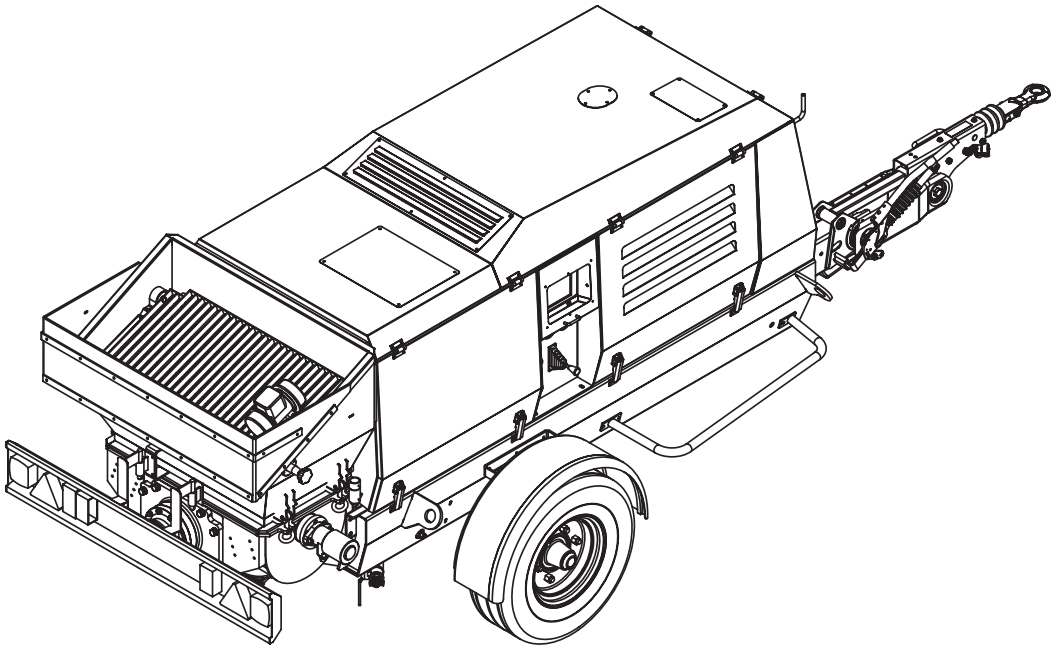
ORIGINALI

USE AND MAINTENANCE MANUAL EN IT

BM 30

IS13/02 - 561291



Serial number

						/		

READ THIS MANUAL CAREFULLY BEFORE USING THE MACHINE.
THIS MANUAL IS AN INTEGRAL PART OF THE MACHINE AND MUST BE KEPT FOR FUTURE REFERENCE UNTIL THE MACHINE IS DISPOSED OF

TURBOSOL
TECNOLOGIA DI POMPAGGIO PER L'EDILIZIA

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1.1 CE DECLARATION OF CONFORMITY

Dichiarazione CE di conformità - *EC declaration of Conformity* - EG – Konformitätserklärung -
Déclaration CE de conformità - Declaración de Conformidad CE - *Declaração CE de conformidade*

Il fabbricante - *The manufacturer* - Le fabricant - *Der Hersteller* - El fabricante - *O fabricante*

TURBOSOL
PRODUZIONE S.p.A.
Via A. Volta, 1
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TREVISO – ITALIA

dichiara che la seguente macchina:
declares that the machinery:
déclare que la machine:
erklärt, dass die maschine:
declara que la máquina:
declara que a máquina:

Pompa per calcestruzzo
Concrete pump
Pompe à béton
Betonpumpe
Bomba para hormigón
Bomba para betão

Modello - *Model* - Modèle - *Modell* - Modelo - *Modelo* **MODELLO**

Versione - *Version* - Version - *Version* - Versión - *Versão* **VERSIONE**

Matricola numero - *Serial number* - Numéro de matricule – *Seriennummer* - Número de matrícula - *Número de matrícula* **XXX.XXX**

Anno di fabbricazione - *Year of manufacture* – Année de fabrication – *Herstellungsjahr* – Año de fabricación – *Ano de fabrico* **ANNO**

è conforme alle disposizioni della direttiva 98/37/CE e alle disposizioni nazionali di attuazione;
è anche conforme alle disposizioni delle seguenti direttive europee: 2000/14/CE, 2004/108/CE;
è conforme alle disposizioni delle seguenti norme armonizzate: EN 12100-1/2:2005, EN 294:1993, EN 60204:2006.

fulfils all the relevant provisions of the Directive 98/37/EC;
also fulfils all the relevant provisions of the following European Directives: 2000/14/EC, 2004/108/EC;
fulfils the provisions of the following harmonised standards: EN 12100-1/2:2005, EN 294:1993, EN 60204:2006.

est conforme aux dispositions de la directive 98/37/CE;
est également conforme aux dispositions des directives européennes suivantes: 2000/14/CE, 2004/108/CE;
est conforme aux dispositions des normes harmonisées suivantes: EN 12100-1/2:2005, EN 294:1993, EN 60204:2006.

den Bestimmungen der Richtlinie 98/37/EG;
ebenso den Bestimmungen der folgenden europäischen Richtlinien entspricht: 2000/14/EG, 2006/95/EG, 2004/108/EG;
den Bestimmungen der folgenden harmonisierten Normen entspricht: EN 12100-1/2:2005, EN 294:1993, EN 60204:2006.

es conforme a las disposiciones de la directiva 98/37/CE ;
también es conforme a las disposiciones de las siguientes directivas europeas: 2000/14/CE, 2004/108/CE;
es conforme a las disposiciones de las siguiente normativas armonizadas: EN 12100-1/2:2005, EN 294:1993, EN 60204:2006.

é conforme às disposições da directiva 98/37/CE;
também é conforme às disposições das seguintes directivas europeias: 2000/14/CE, 2004/108/CE;
é conforme às disposições das seguintes normas harmonizadas: EN 12100-1/2:2005, EN 294:1993, EN 60204:2006.

The original CE Declaration of conformity is provided separately from the manual.

2.1 IMPORTANCE OF THE MANUAL

This "Use and maintenance instructions" technical manual is drawn up as indicated in the European Directives, in order to guarantee an easy and correct understanding of the subject therein by the operators authorised to use and service the machine in question. In the event the operators do not understand this manual, despite the manufacturer's efforts during its drawing up, please immediately request clarifications and further information from the manufacturer, to avoid personal interpretations that might jeopardise safety. The authorised operators must read and undersanding this "Use and maintenance instructions" technical manual and strictly comply with the standards therein before using the machine in question, in order to guarantee their and others safety, obtain the best machine performances and assure maximum efficiency and duration of its components. This manual must be available to the authorised operators at any moment and be well kept and preserved near the machine.

The machine's use and maintenance are the sole duty of the trained and enabled personnel.
The accident-prevention instructions and current rules (in own country/state) on safety at work must be respected. The manufacturer is not liable for any damages due to arbitrarily made changes and/or tampering with the machine. We recommend making a note of the machine's serial number that must always be provided whenever requesting assistance or spare parts, to facilitate the work of personnel in charge. This manual reflects the state of the art at time of marketing the machine and cannot be considered inadequate because subsequently updated due to newly acquired experience.
Any reprint or reproduction, even partial, of this manual must be authorised by us in writing.

THE MANUFACTURER DECLINES EVERY LIABILITY FOR INJURIES TO PERSONS, DAMAGES TO ANIMALS OR PROPERTY DUE TO THE NON-COMPLIANCE WITH THESE STANDARDS AND WARNINGS.

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 NOTES

Bold:
Highlights significant phrases in the text.

2.4 DESCRIPTION OF THE SYMBOLS

The following symbols will be used in the manual to highlight particularly important indications and warnings:

 ***ATTENTION: this symbol indicates the operator's accident-prevention standards.***

 ***PRECAUTION: this symbol indicates the possibility of damaging the machine and/or its components.***

 ***DANGER: this symbol indicates the presence of electric energy.***

 ***IMPORTANT NOTE: this symbol provides useful information.***

2.5 "MACHINE OFF" STATE

The motor must be switched off using the ON/OFF button before performing any maintenance and/or adjustment operation.

2.6 MAIN INFORMATION AND CONTACTS

The BM 30 concrete pump can be supplied with different accessories. Therefore, not all components described in this manual are necessarily assembled on your machine.

Turbosol Produzione S.p.A. customer service is at your complete disposal for any further information.

Turbosol Produzione S.p.A.
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e-mail: info@turbosol.it

THE TURBOSOL MACHINES
Are the result of years of experience and continuous development. The "know-how" in this way acquired constitutes an essential guarantee, together with the high level of attention to quality, for the manufacture of long-lasting, greatly reliable machines and handling costs reduction.

MAINTENANCE AND CARE
Maintenance and care are significantly important for the machine's operation to correspond to expectations. Therefore, in order to maintain the warranty valid, it is essential to respect the prescribed maintenance intervals and accurately perform the necessary maintenance.

SAFETY
Service personnel must also be informed on the safety standards The general standards on safety and accident-prevention foreseen by local legislation, must also be observed.

TRAINING
The operator must be specifically trained to correctly execute the operation.

TURBOSOL SERVICE

Contact the Turbosol dealer for any machine problem or need for spare parts.

3.1 MACHINE NAME

Manufacturer plate

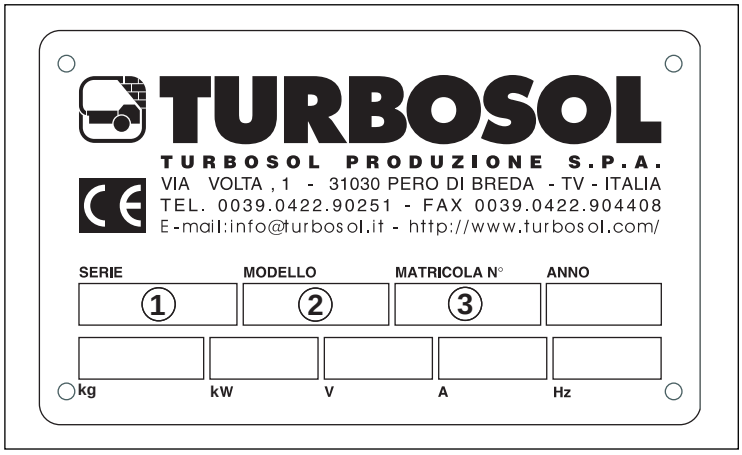


FIG.01

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.

Manufacturer plate position
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.02-REF.3) is punched and an approval identification data plate (FIG.02-REF.4) is present in the versions fitted with road approved tow.

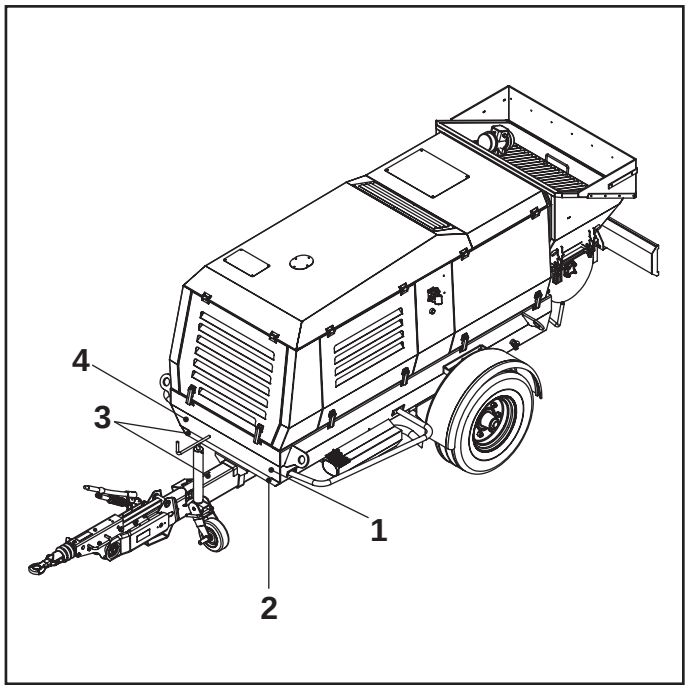


FIG.02

3.2 MACHINE DIMENSIONS

We give the machine's maximum dimensinos and gross weight (ready to operate).

BM 30 D/T

LENGTH	WIDTH	HEIGHT	WEIGHT*
4820 mm	**1610 mm**	**1660 mm**	**2100 kg**

TAB.03
*Weight with full diesel oil and hydraulic oil tank, without optional components.

3.3 TECHNICAL DATA

Fow rate*	m^3/h	30
Maximum pressure on concrete	bar	80
Maximum number of cycles per minute	-	26
Pumping cylinders (diameter x run)	mm	180 x 700
Installed power	kW	37.3
Electric control system power supply	V	12 AC
Main hydraulic circuit maximum pressure	bar	320
Auxiliary hydraulic circuit maximum pressure	bar	180
Maximum pumping granulometry**	mm	25÷30
Maximum serviced distance***	m	150÷200
Maximum serviced height***	m	100÷120
Delivery manifold	inches	5.5
Hopper capacity	litres	300
Diesel oil tank capacity	litres	40
Oil tank capacity (hydraulic system)	litres	75
Hydraulic oil (recommended)	TOTAL AZOLLA HZS 46	
Maximum height A.S.L. of installation place without sensitive power loss	m	1000
Admitted environmental temperature	°C	-
Sound power level Lw	dB	104
Equivalent continuous A Lp-weighted sound pressure level	dB	92

Endothermic engine: PERKINS 404D-22			
Power		kW	37.3
Engine rpm	minimum	rpm	1550
	maximum (vacuum)		2900
Engine oil (recommended)		TOTAL RUBIA TDI 15W40	

TAB.04
* Theoretical.
** Maximum granulometry 30 mm if aggregate obtained for crushing, maximum granulometry 35 mm if spheroidal aggregate.
*** Maximum values not simultaneously obtainable.

3.4 DESTINATION OF USE

The machine is designed and manufactured for the following use destination:
FIELD OF USE: building sector
INTENDED USE: pumping of concrete and spritzbeton.

3.5 PRODUCTS USED FOR PROCESSING

- Concrete with maximum granulometry of 30 mm if aggregate obtained for crushing, maximum granulometry of 35 mm if spheroidal aggregate.
- Spritzbeton (shotcrete).

3.6 NAME OF COMPONENTS

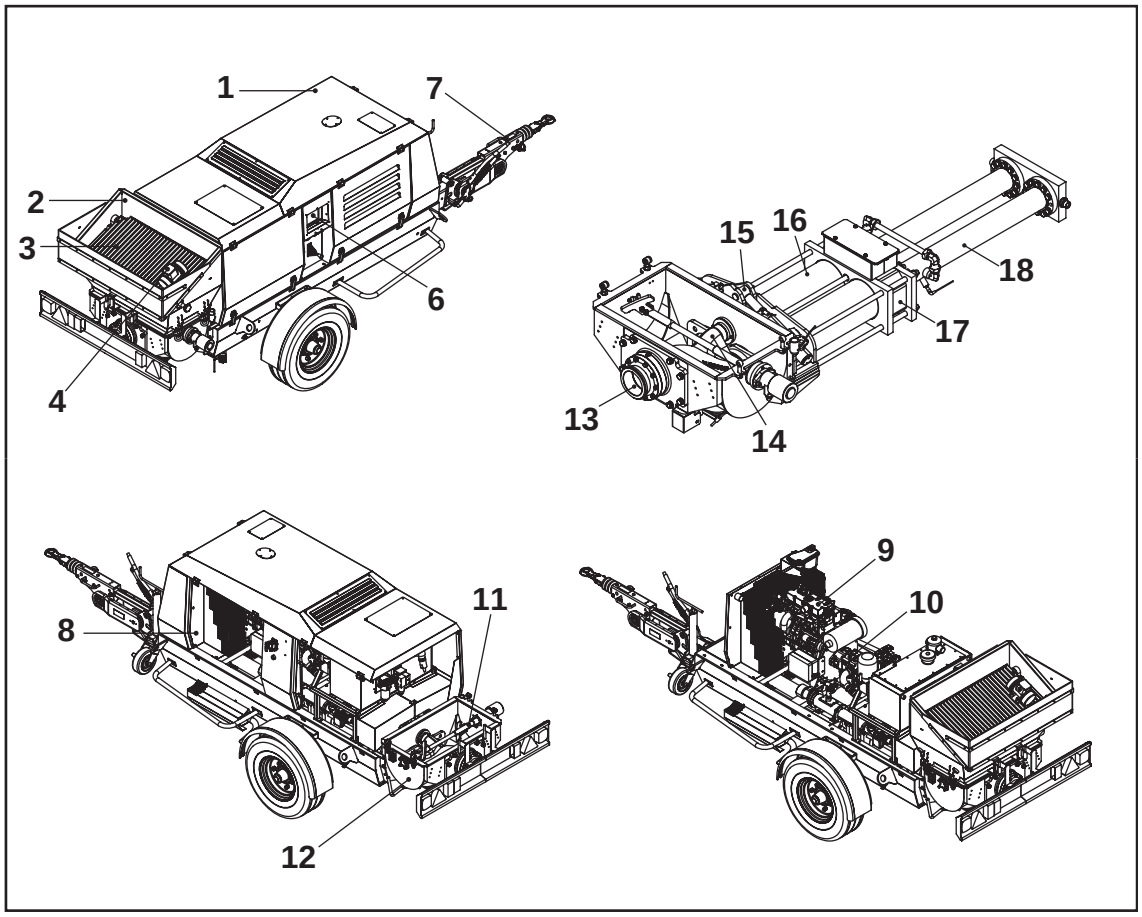


FIG.03
The road tow is shown in the figure.

KEY
FIG.03-REF.1 - Bodywork
FIG.03-REF.2 - Upper hopper
FIG.03-REF.3 - Grid
FIG.03-REF.4 - Vibrator
FIG.03-REF.6 - Control board
FIG.03-REF.7 - Tow
FIG.03-REF.8 - Exchanger
FIG.03-REF.9 - Engine
FIG.03-REF.10 - Hydraulic pump unit
FIG.03-REF.11 - Mixer
FIG.03-REF.12 - Lower hopper
FIG.03-REF.13 - Delivery flange
FIG.03-REF.14 - S Valve
FIG.03-REF.15 - S Valve exchange jack
FIG.03-REF.16 - Pumping barrel
FIG.03-REF.17 - Water tank
FIG.03-REF.18 - Hydraulic pumping cylinder

4.1 MACHINE TRANSPORT AS ROAD TRAILER

Only machines fitted with frame in road towing version can travel on public roads.

Respect the highway code when towing the machine.

The machine cannot be used for transporting any load, not even the accessories foreseen for machine operation (piping, fittings, gaskets, etc.).

Obligations before towing the machine
- Check the diesel engine is off.
- Remove all connected piping from machine (e.g.: concrete pipes, additive pipe).
- Close and block the mobile bodywork checking the hooks are properly closed.
- After having lowered the wheel lift the parking feet to support the machine weight (FIG.04).
- Correctly assemble and fix the lighting bar. Connect and check correct operation of the lighting bar cable.
- Introduce the pull cable in the appropriate cable guide eyelet (FIG.06 and FIG.07).
- Remove the wheels' parking wedges and place them in their housing.
- Release the wheels' parking brake.

Safety prescriptions
- Adjust the drawbar's height only using the handle (FIG.05-REF.03).
- Pull the trailer's parking brake during parking or stop.
- Fix the trailer with two wedges after having released it.

Repulsion brake adjustment
- Remove the split pin (FIG.05-REF.01).
- Loosen the handle (FIG.05-REF.02) and turn it until it stops.
- Adjust the coupling element upwards (50°) or downwards (10°) by means of the repulsion brake handle until it stops.
- Fasten and fix the handle hitting it with a mallet (hard rubber mallet). Insert the split pin.
- Fasten the handle again after about 50 km.

Parking
Pull the hand brake: forcely fasten the hand brake beyond the dead centre.

In start
Loosen the hand brake: place the hand brake lever back to initial position. The dead centre is easily detectable.

The side parts of the towing bar may loosen if not used for a prolonged period of time, due to sudden side or upward movements.

Pay attention and check the cable is sufficiently long for journeys with bends. An excessively extended cable may accidentally activate the brake. House the cable around the towing hook's stem if without appropriate drive eyelet, and hook the snap hook on the cable itself (FIG.07). The cable activates the parking brake (emergency brake) should the trailer accidentally detach from the drive. The cable must be correctly introduced inside the cable guide ring to guarantee excellent emergency brake operation.

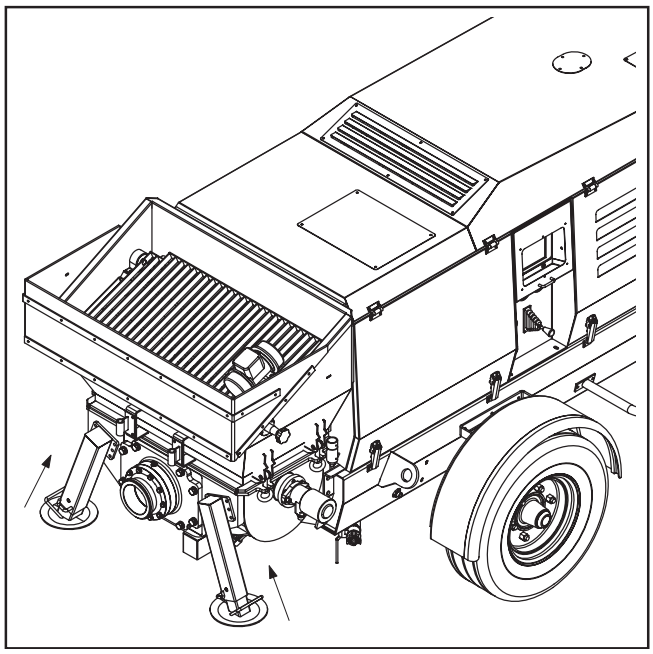


FIG.04

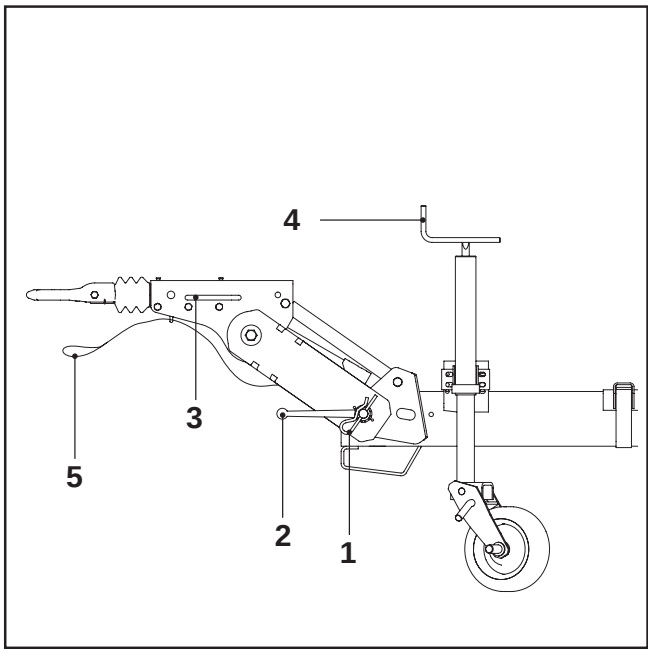


FIG.05

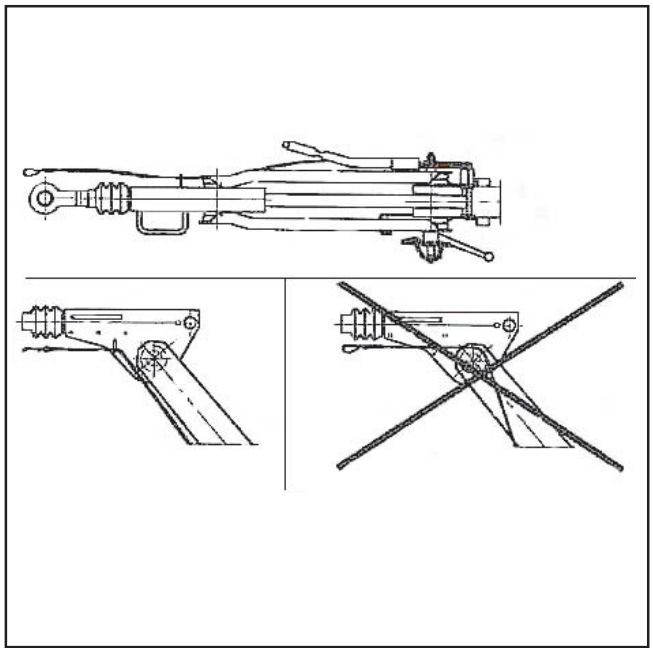


FIG.06

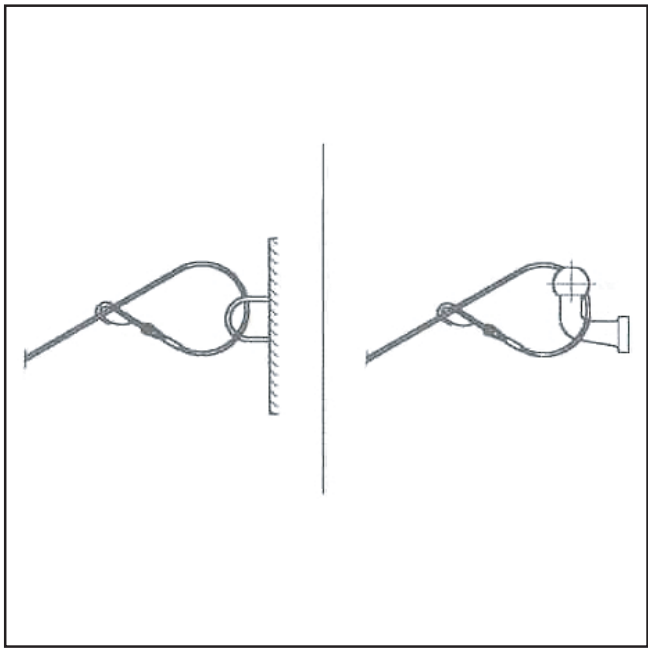


FIG.07

Releasing the machine from the towing vehicle
- Lower and block the wheel.
- Activate the parking brake.
- Release the machine from the towing vehicle.

Always block the machine using the parking brake and supplied wedges to avoid any movement when releasing the machine on a slope.

BM 30 can be transported on motor gearbox vehicles; the machine's load, arrangement and transport on a vehicle must respect the current highway code. If having to load BM 30 onto the vehicle using listing means, consult paragraph 4.2 LIFTING.

4.2 LIFTING

The machine has four lifting points and a lifting beam (FIG.08).
Hook the ropes to the lifting beam (FIG.08-REF.1) and to the four lifting points, ensuring to connect the shortest ropes to hooks (FIG.08-REF.2) and the longer ones to hooks (FIG.08-REF.3).

Use the lifting beam to lift BM 30 only.

Do not use the lifting beam to lift any other load.

Check the lifting beam's integrity before using it, and replace it if required.

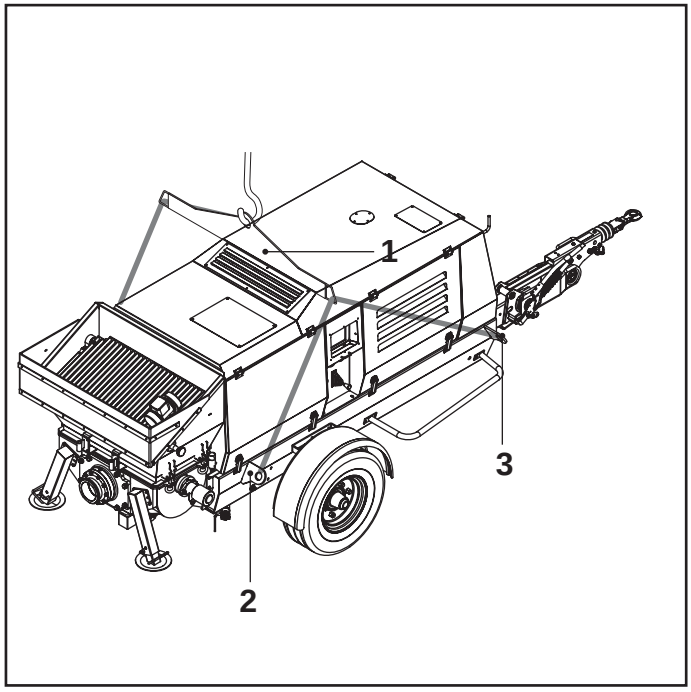


FIG.08

Lifting must happen fully respecting all lifting standards in force, equally the used means must be conform with current standards and perfectly preserved. Personnel in charge of the lifting mean must be adequately trained and enabled for its use.

Use approved hooks and ropes for lifting 2,000 kg.

Ensure no one is too close to the machine before lifting it.

Do not stand underneath the suspended load.

Avoid damaging the components by not lifting or lowering the machine with sudden movements.

Do not alter the connection point for the lifting hook.

Move the machine on flat surfaces only, avoid any slope to prevent danger of running over or crushing between machine and fixed obstacles.

5.1 PLACEMENT

Place the machine horizontally; the maximum admitted longitudinal and transversal slope is 5° (FIG.09).

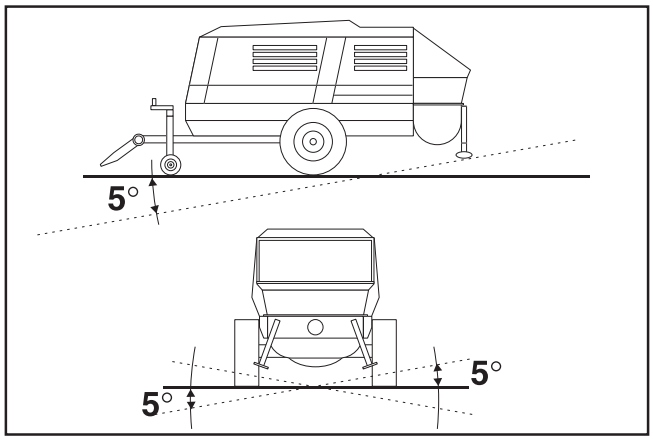


FIG.09

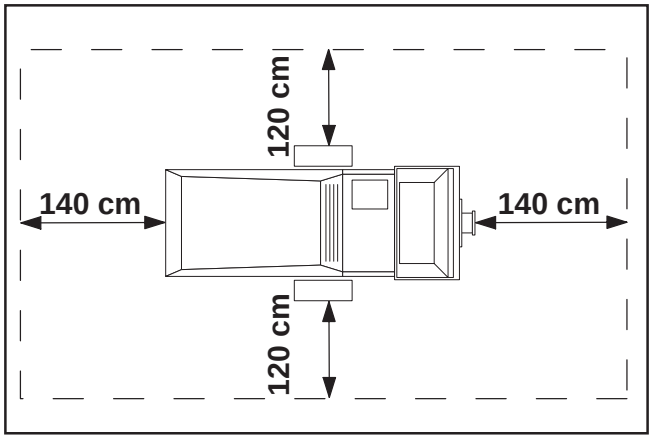


FIG.10

- Place the machine in the most suitable point on site for best use of the piping's action range.
- Brake the machine and block the wheels using appropriate parking wedges.
- Ensure the machine rests on the side stabilising feet.

Clear passages (FIG.10) from any encumbrance and a floor surface without holes or dangerous projections must be present around the machine.

Do not use the wheel as support during work: the machine must rest on the side stabilising feet and the wheels, and this position must be stable.

5.2 PIPING

Lay piping limiting their length as much as possible (transport and wear times are reduced), checking it is in good condition.

Use flexible rubber hoses only in the last piping section and with length of not more than 4 m; the use of rubber hoses in other position along the piping, jeopardises pumping (water separation from concrete) and increases risk of clogging.

Use only TURBOSOL PRODUZIONE S.p.A. original piping and fittings or those from companies expressly authorised by them. TURBOSOL PRODUZIONE S.p.A. will not, in any event, answer for any injuries to people or damages to property

determined by the use of non-original piping or fittings.

Ensure the internal surface of the used flexible hose end is not torn or deteriorated, before pumping. Deforming of the internal surface may cause dangerous cloggings.

5.2.1 Piping line layout

BM 30 can pump horizontally, upwards and downwards. Below are some general rules for the different types of layouts.

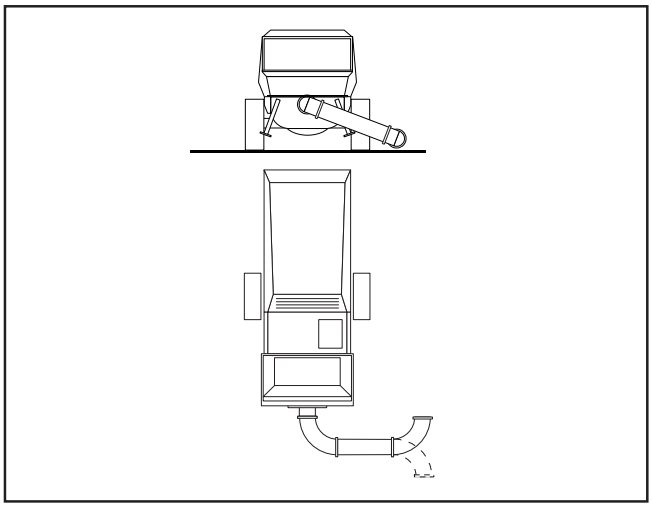


FIG.11

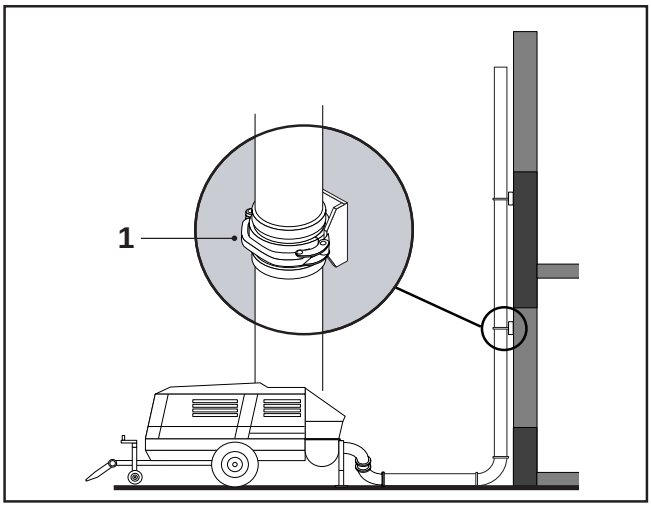


FIG.12

- Horizontal pumping

Lay piping as wanted and connect it to the first section shown in FIG.11 to pump material horizontally.

- Vertical pumping

The vertical piping section must be fixed and supported using the appropriate collars (FIG.12-REF.1).

- Downward pumping

The downward piping section must be fixed and supported using the appropriate collars (FIG.13-REF.1).
Arrangements must be made to stop the concrete fall in the downward section (e.g. assemble a bend or S-bend - as in FIG.13 or make tilted sections). For this type of layout, we recommend lubricating pipes with grout as follows:
- introduce two wash sponges in the piping's initial section (FIG.14).
- Pump the grout. The entire internal surface of the downward section will, in this way, be lubricated. Introduce more sponges and more grout if the downward section is particularly long.

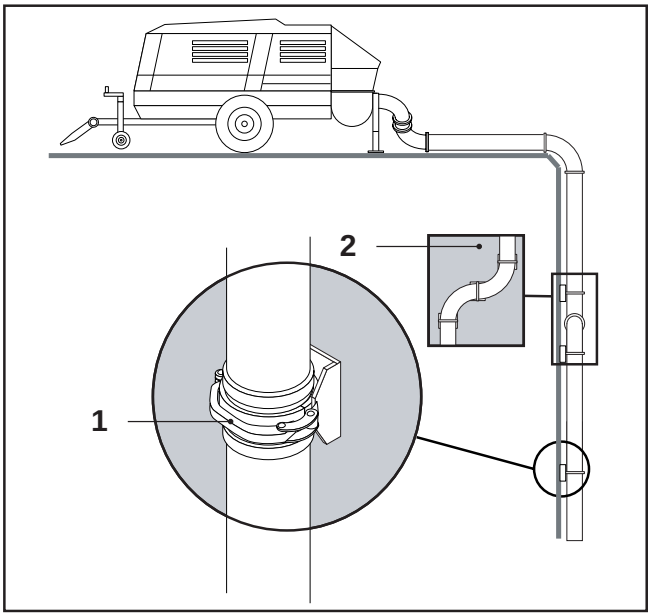


FIG.13

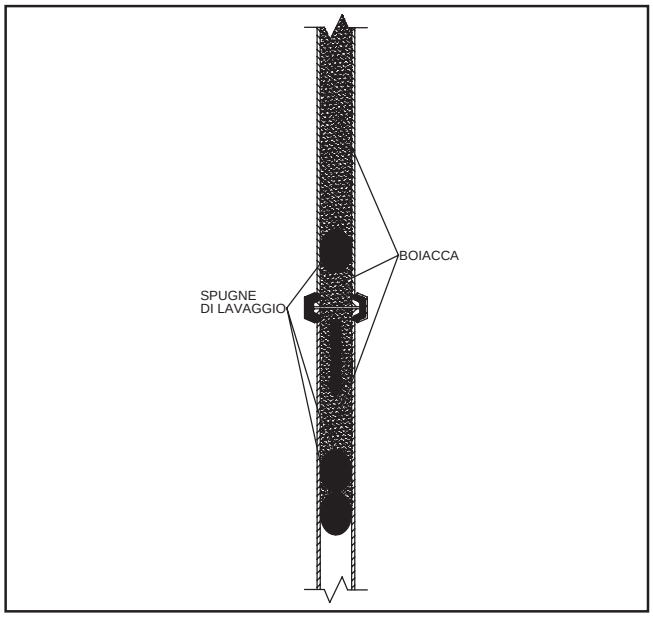


FIG.14

5.3 CONCRETE PIPING FITTINGS

Check fittings are always effective and clean.

Check the rubber gasket (FIG.15-REF.1) is present and fully fasten the levers (FIG.15-REF.2) when connecting the piping segments.

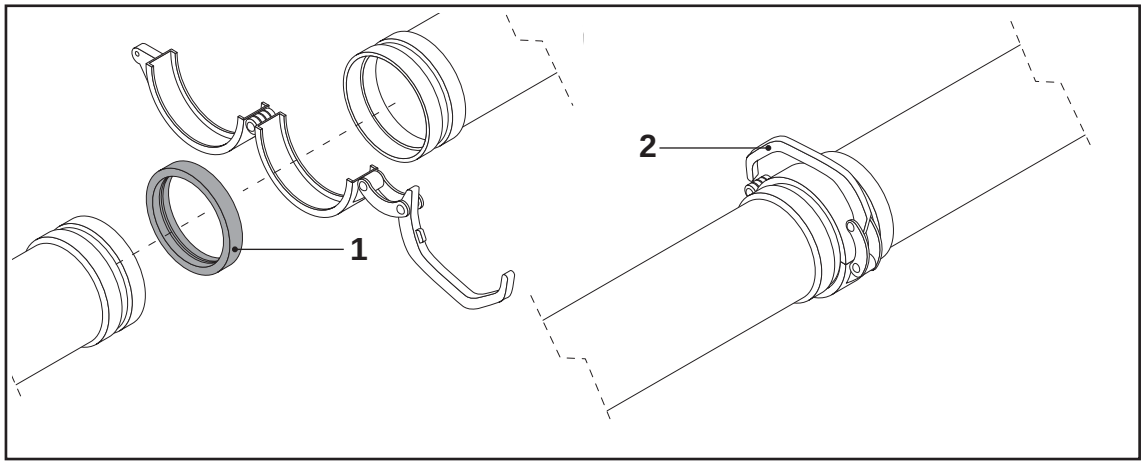


FIG.15

5.4 CONNECTIONS

- Connect the electric vibrator's plug (FIG.16-REF.1) to th emachine socket (FIG.16-REF.2) located on the hydraulic tank. Close the door after connection.

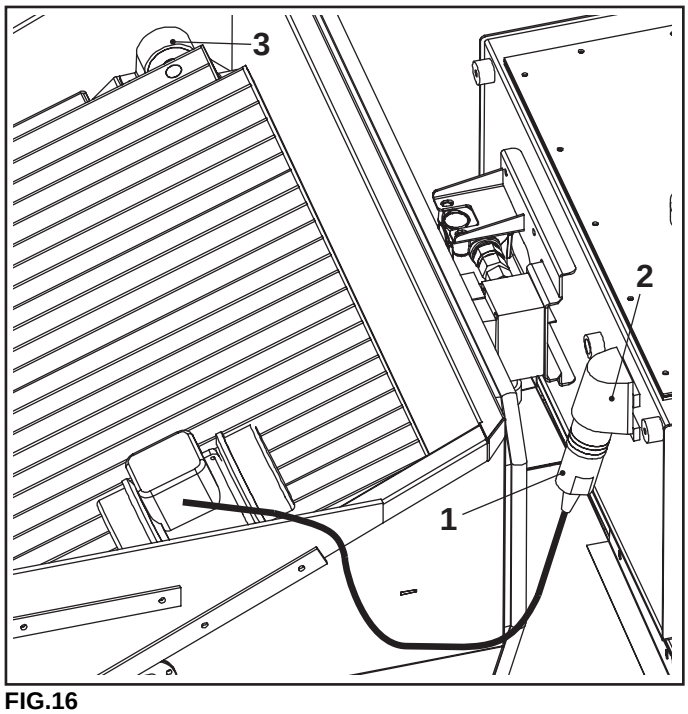


FIG.16

5.4.1 Remote control

The machine is given a remote control via cable;
- Insert the plug (FIG.17-REF.1) in the connector's socket (FIG.17-REF.2) located on the machine's bodywork.
- Activate the mortar pump by placing the selector switch (FIG.17-REF.3) at 1, at 0 to stop pumping and at 2 to reverse rotation direction.

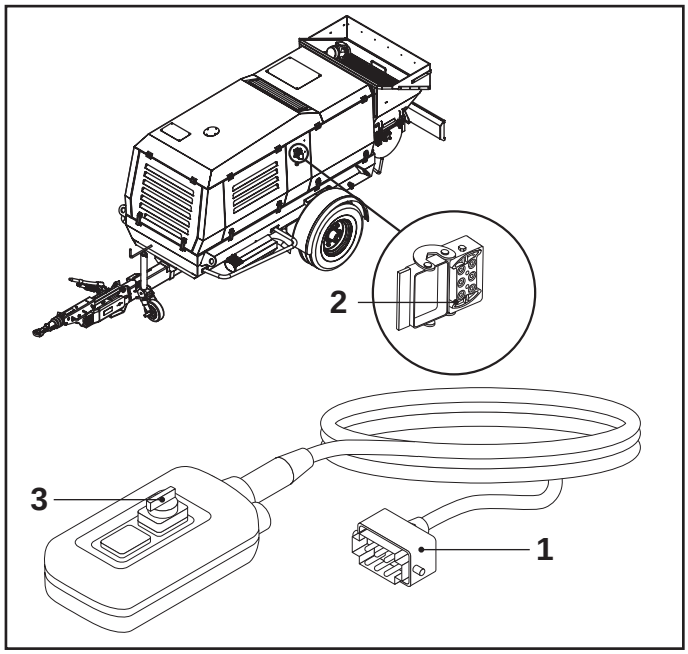


FIG.17

5.4.2 Radio control (optional)

- Connect the plug (FIG.18-REF.1) to the connector's socket (FIG.18-REF.2).
- Use the button (FIG.18-REF.3) to switch the transmitter on and off.
- Start pumping by pressing the button (FIG.18-REF.4); press again to stop pumping.
- Reverse pumping (mix intake from hopper piping) with button (FIG.18-REF.4) at ON, press the button (FIG.18-REF.5) for as long as required.

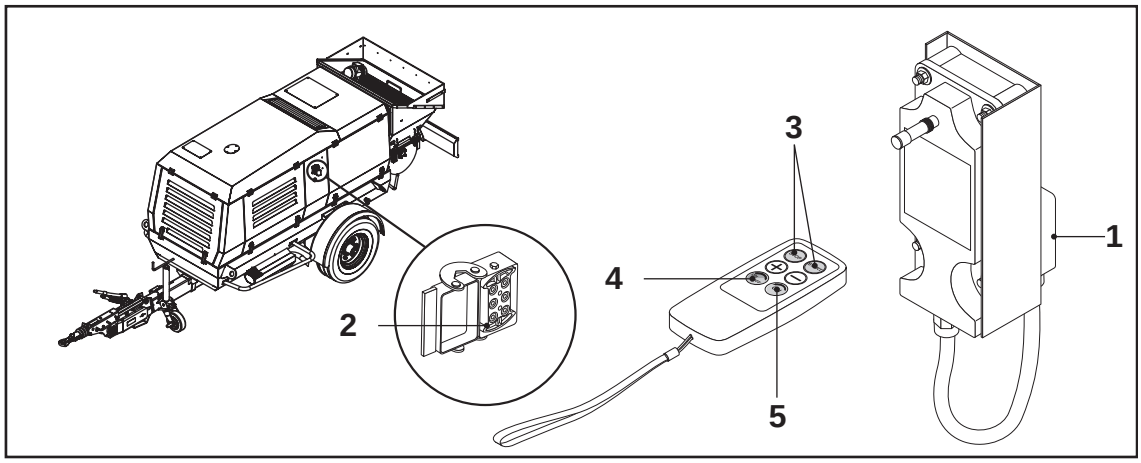


FIG.18

6.1 MAIN RULES

The machine was designed and built to satisfy the essential safety requirements under the CE certificate standards.
The manufacturer has taken all necessary measures to eliminate most of the dangers related to the machine's use conditions, both foreseen and reasonably predictable.
The manufacturer recommend carefully following this Manual's instructions, procedures and recommendations to safely use the machine, and also recommends complying with the current safety at work legislation.


Only qualified and purposely trained personnel can use the machine.


Only use the machine in perfect conditions, conform with its destination. Observe the safety and prevention standards. Comply with this use and maintenance manual dispositions.


The operator must request, know and apply all safety prescriptions applicable to the work environment.


The operator must follow this Use and maintenance manual instructions.


The manual must always be carefully kept on the machine. Immediately request a copy from TURBOSOL PRODUZIONE SPA or your dealer, if no longer legible.


The operator must be in perfect physical and psychological conditions to perform his work. The operator must not be occasional, but have gained experience with the machine.


It is forbidden to use the machine to convey loads.


It is forbidden to use the machine for lifting loads and/or persons.

6.1.1 Correct use

The machine is designed for transporting concrete. Machine use is limited to the work place where pumping occurs. Maximum pressure must not exceed the technical data limit in this manual. Correct use also means respecting this manual's instructions.

6.1.2 Incorrect use

Incorrect use means all that is not intended as correct use. TURBOSOL declines every responsibility for damages caused by incorrectly using the machine and considers the machine's warranty void.

6.1.3 Emergency stop

The emergency button is the red mushroom-shaped button located on the control column (FIG.19-REF.1).

The emergency system must be used to protect the operator's safety and that of persons near the danger area or the machine itself, when the normal stop procedure requires an excessively long time.

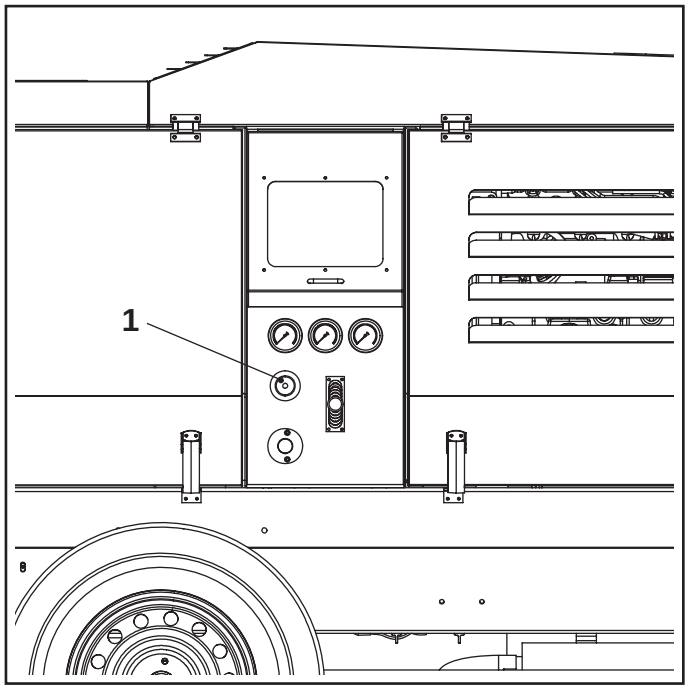


FIG.19

6.1.4 Emergency button re-arm

Remove the causes that have entailed using the device, before re-activating the machine from the emergency condition.

The emergency conditions remains such until re-arm, to avoid accidental re-start.
Proceed as follows to re-arm:

- Turn the red "button" in the direction of the engraved arrows.
- The button re-arms and the machine is ready for start procedure.

6.2 SAFETY DEVICES

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

SAFETY CONTROL UNIT
It manages the signals from the safety sensors located on the grid, on the hopper blocking pumping and mixing. It comply standard UNI EN ISO 13849. The safety intervention is signalled on the board's display.

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.

GRID STOP
Blocks the grid in position and avoids it opening when the hopper is overturned.

SENSOR FOR UPPER HOPPER
Interrupts pumping upon overturning of the upper hopper.

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.

IN MANUAL OPERATION MODE THE SAFETY DEVICES ARE NEUTRALISED: ONLY ONE OPERATOR MUST WORK ON THE MACHINE WHEN IN THIS CONDITION. HE MUST TAKE ALL NECESSARY ACTIONS TO ENSURE ALL PERSONS ARE OUTSIDE THE MACHINE'S WORK AREA (SEE FIG.10).

IT IS STRICTLY FORBIDDEN TO TAMPER WITH, EXCLUDE AND/OR REMOVE ANY SAFETY DEVICE FROM THE MACHINE.

IT IS STRICTLY FORBIDDEN TO REPLACE ANY SAFETY DEVICE OR ONE OF ITS COMPONENTS WITH NON-ORIGINAL SPARE PARTS.

IT IS COMPULSORY TO CONSTANTLY CHECK ALL SAFETY DEVICES INSTALLED ON THE MACHINE OPERATE PROPERLY.

IT IS COMPULSORY TO IMMEDIATELY REPLACE ANY MALFUNCTIONING AND/OR DAMAGED SAFETY DEVICES.

6.3 SAFETY SIGNALS

The safety signals consist in adhesive labels applied outside and inside the machine. The meaning is given below.

FIG.20

PROHIBITION SIGNS

561205

It is forbidden to remove moving parts' fixed protections

561208

It is forbidden to operate to unauthorised persons

COMPULSORY SIGNS

561161

Read the instructions manual before starting work

561170

Lift the machine using the indicated hooks

DANGER SIGNS

561202

Danger of electrocution

561092

Moving parts

561092

Hot surfaces

561256

Danger of explosion

It is compulsory to always keep the safety signals clean to guarantee good visibility.

It is compulsory to replace the deteriorated safety signals, via request to the manufacturer (by ordering code under the safety signal).

It is strictly forbidden to remove or damage the safety signals applied on the machine.

The operator is responsible for respecting this manual's and the work place safety prescriptions and have them respected by the persons near the machine. The operator must, if required, train personnel coming into contact with the machine during work.

6.4 PERSONAL PROTECTIVE EQUIPMENT

The use of personal protective equipment is compulsory in respecting the health and safety standards at work, in force in the country of use of the machine.
The employers, managers and operators in charge must know and apply said standards.

IT IS COMPULSORY TO USE THE PERSONAL PROTECTIVE EQUIPMENT INDICATED BY THE MANUFACTURER (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

6.5 RESIDUE RISKS

The machine was built according to the current state-of-the-art and following the Directives and Standards prescriptions reported in the declaration of conformity. Nevertheless, machine faults, therefore, dangers for the operator or third party, may occur during use.

- Injuries to eyes due to the projecting of concrete

- Injuries to eyes due to the projecting of oil (leaks or opening of pressurised fittings)

- Burns caused by the projecting of oil (leaks or opening of pressurised fittings)

- Machine destabilisation due to ground changes (e.g. rain or ice)

- Contact with powered electrical parts or electric discharge

- Injuries caused by moving parts

- Contact with toxic substances

7.1 OPERATION PRINCIPLE

The machine's main unit is the pumping unit. It consists of a lower hopper (FIG.21-REF.1) housing the S valve (FIG.21-REF.2) and the mixer (FIG.21-REF.3). Two hydraulic jacks (FIG.21-REF.4) are found behind the hopper, that move the S valve; two cylinders accept the concrete sucked by the hopper. A rubber piston that sucks/pumps the concrete is present in each cylinder; the pistons are moved by hydraulic cylinders. A bowl (FIG.21-REF.8) containing water to cool and lubricate the pistons during their run, is found between the concrete cylinders and the hydraulic cylinders.
Fresh concrete is poured inside the hopper; the internal grid preventing oversized aggregate from entering, is fitted with a vibrator to facilitate unload. The concrete is firstly sucked inside the cylinders and then pumped towards the piping. The alternating of sucking/pumping is produced by the S valve alternating communication between the cylinders and the piping.
The pumping system is hydraulically activated, with hydraulic pump at variable flow rate and valves unit distributing the oil. The exchange sequence of the pumping unit is controlled by means of four sensors on the machine's board.
The control board manages the main machine functions. Pumping start, stop and reversal can be directly controlled by the operator by means of remote control via cable (standard) or radio control (optional).

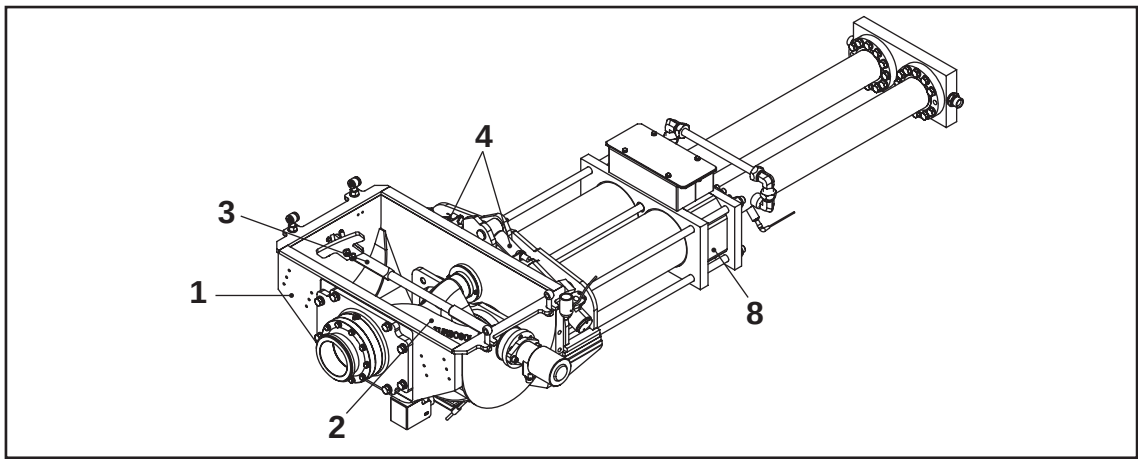


FIG.21

7.2 PUMPABLE MATERIALS

The machine works with different types of material:
- Concrete in general, normal or controlled shrinkage grout, mortar for micropiles, common mortar, sludge and bentonite.
- Grout spraying (spritzbeton/shotcrete) for tunnels, slopes, embankments, swimming pools, channels consolidation and coverings.

All pumpable concrete can be strengthened with flexible or stiff fibres and sprayed with setting accelerator.
The composition of concrete and spritzbeton (shotcrete) to be pumped come from supply agreements not machine dependant.
To avoid problems during pumping:
- the inert's maximum diamter must be between 1/3 and 1/4 of the pipe's diameter,
- the grading envelope of the mix must be suitable for pumping,
- the sand's fineness modulus must be between 2.4 and 3,
- a high slump value must be chosen to facilitate pumping, if the mix cannot be segregated.

7.3 CHECKS BEFORE SWITCH-ON

Check cooling liquid and oil levels only with machine off.

- Check liquid level inside the expanding bowl (FIG.22-REF.1), located above the heat exchanger. Loosen the bodywork's lid (FIG.22-REF.2) above the bowl to top-up.

FIG.22

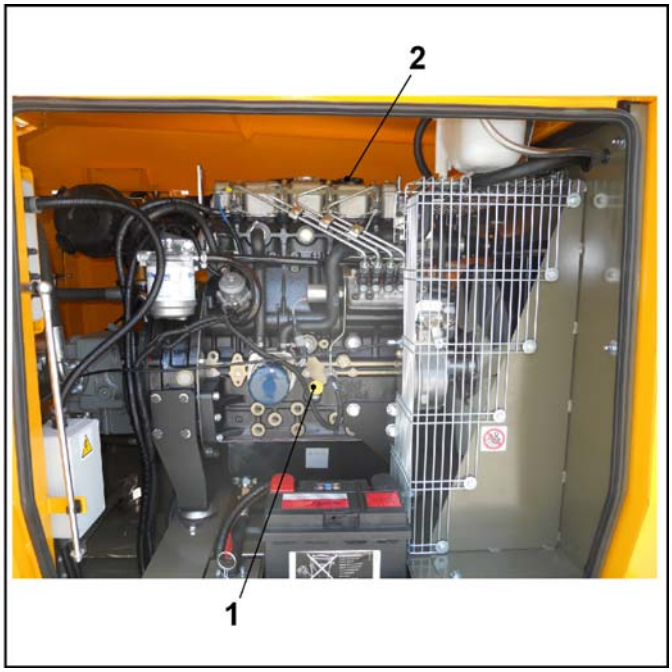


FIG.23

- Check the engine's oil level (FIG.23-REF.1); it must be almost at maximum. The engine oil filler cap (FIG.23-REF.2) is on the head; loosen the bodywork's lid above the engine to top-up.

- Check the hydraulic oil level through the sight glass (FIG.24-REF.1); indicatively, it must be in the centre of the sight glass (with machine off and cold). The filler cap (FIG.24-REF.2) is located above the tank. Loosen the bodywork's lid above the hydraulic oil tank to top-up.

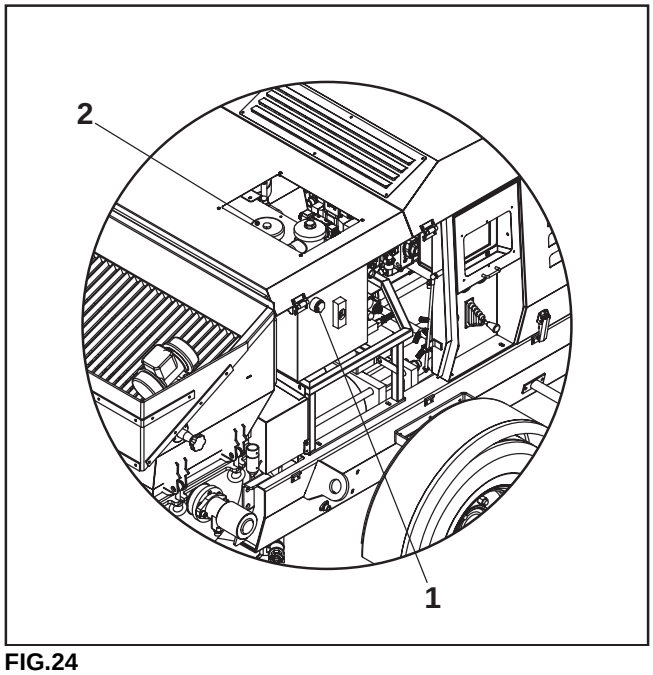


FIG.24

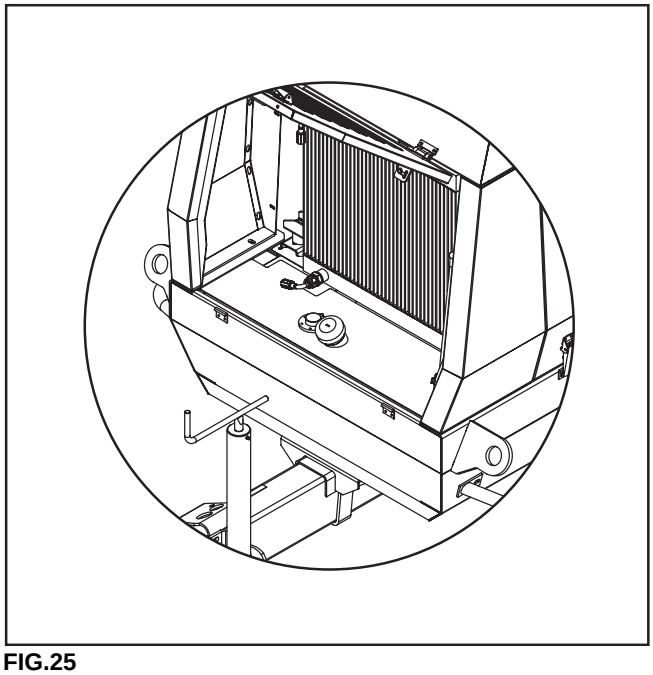


FIG.25

- Avoid condensation problems inside the tank with machine cold by topping-up the diesel oil tank (FIG.25) at end of work session.

- Through the level pipe highlighted in figure, check there is water inside the bowl (FIG.26-REF.1).

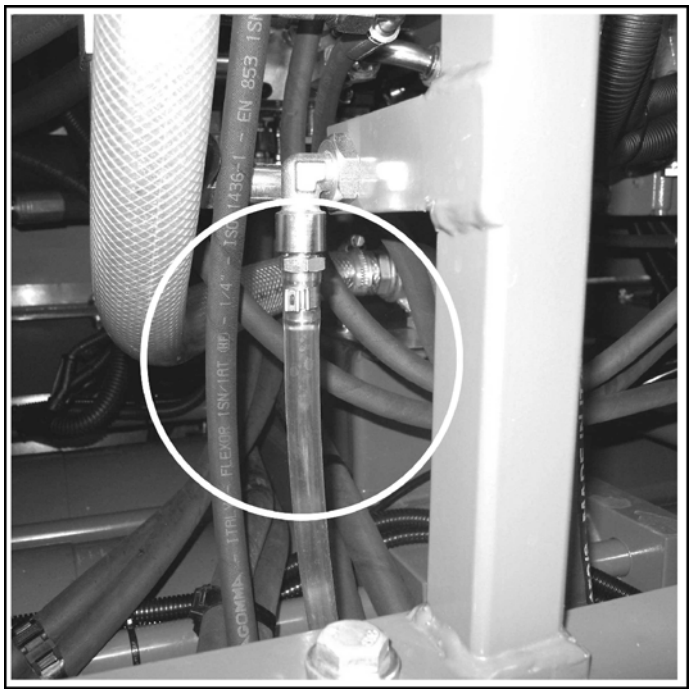


FIG.26

Anti-freeze can be used with cold weather. Respect the safety sheets of the chosen anti-freeze during use and the laws in force with regard to the disposal of such substances.

We recommend emptying the bowl each working day. Water in the bowl must be changed when showing fine sediments.

7.4 CONTROLS

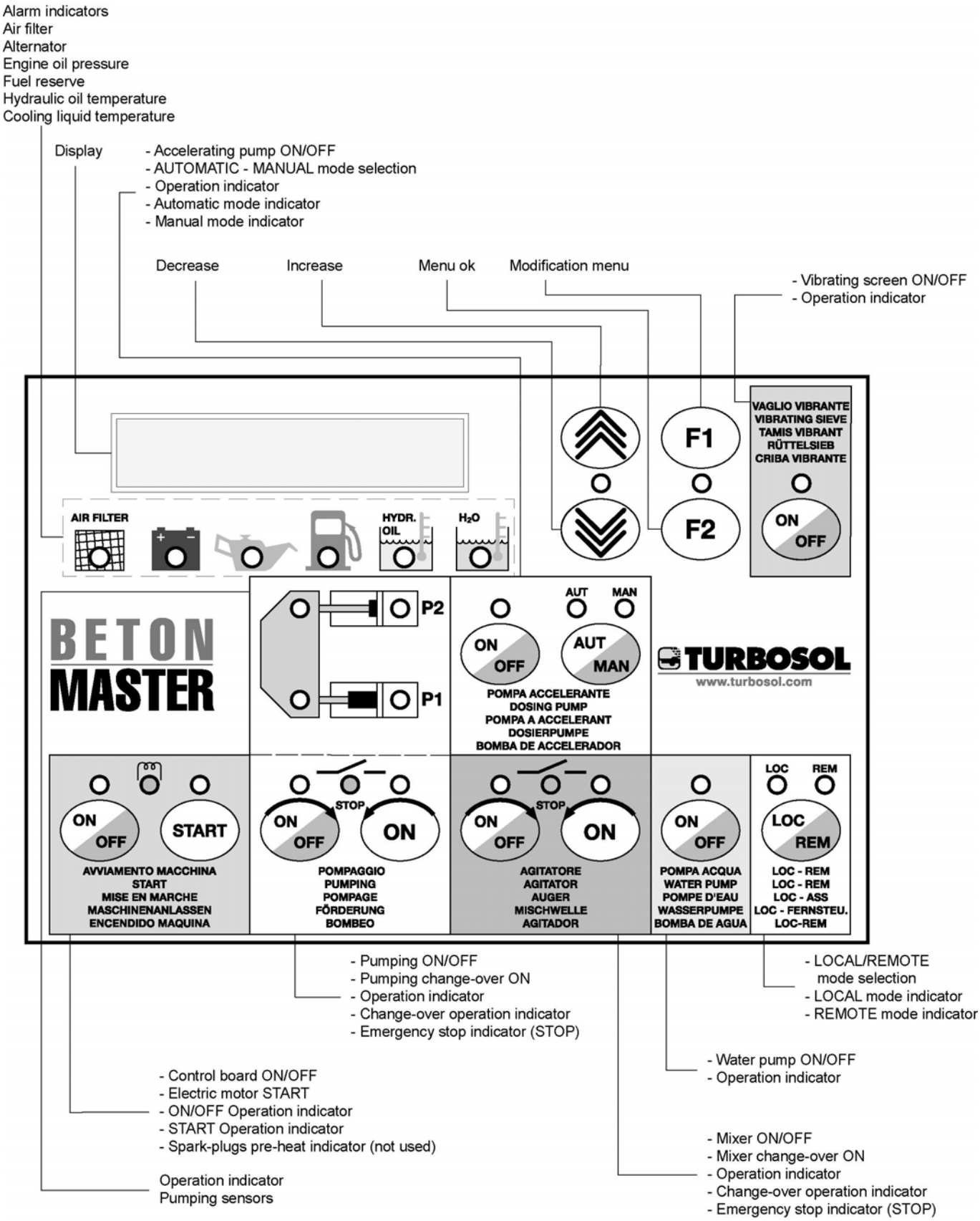


FIG.27

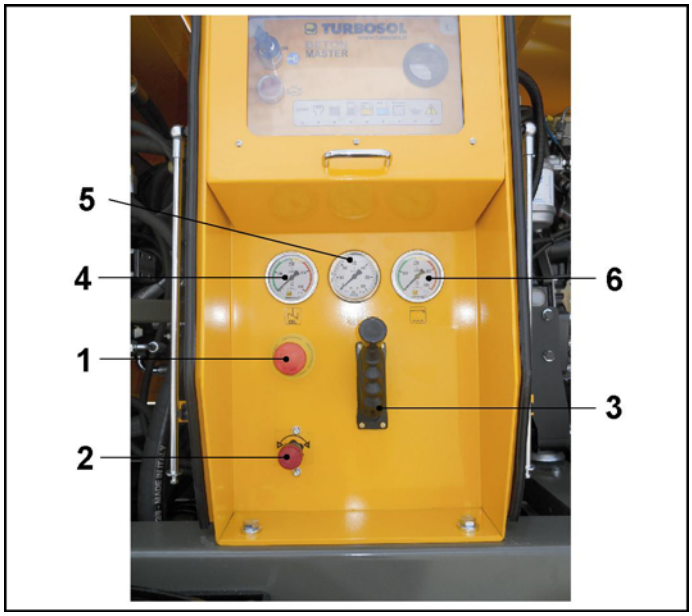


FIG.28

FIG.	REF.	DESCRIPTION
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.)

TAB.08

Display
The display shows, from time to time:
- the clock;
- the time used by the machine (hours-minutes-seconds),
- the battery voltage (charge check);
- the password setting;
- the alarm: engine off;
- maintenance intervention request.

The machine foresees the presence of sensors to avoid anomalous operation conditions that can damage it. Alarm indicators are associated to them:

- Open grid alarm (pumping stop, re-start pumping by pressing START);

- Air filter alarm

This alarm only appears on the console. Clean or replace filters.

- Battery charge alarm

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).

- Engine oil pressure alarm

This alarm automatically turns off the engine after a variable time between 1 and 100 seconds. Restore the oil level and search for leaks.

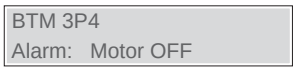
- Diesel oil level alarm

This alarm is signalled when the tank level drops below minimum.
The engine automatically turns off after 10 minutes.
The engine can be re-started with the risk of completely finishing the diesel oil, making it difficult to re-start it even after fuel top-up.

• Hydraulic oil temperature alarm
This alarm automatically switches pumping off.
The machine remains on to allow the oil to cool down.

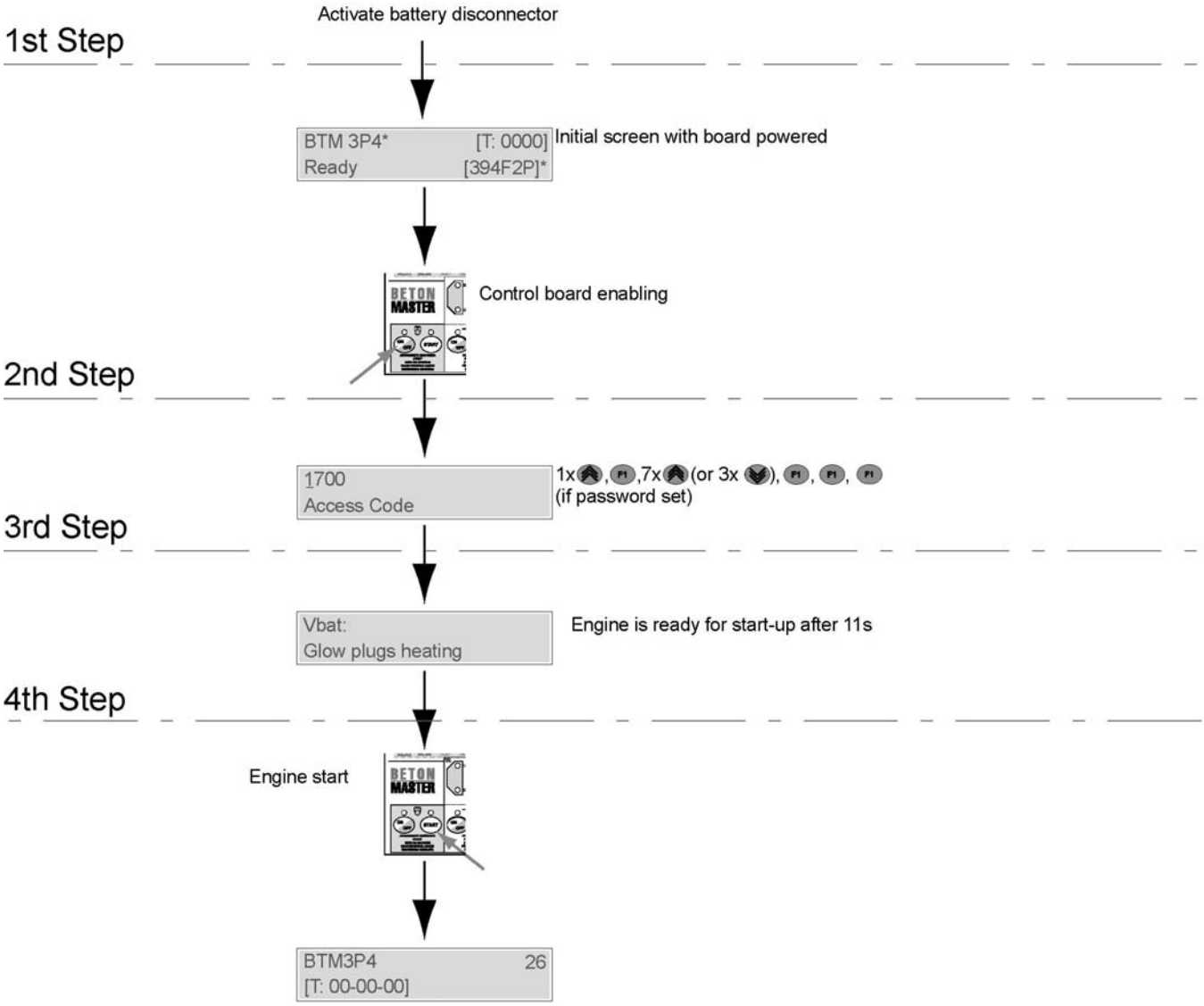
• Engine cooling liquid temperature alarm
This alarm automatically switches the engine off after a variable time between 1 and 100 seconds.

The alarm appears on display:



Operation indicator
A LED (above the relative key) is associated to each function: the LED is on when function is active.

7.5 MACHINE SWITCH-ON



*indicating the installed software and machine's serial number.

- 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.28-REF.1) is not engaged.
- Press the machine start ON/OFF key to start using it.

The pre-heat phase starts automatically once the password is entered. The LED on the console indicating spark plugs pre-heating switches on. Wait for this LED to switch off. Exit this phase and go back using the ON/OFF start key. This phase is set to last 11 seconds, regardless of the external environmental conditions. Start the engine once pre-heat is completed.

The flow rate ratio (corresponding to number of pumps per minute) is shown on the display's top-right part, when pumping is activated. This is important in the event of malfunctionings.
The partial operation time of the started work session is shown bottom-left.

- Pour the grout in the hopper.
- Activate the mix using the ON/OFF key. The mixer's rotation direction can be reversed. Press the ON key with the relative ON/OFF key engaged; go back to normal rotation direction by releasing it.

Ensure material outflow does not create dangers in the unload area before starting pumping.

During warm-up period do not use the machine at maximun output. Let the machine work approx. 10 min. (depending on ambient temperature) in order to warm the hydraulic oil.

- Using the manual acceleratore, accelerate the engine slightly up to bottom ramp and activate pumping by pressing the ON/OFF key; act on the accelerator lever again, if required.
Press the pumping reverse key to suck the mix: the mix is sucked by piping and re-introduced in the hopper. (this is useful to depressurise the piping line, e.g. when clogged). Press the pumping reverse key again to go back to pumping.
- Rotate the hydraulic pump's adjustment handwheel to obtain a value of about 6 - 10 pumps per minute (always displayed top-right of control board's display).
- If the STOP "grid safety intervention" indicators switch-on, it means the hopper's safety grid is open and the grid's safety device has intervened: hydraulic supply is interrupted and the controls are disabled. Close the grid and re-start pumping by pressing the ON/OFF button, to restore operation.

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 grid's electric vibrator using the ON/OFF key. The electric vibrator is working when the indicator is on.

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.

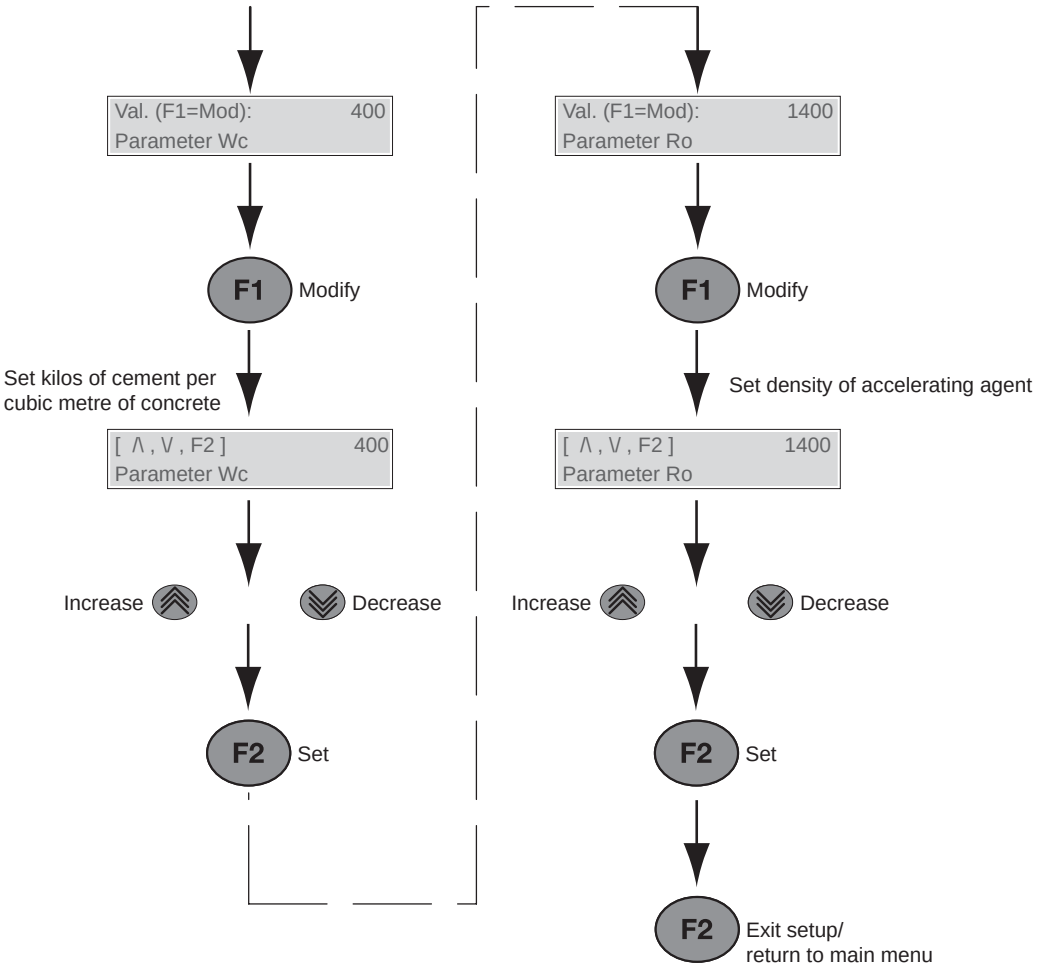
Remote controls
Insert the plut into the connector's socket located on the machine's bodywork (see par. 5.4.1), if using the remote control via cable.
If machine is provided with radio control, connect it to the connector's socket (see par. 5.4.2).
The LOCAL/REMOTE button allows selecting the pumping controls from the control board (local) or from a remote device [remote control (standard) or radio control (optional)].

7.6 Additive pump parameters settings

For proper automati dosage of additive is necessary to set:
- kilos of cement per cubic metre of concrete (refer to the cement manufacturer),
- density of the additive (indicated by the manufacturer, generally on the package itself or on the relative safety data sheet).

Follow the procedure below:

4th Step

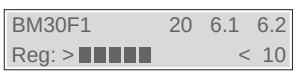


5th Step

The previous sets are saved.

Additive percentage (recommended by the manufacturer, operator's selection) can be modified by acting on ARROW UP and ARROW DOWN on control panel.
The percentage could be set before starting pumping and during pumping.

During the pumping cycle, with the additive pump running, the display shows



- Pumping cycles per minute (20)
- Theoretical additve flow (6.1)
- Actual additive flow (6.2)
- Additive percentage (10)

When dosing pump is set to MAN, it deliver the max flow (with or without the concrete pumping on); this is useful to prime the pump and to clean the dosing system.
When dosing pump is in MAN mode, display shows

When there isn't additive flow (no additive in the tank), the system stops the dosing pump (to avoid pump failure) and the concrete pumping (to avoid sprayed concrete without additive).
The display shows

7.7 CLEANING AT END OF WORK

7.7.1 Cleaning the machine

The operator must be specifically trained to perform the following operations. Ensure there is no residue pressure inside the piping and no other persons are near-by, before opening a joint. This, potentially dangerous, operation must always be carried out, with the utmost caution, by an experienced person.

Only authorised persons can work inside the dangerous area. No one else can stand near the machine.

- Stop the mixer, pumping, and electric vibrator once last mix is pumped.
- Reverse pumping. Make a few reverse pumping to depressurise the piping line, particularly near the delivery manifold.
- Stop the engine.

All the cleaning and discharching operations must be done with engine switched off.

- Release the bend on the delivery manifold.
- Open the bottom flap below the hopper and unload the residue material. Use hammer to discharge residue material on bottom flap.
- Using a water jet, wash inside the hopper.
- Close the bottom flap.

Before start enging and concrete pumping, make sure that all safety devices are fully functional.

- Start engine.
- Insert a maximum of 15-20 cm the water pipe inside the delivery manifold.
- Activate reverse pumping.
- Stop the engine.

All the cleaning and discharching operations must be done with engine switched off.

- Open the bottom flap and discharge the hopper.
- Continue for some cycles until only clear water comes out from the hopper.

All the cleaning and discharching operations must be done with engine switched off.

- Cover the hopper and S valve walls with oil or other lubricant: in this way the mix inside the hopper has less possibilities of forming deposits upon subsequent work session.
- We recomend covering the hopper with a tarpaulin to avoid foreign bodies falling inside it.
- Check there are no concrete residues inside the barrels, hopper, S valve and delivery manifold.

The non-pumped or unloaded from hopper residue material, must be disposed according to current laws.

7.7.2 Using the high pressure water jet machine

The machine is fitted with high pressure water jet machine that can be used for cleaning.

Destination of use

- The pump is exclusively intended for pumping:
  - high pressure water in machines for washing (high pressure water jet machines);
  - water not for the food industry.
- The pump is not intended for pumping:
  - non-filtered water or with impurities;
  - detergents, paints and chemical substances, pure or in watery solution;

- seawater or with high concentration of salt;
- any kind and type of fuels and lubricants;
- flammable liquids or liquified gases;
- liquids for the food industry;
- water having a temperature above 60°C or below 5°C.

• The pump must not be used for washing: persons, animals, powered electrical equipment, delicate objects, the pump itself or the machine it is part of.
• The accessories used with the pump must only be those supplied with the machine.
• The pump is not suitable for use in environments with particular conditions such as corrosive or explosive atmospheres.

Every other use is to be considered improper.
The Manufacturer cannot be considered responsible for any damages due to improper or incorrect uses.

• Do not use the pump if:
- it has suffered significant impacts;
- there are evident oil leaks;
- there are evident water leaks.
• Ensure there is no ice inside the pump if using at extremely low temperatures.
• Check the oil level is in the centre of the oil level indicator when pump is stopped. The oil level must always be checked with pump stopped and completely cooled. Refer to the type of lubricants in the relative maintenance paragraph for top-ups.
• The supply water pressure must not exceed 8 bar/116 psi.
• Do not supply the pump with water having a temperature exceeding 60 °C/140 °F or below 5 °C/41 °F.
• Do not operate the pump without water supply.
• Do not supply the pump with salty water or containing impurities. Operate the pump with clean water for a few minutes should this happen.

High pressure operation

• Parricular attention must be given to using the pump in environments with moving vehicle, risking crushing or damaging the delivery pipe, water gun or nozzle.
• Wear clothing that guarantee adequate protection against incorrect movements with the pressurised fluid jet, before using the pump. Do not use the pump near persons not wearing the personal protective equipment.
• The high pressure jets can be dangerous if improperly used. Do not direct the jet towards persons, animals, powered electrical equipment or the machine incorporating the pump.
• Securely grip the water gun during use, as subjected to the reaction force of the high pressure jet, when acting on its lever.
• Do not direct the high pressure jet against yourself or other persons to clean clothing or shoes.
• Do not direct the high pressure jet towards materials or health damaging substances.
• Do not near the pump's moving parts, even if adequately protected.
• Do not remove protections of the moving parts.
• Do not work on piping containing pressurised liquids.
• Do not service the pump if it is in operation.
• Do not change the pump's installation conditions, particularly do not modify its fixing and hydraulic connections.
• Do not deactivate or tamper with the safety devices and controls and the pressure limit/adjustment valve.

a) Reset the delivery pressure keeping the delivery circuit open by holding the water gun lever pressed.
b) Start the pump to allow its priming.

At end of use
c) Stop the pump;
d) Reset the delivery pressure as described in point a).

7.7.3 Cleaning the pipes

The pipes can be cleaned by either pumping water or using compressed air.
- Use suitably sized sponges for the pipe's diameter.

- Introduce the sponge at the beginning of the section to be washed, being careful to restore pipe blocking through gaskets and joints.

Take all the necessary safety measures to avoid sponge ejecting from the piping section causing injuries to near-by persons and/or damages to objects.

Carefully read the relative paragraph to eliminate clogging during cleaning.

- Cleaning with water

- Wet a washing sponge with water (FIG.29-REF.1) and insert it in the piping.
- Re-connect piping to the machine and open the shutter, if present.
- By means of Victaulic fittings complete with rubber gasket, connect the specific drum (FIG.29-REF.2) collecting the outfeed sponge at piping end.
- Fill the hopper with water and start pumping.

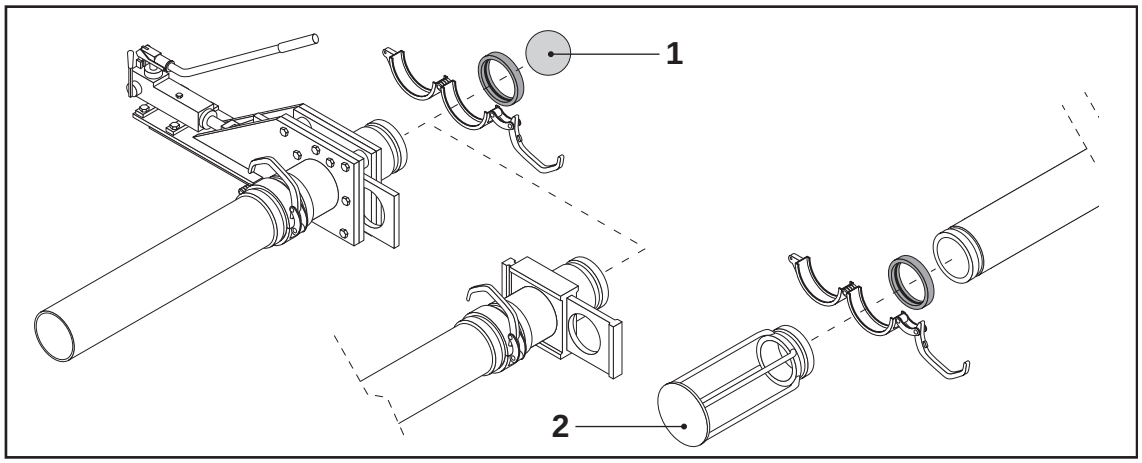


FIG.29

The exiting of the sponge from the end pipe is violent: adequately direct the end pipe so no one near-by is injured and/or property damaged. If deposit is present inside the piping, the sponge does not exit: reverse the pumping direction to drain pressure inside the piping and stop the machine.

Carefully read paragraph 7.7 to eliminate any deposit during cleaning.

- Water-suction cleaning

Insert the rubber sponge at the end of the end pipe, activate pumping by means of leverl 4 (FIG.27) and hold the lever downwards, if pumping is vertical. The concrete is sucked back in hopper.

The concrete may outflow from the hopper if piping is long.

7.8 IMPORTANT WARNINGS

The operator must be specifically trained to following the operations below. Ensure there is no residue pressure in the piping and no other persons are near-by, before opning a joint. This, potentially dangerous, operation must always be carried out, with the utmost caution, by an experienced person.

The manometer (FIG.28-REF.5) shows pressure higher than 150 bar and pumping blocks in case of clogging.
Reverse pumping cycle and run 4-8 suction cycles: the hopper content level will increase.
Clogging can now be eliminated.

The critical points are normally in correspondence of the fittings.

Steel pipes clogging

- The obstruction is located by the noise emitted upon impact of the iron hammer against the pipe:
a metallic sound is heard if the pipe is not clogged, whereas a plonking sound is heard if the pipe is clogged.
- Disconnect the clogged pipe from the piping line, once this has been pre-emptively depressurised.
- Place the pipe vertically to evacuate its contents.

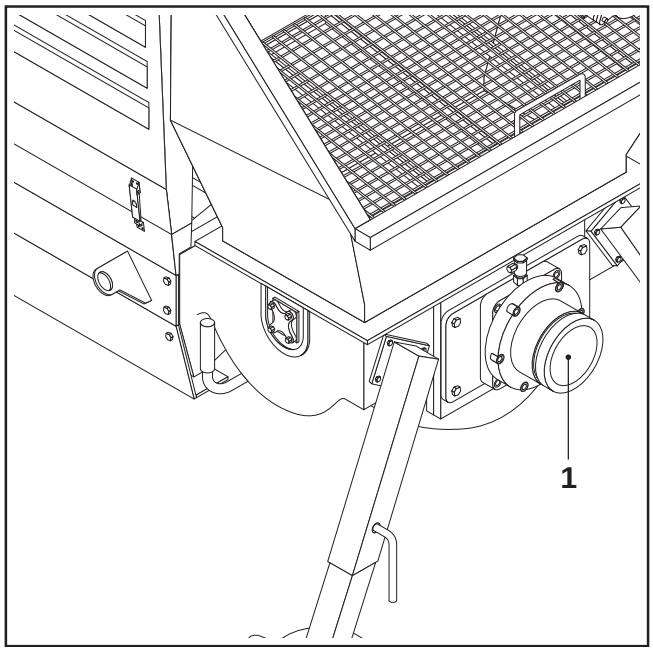


FIG.31

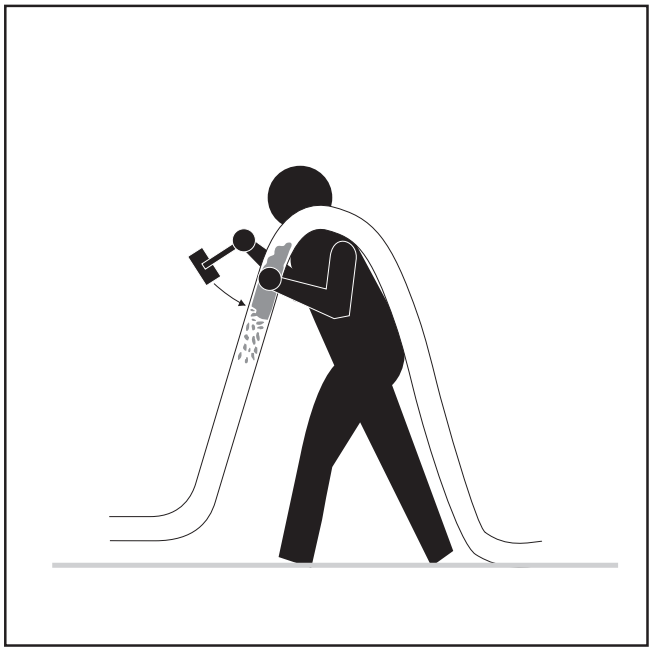


FIG.32

Rubber hoses clogging

- 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

The emergency button (FIG.28-REF.1) must only be used if an emergency stop is required. It must not be used to normally switch-off the machine: repeated, unjustified switch-offs using the emergency button, damage the BM30.

8.1 MAIN WARNINGS

Do not wear rings, wrist watches, jewellery, unbuttoned and loose clothing such as ties, torn clothing, scarves, unbuttoned jackets or blouses with open zips that might become entangled in the moving parts. We recommend wearing approved accident-prevention clothing, such as: helmets, non-slip shoes, gloves, earmuffs, retroreflecting jackets, respirators, safety goggles, when the work requires it. Consult the employer on the safety prescriptions in force and the accident-prevetion devices.
• Apply "Machine under verification" sign at machine side.
• Never go underneath the machine when this is slightly lifted.
• Start the engine in a well ventilated area.
• Ensure no persons are within the action range, before starting the machine.

8.1.1 Environmental protection

All maintenance, cleaning, replacement of machine parts, must be carried out fully respecting the environment.
• Th exhaust oils and greases must be collected in suitable containers and delivered to appropriate disposal centres.
• The same must happen for all lubricant contaminated parts, such as filters, rubber piping, gaskets, etc.
• Plastic parts (lids, protections, etc.) must be differently collected.
• The metallic parts can be delivered to appropriate scrapping centres, as long as without lubricants and other residues.

8.1.2 Maintenance instructions

• Many accidents and damages are due to scarce maintenance or errors made throughout it. The main causes for accidents are attributable to:
- no oil, grease or anti-freeze;
- dirt accumulated on the different units or components;
- broken ropes or slings;
- safety devices not in perfect conditions or out of use.
- hydraulic deficiency, e.g. damaged flexible hoses and slow fittings.
• For your safety also, accurately perform maintenance.
• Never postpone maintenance or repair work.
• Only appoint trained personnel to carry out repair work.
• Always follow the maintenance and repair procedures, requesting pre-emptive authorisation.
• Before removing protections and lids, stop the engine and ensure the pressure has been discharged in all plants.
• Never place the head, body, limbs, hands, feet or fingers inside a shear area, without guards, without having firstly securely blocked parts that can move.
• Never align holes or slots with fingers: use an adequate centring tool.
• Protect yourself using goggles with side guards, when using compressed air to clean parts. Limit the pressure to a maximum of 2 bar.
• Service ladders or platforms used in the workshop or at work, must respect the current accident-prevention standards.
• Never use petrol or solvents or other flammable liquids such as detergents. Use authorised, non-flammable and non-toxic trade solvents.
• Do not lubricate, repair or adjust the machine when running, unless expressely requested by the Use and Maintenance Manual.
• In accordance with the specific safety standards in force, block the machine and all equipment to be lifted.
• Avoid improperly using tools or in bad conditions. e.g. grippers instead of the universal wrench, etc.
• Maintain the maintenance area clean and dry and immediately dry any water and oil traces.
• Pressurised fluid leaks through small holes are almost invisible and can have enough force to pierce the skin. It is important to protect the eyes using safety goggles, provided with side lenses also, before checking for leaks. Search for any pressurised liquid leaks by using a piece of cardboard or wood, never the hands. Injuries caused by pressurised fluis can lead to serious infections: we recommend contacting a doctor for immediate intervention with appropriate care.
• Ensure to have discharged any residue pressure, before disassembling or loosening the piping and hydraulic system fittings.
• Do not accumulate oily or greasy cloths as they constitute a fire hazard. Said cloths must be placed in a closed metallic container.
• Immediately replace any illegible or missing Danger, Attention or instruction plate.
• Before starting the machine, ensure no tools or other materials are left inside the compartments containing the moving parts or near moving parts once maintenance or repair is completed.
• Preserve the machine's and equipment's good state.
• Replace the faulty or excessively worn components with Original Spare Parts.

It is forbidden to use naked flames as means of lighting or when checking components or searching for leaks on the machine.

8.2 OPERATOR RESPONSIBILITY

Below is the essential data for correct machine maintenance. More detailed diesel engine maintenance indications are given in the use and maintenance manual (supplied). This must be carefully read by the machine operator, together with this manual, before starting work.

8.2.1 Replacing lubrication water

- Open the cock (FIG.33) to empty the bowl.
- Check the bowl's water content: the presence of fine suspended material is normal.
- Close cock (FIG.33) once bowl is empty.
- Remove cap (FIG.34) and fill bowl with clean water.
- Through the indicator underneath the oil tank (FIG.26), check correct water level.

FIG.33

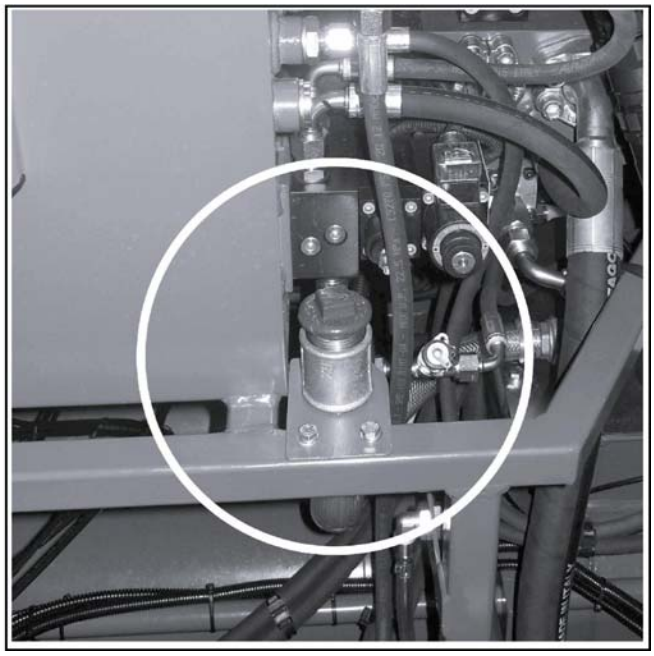


FIG.34

The water bowl can be filled by connecting the water hose connected to the water mains, to the cock (FIG.33). Fill bowl up to correct level (FIG.26).

Anti-freeze can be used with cold weather. Respect the safety sheets of the chosen anti-freeze during use and the laws in force with regard to the disposal of such substances.

We recommend emptying the bowl each working day. Water in the bowl must be changed when showing fine sediments.

8.2.2 Engine cooling liquid check

Check the engine's cooling liquid level and top-up if required (see paragraph 7.3).

8.2.3 Engine oil check

Remove the level dipstick to check the engine oil level. The lubricant level must be in correspondence with the highest notch, but not exceed it.
Top-up using: TOTAL RUBIA TDI 15W40 o equivalente.

8.2.4 Engine air filter check

The engine air filter consists of two filter cartridges (1st and 2nd stage). Release the lid (FIG.35-REF.1), remove the 1st stage cartridge (FIG.35-REF.2) and the 2nd stage cartridge (FIG.35-REF.3) to check. Softly and repeatedly hit the 1st stage element onto a hard surface to eliiminate excess dirt. Do not blow the paper filter element with compressed air. The 2nd stage cartridge can be sometimes cleaned with compressed air, but never washed. Accurately clean the lid and filter support.

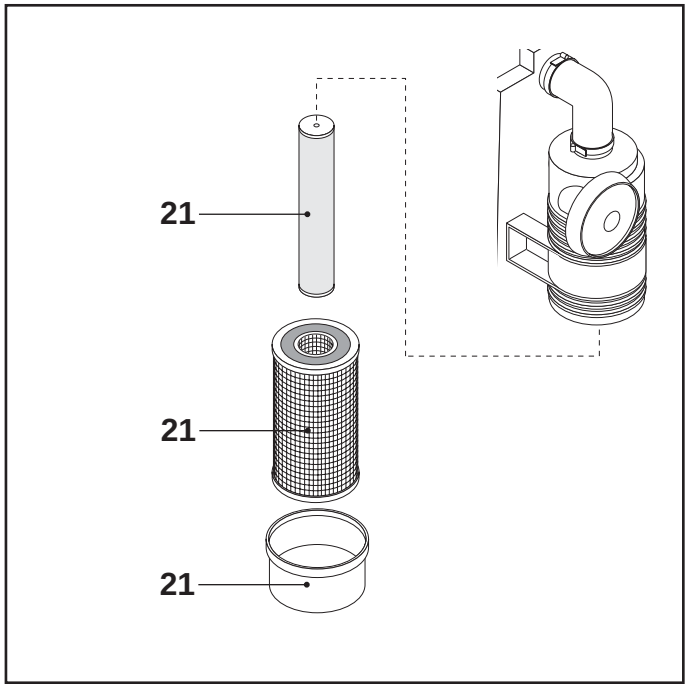


FIG.35

8.2.5 Diesel oil level check

Check the diesel oil level.
It is a good rule to avoid condensation problems inside the tank with machine cold, to top-up the tank once work is completed.

8.2.6 Hydraulic oil level check

Check the hydraulic circuit's tank oil level on the sight glass (FIG.36-REF.1).
Identify and eliminate leaks if oil level is not constant: have enabled personnel perform this operation.
Top-up through cap (FIG.36-REF.2).
Use TOTAL AZOLLA HZS 46 oil to top-up.

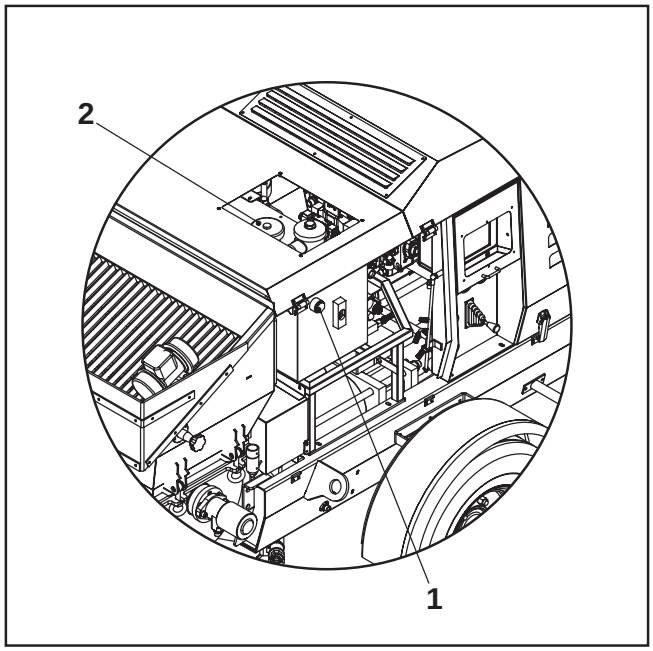


FIG.36

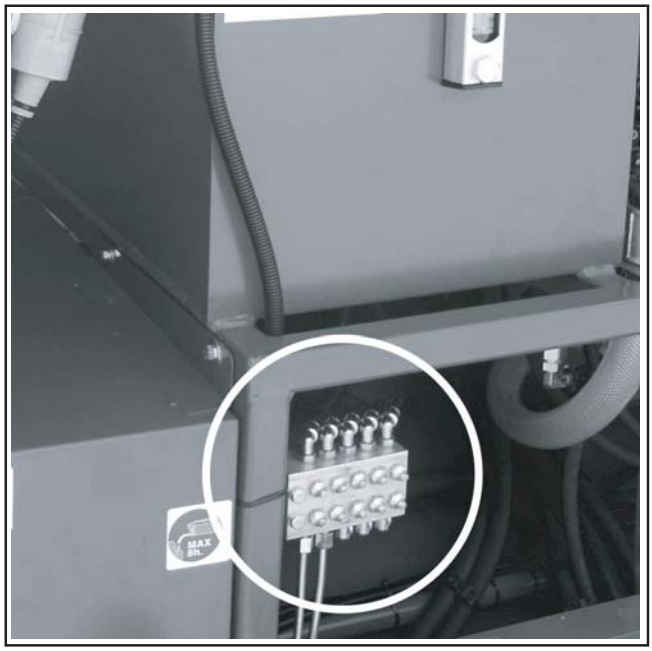


FIG.37

8.2.7 At end of work

- It is preferable to spray the machine with liquid preventing material deposits, once work is completed and after cleaning.
- Use the supplied grease pump to grease the greasing points (FIG.37).

8.3 PUMPING PISTONS REPLACEMENT

Replace the pumping pistons when muddy water and non-fine parts are found in the lubrication bowl.

Prepare the supplied tools:
- 36-41 wrench (FIG.38-REF.1),
- M24 threaded rod (FIG.38-REF.2) and M27 (FIG.38-REF.3),
- M24 nut (FIG.38-REF.4) and M27 (FIG.38-REF.5),
- guide ring for piston (FIG.38-REF.6),
- spacer for guide (FIG.38-REF.7),
- two spacers for rod (FIG.38-REF.8),
- flange for piston disassembly (FIG.38-REF.9),
- two pistons (FIG.38-REF.10).

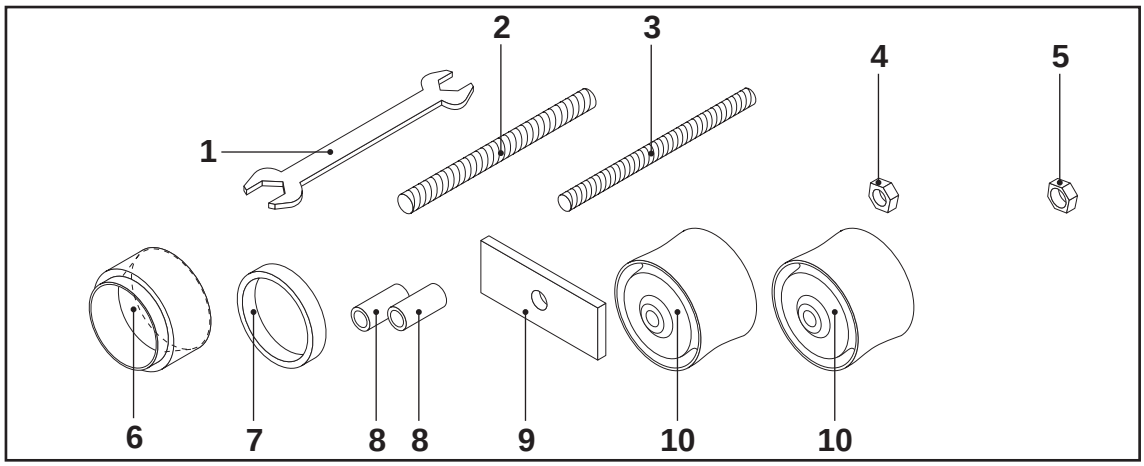


FIG.38

- Empty the water bowl.
- Start the machine with engine at minimum and, using the adjustment handwheel, adjust the hydraulic pump's flow rate to minimum.

- Reverse pumping,
- Looking inside the hopper, lift the safety grid when one of the two pistons reach end run to stop pumping.
- Switch-off machine.

We recommend overturning the upper hopper: ensure the grid is blocked using the device (FIG.39-REF.1),
loosen the two ring locking nuts (FIG.39-REF.2) and overturn the hopper up to blocking position, for safer and easier operation (FIG.40).

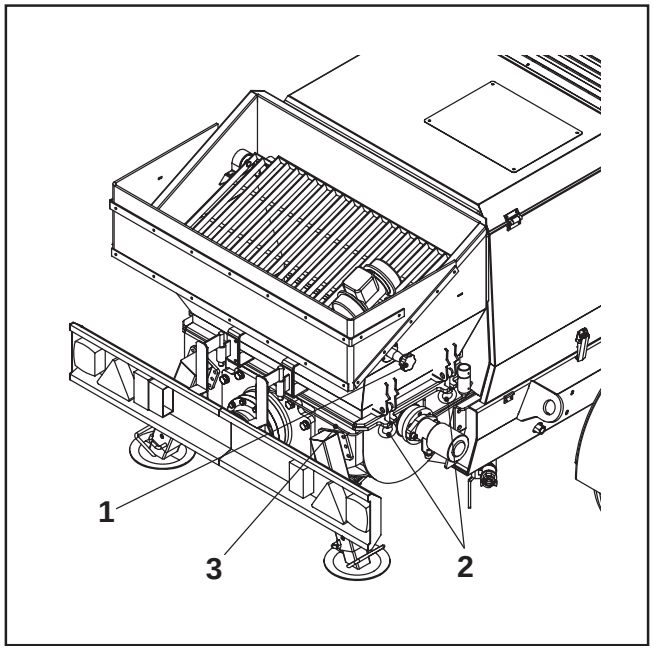


FIG.39

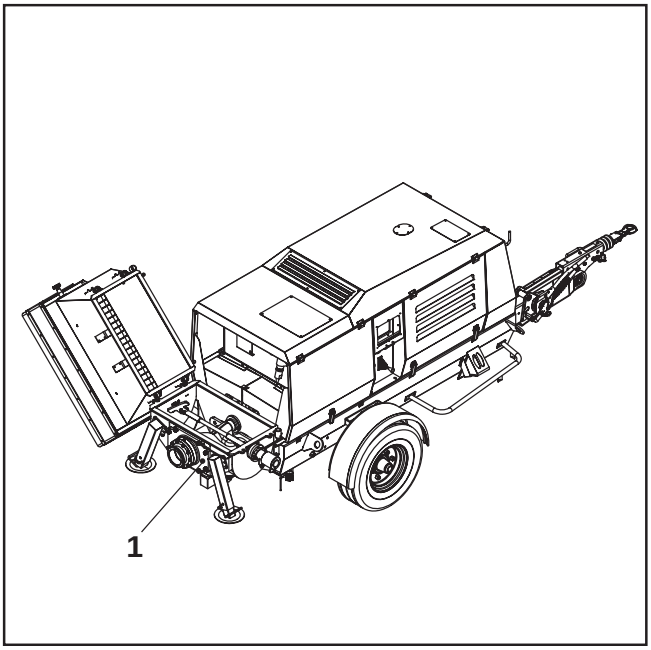


FIG.40

PISTON DISASSEMBLY
- Remove the screw (FIG.41-REF. 1) on the piston head.

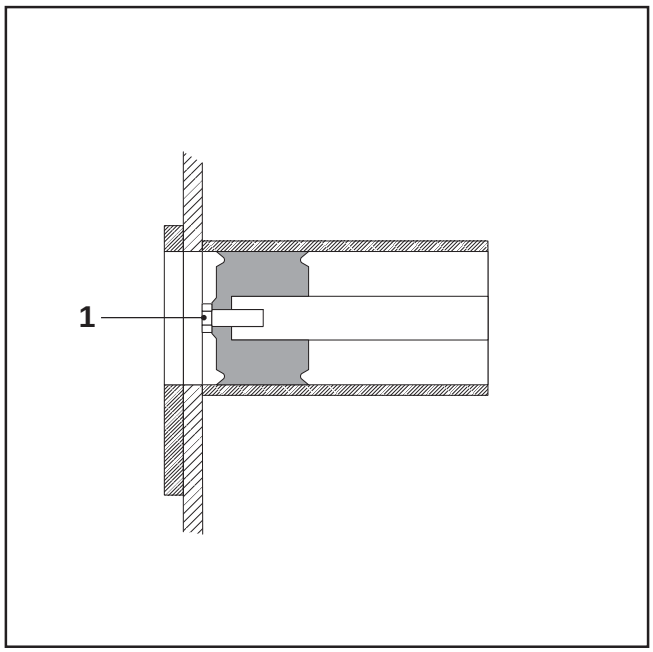


FIG.41

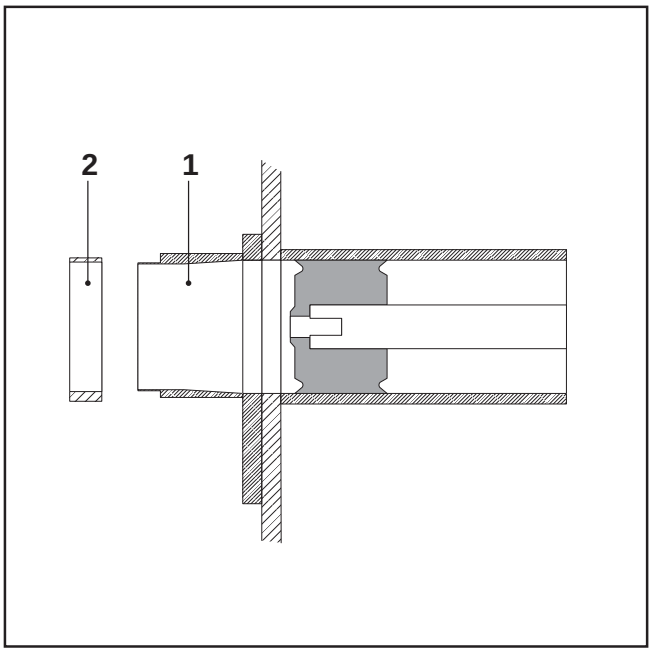


FIG.42

- Slip on the guide ring (FIG.42-REF. 1) applying the tapered part on the wear plate.
- Holding the guide ring against the liner, slip the spacer (FIG.42-REF. 2) on to the guide ring.
- Mount the flange for removing the piston (FIG.43-REF. 1).

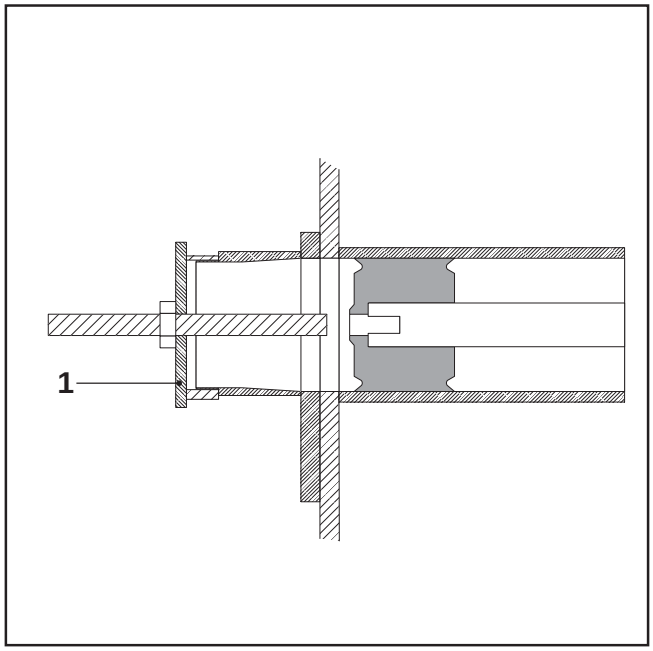


FIG.43

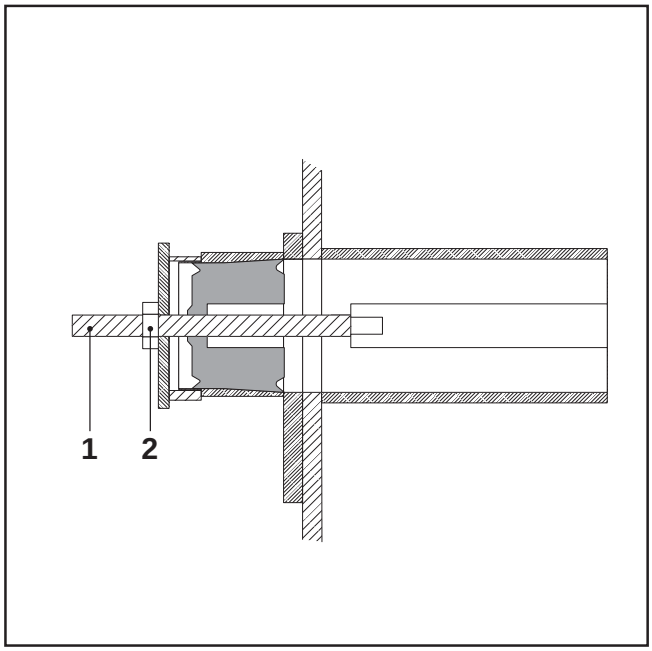


FIG.44

- Screw the M27 threaded rod (FIG.44-REF. 1) onto the piston head, screw on the nut (FIG.44-REF. 2) and pull out the piston.
- Remove the piston with the guide ring (FIG.45).

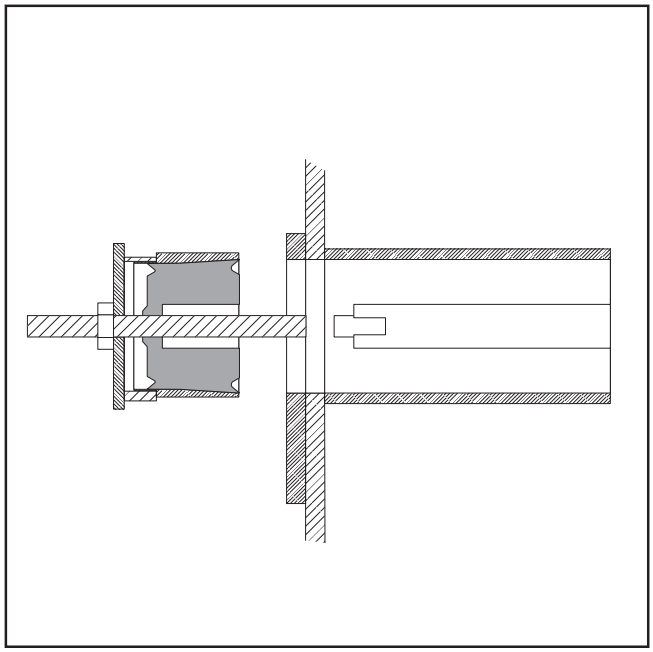


FIG.45

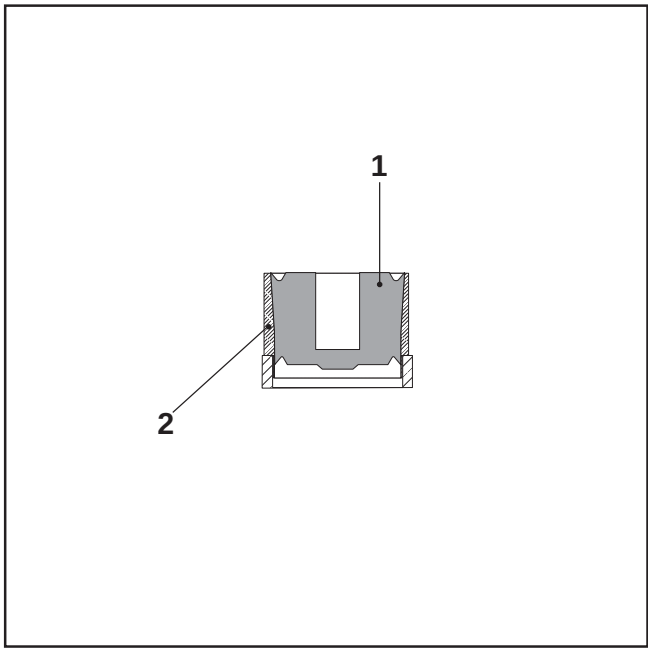


FIG.46

PISTON ASSEMBLY

To install a new piston proceed as follows:
- Lubricate the piston (FIG.46-REF. 1) with Vaseline, and slide the piston into the tapered part of the guide ring (FIG.46-REF. 2).
- Introduce the guide ring's cylindrical part (FIG.47).

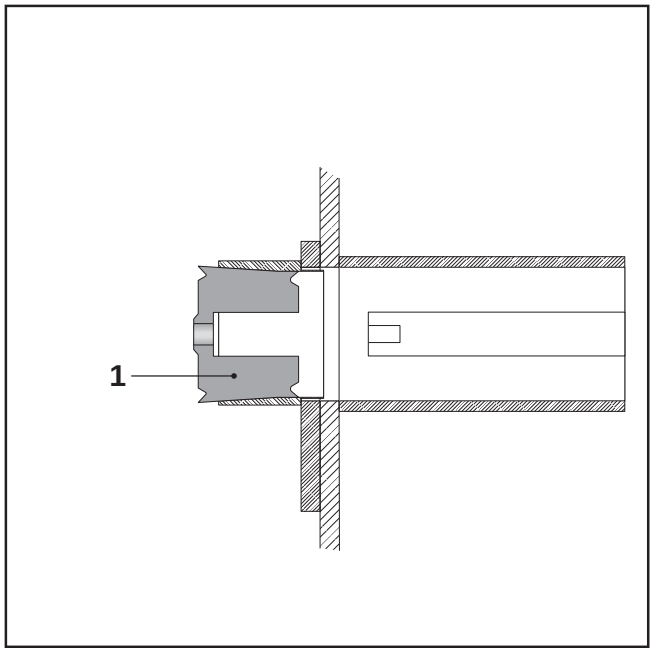


FIG.47

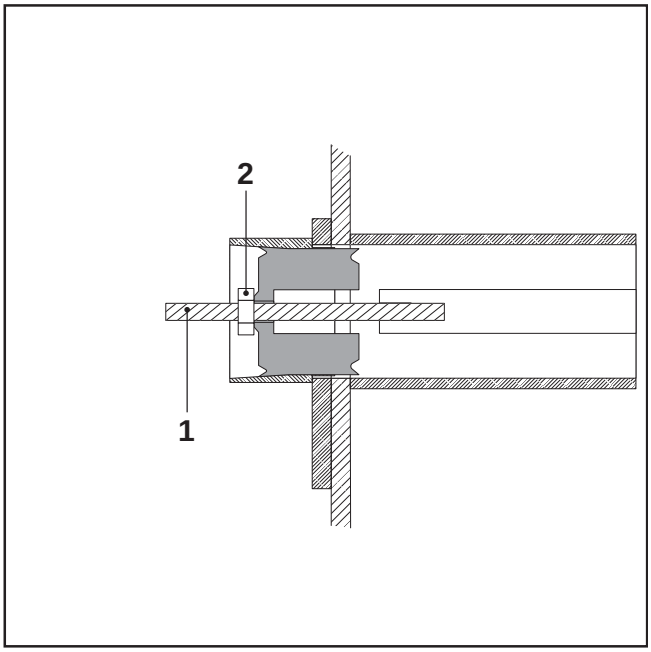


FIG.48

- Screw on the threaded rod M24 (FIG.48-REF. 1) and the threaded nut (FIG.48-REF. 2).
- To make the piston reach the piston rod (FIG.49/50-REF. 1) apply the spacers and keep tightening the nut.

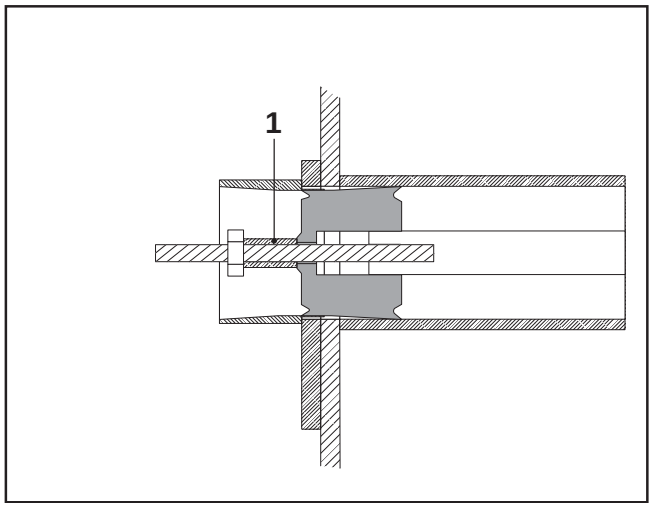


FIG.49

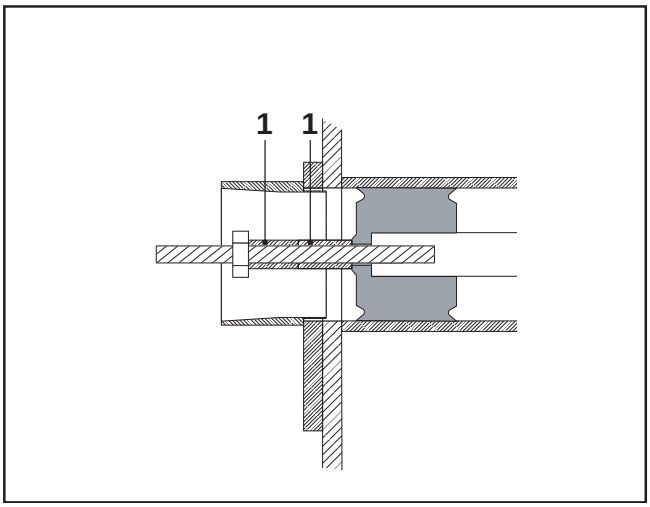


FIG.50

- Unscrew and remove the nut, remove the M24 threaded rod, the spacers, the guide ring and the guide ring spacer.
- Tighten the screw and washer on the piston.

Repeat the operation for the second piston.

Re-position the upper hopper turning it into work position and block it with the two ring nuts.

8.4 S VALVE ADJUSTMENT

The S valve is adjusted to eliminate play between the wear plate and wear disc and restore seal between them. This play is due to wear caused by friction of the two stated components.
Water leaks between the disc and the plate during washing and material outflowing between the same components during pumping, shows the non-perfect seal.
S valve adjustment is indicatevely carried out where distance between wear plate and disc exceeds 0.25 mm or if the S valve is repeatedely clogged.
The following operations must be carried out with machine off.
- Disassemble the jacks protection carter (FIG.51-REF.1).
- Loosen the ring nut (FIG.51-REF.2).

- Fasten the second ring nut (FIG.51-REF.3). It is normally enough to rotate it by 90° or 180°.
- block the 1st ring nut (FIG.51-REF.2).
- Remove the jacks protection carter (FIG.51-REF.1).
- Start the machine and check the S valve regularly exchanges, with the engine at minimum.

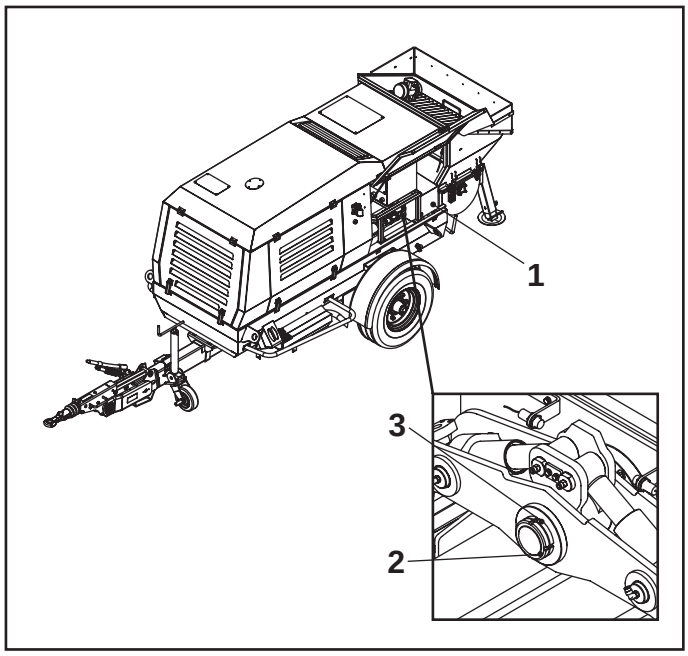


FIG.51

8.5 WEAR PLATE, WEAR DISC REPLACEMENT

The following operations must be performed with machine off.

-Overturn the upper hopper, assemble the lighting bar careful to release the electric connection plug,
-ensure the grid is blocked using the device (FIG.39-REF.1),
-loosen the two ring locking nuts (FIG.39-REF.2) and overturn the hopper up to blocking position (FIG.40).
-Remove the rigid greasing duct (FIG.39-REF.3) located on the greasing flange.
- Loosen the 8 TE screws to remove the delivery flange (FIG.40-REF.1).
- Loosen the two ring nuts of the S valve (FIG.51-REF.2/3),

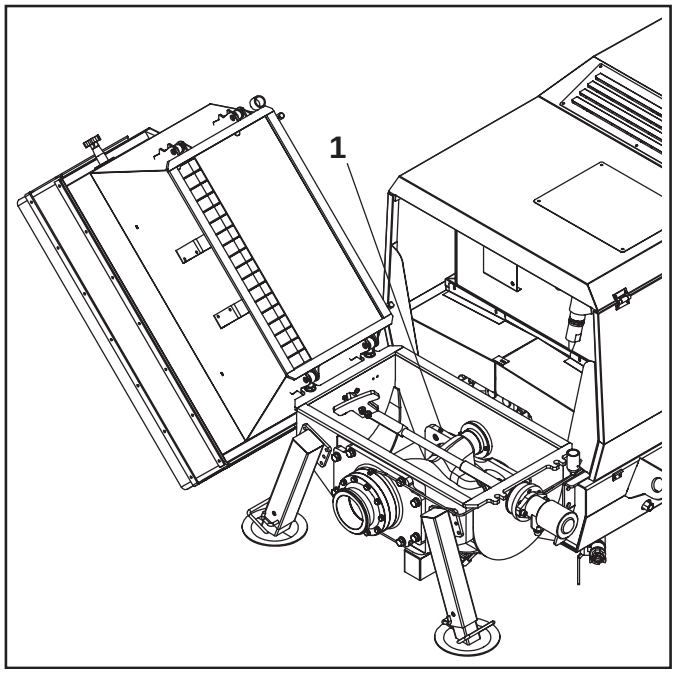


FIG.52

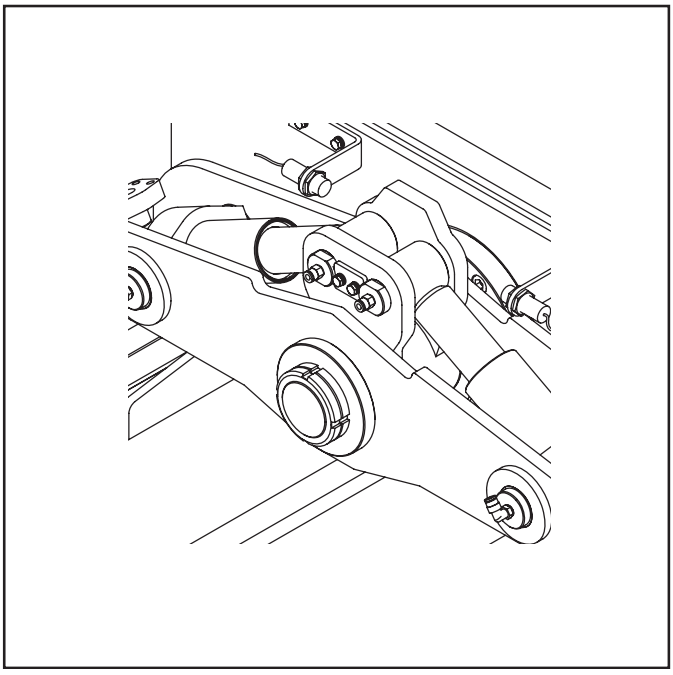


FIG.53

WEAR DISC

- remove the S valve enough to perform operation.

-remove the worn disc and re-assemble a new one careful to re-position the compensating ring in the disc's groove (FIG.54-REF.2).

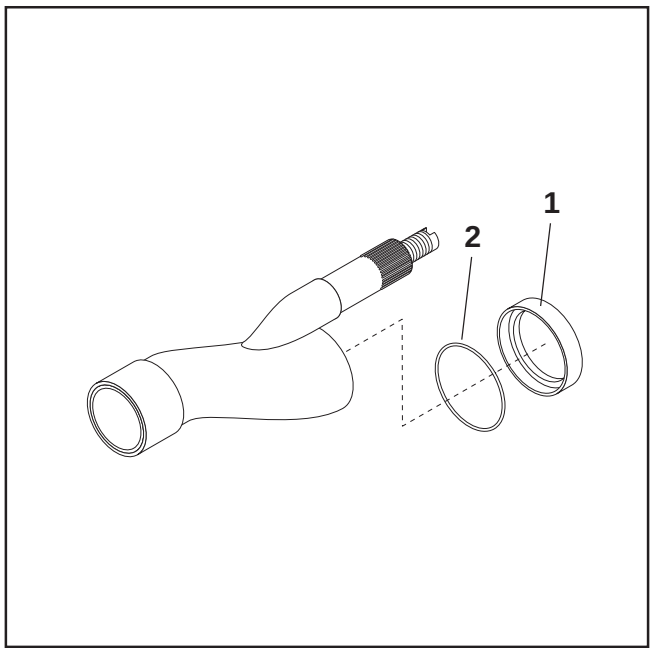


FIG.54

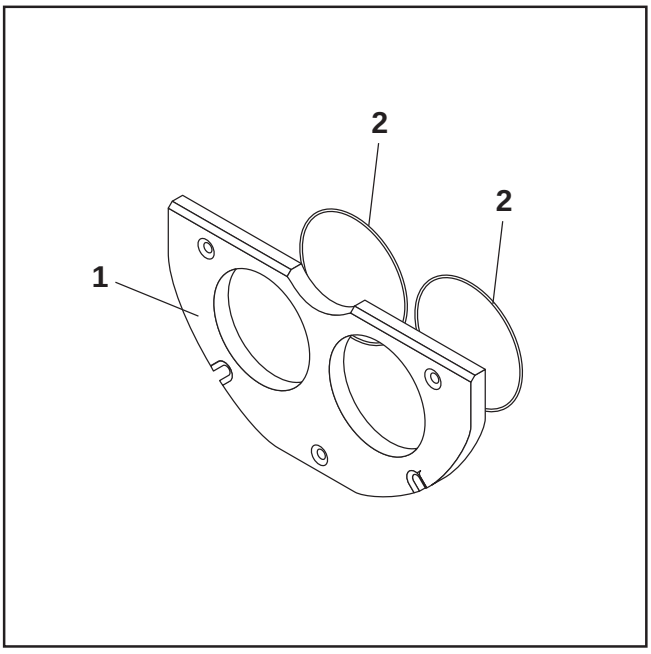


FIG.55

WEAR PLATE

- Remove the wear plate by loosening the 5 fixing screws (FIG.52-REF.1).
- Using grease assemble two new OR rings (FIG.55-REF.2) (the grease holds the two rings in position), without excessively greasing,
  as grease forms thickness.
- Position and fasten the wear plate.

8.6 I OIL FILTER REPLACEMENT

The following operations must be carried out with machine off and oil cold.

There are 3 litres in the hydraulic tank: one on the lid to be replaced every 500 hours and 2 inside the tank to be replaced every 1,000 hours.
- Loosen the four screws from the oil filter inspection carter located on the fixed bodywork, to replace the filter (FIG.56-REF.1).
- Loosen the filter cap (FIG.56-REF.2), remove and replace the filter cartridge.
- Tighten the cap again (FIG.56-REF.2) and close the inspection carter using the screws.

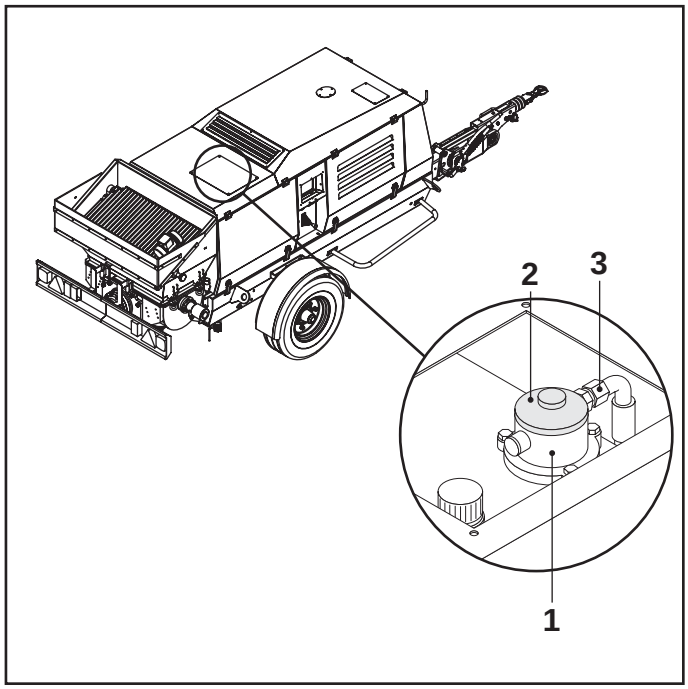


FIG.56

8.7 II OIL FILTER REPLACEMENT

- Remove the fixed bodywork by loosening the screws on the its supports and brackets blocking it to the hydraulic tank (FIG.57).

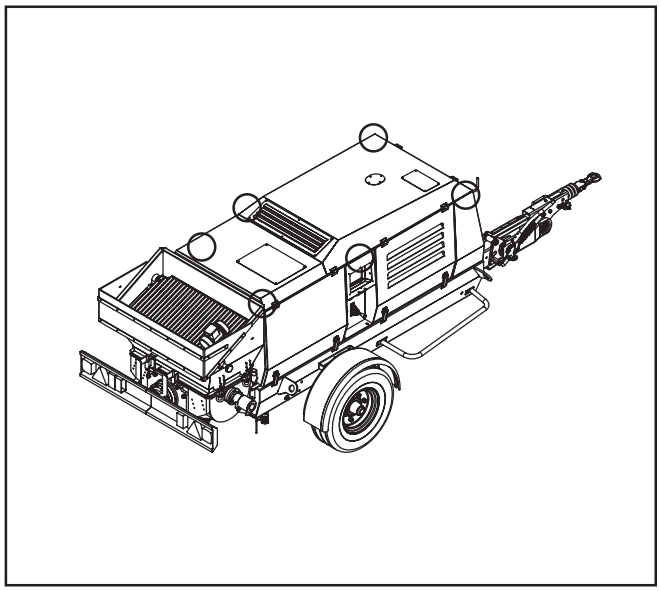


FIG.57

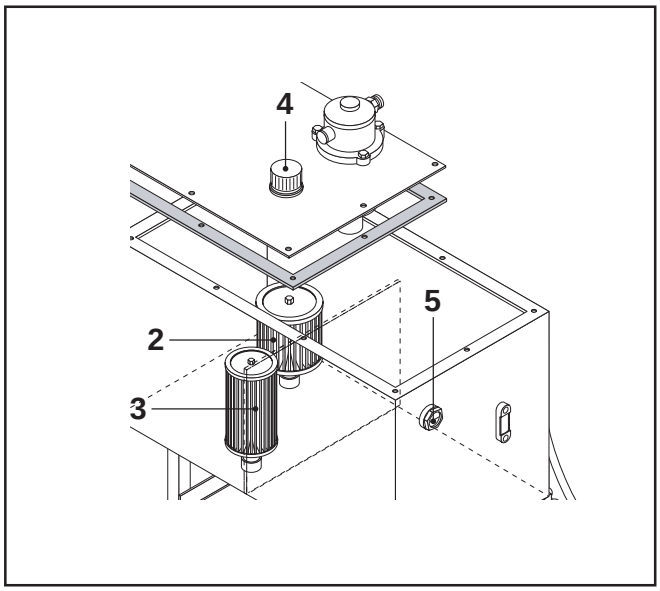


FIG.58

- Opening the cock located underneath the oil tank, drain it ensuring to place an adequate container for oil collection.
- Disconnect the hydraulic duct (FIG.56-REF.3).
- Loosen and replace the internal filters (FIG.58-REF.2/3), close the tank checking the gasket's state (replace if required).
- Open the cap (FIG.58-REF.4) and fill with 75 litres of TOTAL AZOLLA HZS 46 oil.
- Always check the level on the sight glass (FIG.58-REF.5).

- Re-position and fasten the fixed bodywork with specific screws.
- Start the engine and make the hydraulic pump turn for a few minutes empty, checking the oil level through the sight glass (FIG.58-REF.5); top-up if level is below the sight glass.

8.8 Replacing the additive metering pump

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

- release the plug (FIG.59-REF.1).
- Loosen the bolt (FIG.59-REF.3).
- Remove the flange (FIG.59-REF.2).
- Replace the pump.
- Mount the new pump; if necessary remove the cover to hook rotor to the shaft.

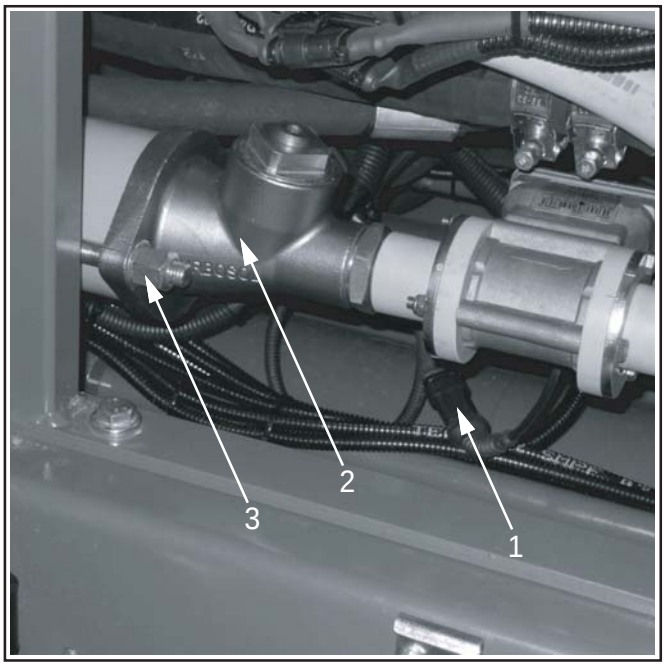


FIG.59

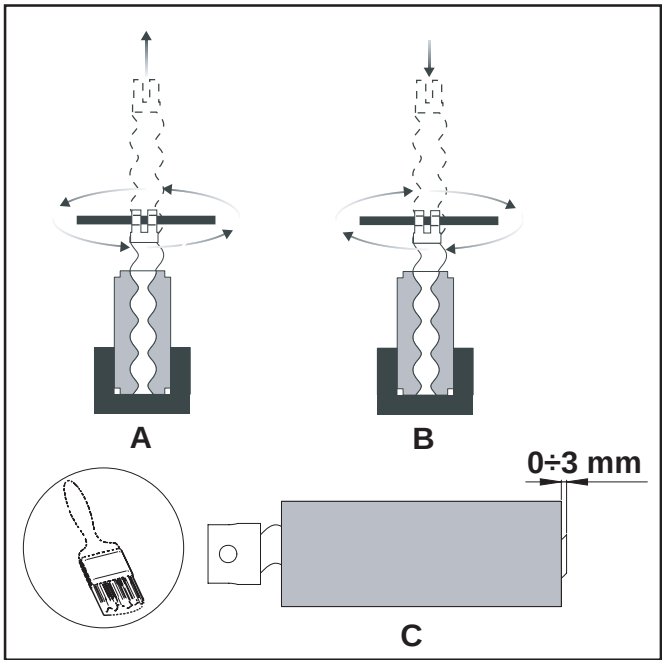


FIG.60

The stator usually works at half the rate of the auger. Accordingly, it may be necessary to replace only the stator while leaving the auger in place.
- Uninstall the pump from the machine (see above).
- Put the pump in a vice and remove the auger (FIG.60-REF.A).
- Lubricate the auger and the opening in the stator with Vaseline (DO NOT USE OIL OR GREASE, USE ONLY VASELINE*).
- Partially introduce the auger inside the countersunk opening.
- Screw the rotor; the rotor end must get out from rotor max. 3 mm (FIG.60-REF.C).

*TURBOSOL suggests vaseline PAKELO VASELBA B.

8.8.1 Greasing dosing pump

Grease dosing pump at the end of work session.

Grease dosing pump by the greaser point pictured on FIG.61.

TURBOSOL suggests grease TOTAL MULTIS EP1

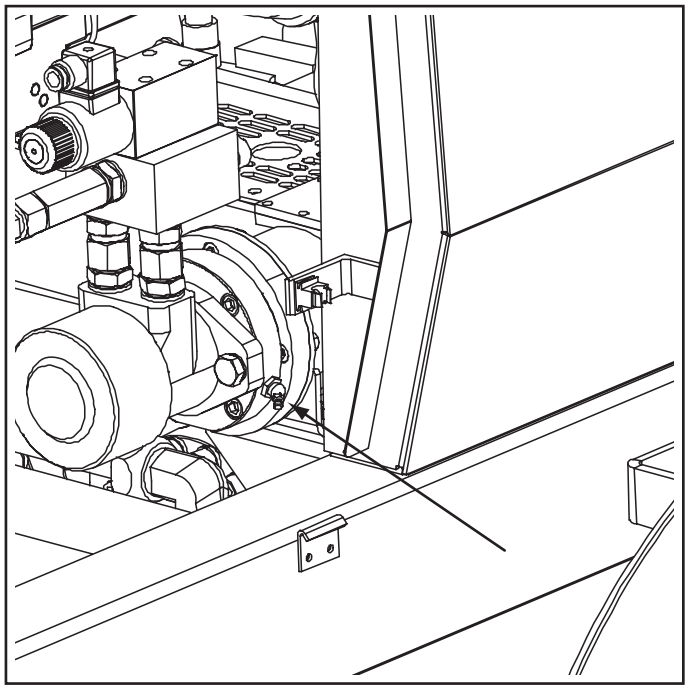


FIG.61

8.9 ROAD TOW MAINTENANCE

- Perform maintenance and cleaning every 10000 km or every 12 months.
- Replace the inert brake's shock absorber:
  - if force is extremely weak.
  - With air bubbles.
  - If stem is easily removed.
  - With oil leaks.
- Grease and oil all sliding surfaces and inert brake joints (FIG.62). Use DIN 51825 multipurpose grease.

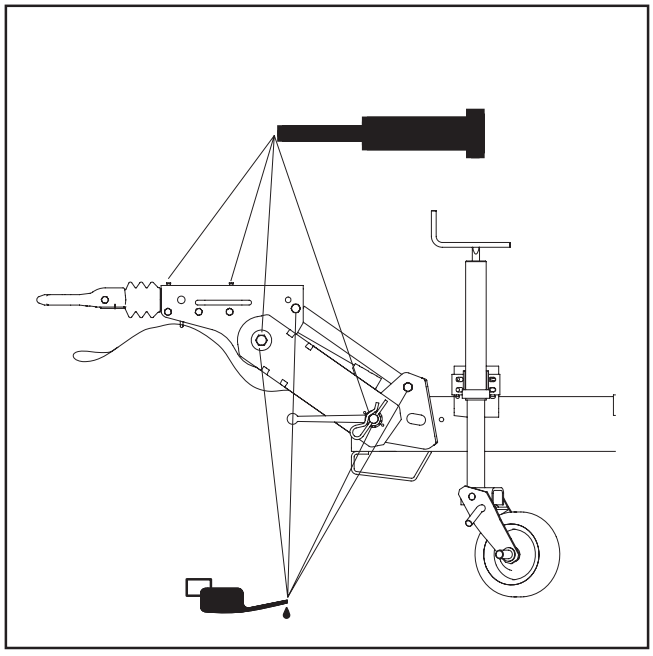


FIG.62

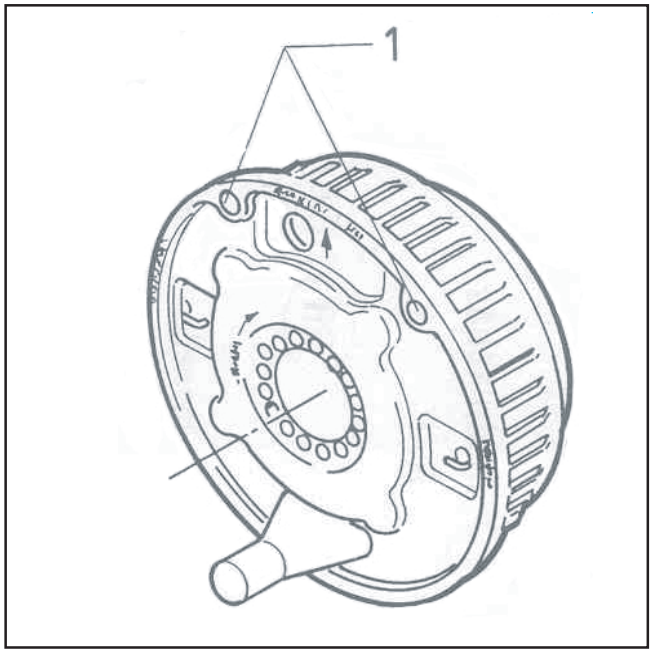


FIG.63

If the drawbar is adjusted at a certain height for a prolonged period, a layer of rust may form between the toothed flanged. It causes the flanges to stick. Clean the flange on a six-monthly basis and apply water-resistant grease (DIN 51502 KPF 2C multi-purpose grease), to eliminate this problem.

- Through the inspection hole (FIG.63-REF.1) check the brake linings' wear. Adjust if required.

Have trained personnel perform all maintenance in qualified workshops or assistance centres.

8.10 ENABLED PERSONNEL RESPONSIBILITY

8.10.1 Maintenance coupon at 50 hours

The machine must be subjected to its first service after 50 hours.

- Check cooling liquid.
- Ensure minimum speed is controlled and adjusted.
- Engine oil change; use: TOTAL RUBIA TDI 15W40
- Remove cap (FIG.64-REF.1) and drain the oil.
- Put the oil drain cap back on, remove the oil filler cap (FIG.65-REF.2), pour oil and put the cap back on. Check the rod's level is almost at maximum (FIG.65-REF.1).
- Replace the engine oil filter cartridge.
- Replace the cartridge and the fuel filter net.
- Cleaning the engine air filter.
- Check the engine supports and fasten them, if required.
- Check the pumping, safety and BM30 management sensors (diesel oil level, hydraulic oil temperature, cooling liquid temperature) are fastened.
- Check the engine is not leaking.
- Check the fittings of the hydraulic system's ducts are fastened.
- Check fastening of the wheels' nuts.
- Adjust the brakes in road approved tow version.

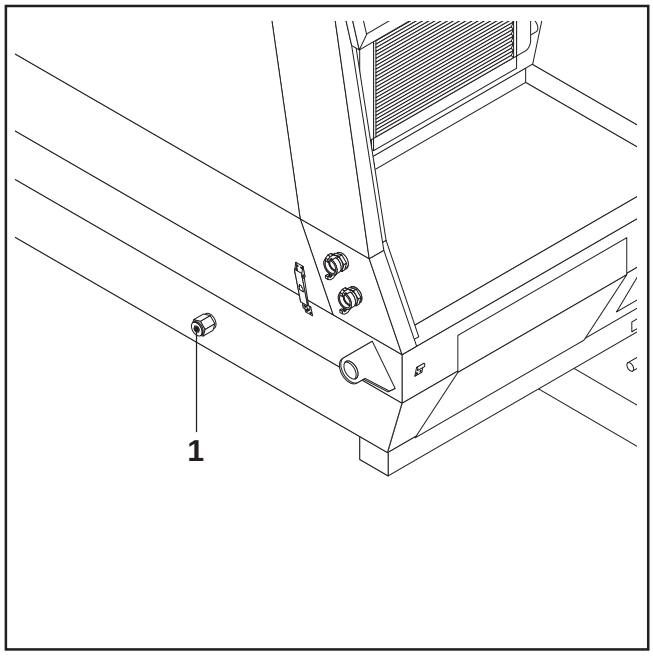


FIG.64

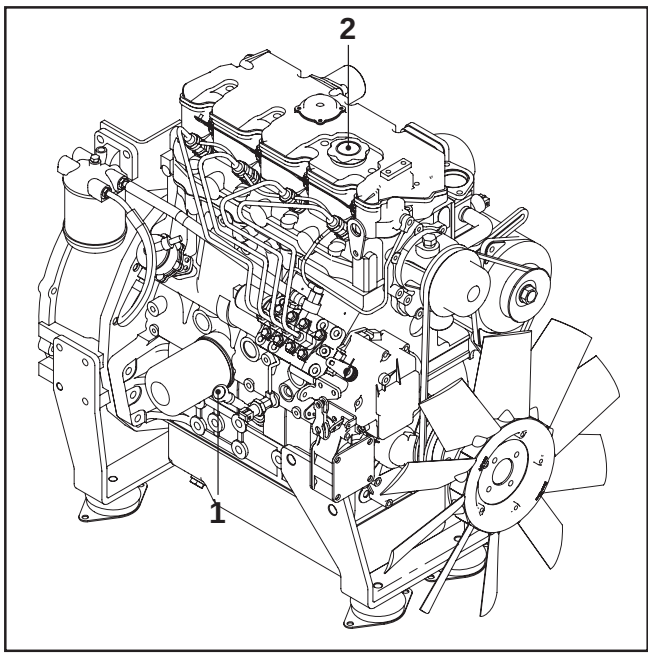


FIG.65

8.10.2 Monthly check or every 125 hours

- Engine oil change
  - Use: TOTAL RUBIA TDI 15W40
  - Remove cap (FIG.64-REF.1) and drain the oil.
  - Put the oil drain cap back on.
  - Remove the oil filler cap (FIG.65-REF.2), pour the oil and put the cap back on.
  - Check the level on the dipstick (FIG.65-REF.1) is almost at maximum.
- Using compressed air, clean the radiator's ribbed surface.
- Check the alternator's belt tension.
- Check the battery: clamps fastening, electrolyte level and density (see engine instructions manual).

The gases emitted by the battery are explosive. Avoid causing sparks near the battery. Avoid the electrolite coming into contact with the skin or clothing.

8.10.3 Check every 250 hours

- Check the delivery flange wear state and replace it if required.
- Replace the engine oil filter's cartridge.
- Clean the diesel oil pre-filter.
- Replace the fuel filter.
- Replace the engine air filter cartridge.
- Check the cooling circuit's sleeves and replace any worn ones.
- Replace the cooling liquide.

8.10.4 Six-monthly check or every 500 hours

- Check the glow plugs.
- Replace the hydraulic oil filters in the hydraulic tank.
- Clean and calibrate the injectors.

8.10.5 Annually check or every 1000 hours

- Replace the hydraulic circuit oil.
- Check S valve play and adjust if required.
- Check state of hydraulic circuit pipes and fittings.
- Check the state of the diesel oil suction circuit pipes and fittings.
- Check the state of the cooling circuit pipes and fittings.
- Disassemble and clean the engine vent piping.
- Check the alternator, the starter motor, etc., correctly operate.
- Inspect the electric system.

8.10.6 Check every 2500 hours

- Replace the engine vent.

9.1 MAIN WARNINGS

It is compulsor to observe the standard in force in the country of use when demolishing the machine.

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

The oils, cooling liquid and electric accumulator must be delivered to authorised and specialised companies in the disposal of these polluting products.

10.1 FAULTY ELECTRONIC BOARD

Pumping operations can be manually completed in the event the control board's electronic board is faulty.
Intervene on the piston's sucking and pumping functions by using the levers (m1,m2,m3) located on the side of the control board.
Open the bodywork's side doors from the control board side to check the alternated switching on of the LEDs on the S valve and on the lubricating water bowl.

With reference to FIG.66:
- levers m1 and m2 in position 1 control the exchange jacks; the manometer (FIG.28-REF.5) shows maximum pressure when the exchange jack reaches end run,
- levers m1 and m2 in position 2 control pumping; when piston reaches end run, the other piston appears in bowl.

Pumping sequence:
m3 lowered + m1 position 1; m3 lowered + m2 position 2; m3 lowered + m2 position 1; m3 lowered + m1 position 2.

Intake sequence:
m3 lowered + m1 position 1; m3 lowered + m1 position 2; m3 lowered + m2 position 1; m3 lowered + m2 position 2.

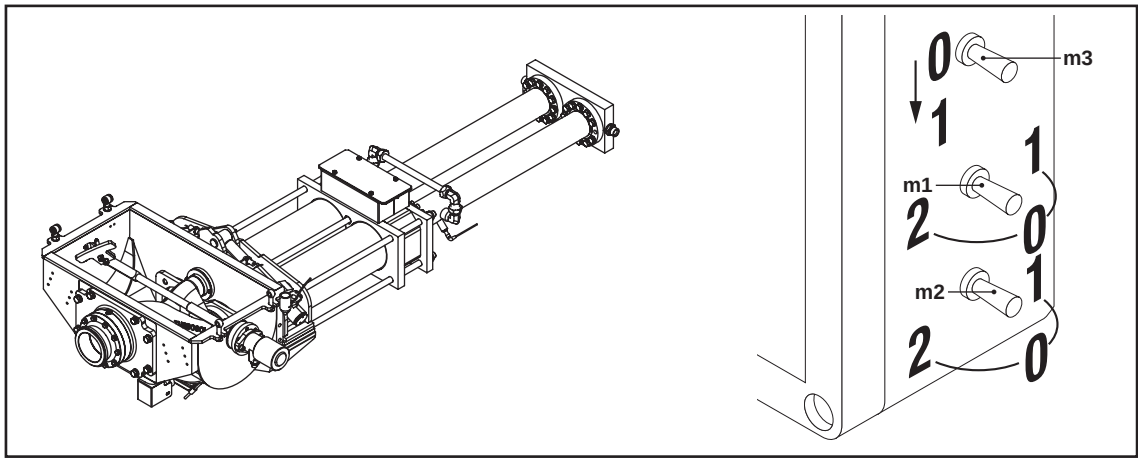


FIG.66

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;
lower the m3 lever and simultaneously 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 warn Turbosol service of the problem.

10.3 OPERATOR 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 display shows the wording EMERGENCY	• 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.
	Safety system intervention and display shows the intervened sensor	• Check the grid is properly closed and the hopper is blocked. The safety system blocks pumping when one of the sensors has the red LED on; when green, the safety system allows pumping.
	High hydraulic oil temperature.	• Top-up the hydraulic oil tank.
	Excessively high hydraulic oil temperature.	• 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.	• CCheck the mixer's solenoid valve wiring and relative relay (see wiring diagram).
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 (see paragraph 3.5 and 7.2).

PROBLEMS	CAUSES	SOLUTIONS
PRESSURE DROP ON MANOMETER OR REPEATED S VALVE CLOGGINGS	The S valve shows play with the wear plate.	• Replace the wear plate or wear disc.
THE VIBRATING SCREEN DOES NOT	Function not active on the control board.	• Activate function from control board.

WORK	No electric power supply.	• Check wiring, the electric plug is correctly inserted and operation of relative relay (see wiring diagram).
THE HIGH PRESSURE WATER JET MACHINE DOES NOT WORK	Function not active on the control board.	• Activate function from control board.
	Water is not reaching the pump.	• Check the water intake piping is not bent or crushed. Place the water tank at an adequate height. Eventually prime the pump.
	Water pump control solenoid valve fault. Check the relative LED switches on.	• Check solenoid valve and relative control relay wiring (see wiring diagram).
LOW BRAKING SYSTEM PERFORMANCE	The tube fully retracts.	• Check brakes' calibration.
	Brake linings not run in.	• Eliminates itself after a few brakes.
	Faulty brake linings.	• Replace brake linings.
	Low performance due to excessive friction, rust forming on piston.	• Make all transmission parts and linkage smooth, lubricate.
STIFF OR BLOCKED REVERSE GEAR	Occurs when the plant's registration is excessively tensioned.	• Correctly register.
	Blocked reverse gear lever.	• Clean and oil the mobile parts.
OVERHEATING OF BRAKES IN START DIRECTION	Incorrect calibration.	• Calibrate.
	The braking system does not perfectly open in start direction.	• Release the hand brake.
	Blocked idler.	• Make all transmission parts and linkage smooth, lubricate road frame mobile parts.
	Bent rod support.	• Check rod support.
	Dirty brake.	• Clean.
	Bent brake rope.	• Replace.
	Rust in drum.	• Replace drum and brake linings if required.
PARKING BRAKE NOT EFFICIENT	Incorrect calibration and/or excessive play in linkage.	• Calibrate.
	Brake linings not run in.	• Eliminates on its own.
	Excessive friction between mobile components.	• Make all transmission parts and linkage smooth, lubricate.
	Faulty gas spring.	• Replace gas spring.
IRREGULAR AND JOG BRAKING	Excessive play in braking system.	• Calibrate.
	Faulty shock absorber.	• Replace shock absorber.
THE TRAILER EXCESSIVELY BRAKES WHEN DECELERATING	Faulty shock absorber.	• Replace shock absorber.
EXCESSIVELY STIFF HEIGHT ADJUSTMENT	Blocked beverage joints.	• Release, clean, lubricate and calibrate joints. Fastening torque 70 Nm.
NO BALANCE	Weak or faulty gas spring.	• Replace gas spring.

11.1 RESPONSIBILITY

The machine manager must ensure whoever works on it knows this use and maintenance manual instructions and have been specifically trained to correctly execute the operations highlighted herein.
The Manufacturer warranty becomes void if the machinery is not used in accordance with this manual's instructions, that must always accompany the machine.
The machine operator must be educated and trained on its use and operation, must sign this use and maintenance manual next to the wording "read and approved".
On the contrary, it is forbidden to work with this machine.

Signature of manager _____

Read and approved _____

Signature of operator _____

Read and approved _____

11.2 WARRANTY

The Turbosol Produzione S.p.A. machines are guaranteed for a 12 (twelve) month period or 1000 hours of work - whichever occurs first - starting from the machine's delivery date to the Final user and, however, not beyond 18 (eighteen) months from their shipment date. The machine's delivery date to the Final user must be reported on the warranty certificate that must accompany all newly manufactured machines.
The warranty is only valid if the Manufacturing Company receives the warranty certificate card, duly completed and underwritten by the Purchaser, within 30 days from machine delivery date.
The warranty is against any manufacturing or material defect.
The goods supplied by Turbosol Produzione S.p.A. but manufactured by third party, are covered by the warranty granted by the latter to Turbosol and that is applied to the Final user.
Only the Manufacturing Company and the Organisations expressely authorised by it, can intervene in the event of faults during the warranty period. The Final user must ensure the machine reaches said Organisations during normal working hours.
The faulty pieces must be sent to the Manufacturing Company ex works, which commits to gratuitously repair or replace those parts that, at its undisputable judgement, show quality vices. The replaced parts remain the Manufacturer's property.
The Purchaser is responsible for the material shipment expenses and those relating to the Manufacturing Company's personnel intervention, if required.
The repair or replacement supply will not extend or renew the overall warranty period. Parts subject to normal wear or inducible deterioration are excluded from the warranty, such as: valves seats and rubber ball valves, pistons and jackets, rubber stators and screws, bushes, deflectors, mixing blades, tanks protection armour, wear cones and plates, filters, etc.
The Purchaser looses the warranty right if the payment conditions are not observed, even if only once, if the declared faults are caused: by the Purchaser's, its employees' or third party acts, when the fault depends on bad use, incorrect installation, improper use or non-conform with the use and maintenance manual instructions received with the machine.
The warranty becomes void if the injection systems are damaged by unsuitable or polluted fuel, in the even of faulty electrical systems due to unsuitable power supply or components like relay, condensers, remote switches, remote controls, etc.: only the supplier warranty applies to these.
The warranty also becomes void due to arbitrary tampering, use of non-original spare parts or different rubber piping to that supplied by the Manufacturing Company.
The Manufacturing Company is not responsible for any liability due to the impossibility of using the product or damages due to work interruption or, direct or indirect, profit losses for damages also caused by the removal of casings or protection carters from the moving parts and safety mechanisms.
Vices and defects must be reported in writing to the Manufacturer within the legal terms.
Refer to the original text in Italian in the event of disputed interpretation of the above clauses.