

Diesel Aftermarket

SI 18/17




CR Injectors Test & Repair – Preliminary information – DRS Partner only

Dear Sir or Madam,

As already mentioned in an earlier Service Information we are currently working on an updated CR Injector Repair Manual for our VDO DRS Partners. As the release of the new manual will still take some time we would like to provide some preliminary information in order to allow testing respectively repairs according to the official requirements.

1. Identification of VDO CR Injectors

It is necessary to distinguish between three types of CR Injector. The correct identification is essential as for the three different types of CR Injectors there are different test & repair levels available.

VDO EU3/4 CR Injectors	VDO EU5 CR Injectors	VDO EU6 CR Injectors
		
DW10TD DV4 DW10B DW10U Lion V6 Lion V6 Upgrade Lion V8 Ford Lynx K9K EU4 MWM IESA	VW EA189 Puma Ford / PSA DV6C Renault K9K EU5 Renault K9KGen6 MWM Sprint Ford Ranger Renault M9T	Ford Panther
Test & Repair possible	Test planned for Q2/2018 / Repair not possible	Test & Repair tbd

For details on article numbers and variants please see the latest “VDO Diesel – IAM Roadmap” which can be downloaded from the VDO Extranet.

2. Testing of VDO CR Injectors

Testing of VDO CR Injectors is allowed on Continental approved test benches only. These test benches fulfil the requirements concerning the electrical control (customized PCB equipped) and the hydraulic pressure.

Currently only the Hartridge **Cri-PC including the customized Piezo Board** is approved.

Note: With the existing test equipment only VDO EU3 & EU4 CR Injectors can be tested on the Hartridge Cri-PC. It is not possible to test VDO EU5 or EU6 CR Injectors.

We are working on EU5 CR Injector test solutions which are planned to be available in Q2/2018. Due to the different electrical design between the EU3/EU4 and the EU5 and EU6 CR Injectors these types must not be tested on any test bench. Any charging with power out of the specified range will lead to damages. The Piezo stack will react on this which results in an uncontrolled functionality of the CR Injector. This then can lead to serious damages of the engine!

Claimed EU5 and EU6 CR Injectors must not be tested on any test bench as subsequently a root cause analysis is no longer possible.

The following test plans are available for the Hartridge Cri-PC



5WS40148-Z	DV4 EU3
5WS40156-4Z	DW10BTED
5WS40156-Z	DW10BTED
	IESA NGD
A2C59515264	3.0
A2C59511315	LION V6
A2C59511316	LION V6
A2C59511364	LION V6
A2C59511601	DW10BTED
A2C59511602	DW10UTED
A2C59511603	DW10BTED
A2C59513552	DW10BTED
A2C59513484	K9K EU4
	LYNX
A2C59511610	K10.01
	LYNX K10-03
A2C59511611	03
A2C59511612	DV4 EU4
A2C59513553	LION V6-UG
A2C59513596	LION V8
A2C59513597	LION V8

3. CR Injector Repair – Repair Kits

Injector repair of EU3 and EU4 CR Injectors means to replace the nozzle and the nozzle retaining nut. No other original repair parts are available on the market. Everything else which is offered are fake parts which can lead to unexpected results.

Nozzle repair kit (example)

For identification reasons the nozzle retaining nut is marked with an “A2C ... article number”.



Please note that the nozzles are high tech repair parts. Even if they might not look like. To allow functionality within the specified range the nozzle must fulfil very tight requirements. The holes are eroded according to very strict specifications. No “fake nozzle” you can buy on the grey market fulfils these requirements. Even if it appears to be that the “engine is running smoothly” it cannot be guaranteed that it will do under e.g. all temperature conditions. Furthermore the emissions requirements are longer met.

Therefore it is mandatory to use original repair parts only!

Note: There are no other authorized repair parts available than the nozzle repair kits! Continental does neither offer solenoids nor any other parts built-in the CR Injectors

Unauthorized repair parts offered in the market: e.g. Solenoids



Fake packaging



No laser marking



Bears traces of a screw-wrench



Note: Please never replace the solenoid (actor) on any VDO CR Injector. The basic adjustment of the CR Injector is mainly based on the torque of the actors nut. Once loosened it is not possible to adjust the CR Injector again according to specification using aftermarket equipment. Vendors in the market who predict that they can adjust the CR Injector after replacing a solenoid do no use and approved test equipment.

A lot of CR Injectors “remanufactured” by vendors have been tested in our laboratory. None of those has met the specifications any more. As mentioned above. The engine appears to be running well but it cannot be guaranteed that it will do under all temperature conditions. Worst case such remanufactured CR Injectors can be the reason for engine damages. Emission requirement are also no longer met!

Please find information about the availability of nozzle repair kits and high pressure connectors in the table below.

System	Variant	IAM article number	Nozzle Repair Kit	High Pressure connector
DW10TD	DW10TD	5WS40000-Z	n/a	
DV4	DV4 EU3	5WS40148-Z	A2C59513997	A2C59507594
	DV4 EU4	A2C59511612	A2C59513998	A2C59507594
DW10B	DW10B Class 4	5WS40156-4Z	A2C59514909	A2C59507595
	DW10B Class 5	5WS40156-Z	A2C59514909	A2C59507595
	DW10B MFMA Class 6	A2C59511601	A2C59514909	A2C59507595
	DW10B MFMA Class M	A2C59511603	A2C59514909	A2C59507595
	DW10B MFMA Class 7	A2C59513552	A2C59514909	A2C59507595
	DW10U MFMA	A2C59511602	A2C59514910	A2C59507595
Ford Lynx	Lynx	A2C59511610	A2C59514911	A2C59507594
	Lynx V227	A2C59511611	A2C59514912	A2C59507594
K9K	K9K EU4	A2C59511606	A2C59506606	A2C59507594
MWM	IESA NGD 3.0	A2C59515264	A2C2000961680	A2C59507594
Lion	Lion V6 Base EU3	A2C59511315	A2C2001018980	A2C59507594
	Lion V6 Base EU4	A2C59511316	A2C2001064080	A2C59507594
	Lion V6 Base /DT17 EU4	A2C59511364	A2C5311306980	A2C59507594
	Lion V6 Upgrade	A2C59513553	A2C5311291780	A2C59507594
	Lion V8 K100	A2C59513596	A2C5311896380	A2C5311416280
	Lion V8 K174	A2C59513596	A2C5311896380	A2C5311416280

Note: Articles marked red will be made available in Q1/2018

4. CR Injector Repair – Procedure

Note: The basis for the CR Injector repair is the current repair manual available for download on the VDO Extranet. Information provided with this document supersede only the appropriate parts of the manual!

4.1 Electrical tests

Note: Electrical tests can also be performed for the **EU5 CR Injectors** as shown in the table.

Conditions for all electrical tests:

Storage and measuring temperature: 23° C +/- 5°

Storage time before testing: min. 3 hours

The multimeter must fulfil the following requirements

- 1.) Voltage 0 – 10V +/- 0,1v
- 2.) Direct current 0 -400 µA +/- 0,4%

Note: In case one of the electrical tests is not passed, the injectors solenoid is defect. The CR Injector cannot be repaired but must be replaced.

4.2 Insulating resistance test

This can be measured using insulation resistance tester.
In order to check for an open or short circuit:

- 1) Connect plug supplying high voltage (approx. 300 V) to both actor pins
 - 2) Connect the ground pole to the injector body
 - 3) Measure the insulation resistance for at least 4 seconds.
- The measured value must be greater than 100 MOhm.

The insulation resistance should be tested under “Clean Room” conditions thus temperature and moisture have very strong influence on the measured value.

4.3 Piezo actor resistance test

The piezo resistance can be measured using a multimeter / multimeter.
In order to check for open or short circuit:

- 1) Keep the temperature of the injector between 0–80°C
 - 2) Set the multimeter to measure resistance (Ohm)
 - 3) Place the probes, one to the left pin and the other to the right pin of the connector in turn
 - 4) Wait for at least 5 seconds for the measurement to stabilize before reading.
- The resistance value must be between 160 kOhm – 240 kOhm

4.4 Piezo capacity test

The piezo capacitance can be measured using a handheld LCR meter (e.g. Agilent U1730C Series).
In order to perform the test, please keep following requirements:

- 1) Temperature of the injector 0 – 25°C
- 2) Voltage <2V and Frequency <5KHz
- 3) Stabilization time 15s

Injector type	The measured capacitance value mustn't be lower than
DV4 EU3	2,8µF
DV4 EU4	2,5µF
DW10B	2,8µF
DW10U	2,8µF
Lynx	2,8µF
Lynx V227	2,8µF
K9K EU4	2,8µF
IESA NGD 3.0	2,8µF
Lion V6 Base	2,8µF
Lion V6 Upgrade	2,8µF
Lion V8	2,8µF
K9K EU5	2,5µF
VW CR	2,5µF
Puma	2,8µF
DV6C	2,5µF

4.5 Cleaning process

If the cleaning process is not carried out correctly, this might lead to corrosion in the nozzle and to function changes (e. g. injection quantity, spray conditioning) or malfunction (nozzle crack).

A mechanical cleaning process also damages the nozzle. Therefore, a cleaning process in the ultrasonic bath according to below mentioned description is recommended.

Mechanical means and cloths shall not be used!

Ultrasonic bath with resolution (deionized water and cleaning agent e. g. Tickopur RW77)

- solution ratio: water – Tickopur: 10:1
- temperature: 60°C
- duration: min. 10min; max. 2h
- power: 300W eff.

Renew the cleaning bath depending on degree of pollution (Recommendation: after max. 4 normal contaminated injectors per 1000ml cleaning fluid).



This surface can be cleaned in ultrasonic bath

Put the injector perpendicularly with the nozzle below in a special retainer in the ultrasonic bath. This retainer should avoid that the injector upsets and that the nozzle gets in contact with the bottom of the cleaning device. It is only allowed that the injector dips until one half of the nozzle retaining nut into the cleaning resolution. Take care that no cleaning fluid comes into the actuator. Therefore carry out an appropriate preventive action (protection connector) during the cleaning. A contact of the nozzle to wall or bottom of the ultrasonic cleaning device is not allowed, because this may lead to a mechanical damaging of the nozzle. Flash the nozzles after ultrasonic bath with brake cleaner (e.g. from CAR1 material number: 5997) and blow them carefully dry with dry compressed air. Avoid contact between nozzle and compressed-air gun. Operate the injector with a corrosion protective medium.

4.6 Nozzle retaining nut

CR Injector type	Initial torque	Rotation angle	Final torque
DV4 EU3 and EU4	10	104°+/-5°	60 +/-20Nm
DW10 B / DW10U	10	104°+/-5°	60 +/-20Nm
Lynx	10	104°+/-5°	60 +/-20Nm
Lynx V227	10	104°+/-5°	60 +/-20Nm
K9K EU4	10	107+/-5°	70 +/-15Nm
Lion V6 (Jaguar) EU3	10	72°+/-5°	70 +/-15Nm
Lion V6 EU4 / DT17	10	70°+/-3°	70 +/-20Nm
Lion V6 (Land Rover)	10	72°+/-5°	70 +/-15Nm
Lion V6 Upgrade	10	67°+/-3°	70 +/-20Nm
Lion V8	10	67°+/-3°	70 +/-20Nm

With kind regards
Product Management

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