



apeks
TECHNICAL SUPPORT

LOW PROFILE AUTO DUMP VALVE



MAINTENANCE MANUAL FOR AUTHORISED TECHNICIANS

Document No. AP 5921

Issue 2
09/11/06

APEKS MARINE EQUIPMENT LTD, NEPTUNE WAY, BLACKBURN, LANCASHIRE. BB1 2BT
Tel: 0044 (0) 1254 692200 Fax: 0044 (0) 1254 692211 E-mail: info@apeks.co.uk Web: www.apeks.co.uk

AMENDMENTS RECORD:

Amendments and approval of this document can only be carried out by the relevant people listed on the Approved list of signatures, which is listed in the Apeks Quality Manual. To instigate a change, a Task / Change request form, (Form No. 'DESI/10002'), must be completed and passed to the relevant person(s) for approval which are listed on the Approved List of Signatures. When approval has been granted and recorded this table can then be completed and the document up issued.

Change No.	Change Request No.	Description & Comments:	Change Date	New Issue No.	Changed By:	Approved By:
0843	crs0069	Added photos of tools and corrected AT44 to AT46	9/11/06	2	JLH	ACD

Contents

COPYRIGHT NOTICE	4
INTRODUCTION	4
WARNINGS, CAUTIONS & NOTES	4
SCHEDULED SERVICE	4
GENERAL GUIDELINES	4
GENERAL CONVENTIONS.....	5
DISASSEMBLY PROCEDURES	5
REASSEMBLY PROCEDURES.....	7
TESTING PROCEDURE	9
TABLE 1 - TROUBLESHOOTING GUIDE.....	10
TABLE 2 - RECOMMENDED TOOL LIST.....	11
TABLE 3 - RECOMMENDED LUBRICANTS AND CLEANERS	12
CLEANING AND LUBRICATION PROCEDURE	13
TABLE 4 -TORQUE SPECIFICATIONS	14
TABLE 5 - TEST BENCH SPECIFICATIONS	14
EXPLODED PARTS DRAWING.....	15

COPYRIGHT NOTICE

This manual is copyrighted, all rights reserved. It may not, in whole or in part, be copied, photocopied, reproduced, translated, or reduced to any electronic medium or machine readable form without prior consent in writing from Apeks Marine Equipment Ltd. It may not be distributed through the internet or computer bulletin board systems without prior consent in from Apeks Marine Equipment Ltd.

©2006 Apeks Marine Equipment Ltd.

Low Profile Auto Dump Valve Maintenance Manual
(AP5921 Issue 2)

INTRODUCTION

This manual provides factory prescribed procedures for the correct maintenance and repair of the Apeks Low Profile Auto Dump Valve. 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 Low Profile Dump Valve should be rinsed in fresh water after use, the operation of the valve should be checked annually and they should be stripped down and serviced every three years.

However, If at all unsure about the correct functioning of the Apeks low profile dump valve, then it must be officially inspected immediately.

An Official Inspection consists of:

1. Testing instructions see page 8.
2. Checking that all parts are assembled correctly and that no parts are loose.
3. A visual inspection of the exhaust valve looking for tears or holes and checking the general condition.

If a valve fails any of the 3 steps it should be fully serviced.

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 Low Profile Auto Dump Kit (AP0237). DO NOT attempt to substitute an Apeks part with another manufacturer's, regardless of any similarity in shape or size.
5. Do not attempt to reuse mandatory replacement parts under any circumstances, regardless of the amount of use the product has received since it was manufactured or last serviced.
6. When reassembling, it is important to follow every torque specification prescribed in this manual, using a calibrated torque wrench. Most parts are made of plastic, and can be permanently damaged by undue stress.

GENERAL CONVENTIONS

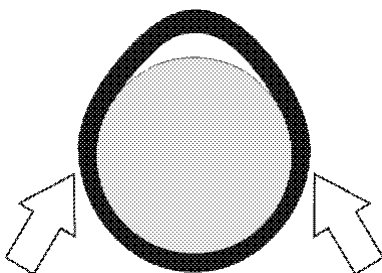
Unless otherwise instructed, the following terminology and techniques are assumed:

1. When instructed to remove, unscrew, or loosen a threaded part, turn the part anti-clockwise.
2. When instructed to install, screw in, or tighten a threaded part, turn the part clockwise.
3. When instructed to remove an 'O' Ring, use the pinch method (see figure below) if possible, or use a brass, aluminium or plastic 'O' Ring removal tool. Avoid using hardened steel picks, as they may damage 'O' Ring sealing surfaces. All 'O' Rings that are removed are discarded and replaced with brand new 'O' Rings.

Pinch Method


Press upwards on sides of 'O' Ring to create a protrusion.


Grab 'O' Ring or insert 'O' Ring tool at protrusion.



4. The following acronyms are used throughout the manual: MP is Medium Pressure; HP is High Pressure; PN is Part Number.
5. Numbers in parentheses reference the key numbers on the exploded parts schematics. For example, in the statement, "...remove 'O' ring (4) from...", the number 4 is the key number to the Spring Carrier 'O' Ring.

DISASSEMBLY PROCEDURES

 **NOTE:** Before performing any disassembly, refer to the exploded parts drawing, which references all mandatory replacement parts. These parts should be replaced with new, and must not be reused under any circumstances - regardless of the age of the regulator or how much use it has received since it was last serviced.

 **CAUTION:** Use only a plastic, brass or aluminium 'O' Ring removal tool (PN AT54) when removing 'O' Rings to prevent damage to the sealing surface. Even a small scratch across an 'O' Ring sealing surface could result in leakage. Once an 'O' Ring sealing surface has been damaged, the part must be replaced with new. **DO NOT** use a dental pick, or any other steel instrument.

Removal of valve From The Suit.

1. Using the Apeks back nut tool (AT43) and appropriate torque wrench, remove the back nut from the valve.



CAUTION:

To prevent damage to the valve always press down the cap and rotate the back nut not the valve.



2. Remove the valve from the suit and remove the retaining ring.



Removal of the cap

3. Using the removal tool AT46 place over the threads of the valve body (11). The lugs of the tool fit underneath the cap (2). Screw the back nut onto the valve and tighten until the cap becomes displaced. Then remove the back nut and tool.



CAUTION:

Align the clips with the lugs on the tool.




4. Lift out the load transmitter (3).





5. Place a flat ended screwdriver in one of the four recesses around the edge and gently displace the inner cap (6) from the body (13). You may need to use one of the other recesses to remove the inner cap.



 **NOTE:** The adjuster (4) and clip (7) has no need to be removed as long as it rotates freely.


6. Remove the spring (5).



7. Remove the spring carrier (8).



8. Carefully remove the valve (9) ensuring no damage occurs to the sealing edge.

 **NOTE:** Place the valve on a clean piece of sponge, this will prevent other components coming into contact and damaging the sealing edge.




9. Remove the valve seating (10).




10. Remove spring washer (11).



11. Gently lift the exhaust valve (12) and inspect the sealing edge of the exhaust and the sealing face inside the valve body.

 **NOTE:** If there is no sign of deterioration the exhaust valve does not need to be removed.


 **WARNING:** Do not use a sharp implement, if the body or non return valve are damaged the valve will leak.



This Ends Disassembly

Before starting reassembly, perform parts cleaning and lubrication according to the procedures outlined in 'Cleaning & Lubrication' on page 12.

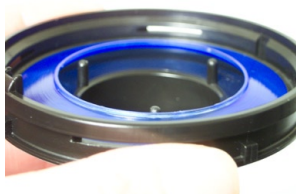
REASSEMBLY PROCEDURES

 **NOTE:** If there is no sign of deterioration the exhaust valve does not need to be removed. In the event of the exhaust valve having been removed, the stalk of the replacement must be trimmed off.

1. Pull the exhaust valve (12) tail through the valve body (13) Trim off the excess.




2. Fit the spring washer (11) into the recess of the body (13) so the washer tapers upwards towards the middle.



3. Fit the valve seating (10) over the spring washer (11), this must lie flat and straight on the spring washer.



 **CAUTION:** The sealing edge of the valve is critical this should be checked for damage by running a finger gently around the edge.



4. Place the valve (9) over the valve seating (10), sealing edge face down.




5. Fit the spring carrier (8) ensuring the small indent on the back locates with the raised pip on the inside of the valve (9).




6. Place the spring (5) onto the spring carrier (8) ensuring that it locates around the raised centre.



 **CAUTION:** If the adjusting screw and clip have previously been removed from the inner cap, the adjuster clip must be refitted chamfer outermost.

7. The stop on the inner cap and the body must be aligned as shown below in green. Push the inner cap (6) into place ensuring all clips are located correctly in the body (13).



 **CAUTION:** The stop on the inner cap and the body must be aligned as shown above. Ensure the clips on the inner cap are inserted fully into the slots in the body. Check for any distortion of the valve body. This distortion could cause the valve to leak.

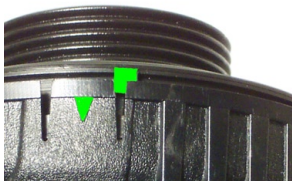
8. Fit the load transmitter (3) through the inner cap (6), this will centralise the valve. Grease the two ratchet pips as shown below by the green arrow.



CAUTION: Before fitting the cap (2), the adjuster (4) in the inner cap (6) must be fully wound down.



9. Line up the stop on the cap (2) to the left of the stop on the body (13) Press the cap down with palm of the hand to clip into place. Rotate the cap approx 350° to ensure the assembly is correct.



CAUTION: If the cap and body are not aligned correctly the cap will not rotate a full 350°.

10. If a new decal (1) is to be fitted, the cap (2) must be degreased first.

11. Refit the valve to the suit using a torque wrench and a back nut tool (AT43). The valve should be torqued to 4lbs/ft or 5.4Nm.



CAUTION: To prevent damage to the valve always press down the cap and rotate the back nut not the valve.


This Ends Reassembly

NOTE: Older versions of the Low Profile Auto Dump Valve. Valves with a serial number previous to 308 089022 will not incorporate the alignment stops as detailed in steps 7 and 9. These alignment instructions should be disregarded.

Testing Procedures

1. This test should be carried out before the valve is fitted to the suit; Adjust the cap until it is fully open. Blow through the valve from the threaded end. There should be virtually no resistance. Rotate the cap fully closed and blow through the valve, the resistance should now be quite high.



 **NOTE:** The valve will never fully shut off, it will always open with enough pressure applied.

2. Check the cap rotates approx 350°.
3. Fit the valve to the suit following the re-assembly procedure. Seal off the cuff and submerge the shoulder of the suit, inspect the inside of the suit for any sign of water ingress.



Table 1 - Troubleshooting Guide

SYMPTOM	POSSIBLE CAUSE	TREATMENT
Valve Leaks	1. Exhaust valve (12) damaged or worn.	1. Replace exhaust valve.
	2. Valve Seating (10) damaged or worn.	2. Replace valve seating.
	3. Sealing edge of valve (9) damaged.	3. Replace valve.
	4. Inner cap (6) not clipped in correctly.	4. Re-assemble inner cap.
	5. Dirt /salt deposits present on exhaust valve /valve seating.	5. Clean or replace exhaust valve or valve seating.
Valve does not operate correctly	1. Cap (2) does not turn approx 350°.	1. Check cap assembly procedures have been followed correctly. Check the inner cap and valve cap have been aligned properly.
	2. Cap (2) does not turn approx 350°.	2. Check inner cap thread is intact.
	3. Older valves could have a damaged Adjuster (4).	3. Replace Inner Cap (6) and Adjuster (4).
Leakage into suit	1. The valve has not been tightened in the suit properly.	1. Re-tighten the valve.
	2. An incompatible backing patch has been fitted to the suit.	2. Fit an Apeks backing patch AP0166.
	3. There is no backing patch fitted.	3. Fit an Apeks backing patch AP0166.
	4. Dirt/salt deposits present internally.	4. Clean the valve.
	5. The valve leaks.	5. See page 8 for test specification.
Restricted air flow	1. Internal spring (5) distorted.	1. Change spring.
	2. Wrong back nut fitted.	2. Fit correct back nut AP1572 & AP1573.
	3. Restrictions from undersuit.	3. Ensure undersuit allows gas to vent out of the valve.

Table 2 - Recommended Tool List

PART NO.	DESCRIPTION	APPLICATION
AT43	Back Nut Tool	Removal of back Nut.
AT46	Cap Removal Tool	Cap Removal.
5-6mm	Flat Ended Screwdriver	Removal of Inner Cap.
n/a	Torque Wrench	Removal and fitting of valve to suit.



AT43





AT46

Notes:

1. Photos not to scale.
2. Actual tools may differ from photos.

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
<div style="border: 1px solid black; padding: 10px;">  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. </div>		
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
<div style="border: 1px solid black; padding: 10px;">  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 </div>		
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 be 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.

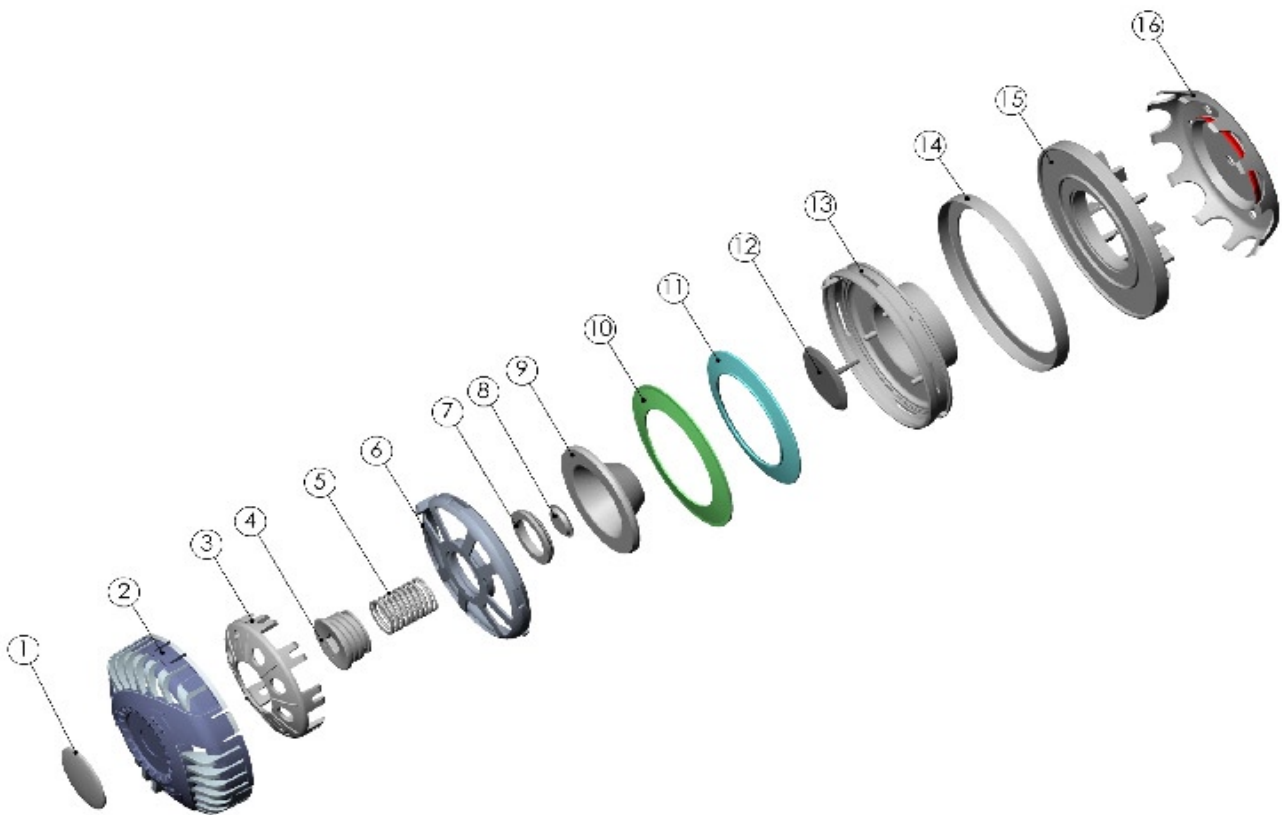
Table 4 - Torque Specifications

PART NUMBER	DESCRIPTION / KEY NUMBER	TORQUE
AP1572,AP1573	Extended Back Plate, Back Nut.	4lbs/ft (5.4Nm)

Table 5 - Test Bench Specifications

TEST	ACCEPTABLE RANGE
Leak Test	No Leaks permitted
Minimum relief pressure	0.5 to 1 mbar
Maximum relief pressure	23 to 25 mbar

Low Profile Auto Dump Valve Exploded Parts Diagram



* All marked items must be replaced when serviced.

1	AP5015	Decal	9	AP7049	Valve
2	AP7044	Cap	10	AP7048*	Valve seating
3	AP7045	Load Transmitter	11	AP7043	Spring washer
4	AP7046	Adjuster	12	AP7051	Non return valve
5	AP7052	Spring	13	AP7041	Valve body
6	AP7042	Inner cap	14	AP7053	Retaining ring
7	AP7047	Adjuster clip	15	AP1573	Back nut
8	AP7050	Spring Carrier	16	AP1572	Extended back plate



Notes



LOW PROFILE AUTO DUMP VALVE
MAINTENANCE MANUAL

FOR
AUTHORISED TECHNICIANS

Apeks Marine Equipment Ltd
Neptune Way, Blackburn, Lancs, England, BB1 2BT