

AP100 AUTO AIR

User Instruction Manual

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Important Information

Please read all the information in this manual, it is extremely important that you familiarise yourself with all the AP100 Auto Air features, adjustments and operations before entering open water.

DO NOT use the Auto Air on any buoyancy compensator with CO₂ inflation.

DO NOT add excessive amounts of gas to the BC while submerged. This can cause a dangerous rate of ascent.

DO NOT tamper with the Auto Air. Alterations to the design of the BCD should only be carried out by AP Diving.

DO NOT use any other brand or type of direct feed hose with the Auto Air as these may not connect properly or provide the required gas flow rate. Always use the direct feed hose supplied with the Inflator.

DO NOT connect the Auto Air direct feed hose to any 1st stage regulator port providing over 400psi (28 BAR).

DO have the Auto Air serviced annually by AP Diving or an authorised agent.

DO pre-dive checks before EVERY dive.

DO post-dive maintenance after every dive, including swimming pool dives.

Caution

The use of compressed air underwater breathing equipment, which includes the Auto Air, is potentially dangerous for the untrained user. Instruction in the use of such equipment from a qualified instructor should be received before venturing into deep or open water. Maximum certified depth using air is 50m at 62.5 litres RMV and water temperature $+10^{\circ}$ C.

Introduction

This instruction manual provides you with all the information you need to get the most out of your Auto Air. It is important that you read this manual to set up your equipment before you go diving. It doesn't take long and it's easy to do, just follow the instructions on the next few pages.

Here are some of the features of the Auto Air:

- High performance demand valve that acts as an "octopus" 2nd stage.
- Emergency breathing valve that allows the breathing of air from inside the buoyancy jacket should your main air supply fail or dry up.
- Buoyancy jacket direct feed inflator.
- Buoyancy jacket oral inflate.
- Buoyancy jacket deflate.



This manual explains all the functions and set-up requirements of the Auto Air. Please ensure that your Auto Air is correctly set to **your** first stage. See the 'How to Adjust Your Auto Air' section

If you have any questions regarding the Auto Air, please contact the factory for advice.

How the Auto Air Works

Emergency Breathing

Provided that it is fitted to a jacket equipped with an independent emergency air cylinder, the Auto Air enables the wearer to be completely self-sufficient in an out-of-air situation. The Auto Air functions as an alternative 2nd stage or "octopus", which regulates the flow of air from the main cylinder on demand. However, should this air supply fail, the Auto Air allows you to continue breathing by AUTOMATICALLY switching over to the jacket breathing valve, drawing air from inside the jacket. As the jacket breathing valve has a higher inhalation resistance to the demand valve, it only operates when the demand valve fails to supply air.

Using the Auto Air as an alternative 2nd stage or "Octopus".

If your partner's air supply fails, you make available your own demand valve or your Auto Air, whichever appears to be the simplest. Both of you can then continue to breathe normally from your main cylinder and ascend at the normal rate, monitoring each other and the air supply as you rise. See fig. 1.

Figure 1 Breathing from the cylinder



Breathing from the "Jacket Breathing Valve".

If your air supply fails, you should raise the Auto Air above your head to allow any water in the convoluted tube to drain into the jacket. DO NOT PRESS ANY BUTTONS - if air is exhausted, water will enter the corrugated hose!. Then insert the Auto Air into the mouth and press the purge or exhale to expel water. Breathe in, drawing air from inside the jacket - see fig 2. There will be no buoyancy change until the air is exhaled but this can be counteracted by allowing more air to enter the jacket from the emergency cylinder ready for the next breath. With practice you can allow the air into the jacket in breathsized bursts and, thereby, maintain your buoyancy AND your ability to breathe from the jacket. During the ascent, due to reducing ambient pressure, your main cylinder may supply air again for a short time in which case the Auto Air feeds this air to you. If the air supply from your main cylinder is then used up again, the Auto Air will supply air from the jacket. This automatic alternating from jacket breathing valve to demand valve is noticeable by different inhalation efforts and is governed simply by the availability of air in your main cylinder.

Figure 2 Breathing from the jacket



Buoyancy Control

Direct Feed Inflator

The direct feed inflator is capable of totally filling a jacket in approx. 5 seconds. It is operated by pressing the blue flexible button on the side of the housing. Accurate control of buoyancy can be achieved by allowing air into the jacket in short bursts.

Oral Inflation

If needed, the buoyancy jacket can be orally inflated via the Auto Air. This is achieved by blowing into the mouthpiece whilst depressing the large button (AP100/31) in the centre of the jacket breathing valve.

Venting Air - NOTE!

If the large button (AP100/31) in the centre of the jacket breathing valve is depressed whilst the convoluted hose is held above the head, air will be vented from the jacket. To prevent water entering the Auto Air, this form of buoyancy trimming should only be used in an emergency. For routine buoyancy control use one of the two AP5 dump valves fitted as standard on all AP Diving jackets.

Getting Started

Connection to the Buoyancy Jacket

AP Diving jackets have re-usable convoluted hose connectors which can only be used with AP Diving fittings. Unscrew the outer collar and remove the inner split mouldings and remove the mouthpiece from the hose. Fit the Auto Air into the hose and refit the securing fittings, making sure that the convolutions of the split ring match those of the hose and the small lip on the inside of the split ring hooks over the large flange on the mouthpiece body.

Figure 3 Connection to the Buoyancy Jacket



Other makes of jacket will need another means of attachment, such as a ty-rap. When connecting, leak check the assembly after fitting

Connecting the Medium Pressure Hose to the 1st stage.

Attach the low/medium pressure hose to an auxiliary low pressure port on the first stage of the regulator. Ensure the hose is not accidentally attached to one of the high pressure ports, which are clearly marked on most regulators. If you cannot determine which port is low pressure, first test by attaching a submersible pressure gauge to the port and connecting the regulator to a fully charged cylinder. If the gauge is connected to a low pressure port it will indicate less than 400 psi (28BAR). DO NOT ATTACH THE INFLATOR HOSE TO ANY PORT PROVIDING A PRESSURE GREATER THAN 400 PSI (28 BAR) - higher pressure may cause damage or personal injury.

Setting up your Auto Air

The adjustment of the Auto Air prior to initial use is fully described in the 'How to Adjust Your Auto air' section. This should be carried out by a competent person. If in any doubt, consult with your instructor/Regulator Technician/Dive Shop/AP Diving.

Using Your Auto Air

Pre Dive Check

1. Visually inspect hoses and hose connections for cuts, abrasions and any other signs of damage. Check the Auto Air, especially in the mouthpiece area. Make sure that there are no holes in the mouthpiece. Make sure that the mouthpiece is firmly attached to the body of the assembly and that the "bites" for the teeth to grip are intact.

2. Turn on the air and listen for leaks. Depress the purge button two or three times to blow out dust and grit. The air flow should stop completely when the purge button is released. If air continues to flow, the unit needs servicing and/or re-setting. The problem could be:

a. Incorrect setting of the Auto Air.

- b. A foreign body lodged in the poppet seal (AP100/23).
- c. A damaged poppet seal.
- d. A damaged valve seat (AP100/21A)

Note: The Auto Air is also a pressure relief valve. If the 1st stage seat is leaking the intermediate pressure will increase until the Auto Air leaks air. Check your interstage pressure as is may be too high and your 1st stage may need servicing.

3. Inhale and exhale through the Auto Air and make sure that air is being supplied via the direct feed and not from the jacket. Turn off the cylinder and carry on breathing. As the air in the direct feed line is used up, the Auto Air will automatically change to drawing air from inside the jacket. Empty the jacket of air and try to inhale. If you can draw any air into the Auto Air, there is a leak in the system and it needs to be serviced before use. If the problem is simply debris holding open the exhaust diaphragm, rinsing in fresh water should cure the problem. If the problem persists it could be a damaged diaphragm and it is essential that the Auto Air should then be serviced by a competent operator before you dive with it.

Useful Tips:

a) The medium pressure hose's quick-release coupling is easier to connect with the main air supply turned off. This technique also extends the life of the coupling seal (AP150/9).

b) The medium pressure hose has re-useable fittings which allow in service adjustment and repair. The standard length of hose is 24" (61cm) but this is relatively easy to change if required.

Post Dive Maintenance

After each dive, carry out the following procedure:-

With the air still turned on and the direct feed inflator hose connected, thoroughly rinse the Auto Air in fresh water. Depress the jacket exhaust button (AP100/31) to allow water to wash over the seat and back end rubber.

Clear any water from the Auto Air by depressing the purge buttons and then the direct feed button. If water is allowed to enter the medium pressure inlet, more frequent servicing will probably be needed.

The Auto Air should be serviced at least annually, at the same time as the main regulator.

Balanced and Unbalanced First Stages

It is important to remember that the Auto Air has to be adjusted to the highest intermediate pressure of your first stage. If this is not done, the Auto Air will leak when the 1st stage delivers maximum intermediate pressure.

It is vital that you ascertain the characteristics of your first stage before making the final adjustment. Different types of 1st stage deliver maximum intermediate pressure at different cylinder pressures.

Points to bear in mind when fitting the Auto Air to modern BALANCED first stages:

This is the most stable type of first stage and is the best type to fit the Auto Air to. This is because the intermediate pressure varies very little as the cylinder pressure drops. Adjust the Auto Air with a full cylinder (see page 8). BUT beware, some manufacturers claim that their 1st stage is balanced but the intermediate pressure still varies as the cylinder pressure drops, in this case the maximum intermediate pressure (i.e. the pressure at which you should set your Auto Air), will have to be ascertained by trial; that is, by firstly checking the Auto Air for leaks with a full cylinder and then again with the cylinder nearly empty as for an unbalanced diaphragm 1st stage - see below.

Points to bear in mind when fitting the Auto Air to UNBALANCED first stages:

There are two types of unbalanced 1st stage : the unbalanced diaphragm 1st stage (eg. the Poseidon Cyclon 300) and the unbalanced piston 1st stage (e.g. Scubapro Mk2 or R190).

Unbalanced diaphragm 1st stage

A general rule with an unbalanced diaphragm 1st stage is that the intermediate pressure rises as the cylinder pressure drops. Therefore the Auto Air needs to be adjusted with only 30 BAR in the cylinder.

Unbalanced piston 1st stage

With an unbalanced piston 1st stage the opposite happens i.e. the intermediate pressure drops as the cylinder pressure drops. Therefore, the Auto Air needs to be adjusted with a full cylinder as in the case of a balanced 1st stage.

The user should also be aware that, when fitted to an unbalanced 1st stage, the breathing characteristics of the Auto Air will change as the cylinder pressure drops, just as it does with the primary 2nd stage valve fitted to this type. When fitted to an unbalanced piston 1st stage, the inhalation effort will increase as the cylinder pressure drops. With the unbalanced diaphragm 1st stage, the inhalation effort will be higher at the start of the dive and decrease as the cylinder pressure drops.

How to Adjust Your Auto Air

Step 1: attaching to the first stage

The Auto Air MUST be adjusted to the MAXIMUM intermediate pressure of your regulator. This is achieved by attaching the Auto Air via the intermediate pressure hose to your regulator 1st stage and fitting to a full cylinder before carrying out the adjustment. (NB: Exception - if you have an "unbalanced" regulator e.g. the Poseidon Cyclon 300, the Auto Air should be adjusted with only 30 BAR in the cylinder - see page 7).





Step 2: dismantling the Auto Air

Unscrew the large Diaphragm Cap (AP100/7), remove both the Skid Disc (AP100/6) and Diaphragm (AP100/5). You will now see the nut (AP100/28A), Washer (AP100/28) and Lever (AP100/27).

Step 3: setting the Auto Air

Using a 5.5mm socket/spanner, adjust the Auto Air by turning nut (AP100/28A) clockwise until the valve leaks and then anti-clockwise until it just stops.

Check for leaks in a bowl of water. If the Auto Air is leaking, turn the nut anti-clockwise 1/8 of a turn and re-test. If there is still a leak, you could need a higher pressure spring, available from the factory (Steps 6 to 9 explain how to change your spring). However if, according to the manufacturer's instructions, your regulator intermediate pressure should be less than 10.5 BAR, but there is still leaking, check your intermediate pressure is correctly adjusted at the first stage at your dive shop.

Step 4: re-assembling the Auto Air

Re-fit the Diaphragm (AP100/5) to the Auto Air body ensuring it fits correctly around the edges.

Balance the Skid Disc on top of the Diaphragm and push on the Diaphragm Cap. Turn back anticlockwise to find the start of the thread and then tighten clockwise. Re-test for leaks.

Step 5: testing the set-up

Test the Auto Air by inhaling. The Auto Air demand valve will be easy to breathe from and the jacket breathing valve will not pull in. Turn the air off and continue breathing. As the air pressure in the hose drops the inhalation effort rises and the jacket breathing valve pulls in, allowing air to be drawn from the jacket. Turn the air back on and the inhalation effort drops as air is again supplied from the regulator.

DO YOU NEED TO CHANGE YOUR SPRING?

If the intermediate pressure of your first stage is higher than 10.5 BAR you will need a higher pressure spring in your Auto Air, steps 6 to 9 show how to change the spring.

Step 6: pressure check

Check the 1St stage characteristics, is it balanced or unbalanced - see page 7- and what is the intermediate pressure? The standard spring is for pressures between 8.5 BAR and 10.5 BAR, if the pressure is higher, you will to fit a stronger spring, coloured red.



Step 7: replacing the spring

To replace the spring firstly remove the Diaphragm Cap (AP100/7), Skid Disc (AP100/6) and (AP100/5). Diaphragm Unscrew the nut (AP100/28A) and remove lever. Replace the washer and nut, screwing the nut clockwise until it stops (this lifts the Poppet clear of the valve seat and prevents scuffing and damage as the valve chamber is rotated). Remove Valve Retainer (AP100/12) and pull the Demand Valve AP100/2 out of the Auto Air body. Unscrew the Valve Chamber (AP100/26) and pick out the grey Poppet Seal (AP100/23). Unscrew the nut to release the Poppet and replace spring.

Step 8: re-assembling the valve body

When re-assembling, ensure that the square on the Poppet is aligned with the square in the Valve Chamber so it cannot turn. With the Spring compressed replace the Washer (radius down), and Screw on the nut. Replace the Poppet Seal (AP100/23). Screw the Valve Chamber back onto the Valve Body.

Step 9: re-assembling the Auto Air

Make sure the flat on the white valve chamber is in line with a flat on the Valve Body (AP100/21). **Do NOT over tighten in an attempt to align the flats; simply unscrew the valve chamber back to line up with the previous flat on the Valve Body.** To insert the Demand Valve Unit (AP100/2) into the Auto Air Body (AP100/1), line up the flats on the white valve chamber, unit with the flat in the inside of the Auto Air Body. Screw on the Valve Retainer (AP100/12). Undo the nut until it is possible to place the lever under the washer and re-tighten. Follow Steps 1 to 5 to adjust the Auto Air.



Fault	Reason	Cure
Auto Air leaks on a full cylinder.	 The Auto Air is incorrectly adjusted or a too-weak spring is fitted. the interstage pressure of the 1st stage is too high. 	 See 'How to adjust your Auto Air' (page 8 - 9) Adjust intermediate pressure.
Auto Air starts to leak once the cylinder pressure drops.	 This is a characteristic of an unbalanced diaphragm 1st stage, i.e: intermediate pressure increases as the cylinder pressure drops. There may be dirt in the valve chamber or a damaged valve rubber or damaged seat. 	 Place the regulator on a cylinder with a pressure of 30 BAR and measure the regulator's intermediate pressure. Ensure the correct spring is used, see the Auto Air Fitting Procedure, and adjust the Auto Air at that cylinder pressure. Be careful when changing the spring so as not to damage the poppet seal, AP100/23, and ensure there is no dirt in the valve chamber and replace damaged components. The poppet seal is reversible for a temporary cure.
AutoAir becomes stiff to breathe as the cylinder pressure falls.	This is a characteristic when fitted to an unbalanced piston 1 st stage.	As this is a limitation caused by the 1 st stage, it may not be possible to eliminate this problem entirely. The problem can be reduced by fitting a lighter spring and ensuring the Auto Air is finely adjusted on a full cylinder. Place the regulator on a full cylinder and measure the intermediate pressure. Ensure the correct spring is used, see the Auto Air Fitting Procedure and adjust the Auto Air at full cylinder pressure. Be careful when changing the spring so as not to damage the poppet seal, AP100/23, and ensure there are no foreign bodies.
Jacket inflates slightly as the diver breathes from the Auto Air.	 The Auto Air is not correctly set up; it may have too strong a spring fitted. If this only occurs at low cylinder pressure then this may be a characteristic when fitted to an unbalanced piston 1st stage. If this only occurs at high cylinder pressure then this may be a characteristic when fitted to an unbalanced diaphragm 1st stage. Air cylinder valve may not be fully open, causing a restriction. 	 See 'How to adjust your Auto Air' (page8 - 9). & 3. As this fault may be attributable to the type of 1st Stage to which the Auto Air is fitted, the diver must be aware of the possibility of this fault arising. The increase in buoyancy is gradual and therefore controllable allowing the diver to complete the dive. If the primary air source fails then the Auto Air will switch over and the diver will breathe the air from the jacket. Open cylinder valve fully.

Fault	Reason	Cure
Jacket inflates when the Auto Air is not inserted in the mouth.	 Air is bypassing the O ring on the AP100/19N insert. Air is bypassing the Core Valve (AP100/44). 	 Check the O ring. Clean or replace. Depress the direct feed button two or three times to remove any dust or grit. If this does not cure the problem, replace Core Valve.
Auto Air rapidly free flows during the dive.	This is a sure sign of a faulty seat in your regulator's 1 st stage.	Monitor the inter stage pressure as you slowly turn the air on. You'll see the intermediate pressure rises very rapidly past the designed pressure. Turn the air off before the pressure reaches 200 psi! Service the 1 St stage. Monitor the intermediate pressure again, ensuring it is stable and follow the Auto Air Fitting Procedure.
Jacket is deflating.	 Air could be leaking either through or past the jacket breathing module. Air could be leaking through (if punctured) or past the blue direct feed button cover (AP100/14). Air could be leaking, slowly, past or through the direct feed insert (AP100/19N) and through the Air Inlet if the quick release coupling is disconnected. 	 First, immerse unit in water and find where the valve leaks: 1. (a) Unscrew the diaphragm cover (AP100/10) and pull the jacket breathing module out [AP100/3]. This is best done by pushing it out from the inside. First check the O ring, [BS.18.1.1.6N70], is not distorted and is correctly located on the back end of the module body, [AP100/37]. Replace O ring if necessary; (b) The above, 1(a), is the usual cause of leaks, but if this does not cure it then ensure the seat in the back end of the module body , and the back end rubber, [AP100/38], are clean and undamaged. Replace any damaged components; 2. Replace the blue direct feed button. 3. (a) Check the O ring on the [AP100/19N]. (b) Depress the direct feed button two or three times to remove any dust or grit. If this does not cure the problem, replace the Core Valve.
On the surface, the jacket breathing valve opens on inhalation, with the air turned on.	 Large cylinder valve not completely turned on and so causing restriction. The Auto Air is incorrectly adjusted or an over strong spring (AP100/25) is fitted. 	

Auto Air Components



NO.	PART NAME	PART NO.	ISSUE	QTY
1	MOUTHPIECE	AP_16	3	1
2	TY WRAP	AP_21	N/A	1
3	BUDDY STICKER	AP_100_11	N/A	Ι
4	DEMAND VALVE	AP_100_2	7	1
5	VALVE RETAINER	APV_100_12	1	1
6	AUTO AIR BODY	AP_100_1	2	Ι
7	Øl0mm MESH	AP_100_41	N/A	1
8	O-RING	BS_0II_N70	N/A	1
9	FEED INSERT	AP_100_19N	8	1
10	SCHRAEDER VALVE	AP_100_44	N/A	1
П	PLUNGER	AP_100_15N	1	I
12	INFLATOR CAP	AP_100_14	1	1
13	CAP RETAINER	APV_100_13	1	I
14	DUMP MODULE	AP_100_3	7	1
15	DUMP GUARD	AP_100_10	1	I
16	DIAPHRAGM	AP_100_5	1	1
17	SKID DISK	AP_100_6	1	1
18	DIAPHRAGM CAP	AP_100_7	1	1
19	DIAPHRAGM SPRING	AP_100_8	1	Ι
20	PURGE BUTTON	AP_100_9	1	1
21	AUTO AIR STICKER	AP_100_11A	N/A	1

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	6				
	11	M3 NUT	AP_100_28A	N/A	
DA	10	WASHER	AP_100_28	N/A	1
	9	LEVER	AP_100_27	1	1
	8	VALVE CHAMBER	AP_100_26	1	1
	7	SPRING	AP_100_25	1	1
	6	POPPET	AP_100_24	5	- 1
	5	POPPET SEAL	AP_100_23	N/A	1
	4	O - R I NG	BS_016_N70	N/A	2
	3	VALVE SEAT	AP_100_21A	1	1
	2	O-RING	BS.9.5+1 N70	N/A	1
	1	VALVE BODY	AP_100_21	9	
	NO.	PART NAME	PART NO.	ISSUE	QTY

AP100/3 Dump Module



10	BACK END WASHER	AP_100_39	1	1
9	BACK END RUBBER	AP_100_38	2	L
8	BS018 16 O-RING	BS0181_16	N/A	1
7	BODY	AP_100_37	1	1
6	SPRING	AP_100_36	1	1
5	STEM	AP_100_35	1	1
4	WASHER	AP_100_34	N/A	1
3	DIAPHRAGM	AP_100_33	N/A	1
2	DIAPHRAGM WASHER	AP_100_32	1	1
1	BUTTON	AP_100_31	1	1
NO.	PART NAME	PART NO.	ISSUE	QTY

Auto Air

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Auto Air Hose Assembly (Post 03/09)

Snap Connector End (EV50B)



3/8" UNF End (AP50C)



16	BALL BEARING	AP_150_13	N/A	4
15	VALVE SLEEVE	AP_150_14	5	T.
4	GUIDE WASHER	AP_150_10	2	L.
13	O-RING	BS_109_N70	N/A	T.
12	VALVE FLOAT	AP_150_6B	5	Ţ.
11	SPRING	AP_150_08	I	1
10	FUNNEL SEAT	AP_150_05	1	Ť.
9	O-RING	BS_56_24_N70	N/A	1
8	SLIDING COLLAR	AP_150_12	4	1
7	SPRING	AP_150_11	1	1
6	MOULDED WASHER	AP_150_18	1	Ĭ.
5	COUPLING BODY	RB_70_30	1	E
4	LP HOSE	AP_50_C	N/A	I.
3	HOSE COLLAR	AP_50_P3	6	2
2	3/8" UNF END	AP_50_P4	7	1
1	O-RING	BS_903_N70	N/A	I.
NO.	PART NAME	PART NO.	ISSUE	QTY

Technical Information

Certified Operating Range

Maximum certified depth using air is 50m at 62.5 litres RMV and water temperature +10 $^{\circ}$ C in water.

Direct Feed Inflator Hose Supply Pressure

Max: 28 BAR

Min: 6.5 BAR

Recommended: 9.5 BAR

Shelf Life

The shelf life of an unused Auto Air is 7 years, derived from the o-rings and seals.

Warranty

All AP Diving products are sold on the understanding that only British Law applies in cases of warranty claims on the product liability, regardless of where the product is purchased or used.

This Auto Air is warranted against faulty materials and workmanship for a period of 1 years from date of purchase.

If a fault occurs AP Diving will replace or repair the product at their discretion, therefore all claims must be referred directly to AP Diving.

AP Diving reserves the right to verify all claims. If a fault occurs, firstly contact the factory for advice and if necessary, the product should be returned directly to the factory, postage and insurance pre-paid.

Due to the harsh nature of the diving environment, misuse or neglect renders all warranties null and void.

Any unauthorised repairs or modifications render all warranties null and void.

Ambient Pressure Diving Itd Water-Ma-Trout Industrial Estate Helston Cornwall United Kingdom TR13 0LW

TEL: (44) 01326 563834 FAX: (44) 01326 565945 Email: info@apdiving.com

Web: www.apdiving.com

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