ENVIRONMENTAL PUMPING SYTEMS

GeoPump™

GP4XD AutoSkimmer

INSTRUCTION MANUAL

AUTOMATIC PNEUMATIC PUMP

FOR

SELECTIVE HYDROCARBON

RECOVERY

CE

Ex II 1 G c

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1.0 Conformity

EC Declaration of Conformity

Document Number MGS/QF/037A

We Marton Geotechnical Services Ltd at above address declare under our sole responsibility that the product detailed below to which this declaration relates complies with protection requirements of the EU Machinery Directive 98/37/EC.

Equipment description	**Pneumatic Pump**
Make/Brand	**GeoPump**
Model	**GP4BXD AutoSkimmer**

Compliance with the essential health and safety requirements of the directives has been assessed by reference to the following harmonised standards

- BS EN 809:1998 Pumps and pump units for liquids – Common safety requirements
- BS EN ISO 16330:2003 Reciprocating displacement pumps and pump units – Technical requirements

A technical file for this equipment is retained at the above address

ATEX 95 Declaration of Conformity

Document Number MGS/QF/037B

II 1 G c

We Marton Geotechnical Services Ltd at above address declare under our sole responsibility that the product detailed below to which this declaration relates complies with protection requirements of the EU Directive for Equipment intended for use in Potentially Explosive Atmospheres (ATEX) 94/9/EC

Equipment description	**Pneumatic Pump**
Make/Brand	**GeoPump**
Model	**GP4BXD AutoSkimmer**

Compliance with the essential health and safety requirements of the directives has been assessed by reference to the following harmonised standards

- BS EN 13463-1:2001 Non-electrical equipment for potentially explosive atmospheres – Part 1: Basic method and requirements.
- BS EN 13463-5:2001 Non-electrical equipment for potentially explosive atmospheres – Part 5: Protection by constructional safety “c”.

The marking of the equipment includes the following II 1 G c T6 Ta 1°C to 70°C
A technical file for this equipment is retained at the above address. An EC Type examination was carried out by Intertek (Notified Body No. 0359), certificate No. 15124

Bury St Edmunds, UK , February 2006

Martin Clegg
Director

2.0 Markings

Use in potentially explosive atmospheres

Your pump can be used in potentially explosive atmospheres if the symbol below is visible on the unit.

The characters to the right of the symbol provide information concerning the category and classification of the equipment with regards to ATEX 95 (94/9/EC).

Group: **II**
Category: **1**
Environment: **Gas/vapours**

The pump should be serviced by qualified personnel according the appropriate service instructions.

Use only MGS approved parts for servicing. Use of non-approved parts will invalidate the EX approval.

No modifications or changes to the pump are allowed, this will make the EX approval invalid.

BEFORE INSTALLING AND OPERATING THE GP4XD AUTOSKIMMER ALWAYS READ THE INSTRUCTIONS MANUAL AND CONSULT IT IF YOU HAVE ANY DOUBTS REGARDING THE GP4XD AUTOSKIMMER FUNCTIONING

THE GP4XD AUTOSKIMMER IS USED IN POTENTIALLY EXPLOSIVE ENVIRONMENTS. WE RECOMMEND FULL ZONING AND RISK ANALYSIS BE UNDERTAKEN BY THE USER PRIOR TO INSTALLATION

ONLY SUITABLY TRAINED/QUALIFIED PERSONNEL SHOULD CARRY OUT WORK/SERVICE/REPAIRS TO GP4XD AUTOSKIMMERS

SEEK ADVICE FROM SPECIALIST COMPRESSED AIR SUPPIERS FOR THE DESIGN AND SUPPLY OF THE COMPRESSED AIR SYSTEM

SUITABLE PERSONAL PROTECTIVE CLOTHING INCLUDING SAFETY GOGGLES, FOOTWEAR AND GLOVES MUST BE WORN

NO SMOKING AT ANY TIME

3.0 Introduction

This manual is intended for all users of the **GP4XD AutoSkimmer** manufactured by MGS Ltd and provides information on the installation, operation and maintenance of the **GP4XD AutoSkimmer.**

3.1 GP4XD AutoSkimmer general description

The **GP4XD AutoSkimmer** is an automatic, inherently safe pneumatically operated pump which can be used for the selective recovery of light hydrocarbons with a specific gravity of < 0.85 and a viscosity range of 201– 1000 Centistokes.

It is important therefore to identify your particular application to ensure correct installation specification and operation.

Features

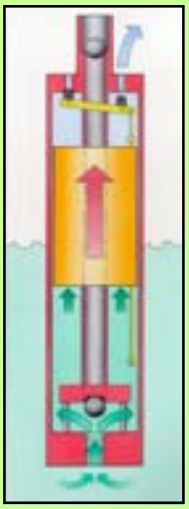
- The **GP4XD AutoSkimmer** is a positive displacement pump with a built in float, to activate the pump only when it is full. It is fitted with a floating intake which will accommodate up to 500mm of fluctuation in the water level.
- Fully pneumatic operation with no electrical components.
- Manufactured from resistant materials to provide reliability and longevity.
- Major components are manufactured from stainless steel, acetyl, and Viton.
- It is easy to take apart and clean in the field without the need for any special tools, making maintenance quick and easy.

3.2 How it works - GeoPump GP4XD

Fill Cycle
Pump starts to fill

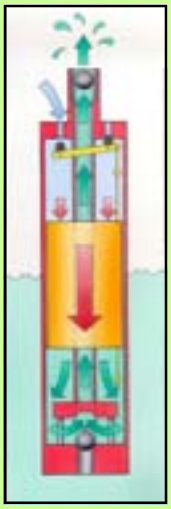
The inlet non-return valve opens, allowing fluid to enter the pump. As the fluid level in the pump rises, the internal float rises to the top of its stroke. In this upper position, the float actuates a lever assembly to open the air inlet valve, and compressed air enters the pump chamber.

Note: No air is used during the fill cycle.



Empty cycle
Pump starts to empty

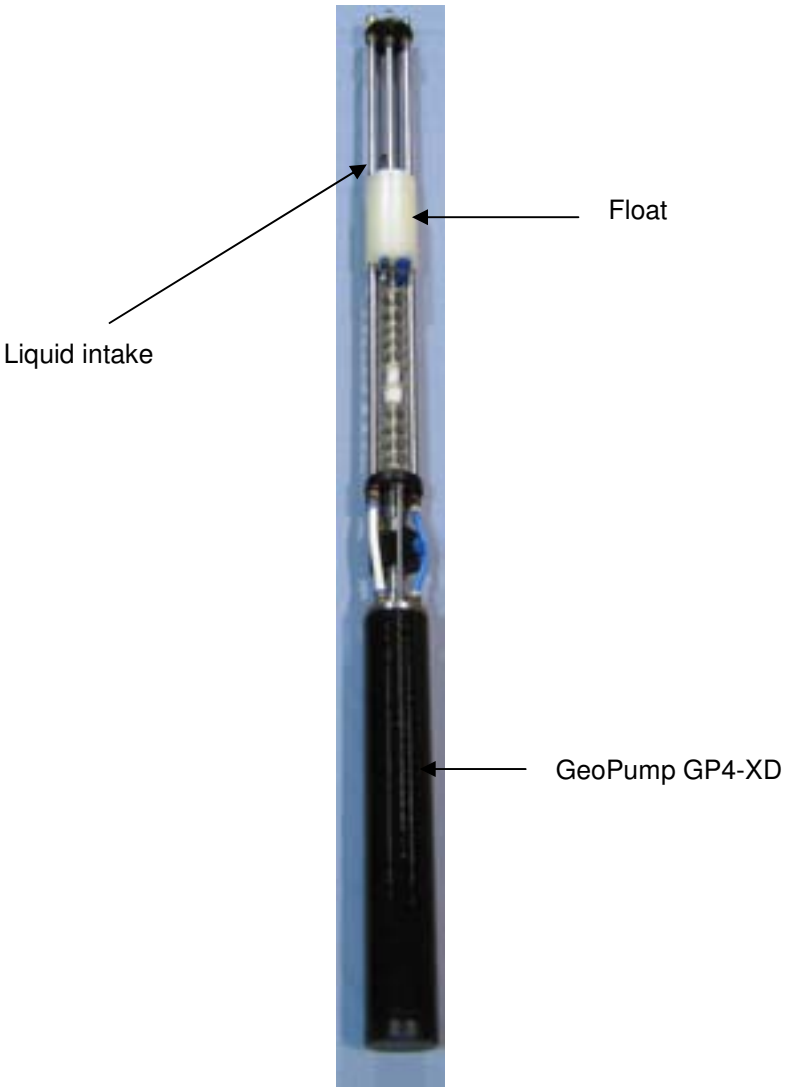
The air pressure within the pump chamber causes the fluid inlet valve to close. The fluid is then displaced from the pump chamber up through the discharge pipe. As the fluid level in the pump is lowered the float actuates the lever to close the air supply and open the air exhaust valve. A new cycle begins.



3.2 How it works - AutoSkimmer

The **AutoSkimmer** has a floating intake that follows the fluctuating water table up to a maximum of 500mm. Hydrocarbon enters the AutoSkimmer through the intake which, then flows down through the coiled tubing and into the **GeoPump GP4XD**. The hydrocarbon level will continue to rise within the **GeoPump GP4XD** and when it reaches the actuation level the **GeoPump GP4XD** will pump out the hydrocarbon.

THE MINIMUM THICKNESS OF PRODUCT THAT WILL BE LEFT WILL DEPEND ON THE SPECIFIC GRAVITY OF THE PRODUCT BUT CAN BE AS MUCH AS 25mm



3.3 Shut-down

The GP4XD AutoSkimmer will automatically shut-down if:-

- There is insufficient liquid to operate the pump
- There is insufficient air volume or pressure to operate the pump
- The total head of the system exceeds the air pressure

4.0 Packaging, handling and storage
4.1 Packaging

The GP4XD AutoSkimmer is provided with a protective tube which can be used for short, medium or long term storage. It is recommended that this package be retained for future storage or transportation.

4.2 Handling

The GP4XD AutoSkimmer should always be handled with care during transport, installation, servicing and repair.

DO NOT DROP AS THIS MAY CAUSE DAMAGE TO INTERNAL COMPONENTS

4.3 Storage

The materials of the GP4XD AutoSkimmer are not adversely affected by temperature and no special requirement is needed for medium or long-term storage although temperature limits should be considered when storing or transporting some accessories, including hoses. Operating temperature for the GP4XD AutoSkimmer is + 2 to 70ºC.

The GP4XD AutoSkimmer should be stored in the tubing provided or other similar protective covering. These tubes may be stacked but should not exceed three high.

DO NOT STORE ANY OTHER ITEMS ON TOP OF THE PROTECTIVE TUBES

5.0 Installation
5.1 Getting started

In order to operate the **GP4XD AutoSkimmer** you will need the following:-

1. **Suitable extraction well > 100mm internal diameter containing liquid to be pumped**
2. **A compressed air system suitably designed to provide adequate air for the GP4XD AutoSkimmer (see specifications)**

5.2 Basic installation

5.3 Installation

STEP 1
Remove GP4XD AutoSkimmer from packaging

STEP 2
Check depth of product & water in well

STEP 3
Measure down well pipework

STEP 4
Connect pipework to pump

Air vent black to EX

Air supply blue to IN

Discharge white

STEP 5
Turn on air supply to pump

STEP 6
Install GP4XD AutoSkimmer into well

STEP 7
Adjust air filter/regulator to suit system requirement

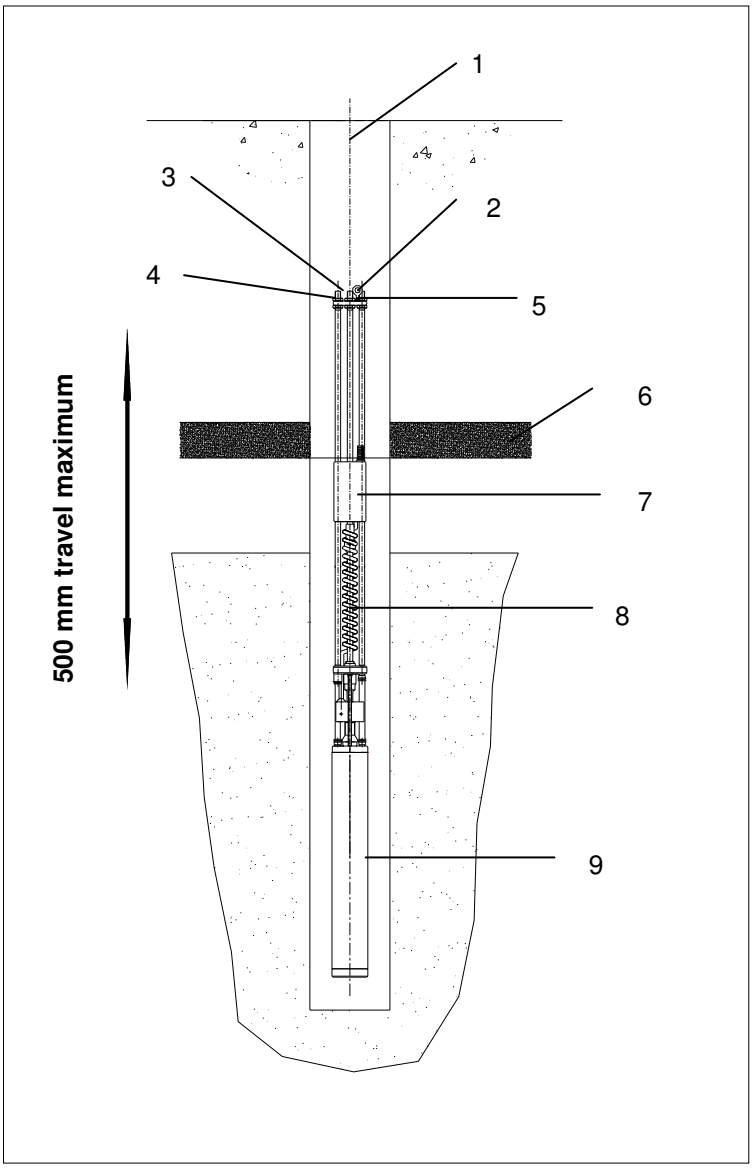
P = TDH + 1 bar

5.3 Installation contd

ALWAYS CHECK THE MAXIMUM WATER FLUCTUATION LEVEL

LOWER THE GP4XD AUTOSKIMMER SLOWLY INTO THE WELL

THE GP4XD AUTOSKIMMER CAN LEAVE UP TO 25MM PRODUCT IN THE WELL DEPENDING ON VISCOSITY



MAIN COMPONENTS

1. Support rope
2. Support hook
3. Air in
4. Air out
5. Discharge
6. Floating hydrocarbon (LNAPL)
7. AutoSkimmer float
8. Coiled tubing
9. GeoPump GP4XD

INSTALLATION

1. Make sure the maximum and minimum water fluctuation levels are known.

2. Take product & water level readings with an oil/water interface probe.

3. The **GP4XD AutoSkimmer** is designed to allow the floating intake to be placed at the **mid-point** of its travel to allow for water table fluctuations in both directions.

4. Slowly lower the **GP4XD AutoSkimmer** into the well. The **GP4XD AutoSkimmer** will be at the bottom of its travel length.

   From the oil/water interface reading adjust the depth (lift up) so that the **GP4XD AutoSkimmer** is placed at its mid-point.

5. Once the **GP4XD AutoSkimmer** is in the correct position secure the support rope.

6.0 Fault finding

Problem	Possible Cause: No air supply	Low air pressure	Discharge blocked	Intake blocked	Inlet & outlet valves open	System head greater than air pressure	Float stuck	Product level in well at minimum	Severe scaling inside pump	Air line contamination
No discharge	X	X	X	X	X	X	X			
Reduced flow		X	X	X	X	X	X			
Slow pumping rate			X			X			X	X
No flow	X	X						X	X	X
Air from exhaust							X		X	
Liquid from exhaust							X			

Remedy Letter	Remedy
a	Establish air supply
b	Increase air pressure
c	Remove non-return valve, clean, inspect for damage & replace. Check pump operation
d	Remove intake, clean, inspect for damage & replace. Check pump operation
e	Clean as in c & d above
f	Maximum air pressure is 7 bar. For greater discharge head refer to MGS
g	Refer to section 8.0 and follow steps 8.1 to 8.1.6. Re-assemble following 8.2
h	Pump is OK. Check product thickness level in well.
j	Clean
k	Clean

7.0 Specification - GeoPump GP4XDAutoSkimmer

Pump type **Fluid intake**	Pneumatic Floating RD type
Max outside diameter **Length** **Weight G**	89 mm 1178 mm 8.15 kg
Materials **of construction**	Stainless steel Teflon FRP Polyethylene Polyurethane Viton
Air inlet/vent size	1/4”- 3/8” BSP
Fitting type	One-touch, hosetail
Air supply tube OD	10 mm
Air vent tube OD	12 mm
Discharge size	1” BSP
Discharge tube OD*	16 mm
Average volume/cycle	0.65 litres
Max flow rate	2.5 litres/min
Max operating **Pressure**	7 bar
Min operating **pressure**	2 bar
Maximum drawdown	400 mm
Restart liquid level	450 mm
SG fluid range	< 0.85
Max operating noise level dB(A)	< 65
Operating temperature	+ 1 to 70° C

Where appropriate, PPE should be used.
If in doubt, use PPE.

8.0 GP4XD AutoSkimmer dis-assembly

8.1 If pump is not already clean, clean with appropriate liquid (normally water) and inspect for any obvious problem or damage.

8.1.2 Empty any liquid from inside the pump casing by tipping the **GP4XD AutoSkimmer** so that liquid empties out through the top discharge valve. Repeat several times until the pump is empty. (Figs 1 & 2)


Fig s 1 & 2

8.1.3 Secure the top head of the **GP4XD AutoSkimmer** so that it cannot turn. Using a 'C spanner' or a 5 mm 'Tommy bar' undo the bottom head by turning it anti-clockwise. (Figs 3 & 4).

Once loose the bottom inlet valve assembly can be undone and removed by hand. Check 'O' ring seals for damage when undoing.


Figs 3 & 4

8.1.4 Screw the special extraction tool (available as an accessory) on to the bottom of the internal discharge pipe (fig 3). Holding the pump casing extract the inner pump assembly by driving the extraction tool onto the ground (Figs 5 & 6).

IF THE PUMP IS VERY TIGHT YOU MADE NEED A VERY SUDDEN & HARD DRIVING MOVEMENT TO REMOVE THE CASING.
TAKE CARE NOT TO DAMAGE THE CASING


Figs 5 & 6

8.1.5 Once the internal components have been extracted inspect for any component damage and clean all deposits that may be present by either pressure or manual washing. (Fig 7)

If there is any defective part please contact MGS or their local distributor for advice.

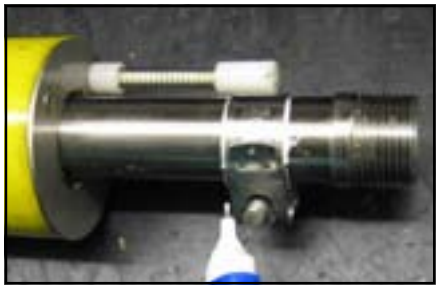
Fig 7

The amount of deposits in remediation projects will vary depending on each application and therefore the frequency of maintenance will depend on the project. Any noticeable **corrosion** of materials should be notified to MGS.

Fig 5

8.3 Spring replacement

The operating life of the spring is dependent on the cycle rate of the pump. The rate at which the pump cycles will depend on site conditions and the total dynamic head of the system. Under normal operating conditions the spring life should be in excess of one year but it is recommended that the spring be replaced during normal service intervals or after a continuous period of six months. Replacement should be done as follows:-



1. Mark position of clamp

2. Remove clamp

3. Push pin out with 1.5mm punch

4. Remove pin

5. Remove control rod bottom stop, spring and top stop

6. Refit top stop, fit new spring and refit the bottom stop.

7. Replace pin

8. Replace clamp at the point marked in 2 above

8.1 GP4XD AutoSkimmer disassembly contd

Fig 8

8.1.6 Deposits may also be present on the inside of the pump casing (Fig 8) which if not cleaned correctly will tend to build up quicker when reinstalled.

Firstly remove as much of the deposits as possible by using a cloth or soft brush and water.

Final cleaning of the inside of the casing should be done using a special honing tool attached to an electric drill (Fig 9).

Run the honer up and down inside the casing and then rinse the inside with clean water. Inspect for any residual deposits and repeat until completely clean.

Fig 9

8.2 GP4XD AutoSkimmer re-assembly

Once the pump has been completely cleaned, inspect for any faults and re-assemble as follows:-

Grease the 'O' ring seals with a silicone based grease (Lubeserve PA4000 or equivalent). Fig 10

Insert the pump back into the **TOP** of the pump casing and tap it gently on the ground to drive home the top head.

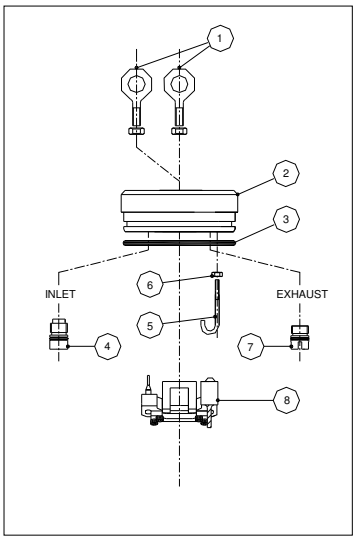
Tighten until the bottom head on the non-return valve is flush with the pump casing (Fig 11) **DO NOT OVERTIGHTEN.**

If the **GP4XD AutoSkimmer** is operating correctly re-install into the well.

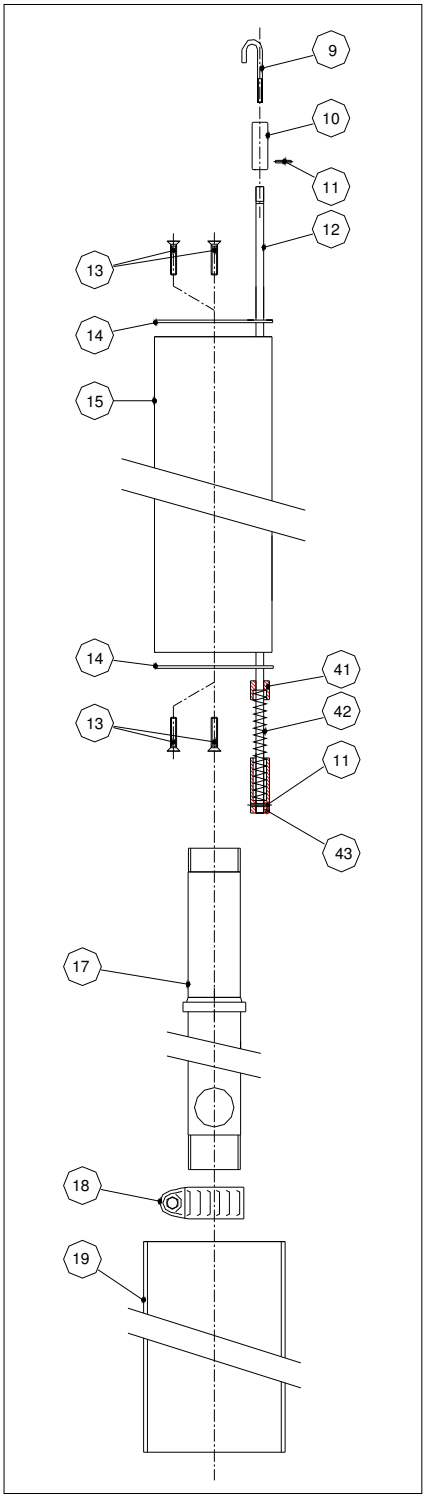
Fig 10

If after re-installing problems still occur contact MGS for advice or return for service repair.

9.2 Spares - GP4XD AutoSkimmer



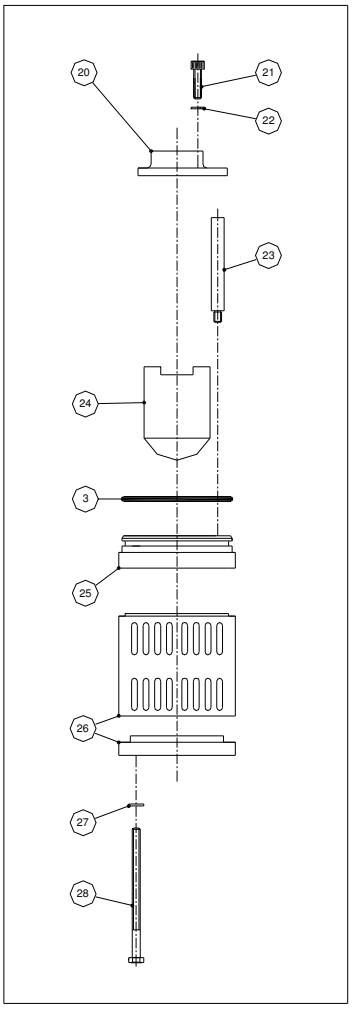
ITEM	QTY	DESCRIPTION	PART NUMBER
1	2	Lifting eye	PO261
2	1	GP4 top head assembly	E38-201
3	2	O-ring	L10-013
4	1	Inlet valve assembly	E39-201
5	1	Stop arm	PO287
6	1	Locknut	M21-001
7	1	Exhaust valve assembly	E38-202
8	1	Pivot block assembly	E38-203
9	1	Control rod link	PO318
10	1	Control rod stop	PO332
11	2	Pin	M50-010
12	1	Control rod Control rod XD model	PO334 PO171
13	4	CSK HD screw	M17-004
14	2	Float end plate	PO337
15	1	Float Float XD model	PO282 PO173
16	1	Control rod bottom stop	PO333
17	1	Discharge pipe Discharge pipe XD model	PO266 PO174
18	1	Clamp	K23-088
19	1	Pump casing FRP Pump casing XD model	PO295 PO170
19a	1	Pump casing SS	PO375
41	1	Top stop	P0417
42	1	Spring Spring XD	P0419A Po419B
43	1	Bottom stop Bottom stop XD	P0418A P0418B

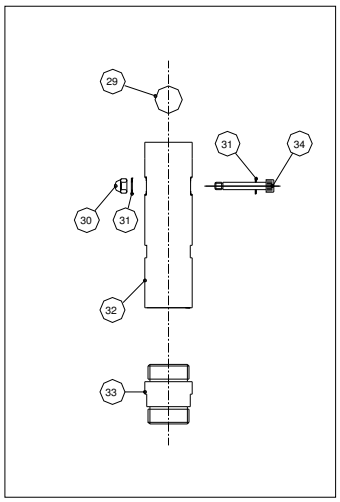


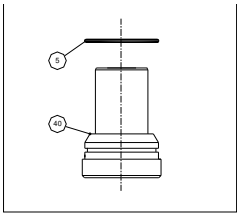
9.2 Spares - GP4XD AutoSkimmer contd

PLEASE QUOTE SERIAL NUMBER
WHEN ORDERING SPARE PARTS

ITEM	QTY	DESCRIPTION	PART NUMBER
20	1	Inlet valve top	PO281
21	3	Cap screw	M11-028
22	3	Coil washer	M31-004
23	3	Check valve shaft Check valve shaft XD model	PO147 PO172
24	1	Plunger Plunger XD model	PO156 PO175
25	1	Inlet check valve bottom	PO137
26	1	Inlet screen Inlet screen XD model	PO152 PO176
27	3	Washer	M30-004
28	3	Hex bolt	M10-168
29	1	Ball	P15-012
30	1	Dome nut	M25-002
31	2	Nylon washer	M30-033
32	1	Discharge valve body	PO313
33	1	1” BSP adaptor	PO350
34	1	Cap head screw	PO328
35	1	Inlet seat	PO367
36	1	Skt cap head screw	M11-100
37	1	Top filling body	PO132
38	1	1” BSP adaptor	PO329
39	1	Inlet screen	PO368
40	1	Intake plug	PO300
41*	1	Skimmer coil	G0006A







* Not illustrated

10.0 Return of goods

10.1 Returns procedure

If goods are to be returned for either service/repair or warranty, the customer should contact MGS Ltd for a **Returns Authorisation Number** and request a **Returned Equipment Report Form QF034** and **Returned Goods Health and Safety Clearance Form QF038** prior to shipment.This number is to be clearly marked on the outside of the shipment.

Complete the **Returned Equipment Report Form QF034**, including as much detail as possible, and enclose it with the returned goods.

All returned goods are also to be accompanied by a completed **Returned Goods Health and Safety Clearance Form QF038** attached to the outside of the package (to be accessible without opening the package) and a copy of both forms should be faxed in advance to the factory.

10.1.1 Chargeable Service or Repairs

Decontamination

With the typical working environments of the GP4XD AutoSkimmer, it is inevitable that they will be contaminated when returned to MGS Ltd. MGS Ltd is duty bound to de-contaminate ALL GP4XD AutoSkimmers which are returned for which there is a standard charge (please contact MGS Ltd for details).

Inspection & estimate

It is the policy of MGS Ltd that an estimate is provided to the customer prior to any repair being carried out and therefore a set charge for inspecting the pump and providing an estimate is also chargeable.

10.1.2 Warranty Claim

(See Limited Warranty Conditions)

This covers defects which arise as a result of a failure in design or manufacturing. It is a condition of the warranty that the GP4XD AutoSkimmer must be installed and used in accordance with the manufacturer's instructions and has not been subject to misuse.

In order to make a warranty claim, contact MGS Ltd and request a **Returned Equipment Report Form QF034.** Tick the warranty claim box and return the form with the goods as above. You will then be contacted and informed whether your warranty claim is valid.

10.2 Packaging and Carriage

All used goods shipped to the factory **must** be sealed inside a clean plastic bag and packed in a suitable carton. If the original packaging is not available, MGS Ltd should be contacted for advice. MGS Ltd will not be responsible for damage resulting from inadequate returns packaging or contamination under any circumstances.

10.3 Transport & Storage

All goods should be adequately packaged to prevent damage in transit or intermediate storage.

11.0 Maintenance Schedule

The schedule below is only a recommendation and individual site applications may demand more frequent intervals. If in doubt please contact MGS for advice.

	daily	weekly	monthly	4 monthly	6 monthly	yearly
GP4XD AutoSkimmer						
Check for operation		X				
Check cycle rate			X			
Check hoses & fittings		X				
Check cycle volume			X			
Check internal & external float operation				X		
Remove casing & clean			X			
Clean as necessary*			X			
Adjust as necessary			X			
Replace bottom NRV plunger*						X
Replace top NRV ball**						X
Replace spring***					X	
Cycle counter						
Check reading		X				
Clean			X			
Compressor						
Condensate drain	X					
Check oil level		X				
Check emergency stop operation				X		
Replace oil filter				X		
Replace air filter				X		
Replace oil				X		
Check drive belt condition & tension						
Air filter/regulator						
Check operation			X			
Check auto drain			X			
Check pressure gauge				X		
Check filter				X		
Replace filter					X	
Pipe work						
Check for leaks			X			
Check valves for operation			X			

* **this may alter if a high degree of solids are being pumped**
** **dependent on individual site conditions**
*** **ATEX requirement**

Limited Warranty

The manufacturer, **Marton Geotechnical Services Limited (MGS)**, warrants the **GP4XD AutoSkimmer** manufactured by it, under normal use and service, to be free from defects in material and workmanship under the following terms and conditions:-

The Purchaser shall satisfy himself that the pumping system has been correctly designed to provide satisfactory hydraulic conditions for the operation of the **GP4XD AutoSkimmer.**

Sufficient site data has been provided to **MGS** by the purchaser as regards the nature of the liquid to be pumped to allow **MGS** to check material compatibility of the and other component parts.

In the absence of any site data being provided by the purchaser standard construction materials will be supplied. All costs for subsequent modifications will be borne by the purchaser.

The **GP4XD AutoSkimmer** equipment shall be installed in accordance with the manufacturer's recommendations.

The equipment is warranted for 1 year from the date of shipment from the manufacturer to the purchaser.

The warranty is limited to replacement of part or parts which, are determined to be defective upon inspection at the factory. Shipment of defective part or parts to the factory shall be at the expense of the Purchaser. Return shipment of repaired/replaced part or parts covered by this warranty shall be at the expense of the Manufacturer.

Unauthorised alteration and/or repair by anyone which, causes failure of the unit or associated components will void this **LIMITED WARRANTY** in its entirety.

The Purchaser warrants through the purchase of the GP4XD AutoSkimmer pumping equipment that he is familiar with the equipment and its proper use. In no event shall the manufacturer be liable for any injury, loss or damage, direct or consequential, special, incidental, indirect or punitive, arising out of the use of or inability to use the equipment sold to the Purchaser by the Manufacturer.

The Purchaser assumes all risks and liability whatsoever in connection with the pumping equipment from the time of delivery to Purchaser.

NOTES:

SERIAL NUMBER:

DATE OF PURCHASE:

LOCATION:

SERVICE HISTORY:

DATE	WORK DONE	SPARES USED

Environmental Pumping Systems

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