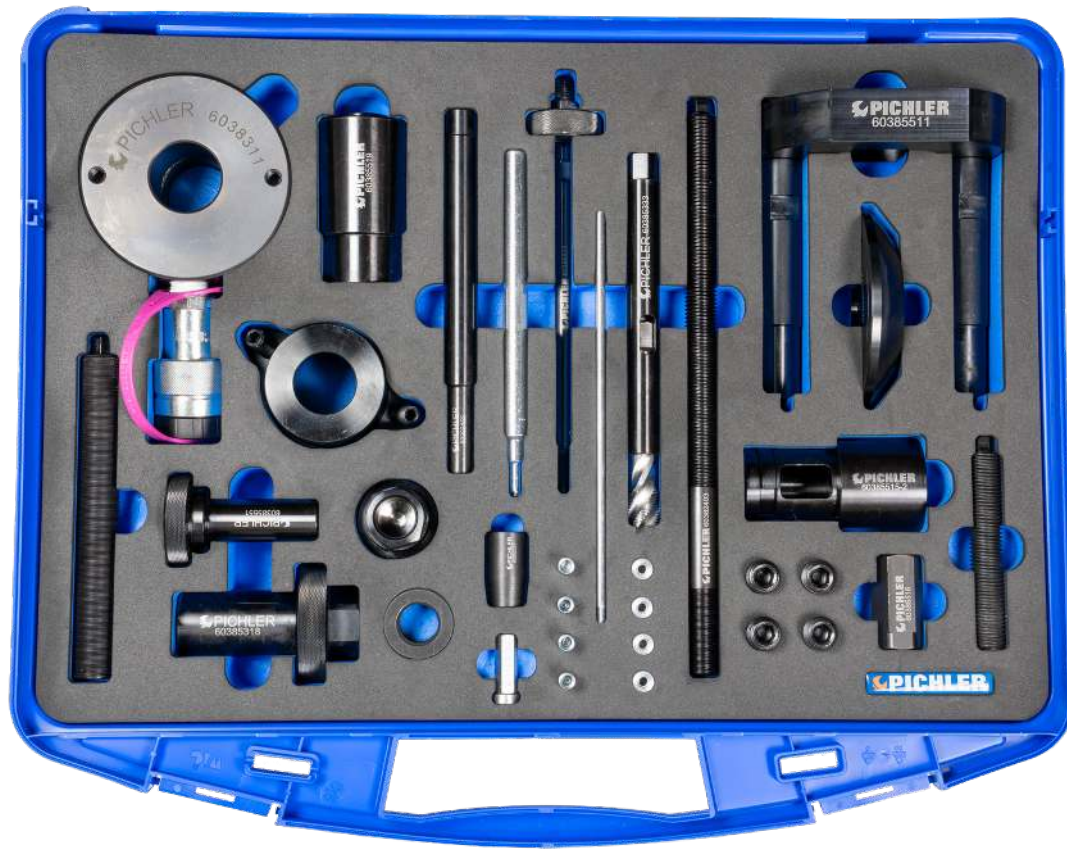




INJECTOR REMOVAL SET MOD. FORD 2.0 TDCI ECOBLUE

Manual

60385555 / 60385560 / 60385565 / 60385550 / 60385545



SAFETY NOTICE

To understand the functioning of the tools, it is necessary to read the manual first!

- > Read these instructions before assembling, during installation and throughout use and in the proper sequence
- > Always refer to the OEM manufacturer's instructions and service manuals for the latest data and to maintain the correct sequence
- > These work instructions and the recommended tools are meant to serve as aides only and are by no means a guarantee for certain results.
- > This tool kit is a special collection and it has been tested and used successfully on several occasions. It is of the utmost importance to maintain the correct procedure as per the instructions
- > The use of the tools should only be carried out by qualified personnel!



ATTENTION

Special caution



CORRECT



LIGHT BULB

Hint or recommendation



WRONG

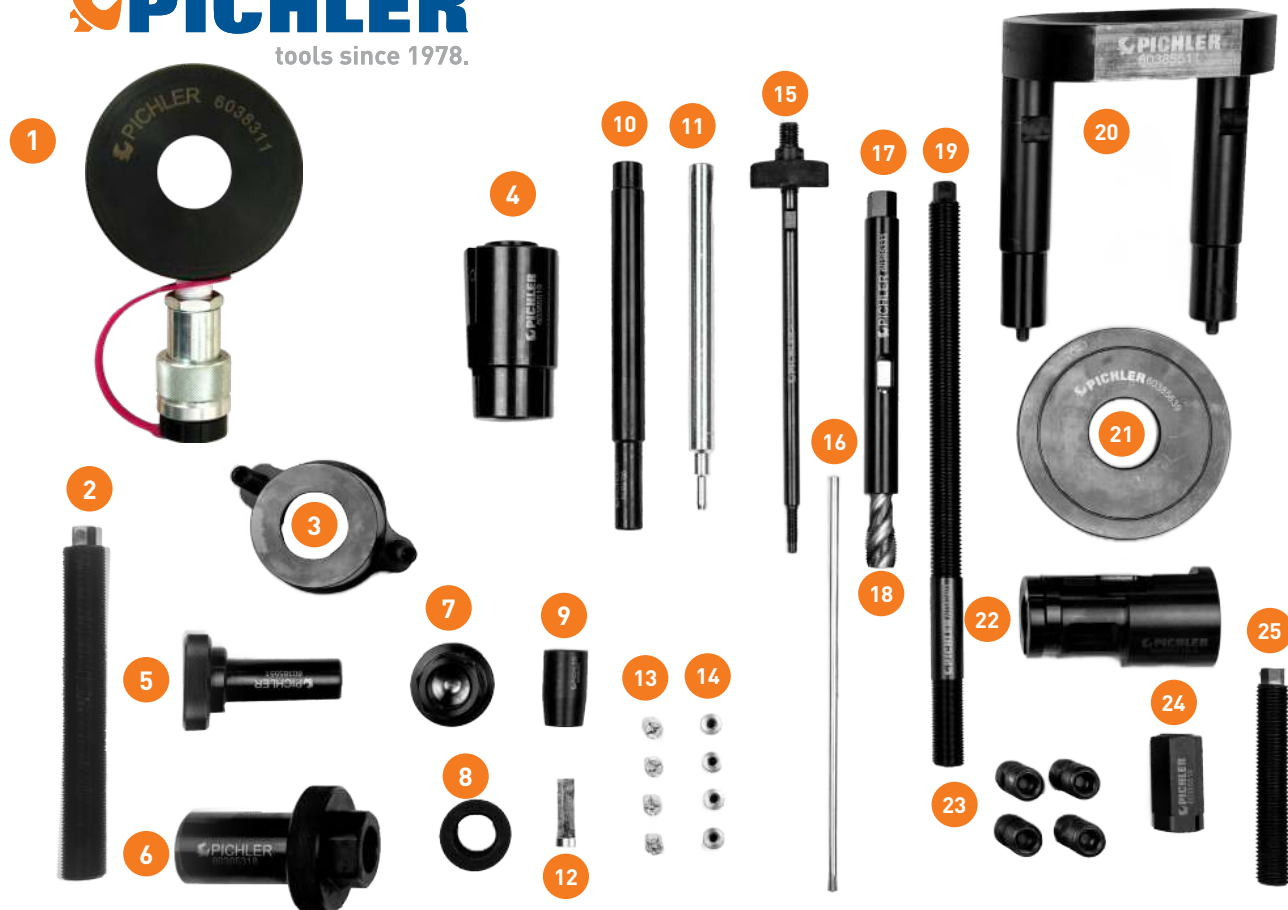


SAFETY GOGGLES

Wearing safety goggles
necessary

CONTENT

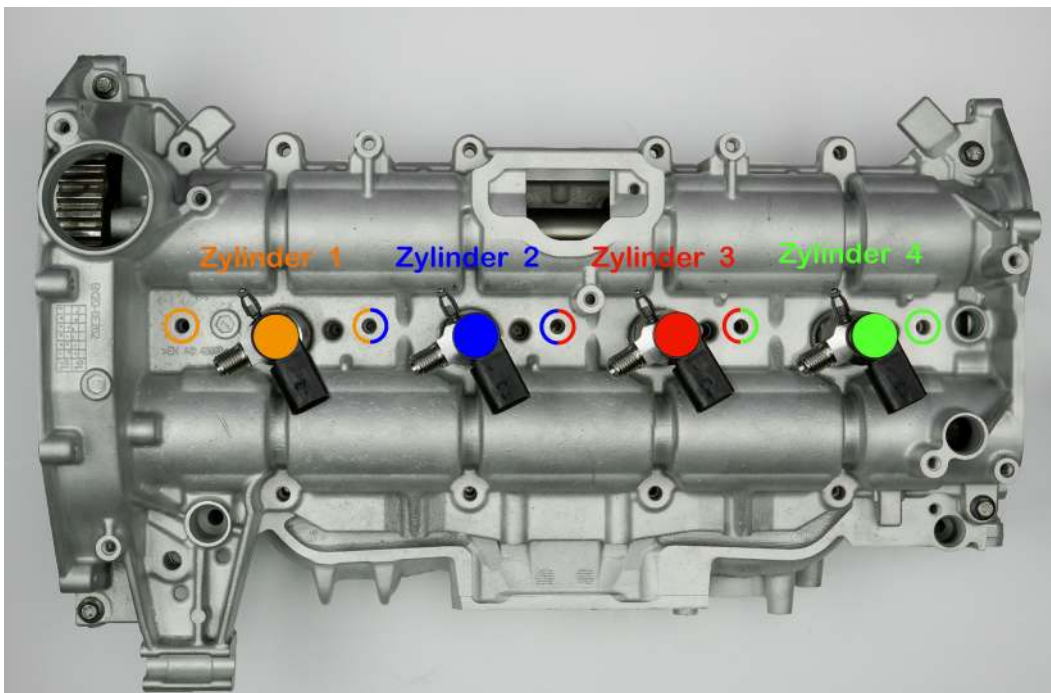
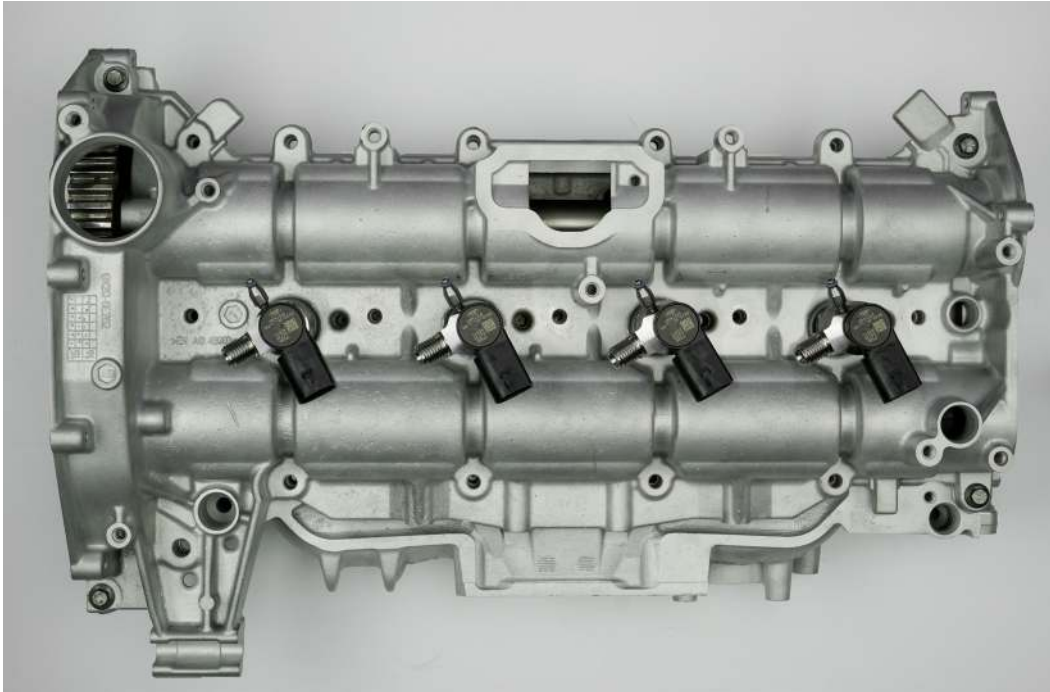
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Nr.	PART.-NR.	Description	60385555	60385560	60385565	60385550	60385545
1	6038311	Hydraulic hollow piston cylinder 20 t, stroke 8 mm	1	-	1	-	1
2	60385321	Extraction spindle M20x1.5, length 160 mm	1	1	1	1	1
3	60385548	Complete fixing sleeve, injector removal tool Ford	1	1	1	1	1
	60385519	Half shell, part 2 for injector claw	1	1	-	1	1
4	60385521	Half shell, part 1 for injector claw	1	1	-	1	1
	60385546	Pull receiver lower part, complete	1	1	1	1	1
5	60385551	Knurled pull adapter M16 for hollow piston cylinder	1	1	1	1	1
6	60385318	Knurled pull adapter M20x1.5 SOFIM, M9R new	1	1	1	1	1
7	60385547	Screw-in adapter, male M20x1.25 / female M20x1.5	1	1	1	1	1
8	91472015	Collar nut M20x1.5 from 60385620	1	1	-	1	1
9	60385331	Centering cone for thread drill holder and vibration drift punch	1	1	-	1	1
10	60382155	Vibration drift punch Vibro Impact Ø8.5 x 135.0 mm	1	1	-	1	1
11	60385513	Expanding mandrel for impact anchors	1	1	1	1	1
12	60382225	Magnetic attachment, female M6, pulling force 6 kg, with adapter	1	1	-	1	1
13	60385529-1	Steel impact anchor M6, zinc-plated, without collar	4	4	4	4	4
14	60390102	Locking sleeve 10 mm for 60390100	4	4	-	4	4
15	60385527	Pull rod for impact anchor M6, complete	1	1	1	1	1
16	60390081	Setting tool for locking sleeves 8 mm and 10 mm	1	1	-	1	1
17	60385333	Special holder for thread drill	1	1	-	1	1
18	60385339	Special thread drill M16x1.5 mm	1	1	-	1	1
19	60382403	Extraction spindle M16x1.5 / M16, 282 mm length	1	1	-	1	1
20	60385510	Support bridge, complete, 3-piece	1	1	-	1	1
21	60385639	Ball disc, injector removal set PSA 2.0	1	1	-	1	1
22	60385515	Claw for damage-free removal	1	1			
23	60385522-1	Shear bolt, 1 pc., for pulling force limiter	4	4	-	-	-
24	60385516	Adapter for pulling force limiter, female M16	1	1			
25	60385328	Extraction spindle M16x2x102 mm 10.9	1	1			

PREPARATION

For preparation: Remove all obstructing parts such as plastic covers, wiring harness on the valve cover, injection lines, etc., and remove the retaining bracket of the injector to be removed. Unscrew the two valve cover bolts located next to the injector to be removed.



DAMAGE-FREE INJECTOR REMOVAL (MAX. PULLING FORCE 6 T)

ONLY POSSIBLE WITH SETS 60385555 AND 60385560

Slide the first part of the injector claw **60385515-1** with the fitted locking sleeve **60385515-3**, as shown in the image, onto the injector. The electrical connection and leak oil line now fit precisely into the cutouts of the claw.



Position the second part of the injector claw **60385515-2**, also as shown in the image, on the injector. First slide the claw with the cutout over the diesel connection, then place it on top of the first part of the injector claw.



Lift the first part of the injector claw **60385515-1** slightly and rotate the locking sleeve **60385515-3** until it rests against the leak oil line.



CAUTION

Rotation is only possible when the first part is lifted!



TIP

For easy lifting, the claw can also be grasped at the internal thread with one finger and gently pulled upward.

Screw the shear bolt **60385522-1** into part 1 of the injector claw **60385515-1** and tighten lightly. Ensure the hexagon socket of the shear bolt faces upward.



Turn the adapter for the pulling force limiter **60385516** so that the shoulder at the hexagon faces toward the engine.



Then screw the extraction spindle **60385328** into the adapter **60385516** and tighten lightly.



Place the support bridge, consisting of support plate **60385511** and the two screwed-in support feet **60385512**, on the engine so that the round side of the support plate faces the timing belt. The ends of the **support** feet must be inserted into the holes of the previously removed valve cover bolts.



CAUTION

The round side of the support plate must face the timing belt!



BEFORE USING THE HYDRAULIC COMPONENTS, THESE MUST BE PROPERLY BLED

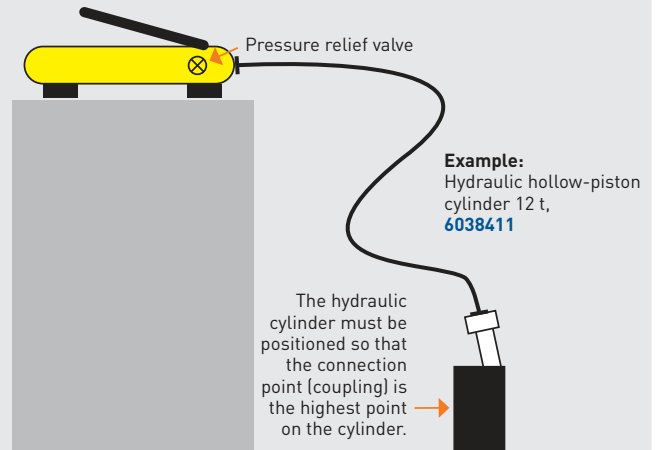


PROPERLY BLEEDING THE HYDRAULIC SYSTEM

For this purpose, the hydraulic hollow-piston cylinder is first connected to a hydraulic pump. The hollow-piston cylinder must always be positioned lower than the hose and the hydraulic pump, so that the air can rise upward through the hose to the hydraulic pump.

Build up pressure until the maximum stroke height of the hollow-piston cylinder is reached. Then release the pressure via the pressure relief valve. This forces the trapped air upward into the pump tank. Repeat this process 4 to 5 times. If necessary, top up oil in the system.

Example: Hydraulic hand pump with hose 80255500



Place the ball disc [60385639](#) onto the spindle [60385328](#) on the support bridge [60385511](#), then mount the hydraulic cylinder [6038311](#) onto the ball disc on the spindle.



Screw the pull adapter [60385551](#) onto the spindle [60385328](#), center the hydraulic cylinder and ball disc, and tighten the pull adapter lightly.



PULLING PROCEDURE



At the start of the pulling procedure, build up only moderate pressure 2 to 3 times → Release pressure → Readjust the knurled adapter. At this point, the support device along with the remaining components can still align and settle slightly.



Build up pressure → after approx. 8 mm, the max. stroke of the hydraulic cylinder is reached → Release pressure → Readjust the knurled adapter → erneut Build up pressure.



CAUTION: When reaching a stroke height of 8 mm, do not continue pumping; instead release the pressure → readjust the adapter, and build up pressure again.



CAUTION

In this variant, the injector can be hydraulically extracted until the pull adapter **60385551** can no longer be tightened. The lower end of the pull adapter **60385551** then rests against the pulling force limiting adapter **60385516**.

During the pulling procedure using damage-free injector removal, there are two possible outcomes: The injector nozzle can be removed from the cylinder head, or the pulling force limiter on the extraction device breaks during the procedure.



If the adapter of the pulling force limiter **60385516** rests against the pull adapter **60385551** and the injector cannot yet be removed from the cylinder head by hand, proceed as follows.

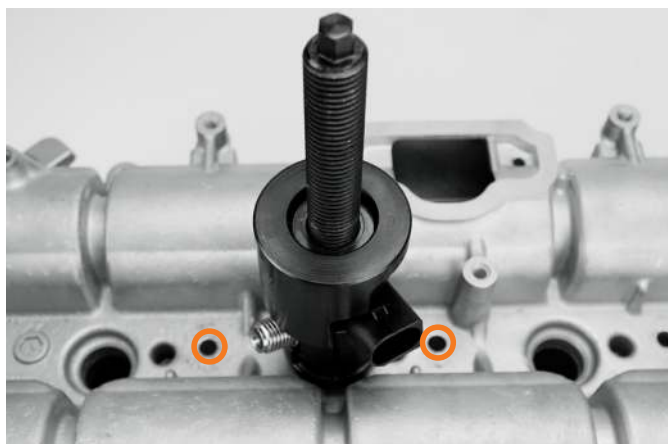
Remove the spindle **60385328**, the adapter for the pulling force limiter **60385516**, and the shear bolt **60385522-1** from the claw **60385515-1**.



The spindle **60385328** is now screwed directly into the injector claw **60385515-1** and tightened lightly.



As described previously, set up the support bridge, position the ball disc, place the cylinder on top, screw the pulling adapter onto the spindle, and tighten lightly.



Then repeat the pulling procedure as described previously, until the injector can be removed from the cylinder head.



If the shear bolt **60385522-1** breaks during the pulling procedure, all tools previously mounted on the injector must be dismantled in reverse order.



Remove the broken shear bolt **60385522-1** from part 1 of the injector claw **60385515-1** using an open-end wrench, and dismantle the injector claw. Then continue with Injector Removal with Destruction of the Injector.



INJECTOR REMOVAL BY DESTROYING THE INJECTOR

Cut the leak oil line and the electrical connection from the injector, as shown in the image.



TIP

The Mini-Flex **80435600** / **80435605** / **80435610** is very suitable for this purpose



Apply the first half shell **60385521** with the fitted adapter **60385546**, as shown in the image, to the injector. Place the half shell behind the injector nozzle and position it on the nozzle with a counterclockwise rotating motion.



Also place the second half shell **60385519** on the injector as shown in the image. Here too, the diesel connection must be located in the cutout of the half shell.



Turn the two grub screws with cone taper **60385549** flush to the lower edge of the fixing sleeve **60385548** (the grub screw must not protrude forward!). Then slide the fixing sleeve **60385548** over both half shells **60385519/21**. Ensure that the diesel connection of the injector is located in the designated cutout on the fixing sleeve **60385548**.



Now screw the screw-in adapter **60385547** into the pull receiver lower part **60385546** and tighten lightly.



Then turn the two grub screws with cone taper **60385549** in by hand only, until they rest against the respective half shells.



In the second pass, tighten the two grub screws with cone taper **60385549** to medium firmness e.g. using a 1/4" ratchet.



Screw the extraction spindle **60385321** into the screw-in adapter **60385547** and tighten lightly.

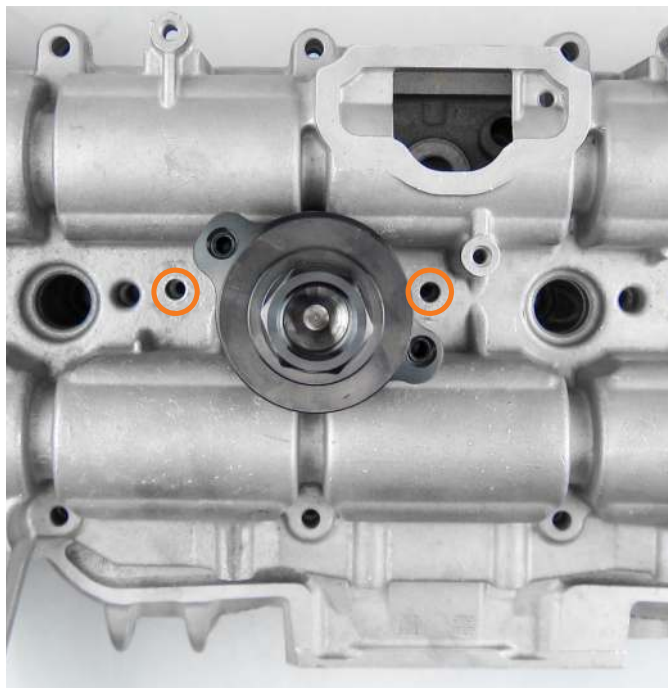


Place the support bridge, consisting of support plate **60385511** and the two screwed-in support feet **60385512**, on the engine so that the round side of the support plate faces the timing belt. The ends of the support feet must be inserted into the holes of the previously removed valve cover bolts.



CAUTION

The round side of the support plate must face the timing belt!



BEFORE USING THE HYDRAULIC COMPONENTS, THESE MUST BE PROPERLY BLED

FOR THE CORRESPONDING WORK STEPS, SEE P. 9

Place the ball disc **60385639** onto the spindle **60385321** on the support bridge **60385511**, then mount the hydraulic cylinder **6038311** onto the ball disc on the spindle.



Screw the pull adapter **60385318** onto the spindle **60385321**, center the hydraulic cylinder and ball disc, and tighten the pull adapter lightly.



PULLING PROCEDURE



At the start of the pulling procedure, build up only moderate pressure 2 to 3 times → Release pressure → Readjust the knurled adapter. At this point, the support device along with the remaining components can still align and settle slightly.



Build up pressure → after approx. 8 mm, the max. stroke of the hydraulic cylinder is reached → Release pressure → Readjust the knurled adapter → Build up pressure.



CAUTION: When reaching a stroke height of 8 mm, do not continue pumping; instead release the pressure → readjust the adapter, and build up pressure again.

Repeat the pulling procedure until the injector can be removed from the cylinder head by hand.



To remove the tools from the extracted injector, it is recommended to simply clamp it in a vise. Then remove the extraction spindle **60385321**, fully unscrew the two grub screws with cone taper **60385549** in the fixing sleeve **60385548**, and unscrew the screw-in adapter **60385547** from the pull receiver lower part **60385546**.



If the injector breaks at the lower threaded connection during the pulling procedure, continue with the following steps.



REMOVAL OF THE BROKEN INJECTOR REMNANT FROM THE CYLINDER HEAD

Remove the remaining loose parts from the injector shaft using the magnetic attachment 60382225 screwed onto the pull rod **60385527**, or a magnet (e.g. **52601040** – not included in the set).



Also remove the nozzle needle tip and the remaining small parts from the nozzle needle body using a magnet.



Spray a rust remover, e.g. **9990020** (not included in the set), into the injector shaft and allow to act briefly.



Insert the knock-out mandrel **60382155** together with the centering cone **60385331** into the injector bore. The longer machined section must face the combustion chamber. Using a vibro hammer with a suitable attachment, e.g. **80257000** (not included in the set), knock the nozzle needle body loose.



TIP

The vibration hammer **80257000** is very suitable for this purpose.



Loosely screw the steel drive-in anchor **60385529-1** onto the pull rod **60385527**. Then insert this unit into the injector bore and push it fully into the center hole of the nozzle needle body.



Then, using the expanding mandrel for steel impact anchors **60385513**, press the steel impact anchor **60385529-1** into the central bore of the nozzle needle body with strong hammer blows until form-locked.



Screw the pull rod **60385527** fully into the steel impact anchor **60385529-1** and tighten lightly at the flat section using an open-end wrench.



The nozzle needle body can now be removed from the injection nozzle.

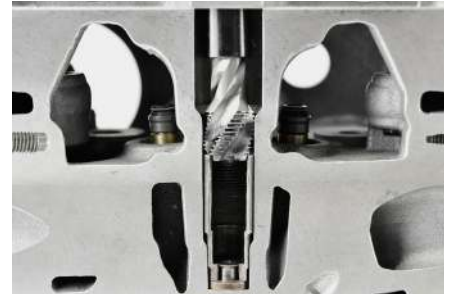
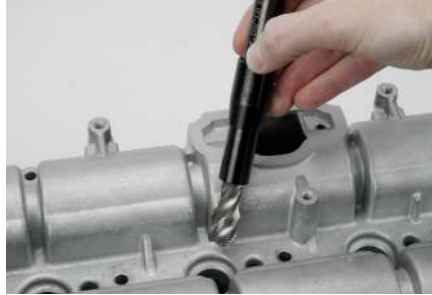


TIP

Optionally, the slide hammer **60390750** can also be mounted on the pull rod **60385527** for additional assistance.



Slide the centering cone **60385331** onto the thread drill holder **60385333**, coat the special thread drill M16x1.5 **60385339** with cutting oil, and insert into the injector shaft.



Using a suitable tool, cut a thread into the still-stuck sleeve. Cut the thread into the injector sleeve over its full length and repeatedly break the resulting chips by briefly reversing.



It is recommended to remove the chips after cutting and then carry out the cutting process once more to ensure that the thread has been cut over the maximum length.



Screw the extraction spindle **60382403** into the previously cut internal thread up to the stop and tighten lightly.

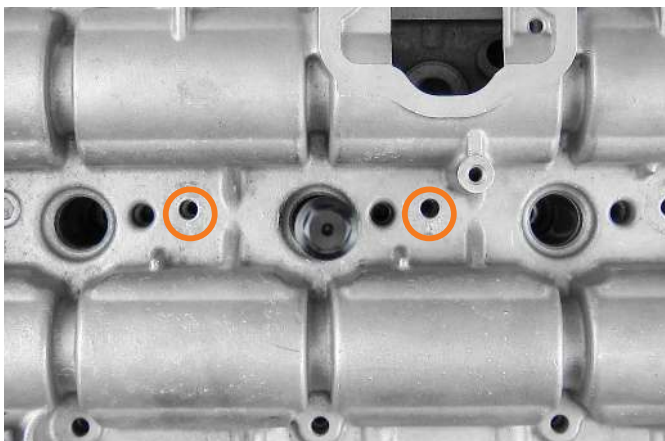


Place the support bridge, consisting of support plate **60385511** and the two screwed-in support feet **60385512**, on the engine so that the round side of the support plate faces the timing belt. The ends of the support feet must be inserted into the holes of the previously removed valve cover bolts.



CAUTION

The rounded side of the support plate must face the timing belt!



Place the ball disc **60385639** onto the spindle **60382403** on the support bridge **60385511**, then mount the hydraulic cylinder **6038311** onto the ball disc on the spindle.



Screw the pull adapter **60385551** onto the spindle **60382403**, center the hydraulic cylinder and ball disc, and tighten the pull adapter lightly.



PULLING PROCEDURE



At the start of the extraction process, 2 to 3 times at medium pressure only: build up pressure → release pressure → readjust the knurled adapter. At this point, the support device along with the remaining components can still align and settle slightly.



Build up pressure → after approx. 8 mm, the max. stroke of the hydraulic cylinder is reached → Release pressure → Readjust the knurled adapter → erneut Build up pressure.



CAUTION: When reaching a stroke height of 8 mm, do not continue pumping; instead release the pressure → readjust the adapter, and build up pressure again.

Repeat the pulling procedure until the injector remnant can be removed from the cylinder head.



Once the nozzle remnant has been removed, remove the locking sleeve **60390102** from the injector shaft bore using the setting tool **60390081** or a magnet.



CLEANING THE INJECTOR SHAFT



TIP

Before fitting the new nozzle, it is advisable to clean the injector bore with the cleaning set **9038100**.



This set contains all the essential tools for removing the sealing ring: for cleaning the circumference of the injector bore as well as the bore on the end face.

In addition, this set also includes various tools for controlled re-milling of the sealing seat with depth limitation.

RECOMMENDED ACCESSORIES

RUST REMOVER AND CONTACT SPRAY

9990020



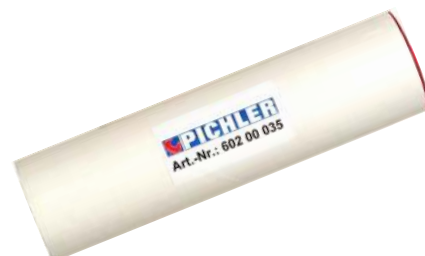
BIO-CUT CUTTING OIL 400 ML

99900175



COOLING LUBRICANT GREASE FOR DRILLING AND THREAD CUTTING

60200015



MINI POWER CUT-OFF GRINDER

80435610



SLIDE HAMMER MOD. 1.35 KG WITH FEMALE THREAD M10

60390750



FLEXIBLE MAGNETIC LIFTER SIZE 4

52601040



HYDRAULIC HAND PUMP SET, 3-PIECE

80255500



AIR-HYDRAULIC FOOT PUMP 700 BAR

80255575



HIGH-IMPULSE SLIDE HAMMER SET

80257050



**INJECTOR SHAFT CLEANING
COMPLETE WITH 5 MODULES**

9038100



**SPECIAL THREAD DRILL M16×1.5 MM
FOR INJECTOR REMOVAL**

60385339



VIDEOSCOPE HD 3.9 MM, 2-WAY ±180°

90780010



INTERNAL BRUSH 19 MM (12 / 3 PCS.)

9039081/ 90390815



INJECTOR SEAL RING PULLER MOD. UNI

6039070



SEAL RING PULLER SET UNI

60390775



INJECTOR SEAL RING SET UNI

60390705



**INJECTOR SEAL RING ASSORTMENT, SPECIFIC
551-PC.**

60390605



**INJECTOR SEAL RING ASSORTMENT UNI,
450-PC.**

60390505



NOTES

NOTES



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