22X
FIRST STAGE

ITM 19

07 SEPT. 2009

SPECIAL TOOLS (# 46201041 - # 46201042)

IMPORTANT INFORMATION

FOR COMPONENTS PLEASE SEE SPARE PARTS LIST 2006 - Table 29 Figure 106

FOR THE FINAL SETTINGS PLEASE REFER TO THE SERVICE MANUAL - EN 13949 SECTION NITROX

12S HD SEAT CONNECTION DISASSEMBLY TOOL (B-41)

INSERT THE TOOL (B-41) INTO A LOW PRESSURE CONNECTION AND USE IT TO LEVER OUT THE HD SEAT CONNECTION.

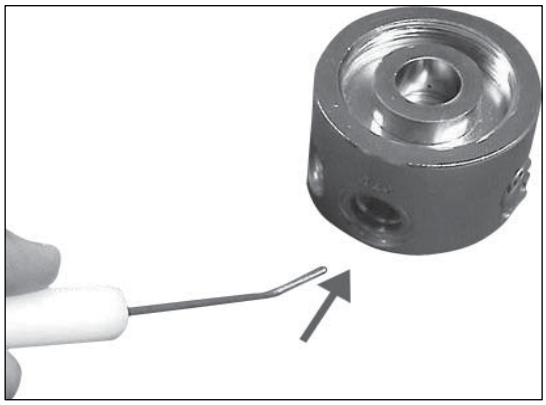


Fig. 2

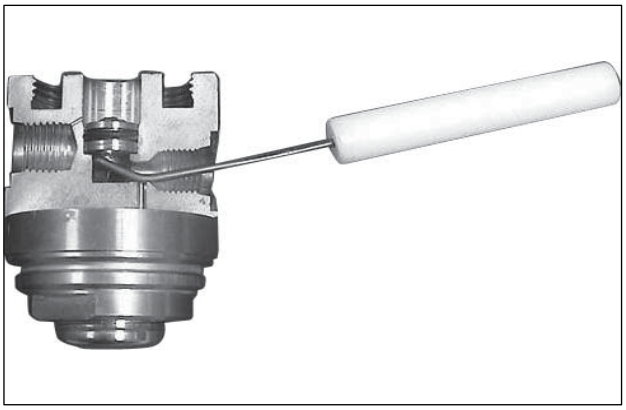


Fig. 3

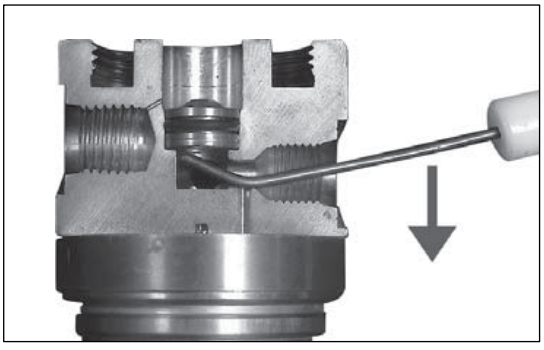


Fig. 4

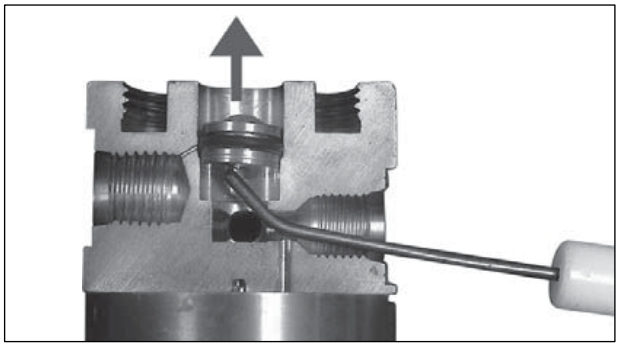


Fig. 5

ITM 19

07 SEPT. 2009

SPECIAL TOOLS (# 46201041 - # 46201042)

HD SEAT CONNECTION DISASSEMBLY TOOL (B-42)

INSERT THE TOOL (B-42) INTO THE CENTER PORT ON THE DIAPHRAGM SIDE UNTIL YOU CAN FEEL THE SEAT PORT (FIG. 3). THEN PRESS ON THE SEAT CONNECTION (FIG. 3) UNTIL IT CAN BE COMPLETELY REMOVED (FIG. 4). VALVE - PROCEDURE FOR THE MR-V 12/16/22/32/HUB SERIES.

Fig. 2

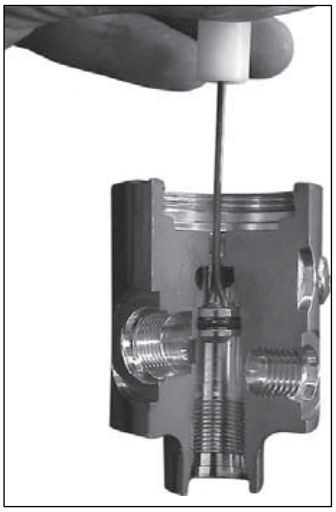


Fig. 3

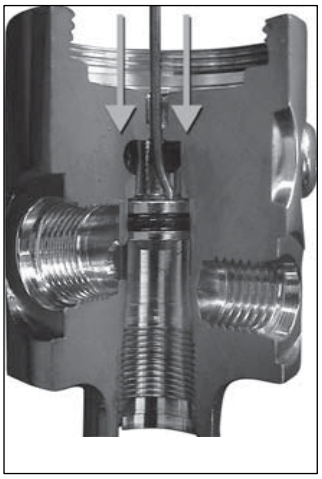


Fig. 4

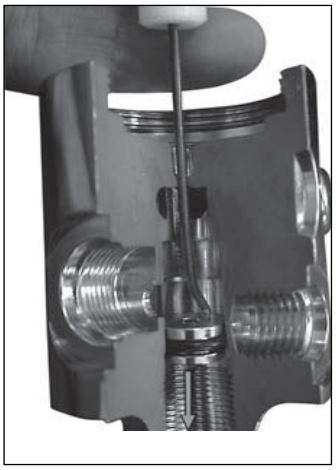


Fig. 5

ITM 19

07 SEPT. 2009

SPECIAL TOOLS (# 46201041 - # 46201042)

DISASSEMBLY OF THE VALVE FOR MR42

INSERT THE TOOL (B-42) INTO THE MIDDLE CONNECTION ON THE DIAPHRAGM SIDE UNTIL YOU CAN FEEL THE SEAT CONNECTION (FIG. 3). THEN PRESS ON IT (FIG. 4) UNTIL YOU CAN REMOVE IT COMPLETELY.

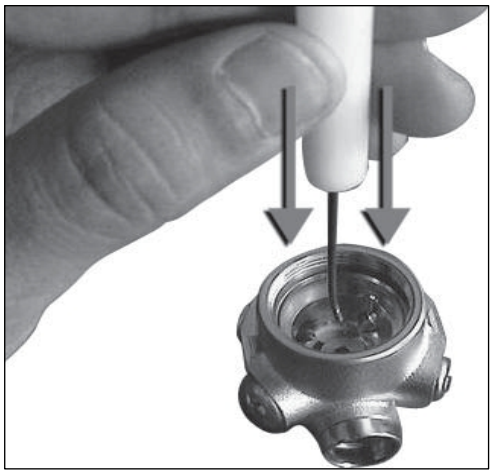


Fig. 2

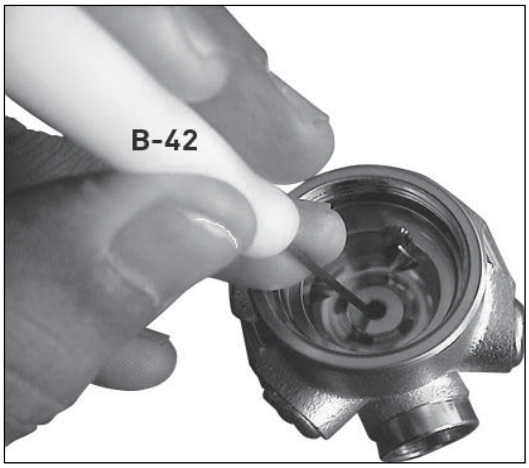


Fig. 3

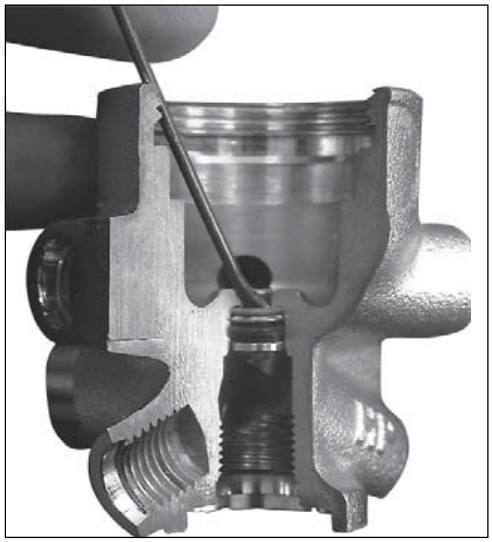


Fig. 4

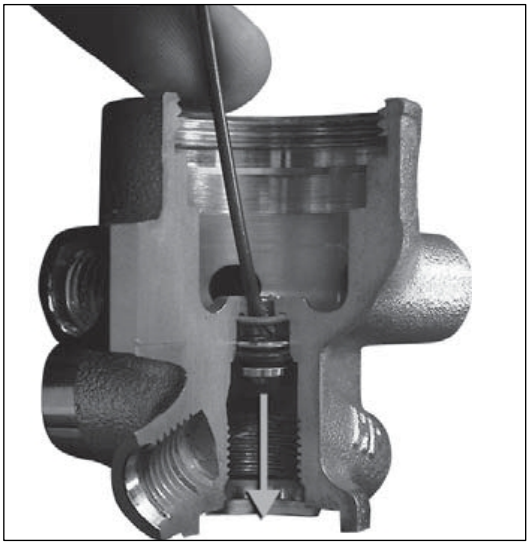


Fig. 5

ITM 24

PARBAK SUPPORT RING

03 AUG. 2011

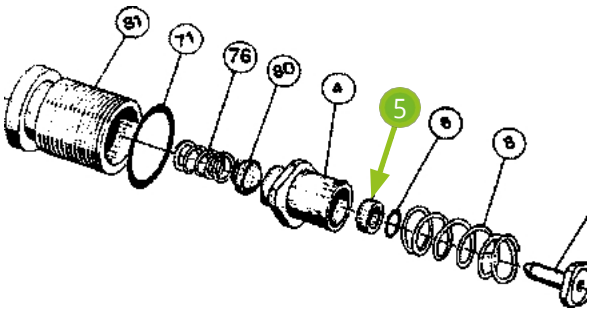
THE TECHNICAL SUPPORT OF THE HEADQUARTERS INFORMS THAT AFTER NUMEROUS TESTS, THE MATERIAL AND SHAPE OF THE SUPPORT RING ORIGINALLY USED ON THE NAVY 22 REGULATORS HAS BEEN CHANGED.

THE NEW PARBAK SUPPORT RING IS CHARACTERIZED BY EXCELLENT PERFORMANCE FOR FIRST STAGES, ESPECIALLY WHEN DIVING IN COLD WATER *(<= 0 °C)*.

SEE FIG. 1. THE NEW PARBAK SUPPORT RING CAN BE EASILY DISTINGUISHED FROM THE PREVIOUS TEFLON VERSION BY THE BLACK COLOR OF THE NEW MATERIAL.

BOTH SUPPORT RINGS WILL SOON BE INCLUDED IN ALL FIRST STAGE SERVICE KITS CURRENTLY IN USE. THEY ARE IDENTIFIED BY THE DIGITS "V.11" IDENTIFIED.

- CURRENTLY USED SUPPORT RINGS -	- HD-CHAMBER SUPPORT RING, PARBAK-
FIG. 1	FIG. 2
	
46185038 461105068	PAGE - A PAGE - B



WARNING!

THE SUPPORT RING IS MADE OF MATERIAL FROM THE NITRILE RUBBER (NBR) FAMILY.

EUROPEAN COUNTRIES:

THE USE OF NITROX BREATHING GAS MIXTURES WITH MORE THAN 21 % O_2 IS NOT RECOMMENDED.
WHEN CARRYING OUT SERVICE AND/OR REPAIR WORK ON NITROX REGULATORS
WE RECOMMEND THE USE OF TEFLON SUPPORT RINGS (# 46185038).

NON EUROPEAN COUNTRIES:

THE USE OF NITROX BREATHING GAS MIXTURES WITH MORE THAN 40 % O_2 IS NOT RECOMMENDED.

ITM 24

03 AUG. 2011

PARBAK SUPPORT RING

ASSEMBLY INSTRUCTIONS

MAKE SURE THAT THE SUPPORT RING (5) INSERTED INTO THE BALANCE CHAMBER (4) IS FACING THE "A" SIDE (FIG. 2) TOWARDS THE O-RING (6).

BREATH REGULATORS WITH THE NEW SUPPORT RING (# 46110506) CAN BE RECOGNIZED BY THE FOLLOWING SERIAL NUMBERS:

PRODUCT CODE	DESCRIPTION	SERIAL NUMBER
416134	ABYSS 22 DIN	EA 29556
416134	ABYSS 22 INT	EA 29180
416182	PRESTIGE 12S DIN	SM 18279
416216	First stage MR22 DIN SMU	UM 11462
416158	ABYSS 22 NAVY DIN	NV 10196
416222	ABYSS 22 INT x SET 2	STA 11291
416209	First stage MR 12S DIN	SS 13965
416155	PRESTIGE 22 DPD DIN	GM 12500
416223	PRESTIGE 12S INT x SET D	STE 10419
416222	ABYSS 12S INT x SET 2	STB 11291
416182	PRESTIGE 12S INT	SM 18921

WARNING!

MAINTENANCE WORK MUST BE CARRIED OUT BY QUALIFIED PERSONNEL AT A MARES TECHNICAL CENTER OR BY A MARES AUTHORIZED REPRESENTATIVE.
TO REMOVE AND REFIT THE SEAT FROM THE FIRST STAGE, IT IS NECESSARY TO F O L L O W THE PROCEDURES DESCRIBED IN THE RELEVANT SECTION OF THE SERVICE MANUAL. IF THE SECTIONS INDICATED IN THE UPDATED MANUAL ARE MISSING OR IF THE INSTRUCTIONS ARE UNCLEAR OR NOT FULLY UNDERSTOOD, PLEASE CONTACT MARES BEFORE PERFORMING ANY MAINTENANCE OR INSPECTIONS.

ITM 37

24 FEB. 2015

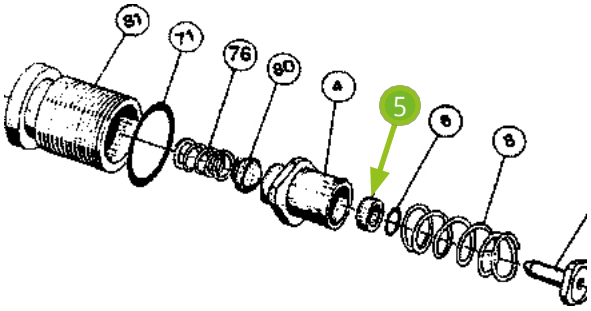
PARBAK SUPPORT RING

WITH REGARD TO THE PREVIOUS ITM 24 R1, MARES TECHNICAL SUPPORT INFORMS ALL MARES LAB PARTNERS THAT, FOLLOWING VARIOUS TESTS, THE PARBACK SUPPORT RING (PART NUMBER 46110506) WILL BE FITTED TO ALL NX REGULATORS AND FIRST STAGE VITON SERVICE KITS FROM SEASON 2015 ONWARDS AS AN ONGOING MODIFICATION.

THE TESTS CARRIED OUT HAVE SHOWN THAT THE PARBAK SUPPORT RING OFFERS EXCELLENT PERFORMANCE, EVEN WHEN USED IN NX-FIRST STAGES, ESPECIALLY IN EXTREMELY COLD WATER *(<= 0 °C).*

SEE FIG. 1. THE PARBACK SUPPORT RING CAN BE EASILY IDENTIFIED BY THE BLACK COLOR OF THE NEW MATERIAL.

- CURRENTLY USED SUPPORT RINGS -		- HD-CHAMBER SUPPORT RING, PARBAK-	
FIG. 1		FIG. 2	
			
46185038	461105068	PAGE - A	PAGE - B



ASSEMBLY INSTRUCTIONS

MAKE SURE THAT THE SUPPORT RING (5) INSERTED INTO THE BALANCE CHAMBER (4) IS FACING THE "A" SIDE (FIG. 2) TOWARDS THE O-RING (6).

WARNING!

MAINTENANCE WORK MUST BE CARRIED OUT BY QUALIFIED PERSONNEL AT A MARES TECHNICAL CENTER OR BY A MARES AUTHORIZED REPRESENTATIVE.
TO REMOVE AND REFIT THE SEAT FROM THE FIRST STAGE, IT IS NECESSARY TO F O L L O W THE PROCEDURES DESCRIBED IN THE RELEVANT SECTION OF THE SERVICE MANUAL. IF THE SECTIONS INDICATED IN THE UPDATED MANUAL ARE MISSING OR IF THE INSTRUCTIONS ARE UNCLEAR OR NOT FULLY UNDERSTOOD, PLEASE CONTACT MARES BEFORE PERFORMING ANY MAINTENANCE OR INSPECTIONS.

ITM 40 **Oct 08, 2015**

ACT (Advanced Coating Technology) FIRST STAGE, INFORMATION ON THE VALVE

THE MARES TECHNICAL DEPARTMENT WOULD LIKE TO INFORM YOU THAT THE NEW ACT VALVE (# 46201361) IS CURRENTLY FITTED TO ALL FIRST STAGES WITH AN INLINE MEMBRANE, WITH THE EXCEPTION OF THE ABYSS NAVY II. NO CHANGES ARE CURRENTLY BEING MADE.

SEE BTM 24

THE SERIAL NUMBERS OF THE REGULATORS REMAIN THE SAME. THE REGULATORS EQUIPPED WITH THE NEW ACT VALVE CAN BE EASILY IDENTIFIED BY AN "X" PRINTED ON THE CARDBOARD BOX AND ON THE PLASTIC PROTECTIVE COVER.

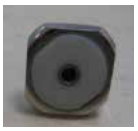
EXAMPLE: ABYSS 22 = ABYSS 22X

THE MOST IMPORTANT FEATURES OF THE ACT VALVE ARE:

- IT CONSISTS OF TWO MATERIALS:
  CHROME-PLATED BRASS - LESS FRICTION ON THE ROD
- ACT COATING PROCESS

AS OF SEPTEMBER 2015, ALL FIRST STAGE SERVICE KITS INCLUDE THE ACT VALVE, WITH THE EXCEPTION OF SERVICE KITS FOR ABYSS 22 NAVY II (INT: # 46186152 / DIN: # 46200606) DUE TO US NAVY PROTOCOLS.

- FIRST STAGE 52X-22X-15X INT/DIN: #46201355
- FIRST STAGE 52X-22X-15X INT/DIN VITON: #46201358
- FIRST STAGE 12S INT/DIN: #46201370
- FIRST STAGE 12S INT/DIN VITON: #46201371



NOTE: SOME SERVICE KITS ARE USED FOR DIFFERENT FIRST STAGE MODELS. (I.E. KIT #46200906 (WITHOUT VALVE) IS USED FOR 22, MR16 AND MR32). THIS SERVICE KIT WILL BE AVAILABLE UNTIL STOCK IS EXHAUSTED. THEREAFTER IT WILL BE REPLACED BY SERVICE KITS CONTAINING THE ACT VALVE. CONTACT MARES HEADQUARTERS FOR FURTHER DETAILS).

NOTE: THE CURRENT MR UPDATE KIT (#46200705) WILL BE DISCONTINUED AND **REPLACED** BY THE **ACT UPDATE KIT (#46201386).**

☞ NOTE

THE VALVE SEAT CODE # 46201139 (RO.15) IS NO LONGER AVAILABLE AND HAS BEEN REPLACED BY THE VALVE SEAT CODE # 46186216 (RO.05), SEE SPARE PARTS CATALOG. THE MARES TECHNICAL DEPARTMENT RECOMMENDS THE USE OF THE NEW VALVE SEAT CODE # 46186216 TO ACHIEVE OPTIMUM PERFORMANCE OF THE ACT VALVE FOR FIRST STAGES, ESPECIALLY FOR DIN VERSIONS (300 BAR).

☞ IMPORTANT

ALL SERVICE AND REPAIR PROCEDURES ON MARES PRODUCTS MUST BE PERFORMED BY A QUALIFIED MARES SERVICE TECHNICIAN AT AN AUTHORIZED DEALER AND SERVICE CENTER. SERVICE TECHNICIANS MUST HAVE THE MOST CURRENT MARES SERVICE MANUAL AND PARTS CATALOG ON HAND WHILE PERFORMING SERVICE PROCEDURES TO STRICTLY ADHERE TO THE RECOMMENDATIONS LISTED THEREIN.

BTM 25_R1

Oct. 27, 2015

REGULATOR SERVICE GUIDELINES AND SERVICE INTERVALS

Mares has revised the service guidelines and service intervals for regulators. The new guidelines and intervals apply to all **Mares diaphragm-controlled regulators** as of **September 1, 2015, except Abyss 22 NAVY II** regulators and Octopus, as noted below.

REGULATOR SERVICE GUIDELINES AND SERVICE INTERVALS

CARRY OUT AN INSPECTION AND/OR SERVICE ANNUALLY OR EVERY 100 DIVES

The annual regulator inspection and/or service must be carried out in accordance with the procedures and guidelines listed in the annual inspection and/or service checklist (see appendix). The result of the inspection may result in a major overhaul of the regulator.

A COMPLETE OVERHAUL OF THE REGULATOR MUST BE CARRIED OUT EVERY TWO YEARS OR AFTER 200 DIVES.

Every two years, the regulator must be completely overhauled in accordance with the specifications set out in the Mares service manual. This overhaul includes at least the replacement of all parts included in the service kit. Please refer to the annual inspection manual and/or the service checklist for more details.

MARES ABYSS 22 NAVY II REGULATOR AND OCTOPUS

SERVICE PROCEDURES AND INTERVALS

Service procedures and intervals for Abyss 22 Navy II regulators and Octopus differ from the procedures described above due to US Navy testing protocols. Below are the service guidelines for Abyss 22 Navy II regulators and Octopus:

After every 100 operating hours:
Mares recommends a complete overhaul every year or after 100 operating hours.

Mares recommends replacing the three-component valve every two years or after 200 hours of operation OR when it shows signs of wear.

NOTE

The ACT valve (code #46201361) MUST NOT BE USED on the Abyss 22 Navy II first stage. Abyss 22 Navy II service guidelines REQUIRE the use of the three-component valve (code #46201132) in the first stage to comply with U.S. Navy testing protocols. The three-component valve is NOT included in the Abyss Navy II first stage service kit. If you order the Abyss 22 Navy II first stage service kit, please also order the three-component valve separately.

IMPORTANT

All service and repair procedures on Mares products must be performed by a qualified Mares service technician at an authorized Mares dealer and service center. Service technicians must have the Mares Service Manual and Spare Parts Catalog available while performing service procedures to follow the exact procedures and guidelines recommended therein.

Oct. 27, 2015

CHECKLIST FOR THE ANNUAL REGULATOR INSPECTION

Date...../ ...../ .....Make/ Model ..... Serial No.....

Customer name..... Date of purchase..... / ...../ .....

TEST 1	**Check filter** Check for dirt or discoloration	☐ Passed	☐ Not passed
TEST 2	**Check the area of the high-pressure chamber** Check for dirt, rust or corrosion	☐ Passed	☐ Not passed
TEST 3	**Check hose** Pull back the hose guard Ensure that all hoses are securely seated in the crimp connection.	☐ Passed	☐ Not passed
TEST 4	**Check the outlet valve of the second stage** Check the valve and the sealing surface for cleanliness, shape and tightness.	☐ Passed	☐ Not passed
TEST 5	**Check mouthpiece** Check for cracks, fissures or holes. Replace if necessary.	☐ Passed	☐ Not passed
TEST 6	**Check the diaphragm of the second stage** Try to inhale without pressure. Check for perfect tightness.	☐ Passed	☐ Not passed
TEST 7	**Checking the medium pressure** Check that the medium pressure is stable. The medium pressure must be within the acceptable range specified in the service manual.	☐ Passed	☐ Not passed
TEST 8	**Opening pressure** Check opening pressure. The opening pressure must be within the acceptable range specified in the service manual.	☐ Passed	☐ Not passed
TEST 9	**Immersion pressure test** Place the unit under pressure while immersed. Check for leaks.	☐ Passed	☐ Not passed

IMPORTANT

1. **If the regulator does not pass points 1, 2 or 9 of the checklist: A complete overhaul of the regulator is required.**
2. **If the regulator does not pass points 7 or 8 of the checklist: If the regulator can be adjusted within the specifications, it has passed the inspection. If not, a complete overhaul is required.**
3. **If the regulator does not pass points 3, 4, 5 or 6 of the checklist: The components associated with these items on the checklist must be replaced OR a complete overhaul of the regulator is required.**

IMPORTANT

All service and repair procedures on Mares products must be performed by a qualified Mares service technician at an authorized Mares dealer and service center. Service technicians must have the Mares Service Manual and Spare Parts Catalog available while performing service procedures to follow the exact procedures and guidelines recommended therein.

22X. TOOLS AND ACCESSORIES REQUIRED

Tool	Description	Code number
	B-1 (25mm)	46106201
	Hexagon wrench 4mm	No code
	B-6	46106206
	B-17 (17mm)	46106217
	B-5	46106205
	B-16	46106216
	Pulling tool for O-rings	46201387

Tool	Description	Code number
	B-4 (5mm)	46106204
	B-13 (10mm)	46106213
	Circlip pliers (B14)	46106214
	B-21	46106221
	B-42	46201042
	B-25	46106253

- Compressed air supply or tank (2600-2900 PSI/185-200 bar)
- Compressed air gun (120-145 PSI/8-10 bar)
- Ultrasonic cleaner and descaling solution (e.g. Deox Extra) or similar
- Loctite 415 or similar
- Test bench (#416920) or medium pressure gauge (46106252)
- Christo-Lube MCG 111 Lubrication Technology or equivalent
- Neoprene work mat (449822)
- First stage service kit # 46201355 INT / DIN - # 46201358 INT / DIN Viton
- Nylon brush

22X. DISASSEMBLY

4.a

WARNING!

FOR USE OF THE FIRST STAGE IN DIVES WITH OXYGEN-ENRICHED BREATHING GAS MIXTURES, STRICTLY ADHERE TO THE PROCEDURES FOR DISASSEMBLY, ASSEMBLY AND ADJUSTMENT DESCRIBED IN THE NITROX CHAPTER OF THIS SERVICE MANUAL (EN 13949 FOR EUROPEAN COUNTRIES)

1. Remove the dust cap (24) from the first stage.
2. Remove the hose from the second stage using the 17 mm wrench (B17).
3. Insert the threaded rod (tool B5) into an LP connection of the first stage.

NOTE

Clamp the threaded rod (tool B5) in a vice (if available) to hold the first stage during disassembly

4. Remove the plug (81) using the compass tool (B-25). Then remove the high pressure chamber, the valve spring (8), the first stage valve (9) and the 32.5 mm valve pin (12) from the first stage housing (1).
5. Remove the O-ring (71) from the plug (81).
6. Remove the spring (76) and the HP housing button (80) using a flat screwdriver or a plastic or brass puller tool. Remove the HP housing button (80) from the spring (76).
7. Use a plastic or brass tool to remove the O-ring (6) and the support ring (5) from the high-pressure chamber (4).

4.c

WARNING!

DO NOT USE SHARP OR POINTED TOOLS MADE OF STEEL OR OTHER MATERIALS TO AVOID SCRATCHING THE SURFACES OF THE HIGH PRESSURE CHAMBER.

7

22X. DISASSEMBLY

8. Remove the adjusting nut (18) using the hexagon wrench (B-13). Remove the retaining nut (17) using the 32 mm wrench (B-16).

9. Remove the first stage diaphragm spring (16) and the plastic spring plate (15) as well as the protective cap (157).

10. Remove the diaphragm of the first stage (14), the DFC washer (35) and the first stage valve knob (13) by performing one of the two steps described below

Option A - Insert the nozzle (#415724) of a low-pressure compressed air gun in the high-pressure chamber of the first stage. Loosen the diaphragm (14) with short bursts of air at low pressure. Once the diaphragm has been loosened, remove it and the valve knob (13). Make sure that all LP and HP plugs are fitted to the first stage

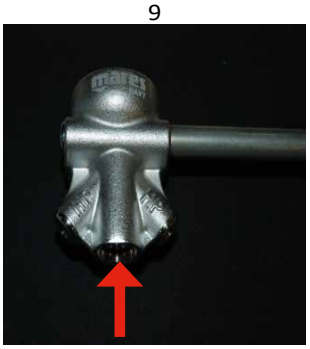
Option B - Place the first stage on a flat surface with the diaphragm facing downwards. Place the special tool (B6) in the HP chamber of the first stage and insert the valve pin (12) through the tool and the valve pin (12).
HD seat (115) so that it is in its original position in the button (13) of the first stage remains. Remove the tool (B6) from the HP chamber and press
Lightly press on the pin with the plastic end of the tool (B-41) to loosen the valve button and the diaphragm.

WARNING!

DO NOT USE A SHARP OR POINTED TOOL TO REMOVE THE DIAPHRAGM. SCRATCHES ON THE SURFACE OF THE DIAPHRAGM CAN LEAD TO LEAKS UNDER HIGH PRESSURE.

8


9


10 a

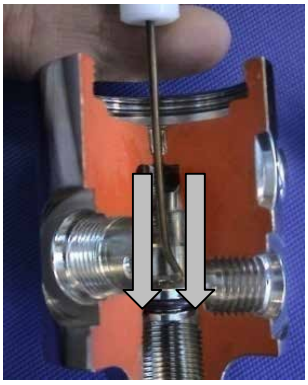

10.b

22X. DISASSEMBLY

11. Remove the valve seat (115) using the special tool (B-42). To do this, insert the tool through the hole on the diaphragm side of the first stage and press lightly on the valve seat to remove it from the housing of the first stage.

12. Remove the O-ring (74) from the valve seat.

11



22X. DISASSEMBLY

INT (Section 13)

DIN/Nitrox (section 14)

22X. DISASSEMBLY INT

13.1 Remove the bracket retaining nut (7) and the bracket connection (154) using the 25 mm special wrench (B1).

13.2 Remove the ironing knob (25).

13.3 Use the safety ring pliers (B14) to remove the safety ring (2), the filter (22) and the filter spring (61). Remove the O-ring (71) from the bracket retaining nut.

13,1

WARNING!

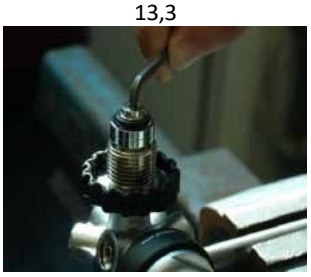
BE CAREFUL WHEN REMOVING THE BRACKET RETAINING NUT (7) SO AS NOT TO DAMAGE THE CHROME COATING

13,3

13.4 Remove the threaded rod (tool B5) and all HP (53) and LP plugs (20) from the housing of the first stage.

13.5 Remove the O-rings (19) from the low-pressure plugs (20) and the O-rings (52) from the high-pressure plugs (53).

22X. DISASSEMBLY DIN - NX



14,1

14.1 Unscrew the O-ring seat (187 - 54 NX) from the DIN housing connection (48 - 50 NX) using a 4 mm hexagon wrench.

14.2 Remove the O-ring (188 - 60 NX) from the O-ring seat (187 - 54 NX).

14.3 Remove the conical filter (56) from the DIN connection of the housing (48 - 50 NX) by turning the housing of the first stage over.

14,2

14.4 Insert a 5 mm hexagon key (B4) into the DIN connection of the housing (48 - 50 NX) and screw it on completely. The use of a wrench (see illustration) can be helpful.

14.5 Remove the O-ring (71) from the DIN housing connection (48 - 50 NX).

14.6 Remove all low-pressure plugs (20) and high-pressure plugs (53) using a 4 mm hexagon key.

14.7 Remove the O-rings (19) from the low-pressure plugs (20) and the O-rings (52) from the high-pressure plugs (53).

14,4

22X. INSPECTION AND CLEANING

Reusable rubber and plastic components

Review

Check all reusable rubber and plastic components for excessive wear and/or damage. Replace the parts if necessary.

Cleaning

Clean all rubber and plastic components by washing them with a mixture of warm water and mild detergent. If necessary, clean the parts with a soft brush. Do not use abrasive cleaning agents, solvents or acids on the rubber components.

WARNING!

SOLVENTS AND ACIDS CAN DAMAGE PLASTIC AND RUBBER PARTS. BEFORE CLEANING METAL COMPONENTS, MAKE SURE THAT ALL RUBBER AND PLASTIC PARTS HAVE BEEN REMOVED.

Metal components

Review

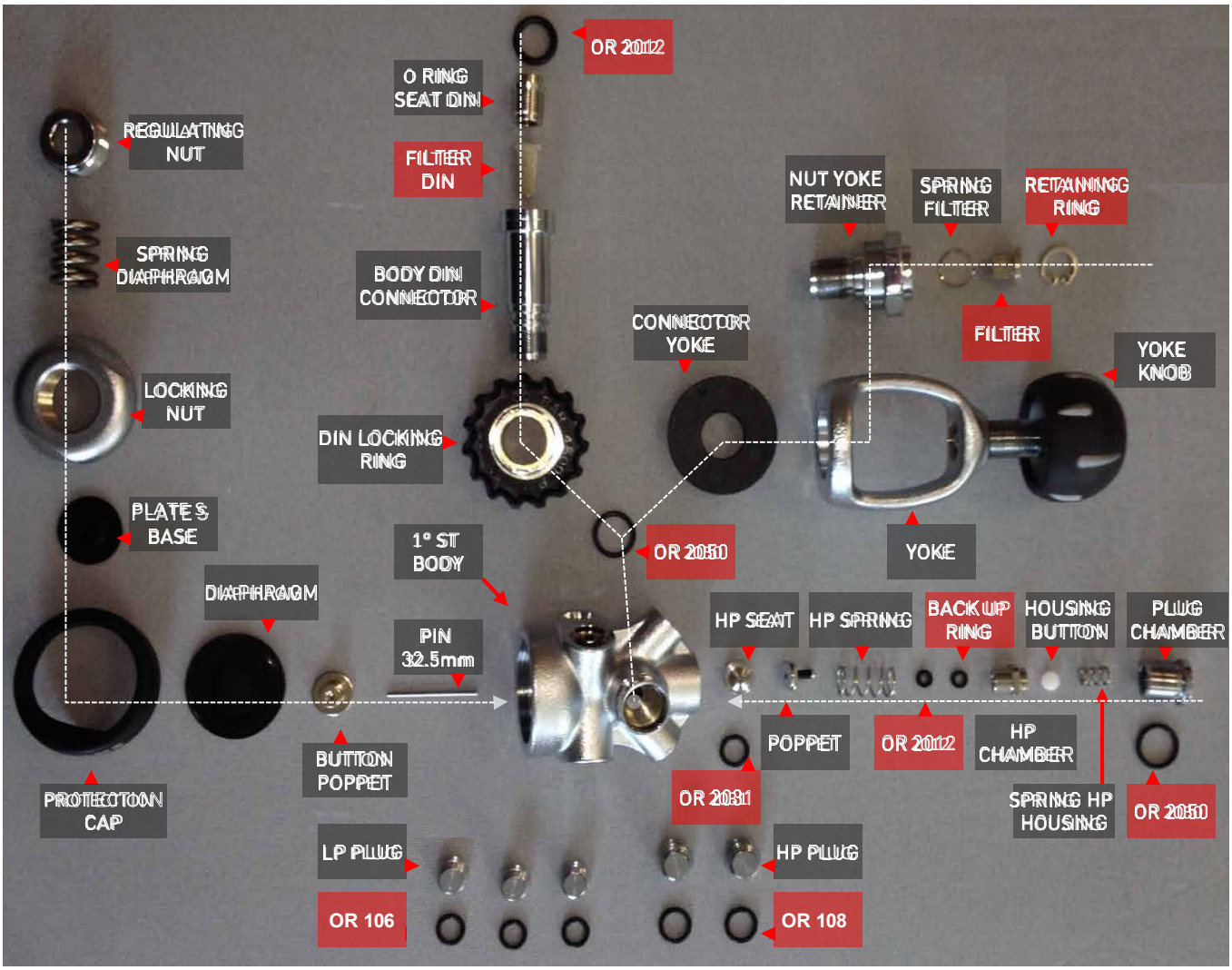
Check all parts for excessive wear and/or damage. Replace the parts if necessary.

Cleaning

Brass, stainless steel and chrome-plated parts are immersed in an ultrasonic cleaner with descaling solution (e.g. Deox Extra) or a solution of white vinegar and hot water. If necessary, you can use a soft brush to remove stubborn deposits.

Make sure to rinse all parts with fresh water and allow them to dry completely before reassembling.

22X. SERVICE KIT FOR SECOND STAGE



Some important components of the first stage must be replaced during an overhaul. These important components are included in the service kit for first stages 22X (code 46201355 INT/DIN - 46201444 NX) and are highlighted in the RED FIELDS above.

SERVICE KIT # 46201355 INT / DIN - 46201444 NX

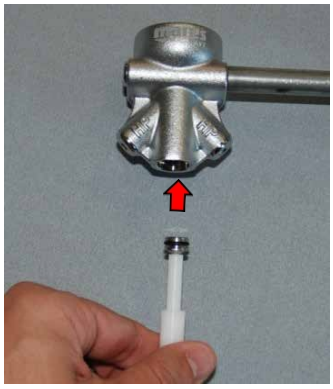
22X. MOUNTING

15

NOTE

Lubrication reduces the likelihood of damage during assembly. Before starting assembly, apply a thin layer of high-quality silicone grease to all O-rings.

15. Place the O-ring (74) on the HP seat (115) and position the seat on the special tool (B21).
16. Insert the HP seat (115) into the housing of the first stage and press slightly until the seat is correctly positioned.



17

WARNING!

BE PARTICULARLY CAREFUL NOT TO DAMAGE THE SEAT WHEN INSERTING IT. IT IS CORRECTLY POSITIONED WHEN THE CONICAL AREA IS VISIBLE FROM THE HD CHAMBER.

17. Position the support ring (5) and the O-ring (6) in the HP chamber (4).

17 a

WARNING!

MAKE SURE THAT SIDE "A" OF THE SUPPORT RING (5) IS FACING THE O-RING (6) AND SIDE "B" IS FACING THE BOTTOM OF THE HD CHAMBER (4)

18. Insert the valve of the first stage (9) into the housing of the first stage with the flat side facing the valve seat (115).
19. Position the spring (8) of the first stage valve (9) and insert the HP housing kit (4-5-6) into the spring (8).

17.b

18

22X. ASSEMBLY

20. Fit the high-pressure housing button (80) onto the spring (76). Place both components (76+80) in the connection by pressing down the HD housing button. Check the correct positioning.
21. Place the O-ring (71) on the HP plug (81).
22. Fit the plug of the HP chamber into the housing of the first stage using the compass tool (B-25).
23. Turn the first stage over as shown and insert the pin (12) into the center hole of the housing.
24. Place the valve knob of the first stage (13) on the pin (12) and press it to feel the "resistance" of the spring (8).
25. Put on the protective cap (157).
26. Fit the membrane (14) into the housing of the first stage and make sure that it is securely seated in the housing.

23

27

28

29

NOTE

Observe the imprint on the valve button (13) on the diaphragm of the first stage. When fitting the diaphragm (14), ensure that it is fitted in the same direction as it was removed.

27. Place the spring plate (15) in the center of the diaphragm (14) and insert the Spring (16) onto the spring plate (15).
28. Lightly lubricate the edge of the retaining nut (17) with silicone grease. Fit it to the housing of the first stage (1) using the 32 mm wrench (B-16).

NOTE

If you use a torque wrench to tighten the retaining nut (17), the tightening torque should be around 26 ft.*lbf / 35 Nm

29. Use the 10 mm hexagon key (B13) to fit the adjusting nut (18) by turning the key only 3 - 4 turns.

NOTE

Do not overtighten the adjusting nut. Overtightening can increase the medium pressure, which can damage the low pressure gauge and impair the medium pressure setting.

22X. ASSEMBLY

INT
(Section 30)

DIN/Nitrox (section 31)

22X. MOUNTING INT

30.1 Turn the housing of the first stage and insert the bracket connection (154) into its correct position on the housing of the first stage.

30.2 Fit the filter spring (61) and the filter (22) in the bracket retaining nut (7).

30.3 Use the safety ring pliers (B14) to press the safety ring (2) onto the filter (22) in the bracket retaining nut (7).

30,3

NOTE

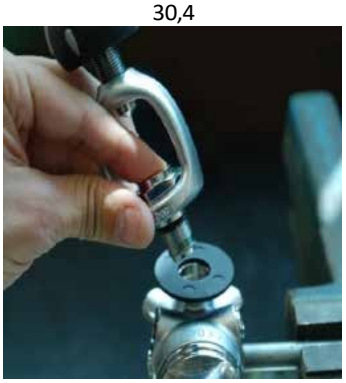
The retaining ring must be aligned with the sharp side facing up and the round side facing down. Then turn the retaining ring to ensure correct positioning.

30,4

30.4 Fit the O-ring (71) on the bracket retaining nut (7).

30.5 Fit the handwheel (25) onto the bracket (3). Place the bracket (3) on the housing of the first stage on the bracket connection (154).

30.6 Use a 25 mm wrench (B1) to fully tighten the bracket retaining nut (7).



32

NOTE

If you use a torque wrench, the tightening torque should be around 13 - 15 ft*lbf / 18-20 Nm.

WARNING!

TO PREVENT THE BRACKET RETAINING NUT (7) FROM LOOSENING, APPLY ONE OR TWO DROPS OF THREAD LOCKING COMPOUND TO THE THREADS BEFORE INSTALLATION. REMOVE ANY EXCESS THREAD LOCKING COMPOUND BEFORE APPLYING A NEW ONE (LOCTITE 415 OR EQUIVALENT).

30,6

30.7 Fit the O-rings (52) on the HP plug (53) and the O-rings (19) on the LP plug (20).

30.8 Install all HP and LP connections of the first stage housing. Leave the DFC and an additional LP connection for the second stage and the medium pressure gauge free.

22X. MOUNTING INT

31.1 Insert the DIN housing connection (48 - 50 NX) into the threaded ring (49 - 51 NX).

31.2 Place the O-ring (71) on the DIN housing connection (48 - 50 NX).

31.3 Tighten the DIN housing connection (48 - 50 NX) on the housing of the first stage using a 5 mm hexagon wrench (B 4).

31.1

31.2

31.3

WARNING!

TO PREVENT THE DIN HOUSING CONNECTION (24) FROM LOOSENING, APPLY ONE OR TWO DROPS OF THREAD LOCKING COMPOUND TO THE THREADS PRIOR TO INSTALLATION. REMOVE EXCESS THREAD LOCKING COMPOUND BEFORE APPLYING NEW COMPOUND (SUPERBOND 415 MASCHERPA OR EQUIVALENT).

NOTE

If you use a torque wrench, the tightening torque should be around 15 ft*lbf / 20 Nm.

31.4 Insert the conical filter (56) into the DIN housing connection (48 - 50 NX).

31.5 Place the O-ring (188 - 60 NX) on the DIN O-ring seat (187 - 54 NX).

31.6 Unscrew the O-ring seat (187 - 54 NX) from the DIN housing connection (48 - 50 NX) using a 4 mm hexagon wrench.

NOTE

If you use a torque wrench, the tightening torque should be around 1.1-1.5 ft*lbf / 1.5-2 Nm

31.7 Remove the threaded rod (tool B-5) from the housing of the first stage.

31.8 Fit the O-rings (52) on the HP plug (53) and the O-rings (19) on the LP plug (20).

31.9 Install all HP and LP connections of the first stage housing. Leave the DFC and an additional LP connection for the second stage and the medium pressure gauge free.

22X. SETTING

NOTE

Connect the first stage to a full tank (at a minimum of 2600 psi/180 bar) or to the test bench and slowly open the air valve to remove any foreign matter from the first stage.

32. Connect the medium pressure gauge (#46106252) or the low pressure hose from the low pressure connection to the test stand and open the low pressure connection.

33. Connect the hose of the second stage to the connection marked DFC (without the cover being fitted to the second stage).

NOTE

If you use a torque wrench, the tightening torque of the hoses should be around 3 - 3.5 ft*lbf / 4 - 4.5 Nm

TABLE 1: MEDIUM PRESSURE SETTING RANGE

HD air supply	Medium pressure (MD)
2900 psi	142 - 148 psi
200 bar	9.8 - 10.2 bar

HD

34. Hold down the second stage demand lever while slowly opening the tank valve and release the demand lever almost simultaneously. Read the value of the first stage setting on the pressure gauge and proceed as follows:

22X. ADJUSTMENT

NOTE

No intermittent or free blow-off of the second stage may occur during the medium pressure setting. If a blow-off occurs, the process will be impaired and the medium pressure setting could be outside the acceptable range.

34.1 If the medium pressure is higher than the specified value (see Table 1), slowly loosen the adjusting nut (18) with the 10 mm hexagon wrench (B-13) until the specified value is achieved.

WARNING!

IF THE MEDIUM PRESSURE IS REDUCED, IT IS NECESSARY TO RELEASE THE EXCESS PRESSURE BEFORE THE NEW VALUE CAN BE READ.

34.2 If the medium pressure is lower than the specified value (see Table 1), slowly tighten the adjusting nut (18) with the 10 mm hexagon wrench (B-13) until the specified value is achieved.

34.2

NOTE

Once the medium pressure is set correctly, operate the second stage demand lever two to three times to ensure that the medium pressure remains constant for a few minutes.

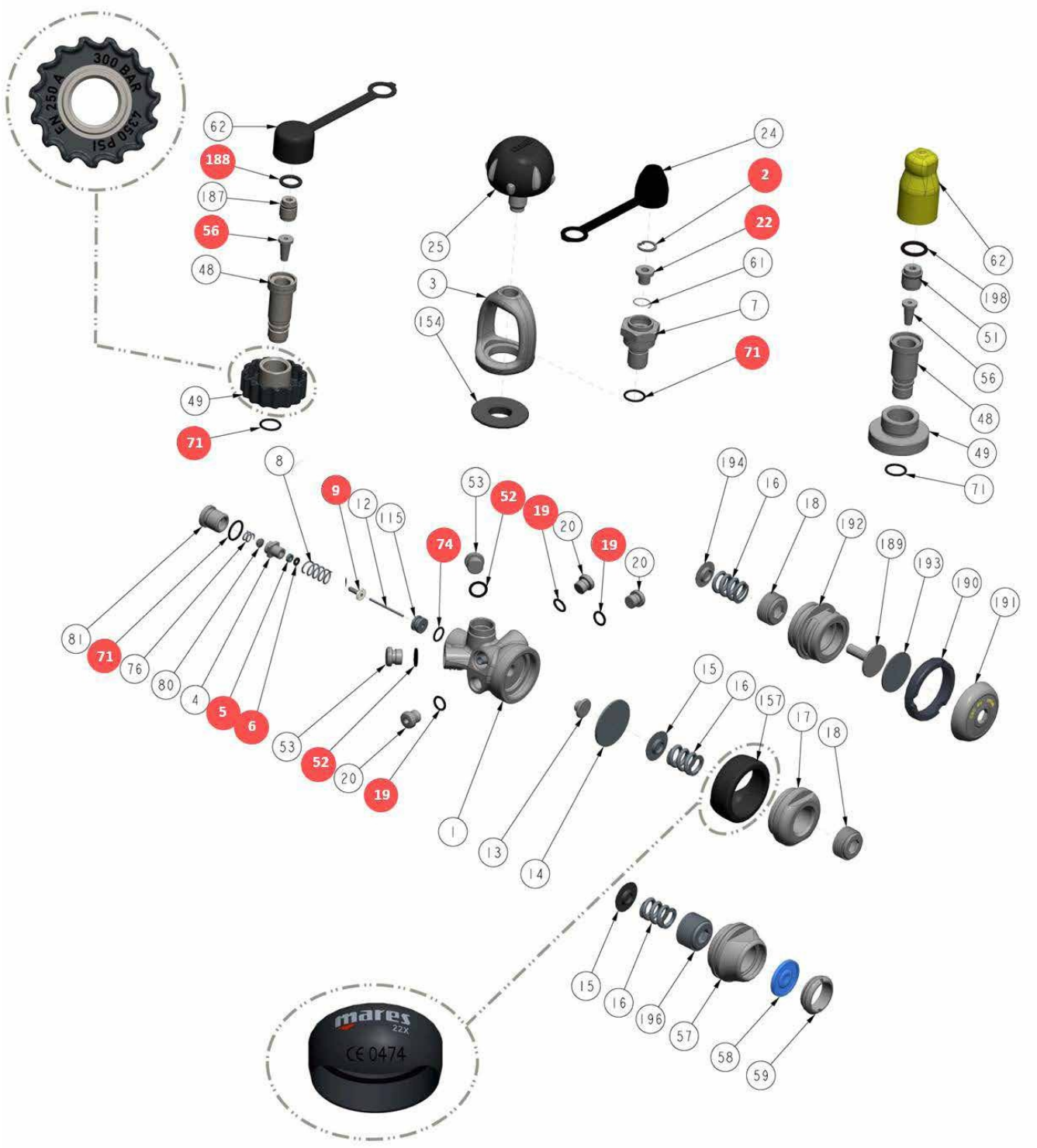
NOTE

The second stage can now be set.

22X. PROBLEM SOLUTION

Problem	Possible cause	Solution
CONTINUOUS FLOW OUT FROM THE FIRST STAGE (BLOW-OFF) CAUSED BY: 1. AN INCREASE IN MEDIUM PRESSURE, OR 2. A CONTINUOUS INCREASE OF THE MEDIUM PRESSURE (CREEPING INCREASE OF THE MEDIUM PRESSURE)	1. medium pressure too high	Set the medium pressure accordingly
	2nd valve of the first stage damaged	Replacing the first stage valve
	2. damaged valve seat	Replace valve seat
	2. damaged components of the HP kit or damaged HP chamber	Check the internal surfaces of the HP chamber. Clean or replace the HP chamber. Replace O-ring and/or support ring.
AIR LEAK FROM THE DIAPHRAGM OF THE FIRST STAGE	Loose retaining nut	Tighten the CWD kit housing
	Damaged diaphragm of the first stage	Replacing the membrane
	Damaged surface of the diaphragm seat of the first stage	Replacing the housing of the first stage
AIR LEAKAGE FROM THE HD/ND CONNECTION PLUGS OF THE FIRST STAGE AND/OR THE HOSE CONNECTIONS	Damaged O-ring - Corrosion on metal surface	Clean seat and/or replace O-ring
	Hose and/or connection plug loose	Tighten the hose and/or connection plug
AIR LEAK BETWEEN BRACKET RETAINING NUT AND TANK VALVE	O-ring seat of the tank valve corroded or damaged	Clean the seat of the tank valve and replace the O-ring
	Sealing surface of the U-nut (7) damaged	Replace bow nut
	O-ring (71) damaged	Replace O-ring

22X. PRESENTATION E896 Updated: 17/07/2015



22X. TABLE 43 Updated: 03/12/2015

TABLE NO.: 43		FIRST STAGE 22X/22X NX			UPDATED: 03/12/2015
REF	**CODE**	**DESCRIPTION**	**REF**	**CODE**	**DESCRIPTION**
1	F	FIRST STAGE HOUSING DFC	157	46200861	PROTECTIVE CAP FIRST STAGE
2	46185015	RETAINING RING, FILTER FIRST STAGE	187	46200547	O-RING SEAT DIN
3	46201074	HANGERS K11	188	46110247	O-ring 3043
4	D	HIGH PRESSURE CHAMBER	189	K	CWD DRY 12S PISTON
5	46110506	SUPPORT RING, FIRST STAGE	190	K	PLASTIC RING CWD DRY 12S
6	46110101	O-ring 2012	191	K	SQUAT CAP CWD DRY 12S
7	46186205	NUT, BRACKET HOLDER FIRST STAGE MR22	192	K	CWD DRY HOUSING
8	46201284	SPRING, VALVE FIRST STAGE	193	46200926	CWD DRY MEMBRANE
9	46201361	ACT VALVE FIRST STAGE	194	46200950	SPRING PLATE CWD DRY
12	46186214	PEN, FIRST STAGE, 32.5 mm	196	46184511	ADJUSTING NUT, FIRST STAGE
13	46186213	NUT, VALVE FIRST STAGE MR22	198	46110227	O-ring 3056
14	46201111	MEMBRAN, MR22			
15	46185034	SPRING PLATE, FIRST STAGE			
16	46201285	SPRING DIAPHRAGM FIRST STAGE	**COMPLETE SETS**		
17	46200859	HOLDING MOTHER	F	416216	FIRST STAGE 22X KIT (INT-DIN)
18	46185028	ADJUSTING NUT, FIRST STAGE	---	46201262	RETAINING RING, FILTER FIRST STAGE (10 pcs.)
19	46110106	O-ring 106	---	46201253	O-ring 2012 (10 pcs.)
20	46185204	HD PLUG 3/8", FIRST STAGE	---	46201267	MEMBRAN, MR22 (10 pcs.)
22	46186202	CONICAL, SINTERED FILTER. FIRST STAGE	---	46201254	O-ring 106 (10 pcs.)
24	46185010	PROTECTIVE CAP	---	46201256	O-ring 108 (10 pcs.)
25	46184079	HANDRAD INT	---	46201266	CONICAL FILTER, DIN (10 pcs.)
48	46201134	HOUSING, DIN CONNECTION 300 BAR	---	46201259	O-ring 2050 (10 pcs.)
48	N	HOUSING, DIN CONNECTION 200 BAR NX	---	46201255	O-ring 2031 (10 pcs.)
49	46200546	DIN 300 BAR RETAINING RING WITH THREAD	D	46185210	HD HOUSING KIT, FIRST STAGE (4-5-6)
49	N	HAND WHEEL NITROX CONNECTION 200 BAR	---	416810	DIN CONNECTION 300 BAR
51	N	O-RING SEAT	I	416851	KIT CWD SILICONE OIL
52	46110108	O-ring 108	K	416855	KIT CWD DRY 22
53	46185205	HD PLUG 7/16", FIRST STAGE	---	46201355	SERVICE KIT FIRST STAGE 52X/22X/15X INT/DIN
56	46200561	CONICAL FILTER, DIN			
57	I	CWD HOUSING	**NITROX VERSION**		
58	46185301	MEMBRANE, CWD KIT	N	46201443	NITROX CONNECTION 200 BAR (EN13949) NBR-O-RINGS
59	46185302	CWD RETAINING RING	---	46201444	SERVICE KIT NX 1.ST 52/22 (EN13949) - NBR-O-RINGS
61	46185013	SPRING, FILTER FIRST STAGE			
62	46200562	PROTECTIVE CAP DIN	**ACCESSOIRES**		
62	N	DUST CAP NITROX 2K5	98	46186207	PLUG 1/2" AND FIRST STAGE MR22
71	46110211	O-ring 2050	97	46110215	O-ring 2043
74	46110107	O-ring 2031			
76	46186210	SPRING, HD HOUSING, FIRST STAGE MR22	**NOTE**		
80	46186206	HD HOUSING KNOB, FIRST STAGE MR22	Parts highlighted in red are included in the service kits 46201355. For the first stages m a n u f a c t u r e d before the X series (2015), you can find the codes of the Viton service kit, the Nitrox connection (Viton) and the NX service kit (Viton) in the previous spare parts catalog (2015 and earlier) or in the "Accessories 1) section of this spare parts catalog		
81	46200860	PLUG, FIRST STAGE, MR22			
115	46186216	VALVE SEAT, FIRST STAGE, MR22			
154	46200553	BRACKET CONNECTION, FIRST STAGE			

52X. ASSEMBLY INT

29.1 Turn the first step over and fit the bracket spacer (37).

29.2 Fit the filter spring (12) and the filter (8) in the bracket retaining nut (23).

29.3 Use the safety ring pliers (B14) to press the safety ring (2) onto the filter (8) and into the bracket retaining nut (23).

29.1

29.3

NOTE

The retaining ring must be aligned with the sharp side facing up and the round side facing down. Then turn the retaining ring to ensure correct positioning.

29.4 Fit the O-ring (26) on the bracket retaining nut (23).

29.5 Fit the handwheel (22) onto the bracket (21). Place the bracket (21) on the housing of the first stage.

29.6 Use a 25 mm wrench (B1) to fully tighten the bracket retaining nut (23)

29.4

NOTE

If you use a torque wrench, the tightening torque should be around 13 - 15 ft*lbf / 18-20 Nm.

29.6

WARNING!

TO PREVENT THE BRACKET RETAINING NUT (7) FROM LOOSENING, APPLY ONE OR TWO DROPS OF THREAD LOCKING COMPOUND TO THE THREADS BEFORE INSTALLATION. REMOVE ANY EXCESS THREAD LOCKING COMPOUND BEFORE APPLYING A NEW ONE (LOCTITE 415 OR EQUIVALENT).

29.7 Fit the O-rings (13) on the HP plug (14) and the O-rings (5) on the LP plug (6).

29.8 Install all HP and LP connections of the first stage housing. Leave the DFC and an additional LP connection for the second stage and the medium pressure gauge free.

52X. MOUNTING DIN - NX

30.1 Insert the DIN housing connection (24-48 NX) into the threaded ring (11-45 NX).

30.2 Place the O-ring (26) on the DIN housing connection (24-48 NX).

30.3 Place the bracket (37) on the housing of the first stage.

30.4 Tighten the DIN housing connection (24-48 NX) onto the housing of the first stage using a 5 mm hexagon key (B4).

30.1 - 30.2

WARNING!

TO PREVENT THE DIN HOUSING CONNECTION (24) FROM LOOSENING, APPLY ONE OR TWO DROPS OF THREAD LOCKING COMPOUND TO THE THREADS PRIOR TO INSTALLATION. REMOVE EXCESS THREADLOCKER BEFORE APPLYING A NEW ONE (LOTITE 415 OR EQUIVALENT).

30.3

NOTE

If you use a torque wrench, the tightening torque should be around 15 ft*lbf / 20 Nm.

30.5 Insert the conical filter (7-8 NX) into the DIN housing connection (24-48 NX).

30.6 Place the O-ring (25-49 NX) on the O-ring seat (15-47 NX).

30.7 Unscrew the O-ring seat (15 - 47 NX) from the DIN housing connection (15 - 47 NX) using a 4 mm hexagon wrench.

30.4

NOTE

If you use a torque wrench, the tightening torque should be around 1.1-1.5 ft*lbf / 1.5-2 Nm

30.5

30.8 Remove the threaded rod (tool B-5) from the housing of the first stage.

30.9 Fit the O-rings (13) on the HP plug (14) and the O-rings (5) on the LP plug (6).

30.10 Install all HP and LP connections of the first stage housing. Leave the DFC and an additional LP connection for the second stage and the medium pressure gauge free.

52X. SETTING

NOTE

Connect the first stage to a full tank (at a minimum of 2600 psi/180 bar) or to the test bench and slowly open the air valve to remove any foreign matter from the first stage.

31. Connect the medium pressure gauge (#46106252) or the low pressure hose from the low pressure connection to the test stand and open the low pressure connection.
32. Connect the hose of the second stage to the connection marked DFC (without the cover being fitted to the second stage).

NOTE

If you use a torque wrench, the tightening torque should be around 3-3.5 ft*lbf / 4-4.5 Nm

TABLE 1: MEDIUM PRESSURE SETTING RANGE

HD air supply	Medium pressure (MD)
2900 psi	142 - 148 psi
200 bar	9.8 - 10.2 bar

MD

33. Hold down the demand lever of the second stage while slowly opening the tank valve and release the demand lever almost simultaneously. Read the value of the first stage setting on the pressure gauge and proceed as follows

Proceed as follows:

HD

52X. ADJUSTMENT

NOTE

No intermittent or free blow-off of the second stage may occur during the medium pressure setting. If a blow-off occurs, the process will be impaired and the medium pressure setting could be outside the acceptable range.

33.1 If the medium pressure is higher than the specified value (see Table 1), slowly loosen the adjusting nut (18) with the 10 mm hexagon wrench (B-13) until the specified value is achieved.

WARNING!

IF THE MEDIUM PRESSURE IS REDUCED, IT IS NECESSARY TO RELEASE THE EXCESS PRESSURE BEFORE THE NEW VALUE CAN BE READ.

33.2 If the medium pressure is **lower** than the specified value (see Table 1), slowly tighten the adjusting nut (18) until the specified value is achieved.

33.2

NOTE

Once the medium pressure is set correctly, operate the second stage demand lever two to three times to ensure that the medium pressure remains constant for a few minutes.

NOTE

The second stage can now be set.

52X. ADJUSTMENT

34. Mount the right and left shells (39-38) correctly on the first stage housing (4) and the first stage cap (44) as shown.

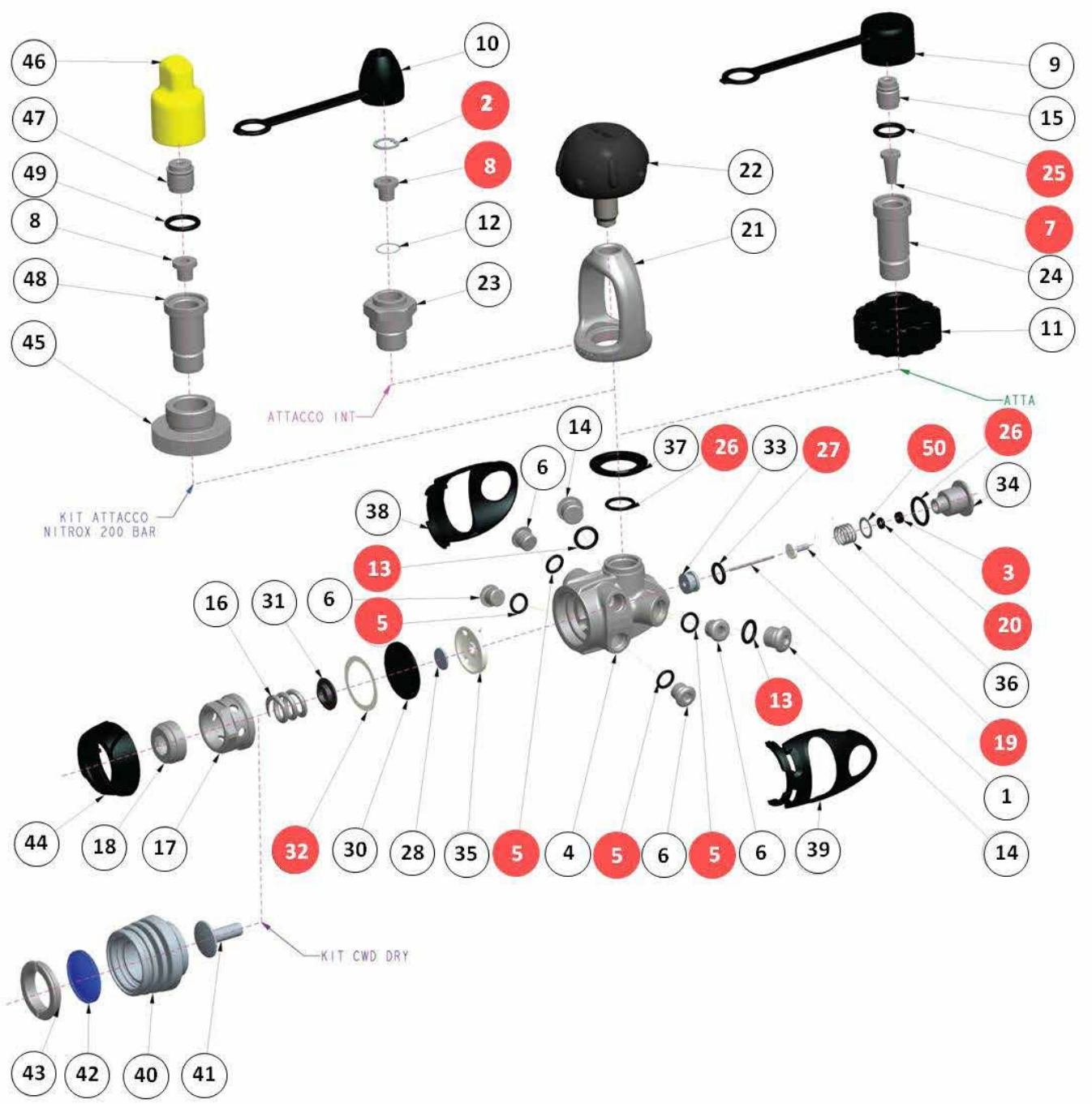
NOTE

The second stage can now be set

52X. PROBLEM SOLUTION

Problem	Possible cause	Solution
CONTINUOUS FLOW OUT FROM THE FIRST STAGE (BLOW-OFF) CAUSED BY: 1. AN INCREASE IN MEDIUM PRESSURE, OR 2. A CONTINUOUS INCREASE OF THE MEDIUM PRESSURE (CREEPING INCREASE OF THE MEDIUM PRESSURE)	1. medium pressure too high	Set the medium pressure accordingly
	2. three-component valve of the first stage damaged	Replace three-component valve
	2. damaged valve seat	Replace valve seat
	2. damaged components of the HP kit or damaged HP chamber	Check the internal surfaces of the HP chamber. Clean or replace the HP chamber. Replace O-ring and/or support ring.
AIR LEAK FROM THE DIAPHRAGM OF THE FIRST STAGE	Loose retaining nut	Tighten the CWD kit housing
	Damaged diaphragm of the first stage	Replacing the membrane
	Damaged surface of the diaphragm seat of the first stage	Replacing the housing of the first stage
AIR LEAKAGE FROM THE HD/ND CONNECTION PLUGS OF THE FIRST STAGE AND/OR THE HOSE CONNECTIONS	Damaged O-ring - Corrosion on metal surface	Clean seat and/or replace O-ring
	Hose and/or connection plug loose	Tighten the hose and/or connection plug
AIR LEAK BETWEEN BRACKET RETAINING NUT AND TANK VALVE	O-ring seat of the tank valve corroded or damaged	Clean the seat of the tank valve and replace the O-ring
	Sealing surface of the U-nut (7) damaged	Replace bow nut
	O-ring (71) damaged	Replace O-ring

52X. PRESENTATION E120 Updated: 03/12/2015



52X. TABLE 40 Updated: 03/12/2015

TABLE NO.: 40		FIRST STAGE 52X/52X NX			UPDATED: 03/12/2015
REF	**CODE**	**DESCRIPTION**	**REF**	**CODE**	**DESCRIPTION**
1	46201124	SPRING PIN 28.3 MM	38	46201126	LEFT SHELL 52
2	46185015	RETAINING RING, FILTER FIRST STAGE	39	46201128	RIGHT SHELL 52
3	46110506	STÜTZRING PK	40	C	CWD DRY HOUSING, 52
4	F	FIRST STAGE 52	41	C	CWD DRY PISTONS
5	46110106	O-ring 106	42	46200558	CWD DRY MEMBRANE
6	46185204	ND PLUG 3/8"	43	C	SQUAT CAP CWD DRY
7	46200561	CONICAL FILTER, DIN	44	46201292	CAP FIRST STAGE 52X
8	46186202	CONICAL FILTER, INT	45	N	NITROX SAFETY RING 200 BAR (EN13949)
9	46200562	PROTECTIVE CAP DIN	46	46200658	YELLOW DUST CAP, NITROX
10	46185010	DUST CAP INT	47	N	O-RING SEAT NITROX (EN13949)
11	46200546	HANDRAD 300 bar	48	N	HOUSING, NITROX CONNECTION 200 BAR (EN13949)
12	46185013	SPRING, FILTER 1ST STAGE	49	46110227	O-ring 3056
13	46110108	O-ring 108	50	46201291	HD-CHAMBER WASHER
14	46185205	HD-PLUG 7/16"			
15	46200547	O-RING SEAT DIN	**COMPLETE SETS**		
16	46201285	SPRING MEMBRANE	F	416231	FIRST STAGE 52X KIT (INT-DIN)
17	46201118	HOLDING MOTHER	---	46201262	SAFETY RING, FIRST STAGE FILTER (10 pcs.)
18	46201120	ADJUSTMENT NUT	---	46201254	O-ring 106 (10 pcs.)
19	46201361	ACT VALVE FIRST STAGE	---	46201266	CONICAL FILTER, DIN (10 pcs.)
20	46110101	O-ring 2012	---	46201256	O-ring 108 (10 pcs.)
21	46201333	HANGERS K11	---	46201253	O-ring 2012 (10 pcs.)
22	46184079	HANDRAD	---	46201259	O-ring 2050 (10 pcs.)
23	46201100	BRACKET RETAINING NUT	---	46201255	O-ring 2031 (10 pcs.)
24	46201102	HOUSING, DIN CONNECTION 300 BAR	---	416809	DIN CONNECTION 300 BAR (9-7-11-15-24-25)
25	46110247	O-ring 3043	C	416857	KIT CWD DRY
26	46110211	O-ring 2050	---	46201355	SERVICE KIT FIRST STAGE 52X/22X/15X INT/DIN
27	46110107	O-ring 2031			
28	46200545	VALVE KNOB FIRST STAGE	**NITROX VERSION**		
30	46201476	MEMBRANE	N	46201443	NITROX CONNECTION 200 BAR (EN13949) NBR- O-RINGS
31	46200582	SPRING DISH	---	46201444	SERVICE KIT NX 1.ST 52/22 (EN13949) - NBR-O-RINGS
32	46200581	GLEITRING			
33	46186216	HD SEAT "MR"	**NOTE**		
34	46201275	PLUG HD-CHAMBER	Parts highlighted in red are included in the service kits 46201355 For the first stages m a n u f a c t u r e d before the X-series (2015), you can find the codes of the Viton service kit, the Nitrox connection (Viton) and the NX service kit (Viton) in the previous spare parts catalog (2015 and earlier) or in the "Accessories 1) section of this spare parts catalog		
35	46201114	DFC WASHER 52			
36	46201284	HD-SPRING FIRST STAGE			
37	46201135	SPACER BRACKET, FIRST STAGE			