



# USE AND MAINTENANCE MANUAL



## T20X

IS16/09 - 561400



Serial number

Year

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## 1 - GENERAL INFORMATION

Dear Customer

Congratulations on your purchase of a TURBOSOL machine. Our long experience, attention to the needs of users and the continuous technological research allow us to offer high quality machines, reliable and long-lasting.

Even if you have used this type of machine before, it is extremely important to be informed on the operation and features by the TURBOSOL PRODUZIONE S.p.A. authorised technicians or by your Dealer, once delivered. By following these guidelines, you will know how to get the best performances from this machine.

For any information, please contact the TURBOSOL PRODUZIONE S.P.A. Assistance Service.



### **Turbosol Produzione S.p.A.**

Via Alessandro Volta, 1

31030 Pero di Breda di Piave (TV) - ITALIA

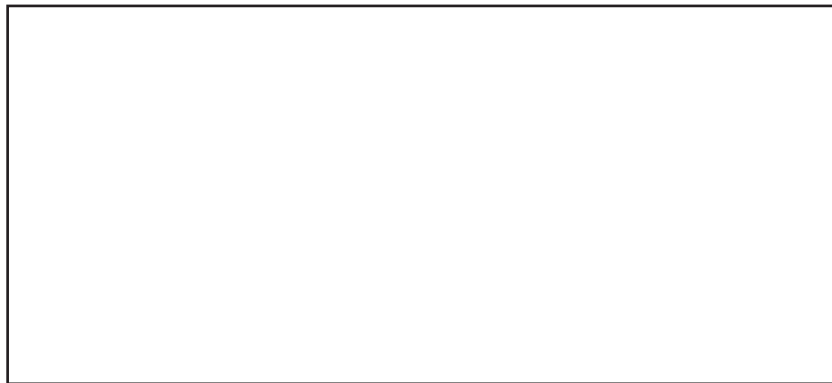
Tel. +39 0422 90251

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website: [www.turbosol.it](http://www.turbosol.it)

e-mail: [info@turbosol.it](mailto:info@turbosol.it)

You can also contact your Dealer or local Assistance Service.

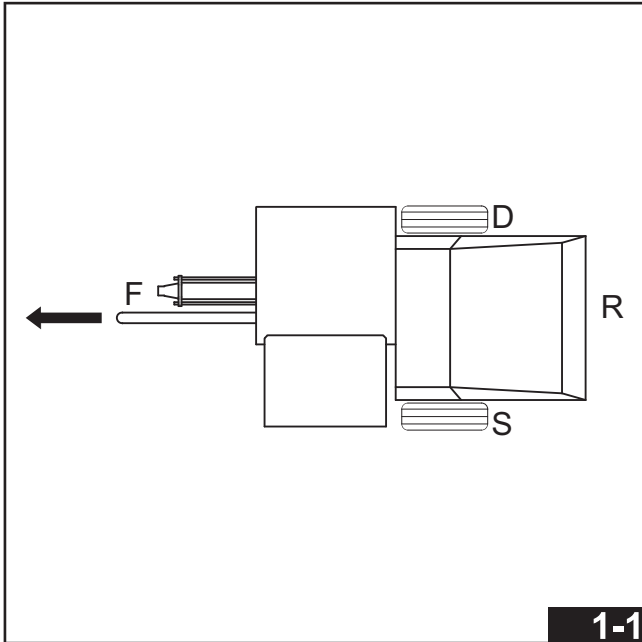




## 1.1 MACHINE IDENTIFICATION

### 1.1.1 Machine orientation

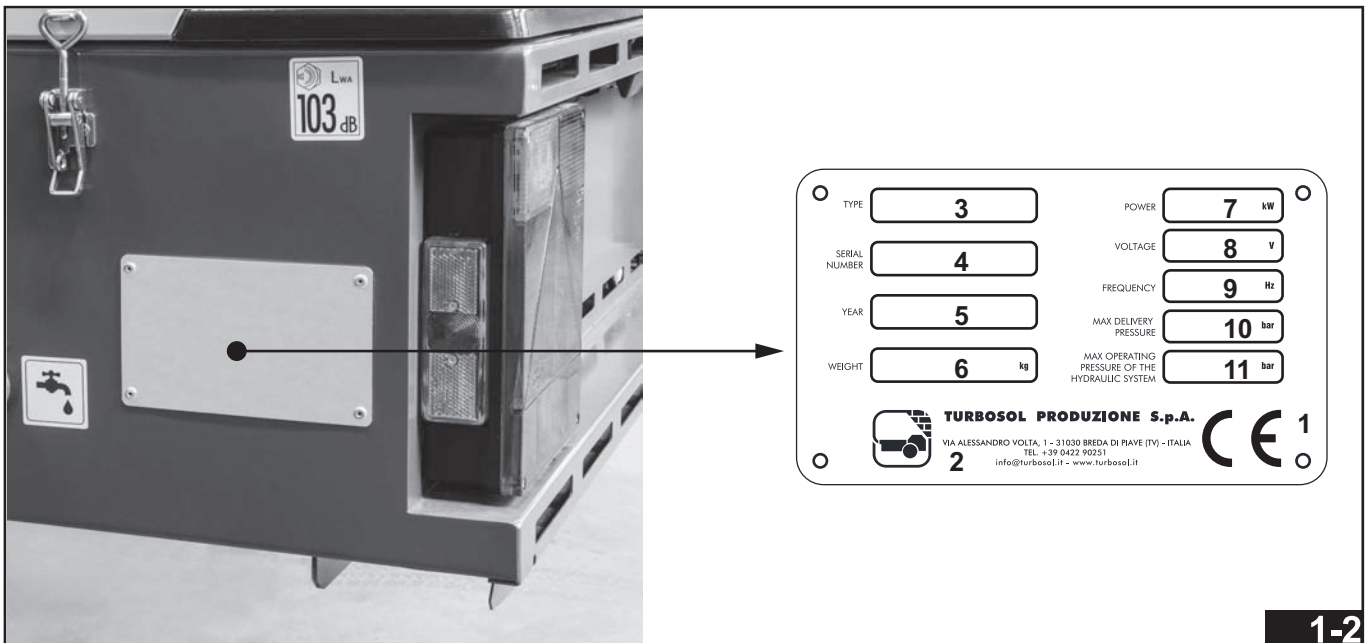
Front F, rear R, left side S and right side D refer to the running direction of the machine.



### 1.1.2 Machine plate

The machine plate is affixed on the rear of the left side. It bears the following information:

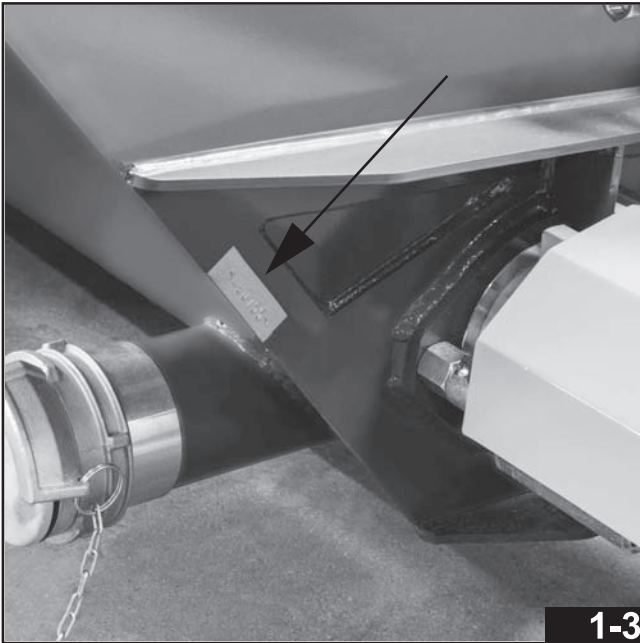
- |   |                                      |
|---|--------------------------------------|
| 1 CE Marking                              | 7 Installed power                    |
| 2 Manufacturer's company name and address | 8 Power voltage                      |
| 3 Type                                    | 9 Frequency                          |
| 4 Serial no.                              | 10 Maximum pumping pressure          |
| 5 Year of manufacture                     | 11 Maximum hydraulic system pressure |
| 6 Weight                                  |                                      |



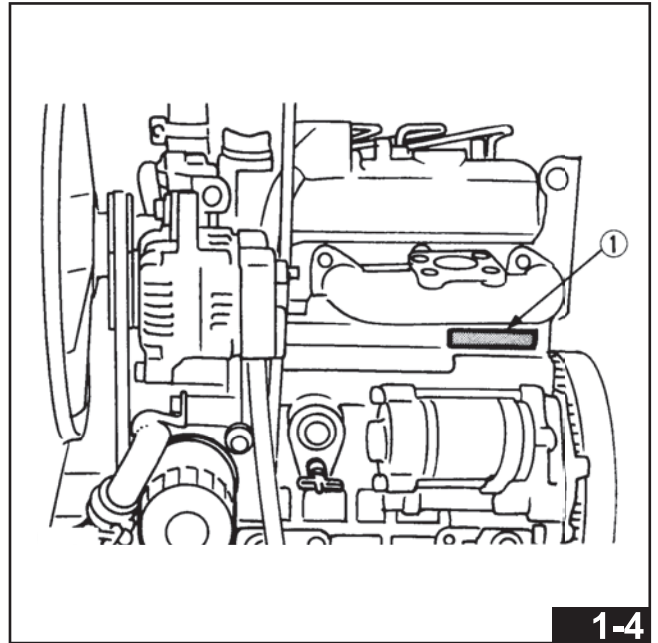


### 1.1.3 Machine and engine serial number

In addition to being indicated on the factory plate, the machine serial number is stamped on the chassis (Fig. 1-3). Engine serial number 1 is imprinted on the base (Fig. 1-4).



1-3

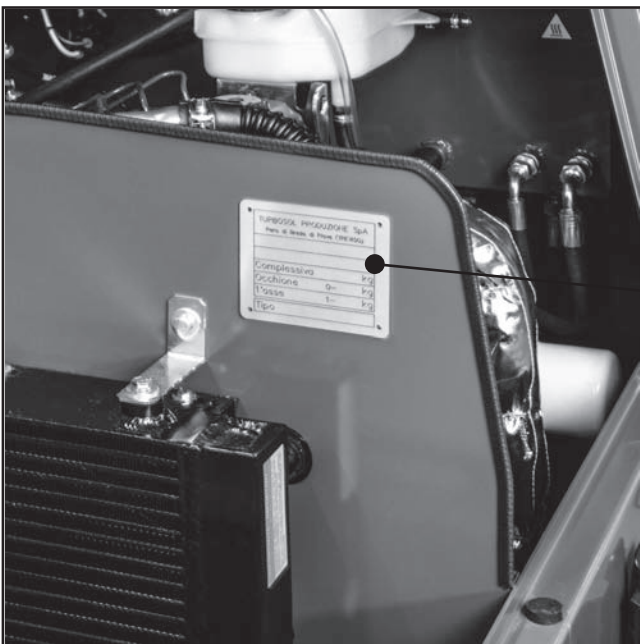


1-4

### 1.1.4 Road trailer identification plate

If the machine has been approved as road trailer, the identification data is shown in plate 1 positioned inside the bonnet, above the radiator. It bears the following data:

- |  |  |
|--|--|
| 1 CE Approval no.                                | 4 Technically permissible maximum mass on the coupling point |
| 2 Service identification no.                     | 5 Technically permissible maximum mass on the axis           |
| 3 Technically permissible maximum full load mass | 6 Machine model  |



TURBOSOL PRODUZIONE SpA Pero di Breda di Piave (TREVISO)	
<b>1</b>	
<b>2</b>	
Complessiva	<b>3</b> kg
Occhione	0- <b>4</b> kg
1°asse	1- <b>5</b> kg
Tipo	<b>6</b>

1-5



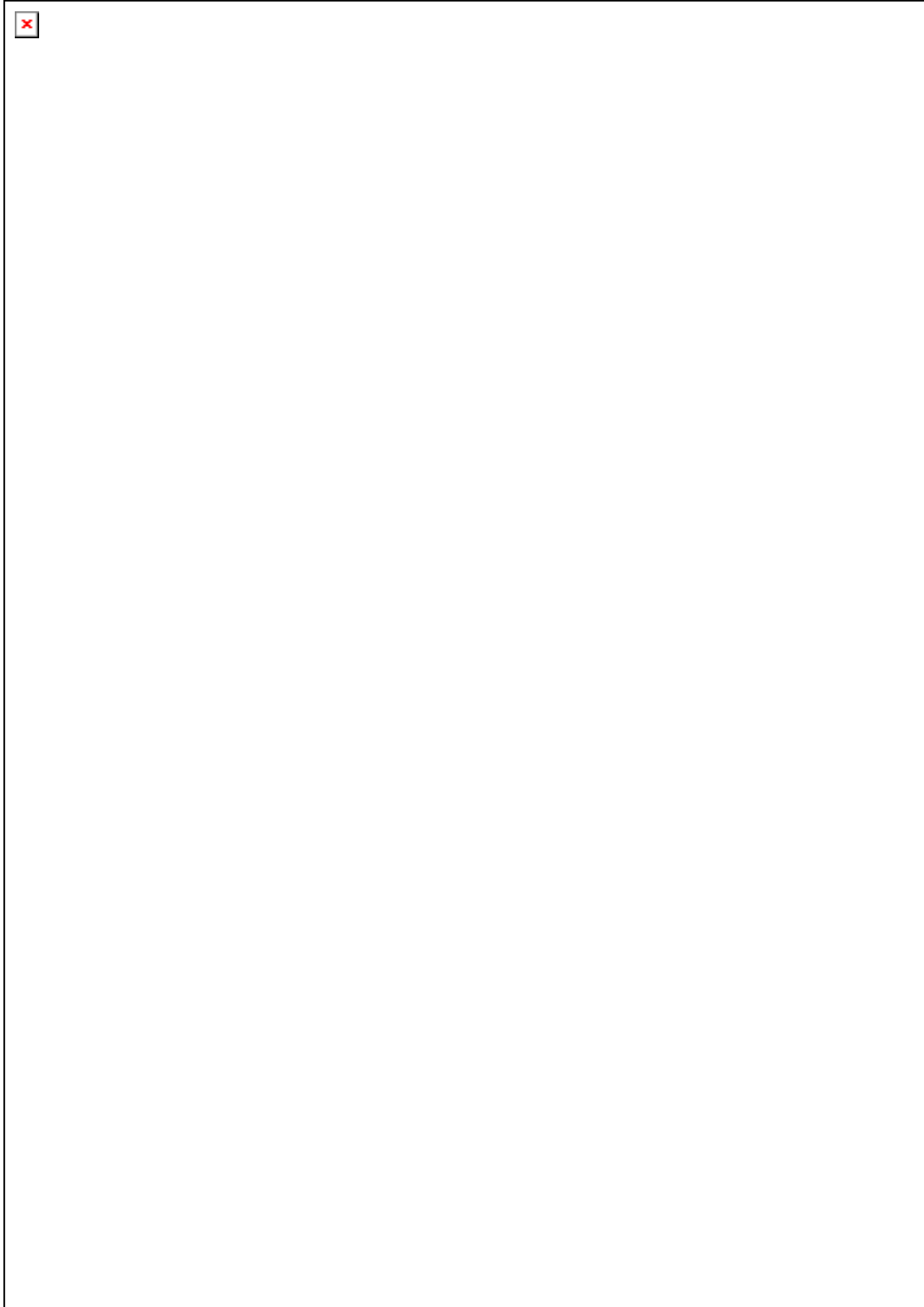


**1.2 DOCUMENTATION ACCOMPANYING THE MACHINE**

The machine is delivered with the following documentation:

- Use and Maintenance Manual
- EC Declaration of Conformity
- S.P.C.
- Warranty certificate
- Engine Use and Maintenance Manual
- Trailer booklet
- System diagrams

**1.3 EC DECLARATION OF CONFORMITY (FACSIMILE)**





## 1.4 WARRANTY LIMITS

Turbosol Produzione S.p.A. machines are covered by a warranty for a 12 (twelve) month period or 1000 hours of work - whichever occurs first - starting from the delivery date of the machine 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 signed by the purchaser, within 30 days from the machine delivery date. The warranty covers any manufacturing or material defects. The goods supplied by Turbosol Produzione S.p.A. but manufactured by third parties 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 expressly authorised by it can intervene in the event of faults during the warranty period. The faulty pieces must be sent to the Manufacturing Company ex works, which commits to gratuitously repair or replace those parts that, at its indisputable judgement, show quality defects. The faulty pieces must be sent to the Manufacturing Company ex works, which commits to gratuitously repair or replace those parts that, at its indisputable judgement, show quality defects. The replaced parts remain the manufacturer's property. The purchaser is responsible for the material shipment expenses and those relating to servicing by the Manufacturing Company's personnel, 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, flaps, mixing blades, tanks protection armour, wear cones and plates, filters, etc. The purchaser loses the right to the warranty if the payment conditions are not respected, even only once, should the declared faults be caused: by the actions of the Purchaser, its employees or third parties, when the defect depends on bad use, incorrect installation, improper use or use that is not compliant with the instructions in the use and maintenance manuals received with the machine. The warranty becomes void if the injection systems are damaged by unsuitable or polluted fuel, in the event of faulty electrical systems due to unsuitable power supply or components like relays, 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 rubber hoses different to those supplied by the Manufacturing Company. The Manufacturing Company is not responsible for any damage caused by the impossibility of using the product or damage 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. Flaws 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.

## 1.5 SPARE PARTS AND DUPLICATES OF DOCUMENTS

The request for spare parts must be submitted to the Dealer or directly to TURBOSOL PRODUZIONE S.p.A., always indicating:

- the identification date of the machine shown on the factory plate: type of machine, serial number, year of manufacture;
- component code and description, found on the S.P.C.;
- the required quantity.

When requesting spare parts of components not manufactured by TURBOSOL PRODUZIONE S.P.A., provide the data on the relative rating plates.



***Repairs, maintenance and replacements of components not compliant with that indicated in this Manual and/or performed by untrained/unauthorised personnel exclude the owner from any warranty claim and relieve the Manufacturer from all liability for malfunctioning of the machine and any resulting consequences.***

The request for duplicates of the documentation accompanying the machine must be submitted to TURBOSOL PRODUZIONE S.p.A., always indicating:

- the identification date of the machine shown on the factory plate: type of machine, serial number, year of manufacture;
- reason of the request.



## 1.6 INFORMATION FOR CONSULTATION

This paragraph contains information useful for the understanding of the text in this Manual.

### 1.6.1 Unit of measurement

The I.S. (Internal System) has been adopted for the unit of measurement.

SIZE	UNIT	DEFINITION	ALTERNATIVE UNIT OF MEASUREMENT
Time	s	second	min (minute, 1 min = 60 s), h (hour, 1 h=3600 s)
Length	m	metre	mm (millimetre, 1 mm=0,001 m)
Temperature	°C	celsius degree	°F (Fahrenheit degree, °F =°C×1.8+32)
Volume	m <sup>3</sup>	cubic metre	l (litre, 1 l=0,001 m <sup>3</sup> ); gal (gallon; 1 l = 0,21997 gal)
Power	kW	kilowatt	Hp (horsepower, 1 kW = 1,341022 Hp)
Electric voltage	V	volt	-
Electric current	A	ampere	-
Frequency	Hz	hertz	-
Pressure	bar	-	MPa (1 MPa = 10 bar); PSI (1 bar = 14,50377 PSI)
Flow rate	m <sup>3</sup> /h	-	l/min (1 l/min = 0,06 m <sup>3</sup> /h)
Sound emission	dB	decibel	-

Tab. 1-1

### 1.6.2 References

The figures are sequentially numbered by chapter. The indication is placed bottom-right of the box; e.g. 2-1 indicates that it is the figure 1 of chapter 2. The figures follow the relative description. In this case, if there are no interpretative doubts, it is omitted in the text preceding the reference to the figure. Where reference is made to the figure of another part of the Manual, the reference is complete, for example, Fig. 2-1.4 indicates part 4 of figure 1 of chapter 2.

The tables are sequentially numbered by chapter. The indication is placed under the table; e.g. Tab. 4-9 indicates table 9 of the fourth chapter.

### 1.6.3 Apexes

2	square
3	cube
-1	reciprocal

### 1.6.4 Abbreviations and acronyms

S.P.C.	<b>S</b> pare <b>P</b> art <b>C</b> atalogue	min.	minimum
~,approx.	approximately	U.M.M.	<b>U</b> se and <b>M</b> aintenance <b>M</b> anual
chap.	chapter	no.	number
P.P.E.	<b>P</b> ersonal <b>P</b> rotective <b>E</b> quipment	p.	page
rh	right	R.R.	<b>R</b> esidual <b>R</b> isk
e.g.	example	§	paragraph
etc.	etcetera	lh	left
fig.	figure	s/n	serial number
max.	maximum	tab.	table

### 1.6.5 Symbols

	Conformity marking according to law.		It indicates the operator activity.
	By observing these safety precautions, the operator prevents possible damage caused by the presence of dangerous situations.		It indicates the maintenance the activity.
	It indicates behavioural rules to avoid the generation of dangerous situations.		Correct.
	It indicates particular information/instructions for machine use.		Incorrect.



## 2 - MACHINE PRESENTATION

### 2.1 TECHNICAL DATA

PIPING FOR MORTAR CONVEYOR <sup>1</sup>		Ø <sub>I</sub> /Ø <sub>E</sub>		
		25/37	35/49	50/66
Nominal diameter	DN	25	35	50
Maximum operating pressure	bar	35	35	35
Connections	Type	Camlock		
	DN-DN	35M-25M	50M-35F 35M-35F	50M-50F

<sup>1</sup> Supplied with the machine

SCREW PUMPS' PERFORMANCE		2L6 <sup>1</sup>	2L7	T25	60.12
Maximum granulometry	mm	4÷6	8÷10	8÷10	8÷10
Maximum theoretical output <sup>2</sup>	l/min	60	60	70	180
Maximum theoretical pressure <sup>3</sup>	bar	40	30	25	30
Maximum pumping distance <sup>4</sup>	m	80÷100	60÷80	60÷80	80÷100
Maximum serviced height <sup>4</sup>	m	50÷60	30÷40	30÷40	40÷50
Pipe connection for machine transportation	Type/DN	Camlock/50F			

<sup>1</sup> Standard pump.

<sup>2</sup> Indicative maximum flow rate for new pump. The maximum flow rate depends on the type of mortar.

<sup>3</sup> Indicative maximum pressure for new pump.

<sup>4</sup> Maximum pumping distance and serviced height depend on the type of mortar and cannot be achieved simultaneously.

MACHINE PERFORMANCE			
Screw pump maximum speed		min <sup>-1</sup>	220
Mixer speed	At MAX/min engine speed	min <sup>-1</sup>	50/40

ENGINE			
<b>KUBOTA D1105</b>	Power	kW	16.3
	MAX/min speed	min <sup>-1</sup>	2600/2000
	Cooling	liquid	
	Intake	natural intake	
	Specific consumption	l/h	5
	Exhaust gas emissions	m <sup>3</sup> /h	191.7
	Approval	97/68/CE Stage III A	

ELECTRICAL SYSTEM			
Power voltage		Vdc	12
Fuse flow rate (on positive pole)		A	50
Battery		12V 60A 540Ah (EN)	

HYDRAULIC SYSTEM			
<b>Closed-loop power transmission for mortar pump</b>			
Pressure reducer valve calibration		bar	210
Maximum pump displacement regulator pressure		bar	18
Adjustment start pressure of pump displacement regulator		bar	6
<b>Circuit for mortar mixing and high pressure washer</b>			
Pressure reducer valve calibration		bar	190
<b>Feed circuit for mixer lifting</b>			
Pressure reducer valve calibration		bar	180

PNEUMATIC SYSTEM			
Compressor	Cylinders	no.	2
	Flow rate	l/min	400
Pressure reducer valve calibration		bar	5.5
Pilot valve calibration		bar	3.5
Pressure switch calibration		bar	3
Pneumatic piping	Fitting type	-	Geka
	Ø <sub>I</sub> /Ø <sub>E</sub>	mm	13/19
	Rated pressure	bar	20

WATER SYSTEM FOR MIXING WATER (Optional)			
Mixing water dispenser		l	50
Maximum pressure admitted at intake		bar	5
Minimum pressure admitted at intake		bar	0.5
Infeed fitting type		-	Geka



HIGH WASHER PRESSURE (Optional)		
Maximum pressure	bar	120
Standard nozzle	-	1504 G1/4
Rated flow rate	l/min	10
Minimum intake flow rate required	l/min	14
Maximum water intake pressure	bar	5
Maximum priming depth	m	0.5
Maximum water temperature	°C	60
Minimum water temperature	°C	5

DIMENSIONS AND WEIGHTS			
Tipping mixer	Rated capacity	l	240
	Flow rate	kg	400
	Loading height	mm	800
Hopper	Rated capacity	l	250
	Loading height	mm	850
Length	Minimum <sup>1</sup>	mm	2830
	In towing position	mm	3200
Width		mm	1480
Height		mm	1216
Unladen weight		kg	746

<sup>1</sup> Up to the delivery fitting of the mortar pump

OVERHEAD NOISE EMISSIONS <sup>1</sup> (in compliance with 2006/42/EC and UNI EN 12001:2012, Annex C)				
L <sub>w</sub>	Sound power level		dB	101
L <sub>WA</sub>	A-weighted sound power level		dB	103
L <sub>p</sub>	A-weighted emission sound pressure level	Control board front	dB	86
		Mixer front	dB	84

VIBRATION EMISSIONS <sup>1</sup> (in compliance with UNI EN 12096:1999)		2L6-2L7	T25	60.12	
A <sub>w, sum</sub>	Total vibration value to which the hand-arm system is exposed	m/s <sup>2</sup>	4.8	<2,5	<2,5
	Measurement uncertainty	m/s <sup>2</sup>	1.9	0.9	0.9

ROAD TRAILER <sup>1</sup>			
Limits of use	Maximum speed (Italian territory) <sup>1,2</sup>	km/h	110
	Max. horizontal coupling angle	Degrees	±20
	Max. vertical coupling angle	Degrees	±25
	Rated weight on coupling system	kg	35
	Maximum weight on coupling system	kg	75
Lighting	Power supply	Vdc	12
	Connection poles	no.	7
Tyres <sup>3</sup>	Type	-	145/80 R13 75T
	Class	-	C1
	Rolling resistance	kg/t	≤10.5 (F or higher)
	Wet grip	-	≥1.1 (E or higher)
	Rolling noise	dB	≤73
	Maximum inflating pressure	kPa	300
	Tightening torque of rim at hub	Nm	90

<sup>1</sup> The shown data refer to the European approval issued by the Italian Ministry of Transport. The approval is only valid for the machine set-up with pump 2L6 and T25.

<sup>2</sup> Respect the speed limits admitted in the country of use.

<sup>3</sup> The data refer to standard tyres.

SERVICE CONDITIONS			
Work environment		-	Construction site, outdoor
Supporting ground conditions		-	Horizontal
Load-bearing capacity of the supporting ground		kN/m <sup>2</sup>	>300 <sup>1</sup>
Gradient allowed during operation	Longitudinal	Degrees	±5
	Transversal	Degrees	±5
Room temperature	Operational conditions	°C	5<T<40
	Transport and storage	°C	-15<T<55 <sup>2</sup>
Minimum lighting required for operation		lux	500
Maximum altitude a.s.l. without sensitive loss of performance		m	1000

<sup>1</sup> For soil with less compactness a support plate is required under the outrigger base, suitably sized for the weight of the machine under working conditions and compactness of the soil.

<sup>2</sup> For periods of less than 24 h, it is possible to have temperatures of up to +70°C.



FUEL AND LUBRICANTS		
Fuel	Type <sup>1</sup>	Lower or very low sulphur content
	Tank capacity	l 15
Engine oil	Type	TOTAL RUBIA TDI 15W40
	Quantity	l ~4,3
Cooling liquid	Composition	50% water <sup>2</sup> + 50% anti-freeze
	Anti-freeze	TOTAL GLACELF T
	System total	l ~5.5
Hydraulic oil	Type	LUBRA OLEODIN HIVS 46
	Tank capacity <sup>3</sup>	l 17
	System total	l ~20
Compressor oil	Type	TOTAL DACNIS 150
	Quantity	l 1.1
High pressure washer oil	Type	MOBIL MOBILFLUID 422
	Quantity	l 0.18
Grease for mortar pump <sup>4</sup>		MICHELIN Graisse Tigre 80 or Petroleum jelly.
Grease for general use		NLGI Grado 2
Recommended lubricant oil		TOTAL CIRKAN C 100

<sup>1</sup> Fuels with a high sulphur content may be used following the instructions given in the Engine manual.

<sup>2</sup> Soft or distilled water.

<sup>3</sup> Half-way on the level indicator.

<sup>4</sup> Do not use mineral oils or grease, as they deteriorate the stator rubber.

## 2.2 TYPE OF MACHINE

The T20X is a stationary machine for the transportation, distribution and projection of mortar. It is used autonomously and independently and is only intended for professional operators.

## 2.3 OPERATION

The premixed bags (or conglomerate individual components) are manually loaded inside the tipping mixer, in which the mixture is created with the right consistency to be pumped. Once ready, it is unloaded into the hopper by mechanically tipping the tipping mixer.

The worm pump transfers the conglomerate through the conveying pipe to the place of projection or distribution. Projection takes place thanks to a gun.

The main machine commands are grouped on its structure, in a position that allows the operator maximum efficiency in preparing the mixture.

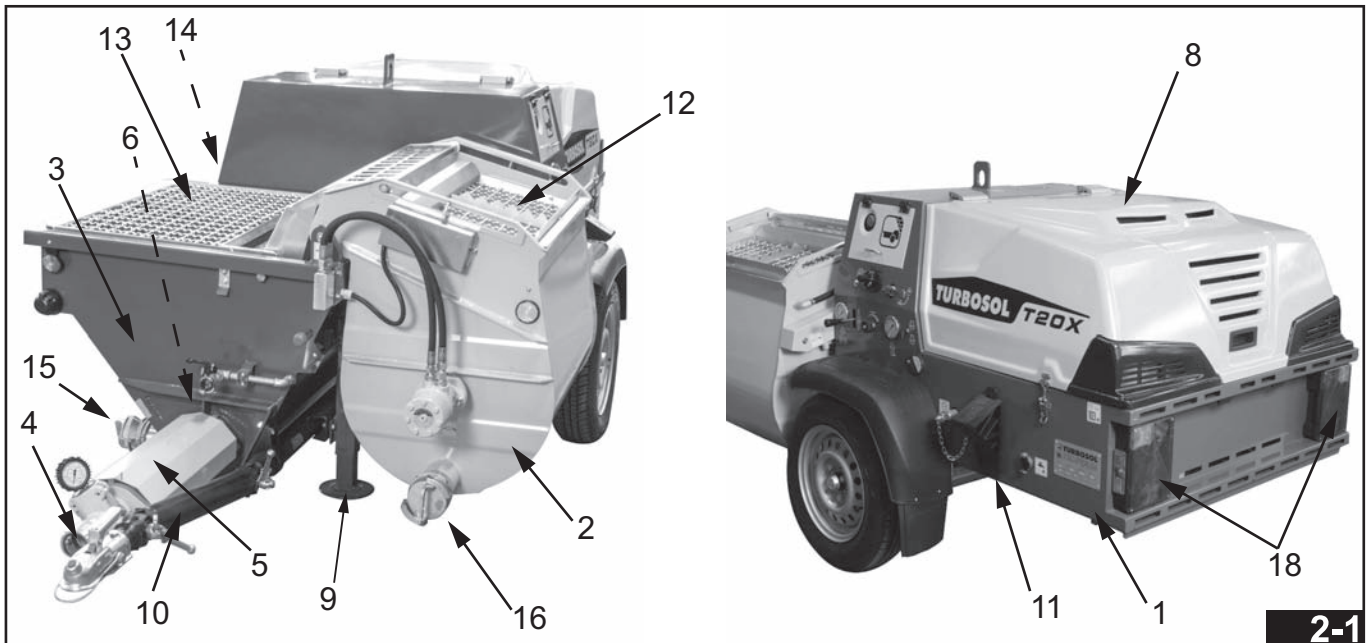
Beneath the bonnet are the machine integrated system, such as the internal combustion engine, electrical, hydraulic, pneumatic and water systems.

The operators generally involved are two and occupy different workstations: the first and main operator is on the machine, in charge of its running and supervision and creation of the mixture; the second operator (generally working at the same time as the first) is in charge of the distribution or projection on the place intended for such activities.



## 2.4 MAIN COMPONENTS OF THE MACHINE

- |                                       |   |
|---------------------------------------|---|
| 1 Structure                           | 10 Drawbar                                  |
| 2 Tipping mixer                       | 11 Parking wedges                           |
| 3 Hopper                              | 12 Safety grid of the mixer                 |
| 4 Pipe connection for mortar conveyor | 13 Safety grid of the hopper                |
| 5 Screw pump                          | 14 Remote control socket (wired, via radio) |
| 6 Agitator                            | 15 Hopper washing fluid drain area          |
| 7 Control board on the machine        | 16 Mixer washing fluid drain area           |
| 8 Bonnet                              | 17 Plate housing (as road trailer)          |
| 9 Outrigger                           | 18 Rear lights (as road trailer)            |



## 2.5 APPLICATION EXAMPLES

- Spraying of common, ready-mixed, insulating and fire-proof plasters.
- Transport of liquid or semi-liquid materials, common or ready-mixed mortar for masonry, special mortar, aerated concrete, lightweight concrete and cement or anhydride-based self-levelling screeds.
- Spraying of concrete or grout added with setting accelerator.
- Rendering.
- Spraying of thick cement and grout mortar on reinforced masonry with electrowelded net panels.
- Structural restoration of concrete.
- Concrete restoration with pouring or casting.

## 2.6 SET-UPS

The machine was designed for the distribution and projection of a wide range of materials and has various accessories (worm pumps, guns, pipes, etc.) to meet the most varied requirements: each application has its own needs.



**Contact your Dealer or TURBOSOL PRODUZIONE S.P.A. directly to configure the machine in the most suitable manner for the type of activities to be performed.**

### 2.6.1 Standard equipment

- 2L6 Pump
- 20 metre DN35 mortar conveying pipe with camlock fittings
- 10 metre DN35 mortar conveying pipe with camlock fittings
- 5 metre DN25 mortar conveying pipe with camlock fittings
- 20 metre DN13 air hose with quick couplings
- 16 metre DN13 air hose with quick couplings
- Ready-mixed gun with set of flaps
- Accessory box

**2.6.2 Set-up for traditional mortars**

- T25 pump kit
- 20 metre DN35 mortar conveying pipe with camlock fittings
- 10 metre DN35 mortar conveying pipe with camlock fittings
- 31 metre DN13 air hose with quick couplings
- Traditional mortar gun with set of flaps
- Accessory box

**2.6.3 Set-up for self-levelling screeds**

- 60.12 pump kit
- 20 metre DN50 mortar conveying pipe with camlock fittings
- 10 metre DN35 mortar conveying pipe with camlock fittings
- Accessory box with nozzle

**2.6.4 Optionals**

- Gun for thick layer ready-mixed plaster
- Guns for plastering joints and filling escapes
- Device for injecting cement slurries
- Sieve with electric vibrator
- Water system for mixing water
- High pressure washer
- Wired-remote control (Pumping/pumping reverse/Stop and emergency stop button)
- Radio remote control (Pumping/pumping reverse/Stop and emergency stop button)







### 3 - SAFETY AND PREVENTION



*Prescriptions can be found in the Manual and on the machine, whose purpose is to prevent potential dangers and warn about residual risks. It is important to read and understand them. In case of incomprehensions, please contact the Manufacturer or Dealer.*



*When a machine is properly used and maintained, it is a safe machine to work with.*



*Do not use the machine if you are not sure of what you are doing.*

#### 3.1 DEFINITIONS

<b>Damage</b>	Physical injury or health damage
<b>Danger</b>	Potential source of damage
<b>Dangerous area</b>	All spaces inside and/or around the machine in which a person may be exposed to a danger
<b>Residual Risk</b>	Risk that remains after taking protective measures
<b>Intended use</b>	Machine use in compliance with the information on use provided in the instructions
<b>Improper use</b>	Incorrect use that does not determined potential accidents
<b>Incorrect use</b>	Prohibited use that if implemented creates a danger
<b>Machine off</b>	Condition in which the engine(s) is stopped and/or the power supply disconnected
<b>Machine cold</b>	Condition in which the engine is turned off by at least two hours

#### 3.2 IMPORTANCE OF THE MANUAL

This Use and Maintenance Manual (hereinafter simply referred to as Manual, if there are no ambiguities of interpretation), was drawn up in compliance with Directive 2006/42/EC. The original Manual language is Italian; the other languages are the translation of the original.



*Read the entire Manual before using the machine for the first time: the instructions are basic requirements for the safe use of the product.*

The Manual has been organised to better train the operator to use the machine. The Manufacturer has carefully supervised the preparation of the Manual; however, should the operator find it difficult to understand what has been described, please request the necessary explanations from the Manufacturer, Employer or Dealer. Incorrect personal interpretations may affect the use of the machine. The operator must pay the utmost attention to the safety aspects during use and maintenance; he/she must observe the warnings in the Manual and on the machine. The operator must act fully aware of his/her actions, which is essential in respecting the health and safety criteria required by the EU Directives and the relevant national regulations.

The Manual is an integral part of the machine and must be kept with care; it must always be available at the workplace and accessible to anyone appointed to perform activities on the machine. Replace the Manual if lost, damaged or no longer legible.

The instructions in the Manual must be integrated with the laws on safety at work and on respecting the environment. The Manufacturer declines every liability for injuries to persons, damages to animals or property due to the non-compliance with this Manual.

The illustrations in this publication are for the basic understanding of the concepts exposed and may differ from reality.

With the aim of continuously improving the product, the Manufacturer reserves the right to make changes without prior notice.

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### 3.3 RECIPIENTS OF USE

The machine was designed to be operated by the following professional figures:

#### OPERATOR

Person trained and informed on residual risks, who deals with the supervision and running of the machine. Must be trained on the position of all control and safety commands. The operator must only work with active safety conditions. The operator is also trained to perform tooling tasks within the dangerous area, with the exclusive use of their hands or special tools provided with the machine. The operator must also know the user requirements of cement conglomerates provided by manufacturers through technical and safety data sheets of the product.

There are generally two operators involved and occupy different workstations:

- the first and main operator is on the machine;
- the second operator (generally working at the same time as the first) is in charge of the distribution or projection on the place intended for such activities.



***The operators must be able to communicate during the processing phases.***

The main operator tasks are:

- possible machine transportation to the site;
- selection of the workplace according to the service conditions;
- placing the machine;
- machine tooling for the work phases (piping connection, refuelling, etc.) and preliminary checks before starting the machine;
- running the machine;
- creating the mixture;
- machine supervision during the work phases, including cleaning;
- cleaning the machine;
- routine maintenance of the machine.

A second operator is required during the distribution and projection of the mortar, whose tasks are:

- distribution or projection of the mortar;
- supervising the distribution or projection area.



***Additional personnel required for the performance of the work must be trained on the operations to be performed and informed on relevant residue risks.***

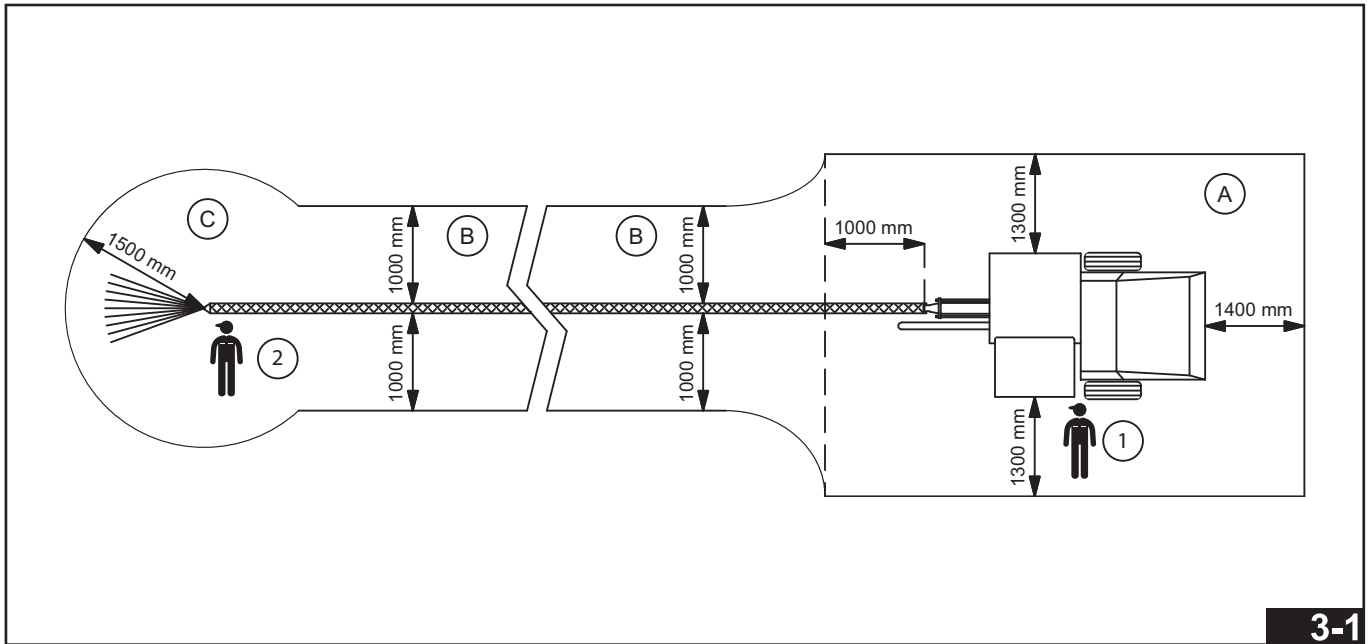
With reference to figure 3-1, the areas that can pose risks for the operator (dangerous areas) are:

- A - work and tooling area around the machine. This is also the area occupied by the operator during cleaning of the machine. During tooling the fixed guards are closed and locked, the mobile guards are closed or open with machine off. During the work phase under manual operating conditions, the fixed guards are closed and locked and the mobile guards closed.
- B - area in which the mortar conveying pipes and pneumatic piping were laid;
- C - area of distribution or projection of the mortar.

The usual operator positions are:

- 1 on the machine, in front of the mixer, for the preparation of the conglomerate and the machine running/supervision;
- 2 inside the area of distribution or projection of the mortar.

The figure also shows the minimum safety distances around the machine that delimit the area within which only the presence of personnel authorised by the user is permitted.



3-1

### MAINTENANCE TECHNICIAN

Qualified technical personnel in charge of the extraordinary maintenance of the machine. The maintenance technician is trained and informed on residual risks but with the safety skills of the maintenance personnel to whom the maintenance of the machine is entrusted, except for the internal combustion engine. The maintenance technician must perform all maintenance work which also occurs within the dangerous areas and with movements de-energised and stopped in guaranteed safety. The maintenance technician can also access the electric panel with the equipment live. Furthermore, the maintenance technician must be trained and specifically educated on the manually executable tooling activities or with the use of tools.

The extraordinary maintenance of the engine must be performed by qualified technicians and authorised by the engine Manufacturer. The maintenance technician must perform all maintenance work which also occurs within the dangerous areas and with movements de-energised and stopped in guaranteed safety. The maintenance technician can also access the electric panel with the equipment live. The maintenance technician must be trained and specifically educated on the manually executable tooling activities or with the use of tools.

Refer to the Engine manual for the engine extraordinary maintenance.

The machine maintenance technician tasks are:

- the tooling, calibration, adjustment, cleaning of the machine inner parts (with possible disassembly), maintenance, assistance interventions, troubleshooting, replacement of worn, deteriorated, structural parts (within the dangerous processing area of the machine, with fixed guards closed and locked and additional mobile guards closed or with mobile guards open and movement de-energised and stopped in guaranteed safety), or parts provided and indicated in the Manual.

The interventions can be, for example:

- a) preparing the machine for commissioning, or remove the blocks provided for transport, etc.;
  - b) commission the machine, if the manufacturer does not reserve to do it itself;
  - c) replace the fluid filters, etc.;
  - d) replace the elements subject to wear, including electrical components;
  - e) check the state of wear and if necessary replace the flexible hoses of the hydraulic, fluidic system, etc.
- clean the machine inner parts with possible disassembly, maintenance, lubrication, assistance interventions, troubleshooting, replacement of worn, deteriorated, structural parts (within the dangerous processing area, with fixed guards closed and locked and additional mobile guards closed or with mobile guards open and movement de-energised and stopped in guaranteed safety) or parts provided and indicated in the Manual;
  - perform the above interventions and as prescribed in the Manual, also removing the fixed guards or fastening systems of each active protection device.

The work area that may endanger the maintenance technician are:

- the area relating to the tooling, calibration, adjustment, repair, lubrication, troubleshooting and replacement of worn or deteriorated parts (parts provided and indicated in the Manual);
- the areas surrounding and inside the machine during the handling of mobile elements;
- the areas surrounding the electrical casings, electric cables, pipes;
- the maintenance area surrounding the engines and related kinematic transmission chains;
- the areas surrounding the fixed and mobile guards;
- the routine and extraordinary maintenance areas;
- the electrical equipment maintenance areas.



### 3.4 MAIN WARNINGS



*The user is responsible for training operators and maintenance technicians and properly implementing the instructions provided.*



*The use and maintenance of the machine are only permitted to professional, trained and authorised operators and maintenance technicians. The use of the machine is forbidden to people with disabilities and minors.*



*The Manual must be entirely read and understood before operating with the machine. It must always be available at the workplace and accessible to anyone appointed to perform operations on the machine.*



*Replace the Manual if lost, damaged or no longer legible.*



*The instructions in the Manual must be integrated with the laws on safety at work and on respecting the environment.*



*Observe the user requirements of the machine in all its life phases, including cleaning.*



*Only use the machine if in good technical condition and compliant with its intended use.*



*Under its normal, and reasonably predictable, operation the machine can only be used for the activities described in this Manual and with the materials (and substances) provided in the Manual and not for other materials (and substances).*



*No other type of use is permitted except for that described in this Manual; it is not permitted to use the machine beyond the provided limits. Do not perform changes, transformations or applications on the machine that might compromise its safety.*



*The machine must not be misused; in particular, it cannot be operated with different parameters to those specified and with materials sized or weighing more than the machine capacity.*



*The machine must not be incorrectly; in particular a) it must not work with the mobile and fixed protection guards open, not properly secured or removed; b) it must not work with the microswitches and safety interlocks deactivated and, in general, with any safety and/or protection device (mechanical, electrical) deactivated and/or not working; c) it must not work if the user has not adopted all measures concerning the elimination of the residual risks indicated in the Manual.*



*The operator must be in perfect physical and psychological condition to perform his work. Maintain a rational and normal behaviour while using the machine.*



*Do not consume alcohol or drugs before and while using the machine. Take care with medicines that may cause drowsiness.*



*Do not use devices (telephones, music players, etc.) that may divert your attention from machine use.*



*Loose clothing are source of danger. Wear suitable accident-prevention clothing. Do not wear necklaces or rings. Long hair must be kept gathered.*



*It is forbidden to climb on the machine.*



*Do not use open flames near the machine.*



*Always have a first aid kit and fire extinguisher at hand.*



*Observe the maintenance intervals indicated in chapter 6 of the Manual.*



*Only use original spare parts.*

### 3.5 SPECIAL WARNINGS FOR THE WORK PHASES

The following paragraphs take into consideration the residual risks present during the various work phases and the requirements to avoid them. There is also a list of additional warnings and information necessary for the safe use of the machine.

#### 3.5.1 Transport

##### 3.5.1.1 Residue risks

The transport operations always involve a residual risk especially due to impacts, running over and/or crushing. These operations require a considerable degree of attention by the workers.



*Transport the machine only if disconnected from the accessories (mortar conveying pipes, pneumatic pipes, remote control, etc.).*



*Transport the machine on vehicles of appropriate size and capacity. Secure the machine to the vehicle with suitable devices, in accordance with the highway code in the country of use. Also secure the accessories provided with the machine (pipes, accessory box, etc.). Avoid unexpected movements.*



*Use the drawbar to manually move the machine or hook the ball joint to an adequate device. No one, except the personnel appointed by the user, should be within the action range of the moving machine during transportation. The machine weight and the trailer limits of use are indicated in the technical data in § 2.1.*



*Machine handling on site must comply with the accident-prevention regulations in the country of use and with any further and additional ones of the site itself.*

##### 3.5.1.2 Additional warnings for transport as road trailer



*If the machine has been registered as road trailer and you want to tow it, you must observe the highway code. The machine cannot be used to transport load, not even accessories (pipes, guns, etc.).*



*The machine can be towed on the road only with mortar pump 2L6 or T25.*



*The driving style must be adequate to the traffic and road conditions.*



*The wear indicator on the joint handle shows the limit of wear (49 mm) of the ball of the towing vehicle. Check the wear indicator before every trip.*



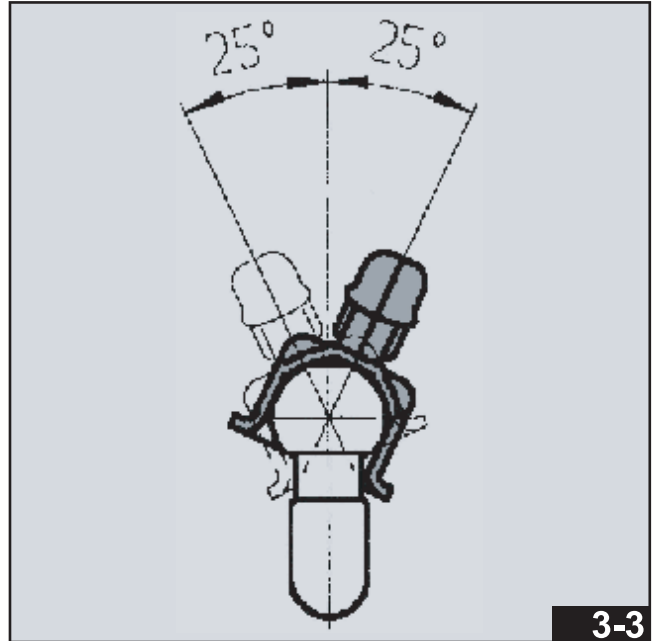
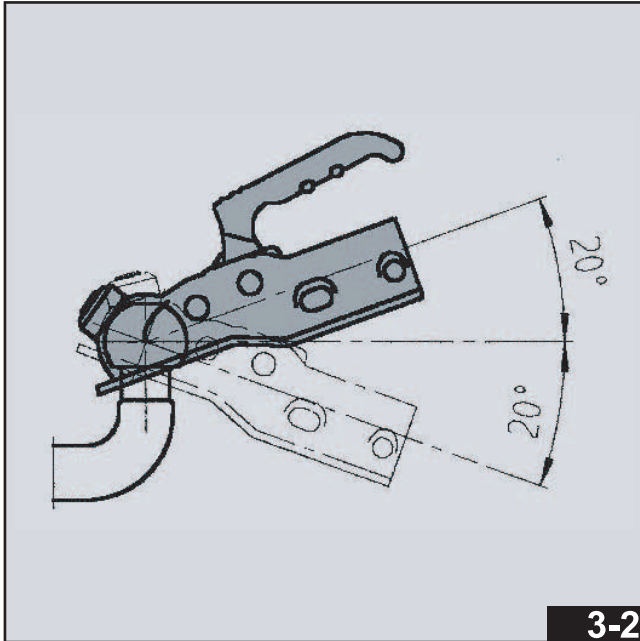
*Worn parts can cause the vehicle to behave abnormally and the joint to loose safety.*



**Make sure that the trailer is properly connected to the towing vehicle before every trip.**



**Observe the coupling angles of the ball joint: by overcoming these angles the components are excessively strained and the proper operation is no longer guaranteed (Horizontal  $\pm 20^\circ$  and vertical  $\pm 25^\circ$ ).**



**After the first trip and whenever a wheel is replaced: tighten the wheel fixing studs after a distance of at least 20 km and at most 100 km.**



**To reduce the formation of white rust on the galvanised parts of the trailer, keep the machine in a ventilated place; after winter trips, clean the galvanised components with clear water (e.g. steam jet).**



**All extraordinary maintenance, repairs and installation of new parts must be performed by personnel authorised by the trailer Manufacturer. Incorrectly replaced parts or defective can cause damage.**

#### 3.5.1.3 P.P.E. to be used





### 3.5.2 Lifting

#### 3.5.2.1 Residue risks

The lifting operations always involve a residual risk especially due to impacts, running over and/or crushing. These operations require a considerable degree of attention by the workers. The machine weight is given in the technical data in § 2.1.



***Do not stand underneath the suspended load.***



***No person should be near the machine during lifting.***

#### 3.5.2.2 Additional warnings



***Lift the machine only if clean.***



***Lift the machine only if disconnected from any device/accessory (mortar conveying pipes, pneumatic pipes, wired-remote control, etc.), with engine off and battery cut-off switch disconnected.***



***Use suitable lifting means with capacities compatible with the machine weight. Observe the accident-prevention regulations in the country of use.***



***Only entrust qualified and authorised personnel with lifting operations.***



***Only use the lifting points indicated by the related safety signals.***

#### 3.5.2.3 P.P.E. to be used







### 3.5.3 Placement

#### 3.5.3.1 Residue risks

The placement operations always involve a residual risk especially due to abrasion, impacts and/or crushing.



*Use the drawbar to correctly position the machine.*



*Stabilise the machine by positioning the parking wedges on the wheels and lower the outrigger base (clockwise rotation of the crank) to the ground.*



*No one, except the personnel appointed by the user, should be within the action range of the moving machine during placement.*

#### 3.5.3.2 Additional warnings



*Inspect the work place to verify its suitability before positioning the machine.*



*The work place must comply with the accident-prevention regulations in the country of use.*



*Observe the safety distances from the boundaries of the worksite or from uneven ground.*



*Observe the safety distances from the live parts of power lines.*



*Position the machine on a levelled surface and consistent ground.*



*The machine cannot be used in environments where there are potentially explosive atmospheres classified as area 0 or area 1 or area 2.*



*The machine cannot be used in environments where there are ionising and non-ionising radiations: e.g. microwaves, UV rays, laser, X-rays and similar.*



*The machine can only operate outdoors. Do not use the machine indoors. Make sure there is always good ventilation.*

#### 3.5.3.3 P.P.E. to be used





### 3.5.4 Use

#### 3.5.4.1 Residue risks

Below is a list of residual risks and description of the safety measures to eliminate them while using the machine.

#### DANGERS ARISING FROM THE SAFETY SYSTEM FAULTS

§ 3.6 lists the safety devices and describes their respective operation.



***The operator is responsible for daily checking the smooth operation of the safety systems.***

In particular:

- with bonnet open the engine must not start;
- with engine started, pressing the emergency buttons must stop the engine;
- the machine functions (pumping, mixing, mixer lifting) are only active after pressing the controls enable button;
- with pumping started, the opening of the hopper grid must stop the pumping itself and the function only restarts after pressing the controls enable button;
- with mixing started, the opening of the mixer grid must stop the mixing itself and the function only restarts after pressing the controls enable button;
- if at least one grid (of mixer or hopper) is open, the mechanical handling of the mixer is inhibited until the grid is closed and the controls enable button pressed.



***The operator must only check the operation of the above-said systems, avoid the introduction of objects or body parts during the inspection.***



***The operator is responsible for stopping the machine and warning the user of the detected failures. The user is responsible for appointing the maintenance technician to solve the failures.***



***It is forbidden to use the machine when it is not under the normal operational conditions provided.***



***Do not use the machine with the mobile and fixed protection guards open, not properly secured or removed.***



***Only use the machine if the safety devices are in perfect working conditions. Do not use the machine with the protection and/or safety devices off and/or not working.***

#### DANGERS ARISING FROM THE TIPPING MIXER MOVEMENT

They usually involve dangers due to abrasions, impacts and/or crushing. The operator's working position is

- in front of the mixer during loading of the material constituting the cement conglomerate;
- laterally, in front of the control panel during the handling of the mixer.



***The operator must maintain appropriate safety distances during the handling of the mixer and avoid touching it in any way.***

#### DANGERS ARISING FROM THE EXHAUST GASES OF THE ENDOTHERMIC ENGINE

The dangers arising from the exhaust gases are:

- scalding or burn;
- inhalation;
- fire.



***The machine can only operate outdoors. Do not use the machine indoors. Make sure there is always good ventilation.***



***The close exposure to the silencer exhaust pipe can cause burn. Do not stand in front of the exhaust gas outlet. If you suspect burn, take the person concerned to the hospital.***



*The exposure to exhaust gases may be source of discomfort or irritation of the respiratory tract. Do not stand in front of the exhaust gas outlet. If you suspect intoxication, take the person concerned to the hospital.*



*Do not expose dry grass, mown grass, oil or other combustible materials to the exhaust gas.*

#### **DANGERS ARISING FROM CONTACT WITH THE MACHINE HOT PARTS**

The dangers arising from contact with hot parts are:

- scalding or burn;
- fire.



*Do not touch the machine hot parts, such as the silencer or radiator. Wait at least two hours after turning off the engine.*



*To prevent fire, pay attention to possible leaks of flammable substances, for example from hydraulic pipes and fuel pipes.*

#### **DANGERS ARISING FROM THE PROJECTION OF PRESSURISED FLUIDS**

The sources of danger are the mortar conveying pipes and the pneumatic piping.

The arising dangers are:

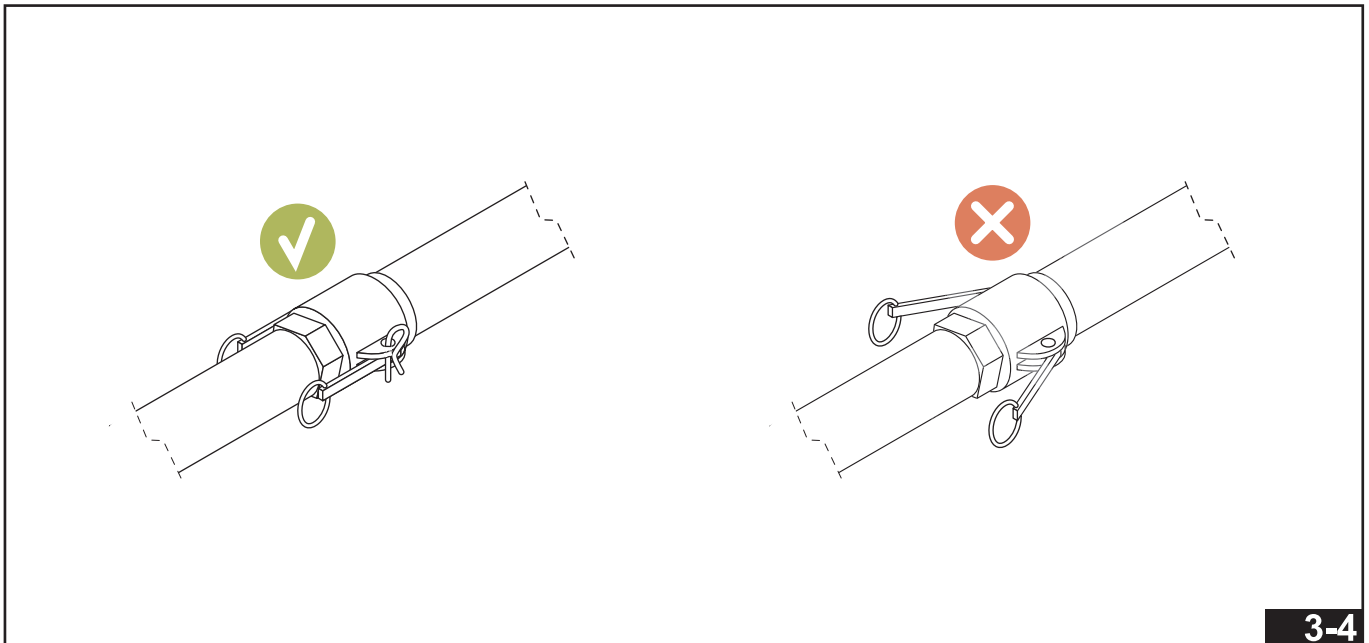
- cutting of the pipes;
- projection of fluids with consequent damage to the eyes and/or parts exposed to the projection.



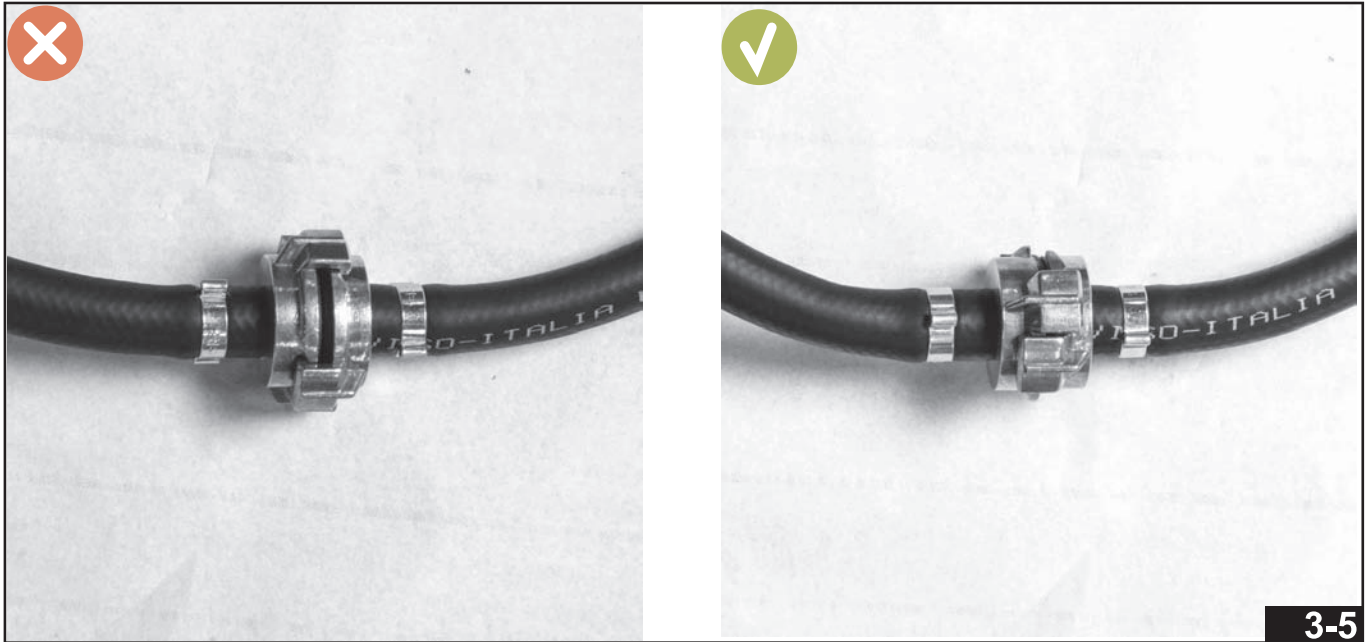
*Verify daily the integrity of the pipes connected to the machine (air pipes and conveyor pipes). If in doubt, replace with new and original ones. The control procedure is described in the maintenance chapter.*



*The connection of the machine transportation pipes must be secured with the safety split pins.*



*The pneumatic piping uses quick fittings. They must be properly engaged.*



**Do not disconnect the pipes from the machine (conveying pipes and air pipes) if they are pressurised. Always discharge the residue pressure and then disconnect them (the mortar pump pressure gauge must be at zero bar, the pneumatic system valves must be open). In the absence of pressure the pipes sag when stepped on.**

#### DANGERS ARISING FROM CONTACT WITH THE LUBRICANTS



**Refer to the residual risks in the Maintenance paragraph.**

#### DANGERS ARISING FROM THE USE OF FUEL (DIESEL)

The dangers arising from the improper use of fuel (diesel) and its container are:

- slipping and falling;
- skin irritation;
- fire.



**Accidental leaks make the surface very slippery. Clean adequately.**



**Wear adequate accident-prevention clothing when handling the fuel.**



**Do not use open flames or smoke when handling the fuel.**

#### DANGERS ARISING FROM THE EMISSION OF OVERHEAD NOISE

The overhead noise emission values are shown in the technical data.



**Use adequate P.P.E. to protect hearing.**

#### DANGERS ARISING FROM THE VIBRATIONS TRANSMITTED TO THE UPPER LIMBS

The vibration emission values are shown in the technical data.



**Use adequate P.P.E. to protect the upper limbs.**

**DANGERS ARISING FROM THE FALLING OF OBJECTS**

The dangers arising from the falling of objects occur during machine tooling and tipping mixer loading; they are:

- impact;
- crushing;
- tripping and falling;
- projection of mortar.



**Carefully handle the objects used during machine use, such as, for example, tools, machine mobile parts (e.g. grids) and bags of ready-mixed material.**



**The area around the machine must be free from any encumbrance.**

**DANGERS ARISING FROM INADEQUATE LIGHTING**

**The service conditions indicate the lighting required in the work environment. Greater lighting in the work environment may be required during certain operations (such as, for example, routine and extraordinary maintenance). If the lighting of the work environment fails, it is necessary to stop working and restore adequate lighting.**

**DANGERS ARISING FROM A REASONABLY FORESEEABLE MISUSE**

These are dangers originating from the operator's behaviour during machine use.



**Observe the user requirements of the machine in all the its life phases, including cleaning.**



**Do not abandon the machine during its running/control.**



**Do not use the machine for more than one or two hours continuously without ever stopping.**

**3.5.4.2 Additional warnings**

**Cordon off the dangerous area to keep unauthorised personnel out.**



**Do not use the machine in case of malfunctions or absence of parts.**



**Check the machine at least once before each shift to check for damage and defects. The operator must immediately stop using the machine and report any irregularities to the user. The user is obliged to resolve the fault before the machine is used again.**



**Make sure that switching on the machine does not endanger anyone.**



**Stop the machine by pressing the emergency button only in emergencies or dangerous situations.**

**3.5.4.3 P.P.E. to be used**



### 3.5.5 Maintenance

#### 3.5.5.1 Residue risks

Below is a list of residual risks and description of the safety measures to eliminate the same while using the machine. For added safety during machine maintenance, also consider the residual risks set out in the previous paragraphs.

#### **DANGERS ARISING FROM THE LUBRICANTS**

The dangers arising from the lubricants, are:

- damage to eyes and skin;
- inhalation and/or ingestion of harmful substances;
- slipping and falling;
- dispersion in the environment.



***Use suitable accident-prevention goggles and gloves when handling the lubricants.***



***Place suitable containers under the machine when performing maintenance related to the systems' fluids (engine oil, hydraulic oil, cooling fluid, etc.).***



***Ensure sufficient ventilation when handling lubricants and keep away from combustible substances.***



***Accidental ingestion may cause harmful effects on the central nervous system.***



***The inhalation of fumes, steam and aerosol may cause a slight irritation of the respiratory tract. Move the person concerned outdoors.***



***In case of ingestion, take the person concerned to the hospital immediately. Do not induce vomiting to avoid the risk of aspiration in the respiratory tract.***



***In case of contact with the skin, take off the contaminated clothing. Thoroughly wash the contaminated parts with soap and water.***



***In case of contact with eyes, rinse immediately with plenty of water, keeping the eyelids open for at least 15 minutes.***



***In case of suspected aspiration, immediately take the person concerned to the hospital.***



***Do not discharge into drains or waterways, wells and in the environment in general. Lubricants must be disposed of according to law.***



***Empty containers may contain flammable or explosive vapours. Cloths soaked with lubricant, paper or other materials used to absorb the product leaks are a fire hazard. Avoid their accumulation. Remove them immediately after use in accordance with the safety measures.***



***Avoid storing lubricants outdoors. Store at room temperature, protected from humidity, away from sources of ignition.***



***The lubricants have a dangerous reaction with strong oxidants.***



***Accidental leaks on the ground make the floor very slippery.***



**Ensure good ventilation in the area. Check the pouring point. Do not smoke.**

In case of accidental dispersion:



**Prevent the product from entering sewers and waterways; recover with the help of physical devices (e.g.: pumping); warn the competent authorities when the situation cannot be effectively and quickly resolved. Warn the competent authorities if the product is dispersed in waterways or sewers.**



**Accidental leaks on the ground make the floor very slippery.**



**Ensure good ventilation in the area. Check the pouring point. Do not smoke.**

### DANGERS ARISING FROM ENGINE MAINTENANCE

The dangers arising from engine maintenance are covered in the Use and maintenance instruction manual of the engine itself.



**Read and understand the Engine manual provided with the machine.**



**Repairs and extraordinary maintenance must be performed by qualified personnel and authorised by the engine Manufacturer.**



**Do not use petrol as fuel.**



**To avoid fires, keep the engine clean and without dirt, grease and waste.**



**Wear suitable accident-prevention clothing when handling the engine fluids and spare parts (anti-freeze, oil, filters, etc.).**

### ELECTRICAL HAZARDS

The electrical hazards arise from the electrical system maintenance operations and are:

- electrocution;
- chemical effects;
- burn;
- fire.



**The wiring diagram must be understood before working on the machine.**



**Disconnect the battery cut-out switch before working on the electrical system.**



**The battery negative pole (-) is connected to the chassis (mass). To avoid sparks caused by short-circuits and consequent damages, always disconnect the negative pole (-) first and then always reconnect it last.**



**Repairs and extraordinary maintenance must be performed by qualified personnel.**



**If the battery is frozen, do not charge it or attempt to start the engine as there is a risk of explosion. To reduce the risk of the electrolyte freezing, keep the battery fully charged. If frozen, warm it properly.**



*Do not use or charge the battery if the electrolyte level is below the minimum notch. Add distilled water until the level is between minimum and maximum.*



*Only check the charge status with voltmeter or densimeter.*



*The battery may emit potentially explosive gases. Do not use naked flames or smoke near it.*



*The battery electrolyte is toxic and corrosive. Do not inhale the gases. Wear adequate accident-prevention clothing when before handling the electrolyte.*

#### **DANGERS ARISING FROM HYDRAULIC SYSTEM MAINTENANCE**

The risks associated with the hydraulic system are:

- burn;
- injection;
- cutting;
- impact and crushing;
- perforation;
- dangers arising from handling lubricant fluids.



*The hydraulic diagram must be understood before working on the machine.*



*Maintenance interventions requiring the disassembly of components must take place with the machine off and cold.*



*Do not start the machine even if only one pipe is disconnected. Disconnect the battery cut-out switch before working on the hydraulic system.*



*Repairs and extraordinary maintenance must be performed by authorised maintenance technicians.*



*Pressurised fluid jets can penetrate the skin and cause damage. Before disconnecting any pipe, make sure there is no residual pressure inside (the circuit pressure gauge must be at zero bar). Wear adequate accident-prevention clothing (gloves, goggles).*



*Replace damaged pipes, gaskets, O-rings or fittings.*

#### **DANGERS ARISING FROM PNEUMATIC SYSTEM MAINTENANCE**

The risks associated with the pneumatic system are:

- burn;
- cutting;
- impact and crushing;
- dangers arising from handling lubricant fluids.



*The pneumatic diagram must be understood before working on the machine.*



*Maintenance interventions requiring the disassembly of components must take place with the machine off and cold.*



*Do not start the machine even if only one pipe is disconnected. Disconnect the battery cut-out switch before working on the pneumatic system.*





**Repairs and extraordinary maintenance must be performed by authorised maintenance technicians.**



**Before disconnecting any pipe, make sure there is no residual pressure inside (open all system valves). Wear adequate accident-prevention clothing (gloves, goggles).**



**The pipes must always be in good conditions. The procedure for checking the pipes is set out in § 6.1.8.**

### 3.5.5.2 Additional warnings



**The machine must be adequately cleaned before any maintenance intervention.**



**Routine maintenance is the user's responsibility. It must be carried out in adequately equipped workshops.**



**Extraordinary maintenance and any repairs must be carried out by authorised maintenance technicians, and in adequately equipped workshops.**



**Extraordinary maintenance and any repairs of the endothermic engine must be performed by personnel authorised by the engine Manufacturer.**



**Cordon off the area where the maintenance or repair is carried out; it must be evident (e.g. through warning signs) that the machine is under maintenance and that it cannot be used normally.**



**Immediately replace the faulty components involved in the safety functions. These components must be replaced by maintenance technicians authorised by the Manufacturer.**



**If it became necessary to neutralise the safety systems (interlocked fixed guards, safety switches, etc.), restore them before reusing the machine.**



**If it is necessary to intervene under the machine, make sure that it is fixed and secured.**



**Disconnect the battery cut-out switch before any maintenance or repair (e.g. bonnet open) to prevent unexpected start-ups.**



**Do not leave tools or other objects on the machine or inside it at the end of the interventions.**



**Only use original spare parts.**

### 3.5.5.3 P.P.E. to be used





### 3.5.6 Disposal

#### 3.5.6.1 Residue risks

Below is a list of residual risks and description of the safety measures to eliminate them during the machine disposal. For added safety during machine disposal, also consider the requirements in the previous paragraphs.

#### DANGERS ARISING FROM THE LUBRICANTS

In this phase, the dangers arising from the lubricants, are the same set out in the maintenance paragraph.

#### ELECTRICAL HAZARDS

The electrical hazards arise from the failed isolation of the battery and are:

- electrocution;
- chemical effects;
- burn;
- fire.



***Disconnect the battery cut-out switch before working on the electrical system.***



***The battery negative pole (-) is connected to the chassis (mass). To avoid sparks caused by short-circuits and consequent damages, disconnect the negative pole (-) first.***



***The battery may emit potentially explosive gases. Do not use naked flames or smoke near it.***



***The battery electrolyte is toxic and corrosive. Do not inhale the gases. Wear adequate accident-prevention clothing when before handling the electrolyte.***

#### DANGERS ARISING FROM THE DISASSEMBLY OF MECHANICAL PARTS IN GENERAL

The risks associated with the disassembly of machine parts are:

- cut;
- entrapment;
- falling;
- impact and crushing;
- dangers arising from handling lubricant fluids.



***Handle the parts being disassembled with care and attention; move them using adequate devices, compatibly with the weight and shape of the component. Do not leave the disassembled components where they could be of hindrance.***

#### DANGERS ARISING FROM THE DISASSEMBLY OF THE HYDRAULIC SYSTEM

The risks associated with the hydraulic system are:

- burn;
- injection;
- cutting;
- impact and crushing;
- perforation;
- dangers arising from handling lubricant fluids.



***The components must be disassembled with the machine off and cold.***



***Pressurised fluid jets can penetrate the skin and cause damage. Before disconnecting any pipe, make sure there is no residual pressure inside (the circuit pressure gauge must be at zero bar). Wear adequate accident-prevention clothing (gloves, goggles).***

#### DANGERS ARISING FROM THE DISASSEMBLY OF THE PNEUMATIC SYSTEM

The risks associated with the pneumatic system are:

- burn;
- cutting;
- impact and crushing;
- dangers arising from handling lubricant fluids.



*The components must be disassembled with the machine off and cold.*



*Before disconnecting any pipe, make sure there is no residual pressure inside (open all system valves).  
Wear adequate accident-prevention clothing (gloves, goggles).*

**3.5.6.2 Additional warnings**



*Cordon off the area where the disposal is carried out; it must be evident (e.g. through warning signs) that the machine cannot be used normally.*



*If it is necessary to intervene under the machine, make sure that it is fixed and secured.*

**3.5.6.3 P.P.E. to be used**



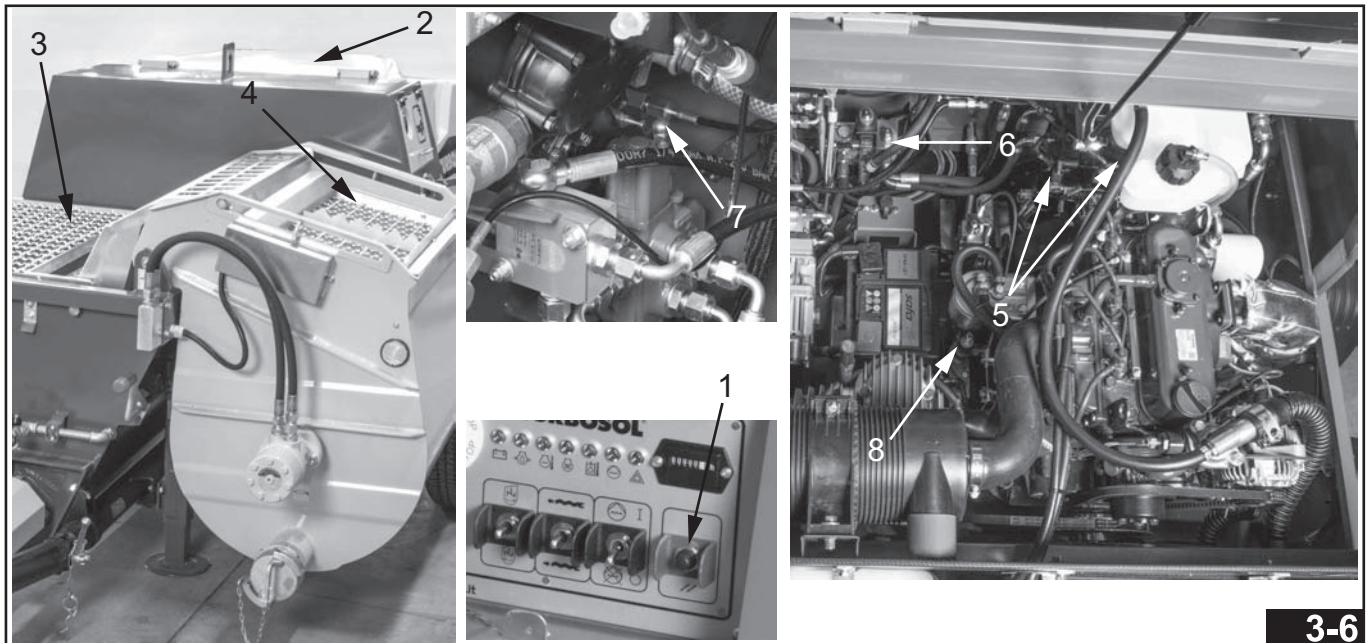


### 3.6 SAFETY DEVICES

The machine is equipped with the following safety devices:

1	<b>CONTROLS ENABLE BUTTON</b> Pressing the button after starting the engine enables pumping, mixing and mixer movement; when the grids are closed the pumping or mixing do not automatically restart, but it is necessary to press the button.
2	<b>BONNET</b> Interlocked mobile guard, PL=c in compliance with EN ISO 13849-1:2008. Avoids exposure to moving parts, pressurised pipes and hot surfaces. The engine turns off when the bonnet is opened. The engine can only be restarted if the bonnet is closed.
3	<b>HOPPER GRID</b> Interlocked mobile guard, PL=c in compliance with EN ISO 13849-1:2008. Avoids exposure to moving parts. When the grid is opened the solenoid valve controlling the pumping and the solenoid valve enabling the tipping mixer movement are de-energised. When the grid is opened the moving parts stop in a very short time (less than 1 sec). The pumping and mixing of the tipping mixer can only be started if the grid is closed and the controls enable button pressed.
4	<b>TIPPING MIXING GRID</b> Interlocked mobile guard, PL=c in compliance with EN ISO 13849-1:2008 Avoids exposure to moving parts. When the grid is opened the solenoid valve controlling the pumping and the solenoid valve enabling the tipping mixer movement are de-energised. When the grid is opened the moving parts stop in a very short time (less than 1 sec). The mixing and handling of the tipping mixer can only be started if the grid is closed and the controls enable button pressed.
5	<b>PRESSURE REDUCER VALVES OF THE MORTAR PUMPING HYDRAULIC CIRCUIT</b> They limit the maximum pressure of the circuit.
6	<b>PRESSURE REDUCER VALVE OF THE SECONDARY HYDRAULIC CIRCUIT</b> It limits the maximum pressure of the circuit (mixing and high pressure washer)
7	<b>REDUCER VALVE OF THE TIPPING MIXER LIFTING CIRCUIT</b> It limits the maximum pressure of the circuit.
8	<b>REDUCER VALVE OF THE PNEUMATIC CIRCUIT</b> It limits the maximum pressure of the circuit.

Tab. 3-1



*Periodically check the proper operation of the safety devices.*



*Do not tamper with the safety devices. Do not use the machine if the safety devices are malfunctioning. Replace the safety devices with original spare parts.*



### 3.7 SIGNS ON THE MACHINE

The machine is fitted with labels having different purposes:

#### Danger

They inform the operator to act with caution and attention since there is a latent danger. The prohibition sign is triangular with a black frame, yellow background and black mark.

#### Prohibition

They inform the operator on the prohibition to perform certain actions or have certain behaviours that can compromise health. The prohibition sign is round with a red edge and diagonal stripe, white background and black mark.

#### Obligation

They inform the operator on the obligation to use protective means or have certain behaviours. The obligation sign has a blue background and white mark.

These labels are placed on the machine parts where there is a residual risk.

#### Information

They inform the operator on specific functions.

These labels are positioned immediately near the element to which they refer. (The machine controls are described in § 5.2÷5.5).




**Keep the signs clean.**



**It is forbidden to remove the signs.**



**Replace worn and/or illegible signs.**











DANGER SIGNS				
				
Danger of electrocution	Burning hazard	Danger of explosion	Danger flammable battery gases	Danger inhalation exhaust fumes

Tab. 3-2





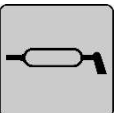

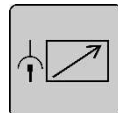
PROHIBITION SIGNS				
				
Use prohibited to unauthorised persons	It is prohibited to perform work before electrically isolating the electrical equipment	It is prohibited to remove the safety devices and protections	It is prohibited to put out fires with water	It is prohibited to work with the bonnet open

Tab. 3-3

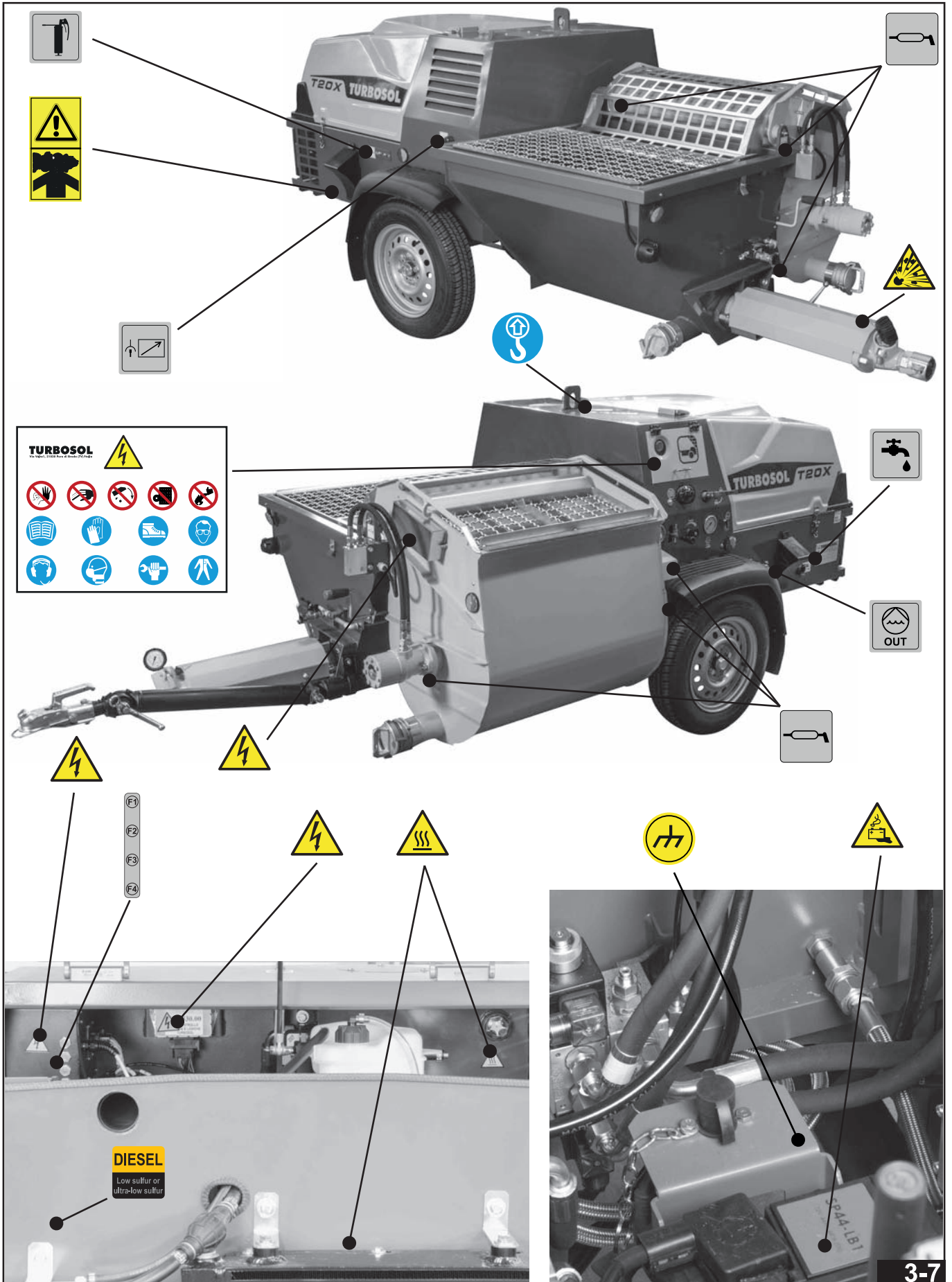


COMPULSORY SIGNS				
 Body protection	 Protective helmet	 Protective gloves	 Safety footwear	 Protect the respiratory tracts: mask (Category II)
 Eye protection	 Hearing protection	 Read the use and maintenance manual before working	 Maintenance performed only by qualified personnel	 Lifting points

Tab. 3-4

INFORMATION			
 Chassis (mass)	 Water connection	 High pressure washer delivery	
 Grease	 Lubricant oil	 Remote control connection	

Tab. 3-5





## 4 - TRANSPORT AND INSTALLATION



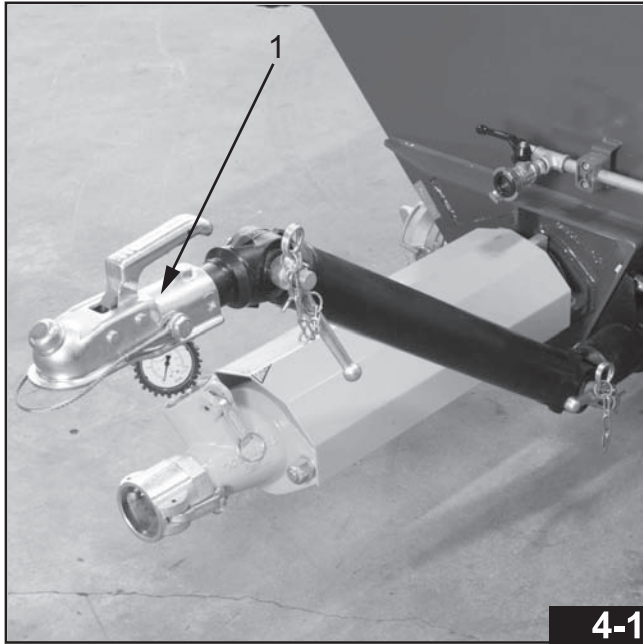
Observe the general safety requirements in § 3.4, those related to transport and use of P.P.E. in § 3.5.1.



The operations listed below are the operator's responsibility.



The machine must be moved to the workplace using drawbar 1.



### 4.1 TRANSPORT AS ROAD TRAILER



Observe the maintenance intervals in chapter 6.

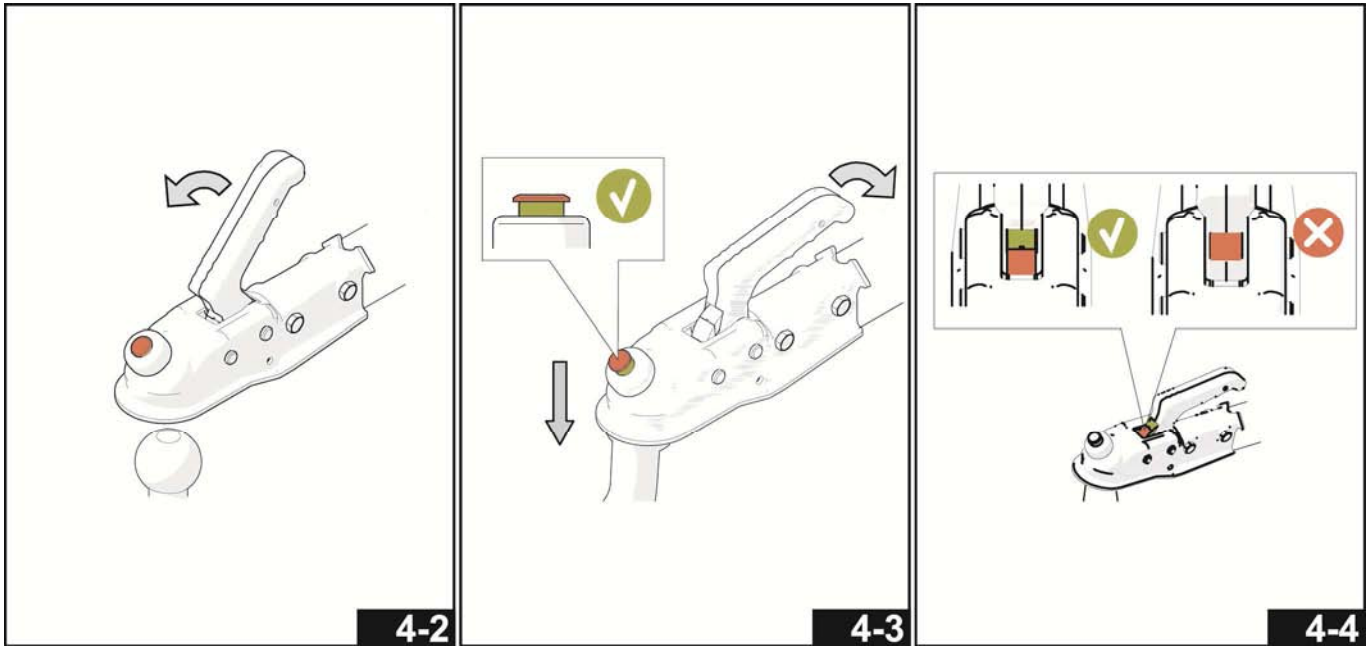
The tipping mixer must be fully lowered. Turn off the engine, remove the keys from the electrical panel, deactivate the battery cut-off switch and fasten the bonnet. Remove all accessories connected to the machine (pipes, wired-remote control, vibrating sieve, etc.).

#### 4.1.1 Before leaving

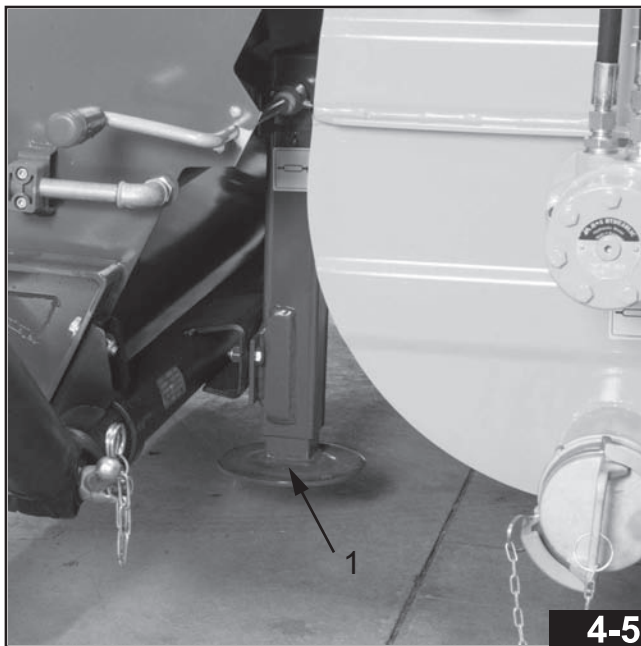
Before each trip, make sure that:

- a visual inspection is carried out for possible visible damages;
- the trailer is properly hooked (Fig. 4-2/3): when the green cylinder is highlighted, then the joint has been properly hooked;
- the ball joint is working (check the wear indicator on the handle) (Fig. 4-4),



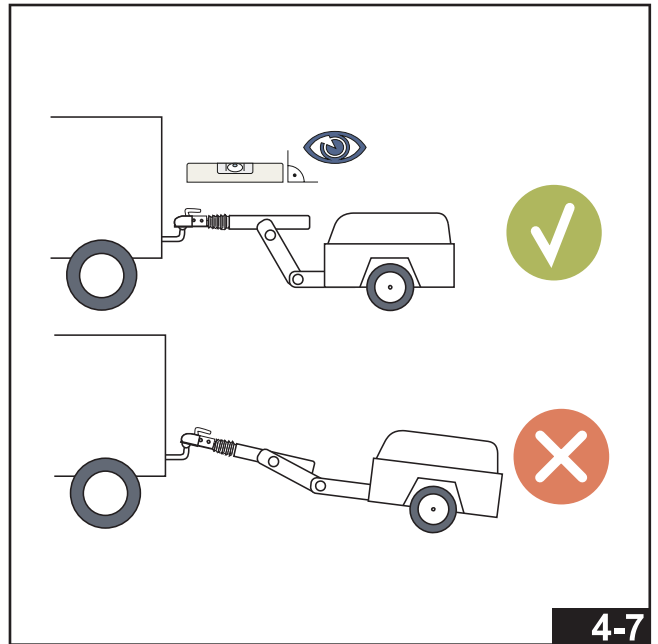
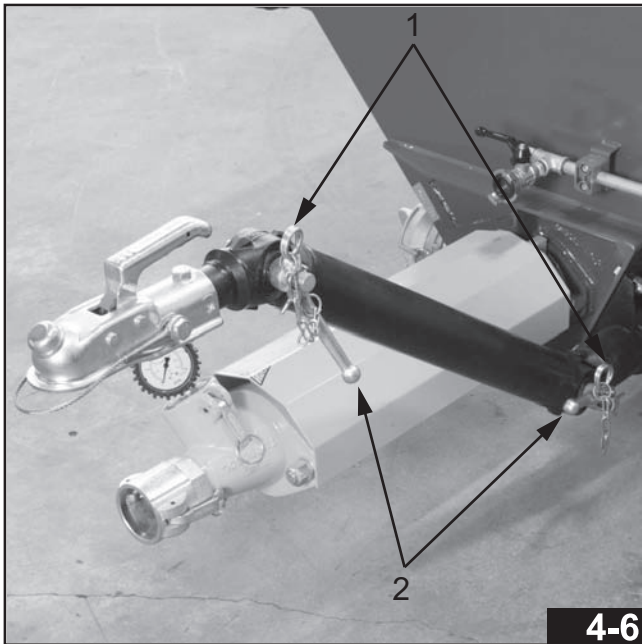


- the locking handles are properly tightened and the safety split pins are present between the drawbar sections;
- the lights cable is connected to the towing vehicle and is working;
- the tyre pressure is correct;
- foot 1 is fully raised.



#### 4.1.2 Connect the trailer

- Adjust the drawbar height:
  - a) Remove the safety split pins 1.
  - b) Loosen the locking handles 2 until rotation between the drawbar sections is possible.
  - c) Adjust the angle of the sections so that the end is horizontally hooked to the vehicle (Fig. 4-7).
  - d) Tighten the locking handles properly (even by striking with a hard rubber mallet) and insert the safety split pins.



- Guide the ball joint over the ball of the towing vehicle;
- open the ball joint (Fig. 4-2);
- raise the outrigger base (anti-clockwise rotation of the crank) until the ball joint engages correctly on the vehicle ball (Fig. 4-3/4);
- raise the outrigger base completely;
- connect the lights power supply cable to the towing vehicle.

#### 4.1.3 Release the trailer

- Disconnect the lights power supply cable from the towing vehicle;
- lower the outrigger base to the ground (clockwise rotation of the crank);
- lift the ball joint handle;
- release the trailer from the towing vehicle.



## 4.2 LIFTING



**Observe the general safety requirements in § 3.4, those related to transport and use of P.P.E. in § 3.5.2.**

Lift the machine using lifting hook 1.



## 4.3 INSTALLATION

### 4.3.1 Placement



**Observe the general safety requirements in § 3.4, those related to transport and use of P.P.E. in § 3.5.3.**

Find a safe and efficient position. The ground must comply with the requirements of § 2.1. Lower the outrigger base to the ground (clockwise rotation of the crank). Use wedges 1 to lock the wheels (Fig. 4-9).

Remove the drawbar (terminal section 1 and intermediate 2, handles 3, safety split pins 4 and pins 5) and store the components in a suitable place. This operation prevents the towing system from being damaged during use of the machine (Fig. 4-10).



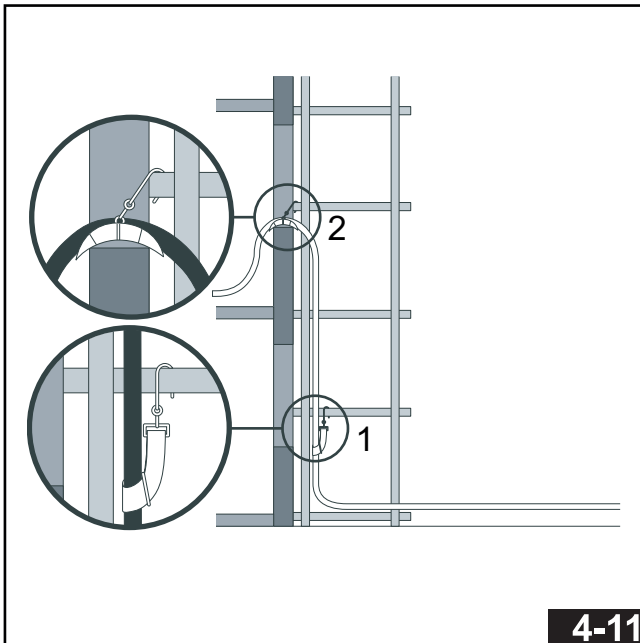
#### 4.3.2 Pipe connection



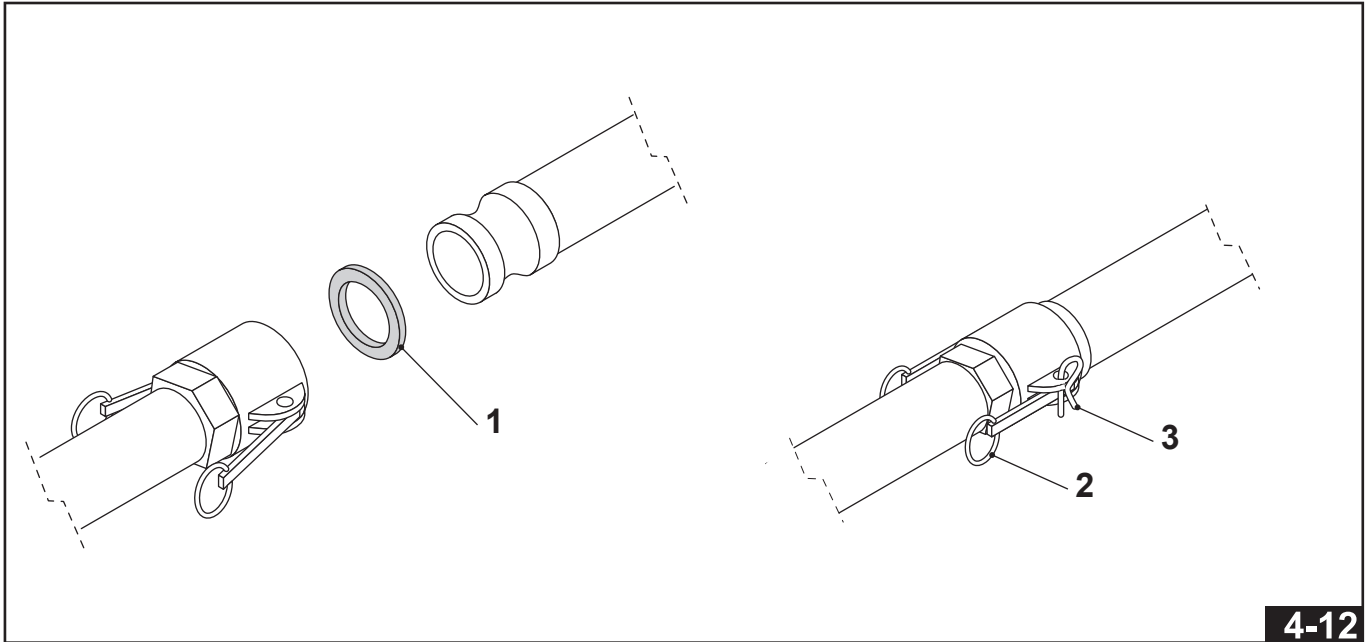
**Check the pipes, gaskets and fittings as described in § 6.1.6-7-8-9.**

Lay the pipes and avoid them from twisting during mortar conveying. The first ten metres of piping are subject to oscillations (a few centimetres) during transport: it is advisable to raise this section from the ground and prevent it from resting on edges or abrasive elements.

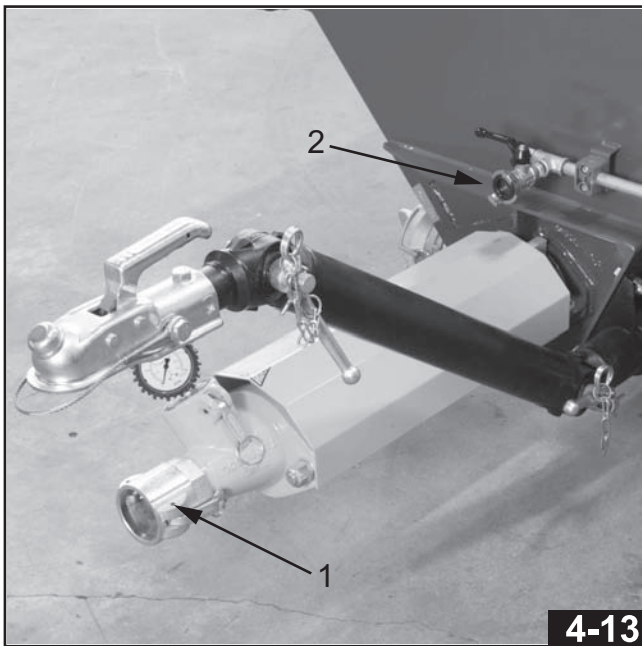
Anchor the pipes properly: use pipe straps 1 for anchoring in vertical sections (always place the pipe strap under the fittings) and pipe strap 2 for arrival to the plane.



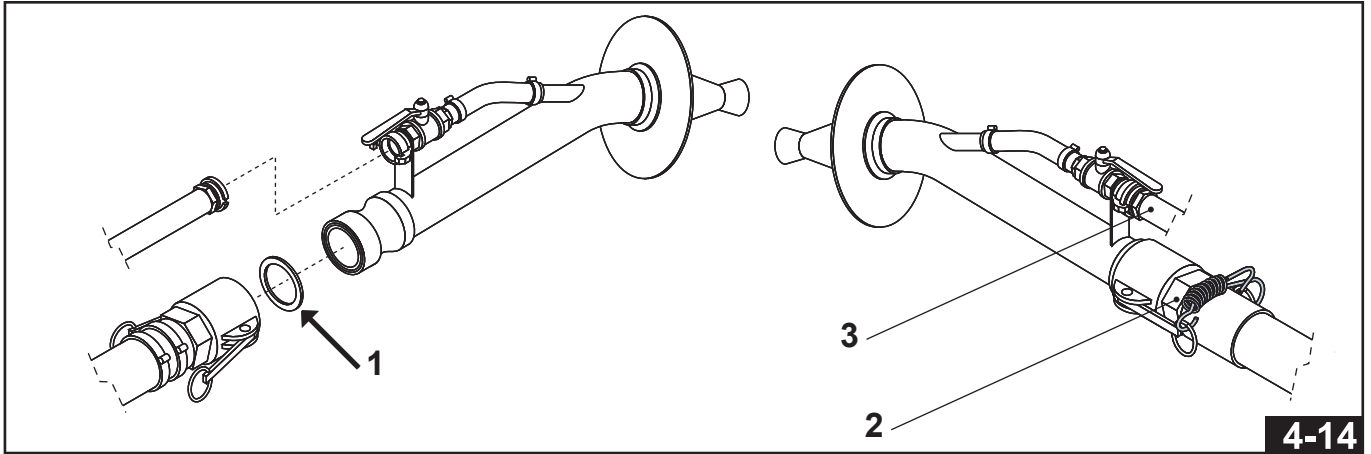
Connect the pipes ensuring the presence of gasket 1, fully tighten fittings 2 and secure them with split pins 3.



Connect the mortar conveying pipe 1 and pneumatic pipe 2 to the machine. The pneumatic pipe must follow the path of the mortar conveying pipe.



Connect the gun to the end of the pipe (when using the gun for common mortars, remove the gasket 1 from inside the fitting). Fully close the fitting and tighten it with safety spring 2. Finally, connect pneumatic pipe 3 to the gun.



If the machine is equipped with mixing water dosing system, connect the water supply pipe to fitting 1.







## 5 - USE AND OPERATION



Observe the general safety requirements in § 3.4, those related to transport and use of P.P.E. in § 3.5.4.

### 5.1 PROCESSING PHASES

#### Switching on the machine

After completing the positioning phases described in the previous chapter, the operator on the machine starts the same as described in § 5.10.

#### Creating the conglomerate

The operator on the machine manually loads the ready-mixed bags or the individual components (such as sand, cement, etc.) into the tipping mixer. The conglomerate is automatically mixed in the mixer in which the operator also adds the fluids necessary (water, additives, etc.) to create a mixture suitable to be pumped by the machine.

#### Transfer of mixture inside the machine

The operator on the machine transfers the mixture from the mixer to the hopper, by mechanically tipping the mixer itself.

#### Transfer of mixture from the machine to the place of distribution or projection


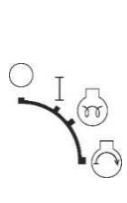






The worm pump transfers the mixture from the hopper to the conveying pipe, which takes the mixture to the place of distribution or projection.

#### Distribution or projection of the mixture

The second operator distributes or projects the mixture. He/she controls the start and stop of the worm pump through a remote control (pneumatic, electric wire or radio remote control, depending on the type of activity performed).

### 5.2 ELECTRIC CONTROL BOARD

#### CONTROLS

1		<b>EMERGENCY BUTTON</b> If pressed, it stops the engine.
2		<b>IGNITION KEY</b>  Key insertion/key disconnection/Engine off.  First click: general power supply.  Second click: the glow-plugs pre-heat takes place by holding the key in this position. The engine can be started when the glow plug indicator light switches off.  Third click: ignition. Release when engine has started.
3	//	<b>CONTROLS ENABLE BUTTON</b> Press the button after starting the engine, in order to enable the electric board functions. The pumping is inhibited when the hopper grid is opened. The mixing is inhibited when the mixer grid is opened. To restore the function, close the grid and press the button //. The indicator light 10 lights up when the safety devices intervene; the indicator light turns off, after closing the grid and pressing the button //.
4		<b>PUMPING</b> Stable position. The pumping is enabled in this position. The pumping is started and stopped by means of the pneumatic remote control, remote control via cable or radio remote control.
5		<b>PUMPING CHANGE-OVER</b> Unstable position. While holding the selector in this position, the pumping change-over is enabled; on releasing the selector the pumping change-over stops.

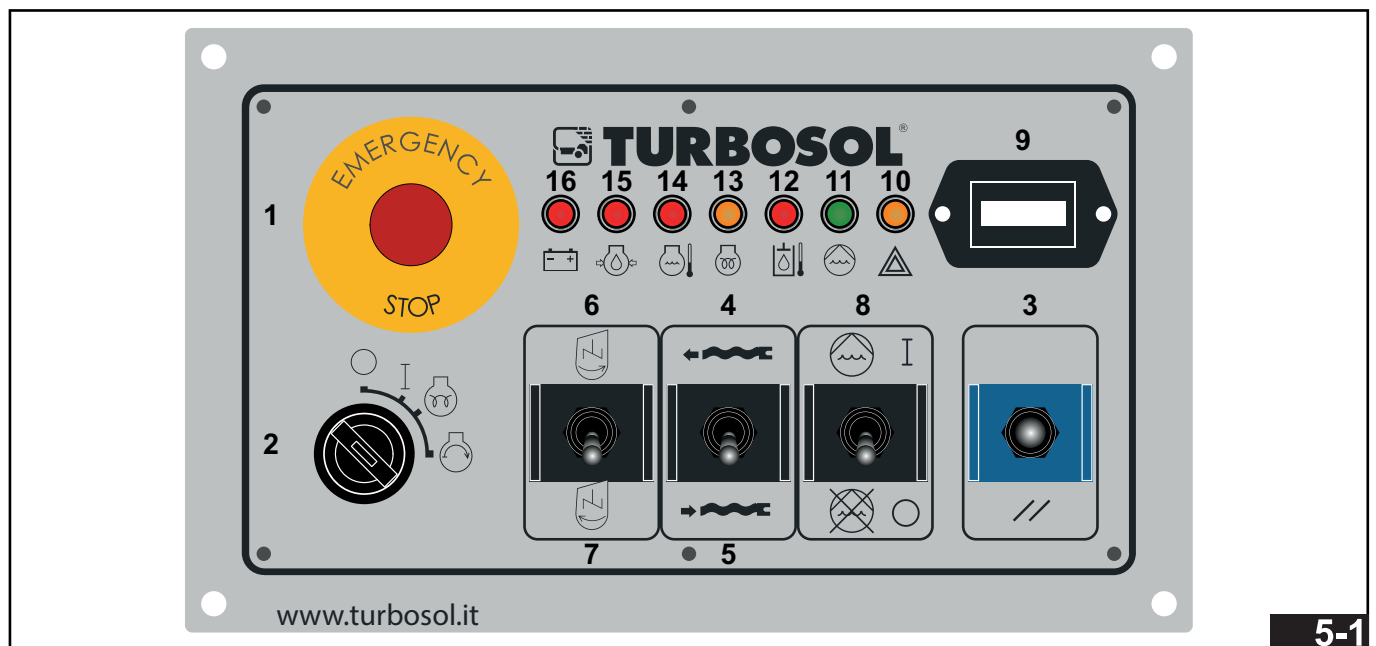
Tab. 5-1A

























6		<b>MIXING</b> Stable position. Mixing of the mixture in the mixer is started in this position.
7		<b>REVERSE MIXING</b> Unstable position. While holding the selector in this position, the reverse mixing activates; on releasing the selector the mixer stops.
8		<b>HIGH PRESSURE WASHER</b> O Off (stable position) I On (stable position)
9		<b>HOUR METER</b> When the engine is started, the hour meter starts counting the machine time of operation.
10		<b>SAFETY DEVICES INTERVENTION INDICATOR (YELLOW)</b> It lights up when the hopper grid or the tipping mixer grid is opened. The indicator turns off when you press the button //.
11		<b>HIGH PRESSURE WASHER INDICATOR (GREEN)</b> It lights up when you activate the high pressure washer.
12		<b>HYDRAULIC OIL TEMPERATURE INDICATOR (RED)</b> When lit during the engine operation, it indicates high hydraulic oil temperature; the control system stops the engine after 5 seconds from switch-on.
13		<b>GLOW-PLUGS PRE-HEAT INDICATOR (YELLOW)</b> When lit, the glow-plugs pre-heat is on; the engine can be started when the indicator turns off.
14		<b>ENGINE COOLING LIQUID TEMPERATURE INDICATOR (RED)</b> When lit during the engine operation, it indicates high cooling liquid temperature; the control system stops the engine after 5 seconds from switch-on.
15		<b>ENGINE OIL PRESSURE INDICATOR (RED)</b> When lit during the engine operation, it indicates low engine oil pressure; the control system stops the engine after 5 seconds from switch-on.
16		<b>CHARGE STATUS INDICATOR (RED)</b> When lit, it indicates the malfunction of the alternator.

Tab. 5-1B

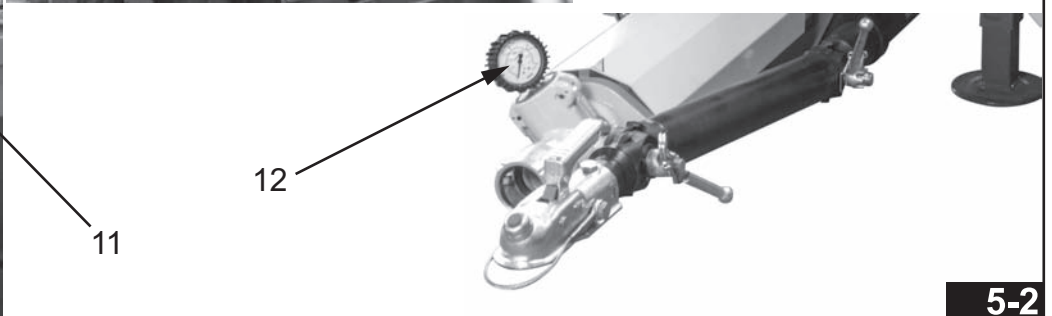
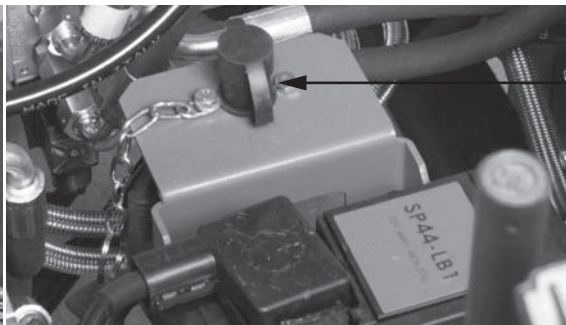
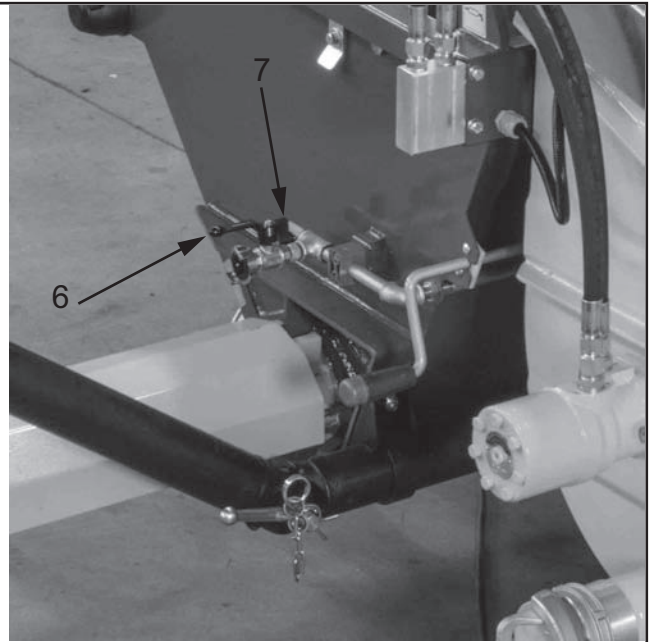
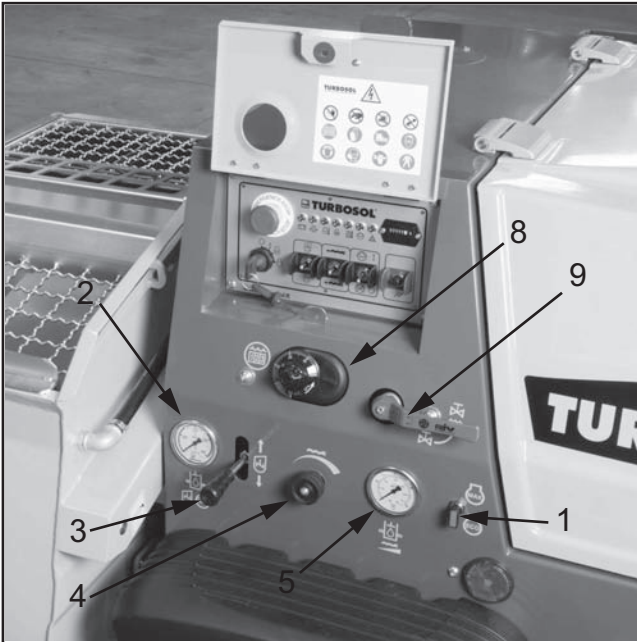




## 5.3 INSTRUMENTS ON THE MACHINE

1		 	<p><b>OPERATING MODE SELECTOR</b></p> <p>In this position the engine is always at maximum.</p> <p>In this position the engine automatically drops to idle speed when pumping is stopped by means of the pneumatic control.</p>
2			<p><b>HIGH PRESSURE WASHER AND MIXING PRESSURE GAUGE</b></p> <p>It indicates the hydraulic mixing pressure and of the high pressure washer</p>
3			<p><b>TIPPING MIXER LIFTING/DESCENT</b></p> <p>Lift the lever to raises the mixer.</p> <p>Lower the lever to lower the mixer.</p>
4			<p><b>PRESSURE REDUCER</b></p> <p>Turn the knob to adjust the displacement of the hydraulic pumping pump. The higher the pressure, the greater the mortar pump speed and thus the flowrate.</p>
5			<p><b>PILOTING PRESSURE GAUGE</b></p> <p>It indicates the hydraulic piloting pressure. The adjustment range is shown in the technical data on § 2.1.</p>
6		-	<p><b>MAIN VALVE</b></p> <p>It enables or inhibits the air flow to the gun. The air flow has a dual function: a) it allows the spraying and b) it is used as remote pumping start/stop controls. When pumping is enabled with valve open the mortar pump turns, with valve closed the mortar pump is stopped.</p>
7		-	<p><b>AUXILIARY VALVE</b></p> <p>It enables or inhibits the air flow to the gun. In normal machine operation it is closed. It is used coupled with the main valve to control the pumping start/stop when the air pipe is not connected.</p>
8			<p><b>MIXING WATER DOSING SYSTEM (OPTIONAL)</b></p> <p>To dose the mixing water, press and turn the water gauge knob up to the desired flow rate. Open valve 9. At the end of counting, the water gauge automatically stops the supply of water. Close valve 9.</p> <p>Note: you can partialise the mixing water by closing and opening valve 9; when the valve is closed, the water gauge stops the supply. In total, the water gauge supplies the initially set amount of water.</p>
9			
10		-	<p><b>BATTERY CUT-OFF SWITCH</b></p> <p>It is positioned inside the engine compartment, near the battery. It disconnects the power supply. Turn the knob clockwise to feed the electrical system. Turn the knob anti-clockwise and pull out to disconnect the electrical system from the battery. With knob extracted, insert the cap to protect the internal contacts of the device.</p>
11		-	<p><b>REMOTE CONTROL SOCKET CAP</b></p> <p>It is positioned on the right, above the wheel cover. It must always be inserted on the socket in order for the machine to work. It contains an electric circuit for the machine emergency circuit.</p>
12		-	<p><b>MORTAR PIPE PRESSURE GAUGE</b></p> <p>It is positioned on the outlet section of the mortar pump. It indicates the mortar pumping pressure.</p>

Tab. 5-2



5-2



#### 5.4 DESCRIPTION OF THE GUN COMPONENTS

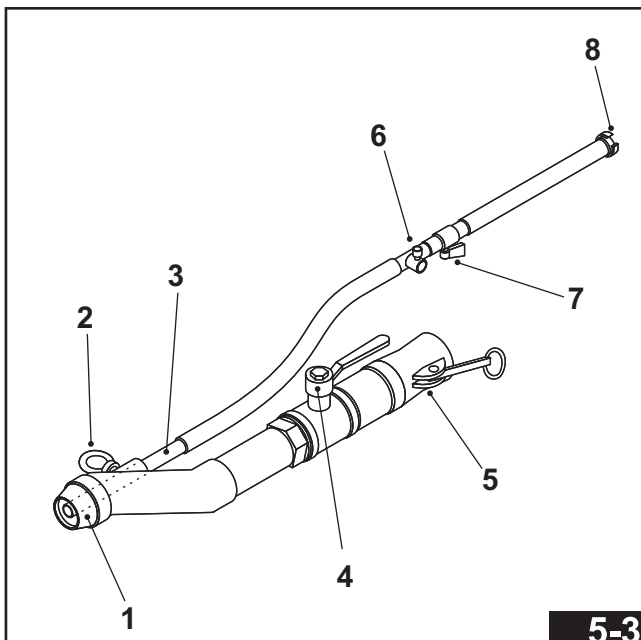
Below is a list of the main components of a projection gun.  
Certain types of gun do not have components.

1	<b>FLAP</b> The mortar and air inside the flap come together and create the projecting rose.
2	<b>NOZZLE LOCKING</b> It locks the nozzle in the desired position.
3	<b>NOZZLE</b> It conveys the air inside the flap.
4	<b>FLOW VALVE</b> It shuts-off the mortar coming from the conveyor pipe.
5	<b>CONVEYOR PIPING FITTING</b> Connect the mortar conveyor piping to this fitting.
6	<b>AUXILIARY AIR VALVE</b> It bleeds the excess air.
7	<b>MAIN AIR VALVE</b> It shuts-off the air flow coming from the pneumatic piping. It enables or inhibits the air flow to the gun. The air flow has a dual function: a) it allows the spraying and b) it is used as remote pumping start/stop controls. When pumping is enabled with valve open the mortar pump turns, with valve closed the mortar pump is stopped.
8	<b>PNEUMATIC PIPING FITTING</b> Connect the pneumatic piping to this fitting.

Tab. 5-3



*Small nozzles and flaps produce wide projections and vice-versa.*





### 5.5 EMERGENCY STOP



*In case of danger, stop the machine by pressing the emergency button.*

Press the button to stop the machine. Press and turn the button clockwise (as shown on the button) to disarm it.

### 5.6 NORMAL MACHINE STOP

Before stopping the engine, run it idle and empty for at least 5 minutes; this decreases the operating temperature. Always perform this operation, unless a dangerous situation occurs requiring an emergency stop.

### 5.7 REFUELLING



*Use approved containers. Do not use buckets, bottles, jars, etc..*

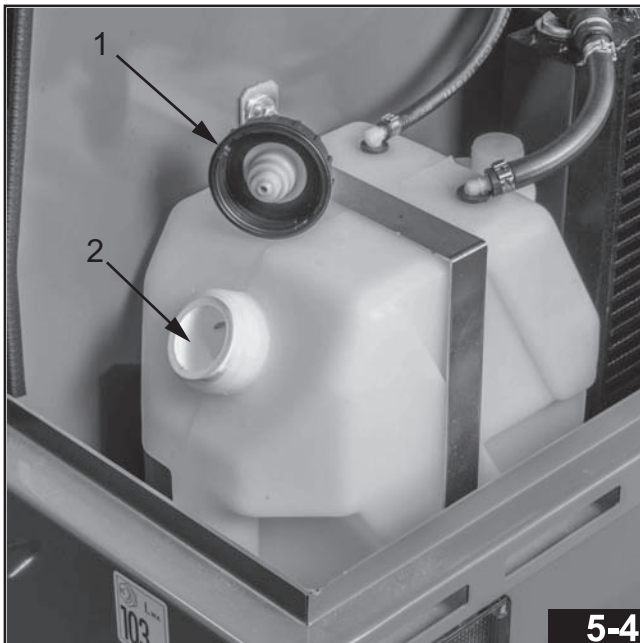


*Do not smoke or generate open flames or sparks in the work area.*



*Do not mix petrol or alcohol with diesel fuel. The mixture can cause fires and serious damage to the engine.*

Open cap 1 and fill the tank. Do not remove filling filter 2. It prevents polluting the fuel in the tank with impurities that could damage the engine. Only use the type of lubricant shown in the technical data in § 2.1.





## 5.8 START-UP



Carry out the necessary daily checks described in § 6.1.

The bonnet must be lowered and closed and locks 1 at the sides of the machine closed. The engine air inlets must be free.

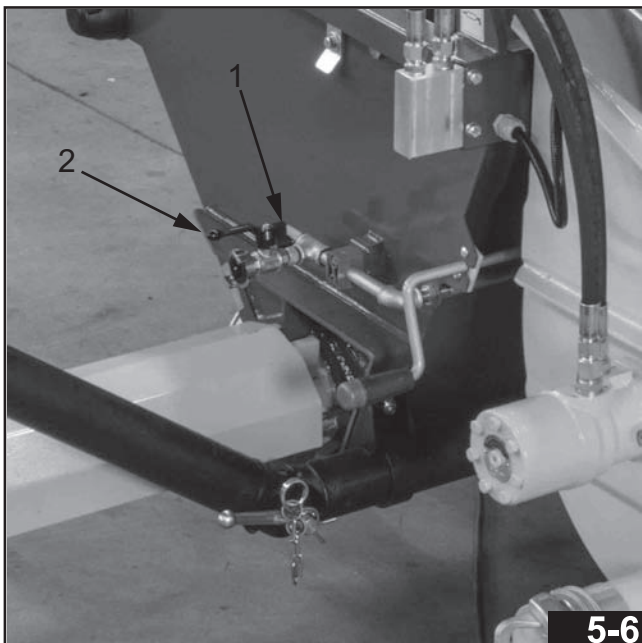


5-5

Check that the mixer and hopper grids are closed.

Make sure that the emergency button is not engaged.

The pumping, mixing and high pressure washer selectors must be in neutral position. The operating modal valve must be at ECO. Close auxiliary valve 1, keep the main valve 2 open and close the gun valve.



5-6

Start the engine with the ignition key. If the engine does not start after 10 seconds from first attempt, wait at least 40 seconds and try again.



***Do not repeatedly and insistently start (not more than 15 seconds), the starter motor may brake.***

Warm up the engine idle for a few minutes.

For low temperature start-ups, refer to the Engine manual.

Prepare the slurry (50% water and 50% cement) to lubricate the pipes before transport and spraying. If you have to convey/spray ready-mixed mortar, use such mortar as slurry over-dosing the water with respect to the manufacturer's instructions.

Approximately 15 litres of slurry is required for 40 metres of conveying pipe. Pour it into the hopper.

Open the gun valve or the auxiliary valve on the machine.

Activate the pumping; when the slurry in the hopper is almost finished, stop pumping by closing the previously opened valve.

Activate mixing and prepare the mixture in the mixer.

The mixture of the ready-mixed products must comply with the manufacturer's requirements; these are usually found on the technical data sheet of the product.

The common mortar must be plastic and pumpable; it must have the proper mix of constituents (cement, inert, water, possible additives, etc.)

An indication of the mixture consistency is the pressure gauge pressure Tab. 5-2.2. The constituents being equal, the mixing pressure will be approximately the same for each mixture.

The selector in position 2 is used when the mixer blocks. Reverse mixing if the mixer blocks (the hydraulic system pressure is around the calibration values of the pressure reducer valve).



***It usually takes a few reversals to restore mixing. If not, the mixture may be a little fluid (high pressure of the pressure gauge or circuit in maximum valve): make the mixture more fluid.***

Tip the mixer to pour the mixture into the hopper.

Activate pumping and adjust the rotation speed of the mortar pump. By now acting on the gun air valve, you can start spraying/casting.



## 5.9 WHAT TO DO IN CASE OF CLOGGING

The most dangerous situation during pumping is the clogging of the conveying pipe. In this condition the mortar pump pressure gauge indicates pressures higher than those of normal operation and the mortar no longer flows from the pipe.

### 5.9.1 Clogging of the conveying pipe

The pipe between the mortar pump delivery and the clogging, is extremely rigid.



***Clogging usually occurs near the fittings.***

The clogging causes can be, for example, an incorrect mixture (little plastic and little fluid, inadequate inert granulometry, etc.) or an excessively prolonged stop.

Stop pumping; relieve the residual pressure in the conveying pipe by activating reverse pumping until the mortar pump pressure gauge shows zero pressure.

Locate the clogged pipe section: this section is not deformable, hard and rigid when stepped on.

Disconnect the pipe, strike the outer surface of the pipe with a hammer (hard rubber mallet) to break the hardened mortar that created the clogging, until it is completely evacuated.

Restart pumping in order to verify that the pipe is indeed free: the mortar should come out normally. Pour the slurry inside the pipe, reconnect the pipe and then restart pumping.



***If the clogging cause is a mortar that cannot be pumped, it must be evacuated from the hopper.***

### 5.9.2 Gun clogging



***A large inert or a flap too small can lead to clogging.***

Stop pumping; relieve the residual pressure in the conveying pipe by activating reverse pumping until the mortar pump pressure gauge shows zero pressure. Stop the machine and depressurise the pneumatic system by opening the auxiliary valve and then the gun valve.

Disassemble the flap and, if necessary the gun, to check for inert too big. If no such inert is found, try replacing the flap with another with larger hole.

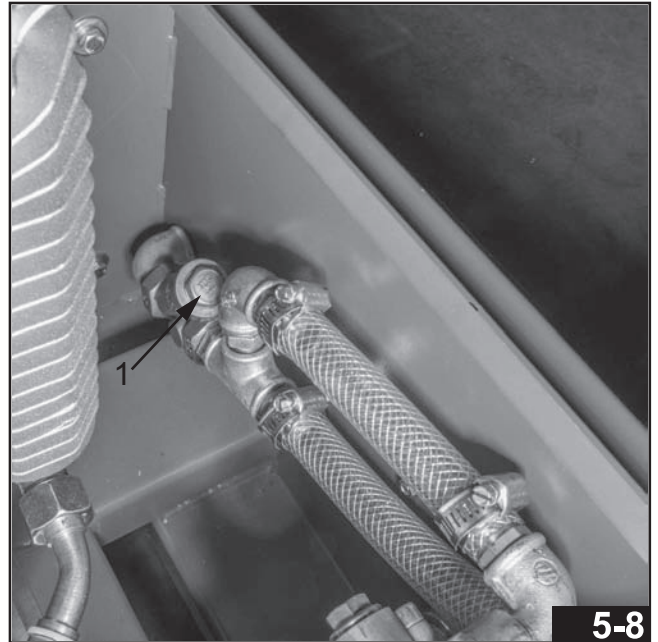
Start the machine and then pumping to verify that mortar comes out regularly from the conveying pipe. Stop pumping (place the pumping selector in neutral position), close the auxiliary valve and then the gun valve. Reassemble the gun. You can now restart spraying normally.

## 5.10 WATER SYSTEM FOR MIXING WATER (OPTIONAL)

Connect the water intake pipe to fitting 1 (Fig. 5-7).

To operate properly, the inlet water must have sufficient pressure (see technical data in § 2.1). The water must be clean. The suction filter 1 must be kept clean (Fig. 5-8).





### 5.11 HIGH WASHER PRESSURE (OPTIONAL)



*If the machine is equipped with high pressure washer, it must be used to clean the machine after use.*



*Only use clean water and observe the limits of use indicated in § 2.1.*



*Do not use the high pressure washer without water supply.*



*Do not use damaged pipes or water guns.*



*Do not point the water gun towards yourself, other people, animals or objects.*



*The suction filter Fig. 5-8.1 must be kept clean.*



*The fittings must be properly tightened.*



*Do not use the high pressure washer in case it has suffered strong impacts, there are evident oil leaks or water leaks. In this case the high pressure washer must be checked by an authorised maintenance technician.*



*Ensure there is no ice inside the pump if using at extremely low temperatures.*



*The inner diameter of the suction pipes must not be smaller than the suction fitting Fig. 5-7.1 and must have a rated pressure of less than 10 bar.*



**Firmly grasp the water gun and pay attention to the reaction force of the high pressure water jet.**



**Do not direct the high pressure jet towards materials containing health damaging substances.**



**Do not modify or tamper with the high pressure washer.**



**Before disconnecting the pipe and nozzle with high pressure washer deactivated, pull the trigger to release the residual pressure.**



**Prevent the crushing or damaging of suction and delivery pipes.**



**The high pressure washer fears frost. Always drain the residual water from the system.**

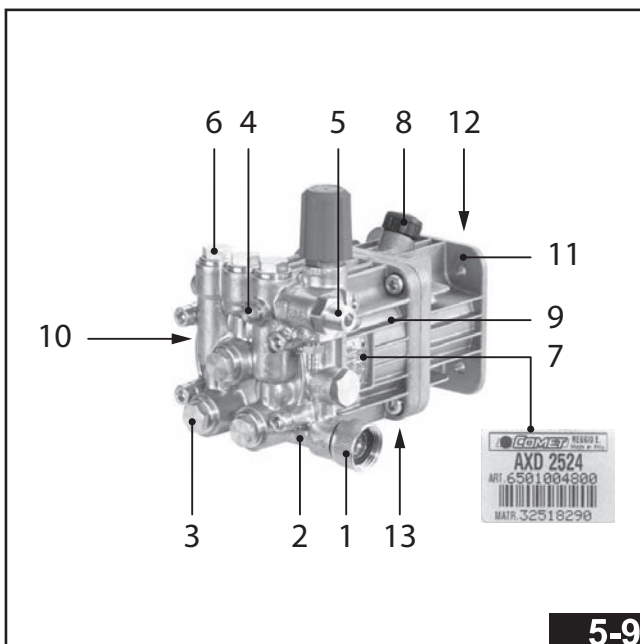


**A slight water dripping under the pump is possible after a prolonged stop. This dripping usually disappears after a few hours of operation. If it persists, contact your authorised maintenance technician.**



**Perform the checks provided by the routine maintenance; contact a qualified technician for extraordinary maintenance.**

- |                          |                          |
|--------------------------|--------------------------|
| 1 Intake fitting         | 8 Oil cap                |
| 2 Pump head              | 9 Pump casing            |
| 3 Intake valve cap       | 10 Oil level indicator   |
| 4 Pressure gauge fitting | 11 Engine flange support |
| 5 Delivery fitting       | 12 Pump shaft            |
| 6 Delivery valve cap     | 13 Oil drain cap         |
| 7 Identification plate   |                          |

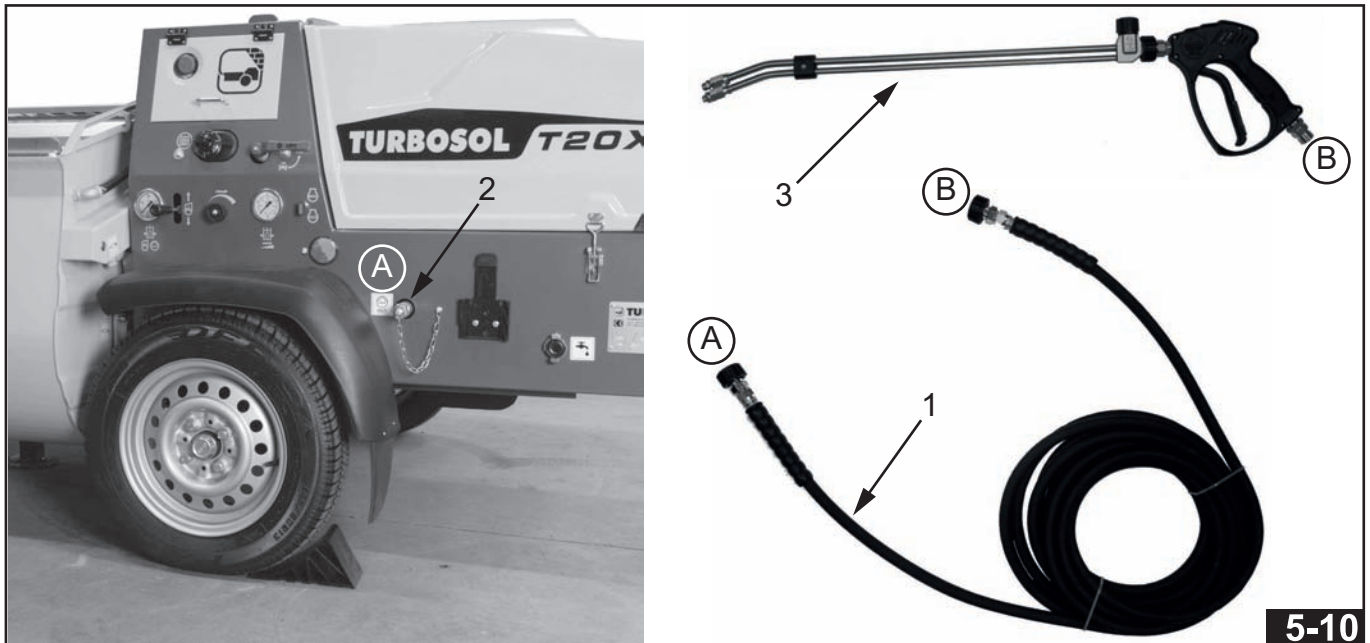


5-9



### 5.11.1 Mains water supply

Connect the water intake pipe to the supply fitting Fig. 5-7.1. Connect the high pressure pipe 1 to the high pressure washer 2 delivery fitting; connect nozzle 3 to pipe 1.



Pull the water gun trigger and wait for the water to come out from the nozzle (water not under high pressure); this is used to trigger the high pressure washer.

Activate the high pressure washer by lifting the selector on the control panel. You can now use the high pressure washer to clean the machine: pull the trigger to release a water jet at a pressure capable of cleaning the machine encrusted surfaces; release the trigger to stop the water jet.

At the end of cleaning, deactivate the high pressure washer by lowering the selector on the electric panel.



*After disconnecting the nozzle and pipe, drain the water inside them. Store them in a suitable place.*

### 5.11.2 Supply from container

The container must have sufficient capacity to complete machine cleaning; it must contain at least 100 litres, be placed at no more than one metre from the machine and the suction pipe must be as short as possible. Container and pipe must be properly cleaned to prevent the circuit from sucking impurities and avoid it being left empty to avoid damaging the high pressure washer. Connect the container intake pipe to the supply fitting Fig. 5-7.1.

Connect the high pressure pipe Fig. 5-10.1 to the delivery fitting of the high pressure washer Fig. 5-10.2; connect the nozzle Fig. 5-10.3 to the pipe Fig. 5-10.1.

Open regulator 1 on the water gun.



Activate the high pressure washer by lifting the selector on the control panel. Pull the nozzle trigger and wait for a water jet to come out (not under high pressure); this procedure is used to trigger the high pressure washer.

Now close the regulator on the water gun Fig. 5-11.1 to increase the water jet pressure.

You can now use the high pressure washer to clean the machine: pull the trigger to release a water jet at a pressure capable of cleaning the machine encrusted surfaces; release the trigger to stop the water jet.

At the end of cleaning, deactivate the high pressure washer by lowering the selector on the electric panel.



**After disconnecting the nozzle and pipe, drain the water inside them. Store them in a suitable place.**

## 5.12 CLEANING THE MACHINE

When the propeller of the stirrer in hopper emerges from the last mixture prepared (it is better for the last mixture to be slightly more fluid than normal):

- stop pumping (close the gun valve and place the pumping selector in neutral);
- stop mixing and completely lower the mixer;
- discharge the residual pressure by activating pumping in reverse for a few seconds, before disconnecting the conveying pipe and the gun;
- stop the engine;
- open the auxiliary valve (Tab. 5-2/6) and the gun valve (Tab. 5-3/7) (the main valve -Tab. 5-2/7 - until now left open) and disconnect the pneumatic piping;
- close the auxiliary valve and the main valve.

Disassemble the gun and thoroughly wash its every part. Check that the nozzle hole is free from fouling.

Loosen the drain plug of the mixer and thoroughly wash it; there must be no residues inside and out. If the grid was opened for easier cleaning, close the grid again.

Loosen the drain plug of the hopper and thoroughly wash it; there must be no residues inside and out. Close the drain plug and fill the hopper with water. Start the engine, press the controls enable button, open the auxiliary valve and start the pumping to clean the mortar pump. When clean water comes out from the pump outlet, stop pumping.

Fill the hopper with water again. Insert one or more washing sponges inside the conveying pipe and connect the latter to the machine. Start pumping. The pumped water will move the sponge forward inside the pipe, cleaning it; the sponge will be ejected. Repeat the pipe washing cycle if clean water does not come out after ejecting the sponge.



**Sponge ejection may be violent. Safely lock the end part of the conveying pipe. Do not point the pipe towards yourself, other people, animals or objects.**

If the pump does not exert sufficient pressure to move the sponge forward and eject it, tighten the clamp evenly until you obtain the necessary pressure. After completing the washing, restore the initial tightening of the clamp.



***Also drain the residual water from the water system. Leave the valves open to discharge the water and protect the system in case of low temperatures.***

After cleaning, turn off the machine. Place the mortar pump selector, mixer and high pressure washer in neutral position. Turn the key to 0 and remove it. Close the control door again. Open the bonnet and disconnect the battery cut-off switch. Close the bonnet with the side locks again.



***For long periods of inactivity, we recommend removing the battery and keep it charged.***

Follow the instructions in § 6.1.17 to disassemble the battery.





6 - MAINTENANCE



Observe the safety requirements in chapter 3.



Only use original spare parts.

6.1 ROUTINE MAINTENANCE



Remember that routine maintenance is the user's responsibility. Refer to the Engine manual for the engine routine maintenance.



		WHEN NECESSARY	DAILY	EVERY 50 HOURS OR EVERY WEEK	EVERY 200 HOURS OR MONTHLY	EVERY 400 HOURS OR 6 MONTHS	EVERY 500 HOURS OR 1 YEAR	EVERY 1000 HOURS OR 24 MONTHS
Engine air filter cartridge check	§ 6.1.1		X					
Engine air filter cartridge replacement	§ 6.1.1					X		
Compressor oil level check	§ 6.1.2		X					
Compressor oil replacement	§ 6.1.1						X	
Hydraulic oil level check	§ 6.1.3		X					
Engine oil level check	§ 6.1.4		X					
Engine cooling liquid level check	§ 6.1.5		X					
Fittings and mortar conveying pipe check	§ 6.1.6		X					
Conveying pipe anchor check	§ 6.1.7							
Pneumatic piping check	§ 6.1.8							
Spraying gun check	§ 6.1.9		X					
Mortar pumping pressure gauge check	§ 6.1.10		X					
Machine and accessories cleanliness	§ 5.14			X				
Greasing	§ 6.1.11		X					
Mortar pump check	§ 6.1.12	X						
Wheel studs tightness check	-					X <sup>1</sup>		
Visual inspection of road trailer for visible damages	-		X					
Ball joint lubrication and greasing	§ 6.1.13					X		
Trailer drawbar cogwheels (joints) cleanliness	§ 6.1.14				X			
Washing of galvanised parts of the axle with clean water	-				X <sup>2</sup>			
Tightening clamps and fuel pipes check	Man. Engine				X			
Engine cooling circuit clamps and pipes check	Man. Engine				X			
Engine air intake pipe	Man. Engine				X			
Fuel tank filling filter check	§ 6.1.15				X			
Pneumatic and hydraulic system fittings and pipes check	§ 6.1.16				X			
Battery replacement	§ 6.1.17							X
Water system intake filter check	§ 6.1.18				X			
High pressure washer oil level check	§ 6.1.19		X					

<sup>1</sup>First inspection from a minimum of 20 km to a maximum of 100 km, then every 6 months of 1500 km.

<sup>2</sup> Halve the maintenance intervals if the trailer is subject to winter journeys or exposed to salty environment.

Tab. 6-1



### 6.1.1 Check and replacement of the engine air filter

When	When beginning work	
Machine state	With machine off and cold	
Tools	Visual inspection	None

Remove lid 1 by opening flaps 2.



The filter is composed of two cartridges, the outer one 1 (first stage) and the inner one 2 (second stage). Manually pull out the first stage cartridge; pull out the second stage cartridge.



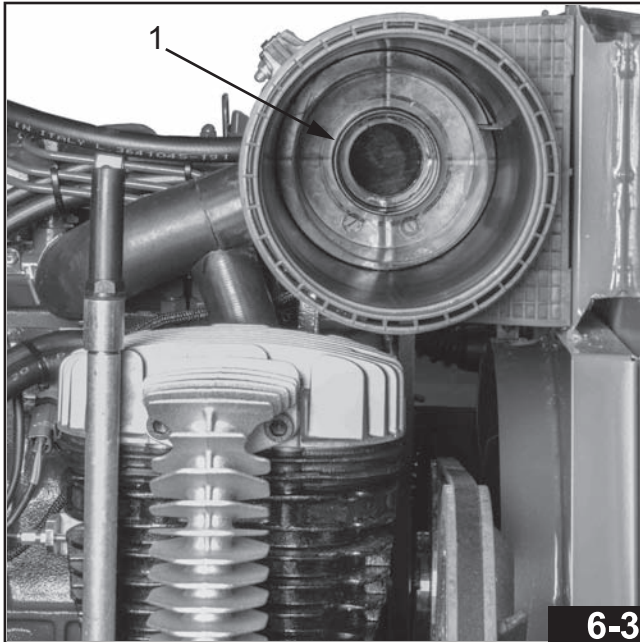
The first stage cartridge must be cleaned by gently and repeatedly hitting on a hard surface, never washed or exposed to compressed air flow.

The second stage cartridge can some times be cleaned with compressed air, never washed.

Also clean the container and lid.

Insert the second stage cartridge, engaging it on its support 1 of the container





Introduce the first stage cartridge and close with the lid.

Replace the cartridges observing the frequencies indicated in Tab. 6-1.

#### 6.1.2 Compressor oil level check

When	When beginning work	
Machine state	With machine off and cold	
Tools	Visual inspection	None
	Top-up	No.19 wrench and funnel
	Replacement	No.18 wrench and funnel

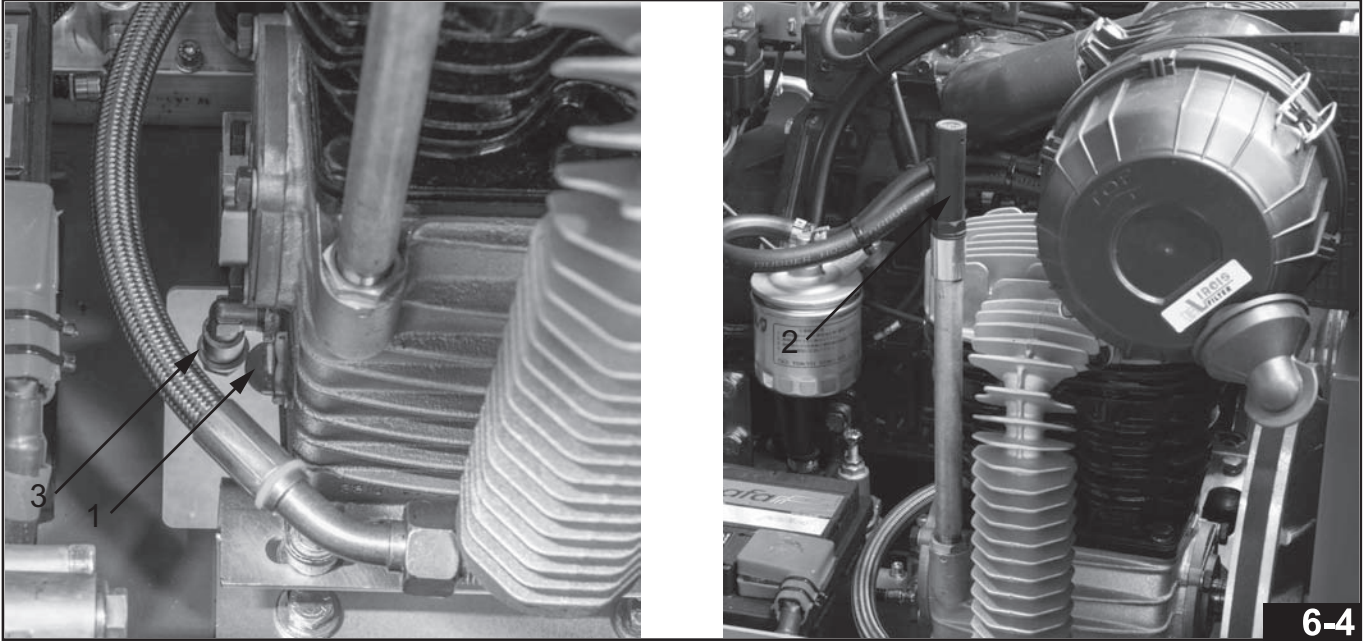


**Replace the oil observing the frequencies indicated in § 6.1. Only use the type of oil reported in § 2.1. Do not mix different oils as they can damage the compressor.**

The compressor oil level must be half-way on the level indicator 1.

To top-up, loosen cap 2 and fill up to half-way on the level indicator. Help yourself with a clean funnel to prevent fluid leaks. Close cap 2.

To replace the oil, place a suitable container under the machine to collect the waste oil. Loosen cap 2 and cap 3; let the oil flow out completely and close cap 3. Fill the compressor with oil up to half-way on indicator 1. Help yourself with a clean funnel to prevent fluid leaks. Close cap 2.

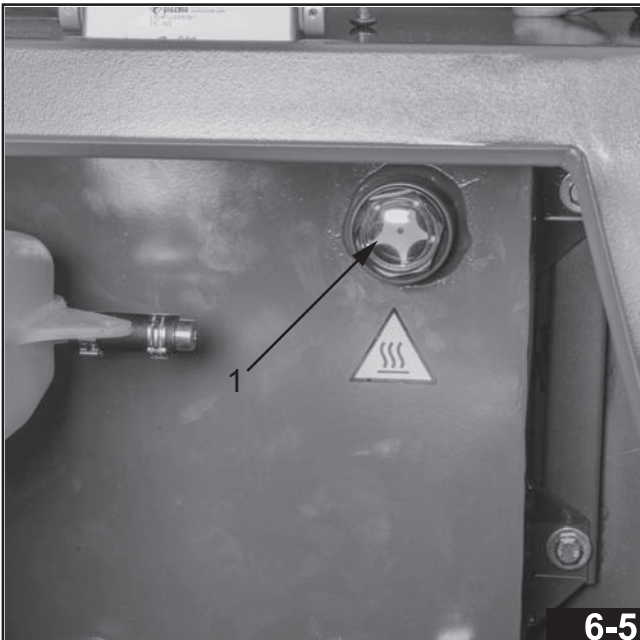


**If after a few consecutive checks the oil level is significantly reduced, it is possible that the compressor leaks. Contact the Dealer or the TURBOSOL PRODUZIONE S.P.A. technical assistance to resolve the fault.**

### 6.1.3 Hydraulic oil level check

When	When beginning work	
Machine state	With machine off and cold	
Tools	Visual inspection	None
	Top-up	No.10 wrench and funnel

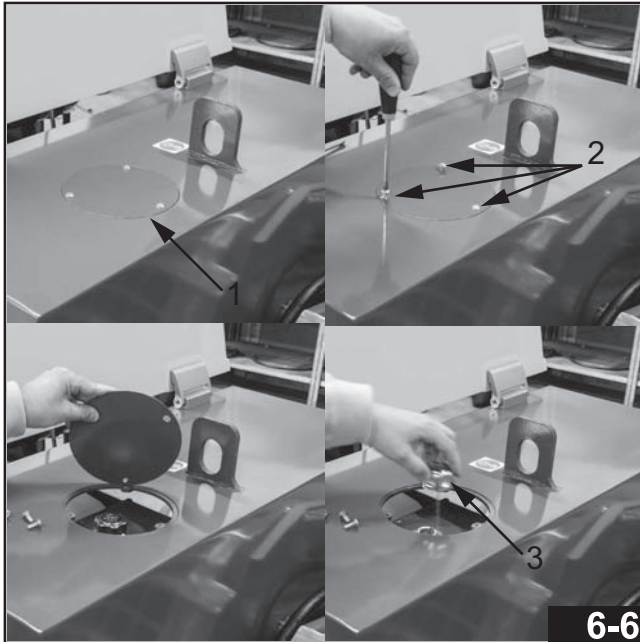
Check the hydraulic oil level always with mixer fully lowered. The oil level in the tank must be half-way on the level indicator 1.



To top-up, remove lid 1 by loosening screws 2, loosen cap 3 and fill up to half-way on the level indicator. Help yourself with a clean funnel to prevent fluid leaks. Only use the type of oil reported in § 2.1.



**Do not mix different oils as they can damage the hydraulic system components.**

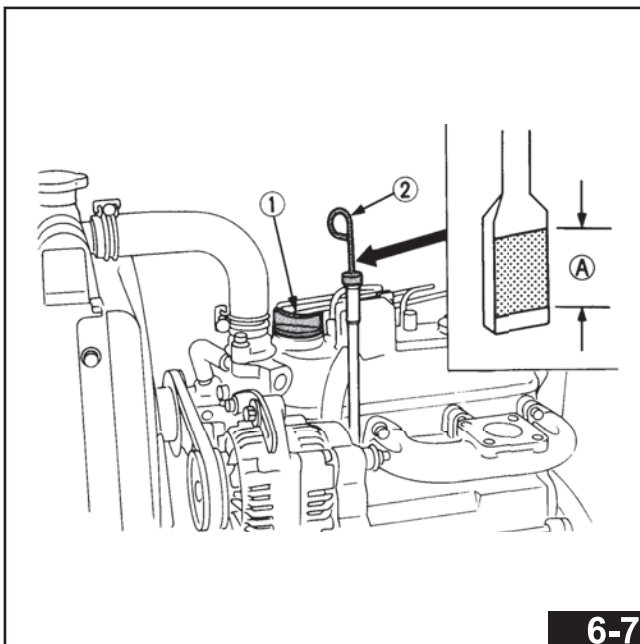


**If after a few consecutive checks the oil level is significantly reduced, it is possible that the system leaks. If the leak comes from a loose fitting, tighten the fitting; if the leak comes from a pipe, have it replaced with a new and original pipe, by an authorised maintenance technician. If you cannot find the source of the leak, contact the Dealer or the TURBOSOL PRODUZIONE S.P.A. technical assistance to resolve the fault.**

#### 6.1.4 Engine oil level check

When	When beginning work	
Machine state	With machine off and cold	
Tools	Visual inspection	None

Remove dipstick 2, clean the end in contact with the oil using a clean cloth, put the dipstick back in and pull it out again; the amount of oil must be between the minimum and the maximum (range A). To top-up, remove cap 1 and add oil up to the prescribed level. Help yourself with a clean funnel to prevent fluid leaks. After adding the oil, wait 5 minutes and check the level again. This time is necessary for the oil to reach the oil pan.



**Only use the type of oil reported in § 2.1. Do not mix different oils as they can damage the engine.**

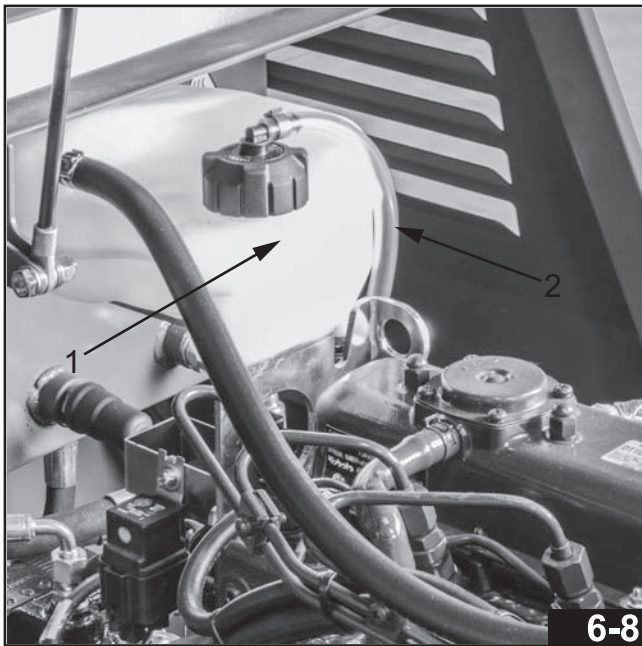


**If after a few consecutive checks the oil level is significantly reduced, it is possible that the engine is not working properly. Contact the Dealer, the TURBOSOL PRODUZIONE S.P.A. technical assistance or an authorised KUBOTA workshop directly.**

### 6.1.5 Engine cooling liquid level check

When	When beginning work	
Machine state	With machine off and cold	
Tools	Visual inspection	None
	Top-up	None

The cooling liquid level must be between the minimum and the maximum shown on the expanding bowl 1. If necessary, top-up with a mixture of water and anti-freeze in the same portions indicated in § 2.1. Any cooling liquid excess will be expelled during operation, through pipe 2.



**Do not mix different anti-freeze as it can damage the engine.**



**An abnormal consumption of cooling liquid implies leaks from the cooling system. Check the system pipes and their fastening; if you cannot find the cause of the leak, contact the Dealer or the TURBOSOL PRODUZIONE S.P.A. technical assistance to resolve the fault.**

### 6.1.6 Fittings and mortar conveying pipe check

When	When beginning work	
Pipe state	Clean, disconnected from the machine	
Tools	Visual inspection	None

The conveying pipe is composed of a rubber hose, to the ends of which the fittings are crimped (permanently). The female fitting contains a removable sealing gasket.

Visually check the good condition of the conveying pipe, fittings and gaskets. The outer surface of the rubber hose must not be cut or cracked; also, the rubber near the fittings must be intact, both internally and externally. The fittings must not be deformed and the closing cams must fasten properly. The gaskets must not be cut or deformed.



**If the piping is damaged or you are not sure of its good condition, replace it with a new and original one.**



**If the gaskets are damaged or you are not sure of their good condition, replace them with new and original ones.**



### 6.1.7 Conveying pipe anchor check

When	When beginning work	
Anchor state	Clean, not released from the conveying pipes	
Tools	Visual inspection	None

Check the good condition of the anchors: the metal parts must not be damaged or rusty, the rubberised canvas parts must not be cut or torn.



***If the anchors are damaged or you are not sure of their good condition, replace them with new and original ones.***

### 6.1.8 Pneumatic piping check

When	When beginning work	
Pipe state	Clean, disconnected from the machine	
Tools	Visual inspection	None

The pipes must always be in good conditions. The rubber must not be cut or cracked. The fittings must not be deformed and the locking system must be intact. The seal gasket inside the fitting must be intact and not be cut or deformed.



***If the pipes are damaged or you are not sure of their good condition, replace them with new and original ones.***

### 6.1.9 Spraying gun check

When	When beginning work	
Gun state	clean and disconnected	
Tools	Visual inspection	None

Check that the nozzle is clean; the flap must be intact and the valves perfectly working. The fittings must not be deformed and the closing cams must fasten properly.



***If the certain parts of the gun are damaged or you are not sure of their good condition, replace them with new and original ones.***

### 6.1.10 Check the pumping pressure gauge

When	When beginning work	
Machine state	With machine off and cold	
Tools	Visual inspection	None

Check that pressure gauge 1 is not broken or illegible (e.g. due to fouling).

Check that the transparent rubber 2 is not broken or deformed.

Check that there are no large air bubbles inside the gauge.

On the contrary, replace the pressure gauge.



***If the pressure gauge is damaged or you are not sure of its good condition, replace it with a new and original one.***

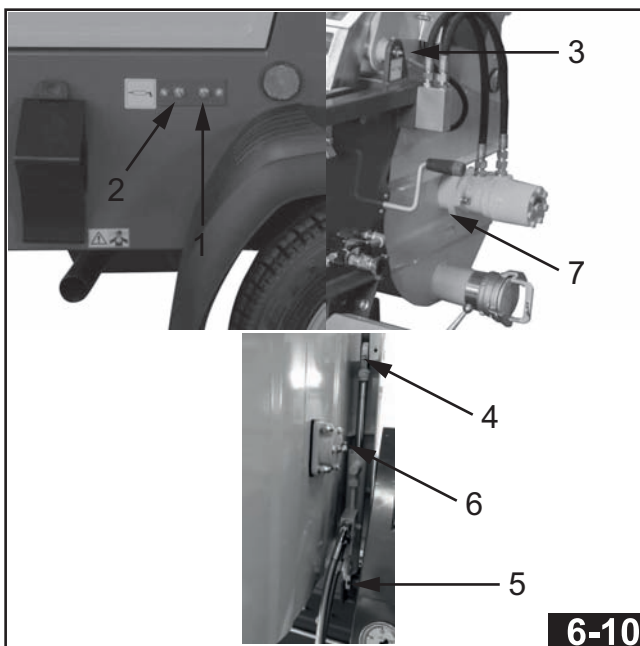


### 6.1.11 Greasing

When	At end of work
Machine state	With machine off
Tools	Grease pump supplied (usable grease indicated in § 2.1)

Grease through the lubricators on the machine.

- 1 Agitator support
- 2/3 Tipping mixing supports
- 4/5 Tipping mixer lifting cylinder joints
- 6/7 Mixer supports



*If greasing is performed correctly, grease must come out.*

### 6.1.12 Check the mortar pump

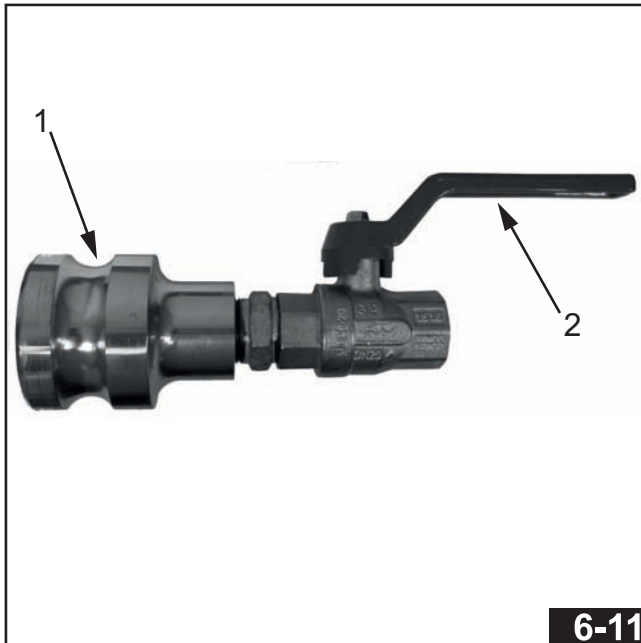


### 6.1.12.1 State of wear

When	When beginning work
Machine state	Machine running
Tools	Mortar pump calibration system No.24 wrench for clamp screws

Checking the state of wear of the pump is necessary to guarantee constant performances. The state of wear must be carried out periodically or when a reduction in performance is detected during the mortar conveying.

Assemble the calibration system 1 with valve 2 open, making sure to properly tighten the closing cams 3 of the joint. The calibration system is found in the accessory box.



Fill the hopper with water and start pumping. Close the calibration system valve and stop pumping.

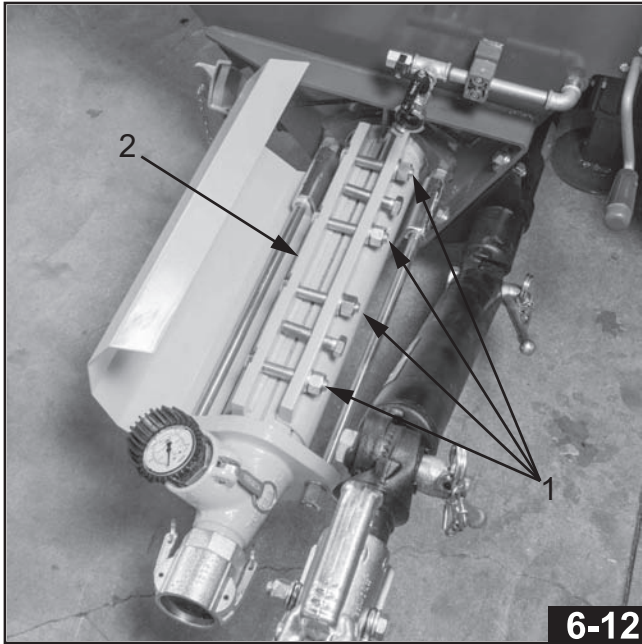


***With worm pump properly adjusted, the residual pressure (read on the delivery pressure gauge) must be 8÷10bar. If the residual pressure is lower or null, the clamp must be adjusted.***

Tighten all adjustment screws "1" of clamp "2" evenly to increase the pumping pressure and loosen them to reduce it. Repeat the test until you obtain a residual pressure of 8÷10bar.



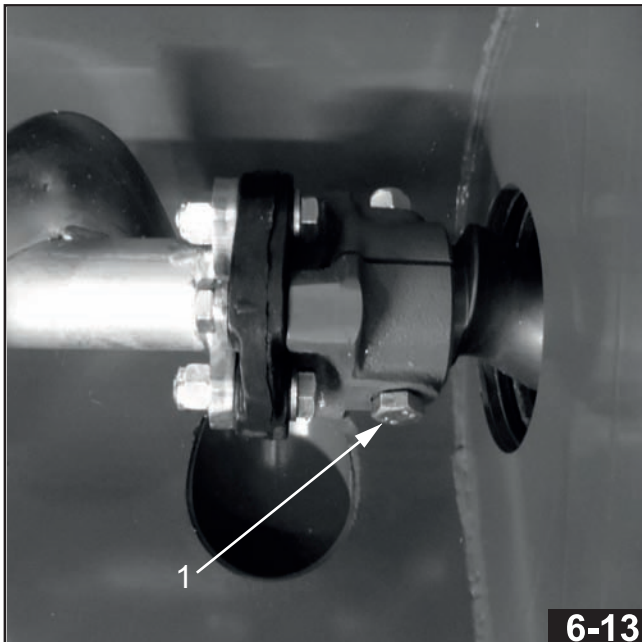
***The pump must be replaced when you can no longer obtain a residual pressure with the previous test. Indicatively replace one screw every two stators.***



#### 6.1.12.2 Mortar pump replacement

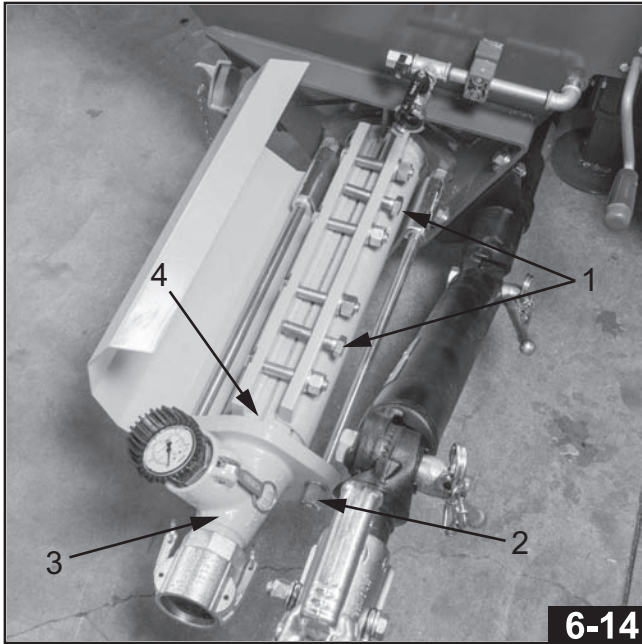
When	As needed
Machine state	With machine off
Tools	No.19 wrench for rotor/shaft connection screw No.24 wrench for clamp screws and tie-rods

Open the hopper grid then loosen and remove screw 1 that connects the rotor head to the stirrer. Replace the screw and bolt and worn/damaged.



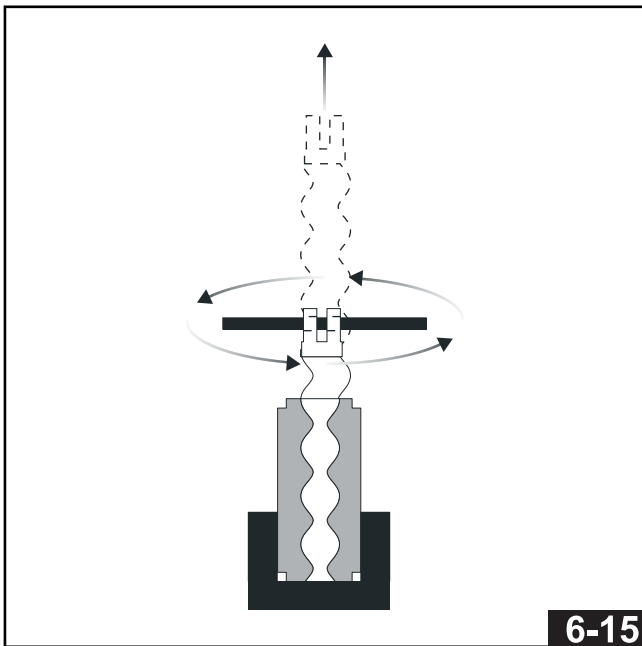
Completely loosen the adjustment screws of the clamp and then open it completely by tightening screws 1. Loosen the tightening screws 2 of the tie-rods. Remove manifold 3 from the end of mortar pump 4.







Remove the mortar pump.

Grip the assembled pump and lock the stator. Insert a 12 mm and sufficiently long (at least 80 cm) iron rod inside the rotor head hole to leverage, and loosen the rotor from the stator. After removing the rotor, check if it can be reused. The outer diameters of the rotors of the pumps provided by TURBOSOL PRODUZIONE S.P.A. are shown in Tab. 6-2.



		2L6	2L7	T25	60.12	
✓		m	62,2	73	73	81,2
✗		m	<59	<70	<70	<78

Tab. 6-2

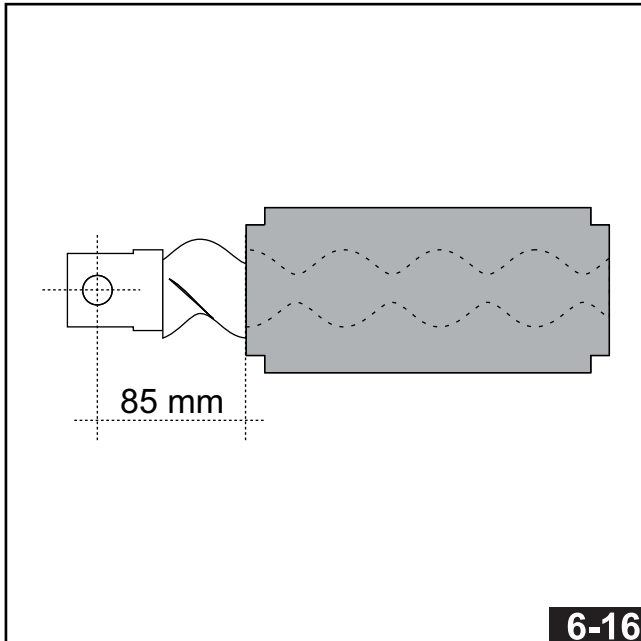
The pump is normally supplied not assembled. Thoroughly grease the rotor and inside the stator with the lubricants indicated in § 2.1.

The rotor must be inserted from the stator flared side (intake side facing the machine).

Grip the pump, insert a 12 mm and sufficiently long (at least 80 cm) iron rod inside the rotor head hole to leverage, and tighten the rotor into the stator.



The screw head hole must be at approximately 85 mm from the intake section of the stator for it to be connected to the stirrer.

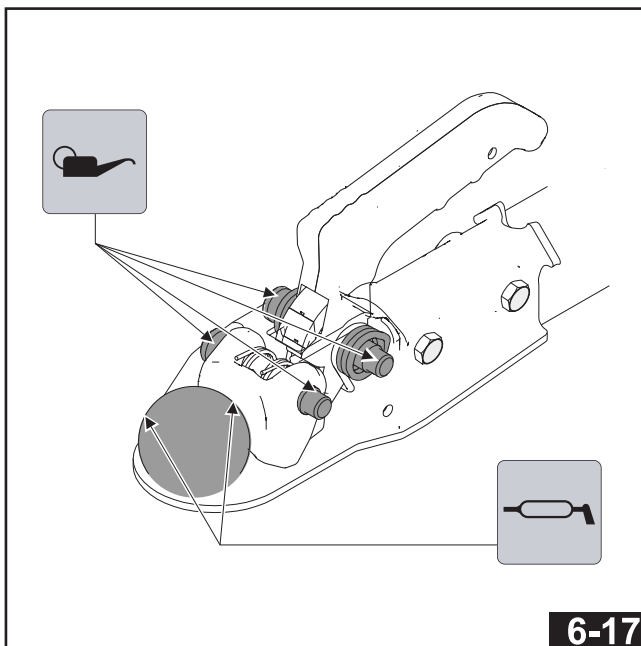


To assemble the pump follow the disassembly instructions in reverse order, remembering that this must be done with the machine off.

#### 6.1.13 Ball joint lubrication and greasing

When	Before towing on the road, with trailer not hooked to the towing vehicle
Machine state	With machine off and cold
Tools	Grease and lubricant (indicated in § 2.1)

Grease the ball seat and lubricate the joints.

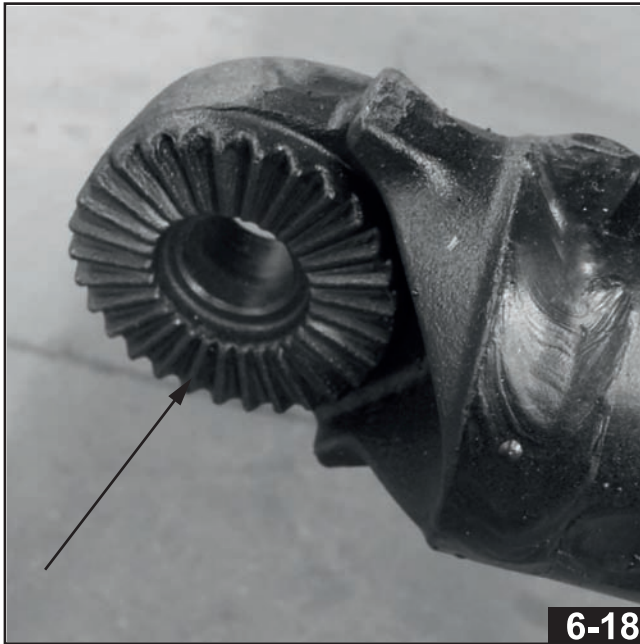


#### 6.1.14 Cleaning of the cogwheels (joints) of the trailer drawbar

When	Before towing on the road, with trailer not hooked to the towing vehicle
Machine state	With machine off and cold
Tools	Brush or cloth



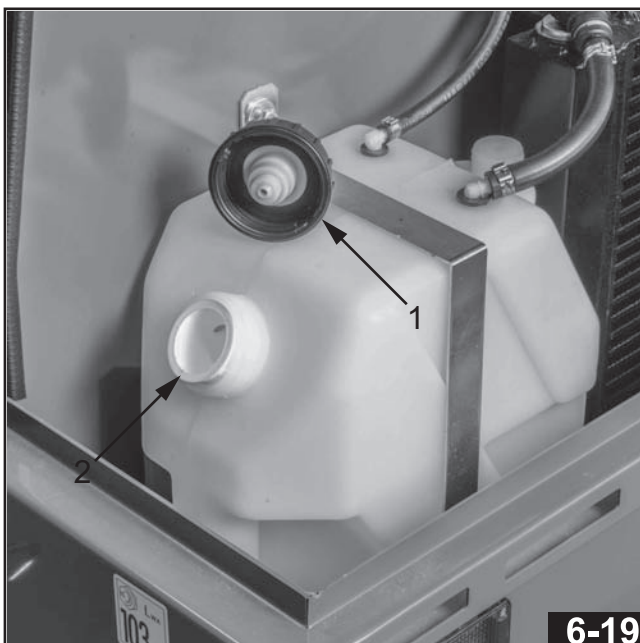
Clean the cogwheels at the ends of the drawbar sections.



#### 6.1.15 Fuel tank filling filter check

When	At end of work	
Machine state	With machine off	
Tools	Visual inspection	None

Open cap 1 of the fuel tank and remove the filling filter 2. Check that it is clean; if not, blow compressed air on it being careful not to damage the filter net. If the filter is damaged (e.g. the net is torn), replace it with a new and original one.



#### 6.1.16 Pneumatic and hydraulic system fittings and pipes check

When	When beginning work	
Machine state	With machine off	
Tools	Visual inspection	None
	Tightening	Various wrenches

The pipes must always be in good conditions. They must not be cut or cracked. The fittings and the locking system must be intact. Do not use pipes of dubious condition. Tighten the fittings if you notice leaks.



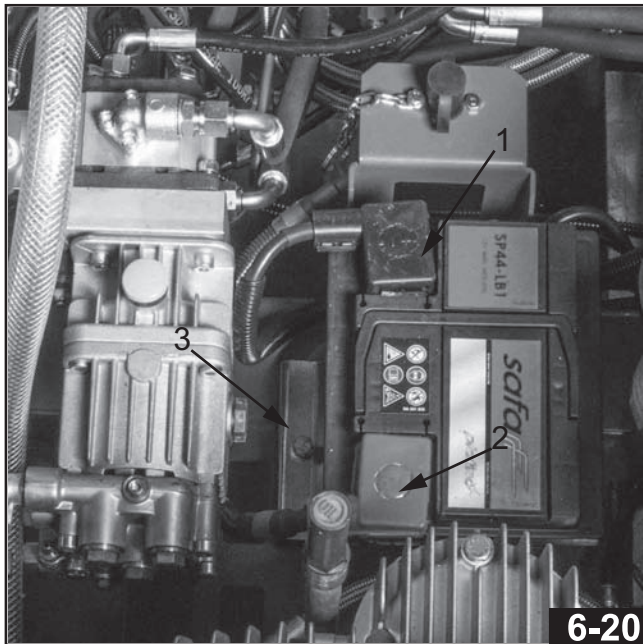
### 6.1.17 Battery replacement

When	As needed
Machine state	With machine off and cold
Tools	No.13 wrench to fix the battery No.9 wrench for the battery poles



**Check that the battery cut-off switch is disconnected.**

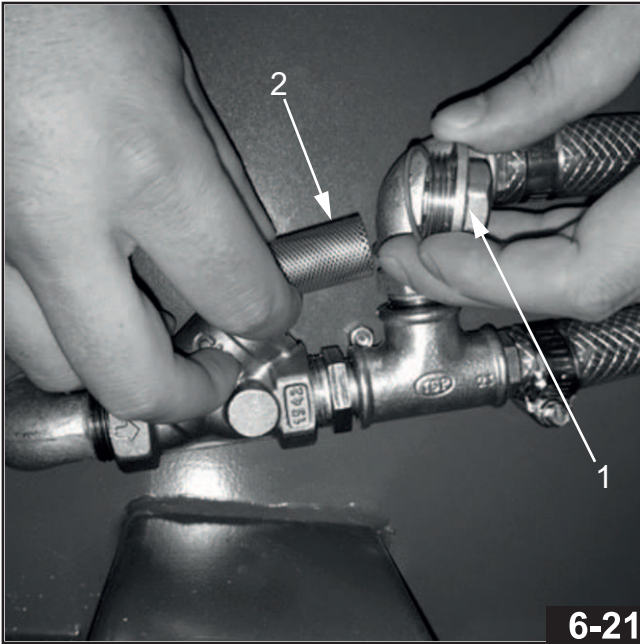
Disconnect the negative pole (-) 1, the positive pole (+) 2 and disassemble the battery stop 3. Replace the battery with a new and original one or with one having features not inferior to those indicated in the technical data. Reassemble the stop, reconnect the positive pole (+) and the negative pole (-).



### 6.1.18 Water system intake filter check

When	As needed
Machine state	With machine off and cold
Tools	No.22 wrench

Loosen lid 1 and remove filter 2. Thoroughly wash and reassemble. Check that the filtering element is not torn.

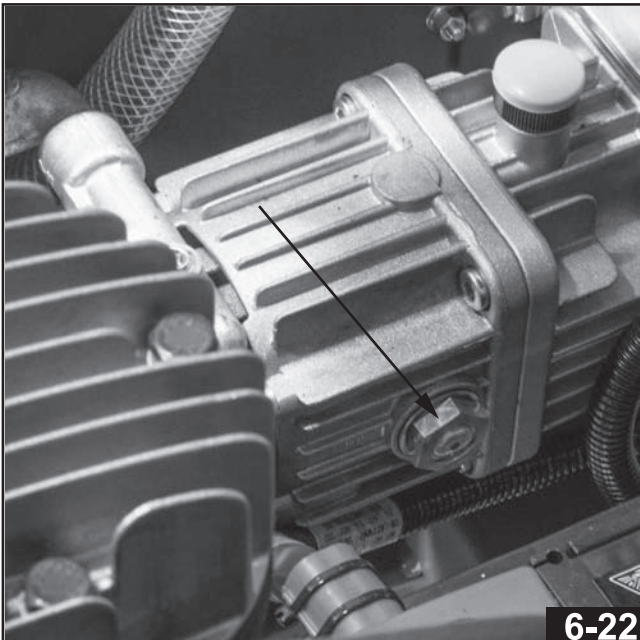


*If the filter is damaged or you are not sure of its good condition, replace it with a new and original one.*

#### 6.1.19 High pressure washer oil level check

When	When beginning work	
Machine state	With machine off and cold	
Tools	Visual inspection	None

The oil level must be in the centre of oil level indicator 1.





## 6.2 EXTRAORDINARY MAINTENANCE



The machine extraordinary maintenance must be carried out by the maintenance technician. The extraordinary maintenance of the engine must be performed by personnel authorised by the engine manufacturer.



	WHEN NECESSARY	EVERY 200 HOURS OR MONTHLY	EVERY 400 HOURS OR 6 MONTHS	EVERY 500 HOURS OR 1 YEAR	EVERY 1000 HOURS OR 24 MONTHS	EVERY 1500 HOURS
Engine oil	◇ <sup>1</sup>					
Engine oil filter cartridge	◇ <sup>1</sup>					
Fuel filter cartridge	◇		◆			
Hydraulic oil	◇				◆	
Hydraulic oil filter	◇				◆	
Filler cap and oil tank vent	◇	●			◆	
Compressor oil	◇			◆		
Engine	◇				●	●
Engine supports	◇					
Belt tension	◇	●				
Hydraulic system	◇			●		
Pneumatic system	◇			●		
Safety system elements	◇	●				
Trailer	◇ <sup>2</sup>			● <sup>3</sup>		
Engine cooling circuit clamps and pipes					◆	
Engine air intake pipe					◆	
Fuel pipes and tightening clamps					◆	
Oil tank breather cap				◆		
Compressor pulley (on engine shaft)				●		
Belts				◆		
Electrical system				●		
Battery electrolyte		●				
Battery terminals		●■				
Battery charge status		●				
Mortar pumping pressure gauge		●				
Mortar pump transmission elastic joint		●				
Mortar conveyor fittings and pipes				●		
Machine structure				●		
Fan			●			
Radiator		■				
Fuel tank		■				
Engine cooling liquid density		●			◆	
High pressure washer oil				◆		
High pressure washer intake valves				●		
High pressure washer pressure reducer valve				●		
General machine check				●		

## Description of the symbols

◇ Service before 50 hours of operation	● Filling Check Restore	■ Cleaning	■ Greasing	◆ Replacement
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<sup>1</sup> After first service, replace the oil every 200 hours of operation. Observe the instructions on the Engine operator manual

<sup>2</sup> After 6 months or 1500 km

<sup>3</sup> Every year or 10000 km

Tab. 6-3



## 7 - DEMOLITION



**Observe the safety requirements in chapter 3.**

The operations to be performed are those for the scrapping of:

- steel, copper, aluminium parts (metal alloys in general);
- rubber and plastic compounds;
- insulating materials;
- lubricating materials;
- batteries and their fluids;
- etc.



**The machine demolition and disposal must be carried out according to law.**





**8 - TROUBLESHOOTING**

This chapter sets out the common problems that can arise and the possible solutions.



**Contact your Dealer or the TURBOSOL PRODUZIONE S.P.A. technical assistance if the problem cannot be resolved or for different anomalies from those listed below.**



**For any engine-related problems, consult the Engine manual or directly contact a KUBOTA authorised workshop.**

FAULT	POSSIBLE CAUSE	SOLUTION	
<b>First click of the key (I) the dashboard LEDs do not light up</b>	Battery cut-off switch disconnected	Restore the circuit power by activating the battery cut-off switch	
	Battery cables not connected	Check that the battery cables are properly connected to poles	
	FJ1 (50A) fuse blown	Open the protection cover, remove the fuse and replace it with a new one	
<b>The engine does not start</b>	Emergency button pressed	Release the pressed emergency button	
	Badly placed cover of the remote control socket	Tighten the cover properly	
	Bonnet open	Close the bonnet with the side locks	
	Badly connected safety hinge connector	Check that the safety hinge connector is properly tightened	
	No fuel	Refuel	
	Flat battery	The maintenance technician must check the battery charge state	
	Faulty fuel solenoid	Contact the KUBOTA assistance centre	
<b>The glow-plugs pre-heat LED does not turn on</b>	Badly connected diesel solenoid wires	The maintenance technician must check the solenoid wiring	
	Key not at second position	Take the key to second position and wait for the LED to turn off	
	F1 fuse tripped	Rearm F1 (on the dashboard side, inside the machine)	
<b>The dashboard selectors do not activate the function</b>	Faulty KUBOTA pre-heat control unit	Contact the KUBOTA assistance centre	
	Button // not pressed	Press button //	
	No power supply (head LED off)	Contact a TURBOSOL PRODUZIONE S.P.A. authorised workshop	
<b>The engine does not go to minimum with the pneumatic system valves closed</b>	Faulty solenoid		
	Engine mode valve at MAX position	Turn the valve to ECO position	
	Air leaking from the pneumatic system	The maintenance technician must check for leaks: loose fittings, torn pipes, etc...	
Faulty pilot valve	Check that the accelerator cylinder is at stroke end when the system valves are closed		



FAULT	POSSIBLE CAUSE	SOLUTION	
<b>The engine suddenly switches off</b>	High cooling liquid temperature (dashboard LED on)	Wait for the time necessary to cool the engine and then resume work. Check the cooling liquid level (with machine cold)	
	High hydraulic oil temperature (dashboard LED on)	Wait for the time necessary to cool the oil and then resume work. Check the oil level (with machine cold)	
	Bonnet open	Close the bonnet with the side locks	
	No fuel	Refuel	
	Low engine oil pressure (dashboard LED on)	Contact the KUBOTA assistance centre	
	<b>Blocked mortar pump</b>	Clogging	Follow the instructions in § 5.10
Clamp excessively tight		Loosen the clamp screws	
Mixture cannot be pumped (e.g. excessive inert granulometry)		Evacuate the mixture from the machine	
Hydraulic circuit fault		Contact a TURBOSOL PRODUZIONE S.P.A. authorised workshop	
<b>Mortar pump stopped</b>	Function off	Activate the selector	
	Grid open	Close the grid and press the reset button //	
<b>Material does not come out of the gun</b>	Clogged pipe	Incorrect mixture	
		Excessively prolonged stop	
	Incorrectly adjusted clamp	Adjust the clamp screws	
	Material crust or stone obstructing the passage	Clean the flap and, if necessary, the gun	
Flap passage too small	Replace the flap		
<b>The material tends to drip from the gun</b>	Flap hole too big	Replace the flap and/or nozzle with one having a smaller hole	
<b>While working the material reaches the gun in an intermittent manner</b>	Folded air hose	Check that the air hose is free	
	Air nozzle clogged	Check that the nozzle is not obstructed	
<b>Mixer blocked</b>	Foreign body in the hopper	Stop the engine, open the mixer grid and remove the foreign body	
	Incorrect mixture	Modify the mixture	
	Hydraulic circuit fault	Contact a TURBOSOL PRODUZIONE S.P.A. authorised workshop	
<b>Mixer stationary</b>	Function off	Activate the selector	
	Grid open	Close the grid and press the button //	
<b>The ball joint does not click after it has been hooked on to the towing vehicle</b>	Diameter of ball greater than 50 mm	Contact an authorised workshop	
	Insufficient vertical load	Press on the ball joint with your hands	
	Area inside the ball joint dirty	Clean and grease the ball joint	



FAULT	POSSIBLE CAUSE	SOLUTION	
<b><i>The high pressure washer does not prime.</i></b>	Air suctioned.	Check the integrity of the intake circuit	
	Delivery closed (e.g. in case of a high pressure washer, water gun closed)	Reset the delivery pressure by pressing the water gun lever	
<b><i>The high pressure washer does not reach maximum pressure.</i></b>	Insufficient water supply or priming from an excessive depth	Check that the water mains flow rate or priming depth comply with the technical data in § 2.1	
	Inadequate use (e.g. worn nozzle or too big)	Restore use	
<b><i>Irregular high pressure washer flow rate and pressure (buttons).</i></b>	Air suctioned	Check the integrity of the intake circuit	
	Dirty water inlet filter	Clean the filter	
	Insufficient water supply or priming from an excessive depth	Check that the water mains flow rate or priming depth comply with the technical data in § 2.1	
	The pump has not completed priming	Prime the pump	
	Clogged use (e.g. clogged nozzle)	Restore use	
<b><i>Accentuated high pressure washer noise</i></b>	Intake circuit with chokes	Check intake circuit	
	Excessive supply water temperature	Feed the pump with water below 60°C	

