TECHNICAL SUPPORT

FSR & FST FIRST STAGE REGULATOR



MAINTENANCE MANUAL FOR AUTHORISED TECHNICIANS

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FSR & FST First Stage Maintenance Manual

(AP5825 Issue 4)

INTRODUCTION

This manual provides factory prescribed procedures for the correct maintenance and repair of the Apeks FSR & FST first stage regulators. The model shown in this manual is the FSR, although the FST differs in appearance, most components are identical. It is not intended to be used as an instructional manual for untrained personnel. The procedures outlined within this manual are to be performed only by personnel who have received factory authorised training through an Apeks Service & Repair Seminar. If you do not completely understand all of the procedures outlined in this manual, contact Apeks to speak directly with a Technical Advisor before proceeding any further.

WARNINGS, CAUTIONS & NOTES

Pay special attention to information provided in warnings, cautions, and notes that are accompanied by one of these symbols:

WARNINGS indicate a procedure or situation that may result in serious injury or death if instructions are not followed correctly.

CAUTIONS indicate any situation or technique that will result in potential damage to the product, or render the product unsafe if instructions are not followed correctly.

NOTES *are used to emphasise important points, tips, and reminders.*

SCHEDULED SERVICE

It is recommended that the Apeks FSR & FST first stage regulators should be examined annually regardless of usage. A full serviced should be performed every two years.

However, If at all unsure about the correct functioning of the Apeks first stage, then it must be officially inspected immediately.

All service and inspection details need to be documented in the *Regulator Service Record* in the back of the Owner's Manual to keep the *Limited Lifetime Warranty* in effect.

An Official Inspection consists of:

1. A pressurised immersion test of the entire unit to check for air leakage.
2. Checking for stable medium pressure that is within the acceptable range.
3. Checking that all parts are tightly fastened together and that no parts are loose.
4. A visual inspection of the Environmental Diaphragm looking for tears or holes and checking the general condition.
5. A visual inspection of any filters for debris or discolouration.
6. Pulling back hose protectors and checking that the hoses are secure in the hose crimps.

If a regulator fails steps 1,2, or 3 the entire regulator should be serviced. If a regulator fails 4 or 5 it will be up to the technician's discretion whether or not a full service is required. Failure of step 6 requires replacement of the Hose.

GENERAL GUIDELINES

1. In order to correctly perform the procedures outlined in this manual, it is important to follow each step exactly in the order given. Read over the entire manual to become familiar with all procedures and to learn which specialty tools and replacement parts will be required before commencing disassembly. Keep the manual open beside you for reference while performing each procedure. Do not rely on memory.
2. All service and repair should be carried out in a work area specifically set up and equipped for the task. Adequate lighting, cleanliness, and easy access to all required tools are essential for an efficient repair facility.
3. During disassembly, reusable components should be segregated and not allowed to intermix with non-reusable parts or parts from other units. Delicate parts, including inlet fittings and valve seats which contain critical sealing surfaces, must be protected and isolated from other parts to prevent damage during the cleaning procedure.
4. Use only genuine Apeks parts provided in the 1st stage service kit (AP0241). DO NOT attempt to substitute an Apeks part with another manufacturer's, regardless of any

1. Using the appropriate spanners, remove all of the hoses from the first stage. Remove the ‘O’ ring from inside the Hose Swivel. Exercise caution not to scratch the ‘O’ ring groove. Remove the ‘O’ ring from the Hose Nut end of the Hose.



Removal of Balance Plug Assembly

6. Using a 6mm Allen key unscrew the Balance Plug (18) and withdraw the Balance Plug assembly.




7. Separate the Balance Plug assembly by pulling on each end.



8. Remove the three 'O' rings from the Balance Plug (18), taking care not to scratch the 'O' ring grooves.





Removal of Dry Sealed Chamber

9. Using a C Spanner (PN AT30) unscrew the Environmental End Cap (1). Remove the Load Transmitter (3,4) from inside the Diaphragm Clamp (6).




10. Using the same C Spanner (PN AT30) unscrew the Diaphragm Clamp (6). This will remove the Spring Adjuster (4,5) and the Spring (7). Remove the Hydrostatic Diaphragm (2) from the Environmental End Cap (1).





Removal of Black Pearl, Tungsten and XTX Diaphragm Clamp

10A. Remove the Moulded Ring (5) and using a 34mm open ended spanner unscrew the Diaphragm Clamp (6).




☞ **NOTE:** *The thickness of the spanner must not exceed 11mm or it will not fit between the thread and the flange. The correct spanner can be purchased from Apeks (PN AT47)*

11. Remove the Spring Carrier (8) and using an 'O' ring removal tool carefully prise the Diaphragm (9) out.




☞ **NOTE:** *Take care when removing the Diaphragm so as not to damage the seating face of the Valve Body (11).*

12. Remove the Valve Lifter (10) from the Valve Body (11).



NOTE: *If the First Stage has a DIN Connection, go to step 13: if it has a Yoke Connection follow step 14.*

Removal of Din Connection

13. Using a 6mm Allen key, unscrew the DIN Connection Assembly and separate into four pieces. Remove the 'O' ring from the end of the Handwheel connector (33).









Removal of Yoke Connection

14. Unscrew the Yoke Clamp Screw (24) and remove the Protective Cap (22) from the Yoke Clamp (19). Using a 3/4" A/F spanner, loosen the Yoke Clamp Connector (20). Unscrew the Yoke Connector and Yoke Clamp. Remove the 'O' ring from the Yoke Clamp Connector (20).









15. Insert a dowel through the open end of the Yoke Clamp Connector (20) and push out the Disc Filter (21).



Removal of Removable HP Valve Seat (FSR Only)

CAUTION: Before proceeding, make sure you are working over a padded work surface: otherwise, the Removable HP Valve Seat (13) may be damaged during removal.

16. Unscrew the Valve body (11) from the First Stage Work Handle (PN AT48).To remove the HP Valve Seat (13) from the FSR Valve Body (11) locate the end of the ATX200 HP Seat Tool (PN AT53) inside the small hole. Gently slide the tool into the hole, this will push the HP Valve Seat out of the bottom of the Valve Body (11).







17. Remove the 'O' ring from the HP Valve Seat (13).



This Ends Disassembly

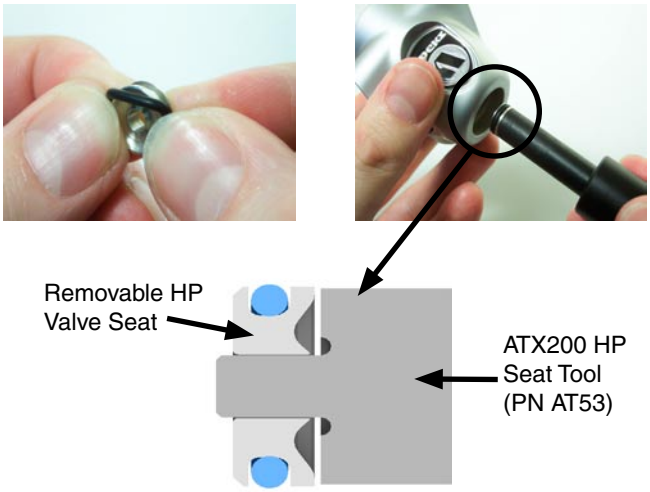
Before starting reassembly, perform parts cleaning and lubrication according to the procedures outlined in 'Cleaning & Lubrication' on page 14.

REASSEMBLY PROCEDURES

Fitting of Removable HP Valve Seat (FSR Only)

1. Install a new lubricated 'O' ring (12) onto the Removable HP Valve Seat (13). Locate the Removable HP Valve Seat onto the end of the ATX200 HP Seat Tool (PN AT53). Ensure that the seating face of the Valve Seat is against the Seat Tool. Firmly push the Seat Tool into the Valve Body (11) until the Removable HP Valve Seat is located at the bottom of the bore.

WARNING: The regulator will not operate if the Removable HP Valve Seat is inserted into the Valve Body incorrectly.



Assembling and fitting of Yoke Connection

2. Insert a new Disc Filter (21) with the smooth side out, into the Yoke Clamp Connector (20). Install a new lubricated 'O' ring (12) into the end of the Connector.



3. Insert the Yoke Clamp Connector (20) through the Yoke Clamp (19). With the Valve Body held so that the inlet connection port points down, screw the Yoke Clamp Connector into the Valve Body (11) until finger tight.



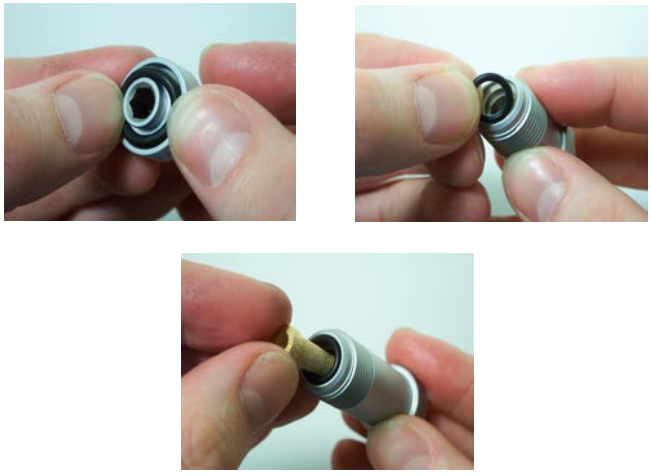
CAUTION: If the Yoke Clamp Assembly is not held vertically whilst it is screwed into the Valve Body, the 'O' ring in the end of the Yoke Clamp Connector may not remain in the correct position.

4. Secure the Valve Body (11) back into the vice using the First Stage Work Handle (PN AT48). Tighten the Yoke Clamp Connector using a 3/4" A/F spanner. Install the Protective Cap (22) with the logo facing outwards, onto the Yoke Clamp (19). Screw the Yoke Clamp Screw (24) back into the Yoke Clamp (19), until the Protective Cap (22) is retained in place.



Assembling and fitting of DIN Connection

5. Install a new 'O' ring (23) into the face of the Handwheel Connector (33). Install a new lubricated 'O' ring (12) into the opposite end of the Connector. Install the Conical Filter (35) into the Connector, through the 'O' ring.



NOTE: *Ensure that the 'O' ring is retained in the Connector after the Conical Filter has been fitted.*

6. Insert the threaded end of the Handwheel Connector through the threaded end of the Handwheel (32). With the Valve Body held so that the inlet connection port points down, screw the Handwheel Connector into the Valve Body (11) until finger tight.



CAUTION: If the Handwheel Connector Assembly is not held vertically whilst it is screwed into the Valve Body, the 'O' ring in the end of the Handwheel Connector may not remain in the correct position.

7. Secure the Valve Body (11) back into the vice using the First Stage Work Handle (PN AT48). Tighten the Handwheel Connector (33) using a 6mm Allen key bit in a torque wrench to 20 Nm.



Fitting of Dry Sealed Chamber

8. Drop the Valve Lifter (10) through the centre hole of the Valve Body (11). Press a new Diaphragm (9) into the Body. Run your finger around the edge of the diaphragm to make sure it is properly seated.





9. Place the Spring Carrier (8), flat side down, in the centre of the diaphragm. Place the Spring (7) on the Spring Carrier. Thread the Diaphragm Clamp (6) onto the Valve Body (11), making sure that the Spring (7) remains on the Spring Carrier (8), until hand tight. Using a C Spanner (PN AT30) tighten the Diaphragm Clamp (6) until there is metal to metal contact.









Fitting of Black Pearl, Tungsten and XTX Diaphragm Clamp

9A. Thread the Diaphragm Clamp (6) onto the Valve Body (11), making sure that the Spring (7) remains on the Spring Carrier (8), until hand tight. Using a 34mm Spanner (PN AT47) tighten the Diaphragm Clamp (6) until there is metal to metal contact. Refit the Moulded Ring (5).





10. Fit new Lubricated 'O' rings (12 & 17) onto the H.P. Balance Plug. Install a new lubricated 'O' ring (16) into the end of the H.P Balance Plug.







11. Press the Spring (15) onto the end of the H.P. Balance Plug. Carefully insert a new H.P. Valve (14) into the Valve Body (11) making sure that it slides onto the shaft of the Valve Lifter (10).





12. Insert the H.P. Balance Plug (18) into the Valve Body (11) and tighten using a 6mm Allen key bit in a torque wrench to to 8 Nm.





WARNING: Compressed air can be highly explosive and is dangerous if misused. Ensure cylinder valve is opened slowly. Use Eye and Ear Personal Protective Equipment when performing any tests involving Compressed air.

Adjusting the First Stage

1. Attach the first stage (with no Blanking Plugs fitted) to a fully charged 232 or 300 bar cylinder. Slowly open the cylinder valve, this will remove any particles or contaminants from the first stage.



2. Install new lubricated 'O' rings (12,28,29) on all of the Blanking Plugs (27,31,30). Using a 5mm Allen key, install all of the Blanking Plugs into the Valve Body.



WARNING: The primary MP port is 1/2" UNF (except XTX models). When adjusting the regulator, install either a 1/2" UNF Blanking Plug (30) or a 1/2" UNF hose with a properly adjusted second stage. Alternatively, you may use a 3/8" UNF female to 1/2" UNF male adapter attached to the LP test gauge, as long as the test gauge has a built in pressure relief.

3. Attach a MP test gauge (0 - 20 bar) to a medium pressure hose and thread the hose into a MP port. If your test gauge does not have an over pressure relief valve, you must also attach a proplery adjusted second stage to the first stage to act as the relief valve in case of a HP leak. Make sure Blanking Plugs are installed in any open ports.



CAUTION: If the pressure gauge rapidly exceeds 11 bar, then there is a HP leak. Quickly close the cylinder valve and purge the regulator. Refer to the troubleshooting table for the causes of the leak.

4. Assuming there are no leaks, close the cylinder valve and depressurise the regulator by opening the gauge relief valve or by pressing the purge button of the second stage regulator. Adjust the medium pressure by turning the Spring Adjuster (4,5): Turning in the Spring Adjuster increases the MP; Turning out the Spring Adjuster decreases the MP. Turn the Spring Adjuster in 1/8th turn increments and purge the relief valve several times after each adjustment. When the MP is between 9 and 10 bar , purge the relief valve on and off 10-15 times. After cycling, watch the gauge needle. The first stage MP should "lock-up" between 9 and 10 bar. Make any adjustments as necessary. Allow the first stage to stay pressurised for several minutes and check the MP again to make sure it remains "locked-up" between 9 and 10 bar. If the MP creeps upward more than 0.25 bar, then there is a leak. Refer to the troubleshooting table for possible causes.



5. Close the cylinder valve and depressurise the regulator by opening the gauge relief valve or by pressing the purge button of the second stage regulator. Close the relief valve and repressurise the system. The MP should still read between 9 and 10 bar. If the pressure reading is different than the original setting, repeat steps 3 and 4 until the MP is stable.

Final Assembly

1. With the regulator still pressurised, insert the Load Transmitter (3,4) into the Diaphragm Clamp (6). Press a new Hydrostatic Diaphragm (2) into the Environmental End Cap (1).





NOTE: *The Pour Moulded* Hydrostatic Diaphragm (2) in the Black Pearl, Tungsten and XTX does not need to be replaced with a new one.

2. Thread the Environmental End Cap (1) onto the Diaphragm Clamp (6) until hand tight. Using the C Spanner (PN AT30), tighten the Environmental End Cap (1) until there is metal to metal contact. Re-check the medium pressure, making sure that it is still between 9 and 10 bar.







3. Close the cylinder valve and depressurise the regulator. Remove the test gauge and reinstall the Blanking Plug.

This Ends Reassembly

IMMERSION TEST

With the Blanking Plugs and at least one properly adjusted second stage installed, slowly open the cylinder valve and pressurise the first stage. Completely Submerge the first stage in fresh water and check for leaks.

NOTE: *Do not confuse bubbles from trapped air with a true air leak. If there is an air leak, bubbles will come out in a steady constant stream.*

Assuming that there are no leaks, close the cylinder valve and depressurise the regulator. Remove the first stage from the valve and secure the Protective Cap (22) in place with the Yoke Clamp Screw (24). If the regulator has a DIN connection replace the Protective DIN Cap (34).

If a leak is detected, note the source of the leak and refer to the troubleshooting table on page 11 for possible causes and corrective actions.

This Ends Testing

Table 1 - Troubleshooting Guide

SYMPTOM	POSSIBLE CAUSE	TREATMENT
High Pressure Creep (also causes second stage leaks)	1. HP Valve (14) is worn or damaged.	1. Replace HP Valve.
	2. Removable HP Valve Seat(13) is worn or damaged. (FSR Only)	2. Replace Removable HP Valve Seat.
	3. 'O' ring on Removable HP Valve Seat (12) is damaged or worn.	3. Replace 'O' ring.
	4. HP Balance Plug internal wall damaged.	4. Replace HP Balance Plug.
	5. 'O' ring inside HP Balance Plug (16) is damaged or worn.	5. Replace 'O' ring.
	6. 'O' ring on HP Balance Plug (12) is damaged or worn.	6. Replace 'O' ring.
	7. HP Valve Seat in Valve Body (11) is worn or damaged. (FST Only)	7. Replace Valve Body.
External air leakage or Secondary diaphragm distended or burst	1. Blanking Plug 'O' rings (12,28,29) are worn or damaged.	1. Replace 'O' Ring.
	2. Diaphragm (9) worn or damaged.	2. Replace diaphragm.
	3. Diaphragm seating surface damaged.	3. Replace Valve Body.
	4. Connector 'O' ring (12) worn or damaged.	4. Replace 'O' Ring.
	5. Diaphragm Clamp (6) loose.	5. Tighten Diaphragm Clamp.
	6. 'O' ring on HP Balance Plug (17) worn or damaged.	6. Replace 'O' Ring.
Restricted air flow or high inhalation resistance through entire system	1. Cylinder valve not completely open.	1. Open valve, check fill pressure.
	2. Cylinder valve requires servicing	2. Switch to different cylinder.
	3. Conical Filter (35) or Disc Filter (21) is clogged.	3. Replace filter.
	4. Very Low Medium Pressure.	4. Adjust Medium Pressure to between 9 and 10 bar.

Table 2 - Recommended Tool List

PART NO.	DESCRIPTION	APPLICATION
AP0430	I.P. test gauge	Intermediate pressure testing
AT54	'O' Ring removal pick	'O' Ring removal
AT30	C spanner	Removal of Diaphragm Clamp & End Cap
AT48	First Stage Work Handle	Clamping Valve Body in Vice
AT53	Removable HP Valve Seat Tool	Removal and installation of HP Valve Seat (FSR)
n/a	Torque wrench, Nm or lbf/ft	Installation of Balance Plug & DIN Connection
n/a	6mm Allen key bit for torque wrench	Installation of Balance Plug & DIN Connection
AT34	11/16" spanner	Hose Removal
AT37	5mm Allen key	Blanking Plugs
AT38	6mm Allen key	Removal of Balance Plug, DIN Connection & Spring Adjuster
AT47	34mm open ended spanner	Removal of Black Pearl, Tungsten and XTX Diaphragm Clamp
AT33	3/4" ring spanner	Removal and installation of Yoke Clamp Connector
n/a	232 or 300 bar Diving cylinder	Testing of regulator

Table 3 - Recommended Lubricants & Cleaners

LUBRICANT / CLEANER	APPLICATION	SOURCE
Christo-Lube® MCG-111 (Lubricant)	All 'O' Ring seals	Apeks Marine Equipment Ltd PN AP1495, or Lubrication Technologies 310 Morton Street Jackson, OH 45640, USA (800) 477-8704
CAUTION: Silicone rubber requires no lubrication or preservative treatment. DO NOT apply grease or spray to silicone rubber parts (eg. Diaphragm, Exhaust Valves.) Doing so may cause a chemical breakdown and premature deterioration of the material.		
Biox (Cleaning agent)	Biological immersion fluid for reusable stainless steel and brass parts.	Solent Divers Ltd 122-128 Lake Rd, Portsmouth, Hants, PO1 4HH
White distilled vinegar (100 gr.) (Cleaning agent)	Acid bath for reusable stainless steel and brass parts.	"Household" grade
CAUTION: Do not use muriatic acid for the cleaning of any parts. Even if strongly diluted, muriatic acid can harm chrome plating and may leave a residue that is harmful to 'O' Ring seals and other parts		
Liquid dishwashing detergent diluted with warm water (Cleaning agent)	Degreaser for brass and stainless steel parts; general cleaning solution for plastic and rubber	"Household" grade

Cleaning & Lubrication Procedure

General Cleaning of all Parts

1. Place all components in an ultrasonic cleaning bath containing an appropriate cleaning solution, such as Biox.
2. The components should be cleaned for 6 minutes, depending upon their condition. Longer cleaning times may used if required.
3. Rinse the components in warm fresh water.
4. The components should then be blown dry or left to dry naturally.

Lubrication and Dressing

All 'O' Rings should be lubricated with Christo-Lube® MCG-111. Dress the 'O' Rings with a very light film of grease, and remove any visible excess by running the 'O' Ring between thumb and forefinger. Avoid applying excessive amounts of Christo-Lube grease, as this will attract particulate matter that may cause damage to the 'O' Ring.

Nitrox

When it comes to issues of nitrox safety and compatibility, the concerns lie primarily with the first stage as it is subjected to high inlet pressures. High inlet pressures lead to adiabatic compression or heating of the gas. As they leave the factory, standard Apeks regulators are suitable for use with oxygen enriched gases (i.e. nitrox, etc.) providing the oxygen content does NOT EXCEED 40% (EAN40).

Any Apeks regulator, when properly cleaned, lubricated and assembled, is authorised for use with enriched air nitrox (EAN) up to 100% (EAN100). It is authorised because it has undergone adiabatic compression testing and the authorised service kit components and lubricants are compatible in elevated oxygen environments. During cleaning, a mild detergent is used to remove condensed hydrocarbons (compressor oils) from the inside passageways of the first stage. For the first stage to remain EAN100 compatible, only use hyperfiltered compressed gas (hydrocarbons < 0.1 mg/m3). Ordinary compressed breathing air to BS EN 12021:1999 does not meet this criteria. Once ordinary breathing air is used, the first stage is no longer EAN100 compatible until it is cleaned and serviced again.

Although regulator second stage components are not exposed to high pressure EAN, Apeks recommends that the same cleaning procedures be followed for the complete regulator. This prevents the possibility of cross contamination and guarantees the cleanliness of the entire regulator.

WARNING: Please check the regulations regarding Nitrox in your particular country as this may differ from Apeks standard policy.

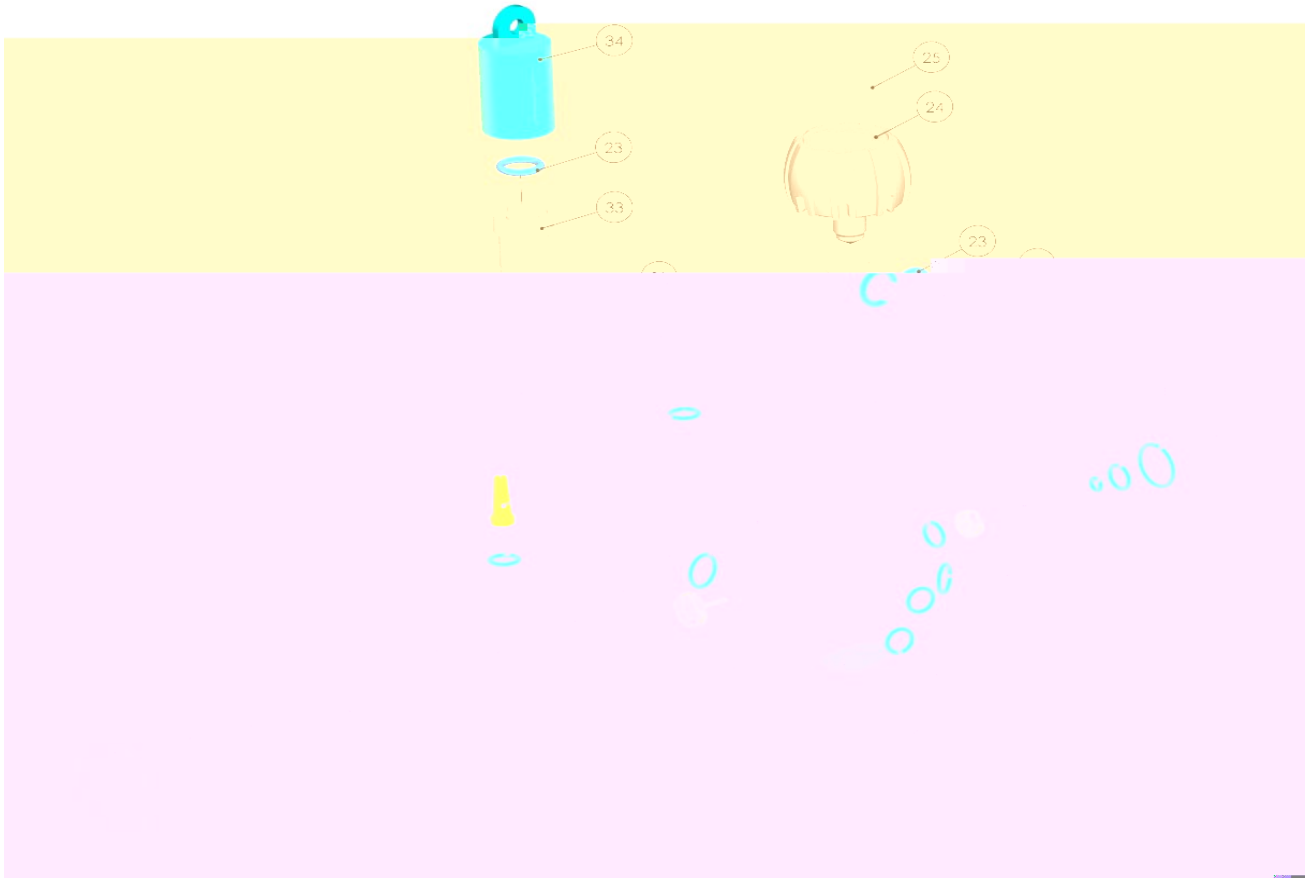
Table 4 - Torque Specifications

PART NUMBER	DESCRIPTION / KEY NUMBER	TORQUE
AP1471, AP1471/PVD	Handwheel Connector (33)	20 Nm / 14.7 lbf/ft
AP5309	H.P. Balance Plug (18)	8 Nm / 5.9 lbf/ft

Table 5 - Test Bench Specifications

TEST	CONDITION	ACCEPTABLE RANGE
Leak Test	Inlet pressure 150 - 232 bar	No Leaks allowed
Medium Pressure	Inlet pressure 150 - 232 bar	9 to 10 bar
Medium Pressure Creep	Inlet pressure 150 - 232 bar	0.25 bar max for 15 seconds after purging regulator

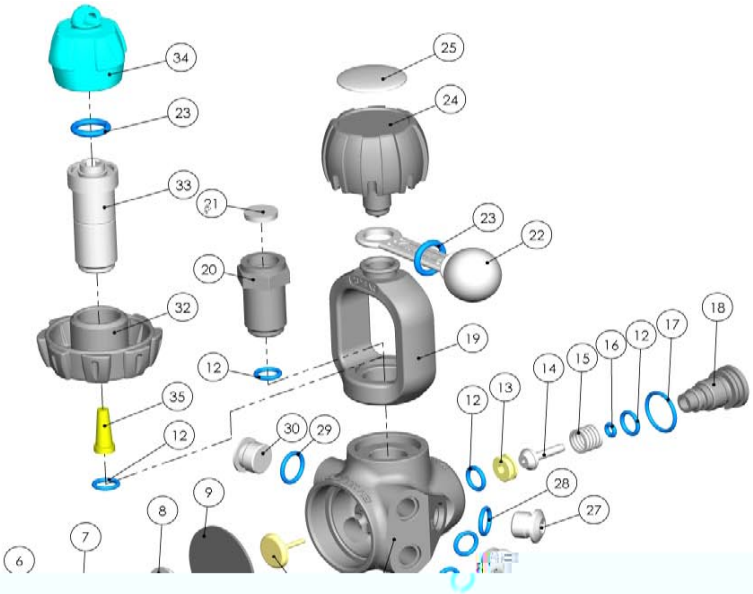
FSR (ATX200) Exploded Parts Diagram



* All marked items must be replaced when serviced.

1	AP1484/S	Environmental End Cap	19	AP1403/S	Yoke Clamp
2*	AP1482	Hydrostatic Diaphragm	20	AP1407/S	Yoke Clamp Connector
3	AP1477	Environmental Decal	21*	AP1406	Disc Filter
4	AP1483	Hydrostatic Transmitter	22	AP1404	Protective Cap
5	AP1474	Spring Adjuster	23*	AP1166	‘O’ Ring
6	AP1473	Diaphragm Clamp	24	AP1400	Yoke Clamp Screw
7	AP1475	Spring	25	AP5015	Decal
8	AP1476	Spring Carrier	26	AP5723	Decal
9*	AP1478	Diaphragm	27	AP1413	7/16” UNF Blanking Plug
10	AP5722	Valve Lifter	28*	AP1445	‘O’ Ring
11	AP5720/S	Valve Body	29*	AP1410	‘O’ Ring
12*	AP1409	‘O’ Ring	30	AP1487	1/2” UNF Blanking Plug
13	AP5721	Removable H.P. Valve Seat	31	AP1408	3/8” UNF Blanking Plug
14*	AP1419	H.P. Valve	32	AP1470	Handwheel 300 Bar
15	AP1415	Spring	33	AP1471/S	Handwheel Connector
16*	AP1299	‘O’ Ring	34	AP1264	Protective DIN Cap
17*	AP1300	‘O’ Ring	35*	AP1472	Conical Filter
18	AP5309	H.P. Balance Plug			

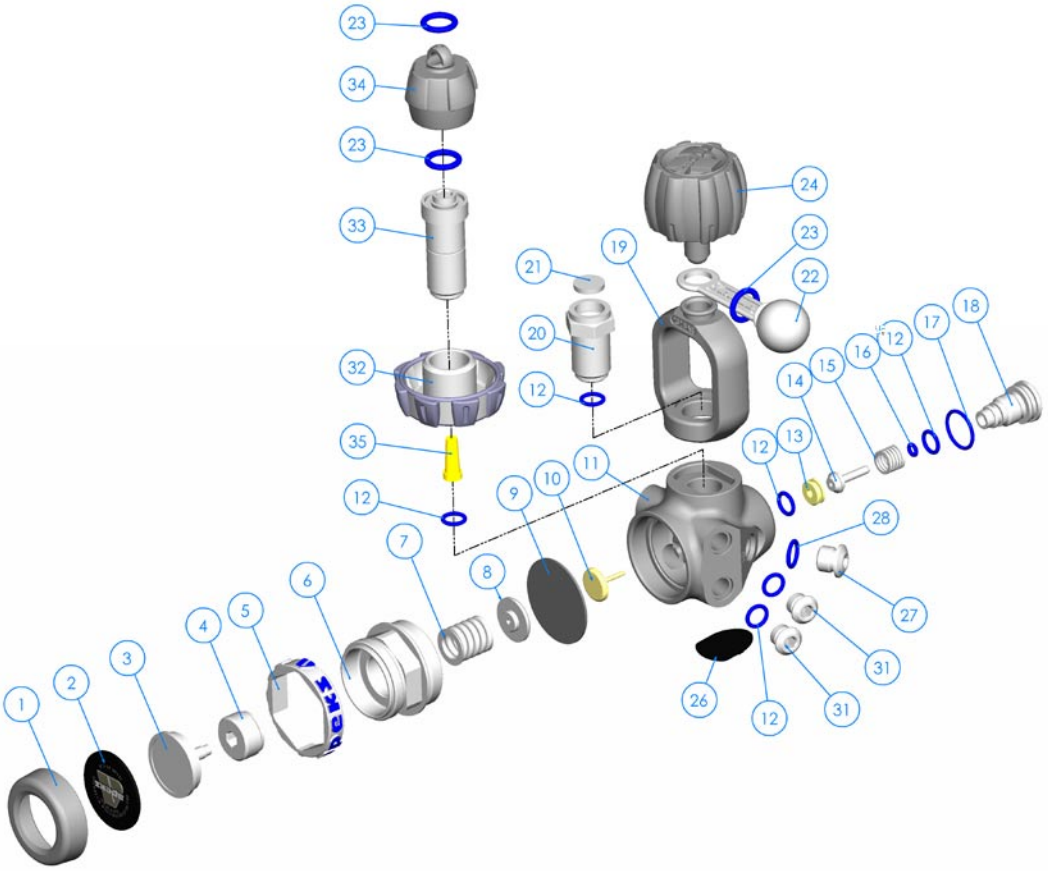
FSR Black Pearl Exploded Parts Diagram



* All marked items must be replaced when serviced.

1	AP1484/PVD	Environmental End Cap	19	AP1403/PVD	Yoke Clamp
2	AP1482-1	Hydrostatic Diaphragm	20	AP1407/PVD	Yoke Clamp Connector
3	AP1483	Hydrostatic Transmitter	21*	AP1406	Disc Filter
4	AP1474	Spring Adjuster	22	AP1404	Protective Cap
5	AP5727	Moulded Date Ring	23*	AP1166	‘O’ Ring
6	AP1473-1	Diaphragm Clamp	24	AP1400/PVD	Yoke Clamp Screw
7	AP1475	Spring	25	AP5730	Black Pearl Decal
8	AP1476	Spring Carrier	26	n/a	
9*	AP1478	Diaphragm	27	AP1413	7/16” UNF Blanking Plug
10	AP5722	Valve Lifter	28*	AP1445	‘O’ Ring
11	AP5726	Black Pearl Valve Body	29*	AP1410	‘O’ Ring
12*	AP1409	‘O’ Ring	30	AP1487	1/2” UNF Blanking Plug
13	AP5721	Removable H.P. Valve Seat	31	AP1408	3/8” UNF Blanking Plug
14*	AP1419	H.P. Valve	32	AP6201/PVD	DIN Moulded Handwheel
15	AP1415	Spring	33	AP1471/PVD	Handwheel Connector
16*	AP1299	‘O’ Ring	34	AP6202	DIN Protective Cap
17*	AP1300	‘O’ Ring	35*	AP1472	Conical Filter
18	AP5309/PVD	H.P. Balance Plug			

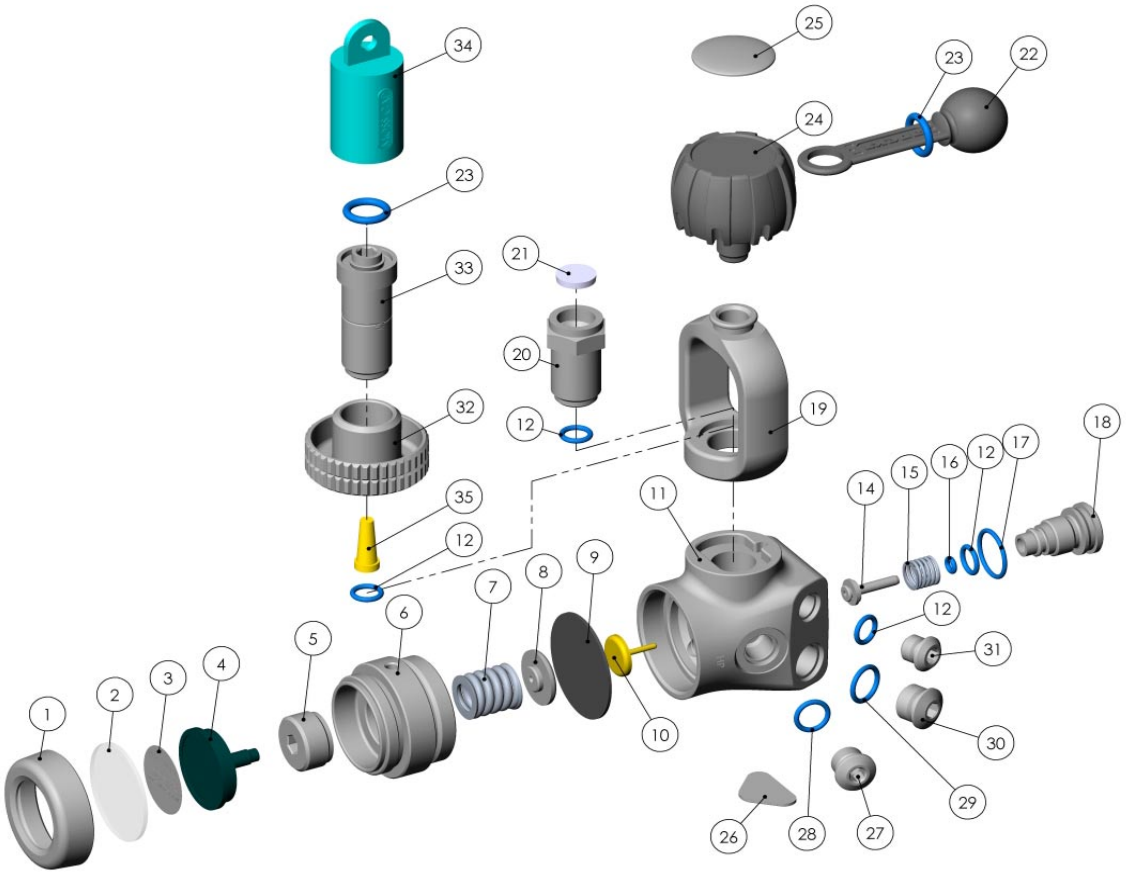
FSR Tungsten Exploded Parts Diagram



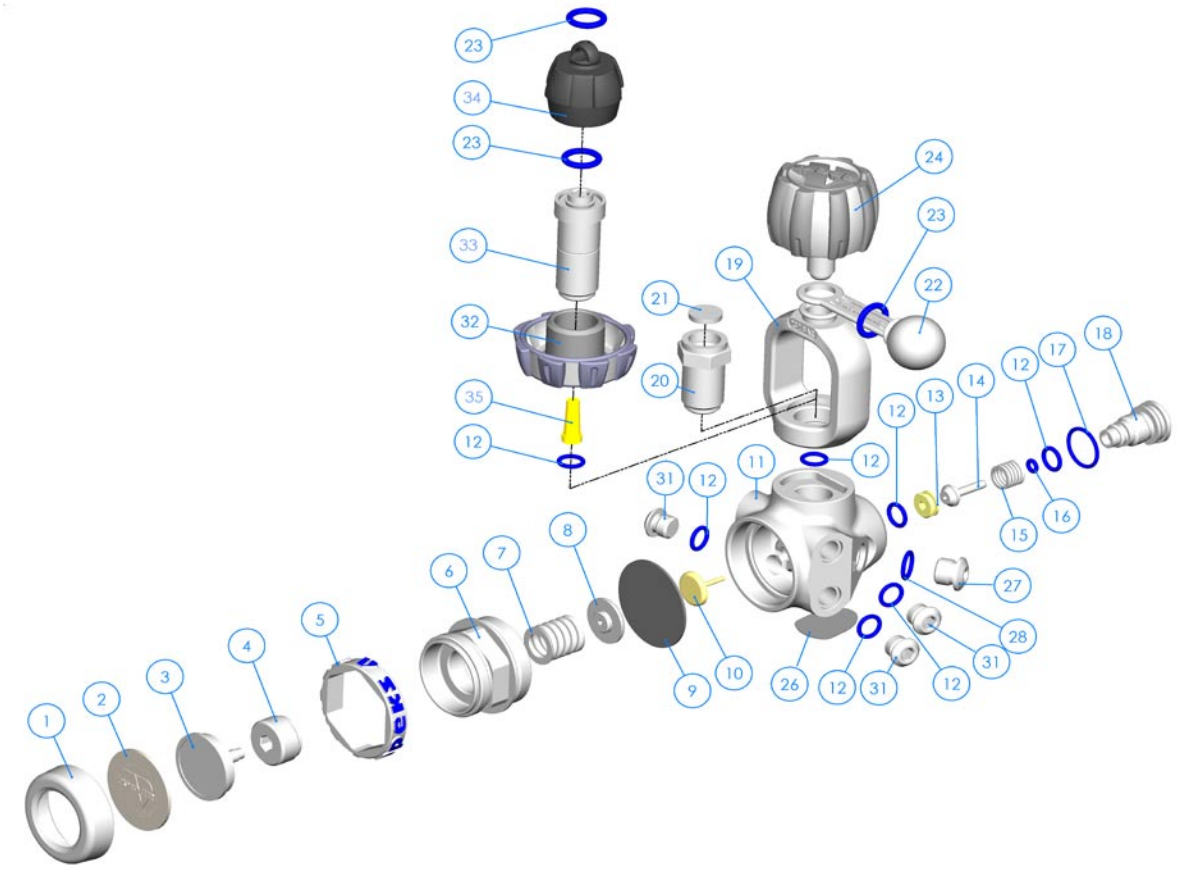
* All marked items must be replaced when serviced.

1	AP1484/PVDS	Environmental End Cap	19	AP1403/PVDS	Yoke Clamp
2	AP1482-1	Hydrostatic Diaphragm	20	AP1407/PVDS	Yoke Clamp Connector
3	AP1483	Hydrostatic Transmitter	21*	AP1406	Disc Filter
4	AP1474	Spring Adjuster	22	AP1404	Protective Cap
5	AP5725	Moulded Logo Ring	23*	AP1166	‘O’ Ring
6	AP1473-1	Diaphragm Clamp	24	AP1402	2 Shot ‘A’ Clamp Knob
7	AP1475	Spring	25	n/a	
8	AP1476	Spring Carrier	26	AP5739	Tungsten Decal
9*	AP1478	Diaphragm	27	AP1413	7/16” UNF Blanking Plug
10	AP5722	Valve Lifter	28*	AP1445	‘O’ Ring
11	AP5726/PVDS	Tungsten Valve Body	29*	AP1410	‘O’ Ring
12*	AP1409	‘O’ Ring	30	AP1487	1/2” UNF Blanking Plug
13	AP5721	Removable H.P. Valve Seat	31	AP1408	3/8” UNF Blanking Plug
14*	AP1419	H.P. Valve	32	AP6201	DIN Moulded Handwheel
15	AP1415	Spring	33	AP1471/PVDS	Handwheel Connector
16*	AP1299	‘O’ Ring	34	AP6202	DIN Protective Cap
17*	AP1300	‘O’ Ring	35*	AP1472	Conical Filter
18	AP5309/B	H.P. Balance Plug			

FST (ATX100 / TX100) Exploded Parts Diagram


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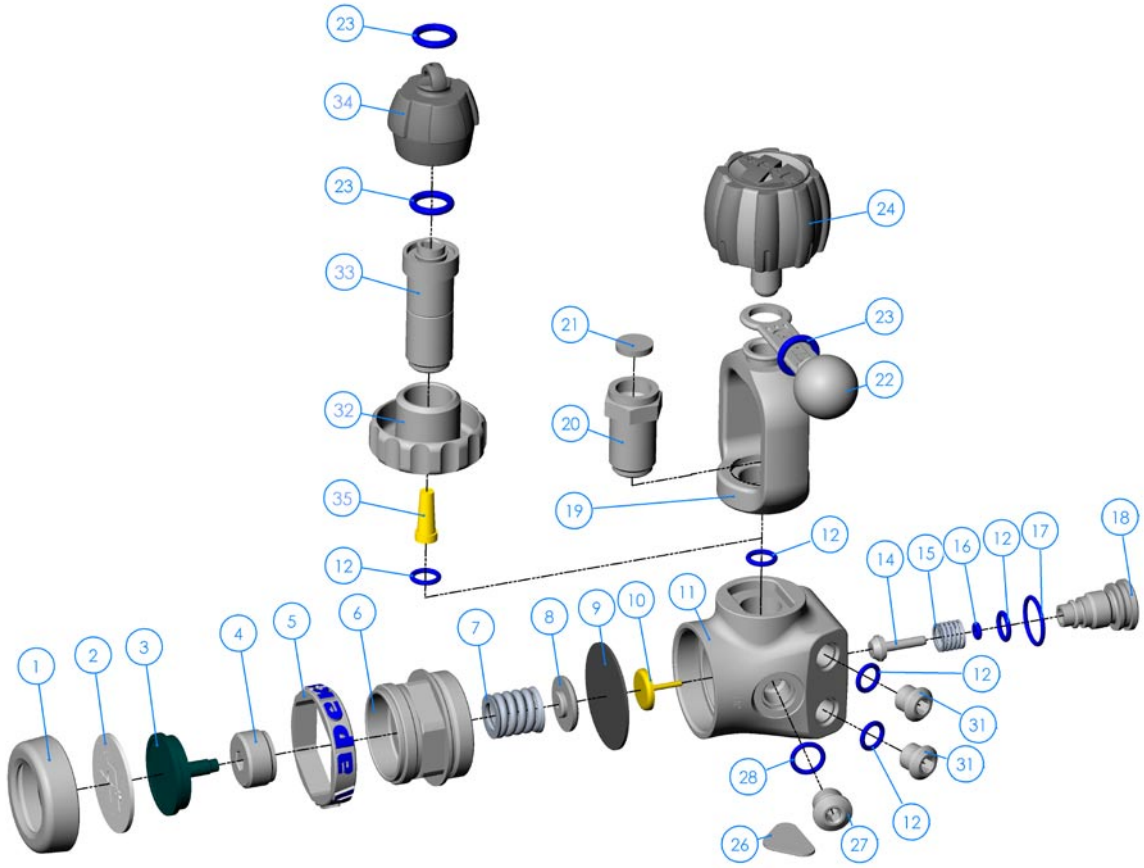
FSR (XTX 200) Exploded Parts Diagram



* All marked items must be replaced when serviced.

1	AP1484	Environmental End Cap	19	AP1403	Yoke Clamp
2	AP1482-1	Hydrostatic Diaphragm	20	AP1407	Yoke Clamp Connector
3	AP1483	Hydrostatic Transmitter	21*	AP1406	Disc Filter
4	AP1474	Spring Adjuster	22	AP1404	Protective Cap
5	AP5725	Moulded Logo Ring	23*	AP1166	‘O’ Ring
6	AP1473-1	Diaphragm Clamp	24	AP1402/B	2-Shot ‘A’ Clamp Knob
7	AP1475	Spring	25	n/a	
8	AP1476	Spring Carrier	26	AP5723	Decal
9*	AP1478	Diaphragm	27	AP1413	7/16” UNF Blanking Plug
10	AP5722	Valve Lifter	28*	AP1445	‘O’ Ring
11	AP5101	XTX FSR Body	29	n/a	
12*	AP1409	‘O’ Ring	30	n/a	
13	AP5721	Removable H.P. Valve Seat	31	AP1408	3/8” UNF Blanking Plug
14*	AP1419	H.P. Valve	32	AP6201	DIN Moulded Handwheel
15	AP1415	Spring	33	AP1471	Handwheel Connector
16*	AP1299	‘O’ Ring	34	AP6202	DIN Protective Cap
17*	AP1300	‘O’ Ring	35	AP1472	Conical Filter
18	AP5309/B	H.P. Balance Plug			

FST (XTX100) Exploded Parts Diagram



* All marked items must be replaced when serviced.

1	AP1484/S	Environmental End Cap	19	AP1403/S	Yoke Clamp
2	AP1482-1	Hydrostatic Diaphragm	20	AP1407/S	Yoke Clamp Connector
3	AP1483	Hydrostatic Transmitter	21*	AP1406	Disc Filter
4	AP1474	Spring Adjuster	22	AP1404	Protective Cap
5	AP5725	Moulded Logo Ring	23*	AP1166	'O' Ring
6	AP1473-1	Diaphragm Clamp	24	AP1402	2-Shot 'A' Clamp Knob
7	AP1475	Spring	25	n/a	
8	AP1476	Spring Carrier	26	AP5723	Decal
9*	AP1478	Diaphragm	27	AP1413	7/16" UNF Blanking Plug
10	AP1479	Valve Lifter	28*	AP1445	'O' Ring
11	AP5102	XTX FST Body	29	n/a	
12*	AP1409	'O' Ring	30	n/a	
13	n/a		31	AP1408	3/8" UNF Blanking Plug
14*	AP1419	H.P. Valve	32	AP1470/S	Handwheel 300 Bar
15	AP1415	Spring	33	AP1471/S	Handwheel Connector
16*	AP1299	'O' Ring	34	AP6202	Protective DIN Cap
17*	AP1300	'O' Ring	35*	AP1472	Conical Filter
18	AP5309	H.P. Balance Plug			



FSR & FST FIRST STAGE REGULATOR

MAINTENANCE MANUAL
FOR
AUTHORISED TECHNICIANS

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