

DX3 BALANCED DIAPHRAGM FIRST STAGE

TROUBLE SHOOTING		
SYMPTOM	POSSIBLE CAUSE	TREATMENT
* Restricted airflow and inhalation resistance through complete system.	<ol style="list-style-type: none"> 1. Cylinder valve not completely opened. 2. Cylinder valve requires service. 3. Cone filter(5,13) is contaminated. 	<ol style="list-style-type: none"> 1. Open valve completely. 2. Connect regulator to a different cylinder. 3. Replace with new and perform a complete service.
* Air leakage detected from beneath the adjustment cup, inside the end cap.	<ol style="list-style-type: none"> 1. End cap(36,41) is loose. 2. Diaphragm(34) is worn or damaged. 3. Diaphragm washer(35) is damaged or incorrectly seated. 4. Seating surface inside body(31) is damaged. 	<ol style="list-style-type: none"> 1. Tighten end cap onto body, using prescribed torque value in reassembly procedure. 2. Replace with new. 3. Reseat or replace with new. 4. Replace body with new.
* Air leakage detected from receiver.	<ol style="list-style-type: none"> 1. Receiver o-ring(25) is damaged or worn. 2. Seating surface inside the body(31) is damaged. 3. Seating surface on the receiver(34) is damaged. 	<ol style="list-style-type: none"> 1. Replace with new. 2. Replace with new. 3. Replace with new.
* Insufficient intermediate pressure.	<ol style="list-style-type: none"> 1. End cap(36,41) loose. 2. First stage improperly adjusted. 3. Ambient spring(38) is weakened or damaged. 4. Seating surface of body(31) beneath diaphragm is damaged. 	<ol style="list-style-type: none"> 1. Tighten end cap onto body, using prescribed torque value in reassembly procedure. 2. Readjust according to procedure specified in reassembly procedure. 3. Replace with new. 4. Replace body with new.
* Excessive intermediate pressure/Intermediate pressure creeps.	<ol style="list-style-type: none"> 1. First stage improperly adjusted. 2. HP seat(28) damaged or worn. 3. HP seat o-ring(26) damaged or worn. 4. Seating surface of HP seat(28), or receiver(24), or cone(29), or body(31) is damaged. 5. Seat spring(27) is weakened or damaged. 	<ol style="list-style-type: none"> 1. Readjust according to reassembly procedure. 2. Replace with new. 3. Replace with new. 4. Replace with new. 5. Replace with new.

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DISASSEMBLY PROCEDURE

△ NOTE: Be sure to check and record the intermediate pressure and perform the Leak Detection Test outlined in the Initial Inspection Procedures prior to disassembling the regulator. Review the troubleshooting section to gain a better idea of which internal parts may be worn, and to better advise your customer of the service that is needed.

1. Before disassembling the first stage, remove the low pressure second stage hoses with a 9/16" open end wrench, the high pressure hose(s) with a 5/8" open end wrench, and the low pressure inflator hose with either a 9/16" or 1/2" open end wrench.
2. Remove and inspect the o-rings now visible on all these items for any signs of decay. Discard if found.

△ NOTE: It is important to remove the receiver end components first to avoid damage of the HP seat cone located inside the main body.

3. Using 1/4" hex key, turn the receiver(24) in a counter clockwise direction to remove it from the body(31). (Fig. 1)
4. Remove the HP seat (29) and transfer pin(32) from the receiver(24). Discard the HP seat, regardless of condition, and DO NOT attempt to reuse. Inspect the transfer pin for signs of wear or distortion. Discard if found.
5. Remove the HP seat spring(27). Using the magnifier, closely examine the spring(27) for any signs of corrosion. Discard if found and DO NOT attempt to reuse.
6. Using care not to scratch or damage the receiver, remove the HP seat o-ring(26) from inside the receiver(24). (Fig. 2) Discard, regardless of condition, and DO NOT attempt to reuse.
7. Remove and inspect the receiver o-ring(25) for any signs of decay. Discard if found.
8. Gently insert the longer, tapered end of a Cone Removal/Installation tool directly into the HP cone(28), which is held inside the main body(31). Pull the tool straight out to remove the cone from the main body. (Fig. 3)
9. Remove the HP cone o-ring(30), being very careful to avoid damaging the cone. Discard the cone o-ring, and DO NOT attempt to reuse. Inspect the HP cone(28) for any signs of damage or corrosion. Discard if found.



Fig. 1



Fig. 2



Fig. 3

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NOTE: Perform step 10 only if an Environmental Protection Kit has been installed.

10. Environmental Protection Kit Disassembly:

A. Turn the plastic environmental cap(44) counter clockwise by hand to loosen and remove.

B. Gently peel the lip of the environmental diaphragm(43) away from the brim of the end cap(41) and lift out to remove. Examine the condition of the diaphragm, checking for any signs of wear, distortion, corrosion, or perforation. Discard if found.

C. Turn the first stage diaphragm side down and remove the transfer piston(42). Check for any signs of wear, distortion, or corrosion. Discard if found.

11. Place the first stage on the repair bench, situated with the yoke screw, or DIN connector, facing farthest away, vertically. Holding the yoke, or DIN connector, firmly in place, apply a 5/16" hex key to the adjustment cup(40), and turn counter clockwise to remove. (Fig. 4)

12. Remove the spring washer(39) and spring(38). Inspect the washer(39) for any signs of wear or distortion. Discard if found.

13. Using a magnifier, closely inspect the spring(38) for any signs of corrosion. Discard if found and DO NOT attempt to reuse.

14. Secure the first stage in a soft-jawed or well padded vise and apply a 3/8" socket drive wrench with a 3/8" Socket Drive Spanner to the end cap(36 or 41). Turn the end cap counter clockwise to remove from the main body(31). (Fig. 5) Lift out the diaphragm washer(35) and diaphragm plate(37), and inspect for signs of wear or distortion. Discard if found.

CAUTION: Tighten the vise only as snug as is needed to hold the first stage secure, and DO NOT overtighten. Doing so will result in permanent damage, rendering it inoperable.

15. Using a 5/32" hex key, install HP port plugs(20) into the open HP ports, and LP port plugs(22) into all but one of the LP ports. Check to ensure that 1 of the 4 LP ports is open, and all other ports are sealed. Tighten the yoke screw to ensure that the protector cap(2) is securely sealed over the yoke retainer(7).

16. Remove the diaphragm(34) from the main body(31) by covering the receiver opening in the body with the palm of your hand and directing short blasts of low pressure air through the open LP port. (Fig. 6) Lift the diaphragm out carefully and discard, regardless of its condition, and DO NOT attempt to reuse.

CAUTION: DO NOT attempt to remove the diaphragm with the use of a metallic instrument. Doing so will seriously damage the brass seating surface of the body.



Fig. 4



Fig. 5



Fig. 6

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17. Remove the button(33) and inspect for signs of wear or distortion. Discard if found.

18. Remove all port plugs(20 & 22) with a 5/32" hex key. Remove and inspect the port plug o-rings(21 & 23) for any signs of decay. Discard if found.

R 19. Secure the first stage body in a soft jawed or well padded vise with the yoke assembly or the DIN connector facing up.

⚠ CAUTION: Tighten the vise only as needed to hold the first stage secure, and **DO NOT** overtighten. Doing so will result in permanent damage, rendering it inoperable.

△ NOTE: For units received with Yoke connectors perform step 20Y, for units received with DIN connectors perform step 20D.

20Y. Yoke connector disassembly:

A. Remove the knob assembly(1) from the yoke(3), and the protector cap(2) from the knob assembly.

R B. Apply a thin wall, or modified, 1" box wrench to the yoke retainer(7). Using firm steady force, turn the yoke retainer counter clockwise to remove. **DO NOT** use impact to loosen.

△ NOTE: It is important that the wrench is properly seated over the entire hex portion of the yoke retainer to prevent any damage to the part. (Fig. 7)

C. After removing the yoke retainer(7), remove the yoke(3) and saddle(19) and set these aside. Remove the saddle o-ring(18) from the yoke retainer and inspect for any signs of decay. Discard if found. Remove and discard the yoke retainer o-ring(8). **DO NOT** attempt to reuse.

D. Using Internal Circlip Pliers, remove the retaining clip(4) that retains the cone filter(5). The cone filter should drop out freely into your hand. Discard, and **DO NOT** attempt to reuse. Remove and inspect the filter o-ring(6) for any signs of decay. Discard if found

19D. DIN connector disassembly:

R A. Apply a 1/4" hex key to the filter retainer(11) and loosen in a counter clockwise direction to remove. (Fig. 8) Remove the DIN face o-ring(10) and filter retainer o-ring(12) and inspect for any signs of decay. Discard if found.

B. Lift the coupler wheel(14) straight off the filter housing(16) and set aside. Apply a 1" open end wrench to the flange at the base of the filter housing(16). (Fig. 9) Using firm, steady force, loosen in a counter clockwise direction to remove. **DO NOT** use impact to loosen.

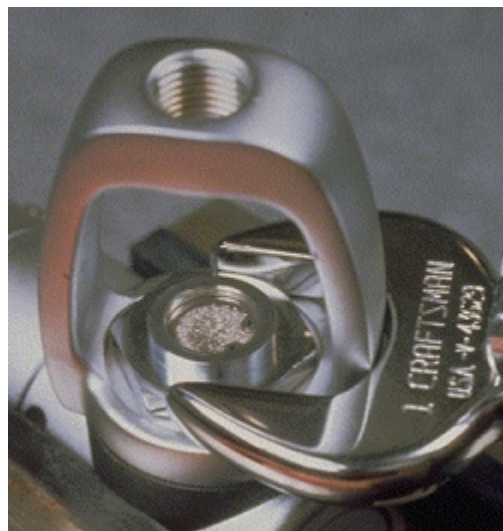


Fig. 7



Fig. 8



Fig. 9

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NOTE: It is important that the wrench is deep enough to seat entirely over the flange to avoid any damage to the seating surface.

R C. After removing the filter housing(16) from the main body(31), turn it over and tap lightly to drop out the conical filter(13). (Fig10) Discard the filter and DO NOT attempt to reuse. Remove and inspect the filter o-ring(15) for any signs of decay. Discard if found. Remove and discard DIN filter housing o-ring(17). DO NOT attempt to reuse.

D. Remove and inspect the saddle o-ring(18) for any signs of decay. Discard if found.

20. Inspect the saddle(19), checking for any signs of stress cracks or other distortions. Discard if found.

REASSEMBLY PROCEDURE

NOTE: Prior to reassembly, it is necessary to inspect all parts, both new and those that are being reused. Check to ensure that o-rings are clean and supple, and that every part and component has been thoroughly cleaned.

WARNING: Use only genuine Oceanic parts, subassemblies, and components whenever assembling Oceanic products. DO NOT attempt to substitute an Oceanic part with another manufacturer's, regardless of any similarity in shape, size, or appearance. Doing so may render the product unsafe, and could result in serious injury or death of the user.

NOTE: For units received with Yoke connectors perform step 1Y, for units received with DIN connectors perform step 1D.

1Y. Yoke connector reassembly:

R A. Secure the first stage body in a soft jawed or well padded vise, with the threaded HP inlet bore facing straight up.

R **CAUTION:** Tighten the vise only as needed to hold the first stage secure, and DO NOT overtighten. Doing so will result in permanent damage, rendering it inoperable.

B. Install the filter o-ring(6) into the yoke retainer(7), at the base of the filter cavity in the body. (Fig. 11)

C. Install the conical filter(5) into the yoke retainer(7) and install the retaining clip(4) into the groove above it, using Internal Circlip Pliers. (Fig. 12)

NOTE: Close examination of the retaining clip will show that one side is slightly rounded and the other is flat. Install with the flat side facing out of the yoke retainer to ensure greater holding strength.

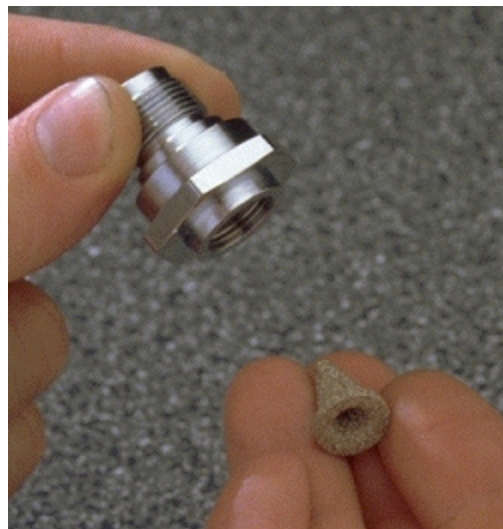


Fig. 10

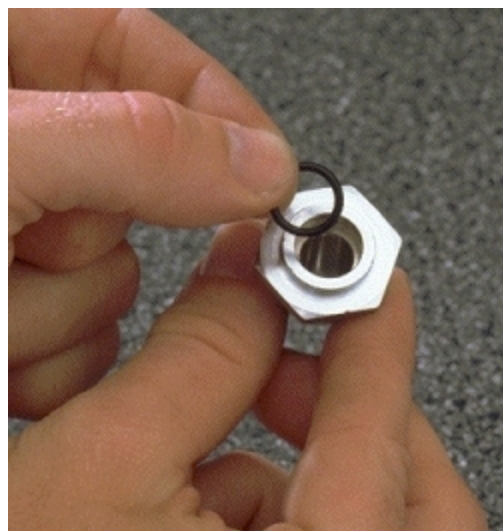


Fig. 11



Fig. 12

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D. Lubricate and install the saddle o-ring(18) onto the yoke retainer(7) at the base of the threads, and the yoke retainer o-ring(8) into the groove on the end.

E. Insert the threaded end of the yoke retainer(7) through the yoke(3), facing opposite the end which holds the knob assembly(1). (Fig. 13) Place the saddle(19) onto the yoke retainer, with the flat side mating to the base of the yoke.

F. Holding the yoke retainer, yoke, and saddle together between thumb and forefinger, mate the yoke retainer into the main body, so that the threads seat properly. Hand tighten in a clockwise direction until secure. Using a thin-wall, or modified, 1" crow's foot wrench that is properly seated over the entire hex portion of the retainer, tighten **to a torque of 16-18 ft-lbs.** (Fig. 14)

G. Install the protector cap(2) onto the knob assembly(1) and the knob assembly into the yoke(3).

1D. DIN connector reassembly:

R A. Secure the first stage body in a soft jawed or well padded vise, with the threaded HP inlet bore facing straight up.

R **⚠ CAUTION: Tighten the vise only as needed to hold the first stage secure, and DO NOT overtighten. Doing so will result in permanent damage, rendering it inoperable.**

B. Lubricate and install the saddle o-ring(18) onto the filter housing(16), at the base of the threads, and the DIN filter housing o-ring(17) into the groove on the end.

C. Insert the threaded end of the filter housing(16) through the flat side of the saddle(19).

D. Install the filter housing(16) into the main body(31) so that the threads seat properly, and hand tighten in a clockwise direction until secure. Using a thin-wall, or modified, 1" crows foot wrench that is properly seated over the entire seating surface of the filter housing flange, tighten **to a torque of 16-18 ft-lbs.** (Fig. 15).

E. Lubricate and install the conical filter o-ring(15) into the filter housing(16), at the base of the filter cavity. Install the conical filter(13) into the filter housing.

F. Install the coupler wheel(14) down over the stem of the filter housing(16), with the threaded end facing up.

G. Lubricate and install the DIN face o-ring(10) and filter retainer o-ring(12) onto the filter retainer(11).

H. Insert the threaded end of the filter retainer(11) through the coupler wheel(14), into the filter housing(16), and tighten until secure. Apply a 1/4" hex socket and tighten **to a torque of 120-140 in-lbs.**



Fig. 13



Fig. 14



Fig. 14

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2. Place the stem of the button(33) directly into the center hole in the body(31), ensuring that it enters without any restriction.
3. Position the diaphragm(34) flat, directly over the opening of the body(31). Gently push the edges of the diaphragm down inside the internal threads of the body, one thread at a time. Rotate the body while doing this, to facilitate an even seating of the diaphragm, and closely inspect to ensure it is well seated at the base of the threads. (Fig.16)

⚠ CAUTION: DO NOT force the diaphragm into the body in a manner that will damage either the lip or surface of the diaphragm, or the threads of the body. The use of a sharp instrument, such as a screwdriver, is to be strictly avoided.

4. Place the diaphragm washer(35) into the body on top of the diaphragm(34) with the collar facing up.
5. Lay the diaphragm plate(37) into the center of the diaphragm washer(35), with its flat surface against the diaphragm(34).
6. Thread the end cap(36 or 41), into the body(31), turning clockwise by hand until secure.
7. Secure the first stage body in a soft jawed or well padded vise, and using a 3/8" Socket Drive Spanner on a foot-pounds torque wrench, tighten the end cap(36), or environmental end cap(41), into the body **to a torque of 20-22 ft-lbs.** (Fig. 17).

⚠ CAUTION: Tighten the vise only as needed to hold the first stage secure, and DO NOT overtighten. Doing so will result in permanent damage, rendering it inoperable.

8. Apply a very light film of lubricant (Christo Lube MCG111) to both ends of the diaphragm spring(38), and place it on the diaphragm plate(37).
9. Place the spring washer(39) directly onto the upper end of the spring(38) and install the adjustment cup(40) into the end cap(36 or 41). Using a 5/16" hex key, turn the adjustment cup(40) clockwise only until only two threads are showing.

- R** 10. Lubricate and install the HP cone o-ring(27) onto the HP cone(28), and place the cone sealing edge down onto the smaller end of a clean two-part Cone Removal/Installation Tool. Use care not to damage the seating surface of the cone as this is done. Lower the large opening of the installation tool-sleeve over the HP cone until the edge of the narrow opening is even with the base of the HP cone(28).

- R** 11. Guide the HP cone(28) Tool Assembly into the high pressure chamber of the body(30), taking care to align the HP cone(28) with the recess in the high pressure chamber properly. (Fig. 18) Carefully press the cone completely into place and withdraw the tool, pulling it straight out.



Fig. 16



Fig. 17



Fig. 18

R = Revision

Doc. 12-2206-r01 (10/00)

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12. Lightly lubricate and install the receiver o-ring(25) onto the receiver(24) and the HP seat o-ring(26) into the inner bore of the receiver. Lightly lubricate the threads of the receiver(24).

13. Apply a very light film of lubricant to both ends of the HP seat spring(27) and the lower 1/4" of the HP seat shaft(28). Install the HP seat spring(27) onto the end of the receiver(24).

14. Carefully guide the shaft of the HP seat(28) so that it passes through the spring(27) and into the seat o-ring(26) in the inner bore of the receiver(24). (Fig. 19).

15. Carefully insert the transfer pin(32) into the opening of the HP seat(29).

R 16. While looking into the body(30) so that you may see the HP cone(28), insert the seat/receiver assembly directly into the center of the receiver opening in the body(30) and carefully guide the transfer pin(26) through the center of the HP cone(28) and into the diaphragm button(31). (Fig. 20) During this step, USE CAUTION to avoid touching the HP cone(28) as the transfer pin(26) passes through the center of it.

R 17. While holding the body(31) secure, turn the receiver(24) clockwise to engage the threads and using a 1/4" hex key socket, tighten the receiver(24) into the body **to a torque of 80-100 in-lbs.** (Fig. 21)

R 18. Lubricate and install port plug o-rings(21 & 23) onto the port plugs(20 & 22). While holding the body(31) secure, install the port plugs into the body(31), tightening clockwise with a 5/32" hex key socket **to a torque of 35-40 in-lbs.**

R 19. Lubricate and install all hose o-rings onto hoses and install the hoses into the body(31). While holding the body secure, tighten the low pressure second stage hose(s) clockwise with a 9/16" crows foot wrench, the high pressure hose(s) with a 5/8" crows foot wrench, and the low pressure inflator hose(s) with either a 9/16" or 1/2" crows foot wrench, **to a torque of 35-40 in-lbs.**

⚠ **NOTE:** It is important to connect the primary second stage to the LP port identified by the letter 'R' stamped into the body above it for optimum performance.

⚠ **CAUTION:** Be certain not to install any low pressure hose into a high pressure port via an adaptor.

FINAL ADJUSTMENT

1. Connect a recently calibrated low pressure test gauge to a low pressure hose, and connect the first stage with second stage and low pressure test gauge to a pure breathing gas source of 3000PSI. Slowly open the supply valve to pressurize the regulator, and purge the second stage several times.



Fig. 19



Fig. 20



Fig. 21

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- Adjust the intermediate pressure, if necessary, to read 142-148PSI by turning the adjustment cup(40) clockwise to increase the pressure or counter clockwise to decrease it.

NOTE: Turn the adjustment cup no more than 1/8 of a turn at a time, pausing to purge the second stage several times to gain an accurate reading of the intermediate pressure before adjusting further.

NOTE: Ensure that the intermediate pressure holds stable at 140PSI, plus or minus 5PSI, and does not creep or fluctuate after the second stage has been purged several times. If creeping is detected, refer to the troubleshooting section to determine possible cause and treatment.

NOTE: Perform the following steps only if an Environmental Protection Kit is being installed.



Fig. 22

ENVIRONMENTAL KIT REASSEMBLY

- Insert the transfer piston(42) into the environmental end cap(41). (Fig. 22)
- Turn the air supply off and bleed off intermediate pressure. Insert the environmental diaphragm(43) over the top of the end cap(41) with the thin perimeter seal facing down. Ensure that the thin perimeter seal is seated completely into the circular groove in the environmental end cap(41). (Fig. 23).
- Thread the plastic environmental cap(44) onto the end cap(41), being very careful to avoid cross threading, and tighten clockwise by hand until secure. DO NOT use tools to tighten.
- Turn on the air supply and purge the second stage several times, and check once more to ensure proper intermediate pressure of 142-148psi.



Fig. 23

SPECIFICATIONS

Torques

P/N 3450	Yoke Retainer	16 to 18 ft-lbs
P/N 4544	DIN Filter Retainer	120 to 140 in-lbs
P/N 4543	DIN Filter Housing	16 to 18 ft-lbs
P/N 3462	HP Port Plug	35 to 40 in-lbs
P/N 3463	LP Port Plug	35 to 40 in-lbs
P/N 4973.3	Receiver	80 to 100 in-lbs
P/N 6521	End Cap	20 to 22 ft-lbs
P/N 6525	Environ. End Cap	20 to 22 ft-lbs
HP Hose into First Stage Body		35 to 40 in-lbs
LP Hose into First Stage Body		35 to 40 in-lbs
Inflator Hose into First Stage Body		35 to 40 in-lbs

Intermediate Pressure

Preferred	142 to 148 psi
Acceptable	139 to 151 psi

Specialty Tools

P/N 40.2302	Christo-Lube MCG111 - 2 oz
P/N 40.6536.1	HP Cone Installation/Removal Tool
P/N 40.6536	3/8" Socket Drive DX Spanner
P/N 40.9311	Filter Circlip Pliers
P/N 40.9313	5/32" Allen Key
P/N 40.9314	5/16" Allen Key
P/N 40.9315	Intermediate Press. Gauge
P/N 40.9316	1/8" Allen Key
P/N 40.9320	1/4" Allen Key (for DIN model)
P/N 40.9520	O-ring Tool Kit

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Dia. No.	Part #	Description
Yoke Version		
1c	6307.07	Knob Assembly
	6307.13	Knob Assembly (Nitrox - Yellow)
2c	3877	Cap - Protector - Black
3c	6316.3	Yoke (satin finish)
4c	3530	Clip - Retaining
5a	3545	Filter - Conical
6a	2.013	O-ring - Conical Filter
	2.013V	O-ring - Filter Viton (Nitrox)
7c	3450	Retainer - Yoke
8a	2.011	O-ring - Yoke Retainer
	2.011V	O-ring - Retainer Viton (Nitrox)
n/s	6317	Yoke Decal - Oceanic
n/s	6493	Yoke Decal (Nitrox)

DIN Version

9c	4547.07	Cap - Protector - Black
	4547.13	Cap - Protector (Nitrox - Yellow)
10a•	6374	O-ring - DIN Face Urethane (Nitrox)
11c	4544	Retainer - DIN Filter
12a•	2.012	O-ring - Filter Retainer
	2.012V	O-ring - Retainer Viton (Nitrox)
13a•	4546	Filter - DIN Conical
14c	4545	Wheel - DIN Coupler
15a•	2.011	O-ring - Filter
	2.011V	O-ring - Filter Viton (Nitrox)
16c	4543	Housing - DIN Filter
17a•	2.011	O-ring - DIN Filter Housing
	2.011V	O-ring - Filter Hsg Viton (Nitrox)

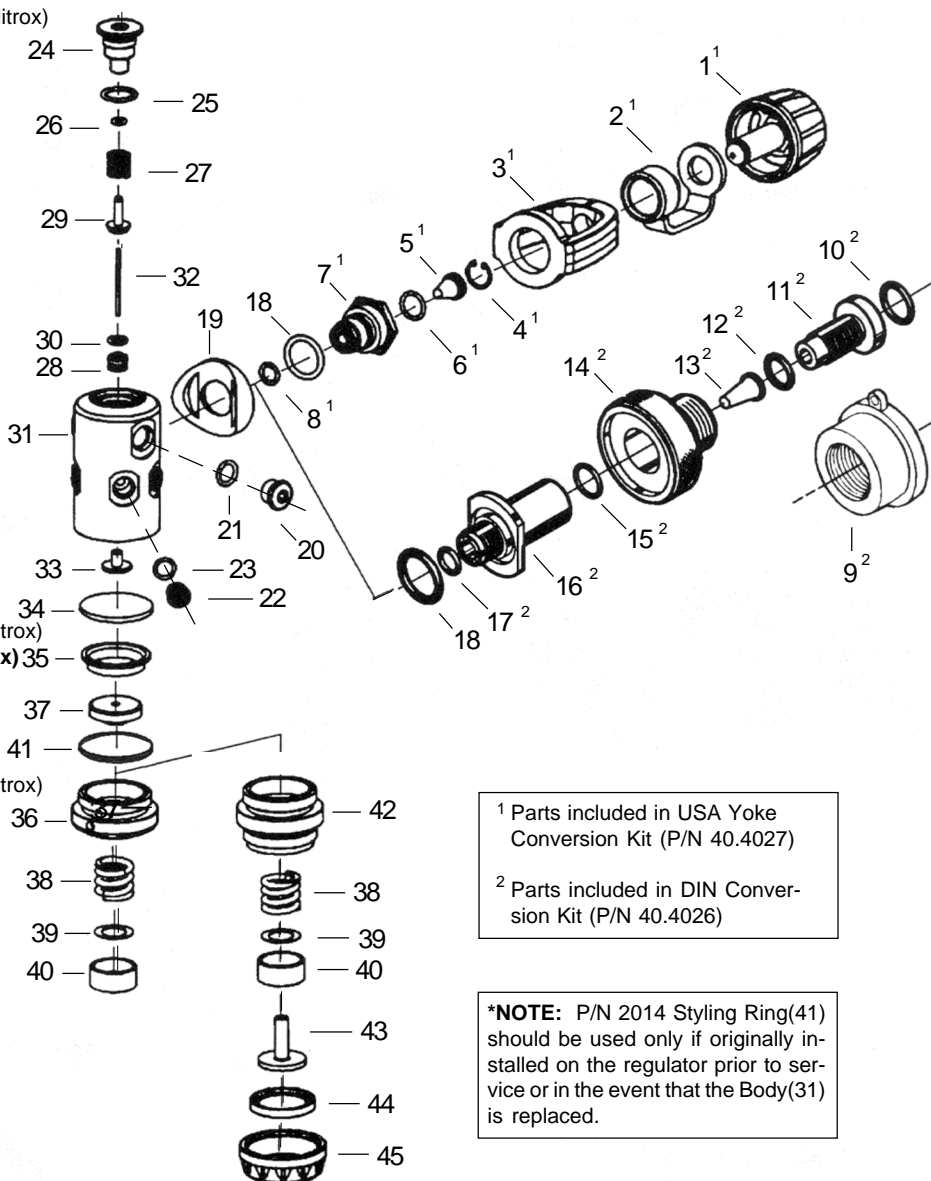
Yoke & DIN Versions

18b	2.115	O-ring - Saddle
19c	4918.07	Saddle - Black
	4918.21	Saddle (Nitrox - Green)
20c	3462	Plug - HP Port
21b	3.904	O-ring - HP Port Plug
	3.904V	O-ring - HP Plug Viton (Nitrox)
22c	3463	Plug - LP Port
23b	3.903	O-ring - LP Port Plug
	3.903V	O-ring - LP Plug Viton (Nitrox)
24c	6488	Receiver
25c	2.015	O-ring - Receiver
	6508	O-ring - Receiver Urethane (Nitrox)
26a	6498	O-ring - Seat Urethane (Nitrox)
27c	6512	Spring - Seat
28c	6489	Cone
29a	6490	Seat - HP
30a	2.010	O-ring - HP Cone
	6499	O-ring - HP Cone Urethane (Nitrox)
31c	6537	Body (satin finish)
32c	6517	Pin - Transfer
33c	6514	Button
34a	4913	Diaphragm
35b	4917	Washer - Diaphragm
36c	6521	Cap - End (satin finish)
37c	6450	Plate - Diaphragm
38c	6513	Spring - Diaphragm
39b	6524	Washer - Spring
40c	6518	Cup - Adjustment (satin finish)
41c	2014*	Ring, Styling

Dia. No.	Part #	Description
Environmental Kit Version (P/N 40.4045.97)		
42c	6525.3	Cap - Environmental End (satin finish)
43c	6516	Piston - Transfer
44c	6511	Diaphragm - Environmental
45c	6302	Cap - Environmental

ANNUAL SERVICE PARTS KITS

40.6113	Service Kit - Regulator
	(Includes all Bold items.)
40.6113.19	Nitrox Conversion/Service Kit
40.6144	Service Kit - DIN assembly (Nitrox compatible)
	(Includes all • items)



¹ Parts included in USA Yoke Conversion Kit (P/N 40.4027)

² Parts included in DIN Conversion Kit (P/N 40.4026)

***NOTE:** P/N 2014 Styling Ring(41) should be used only if originally installed on the regulator prior to service or in the event that the Body(31) is replaced.