Cembre

CERTIFIED ISO 9001 Certified Quality Management System

CERTIFIED ISO 14001 Certified Environmental Management System

CERTIFIED OHSAS 18001 Certified Occupational Health&Safety Management System

RAIL DRILL

LD-16B - LD-16BA - LD-16BE - LD-16BT

CE

GO4GREEN

ENGLISH

OPERATION AND MAINTENANCE MANUAL

16 M 187 E

INDEX **page**

⚠ ATTENTION

- Before using the rail drill, carefully read the instructions contained in this manual.
  SAVE THESE INSTRUCTIONS: this manual contains important safety and operating instructions for the rail drill.

- Do not use the rail drill for purposes other than those intended by **Cembre**.

- Never use a rail drill that is faulty, has been tampered with or which has been modified from its original form.

- Always remove the battery when servicing the drill, before performing any work in the area of the spindle e.g removing cutting tools (broach cutters, spiral bits) assembling positioning templates, maintenance or cleaning.

- When operating, stand in a stable, secure position and grip the drill firmly.
  Be sure to work in good light conditions or with sufficient artificial lighting.
  During drilling keep your hands outside the danger area.
  Always wear protective glasses and working gloves.
  Avoid wearing clothes which may present a risk to personal safety.

- The degree of protection of the drilling machine against moisture is classified “ordinary" (EN 50144-1 Standard).
  Do not expose the drill to rain and moisture; any water ingress may damage the electric motor, circuit board and battery.

- Batteries are supplied with a charge ≤ 30%.
  To maximise energy level, it is necessary to fully recharge them before use.


Protect the batteries from humidity!
Do not expose the batteries to fire!


At the end of their life, always recycle batteries.
Never discard batteries with domestic waste.
They must be sent to appropriate collection centres for disposal.

Do not use defective or deformed batteries! DANGER OF EXPLOSION OR FIRE!
Do not open batteries!
Do not touch or short-circuit the battery contacts!
A slightly acidic and flammable liquid may leak from defective Lithium batteries!
If this liquid comes into contact with skin, rinse immediately and thoroughly with water.
If the liquid from the battery comes into contact with the eyes, rinse with clean water and seek medical advice immediately.

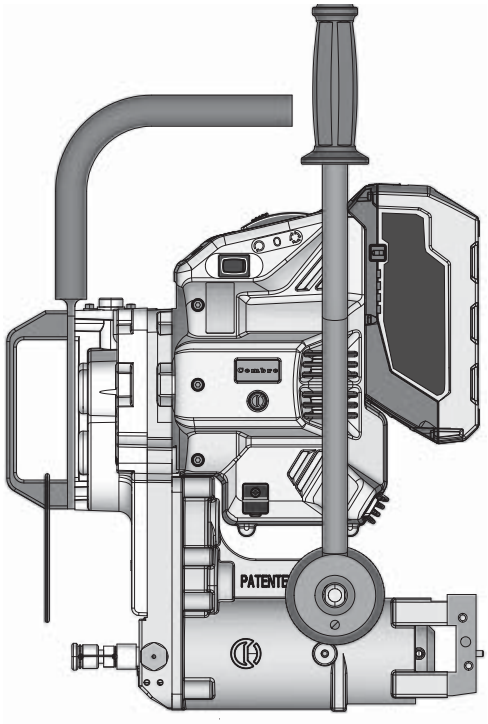
- Following information applies in member states of the European Union:

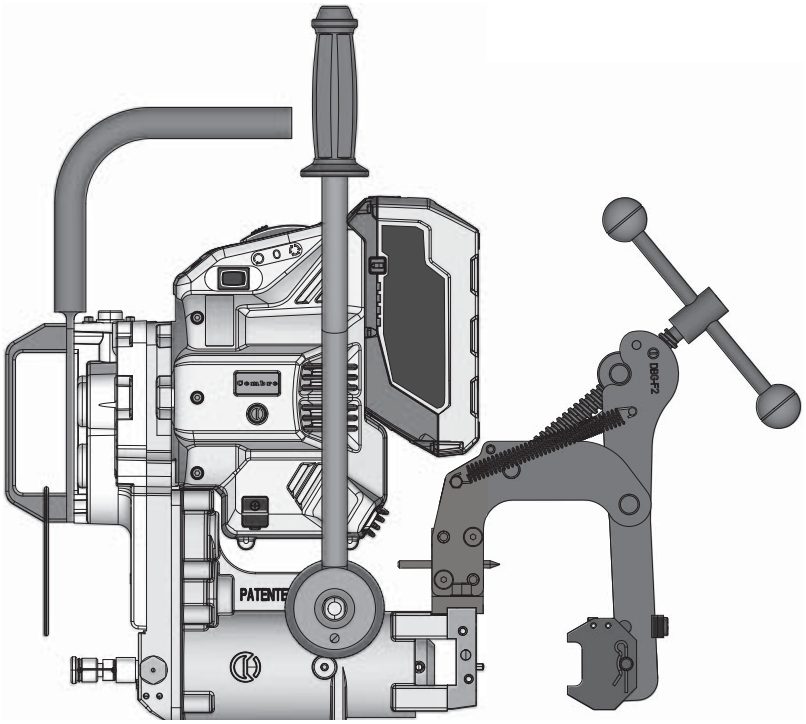
USER INFORMATION in accordance with "Directives 2011/65/EU e 2012/19/EU regarding the reduction of hazardous substances in electrical and electronic equipment, including the disposal of waste".

The 'Not in the bin' symbol above when shown on equipment or packaging means that the equipment must, at the end of its life, be disposed of separately from other waste.
The separate waste collection of such equipment is organised and managed by the manufacturer. Users wishing to dispose of such equipment must contact the manufacturer and follow the prescribed guidelines for its separate collection.
Appropriate waste separation, collection, environmentally compatible treatment and disposal is intended to reduce harmful environmental effects and promote the reuse and recycling of materials contained in the equipment.
Unlawful disposal of such equipment will be subject to the application of administrative sanctions provided by current legislation.

Definitions:

LD-16BN LD-16BNA
LD-16BNE LD-16BNT
(drill without railweb clamping device)

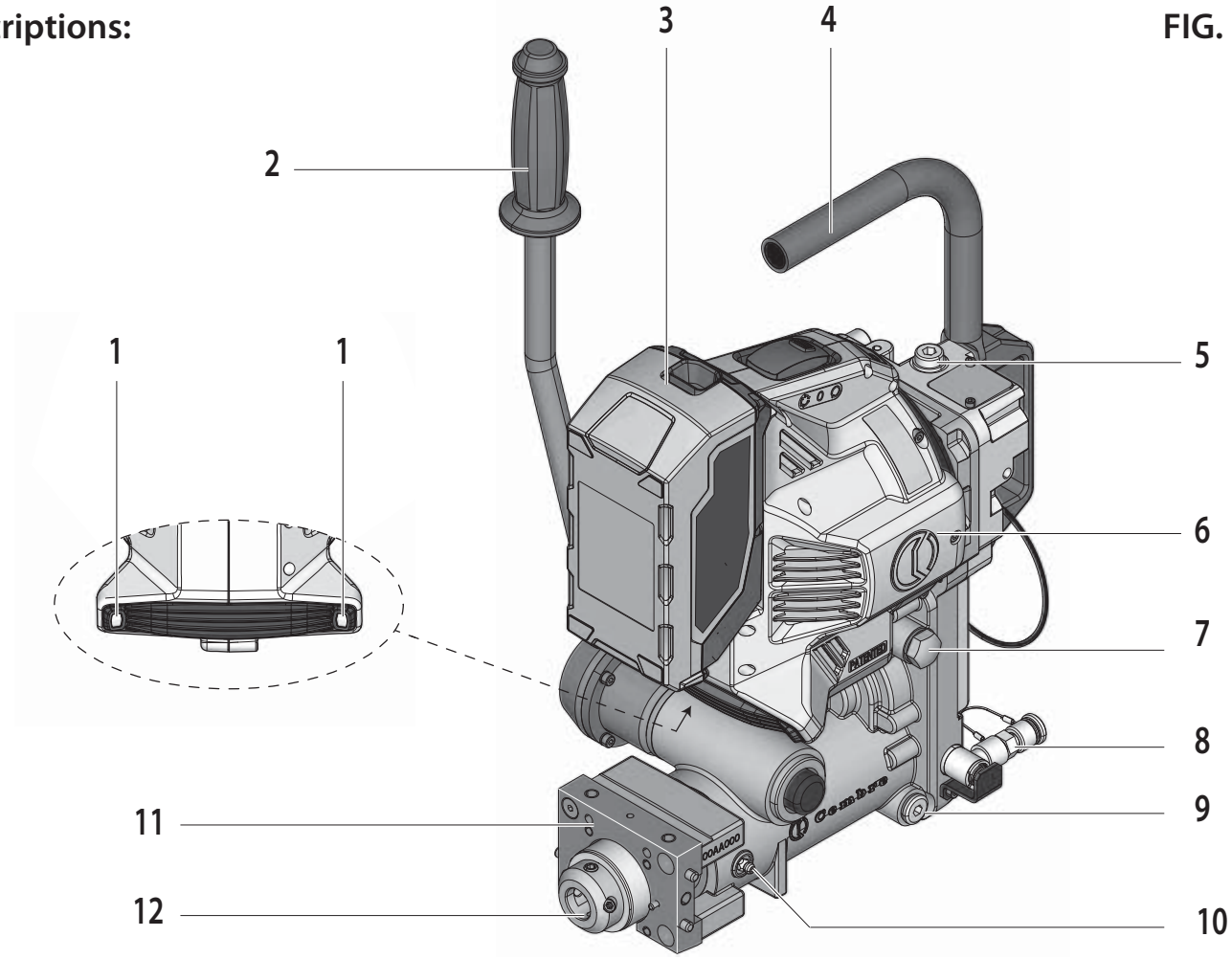


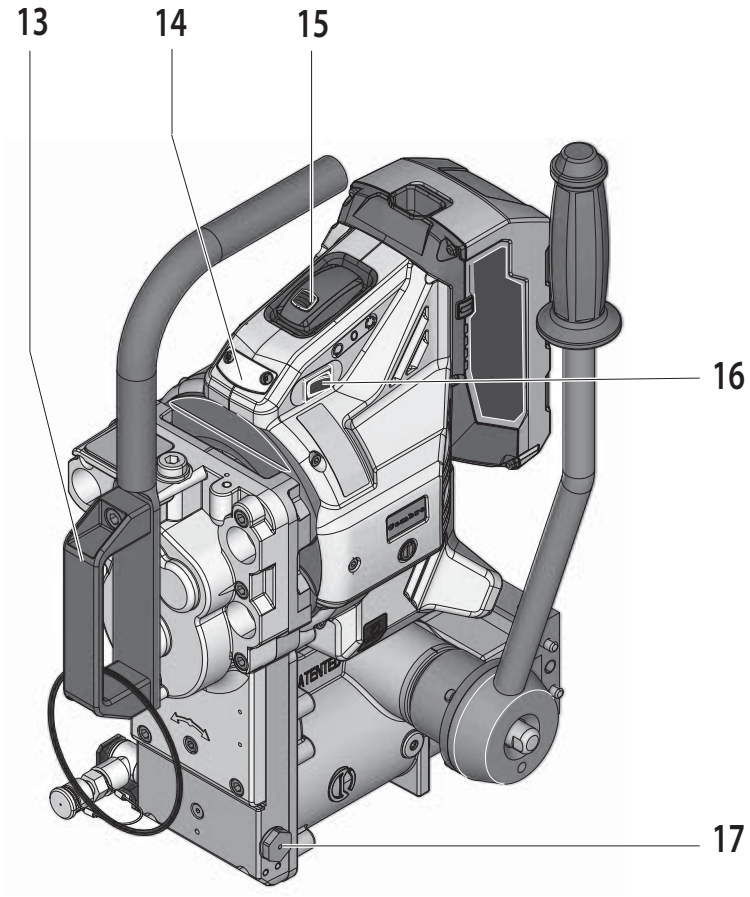


LD-16B LD-16BA
LD-16BE LD-16BT
(drill complete with
DBG-F2 railweb clamping device)

Descriptions:

FIG. 1





1	Powerful LED worklights
2	Spindle advance lever
3	Battery 36V Li-Ion
4	Trasport handle
5	Oil filler cap
6	36V DC motor unit
7	Oil level indicator
8	Coolant connection
9	Cap with magnetic insert
10	Lubricator for spindle shaft
11	Front plate for assembling templates
12	Spindle shaft
13	Support handgrip
14	LED indicator
15	Motor ON / OFF switch (EMERGENCY)
16	LED worklights ON / OFF switch
17	Air valve

1. GENERAL CHARACTERISTICS

		LD-16B	LD-16BE	LD-16BT	LD-16BA
Rated drilling capacity	Ø mm (inch)	7 ➞ 33 (9/32) ➞ (1 5/16) 7 ➞13 (9/32) ➞ (1/2) with **Cembre** PE range spiral bits 13 ➞ 33 (1/2) ➞ (1 5/16) with **Cembre** CY range broach cutters			
Max drilling thickness	mm (inch)	50 (2)			
Rated no load speed n_0 (spindle)	min^{-1}	260			
Brushless electric motor	V ⎓	36			
Degree of protection (motor-battery)		IP 20			
Weight (drilling machine only)	kg (lbs)	13,7 (30.1)			
Weight (with DBG-F2 and battery)	kg (lbs)	18,5 (40.7)			
Dimensions		Ref. to page 38			
Operating temperature	°C (°F)	-20 to +50 (-4 to +122)			
Recommended oil (100 ml) (for gear sump)	type	SHELL SPIRAX S4 TXM SAE 10W-30			
Air Noise [1]	dB	L_{pA} 83,8 (A) L_{pCPeak} 103,9 (C) L_{WA} 90,7 (A)			
Vibrations [2]	m/s^2	1,6 max.			
Rechargeable battery	type	CB3662L (Li-Ion)			
Voltage / Current / Energy	V / Ah / Wh	36 / 6.2 / 223.2			
Weight	kg (lbs)	1.6 (3.5)			
Battery charger ASC ULTRA	type	EU 27265000	UK 27266000	AUS/NZ Ref. to note 3	USA/CAN 627268000
Input	V / Hz (W)	220 - 240 / 50 - 60 (290)			115 / 60 (290)
Output	V ⎓ / A	14.4 - 36 / 6.5 max.			
Weight	kg (lbs)	0.97 (2.1)			

In order to optimise the charge of the battery, the drill is equipped with a timer which disconnects power to the motor when the continuous operating time threshold of 120 s has been exceeded.

[1] Directive 2006/42/EC, annexe 1, point 1.7.4.2 letter u

L_{pA} = *weighted continuous acoustic pressure level equivalent.*

L_{pCPeak} = *maximum value of the weighted acoustic displacement pressure at the work place.*

L_{WA} = *acoustic power level emitted by the machine.*

[2] Directive 2006/42/EC, annexe 1, point 2.2.1.1

Weighted root mean square in frequency of the acceleration the upper limbs are exposed to for each biodynamic reference axis. Tests carried out in compliance with the indications contained in EN ISO 5349-1/2 Standard, and under operating conditions much more severe than those normally found.

(3) Type ASC30-36 27047000: 220 - 240 V 50 - 60 Hz 85 W*(3) Type ASC30-36 27047000:* 220 - 240 V 50 - 60 Hz 85 W

2. ACCESSORIES SUPPLIED WITH THE DRILL

2.1) Guide bits for controlling the coolant system:
for broach cutters suitable for drilling thickness up to 25 mm
PP 1 (1 pc) diameter 7 mm.
PP 2 (1 pc) diameter 8 mm.

for broach cutters suitable for drilling thickness up to 50 mm
PPL 1 (1 pc) diameter 7 mm.
PPL 2 (1 pc) diameter 8 mm.

2.2) Spacer, type DPE, (1 pc) for controlling the coolant system, use with APE adapter for special spiral bits.

2.3) Adapter, type ARE (1 pc) for external coolant connection, use with SR5000 coolant unit.

2.4) Grub screw, M8x10 (1 pc as a spare) for securing broach cutters or spiral bits with Weldon shank on spindle shaft.

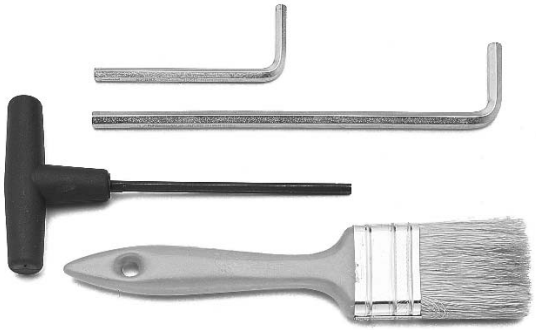
2.5) Transverse threaded pin (1 pc as a spare) for securing broach cutters or spiral bits with push/turn shank on spindle shaft.

2.6) Wing nuts (2 pcs) complete with fixing washer for securing positioning inserts type KPAF to front plate.

2.7) Screws M6x16 (4 pcs) for securing positioning templates to front plate.

2.8) Screws M6x25 (4 pcs) for securing special positioning templates type MPD... & MPR... to front plate.

2.9) Range of tools:
5 mm **Allen key** (1 pc)
6 mm **Allen key** (1 pc)
4 mm **T-handle Allen key** (1 pc)
Brush (1 pc)



2.10) 100 ml oil bottle for gear sump.
Ref. to **§16** for other details.

(Parts **2.1 to 2.10** are included in the **"ACCESSORIES KIT"**, Code **Nr. 6004356**)

2.11) Type SR5000 coolant unit (1 pc)

Provides coolant fluid to the cutter during the drilling operation.
Consists of a tank complete with tube and maximum pressure valve, fitted with a pump device for pressurisation.

2.12) Type CB3662L rechargeable battery (2 pcs)

36 V 6,2 Ah (LiHD Technology) Li-Ion, equipped with LED indicators of the remaining battery life at any time by pressing the button.

2.13) ASC Ultra -fast charger (1 pc)

Differs depending on geographic region.
Use to quickly charge the Li-Ion batteries supplied:

- Minimal current consumption in stand-by mode
- Management of the charging process by means of a processor
- "AIR COOLED" function for quicker cooling of the battery in case of overheating.

2.14) Canvas bag type 032 (1 pc)

Designed to store and protect the batteries and the battery charger.
Can be separated into two parts for easy storage inside the drill case.
Optimal battery storage temperature is between 10°C and 30°C.

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 terminations:

- **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.
- **TDB 6:** standard termination for rails and stock rails.

(*) Already supplied with LD-16B ; LD-16BA ; LD-16BE ; LD-16BT rail drills

TDB 6 TDB 3

TDB 1

TDB 7

3.1.1) DBG-LF2 device

with moving arm complete with **TDB 7** termination for clamping the drill to girder rails and for additional special applications.

3.2) DBSN device

For clamping the drill to flange rails, for use in conjunction with the MPAF templates.
Using this device the rail drill can remain clamped in the drilling position even when trains pass over it.

3.3) VAL P24 plastic carrying case for storing the drill complete with the DBG-F2 and drilling accessoires.
VAL P24-CS wheeled plastic carrying case: VAL P24 with folding handle and wheels.

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

VAL P24-CS

VAL LD-L

3.4) MPAF templates for positioning the drill on rails and stock rails to enable drilling to be carried out according to the provisions of railway boards standards e.g.:

– **MPAF UIC54** on DRILLING AXIS of 54E1 rail

– **MPAF UIC60** on DRILLING AXIS of 60E1 rail

• Contact **Cembre** for selection of other specific application accessories.

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

3.6) KPAF "double-sided" templates with double face, enable drilling on two types of rails with a single kit, simply by turning the two inserts.

• Contact **Cembre** for selection of other specific application accessories.

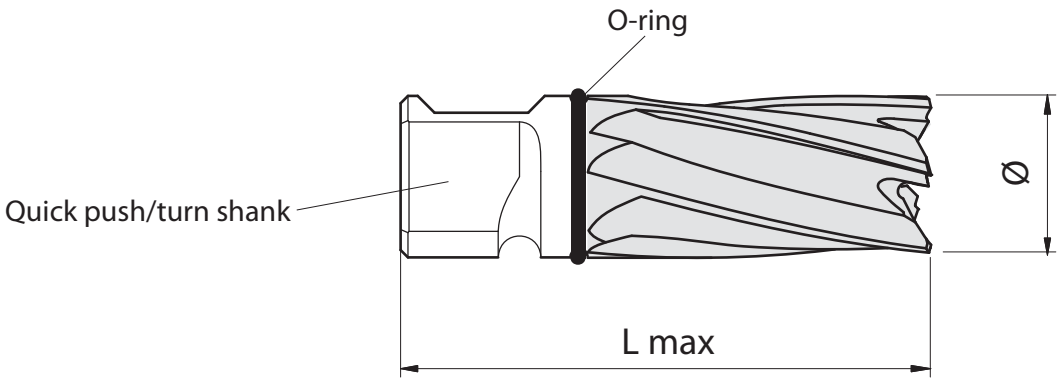
3.7) SPA positioning plates for use in conjunction with MPAF... positioning templates.
For drilling rail heads with a centre-to-centre distance established in the Railway boards standards, without the need for marking out;

• Contact **Cembre** for selection of other specific application accessories.

3.8) 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.

3.9) VAL MPA tool case for storing the accessories indicated in 3.4 - 3.8, and the cutting tools.

3.10) CY range broach cutters (with Quick push/turn shank)

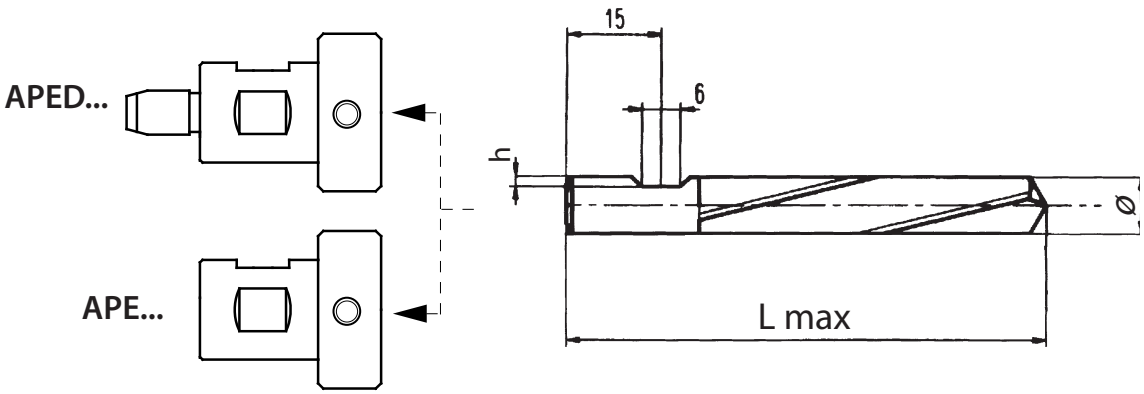


BROACH CUTTERS FOR RAILS IN STEEL QUALITY 700-900-1100 (UIC 860.0)

Ø mm	STANDARD RANGE		LONG RANGE (L max = 88mm)	
	Broach cutter	*Required guide bit*	*Broach cutter*	*Required guide bit*
13	**CY130**	**PP 1**		
13,5	**CY135**			
14			**CY140L**	**PPL 1**
16	**CY160**		**CY160L**	
17	**CY170**	**PP 2**	**CY170L**	**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**	

CY broach cutters allow automatic cooling by means of the SR5000 unit supplied with the drill.
Contact **Cembre** for other types of broach cutters.

3.11) PE range spiral bits and adapters



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

Ø mm	*Spiral Bit*	*L max mm*	*h mm*	*Required adapter*
7	**PE70**	76	1,2	**APED70**
7,1	**PE71**	72		
8	**PE80**	76	1,4	**APED80**
8,5	**PE85**			
9	**PE90**			**APE 90**
9,5	**PE95**			**APE 95**
10	**PE100**			**APE100**
11	**PE110**		1,6	**APE110**
12	**PE120**			**APE120**
13	**PE130AR** (*)			**APED130**

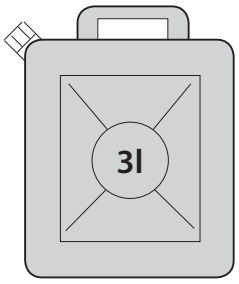
(*) PE... AR: special high quality spiral bit.

- The 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 **thickness up to 45 mm.**

The cutting tools indicated in the tables guarantee optimum results.
For other type of tools, check the dimensional compatibility (particularly the size of the attachment and the length).

3.12) LR2 biodegradable lubrocoolant

3 litre container. For optimum operation of both broach cutters and spiral bits. Fill with water and lubrocoolant in a 5 % solution (4,75 l of water + 0,25 l of lubrocoolant).



3.13) LR3 antifreeze concentrate

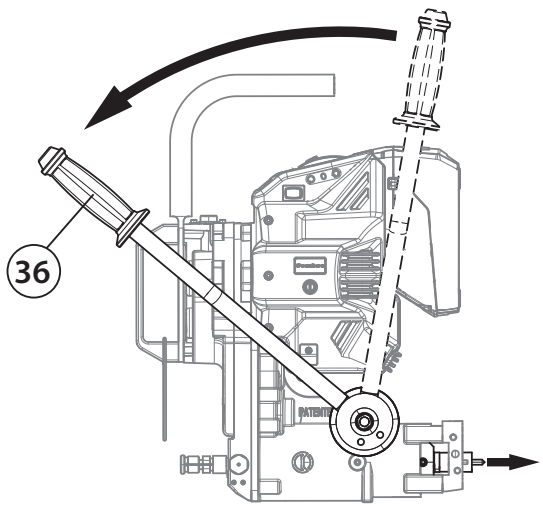
3 litre container. Added to the lubrocoolant mixture in the right concentration will maintain its fluidity fluid in minus temperatures.

4. SPINDLE ADVANCE LEVER

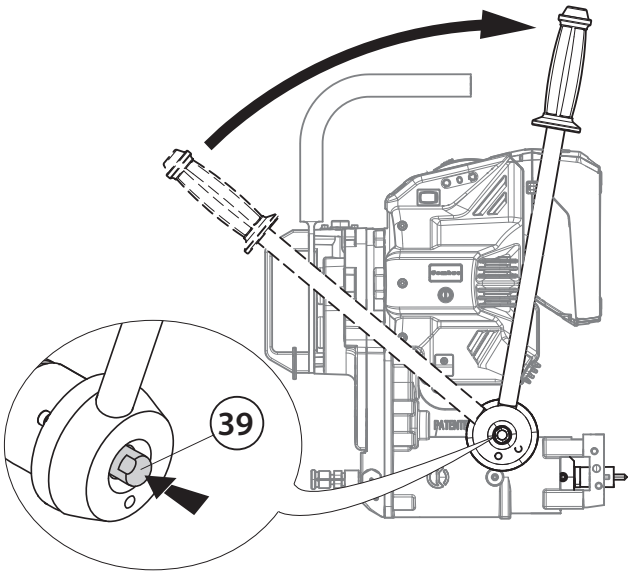
The spindle is advanced by moving the lever (36) (Ref. to Fig. a). The lever is fitted with a release pawl (39) (Ref. to Fig. b). which, when pressed, renders it independent of the hub and hence the spindle;

The operator can therefore:

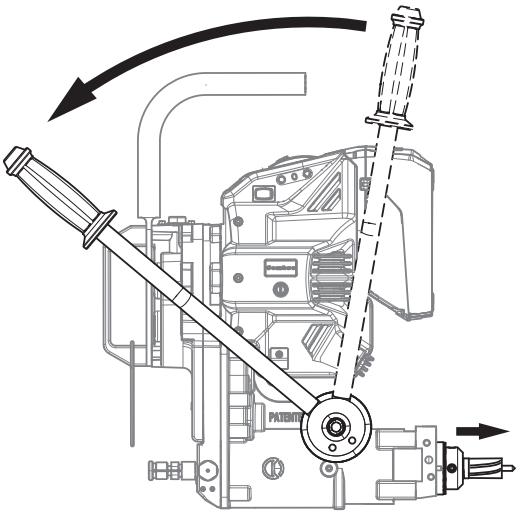
- Easily change the angular position of the lever without movement of the spindle.
- Retrieve the stroke in phase of drilling (Ref. to Fig. c).



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



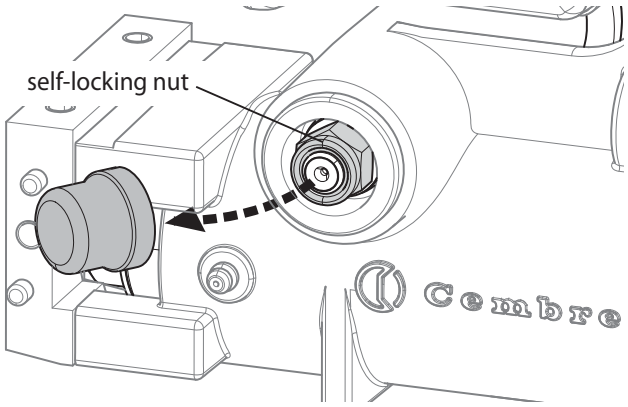
b) - With the release pawl (39) pressed, the lever is released from its hub and can repeat the previous travel without the spindle moving.



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

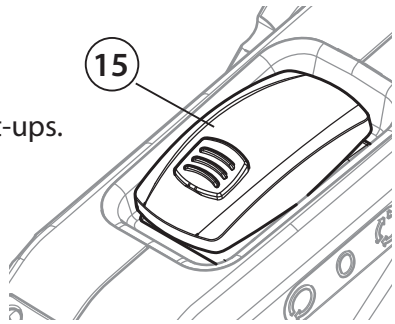
4.1) Adjustment of the advance lever

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.



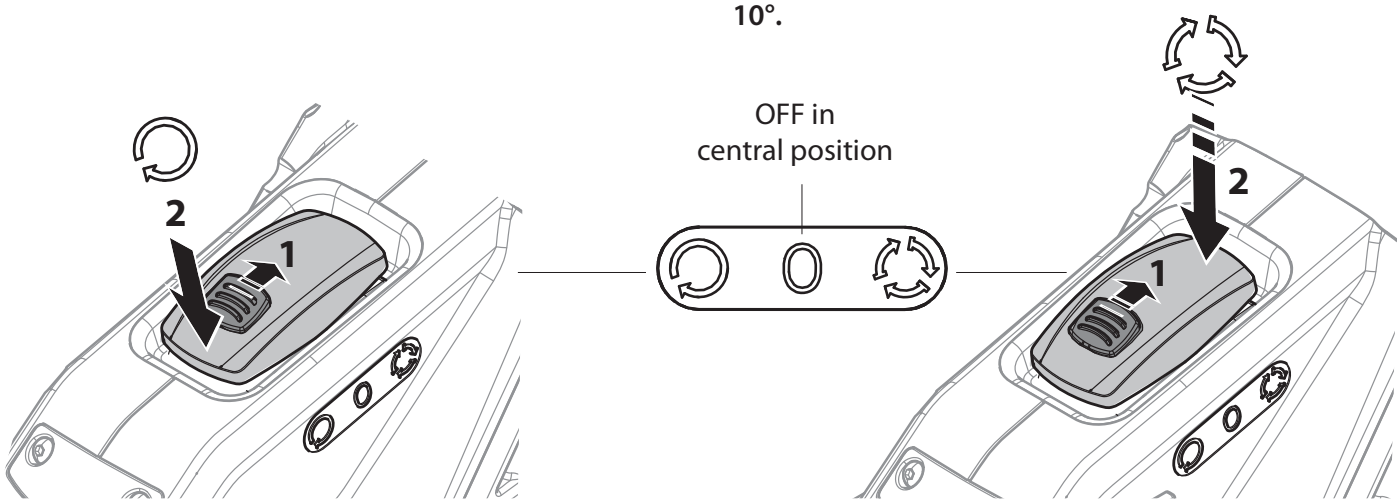
5. MOTOR ON/OFF SWITCH (EMERGENCY)

The motor switch (15) is placed on the motor in an easily visible position and can be rapidly activated in case of emergency.
It is a tilt switch and provided with an interlock device to avoid unintentional start-ups.
The switch has two specific functions:



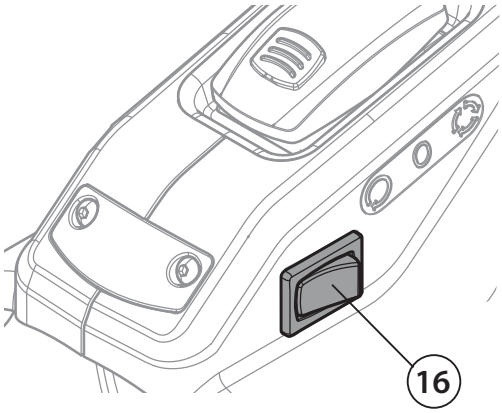
Start / Stop of the drill:
slide the interlock device forward (**1**) and press the switch into operating position (**2**).
To stop the drill, return the switch to its central position (0).

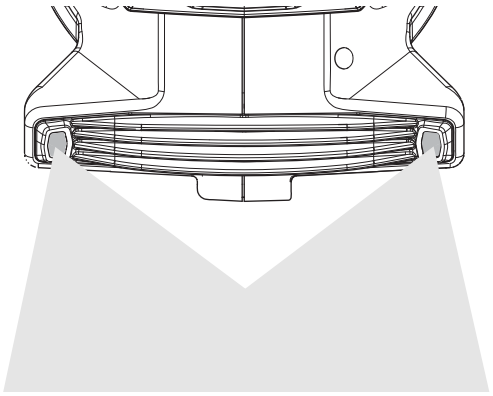
"Indexing" function:
is useful for easy access to the grub screws on the drill spindle.
With one finger, keep the interlock device forward (**1**) and with another repeatedly push the switch down (**2**).
With each press of the switch, the spindle rotates by 10°.



6. LED WORKLIGHTS ON/OFF SWITCH

Two high efficiency LED worklights enable efficient illumination of the drilling area (e.g. in tunnels or outdoors at night).
Use the ON/OFF switch (16) on the side of the motor switch to activate or deactivate the automatic illumination of the lights on the front of the motor.
ON position: the lights turn on automatically at start-up and turn off automatically 20 seconds after the motor is switched off.
OFF position: no automatic illumination, the lights remain off.

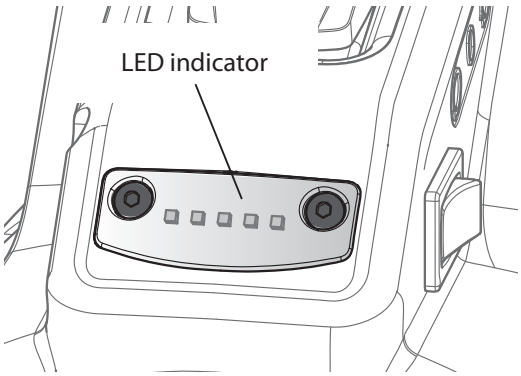




7. LED INDICATOR

The drill features a circuit board that constantly monitors the operating voltage, motor and battery current. This enables optimisation of the electric motor's capability and consequently enables best possible battery life, guaranteeing security and reliability.
An LED indicator is placed in an easily visible position on the motor and has the dual function of:

- **Providing "Drilling Assistance" to the operator (Ref. to § 8).**
- **Indicating any errors or operational anomalies of the machine (Ref. to § 13).**



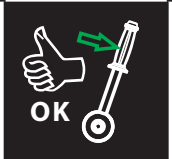
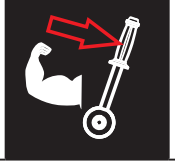
8. "DRILLING ASSISTANCE" FUNCTION

The "drilling assistance" function has been developed and optimised for use with **Cembre** *CY range Broach Cutters (diameter from19 to 32 mm, ref. to § 3.10), on 800 and 900 quality steel rails (UIC 860.0).*
The multiplicity of variables (hardness of the rail, typology and sharpness of the cutting tool in use) does not permit all possible application criteria to be covered.

The "drilling assistance" function is not optimised for cutting tools of other manufacturers.

By responding to the changes in colour of the LED indicators (Ref. to TABLE 1), the operator is able to apply optimum force on the spindle lever so as to obtain the maximum possible output, required to achieve predictable drilling times by standard methods.

TABLE 1 ("Drilling Assistance" with Cembre CY range Broach Cutters, diameter from19 to 32 mm)

LED colour	Force applied to the spindle advance lever		Action
WHITE		INSUFFICIENT Spindle progress too slow	Increase force so as to turn on the GREEN LED
GREEN		**OPTIMUM *** **Correct spindle progress**	**Maintain this progress for the entire drilling process**
RED		EXCESSIVE Spindle progress too fast	Reduce force so as to turn on the GREEN LED

** Normally, using twist drill bits up to Ø 13 mm (Ref. to § 3.11) does not require a force that illuminates the green LED. In such a case, it is however acceptable for the WHITE LED to remain illuminated.*

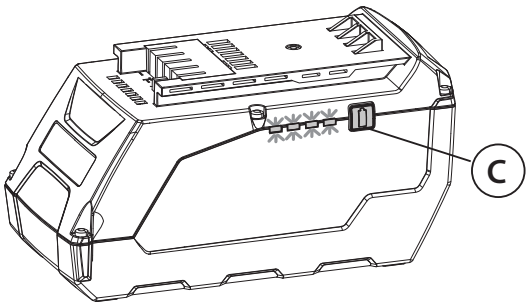
9. RECHARGEABLE BATTERY

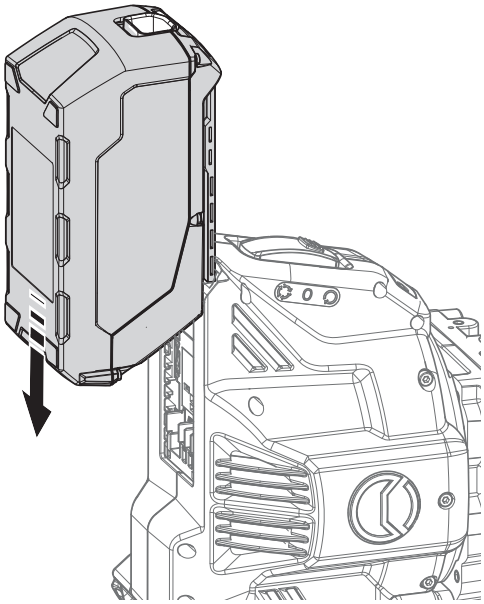
The battery must be always removed from the drill when not in use for extended periods or during transportation.

Batteries are supplied with a charge ≤ 30%. To maximise energy level, it is necessary to fully recharge them before use. Only use the battery charger supplied with the drill.
Charge the battery by following the instructions provided in the battery charger manual, approximately 50-60 minutes are required to charge a fully depleted battery with ASC ULTRA fast charger.

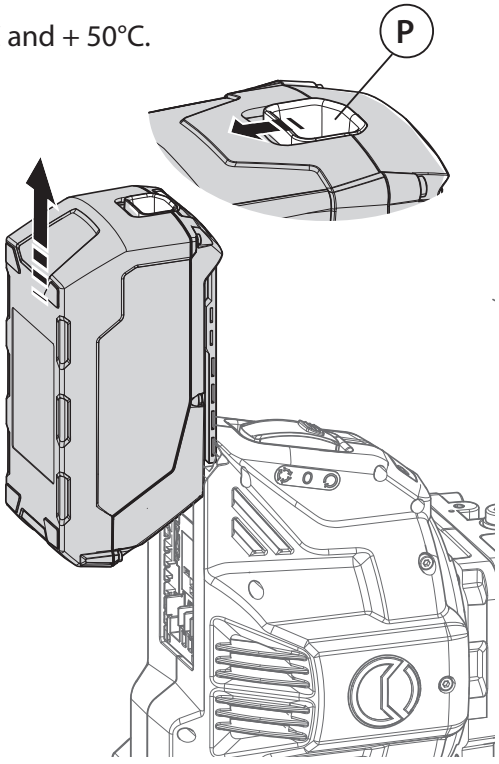
Before inserting the battery, ensure that the Motor switch is in the central OFF position "0": if not, the yellow LED on the indicator will be lit with a subsequent electronic lock of the drill (Ref. to §12) in order to avoid involuntary start-ups. To restore function, remove the battery, move the Motor switch to the OFF "0" position and reinsert the battery.

The battery is equipped with LED indicators that indicate the remaining battery life at any time by pressing the adjacent button (C):
4 LEDs illuminated: fully charged
2 LEDs illuminated: 50 % capacity
1 LED flashing: minimum charge, the battery is almost depleted and needs to be charged. The electronics protect the battery from any damage caused by complete depletion.
Continuous overload causes deactivation due to overheating. In such a case, allow the battery to cool down; if the battery feels hot to the touch, it can be cooled down more quickly by inserting it into the relevant "AIR COOLED" battery charger.
A completely charged battery provides 100% of its energy between -20°C and + 50°C.





▶ **Insertion of the battery:**
slide it down the guides until in place and locked.



▶ **Removal of the battery:**
unlock it by pressing the button (P) and remove it in an upwards direction.

9.1) Using the battery charger

Carefully follow the instructions in the battery charger user manual.

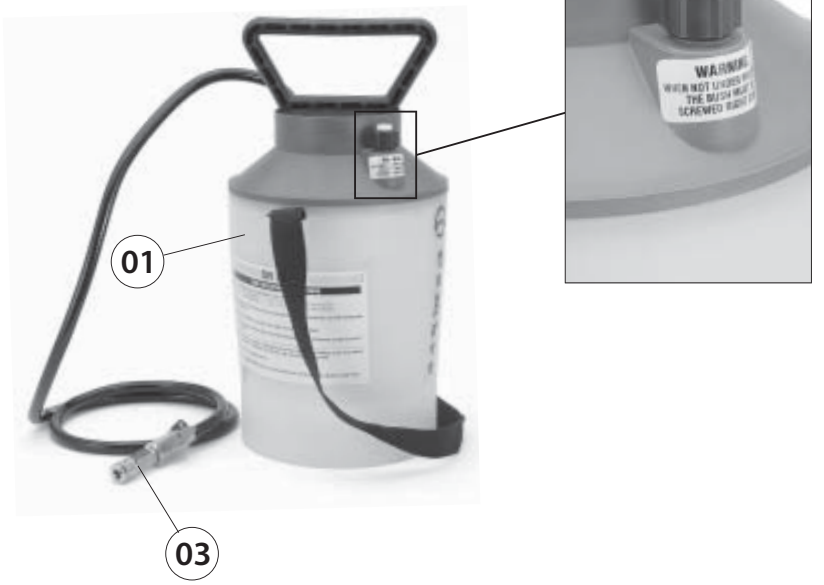
10. SR5000 COOLANT UNIT

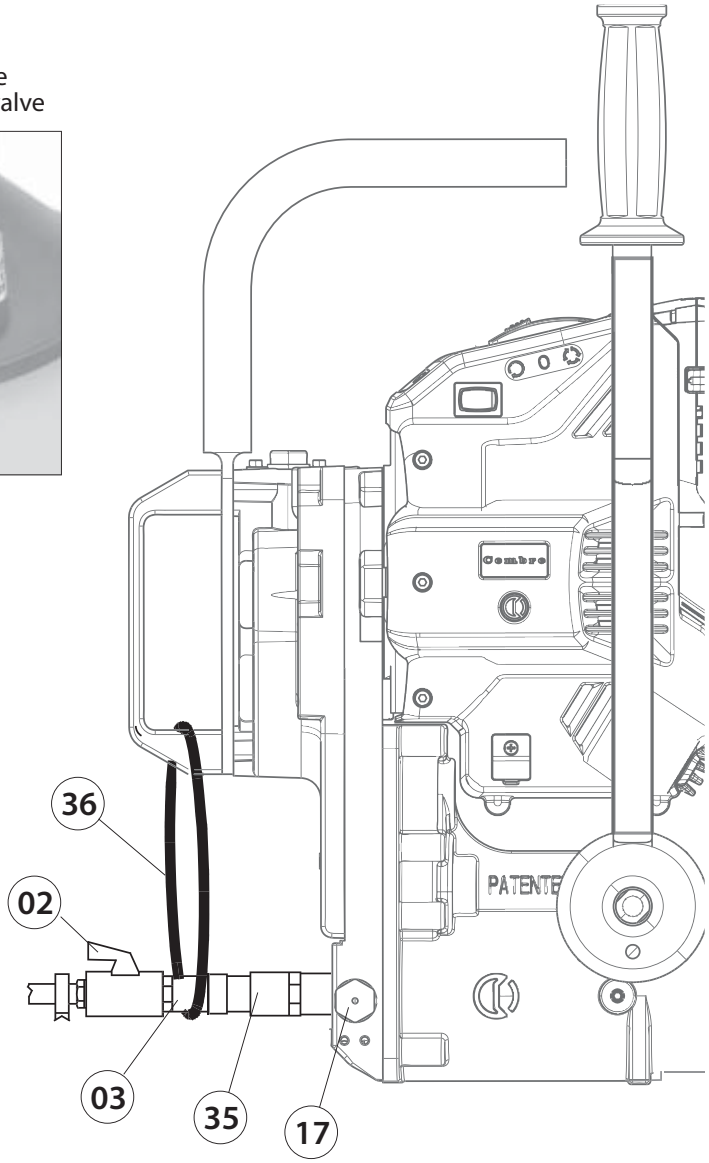
Connect the SR5000 coolant unit to the attachment (35) on the drill by means of its quick-coupling (03) by passing the hose through the O-Ring (36) so as to support the tap (02).
The use of the lubrocoolant supplied by **Cembre**, in the recommended concentrations, guarantees optimum life of the cutting 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.
To fill tank with lubrocoolant, turn handle anticlockwise approximately 2 turns to release handle locking mechanism. Remove handle/piston assembly from tank.

When drilling with a broach cutter, the delivery and shut-off of the lubrocoolant are controlled 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).

When the tank is not under pressure, check that the maximum pressure valve is screwed right down. Avoid leaving the SR5000 coolant tank under pressure or exposed to sunlight for long periods of time.

Detail of the max pressure valve





01 – SR5000 coolant unit
02 – Tap
03 – Quick-coupling
17 – Vent valve
35 – Attachment coupling
36 – O-Ring

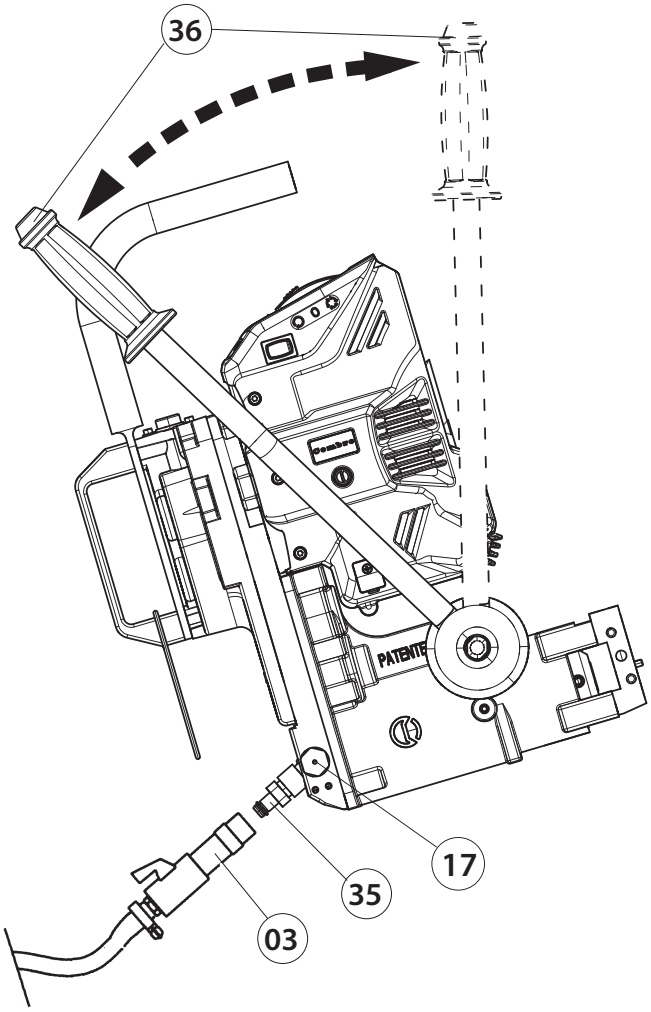
The drill is equipped with a coolant attachment valve (35) and a vent valve (17).
If under certain operating circumstances they need to be interchanged, proceed as follows:

- Using a 17 mm spanner unscrew the vent valve from its seat.
- Remove the protection plate and using the 4 mm T-handle Allen key provided with the drill, remove the appropriate coolant valve from its seat and fit into the vent valve seat, then assemble the protection plate.
- Fit the vent valve into the removed 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:

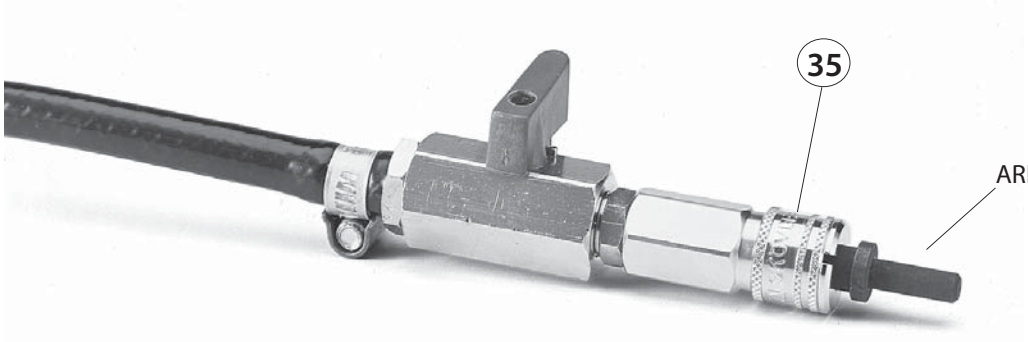
- Disconnect the quick-coupling (03) from the coolant attachment (35) on the drilling machine.
- Tilt the machine so that the coolant attachment is at its lowest point allowing natural drainage.
- Operate the advancing lever (36) to advance and retract the drilling spindle.
- Gently shake the machine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



Adapter ARE

The ARE adapter is inserted in the quick-coupling (35) of the tank tube of the SR5000, 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.
- To clean various parts of the drill, by means of the lubrocoolant pressure jet, e.g. the tool clamping seat in the spindle shaft, seats for the template fixing screws, etc.



11. PREPARING THE RAIL DRILL

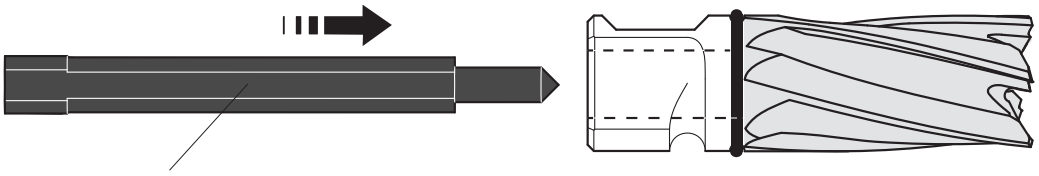
Always remove the battery when servicing the drill, before removing the cutting tools (broach cutters, spiral bits and positioning templates etc).

Be careful of the broach cutter's sharp edges. Always wear work gloves to avoid injury.

The drill spindle is factory-set to operate with* Cembre *CY range broach cutters fitted with Quick push/turn coupling; use of broach cutters and twist drill bits fitted with Weldon shank only requires disassembly of the transverse pin in the spindle (Ref. to §11.2).

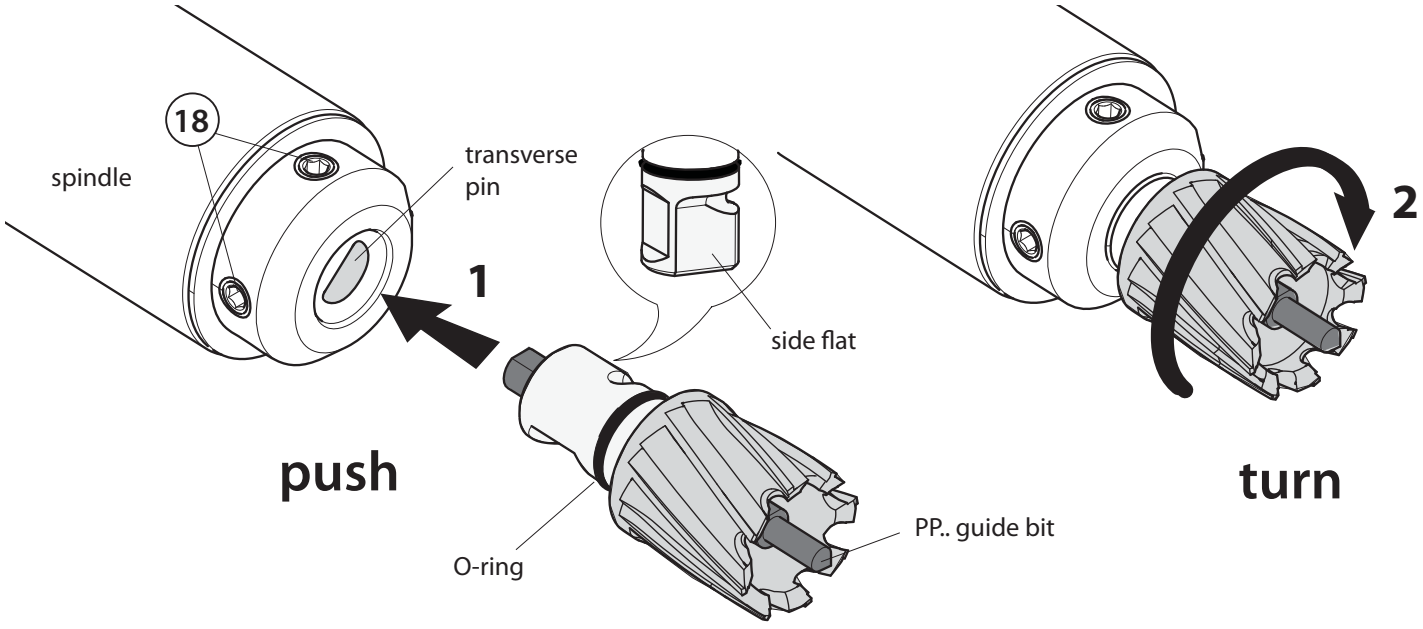
11.1) Assembling broach cutters with Quick push/turn shank

- Using the drive lever, turn the spindle so as to facilitate operation.
- Insert the correct guide bit into the broach cutter (Ref. to § **3.10**), from the shank end.



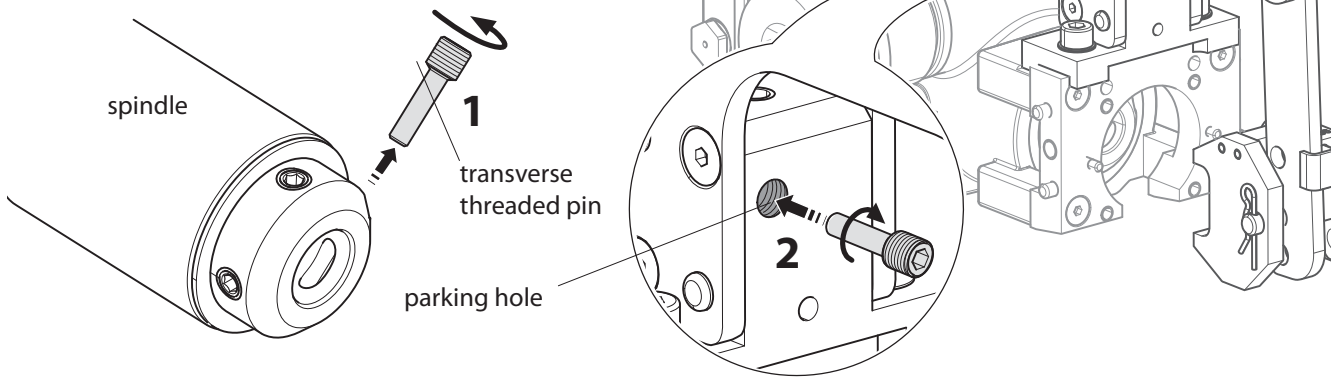
- Insert the broach cutter into the spindle by positioning it so that the side flat lines up with the transverse pin within the spindle, then rotate in a clockwise direction (2); the broach cutter will be locked without the need to tighten the two grub screws (18).
- Check that the guide bit slides freely by applying slight pressure on it.
- To disassemble the broach cutter, turn in an anticlockwise direction and remove it from the spindle.

Before fitting, always check that the broach cutter is provided with the O-ring to ensure it secures correctly. It is also possible to assemble broach cutters with Weldon shanks (Ref. to § 11.2).



11.2) Assembling broach cutters with Weldon shank

- Using the spindle lever, advance the spindle to make the transverse threaded pin accessible; if it is not in a easily-accessible position, insert the battery and slide the Motor switch forward (indexing function (Ref. to § **5**) to make the pin visible, then remove the battery.
- With the 4 mm T-handle Allen key, remove the transverse threaded pin from the spindle (1) and screw it into the "parking hole" in the clamping device.

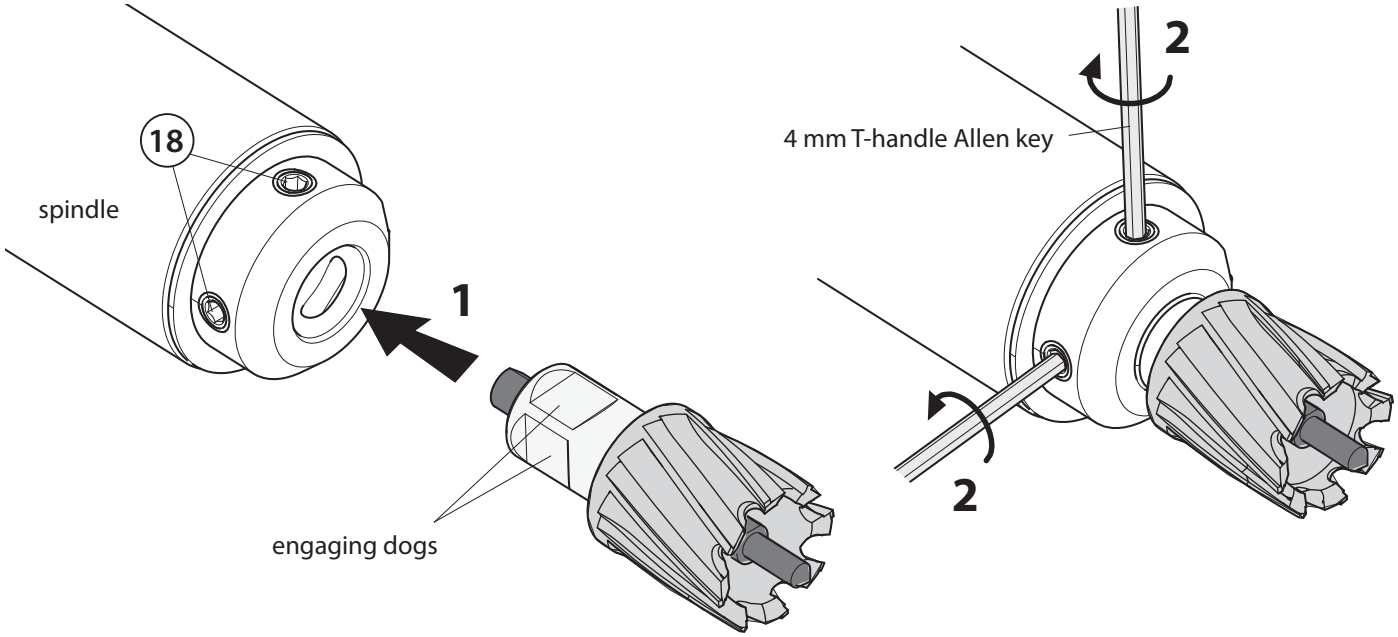


To protect the transverse threaded pin, tightly screw it into the "parking hole" (2) on the clamping device; A spare pin is available in the ACCESSORIES KIT.

- Using the advance lever, position the spindle shaft so that both grub screws (18) become accessible. If necessary, insert the battery, slide the Motor switch forward to generate successive rotations of the spindle (indexing function (Ref. to § **5**), making the grub screws (18) visible, then remove the battery.
- Insert the correct guide bit into the broach cutter (Ref. to § **3.10**), from the shank end.
- Unscrew grub screws (18) and insert the broach cutter into the spindle (**1**) in such a way that the two engaging dogs on the shank of the broach cutter correspond to the grub screws.

Grub screws (18) have stops that prevent their complete unscrewing, do not force them past this stop.

- Lock the broach cutter by fully tightening the screws using the 4 mm T-handle Allen key (**2**).
- Check that the guide bit slides freely by applying slight pressure on it.



11.3) Assembling special spiral bits

- Using the spindle lever, position the spindle shaft so that both grub screws (18) become accessible.
  If necessary, insert the battery, slide the Motor switch forward to generate successive rotations of the spindle (indexing function (Ref. to § **5**), making the grub screws (18) visible, then remove the battery.
- Insert the spiral bit in the corresponding APED adapter (**1**) and lock it with the grub screw (19) using the 4 mm T-handle Allen key (**2**) (Ref. to Fig. a).
- Unscrew grub screws (18) and insert the bit-adapter unit in the spindle (**1**) so that the two engaging dogs on the bit spigot line up with the grub screws (18) (Ref. to Fig. b).

Grub screws (18) have stops that prevent their complete unscrewing, do not force them past this stop.

- Lock the adapter by fully tightening the screws using the 4 mm T-handle Allen key (**2**) (Ref. to Fig. b).

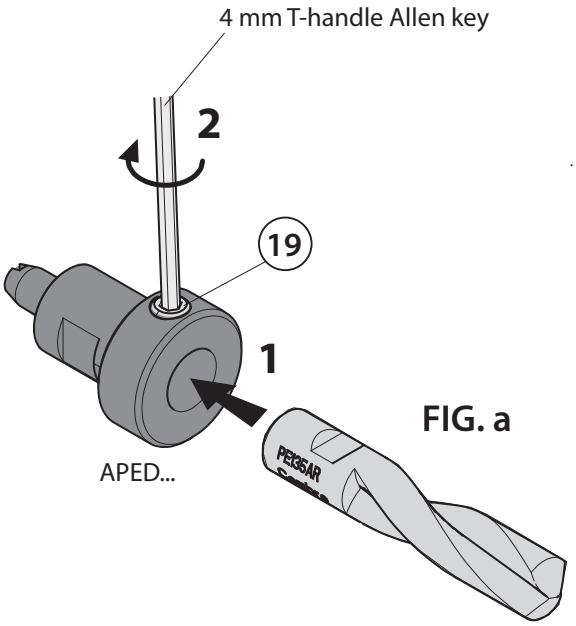


FIG. a

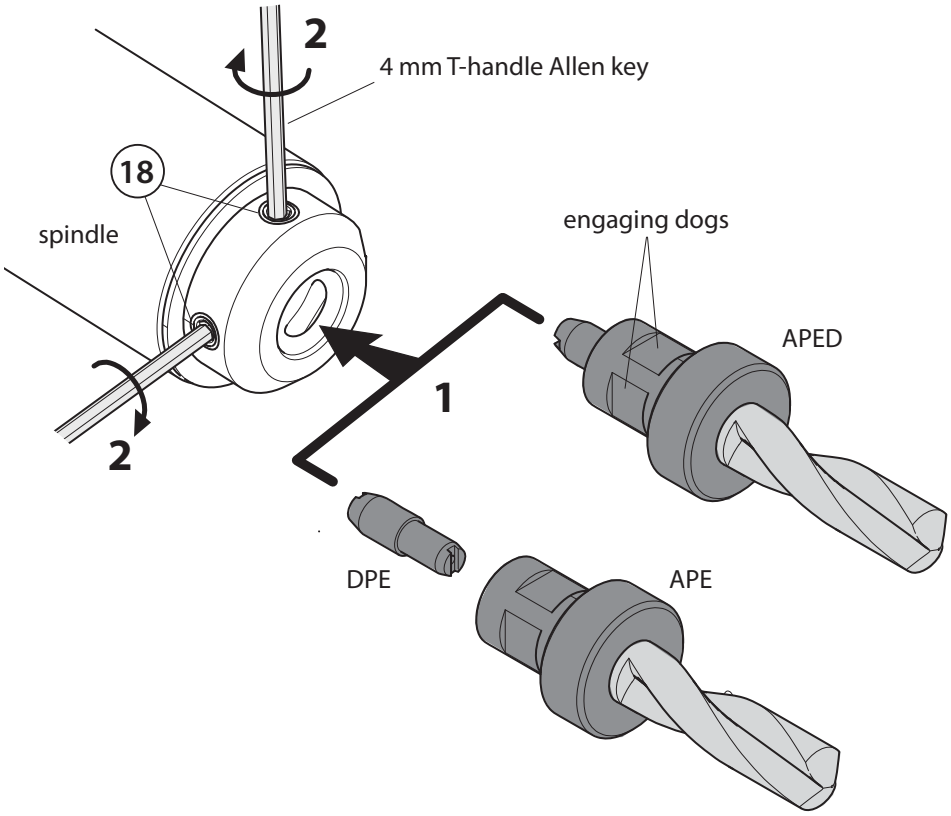
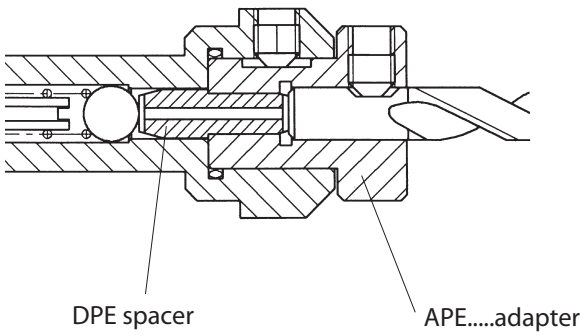


FIG. b

Using APE adapters, it is necessary to insert the DPE Spacer into the APE to activate the coolant system.



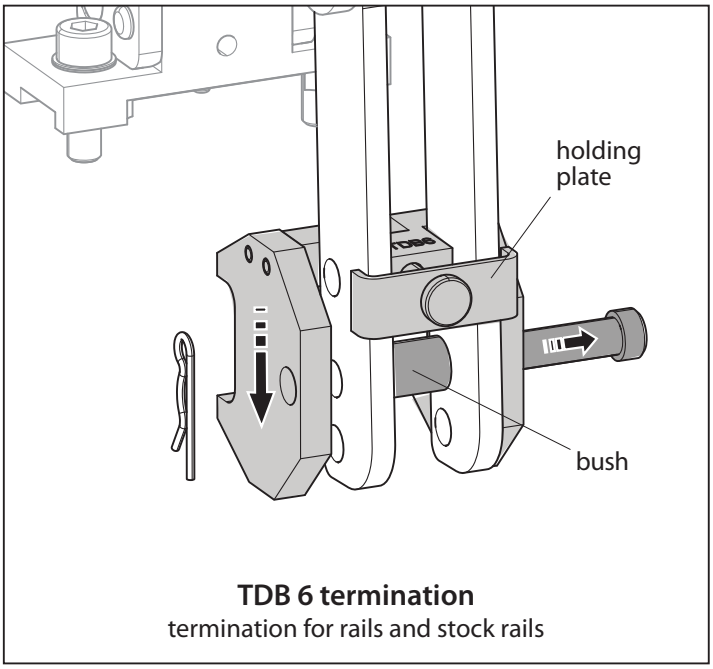
11.4) Assembling terminations on DBG-F2 clamping device

TDB 1, TDB 6 and TDB 3 terminations 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/disassembly is shown in the Figures. Normally they are mounted in the central holes of the clamping device. The two adjacent holes allow to adapt them to a variety of clamping conditions.

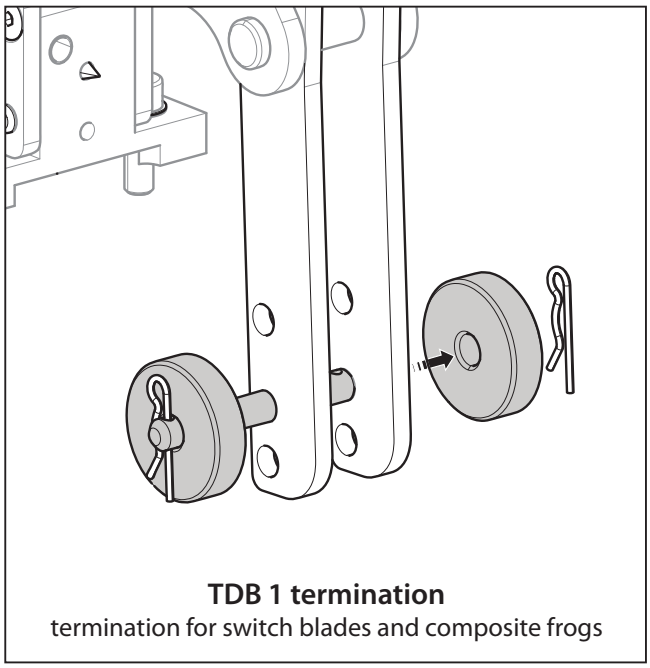
When disassembling the TDB 6 termination first remove the pivot and central bush, ensuring that it is slid away downwards without acting on the holding plate.

Over-advancing the spindle after drilling must be avoided when using the TDB 1 and TDB3 terminations.

When assembling the TDB 3 termination ensure that the positioning pawl is pointing downward in relation to the bolt.

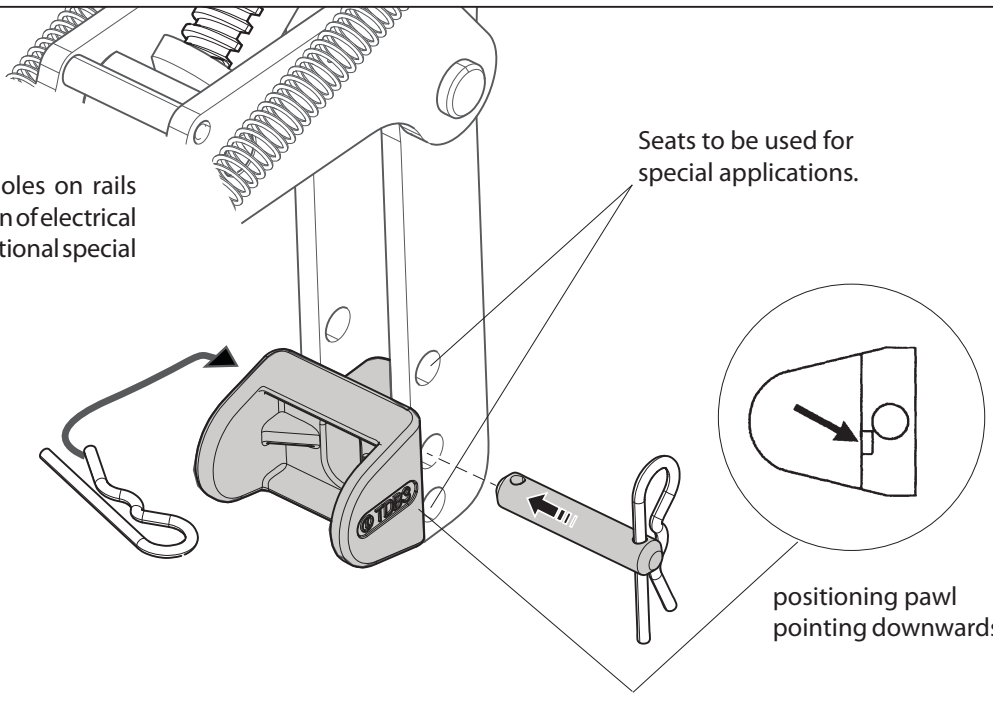


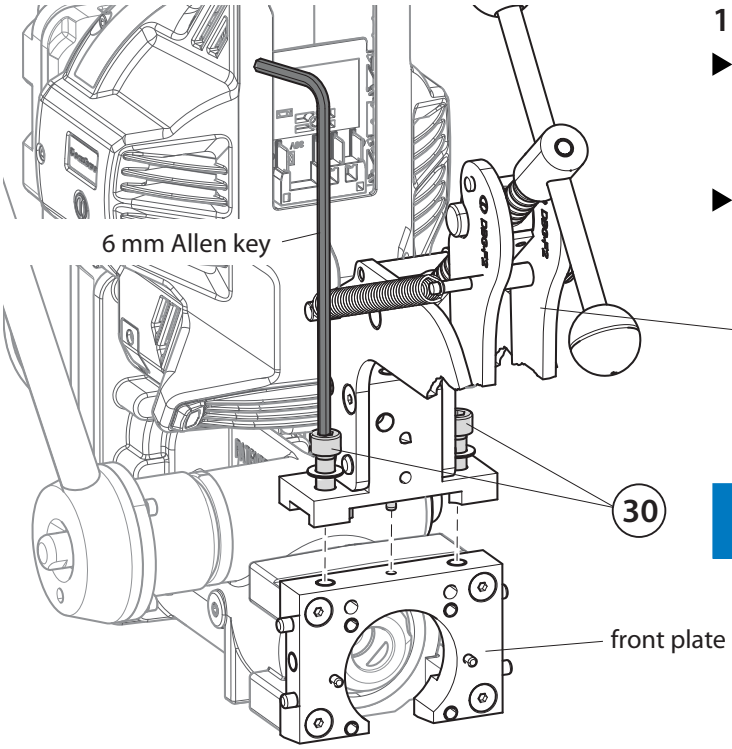
TDB 6 termination
termination for rails and stock rails



TDB 1 termination
termination for switch blades and composite frogs

TDB 3 termination
for enlarging existing holes on rails inherent in the application of electrical connections and for additional special applications.





11.5) Assembly of the DBG-F2 clamping device

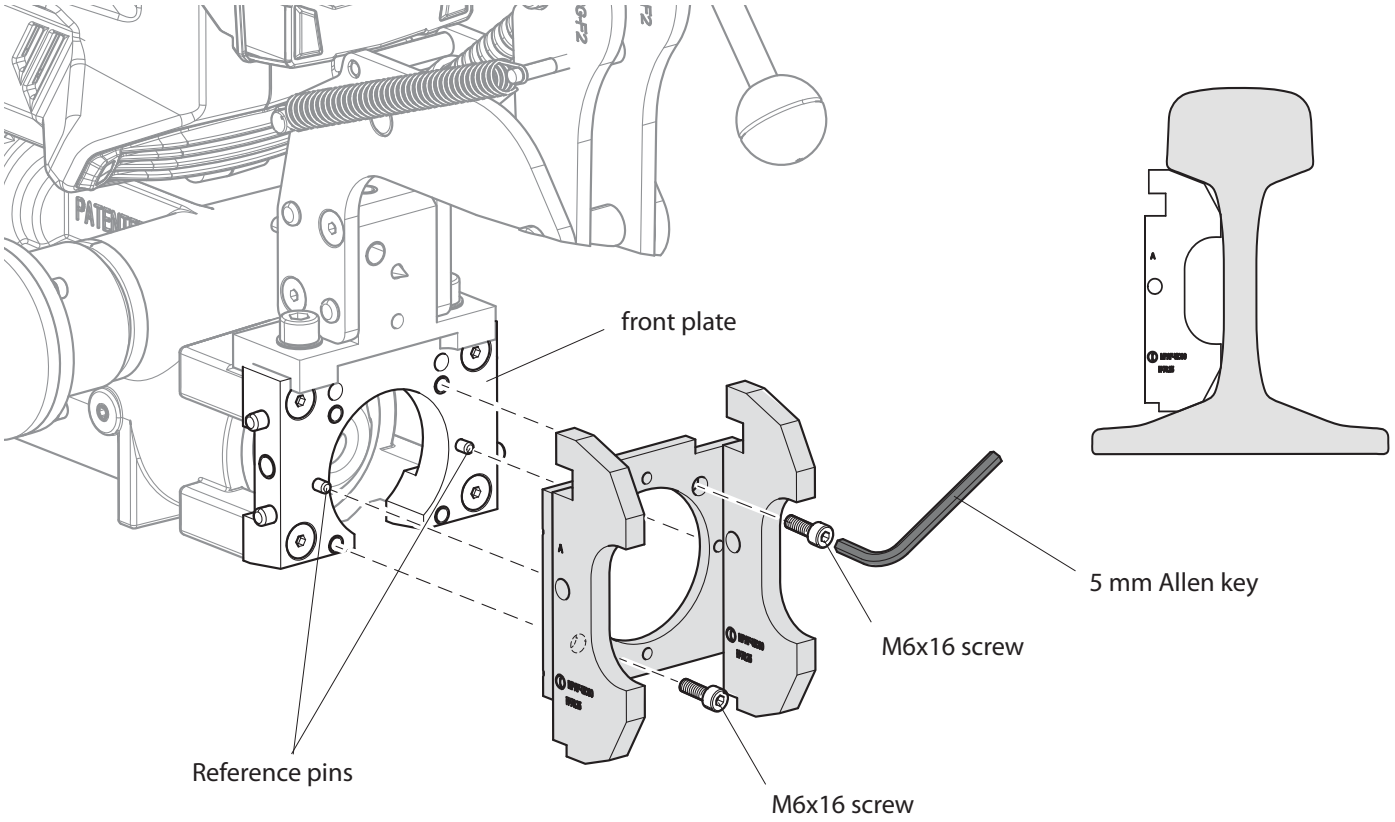
- The clamping device is fitted to the front plate of the drill, and secured with the two screws M8x25 (30). The assembly is illustrated in the Figure.
- To disassemble it, using the 6 mm Allen key supplied in the ACCESSORIES KIT of the drill.

If the clamping device must be removed, make sure that, on reassembly, the two locking screws (30) and washers are firmly fastened.

11.6) Assembling positioning templates

Only Cembre positioning templates and jigs are to be used with the rail drill.

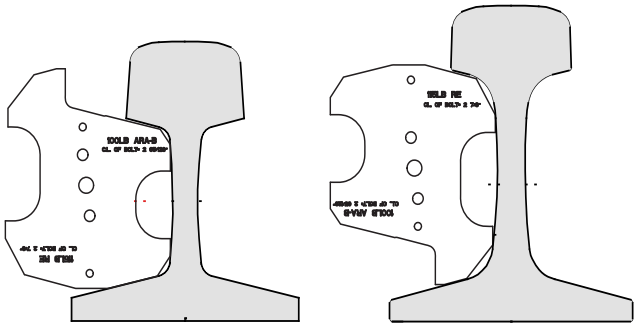
- Choose the correct positioning template for the rail profile to be drilled.
- Place the positioning template on to the front plate of the drill, aligning the two reference pins with the holes in the template.
- **MPAF.. MPSR and MPAU** positioning templates are secured to the front plate by means of two screws M6x16 by using the 5 mm Allen key supplied in the ACCESSORIES KIT of the drill.
  For special positioning templates (e.g **MPD...** & **MPR...)** use the two screws M6x25.



11.7) Fitting "double-sided'" templates

Compared to the templates for positioning rail drills, the **KPAF** "double-sided templates" are equipped with a double profile that enables positioning of the drill on two different types of rail by simply inverting them.
They are fixed on the sides of the front plate.

The inserts permit the drill to be positioned on two types of rail with a specific drilling axis. During fitting, ensure that the inserts are facing the correct side, corresponding to the rail being drilled.



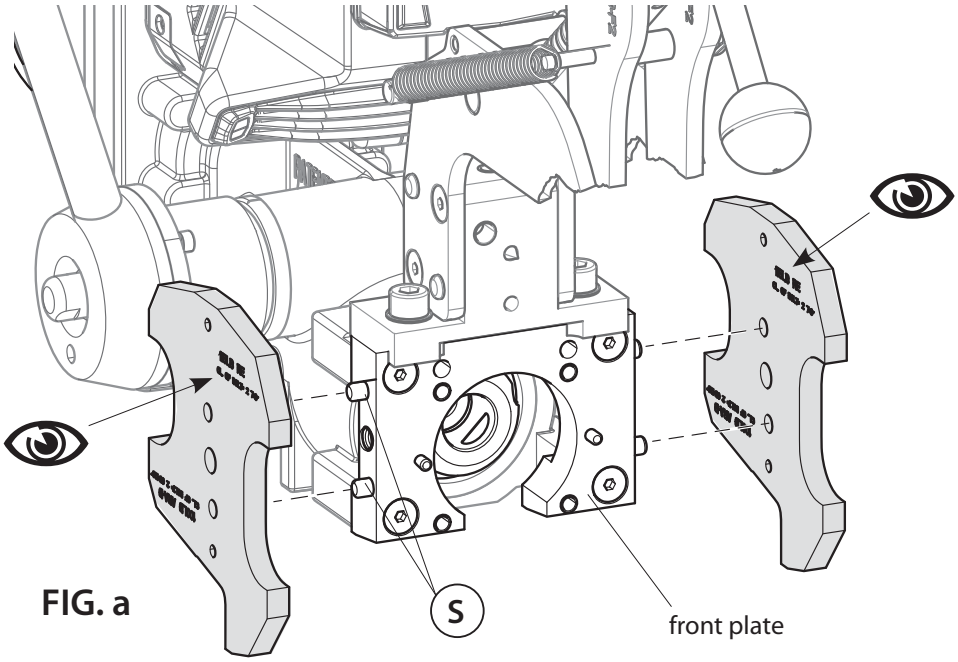


FIG. a

- Rotate both inserts to the same side, suited to the profile of the rail being drilled.
- Mount inserts onto the sides of the drill's front plate by ensuring that the pins (S) match the corresponding holes in the inserts (Ref. to Fig. a).

The markings on the two inserts should face the same direction .

- Secure the two inserts by hand (Ref. to Fig. b) using the wing nuts and washers supplied in the ACCESSORIES KIT of the drill.

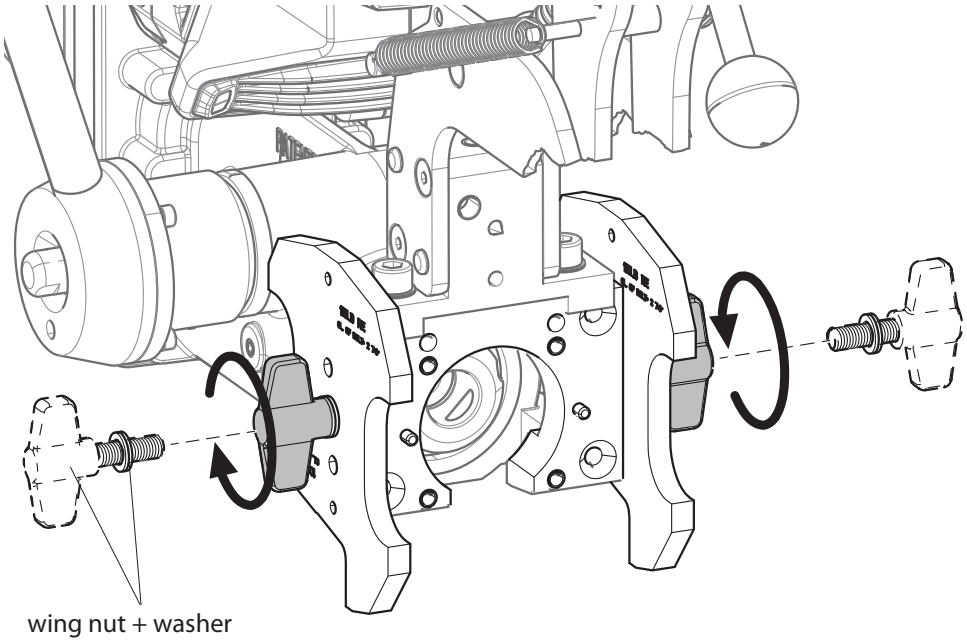


FIG. b

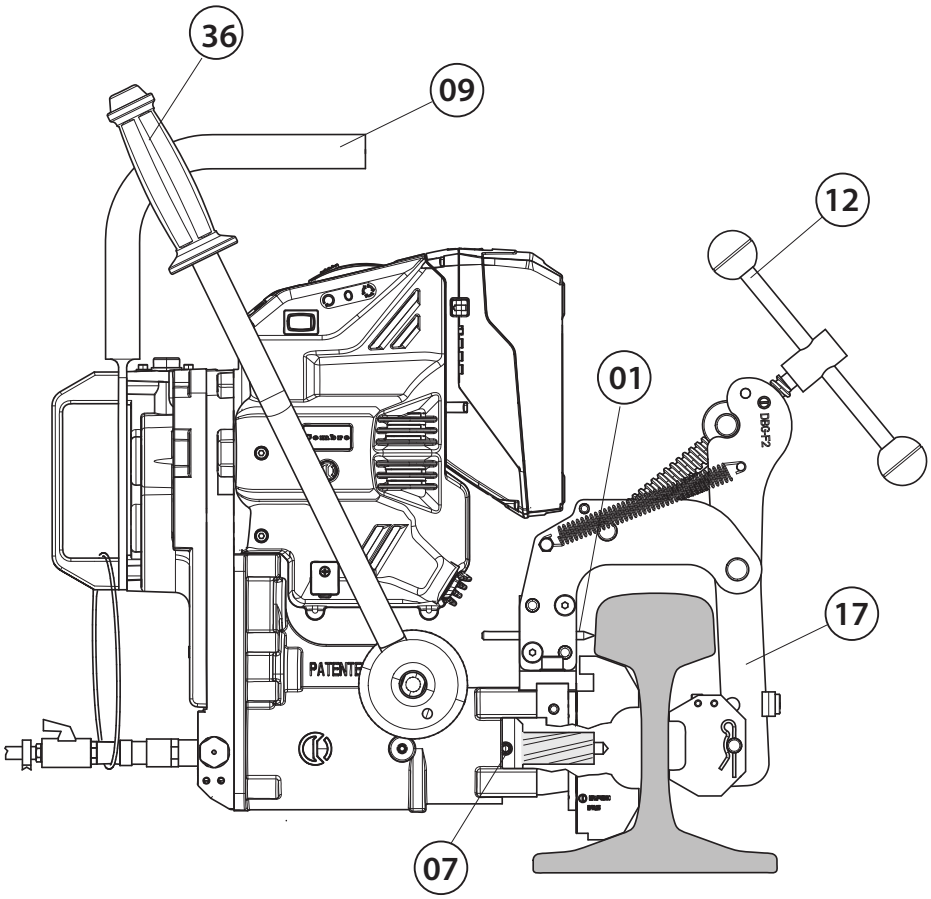
11.8) Clamping the drill to the rail web

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 moving arm (17) (Ref. to Fig. a); use the hand-wheel (12) to completely open the moving arm.
- Place the drill on the rail at the point to be drilled and clamp it by **tightening the hand-wheel fully down** (12): the positioning template will automatically position the cutting tool in line with the designated axis; if precise positioning is necessary to the longitudinal track axis, use the reference pin (01).
- For rapid drill release, simply back-off the hand-wheel (12) by approximately two complete turns, and while supporting the drill by its handle (09), pull the hand-wheel towards you. The threaded bush (39) will disengage the seat (A) in the moving arm (17) (Ref. to Fig. b) 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 forwards so that the threaded bush (39) engages the seat (A) of the moving arm. Now, a few turns on the hand-wheel will be sufficient to engage the drill correctly on the rail.

When the drill is fitted with "long" type broach cutter (for drilling thickness up to 50 mm) take care to position the drill on the rail by keeping the spindle fully withdrawn.



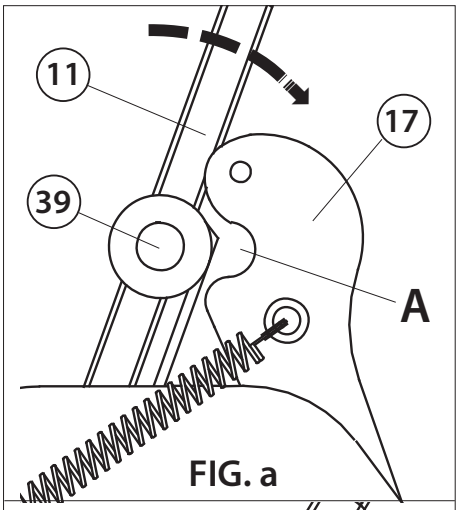


FIG. a

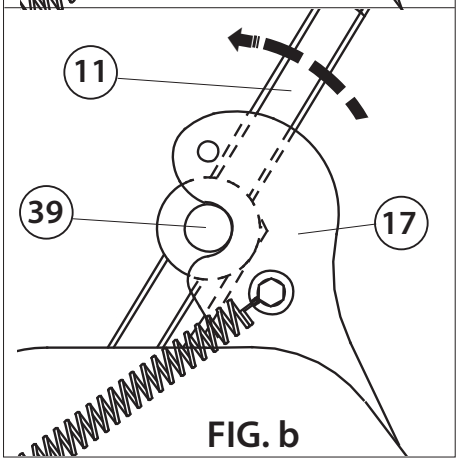


FIG. b

12. DRILLING OPERATION

To optimise battery charge and for safety reasons, the drill is equipped with a timer.
If drilling operations continue for more than 120 seconds, the motor automatically stops.
To re-start it, it is sufficient to operate the Motor switch.

Switch on the cooling system before starting the drill (§ 10).

Avoid pressure jolts on the advancing lever during drilling.

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.

Always ensure that swarf is regularly removed before starting to drill a new hole.

Incomplete locking of the machine on the rail being drilled may cause breaking or accelerated wear of the cutting tool as well as damage to the spindle shaft bearings.

12.1) Drill fitted with broach cutter

The drilling sequence may be started with the drill corrected clamped to the rail (Ref. to § **11.8**) than:

1) Connect the female quick-coupling of the SR5000 coolant unit to the male coupling on the drill (§ **10**).
2) Open the tap fitted on the coolant unit hose.
3) Using the lever (36) bring the guide bit almost in contact with the rail (Ref. to Fig. a);
4) Keeping the release pawl (39) pressed, release the lever from its cup and return it to the initial position (Ref. to Fig. b), which will enable the travel of the lever to be used in the most advantageous way (Ref. to Fig. c).

FIG. a

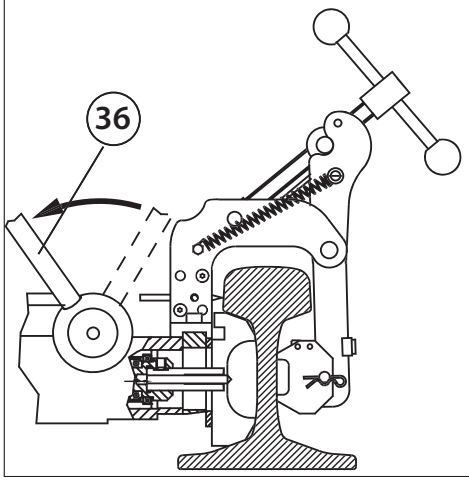


FIG. b

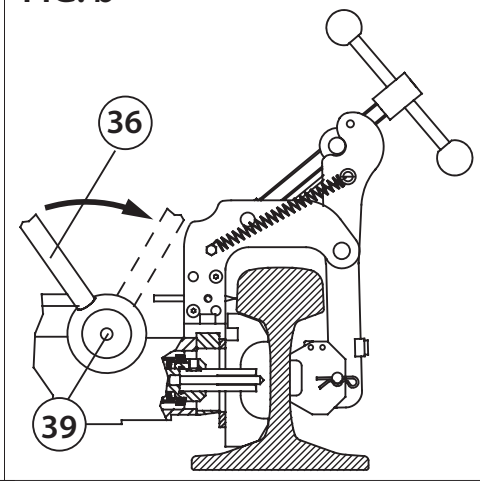
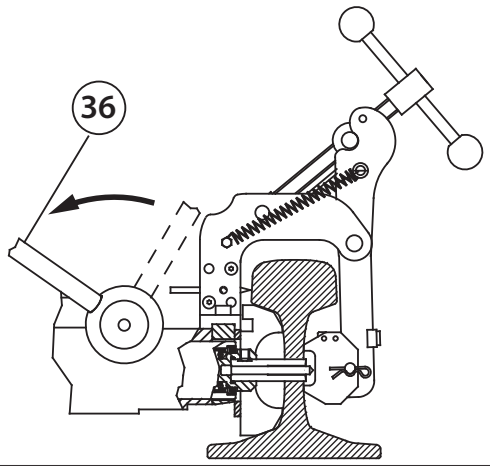
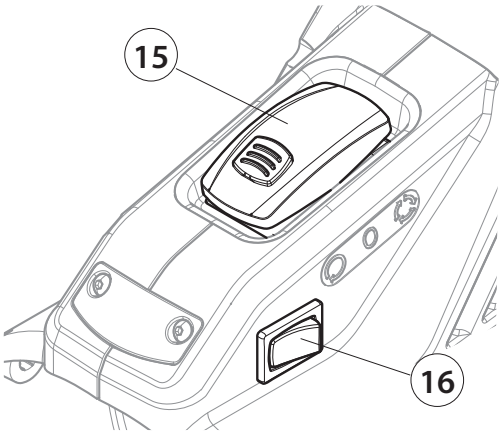
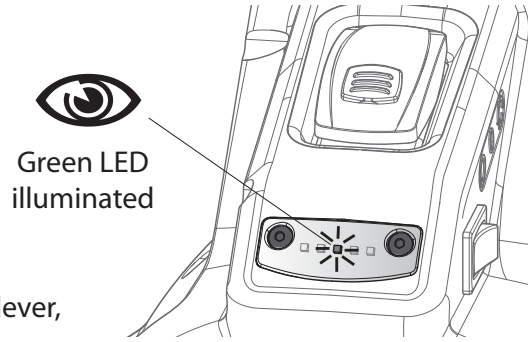


FIG. c





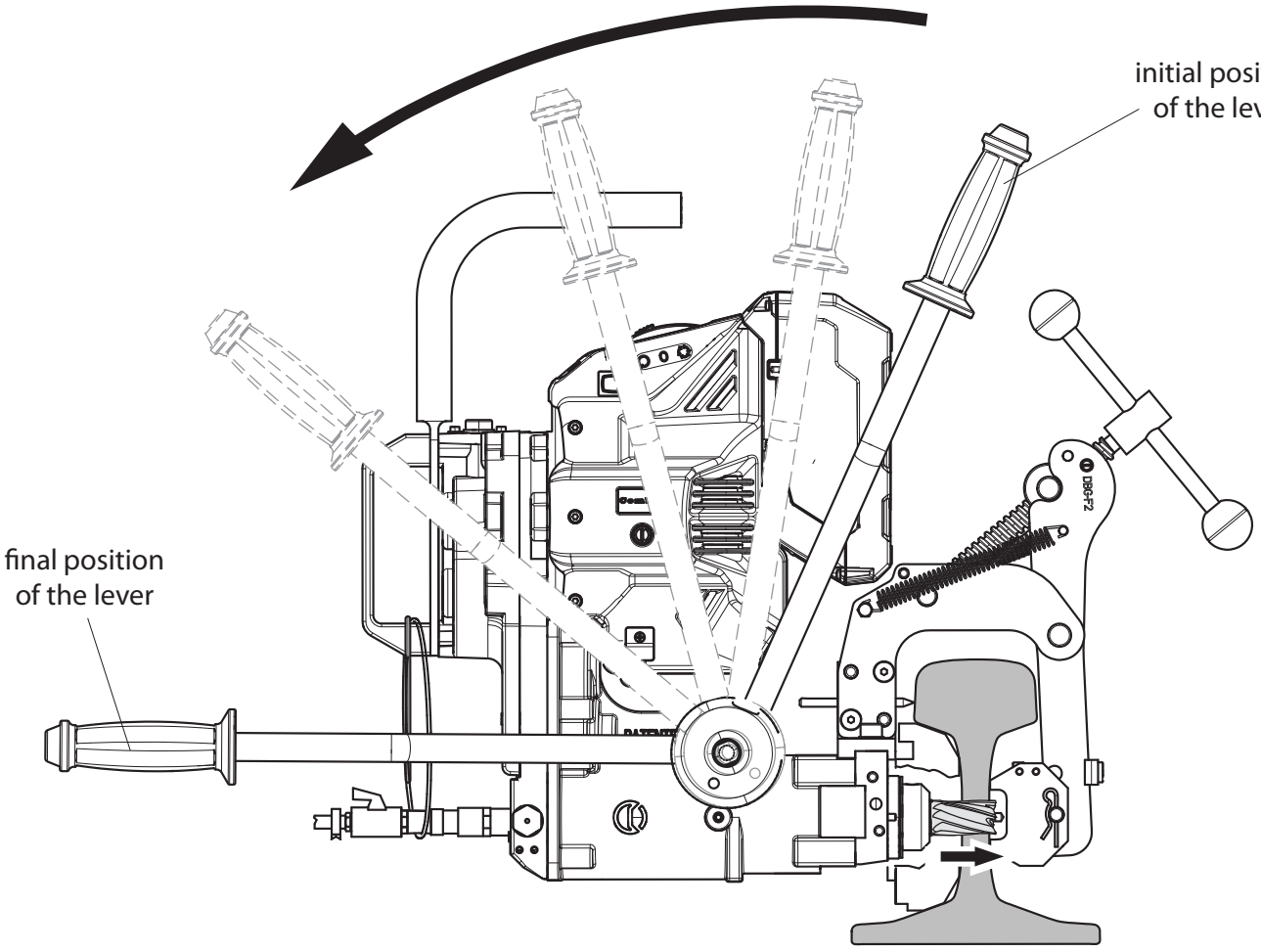
5) Start the machine by pressing the Motor switch (15) as described in the **§ 5**.
If necessary, activate switch (16) for the automatic illumination of the LED worklights.



6) Proceed to drill the hole by initially applying a light pressure on the lever, gradually pushing it so that the green LED on the indicator display turns on (Ref. to § **8** for further details); continue this progress, avoiding any changes, so that the green LED stays illuminated for the entire drilling process; only alleviate the pressure on the lever during the exit phase.
To finish drilling, depending on the thickness being drilled, a stroke recovery may be performed by releasing the lever, as described in point 4 above.
The guide bit will enable the lubrocoolant to be discharged throughout the drilling process.

7) When drilling has been completed, fully retract the spindle, stop the machine by pressing the Motor switch in 0 position "OFF".

Any shut-off of the motor during the drilling process, combined with illumination of an LED on the indicator, indicates the presence of a fault. In such a case refer to §13.

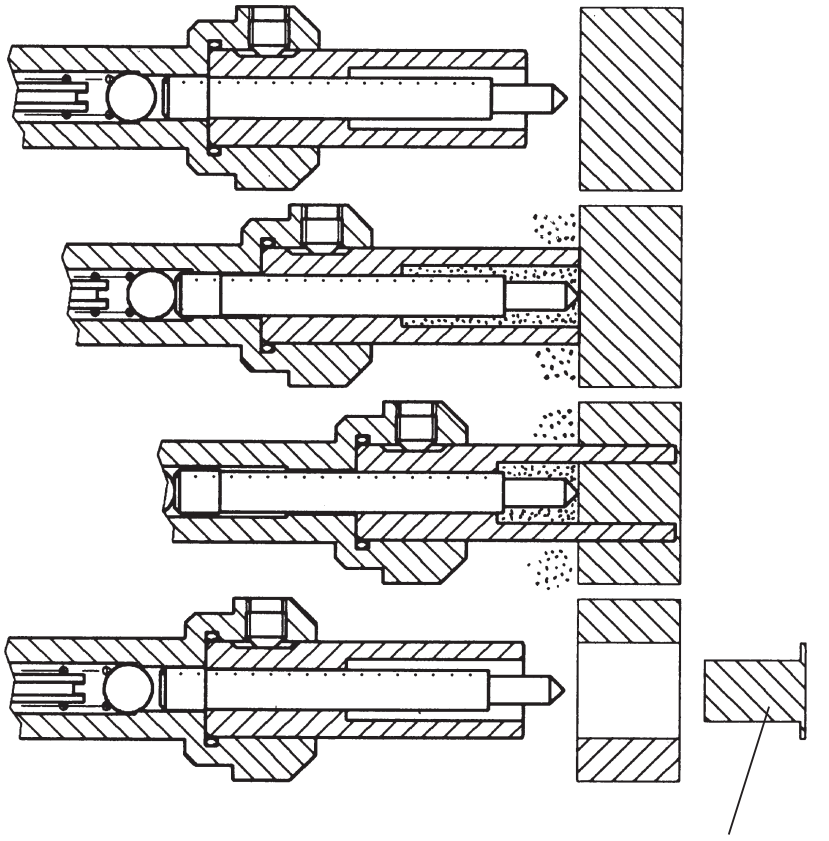


Approach

Start drilling
with discharge of lubrocoolant

Drilling

Finish drilling
with removal of swarf and switching off of lubrocoolant

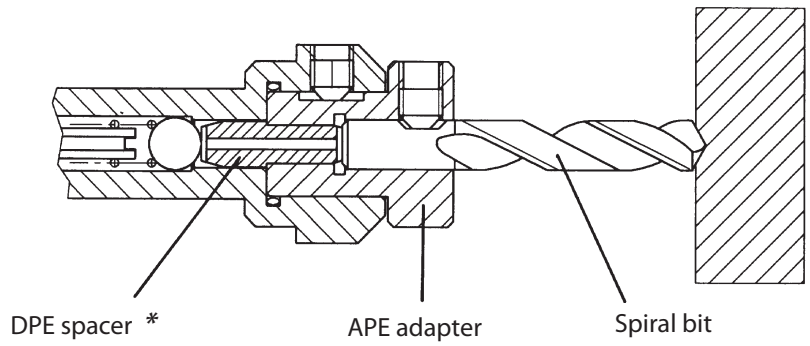


Clean the spindle and the broach cutter of any swarf with the brush provided.
Ensure that swarf is removed before carrying out another drilling process.

12.2) Drill fitted with special spiral bit

Follow the sequence described in § **12.1**, 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 APED adapter or DPE spacer fitted on the spigot of the spiral bit; it must therefore be activated, by opening the tap, before starting to drill, then switched off after drilling by closing the tap.

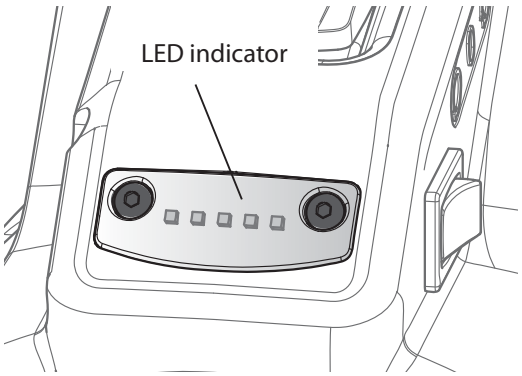
Normally, using twist drill bits up to Ø 13 mm (Ref. to § 3.11) does not require a force that illuminates the green LED on the indicator.
In such a case, it is however acceptable for the WHITE LED to remain illuminated.



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

13. ALARMS

The alarms associated with a visual indication on the LED indicator go off during operation of the drill and cause electronic blocking of the drill with a subsequent motor shut-off.



Verifiable alarms are summarised in the following table:

LED colour	Cause		Solution
Flashing RED		Overheating of the battery caused by intensive use or high ambient temperature.	Replace the battery and wait for it to cool down (*).
Flashing YELLOW		Low battery.	Push the start switch to the OFF position, replace the battery.
Flashing BLUE		Overheating of the motor caused by intensive use or high ambient temperature.	Push the start switch to the OFF position and wait for motor to cool down.
Flashing YELLOW - RED		Rotation is obstructed, blocked spindle or rotation with too low speed (for example blocked broach cutter in the rail, gears broken, excessive force on the spindle lever.)	Push the start switch to the OFF position, remove what is blocking the spindle's rotation and re-start the drill. Lighten the force on the spindle lever.
Constant RED		Exceeding maximum motor current absorption within a specific time.	Push the start switch to the OFF position, re-start the drill. Lighten the force on the spindle lever.
Constant YELLOW		- Power supply failure; insertion of the battery with the start switch in ON position. - Self diagnosis with a negative out come.	- Push the start switch to the OFF position, re-start the drill. - If the problem persists, please contact **Cembre**.
Constant BLUE	PCB	Overheating of the electronic control card caused by intensive use.	Push the start switch to the OFF position and wait for the electronic control card to cool down.

In order to reset the alarm, <u>remove and reinsert the battery</u>, the alarm is reset only if the conditions of use are within parameters to safely operate the drill without damage.

(*) If the battery overheats, it is possible to insert it into the supplied battery charger, making use of the specific "AIR COOLED" function in order to make it cool down quicker.

14. SPA... POSITIONING PLATE

14.1) Drilling close to rail heads

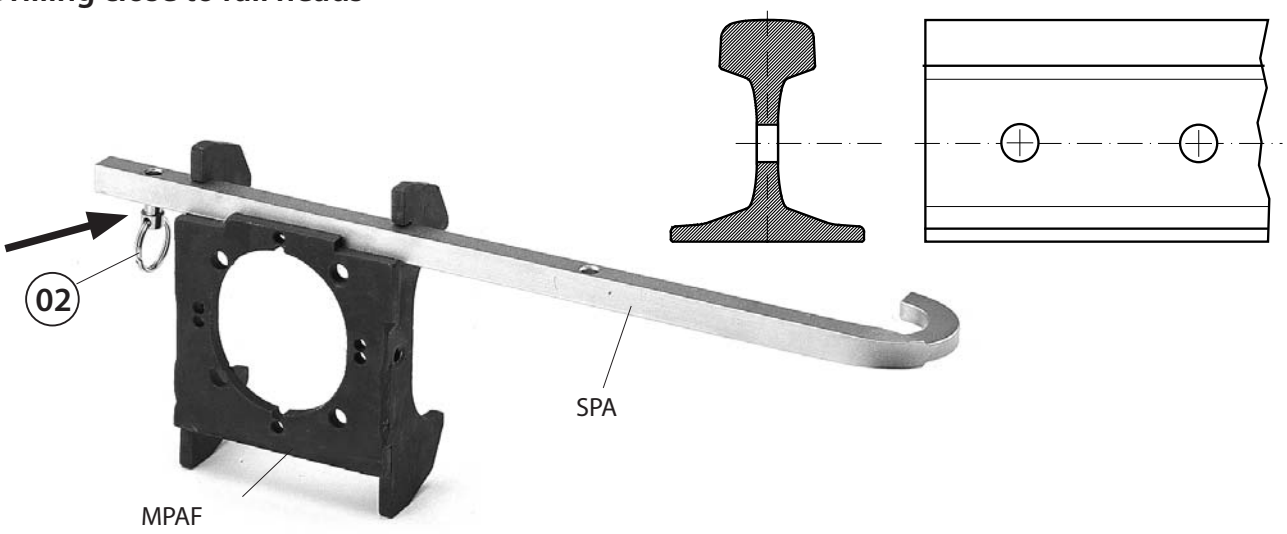


FIG. a

1) Fit the MPAF... positioning template corresponding to the rail to be drilled.

2) Insert the SPA... positioning plate (03) relating to the rail to be drilled, in the appropriate housing (Ref. to Fig. a).

3) Insert the locking pin (02) in one of the two holes in the positioning plate.

4) With the spindle fully withdrawn position the drill close to the rail head without clamping it.

5) Slide the drill so that (Ref. to Fig. b):

- **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).**

6) Clamp the drill in this position by tightening the hand-wheel fully, and commence drilling (Ref. to § **12**).

7) To drill the second hole in the rail, repeat operations **5 - 6** with the locking pin (02) inserted in the second hole of the SPA... positioning plate (Ref. to Fig. c).

For clarity the drill is not shown in the figures.

FIG. b

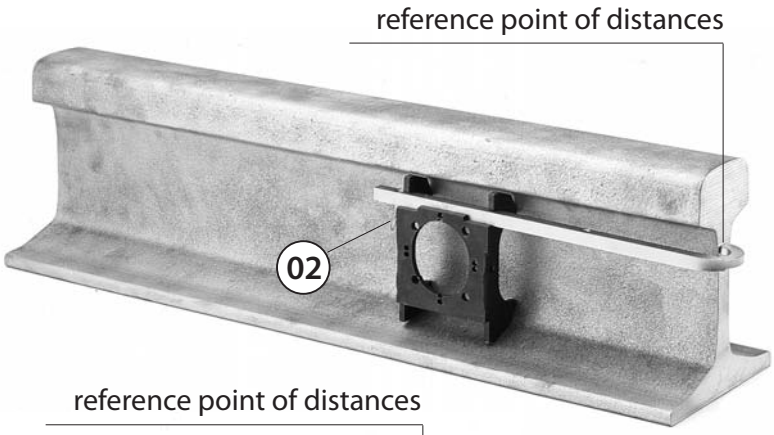
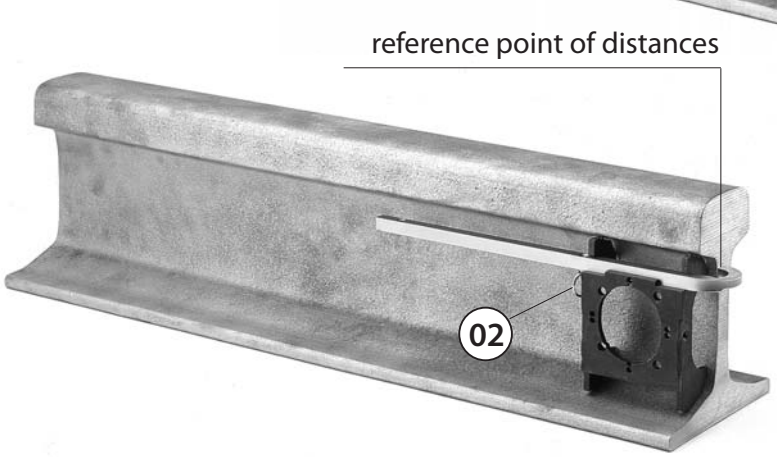


FIG. c



14.2) Drilling in line with rail heads

1) Fit the MRF clamp on the head of the rail (Ref. to Fig. d). 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 push-button for moving in any direction after locking.

2) Fit the MPAF... positioning template corresponding to the rail to be drilled.

3) Insert the SPA... positioning plate so that the curved part is facing upwards (Ref. to Fig. e).

4) Insert the locking pin (02) in one of the two holes of the connection plate.

5) With the spindle fully withdrawn, position the drill close to the MRF clamp, without locking the spindle.

6) Slide the drill so that (Ref. to Fig. f):

- **the curved end of the SPA... plate is flush against the MRF clamp on the side identifying the reference point of the distances.**
- **the MPAF... positioning template is flush against the locking bolt (02).**

7) Clamp the drill in this position by tightening the hand-wheel fully, and commence drilling (Ref. to § **12**).

8) To drill the second hole in the rail, repeat operations **6** - **7** with the locking pin (02) inserted in the second hole of the SPA... plate (Ref. to Fig. g).

FIG. d

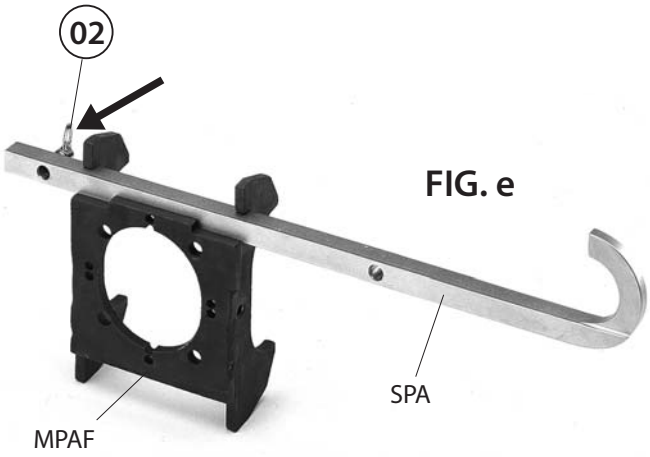


FIG. e

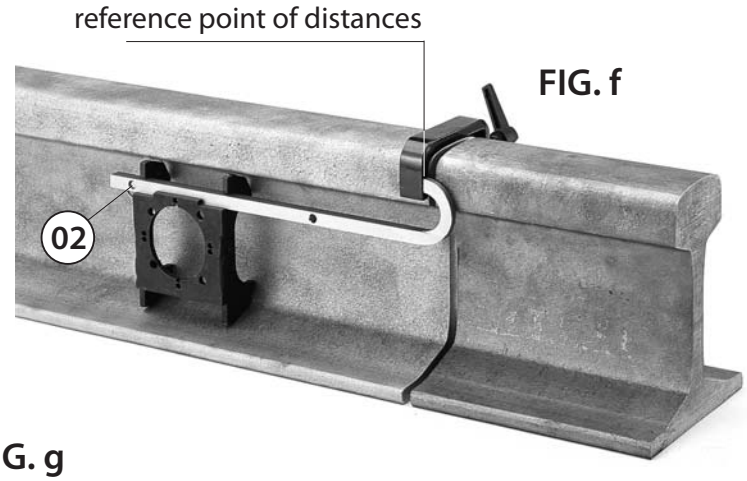


FIG. f

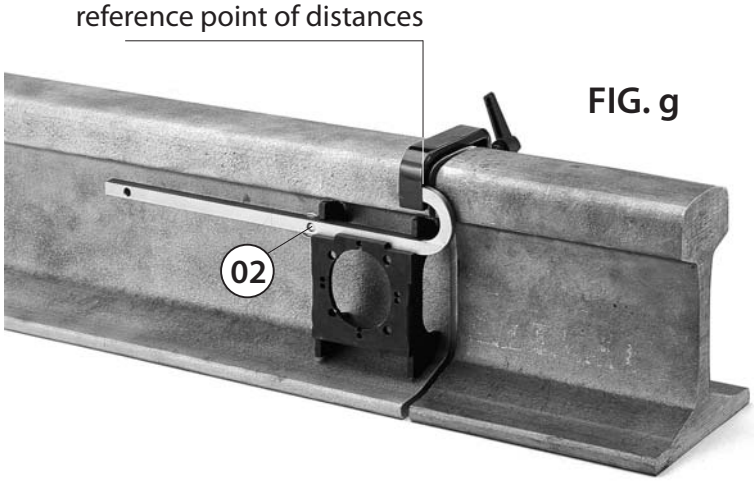


FIG. g

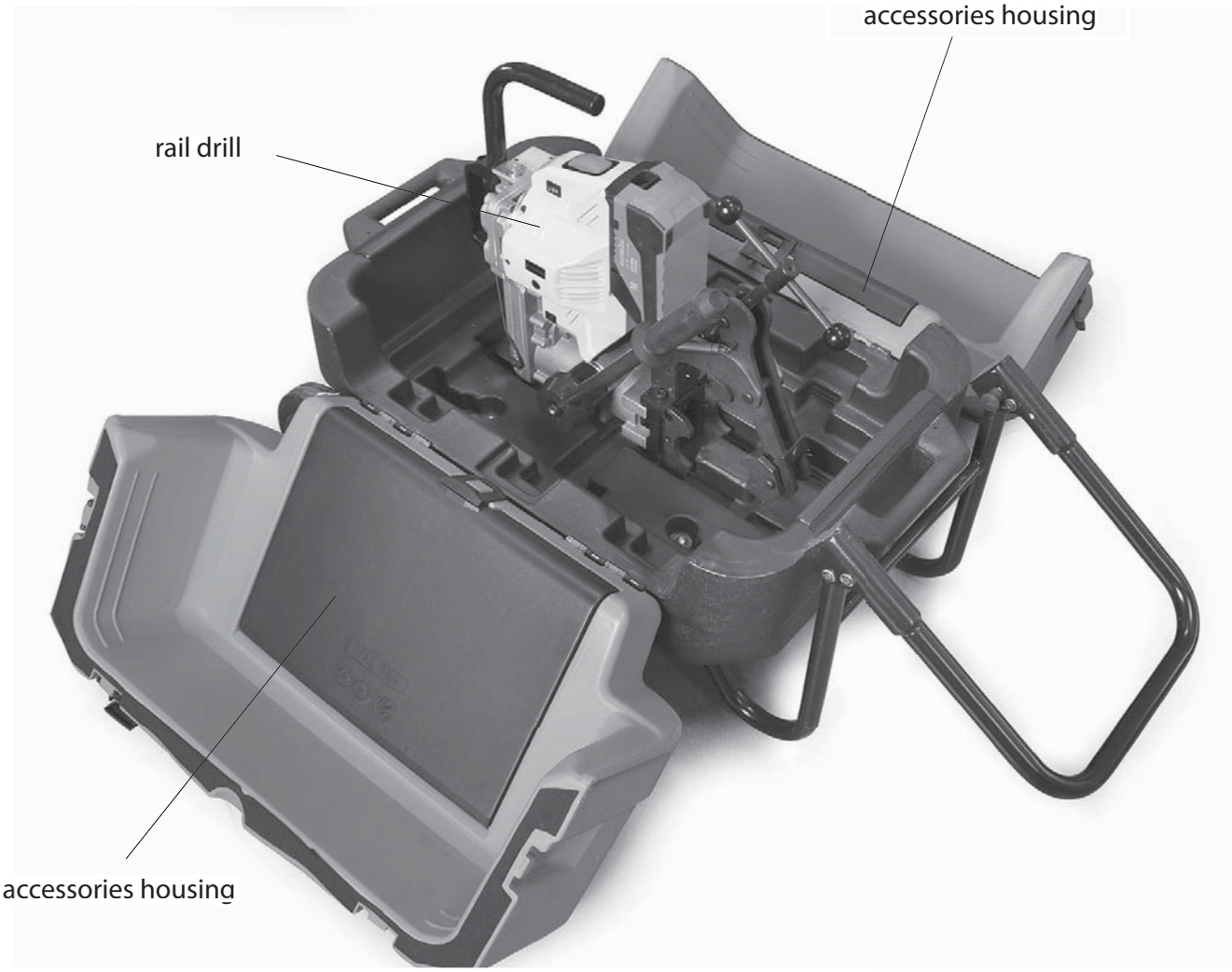
For clarity the drill is not shown in the figures.

15. STORING THE DRILL

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

- Depressurise the tank of the SR5000 coolant unit (Ref. to **§ 10**), close the tap on the hose and disconnect the quick-coupling.
- Remove the battery from the drill, thoroughly clean it with a dry cloth and place in the appropriate canvas bag 032, also suitable for the storage of the battery charger and the spare battery.
- Carefully clean the drill, particularly in the spindle area, removing machining waste (swarf, etc.) and any deposits of lubrocoolant, then fully withdraw the spindle.
- Place the drill, batteries, battery charger and the SR5000 coolant unit in a sealed place free from dust, moisture and the risk of accidental impact.
  The optimum storage temperature of the batteries is between 10 ° C and 30 ° C.

For better protection **Cembre** recommends the use of the VAL P24 or VAL P24-CS (with wheels) plastic cases designed for this purpose, which enable to store the drill blocked by means of the DBG-F2 clamping device and canvas bags for batteries and battery charger.
Suitable side housings are also provided in this case for storing comon accessories.



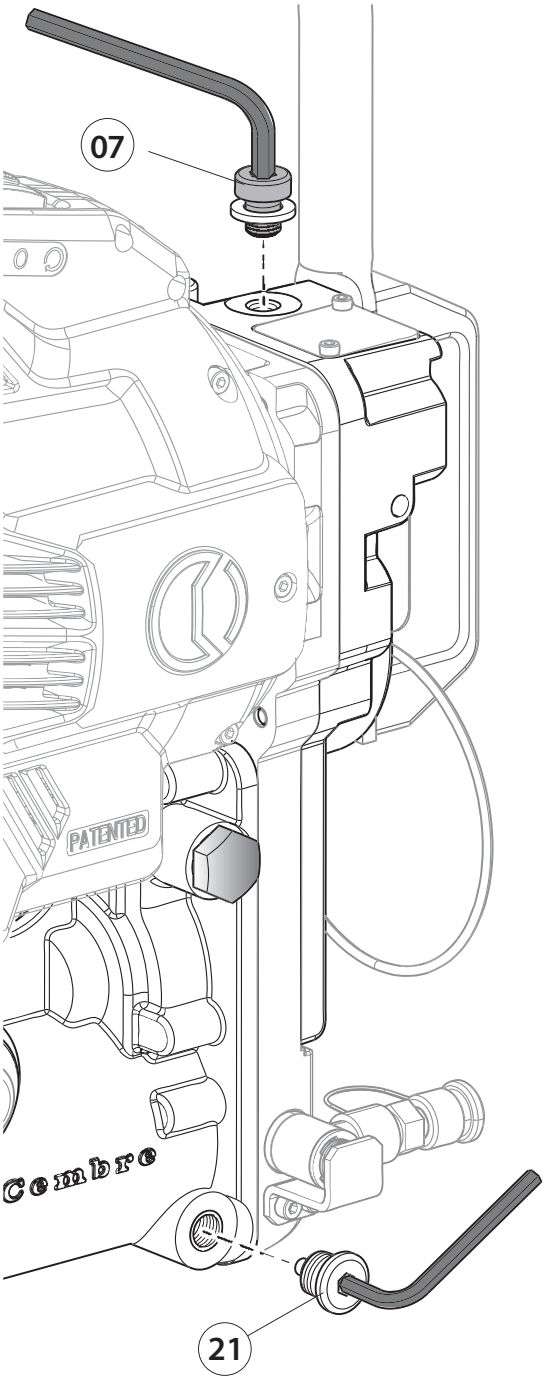
16. MAINTENANCE

Before servicing or maintenance the drill, always remove the battery.

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

- Remove oil filler cap (07).
- Remove the cap with the magnetic insert (21).
- Make sure that all the oil comes out by slightly tilting the drill.
- Clean up the cap (21) (see **§ 16.1.3**).
- Reassemble the cap (21).
- Fill the sump with oil to the level indicator (see **§ 16.1.2**) using the oil supplied (**100 ml**) in the ACCESSORIES KIT of the rail drill.
- Replace the filler cap (07).

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



Daily maintenance is indispensable to keep the machine in best condition. Maintenance not carried out properly, or carried out by unauthorised or unqualified personnel can noticeably reduce the machine's efficiency and increase the risk of accidents and serious injury. The maintenance procedures described may be carried out by the operator.
For any eventual fine tuning or repairs, return to **Cembre** (Ref. to § **17**).

16.1) ORDINARY MAINTENANCE OF THE DRILL

Daily

Before use, check:
- The drill in its entirety (securing of various components).
- The correct operation and integrity of the Motor switch (Ref. to § **5**).
- The integrity and charge of the batteries.

After use:
- Clean the machine of any contaminants and swarf by using a clean rag.
- Thoroughly clean the spindle area and the drilling machine of any swarf.
- Clean the air intake on the side of the motor if it is clogged.

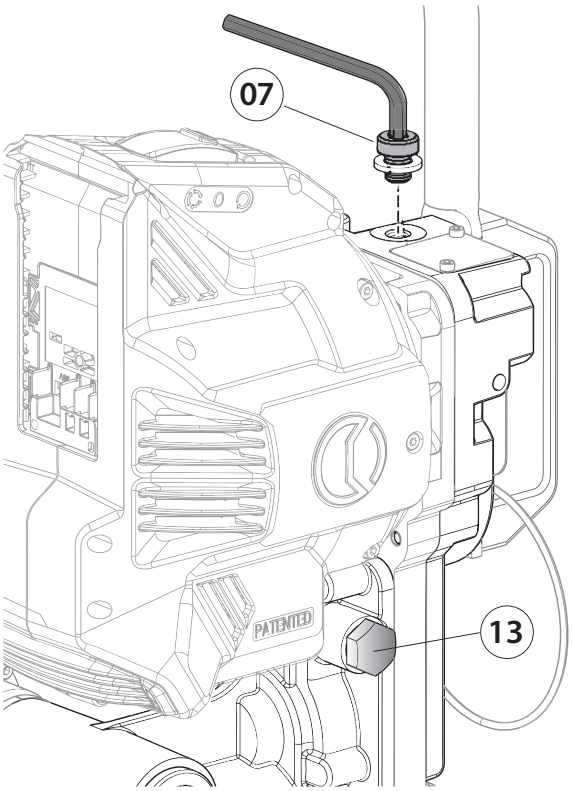
Every 20 hours of operation

16.1.1) Check screws

Check and re-tighten all screws where necessary.

16.1.2) Top up oil

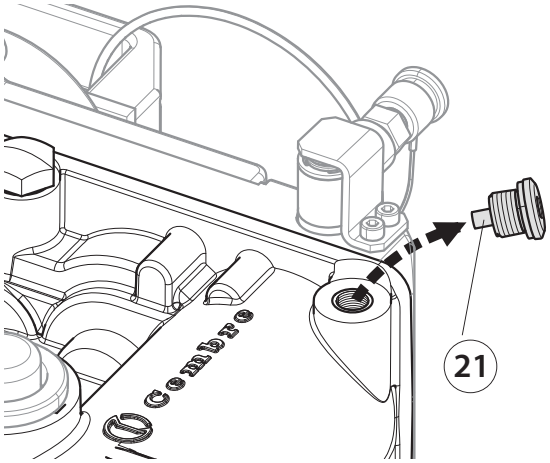
With the drill placed on a flat surface, check the oil level in the crankcase by looking through the appropriate transparent inspection cover (13). The level must be approximately half way up the cover; if the level is low top up the oil by unscrewing the cover (07) at the top of the crankcase and adding the quantity of oil required.



Only use the oil grade recommended in § 1.
Never use regenerated or used oil.
The oil must be clean.

16.1.3) Remove metallic residues from the crankcase

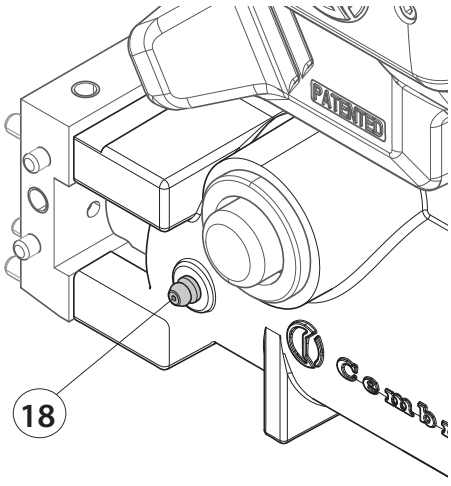
When the drill is positioned as shown in Figure unscrew the appropriate cap, with magnetic insert (21) on which any metallic residue will have collected.
Carefully clean the magnetic insert with a clean rag and screw it back in the appropriate housing.

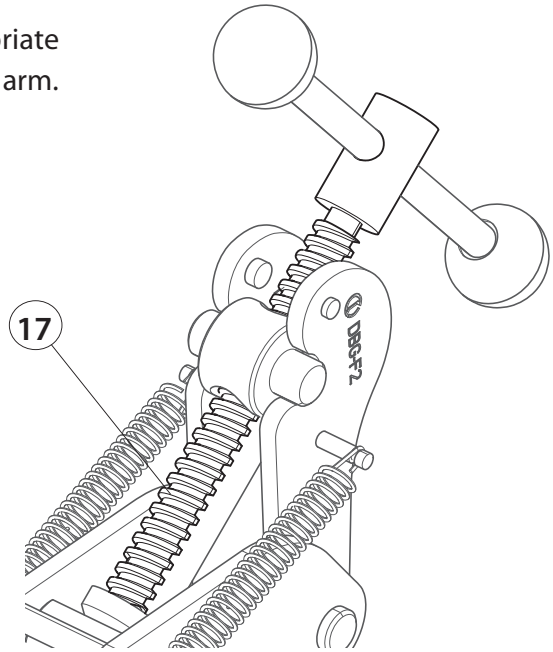


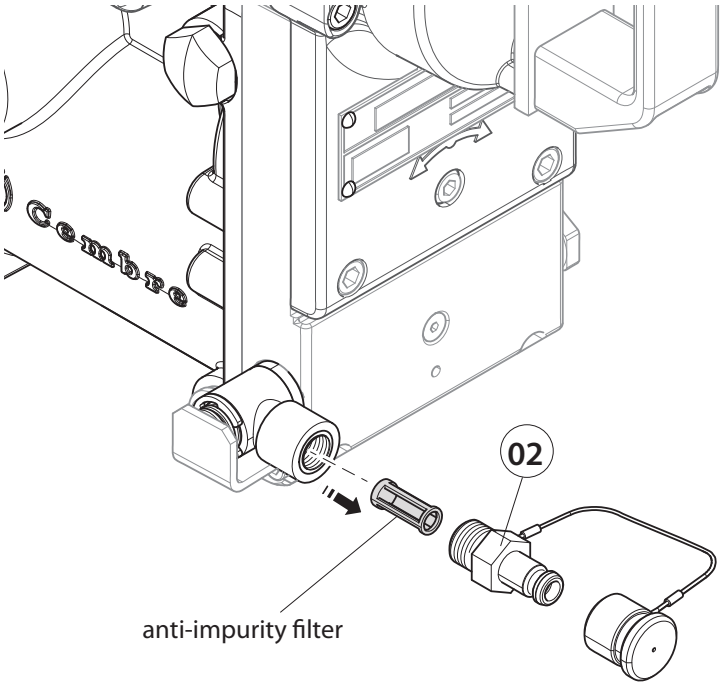
Every 50 hours of operation

16.1.4) Lubricate

Lubricate the spindle support housing by means of the appropriate lubricator (18), the screw (17) of the clamping device with moving arm.







16.1.5) Clean coolant filter

The coolant circuit of the drilling machine is provided with an anti-impurity filter; should an evident decrease of the flow of the lubrocoolant occur, it could be necessary to clean the filter 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 figure.
- ▶ Reposition and fully tighten the coupling (02).

16.2) SPECIAL MAINTENANCE OF THE DRILL

Special maintenance operations require the intervention of qualified personnel only, please contact **Cembre** (Ref. to § **17**)

APPENDIX "A" Factors which influence the number of holes that can be made according to the cutting tool used.

- **Hardness of the material to be drilled.**
- **Thickness to be drilled.**
- **Stability of the drill clamp and correct assembly of the cutter/bit.**
- **Suitable lubrocooling** (lubrication/cooling) to keep the temperature of the cutter low so as not to compromise the efficiency of the cutting edges, whilst at the same time facilitating the removal of the swarf.
- **The contact time of the cutting edge with the material and the force exerted on it;** bear in mind that drilling the hole in the shortest time may mean excessive pressure has been applied to the cutter thus reducing its efficiency. The "drilling assistance" function allows the operator to work in a manner which optimises force and time thereby maximising cutter efficiency.

Observe these basic rules:

1) Commence drilling by exerting light pressure on the advancing lever, progressively increasing and then relaxing it only when the cutter is in the exit phase.
2) Avoid pressure jolts and only advance according to the drilling diameter to avoid scratching the material or damaging the cutting edges of the cutter/bit.
3) Remember that a cutter with efficient cutting edges requires a pressure lower than that applied to one with which a number of holes have already been made.
4) When holes are made close to raised lettering on the rails, the initial pressure must be extremely light until the markings disappear, otherwise the cutter may be damaged.

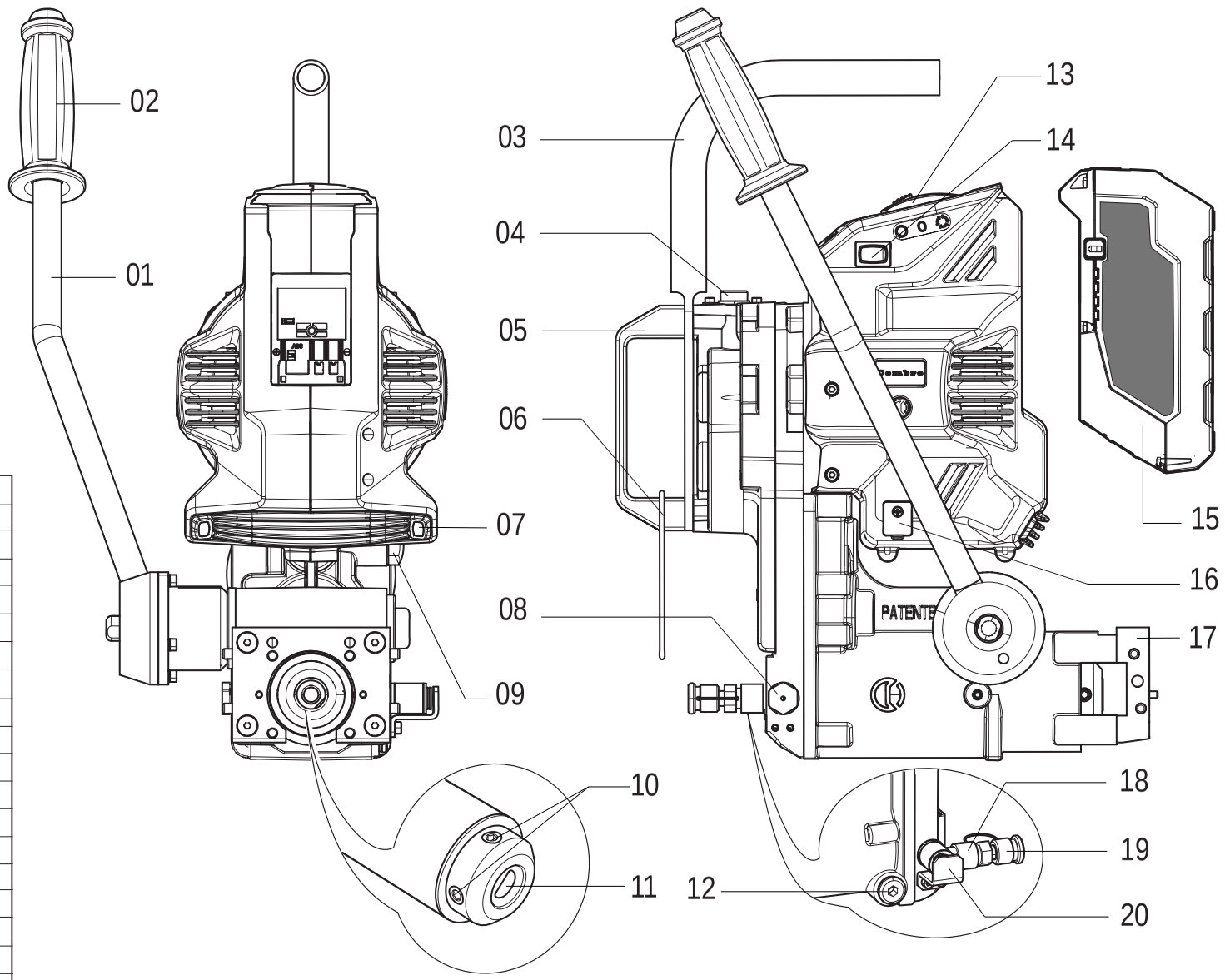
17. RETURN TO Cembre FOR OVERHAUL

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 machine to our nearest service Centre; if possible, attach a copy of the Test Certificate supplied by **Cembre** together with the machine or fill in and attach the form available in the "ASSISTANCE" section of the **Cembre** website.

When ordering spare parts always give the following information:

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

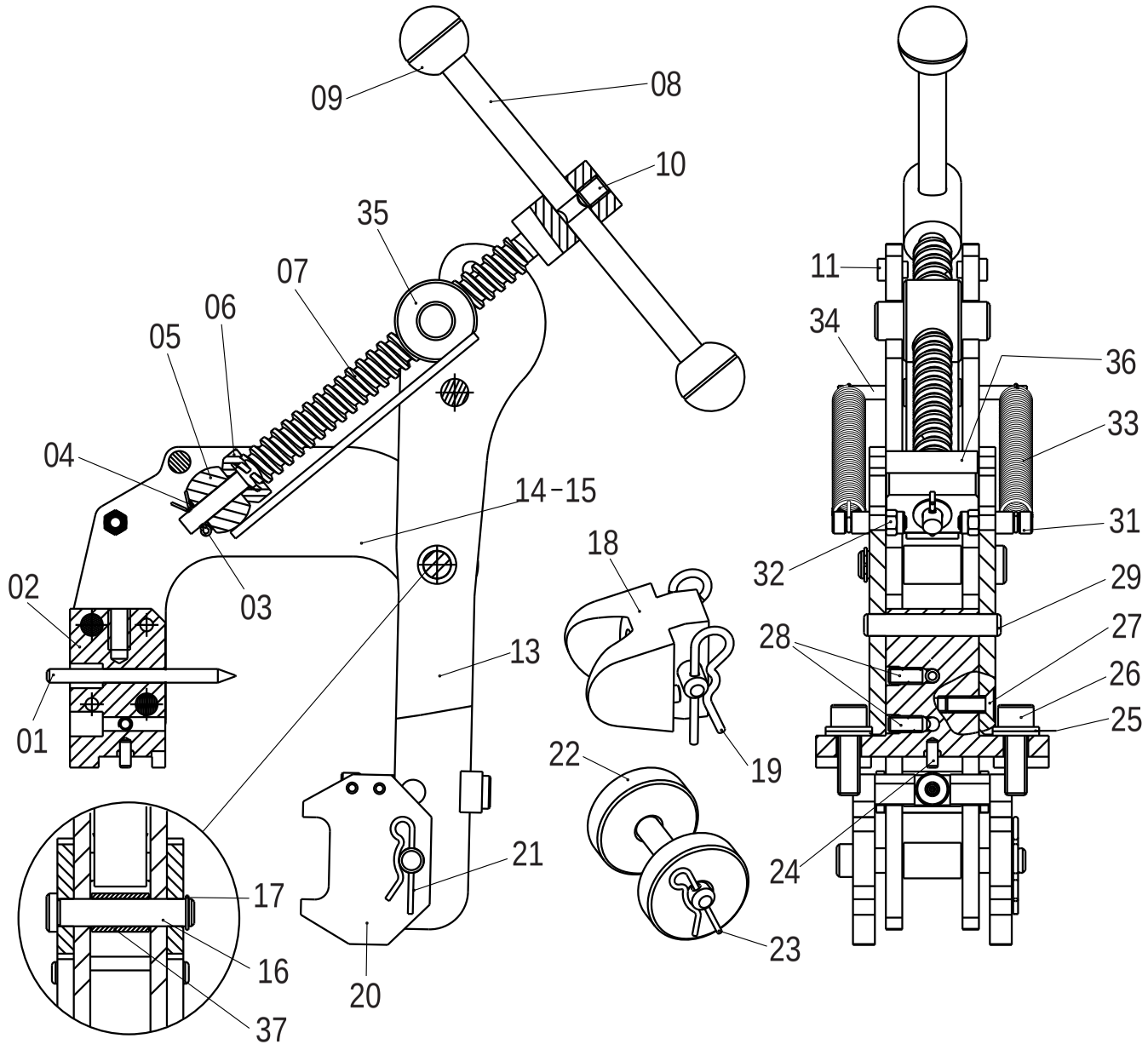
Guarantee conditions cease upon usage of non **Cembre** original spare parts.



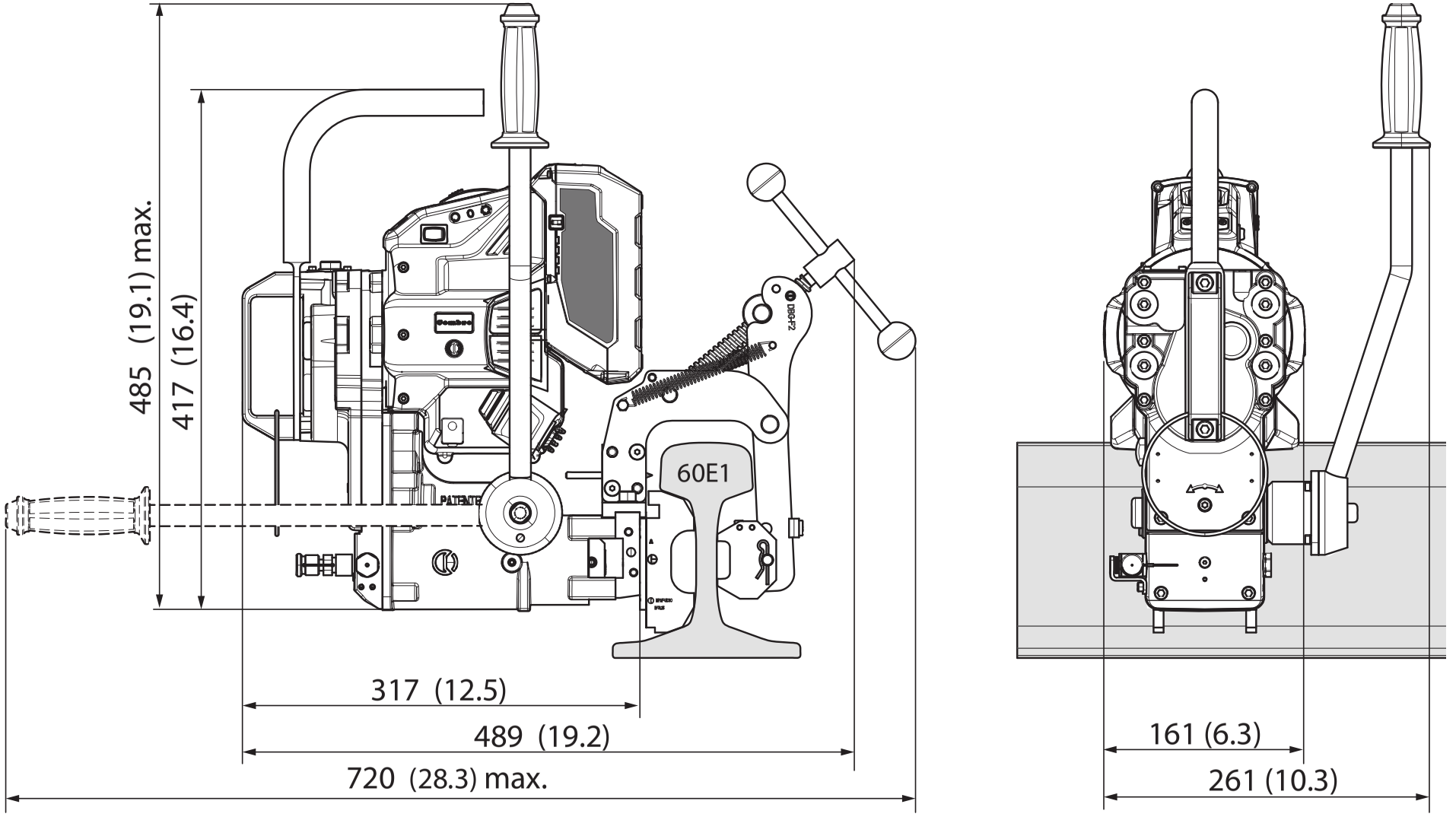
Code N°	Item	Description	Qty
6001731	20	Coupling protection plate	1
6001383	19	Coupling cap	1
6001428	18	Coolant coupling + Cap	1
2870170	17	Complete front plate	1
6004352	16	mini-USB Cap	1
2870229	15	CB3662L Li-Ion battery	1
6001211	14	Worklight ON/OFF switch	1
6004351	13	Motor ON/OFF switch	1
6001209	12	Magnetic cap	1
6004388	11	Transverse threaded pin	1
6004389	10	Spindle grub screw	2
6001195	09	Inspection cover	1
6001397	08	Complete air valve	1
6006233	07	2 LED wiring	1
6360480	06	O-Ring	1
6490050	05	Handle	1
6003034	04	Complete oil filler cap	1
6003612	03	Carrying handle	1
6380330	02	Handgrip	1
6001940	01	Spindle advance lever	1

BASIC DRILL

Code N°	Item	Description	Qty
6001155	37	Spacer	1
6002871	36	Blocking screw	1
6001762	35	Complete bush	1
6001768	34	Spring support spacer	1
6001769	33	Spring	2
6180201	32	M 5 self-locking nut	2
6001776	31	Pin	2
6760378	29	ø 8x50 cylindrical pin	2
6340612	28	M5 ball dowell	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	ø1,8x37 split pin	1
6001138	22	TDB 1 termination	1
6140082	21	ø1,8x37 split pin	1
6001775	20	TDB 6 termination	1
6140080	19	Split pin	1
6001137	18	TDB 3 termination	1
6040421	17	ø10 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 2,5x16 split pin	1
6001145	02	Blocking support	1
6001281	01	Reference pin	1



DBG-F2 RAIL WEB CLAMPING DEVICE



Dimensions in mm (inch)

Cembre Ltd.
Dunton Park
Kingsbury Road, Curdworth - Sutton Coldfield
West Midlands B76 9EB (**UK**)
Tel.: 01675 470440 - Fax: 01675 470220
E-mail: sales@cembre.co.uk
www.cembre.co.uk

Cembre S.a.r.l.
22 Avenue Ferdinand de Lesseps
91420 Morangis (**France**)
Tél.: 01 60 49 11 90 - Fax: 01 60 49 29 10
CS 92014 - 91423 Morangis Cédex
E-mail: info@cembre.fr
www.cembre.fr

Cembre España S.L.U.
Calle Verano 6 y 8
28850 Torrejón de Ardoz - Madrid (**España**)
Teléfono: 91 4852580
Telefax: 91 4852581
E-mail: comercial@cembre.es
www.cembre.es

Cembre Inc.
Raritan Center Business Park
181 Fieldcrest Avenue
Edison, New Jersey 08837 (**USA**)
Tel.: (732) 225-7415 - Fax: (732) 225-7414
E-mail: sales.US@cembreinc.com
www.cembreinc.com

Cembre GmbH
Heidemannstraße 166
80939 München (**Deutschland**)
Telefon: 089 3580676
Telefax: 089 35806777
E-mail: sales@cembre.de
www.cembre.de

IKUMA GmbH & Co. KG
Boschstraße 7
71384 Weinstadt (**Deutschland**)
Telefon: 7151 20536 - 60
Telefax: 7151 20536 - 80
E-mail: info@ikuma.de
www.ikuma.de

cod. 6261415

Cembre **www.cembre.com**

Cembre S.p.A.
Via Serenissima, 9
25135 Brescia (**Italia**)
Telefono: 030 36921
Telefax: 030 3365766
E-mail: sales@cembre.com
www.cembre.com