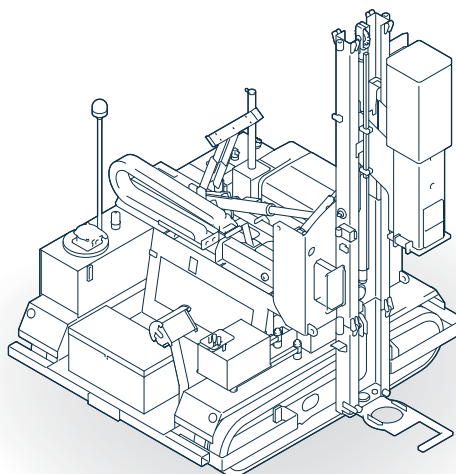


## PILE DRIVER ON CRAWLER



## USE AND MAINTENANCE MANUAL

Translations of the original instructions in italian language

**ORTECO S.r.l.**  
Via 2 Giugno, 19  
40011 Anzola Emilia (Bo) - Italia  
Tel. +39 051 731051  
Fax +39 051 731925  
mail: [orteco@orteco.com](mailto:orteco@orteco.com)  
[www.orteco.com](http://www.orteco.com)

Serial number 

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## Aim of the manual

This manual, which is an integral part of the machine, has been prepared by the manufacturer to provide the operator with the necessary information and criteria for the use and maintenance of the machine.

The original instructions are provided by the manufacturer in English. To meet legal or sales requirements, the manufacturer may provide the instructions in other languages.

Certain illustrations in the manual show the machine with the safety devices and/or guards removed only in order to make it easier to understand the operations to be performed. The machine must never be used without the safety devices or guards fitted.

The pictures may differ from the actual machine configuration, but this does not affect the instructions.

The manufacturer reserves the right to make changes to the manual without prior notice, with the exception of changes concerning the level of safety.

The manual must be kept, for future reference, until the machine is scrapped.

If the machine is sold, the seller is required to pass on the manual to the new owner.

In the case of discordant information between the machine manual and the attached manuals, the machine manual must be considered valid.

The symbols shown in this manual are designed to highlight the operations involving a certain level of risk in safety terms or important information.



### DANGER

**This indicates information or procedures which, if not strictly followed, cause death or serious personal injury.**



### WARNING

**This shows information or procedures which, if not followed, may cause death or serious personal injury.**



### CAUTION

**This shows information or procedures which, if not followed, may cause slight personal injury.**

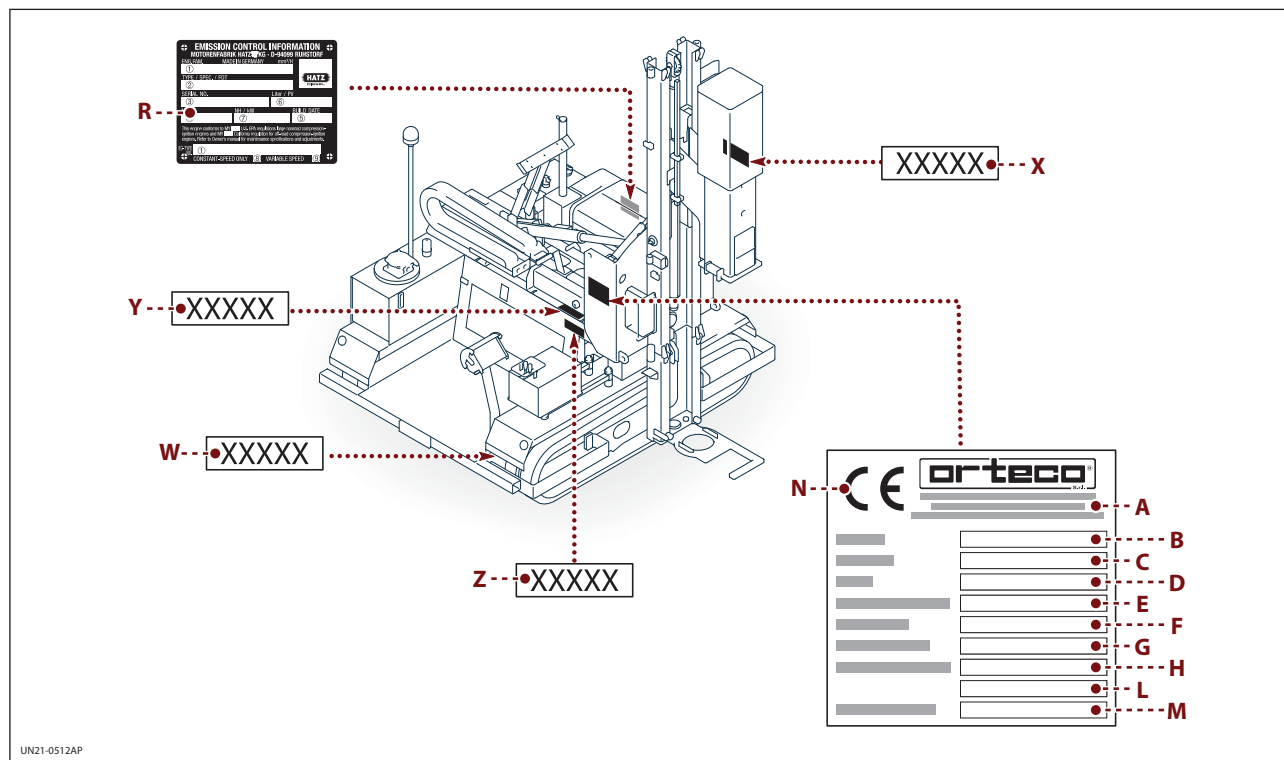
### NOTICE

**This shows information or procedures which are important to follow in order to prevent malfunctions or physical damage.**

## Manufacturer and machine identification details

The picture shows the identification plate and the position of the serial numbers of the units that make up the machine.

The plate contains all the information to identify the machine and the manufacturer.



### Machine identification plate

- A)** Manufacturer's details
- B)** Machine model
- C)** Type of machine
- D)** Serial number
- E)** Year of manufacture
- F)** Maximum pressure
- G)** Required oil flow
- H)** Engine power
- L)** Electric voltage
- M)** Overall weight
- N)** "CE" marking

**R)** Engine identification plate

### Punching

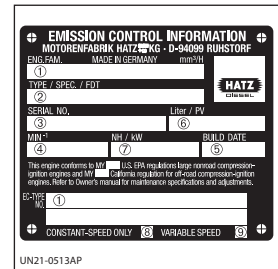
The following serial numbers are punched on the machine.

- W)** Undercarriage serial number
- X)** Hydraulic hammer serial number
- Y)** Pile driver serial number
- Z)** Tracked truck serial number

## Engine identification

Engine identification data is shown on the identification plate applied to the engine.

For the meaning of the data contained on the plate see the engine manufacturer's use and maintenance manual.



## Technical assistance procedure

For technical assistance (machine malfunction, failure, etc.) contact the nearest technical assistance service or the manufacturer.

When requesting technical assistance, the data shown on the machine's identification plate, the work hours shown on the hour meter and the type of failure must be reported.

For motor technical assistance (engine malfunction, failure, etc.) contact the nearest technical assistance service of the engine manufacturer (see enclosed manual).

## Disclaimer notice

The manufacturer cannot be held responsible for the following:

- use of the machine by untrained and/or unauthorised personnel;
- improper use of the machine;
- failure to carry out maintenance;
- unauthorised modifications or repairs;
- use of non-original spare parts or parts not designed specifically for the model concerned.

## Warranty

The warranty clauses are specified in the sales contract valid at the time of purchase of the machine.

## Annexed documentation

The following documentation is supplied to the Customer together with the use and maintenance manual.

- "CE" declaration of conformity of the machine
- Engine maintenance booklet
- Safety data sheets for fuel and lubricants.

## Glossary of terms

**Version:** type of machine that features technical and performance differences with respect to the standard model.

**Accessory:** unit that increases the machine's functionality for specific operations. The accessory must be requested by the customer when placing the order.

**Supplement:** component or unit that completes the machine, which is not included in the standard model.

The supplement must be requested by the customer when placing the order.

**Routine maintenance:** the set of interventions needed to guarantee the machine a long working life, in good working order, and to ensure safety requirements are always met.

**Special maintenance:** set of operations that are carried out in case of a sudden failure to restore the initial operating conditions.

**Operator:** trained person who has been authorised by the respective manager.

It is the operator's duty to ensure the operational tasks and daily routine maintenance outlined in this manual are carried out safely.

**Maintenance engineer:** trained person who has been authorised by the respective manager.

It is the maintenance engineer's duty to ensure the routine maintenance work on the machine requiring specific technical skills is carried out safely.

The procedures to follow for such work are described in this manual.

**Specialist technician:** person appointed and authorised by the manufacturer or by the agent thereof.

It is the specialist technician's duty to ensure work is carried out safely in terms of routine and special maintenance work on the machine requiring specific technical skills or particular abilities.

The procedures to follow for such work are described in specific instructions.

## General description

This machine has been designed and built to sink into the ground steel piles or wood piles using a percussion hammer.

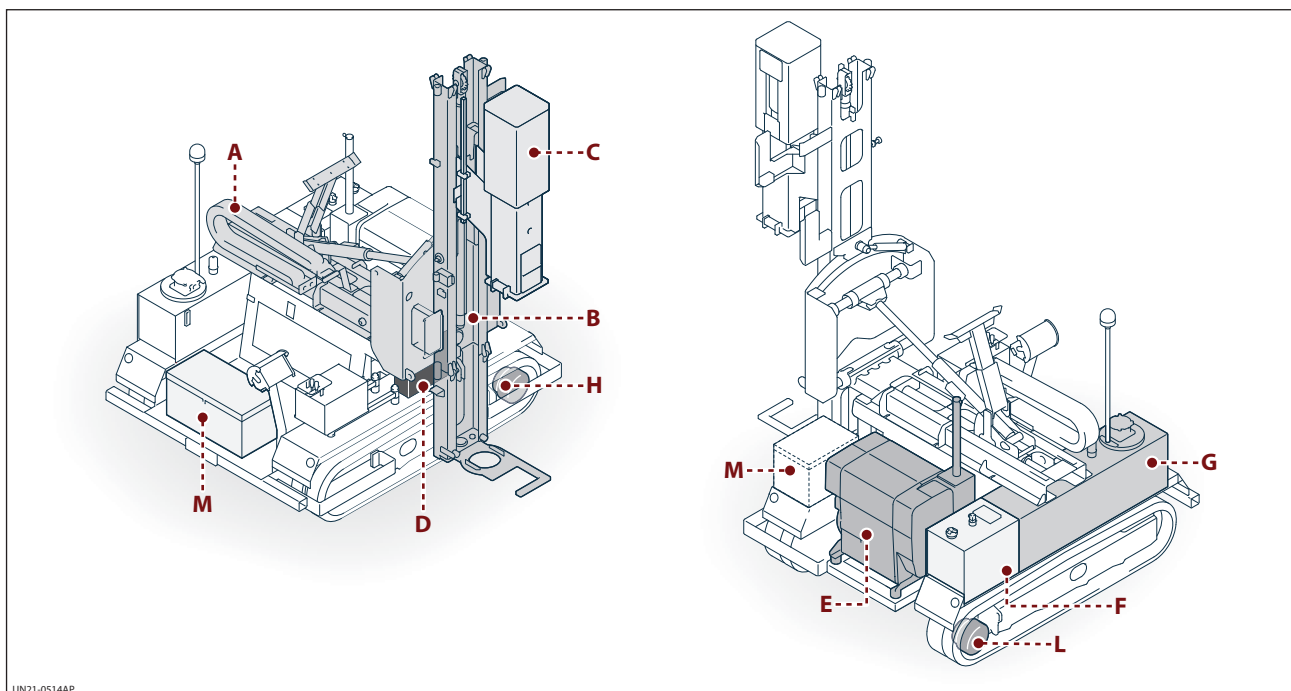
The machine is made up of a tracked truck for manoeuvres and a percussion hammer to drive the pile into the ground.

The machine is manufactured in various versions where the main difference is the percussion power of the hammer; the machine is driven by hydraulic power generated by an engine and a pump.

Other accessories can be installed on the machine to drill holes in conglomerates, in the ground and in rocky ground.

One operator is sufficient to operate the machine; said operator must have the necessary requisites to use the machine in total safety.

## Main parts



- A) Pile driver base:** it contains the slide for the transversal movement of the column.
- B) Column:** to position the hammer in the right position to drive the element into the ground.
- C) Percussion hammer:** to sink the element into the ground.
- D) Heat exchanger:** to dissipate the excessive heat of the hydraulic oil.
- E) Engine:** to supply power to all main parts.
- F) Fuel tank:** to supply the engine.
- G) Hydraulic oil tank:** to supply the machine operations (shifting, lifting of hammer, etc.).
- H) Track gearmotor:** to move the left track.
- L) Track gearmotor:** to move the right track.
- M) Tool box**

## Intended uses

This machine has been designed and built to sink metal piles for guard-rails, wood piles and metal piles for photovoltaic systems.

Using special accessories approved by the manufacturer, it is possible to extract piles, make holes and drill (see "Accessories").

Any other use is considered improper and is therefore forbidden.

## Unauthorised uses

The machine must be used in conformity with its technical characteristics; it is forbidden to make modifications or use the machine for improper uses.

**It is prohibited** to use of the machine in potentially explosive atmospheres.

**It is prohibited** to use the machine with equipment not approved by the manufacturer.

**It is prohibited** to use the machine to transport people.

**It is prohibited** to use the machine to lift people with the percussion hammer.

**It is prohibited** to use the machine to drive piles, make holes on manufactured goods or drill the ground when the column is not perfectly vertical.

**It is prohibited** to drive the machine on the roads as it is not approved for road use.

**It is prohibited** to use the installed pile extraction clamp, corer and drill to drive piles.

**It is prohibited** to extract metal piles from concrete.

**It is prohibited** to activate the track movement or correct the position or tilt of the vertical column during pile driving or extraction operations, when making holes on elements or drilling the ground.

## Operator training

The operator has the task of carrying out all the operations related to the use of the machine and ordinary maintenance operations in total safety.

Personnel authorised by the manufacturer must train the operator to transfer the knowledge necessary to carry out the activity independently and without risks.

## Residual risks



### WARNING

**Even if the safety regulations and information contained in this manual are respected there are residual risks during the use of the machine; the main ones are described below.**

- Risk of crushing of lower limbs in tracks.
- Risk of crushing of upper limbs between the stroke plate and the pile to be driven.
- Thermal danger in case of contact with hot parts.
- Fuel leaking from the tank during machine use or during refuelling may lead to a fire risk.
- Risk of high-pressure spurts of fluid. A pipe or hose breaking or high-pressure oil leakage may lead to injuries and skin infections.
- Risk of being run over. Due to the insufficient visibility when the machine is reversed in tight spaces with poor lighting there is the risk that objects, animals and people may be run over.
- Risk of impact. The accidental and sudden lowering of the percussion hammer may seriously injure the operator.





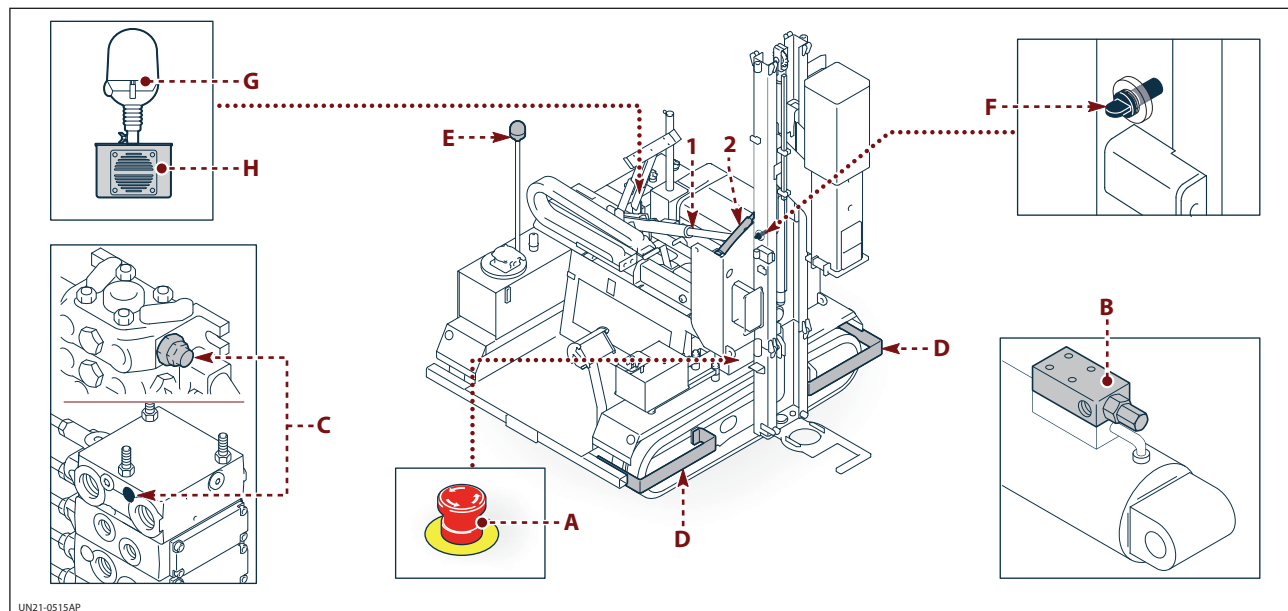
## Safety devices



### WARNING

**On no account must you tamper with or by-pass the safety devices.  
Keep all safety devices in good working order through regular maintenance.**

The illustration shows the position of the safety devices on the machine.



- A) Emergency stop button:** to stop the machine in the case of impending risk.
- B) Lock valves:** these are used to block the movement (extension/retraction) of the jack in case of rupture of a pipe or drop in pressure. These valves are installed on the jacks **(1)** and **(2)**.
- C) Maximum pressure valve:** this limits maximum operating pressure to prevent overloading of the hydraulic system.  
The valve installed on each hydraulic distributor is set and sealed by the manufacturer during testing and must not be altered.
- D) Safety guards:** these protect the operator from accidental contact with moving tracks.
- E) Rotating light:** this signals the start up of the machine and is automatically activated in the ignition phase.
- F) Safety lock pin:** this protects the operator from the accidental and sudden lowering of the percussion hammer.
- G) Rotating light (optional):** signals the machine's reverse shift motion.
- H) Buzzer (optional):** signals with an intermittent sound the machine's reverse shift motion.

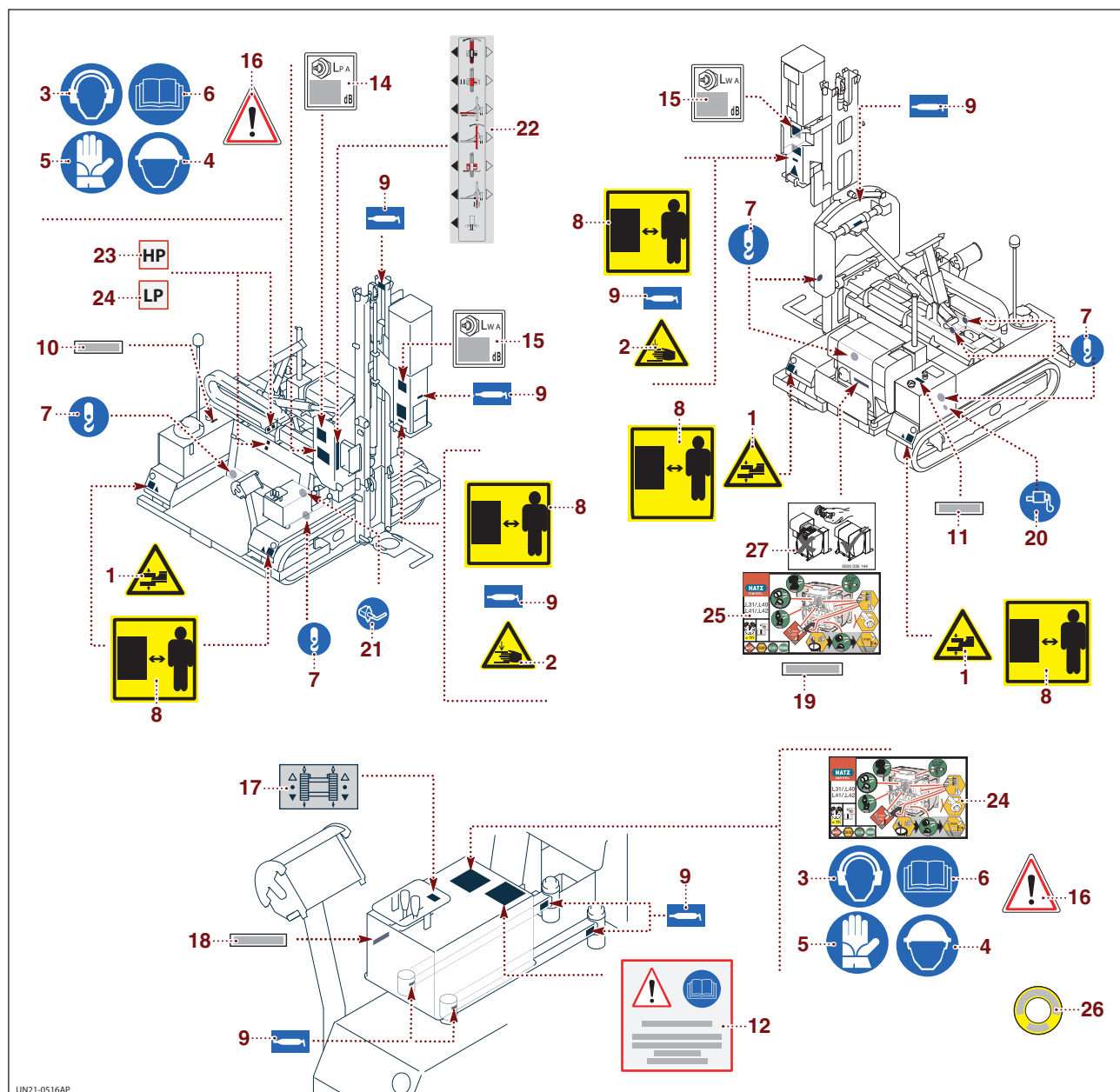
**Information and safety signs**

**WARNING**

**Always respect the safety instructions on the plates.**

**Check that the plates are always in place and legible; if they are not, replace them with new ones, maintaining the original location on the machine.**

The illustrations show the position of the safety and information signs on the machine. The meaning of each sign is described below.



- 1) Risk of crushing of lower limbs in tracks.
- 2) Risk of limbs being crushed by the machine's moving parts.
- 3) Ear defenders must be worn to protect the user's hearing from loud noises.
- 4) Safety helmets must be worn.
- 5) Personal protection equipment requirement: this sign shows the operator is required to wear gloves.
- 6) Carefully read the instruction manual before operating the machine.

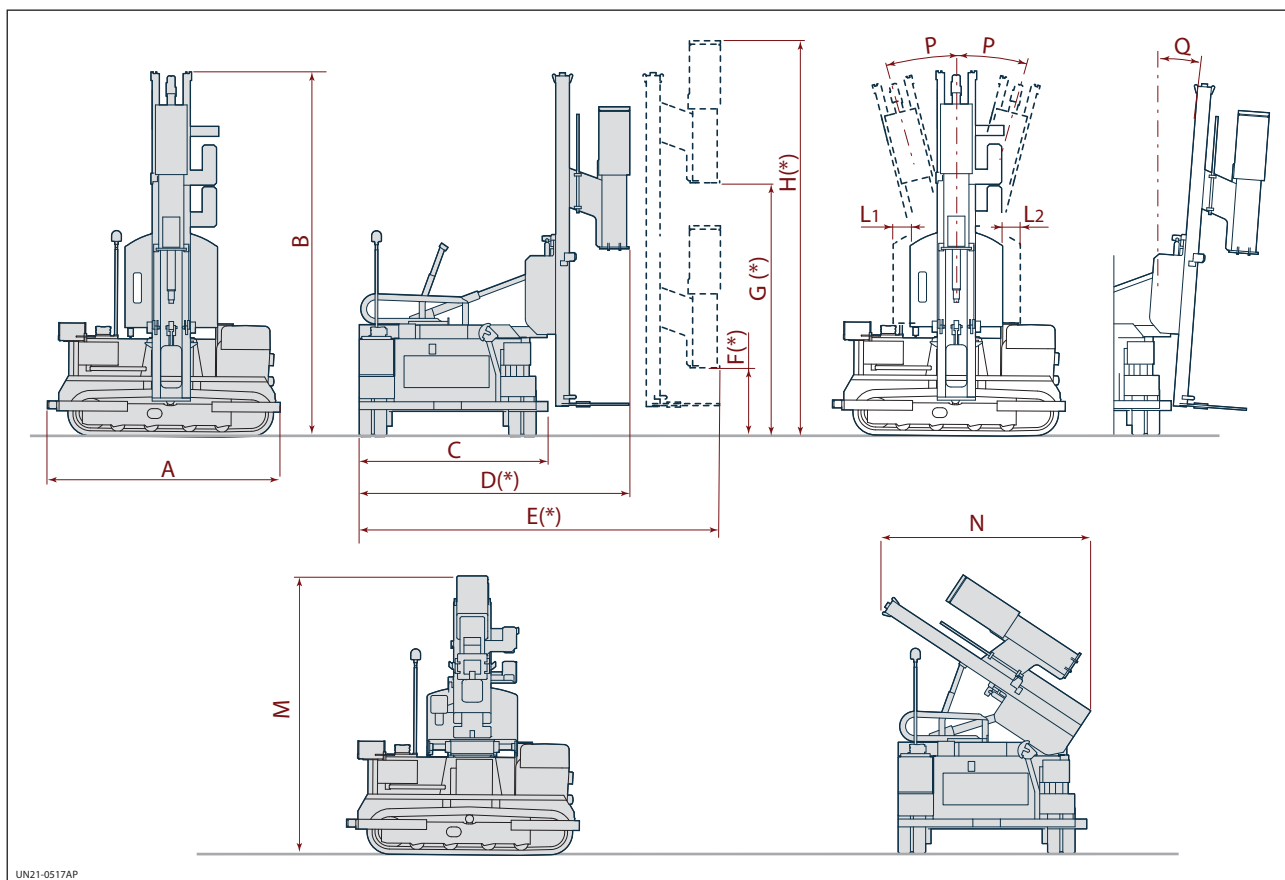
- 7) Attachment points of lifting hooks.
- 8) Operators and site assistants must keep a safe distance from the machine.
- 9) Greasing points.
- 10) Type of oil used for the hydraulic system.
- 11) Type of engine fuel.
- 12) Before starting the engine check that the emergency button is not pressed down.
- 14) This shows the sound pressure at the operator's work station.
- 15) This shows the machine's acoustic power level.
- 16) General hazard.
- 17) This shows the direction of movement and the relevant manoeuvres of the shifting control levers.
- 18) This shows the direction of movement of the accelerator lever to increase or decrease the number of revolutions of the engine.
- 19) This specifies the type of engine oil used.
- 20) This shows the fuel supply open/close turn valve.
- 21) This shows the battery cut-off device.
- 22) This shows the direction of movement and the relevant manoeuvres of the pile driver control levers.
- 23) This shows the connection of the high pressure delivery hose.
- 24) This shows the connection of the low pressure draining hose.
- 25) This shows the maintenance instructions (see "General maintenance instructions" described in the instruction manual provided with the engine).
- 26) This shows the emergency stop button.
- 27) This shows damage to the engine caused by insufficient cooling.  
Always start the engine with all the casings in place.

## Technical characteristics

Machine model		HD 800	HD 1000
Engine brand		HATZ	
Engine model		3L41C	
Engine power	kW	32,5	
Engine speed	rpm	2600	
Hammer drill power	J	830	1060
Stroke frequency	strokes / minute	620 ÷ 1500	570 ÷ 1180
Working pressure	MPa	18	
Required oil flow	l/min	95	110
Hydraulic oil tank capacity	l	160	
Fuel tank capacity	l	60	
Electrical system voltage	V <sub>DC</sub>	12	
Maximum longitudinal slope	°	8	
Maximum transversal slope	°	8	
Maximum wading depth	mm	357	
Maximum speed	km/h	2,93 ÷ 5,52	3,39 ÷ 6,39
Maximum towable load	kg	1350	
Stroke plate weight	kg	25	35
Crawler weight (without accessories)	kg	2525	
Pile-driver weight (without accessories)	kg	1375	1525
Overall weight of machine (tracked truck and pile driver) (without accessories)	kg	3900	4050

## Overall dimensions

The illustration shows the general dimensions of the machine when operating and when resting.



(\*) Dimensions of the machine without accessories or supplements. The dimension (G) corresponds to the maximum length of the pile to be driven into the ground.

Model	A	B	C	D	E	F*	G*	H*	L1	L2	M	N	P	Q
	(mm)												(°)	
HD 800	2370	3355	1930	2570	3570	320	2830	4155	125	45	2800	2125	8	10
HD 1000								4265			2850			

## Sound emissions

The sound level, measured in operating condition when driving metal piles, is shown in the table.

The measurement has been carried out in compliance with the ISO 6395:1988, EN ISO 3744:1997, UNI EN ISO 11201:2010 standards using a ONO SOKKI phonometer model LA 4350.

		HD 800	HD 1000
Weighted acoustic power level (A) guaranteed ( $LwA_g$ )	dBA	126	126
Weighted acoustic power level (A) at the operator's workstation ( $LpA_g$ )	dBA	107	109

**The operator and nearby people must wear personal protective equipment (ear defenders, ear plugs, etc.) to reduce the noise level received or eventually work shifts that foresee interruptions must be programmed to reduce the exposure to noise.**

---

### **Gas emissions**

---

During operation and/or when standing still, the machine emits the toxic gases listed below.

- Carbon monoxide generated by the exhaust of the engine.
- Hydrogen generated by the engine ignition battery.
- Inflammable and explosive fumes produced by the engine fuel.

---

### **Environmental operating limits**

---


The machine works correctly at a temperature between -20 and +40 °C, with 80% maximum relative humidity.

## Declaration of conformity


The picture shows a copy of the “EC” declaration of conformity; the original is issued by the manufacturer together with this manual.

### DECLARATION OF CONFORMITY

(Annex II A to Directive 2006/42/CE)



**The Manufacturer**



**Orteco S.r.l.**

Via 2 Giugno, 19 - 40011 Anzola dell'Emilia (BO) – Italia  
Tel. +39 051731051 - Fax +39 051731925

**of the Machine:**

DESCRIPTION		●	A
FUNCTION		●	B
MODEL / COMMERCIAL NAME		●	C
TYPE / COMMERCIAL NAME		●	D
SERIAL NUMBER		●	E
YEAR OF MANUFACTURE		●	F
IMPACT ENERGY		●	G

*declares, under its own responsibility, that the aforesaid machine complies with the provisions of the following directives and subsequent amendments thereto:*

2006/42/CE	Machinery Directive
2014/30/UE	Electromagnetic Compatibility Directive
D.Lgs. 262/2002	Noise Directive, Definition 42, Annex I, Annex V procedure
2000/14/CE	Measured sound power level: dB(A) Guaranteed sound power level: dB(A)

**Standards applied:** UNI EN ISO 12100:2010

*declares, furthermore, that the following party (based within the European Union) is authorised to prepare the technical documentation file:*

**First name and surname**  ● H

**Address**  ● L

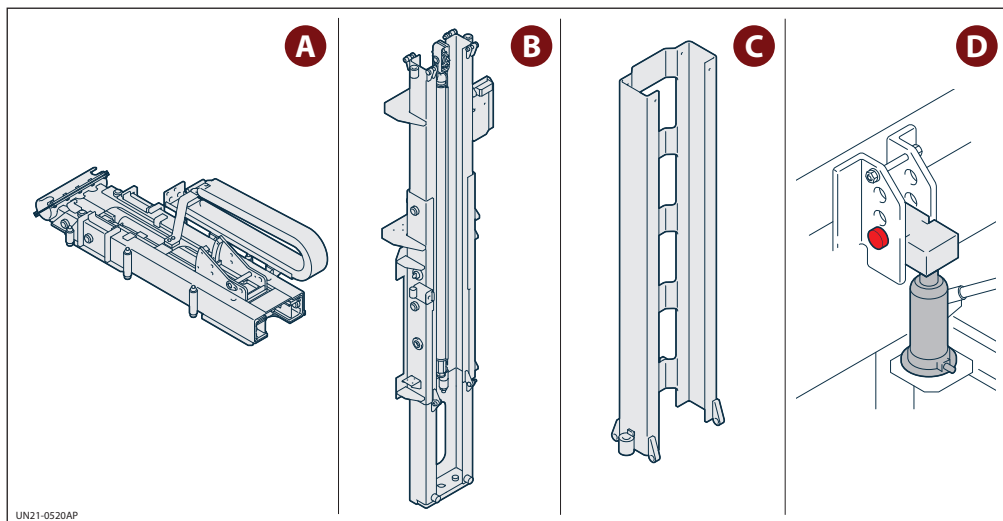
**Date**  **Place**  **Signature**  ● P

M-  N-  Legal Representative)

UN21-0519AP\_GB

- A) General description
- B) Function
- C) Model / trade name
- D) Type / trade name
- E) Serial number
- F) Year of manufacture
- G) Hammer impact energy
- H) Name of the legal person authorised to compile the technical file
- L) Technical file storage area
- M) Date of declaration
- N) Place of issue of the declaration
- P) Signature of the person authorised to write the conformity declaration

## Versions



- A) Additional extension skid:** this is used to drive in piles or to use accessories at a distance from the side of the tracked crawler which is further than possible with the standard machine.
- B) 4.5 m sliding vertical column:** this is used to drive in piles or to use accessories which are longer than the standard machine (up to 4500 mm).
- C) Oversize fixed vertical column:** this is used to drive in piles or to use accessories which are longer than the standard machine.  
The manufacturer offers four different lengths: 3000 mm, 3500 mm, 3800 mm, and 4000 mm.
- D) Macro tilt:** this is used to drive in piles or to use accessories in perfectly vertical manner when the ground is sloping and the standard machine cannot offset the slope with hydraulic manoeuvres.

### Horizontal additional extension skid

The machine is equipped with a counterweight (**A**) to prevent transverse overturning.

Do not use the machine without the counterweight.

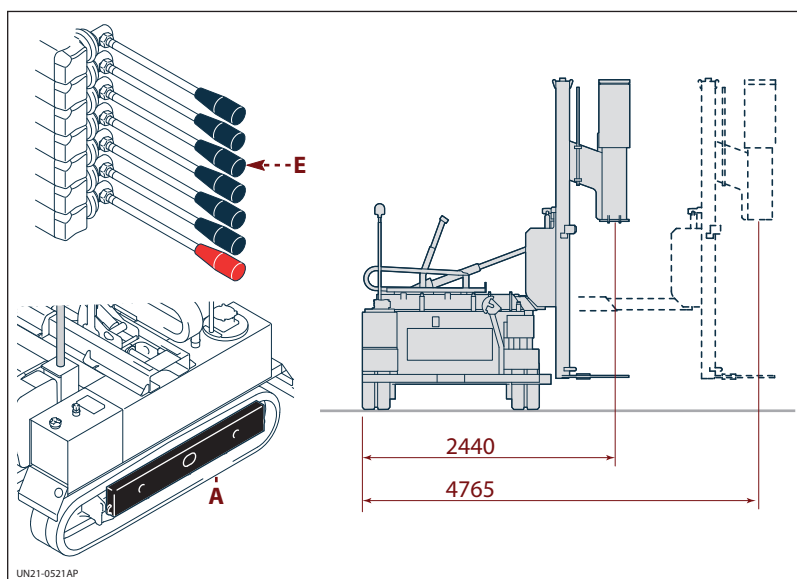
On sloping ground, do not exceed the maximum longitudinal and transverse slope limits stated in the "Specifications".

The skid is extended using lever (**E**) (see "Operating Controls").

Carry out scheduled maintenance as stated by the manufacturer (see "Scheduled maintenance charts").

The chart shows the increase in weight.

Description	Weight (kg)
Additional extension skid	170
Counterweight	142



### 4,5 m sliding vertical column

The machine is equipped with a counterweight (**E**) to prevent transverse over-turning.

Do not use the machine without the counterweight.

On sloping ground, do not exceed the maximum longitudinal and transverse slope limits stated in the "Specifications".

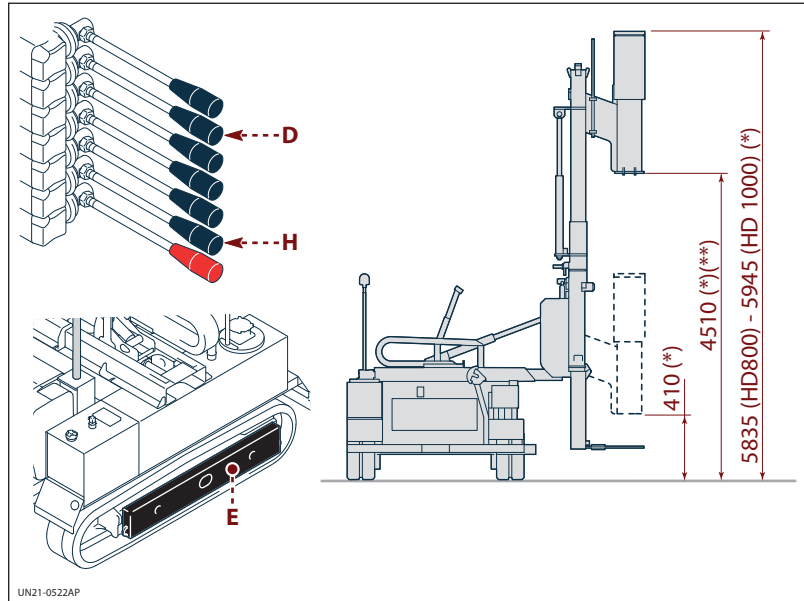
**D) Four-position lever (including two permanent-contact positions):** this is used to raise and lower the hammer drill (see "Operating Controls").

**H) Lever:** this is used to raise and lower the entire column unit (see "Operating Controls").

Carry out scheduled maintenance as stated by the manufacturer (see "Scheduled maintenance charts").

The chart shows the increase in weight.

Description	Weight (kg)
Sliding column	320
Counterweight	142



(\*) Dimensions of the machine without accessories or supplements.

(\*\*) The dimension corresponds to the maximum length of the pile to be driven into the ground.

### Oversize fixed vertical column

The machine is equipped with a counterweight (**E**) to prevent transverse over-turning.

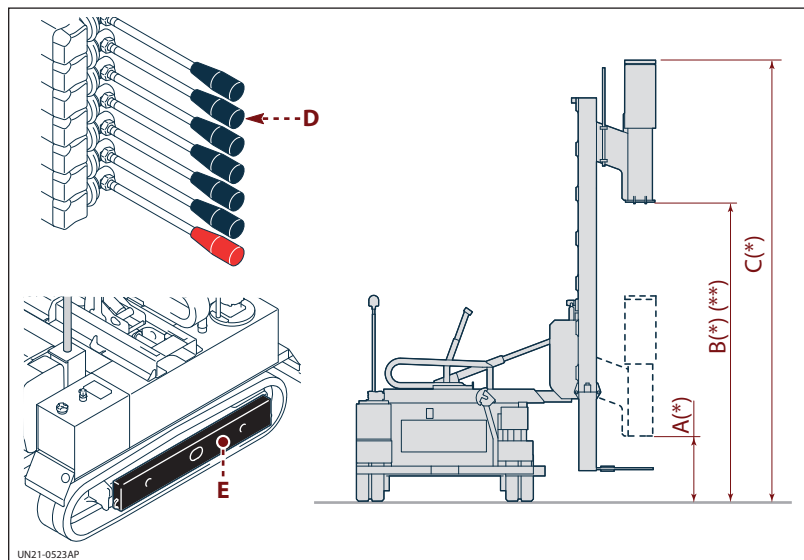
Do not use the machine without the counterweight.

On sloping ground, do not exceed the maximum longitudinal and transverse slope limits stated in the "Specifications".

**D) Four-position lever (including two permanent-contact positions):** this is used to raise and lower the hammer drill (see "Operating Controls").

Carry out scheduled maintenance as stated by the manufacturer (see "Scheduled maintenance charts").

The chart shows the dimensions and the increase in weight.



(\*) Dimensions of the machine without accessories or supplements.

(\*\*) The dimension corresponds to the maximum length of the pile to be driven into the ground.

Model	A (mm)	B (mm)	C (mm)		Weight (kg)
			HD 800	HD 1000	
3000	320	3030	4355	4465	175
3500	430	3530	4855	4965	215
3800	730	3830	5155	5265	215
4000	900	4000	5325	5435	220
Counterweight	-	-	-	-	142

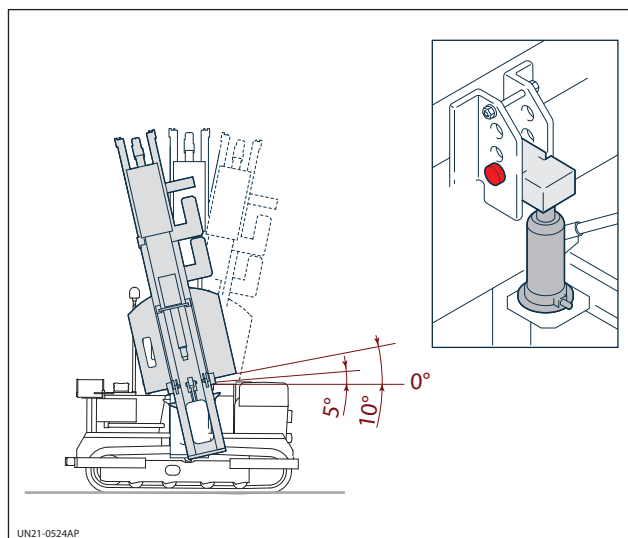


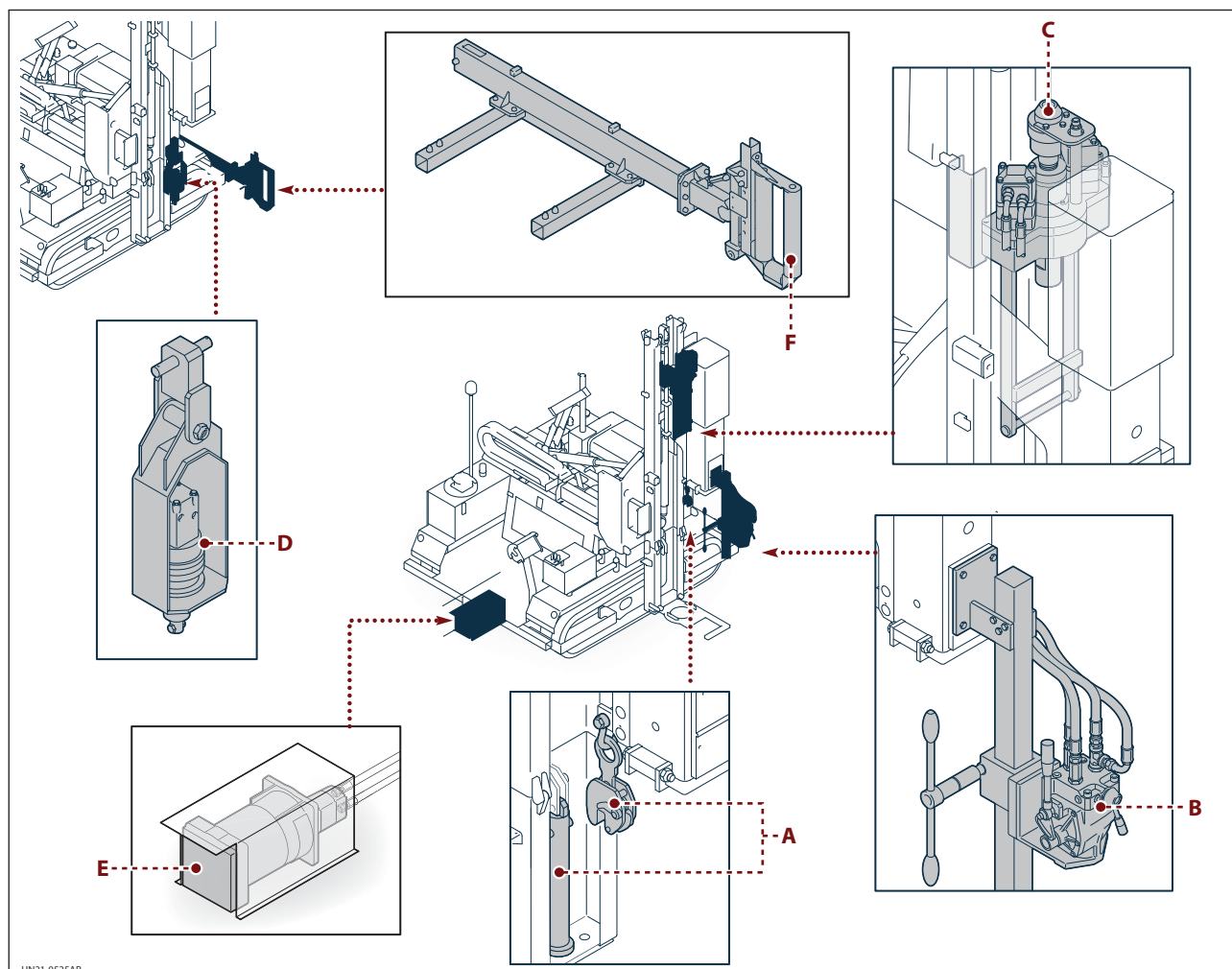
### Macro tilt

The pile driver is tilted via a manually operated cylinder (see "Procedure for use of the macro tilt").

The chart shows the increase in weight.

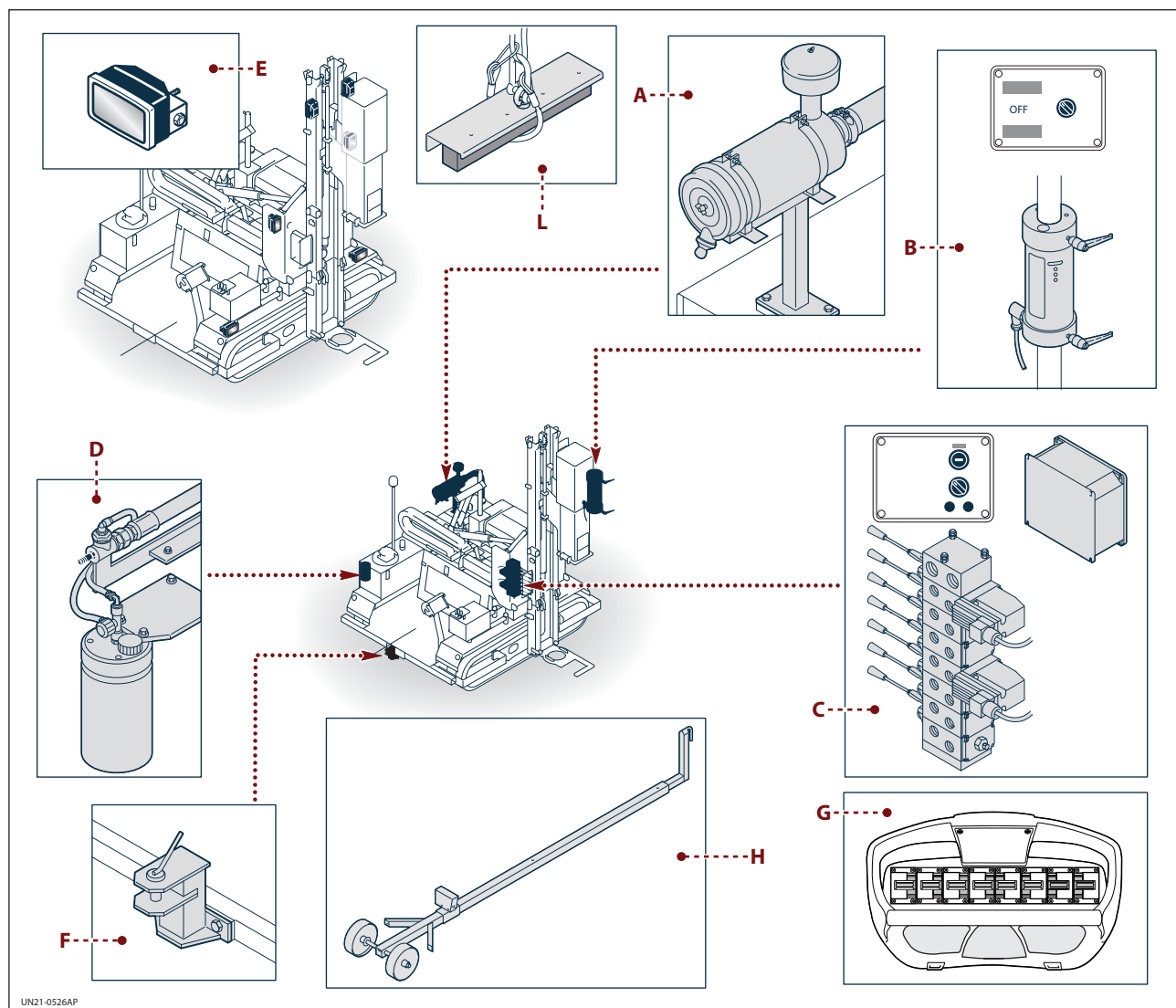
Description	Weight (kg)
Macro tilt	35



**Accessories**


- A) Clamp:** used to extract piles from the ground (piles for guard-rails, piles for photovoltaic systems, etc). For assembly, use and maintenance of the clamp, see "Metal pile extraction procedure".
- B) Corer:** to make circular holes with a diamond cup-shaped tool in hard and compact areas (road surfaces in cement, asphalt, etc.). For assembly, use and maintenance of the core borer, see "Core boring procedure".
- C) Boring device:** to make circular holes on hard and compact surfaces (cement, rock) using a tool with a combined rotation and percussion action. For assembly, use and maintenance of the drilling machine, see "Drilling procedure with the drilling machine".
- D) Drill:** to drill holes in ground containing a small quantity of rock fragments (gravel, crushed stone, etc.). For assembly, use and maintenance of the drill, see "Drilling procedure with the drill".
- E) Electrical power generator:** this is activated by the machine's hydraulic system and supplies electricity to the electric tools (drill, screwdriver, etc.). For use and maintenance of the electric generator, see "Activating the electric generator."
- F) Blade raiser:** this is used to position the segments of guardrail (already bolted and laid on the ground) against the pile. For assembly, use and maintenance of the blade raiser, see "Guardrail lifting procedure".

Pos.	Weight (kg)
<b>A</b>	49
<b>B</b>	38
<b>C</b>	90 (RP 200) 148 (RP 500)
<b>D</b>	52 (T2) 104 (T3)
<b>E</b>	40
<b>F</b>	320

**Supplements**


- A) Supplementary air filter:** to filter the air taken in by the motor in particularly dusty work conditions.
- B) "Laser" device:** to automatically stop the driving of a pile or the execution of a hole at the required depth.  
For its use see "Adjusting the 'laser device' that stops the hammer's down stroke".
- C) Column verticality automatic device:** to automatically place the column in vertical position, independently from the gradient of the ground.
- D) Compressed air circuit:** to supply to the boring device the air necessary for the percussion action and to clean the hole.
- E) Lights:** to illuminate the work area in case of low visibility or at night (see "Working at night or with low visibility").
- F) Tow hook:** to tow equipment on wheels (compressor, trolley, etc.). The maximum load that can be towed is shown on the plate on the tow hook.
- G) Radio control:** this is used to remotely control the machine using radio waves.
- H) System for measuring the distance between the piles:** this signals the previously calculated driving distance between the last pile driven in and the following one.
- L) Magnet:** this is used to lift particularly large ferromagnetic piles into the driving position.

## General safety warnings

**Failure to comply with some simple safety and prudence rules is the cause of most accidents and injuries at work.**

**In most cases, accidents can be avoided by foreseeing the possible causes and consequently acting with the necessary care and caution.**

**Every worker influences, with his /her behaviour, the risks related to the activity to be carried out, therefore a careful and prudent worker is the best guarantee against accidents.**

**Before using the machine, the operator and other workers must carefully read and understand the instructions contained in the manual supplied and those directly applied to the machine.**

**It is important to pay attention to the meaning of the symbols on the labels applied; their shape and colour are very important for safety purposes. All labels must be legible and the information they contain must be respected.**

**When the machine is in use, the operator and the people directly involved in the operations must wear accident prevention equipment; for this purpose contact the safety manager.**

**On no account must you tamper with, eliminate or by-pass the safety devices as this could seriously put at risk the health of people.**

**Never start or use the machine in poorly ventilated areas. If necessary, adopt all necessary precautions to prevent build-ups of machine exhaust gas.**

## Use and operation safety precautions

**The operator must know well the performance and weight of the machine in relation to the type of ground (flat, compact, rough, sloping) in order to always maintain a safe distance when working near open excavations, slopes, verges and overhanging rocks.**

**Use the machine only if you are in good physical and mental condition.**

**Check that the routs at the site are suitable and that the work areas are suitable for the passage and stability of the machine. Ask for the the expert operators' assistance for operations in tight spaces and with poor visibility.**

**In the case of operations near particularly high mounds of land make sure that the excavation walls are correctly buttressed to avoid landslides caused by the vibrations transferred from the machine to the ground.**

**At the end of the shift or day do not park the machine inside banks or waterways.**

**Mark-off the work area with appropriate signs and forbid access to anyone not involved in the operations. The operator must make sure said prohibition is respected even by suspending work.**

**Do not use the hammer to lift people, pull or lift loads.**

**Do not use the machine during storms.**

**Make sure there are no buried pipelines or cables which could interfere with the pile driving operation (gas or water pipes, electric cables).**

Keep a safe distance from the lines of public utilities. In case of work near buried pipe-lines or cables (gas or water pipes, electric cables) contact the provider requesting assistance to search for the lines and eventually disable them.

Do not fill the fuel tank when smoking, when the engine is on or hot or near naked flames.

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### Handling and transport safety precautions

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Lifting and handling operations must be carried out following the information on the machine and in the manufacturer's use manual.

Loading, unloading, handling and lifting operations must be carried out by qualified and authorised personnel that has received specific training.

Before transferring the machine check that the machine and its components are anchored to the means of transport to avoid uncontrolled movements and check that the profile is within the foreseen overall dimensions. If necessary apply the necessary markings.

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### Safety instructions for adjustment and maintenance

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Maintenance is of primary importance for the efficiency and reliability of the machine and is one of the most important safety elements.

Maintenance schedule operations must be carried out at the set intervals and in the manner foreseen by the manufacturer.

For maintenance operations that require special equipment and/or specialised knowledge contact the authorised assistance centres.

Before carrying out any maintenance or adjustment operation lower the hammer to the ground, switch off the engine and remove the ignition key.

Servicing of hydraulic components must be carried out only with the system depressurised.

When searching for oil leaks from hydraulic components, all the necessary measures must be taken to avoid injuries (perforations) caused by the pressurised oil.

Worn parts must be replaced with original spare parts.

Before working on the engine or near it, make sure it is cold.

Dispose of polluting material in compliance with the regulations in force in the country of use; do not fly tip it.

Keep the engine, battery, fuel tank and hydraulic oil tank areas clean to avoid the risk of fire caused by the build-up of residues.

Before any adjustment operation activate all safety devices foreseen and assess whether personnel working nearby must be informed of the operation.

At the end of the operations, before starting the machine, check that there are no tools, cloths or other material near the moving parts or in risk areas.

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**Environmental protection precautions**


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**Improper disposal of waste can cause environmental and ecological damage.**

**Potentially polluting waste installed on the machine (fuel, oil, coolant, filters and batteries) must be separated and disposed of in different ways, according to the different composition of the products, in compliance with the laws in force.**

**Keep the exhaust gases within the minimum values in order to limit the emissions into the atmosphere.**

**Correctly dispose of waste from electrical and electronic equipment because it may contain substances that are potentially harmful to the environment and to people's health.**

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**Fire-prevention and first aid measures**


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***First aid measures***

**In the event of an accident, provide medical assistance as envisaged by legislation and standards in force in the country where the machine is in use.**

**In the event of contact with fuel or hydraulic oil, refer to the "Safety and environmental data sheets for hydraulic oil" or the "Safety and environmental data sheets for fuel".**

***Fire prevention measures***

**In the event of an accident, follow the procedures envisaged by legislation or standards in force in the country where the machine is in use.**

**Operators must take all precautionary measures to prevent fires occurring and to limit the consequences in the event a fire does occur.**

**Do not smoke or use open flames during refuelling and clean up any fuel and hydraulic fluid leaks on the pile driver immediately.**

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### Advice for handling and transportation

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**Before starting any operation, the work area must be organised to safely carry out lifting and handling operations.**

**During lifting and handling operations anyone not involved must keep a safe distance.**

**Hooks and ropes in good condition suitable for the load to be lifted must be used for lifting operations.**

**Transportation by rail, sea or air must be carried out in compliance with the regulations and laws in force.**

**Transport on public roads must comply with the local laws in force.**

**If necessary, when loading and unloading from the truck use ramps which are in good condition and offer the appropriate load-bearing capacity.**

---

### Transportation procedure

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The machine, depending also on the destination, can be delivered using different transport means (road, rail, sea and air).

The machine is delivered completely assembled or divided in two parts (tracked truck and pile driver) to make it easier to transport, with the disassembled components in a wooden crate. The parcels can be loaded onto a means of transport directly or in suitable containers if shipped by sea or air or to far-off destinations.

The manufacturer has foreseen anchorage points to guarantee stability of the assembled or split machine on the transport means.

## Lifting the machine



### WARNING

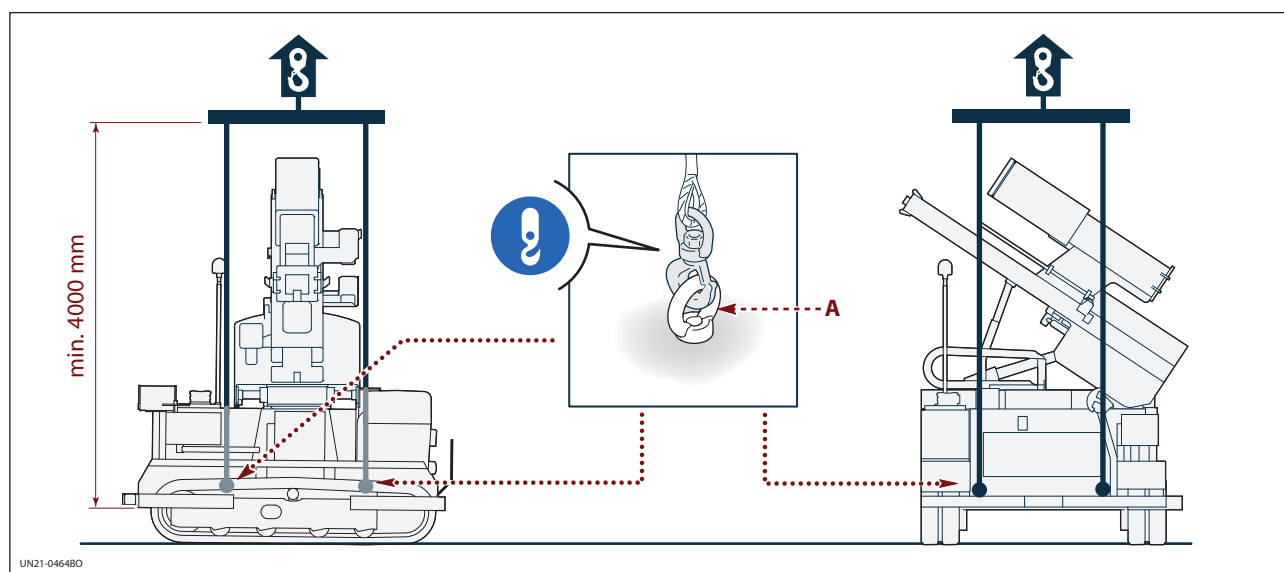
**The assembled machine must only be lifted when the pile driver is in resting position using suitable equipment (lifting beam) to avoid damaging it.**

**Hooks and ropes in good condition suitable for the load to be lifted must be used for lifting operations.**

Proceed as outlined below.

- 1) Check the weight of the machine to be lifted in the "Technical specifications" chapter to make sure the lifting means is suitable.
- 2) Fix the lifting ropes to the eyebolts marked **(A)** indicated by a special sign.

The illustration shows the harnessing points and lifting procedure.

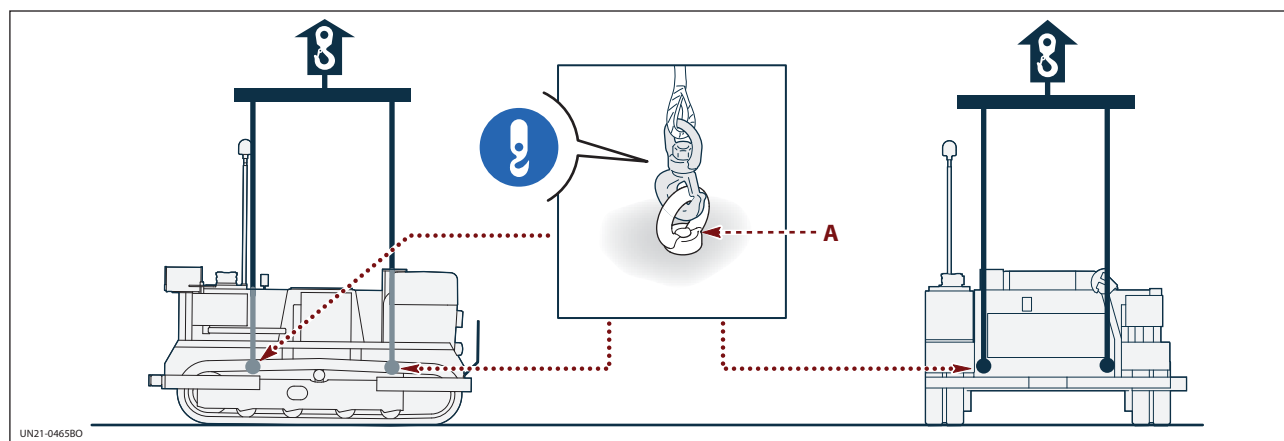


## Lifting the truck

Proceed as outlined below.

- 1) Check the weight of the truck to be lifted in the "Technical information" chapter to make sure the lifting means is suitable.
- 2) Fix the lifting ropes to the eyebolts marked **(A)** indicated by a special sign.

The illustration shows the harnessing points and lifting procedure.





## Lifting the pile driver



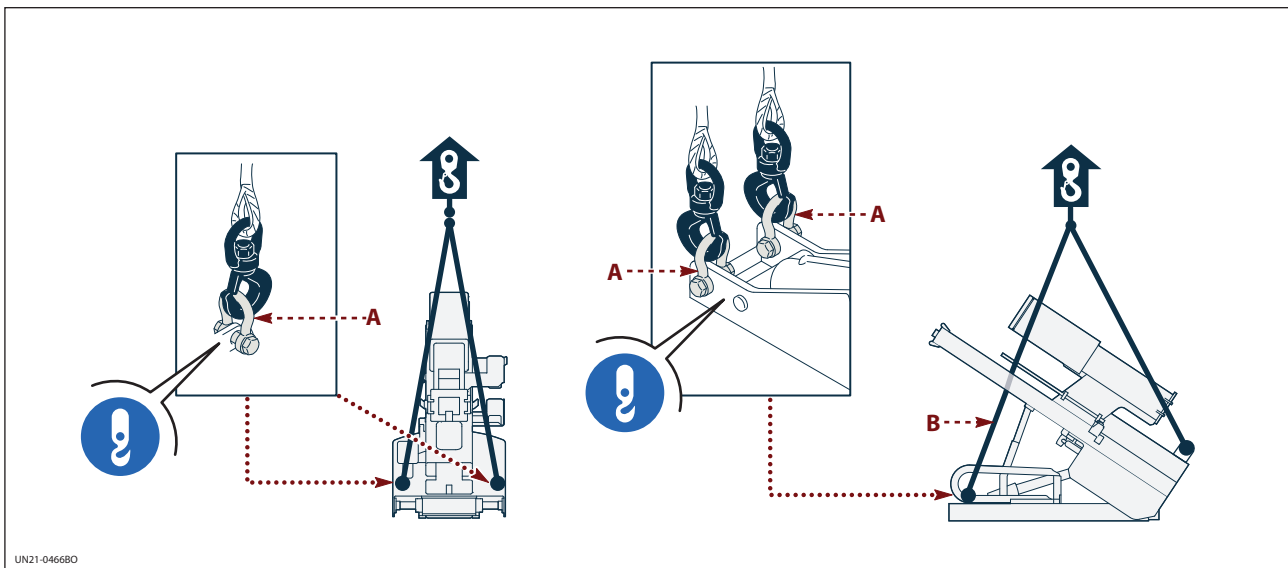
### WARNING

**Be extremely careful when using a forklift truck to handle the pile driver; the pile driver has a high barycentre therefore it becomes particularly unstable.**  
**Use lifting means with a sufficient capacity for the load to be lifted.**  
**Hooks and ropes in good condition suitable for the load to be lifted must be used for lifting operations.**

Proceed as outlined below.

- 1) Fit the bow shackles (**A**) on the special hooking points as shown in the figure.
- 2) Pass the lifting bands (**B**) through the hole in the column.
- 3) Check the weight of the installed pile driver to be lifted in the "Technical information" chapter to make sure the lifting means is suitable.
- 4) Fix the lifting ropes to the bow shackles (**A**) indicated by a special sign.

The illustration shows the harnessing points and lifting procedure.



## Procedure for getting on and off the transport means

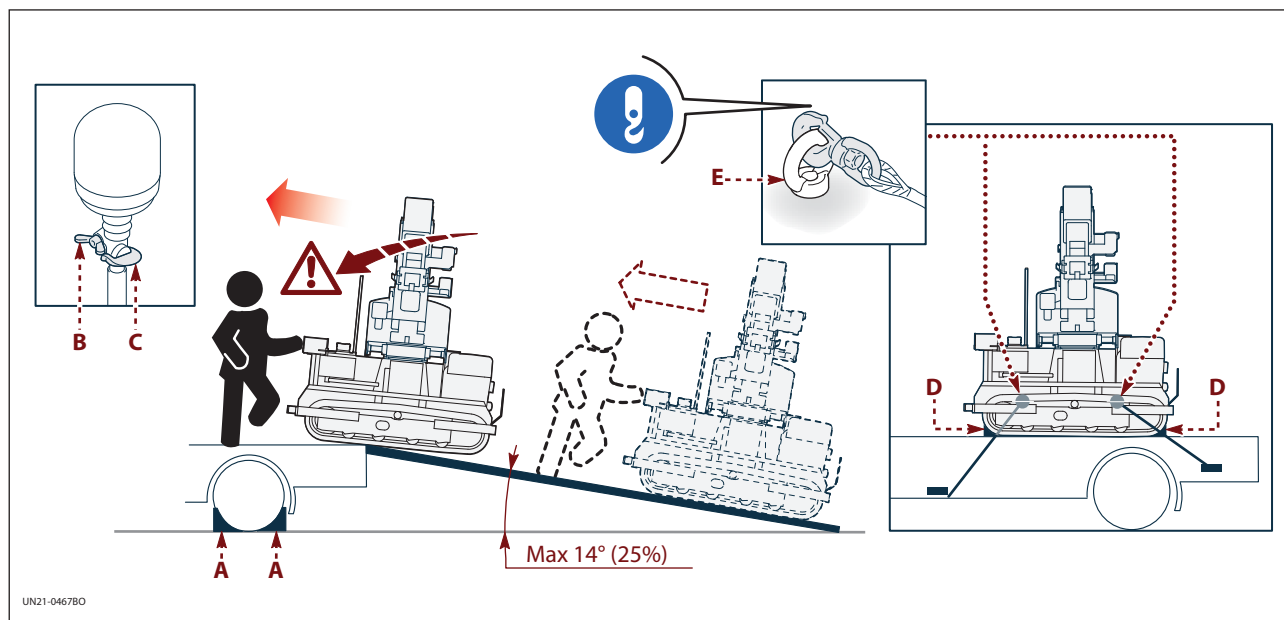


### WARNING

**Loading and unloading operations must be carried out on solid and level ground that does not present risks.**  
**When getting the machine on and off the transport means, the pile driver must be in resting position.**  
**Check that the capacity of the loading ramps is suitable; the ramps must have a guiding edge on both sides to guide the tracks.**  
**Position the ramps on the transport means and fix them in a stable way to the truck bed using the fastening devices (pins, screws, chain etc.).**  
**Where the ramps meet the truck bed there is a dangerous bump so move the machine very carefully over this point.**  
**Before getting the machine on and off the transport means clean the ramps and truck bed accurately.**

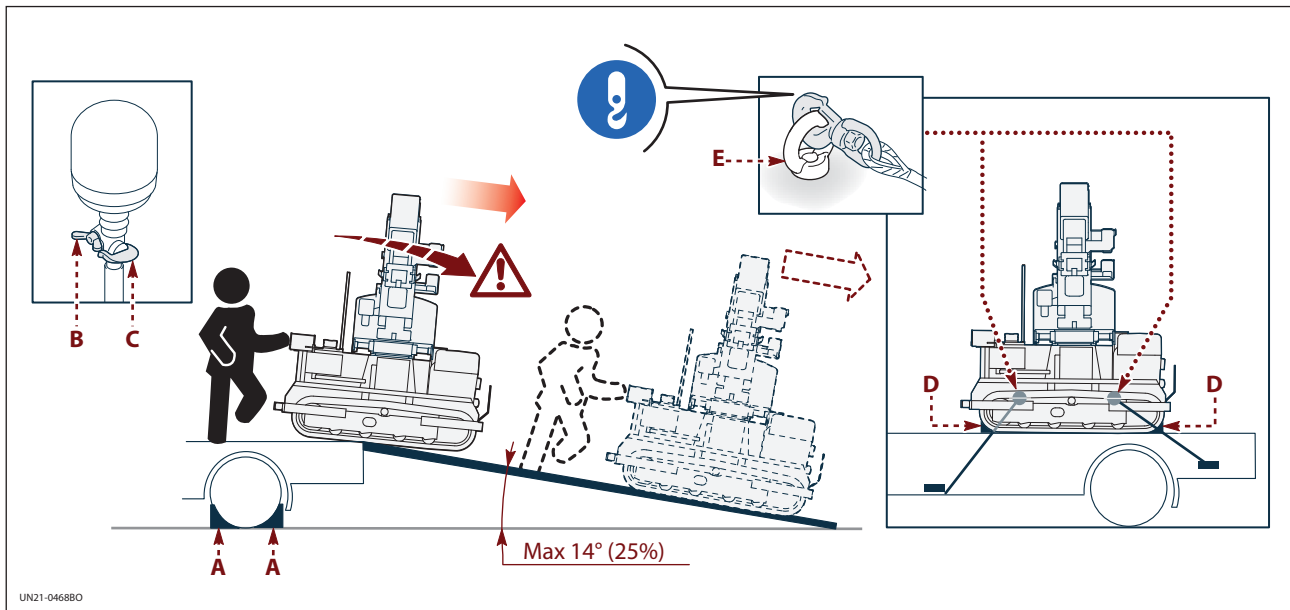
Pull the parking brake of the transport means and position the chocks (A) against the wheels.

Move on and off the transport means with the controls facing the truck bed as shown in the figure to reduce to a minimum the risk of accidents should the machine tip over.



**To get the machine on proceed as outlined below.**

- 1) Unscrew the wing screw (B) and remove the rotary lamp to avoid damaging it during transport.  
Use the cap (C) to prevent the rotary lamp support from getting dirty.
- 2) Start the machine (see "Starting the engine").
- 3) Position the machine centrally to the ramps and if necessary adjust the width of the ramps so that the machine weight is evenly distributed.
- 4) Move up onto the transport means with minimum forward speed.
- 5) Switch off the engine and remove the ignition key.
- 6) Place the chocks (D) against the tracks.
- 7) Anchor the machine to the transport means by passing chains or ropes through the lifting eyebolts (E), indicated by the special sign.



**To get the machine off proceed as outlined below.**

- 1) Remove the ropes that anchor the machine to the transport means from the eyebolts (E), indicated by the special sign.
- 2) Remove the chocks (D) from the tracks.
- 3) Start the machine (see "Starting the engine").
- 4) Position the machine centrally to the ramps and if necessary adjust the width of the ramps so that the machine weight is evenly distributed.
- 5) Move off the transport means at minimum forward speed.
- 6) Remove cap (C) from the rotary lamp support.
- 7) Mount the rotary lamp on the support and tighten the wing screw (B) to lock it in place.

### Assembly of pile driver on the crawler

The machine delivered in different parts (crawler and pile driver), must be assembled by duly trained personnel in an authorised service centre.

The authorised service centre has all the information about the safety warnings and the procedures to follow in order to ensure safe and proper assembly.

Do not carry out any of the activities required if the assembly information is missing and you are not suitably trained to perform them properly and safely.

The staff member must be authorised to perform the required activities.

## Safety advice for the adjustments

To protect the people involved, the adjustment operations must be carried out with all safety devices activated and unauthorised people must not be allowed to access the area of operation which must be appropriately marked.

Prima di riavviare la macchina controllare che non siano rimasti attrezzi, stracci o al-  
 Before starting the machine, check that there are no tools, cloths or other material near the moving parts or in risk areas.

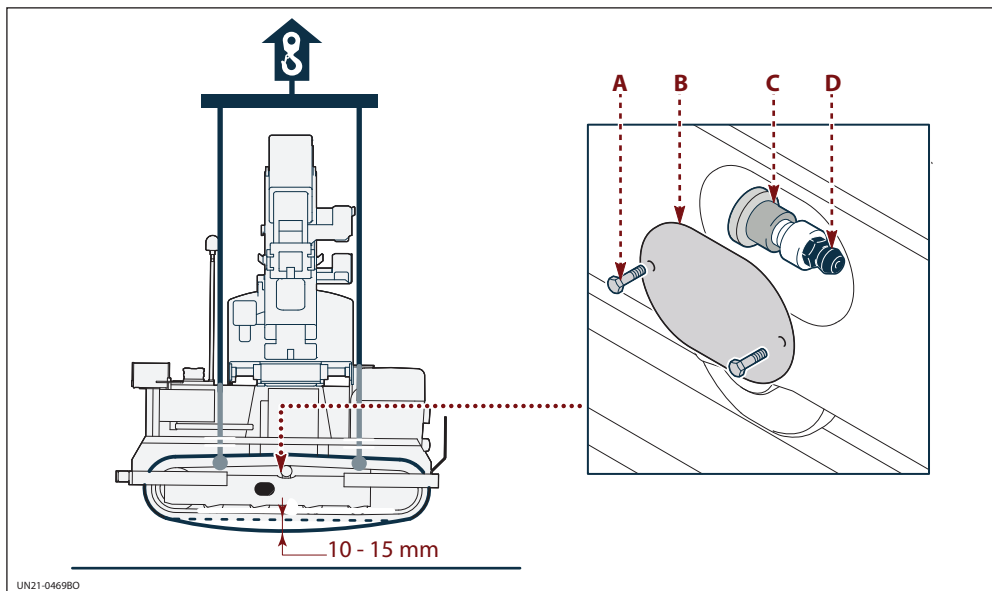
## Adjusting track tension



### WARNING

**The tensioning device (valve and lubricator) is pressurised.**

**To avoid dangerous situations loosen the valve by maximum one turn and never unscrew the lubricator.**



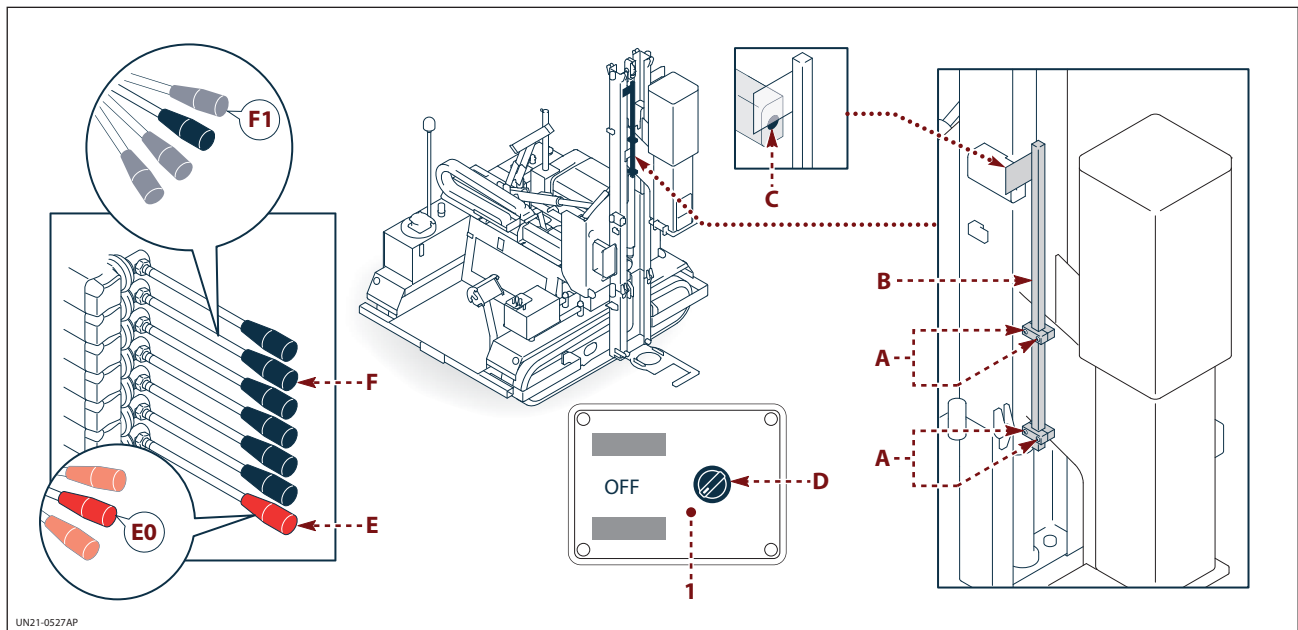
Proceed as outlined below.

- 1) Stop the machine on solid and even ground.
- 2) Switch off the engine and remove the ignition key and keep it in a safe place.
- 3) Lift the machine off the ground the bare minimum needed and block it with external means to prevent it from accidentally coming down.
- 4) Unscrew the screws (A) and remove the cover (B).
- 5) Check track tension.  
 Tension is correct when the tension at the centre track roller is between 10 and 15 mm.  
 If the tension is greater than the maximum allowed loosen (maximum 1 turn) the valve (C) to reduce pressure and set the correct track tension.  
 Tighten the valve (C).  
 If the tension is lower than the minimum allowed pump grease from the lubricator (D) to restore the correct track tension.
- 6) Fit the cover (B) and tighten the screws (A).

## Adjusting of "PROXIMITY device" that stops the hammer's down stroke

The "PROXIMITY device" that stops automatically the hammer's down stroke is used to drive piles into the ground or make holes in the ground at the same depth depending on the type of ground.

### Adjusting the pile driving depth

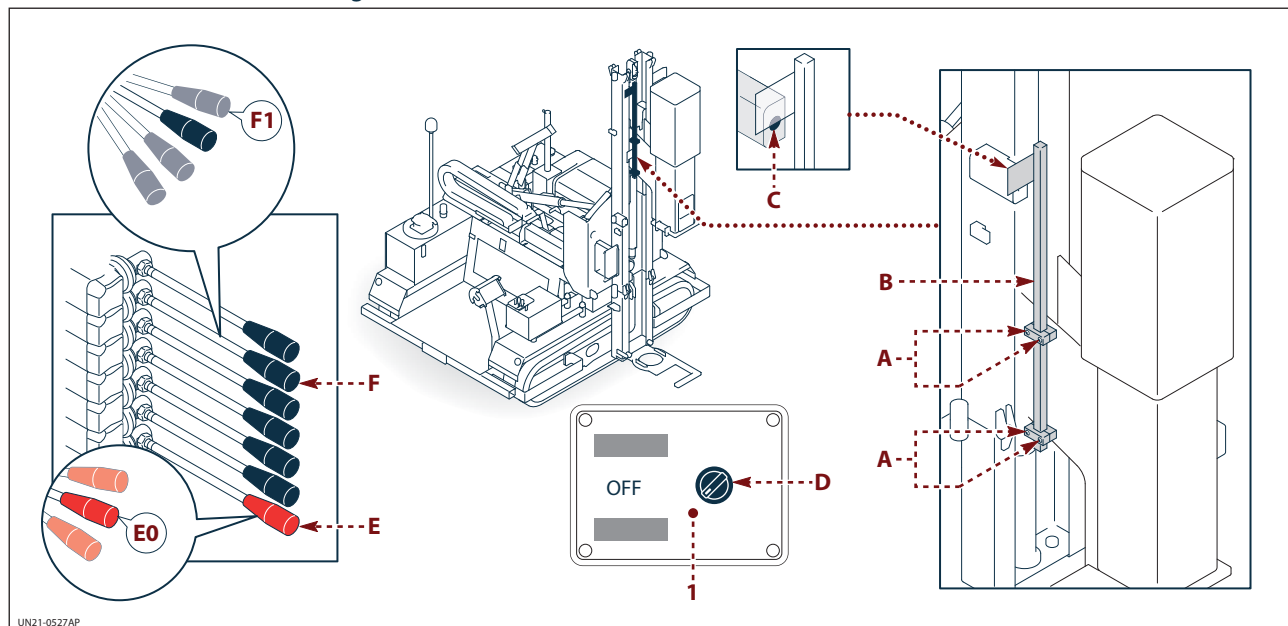


Proceed as outlined below.

- 1) Rotate the selector switch (**D**) to "OFF" position.
  - 2) Drive a pile into the ground at the required depth (see "Pile driving procedure").
  - 3) Stop the percussion and rest the hammer on the pile head.
  - 4) Loosen the screws (**A**).
  - 5) Adjust the device (**B**) at the centre line of the proximity sensor (**C**) as shown in the figure.
  - 6) Tighten the screws (**A**).
  - 7) Turn the selector (**D**) to the "PROXIMITY" position (**1**) to activate the device.
  - 8) Drive another pile into the ground until the stop device automatically interrupts the pile driving operation.
  - 9) Move lever (**E**) to "E0" position.
  - 10) Move the lever (**F**) to position "F1" to lift the hammer from the pile and measure its height.
  - 11) Check the correct pile driving depth.  
If the driving depth is not correct repeat the adjustment to correct the error.
- Turn the selector (**D**) to the "OFF" position to deactivate the device.

### Adjusting the hole depth

(For holes made with the boring device and drill)



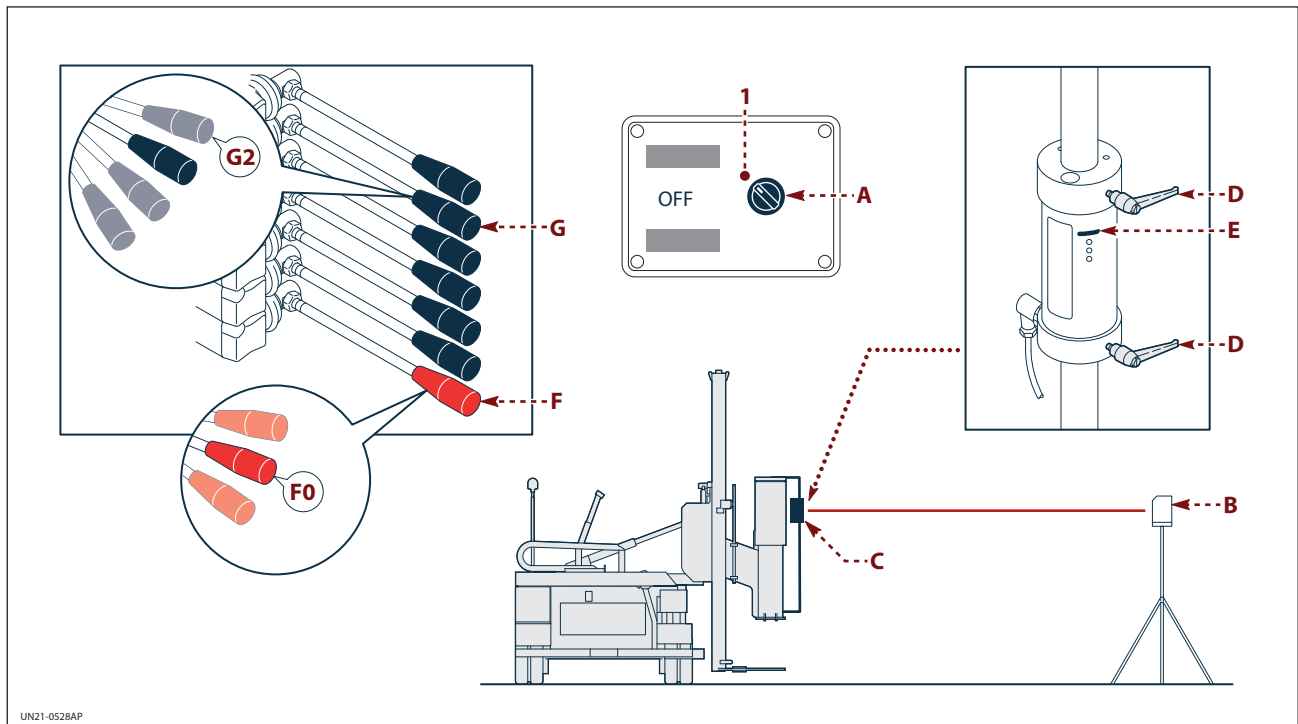
Proceed as outlined below.

- 1) Rotate the selector switch (**D**) to "OFF" position.
  - 2) Make the hole at the depth required (see the "Procedure to make holes using the boring device" or the "Procedure to make holes using the drill").
  - 3) Move the lever (**E**) to position "E0" to stop the tool rotation.  
Keep the tool in contact with the ground.
  - 4) Loosen the screws (**A**).
  - 5) Adjust the device (**B**) at the centre line of the proximity sensor (**C**) as shown in the figure.
  - 6) Tighten the screws (**A**).
  - 7) Turn the selector (**D**) to the "PROXIMITY" position (**1**) to activate the device.
  - 8) Make another hole until the stop device automatically interrupts the progress of the tool.
  - 9) Move the lever (**E**) to position "E0" to stop the tool rotation.
  - 10) Move the lever (**F**) to position "F1" to remove the tool from the hole.
  - 11) Check the correct depth of the hole.  
If the depth of the hole is not correct repeat the adjustment to correct the error.
- Turn the selector (**D**) to the "OFF" position to deactivate the device.



## Adjusting the hole depth

(For holes made with the boring device and drill)



Proceed as outlined below.

- 1) Rotate the selector switch **(A)** to "OFF" position.
  - 2) Make the hole at the depth required (see the "Procedure to make holes using the boring device" or the "Procedure to make holes using the drill").
  - 3) Move the lever **(F)** to position "F0" to stop the tool rotation.  
Keep the tool in contact with the bottom of the hole.
  - 4) Activate the emitter of the "laser device".
  - 5) Turn the selector **(A)** to the "laser" position **(1)** to activate the device.
  - 6) Position the laser emitter **(B)** at a maximum distance of 100 - 150 m from the pile-driver.
  - 7) Adjust the laser emitter **(B)** at a height from the ground similar to that of the receiver and is such a way that there are no obstacles between the emitter and the receiver **(C)**.
  - 8) Loosen the locking levers **(D)**.
  - 9) Slide the receiver **(C)** along the pipe to intercept the laser ray until the green lights **(E)** light up.
  - 10) Tighten the levers **(D)** to lock the receiver in the required position.
  - 11) Make another hole until the "laser device" automatically interrupts the progress of the tool.
  - 12) Move the lever **(F)** to position "F0" to stop the tool rotation.
  - 13) Move the lever **(G)** to position **(G2)** to remove the tool from the hole.
  - 14) Check the correct depth of the hole.  
If the depth of the hole is not correct repeat the adjustment to correct the error.
- Turn the selector **(A)** to the "OFF" position to deactivate the device.



## Safety advice concerning use

**Do not allow unauthorised persons to work on the machine.**

**The operator must be appropriately trained and informed on the use of the machine; upon first use of the machine, the operator must perform a range of practice manoeuvres to acquire familiarity with the controls and main functions.**

**Machines in the additional extension version must be equipped with a counter-weight.**

**Always check the work area for any risks.**

**Take particular care when working on sloping ground, bumpy areas, slopes and high mounds of land, gorges, ditches, filled excavations and ridges, rough ground, wet or muddy ground.**

**On sloping ground, move and operate the machine only within the limits foreseen by the manufacturer (see "Technical characteristics").**

**Keep away from the digging area and do not drive near the edges unless they have been tested for stability.**

**Before use check the efficiency of the controls, braking and parking devices, rotary lamp and buzzer.**

**Do not stop or pass under the percussion hammer.**

**On public roads the work area must be adequately marked with signs.**

## Description of the controls

### NOTICE

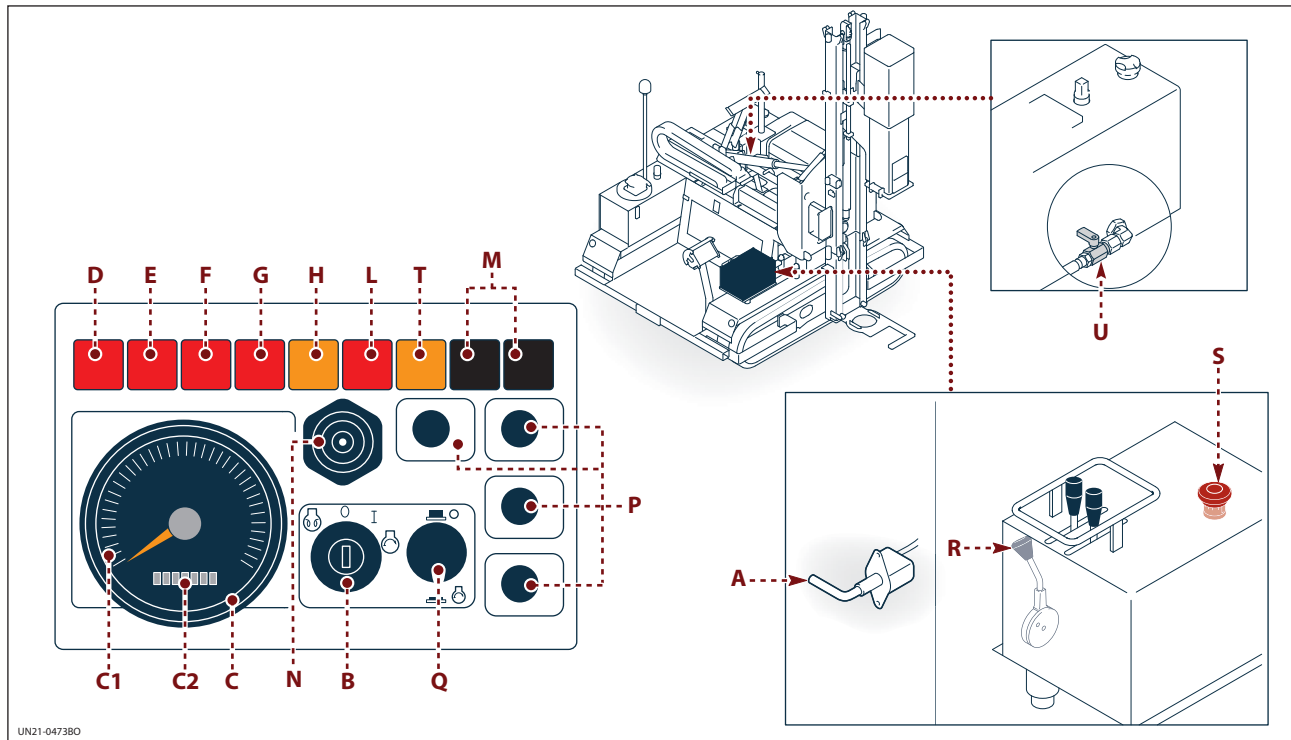
**The machine may be equipped with proportional control distributors (either mechanical or electric).**

For identification purposes, the controls have been divided as described below.

- Dashboard controls (base version).
- Controls to run the machine.
- Operation controls.

## Dashboard controls (base version)

The controls of any accessory installed on the machine are described in the use procedures of each single accessory.



**A) Disconnecting switch to isolate the batteries:** to disconnect and connect the battery to the electrical system.

**B) Ignition switch:** to switch on the engine.

**C) Multifunction signalling instrument:** this shows the engine rpm (**C1**) and the number of hours of operation (**C2**).

**D) Signal light (red):** this indicates the state of operation of the alternator; when the light is on, it means the alternator is not charging the battery.

**E) Signal light (red):** this shows there is insufficient engine oil pressure.

**F) Signal light (red):** this shows that the engine air filter is clogged.

**G) Signal light (red):** this shows the engine is overheating.

**H) Signal light (orange):** low fuel warning light.

**L) Signal light (red):** this shows that the delivery filter of the hydraulic system is clogged.

**M) Area without control device.**

**N) Buzzer.**

- 1) This warns the operator, with a continuous signal, that the oil pressure is low. The motor stops automatically and lights (**D**) and (**E**) come on.
- 2) This warns the operator, with a continuous signal, that the emergency button has been activated. The motor stops automatically and lights (**D**) and (**E**) come on.
- 3) This warns the operator, with an intermittent signal, that the engine is overheating. Signal light (**G**) comes on. Switch off the engine immediately and remove the cause of the overheating.

**P) Area without control device.**

**Q) Area without control device.**

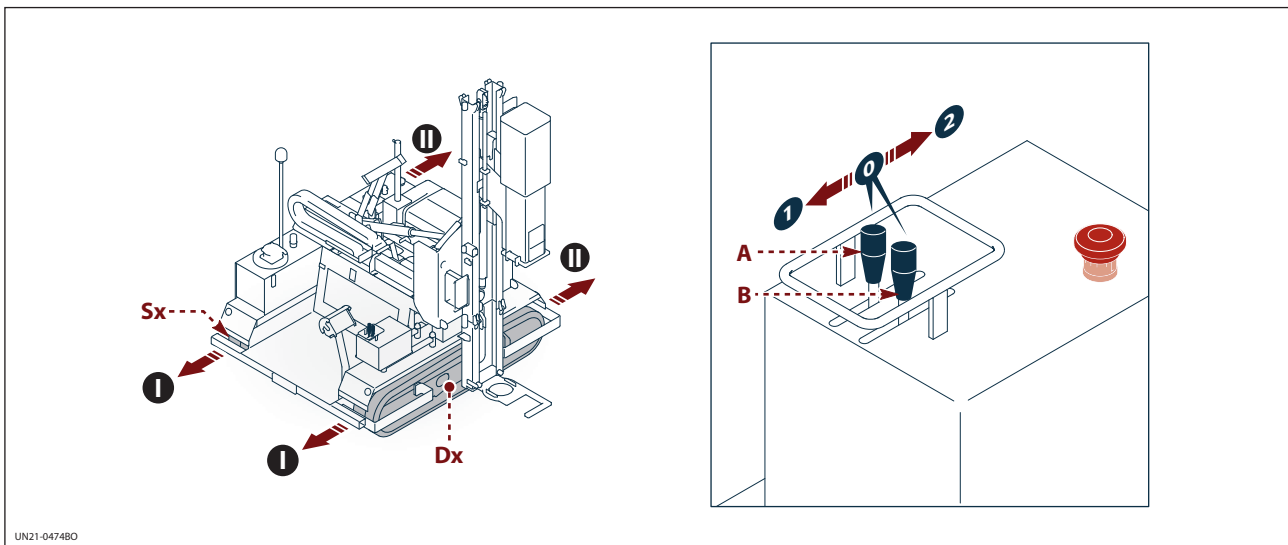
**R) Accelerator lever:** to change the engine rpm.

**S) Emergency stop button:** to stop the machine in the case of impending risk.

**T) Signal light (orange):** this shows that the pre-heating glow plugs have been activated (for diesel engines).

**U) Valve:** this is used to open and close the flow of fuel from the tank to the engine.

## Controls to run the machine



**A) Lever:** to activate the left track (**Sx**).

Move the lever to position **(1)** to move the track in direction **(I)**.

Move the lever to position **(2)** to move the track in direction **(II)**.

When the lever is released, it returns to neutral position **(0)**.

When the lever is in neutral position, the movements of the left track are disabled.

**B) Lever:** to activate the right track (**Dx**).

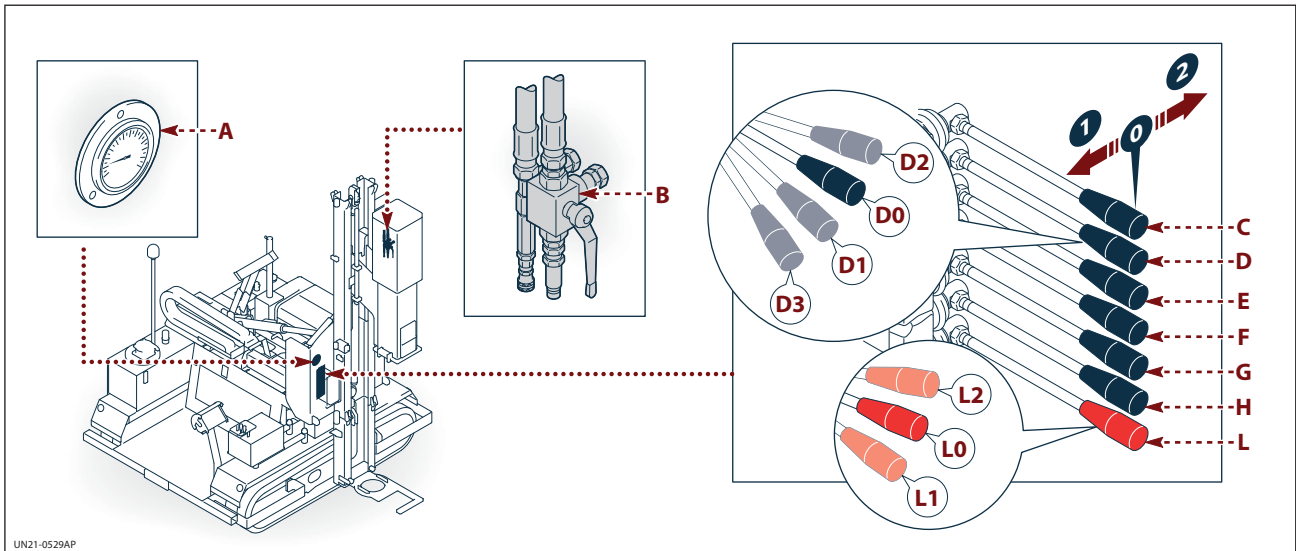
Move the lever to position **(1)** to move the track in direction **(I)**.

Move the lever to position **(2)** to move the track in direction **(II)**.

When the lever is released, it returns to neutral position **(0)**.

When the lever is in neutral position, the movements of the right track are disabled.

## Operation controls

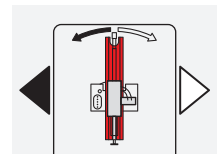


**A) Pressure gauge:** this shows the pressure of the pile driver's hydraulic circuit.

**B) Switch:** to switch the hydraulic power supply to the hammer or accessory.

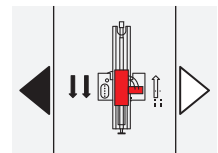
**C) Lever:** to tilt the column lengthways in relation to the machine.

- **Position (1):** this activates column tilt to the left.
- **Position (2):** this activates column tilt to the right.
- When the lever is released, it returns to neutral position (0).
- **Neutral position (0):** this deactivates column tilting.



**D) Four-position lever (two stable "D0" - "D3"):** to lift and lower the percussion hammer.

- **Position "D1":** to activate the rapid lowering of the percussion hammer.
- **Position "D3":** to activate the slow (floating) lowering of the percussion hammer.
- **Position "D2":** to activate the lifting of the percussion hammer.
- **Neutral position "D0":** this deactivates the up and down movements of the percussion hammer.

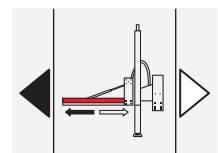


### NOTICE

**If equipped with an electric module, the proportional distributor has no permanent contact position (D3) when actuated manually, which means the operator will have to hold the lever in position during work.**

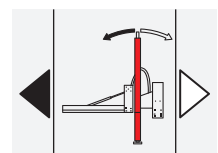
**E) Lever:** to shift the column transversally.

- **Position (1):** this activates column retraction.
- **Position (2):** this activates column extension.
- When the lever is released, it returns to neutral position (0).
- **Neutral position (0):** this disables transverse column shifting.



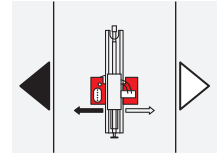
**F) Lever:** to tilt the column transversally.

- **Position (1):** this activates column tilt to the left.
- **Position (2):** this activates column tilt to the right.
- When the lever is released, it returns to neutral position (0).
- **Neutral position (0):** this disables transverse column tilting.



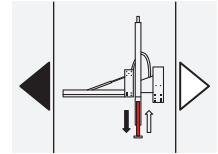
**G) Lever:** to shift the column lengthways.

- **Position (1):** this activates column shifting to the left.
- **Position (2):** this activates column shifting to the right.
- When the lever is released, it returns to neutral position (0).
- **Neutral position (0):** this disables longitudinal column travel.



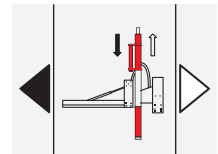
**H) Lever:** to activate the outrigger jack.

- **Position (1):** this activates cylinder extension onto the ground.
- **Position (2):** this activates cylinder retraction from the ground.
- When the lever is released, it returns to neutral position (0).
- **Neutral position (0):** this deactivates outrigger cylinder movements.



## NOTICE

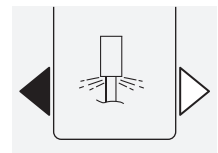
**In the version with the 4,5 m sliding vertical column, the lever controls the vertical movement of the entire column.**



**L) Lever with two stable positions (red - "L0" - "L1"):** to activate and disable the percussion hammer.

The lever is also used to activate certain accessories such as the corer, boring device, drill, etc. (see the procedure for the use of the accessory installed on the machine).

- **Position "L1":** to activate the percussion hammer.
- **Position "L0":** to stop the percussion hammer.
- **Position "L2":** if featured, it activates the opposite rotation of certain accessories.



## NOTICE

**The manually operated proportional distributor is equipped with a clutched lever. This lever remains in the position in which it was left by the operator. If equipped with an electric module, the proportional distributor has no permanent contact position (D3) when actuated manually, which means the operator will have to hold the lever in position during work.**

## Use in cold environmental conditions

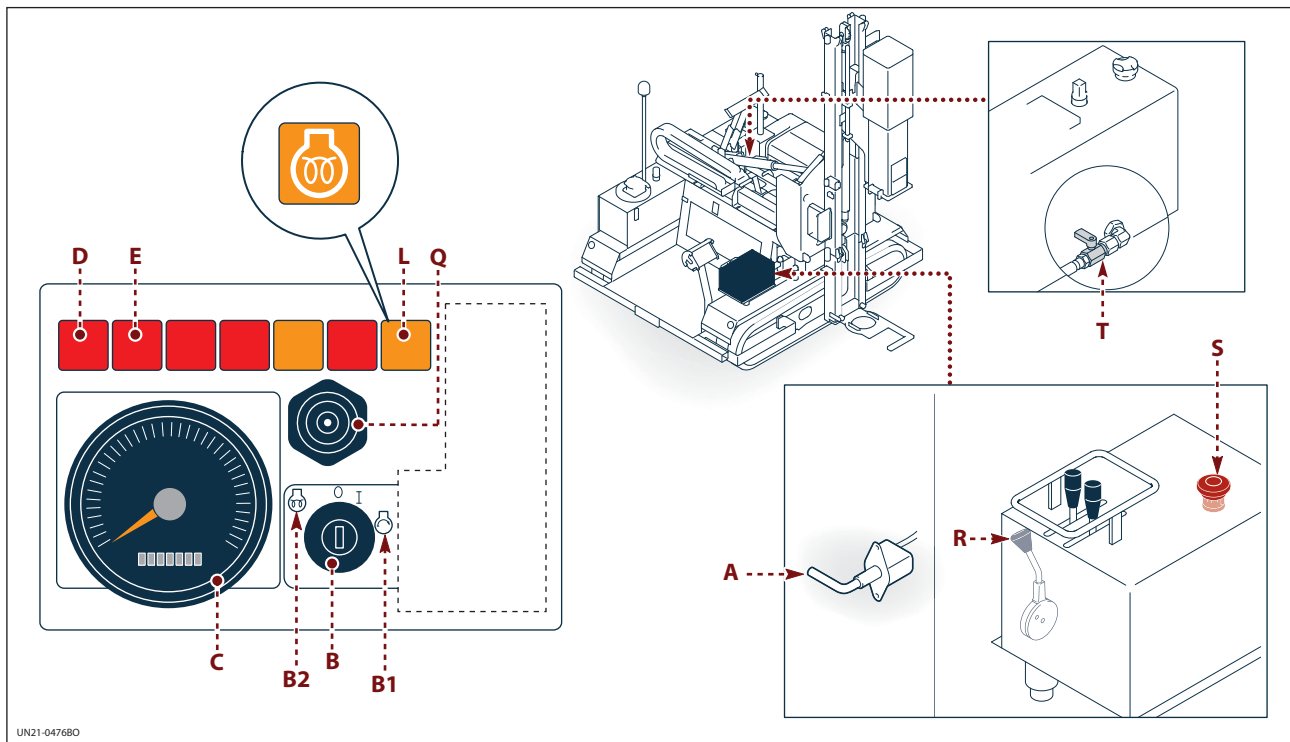
At temperatures below 0 °C, the procedure described below must be implemented.

- Only use hydraulic oil and lubricants suitable for the working temperature.
- Check battery efficiency.
- Activate the controls of the hydraulic jacks to heat the oil to a temperature of 22 - 25 °C.
- Activate the percussion at a minimum stroke frequency for at least 5 minutes to heat the percussion hammer.

**Starting the engine**
**NOTICE**

**The electric starting motor must not be used continuously for more than 10 seconds. When trying to start the machine wait one minute between each attempt to allow the electric motor to cool.**

**At each start-up check that the buzzer (Q) is in good working order (continuous sound signal).**



*To start the machine at temperatures below 0 °C proceed as described.*

- 1) Check that the emergency stop button (S) is off.
- 2) Turn the battery isolation switch (A) to activate the dashboard and the electrical system.
- 3) Check that the fuel valve (T) is open.
- 4) Position the accelerator lever (R) about half way.
- 5) Turn the ignition key (B) by one click (position "I").
- 6) The signal lights (D and E) switch on and the buzzer (Q) sounds.
- 7) Turn the ignition key (B) one more click to position "B1" to start the engine.
- 8) When the motor is on, the signal lights (D and E) switch off and the buzzer (Q) stops.

*To start the machine at temperatures above 0 °C proceed as described.*

- 1) Check that the emergency stop button (S) is off.
- 2) Turn the battery isolation switch (A) to activate the dashboard and the electrical system.
- 3) Position the accelerator lever (R) about half way.
- 4) At temperatures below zero if the glow plugs supplement is featured turn the key towards the symbol "B2"; at the same time signal light (L) comes on.

Keep the key in that position for the heating time necessary (usually 1 minute). Release the key; the signal light will switch off.

- 5) Turn the ignition key (**B**) by one click (position "I").
- 6) The signal lights (**D** and **E**) switch on and the buzzer (**Q**) sounds.
- 7) Turn the ignition key (**B**) one more click to position "B1" to start the engine.
- 8) When the motor is on, the signal lights (**D** and **E**) switch off and the buzzer (**Q**) stops.

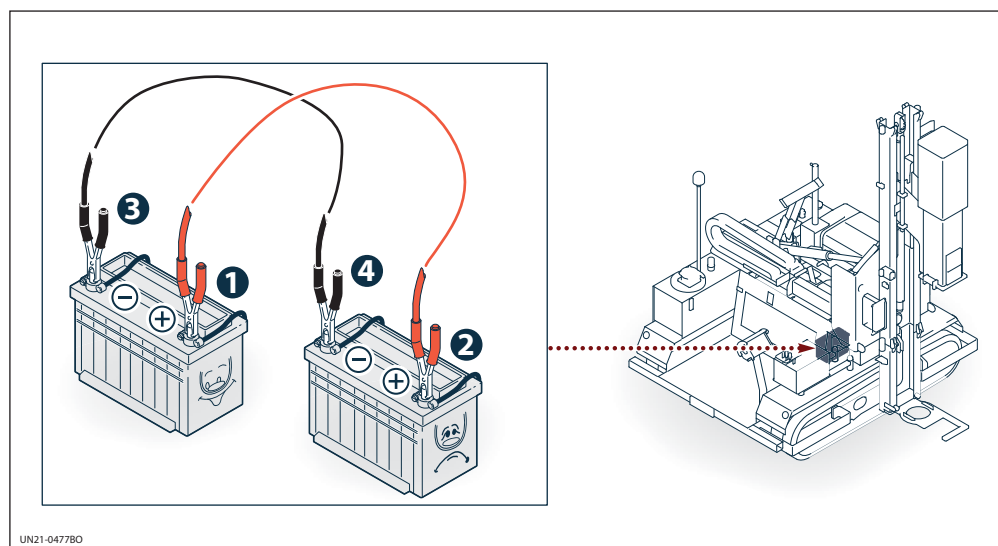
## Starting the engine with the auxiliary battery

### NOTICE

**Do not cause sparks or use naked flames near the batteries.**

**Avoid direct contact with the battery liquid.**

**Use cables with an adequate section and isolated terminals.**



If the battery is flat, the engine can be started with another battery (auxiliary) with a nominal voltage and capacity identical to the flat battery.

Proceed as outlined below.

- 1) Connect the cables in the order shown in the figure.
- 2) Start the machine (see "Starting the engine").
- 3) Disconnect the cables in reverse order.

## Shifting procedure



### WARNING

**Machines in the additional extension version must be equipped with a counter-weight.**

**The operator must control the machine from the ground.**

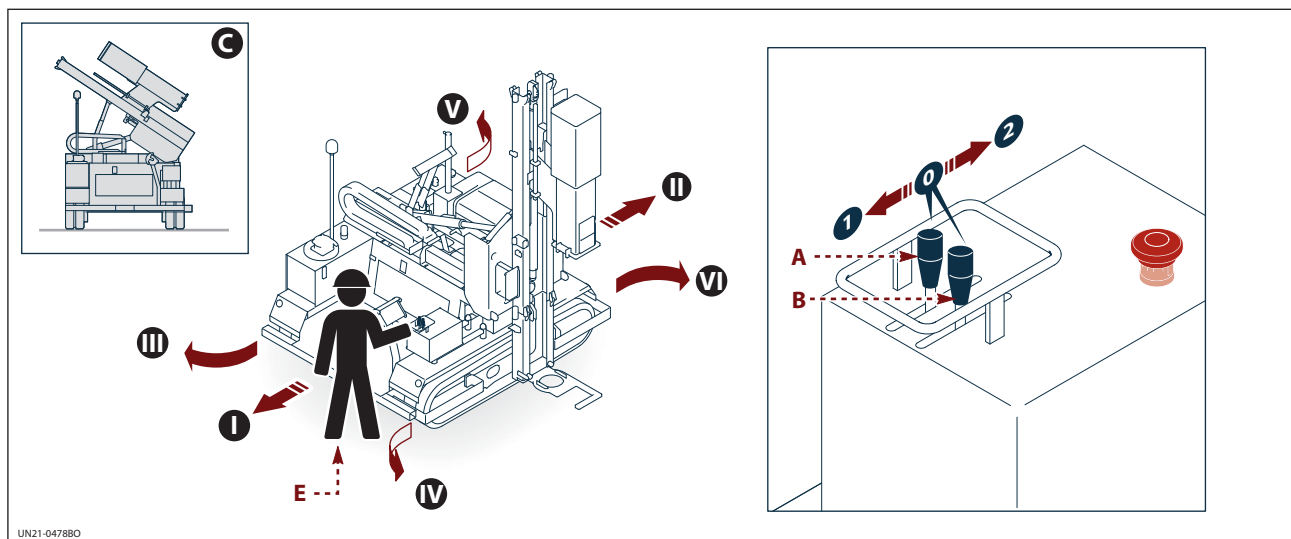
**Turn (both forwards and backwards) gradually to reduce the wear of the tracks.**

**The controls must be operated gently and smoothly to avoid sudden movements of the machine which could injure the operator or people nearby.**

**Unauthorised persons are prohibited from standing or moving in the work area.**

For short journeys (between a driven pile and the next one to be driven) keep the pile-driver in working position and control the machine from the position **(E)** foreseen for the operator.

For transfers at the work site put the pile-driver in resting position **(C)** and control the machine from the position **(E)** foreseen for the operator.



Proceed as outlined below.

- 1) Start the engine (see "Starting the engine").
- 2) Move levers **(A)** and **(B)** at the same time towards the position **(1)** to move the machine forwards in the direction **(I)**.
- 3) Move levers **(A)** and **(B)** at the same time towards the position **(2)** to move the machine forwards in the direction **(II)**.
- 4) Move the lever **(A)** further than the lever **(B)** towards the position **(1)** to gradually turn in the direction **(IV)**.
- 5) Move the lever **(A)** further than the lever **(B)** towards the position **(2)** to gradually turn in the direction **(VI)**.
- 6) Move the lever **(B)** further than the lever **(A)** towards the position **(1)** to gradually turn in the direction **(III)**.
- 7) Move the lever **(B)** further than the lever **(A)** towards the position **(2)** to gradually turn in the direction **(V)**.



## Shifting on slopes procedure



### WARNING

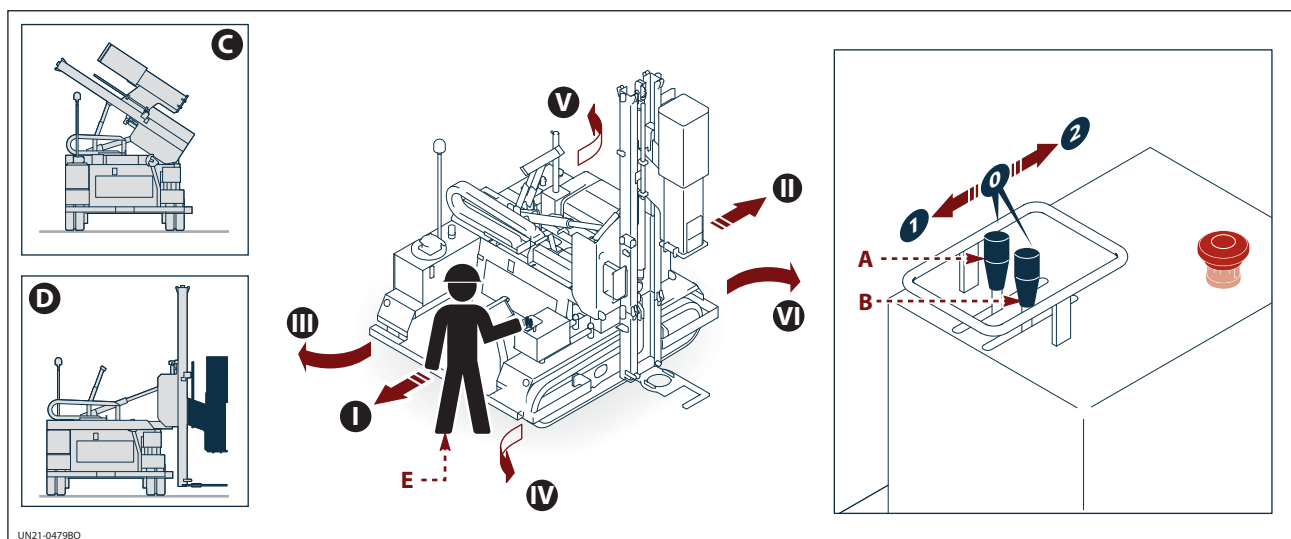
**Travel only on slopes within the maximum slope limits foreseen by the manufacturer (see "Technical characteristics").**

**On sloping ground keep the percussion hammer completely lowered to increase machine stability.**

**In the case of long stretches on sloping ground keep the pile driver in resting position (C) to increase machine stability. Avoid moving transversally to the slope; move vertically (up-down and vice versa).**

**The gradient that can be tackled depends on various factors: the type of ground (soft, slippery, wet or markedly uneven), the speed and visibility.**

**When working on sloping ground the operator's experience and good sense prevail over any rule.**



**E)** Control position foreseen for the operator

Proceed as outlined below.

1) Start the engine (see "Starting the engine").



### WARNING

**On sloping ground travel at minimum speed to prevent the risk of the machine over-turning.**

- 2) Move levers **(A)** and **(B)** at the same time towards the position **(1)** to move the machine forwards in the direction **(I)**.
- 3) Move levers **(A)** and **(B)** at the same time towards the position **(2)** to move the machine forwards in the direction **(II)**.
- 4) Move the lever **(A)** further than the lever **(B)** towards the position **(1)** to gradually turn in the direction **(IV)**.
- 5) Move the lever **(A)** further than the lever **(B)** towards the position **(2)** to gradually turn in the direction **(VI)**.
- 6) Move the lever **(B)** further than the lever **(A)** towards the position **(1)** to gradually turn in the direction **(III)**.
- 7) Move the lever **(B)** further than the lever **(A)** towards the position **(2)** to gradually turn in the direction **(V)**.

**Pile driving procedure**

**WARNING**

**Only drive the pile into sloping ground within the limits foreseen by the manufacturer.**

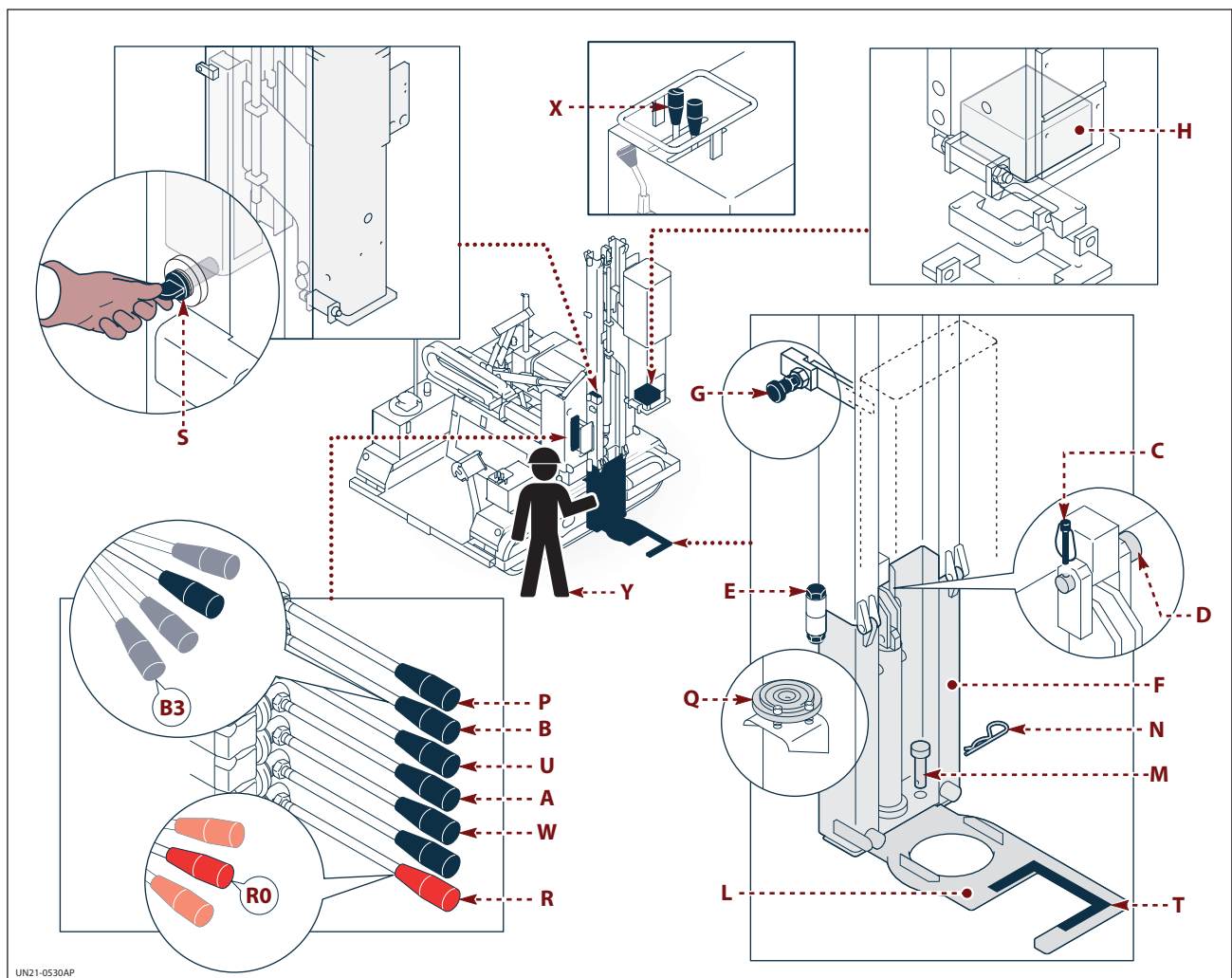
**On sloping ground position the machine with the pile driver as close as possible to the truck to reduce the risk of tipping over.**

The operator must be positioned as shown in the figure.

When driving the pile into the ground the percussion hammer must be manually placed in a perfectly vertical position (see "Operation controls") or automatically (see "Using the verticality system").

To manually place the column in a perfectly vertical position use the level gauge (Q).

Check the need to replace, according to the type of pile to be driven, the stroke plate (H) and the matrix (T) (see "Replacing the stroke plate").



Y) Control position foreseen for the operator

Proceed as outlined below.

- 1) Move the lever (A) to lift the column vertically compared to the ground.
- 2) Move the lever (B) to lift the percussion hammer.
- 3) Tighten the safety lock pin (S) and slowly rest the hammer on the pin.
- 4) Remove the peg (C) and the pin (D).

- 5) Support the guide (F), release it from the pin (G) and rotate it downwards.
- 6) Slide in the pin (D) and the peg (C).
- 7) Lock the guide with the bolts (E).
- 8) Fit the guide plate (L) and lock it with the pins (M) and the safety split pins (N).
- 9) Install the matrix (T) on the guide plate (L).
- 10) Lift the hammer slightly and unscrew the safety lock pin (S).
- 11) Move the levers (X) to shift the machine to the pile extraction point.
- 12) Move the lever (P) and the lever (A) to position the column vertically.  
Check the verticality using the level gauge (Q).
- 13) Move the lever (U) and the lever (W) to position the percussion hammer right on the driving point.  
To make it easier, the centre of the matrix can be used as reference (T).
- 14) Insert the pile between the stroke plate (H) and matrix (T).


**WARNING**

**Take care when the hammer is lowered because there is the risk of crushing hands between the pile head and the stroke plate.**

**Remain at the side of the percussion hammer to avoid being hit if the percussion hammer comes down suddenly.**

- 15) Move the lever (B) to lower the hammer onto the pile until the head of the pile is inside the grooved profile of the stroke plate and then move it to the floating position "B3".

**NOTICE**

**Make sure that the automatic verticality system is disabled before activating the percussion hammer, to avoid damaging the device.**

- 16) Move the lever (R) to activate the percussion hammer.

**NOTICE**

**When working on extremely hard ground, it is important not to use a pneumatic drill for more than 30 seconds at a time. After this limit, stop for at least 15 seconds before resuming drilling.**

**If the pile does not go into the ground, do not attempt to force it; there is probably an obstruction preventing it from being driven in fully.**

**NOTICE**

**To automatically stop the pile driving operation at the required depth see the "Adjusting of PROXIMITY device that stops the hammer's down stroke" section.**

**If the machine is fitted with the laser device see the "Adjusting the laser device that stops the hammer's down stroke" section.**

- 17) Once the required depth has been reached move the lever (R) to position "R0" to stop the percussion or activate the automatic stop devices (Proximity and laser).
- 18) Move the lever (B) to lift the percussion hammer.
- 19) Move the machine to the point where the next pile is to be driven in.


**WARNING**

**The operator and other workers must remain at a safe distance from the pile during the manoeuvres to release it, in order to avoid getting knocked over if the pile suddenly comes unhooked.**

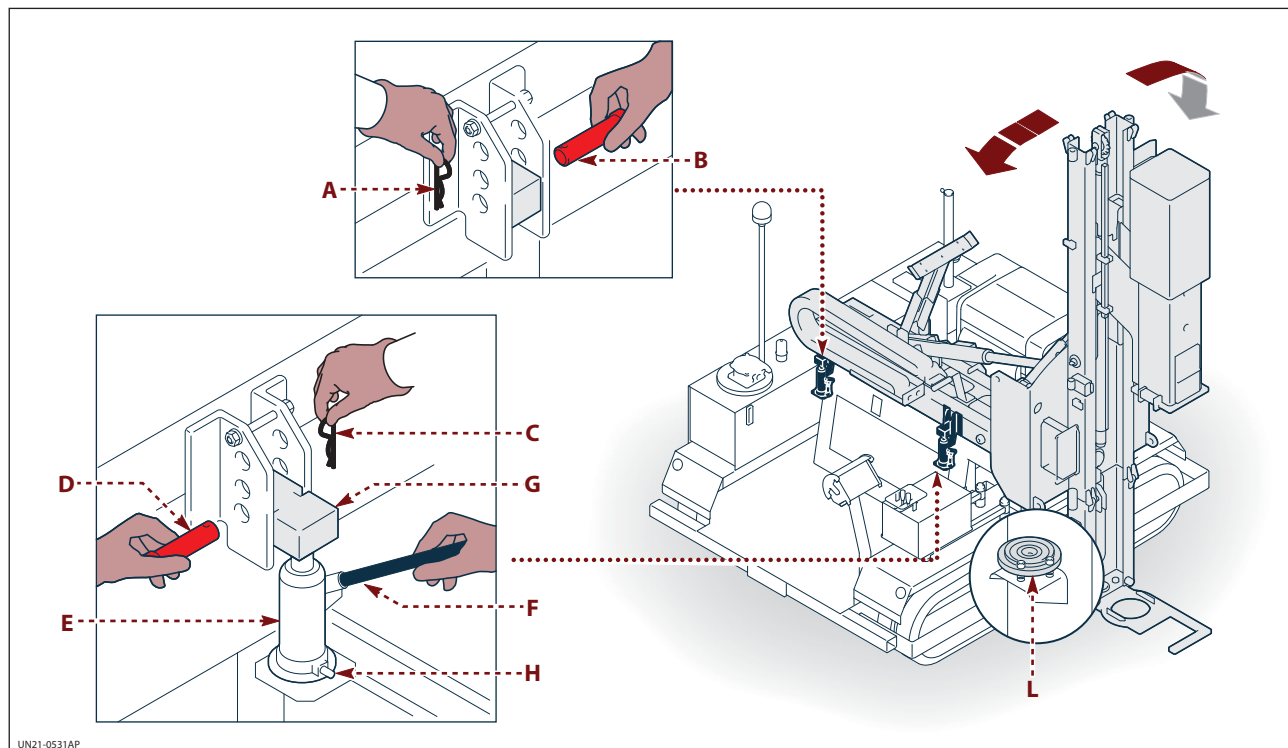
If the pile gets blocked in the stroke plate proceed as described.

- 1) Move the levers (P, U, A, W) and make small movements to unblock the pile from the stroke plate.
- 2) When the pile is free from the stroke plate, move the lever (B) to lift the percussion hammer.

### Procedure for use of the macro tilt

On steeply sloping ground tilt the pile-driver to place the column in vertical position.  
 To place the column in a vertical position use the level gauge (L).

The pile-driver can be longitudinally tilted from the right or left side.



Proceed as outlined below.

- 1) Position the jack (E) on the support base as shown in the figure.
- 2) Position the jack shaft in the support seat (G) and apply light pressure.
- 3) Remove the peg (C) and the pin (D).
- 4) Remove the peg (A) and the pin (B).
- 5) Move lever (F) to tilt the pile-driver base to align the holes corresponding to the necessary tilt to drive the pile.
- 6) Slide in the pins (B and D) in the holes and the pegs (A and C) to lock the base in the required position.
- 7) Insert the lever (F) in the pin (H).
- 8) Turn the lever (F) to lower the jack shaft.
- 9) Remove the jack (E).

To tilt the base in the opposite direction repeat the same operations on the other side of the base.

## Gripper for metal pile extraction - instructions for assembly, use, and maintenance

The extraction gripper is designed to extract metal piles from soil and from bituminous concrete.

To extract metal piles the extraction clamp must be fitted on the hammer.

Remove the pile-guide if present.

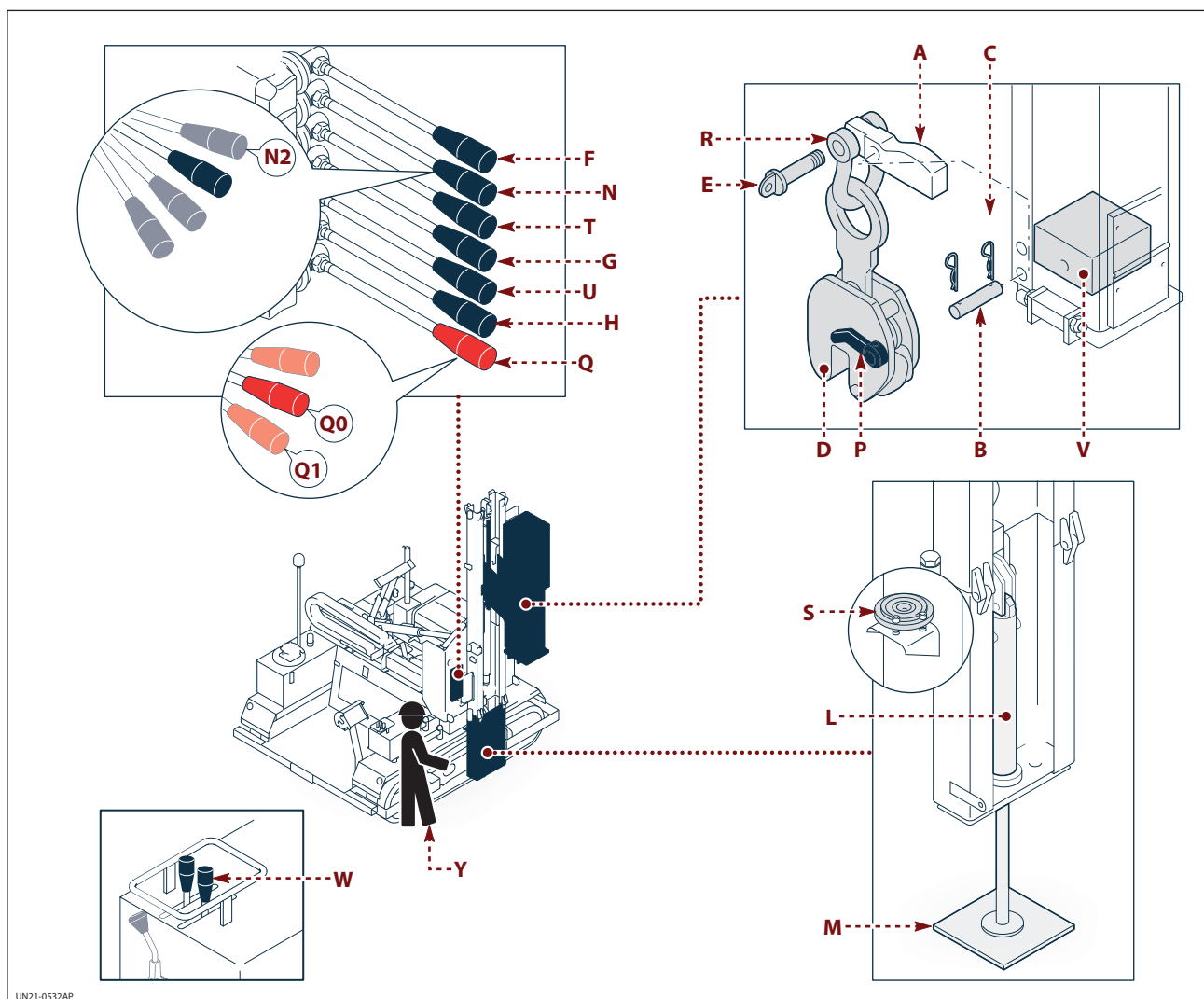
In the assembly phase, the operator must stand at the side of the percussion hammer (see figure).



### WARNING

**Fit the clamp with the machine parked on flat and stable ground, the engine off and the percussion hammer at minimum distance from the ground. Do not use the gripper if it is damaged or there is a malfunction in the grip lock system.**

### Fitting the pile extraction clamp



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Y) Control position foreseen for the operator

To fit the pile extraction clamp proceed as outlined below.

- 1) Position the bracket (A) as shown in the figure.
- 2) Insert pin (B).
- 3) Insert the safety lock pins (C).
- 4) Position the gripper (D) in the bracket (R) using the shackle (A). Together with the accessory, the manufacturer provides a series of shackles to allow the gripper to be positioned in different directions.
- 5) Tighten the lock pin (E).

## NOTICE

**Before extracting piles, check the area where the bracket (C) comes into contact with the stop plate (V). This contact must be made between smooth, flat surfaces. If the stop plate features machining for centring the piles, it may be damaged or broken during extraction work. To avoid damage to the stop plate, a smooth plate (with no machining) must be used.**

To extract the pile proceed as outlined below.

- 1) Start the machine (see "Starting the engine").
- 2) Move the levers (W) to shift the machine to the pile driving point.
- 3) Place the column in a perfectly vertical position.
  - To manually position the column in vertical position use the levers (F) and (G).
  - Check the verticality using the level gauge (S).
  - To automatically place the column in vertical position see "Using the verticality system".
  - Move the lever (T) and the lever (U) to position the percussion hammer right on the driving point.
- 4) Move the lever (H) and lower the jack (L) to the ground to counter the force applied for the extraction.



## WARNING

**On loose ground place a plate (M) of a suitable size between the ground and the foot of the outrigger to increase the resting surface area. The outrigger foot must rest on the ground applying a light pressure but not lifting the machine.**

- 5) Move the lever (N) to lower the percussion hammer until the clamp is positioned on the end of the hammer.
- 6) Lock the grip of the clamp on the pile using the lever (P).
- 7) Move the lever (N) (position "N2") to slowly lift the percussion hammer until the clamp is tensioned.
- 8) When the clamp is tensioned move the lever (Q) to position "Q1" and then move the lever (N) to position "N2".

## NOTICE

**When extracting old piles or files driven into extremely hard ground, it is important not to use a pneumatic drill for more than 30 seconds at a time. After this limit, stop for at least 15 seconds before resuming drilling. If the pile shows no sign of coming out of the ground, do not carry on trying to extract it.**

- 9) Move the lever (Q) to position "Q0" to stop the percussion when the pile has been extracted from the ground and move the lever (N) to stop the lifting of the percussion hammer.
- 10) Tilt the pile and move lever (N) to activate the lowering of the hammer until the pile is on the ground.
- 11) Move the lever (P) to open the jaws of the clamp and remove the pile.
- 12) Move the lever (H) to lift the jack (L) from the ground.o.
- 13) Remove the clamp at the end of the pile extraction work.

### Removing the pile extraction clamp

To remove the pile extraction clamp carry out the fitting operations described above in reverse order.

### Pile extraction clamp maintenance

When cleaning the gripper, use non-flammable, non-toxic detergents authorised by legislation in force and available in the shops.

Dry the gripper with high-pressure air.

Limit the pressure to 1,9 bar and wear safety glasses for eye protection.

Grease the gripper pins and joints.

Grease type: use PAKELO BEARING EP2 or equivalent.

## Core borer - instructions for assembly, use, and maintenance

Use the corer fitted on the pile driver to make holes in bituminous conglomerates, concrete and reinforced concrete.

The corer tool must be cooled with water.

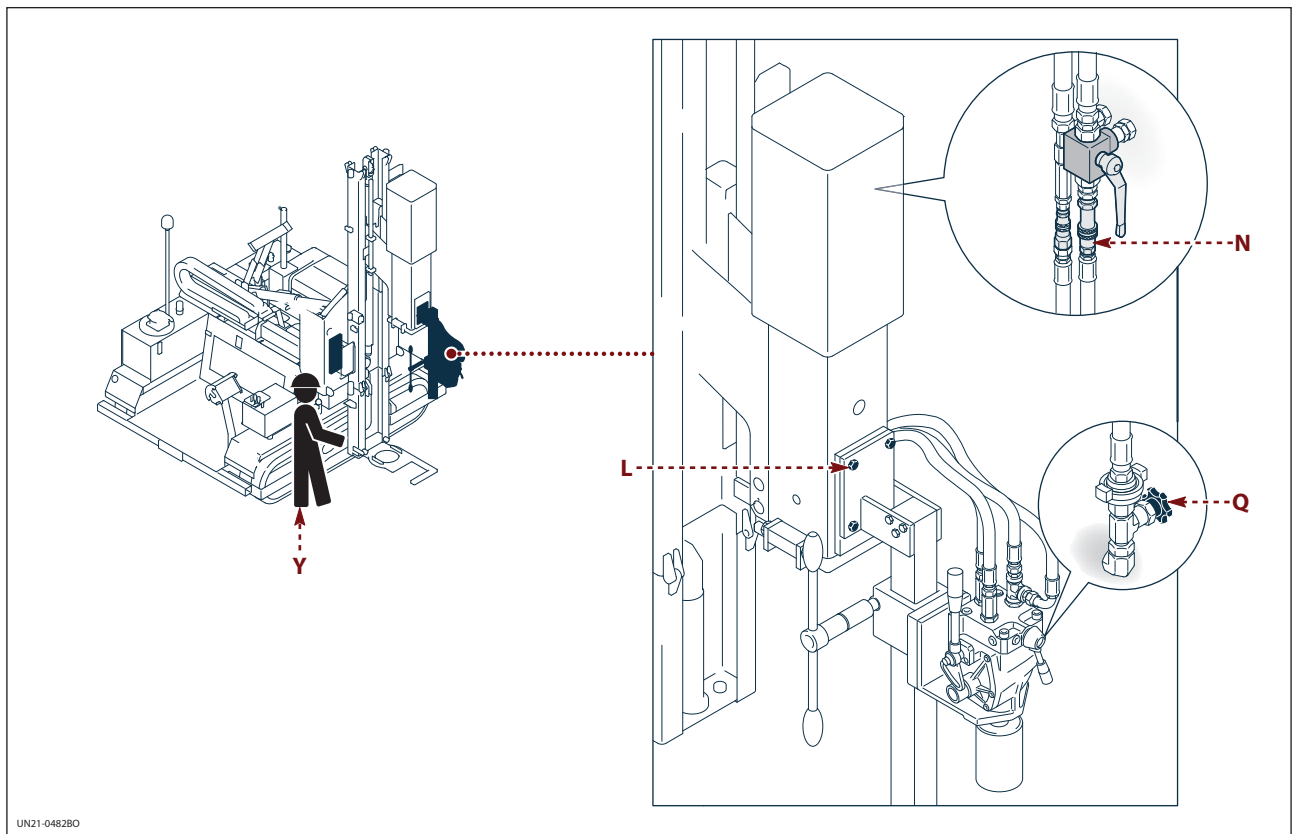


### WARNING

**Fit the corer with the machine parked on flat and stable ground, the engine off and the percussion hammer at minimum distance from the ground.**

**Arrange appropriate safety measures and use suitable equipment to avoid accidents that could injure the people in charge of the operation and people nearby.**

### Fitting the corer

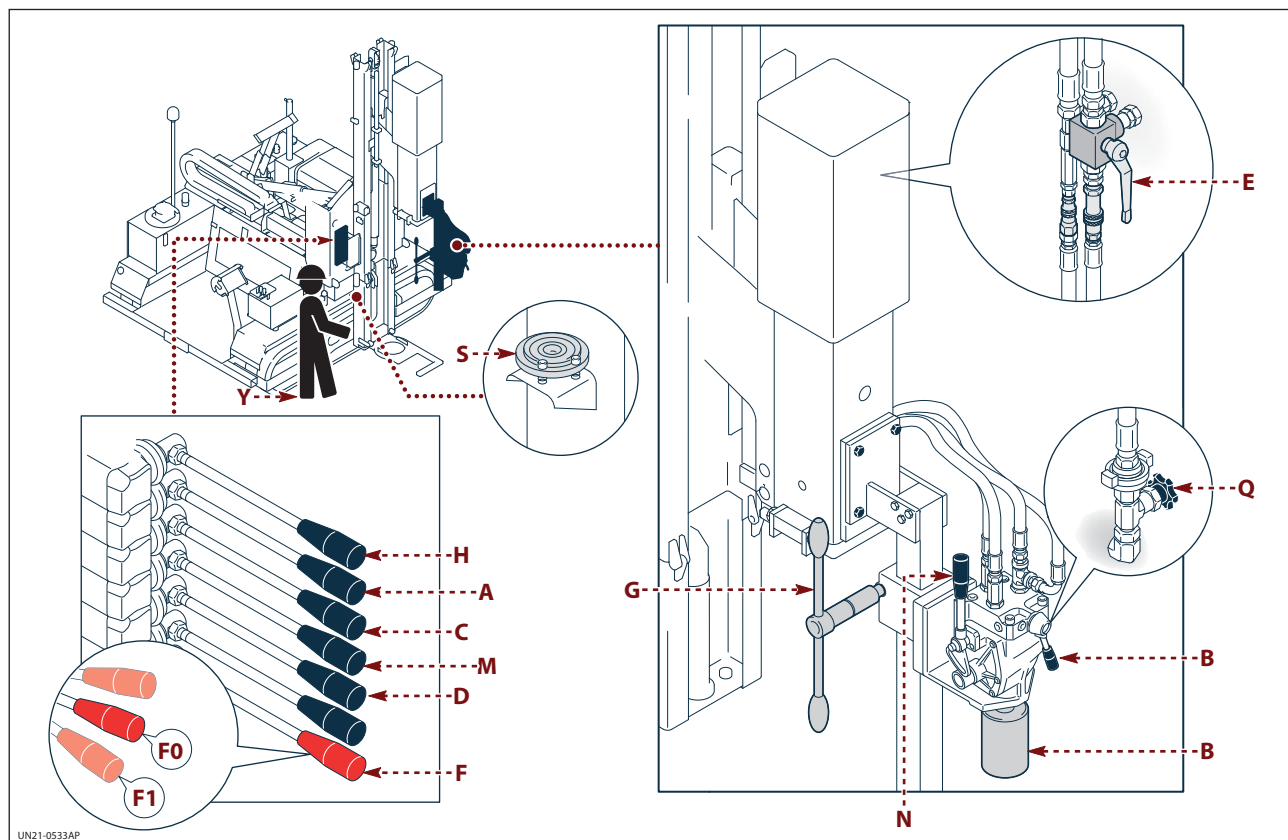


Y) Control position foreseen for the operator

To fit the corer proceed as outlined below.

- 1) Lower the hammer to the limit to make the fitting operations easier.
- 2) Lift the corer and position it against the percussion hammer.
- 3) Lock the corer to the percussion hammer with all the screws (L) supplied.
- 4) Tighten the screws to the prescribed torque (see "Nuts and bolts tightening torques chart").
- 5) Connect the hydraulic pipes of the corer to the quick couplings (N).
- 6) Connect the water supply pipe to the water tap (Q).
- 7) Lift the percussion hammer.



**Using the corer**


Y) Control position foreseen for the operator

Technical characteristics		
Maximum operating temperature	°C	40
Minimum operating temperature	°C	0
Minimum output speed	rpm	530
Maximum output speed	rpm	1000
Maximum bore diameter	mm	500
Minimum bore diameter	mm	16

	High hardness (plastic welded parts and steatites)	High hardness (granite, quartz, porphyry)	Medium hardness, low abrasion resistance (travertine and limestone)	High abrasion resistance (reconstructed stone, medium hardness stoneware, marble)	Very high abrasion resistance (refractory materials, soft stoneware, asphalt)
Tool rotation speed (rpm)	Tool diameter (mm)	Tool diameter (mm)	Tool diameter (mm)	Tool diameter (mm)	Tool diameter (mm)
1000	16-22	17-45	55-103	112-160	150-200
900	18-25	19-50	60-115	125-117	170-220
750	21-31	22-60	75-135	150-210	200-265
650	25-36	26-70	85-155	170-245	230-300
600	29-38	28-75	90-170	185-265	250-300
550	30-43	30-80	100-185	285-290	275-300
500	33-47	33-90	110-205	225-300	-----
Tool travel speed (cm/min)	1-2	3-4	5-10	6-8	8-10



To use the corer proceed as outlined below.



### WARNING

**Do not lift or lower the percussion hammer when the corer is fitted to avoid accidents or damage to the corer. During use, the operator must stand at the side of the percussion hammer (see figure).**

### NOTICE

**To prevent tool breakage and damage to the core borer, do not change the rotation speed during core boring.**

- 1) Rotate the lever (E) to by-pass the percussion hydraulic supply from the hammer to the corer. All machine movements are enabled except for the percussion.
- 2) Move the lever (A) to lower the tool (B) near the surface to be drilled.
- 3) Place the column in a perfectly vertical position.
  - To manually position the column in vertical position use the levers (H) and (M).
  - Check the verticality using the level gauge (S).
  - To automatically place the column in vertical position see "Using the verticality system".
- 4) Move levers (C) and (D) to slightly change the position of the tool.
- 5) Set lever (F) in position "F1" to switch on the hydraulic power to the accessory.
- 6) Open the turn valve (Q) to cool the tool.
- 7) Move the lever (L) to activate the tool.
- 8) Use lever (N) to adjust the tool rotation speed.
- 9) Move the lever (G) to manually move the tool forward.

### NOTICE

**Start core boring with care as the centring of the tool depends on this stage.**

### Removing the corer

To remove the corer carry out the fitting operations described above in reverse order.

### Corer maintenance

Carry out scheduled maintenance as stated by the manufacturer (see "Scheduled maintenance charts").

Wash the core borer to prevent the processing sludge drying.

Lubricate the threads on the chuck, the rack, and the threads on the tool extensions.

Grease type: use PAKELO BEARING EP2 or equivalent.

Spray a rust inhibitor into the tool cooling water pipeline.

## Drilling machine - instructions for assembly, use, and maintenance

Use the boring device fitted on the pile driver to make holes in rocks and unreinforced concrete.

The boring device requires compressed air for the percussion of the tool and to remove the dust from the hole.

The air must be lubricated to avoid damage to the boring head.

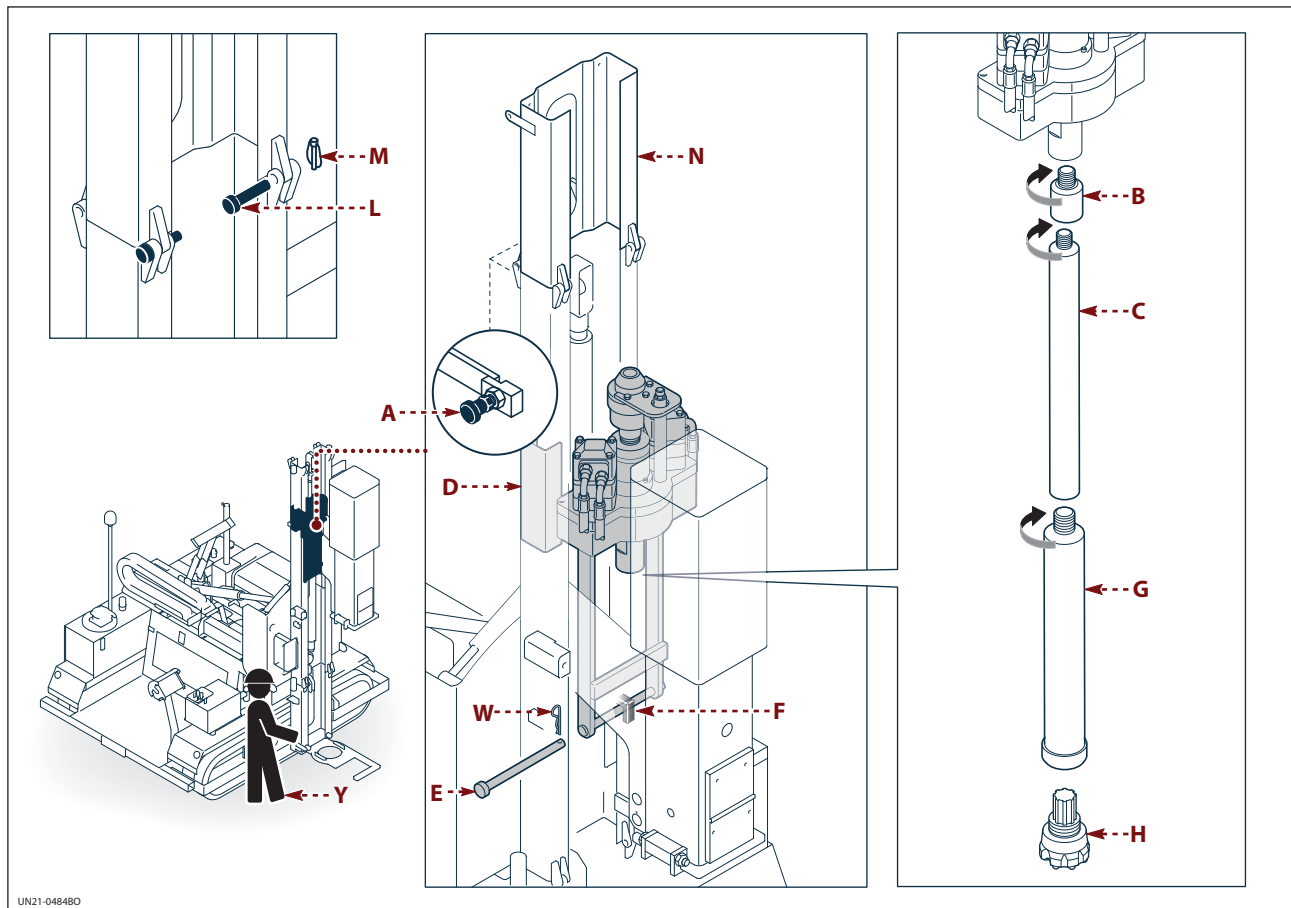


### WARNING

**Fit the boring device with the machine parked on flat and stable ground, the engine off and the percussion hammer at minimum distance from the ground.**

**Arrange appropriate safety measures and use suitable equipment to avoid accidents that could injure the people in charge of the operation and people nearby.**

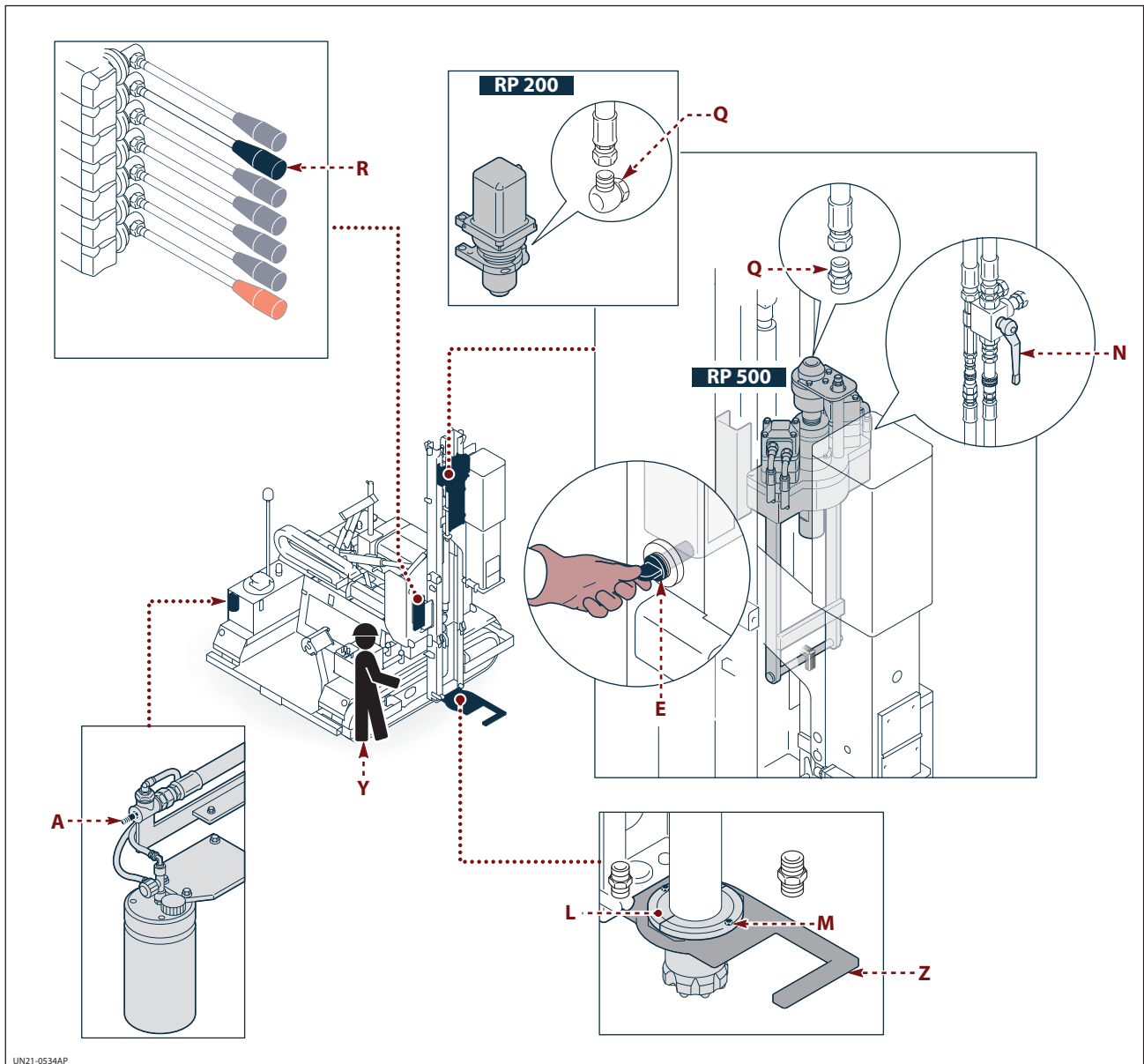
### Fitting the boring device



**Y)** Control position foreseen for the operator

To fit the boring device proceed as outlined below.

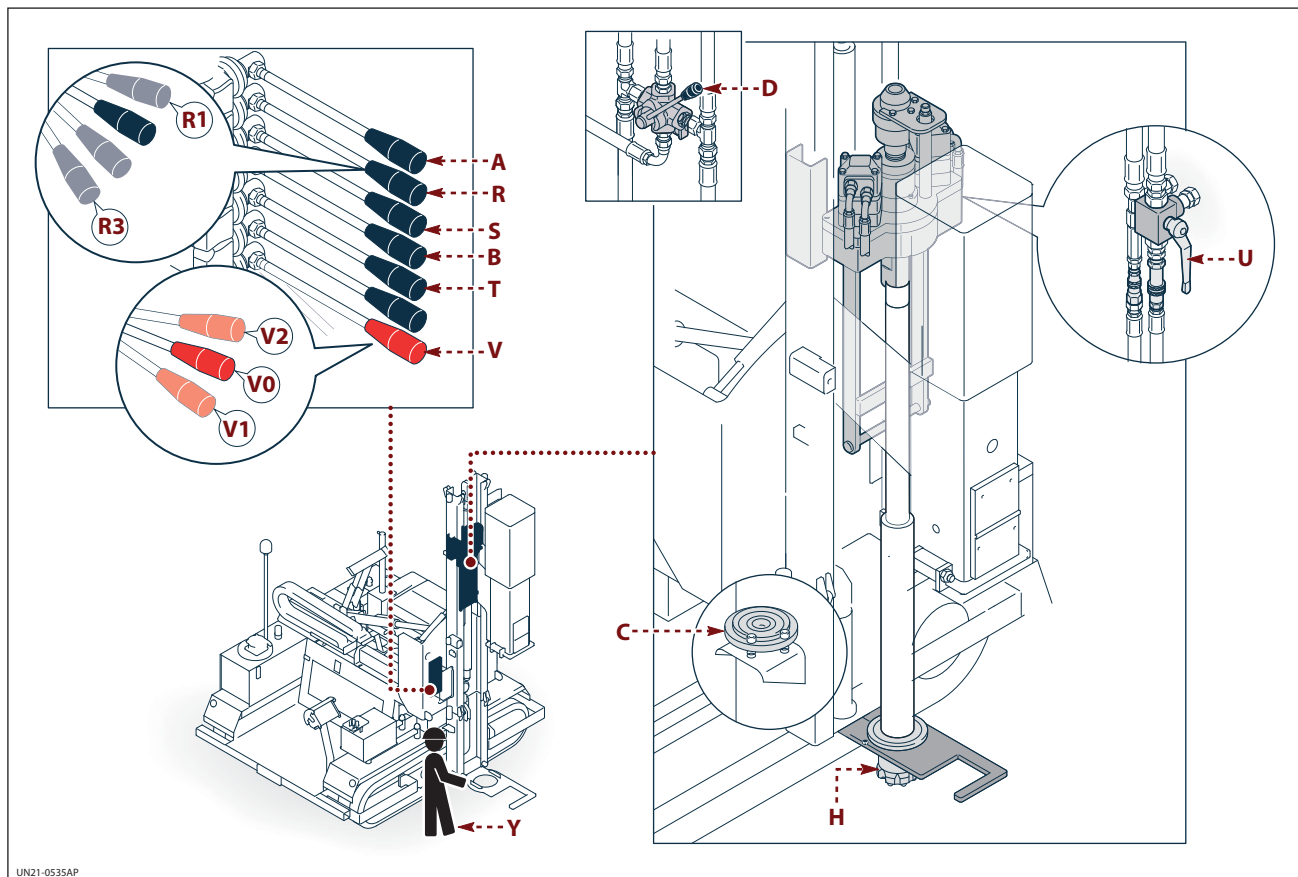
- 1) Unlock the guide (**N**) from the pin (**A**) and rotate it in vertical position.
- 2) Lock the guide with the pins (**L**) and the safety lock pins (**M**).
- 3) Lift the boring device and fit the slides (**D**) inside the column.
- 4) Insert the pin (**E**) and the safety split pin (**W**) to lock the boring device to the percussion hammer support.  
Fit the pin below the element (**F**).
- 5) Fit the fitting (**B**).
- 6) Fit the extension or extensions (**C**).
- 7) Fit the down-the-hole hammer (**G**) coupled to the tool (**H**).



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**Y)** Control position foreseen for the operator

- 8) Start the machine (see "Starting the engine").
- 9) Move the lever (**R**) to lift the percussion hammer and the boring device.
- 10) Tighten the safety lock pin (**E**) to avoid the accidental fall of the percussion hammer and prevent injuring the people involved in the operations.
- 11) Fit the pile guide (**Z**).
- 12) Lift the hammer slightly and unscrew the safety lock pin (**E**).
- 13) Move the lever (**R**) to lower the boring device to the ground.
- 14) Stop the machine (see "Operational stop").
- 15) Fit the half bushings (**L**) onto the pile guide and tighten the screws (**M**).
- 16) Connect the hydraulic pipes to the quick couplings (**N**).
- 17) Connect the air supply pipe from the compressor to the coupling (**Q**) to supply the tool percussion and to remove the dust from the hole.  
If the machine is fitted with an on board compressed air circuit, connect the compressor supply pipe to the coupling (**A**).

**Using the boring device**


**Y)** Control position foreseen for the operator

To use the boring device proceed as outlined below.

- 1) Rotate the lever (**U**) to by-pass the percussion hydraulic supply from the hammer to the boring device. All machine movements are enabled except for the percussion.
- 2) Move the lever (**R**) to lower the tool (**H**) near the surface to be drilled.
- 3) Place the column in a perfectly vertical position.
  - To manually position the column in vertical position use the levers (**A**) and (**B**).
  - Check the verticality using the level gauge (**C**).
  - To automatically place the column in vertical position see "Using the verticality system".
- 4) Move levers (**S**) and (**T**) to slightly change the position of the tool.
- 5) Switch on the supply of compressed air to the boring device.
- 6) Use the knob of the compressed air lubrication device to adjust the amount of oil.

**NOTICE**

**To prevent tool breakage and damage to the drilling machine, do not change the rotation speed during drilling.**

- 7) Use lever (**D**) to alter tool rotation.
- 8) Move the lever (**V**) to position "**V1**" to rotate the tool.
- 9) Move lever (**R**) (to "**R3**" floating position) to manually activate the tool forward.

- 10) Once the required depth has been reached move the lever (**V**) to the disabled position "**V0**" to manually stop tool rotation or activate the automatic stop devices (proximity or laser).
- 11) Deactivate the compressed air.
- 12) Move the lever (**R**) to position "**R1**" to remove the tool from the hole.

#### *Counter-rotation of the tool*

- If the counter-rotation tool is foreseen, move the lever to position "**V2**" to activate the rotation in the opposite direction to the hole making direction.  
Counter-rotation is mainly used to unblock the tool from the hole.
- After having unblocked the tool, move lever (**V**) to the disabled position "**V0**" to stop the counter-rotation.
- Move the lever (**R**) to position "**R1**" to remove the tool from the hole.

#### **NOTICE**

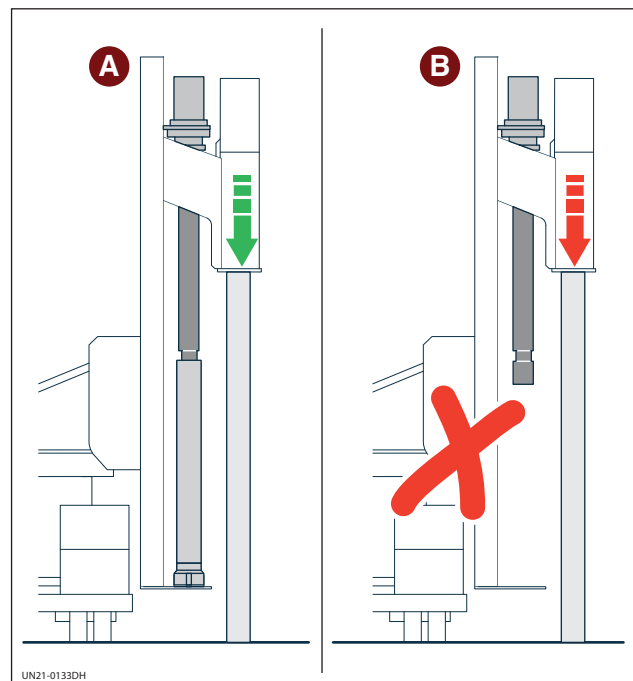
**To automatically stop the tool at the required depth, see the "Adjusting of 'PROXIMITY device' that stops the hammer's down stroke" section.**

**If the machine is fitted with the laser device see the "Adjusting the laser device that stops the hammer's down stroke" section.**

#### **Alternative perforation and pile driving procedure**

The boring device can remain fitted also during the pile driving phase.

- A)** Correct work configuration.
- B)** This configuration is not allowed as the pile driving vibrations would damage the boring head.

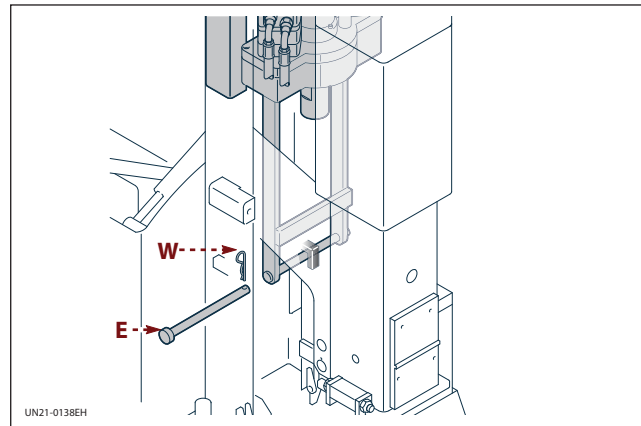


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**NOTICE**

**To operate in configuration "A" the pin (E) and the split pin (W) must be removed.**

Down-The-Hole Hammer (DTHH)	Air consumption at 10,5 bar m <sup>3</sup> /min
3"	3,4
4"	5,5
5"	8
6"	11,4


**Refuelling of air lubricating oil**

The oil used the first time is of the ISO VG32 type for pneumatic tools, suitable for winter temperatures.

In the summer period use oil for pneumatic tools of the ISO VG100 type.

**Removing the boring device**

To remove the boring device carry out the fitting operations described above in reverse order.

**Maintenance for drilling machine hydraulic head**

The hydraulic head is normally supplied pre-greased and complete with the required lubricant inside the gearbox.

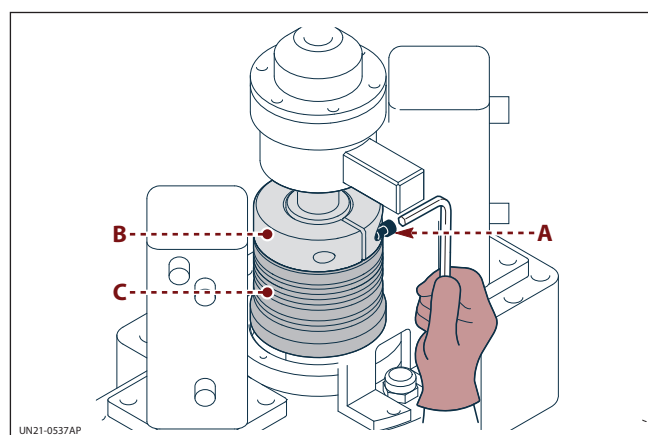
Upon first use, it is compulsory to check that the head is fully greased and filled with lubricant.

Carry out scheduled maintenance as stated by the manufacturer (see "Scheduled maintenance charts").

**Shaft clearance adjustment (RP500)**

Proceed as outlined below.

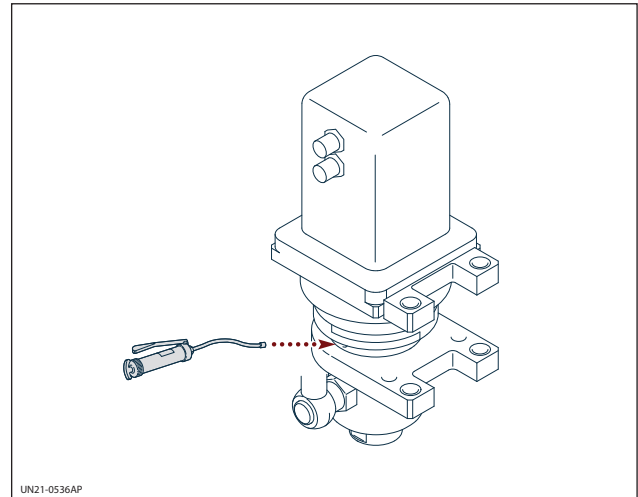
- 1) Loosen the screw (A).
- 2) Turn the ring nut (B) to compress the springs (C) until there is no clearance.
- 3) Tighten the screw (A).



### Head lubrication (RP200)

Proceed as outlined below.

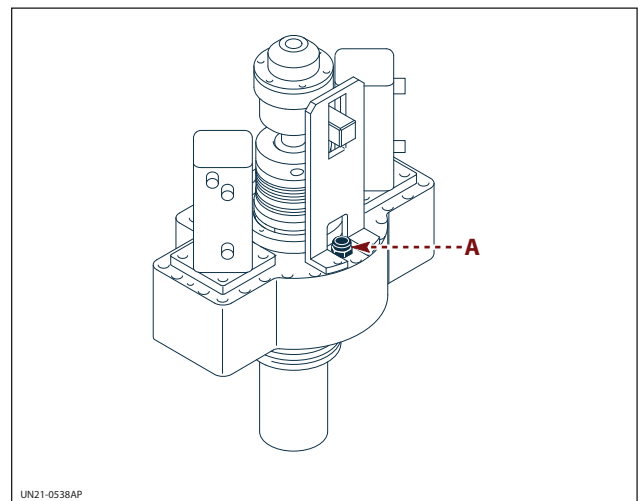
- 1) Before carrying out any lubrication work, clean the greasing nozzle, to prevent pollution of the lubricant.
- 2) Lubricate via greasing nozzle. Grease type: use PAKELO BEARING EP2 or equivalent.



### Checking the gear unit oil level (RP500)

Proceed as outlined below.

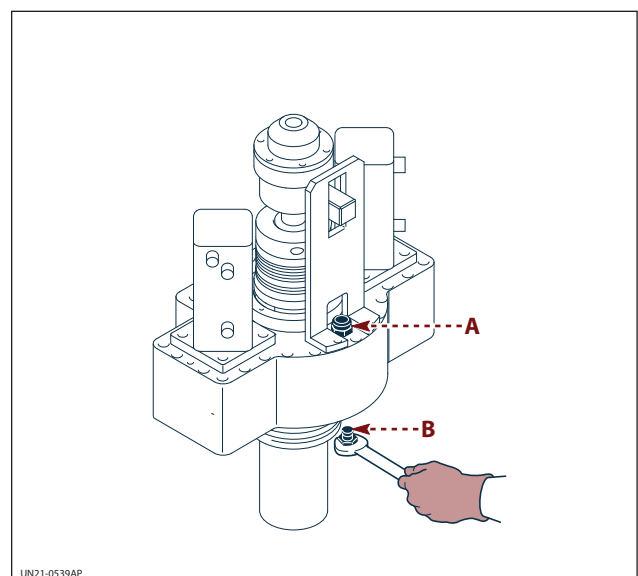
- 1) Stop the machine on flat, solid ground.
- 2) Place the column in a perfectly vertical position.
- 3) Unscrew cap (A).
- 4) Check that the oil level is at approximately 2/3 of the gear box.  
If topping up is required, use PAKELO GEAR OIL EP/E GL-5 SAE 80W90 or an equivalent product.
- 5) Screw on the cap (A).



### Replacing the gear unit oil (RP500)

Proceed as outlined below.

- 1) Remove the accessory from the machine.
- 2) Unscrew cap (A).
- 3) Unscrew cap (B).
- 4) Drain out the oil completely.
- 5) Screw on the cap (B).
- 6) Add oil via filler neck (A) until it is at approximately 2/3 of the gear box (approximately 2 litres).
- 7) Use PAKELO GEAR OIL EP/E GL-5 SAE 80W90 or an equivalent product.
- 8) Screw on the cap (A).
- 9) Refit the accessory on the machine.



## Drill - instructions for assembly, use, and maintenance

Holes in the ground, even with modest amounts of small sized solid elements (gravel, crushed stone, etc.) are made with the drill fitted on the pile-driver.

The drill can be installed either in front or behind the percussion hammer.

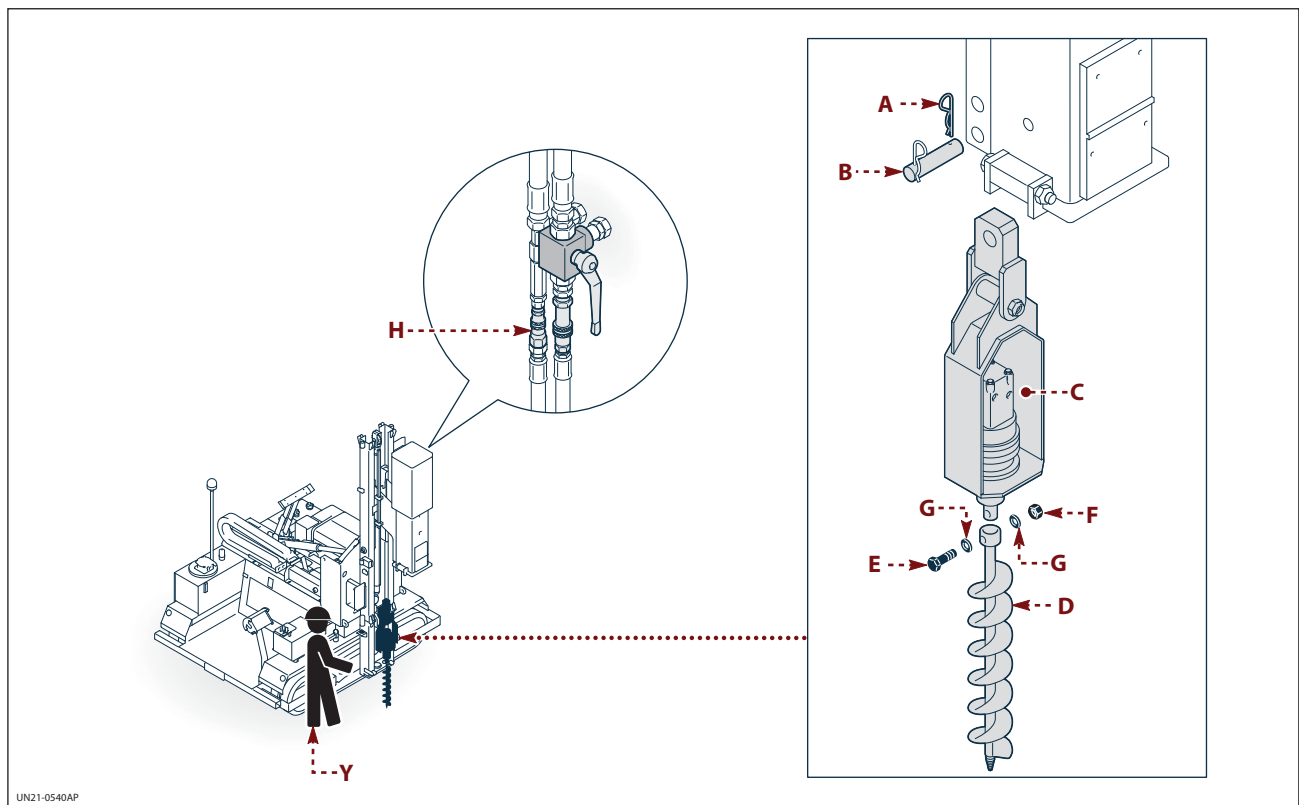


### WARNING

**Fit the drill with the machine parked on flat and stable ground, the engine off and the percussion hammer at the necessary distance from the ground to fit the tool.**

**Arrange appropriate safety measures and use suitable equipment to avoid accidents that could injure the people in charge of the operation and people nearby.**

### Rear fitting of the drill

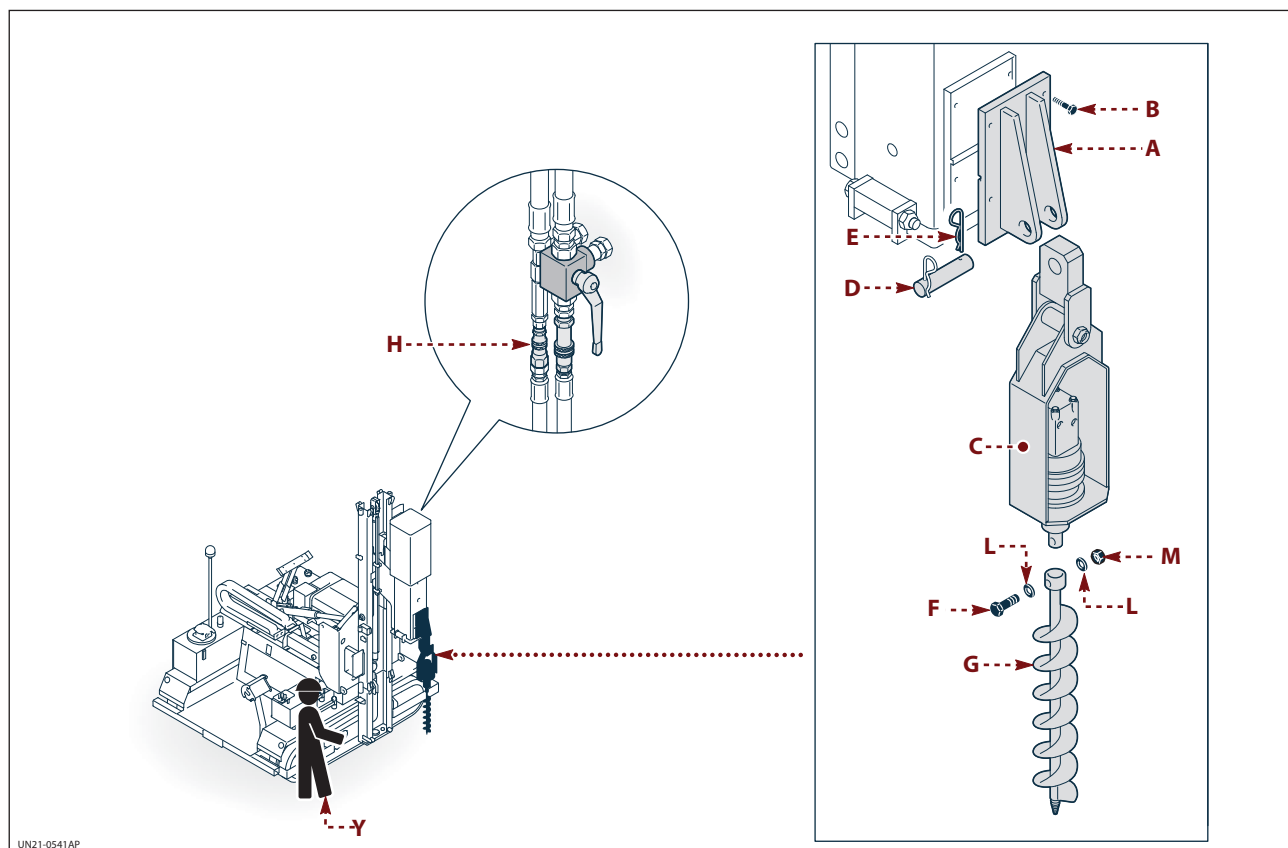


Y) Control position foreseen for the operator

For rear fitting proceed as outlined below.

- 1) Remove the peg (A) and the pin (B).
- 2) Fit the head (C) of the drill on the percussion hammer.
- 3) Insert the pin (B) and the lock pin (A).
- 4) Lift the percussion hammer the bare minimum to fit the tool (D).
- 5) Fit the tool (D).
- 6) Position the washers (G).
- 7) Insert the screw (E).
- 8) Tighten the nut (F).
- 9) Connect the hydraulic pipes to the quick couplings (H).



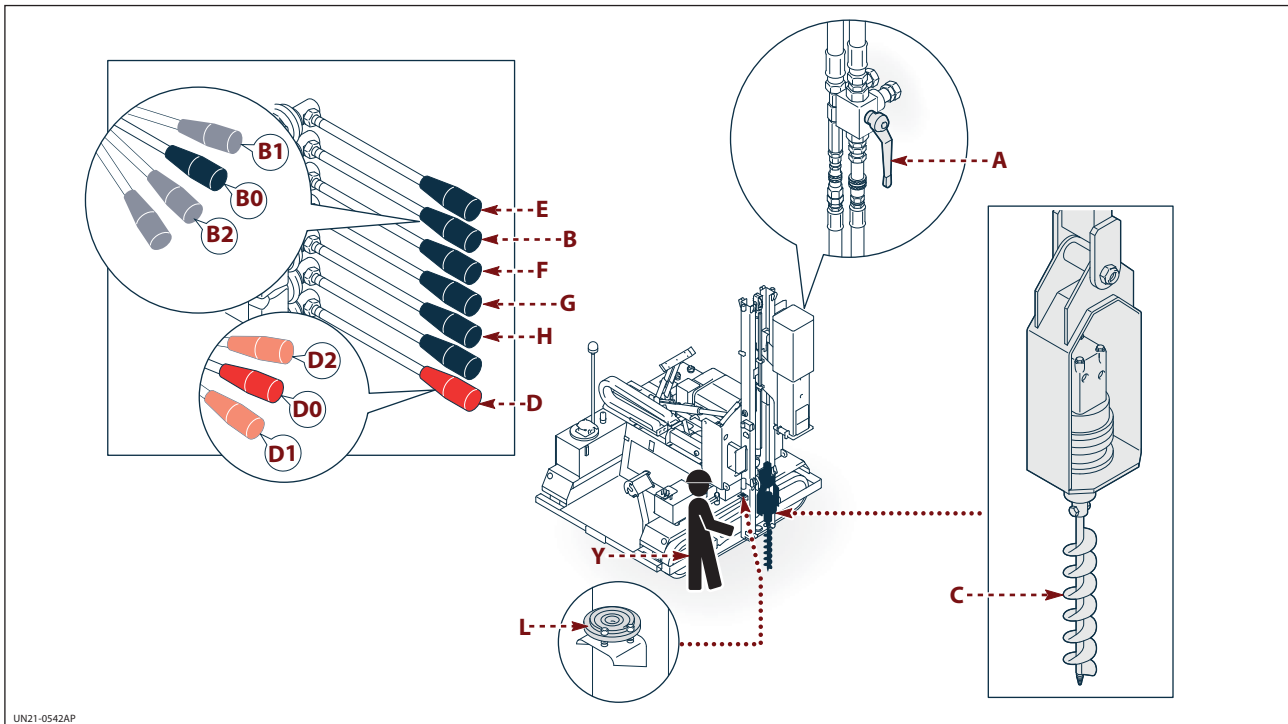
**Front fitting of the drill**


**Y)** Control position foreseen for the operator

For front fitting proceed as outlined below.

- 1) Fit the support **(A)** and tighten the screws **(B)** to fix it to the percussion hammer.
- 2) Fit the head **(C)** of the drill on the support **(A)**.
- 3) Insert the pin **(D)** and the lock pin **(E)**.
- 4) Lift the percussion hammer the bare minimum to fit the tool **(G)**.
- 5) Fit the tool **(G)**.
- 6) Position the washers **(L)**.
- 7) Insert the screw **(F)**.
- 8) Tighten the nut **(M)**.
- 9) Connect the hydraulic pipes to the quick couplings **(H)**.

## Using the drill



**Y)** Control position foreseen for the operator

To use the drill proceed as outlined below.

- 1) Rotate the lever (**A**) to by-pass the percussion hydraulic supply from the hammer to the drill. All machine movements are enabled except for the percussion.
- 2) Move the levers (**E**) and (**G**) to place the column in vertical position.  
To place the column in a vertical position use the level gauge (**L**).
- 3) Move levers (**F**) and (**H**) to slightly change the position of the tool.
- 4) Move the lever (**B**) to lower the tool (**C**) until the drill's centering point sinks into the ground.
- 5) Move the lever (**D**) to position "**D1**" to rotate the tool.
- 6) Move the lever (**B**) to position "**B2**" to activate the tool forward.
- 7) Once the required depth has been reached move the lever (**D**) to position "**D0**" to manually stop tool rotation or activate the automatic stop devices (proximity or laser).
- 8) Move the lever (**B**) to position "**B1**" to remove the tool from the hole.

### Counter-rotation of the tool

- If the counter-rotation tool is foreseen, move the lever to position "**D2**" to activate the rotation in the opposite direction to the hole making direction.  
Counter-rotation is mainly used to unblock the tool from the hole.
- After having unblocked the tool, move lever (**D**) to the disabled position "**D0**" to stop the counter-rotation.
- Move the lever (**B**) to position "**B1**" to remove the tool from the hole.

## Removing the drill

To remove the drill carry out the fitting operations described above in reverse order.

## Drill maintenance

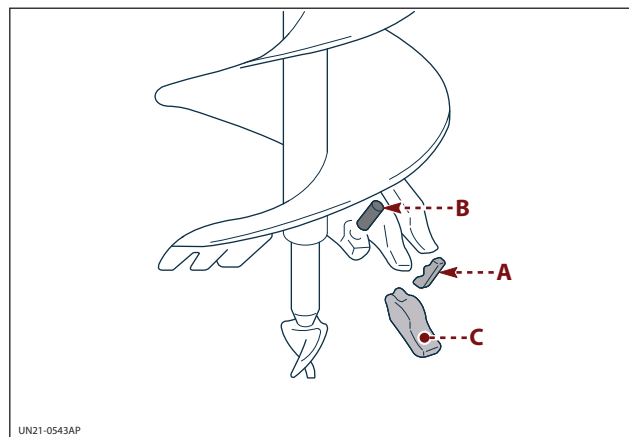
Cleaning, inspection, and maintenance activities must be performed with the drill removed from the machine.

Carry out scheduled maintenance as stated by the manufacturer (see "Scheduled maintenance charts").

### Tooth replacement

Proceed as outlined below.

- 1) Remove the pin (**A**).
- 2) Remove the part (**B**).
- 3) Remove the damaged tooth (**C**).
- 4) Fit the new tooth.
- 5) Position the element (**B**).
- 6) Insert the plug (**A**).



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### Drill cleaning

When cleaning the drill, use non-flammable, non-toxic detergents authorised by legislation in force and available in the shops.

### Drill lubrication

Check the lubricant level in the head visually via the level gauge.

If topping up is required, use PAKELO GEAR OIL EP/E GL-5 SAE 80W90 or an equivalent product.

### Replacing the gear unit oil

Change the oil when the gearbox is warm.

When cleaning the internal parts of the gear unit, use non-flammable, non-toxic detergents authorised by legislation in force and available in the shops.

Use PAKELO GEAR OIL EP/E GL-5 SAE 80W90 or an equivalent product.

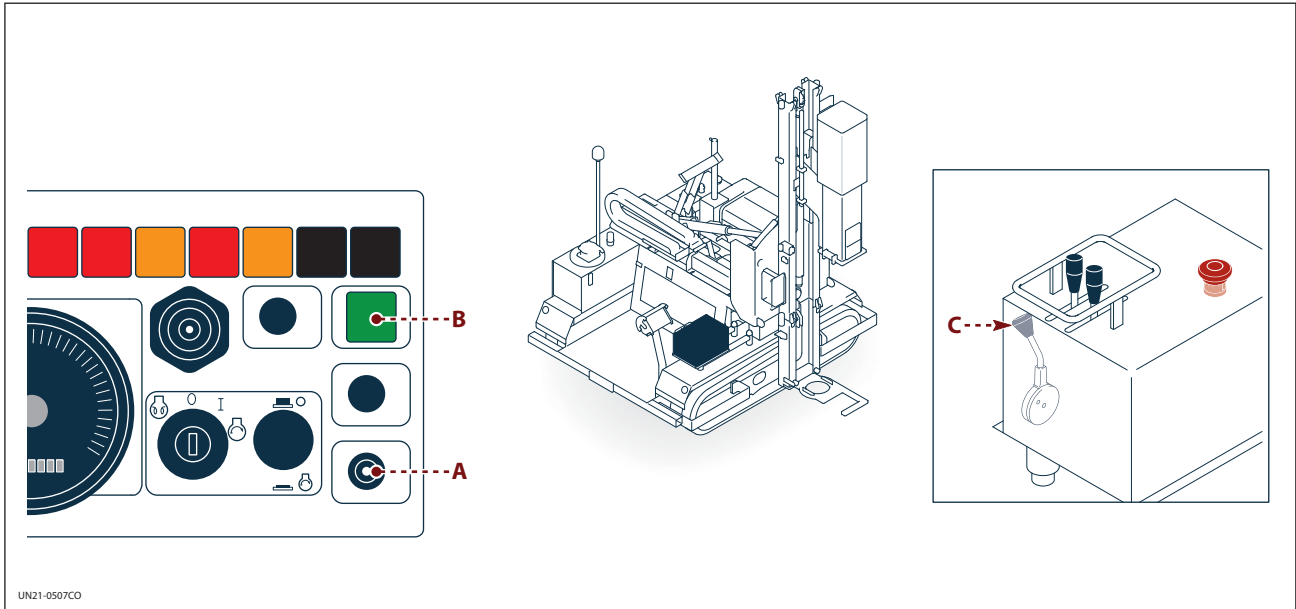
## Electric generator - use and maintenance procedures

### Use of the electric generator



#### **WARNING**

**Do not use the electric generator if it is wet, or if it is raining heavily or particularly humid.**



To activate the electric generator proceed as outlined below.

- 1) Start the machine (see "Starting the engine").
- 2) Press the switch (A) and at the same time the signal light (B) will come on.
- 3) Move the lever (C) to accelerate the engine to 1500 rpm/1'. If the generator is used at the same time as other manoeuvres increase the maximum rpm.  
When the electrical generator is not in use switch it off to avoid a drop in the machine's performance.

To disable the electric generator proceed as outlined below.

- 1) Press the switch (A): at the same time the signal light (B) will switch off.

### Electrical power generator maintenance



#### **WARNING**

**Do not use water to clean the electric generator.**

When cleaning the electric generator, use non-flammable, non-toxic detergents authorised by legislation in force and available in the shops.

Protect the quick couplings with rust inhibitors.

## Blade raiser - instructions for assembly, use, and maintenance

This accessory is used to lift up the segments of guardrail (already bolted and laid on the ground).

Using the machine's travel motion, the accessory raises the guardrail, positions it in the point of installation and provides the exact location where the pile needs to be driven in.

The blade raiser can be supplied to the customer already fitted on the machine or shipped separately, partially disassembled and protected by appropriate packaging.

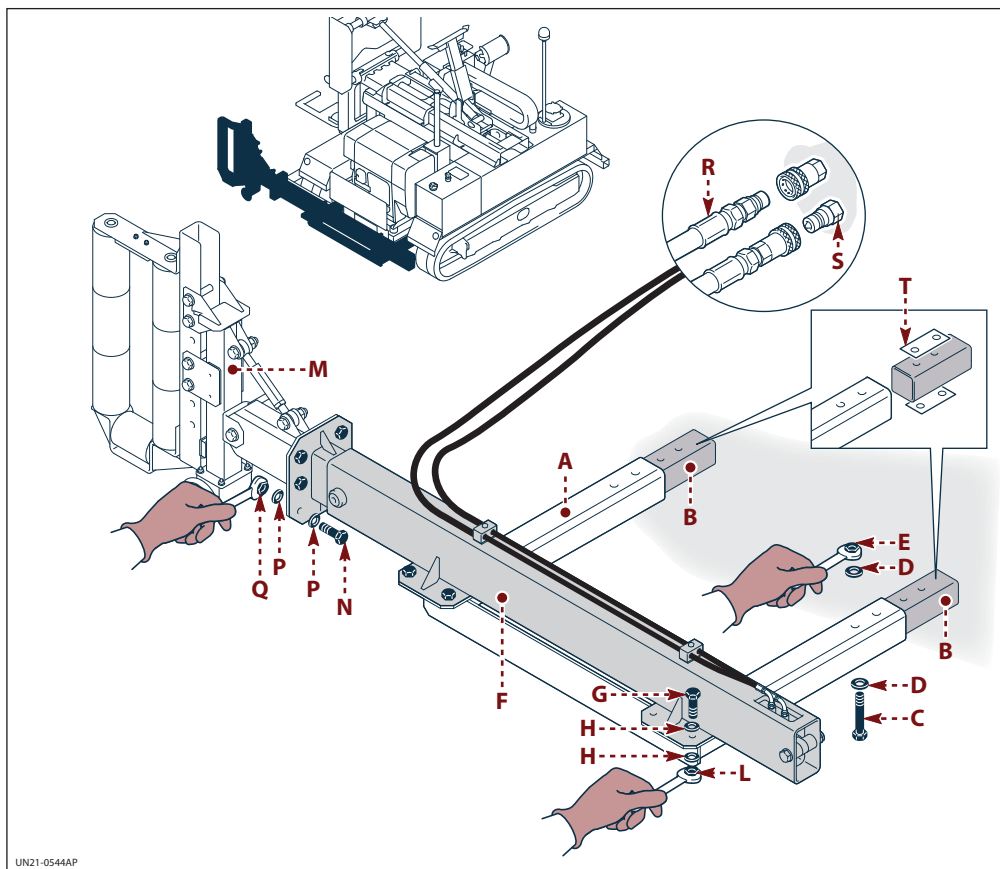
### Blade raiser assembly



#### **WARNING**

**Use lifting means with a sufficient capacity for the load to be lifted.**

**Hooks and ropes in good condition suitable for the load to be lifted must be used for lifting operations.**



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Proceed as outlined below.

- 1) Strap up and lift the separate units (**A - F - M**) comprising the accessory properly.
- 2) If necessary, fit the shims (**T**) supplied with the accessory in order to reduce the clearance between the frame (**A**) and the supports (**B**).
- 3) Slide the frame (**A**) into the supports (**B**) welded to the crawler.
- 4) Insert the screws (**C**) and the washers (**D**).
- 5) Tighten the nuts (**E**).
- 6) Position the arm (**F**).
- 7) Insert the screws (**G**) and the washers (**H**).
- 8) Tighten the nuts (**L**).
- 9) Position the head (**M**).
- 10) Insert the screws (**N**) and the washers (**P**).
- 11) Tighten the nuts (**Q**).
- 12) Connect the hydraulic pipes to the quick couplings (**R - S**).

### Blade raiser removal

Proceed as outlined below.

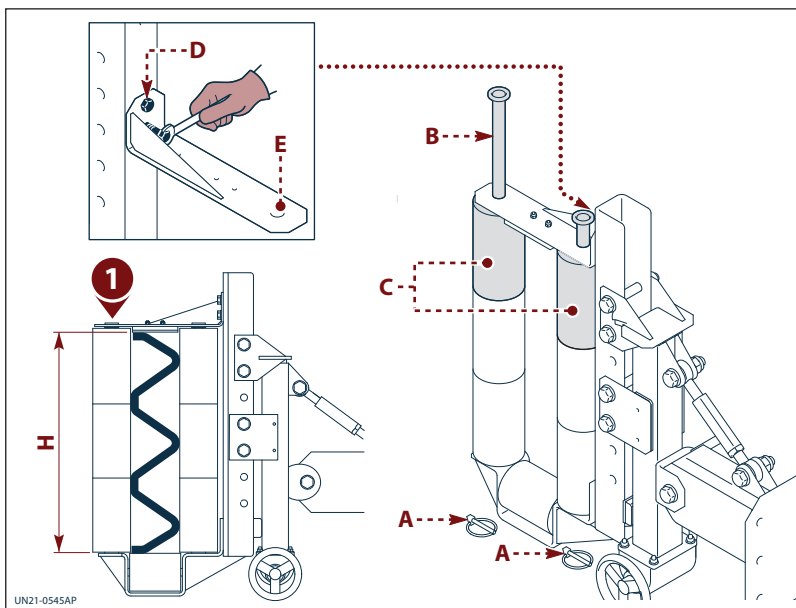
- 1) Disconnect the fittings (**R - S**).
- 2) Separate and remove the individual units working in reverse order to the procedure described for the assembly.

### Adapting the accessory to the size of the guardrail

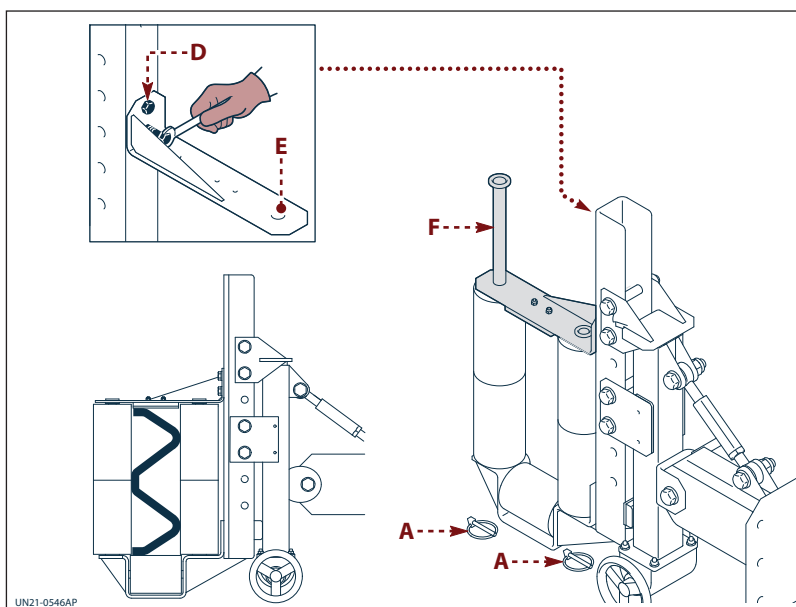
The accessory is usually supplied in the configuration (**1**) illustrated in the figure. Check that the height of guardrail (**H**) is compatible with the height of the guide. Should it be necessary to install a lower guardrail, perform the procedure described.

Proceed as outlined below.

- 1) Remove the safety lock pins (**A**).
- 2) Slide out the pins (**B**).
- 3) Remove the rollers (**C**).
- 4) Undo the screws (**D**).
- 5) Remove the bracket (**E**).



- 6) Position the bracket (**E**) aligned with the lower holes.
- 7) Tighten the screws (**D**).
- 8) Insert the appropriate pins (**F**) provided with the accessory.
- 9) Insert the safety lock pins (**A**).



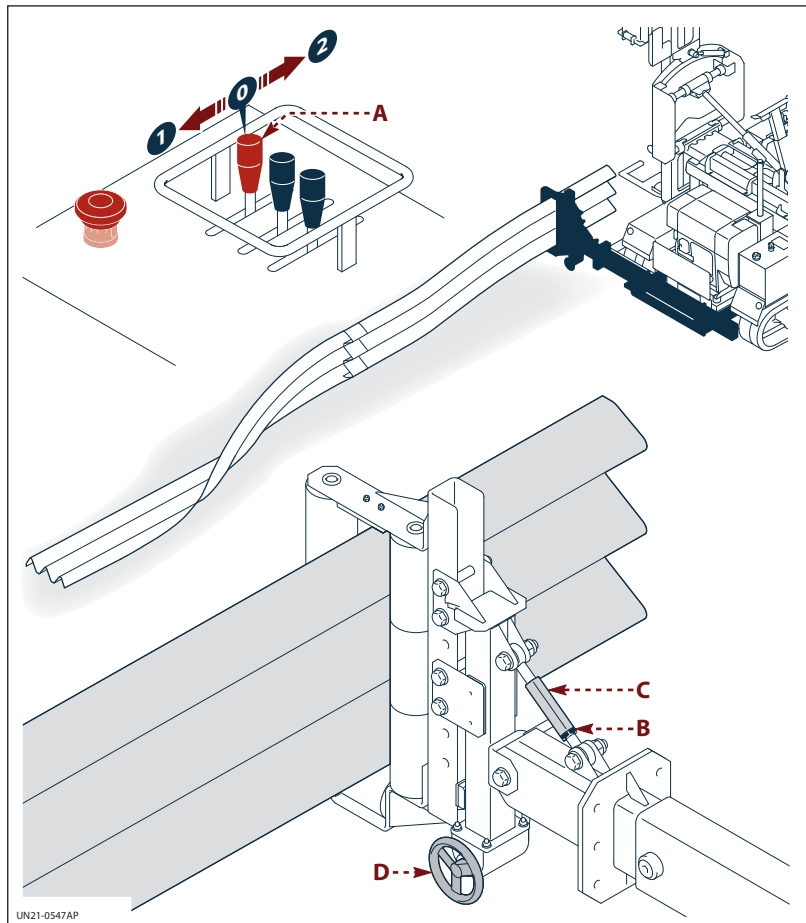
### Use of the blade raiser

**A) Lever:** this is used to activate the extension and retraction of the head on the blade raiser.

- Use the lever (1) to extend the head and bring the guardrail near the pile.
- Set the lever in position (2) to retract the head and move the guardrail away from the pile.

Proceed as outlined below.

- 1) Position the machine in the spot where work needs to begin.
- 2) Bolt the guardrail segments together and lay them on the ground.
- 3) Insert the end of the first segment into the guide.
- 4) Use the lever (A) to position the guardrail in the fastening position envisaged in the design.
- 5) Check that the surface of the guardrail is fully in contact with the mounting surface of the pile.  
If the guardrail is not perfectly in contact, proceed as described below.
  - Loosen the nut (B).
  - Adjust the tie rod (C).
  - Tighten the nut (B).
- 6) Check that the holes in the guard rail are aligned with the holes in the pole.  
If the holes are not aligned, turn the flywheel (D) to move the guide vertically.
- 7) Bolt the barrier onto the first pile before moving on to the next one.
- 8) Move forwards with the machine until you reach the position where the next pile needs to be driven in.

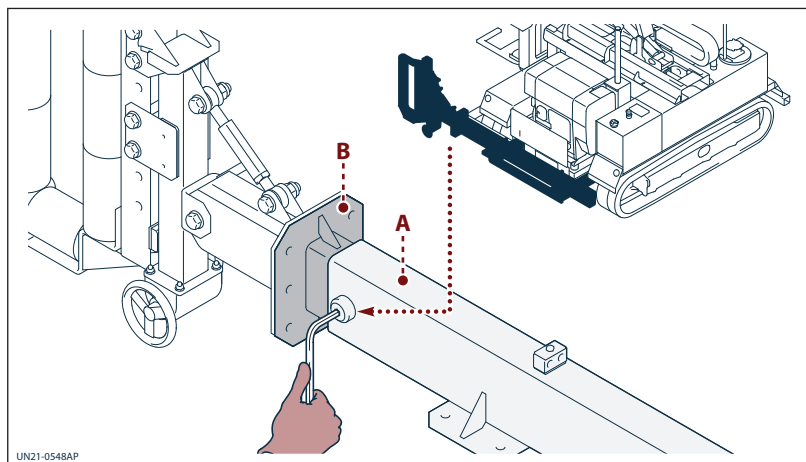


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### Adjusting the clearance of the extendable arm

Carry out the operations described.

- 1) Use the adjustment screw to reduce the clearance between the fixed arm (A) and the telescopic arm (B) to a minimum.



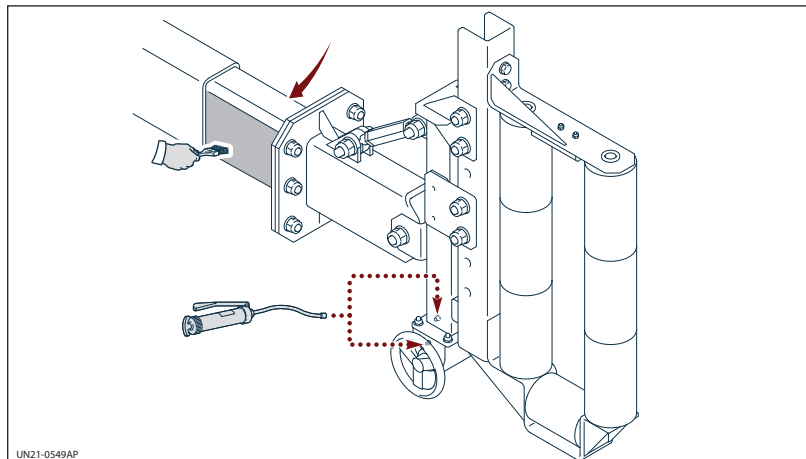
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### Maintenance of the blade raiser

Carry out scheduled maintenance as stated by the manufacturer (see "Scheduled maintenance charts").

Carry out the operations described.

- 1) Check the tightness of the main nuts and bolts (see section on scheduled maintenance).
- 2) Clean and lubricate the surface of the side of the extendable arm.  
Grease type: use PAKELO BEARING EP2 or equivalent.
- 3) Grease the components with the special greasing nozzles.  
Grease type: use PAKELO BEARING EP2 or equivalent.



### Pointed bit - instructions for assembly, use, and maintenance

This kind of tool can be used to drill holes in the ground (even in ground containing some solid materials with small particle sizes, such as gravel, crushed stone, etc.).

The tool makes the hole in the ground into which the pile will be fitted, without producing any spoil.

### Fitting the tool



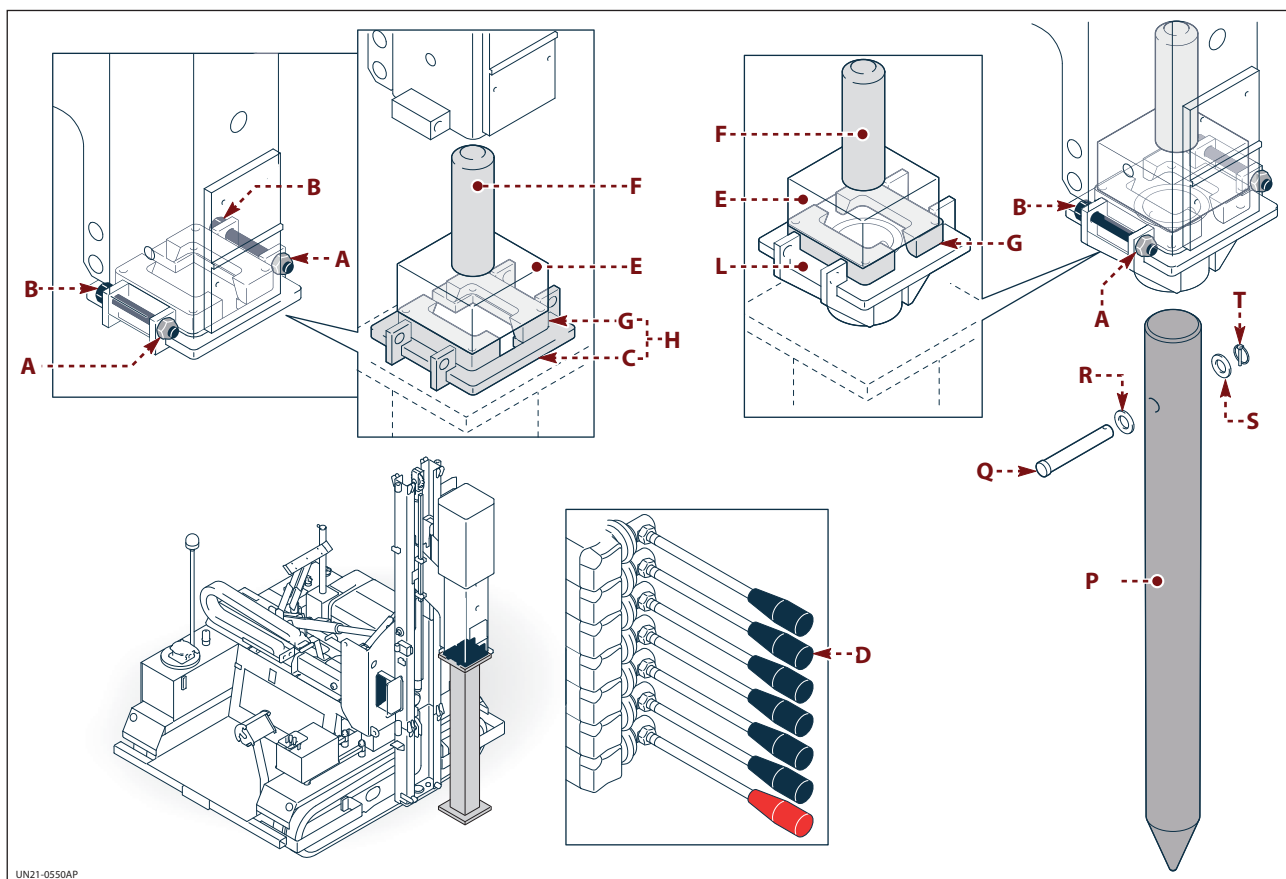
#### **WARNING**

**Fit the tool with the machine parked on flat, firm ground, with the engine stopped and the hammer drill far enough off the ground to facilitate assembly.  
Arrange appropriate safety measures and use suitable equipment to avoid accidents that could injure the people in charge of the operation and people nearby.**

Carry out the operations described.

- 1) Move the lever (**D**) and rest the percussion hammer on a surface sufficiently strong to bear the weight of the hammer.
- 2) Unscrew the nuts (**A**).
- 3) Remove the screws (**B**).
- 4) Gently move the lever (**D**) and carefully lift the percussion hammer.  
The components (**E - F**) and the unit (**H**) will remain on the support surface.





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- 5) Unscrew the unit (H) and the components (E -F).
- 6) Remove the components (G) from the component (C).
- 7) Position the components (G) on the new component (L).
- 8) Position the stop plate (E).
- 9) Position the component (F).


**CAUTION**

**Pay particular attention to the component (F) which could fall and injure the operator.**

- 10) Gently move the lever (D) and carefully lower the percussion hammer.
- 11) Insert the screws (B).
- 12) Tighten the nuts (A).
- 13) Move the lever (D) to lift the percussion hammer.
- 14) Position the tool (P) below the hammer drill.
- 15) Use the lever (D) to lower the hammer drill and insert the tool into its seat.
- 16) Position the washer (R).
- 17) Insert pin (Q).
- 18) Position the washer (S).
- 19) Insert the lock pin (T).

**Procedure for drilling holes**

**WARNING**

**Holes may be drilled in sloping ground, subject to the limits set by the manufacturer. On sloping ground position the machine with the pile driver as close as possible to the truck to reduce the risk of tipping over.**

Carry out the operations described.

- 1) Drive the machine to the area where the hole is needed (see section on travel mode).

When drilling a hole, it is important to position the hammer drill perfectly vertical either manually (see "Operating controls"), or automatically (see "Procedure for use of the verticality system").

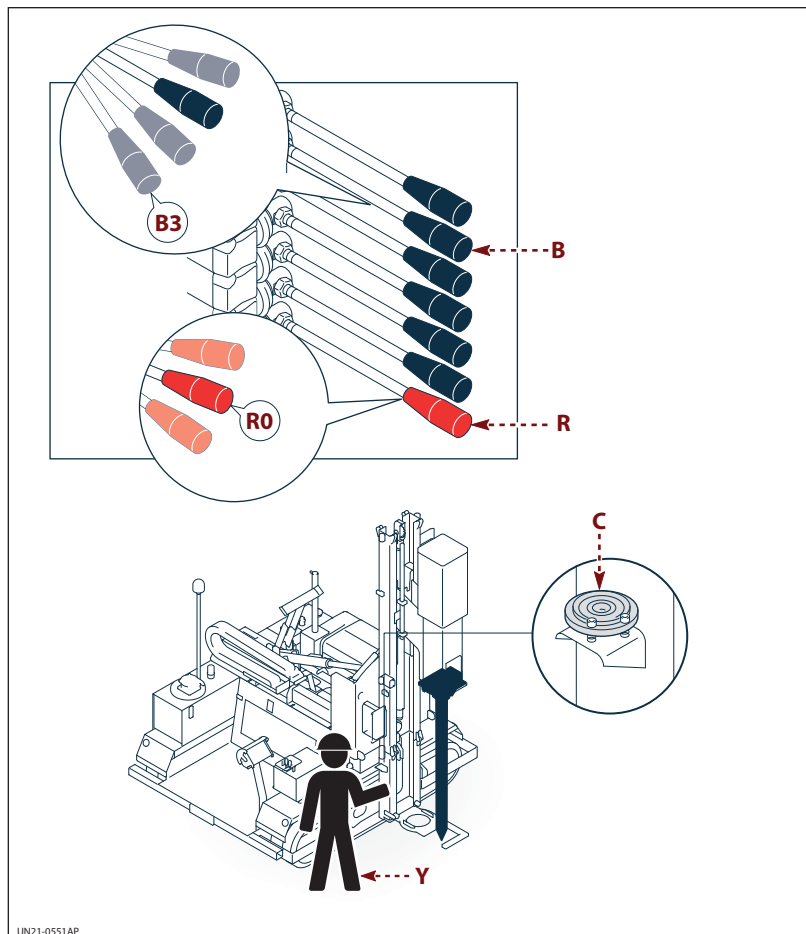
To manually place the column in a perfectly vertical position use the level gauge (C).

The operator must be positioned as shown in the figure.

- 2) Place the column in a perfectly vertical position.
- 3) Using the lever (B), lower the tool until it is touching the ground.
- 4) Set the lever (B) in the floating position "B3".

**NOTICE**

**Make sure that the automatic verticality system is disabled before activating the percussion hammer, to avoid damaging the device.**



Y) Control position foreseen for the operator

- 5) Move the lever (R) to activate the percussion hammer.

**NOTICE**

**When working on extremely hard ground, it is important not to use a pneumatic drill for more than 30 seconds at a time.**

**After this limit, stop for at least 15 seconds before resuming drilling.**

**If the tool does not go into the ground, do not attempt to force it; there is probably an obstruction preventing it from being driven in fully.**

**NOTICE**

**To automatically stop the tool at the required depth, see "Adjusting the PROXIMITY device for stopping the hammer downstroke".**

**If the machine is fitted with the laser device see the "Adjusting the laser device that stops the hammer's down stroke" section.**

- 6) Once the required depth has been reached move the lever (**R**) to position "**R0**" to stop the percussion or activate the automatic stop devices (Proximity and laser).
- 7) Use the lever (**B**) to lift the hammer drill and remove the tool from the hole.
- 8) Drive the machine to the area where the hole is needed (see section on travel mode).

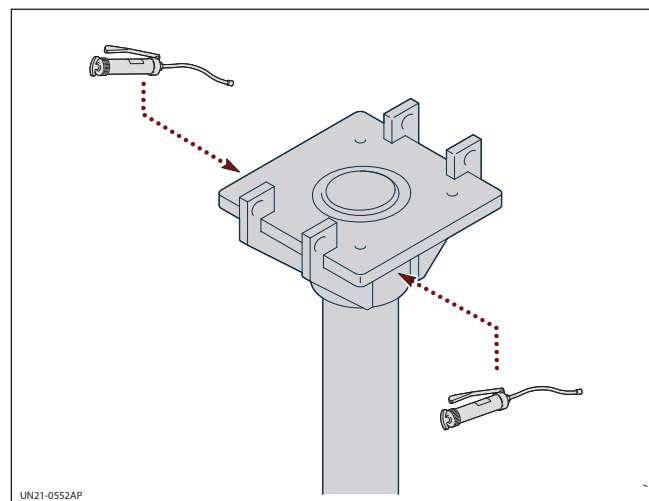
### Removing the tool

To remove the tool, carry out the steps in reverse order to the procedure described for the assembly.

### Tool maintenance

Carry out scheduled maintenance as stated by the manufacturer (see "Scheduled maintenance charts").  
 Proceed as outlined below.

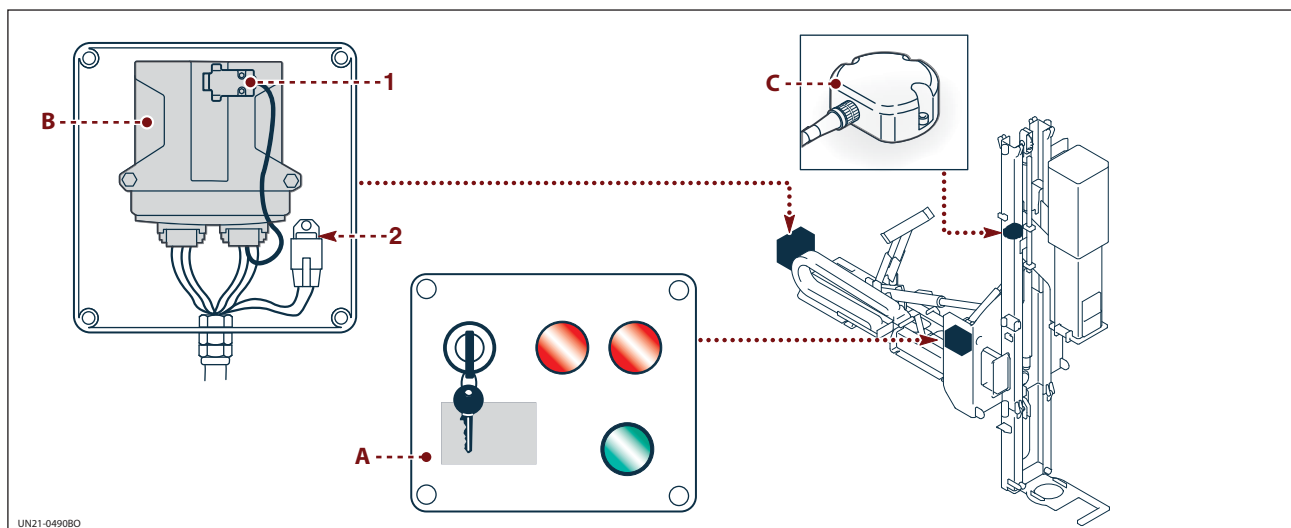
- 1) Before carrying out any lubrication work, clean the greasing nozzle, to prevent pollution of the lubricant.
- 2) Lubricate via greasing nozzle.  
 Grease type: use PAKELO BEARING EP2 or equivalent.

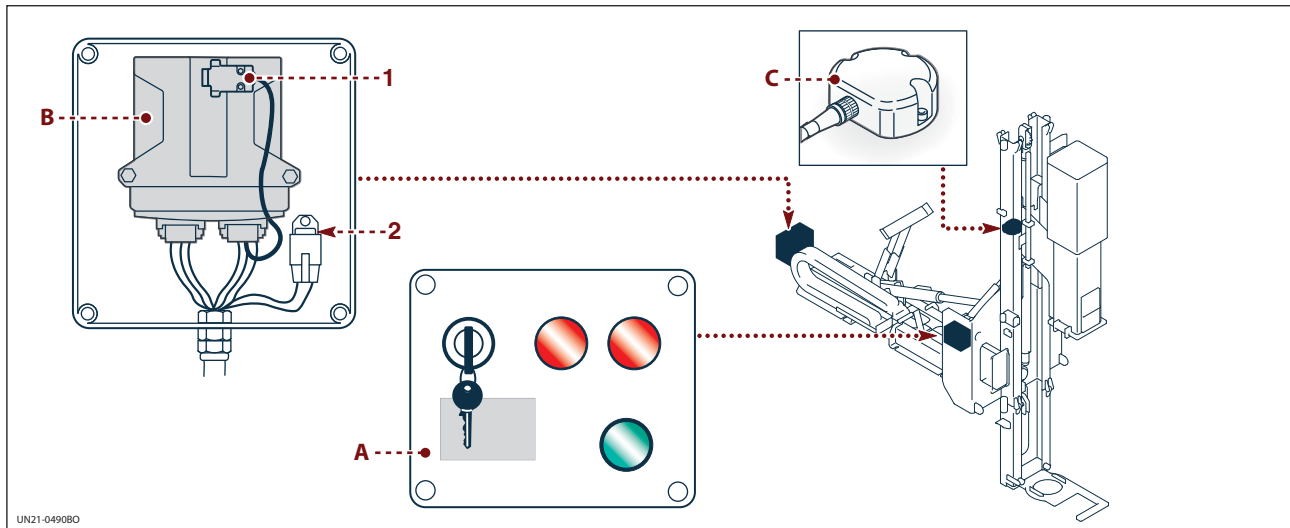


## Automatic verticality system - instructions for use

### General description

The verticality system is used to automatically place the column in vertical position.  
 The main components of the verticality system are shown in the figure.

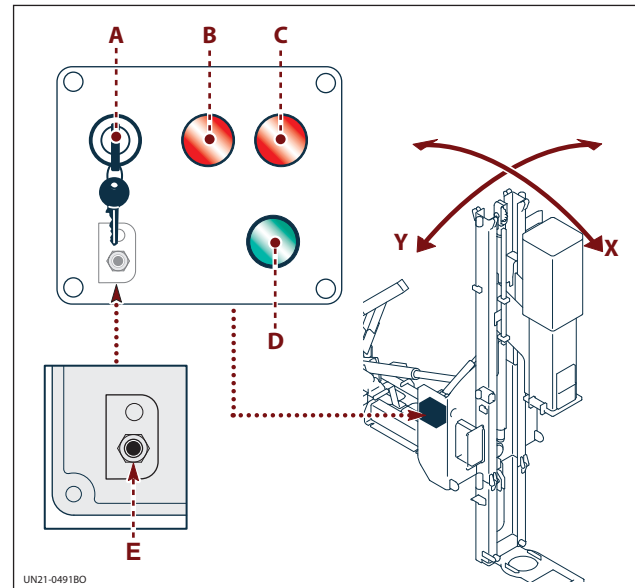




- A) Control panel:** to manage the column automatic verticality system.
- B) Electronic control unit:** to check the vertical position of the column by means of software incorporated in the component.  
 The software can be updated or reinstalled via personal computer connected to the can/usb gateway (1) connector or via the internet (remote assistance).  
 The 10A fuse (2) protects the electronic control unit against overcurrents.
- C) Angular sensor:** the sensor detects the incorrect position of the column and sends the signal to the electronic control unit, which switches on the red signal lights and the green signal light.

### Controls and signals/gauges

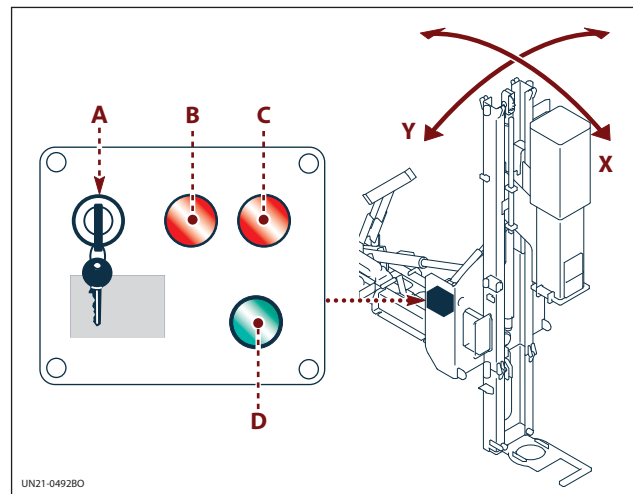
- A) Key switch:** to activate the automatic verticality system functions.
- B) Red signal light.**
- **Signal light off:** this indicates the correct vertical position of the column in relation to the axis (X).
  - **Signal light on:** this indicates the incorrect vertical position of the column in relation to the axis (X).
  - **Flashing signal light:** this indicates that the automatic verticality system is out of range due to the excessive inclination of the column compared to the axis (X).
- C) Red signal light.**
- **Signal light off:** this indicates the correct vertical position of the column in relation to the axis (Y).
  - **Signal light on:** this indicates the incorrect vertical position of the column in relation to the axis (Y).
  - **Flashing signal light:** this indicates that the automatic verticality system is out of range due to the excessive inclination of the column compared to the axis (Y).
- D) Illuminated momentary pushbutton (green light).**
- **Pushbutton on:** this shows that the system is ready to activate the vertical positioning of the column.  
 One or both signal lights (B) and (C) are on.
  - **Pushbutton off:** the column is in perfectly vertical position. The system goes automatically into stand-by.
- E) Momentary pushbutton:** this is used to reset the column verticality system.



### Automatic verticality system operating mode

Carry out the operations described.

- 1) Position the column near the pile to be driven into the ground (see "Pile driving procedure").
- 2) Turn the key of the switch (A) to position "I".  
One or both the signal lights (B) and (C) may switch on and the illuminated pushbutton (D) will light up.
- 3) Press pushbutton (D) to activate the vertical positioning of the column in relation to axis (X) and axis (Y).  
Signal lights (B) and (C) and pushbutton (D) switch off when the column is perfectly vertical. At the end of each cycle, the system goes automatically into stand-by.
- 4) Turn the key of the switch (A) to position "0" to disable the automatic verticality device.



### NOTICE

**Do not activate the automatic verticality device while the pile is being driven into the ground, to avoid damaging the device.**

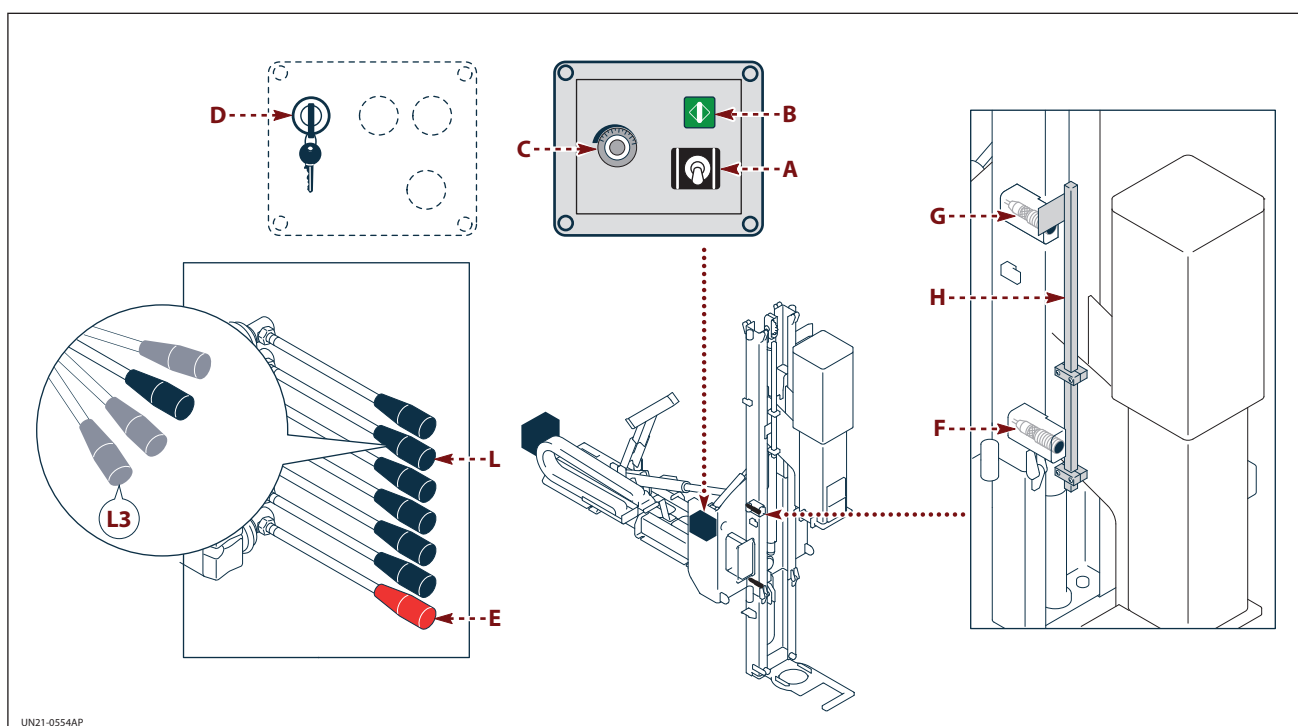
### System for adjusting/reducing the hammer drill frequency - instructions for use

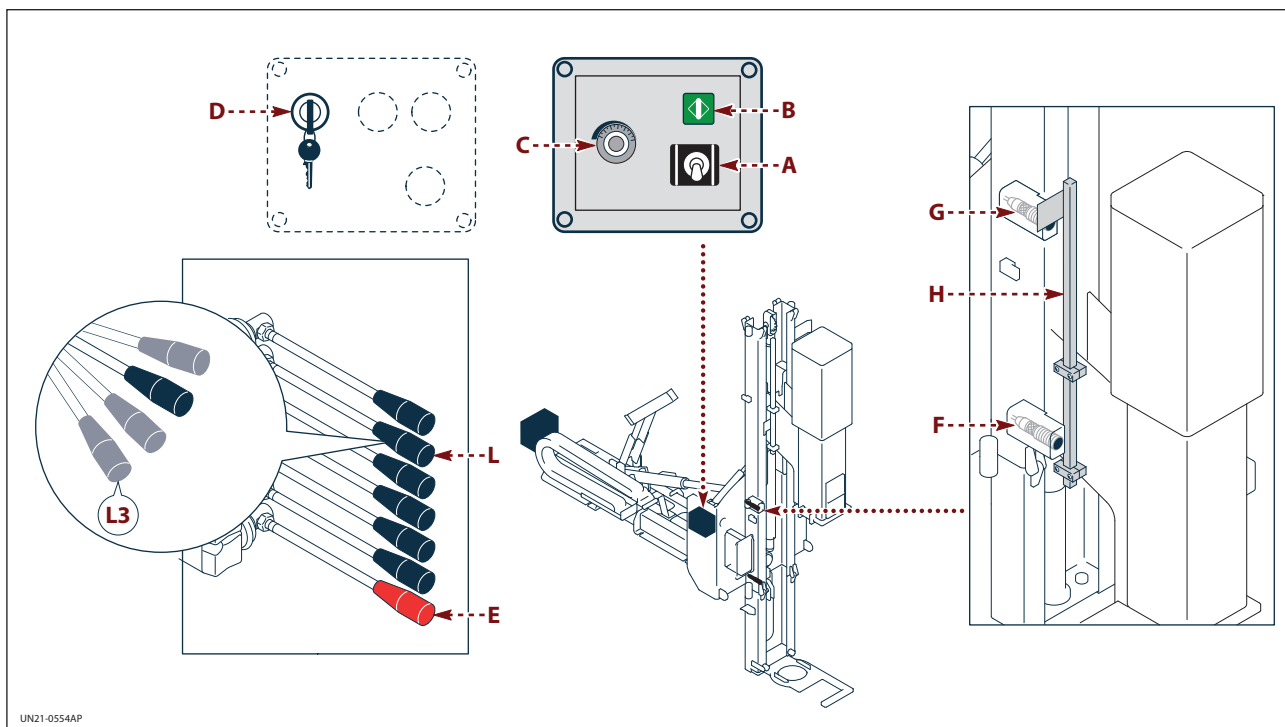
The device, which is ideal for driving piles into soft ground, reduces the stroke frequency during the final driving stage.

The reduction of the stroke frequency allows greater pile driving accuracy.

The driving depth at which the stroke frequency may be reduced is determined by the distance between sensors (F - G).

Usually, the distance between the two sensors is specified when the customer places the order.





- A) Two-position permanent-contact switch:** this is used to activate and deactivate the hammer drill strokes and the stroke frequency reduction device for the said hammer drill hammer.
- B) Signal light (green light):** this signals the activation and deactivation of the switch (A).
- C) Knob:** this is used to gradually reduce the hammer drill stroke frequency.
- D) Key-operated switch:** this is used to activate the features of the system for adjusting/reducing the hammer drill frequency.

Proceed as outlined below.

- 1) Turn the key of the switch (D) to position "I".
- 2) Use the lever (L) to lower the hammer drill onto the pile until the head of the pile is fitted inside the grooved profile of the stop plate and then set it in the floating position "L3".
- 3) Use switch (A) to start the hammer drill working and activate the system.  
The indicator lamp (B) lights up.
- 4) Use the knob (C) to reduce the hammer drill stroke frequency.  
When the device (H) activates the sensor (G) during the downward stroke of the hammer drill, this starts to reduce the preset frequency.  
When the device (H) activates the sensor (F), the pile driving stops.
- 5) Use switch (A) to stop the hammer drill working and deactivate the system.  
The signal light (B) will switch off.
- 6) Move the lever (L) to lift the percussion hammer.
- 7) Move the machine to the point where the next pile is to be driven in.

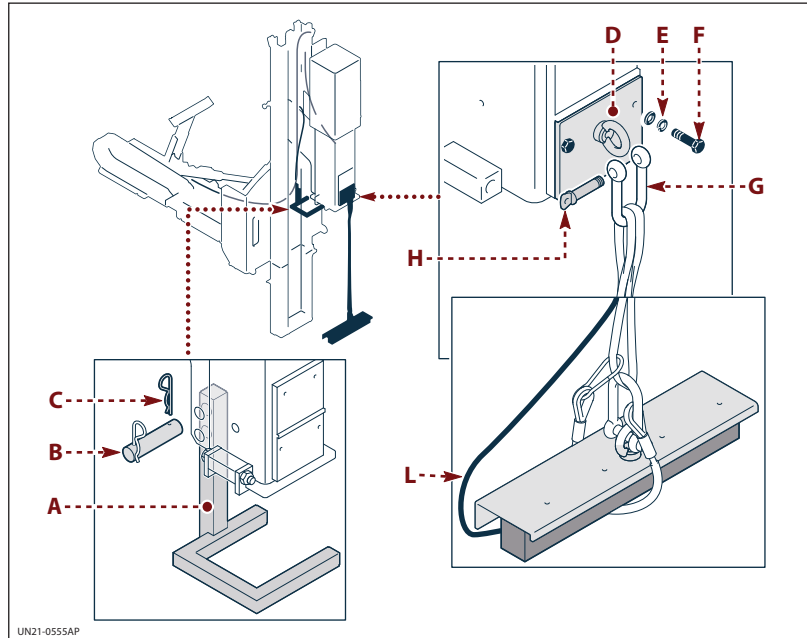
## Magnets - instructions for assembly, use, and maintenance

The magnet is used to lift particularly large ferromagnetic piles into the driving position.

### Fitting the magnet

Proceed as outlined below.

- 1) Position the pile guide (A).
- 2) Insert the pins (B).
- 3) Insert the safety lock pins (C).
- 4) Position the plate (D).
- 5) Position the washers (E).
- 6) Tighten the screw (F).
- 7) Position the shackle (G).
- 8) Tighten the lock pin (H).
- 9) Connect the electrical cable (L).



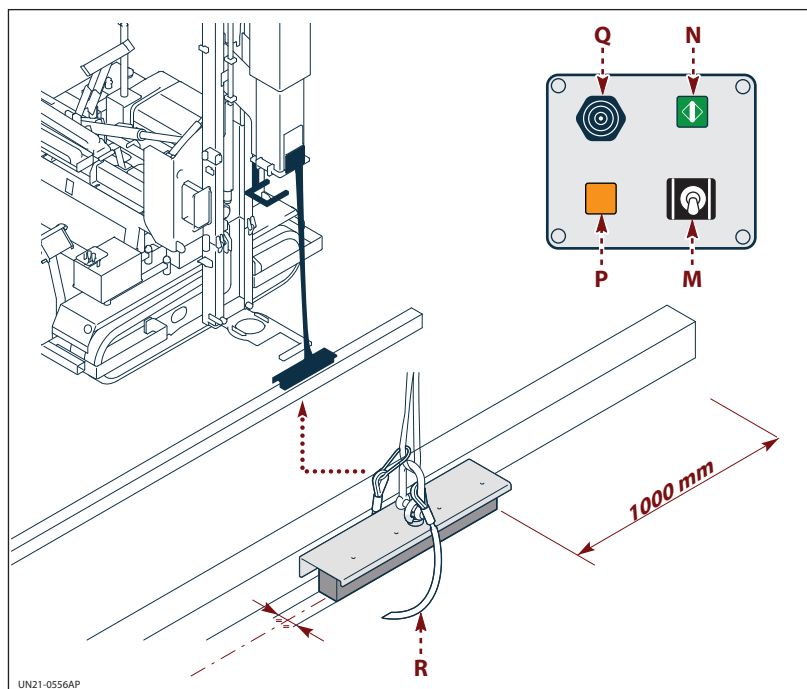
### Controls and signals/gauges

**M) Two-position permanent-contact switch:** this is used to activate and deactivate the magnet.

**N) Signal light (green):** this shows that the magnet is switched on.

**P) Signal light (orange):** this shows that the magnet is about to switch off (within 5 seconds).

**Q) Audio warning device:** this audio signal means that the magnet will switch off within 5 seconds.



### Use of the magnet

Proceed as outlined below.

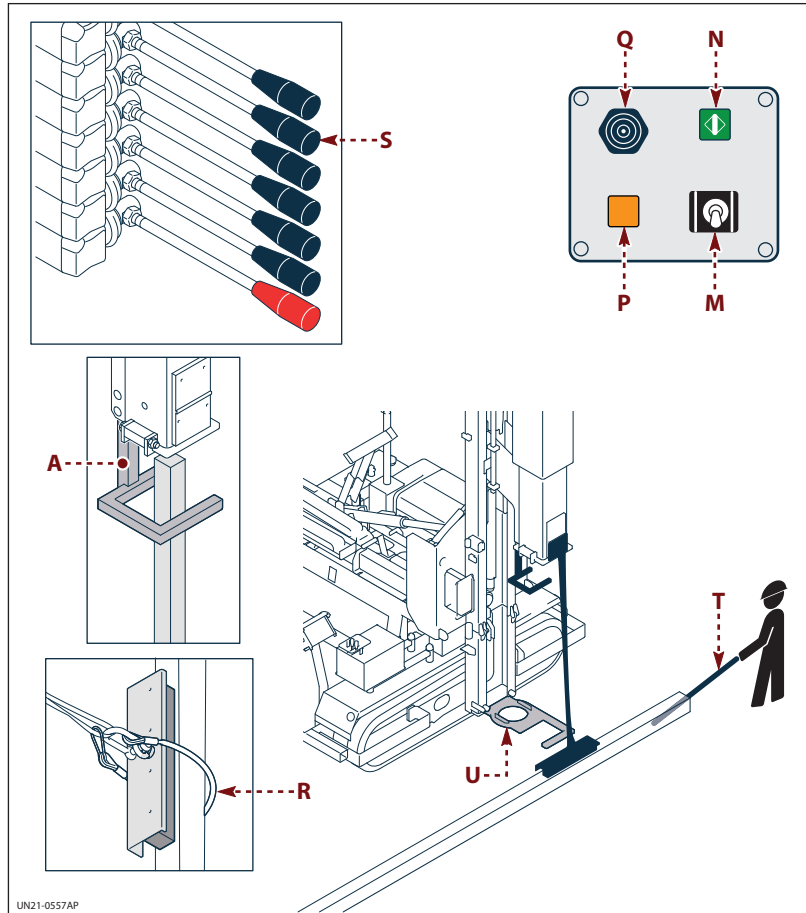
- 1) Clean the magnet grip surface and the pile contact surface.
- 2) Position the magnet in the centre of the pile at the distance from the head shown in the figure.
- 3) Run the safety cable (R) around the pile.
- 4) Use the switch (M) to activate the magnet.  
The indicator lamp (N) lights up.

- 5) Use the lever (**S**) to lift the pile.

#### NOTICE

**Use a lever (T) to manoeuvre around the pile guide plate (U).**

- 6) Once the vertical position is reached, place the pile inside the guide (**A**) manually and insert it into the stop plate.
- 7) Drive the pile down to the required depth (see "Pile driving procedure").
- 8) Use the switch (**M**) to deactivate the magnet.
- At the same time, the signal light (**N**) switches off, the signal light (**P**) comes on, and the audio signal sounds (**Q**).  
After 5 seconds, the signal lights (**N - P**) switch off, the audio signal stops sounding, and the magnet is no longer attracted to the pile.
- 9) Release the pile from the safety line (**R**).



### Removing the magnet

To remove the magnet, carry out the steps in reverse order to the procedure described for the assembly.

### Magnet maintenance

When cleaning the magnet, use non-flammable, non-toxic detergents authorised by legislation in force and available in the shops.



## System for measuring the distance between the piles - instructions for assembly, use, and maintenance

The system for measuring the distance between the piles is used when driving in piles (made of either metal or another material) to keep the same distance between the piles.

### Assembling the system for measuring the distance between the piles

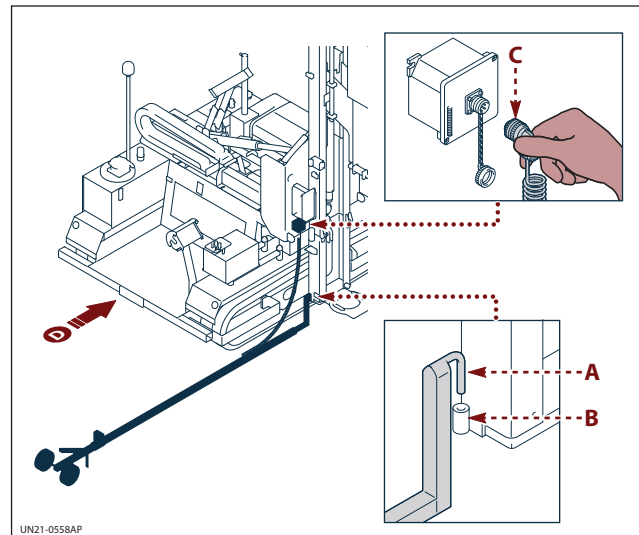
Fit the system based on the direction in which the machine drives.

The figure shows the system fitted based on the machine travel direction (**D**).

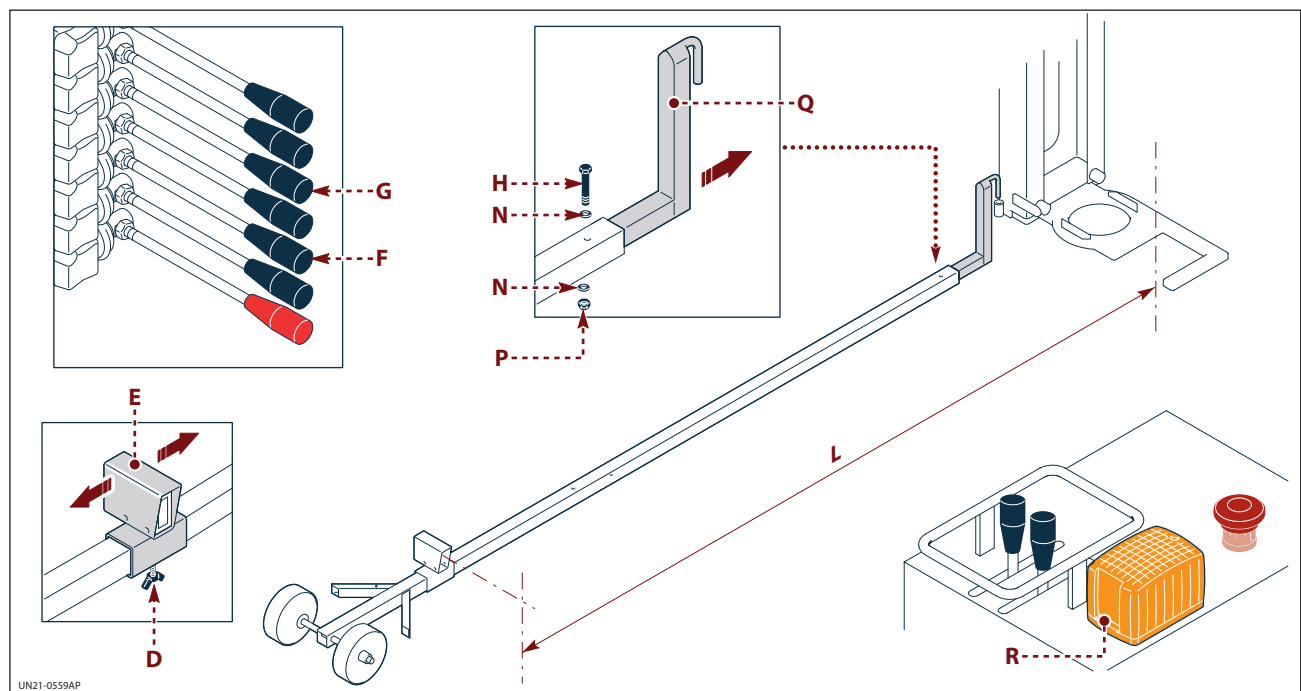
If the travel direction is the opposite to that shown in the figure, fit the system in the same way on the opposite side of the column.

Carry out the operations described.

- 1) Insert the pin (**A**) into the bushing (**B**).
- 2) Connect the connector (**C**).



### Use of the system for measuring the distance between the piles

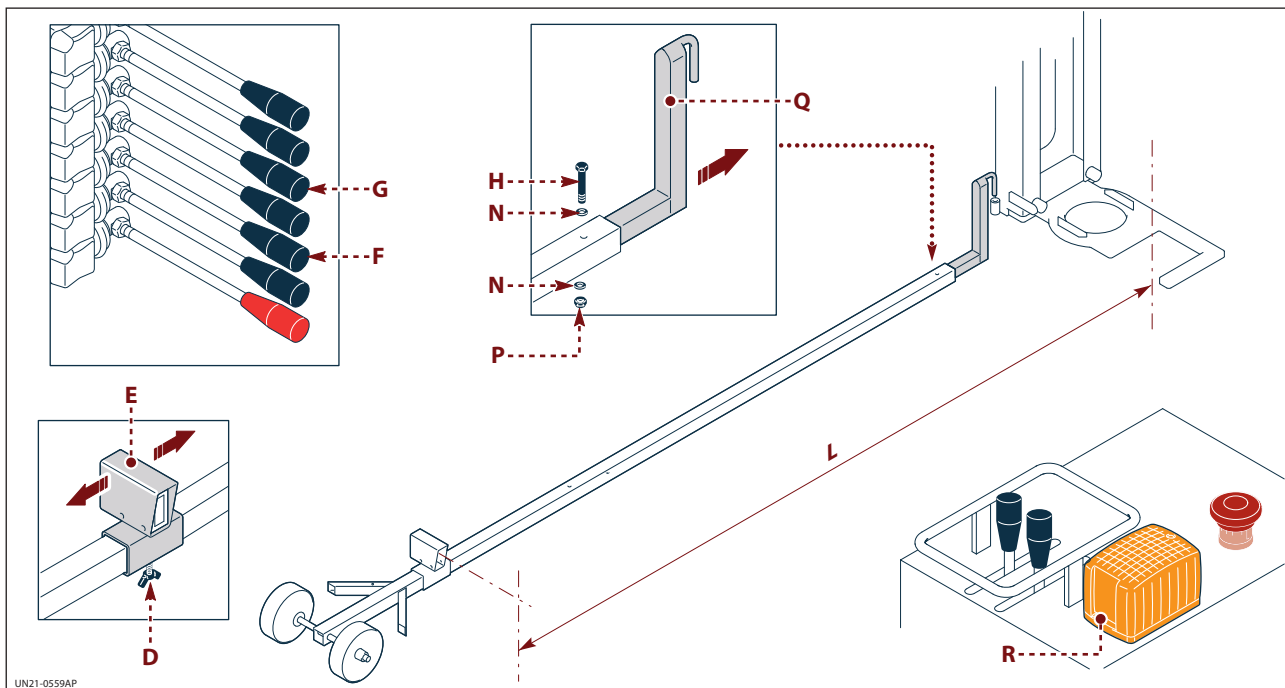


Adjust the system according to the distance (**L**) between the piles to be driven in.

The maximum distance (**L**) allowed is 4000 mm.

Carry out the operations described.

- 1) Drive the first pile into the ground (see "Pile driving procedure").
- 2) Move the machine to the point where the next pile is to be driven in.



- 3) Using a tape measure, check the distance between the two piles.
- 4) If necessary, use the levers (**F - G**) to position the hammer drill and the pile exactly in the spot where the second pile will be positioned.
- 5) Drive the second pile into the ground (see "Pile driving procedure").
- 6) Do not move the machine away from the pile driving position.
- 7) Loosen the screw (**D**).
- 8) Move the photocell (**E**) to the spot where the signal light (**R**) comes on.
- 9) Tighten the screw (**D**).

If the movement of the photocell alone is not enough, proceed as described below.

- 10) Unscrew the nut (**P**).
- 11) Remove the screws (**H**).
- 12) Remove the washers (**N**).
- 13) Slide out the tubular bar (**Q**) until the holes for fastening the tubular bar in the open configuration are aligned.
- 14) Position the washers (**N**).
- 15) Insert the screw (**H**).
- 16) Tighten the nut (**P**).
- 17) Loosen the screw (**D**).
- 18) Move the photocell (**E**) to the spot where the signal light (**R**) comes on.
- 19) Tighten the screw (**D**).
- 20) Drive the machine to the point at which the next pile will be driven in.
- 21) When the signal light (**R**) switches on, it means the position for the next pile has been reached.

### Removal of the system for measuring the distance between the piles

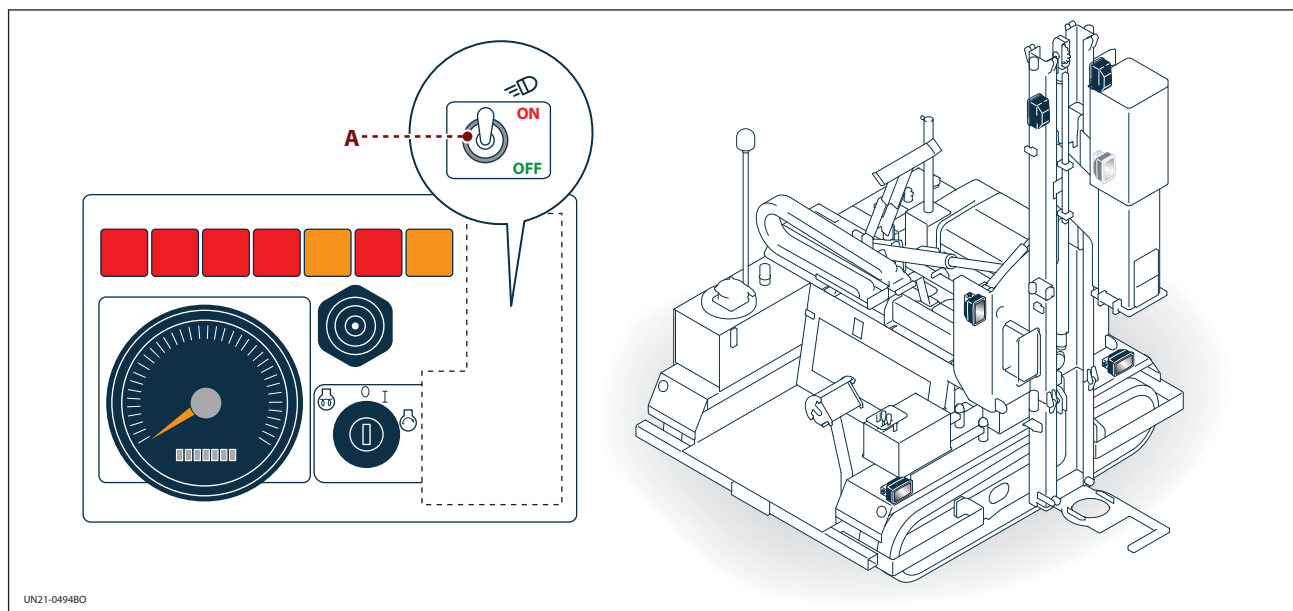
To remove the system for measuring the distance between the piles, carry out the steps in reverse order to the procedure described for the assembly.

### Maintenance of the system for measuring the distance between the piles

Carry out scheduled maintenance as stated by the manufacturer (see "Scheduled maintenance charts").

When cleaning the system for measuring the distance between the piles, use non-flammable, non-toxic detergents authorised by legislation in force and available in the shops.

### Lighting - instructions for working at night or in poor visibility conditions



Working at night or in low visibility conditions increases the risks that derive from the use of the machine.

In case of work at night or in low visibility conditions use the switch **(A)** to switch on the lights to illuminate the work area.

The position of the lights is shown in the figure.

## Refuelling



### WARNING

**Do not fill the fuel tank completely when the machine is exposed to the sun as the fuel may spill out and catch fire.**

### NOTICE

**The fuel must comply with the specifications provided by the manufacturer of the engine (see the engine manufacturer's user manual).**

For the good working order of the engine, the fuel must be free from suspended impurities; therefore it must decant for a suitable amount of time.

It is advisable to refuel before the tank is completely empty to stop the injection pump from sucking in air. In this case, fill the fuel tank and, with the engine off and cool, bleed the fuel circuit (see the use and maintenance manual provided by the engine manufacturer).

The supply gun must always be in contact with the tank opening until refuelling is complete to avoid the risk of electrostatic sparks between the supply gun and the tank opening which could lead to the fuel catching fire or the tank exploding.

## Long out-of-use periods

When the machine is not going to be used for long periods of time proceed as follows.

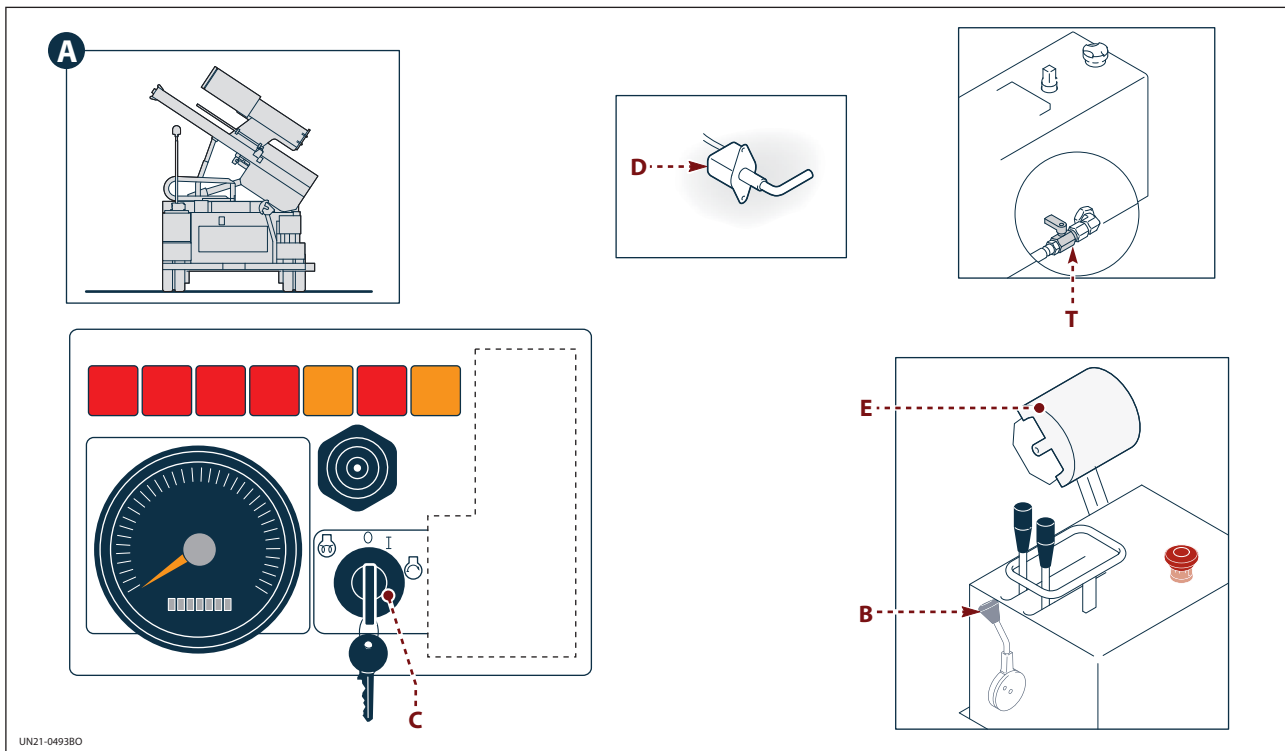
- 1) Wash the machine completely.
  - 2) Grease the machine (see "Lubrication diagram").
  - 3) Fix any oil leaks (hydraulic and engine circuits).
  - 4) Repair damaged or worn mechanical parts (tracks, etc.).
  - 5) Protect the unpainted parts with antioxidant products.
  - 6) Empty the fuel tank completely.
  - 7) Turn the battery cut-off switch to open the circuit and remove the battery.
  - 8) Park the machine in a sheltered place, where it can only be accessed by authorised personnel.
- **If the engine is not going to be used for a long period of time see the engine manufacturer's manual.**

## Re-commissioning

Before starting up the machine after a long period out-of-use proceed as follows.

- 1) Check the pressure of the accumulator of the percussion hammer.
  - 2) Check the condition of the battery.
  - 3) Refit the battery and turn the cut-off switch to close the circuit.
  - 4) Remove the antioxidant from the unpainted parts.
  - 5) Check that the main fixing nuts and bolts are tight.
  - 6) Check all oil levels.
  - 7) Fill the fuel tank.
  - 8) Start the engine at minimum for the time necessary to heat the engine.
  - 9) Check the efficiency of the safety devices.
- **To start up the engine again see the engine manufacturer's manual.**

## Operational stop



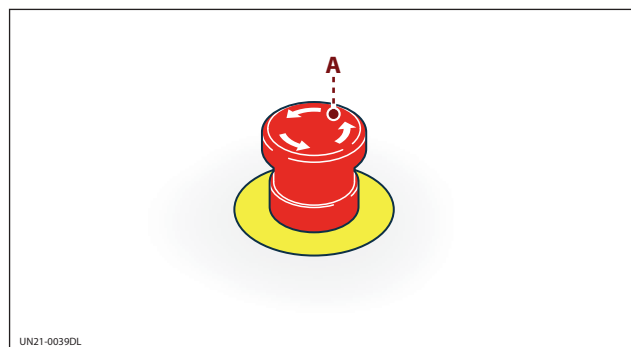
Proceed as outlined below.

- 1) Remove any accessories from the machine.
- 2) Close the machine in the resting position (A).
- 3) Park the machine on solid and even ground.
- 4) Use the accelerator lever (B) to reduce to a minimum the rpm.
- 5) Turn the ignition key (C) to position (0) to switch off the engine.
- 6) Remove the ignition key (C) from the dashboard and keep it in a safe place.
- 7) Close the dashboard guard (E) and assess the need to padlock it to avoid tampering of the controls and prevent unauthorised use of the machine.
- 8) Turn the battery cut-off switch (D) to open the circuit and isolate the battery.
- 9) Close the valve (T).
- 10) If necessary signal the presence of the parked machine.

## Emergency stop

Press the emergency button (A), only in the case of imminent danger, to immediately stop all machine movements.

Eliminate the cause of the emergency stop before re-starting the machine (see "Starting the engine").



## Safety advice for maintenance

To protect the people involved, maintenance operations must be carried out with all safety devices activated and unauthorised people must not be allowed to access the area of operation which must be appropriately marked.


Before starting the machine, check that there are no tools, cloths or other material near the moving parts or in risk areas.


In the case of maintenance operations which cannot be performed from the floor surface, a suitable ladder in compliance with the safety at work regulations in force must be used.

Carry out the maintenance operations envisaged by the machine's manufacturer to ensure the machine remains safe and in good working order (see and fill out the "Maintenance register").

All maintenance operations not provided for in this chapter must be carried out by authorised and qualified maintenance personnel.

Perform the scheduled maintenance activities required for the engine (see the "Engine instruction manual" provided with this manual).


Scheduled maintenance chart (operator)				
	Interval	Component	Type of work	Reference
	Every 4 hours of work	Stroke plate Hammer point Nuts and bolts Accessories and supplements Drilling machine	Greasing Greasing Inspection Nut and bolt tightness check Greasing	See "Lubrication diagram" See "Lubrication diagram" See "Nuts and bolts check"
	At the end of the work	Core borer Core borer water pipeline Drill Accessories and supplements	Cleaning Rust inhibitor Cleaning Cleaning Condition inspection	See "Core borer maintenance" See "Core borer maintenance" See "Drill maintenance"

Scheduled maintenance chart (maintenance engineer)				
	Interval	Component	Type of work	Reference
	Every 100 hours of work	Track reduction gear	Oil level check Oil change (1)	See "Track gearmotor oil level check" See "Replacing the track reduction gear oil"
		Percussion hammer lifting chain	Cleaning and lubrication (2)	See "Cleaning and lubrication of hammer lifting chain"
			Check	See "Replacing the chain"
		Slide	Lubrication	See "Lubrication diagram"
		Inside of the column	Lubrication	See "Lubrication diagram"
		Drill	Oil change (1)	See "Drill maintenance"
		Core borer	Greasing	See "Core borer maintenance"
		Drilling machine (RP500)	Checking the gear unit oil level	See "Drilling machine maintenance"
			Spring adjustment	See "Drilling machine maintenance"


(1) At this use rate, the oil is changed only the first time.

(2) To be checked more often in case of intensive use of the machine.

**Scheduled maintenance chart (maintenance engineer)**

	Interval	Component	Type of work	Reference
	Every 250 hours of work	Tracks	Tension check	See "Track tension check"
	Every 500 hours of work	Hydraulic oil tank	Oil level check	See "Hydraulic oil level check"
		Pile extraction gripper Blade raiser	Cleaning Greasing Greasing	
	Every 1000 hours of work	Tracks gearmotor	Oil change	See "Replacing the track reduction gear oil"
		Hydraulic oil delivery line filter	Check the filter cartridge clogging Replacing the filter cartridge	See "Replacing the discharge filter cartridge (low pressure)"
		Hydraulic oil discharge filter	Replacing the filter cartridge	See "Replacing the delivery line filter cartridge (high pressure)"
		Drill	Replacing the gear unit oil.	See "Drill maintenance"
		Drilling machine	Replacing the gear unit oil	See "Drilling machine maintenance"

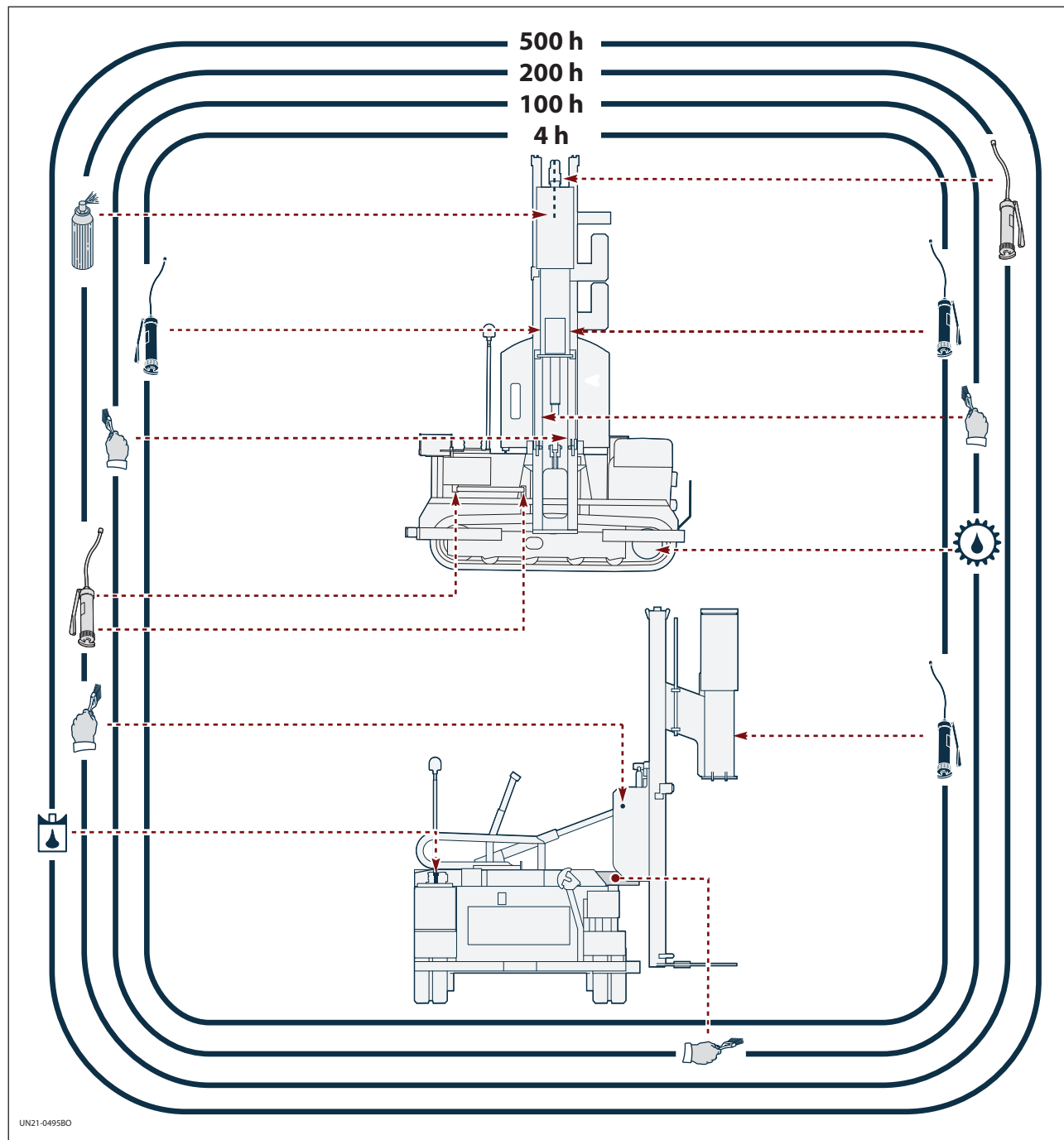
**Scheduled maintenance chart (specialist technician)**

	Interval	Component	Type of work	Reference
	Every 250 hours of work	Hammer drill accumulator diaphragm	Condition check	Carry out check at an authorised service centre
		Tie-rods and bolts	Condition and tightness inspection	
	Every 1000 hours of work	Percussion hammer lifting chain	Replacement	See "Replacing the chain"
	Every 2000 hours of work	Hydraulic oil tank	Oil change	Contact an authorised service centre

## Lubrication diagram

Lubricate the parts as shown in the illustration.

Before lubricating, clean the components concerned and the greasing nipples to prevent contamination of the lubricant.



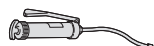
**PAKELO HAMMER GREASE PLUS NLGI 2**



**PAKELO BEARING EP2**



**PAKELO GEAR OIL EP/E GL-5 SAE 80W/90**



**PAKELO BEARING EP2**



**Oil for chains**



**PAKELO HYDRAULIC EP ISO 46**

The lubricants indicated are factory fill lubricants.

For equivalent lubricants see the "Lubricant comparison table".



## Nut and bolt check

Check that the main fixing nuts and bolts are tight.

If the bolts are loose tighten them to the prescribed torque (see the "Nuts and bolts tightening torques chart").

## Checking and cleaning the supplementary air filter

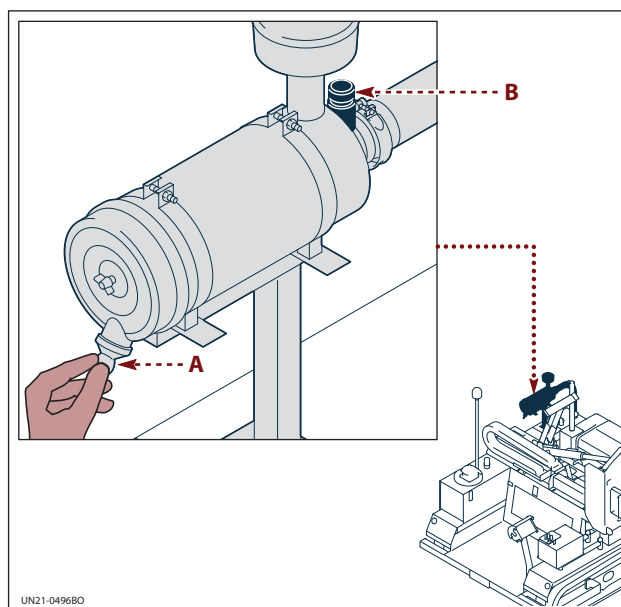
### NOTICE

**Never carry out maintenance operations on the air filter with the engine on to prevent dirt and debris suspended in the air from seriously damaging the engine. In certain operating conditions (dust, dirt and debris), the air filter may need to be checked and cleaned more frequently.**

Use the valve (A) to release the dust contained in the filter.

Check the clog signal (B) every day.

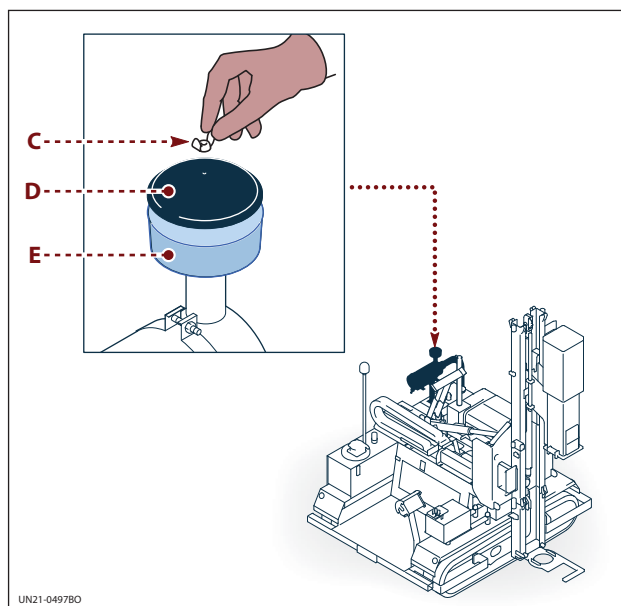
When the signal is in the red area, it means the filter is clogged and must be cleaned or replaced (see "Replacing supplementary air filter cartridges").



For checking and cleaning operations proceed as outlined below.

### - Pre-filter

- 1) Unscrew the wing nut (C).
- 2) Remove the cover (D).
- 3) Remove any dirt or debris from the pre-filter (E).
- 4) Refit the cover (D).
- 5) Tighten the wing bolt (C).



### - Primary filter

- 6) Unscrew the wing nut (**F**).
- 7) Remove the cover (**G**).
- 8) Unscrew the wing nut (**H**).
- 9) Slide out the primary filter (**L**).

If the filter is clogged do not beat it to remove the dust.

Do not wash the filter.

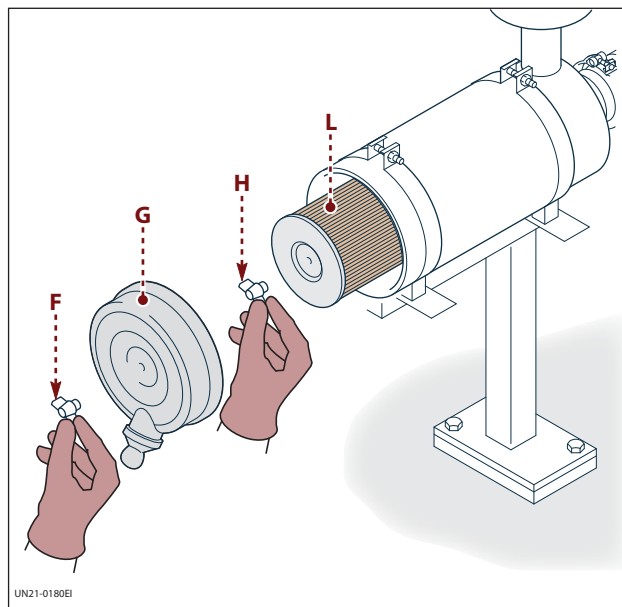
Use low pressure compressed air to remove the dust from the filter.

Direct the flow of air vertically along the folds of the filtering material, from the inside outwards.

Be careful not to damage the folds of the filtering element.

The primary filter can be cleaned up to six times (if cleaned and checked correctly), then it must be replaced.

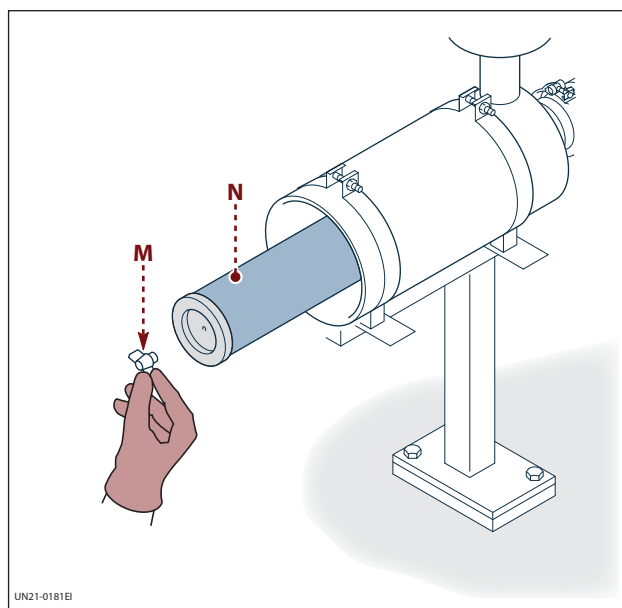
If the filter is damaged (torn filtering material, damaged seals) it must be replaced.



### - Secondary filter

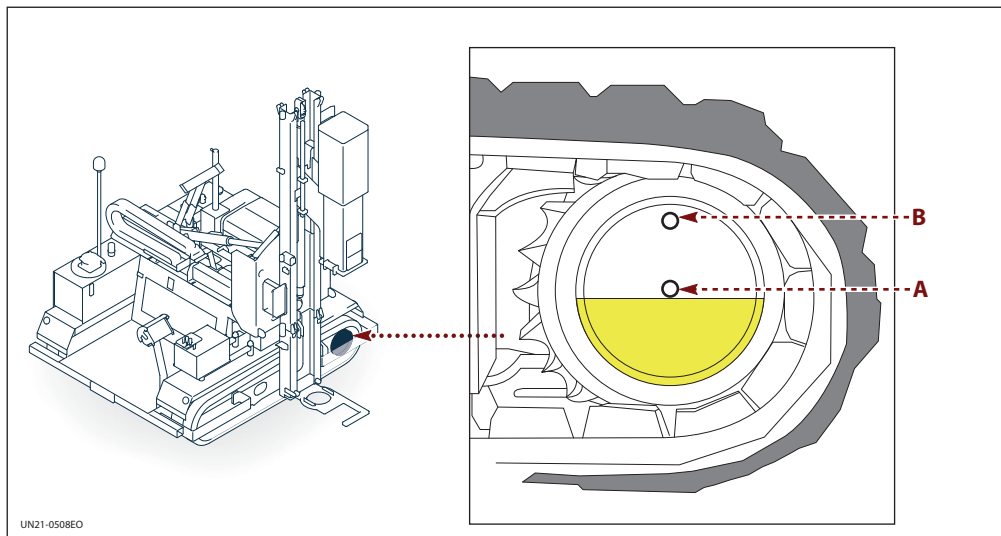
- 10) Unscrew the wing nut (**M**).
- 11) Slide out the secondary filter (**N**).

Check the clogging level of the filter and if necessary replace it.



After having checked and cleaned the filters (to assess the need to replace them) fit the filters following the removal sequence in reverse order.

## Track gearmotor oil level check



Proceed as outlined below.

- 1) Stop the machine on flat ground with caps **(A)** and **(B)** arranged as shown in the figure.
- 2) Remove the ignition key and store it safely.



### WARNING

**Take special care when removing the caps as any excess pressure inside the gear unit may force them outwards.**

- 3) Unscrew cap **(A)** and check that the oil is level with the bottom edge of the hole.
- 4) If necessary unscrew the cap **(B)** and top up the oil to the correct level.
- 5) After topping up, screw the caps **(A - B)** back on.

For oil characteristics see the "Lubricant comparison table".

## Hose check

Check the seam fastening the fitting to the hose and the condition of the hose.

If the hose shows signs of ageing, breakages, swellings, abrasions, etc., it must be replaced.

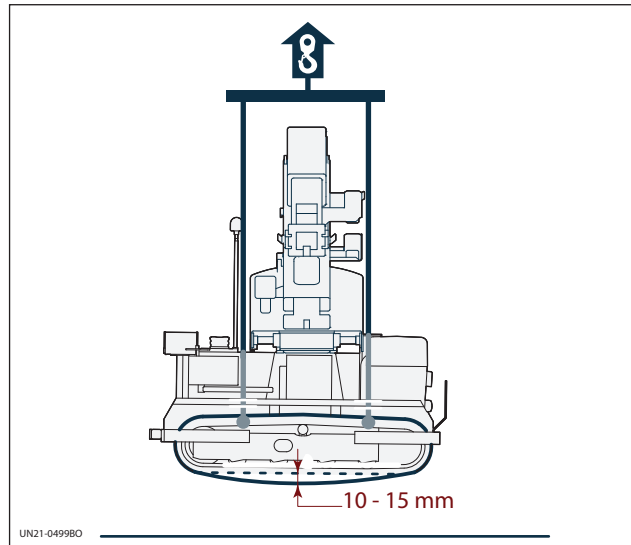
## Track tension check

Proceed as outlined below.

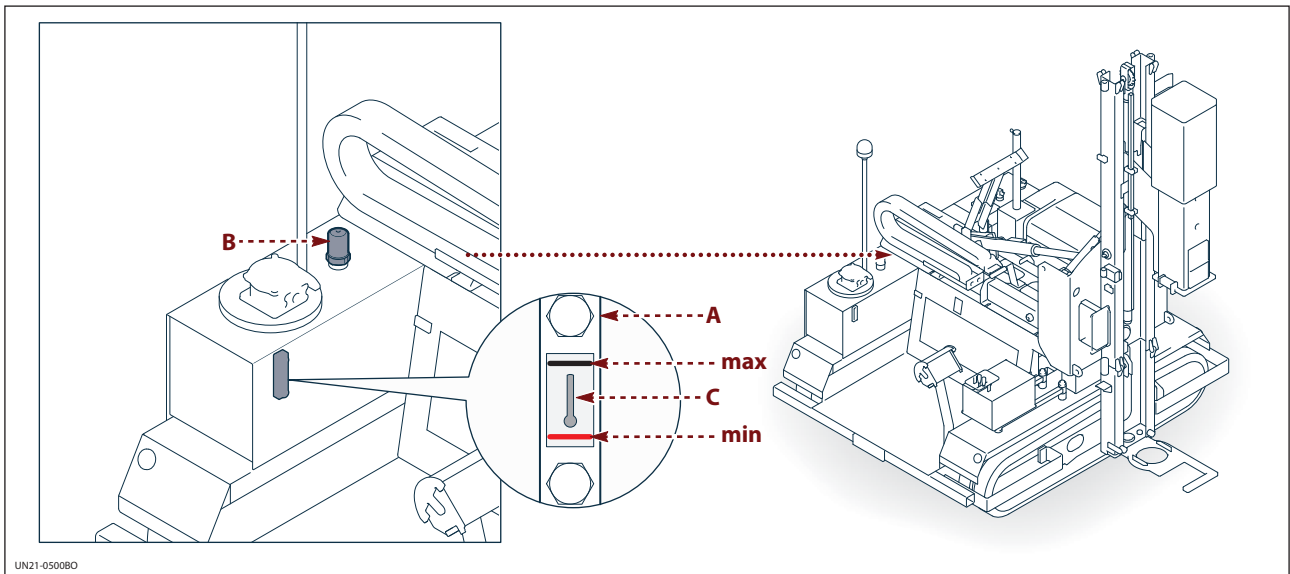
- 1) Stop the machine on solid and even ground.
- 2) Switch off the engine and remove the ignition key and keep it in a safe place.
- 3) Lift the tracks off the ground.
- 4) Lock the machine lifted from the ground using appropriate external means (stands, etc.).
- 5) Check track tension.

Tension is correct when the tension at the centre track roller is between 10 and 15 mm.

- 6) If necessary adjust the track to the correct tension (see "Adjusting track tension").



## Hydraulic oil level check



Proceed as outlined below.



### CAUTION

**Slowly unscrew the cap and discharge the pressure inside the tank to prevent the danger of burning caused by the expulsion of hot liquid.**

- 1) Stop the machine on solid and even ground and the pile driver in resting position with all jacks retracted.
- 2) The oil gauge level (A) must be between min. and max.
- 3) If necessary unscrew the pressurised filling cap (B) and top up the oil to the correct level.
- 4) Once topped up screw the cap (B) back on.

For oil characteristics see the "Lubricant comparison table".

Level gauge (A) includes a thermometer (C) that shows the oil temperature inside the tank.

## Cleaning and lubrication of hammer lifting chain



### WARNING

**The percussion hammer lifting chain is a fundamental safety device therefore it must be maintained efficient through regular maintenance.**

The lifting chain wears quickly if it is not regularly lubricated.

The lubrication frequency shown in the maintenance schedule chart refers to normal use.

If the chain is exposed to greater stress (dust, temperature, or intensive use) the chain must be lubricated more often.

If the chain is damaged, worn, corroded, etc., it must be replaced immediately (see "Replacing the chain").

Proceed as outlined below.

- 1) Stop the machine on solid and even ground.
- 2) Switch off the engine and remove the ignition key and keep it in a safe place.
- 3) Clean the chain with diesel oil or petrol or a paraffin-derived product.
- 4) Lubricate with spray lubricant for chains following the indications.

During this operation the chain must not be tensioned.

### NOTICE

**To avoid damaging the chain, do not clean it with steam jets and corrosive detergents.**

## Machine cleaning

Clean the jack rods to avoid dirt build-up.

Wash the machine with a high-pressure water jet using legally approved non-toxic and non flammable detergents.

### NOTICE

**Do not spray the water on the electrical parts, as this could damage them.**

## Lubricant comparison table

Hydraulic oil - suitable for room temperature of -20 to +40 °C					
Brand	PAKELO	IP	AGIP	MOBIL	SHELL
Type	HYDRAULIC EP ISO 46	HYDRUS OIL HI 46	ENI-ARNICA 46	DTE 10 EXCELL	SHELL TELLUS S2 V 46

Track gearmotor oil					
Brand	PAKELO	IP	AGIP	MOBIL	SHELL
Type	GEAR OIL EP/E GL-5 SAE 80W/90	PONTIAX 80W/90 EP GL-5	BLASIA	GEAR A 80W/90	SPIRAX A 80W/90

Grease					
Brand	PAKELO	IP	AGIP	MOBIL	SHELL
Type	BEARIN EP2	ATHESIA PGX 2	ENI - GREASE MU EP 2	MOBILUX EP 2	ALVANIA GREASE EP

Molybdenum disulphide grease (specifically for the point and stroke plate)					
Brand	PAKELO	IP	AGIP	MOBIL	SHELL
Type	HAMMER GREASE PLUS NLGI 2	BIMOL LTM	ENI - GREASE SM 2	MOBILGREASE SPECIAL	SHELL RETINAX HDX

Engine oil - standard climates					
Brand	PAKELO	IP	AGIP	MOBIL	SHELL
Type	GOLDEN DIESEL HP/A SAE 15W/40	TARUS TURBO EXTRA 15W/40	I SIGMA PERFORMANCE E7	DELVAC MX 15W/40	RIMULA R 4 X 15W/40

Engine oil - cold climates					
Brand	PAKELO	IP	AGIP	MOBIL	SHELL
Type	GOLDENSTAR LA 77 - 51 SAE 5W/30	TARUS TURBO SYNTETIC 5W/30	I SIGMA TOP 5W/30	DELVAC 1 LE EW/30	RIMULA R 6 ME

## Nuts and bolts tightening torques chart

Thread diameter	Tightening torque (Nm)		
	Resistance class 8.8	Resistance class 10.9	Resistance class 12.9
M6	9.5	13.0	16.0
M8	23.0	32.0	39.0
M10	46.0	64.0	77.0
M12	80.0	110.0	135.0
M14	125.0	180.0	215.0
M16	195.0	275.0	330.0
M18	270.0	390.0	455.0
M20	385.0	540.0	650.0
M22	510.0	720.0	670.0
M24	660.0	930.0	1100.0
M27	980.0	1400.0	1650.0
M30	1350.0	1850.0	2250.0

Note: friction coefficient (0,125)

**Safety advice in case of faults**

**Repairs that require specific technical competence or special skills must be carried out only by an authorised service centre.**

Fault	Likely cause	Solution	Reference
Hammer percussion is not regular	Cold oil	Repeat machine movements several times to heat the oil	
Weak hammer percussion	Flat accumulator	Recharge (*)	Contact an authorised service centre
	Damaged accumulator	Replace the membrane	
Percussion gets blocked	Excessive oil counter pressure in return pipe	Restore the correct counter pressure	Contact an authorised service centre
	Excessive oil delivery	Restore the correct oil delivery	
	Loose nuts of the percussion hammer's tie rod	Tighten the nuts	
	Faulty hydraulic system	Restore the hydraulic system	
The engine switches off immediately after start-up	The emergency button has been accidentally pressed	Deactivate the emergency button	Contact an authorised service centre
	The electrical system of the emergency button is faulty	Repair the fault	
Locking machine movements	Maximum pressure valves of the distributors clogged with dirt	Clean the valves	Contact an authorised service centre
The accessory does not switch on	The hydraulic supply by-pass valve lever is in the hammer activation position	Turn the valve lever to the correct position	
	The accessory does not work correctly	See the instruction manual of the accessory's manufacturer	
The machine does not have the original operating speed and percussion power	Damaged pump	Replace the pump	Contact an authorised service centre
	Damaged PTO	Replace the PTO	
	Main pressure valve not calibrated correctly	Set correct calibration	

(\*) If the accumulator has worked for a prolonged period at a pressure below 20 bar, replace the membrane

## Safety advice in case of replacements

To protect the people involved, the replacement of parts must be carried out with the machine cut-off from any power source and unauthorised people must not be allowed to access the area of operation which must be appropriately marked.

Replace worn components with original spare parts.

The manufacturer shall not be liable for any damage to objects or persons caused by the use of non-original parts and spare parts.

Before starting the machine, check that there are no tools, cloths or other material near the moving parts or in risk areas.

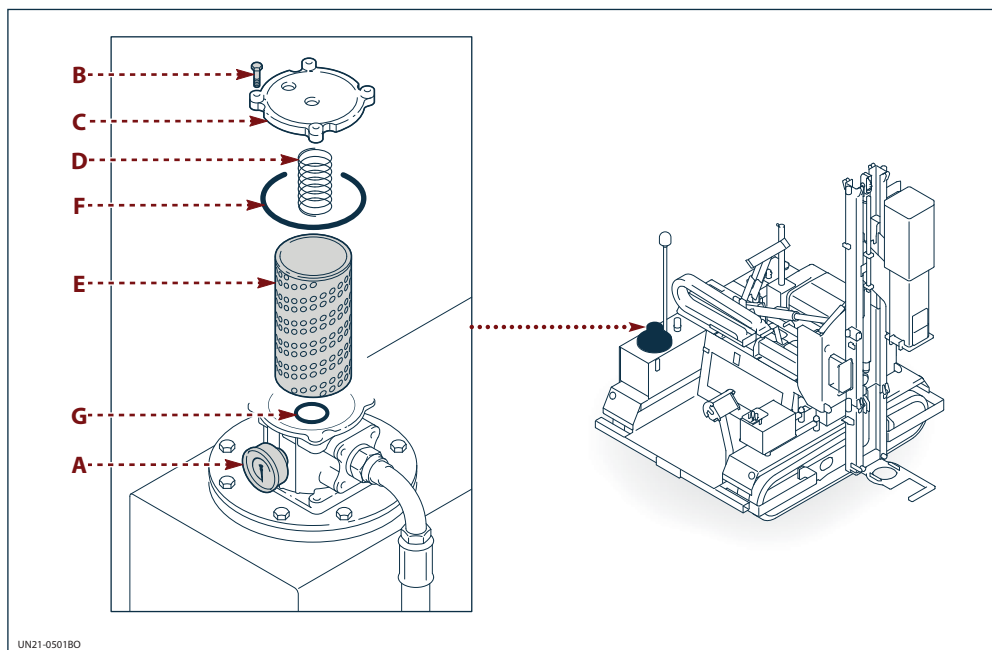
Components and waste material must be disposed of in compliance with the law in force concerning waste collection, sorting and disposal.

## Replacing the discharge filter cartridge (low pressure)



### CAUTION

The filter cartridge must be replaced with the hydraulic system depressurised.



Replace the filter cartridge when the needle of the clog indicator (**A**) is in the red area or in any case at the intervals shown in the "Scheduled maintenance chart".

Proceed as outlined below.

- 1) Clean the filter's outer surfaces accurately.
- 2) Unscrew the screws (**B**) and remove the cover (**C**).
- 3) Remove the spring (**D**) and the filter cartridge (**E**).
- 4) Remove the gaskets (**F**) and (**G**) and replace them if damaged.
- 5) Fit the new filter cartridge, the gaskets (**F**) and (**G**), the spring (**D**) and the cover (**C**).
- 6) Tighten the screws (**B**).



## Replacing the delivery line filter cartridge (high pressure)



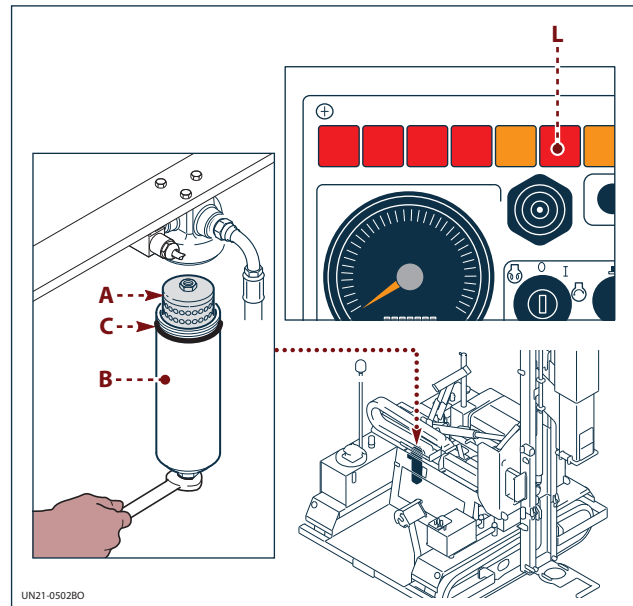
### CAUTION

**The filter cartridge must be replaced with the hydraulic system depressurised.**

Replace the filter cartridge when the signal (L) lights up and remains constantly switched on for a few minutes.

Proceed as outlined below.

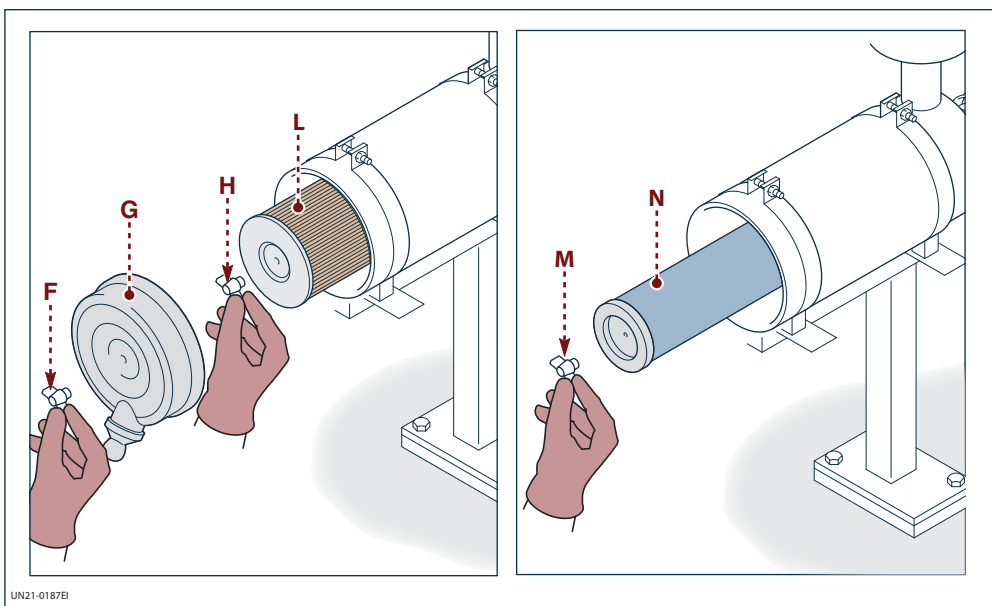
- 1) Position a container of adequate capacity under the filter to collect the oil.
- 2) Clean the filter's outer surfaces accurately.
- 3) Unscrew the filter unit (B).
- 4) Slide out the worn or clogged filter cartridge (A).
- 5) Accurately clean the inside of the filter unit (B).
- 6) Slide the new filter cartridge into the filter unit.
- 7) Check the state of the seal (C) and if damaged replace it.
- 8) Tighten the filter unit (B).



## Replacing supplementary air filter cartridges

### NOTICE

**Never replace air filter cartridges with the engine on to prevent dirt and debris suspended in the air from seriously damaging the engine.**



Proceed as outlined below.

- 1) Unscrew the wing nut (**F**).
- 2) Remove the cover (**G**).
- 3) Unscrew the wing nut (**H**).
- 4) Slide out the primary filter (**L**).
- 5) Unscrew the wing nut (**M**).
- 6) Slide out the secondary filter (**N**).

Fit the new filter cartridges following the removal sequence in reverse order.

## Replacing hosing



### CAUTION

**The hosing must be replaced with the hydraulic system depressurised.**

To depressurise the system stop the engine and move the shift control levers in both directions.

Unscrew the hosing fittings and collect the oil in a suitable container.

Replace hosing and tighten the fittings.

## Replacing the track reduction gear oil

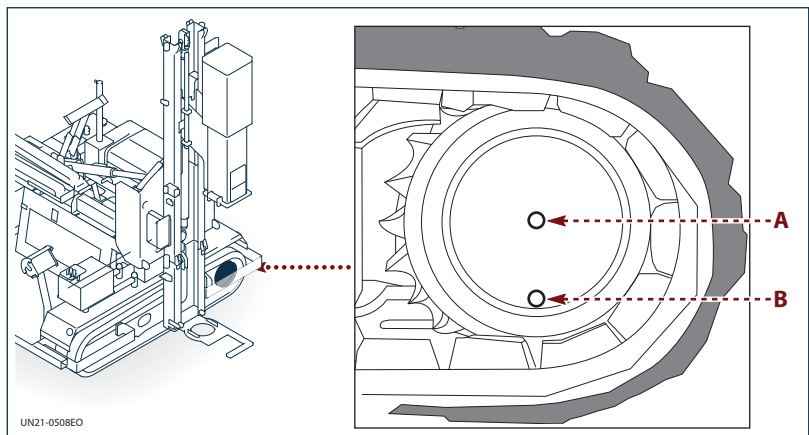
Proceed as outlined below.

- 1) Stop the machine on flat ground with caps (**A**) and (**B**) arranged as shown in the figure.
- 2) Remove the ignition key and store it safely.



### WARNING

**Take special care when removing the caps as any excess pressure inside the gear unit may force them outwards.**



- 3) Unscrew the caps (**A - B**) and allow the oil to run into a sufficiently sized container.
- 4) Wait a few minutes, until all the oil has drained out.
- 5) Refill the oil as shown (see "Oil level check for track gear units").
- 6) Screw on the caps (**A - B**).

For oil characteristics see the "Lubricant comparison table".

### NOTICE

**Never dump the oil.**

**It must be disposed of in compliance with applicable laws.**

## Replacing the chain



### WARNING

**The percussion hammer lifting chain is a fundamental safety device therefore it must always be intact otherwise it must be replaced.**

Check the percussion hammer lifting chain very carefully.

If the chain is damaged, worn, corroded, etc., it must be replaced immediately.

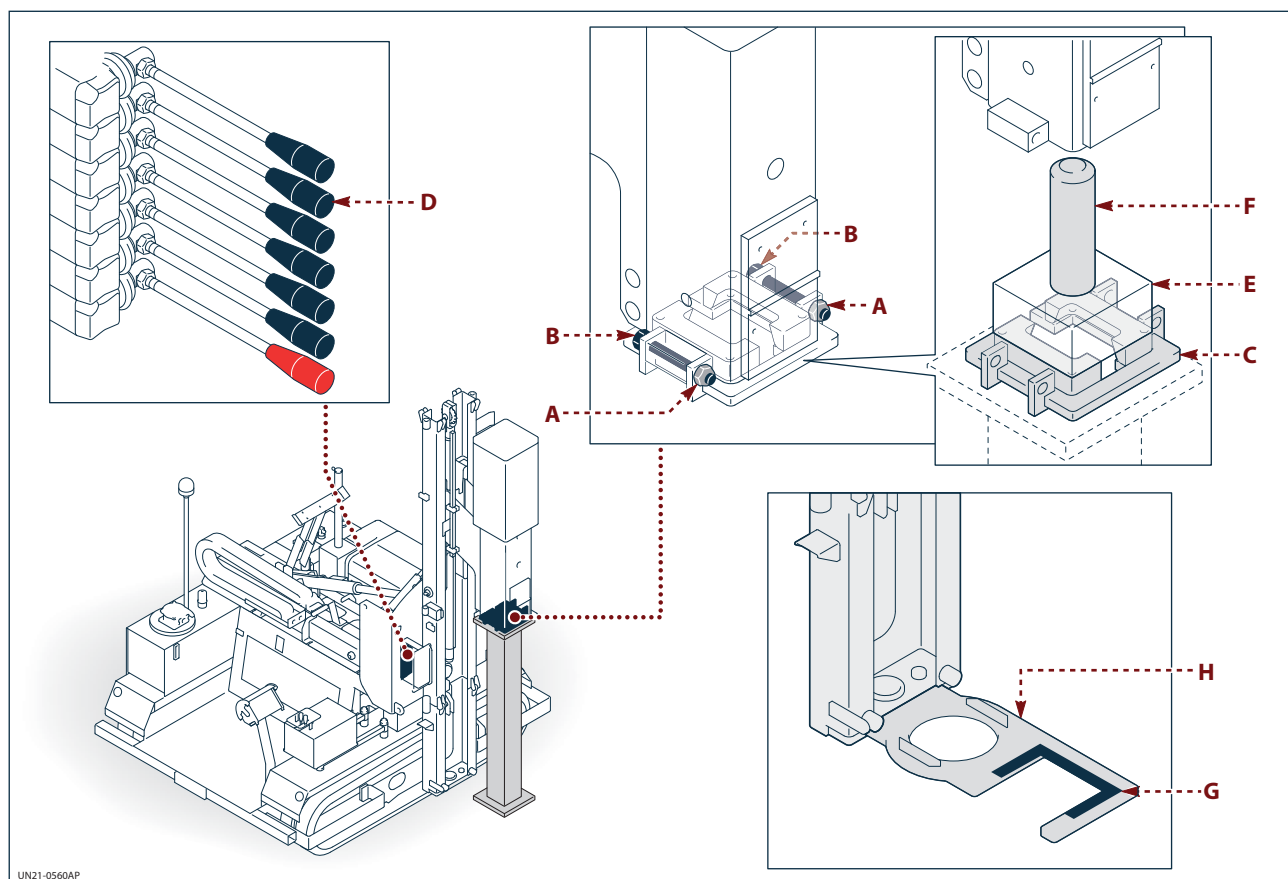
When replacing the chain replace the connection link and the fixing pins that connect the chain to the anchorage blocks.

The chain must be in any case replaced after 1000 hours of work.

The chain must be replaced by an authorised service centre.

## Replacing the stroke plate

The oversized stroke plate (weight over 25 kg) must be replaced by two people using suitable lifting and support means.



- 1) Remove the guide plate (H) from the machine.
- 2) Move the lever (D) and rest the percussion hammer on a surface sufficiently strong to bear the weight of the hammer.
- 3) Unscrew the nuts (A) and remove the screws (B).

- 4) Gently move the lever (**D**) and carefully lift the percussion hammer. The components (**C**, **E**, **F**) will remain on the resting surface.



## CAUTION

**Pay particular attention to the component (F) which could fall and injure the operator.**

- 5) Accurately clean the surfaces of the components removed.
- 6) Position the component (**C**), the new stroke plate (**E**) and the component (**F**) on the resting surface.
- 7) Grease the components (**E**) and (**F**).
- 8) Gently move the lever (**D**) and carefully lower the percussion hammer.
- 9) Fit the screws (**B**) and tighten the nuts (**A**).
- 10) Fit the guide plate (**H**).
- 11) Replace the matrix (**G**) with the stroke plate.

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## Scrapping the machine

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Scrapping operations must be handled by specialised personnel with suitable skills for the job.

The components removed must be sorted according to the type of materials they contain and in compliance with the laws in force concerning "waste collection, sorting and disposal".

With reference to WEEE directives (Waste from Electrical and Electronic Equipment), the electric and electronic parts, marked with the relative symbol, must be disposed of via specific authorised collection centres.



## Pakelo Motor Oil Lubricants

### Material Safety Data Sheet

#### 1 - Preparation and company identification

Identification of the preparation 0036 PAKELO HYDRAULIC EP ISO 46  
Preparation use Hydraulic oil.  
Company PAKELO MOTOR OIL srl  
Via Fontanelle - 37047 S. Bonifacio (Verona) -Italy-  
(Tel.+39 045-6101643)  
Emergency telephone +39 045 6101643 (Mon - Fri 8 - 12 / 14 - 18)  
Urgently seek medical assistance. Transport to hospital or medical centre with MSDS.  
If ingestion occurs contact Poisons Information Centre.  
Business references mail: schedi.sicurezza@pakelo.it

#### \* 2 - Hazards identification

Hazards The substance is not regarded as hazardous according to the Directive 1272/2008/EEC.  
Label Elements  
Main risks to health/environment No particular risks in normal working conditions. We recommend, however, to keep normal personal hygiene and to avoid frequent and prolonged contact. Use according to good working practice avoiding to disperse the product in the environment.  
Other hazards This product does not contain any PBT or vPvB substances.

#### \* 3 - Composition / Information on ingredients

##### Ingredients composition

##### No. 1272/2008/CE

lubricating oils (petroleum), C24-50, solvent-extd., dewaxed, hydrogenated	<=93.25 %	01-2119489969-06-XXXX
No. EU: 309-877-7	No. CAS: 101316-72-7	
2,6-Di-tert-butylphenol	<=0.25 %	01-2119490822-33
No. EU: 204-884-0		
Skin Irrit. 2; H315		
Aquatic Acute 1; H400		
Aquatic Chronic 1; H410		
Please refer to section 16 for more information about R phrases referred to.		

Components information The content of DMSO extract, determined with the IP 346/92 method is lower than 3% in weight.  
Chemical composition Paraffinic solvent highly refined base stocks blended with additive packages.



## Pakelo Motor Oil Lubricants

### Material Safety Data Sheet

#### 4 - First aid measures

Inhalation	In case of exposure to high concentration of vapours or fogs move the person from contaminated area to well ventilated place. Seek medical assistance if necessary. If you suspect inhalation, urgently go to hospital.
Contact with the skin	Remove contaminated clothes and wash with plenty of water. If irritation persist, get medical attention. General advice: any substance, in case of accidents involving pressurised pipes, may be accidentally injected in subcutaneous tissues, even without external injuries. In this case, person must be urgently taken to the hospital for medical treatment.
Contact with the eyes	Immediately flush eyes with plenty of water for a few minutes while keeping eyelids open. Get medical attention.
Ingestion	Do not induce vomit to avoid aspiration through the respiratory tract. Get medical attention.

#### 5 - Fire-fighting measures

Fire-fighting equipment	Extinguish flames with foam, dry chemicals, CO <sub>2</sub> .
Inappropriate extinguishers	Do not use direct water jets. Use water jets just to cool down surfaces exposed to fire.
Specific dangers in case of exposition to the chemicals, its combustion products or gases	Avoid breathing combustion fumes that, in case of fire, can form carbon monoxide, carbon dioxide, oxid of sulphur, phosphorus, zinc and unburnt hydrocarbon compounds and other derivatives potentially dangerous.
Specific protective equipment for fire-fighting personnel	Wear protective overalls with self-breathing equipment.

#### 6 - Accidental release measures

Person - related safety precautions	Wear gloves, protecting clothes and glasses. In case of indoors significant spill avoid to breathe vapours by ventilating the area or by wearing breath protecting equipment. Remove possible ignition sources.
Environmental precautions	The product contains substances harmful to the aquatic environment. Avoid to disperse the product into sewers or into waterways. Otherwise inform local authorities.
Decontamination procedures	In case of significant spillage, stem and transfer product to suitable containers. Spillage on ground: stem spilled product with soil or sand, clean up spilled product and dispose according to local regulations. Spillage in water: stem immediately the spillage. Mechanically remove spilled product from the surface.

#### 7 - Handling and storage

Handling	Avoid direct contacts with the product. Avoid breathing aerosol or product mist guaranteeing a suitable ventilation in working areas. Do not smoke and avoid any contact with ignition sources. Keep containers closed when not used.
Storage	Keep the product in original containers. Storage in a fresh place, away from heating sources and direct sun exposition. Avoid to accumulate electrostatic charge. Keep closed and covered the containers to avoid infiltrations of rain. Maintain suitable ventilation of the work place.
Empty containers	The containers contain product residues. Dispose the containers in safe ecological way according to the local regulations.



## Pakelo Motor Oil Lubricants

### Material Safety Data Sheet

#### 8 - Exposure controls / personal protection

Exposure borderline values

	TLV - TWA (1)		TLV - STEL (2)	
	ppm	mg/m <sup>3</sup>	ppm	mg/m <sup>3</sup>
lubricating oils (petroleum), C24-50, solvent-extd., dewaxed, hydrogenated		5		10

(1) Long exposure limits

(2) Short exposure limits

Exposure control	Avoid the formation of hazes or aerosol and use engineering controls, ventilation or localized aspiration if necessary.
Breathing equipment	Not necessary under normal working conditions. Keep oil hazes within the TLV-TWA limit of 5 mg/m <sup>3</sup> . (A.C.G.I.H. 2000). Use masks with filters for organic vapours in case of exposure superior to the fixed limits.
Hands and skin protection	Wear gloves and protective overalls; change immediately contaminated clothes and wash them thoroughly before use. We recommend to keep normal personal hygiene and of working clothes. Wear gloves only after having thoroughly washed your hands.
Eyes protection	Wear safety protective glasses where it is possible to be in contact with the product.

#### 9 - Physical and chemical properties

Physical status :	Liquid
Colour :	Straw yellow
Odour :	Typical
pH :	Not applicable
Water Solubility :	Insoluble
Density at 15°Ckg/l :	0,880
Kinematic Viscosity at 40°CcSt :	46
Flash Point (C.O.C.)°C :	210
Pour Point°C :	-35

#### 10 - Stability and reactivity

Reactivity and materials to avoid	Avoid contacts with strong acid, strong bases and oxidation agents. Avoid extreme heat and high energy sources of ignition.
Stability	Stable product in normal applications.

#### 11 - Toxicological information

Chronic toxicity	Exposure to oil vapour that exceeds Professional Inhalation Limits can cause respiratory system irritations.
Skin contact	LD50 skin (rabbit) > 2000 mg/kg (estimated). Frequent and continuous contacts could degrease skin and cause dermatitis.
Eyes contact	It can cause light irritation.
Oral toxicity	LD50 (rats): > 2000 mg/kg (estimated). The product if ingested can irritate the digestive apparatus and induce vomiting, cause nausea and diarrhea.
Inhalation	Long term exposure to the product mist can cause irritation to the respiratory system.



## Pakelo Motor Oil Lubricants

### Material Safety Data Sheet

#### 12 - Ecological information

Mobility	The product keeps afloat.
Degradability	Not determined.
Accumulation	Not determined.
Ecotoxicity	In compliance with EEC Regulations the product is not regarded as hazardous to the environment.
Ecotoxicity Test	LC50 acute for freshwater fish: 100 - 1000 mg/L. EC50 acute for freshwater invertebrates: 100 - 1000 mg/L. Chronic effects expected at 100 - 1000 mg/L based on component data. EC50 acute for algae: 1000 - 10000 mg/L.

#### 13 - Disposal considerations

General information	Do not dispel the environment. Comply with the current laws.
Disposal	Avoid to disperse the product on ground, into sewers and surface waters. Discharge the exhausted products and the containers through the authorized industries in compliance with the state and local regulations for disposal of this type of waste.

#### 14 - Transport information

##### Not hazardous for the transport.

Transport name	PAKELO HYDRAULIC EP ISO 46
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#### \* 15 - Regulatory information

Reference Laws	This Safety Data Sheet complies with the Regulation n.453/2010.  Regulation (CE) n.1907/2006 (REACH); Regulation (CE) n.1272/2008 (GHS/CLP); I ATP n.790/2009; II ATP n.86/2011; III ATP n.618/2012; IV ATP n.487/2013.  Refer also to local laws.
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#### \* 16 - Other information

Relevant H phrases	H315 Causes skin irritation. H400 Very toxic to aquatic life. H410 Very toxic to aquatic life with long lasting effects. H412 Harmful to aquatic life with long lasting effects.
Warning	The information presented in this Material Safety Sheet is based on data believed to be accurate as of the date this Material Safety Data Sheet was prepared. The purpose of this data sheet is to inform and assume a correct technological use of the product. PAKELO MOTOR OIL does not take any responsibility resulting from any damage or injury resulting from abnormal use.







## Pakelo Motor Oil Lubricants

### Material Safety Data Sheet

#### \* 1 - Preparation and company identification

Identification of the preparation 0088 PAKELO BEARING EP 2  
Preparation use Lubricating grease.  
Company PAKELO MOTOR OIL srl  
Via Fontanelle - 37047 S. Bonifacio (Verona) -Italy-  
(Tel.+39 045-6101643)  
Emergency telephone +39 045 6101643 (Mon - Fri 8 - 12 / 14 - 18)  
Urgently seek medical assistance. Transport to hospital or medical centre with MSDS.  
If ingestion occurs contact Poisons Information Centre.  
Business references mail: [schede.sicurezza@pakelo.it](mailto:schede.sicurezza@pakelo.it)

#### \* 2 - Hazards identification

Hazards The substance is not regarded as hazardous according to the Directive 1272/2008/EEC.

Label Elements

Main risks to health/environment No particular risks in normal working conditions. We recommend, however, to keep normal personal hygiene and to avoid frequent and prolonged contact. Use according to good working practice avoiding to disperse the product in the environment.

Other hazards This product does not contain any PBT or vPvB substances.

#### \* 3 - Composition / Information on ingredients

Ingredients composition

##### No. 1272/2008/CE

Lubricating oils,(petroleum), C24-50,solvent-extd., dewaxed,hydrogenated No. EU: 309-877-7	No. CAS: 101316-72-7	<=90.00 %	Asp. Tox. 1; H304	01-2119489969-06
Lubricating oils (petroleum), C>25 No. EU: 309-874-0	No. CAS: 101316-69-2	<=90.00 %		01-2119486987-11
Zinc alkyl dithiophosphate No. EU: 272-028-3	No. CAS: 68649-42-3	<=1.50 %	Skin Irrit. 2; H315 Aquatic Chronic 2; H411 Eye Dam. 1; H318	

Please refer to section 16 for more information about H phrases.

Components information The content of DMSO extract, determined with the IP 346/92 method is lower than 3% in weight.

Chemical composition Solvent refined mineral oil with lithium soap and additives.

#### 4 - First aid measures

Inhalation If exposed to high concentration of vapours and fogs move the person from contaminated area to well ventilated place. Seek medical assistance.  
Contact with the skin Remove contaminated clothes and wash with soap and plenty of water. If irritation persist, get medical attention.  
Contact with the eyes Immediately flush eyes with plenty of water for a few minutes while keeping eyelids open. Get medical attention.  
Ingestion Do not induce vomit to avoid aspiration through the respiratory tract. Get medical attention.



## Pakelo Motor Oil Lubricants

### Material Safety Data Sheet

#### 5 - Fire-fighting measures

Fire-fighting equipment	Extinguish flames with foam, dry chemicals, CO <sub>2</sub> .
Inappropriate extinguishers	Do not use direct water jets. Use water jets just to cool down surfaces exposed to fire.
Specific dangers in case of exposition to the chemicals, its combustion products or gases	Avoid breathing combustion fumes that, in case of fire, can form carbon monoxide, carbon dioxide, oxid of sulphur, phosphorus and unburnt hydrocarbon compounds and other derivatives potentially dangerous.
Specific protective equipment for fire-fighting personnel	Wear protective overalls with self-breathing equipment.

#### 6 - Accidental release measures

Person - related safety precautions	Wear gloves, protecting clothes and glasses. In case of indoors significant spill avoid to breathe vapours by ventilating the area or by wearing breath protecting equipment. Remove possible ignition sources.
Environmental precautions	Avoid to disperse the product in ground, into sewers and into surface waters. If necessary inform local authorities.
Decontamination procedures	In case of significant spillage, stem and transfer product to suitable containers. Spillage on ground: stem spilled product with soil or sand, clean up spilled product and dispose according to local regulations. Spillage in water: stem immediately the spillage. Mechanically remove spilled product from the surface.

#### 7 - Handling and storage

Handling	Avoid direct contacts with the product. Avoid breathing aerosol or product mist guaranteeing a suitable ventilation in working areas. Do not smoke and avoid any contact with ignition sources. Keep containers closed when not used.
Storage	Keep the product in original containers. Storage in a fresh place, away from heating sources and direct sun exposition (temperature from -5°C to +40°C). Avoid to accumulate electrostatic charge. Do not storage in open containers without labels. Maintain suitable ventilation.
Empty containers	The containers contain product residues. Dispose the containers in safe ecological way according to the local regulations.

#### 8 - Exposure controls / personal protection

Exposure borderline values

	TLV - TWA (1)		TLV - STEL (2)	
	ppm	mg/m <sup>3</sup>	ppm	mg/m <sup>3</sup>
Lubricating oils, (petroleum), C24-50, solvent-extd., dewaxed, hydrogenated		5		10
Lubricating oils (petroleum), C>25		5		10

(1) Long exposure limits

(2) Short exposure limits



## Pakelo Motor Oil Lubricants

### Material Safety Data Sheet

Exposure control	Avoid the formation of hazes or aerosol and use engineering controls, ventilation or localized aspiration if necessary.
Breathing equipment	Not necessary under normal working conditions. Keep oil hazes within the TLV-TWA limit of 5 mg/m <sup>3</sup> . (A.C.G.I.H. 2000). Use masks with filters for organic vapours in case of exposure superior to the fixed limits.
Hands and skin protection	Wear gloves and protective overalls; change immediately contaminated clothes and wash them thoroughly before use. We recommend to keep normal personal hygiene and of working clothes. Wear gloves only after having thoroughly washed your hands.
Eyes protection	Wear safety protective glasses where it is possible to be in contact with the product.

### 9 - Physical and chemical properties

Physical status- :	Semi-solid homogeneous
Colour- :	Brown
Odour- :	Typical
pH :	Not applicable
Water Solubility- :	Insoluble
Base Oil Flash Point (C.O.C.)°C :	>200
Worked Penetration 60 strokes at 25°C0,1 mm :	280
Dropping Point°C :	200

### 10 - Stability and reactivity

Reactivity and materials to avoid	Avoid contacts with strong acid, strong bases and oxidation agents. Avoid extreme heat and high energy sources of ignition.
Stability	Stable product in normal applications.

### 11 - Toxicological information

Chronic toxicity	Exposure to oil vapour that exceeds Professional Inhalation Limits can cause respiratory system irritations.
Skin contact	LD50 skin (rabbit) > 2000 mg/kg (estimated). Frequent and continuous contacts could degrease skin and cause dermatitis.
Eyes contact	It can cause light irritation.
Oral toxicity	LD50 (rats): > 2000 mg/kg (estimated). The product if ingested can irritate the digestive apparatus and induce vomiting, cause nausea and diarrhea.
Inhalation	Long term exposure to the product mist can cause irritation to the respiratory system.

### 12 - Ecological information

Mobility	The product keeps afloat.
Degradability	Not determined.
Accumulation	Not determined.
Ecotoxicity	In compliance with EEC Regulations the product is not regarded as hazardous to the environment.

### 13 - Disposal considerations

General information	Do not dispel the environment. Comply with the current laws.
Disposal	Avoid to disperse the product on ground, into sewers and surface waters. Discharge the exhausted products and the containers through the authorized industries in compliance with the state and local regulations for disposal of this type of waste.

### 14 - Transport information

**Not hazardous for the transport.**



## Pakelo Motor Oil Lubricants

### Material Safety Data Sheet

Transport name      PAKELO BEARING EP 2

#### \* 15 - Regulatory information

Reference Laws      This Safety Data Sheet complies with the Regulation n.453/2010.

Regulation (CE) n.1907/2006 (REACH); Regulation (CE) n.1272/2008 (GHS/CLP); I ATP n.790/2009; II ATP n.86/2011; III ATP n.618/2012; IV ATP n.487/2013.

Refer also to local laws.

#### \* 16 - Other information

Relevant H phrases

H304 May be fatal if swallowed and enters airways.

H315 Causes skin irritation.

H318 Causes serious eye damage.

H319 Causes serious eye irritation.

H411 Toxic to aquatic life with long lasting effects.

Warning

The information presented in this Material Safety Sheet is based on data believed to be accurate as of the date this Material Safety Data Sheet was prepared. The purpose of this data sheet is to inform and assume a correct technological use of the product. PAKELO MOTOR OIL does not take any responsibility resulting from any damage or injury resulting from abnormal use.



## Pakelo Motor Oil Lubricants

### Material Safety Data Sheet

#### 1 - Preparation and company identification

Identification of the preparation 0282 PAKELO GOLDEN DIESEL HP/A SAE 15W/40

Preparation use Engine oil.

Company PAKELO MOTOR OIL srl  
Via Fontanelle - 37047 S. Bonifacio (Verona) -Italy-  
(Tel.+39 045-6101643)

Emergency telephone +39 045 6101643 (Mon - Fri 8 - 12 / 14 - 18)  
Urgently seek medical assistance. Transport to hospital or medical centre with MSDS.  
If ingestion occurs contact Poisons Information Centre.

Business references mail: schedi.sicurezza@pakelo.it

#### \* 2 - Hazards identification

Main risks to health/environment No particular risks in normal working conditions. We recommend, however, to keep normal personal hygiene and to avoid frequent and prolonged contact. Use according to good working practice avoiding to disperse the product in the environment.

Hazards The substance is not regarded as hazardous according to the Directive 1272/2008/EEC.

Other hazards This product does not contain any PBT or vPvB substances.

#### \* 3 - Composition / Information on ingredients

Ingredients composition

##### No. 1272/2008/CE

lubricating oils (petroleum), C24-50, solvent-extd., dewaxed, hydrogenated No. EU: 309-877-7 No. CAS: 101316-72-7	<78.59 %	01-2119489969-06-XXXX
Phosphorodithioic acid, mixed O,O-bis(1,3-dimethylbutyl and iso-Pr)esters, zinc No. EU: 283-392-8 No. CAS: 84605-29-8	<1.19 %	01-2119493626-26 Eye Dam. 1; H318 Aquatic Chronic 2; H411 Skin Irrit. 2; H315
Benzene sulfonic acid, mono-C16-24-alkyl derivatives, calcium salts No. EU: 274-263-7 No. CAS: 70024-69-0	<0.55 %	01-2119492616-28 Skin Sens. 1; H317
Dodecylphenol, mixed isomers (branched) No. EU: 310-154-3	<0.1 %	01-2119513207-49 Aquatic Acute 1; H400 Aquatic Chronic 1; H410 Eye Irrit. 2; H319 Repr. 2; H361fd Skin Irrit. 2; H315

Please refer to section 16 for more information about R phrases referred to.

Components information The content of DMSO extract, determined with the IP 346/92 method is lower than 3% in weight.

Chemical composition Paraffinic solvent highly refined base stocks blended with additive packages.



## Pakelo Motor Oil Lubricants

### Material Safety Data Sheet

#### 4 - First aid measures

Inhalation	In case of exposure to high concentration of vapours or fogs move the person from contaminated area to well ventilated place. Seek medical assistance if necessary. If you suspect inhalation, urgently go to hospital.
Contact with the skin	Remove contaminated clothes and wash with soap and plenty of water. If irritation persist, get medical attention.
Contact with the eyes	Immediately flush eyes with plenty of water for a few minutes while keeping eyelids open. Get medical attention.
Ingestion	Do not induce vomit to avoid aspiration through the respiratory tract. Get medical attention.

#### 5 - Fire-fighting measures

Fire-fighting equipment	Extinguish flames with foam, dry chemicals, CO <sub>2</sub> .
Inappropriate extinguishers	Do not use direct water jets. Use water jets just to cool down surfaces exposed to fire.
Specific dangers in case of exposition to the chemicals, its combustion products or gases	Avoid breathing combustion fumes that, in case of fire, can form carbon monoxide, carbon dioxide, oxid of sulphur, phosphorus, zinc and unburnt hydrocarbon compounds and other derivatives potentially dangerous.
Specific protective equipment for fire-fighting personnel	Wear protective overalls with self-breathing equipment.

#### 6 - Accidental release measures

Person - related safety precautions	Wear gloves, protecting clothes and glasses. In case of indoors significant spill avoid to breathe vapours by ventilating the area or by wearing breath protecting equipment. Remove possible ignition sources.
Environmental precautions	Avoid to disperse the product in ground, into sewers and into surface waters. If necessary inform local authorities.
Decontamination procedures	In case of significant spillage, stem and transfer product to suitable containers. Spillage on ground: stem spilled product with soil or sand, clean up spilled product and dispose according to local regulations. Spillage in water: stem immediately the spillage. Mechanically remove spilled product from the surface.

#### 7 - Handling and storage

Handling	Avoid direct contacts with the product. Avoid breathing aerosol or product mist guaranteeing a suitable ventilation in working areas. Do not smoke and avoid any contact with ignition sources. Keep containers closed when not used.
Storage	Keep the product in original containers. Storage in a fresh place, away from heating sources and direct sun exposition. Avoid to accumulate electrostatic charge. Keep closed and covered the containers to avoid infiltrations of rain. Maintain suitable ventilation of the work place.
Empty containers	The containers contain product residues. Dispose the containers in safe ecological way according to the local regulations.



## Pakelo Motor Oil Lubricants

### Material Safety Data Sheet

#### 8 - Exposure controls / personal protection

Exposure borderline values

	TLV - TWA (1)		TLV - STEL (2)	
	ppm	mg/m <sup>3</sup>	ppm	mg/m <sup>3</sup>
lubricating oils (petroleum), C24-50, solvent-extd., dewaxed, hydrogenated		5		10

(1) Long exposure limits

(2) Short exposure limits

Exposure control	Avoid the formation of hazes or aerosol and use engineering controls, ventilation or localized aspiration if necessary.
Breathing equipment	Not necessary under normal working conditions. Keep oil hazes within the TLV-TWA limit of 5 mg/m <sup>3</sup> . (A.C.G.I.H. 2000). Use masks with filters for organic vapours in case of exposure superior to the fixed limits.
Hands and skin protection	Wear gloves and protective overalls; change immediately contaminated clothes and wash them thoroughly before use. We recommend to keep normal personal hygiene and of working clothes. Wear gloves only after having thoroughly washed your hands.
Eyes protection	Wear safety protective glasses where it is possible to be in contact with the product.

#### 9 - Physical and chemical properties

Physical status :	Liquid
Colour :	Amber
Odour :	Typical
pH :	Not applicable
Water Solubility :	Insoluble
Density at 15°C/kg/l :	0,886
Kinematic Viscosity at 40°CcSt :	105,8
Flash Point (C.O.C.)°C :	215
Pour Point°C :	-34

#### 10 - Stability and reactivity

Reactivity and materials to avoid	Avoid contacts with strong acid, strong bases and oxidation agents. Avoid extreme heat and high energy sources of ignition.
Stability	Stable product in normal applications.

#### 11 - Toxicological information

Chronic toxicity	Exposure to oil vapour that exceeds Professional Inhalation Limits can cause respiratory system irritations.
Skin contact	LD50 skin (rabbit) > 2000 mg/kg (estimated). Frequent and continuous contacts could degrease skin and cause dermatitis.
Eyes contact	It can cause light irritation.
Oral toxicity	LD50 (rats): > 2000 mg/kg (estimated). The product if ingested can irritate the digestive apparatus and induce vomiting, cause nausea and diarrhea.
Inhalation	Long term exposure to the product mist can cause irritation to the respiratory system.





**Pakelo Motor Oil**  
Lubricants

## Material Safety Data Sheet

### 12 - Ecological information

Mobility	The product keeps afloat.
Degradability	Not determined.
Accumulation	Not determined.
Ecotoxicity	In compliance with EEC Regulations the product is not regarded as hazardous to the environment.

### 13 - Disposal considerations

General information	Do not dispel the environment. Comply with the current laws.
Disposal	Avoid to disperse the product on ground, into sewers and surface waters. Discharge the exhausted products and the containers through the authorized industries in compliance with the state and local regulations for disposal of this type of waste.

### 14 - Transport information

#### Not hazardous for the transport.

Transport name	PAKELO GOLDEN DIESEL HP/A SAE 15W/40
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### \* 15 - Regulatory information

Reference Laws	This Safety Data Sheet complies with the Regulation n.453/2010.  Regulation (CE) n.1907/2006 (REACH); Regulation (CE) n.1272/2008 (GHS/CLP); I ATP n.790/2009; II ATP n.86/2011; III ATP n.618/2012; IV ATP n.487/2013.  Refer also to local laws.
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### \* 16 - Other information

Relevant R and H phrases	H315 Causes skin irritation. H317 May cause an allergic skin reaction. H318 Causes serious eye damage. H319 Causes serious eye irritation. H361f Suspected of damaging fertility.Suspected of damaging the unborn child. H400 Very toxic to aquatic life. H410 Very toxic to aquatic life with long lasting effects. H411 Toxic to aquatic life with long lasting effects.
Warning	The information presented in this Material Safety Sheet is based on data believed to be accurate as of the date this Material Safety Data Sheet was prepared. The purpose of this data sheet is to inform and assume a correct technological use of the product. PAKELO MOTOR OIL does not take any responsibility resulting from any damage or injury resulting from abnormal use.



## Pakelo Motor Oil Lubricants

### Material Safety Data Sheet

#### \* 1 - Preparation and company identification

Identification of the preparation	4026 PAKELO GEAR OIL EP/E GL-5 SAE 80W/90
Preparation use	Lubricant for transmissions and differentials.
Company	PAKELO MOTOR OIL srl Via Fontanelle - 37047 S. Bonifacio (Verona) -Italy- (Tel.+39 045-6101643)
Emergency telephone	+39 045 6101643 (Mon - Fri 8 - 12 / 14 - 18) Urgently seek medical assistance. Transport to hospital or medical centre with MSDS. If ingestion occurs contact Poisons Information Centre.
Business references	mail: <a href="mailto:schede.sicurezza@pakelo.it">schede.sicurezza@pakelo.it</a>

#### \* 2 - Hazards identification

Hazards	The substance is not regarded as hazardous according to the Directive 1272/2008/EEC.		
Label Elements	<table> <tr> <td>Contain</td><td>Polysulfides, di-tert-Bu: Can Cause allergic reaction Reaction products of bis(4-methylpentan-2-yl)dithiophosphoric acid with phosphorus oxide, propylene oxide and amines, C12-14 alkyl (branched): Can Cause allergic reaction</td></tr> </table>	Contain	Polysulfides, di-tert-Bu: Can Cause allergic reaction Reaction products of bis(4-methylpentan-2-yl)dithiophosphoric acid with phosphorus oxide, propylene oxide and amines, C12-14 alkyl (branched): Can Cause allergic reaction
Contain	Polysulfides, di-tert-Bu: Can Cause allergic reaction Reaction products of bis(4-methylpentan-2-yl)dithiophosphoric acid with phosphorus oxide, propylene oxide and amines, C12-14 alkyl (branched): Can Cause allergic reaction		
Main risks to health/environment	No particular risks in normal working conditions. We recommend, however, to keep normal personal hygiene and to avoid frequent and prolonged contact. Use according to good working practice avoiding to disperse the product in the environment.		
Other hazards	This product does not contain any PBT or vPvB substances.		



## Pakelo Motor Oil Lubricants

### Material Safety Data Sheet

#### \* 3 - Composition / Information on ingredients

##### Ingredients composition

##### No. 1272/2008/CE

Residual oil (crude oil) refine with solvent No. EU: 265-101-6	No. CAS: 64742-01-4	<=56.00 %	01-2119488707-21
lubricating oils (petroleum), C24-50, solvent-extd., dewaxed, hydrogenated No. EU: 309-877-7	No. CAS: 101316-72-7	<=37.50 %	01-2119489969-06-XX
Polysulfides, di-tert-Bu No. EU: Polimero		<=3.00 %	Aquatic Chronic 4; H413 Skin Sens. 1; H317
Reaction products of bis(4-methylpentan-2-yl)dithiophosphoric acid with phosphorus oxide, propylene oxide and amines, C12-14 alkyl (branched) No. EU: 931-384-6		<=1.00 %	01-2119493620-38 Acute Tox. 4; H302 Aquatic Chronic 2; H411 Eye Dam. 1; H318 Skin Sens. 1; H317
Reaction product of 1,3,4-thiadiazolidine-2,5-dithione, formaldehyde and phenol, heptyl derivs No. EU: 939-460-0		<=0.50 %	Skin Irrit. 2; H315 Skin Sens. 1; H317 Aquatic Chronic 3; H412 Eye Dam. 1; H318 Flam. Liq. 3; H226
Oleilamine No. EU: 204-015-5		<=0.50 %	Acute Tox. 4; H302 Aquatic Acute 1; H400 Eye Dam. 1; H318 Skin Corr. 1C; H314 Skin Sens. 1; H317

Please refer to section 16 for more information about R phrases referred to.

**Components information** The content of DMSO extract, determined with the IP 346/92 method is lower than 3% in weight.

**Chemical composition** Paraffinic solvent highly refined base stocks blended with additive packages.

#### 4 - First aid measures

Inhalation	In case of exposure to high concentration of oil mist, move into fresh air. Seek medical attention if necessary. If you suspect that there has been inhalation, urgently go to hospital with the patient.
Contact with the skin	Remove contaminated clothing. Wash thoroughly with water and then with soap and water. If symptoms persist, seek medical attention.
Contact with the eyes	Immediately flush eyes with large amounts of water and keep eyelids open for a few minutes. Get prompt medical attention.
Ingestion	Do not induce vomit to avoid sucking through the respiratory tract. Seek medical help.

#### 5 - Fire-fighting measures

Fire-fighting equipment	Extinguish flames with foam, dry chemicals, CO2.
Inappropriate extinguishers	Do not use direct water jets. Use water jets just to cool down surfaces exposed to fire.
Specific dangers in case of exposition to the chemicals, its combustion products or gases	Avoid breathing combustion fumes that, in case of fire, can form carbon monoxide fuel gases, carbon dioxide, sulphur, phosphorus, nitrogen and unburnt hydrocarbon compounds and other derivatives potentially dangerous.
Specific protective equipment for fire-fighting personnel	Wear protective overalls with self-breathing equipment.



## Pakelo Motor Oil Lubricants

### Material Safety Data Sheet

#### 6 - Accidental release measures

Person - related safety precautions	Wear gloves and protective glasses. In case of spillage of considerable quantities into bordering place, avoid to breathe exhalations; air the environment or wear protective breathing apparatus. Remove any possible ignition sources.
Environmental precautions	The product contains substances harmful to the aquatic environment. Avoid to drain the product into sewers or into waterways otherwise inform the relevant local authorities.
Decontamination procedures	In case of significant amount of spilled product, control and transfer the product in suitable containers. Spillage on ground: Control spilled product with earth or sand. Clean up spilled product and dispose according to local regulations. Spillage in water: Border immediately the spillage. Remove spilled product from the surface with mechanical equipment.

#### 7 - Handling and storage

Handling	Avoid direct contacts with the product. Do not breathe aerosol or product mist guaranteeing a suitable ventilation in working areas. Do not smoke and avoid any contact with ignition sources. Keep containers closed when not used.
Storage	Keep the product in originals containers. Storage in a fresh place, away from heating sources and direct sun exposition. Avoid to accumulate electrostatic charge. Keep closed and covered the containers to avoid infiltrations of rain. Maintain suitable ventilation of the work place.
Empty containers	The containers contain product residues. Dispose the containers in safe ecological way according to the local regulations.

#### 8 - Exposure controls / personal protection

##### Exposure borderline values

	TLV - TWA (1)		TLV - STEL (2)	
	ppm	mg/m <sup>3</sup>	ppm	mg/m <sup>3</sup>
Residual oil (crude oil) refine with solvent		5		10
lubricating oils (petroleum), C24-50, solvent-extd., dewaxed, hydrogenated		5		10

(1) Long exposure limits

(2) Short exposure limits

Exposure control	Avoid the formation of hazes or aerosol and use engineering controls, ventilation or localized aspiration if necessary.
Breathing equipment	Not necessary under normal working conditions. Keep oil hazes within the TLV-TWA limit of 5 mg/m <sup>3</sup> . (A.C.G.I.H. 2000). Use masks with filters for organic vapours in case of exposure superior to the fixed limits.
Hands and skin protection	Wear gloves and protective overalls; change immediately contaminated clothes and wash them thoroughly before use. We recommend to keep normal personal hygiene and of working clothes. Wear gloves only after having thoroughly washed your hands.
Eyes protection	Wear safety protective glasses where it is possible to be in contact with the product.

## Material Safety Data Sheet

### 9 - Physical and chemical properties

Physical status :	Liquid
Colour :	Dark amber
Odour :	Typical
pH :	Not applicable
Water Solubility :	Insoluble
Density at 15°Ckg/l :	0,899
Kinematic Viscosity at 40°CcSt :	131
Flash Point (C.O.C.) :	>200
Pour Point :	-28

### 10 - Stability and reactivity

Reactivity	Avoid contacts with strong acid, strong bases and oxidation agents. Avoid extreme heat and high energy sources of ignition.
Stability	Stable product in normal applications.

### 11 - Toxicological information

Chronic toxicity	Exposure to oil vapour that exceeds Professional Inhalation Limits can cause respiratory system irritations.
Skin contact	LD50 skin (rabbit) estimated > 2000 mg/kg. Frequent and continuous contacts could degrease and irritate skin and cause dermatitis. The product may cause sensitization by skin contact.
Eyes contact	It can cause light irritation.
Oral toxicity	LD50 (rats): > 2000 mg/kg (estimated). The product if ingested can irritate the digestive apparatus and induce vomiting, cause nausea and diarrhea.
Inhalation	Long term exposure to the product mist can cause irritation to the respiratory system.

### 12 - Ecological information

Mobility	The product keeps afloat.
Degradability	Not determined.
Accumulation	Not determined.
Ecotoxicity	In compliance with EEC Regulations the product is not regarded as hazardous to the environment.
Ecotoxicity Test	LC50 acute for freshwater fish: 20 - 200 mg/L. LC50 acute for freshwater invertebrates: 20 - 200 mg/L. EC50 acute for algae: 20 - 200 mg/L. LC50 acute for saltwater fish: 20 - 200 mg/L. LC50 acute for saltwater invertebrates: 20 - 200 mg/L.

### \* 13 - Disposal considerations

General information	Do not dispel the environment. Comply with the current laws.
Disposal	Avoid to disperse the product on ground, into sewers and surface waters. Discharge the exhausted products and the containers through the authorized industries in compliance with the state and local regulations for disposal of this type of waste.

### 14 - Transport information

#### Not hazardous for the transport.

Transport name	PAKELo GEAR OIL EP/E GL-5 SAE 80W/90
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### \* 15 - Regulatory information

Reference Laws	This Safety Data Sheet complies with the Regulation n.453/2010.
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## Pakelo Motor Oil Lubricants

### Material Safety Data Sheet

Regulation (CE) n.1907/2006 (REACH); Regulation (CE) n.1272/2008 (GHS/CLP); I ATP n.790/2009; II ATP n.86/2011; III ATP n.618/2012; IV ATP n.487/2013.

Refer also to local laws.

#### \* 16 - Other information

Relevant H phrases

H226 Flammable liquid and vapour.  
H302 Harmful if swallowed.  
H314 Causes severe skin burns and eye damage.  
H315 Causes skin irritation.  
H317 May cause an allergic skin reaction.  
H318 Causes serious eye damage.  
H319 Causes serious eye irritation.  
H400 Very toxic to aquatic life.  
H411 Toxic to aquatic life with long lasting effects.  
H412 Harmful to aquatic life with long lasting effects.  
H413 May cause long lasting harmful effects to aquatic life.

Warning

The information presented in this Material Safety Sheet is based on data believed to be accurate as of the date this Material Safety Data Sheet was prepared. The purpose of this data sheet is to inform and assume a correct technological use of the product. PAKELO MOTOR OIL does not take any responsibility resulting from any damage or injury resulting from abnormal use.



## Pakelo Motor Oil Lubricants

### Material Safety Data Sheet

#### \* 1 - Preparation and company identification

Identification of the preparation 4292 PAKELO GOLDENSTAR LA 77-51 SAE 5W/30

Preparation use Engine oil.

Company PAKELO MOTOR OIL srl  
Via Fontanelle - 37047 S. Bonifacio (Verona) -Italy-  
(Tel.+39 045-6101643)

Emergency telephone +39 045 6101643 (Mon - Fri 8 - 12 / 14 - 18)  
Urgently seek medical assistance. Transport to hospital or medical centre with MSDS.  
If ingestion occurs contact Poisons Information Centre.

Business references mail: schedi.sicurezza@pakelo.it

#### \* 2 - Hazards identification

Main risks to health/environment No particular risks in normal working conditions. We recommend, however, to keep normal personal hygiene and to avoid frequent and prolonged contact. Use according to good working practice avoiding to disperse the product in the environment.

Hazards The substance is not regarded as hazardous according to the Directive 1272/2008/EEC.

Other hazards This product does not contain any PBT or vPvB substances.

#### \* 3 - Composition / Information on ingredients

Ingredients composition

##### No. 1272/2008/CE

Distillates (petroleum), heavy paraffinic, hydrotreated	<53.5 %		
No. EU: 265-157-1	No. CAS: 64742-54-7	Asp. Tox. 1; H304	
3-(3,5-di-tert-butyl-4-hydroxyphenyl)propanoate, C7-9 alkyl esters mixed	<1.07 %		01-0000015551-76
No. EU: 406-040-9	No. CAS: 125643-61-0	Aquatic Chronic 4; H413	
Reaction products of Benzeneamine,N-phenyl- white nonene	<1.07 %		05-2114603735-51
No. EU: 253-249-4		Aquatic Chronic 4; H413	
zinc bis[O-(6-methylheptyl)] bis[O-(sec-butyl)] bis(dithiophosphate)	<1.07 %		01-2119543726-33
No. EU: 298-577-9		Aquatic Chronic 2; H411 Eye Dam. 1; H318 Skin Irrit. 2; H315	

Please refer to section 16 for more information about R phrases referred to.

Components information The content of DMSO extract, determined with the IP 346/92 method is lower than 3% in weight.

Chemical composition Synthetic base oil with additives.

#### 4 - First aid measures

Inhalation In case of exposure to high concentration of vapours or fogs move the person from contaminated area to well ventilated place. Seek medical assistance if necessary. If you suspect inhalation, urgently go to hospital.

Contact with the skin Remove contaminated clothes and wash with soap and plenty of water. If irritation persists, get medical attention.

Contact with the eyes Immediately flush eyes with plenty of water for a few minutes while keeping eyelids open. Get medical attention.

Ingestion Do not induce vomit to avoid aspiration through the respiratory tract. Get medical attention.



## Material Safety Data Sheet

### 5 - Fire-fighting measures

Fire-fighting equipment	Extinguish flames with foam, dry chemicals, CO <sub>2</sub> .
Inappropriate extinguishers	Do not use direct water jets. Use water jets just to cool down surfaces exposed to fire.
Specific dangers in case of exposition to the chemicals, its combustion products or gases	Avoid breathing combustion fumes that, in case of fire, can form carbon monoxide, carbon dioxide, oxid of sulphur, phosphorus and unburnt hydrocarbon compounds and other derivatives potentially dangerous.
Specific protective equipment for fire-fighting personnel	Wear protective overalls with self-breathing equipment.

### 6 - Accidental release measures

Person - related safety precautions	Wear gloves, protecting clothes and glasses. In case of indoors significant spill avoid to breathe vapours by ventilating the area or by wearing breath protecting equipment. Remove possible ignition sources.
Environmental precautions	The product contains substances harmful to the aquatic environment. Avoid to disperse the product into sewers or into waterways. Otherwise inform local authorities.
Decontamination procedures	In case of significant spillage, stem and transfer product to suitable containers. Spillage on ground: stem spilled product with soil or sand, clean up spilled product and dispose according to local regulations. Spillage in water: stem immediately the spillage. Mechanically remove spilled product from the surface.

### 7 - Handling and storage

Handling	Avoid direct contacts with the product. Do not breathe aerosol or product mist guaranteeing a suitable ventilation in working areas. Do not smoke and avoid any contact with ignition sources. Keep containers closed when not used.
Storage	Keep the product in original containers. Storage in a fresh place, away from heating sources and direct sun exposition. Avoid to accumulate electrostatic charge. Keep closed and covered the containers to avoid infiltrations of rain. Maintain suitable ventilation of the work place.
Empty containers	The containers contain product residues. Dispose the containers in safe ecological way according to the local regulations.

### \* 8 - Exposure controls / personal protection

Exposure borderline values

	TLV - TWA (1)		TLV - STEL (2)	
	ppm	mg/m <sup>3</sup>	ppm	mg/m <sup>3</sup>
Distillates (petroleum), heavy paraffinic, hydrotreated		5		10

(1) Long exposure limits

(2) Short exposure limits





## Pakelo Motor Oil Lubricants

### Material Safety Data Sheet

Exposure control	Avoid the formation of hazes or aerosol and use engineering controls, ventilation or localized aspiration if necessary.
Breathing equipment	Not necessary under normal working conditions. Keep oil hazes within the TLV-TWA limit of 5 mg/m <sup>3</sup> . (A.C.G.I.H. 2000). Use masks with filters for organic vapours in case of exposure superior to the fixed limits.
Hands and skin protection	Wear gloves and protective overalls; change immediately contaminated clothes and wash them thoroughly before use. We recommend to keep normal personal hygiene and of working clothes. Wear gloves only after having thoroughly washed your hands.
Eyes protection	Wear safety protective glasses where it is possible to be in contact with the product.

### 9 - Physical and chemical properties

Physical status :	Liquid
Colour :	Amber
Odour :	Typical
pH :	Not applicable
Water Solubility :	Insoluble
Density at 15°Ckg/l :	0,860
Kinematic Viscosity at 40°CcSt :	70
Flash Point (C.O.C.)°C :	200

### 10 - Stability and reactivity

Reactivity and materials to avoid	Avoid contacts with strong acid, strong bases and oxidation agents. Avoid extreme heat and high energy sources of ignition.
Stability	Stable product in normal applications.

### 11 - Toxicological information

Chronic toxicity	Exposure to oil vapour that exceeds Professional Inhalation Limits can cause respiratory system irritations.
Skin contact	LD50 skin (rabbit) > 2000 mg/kg (estimated). Frequent and continuous contacts could degrease skin and cause dermatitis.
Eyes contact	It can cause light irritation.
Oral toxicity	LD50 (rats): > 2000 mg/kg (estimated). The product if ingested can irritate the digestive apparatus and induce vomiting, cause nausea and diarrhea.
Inhalation	Long term exposure to the product mist can cause irritation to the respiratory system.

### 12 - Ecological information

Mobility	The product keeps afloat.
Degradability	Not determined.
Accumulation	Not determined.
Ecotoxicity	In compliance with EEC Regulations the product is not regarded as hazardous to the environment.

### 13 - Disposal considerations

General information	Do not dispel the environment. Comply with the current laws.
Disposal	Avoid to disperse the product on ground, into sewers and surface waters. Discharge the exhausted products and the containers through the authorized industries in compliance with the state and local regulations for disposal of this type of waste.

### 14 - Transport information

**Not hazardous for the transport.**



## Pakelo Motor Oil Lubricants

### Material Safety Data Sheet

Transport name      PAKELO GOLDENSTAR LA 77-51 SAE 5W/30

#### \* 15 - Regulatory information

Reference Laws      This Safety Data Sheet complies with the Regulation n.453/2010.

Regulation (CE) n.1907/2006 (REACH); Regulation (CE) n.1272/2008 (GHS/CLP); I ATP n.790/2009; II ATP n.86/2011; III ATP n.618/2012; IV ATP n.487/2013.

Refer also to local laws.

#### \* 16 - Other information

Relevant R and H phrases

H304 May be fatal if swallowed and enters airways.

H315 Causes skin irritation.

H318 Causes serious eye damage.

H319 Causes serious eye irritation.

H411 Toxic to aquatic life with long lasting effects.

H413 May cause long lasting harmful effects to aquatic life.

Warning

The information presented in this Material Safety Sheet is based on data believed to be accurate as of the date this Material Safety Data Sheet was prepared. The purpose of this data sheet is to inform and assume a correct technological use of the product. PAKELO MOTOR OIL does not take any responsibility resulting from any damage or injury resulting from abnormal use.



## Pakelo Motor Oil Lubricants

### Material Safety Data Sheet

#### \* 1 - Preparation and company identification

Identification of the preparation 4226 PAKELO HAMMER GREASE PLUS  
Preparation use Lubricating grease.  
Company PAKELO MOTOR OIL srl  
Via Fontanelle - 37047 S. Bonifacio (Verona) -Italy-  
(Tel.+39 045-6101643)

Emergency telephone +39 045 6101643 (Mon - Fri 8 - 12 / 14 - 18)  
Urgently seek medical assistance. Transport to hospital or medical centre with MSDS.  
If ingestion occurs contact Poisons Information Centre.

Business references mail: schede.sicurezza@pakelo.it

#### \* 2 - Hazards identification

Hazards The substance is not regarded as hazardous according to the Directive 1272/2008/EEC.

Label Elements

Main risks to health/environment No particular risks in normal working conditions. We recommend, however, to keep normal personal hygiene and to avoid frequent and prolonged contact. Use according to good working practice avoiding to disperse the product in the environment.

Other hazards This product does not contain any PBT or vPvB substances.

#### \* 3 - Composition / Information on ingredients

##### Ingredients composition

##### No. 1272/2008/CE

Residual oil (crude oil) refine with solvent No. EU: 265-101-6	No. CAS: 64742-01-4	<=40.00 %	01-2119488707-21
Distillate (petroleum) hydrotreated heavy naphthenic No. EU: 265-155-0	No. CAS: 64742-52-5	<=30.00 %	01-21194671-71-xxxx
Phosphorodithioic acid, mixed O,O-bis(2-ethylhexyl and iso-Bu and iso-Pr) esters, zinc salts No. EU: 288-917-4	No. CAS: 85940-28-9	<=1.80 %	Aquatic Chronic 2; H411 Eye Irrit. 2; H319 Skin Irrit. 2; H315

Please refer to section 16 for more information about H phrases.

Components information The content of DMSO extract, determined with the IP 346/92 method is lower than 3% in weight.

Chemical composition Mineral oil highly refined thickened with aluminium complex soap, additives, graphite, copper, molybdenum and titanium.



## Pakelo Motor Oil Lubricants

### Material Safety Data Sheet

#### 4 - First aid measures

Inhalation	In case of exposure to high concentration of vapours or mist, move into fresh air. Seek medical attention if necessary. If you suspect that there has been inhalation, urgently go to hospital with the patient.
Contact with the skin	Undress the person who has come in contact with the chemical. Cleanse the skin with water and soap. Warning: in case of accidents involving pressurised pipes, any chemical may be accidentally injected in subcutaneous tissues, even without any external injury. In this case the person must be taken to the hospital for medical treatment.
Contact with the eyes	Immediately flush eyes with large amounts of water and keep eyelids open for a few minutes. Get prompt medical attention.
Ingestion	Do not induce vomit to avoid sucking through the respiratory tract. Seek medical help.

#### 5 - Fire-fighting measures

Fire-fighting equipment	Use class B fire extinguishers: carbon dioxide, dry chemical powder, fire foam, spray water, sand, earth. Contaminated firefighting water must be disposed of in accordance with official regulations.
Inappropriate extinguishers	Do not use direct water jets. Use water jets just to cool down surfaces exposed to fire.
Specific dangers in case of exposition to the chemicals, its combustion products or gases	Avoid breathing combustion fumes that, in case of fire, can form carbon monoxide fuel gases, carbon dioxide and unburnt hydrocarbon fumes.
Specific protective equipment for fire-fighting personnel	Wear protective overalls with self-breathing equipment.

#### 6 - Accidental release measures

Person - related safety precautions	Wear gloves and protective glasses. In case of spillage of considerable quantities into bordering place, avoid to breathe exhalations; air the environment or wear protective breathing apparatus. Remove any possible ignition sources.
Environmental precautions	The product contains substances harmful to the aquatic environment. Avoid to drain the product into sewers or into waterways otherwise inform the relevant local authorities.
Decontamination procedures	In case of significant amount of spilled product, control and transfer the product in suitable containers. Spillage on ground: Control spilled product with earth or sand. Clean up spilled product and dispose according to local regulations. Spillage in water: Border immediately the spillage. Remove spilled product from the surface with mechanical equipment.

#### 7 - Handling and storage

Handling	Avoid direct contacts with the product. Do not breathe aerosol or product vapours guaranteeing a suitable ventilation in working areas.
Storage	Keep the product in original containers. Storage in a fresh place, away from heating sources, direct sun exposition and temperatures over 50°C. Avoid to accumulate electrostatic charge. Keep closed and covered the containers to avoid infiltrations of rain. Maintain suitable ventilation of the work place.
Empty containers	The containers contain product residues. Dispose the containers in safe ecological way according to the local regulations.



## Pakelo Motor Oil Lubricants

### Material Safety Data Sheet

#### \* 8 - Exposure controls / personal protection

Exposure borderline values

	TLV - TWA (1)		TLV - STEL (2)	
	ppm	mg/m <sup>3</sup>	ppm	mg/m <sup>3</sup>
Residual oil (crude oil) refine with solvent		5		10
Distillate (petroleum) hydrotreated heavy naphthenic		5		10

(1) Long exposure limits

(2) Short exposure limits

Exposure control	Avoid the formation of hazes or aerosol and use engineering controls, ventilation or localized aspiration if necessary.
Breathing equipment	Not necessary under normal working conditions. Keep oil hazes within the TLV-TWA limit of 5 mg/m <sup>3</sup> . (A.C.G.I.H. 2000). Use masks with filters for organic vapours in case of exposure superior to the fixed limits.
Hands and skin protection	Wear gloves and protective overalls; change immediately contaminated clothes and wash them thoroughly before use. We recommend to keep normal personal hygiene and of working clothes. Wear gloves only after having thoroughly washed your hands.
Eyes protection	Wear safety protective glasses where it is possible to be in contact with the product.

#### 9 - Physical and chemical properties

Physical status :	Semi-solid homogeneous
Colour :	Coppery
pH :	Not applicable
Water Solubility :	Insoluble
Density at 15°Ckg/l :	0,950
Flash Point (C.O.C.)°C :	>220
NLGI grade :	2
Dropping Point°C :	>260

#### 10 - Stability and reactivity

Reactivity and materials to avoid	Avoid contacts with strong acid, strong bases and oxidation agents. Avoid extreme heat and high energy sources of ignition.
Stability	Stable product in normal applications.

#### 11 - Toxicological information

Chronic toxicity	Exposure to oil vapour that exceeds Professional Inhalation Limits can cause respiratory system irritations.
Skin contact	LD50 skin (rabbit) > 2000 mg/kg (estimated). Frequent and continuous contacts could degrease skin and cause dermatitis.
Eyes contact	It can cause light irritation.
Oral toxicity	LD50 (rats): > 2000 mg/kg (estimated). The product if ingested can irritate the digestive apparatus and induce vomiting, cause nausea and diarrhea.
Inhalation	Long term exposure to the product mist can cause irritation to the respiratory system.



## Pakelo Motor Oil Lubricants

### Material Safety Data Sheet

#### 12 - Ecological information

Mobility	The product keeps afloat.
Degradability	Not determined.
Accumulation	Not determined.
Ecotoxicity	In compliance with EEC Regulations the product is not regarded as hazardous to the environment.

#### 13 - Disposal considerations

General information	Do not dispel the environment. Comply with the current laws.
Disposal	Avoid to disperse the product on ground, into sewers and surface waters. Discharge the exhausted products and the containers through the authorized industries in compliance with the state and local regulations for disposal of this type of waste.

#### 14 - Transport information

##### Not hazardous for the transport.

Transport name	PAKELO HAMMER GREASE PLUS
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#### \* 15 - Regulatory information

Reference Laws	This Safety Data Sheet complies with the Regulation n.453/2010.  Regulation (CE) n.1907/2006 (REACH); Regulation (CE) n.1272/2008 (GHS/CLP); I ATP n.790/2009; II ATP n.86/2011; III ATP n.618/2012; IV ATP n.487/2013.  Refer also to local laws.
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#### \* 16 - Other information

Relevant H phrases	H315 Causes skin irritation. H319 Causes serious eye irritation. H411 Toxic to aquatic life with long lasting effects.
Warning	The information presented in this Material Safety Sheet is based on data believed to be accurate as of the date this Material Safety Data Sheet was prepared. The purpose of this data sheet is to inform and assume a correct technological use of the product. PAKELO MOTOR OIL does not take any responsibility resulting from any damage or injury resulting from abnormal use.





api - anonima petroli italiana S.p.A.

Safety sheet: DIESEL



**SECURITY SHEET**  
**TECHNICAL INFORMATION**  
**DIESEL**  
**(all types)**



Xn

N

**1 IDENTIFICATION CARD OF THE PRODUCT AND COMPANY'S DATAS**

**1.1 PRODUCT IDENTIFICATION: DIESEL ( all types )**
**1.2 PRODUCT'S USE:**

 Fuel for internal combustion engines,  
 Fuel for heating,  
 Fuel for other industrial uses.

**1.3 COMPANY'S FULL STYLE:**
**api anonima petroli italiana S.p.A.**

Via Salaria 1322- 00132 Roma

Tel. 06-84934111 / FAX. 84937458

TLX 610068-622268 Tlg.APIOIL

**www.apioil.com**

C.C.I.A.A. 103708 Iscr. Trib. Roma 559/39

Cod. Fisc. 00441670585 P.IVA 0893861005

**1.4 EMERGENCY TELEPHONE:**

 Anti poisoning "POLICLINICO GEMELLI"  
 Tel. +39 06.305.43.43

**1.5 TECHNICAL COMPETENT**
**SECURITY DATA SHEET :**
**sicurezza@gruppoapi.com**
**1.6 FURTHER INFORMATION:**

- |             |              |
|-------------|--------------|
| • N° CAS    | 68476-34-6   |
| • N° EINECS | 270-676-1    |
| • N° Index  | 649-227-00-2 |

**2 IDENTIFICATION OF DANGERS**

**2.1 CHARACTERISTICS**

Risks - the product, in the standard conditions of use and with due precautions, doesn't present particular risks for the user.

Classification - according to the current legislation the product is considered as dangerous and its classification is: Xn, N; R40, R51/53, R65, R66.

*(For the full text of the sentences R, see part. 16).*
**2.2 PHYSICAL-CHEMICAL HAZARDS: RISKS OF FIRE OR BLOWING**

The greatest danger related to this product is the fire risk due to its high flammability. The heated product may generate vapors which mixed to air can become very flammable and explosive.

The product's vapors, heavier than air, can accumulate in confined areas or depressions and spread at ground with risk of fire and explosion, also at distance.

**2.3 HEALTH DANGERS**
**Skin contact** - Frequent and prolonged contact with the skin may cause irritation, redness and dermatitis from contact with the possibility of malignant skin alterations. This type of risk is very low if the handling standard procedures are respected together with a good personal hygiene.

**Eyes contact** - The accidental contact and the prolonged exposure to vapors can cause eye irritation.

**Inhalation** - The exposition to vapor's high concentration, for example in closed areas and not properly ventilated places, may generate respiratory irritation, sickness, nausea, and stunning. There are still insufficient records to classify the potential irritation of the respiratory tract linked to aerosol inhalation of the product. The product has a low volatility, even at room temperature, so it doesn't produce a significant concentration of vapors. In particular conditions (at high temperatures, fogs) the



api - anonima petroli italiana S.p.A.

Safety sheet: DIESEL

exposure can cause respiratory tract irritation, nausea, sickness and dizziness, particularly in confined and not properly ventilated places.

**Ingestion** - in case of accidental small quantities ingestion it may cause nausea, sickness and stomach upset.

Due to the organoleptic characteristics of the product, the ingestion of large quantities are considered improbable.

**Inhalation** - For all petroleum products at low viscosity, specific risk is linked to suction fluid in the lungs, which can occur directly as a result to, or later in the case of vomiting, spontaneous or provoked. In that eventuality may arise chemical pneumonia, a condition that requires medical treatment and can be fatal. The petroleum products that present such a risk are those with a viscosity of less than 7 mm<sup>2</sup>/s at 40 ° C. For this reason, the Directive 96/54 EC requires that the product be labeled as "Harmful" with the risk phrase R65 ( "Harmful: may cause lung damage if swallowed"), in order to highlight the risk described.

**Exposure** - Some of these chemical compounds may have potentially harmful effects when the exposure is prolonged. So the exposure must be limited. For toxicological characteristics of the product, see section 11 of the tab.

## 2.4 DANGERS FOR THE ENVIRONMENT

**Photochemical smog** - Given the characteristics of the components, a small part of the product evaporates and escapes into the air, and this phenomenon contributes to the formation of photochemical smog.

**Biodegradability** - The remaining part has a low biodegradability under anaerobic conditions and can be persistent.

**Aquatic organisms** - Some of the chemical compounds present have a potential bioaccumulation that can result harmful to aquatic organisms.

## 2.5 OTHER DANGERS: ELEVATED ELECTROSTATIC CHARGES

In some circumstances, the product can earn electrostatic charges in considerable quantity with the risk of discharges that may trigger fires or explosions.

# 3 COMPOSITION

## 3.1 DEFINITION

A mixture of hydrocarbons obtained by distillation and refining of crude oil, with carbon atoms number C9 and C20 and distillation range approximately between 160°C ÷ 390°C.

## 3.2 DANGEROUS COMPOUNDS

This product may contain one or more of the following components, from time to time in different proportions which can't be defined in variables.

- Diesels, not otherwise specified: % peso 0÷100, which are classified:  
Xn, N; R40, R51/53, R65, R66
- Kerosene (not otherwise specified): from 0 to 10 % p.  
(For the complete text of the sentences R, see part. 16).

## 3.3 OTHER INFORMATION: PRESENCE OF OTHER COMPONENTS

Depending on the characteristics and origin of the components in the chemical composition of the finished product there can be identified some of the following chemicals:

- Trimetil benzenes, Alchin benzenes Naphthalene and others in different amounts which are not predictable.

These compounds are not deliberately added.

It may contain esters from fatty acids (bio diesel) which shall not exceed 5% max.

# 4 FIRST AID WORLD

## 4.1 SKIN CONTACT

Take off contaminated clothes and shoes; wash the skin with water and soap; don't reuse the still contaminated clothes.

## 4.2 EYES CONTACT

Wash well with plenty of water for some minutes, keeping eyes wide open; if the irritation persists get medical help.

## 4.3 INHALATION

In case of exposition to high concentration of fog and / or vapors, carry the injured into the unpolluted atmosphere and immediately call a doctor. If breathing is irregular or stopped, practice artificial respiration, in the event of heart arrest, do the cardiac massage.

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Safety sheet: DIESEL

#### 4.4 INGESTION

Do not induce vomit to avoid aspiration in the lungs.  
If the person is conscious, rinse the mouth with water without swallowing it.  
Keep the injured calm and call immediately a doctor.

#### 4.5 ASPIRATION

If, in case of spontaneous vomit, you suppose that the liquid product has been aspirate in the lungs, take him to a hospital immediately.

### 5 FIRE-FIGHTING MEASURES

#### 5.1 MEANS OF EXTINCTION

Appropriate means of extinction: foam, dry powder, carbon dioxide and water spray.  
Avoid using water jets on directly on the fire or inside the burning tanks, because they can cause spontaneous boiling.

#### 5.2 PRECAUTIONS

- Isolate the area and always assure yourself to keep a way out from the flames.
- Use spray water to protect the staff and to cool surfaces exposed to fire; it is preferable if the water spray jets are used by specially trained personnel.
- Cover the spills that aren't burning with foam or soil.

#### 5.3 DANGEROUS PRODUCTS FROM COMBUSTION

The combustion may generate the following dangerous compounds:  
Oxides of carbon (COx); Sulphurated Oxides (SOx); Aldehydes; unburned Hydrocarbons (HC) and other products from decomposing, in case of incomplete combustion.

#### 5.4 SPECIAL EQUIPMENT FOR FIRE EMPLOYEES

In the event of fire either in confined places (buildings) or in open air means of protection for eyes and breathing should always be used. Only in case of small fires in open areas that can be easily extinguished with portable fire extinguishers, the breathing apparatus may not be necessary.

### 6 PROCEDURE TO APPLY IN CASE OF ACCIDENTAL LEAKAGE

#### 6.1 STANDARD PROCEDURES

- Put off the possible sources of ignition.
- If the area is closed, ventilate it.
- If possible, stop the spreading at the origin.
- Avoid the liquid spreading and send it to sewerage or incineration in accordance with the current legislation.
- Tell the occupants of the areas downwind of the risk of explosion and fire.
- Inform the competent authorities in accordance with the current legislation.

#### 6.2 DISPERSION IN THE SOIL

- Try to contain the leakage with earth, sand or other absorbent mean.
- Collect the product and in appropriate waterproof containers and resistant to hydrocarbons.
- Start a recovery or disposal, in accordance with the legislation in force.

#### 6.3 DISPERSION IN WATER

- Take away the leaked product from the surface utilizing the appropriate mechanical or absorbent means.
- Start the recovery or disposal, in accordance with the legislation in force.

#### 6.4 PERSONNEL PROTECTION

- See part. 8.

### 7 HANDLING AND STORAGE

#### 7.1 HANDLING

- Don't smoke. Always work in well ventilated areas and in accordance with the current legislation relating with fire prevention.
- During the transferring operations and the mixing processes, observe the protective measures against electrostatic discharge (link to the land of containers).
- Do not puncture, cut, rub, solder, incinerate or burn empty containers not reclaimed, may still contain traces of the product.
- Avoid contact with skin. Avoid breathing product vapors.



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**7.2 STORING**

- Recommended storing temperature: not superior to 50°C.
- Don't store near source of ignition.

**8 PERSONAL PROTECTION / EXPOSURE LIMIT VALUES**
**8.1 EXPOSURE LIMIT VALUES**

Most significant exposure limit values

Index	Substance	Value	Unit	Reference
TLV-TWA	Diesel (total HC)	100	mg/m <sup>3</sup>	(A.C.G.I.H.2004)
TLV-TWA	Fog mineral oil	5	mg/m <sup>3</sup>	(A.C.G.I.H.2004)
TLV-STEL	Fog mineral oil	10	mg/m <sup>3</sup>	(A.C.G.I.H.2004)
TLV-TWA	Naphthalene	10	ppm	(A.C.G.I.H.2004)
TLV-STEL(*)	Naphthalene	15	ppm	(A.C.G.I.H.2004)
TLV TWA	Trimetil benzene	20	ppm	(D.Min. 26/02/2004)
TLV TWA	2-Fenilpropene	100	ppm	(D.Min. 26/02/2004)
TLV STEL(*)	2-Fenilpropene	200	ppm	(D.Min. 26/02/2004)

(\*) It is important always to be aware of skin contact.

Caption

TLV-TWA      Average concentration per working day of 8 hours and 40 hours per week (chronic exposure)

TLV-STEL      Maximum concentration for short periods of time (peak).

Experience shows that if you are below the values listed above, which is expected to compliance with the limits for any other chemical compounds mentioned in Section 2 of this card. If you need to refer to the limits listed in the D. Min. 26/02/2004, in a contract of employment or in the documentation ACGIH Monitoring recommended procedures: refer to the D. Lgs. 25/2002

**8.2 EXPOSURE CONTROL**

**Technical means of protection** - In case of over exposure of the product in the air as mentioned in the above limits and the other means to reduce wouldn't result sufficient, it may be necessary to provide personal protective equipment.

**Respiratory protection** - The product has a low vapor pressure, at room temperature so it is not sufficient to produce a significant concentration of vapors.

In ventilated areas or in open spaces (ex. Gasoline station)	None
In closed areas (ex. Inside a tank)	Respiratory equipment as in D.M. 02.05.01

**Hands, eyes, skin protection**

General	Use DPI in accordance with the D.M. 02.05.01
Skin	In case of manipulation, use clothes with long sleeves. In this case refer to UNI EN 465-466-467.
Eyes	In the event of eyes contact, use goggles or other means of protection. In the case refer to UNI EN 166.
Hands	In the event of repeated contact / prolonged contact with the skin, use special gloves. Experience shows that the nitrile gloves or PVA (Polyvinylalcohol) are adequate for the purpose. Use gloves in accordance with the conditions and limitations set by the constructor. The neoprene, or PVC natural rubber (latex) does not have adequate resistance characteristics. In the case refer to UNI EN 374.

**Hygienic measures**

- Avoid skin and eyes contact. Don't breath the fogs / the vapors of the product.
- Use good personal hygiene practice: wash your hands with water and soap, don't use solvents or other irritating and degreasing substances.
- Don't eat, don't drink, or smoke with the hands dirty of product.
- Don't reuse the still contaminated clothes and don't keep dirty rags in the pockets.

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**9 PHYSICAL AND CHEMICAL PROPERTIES**

<i>Characteristics</i>	<i>Value</i>	<i>Notes</i>
Aspect	Clear Liquid	visual
Smell	Pungent	
PH	Not applicable	
Distillation interval, °C	160 ÷ 390	ASTM D-86 / ISO 3405
Flammability point, °C:	> 55	ASTM D-3828 / ISO 2719
Density at 15°C Kg/dm <sup>3</sup>	0,820 ÷ 0,865	ASTM D-1298 /ISO 3675
Water solubility	Not soluble	
Sharing Coeff. n-Ottanol/water , log Kow	3,3 ÷ 6,0	
Viscosity a 40°C, mm <sup>2</sup> /s:	<7	ASTM D-445
Temp. of auto ignition, °C:	>220	DIN 51794
Explosion limits, %Vol in air:	Inf.: 1    Sup.: 6	

**10 STABILITY AND REACTIVITY**
**10.1 PRODUCT STABILITY:** Stable product.

**10.2 DANGEROUS REACTIONS:** Do not happen.

**10.3 INCOMPATIBLE SUBSTANCES:** Strong oxidants.

**10.4 FIRE DECOMPOSITION COMPOUNDS.**

In case of fire the product may generate: carbon oxides COx), unburned Hydrocarbons (HC). Sulfur oxides (SOx), aldehydes and to other decomposition products in case of incomplete combustion.

**11 TOXICOLOGICAL INFORMATION**
**11.1 VERY HIGH TOXIC: LIMIT VALUES**

Index	way	Animal	Limit	Unit
LD <sub>50</sub>	Oral	mouse	> 2000	mg/kg
LD <sub>50</sub>	Cutaneous	rabbit	> 2000	mg/kg
LD <sub>50</sub>	respiratory	mouse	> 5	mg/l/4h

There is no experimental value for LC50.

The indicated value is estimated, on the escort of intermediate information coming from refinery with analogous interval of distillation and carbon atom number.

**Effects** - It can cause skin, eyes, respiratory irritation, due to over exposure and to incorrect utilization.

The prolonged inhalation of the vapors can cause nausea and dizziness.

**11.2 CHRONIC TOXICITY**

**Evidence on man** - The diesel oils have given results of uncertain interpretation in long term studies on rats,. In fact the IARC, in its publication of 1989 on main fuel of oil origin, has assigned to the "Distillates Diesel Light Fuels" to its Group 3 (not classifiable Agent for carcinogenic properties on man, for inadequate studies).

**Classification** - Therefore in 21° the ATP (Adaptation to Technical Progress) of the directive 67/548 CE, the diesel oil trades them has been classified "carcinogen of Category 3" with phrase of risk R 40 (Danger of irreversible effects-tests insufficient).

**12 ECOLOGICAL INFORMATION**

**Volatility** - In case of environmental dispersion, the major flow constituent of the product evaporates in the atmosphere, where they endure rubbish degradation processes and they favor the formation of photochemical smog.

**Biodegradability** - The product is poorly biodegradable. In the case of dispersion in the environment, the remainder does not flow, therefore can be moderately persistent, particularly in anaerobic conditions.



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**Potential bioaccumulation** - Some of the compounds potentially present a potential bioaccumulation (Log. Kow > 3).

**Eco toxicity** - No data are available on eco toxicity.

**Toxicity for the aquatic organisms** - Based on the composition, and by analogy with oil products and fractions of the same type, it is presumed that this product has a toxicity to aquatic organisms between 1 e 10 mg/l and it is considered dangerous for the environment.

**Specifications for injunctions** - This product has no specific nature of inhibition of bacterial cultures. In any case, the contaminated water of the product must be treated in wastewater treatment plants suitable for the purpose.

**Conditions of use** - Use properly instead of dispersing it.

### 13 DISPOSAL OBSERVATIONS

Do not download on the ground or in sewers, tunnels or watercourses. For the disposal of waste arising from the product, including empty containers not reclaimed, use the Leg. 22/97 and legislation.

**European Code Waste Catalogue:** 13 07 01 (Directive Environment Ministry 09/04/02)

The code is only a guideline, based on the original product composition and use expected. The user has the final responsibility to choose the most appropriate code on the basis of genuine product, any alteration or contamination. The product as such does not contain halogenated compounds.

### 14 SHIPPING INFORMATION

Shipping labeling		
Denomination ONU	Diesels, Diesel fuels, Light heating oils.	
Denomination ONU	UN 1202 DIESEL, 3 III	
Number ONU	1202	
R.I.D./A.D.R. Transport on the road /by railway	Class	:3
	Classification Code	:F1
	Warning label	:3
	Identif.N° of warning (N° Kemler)	:30
	Packaging group	:III
A.D.N.R. Fluvial Transport	Class	:3
	Classification Code	:F1
	Warning label	:2.1
	Packaging Group	:III
I.M.O. - I.M.D.G. Transport by sea	Class	:3
	Warning label	:3
	Security shift for transportation	:F-E, S-E
	Sea polluting	: Non
	Packaging group	: III

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O.A.C.I. - I.A.T.A	Class	:3
Transport by Air	Warning label	:3
	Packaging group	:III
	Special dispositions	:274 - 583

## 15 LEGISLATION INFORMATION

### 15.1 CLASSIFICATION

Product ranked based on the Legislative Decree No. 65 of 14/03/03 and D. Min Health 14 June 2002 and its related regulations: relating to the classification and discipline of packaging and labeling of dangerous substances and preparations.

### 15.2 LABELING

Symbols


**Xn**
**N**

Risks signs, R:

R10, R40, R51/53, R65, R66

Care recommendation, S:

S2, S24, S29, S36/37, S61, S62

(For the complete sentences text R and S, see part.16)

### 15.3 LEGISLATION INFORMATION

DPR n°547/1955	Rules and regulations for the prevention of accidents at work and subsequent changes and additions
DPR n°303/1956	General rules for hygiene at work and subsequent amendments thereto (Case Risk No. 47)
DPR n°336/1994	Table of occupational diseases in industries.
DL n°626/1994, D. Lg. 242/96 e 25/2002 and subsequent amendments and additions	"Implementation of the Directives 89/391/EEC, 89/654/EEC, 89/655/EEC, 89/656/EEC, 90/269/EEC, 90/270/EEC, 90/394/EEC, 90/679 / EEC, 93/88/EEC, 95/63/EC, 97/42/EC, 98/24/EC, 99/38/CE regarding improvements in the safety and health of men at work".

## 16 FURTHER INFORMATION

### 16.1 CONFORMITY

Sheet in accordance with the provisions set out in Directive 2001/58/EC and Decree 07/09/2002 and subsequent modifications and additions.

Card complies with the regulations 1907/2006/CE: REACH.

The data and information reported in this security card are in accordance with the current legislation, however, the user is recommended to check and comply with his national, regional and local measures concerning hazardous activities and environmental protection, which are not mentioned in this document.

### 16.2 RISKS SIGNS DESCRIPTION "R" AND CARE ADVICE "S"

Risks signs, R

R 10	Flammable
R 40	Risks of irreversible effects
R 51/53	Toxic to aquatic organisms, may cause long-term adverse effects in the aquatic environment.

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R 65	Toxic: can cause lung damages
R 66	The repeated exposure can cause dryness and cracks to the skin

#### Care recommendation, S

S 2	Keep away from children reach (obligatory)
S 24	Avoid skin contact
S 29	Don't throw waste into drains
S 36/37	Use protective clothing gloves
S 61	Do not release in the environment
S 62	If swallowed don't induce vomit: seek immediately for medical advice and show the label

### 16.3 OBSERVATIONS

**Prohibitions** - Don't use the product for other purposes than those specified, in this case the user may be exposed to not predictable dangers.

**Precautions** - If the above information indicate a potential risk or a dangerous component employees and users will be given appropriate instructions to take all necessary precautions.

### 16.4 RESPONSABILITIES

**Information** - Although the information given is accurate, the provider assumes no responsibility.

**Methods of use** - No responsibility can be given to api - anonima petroli italiana S.p.A. for damages to the buyer or some other person arising from incorrect use of the product. All the risks arising from the product are liable because the pattern of use are beyond our control, therefore does not grant guarantees of any kind and nature. We do not accept liability for any damage arising from the use of such information for purposes other than those mentioned.

### 16.5 PURPOSE AND VALIDITY OF DATAS

**Purpose** - The information on this technical sheet are provided to preserve health and to guarantee safety on the working places.

#### Validity

The information herein contained refers only to the product indicated and may not apply if the product is used or worked in combination with others.

**Period of validity** - All information is the best of what we have on the date of issuing of this card. This card cancels and replaces the previous edition.

### 16.6 CHANGES MADE FROM PREVIOUS REVISION

The changes, according to CE 2006/1907 (REACH) may include:

Replacement of the Company's brand, and address

Inversion of point 2 (Warning Identification) with paragraph 3 (Composition).

E- mail address addenda of the competent technician.

Registered product in the Archives of Warning Preparations of the Superior Health Institute (ISS) with the code: AUT-16

MATERIAL SAFETY DATA SHEET

Rev. N°

February 2009











## Maintenance register




This register is made up of different maintenance operation sheets; fill out the sheets after each periodic ordinary and extraordinary maintenance carried out on the machine.

When the sheets have finished, photocopy one or more pages of the register and keep them together with this manual, to record future maintenance operations.




**During maintenance phases carefully follow the safety instructions described herein and the regulations on accident prevention at work.**




Maintenance sheets after 100 hours of work	
 <p>Date of operation</p> <p>____/____/____</p>	 <p>Description of operation</p>
<p>Stamp of the authorised service centre</p>	
 <p>Signature of the technician</p>	




Maintenance sheets after 200 hours of work	
 Date of operation  ____/____/____	 Description of operation  ..... ..... ..... ..... .....
Stamp of the authorised service centre	..... ..... ..... ..... .....
 Signature of the technician	..... ..... ..... ..... .....




Maintenance sheets after 250 hours of work	
 Date of operation ____ / ____ / ____	 Description of operation <hr/> <hr/> <hr/> <hr/> <hr/> <hr/> <hr/> <hr/> <hr/> <hr/>
Stamp of the authorised service centre	<hr/> <hr/> <hr/> <hr/> <hr/> <hr/> <hr/> <hr/> <hr/> <hr/>
 Signature of the technician	<hr/> <hr/> <hr/> <hr/> <hr/> <hr/> <hr/> <hr/> <hr/> <hr/>









Maintenance sheets after 700 hours of work	
 Date of operation ____ / ____ / ____	 Description of operation <hr/> <hr/> <hr/> <hr/> <hr/> <hr/> <hr/> <hr/> <hr/> <hr/>
Stamp of the authorised service centre	<hr/> <hr/> <hr/> <hr/> <hr/> <hr/> <hr/> <hr/> <hr/> <hr/>
 Signature of the technician	<hr/> <hr/> <hr/> <hr/> <hr/> <hr/> <hr/> <hr/> <hr/> <hr/>




Maintenance sheets after 750 hours of work	
 Date of operation ____ / ____ / ____	 Description of operation <hr/> <hr/> <hr/> <hr/> <hr/> <hr/> <hr/> <hr/> <hr/> <hr/>
Stamp of the authorised service centre	<hr/> <hr/> <hr/> <hr/> <hr/> <hr/> <hr/> <hr/> <hr/> <hr/>
 Signature of the technician	<hr/> <hr/> <hr/> <hr/> <hr/> <hr/> <hr/> <hr/> <hr/> <hr/>

Maintenance sheets after 800 hours of work	
 Date of operation ____ / ____ / ____	 Description of operation <hr/> <hr/> <hr/> <hr/> <hr/> <hr/> <hr/> <hr/> <hr/> <hr/>
Stamp of the authorised service centre	<hr/> <hr/> <hr/> <hr/> <hr/> <hr/> <hr/> <hr/> <hr/> <hr/>
 Signature of the technician	<hr/> <hr/> <hr/> <hr/> <hr/> <hr/> <hr/> <hr/> <hr/> <hr/>

Maintenance sheets after 900 hours of work	
 Date of operation ____ / ____ / ____	 Description of operation <hr/> <hr/> <hr/> <hr/> <hr/> <hr/> <hr/> <hr/> <hr/> <hr/>
Stamp of the authorised service centre	<hr/> <hr/> <hr/> <hr/> <hr/> <hr/> <hr/> <hr/> <hr/> <hr/>
 Signature of the technician	<hr/> <hr/> <hr/> <hr/> <hr/> <hr/> <hr/> <hr/> <hr/> <hr/>

Maintenance sheets after 1000 hours of work	
 Date of operation ____ / ____ / ____	 Description of operation <hr/> <hr/> <hr/> <hr/> <hr/> <hr/> <hr/> <hr/> <hr/> <hr/>
Stamp of the authorised service centre	<hr/> <hr/> <hr/> <hr/> <hr/> <hr/> <hr/> <hr/> <hr/> <hr/>
 Signature of the technician	<hr/> <hr/> <hr/> <hr/> <hr/> <hr/> <hr/> <hr/> <hr/> <hr/>

Maintenance sheets after 1100 hours of work	
 Date of operation ____ / ____ / ____	 Description of operation <hr/> <hr/> <hr/> <hr/> <hr/> <hr/> <hr/> <hr/> <hr/> <hr/>
Stamp of the authorised service centre           	<hr/> <hr/> <hr/> <hr/> <hr/> <hr/> <hr/> <hr/> <hr/> <hr/>
 Signature of the technician           	<hr/> <hr/> <hr/> <hr/> <hr/> <hr/> <hr/> <hr/> <hr/> <hr/>

Maintenance sheets after 1200 hours of work	
 <p>Date of operation</p> <p>____/____/____</p>	 <p>Description of operation</p>
<p>Stamp of the authorised service centre</p>	
 <p>Signature of the technician</p>	




<b>Maintenance sheets after 1250 hours of work</b>	
Date of operation _____/_____/_____	Description of operation  .....  .....  .....  .....
Stamp of the authorised service centre	  .....  .....  .....  .....
Signature of the technician	  .....  .....  .....  .....

<b>Maintenance sheets after 1300 hours of work</b>					
	Date of operation  _____/_____/_____		Description of operation		
<b>Stamp of the authorised service centre</b>					
	Signature of the technician				




Maintenance sheets after 1400 hours of work	
Date of operation  _____/_____/_____	Description of operation  
Stamp of the authorised service centre	
Signature of the technician	

[illegible][illegible]




**Maintenance sheets after 1700 hours of work**

 Date of operation ____ / ____ / ____	 Descrizione intervento _____ _____ _____ _____ _____ _____
Stamp of the authorised service centre  	
 Signature of the technician	




**Maintenance sheets after 1750 hours of work**

 Date of operation ____ / ____ / ____	 Descrizione intervento _____ _____ _____ _____ _____ _____
Stamp of the authorised service centre  	
 Signature of the technician	

**Maintenance sheets after 1800 hours of work**

 Date of operation ____ / ____ / ____	 Description of operation _____ _____ _____ _____ _____ _____
Stamp of the authorised service centre  	
 Signature of the technician	

**Maintenance sheets after 1900 hours of work**

 Date of operation ____ / ____ / ____	 Description of operation _____ _____ _____ _____ _____ _____
Stamp of the authorised service centre  	
 Signature of the technician	

## Maintenance sheets after 2000 hours of work



Date of operation

\_\_\_\_/\_\_\_\_/\_\_\_\_

Stamp of the authorised service  
centre


Signature of the technician



Description of operation







