Huma-Air Regulator Revision Guideline

Before you you start, realize this;

- Working on a high pressure rifle could potentially be harmful or lethal to you or bystanders if you do not know what you are doing.
- The pictures of the rifleparts in this manual are universal and mend as an example to explain the working principle. They might not be equal to the parts in your rifle.
- Do not attempt to install this regulator yourself if you do not have a clear understanding of how these pcp rifles and regulators work.
- Do not attempt to install this regulator if you are not skilled to work on an airrifle; contact your local gunsmith to do the fitting.
- Installation and operation is done completely at your own risk.
- Installing this regulator might void your rifle's factory warranty.
- Your rifle may never be filled higher in pressure as stated in your rifle's manual.
- Do not attempt to fit this regulator in another rifle as mentioned in our order conformation.
- These regulators are not suitable to use as a CO2 to HPA conversion, this could potentially be harmful or lethal to you or bystanders.
- We cannot be held liable for any accidents in relation to this regulator and its installation.

Before you start, make sure that the rifle is unloaded, remove the magazine and make absolutely sure ALL the air is drained from the pressure tube. If there is a pressure gauge, it will give you just an indication. Dry fire the rifle or follow the manufactures instructions and double check to make sure all the air is out of the rifle

If the regulator is fitted and there is no output pressure after filling the pressure tube, something might be wrong causing the airflow to block totally.

Please beware even though there is no output pressure, the pressure tube/bottle is fully charged with high pressure air!!
If you are not able to relieve the pressure of the pressure tube according to the manufacture instructions or by dry firing the rifle then:

Contact a professional gunsmith to retrieve a solution!

- **DO NOT try to unscrew or to open the pressure tube in any way.**
- **DO NOT try to pierce/drill or to use force to open the pressure tube or unscrew parts in an attempt to relieve the blocked pressure.**
- **These actions can cause serious injury or death to you or bystanders**

For adjustment tips, frequently asked questions and a complete list of installation manuals and instructions on how to adjust your Huma-Air regulator **https:/www.huma-air.com/fitting-instructions**

Before you start, read the full manual.
This manual is an universal guideline and can be different in detail compared to your rifle.

Essential items you need for a proper rebuild of your regulator:

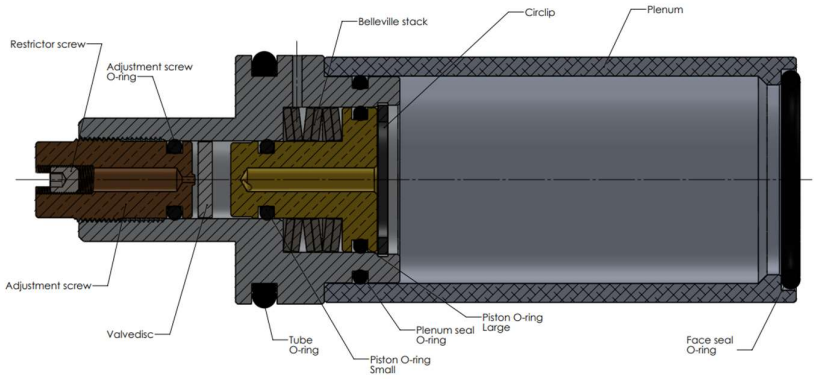
- Brake cleaner or a similar de-greasing fluid
- Huma-Air rebuild kit for your regulator
  Our regulator rebuild sets contain a **double** replacement set of seals for the regulator piston and the set screw plus all external o-rings of your regulator, a replacement specimen of our special delrin valve disk and a syringe with our high quality silicone grease to lubricate the internal regulator parts.
- Cleaning cloth

Optional items what can be handy when you want to rebuild your regulator:

- Tool to remove the old o-rings (like this 5 pc o-ring pick tool)
- Huma-Air regulator tester
- Extra regulator silicone oil
- Thick silicone grease
- Huma-Air Maintenance bench mat

Indicators for when a regulator will need to be rebuilt.

Understanding the function of a regulator is important in diagnosing what issues to address



To better describe what happens in a regulator we take our Hatsan AT44 regulator as an example. Although this is one of the more basic designs as you can see there are already quite some o-rings in this regulator. The regulator sits in the tube an primary pressure will flow through the adjustment screw, past the valve disc and through the piston. As pressure starts to rise in the plenum the piston will start to move towards the setscrew. This movement will continue until the piston pushes the valve disc onto the adjustment screw, effectively closing of the airflow from the high pressure side. The distance that the piston can travel combined with the installed spring stack will determine the regulated pressure. With the exception of the o-ring on the setscrew. All of the other o-rings prevent air from escaping to atmosphere.

As discussed a regulator contains a couple of o-rings and a sealing face (we use a valve disc). These seals are subject to wear and tear. Depending on the settings, use and environmental influences the interval in which a regulator needs to be rebuilt can vary. But generally speaking there are a couple of indicators that will signal that a rebuild is due.

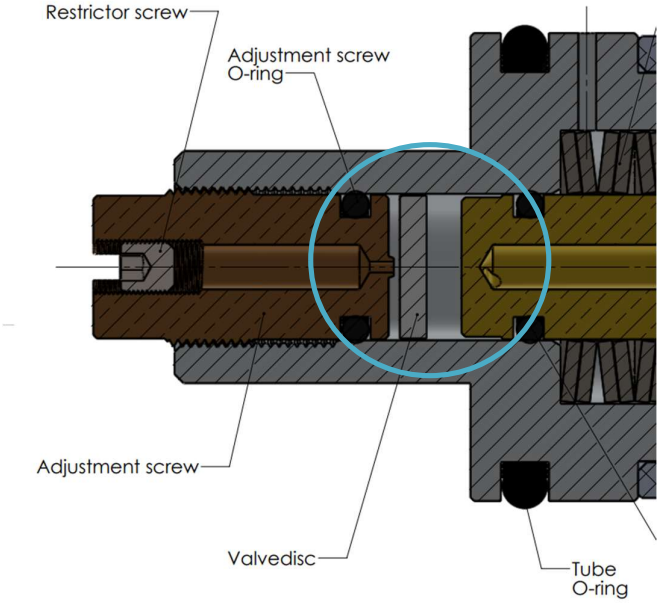
- Regulator creep
- Slow cycle to set pressure
- Leaks to atmosphere
- Erratic regulation

Let’s start with regulator creep and slow cycle. Both problems describe the same basic failure mode. This is the state in which regulator pressure slowly rises from set pressure, or only very slowly cycles to it’s set pressure. Over night it can sometimes happen that regulator pressure slowly rises a few bar. As long as after 1 maybe two shots pressure stabilizes to it’s original setting this isn’t designated as creep. Remember the function of a regulator is a delicate balance of forces. Slight variations can always occur there.

Creep describes the situation that a regulator will reach regulator pressure relatively quickly but then starts to steadily but slowly climb. This sometimes stops after 5-10 bar, but in some instances this will continue until regulated pressure is equalized with tank pressure.

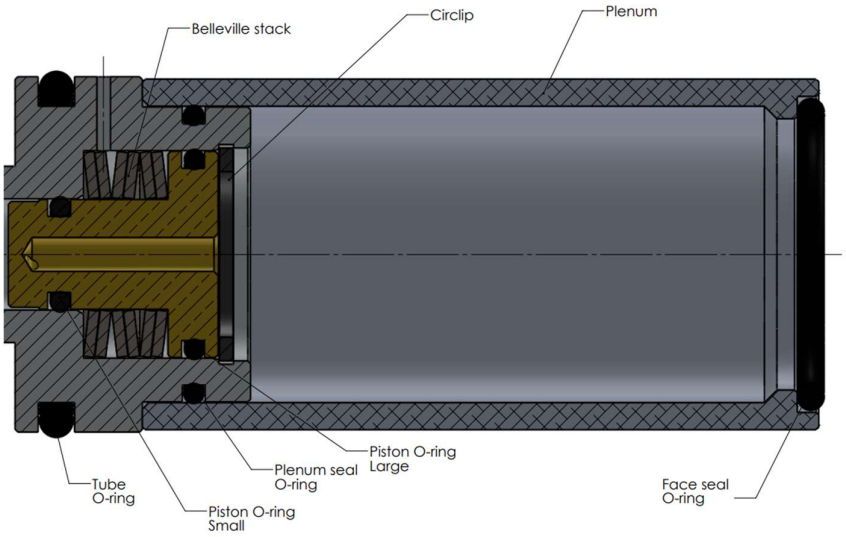
When solving creep the main focus will be on the adjustment screw o-ring and the valve disc.

As you may expect if the seal between the valve disc and the adjustment screw is not perfect, air can still escape from the high pressure side and flow to the regulated side. The same goes for the o-ring on the adjustment screw. When this is worn air can also flow directly to the plenum.



In some circumstances a slow refill or blocked airflow can be due to the small M3x3 grubscrew being turned in too far. The position of this screw should be screwed in until it bottoms out and then backed off 3 full turns. This will ensure ample pathway for air to flow past the screw. It can sometimes happen that the threads become clogged with debris or gunk. This will need to be cleaned of with break cleaner before setting this screw. When using brake cleaner the adjustment screw should be removed from the regulator. Make sure all brake cleaner has evaporated before reinserting it.

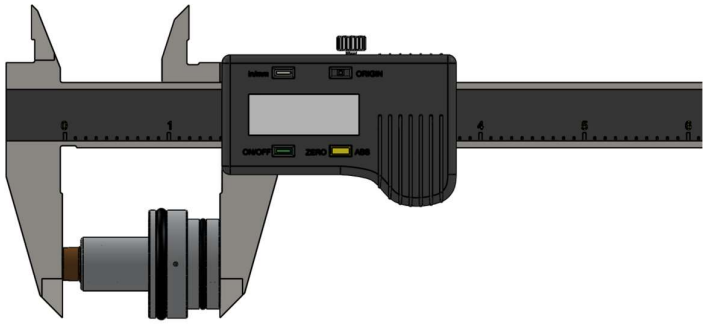
Next thing to address is the leak to atmosphere. In order for a regulator to function properly it needs a constant reference pressure in the Belleville spring chamber. This could be any pressure, but very conveniently atmospheric pressure provides a very constant reference pressure of 1bar. In order to atmospheric pressure to reach the spring chamber a relatively unrestricted pathway needs to be created from the outside to the spring chamber.



As you can see in the above picture, there is a small hole in the regulator running from the outside diameter to the spring chamber. Any of the o-rings shown in the picture above can cause a leak to the atmosphere. This is the most difficult failure mode to diagnose which o-ring is the cause of the leak. But, if you created a correct pathway for the reference pressure it will also vent leaked air correctly. As a regulator is a one way valve, if the cylinder primary pressure is dropping but the regulated pressure side is keeping pressure then the Tube o-ring is the problem. But if the complete tube including regulated side will empty it is one of the other ones. In that case we advise to exchange all o-rings.

In case of Erratic regulation, this is mostly due to worn o-rings on the piston.

Before you start the rebuilding process it is important to note the start dimension of your setscrew. Measure this dimension carefully and write it down. When measuring this dimension be sure to measure from the bottom of the regulator body to the top of the adjustment screw. If the regulator has a cap screw in the adjustment screw instead of the standard grubscrew or an oring in the bottom face of the regulator be sure to remove this so not to interfere with this measurement



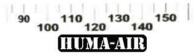
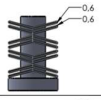
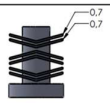
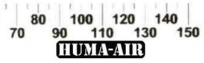
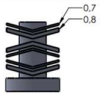
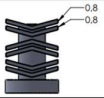
Our basic design regulators have either a 15-8mm piston or a 12-6mm piston. Within those piston designs we discern a couple of different spring stacks.

- 15-8 low pressure
- 15-8 middle pressure
- 15-8 high pressure

And for the the 12-6mm piston the same applies

- 12-6 low pressure
- 12-6 middle pressure
- 12-6 high pressure. (This is only used in very specific models and out of the scope of this document)

In case you loose the dimension or have forgotten to note it before disassembling the regulator. The stacking info and basic indication dimensions are given in the table below. These dimensions will get you approximately in the middle of the output range, but remember that they are indicative and this is by no means a precise way to set the pressure. To set the pressure precisely, we advise to use the Huma-Air Regulator Tester.

Piston size	Pressure range	Scale label	Belleville springs arrangement	Height Indication
12-6	LP			33,2mm
12-6	MP			32,3mm
12-6	HP			-
15-8	LP			37,3mm
15-8	MP			36,8mm
15-8	HP			36,4mm

Now there are a couple of standard models that cannot be measure like this. Like our bottle regulator, R10 and the Inline regulator will require you to measure the depth of the adjustment screw.

The R10 uses a 15-8 MP stack and depth of the adjustment screw should be around 2,4mm

The 400/500cc Bottle regulator uses a 12-6 MP stack and the depth of the adjustment screw should be around 22mm

The External Inline Regulator uses a 12-6 piston with it's own stacking, which can be found here:

Depth of the adjustment screw should be around 8mm

Now lets start with the actual rebuild of a regulator.

Remove your regulator out of the rifle. Make sure you empty the pressure tube totally by dry-firing and/or de-pressurizing your rifle You can use the fitting instructions as guide line or follow the rifle manufacturers directions.

Separate the regulator body from the plenum. Some models are threaded, some are plug-in

Read the pressure setting of the regulator from the scale and write it down. Then measure the exact length of the regulator body incl. setscrew (you need this to restore the set-pressure).

When you also exchange the valve disc or strip the Belleville stack, the scale label can be off. Unfortunately tolerances are such, that only a slight variance in dimensions can already mean a different output.

Remove the C-clip on the backside of the regulator body

The backside of the piston has either a M3, M4 or M5 tread in it depending on the model. You can screw in a appropriate screw or bolt to pull out the piston. After that you can unscrew the setscrew of the body

Inside the adjustment screw is an tiny m3 grubscrew. Please unscrew it before cleaning. Now remove all o-rings of the body, piston and adjustment screw. Do not change the spring order (see previous remark)

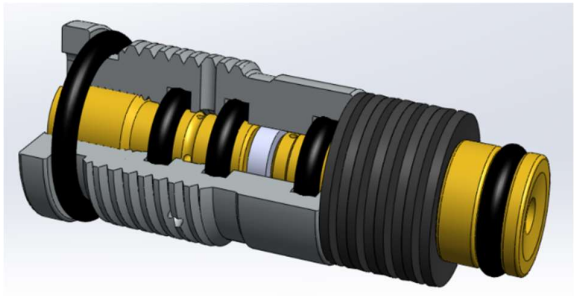
Clean all parts with some brake cleaner, and make sure all grease residue is gone. Dry all parts before you continue.

Inside the Huma-Air Rebuild Kit there is a special type of silicone grease, replacement o-rings and valve disk. Apply a royal layer of grease inside the walls of the regulator's body. Put a bit grease on the o-rings and Belleville springs Replace the springs in the right stacking back on the piston and place the new o-rings Push the piston carefully into the reg-body and reinstall the C-clip

Put the valve disk on top of the piston and screw the set-screw back in place. Screw the M3- allen bolt back into the setscrew, turn it to the bottom and then screw it back 2 turns. Then measure the total length of the regulator incl. setscrew and adjust it to the exact same length you measured before. It should be very near to the right pressure on the scale. Of course there can be some difference in the pressure setting due to the use of the new materials

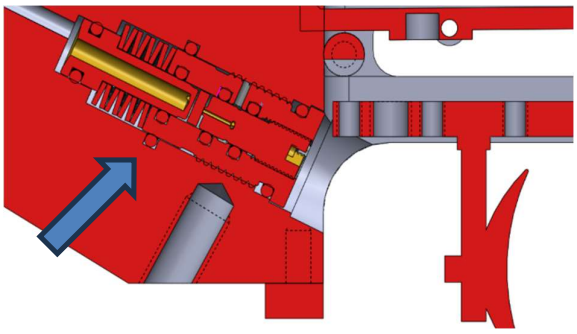
Replace the outer o-rings of the body and plenum and place the regulator back into the rifle following the fitting instructions.

Now let's cover the FX AMP replacement reg GEN1,2 and 3. The procedure for all three are very similar



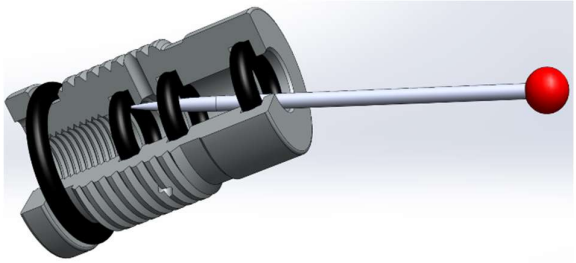
If the regulator leaks around the visible portion or the adjustment screw, Either one of the most left o-rings is defective.

If the regulator pressure is creeping up then either the middle of the three small o-rings is defective or the valve disc needs replacing.



If the regulator is leaking out of the breather hole on the side of the action then it can be the either of the two o-rings that seal on the piston. Or, and this is often forgotten. The o-ring inside of the action is defective.

The dimensions of the factory regulator o-rings can be found here, but it is also contained in our FX model specific o-ring replacement kits. The factory regulator is not the same as the Huma-Air Gen3 tuning regulator in the picture here above,



It needs some practice to remove are the 3 o-rings on the inside. But it is actually not all that difficult. Using a pointy object like a clothing pin puncture the o-ring. But make sure you do not go through it and damage the groove sidewalls. A needle that is not too sharp works well for this. Now pull the oring out of the groove inside the bore. Once it has cleared the groove edge you can push it out further into the bore. This method is quick and easy.

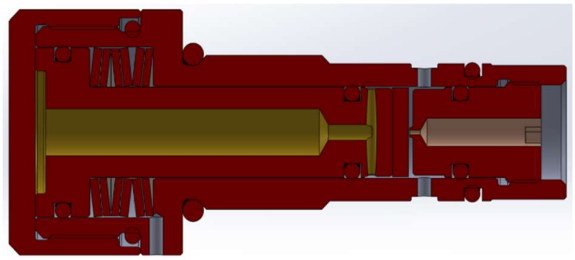
For cleaning and greasing all the parts you can follow the basic instructions above.

Check our extended fitting manual of the FX Impact regulators for the exact stacking of your specific model:

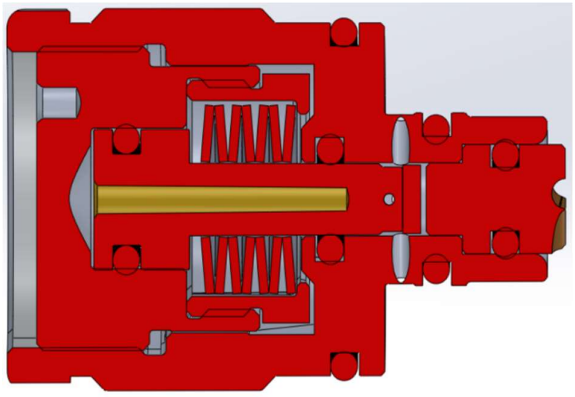
Gen1 and Gen 2 models and Gen 3 models

To reinsert the orings you need a small 4mm pin to back up the oring when it pushing the oring in. Position that pin just in before the oring groove. Pushing down on the oring should force one side into the groove. After the first part of the oring is in the groove, you should easily be able to push home the rest in a slow manner. All other orings should be smooth sailing from there on.

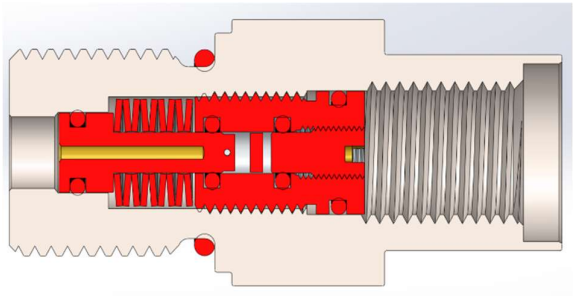
Now we will show the less common regulators we sell but it will show the basic construction and o-ring location.



R10, Wolverine HR regulator. Uses 15-8 piston size. Belleville stacks used can be LP, MP and HP.

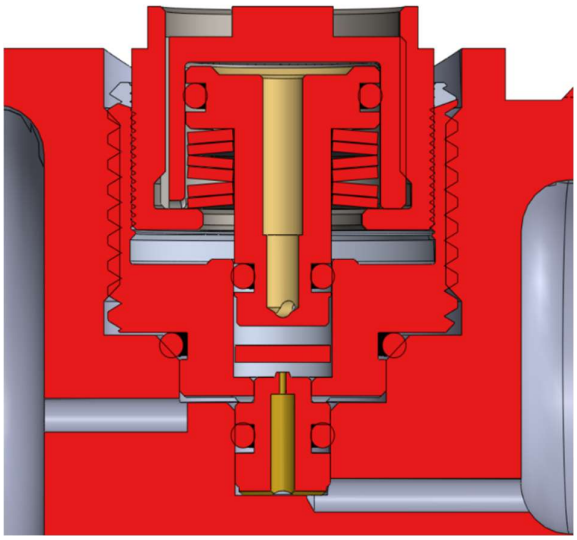


Edgun Leshiy 2 regulator. It uses the 12-6 MP Belleville stack.

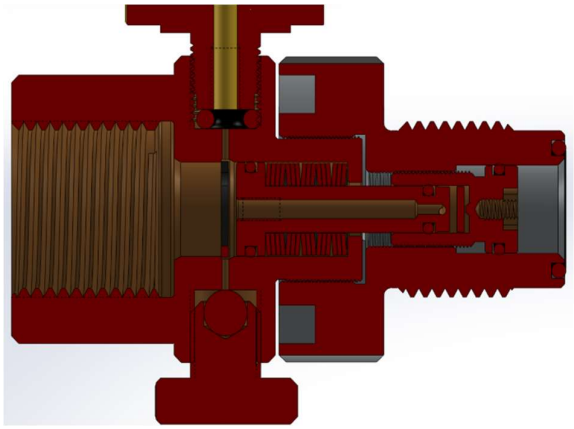


RAW regulator (the base is identical to our FX first stage, Walther Reign and S10 regulator for instance)

This uses a 7-4 regulator piston. Belleville stack is model specific.



The the Huben K1/Airmaks Krait regulator. This also uses 7-4 piston. But is available in low and high pressure Belleville stack.



The Externally Adjustable Inline Regulator. This also uses a 12-6 piston, and has a springstack as described in it's own manual.

Lastly, in 2024 we started using a different seal material on some regulators and there are a couple of models that use a fixed discs pistons. Before ordering a rebuild kit, it is a good idea to check what model of valvedisc you have.

To remove the valvedisc you can easily use an exactly knife in the small cutout to remove the valvedisc from it's orifice.

When finished we would like to advice you to read our manual how to read and adjust the regulator pressure and our General Adjustment Tips to set up your rifle perfect.