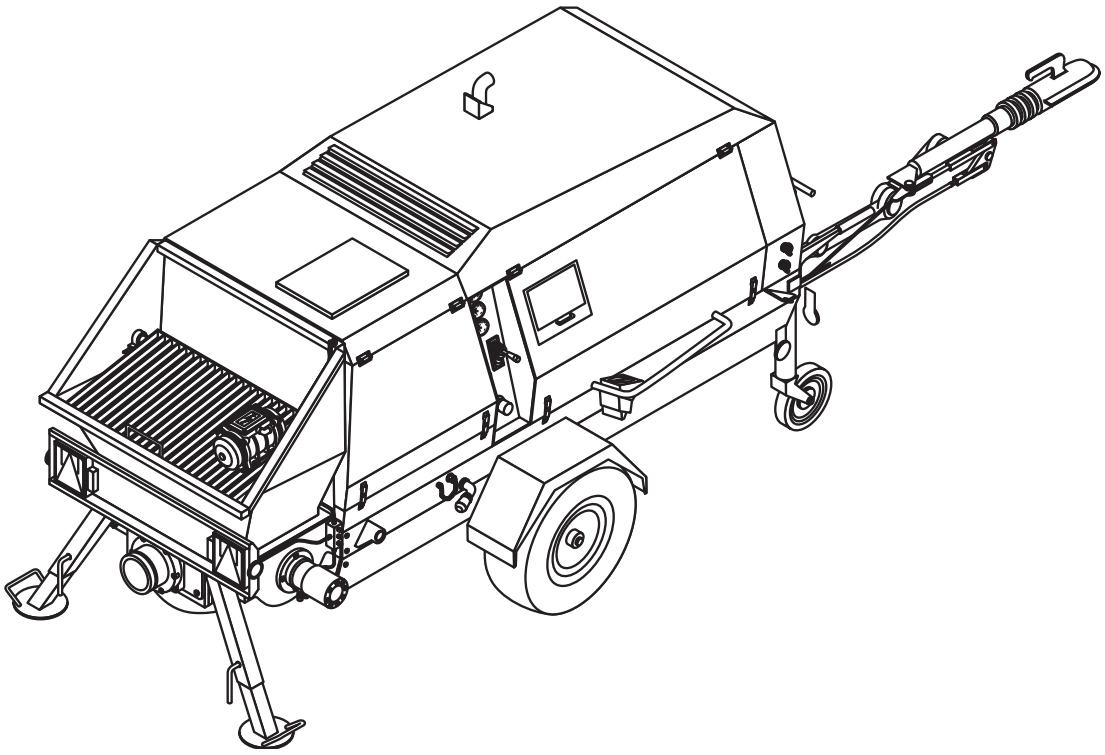
OPERATION AND MAINTENANCE MANUAL

ORIGINAL
EN

BETON MASTER

IS19/07 - 561270



Serial number | | | | | | | / | Year | |

TURBOSOL
TECNOLOGIA DI POMPAGGIO PER L'EDILIZIA

INDEX

1 - CE DECLARATION

1.1 CE DECLARATION OF CONFORMITY

TURBOSOL

DICHIARAZIONE CE DI CONFORMITÀ / *EC DECLARATION OF CONFORMITY*

2006/42/CE (Allegato II, parte A), 2000/14/CE (Allegato II) / *2006/42/EC (Annex II, part A), 2000/14/EC (Annex II)*

Fabbricante / *Manufacturer*	**TURBOSOL PRODUZIONE S.r.l.**
Indirizzo / *Address*	Via Alessandro Volta,1 – 31030 Pero di Breda (TV) Italia

Nome e indirizzo della persona autorizzata a costituire il fascicolo tecnico / *Name and address of person authorized to compile the technical file*

Nome / *Name*	**TURBOSOL PRODUZIONE S.r.l.**
Indirizzo / *Address*	Via Alessandro Volta,1 – 31030 Pero di Breda (TV) Italia

Il fabbricante dichiara che la macchina / *Manufacturer declares that the machinery*

Tipo / *Type*	Pompa da calcestruzzo *Stationary concrete pump*
Modello / *Model*	**BETON MASTER**
Matricola / *Serial N°*	**XXXXXX**
Potenza installata / *Installed power*	**kW**
Anno di costruzione / Year of manufacture	**XXXX**

risulta in conformità a tutte le disposizioni pertinenti previste dalla seguenti direttive comunitarie (comprese le modifiche applicabili) / *conforms to all the provisions set out by the following EU directives (including applicable amendments)*

2006/42/CE – Direttiva Macchine
2006/42/EC – Machine Directive

2014/30/UE – Direttiva Compatibilità Elettromagnetica
2014/30/UE – EMC Directive

2000/14/CE - Emissione acustica ambientale delle macchine destinate a funzionare all'aperto
2000/14/CE - Noise emission in the environment by equipment for use outdoors

Livello potenza sonora garantita / *Guaranteed sound power level*	**111 dB(A)**
Livello potenza sonora misurata / *Measured sound power level*	**109 dB(A)**

Ai sensi della Direttiva Macchine è stata applicata la seguente norma / *In accordance to the Machine Directive the following standard was applied*

EN 12001:2012 - Conveying, spraying and placing machine for concrete and mortar. Safety requirements

Ai sensi della Direttiva Compatibilità Elettromagnetica è stata applicata la seguente norma / *In accordance to the Electromagnetic Compatibility Directive the following standard was applied*

EN 13309:2010 - Construction machinery - Electromagnetic compatibility of machines with internal power supply

CTO

SCOMPARIN TARCISIO

Pero di Breda di Piave,
06.09.2019

An original copy of the CE Declaration of Conformity is supplied separately from the manual.

2 - GENERAL INFORMATION

2.1 IMPORTANCE OF MANUAL

The present Operation and Maintenance Manual has been prepared following the guidelines contained in the relevant European Directives. Its purpose is to provide a simple and full understanding of the subjects dealt with to the persons authorized to operate and perform maintenance on the machine described. The manufacturer has prepared this manual with the greatest care. However, should any operators find any part of the manual difficult to understand, they should contact the manufacturer immediately and request explanations and/or further information in order to avoid misunderstandings that might compromise the user's safety. Before using the machine, operators are required to read and understand this manual in every part and strictly follow its instructions, in order to ensure their own and others' safety, to make the machine work at its full potential and to ensure a long-lasting and efficient service life to all the machine parts. This manual should be safely stored and kept close to the machine at all times for immediate consultation by operators.

Only specifically trained and authorized personnel may be allowed to operate and perform maintenance on the machine.
Operators must follow all the instructions regarding the prevention of accidents and the regulations on workplace safety in force in the country of use.
The Manufacturer shall not be responsible for any damages resulting from changes made to the machine and/or from unauthorized tampering.
Users are advised to take note of the machine's serial number; it must be presented along with every request for technical assistance or for spare parts, and will facilitate processing such requests.
This manual reflects the latest information available at the time of marketing the machine and should not be considered inadequate only because newly acquired information may require its updating. Reprinting or reproducing this manual, in whole or in part, is not allowed unless authorized by ourselves in writing.

THE MANUFACTURER DECLINES ANY RESPONSIBILITY FOR DAMAGES TO PERSONS, ANIMALS OR PROPERTY CAUSED FAILURE TO OBSERVE THE INSTRUCTIONS AND WARNINGS CONTAINED HEREIN.

2.2 ABBREVIATIONS

ca.	around	**min**	minutes
cap.	chapter	**N.**	number
DPI	device of individual protection	**pag.**	page
DX	right	**par.**	paragraph
h	times	**pos.**	position
EN	European Norm	**RIF.**	reference
Es.	example	**s**	second
FIG.	figure	**SX**	left
max.	maximum	**TAB.**	table
min.	minimum	**v.**	see

TAB. 01

2.3 INFORMATION ON CONSULTING THE MANUAL

Boldface:
Highlights important parts in the text.

2.4 MEANING OF SYMBOLS

Information and warnings that are particularly important are indicated in this manual by the following symbols:

CAUTION: This symbol indicates safety regulations regarding the operator.

NOTE: This symbol indicates additional information regarding the operation under way.

DANGER: This symbol indicates an electric shock hazard.

IMPORTANT: This symbol indicates further useful information.

2.5 MACHINE OFF

The motor must be switched off using the ON/OFF key before performing any maintenance and/or adjustment operation (FIG. 35-REF. 1).

2.6 GENERAL AND CONTACT INFORMATION

The BETON MASTER concrete pump can be supplied with a number of different accessories, therefore not all the parts described in this manual may be actually installed on your machine.

The Customer Service department of Turbosol Production S.R.L. will be glad to provide any information you may need.

TURBOSOL MACHINES
Turbosol machines are the result of years of experience and constant research. This wealth of expertise, together with a special attention to quality, contributes to guarantee that Turbosol machines are built to last, are highly reliable and work with low operating costs.

MAINTENANCE AND CARE
Proper maintenance and care are essential for the machine to work as designed. It is extremely important that users observe the recommended maintenance intervals and carry out any maintenance required, both to keep the machine in perfect running order and to preserve the validity of the warranty.

SAFETY
The safety rules should also be made known to the maintenance personnel, and the local regulations on safety and accident prevention should be followed at all times.

OPERATOR TRAINING
Operators must receive specific training on the operations to be carried out.

TURBOSOL SERVICE

Please contact your TURBOSOL dealer for any information regarding machine malfunctions or requests for spare parts.

3 - TECHNICAL DESCRIPTION

3.1 NAME OF MACHINE

CE Marking

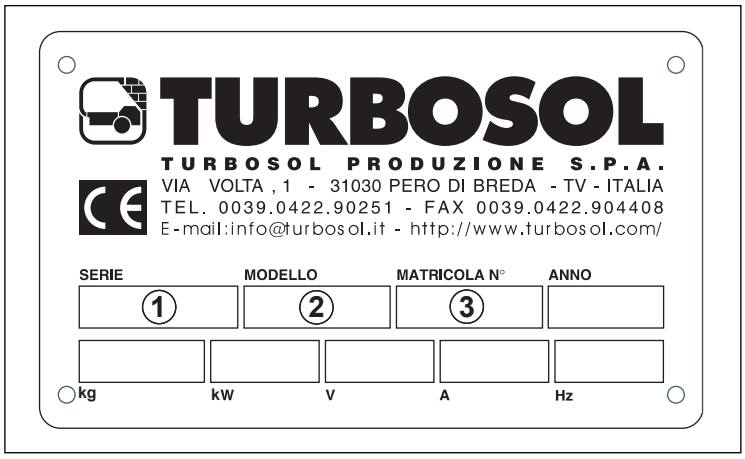


FIG. 01

The series (1), the machine model (2) and the machine's serial number (3) and the power data are engraved on the plate.

Below is the meaning of the used symbols.
(1) = Machine series.
(2) = Machine model.
(3) = Machine's serial number.

/T = With road approved tow.

Position of CE nameplate
As the figure shows, the manufacturer plate (FIG.02-REF.1) is fixed to the base of the machine.

Machine's serail number and road tow plate position
The machine's serial number (FIG.02-REF.2) is punched on the machine's base and on the manufacturer's plate.
The vehicle's identification number (FIG.03-REF.1) is punched and an approval identification data plate (FIG.03-REF.2) is present in the versions fitted with road approved tow.

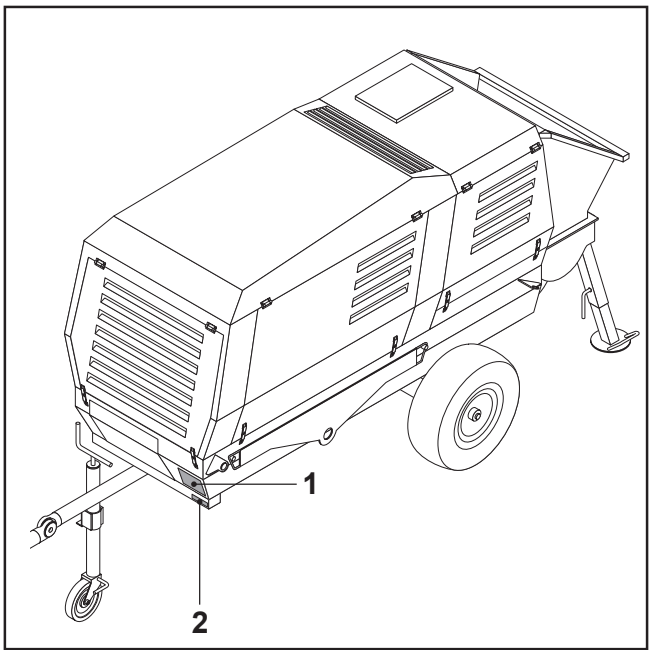


FIG.02

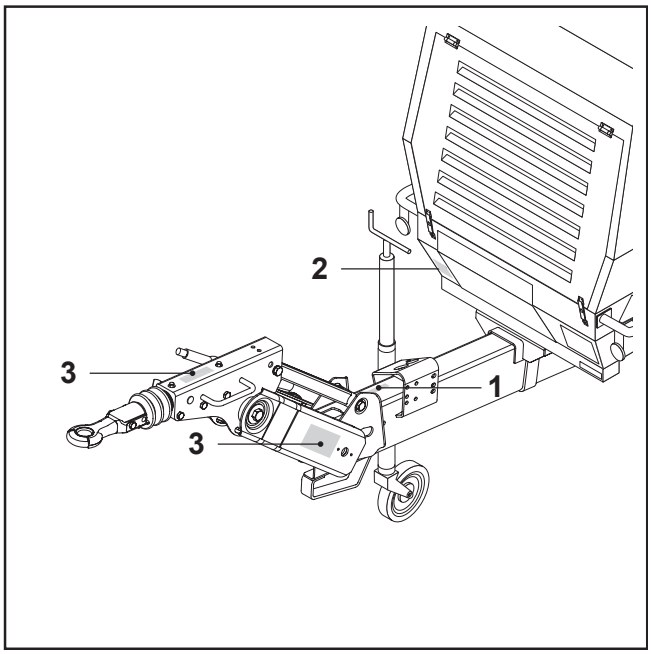


FIG.03

3.2 DIMENSIONS OF MACHINE

The following are the machine's overall dimensions and gross weight (in working conditions).

BETON MASTER D

LENGTH	WIDTH	HEIGHT	WEIGHT*
3335 mm	**1420 mm**	**1600 mm**	**1560 kg**

TAB. 02:

BETON MASTER D/T

LENGTH	WIDTH	HEIGHT	WEIGHT*
4555 mm	**1420 mm**	**1600 mm**	**1720 kg**

TAB. 03

*Weight with full fuel tank and hydraulic oil tank and no optional accessories.

3.3 TECHNICAL DATA

Flow rate*	m^3/h	15
Maximum pressure on the concrete	bar	80
Maximum number of cycles per minute	-	30
Pumping cylinders (diameter x stroke)	mm	120 x 700
Input power	kW	37.3
Electric control plant power supply	V	12 AC
Main hydraulic circuit maximum pressure	bar	240/190
Auxiliary hydraulic circuit maximum pressure	bar	180
Maximum particle size that can be pumped**	mm	25÷30
Maximum useful distance***	m	150÷200
Maximum useful height***	m	100÷120
Flow collector	inches	4.5
Hopper capacity	litres	200
Diesel tank capacity	litres	27
Oil tank capacity (hydraulic plant)	litres	75
Hydraulic oil (recommended)	ELF OLNA DS 46	
Maximum height above s. l. of the place of installation without sensitive loss of power	m	1000
Acceptable environmental temperature	°C	-5° ÷ 35°
Guaranteed sound power level LwA	dB	108
Equivalent continuous A Lp-weighted sound pressure level	dB	88

Endothermic motor: PERKINS 404D-22			
Power		kW	37.3
Motor rpm	minimum maximum	rpm	1550 2900
Motor oil (recommended)		TOTAL RUBIA TIR 7400	
Endothermic motor: PERKINS 403D-15T			
Power		kW	37.3
Motor rpm	minimum maximum	rpm	1550 2900
Motor oil (recommended)		TOTAL RUBIA TIR 7400	

TAB. 04

* Theoretical.

** Maximum particle size 25 mm if aggregates obtained by crushing; maximum particle size 30 mm in case of spheroidal aggregates.

*** Maximum values not simultaneously obtainable.

3.4 INTENDED USES

The machine has been designed and built for the following use:
FIELD OF USE: CONSTRUCTION WORK.
INTENDED USE: PUMPING SHOTCRETE AND CONCRETE

3.5 MATERIALS USED

- Concrete with maximum particle size 25 mm if aggregates obtained by crushing; maximum particle size 30 mm in case of spheroidal aggregates.
- Shotcrete.

3.6 NAME OF MACHINE PARTS

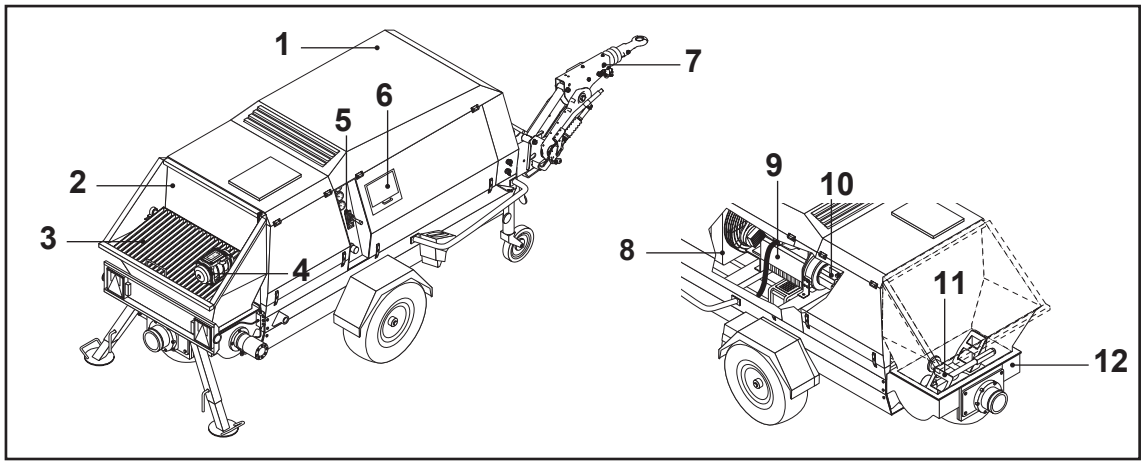


FIG. 04 *Figure shows towing gear.

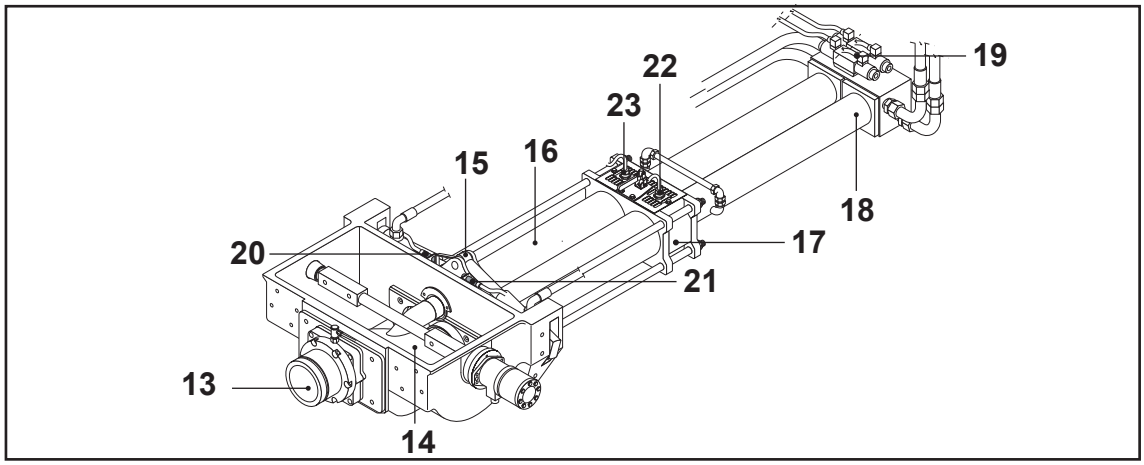


FIG. 05

LEGEND

FIG. 04-REF. 1 - Casing
FIG. 04-REF. 2 - Upper hopper
FIG. 04-REF. 3 - Grid
FIG. 04-REF. 4 - Vibrator
FIG. 04-REF. 5 - Control column
FIG. 04-REF. 6 - Control panel
FIG. 04-REF. 7 - Towing gear*
FIG. 04-REF. 8 - Exchanger
FIG. 04-REF. 9 - Engine
FIG. 04-REF. 10 - Hydraulic pump assembly
FIG. 04-REF. 11 - Mixer
FIG. 04-REF. 12 - Lower hopper
FIG. 05-REF. 13 - Delivery flange
FIG. 05-REF. 14 - S-valve
FIG. 05-REF. 15 - S-valve switching jack
FIG. 05-REF. 16 - Pumping tube
FIG. 05-REF. 17 - Water tank
FIG. 05-REF. 18 - Hydraulic pumping cylinder
FIG. 05-REF. 19 - Solenoid valves
FIG. 05-REF. 20 - Switching jack control sensor
FIG. 05-REF. 21 - Switching jack control sensor
FIG. 05-REF. 22 - Pumping control sensor
FIG. 05-REF. 23 - Pumping control sensor

4 - TRANSPORTATION AND HANDLING

4.1 TRANSPORTING THE MACHINE AS A VEHICLE TRAILER

Only machines with a frame equipped with vehicle towing gear are allowed to circulate on public roads.

Always respect the rules of the road when towing the machine.

The machine cannot be used for carrying loads of any kind, not even the removable accessories used for its operation (pipes, fittings, gaskets, etc.).

What to do before towing the machine

- Make sure the diesel engine is switched off.
- Remove all pipes and hoses connected to the machine.
- Close and fasten the casing and check the fasteners.
- Lower the towing wheel and raise the support legs (FIG. 06).
- Fasten the light bar in its towing position (FIG. 06).

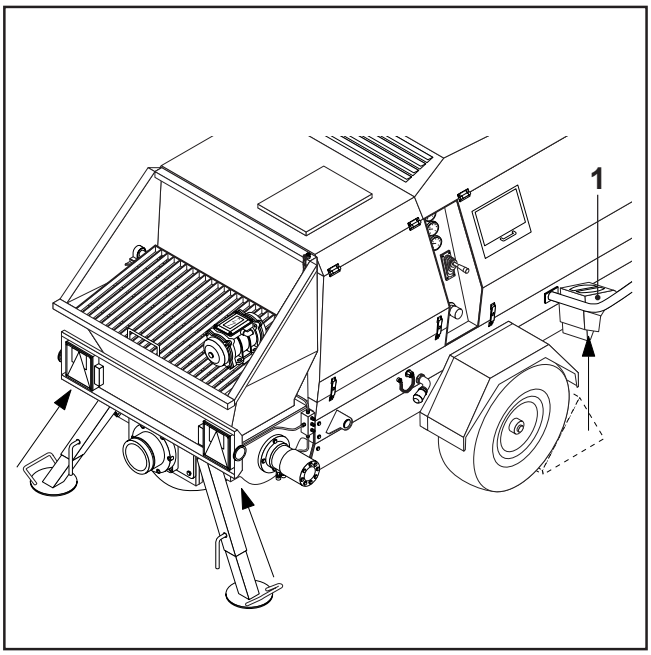


FIG.06

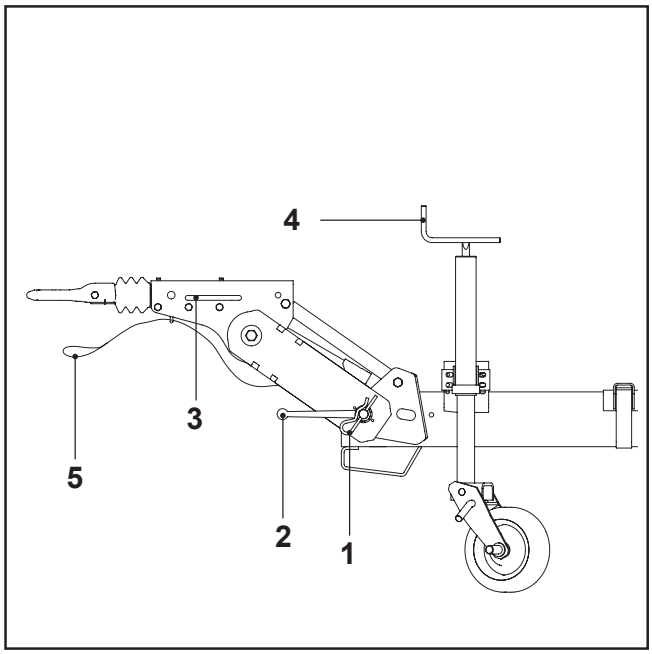


FIG.07

- Check the efficiency of the drawbar, the hook on the vehicle and the coupling mechanism.
- Remove the safety pin (FIG. 07-REF. 1)
- Unscrew the handle (FIG. 07-REF. 2) completely.
- Pull the "stickers" off the side discs (with a strong upward pull, to the left and to the right). Use only the handle (FIG. 07-REF. 3) to adjust the height.
- The middle section can be adjusted upward by 50° and downward by 10° until it reaches the limit.
- Tighten and lock the handle.
- Insert the safety pin.
- Turn the lever to raise the towing wheel (FIG. 07-REF. 4).
- After approximately 50 km, stop and tighten the handle again.

- Connect the light bar cable and make sure it works.
- Insert the snap cable through the eyelet welded on the side (guide cable grommet) (FIG. 08-REF. 1) and fasten the snap hook to the hole (FIG. 09).

Make sure the cable is long enough to handle bends in the road. If the cable is too short it might accidentally pull the brake.

If there is no eyelet on the towing vehicle, wrap the cable around the stem of the trailer hitch and attach the snap hook to the cable itself. If the trailer is accidentally detached from the vehicle, the cable will pull the parking brake (emergency brake). The cable must be correctly passed through the cable guide grommet in order for the emergency brake to work properly.

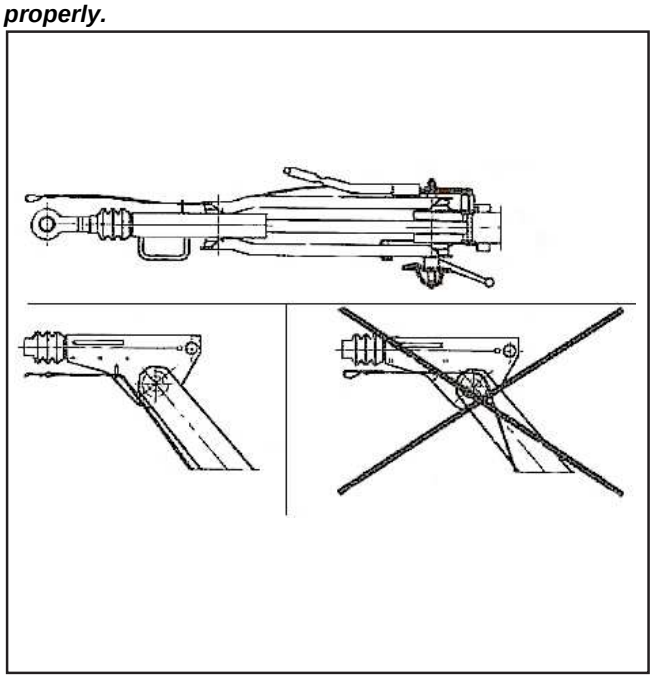


FIG.08

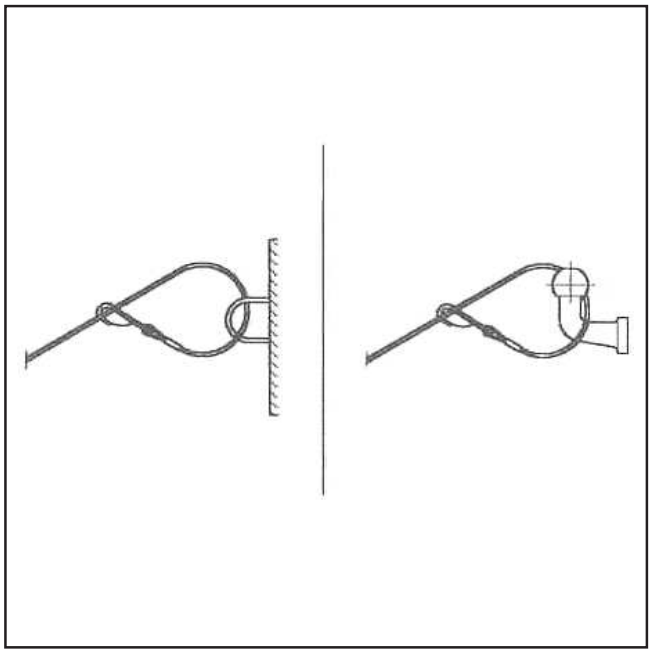


FIG.09

- Release the parking brake and remove the chocks (FIG. 06-REF. 1).

Unhitching the machine from the towing vehicle
- Lower and block the towing wheel.
- Pull the parking brake.
- Unhitch the machine from the towing vehicle.

When unhitching on a slope, block the machine using the parking brake and the chocks so that it won't move after unhitching.

BETON MASTER can also be carried on motor vehicles; loading, securing and transporting the machine on a motor vehicle should always be done in compliance with the rules of the road. See paragraph 4.2, LIFTING, for information on using lifting apparatus to load BETON MASTER on a vehicle.

4.2 LIFTING

BETON MASTER is provided with four lifting points and supplied with a lifting beam (FIG. 10).
- Fasten the ropes to the lifting beam (FIG. 10-REF. 1) and to the four lifting points, attaching the shorter ropes to the hooks shown in FIG. 10-REF. 2 and the longer ropes to the hooks shown in FIG. 10-REF. 3.

Use the lifting beam only for the lifting of Beton Master.

Don't use the lifting beam to lift any other load. Before using the lifting beam, check its integrity and in case replace it.

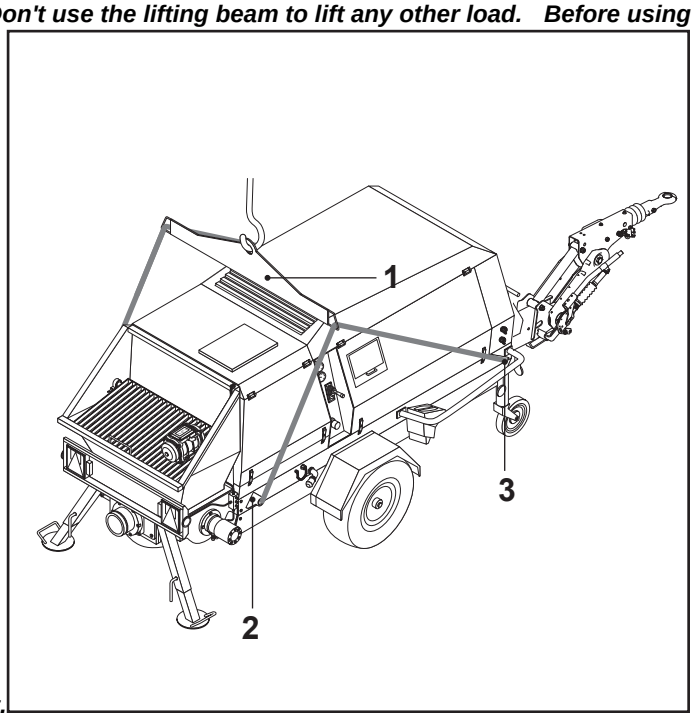


FIG. 10

Lifting should be carried out in strict observance of all the relevant safety rules, and the equipment used must be in good order and conforming to regulations. The lifting apparatus must be operated by specifically trained and authorized personnel.

Use only hooks and ropes certified for lifting 2000 kg.

Make sure the area is clear of any bystanders before lifting the machine.

Do not stand under suspended loads. To prevent damages to the machine, do not lift or lower it with abrupt movements. Do not change the lifting hook's anchoring point. Move the machine only over level surfaces; avoid sloping surfaces to prevent the risk of being hit by the machine or crushed between the machine and fixed obstacles.

5 - INSTALLATION

5.1 POSITIONING THE MACHINE

Place the machine in a horizontal position; the maximum allowed gradient is 5°, both lengthwise and crosswise (FIG. 11).

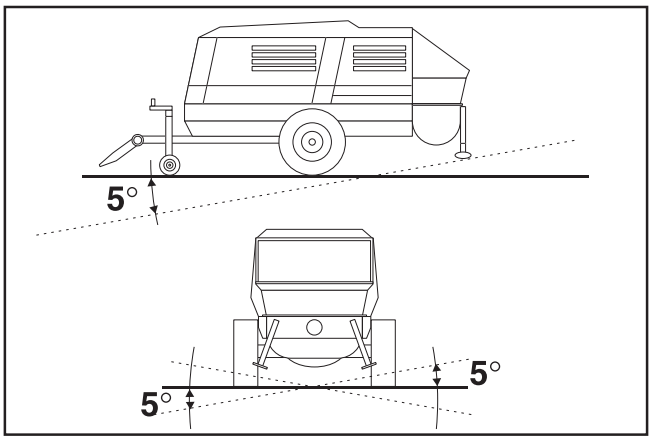


FIG.11

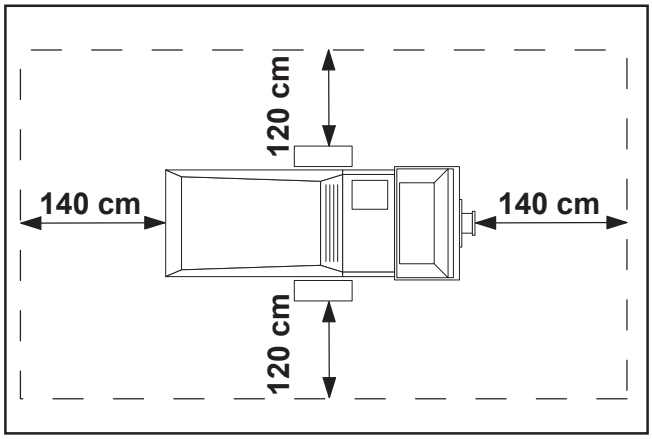


FIG.12

- Place BETON MASTER at the point of the worksite where you can use the pipes and hoses to their full extension.
- Brake the machine and block the wheels using the chocks supplied.
- Make sure the machine is resting on its side support legs and then raise the wheel.

Be sure to leave a passageway all around the machine (FIG12) clear of any obstacles and with no potholes or hazardous projections.

Do not use the towing wheel to support the machine during operation; the machine should rest on the side support legs and the main wheels in a stable manner.

5.2 PIPING

Lay out the piping using the shortest lengths possible (to reduce handling time and limit wear) and make sure the pipes are in good conditions.

Use rubber hoses only for the last section of the piping and for lengths no longer than 4 metres. using rubber hoses elsewhere along the piping may compromise pumpability (causing water to separate from the concrete) and increase the risk of clogging.

Use only original pipes and fittings. The pipes should be fitted by TURBOSOL PRODUCTION S.R.L. or by companies expressly authorized by TURBOSOL.

TURBOSOL PRODUCTION S.R.L. shall not be held responsible for damages to persons or property caused by using non-original piping or fittings.

Before starting to pump, make sure the hoses show no cracks or deformations on their inner surface. Deformations on the inner surface of rubber hoses can lead to dangerous clogging.

5.2.1 Piping layout

BETON MASTER can pump slurries horizontally, upwards or downwards. Here below are a few general rules that should be followed when setting up the various layouts.

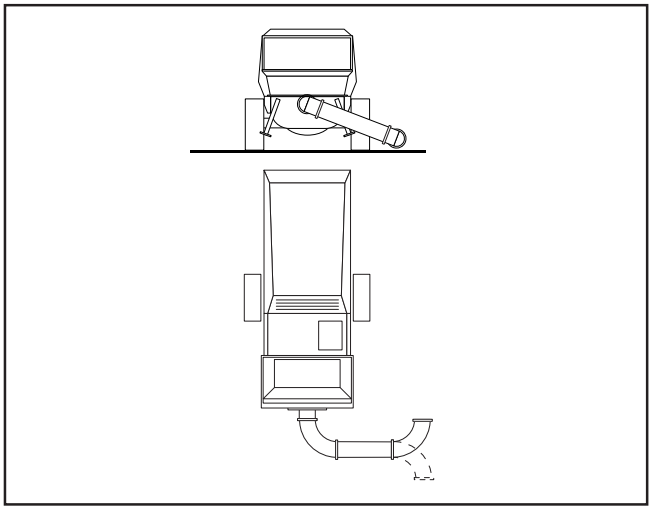


FIG.13

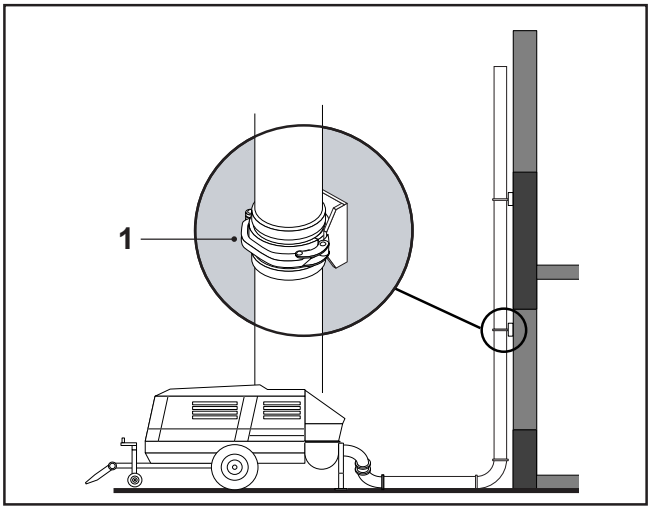


FIG.14

- **HORIZONTAL PUMPING**

In case of horizontal pumping simply lay out the pipe in the desired layout and connect it to the first section described above.

- **VERTICAL PUMPING**

Vertical sections should be fastened and supported by collars (FIG. 14-REF. 1).

- **DOWNWARD PUMPING**

Downward sections should be fastened and supported by collars (FIG. 15-REF. 1).
Measures should be taken to prevent the concrete from dropping too fast along downward sections, for example by installing a curve and a reverse curve as in FIG. 15 or by laying out a sloping section.
With this kind of layout lubricating the pipes with slurry should be carried out as follows:
- introduce two pipe sponges into the first section of the piping (FIG. 16)
- pump the slurry

This will lubricate the entire downward section. If the downward section is very long, we recommend pumping additional sponges and slurry.

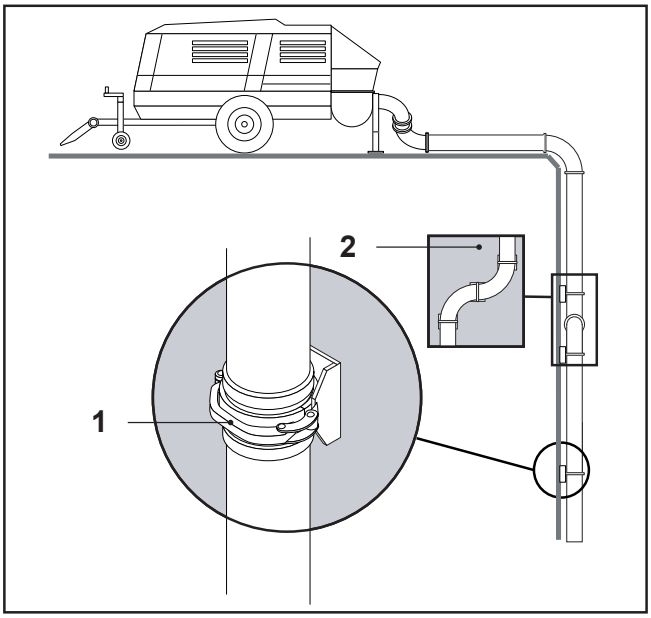


FIG.15

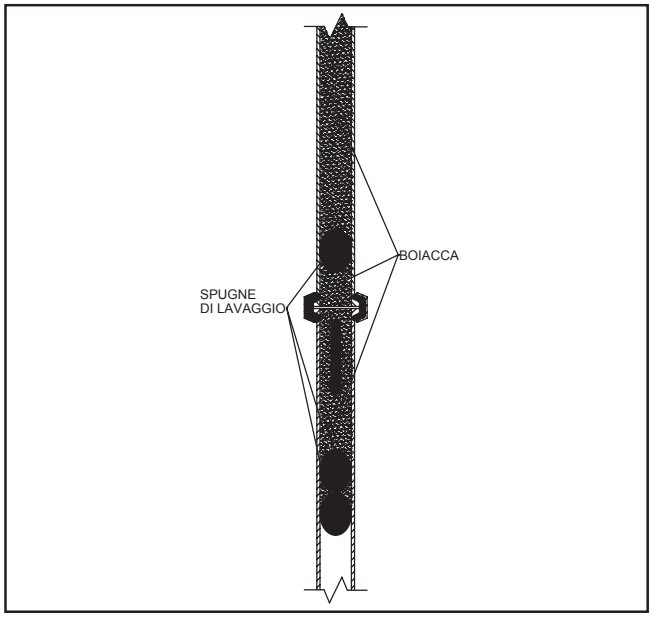


FIG.16

5.3 CONCRETE PIPING FITTINGS

Make sure the fittings are clean and in good order at all times.

Check the rubber gasket (FIG.17-REF.1) is present and fully fasten the levers (FIG.17-REF.2) when connecting the piping segments.
Lock coupling with safety pin to avoid inadvertent openings (FIG.17A-RIF.3).

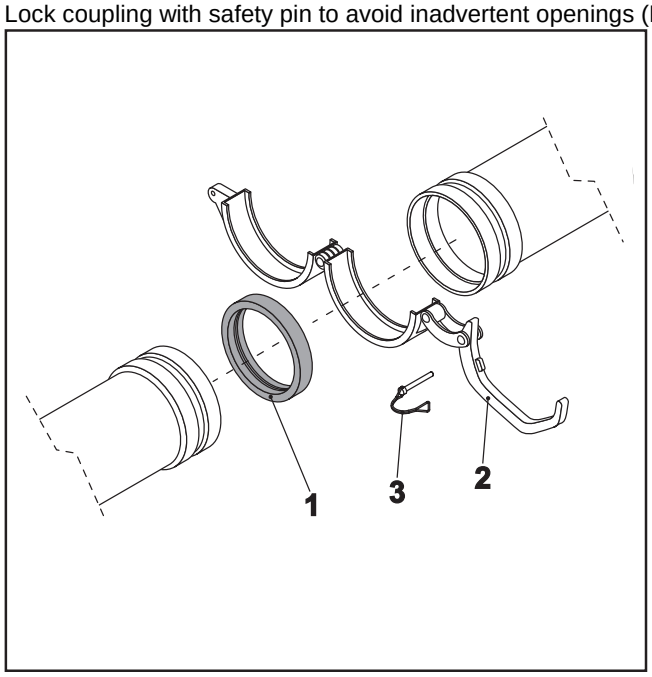


FIG.17

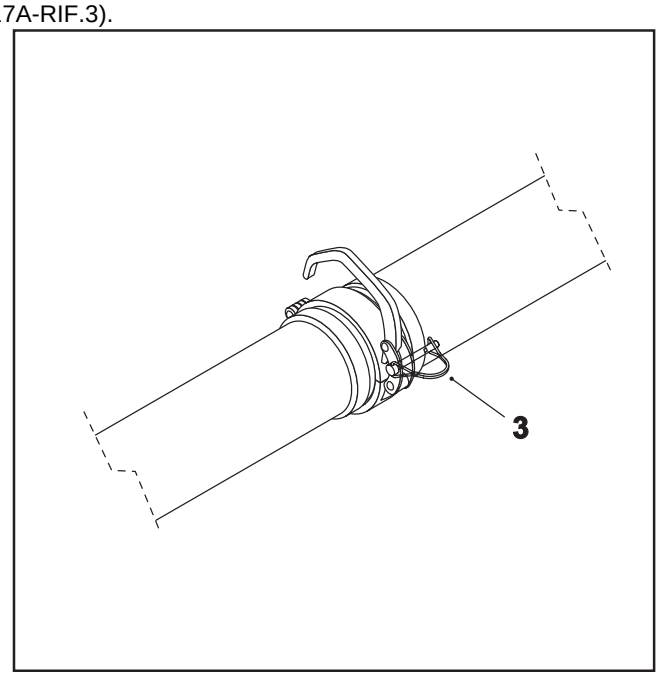


FIG.17A

5.4 CONNECTIONS

5.4.1 Concrete grid and vibrator

- Connect the electric vibrator's plug (FIG.19-REF.1) to the machine socket (FIG.19-REF.2) located on the hydraulic tank. Close the door after connection.

When pumping shotcrete you will need to use the shotcrete nozzle and the 15 mm slotted grid with the electric vibrator.
- Unscrew the shock absorber's anchoring bolts (FIG. 18.REF. 1).
- Remove the concrete grid, replace it with the shotcrete grid and fasten it to the shock absorbers using the bolts.
- Open the small door, connect the electric vibrator's plug (FIG. 19-REF. 1) to the machine's socket (FIG. 19-REF. 2) located on the hydraulic oil tank and close the door.

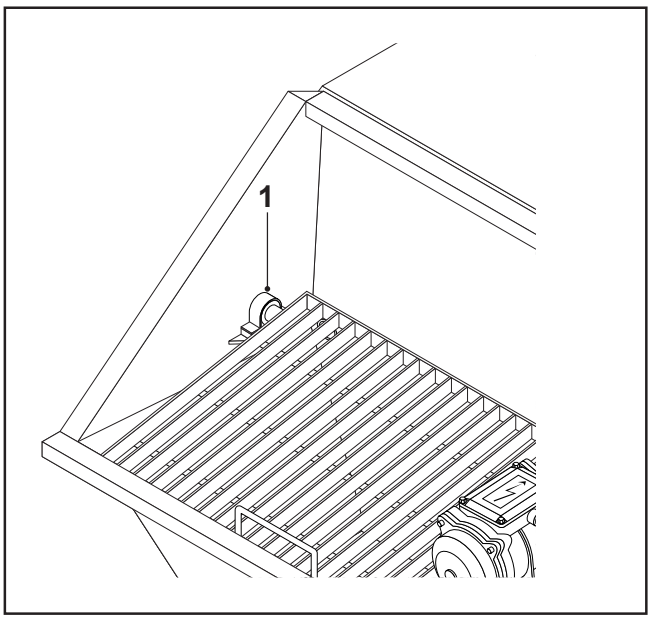


FIG.18

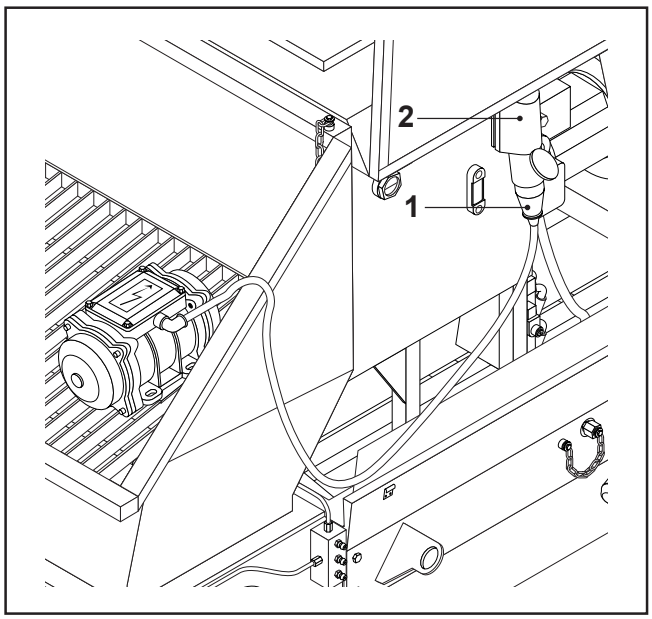


FIG.19

- Connect the slurry delivery hose (FIG. 20-REF. 1) to the shotcrete nozzle and the air delivery hose (FIG. 20-REF. 2) to the nozzle and to the auxiliary compressor.
- Connect the additive delivery hose to the spraygun (additive dosing kit is optional).

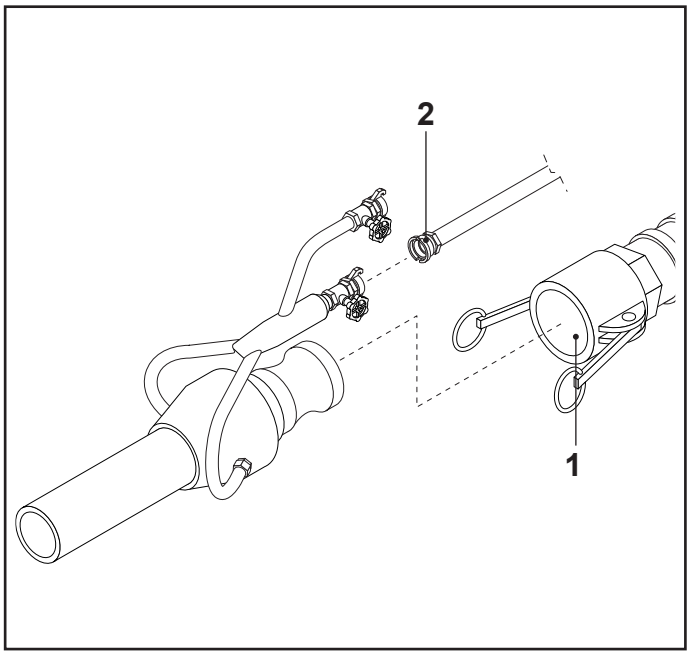


FIG.20

Accelerating additives are harmful. Protect any exposed surfaces adequately.

Handle additives with care and follow the manufacturer's instructions.

5.4.2 Remote control

The machine is supplied with a cable remote control. Plug the cable (FIG. 21-REF. 1) into the connector socket (FIG. 21-REF. 2) located on the machine's casing.
Turn the selector (FIG. 21-REF. 3) to 1 to start the mortar pump, to 0 to stop pumping and to 2 to reverse the direction of rotation.

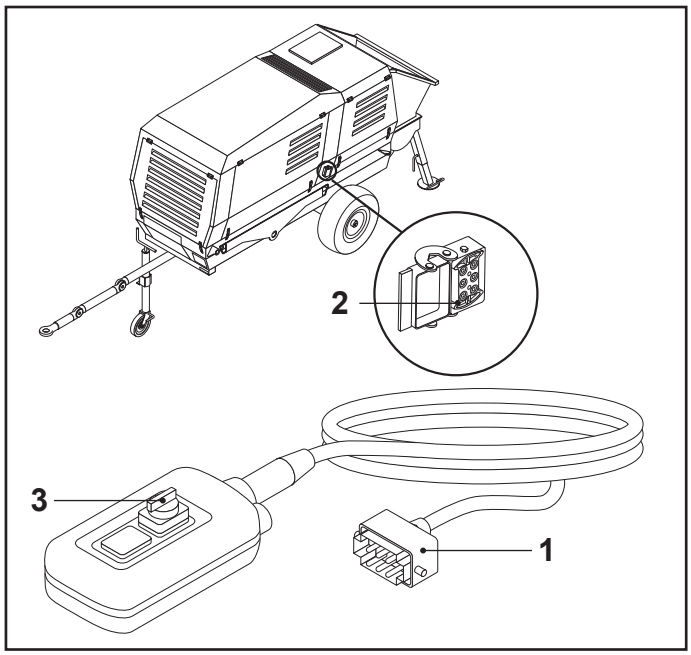


FIG. 21

5.4.3 Connecting the radio control (optional)

- Connect the plug (FIG. 22-REF. 1) to the connector socket (FIG. 22-REF. 2).
- Press the button (FIG. 22-REF. 3) to switch the remote control on and off.
- Press the button (FIG. 22-REF. 4) to start pumping. Press the button again to stop pumping.
- To reverse pumping (i.e., sucking the mix from the pipe on the hopper), make sure the button (FIG. 22-REF. 4) is turned to ON and press the button (FIG. 22-REF. 5) for the time required.

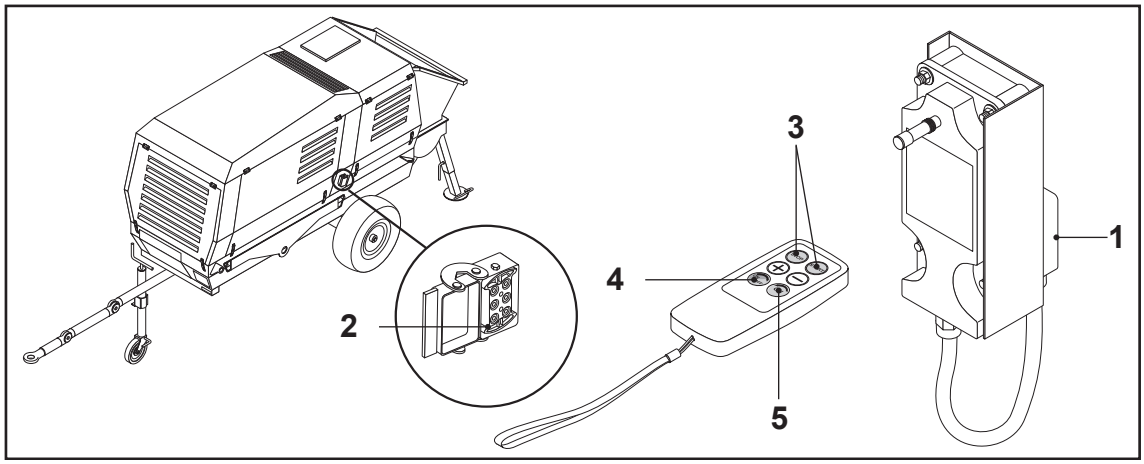


FIG.22

6 - SAFETY

6.1 SAFETY DEVICES

MUSHROOM-SHAPED EMERGENCY BUTTON
Located on the control column it stops power supply in case of an emergency.

PROTECTION GRID IN UPPER HOPPER
The grid preventing access to the oversized aggregate and contact with the S valve, is found inside the upper hopper.

GRID OPENING SENSOR
Sensor interrupting pumping when the grid opens with machine running.

COOLING FAN PROTECTION GRID
A grid fixed with screws protecting the cooling fan, is found inside the engine compartment.

BODYWORK
The bodywork protects against contact with the internal hot parts and the hydraulic circuit's pressurised components.

MAXIMUM PRESSURE VALVE OF MAIN HYDRAULIC CIRCUIT
A maximum pressure valve to limit pumping maximum pressure and S valve movement is found inside the hydraulic system.

MAXIMUM PRESSURE VALVE OF AUXILIARY HYDRAULIC CIRCUIT
A maximum pressure valve to limit the auxiliary circuit's maximum pressure is found on the proportional solenoid valve.

PRESSURE MANOMETER OF MAIN HYDRAULIC CIRCUIT
The manometer is located in the control area and is used to indicate the pumping and S valve movement working pressure to the operator.

PRESSURE MANOMETER OF AUXILIARY HYDRAULIC CIRCUIT
The manometer is located in the control area and is used to indicate the auxiliary circuit's working pressure.

PARKING FEET
The parking feet are required to guarantee a stable position with the machine in place.

PARKING WEDGES
Guarantee machine parking.

COUPLING SAFETY PIN
It avoids inadvertent pipeline coupling openings.

DO NOT UNDER ANY CIRCUMSTANCES TAMPER WITH, DISCONNECT AND/OR REMOVE ANY SAFETY DEVICES FROM THE MACHINE.

DO NOT UNDER ANY CIRCUMSTANCES REPLACE ANY SAFETY DEVICES OR PARTS OF A SAFETY DEVICE WITH NON-ORIGINAL SPARE PARTS.

CONSTANTLY CHECK THE PROPER OPERATION OF ALL THE SAFETY DEVICES INSTALLED ON THE MACHINE.

MALFUNCTIONING OR DAMAGED SAFETY DEVICES MUST BE REPLACED IMMEDIATELY.

6.2 SAFETY SIGNS

The safety signs are adhesive labels affixed outside and inside the machine.

The safety signs must be kept clean and clearly visible at all times.

E' obbligatorio sostituire la segnaletica di sicurezza deteriorata, facendone richiesta al fabbricante. E' assolutamente vietato rimuovere o danneggiare la segnaletica di sicurezza applicata alla macchina.

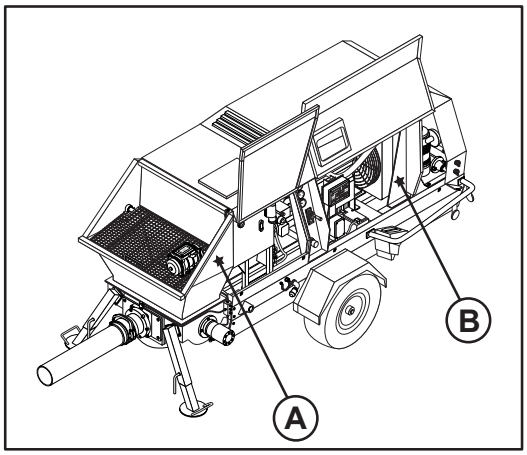


FIG.28

REF.	LABEL	DESCRIPTION
A		**Danger** Moving parts
B		**Danger** High temperatures

TAB.07

6.3 PERSONAL PROTECTIVE EQUIPMENT

Wearing personal protective equipment is mandatory, in compliance with the workplace health and safety regulations in force in the country of use.
Employers, directors and operators must be acquainted with and enforce these regulations.

USING THE PROTECTION DEVICES INDICATED BY THE MANUFACTURER IS MANDATORY (TAB. 08).

MANDATORY SIGNS	DESCRIPTION
	IT IS MANDATORY TO PROTECT THE EYES..
	IT IS MANDATORY TO PROTECT HEARING.
	IT IS MANDATORY TO PROTECT THE HANDS.
	IT IS MANDATORY TO PROTECT THE FEET.

TAB. 08

6.4 RESIDUAL RISKS

Following the instructions and recommendations contained in this manual will allow you to use the machine correctly and reduce any residual risks.

IN PARTICULAR:
Read the operation and maintenance manual before starting the machine.
Operators on the machine and on the slurry delivery end must be trained to carry out their work following the instructions contained in this manual.
All maintenance must be carried out with the machine switched off.

PARTS UNDER PRESSURE::
Inspect the piping and make sure there are no signs of damage.
Make sure all the quick-release couplings and pipe joints are tight.
Make sure the vertical piping fasteners are securely fastened.
Do not open pipe fittings when the pipe is under pressure.

HOT PARTS:
Do not open the casing while the machine is running.
Do not touch the diesel engine silencer.

MOVING PARTS:
Do not open the casing while the machine is running.
Do not lift the hopper protection grid while the machine is running.
Do not introduce foreign matter through the grid.

7 - USE AND OPERATION

7.1 OPERATING PRINCIPLE

At the core of the BETON MASTER is the pumping assembly, consisting of: the lower hopper (FIG. 29-REF. 1), which containes the S-valve (FIG. 29-REF. 2), and the mixer (FIG. 29-REF. 3). Behind the hopper are two oil-hydraulic jacks (FIG. 29-REF. 4) that operate the S-valve; two pumping cylinders take in the concrete aspirated from the hopper. A rubber piston inside each pumping cylinder aspirates/pumps the concrete. The alternating motion of the rubber pistons is produced by two hydraulic cylinders (FIG. 29-REF. 6) controlled by a solenoid valve (FIG. 29-REF. 7); the valve is located above a hydraulic unit coupled to the bottom of the pistons. Above the hydraulic unit there is also the solenoid valve that controls the jacks (FIG. 29-REF. 8). Between the pumping cylinders and the hydraulic cylinders there is a small tank (FIG. 29-REF. 9) containing water for cooling and lubricating the pistons during their stroke.
The fresh concrete is poured into the hopper; the grid inside the hopper prevents the entrance of larger particles and is equipped with an electric vibrator to facilitate the passage of the concrete. The concrete is first aspirated from the hopper and then pumped towards the conveying pipes. The alternated sucking and pumping is governed by the S-valve, which puts the pumping cylinders in communication with the conveying pipe, alternately. The pumping is oil-hydraulically operated with a variable-displacement hydraulic pump. This type of pump makes it possible to change the concrete's flow rate through a manually-operated oil-hydraulic control.
Pumping is monitored by sensors that send their readings to the electronic control panel; the panel controls the pumping assembly's switching sequence.
There are four sensors: two control the jacks and are located next to them and two control the hydraulic cylinders and are located inside the tank.
Pumping can be started, stopped or reversed by the operator using a cable remote control (supplied) or a radio control (optional).

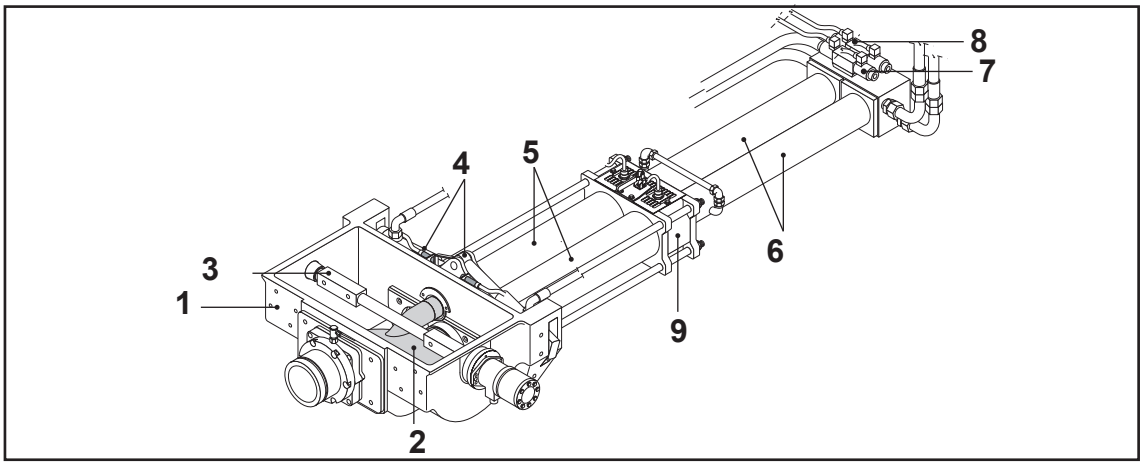


FIG. 29

7.2 PUMPABLE SLURRIES

BETON MASTER works with two kinds of slurries:
- Pumping: general-purpose concrete, normal or controlled-shrinkage micro-concrete, mortar for micropiles, common mortars, muds and bentonite.
- Spraying: micro-concrete (shotcrete) for lining and consolidating tunnels, slopes, embankments, swimming pools, canals.

All pumpable mixes can be reinforced with flexible or rigid fibres and sprayed together with set accelerators.
The composition of the concrete or shotcrete is based on supply agreements that do not depend on the machine.
In order to avoid problems during pumping, the following conditions must be respected:
- the maximum particle diameter should be between 1/3 and 1/4 the diameter of the hose;
- the grading envelope of the mix must be suitable for pumping;
- the sand's fineness modulus should be between 2.4 e 3;
- high slump values should be used to facilitate pumping of non-segregable mixes.

7.3 CHECKS BEFORE START-UP

The oil level and the coolant level should be checked with the machine switched off.

- Check the level of the liquid inside the expansion vessel (FIG. 30-REF. 1) above the heat exchanger. To top up the liquid unscrew the cover (FIG. 30-REF. 2) on the machine casing above the tank.

FIG. 30

- Check the motor oil level (FIG. 31-REF. 1); the level should be close to the maximum mark. The motor oil refilling cap (FIG. 31-REF. 2) is located on the cylinder head; to add oil unscrew the cover on the machine casing above the engine.

FIG. 31

- Check the hydraulic oil level through the inspection window (FIG. 32-REF. 1); as a rule, the oil level should reach the middle of the window (with the machine switched off and cooled down). The refilling cap (FIG. 32-REF. 2) is located above the tank. To add oil, unscrew the cover on the casing above the hydraulic oil tank.

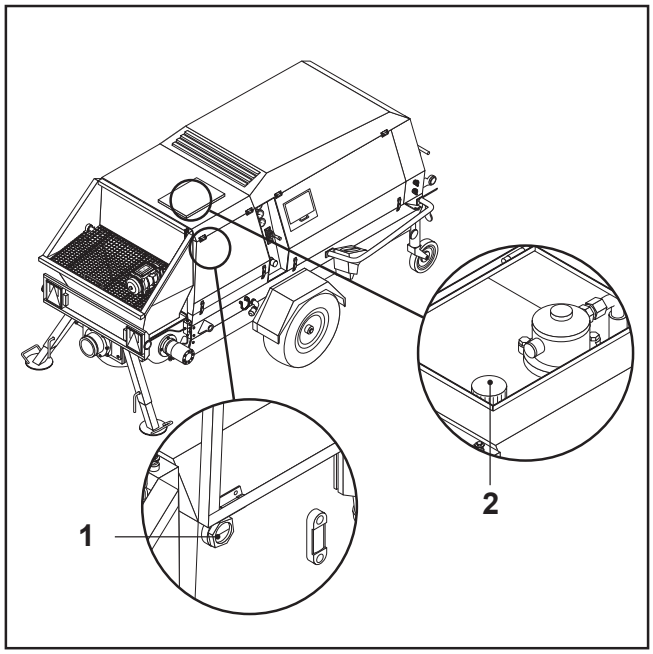


FIG.32

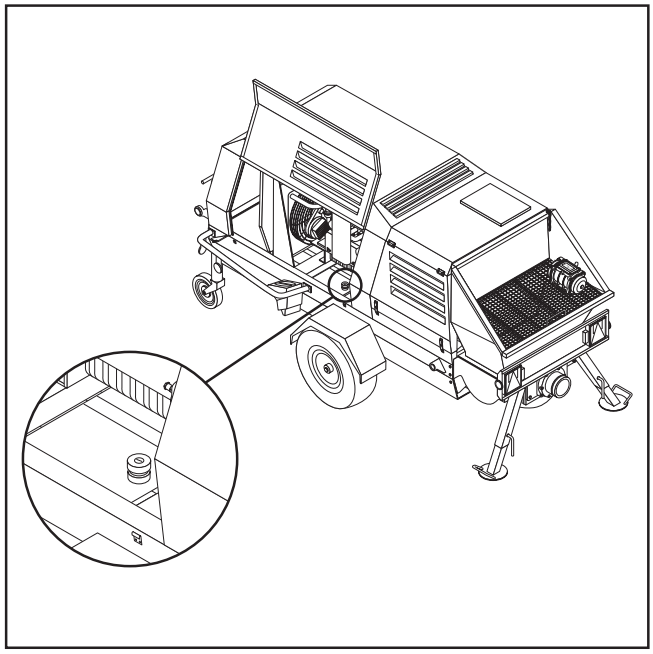


FIG.33

- Top up the diesel fuel tank (FIG. 33) at the end of every work session to avoid the forming of condensate inside the tank when the machine cools down.

- Make sure there is water inside the tank (FIG. 34-REF. 1).

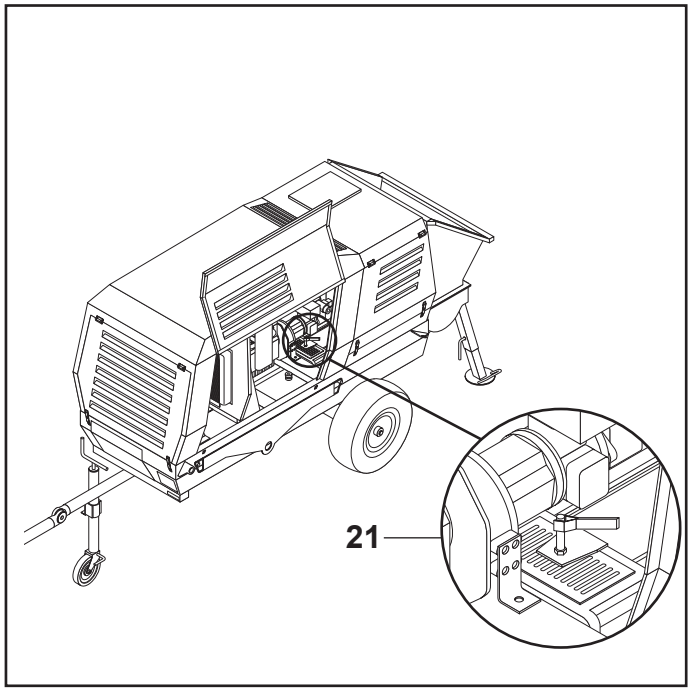


FIG. 34

The water in the tank may freeze at low temperatures. Add a small amount of liquid antifreeze to the water to prevent ice from forming inside the tank and in the parts close to it.

7.4 CONTROLS

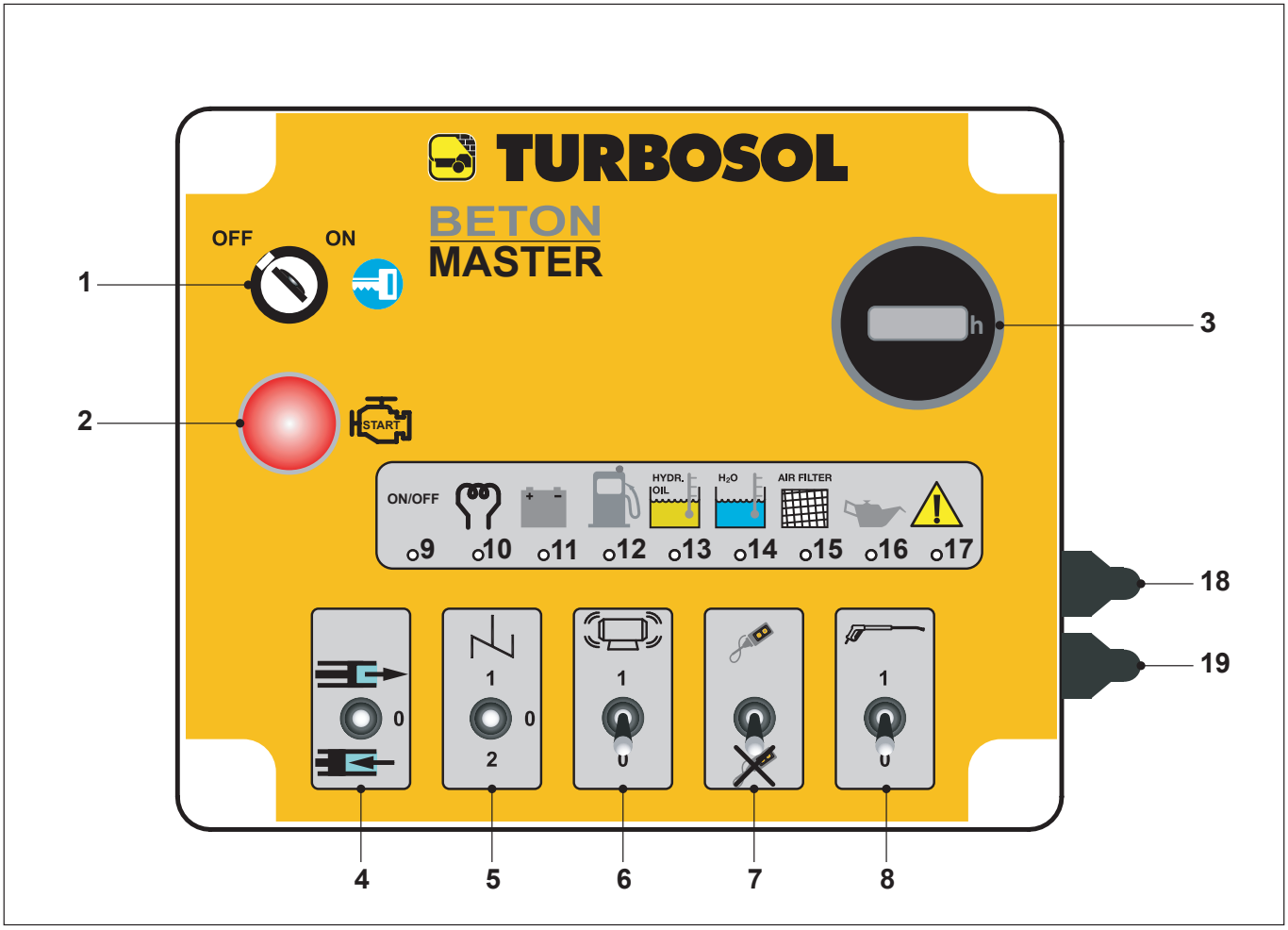


FIG. 35

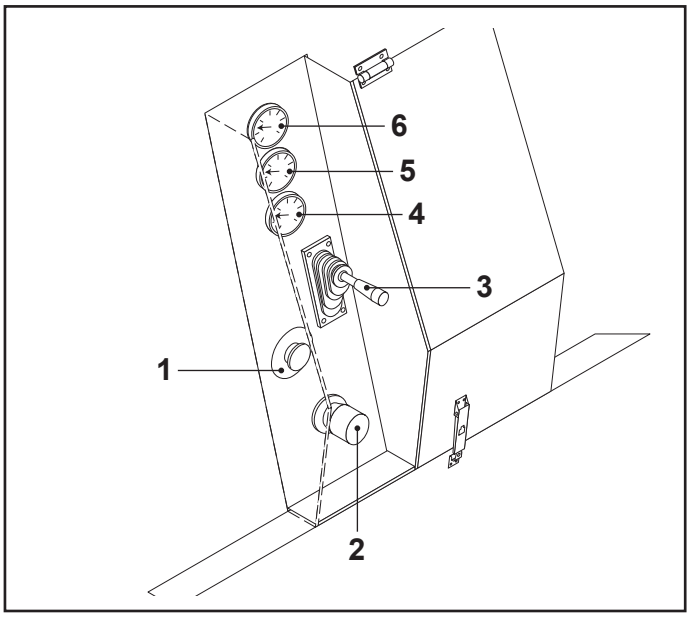


FIG.36

FIG.	REF.	DESCRIPTION
27	1	Ignition key
27	2	Activation button
27	3	Hour meter
27	4	Pumping and sucking start/stop
27	5	Mixer Start/stop/Reverse
27	6	Vibrating screen activation/stop
27	7	Local/remote control selector switch
27	8	High pressure washer
27	18	S-valve manual control and pumping cylinders
27	19	S-valve manual control and pumping cylinders
28	1	Emergency stop button
28	2	Flow rate regulator
28	3	Accelerator
28	4	Auxiliary circuit manometer
28	5	Pumping circuit manometer
28	6	High pressure water pump manometer (opt.)

INDICATORS (on)

FIG.	REF.	DESCRIPTION
27	9	Activation
27	10	Spark-plugs pre-heat
27	11	Alternator failure
27	12	Fuel tank reserve
27	13	High hydraulic oil temperature
27	14	High motor cooling liquid temperature
27	15	Air filter clogging
27	16	Low motor oil pressure
27	17	Safety devices intervention

TAB.08

Indications on the control panel alarms are provided below:

- Battery re-charge alarm (FIG.35-REF.11)
It is possible to continue working with the machine for a maximum of 200 minutes (approx. 4 hours) to allow completing the work in progress, after this alarm is signalled. After this time it is no longer possible to work as the engine automatically turns off after it is started. Avoid the battery discharging by intervening to restore charge correct operation.
(Request the authorised after-sales assistance intervention).

- Diesel oil level alarm (FIG.35-REF.12)
This alarm is signalled when the tank level drops below minimum. We recommend topping-up.
It is possible to work, but with the risk of completely finishing the diesel oil, making it difficult to re-start the motor even after fuel top-up.

- Hydraulic oil temperature alarm (FIG.35-REF.13)
This alarm automatically switches pumping off.
The machine remains on to allow the oil to cool down.

- Engine cooling liquid temperature alarm (FIG.35-REF.14)
This alarm automatically switches the motor off.

- Air filter alarm (FIG.35-REF.15)
This alarm only appears on the console. Clean or replace filters.

- Motor oil pressure alarm (FIG.35-REF.16)
Should a fault be found upon starting the motor (i.e. broken motor wiring or disconnected pressure switch) the warning light flashes and start-up is inhibited. Upon restoring normal conditions the warning light goes out and the motor may be started.
This alarm automatically switches the motor off. Restore the oil level and search for leaks.

- Safety devices activation alarm (FIG.35-REF.17)
This alarm indicates the activation of the machine safety devices.
This alarm automatically switches pumping off.

7.5 STARTING THE MACHINE

- Package an adequate amount of grout (water and cement):
  - pumping up to 20 m - 40/50 litres
  - pumping beyond 20 m - 50/80 litres

- Check the emergency button (FIG.36-REF.1) is not engaged.
- Insert the ignition key and turn it to ON

The pre-heating phase starts automatically, once the key has been turned. The LED (FIG.35-REF.10) on the console indicating spark plugs pre-heating switches on. Wait for this LED to switch off. Once the pre-heating phase has been completed:

- Press the activation button (FIG.35-REF.2); the motor starts running.

- Pour the slurry into the hopper.
- Press the button to start the mixer. The mixer's direction of rotation can be reversed.

Before starting the pumping, be sure that, in the zone of unloading of the material, this operation doesn't create danger.

- Using the manual accelerator, accelerate the engine slightly up to bottom ramp and activate pumping by using the selector switch (upwards); act on the accelerator lever again, if required.
Press the selector switch downwards key to suck the mix: the mix is sucked by piping and re-introduced in the hopper. To return to the pumping phase, press the selector switch upwards.
- Rotate the adjustment hand wheel (FIG.36-REF.2) of the hydraulic pump to reach a value of 6 - 10 pumping/minute.
- If the "safety intervention" indicator switches on, it means the hopper safety grid is open and the grid safety device has intervened: hydraulic supply is interrupted and the controls are disabled.

The operator must check the pumping circuit manometer during the first few pumping cycles, for best perception of relation between the effective work pressure and the maximum pressure.
The effective work pressure (on hydraulic circuit oil) varies based on used mix and layout of the piping line. The manometer indicates the hydraulic cylinders' working pressure during pumping. The manometer indicates the hydraulic jacks' (controlling the S valve) working pressure during S valve exchange; the manometer indicates peak pressure for a brief moment, when jacks reach end run.

When the pumping barrels' inlets and/or wear plate surface from the hopper full of grout, pour the concrete and start pumping at low flow rate.
- Activate the electric vibrator of the grid.

Flow rate can be increased to wanted value using the flow rate regulator, when the first concrete reaches the piping line's outfeed.
The auxiliary circuit manometer indicates the services' work pressure (mixer, optional high pressure water jet machine), that must be below 180 bar. Should the mix be operating and manometer show 180bar pressure, check there is nothing in the hopper preventing mixer rotation.

Remote controls
Insert the plug into the connector's socket located on the machine's bodywork (see par. 5.4.2), if using the remote control via cable.
If machine is provided with radio control, connect it to the connector's socket (see par. 5.4.3).
The LOCAL/REMOTE selector switch allows selecting the pumping controls from the control board (local) or from a remote device [remote control (standard) or radio control (optional)].

7.6 CLEANING THE MACHINE AFTER A WORK SESSION

The following operations should be carried out only by specifically trained personnel. In particular, before breaking a joint make sure there is no residual pressure inside the piping and that no one is standing nearby. This operation is potentially dangerous and should always be performed with caution and by qualified personnel only.

For safety reasons, no one should be allowed to stand close to the hoses during cleaning operations.

When pumping is finished stop the mixer, the pumping unit and the electric grid vibrator.

- Before disconnecting the pipes. Carry out 4-8 pumpings in reverse to depressurize the piping, especially the sections near the front delivery flange.
- Disconnect the pipes from the front delivery flange.

- Open the hopper discharge chute (FIG. 37-REF. 1) to discharge the remaining slurry and then wash down the inside of the hopper with water.
- Introduce the water hose into the delivery conduit (FIG. 37-REF. 2) for about 15-20 centimetres, start pumping in reverse and draw the water out of the S-valve. Continue until you see only clear water coming out of the hopper.

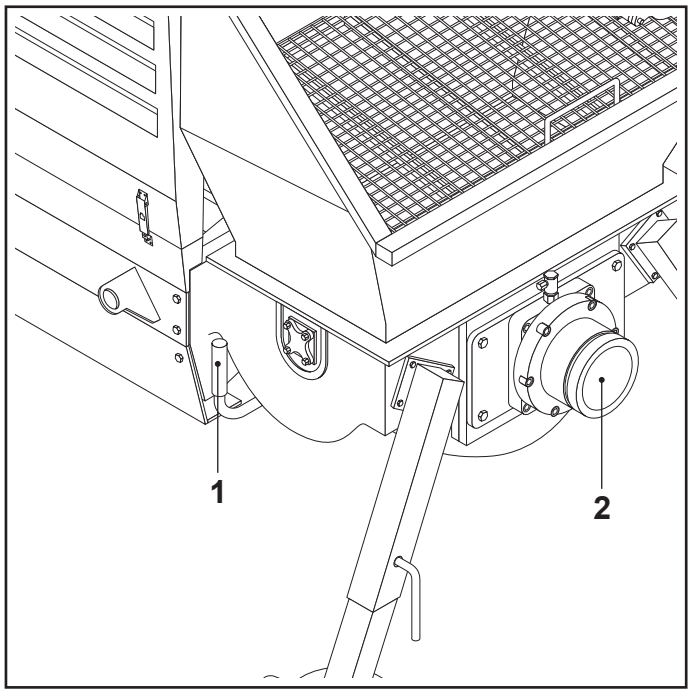


FIG. 37

- Stop pumping and close the discharge chute.
- Let the diesel engine idle for 2-3 minutes, and stop the engine.
- Make sure no residues of concrete remain inside the hopper, the S-valve and the front delivery flange.
- Lubricate the hopper walls and the S-valve with oil or other lubricants. This will reduce the chances of deposits forming inside the hopper after the next work session.
- We recommend covering the hopper with a piece of material to prevent foreign matter from falling inside.

The machine can be equipped with a high-pressure water-jet cleaner (optional).

Use the high-pressure cleaner as follows:
- Connect the water supply hose to the coupling on the machine. The water mains should be able to supply at least 10 l/min.

If you are drawing water from a container, make sure that:
- the water is clean
- the drawing point is at least 50 cm above the coupling (FIG. 38-REF. 1)
- the pump has been primed beforehand

- Connect the nozzle together with its delivery hose to the coupling (FIG. 38-REF. 2).
- Switch on the water pump by lever on the control panel. The pressure gauge (FIG. 36-REF. 6) shows the pressure in the water-jet cleaner (i.e., 100-120 bar).
- Make sure the mixer is switched off when using the water pump.
- Proceed to wash.

Never direct the water jet at people. Wear appropriate protection, in particular for your hands and eyes. Do not direct the water jet at electric or hydraulic components.

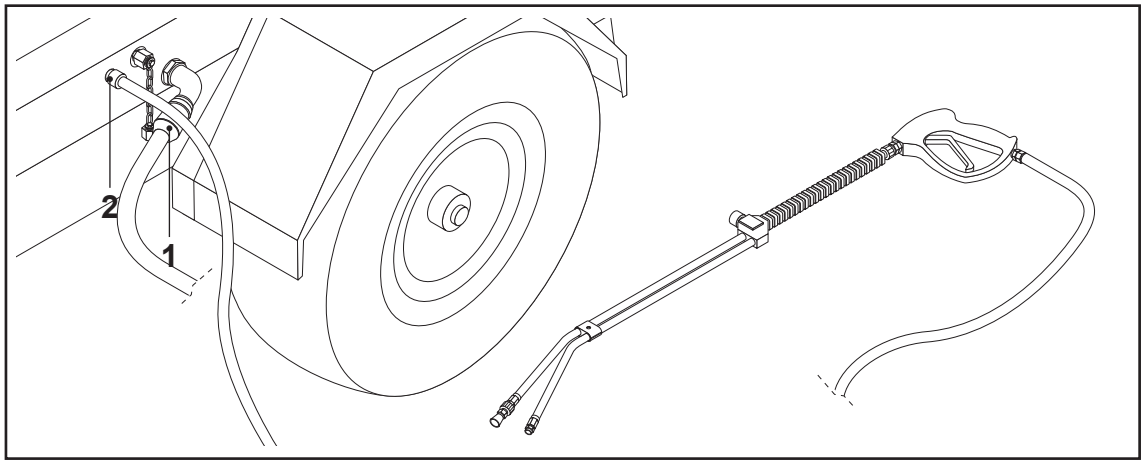


FIG.38

7.6.1 Washing the piping

The pipes and hoses can be washed in three different ways:
1) by flushing with water under pressure
2) by flushing with compressed air
3) by reverse pumping (vertical piping only)

Note that:
- Flushing with water or compressed air lets you use all the concrete produced since it is expelled onto the place of application.
- With reverse pumping the slurry inside the piping is brought back to the hopper. Bear in mind that the hopper's capacity will let you recover about 200 litres of slurry.

- FLUSHING WITH WATER

- Soak a pipe sponge (FIG. 39-REF. 1) and put it inside the pipe.
- Connect the pipe to the machine and open the gate valve if present.
- Connect the basket (FIG. 39-REF. 2) designed to catch the sponge to the end of the hose using a Victaulic coupling complete with rubber gasket.
- Fill the hopper with water and start pumping.

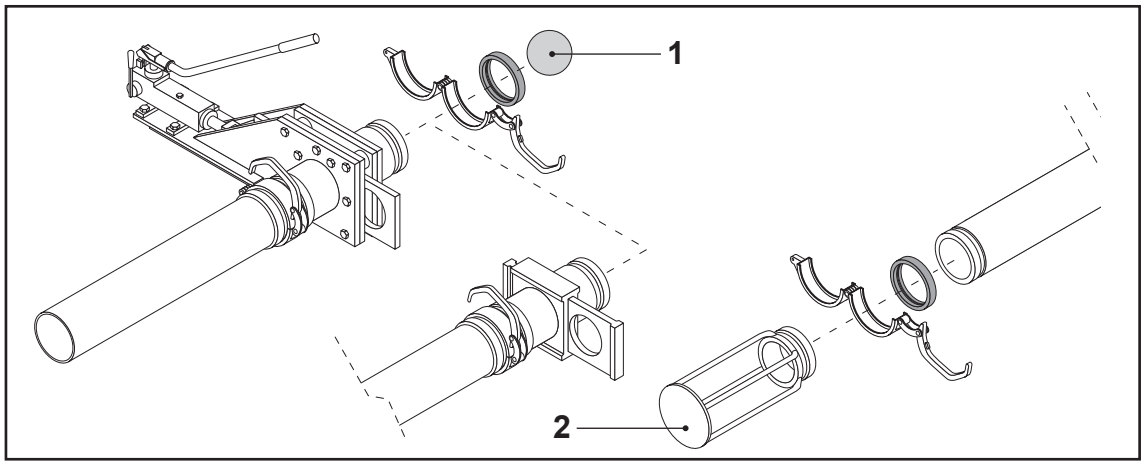


FIG.39

The sponge will be violently expelled from the hose. Make sure the hose is pointing in a direction where there is no risk of harming anyone or damaging anything. If the piping is encrusted the sponge will not be expelled. In this case, reverse the direction of pumping to reduce the pressure inside the piping and stop the machine.

In case the pipes are found to be clogged when flushing, follow the instructions in paragraph 7.7.

- FLUSHING WITH COMPRESSED AIR

- Connect the basket (FIG. 40-REF. 1) designed to catch the sponge to the end of the hose using a Victaulic coupling complete with rubber gasket.
- At the other end, introduce an adequately-sized pipe sponge (FIG. 40-REF. 2) soaked in water, connect the flushing cap supplied (FIG. 40-REF. 3) and make sure it is well fastened.
- Close the valve (FIG. 40-REF. 4).
- Connect the compressed-air hose (FIG. 40-REF. 5) from the compressor to the quick-release coupling (FIG. 40-REF. 6) on the flushing cap.
- Start the air compressor, open the valve (FIG. 40-REF. 4), pressurize the piping for a few seconds and then close the valve. The slurry will begin to flow out and the pressure shown on the pressure gauge will begin to fall.
- Open the valve again and adjust it so that the air pressure stays at a level sufficient to push the slurry out.

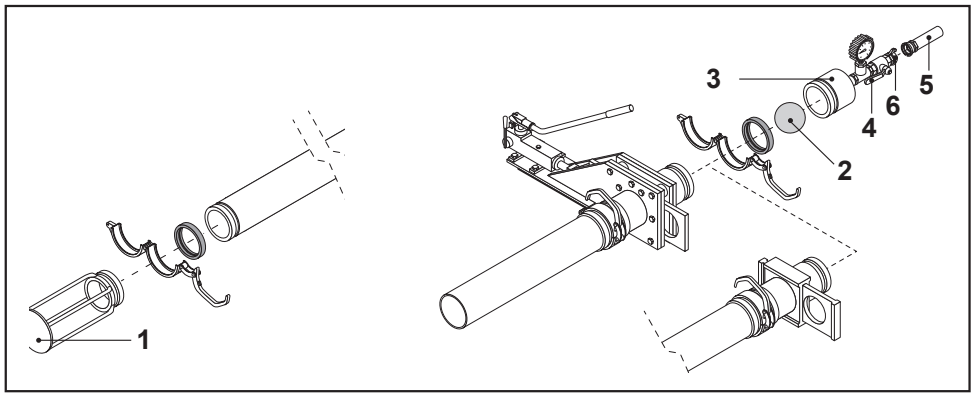


FIG.40

Before you loosen any joint on the slurry delivery hose, make sure that the valve with the safety lever is open, that the pressure gauge shows a pressure of zero bar and that there is no residual pressure inside the piping.

The sponge will be violently expelled from the hose. Make sure the hose is pointing in a direction where there is no risk of harming anyone or damaging anything.

In case the pipes are found to be clogged during flushing, follow the instructions in paragraph 7.7. Be sure to discharge the pressure before you open any coupling:

- close the valve (FIG. 40-REF. 4) - close the compressed-air hose valve - disconnect the compressed-air hose from the coupling (FIG. 40-REF. 6) - open the valve (FIG. 40-REF. 4)

- CLEANING BY REVERSE PUMPING

If the pumping line is vertical, introduce the rubber sponge into the delivery hose, start pumping in reverse mode and hold the lever the necessary time. The concrete will be drawn back into the hopper.

Note: Each metre of Ø 100 mm piping can contain approximately 8 litres of slurry, and each metre of Ø 75 mm piping can contain approximately 4.5 litres.

If the piping is relatively long the cement may overflow from the hopper.

7.7 IMPORTANT WARNING

The following operations should be carried out only by specifically trained personnel. In particular, before breaking a joint make sure there is no residual pressure inside the piping and that no one is standing nearby. This operation is potentially dangerous and should always be performed with caution and by qualified personnel only.

In case of clogging, the pressure gauge will show a pressure above 150 bar and pumping will be stopped.
If this occurs, start reverse pumping and carry out 4-8 pumping cycles. The level of the slurry inside the hopper will rise.
You can now proceed to remove the clogging.

Clogging usually occurs inside and close to the couplings.

Clogging in steel pipes

- To locate a clogging, strike the pipe with an iron hammer and listen to the sound it makes:

a metallic sound means the pipe is clear, while a dull sound indicates a clogged pipe.
- Detach the piping between the clogging and the front delivery flange (FIG. 55-REF. 1).
- Disconnect the steel pipe downstream from the clogging. Once you have separated it from the line, hold the clogged section vertically and clean it out.

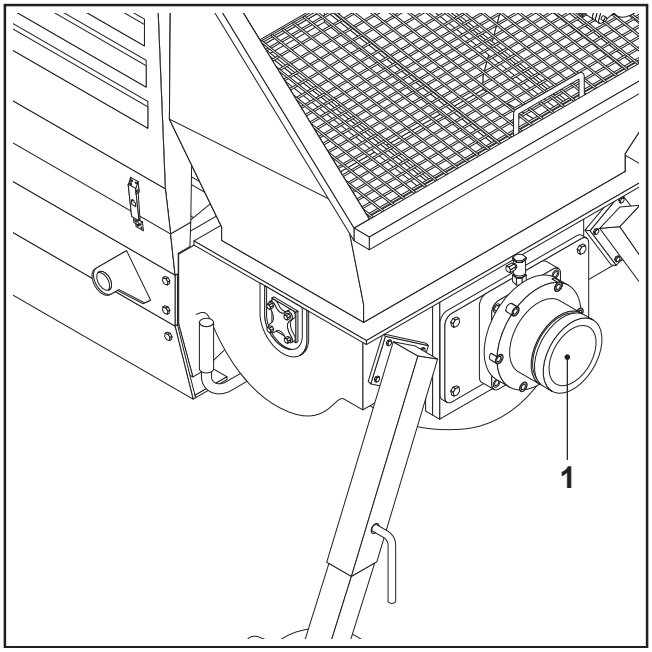


FIG.41

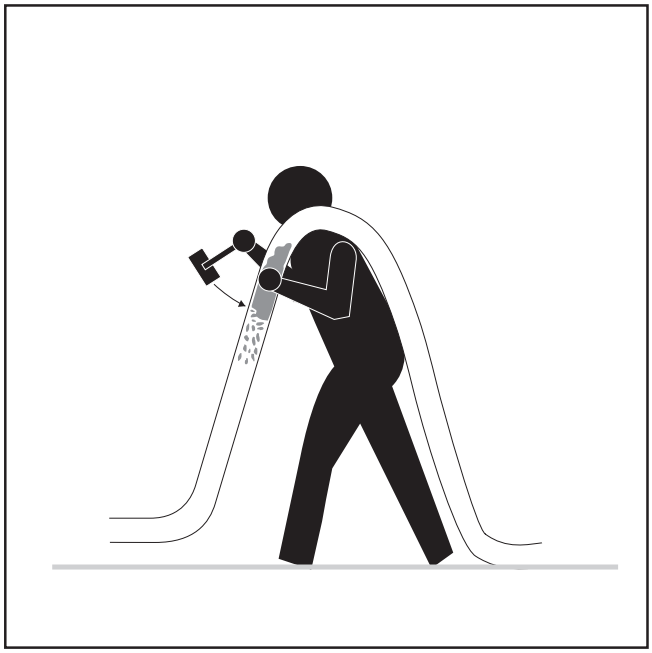


FIG.42

Clogging in rubber hoses
- The pipe is hard and rigid near the obstruction; on the contrary, the hose sags upon treading.
- Disconnect the clogged hose from the piping line, once this has been pre-emptively depressurised.
- Place the hose vertically to evacuate its contents.

EMERGENCY STOP

Use the emergency button (FIG. 36-REF. 1) only when you must stop the machine for an emergency. Do not use it to stop the machine when no emergency is under way. Repeated, unjustified use of the emergency button may damage the machine.

8 - MAINTENANCE

8.1 MAINTENANCE TO BE CARRIED OUT BY OPERATOR

The following are the basic instructions for performing proper maintenance on the machine. More detailed information can be found in the diesel engine operation and maintenance manual (supplied), which operators are required to read and understand (along with the present manual) before using the machine.

- CHECKING THE LUBRICATION WATER LEVEL

- Open the discharge lever (FIG. 43-REF. 1) to empty the tank.
- If the water in the tank is not clear but grey and thick, it means that slurry is seeping out from between the piston and the pumping tube. If this occurs, replace the pistons.
- Turn the lever (FIG. 43-REF. 1) to its horizontal position to close the tank.
- Fill the tank by pouring water through the slots until overflowing.

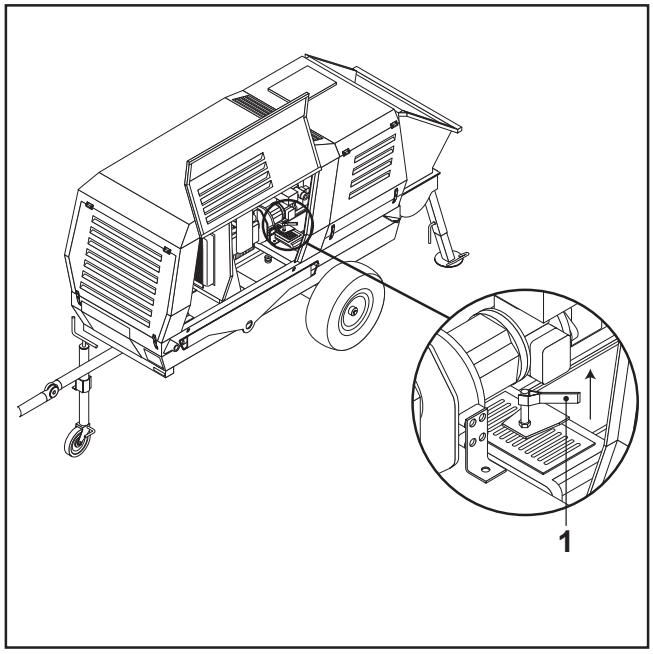


FIG.43

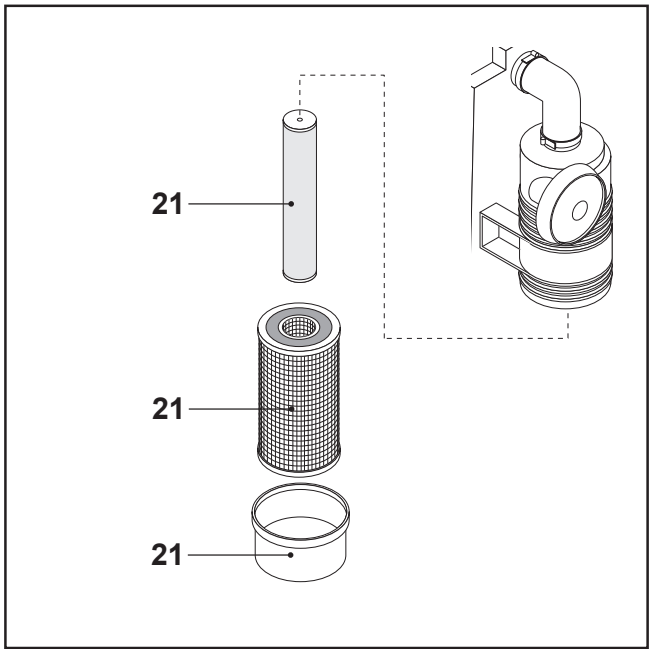


FIG.44

The lubrication water should be changed completely at least once a week, or preferably after every work session.

When working in a cold climate, empty the tank at the end of every work session or add antifreeze.

- CHECKING THE ENGINE COOLANT LEVEL

Check the level of the engine coolant and top up if necessary (see paragraph 7.3).

- CHECKING THE MOTOR OIL

Check the motor oil level using the dipstick. The level should be near the top mark but never above.
For topping up, use: TOTAL RUBIA TIR 7400 or an equivalent oil.

- CHECKING THE ENGINE AIR FILTER

The engine air filter contains two filter cartridges (1st and 2nd stage). To inspect the filter snap off the cover (FIG. 44-REF. 1) and remove the 1st stage cartridge (FIG. 44-REF. 2) and the 2nd stage cartridge (FIG. 44-REF. 3). Lightly tap the filter element of the 1st stage cartridge on a hard surface a few times to shake off any excess dirt. Do not blow the paper filter element with compressed air. The 2nd stage cartridge can be cleaned a few times with compressed air but not washed with water. Accurately clean the cover and the filter mount.

- CHECKING THE DIESEL FUEL LEVEL

Check the diesel fuel level.

Top up the diesel fuel tank at the end of every work session to avoid the forming of condensate inside the tank when the machine cools down.

- CHECKING THE HYDRAULIC OIL LEVEL

Check the level of the oil in the hydraulic oil tank through the inspection window (FIG. 45-REF. 1).
If the oil level does not remain constant there may be a leak that must be found and stopped; this should be done by qualified personnel.
Top up the oil through the cap (FIG. 45-REF. 2).
Use ELF OLNA DS46 hydraulic oil.

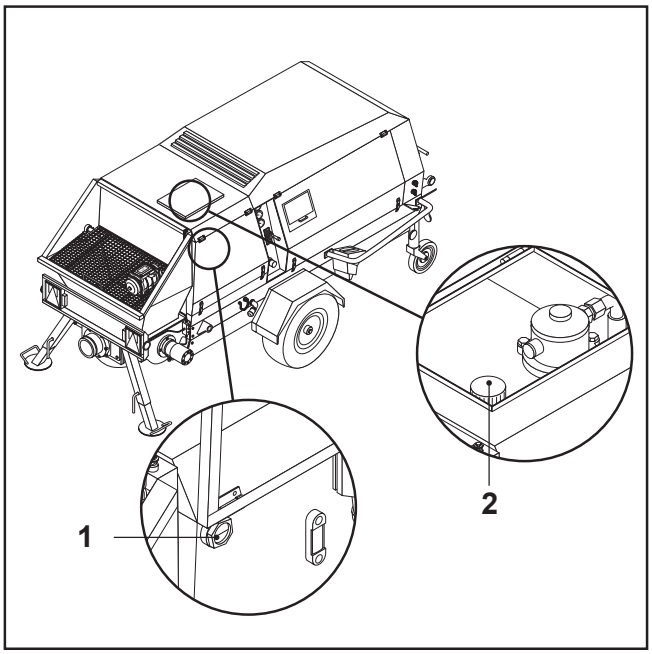


FIG.45

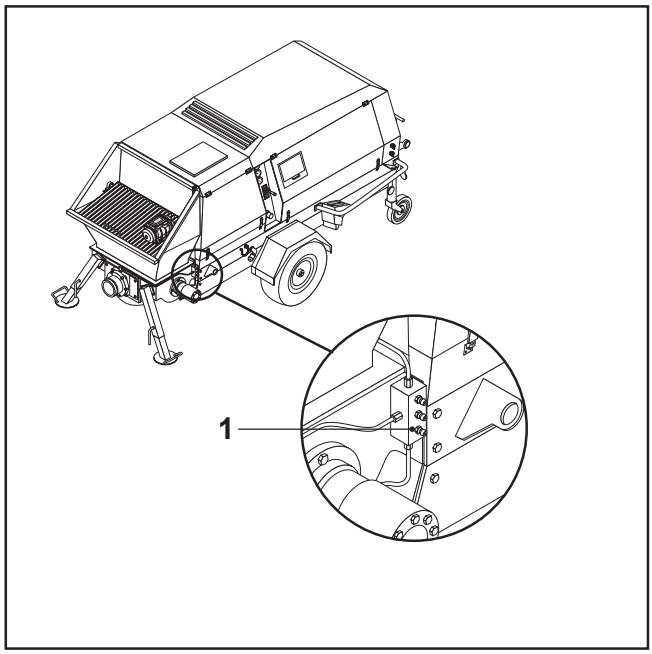


FIG.46

- AT THE END OF A WORK SESSION

- After a work session and after cleaning the machine, we recommend spraying it with a liquid that can prevent the forming of deposits.
- Using the grease pump supplied, lubricate the three greasing points (FIG. 46-REF. 1) on the mixer support and the S-valve mount.
- Lubricate the switching jacks.

8.2 REPLACING THE PUMPING PISTONS

Replace the pumping pistons when the lubrication water in the tank appears cloudy and contains coarse grains.

Prepare the tools supplied:
- 32 mm wrench (FIG. 47-REF. 1)
- M20 (FIG. 47-REF. 2) and M16 (FIG. 47-REF. 3) threaded rods
- M20 (FIG. 47-REF. 4) and M16 (FIG. 47-REF. 5) nuts
- piston guide ring (FIG. 47-REF. 6)
- guide spacer (FIG. 47-REF. 7)
- two rod spacers (FIG. 47-REF. 8)
- flange for removing piston (FIG. 47-REF. 9)
- two pistons (FIG. 47-REF. 10)

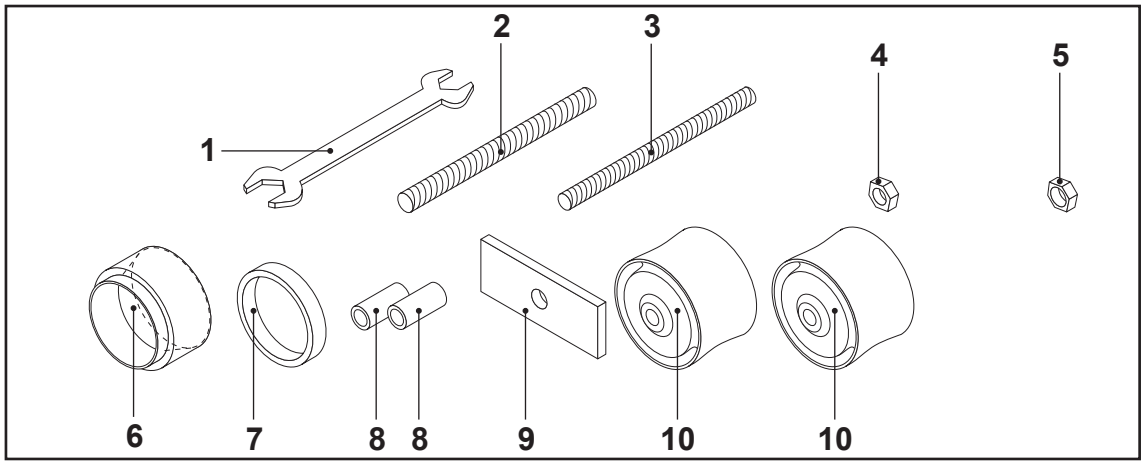


FIG.47

- Empty the water tank.
- Start the machine, and with the engine idling, turn the handwheel (r1) to set the flow of the hydraulic pump at minimum.
- Start reverse pumping.
- Watch the hopper and when one of the pistons reaches the end of its stroke lift the safety grid to stop the pumping.
- Stop the machine.

The following steps must be carried out with the machine switched off.

To facilitate operations we recommend removing the upper hopper by unscrewing its four fastening screws. Be sure to remove the hopper safety sensor too.

- Remove the screw (FIG. 48-REF. 1) on the piston head.

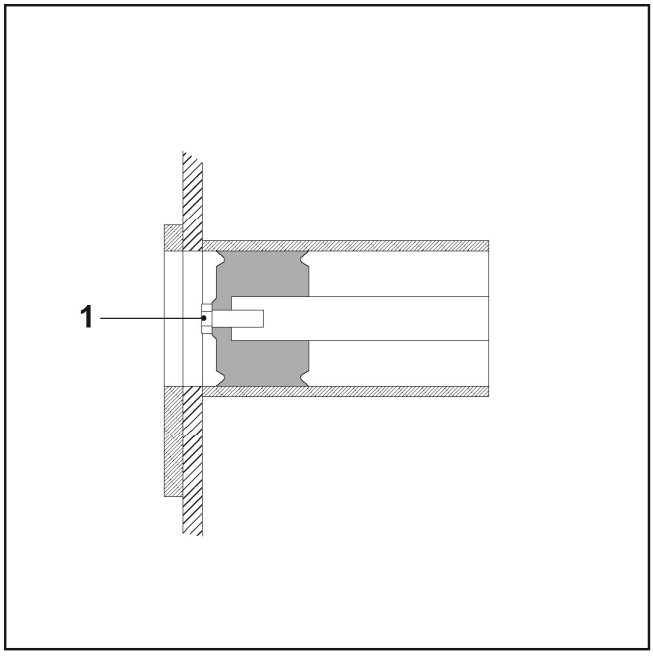


FIG.48

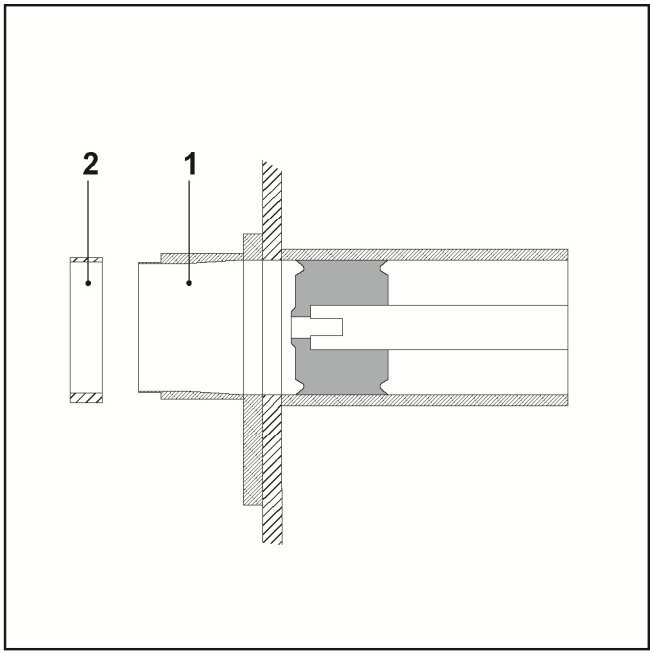


FIG.49

- Slip on the guide ring (FIG. 49-REF. 1) applying the tapered part on the wear plate.
- Holding the guide ring against the liner, slip the spacer (FIG. 49-REF. 2) on to the guide ring.
- Mount the flange for removing the piston (FIG. 50-REF. 1).

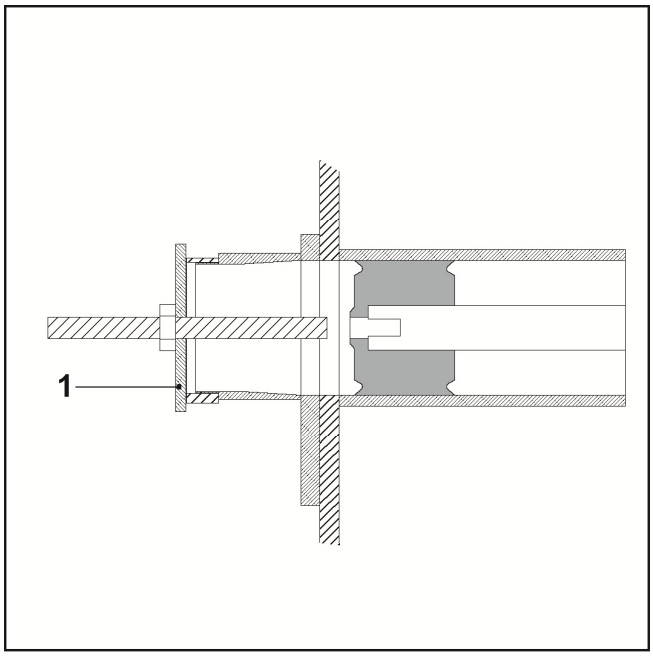


FIG.50

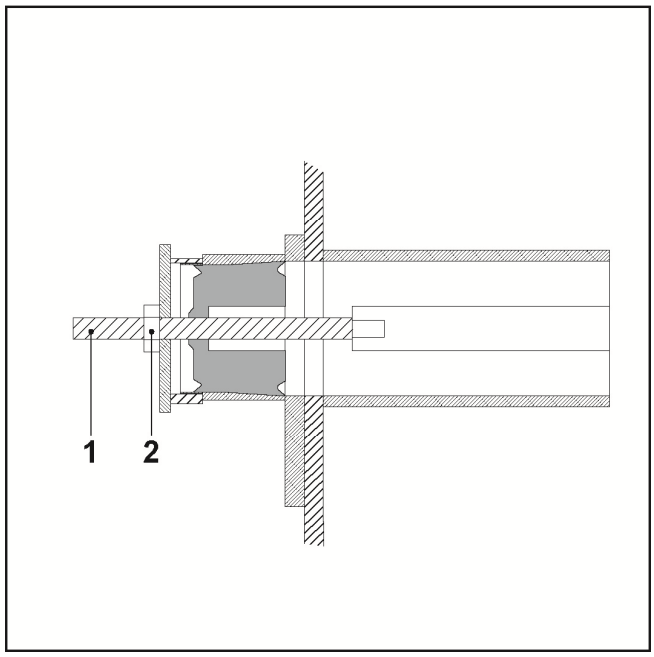


FIG.51

- Screw the M20 threaded rod (FIG. 51-REF. 1) onto the piston head, screw on the nut (FIG. 51-REF. 2) and pull out the piston.
- Remove the piston with the guide ring (FIG. 52).

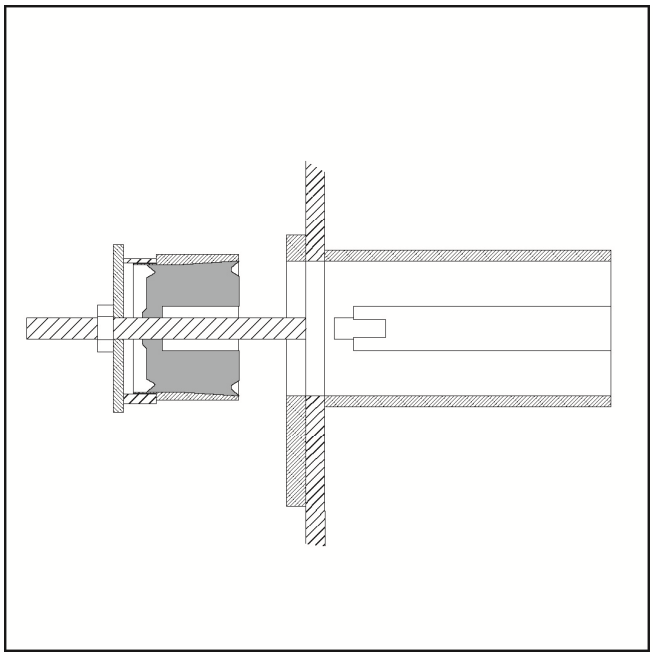


FIG.52

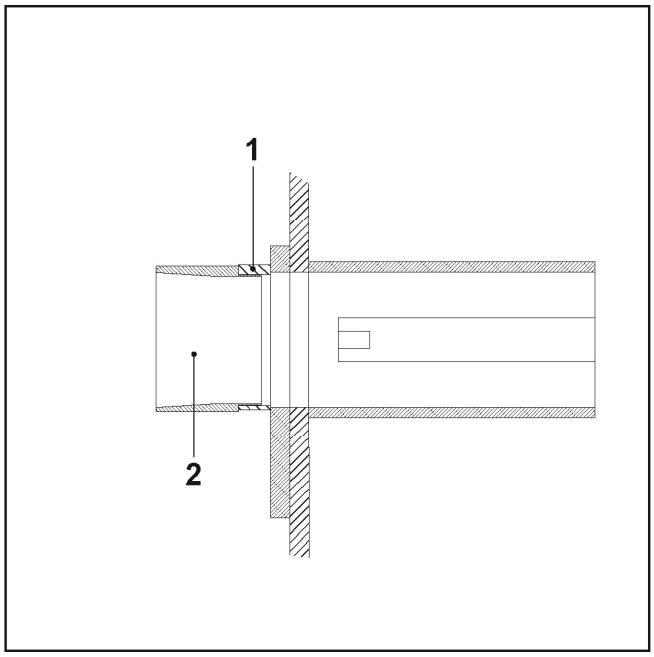


FIG.53

To install a new piston proceed as follows:
- Slide the guide spacer (FIG. 53-REF. 1) onto the cylindrical part of the guide ring (FIG. 53-REF. 2) with the countersunk part facing outward.
- Lubricate the piston (FIG. 54-REF. 1) with Vaseline, and slide the piston into the tapered part of the guide ring.

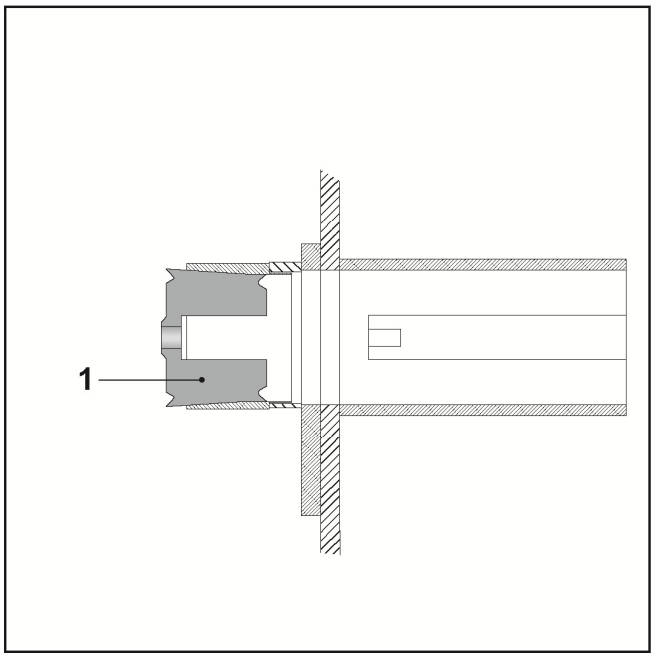


FIG.54

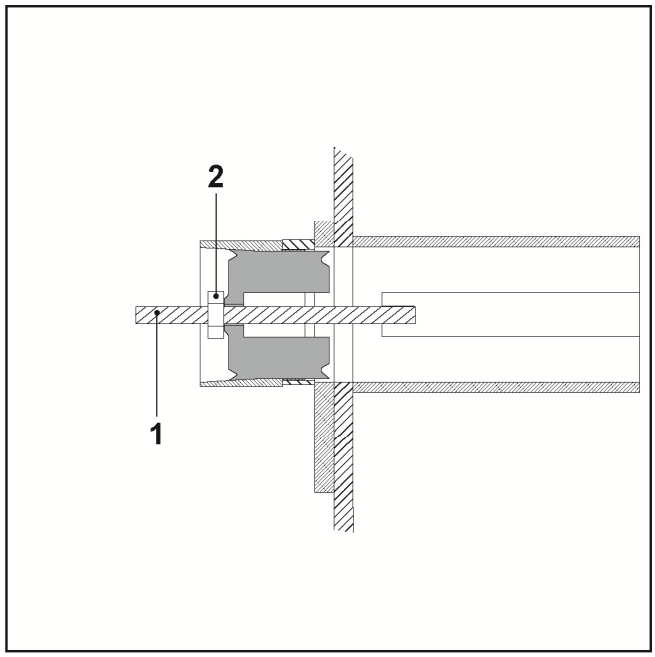


FIG.55

- Apply more Vaseline.
- Push the piston completely into the guide ring, screw on the threaded rod M16 (FIG. 55-REF. 1) and the threaded nut (FIG. 55-REF. 2).
- To make the piston reach the piston rod (FIG. 56/57-REF. 1) apply the spacers and keep tightening the nut.

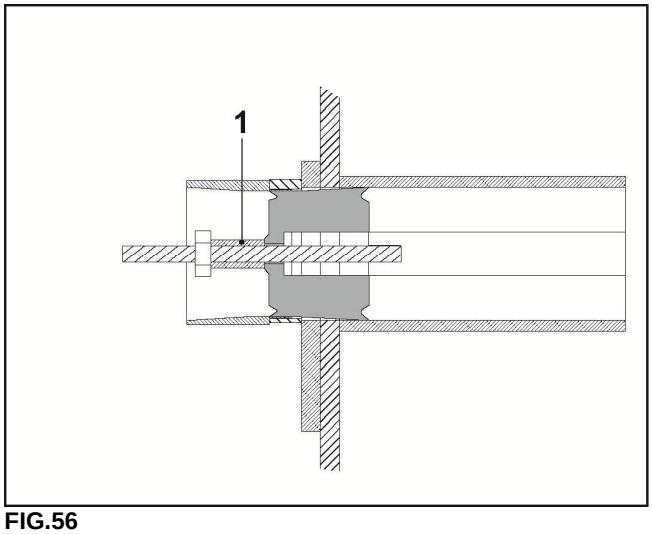


FIG.56

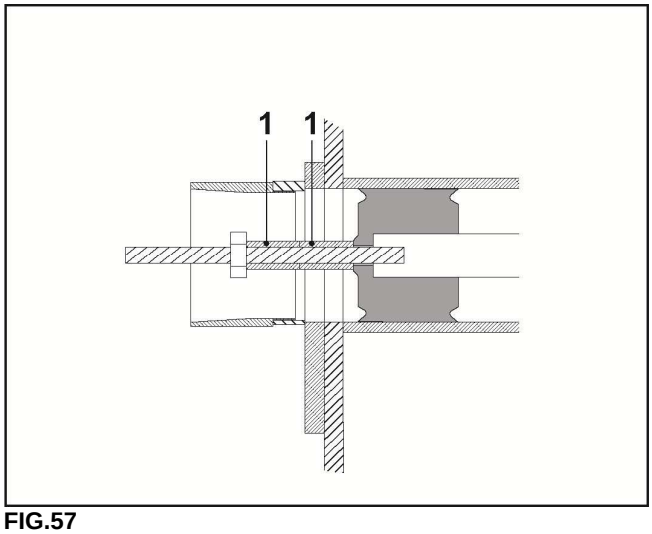


FIG.57

- Unscrew and remove the nut, remove the M16 threaded rod, the spacers, the guide ring and the guide ring spacer.
- Tighten the screw and washer on the piston.
- Repeat the entire procedure for the second piston.
- Reinstall the upper hopper and the safety grid.

8.3 ADJUSTING THE S-VALVE

The S-valve should be adjusted to eliminate all play between the wear plate and the wear disc and make them seal to each other. Play is caused by wear on the two elements produced by scraping.
Imperfect sealing can be detected during washing, when water seeps out from between the disc and the plate, and during pumping, when slurry seeps out from between them.
As a rule, the S-valve should be adjusted when the distance between the disc and the wear plate is greater than about 0.25 mm or in case of frequent clogging of the S-valve.

The following steps must be carried out with the machine switched off.
- Remove the TE screw (FIG. 58-REF. 1), remove the lever locking the adjustment nut (FIG. 58-REF. 2) and loosen or tighten the adjustment nut as required (FIG. 58-REF. 3); usually it is sufficient to turn the nut by 60°-120°.
- Put back the nut-locking lever (FIG. 58-REF. 2) and fasten it with the screw (FIG. 58-REF. 1).

- Start the machine and, with the engine running idle, make sure the S-valve switches regularly.

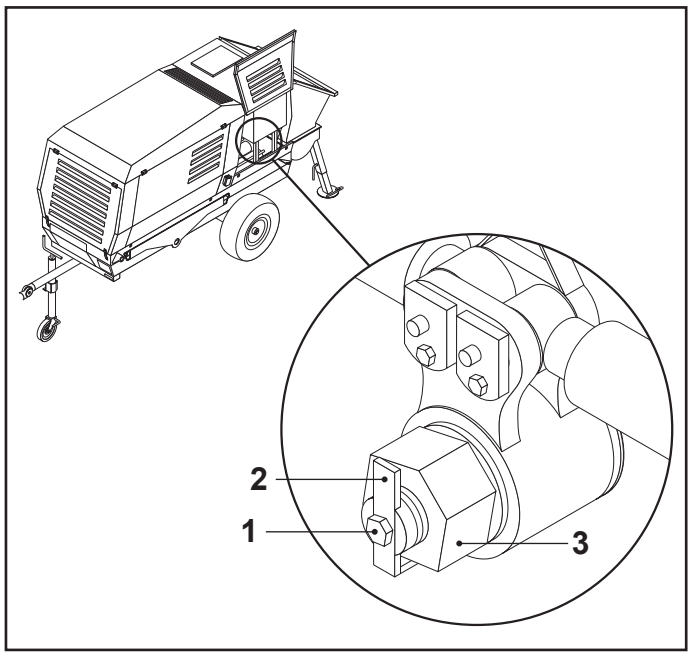


FIG.58

8.4 REPLACING THE WEAR DISC, THE WEAR PLATE AND THE S-VALVE

The following steps must be carried out with the machine switched off.

- Remove the upper hopper by unscrewing its four fastening screws.
- Remove the rigid grease fitting (FIG. 59-REF. 1) on the greasing flange.
- Loosen the 4 TE screws (FIG. 59-REF. 2) and remove the delivery flange.
- Remove the TE screw (FIG. 58-REF. 1), remove the lever locking the adjustment nut (FIG. 59-REF. 2) and remove the adjustment nut (FIG. 59-REF. 3).
- If you only need to replace the wear disc and the wear plate, pull the S-valve out as far as necessary to do so.
- If you need to replace the S-valve too, strike it with a hammer to facilitate removing.

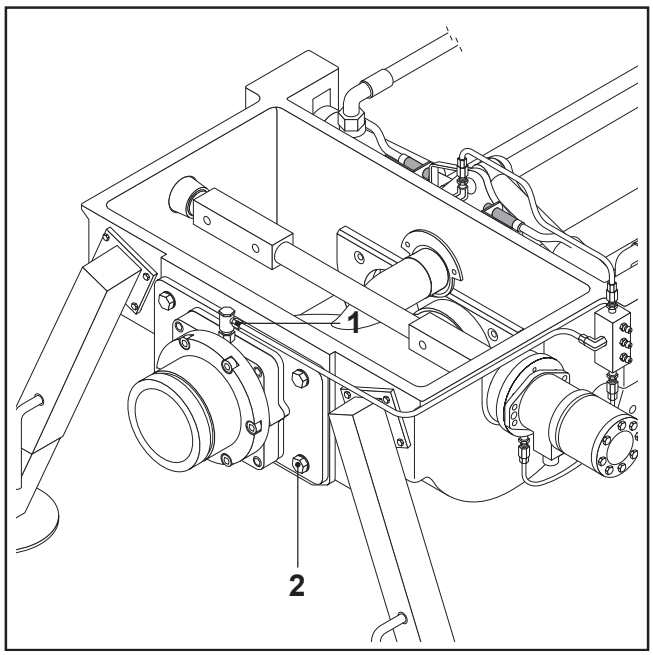


FIG.59

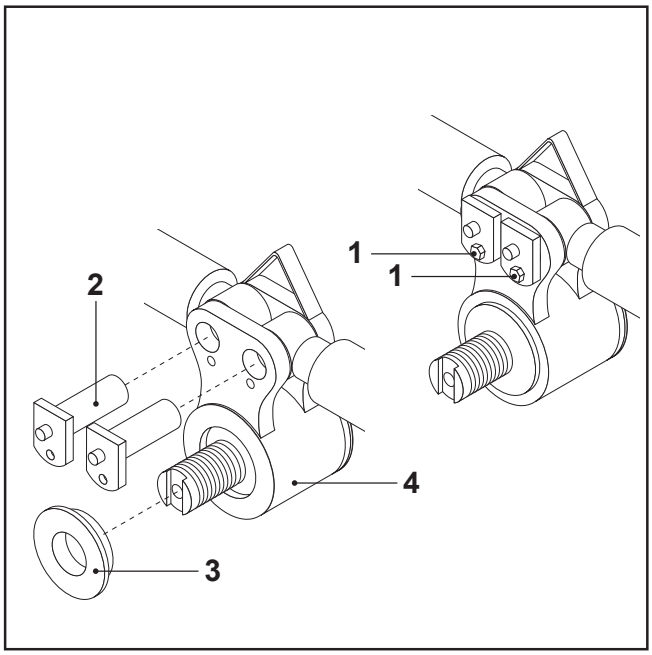


FIG.60

- Unscrew the two TE screws (FIG. 60-REF. 1) on the head of the jack retaining pins and remove the two pins (FIG. 60-REF. 2).
- Set aside the lever locking washer (FIG. 60-REF. 3) and the tapered connecting rod (FIG. 60-REF. 4).

- Remove the 5 fastening screws (FIG. 61-REF. 1) and take out the wear plate.
- Apply two new O-rings (FIG. 61-REF. 2) lubricating them with grease (the grease keeps the rings in place). Do not apply too much grease because it creates thickness.
- Install and fasten the wear plate.

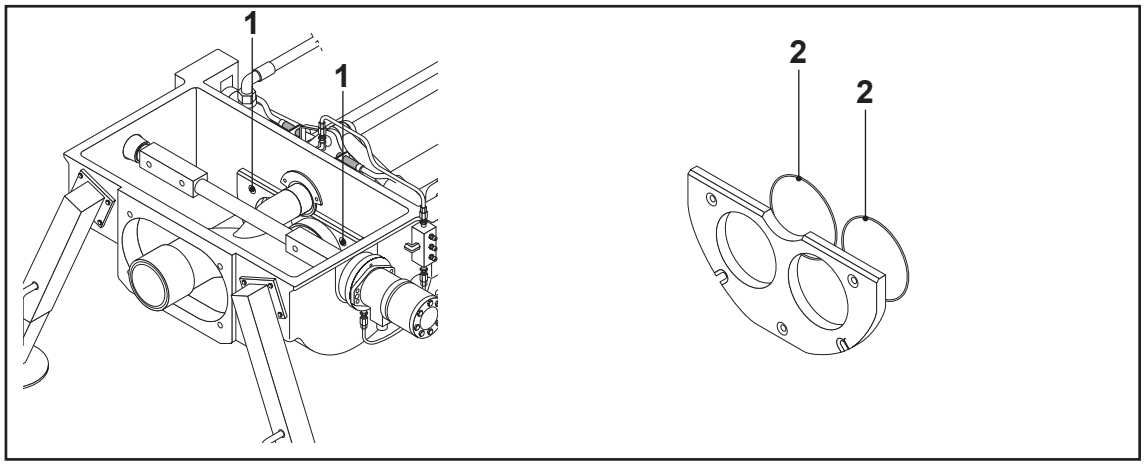


FIG.61

- Install the wear disc (FIG. 62-REF. 1) with the O-ring (FIG. 62-REF. 2) on the S-valve.
- Reinstall the S-valve.
- Reinstall the tapered connecting rod, aligning the little hole between the flanges with the hole on the S-valve.

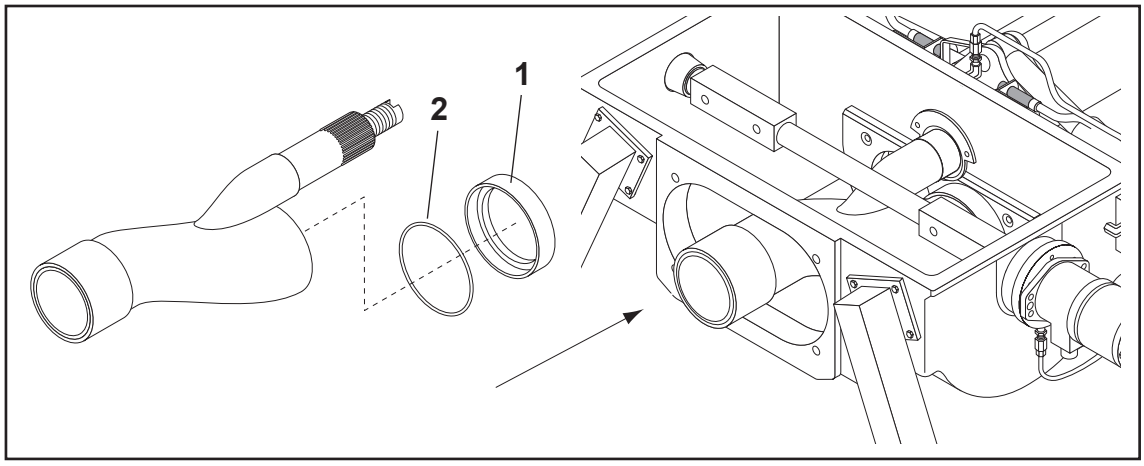


FIG.62

- Put back the lever locking washer (FIG. 63-REF. 1), the adjustment nut (FIG. 63-REF. 2), the nut locking lever (FIG. 63-REF. 3) and fasten it with the TE screw (FIG. 63-REF. 4).
- Put back the two pins (FIG. 63-REF. 5), align the holes on the tapered connecting rod with the holes on the jack and tighten the screws to fasten them.

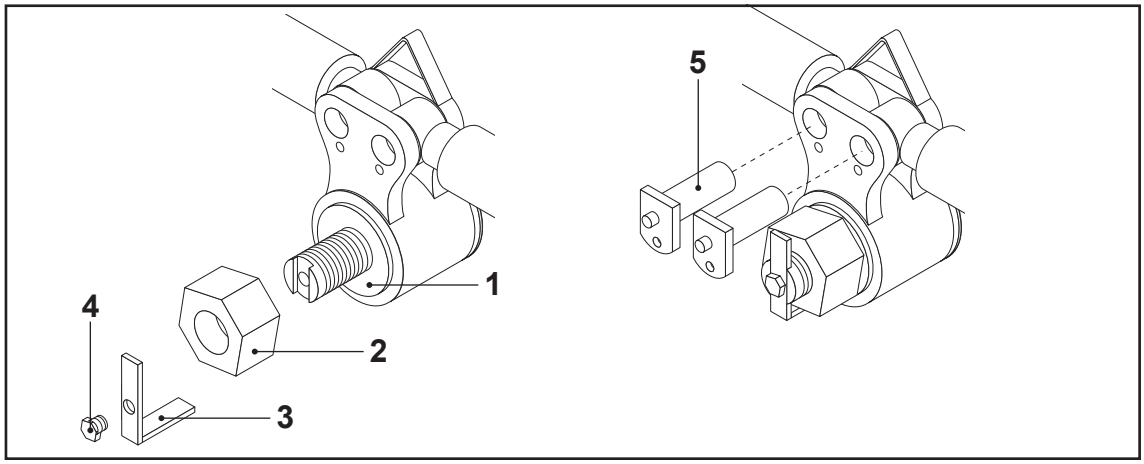


FIG.63

- Reinstall the delivery flange and the grease fitting.
- Reinstall the upper hopper and the safety grid.
- Start the machine and make sure the S-valve switches regularly.

8.5 CHANGING THE FIRST OIL FILTER

The following steps must be carried out with the machine switched off and the oil cooled down.

The hydraulic oil tank is provided with two filters. Replace the filter on the cover every 500 hours and the filter inside the tank every 1000 hours.
- To change the filter (FIG. 64-REF. 1) unscrew the four screws on the oil filter inspection cover on the fixed casing.
- Unscrew the filter cap (FIG. 64-REF. 2) and remove and replace the filter cartridge.
- Screw the cap back on (FIG. 64-REF. 2) and fasten the inspection cover with the screws.

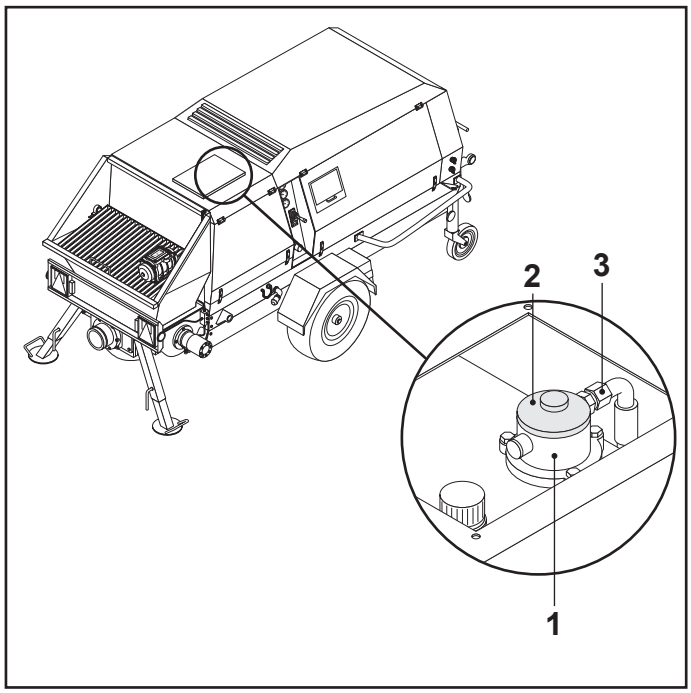


FIG.64

8.6 CHANGING THE SECOND OIL FILTER

- Take down the fixed casing by removing the screws on the casing mounts and on the brackets that fasten it to the hydraulic oil tank (FIG. 65).

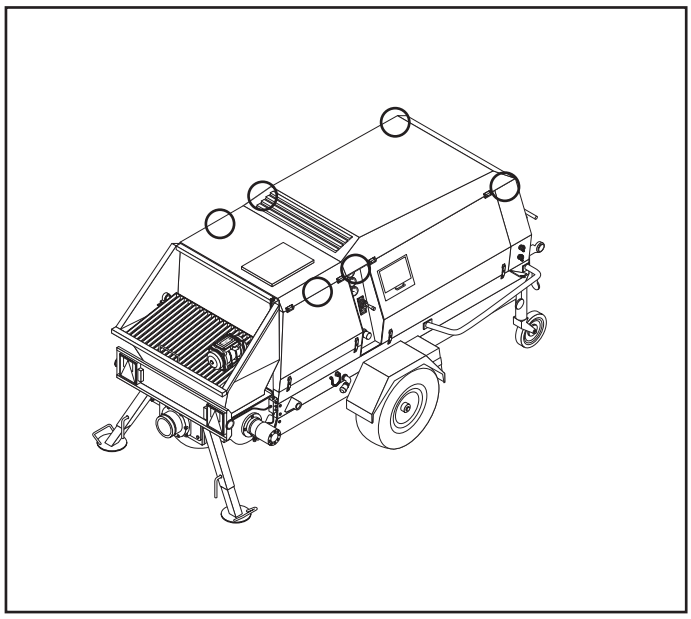


FIG.65

- Open the valve (FIG. 66-REF. 1) beneath the oil tank to drain the tank, placing an adequately sized container below it to collect the oil.
- Disconnect the hydraulic oil pipe (FIG. 64-REF. 3).
- Unscrew and replace the internal filters (FIG. 66-REF. 2/3) and close the tank after inspecting the conditions of the gasket (replace if necessary).
- Open the cap (FIG. 66-REF. 4) and fill the tank with 75 litres of ELF OLNA DS 46 hydraulic oil.
- Check the oil level through the inspection window (FIG. 66-REF. 5).
- Reinstall the fixed casing and fasten it with the screws.
- Start the engine and let the hydraulic pump run idle for a few minutes while checking the oil level through the inspection window (FIG. 66-REF. 5); if the level is below the inspection window, add more oil.

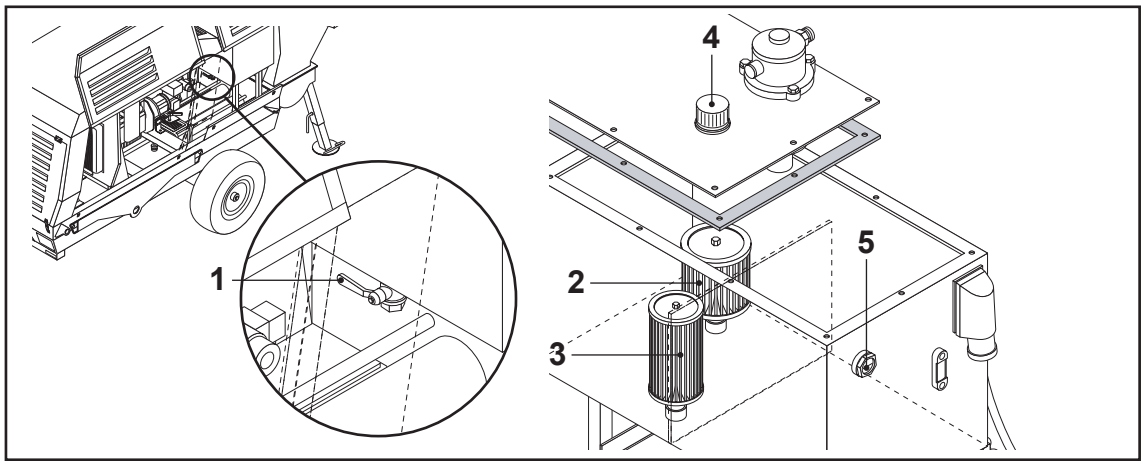


FIG.66

8.7 TO BE CARRIED BY QUALIFIED PERSONNEL

8.7.1 Maintenance after 50 hours

- Check the engine coolant level.
- Check and adjust the engine idling speed.
- Change the motor oil; use TOTAL RUBIA TIR 7400.
- Remove the plug (FIG. 67-REF. 1) and drain the oil.
- Put the oil drain plug back in, remove the refilling cap (FIG. 68-REF. 2), refill with oil and put back the cap. Check the level on the dipstick. It should be near the maximum mark (FIG. 68-REF. 1).
- Replace the motor oil filter cartridge.
- Replace the fuel filter cartridge and screen.
- Clean the engine air filter.
- Check the valve clearance and adjust if necessary.
- Check the engine mountings and tighten if necessary.
- Check the tightness of the pumping sensors, the safety sensors and the BETON MASTER operation sensors (diesel fuel level, hydraulic oil temperature, coolant temperature).
- Make sure there are no leaks from the engine.
- Check the tightness of the fittings in the hydraulic system.
- Check the tightness of the nuts and wheels.
- Adjust the brakes on versions equipped with vehicle towing gear.

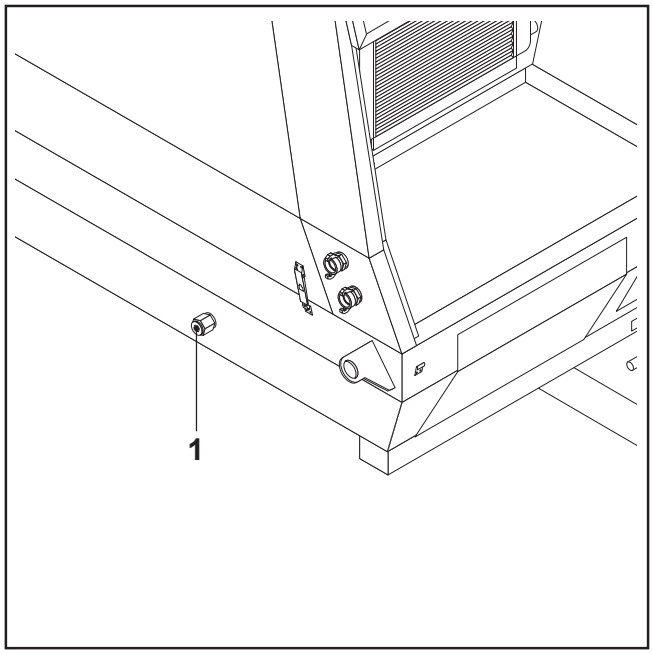


FIG.67

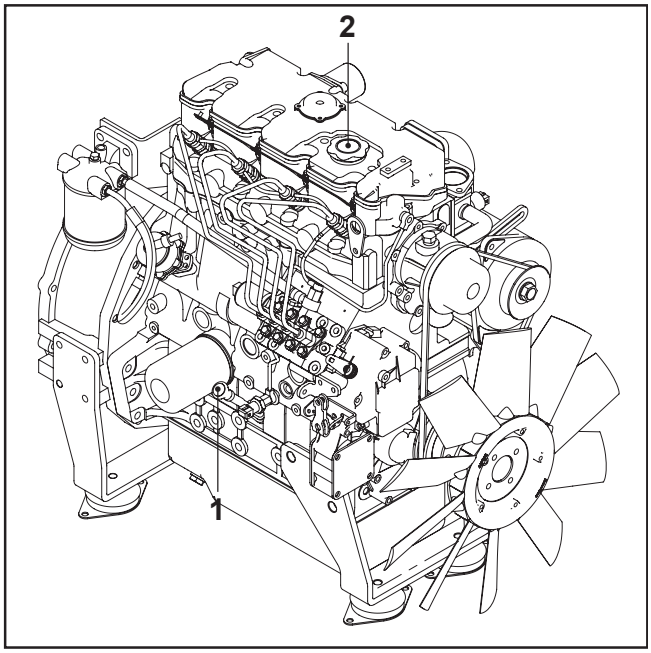


FIG.68

8.7.2 Maintenance to be performed every month or every 125 hours

- Change the motor oil
  - Use TOTAL RUBIA TIR 7400.
  - Remove the plug (FIG. 67-REF. 1) and drain the oil.
  - Put the oil drain plug back on.
  - Remove the refilling cap (FIG. 68-REF. 2), refill with oil and put back the cap.
  - Make sure the level shown on the dipstick (FIG. 68-REF. 1) is near the maximum mark.
- Clean the finned surface of the radiator with compressed air.
- Check the tension of the alternator belt.
- Check the battery: the tightness of the terminals, the level and density of the electrolyte (see engine instructions booklet).

Gas released by the battery is explosive. Avoid making sparks near the battery. Avoid contact of the electrolyte with skin or clothing.

8.7.3 Maintenance to be performed every 250 hours

- Check the wear on the delivery flange and replace if necessary.
- Replace the motor oil filter cartridge.
- Clean the diesel fuel prefilter.

- Replace the fuel filter.
- Replace the oil filter on the additive metering pump.
- Replace the engine air filter cartridges.
- Check the sleeves in the cooling circuit and replace any worn sleeves.
- Check the density of the coolant.

8.7.4 Maintenance to be performed every six months or every 500 hours

- Check the glow plugs.
- Replace the hydraulic oil filters inside the hydraulic oil tank.
- Clean and set the injectors.

8.7.5 Maintenance to be performed every year or every 1000 hours

- Change the oil in the hydraulic circuit.
- Check the clearance on the S-valve and adjust if necessary.
- Check the conditions of the hoses and fittings in the oil-hydraulic circuit.
- Check the conditions of the hoses and fittings in the diesel fuel circuit.
- Check the conditions of the hoses and fittings in the cooling circuit.
- Remove and clean the engine breather pipe.
- Check the functioning of the alternator, the starter motor, etc.
- Inspect the electric system.

8.7.6 Maintenance to be performed every 2500 hours

- Replace the engine breather pipe.

8.8 TOWING GEAR MAINTENANCE

- Service and clean every 10,000 km or every 12 months.
- Replace the shock absorber on the overrun brake:
  - if very weak
  - if air bubbles are present
  - if the rod slips off easily
  - in case of oil leaks
- Lubricate all the sliding surfaces and joints in the overrun brake (FIG. 88). Use DIN 51825 multipurpose grease.

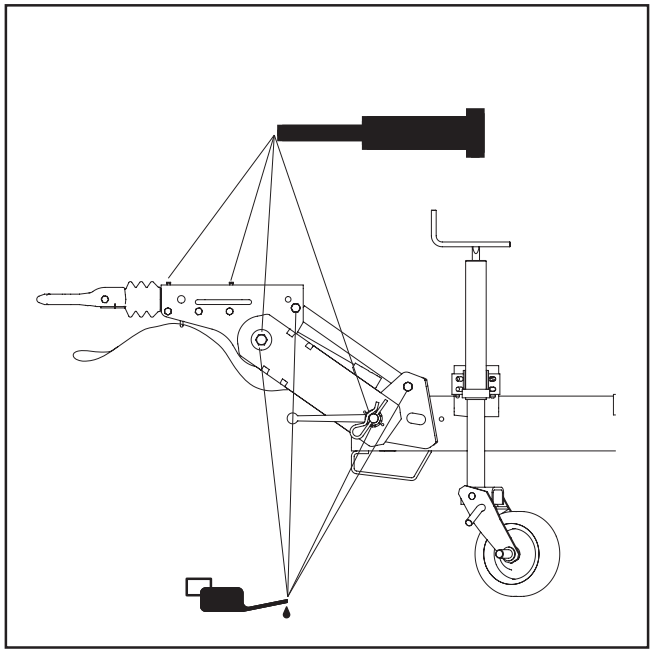


FIG.69

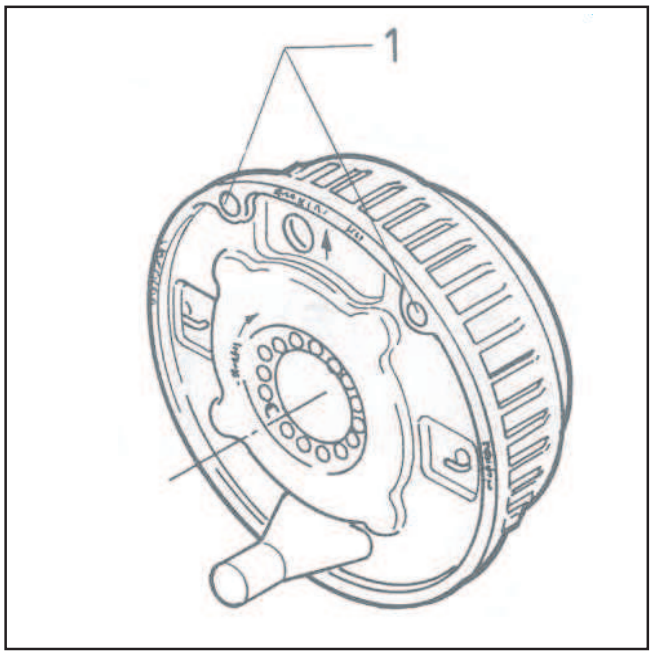


FIG.70

If the drawbar remains set at a certain height for a long period of time, a thin layer of rust may form between the toothed flanges. This make cause the flanges to stick to each other. To prevent this from happening, clean the flanges every six months and apply water-repellent grease (DIN 51502 KPF 2C multipurpose grease).

- Check the wear of the brake lining through the inspection hole (FIG. 70-REF. 1). Have the brakes adjusted if necessary.

All maintenance work should be carried out by trained personnel in authorized workshops or service centres.

9 - SCRAPPING

9.1 GENERAL INFORMATION

Follow the local regulations at the time of scrapping the machine.

Separate the machine parts according to the type of material (plastic, rubber, iron, etc.).

The oil, the coolant and the storage cell must be handed over to authorized firms specializing in the disposal of polluting products.

10 - TROUBLESHOOTING

10.1 PROBLEMS WITH THE ELECTRONIC BOARD

In case of failures in the electronic board inside the control panel, a pumping job may be completed by manual operation.
You can control the pistons' pumping and sucking operations using the small levers (m1-m2) on the side of the control panel.
Open the side doors on the casing from the control panel side so that you can monitor the alternating lighting up of the LEDs on the S-valve and the lubrication water tank.

- The LEDs on the two sensors next to the jacks controlling the S-valve show which of the two pistons is currently pumping.
- Two more sensors (and respective LEDs) on the water tank show when the relative pumping piston ends its suction phase and is ready to start the pumping phase.

When the LED (FIG. 71-REF. 1) is on, meaning that the piston is ready for pumping, move the lever (m1) to position 1.
When the LED (FIG. 71-REF. 3) turns on the pumping phase is completed.
Now move the lever (m1) to position 2 to switch the position of the S-valve. LEDs (FIG. 71-REF. 2) and LED (FIG. 71-REF. 4) will light up.
Move on to the lever (m2) and follow the same procedure: position 1 starts the pumping and position 2 switches the S-valve.
Proceed until the hopper is empty.

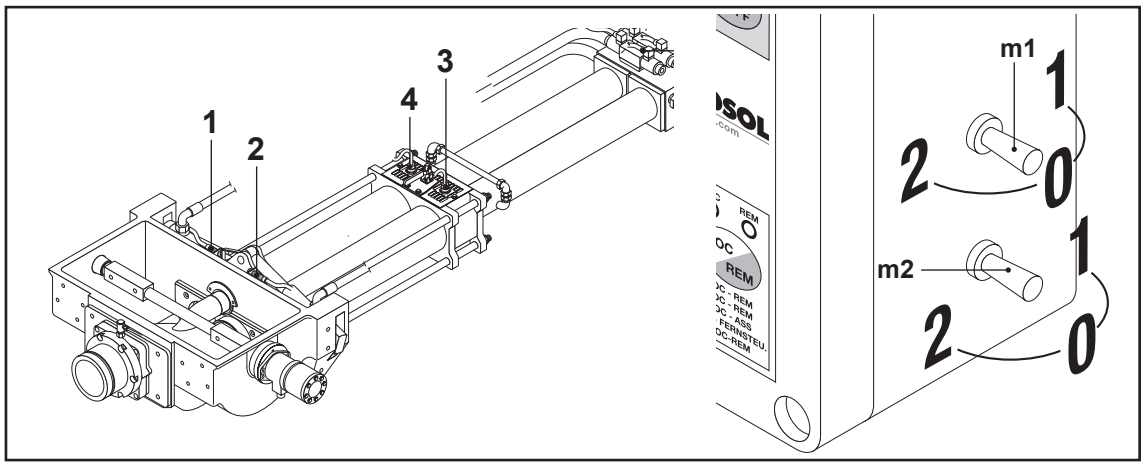


FIG.71

10.2 PUMPING SYNCHRONISM RESET

Perform the following operations if the pumping piston's synchronism is lost.
- stop pumping,
- ensure the hopper unload door and grid are closed;
- act on the m1 lever bringing it to position 2, holding it in position for a few seconds,
- carry out previous operation for the m2 lever also,
- re-start pumping.

Immediately inform Turbosol service of the problem.

10.3 OPERATOR'S INTERVENTION

PROBLEMS	CAUSES	SOLUTIONS
THE CONTROL BOARD DOES NOT SWITCH-ON	No electric power supply.	• Check the battery disconnector is active • Check the battery charge and main fuse state.
	Fault in control board	• Contact the authorised assistance.
THE STARTER MOTOR DOES NOT TURN	No electric power supply to starter motor.	• Check the battery charge, the main fuse and starter motor electric wiring state.
	Emergency button pressed and EMERGENCY led lights on.	• Release the emergency button.
THE MACHINE DOES NOT PRE-HEAT SPARK PLUGS UPON START-UP	Probable spark plugs pre-heat relay fault.	• The the spark plugs pre-heat relay operation and replace it if required.
THE STARTER MOTOR TURNS BUT THE DIESEL ENGINE DOES NOT START	No fuel.	• Fill the tank with fuel and try again.
	Fuel is not reaching the engine.	• Check diesel oil solenoid valve control relay operation. • Pump fuel using the manual pump. • Check the manual pump is not broken.
THE DIESEL ENGINE WORKS IN AN IRREGULAR MANNER AND TENDS TO SWITCH-OFF	Clogged diesel oil filters.	• Replace the diesel oil filters.
	Faulty manual pump.	• Replace the manual pump.
	Diesel oil tank in reserve.	• Add diesel oil.
	Clogged air filters.	• Clean or replace the air filters.
BATTERY CHARGER ALARM ON	Alternator is not charging the battery.	• Check the alternator's transmission belt and replace it if required. • Check alternator and diode bridge
WATER TEMPERATURE ALARM ON AND DIESEL ENGINE SWITCHES OFF	Insufficient cooling liquid level and/or dirty engine cooling radiator.	• Top-up the cooling liquid level and clean the radiator.
	Faulty water pump	• Replace water pump
PUMPING STOPS	Unsuitable mix and pumping pressure at limit	• Make mix suitable for pumping.
	Open hopper grid	• Check the grid is properly closed and the hopper is blocked.
	High hydraulic oil temperature.	• Top-up the hydraulic oil tank.
		• Check the hydraulic oil level and clean the hydraulic oil radiator. Wait for the oil to cool with diesel engine on.
	One of the pumping control solenoid valves is faulty.	• If the solenoid valve does not work in manual mode, the cause is the solenoid valve • Check the solenoid valve is powered (red LED on cap must switch-on)
	Faulty pumping sensors.	• If the machine does not work in manual mode, a sensor is faulty; the faulty sensor's LED does not normally switch-on.
THE MIXER DOES NOT TURN	Function not active on the control board.	• Activate function from control board.
	Open hopper grid.	• Close the hopper grid.
	Foreign body present blocking the mixer. Check pressure on the pumping manometer.	• Stop engine and remove the foreign body.
	Mixer control solenoid valve faulty. Check the relative LED switches on.	• Check the mixer's solenoid valve wiring and relative relay.
WORSENING OF MACHINE PERFORMANCES	Disc and/or wear plate worn.	Register the S valve.
	Worn pumping pistons.	• Replace the pumping pistons.
	Mix to be pumped excessively dense and cannot be pumped.	• Modify mix making it more liquid.

11 - RESPONSIBILITY OF THE OPERATOR

11.1 RESPONSIBILITY

The person in charge of the machinery is responsible for assuring that whoever operates such machinery is well aware of the instructions contained in this use and maintenance manual, and in particular that said operator has received special training in the proper execution of those operations marked in the manual
The warranty offered by the manufacturer becomes null and void if this machinery is not used in accordance with the instructions in this manual. In addition, this manual must always accompany the machine.
The machine's operator must be thoroughly taught and trained in regard to the operation and use of the machine itself and must sign this use and maintenance manual on the line reading "read and approved". If this procedure is not complied with, the operator is prohibited from using this machine.

Signature of the person in charge _____

Read and approved _____

Signature of the operator _____

Read and approved _____

11.2 WARRANTY

The machinery manufactured by Turbosol Produzione S.R.L. is guaranteed for a period of twelve (12) months or one thousand (1,000) hours of operation - whichever comes first - from the date said machinery is delivered to the end consumer, and in any event not more than eighteen (18) months from its shipment. The date upon which these products are delivered to the end consumer must be entered on the special warranty certificate which comes with all new machinery leaving the factory.
This warranty shall be valid only if the Manufacturer receives the attached warranty certificate card within thirty (30) days of delivery of the machinery in question. This card must be filled out completely and signed by the Purchaser.
This guarantee is to be understood as covering any defect In manufacturing or in the materials employed in said manufacture.
Component parts supplied by Turbosol Productions S.R.L. by third parties shall be covered by the guarantee said parties have provided Turbosol and which Turbosol in turn shall make available to the end consumer.
In the event that anomalies should appear during the period covered by the warranty, the right to intervene to correct said anomalies shall be limited to the Manufacturer itself or to parties specially authorised by the Manufacturer. The end consumer shall be responsible for having the defective machinery brought to the designated repair facility during regular working hours. Defective parts must be sent free port to the Manufacturer, which shall either repair said parts or replace them free of charge when and if, in the final judgement of the Manufacturer, said parts show defects in quality. The replacement parts shall remain the exclusive property at the Manufacturer.
The Purchaser shall be responsible for those expenses related to shipping the materials in question as well as for the costs of possible intervention on the part of the Manufacturer's personnel.
Repairs or replacements shall in no way extend the life of the overall warranty period. The warranty does not cover normal wear of parts or their deterioration through improper use, said parts to include: valve housings and spherical valves made of rubber, piston liners, rubber stators and pump screws, axle boxes, deflectors, stirring blades, wear protection for vessel, wear plates and cones, filters, etc
The Purchaser shall forfeit his rights under this warranty when and if he fails even on but one single occasion, to comply with the payment terms and/or if the breakdowns reported prove to have originated: from circumstances introduced by the Purchaser himself, by his employees or by third parties, when the damage is due to incorrect use, poor installation, or utilization that is improper or in conflict with the instructions given in the use and maintenance manuals provided with the machinery.
This warranty shall no longer be valid if the injection systems are damaged by unsuitable or polluted fuel, if the electrical systems break down due to an improper feed or because of such components as relays, condensers, remote control devices, etc., the latter of which are covered by warranties issued by the supplier.
The warranty shall likewise no longer be valid following questionable tampering and/or the use of non-original spare parts or rubber hosing different from that furnished by the Manufacturer.
The Manufacturer shall rightfully decline all responsibility arising from an impossibility to utilise the product or from damages due to interruption in work, or loss of direct or indirect profits, or for damages likewise caused by removal of the cowling or protective carters; on moving parts and safety devices.
Imperfections and defects must be reported in writing to the Manufacturer as indicated by law.
In the case of disputes arising from interpretation of the clauses above, the original Italian text shall apply.