The 1.6 8V HDI engine is fitted to vehicles from 2010 to 2016 and comes with three different power options. There are 75 BHP and 92 BHP models which both use the same injectors, turbo and ECU. These come fitted with a Bosch EDC17C10 ECU and a Mitsubishi TD02 waste gated turbo charger. The 75 BHP model generally only comes in the Partner and Berlingo vans.

There is also a 115 BHP version which uses a Siemens SID807 ECU, Siemens injectors and a Garrett GTC1244VZ VNT turbo charger, we **do not want to use that turbo** as the actuator position sensor cannot work with our EDC17C10 ECU.

In the UK, all of the 1.6 8V engines we have seen come fitted with a DPF with a lambda sensor, differential pressure sensor and temperature sensors.

As the engine is the same it's easy to upgrade the turbo on the 92 BHP model to use the turbo from the 120 BHP 1.6 adblue model. The exhaust manifold is the same, and everything else is 'almost' the same so it's relatively easy to do.

This guide is also applicable to a hybrid turbo upgrade, the process is the same except the fuel pump must be upgraded, contact us for more info.

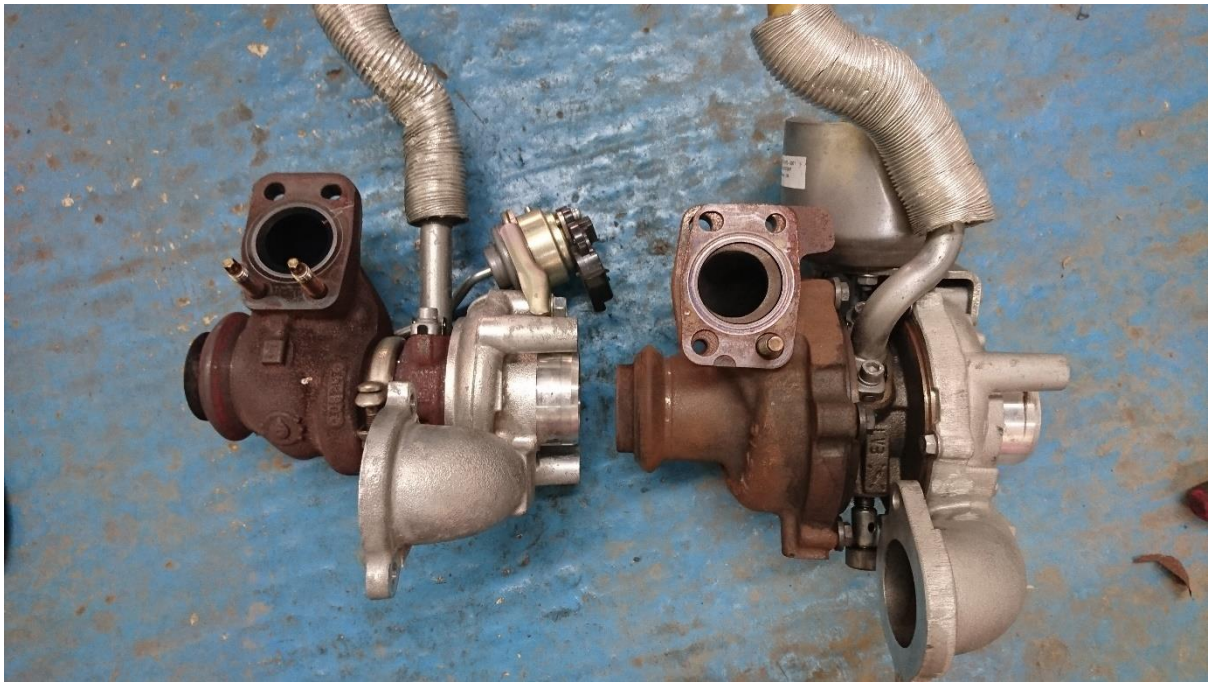
Both turbos are available in our webshop:

GTD1244VZ – 150 BHP £399

GTD12 49mm Hybrid - 185 BHP £699

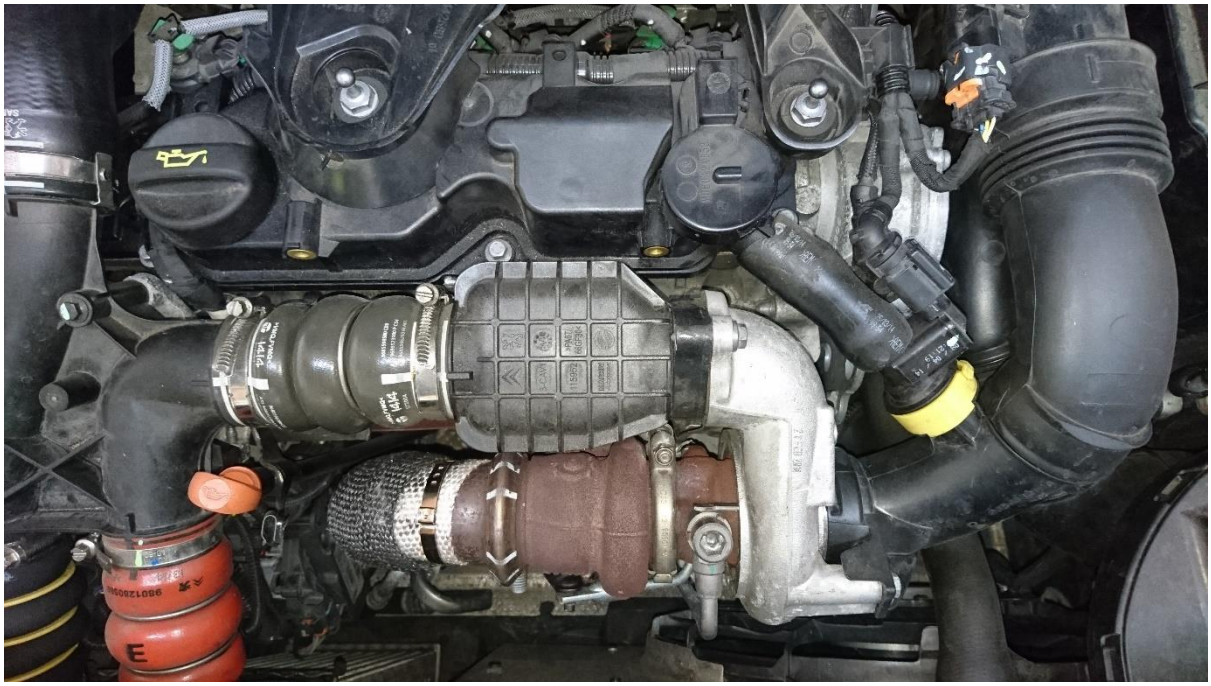
1.6 HDI DPF delete/ Decat pipe available here

Here's a photo showing a comparison of the two turbos, the Garrett VNT turbo (right) is clearly a lot bigger, but thanks to the VNT system it still spools very early and can give good top end figures.

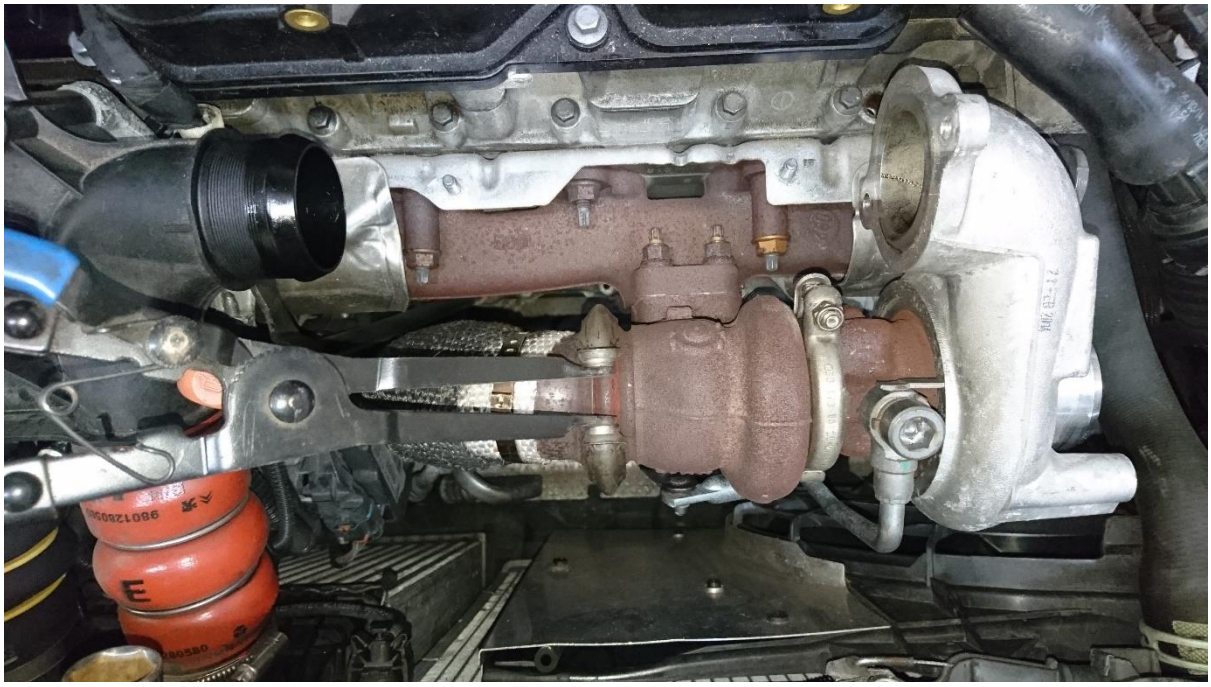


The position of the oil drain and the oil feed is the same, so it's quite an easy conversion.

The first step of the conversion is to remove the heat shields around the turbo and the DPF, you'll also need to remove the DPF and get a straight through pipe made. All the unwanted sensors in the exhaust can be written out in a remap.

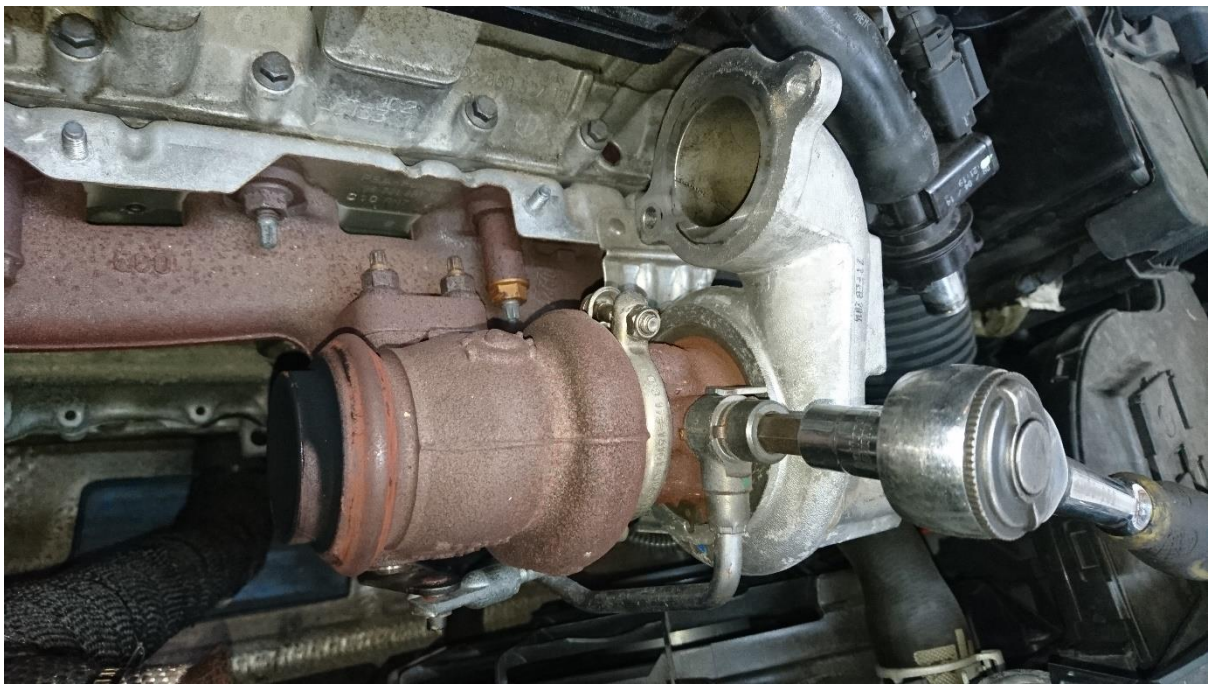


Remove the intake pipe which is held on with a 10mm bolt, and the turbo outlet to intercooler pipe which has two 10mm bolts and the jubilee clip uses a 7mm socket.



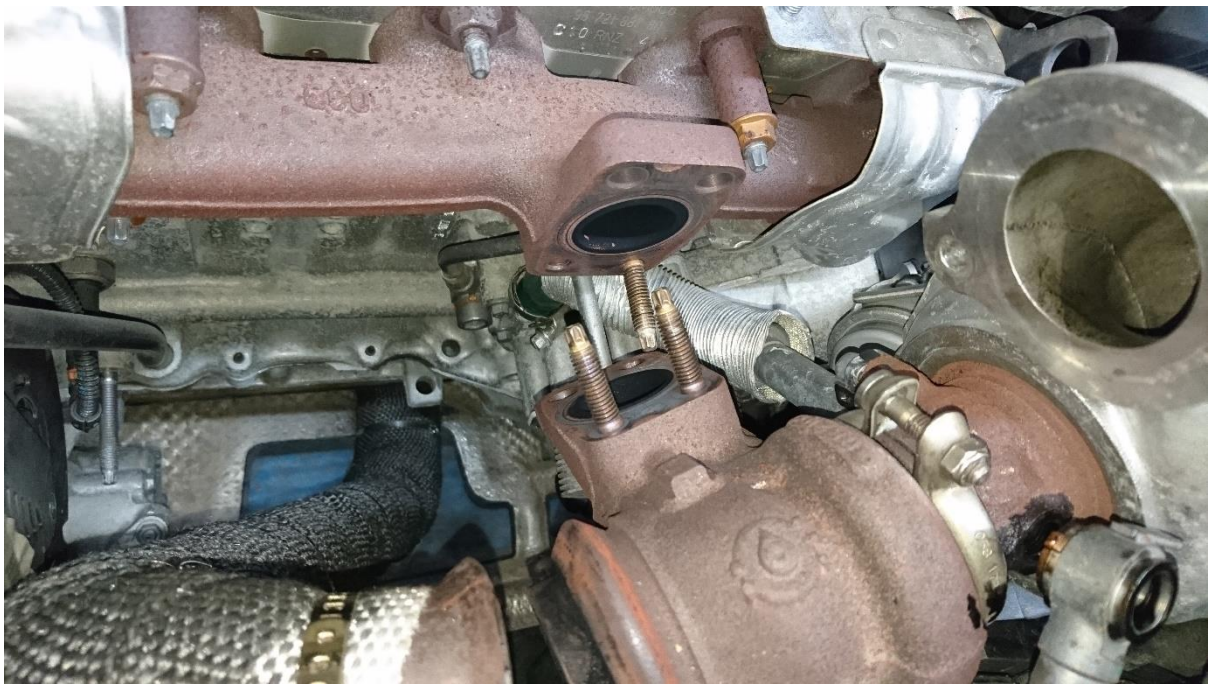
The exhaust clamp uses a 16mm nut at the bottom and then you can use a tool as shown above to remove the v band clamp.

Loosen the allan head bolt which is used for the turbo oil feed.



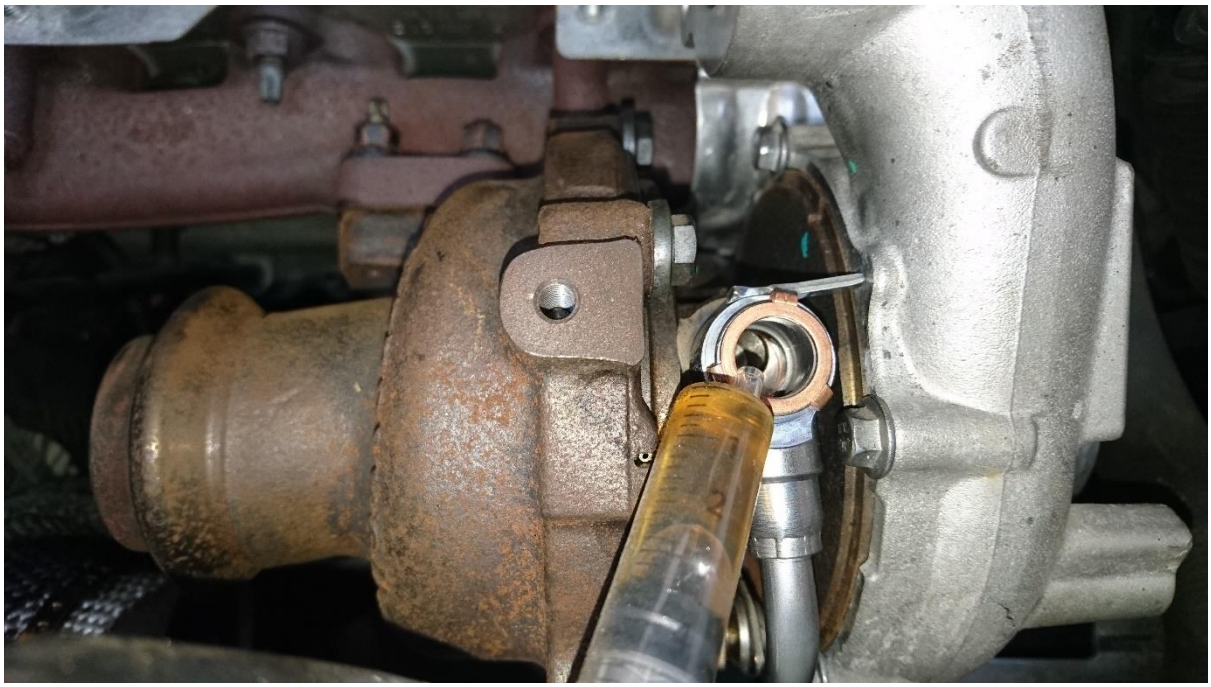
The next step is to loosen the 4 11mm nuts holding the turbo to the manifold. If these are tight you might want to join two spanners together to get some extra leverage.

With the four nuts off you can slide the turbo outwards and then you'll be able to easily see the turbo oil drain. Loosen the 7mm nut on the jubilee clamp and then pop the hose off. The turbo will now come out.



Before you refit the turbo, you will need the correct oil pipe (part number 63846), as shown here the pipe for the GTD1244VZ is completely different. I would also recommend fitting new banjo bolts. Don't remove the strainer from the lower bolt, it's a filter and an oil restrictor, removing it will cause future problems.

Refitting the new turbo is exactly the opposite of removing the old turbo. It doesn't hurt to put some oil in the turbo so it doesn't start up dry.



When you come to connect the plug to the turbo actuator position sensor you will find that it has been designed to prevent you from connecting it to the wrong turbo. To get the extra length on the wire you simply need to remove the 90-degree collar that is clipped on to the wire.

The intake pipe is also designed in a way that you can't accidentally fit the wrong turbo. With a hack saw or a cutting disc you just need to remove a small piece of plastic to allow the pipe to clamp down flat to the turbo inlet.

Once the new turbo is refitted it will look quite standard.

As the intake pipe is slightly too short I chose to hold both ends with jubilee clamps so that it couldn't fall off. The standard setup just clips on without and clamps.

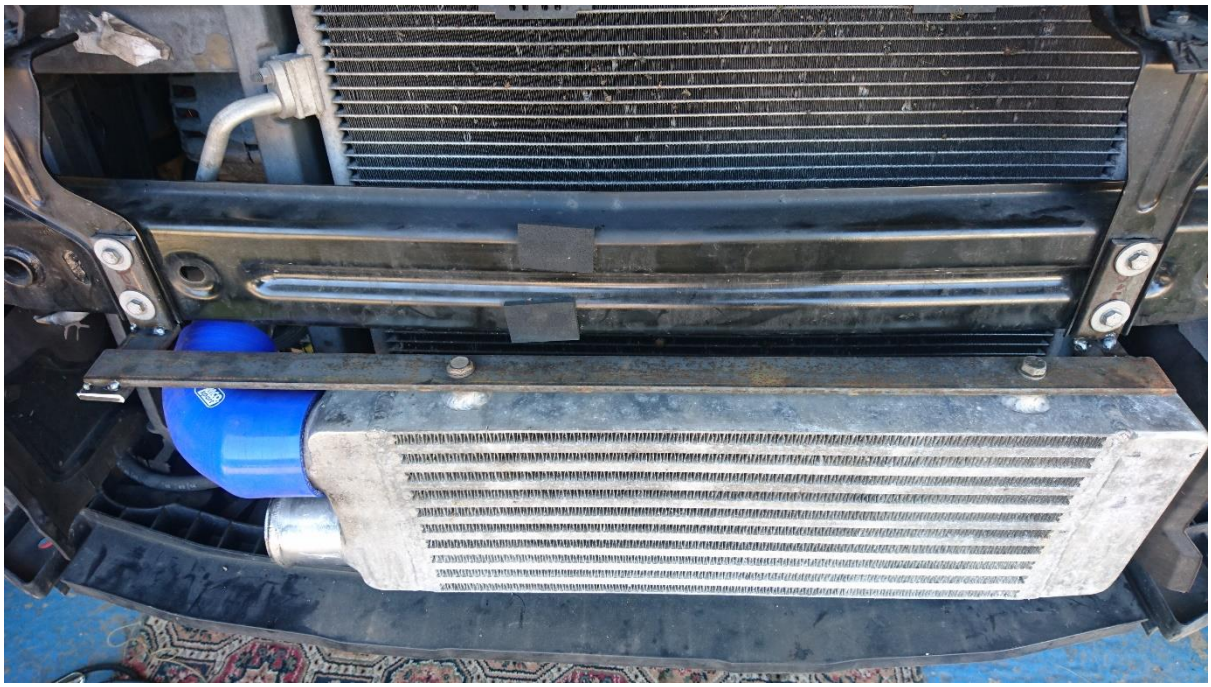
I chose to put some heat wrap around the turbo outlet pipe so that it wouldn't absorb hear from the turbine side of the turbo. If you do this you want the shiny side facing out to reflect heat. If you wrap the turbo you want the shiny side inwards to keep heat inside.

The standard intercooler doesn't give sufficient cooling when you're running higher levels of boost. On the dyno, I found the temperatures could get as high as 100 C at the intake manifold which has a

negative effect on performance. To upgrade the intercooler the first step is to remove the under tray, the wheel arch liners and the bumper. The bumper is held on by two 10mm bolts, it's best to undo the outer bolt fully, then unclip the bumper slightly. You will now have access to the second bolt. It's best to not undo this fully as it will make it easier to refit.

Once the bumper is off you can remove the front beam to give enough space to remove the stock intercooler. Here's a comparison of the stock intercooler versus the upgraded intercooler. The area is around double and it will be in a much better position behind the grill with much better air flow to keep it cool.

Use some mild steel bar to weld up a simple bracket, it’s best to go on to the same brackets as the headlights.



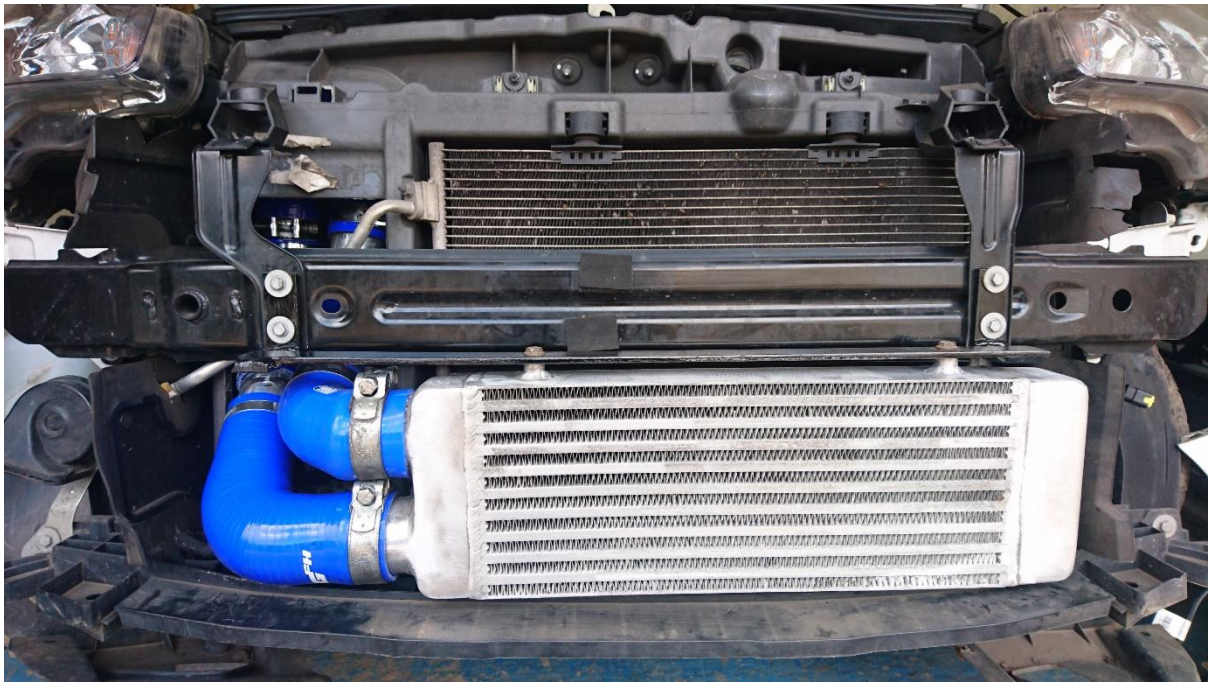
Once you’re happy the bracket is the correct size and that the bumper will fit back on you can weld it fully and paint it to prevent rust.

To join the intercooler to the inlet manifold you will need:

2 x 48<57mm 45 silicone bend
1 x 57<63mm 90 degree short radius silicone bend
1 x 57<63mm 90 degree long radius silicone bend
1 x 57mm 45 degree short radius silicone bend
1 x 57mm 45 degree alloy joiner 100mm leg length (wasn't long enough)
3 x 57mm alloy swaged joiners
1 x 57mm silicone join to lengthen the alloy 45 bend.

Here’s how the pipe work looks from above.

Here’s the final job with the intercooler and pipe work fitted.



And now the hard part begins. You're going to have some faults when you start up as the turbo position sensor uses a different calibration and that will be picked up by the ECU. You can't really use the car until the turbo has been set up properly as the ECU will not allow any boost.

The remapping is very complex to get this turbo to work nicely on this ECU. On my project car it took almost 150 different remaps with different tweaks and different experiments to get it running perfectly. The turbo spools very early (around 1750 RPM) and gives great low-down torque and lots of high end power. The standard TD02 turbo does drive nicely in the low revs but it really runs out of puff quickly. With this turbo upgrade it makes a big difference to driveability.

Once on the dyno I found the uprated intercooler made a big difference. Before we had to cut the test short because intake temperatures were getting past 100C before 4000 RPM. With the upgraded intercooler, they didn't pass 40C even after two consecutive runs revving the engine to around 4500 RPM. It could be the case the stock intercooler performs better when on the road as the bumper is designed to bring air flow over it, however on the dyno this is not the case.

The final power figures were very good with 318Nm and 141 BHP.

Troubleshooting: If after remapping you have a permanent fault with the turbo position sensor and a reading of 0% on live data, then you must swap wires 1&3 in the electrical connector to the turbo position sensor. Usually this is not required and must only be undertaken if there is a permanent reading of 0% with live diagnostics.

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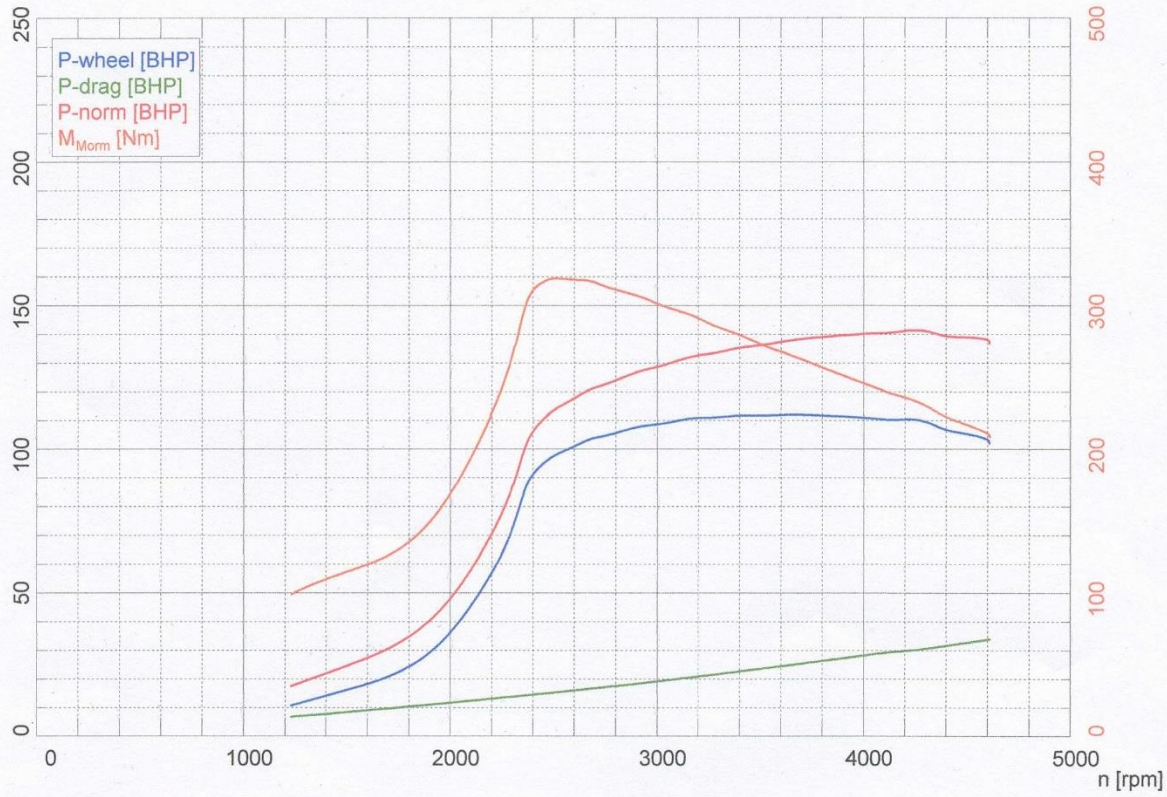

Power data

Corrected power 1)	P_{Norm}	141.2 BHP	/ 103.8	kW
Engine power	P_{Eng}	140.1 BHP	/ 103.0	kW
Wheel power	P_{Wheel}	110.2 BHP	/ 81.0	kW
Drag power	P_{Drag}	29.9 BHP	/ 22.0	kW
Max. power at		4240 rpm	/ 160.5	km/h
Torque 1)	M_{Morm}	318.5 Nm		
Max. Torque at		2520 rpm	/ 95.4	km/h
Max. attained RPM		4610 rpm	/ 174.6	km/h

1) Correction acc. to DIN 70020
Correction factors: Q_V = 0.00 %

Ambient data

Ambient temperature	$T_{Ambient}$	19.7	°C
Intake air temperature	$T_{Intake\ air}$	18.8	°C
Relative humidity	H_{Air}	67.1	%
Air pressure	p_{Air}	997.8	hPa
Steam pressure	p_{Steam}	15.4	hPa
Oil temperature	T_{Oil}	19.0	°C
Fuel temperature	T_{Fuel}	----.-	°C