



# GP1500A GROUT PUMP

*OPERATING & MAINTENANCE MANUAL*

Operating & Maintenance Manual for Air Driven GP1500A Grout Pump

## Contents

TECHNICAL SPECIFICATIONS .....	2
LIFTING PROCEDURE .....	3
SAFETY.....	4
Introduction .....	4
Warning Notices and Symbols:.....	4
Personal Safety .....	4
General Safety Regulations.....	4
Obligations and Responsibilities.....	5
Maintenance Obligations.....	5
OPERATION AND DESIGN.....	6
Description of the Design.....	6
Operation .....	6
Operating Controls.....	7
Start Up.....	7
Cleaning Operation .....	7
Pumping Suggestions .....	8
Mix Design for Spray Mortars .....	9
Mix Design for Grouts .....	9
MAINTENANCE.....	10
Qualification of Personnel .....	10
Specific Maintenance.....	11
Pressure Testing the Rotor Stator Assembly .....	11
Commissioning.....	12
FAULT TABLES .....	13
Air Model .....	13

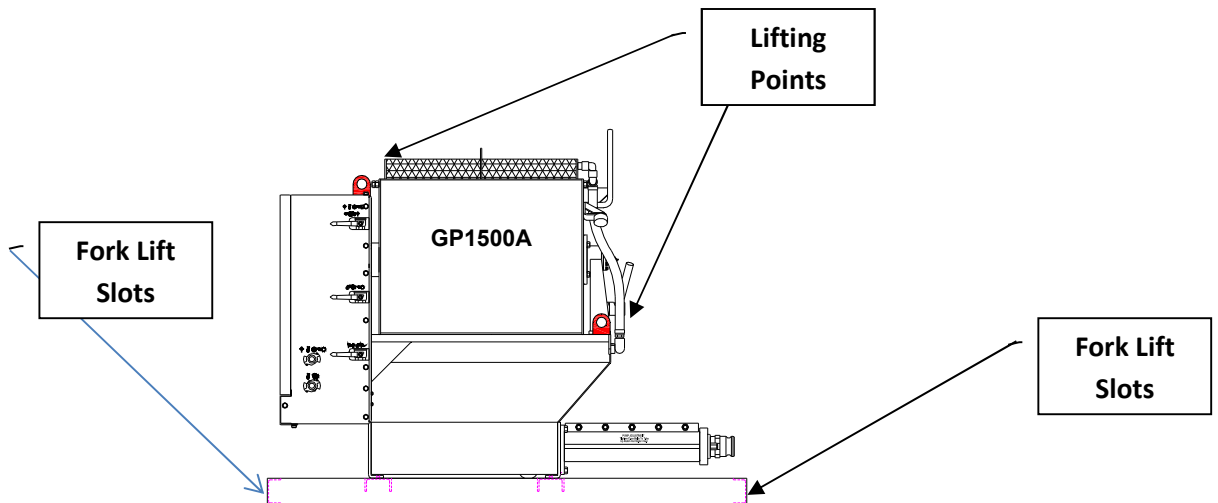
## TECHNICAL SPECIFICATIONS

Description	GP1500A
<b>Dimensions:</b>	
Length	1.77 m
Width	1.03 m
Height	1.43 m
<b>Weight</b>	570 kg
<b>Motors:</b>	
Mixer	3kw
Pump	4kw
<b>Capacity</b>	
Mixer	100 L
Hopper	195 L
<b>Pump Performance</b>	
Minimum	3 L/min
Maximum	25 L/min
<b>Maximum Pressure</b>	25 Bar
<b>Pumping Distances:</b>	
Vertical	15m - 25m
Horizontal	35m - 45m
<b>Pumping Capacity Water/Cement Ratio</b>	0.25 >
<b>Maximum Agg. Size</b>	< 4 mm
<b>Water Meter Increment</b>	No Meter

<b>Energy Requirements</b>	530m <sup>3</sup> /hr @ 7 bar
<b>Mixer Speed</b>	50 rpm
<b>Pump Speed</b>	156 rpm
<b>Gearbox Oil Type</b>	Shell Omala S2 G 320
<b>Gearbox Oil Qty</b>	
Mixer	0.5 L
Pump	4.2 L
<b>Air Motor Oil Type</b>	Shell Tellus S2 M 46
<b>Paint Type Colour</b>	Powdercoat Yellow

## LIFTING PROCEDURE

Ensure you use designated lifting points as indicated below:



## SAFETY

### Introduction

Who may use the GP1500A grout pump:

- Trained and qualified personnel in accordance with local regulations.
- Operators shall read and understand this manual.

Inappropriate use:

- This equipment shall be operated in accordance with the specifications.
- For all modifications to the unit the owner must consult with the manufacturer.

### Warning Notices and Symbols:

- Signs and symbols are awareness indicators.
- Signs indicate potential hazards.
- Signs and labels **SHALL NOT BE REMOVED**.
- All safety signage includes the following:



### Personal Safety

When operating this equipment adhere to all personal safety requirements:

- Follow and administer the safe working practices in these instructions.

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

Safety devices:

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

### General Safety Regulations

Replacement parts:

- Only genuine Zenith Engineering GP1500A parts shall be installed.

Repair and maintenance:

- Trained and qualified maintenance personnel **ONLY** shall conduct service repairs.

## Obligations and Responsibilities

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.

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.

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.

## Maintenance Obligations

Generally:

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

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.

Operating instructions availability:

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

## OPERATION AND DESIGN

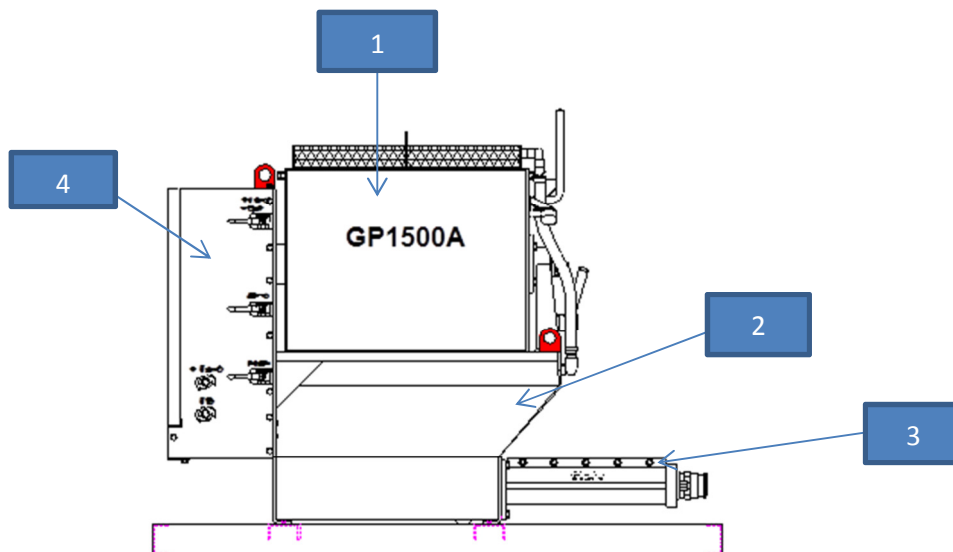
### Description of the Design

Generally:

- The GP1500A 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 GP1500A is also suitable for small volume, spray mortar applications, up to a maximum aggregate size of 4mm.

Functional principle:

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



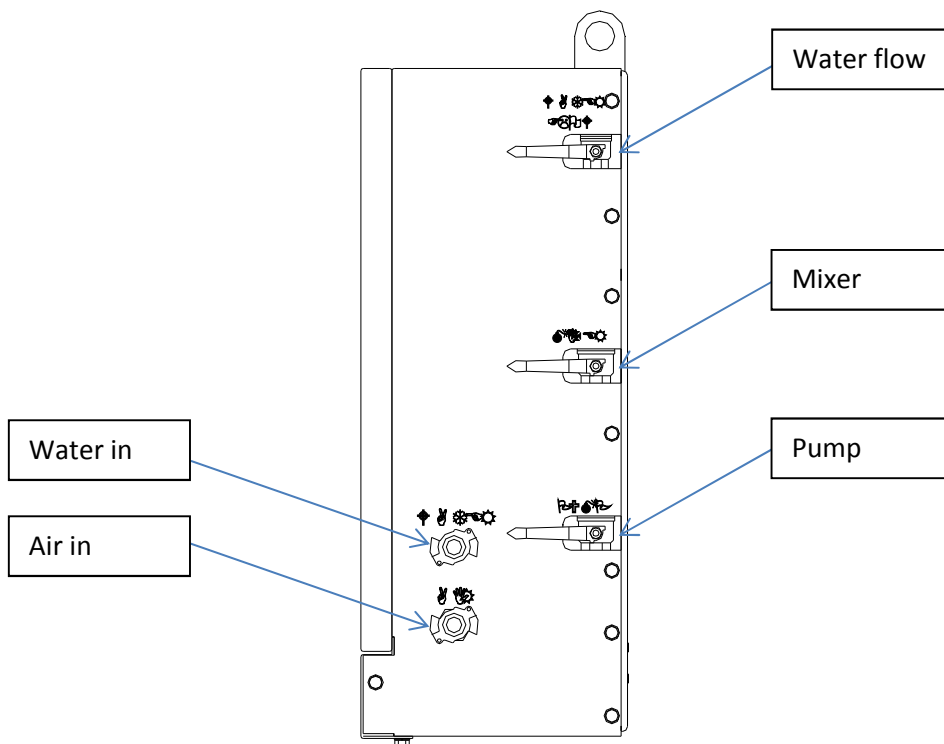
### Operation

Positioning of 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.
- 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.

## Operating Controls

As per side of operating cabinet, figure below:



## 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.

## 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.



Additional details:

- 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.
- **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.**

## Pumping Suggestions

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 1500 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.

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.

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

Grout quality:

- The type and quality of grout largely influences the machine performance.
- The quality and pump ability 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.**

### Mix Design for Spray Mortars

Generally:

- 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 may be difficult or even impossible to pump.

### Mix Design for Grouts



Generally:


- 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 flow ability at low water cement ratios.
- The GP1500A is designed to pump thick mixes as well as fluid grouts.

Grout mix design table:

- The flowing table indicates typical mix design quantities.

<b>GP 2000 GROUT MIX-DESIGN TABLE</b>					
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 15/10/88)
 
 HGB or Cable bolt thick Split Set
 

 Cable Bolt thin CT Bolt

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

<b>CEMENT REQUIRED PER BORE HOLE VOLUME</b>			
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

## MAINTENANCE

### Qualification of Personnel

Generally:

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

## Specific Maintenance

Filter maintenance:

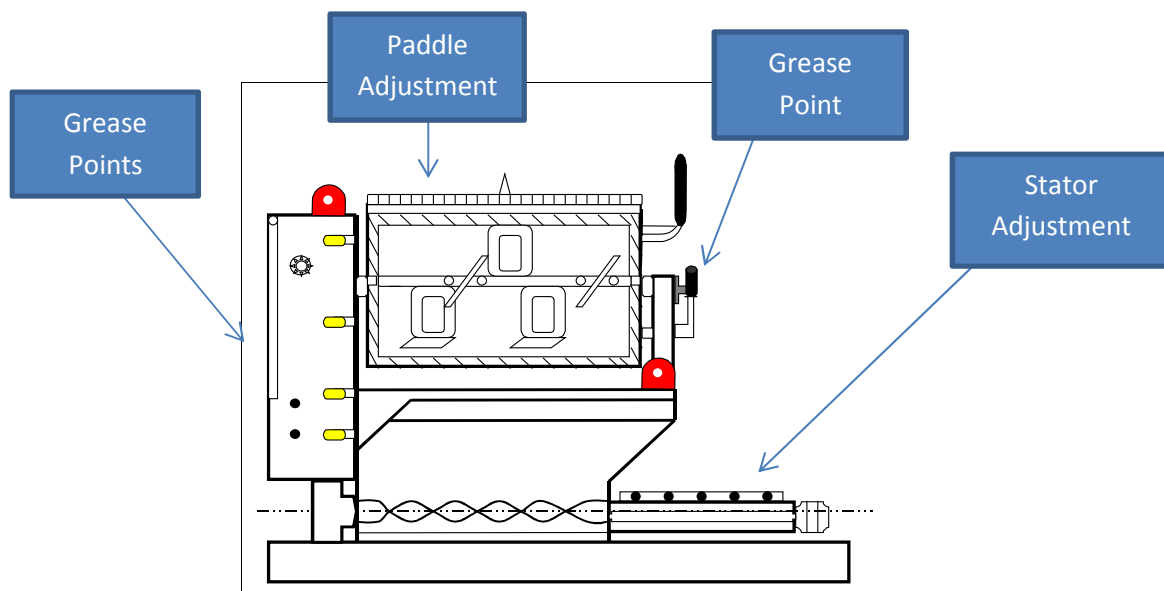
- Clean or replace filters according to the following, however note that GP1500A pumps do not record operating hours.
  - Water filter every 50 hours.
  - Air filter every 50 hours.

Greasing:

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

Mixer paddle adjustment:

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



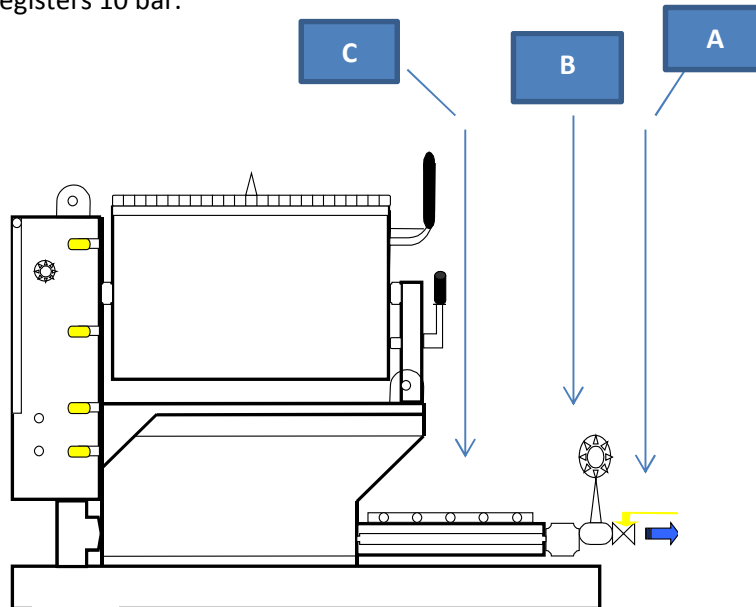
## Pressure Testing the Rotor Stator Assembly

Generally:

- 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.

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.



## Commissioning

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

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.

## FAULT TABLES

### Air Model

MALFUNCTION	POSSIBLE REASON
<p>Rotor is rotating without Pumping:</p> <p>Air motor will not start:</p> <p>Seized air motor:</p>	<ul style="list-style-type: none"> <li>• Stator requires adjustment or is worn out.</li> <li>• Blockage in the delivery line, pump outlet or Outlet reducer.</li> <li>• Grout is too thick to slide down hopper sides (hollow void)</li> <li>• Flow control knob wound too far in.</li> <li>• Insufficient air pressure or volume. 350 cfm @ 90 psi, or 10m<sup>3</sup> @ 6 bar.</li> <li>• Through insufficient use.</li> <li>• Insufficient oil being dispensed by the lubricator.</li> <li>• Water in the air system.</li> <li>• A film of rust may cause the air motor vanes to seize inside the motor case.</li> <li>• Pouring oil into the air inlet and applying air pressure often frees the seized vanes.</li> </ul>