



Cembre



ISO 9001
Certified Quality
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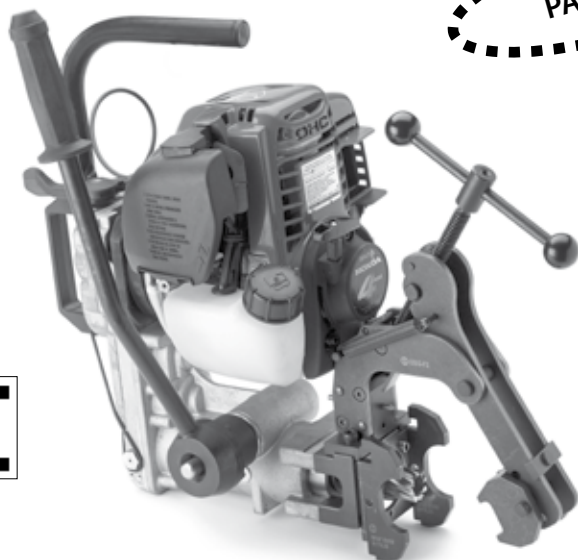
OHSAS 18001
Certified Occupational
Health & Safety
Management System

ENGLISH

**4-STROKE
HONDA ENGINE**

RAIL DRILL TYPE LD-41P

PATENTED



**OPERATION AND MAINTENANCE
MANUAL**

WARNINGS

- Before using the drill, carefully read the instructions contained in this manual. **SAVE THESE INSTRUCTIONS:** this manual contains important safety and operating instructions for the drill.
- **STOP THE ENGINE** when servicing the drill: before removing the broach cutters, spiral bits, positioning templates etc.
- During operation keep hands away from the danger zone.
- Always wear protective glasses and work gloves.
- Avoid wearing clothes which may present a risk to personal safety.

LD-41PN
basic drill



LD-41P
(LD-41PN + DBG-F2)
basic drill complete with
railweb clamping device



1. GENERAL CHARACTERISTICS

	LD-41PN
Drilling capacity (*):	Ø 7 ÷ 40 mm
Speed without load:	230 rpm
Weight:	16,3 kg
Weight with DBG-F2:	19,5 kg
Gear sump Recommended oil:	SHELL SPIRAX S4 TXM or MOBIL SUPERMULTIGRADE 10-30-SAE or equivalents
Combustion engine: Type: Model: Displacement: Power (SAE J1349): Fuel tank capacity: Clutch: Start: Ignition: Spark plug: Fuel: Recommended oil: Operating angle: Emissions:	4-stroke, overhead camshaft, single cylinder Honda GX35NT STSC 35,8 cm ³ 1,0 kW (1,3 HP) / 7000 rpm 0,63 litres centrifugal with automatic intervention by rope pull transistorized magneto NGK CM5H or CMR5H or equivalents unleaded regular grade petrol (see § 10) SAE 10W-30, API SJ or later infinite, can be stored and continuously operated in full 360° inclination, thanks to the rotary-slinger pumping lubrication system. according to "Phase 2" European Directives 97/68/EC, 2001/63/EC and 2002/88/EC
Acoustic Noise (Directive 2006/42/EC, annexe 1, point 1.7.4.2 letter u) – The weighted continuous acoustic pressure level equivalent A at the work place L_{pA} is equal to 96,2 dB (A) – The maximum value of the weighted acoustic displacement pressure C at the work place L_{pCpeak} is < 130 dB (C) – The acoustic power level emitted by the machine L_{WA} is equal to 101,9 dB (A)	
Risks due to vibration (Directive 2006/42/EC, annexe 1, point 2.2.1.1) Tests carried out in compliance with the indications contained in UNI ENV 25349 and UNI EN 28662 part 1 st Standards and under operating conditions much more severe than those normally found, certify that the weighted root mean square in frequency of the acceleration the upper limbs are exposed is 2,69 m/sec² max.	

(*) with broach cutters on thicknesses up to 50 mm
with special spiral bits on thicknesses up to 45 mm

2. ACCESSORIES SUPPLIED WITH THE DRILL

2.1) Guide bits for controlling the coolant system:

for broach cutters suitable for drilling thicknesses up to 25 mm

- 1 pc PP 1, diameter 7 mm
- 1 pc PP 2, diameter 8 mm

for broach cutters suitable for drilling thicknesses up to 50 mm

- 1 pc PPL 1, diameter 7 mm
- 1 pc PPL 2, diameter 8 mm



2.2) Spacer, type DPE, for controlling the coolant system, for special spiral bits, diam. 7 ÷ 27,5 mm.



2.3) Adaptor, type ARE, for external cooling, to be used with the SR5000 cooling unit.



2.4) Grub screw, M8x10

- 4 pcs for clamping cutters or bits onto spindle shaft.



2.5) Socket head cap screws, M6x16

- 4 pcs for securing positioning templates to front plate.



2.6) Socket head cap screws, M6x25

- 4 pcs for securing special positioning templates to front plate.



2.7) Range of tools:

- 1 pc 5 mm Allen key
- 1 pc 6 mm Allen key
- 1 pc 4 mm Allen key, with handle
- 1 pc spark plug key
- 1 pc brush for remove the drilling swarf



2.8) 100 ml oil bottle for gear sump

Parts 2.1 to 2.8 are included in the "LD-41PN ACCESSORIES KIT" code 6002604.



2.9) Type SR5000 cooling unit

3. ACCESSORIES TO BE ORDERED SEPARATELY

3.1) DBG-F2 device (*) with moving arm for clamping the drill to the rail web and track fittings, complete with the following end pieces:

- **TDB 6:** standard end piece for rails and stock rails.
- **TDB 1:** for switch blades and compound frogs.
- **TDB 3:** for repairing (adjusting) existing holes on rails for subsequent application of electrical connections and for additional special applications.

(*) Always supplied with type LD-41P drill.



TDB 7



TDB 1

TDB 6

TDB 3

3.1.1) DBG-LF2 device with moving arm complete with **TDB 7** end piece for clamping the drill to girder rails and for additional special applications.

3.2) "VAL P24" plastic carrying case for storing the drill complete with the DBG-F2 device and accessories.

Also available **VAL P24-CS plastic carrying case** with folding handle and wheels.

3.2.1) "VAL LD-L" metal case for storing the drill complete with the DBG-LF2 device, and VAL MPA tool case.



VAL P24-CS



VAL LD-L

3.3) Templates for positioning the drill on rails and stock rails to enable drilling to be carried out according to the **provisions of railway board standards:**

- **MPAF UIC54** on DRILLING AXIS of UIC 54 rail
- **MPAF UIC60** on DRILLING AXIS of UIC 60 rail
- **MPAFN UIC60** on DRILLING/NEUTRAL AXIS of UIC 60 rail

• **Note:** Contact **Cembre** for selection of specific application accessories.



3.4) MPAU universal positioning template suitable both for repairing existing holes on various fittings, and for drilling disused rails.



3.5) SPA positioning plates for drilling rail heads with a centre-to-centre distance established in the Railway board standards, without the need for marking out; for use in conjunction with MPAF... positioning templates.

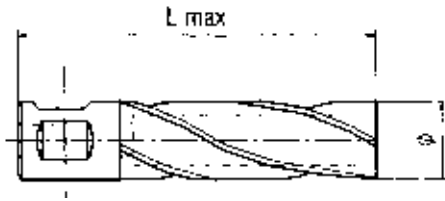


3.6) MRF clamp to be applied as a **reference to the head of rails** for use, in conjunction with SPA... positioning plates, for **in-line drilling of rail heads, with established centre-to-centre distance.**



3.7) VAL MPA tool case suitable for storing the accessories indicated in 3.3 - 3.6, and the drilling tools.

3.8) Broach cutters



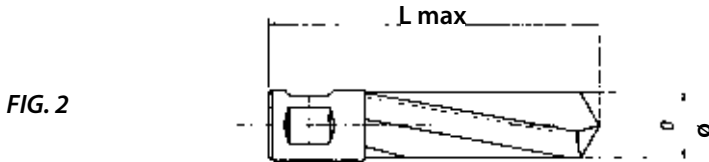
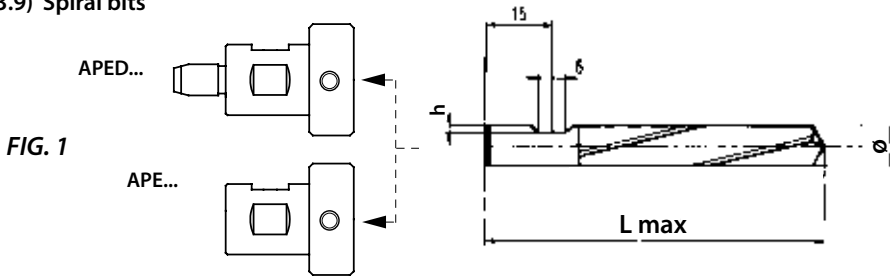
BROACH CUTTERS FOR RAILS IN STEEL QUALITY 700-900-1100 (UIC 860.0)

Ø mm	SHORT RANGE		LONG RANGE (L max = 88mm)	
	Broach cutter	Guide bit	Broach cutter	Guide bit
13	CY130	Ref. PP 1		
13,5	CY135			
14			CY140L	Ref. PPL 1
16	CY160		CY160L	
17	CY170	Ref. PP 2	CY170L	Ref. PPL 2
17,5	CY175			
18	CY180		CY180L	
19	CY190		CY190L	
20	CY200		CY200L	
21	CY210		CY210L	
22	CY220		CY220L	
23	CY230		CY230L	
24	CY240		CY240L	
25	CY250		CY250L	
26	CY260		CY260L	
27	CY270		CY270L	
27,5	CY275			
28	CY280		CY280L	
29	CY290		CY290L	
30	CY300		CY300L	
31	CY310			
32	CY320		CY320L	
33	CY330		CY330L	
	MAX DRILLING THICKNESS 25 mm		MAX DRILLING THICKNESS 50 mm	

Contact **Cembre** for other types of broach cutters.

Broach cutters resharpening must be carried out in compliance with appropriate modes of operation which allow the best result.

3.9) Spiral bits



SPECIAL SPIRAL BITS FOR RAILS IN STEEL QUALITY 700 - 900 - 1100 (UIC 860.0)

Figure	Ø mm	Spiral Bit ref. (*)	L max mm	h mm	Adaptor ref.	Figure	Ø mm	Spiral Bit ref. (*)	L max mm	h mm	Adaptor ref.
1	7	PE 70	76	1,2	APED 70	1	14	PE 140	76	1,6	APED 135/165
	7,1	PE 71	72				16	PE 160			
	8	PE 80	76	1,4	APED 80	2	17	PE 170AR	88		
	8,5	PE 85					17,5	PE 175			
	9	PE 90					18	PE 180			
	9,5	PE 95					19	PE 190AR			
	10	PE 100		1,6	APED 130	2	21	PE 210AR	88		
	11	PE 110					22	PE 220			
	12	PE 120					24	PE 240AR			
	13	PE 130AR					27,5	PE 275AR			
	13,5	PE 135AR									

(*) PE... AR: special high quality spiral bit.

- The special spiral bits in the **PE** range allow automatic cooling by means of the **SR5000** unit supplied with the drilling machine.
- All spiral bits in the **PE** range allow drilling of thicknesses up to 45 mm.

The drilling tools indicated in the table guarantee optimum results. For tools of other types, check the dimensional compatibility (particularly the size of the attachment and the length).

3.10) LR2 BIODEGRADABLE LUBROCOOLANT

3 litre container to be used in a 5-10 % solution, for optimum operation of both broach cutters and spiral bits.

3.11) LR3 ANTIFREEZE CONCENTRATE

3 litre added to the lubrocoolant mixture in the right concentration will maintain the lubrocoolant mixture fluid in negative temperature conditions.



4. COOLANT UNIT TYPE SR5000

The type SR5000 coolant unit consists of a tank complete with tube and maximum pressure valve (01), fitted with a pump device for pressurisation, which must be connected to the attachment (35) on the drill by means of its quick-coupling (03).

The delivery and shut-off of the lubrocoolant are controlled automatically, when drilling with a broach cutter, by the guide bit; when drilling with a spiral bit, delivery and shut-off of the fluid must be effected manually by operating the tap (02). The use of the lubrocoolant supplied by **Cembre**, in the recommended concentrations, guarantees optimum use of the drilling tools. **Consumption of the lubrocoolant depends both on the variable degree of opening of the tap (02) and the inner pressure of the tank: it is therefore advisable to open the tap a little when the tank is at maximum pressure, while it must be fully opened when the pressure in the tank is low.** When using the coolant system, pay careful attention to the instructions on the tank label.

WARNING:

- When the tank is not under pressure, check that the bush on the maximum pressure valve is screwed right down.
- To fill tank with lubrocoolant, turn handle anticlockwise approximately 2 turns to release handle locking mechanism. Remove handle/piston assembly from tank.

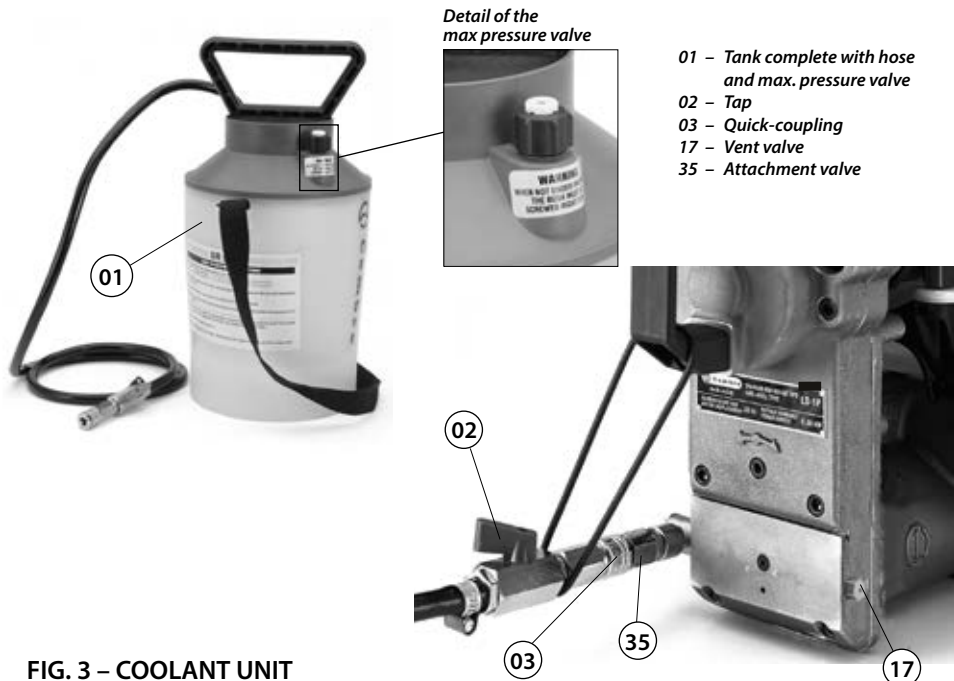


FIG. 3 – COOLANT UNIT

- The drill is equipped with a coolant attachment valve (35) and a vent valve (17) which are located as shown (Fig. 3).

If under certain operating circumstances they need to be interchanged, proceed as follows:

- Using a 17 mm hexagonal spanner unscrew the vent valve from its seat.
- Using the 4 mm allen key provided with the drill, remove the appropriate coolant valve from its seat and fit into the vent valve seat.
- Fit the vent valve into the vacant coolant valve seat.

- **When temperatures fall below 0° C the lubrocoolant may freeze which could cause damage to the seals contained in the drill coolant system.**

It is therefore advisable, when storing the drilling machine, to empty the lubrocoolant system completely.

Proceed as follows (Fig. 4):

- Disconnect the quick coupling (03) from the coolant attachment (35) on the drilling machine.
- Tilt the machine so that the coolant attachment is at its lowest point - allowing for natural drainage.
- Operate the advancing lever (36) to advance and retract the drilling spindle.
- Gently shake the machine to expel all fluid.

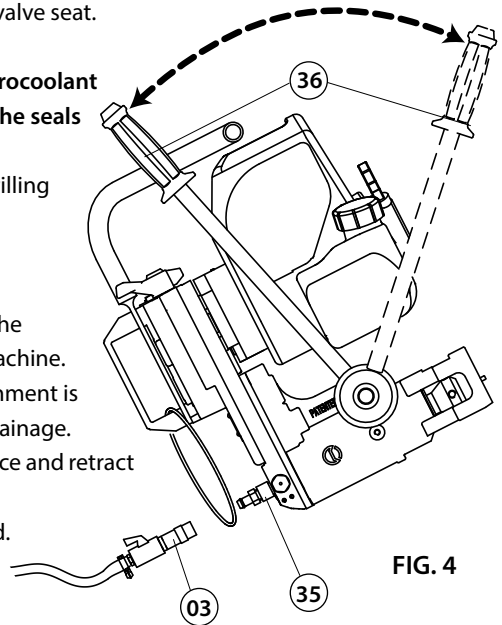


FIG. 4

4.1) ARE adaptor

For use with type **SR5000 coolant unit**. The **ARE** adaptor is inserted in the quick-coupling of the tank tube (Ref. to Fig. 5), it **may be used to provide manual external cooling when cutters are used to enlarge existing holes, or when using spiral bits not designed for automatic cooling.**

If necessary the **ARE** adaptor can also be used to clean various parts of the drill, by means of the lubrocoolant pressure jet, e.g. parts such as the tool clamping seat in the spindle shaft, seats for the jig fixing screws, etc.

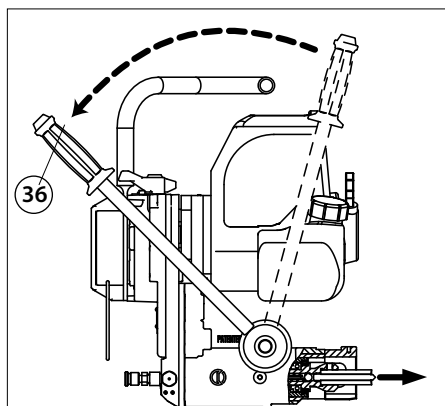


FIG. 5 – ARE ADAPTOR

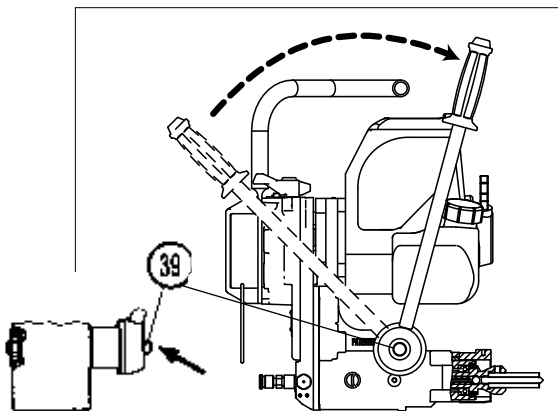
5. SPINDLE ADVANCE LEVER

The spindle is advanced by moving the lever (36) (See Fig. 6 a). The lever is fitted with a release pawl (39) which, when pressed, renders it independent of the hub and hence the spindle; the operator can therefore easily vary the angular position of the lever without movement of the spindle (Fig.6).

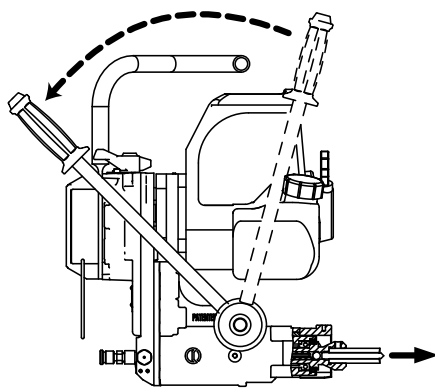
FIG. 6



6a - Moving the lever (36) towards the operator produces a corresponding advance of the spindle.



6b - With the release pawl (39) pressed, the lever is released from its hub and can repeat the previous travel without the spindle moving.



6c - With the hub released, moving the lever towards the operator produces a corresponding advance of this spindle.

5.1) Adjustment of the advance lever

The movement of the lever **must never be loose**, for adjustment proceed to tighten it by loading the cup springs by means of the associated self-locking nut, after removing the protective cap (see Fig. 7).

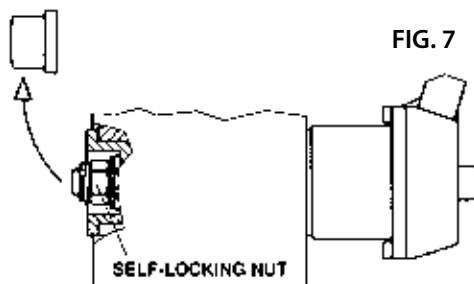


FIG. 7

6. PREPARING THE DRILL



STOP THE ENGINE when servicing the drill: before removing the broach cutters, spiral bits, positioning templates etc.

6.1) Assembling broach cutters (Ref. to Figs. 8-11).

6.1.1) Insert the guide bit in the cutter from the side of the spigot.

6.1.2) Using the lever (36), position the spindle shaft (07) so that both grub screws (18) become accessible and sufficient space is provided to insert the cutter; if necessary rotate the spindle shaft manually and sufficiently by inserting the 4 mm male hexagon key in the appropriate intermediate gear housing (33) in the crankcase of the drill corresponding to the feed handle (71) (see Fig. 11).

6.1.3) Insert the cutter in the spindle shaft so that the two engaging dogs on the cutter spigot line up with the grub screws (18).

6.1.4) Clamp the cutter by fully tightening the grub screws by means of the 4 mm male hexagon key.

6.1.5) Check that the guide bit slides freely by applying slight pressure on it.

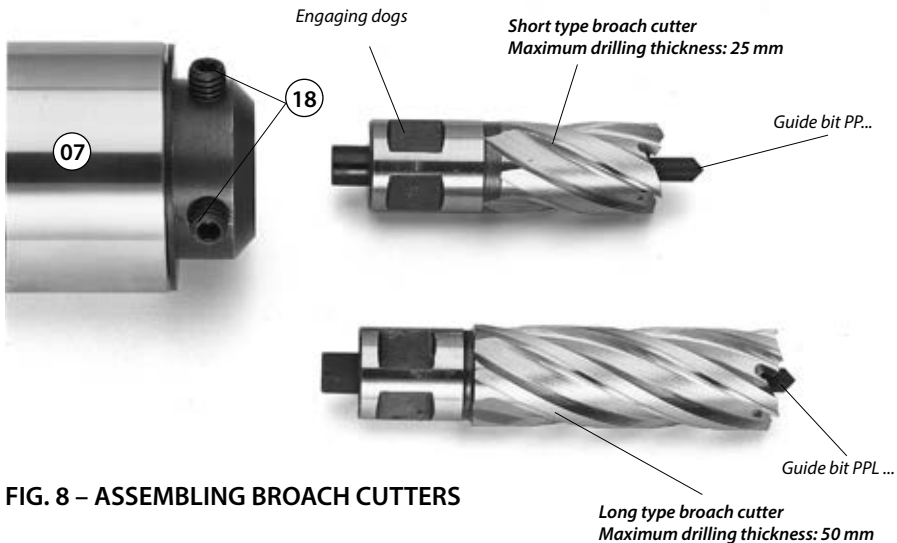
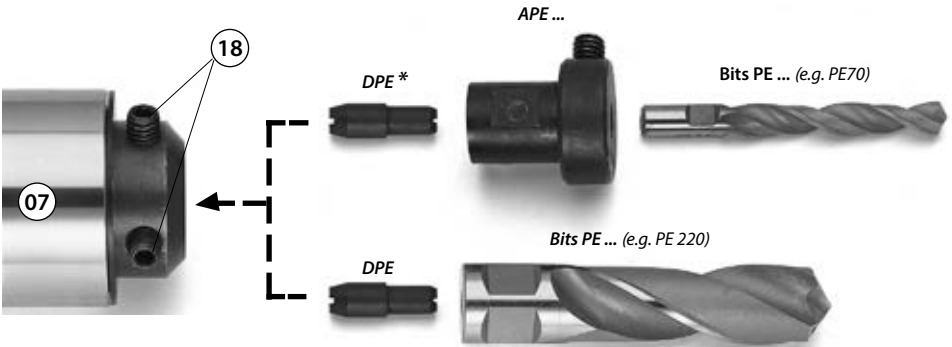


FIG. 8 – ASSEMBLING BROACH CUTTERS

6.2) Assembling spiral bits (Ref. to Figs. 9 - 11)

6.2.1) Using the advance lever, position the spindle shaft so that both grub screws become accessible and sufficient space is provided to insert the spiral bit; if necessary rotate the spindle shaft manually and sufficiently by inserting the 4 mm male hexagon key in the appropriate intermediate gear housing in the crankcase of the drill corresponding to the feed handle (see Fig. 11).

- 6.2.2) Insert into the spindle shaft, the **DPE** spacer required to activate the coolant system.
- If it necessary to use an **APE...** adaptor, the bit must first be fitted into the corresponding **APE** adaptor and locked with the appropriate grub screw, then the **DPE** spacer inserted.
- Note: Adaptors type APED... (e.g. APED 135/165) do not require use of DPE spacer.**
- 6.2.3) Insert the bit-spacer unit in the spindle shaft so that the two engaging dogs on the bit spigot line up with the grub screws. **Press the bit-spacer unit home against the inner seat of the spindle: this will enable the DPE spacer to open the coolant circuit** (see Fig. 10).
- 6.2.4) Clamp the bit by fully tightening the two grub screws (18) using the 4 mm male allen key.



** use only for APE, not required for APED*

FIG. 9 – ASSEMBLING SPIRAL BITS

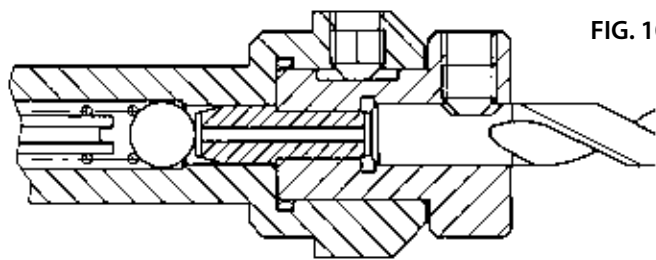


FIG. 10 – ASSEMBLING THE BIT-SPACER UNIT



FIG. 11 – MANUAL SPINDLE ROTATION

7. DRILL TYPE LD-41P

Part code **LD-41P** consist of the LD-41PN basic drill (see page 1) complete with the **DBG-F2** moving arm device for clamping to the rail web and track fittings (Ref. to Fig. 12).

The **DBG-F2** clamping device consists of:

- Clamping unit
- Type **TDB 1** end piece
- Type **TDB 3** end piece
- Type **TDB 6** standard end piece
- Socket head cap screws **M8x25** (2 pcs)
- Spring washers (4 pcs)
- Reference pin

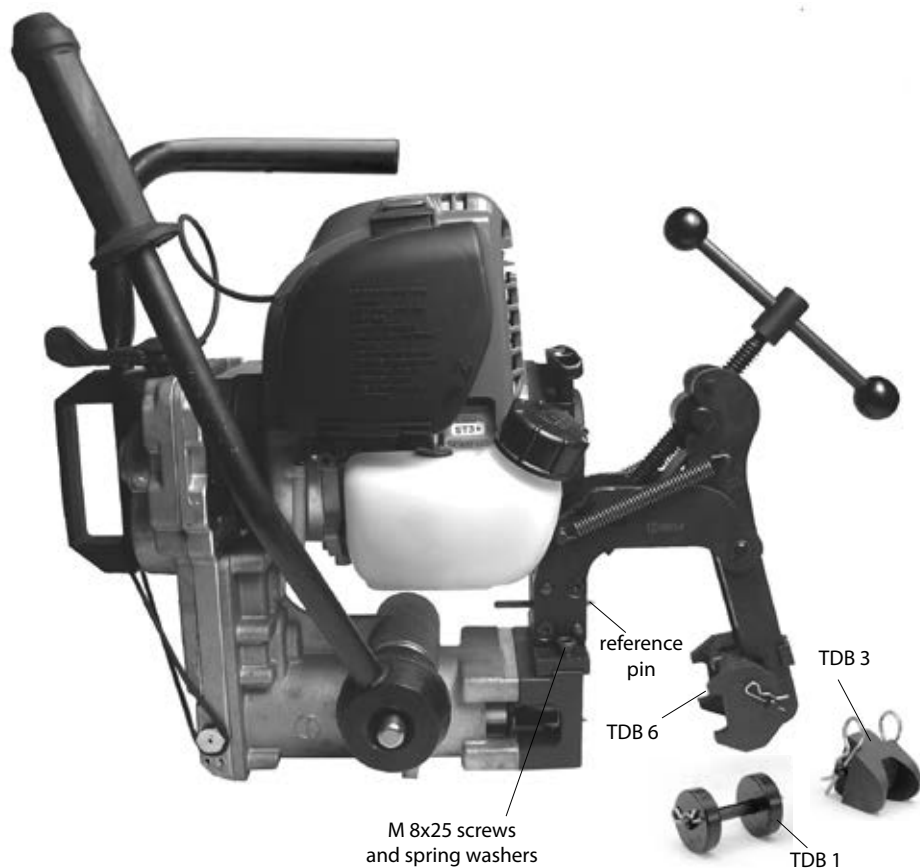


FIG. 12 – DRILL TYPE LD-41P

7.1) Assembling the end pieces

TDB 1, TDB 6 and TDB 3 end pieces of the DBG-F2 device, with moving arm, have been designed for adaptation to the different operating conditions on rails and track fittings; their assembly is shown in Fig. 13.

- *When assembling the TDB 3 end piece ensure that the positioning pawl is pointing downward in relation to the bolt.*
- *When disassembling the TDB 6 end piece ensure that, after removing the pivot, the complete assembly is slid away downward without acting on the holding plate.*
- *Over-advancing the spindle after drilling must be avoided when using the TDB 1 and TDB 3 end pieces.*

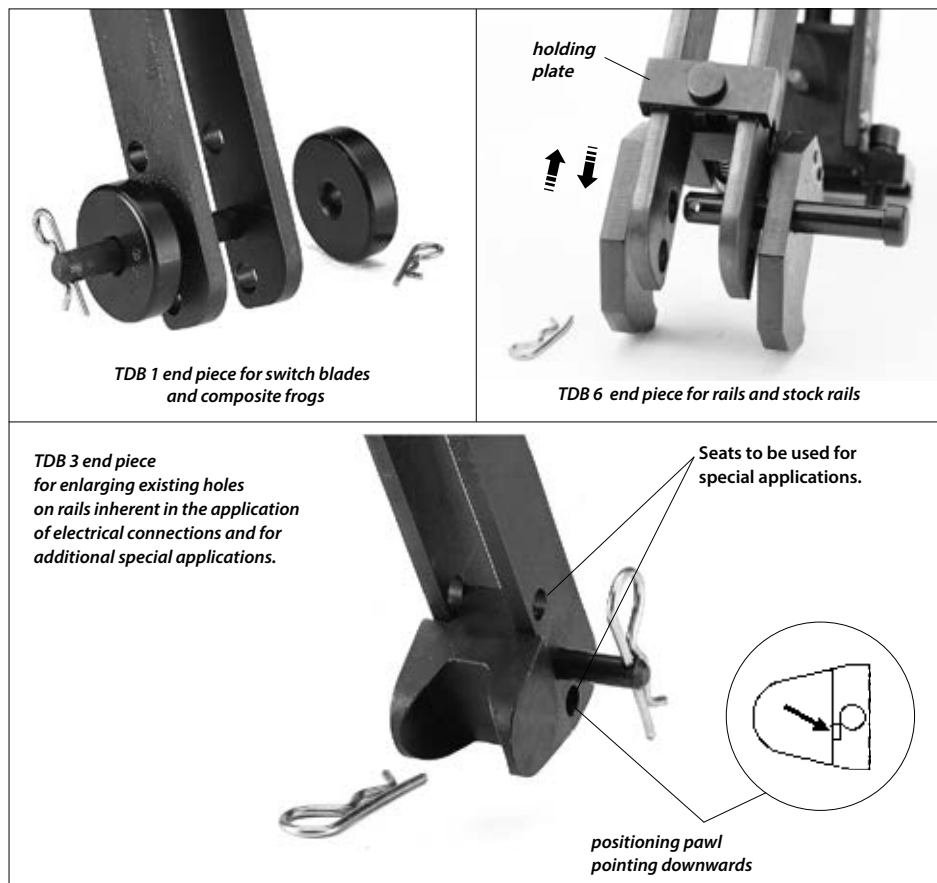
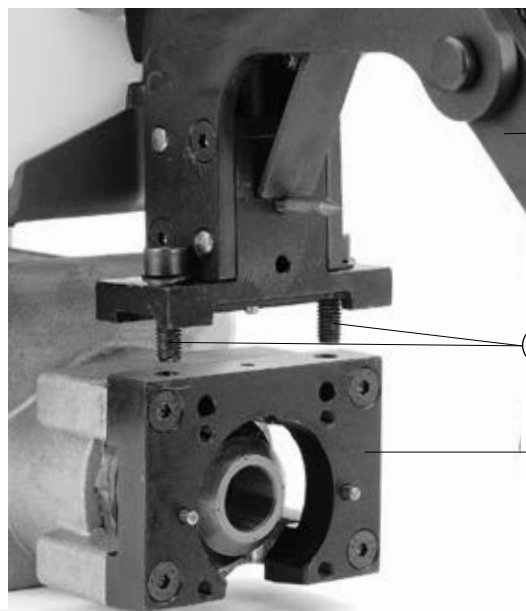


FIG. 13 – ASSEMBLY OF END PIECES

7.2) Assembly of the DBG-F2 clamping device on the drill

The DBG-F2 clamping device is fitted to the front plate of the drill, centred by means of the reference pin supplied and secured with the two socket head cap screws **M8x25** (35) also supplied. The assembly is illustrated in Fig. 14.



**FIG. 14 – ASSEMBLY OF
DBG-F2 CLAMPING DEVICE**

7.3) Assembly of positioning templates (Ref. to Fig. 15)

7.3.1) The type **MPAF..** and **MPAU** positioning templates are secured to the front plate (22) of the drill by means of the two screws **M 6x16** supplied.

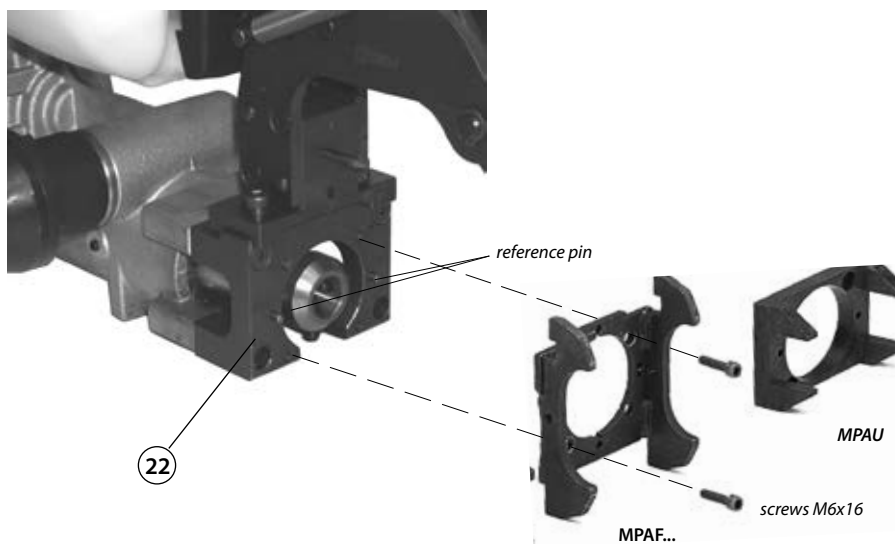


FIG. 15 – ASSEMBLY OF TEMPLATES

7.4) Clamping to the rail web (Ref. to Fig. 16)

The drill has a rapid rail engagement/release mechanism and specially shaped positioning templates for each rail type which facilitate precise and certain location of the part to be drilled.

To fully exploit the special features of the engagement device, we recommend calibrating it to the rail type to be drilled as follows:

- Withdraw the spindle shaft (07) completely by means of the lever (36).
- Insert the threaded bush (39) of screw (11) into its seat (A) in the mobile arm (17) (see detail in Fig. 16); use the hand-wheel (12) to completely open the mobile arm.
- Place the drill on the track at the point to be drilled and **clamp it by tightening the handwheel fully down (12)**: the positioning template will automatically position the cutter or drill bit in line with the designated axis; if precise positioning is necessary to the longitudinal track axis, use the reference pin (18).
- For rapid drill release, simply back-off the hand-wheel (12) by approximately two complete turns, and while supporting the drill by its grip (09), pull the hand-wheel towards you. The threaded bush (39) will disengage the seat (A) in the mobile arm (17) which will open automatically, freeing the drill.

In this way, the operator can rapidly remove the machine from the track in case of danger, or move on to drill another hole.

Thus, the next track engagement operation will be considerably simplified:

after positioning the drill at the point to be drilled, simply push the hand-wheel forward so that the threaded bush engages the seat (A) of the mobile arm. Now, a few turns on the hand-wheel will be sufficient to engage the drill correctly on the track.

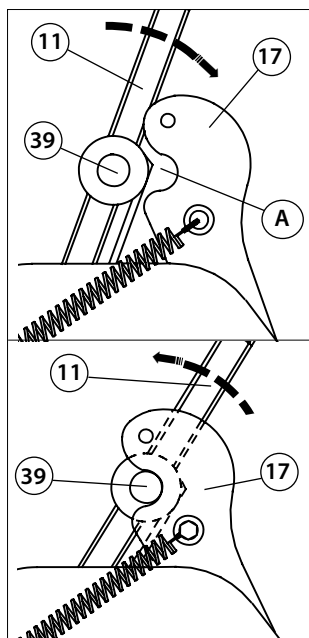
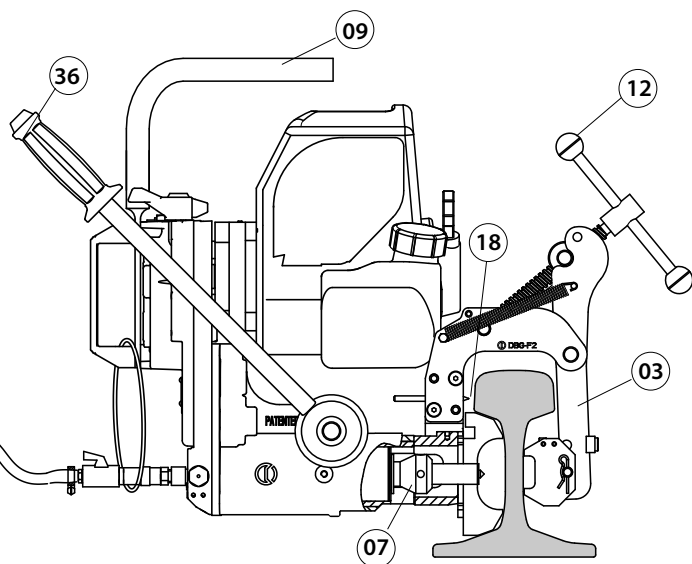


FIG. 16 – POSITIONING THE DRILL

8. DRILLING



Check engine oil level before operation (see § 13.2.4).

Switch on the cooling system before starting the drill (see § 4).

8.1) Drill fitted with “short” type broach cutter (for drilling thicknesses of up to 25 mm).

The drilling sequence may be started with the drill fitted with the broach cutter (§ 6.1), clamping end piece (§ 7.1), positioning template (§ 7.3), the drill being clamped to the rail (§ 7.4), as follows:

8.1.1) Connect the female quick-coupling of the **SR5000 coolant unit** to the **male coupling** (35) on the drill.

8.1.2) Open the tap (02) fitted on the coolant unit hose.

8.1.3) Using the lever (36) bring the guide bit almost in contact with the rail (Fig. 17a); keeping the release pawl (39) pressed, release the lever from its cup and return it to the initial position (Fig. 17b), which will enable the travel of the lever (36) to be used in the most advantageous way.

Fig. 17a

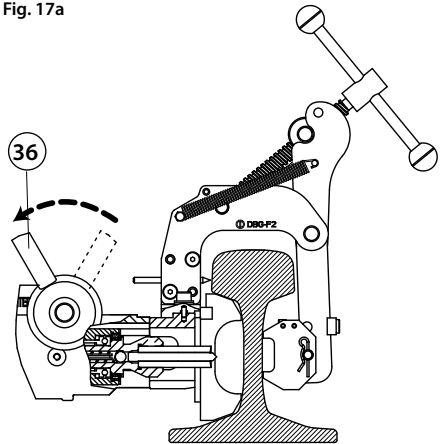


FIG. 17 – DRILLING

Fig. 17b

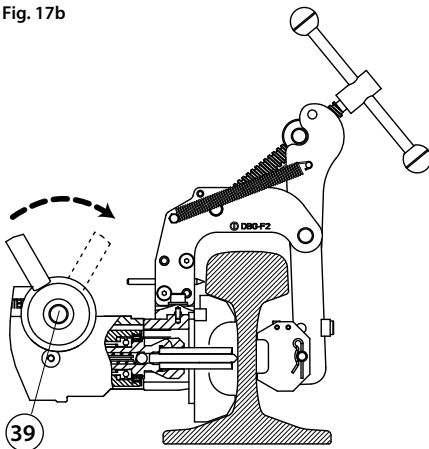
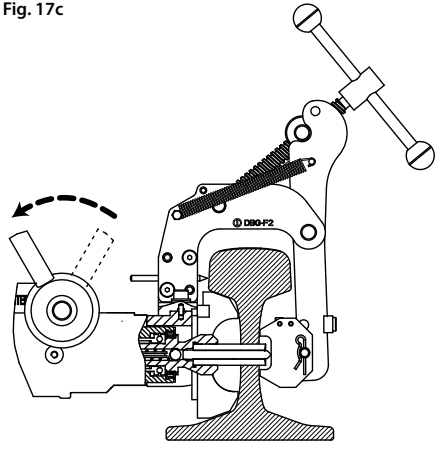


Fig. 17c



- 8.1.4) Start the engine, following instructions § 11.
- 8.1.5) Proceed to drill by initially applying light pressure on the lever (36), increasing the pressure progressively, avoiding jolts, and finally relieving the pressure in the exit phase. When drilling close to raised markings on the rail the initial pressure must be extremely light until the markings disappear, otherwise the cutter may be damaged.
- 8.1.6) The guide bit will enable the lubrocoolant to be discharged throughout the drilling process.
- 8.1.7) When drilling has been completed, fully retract the spindle, **stop the motor by pressing the switch to "OFF" position**, and make sure that drilling swarf is removed before recommencing drilling.
- 8.1.8) After drilling it is advisable to remove with the brush all swarf from the broach cutter or spiral bit and spindle area.

8.2) Drill fitted with "long" type broach cutter (for drilling thicknesses of up to 50 mm).

Follow the sequence described in § 8.1, taking care to position the drill on the rail by keeping the spindle fully withdrawn.

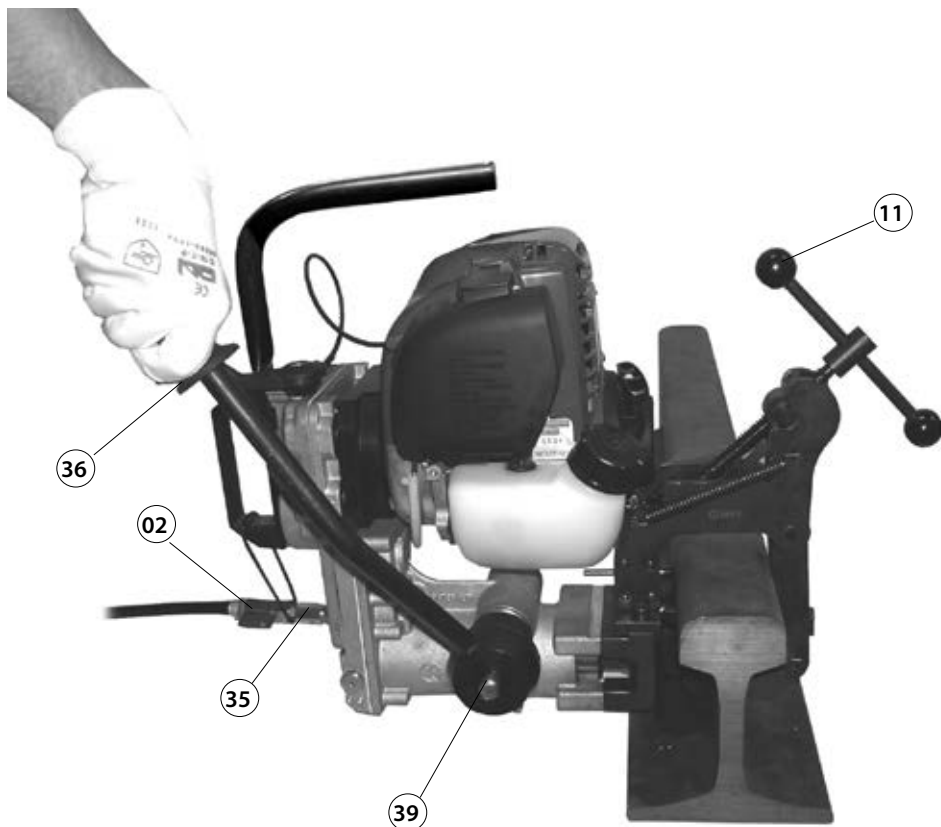


FIG. 18 – DRILLING

Approach

*Start drilling
with discharge of
lubrocoolant*

Drilling

*Finish drilling
with removal of swarf and
switching off of
lubrocoolant*

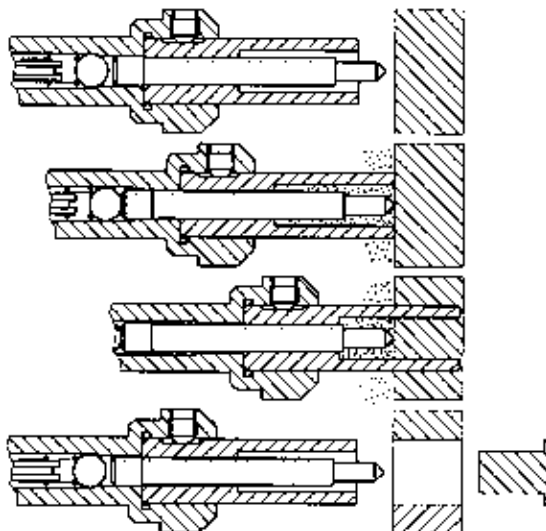


FIG. 19 – COOLANT DRILLING WITH BROACH CUTTER

8.3) Drill fitted with special spiral bit

Follow the sequence described in § 8.1, taking care to position the drill on the rail by keeping the **spindle fully withdrawn**. Bear in mind that the coolant circuit, instead of being automatically opened and closed by the guide bit, is kept open at all times by the **DPE spacer** fitted on the spigot of the spiral bit; it must therefore be activated, by opening the tap (02), before starting to drill, then switched off after drilling by closing the tap.

FIG. 20a
PE 70 - PE 165 spiral bits
(drilling diameters from 7 to 16,5 mm)

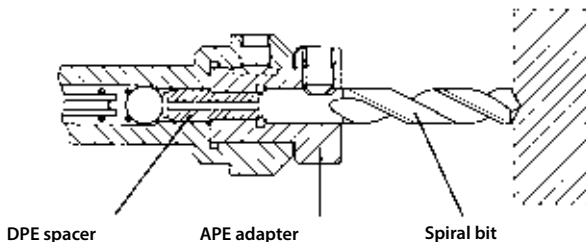


FIG. 20b
PE 170 - PE 275 spiral bits
(drilling diameters from 17 to 27,5 mm)

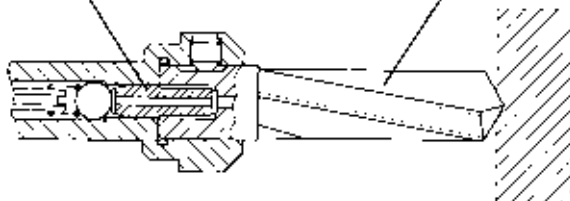


FIG. 20 – COOLING DRILLING WITH SPIRAL BIT

9. SPA... POSITIONING PLATE

9.1) Instruction for drilling close to rail heads

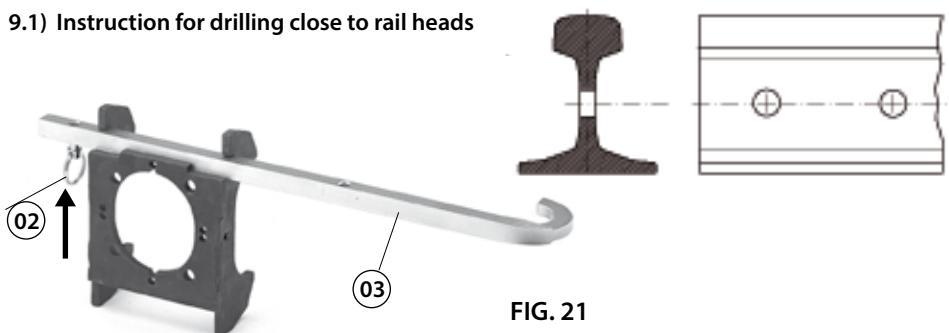


FIG. 21

- 9.1.1) Fit the **MPAF...** positioning template corresponding to the rail to be drilled (see § 7.3).
- 9.1.2) Insert the **SPA...** positioning plate (03) relating to the rail to be drilled in the appropriate housing (see Fig. 21).
- 9.1.3) Insert the locking pin (02) in one of the two holes of the positioning plate.
- 9.1.4) With the spindle fully withdrawn, position the drill close to the rail head without clamping it.
- 9.1.5) Slide the drill so that:
 - the curved end of the **SPA...** positioning plate is flush against the rail head.
 - the **MPAF...** positioning template is flush against the locking bolt (02).
- 9.1.6) Clamp the drill in this position by tightening the handwheel fully, and commence drilling (see § 8.1).
- 9.1.7) To drill the second hole in the rail, repeat operations 9.1.5 - 6 with the locking pin (02) inserted in the second hole of the **SPA...** positioning plate.

For clarity the drill is not shown in the figures

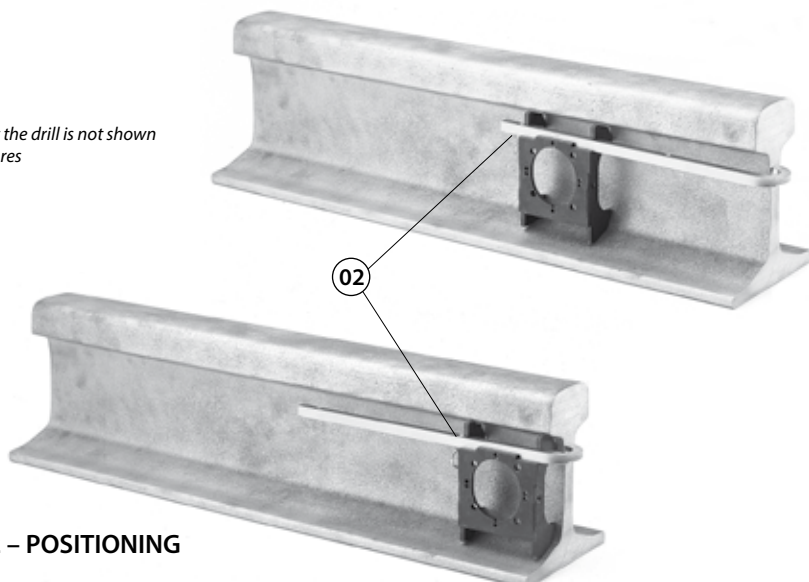


FIG. 22 – POSITIONING

9.2) Drilling in line with rail heads (Ref. to Figs. 23-24)

- 9.2.1)** Fit the **MPAF...** positioning template corresponding to the rail to be drilled (see § 7.3 or 9.1).
- 9.2.2)** Fit the **MRF** clamp on the head of the rail, keeping it in contact with the rail head at the reference point of the drilling centres. Lock it in position with the lever. The lever is provided with a return pushbutton for moving in any direction after locking (See Fig. 23).
- 9.2.3)** Insert the **SPA...** positioning plate so that the curved part is facing upwards.
- 9.2.4)** Insert the locking pin (02) in one of the two holes of the connection plate.
- 9.2.5)** With the spindle fully withdrawn, position the drill close to the **MRF** clamp, without locking the spindle.
- 9.2.6)** Slide the drill so that:
- **the curved end of the SPA... plate is flush against the MRF clamp on the side identifying the reference point for distances.**
 - **the MPAF... positioning template is flush against the locking bolt (02)** (see Fig. 24).
- 9.2.7)** Clamp the drill in this position by tightening the handwheel fully, and commence drilling (see § 8.1).
- 9.2.8)** To drill the second hole in the rail, repeat operations 9.2.6 - 7 with the locking pin (02) inserted in the second hole of the SPA... plate.



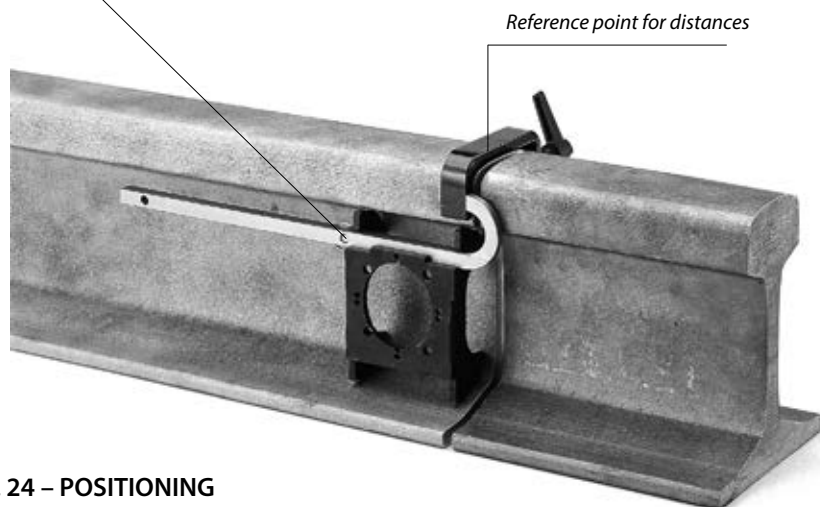
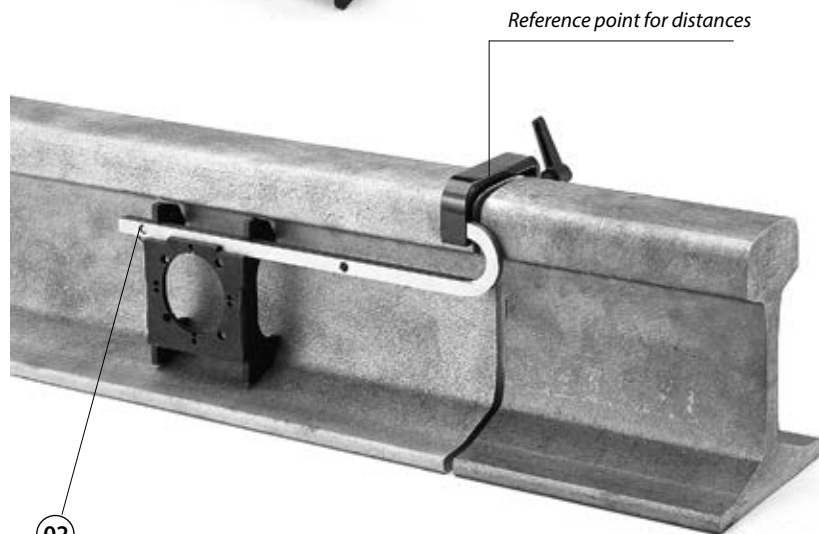
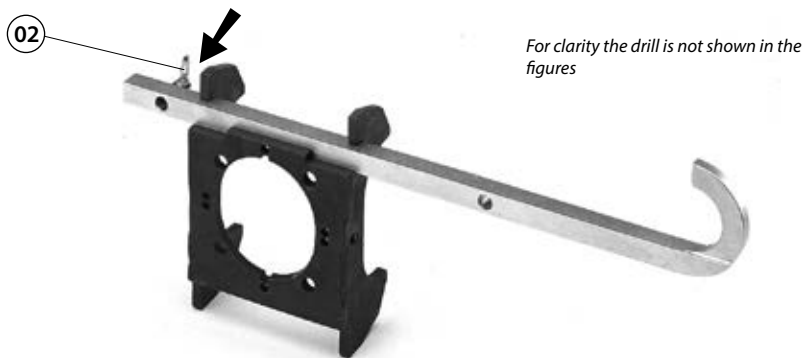






FIG. 24 – POSITIONING

10. CHECK FUEL

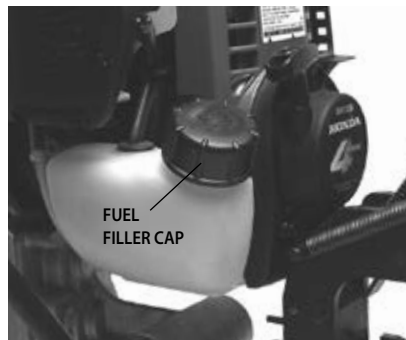
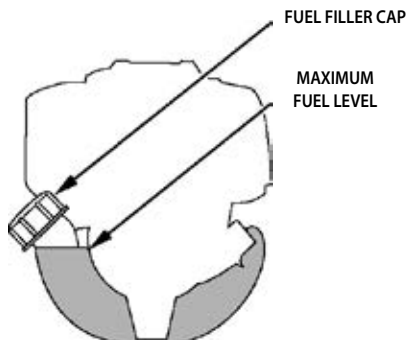
WARNING

	<ul style="list-style-type: none"> - Petrol is extremely flammable and explosive. - DO NOT SMOKE. - Refuel in a well ventilated area away from flame or sparks. - Stop engine and allow it to cool before refueling.
	<p>When handling petrol:</p> <ul style="list-style-type: none"> - Risk of intoxication, avoid inhalation of petrol vapours. - Risk of irritation, avoid prolonged and repeated contact with skin. - Exhaust gas contains carbon monoxide, an odourless and deadly poison. - Do not run engine in an enclosed area.
	<ul style="list-style-type: none"> - To avoid a serious burn, do not touch a hot engine or exhaust. - The engine becomes hot during operation.
	<ul style="list-style-type: none"> - To avoid an electric shock, do not touch spark plug, plug cap or spark plug lead during engine running.

The LD-41P drilling machine features a 4-stroke petrol engine **run on unleaded regular grade petrol only**. Pump octane rating 86 or higher.

For refuel proceed as follow:

- Check the fuel level by looking through the translucent fuel tank.
- Stop the engine and open the fuel cap, if the engine has been running, allow it to cool.
- Refill fuel to the upper level.
- Do not overfill with fuel.
- When filling the fuel tank, always use the fuel filter.
- Wipe off any spilled fuel before starting the engine.




11. STARTING THE ENGINE

Before starting the engine, ensure that:

- the spindle shaft is fully retracted.
- the accelerator control lever is positioned at the low speed position "0".

11.1) Set the engine "ON/OFF" switch to the "ON" position (Fig. a).


11.2) Set the choke lever to the CLOSED  position; when engine is warm or in the case of high ambient temperatures, this lever may require setting to the OPEN position (Fig. b).

11.3) Keeping the accelerator control lever at the low speed position, press the priming bulb repeatedly until fuel can be seen in the clear-plastic fuel-return tube (Fig. c).

11.4) Pull the starter grip lightly until resistance is felt, then pull briskly (Fig. d). Return the starter grip gently.

Do not pull the rope out all the way.

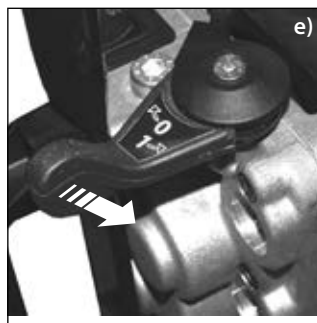
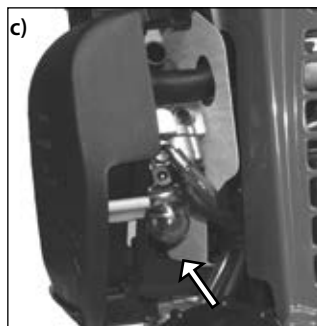
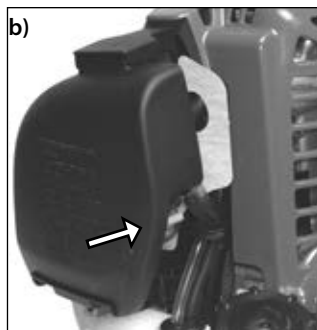
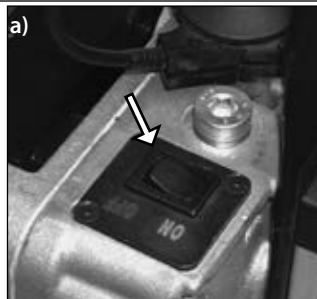
Do not allow the starter grip to snap back against the engine, return it gently to prevent damage to the starter.

11.5) If the choke lever was moved to the CLOSED  position to start the engine, gradually move it to the OPEN position as the engine warms up (Fig. e).

11.6) Keep the engine "warming up" for at least 3 minutes before starting any actual drilling.

11.7) To stop the engine, set the accelerator lever at the low speed position and allow the engine to run at low speed for 2 or 3 minutes before stopping. Set the "ON/OFF" switch to the "OFF" position.

NOTE: the engine will perform at its optimum after a "running-in" period of approximately 200 drilling operations.



12. STORING THE DRILL

When work has been completed, put away the drill by proceeding as follows:

- 12.1) Depressurise the tank of the **SR5000** cooling unit (see § 4), close the tap (02) on the tube from the tank, and disconnect the quick-coupling (03).
- 12.2) Carefully clean the drill, particularly in the spindle area, removing machining waste (swarf, etc.) and any deposits of lubricating coolant.
- 12.3) Fully withdraw the spindle.
- 12.4) Place the drill and the **SR5000** cooling unit in a sealed place free from dust, moisture and the risk of accidental impact.

For better protection **Cembre** recommends the use of the **VAL P24** plastic case or **VAL P24-CS** (variant with folding handle and wheels, see Fig. 24a) designed for this purpose (see § 3.2). The DBG-F2 moving arm device allows the drill to be housed and locked in the case. Suitable housings are also provided in the plastic case for containing the most commonly used accessories.

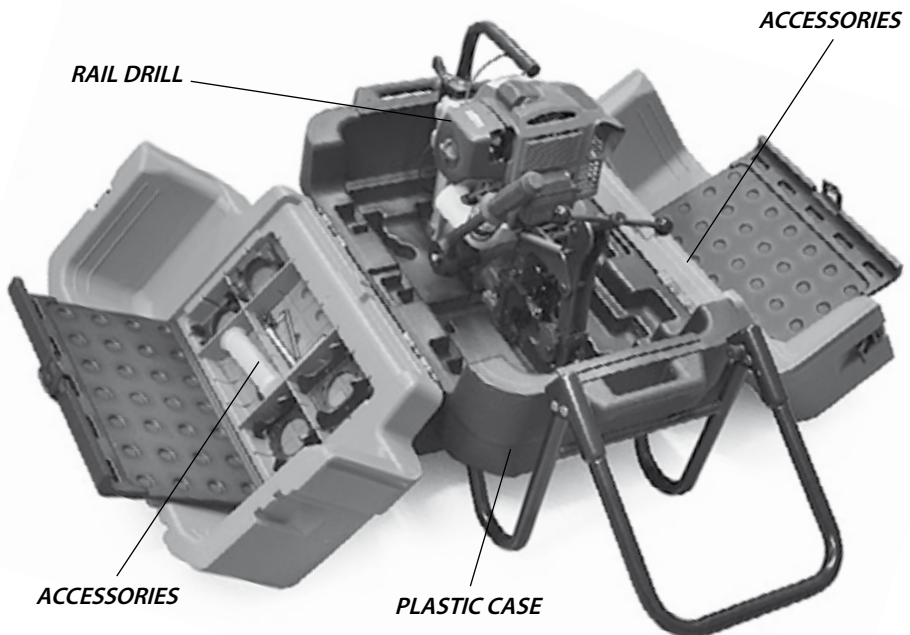


FIG. 24a VAL P24-CS STORAGE PLASTIC CASE

13. MAINTENANCE



**Before you service or remove parts, stop the engine and allow it to cool.
Always remove the spark plug cap from spark plug when servicing the engine
to prevent accidental starting.**

After the first 10 operating hours, proceed with sump oil change, as follows:

(Ref. to Figs. 25 and 25a)

- Remove the cap with the magnetic insert (28).
- Remove the oil filler cap (07).
- Make sure that all the oil comes out by tilting slightly the drilling machine in order to make the operation easier.
- Clean the cap (28) (see § 13.1.2).
- Reassemble the cap.
- Fill the oil sump to the level indicator (see § 13.1.1) using the oil supplied with the drilling machine; it will be necessary to use about 100 ml oil.
- Replace the oil filler cap (07).

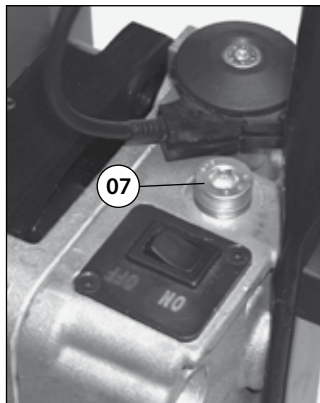


FIG. 25

**Ensure that disposal of used oil is
in accordance with current legislation.**

13.1) ORDINARY MAINTENANCE OF THE DRILL

Every 20 hours of operation

13.1.1) **Topping up oil** (Ref. to Figs. 25 and 25a)

With the drill switched off and placed on a flat surface, check the oil level in the crankcase by looking through the transparent inspection cover (19).

The level must be approximately half way up the cover; if the level is low, top up the oil by unscrewing the cap (07) at the top of the crankcase and adding the quantity of oil required.

Only use the oil grade recommended in § 1.

Never use regenerated or used oil.

The oil must be clean.

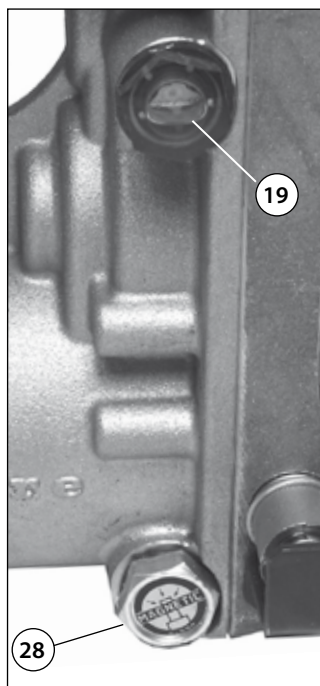


FIG. 25a

13.1.2) Removal of metal residues from the crankcase

When the drill is positioned as shown in Fig. 26 unscrew the cap with magnetic insert (28) on which any metal residues present in the oil will have collected. Carefully clean the magnetic insert with a clean cloth and screw it back into the appropriate housing.

FIG. 26 – REMOVAL OF METAL RESIDUES



Every 50 hours of operating

13.1.3) Checking of screws.

- Check and re-tighten all screws where necessary.

13.1.4) Lubrication (Ref. to Figs. 33 and 34)

- Lubricate the spindle support housing by means of the appropriate lubricator (25), the screw of the **DBG-F2** clamping device.

13.1.5) Cleaning of coolant filter (Ref. to Fig. 27)

The coolant system of the drilling machine is provided with anti-impurity filter; should a decrease of the flow of the lubrocoolant be noticed, it may be necessary to clean it in the following way:

- Using a 14 mm key, unscrew the coupling (02).
- Extract the filter and clean it carefully.
- Reassemble the filter into the coupling (02) as shown in the Fig. 27, fully tighten the coupling.

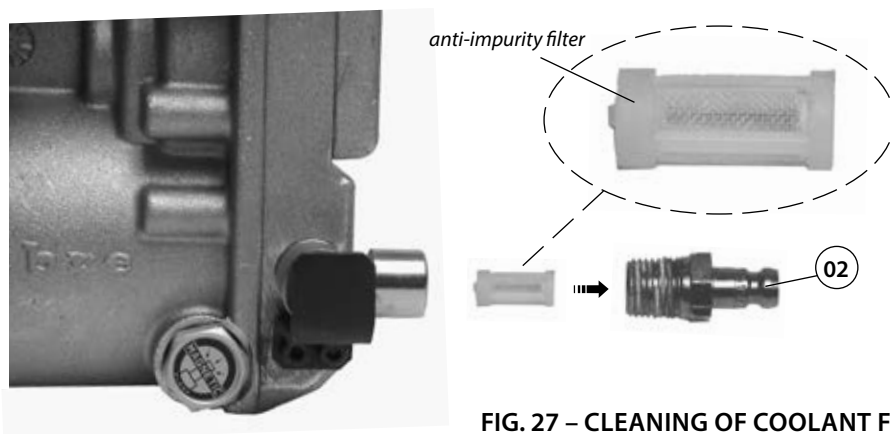


FIG. 27 – CLEANING OF COOLANT FILTER

13.2) ORDINARY MAINTENANCE OF THE COMBUSTION ENGINE

Every 100 hours of operation

13.2.1) Fuel filter cleaning (Ref. to Fig. 28)

- Check that the engine oil filler cap is tightened securely.
- Remove the fuel filler cap, and drain the fuel into an approved gasoline container by tipping the engine toward the fuel filler neck.
- Pull the fuel filter out through the fuel filler neck by hooking the black fuel tube with a piece of wire, such as a partly straightened paper clip.
- Inspect the fuel filter. If the fuel filter is dirty, wash it gently with nonflammable or high flash point solvent. If the fuel filter is excessively dirty, replace it.
- Remove water and dirt from inside the fuel tank by rinsing it out with non-flammable or high flash point solvent.
- Insert the fuel filter into the fuel tank and tighten the fuel filler cap securely.

Improper use of solvents can result in fire or explosion.

Every 3 months or 25 hours of operation

13.2.2) Air filter cleaning (Ref. to Fig. 29)

- Press the latch tab (A) on the top of the air cleaner cover and remove the cover.
- Clean the filter element in warm soapy water, rinse and allow to dry thoroughly, or clean in non flammable solvent and allow to dry.
- Dip the filter element in clean engine oil, then squeeze out all excess oil.
- Wipe dirt from the air cleaner body and cover, using a moist rag. Be careful to prevent dirt from entering the carburettor.
- Reinstall the filter element and air cleaner cover. Always replace damaged filter elements.

Operating in dusty condition may require more frequent maintenance than above.

Do not operate the engine with air filter removed.

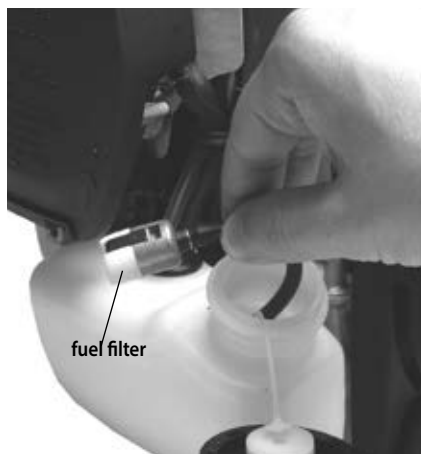


FIG. 28 – FUEL FILTER CLEANING

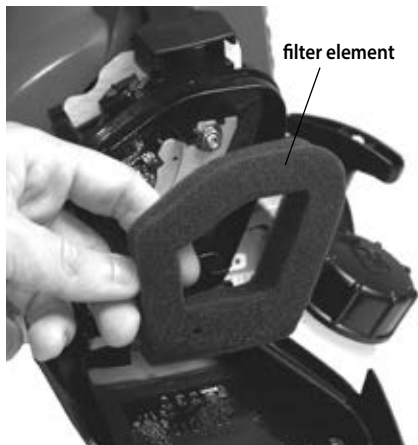


FIG. 29 – AIR FILTER CLEANING

13.2.3) Spark plug cleaning (Ref. to Fig. 30)

- Using a 4 mm allen key remove the fixing screw on the top of the red cover.
- Disconnect the spark plug wire lead and remove the spark plug with the key supplied.
Inspect the spark plug. Replace it if damaged or badly fouled, if the sealing washer is in poor condition, or if the electrode is worn. Measure the spark plug electrode gap, correct the gap if necessary by carefully bending the side electrode.
The gap should be: 0.60-0.70 mm (0.024-0.028 in).
- Install the spark plug carefully, by hand, to avoid crossthreading.
- When installing a new spark plug, tighten 1/2 turn with the key to compress the washer.
When reinstalling the original spark plug, tighten 1/8-1/4 turn with the key to compress the washer.
A loose spark plug can overheat and damage the engine. Overtightening the spark plug can damage the threads in the cylinder head.
- Attach the spark plug cap to the spark plug.
Install the top cover, and tighten the fixing screw.
- In case of plug replacement, use type **NGK CM5H**, **CMR5H** or equivalents.

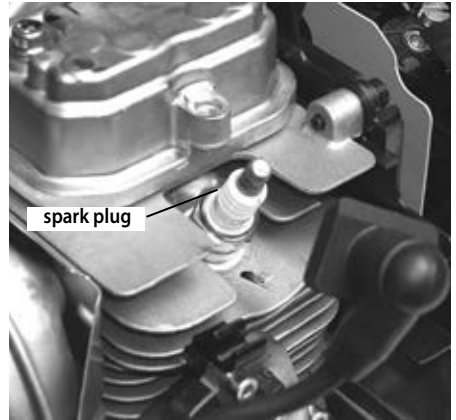


FIG. 30 – SPARK PLUG CLEANING

13.2.4) Check engine oil (each use) (Ref. to Fig. 31)

Before checking or refilling engine oil, be sure the machine is located on a stable, level surface and stopped.

- Remove the oil filler cap/dipstick and wipe it clean.
- Insert the oil filler cap/dipstick without screwing it into the oil filler neck, then remove it to check the oil level shown on the dipstick.
If the oil level is near or below the lower limit mark on the dipstick, fill to the bottom edge of the oil fill hole with the recommended oil (see § 1).
- Change oil if it is contaminated.
- Wipe off any spilled oil before starting the engine.
- Reinstall the oil filler cap/dipstick and tighten securely.

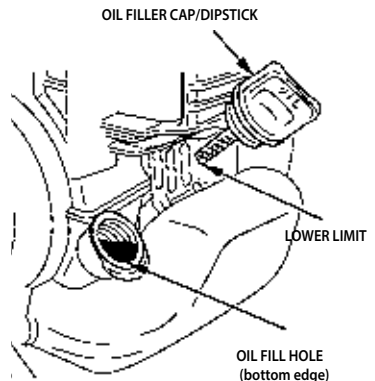
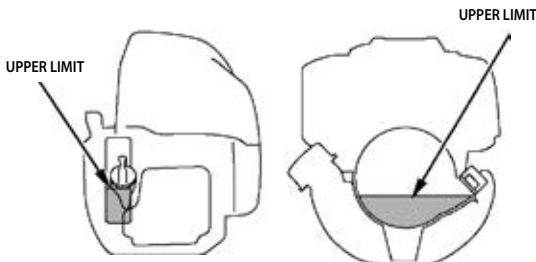


FIG. 31 – CHECK ENGINE OIL

13.2.5) Engine oil change (Ref. to Figs. 31 and 32)

**Initial oil change: first month or after 10 hours of operation.
Thereafter: every 6 months or 50 hours of operation.**

- Drain the used oil when the engine is warm. Warm oil drains quickly and completely.
- Check that the fuel filler cap is tightened securely.
- Place a suitable container below the engine to catch the used oil.
- Remove the oil filler cap/dipstick and drain the oil into the container by tipping the machine toward the oil filler neck.
Some oil will remain in the engine after draining, when refilling with fresh oil, start with less than 80 ml (2.7 US oz).
- With the engine in a level position, fill to the bottom edge of the oil fill hole (Ref. to Fig. 31 and 32) with the recommended oil (see § 1).
- MAX OIL CAPACITY: 100 ml.

**Always use the best grade and clean oil.
Contaminated oil, poor quality oil and shortage of oil
cause damage to engine or shorten the engine life.**



*Ensure that disposal of used oil is in
accordance with current legislation.*

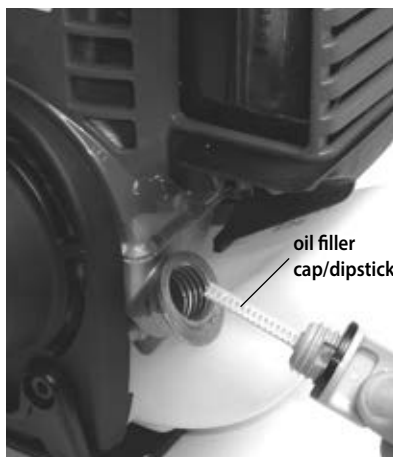


FIG. 32 – ENGINE OIL CHANGE

13.2.6) Checking of screws

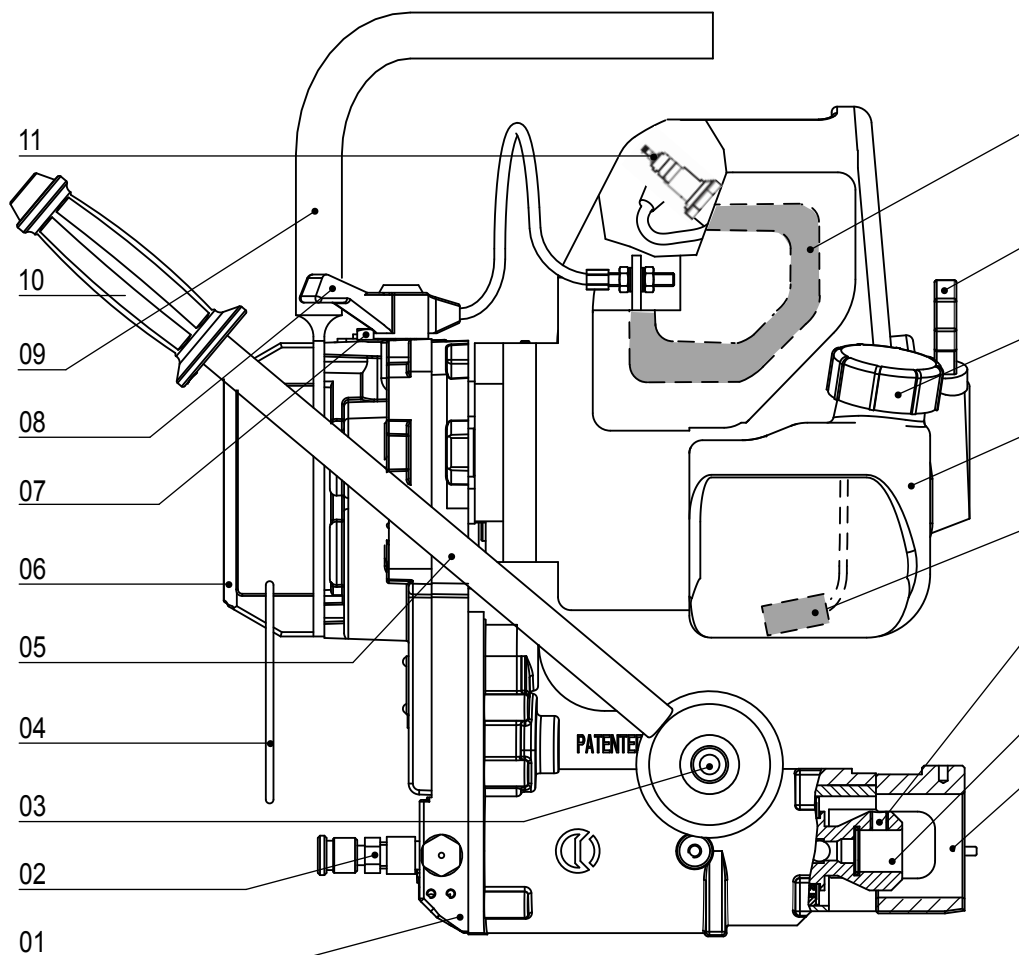
- Check and re-tighten all screws where necessary.

13.3) SPECIAL MAINTENANCE OF THE DRILL

The special maintenance operations require the intervention of qualified personnel only, please contact **Cembre** (See § 15).

13.3.1) Storing the drilling machine for long periods

- Completely empty the fuel tank.
- Start the engine and let it run until it stops, so that all fuel is exhausted from the machine.
- Remove the spark plug.
- Pour 3-5 cm³ of oil into the cylinder.
- Repeatedly pull gently on the starting rope so that dispersion of oil in the cylinder is achieved and reinstall the spark plug.
- Using a clean cloth soaked with motor oil, clean all metal parts of the machine.
- Store the drilling machine in its appropriate case or in a dry environment protecting it against accidental damage and dust.

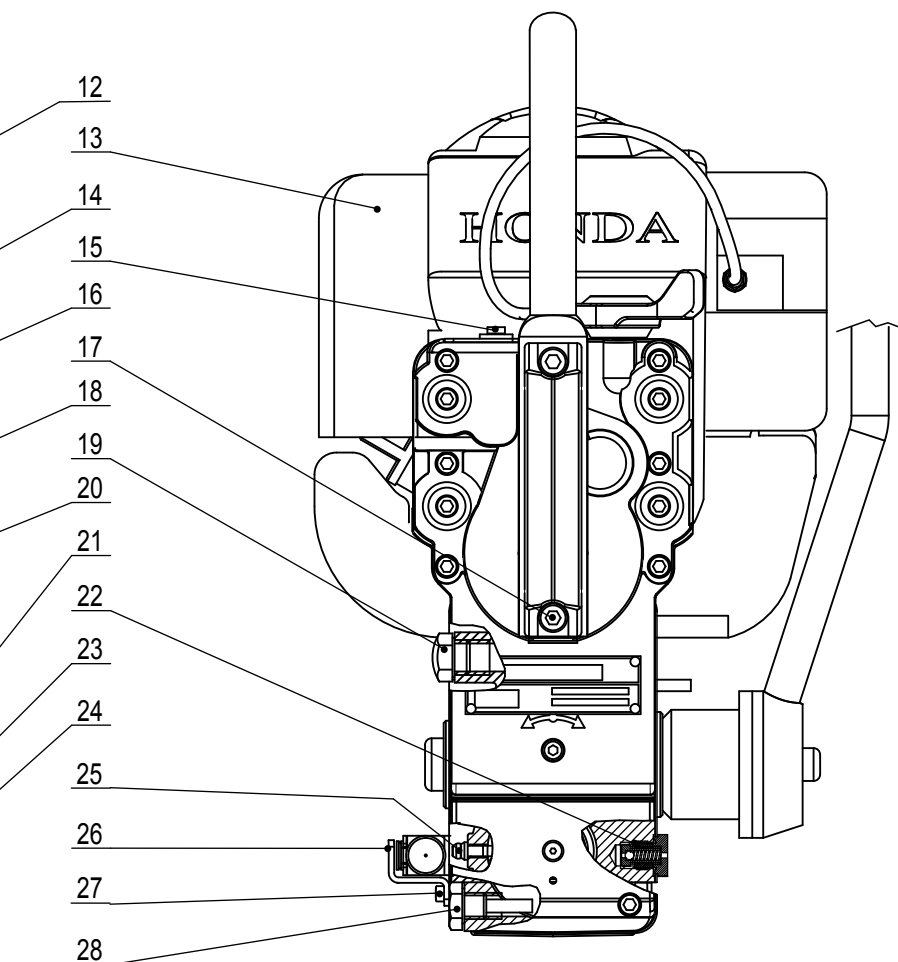


Guarantee conditions cease upon usage of non original spare parts.

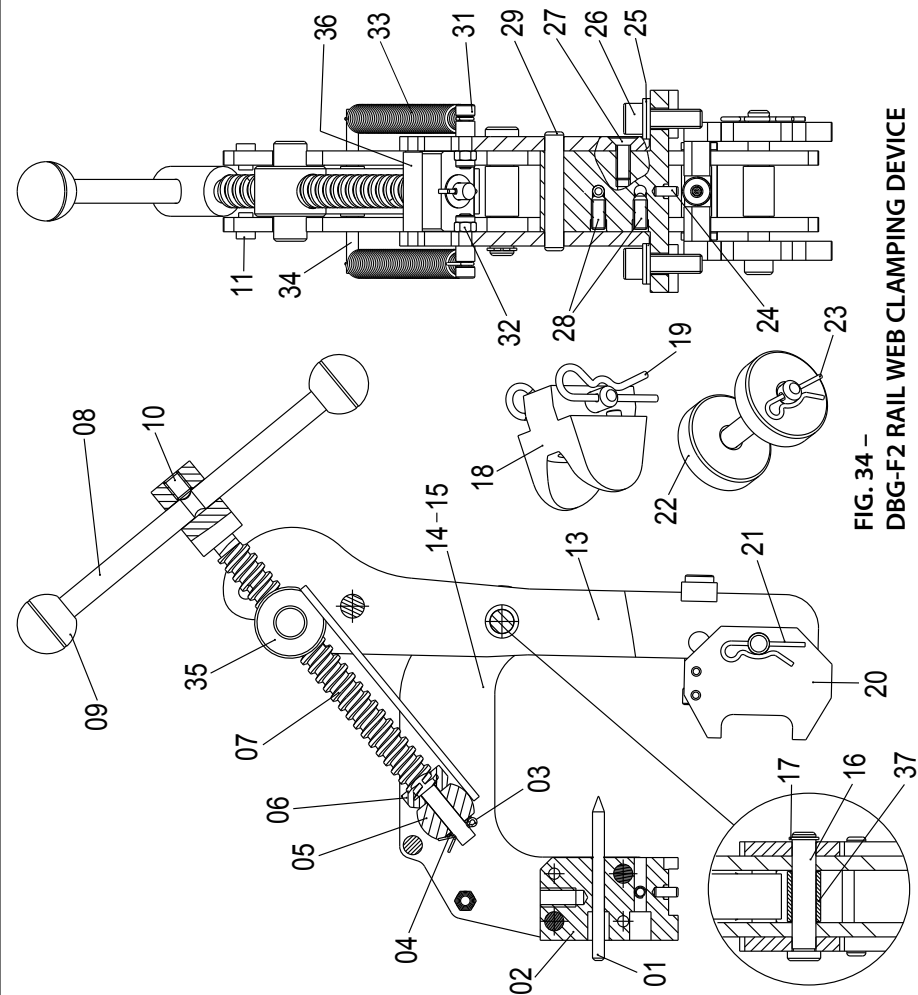
When ordering spare parts always give the following information:

- spare part code
- spare part description
- drilling machine model
- drilling machine serial number

FIG. 33 – LD-41PN DRILL ASSEMBLY



6001209	28	Magnetic cap	1	-	14	Starting handgrip	1
6900060	27	M 4x8 screw	2	-	13	Engine	1
6001731	26	Cooling connection guard	1	6003476	12	Air filter element	1
6001198	25	Lubricator	1	-	11	Spark plug	1
6002607	24	Front plate	1	6380330	10	Handle	1
6002602	23	Drilling spindle	1	6002613	09	Complete handgrip	1
6001397	22	Complete air valve	1	6001166	08	Accelerator lever	1
6340160	21	M 8 x 10 grub screw	1	6003034	07	Cap	1
-	20	Fuel filter	1	6490050	06	Carriage handle	1
6001195	19	Level gauge	1	6001940	05	Spindle advancing lever	1
-	18	Fuel tank	1	6360480	04	O-ring	1
6900346	17	Handle Screw	2	6001176	03	Lever release pawl	1
-	16	Fuel tank cap	1	6001428	02	Complete cooling connection	1
6001211	15	ON/OFF Switch	1	6001489	01	Body	1
Code N°	Item	Description	Qty	Code N°	Item	Description	Qty



**FIG. 34 –
DBG-F2 RAIL WEB CLAMPING DEVICE**

Code N°	Item	Description	Qty
6001155	37	Spacer	1
6002871	36	Stop pin	1
6001762	35	Complete bush	1
6001768	34	Spring support spacer	1
6001769	33	Spring	2
6180201	32	M5 self-locking nut	2
6001776	31	Pin	2
6760378	29	ø 8x50 cylindrical pin	2
6340612	28	M 5 ball dowel	2
6900314	27	M 6x18 screw	4
6900348	26	M 8x25 screw	2
6650144	25	ø 8 elastic washer	4
6760222	24	ø 4x10 cylindrical pin	1
6140082	23	ø 1.8x35 split pin	2
6001138	22	TDB1 end piece	1
6140082	21	ø 1.8x35 split pin	1
6001775	20	TDB6 end piece	1
6140080	19	Split pin	2
6001137	18	TDB3 end piece	1
6040421	17	ø 10 circlip	1
6001156	16	Pin	1
6001907	15	Left support shoulder	1
6001906	14	Right support shoulder	1
6001757	13	Blocking side plate	2
6001772	11	Pin	2
6340160	10	M 8x10 grub screw	1
6380310	09	Handgrip	2
6001150	08	Hand-wheel	1
6001151	07	Blocking screw	1
6001659	06	Spacer	1
6001152	05	Bush	1
6520422	04	Cup spring	1
6140085	03	ø 2.5x15 split pin	1
6001145	02	Blocking support	1
6001281	01	Reference rod	1

14. WARNINGS

- 14.1) Regularly check for correct tightening (torque) of the fixing screws of the drilling tools and positioning templates.
- 14.2) Avoid pressure jolts on the advancing lever during drilling.
- 14.3) Always make sure that the drilling swarf is properly removed before starting to drill a new hole.
- 14.4) Incomplete clamping of the drill on the rail to be drilled may lead to the breakage or accelerated wear of the drilling tool and damage to the spindle shaft bearings.
- 14.5) If it is necessary to operate the drill without the cutter inserted, remove the locking grub screws from the spindle shaft.
- 14.6) Avoid leaving the **SR5000** tank under pressure and exposed to sunlight for long periods of time.
- 14.7) Should the **DBG-F2** clamping device be removed, make sure that by reassembling it, the two locking screws are firmly fastened.

15. RETURN TO Cembre FOR OVERHAUL

In the case of a breakdown, contact our **Area Agent** who will advise you on the problem and give you the necessary instructions on how to dispatch the drill to our **nearest service Centre**; if possible, attach a copy of the Test Certificate supplied by **Cembre** together with the drill or, if no other references are available, indicate the approximate purchase date and the drill serial number.

APPENDIX "A"

Factors which influence the number of holes that can be made according to the tool used:

- **Hardness of the material to be drilled.**
- **Thickness to be drilled.**
- **Stability of the drill clamping** and correct assembly of the drilling tool.
- **Suitable lubrocooling (lubrication/cooling)** to keep the temperature of the tool low so as not to compromise the efficiency of the cutting edges, whilst at the same time facilitating the removal of the swarf.
- **Contact time of the cutting edges of the tool with the material to be drilled;** bear in mind that the faster the hole is made, the greater the efficiency.
- **Observance of these basic rules:**
 - 1) **Commence drilling by exerting light pressure on the advancing lever, progressively increasing and then relaxing it when the tool is in the exit phase.**
 - 2) **Avoid pressure surges and advance according to the diameter of the drilling diameter, to avoid scratching the material or damaging the cutting edges of the tool.**
 - 3) **Remember that a tool with efficient cutting edges requires a lower application pressure than one that has already made a certain number of holes.**
 - 4) **When holes are made close to raised lettering on the rails, commence drilling with very light pressure until the lettering disappears, to avoid possible breakage of the tool.**
 - 5) **Bear in mind that when operating on very hard rails, as in the case of quality 1100 steel, it is advisable to increase the lubrocoolant flow rate.**

**Cembre S.p.A.**

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