

Water Pump and Thermostat Replacement DIY

So I after 149,521 glorious miles, the water pump in my 325i went dead. I figured I'd do a DIY for it using the basic procedure for a coolant change (I wrote a few years ago). Also, I replaced the thermostat a few months back so I'll throw that in too since you need to remove it to get the pump out. I don't take pictures because it takes too long and I don't want to dirty up my nice camera. The intent of my DIYs is to provide the details of removing parts by being descriptive enough that pictures are not necessary. I find that repair manuals lack the detail of how to actually remove parts and disconnect hoses and electrical connectors, which is what I try to add. One final note, I have a lift, so this is written from the perspective of standing on your feet (i.e. not lying on your back) so you'll have to orient yourself appropriately.

This DIY assumes you have a decent skill set at turning wrenches and have a pretty good set of tools, and you are familiar with the E9x engine compartment. You should also know that coolant hoses stick to their attachment points and need to be "finessed" off.

- The tools needed are:
- 10mm socket
- 10mm wrench
- 8mm wrench
- 6mm socket
- 6mm wrench
- Set of E-torx sockets
- Extension bars
- Universals
- Big flat blade screwdriver
- Small flat blade screwdriver
- 1/4drive ratchet
- 1/4 drive nut driver
- Mechanic's Dental pick - really helps with this procedure
- LED Flashlight
- Coolant catchpan
- Shop towels and paper towels
- I suggest getting some floor-dry compound to soak up any spilled coolant. Cat litter will do.
- Large Zip tie, or small-diameter rope, or stiff wire

For nomenclature purposes, the right side of the engine is the passenger side and the left the driver's side. Note: you will be wrenching on aluminum and plastic screws, and small hose clamps, so don't over torque them when tightening!

Our cars have an electric water pump and electric thermostat. Both the thermostat and water pump housings are on the front right side of the engine next to each other just above the steering rack.

Fault codes: The pump if it has failed will have put fault/trouble codes in the ECU. Most BMW procedures that replace sensors (that throw codes) call for clearing the codes before the part is removed and the ignition re-energized. If your car has pump codes in the ECU, clear them first. You'll need a BMW-specific scan tool to clear the codes because they are not OBDII codes.

The basic procedure is:

- Remove the engine underpans
- Move the steering fluid cooling hoses out of the way
- Drain the coolant
- Remove the radiator cooling fan
- Remove the Thermostat (T-stat)
- Remove the water pump (pump)
- Replace the T-stat
- Replace the water pump
- Refill the coolant
- Vent the coolant – bleeds the air out of the system using the water pump
- Top off the coolant
- Re-install the underpans

Steps:

- 1) Open the hood and open and remove the coolant reservoir cap.
- 2) Just for good measure, open the coolant reservoir bleed screw (it is the cross-headed button next to the cap where the overflow hose comes in to the reservoir).
- 3) Lift the car off the ground so you can get underneath it. Lift the front and rear so the car is level in the air. Get it as high as you can so you have room to work.
- 4) Remove the engine underpan (the big plastic cover under the engine compartment). It is held in place by 16 or so 8mm-head bolts.
- 5) Remove the plastic under-shield covering the bottom of the radiator. It has two 8mm head bolts. Then it has two clips that attach to the cross member pull straight down on them, then the cover just slides rearward. There are two aluminum sheet metal brackets that come off with it. Make a note how they are installed.
- 6) Un-attach the power steering cooling hose and move it out of the way. The hose is two parallel hoses that loop around (with a horseshoe metal pipe in a rubber isolator) that runs next to and is attached to the steering rack. It's mounted in two places – you need only to remove the right-side mount. Remove the mount by removing the 10mm bolt on the steering rack flange. Tie off the hoses out of the way using a zip tie, stiff wire, or rope.
- 7) Place a catchpan under the left side of the radiator and open and remove the blue plastic radiator coolant drain screw on the left side of the radiator. You need only to remove the blue screw (it threads into a white nut – don't remove the nut!). (Some cars have two drain screws, one on each side of the radiator)
- 8) Let coolant drain. It takes about 10 minutes or a bit longer. You can get more coolant out by squeezing the lower radiator hose on the right side of the radiator.

Remove the radiator cooling fan:

The fan comes out as a whole unit. It is secured with one regular torx screw and a thumb clip on the left side. It sits on plastic mounts on the bottom of the radiator.

To remove it:

- Remove the silver-colored torx screw on the upper right side corner of the fan unit.
- Remove the temperature sensor electrical connector on the lower radiator hose. Push the wire clip in and pull the connector straight back.
- Remove the electrical connector for the fan motor; it is on the left-side of the unit next to the fan motor.
- Move the small tube that is part of the coolant over-flow hose; it snaps in mounts on the radiator.
- Move the electrical harness out of the way. It mounted along the water tube.
- Look for the thumb tab on the left side of the unit (about half-way) down. Push it in and pull up on the whole fan unit.
- Move the unit back and to the left to clear the lower radiator hose, and then pull the whole unit up and out.

T-stat and water pump removal:

T-stat (comes out first)

There are four (4) hoses attached to the T-stat. The two big ones are in the front and back of the housing; the front is the lower radiator hose, the rear is the U-shaped hose that supplies the water pump. The other two are smaller diameter hoses that attach to the topside of the T-stat housing on the frame-side of the housing. They are attached using two different types of clamps: a) BMW plastic clamp-body with a wire clip, or b) a regular (German “Würth”) worm-gear hose clamp. The hose clamp types are as follows:

Large hose to radiator (front) – BMW plastic clamp housing
Large hose (U-shaped) to water pump (rear) – regular hose clamp
Small hose (back-top): regular hose clamp
Small hose (front-top): BMW plastic clamp housing

- 9) Find the 2-wire T-stat connector and unplug it. Pull up on the little tab (I use the pick here) and pull it straight back.
- 10) Place the coolant catchpan underneath the thermostat/water pump housings.
- 11) Remove the U-shaped hose running from the thermostat housing to the water pump first (to give you access to the small hose above it). About 16 ounces or more of coolant will come out.
- 12) Remove the radiator hose at the T-stat (front). To loosen the BMW plastic clamp, find the wire clip (it similar to the wire clips you see on electric connectors – except it pulls up). Find the top of the wire clip and pull straight up away from the hose. It will “snap” into the open (loose) position. Now wriggle the plastic hose body up and down to loosen it up. Note – It does not twist! There are guide

- slots at the 12 and 6 o'clock positions so it can't rotate around the opening on the T-stat body. To get the hose off, you need to break the tension on the o-ring (by wiggling it up and down) and then pull it straight off the T-stat body.
- 13) Remove the small diameter hose (back-top) - the one with the regular hose clamp.
 - 14) Remove the small diameter hose (front-top) – the one with the BMW plastic body clamp.
 - 15) Remove the two mounting bolts that hold the T-stat to the water pump. The bolts are located right above the water pipe that runs along the cross member. You'll need a 1/4 drive 6-extension bar and universal to get them out. They are 10MM heads.
 - 16) Remove the T-stat from the car by rotating it and pulling it towards the rear and drop it down between the engine and cross member (this is why you moved the power steering hoses out of the way).

Water Pump Removal.

The new water pump is shipped in an ESD bag (Electro-Static Discharge). That means DON'T TOUCH the pins of the electrical connector or you might damage the electronics that control the water pump.

The water pump sits backwards in position; meaning the impeller side faces the rear of the car. The U-shaped hose from the T-stat dumps straight into the impeller housing. The second hose is positioned on the top-side of the impeller housing. The pump is held in place with three aluminum mounting bolts that screw into the engine block. They are blue-headed screws meaning they are one-time use only. (Note: the replacement screws are not blue-headed). The bolt heads are E-torx (E-10). Two of the bolts are on the bottom (easily seen once the T-stat is removed). The third bolt is at the top-front of the water pump and is hard to see. You'll need a 3/8 drive 6-inch extension bar and universal to get a good, straight bite on the E-10 torx head. My advice is to look at the new pump in the proper orientation it is mounted to the block to see the positions of the bolts, just so you are familiar with it in the mounted position. Leave it sitting on the ESD bag until you actually install it.

- 17) Find the 4-wire pump electrical connector. Squeeze the sides of it and pull it straight back. Note how the harness loops below the pump and is clipped into a mounting clip on the pump.
- 18) Remove the last water hose (you've already removed the U-shaped hose) that is on the water pump housing. It has a regular clamp.
- 19) Remove all three bolts.
- 20) Pull the old pump forward toward the radiator. Rotate it 90 degrees (so the center hose orifice is facing the left side of the car. Move it along the radiator until it clears the water pipe and drop it down out of the car.

Water Pump and T-stat installation:

- 21) The new water pump goes in first. Put the new pump into place following opposite direction you used to remove it.
- 22) Install the two bottom mount screws first, but leave them loose.
- 23) Install the top screw.
- 24) Torque-down all three screws. The torque is 81 INCH-pounds (NOT FOOT POUNDS). 81inch-pounds is about 7 foot-pounds. You really can't get a torque wrench in there anyway, so just gently tighten the bolts till they are snug and then go another 90 degrees of rotation. Don't over torque them or you'll snap them off. They are aluminum bolts!
- 25) Install the top-side water hose. Don't install the U-shaped hose just yet.
- 26) Install the T-stat in the same manner as removing it, just in reverse.
- 27) Install the two T-stat mounting bolts. They are steel. Just tighten them down.
- 28) Install the four (hoses) on the T-stat. The BMW clamps need to be pushed on hard. You have to line up the guide-slots and push the connector until it snaps in place. Push the wire clip down and make sure the hose is all the way in on the mount. Pull on it to make sure it won't come off and it is locked on the T-stat orifice is connects to.
- 29) Install the U-shaped hose between the T-stat and pump.
- 30) Reconnect the T-stat electrical connector
- 31) Reconnect the water pump connector. Transfer the old wire harness clip to the new pump (use a flat screwdriver to pry it off) and clip the electrical harness into it (the harness sheath will have the indent where it was in the clip). Make sure there is slack in the harness and that it is not rubbing on any of the hoseclamp screw-heads.
- 32) Re-install the power steering hose to its mount.

Coolant Refill procedure:

- 33) Reinstall the blue radiator drain screw.
- 34) If you didn't open the bleed screw on the coolant reservoir, open it now (about 4 turns)
- 35) Slowly fill the system with a premixed 50/50% mix of BMW coolant and distilled water.
- 36) Fill the reservoir all the way up to the bottom of the filler neck. The bleed screw will bleed air as it gets trapped in the reservoir. Keep filling until the bleed screw is passing coolant with no bubbles in it. (Keep a paper towel handy to soak up the coolant coming out of the bleed screw).
- 37) Close the bleed screw.
- 38) Once the reservoir (system) is full (it will take almost two gallons of antifreeze) fully close the reservoir cap.

Venting Procedure (to get the trapped air out of the system):

- 39) Insert the key into the dash slot and hit the starter button (but don't start the engine – e.g. keep your foot off the brake/clutch).
- 40) When the ignition is on, set the heater to the highest temp (84 deg.) and set the fan on low.
- 41) Hold down the accelerator pedal for 10 seconds then release. This activates the water pump and it will cycle for 12 minutes (note the time you start because it takes 12 minutes, no more no less and if you don't time it you'll sit there guessing if it is finished) to vent all the trapped air into the coolant reservoir (it sounds like a mini washing machine). Note: the time you start because it takes 12 minutes, no more no less and if you don't time it you'll sit there guessing if it is finished. Don't open the reservoir cap or bleed screw during the venting process! (you'll have start the process over if you do). You may want to hook up an extra battery to the under-hood jumper points to keep the car's battery from running down.
- 42) Once the water pump stops after 12 minutes, open the reservoir cap (it will hiss a little) and add coolant until the measuring stick (ball indicator) is 6 mm above the top of the filler neck. (there is a pictograph on the reservoir that shows how far out the stick is at the full level)
- 43) Close the cap and check for leaks in the system (the hose connections you took off)
- 44) Reinstall the plastic radiator shield and engine underpan. The job is complete.