TIER 2 CURSOR SERIES

Industrial applications

C78

C78 ENT

C10

C10 ENT

C13

C13 ENT

CURSOR G-DRIVE

CURSOR 78 TE2
CURSOR 13 TE1
CURSOR 13 TE2
CURSOR 13 TE3

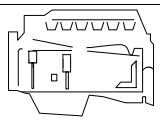
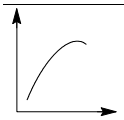
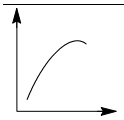
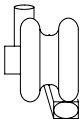
Technical and Repair Manual

Graph and symbols

	Removal Disconnection
	Refitting Connection
	Removal Disassembly
	Fitting in place Assembly
	Tighten to torque
	Tighten to torque + angle value
	Press or caulk
	Regulation Adjustment
	Warning Note
	Visual inspection Fitting position check
	Measurement Value to find Check
	Equipment
	Surface for machining Machine finish
	Interference Strained assembly
	Thickness Clearance
	Lubrication Damp Grease
	Sealant Adhesive
	Air bleeding

	Intake
	Exhaust
	Operation
ϱ	Compression ratio
	Tolerance Weight difference
	Rolling torque
	Replacement Original spare parts
	Rotation
	Angle Angular value
	Preload
	Number of revolutions
	Temperature
	Pressure
>	Oversized Higher than…. Maximum, peak
<	Undersized Less than…. Minimum
	Selection Classes Oversizing
	Temperature < 0 °C Cold Winter
	Temperature > 0 °C Hot Summer

CLEARANCE DATA

 Type		F2BE0684		F2B0687
		A*B001	A*B002	A*B101
ϱ Compression ratio		16 ± 0.8	16 ± 0.8	16 ± 0.8
  Max. output	kW (HP) rpm	265 (360) 2100	265 (360) 2100	220 (300) 2200
  Max. torque	Nm (kgm) rpm	1420 (142) 1500	1420 (142) 1500	1250 (125) 1200
 Loadless engine idling	rpm	1300	1300	900
 Loadless engine peak	rpm	2110	2110	2430
Bore x stroke Displacement	mm cm^3	115 x 125 7790	115 x 125 7790	115 x 125 7790
 **SUPERCHARGING** Turbocharger type		Intercooler Direct injection HX40W		
 **LUBRICATION** Oil pressure (warm engine) - idling - peak rpm	 bar bar	Forced by gear pump, relief valve single action oil filter 4 5		
COOLING Water pump control **Thermostat** - start of opening	 °C	Liquid Through belt 85		

NOTE Data, features and performances are valid only if the setter fully complies with all the installation prescriptions provided by Iveco Motors.

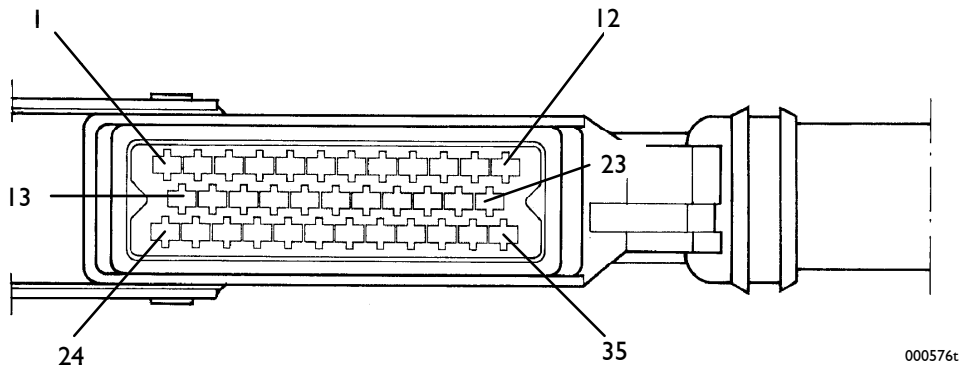
Furthermore, the users assembled by the setter shall always be in conformance to couple, power and number of turns based on which the engine has been designed.

EDC control unit PIN-OUT

Connector "A" (Engine)

Pin	Function
1 -	Engine rev sensor
2 -	Distribution rev sensor
3 -	---
4 -	Air temperature sensor mass
5 -	Engine coolant temperature sensor mass
6 -	Engine oil temperature and fuel temperature sensor ground
7 -	---
8 -	---
9 -	---
10 -	Engine oil temperature sensor signal
11 -	Fuel temperature sensor signal
12 -	Oversupply pressure sensor signal
13 -	Engine rev sensor
14 -	Distribution rev sensor
15 -	---
16 -	---
17 -	Boosting pressure sensor ground
18 -	---
19 -	---
20 -	---
21 -	Air temperature sensor signal
22 -	Engine coolant temperature sensor signal
23 -	Oversupply pressure sensor power supply
24 -	Injector power supply for cylinders 1 / 2 / 3
25 -	Injector power supply for cylinders 4 / 5 / 6
26 -	Cylinder 4 injector control
27 -	Cylinder 6 injector control
28 -	Cylinder 5 injector control
29 -	---
30 -	---
31 -	---
32 -	---
33 -	Cylinder 3 injector control
34 -	Cylinder 2 injector control
35 -	Cylinder 1 injector control

Figure 95



EDC CONTROL UNIT DIAGRAM WITH ELECTRICAL CONNECTIONS TO CONNECTOR "A"

Colour code	
B	White
BG	Beige
C	Orange
G	Yellow
H	Grey
L	Blue
M	Brown
N	Black
R	Red
S	Pink
V	Green
Z	Purple

PRE/POST-HEATING RESISTANCE

The resistance is ~ 0,7 Ohm.

Such resistance is placed between the cylinder head and the suction manifold. It is used to heat up air during pre/post-heating operations.

When the ignition key is inserted, should any one of the temperature sensors – water, air, gas oil – detect a value below 10°C, the electronic control unit will activate pre/post-heating and turn on the relevant dashboard warning light for a variable time depending on the temperature.

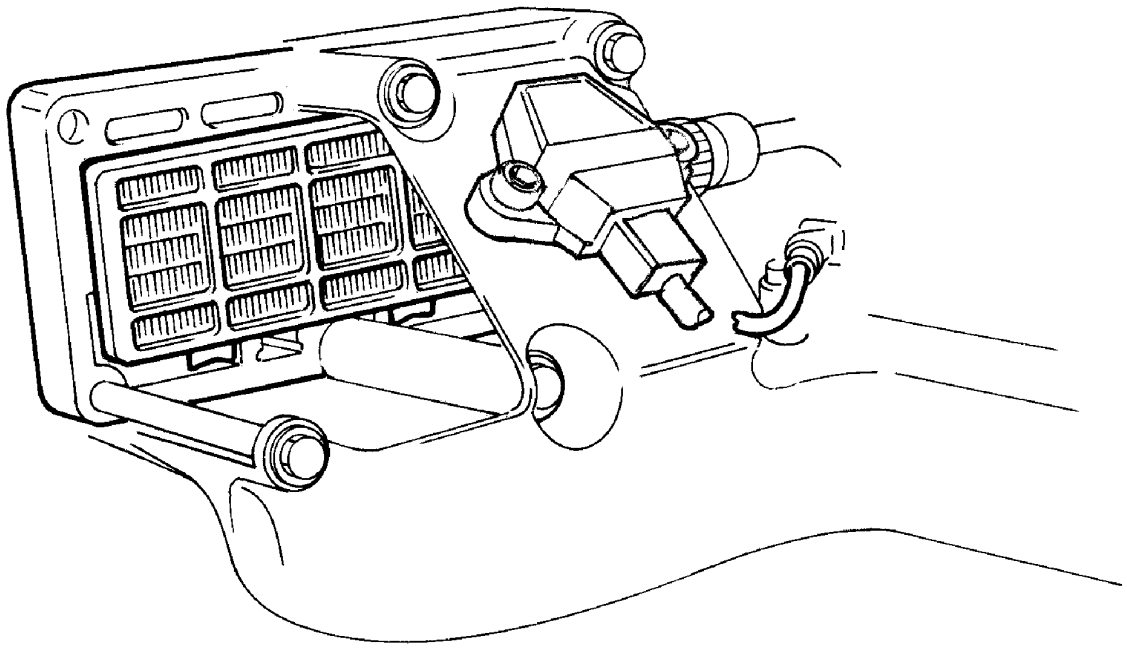
After that time, the warning light starts blinking thus informing the driver that the engine can be started.

When the engine is running the warning light goes off, while the resistance is being fed for a certain time as a result of post-heating.

If the engine is not started, with the warning light flashing, in 20 / 25 seconds, the operation is cancelled to prevent draining the battery.

On the contrary, if reference temperatures are over 10°C, when the ignition key is inserted the warning light comes on for about 2 seconds and carries out the test and then goes out to signal that the engine can be started.

Figure 105



001256t

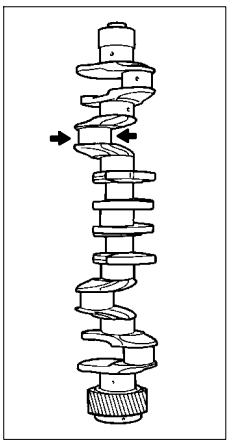
Selection of connecting rod half-bearings (rectified pins)

If pins have been rectified, the procedure described must be applied.
In this case, (for each undersizing) determine the tolerance field the new big end pins belong to, and install the half-bearings identified according to the relative table.

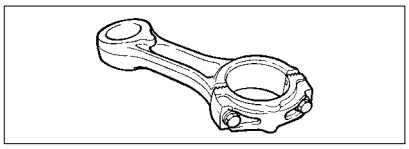
Figure 31

red/black = 2.074 to 2.083 mm

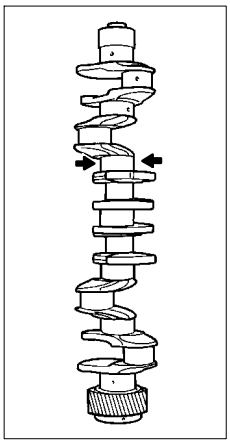
green/black = 2.063 to 2.073 mm



-0.127

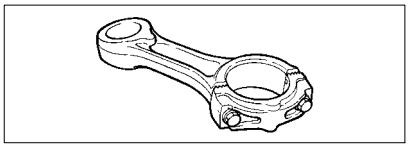


	1	2	3
72.789 72.798 (1)	green/black	green/black	green/black
	green/black	green/black	green/black
72.799 72.808 (2)	red/black	green/black	green/black
	red/black	green/black	green/black
72.809 72.818 (3)	red/black	red/black	green/black
	red/black	red/black	green/black

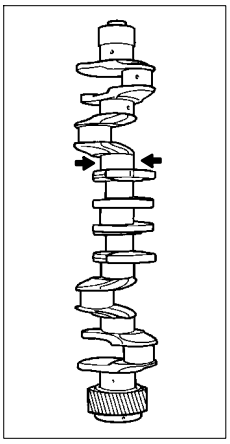


-0.254

red 2.127 to 2.137 mm
green = 2.138 to 2.147 mm

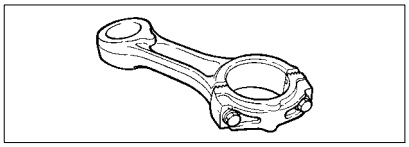


	1	2	3
72.671 72.680	red	green	green
	red	green	green
72.681 72.691	red	red	green
	red	red	green



-0.508

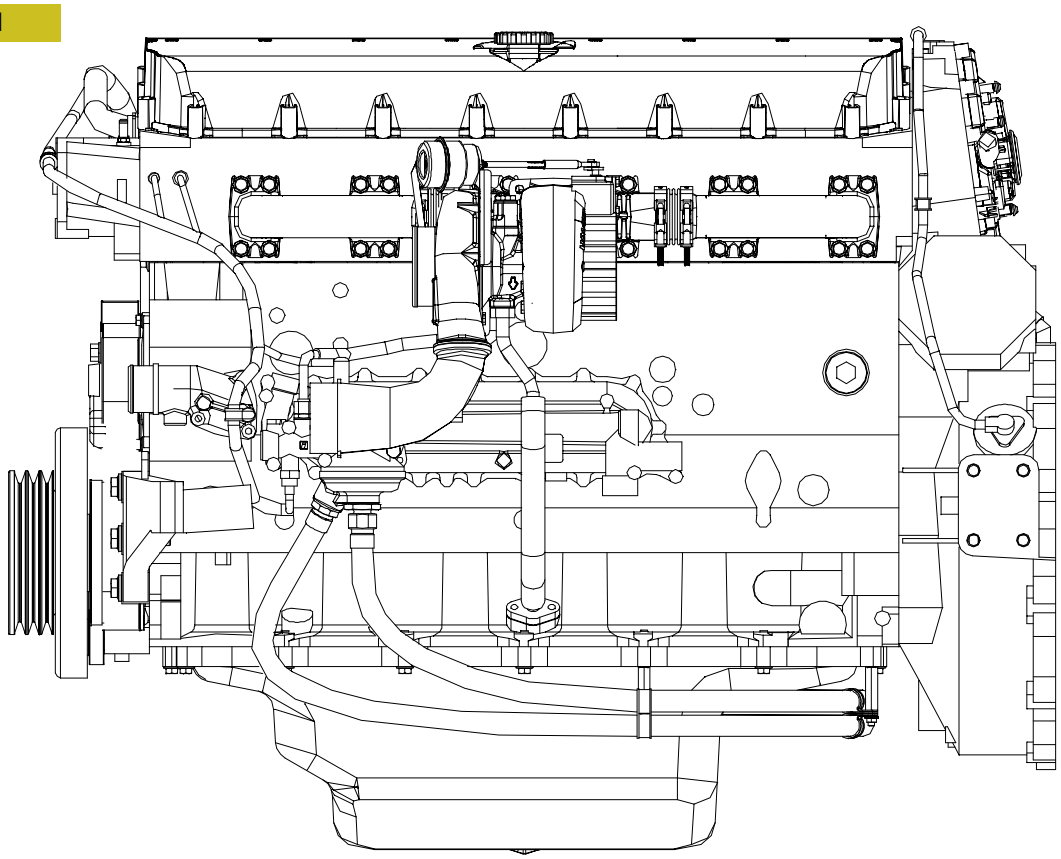
red = 2.254 to 2.264 mm
green = 2.265 to 2.274 mm



	1	2	3
72.417 72.426	red	green	green
	red	green	green
72.427 72.437	red	red	green
	red	red	green

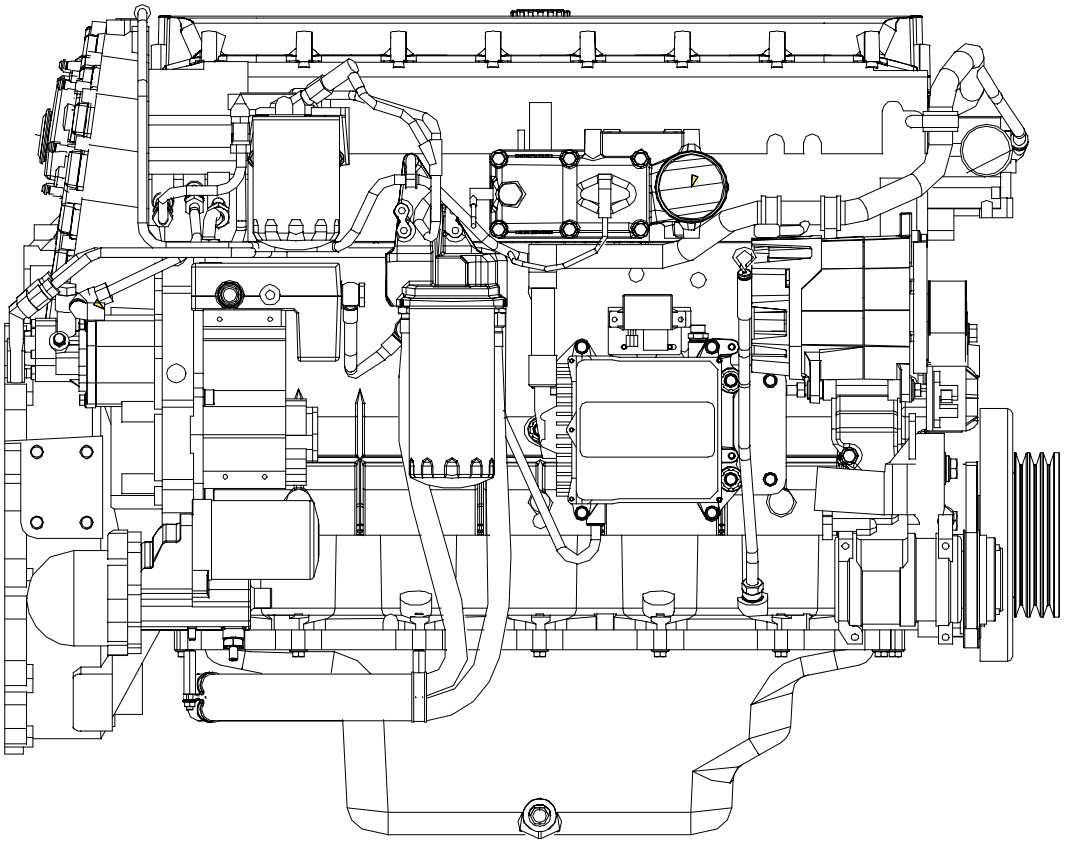
VIEWS OF ENGINE (F3AE0684D*B001 - F3AE0684G*B003)

Figure 1



81852

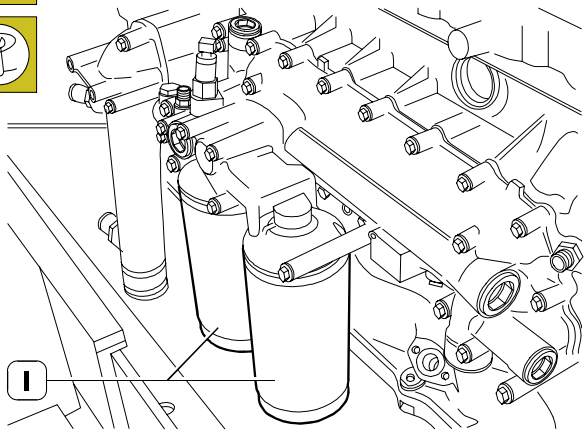
LEFT-HAND SIDE VIEW



81853

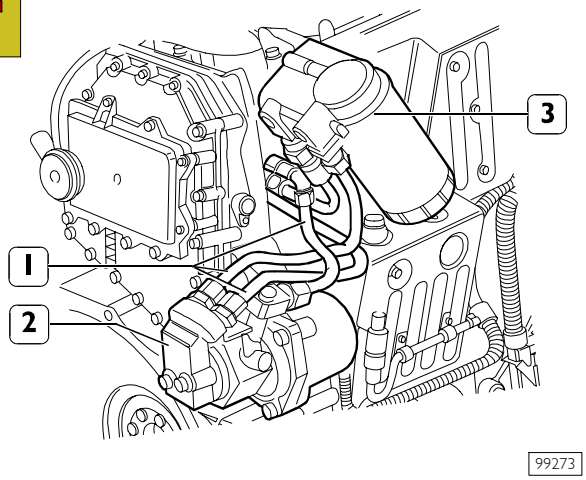
RIGHT-HAND SIDE VIEW

Figure 13



For types F3AE0684D*B003 and F3AE0684E*B002 only, using tool 99360314 (2), unscrew the oil filters (1).

Figure 14

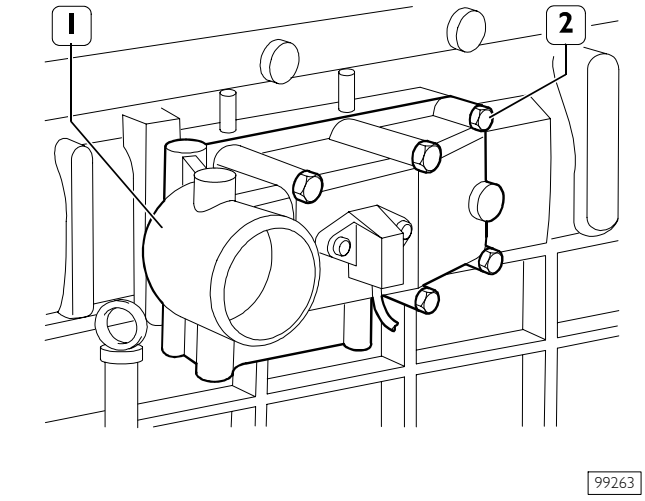


Disconnect the fuel pipes (1) from the fuel pump (2).

Remove:

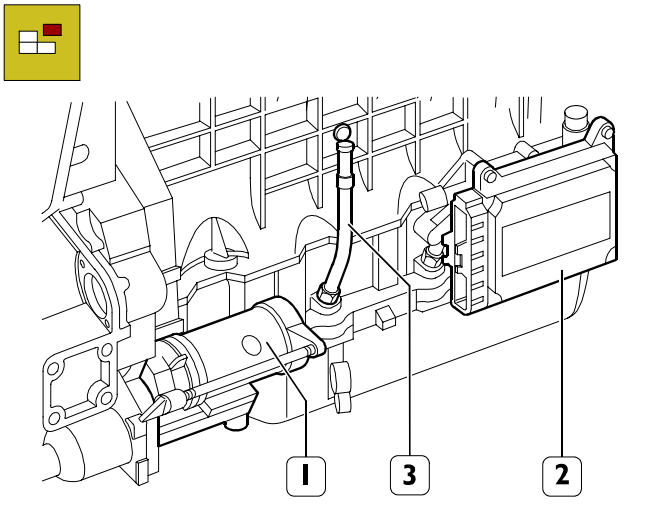
- the fuel pump (2);
- the fuel filter unit (3) and pipes (1).

Figure 15



Take out the screws (2) and remove the intake manifold (1).

Figure 16



Remove:

- the starter motor (1);
- the control unit (2) and its support;
- the oil dipstick (3) from the crankcase.

DEFINING THE CLASS OF DIAMETER OF THE MAIN JOURNALS AND CRANKPINS (Journals with nominal diameter)

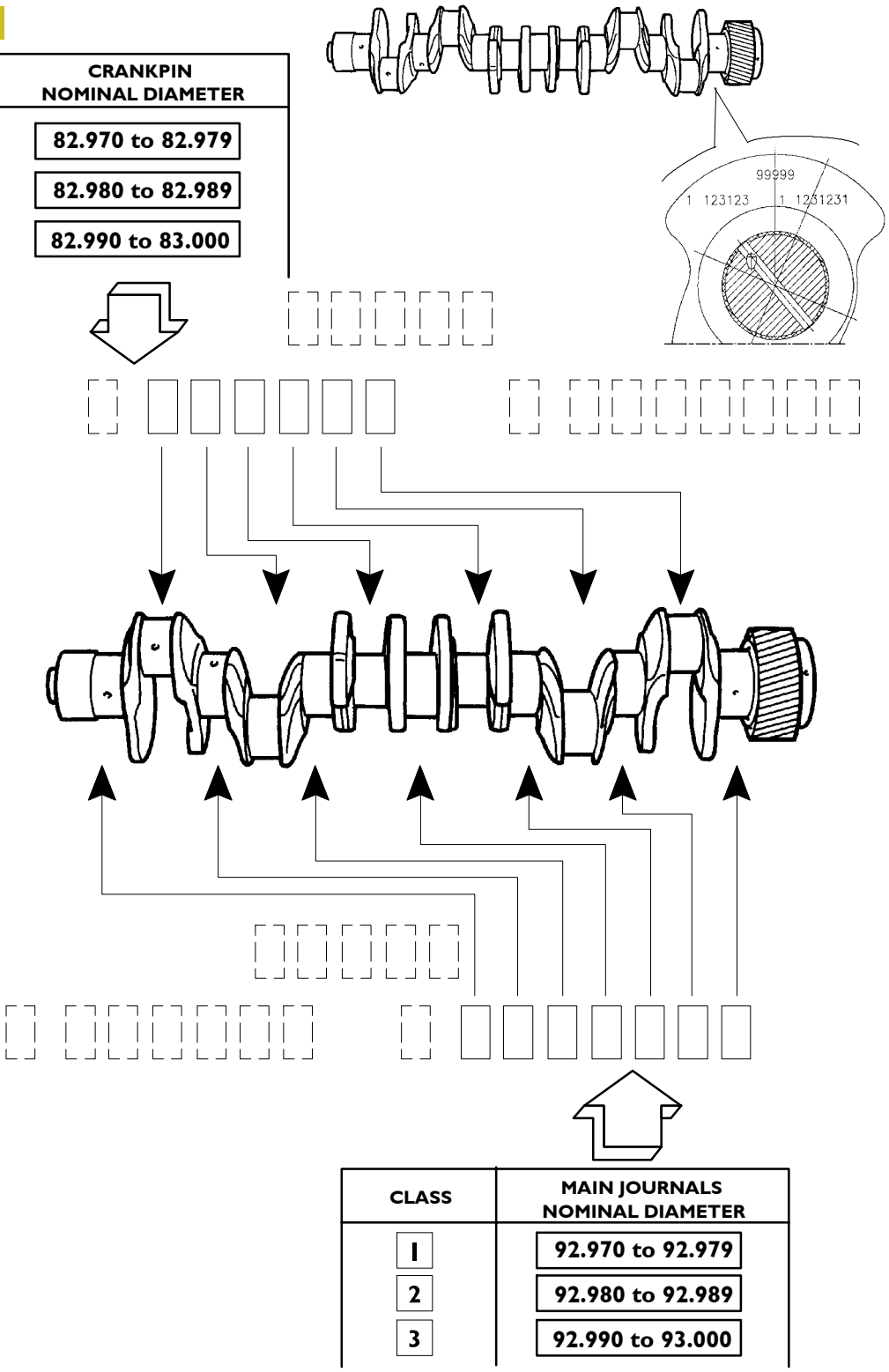
Main journals and crankpins: determining the class of diameter of the journals.

Three sets of numbers are marked on the crankshaft in the position shown by the arrow (Figure 26 at top):

- The first number, of five digits, is the part number of the shaft.
- Under this number, on the left, a set of six digits refers to the crankpins and is preceded by a single digit showing the status of the journals (1 = STD, 2 = -0.127), the other six digits, taken singly, give the class of diameter of each of the crankpins they refer to (Figure 26 at top).
- The set of seven digits, on the right, refers to the main journals and is preceded by a single digit: the single digit shows the status of the journals (1 = STD, 2 = -0.127), the other seven digits, taken singly, give the class of diameter of each of the main journals they refer to (Figure 26 at bottom).

Figure 26

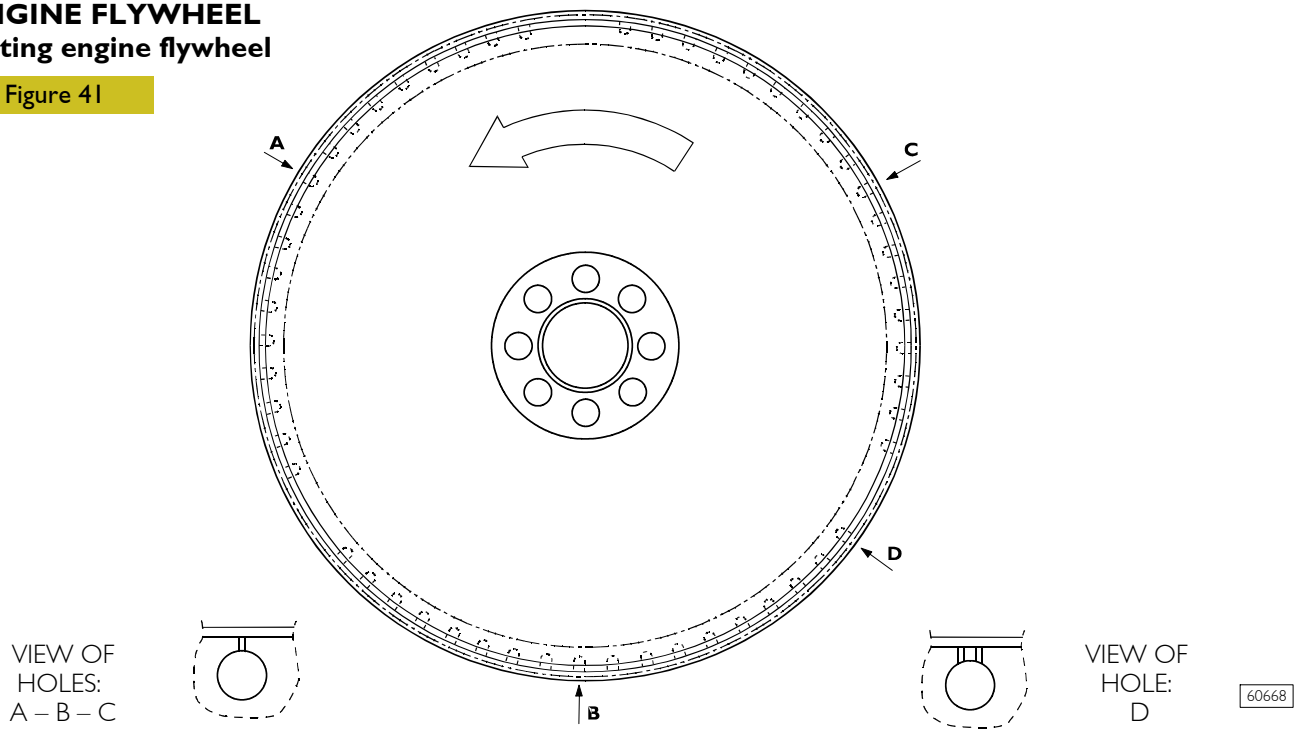
CLASS	CRANKPIN NOMINAL DIAMETER
1	82.970 to 82.979
2	82.980 to 82.989
3	82.990 to 83.000



CLASS	MAIN JOURNALS NOMINAL DIAMETER
1	92.970 to 92.979
2	92.980 to 92.989
3	92.990 to 93.000

ENGINE FLYWHEEL
Fitting engine flywheel

Figure 41



DETAIL OF PUNCH MARKS ON ENGINE FLYWHEEL FOR PISTON POSITIONS

A = Hole on flywheel with one reference mark, corresponding to the TDC of pistons 3-4.

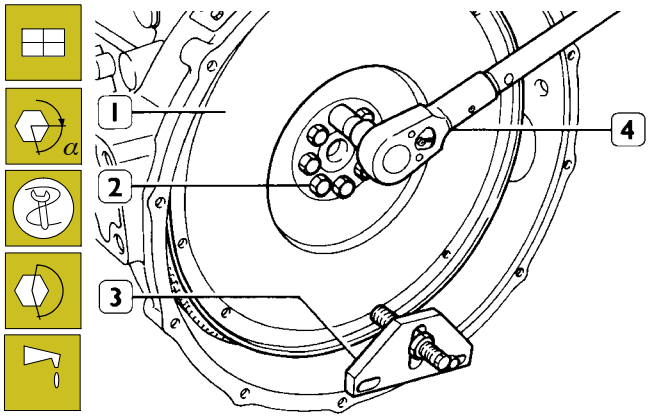
B = Hole on flywheel with one reference mark, corresponding to the TDC of pistons 1-6.

C = Hole on flywheel with one reference mark, corresponding to the TDC of pistons 2-5.

D = Hole on flywheel with two reference marks, position corresponding to 54°.

NOTE If the teeth of the ring gear mounted on the engine flywheel, for starting the engine, are very damaged, replace the ring gear. It must be fitted after heating the ring gear to a temperature of approx. 200°C.

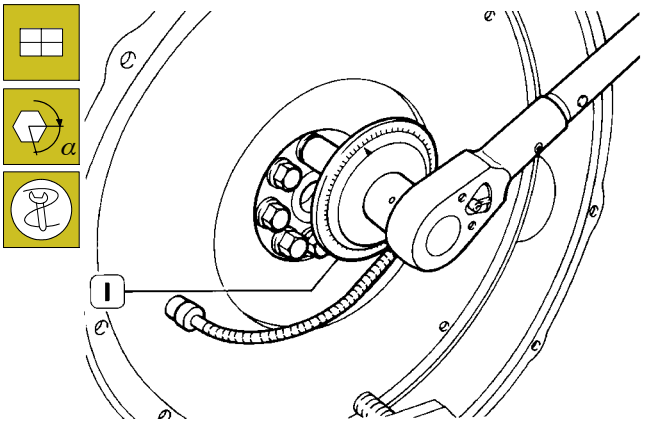
Figure 42



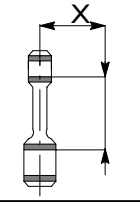
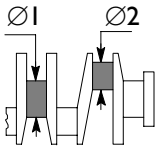
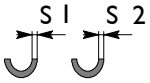
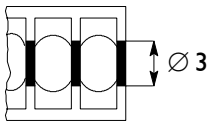
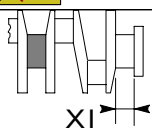
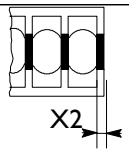
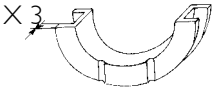
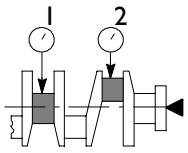
NOTE The crankshaft has a locating peg that has to couple with the relevant seat on the engine flywheel.

Position the flywheel (1) on the crankshaft, lubricate the thread of the screws (2) with engine oil and screw them down. Lock rotation with tool 99360351 (3). Lock the screws (2) in three phases.
First phase: pre-tightening with torque wrench (4) to a torque of 120 Nm (12 kgm).

Figure 43



Second phase: 90° corner closing with tool 99395216 (1).

	Type		F3B
			mm
	Measuring dimension	X	125
	Max. connecting rod axis misalignment tolerance	—	0.08
	Main journals	Ø1	
	- rated value		99.970 to 100.000
	- class	1	99.970 to 99.979
	- class	2	99.980 to 99.989
	- class	3	99.990 to 100.000
	Crankpins	Ø2	
	- rated value		89.970 to 90.000
	- class	1	89.970 to 89.979
	- class	2	89.980 to 89.989
	- class	3	89.990 to 90.000
	Main bearing shells	S1	
	Red		3.110 to 3.120
	Green		3.121 to 3.130
	Yellow*		3.131 to 3.140
	Big end bearing shells	S2	
	Red		1.965 to 1.975
	Green		1.976 to 1.985
	Yellow*		1.986 to 1.995
	Main bearing housings	Ø3	
	- rated value		106.300 to 106.330
	- class	1	106.300 to 106.309
	- class	2	106.310 to 106.319
	- class	3	106.320 to 106.330
	Bearing shells - main journals ○		0.060 to 0.108 * - 0.061 to 0.119 ** - 0.060 to 0.130 ***
	Bearing shells - big ends ○		0.050 to 0.108 * - 0.051 to 0.109 ** - 0.050 to 0.098 ***
	Main bearing shells		0.127 - 2.254 - 0.508
	Big end bearing shells		0.127 - 2.254 - 0.508
	Main journal, thrust bearing	X1	47.95 to 48.00
	Main bearing housing, thrust bearing	X2	40.94 to 40.99
	Thrust washer halves	X3	3.38 to 3.43
	Crankshaft end float		0.10 to 0.30
	Alignment	1 - 2	≤ 0.025
	Ovalization	1 - 2	0.010
	Taper	1 - 2	0.010

* Fitted in production only and not supplied as spares

○ Spares provided: : * = standard spares - 0.127; ** = 0.254 - 0.508

SAFETY PRESCRIPTIONS

Standard safety prescriptions

Particular attention shall be drawn on some precautions that must be followed absolutely in a standard working area and whose non fulfillment will make any other measure useless or not sufficient to ensure safety to the personnel in-charge of maintenance.

Be informed and inform personnel as well of the laws in force regulating safety, providing information documentation available for consultation.

- ❑ Keep working areas as clean as possible, ensuring adequate aeration.
- ❑ Ensure that working areas are provided with emergency boxes, that must be clearly visible and always provided with adequate sanitary equipment.
- ❑ Provide for adequate fire extinguishing means, properly indicated and always having free access. Their efficiency must be checked on regular basis and the personnel must be trained on intervention methods and priorities.
- ❑ Organize and displace specific exit points to evacuate the areas in case of emergency, providing for adequate indications of the emergency exit lines.
- ❑ Smoking in working areas subject to fire danger must be strictly prohibited.
- ❑ Provide Warnings throughout adequate boards signaling danger, prohibitions and indications to ensure easy comprehension of the instructions even in case of emergency.

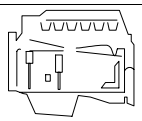
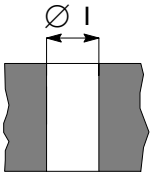
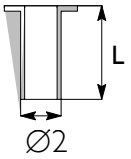
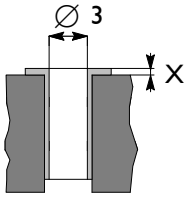
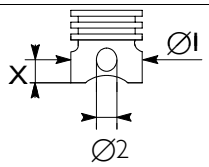
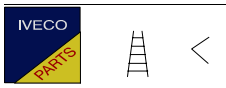
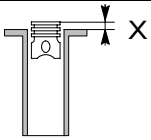
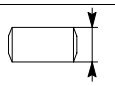
Prevention of injury

- ❑ Do not wear unsuitable cloths for work, with fluttering ends, nor jewels such as rings and chains when working close to engines and equipment in motion.
- ❑ Wear safety gloves and goggles when performing the following operations:
  - filling inhibitors or anti-frost
  - lubrication oil topping or replacement
  - utilization of compressed air or liquids under pressure (pressure allowed: ≤ 2 bar)
- ❑ Wear safety helmet when working close to hanging loads or equipment working at head height level.
- ❑ Always wear safety shoes when and cloths adhering to the body, better if provided with elastics at the ends.
- ❑ Use protection cream for hands.
- ❑ Change wet cloths as soon as possible
- ❑ In presence of current tension exceeding 48-60 V verify efficiency of earth and mass electrical connections. Ensure that hands and feet are dry and execute working operations utilizing isolating foot-boards. Do not carry out working operations if not trained for.
- ❑ Do not smoke nor light up flames close to batteries and to any fuel material.
- ❑ Put the dirty rags with oil, diesel fuel or solvents in anti-fire specially provided containers.
- ❑ Do not execute any intervention if not provided with necessary instructions.
- ❑ Do not use any tool or equipment for any different operation from the ones they've been designed and provided for: serious injury may occur.
- ❑ In case of test or calibration operations requiring engine running, ensure that the area is sufficiently aerated or utilize specific vacuum equipment to eliminate exhaust gas. Danger: poisoning and death.

During maintenance

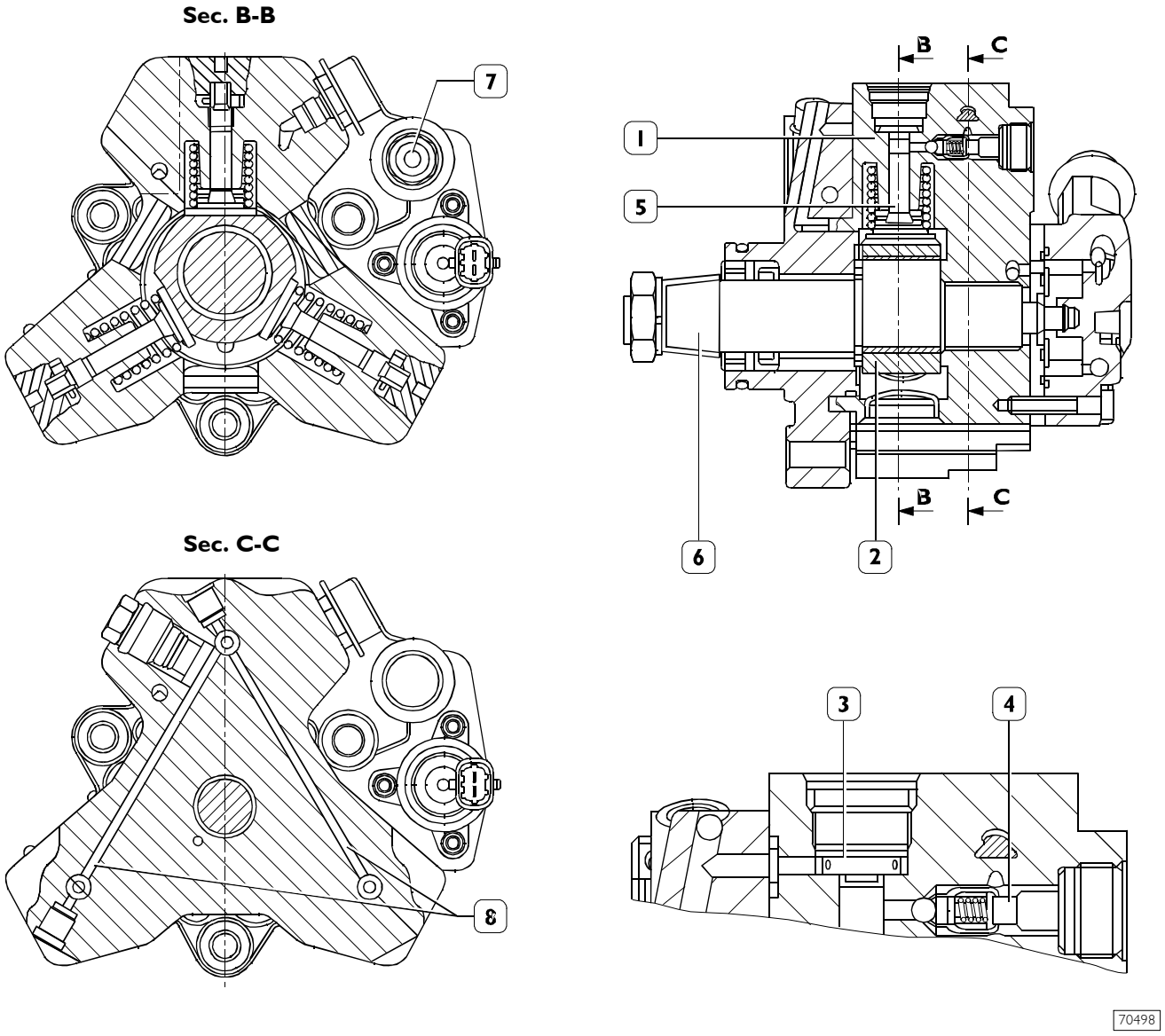
- ❑ Never open filler cap of cooling circuit when the engine is hot. Operating pressure would provoke high temperature with serious danger and risk of burn. Wait unit the temperature decreases under 50°C.
- ❑ Never top up an overheated engine with cooler and utilize only appropriate liquids.
- ❑ Always operate when the engine is turned off: whether particular circumstances require maintenance intervention on running engine, be aware of all risks involved with such operation.
- ❑ Be equipped with adequate and safe containers for drainage operation of engine liquids and exhaust oil.
- ❑ Keep the engine clean from oil tangles, diesel fuel and or chemical solvents.
- ❑ Use of solvents or detergents during maintenance may originate toxic vapors. Always keep working areas aerated. Whenever necessary wear safety mask.
- ❑ Do not leave rags impregnated with flammable substances close to the engine.
- ❑ Upon engine start after maintenance, undertake proper preventing actions to stop air suction in case of runaway speed rate.
- ❑ Do not utilize fast screw-tightening tools.
- ❑ Never disconnect batteries when the engine is running.
- ❑ Disconnect batteries before any intervention on the electrical system.
- ❑ Disconnect batteries from system aboard to load them with the battery loader.
- ❑ After every intervention, verify that battery clamp polarity is correct and that the clamps are tight and safe from accidental short circuit and oxidation.
- ❑ Do not disconnect and connect electrical connections in presence of electrical feed.
- ❑ Before proceeding with pipelines disassembly (pneumatic, hydraulic, fuel pipes) verify presence of liquid or air under pressure. Take all necessary precautions bleeding and draining residual pressure or closing dump valves. Always wear adequate safety mask or goggles. Non fulfillment of these prescriptions may cause serious injury and poisoning.

F2B ASSEMBLY CLEARANCE DATA

	Type	F2B
CYLINDER BLOCK AND CRANK MECHANISM COMPONENTS		mm
	Cylinder sleeve bore Ø 1 upper	130.200 to 130.225
	Ø 1 lower	128.510 to 128.535
	Cylinder liners: outer diameter: Ø 2 upper	130.161 to 130.186
	Ø 2 lower	128.475 to 128.500
	length L	
	Cylinder sleeve - crankcase bore upper	0.014 to 0.064
	lower	0.010 to 0.060
	Outside diameter Ø 2	
 * Available dia. class	Cylinder sleeve inside diameter Ø3 A*	115.000 to 115.012
	inside diameter Ø3 B*	115.010 to 115.022
	Protrusion X	0.035 to 0.065
 • Class A pistons supplied as spares. •• Class B pistons are fitted in production only and are not supplied as spares.	Pistons: measuring dimension X	18
	outside diameter Ø 1 A•	114.888 to 114.900
	outside diameter Ø 1 B••	114.898 to 114.910
	outside diameter Ø 2	46.010 to 46.016
	Piston - cylinder sleeve	0.100 to 0.124
	Piston diameter Ø 1	–
	Pistons protrusion X	-
	Gudgeon pin Ø 3	45.994 to 46.000
	Gudgeon pin - pin housing	0.010 to 0.022

High pressure pump-inside structure

Figure 8

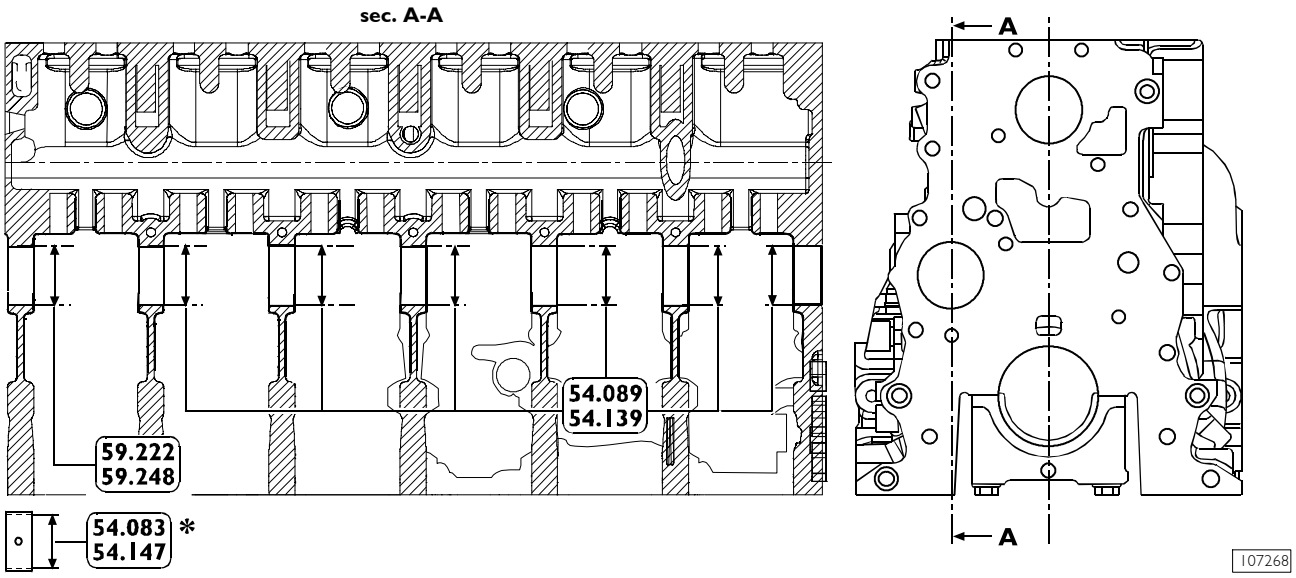


1. Cylinder. – 2. Three-lobe element. – 3. Cap intake valve. – 4. Ball delivery valve. – 5. Piston. – 6- Pump shaft. – 7. Low-pressure fuel inlet. – 8. Pumping elements supplying fuel ducts.

Every pumping unit is composed of:

- a piston (5) actuated by a three-lobe element (2) floating on the pump shaft (6). The element (2), being floating on a misaligned part of the shaft (6), when the shaft rotates, does not rotate therewith but is only translated in a circular movement along a wider radius, with the resulting alternate actuation of the three pumping elements;
- cap intake valve (3);
- ball delivery valve (4).

Figure 17

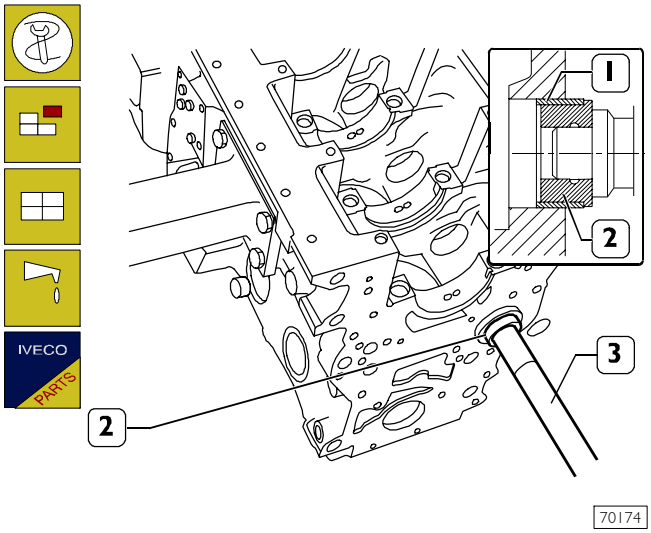


MAIN DATA ABOUT CAMSHAFT BUSHES AND RELATED HOUSINGS

*Height to be obtained after driving the bushes.

Bush replacement

Figure 18

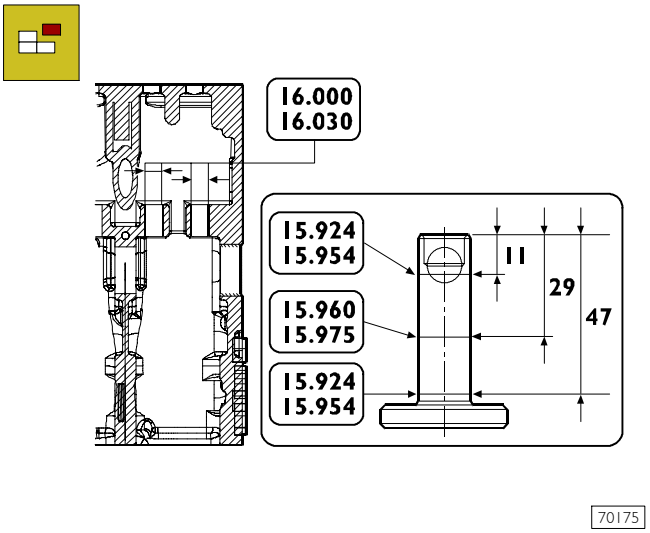


To replace front and rear bushes (1), remove and refit them using the beater 99360362 (2) and the handgrip 99370006 (3).

When refitting the bushes (1), direct them to make the lubricating holes (2) coincide with the holes on the block housings.

Tappets

Figure 19



MAIN DATA CONCERNING THE TAPPETS AND THE RELEVANT HOUSINGS ON THE ENGINE BLOCK