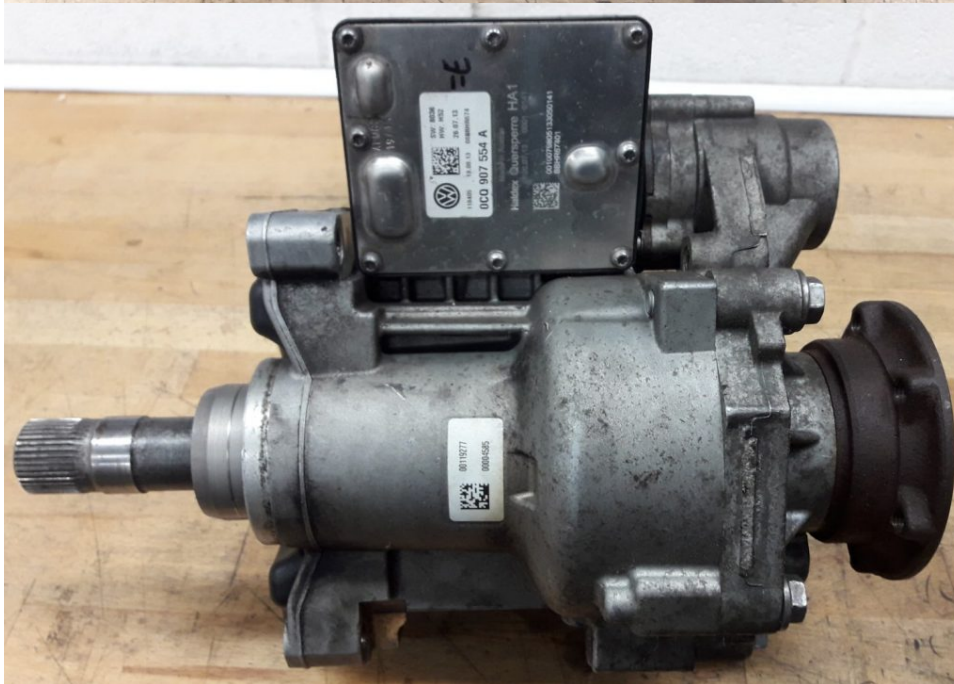
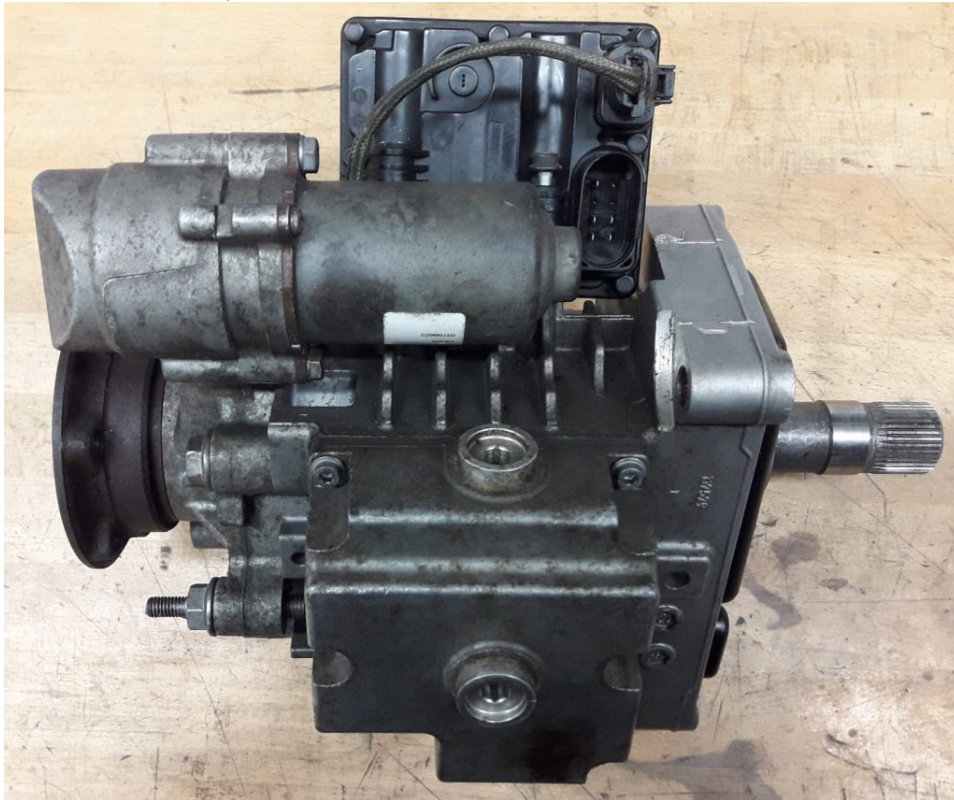


## GUIDE TO FRONT VAQ E DIFF LOCK LSD ON GOLF GTI, AUTOBAHN, SEAT LEON



This Guide applies to:-

- Seat Leon Cupra 5F 2013- onwards
- Skoda Octavia vRS 5E 2013- onwards Saloon/Estate
- Volkswagen Golf 5G 2013- onwards Saloon, GTi, Autobahn



The front E-Diff fitted to the Golf GTI and Seat Leon Cupra system is based on Generation 5 Haldex. It is given many names – VAQ system, Vorderachsquersperre (German for “transverse front axle locking”), Ediff or ELSD. But as complicated as this may sound it is nothing more than a Haldex type clutch pack which locks the rotation of the left wheel to the right (and thus the right to the left), it stops either front wheel spinning by locking the diff. It clamps the non gripping spinning wheel over to the non spinning wheel. There is still a normal diff in the final drive of the gearbox, then this E-diff transfer box slips into the right hand side of the gearbox where it meshes into the middle of the normal diff just like a drive shaft would, then it has another spline on the outer tube which meshes into the diff's outer housing thus the final drive (see picture below). The system simply clamps the right prop shaft output onto the outer final drive casting of the diff, thus it stops the diff from differentiating, thus acting like a controllable diff locker.

The system uses the ESP/ABS module to monitor wheel speeds, then if there is demand for torque/power from the driver the ESP system watches for wheel spin by the ABS wheel speeds sensors and if there is an excessive speed from either front wheel then it locks the diff together.

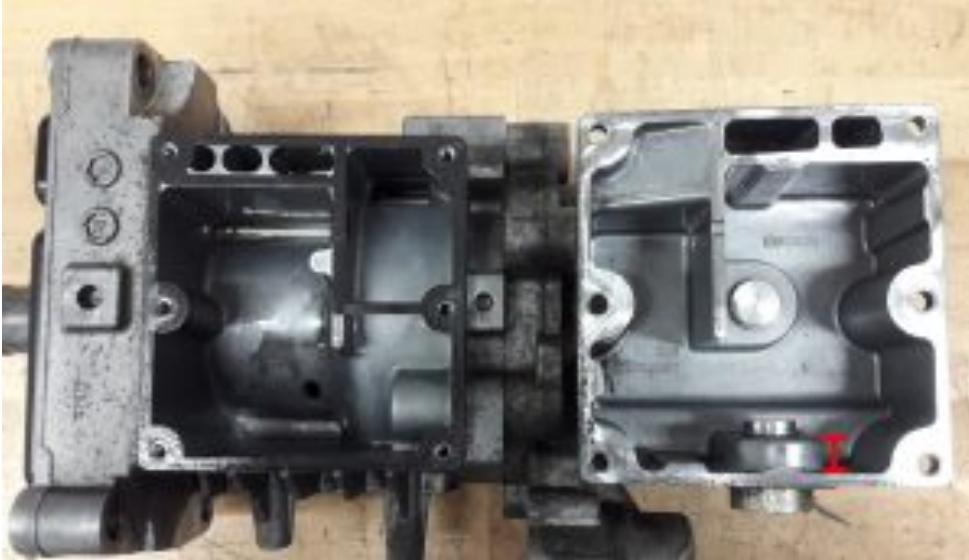


This is not a simple crude engaged/disengaged system, instead by varying the pump motor speed it varies the clamping pressure of the clutch plates

thus it controls the torque applied or slippage as its sees fit.

Everything about the VAQ E-diff is Generation 5 Haldex – the pump, the control unit, and the clutch basket design. There is the same type piston assembly and brass pressure relief valve. Here on this page are some photos of a strip down so you can see for yourself.

Being a Gen 5 Haldex system it has same issues as comes with Golf R, Tiguan etc MQB platform Gen 5 Haldex vehicles, e.g. the gauze blocks up, the motor fails, and many people never notice that it isn't working. The difference in construction is these have a proper sump chamber in an alloy box on the side, with both the fill and drain bungs. But as you can see from the internal design (click on picture to the right below to see the sump inside), when you remove the drain bung, the bottom 10mm of fluid with all the clutch pack gunge material is stuck in there so really you need to take this little sump off and clean it out to do a job actually worth doing.



Removing the pump and cleaning the gauze is also important as always, and if you are looking for a guide on servicing, it would be a good idea to work around 20k miles or 2 years, and maybe more depending on how you use the car, as the more you apply friction through the clutch plates then the more scum will build up to clog it up. A track car really needs doing every 2,000 miles.

The control module can be accessed with VAGCOM VCDS under the module number 32 “Differential Locks”, the control module has the part number 0cq907554E and is called Quersperre. It has the same requirement for learning the pump motor as the Gen 5 Haldex system, so ensure after any repair or servicing of the diff that the [pump learn is carried out which is documented at the bottom of this page](#), otherwise the motor will not operate correctly.





If you are getting fault codes such as 16671 or 16670 or 16668, which are often read as C111207 or C1112-07 or C111204 or C1112-04 then most likely your pump has failed and should be replaced, AND the pump learn function completed successfully. If you are getting 16670 or C111307 or C1113-07 you might be lucky as a clean out of the gauze, fresh oil and a pump learn might resolve it, otherwise you will be replacing the pump too. The pump you require for this system is [part number 0cq525549 which you will find here](#) . The oil you will need is here [Febi 850ml Haldex Oil](#)

**If you need to replace or clean the pump, which is very much recommended to extend the pumps life then these diagrams should assist you, along with how to refill the oil.**

## Removing and installing pump for front differential lock -V181-

### Removing

- Switch off ignition.

On some vehicles, pump for front differential lock - V181- is concealed by noise insulation.

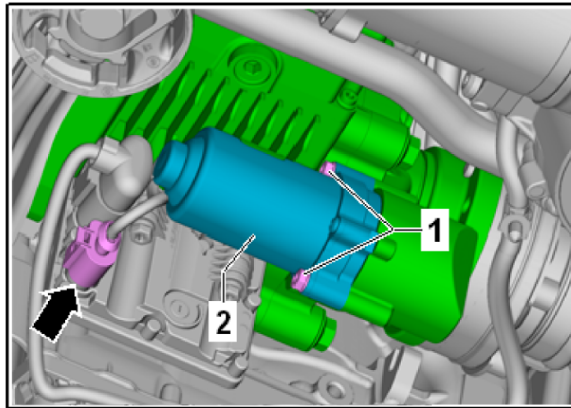
- In this case, remove noise insulation

### Removing

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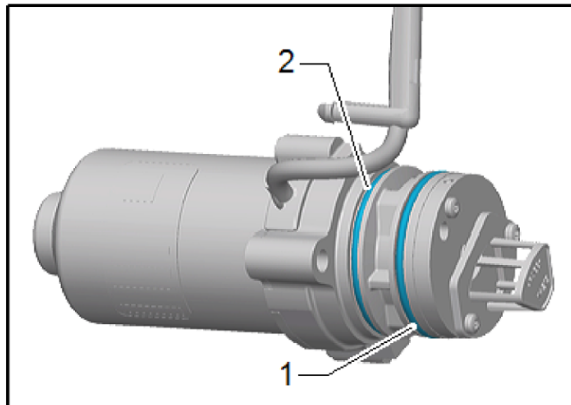
- In this case, remove noise insulation
- Pull off wiring harness -arrow- for pump for front differential lock.
- Unscrew bolts -1- of pump for front differential lock-2-.
- Pull out pump for front differential lock-2-.



### Installing

Install in the reverse order of removal observing the following:

- If necessary, renew O-rings -1- and -2- and lightly coat with oil for front differential lock.
- Push in pump for front differential lock-2- as far as stop. When doing so, observe routing of wiring harness.
- Tighten bolts -1- to specified torque.
- Push electrical connector -arrow- for pump for front differential lock onto axle differential lock control unit -J647-.
- Check level of oil for front differential lock and top up if necessary
- Test operation

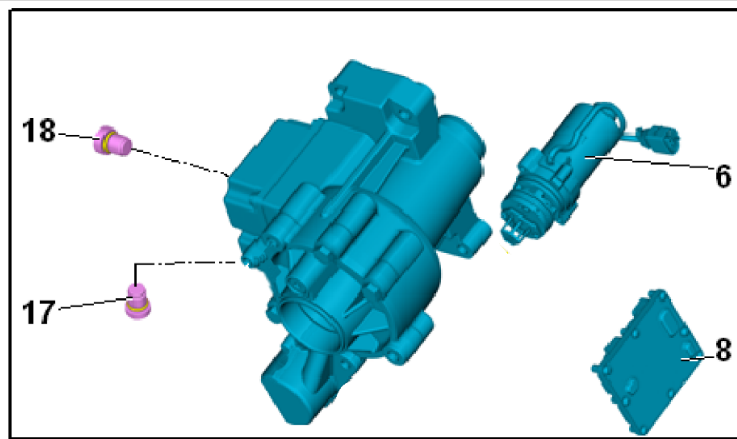


### Specified torque

Pump for front differential lock 9 Nm

## Components Outline

- 18 - Oil Fill
- 17 - Oil Drain
- 6 - Haldex Pump V181
- 8 - Control Unit J492

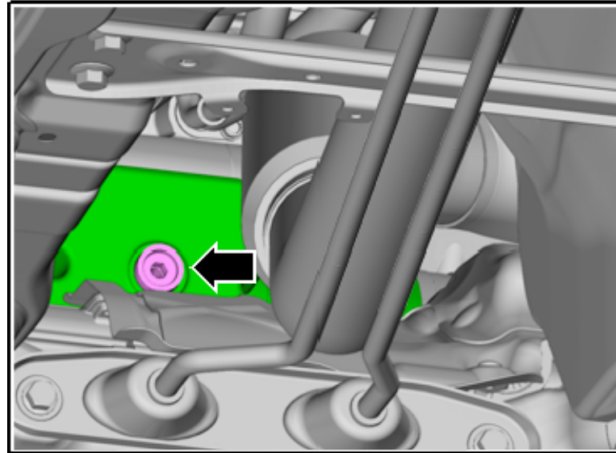


## Oil Fill Method

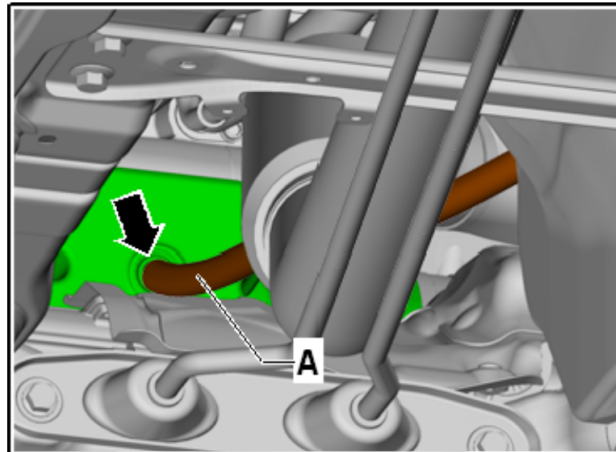
- Clean area around oil filler plug - arrow- of front differential lock.
- Cover surrounding components.
- Remove oil filler plug -arrow-.

Always renew oil filler plug after removing.

- Insert hose-A- into filler hole -arrow-
- Insert funnel into hose -A-.
- Top up oil until oil escapes between hose and filler hole.
- Remove hose. Excess oil may escape while doing so.



The oil level is correct when the  
1 Haldex coupling is filled to the lower  
edge of the filler hole.



- Screw in new oil filler plug -arrow- and tighten it to specified torque.

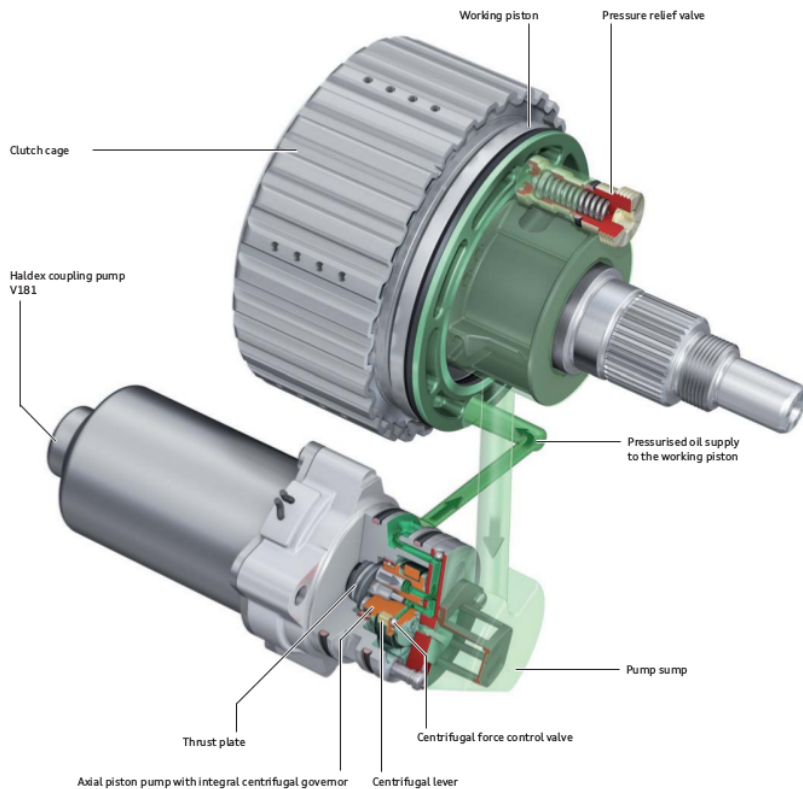
Oil filler plug	15 Nm
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## GENERATION 5 HALDEX FAULT FINDING REPAIR GUIDE



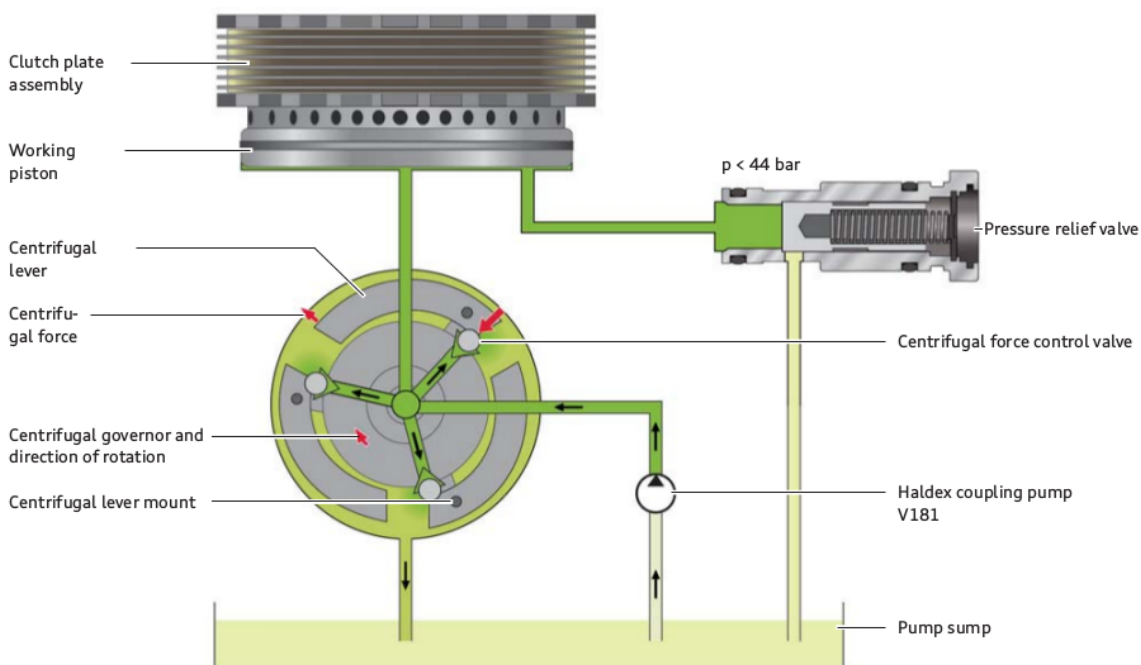
This list is not definitive, and be cautious on the dates as cars around the change over date may have either Gen 4 or Gen 5, please check by comparing the picture to the right of the Gen 4 v's Gen 5 control unit to see which system is fitted to the vehicle. Mixing up repair information is common and leads to misdiagnosis, and incorrect parts orders. So check

and be sure which you have! Generation 5 Haldex is fitted to the following VAG group 4wd vehicles (and also some of their 2wd vehicles but will be discussed elsewhere!):-



- Audi A3 S3 RS3 / Sportback 2013 onwards
- Audi TT / TTS / TTRS Coupe/Roadster 2014 onwards
- Volkswagen Golf / Golf R / 4Motion 2013 onwards
- Volkswagen Tiguan 2013 onwards

Generation 5 Haldex is the most simplified and cut back Haldex system to date, it has less components than ever before and is the lightest generation so far. A cynic might say the most “cost effective” system to manufacture! We are being inundated with customers contacting us with low mileage vehicles, around 15k to 30k miles and only 3 to 5 years old, where the 4wd system no longer works. Often they have been given astronomical quotes from main dealerships or aftermarket garages for potential repair quotes, usually in the region of £1500 to £3000 is common depending on what parts the garage is guessing at replacing!



The system really only has a few components, as seen on the diagram. There is control unit which powers a pump – which is fitted with a strainer gauze, when pressure is made the piston applies force to the clutch pack which engages the 4wd. There is a pressure relief/blowoff valve which vents any excess oil pressure. And that is about all there is! There is no fine particle filter cartridge like the previous systems, which we suspect is the main cause of early failure. There is no “n373 Valve for Controlling Clutch Operating Angle”, nor any pressure sensors. Any pressure values shown on the diagnostic equipment measuring blocks like VCDS is purely estimated and calculated, thus they are purely fictitious.

### Common Problems and Fault Codes

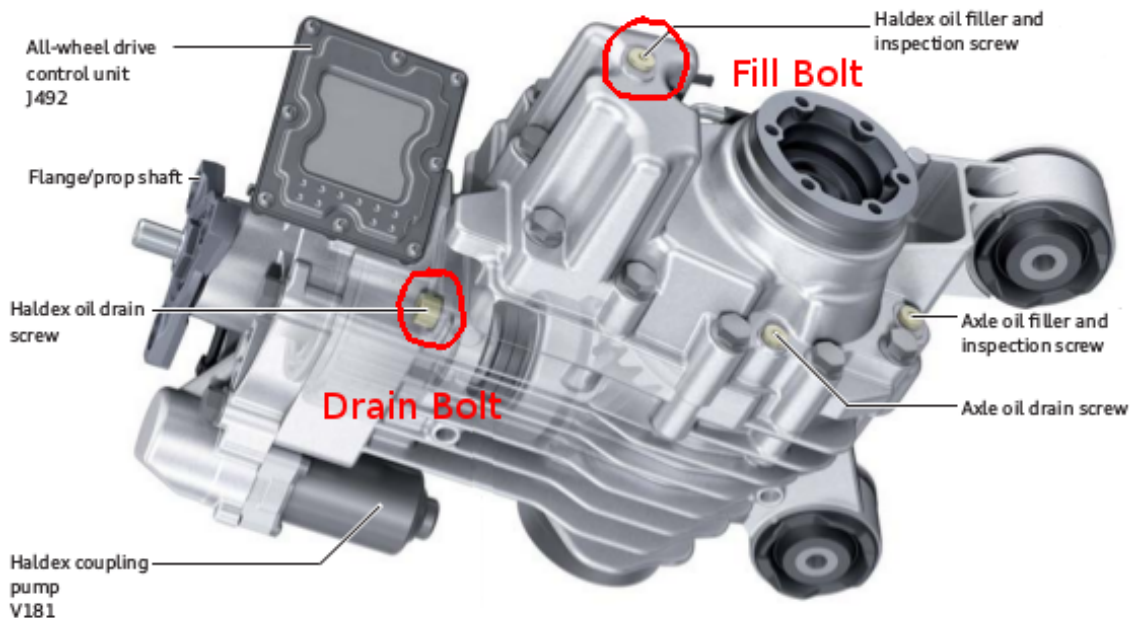
Often customers complain about no drive to the rear wheels, and typically there are no warning lights or error messages shown on the dashboard to illustrate the system is faulty, thus owners are unaware of the issue. Buyers of second hand cars often purchase these cars not working, so then never know any different. Only when it comes to winter time where they get stuck somewhere they then realise the rear wheels are not turning. With the more performance orientated cars such as Golf R, RS3, S3, TTS or TTRS, the lack of 4wd is more apparent as brisk acceleration usually causes the traction light to flash and power be limited – accompanied by lots of wheel spin, especially on wet roads or slippery surfaces.

When scanning the vehicle for fault codes, it is important to use some decent scanning system which can actually communicate with the Haldex control module which is “22 AWD”, otherwise you will find there is no fault codes stored! People often fall into this trap with cheap OBD2 code readers or phone apps. Fault codes which often occur are:-



- 131599 – All Wheel Drive Clutch – U0114 00 [009] – No Communication (typically ECU fault)
- 131599 – Control Module for All Wheel Drive Clutch – C1113 07 Intermittent error (typically ECU fault)
- 16670 – All-Wheel Drive – C1113 07 [008] – Mechanical Failure (typically pump type fault)
- 16671 – Pump for Haldex Clutch – C1112 04 [008] Internal System Fault (typically pump type fault)
- 16671 – Haldex clutch pump Faulty – C1112 04 passive/sporadic (typically pump type fault)
- 16668 – Pump for Haldex Clutch C1112 07 [008] – Mechanical Failure Intermittent (typically pump type fault)
- C111307 – Mechanical Malfunction – Passive / Sporadic (typically blocked pump, clean out and relearn)

## Oil Change guide



These Generation 5 Haldex systems have never been serviced correctly, many aftermarket VAG specialists are offering far better servicing where the pump is removed and cleaned which puts them in a far better position but still trouble often persists. Servicing is often not the solution to problems, it is more preventative maintenance. If the car is getting the 16671 or 16668 fault codes then often a new pump is required, but if the vehicle is just getting the 16670 fault code then often cleaning them out, and fresh oil will solve them but the “pump learn” function must be carried out.

- When doing an oil change, remove the pump, remove the fill bolt and drain bolt.
- Wash out sludge out of the coupling by blowing compressed air into the fill plug with the drain undone.
- Add a little clean oil to wash out the last of the sludge and blow out again.
- Blow the pump gauze clean with compressed air, refit the pump with new oil seal O rings with a little oil, refit the drain bolt.
- Fill with Haldex fluid via the fill bolt until oil over spills. Refit the fill plug and clean up any mess.



### Typical Solutions

When the fault code 131599 is triggered it is often caused by damage or corrosion to the control unit, we can test and often repair these, they are easy to open by the 8 torx screws on the front and check for obvious signs of water ingress or blown/burnt components.

It is common for owners to have a new pump fitted by a garage or main dealer and still the problem persists. When fitting a pump, or even just after a clean out and service it is essential to carry out the “pump learn” function in the “basic settings” of the Haldex control unit, VCDS/VAGCOM can do this and so can the main dealer ODIS system. Customers are often told there is “no adaption” or programming required to fit a new pump, **this is incorrect!**

The control unit learns how much power is required to run the pump until the pressure hits a certain threshold, it does this by monitoring how much current is consumed by the pump, when the pump is blocked, or faulty, the control unit learns/adapts some very low values which means when the Haldex controller tried to engage the pump, it does not supply enough power to make it engage. By carrying out the learn function when fitting a new pump, it will learn the correct power values and thus engage the system correctly.

Literally multiple times a week we get customers calling who have had new pumps fitted, often by main VW, Audi, or Skoda dealership, yet the system still does not work and they will not perform the pump learn process. Instead they then quote the customers on a brand new ECU/Haldex Controller, or they quote them on a complete new

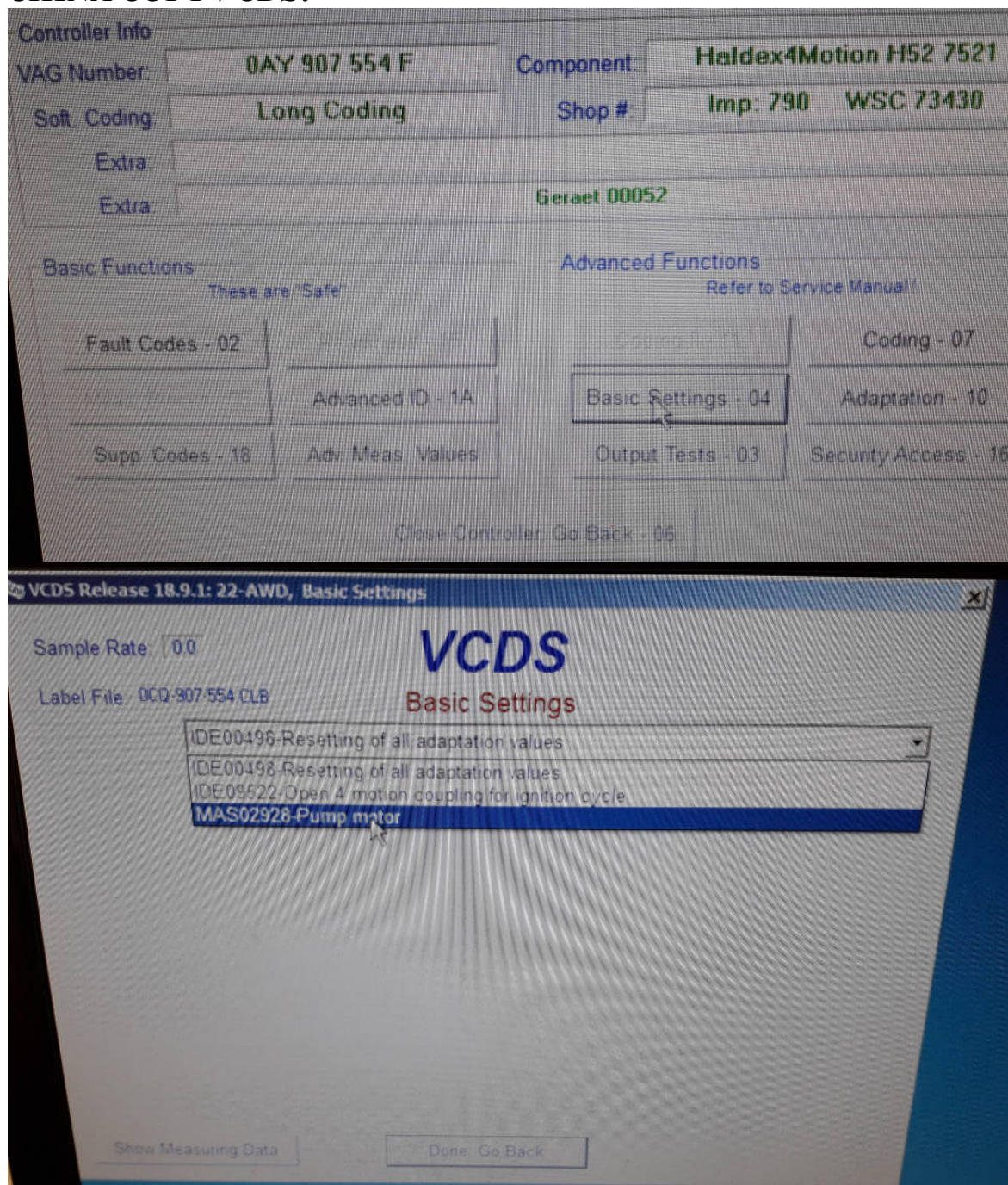


coupling/rear diff, plus labour, while the customer breaks down at the £1500 to £3000 quote. If they actually read their own "VAG Self Study Guide", e.g. their own in house training manuals, it documents all this in their installation workshop manual guides.

Sometimes, the pressure relief blow off valve will stick open, this will cause the coupling to not engage 4wd as there is no oil pressure there to clamp the clutch plates together. We have brand new valves in stock, they are easy to replace and not very expensive.

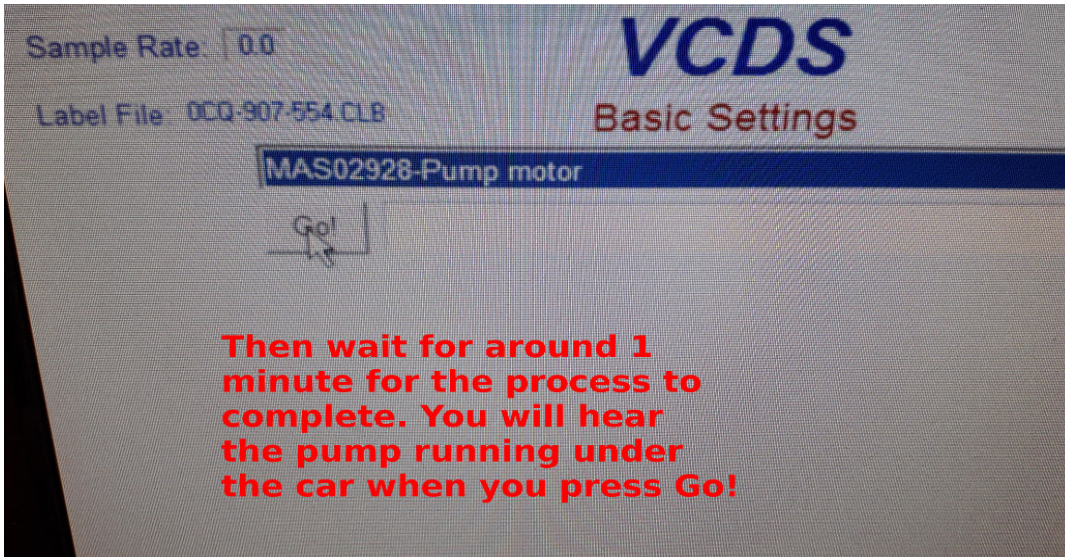
**Here are some photos of how to carry out the pump learn function using VCDS VAGCOM**

***MAKE SURE YOU HAVE THE ENGINE RUNNING TO SUCCESSFULLY CARRY OUT THE PUMP LEARN FUNCTION!!! ALSO IT DOES NOT WORK CORRECTLY WITH "OBD11" OR CHINA COPY VCDS!***



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If you have system that is not working, a good starting point is to data log some of the measuring blocks for the pump control, these are the Pump PWM %, Pump current and Pump Voltage. Take the car somewhere that it can be launched to hopefully cause wheel spin somewhere safely and legal while data logging these values. This image is of a system before and after the pump learn function, as you can see there is almost twice the voltage and current being measured at the pump, and the PWM % green trace line shows the control unit is driving the pump harder thus the larger Voltage and Current values.

