PANDROL

User manual

GAS-POWERED RAIL DRILL

Revision 01

Partners in excellence

Revision History

Version	Date	Author	Comments
00	18/05/2020	C. CHA	

Contents

1. Explanation of symbols

DANGER — it refers to dangers dealing with the described activity. When there is “DANGER” we refer to activities that could occur while using the machine and could endanger people.

ATTENTION — it refers to dangers dealing with the described activity. When there is “ATTENTION” we refer to activities that could occur while using the machine and could endanger the machine.

WARNING — We refer to integrations or suggestions for a correct use of the machine and to illustrate basic characteristics.

1.1 Security’s pictograms

Pictograms inside a triangle indicate DANGER.

Pictograms inside a circle impose a PROHIBITION/OBLIGATION.

Pictograms	Description
	Danger electric tension.
	Arms crushing.
	Hitching on.
	Dragging.
	Generic danger.

Pictograms	Description
	No entry for not authorized personnel.
	Don’t remove security devices.
	Don’t clean, oil, grease, repair or adjust working parts by hand.
	Don’t execute works before remove tension.
	Obligatory protection gloves.
	Obligatory safety footwear.
	Obligatory safety helmet.

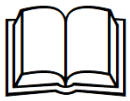
1.2 Unified symbols on the machine

Unified symbols that follows indicate danger operation or situations that could occur while using the machine.

ATTENTION

If the decals (illustrated above) are not legible, you have to substitute them with new ones.

Table 1: Unified symbols and meanings

Meaning	Symbol
This symbol indicates that you have to consult the manual.	
This symbol is applied near grip devices for lifting.	
This symbol indicates burn danger due to high temperature near thermic engine (silencer, manifold, etc)	
This symbol is applied nest to the fuel's tank's socket with mixture engine	
This symbol is applied next to the fuel's tank's socket with petrol engine	
This symbol is applied next to the fuel's tank's socket with diesel engine	

2. General safety instructions

2.1 General warning

- The drilling unit is a machine to be handled by a single user and must be held in both hands in order to run it in a safe manner.
- The operator must wear protective gear that is indispensable for the grinding operations: goggles, gaiters, gloves, etc.
- If the burst of sparks is directed (directly or indirectly) towards an inflammable material (undergrowth, crops, etc.), have a screen to intercept the incandescent particles to prevent a fire.
- Precautions to be taken during the supply of fuel:
- DO NOT SMOKE,
- STAY AWAY FROM OPEN FLAMES,
- DO NOT SPILL FUEL OUTSIDE THE TANK.
- If there is spilt fuel, immediately clean the machine and move it at least 5 m away from there before starting.
- Since the engine is warm, do not fill the tank to the brim, as the fuel may flow through the cap of the fuel tank due to expansion.
- If clothes come in contact with the fuel, change them immediately.
- The fuel must be stored in cans, in compliance with the regulations; and must be properly closed and labelled.

2.2 Environmental conditions for which the machine has been designed for

The machine in standard configuration is designed to be used in these environmental conditions:

- Work temperature: + 25°C
- Max temperature: + 40°C
- Min temperature: – 15°C
- Relative dump: 20% - 80% (without moisture)
- Protection grade: IP44
- Maximum super-elevation from the sea level: 1500 m

The machine in standard configuration has to work only in these environmental conditions.

ATTENTION

It is forbidden the use of the machine in standard execution in areas that are different from the listed above. The eventual use of the machine in non-suitable places can cause the malfunctioning or the breaking of the machine's hydraulic or electric components.

2.3 Prohibited uses

- Use the machine for aims that are different from those it is designed for
- Not correctly or moved and started according to its safety/service rules
- Carelessness and/or absence of maintenance as prescribed or use of non-original spare parts
- Use of the machine out of allowable environmental conditions
- Use the machine with excluded or damaged safety devices
- Use the machine modified in any of its parts without a written Pandrol authorization
- Use of the machine on rails without respect the rules of the railway body owner of the railway
- Use of the machine on rails open to traffic
- Use of the machine on track circuit
- Use the machine in presence of a third rails
- Use the machine in presence of inclination superior or equal to 4%
- Go away from the machine leaving the engine running - Not under the influence of drugs or alcohol.

2.4 Allowed uses

- Use the machine built only with the compatible equipment, in specific working conditions.
- Use the machine only on non-open traffic rails.

2.5 Care and maintenance

To execute maintenance and repairs, you have to move the machine in a place authorized by the team leader of the yard.

To maintain the machine clean, never use liquids easy flammable and corrosive products.

Stop the engine before every repair, maintenance and fueling work. After fueling screw on the top of the tank. Avoid fueling with hot engine. If necessary, leave the maximum level at ¾ of its capacity.

If the fuel leaks don't start the engine but clean the area tainted by the fuel. Periodically verify that there aren't fuel leaks. In case of any leaks or bad functioning stop the machine and repair when the engine is cold.

Observe the normal fire rules and fueling with engine off, always keeping in mind tank's capacity to avoid fuel spilling, in particular with hot engine.

Execute check and maintenance work prescribed according to the engine's maintenance table, as well as all the little repairs and check tightening of bolts.

The eventual lifting of the machine should be made only using the handles. For the maintenance is fundamental the use of suitable tools.

ATTENTION

It is impossible to list all the possible safety rules, so we entrust operator good sense, who, with care and caution, guarantees the best safety against every kind of accident.

2.6 Residual risk

Dangers that couldn't be deleted from safety measures adopted by the manufacturer couldn't be caused by an incorrect use of the machine or by a failed respect, due to the user, of the rules described in this manual.

The personnel in charge of the machine must be equipped of specific individual protection's devices required by law.

DANGER

During every kind of work pay attention of high voltage line, if you are next to them could cause DEATH.

2.7 Required operator's training

Every operator must read entirely with full attention this manual and respect what is written.

The Employer is obliged to verify that the operator owns all the abilities required for the operation of the machine and has carefully reviewed the manual and has to give to machine's user devices for personal protection (gloves, shoes, clothes, etc.) according to rules in force.

ATTENTION

The endothermic engine and the parts near it reach high temperatures during the operation of the machine that may cause severe burns. Use extreme care not to come into contact with these parts.

2.8 Noise

The level of pressure and acoustic power that follows have been done with the machine's engine at the maximum speed.

The medium level of acoustic pressure during the drilling operation is 81 dB (A).

2.9 Expected use

The machine has been designed and made by PANDROL for rail grinding and profiling.

There must be carefully respected safety prescriptions passed from Railway Administrations for works on rails and near them. You have to start working only after the officials in charge for safety have given their go ahead.

You have quickly and carefully executed the guidelines conveyed by the Site Manager or the safety responsible. Always leave devices and material in a way that these ones can't collide with other railway vehicles. In case of use in the presence of the third rail, it is essential to make sure that the third rail is isolated otherwise do not work.

2.10 Not expected use

Not observe the prescribed limits is equivalent to an improper use of the machine. If this happens, PANDROL will not assume any liability for accidents to persons or damage to property or the machine itself.

2.11 Safety work

Pandrol doesn't answer for accidents, working's anomalies and/or damages during the machine's use, due to user's nonobservance of laws, prescriptions, dispositions and rules in force.

The use of the machine is allowed only at the trained personnel. Only authorized people can stay near the machine. You have always to stay by safety distances from mobile parts and check that during its work normal safety prescriptions are respected. You always have to assure that advertisement given to other people are understand and executed.

Dangers that couldn't be deleted from safety measures adopted by the constructor couldn't be caused by an incorrect use of the machine or by a failed respect, due to the user, of the rules described in this manual.

2.12 Prevention of accident risks during work

- Check the drill rotation speed is compatible with the machine speed
  - Max tool diameter : 33 mm
  - Min. speed : 300 rpm
  - Drilling stroke : 48 mm
- Stop the engine before replacing the drill.
- Never use damaged drills.
- Any new or reassembled drill must be run at idle for 30 seconds; personnel must be kept at a distance during the test, except for the operator who must hold the machine in such a way that he/she is outside the safety guard opening side.
- Measure drill rotation speed at regular intervals, and imperatively every time the machine is repaired.
- Check the tightening of the drill in order to prevent any accident during drilling.
- Wearing personal protective equipment is mandatory

2.13 Precautions before commissioning

Refer to the instructions of the engine manufacturer

Check the oil level of the engine on a daily basis.

3. Presentation

3.1 General

The machine has been designed for the rapid and precise drilling of Vignola and Tram rails. The advancing lever of the crown cutter allows the operator to automatically accelerate the petrol 4 –strokes engine during the perforation only, at with the power needed in those moment. All that is possible thanks to the innovative system that has directly connected the heat engine to the lever used by the operator to drill and, consequently, there is a limit usury of the crown cutter and a lower fuel consumption.

The clamp with a rapid rail approach system, an ergonomic handle to guarantee the minimum vibrations to the operator, the action of the fully protected tool and a single couple of rail profile templates for two different rail profiles, make this rail drilling machine unique in its kind.

Table 2: General Characteristics

	VIGNOLE RAIL	TRAM RAIL
Engine	Honda GXV57	Honda GXV57
Max. Power	1.5 Kw (2HP) at 4800 rpm	1.5 Kw (2HP) at 4800 rpm
Max. Torque	3.2 Nm at 4000 rpm	3.2 Nm at 4000 rpm
Wheel rotation speed	300 rpm	300 rpm
Dimensions (L x W x H)	583 x 341 x 392 mm	695 x 341 x 392 mm
Tool max. diameter	33 mm	33 mm
Hole diameter	6 – 40 mm	6 – 40 mm
Tool max.stroke	48 mm	48 mm
Max. rail thickness	33 mm	33 mm
Weight (dry without accessories)	17.8 Kg	17.8 Kg
Vibration level at the handle	2.6 m/s²	2.6 m/s²
Sound pressure	81 dB	81 dB
Sound power	89.9 dB	89.9 dB

3.2 Control and ajustement components

Figure 1: Control and adjustment components

Components list:

1. Cooling tank
2. Rail drilling machine
3. Clamp
4. Centering viewfinder
5. Drilling template

4. Use

4.1 Transport and movement

The lifting of the machine can be done only by using highlighted devices' grips that are on the machine.

ATTENTION

Lifting operations have to be done with engine off.

It is forbidden to lift the machine hooking it from the handlebar.

We recommend to use expected personal safety devices as: gloves, safety footwear with steel toe and overalls.

During the movement, the machine must be located in a position as in the picture.

DANGER

Bump and crushing danger. During the lifting and moving you have to operate carefully.

4.2 Handling

- The weight of the grinder in order to work is 17.8 Kg.
- For its handling 1 person is necessary.

4.3 Starting up the engine

At the first start of the machine you have to execute checks that follow:

- Verify that the machine has:
  - Declaration of conformity CE
  - Engine Use and Maintenance's manual
  - Engine's manual (where expected)
  - Equipment's handbook
- General visual check of the machine
- Check and verification of the presence of identification's plate and of safety labels 4. Check and verify oil level in the engine
- Check and verification of:
- Fuel' s level.
- Machine's operation buttons on the switchboard.
- Verify electric cables' status (check the eventual presence of scratches, weakens, spelled wires or shealts, etc.)
- Check the functionality of safety and emergency devices
- Check commands and indicators' efficiency
- Varnishing's check
- Execute a functioning's test to idle in every expected operative condition
- After executing tests verify if there are lacks
- Operate the machine only after an adequate warming-up period.

ATTENTION

Before starting the machine, the operator in charge has to read completely this manual.

4.4 Checks at the beginnig of every working day

Before the start of every working day you have to check:

1. General check of the machine in particular verify if there are liquids' lacks (fuel, etc.)
2. Verify the electric cables (check the eventual presence of scratches, weakens, spelled wires or shealts,etc)
3. Check the functionality of safety and emergency devices
4. Check commands and indicators' efficiency
5. Varnishing's check
6. Verify fuel level

If one or more described points are damaged, don't use the machine and provide for re-establish the machine in efficiency conditions.

If there are any anomalies that the operator couldn't solve, contact PANDROL.

4.5 Protection and storing

When it is expected that the machine has to remain idle for a quite long period, it is necessary to take precautions to preserve machine's functionality.

4.5.1 In preparation for a short inactivity

1. Put the machine in a way that can guarantee an adequate safety.

4.5.2 Storing and preparation for a long inactivity

As above, also:

1. Clean the air filter of the engine
2. Protect the muffler to avoid that foreign bodies could enter
3. Cover the machine with a protective oil.
4. If possible, store the machine in a covered place, dry and non-dusty, or protect the machine with a plastic sheet to avoid storm damages.

4.5.3 Reclamation after a long inactivity:

1. Carefully clean the machine
2. Remove the protection on the muffler
3. Verify fuel's level
4. Open the tap of the fuel tank
5. Start the engine and idle it for some minutes
6. Check the functionality of safety and emergency devices
7. Check commands and indicators' efficiency

4.6 Lifting the machine

Lift the machine by hand with the engine stopped and the muffler away from the body, after an adequate engine cooling time, using the appropriate lifting handles.

If possible, empty the fuel tank, and secure the unit before storing the machine. Make sure that the engine switch is turned off during transport.

Figure 2: Correct lifting

ATTENTION

Lifting operations must be carried out not using the engine. We recommend to use expected personal safety devices as: gloves, safety footwear with steel tip and overalls.

DANGER

Bump and crushing danger. During the lifting and moving you have to operate carefully.

5. Machine’s use

5.1 Ignition of the engine

Fasten the machine to the rail to be drilled and make sure that the engine oil level is correct.

Figure 3: Start step 1

Figure 4: Starting step 2

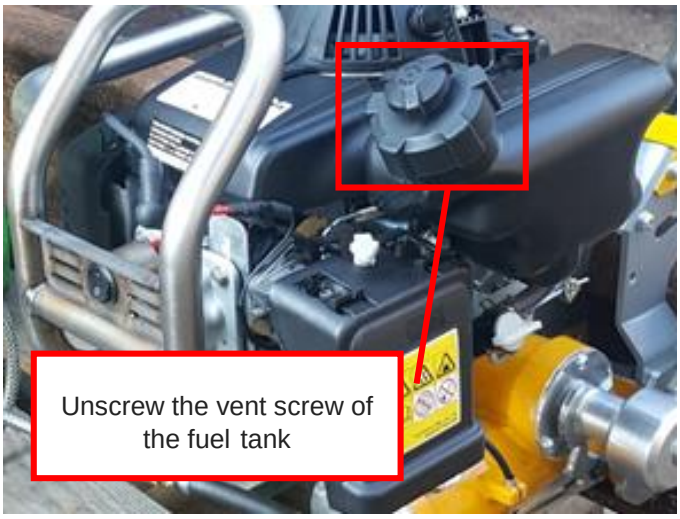


Figure 5: Starting step 3

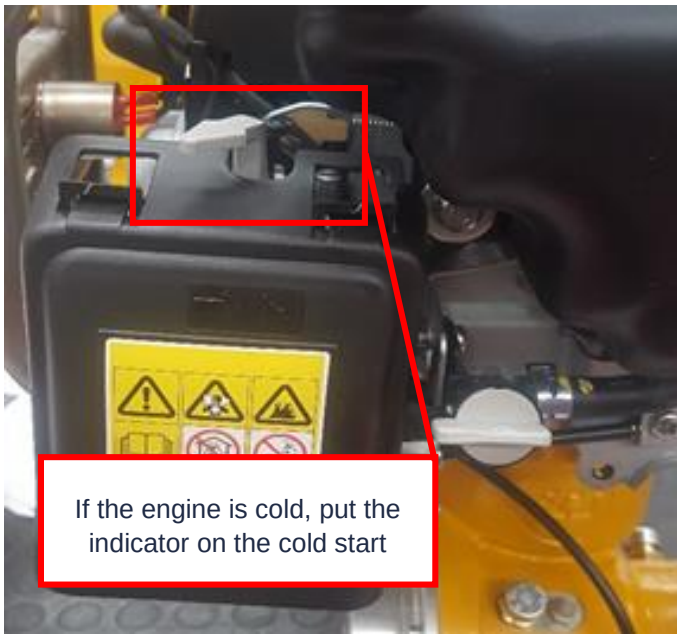


Figure 6: Starting step 4

Place the advancement lever of the machine in rest position as shown in the picture on the right.

Pull the engine starter cord many times, until the engine start.

When the engine has reached the operating temperature, move the lever in the cold start indicator from the initial position.

Move the advancement lever of the cutter toward the operator, so automatically the engine/cutter gears will increase and the cutter will penetrate into the rail, drilling it.

Place the advancement lever on the rest position, so as to keep away the tool from the rail.

If the engine does not turn on, repeat the procedure from the beginning.

Figure 7: Advancement lever position

DANGER

Once the engine is running, never leave the machine.

5.2 Switching off the engine

Move the lever to the rest position so as to move the tool away from the rail and decrease the engine speed.

Figure 8: Stopping step 1

Figure 9: Stopping step 2

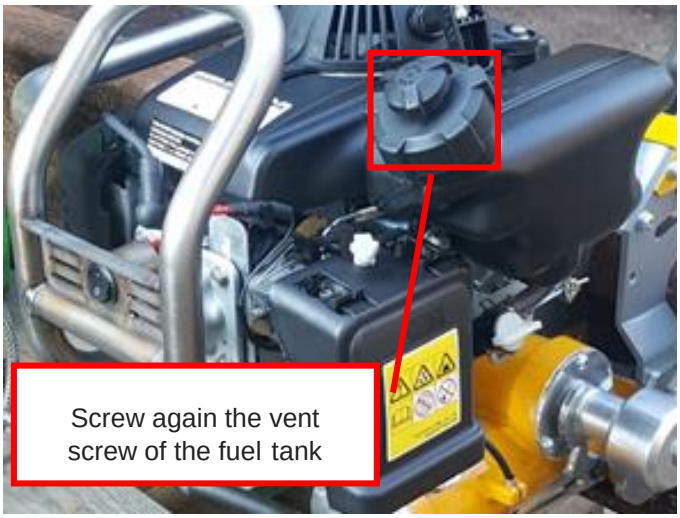
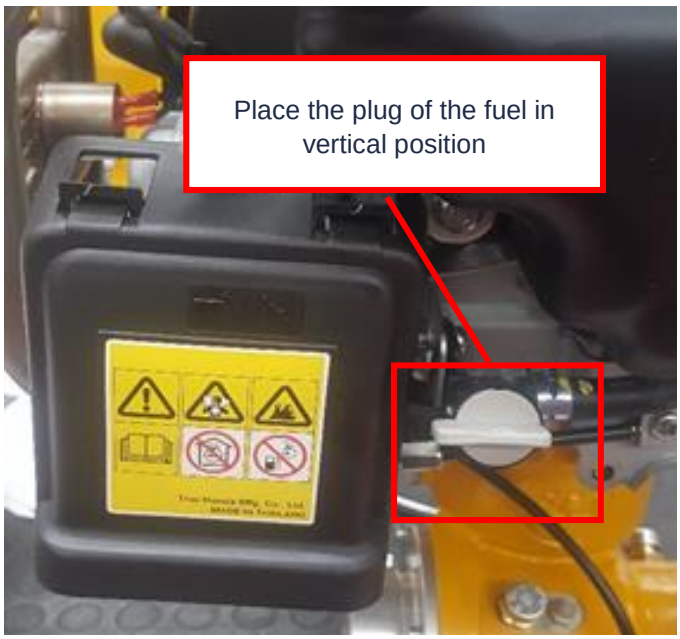


Figure 10: Stopping step 3



5.3 Refuelling

Engine tank has to be filled throughout the socket indicated on the tank and indicated on the machine by the special symbol (see paragraph “UNIFIED SYMBOLS ON THE MACHINE”).

After fuelling close the tap of the fuel tank. Avoid spilling fuel on hot engine. If necessary leave the maximum level at ¾ of its capacity.

If the fuel leaks don’t start the engine but clean the area effected by the fuel. Periodically verify that there aren’t leaks of fuel. In case of any anomaly or bad functioning stop the machine and repair when the engine is cold.

Observe the normal fire rules when adding fuel with engine off, always keeping in mind tank’s capacity to avoid leaks of fuel, in particular with hot engine.

DANGER

Petrol is extremely inflammable and explosive. A fire or an explosion could burn you and others.

Fill the tank in open space, at cold engine, and clean the accidental leaks or spills.

Do not handle petrol near to free flames or sparks.

Never remove the fuel cap when the engine is running.

You should always use unleaded gasoline with a minimum octane number 90 RON (U.S.) / Canada: octane pump. 87.

Petrol of inferior quality can damage the engine, sealing rings, the lines of fuel or the fuel tank.

ATTENTION

The structure of this kind of machine needs a particular care during fuelling operation.

5.4 Cooling liquid

The cooling fluid is contained in manually dispenser tank and is specifically formulated to significantly improve the performance and durability of the cutting tool, and improve the quality and the surface finish of the hole.

The refrigerant liquid is introduced into the system through the dispenser of the pressurized cooling fluid. Connect the cooling tank to the machine and then pressurize sever times the bottle using the upper handle. Use the valve for adjusting the fluid. Usually is sufficient regulate the valve one-quarter.

Always use the coolant liquid during drilling operation, in order to obtain a long durability of the drill bit. The EMULSOIL refrigerant is a mixture of oil and water for cutting. Always mix the oil with pure water according to the following dilution table:

Table 3: Cooling liquid percentage

Resistance on the material	% of oil to be diluted in wated
<900 MPA	5 %
>900 MPA	10 % vol

Figure 11: Coolant bottle connection

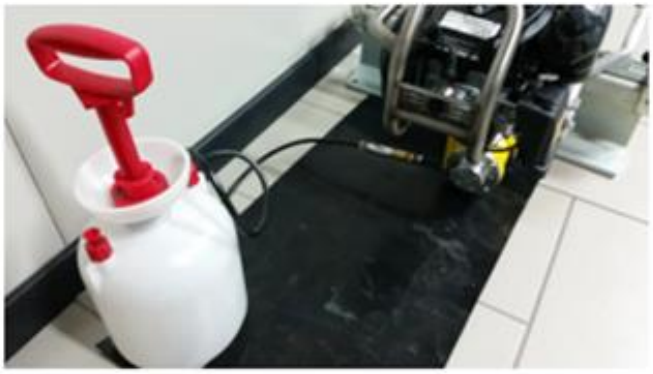


Figure 12: Rear coolant tube connection

5.5 How to use the machine

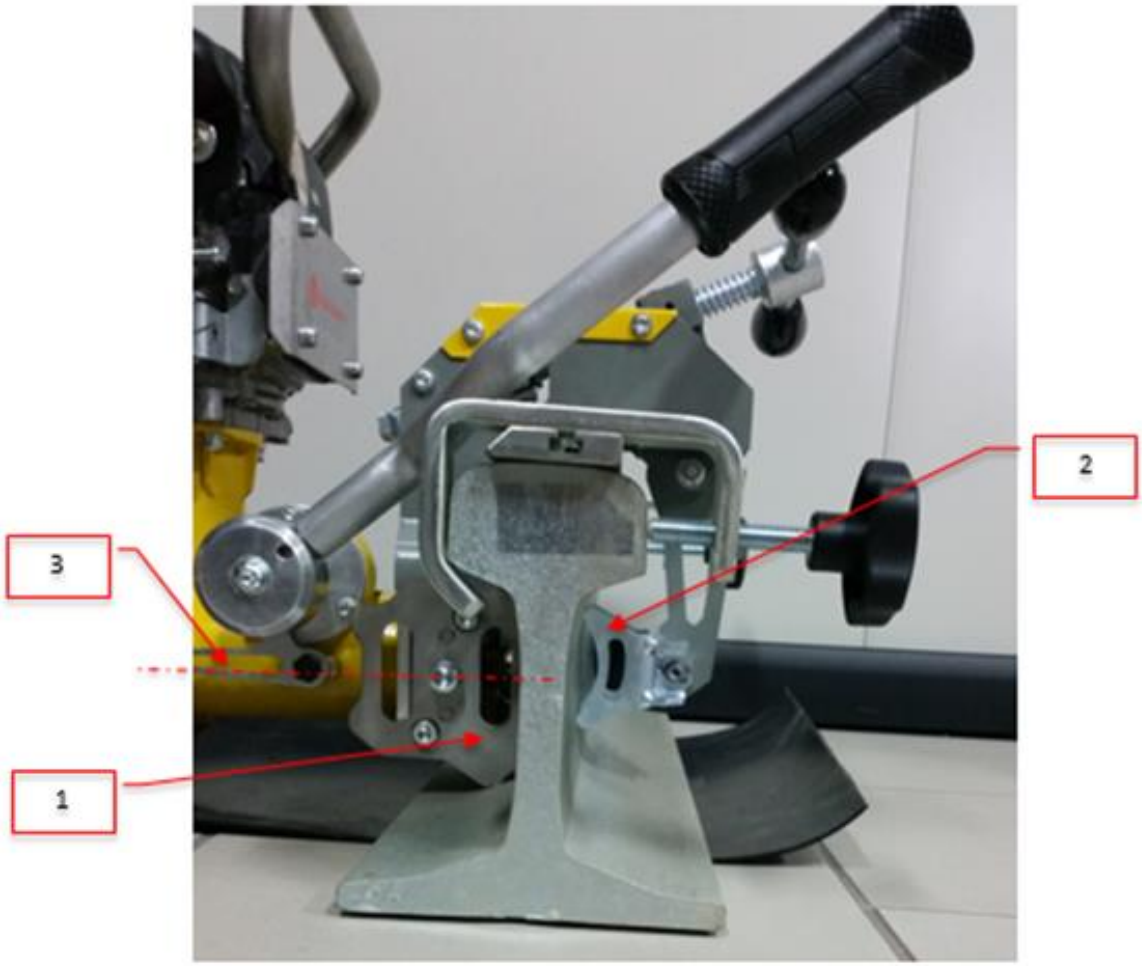
- Keep the advance lever of the tool in retracted position, so as to keep the tool away from the rail.
- Pressurize the tank of the cooling fluid by pumping the handle for 5-10 times.
- With the pressurized coolant and the dispenser connected to the machine through the feed tube, the liquid refrigerant exits automatically at the time of contact between the cutting tool and the rail.
- To ensure that the coolant correctly exits, slowly move the advance lever, so as to bring into contact the tool and the rail. Adjust the flow using the cooling fluid valve.
- While the cutting tool approaches the rail, the throttle valve automatically increase the speed of revolutions of the engine to ensure the maximum speed before cutting the hole. Once the hole has been mad, retact the advance lever, so as to return at the minimum speed.

DANGER

Do not leave the machine at maximum speed when it is not in use for drilling operation.

- Place the machine on the rail as indicated in the photo below.

Figure 13: Rail connection



- Remove solid materials on the rail to drill.
- The rail templates (1) and the support (2) have to be perfectly in contact with the web of the rail.
- The drilling axe (3) has to be horizontal.
- When starting to make a hole, apply a slight pressure until the cutting tool penetrates into the rail. Then the pressure can be increased a bit while you are making the hole. An excessive pressure is useless, because it can damage the tool, reducing the durability, or even break it.

DANGER

User that doesn't follows the instruction in the manual is exposed to potential danger situations.

ATTENTION

We recommend to use expected personal safety devices as: gloves, safety footwear with steel tip and overalls.

ATTENTION

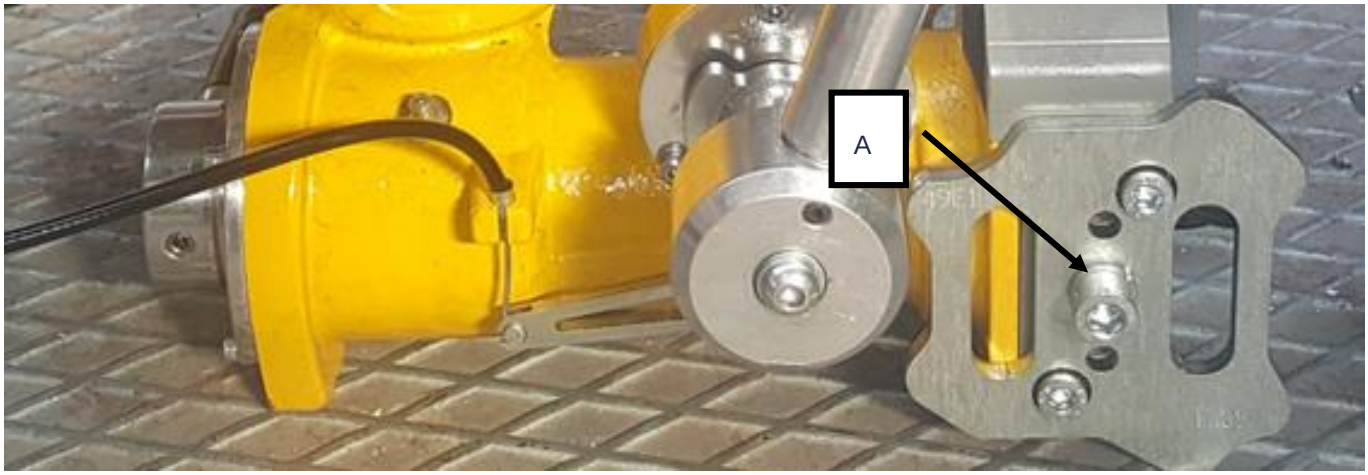
Pandrol declines all the responsibility for damages that could occur for non-fulfilment for what said before.

5.6 Replacement of the clamp (vignole – tram)

The machine is supplied in standard configuration with rail clamp for Vignola rails (UNI 60, UNI 50, S 49 etc.).

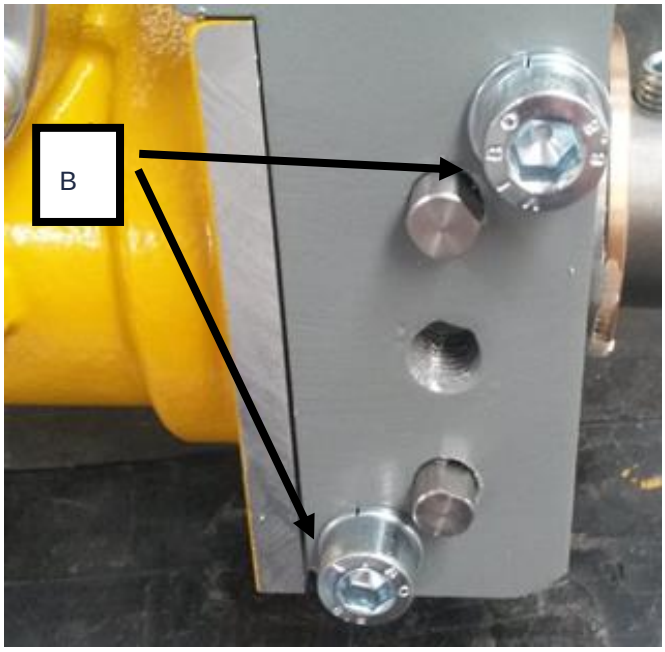
However, the machine can also drill tram rails. To do this, it is necessary to replace the clamp as follows:

Figure 14: Rail template change 1



- Remove the masks unscrewing the 2 screws with a suitable wrench of 8 mm (position A)
- Unscrew 4 screws (B) with a suitable wrench of 6 mm.
- Unscrew 4 screws (C) with a suitable wrench of 7 mm.

Figure 15: Rail template change 2



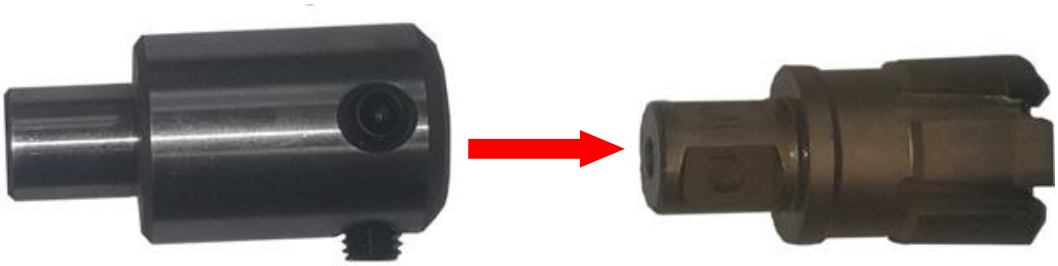
- Remove the clamp sliding it toward the opposite side of the mandrel.
- Place the other clamp and reassemble it as per the instructions above mentioned with the reverse order.
- Install the appropriate extension in the spindle. The extension is provided with the clamp kit and you have to insert the pin for the coolant inside the extension and then secure it to the spindle.

Figure 16: Pin for coolant (l: 127 mm)

Figure 17: Extension (length: 50 mm)

- Correctly insert the cutter in the extension that has the same attack and then secure it.

Figure 18: How to mount the drill



Once finished the steps above mentioned, check the tightening of the screws and make a drilling test on a piece of rail, in order to be sure that the change of the clamp has been correctly done.

ATTENTION

By drilling the following rail with the appropriate clamp, the machine can drill only the girder part and not the opposite part.

Figure 19: Not allowed operation

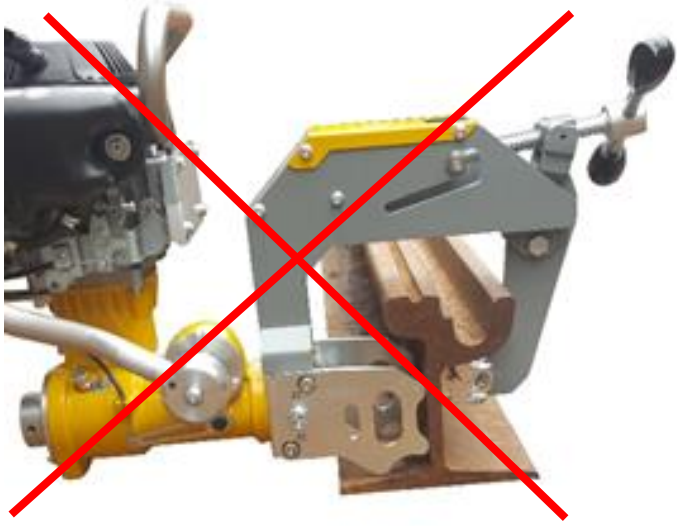


Figure 20: Allowed operation

5.7 Exchange of the cutting tool (cutter)

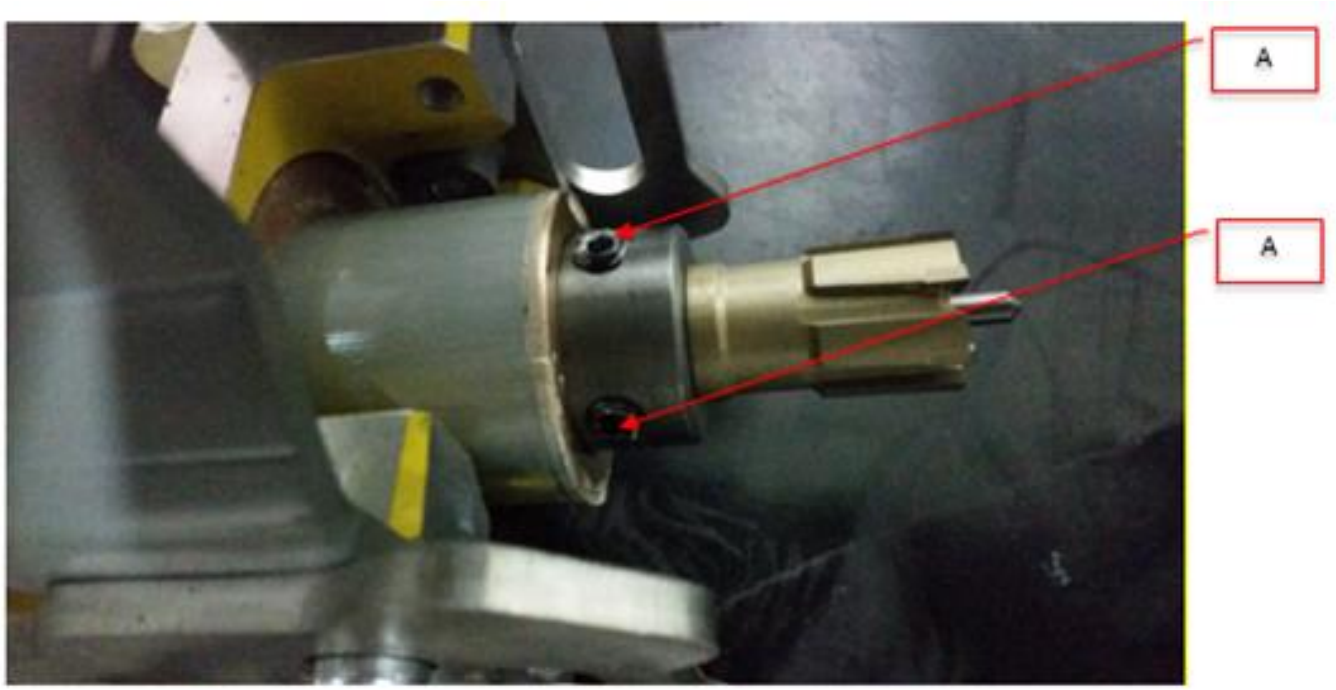
Select the drill bit on the base of the diameter of the hole to execute and insert it on the mandrel, then align it with the engine shaft and fix it with the allen screws.

The cutter is stopped in the mandrel thanks to two nuts without head.

To replace and/or assemble the cutter, please follow these instructions:

1. Remove the two headless screws with an allen wrench of 4 mm;
2. Remove the previous drill bit;
3. Insert the pin which controls the refrigerant liquid in the cutter;
4. Add the new cutter into the mandrel, making sure that everything is clean and free of impurities;
5. Tighten the two allen screws (A) for securing the cutter in the mandrel of the drilling machine.

Figure 21: How to change the drill



What to check after replacing the cutter:

- Place the drilling machine on the track, pull the advance lever so as to verify the correct functioning of the pin. It is sufficient to bring the pin into contact with a minimum pressure in the advance lever, to verify the correct opening / closing of the refrigerant liquid valve placed inside the mandrel. Check the cooling liquid capacity without drilling the rail. If the cooling liquid exits, you can proceed to drill the rail. Otherwise, it is necessary to stop, determine the cause of the problem and resolve it. Drilling without cooling liquid causes an overheating of the cutter, damaging it irreparably.

ATTENTION

The breaking of the cutting tool is usually caused by an incorrect positioning.

ATTENTION

The change of the cutting tool (cutter) has to be done with engine off.

We recommend to use expected personal safety devices as: gloves, safety footwear with steel tip and overalls.

5.8 Lightning

Use the machine just in a well lighted place.

5.9 Instruction for emergency situations

In case on emergency you can switch off the machine using the standard procedure, so by releasing the accelerator lever and pressing the switching off button.

6. Maintenance

ATTENTION

Maintenance operations have to executed only by Pandrol's Customer Service or by qualified personnel.

6.1 Preface

In order to obtain best performances and to assure all the elements the maximum life, is necessary that use and maintenance's rules are carefully followed by the operators in charge. For this we suggest to Customers, in their interest, to carefully read these notes and to consult the manual every time they need suggestions to avoid eventual drawbacks.

For further clarifications call up our customer care:

- All the maintenance's operations have to be performed with engine shut off.
- Ordinary maintenance includes all the necessary information for the good functioning and preservation of the machine.
- We suggest to let the same operator do maintenance operations, he is familiar with the machine how it works and has to know what is in the manual.
- Check of lubricant's levels must be done at cold machine and set on a lever place. Before checking levels, carefully clean areas to inspect to avoid foreign bodies enter. In case of re-establishment, use clean bins and assure that foreign bodies don't enter in the lubricant.
- Hydraulic oil, engine oil, grease, cooling liquid and any other liquid use for the good working of the machine, must be of good quality, without contaminations and brand-new.
- The substitution of engine oil must be done when hot to assist the flow.
- Some maintenance's interventions to the engine must be researched in the specific manual.
- During the disassembling and re-assembling you always have to use the extractor, keys and suitable equipment to avoid deteriorate parts.
- To unlock parts solidly adherent, use copper's hammer or suitable tools.
- Separate clearly elements of various groups and screw back the nut in part on its pins or studs. Clean the parts with a rag and then clean with de-grease blowing off residuals with compressed air.
- After grinding process or remachining with abrasive bodies , carefully clean the parts or blow them with compressed air assuring the complete aspiration of the abrasive dust.
- During the re-assembling of various parts, assure that they are clean and then carefully lubricate.
- Ordinary maintenance's operations indicated on the table that follows must have the same frequency of the machine's working hours indicated on the column at the right, under period.

6.2 Trouble shooting

Table 4: Trouble shoot table

BREAK DOWN	POSSIBLE CAUSES	REMEDIATION
The engine doesn't start	Leak of fuel	Fill the fuel tank
	Plug wet by excessive fuel	Remove the plug Pull the power retractable handle for 5 – 6 times Install the plug Place the choke lever open pull the power retractable handle
	Fuel channel bent or disconnected	Verify the integrity of the channel
	Malfunction of carburettor	Leak of air in the carburettor Incorrect adjustment of the carburettor Blocked fuel float Carburettor's valve incorrectly adjusted
	Switch in OFF position	Turn the switch in ON position
	Spark not present	Incorrect connection of the starting coil Spark plug to be replaced Failed starter coil
	Short circuit stop switch	Repair or substitute
	Dirty plug	Clean or substitute the plug
	Wrong distance of the candle	Adjust the play correct at 0,6 mm
	Faulty connection cable plug	Verify the connection
	Failed coil injection	Substitute
The engine turns off after starting	Leak of fuel	Fill the tank with fuel
	Power handle in close position	Open the power valve
	Air enters in the feeding system	Verify the connections
	Malfunctioning of the carburettor	Leak of air in the carburettor Incorrect adjustment of the carburettor Blocked fuel float Carburettor's valve incorrectly adjusted
	Plug doesn't work	Substitute the plug
	Failed coil injection	Substitute
Engine overheating	Wrong % of mixture	Fill the tank with correct % of fuel
	Wrong plug	Substitute the plug
	Dirty cylinder	Clean the cylinder
The clamp doesn't open with the "quick release mechanism"	Visually look the mechanism, to check if there are some obstacle along the side slits	Remove obstacles and / or impurities
Reduced output power	Dirty air filter	Clean the air filter
	Clogged silencer or clogged cylinder flue pipe	Clean
	Loss of pressure in the cylinder	Replace seal rings or the cylinder

6.3 Maintenance table

Table 5: Maintenance Table

		PERIODICITY					
OBJECT	DESCRIPTION	Before use	After use	Every 3 months or 25 hours	Every 6 months or 50 hours	Every 100 hours or 4000 holes	Every year or 500 hours or 20000 holes
Engine oil	Check	X		X			
	Replace		X		X		
Air filter	Check	X					
	Clean			X			
Plug	Clean/Adjust					X	
	Replace						X
Fuel filter	Clean					X	
Idle speed	Check/Adjust					X	
Valve clearance	Check/Adjust						X
Combustion chamber	Clean						X
Grease gear box	Top up					X	X
	Replace						X
Fuel pipelines	Check						X

Table 6: Engine adjustments

Valve clearance	Aspiration 0,06 - 0,1mm Exit 0,09 - 0,31	It is recommended to make this adjustment by a Honda dealer /agent
Idle Speed	2500 - 2600 rpm	It should be the idle speed without the tool installed
Type of plug	NGK C5HSB	0,6 - 0,7 (.024”-.028”)
Type of oil	SAE 10W-30	
Type of grease of the gear box	Termoplex ALN VP 2	

DANGER

For starting the engine and doing its maintenance refer to its manual of operation and maintenance.

6.4 Verify the engine oil

DANGER

The check of the oil has to be done with engine off.

For the engine refer to the manual of operation and maintenance of the Honda engine supplied with the machine.

6.5 Lubricating the machine

The machine has a part to lubricate according to the maintenance table.

- The gearbox

6.6 Lubricating the gearbox

The lubricant has to be introduced through a lubricator on the right side of the machine (shown in position 1).

The refilling of the grease should be done every 100 working hours (about 4000 holes).

The complete replacement of the grease should be done every year or every 500 working hours (20000 holes).

If the grease has to be replaced, remove the posterior cap to allow the escape of all the grease and clean inside the gearbox.

The figures below show how to fill and clean the gearbox.

Figure 22: Gearbox grease point

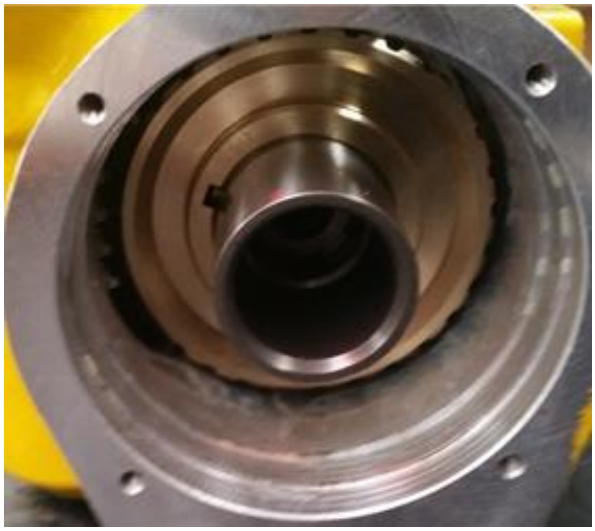
Figure 23: Gearbox greasing

In the picture is indicated with an arrow the hole to be used as the correct level of lubrication. The greasing operations have to be performed with engine off proceeding as indicated above.

In the pictures below you can see how to proceed with the replacement of grease. You can see the disassembly and the gearbox after cleaning. Before inserting the new grease close the box proceeding to the assembly of the parts with the reverse order of assembly.

Figure 24: Gearbox disassembly

Figure 25: Gearbox assembly



6.7 Cleaning

After each use, clean the machine and, in particular, the chippings drill bit as follow:

- If you are using a water jet or high-pressure cleaner do not wash the engine.
- Do not use any combustible or easily flammable cleansers.
- Do not leave paper or tatters used for cleaning on the engine and the machine.

6.8 Fire

In case of start of a fire, use a CO2 extinguisher (not supplied) according to guidelines in force.

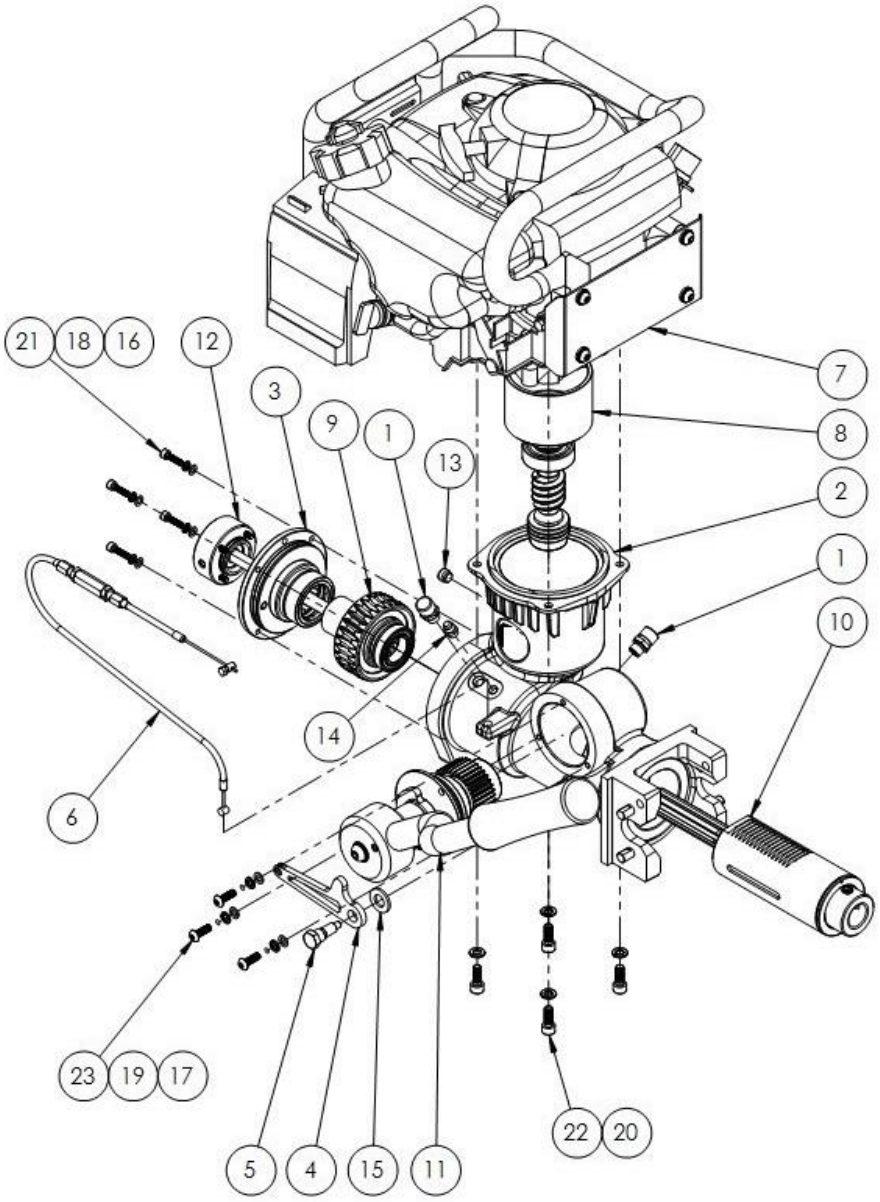
In case of machine on fire or if the machine is near a fire, give the alarm in the yard and call the fire brigade.

6.9 Breaking up and disposal

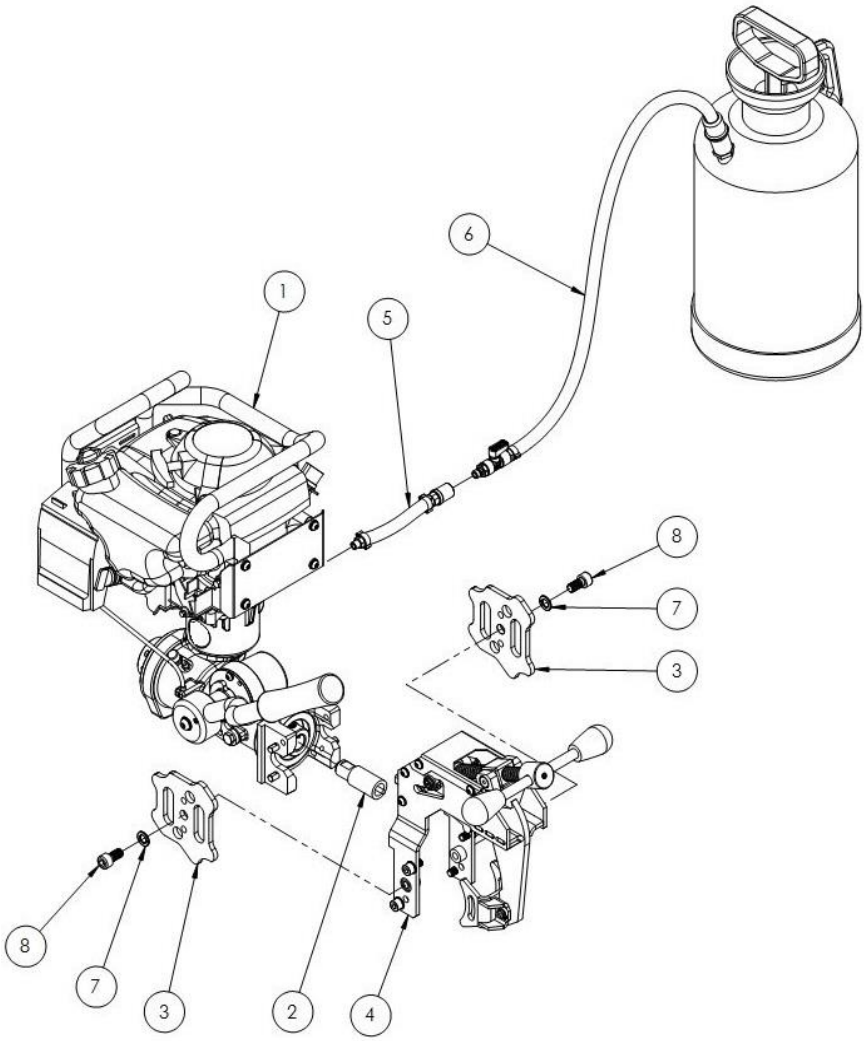
At the end of machine's life, remember that the owner of the machine must provide for its dismantling for the machine disposer according to guidelines in force.

Remember that every time that you substitute oil, hose and every machine's detail prone to different disposal, you always need to make reference to rules in force and to authorized disposals.

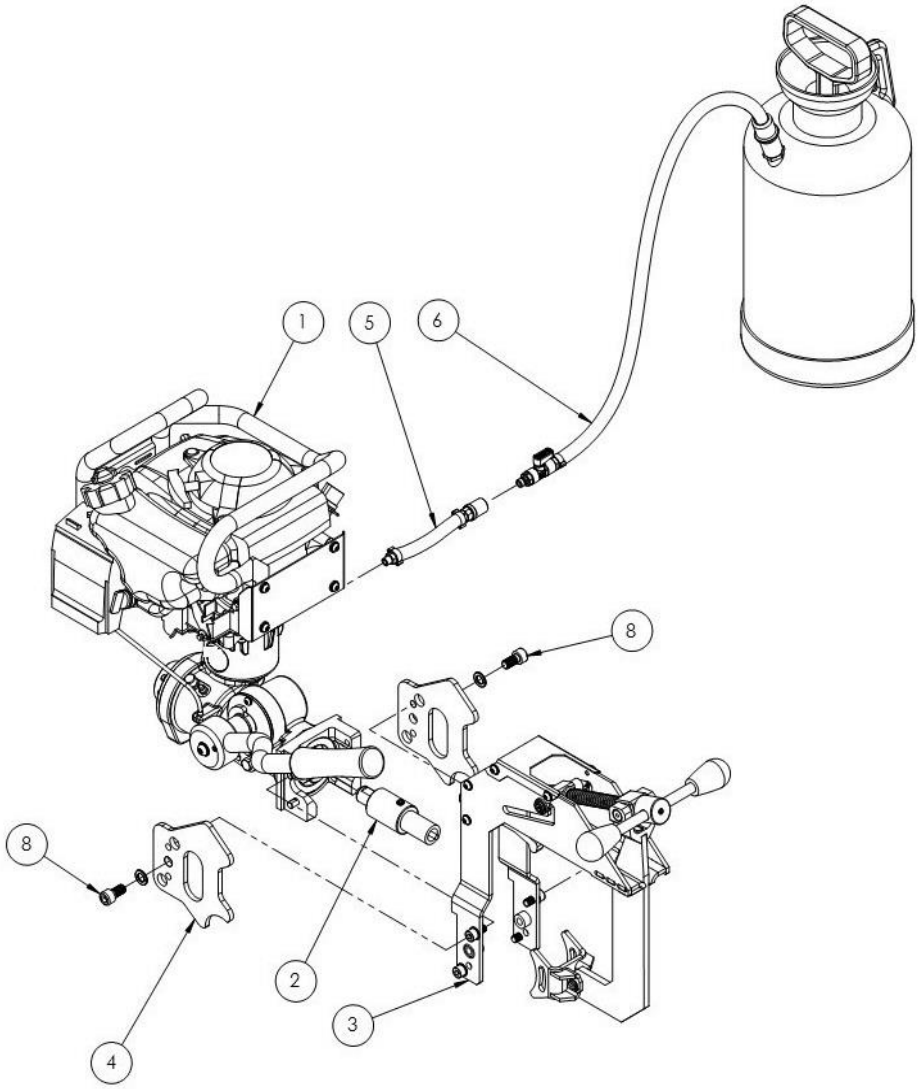
7. Spare parts



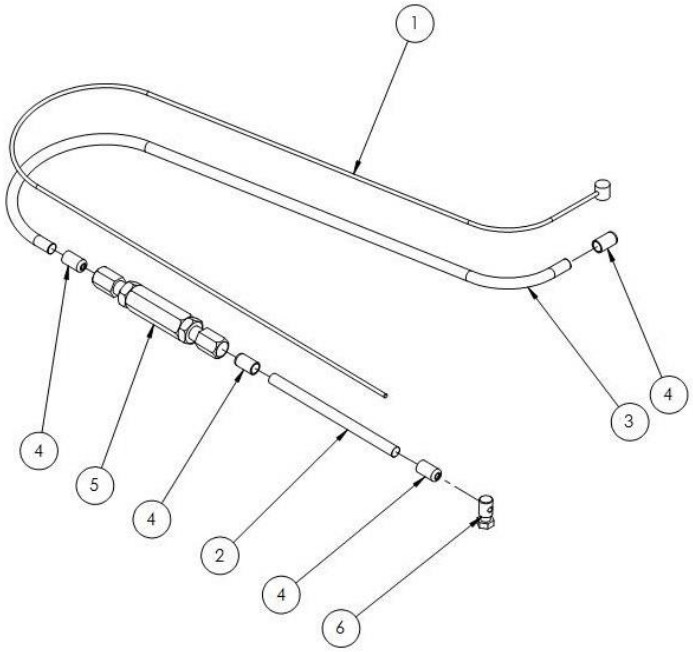
RAIL DRILL			
ITEM	**QTY**	**NUMBER**	**DESCRIPTION**
1	2		GEARBOX SCREW
2	1	FDRILL0013	CASE ASSEMBLY
3	1	FDRILL0014	REAR PLUG ASSEMBLY
4	1		FEED-IN MOUNTING BRACKET
5	1		FEED-IN MOUNTING MAIN SCREW
6	1	FDRILL0015	THROTTLE CABLE ASSEMBLY
7	1		ENGINE ASSEMBLY
8	1	FDRILL0016	POWER TRANSMISSION ASSEMBLY
9	1	FDRILL0017	GEAR ASSEMBLY
10	1	FDRILL0018	CUTTING ARBOR ASSEMBLY
11	1	FDRILL0019	FEED-IN ASSEMBLY
12	1	FDRILL0020	COMPLETE REAR PLUG ASSEMBLY
13	1		ENGINE POSITIONNING SCREW
14	1		GREASE POINT
15	1		FEED-IN MOUNTING WASHER
16	4		COMPLETE REAR PLUG MOUNTING SCREW
17	3		FEED-IN MOUNTING SCREW
18	4		COMPLETE REAR PLUG MOUNTING SCREW
19	3		FEED-IN MOUNTING SCREW
20	4		ENGINE MOUNTING SCREW
21	4		COMPLETE REAR PLUG MOUNTING SCREW
22	4		ENGINE MOUNTING SCREW
23	3		FEED-IN MOUNTING SCREW



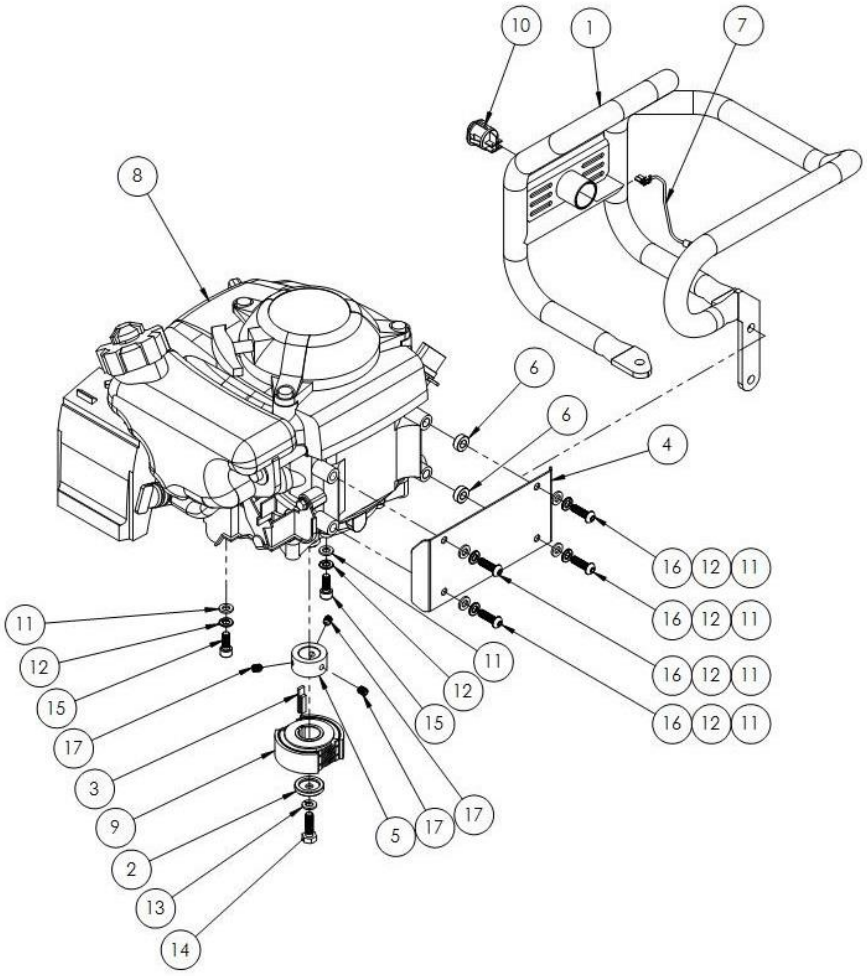
VIGNOLA RAIL EQUIPMENTS			
ITEM	**QTY**	**NUMBER**	**DESCRIPTION**
1	1		RAIL DRILL
2	1	FDRILL0021	DRILL
3	2	FDRILL0022	RAIL TEMPLATE
4	1	FDRILL0023	VIGNOLE RAIL CLAMPING UNIT
5	1	FDRILL0024	REAR COOLANT TUBE ASSEMBLY
6	1	FDRILL0025	COOLANT BOTTLE ASSEMBLY
7	2		RAIL TEMPLATE MOUNTING WASHER
8	2		RAIL TEMPLATE MOUNTING SCREW



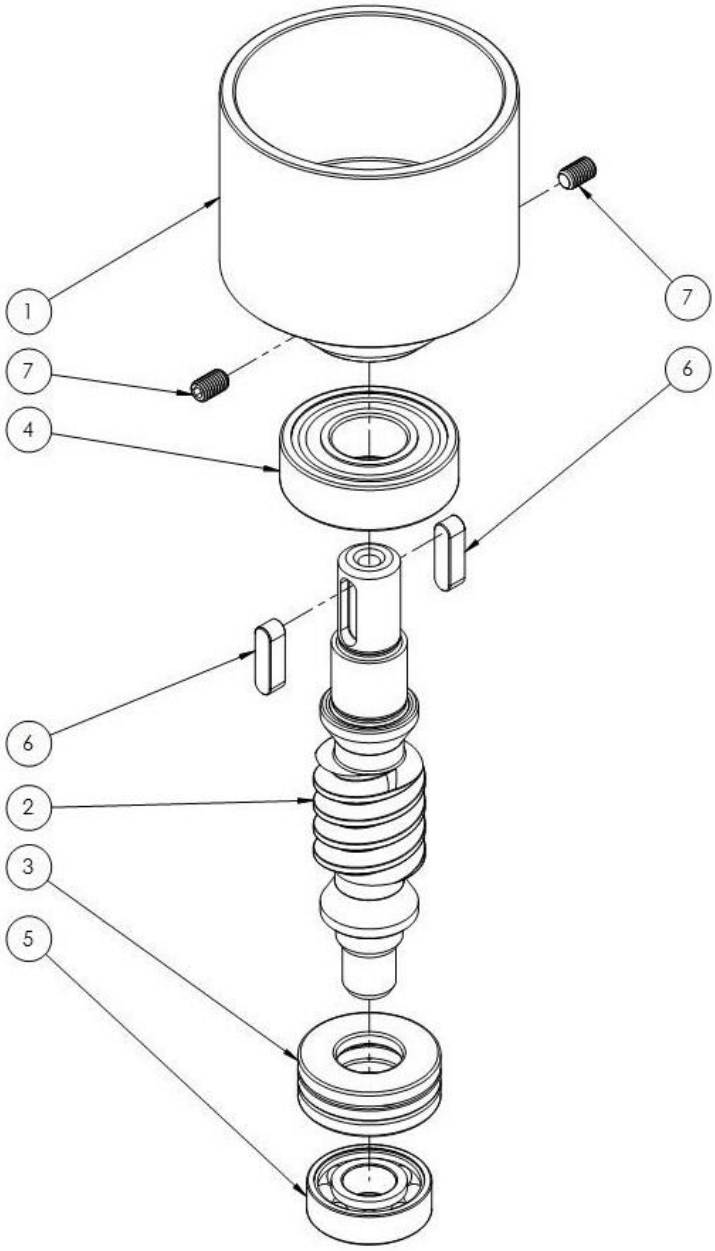
GROOVED RAIL EQUIPMENTS			
ITEM	**QTY**	**NUMBER**	**DESCRIPTION**
1	1		RAIL DRILL
2	1		DRILL
3	2		RAIL TEMPLATE
4	1	FDRILL0026	GROOVED RAIL CLAMPING UNIT
5	1		REAR COOLANT TUBE ASSEMBLY
6	1		COOLANT BOTTLE ASSEMBLY
7	2		
8	2		RAIL TEMPLATE MOUNTING SCREW



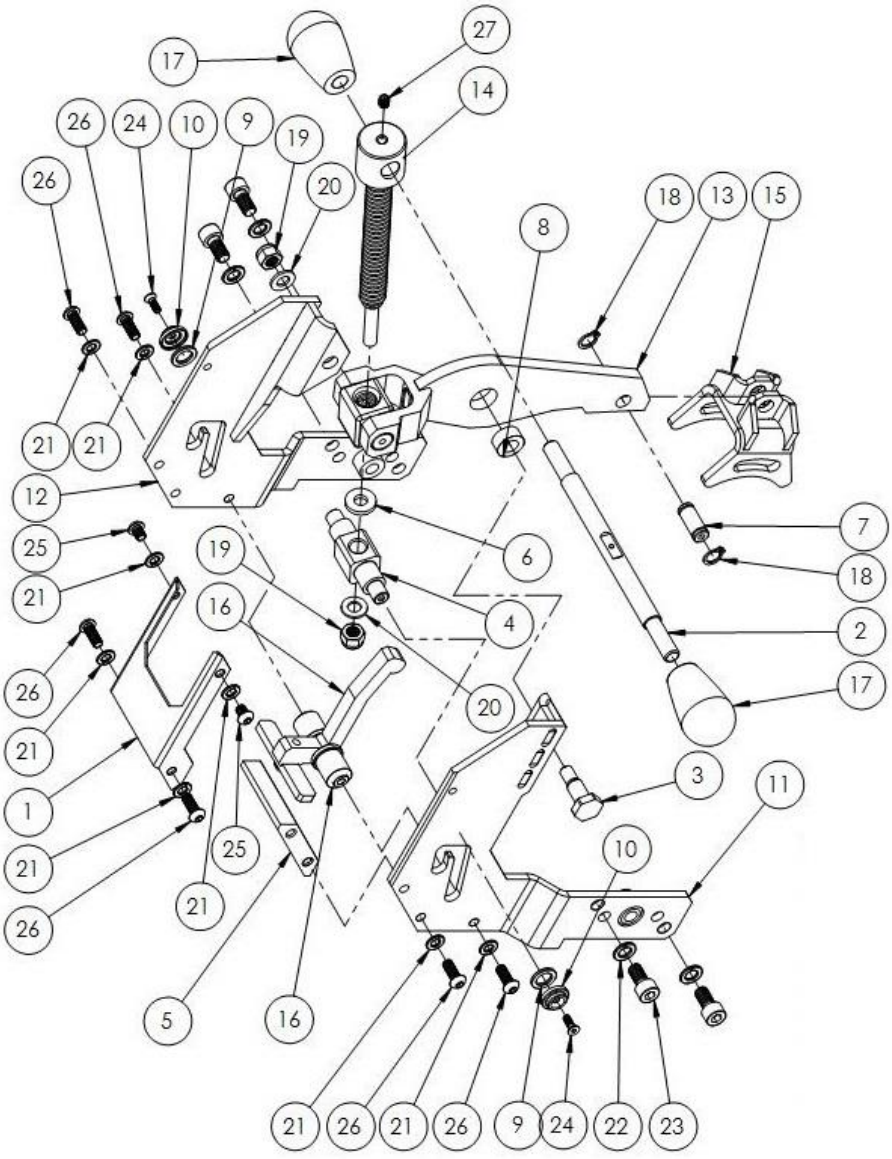
THROTTLE CABLE ASSEMBLY			
ITEM	**QTY**	**NUMBER**	**DESCRIPTION**
1	1	FDRILL0027	THROTTLE CABLE
2	1		THROTTLE END CABLE
3	4		THROTTLE CABLE HOUSING
4	4		THROTTLE CABLE CAP
5	1		THROTTLE CABLE TENSIONNER
6	1		THROTTLE CABLE CONNECTOR



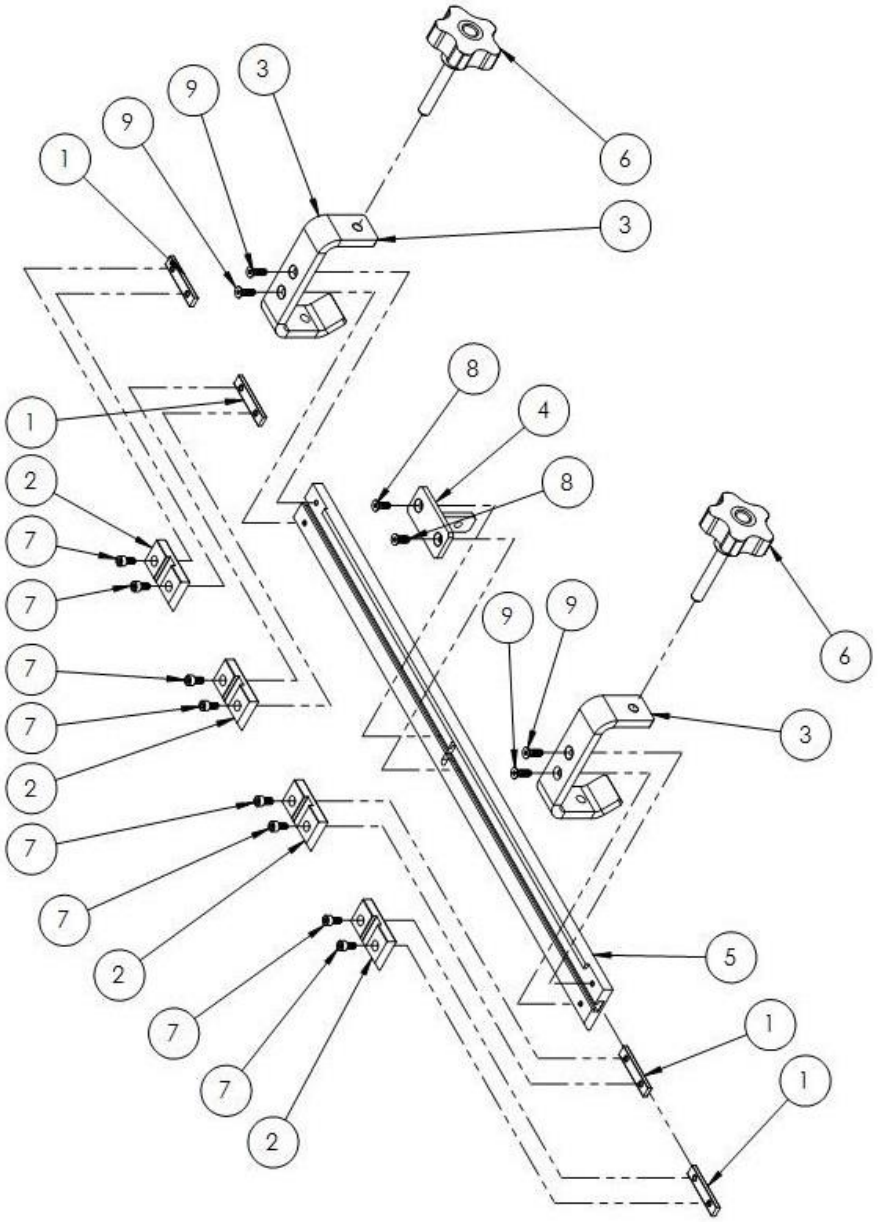
ENGINE ASSEMBLY GXV57			
ITEM	**QTY**	**NUMBER**	**DESCRIPTION**
1	1	FDRILL0028	ENGINE FRAME
2	1		ENGINE SHAFT RING
3	1		ENGINE SHAFT KEY
4	1		ENGINE MOUNTING PLATE
5	1		CLUTCH ADAPTATOR
6	2		MOUNTING PLATE SPACER
7	1	FDRILL0029	IGNITION CABLE
8	1	FDRILL0030	HONDA GXV57
9	1	FDRILL0031	CLUTCH
10	1	FDRILL0032	IGNITION BUTTON
11	6		ENGINE ASSEMBLY WASHER
12	1		ENGINE ASSEMBLY ELASTIC WASHER
13	1		ENGINE SHAFT WASHER
14	1		ENGINE SHAFT SCREW
15	2		ENGINE ASSEMBLY BOTTOM SCREW
16	4		ENGINE ASSEMBLY FRONT SCREW
17	3		ADAPTATOR POSITIONING SCREW



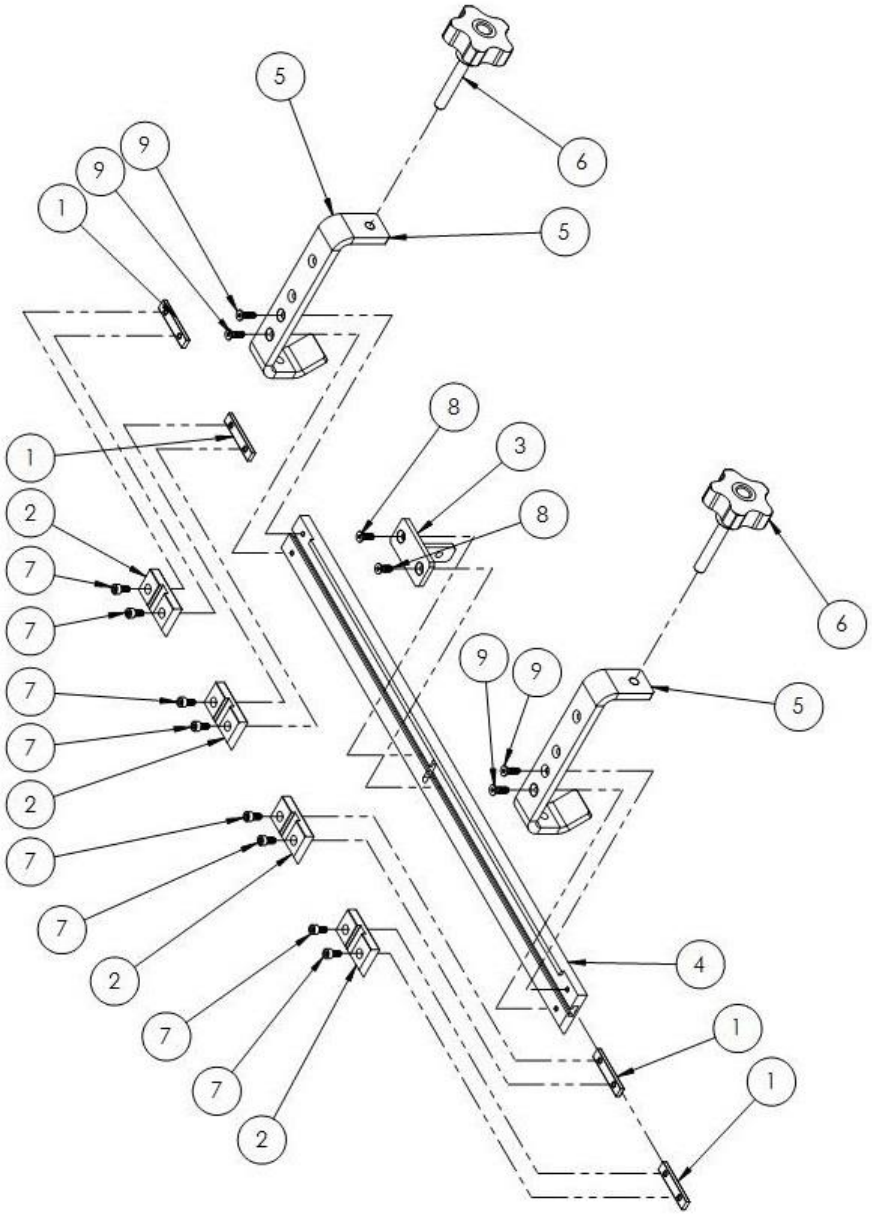
POWER TRANSMISSION ASSEMBLY			
ITEM	**QTY**	**NUMBER**	**DESCRIPTION**
1	1	FDRILL0033	CLUTCH HOUSING
2	1		VERTICAL SHAFT
3	1		TRANSMISSION BOTTOM RING
4	1		TRANSMISSION TOP BEARING
5	1		TRANSMISSION BOTTOM BEARING
6	2		POWER TRANSMISSION KEY
7	2		CLUTCH HOUSING POSITIONING SCREW



VIGNOLE CLAMPING UNIT			
ITEM	**QTY**	**NUMBER**	**DESCRIPTION**
1	1		CLAMP TOP PLATE
2	1	FDRILL0034	CLAMP LEVER SHAFT
3	1		MOVING CLAW CENTRAL PIVOT
4	1	FDRILL0035	CLAMP LEVER PIVOT
5	1		CLAMP BACK PLATE
6	1		LEVER PIVOT ASSEMBLY BIG WASHER
7	1		CLAMP TOE AXLE
8	1		CENTRAL PIVOT BUSHING
9	2		SIDE PARTS ASSEMBLY WASHER
10	2		SIDE PARTS ASSEMBLY ELASTIC WASHER
11	1		RIGHT SIDE PART
12	1		LEFT SIDE PART
13	1		MOVING CLAW
14	1	FDRILL0036	CLAMP LEVER THREADED SHAFT
15	1	FDRILL0037	CLAMP TOE
16	1	FDRILL0038	VIEWFINDER
17	2		CLAMP LEVER SHAFT PASTIC HANDLE
18	2		CLAMP TOE ASSEMBLY CIRCLIPS
19	2		SIDEPARTS ASSEMBLY NUT
20	2		LEVER PIVOT SMALL ASSEMBLY WASHER



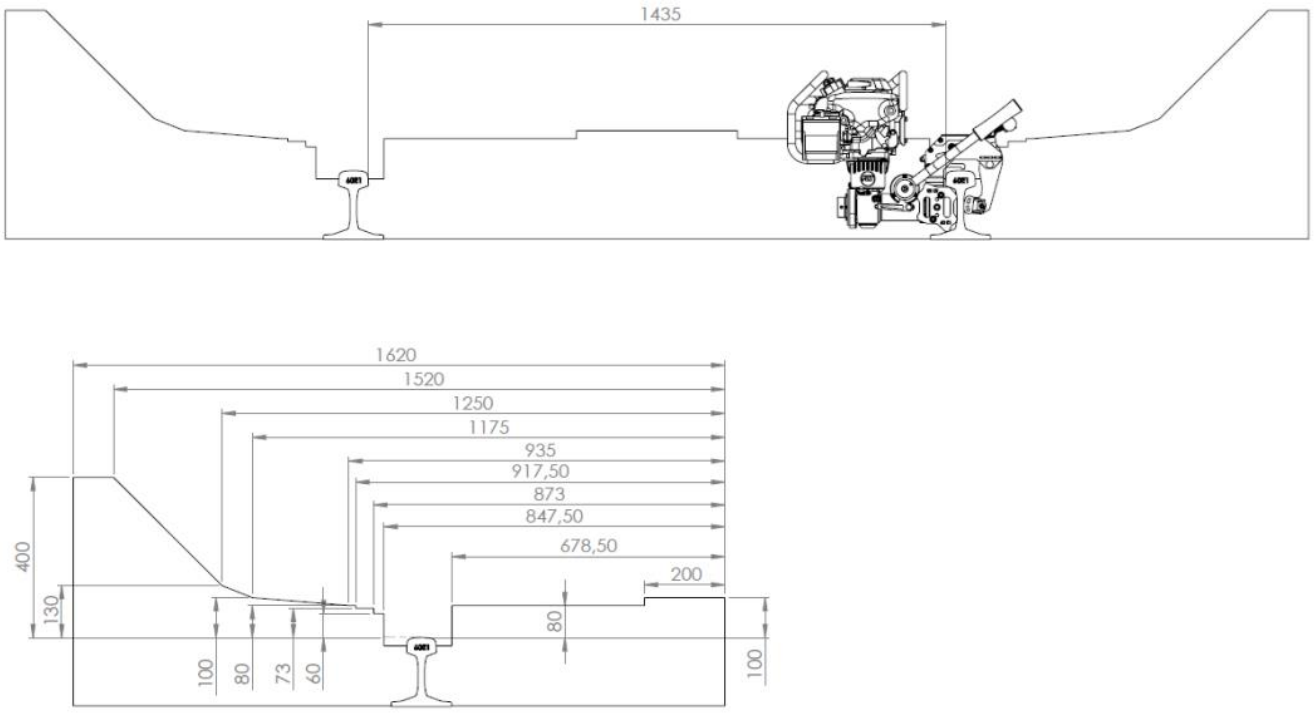
VIGNOLE RAILS HOLES LOCATOR			
ITEM	**QTY**	**NUMBER**	**DESCRIPTION**
0	1	FDRILL0039	VIGNOLE RAILS HOLES LOCATOR



GROOVED RAILS HOLES LOCATOR			
ITEM	**QTY**	**NUMBER**	**DESCRIPTION**
0	1	FDRILL0040	GROOVED RAILS HOLES LOCATOR

8. Conformance to gauge

Figure 26: Conformance to gauge



PANDROL

Find out more at

pandrol.com

Partners in excellence