

GP 2000 GROUT PUMP



OPERATING MANUAL FOR DRIVE TYPE

- Air
- Hydraulic
- Diesel
- Electric



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GP 2000 Operating Manual



Models:

Air Powered



415V Electric



Hydraulic

Diesel Powered Unit Also Available

GP 2000 Operating Manual

DESCRIPTION	AIR	HYDRAULIC	DIESEL	ELECTRIC
Dimensions				
Length / meters	1.77	1.77	2.52	2.02
Width / meters	1.03	1.05	1.05	1.13
Height / meters	1.43	1.43	1.43	1.43
Weight / kg	570	540	900	660
Motors			Isuzu	415Volt 50Hz
Mixer	Vane 2.2kw	100cc/rev	100cc/rev	1.5kw
Pump	Vane 3.5kw	400cc/rev	400cc/rev	4kw
Oil Required litr/ min		65		
Pressure / bar		150		
Mixer				
Total Volume / litres	180	180	180	180
Mixing Capacity litres	100	100	100	100
Pump Hopper / litres	195	195	195	195
Pump Performance				
Minimum litres / min	3	5	10	5
Maximum litres / min	35	35	35	35
Maximum P in Bar	35	35	35	35
Pumping Distances				
Vertical / meters	20-30	20-30	20-30	20-30
Horizontal / meters	40-50	40-50	40-50	40-50

1.1 TECHNICAL SPECIFICATIONS continue

DESCRIPTION	AIR	HYDRAULIC	DIESEL	ELECTRIC
Pumping Capacity Water / Cement Ratio	0.25 >	0.25 >	0.25 >	0.25 >
Max. Agg. Size / mm	< 4	< 4	< 4	< 4
Water Meter Increment	.1 of a Litre	.1 of a Litre	.1 of a Litre	.1 of a Litre
Energy Requirements	350cfm or 10 m ³ / min At 7 bar	65 Litre/Min @ 150 Bar	Diesel	415 volt 50 Hz 25 Amp
Mixer Speed / Rpm	50	50	50	50
Gearbox Oil Type	Shell Omala S2 G 320	Shell Omala S2 G 320	Shell Omala S2 G 320	Shell Omala S2 G 320
Gearbox Oil Quantity Mixer / Litre Pump / Litre Variator / Litre	0.5 4.2			0.5 4.2 2 to 3
Variator Oil Type				AT F
Hydraulic Oil Type Quantity			Shell Tellus S2 M 68 80 Litres	
Airmotor Oil Type	Shell Tellus S2 M 46			
Paint Type Colour	Powdercoat White	Powdercoat White	Powdercoat White	Powdercoat White

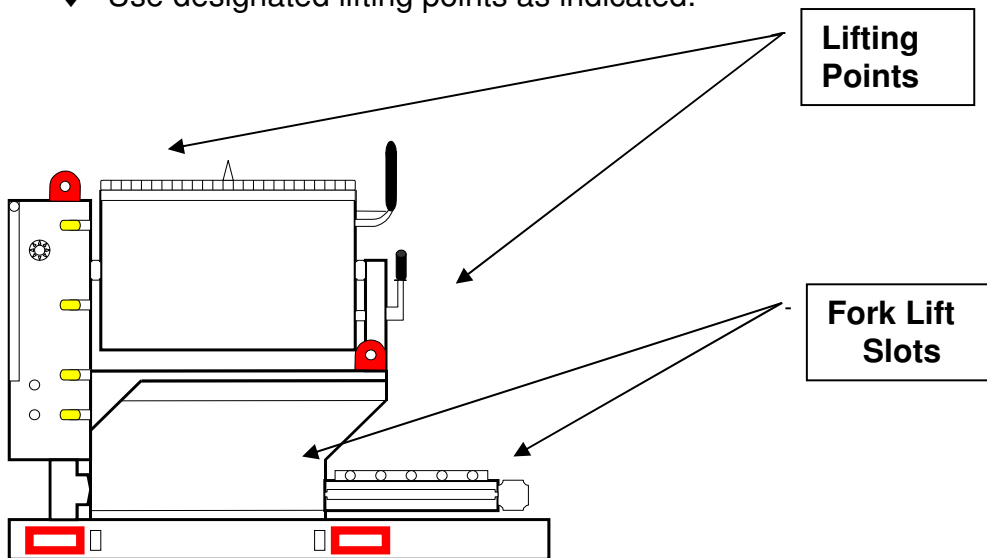
1.1 TECHNICAL SPECIFICATIONS continue

GP2000E NORMET		
Dosing Pump	Bredel20	3.5 Bar
Product Flowmeter	PMS025	Flowmeter & Display
Dosing Flowmeter	MES20-T FRT303-A-E	Flowmeter Display

Lifting Procedure

1.5.1 Correct Lifting Procedure

- ◆ Use designated lifting points as indicated.



2 SAFETY

Introduction

2.1.1 Who may operate a GP 2000 Grout Pump.

Trained and qualified personnel, in accordance to local regulations.

Use in accordance to the specification.

Operators shall read and understand this manual.

Inappropriate Use

This equipment shall be operated according to the specifications, furthermore for any modifications consult the manufacturer.

2.2 Warning Notices and Symbols

2.2.1 Signs and symbols are awareness indicators

- ◆ Signs indicate potential hazards!



- ◆ Signs and labels **SHALL NOT BE REMOVED!**

2.3 Personal Safety

2.3.1 When operating this equipment adhere to all personal safety requirements.

- ◆ Follow and administer the safe working practice in these instructions.

2.3.2 Safety precautions when working with Cement Based Materials.

- ◆ **Skin protection**, cover all exposed skin and use suitable barrier creams, furthermore wear suitable gloves and a face shield.
- ◆ **Eye protection**, wear safety glasses or goggles.
- ◆ **Ear protection** when operating in a noisy environment., or as per specific company policy.
- ◆ Adhere to COMPANY SPECIFIC P.P.E

2.3.3 Safety Devices

- ◆ Alterations to the equipment or removing safety devices are **strictly forbidden!**

2.4 General Safety Regulations

2.4.1 Replacement Parts

- ◆ Only genuine ZENITH GP2000 parts shall be installed.

2.4.2 Repair and Maintenance

- ◆ Trained and qualified maintenance personnel shall conduct service repairs.

2.5 Obligations and Responsibilities

2.5.1 Manufacturer Obligations

- ◆ The manufacturer is responsible for product safety. However, considerable onus is placed on the operator.
- ◆ The manufacturer may request information on safety aspects, regarding the machine application.

2.5.2 Operator Obligations

- ◆ The operator shall read and understand these instructions, however failing to abide by these instructions places all responsibility on the operator.
- ◆ The operator is responsible for his actions, furthermore he is responsible for his fellow work colleges and the work place environment.
- ◆ The owner or operator must ensure that only authorised personnel operate this equipment.
- ◆ Occasional users or temporary employees must receive thorough initial instruction, based on this operating manual .

Caution !

- ◆ The owner or operator must ensure all personnel adhere to the operating instructions.
- ◆ All relevant safety aids must be readily available, and the owner or operator is responsible for all the warning signs and symbols, which must stay readable at all times.

2.5.3 Authority

- ◆ The responsibility for all operational work sequences, especially the commissioning, cleaning and overhauling operation, must be clearly defined and adhered to, so that safety responsibility aspects are clearly regulated.

2.6 Maintenance Obligations and Care

- ◆ The machine must be operated and maintained in a safe and responsible manner.
- ◆ Maintenance intervals shall be adhered to.

2.6.1 Obligations to Observe and Report

- ◆ If, while operating this equipment dangers and risks arise which are not covered in these operating instructions, the operator shall immediately inform the manufacture.

2.6.2 Operating Instructions Availability

- ◆ These operating instructions shall be readily available to anyone requiring them in the work place.

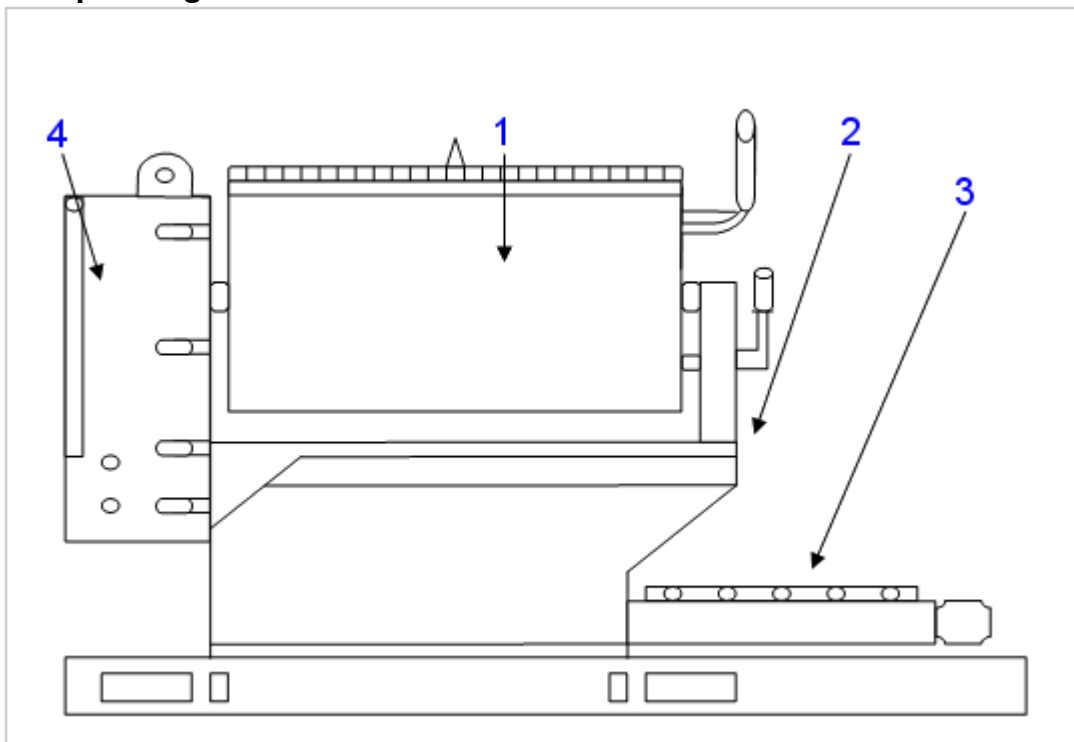
3 OPERATION AND DESIGN

3.1 Description of the design

- ◆ The GP2000 grout pump is capable of pumping cement based grouts, from high flow to thixotropic grout.
- ◆ Precisely controlled water addition is capable to one tenth of a litre through an accurate digital water meter.
- ◆ Continuous grouting is possible through the two-stage mixer and pump system, this enables a high degree of quality control.
- ◆ Cement and water is mixed in the efficient paddle mixer, then discharged into the lower hopper, where a variable speed drive coupled to a rotor stator pump (mono system) discharges the grout at the desired rate.
- ◆ The GP2000 is also suitable for small volume, spray mortar applications, up to a maximum aggregate size of 4mm.

3.1.1 Functional Principle

- 1 Paddle Mixer
- 2 Pump Hopper
- 3 Rotor Stator
- 4 Operating Cabinet

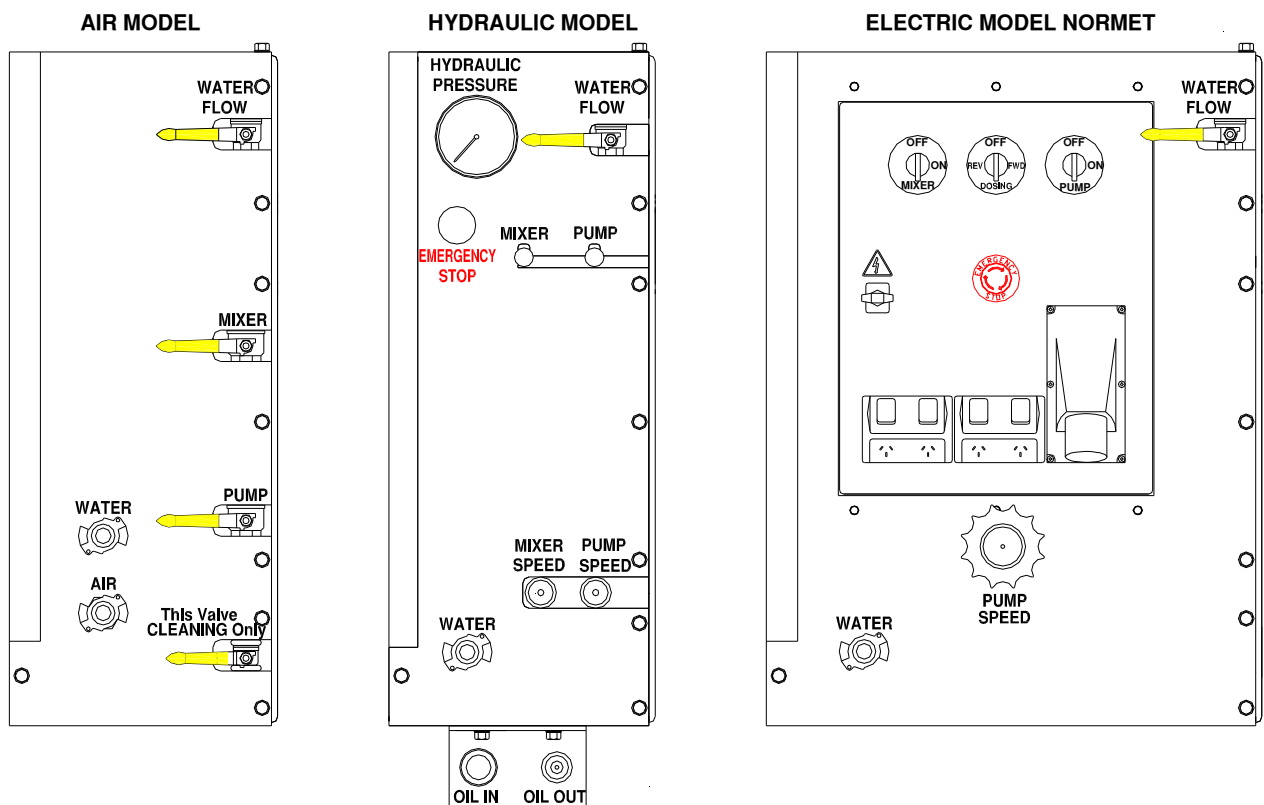


3.2 Operation

3.2.1 Positioning the Unit

- ◆ The machine should be placed on firm level ground, and must be stable before operating begins.
- ◆ Keep clear of electricity panels and heavy traffic areas, however to eliminate pumping problems place the machine as close as possible to the work area.
- ◆ The work area must be suitably guarded if the above is not possible.

3.2 Operating controls



3.3 Start up

1. Connect all necessary hoses and secure with safety clips.
2. Check mixer, pump hopper and hoses for foreign objects.
3. Run water through mixer, pump and hoses, then completely drain before grouting begins.
4. Add most of the required water to the mixer before adding the cement material.
5. Discharge the cement powder slowly to **AVOID BOGGING THE PADDLES**.
6. Allow thorough mixing before dumping the mixed medium into the pump hopper.

“NEVER RUN THE PUMP DRY”
Running the pump dry will destroy the stator.

3.4 Cleaning Operation

WARNING !

- ◆ Never remove equipment guards while machine is switched on or operating.
- ◆ Isolate power source before cleaning inside the mixer or pump hopper.
- ◆ Release pressure from hoses before disconnecting.

- ◆ Thoroughly clean grout from the machine with water. Take extra care around electrical items.
- ◆ Wash out the pump hopper through the discharge cap in the bottom of the hopper.
- ◆ Pump clean water through the rotor stator. The presence of clean water at the discharge point of the pump ensures that the rotor stator is clean.

3.4 Cleaning Operation Cont.

- ◆ **Note:** - Special attention shall be applied to the discharge connection and reducers. When pumping cement grout, buildup may occur which may need removing with a screwdriver or some similar device.
- ◆ Clean the conveying hoses with water and flush a sponge ball or a knotted rag through the hoses to remove restricting material.

NOTE: Water alone will not effectively clean the grout hoses.

- ◆ **To ease the cleaning operation, the manufacturer recommends applying form release agent before commencing the grout operation.**

3.5 Pumping Suggestions

3.5.1 Pump Speed

- ◆ When using long lines or pumping low w/c (water/cement) ratio grout (0.3-0.35) reduce the pump speed. The pump is capable of pumping 2000 to 3000 litres of grout per hour, however the length and size of the lines and the pumpability of the grout must be considered when selecting the pump speed.

3.5.2 Pumping Distances

- ◆ The pumping performance will vary depending on the line size, distance or grout stiffness.
- ◆ Horizontal or vertical pumping performance may also vary; therefore refer to the following chart as a guide.

3.5 Pumping Suggestions Cont.

PUMPING PERFORMANCE		
Water/cement ratio	Horizontal	Vertical
0.30	30m	15m
0.40	45m	25m
0.50	70m	30m
0.60	100m	45m

3.5.3 Grout Quality

- ◆ The type and quality of grout largely influences the machine performance.
- ◆ The quality and pumpability of the grout may simply be improved through admixture addition.
- ◆ When pumping water cement grout (even containing admixtures) the inside of the hose reducer should be checked periodically. Grout may build up inside the reducer restricting the flow, eventually causing a blockage.
- ◆ This build-up may become dislodged at any time and cause an instant blockage.

Note: When pumping, do not block the discharge hose, as this will pressurise the system and rapidly damage the rotor stator.

- ◆ Rapid build up in the reducer may be the result from operating the pump too fast.

3.6 Mix Designs for Spray Mortars

- ◆ A well graded mix is necessary for any mortar pumping, however grading is only part of a good mix design.
- ◆ The aggregate shape can make the difference between a pumpable and non-pumpable mix design.
- ◆ Angular and flaky shaped aggregates will often produce a mix, which is difficult to pump.
- ◆ Washed sands are often too clean for pumping, as all the fines which help stop the water squeezing through the coarser aggregates, are mostly removed through the washing process.
- ◆ A simple test to determine this is to let a bucket of mortar rest for twenty minutes. If water bleeds to the top the mix maybe difficult or even impossible to pump.

3.7 Mix Designs for Grouts


- ◆ When designing a grout mix for bolts, cables or machine plates, consideration should be given to the water cement ratio.
- ◆ For best results, the water cement ratio should be under 0.4, however, thixotropic grouts with a water cement ratio of 0.3 are achievable through grout admixtures.
- ◆ BASF have a range of grout admixtures and we recommend utilizing them where grout requires high flowability at low water cement ratios.
- ◆ The GP2000 is designed to pump thick mixes as well as fluid grouts.


3.7 Mix Designs for Grouts Cont.


3.7.1 Grout Mix Design Table

- The following table indicates typical mix design quantities.

GP 2000 GROUT MIX-DESIGN TABLE					
Number of Bags	Kg of Cement	Litres of water at different w/c			
		0.3	0.35	0.375	0.4
2	40	12	14	15	16
3	60	18	21	22.5	24
4	80	24	28	30	32
5	100	30	35	37.5	40
6	120	36	42	45	48
7	140	42	49	52.5	56
8	160	48	56	60	64
9	180	54	63	67.5	72
10	200	60	70	75	80

 Suggested Mix Size (AP 15/10/98)

 HGB or Cable bolt thick ← Split Set

 Cable Bolt thin → CT Bolt

3.7 Mix Designs for Grouts Cont.

- The following Table indicates typical bore hole volume and grout volume required to fill one hole.

CEMENT REQUIRED PER BORE HOLE VOLUME			
Bore hole ø in mm	Bore hole Vol in liter / m	Kg grout per m bore hole	→ + 20%
45	1.6	2.28	3
51	2.04	2.91	4
57	2.55	3.64	5
65	3.32	4.74	6
75	4.42	6.31	8
89	6.22	8.9	11
102	8.17	11.7	14

Assume 40kg cement at 0.4 w/c ratio produces 28 litres of grout
 1 kg cement at 0.4 w/c produces 0.7 litres of grout
 Volume of a 15.2mm ø cable displaces 0.143 litres per meter

4 MAINTENANCE

4.1 Qualification of Personnel

- ◆ Personnel with sufficient experience with grout or similar equipment should only maintain this machine.

STOP!

Read the manual before attempting any work.

4.2 Specific maintenance

4.2.1 Filter Maintenance

- ◆ Clean or replace filters according to the following table, however note the GP 2000 pumps do not record operating hours.

MACHINE MODEL	FILTERS FOR		
	WATER	AIR	OIL
HYDRAULIC	50 hrs		1000 hrs
DIESEL	50 hrs	500 hrs	500 hrs
ELECTRIC	50 hrs		
AIR	50 hrs	50 hrs	

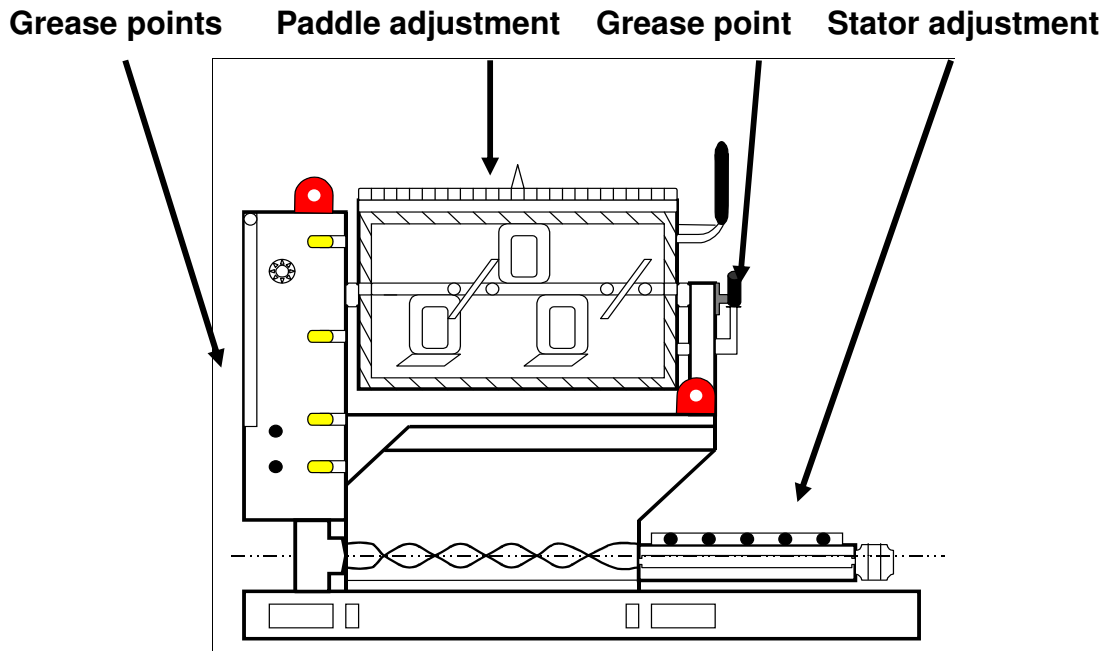
4.2 Specific Maintenance Cont.

4.2.2 Greasing

- ◆ Shall be applied every twelve (12) operating hours.

4.2.3 Mixer Paddle Adjustment

- ◆ Shall be checked and adjusted every hundred (100) operating hours.

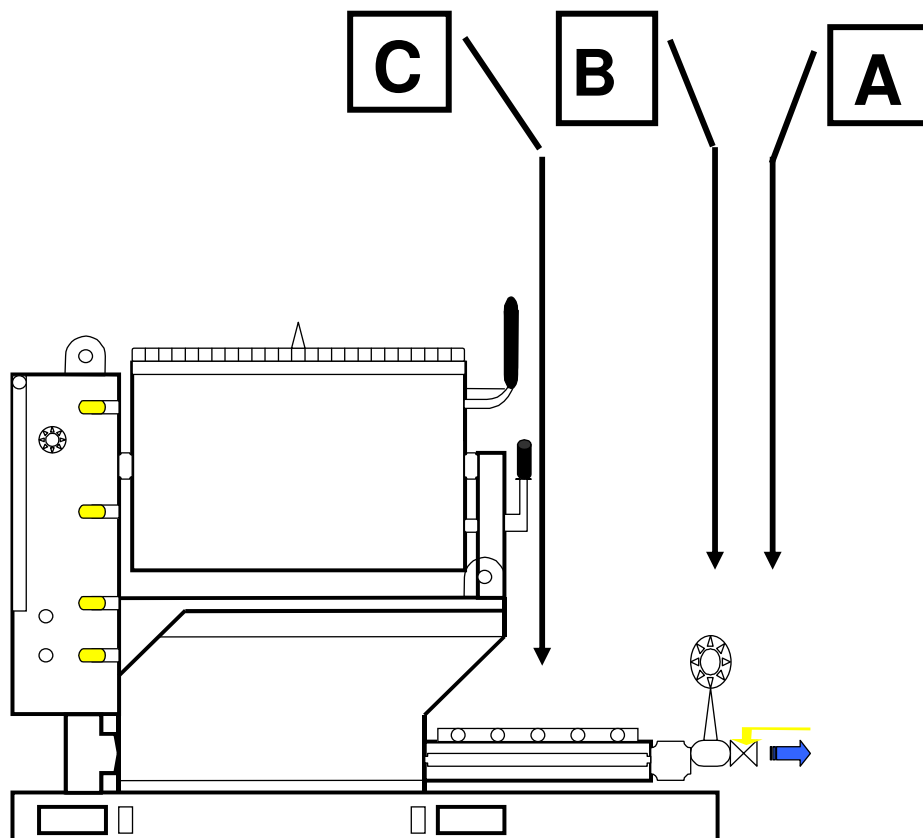


4.3 Pressure Testing the Rotor Stator Assembly

- ◆ The manufacturer recommends checking or pressure testing the rotor/stator every twelve (12) operating hours.
- ◆ Or every ten (10) operating hours when pumping spray mortars.

4.3.1 How to conduct a pressure test

1. Connect the pressure test gauge to the pump as shown. Fill the pump hopper with clean water.
2. Run the pump at about half speed. Close valve **(A)** and note the pressure on gauge **(B)**.
3. If the pressure is below 10 bar, evenly adjust the row of bolts **(C)** along the stator sleeve until the gauge registers 10 bar.



4.4 Commissioning

DO NOT RUN THE PUMP DRY !
Running the pump dry will destroy the stator.

4.4.1 Commissioning the Hydraulic Version

1. Connect the hydraulic lines to a suitable hydraulic provider.
2. Adjust the pump & mixer speed via the flow control knob.

4.4.2 Commissioning the Air Version

1. Check the air filter and lubricator before running the machine.
2. Fill the lubricator if required, check oil type from specification section.
3. While unit is running, adjust lubricator (via screw in the top of lid) to dispense oil at 10 to 12 drops per minute.

4.4.3 Commissioning the Diesel Version

1. Carry out pre-start checks including oil and water levels.
4. Hydraulic flow rates are factory pre-set, however during commissioning cycle routine checks should be undertaken.
5. Adjust the pump speed via the flow control knob.

4.4.4 Commissioning the Electric Version

1. Connect electric power lead to suitable supply outlet.
2. Fill the hopper with water and pump this through the machine.
3. Adjust the pump speed via the flow control knob.

5 FAULT TABLES

5.1 All Models

MALFUNCTION	POSSIBLE REASON
<p>Rotor is rotating without Pumping</p> <p>Diesel & hydraulic units</p>	<ul style="list-style-type: none"> ◆ Stator requires adjustment or is worn out. ◆ Blockage in the delivery line, pump outlet or Outlet reducer. ◆ Grout is too thick to slide down hopper sides (hollow void) ◆ Flow control knob wound too far in

5.2 Air Driven Units

MALFUNCTION	POSSIBLE REASON
<ul style="list-style-type: none"> ◆ Air Motor will not start ◆ Seized air Motor 	<ul style="list-style-type: none"> ◆ Insufficient air pressure or volume. 350 cfm @ 90 psi, or 10m³ @ 6 bar ◆ Through insufficient use ◆ Insufficient oil being dispensed by the lubricator. ◆ Water in the air system ◆ A film of rust may cause the air motor vanes to seize inside the motor case. ◆ Pouring oil into the air inlet and applying air pressure often frees the seized vanes.