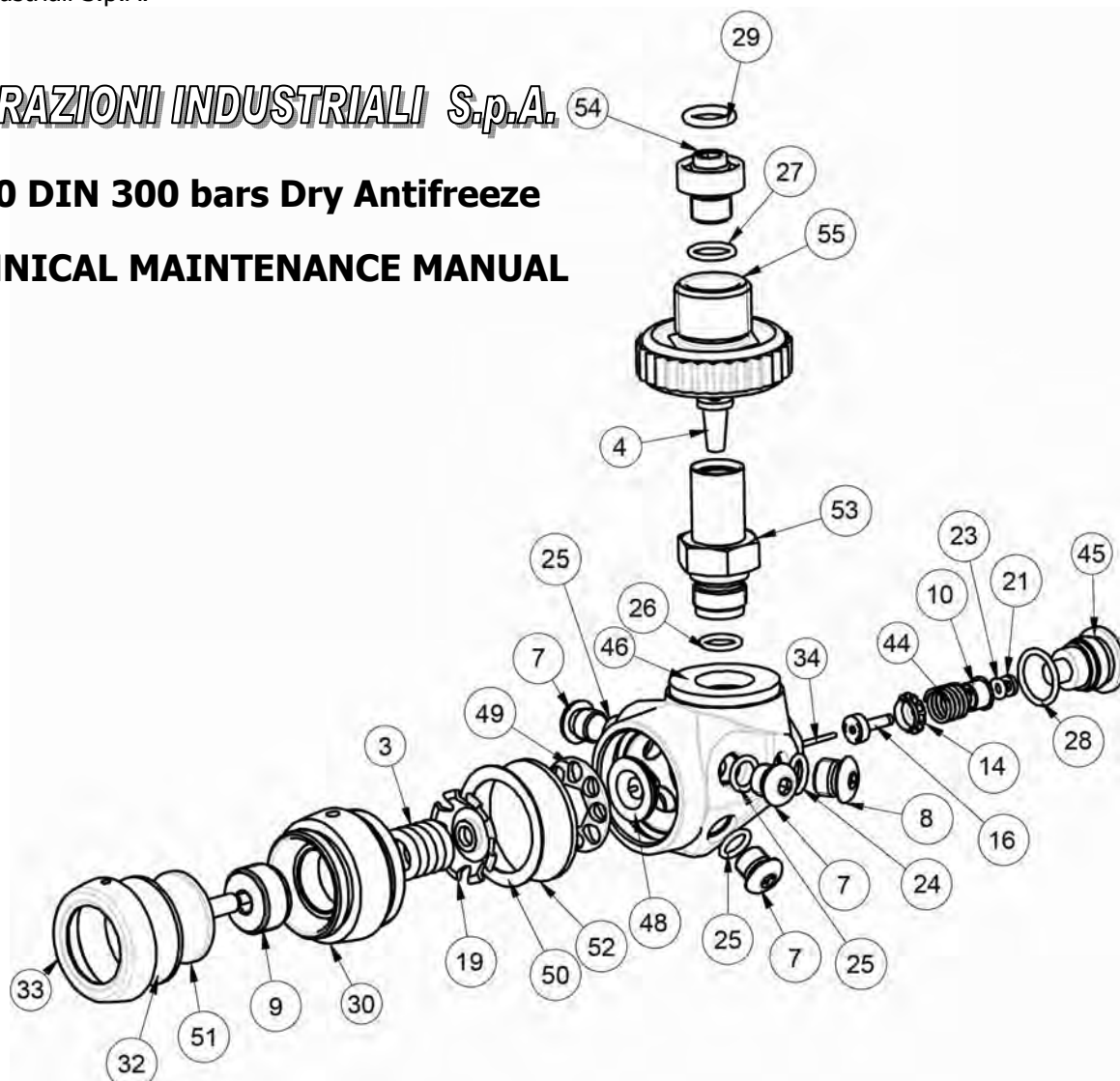




**LAVORAZIONI INDUSTRIALI S.p.A.**

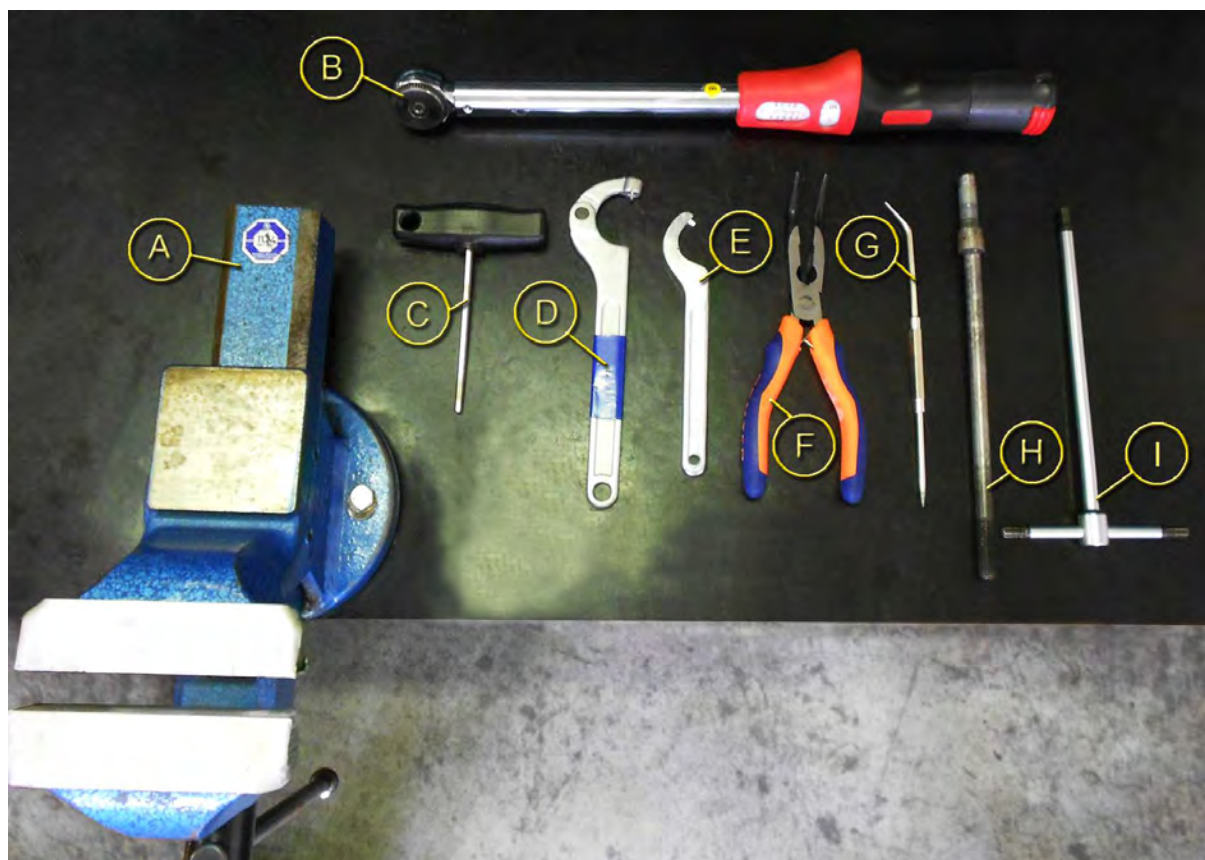
## M50 DIN 300 bars Dry Antifreeze TECHNICAL MAINTENANCE MANUAL



Pos.	Code	Description
3	D010400872-00	SETTING SPRING
4	D012801843-80	DIN CONE-SHAPED FILTER
7	D015800765-82	LP PLUG 3/8"
8	D015800767-82	HP PLUG 7/16"
9	D015800867-82	PRESSURE ADJUSTING RING NUT
10	D015800873-80	O-RING LOCK BUSH
14	D015801938-80	HP CROWN GUIDE
16	D015902533-80	HP SEAT / POPPET
19	D019001936-00	SPRING NUT PLATE
21	DBK9000875-00	ANTIEXTRUDER WASHER
23	DOR9100791-00	O-RING 2012 70 SH
24	DOR9101422-00	O-RING 108 70 SH
25	DOR9101809-00	O-RING 2031 70 SH
26	DOR9101816-00	O-RING 2037 70 SH
27	DOR9101819-00	O-RING 2043 70 SH
28	DOR9101825-00	O-RING 2056 70 SH
29	DOR9102644-00	O-RING 3043 90 SH
30	D015800058-82	MIDDLE RING
32	D019100006-00	ANTIFREEZE DIAPHRAGM
33	D015800061-82	ANTIFREEZE RETAINING CAP
34	D010201933-00	SLIDE STEM
44	D010402835-00	M50 RETURN SPRING
45	D015800067-82	M50 BALANCING CHAMBER
46	D015800138-82	M50 FIRST STAGE BODY
48	D015802841-80	DEFLECTOR
49	DL19900078-99	M50 THRUSTING CAP
50	D019001083-00	M50 DIAPHRAGM RETAINER WASHER
51	D019002808-00	M50 ANTIFREEZE PISTON
52	D019101082-00	M50 DIAPHRAGM
53	D015800734-82	DIN CONNECTION LOCK 300 BARS
54	D015800729-82	DIN HANDLE CONNECTION 300 BARS
55	DL19901516-99	DIN HANDLE 300 BARS



## **RECOMMENDED TOOLS LIST FOR FIRST STAGE MAINTENANCE**



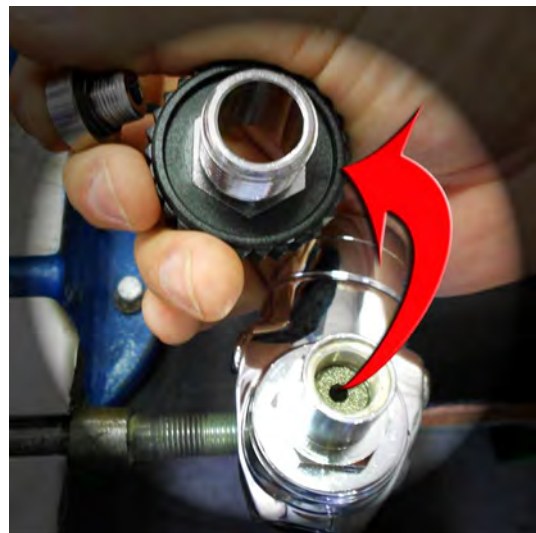
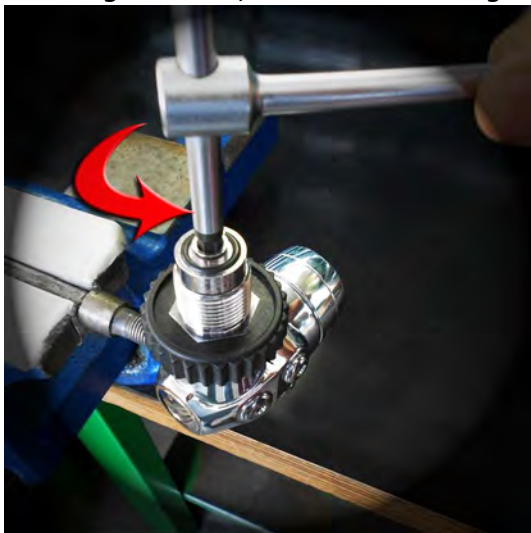
- A) Bench vise
- B) Torque wrench
- C) 4mm Allen wrench
- D) Jointed pin wrench
- E) Pin wrench
- F) Needle nose pliers
- G) Needle
- H) Threaded rod
- I) 6mm Allen wrench
- J) 0 / 15 bars intermediate pressure gauge



## **DISASSEMBLY PROCEDURES**

To simplify the disassembly procedures, it is advisable to remove the hose connected to the first stage. Slide back the hose protector from the fitting screwed on the first stage.

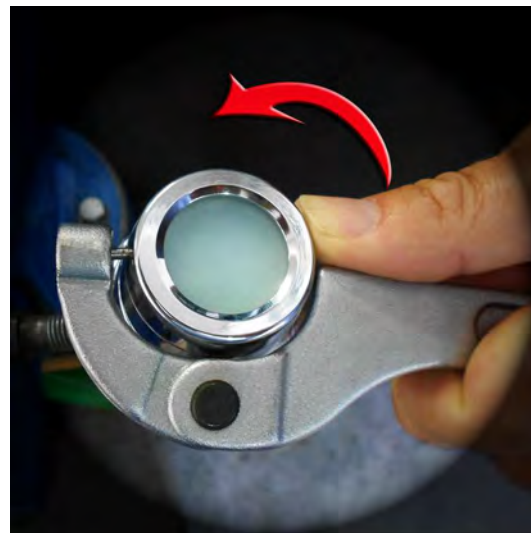
- 1) Screw the threaded rod on the M50 First Stage Body (46) and clamp it on the bench vise.
- 2) Using a 14mm wrench disconnect the LP hose.
- 3) Using a 6mm Allen wrench, loosen the DIN Handle Connection (54). Remove the Din Handle (55).  
Using a needle, remove the O-Ring 3043 (29) and 2043 (27).



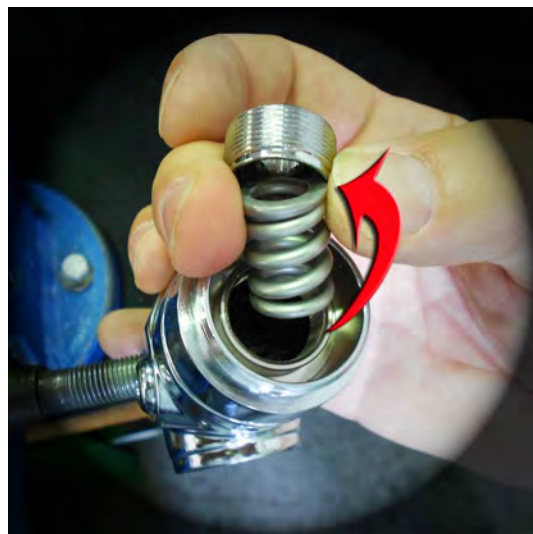
- 4) Using a 22mm socket wrench unscrew the DIN Connection Lock (53); remove the DIN Cone-Shaped Filter (4) and the O-Ring 2037 (26).



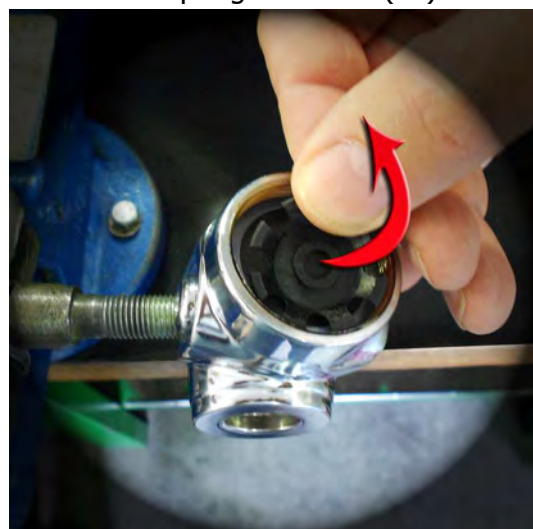
- 5) Turn the M50 First Stage Body (46) with the antifreeze device upward. Using a jointed pin wrench unscrew the Antifreeze Retaining Cap (33), remove the Antifreeze Diaphragm (32) and the Antifreeze Piston (51).



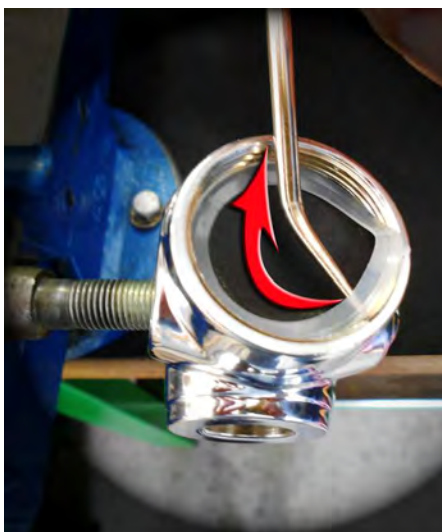
6) Using a 6mm Allen wrench, unscrew the Pressure Adjusting Ring Nut (9) and remove the Setting Spring (3).



7) Using a jointed pin wrench, unscrew the Middle Ring (30) and remove the Spring Nut Plate (19).

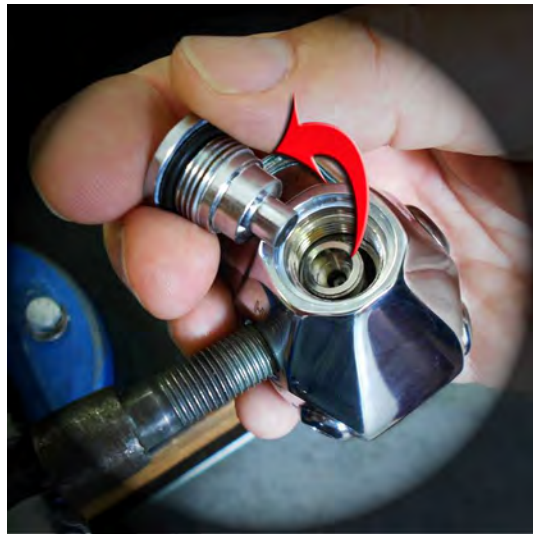
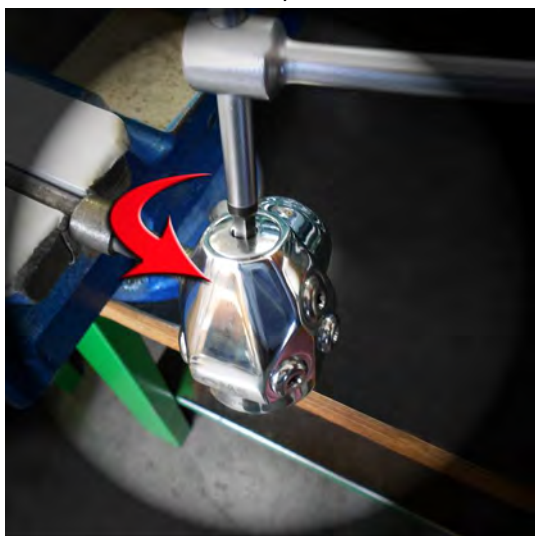


8) Using a needle, remove the Diaphragm Retainer Washer (50), the Diaphragm (52) and the Deflector (48) with the Thrusting Cap (49); using a needle nose pliers remove the Slide Stem (34).





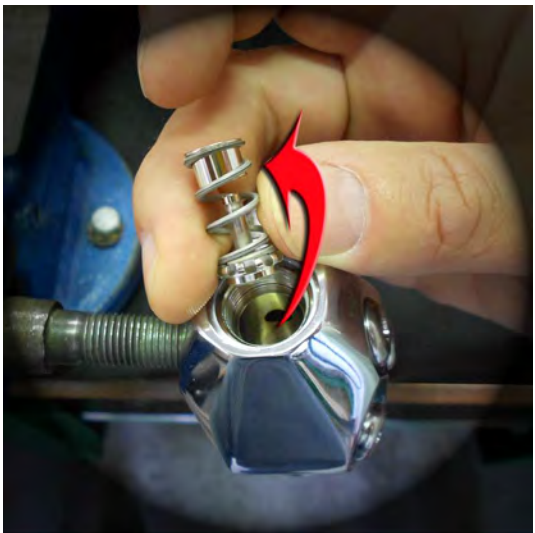
- 9) Turn upside down the M50 First Stage Body (46) with the Balancing Chamber (45) upward. Using a 6mm Allen wrench, unscrew the Balancing Chamber (45).



- 10) Remove the O-Ring 2012 (23) and the Antiextruder Washer (21). Remove the O-Ring 2056 (28).



- 11) Using a needle nose pliers, remove from inside the M50 First Stage Body (46) the O-Ring Lock Bush (10), the Return Spring (44) and the HP Seat (16) with the HP Crown Guide (14).





## **CLEANING AND INSPECTION**

Proceed to clean all the components following the instructions of the section "**GENERAL CLEANING PROCEDURES**".

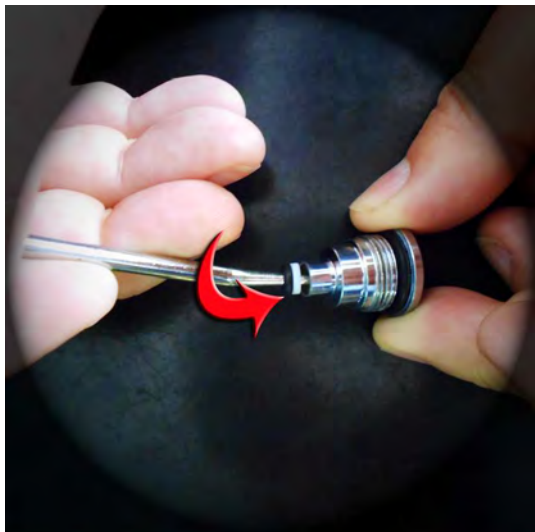
During the maintenance, it is advisable to replace all the O-Rings (21, 23, 24, 25, 26, 27, 28, 29), the HP Seat (16), the Diaphragm Retainer Washer (50), the Diaphragm (52) and the DIN Cone-Shaped Filter (4).

Check the other components with the help of a magnifier for a possible replacement:

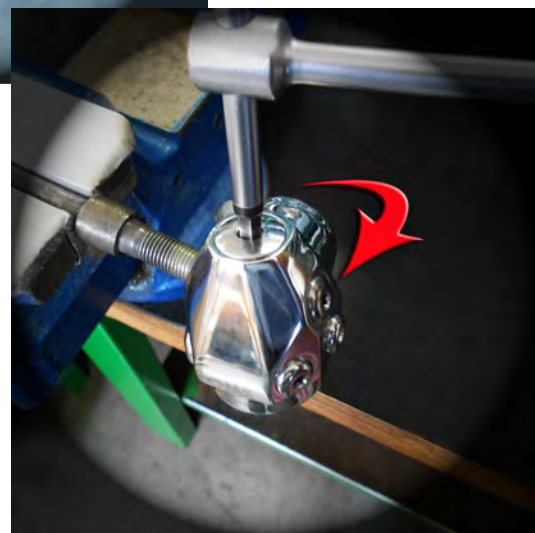
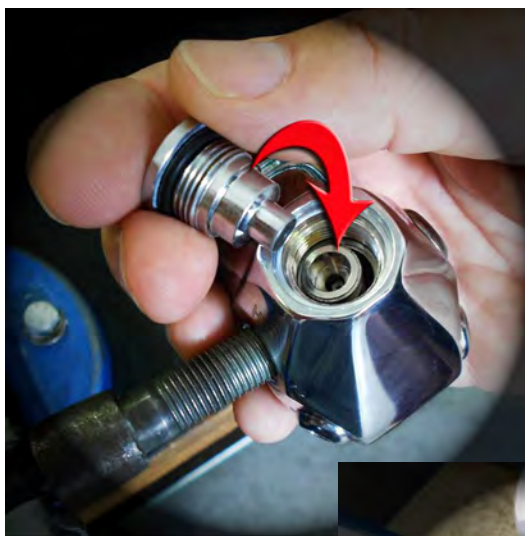
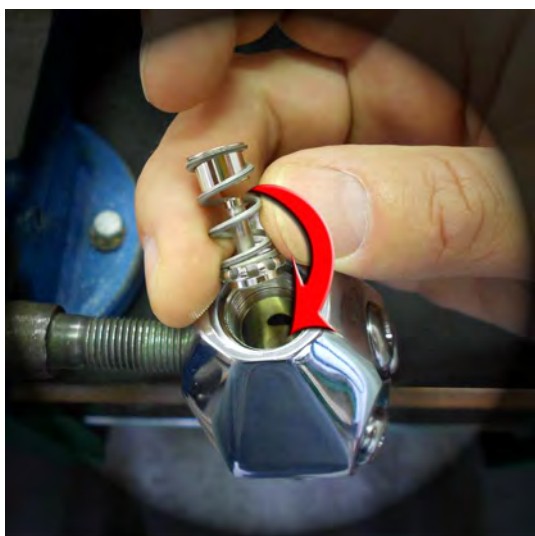
- Check all metal parts for excessive wear or corrosion. Check all metal sealing surfaces which make contact with O-Rings for any signs of contamination and/or imperfections that may cause leakage past the O-Ring seal. Examine all chrome plated surfaces for any evidence of peeling or flaking of the chrome plating. Inspect all threads for galling, cross threading, or damage to the chrome plating. If any parts show damage or excessive wear, they must be replaced with new.
- Springs (3, 44): Inspect for signs of permanent corrosion, including pitting or cracks in the surface of the metal.
- First Stage Body (46): Inspect all cavities for any nicks, scratches, pitting, or any defects in the plating. Pay particular attention to the sealing edge for the HP seat.
- DIN Connection Lock (53): Examine the condition of the threads and the O-Ring seat at the base for any signs of damage.

## **REASSEMBLY PROCEDURES**

- 1) Screw the threaded rod on the M50 First Stage Body (46) and clamp it on the bench vise. Place the M50 First Stage Body (46) with the housing for the Balancing Chamber (45) upward.
- 2) Insert in the Balancing Chamber (45) first the Antiextruder Washer (21) and then the O-Ring 2012 (23); afterwards insert the O-Ring 2056 (28).

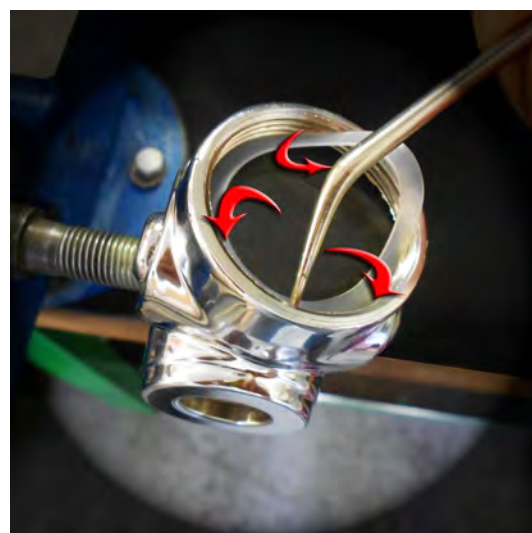
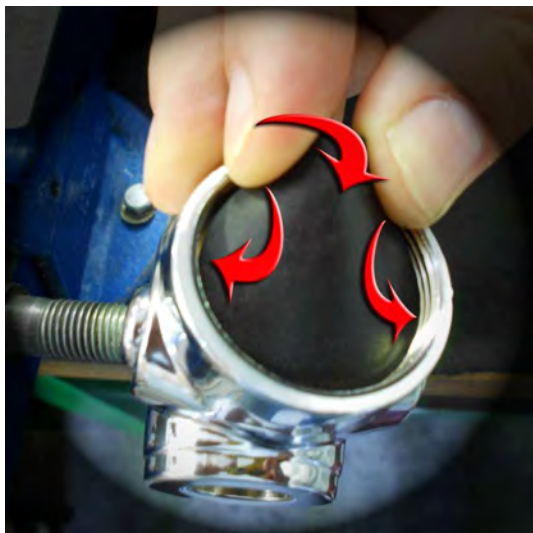
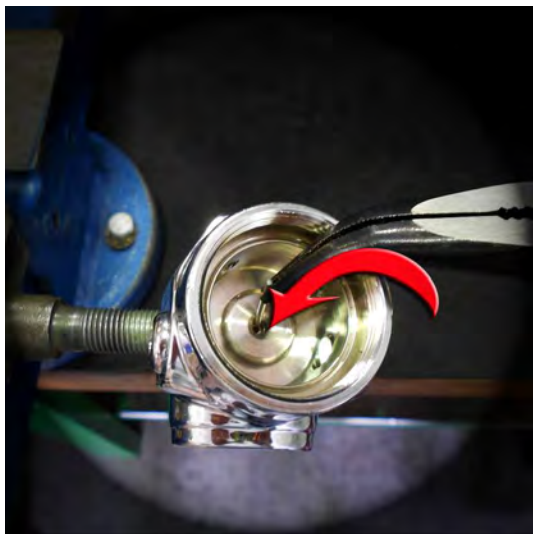


- 3) Insert the HP Seat (16) with the HP Crown Guide (14), Return Spring (44) and the O-Ring Lock Bush (10); using a 6mm Allen wrench, screw the Balancing Chamber (45) on the M50 First Stage Body (46).

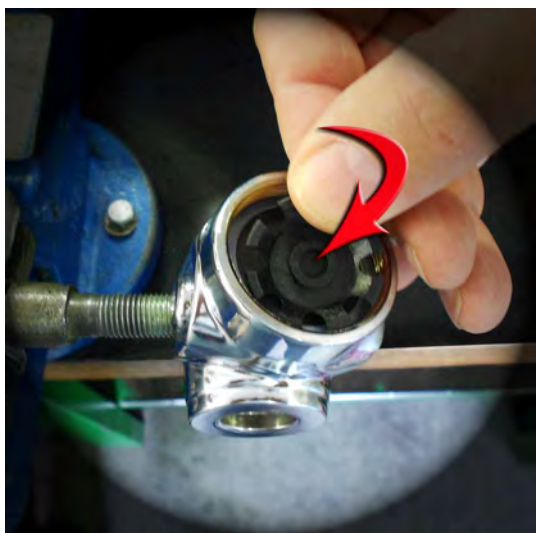




- 4) Turn upside down the M50 First Stage Body (46) with the housing for the Diaphragm (52) upward; insert in the central hole of the M50 First Stage Body (46) the Slide Stem (34), the Deflector (48) with the Thrusting Cap (49), the Diaphragm (52) and the Diaphragm Retainer Washer (50). ← Be careful! Insert this ring under the thread using a needle.

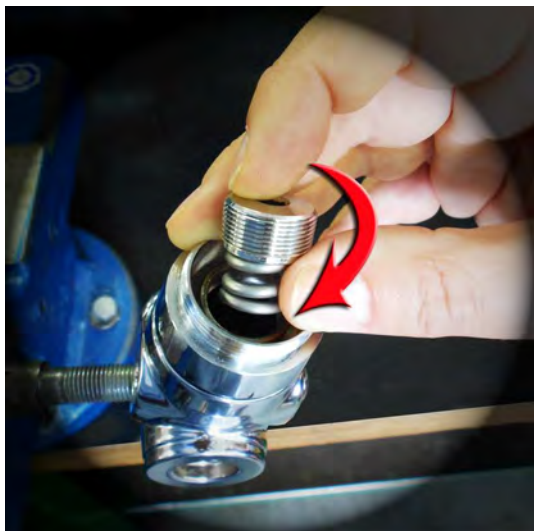


- 5) Place on the Diaphragm (52) the Spring Nut Plate (19); using a jointed pin wrench tighten the Middle Ring (30) on the M50 First Stage Body (46).

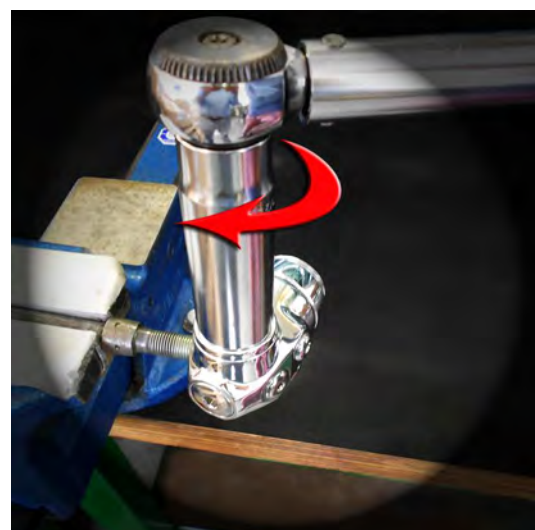
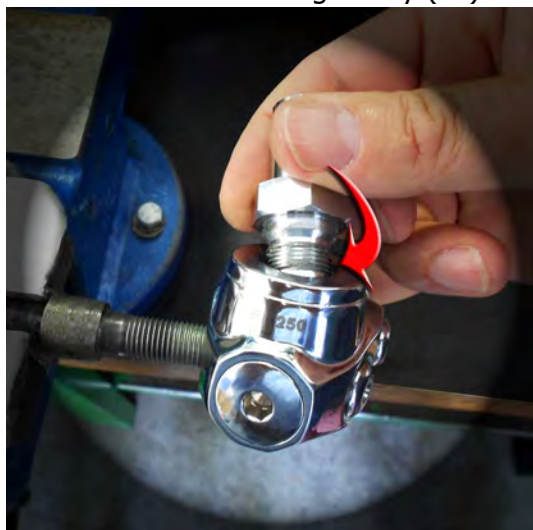




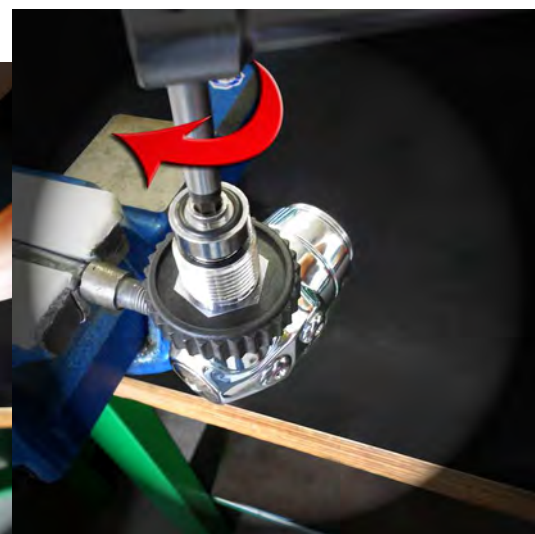
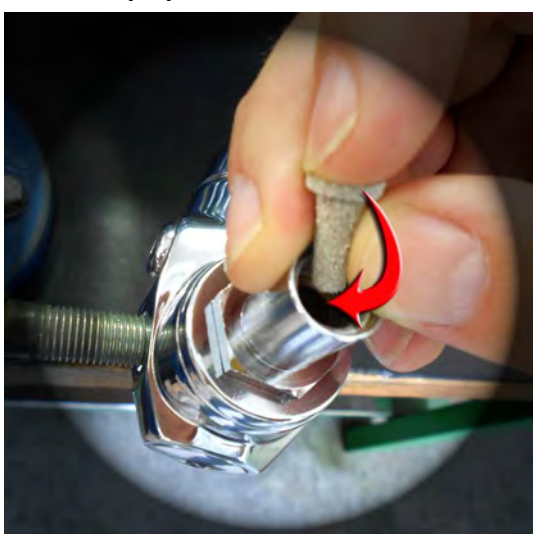
- 6) Place the Setting Spring (3) on the Spring Nut Plate (19) and screw the Pressure Adjusting Ring Nut (9) on the Middle Ring (30) until about 3mm over the inner rim of the Middle Ring (30).



- 7) Turn the M50 First Stage Body (46) with the housing for the DIN Connection Lock (53) upward. Using a torque wrench calibrated to 30/35 Nm, screw the DIN Connection Lock (53) with the O-Ring 2037 (26) on the M50 First Stage Body (46).



- 8) Insert inside the DIN Connection Lock (53) the DIN Cone-Shaped Filter (4) and outside the DIN Handle (5); using a 6mm Allen wrench screw the DIN Handle Connection (54) with the O-Rings 2043 (27) and 3043 (29) on the DIN Connection Lock (53).





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- 9) Attach the complete M50 First Stage on the bench test and connect it to a 0 / 15 bars intermediate pressure gauge.

**ATTENTION**



: You can also attach the complete M50 First Stage to a cylinder and use a pressure gauge directly connected to a low pressure port, but in this case it is very important to connect the second stage because it works as a overpressure safety valve.

- 10) Supply at least 200 bars air pressure and check the intermediate pressure with the gauge; using a 6mm Allen wrench screw the Pressure Adjusting Ring Nut (9) to increase the pressure or unscrew to decrease it until a working pressure of 9,8/10 bars is obtained. Push the purge button and check again the intermediate pressure: adjust the setting if necessary. Wait at least one minute for the final check.



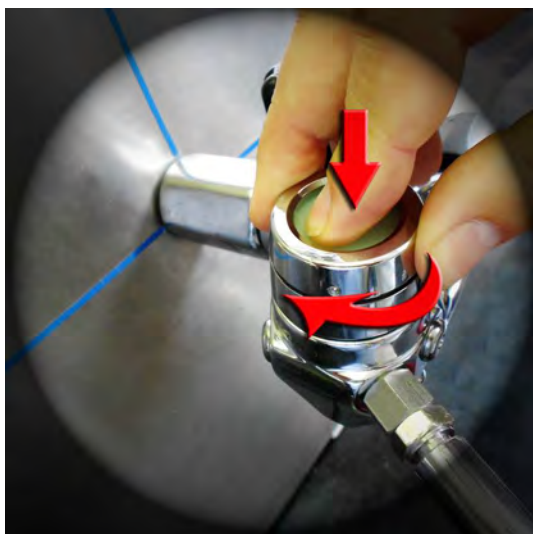
- 11) Leaving the first stage in pressure, place the Antifreeze Piston (51) on the Pressure Adjusting Ring Nut (9). Place the Antifreeze Diaphragm (32) on the Antifreeze Piston (51).





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- 12) Pushing the Antifreeze Diaphragm (32) on the Antifreeze Piston (51), using a jointed pin wrench screw the Antifreeze Retaining Cap (33) on the Middle Ring (30). Push the purge button and check again the intermediate pressure: adjust the setting if necessary. Wait at least one minute for the final check. If it is necessary a further setting, restart from point 10 at page 10.



- 13) Using a 14mm wrench, screw the hose with the second stage on a LP port. Finally, check the interstage pressure of the regulator complete of first and second stage.

**- Use as CE EN250 Max depth 50m / 164ft -**



REF.	DETAIL	FUNCTION	DAMAGE WAY	DAMAGE POTENTIAL EFFECTS	DAMAGE PROBABLE CAUSE
3	SETTING SPRING	Allows to calibrate the interstage pressure	Incorrect positioning	Irregular air supply	Wrong assembly during maintenance
4	DIN CONE-SHAPED FILTER	Purifies the inlet air and prevents the entry of debris	A) Lacking piece B) Clogged	A) Penetration of impurities from the cylinder B) Reduced air flow	A) Wrong assembly during maintenance B) Lack of maintenance of compressor or cylinders
7	LP PLUG 3/8"	Closes the LP port	A) Lacking piece B) Weak tightening	Air leakage	Wrong assembly during maintenance
8	HP PLUG 7/16"	Closes the HP port	A) Lacking piece B) Weak tightening	Air leakage	Wrong assembly during maintenance
9	PRESSURE ADJUSTING RING NUT	Compresses the setting spring	Lacking piece	Lack of air supply	Wrong assembly during maintenance
10	O-RING LOCK BUSH	Contains parts 21 and 23 within the balancing chamber. Support for HP seat return spring	A) Lacking piece B) Out of position from its seat	Overpressure (air leakage) with lock bush and balancing chamber damaged	Wrong assembly during maintenance
14	HP CROWN GUIDE	Allows to keep the HP seat axial and centered	Lacking piece	Overpressure (air leakage)	Wrong assembly during maintenance
16	HP SEAT / POPPET	Keeps balanced the system through the central channel. Closes the air flow	A) Lacking piece B) HP seat damaged	A) Overpressure (air leakage) B) Increase of the intermediate pressure	A) Wrong assembly during maintenance B) Wear
19	SPRING NUT PLATE	Transmits spring compression to the inner mechanism	A) Lacking piece B) Out of position from its seat	Irregular air supply with air leakage	Wrong assembly during maintenance
21	ANTIEXTRUDER WASHER	Avoids the extrusion of the O-Ring 2012 (23)	A) Lacking piece B) Out of position from its seat	Calibration not constant (increase)	Wrong assembly during maintenance
23	O-RING 2012 70 SH	Allows the seal between HP seal and balancing chamber	A) Lacking piece B) Cuts or porosity	Air leakage	A) Wrong assembly during maintenance B) Wear
24	O-RING 108 70 SH	Allows the seal between first stage body and HP port or HP hose	A) Lacking piece B) Cuts or porosity	Air leakage	A) Wrong assembly during maintenance B) Wear
25	O-RING 2031 70 SH	Allows the seal between first stage body and LP port or LP hose	A) Lacking piece B) Cuts or porosity	Air leakage	A) Wrong assembly during maintenance B) Wear
26	O-RING 2037 70 SH	Allows the seal between yoke nut and first stage body. Shock absorber under cone-shaped filter	A) Lacking piece B) Cuts or porosity	A) Air leakage B) The filter is not correctly fixed	A) Wrong assembly during maintenance B) Wear
27	O-RING 2043 70 SH	Allows the seal between DIN handle and DIN connection lock	A) Lacking piece B) Cuts or porosity	Air leakage	A) Wrong assembly during maintenance B) Wear
28	O-RING 2056 70 SH	Allows the seal between first stage body and balancing chamber	A) Lacking piece B) Cuts or porosity	Air leakage	A) Wrong assembly during maintenance B) Wear
29	O-RING 3043 90SH	Allows the seal between regulator and cylinder valve	A) Lacking piece B) Cuts or porosity	Air leakage	A) Wrong assembly during maintenance B) Wear
30	MIDDLE RING	Closes the antifreeze system. Blocks the antifreeze diaphragm	Weak tightening	Irregular air supply with air leakage	Wrong assembly during maintenance
32	ANTIFREEZE DIAPHRAGM	Transmits the ambient pressure to the inner diaphragm through the antifreeze piston	A) Out of position from its seat B) Cut	Irregular air supply	A) Wrong assembly during maintenance B) Wear
33	ANTIFREEZE RETAINING CAP	Closes the antifreeze system. Blocks the antifreeze diaphragm	Weak tightening	Irregular air supply, antifreeze failure	Wrong assembly during maintenance
34	SLIDE STEM	Transmits diaphragm motion to the HP seat	A) Lacking piece B) Bent slide stem	A) Lack of air supply B) Overpressure (air leakage)	Wrong assembly during maintenance
44	RETURN SPRING	Brings the HP seat back in closed position	Lacking piece	Overpressure (air leakage)	Wrong assembly during maintenance
45	BALANCING CHAMBER	Allows to keep constant the interstage pressure	Weak tightening	Air leakage	Wrong assembly during maintenance
46	M50 FIRST STAGE BODY	Main first stage body	Damaged HP sealing edge	Increase of the intermediate pressure	Damage during maintenance

REF.	DETAIL	FUNCTION	DAMAGE WAY	DAMAGE POTENTIAL EFFECTS	DAMAGE PROBABLE CAUSE
48	DEFLECTOR	Supports slide stem against the diaphragm	A) Lacking piece B) Out of position from its seat	A) Lack of air supply B) Overpressure (air leakage)	Wrong assembly during maintenance
49	M50 THRUSTING CAP	Supports deflector	A) Lacking piece B) Out of position from its seat	A) Lack of air supply B) Overpressure (air leakage)	Wrong assembly during maintenance
50	M50 DIAPHRAGM RETAINER WASH	Allows to compress the diaphragm between first stage body and retaining cap, holds in place the diaphragm	A) Lacking piece B) Out of position from its seat	A) Possible deformation of the diaphragm with air leakage B) Air leakage due to wrong position of the washer	Wrong assembly during maintenance
51	BLUE ANTIFREEZE PISTON	Transmits the ambient pressure to the inner balance through the antifreeze diaphragm	Lacking piece	Irregular air supply, antifreeze failure	Wrong assembly during maintenance
52	DIAPHRAGM	Transmits the ambient pressure to the inner balance	A) Cut B) Out of position from its seat	Air leakage	A) Wear B) Wrong assembly during maintenance
53	DIN CONNECTION LOCK 300bar	Connects the DIN connection to the first stage body and houses the DIN handle	Incorrect positioning	Air leakage	A) Wrong assembly during maintenance B) Incorrect tightening
54	DIN HANDLE CONNECTION 300bar	Contains parts 27 and 29. Holds in place the DIN handle	Incorrect positioning	Air leakage	A) Wrong assembly during maintenance B) Incorrect tightening
55	DIN HANDLE 300bar	Allows coupling between the first stage and cylinder valve	Weak tightening on the cylinder valve	Air leakage	Incorrect tightening

