

# Warm-up Regulator rebuild

## Type 3 Double Diaphragm

There are four basic types of Warm-Up Regulator (WUR), and many variations within them.

1. Non Vacuum
2. Single diaphragm
3. Double diaphragm
4. Turbo

This tutorial will be using a 0438140007 for most of the example.

This uses a dual diaphragm and is one of the more difficult of the 4 basic types of WUR to rebuild.

This is going to be a very step-by-step tutorial so no matter what your level of experience is, you should be able to follow this through and successfully rebuild your WUR.

If you don't want to reset your pressure settings do not remove the fuel cell or change the position of the bimetallic pin strip.

Start by turning it over and removing the screws.

Remove the base and you will expose the diaphragm we will be replacing.



Remove the diaphragm assembly and you will see the springs and the electrically heated bimetallic strip.



There are 2 springs, a 'hat' for the springs to sit on, and a pin which sits inside the hat and presses onto the fuel cell.

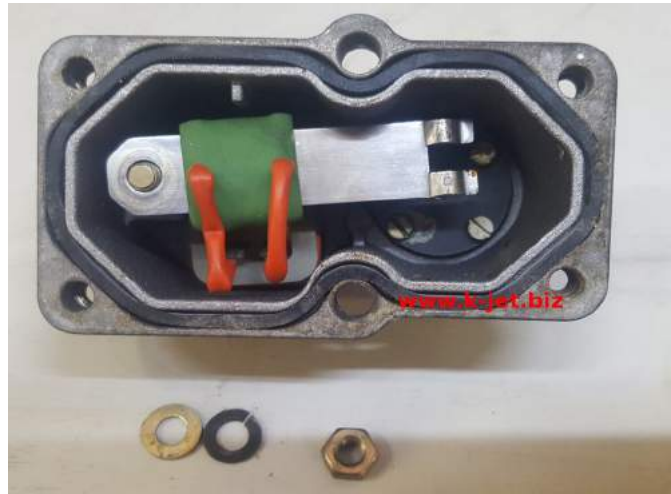
The pressure from the pin on the fuel cell sets the pressure and the fuel control pressure either increases or decreases based on being set-up correctly and the temperature and vacuum.



There is a clip holding the electrical plug in place. It needs to be slid sideways to remove.



Undo the 6mm nut (size 10mm socket) so you can remove the bimetallic strip.



Set your multimeter to ohms and test the resistance of the bimetallic strip.

Usually there is a stamp on the resistor stating the resistance and a few ohms either side of this is ok.

If the resistance readings are poor, carefully clean the terminals in the plug and recheck the resistance.



Remove the main body seal



Only remove the fuel cell and the position of the bimetallic pin if you intend to reset the pressures.

You now need to push the electrical bimetallic strip pin up to level with the top of the body. Put the nut back onto the thread so that you don't damage it while pushing / knocking the pin up.



Now push out the fuel cell.

While the body is empty, give it a clean. **DON'T** touch where the fuel cell fits in. It must be a firm fit, if it's loose you'll be in trouble



Grip the fuel cell in the vice to remove the screws. Note that the screws are not against the vice but parallel to the jaws. This makes the screws easier to remove.



Remove the top. Beware of the small 'hat' that lives in it. Don't lose it. Then there is the shim and the seal.





Reface the fuel cell, top & bottom of the main part of the fuel cell. Also the the top end cap plate of the fuel cell with the 'hat' inside it, and the shim.



I use 1,000 grade wet and dry.



Now for putting the fuel cell back together

Put some grease, I use copper grease, around where the 'hat' fits into the end cap.



Turn the cap over and put some grease into the 'hat', this helps hold the pin in place.



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Find the fuel cell seal and put it into the groove.



Place the shim on the top of the fuel cell.



Put the cap on, just make sure there was no grease on the face of the cap otherwise it may affect how the shim operates.



You have 4 Allen screws, put a small amount of grease on the thread, and tighten them firmly. Remember they are only small screws so don't go too hard and strip them.



Reface the body on the wet & Dry



Now to refit the fuel cell into the body.

Position the fuel cell with the larger fuel fitting on the side of the electrical plug.



Put it in the vice as shown here and the tighten the vice until the fuel cell is sitting out about 4 to 5mm



Fit the new 'O' ring over the electrical plug



Push the plug into the body



Apply pressure to the bottom of the plug, careful not to damage the wires or the resistor, and locate the 'C' clip onto the plug on the outside.



Then push it all the way home.



Turn the body over and fit the flat washer, spring washer and nut. Do the nut up tight and then, with a screwdriver at the fuel cell end, centralise the bimetallic strip.

The slit, or hole must be over the 'hat' in the fuel cell for the pin to sit upright.

Also, make sure that the raised 'bumps' in the bimetallic strip are facing up towards you. The spring hat sits on the raised 'bumps'





Time now to recondition the dual diaphragm section.

First job is to remove the rivets.

I use a wood chisel to carefully chisel off the tops of the rivets



The rivet heads removed



Punch out the rivets.

I use a 2.5mm punch to push the rivets out



Rivets removed



Lift off the spring mount to expose the small diaphragm.



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Turn the centre section housing over and remove the diaphragm assembly.



Remove the centre adjustable screw. You will reuse this screw in your new diaphragm.



Time to clean-up and prepare for reassembly.

Clean up both the spring seat and both sides of the diaphragm housing with your 1,000 grit paper.

You may be quite surprised at how much it takes to get a smooth surface.

The larger of the 2 springs sits into the recess of this disc.



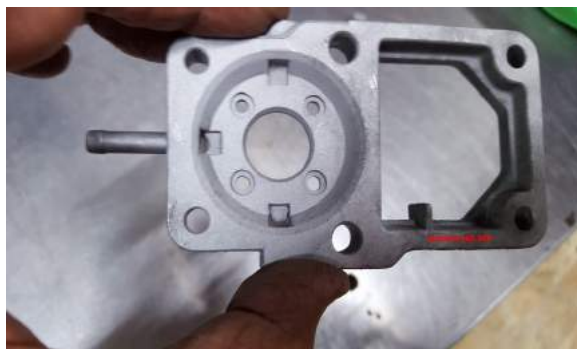
Pick up the small hat diaphragm and push the centre pin through it



Should look something like this.



Take the centre housing and the rivets go in from this side.



I have a couple of washers that I use to hold the rivets in place so they don't fall out.

Put a little wipe of gasket sealant like Loctite 515 on the flat surface where the diaphragm will sit.



Place the diaphragm and centre pin over the rivets and again wipe the flat surface of the diaphragm with the gasket sealant



Fit the spring seat over the rivets



Flare the rivets over. Having the washers under the head of the rivets ensures that they don't move when you flare them over which could leave the diaphragm a bit loose. The rivets must be firm and the diaphragm seated tightly or else you will have vacuum leaks.



Turn the assembly over.



And fit the spacer ring



Next take one of the large flat washers and place it with the cup facing down.



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Take the large diaphragm and place it as per the picture.



Next take one of the large flat washers and place it on the diaphragm with the cup facing up.



Hold it all together with the knurled nut.



Now insert the centre adjustable screw. Note, often these don't have a 'O' ring seal on them, and in this picture I hadn't yet fitted it. Fit the 'O' ring and wipe a little bit of Vaseline on it before you screw it in. Screw it all the way in and then back it out about 3 turns.



The base section. It will look something like this but there are some slight variations.



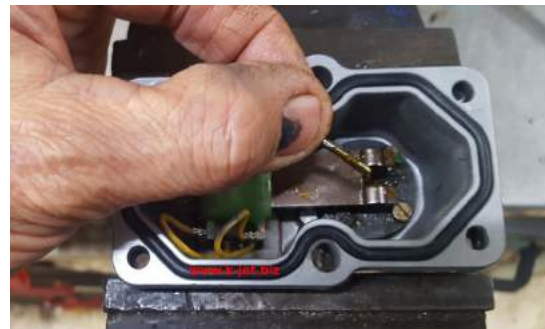
Carefully knock out the plug. I use a socket.



Back to the top assembly.  
We left it looking like this.



Put the body seal into the groove.  
Note: if the seal or the groove is not perfectly dry, the seal will NOT sit in place. So if you are having trouble getting it to stay in place, dry the seal and the groove.

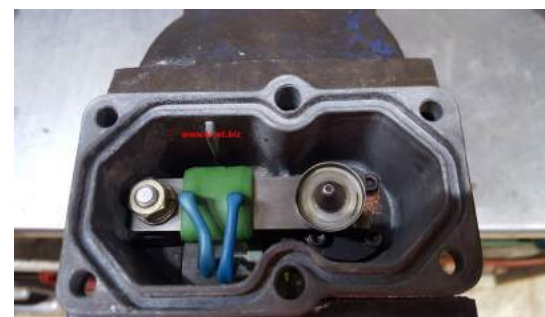


Find the control pin to sit it into place.



The pin sits into the hat, in the grease so it holds without easily falling out.

Place the spring hat over the pin



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Sit the 2 springs onto the hat.



Now place the centre diaphragm section on the top body assembly. You must make sure that the springs sit into their seats in the diaphragm assembly.



Fit the base section

Screw it all together, tighten the screws firmly.

Leave the bottom plug out.



## Setting it up

You need to know the settings for your particular part number. Go to [www.k-jet.biz](http://www.k-jet.biz) and you will find most of the specifications there.

You also need to know what the temperature is in order to set the cold settings

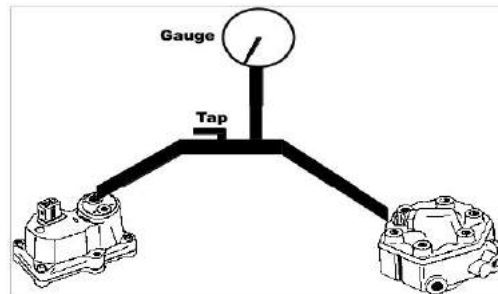
This part is a bit fiddly when you don't have a test bench and are doing it 'on the car'.

Screw in the fuel lines but **DO NOT PLUG IN THE ELECTRICAL PLUG**. We need to do all the initial settings with no electrical power to the bimetallic strip.

Although we are setting the warm pressure we do this while it is cold. It will make sense shortly.



You must have a fuel pressure gauge fitted between the centre of the fuel distributor and the inlet (large) fuel fitting on the Warm-up regulator.



Now you need the fuel pump running, so you can remove the fuel pump relay and put a jumper lead between the battery power and the fuel pump +ve connector, or just run a wire from the +ve side of the battery to the +ve connector of the fuel pump.

Watch the fuel pump pressure and you must start to tap in the fuel cell slowly until you have about 2.0 bar pressure. I suggest that you use a punch and hit the fuel cell either side of the connectors until you get to the correct pressure.

When you have about 2.0 bar pressure put a vacuum hose onto the manifold vacuum fitting of the warm-up regulator.

It is very important to know which vacuum fitting is the primary manifold vacuum fitting as some warm-up regulators have 1, 2 or 3 vacuum points.

The vacuum fittings will be either 8mm (large) or 5mm (small). One will be primary manifold vacuum, the others may be just breathers to atmosphere or, secondary vacuum, controlled vacuum which receives vacuum depending on



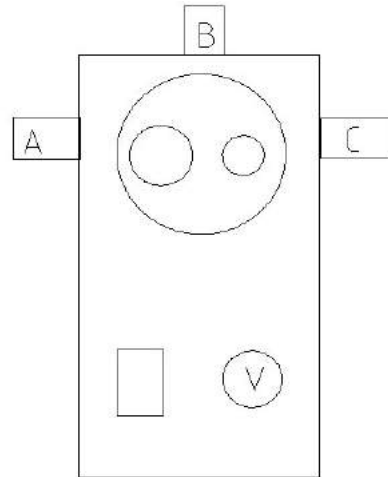
temperature controlled switches or they are joined above the throttle butterfly.

To try and help find the correct one there is a general rule, but it is not always followed so refer to the list to find the correct fitting.

The general rule is: Manifold vacuum is to the large (8mm) fitting. If you have a large fitting on the side of the WUR, this will be the primary manifold vacuum. If you have small fittings on the side or the end, then the top vacuum hose fitting will be primary manifold vacuum.

This diagram refers to the list on the web page.

- V = Top vacuum fittings
- AL = 8mm fitting on left side
- AS = 5mm fitting on left side
- BS = 5mm fitting on the end
- CL = 8mm fitting on right side
- CS = 5mm fitting on right side



If you have a vacuum gauge it is worth knowing how much vacuum you are able to suck. If you don't have a vacuum gauge, don't worry, just suck as hard as you can.

Suck on the hose fitted to the primary vacuum fitting. You want the fuel pressure to reach 3.4bar to 3.8bar.

If the pressure, **with vacuum** is not correct then push the fuel cell in further until you get 3.4-3.8bar.

So, the first pressure you set is the warm control pressure WITH vacuum and that should be 3.4-3.8bar.

Now, WITHOUT vacuum. When you stop sucking the pressure will have dropped. Just to make sure everything is ok, suck on the hose to apply vacuum and then release it to watch the pressure rise and fall, make sure you consistently get the pressure you set the screw to.

Refer to the list to find out what the specification is for your WUR without vacuum. Typically this will be 2.8-3.2bar.

To set the warm WITHOUT vacuum setting we use the bottom plug that you knocked out earlier.



Now you need to knock the plug back in VERY CAREFULLY.

Start by knocking it in until it is level with the base of the WUR. From this point on, be careful. If you knock it in too far you have to pull the bottom off the WUR, knock the plug back out and refit it back.

Watch the fuel pressure gauge carefully. GENTLY tap in the plug and at some point you will see the fuel pressure start to increase. Continue tapping it in until you get to the pressure you require, Refer to the list for the correct pressure.

Suck on the vacuum hose to check you have the correct WITH vacuum pressure, release the vacuum to check you have the correct WITHOUT vacuum pressure.

Next we set the cold pressure.

What is the temperature where you are now? What ever the temperature is, this is what you need to use to set the cold pressure. You also need to know if the cold pressure is with vacuum or without. I have tried to supply both readings, but typically it will be with vacuum, ie. The engine running when checking it on the car.

To set the cold pressure you need a punch or a bolt that you can use to knock the bimetallic strip pin in.

Knock the pin down until you reach the cold pressure setting.

Remember, if it is with vacuum or without.



Once you have set your cold pressure, plug in the electrical plug for the bimetallic strip and watch the pressure rise up to your warm settings.

You have now finished the rebuild of the warm-up regulator. If this has been helpful to you please consider a donation. I give this information freely and it is the accumulation of a lot of work. Please send a donation to my PayPal account [www.paypal.me/KJetSpecialists](http://www.paypal.me/KJetSpecialists)

Happy motoring

Colin Duncan