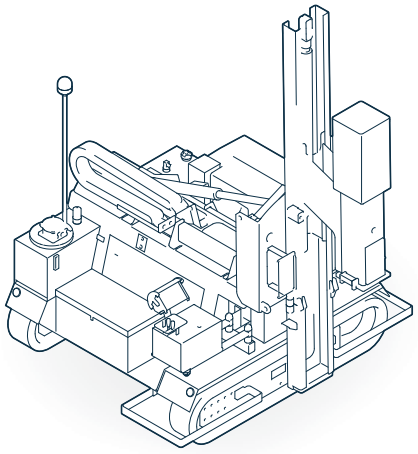
SMART 600J - 800J

II[a] Series

SELF-PROPELLED TRACKED PILE-DRIVER



USE AND MAINTENANCE MANUAL

Original instructions in English language

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SUMMARY

ANALYTICAL INDEX

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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 supplied by the manufacturer in English language. To fulfil legal or commercial requirements, the original instructions may be supplied by the manufacturer 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 - Warning

This indicates information or procedures which must be followed. Failure to comply may create a serious risk to the health and safety of people.

Caution - Care

This indicates information or procedures which must be followed otherwise failure to do so may create a risk to the health and safety of people or cause economic damage.

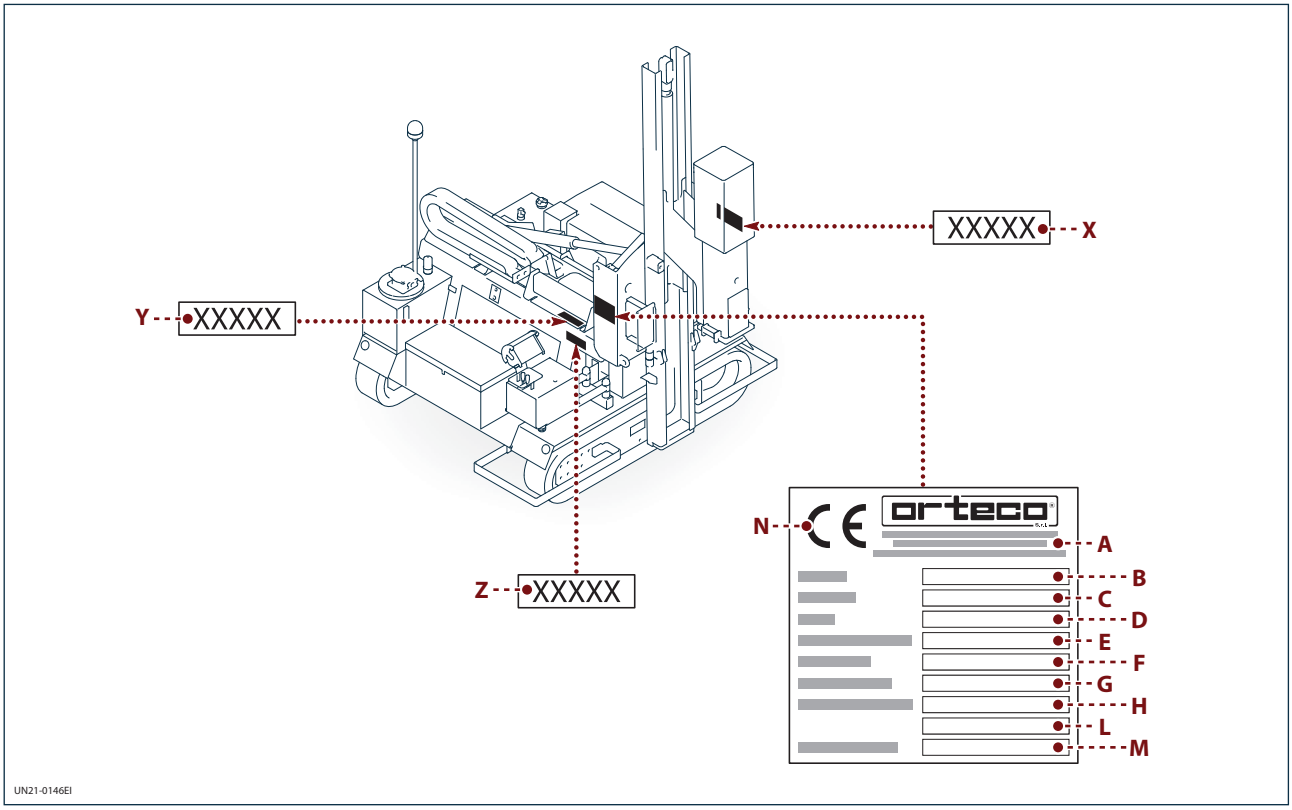
Information

This highlights useful and important information and procedures.

Manufacturer and machine identification details

Identification plate

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.



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

Punching

The following serial numbers are punched on the machine.
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.

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
- use and maintenance manual of the boring device
- use and maintenance manual of the corer
- use and maintenance manual of the pile extraction clamp
- use and maintenance manual of the drill
- "hydraulic oil safety and environment data sheet"
- "engine oil safety and environment data sheet"
- "fuel safety and environment data sheet"
- "gear lubricant safety and environment data sheet"

The "Use and maintenance" manuals of the boring device, corer, pile extraction clamp and drill are supplied only if said parts are installed on the machine.

Glossary of terms

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 requested by the customer when placing the order.

General description

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

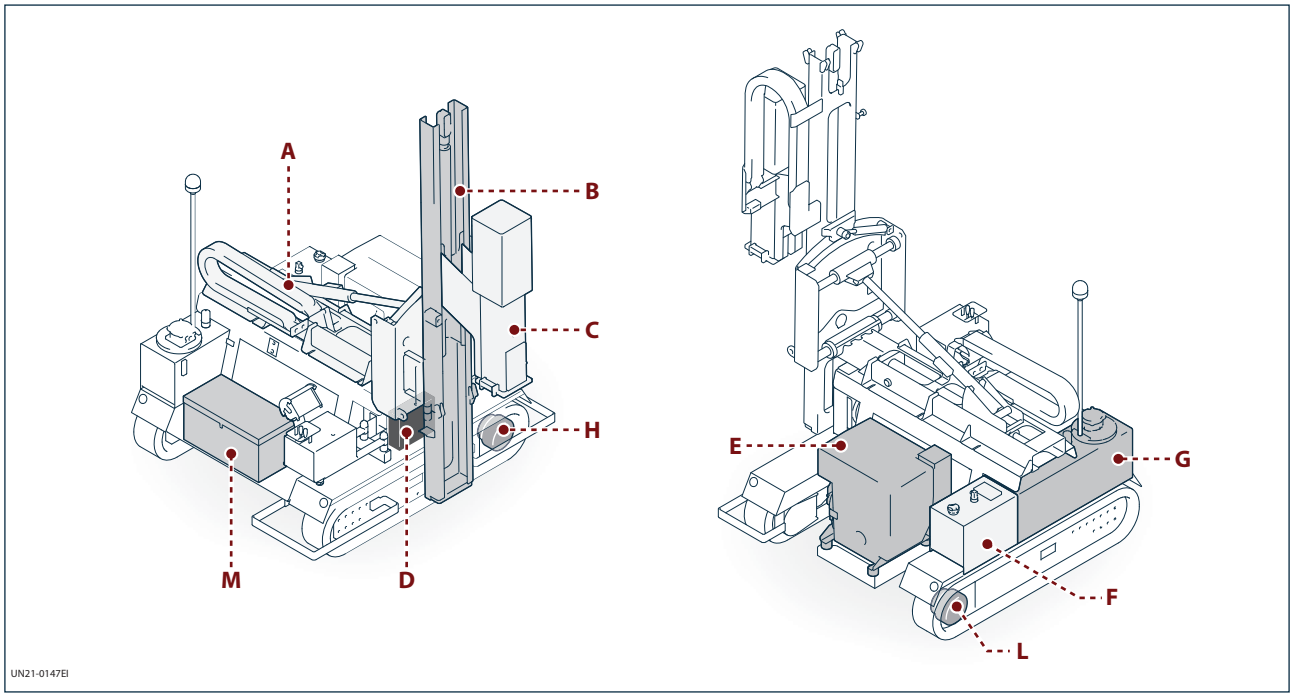
The machine is made up of a tracked truck for manoeuvres and a percussion hammer to drive the pile into the ground.

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.
Use of the machine **is prohibited** in potentially explosive atmospheres.
Use of the machine with equipment not approved by the manufacturer **is prohibited**.
Use of the machine to transport people **is prohibited**.
Use of the machine to lift people with the percussion hammer **is prohibited**.
Use of the machine to drive or extract piles, make holes on manufactured goods or drill the ground **is prohibited** when the column is not perfectly vertical.
The machine **cannot be driven** on the roads as it is not approved for road use.
The installed pile extraction clamp, corer and drill **must not be used** to drive piles.

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

Danger - 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.

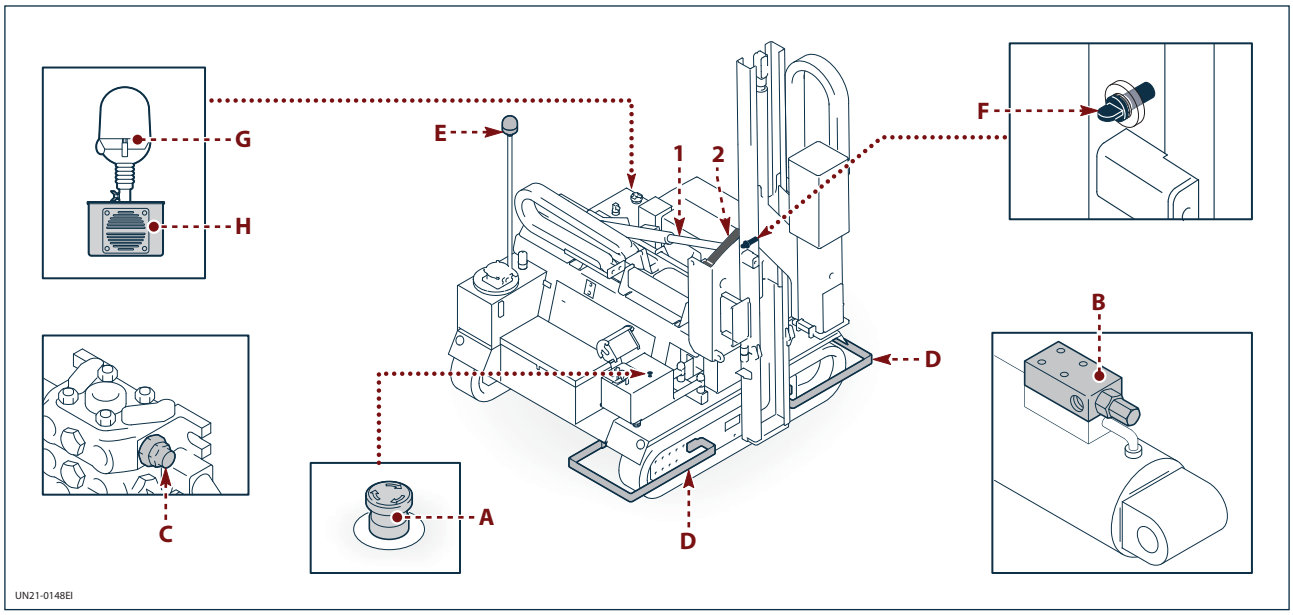
- **Risk of crushing of lower limbs in tracks.**
- **Risk of crushing of upper limbs between the stroke plate and the pile to be driven.**
- **Thermal danger in case of contact with hot parts.**
- **Fuel leaking from the tank during machine use or during refuelling may lead to a fire risk.**
- **Risk 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

Danger - 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.

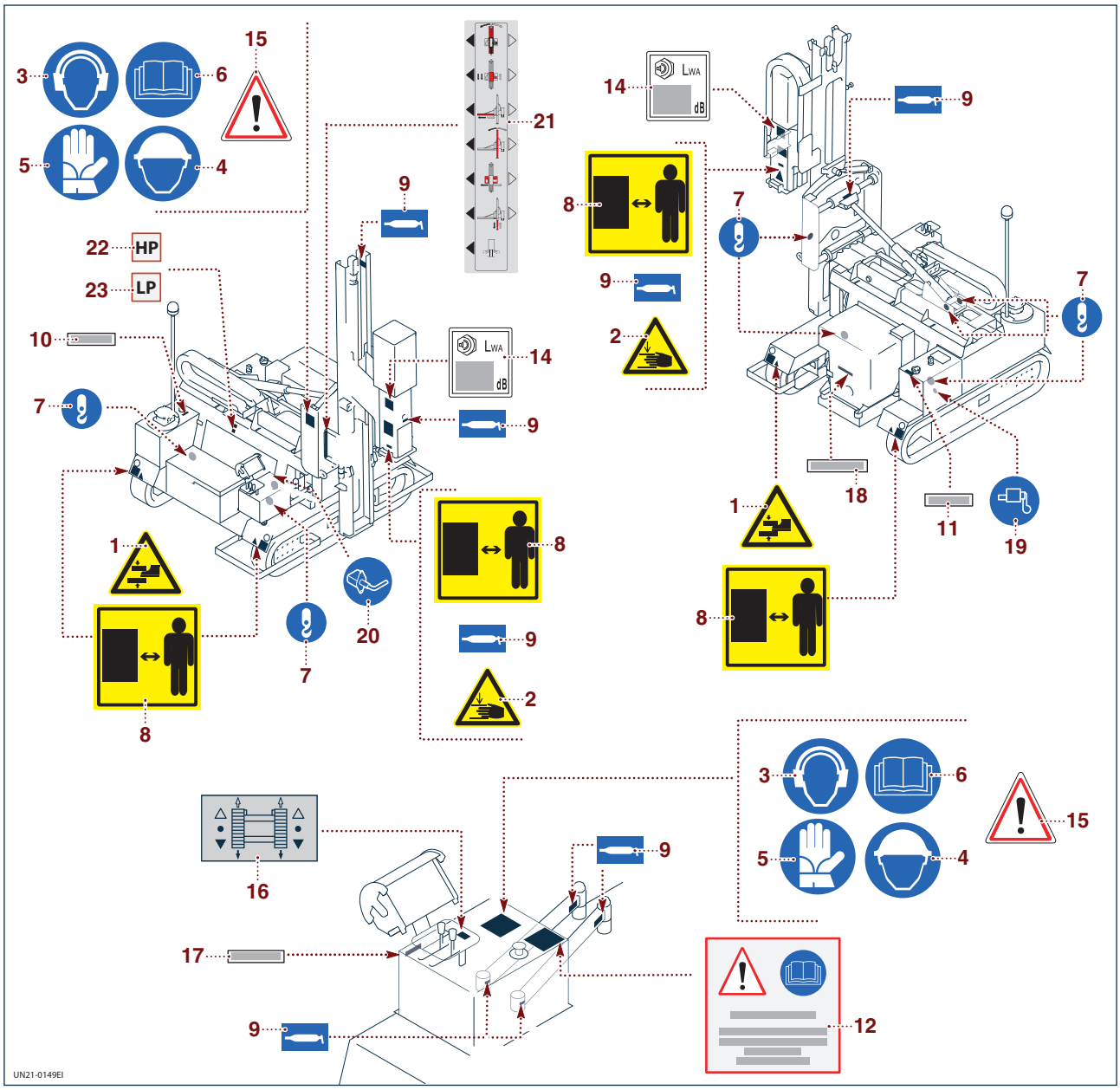
H) Buzzer (optional): signals with an intermittent sound the machine's reverse shift motion.

Information and safety signs

Danger - 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 operating noise level emitted by the machine.

15) General hazard.

16) This shows the direction of movement and the relevant manoeuvres of the shifting control levers.

17) This shows the direction of movement of the accelerator lever to increase or decrease the number of revolutions of the engine.

18) This specifies the type of engine oil used.

19) This shows the fuel supply open / close turn valve.

20) This shows the battery cut-off device.

21) This shows the direction of movement and the relevant manoeuvres of the pile driver control levers.

22) This shows the connection of the high pressure delivery hose.

23) This shows the connection of the low pressure draining hose.

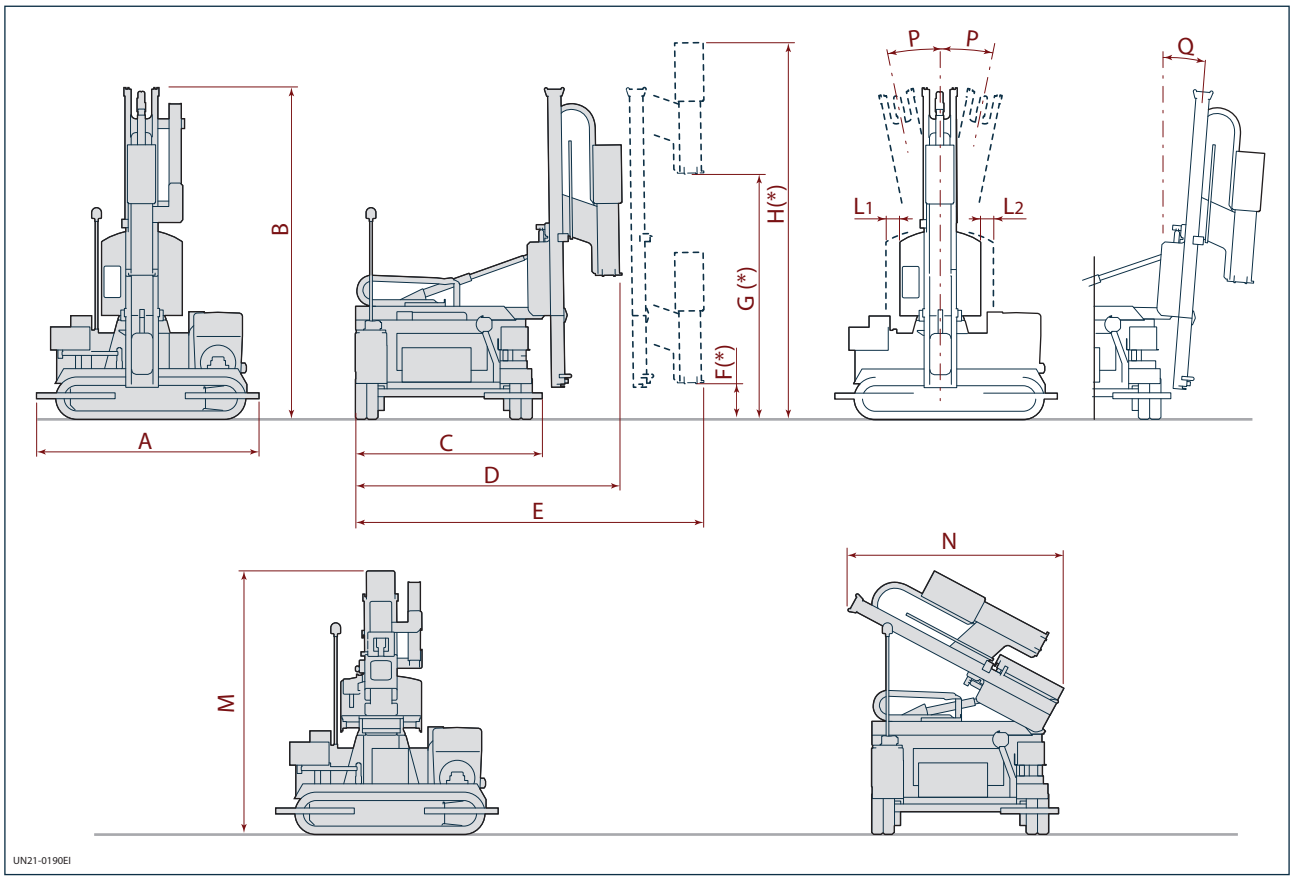
Technical characteristics

Percussion hammer model		**SMART 600J**	**SMART 800J**
Engine		(**)	(**)
Percussion hammer power	joule	590	830
Strikes per minute	n° min	650 ÷ 1000	680 ÷ 720
Working pressure	Mpa	15	
Required oil flow	l/min	75	
Hydraulic oil tank capacity	l	110	
Fuel tank capacity	l	50	
Electrical system voltage	V dc	12	
Maximum longitudinal slope	degrees	8	
Maximum transversal slope	degrees	8	
Maximum wading depth	mm	430	
Maximum speed	Km/h	2,1	
Maximum towable load	kg	1000	
Stroke plate weight	kg	25	
Crawler weight (without accessories)	kg	1750	
Pile-driver weight (without accessories)	kg	1100	1250
Overall weight of machine (tracked truck and pile driver) (without accessories)	kg	2850	3000

(**) For the technical characteristics of the engine see the engine manual enclosed.

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)												(°)	
SMART 600J	2264	3355	1905	2570	3570	310	2870	4075	125	75	2650	2148	8	10
SMART 800J								4205			2670			

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 UNI EN 11201:2009 - UNI EN 996:2009 standards using a Delta Ohm phonometer model HD2010UC.

		SMART 600J	SMART 800J
Guaranteed sound power level (**LwA_G**)	dBA	112,3	108,9
Guaranteed A-weighted sound pressure level (**LpA_G**)	dBA	102,1	100,0
Guaranteed instantaneous C-weighted peak sound pressure level (**$LpCpeak_G$**)	dBA	135,1	134,2

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.

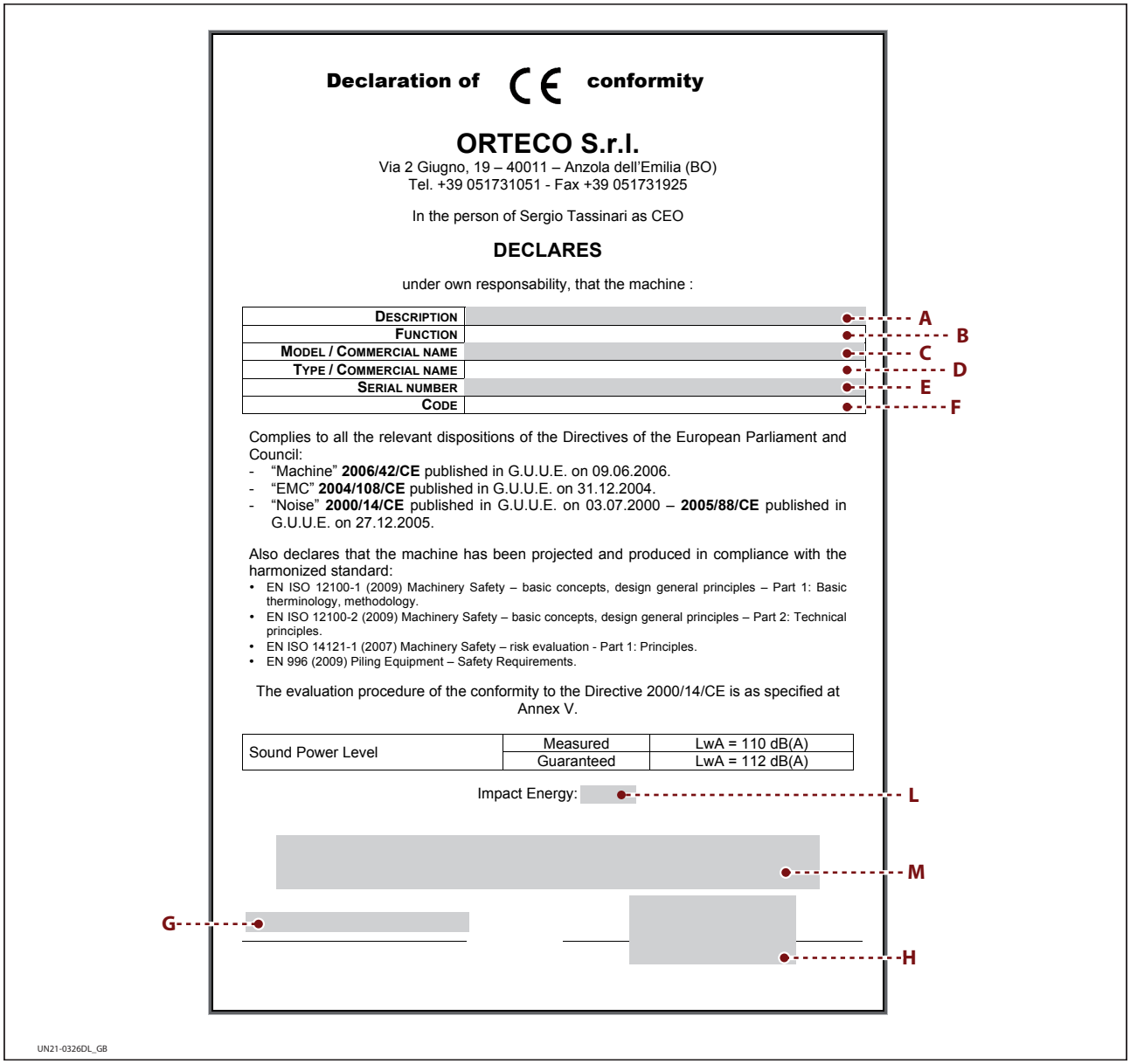
- Carbon monoxide generated by the exhaust of the engine.
- Hydrogen generated by the engine ignition battery.
- Inflammable and explosive fumes produced by the engine fuel.

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 CE conformity

ORTECO S.r.l.
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In the person of Sergio Tassinari as CEO

DECLARES

under own responsability, that the machine :

DESCRIPTION	A
FUNCTION	B
MODEL / COMMERCIAL NAME	C
TYPE / COMMERCIAL NAME	D
SERIAL NUMBER	E
CODE	F

Complies to all the relevant dispositions of the Directives of the European Parliament and Council:
- "Machine" **2006/42/CE** published in G.U.U.E. on 09.06.2006.
- "EMC" **2004/108/CE** published in G.U.U.E. on 31.12.2004.
- "Noise" **2000/14/CE** published in G.U.U.E. on 03.07.2000 – **2005/88/CE** published in G.U.U.E. on 27.12.2005.

Also declares that the machine has been projected and produced in compliance with the harmonized standard:
- EN ISO 12100-1 (2009) Machinery Safety – basic concepts, design general principles – Part 1: Basic therminology, methodology.
- EN ISO 12100-2 (2009) Machinery Safety – basic concepts, design general principles – Part 2: Technical principles.
- EN ISO 14121-1 (2007) Machinery Safety – risk evaluation - Part 1: Principles.
- EN 996 (2009) Piling Equipment – Safety Requirements.

The evaluation procedure of the conformity to the Directive 2000/14/CE is as specified at Annex V.

Sound Power Level	Measured	LwA = 110 dB(A)
	Guaranteed	LwA = 112 dB(A)

Impact Energy: L

M

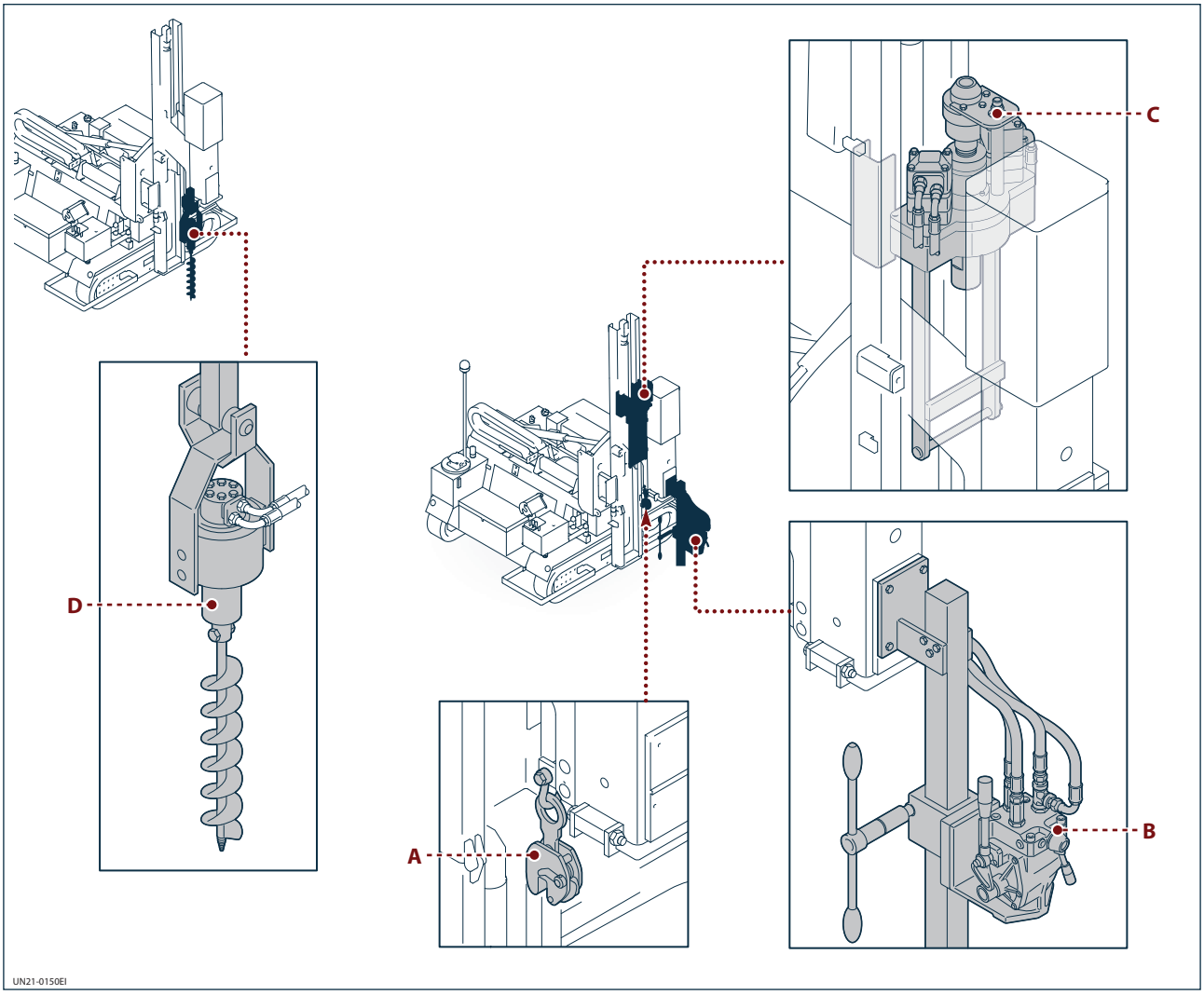
G

H

UN21-0326DL_GB

A) General description
B) Function
C) Model / trade name
D) Type / trade name
E) Serial number
F) Code
G) Place and date of the declaration of conformity
H) Signature of the person authorised to write the conformity declaration
L) Hammer impact energy
M) Name of the legal person authorised to compile the technical file

Accessories



A) Clamp: used to extract piles from the ground (piles for guard-rails, piles for photovoltaic systems, etc). For information on how to use 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 technical information see the use manual of the corer's manufacturer.
For information on how to use the corer see "Procedure to make holes using the corer".

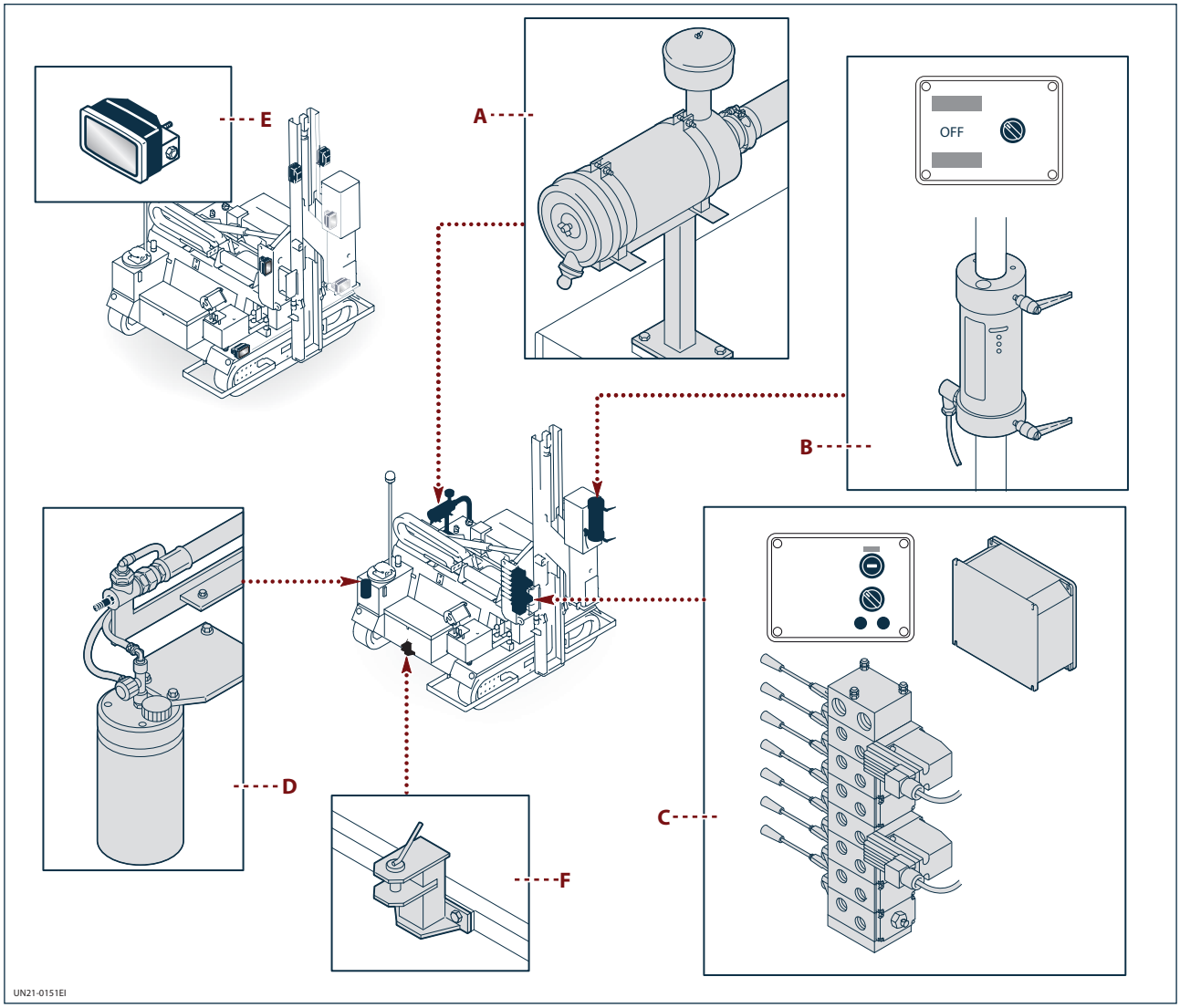
C) Boring device: to make circular holes on hard and compact surfaces (cement, rock) using a tool with a combined rotation and percussion action.
For technical information see the use manual of the boring device's manufacturer.
For information on how to use the boring device see "Procedure to make holes using the boring device".

D) Drill: to drill holes in ground containing a small quantity of rock fragments (gravel, crushed stone, etc.).
For technical information see the use manual of the drill's manufacturer.
For information on how to use the drill see "Procedure to make holes using the drill".

Information

For the weight of the accessories see the specific manual of the accessory manufacturer.

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 "Night-time work or poor visibility conditions").

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.

General safety instructions

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.

Safety instructions for use and operation

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 pipelines 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.

Safety instructions for handling and transportation

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.

Safety instructions for adjustments and maintenance

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.

Advice for handling and transportation

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 ramps can be used to load/unload the machine from the transport vehicle; the ramps must be in good condition and with a suitable capacity.

Transportation procedure

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

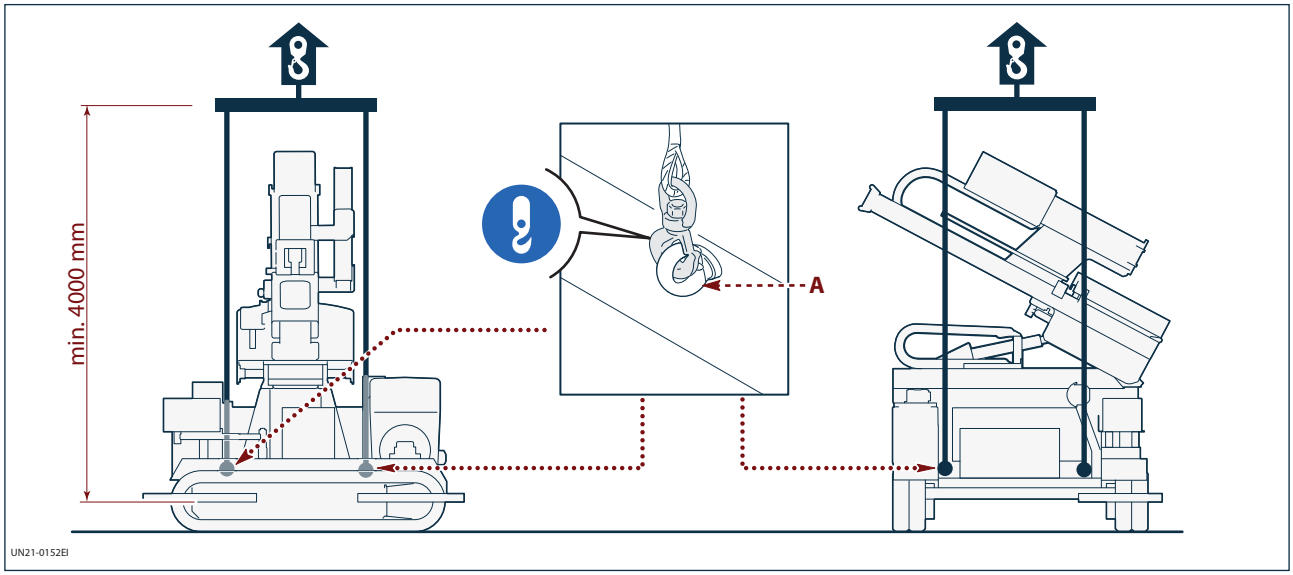
Danger - Warning

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 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.

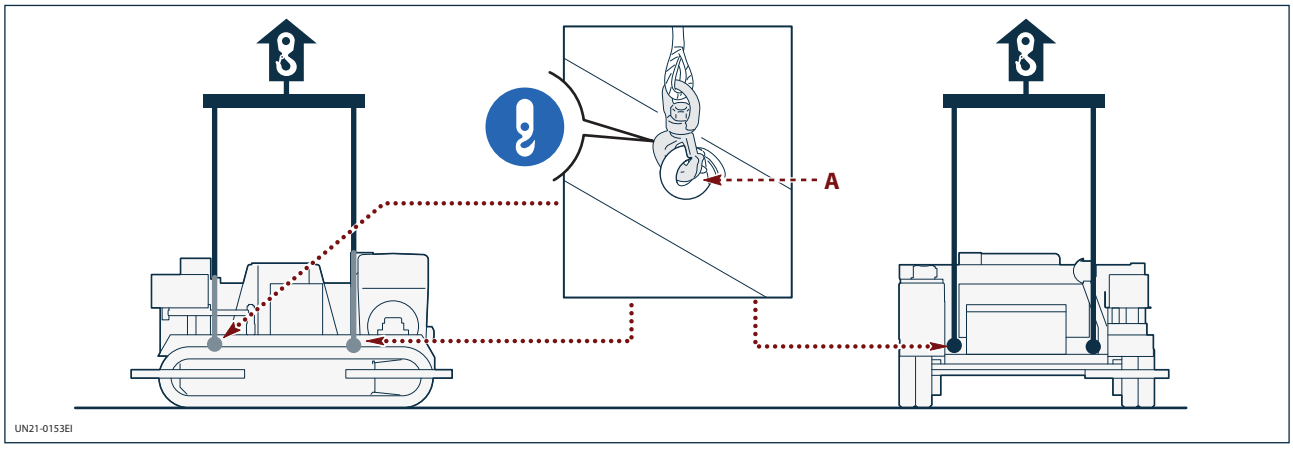


Lifting the truck

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

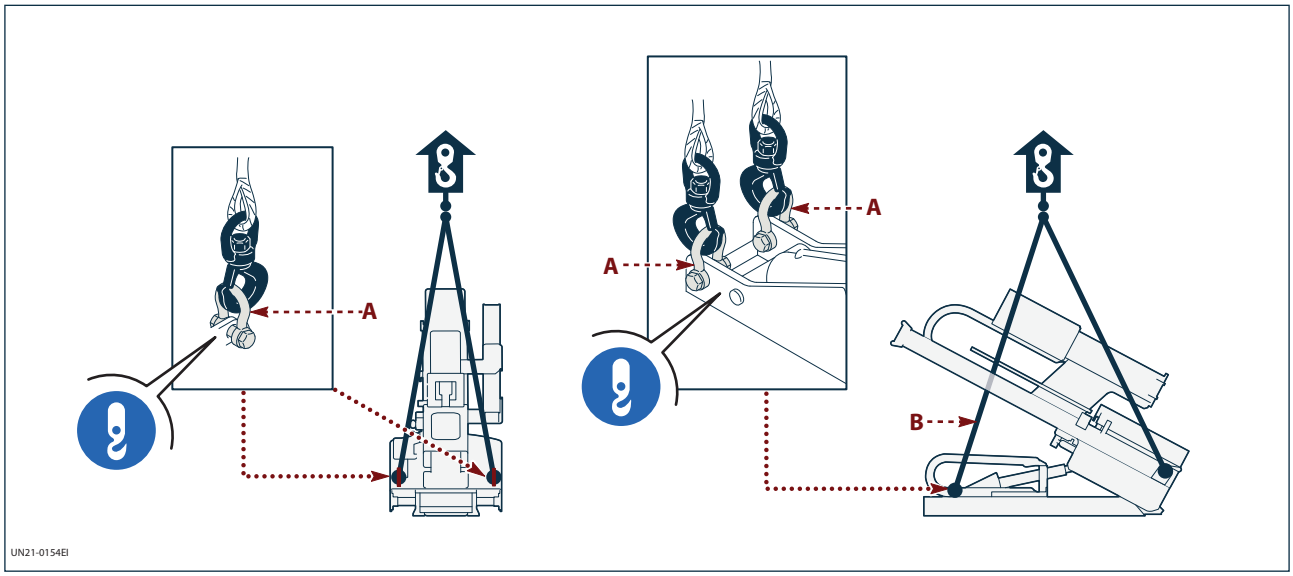
Danger - Warning

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) Fasten the ropes to the bow shackles (**A**) indicated by a special sign.

The illustration shows the harnessing points and lifting procedure.



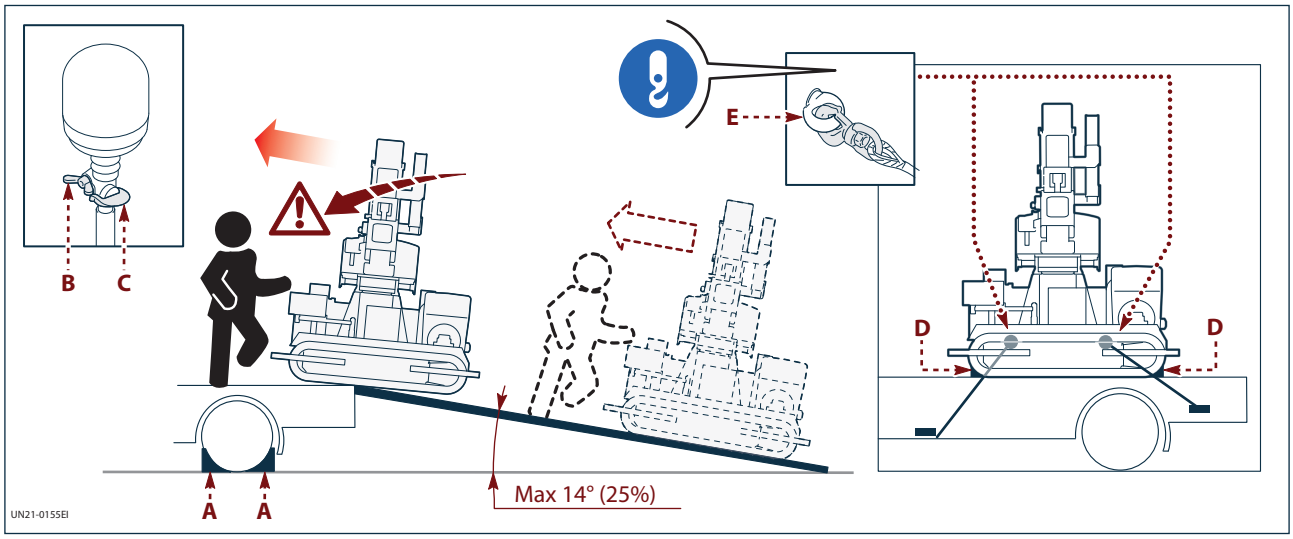
Procedure for getting on and off the transport means

Danger - 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.

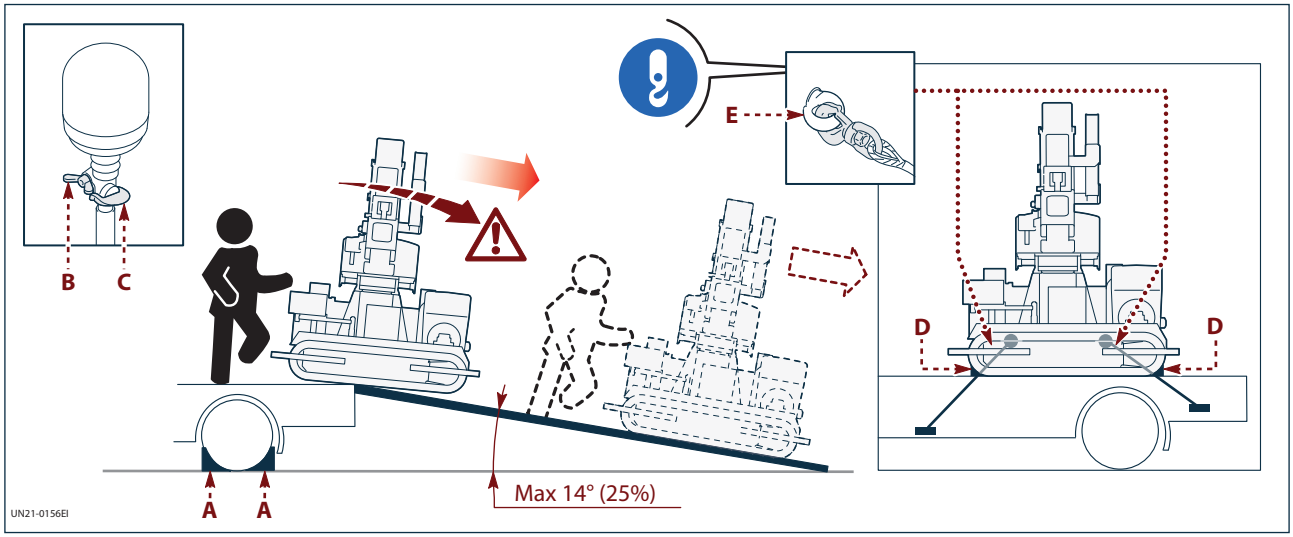
Pull the parking brake of the transport means and position the chocks (**A**) against the wheels.

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.

Fitting the pile driver

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

Safety advice for the adjustments

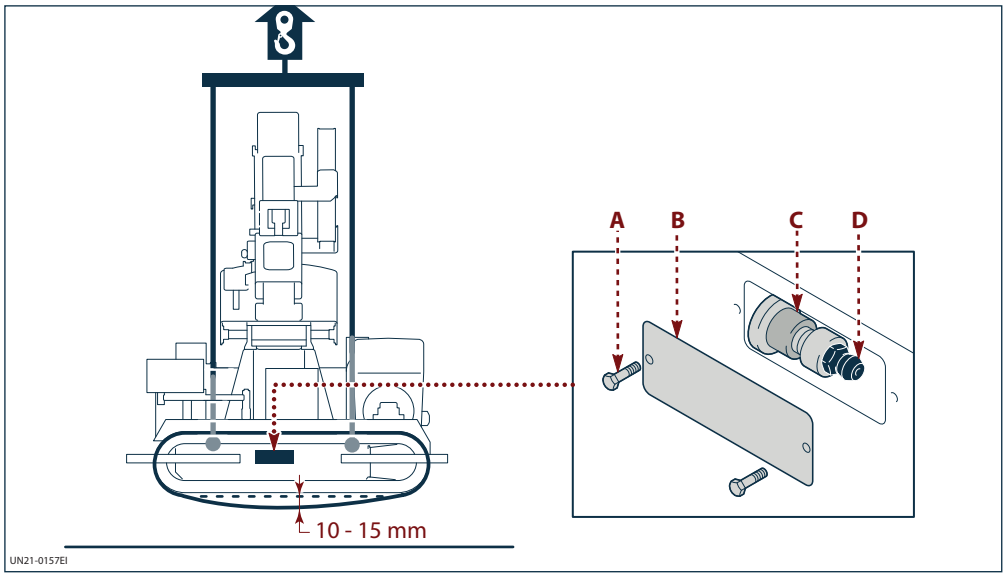
To protect the people involved, the adjustment operations must be carried out with all safety devices activated and unauthorised people must not be allowed to access the area of operation which must be appropriately marked.

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

Danger - 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.



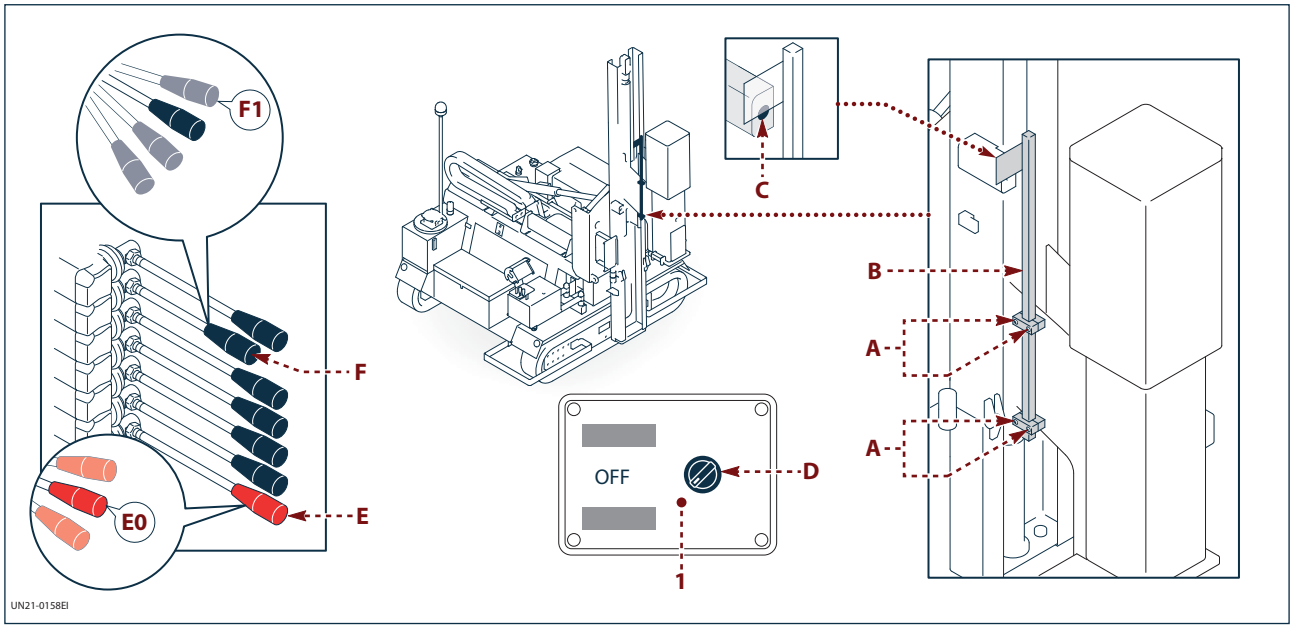
Proceed as outlined below.

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 dependending on the type of ground.

Adjusting the pile driving depth



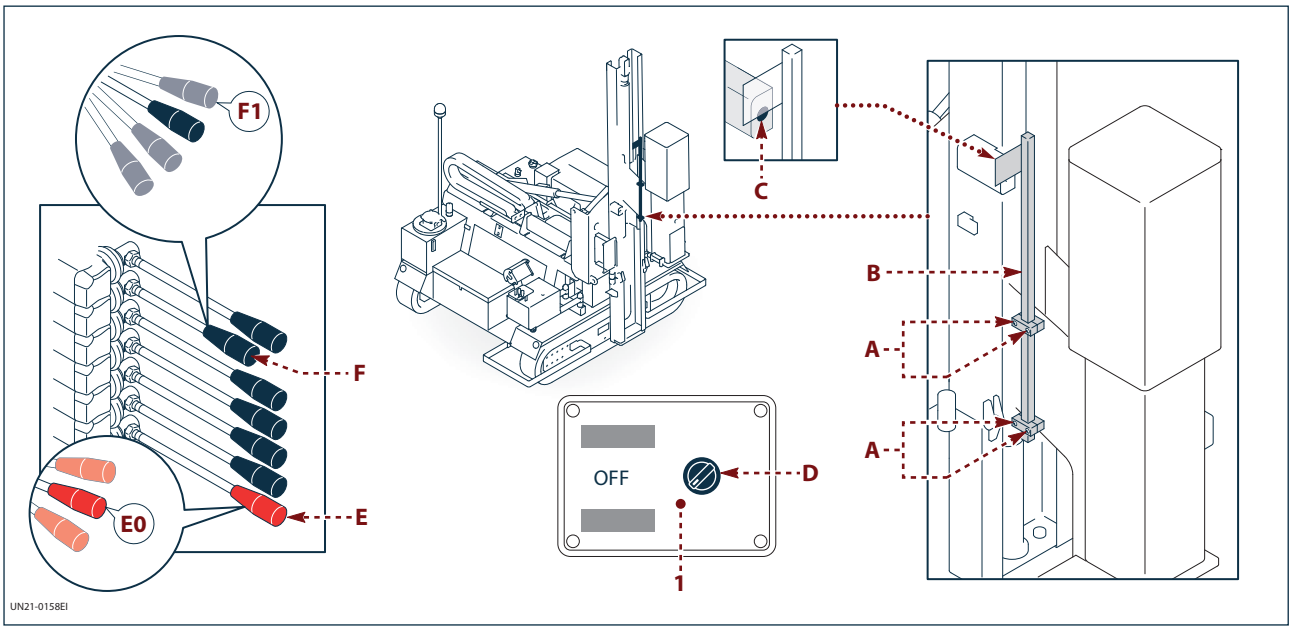
Proceed as outlined below.

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.

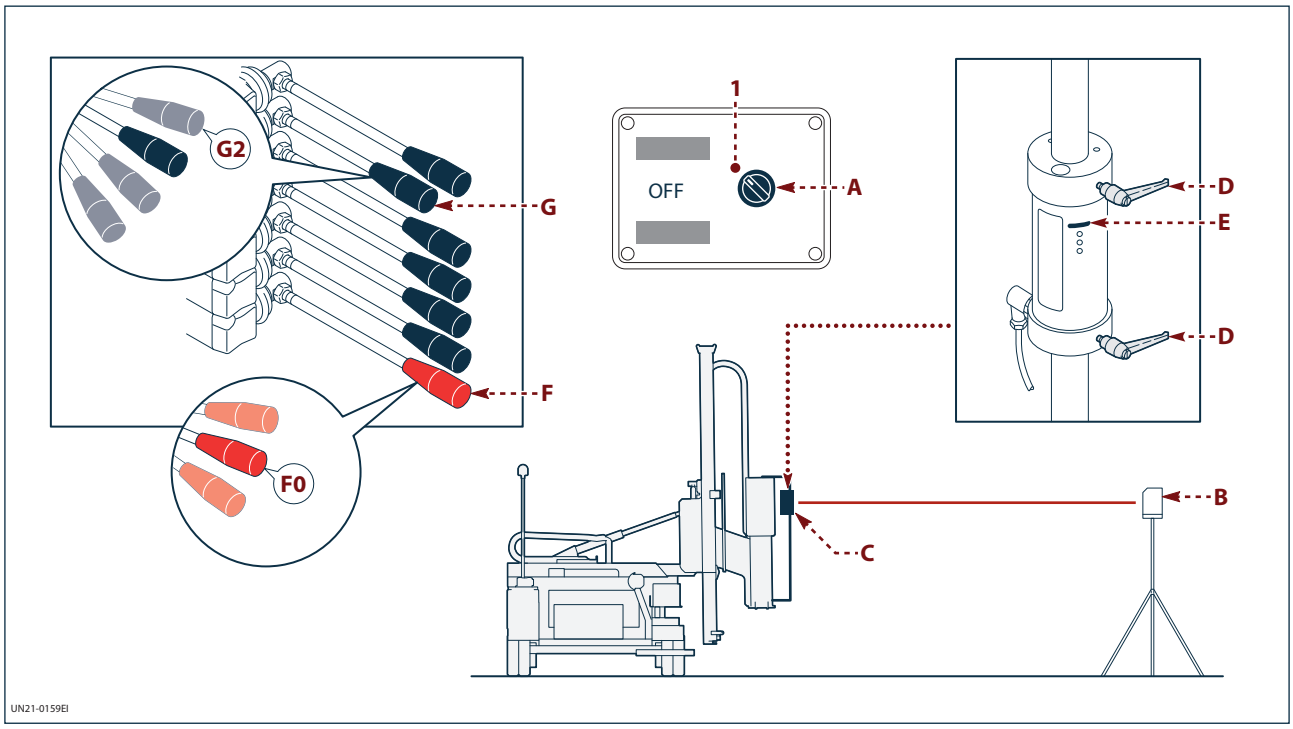
- Turn the selector (**D**) to the "OFF" position to deactivate the device.

Adjusting the "laser device" that stops the hammer's down stroke

The "laser device" is used to drive piles into the ground or make holes in the ground at the same depth compared to a fixed reference (emitter) and automatically stops the descent of the percussion hammer when the preset depth is reached (pile driving or hole depth), independently from the type of ground.

The same pile driving and hole depth is obtained by using a laser emitter that acts as fixed reference point and a receiver fitted on the pile driver.

Adjusting the pile driving depth



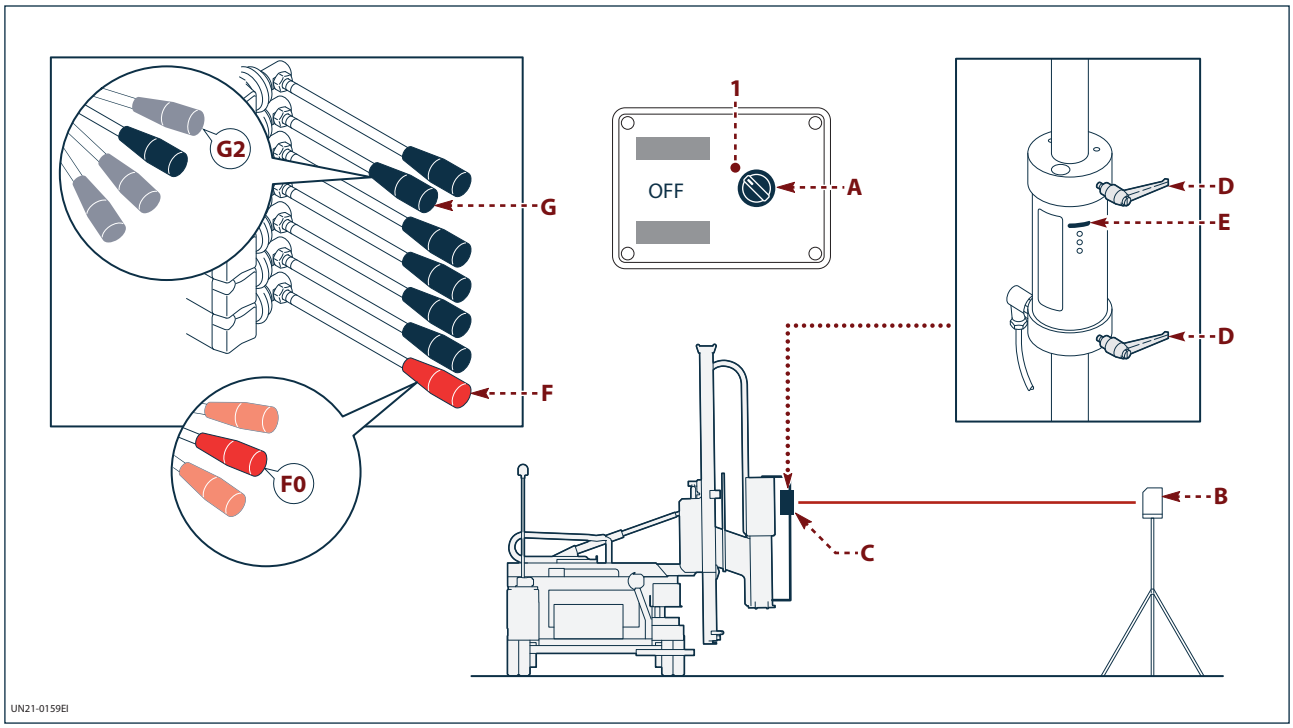
Proceed as outlined below.

1) Rotate the selector switch (**A**) to "OFF" position.
2) Drive the pile into the ground at the required depth.
3) Stop the percussion and rest the hammer on the pile head.
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 distance of at least 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) Drive another pile into the ground until the "laser device" automatically interrupts the pile driving operation.
12) Move lever (**F**) to (**F0**) position.
13) Move the lever (**G**) to position (**G2**) to lift the percussion hammer.
14) Check the correct pile driving depth.
    If the driving depth is not correct repeat the adjustment to correct the error.

- Turn the selector (**A**) 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.

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.

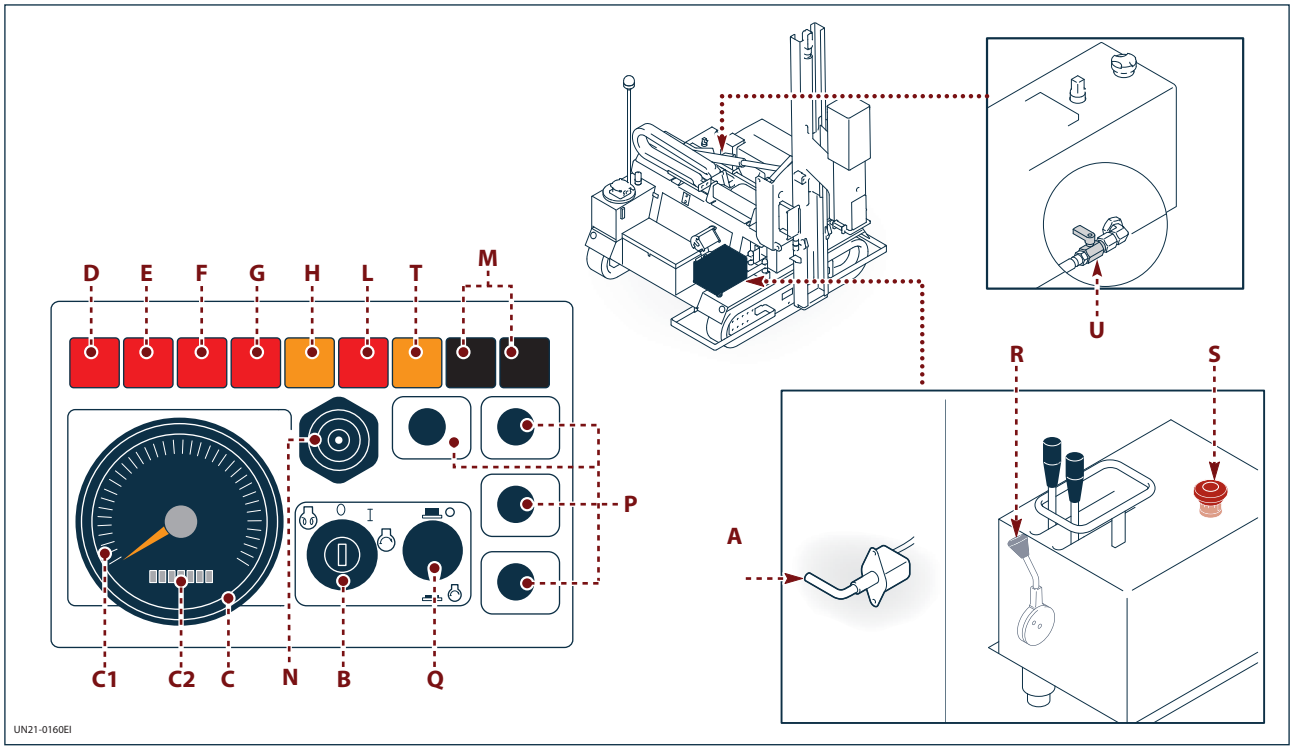
Description of the controls

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) A continuous sound signal warns that the oil pressure is insufficient. The engine switches off automatically and the signal lights (**D**) and (**E**) switch on.
2) A continuous sound signal warns that the emergency button has been pressed. The engine switches off automatically and the signal lights (**D**) and (**E**) switch on.
3) An intermittent sound signal warns 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.

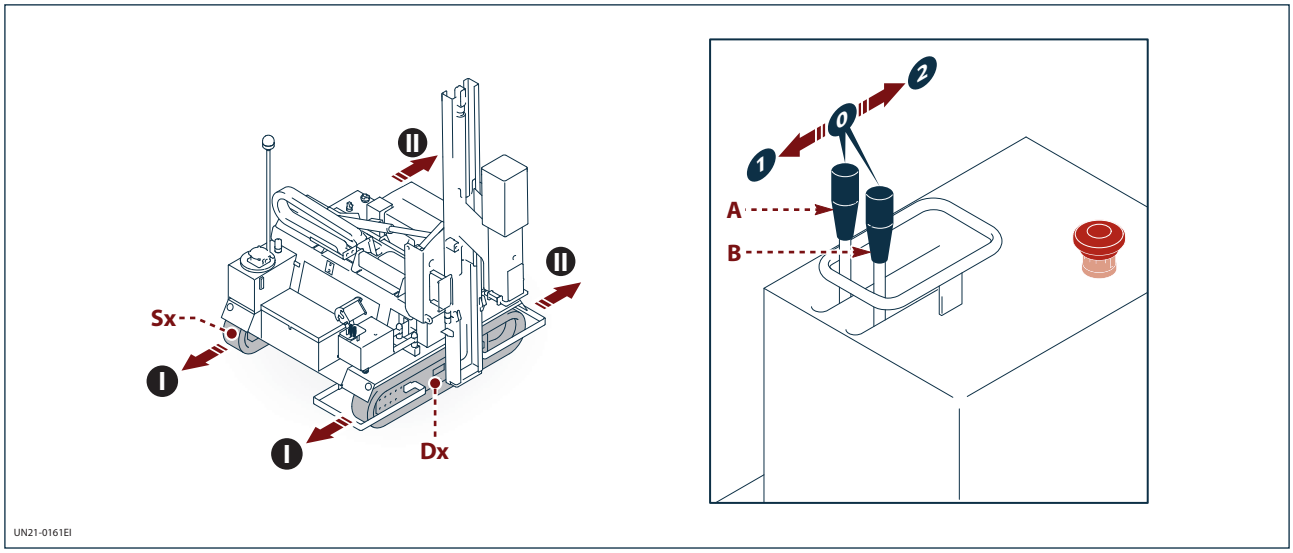
R) Accelerator lever: to change the engine rpm.

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.

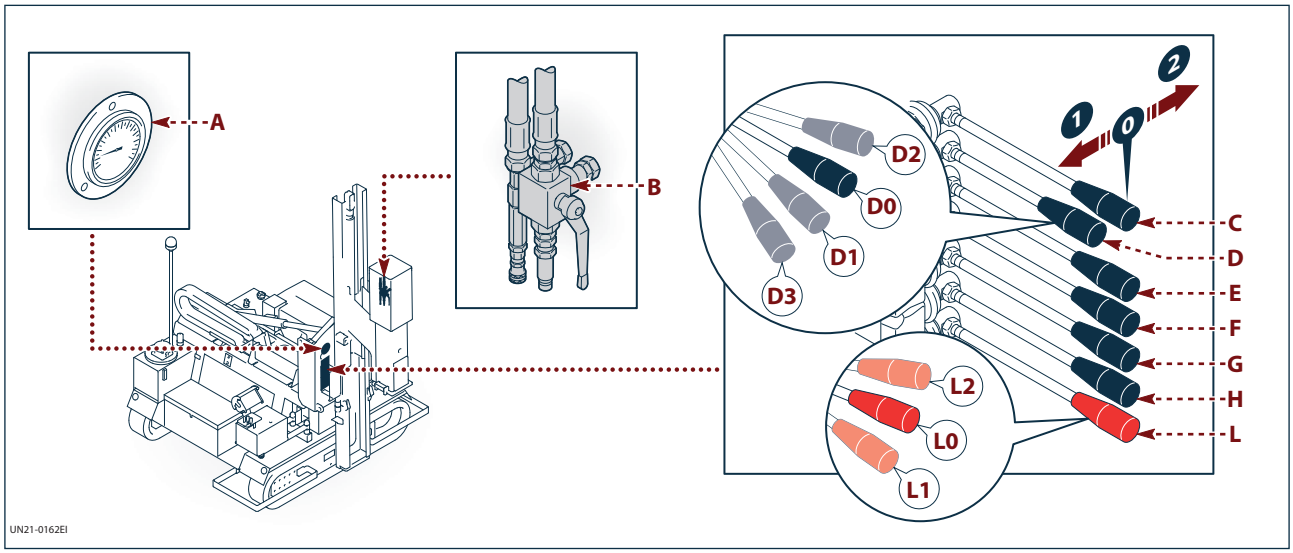
Controls to run the machine



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 LH 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 RH track are disabled.

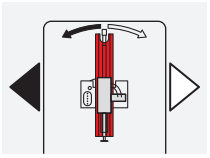
Operation controls



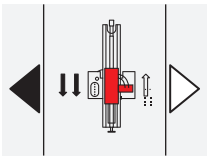
A) Pressure gauge: this shows the pressure of the pile driver's hydraulic circuit.

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

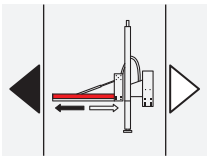
C) Lever: to tilt the column lengthways in relation to the machine.
- **Position (1):** to tilt the column to the left.
- **Position (2):** to tilt the column to the right.
- When the lever is released, it returns to neutral position (**0**).
- **Neutral position (0):** this blocks the inclination of the column.



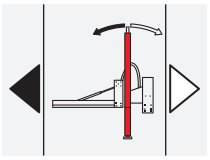
D) Four-position lever (two stable "D0 - D3"): to lift and lower the percussion hammer.
- **Position (D1):** to activate the rapid lowering of the percussion hammer.
- **Position (D3):** to activate the slow (floating) lowering of the percussion hammer.
- **Position (D2):** to activate the lifting of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



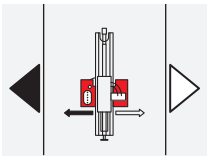
E) Lever: to shift the column transversally.
- **Position (1):** to retract the column.
- **Position (2):** to extend the column.
- When the lever is released, it returns to neutral position (**0**).
- **Neutral position (0):** to block transversal movements of the column.



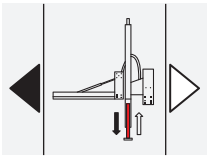
F) Lever: to tilt the column transversally.
- **Position (1):** to tilt the column to the left.
- **Position (2):** to tilt the column to the right.
- When the lever is released, it returns to neutral position (**0**).
- **Neutral position (0):** to block the transversal inclination of the column.



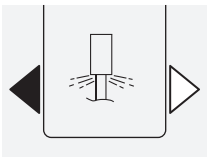
G) Lever: to shift the column lengthways.
- **Position (1):** to shift the column to the left.
- **Position (2):** to shift the column to the right.
- When the lever is released, it returns to neutral position (**0**).
- **Neutral position (0):** to block the lengthways shift of the column.



H) Lever: to activate the outrigger jack.
- **Position (1):** to lower the jack rod on the ground.
- **Position (2):** to lift the jack rod off the ground.
- When the lever is released, it returns to neutral position (**0**).
- **Neutral position (0):** to block the movements of the outrigger jack.



L) Lever with two stable positions (red): 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.



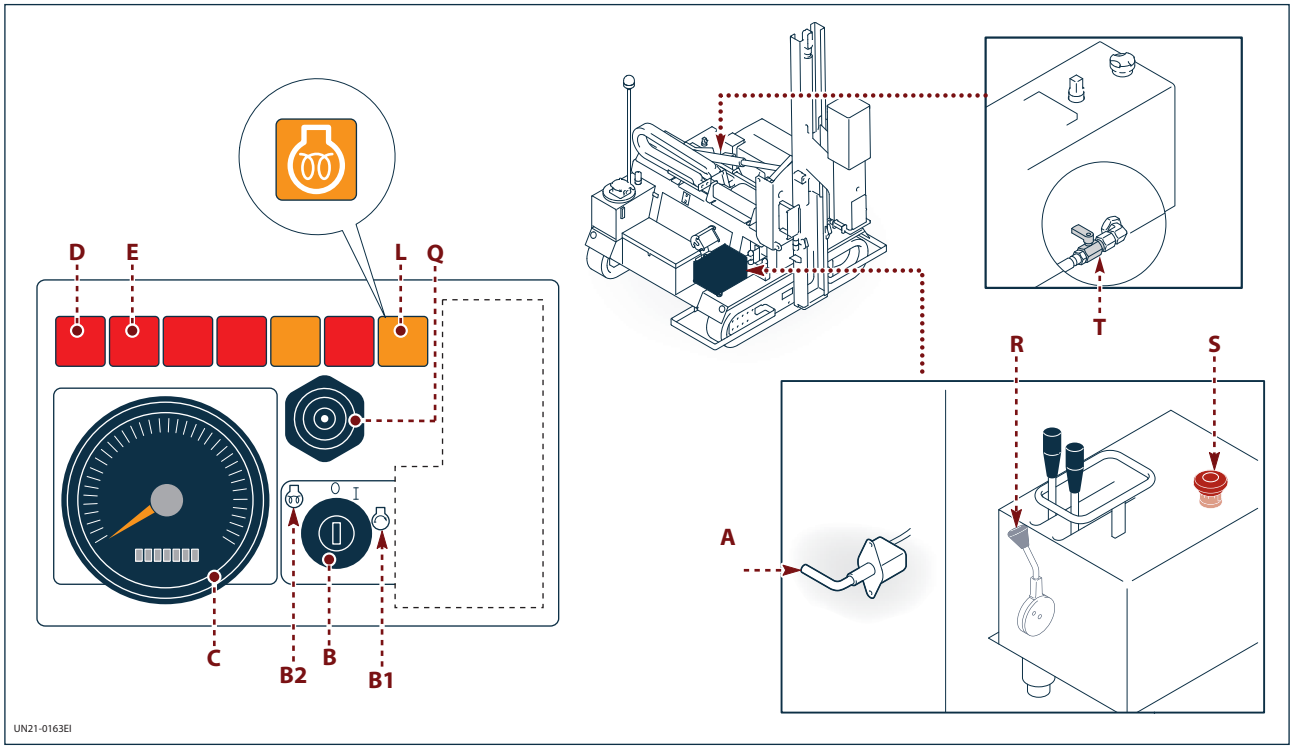
Use in cold environmental conditions

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

Caution - Care

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 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) 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 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) 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.

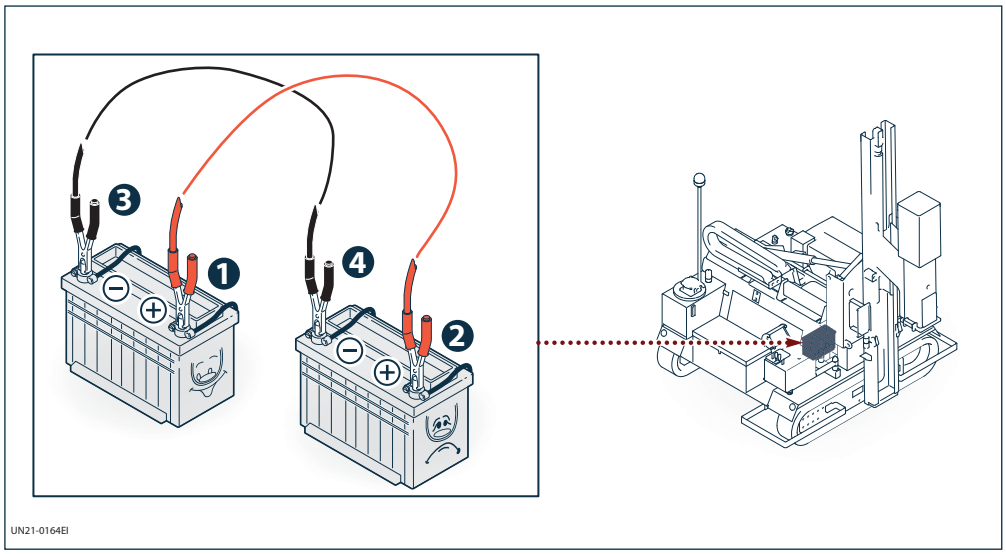
Keep the key in that position for the heating time necessary (usually 1 minute). Release the key; the signal light will switch off.

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

Danger - Warning

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.

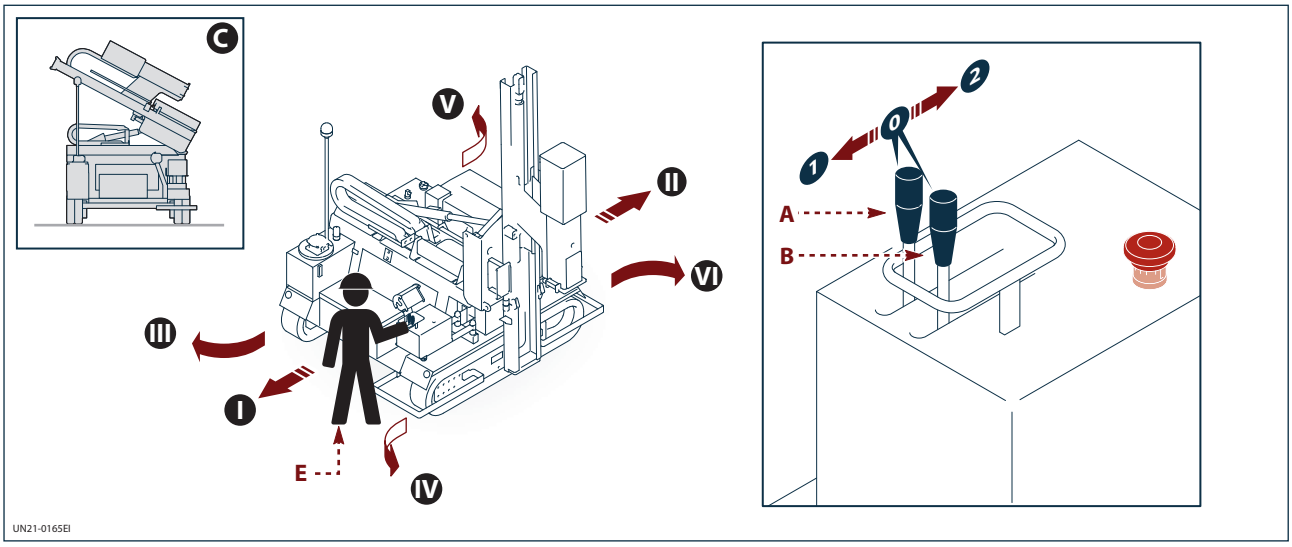
1) Connect the cables in the order shown in the figure.
2) Start the machine (see "Starting the engine").
3) Disconnect the cables in reverse order.

Shifting procedure

Caution - Care

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.

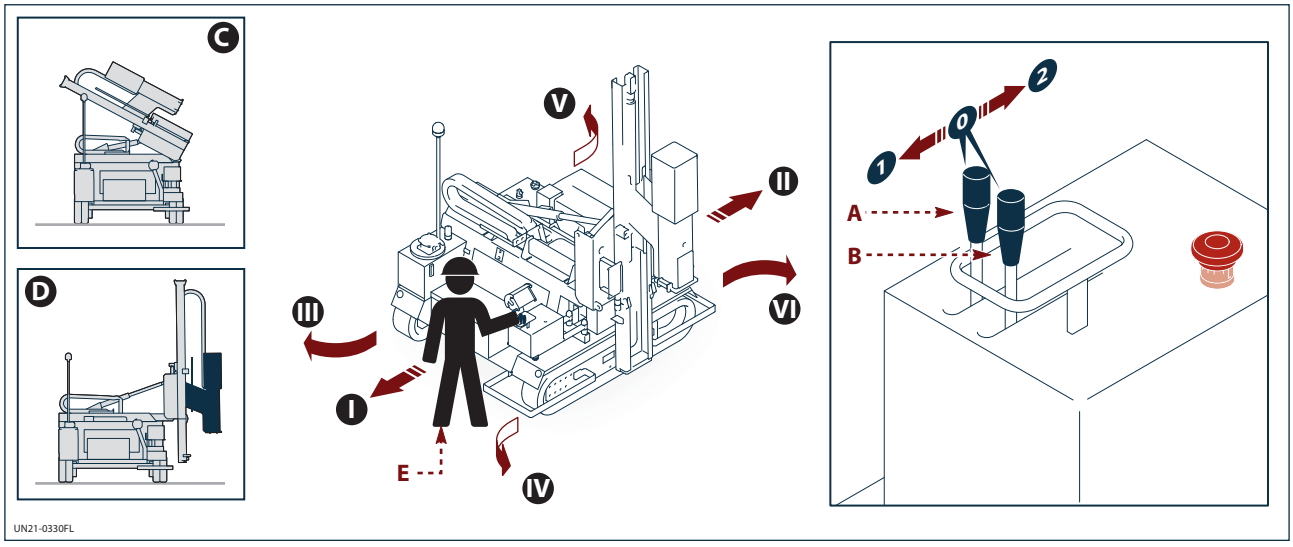
Proceed as outlined below.

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

Danger - 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").

Danger - Warning

On sloping ground travel at minimum speed to prevent the risk of the machine overturning.

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

Danger - Warning

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

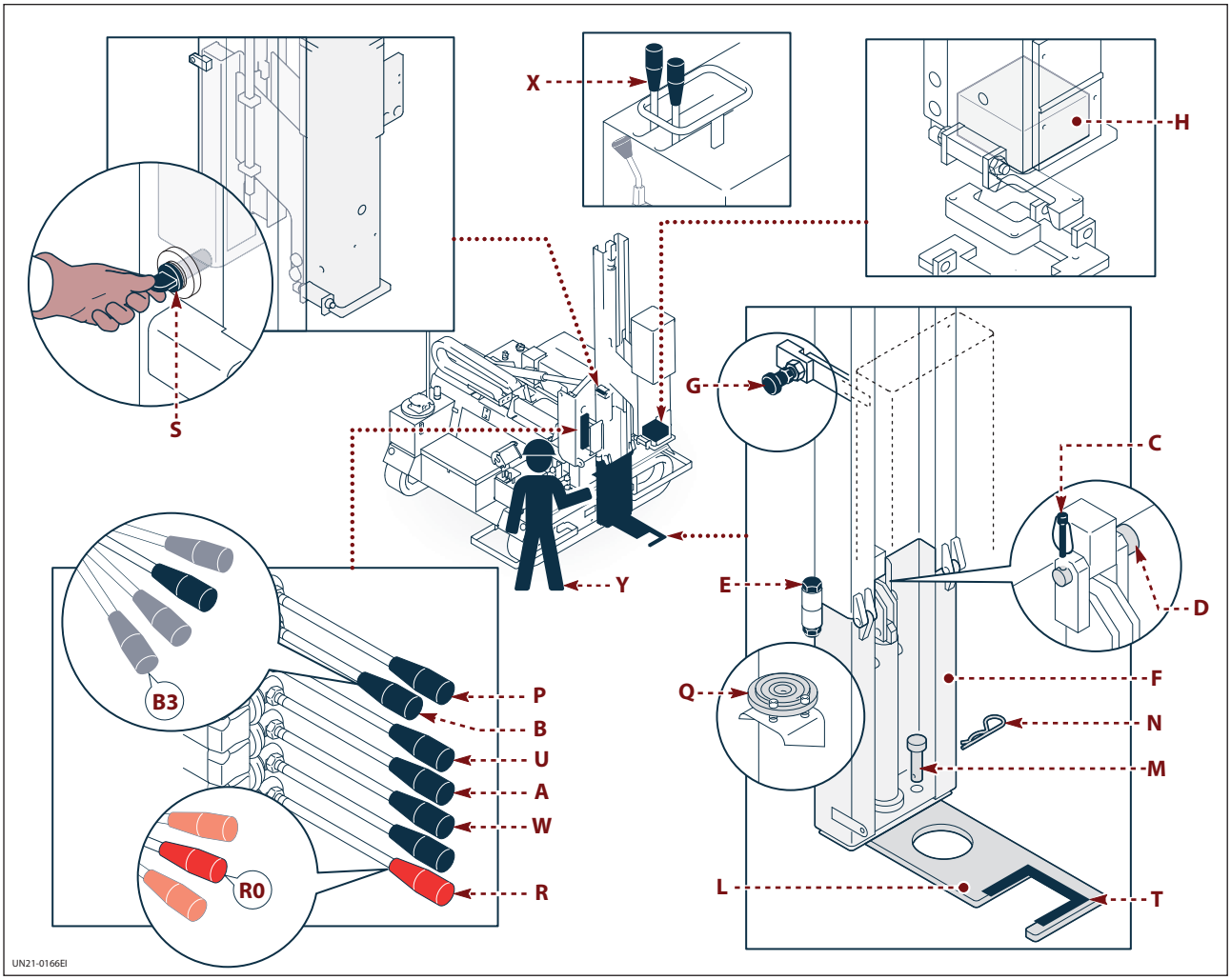
On sloping ground position the machine with the pile driver as close as possible to the truck to reduce the risk of tipping over.

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 percussion 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 (**H**).

Danger - 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**".

Caution - Care

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.

Information

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.

Danger - 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.

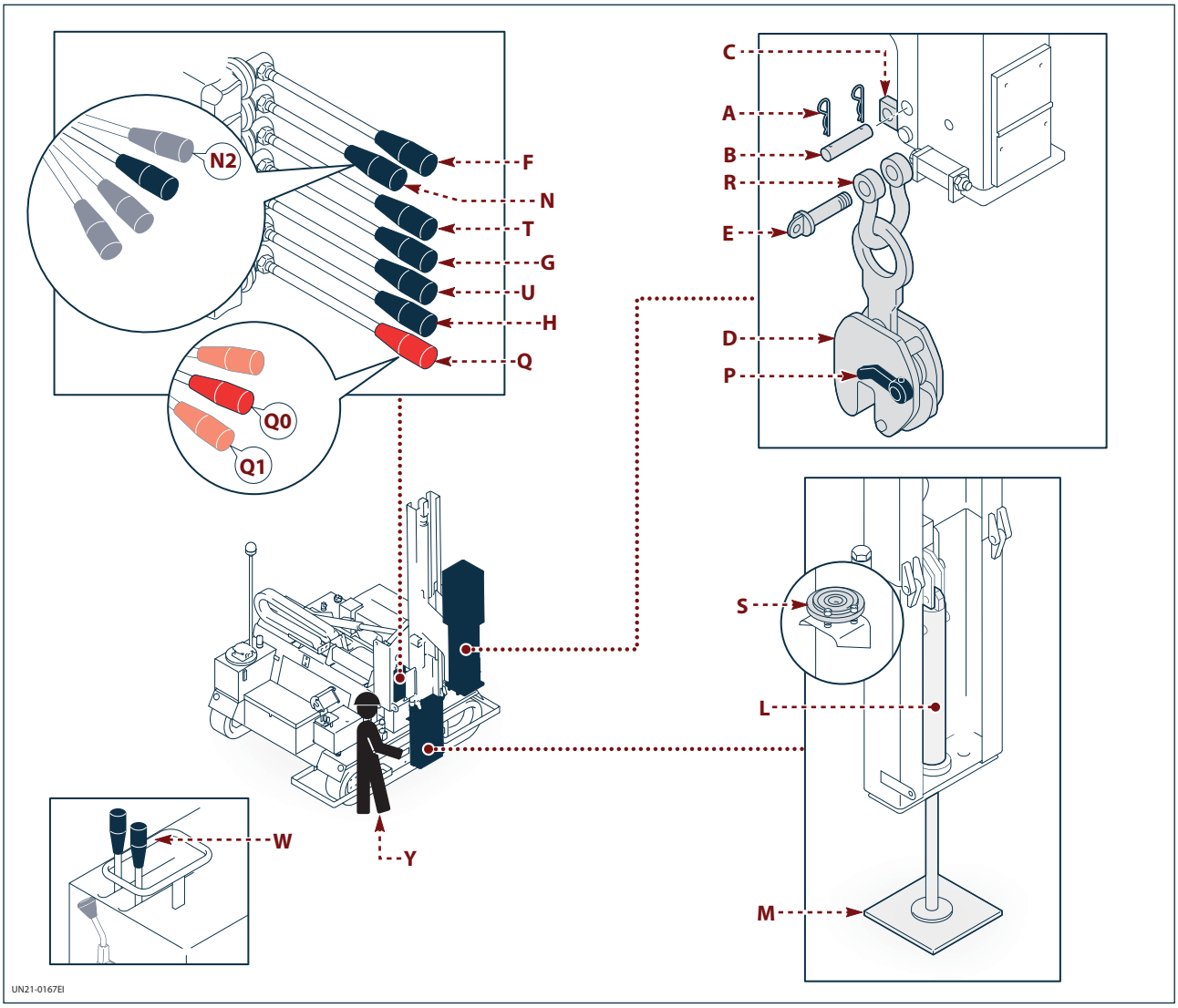
Metal pile extraction procedure

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).

Danger - 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.

Fitting the pile extraction clamp



Y) Control position foreseen for the operator

To fit the pile extraction clamp proceed as outlined below.

1) Slide out the pegs (**A**) and remove the pin (**B**).
2) Turn the bracket (**C**).
3) Fit the clamp (**D**) on the bracket (**C**) using the bow shackle (**R**).
4) Tighten the lock pin (**E**).

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.

Caution - Care

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**).
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.
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

For maintenance operations refer to the manual of the manufacturer of the pile extraction clamp.

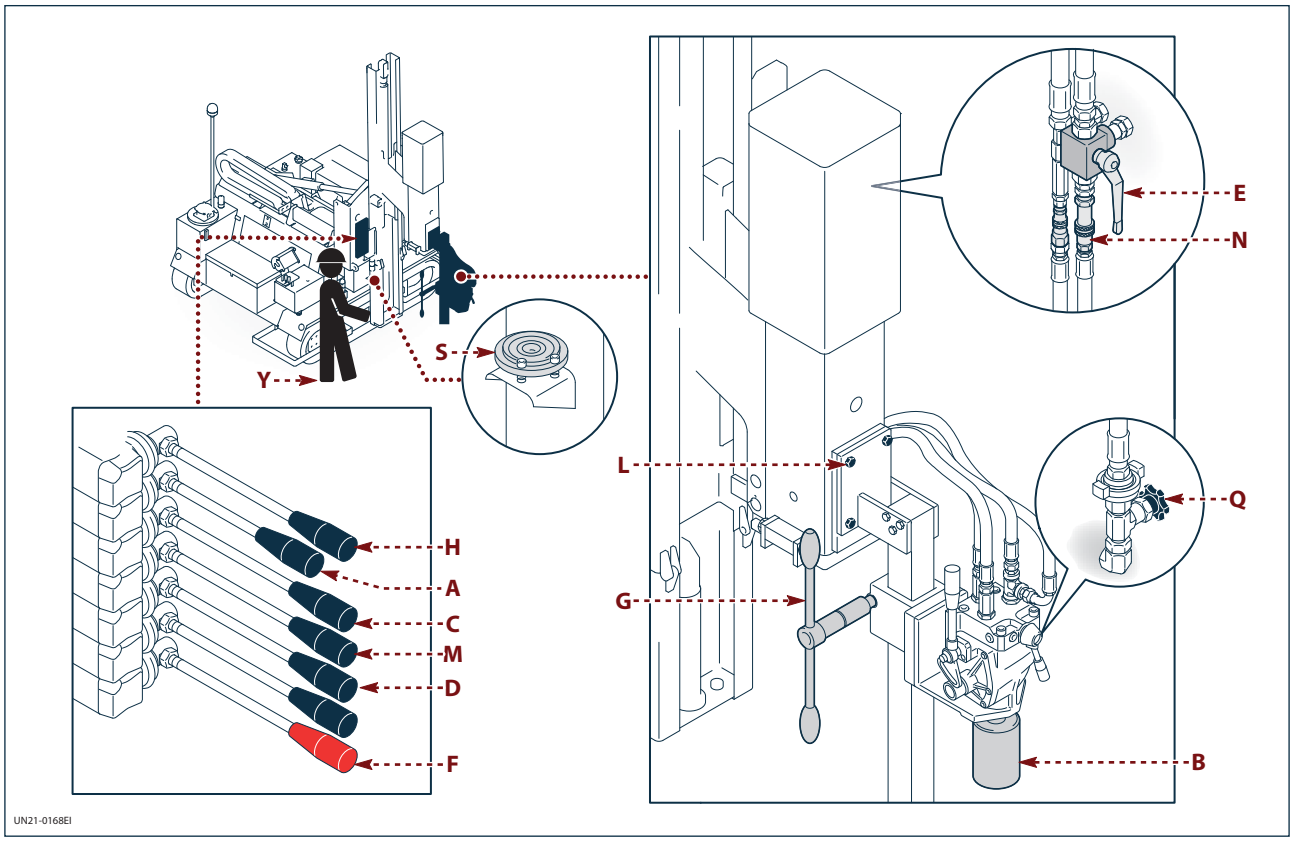
Procedure to make holes using the corer

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.

Danger - 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

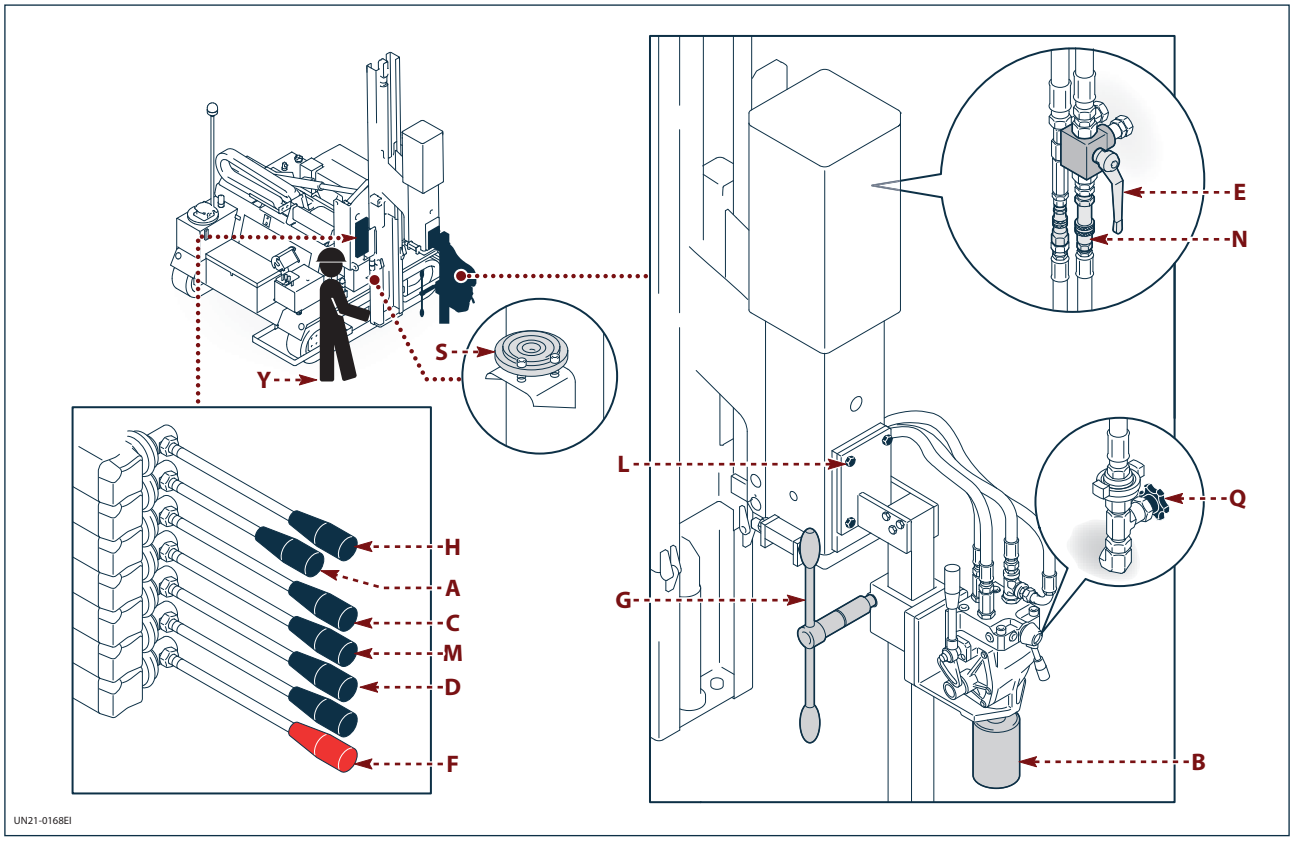


Y) Control position foreseen for the operator

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

To use the corer proceed as outlined below.

Danger - 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).

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) Move the lever (**F**) to activate the tool.
6) Open the turn valve (**Q**) to cool the tool.
7) Move the lever (**G**) to manually move the tool forward.

Removing the corer

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

Corer maintenance

For maintenance operations refer to the manual of the manufacturer of the corer.

Procedure to make holes using the boring device

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

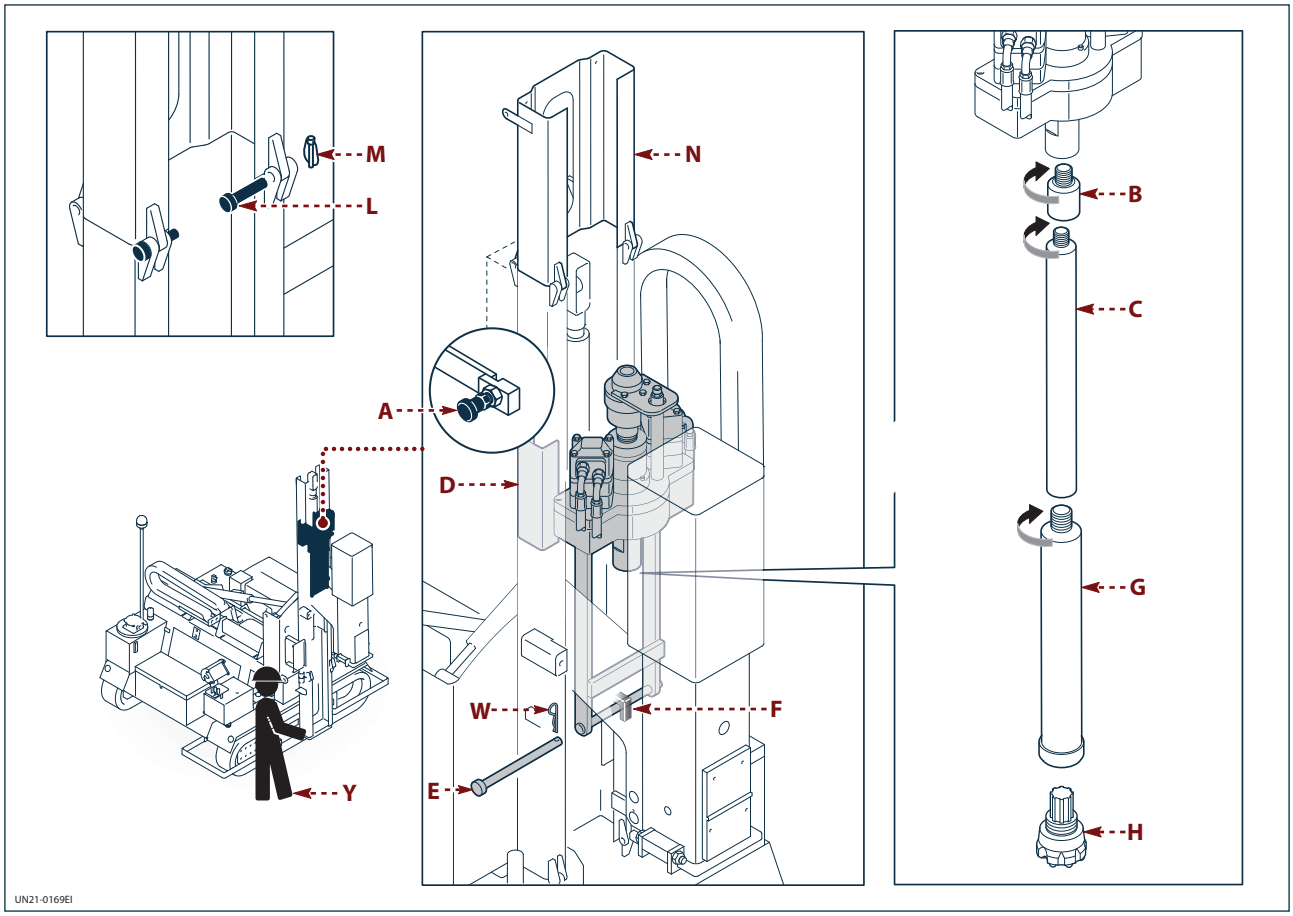
The boring device requires compressed air for the percussion of the tool and to remove the dust from the hole.

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

Danger - 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.

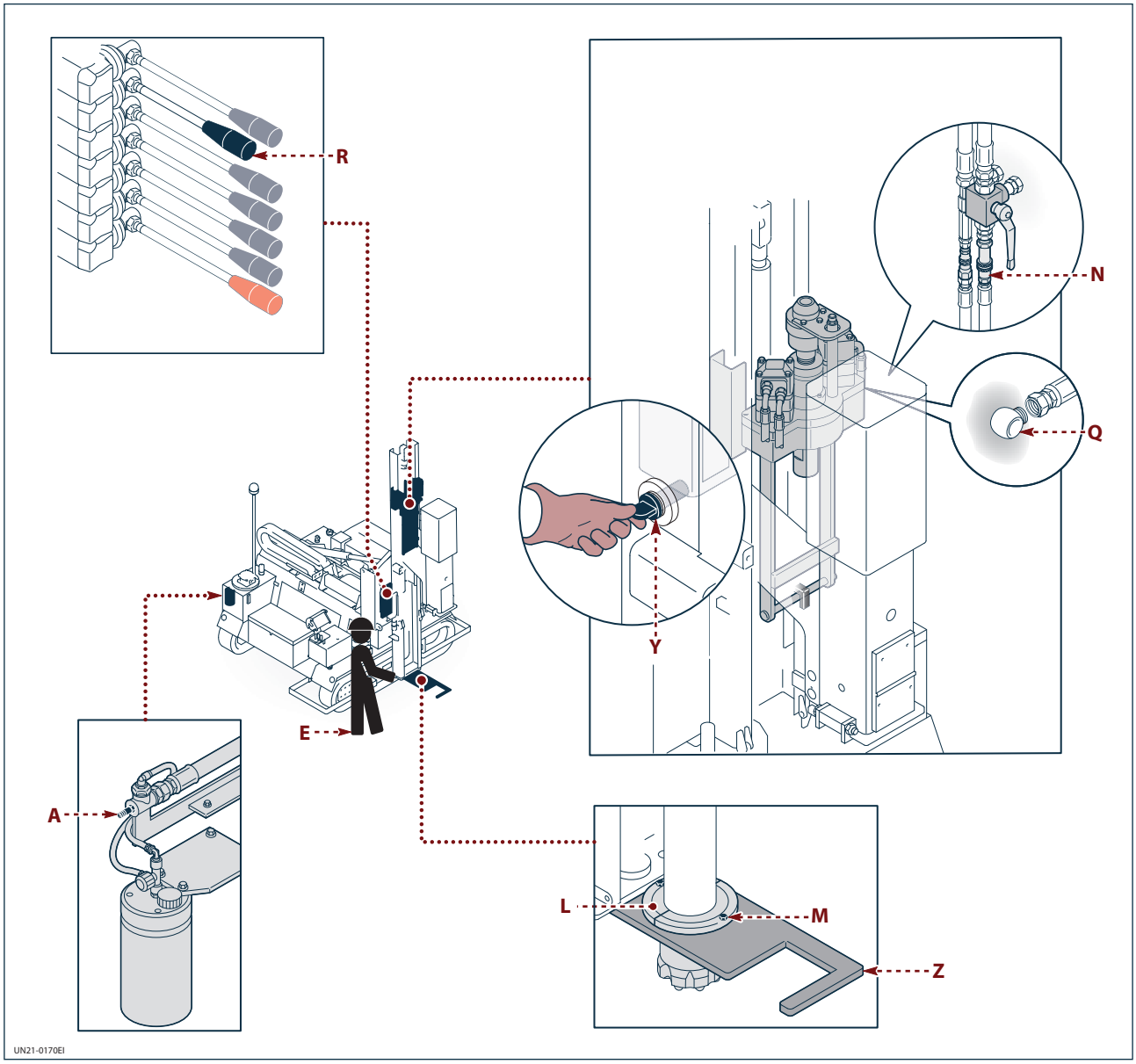
Fitting the boring device



Y) Control position foreseen for the operator

To fit the boring device proceed as outlined below.

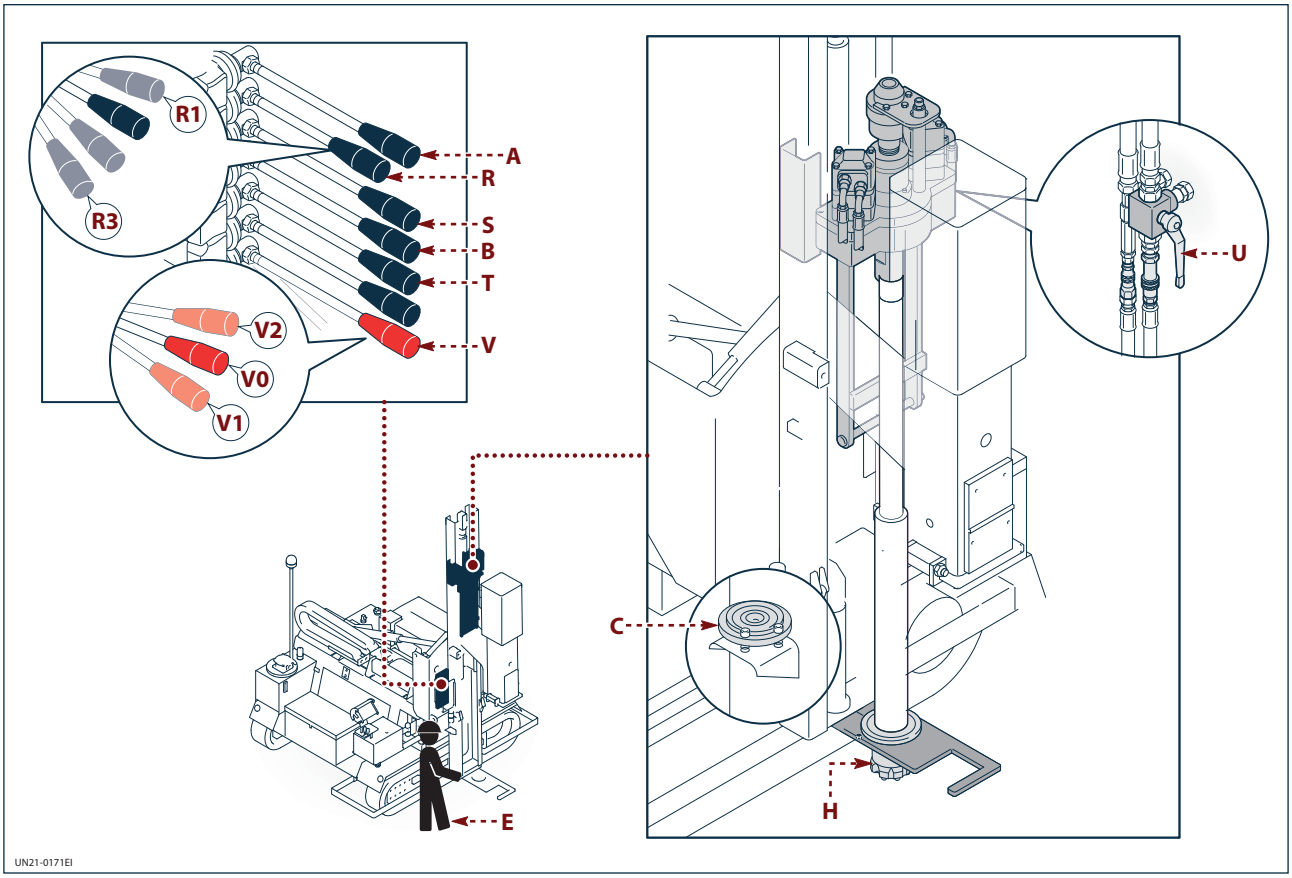
1) Unlock the guide (**N**) from the pin (**A**) and rotate it in vertical position.
2) Lock the guide with the pins (**L**) and the safety lock pins (**M**).
3) Lift the boring device and fit the slides (**D**) inside the column.
4) Insert the pin (**E**) and the safety split pin (**W**) to lock the 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**).



E) 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 (**Y**) 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 percussion hammer slightly and unscrew the safety lock pin (**Y**).
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



E) 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 automatic 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.
7) Move the lever (**V**) to position (**V1**) to rotate the tool.
8) Move lever (**R**) (to "**R3**" floating position) to manually activate the tool forward.
9) 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).
10) Deactivate the compressed air.
11) 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.

Information

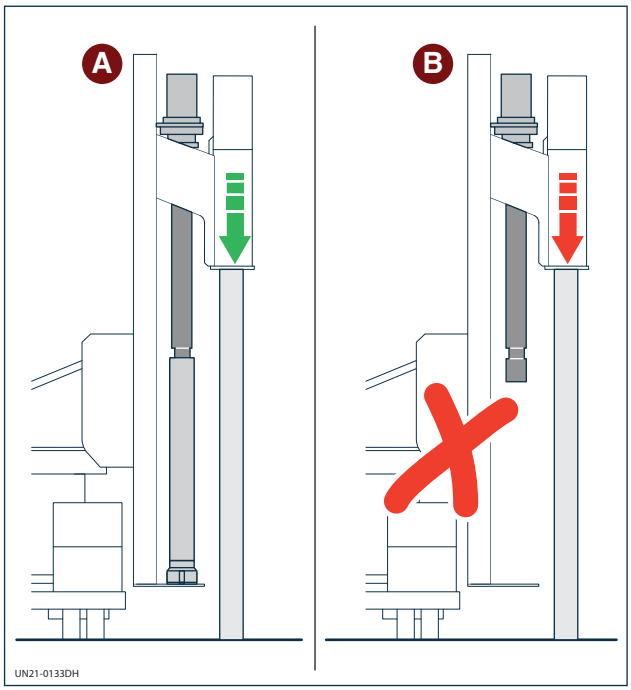
To automatically stop the tool at the required depth, see the "Adjusting of PROXIMITY device that stops the hammer's down stroke" section.
If the machine is fitted with the laser device see the "Adjusting the laser device that stops the hammer's down stroke" section.

Alternative perforation and pile driving procedure

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

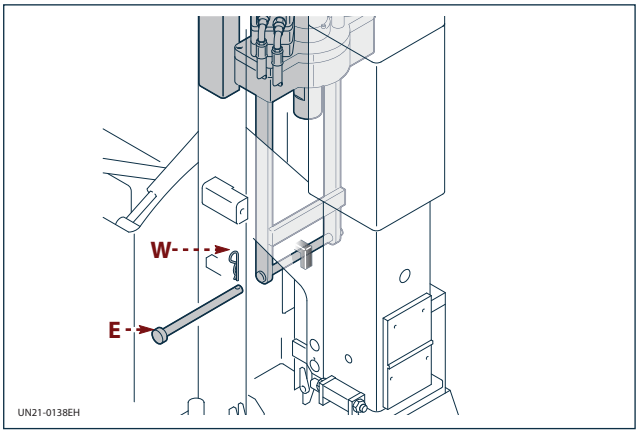
A) Correct work configuration.

B) This configuration is not allowed as the pile driving vibrations would damage the boring head.



Information

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



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.

Boring device maintenance

For maintenance operations refer to the manual of the manufacturer of the boring device.

Procedure to make holes using the drill

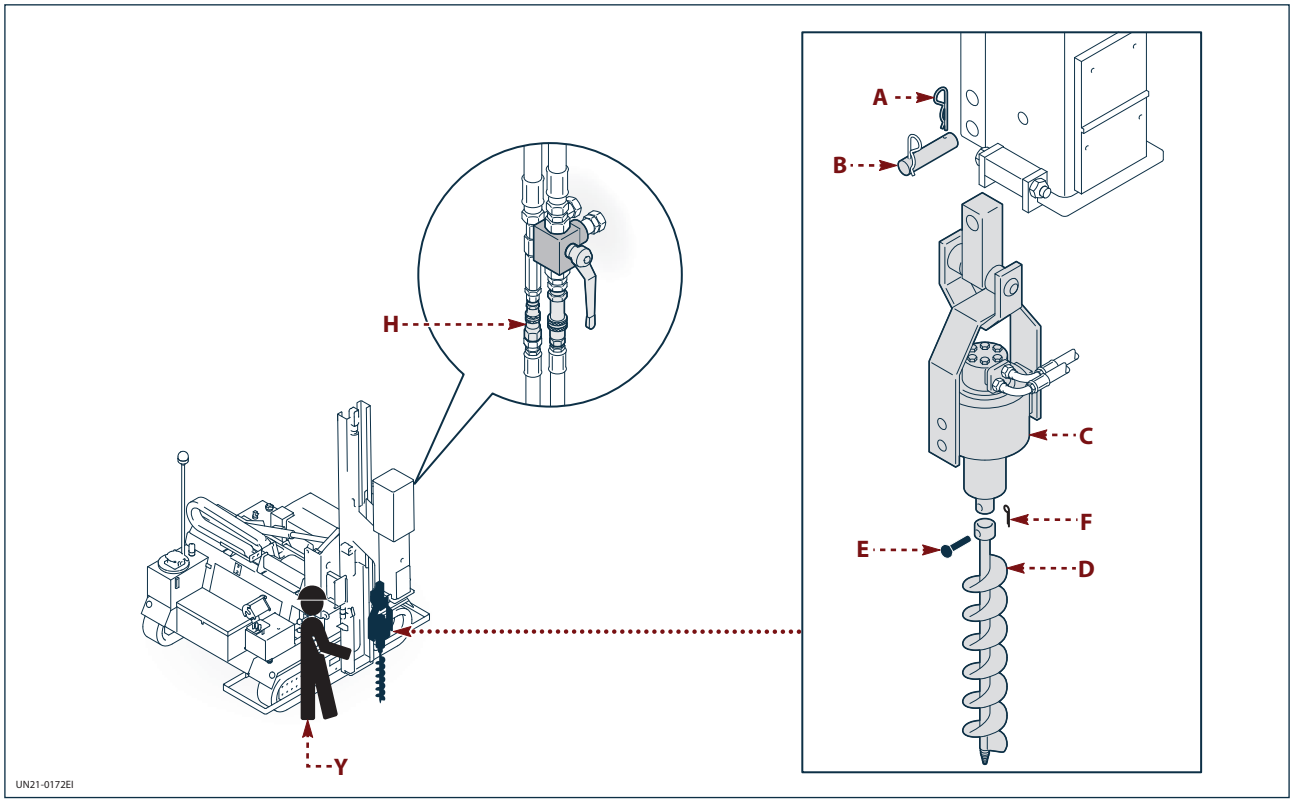
Holes in the ground, even with modest amounts of small sized solid elements (gravel, crushed stone, etc.) are made with the drill fitted on the pile-driver.

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

Danger - 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

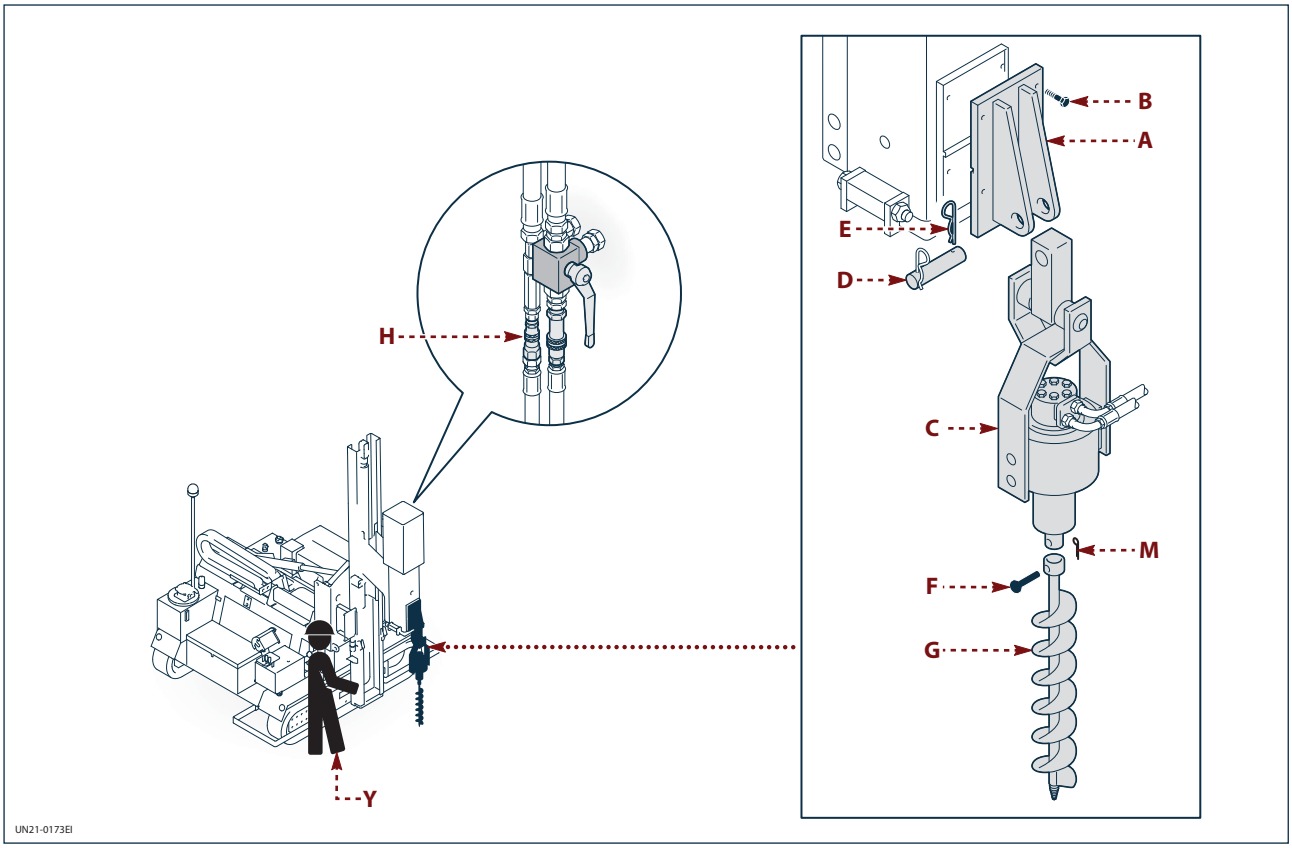


Y) Control position foreseen for the operator

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) Insert the pin (**E**) and the lock pin (**F**).
7) Connect the hydraulic pipes to the quick couplings (**H**).

Front fitting of the drill

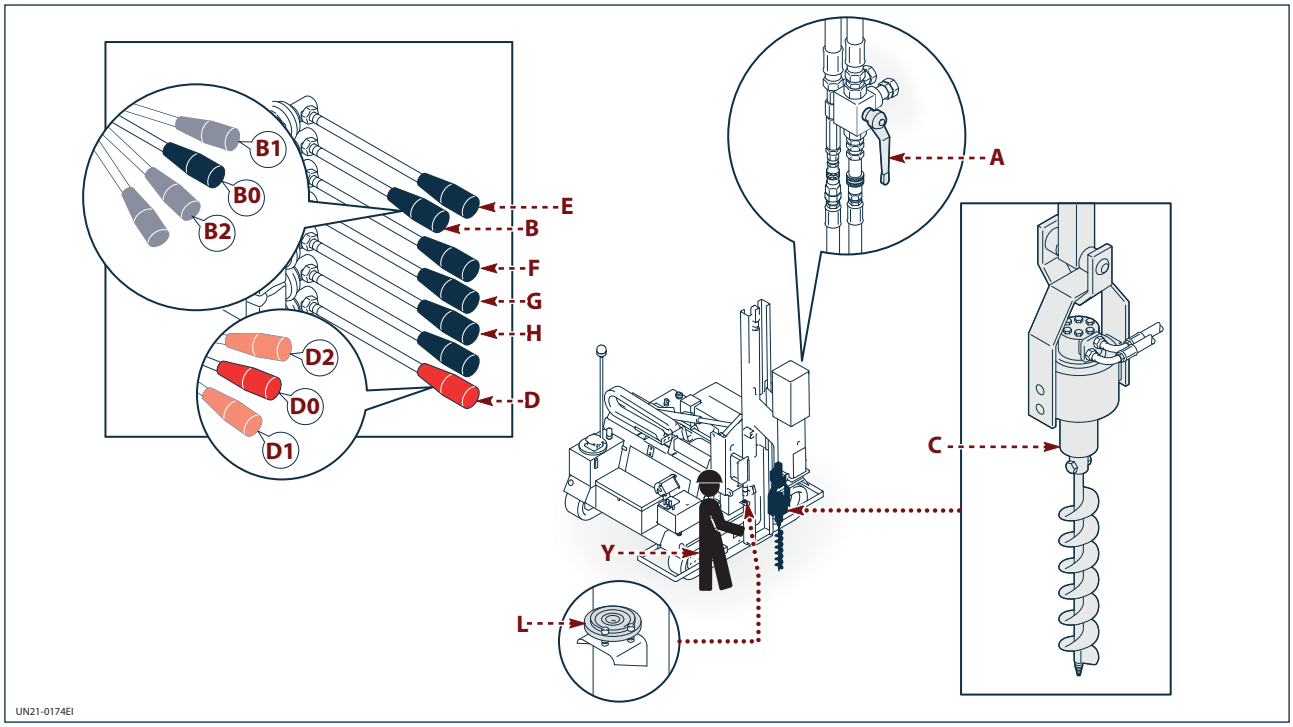


Y) Control position foreseen for the operator

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) Insert the pin (**F**) and the lock pin (**M**).
7) 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 lever (**B**) to (**B2**) position to manually 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

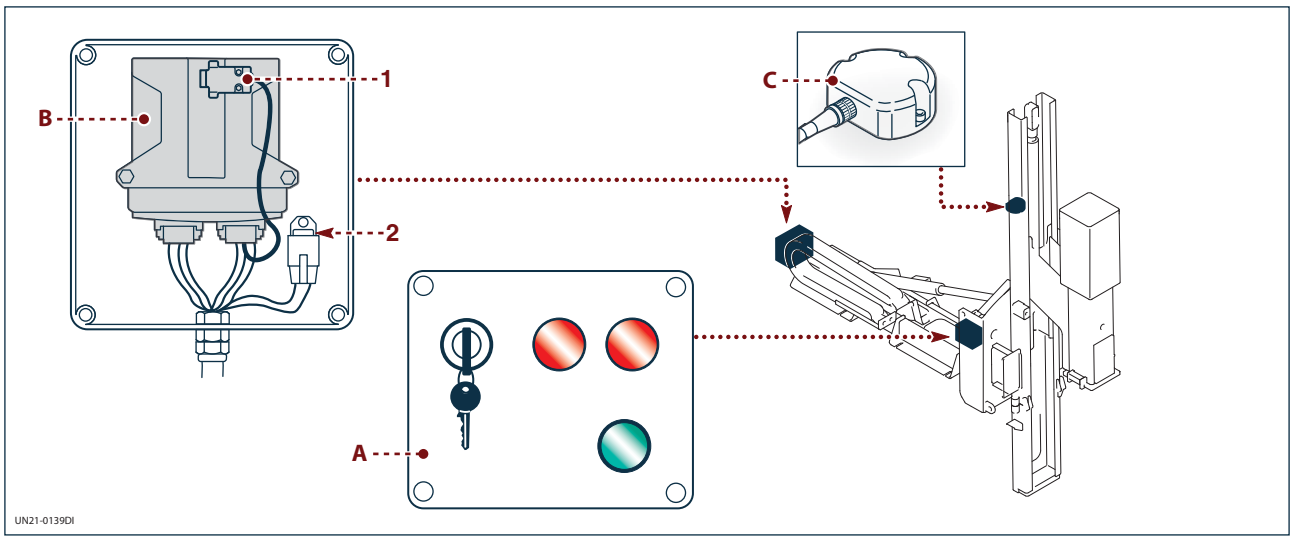
For maintenance operations refer to the manual of the manufacturer of the drill.

Using the verticality system

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 10 A fuse (**2**) protects the electronic control unit against overcurrents.

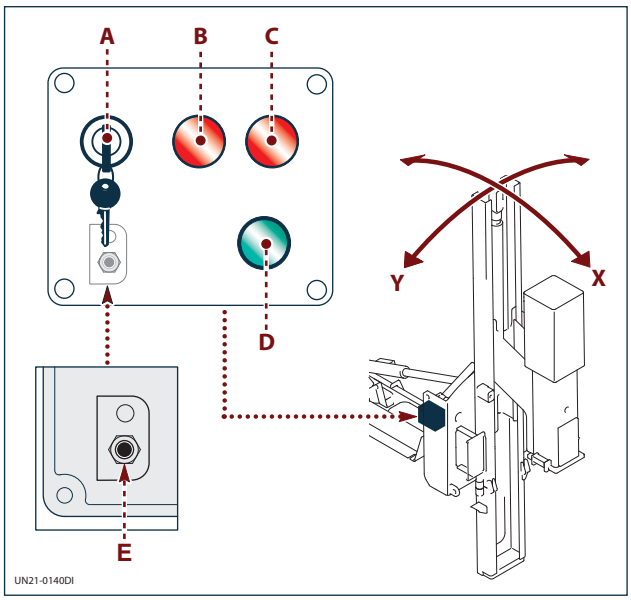
C) Angular sensor: the sensor detects the incorrect position of the column and sends the signal to the electronic control unit, which switches on the red signal lights and the green signal light.

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**).



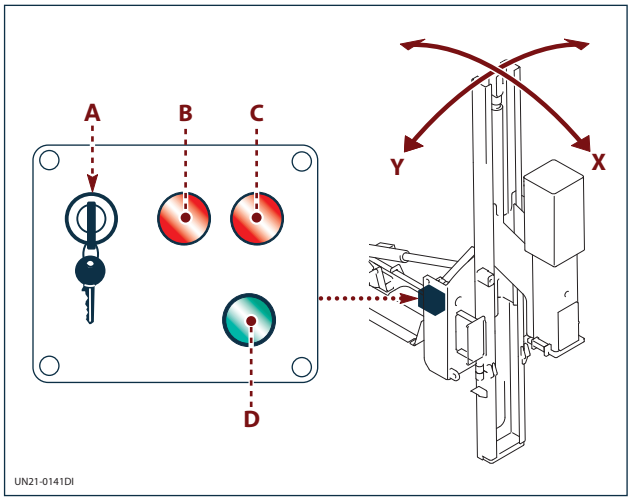
D) Illuminated momentary pushbutton (green light).
- **Pushbutton on:** this shows that the system is ready to activate the vertical positioning of the column.
  One or both signal lights (**B**) and (**C**) are on.
- **Pushbutton off:** the column is in perfectly vertical position.

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.
4) Turn the key of the switch (**A**) to position "0" to disable the automatic verticality device.



Caution - Care

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

Refuelling

Danger - 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.

Caution - Care

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. If this should happen refuel the tank and with the engine off and cold bleed the fuel circuit (see the engine manufacturer's use and maintenance manual).

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.**

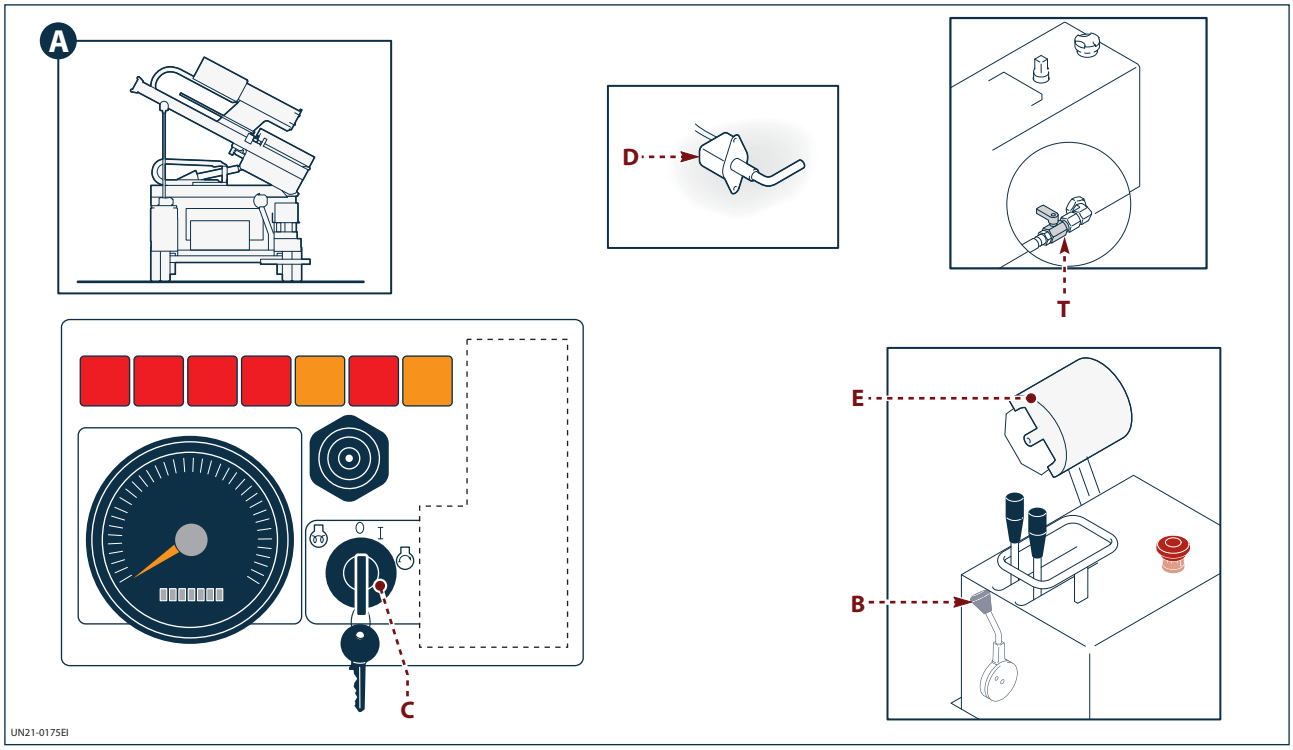
Re-commissioning

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



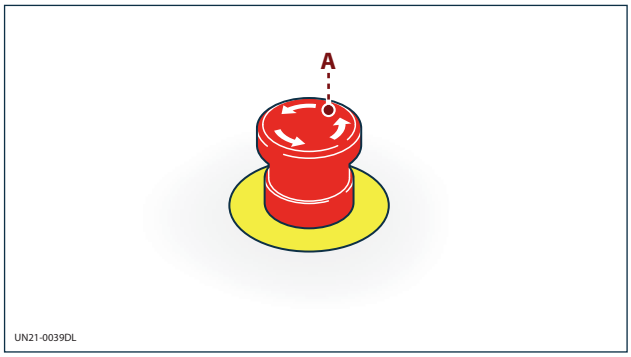
Proceed as outlined below.

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.

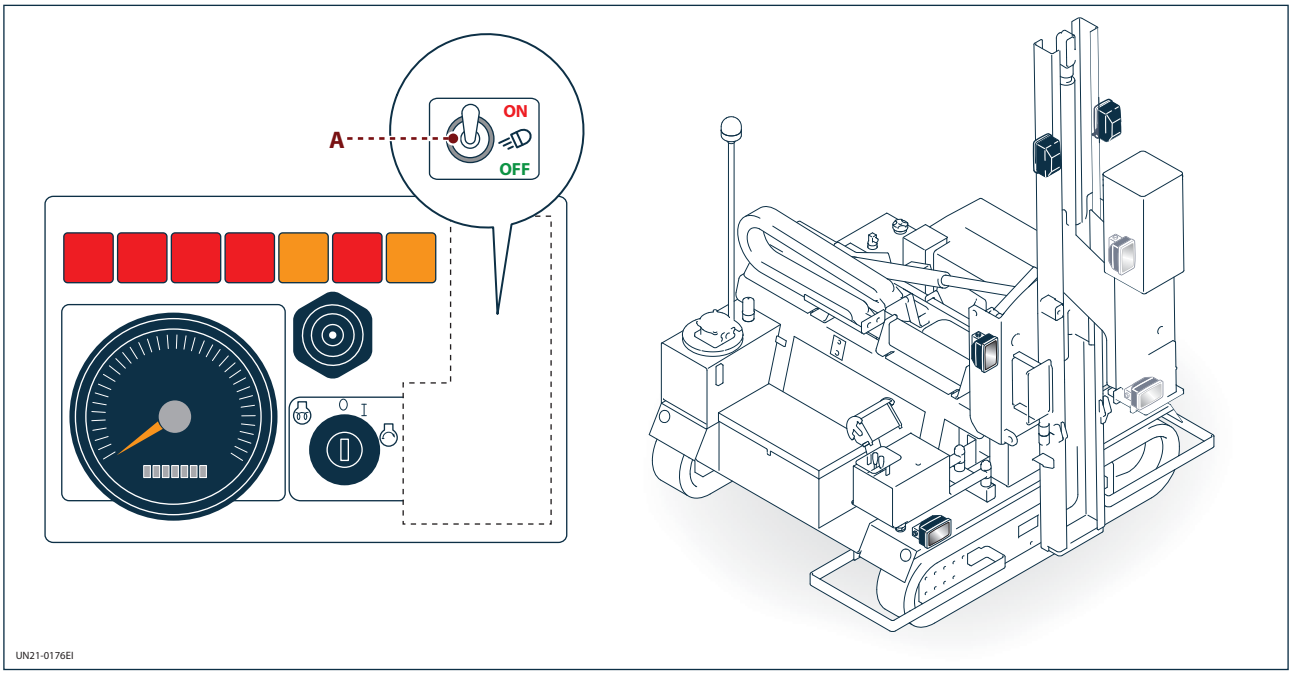
Emergency stop

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 restarting the machine (see "Starting the engine").



Night-time work or 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.

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 scheduled maintenance operations envisaged by the 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.
For engine and accessory maintenance, see the schedule in the use and maintenance manuals of the relevant manufacturers.

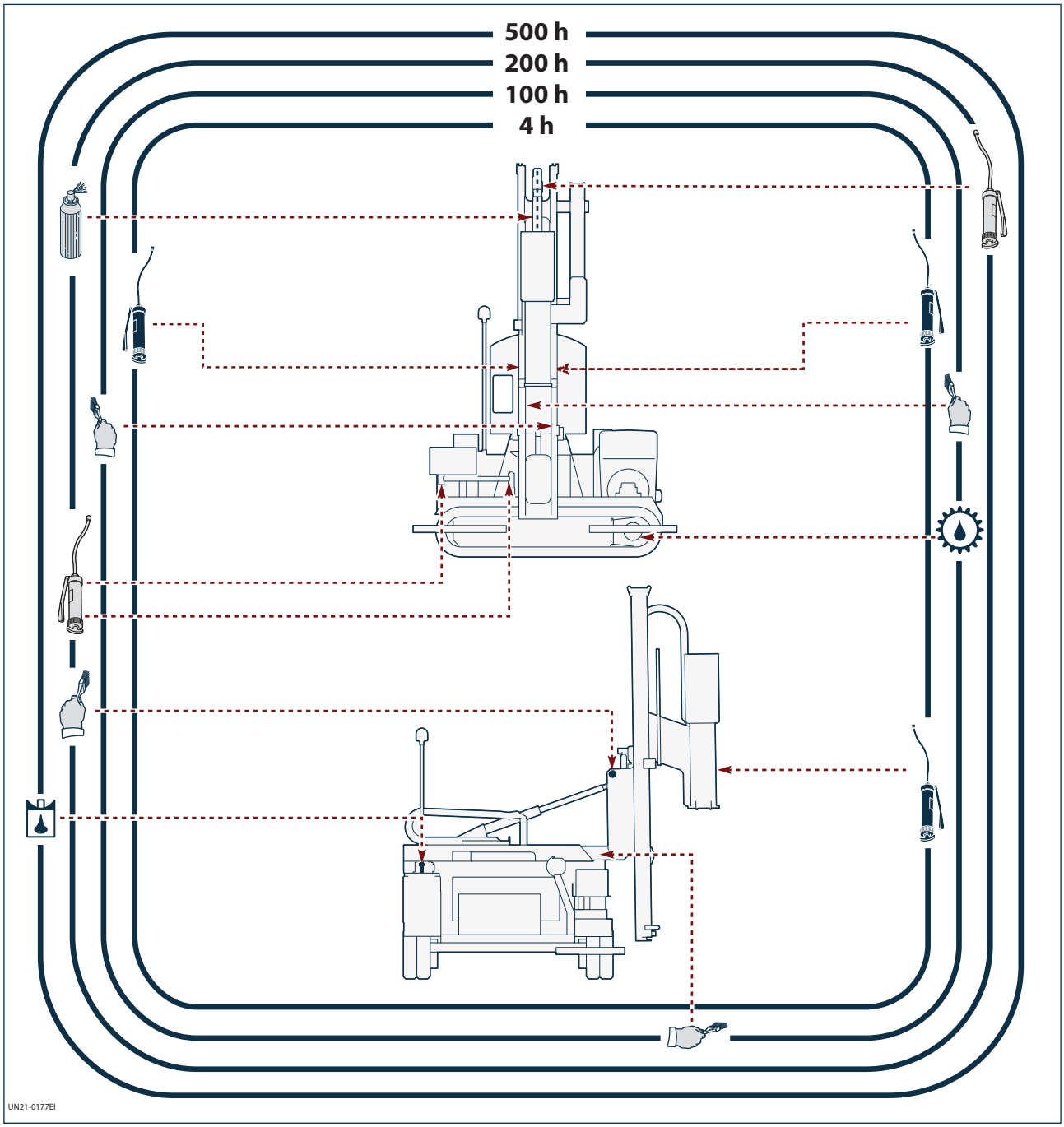
Scheduled maintenance chart			
Frequency	**Component**	**Type of work**	**Reference**
Every 4 hours of work	Stroke plate	Greasing	See "Lubrication diagram"
	Hammer point	Greasing	See "Lubrication diagram"
	Nuts and bolts	Inspection	See " Nut and bolt check"
	Percussion hammer	Nut and bolt tightness check	Contact an authorised service centre
Every 100 hours of work	Track gearmotor	Oil level check	See "Track gearmotor oil level check"
		Oil change (**1**)	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"
Every 200 hours of work	Percussion hammer lifting chain	Cleaning and lubrication	See "Cleaning and lubrication of hammer lifting chain"
	Couplings and hosing	Check	See "Hose check"
	Column	Lubrication	See "Lubrication diagram"
	Chain pinion	Lubrication	See "Lubrication diagram"
	Shift controls	Lubrication	See "Lubrication diagram"
Every 250 hours of work	Tracks	Tension check	See "Track tension check"
	Percussion hammer accumulator	Condition check	Carry out check at an authorised service centre
Every 500 hours of work	Hydraulic oil tank	Oil level check	See "Hydraulic oil level check"
Every 1000 hours of work	Track gearmotor	Oil change	See "Replacing the track reduction gear oil"
	Percussion hammer lifting chain	Replacement	See "Replacing the chain"
	Hydraulic oil delivery line filter	Check the filter cartridge clogging	
	Hydraulic oil discharge filter	Replacing the filter cartridge	See "Replacing the discharge filter cartridge (low pressure)"
	Hydraulic oil delivery line filter	Replacing the filter cartridge	See "Replacing the delivery line filter cartridge (high pressure)"
Every 2000 hours of work	Hydraulic oil tank	Oil change	Contact an authorised service centre

(**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.

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.



IP BIMOIL GREASE 481

IP ATHESIA EP GR2

IP ATHESIA EP GR2

Oil for chains

ISO WG 150

IP HYDRUS OIL HI 46

The lubricants indicated are factory fill lubricants.
For equivalent lubricants see the “Lubricant comparison table”.

Nut and bolt check

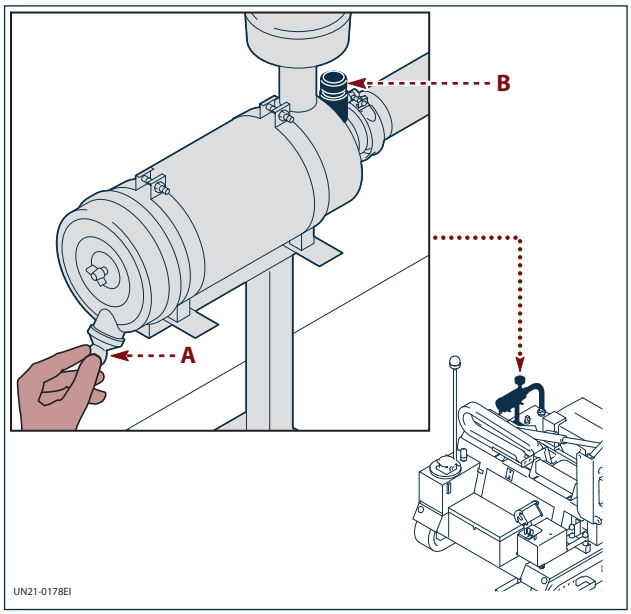
Check that the main fixing nuts and bolts are tight.
If the bolts are loose tighten them to the prescribed torque (see the "Nuts and bolts tightening torques chart").

Checking and cleaning the supplementary air filter

Caution - Care

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.

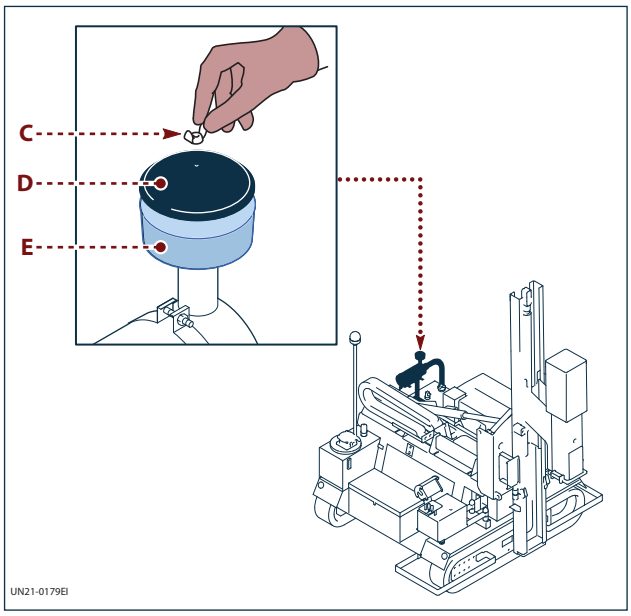
Use the valve (**A**) to release the dust contained in the filter.
Check the clog signal (**B**) every day.
When the signal is in the red area, it means the filter is clogged and must be cleaned or replaced (see "Replacing supplementary air filter cartridges").



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.

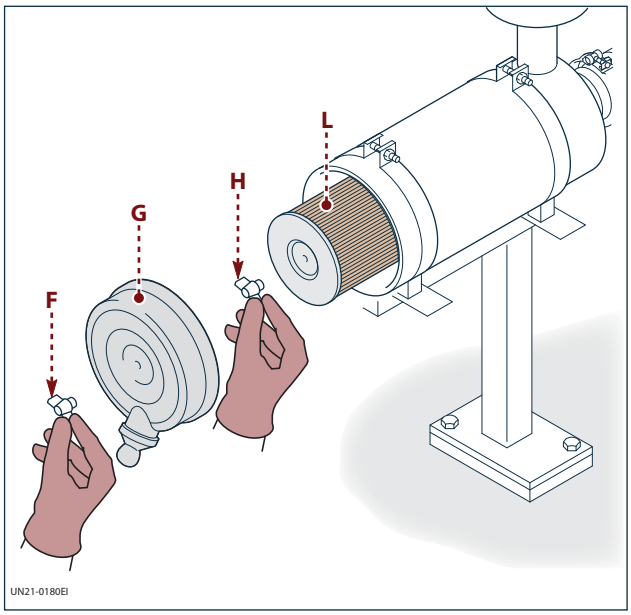
Do not wash the filter.

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.

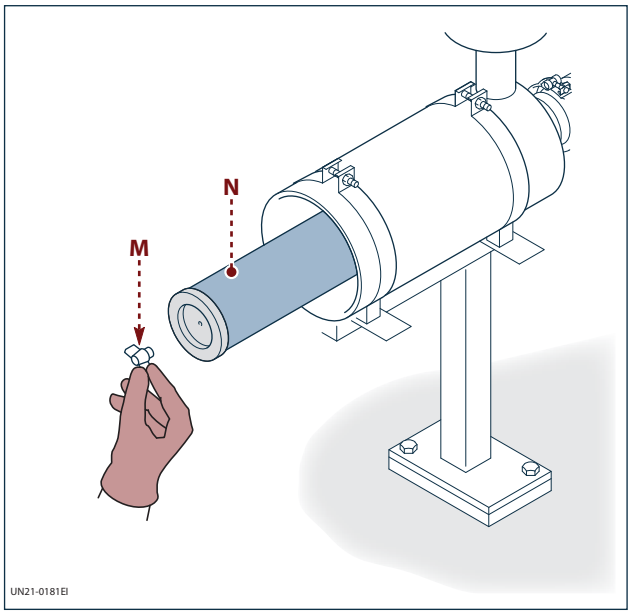
The primary filter can be cleaned up to six times (if cleaned and checked correctly), then it must be replaced.



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

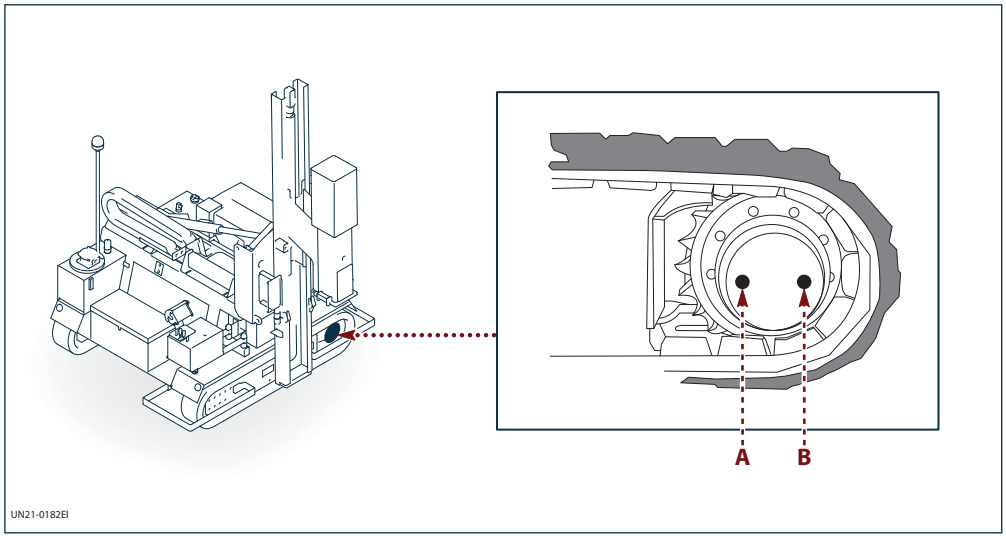
- Secondary filter

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

For oil characteristics see the "Lubricant comparison table".

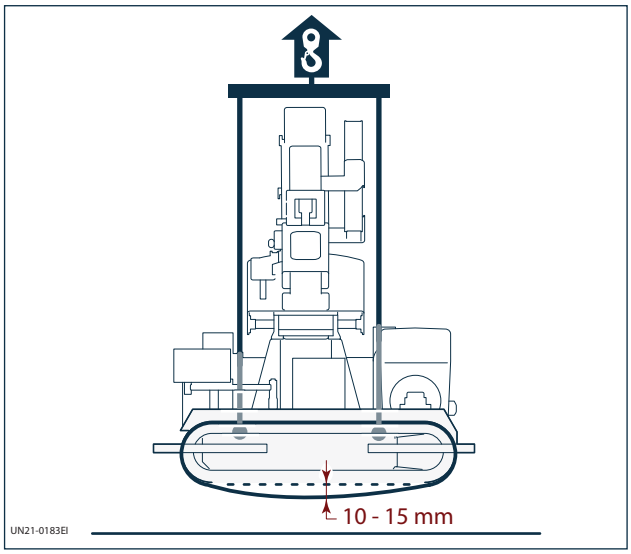
Hose check

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.

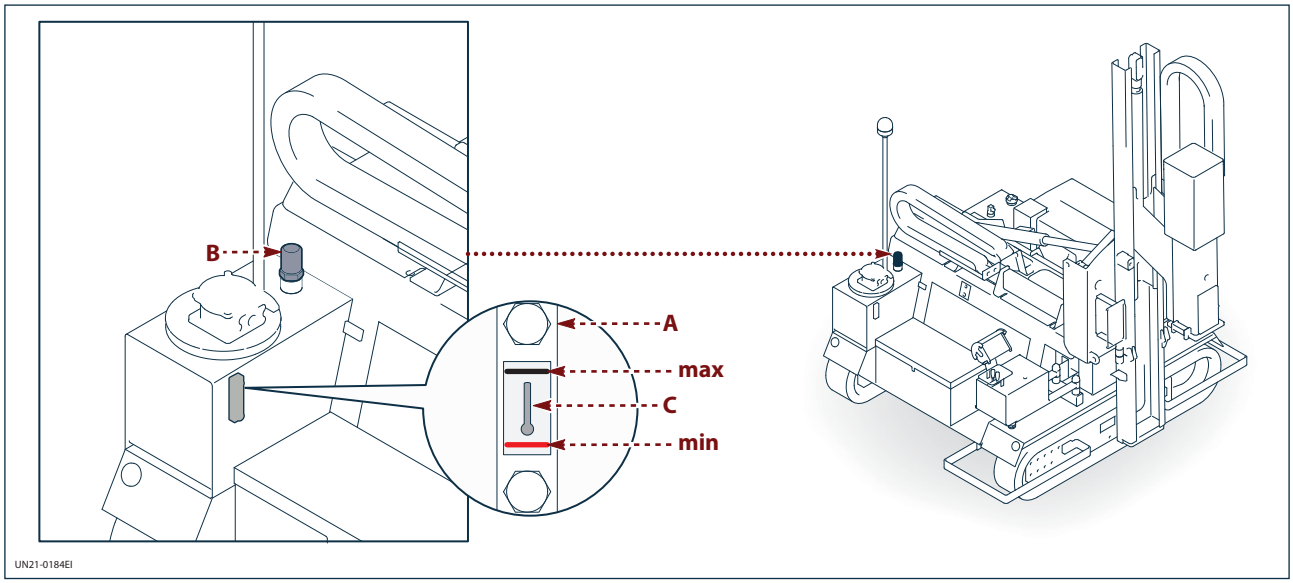
Track tension check

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 - Care

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

Danger - 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.

Caution - Care

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.

Caution - Care

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	**IP**	**AGIP**	**MOBIL**	**SHELL**
Type	IP HYDRUS HI 46	ENI-ARNICA 46	MOBIL DTE 10 ECEL 46	SHELL TELLUS T 46

Track gearmotor oil				
Brand	**IP**	**AGIP**	**MOBIL**	**SHELL**
Type	IP MELLANA OIL	BLASIA	MOBIL GEAR 600 XP	OMALA

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

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

Engine oil				
Brand	**IP**	**AGIP**	**MOBIL**	**SHELL**
Type	IP TARUS TURBO EXTRA 15W/40	ENI - I SIGNA PERFORMANCE E 7	MOBIL DELVAC 15W/40 MX	SHELL RIMULA R 4 L 15W/40

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	
	The electrical system of the emergency button in faulty	Repair the fault	Contact an authorised service centre
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 parts which are not original spare parts.

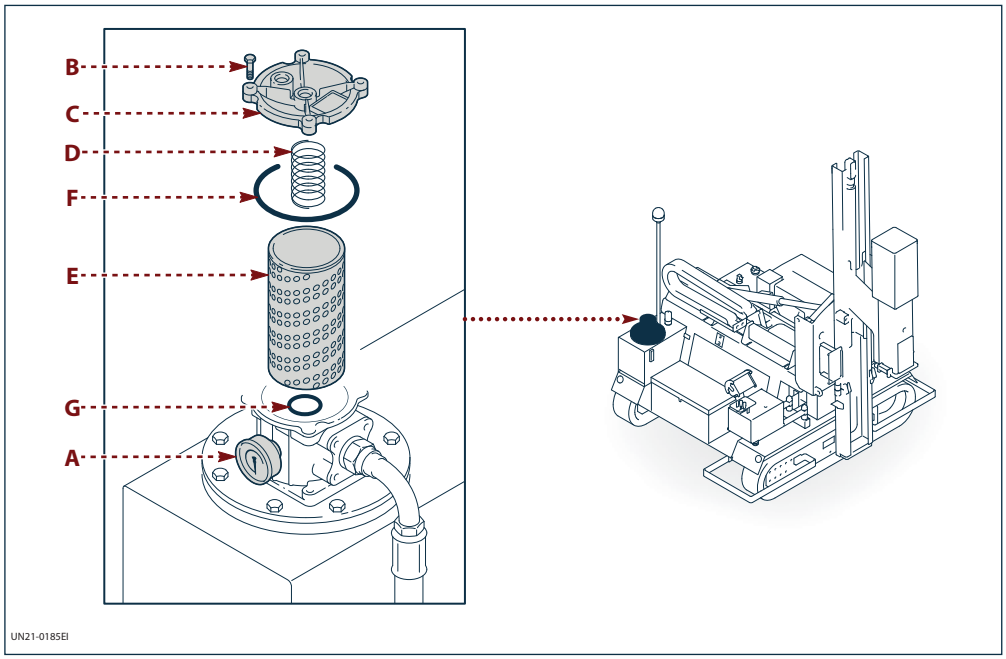
Before starting the machine, check that there are no tools, cloths or other material near the moving parts or in risk areas.

The components removed and waste material must disposed of in compliance with the laws in force concerning waste collection, sorting and disposal.

Replacing the discharge filter cartridge (low pressure)

Caution - Care

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)

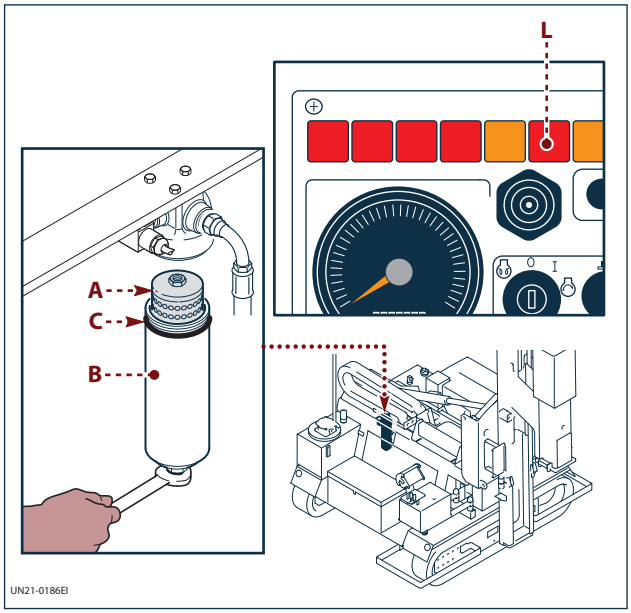
Caution - Care

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.

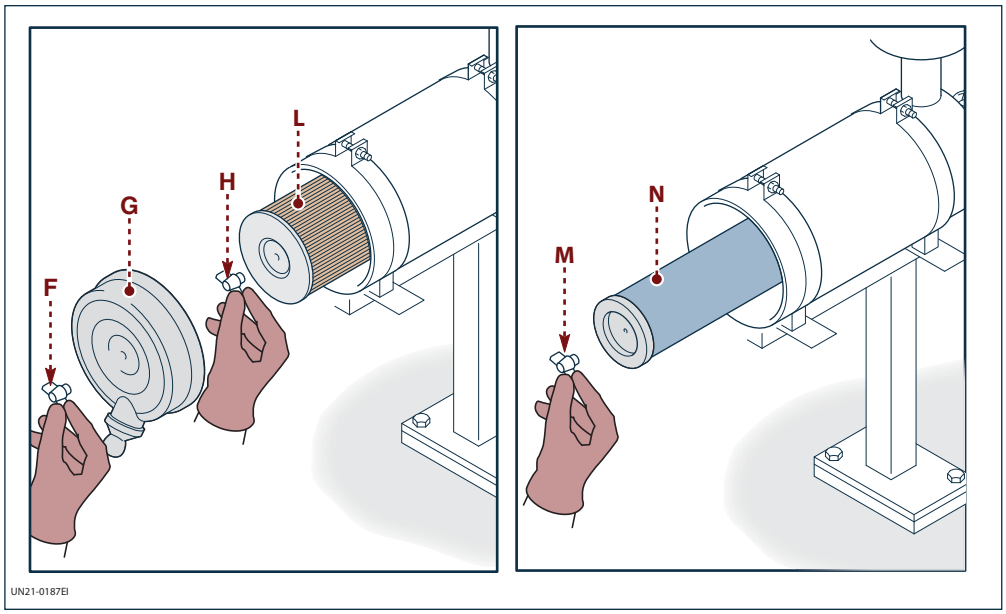
1) Position a container of adequate capacity under the filter to collect the oil.
2) Clean the filter's outer surfaces accurately.
3) Unscrew the filter unit (**B**).
4) Slide out the worn or clogged filter cartridge (**A**).
5) Accurately clean the inside of the filter unit (**B**).
6) Slide the new 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

Caution - Care

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 - Care

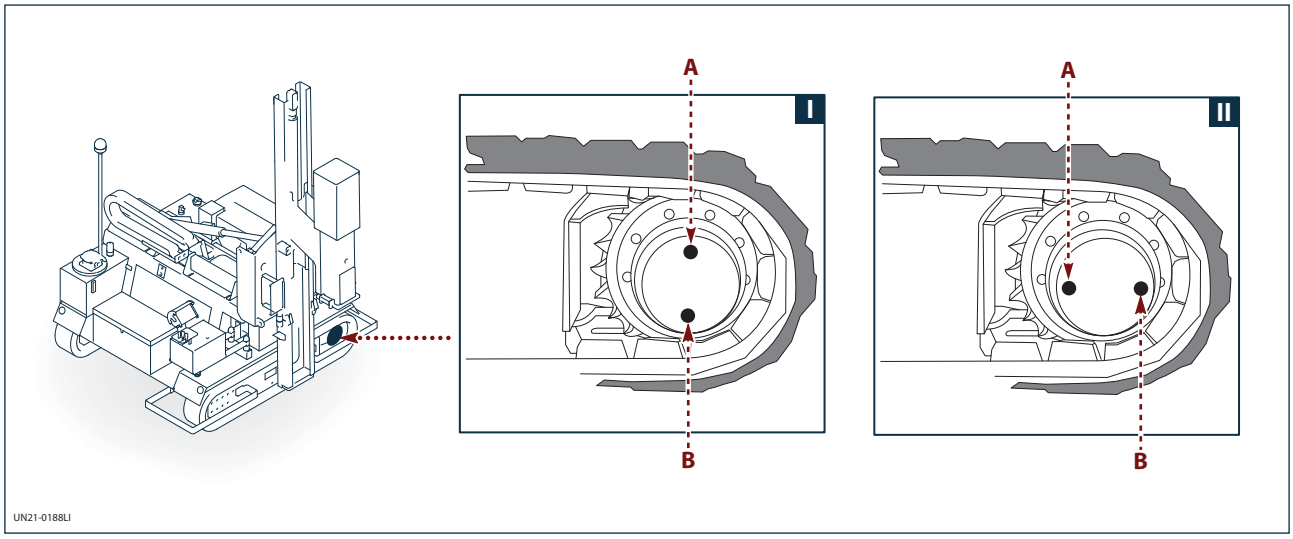
The hosing must be replaced with the hydraulic system depressurised.

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 (**I**).
2) Remove the ignition key and store it safely.
3) Unscrew cap (**A**).
4) Unscrew the cap (**B**) and collect the drain oil in a suitable container.
5) Screw on the cap (**B**).
6) Move the track and arrange the caps as shown in the figure (**II**).
7) Pour oil into the hole of the cap (**A**) until the oil is level with the bottom edge of the hole.
8) Screw on the cap (**A**).

For oil characteristics see the "Lubricant comparison table".

Replacing the chain

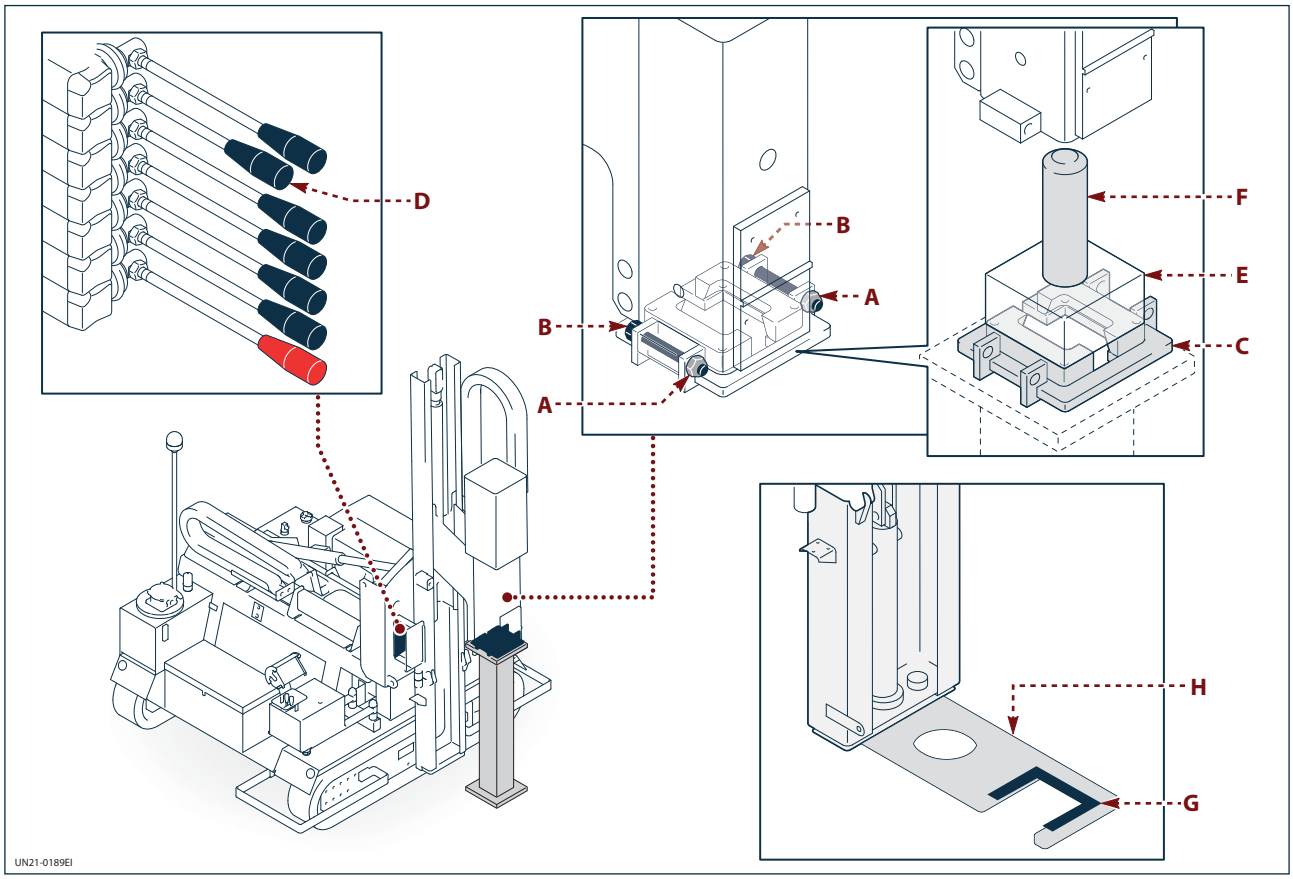
Danger - Warning

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.

Danger - Warning

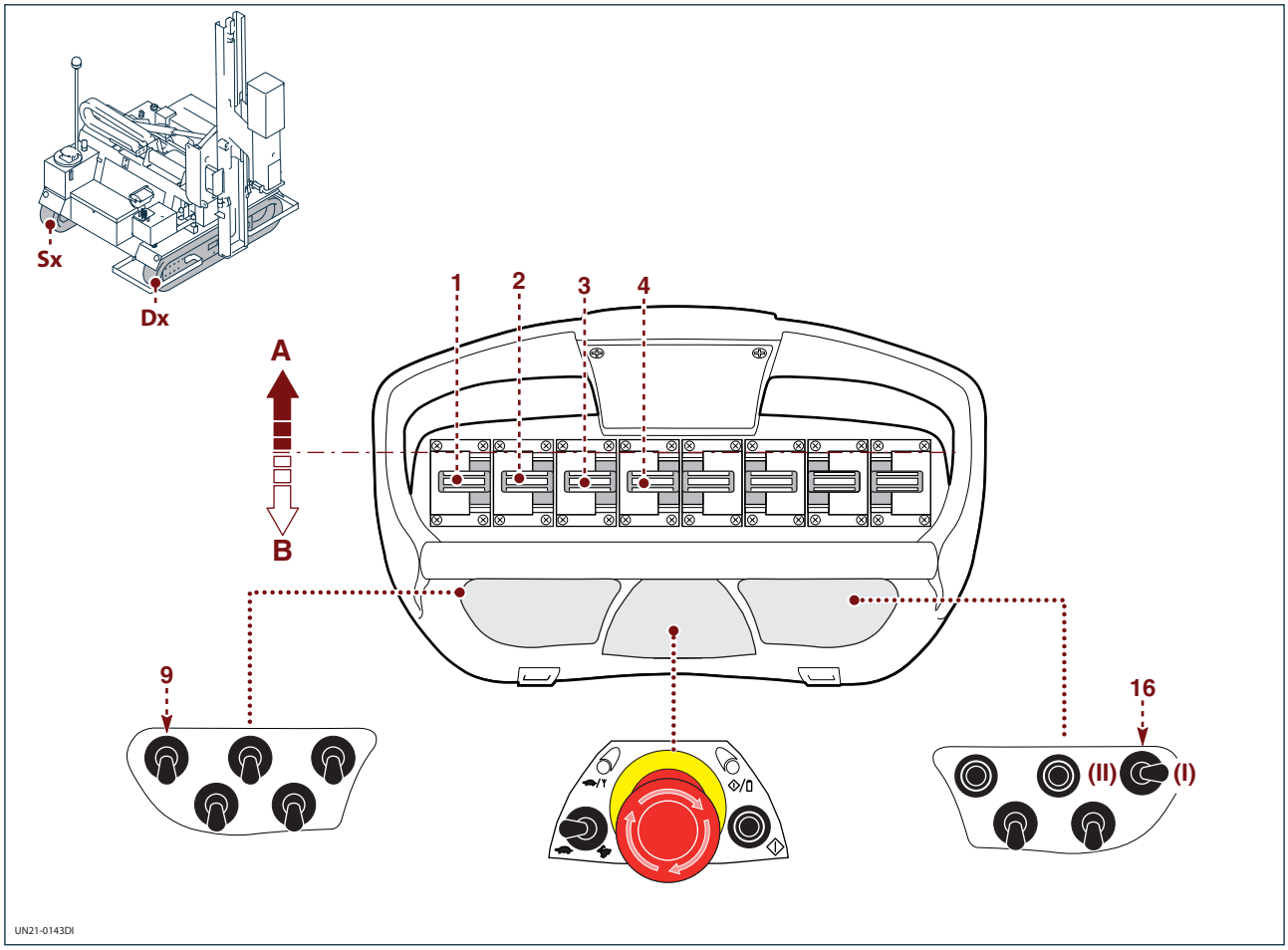
Pay particular attention to the component (F) which could fall and injure the operator.

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.

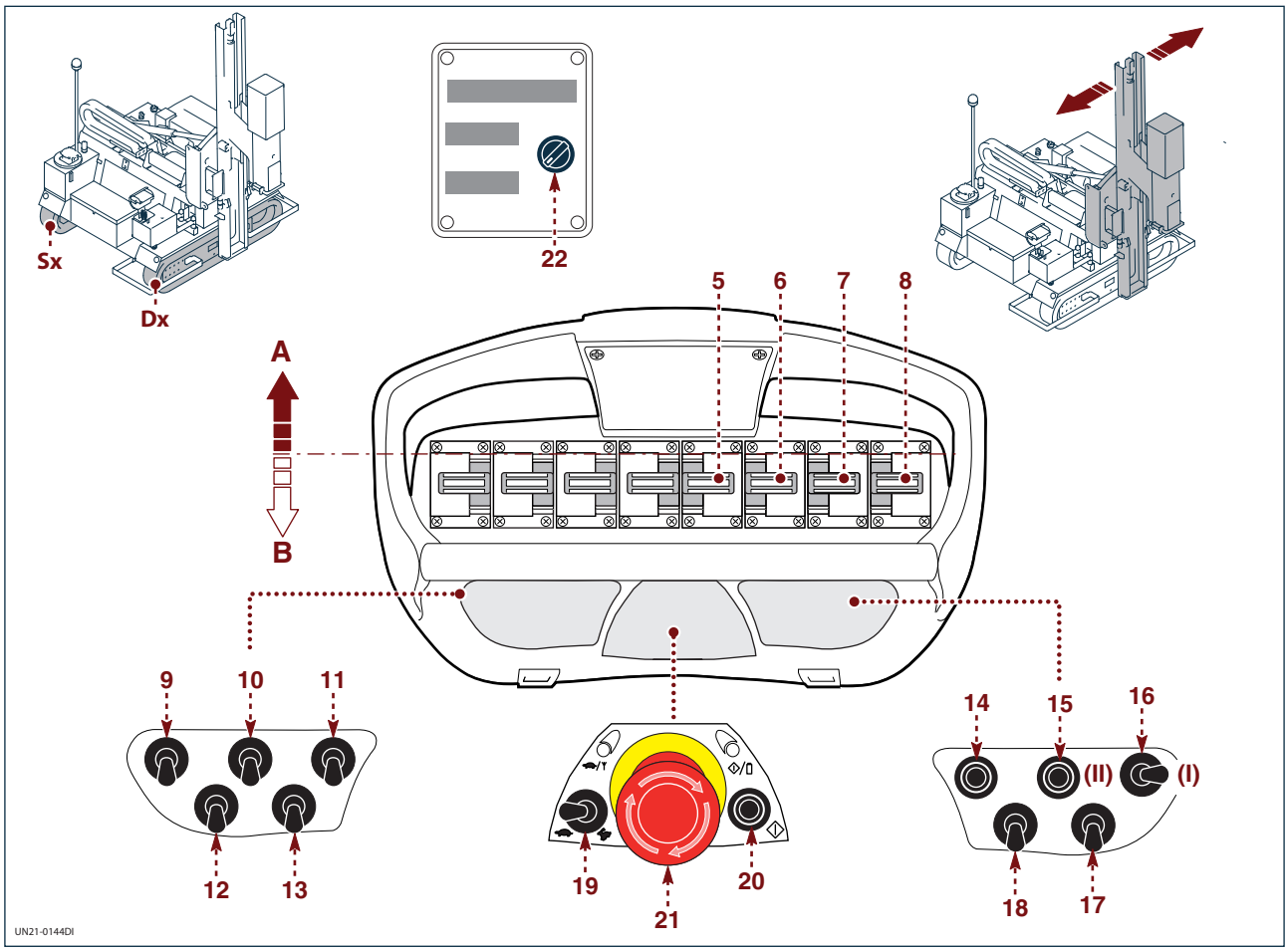
Scrapping the machine

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.

Radio control



1) **Lever:** to tilt the column lengthways in relation to the machine.
   - Position (**A**): to tilt the column to the right (**Dx**).
   - Position (**B**): to tilt the column to the left (**Sx**).
2) **Lever:** to lift and lower the percussion hammer.
   - Position (**A**): to lift the percussion hammer.
   - Position (**B**): to lower the percussion hammer.
   - When the switch (**9**) is in position "ON" and the lever is in position (**B**), the percussion hammer floating descent is activated.
3) **Lever:** to shift the column transversally to the machine.
   - Position (**A**): to retract the column.
   - Position (**B**): to extend the column.
4) **Lever:** to tilt the pile driver in working/resting position and to activate the movement of the left (**Sx**) track.
   - Switch (**16**) in position (**I**) and lever in position (**A**), to place the pile driver in working position.
   - Switch (**16**) in position (**I**) and lever in position (**B**), to place the pile driver in resting position.
   - Switch (**16**) in position (**II**) and lever in position (**A**) to move the left (**Sx**) track forwards.
   - Switch (**16**) in position (**II**) and lever in position (**B**) to move the left (**Sx**) track backwards.



5) **Lever:** to shift the column (longitudinally to the machine) and to activate the movement of the right (**Dx**) track.
- Switch (**16**) in position (**I**) and lever in position (**A**), to shift the column to the right (**Dx**).
- Switch (**16**) in position (**I**) and lever in position (**B**), to shift the column to the left (**Sx**).
- Switch (**16**) in position (**II**) and lever in position (**A**) to move the right (**Dx**) track forwards.
- Switch (**16**) in position (**II**) and lever in position (**B**) to move the right (**Dx**) track backwards.

6) **Lever:** to activate the outrigger jack.
- Position (**A**): to lift the jack rod off the ground.
- Position (**B**): to lower the jack rod on the ground.

7) **Lever:** to activate and disable the percussion hammer.
- Position (**A**): not active.
- Position (**B**): to activate the percussion hammer.

8) **Lever:** not active.

9) **Two-way switch:** to activate and disable the slow (floating) descent of the percussion hammer.

10) **Two-way switch:** not active.

11) **Two-way switch or potentiometer** (according to the machine models): to change the number of revolutions of the engine (optional).

12) **Two-way switch:** to activate the automatic stop of the down stroke of the percussion hammer (see "Adjusting the PROXIMITY device to stop the hammer's down stroke").

13) **Two-way switch:** to select the column verticality in manual mode using the radio control or using the automatic verticality device.
14) **Momentary pushbutton:** to activate the automatic verticality procedure.
The signal lights of the "verticality system" signal when the automatic verticality of the column has been reached (see "Using the verticality system").
15) **Momentary pushbutton:** not active.
16) **Two-way switch:** to switch the functions described:
- (**I**): from working/resting position to movement of the left track and vice versa.
- (**II**): from longitudinal shifting of the column to movement of the right track and vice versa.
17) **Two-way switch:** to switch the activation of the tracks.
18) **Two-way switch:** to switch on the work lights.
19) **Two-way switch:** to vary the machine's shifting speed (from normal speed to maximum speed and vice versa).
20) **Momentary pushbutton:** to activate the radio control.
21) **Emergency stop button:** to stop the machine in the case of impending risk.
22) **Two-way selector switch:** to disable the receiver unit and the radio control.

PRODUCT SAFETY DATA SHEET

Product : **IP HYDRUS OIL H.I. (ISO 46)** Page : 1/6

Product code : IP4021 Version : 1 Date : 01/03/2006

1. Identification of the substance/preparation and of the company

Identification of the substance or preparation:	IP HYDRUS OIL H.I. (ISO 68)
Type of product and use:	Hydraulic oil
Company identification:	a p i - a n o n i m a p e t r o l i i t a l i a n a S p A
Address and telephone Nr.:	Corso Italia 6 00198 ROMA- ITALY (+ 39) 06 -8 49 31 FA X. (+ 3 9) 0 6- 849 37 58

2. Composition/information on ingredients.

Components:	Paraffinic base stock, severely solvent refined (97 %wt min.) - CAS 101316-72-7 Additives
Hazardous component(s):	None to be reported, according to the present EU regulations.
Other information:	All the mineral base oils contained in this product have a value < 3 % wt of DMSO extract, according to IP 346/92 (note L - Dir. 94/69/CE)

3. Hazards identification.

3.0 General informations:

Classification of the product:	The product is not classified as dangerous according to the criteria set by the European Union.

3.1 Physical-chemical dangers:

Important hazards:	Product with a low risk of fire. It can create flammable mixtures or burn only if heated above its flash point.

3.2 Dangers for human health:

Skin contact:	Prolonged and repeated skin contact, especially if hygiene practices are poor, may cause reddening, irritation and dermatitis.
Eye contact:	Contact with eyes may cause reddening and irritation.
Ingestion:	Accidental ingestion of small quantities of the product may cause nausea, discomfort and gastric disturbances. Taking into account the taste and smell of the product, however, ingestion of dangerous quantites is very unlikely.
Inhalation:	This product has a low vapour pressure, and in normal conditions at ambient temperature the concentration in the air is negligible. A significant concentration may build up only if the product is used at high temperature, or in case of sprays and mists. In these cases overexposure to vapours (e.g. through prolonged use in confined insufficiently ventilated spaces) may cause irritation to airways, nausea and dizziness.
Aspiration of liquid into the lungs:	The aspiration of small amounts of petroleum substances into the lungs may cause a chemical pneumonia. Taking into account the characteristics of the product, however, this possibility is unlikely.

PRODUCT SAFETY DATA SHEET

Other information:	Any substance, in case of accidents involving pressurized circuits and the like, may be accidentally injected under the skin, even without external damage. In such a case, the victim should be brought to an hospital as soon as possible, to get specialized medical treatment.
3.3 Environmental hazards:	
Important hazards:	This product is not classified as dangerous to the environment, according to the criteria set by the EU.

4. First aid measures.

Skin contact:	Take off contaminated clothing and shoes. Wash thoroughly with soap and water.
Eye contact:	Flush with large amounts of water; if irritation persists, seek medical attention.
Ingestion:	Do not induce vomiting to avoid aspiration into the lungs; seek medical attention.
Inhalation:	In case of disturbances owing to an exposure to a high concentration of vapours or mists, remove the victim from exposure; keep at rest; if necessary, seek medical attention.
Aspiration of liquid into the lungs:	If there is the possibility that the product has been aspired into the lungs (i.e. in case of spontaneous vomiting), transport the victim to a hospital.

5. Fire-fighting measures.

General information:	Shut off source of product, if possible. If possible, move containers and drums away from danger area.
Extinguishing media:	
- Suitable:	Carbon dioxide, dry chemicals, foam, water spray (fog).
- Not to be used:	Do not use water jets. They could cause splattering, and spread the fire.
Special protective equipment for firefighters:	Personal protection equipment. Self-contained breathing apparatus
Useful precautions:	Avoid accidental sprays (i.e. from broken couplings) on hot surfaces or electrical contacts (switches, outlets and the like). In case of losses from pressurized circuits, the sprays may form oil mists. Take into account that the lower explosion limit for oil mists is about 45 g oil/m³ air.
Other information:	Spilled product which is not burning should be covered with sand or foam Use water sprays to cool the surfaces exposed to the flames. In case of fire, do not discharge runoff water: collect separately and use a proper treatment.

6. Accidental release measures.

General measures:	Shut off source of spill, if possible. Do not let the product flow into sewers, rivers or water courses.
Personal precautions:	See Sect. 8 of this sheet.
Methods for cleaning up:	
- Soil:	Contain spilled liquid with sand, earth or other suitable absorbents. Recover free liquid and waste materials in suitable waterproof and oil-resistant containers. Clean contaminated area. Dispose of according to local regulations.

PRODUCT SAFETY DATA SHEET

- Water:	Confine the spillage. Remove from surface by skimming or suitable absorbents. Notify local authorities according to regulations. Do not use solvents or dispersants.

7. Handling and storage.

Storage:	Keep away from sources of ignition. Storage temperature: ambient to 65°C max .
Handling:	Store the product in cool, well ventilated surrounding. Keep away from sources of ignition. Avoid contact with skin Do not breathe vapours or mists. Do not smoke. Do not cut, weld, drill, burn or incinerate empty containers or drums, unless they have been cleaned, and declared safe.

8. Exposure controls/personal protection.

8.1 Exposure limit values

Exposure limits:	TLV-TWA (A.C.G.I.H. 2005): 5 mg/m³ (mineral oil mists) TLV-STEL (A.C.G.I.H. 2005): 10 mg/m³ (mineral oil mists) If necessary, take into account the other limits listed in the relevant workplace regulations, or in the ACGIH documents.
Monitoring procedures:	Refer to relevant legislation and in any case to the good practice of industrial hygiene.

8.2 Control of exposure

General informations:	In case the concentration of the product or any constituent is above the exposure limits, and if plant characteristics, work procedures and other means are not able to reach the purpose, it is necessary to use suitable means of personal protection.
Respiratory protection:	Open or well ventilated areas: not necessary. Closed or confined areas (e.g. tank interiors): self-contained breathing apparatus.
Personal protection:	Long-sleeved overalls. If necessary, refer to the EN 465-466-467 standards When there is a risk of contact with the eyes, use safety goggles or other means of protection. If necessary, refer to national standards or to the EN 166 standard. When there is a risk of contact with the skin, use hydrocarbon-resistant, felt-lined gloves. Experience shows that gloves made of: Nitrile rubber, PVA (polyvinylalcohol), PVC are adequate for this use. Gloves made of: Natural rubber (Latex), Neoprene rubber have inadequate resistance. Use gloves respecting all the conditions and within the limits set by the manufacturer. Replace gloves immediately in case of cuts, holes or other signs of damages or degradation. If necessary, refer to the EN 374 standard.
Hygiene measures:	Avoid contact with skin and eyes Do not breathe vapours or mists. Do not clean hands with dirty or oil-soaked rags. Do not keep dirty rags in the overall pockets. Do not drink, eat or smoke with dirty hands.

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Wash hands with water and soap, do not use solvents or other irritant products which have a defatting effect on the skin.
Do not re-use clothes, if they are still contaminated.

9. Physical and chemical properties (typical values).

Appearance:	Liquid, bright & clear (ASTM D 4176/1).
Odour:	Characteristic.
Colour	Not determined (ASTM D 1500)
Density a 15°C:	880 kg/m³ (ASTM D 1298).
Boiling point/range:	> 200 °C (at 10 mmHg) (ASTM D 1160)
Vapour pressure:	1·10-3 hPa (20 °C)
Viscosity at 40°C:	46 mm²/s (ASTM D 445).
Solubility in water:	Insoluble in water
pH :	Not applicable (ASTM D 1287).
Pour point:	-27 °C. (ASTM D 97)
Flash point :	225 °C. (ASTM D 92)
Auto-ignition temperature:	> 300 °C (DIN 51794)
Explosion limits:	
- Lower:	Not determined.
- Upper:	Not determined.
Partition coefficient (P o/w):	Not determined.
DMSO extract of base stock:	< 3 % wt (IP 346/92)

10. Stability and reactivity.

Thermal decomposition products:	COx, HC, SOx, NOx. POx.
Stability:	Stable product.
Hazardous reactions:	None
Materials to avoid:	Strong oxidants

11. Toxicological information.

Oral toxicity (rat):	LD50 greater than 2000 mg/kg (estimated from the composition)
Dermal toxicity (rabbit):	LD50 greater than 2000 mg/kg (estimated from the composition)
Inhalation toxicity (rat):	LC50 greater than 5 mg/l/4h (estimated from the composition)
Skin sensitization:	This product does not contain any significant amounts of substances classified as sensitizers (in any case < 0.1 % wt)
Other information:	* Not irritating to eyes and skin * Minor irritation may occur after prolonged or repeated contact, especially if normal hygienic rules are not respected. * None of the components of this product are listed as carcinogen by NTP, IARC, OSHA, EU or others.

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12. Ecological information.

General informations:	This product is expected to be resistant to biodegradation and to persist in the environment. Handle according to general working hygiene practices to avoid pollution and release into the environment.
Biodegradation:	The most significant constituents of the product should be considered as "inherently biodegradable", but not "readily biodegradable", and they may be moderately persistent, particularly in anaerobic conditions.
Toxicity for aquatic organisms:	No specific environmental data are available for this product. According to the components, and by comparison with other products of the same type and composition, it is expected that this product has a toxicity for aquatic organisms > 100 mg/l, and must not be regarded as dangerous to the environment.
Other data:	This product has no specific properties for inhibition of bacterial activity. In any case, wastewater containing this product should be treated in plants that are suited for the specific purpose.
WGK class (Germany):	1.

13. Disposal considerations.

Disposal of product:	Do not dispose of the product, either new or used, by discharging into sewers, tunnels, lakes or water courses. Deliver to a qualified official collector.
European Waste Catalogue Code:	13 01 10 (Ref: 2001/118/CE) This code is only a general indication, and takes into account the original composition of the product and its intended use. The user has the responsibility of choosing the right code, considering the actual use of the product, alterations and contaminations. The product as it is does not contain halogenated substances
Disposal of packaging:	Dispose of in a safe manner, in accordance with local regulations. Do not cut, weld, drill, burn or incinerate empty containers or drums, unless they have been cleaned, and declared safe.

14. Transport information.

Transport hazard label:	None.
Substance identification number. (UN Nr.):	Not applicable.
RID/ADR:	Does not belong to any class of danger.
ICAO/IATA:	Does not belong to any class of danger.
IMO-IMDG code:	Does not belong to any class of danger.

15. Regulatory information.

EU labelling information:	Not classified under this legislation.
Applicable laws and regulations:	National laws on classification and labeling of dangerous substances/preparations (Adoption of Directive 67/548/CE and subsequent Adaptations to Technical Progress - ATP, and Directive 1999/45/CE). Relevant national laws on health and safety on the workplace. National adoption of Directives 89/391/CEE, 89/654/CEE, 89/655/CEE, 89/656/CEE, 90/269/CEE, 90/270/CEE, 90/394/CEE, 90/679/CEE, 93/88/CEE, 95/63/CE, 97/42/CE, 98/24/CE, 99/38/CE.

PRODUCT SAFETY DATA SHEET

National adoption of Directive 75/439/CEE concerning disposal of used oils.
Relevant national laws on recycling and re-use of waste materials.
Relevant national laws on prevention of water pollution.

16. Other information.

General indications:	Avoid excessive or improper use.
Other uses of the product:	Do not use the product for any purposes that have not been advised by the manufacturer. In that case, the user could be exposed to unforeseeable dangers.
Document references:	This Safety Data Sheets conforms to the dispositions of Directive 2001/58/CE
Text of R-phrases:	--
Nature of revision:	First issue.

This information relates only to the specific product and may not be valid if the product is used in combination with any other material or in any process.
The informations in this sheet are according to our best knowledge at the date of printing.

This Safety Data Sheet has been checked and printed on 01/03/2006.

End of document. **Number of page(s) : 6**

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

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 mm2/sa 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.

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.

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^3	(A.C.G.I.H.2004)
TLV-TWA	Fog mineral oil	5	mg/m^3	(A.C.G.I.H.2004)
TLV-STEL	Fog mineral oil	10	mg/m^3	(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 (Polyvinylalcool) 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.

9 PHYSICAL AND CHEMICAL PROPERTIES

Characteristics	*Value*	*Notes*
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^3	0,820 ÷ 0,865	ASTM D-1298 /ISO 3675
Water solubility	Not soluble	
Sharing Coeff. n-Ottanolo/water , log Kow	3,3 ÷6,0	
Viscosity a 40°C, mm^2/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_{50}	Oral	mouse	> 2000	mg/kg
LD_{50}	Cutaneous	rabbit	> 2000	mg/kg
LD_{50}	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.

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 Classification Code Warning label Identif.N° of warning (N° Kemler) Packaging group	:3 :F1 :3 :30 :III
A.D.N.R. Fluvial Transport	Class Classification Code Warning label Packaging Group	:3 :F1 :2.1 :III
I.M.O. - I.M.D.G. Transport by sea	Class Warning label Security shift for transportation Sea polluting Packaging group	:3 :3 :F-E, S-E : Non : III

O.A.C.I. - I.A.T.A Transport by Air	Class	:3
	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.

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 shift 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

MATHERIAL SAFETY DATA SHEET Rev. N° February 2009

PRODUCT SAFETY DATA SHEET

Product : **IP TARUS TURBO EXTRA (SAE 15W-40)** Page : 1/7

Product code : IP3301 Version : 2 Date : 22/01/2010

Supersedes SDS dated : 17/05/2005

1. Identification of the substance/preparation and of the company

Identification of the substance or preparation:	**IP TARUS TURBO EXTRA (SAE 15W-40)**
Type of product and use:	Lubricant for internal combustion engines
Company identification:	**api-anonima petroli italiana S.p.A**.
Address and telephone Nr.:	Via Salaria, 1322 - 00138 ROMA ITALY TEL. (+ 39) 06-84934111 FAX (+ 39) 06-84934758
E-mail contact address:	Competent person responsible for the Safety Data Sheet (Reg. EC nr. 1907/2006): sicurezza@gruppoapi.com
Reference legislation	This Safety Data Sheet is printed in English, and complies with present European Union regulations. This document does not include information relevant to other countries.

2. Hazards identification.

0 - General informations:	
Classification of the product:	The product is not classified as dangerous according to the criteria set by the European Union.
1 - Physical-chemical dangers:	
Important hazards:	Product with a low risk of fire. It can create flammable mixtures or burn only if heated at temperatures which are higher than normal ambient levels.
2 - Dangers for human health:	
Skin contact:	Prolonged and repeated skin contact, especially if hygiene practices are poor, may cause reddening, irritation and dermatitis.
Eye contact:	Contact with eyes may cause reddening and irritation.
Ingestion:	Accidental ingestion of small quantities of the product may cause nausea, discomfort and gastric disturbances. Taking into account the taste and smell of the product, however, ingestion of dangerous quantites is very unlikely.
Inhalation:	This product has a low vapour pressure, and in normal conditions at ambient temperature the concentration in the air is negligible. A significant concentration may build up only if the product is used at high temperature, or in case of sprays and mists. In these cases overexposure to vapours (e.g. through prolonged use in confined insufficiently ventilated spaces) may cause irritation to airways, nausea and dizziness.
Aspiration of liquid into the lungs:	The aspiration of small amounts of petroleum substances into the lungs may cause a chemical pneumonia. Taking into account the characteristics of the product, however, this possibility is unlikely.
Other information:	Any substance, in case of accidents involving pressurized circuits and the like, may be accidentally injected under the skin, even without external damage.

PRODUCT SAFETY DATA SHEET

	In such a case, the victim should be brought to an hospital as soon as possible, to get specialized medical treatment.
3 - Environmental hazards:	
Important hazards:	This product is not classified as dangerous to the environment, according to the criteria set by the EU.

3. Composition/information on ingredients.

Components:	Paraffinic base stock, severely solvent refined (87 %wt min.) - CAS 101316-72-7 / EINECS 309-874-0 Additives
Hazardous component(s):	Zinc alkyldithiophosphate 1.49 % wt max (EINECS 272-028-3; Xi, N; R 38-41-51/53) Overbased calcium alkylsulfofenate 0.99 % wt max (Polymer; R 53) For the complete text of the R-phrases quoted in this section, see section 16.
Other hazardous substances (impurities and/or secondary reaction products):	Alkylphenol, branched 0.49 %wt max (CAS 121158-58-5 / EINECS 310-154-3; Xn, N; R 38-41-62-50/53) - All these chemical compounds are present as impurities and/or secondary reaction products in the components, and are not added deliberatedly as such.
Other information:	All the mineral base oils contained in this product have a value < 3 % wt of DMSO extract, according to IP 346/92 (note L - Dir. 94/69/CE)

4. First aid measures.

Skin contact:	Take off contaminated clothing and shoes. Wash thoroughly with soap and water.
Eye contact:	Rinse eyes thoroughly for at least 10 minutes. Keep eyelids well apart. If inflammation or irritation persists, seek medical advice.
Ingestion:	Do not induce vomiting to avoid aspiration into the lungs. If the person is conscious, rinse mouth with water without swallowing. Keep at rest. Call for medical assistance or bring to an hospital.
Inhalation:	In case of disturbances owing to an exposure to a high concentration of vapours or mists, remove the victim from exposure; keep at rest; if necessary, seek medical attention.
Aspiration of liquid into the lungs:	If there is the possibility that the product has been aspired into the lungs (i.e. in case of spontaneous vomiting), transport the victim to a hospital.

5. Fire-fighting measures.

General information:	Shut off source of product, if possible. If possible, move containers and drums away from danger area.
Extinguishing media:	
- Suitable:	Small-size fires: carbon dioxide, dry chemicals, foam, sand or earth. Large fires: foam or water fog (mist). These means should be used by trained personnel only.
- Not to be used:	Do not use water jets. They could cause splattering, and spread the fire.
Special protective equipment for firefighters:	Personal protection equipment. Self-contained breathing apparatus

PRODUCT SAFETY DATA SHEET

Useful precautions:	Avoid accidental sprays (i.e. from broken couplings) on hot surfaces or electrical contacts (switches, outlets and the like). In case of losses from pressurized circuits, the sprays may form oil mists. Take into account that the lower explosion limit for oil mists is about 45 g oil/m^3 air.
Other information:	Spilled product which is not burning should be covered with sand or foam Use water sprays to cool the surfaces exposed to the flames. In case of fire, do not discharge runoff water: collect separately and use a proper treatment.

6. Accidental release measures.

General measures:	Shut off source of spill, if possible. Do not let the product flow into sewers, rivers or water courses.
Personal precautions:	See Sect. 8 of this sheet.
Methods for cleaning up:	
- Soil:	Contain spilled liquid with sand, earth or other suitable absorbents. Recover free liquid and waste materials in suitable waterproof and oil-resistant containers. Clean contaminated area. Dispose of according to local regulations.
- Water:	Confine the spillage. Remove from surface by skimming or suitable absorbents. Collect recovered product and other waste materials in suitable waterproof, oil resistant containers. Recover or dispose of according to local regulations. Do not use solvents or dispersants.

7. Handling and storage.

Storage:	Keep away from sources of ignition. Storage temperature: ambient to 55°C max .
Handling:	Store the product in cool, well ventilated surrounding. Keep away from sources of ignition. Avoid contact with skin Do not breathe vapours or mists. Do not smoke. Do not cut, weld, drill, burn or incinerate empty containers or drums, unless they have been cleaned, and declared safe.

8. Exposure controls/personal protection.

General indications:	Avoid excessive or improper use. Avoid the creation of mists or vapours.
8.1 Exposure limit values	
Exposure limits:	For the control of exposure to the product, the most relevant exposure limits are listed here. TLV-TWA (A.C.G.I.H. 2008): 5 mg/m^3 (mineral oil mists) TLV-STEL (A.C.G.I.H. 2008): 10 mg/m^3 (mineral oil mists) If necessary, take into account the other limits listed in the relevant workplace regulations, or in the ACGIH documents.
Monitoring procedures:	Refer to relevant legislation and in any case to the good practice of industrial hygiene.

PRODUCT SAFETY DATA SHEET

8.2 Control of exposure

General informations:	In case the concentration of the product or any constituent is above the exposure limits, and if plant characteristics, work procedures and other means are not able to reach the purpose, it is necessary to use suitable means of personal protection.
Respiratory protection:	Open or well ventilated areas: not necessary. Closed or confined areas (e.g. tank interiors): self-contained breathing apparatus.
Personal protection:	Long-sleeved overalls. If necessary, refer to the EN 943-13034-14605 standards When there is a risk of contact with the eyes, use safety goggles or other means of protection. If necessary, refer to national standards or to the EN 166 standard. When there is a risk of contact with the skin, use hydrocarbon-resistant, felt-lined gloves. Experience shows that gloves made of Nitrile rubber or PVA (Polyvinylalcohol) are adequate for this use. Gloves made of PVC can be used for limited periods. Gloves made of Neoprene or natural rubber (latex) have inadequate resistance. Use gloves respecting all the conditions and within the limits set by the manufacturer. Replace gloves immediately in case of cuts, holes or other signs of damages or degradation. If necessary, refer to the EN 374 standard.
Hygiene measures:	Avoid contact with skin and eyes Do not breathe vapours or mists. Do not clean hands with dirty or oil-soaked rags. Do not keep dirty rags in the overall pockets. Do not drink, eat or smoke with dirty hands. Wash hands with water and soap, do not use solvents or other irritant products which have a defatting effect on the skin. Do not re-use clothes, if they are still contaminated.

9. Physical and chemical properties (typical values).

Appearance:	Liquid, bright & clear (ASTM D 4176/1).
Odour:	Characteristic.
Colour	Not determined (ASTM D 1500)
Density a 15°C:	885 kg/m^3 (ASTM D 1298).
Boiling point/range:	> 200 °C (at 10 mmHg) (ASTM D 1160)
Vapour pressure:	1·10-3 hPa (20 °C)
Viscosity at 40°C:	N.D. (ASTM D 445).
Viscosity at 100°C :	14.5 mm^2/s (ASTM D 445).
Solubility in water:	Insoluble in water
pH :	Not applicable (ASTM D 1287).
Pour point:	-24 °C. (ASTM D 97)
Flash point :	225 °C. (ASTM D 92)
Auto-ignition temperature:	> 300 °C (DIN 51794)
Explosion limits:	
- Lower:	Not determined.
- Upper:	Not determined.
Partition coefficient (P o/w):	Not determined.

PRODUCT SAFETY DATA SHEET

Product : **IP TARUS TURBO EXTRA (SAE 15W-40)** Page : 7/7

Product code : IP3301 Version : 2 Date : 22/01/2010
Supersedes SDS dated : 17/05/2005

Other uses of the product:	Do not use the product for any purposes that have not been advised by the manufacturer. In that case, the user could be exposed to unforeseeable dangers.
Document references:	This Safety Data Sheets conforms to the dispositions of Regulation (EC) No 1907/2006 (REACH).
Text of R-phrases:	Complete text of the R-phrases quoted in this Safety Sheet. These phrases are reported here for information only, and MAY NOT correspond to the classification of the product. R 38: Irritating to skin. R 41: Risk of serious damage to eyes. R 50/53: Very toxic to aquatic organisms, may cause long-term adverse effects in the aquatic environment. R 51/53: Toxic to aquatic organisms, may cause long-term adverse effects in the aquatic environment. R 53: May cause long-term adverse effects in the aquatic environment. R 62: Possible risk of impaired fertility.
Nature of revision:	Modification according to Regulation (EC) nr. 1907/2006. Correction in Section: 1, 2, 3, 5, 6, 7, 8, 11, 12, 14, 15, 16.

This information relates only to the specific product and may not be valid if the product is used in combination with any other material or in any process.
The informations in this sheet are according to our best knowledge at the date of printing.

This Safety Data Sheet has been checked and printed on 22/01/2010.

End of document. **Number of page(s) : 7**

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PRODUCT SAFETY DATA SHEET

Product : **IP TARUS TURBO EXTRA (SAE 15W-40)** Page : 7/7

Product code : IP3301 Version : 2 Date : 22/01/2010
Supersedes SDS dated : 17/05/2005

Other uses of the product:	Do not use the product for any purposes that have not been advised by the manufacturer. In that case, the user could be exposed to unforeseeable dangers.
Document references:	This Safety Data Sheets conforms to the dispositions of Regulation (EC) No 1907/2006 (REACH).
Text of R-phrases:	Complete text of the R-phrases quoted in this Safety Sheet. These phrases are reported here for information only, and MAY NOT correspond to the classification of the product. R 38: Irritating to skin. R 41: Risk of serious damage to eyes. R 50/53: Very toxic to aquatic organisms, may cause long-term adverse effects in the aquatic environment. R 51/53: Toxic to aquatic organisms, may cause long-term adverse effects in the aquatic environment. R 53: May cause long-term adverse effects in the aquatic environment. R 62: Possible risk of impaired fertility.
Nature of revision:	Modification according to Regulation (EC) nr. 1907/2006. Correction in Section: 1, 2, 3, 5, 6, 7, 8, 11, 12, 14, 15, 16.

This information relates only to the specific product and may not be valid if the product is used in combination with any other material or in any process.
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Other uses of the product:	Do not use the product for any purposes that have not been advised by the manufacturer. In that case, the user could be exposed to unforeseeable dangers.
Document references:	This Safety Data Sheets conforms to the dispositions of Regulation (EC) No 1907/2006 (REACH).
Text of R-phrases:	Complete text of the R-phrases quoted in this Safety Sheet. These phrases are reported here for information only, and MAY NOT correspond to the classification of the product. R 38: Irritating to skin. R 41: Risk of serious damage to eyes. R 50/53: Very toxic to aquatic organisms, may cause long-term adverse effects in the aquatic environment. R 51/53: Toxic to aquatic organisms, may cause long-term adverse effects in the aquatic environment. R 53: May cause long-term adverse effects in the aquatic environment. R 62: Possible risk of impaired fertility.
Nature of revision:	Modification according to Regulation (EC) nr. 1907/2006. Correction in Section: 1, 2, 3, 5, 6, 7, 8, 11, 12, 14, 15, 16.

This information relates only to the specific product and may not be valid if the product is used in combination with any other material or in any process.
The informations in this sheet are according to our best knowledge at the date of printing.

This Safety Data Sheet has been checked and printed on 22/01/2010.

End of document. **Number of page(s) : 7**

PRODUCT SAFETY DATA SHEET

Product : **IP MELLANA OIL (ISO 150)** Page : 1/7

Product code : IP4432 Version : 1.03 Date : 17/08/2010

1. Identification of the substance/preparation and of the company

Identification of the substance or preparation:	**IP MELLANA OIL (ISO 150)**
Type of product and use:	Lubricant for gears
Company identification:	**api-anonima petroli italiana S.p.A**.
Address and telephone Nr.:	Via Salaria, 1322 - 00138 ROMA ITALY TEL. (+ 39) 06 84931 - FAX (+ 39) 06 84934758
E-mail contact address:	Competent person responsible for the Safety Data Sheet (Reg. EC nr. 1907/2006): sicurezza@gruppoapi.com
Reference legislation	This Safety Data Sheet is printed in English, and complies with present European Union regulations. This document does not include information relevant to other countries.

2. Hazards identification.

0 - General informations:	
Classification of the product:	The product is not classified as dangerous according to the criteria set by the European Union.
1 - Physical-chemical dangers:	
Important hazards:	Product with a low risk of fire. It can create flammable mixtures or burn only if heated at temperatures which are higher than normal ambient levels.
2 - Dangers for human health:	
Skin contact:	Prolonged and repeated skin contact, especially if hygiene practices are poor, may cause reddening, irritation and dermatitis.
Eye contact:	Contact with eyes may cause reddening and irritation.
Ingestion:	Accidental ingestion of small quantities of the product may cause nausea, discomfort and gastric disturbances. Taking into account the taste and smell of the product, however, ingestion of dangerous quantites is very unlikely.
Inhalation:	This product has a low vapour pressure, and in normal conditions at ambient temperature the concentration in the air is negligible. A significant concentration may build up only if the product is used at high temperature, or in case of sprays and mists. In these cases overexposure to vapours (e.g. through prolonged use in confined insufficiently ventilated spaces) may cause irritation to airways, nausea and dizziness.
Aspiration of liquid into the lungs:	The aspiration of small amounts of petroleum substances into the lungs may cause a chemical pneumonia. Taking into account the characteristics of the product, however, this possibility is unlikely.
Other information:	Any substance, in case of accidents involving pressurized circuits and the like, may be accidentally injected under the skin, even without external damage.

In such a case, the victim should be brought to an hospital as soon as possible, to get specialized medical treatment.

3 - Environmental hazards:

Important hazards: This product is not classified as dangerous to the environment, according to the criteria set by the EU.

3. Composition/information on ingredients.

Components: Paraffinic base stock, severely solvent refined (71 %wt min.) - CAS 101316-72-7 / EINECS 309-877-7
Paraffinic base stock, severely solvent refined (26 %wt min.) - CAS 64741-95-3 / EINECS 265-096-0
Additives

Hazardous component(s): Olefin sulphide 0.95 %wt max (EINECS 273-103-3; Xi; R 43-53)

For the complete text of the R-phrases quoted in this section, see section 16.

Other information: All the mineral base oils contained in this product have a value < 3 % wt of DMSO extract, according to IP 346/92 (note L - Dir. 94/69/CE)

4. First aid measures.

Skin contact: Take off contaminated clothing and shoes. Wash thoroughly with soap and water. If inflammation or irritation persists, seek medical advice.

Eye contact: Rinse eyes thoroughly for at least 10 minutes. Keep eyelids well apart. If inflammation or irritation persists, seek medical advice.

Ingestion: Do not induce vomiting to avoid aspiration into the lungs. If the person is conscious, rinse mouth with water without swallowing. Keep at rest. Call for medical assistance or bring to an hospital.

Inhalation: In case of disturbances owing to an exposure to a high concentration of vapours or mists, remove the victim from exposure; keep at rest; if necessary, seek medical attention.

Aspiration of liquid into the lungs: If there is the possibility that the product has been aspired into the lungs (i.e. in case of spontaneous vomiting), transport the victim to a hospital.

5. Fire-fighting measures.

General information: Shut off source of product, if possible.
If possible, move containers and drums away from danger area.

Extinguishing media:

- Suitable: Small-size fires: carbon dioxide, dry chemicals, foam, sand or earth.
Large fires: foam or water fog (mist). These means should be used by trained personnel only.

- Not to be used: Do not use water jets. They could cause splattering, and spread the fire.

Special protective equipment for firefighters: Personal protection equipment.
Self-contained breathing apparatus

Useful precautions: Avoid accidental sprays (i.e. from broken couplings) on hot surfaces or electrical contacts (switches, outlets and the like).
In case of losses from pressurized circuits, the sprays may form oil mists. Take into account that the lower explosion limit for oil mists is about 45 g oil/m^3 air.

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Other information:	Spilled product which is not burning should be covered with sand or foam Use water sprays to cool the surfaces exposed to the flames. In case of fire, do not discharge runoff water: collect separately and use a proper treatment.

6. Accidental release measures.

General measures:	Shut off source of spill, if possible. Do not let the product flow into sewers, rivers or water courses.
Personal precautions:	See Sect. 8 of this sheet.
Methods for cleaning up:	
- Soil:	Contain spilled liquid with sand, earth or other suitable absorbents. Recover free liquid and waste materials in suitable waterproof and oil-resistant containers. Clean contaminated area. Dispose of according to local regulations.
- Water:	Confine the spillage. Remove from surface by skimming or suitable absorbents. Collect recovered product and other waste materials in suitable waterproof, oil resistant containers. Recover or dispose of according to local regulations. Do not use solvents or dispersants.

7. Handling and storage.

Storage:	Keep away from sources of ignition. Storage temperature: ambient to 55°C max .
Handling:	Store the product in cool, well ventilated surrounding. Keep away from sources of ignition. Avoid contact with skin Do not breathe vapours or mists. Do not smoke. Do not cut, weld, drill, burn or incinerate empty containers or drums, unless they have been cleaned, and declared safe.

8. Exposure controls/personal protection.

General indications:	Avoid excessive or improper use. Avoid the creation of mists or vapours.
8.1 Exposure limit values	
Exposure limits:	For the control of exposure to the product, the most relevant exposure limits are listed here. TLV-TWA (A.C.G.I.H. 2008): 5 mg/m^3 (mineral oil mists) TLV-STEL (A.C.G.I.H. 2008): 10 mg/m^3 (mineral oil mists) If necessary, take into account the other limits listed in the relevant workplace regulations, or in the ACGIH documents.
Monitoring procedures:	Refer to relevant legislation and in any case to the good practice of industrial hygiene.
8.2 Control of exposure	
General informations:	In case the concentration of the product or any constituent is above the exposure limits, and if plant characteristics, work procedures and other means are not able to reach the purpose, it is necessary to use suitable means of personal protection.

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Respiratory protection:	Open or well ventilated areas: not necessary. Closed or confined areas (e.g. tank interiors): self-contained breathing apparatus.
Personal protection:	Long-sleeved overalls. If necessary, refer to the EN 943-13034-14605 standards When there is a risk of contact with the eyes, use safety goggles or other means of protection. If necessary, refer to national standards or to the EN 166 standard. When there is a risk of contact with the skin, use hydrocarbon-resistant, felt-lined gloves. Experience shows that gloves made of Nitrile rubber or PVA (Polyvinylalcohol) are adequate for this use. Gloves made of PVC can be used for limited periods. Gloves made of Neoprene or natural rubber (latex) have inadequate resistance. Use gloves respecting all the conditions and within the limits set by the manufacturer. Replace gloves immediately in case of cuts, holes or other signs of damages or degradation. If necessary, refer to the EN 374 standard.
Hygiene measures:	Avoid contact with skin and eyes Do not breathe vapours or mists. Do not clean hands with dirty or oil-soaked rags. Do not keep dirty rags in the overall pockets. Do not drink, eat or smoke with dirty hands. Wash hands with water and soap, do not use solvents or other irritant products which have a defatting effect on the skin. Do not re-use clothes, if they are still contaminated.

9. Physical and chemical properties (typical values).

Appearance:	Liquid, bright & clear (ASTM D 4176/1).
Odour:	Characteristic.
Colour	Not determined (ASTM D 1500)
Density a 15°C:	895 kg/m^3 (ASTM D 1298).
Boiling point/range:	> 200 °C (at 10 mmHg) (ASTM D 1160)
Vapour pressure:	1·10-3 hPa (20 °C)
Viscosity at 40°C:	141 mm^2/s (ASTM D 445).
Solubility in water:	Insoluble in water
pH :	Not applicable (ASTM D 1287).
Pour point:	-21 °C. (ASTM D 97)
Flash point :	245 °C. (ASTM D 92)
Auto-ignition temperature:	> 300 °C (DIN 51794)
Explosion limits:	
- Lower:	Not determined.
- Upper:	Not determined.
Partition coefficient (P o/w):	Not determined.
DMSO extract of base stock:	< 3 % wt (IP 346/92)

10. Stability and reactivity.

Thermal decomposition products:	HC, COx, NOx, SOx, H2S, POx
Stability:	Stable product.

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Hazardous reactions:	None
Materials to avoid:	Strong oxidants

11. Toxicological information.

Oral toxicity (rat):	LD50 greater than 2000 mg/kg (estimated from the composition)
Dermal toxicity (rabbit):	LD50 greater than 2000 mg/kg (estimated from the composition)
Inhalation toxicity (rat):	LC50 greater than 5 mg/l/4h (estimated from the composition)
Skin sensitization:	Contains a sensitizer (olefin sulphide) in an amount > 0.1 % wt (Ref.: Dir. 1 999/45/CE) Contains a sensitizer (Phosphoric acid ester, amine salt) in an amount > 0.1 % wt (Ref.: Dir. 1 999/45/CE) The product is not classified as a sensitizer according to the criteria set by the EU. (Refers to active component).
Other information:	* Not irritating to eyes and skin * Minor irritation may occur after prolonged or repeated contact, especially if normal hygienic rules are not respected. * None of the components of this product are listed as carcinogen by NTP, IARC, OSHA, EU or others.

12. Ecological information.

General informations:	Handle according to general working hygiene practices to avoid pollution and release into the environment.
Biodegradation:	The most significant constituents of the product should be considered as "inherently biodegradable", but not "readily biodegradable", and they may be moderately persistent, particularly in anaerobic conditions.
Toxicity for aquatic organisms:	No specific environmental data are available for this product. According to the components, and by comparison with other products of the same type and composition, it is expected that this product has a toxicity for aquatic organisms > 100 mg/l, and must not be regarded as dangerous to the environment. This product is not soluble in water. It floats on water and forms a film on the surface. The damage to aquatic organisms is of mechanical kind (immobilization and entrapment)
Other data:	This product has no specific properties for inhibition of bacterial activity. In any case, wastewater containing this product should be treated in plants that are suited for the specific purpose.
WGK class (Germany):	1

13. Disposal considerations.

Disposal of product:	Do not dispose of the product, either new or used, by discharging into sewers, tunnels, lakes or water courses. Deliver to a qualified official collector.
European Waste Catalogue Code:	13 02 05 (Ref: 2001/1 18/CE) This code is only a general indication, and takes into account the original composition of the product and its intended use. The user has the responsibility of choosing the right code, considering the actual use of the product, alterations and contaminations. The product as it is does not contain halogenated substances

PRODUCT SAFETY DATA SHEET

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This Safety Data Sheet has been checked and printed on 17/08/2010.

End of document. **Number of page(s) : 7**

PRODUCT SAFETY DATA SHEET

This information relates only to the specific product and may not be valid if the product is used in combination with any other material or in any process.
The informations in this sheet are according to our best knowledge at the date of printing.

This Safety Data Sheet has been checked and printed on 17/08/2010.

End of document. **Number of page(s) : 7**

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	
Date of operation _____/_____/_____	Description of operation
Stamp of the authorised service centre	
Signature of the technician	

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
Stamp of the authorised service centre	
Signature of the technician	

Maintenance sheets after 300 hours of work	
Date of operation _____/_____/_____	Description of operation
Stamp of the authorised service centre	
Signature of the technician	

Maintenance sheets after 400 hours of work	
Date of operation _____/_____/_____	Description of operation
Stamp of the authorised service centre	
Signature of the technician	

Maintenance sheets after 500 hours of work	
Date of operation _____/_____/_____	Description of operation
Stamp of the authorised service centre	
Signature of the technician	

Maintenance sheets after 600 hours of work	
Date of operation _____/_____/_____	Description of operation
Stamp of the authorised service centre	
Signature of the technician	

Maintenance sheets after 700 hours of work	
Date of operation _____/_____/_____	Description of operation
Stamp of the authorised service centre	
Signature of the technician	

Maintenance sheets after 750 hours of work	
Date of operation _____/_____/_____	Description of operation
Stamp of the authorised service centre	
Signature of the technician	

Maintenance sheets after 800 hours of work	
Date of operation _____/_____/_____	Description of operation
Stamp of the authorised service centre	
Signature of the technician	

Maintenance sheets after 900 hours of work	
Date of operation _____/_____/_____	Description of operation
Stamp of the authorised service centre	
Signature of the technician	

Maintenance sheets after 1000 hours of work	
Date of operation _____/_____/_____	Description of operation
Stamp of the authorised service centre	
Signature of the technician	

Maintenance sheets after 1100 hours of work	
Date of operation _____/_____/_____	Description of operation
Stamp of the authorised service centre	
Signature of the technician	

Maintenance sheets after 1200 hours of work	
Date of operation _____/_____/_____	Description of operation
Stamp of the authorised service centre	
Signature of the technician	

Maintenance sheets after 1250 hours of work	
Date of operation _____/_____/_____	Description of operation
Stamp of the authorised service centre	
Signature of the technician	

Maintenance sheets after 1300 hours of work	
Date of operation _____/_____/_____	Description of operation
Stamp of the authorised service centre	
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	

Maintenance sheets after 1500 hours of work	
Date of operation _____/_____/_____	Description of operation
Stamp of the authorised service centre	
Signature of the technician	

Maintenance sheets after 1600 hours of work	
Date of operation _____/_____/_____	Description of operation
Stamp of the authorised service centre	
Signature of the technician	

Maintenance sheets after 1700 hours of work	
Date of operation _____/_____/_____	Description of operation
Stamp of the authorised service centre	
Signature of the technician	

Maintenance sheets after 1750 hours of work	
Date of operation _____/_____/_____	Description of operation
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 _____/_____/_____	Description of operation
Stamp of the authorised service centre	
Signature of the technician	