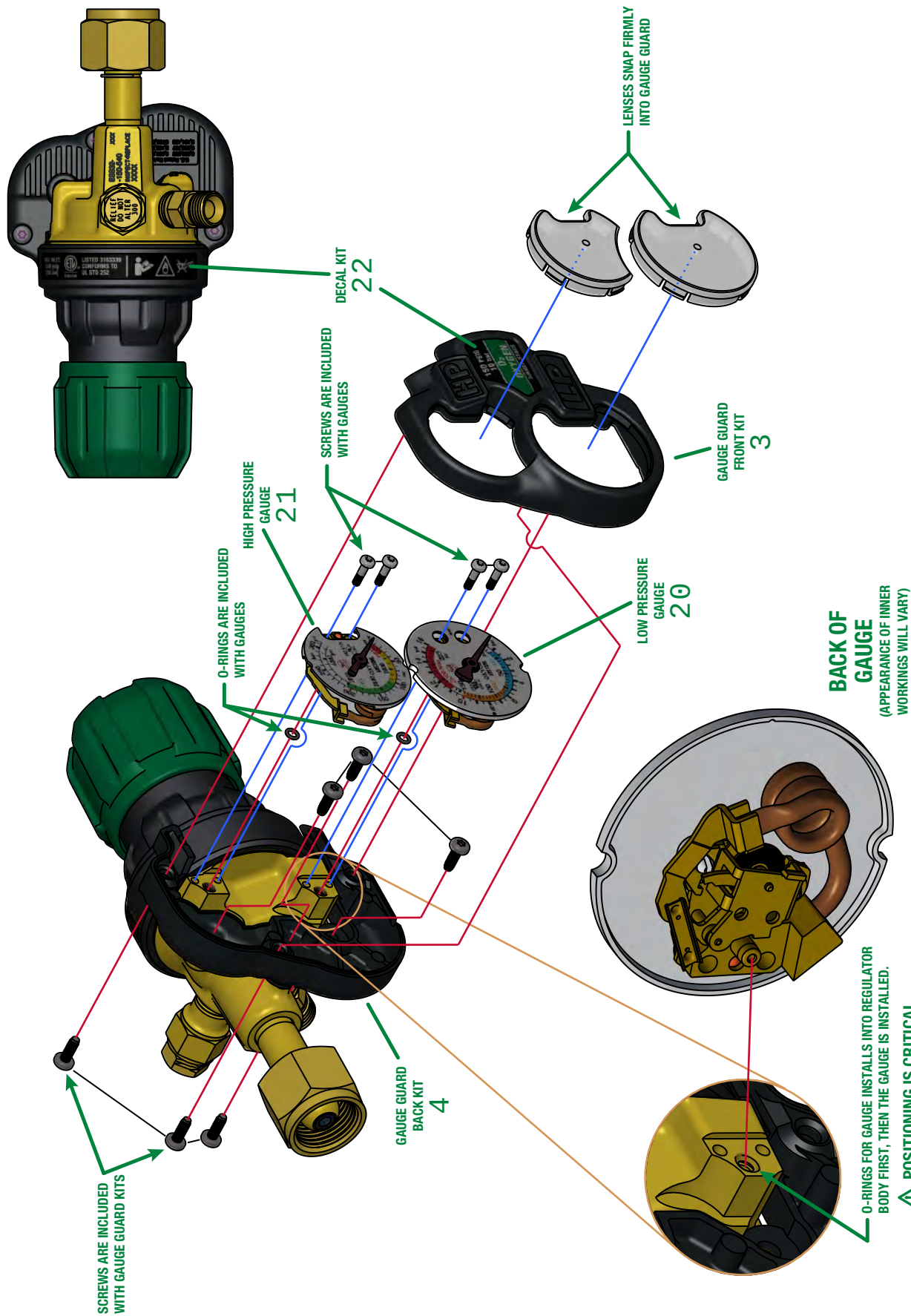
- Pipe Plug replaces Relief Valve on fuel gas models (510, 300, 993).
- Vented Relief Valves (used on hydrogen models) are not repairable.

DETAIL A - Relief Valve

Gauges and Gauge Guard
 See Page 21

EDGE™ SERIES 2.0 **EXPLODED VIEW - ESS32 MODEL**

ESS32



EDGE™ SERIES 2.0

ESS32 PARTS TABLES - REFER TO EXPLODED VIEWS

REF. NO.	DESCRIPTION	PART NO.	QTY	CONTENT NOTES
1	Body	0701-0676RP	1	
2	Bonnet	0720-0346RP	1	
3	Gauge Guard Front Kit	0790-0273RP	1	Includes Gauge Guard Front Half, Both Lenses and 3 Mounting Screws
4	Gauge Guard Back Kit	0790-0274RP	1	Includes Gauge Guard Back Half and 3 Mounting Screws
5	Lens Replacement Kit	0790-0275RP	1	Includes Both HP and LP Gauge Lenses
6	Diaphragm Kit	0790-0276RP	1	Includes Diaphragm Assembly & Slip Ring
7	Decal, Knob	1415-0788	1	
8	Adjusting Knob Kit	TABLE 1	1	Includes Knob, Screw, Washer and Knob Decal
9	Adjusting Screw Assembly Kit	0790-0260RP	1	Includes Drive Screw, Drive Bushing, Thrust Washer, Screw and Washer (Assembled)
10	Adjusting Spring	TABLE 1	1	
11	Seat Assembly Kit	TABLE 1	1	
12	Seat Guide	0708-0018	1	Includes Nozzle, O-Ring, Seat Assembly, Valve Spring, Gland and Friction Damper
13	Inlet Nut	TABLE 2	1	
14	Inlet Swivel w/Filter	TABLE 2	1	
15	Inlet Filter	0717-0003	1	
16	Retaining Ring	TABLE 1	1	
17	Pipe Plug	1105-0014	1	
18	Outlet Connection	TABLE 2	1	
19	Relief Valve	TABLE 3	1	
20	Gauge, Low Pressure	TABLE 1	1	Includes Mounting Screws & O-Ring
21	Gauge, High Pressure	TABLE 1	1	Includes Mounting Screws & O-Ring
22	Decal Kit	TABLE 1	1	Includes Front Gas Decal and Rear Compliance/Warning Decal

TABLE 1 - Spring, Seat, Gauges, Knob, Decals, Color Coded Items

REF.	DESCRIPTION	15 PSIG Delivery				60 PSIG Delivery				150 PSIG Delivery				50 CFH Flowgauge			
		Acetylene ESS32-15-	Oxygen ESS32-60-	LP Gas ESS32-60-510LP	Hydrogen ESS32-60-350	Inert Gas ESS32-60-580	Oxygen ESS32-150-	LP Gas ESS32-150-510LP	Hydrogen ESS32-150-350	Inert Gas ESS32-150-580	Air ESS32-150-346	Carbon Dioxide ESS32-150-320	Argon-CO2 ESS32-80CFH-580	Argon-CO2 ESS32-80CFH-320			
8	Adjusting Knob Kit	0790-0250RP	0790-0249RP	0790-0251RP	0790-0250RP	0790-0252RP	0790-0249RP	0790-0251RP	0790-0250RP	0790-0252RP	0790-0253RP	0790-0252RP	0790-0253RP				
10	Adjusting Spring	0761-0107	0761-0161	0761-0161	0761-0161	0761-0161	0761-0080	0761-0080	0761-0080	0761-0080	0761-0080	0761-0077	0761-0077				
11	Seat Assembly Kit	0790-0262RP	0790-0277RP	0790-0262RP	0790-0277RP	0790-0277RP	0790-0277RP	0790-0262RP	0790-0277RP	0790-0277RP	0790-0277RP	0790-0277RP	0790-0277RP				
16	Retaining Ring	---	1406-0130	---	---	---	1406-0130	---	---	---	---	---	---				
20	Gauge, Low Pressure *	1435-0227RP	1435-0229RP	1435-0231RP	1435-0231RP	1435-0231RP	1435-0232RP	1435-0233RP	1435-0233RP	1435-0233RP	1435-0233RP	1435-0226RP	1435-0226RP				
21	Gauge, High Pressure *	1435-0217RP	1435-0221RP	1435-0218RP	1435-0222RP	1435-0222RP	1435-0221RP	1435-0218RP	1435-0222RP	1435-0222RP	1435-0222RP	1435-0222RP	1435-0222RP				
22	Decal Kit	0790-0279RP	0790-0280RP	0790-0282RP	0790-0286RP	0790-0284RP	0790-0281RP	0790-0283RP	0790-0287RP	0790-0285RP	0790-0288RP	0790-0290RP	0790-0290RP				

* Spring may include a Spacer Washer on top - be sure to reuse the Spacer Washer if your Regulator included one.

TABLE 2 - Inlet & Outlet

Gas	Inlet Type	I.D. Color	Inlet Nut	Inlet Swivel (w/Filter)	Outlet Connection
Oxygen	CGA 540	GREEN	0967-0044	0967-0033	0950-0068
Oxygen/Nitrogen	992	GREEN	0992-0003	0970-0015	0950-0068
Argon/Helium/Nitrogen	CGA 580	BLACK	0973-0003	0970-0015	0950-0017
Air (Industrial)	CGA 590	BLACK	0974-0003	0970-0015	0960-0014
Air (Breathing)	CGA 346	YELLOW	0972-0015	0972-0009	0960-0014
Carbon Dioxide	CGA 320 *	GREY	0985-0030	0985-0004 *	0950-0017
Hydrogen & Methane	CGA 350	RED	0983-0003	0983-0005	0960-0029
Acetylene	CGA 510	RED	0970-0003	0970-0015	0960-0029
Acetylene	CGA 300	RED	0968-0003	0968-0005	0960-0029
Acetylene	993	RED	0993-0003	0970-0015	0960-0029
LP Gas	CGA 510	ORANGE	0970-0003	0970-0015	0960-0029

* CGA 320 inlet requires inlet washer part number 1408-0065.

TABLE 3 - Relief Valve

REF. NO.	DESCRIPTION	Acetylene, LP Gas	Hydrogen (Vented Relief Valve)	All Other Models
Rel. Valve Norm. Set Pressure -->		---	100	100
27	Relief Valve Complete	1105-0014	0600-0257	0600-0016
27A	Body	---	---	0601-0004
27B	Seat	---	---	0608-0009
27C	Seat Retainer	---	---	0609-0003
27D	Upper Seat	---	---	0608-0018
27E	Disc	---	---	1406-0016
27F	Spring	---	---	0610-0009
27G	Cap	---	---	0614-0004

SERVICE & REPAIR – PROCEDURES

ESS32 Single Stage EDGE™ Series 2.0 Regulators

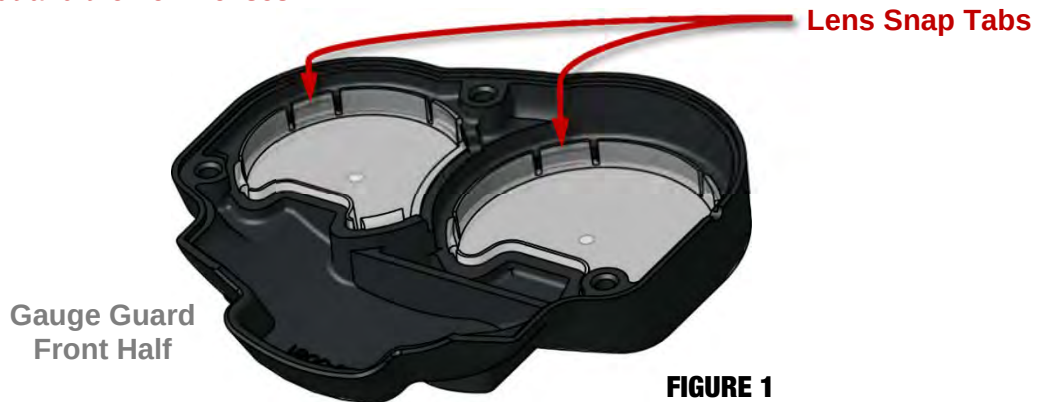
DISASSEMBLY PROCEDURES

➔ Refer to the exploded view for reference numbers [Shown in brackets].

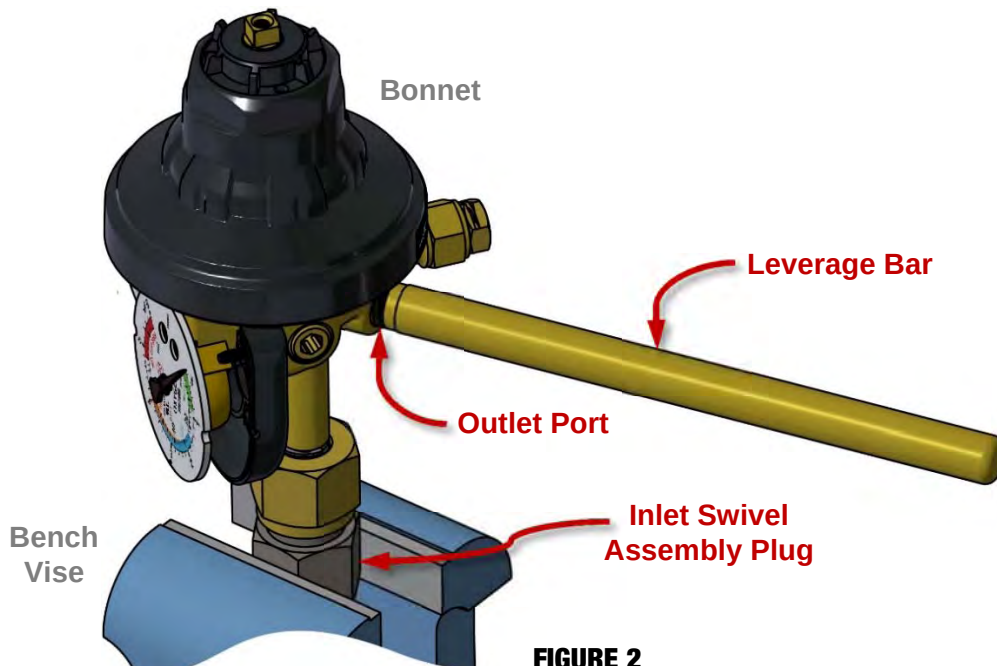
➔ Ensure adjusting knob is backed completely out (counterclockwise) before starting.

1. Mount the Inlet Swivel Assembly Plug in the Bench Vise and firmly attach the Regulator.
2. Remove the front half of the Gauge Guard [3] by removing the three Torx Head Screws from the back side.

➔ The Lenses can now be remove/replaced if desired, by simply snapping the old Lenses out and the new Lenses in.



3. Remove the Knob by removing the Knob Decal, then removing the #10-32 Screw and Washer found inside the Knob [8].
 4. Remove the Outlet Connection [18] from the Body, then remove the Bonnet [2].
- ➔ To keep the Body from spinning while removing the Bonnet, use Leverage Bar 1420-0299 in the Outlet Port to obtain leverage to hold the Body, as shown in **FIGURE 2**.



5. Remove the Adjusting Screw Assembly [9], Adjusting Spring [10], then remove the Slip Ring and Diaphragm Assembly [6].

➔ *Make sure you've got the Thrust Washer. If it's not sitting on top of the Adjusting Screw Assembly, it may still be up inside the Bonnet.*

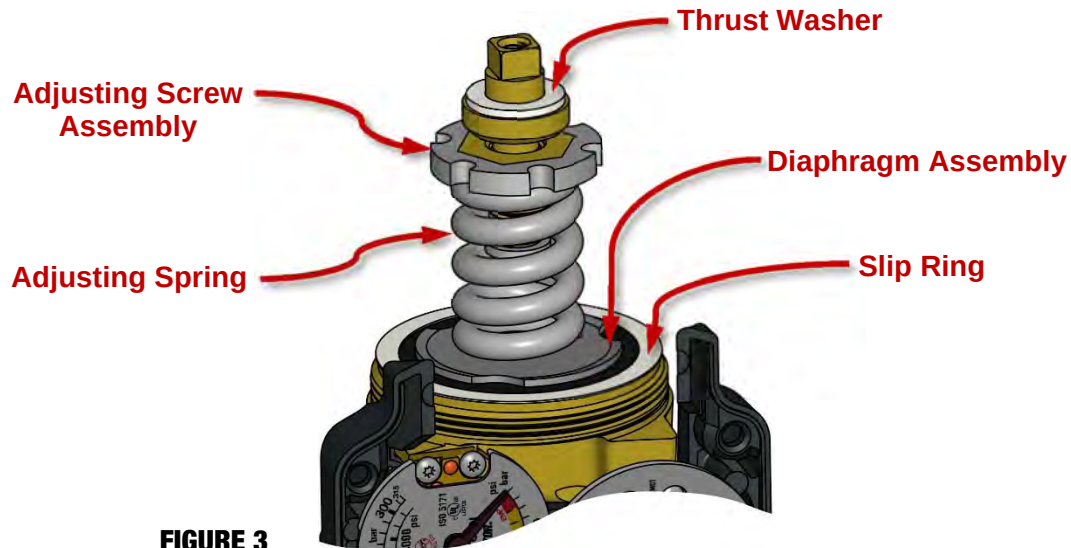


FIGURE 3

6. Remove all the Seat Assembly components (Nozzle w/O-Ring, Seat Assembly, Spring, Gland and Friction Damper) [11], then remove the Seat Guide [12] from the Body.
7. Remove the Relief Valve or Pipe Plug [19], and any other Pipe Plugs [17] (if necessary) from the Body.
8. Remove both HP and LP Gauges [20 and 21] by removing the two Torx Head Screws holding each in place. Note that the Gauge may be “stuck” in the Body on its O-Ring Seal. **DO NOT** pull up forcefully on the Gauge Face, as this can damage the Gauge! If a **LIGHT** pull doesn't pull the gauge out, lightly pry on the brass base underside of the Gauge with a Slotted Screwdriver, and “rock” it gently to get it to release from the O-Ring Seal and come out.

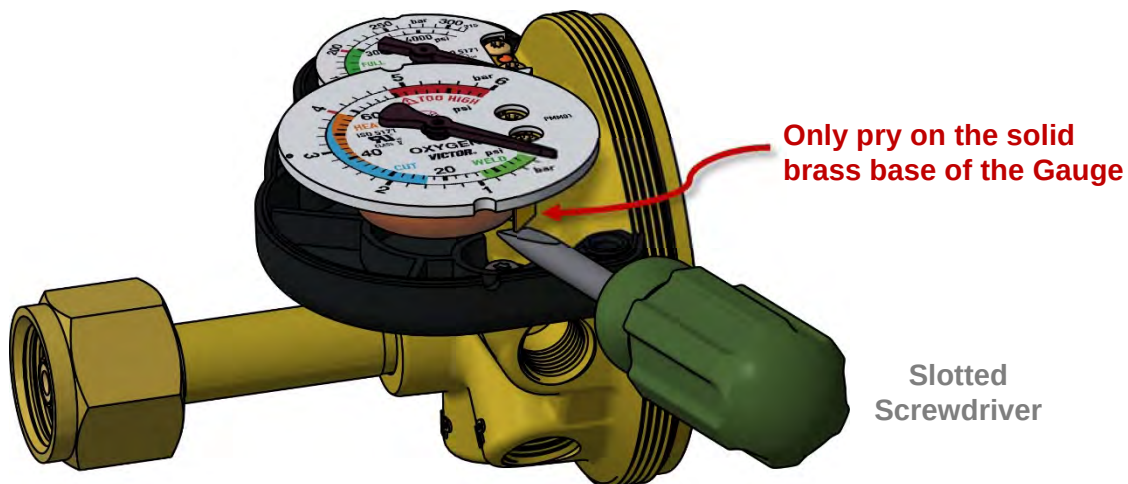
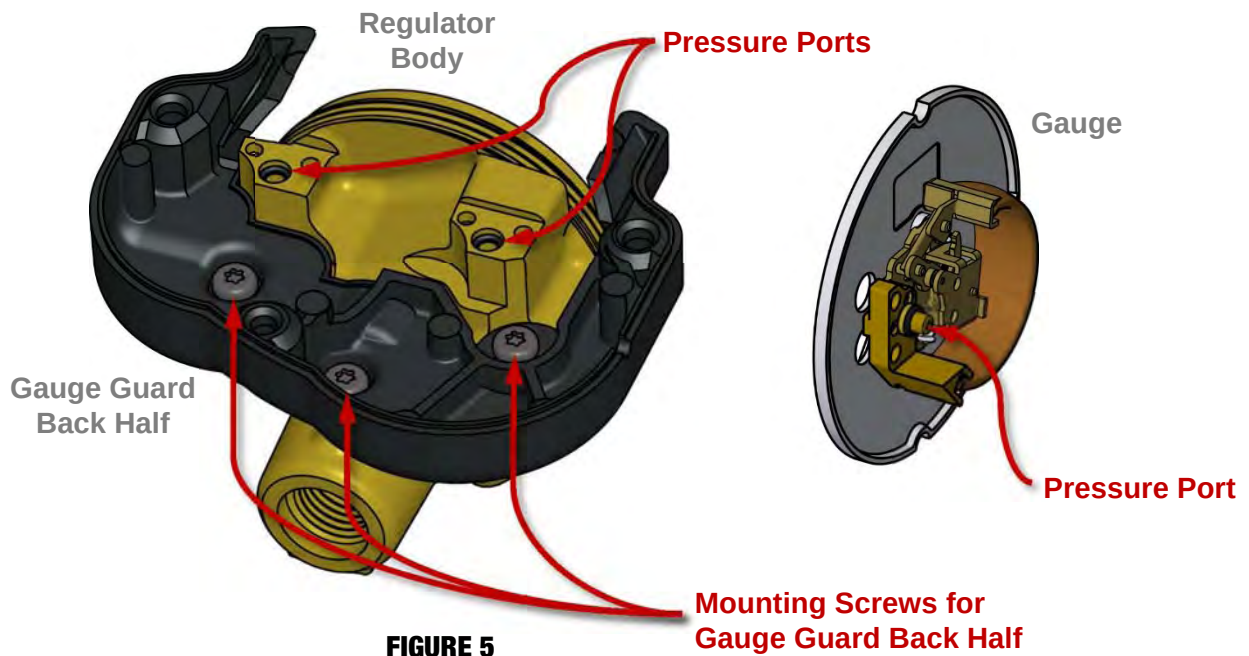


FIGURE 4

➔ *Be careful not to touch any of the inner workings of the Gauge. Handle the Gauge by holding onto the plastic face only.*

9. Carefully remove the Gauge O-Rings, taking care not to scratch any sealing surfaces. There is one O-Ring per Gauge. Typically they will remain in the body after Gauge removal, but if not there, they may also still be on the Pressure Port of the Gauge itself.



10. It is not required to remove the back half of the Gauge Guard [4] for any repairs that may be needed, but if removal is desired, simply remove the three Torx Head Screws holding it in place.
11. Install Leverage Bar 1420-0299 into any $\frac{1}{4}$ NPT port in the Body (if not already there), and use the bar to unscrew the Body off the Inlet Swivel [14].
- ➔ *Watch the Inlet Swivel while trying to turn the Body. If the Swivel is turning **with** the Body, then you need to tighten the Inlet Nut tighter on the Inlet Swivel Assembly Plug.*
12. If necessary, disassemble the Relief Valve as shown in **DETAIL A**.

⚠ CAUTION! You should never reuse the Nozzle O-Ring, Seat Assembly, Friction Damper, Inlet Filter or Diaphragm Assembly. Replace them with new parts each time you assemble a Regulator.

CLEANING PARTS

It is recommended to clean all metal parts for oxygen service, regardless of Regulator Model being repaired. There are several ways to clean components for oxygen service; the following standards are recommended reading for more detailed information on methods and processes:

- CGA G-4.1 "Cleaning Equipment for Oxygen Service"
- ASTM G-93 "Standard Practice for Cleaning Methods and Cleanliness Levels for Material and Equipment Used in Oxygen-Enriched Environments"
- ASTM G-127 "Standard Guide for the Selection of Cleaning Agents for Oxygen Systems"

For metal parts, **VICTOR** suggests using CCI Enviro spray Liquid, used per the manufacturer's instructions, followed by a hot water rinse and thorough drying. Additional information can be found at <http://www.ccichemical.com>.

DO NOT allow non-metal parts to come in contact with cleaning solvents. Cleaning solvents can cause non-metal parts to swell and/or crack. To clean these parts, use a non-petroleum based mild soap solution, followed by a thorough rinsing in water. Dry parts completely prior to reassembling.

ASSEMBLY PROCEDURES

Refer to the exploded view for reference numbers [Shown in brackets]

⚠ IMPORTANT NOTES ABOUT SEALING PIPE THREADS:

- **When using Teflon® tape where noted: Apply two to three layers around the threads, leaving the first thread clean. Insure your Teflon® tape is oxygen-compatible.**
- **When using Loctite® #222 Threadlocker where noted: Apply two to three drops to the second and third thread, leaving the first thread clean.**

1. Install a new Filter [15] into the Inlet Swivel (or replace entire Inlet Swivel w/Filter installed [14]), and apply Teflon® tape to the Inlet Swivel threads.
2. If not already in place, mount the Inlet Swivel Assembly Plug back in the Bench Vise. Firmly attach the Inlet Swivel and Inlet Nut [13] onto the Inlet Swivel Assembly Plug. Install Retaining Ring [16], if equipped.
3. Screw the Body onto the Inlet Swivel, screw the Leverage Bar 1420-0299 into the outlet port of the Body (light hand tight), and then use the Leverage Bar to tighten the Body onto the Inlet Connection. At this point, tighten enough so that the body cannot be turned by hand without the assistance of the Leverage Bar. Final torque for the Inlet Connection will occur in upcoming **STEP 15**.

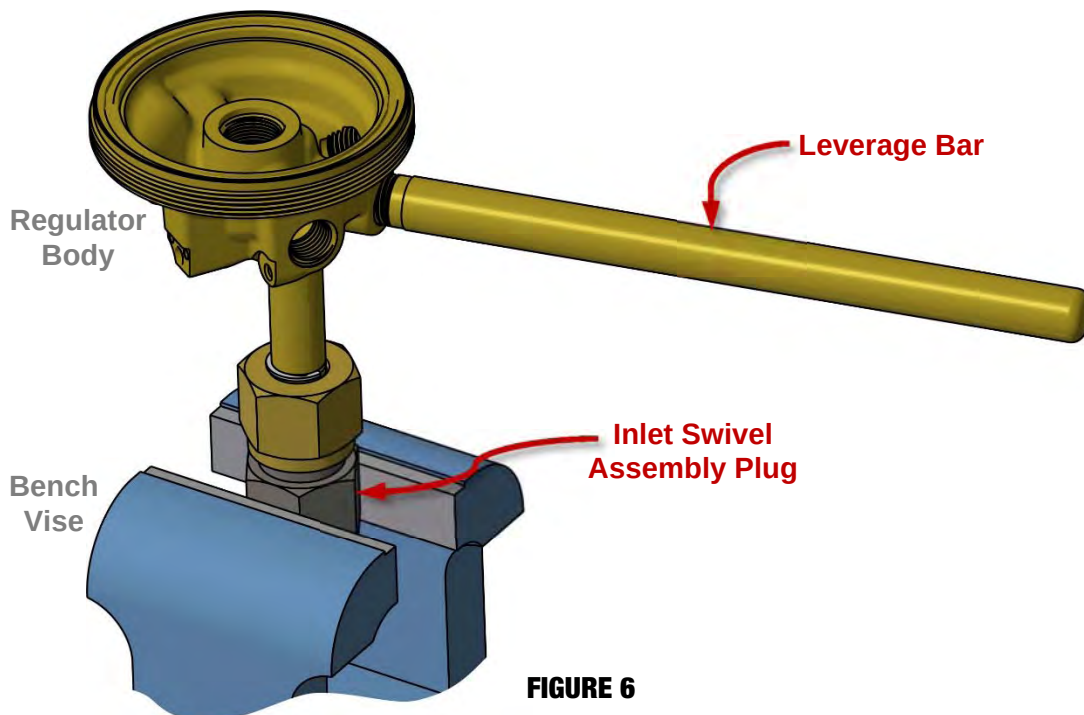


FIGURE 6

4. **Preassemble the Relief Valve (if so equipped):** Assemble (or reassemble) the Relief Valve **[19]** as shown in **DETAIL A**. Use no lubricants or sealants. If your Regulator model has a Pipe Plug instead of a Relief Valve, or if your Relief Valve is already assembled and tested, you can skip to **STEP 8**.
5. To ensure proper Relief Valve performance, perform the following test procedures *before assembling the Relief Valve in the Regulator*.
 - a. Attach the Relief Valve to a 450 PSIG source of oil-free air or dry nitrogen.
 - b. Slowly pressurize the Relief Valve, increasing to the recommended blow-off pressure listed in **TABLE 2** below. Note that **VICTOR** Relief Valves are stamped with their nominal set pressure, in case you're unsure which Relief Valve you have.

Non-Vented Relief Valves:

If the Relief Valve vents before the minimum blow-off pressure is reached, then a second Disc **[27E]** may be added.

If it still vents, then the Spring **[27F]** must be replaced.

Vented Relief Valves:

If the Vented Relief Valve fails to vent within the recommended blow-off pressure, reset the Adjusting Screw **[27J]** as necessary and perform this step again. Make sure you fully bleed off all pressure each time you test for blow-off pressure.

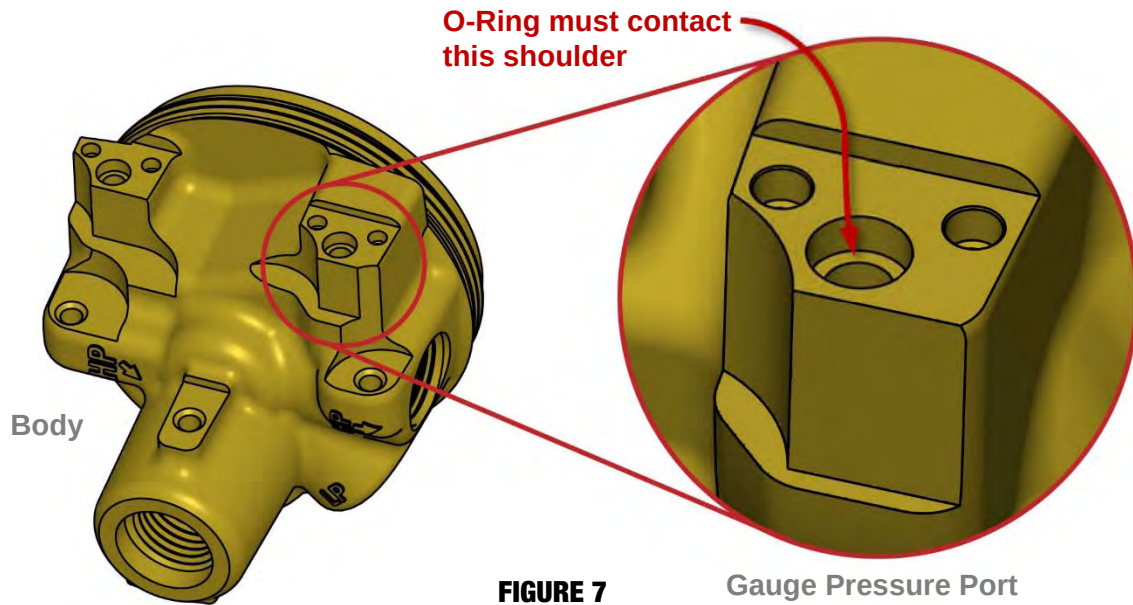
TABLE 2 – Relief Valve Blow-off Pressure

Relief Valve Nominal Set Point	Recommended Blow-off Pressure
60 PSIG	55 to 66 PSIG
100 PSIG	90 to 110 PSIG
200 PSIG	180 to 220 PSIG
300 PSIG	270 to 330 PSIG
400 PSIG	360 to 440 PSIG

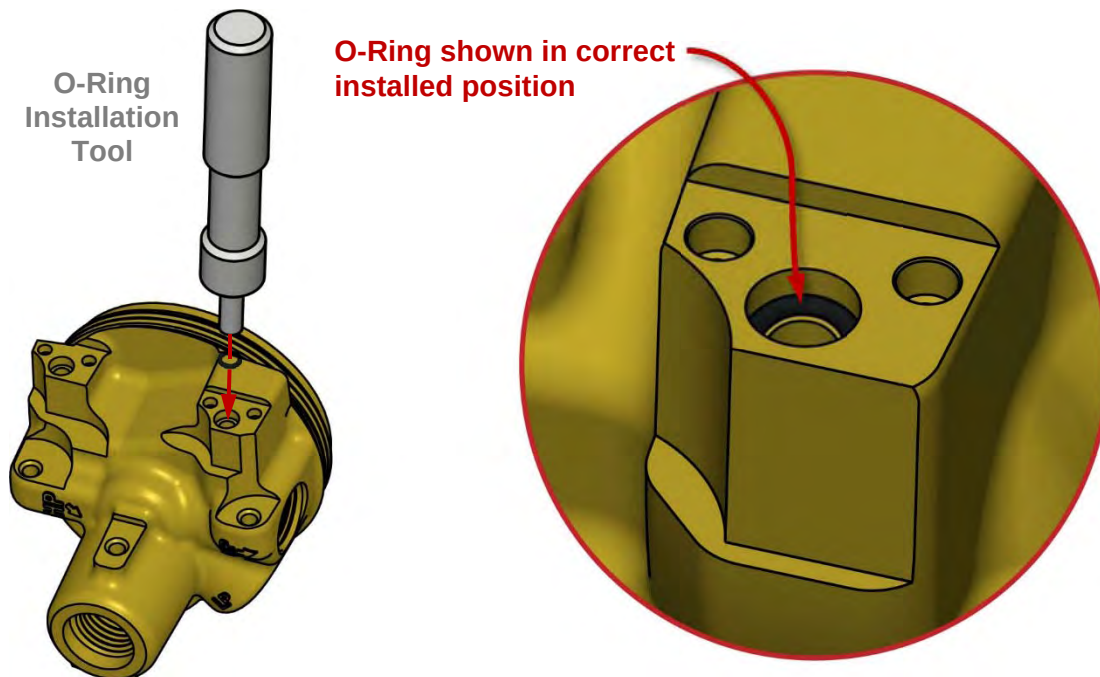
6. When all testing is completed, bleed pressure off the Relief Valve. Install the Cap Nut **[27K]** on the Vented Relief Valve.
7. Apply Teflon® tape to the Relief Valve **[19]** threads. Install the Relief Valve (or Pipe Plug) into the Body and torque to 15 ft-lbs.
8. Apply Teflon® tape to any other Pipe Plug **[17]** threads. Install Pipe Plugs into the Body where appropriate, and torque to 15 ft-lbs.

➔ The Outlet Connection gets installed after **STEP 18**.
9. At this point, thoroughly blow out the Body assembly with pressurized oil-free air or dry nitrogen to insure it is completely free of chips and debris.
10. If the back half of the Gauge Guard was removed, reinstall it now using three Torx head screws. Torque Screws to 16 - 20 in-lbs.

11. **Gauge Installation:** The Edge 2.0 regulator uses new Gauge technology that utilizes an O-Ring seal, thereby eliminating messy Teflon® tape and burr/chip generation from pipe threads. While very easy to install, care must be taken to ensure a leak-free installation.
- a. The Gauge O-Ring installs into the **REGULATOR BODY**, not onto the Gauge, and must be carefully pushed down into the Body until it contacts the shoulder shown:



- b. This location is critical for leak-free installation. Use the O-Ring Installation Tool 1420-0344 to push the O-Ring down against the shoulder – it will move easy, and you will feel a positive stop once in position. No lubrication is required on the O-Ring, but may be used if desired (very light coat).



- c. Next, install the Gauge itself by simply pushing the Gauge onto the O-Ring and Body. **DO NOT** push on the plastic face of the Gauge. Instead, use your hand grip on the Gauge face as a guide only, and use a Slotted Screwdriver to push on the exposed brass portion of the Gauge as shown. It doesn't matter which gauge is installed first, but typically it's easier to install the HP Gauge first, since it sits slightly under the larger LP Gauge.
- d. Once the Gauge is pushed in all the way, and the metal face of the Gauge has contacted the face of the Body, the Gauges should naturally hold themselves in position. Now, simply install the two Torx Head Screws included with the Gauges. Torque Screws to 4.0 ± 0.4 in-lbs.

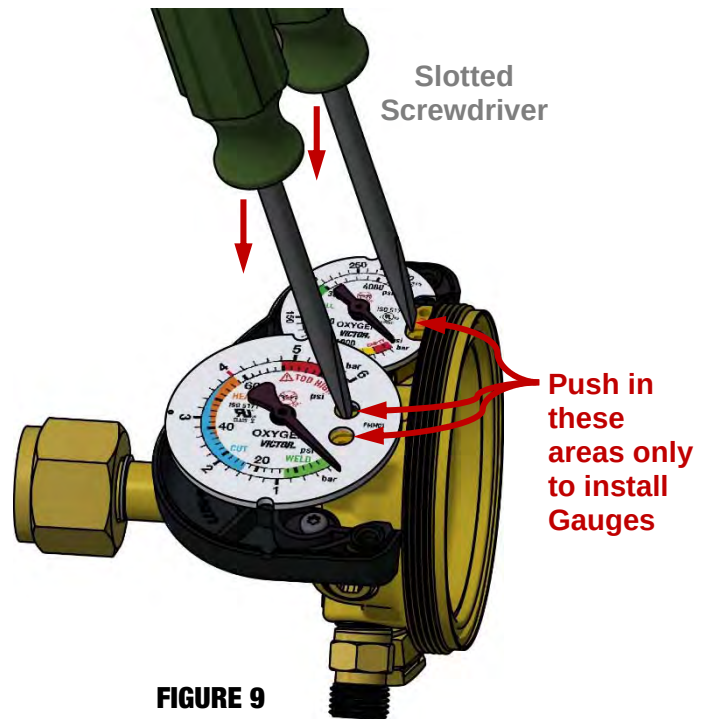


FIGURE 9

12. Install the Seat Guide [12] into the Body – it should slip in freely. Note its orientation when installing – the cupped end with the hex on it should face up.

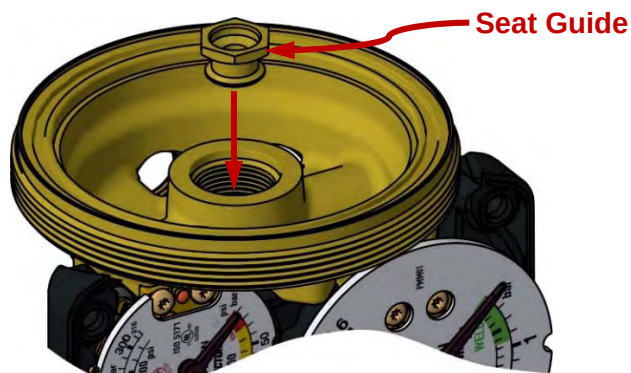


FIGURE 10

13. **Preassemble the seat components [11]:** Push the Friction Damper into the Gland, and then slip the Valve Spring, Gland and Friction Damper onto the shaft of the Seat Assembly.

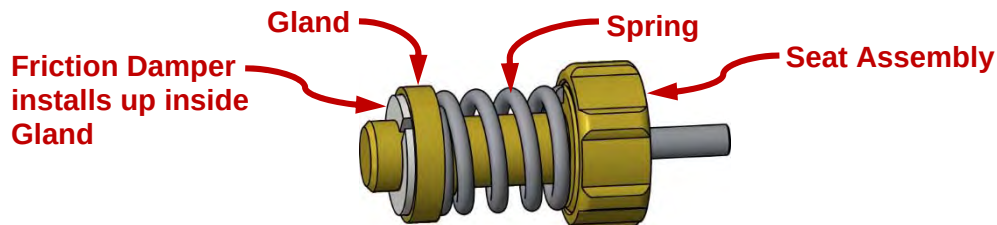


FIGURE 11

- ➔ *The Friction Damper should have enough tension to hold the Gland and the Valve Spring in position on the shaft of the Seat Assembly. If there appears to be no tension (if the parts just seem to want to fall off), then there may be a problem with your Friction Damper, or the Friction Damper may not be firmly pushed up in place inside the Gland.*

14. Install the preassembled seat components into the Regulator Body – with the Friction Damper and Gland fitting down into the cup shape of the Seat Guide.
15. Apply a light coat of CHRISTO-LUBE® #129 Lubricant to the Nozzle O-Ring, and install the new O-Ring onto the Nozzle, taking care to guide it carefully over the Nozzle threads to avoid nicks or tears. Install the Nozzle into the Regulator Body and torque to 15 - 20 ft-lbs. Note that 15 - 20 ft-lbs is the same recommended torque for the Inlet Connection Swivel, so as you torque down the Nozzle, ***you're also finish-tightening the Inlet Swivel to the correct torque value.***
 - ➔ ***Watch the Inlet Swivel while you torque down the Nozzle. If the Swivel is turning with the Body, then you need to tighten the Inlet Nut tighter on the Inlet Swivel Assembly Plug. You want to be sure that the 15 - 20 ft-lbs torque is being applied to both the Nozzle threads and the Inlet Swivel threads.***
16. Install the Diaphragm Assembly [6] into the regulator body. Ensure the assembly is centered on the body – it should fit within the outer lip of the top surface of the Body.

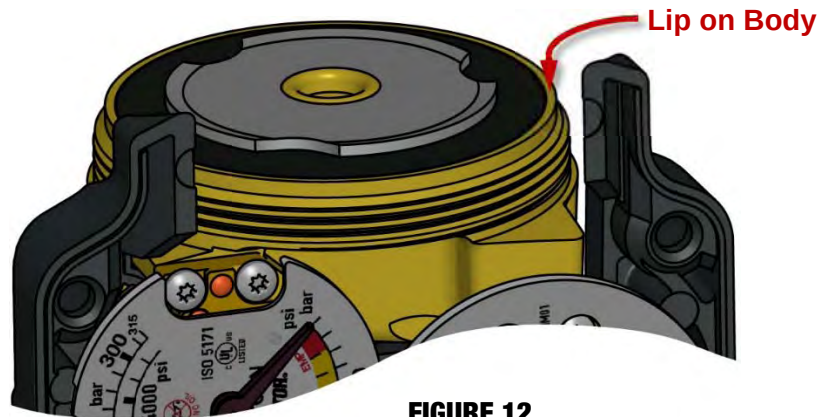


FIGURE 12

17. Next, install the Slip Ring [6], Adjusting Spring [10], and Adjusting Screw Assembly [9]. ***Don't forget the Thrust Washer!*** It should be sitting on top of the Adjusting Screw Assembly. Regulator function will be impaired without it.

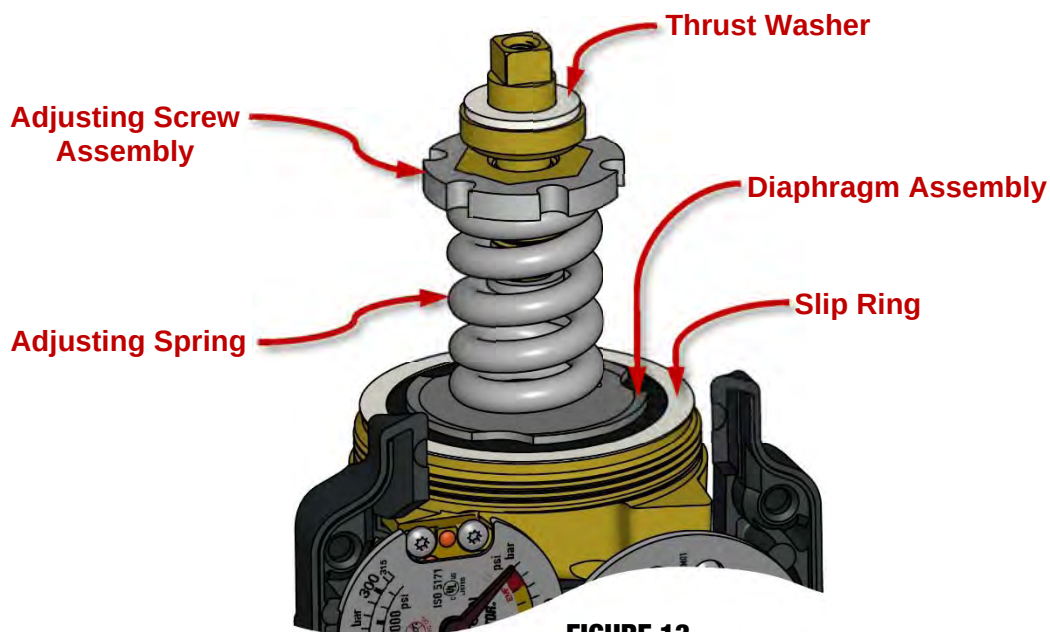


FIGURE 13

18. Install the Bonnet [2] onto the Body. Take care while slipping the Bonnet down over the internal components – the ribs inside the Bonnet must slide into the scallops of the Adjusting Screw Assembly. Torque the Bonnet to 45 - 50 ft-lbs.
 ➔ Use the Leverage Bar 1420-0299 in the open Outlet Port to prevent the assembly from rotating while torquing the Bonnet.
19. Apply **only** Loctite® #222 threadlocker to the Outlet Connection [18] threads. Install the Outlet Connection into the Body and torque to 15 ft-lbs.
20. Apply a small amount of CHRISTO-LUBE® #129 to the top surface of the Bonnet (the surface around the square of the Drive Screw), then slip the Knob [8] into position – the square hole inside the knob mates to the square shaft of the Drive Screw.
21. Install the #10-32 Screw and Washer to hold the Knob on. Torque this Screw to 30 - 36 in-lbs. Then apply the new Knob Decal.
22. Snap new Lenses into the front half of the Gauge Guard [3] (unless already installed), and install the front half of the Gauge Guard onto the regulator using three Torx Head Screws from the back side. Torque Screws to 16 - 20 in-lbs.
23. Apply new Gas I.D. and Compliance Decals [22] as needed to ensure the Regulator maintains clear visual identification.



FIGURE 14

24. Disconnect the Regulator from the Inlet Swivel Assembly Plug. The Regulator is now ready for testing.

TABLE 3 - Torque Specifications Summary

Seat Nozzle / Encapsulated Seat	15 - 20 ft-lbs.
Bonnet	45 - 50 ft-lbs.
Inlet Connection	15 - 20 ft-lbs.
Outlet, Relief Valve, Pipe Plugs	15 ft-lbs.
Gauge Screws (M2.5 Screws Included w/Gauges)	4.0±0.4 in-lbs.
Gauge Guard Screws (M3.5 Thread Forming Screws)	16 - 20 in-lbs.
Adjusting Mechanism Screws (10-32 Thread Self Locking Screws)	30 - 36 in-lbs.

RECOMMENDED TOOLS AND SUPPLIES FOR TEST PROCEDURES

- Test Gun (quick opening on/off valve) with #52 (.0635") restricting orifice
- Valved source of oil-free air or dry nitrogen

TEST PROCEDURES



For your safety, and the safety of others:

- **Always test with oil-free air or dry nitrogen only.**
- **Always wear eye protection while testing a Regulator.**
- **Always perform all of the following test procedures after reassembling a Regulator.**

1. Set gas supply to the proper pressure shown in the following table:

TABLE 4 – Edge 2.0 Regulator Test Pressures

Gas Service	Manifold Pressure for Testing
Acetylene & LP Gas	250±20 PSIG
CO ₂ & N ₂ O	1000±100 PSIG
Air, Argon, Hydrogen, Helium, Nitrogen, Oxygen	2000±100 PSIG

2. Attach the Regulator to the gas supply – start the Inlet Nut by hand (do not force), and tighten securely with a wrench to create a seal.
3. **Contamination purge prior to test:**
 - a. Turn the Regulator Adjusting Knob clockwise two or three times until you feel slight tension being applied to the Adjusting Spring.
 - b. Slowly open and close the Gas Supply Valve two or three times to remove contamination that may cause malfunctions. Leave the Gas Supply Valve closed.
 - c. If no flow comes through the Regulator, determine the cause – refer to the **TROUBLESHOOTING CHART** at the end of this section.
4. Turn the Adjusting Knob counterclockwise until it stops, and attach the Test Gun (with a #52 restricting orifice) to the outlet of the Regulator.
5. Open the Gas Supply Valve and close the Test Gun.
 - a. Working pressure will appear on the High Pressure Gauge.
 - b. If the Low Pressure Gauge begins to show pressure building, turn the Gas Supply Valve off and refer to the **TROUBLESHOOTING CHART**.
6. Use the values in the following table for all subsequent tests:

TABLE 5 – Edge 2.0 Regulator Test Values

Edge™ 2.0 Model	A Pressure Set for Leak Test	B Pressure Set for Creep/Drop Test	C Drop Allowance	D Initial Shut-off Allowance
ESS32-15-	15 PSIG	5 PSIG	3 PSIG	1 PSIG
ESS32-60-	60 PSIG	10 PSIG	3 PSIG	2 PSIG
ESS32-150-	150 PSIG	20 PSIG	4 PSIG	3 PSIG

7. LEAK TEST

- a. With the Test Gun closed and the Gas Supply Valve open, adjust the Regulator to deliver **A** PSIG.
- b. Close the Gas Supply Valve and turn the Adjusting Knob one turn counterclockwise.
- c. Observe the Low Pressure and High Pressure Gauges for five (5) minutes:
 1. If the High Pressure Gauge reading drops, there is a leak in the Gas Supply Valve, Inlet Connection, High Pressure Gauge or the plugged high pressure port.
 2. If the Low Pressure Gauge reading drops, there is a leak in the downstream equipment, Low Pressure Gauge, Outlet Connection or Relief Valve port.
 3. If the High Pressure Gauge reading drops at the same time the Low Pressure Gauge reading increases, there is a leak in the Regulator Seat.
- d. If any leaks are found, isolate if possible using a liquid leak detector, disassemble and repair or replace parts as needed, and start the test over again. Refer to **TROUBLESHOOTING CHART** for more detailed cause and possible corrective action information.

8. DROP TEST

- a. With the Test Gun closed and the Gas Supply Valve open, adjust the Regulator to deliver **B** PSIG.
- b. Open the Test Gun and note the new indicated delivery pressure. Drop (indicated pressure static minus indicated pressure flowing) must not exceed **C** PSIG.

9. CREEP TEST / SLOW SHUT-OFF TEST

- a. With the Test Gun closed and the Gas Supply Valve open, adjust the Regulator to deliver **B** PSIG.
 - b. Open and close the Test Gun several times to stabilize the Regulator. Leave the test gun closed.
 - c. Observe the Low Pressure Gauge for five (5) minutes:
 1. During the first minute, an initial shut-off increase of **D** PSIG is permissible.
 2. During the next 4 minutes, no further increase (creep) is allowed.
10. Close the Gas Supply Valve and release all pressure from the Regulator by opening the Test Gun. Turn the Adjusting Knob counterclockwise until it stops.
11. Remove the Test Gun from the Regulator.
12. Remove the Regulator from the gas supply. The Regulator is now ready to use.

TROUBLESHOOTING

CAUSES	POSSIBLE CORRECTIVE ACTIONS
1. No gas flows through the Regulator and the High Pressure Gauge <i>does not</i> indicate pressure.	
a. Inlet or Inlet Filter is plugged.	Blow 40-45 PSIG of air through the Filter in reverse direction of the normal gas flow.
b. Empty Supply Cylinder.	Replace the Cylinder.
2. No gas flows through the Regulator and the High Pressure Gauge <i>does</i> indicate pressure.	
a. Damaged Adjusting Mechanism or missing components.	Check the Drive Screw, Guide Bushing and Thrust Washer – insure they are installed correctly and moving freely in the Bonnet.
b. Adjusting Knob not installed correctly.	Make sure the square of the Drive Screw is properly mated into the square in the Adjusting Knob.
c. Outlet Connection plugged.	Inspect and clear the Outlet Connection of any debris.
d. Defective Adjusting Spring.	Replace the Adjusting Spring.
e. Broken Seat Stem.	Replace the Seat Assembly.
3. Gauges do not indicate pressure but gas flows through the Regulator.	
a. Defective Gauge(s).	Replace Gauge(s).
4. Regulator does not deliver in its designed delivery pressure range.	
a. Incorrect Adjusting Spring used during repair.	Replace with correct Adjusting Spring.
b. Damaged Adjusting Mechanism or missing components.	Check the Drive Screw, Guide Bushing and Thrust Washer – insure they are installed correctly and moving freely in the Bonnet.
5. Regulator hums or clatters while flowing.	
a. Missing Friction Damper.	Install a Friction Damper.
b. Missing Seat Guide.	Install the Seat Guide.
c. Flow exceeds Regulator capacity.	Reduce flow to below the maximum rating of the Regulator.
d. Restriction upstream of the Regulator.	Inspect system and remove restriction.

CAUSES**POSSIBLE CORRECTIVE ACTIONS****6. Regulator experiences excessive drop.**

a. Friction Damper too tight.	Replace the Friction Damper and/or Gland.
b. Wrong size orifice in Test Gun.	Insure the correct orifice is installed in the Test Gun - size #52 (.0635").
c. Partially plugged Inlet Filter.	Clean or replace the Inlet Filter.
d. Incorrect Adjusting Spring used during repair.	Replace with correct Adjusting Spring.
e. Low Cylinder pressure or Manifold test pressure.	Check Cylinder and Manifold pressure and adjust/replace as needed.
f. Flow exceeds Regulator capacity.	Reduce flow to below the maximum rating of the Regulator.

7. Increase in the low pressure gauge reading (creep).

a. Loose Nozzle.	Tighten Nozzle to 15 - 20 ft-lbs torque.
b. Missing or damaged Nozzle O-Ring.	Inspect and install or replace O-Ring as necessary.
c. Accumulation of foreign particles on Seat Assembly or seating surfaces.	Clean seating surfaces and/or replace Seat Assembly.

9. Rapid pressure drop on both High and Low Pressure Gauges.

a. Loose connection – Bonnet to Body.	Re-tighten Bonnet per STEP 18 of assembly procedure.
a. Damaged Diaphragm	Replace Diaphragm.
b. Loose connection – Regulator to Test Manifold.	Insure Regulator is securely tightened to the Manifold.

9. With the cylinder valve closed, the High Pressure Gauge indicator drops, and there is no immediate increase in pressure indicated on the Low Pressure Gauge.

a. Loose connection – Regulator to Test Manifold.	Insure Regulator is securely tightened to the Manifold.
b. Loose connection – Inlet Swivel to Regulator Body.	Tighten the Swivel using 20 ft-lbs torque.
c. Loose connection – High Pressure Gauge to Regulator Body.	Re-check Gauge Screw torque, O-Ring installation, and verify O-Ring installed properly and not damaged (See STEP 11 of the Assembly Procedure).
d. Loose connection – Bottom Pipe Plug.	Tighten Pipe Plug using 15 ft-lbs torque.
e. Leaking Gauge.	Replace the Gauge.

CAUSES**POSSIBLE CORRECTIVE ACTIONS****10. Low Pressure Gauge indicator slowly drops, and there is no decrease in pressure on the High Pressure gauge when the Manifold Valve is closed.**

- | | |
|---|--|
| b. Test Gun is not attached securely. | Tighten the Test Gun. |
| c. Loose connection – Low Pressure Gauge to Regulator Body. | Re-check Gauge Screw torque, O-Ring installation, and verify O-Ring installed properly and not damaged (See STEP 11 of the Assembly Procedure). |
| d. Loose connections at the Regulator Body – Outlet Connection or Relief Valve/Plug | Tighten connections using 15 ft-lbs torque. |
| e. Loose connection – Bonnet to Body. | Re-tighten Bonnet per STEP 18 of assembly procedure. |
| f. Damaged Diaphragm | Replace Diaphragm. |

11. Rapid increase in Low Pressure Gauge reading.

- | | |
|--|--|
| a. Damaged or loose Nozzle. | Replace and/or tighten the Nozzle to 20 ft-lbs torque. |
| b. Heavy accumulation of foreign particles on Seat Assembly or seating surfaces. | Clean seating surfaces and/or replace Seat Assembly. |
| c. Missing or damaged Nozzle O-Ring. | Inspect and install or replace O-Ring as necessary. |
| d. Improper Adjusting Spring (spring too long). | Replace Adjusting Spring. |

12. Relief Valve opens at a greater or less than marked pressure (outside a pressure tolerance of $\pm 15\%$ of the marked pressure).

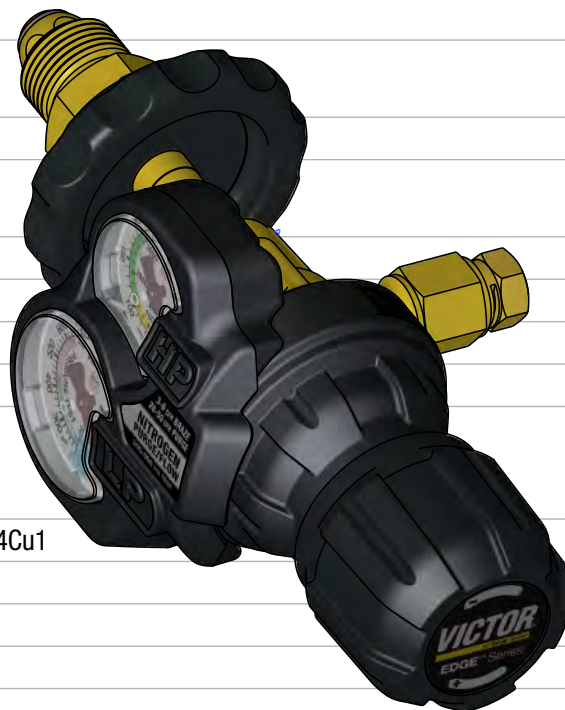
- | | |
|-----------------------------------|---|
| a. Incorrect Spring used. | Replace with correct Spring. |
| b. Relief Valve not set properly. | Repeat Relief Valve assembly/test procedure STEP 4 . |

SECTION 3

ESS32-PFH Pressure-Flow Hybrid EDGE™ 2.0 Regulator

TECHNICAL DATA

Regulator Type	Single Stage
Delivery Ranges	3 - 6 CFH "BRAZE", 20 - 50 CFH "PURGE" and 200 - 800 psig Test Pressure
Max. Inlet Pressure	3000 psig
Gauges	50mm/40mm ISO 5171 / UL Listed & Recognized as Required
Standards Compliance	CGA E-4, UL 252, ISO 2503
Other Safety	SLAM™ Impact Absorbing Safety Knob, Self Reseating Relief Valve
Weight	3.5 lbs Approx.

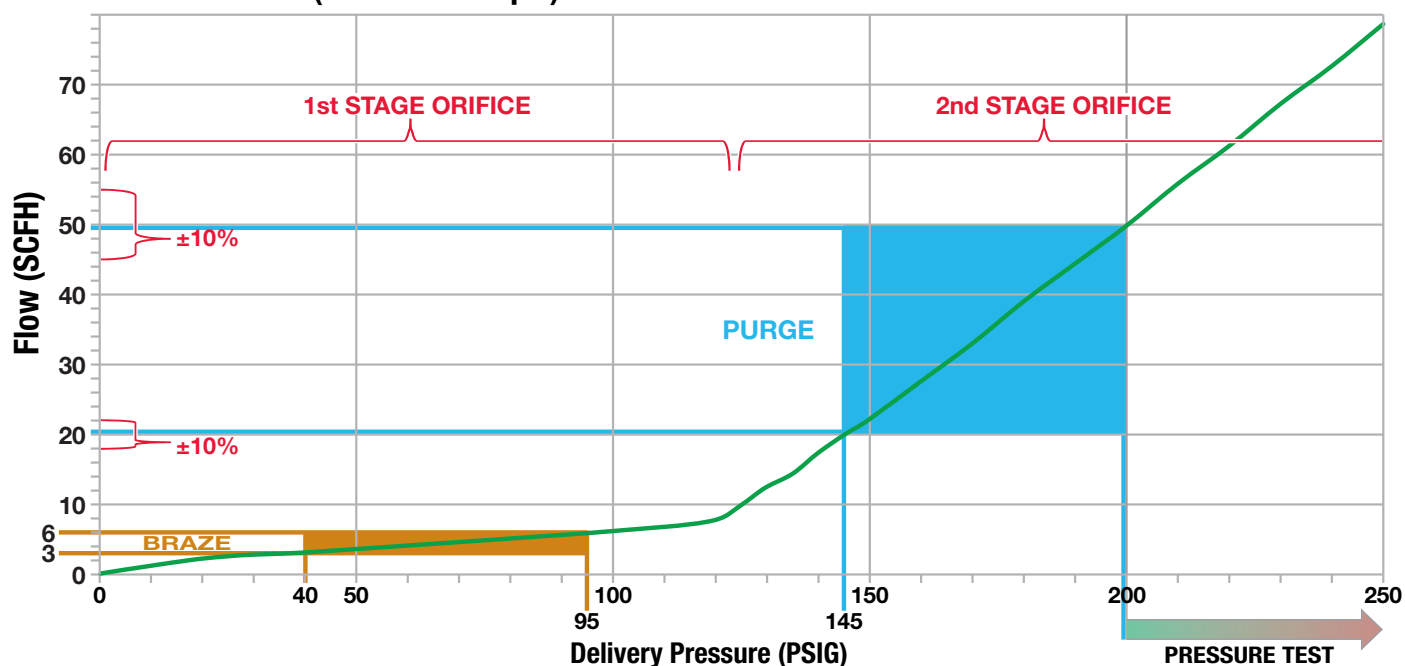


Materials of Construction

Body	Forged Brass (CW617N per EN12165)
Bonnet	Die Casting Alloy No. 5, Conf. to ISO 301:1981 ZnAl4Cu1
Gauge Guard	Die Casting Alloy A380
Knob	High Impact ABS (Acrylonitrile Butadiene Styrene)
Piston	Brass w/BUNA-N O-Ring Seals
Seat	Neoflon™ (PCTFE), Encapsulated
Inlet Filter	Dual Filtration (Inlet Swivel & Encapsulated Seat), Nickel Plated Sintered Bronze
Inlet Connection	CGA 580 Handtight
Outlet Connection	1/4" SAE Flare w/Internal Two-Stage Orifice Design (Enables Flow Bands to Function)

Two-Stage Orifice

Outlet Flow Transition (Nominal Example)



SERVICE & REPAIR – BEFORE YOU BEGIN

ESS32-PFH Pressure-Flow Hybrid EDGE™ Series 2.0 Regulator



Apparatus improperly operated, maintained or repaired can be dangerous!

Service and repair of **VICTOR** apparatus should only be performed by a Qualified Repair Technician. The term “Qualified Repair Technician” refers to repair personnel capable of servicing apparatus in strict accordance with all applicable Victor “Parts & Service Bulletins” and literature. Improper service or repair, or modification of the product, could result in damage to the product or injury to the operator.

Protect your investment! Some parts and accessories manufactured by others may fit **VICTOR** apparatus, but not conform to **VICTOR's** exacting standards for quality, fit and function. For your own protection and the protection of your investment, specify and use only **VICTOR** genuine parts and accessories. It's the only way to guarantee the level of performance, safety and reliability that you expect from **VICTOR**.

GLOSSARY – COMMONLY USED TERMS

OUTLET PRESSURE: The pressure measured at the Regulator's outlet port.

INLET PRESSURE: The pressure measured immediately at the Regulator's entry.

DROP: A change in outlet pressure from a no-flow to flowing condition while the inlet pressure remains constant.

RISE: An increase in outlet pressure as the inlet pressure decreases.

CREEP: A gradual increase in outlet pressure.

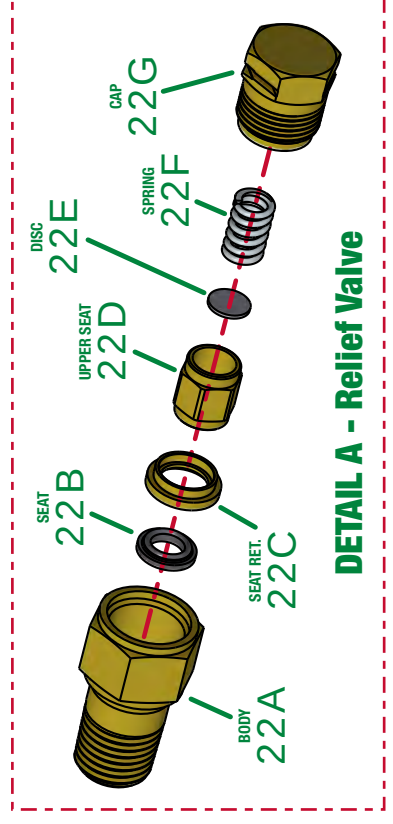
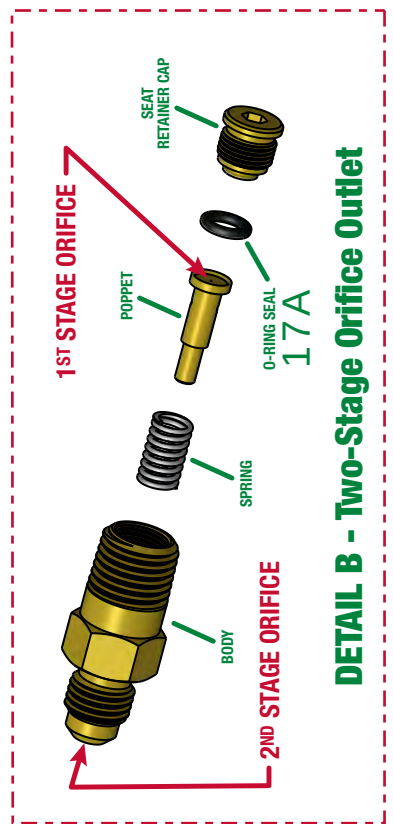
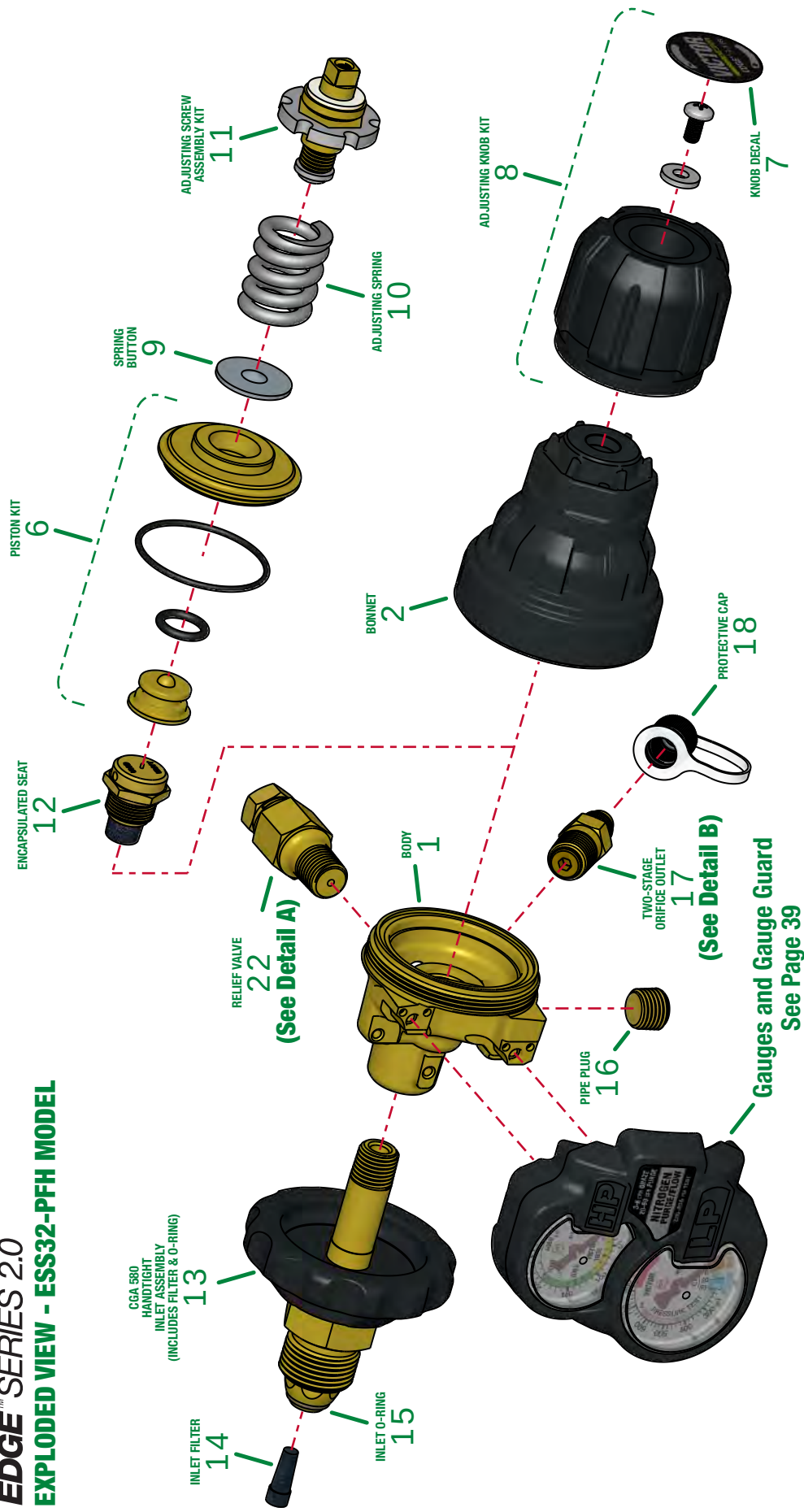
RECOMMENDED TOOLS & SUPPLIES FOR REPAIR PROCEDURES

- Inlet Swivel Assembly Plug (SEE TABLE 1)
- Bench Vise
- 9/16", 11/16", 3/4", 1-5/8" Sockets
- Torque Wrench for 4 - 36 in-lbs ranges
- Torque Wrench for 15 - 50 ft-lbs ranges
- 1/4" Hex Key
- Torx T-8 and T-15 Drivers
- Philips and Flat Head Screwdrivers
- Leverage Bar – Part No. 1420-0299
(To support body and install inlet)
- O-Ring Installation Tool – Part No. 1420-0344
(To ensure proper Gauge O-Ring positioning)
- Oxygen-compatible Teflon® Tape
- Loctite® #222 Threadlocker
- CHRISTO-LUBE® #129 Lubricant.

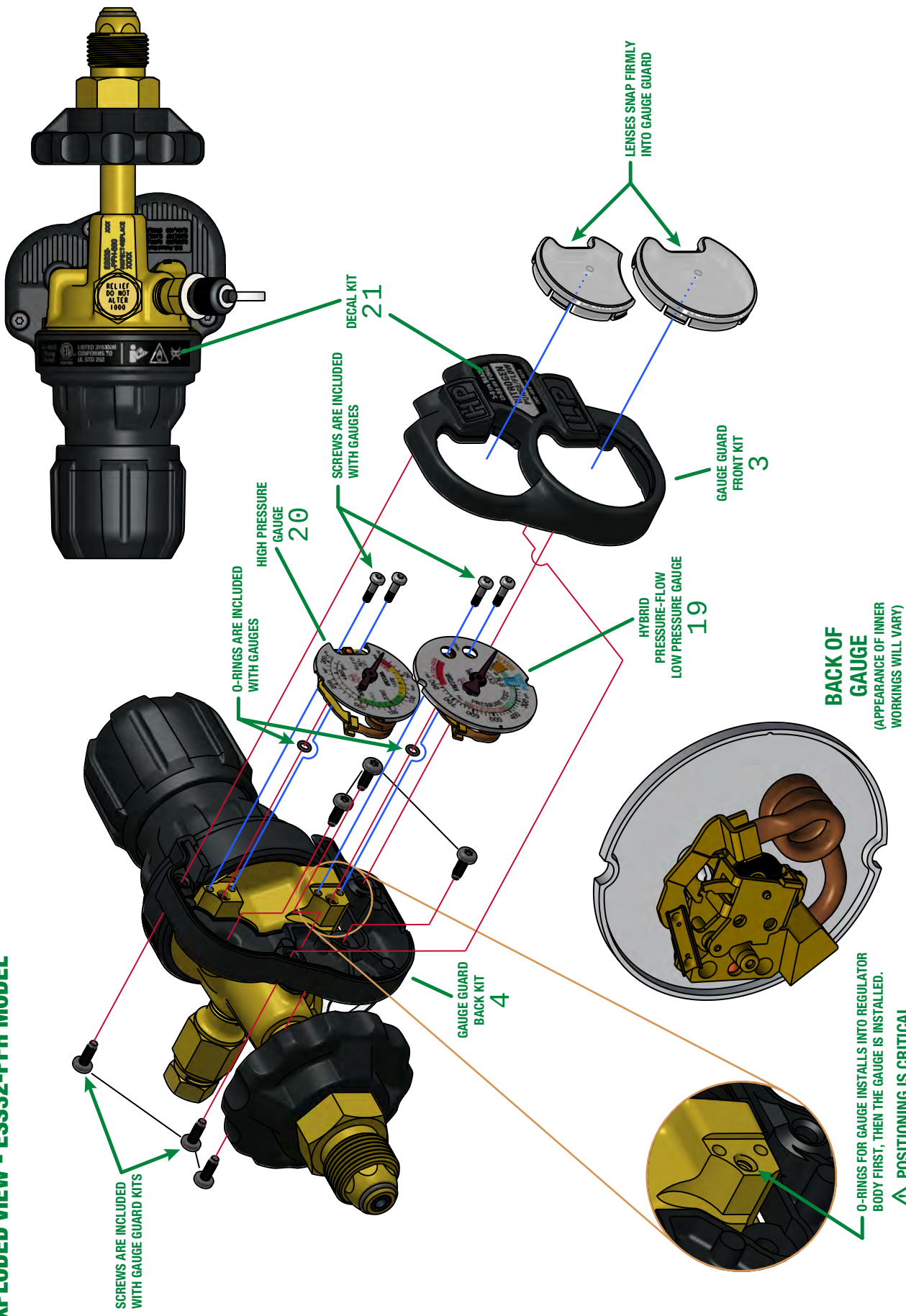
TABLE 1 – Inlet Swivel Assembly Plugs

Inlet Connection	Inlet Swivel Assembly Plug P/N
CGA 300	1420-0013
CGA 320	1420-0127
CGA 326	1420-0219
CGA 346	1420-0220
CGA 350	1420-0009
CGA 510	1420-0015
CGA 540	1420-0014
CGA 580	1420-0134
CGA 590	1420-0135
"992" (British BS3)	1420-0145
"993" (British BS2)	1420-0146

EDGE™ SERIES 2.0 **EXPLODED VIEW - ESS32-PFH MODEL**



EDGE™ SERIES 2.0 **EXPLODED VIEW - ESS32-PFH MODEL**



EDGE™ SERIES 2.0**ESS32-PFH PARTS TABLE - REFER TO EXPLODED VIEWS**

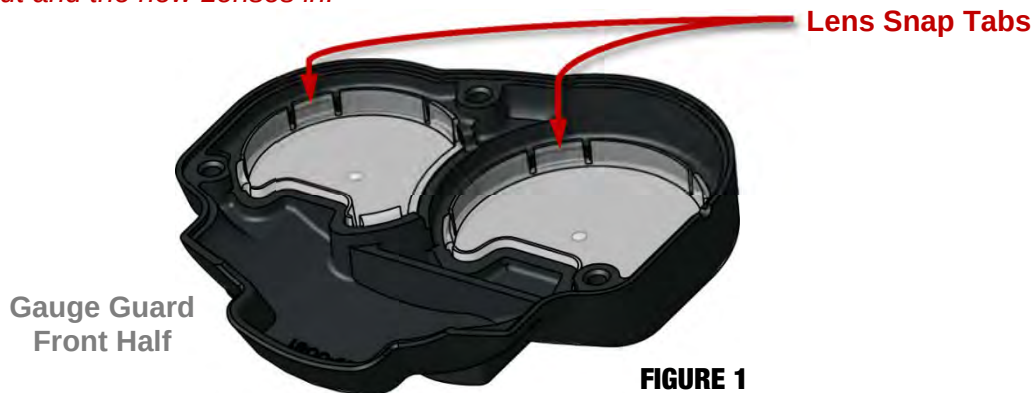
REF. NO.	DESCRIPTION	PART NO.	QTY	CONTENT NOTES
1	Body	0701-0676RP	1	
2	Bonnet	0720-0346RP	1	
3	Gauge Guard Front Kit	0790-0273RP	1	Includes Gauge Guard Front Half, Both Lenses and 3 Mounting Screws
4	Gauge Guard Back Kit	0790-0274RP	1	Includes Gauge Guard Back Half and 3 Mounting Screws
5	Lens Replacement Kit	0790-0275RP	1	Includes Both HP and LP Gauge Lenses
6	Piston Kit	0790-0291RP	1	Includes Piston, Centralizer, Centralizer O-Ring and Piston O-Ring
7	Decal, Knob	1415-0788	1	
8	Adjusting Knob Kit, Black	0790-0252RP	1	Includes Knob, Screw, Washer and Knob Decal
9	Spring Button	0706-0001	1	
10	Adjusting Spring	0761-0068	1	
11	Adjusting Screw Assembly Kit	0790-0293RP	1	Includes Drive Screw, Drive Bushing, Thrust Washer, Screw and Washer (Assembled)
12	Encapsulated Seat U1.8D	0739-0081RP	1	
13	CGA 580 Handtight Inlet Assembly	0791-0292RP	1	Includes Inlet w/Filter, Inlet O-Ring and CGA 580 Handwheel
14	Inlet O-Ring	1407-0219	1	
15	Inlet Filter	0717-0003	1	
16	Pipe Plug	1105-0014	1	
17	1/4" SAE Two-Stage Outlet	0910-0122RP	1	Complete Assembly
	17A - O-Ring Seal	1407-0262	1	
18	1/4" SAE Protective Cap	1417-0068RP	1	Includes Qty. 5 Protective Caps
19	Gauge, LP Hybrid Pressure-Flow	1435-0235RP	1	Includes Mounting Screws & O-Ring
20	Gauge, High Pressure	1435-0222RP	1	Includes Mounting Screws & O-Ring
21	Decal Kit	0790-0294RP	1	Includes 5 ea. Front Gas Decal and Rear Compliance/Warning Decal
22	Relief Valve, 1000 psig	0600-0245RP	1	Complete Assembly
	22A - Body	0601-0008	1	
	22B - Seat	0608-0007	1	
	22C - Seat Retainer	0609-0009	1	
	22D - Upper Seat	0608-0021	1	
	22E - Disc	1406-0017	1	
	22F - Spring	0610-0014	1	
	22G - Cap	0614-0006	1	

SERVICE & REPAIR – PROCEDURES

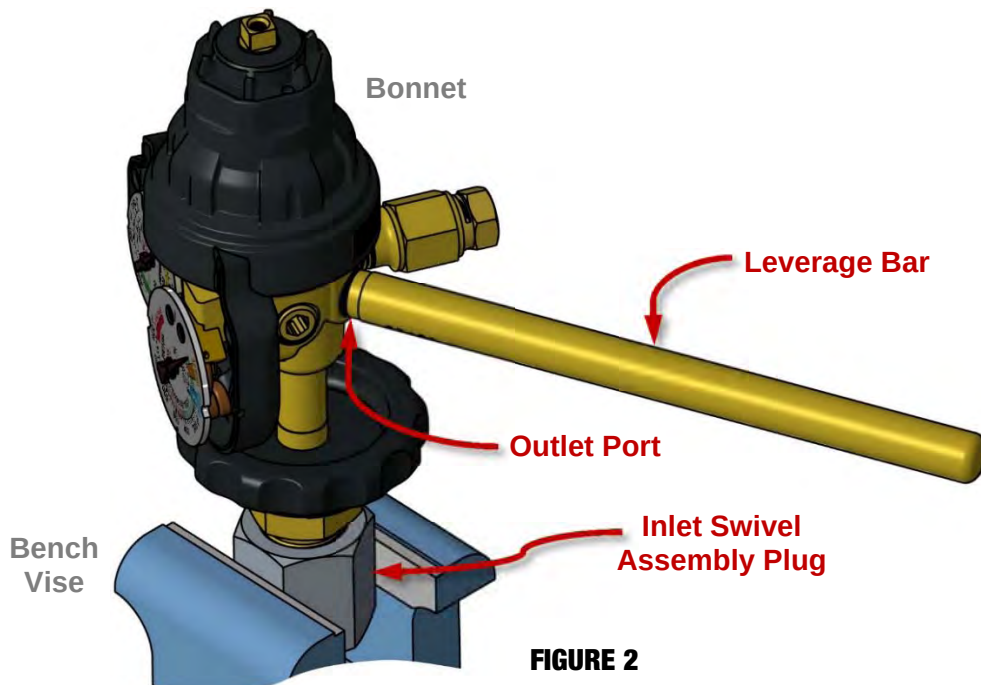
ESS32-PFH Pressure-Flow Hybrid EDGE™ Series 2.0 Regulator

DISASSEMBLY PROCEDURES

- ➔ Refer to the exploded view for reference numbers **[Shown in brackets]**.
 - ➔ Ensure adjusting knob is backed completely out (counterclockwise) before starting.
1. Mount the Inlet Swivel Assembly Plug in the Bench Vise and firmly attach the Regulator.
 2. Remove the front half of the Gauge Guard **[3]** by removing the three Torx Head Screws from the back side.
- ➔ The Lenses can now be remove/replaced if desired, by simply snapping the old Lenses out and the new Lenses in.

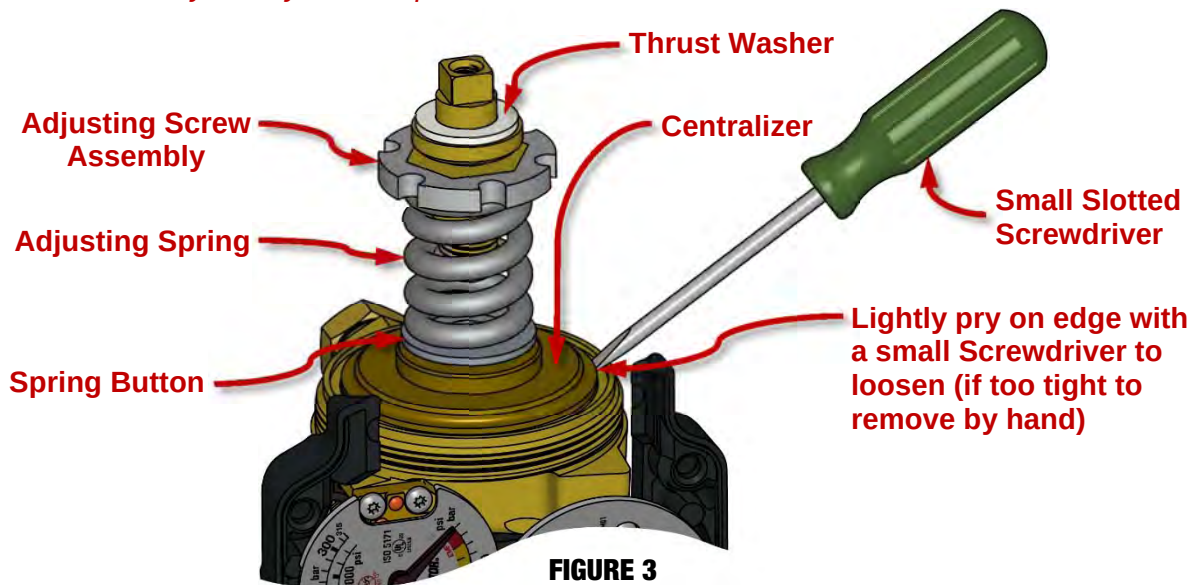


3. Remove the Knob by removing the Knob Decal, then removing the #10-32 Screw and Washer found inside the Knob **[8]**.
 4. Remove the Outlet Connection **[15]** from the Body, then remove the Bonnet **[2]**.
- ➔ To keep the Body from spinning while removing the Bonnet, use Leverage Bar 1420-0299 in the Outlet Port to obtain leverage to hold the Body, as shown in **FIGURE 2**.

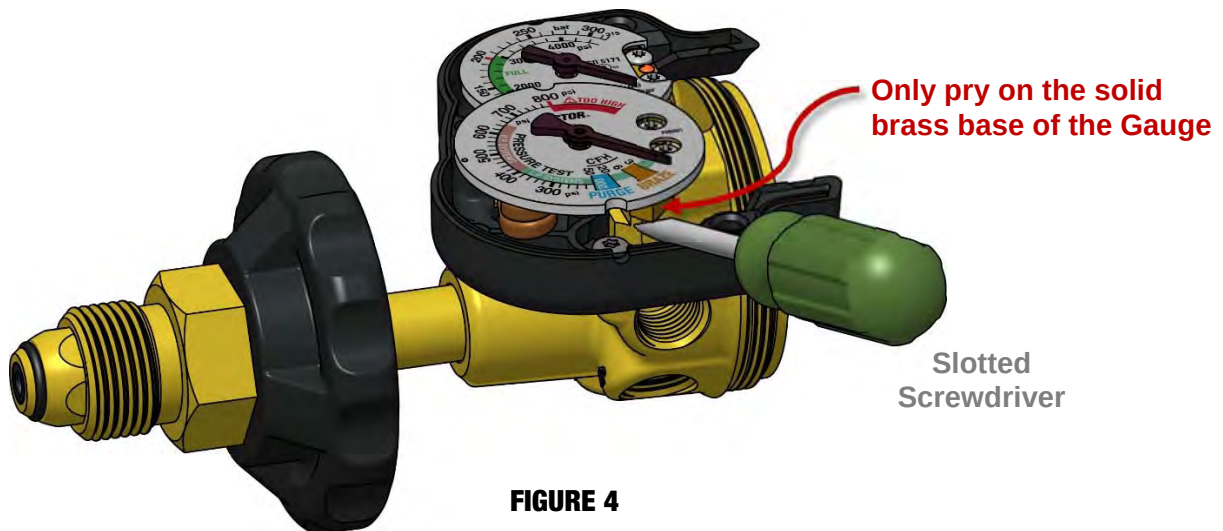


5. Remove the Adjusting Screw Assembly [11], Adjusting Spring [10] and Spring Button [9], then remove the Centralizer containing the Piston and O-Ring Seals [6]. The Centralizer may be tight in the Regulator Body – if so, use a slotted Screwdriver to **carefully** pry up on the edge to pop it out.

➔ *Make sure you've got the Thrust Washer. If it's not sitting on top of the Adjusting Screw Assembly, it may still be up inside the Bonnet.*

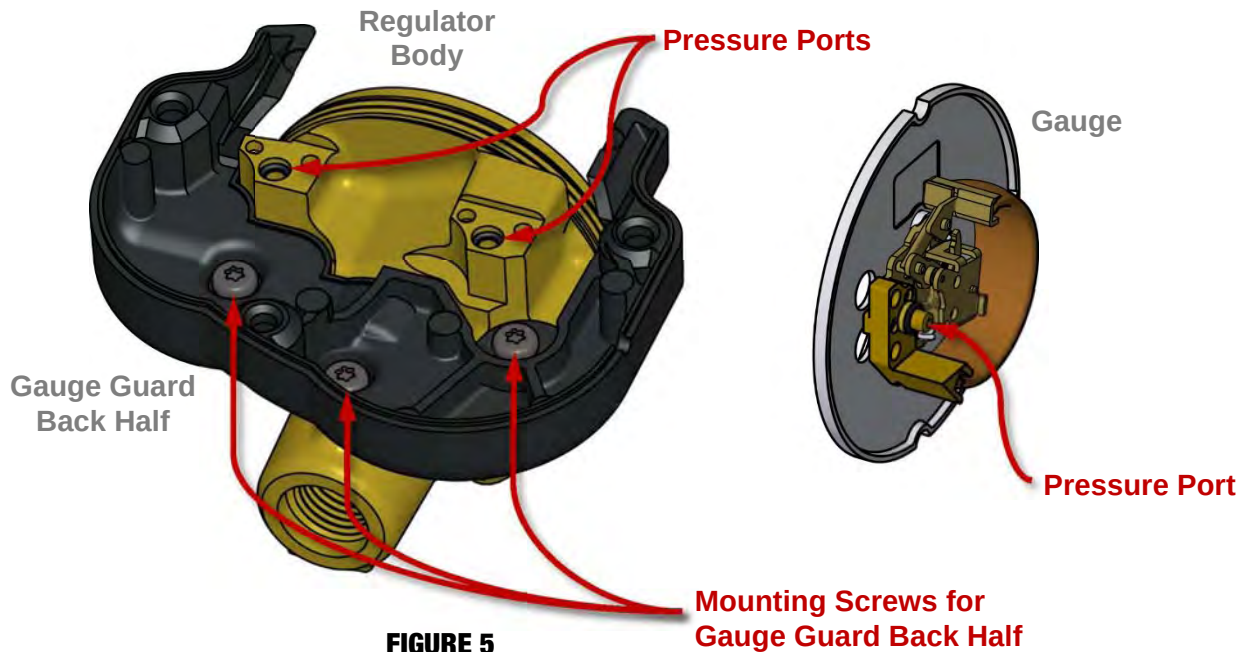


6. Remove the Encapsulated Seat [12] from inside the Body, then remove the external Relief Valve [20] and Pipe Plug [14] (if necessary).
7. Remove both HP and LP Gauges [17 and 18] by removing the two Torx Head Screws holding each in place. Note that the Gauge may be “stuck” in the Body on its O-Ring Seal. **DO NOT** pull up forcefully on the Gauge Face, as this can damage the Gauge! If a **LIGHT** pull doesn't pull the gauge out, lightly pry on the brass base underside of the Gauge with a Slotted Screwdriver, and “rock” it gently to get it to release from the O-Ring Seal and come out.



➔ *Be careful not to touch any of the inner workings of the Gauge. Handle the Gauge by holding onto the plastic face only.*

8. Carefully remove the Gauge O-Rings, taking care not to scratch any sealing surfaces. There is one O-Ring per Gauge. Typically they will remain in the body after Gauge removal, but if not there, they may also still be on the Pressure Port of the Gauge itself.



9. It is not required to remove the back half of the Gauge Guard [4] for any repairs that may be needed, but if removal is desired, simply remove the three Torx Head Screws holding it in place.
10. Install Leverage Bar 1420-0299 into any $\frac{1}{4}$ NPT port in the Body (if not already there), and use the bar to unscrew the Body off the Inlet Swivel [14].
- ➔ *Watch the Inlet Swivel while trying to turn the Body. If the Swivel is turning **with** the Body, then you need to tighten the Inlet Nut tighter on the Inlet Swivel Assembly Plug.*
11. If necessary, disassemble the Relief Valve as shown in **DETAIL A**.

⚠ CAUTION! You should never reuse the Inlet Filter or any O-Ring Seals. Replace them with new parts each time you assemble a Regulator.

CLEANING PARTS

It is recommended to clean all metal parts for oxygen service, regardless of Regulator Model being repaired. There are several ways to clean components for oxygen service; the following standards are recommended reading for more detailed information on methods and processes:

- CGA G-4.1 "Cleaning Equipment for Oxygen Service"
- ASTM G-93 "Standard Practice for Cleaning Methods and Cleanliness Levels for Material and Equipment Used in Oxygen-Enriched Environments"
- ASTM G-127 "Standard Guide for the Selection of Cleaning Agents for Oxygen Systems"

For metal parts, **VICTOR** suggests using CCI Enviro spray Liquid, used per the manufacturer's instructions, followed by a hot water rinse and thorough drying. Additional information can be found at <http://www.ccichemical.com>.

DO NOT allow non-metal parts to come in contact with cleaning solvents. Cleaning solvents can cause non-metal parts to swell and/or crack. To clean these parts, use a non-petroleum based mild soap solution, followed by a thorough rinsing in water. Dry parts completely prior to reassembling.

ASSEMBLY PROCEDURES

Refer to the exploded view for reference numbers [Shown in brackets]

⚠ IMPORTANT NOTES ABOUT SEALING PIPE THREADS:

- When using Teflon® tape where noted: Apply two to three layers around the threads, leaving the first thread clean. Insure your Teflon® tape is oxygen-compatible.
- When using Loctite® #222 Threadlocker where noted: Apply two to three drops to the second and third thread, leaving the first thread clean.

1. Install a new Filter [14] into the Inlet Swivel (or replace entire Inlet Swivel w/Filter installed [13]), and apply Teflon® tape to the Inlet Swivel threads.
2. If not already in place, mount the Inlet Swivel Assembly Plug back in the Bench Vise. Firmly attach the Inlet Swivel and Nut [13] onto the Inlet Swivel Assembly Plug. Leave the Inlet O-Ring [13] off for now – it will get installed at the end of assembly.
3. Screw the Body onto the Inlet Swivel, screw the Leverage Bar 1420-0299 into the outlet port of the Body (light hand tight), and then use the Leverage Bar to tighten the Body onto the Inlet Connection. At this point, tighten enough so that the body cannot be turned by hand without the assistance of the Leverage Bar. Final torque for the Inlet Connection will occur in upcoming **STEP 11**.

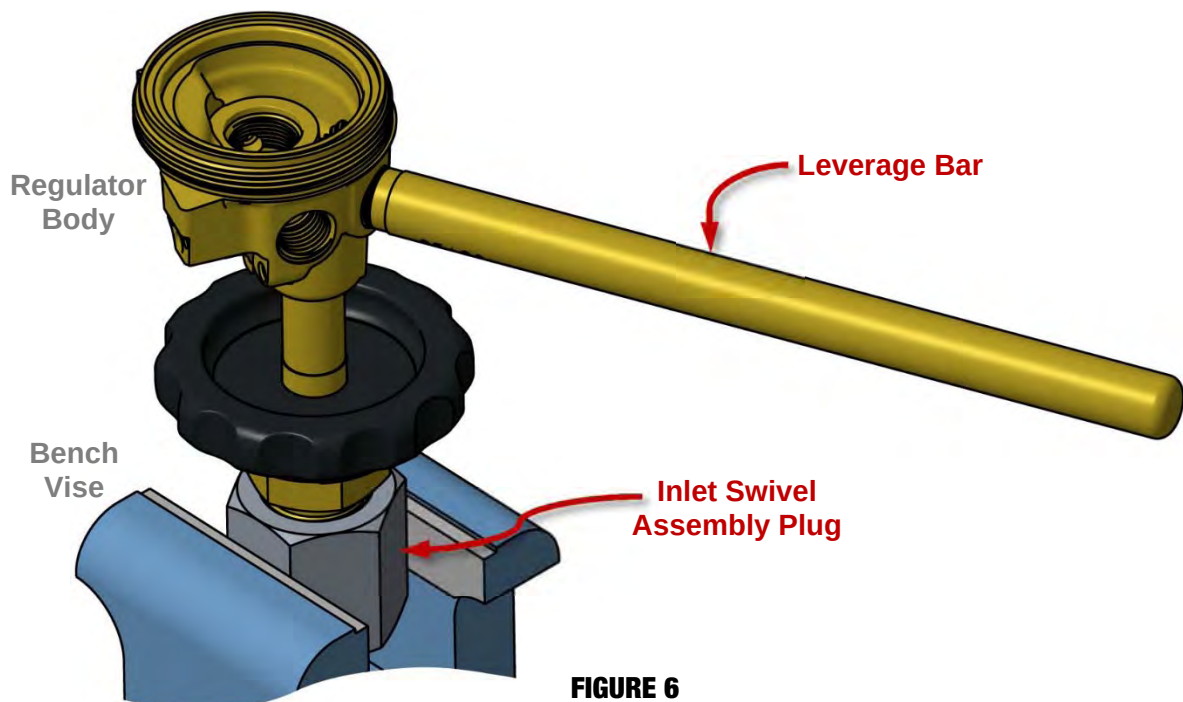
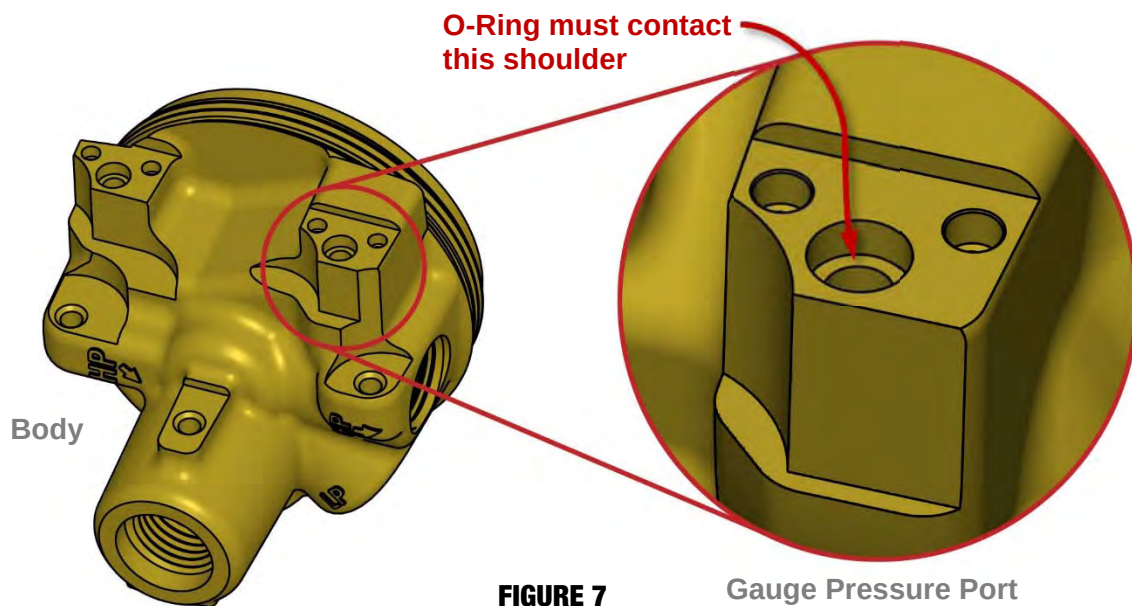


FIGURE 6

4. **Preassemble the Relief Valve:** Assemble (or reassemble) the Relief Valve [22] as shown in **DETAIL A**. Use no lubricants or sealants. If your Relief Valve is already assembled and tested, you can skip to **STEP 7**.
5. To ensure proper Relief Valve performance, perform the following test procedures *before assembling the Relief Valve in the Regulator*.
 - a. Attach the Relief Valve to a 1500 PSIG source of oil-free air or dry nitrogen (e.g. SR4G-580 Regulator, Part No. 0781-1428).
 - b. Slowly pressurize the Relief Valve. It should be bubble tight below 950 psig, and then should blow off (start to vent) between 950-1200 psig. If the Relief Valve vents before the minimum blow-off pressure is reached, then a second Disc [22E] may be added. If it still vents, then the Spring [22F] may need replacing. If the Relief Valve still won't blow off within the specified range, or if it continuously leaks below 950 psig, it is recommended that you replace the Relief Valve entirely.
6. When all testing is completed, bleed pressure off the Relief Valve, and apply Teflon® tape to the threads. Install the Relief Valve into the Body and torque to 15 ft-lbs.
7. Apply Teflon® tape to the Pipe Plug [16] threads (if it was removed from the Body). Install Pipe Plug into the Body, and torque to 15 ft-lbs.

➔ *The Outlet Connection gets installed at STEP 17.*
8. At this point, thoroughly blow out the Body assembly with pressurized oil-free air or dry nitrogen to insure it is completely free of chips and debris.
9. If the back half of the Gauge Guard was removed, reinstall it now using three Torx head screws. Torque Screws to 16 - 20 in-lbs.
10. **Gauge Installation:** The Edge 2.0 regulator uses new Gauge technology that utilizes an O-Ring seal, thereby eliminating messy Teflon® tape and burr/chip generation from pipe threads. While very easy to install, care must be taken to ensure a leak-free installation.
 - a. The Gauge O-Ring installs into the **REGULATOR BODY**, not onto the Gauge, and must be carefully pushed down into the Body until it contacts the shoulder shown:



- b. This location is critical for leak-free installation. Use the O-Ring Installation Tool 1420-0344 to push the O-Ring down against the shoulder – it will move easy, and you will feel a positive stop once in position. No lubrication is required on the O-Ring, but may be used if desired (very light coat).

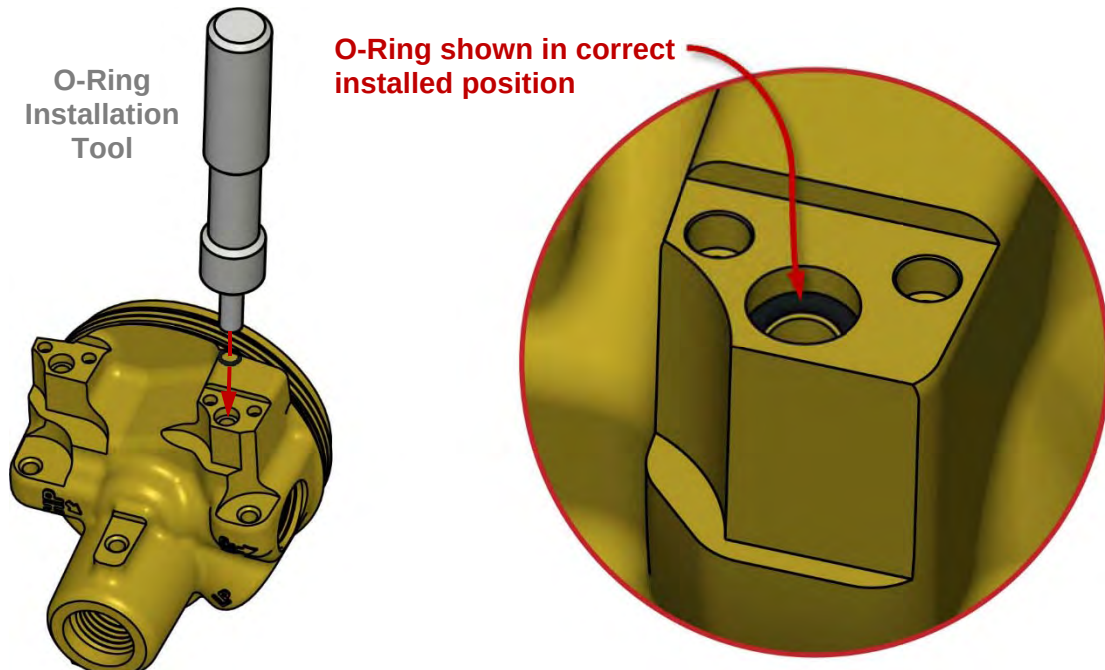


FIGURE 8

- c. Next, install the Gauge itself by simply pushing the Gauge onto the O-Ring and Body. **DO NOT** push on the plastic face of the Gauge. Instead, use your hand grip on the Gauge face as a guide only, and use a Slotted Screwdriver to push on the exposed brass portion of the Gauge as shown. It doesn't matter which gauge is installed first, but typically it's easier to install the HP Gauge first, since it sits slightly under the larger LP Gauge.

- d. Once the Gauge is pushed in all the way, and the metal face of the Gauge has contacted the face of the Body, the Gauges should naturally hold themselves in this position. Now, simply install the two Torx Head Screws included with the Gauges, and torque the Screws to 4.0 ± 0.4 in-lbs.

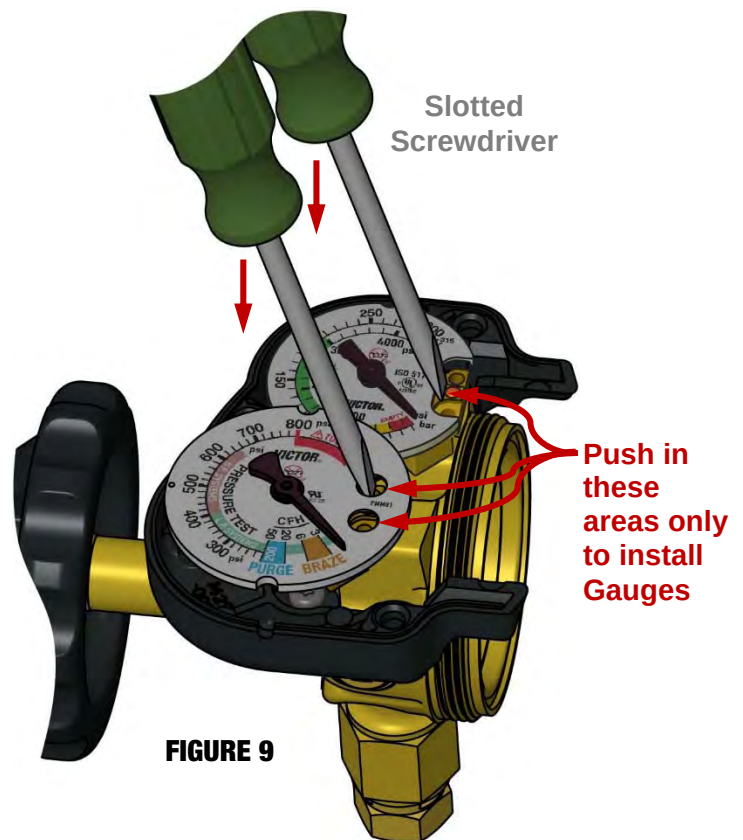
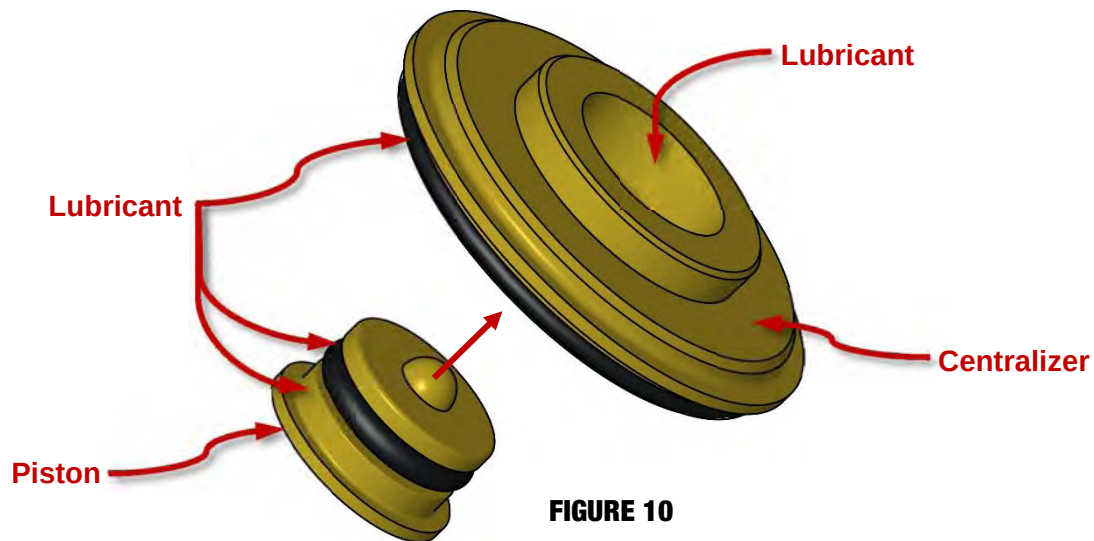
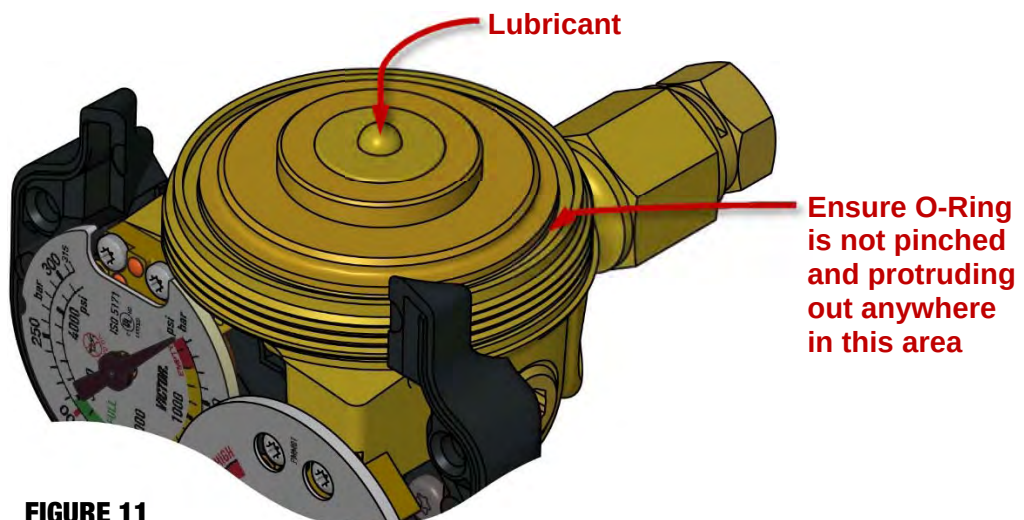


FIGURE 9

11. Apply a light coat of CHRISTO-LUBE® #129 Lubricant to the Encapsulated Seat [12] O-Ring, and install the Encapsulated Seat into the Regulator Body. Torque to 15 - 20 ft-lbs. Note that 15 - 20 ft-lbs is the same recommended torque for the Inlet Connection Swivel, so as you torque down the Encapsulated Seat, ***you're also finish-tightening the Inlet Swivel to the correct torque value.***
→ Watch the Inlet Swivel while you torque down the Encapsulated Seat. If the Swivel is turning *with* the Body, then you need to tighten the Inlet Nut tighter on the Inlet Swivel Assembly Plug. You want to be sure that the 15 - 20 ft-lbs torque is being applied to both the Encapsulated Seat threads and the Inlet Swivel threads.
12. Apply a light coat of CHRISTO-LUBE® #129 Lubricant to the Centralizer O-Ring and Piston O-Ring [6]. Install the O-Rings onto the Piston and Centralizer.
13. Apply a light coat of CHRISTO-LUBE® #129 Lubricant to the outside of the Piston and the inside of the Centralizer as shown, then push the Piston into the Centralizer (it should slide in easily).



14. Next, install the assembled Piston/Centralizer into the Regulator Body, centering and pushing down firmly until the O-Ring slides into the Body. **Take care** that the O-Ring does slide down into the Body, and doesn't end up pinched and protruding out in spots. At this time, lubricate the top "nose" of the Piston, as lubricant is needed here before the Spring Button [9] can be installed.



15. Install the Spring Button [9], Adjusting Spring [10] and Adjusting Screw Assembly [11]. **Don't forget the Thrust Washer!** It should be sitting on top of the Adjusting Screw Assembly. Regulator function will be impaired without it.

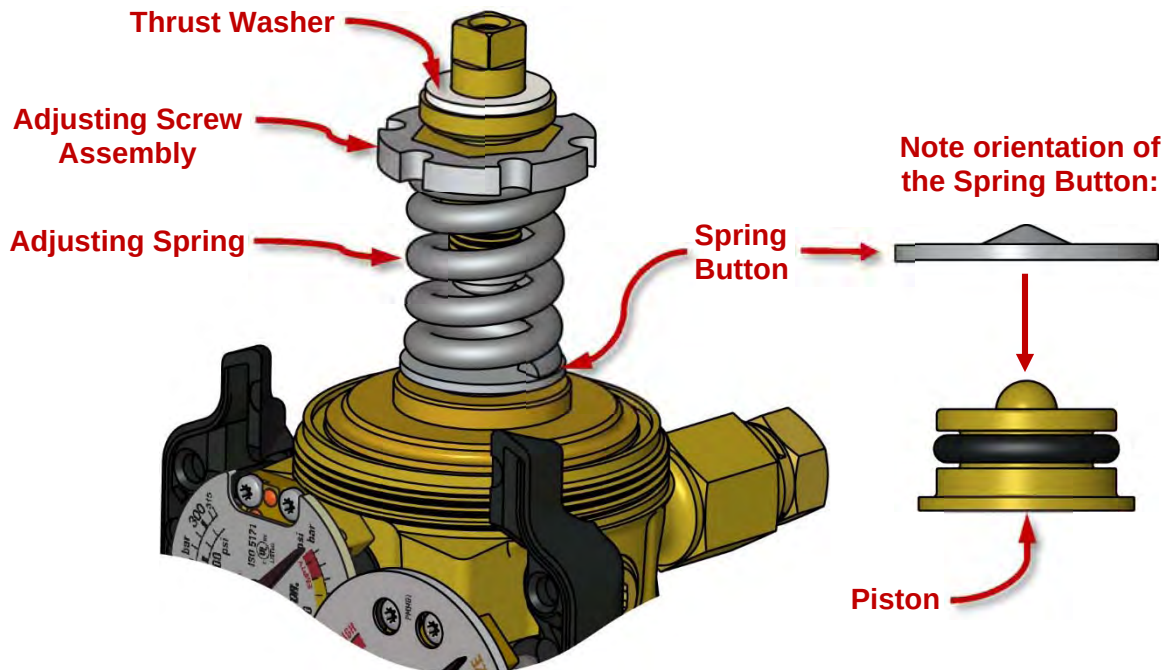


FIGURE 11

16. Install the Bonnet [2] onto the Body. Take care while slipping the Bonnet down over the internal components – the ribs inside the Bonnet must slide into the scallops of the Adjusting Screw Assembly. Torque the Bonnet to 45 - 50 ft-lbs.

➔ *Use the Leverage Bar 1420-0299 in the open Outlet Port to prevent the assembly from rotating while torquing the Bonnet.*

17. Apply **only** Loctite® #222 threadlocker to the Outlet Connection [17] threads. Install the Outlet Connection into the Body and torque to 10-15 ft-lbs.



DO NOT use any other 1/4" SAE flare fitting in the outlet of this Regulator!

This Regulator requires a special two-stage orifice Outlet Connection in order for the "BRAZE" and "PURGE" flow bands to operate properly. Failure to use the correct Outlet Connection in this Regulator will render these flow bands inoperable.

18. Apply a small amount of CHRISTO-LUBE® #129 to the top surface of the Bonnet (the surface around the square of the Drive Screw), then slip the Knob [8] into position – the square hole inside the knob mates to the square shaft of the Drive Screw.
19. Install the #10-32 Screw and Washer to hold the Knob on. Torque this Screw to 30 - 36 in-lbs. Then apply the new Knob Decal.
20. Snap new Lenses into the front half of the Gauge Guard [3] (unless already installed), and install the front half of the Gauge Guard onto the regulator using three Torx Head Screws from the back side. Torque Screws to 16 - 20 in-lbs.

21. Apply new Gas I.D. and Compliance Decals [21] as needed to ensure the Regulator maintains clear visual identification, and install the Protective Cap [18] onto the Outlet Connection.

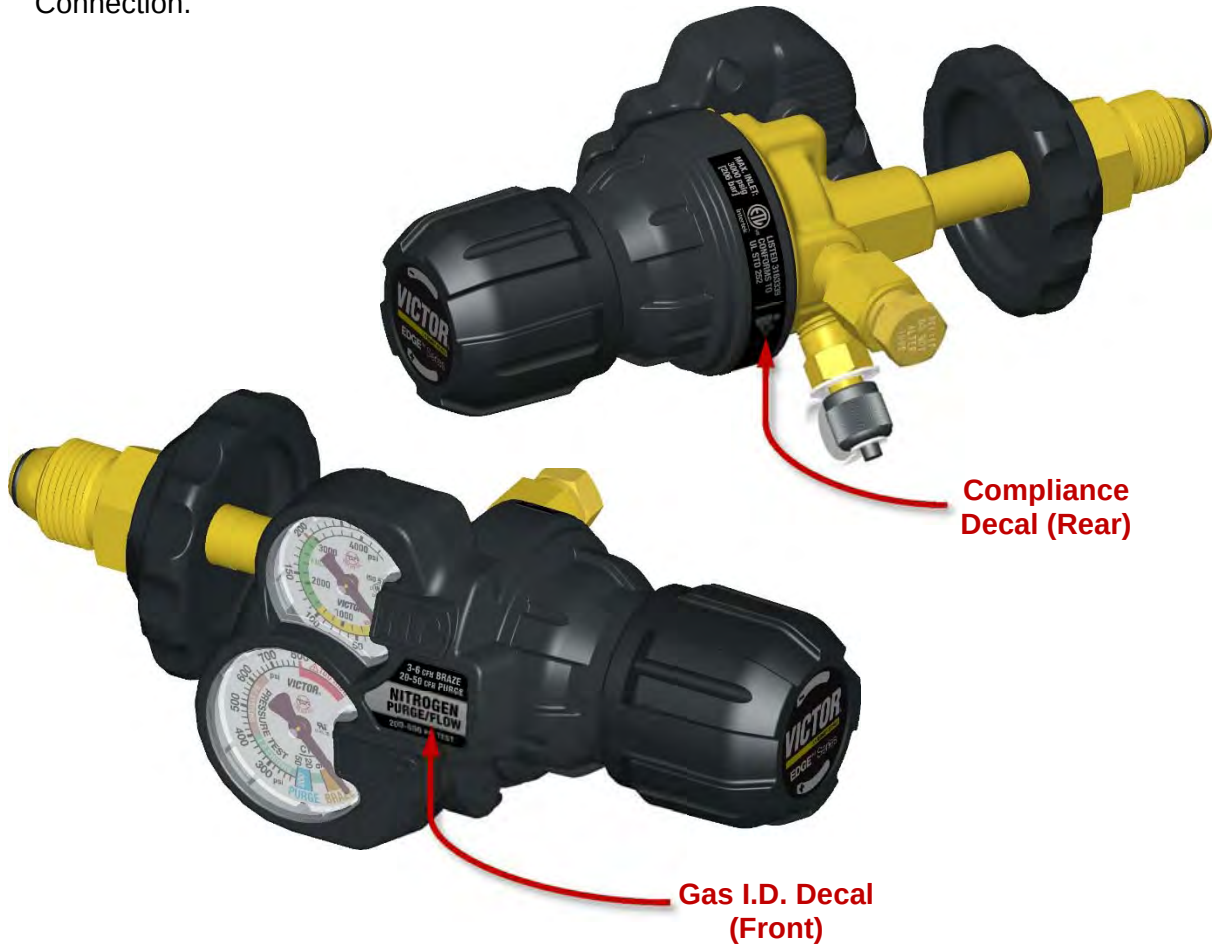


FIGURE 12

22. Disconnect the Regulator from the Inlet Swivel Assembly Plug and install the Inlet O-Ring [15]. The Regulator is now ready for testing.

TABLE 3 - Torque Specifications Summary

Seat Nozzle / Encapsulated Seat	15 - 20 ft-lbs.
Bonnet	45 - 50 ft-lbs.
Inlet Connection	15 - 20 ft-lbs.
Outlet, Relief Valve, Pipe Plugs	15 ft-lbs.
Gauge Screws (M2.5 Screws Included w/Gauges)	4.0±0.4 in-lbs.
Gauge Guard Screws (M3.5 Thread Forming Screws)	16 - 20 in-lbs.
Adjusting Mechanism Screws (10-32 Thread Self Locking Screws)	30 - 36 in-lbs.

RECOMMENDED TOOLS AND SUPPLIES FOR TEST PROCEDURES

- Test Gun (quick opening on/off valve) with NO orifice in it
- Valved source of oil-free air or dry nitrogen

TEST PROCEDURES



For your safety, and the safety of others:

- **Always test with oil-free air or dry nitrogen only.**
 - **Always wear eye protection while testing a Regulator.**
 - **Always perform all of the following test procedures after reassembling a Regulator.**
1. Set gas supply to **2000 ± 200** PSIG pressure.
 2. Attach the Regulator to the gas supply – start the Inlet Nut by hand (do not force), and hand tighten to create a seal on the Inlet O-Ring.
 3. Turn the Adjusting Knob counterclockwise until it stops, and attach the Test Gun to the outlet of the Regulator.
 4. Open the gas supply valve and close the Test Gun.
 - a. Working pressure will appear on the High Pressure Gauge.
 - b. If the Low Pressure Gauge begins to show pressure building, turn the Gas Supply Valve off and refer to the **TROUBLESHOOTING CHART**.
 5. **LEAK TEST**
 - a. With the Test Gun closed and the Gas Supply Valve open, adjust the Regulator to deliver **800** PSIG.
 - b. Close the Gas Supply Valve and turn the Adjusting Knob one turn counterclockwise.
 - c. Observe the Low Pressure and High Pressure Gauges for five (5) minutes:
 1. If the High Pressure Gauge reading drops, there is a leak in the Gas Supply Valve, Inlet Connection, High Pressure Gauge or the plugged high pressure port.
 2. If the Low Pressure Gauge reading drops, there is a leak in the downstream equipment, Low Pressure Gauge, Outlet Connection or Relief Valve port.
 3. If the High Pressure Gauge reading drops at the same time the Low Pressure Gauge reading increases, there is a leak in the Regulator Seat.
 - d. If any leaks are found, isolate if possible using a liquid leak detector, disassemble and repair or replace parts as needed, and start the test over again. Refer to **TROUBLESHOOTING CHART** for more detailed cause and possible corrective action information.
 6. **DROP TEST**
 - a. With the Test Gun closed and the Gas Supply Valve open, adjust the Regulator to deliver **300** PSIG.
 - b. Open the Test Gun and note the new indicated delivery pressure. Drop (indicated pressure static minus indicated pressure flowing) must not exceed **30** PSIG.
 7. **CREEP TEST / SLOW SHUT-OFF TEST**
 - a. With the Test Gun closed and the Gas Supply Valve open, adjust the Regulator to deliver **300** PSIG.

- b. Open and close the Test Gun several times to stabilize the Regulator. Leave the test gun closed.
- c. Observe the Low Pressure Gauge for five (5) minutes:
 1. During the first minute, an initial shut-off increase of **10** PSIG is permissible.
 2. During the next 4 minutes, no further increase (creep) is allowed.
8. Close the Gas Supply Valve and release all pressure from the Regulator by opening the Test Gun. Turn the Adjusting Knob counterclockwise until it stops.
9. Remove the Test Gun from the Regulator.
10. Remove the Regulator from the gas supply. The Regulator is now ready to use.

ADDITIONAL INFORMATION ABOUT THE OUTLET CONNECTION

This Regulator requires a special two-stage orifice Outlet Connection in order for the “BRAZE” and “PURGE” flow bands to operate properly. Failure to use the correct Outlet Connection in this Regulator will render these flow bands inoperable.

DO NOT use any other ¼” SAE flare fitting in the outlet of this Regulator!

If you need to check the accuracy or verify function of the Outlet Connection separately:

1. Connect the INLET of the Outlet Connection to a regulated source of nitrogen capable of regulating up to 150 PSIG gas pressure.
 2. Connect the OUTLET of the Outlet Connection to a flow measurement device capable of measuring flow up to at least 50 CFH.
 3. Apply pressure to obtain the following flow values.
 - a. With 40±5 PSIG air on the Inlet, the device should flow 3 CFH
 - b. With 95±5 PSIG air on the Inlet, the device should flow 6 CFH
- The above flows are generated flowing through the 1st Stage Orifice.*
- c. With 145±5 PSIG air on the Inlet, the device should flow 20 CFH
 - d. With 200±5 PSIG air on the Inlet, the device should flow 50 CFH

The above flows are generated after the Poppet opens, flowing through the 2nd Stage Orifice

TOLERANCE FOR ALL FLOW RATES IS ±10%

TROUBLESHOOTING

CAUSES	POSSIBLE CORRECTIVE ACTIONS
1. “BRAZE” and/or “PURGE” flow bands are not flowing correctly.	
a. Outlet orifices are plugged.	Disassemble Outlet as shown in DETAIL B , and carefully blow out 1 st and 2 nd Stage orifices, verify they are clear of debris.
b. Contamination on 1 st Stage Orifice O-Ring Seal.	Disassemble Outlet as shown in DETAIL B , and carefully blow off the Seat to remove any debris that may be present.
c. Damaged 1 st Stage Orifice O-Ring Seal.	Replace O-Ring Seal.
d. Outlet not transitioning correctly from 1 st Stage Orifice to 2 nd Stage Orifice (i.e. from “BRAZE” to “PURGE”).	Replace Outlet Connection with the correct Two-Stage Orifice Outlet 0910-0122RP.
e. Damaged / inaccurate Hybrid Pressure-Flow L.P. Gauge.	Replace Gauge.
f. Wrong Outlet Connection installed.	Replace Outlet Connection with the correct Two-Stage Orifice Outlet 0910-0122RP.
2. No gas flows through the Regulator and the High Pressure Gauge <i>does not</i> indicate pressure.	
a. Inlet or Inlet Filter is plugged.	Blow 40-45 PSIG of air through the Filter in reverse direction of the normal gas flow.
b. Empty Supply Cylinder.	Replace the Cylinder.
3. No gas flows through the Regulator and the High Pressure Gauge <i>does</i> indicate pressure.	
a. Damaged Adjusting Mechanism or missing components.	Check the Adjusting Screw Assembly to ensure it is installed correctly and moving freely in the Bonnet. Ensure the Spring Button is in position and hasn't been missed.
b. Adjusting Knob not installed correctly.	Make sure the square of the Drive Screw is properly mated into the square in the Adjusting Knob.
c. Outlet Connection plugged or not functioning properly.	Replace Outlet Connection with the correct Two-Stage Orifice Outlet 0910-0122RP.
d. Defective Adjusting Spring.	Replace the Adjusting Spring.
e. Defective Encapsulated Seat.	Replace the Encapsulated Seat.
4. Gauges do not indicate pressure but gas flows through the Regulator.	
a. Defective Gauge(s).	Replace Gauge(s).

CAUSES**POSSIBLE CORRECTIVE ACTIONS****5. Regulator does not deliver in its designed delivery pressure range.**

- | | |
|---|---|
| a. Incorrect Adjusting Spring used during repair. | Replace with correct Adjusting Spring. |
| b. Damaged Adjusting Mechanism or missing components. | Check the Adjusting Screw Assembly to ensure it is installed correctly and moving freely in the Bonnet. Ensure the Spring Button is in position and hasn't been missed. |

6. Regulator hums or clatters while flowing.

- | | |
|---|--|
| a. Some hum may occur from the Outlet Connection, depending on pressure and flow demand. As long as the Regulator is performing normally, this humming sound is normal. | |
| b. Restriction upstream of the Regulator. | Inspect system and remove restriction. |
| c. Spring Button not installed properly. | Check and/or replace Spring Button. |
| d. Damaged Encapsulated Seat. | Replace Encapsulated Seat. |

7. Regulator experiences excessive drop.

- | | |
|--|---|
| a. Damaged Encapsulated Seat. | Replace Encapsulated Seat. |
| b. Outlet Connection plugged or not functioning properly. | Replace Outlet Connection with the correct Two-Stage Orifice Outlet 0910-0122RP. |
| c. Piston damaged, Piston O-Ring damaged or missing, or lack of lubrication. | Inspect Piston, Piston O-Ring and inside of Centralizer for nicks, dings, scratches, etc. and ensure parts are lubricated properly. |
| d. Incorrect Adjusting Spring used during repair. | Replace with correct Adjusting Spring. |
| e. Low Cylinder pressure or Manifold test pressure. | Check Cylinder and Manifold pressure and adjust/replace as needed. |

8. Increase in the low pressure gauge reading (creep).

- | | |
|---|---|
| a. Loose Encapsulated Seat. | Tighten Encapsulated Seat to 15 - 20 ft-lbs torque. |
| b. Damaged Encapsulated Seat. | Replace Encapsulated Seat. |
| c. Damaged or contaminated Encapsulated Seat O-Ring | Inspect O-Ring for damage, and clean or replace as necessary. |

9. Rapid pressure drop on both High and Low Pressure Gauges.

- | | |
|---|---|
| a. Loose connection – Bonnet to Body. | Re-tighten Bonnet per STEP 16 of assembly procedure. |
| b. Damaged Piston, Centralizer or O-Rings. | Replace Piston, Centralizer and O-Rings via Piston Kit 0790-0291RP. |
| c. Loose connection – Regulator to Test Manifold. | Ensure Regulator is securely tightened to the Manifold. |

CAUSES**POSSIBLE CORRECTIVE ACTIONS****10. Rapid increase in Low Pressure Gauge reading.**

- | | |
|---|---|
| a. Loose Encapsulated Seat. | Tighten Encapsulated Seat to 15 - 20 ft-lbs torque. |
| b. Damaged Encapsulated Seat. | Replace Encapsulated Seat. |
| c. Damaged or contaminated Encapsulated Seat O-Ring | Inspect O-Ring for damage, and clean or replace as necessary. |

11. With the cylinder valve closed, the High Pressure Gauge indicator drops, and there is no immediate increase in pressure indicated on the Low Pressure Gauge.

- | | |
|--|--|
| a. Loose connection – Regulator to Test Manifold. | Insure Regulator is securely tightened to the Manifold. |
| b. Loose connection – Inlet Swivel to Regulator Body. | Tighten the Swivel using 20 ft-lbs torque. |
| c. Loose connection – High Pressure Gauge to Regulator Body. | Re-check Gauge Screw torque, O-Ring installation, and verify O-Ring installed properly and not damaged (See STEP 10 of the Assembly Procedure). |
| d. Loose connection – Bottom Pipe Plug. | Tighten Pipe Plug using 15 ft-lbs torque. |
| e. Leaking Gauge. | Replace the Gauge. |

10. Low Pressure Gauge indicator slowly drops, and there is no decrease in pressure on the High Pressure gauge when the Manifold Valve is closed.

- | | |
|---|--|
| a. Test Gun is not attached securely. | Tighten the Test Gun. |
| b. Loose connection – Low Pressure Gauge to Regulator Body. | Re-check Gauge Screw torque, O-Ring installation, and verify O-Ring installed properly and not damaged (See STEP 10 of the Assembly Procedure). |
| c. Loose connections at the Regulator Body – Outlet Connection or Relief Valve/Plug | Tighten connections using 15 ft-lbs torque. |
| d. Loose connection – Bonnet to Body. | Re-tighten Bonnet per STEP 16 of assembly procedure. |
| e. Damaged Piston O-Ring or Centralizer O-Ring. | Replace Piston, Centralizer and O-Rings via Piston Kit 0790-0291RP. |

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