

Item nr. 38920**Tool set for repairing of partialy broken stud M8 Fiat 2,3-3,0 SOFIM****Security precautions**

- To understand the activities of the instrument is required in advance to read these instructions!
 - Carefully and in the right order, please read this manual before setting – starting repair
 - At work, always follow the data in the instructions / maintenance manual manufacturer for current information and steps in the right order
 - The instructions for use and recommended tools in this set are as a guideline and it is no guarantee for success
 - This set contains special products, which was several times successfully tested and used successfully.
- It is necessary to pay attention to the accuracy of compliance with the order of the steps
- The device must only be used professionally

Tool Set 38920 contains instruction manual + detailing photo documents.

Set is packed in EVA foam in plastic case.

All part are available separately.



Set contents:

List of items included in this kit

Item nr.	Description	Quantity	Item order nr.
1	Deburring tool , edge reamer, range Ø3 - 19mm, 1/4" drive	1	12833
2	Drill Ø 3,0mm cobalt 5%, grinded, tip 135°	1	39357
3	Guiding drill pilot Ø 3 mm for Fiat Sofim	1	39523
4	Thread die M8x1,25 HSS DIN EN 22 568	1	33139
5	Thread die holder M8x1,25, drive 19mm	1	39295
6	Hex key "L" - 2 mm	1	30817
7	Cylindrical shape burr Ø 6 mm, with radius end, shank Ø 6 mm	1	37004
8	Drill Ø 9,0mm cobalt 5%, grinded, tip 135°	1	12849
9	Drill Ø 11,0mm cobalt 5%, grinded, tip 135°	1	12854
10	Blend hex nut 14mm, M8x1,25	5	39296

Other recommended tools:



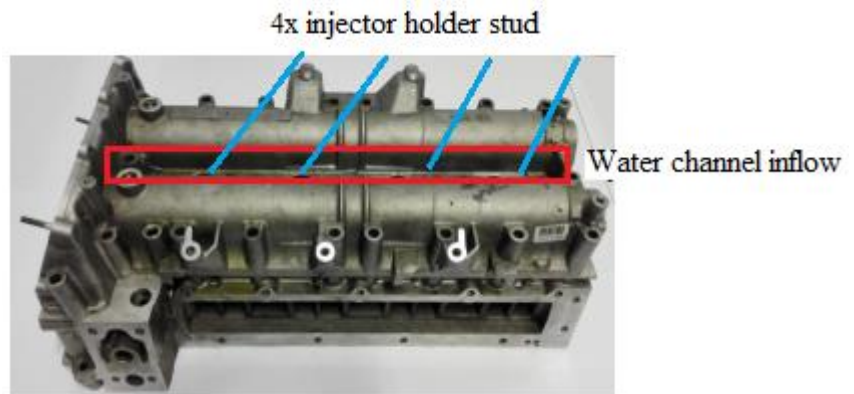
High speed grinder 20 000 rpm,
suitable for diamond reamers



Air/Battery/Electric drill

Problem localization:

Set of special tools is suitable for light commercial vehicle with engine 3.0l and 2.3l:
Engine code F1CE-3,0/2.3 l in:
Fiat Ducato
Iveco Daily, Massif
Peugeot Boxer
Citroën Jumper (Euro 3, 4 & 5)
Mitsubishi Fuso Canter
Dodge RAM Promaster



Picture 2. Dismantled cylinder head of engine Fiat Ducato HPi 3.0l localization of injector stud holder M8 (4x)

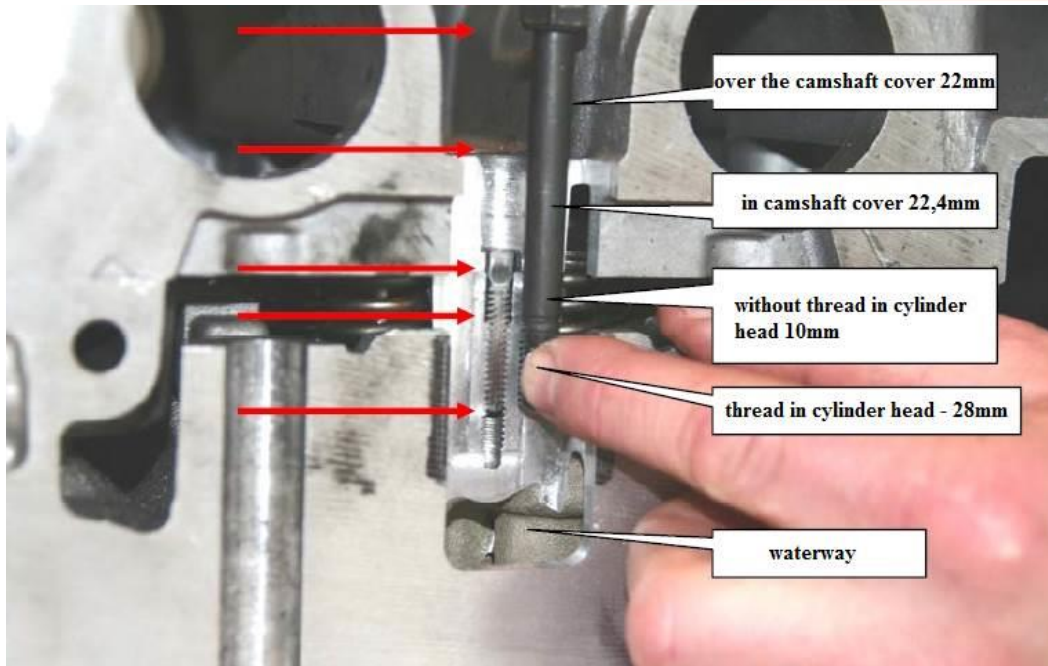
Problem description

Diesel injectors of the engines mentioned above are fixed by bolt M8. The bolts of all injectors are situated in the camshaft cover recess, which is on the right end in the cover camshafts with drainage groove. Drainage groove serves the water removing which has flowed through a leak between the windshield and the hood. This technically imperfect solution to drain water causes water retention around the injectors and injector bolts which penetrates and settles between the steel bolt and the head of the cast, where bolt formed solid precipitate in the height of 22 mm. It cannot be chemically removed; it can be removed by manually linkages breaking.



Picture 3. Cylinder head cross section Fiat Ducato HPi 3.0l

Due to this often-clogged water channel, water is stored between this groove and the engine cover, thus helping to create an electrocorrosion between the material. The screw placed at the engine cover and tightened to the correct torque (Nm) begins to corrode because of this. The thread is screwed between the steel and aluminum, thereby it comes to pulling the thread on the screw already at manufacture. That is reason why it is almost impossible to release the screw in two or three years of using.



Picture 4. Cylinder head cross cutting view Fiat Ducato HPi 3.0l

In other words, the thread is 28 mm long in the cylinder head and 32 mm corroded part. Such a high resistance can not be overcome by using a 13mm socket for its unscrewing and in most cases it will also occur on new vehicles to tear off the screw head on all 4 injector holders. This happens in up to 80% of cases where the 13mm screw head is torn off, which can then be fixed with this set.

Then drilling of the entire screw is very complicated because the bolt is made by rolling, which material densifies mainly at the point of the thread and the connection between the beginning and the body of screw. (Hardness of screw 10.8).



The most strongest area on stud

Picture 5. Injector holder stud Fiat Ducato HPi 3.0l

Inproper free drilling out done by hands (without guider) in wrong speed without cooling and without removing chips also with inaccuracies drill heads almost always results in imprecise drilling and break the cylinder head wall. So it should not fully drill out of original thread or drilling the water canal, which is located just below the end of the bolt.

Drilling out broken stud takes three hours also for manually operation skillfully workers, (for all four injectors 12 hours).

The solution is to drill a protruded part of broken stud with a Broken stud M8 remover kit with press function, version order item nr. 24952.



Picture 6. Broken stud M8 remover kit with press function, version Fiat Ducato Hpi:

To make this work simpler, may be drilled the screw of the injector holder after removing the cylinder head of the engine, which however brings with it an additional time and costly task such as draining coolant, replacing the gasket under the head, dismantling the manifold and other. When the screw is drilled, the "hole" tolerance of the original hole is so big that the cleaning of the original thread M8x1,25 is insufficient and helicoil threading is therefore needed. Due to the difficulty and difficulty of this operation, the mechanics make it easier to work and place the helicoil in the cam shaft cover, but this is improperly constructive reason.

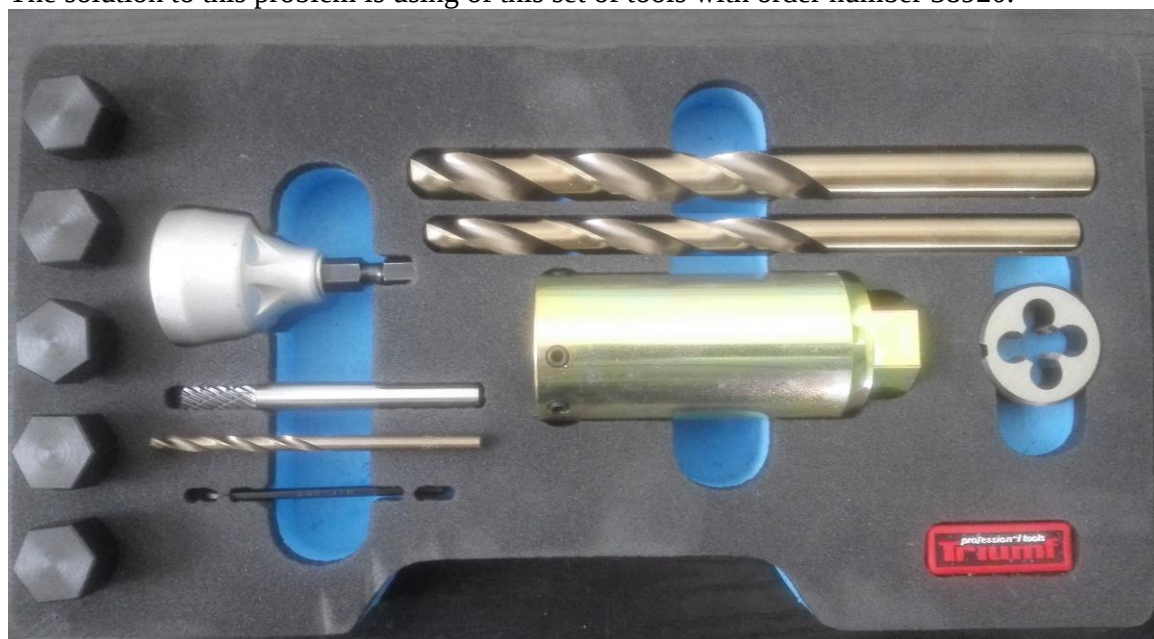
In case that the stud is broken under the engine cover, complete drilling is required the remaining part of the cranked injector holder stud using a hollow cutter with carbide inserts where the aluminum cover of the engine around the M8 stud is completely drilled out. However, this process takes a long time and it is necessary to cut a new thread into the aluminum engine cover and thus place a coil for mounting new M8 stud.



Picture 7. When stud is broken under the engine cover is need to drill broken stud by hollow cutter item nr 10140.

Solution

The solution to this problem is using of this set of tools with order number 38920.



Picture 8. Tool set for repairing of partially broken stud M8 Fiat 2,3-3,0 SOFIM

In some cases you cannot use this set are follow:

1. If the stud is short - cut too low under the head
 2. If residual chips of welded electrode remains on the bolt - there is not possible to cut the thread
 3. If the broken stud is too bent (bent stud shank) due to the use of excessive force
- However, the use of this tool kit is only possible if the protrude stud measures at least 20 mm so that the injector holder can be re-positioned in its place, and also allow to screw the hexagon nut onto the protruding portion of the broken stud.



Picture 9: Cases, when cannot use tool kit nr. 38920

Using of this tool kit

There is no need many engine parts dismounting before work starts. When using this kit, it is enough to remove/dismantle the electrical wiring from each injector, fuel injector tubes, and, in the case of the first and second cylinders, also the heating and air conditioning assembly.



Picture 10: problem localization: installed injector, holding by injector holder and fixing bolt.

Before work we start with injector holder bolt releasing using by 13mm combination spanner.

Help:

If you feel roll over of the ratchet during the releasing of injector holder stud and you cannot release the stud on first time, no additional force is required. Just use a 3mm center punch, to mark the center of the screw head and then use a 3mm cobalt drill to drill the head of stup in depth of 1cm. Then, use firstly 9mm cobalt drill then 11 mm drill and drill out complete head and the remaining part of the screw is now flat - ideal for cutting the required number of threads and finishing the replacement nut





Picture 11. Instruction for drilling of hexagon head of holder 's stud of injector – using of center punch and drill 3mm Fiat Ducato HPi 3.0l

Then, we dismantle the injector as well as the injector holder. The injector must be removed, ensuring better access to the bolt. If the injector is already removed, it is recommended that the injector nozzle chambers will be blind with a sealing plugs - order number 5055 (sealing plugs for injectors Ø10mm, shank Ø7mm, plus insertion tool - not included in the set). There is recommended also remaining holes, hoses, pipes seal by clothes.



Picture 12: removed injectors, detail of broken stud without other changes



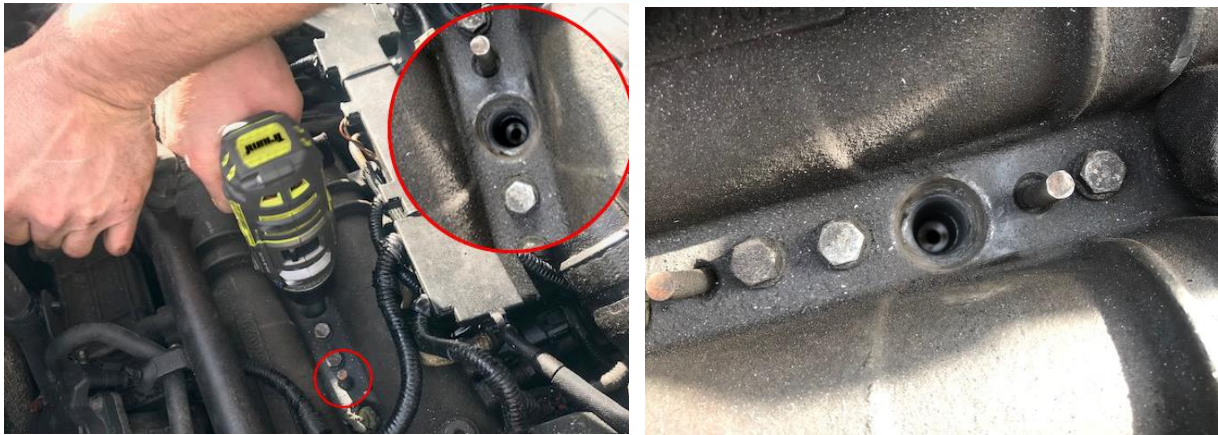
Picture 13: sealing plugs for blind of injector nozzle chamber order item nr. 5055

However, due to the corroded thread of the injector holder stud, it is quite common to broke this stud while a certain part of the broken stud protrude over the surface of the engine cover.

The leading edge of the broken screw is need to deburr around the top using by deburring tool /item nr. 39375 by max. revolutions 400 rpm in a clockwise direction for 3-5 seconds.



Picture 14: broken stud of injector holder M8 using by debburing tool item nr. 39375



Picture 15: deburring edges of protruding injector holder stud M8 over the engine cover

Insert the threaded die into the die holder and fix its position with a 2 mm allen key (allen key 2mm is also part of this set)

Once the remaining part of injector stud is flat, without welding chips and enough long, cut the protruded part of stud by threaded die M8x1,25 placed into the threaded die holder.

Tap the thread M8x1,25 with his depth of least 2/3. Make cutting of thread by threaded die item no. 3 inserted into the extension adapter item no. 4 and using a ratchet with 19mm socket.



Picture 16: installing of threaded die into the die holder using by 2mm allen key



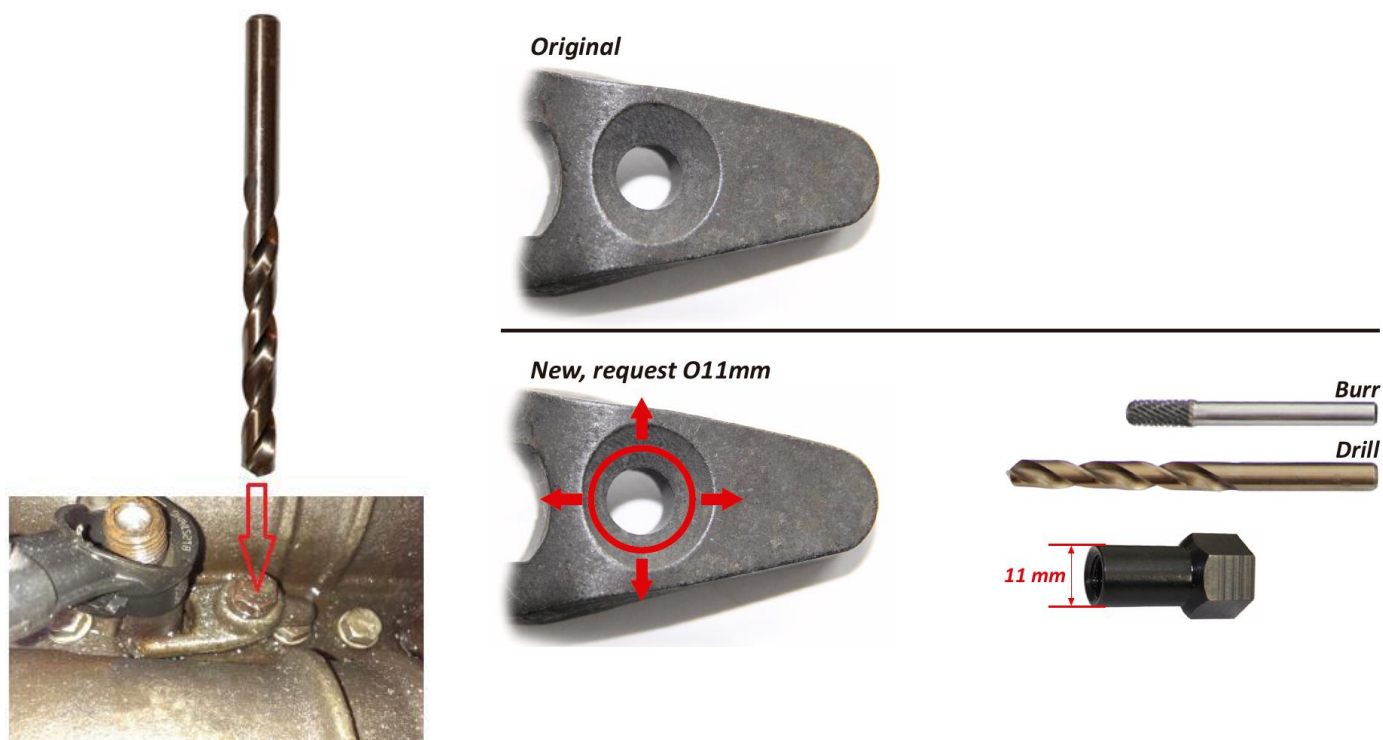
Picture 17: Thread cutting made by ratchet with 19mm socket

The threaded die holder has a continuous hole under the threaded die M8x1,25 which allow the cutting of sufficient threads number. Then it will be screwed onto protruding part of broken stud. This protruding part of stud comfortably fits to milled hole in the threaded die holder. This will ensure that a sufficient number of threads are cut in order to firmly screw the hexagon nut to replacement nut repair of broken stud for injector holder.



Picture 18: Cutting of sufficient thread numbers for protruding part broken stud M8.

Before completing - by screwing the hexagon new nut, it is necessary to enlarge the hole in the injector holder to Ø11mm. We enlarge the hole with two tools, using cobalt drill Ø11, (tool no. 2) attached to the electric or cordless drill or using Ø6mm cylindrical carbide burr no. 4 attached in a high speed grinder (Max speed 19,000 rpm). Enlarging the hole in the injector holder is drilling when holder is clamped in the working table vice.



Picture 19: drilling of the injector holder with a 11 mm cobalt drill bit to enlarge the hole for installing replacement hexagon nut for original broken stud

After cutting the thread on protrude stud, screw the spare hexagon nut no. 6 through the modified hole in the injector holder. Tight the nut with correct torque specified by the vehicle manufacturer. Screw the nut so that it catches a broken stud in a 15 mm overhang. The screw will be tightened





Picture 20: Mounting of a hexagonal nut on the injector older stud.



Picture 21: Spare replacement item nr: 39296 – 14mm hexagon nut with inner thread M8x1,25, body size 11mm.

Re-Mounting the complete injector fitting and the dismantled parts of the engine are performed in the reverse order of dismantling.

- We'll install the injector
- Install the injector holder, through which the hexagon-nut is screwed.
- Connect the injector line (electrical connector and fuel supply or drain tubes)
- Perform the assembly of the other dismantled parts of the engine