OPERATING MANUAL

ROTAMP LIGHT

62.05L / Vers. 02

Vertical tamper

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These operating instructions were issued taking into consideration
the latest technology at the time of printing.
They are subject to change due to new developments.
Dimensions and weights are approximate.
Some photos show special designs.

Content

1. General Information

Staff operating and maintaining this product must have read and understood these operating instructions.

All those involved must have access to the operating instructions at all times.

1.1 About these instructions

The following symbols are used to mark operating procedures, lists and other elements of these instructions:

Symbol	Explanation
1. Action 2. Action	**Operating procedure** - the sequence of actions must not be changed.
• List 1 – List 1.1 • List 2	**List**- Sequence may be changed.
► Measure ► Measure	**Measure** - the sequence must not be changed.

1.2 General Regulations

Appropriate legal requirements and accident prevention measures for use of this product must generally be observed. If they are not observed, the operator of the appliance takes responsibility for any legal consequences.

In the event of differences between prevailing regulations that apply to use of the product and the manufacturer's or subcontractor's specifications, whichever limitations are the most stringent must apply.

The buyer must provide all necessary machinery, equipment and material resources for putting the delivered product into operation and training staff. He must also make available unrestricted, safe and sufficiently long track and work sections, on which staff can learn how to operate and use the delivered product and practise these tasks. Since the manufacturer or supplier of the product has no influence over the buyer's particular staffing and operating circumstances, no responsibility is accepted for the effectiveness of the instructions.

ROBEL Bahnbaumaschinen GmbH together with its customer service organizations are however happy to provide further advice, training or other consultative services. Further details and conditions can be obtained separately.

1.3 Intended Audience for this Operating Manual

This manual contains the information needed to use the product they describe correctly.

The manual has been written exclusively for technically qualified personnel. Qualified personnel in this context are:

- Personnel who can prove that they are qualified to use this product either through training or experience,
- Personnel familiar with the safety concepts that relate to machinery and equipment,
- Maintenance and service personnel who are specially trained to repair machines, appliances and its accessories.

Only persons who can read and understand this manual are allowed to use the product. They should sign to indicate that they have read and understood the manual.

Replacement, maintenance and operation of the product should only occur where official regulations are strictly followed for its use and safety, especially where they relate to safety and protection of the workplace and environment as well as the operating, maintenance and safety regulations or other instructions supplied by the manufacturer or supplier.

1.4 Liability Exclusions

The manufacturer declares himself to be exempt from any responsibility for damage arising when the product is not used in a designated way. This also includes use of the machine without safety mechanisms.

Any use of the product other than that specified above is not designated and endangers the lives and health of operating and maintenance personnel as well as the material property of the operator. The manufacturer of the product declares himself free from liability for damage to people or property belonging to the operator or a third party if:

- the product is not used as specified,
- operating and maintenance personnel have not read and understood the aforementioned directions and have used the product for other purposes,
- operating or maintenance personnel are not sufficiently qualified
- the product has been used under conditions exceeding limiting values,
- the product has not been serviced within the time specified,
- the product has not been serviced using other than original spare parts,
- product components or attachments have been altered without authorisation.

These exclusions from liability for damage to people or material property do not affect other exclusions.

1.5 Copyright

Specific characteristics and particular attributes of the product are the intellectual property of ROBEL Bahnbaumaschinen GmbH. The copyright on its use remains with ROBEL Bahnbaumaschinen GmbH. It may not be reproduced either in full or in part, published or otherwise exploited for competitive purposes, whether for payment or not. Its contents may not be passed by company employees to anyone outside the business.

1.6 Acceptance, Equipment and Operating Licence

It is the buyer's responsibility to check that the condition, fittings, performance and especially the safety features of the goods delivered match the relevant specifications agreed and to take account of the regulations specified in the contract.

The buyer must equip the goods delivered with all fittings necessary to meet relevant operational and safety regulations, norms, statutory regulations or other regulations, e.g. fire extinguisher, first aid box, signal and telecommunications equipment, additional warning devices, protective clothing, safety notices etc.

Unless otherwise agreed, no fittings of this nature are provided with the goods delivered.

Furthermore it is the buyer's responsibility to demonstrate that the goods delivered have been accredited for use by the appropriate authority. Any documentation to be provided by the manufacturer or supplier (descriptions, proof, attestations, etc.) to enable this should be specified in the contract of supply.

Any additional measures and costs required to achieve operational accreditation must be borne by the buyer.

1.7 Validity of these instructions

These operating instructions apply to products with the following EDP nos.:

- EDP-No. 899 990 0005
- EDP-No. 980 620 5190

2. Safety

2.1 Designated use

The vibratory tamper 62.05L has been designed and manufactured for is used in track construction to compact the ballast bed under the sleepers

2.2 Foreseeable misuse

The vertical tamper must not be used for demolition work or the like.

2.3 Conventions of layout

These instructions make use of the following warning texts and symbols to keep the operator safe and injury-free and prevent damage to the material assets of the operating company:

DANGER

Indicates that non-compliance with the instructions will result in death or severe (irreversible) injuries of the operating personnel.

WARNING

Indicates that non-compliance with the instructions may result in death or severe (irreversible) injuries of the operating personnel.

CAUTION

Indicates that non-compliance with the instructions may result in minor (reversible) injuries of the operating personnel.

NOTICE

Points out that non-compliance with instructions may result in damage to the product or other assets of the operating company.

Contains important information about the product, its operation or about a section of the instructions on hand.

Structure of the warnings

The warnings are structured as follows:

SIGNAL WORD

Type and source of danger!

(Possible) consequences when ignoring the danger.

► Measure to avoid the danger.

2.4 Design changes, original parts

The manufacturer will not be liable if any unauthorised changes to product components and attachments are made.

Original parts and accessories have been designed specifically for this product. The use of non-approved spare parts may result in structural features of the product being changed or impaired.

The manufacturer is not liable for any damage which is proven to be attributed to the use of such parts or inferior operating fluids.

2.5 Protective devices

Danger to life for the operator and others from manipulation of the safety devices!

► The operator is obliged to actually fit the designated protective devices during operation or to leave them in the predetermined factory position.

► The person commissioned to carry out maintenance must refit the protective devices after completing his work.

2.6 Safety regulations

The necessary requirements for protecting life, health, material property and the environment when handling the product must take precedence!

► Before using the product, make sure you can prove that all personnel affected have been made aware of the following relevant regulations and provisions:

- Statutory national safety regulations
- Provisions of the respective building code and works rules
- Provisions of the respective professional and trade associations
- Occupational and environmental health and safety regulations
- Approvals regulations
- Company-internal regulations
- All other applicable regulations, in addition to and in concert with the manufacturer's safety and operating regulations

If necessary, the office in charge of operation must lay down additional regulations and measures geared to the special tasks of the product to ensure that all safety requirements are met.

In addition to the information mentioned above the specific safety regulations must be observed and adhered to.

2.7 Qualifications of staff

Operator

The operator was trained by the operating company in the tasks assigned to him and informed of the potential dangers arising from inappropriate behaviour.

Requirements for the operator

- Comprehensive training on the product
- Knowledge of content of these operating and maintenance instructions
- Knowledge of content of operating and maintenance instructions of suppliers' and additional equipment
- Knowledge of national regulations and laws concerning the product and additional equipment
- Physical and mental fitness
- Power of concentration, sense of responsibility, reliability
- Necessary national requirements (qualifications, minimum age)
- No influence of alcohol, medicines, drugs or fatigue, etc.

2.8 Personal protective equipment

The approved personal protective equipment has to be used when operating and maintaining the product.

► Wear protective gloves!

► Wear ear protection!

► Wear steel-capped work shoes

The protective equipment is determined by:

- These instructions
- National safety rules
- Rules of the professional trade associations
- etc.

► If there are differences between the prevailing regulations within the operating company's scope of validity and those of the manufacturer and his suppliers, whichever regulations are the most stringent shall be applied.

2.9 Information on particular types of dangers

Danger due to heavy weight

If the permissible per-person lifting weight is exceeded when lifting or carrying, there is a risk of injuring muscles, tendons, joints or bones.

► Prior to transportation, ensure that the pathway is free of obstructions or trip hazards.

► When lifting or carrying machinery or equipment, adhere to the permissible per-person lifting weight.

It is the responsibility of the operating company to ensure that the national safety regulations and guidelines of the trade associations in the respective countries are observed. The values stated in the warning notices of these operating instructions relate to regulations in Germany.

► Carry out an assessment. Consider the following aspects with regard to operators and the transport task:

- Frequency of transport
- Age
- Gender
- Operator's state of health

► Observe the relevant guidelines on lifting and transporting heavy machinery or equipment.

Danger due to unergonomic operation

With some activities there is a risk of injuring muscles, tendons, joints or bones if the necessary caution is not exercised with the controls. An example is starting the engine by means of the reversing starter.

► Pull the reversing starter vigorously but avoid jerky movements.

► Avoid adverse movements and poor posture.

Danger from combustion engines

When the engine is running, there is a risk of injury from rotating and hot components.

► Only authorised technical personnel may work on the combustion engine.

► Switch off the engine and allow it to cool down.

► Check the engine regularly and rectify any faults found straight away (e.g. damage, leaks).

► Listen out for unusual noises or vibrations, etc.

► Only perform maintenance with the engine switched off.

► Watch out for hot components.

The ignition cable carries high voltage to the spark plugs. Lethal electric shocks may result if the ignition cable or spark plug is touched when the engine is running. Wearers of pacemakers are particularly at risk.

► Do not touch the ignition cable or spark plug when the engine is running.

► Wearers of pacemakers must not carry out any work on the ignition system.

Danger of poisoning from exhaust gases. The exhaust gases contain carbon monoxide, a colourless, odourless and toxic gas. If breathed in, carbon monoxide can lead to severe brain injuries or even death.

- ► Only operate combustion engines outdoors. Operate in enclosed spaces only if exhaust fume extraction is installed.
- ► Do not breathe in exhaust fumes.

Danger from fuel

Fuel is highly flammable and under certain conditions fuel-air mixtures can be explosive.

There is a risk of injury or damage to material property if fuel is not handled properly.

- ► Switch off the engine and allow it to cool down before refilling,
- ► Refuel in a well-ventilated area with the engine stopped.
- ► Do not smoke when handling fuel.
- ► Keep fuel well away from naked flames and sparks.
- ► Avoid repeated or prolonged contact with skin or breathing of vapour.
- ► Be careful not to spill fuel when refuelling.
- ► Refill fuel only with suitable filling devices (e.g. funnel).
- ► Wipe up spills immediately.

If the fuel tank is overfilled, heat subsequently generated may cause the fuel to expand and emerge through openings in the filler cap.

- ► Do not overfill the tank so that fuel rises up into the filler neck.

Danger from electrical voltage

Some parts may be live and may cause severe to fatal injuries when getting in contact with them.

- ► Work on the electrical system only by authorised electrical engineers.
- ► Rectify faults (contact faults, external damage to cables or housings, etc.) straight away.
- ► Before working on the electrical system: Shut off the power supply to the system, switch off the drive and disconnect the power supply.
- ► During work on the electrical system: Do not touch any live lines.
- ► Check earthing cables are securely seated and complete.
- ► Check that the connecting surfaces of the earthing cables are clean and free from corrosion.

Danger from noise

Permanent damage, especially to hearing, if the operator does not constantly wear personal hearing protection.

- ► Wear ear protection.

Danger from heat

Risk of injury from touching hot parts.

► Do not touch heated parts.

Prior to work on heated parts, switch off engines and allow hot parts to cool down for at least 30 minutes.

Risk of fire

► Place the machine at least one metre away from buildings and other equipment.

► Make sure that there is no flammable material near the engine and that no objects are placed on the engine when it is running.

► Only cover and/or reload the machine when it has cooled down.

Danger from vibration

The transmission of vibrations to the human body causes adverse health effects. Although the operating guide handle is vibration cushioned via rubber buffers, a complete decoupling of vibrations is unachievable.

► Wear padded gloves.

► During the work process, incorporate vibration-free activities with mainly dynamic demands on muscles.

Risk of environmental damage

The majority of the components and parts used are subject to special regulations for collection and disposal.

► Dispose of components according to material groups (steel, plastics, oils, etc.).

► Collect waste oil in line with the relevant regulations and dispose of it accordingly.

Danger arising from unauthorised start-up

Unauthorised start-up and misuse can result in dangers and damage of any kind.

► Unauthorised start-up by unauthorised persons is strictly prohibited.

► It is up to the operating company to assess this risk.

► It is the responsibility of the operating company to implement appropriate measures against unauthorised start-up.

2.10 Accident prevention

The accident prevention regulations of the Civil Engineering association also find application in these operating instructions and are to be carefully read and adhered to.

► Always observe the general and internal accident prevention regulations.

► Consider the potential risks of accidents in association with the special tasks of the product and provide for appropriate training.

► Check that the product is in proper working order before putting it into service:

- Equipment, devices, tools, accessories, safety equipment, etc. are complete and intact.
- Inspection and maintenance work has been carried out professionally and on schedule.
- Operating fluids have been topped up (fuel, lubricants, etc.)
- All prerequisites for carrying out work safely have been met with regard to you and other persons, material property and the environment.

► Beware of the particular dangers of the product and your work area, especially:

- persons and obstacles,
- adherence to safety clearances,
- traffic on adjacent tracks,
- secure fitting of all protective equipment,
- compliance with all operationally necessary safety measures.

► Leaking operating fluids (oil, grease, etc.) must be removed immediately to prevent a fire hazard or risk of slipping. Keep suitable oil binding agents and cleaning agents at hand.

► Before leaving the product perform the following checks:

- It has been shut down properly.
- It is secured against moving unintentionally.
- Tools and accessories are stowed away safely.

► Use only machines, appliances and tools that work properly.

► Rectify smaller faults straight away in order to avoid larger faults.

First Aid

Ensure the following to be able to provide First Aid in an emergency:

► Make sure that the First Aid kit is in proper condition, complete and clean at all times.

► Consult the medical service or doctor at your office regarding First Aid measures and appropriate equipment.

► Immediately replenish used up material.

► Store First Aid equipment (First Aid kit, blankets etc.) and fire extinguishers within easy reach.

► Carry material for securing accident sites.

2.11 Fire safety

Poisonous vapours are released when fuels, oils, paints or varnishes catch fire.

In addition, all measures required to prevent the development or spreading of a fire must be taken in individual cases.

With smouldering fires in electrical equipment toxic vapours are released from charring cables, also with fires of fuels, oil or paints.

- ► Everybody is obliged, as far as possible and reasonable to refrain from any actions that may cause a fire or favour the spreading of a fire. In addition, all measures required to prevent the development or spreading of a fire must be taken in individual cases.
- ► In general, any fires that occur are to be fought only with powder extinguishers.

General

The following fire safety measures must be adhered to.

- ► Use only approved fire extinguishers (powder-type extinguishers) of the prescribed fire protection class.
- ► Check the fire extinguishers periodically and ensure that they are provided with an inspection label (at least every 2 years, check the expiry date!).
- ► After using a fire extinguisher, replace it straight away.

3. Technical data

3.1 Drive

Type: Dolmar 4300, air cooled one-cylinder four-stroke engine

RPM	7,500 RPM
Output at 7,500 U/min	1.5 kW
Fuel	Petrol, min. 91 ROZ (equivalent to 86 octane)
	Unleaded petrol (E10 or less)
	Alkylate based petrol (four stroke)
Consumption per operational hour	approx. 0.9 l/h
Exhaust emissions	in accordance with CARB Tier 3, EPA Phase 2, EU level 2

3.2 Dimensions

Length	1,080 mm
Width	510 mm
Height	410 mm

3.3 Filling Quantities

Fuel	0.6 l
Motor: Engine oil SAE 10W-30	0.06 l
Tamping pick: Engine oil SAE 10W-30	0.06 l

3.4 Weight

Tamper	19.6 kg

3.5 Environmental conditions

3.5.1 Temperature

Temperature range - operation	-20 °C to 50 °C
Temperature range - transport	-20 °C to 60 °C
Temperature range – storage	-20 °C bis 60 °C

3.5.2 Operating altitude

With standard valve equipment and carburetor factory setting	100 m to 800 m, ideal 400 m

For adjusting the operating altitude see chapter 5.2

3.6 Noise emissions and vibration

Since the noise level criterion for personnel is exceeded when working, suitable ear protection must be used (see also national statutory regulations as well as basic health and safety requirements).

Assessment of the noise level for personnel requires consideration of the actual working environment for each worker (e.g. staying at different places/machines)

3.6.1 Noise emissions

Sound pressure level L_{pA}	113.6 dB(A)
Sound power level L_{WA}	109.0 dB(A)

3.7 Vibration

Total vibration (vector sum of three directions)	7.7 m/s²

3.8 Digital tach/hour meter

Range

Value	Range
Revolutions per minute (RPM)	0...60,000 U/min (UPM)
Max. value of revolutions per minute ever reached (RPM)	0...60,000 U/min (UPM)
Operating hours	0...99,999 hours

Resolution

Value	Resolution
Revolutions per minute (RPM)	1 U/min (UPM)
Max. value of revolutions per minute ever reached (RPM)	1 U/min (UPM)
Operating hours	0.1 hour

4. Description of machine

4.1 Design

4.1.1 Vertical tamper

The vertical tamper consists of a petrol engine which drives a shaft using an unbalance to produce the vibrations.

Mounted on the engine is the "engine stop" button for cutting it off.

4.1.2 Tamping pick

The tamping pick consists of two parts. The tamping tool is located on its bottom side.

4.1.3 Guiding frame

The guiding frame is fixed to the vibrator with damping via eight rubber-metal buffers.

The throttle handle is fitted on the right-hand side.

4.2 General view

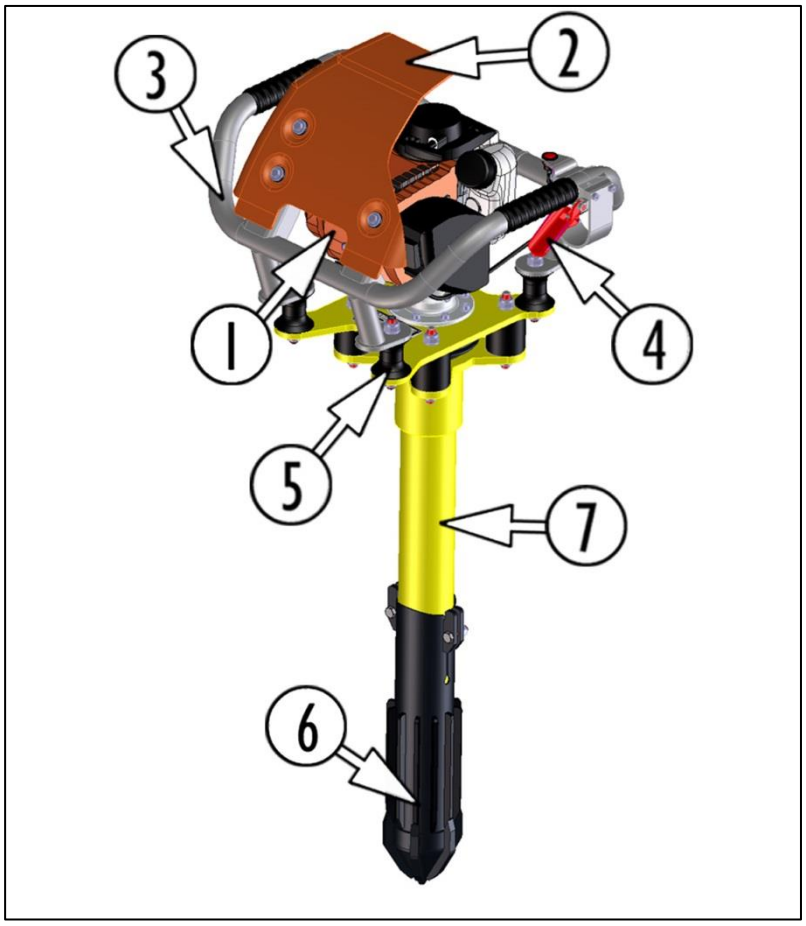

Fig. 1: General view

1	Petrol engine
2	Protective cover
3	Guiding frame
4	Throttle handle
5	Rubber buffer
6	Tamping tool
7	Tamping pick

4.3 Work station

The operator stands behind the machine and grabs the handles with both hands. For information on working ergonomically see chapter 6.2.1.

4.4 Petrol engine

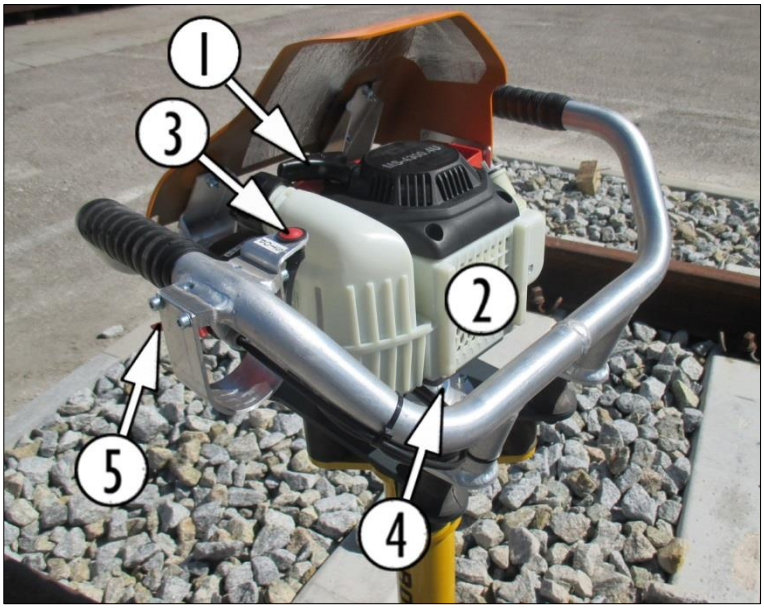

Fig. 2: Petrol engine

1 Handle of recoil starter
2 Fuel tank
3 "Engine stop" button
4 Centrifugal clutch
5 Throttle lever

4.5 Signs and labels

4.5.1 Signs and labels used

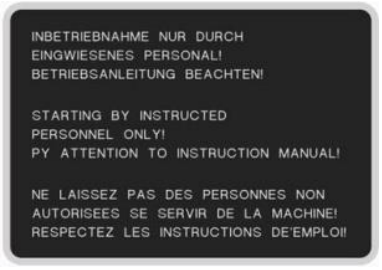

Fig. 3: Sign "Starting by instructed personnel only"

Fig. 4: Type label (Example)

Fig. 5: Transport/Storage position

Fig. 6: Observe operating instructions

Fig. 7: Logo of manufacturer

Fig. 8: Tank capacity

Fig. 9: STOP (next to Engine-Stop)

- ► Regularly check that all signs are present and intact!
- ► Replaces labels if necessary!

4.5.2 Position on the product

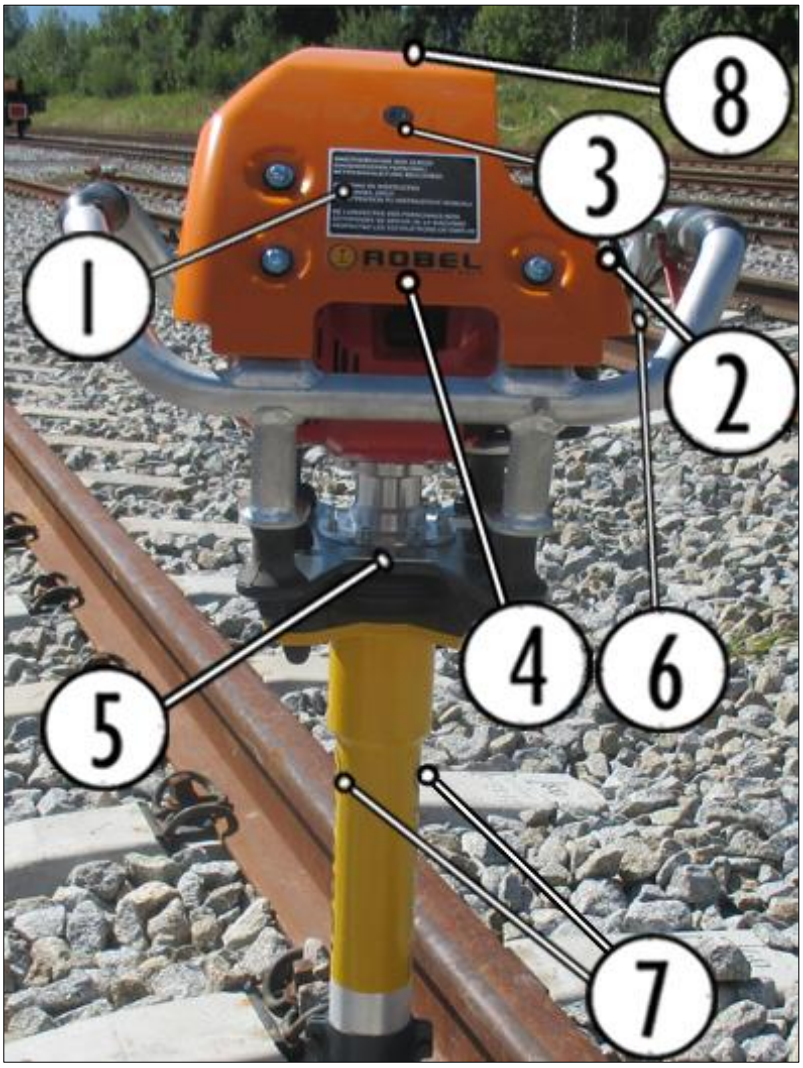

Fig. 10: Position on the product

1 Label “Starting by instructed personnel only”
2 Label “Tank capacity”
3 Label “Observe operating instructions”
4 Logo of manufacturer
5 Type label
6 Label “STOP”
7 Logo of manufacturer
8 Label “Transport/Storage Position”

4.6 Digital tach/hour meter

The digital inductive Tach/hour meter is capable of displaying three values:

- Operating hours (engine off)
- Actual RPM (engine running)
- Max. RPM ever reached

Fig. 11: Example: display of actual rpm

1 Button

4.7 Accessories

- Rail movement indicator
  (EDP-No 886 823 0001)

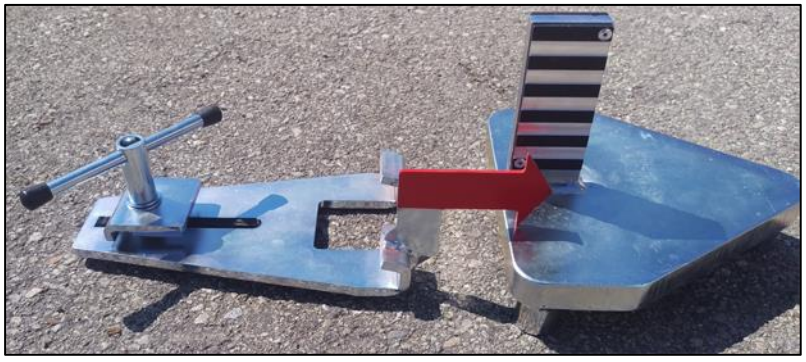

Fig. 12: Rail movement indicator

5. Preparing the machine

5.1 Digital inductive tach/hour meter

5.1.1 Operation

Display standard mode:

Fig. 13: Operating hours (left) and revolutions per minute (right)

- When the engine is not running, the tach/hour meter displays the actual amount of operating hours.
- When the engine is running, the tach/hour meter displays the actual RPM of the engine.

To view stored max. RPM.

1. Press button 2x.

   The display shows “2 RPM” and the max. RPM stored.

Fig. 14: Max. RPM stored

If no button is pushed for around 8 seconds, the display automatically switches back to standard mode.

5.1.2 Settings

The digital Tach/hour meter has been factory-set according to the engine used.

- Do not change settings without reason.

The digital Tach/hour meter can be used both for two-stroke and four-stroke engines.

Check settings:

1. Press the button once.

   The value “1P1r” should be displayed if a two-stroke engine is used or „2P1r” should be displayed if a four-stroke engine is used.

Fig. 15: Setting for two-stroke engines

Fig. 16: Setting for four-stroke engines

Change settings

1. Press the button once.

   The display shows “1P1r” or “2P1r”.
2. Press the button again and hold for around 4 seconds.

   The display flashes.
3. Press the button once.

   The display is showing the other setting.

By pushing the button again, the display toggles between the two settings.

4. Set “1P1r” for two-stroke engines or “2P1r” for four-stroke engines.
5. Once the display is showing the correct setting, wait for around 10 seconds.

   The displayed setting has been stored and the display automatically returns to standard mode.

5.2 Checking/adjusting the carburetor setting

NOTICE

Risk of engine damage!

The carburetor has been factory-set for an altitude of 400 m MSL. If the engine is operated at lower altitude without adjusting the carburetor setting, it will show low performance, tend to overheat and finally even suffer severe damage due to a mixture which is too lean.

► Adjust the carburetor setting according to the altitude.

► Do not change the carburetor setting without reason.

5.2.1 Operation at high altitude (>800 m)

At high altitude above sea level, the mixture of fuel/air becomes too rich (due to lower oxygen in the air). This results in low engine performance and high consumption.

Setting the carburettor for high altitude

Tools

- Screwdriver

1. Start the engine and allow to warm up.
2. Hold the tamper so that the tamping tool does not touch the ground.
3. Apply full throttle and evaluate he sound of the engine: If the engine is not running smoothly, this is an indication that the mixture is too rich.
4. Turn the screw **H** (2) clockwise in steps of 1/8 turn each step, see following figure.

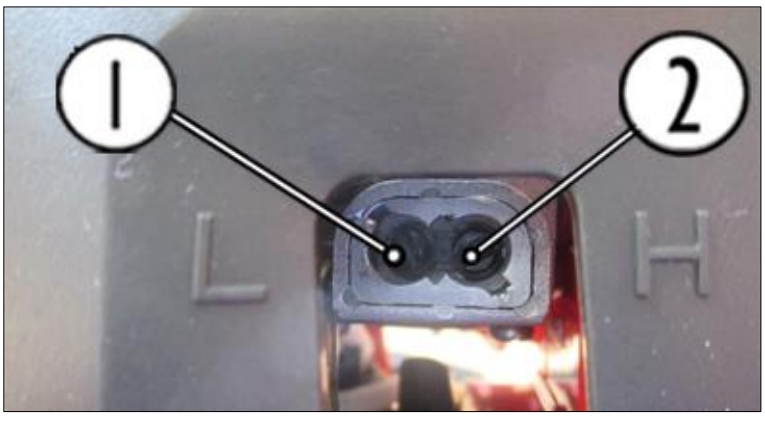

Fig. 17: Screw L (1) und H (2)

5. Evaluate the sound of the engine: If the engine is running smooth, finish the adjustment. If further adjustment is needed, continue by turning the screw **H** (2) clockwise, 1/8 turn each step.
6. Let the engine idle and evaluate the sound of the engine: If the engine is not running smoothly, this is an indication that the mixture is too rich.

7. Turn the screw **L** (1) clockwise, 1/8 turn each step.
8. Evaluate the sound of the engine: If the engine is running smooth, finish the adjustment. If further adjustment is needed, continue by turning the screw **L** (1) clockwise, 1/8 turn each step.

   The carburetor has been set for operation at high altitude.

Even with suitable carburetor setting, engine horsepower will decrease approximately 3.5% for each 305 m (1,000 feet) increase in altitude. The affect of altitude on horsepower will be greater than this if no carburetor adjustment is made.

Make sure that the setting is adjusted again if the engine is operated at lower altitude.

5.2.2 Operation at low altitude (<100 m)

In low altitude (MSL) the mixture of fuel/air becomes too poor. This causes reduced engine performance and overheating which may result in engine damage.

Adjusting the carburetor for low altitude

Tools

- Screwdriver

1. Start the engine and allow to warm up.
2. Hold the tamper so that the tamping tool does not touch the ground.
3. Apply full throttle and evaluate he sound of the engine: If the engine is not running smoothly, this is an indication that the mixture is too poor.
4. Turn the screw **H** (2) counter clockwise in steps of 1/8 turn each step, see following picture.

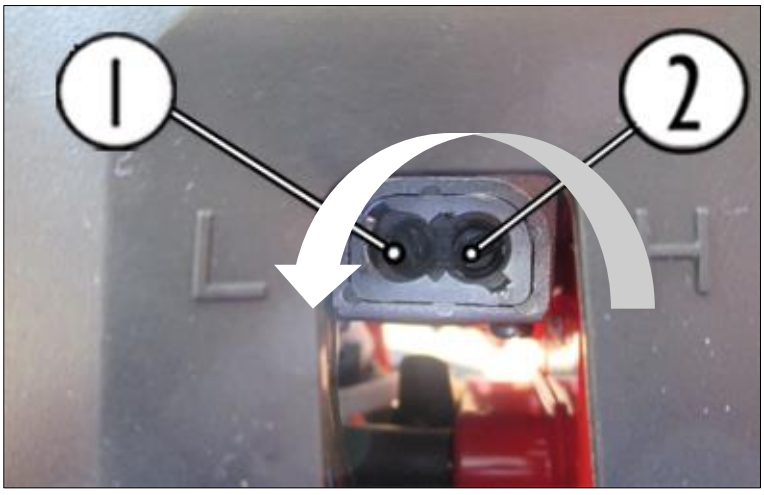

Fig. 18: Screw L (1) und H (2)

5. Evaluate the sound of the engine: If the engine is running smooth, finish the adjustment. If further adjustment is needed, continue by turning the screw **H** (2) counter clockwise, 1/8 turn each step.

6. Let the engine idle and evaluate the sound of the engine: If the engine is not running smoothly, this is an indication that the mixture is too poor.
7. Turn the screw **L** (1) counter clockwise, 1/8 turn each step.
8. Evaluate the sound of the engine: If the engine is running smooth, finish the adjustment. If further adjustment is needed, continue by turning the screw **L** (1) counter clockwise, 1/8 turn each step.

   The carburettor has been set for operation at low altitude.

Ensure that the carburetor setting is adjusted again prior to engine operation at high altitude.

5.2.3 Adjusting idle

After the mixture has been set according to the altitude, it might be necessary to re-adjust the idle setting, see ch. 9.3.4.

5.3 Checking the petrol engine

5.3.1 Engine oil level

NOTICE

Risk of engine damage!

There is a risk that engine lubrication will not work if the oil level falls too low. The engine will be seriously damaged.

► Make sure to operate the engine with a sufficient amount of oil.

► Check the oil level on a level surface and with the engine stopped.

1. Place the engine horizontally with the fuel tank side facing down on a level surface.
2. Remove the oil filler cap and check the oil level. Make sure that the oil level is above the lower limit mark of the oil tank.

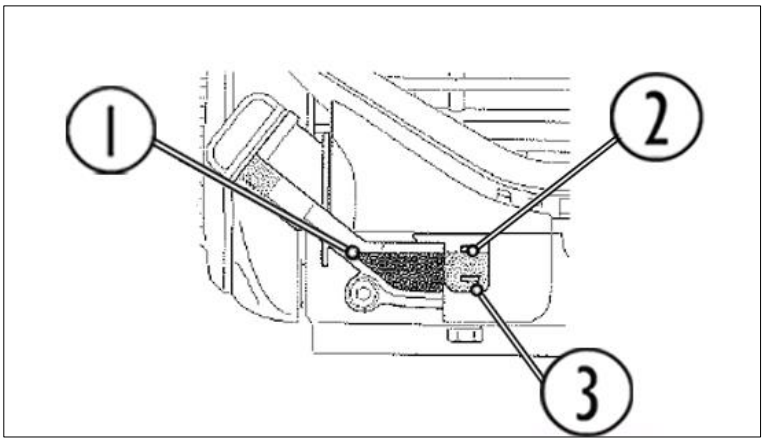

Fig. 19: Engine Oil level

1 Oil
2 Upper limit mark
3 Lower limit mark

3. If the oil level is low, replenish with the recommended oil up to the upper limit mark of the oil tank.
4. Check the oil level every 10 operating hours and replenish up to the upper limit mark of the oil tank.

Use engine oil for four-stroke engines that meets or exceeds the requirements for API service category SF or higher (or equivalent quality). Always check the API service label on the oil container to ensure that it contains the letters SF or those of a higher category (or equivalent quality).

SAE 10W-30 is recommended for general use. Oils with the other viscosities indicated in the table can be used if the average temperature at the place of use lies within the range shown.

NOTICE

Risk of engine damage!

The use of inadequate oils has an adverse effect on the service life of the engine.

► Do not use non-soluble oils or two-stroke oils.

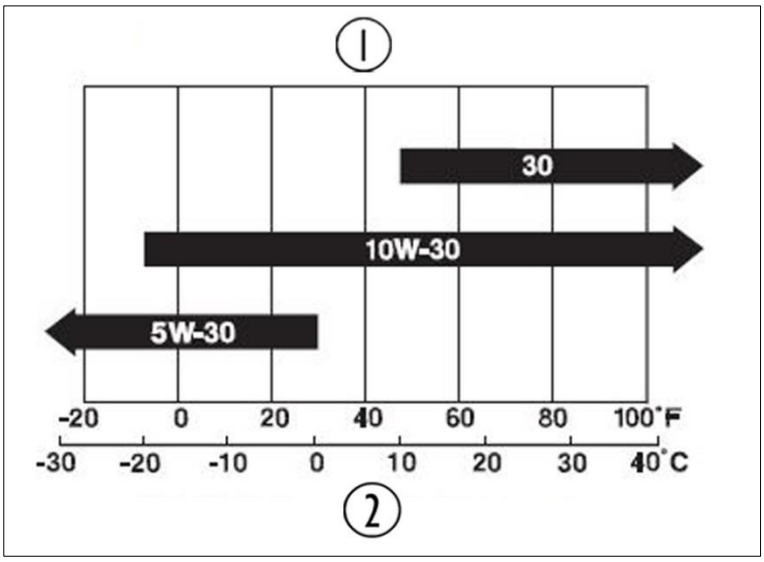

Fig. 20: SAE Viscosity Categories

1 SAE Viscosity Categories
2 Ambient temperature

5.3.2 Air filter

NOTICE

Risk of engine damage!

If the engine is operated without air filter, particles (dust) can get into the combustion chamber and cause engine wear. The sleeve construction will be scratched and the engine will loose compression and consequently performance will decrease.

► Do not leave the engine running without the air filter.

NOTICE

Risk of damaging the air filter!

If compressed air is used to clean the air filter, the sensitive filter elements may be destroyed.

Brushing forces the dirt into the fibers.

► Do not use compressed air to clean or dry the air filter.

► Do not brush the dirt away.

ROBEL recommends replacing air filters and spark plugs at regular intervals in line with the specifications in the maintenance schedule.

Only perform the described cleaning procedures on air filters and spark plugs in an emergency, i.e. if no spare parts are available.

1. Check the air filter inserts to make sure they are clean and in good condition.
2. Clean or replace the inserts if necessary.

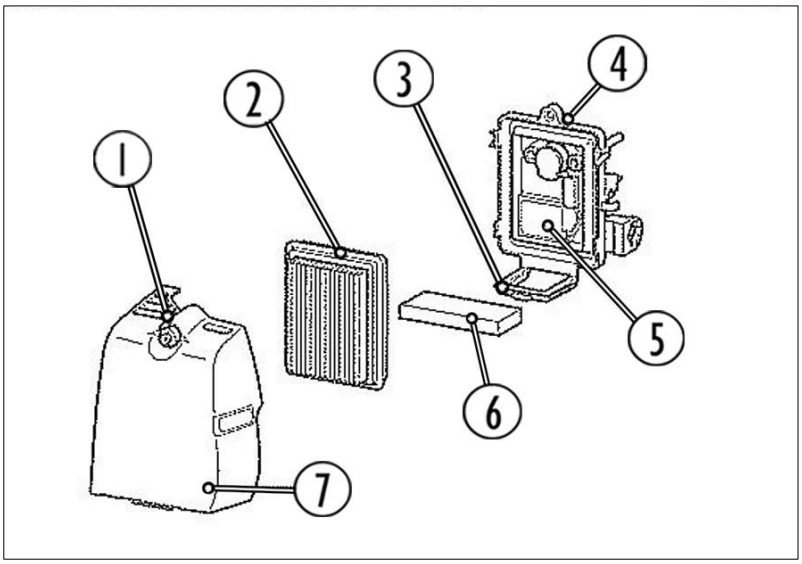

Fig. 21: Air filter

1	Fixing bolt
2	Filter element (paper)
3	Loop
4	Plate
5	Separator plate
6	Filter element (sponge)
7	Air filter cover

5.3.3 Filling the tank

WARNING

Risk of fire or explosion!

Petrol is extremely flammable and is explosive under certain conditions.

► Obey the safety notes concerning the combustion engine and fuel in Chap. 2.

The heat generated by the engine can cause the fuel to expand and leak through the openings in the fuel filler cap.

► Do not overfill the fuel tank: there must not be fuel in the filler neck.

NOTICE

Risk of engine damage!

Contaminated fuel can lead to engine damage.

► Do not use any oil-petrol mixes or petrol that is not clean.

► Avoid dirt, dust or water from getting into the fuel tank.

► Use clean, fresh and unleaded petrol with an ethanol volume percentage of no more than 10%.

Risk of damage to paintwork!

Fuel can have an aggressive effect on paint and some plastics.

► Make sure not to spill any fuel when refuelling.

1. Keep the handle dry, clean and free of fuel and oil.
2. Lay the vibration tamper down on the handle frame and unscrew the tank cap.
3. Fill in the fuel carefully.

Tank capacity: 0.6 l.

4. Screw the fuel cap back on and check that it has a tight fit.
5. If there is any damage on the tank cap, replace it.

Do not use petrol that has been stored for more than two months.

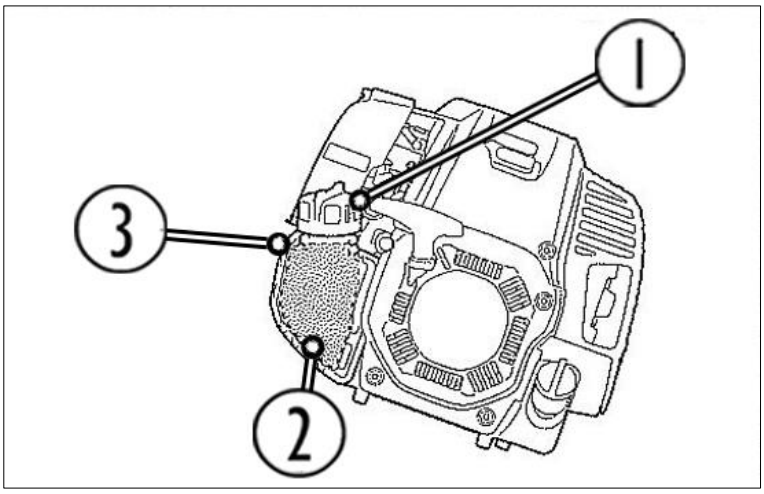

Fig. 22: Filling the tank

1 Fuel tank cap
2 Fuel upper limit
3 Fuel tank

6. Operation

6.1 Starting the engine

1. When the engine is cold close the choke lever (slide to CLOSE position).

Full opening if the engine is a bit warm. Easy use of the throttle handle allows a better start.

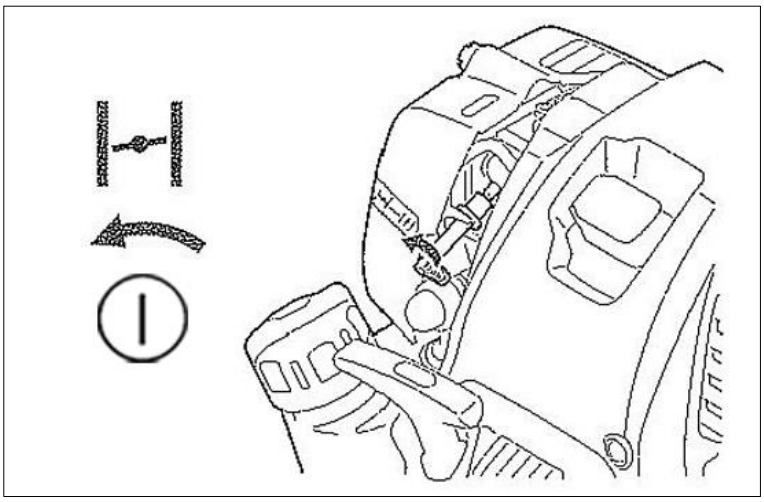

Fig. 23: Close the choke lever

1 Choke Position „CLOSE“

2. Continue to push the primer pump until fuel comes into the primer pump. (In general, 7 to 10 pushes.)

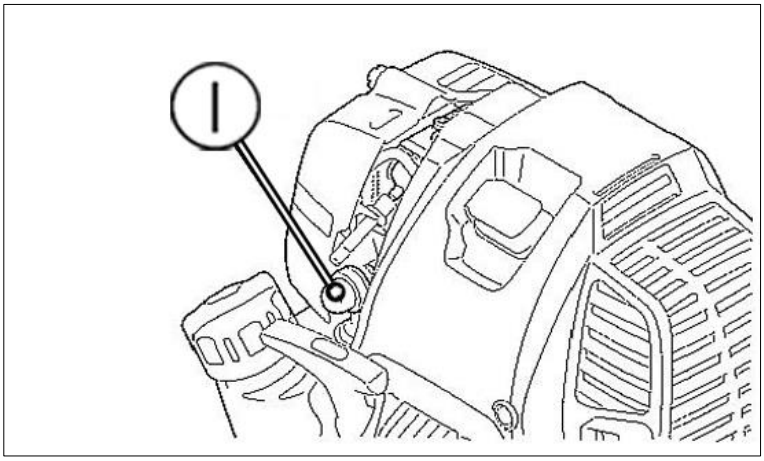

Fig. 24: Primer pump

1 Primer pump

NOTICE

Risk of damaging the starter!

If the starter handle is released immediately after start-up, it might be damaged.

► Do not let the starter handle rebound towards the engine but move it back carefully.

3. Pull the starter handle gently until resistance is felt, then pull out the handle forcefully.
4. Once engine starts, set choke lever to the OPEN position.

Open the choke lever gradually while checking the engine operation. Be sure to open the choke lever to the full in the end.

In cold or when the engine is cooled down, never open the choke lever suddenly. Otherwise the engine may stop.

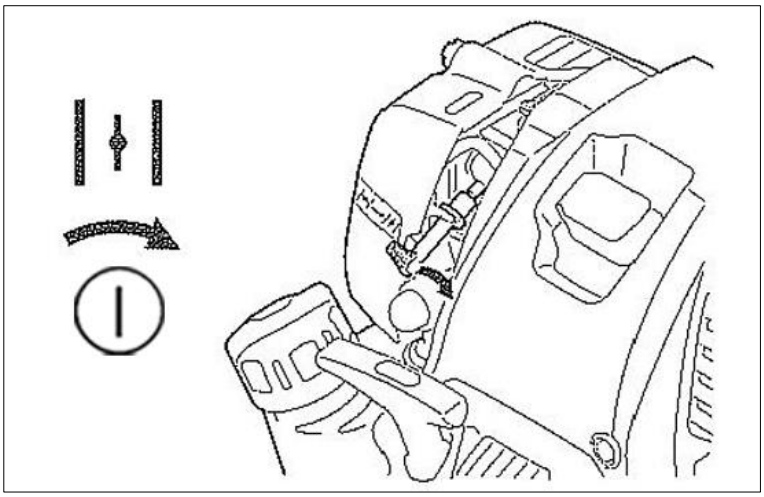

Fig. 25: Move choke lever to “OPEN”

1 Choke Position „OPEN“

5. Warm up the engine for 2-3 minutes, in the meantime pull the throttle handle now and then.

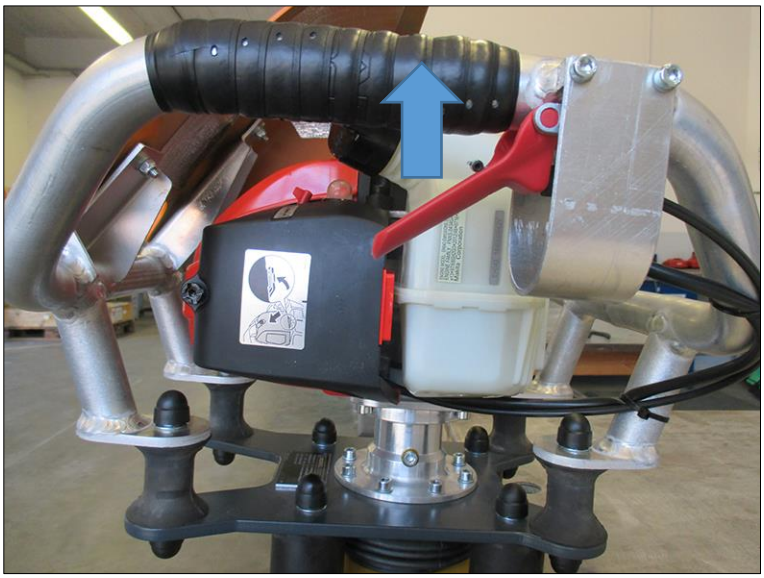

Fig. 26: Pull throttle handle

6.2 Working with the tamper

6.2.1 Tamping (sleeper)

Avoid contact with the sleeper!

- Place the tamping tool approx. 1 to 5 cm next to the sleeper.
- Do not touch the sleeper with the tamping tool while tamping.

Apply force ergonomically!!

- While tamping, use the weight of the upper part of your body to apply the vertical force, this will relieve the backbone.

1. Hold the tamper upright and place it next to the sleeper.
2. Press down the throttle handle by hand.

   The tamping tool starts to vibrate.
3. Continue holding the tamper by the handles and apply force by using the weight of the upper part of the body.
4. Dive vertically into the ballast until the tip of the tamping tool is located approx. 5 to 10 cm below the bottom of the sleeper, see figure.

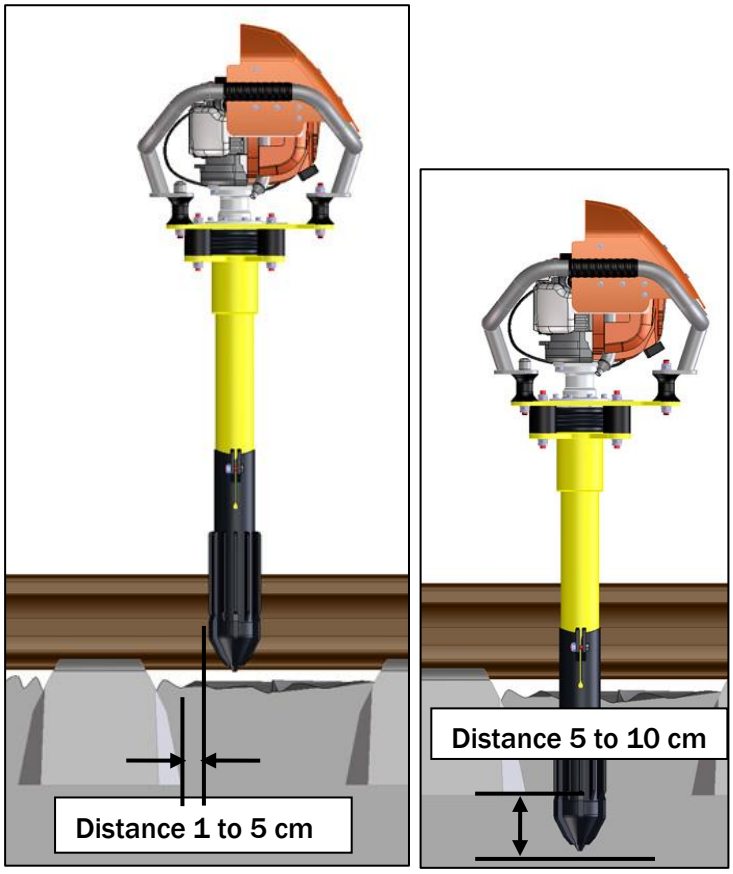

Fig. 27: Distances between taming tool and sleeper

5. Pull the tamper towards the operator so that the ballast is compacted under the sleeper.

Fig. 28: Compact ballast under the sleeper

6. Withdraw the tamper.
7. Repeat steps 1-6 two or three times in order to achieve an optimal and sustainable result.
8. At the end insert the tamper without working it and level the indent at the tamping spot.

Do not position the tamping tool too close to the sleeper: distance min. 1 cm!

9. Repeat this procedure on both sides of the sleeper.

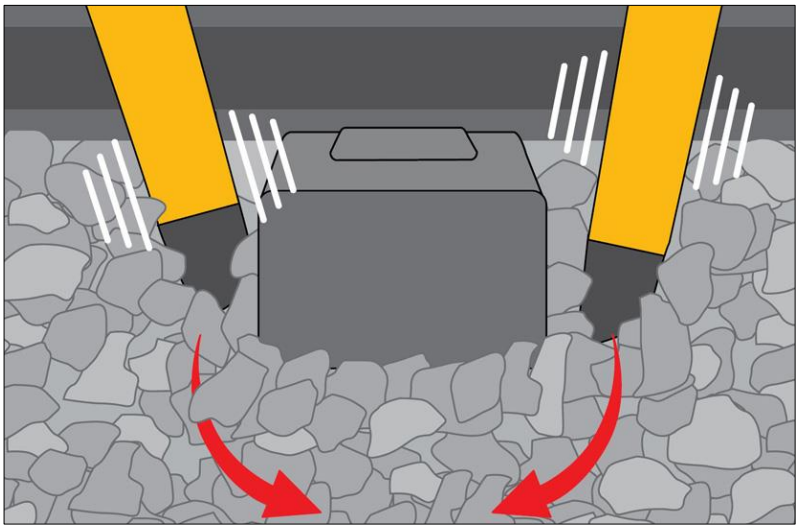

Fig. 29: Repeat this procedure on both sides of the sleeper

6.2.2 Tamping (track panel)

For optimum tamping result all sleepers must be tamped from both sides (directions): FORWARD and BACKWARD.

Example illustration:

- green = forward tamping (from right to left))
- red = backward tamping (from left to right)

Or vice versa!

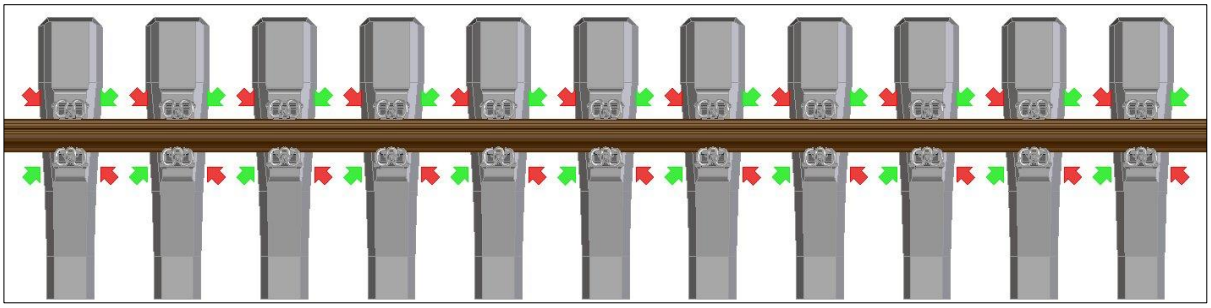

Fig. 30: Tamping (track panel)

6.3 Stopping the engine

NOTICE

Risk of engine damage!

The engine can be damaged if it is stopped suddenly when operating at a high speed.

► Before switching off the engine when it has been running at high speed and under full load, reduce its speed and allow it to idle for about one minute.

Also let the engine run for a while (at idling speed) so that it can cool down.

1. Release the gas handle and allow the engine to idle.
2. After approx. 1 minute, press the “STOP” button.

   Engine stops.

6.4 Installing rail movement indicator (accessories)

The rail movement indicator can be used to show the rail movement when a train is travelling over the track.

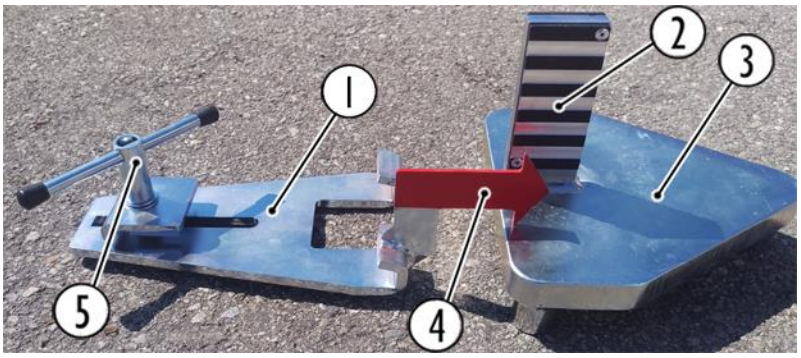

Fig. 31: Rail movement indicator

1	Indicator part
2	Scale
3	Scale part
4	Arrow
5	Clamping lever

1. Remove the ballast from under the rail.
2. Loosen the clamping lever on the indicator part.
3. Push the indicator part through under the rail and fasten it at the rail using the clamping lever.
4. Position the scale centrally opposite the red arrow.

   As soon as the train travels over the track the movement can be read from the arrow on the scale.

7. Transport and storage

NOTICE

Risk of damage!

The oil can leak from the tamping pick the moment it is higher than the engine.

► Always transport the vertical tamper with its motor to the top.

7.1 Transport

The temperature range for transporting the machine is -20 °C to +60 °C.

If the product is placed in its original packaging and properly lashed down, it can be transported by any means of transport without damage.

Transport to the workstation

1. Carry the vertical tamper to the workstation.

Fig. 32: Carrying the vertical tamper

Laying down the machine

2. Make sure to lay down the machine only in the same manner as shown in the picture with the protection shield pointing upwards (see arrow).

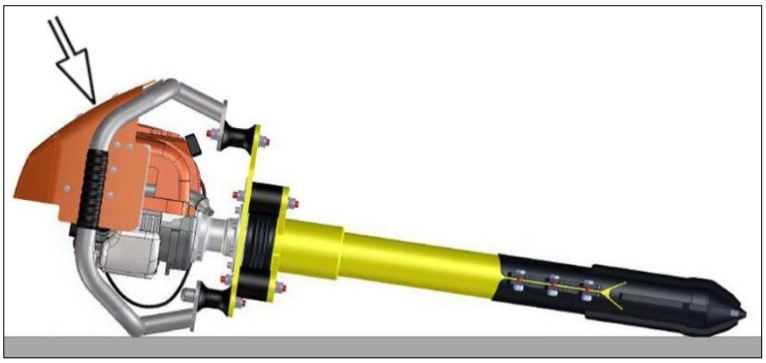

Fig. 33: Laying down the machine

7.2 Storage

The temperature range for storing the machine is -20 °C to +60 °.
Ensure that the place of storage is dry and dust-free.

NOTICE

Risk of damage!

The oil can leak from the tamping pick the moment it is higher than the engine.

► Always store the vertical tamper with its motor to the top.

Before putting the machine into storage for a prolonged period

1. Make sure that the storage location is free of excessive moisture and dust.

WARNING

Risk of fire or explosion!

Petrol is extremely flammable and is explosive under certain conditions.

► Obey the safety notes concerning the combustion engine and fuel in Chap. 2.

2. Drain off the fuel:
3. Make sure that the oil filling cap is tightened securely.
4. Unscrew the fuel tank cap and drain the fuel into a suitable container. To do this tilt the engine towards fuel filler neck.
5. If there is any foreign matter remaining in the fuel tank, remove it completely.
6. Pull out the fuel filter from the refill port using a wire.
7. Press in the starter pump button several times until all the fuel in the fuel return line has been pumped back into the fuel tank.
8. Tilt the engine towards the fuel filler neck to let the fuel in the fuel tank flow into the container.

9. Put the filter to the fuel tank, and securely tighten the fuel tank cap.
10. Then, continue to operate the engine until it stops.
11. Remove the spark plug, and drip several drops of engine oil through the spark plug hole.
12. Gently pull the starter handle so that engine oil will spread over the engine, and attach the spark plug.

8. Troubleshooting

Error	Cause	Remedy
Engine will not start	No fuel	► Refuel
	No choke	► Close the choke lever, push the primer pump, see chapter 6
	Spark plug wet with fuel (flooded engine) or oily.	► Clean spark plug, see chapter. 9.3.3
	Clogged Fuel filter	► Clean fuel filter, see chapter 9.3.2
Engine stops at idle	Idle setting too low	► Adjust idle setting, see chapter 9.3.4
Engine becomes very hot, low performance	Carburetor setting too lean	► Adjust carburetor setting according to actual altitude above sea level, see chapter. 5.2
	Clogged Fuel filter	► Clean fuel filter, see chapter 9.3.2
	Oil level too low	► Check oil level, see chapter 5.3.1
Engine runs not smoothly, low performance	Carburetor setting too rich	► Adjust carburetor setting according to actual altitude above sea level, see chapter 5.2
	Clogged Fuel filter	► Clean air filter, see chapter 9.3.1
Worn tamping tool	Wear	► Change tamping tool, see chapter 9.5
Worn bearings in tamping pick	Wear	► Change bearings, see chapter 9.6.3
Rubber buffers ripped	Wear	► Change rubber buffers, see chapter 9.4
Tamping pick does not vibrate although engine is running at high rpm.	Coupling element between engine and eccentric shaft defective	► Change coupling element, see chapter 9.6.3

9. Maintenance

WARNING

Risk of Injury!

During maintenance work it may happen that the engine is turned; this may result in the engine starting unintentionally.

- ► Before commencing all maintenance work, switch off the engine.
- ► Before performing maintenance work, always disconnect the spark plug connectors to prevent accidental starting of the engine.

CAUTION

Risk of burns!

The engine, especially the silencer and parts of the machine, get hot during operation.

- ► Do not touch hot parts.
- ► Allow the machine to cool down for at least 30 minutes before performing maintenance work.

NOTICE

Risk of engine damage!

There is a risk of engine damage if the spare parts used do not meet the specified quality requirements.

- ► Use only original spare parts or parts of equivalent specification.

1. Use only the recommended lubricants and, when carrying out repairs, use only original spare parts.

   This is important, firstly for warranty cases and secondly to enhance the operational reliability of the product.

   Correct ordering of spare parts is an essential contribution to a speedy delivery of spare parts and consequently to the economic viability of the product.
2. When you order spare parts from us please provide the following information:

- Type of machine
- Number of the machine
- Assembly
- Description and number of spare part
- Quantity
- Shipping method
- Despatch address

3. Adhere to the prescribed service intervals!

4. Observe the country-specific safety and environmental regulations when performing maintenance work!

The engine should be maintained by an authorised dealer, unless the operator has the necessary tools and maintenance data and staff with the necessary technical knowledge and skills.

ROBEL recommends replacing air filters and spark plugs at regular intervals in line with the specifications in the maintenance schedule.

Only perform the described cleaning procedures on air filters and spark plugs in an emergency, i.e. if no spare parts are available.

9.1 Maintenance schedule

Interval	Part/Component	Maintenance work	Remark
Daily (Every 10 operating hours)	Vibration tamper	Clean	
	Vibrator	Check operational safety	
	Rubber buffer[1)]	Visual check	Replace if necessary (formation of cracks), see ch. 9.4
	Tamping tool	Check for wear, replace when necessary	See ch. 9.6.1 replacement see ch. 0
			After 10 hours following initial commissioning and tamping tool replacement check the measurement of 224 mm between the tamping tool and the tamping pick flange and tighten the screws with 20 Nm.
	Engine oil	Check filling level	See ch. 5.3.1
	Air filter	Clean	See ch. 9.3.1
	Spark plug	Clean, check for damage	See ch. 9.3.3
	Cooling air passage and cylinder fins	Clean	
	Fuel pipe	Check for tight fit	
	Screws/nuts [2)]	Check	
Every 50 operating hours	Engine oil	Replace	See ch. 9.3.4
			First oil change after 20 hours!
	Fuel filter	Check / clean	See ch. 9.3.2
Every 100 operating hours	Check screw of centrifugal clutch	Refill	See ch. 9.5

Interval	Part/Component	Maintenance work	Remark
Every 200 operating hours	Valve clearance (intake valve and exhaust valve)	Inspect / adjust	Request authorized service station
Every year or every 200 operating hours	Fuel pipe	Replace	See ch. 9.3.7

[1] **Rubber buffer** The rubber buffers for vibration damping fitted between the guide frame and the vibrator are parts subject to wear. They must be replaced when necessary (porous, torn, damaged.

[2] **Screws** All externally accessible screws and nuts are to be checked for tight fit approximately every 10 operating hours or daily.

9.2 Cleaning and care

Regular care and maintenance of the product will prolong its service life significantly.

NOTICE

Risk of damage!

Cleaning the product with solvents, aggressive or combustible cleaning agents may result in damage.

The use of high-pressure washers can result in damage caused by water getting into the motor (silencer, air filter, carburettor) and articulated joints of the product.

- ► Do not use any solvents or aggressive, combustible cleaning fluids!
- ► Do not use petrol for cleaning.
- ► Do not use a jet of water or a high pressure washer.

NOTICE

Risk of engine damage!

Dirt or dust adhering to the cylinder fins can cause piston seizure because heat cannot be dissipated.

- ► Keep the cylinder fins free of dust or dirt.

1. Clean the product regularly so that it does not suffer a production outage due to dirt.
2. Only use a damp cloth to clean the product. Only use water and, if necessary, a mild detergent without any chemical additives.

9.3 Engine

Periodic inspection and adjustment of the engine are essential if high level performance is to be maintained.

Regular maintenance will also ensure a long service life. The required maintenance intervals and the type of the maintenance work to be carried out are described in the table in chapter 9.1 (see also original operating instructions of the engine manufacturer).

9.3.1 Cleaning the air filter

A dirty air filter will restrict air flow to the carburetor. To prevent carburetor malfunction, clean the air filter regularly. Clean the filter more frequently when operating the engine in extremely dusty surroundings.

WARNING

Danger of fire and explosion!

If the air filter is cleaned with petrol or a low flash point solvent, a fire or an explosion could occur.

► Do not use petrol or low flash point solvents for cleaning the air filter insert.

NOTICE

Risk of increased engine wear!

If the engine is operated without an air filter, particles (of dust) can enter the combustion chamber. Scoring of the engine moving parts occurs (pistons and cylinders). The engine loses compression and hence performance.

► Never leave the engine running without the air filter.

NOTICE

Risk of damaging the air filter!

If compressed air is used to clean the air filter, the sensitive filter elements may be destroyed.

Brushing forces the dirt into the fibres.

► Do not use compressed air to clean or dry the air filter.

► Do not brush the dirt away.

Spare parts air filter:

Filter element paper:
EDP-No. 900 044 0398

Filter element sponge:
EDP-No. 900 044 0456

Clean the air filter every 10 operating hours (daily):

1. Close the choke lever (move to CLOSED position).

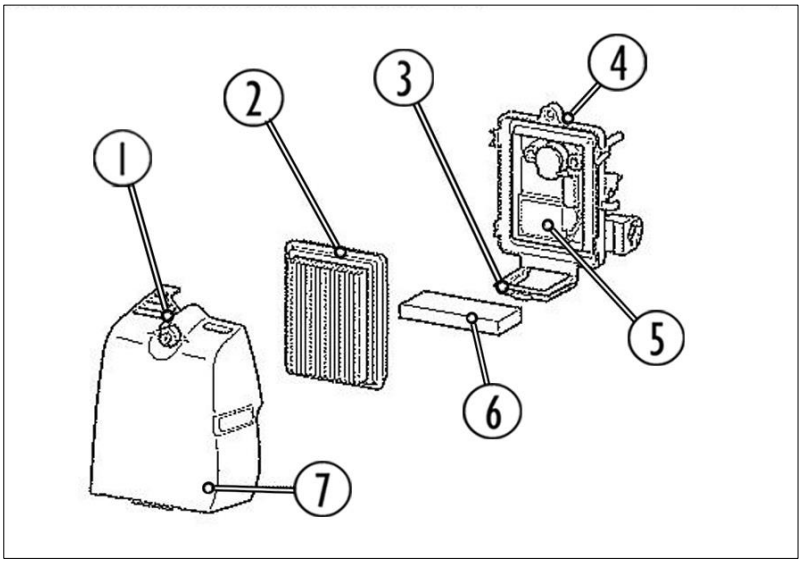

Fig. 34: air filter

1	Fixing bolt
2	Filter element (paper)
3	Loop
4	Plate
5	Separator plate
6	Filter element (sponge)
7	Air filter cover

2. Release the hook on the air cleaner cover by pressing down the loop (3) on the plate (4).
3. Loosen fixing bolt (1).
4. Pull and remove the air cleaner cover (7).
5. Remove the filter elements (2, 6) and tap them to remove dirt.

For heavy contamination

6. Remove the filter element (sponge), immense it in warm water or in water-diluted neutral detergent.
7. Dry it completely.
8. Do not squeeze or rub it, when washing.
9. Clean the filter element (paper) by tapping it gently. Do not wash the filter element (paper).
10. Refit the cleaning elements. Refit the air filter cover by hooking in the clips and fix the fixing bolt.
11. Fasten fixing bolt.

9.3.2 Cleaning the fuel filter

WARNING

Risk of fire or explosion!

Petrol is extremely flammable and is explosive under certain conditions.

► Do not smoke or allow flames or sparks in the working area.

1. Make sure that the engine oil filler cap on the four-stroke engine is tightened securely.
2. Unscrew the fuel tank cap.
3. Carefully pull out the fuel filter from the fuel filler neck using a wire.

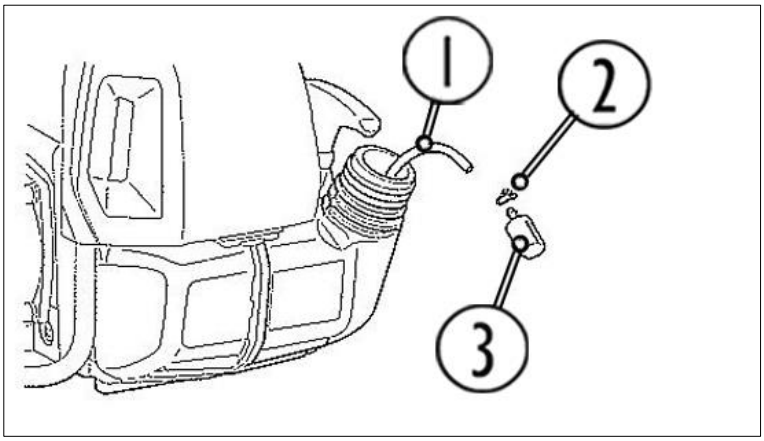

Fig. 35: Cleaning the fuel filter

1 Fuel pipe
2 Hose clamp
3 Fuel filter

4. Check the fuel filter for any contamination. If it is contaminated wash it using a non-flammable solvent or one with a high flash point. Replace the filter if it is contaminated excessively.
5. After checking, cleaning or replacing, fix the fuel filter onto the fuel pipe with the hose clamp.
6. Re-insert the fuel filter into the fuel filler neck.
7. Push the filter in all the way to the bottom of the fuel tank.
8. Tighten the tank lid securely.

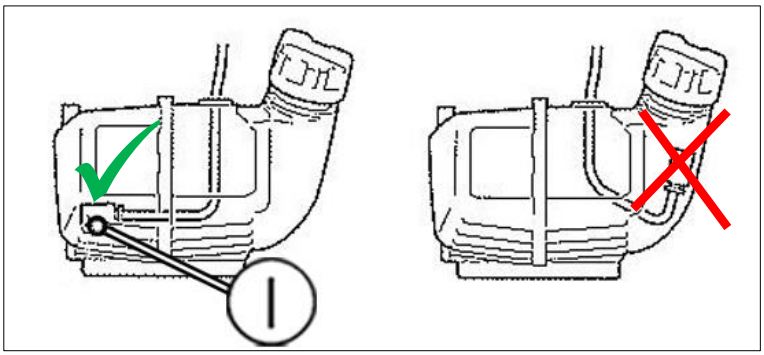

Fig. 36: Position of filter

1 Fuel filter

9.3.3 Maintaining the spark plug

To ensure proper engine operation, the spark plug must be properly gapped and free of deposits.

NOTICE

Risk of engine damage!

The engine may be damaged if a spark plug with inadequate heat range is used.

► Use a spark plug with adequate heat range!

Recommended spark plug: CMR6A (NGK)

Spare part spark plug:
EDP-No. 900 044 0408

The recommended spark plug has the correct heat rating for normal engine operating temperatures.

1. Remove the spark plug connector.
2. Clean the surrounding area of the spark plug.
3. Unscrew the spark plug with a suitable spark plug wrench.
4. Visually inspect the spark plug. Discard the spark plug if there is apparent wear, or if the insulator is cracked or chipped.
5. Measure the spark plug gap with a feeler gauge.
6. Correct as necessary by bending the side electrode.

Spark plug gap (2)	0,70 – 0,80 mm
	(0.028″ – 0.031″)

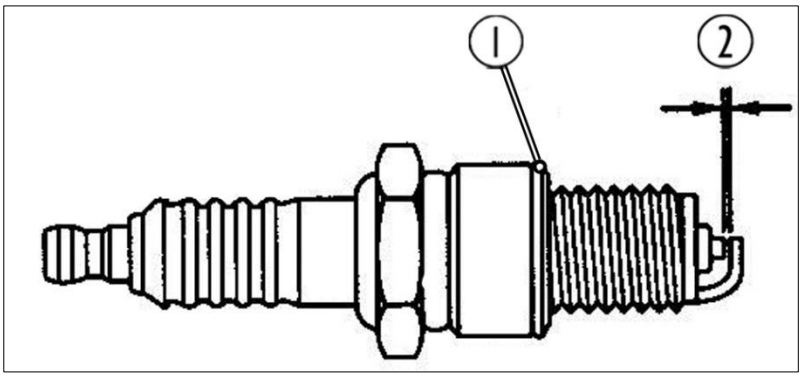

Fig. 37: Spark plug gap

1 Sealing washer

2 Spark plug gap

NOTICE

Risk of engine damage!

A loose spark plug may become very hot. Over-tightening of the spark plug may damage the thread in the cylinder head.

► Tighten the spark plug to the prescribed torque.

7. Ensure that the sealing washer is satisfactory, then screw the spark plug back in by hand to avoid cross threading.

When installing a new spark plug, tighten ½ turn after it seats to compress the sealing washer.

When reinstalling the original spark plug, tighten 1/8 to 1/4 turn after the spark plug seats to compress the sealing washer.

8. After the spark plug is seated, tighten it with a spark plug wrench to compress the sealing washer.
9. Reattach the spark plug connector.

9.3.4 Idle adjustment

1. Start engine and allow to warm up.
2. Push throttle lever to the "MIN" position

Tool

- Screwdriver

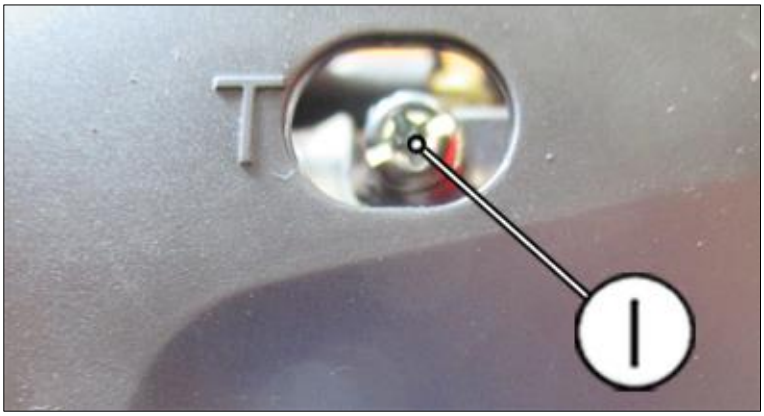

Fig. 38: Screw T (idle)

- If idle is too high, turn screw **T** (1) ccw.
- If idle is too low (engine stops), turn screw **T** (1) cw.

Nominal value of idle RPM: approx. 1100 RPM.

9.3.5 Reset carburetor to factory setting

If multiple changes have been carried out on the carburetor without success, it might be beneficial to reset the carburetor to the original setting and start adjustment again from this point.

Tool

- Screwdriver

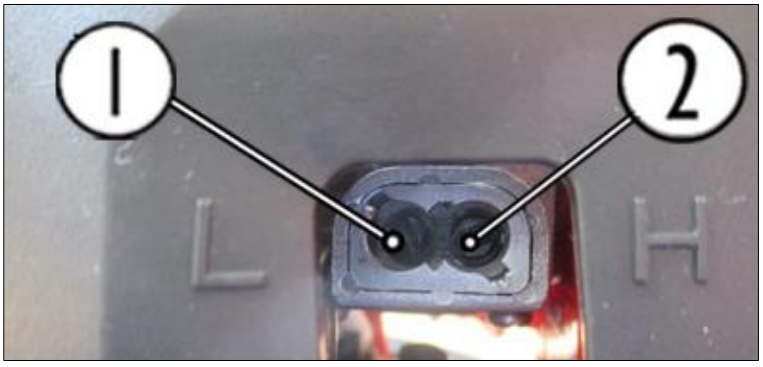

Fig. 39: Screws L (1) and H (2)

1. Tighten the screw **H** (2) fully (CW), then turn it 2 turns in the opposite direction (CCL)
2. Tighten the screw **L** (1) fully (CW), then turn it 2 ½ turns in the opposite direction (CCL)

   Factory setting of the carburettor has been restored, suitable for an altitude of 400 m MSL.

9.3.6 Changing the oil

WARNING

Risk of injury!

Repeated and prolonged skin contact with old engine oil may cause skin cancer.

- ► Wear protective gloves.
- ► Wash hands thoroughly with water and soap immediately after each contact with used oil.

Dispose of used engine oil in a manner that is compatible with environmental regulations.

Do not throw used oil in with the rubbish or pour it on the ground or into drains.

We suggest you take the oil in a sealed container to your local waste oil

Drain the oil while the engine is still warm to ensure speedy and complete draining.

1. Make sure that the tank cap is tightened securely.
2. Place a large container (pan, etc.).

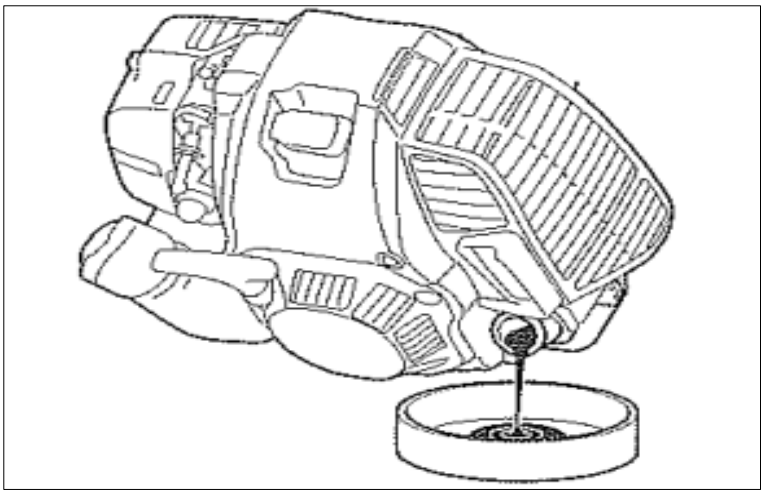

Fig. 40: Changing the oil

3. Remove oil cap, tilt the tamper toward the filler hole, and drain out. Collect oil in container.
4. Refill with the recommended oil (SAE 15W-40) and check the oil level.
5. Refit the oil filler cap.

Engine oil filling quantity: approx. 0.06 l.

9.3.7 Changing fuel pipe

WARNING

Risk of fire and explosion!

Petrol is extremely flammable and is explosive under certain conditions. Fuel leaks can cause a fire.

- ► If any leakage is detected during inspection, replace the fuel pipe immediately.
- ► Observe the safety information on combustion engine and fuel in chapter 2.

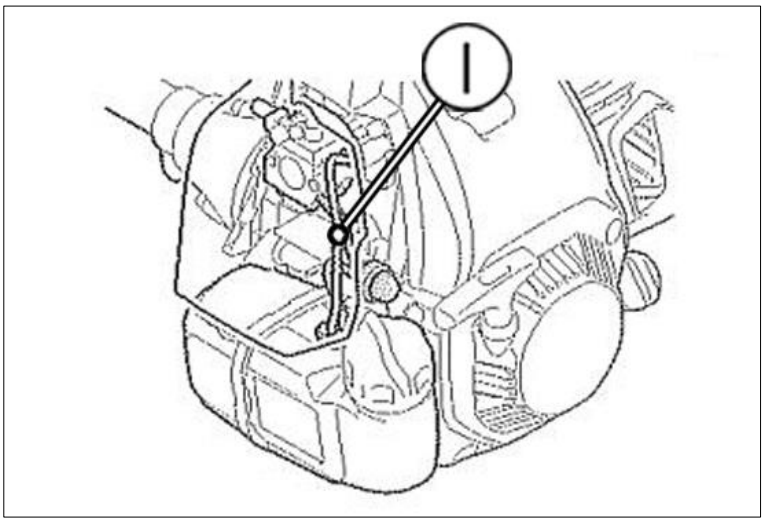

Fig. 41: Fuel pipe

1 Fuel pipe

1. Replace the fuel pipe every year or every 200 operating hours.
2. If any leakage is detected during inspection, replace the fuel pipe immediately.

9.4 Rubber buffers

9.4.1 Checking the rubber buffers

The rubber buffers for vibration damping fitted between the handle, mounting plate and tamping tool are wear parts.

1. Replace the rubber buffers when necessary (= visible cracks, porosity.)

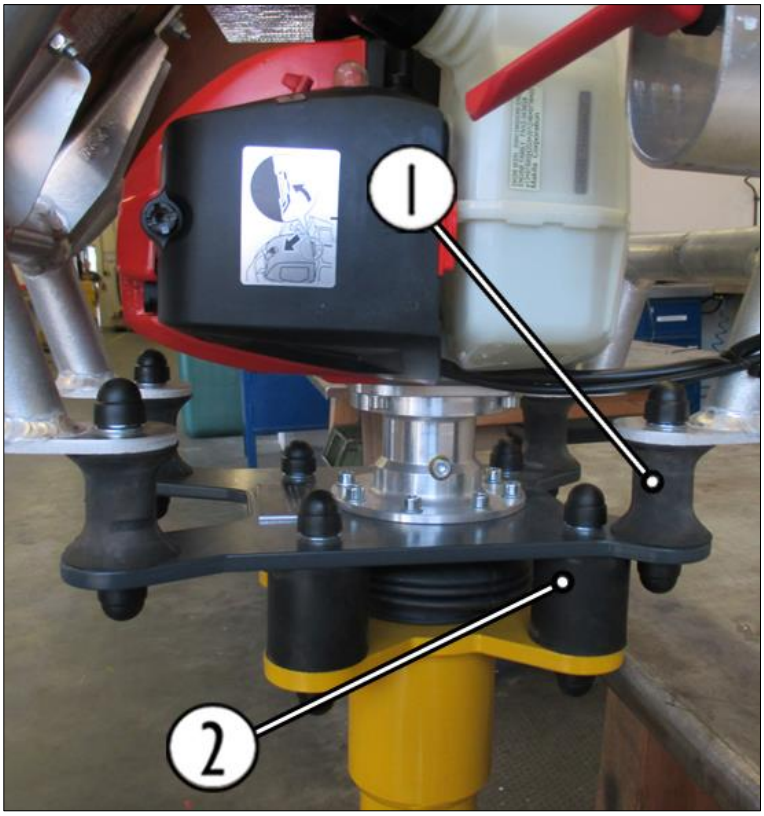

Fig. 42: Rubber buffers

1 4x between handle and mounting plate:
(EDP No. 988 015 0446)

2 4x between mounting plate and tamping tool:
(EDP No. 900 162 0104)

Do not reuse used hexagon nuts!
(EDP-No.: 990 985 1000)

9.4.2 Replacing the rubber buffers

Dismantling rubber buffers

Tools:

- Open-end spanner AF 17
- Pliers with protective jaws

NOTICE

Risk of damage to rubber buffers!

If rubber buffers are twisted or misaligned, tensile or compressive stresses are already impressed at standstill. Superimposed with the stresses during normal operation, this will lead to over-stressing the rubber buffers. A significant decrease of service life of the rubber buffers is the result.

If rubber buffers are gripped with pliers without additional protection, they will be damaged.

► Rubber buffers must not be screwed in twisted or misaligned.

► Use additional protection if you grip rubber buffers with pliers in order to protect them.

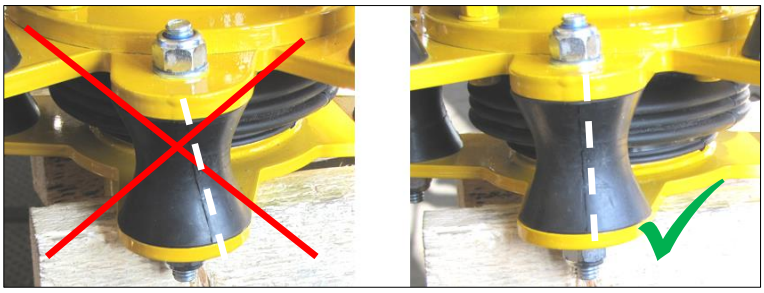

Fig. 43: Left: twisted seam, right: vertical seam

Mounting rubber buffers

1. Hold rubber buffer tight using pliers ,tighten the associated nuts (torque 20 Nm).

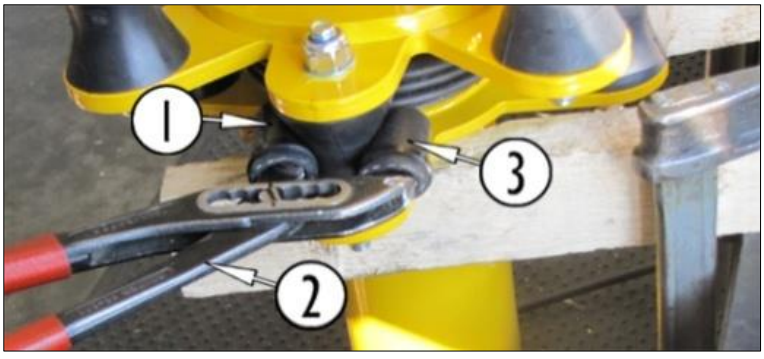

Fig. 44: Mounting rubber buffers

1	Rubber buffer
2	Plier
3	Protection

9.5 Centrifugal clutch

Every 100 operating hours:

1. Unscrew the check screw (1) and refill approximately 2 cm^3 of ball bearing grease.

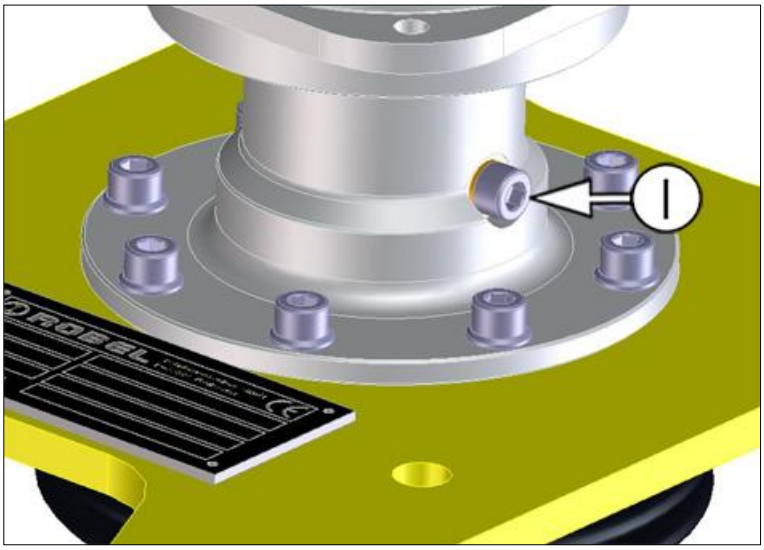

Fig. 45: Maintaining centrifugal clutch

1 Check screw

2. Screw in the check screw.

9.6 Tamping tool

9.6.1 Checking the tamping tool for wear

To prevent a hole appearing in the bottom of the tamping pick and oil escaping or to prevent damage to the bearing, regular checks must be made prior to each use to see how much material has already worn away.

NOTICE

Risk of damage to tamping pick!

the tamping tool is worn and the aluminium of the tamping pick is visible, there is danger of holes forming.

► As soon as aluminium is visible, you have to replace the tamping tool.

Fig. 46: Measuring the length of the tamping tool

1. Measure the length of the tamping tool using a tape measure.

New tamping tool: Length 40.5 cm
Worn tamping tool: Length <36 cm

2. As soon as the tamping tool is worn approx. 4.5 cm, it must be replaced (see next page).

9.6.2 Replacing the tamping tool

Tools, material:

- Open ended spanner AF 13
- Torque wrench
- Angle grinder
- Tamping tool removal device (optional)

Removing used tamping tool

If the tamping tool is worn, it is very likely that the screws and nuts have been damaged, too. In this case it is impossible to remove the fastening crews with the aid of standard tools.

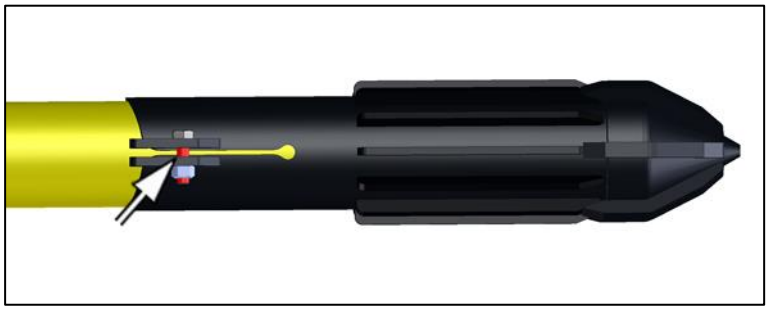

Fig. 47: Cut screws

1. Use an angle grinder and cut the two screws (see arrows, one screw on each side).

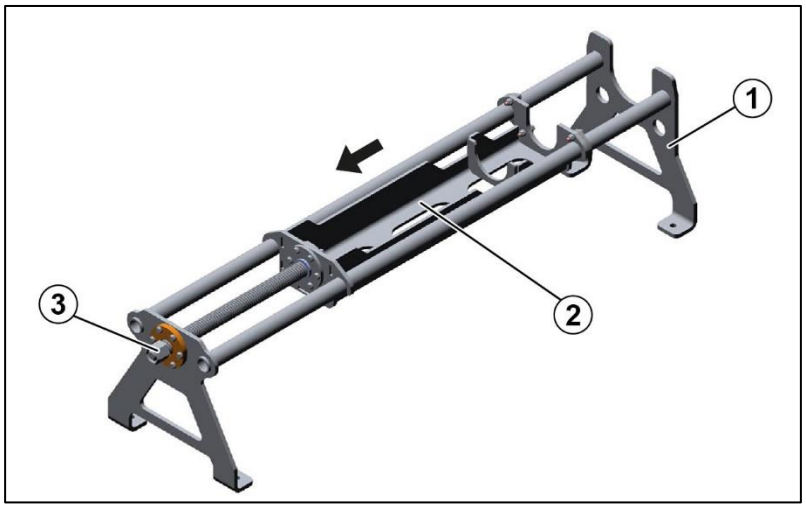

Fig. 48: Tamping tool removal device (optional)

1 Tamping tool removal device
2 Tamping tool support
3 Hexagonal receiver

Order No. Tamping tool removal device:

EPD No. 8998950200

2. Place the tamping tool on the support (2) of the tamping tool removal device (optional).
3. Use a suitable wrench to turn the hexagonal receiver (3) of the tamping tool removal device in the counterclockwise direction.
4. Remove the tamping tool from the tamping pick.

Sliding new tamping tool

1. Measure the length for the tamping pick and mark it at 34.5 cm.

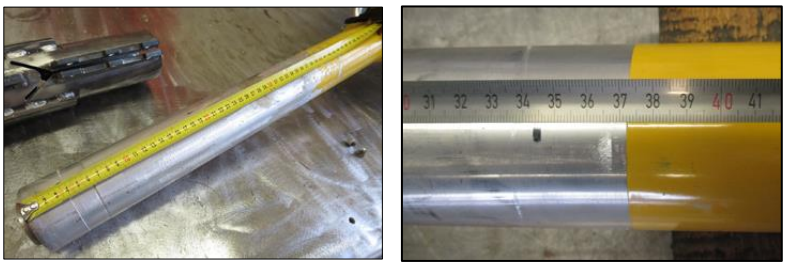

Fig. 49: Mark tamping pick

Injection of resin for longer service life

Safety equipment

- Protective gloves
- Safety goggles
- Respiratory Mask

Fig. 50: Safety equipment

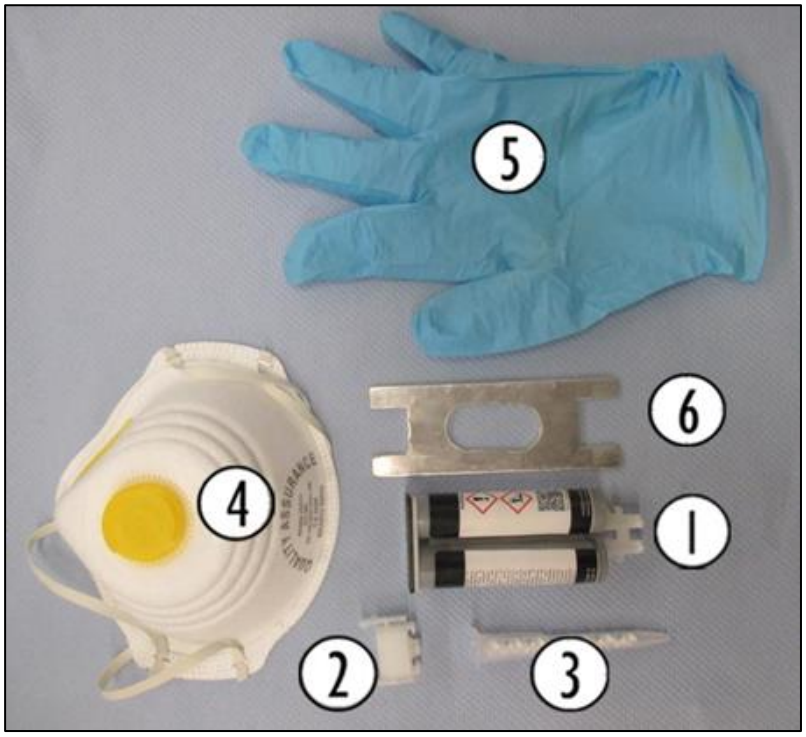

Fig. 51: Scope of delivery

1	Injection – epoxy resin
2	Adapter
3	Mixing tube
4	Mask
5	Protective gloves
6	Auxiliary plate

Note data sheets and safety data sheets

Tools, means, material:

- Multi-purpose grease
- Brush
- Paper towel
- File
- Side cutter

2. Apply multipurpose grease around the bottom 200 mm of aluminium tube and to the centering.

   Grease is used as a release agent so that the aluminium tube has no connection with the tamping tool.

Fig. 52: Apply grease to the aluminium tube and to the centring

3. Wipe off excess multipurpose grease.

Fig. 53: Wipe off excess grease

4. Prepare injection.

Fig. 54: Remove protective cap

Fig. 55: Attach adapter, unscrew mixing tube, shorten mixing tube

5. Place auxiliary plate on tamping tool and insert injection into auxiliary plate.

Fig. 56: Place auxiliary plate on tamping tool.

Fig. 57: Insert injection into auxiliary plate

6. Inject epoxy resin into tamping tool.

Fig. 58: Inject epoxy resin into tamping tool

When filling, make sure that the epoxy resin is just on the bottom of the tamping tool.

7. Remove injection and auxiliary plate.
8. Within 2 minutes push the tamping tool onto the aluminium tube and check control dimension 224 mm, see chap.

Fig. 59: push the tamping tool onto the aluminium tube

9. Using a AF13 spanner and a torque spanner, screw the nuts onto the hexagonal screws.

10. Tighten the 2 screws uniformly on both sides, each screw with 20 Nm.

Fig. 60: Tighten the fixing screws to 20 Nm

11. Check the distance between the tamping tool and the tamping pick flange (see illustration below).

    Target measurement: 224 mm

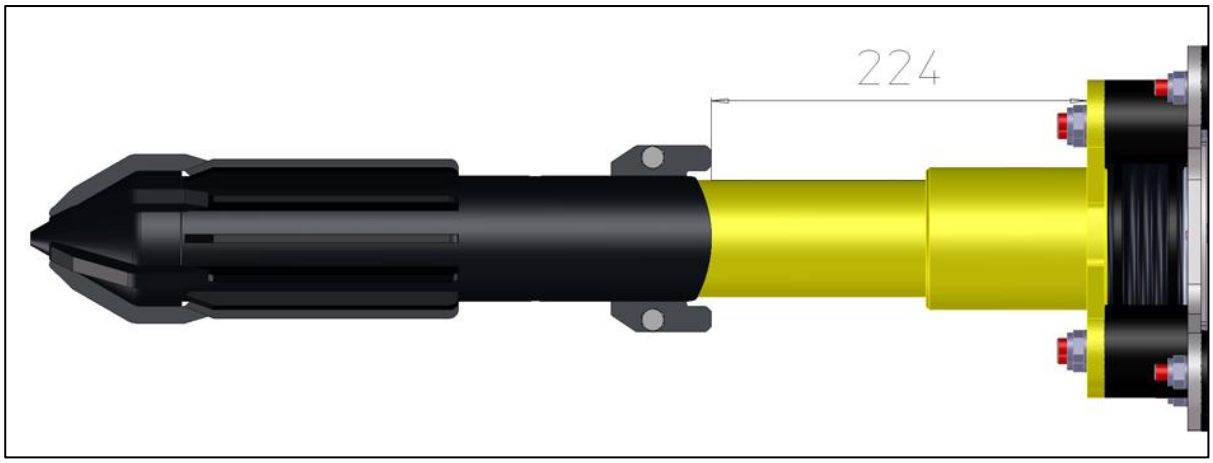

Fig. 61: Checking the reference measurement

12. Store vertically for about 5 hours and allow the resin to harden.

13. After 10 operating hours re-tighten the two screws again with 20 Nm.

Fig. 62: Tighten with torque wrench

9.6.3 Changing bearings

If it is planned to change the bearings of the eccentric shaft, it is necessary to dismount the bearing sets (fixed and floating bearing) together with the eccentric shaft. The outer bearing rings are attached to sleeves. This sleeves have a tight fit in the seats within the tamping pick, so considerable force will be needed to dismount the eccentric shaft.

Tools, means, materials

- Knocking device (EDP-No. 899 895 0001)
- Drain tray (container)
- Open-end spanner AF17
- Allen key AF6
- 60 ml engine oil (SAE 10W-30)

Disassembling the eccentric shaft

NOTICE

Risk of damaging the tamping pick!

If the flange oft he tamping pick or the rim is hit directly with any tool, it is very likely that the tamping pick will suffer distortions and will be irreversibly damaged. It will become impossible to dismount the eccentric shaft.

► Use tapping device (1, optional) for disassembly of eccentric shaft.

NOTICE

Risk of contamination due to draining oil

The tamping pick is filled with oil, it will drain during disassembly.

► Be prepared that oil will drain during disassembly. We suggest to proceed the disassembly oft he eccentric shaft over a suitable drain tray (preferable made of steel.

1. Provide a drain tray for the oil, preferable made of steel. The drain tray needs to be big enough to take the tapping device (1).

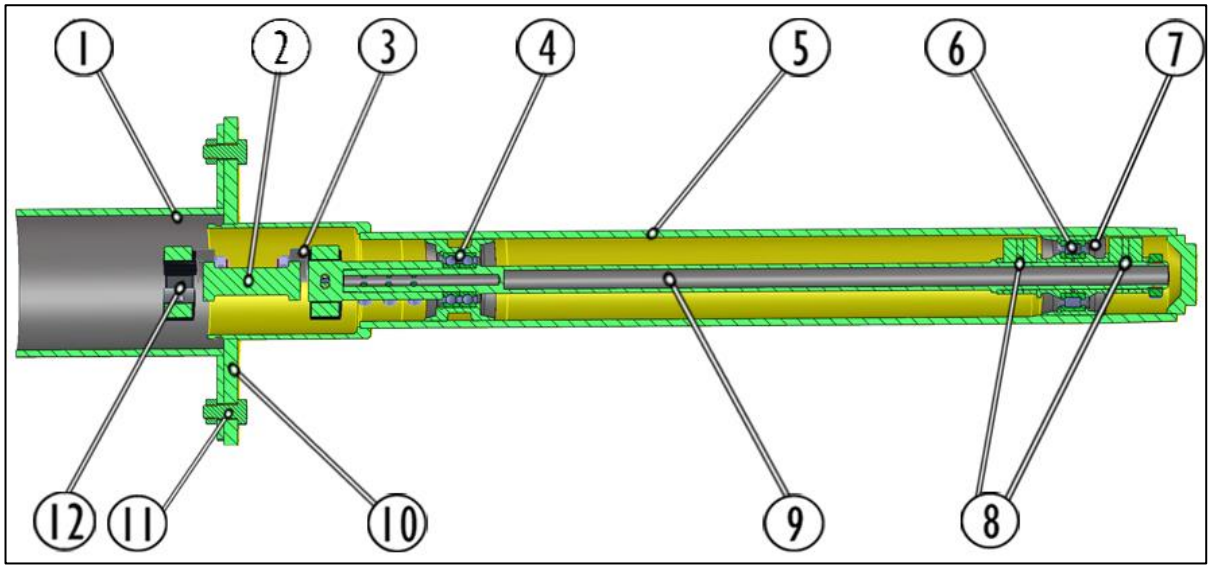

Fig. 63: Section of tamping pick with tapping device attached

1	Knocking device (optional)	7	Sleeve of floating bearing
2	Intermediate shaft	8	Unbalance
3	Rubber damper	9	Eccentric shaft
4	Fixed bearing	10	Flange of tamping pick
5	Tamping pick	11	Nut and Bolt (M10)
6	Floating bearing	12	Fastening screws engine shaft

Fig. 64: Knocking device

Order Number for knocking device:

EDP. No. 899 895 0001

2. Dismount the whole assembly (the tamping pick) off the vertical tamper: Untighten the screws M10 (11) of flange (10) with open-end spanner AF17 and the two screws M8 (12) that attach the coupling element to the engine shaft (under rubber bellow) with Allen key AF6.
3. Detach tamping pick together with eccentric shaft (9) from vertical tamper.
4. Attach knocking device (1) with screws M10 (11) to flange (10).
5. Put drain tray on a rigid work surface.

6. Place the assembly vertically with the knocking device pointing downwards over the drain tray and knock it forcefully onto the work surface.

   Inertia will drive the eccentric shaft out of the tramping pick (5).

7. Once the outer coupling element of the intermediate shaft touches the work surface, withdraw the eccentric shaft together with the bearings.

   The oil (approx. 60 ml) drains.

8. Dismount knocking device.

9. Change bearings.

Mount eccentric shaft

NOTICE

Risk of damaging the tamping pick!

On the inner side of the tamping pick, there is a stop for the sleeve of the floating bearing which is limiting the travel during assembly. If force is applied although this stop has been reached, the bearings may be damaged.

► Consider the dimension 74 mm during assembly. Do not apply any more force once this dimension has been reached.

The lower bearing (floating bearing) needs oil in order to reach a long working life.

► Make sure to fill in the appropriate amount of engine oil (60 ml).

10. Place tamping pick with the flange pointing upwards and fill in 60 ml engine oil.

11. Insert the eccentric shaft into the tamping pick with the floating bearing first until the sleeves are touching their seats.

12. Place the tamping pick over a rigid work surface with the flange pointing upwards and knock it forcefully against the work surface for several times.

    Inertia will drive the eccentric shaft into the tamping pick.

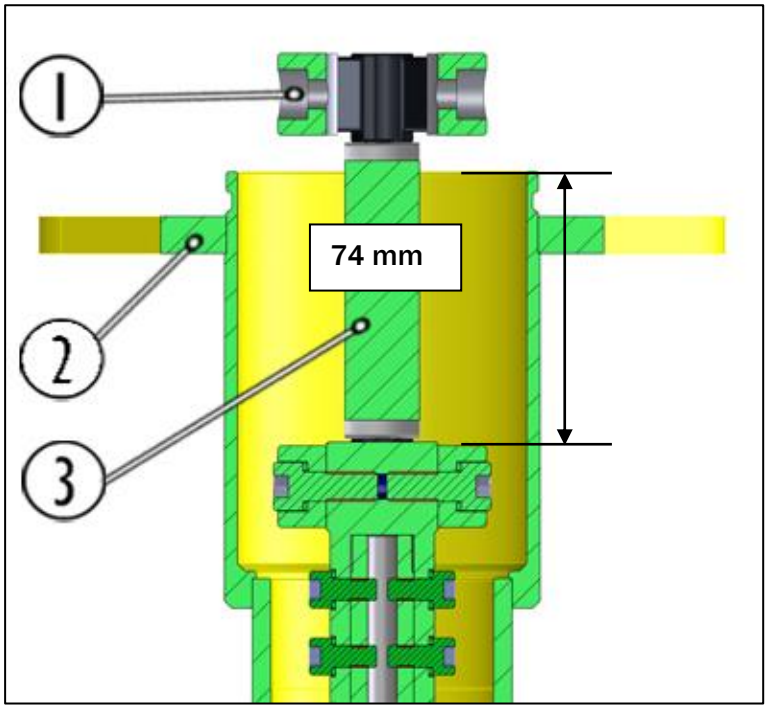

Fig. 65: Consider the dimension 74 mm

1 Screws for engine shaft
2 Flange of tamping pick
3 Intermediate shaft

13. sider the dimension 74 mm and keep on knocking until this dimension has been reached.
14. Prior to assembly, check if orientation of the coupling elements (3) between engine and intermediate shaft is correct. Align if necessary.
15. Join tamping pick and engine.
16. Insert screws into flange and tighten.
17. Degrease the two screws that attach the coupling element of the intermediate shaft to the engine shaft (under rubber bellow) and apply high-strength screw retention.
18. Insert the two screws (1) for the engine shaft and tighten with 20 Nm.

9.7 Signs and labels

► Regularly check if signs and labels are present and in good condition.

► Replace signs and labels if necessary.

10. Environmental protection and disposal

10.1 Environmental protection

1. While working on or with the product, comply with the legal regulations for waste prevention and proper recycling/ disposal and also follow the environmental laws applicable in the user country.
2. Particularly, make sure that during the repair and maintenance work, water polluting substances such as greases and oils do not pollute the ground or get into the drains.

10.2 Disposal

The disposal of the product (including machine parts, engine oil and fuel) will depend upon the local regulations for waste disposal.

If the product reaches the end of its life cycle, ensure a safe and proper disposal, particularly of parts or substances which are harmful for the environment. These include, among others, fuel, lubricants, and plastics.

1. Since there is a risk of potential environmental pollution, have the product disposed of by an approved specialist firm.
2. In any case, check which materials can be used for recycling. Have these disposed of by appropriate waste management companies.

11. Appendix

EC Declaration of Conformity

ROBEL Bahnbaumaschinen GmbH

EG-Konformitätserklärung (deutsche Originalfassung)
EC Declaration of Conformity (English translation)
Déclaration „CE" de Conformité (Traduction française)

gemäß Maschinen-Richtlinie 2006/42/EG, Anhang II A
as defined by the Machinery Directive 2006/42/EC Annex II A
conformément à la directive „CE" relative aux machines 2006/42/CE, Annexe II A

Hersteller (Name und Anschrift): Manufacturer (name and address): Fabricant (nom et adresse):	ROBEL Bahnbaumaschinen GmbH Industriestraße 31 D-83395 Freilassing
Hiermit erklären wir, dass der Herewith we declare that the model Par la présente, nous déclarons, que le modèle fourni par	Vertikal-Schwingstopfer Vertical Tamper Bourroir autonome **RO**TAMP Light Typ, type, type 62.05L/2
folgenden einschlägigen Bestimmungen entspricht: complies with the following provisions applying to it: correspond aux dispositions pertinentes suivantes:	2006/42/EG
Angewandte harmonisierte Normen: Applied harmonized standards: Normes harmonisées appliquées:	DIN EN ISO 12100: 2011
Bevollmächtigt für die techn. Dokumentation: Responsible person for technical documentation: Personne chargee pour la documentation technique:	Mag. Bernhard Lair Abt. Technische Dokumentation Industriestraße 31, D-83395 Freilassing

Freilassing, 21.06.2018

Ort, Datum
Place, date / Lieu, date

Otto Widlroither
Leiter HMG/Head of HGM/
Direct. gestion de mach.

Wolfgang R. Fally
Geschäftsführer/Managing Director/
Gérant

Unterschrift, Angabe der Funktion im Unternehmen
Signature, acting in the company / Signature, en qualité de

ROBEL Bahnbaumaschinen GmbH
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Registergericht: Traunstein: HRB181
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Bankverbindung:
Hypo Vereinsbank Freilassing
IBAN: DE34 7102 0072 0009 333100
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Fig. 66: EC Declaration of Conformity

产品说明书

ROTAMP LIGHT
62.05 L/版本 02

立式捣固机

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产品说明书译文版
日期： 2020 年 7 月 14 日
第 5 简版

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印刷时的最新技术的基础上编制的。
并且会随着技术发展进行更改。
尺寸和重量都为近似值。
有些照片显示的为特殊设计。

目录

1. 一般资料

操作和维护此产品的人员必须阅读并理解本说明书。

所有相关人员必须可随时查阅本说明书。

1.1 关于说明

下列符号用于标记操作程序、列表以及本说明书的其他要素：

符号	解释
1.操作 2.操作	操作程序 操作的顺序不得更改。
• 表 1 – 表 1.1 • 表 2	列表 – 可以更改顺序。
► 度量 ► 度量	度量 顺序不得更改。

1.2 总则

一般情况下，使用本产品必须遵守适用法律要求和事故预防措施。如未遵守，设备操作人员承担任何法律后果的责任。

如果适用于产品使用的现行法规与制造商或分包商的规范之间存在差异，则以最严格的限制规定为准。

买方必须提供一切必要的机械、设备和材料资源，以便将交付的产品投入生产并培训员工。买方还必须提供无限制、安全和足够长的轨道和作业区段，在这些区段上，员工可以学习如何操作和使用交付的产品并进行实操训练。产品制造商或供应商对买方的特定人员配置和操作环境没有影响，因此，对本手册的有效性不承担任何责任。

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1.3 本说明书的阅读对象

本说明书包含正确使用他们所描述的产品必需的信息。

本说明书是专门为技术上合格的人员编写的。本文中合格人员包括：

- 能够通过培训或经验证明自己有资格使用本产品的人员，
- 熟悉与机械和设备有关的安全概念的人员，
- 受过专业培训，负责修理机器、器具及其附件的维修和服务人员。

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买方必须为交付的货物配备一切必要的配件，以符合有关的操作和安全规程、规范、法规或其他规定，如灭火器、急救箱、信号和通讯设备、附加报警装置、防护服、安全告示等。

除非另有约定，货物交付时不提供此等性质的配件。

此外，买方有责任证明所交付的货物已通过认证，供有关当局使用。 制造商或供应商为此目的需提供的任何文件（说明、证明、认证等），应在供应合同中加以规定。

为取得操作认证所需的任何额外措施和费用都必须由买方承担。

1.7 本说明书的有效性

本说明书适用于以下 EDP 编号的产品：

- EDP 编号：899 990 0005
- EDP 编号 980 620 5190

2. 安全

2.1 指定用途

振动式捣固机 62.05 L 是为轨道施工而设计制造的，用于压实轨枕下的道床。

2.2 可预见的误用

立式捣固机不得用于拆除或类似工程作业。

2.3 布局惯例

本说明书利用下列警告文字及符号来保障操作人员的安全以及保护其不会受到伤害，并防止对运营公司的物质资产造成损害：

危险

该符号表明不遵守产品说明书将导致操作人员死亡或严重（不可逆的）伤害。

警告

该符号表示不遵守产品说明书可能导致操作人员死亡或严重（不可逆的）伤害。

小心

该符号表示不遵守产品说明书可能导致操作人员轻微（可逆的）伤害。

通知

该通知指出不遵守操作说明可能对运营公司的产品或其他资产造成损害。

该符号表示其包含关于产品及其操作或关于现有部分说明的重要信息。

预警结构

这些警告的结构如下：

警示词

危险的类型和来源！

忽视危险时的（可能）后果。

► 采取措施规避危险。

2.4 设计变更，原装零件

如擅自对产品部件和附件进行任何更改，制造商概不负责。

原装零件和配件是专门为产品设计的。使用未经批准的备件可能导致产品的结构特性发生变化或受损。

对于因使用此类零件或劣质操作液体而造成的任何损坏，制造商不负任何责任。

2.5 防护装置

操作安全装置会对操作人员和他人的生命构成危险!

► 操作者有义务在操作过程中切实安装好指定防护装置，或保持其预定出厂状态。

► 受委托进行维护的人员在完成工作后，必须重新安装防护装置。

2.6 安全规程

操作本产品时，必须优先考虑保护生命、健康、物质财产和环境的必要要求！

► 在使用本产品前，请确保你能证明所有受影响的人员均已知悉下列有关规例及条文：

- 国家安全法规
- 各建筑守则及工程规则的条文
- 各专业及行业协会的规定
- 职业与环境健康和安全条例
- 审批规程
- 公司内部规章制度

- 制造商的安全和操作规程之外并与之一致的所有其他适用规定

必要时，负责操作的办公室必须针对产品的特殊作业制定额外的规程和措施，以确保满足所有的安全要求。

除上述资料外，还必须遵守和符合具体的安全规则。

2.7 工作人员资质

操作人员 运营公司对操作人员就分配给他的作业任务进行了培训，并告知操作人员不适当的行为可能带来的危险。

对操作人员的要求

- 产品综合培训
- 了解操作和维护说明的内容
- 了解供应商及辅助设备的操作和维护说明的内容
- 了解有关产品和辅助设备的国家法律和法规
- 身心健康
- 具有专注力、责任感、可靠性
- 必要的国家要求（资格、最低年龄）
- 无酒精、药物、毒品、疲劳等影响。

2.8 人身防护设备

在使用和维护产品时，必须使用经批准的人身防护设备。

► 戴上防护手套！

► 戴上听力保护装置！

► 穿钢头工作鞋

防护设备根据下列项确定：

- 本产品说明书
- 国家安全规则
- 专业行业协会规则
- 等

► 如果运营公司现行有效的规定与制造商及其供应商的规定有差异，则最严格者适用。

2.9 关于特定类型危险的信息

重物危险

如果单人抬起或搬运的重量超过了允许的范围，就会有损伤肌肉、肌腱、关节或骨骼的危险。

- ► 在运输之前，确保路上没有障碍或绊倒危险。
- ► 在抬起或搬运机械或设备时，应遵守允许的单人起重量规定。

运营公司有责任确保遵守其所在国家的安全条例和行业协会指南。 本产品说明书的警告通知述及的价值观与德国法规有关。

- ► 进行风险评估，并考虑到关于操作人员和运输作业的下列方面：
  - 运输频率
  - 年龄
  - 性别
  - 操作人员健康状况
- ► 遵守起重及运输重型机械或设备的有关指南。

不符合人体工程学操作的危险

在某些活动中，如果不通过控制装置采取必要的谨慎预防措施，则有可能损伤肌肉、肌腱、关节或骨骼。比如通过换向启动器来启动发动机。

- ► 用力拉换向启动器，但要避免急动。
- ► 避免不利的动作和不良的姿势。

内燃机危险

当发动机运转时，旋转部件和热部件有造成人身伤害的风险。

- ► 只有经过授权的技术人员才能在内燃机上工作。
- ► 关掉发动机，让它冷却。
- ► 定期检查发动机并立即纠正发现的任何故障（如 损坏、泄漏等）。
- ► 留意不寻常的噪音或振动等。
- ► 进行维护时必须关闭发动机。
- ► 小心过热的部件。

点火电缆将高压输送到火花塞。当发动机运转时，如果触及点火电缆或火花塞，就可能产生致命的电击。心脏起搏器佩戴者尤其处于危险之中。

► 发动机运转时，请勿触摸点火电缆或火花塞。

► 起搏器佩戴者不得对点火系统进行任何作业。

有因废气而中毒的危险。废气中含有一氧化碳，这是一种无色、无味、有毒的气体。如果吸入一氧化碳，可能导致严重的脑损伤，甚至死亡。

► 只能在室外操作内燃机。只有在安装排气排烟装置的情况下，才可在密闭的空间内操作。

► 不要吸入废气。

燃料危险

燃料是高度易燃的，在一定条件下与空气混合会发生爆炸。

如果燃料处理不当，会有造成人身伤害或损坏物质财产的危险。

► 关掉发动机，让它冷却后再加油。

► 在通风良好的区域以及发动机停机后加油。

► 操作燃料时不要吸烟。

► 保持燃料远离明火和火花。

► 避免反复或长时间接触皮肤或吸入蒸气。

► 加油时小心不要弄洒燃油。

► 只使用合适的加油装置来补充燃料（例如： 漏斗）。

► 立即擦掉溢出物。

如果油箱过满，随后产生的热量可能导致燃料膨胀，并通过加油口盖上的开口溢出。

► 不要把油箱加得过满，这样燃料会升到加油口颈。

电气电压危险 有些部件可能带电，当与它们接触时可能会造成严重甚至致命的伤害。

- ► 仅由经授权的电气工程师负责电气系统相关工作。
- ► 立即纠正故障（接触故障、电缆或机壳的外部损伤等）。
- ► 对电气系统进行操作之前： 关闭系统电源，关闭驱动装置并断开电源：
- ► 对电气系统进行操作期间： 请勿触摸任何带电的线路。
- ► 检查接地电缆是否安装到位且牢固。
- ► 检查接地电缆的连接面是否洁净且无腐蚀。

噪音危险 如果操作人员不经常佩戴个人听力保护器，会对身体尤其是听力造成永久性损害。

- ► 戴上听力保护装置。

热危险 接触热部件有受伤的危险。

- ► 请勿触摸受热部件。

  在对受热部件进行操作之前，关闭发动机，让热部件冷却至少 30 分钟。

火灾风险

- ► 将机器放置在离建筑物和其他设备至少一米远的地方。
- ► 确保发动机附近没有易燃材料，并且当发动机运转时其上没有放置任何物体。
- ► 机器适当冷却之前，不得盖住或加载机器。

振动危险 振动传递到人体会对健康造成不利影响。虽然操作导向手柄通过橡胶缓冲器进行减振，但无法实现完全消除振动。

- ► 戴上带衬垫的手套。
- ► 工作过程中，将无振动活动与对肌肉的主要动态需求相结合。

环境损害风险 使用的大部分部件和零件都要遵守收集和处置的特别规定。

► 按物料类别（钢、塑料、油类等）对部件进行处置。

► 按照有关规定收集废油，并进行相应处置。

擅自启动导致的危险 擅自启动和误用可能导致任何形式的危险和损害。

► 严禁未经许可的人员擅自启动。

► 由运营公司来评估这种风险。

► 运营公司有责任对未经授权的启动实施适当的措施。

2.10 事故预防

土木工程师协会的《事故预防规例》也适用于本说明书，并须仔细阅读和遵守。

► 始终遵守通用的和内部的预防事故的规定。

► 考虑与产品的特殊作业相关的潜在事故风险，并提供适当的培训。

► 在产品投入使用前，应检查产品是否处于正常工作状态：

- 设备、装置、工具、附件、安全设备等都齐套且完好无损。
- 检验和维护工作已按时以专业方式进行。
- 工作液已加满（燃料、润滑剂等）
- 满足你及其他人、物质财产和环境方面安全作业的所有先决条件。

► 注意产品和工作区域的特殊危险，特别是：

- 人与障碍，
- 符合安全间隙，
- 邻近轨道上的交通，
- 确保所有保护设备安装牢固，
- 遵守所有操作上必要的安全措施。

► 操作液体（油、润滑脂等）泄漏必须立即去除，以防止发生火灾或滑倒的危险。 手边应备有适当的油粘合剂和清洗剂。

► 离开产品前进行下列检查：

- 已正确关机。
- 已固定，以防止无意间移动。
- 工具和附件已安全存放。

► 只使用工作正常的机器、器具和工具。

► 立即对较小的故障进行整改，以避免较大的故障。

急救 确保下列各项，以便能够在紧急情况下提供急救：

► 确保急救箱处于良好状态，在任何时候都是齐备和干净的。

► 向贵方办事处的医疗服务机构或医生咨询急救措施和相应设备。

► 立即补充已用完的材料。

► 储存急救设备（急救箱、毯子等）。和容易取到的灭火器。

► 携带保护事故现场的材料。

2.11 消防安全

当燃料、油、油漆或清漆着火时，就会释放出有毒的烟雾。

此外，必须根据具体情况采取一切必要的措施，防止火灾的发生或蔓延。

电气设备闷燃时，烧焦的电缆释放出有毒的烟雾，燃料、油或油漆起火时也会释放有毒烟气。

► 每个人都有义务尽可能合理地避免进行任何可能引起火灾或有利于火灾蔓延的操作。 此外，必须根据具体情况采取一切必要的措施，防止火灾的发生或蔓延。

► 一般来说，任何发生的火灾都只能用干粉灭火器来扑灭。

一般要求 必须遵守下列消防安全措施。

► 只使用经批准的防火级别的灭火器（粉末型灭火器）。

► 定期检查灭火器，并确保其配有检验标签（至少每 2 年一次，检查失效日期！）。

► 使用灭火器后，立即更换。

3. 技术参数

3.1 驱动装置

类型：Dolmar 4300 风冷单缸四冲程发动机

转速	7,500 RPM
7,500 U/min 下的输出	1.5 kW
燃料	汽油，至少 91 ROZ（相当于 86 辛烷值）
	无铅汽油（E10 或以下）
	烷基化汽油（四冲程）
每运行小时耗用量	大约 0.9 L/h
废气排放	根据加州空气资源委员会三级，美国环境保护署二阶段，欧盟二级

3.2 尺寸

长度	1080 毫米
宽度	510 毫米
高度	410 毫米

3.3 加油量

燃料	0.6 升
电机： 发动机油 SAE10W-30	0.06 升
捣固镐： 发动机油 SAE10W-30	0.06 升

3.4 重量

捣固机	19.6 公斤

3.5 环境条件

3.5.1 温度

温度范围 - 操作	-20℃至 50℃
温度范围 - 运输	-20℃至 60℃
温度范围 - 储存	-20℃至 60℃

3.5.2 运行高度

标准阀门设备和化油器出厂设置下	100 米至 800 米，理想状态为 400 米

调整运行高度参见第 5.2 章

3.6 噪声排放及振动

由于作业时的噪音超过了适用于人的噪音标准，因此必须佩戴适当的听力保护装置（也请参见国家法律法规以及基本的健康和安全要求）。

评估人员适用的噪音水平需要考虑到每个工人的实际工作环境（比如呆在不同的地方/机器处）。

3.6.1 噪声排放

声压级 L_{pA}	113.6 dB(A)
声功率级 L_{WA}	109.0 dB(A)

3.6.2 振动

总振动（三方向矢量和）	7.7 m/s^2

3.7 数字式转速/小时

范围

参数	范围
每分钟转数(RPM)	0...60,000 U/min (UPM)
曾经达到的每分钟转数（RPM）最大值	0...60,000 U/min (UPM)
运行时间	0....99.999 小时

分辨力

参数	分辨力
每分钟转数(RPM)	1 U/min (UPM)
曾经达到的每分钟转数（RPM）最大值	1 U/min (UPM)
运行时间	0.1 小时

4. 机器简介

4.1 设计

4.1.1 立式捣固机

立式捣固机由一个汽油发动机组成，其利用不平衡力来驱动轴产生振动。

安装在发动机上的是切断发动机的“发动机停止”按钮。

4.1.2 捣固镐

捣固镐由两部分组成。捣固机具位于其底部。

4.1.3 导向架

导向架通过八个橡胶 - 金属缓冲器固定在带阻尼的振动体上。

油门手柄安装在右侧。

4.2 全视图

图 1 全视图

1 汽油发动机
2 防护罩
3 导向架
4 油门手柄
5 橡胶缓冲器
6 捣固机具
7 捣固镐

4.3 作业站

操作人员站在机器后面，双手抓住把手。符合人体工程学的操作方面的信息，请参见第 6.2.1 章。

4.4 汽油发动机

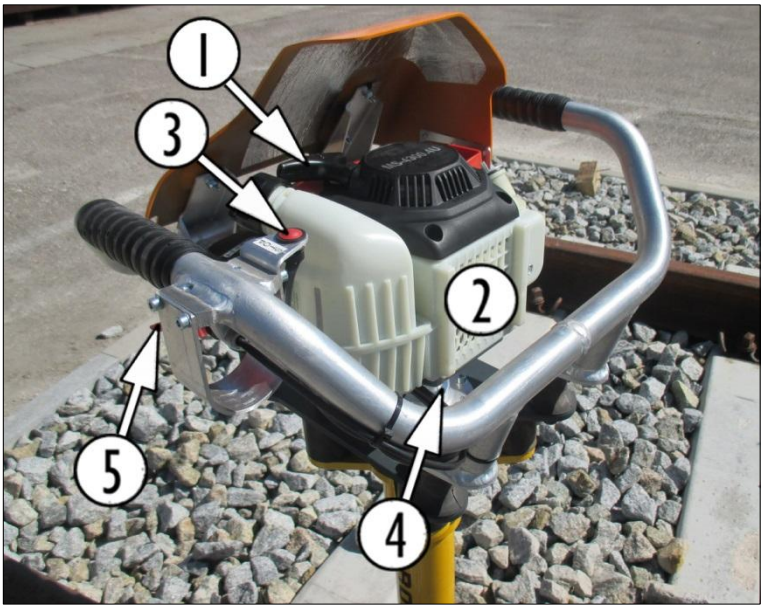

图 2 汽油发动机

1 反冲起动器手柄

2 燃油箱

3 " “发动机停止”按钮

4 离心式离合器

5 油门杆

4.5 标志和标签

4.5.1 使用的标志和标签

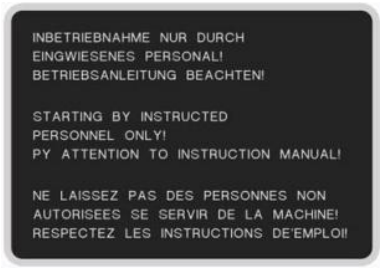

图 3 “仅限受过培训的人员启动”标志

图 4 类型标号（例）

图 5 运输/储存位置

图 6 遵守操作规程

图 7 厂商徽标

图 8 油箱容量

图 9 停止（发动机停止按钮旁）

- ► 定期检查所有标志是否完好无损!
- ► 必要时更换标签！

4.5.2 产品定位

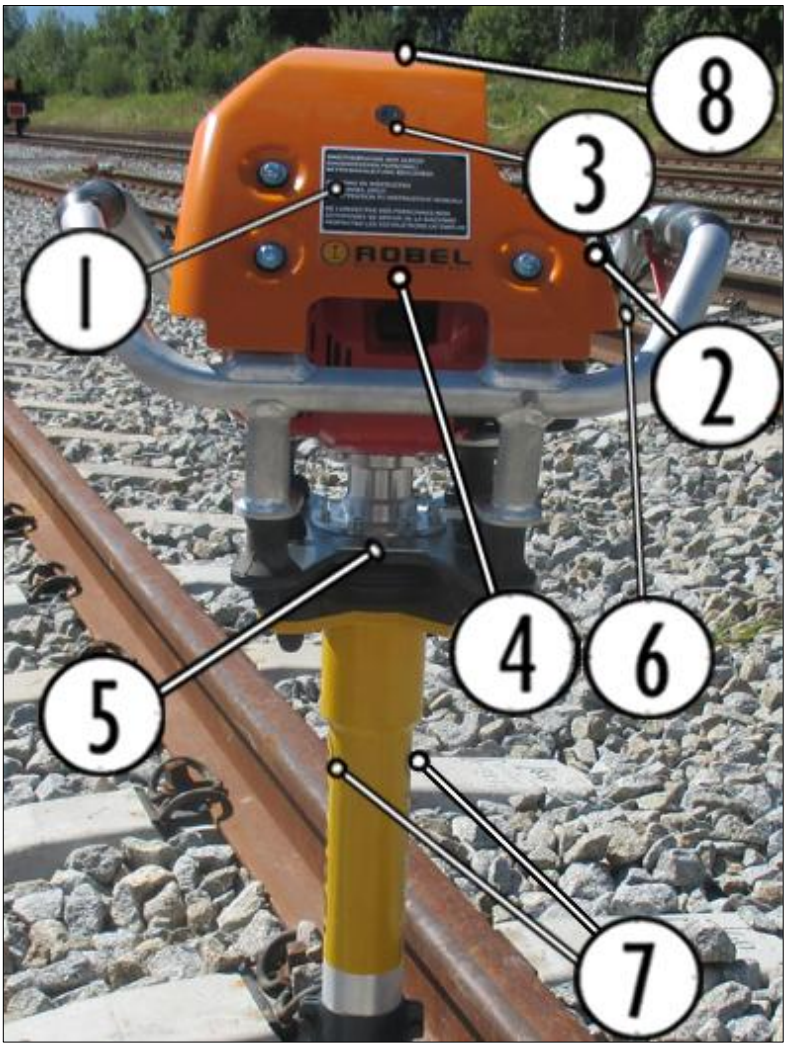

图 10 产品定位

1 “仅限接收指引人员启动”标签

2 “油箱容量”标签

3 “遵守操作说明书”标签

4 厂商徽标

5 类型标号

6 “停止”标签

7 厂商徽标

8 “运输/储存位置”标签

4.6 数字式转速/小时

数字感应式转速/小时能够显示三个值：

- 运转时数（发动机熄火）
- 实际转速（发动机运转时）
- 曾经达到的每分钟转速最大值

图 11 例：实际 rpm 显示

1 按钮

4.7 配件

- 轨道移动指示器

  （EDP 编号 886 823 0001）

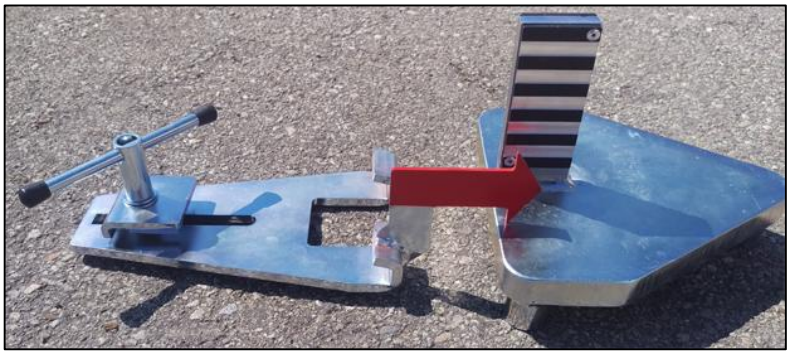

图 12 轨道移动指示器

5. 机器准备

5.1 数字感应式转速/小时

5.1.1 操作

显示标准模式：

图 13 运行时数（左）及每分钟转数（右）

- 当发动机不运转时，转速/小时显示实际运行时间。
- 当发动机运转时，转速/小时显示发动机的实际转速。

查看存储的 RPM 最大值

1. 按 2x 键。

   显示器显示“2 RPM”和存储的 RPM 最大值。

图 14 每分钟存储的 RPM 最大值

如果没有按下按钮约 8 秒，显示器自动切换回标准模式。

5.1.2 设置

数字转速/小时已根据所用的发动机设定出厂设置。

- 不得无故更改设置。

数字转速/小时既可用于二冲程发动机，也可用于四冲程发动机。

检查设置：

1. 按一下按钮。

   如果使用二冲程发动机，则应该显示“1P1r”；如果使用四冲程发动机，则应该显示“2P1r”。

图 15 二冲程发动机设置

图 16 四冲程发动机设置

更改设置

1. 按一下按钮。

   显示器显示“1P1r”或“2P1r”。

2. 再次按下按钮，保持大约 4 秒。

   显示器闪烁。

3. 按一下按钮。

   显示器显示另一个设置。

再次按下按钮，显示器就会在两个设置之间切换。

4. 设置二冲程发动机为 “1P1r”或 四冲程发动机为 “2P1r”。

5. 一旦显示器显示正确的设置，等待大约 10 秒。

   显示的设置已被存储，显示自动返回标准模式。

5.2 检查/调整化油器设置

通知

发动机损坏风险！

该化油器出厂设置针对的是 400 米 MSL 的海拔高度。如果发动机在较低的高度运行，而不调整化油器设置，它将显示低性能，且容易过热，并最终因混合气过于稀薄而遭受严重损坏。

► 根据该高度调整化油器设置。

► 不得无故更改化油器的设置。

5.2.1 高空作业（>800 米）

在海平面以上的高海拔地区，燃料/空气的混合物会变得过于浓稠（因为空气中氧含量较低）。这会导致发动机性能下降和油耗增加。

高海拔下化油器的设置

工具

- 螺丝刀

1. 启动发动机并让它预热。
2. 握紧捣固机，使捣固机不接触地面。
3. 加全油门并评估发动机的声音： 如果发动机运转不畅，则表明混合气太浓。
4. 顺时针方向转动螺钉 H（2），每一步旋转 1/8 圈，如下图所示。

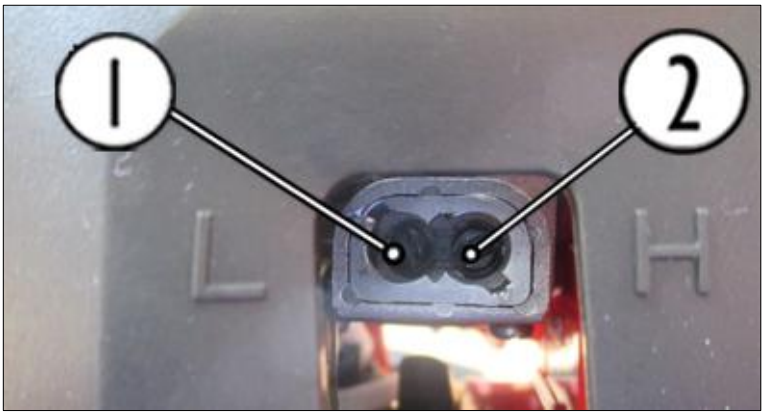

图 17 螺钉 L（1）和 H（2）

5. 评估发动机的声音：如果发动机运转平稳，完成调整。如果需要进一步调整，继续按顺时针方向旋转螺钉 H（2），每一步转动 1/8 圈。
6. 让发动机空转，评估发动机的声音：如果发动机运转不畅，则表明混合气太浓。
7. 顺时针旋转螺钉 L（1），每一步转动 1/8 圈。
8. 评估发动机的声音：如果发动机运转平稳，完成调整。如果需要进一步调整，继续转动螺钉 L（1）顺时针旋转，每一步转动 1/8 圈。

化油器已设定好，可在高海拔地区使用。

即使在适当的化油器设置下，海拔高度每增加 305 米（1000 英尺），发动机马力仍会降低大约 3.5%。如果化油器设置不进行调整，海拔高度对马力的影响将比这更大。

如果发动机在较低的高度运行，请确保再次调整设置。

5.2.2 低空作业（<100 米）

在低海拔高度下（MSL-平均海平面），燃料/空气的混合物会变得很差。这会导致发动机性能下降和过热，进而导致发动机损坏。

低海拔下化油器设置调整

工具

- 螺丝刀

1. 启动发动机并让它预热。
2. 握紧捣固机，使捣固机不接触地面。
3. 加全油门并评估发动机的声音：如果发动机运转不畅，则表明混合气太差。
4. 逆时针方向旋转 H（2）螺钉，每一步旋转 1/8 圈，如下图所示。

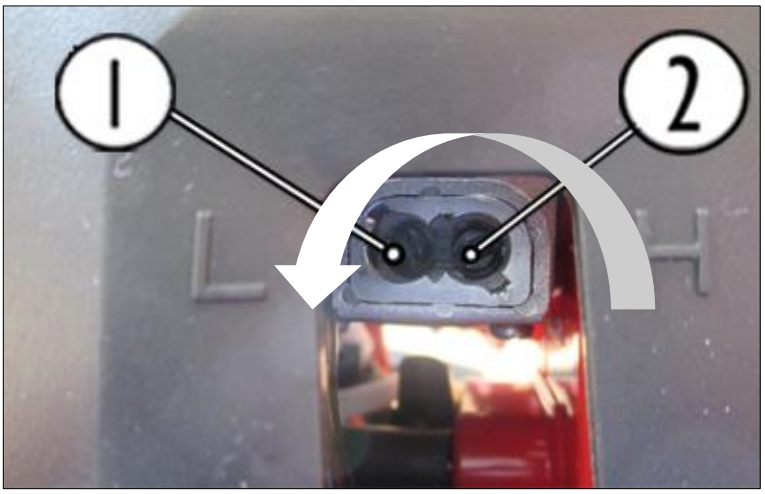

图 18 螺钉 L（1）和 H（2）

5. 评估发动机的声音：如果发动机运转平稳，完成调整。如果需要进一步调整，继续按顺时针方向旋转螺钉 H（2），每一步转动 1/8 圈。
6. 让发动机空转，评估发动机的声音：如果发动机运转不畅，则表明混合气太差。
7. 逆时针旋转螺钉 L（1），每一步转动 1/8 圈。
8. 评估发动机的声音： 如果发动机运转平稳，完成调整。如果需要进一步调整，继续转动螺钉 L（1）逆时针旋转，每一步转动 1/8 圈。

化油器已设定好，可在低海拔下使用。

发动机高空运行之前确保再次调整化油器的设置。

5.2.3 怠速调整

当混合气已根据高度设置后，可能需要重新调整怠速设置，参见第 9.3.4 章。

5.3 检查汽油发动机

5.3.1 发动机油位

通知

发动机损坏风险！

如果油位降得太低，则会有发动机润滑失效的风险。发动机将受到严重损坏。

► 确保发动机运行时有足够的机油。

► 发动机停机后在水平地面检查机油油位。

1. 将发动机水平放置，油箱侧面朝下放在水平面上。
2. 拆下加油口盖，检查油位。确保油位高于油箱的下限标志。

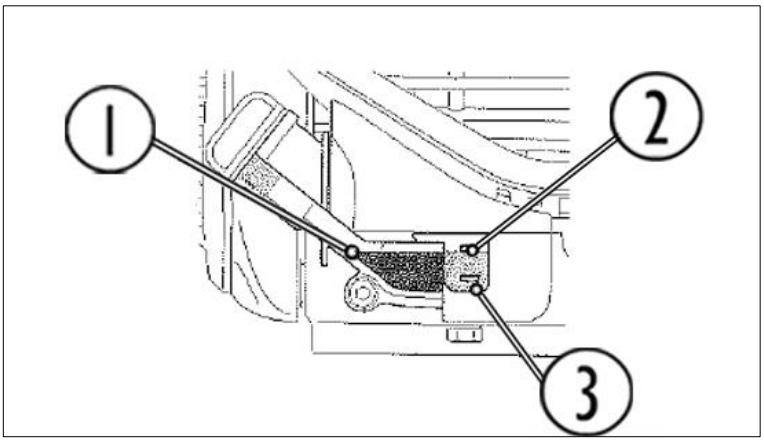

图 19 发动机油位

1 机油
2 上限标记
3 下限标记

3. 如果油位低，加建议的油直至到达油箱上限标记。
4. 每 10 个运行小时检查油位并加建议的油直至到达油箱上限标记。

四冲程发动机使用的发动机油应满足或超过 API（美国石油协会）使用类级 SF 或以上要求（或同等质量）。始终检查机油容器上的 API 使用标签，以确保它包含字母 SF 或更高类级（或同等质量）的字母。

一般用途建议用 SAE 10 W-30。如果使用地点的平均温度在规定范围内，则可以使用表中给出的其他粘度的机油。

通知

发动机损坏风险！

使用不合适的机油会对发动机的使用寿命产生不利影响。

► 不要使用不溶性油或二冲程油。

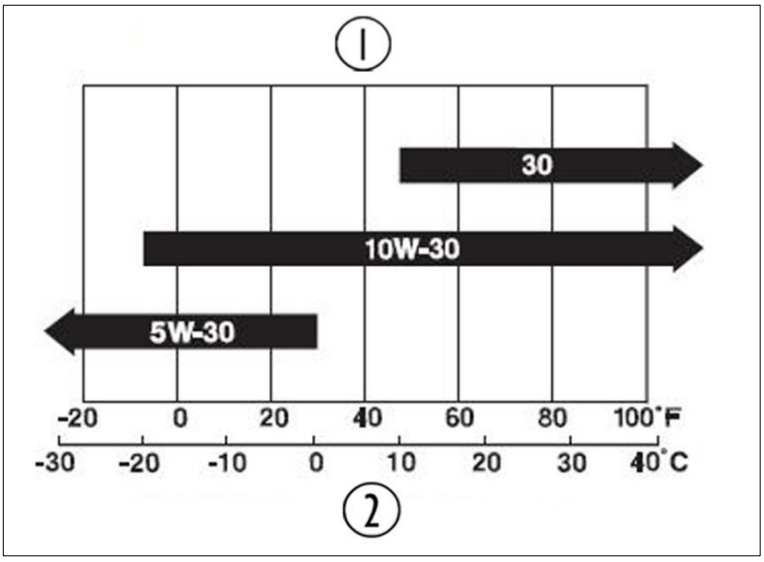

图 20 SAE 粘度类别

1 SAE 粘度类别

2 环境温度

5.3.2 空气过滤器

通知

发动机损坏风险！

如果发动机在没有空气过滤器的情况下工作，颗粒物（灰尘）会进入燃烧室，导致发动机磨损。套筒结构会被刮伤，发动机将丧失压缩功能，进而导致性能下降。

► 没有空气过滤器时切勿运行发动机。

通知

有损坏空气过滤器的风险！

如果使用压缩空气来清洗空气过滤器，敏感的滤芯可能会被破坏。

刷力会使污垢渗入纤维。

► 不要使用压缩空气来清洗或干燥空气过滤器。

► 不要用刷子来清除污垢。

Robel 建议定期更换空气过滤器和火花塞，以符合维护计划表中的规范要求。

只有在紧急情况下，即在没有备用部件的情况下，才对空气过滤器和火花塞执行所描述的清洁程序。

1. 检查空气过滤器滤芯以确保其洁净且状态良好。
2. 必要时清洗或更换滤芯。

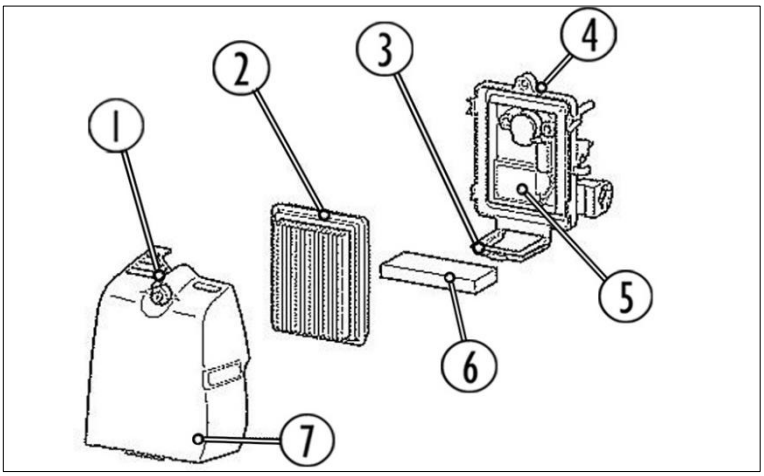

图 21 空气过滤器

1	固定螺栓
2	滤芯（纸）
3	回线
4	滤板
5	分离板
6	滤芯（海绵）
7	空气过滤器盖

5.3.3 加油

警告

有着火或爆炸的危险！

汽油是极易燃的，在某些条件下是易爆的。

► 遵守第 2 章有关内燃机和燃料的安全须知。

发动机产生的热量会导致燃料膨胀，并通过加油口盖的开口泄漏。

► 油箱不要加得太满： 加油颈不得有燃油。

通知

发动机损坏风险！

燃料污染会导致发动机损坏。

► 不要使用任何不清洁的机油 - 汽油混合物或汽油。

► 避免污垢、灰尘或水进入油箱。

► 使用清洁、新鲜且无铅的汽油，乙醇含量百分比不超过 10%。

油漆涂层有损坏的风险！

燃料会腐蚀油漆和一些塑料制品。

► 加油时一定不要把燃料洒了。

1. 保持手柄干燥、清洁，无燃油和油污。
2. 将振动式捣固机放在手柄架上，拧下油箱盖。
3. 小心加油。

油箱容量：0.6 升

4. 旋回油箱盖，并检查它是否紧密贴合。
5. 如果油箱盖有任何损坏，请更换。

不要使用储存超过两个月的汽油。

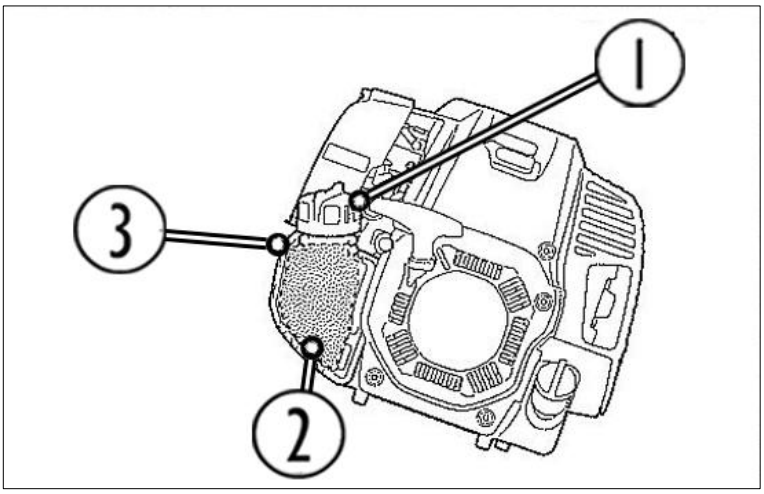

图 22 油箱加油

1 油箱盖

2 燃料上限

3 燃油箱

6. 操作

6.1 启动发动机

1. 当发动机处于低温状态时，关闭阻风门杆（将其滑动至关闭位置）。

如果发动机有点热，则完全打开。 油门手柄使用简便，使发动机可以更好地启动。

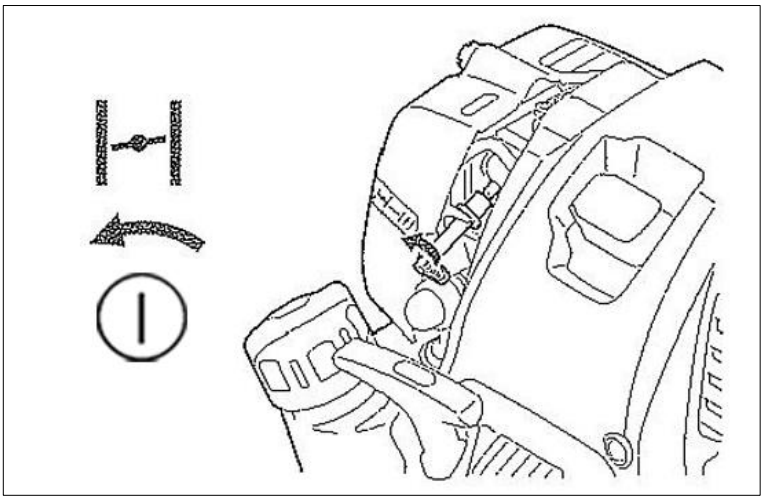

图 23 关闭阻风门杆

1 阻风门“关闭”位置

2. 继续推动起动注油泵，直到燃料进入该泵。（一般推 7 到 10 次。）

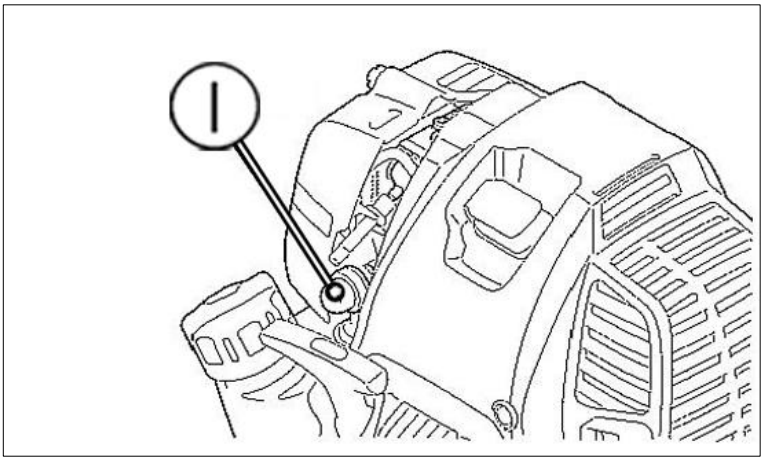

图 24 起动注油泵

1 起动注油泵

通知

有损坏起动机的风险！

如果启动后立即放开起动器手柄，则该手柄可能损坏。

► 不要让起动器手柄回弹到发动机上，而要小心地将其向后移动。

3. 轻拉起动器手柄，直到感觉到阻力，然后用力拉出手柄。
4. 发动机启动后，将阻风门杆设置为开启位置。

检查发动机运行的同时逐渐打开阻风门杆。最后一定要把阻风门杆完全打开。

在寒冷条件下或发动机冷却后，切勿突然打开阻风门杆。否则发动机可能会熄火。

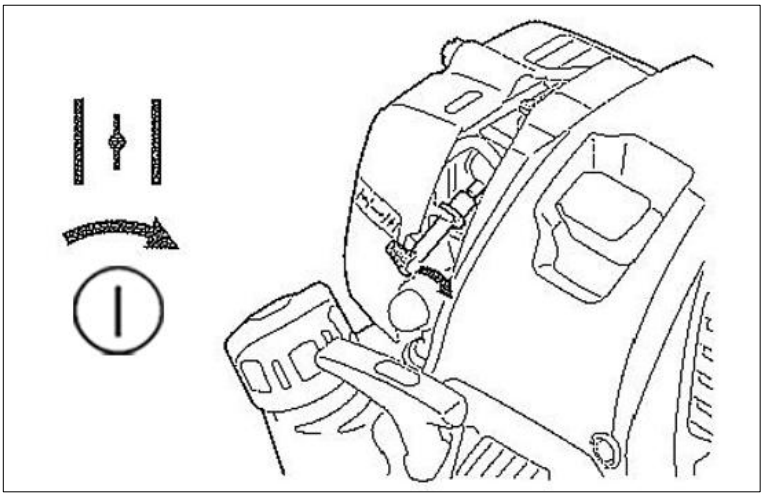

图 25 将阻风门杆移动到 “开启”位置

1 阻风门“开启”位置

5. 将发动机预热 2-3 分钟，同时不时拉动油门手柄。

图 26 拉油门手柄

6.2 与捣固机一起工作

6.2.1 捣固（轨枕）

避免与轨枕接触！

- 将捣固机具放置在轨枕附近约 1-5 厘米处。
- 捣固时捣固机具不要碰到轨枕。

施加符合人体工程学的力量。

- 在捣固的时候，用您身体上部的重量来施加垂直的力量，这样可以放松您的脊柱。

1. 保持捣固机直立，并将其放置在轨枕旁边。
2. 用手压下油门手柄。

捣固机具开始振动。

3. 继续用手柄把持住捣固机，并利用身体上部的重量施加力。
4. 垂直潜入道碴直到捣固机具到达轨枕底部以下约 5 到 10 厘米处，见图。

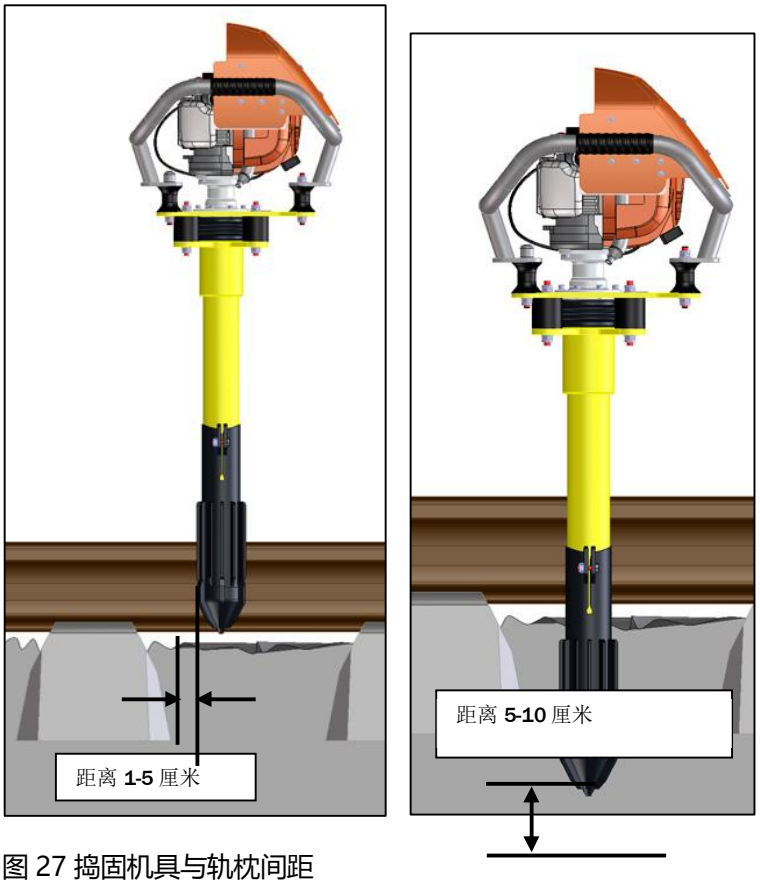

图 27 捣固机具与轨枕间距

5. 将捣固机拉向操作人员，以便将道碴压实在轨枕之下。

图 28 压实轨枕下的道碴

6. 撤回捣固机。
7. 重复第 1-6 步 2 到 3 次，以获得最佳和可持续的效果。
8. 最后，在不进行任何操作的情况下插入捣固机，并将捣固点的凹痕整平。

不要把捣固机放在离轨枕太近的位置：最小距离 1 厘米！

9. 在轨枕的两侧重复这一步骤。

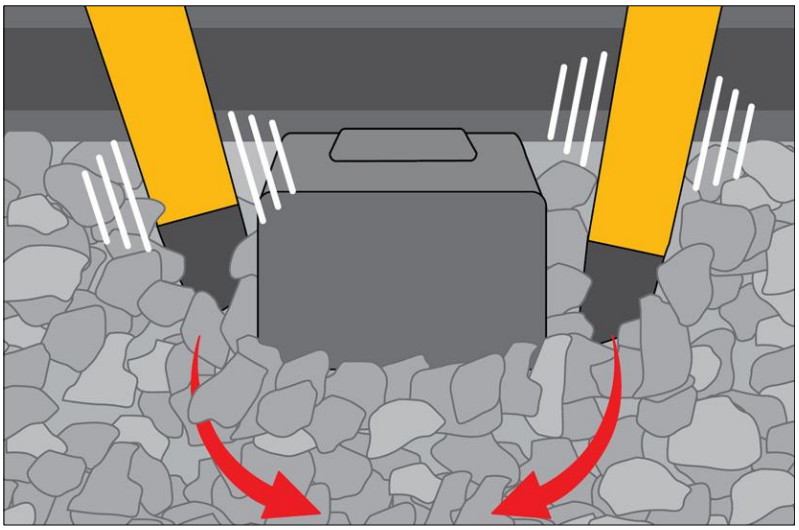

图 29 在轨枕的两侧重复这一步骤

6.2.2 捣固（轨排）

为了获得最佳的捣固效果，所有轨枕都必须从两侧（方向）进行捣固： 向前和向后。

示例：

- 绿色=向前捣固（从右到左）
- 红色=向后捣固（从左到右）

或者反过来！

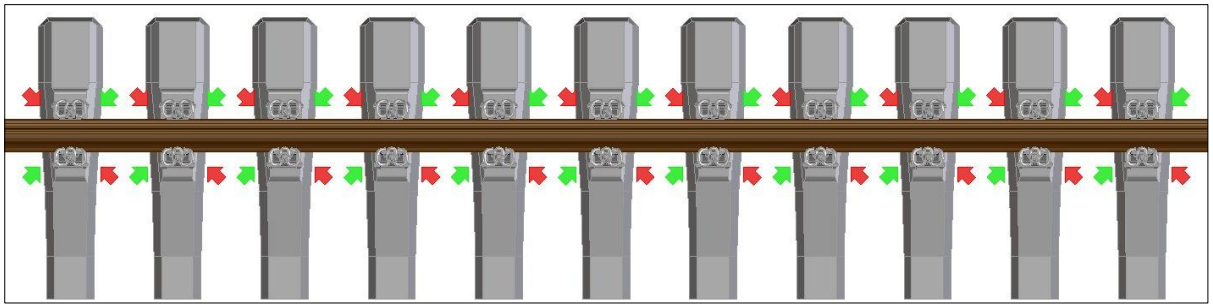

图 30 捣固（轨排）

6.3 关停发动机

通知

发动机损坏风险！

如果发动机在高速运转时突然停止，就可能损坏。

► 在关闭发动机之前，如其一直在满负荷高速运转，降低它的速度，并让它空转约一分钟。

让发动机以怠速运行一段时间，以便它冷却。

1.松开油门手柄，让发动机空转。

2.在大约 1 分钟后，按下“停止”按钮。

发动机停机。

6.4 安装轨道移动指示器（配件）

当火车在轨道上行驶时，可以用轨道运动指示器来显示轨道的运动。

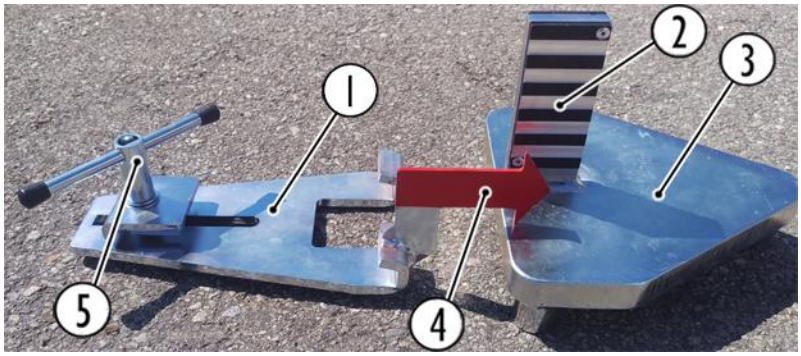

图 31 轨道移动指示器

1 指示器部分
2 刻度盘
3 刻度盘部分
4 箭头
5 夹紧杆

1. 从轨道下面移除道碴。
2. 松开指示器部分的夹紧杆。
3. 将指示器部分压入轨道下，并用夹紧杆将其固定在轨道上。
4. 将刻度盘置于红色箭头的正对面。

   火车一行经轨道，动作就可以从刻度盘上的箭头读出。

7. 运输与储存

通知

有损坏的风险！

机油比发动机还高的时候，就会从捣固机中泄漏出来。

► 因此运输立式捣固机时其电机应始终朝上。

7.1 运输

运输机器的温度范围是-20°C到+60°C。

如果将产品放在原始包装中并妥善捆扎，则可以通过任何运输方式运输而不受损坏。

运输到作业站

1. 将立式捣固器送至作业站。

图 32 搬运立式捣固机

放下机器

2. 请务必按与图中所示相同的方式放下机器，防护罩应朝上（如箭头所示）。

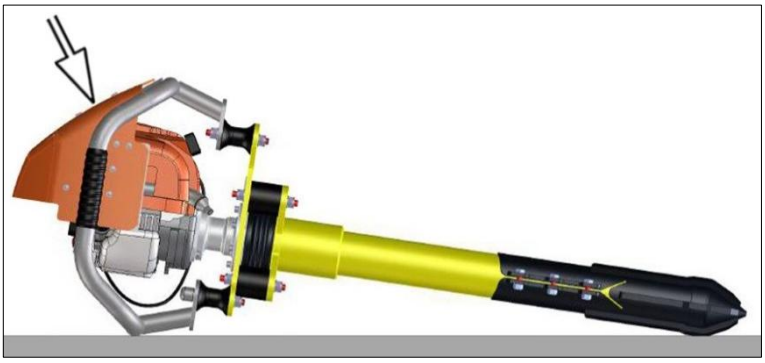

图 33 放下机器

7.2 储存

机器的储存温度范围为-20°C至+60°。

确保储存处干燥无尘。

通知

有损坏的风险！

机油比发动机还高的时候，就会从捣固机中泄漏出来。

► 存放立式捣固机时其电机应始终朝上。

机器长期存放之前

1. 确保储存的地方没有过多的水汽和灰尘。

警告

有着火或爆炸的危险！

汽油是极易燃的，在某些条件下是易爆的。

► 遵守第 2 章有关内燃机和燃料的安全须知。

2. 放空燃油：
3. 确保加油口盖牢固地拧紧。
4. 拧下油箱盖并将燃油排入合适的容器。为此目的发动机应向加油颈倾斜。
5. 如果油箱里还有异物，应完全去除。

6. 用金属丝从加油口拉出燃油过滤器。
7. 多次按下起动泵按钮，直到燃料回流管路中的所有燃料被泵回油箱为止。
8. 将发动机向燃料加注口颈部倾斜，使油箱中的燃料流到容器中。
9. 将滤清器放入油箱，并牢牢拧紧油箱盖。
10. 然后，继续操作发动机，直至它停机。
11. 拆下火花塞，从火花塞孔中滴入几滴机油。
12. 轻拉起动器手柄，以便发动机油分散到发动机上，然后固定火花塞。

8. 故障措施

故障描述	原因	补救措施
发动机不启动	无燃料	► 加油
	无阻风门	► 关闭阻风门杆，推动起动注油泵，参见第 6 章
	火花塞被燃料浸湿（淹没发动机）或有油污。	► 清洁火花塞，参见第 9.3.3 章。
	燃油过滤器堵塞	► 清洁燃油过滤器，参见第 9.3.2 章
发动机空转停机	怠速设置过低	► 调整怠速设置，参见第 9.3.4 章
发动机变得很热，性能很低	化油器设置过稀	► 根据海平面以上的实际高度调整化油器设置，参见第 5.2 章。
	燃油过滤器堵塞	► 清洁燃油过滤器，参见第 9.3.2 章
	油位过低	► 检查油位，参见第 5.3.1 章
发动机运转不畅，性能低下	化油器设置太浓	► 根据实际海拔高度调整化油器设置，参见第 5.2 章
	燃油过滤器堵塞	► 清洁空气过滤器，参见第 9.3.1 章
捣固机具磨损	磨损	► 更换捣固机具，参见第 9.5 章
捣固镐轴承磨损	磨损	► 更换轴承，参见第 9.6.3 章
橡胶缓冲器开裂	磨损	► 更换橡胶缓冲器，参见第 9.4 章
捣固镐不振动，虽然发动机高速运转。	发动机与偏心轴间的连接件有缺陷	► 更换连接件，参见第 9.6.3 章

9. 保养维护

警告

有受伤的危险！

在维护工作中，发动机可能会因此而无意中运转和启动。

- ► 在开始所有的维护工作之前，请关掉发动机。
- ► 在进行维护工作之前，一定要断开火花塞连接器，以防止发动机意外启动。

小心

有灼伤的危险！

发动机，尤其是消音器和机器部件，在运转过程中会发热。

- ► 请勿触摸发热部位。
- ► 在进行维护工作之前，让机器至少冷却 30 分钟。

通知

发动机损坏风险！

如果所使用的备件不符合规定的质量要求，就有损坏发动机的风险。

- ► 只使用原装零部件或同等规格的零部件。

1. 只使用推荐的润滑剂，在进行维修时，只使用原装备件。

   这一点首先对于质保很重要，其次也有助于提高产品的运行可靠性。

   正确订购备件无论对于快速交付备件，还是对于实现产品的经济可行性，都必不可少。

2. 当您向我们订购备件时，请提供以下资料：

- 机器类型
- 机器编号
- 组装
- 备件描述和编号
- 数量
- 运输方法
- 发货地址

3. 遵守规定的保养间隔周期！

4. 维修作业时，要遵守相应国家规定的安全和环保规例。

发动机应由授权经销商维护，除非操作人员拥有必要的工具和维护数据，并具备必要的技术知识和技能。

Robel 建议定期更换空气过滤器和火花塞，以符合维护计划表中的规范要求。

只有在紧急情况下，即在没有备用部件的情况下，才对空气过滤器和火花塞执行所描述的清洁程序。

9.1 维护计划表

间隔时间	部件/组件	维护工作	备注
每日（每 10 个运行小时）	振动式捣固机	清洁	
	振动体	检查操作安全	
	橡胶缓冲器 1)	目视检查	必要时更换（形成裂缝），参见 9.4 章
	捣固机具	检查磨损情况，必要时更换	参见第 9.6.1 章，更换参见第 0 章
			在初始调试和捣固机具更换后 10 小时，检查捣固机具与捣固镐法兰是否间距 224 毫米，并用 20 Nm 力矩拧紧螺钉。
	发动机油	检查加注油位	参见第 5.3.1 章
	空气过滤器	清洁	参见第 9.3.1 章
	火花塞	清洁，检查是否有损坏	参见第 9.3.3 章
	冷却风道和气缸散热片	清洁	
	燃油管	检查安装是否紧固	
	螺钉/螺母 2)	检查	
每 50 个运行小时	发动机油	替换	参见第 9.3.4 章
			20 小时后第一次换油！
	燃油过滤器	检查/清洁	参见第 9.3.2 章
每 100 个运行小时	离心式离合器止动螺钉	加油	参见第 9.5 章
每 200 个运行小时	气门间隙（进气阀和排气阀）	检查/调整	请求授权服务站
每年或每 200 个运行小时	燃油管	替换	参见第 9.3.7 章

1）橡胶缓冲器 安装在导向架和振动体之间的减振橡胶缓冲器是易磨损件。必要时必须更换（砂孔、开裂、损坏）。

2）螺钉 大约每 10 个运行小时或每天检查所有外部可及的螺钉和螺母是否紧固。

9.2 清洁和护理

定期对产品进行护理和保养，可显著延长产品的使用寿命。

通知

有损坏的风险！

用溶剂、腐蚀性或易燃的清洗剂清洁产品可能会造成损坏。

使用高压清洗器可能会导致水进入电机（消音器、空气过滤器、化油器）和产品的铰接接头而造成损坏。

► 不要使用任何溶剂或腐蚀性、易燃的清洗液！

► 不要用汽油清洗。

► 不要使用喷水或高压清洗器。

通知

发动机损坏风险！

附着在气缸散热片上的污垢或灰尘会导致活塞卡住，因为热量无法散逸。

► 保持气缸散热片上没有灰尘和污物。

1. 定期清洁产品，使其不会因污垢而造成生产中断。
2. 只能用湿布来清洁产品。只使用水，如有必要，使用不添加任何化学添加剂的温和清洁剂。

9.3 发动机

如果要维持高水平的性能，发动机的定期检查和调整必不可少。

定期维护也会保证一个较长的使用寿命。所需的保养维护间隔时间和需要进行的维护工作的类型在第 9.1 章的表格中进行了说明（也可参阅发动机制造商的产品说明书）。

9.3.1 清洁空气过滤器

污浊的空气过滤器会限制空气流向化油器。 为防止化油器故障，应定期清洗空气过滤器。 在灰尘极多的环境下操作发动机时，应增加过滤器清洗频率。

警告

火灾和爆炸的危险！

如果用汽油或低闪点溶剂清洗空气过滤器，可能会发生火灾或爆炸。

► 不要使用汽油或低闪点溶剂清洗空气过滤器滤芯。

通知

发动机磨损加剧的风险！

如果发动机在没有空气过滤器的情况下运行，颗粒物（灰尘）易进入燃烧室。发动机活动部件（活塞和气缸）出现划痕。 发动机会失去压缩功能，进而丧失其性能。

► 没有空气过滤器时切勿运行发动机。

通知

有损坏空气过滤器的风险！

如果使用压缩空气来清洗空气过滤器，敏感的滤芯可能会被破坏。

刷毛会使污垢渗入纤维。

► 不要使用压缩空气来清洗或干燥空气过滤器。

► 不要用刷子来清除污垢。

空气过滤器备件：

纸滤芯：

EDP 编号 900 044 0398

海绵滤芯：

EDP 编号 900 044 0456

每 10 个运行小时（每天）清洗一次空气过滤器：

1. 关闭阻风门杆（移动到关闭位置）。

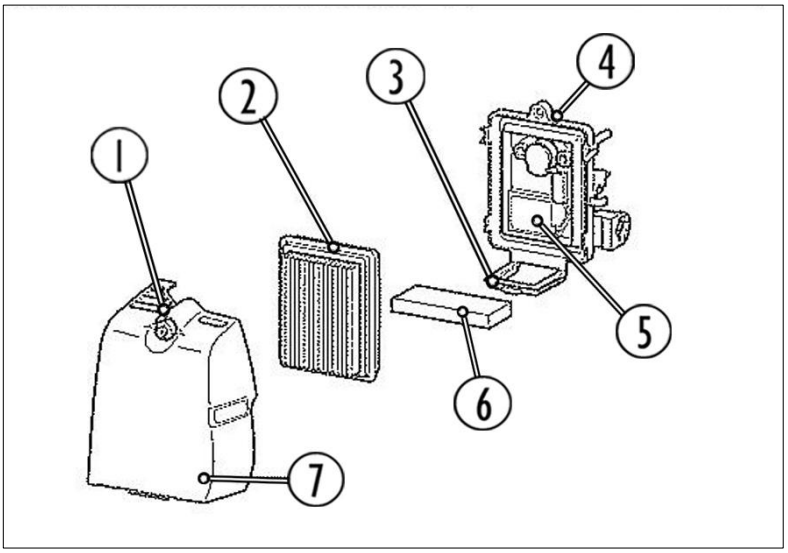

图 34 空气过滤器

1	固定螺栓
2	滤芯（纸）
3	回线
4	滤板
5	分离板
6	滤芯（海绵）
7	空气过滤器盖

2. 压下壁板（4）上的环箍（3），松开空气过滤器盖上的卡扣。
3. 松开固定螺栓（1）。
4. 拉下空气过滤器盖（7）。
5. 拆下滤芯（2，6），轻拍滤芯以去除污垢。

对于重污染

6. 取出滤芯（海绵），放入温水或用水稀释的中性洗涤剂中。
7. 使之充分干燥。
8. 清洗时不要挤压或摩擦它。

9. 轻拍滤芯（纸质）以清洁滤芯（纸质）。切勿清洗纸质滤芯。
10. 重新安装清洗元件。钩住卡夹并固定固定螺栓，以重新安装空气过滤器盖。
11. 紧固固定螺栓。

9.3.2 清洗燃油过滤器

警告

有着火或爆炸的危险！

汽油是极易燃的，在某些条件下是易爆的。

► 禁止在工作区域吸烟或允许产生火焰或火花。

1. 确保四冲程发动机的机油加油口盖牢牢紧固。
2. 拧下油箱盖。
3. 用金属丝小心从加油口颈拉出燃油过滤器。

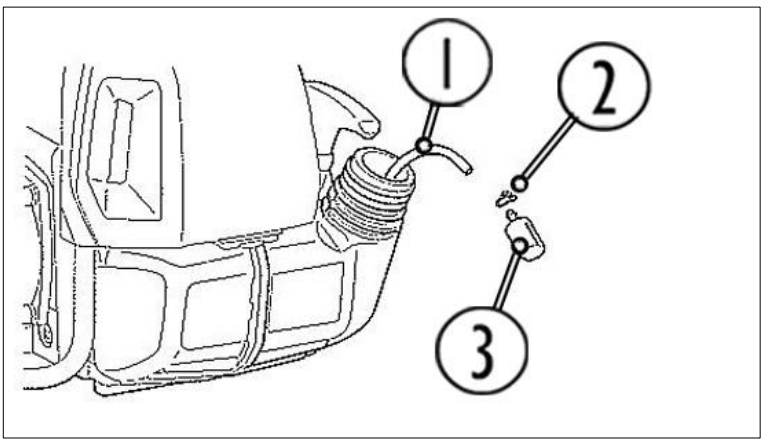

图 35 清洁燃油过滤器

1 燃油管
2 软管夹
3 燃油过滤器

4. 检查燃油过滤器是否有任何污染。如果它被污染了，用不易燃的溶剂或高闪点的溶剂清洗。如果过滤器遭过度污染，请更换。

5. 检查、清洗或更换燃料过滤器后，用软管夹将燃油过滤器固定在油管上。
6. 将燃油过滤器重新插入到加油口颈。
7. 将过滤器一直推到油箱的底部。
8. 拧紧油箱盖。

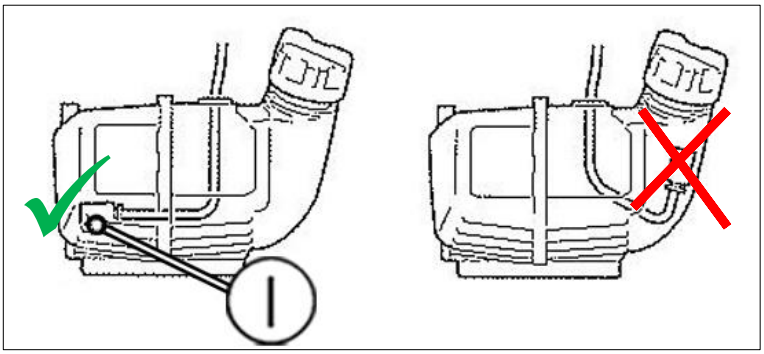

图 36 过滤器位置

1 燃油过滤器

9.3.3 火花塞维护

为了确保发动机正常运转，火花塞必须有适当的间隙且无沉淀。

通知

发动机损坏风险！

如果使用的火花塞的热范围不够，发动机可能会损坏。

► 使用具有足够热范围的火花塞！

推荐火花塞：CMR6A（NGK）

火花塞备件：

EDP 编号 900 044 0408

该推荐火花塞具有正确的热额定值，可确保发动机有正常的运行温度。

1. 拆下火花塞连接器。
2. 清洁火花塞周围区域。
3. 用合适的火花塞扳手拧下火花塞。

4. 目视检查火花塞。如果有明显的磨损或绝缘体破裂或有缺口，则丢弃该火花塞。
5. 用塞尺测量火花塞间隙。
6. 通过弯曲侧面电极来进行必要的校正。

火花塞间隙（2）	0,70-0,80 毫米
	(0.028" – 0.031")

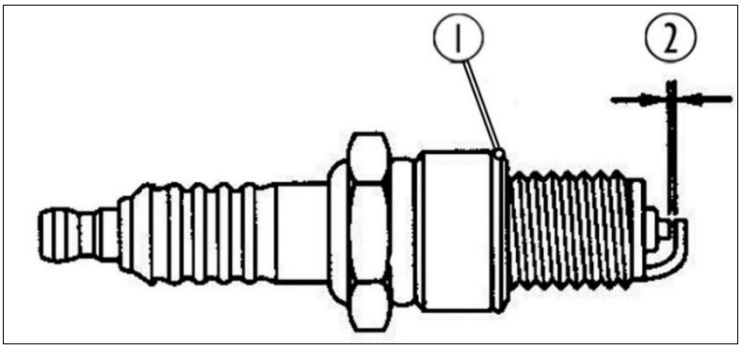

图 37 火花塞间隙

1 密封垫圈

2 火花塞间隙

通知

发动机损坏风险！

一个松动的火花塞可能会变得非常热。火花塞过紧可能损坏气缸盖的螺纹。

► 将火花塞拧紧至规定扭矩。

7. 确保密封垫圈合乎要求，然后用手将火花塞旋回，避免螺纹错扣。

安装一个新的火花塞时，在火花塞就位后拧紧 ½圈，以压紧密封垫圈。

重新安装原来的火花塞时，在火花塞阀座后拧紧 1/8 到 1/4 圈，以压紧密封垫圈。

8. 火花塞就位后，用火花塞扳手拧紧火花塞，压紧密封垫圈。
9. 重新安装火花塞连接器。

9.3.4 怠速调整

1. 启动发动机并进行预热。
2. 将油门杆推至“MIN”位置

工具

- 螺丝刀

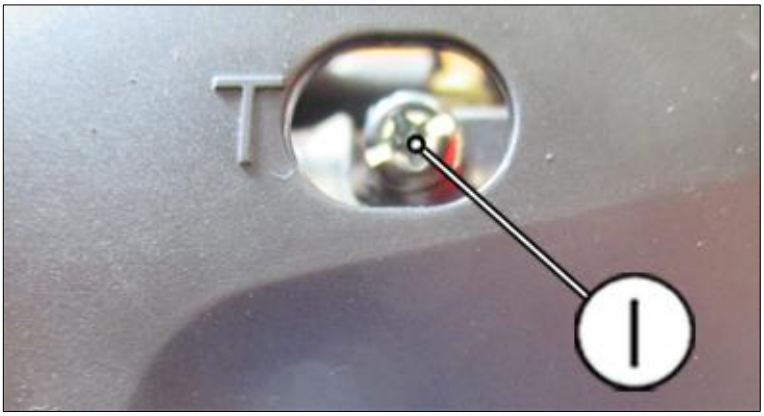

图 38 螺钉 T（怠速）

- 如果怠速过高，则转动螺钉 T（1）ccw。
- 如果怠速太低（发动机停止），则转螺钉 T（1）cw。

空转速度的标称值：大约每分钟 1100 RPM。

9.3.5 将化油器复位到出厂设置

如果在化油器上进行多次更改都没有成功，那么将化油器重置为原始设置并从此时重新开始调整可能会有效果。

工具

- 螺丝刀

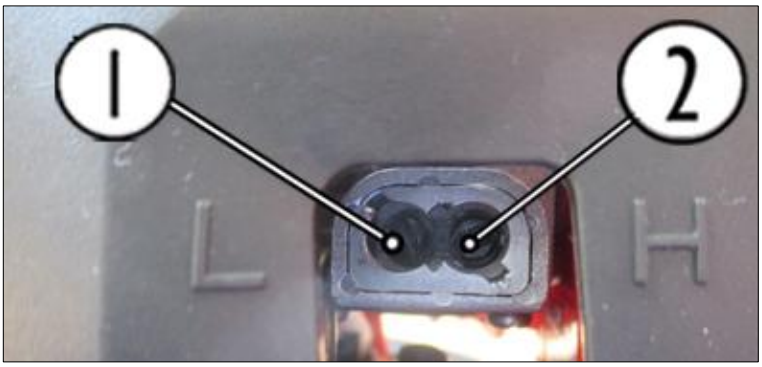

图 39 螺钉 L（1）和 H（2）

1. 完全拧紧 H（2）螺钉（CW），然后向相反方向旋转 2 圈（CCL）
2. 将螺钉 L（1）完全拧紧（CW），然后向相反方向转动 2 ½ 圈（CCL）

   化油器的出厂设置已经恢复，适用于海拔 400 米 MSL 。

9.3.6 换油

警告

有受伤的危险！

皮肤与旧机油反复长时间接触可能会导致皮肤癌。

- ► 戴上防护手套。
- ► 每次接触用过的油后立即用水和肥皂彻底洗手。

以符合环保规例的方式处置用过的发动机油 。

不要把用过的油和垃圾一起倒在地上或排入下水道。

我们建议您装在专门的容器里并密封，然后送到您当地的废油处理机构。

在发动机仍处于温热状态时排放机油，以确保快速和彻底的排放。

1. 确保油箱盖牢固拧紧。
2. 放置一个大容器（盘等）。

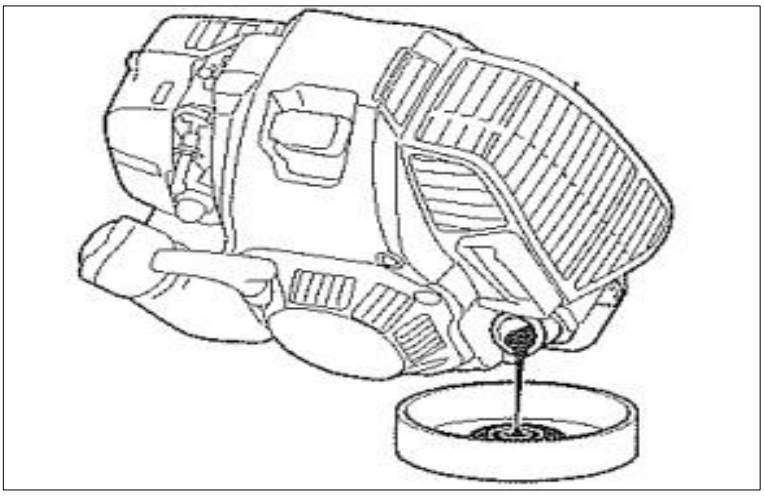

图 40 换油

3. 拆下油箱盖，将捣固机向加油孔倾斜，然后排出机油。收集容器里的机油。
4. 加推荐用油（SAE 15 W-40），并检查油位。
5. 重新装上加油口盖。

发动机加油量：大约 0.06 升

9.3.7 更换燃油管

警告

有发生火灾和爆炸的风险！

汽油是极易燃的，在某些条件下是易爆的。燃油泄漏会引起火灾。

► 如果在检查过程中发现任何泄漏，应立即更换燃油管。

► 遵守第 2 章关于内燃机和燃料的安全信息。

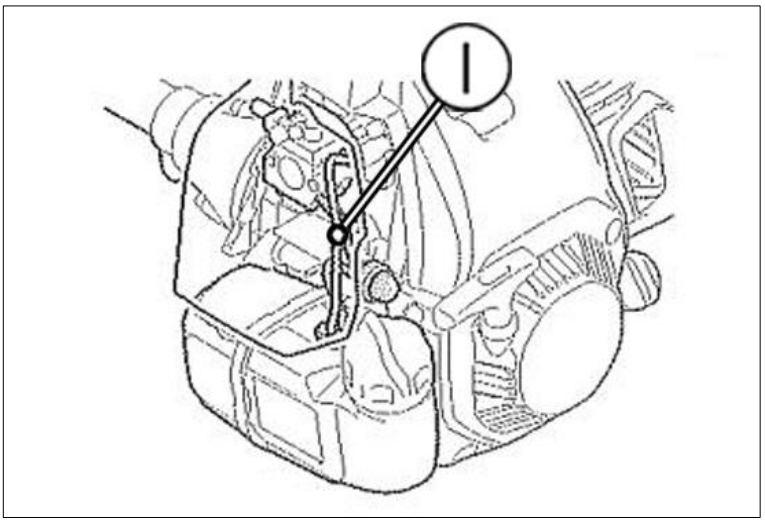

图 41 燃油管

1 燃油管

1. 每年或每 200 个运行小时更换燃油管。
2. 如果在检查过程中发现任何泄漏，应立即更换燃油管。

9.4 橡胶缓冲器

9.4.1 检查橡胶缓冲器

安装在手柄、安装板和捣固机具之间的减振橡胶缓冲器为易磨损件。

1. 必要时更换橡胶缓冲器（ =可见的裂纹、砂孔。 ）

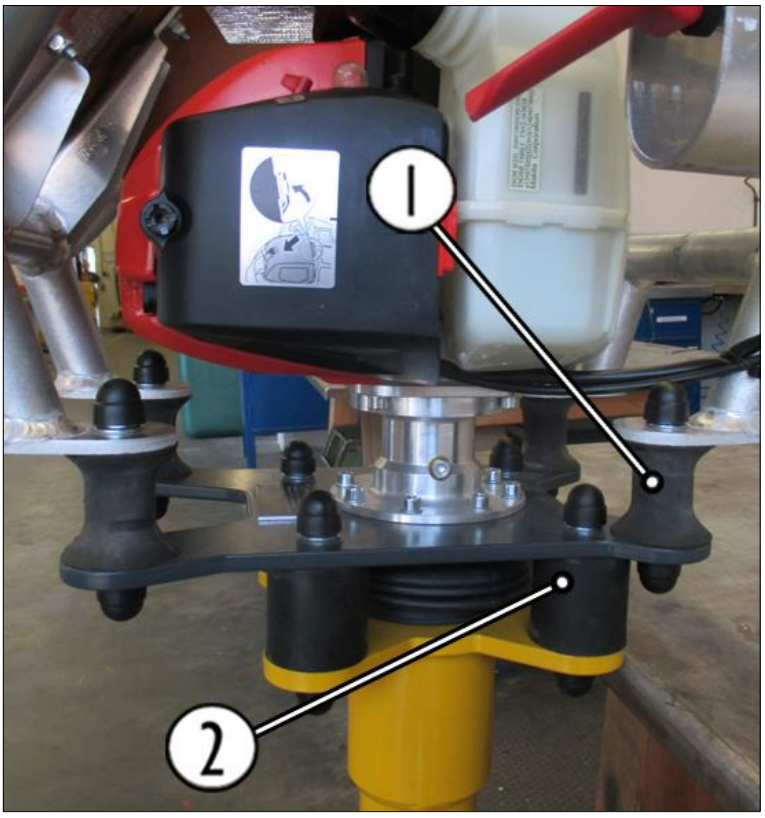

图 42 橡胶缓冲器

1 手柄和安装板之间 4x：
（ EDP 编号 988 015 0446 ）

2 安装板和捣固机具之间 4x：
（ EDP 编号 900 162 0104 ）

不要重复使用用过的六角螺母！
（ EDP 编号：990 985 1000 ）

9.4.2 更换橡胶缓冲器

拆卸橡胶缓冲器 **工具：**

- 开口扳手 AF 17
- 护嘴钳

通知

有损坏橡胶缓冲器的风险！

如果橡胶缓冲器扭曲或错位，则会在静止状态下产生拉应力或压应力。正常运行过程中再加应力，这将导致橡胶缓冲器所受应力过大。进而导致橡胶缓冲器的使用寿命显著缩短。

如果用钳子夹住橡胶缓冲器而没有额外的保护，就会损坏。

► 橡胶缓冲器不得拧至扭曲和错位。

► 如果您出于保护目的用钳子夹住橡胶缓冲器，则需要采取额外的保护措施。

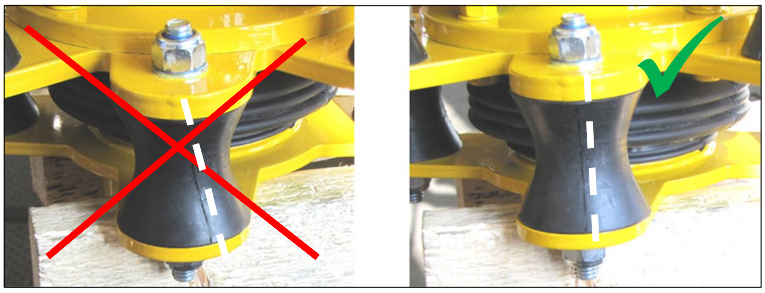

图 43 左：扭曲的接缝，右：竖缝

安装橡胶缓冲器

1. 用钳子将橡胶缓冲器固定，拧紧相关螺母（扭矩 20 纳米）。

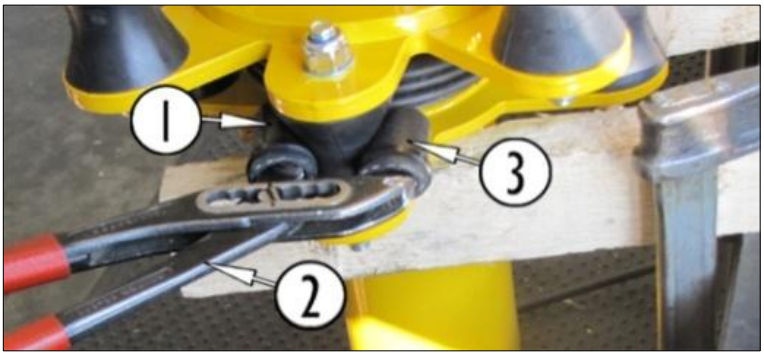

图 44 安装橡胶缓冲器

1 橡胶缓冲器
2 夹钳
3 保护装置

9.5 离心式离合器

每 100 个运行小时：

1. 拧下止动螺钉（1），重新注入大约 2 立方厘米的滚珠轴承润滑脂。

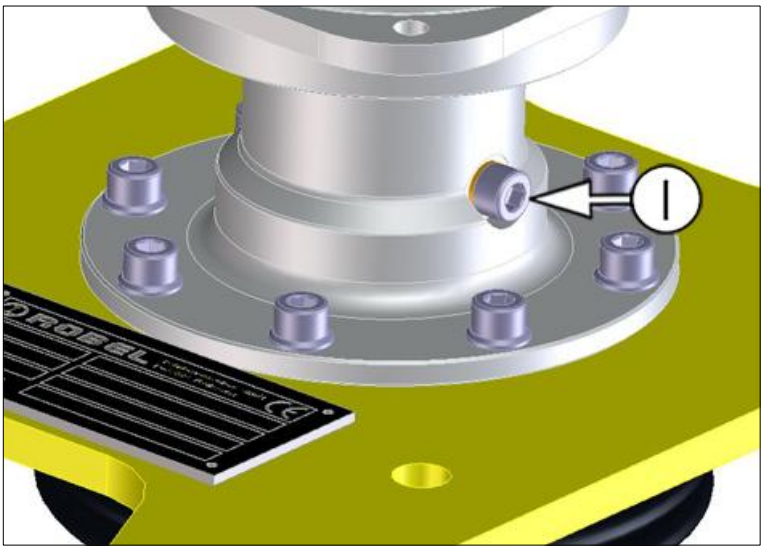

图 45 离心式离合器维护

1 止动螺钉

2. 旋入止动螺钉。

9.6 捣固机具

9.6.1 检查捣固机具的磨损情况

为防止捣固镐底部出现一个孔洞，防止漏油或轴承损坏，必须在每次使用前进行例行检查，看看材料的磨损程度。

通知

捣固镐有损坏的风险！

捣固机具磨损，捣固镐铝管可见，有形成孔洞的危险。

► 一旦看到铝管，就必须更换捣固机具。

图 46 捣固机具长度测量

1. 用卷尺测量捣固机具的长度。

新型捣固机具： 长度 40.5 厘米
捣固机具磨损： 长度<36 厘米

2. 一旦捣固机具磨损约 4.5 厘米，必须更换（见下一页）。

9.6.2 更换捣固机具

工具、材料：

- 开口扳手 AF 13
- 扭力扳手
- 角磨机
- 捣固机具拆卸装置（可选）

拆除旧捣固机

如果捣固机具磨损，很可能螺钉和螺母也损坏了。在这种情况下，无法借助标准工具来拆除紧固螺钉。

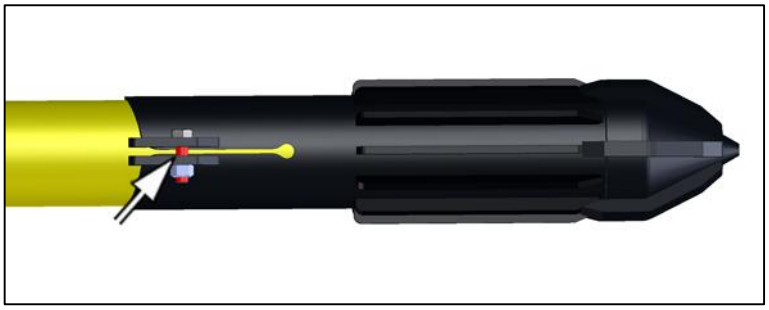

图 47 切断螺钉

1. 用角磨机切断两个螺钉（见箭头，每一侧各一个螺钉）。

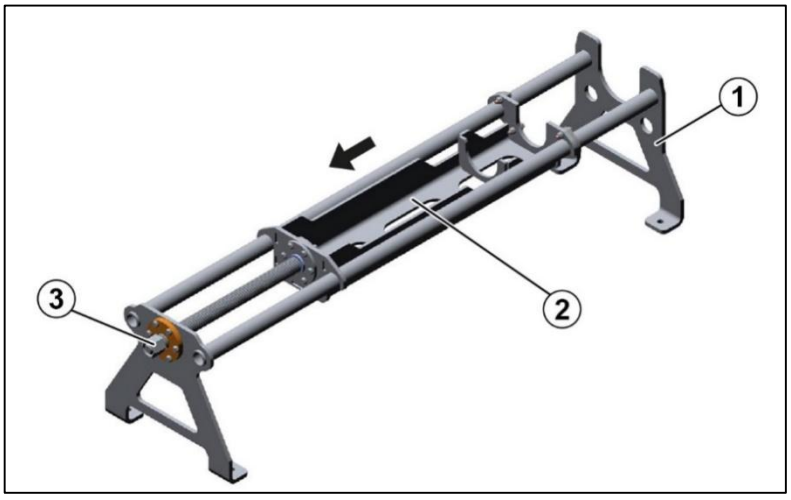

图 48 捣固机具拆卸装置（可选）

1 捣固机具拆卸装置

2 捣固机具支架

3 六角形接收装置

订购编号 捣固机具拆卸装置：
EDP 编号 8998950200

2. 将捣固机具放置在捣固机具拆卸装置（可选）的支架（2）上。
3. 使用合适的扳手逆时针方向转动捣固机具拆卸装置的六角形接收装置（3）。
4. 从捣固镐上拆下捣固机具。

滑动式新型捣固机具

1. 测量捣固镐的长度，并将其标记为 34.5 厘米。

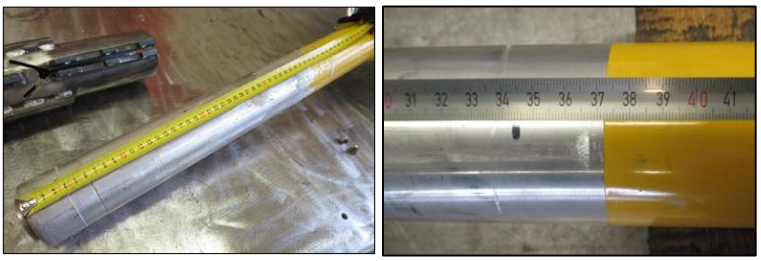

图 49 标记捣固镐

注入树脂延长使用寿命

安全设备

- 防护手套
- 安全护目镜
- 呼吸面罩

图 50 安全设备

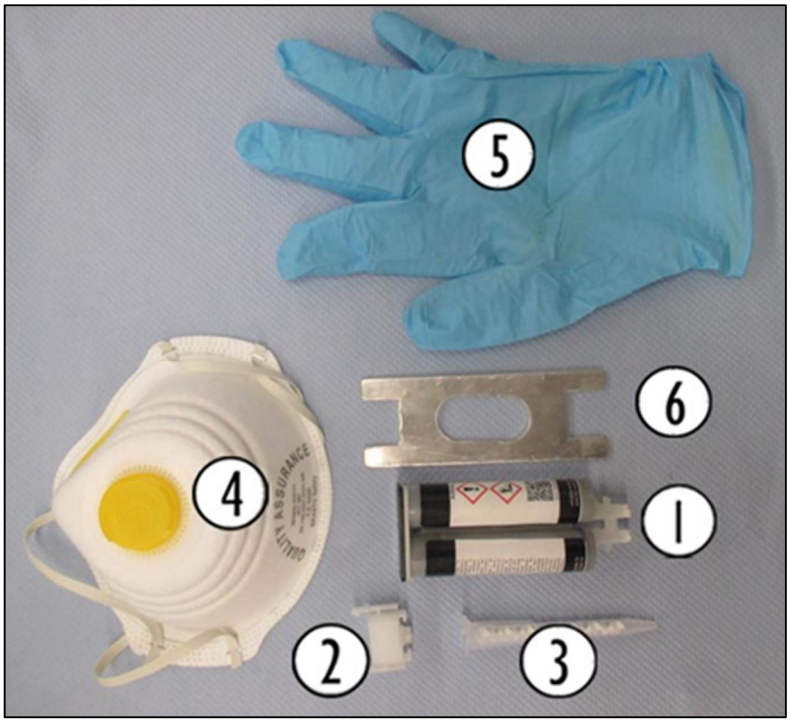

图 51 交货范围

1 注射针管 - 环氧树脂
2 转接器
3 混合管
4 口罩
5 防护手套
6 辅助板

注意数据表及安全数据表

工具、装置、材料：

- 多用途润滑脂
- 刷子
- 纸巾
- 锉刀
- 侧铣刀

2. 在铝管底部 200 毫米处涂上多用途润滑脂，并将其涂在定心处。

   用润滑脂作为脱模剂，使铝管不与捣固机具连接。

图 52 在铝管和定心处涂上润滑脂

3. 擦去多余的多用途润滑脂。

图 53 擦去多余的润滑脂

4. 准备注入

图 54 拆下保护盖

图 55 固定转接器，拧下混合管，缩短混合管

5. 在捣固机具上放置辅助板，并将注射针管插入辅助板。

图 56 将辅助板放置在捣固机具上。

图 57 将注射针管插入辅助板

6. 将环氧树脂注入捣固机具中。

图 58 将环氧树脂注入捣固机具

加注时，确保环氧树脂正好在捣固机具的底部。

7. 拆下注射针管和辅助板。
8. 在 2 分钟内将捣固机具推到铝管上并检查控制尺寸 224 毫米，参见第 9.1 章。

图 59 将捣固机具推到铝管上

9. 使用 AF13 扳手和扭力扳手，将螺母拧紧到六角螺钉上。

10. 均匀拧紧两侧的 2 颗螺钉，每个螺钉 20 Nm。

图 60 拧紧固定螺钉至 20Nm

11. 检查捣固机具与捣固镐法兰之间的距离（见下图）。

测量目标：224 毫米

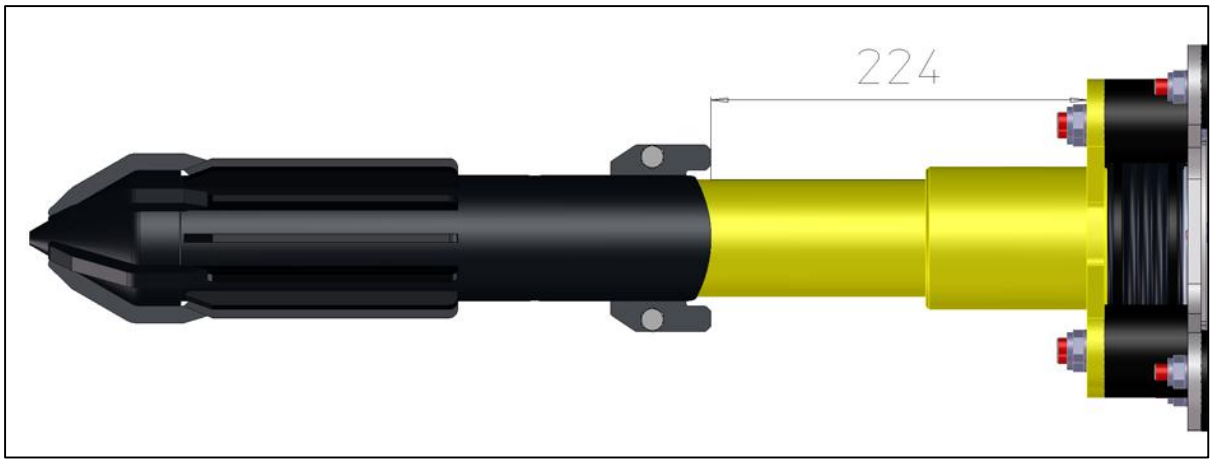

图 61 基准测量检定

12. 竖直存放约 5 小时，让树脂硬化。

13. 10 个运行小时后，用 20 Nm 重新拧紧两个螺钉。

图 62 用扭力扳手拧紧

9.6.3 更换轴承

如果计划更换偏心轴的轴承，则必须将轴承组（固定和浮动轴承）与偏心轴一起卸下。外轴承环连接到轴套上。该轴套与捣固机具的阀座紧密配合，因此需要相当大的力才能拆卸偏心轴。

工具、装置、材料

- 敲击装置（EDP 编号 899 895 0001）
- 放油盘（容器）
- 开口扳手 AF 17
- 内六角扳手 AF6
- 60 毫升发动机油（SAE 10W-30）

偏心轴拆卸

通知

有损坏捣固镐的风险！

如果捣固镐的法兰或轮毂被任何工具直接撞击，则捣固镐很可能会遭扭曲和不可逆转的损坏。如此则无法卸下偏心轴。

► 使用敲击装置（1，可选）拆卸偏心轴。

通知

排油污染风险

捣固镐加的有机油，因此拆卸时应放油。

► 准备好在拆卸过程中放油。 我们建议在合适放油盘（最好是钢制的）上方进行偏心轴的拆卸。

1. 提供一个放油盘，最好是钢制的。放油盘需足够大，以承接敲击装置（1）。

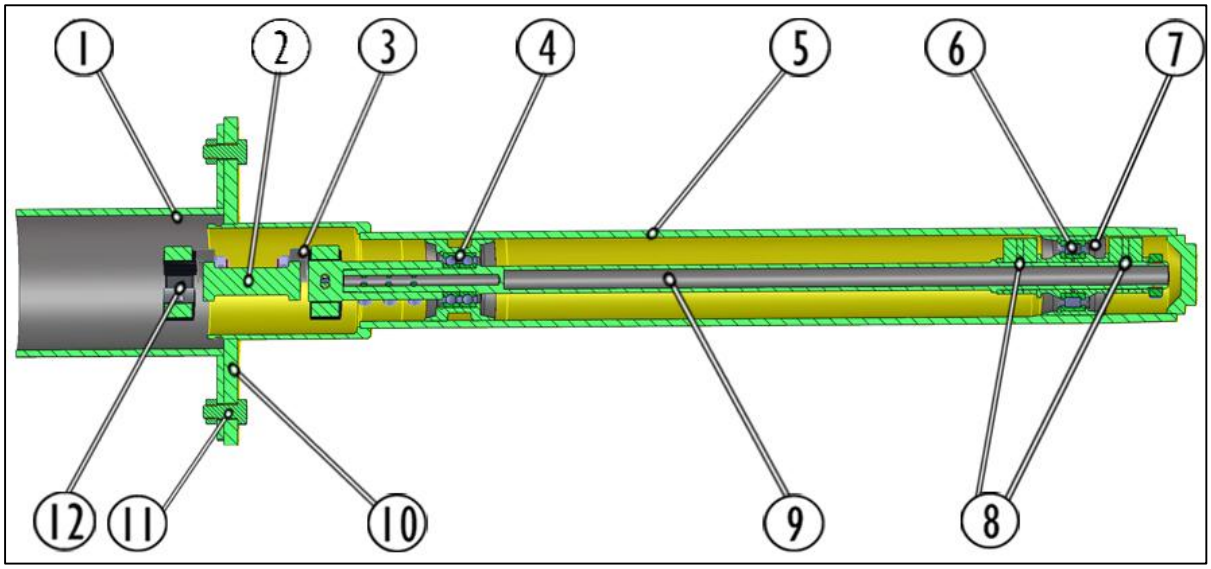

图 63 连接有敲击装置的捣固镐区段

1	敲击装置（可选）	7	浮动轴承套
2	中间轴	8	不平衡
3	橡胶减震装置	9	偏心轴
4	固定轴承	10	捣固镐法兰
5	捣固镐	11	螺母和螺栓（M10）
6	浮动轴承	12	发动机轴紧固螺钉

图 64 敲击装置

敲击装置的订购编号：

EDP 编号 899 895 0001

2. 拆下立式捣固器的整个总成（捣固镐）：用开口扳手 AF17 拧松法兰（10）的 M10（11）螺钉，然后用内六角扳手 AF6 将连接件连接到发动机轴（橡胶波纹管下）的两个 M8（12）螺钉拧松。

3. 将捣固镐与偏心轴（9）一起从立式捣固机上拆卸下来。
4. 用 M10（11）螺钉将敲击装置（1）连接到法兰（10）上。
5. 将放油盘放置在坚硬的工作表面上。
6. 将总成垂直放置，敲击装置朝下，置于放油盘上方，然后用力将其敲向工作表面。

   惯性将使偏心轮从捣固镐（5）中脱离出来。
7. 中间轴的外连接件接触工作表面后，将偏心轴连同轴承一起抽出。

   排出机油（大约 60 毫升）。
8. 拆卸敲击装置。
9. 更换轴承

安装偏心轴

通知

有损坏捣固镐的风险！

在捣固镐的内侧，浮动轴承套有一个止动块，限制了装配过程中的行程。 如果施加力，虽已经达到该止动块，轴承仍可能损坏。

► 装配过程中考虑 74 毫米的尺寸。 一旦到达这个尺寸，不要施加任何更多的力。

较低的轴承（浮动轴承）需要加油，以达到一个较长的工作寿命。

► 请务必加适量的发动机油（60 毫升）。

10. 将捣固镐置于法兰朝上的位置，注入 60 毫升发动机油。
11. 首先用浮动轴承将偏心轴插入捣固机，直到轴承套接触到它们的阀座。
12. 将捣固镐置于坚硬的工作表面上，法兰朝上，然后用力敲击工作表面数次。

    惯性将驱动偏心轴进入捣固镐。

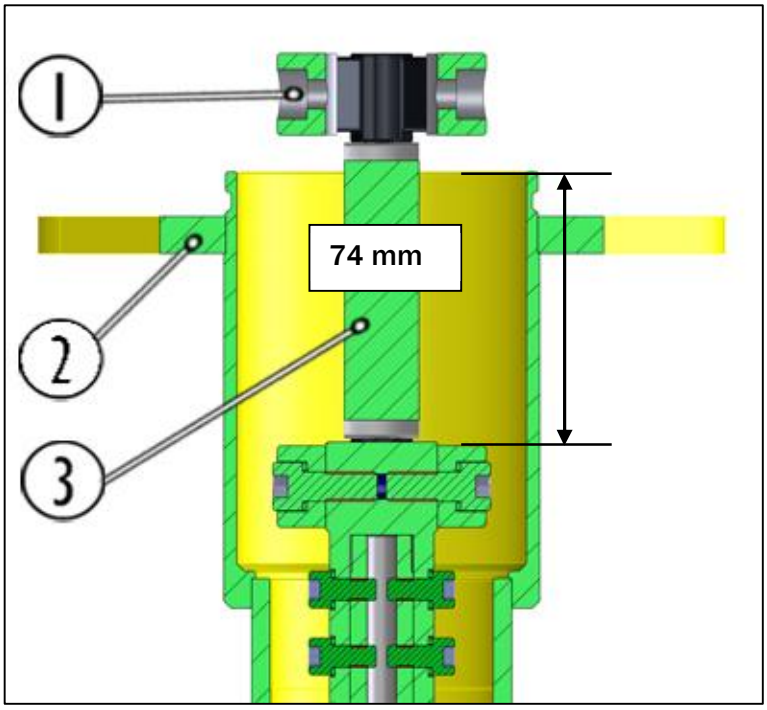

图 65 考虑 74 毫米的尺寸

1 发动机轴用螺钉

2 捣固镐法兰

3 中间轴

13. 考虑 74 毫米的尺寸，继续敲击，直到达到这个尺寸为止。

14. 在装配之前，检查发动机和中间轴之间的连接件（3）的定位是否正确。必要时对齐。

15. 接入捣固镐和发动机。

16. 将螺钉插入法兰并拧紧。

17. 去除固定中间轴连接件与发动机轴（橡胶波纹管下）的两个螺钉上的油脂，并运用高强度螺钉固位。

18. 插入发动机轴的两个螺钉（1）并用 20Nm 拧紧。

9.7 标志和标签

► 定期检查标志和标签是否完好。

► 必要时更换标志和标签。

10. 环境保护与处置

10.1 环境保护

1. 在产品上操作或使用产品进行作业时，遵守有关废物预防和适当回收/处置的法律规定，并遵守使用者所在国家适用的环境法。
2. 特别要注意的是，在维修和保养工作中，应确保水污染物质，如油脂和机油，不得污染地面或进入下水道。

10.2 处置

该产品（包括机械零件、发动机油和燃料）的处理将取决于当地的废物处理条例。

产品寿命周期结束时，应确保进行安全和适当的处理，特别是对环境有害的部件或物质的处理。其中包括燃料、润滑剂和塑料。

1. 由于存在潜在的环境污染的风险，应将产品交给经批准的专业公司处理。
2. 在任何情况下，检查哪些材料可用于回收利用。并将这些材料交由适当的废物管理公司处理。

11. 附录

欧共体符合性声明

ROBEL Bahnbaumaschinen GmbH

EG-Konformitätserklärung (deutsche Originalfassung)
EC Declaration of Conformity (English translation)
Déclaration „CE" de Conformité (Traduction française)

gemäß Maschinen-Richtlinie 2006/42/EG, Anhang II A
as defined by the Machinery Directive 2006/42/EC Annex II A
conformément à la directive „CE" relative aux machines 2006/42/CE, Annexe II A

Hersteller (Name und Anschrift): Manufacturer (name and address): Fabricant (nom et adresse):	ROBEL Bahnbaumaschinen GmbH Industriestraße 31 D-83395 Freilassing
Hiermit erklären wir, dass der Herewith we declare that the model Par la présente, nous déclarons, que le modèle fourni par	Vertikal-Schwingstopfer Vertical Tamper Bourroir autonome **RO**TAMP Light Typ, type, type 62.05L/2
folgenden einschlägigen Bestimmungen entspricht: complies with the following provisions applying to it: correspond aux dispositions pertinentes suivantes:	2006/42/EG
Angewandte harmonisierte Normen: Applied harmonized standards: Normes harmonisées appliquées:	DIN EN ISO 12100: 2011
Bevollmächtigt für die techn. Dokumentation: Responsible person for technical documentation: Personne chargee pour la documentation technique:	Mag. Bernhard Lair Abt. Technische Dokumentation Industriestraße 31, D-83395 Freilassing

Freilassing, 21.06.2018

Otto Widlroither — Leiter HMG/Head of HGM/ Direct. gestion de mach.

Wolfgang R. Fally — Geschäftsführer/Managing Director/ Gérant

Ort, Datum
Place, date / Lieu, date

Unterschrift, Angabe der Funktion im Unternehmen
Signature, acting in the company / Signature, en qualité de

ROBEL Bahnbaumaschinen GmbH
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Registergericht: Traunstein: HRB181
Ust-ID-Nr.: DE 131554634

Bankverbindung:
Hypo Vereinsbank Freilassing
IBAN: DE34 7102 0072 0009 333100
BIC: HYVEDEMM410

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图 66 欧共体符合性声明