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Part 1: POWERPACK MANUAL

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EC DECLARATION OF CONFORMITY

Watterra (UK) Limited
Unit 4, r/o 179-189 Stratford Road
Shirley
Solihull
West Midlands
B90 3AU

Description:

Lightweight portable petrol motor powered actuator for operating inertial pumps

Type:

PowerPack PP1

Serial Numbers: Engine No:

PowerPack PP1 No:

Requirements:

Meets the relevant Essential Health & Safety Requirements of :

EEC Directive 98/37/EC.

in accordance with:

The Supply of Machinery (Safety) Regulations 1992 (SI 1992/3073)

as amended by:

The Supply of Machinery (Safety) (Amendment) Regulations 1994
(SI 1994/2063)

Authority:



Peter Dumble, Managing Director

INTRODUCTION

This Manual covers the operation and maintenance of the Waterra PowerPack PP1. This lightweight portable petrol motor powered actuator is used for operating Waterra inertial pumps.

Waterra UK Limited reserves the right to make changes at any time without notice and without incurring any obligation.

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This manual should be considered a permanent part of the PowerPack and should remain with it if it is sold.

If a problem should arise, or if you have any questions, please contact Waterra.

Date of manufacture:

Manufactured in the UK.

waterra
Groundwater Monitoring equipment

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SAFETY INSTRUCTIONS

Explanation of symbols

! WARNING

To ensure safe operation, pay particular attention to these precautions.



The Waterra PowerPack PP1 is designed to give safe and dependable service if operated according to instructions. Read and understand the Owner's Manual, together with the Honda engine manual, before operating the PowerPack. Failure to do so could result in personal injury or equipment damage.



Keep fingers away from actuator arm slot during operation.



Keep away from the actuator arm when in operation



The exhaust pipe becomes very hot during operation and remains hot for a while after stopping the engine. Be careful not to touch the exhaust pipe while it is hot, Let the engine cool before storing indoors. To prevent scalding, pay attention to the warning marks attached to the PowerPack.



Wear ear defenders at all times during operation, to protect your hearing from high pitched engine noise. Wear protective footwear to protect your feet in case the pump is dropped



When the PowerPack PP1 is operating, the upper tubular carrying frame must not be held. This portion of the frame generates high vibration levels and should not be touched for longer than 16 minutes per day. Excessive contact can cause injury to the hands and arms of workers whose hands are exposed to high vibration.



Petrol/gasoline is extremely flammable and is explosive under certain conditions. Do not smoke or allow flames or sparks in the area.

SAFETY INSTRUCTIONS

Using the PowerPack PP1 on boreholes without mountable headworks

The PowerPack PP1 is designed to be attached to boreholes with upright headworks to enable it to be operated without user contact. In situations where it is used unattached to headworks, it is important that operators are trained to use the machine without touching the upper part of the tubular carrying handle and advised of the risks associated with prolonged contact as follows:

Prolonged and regular work with high vibration hand-held or hand-guided tools can result in workers suffering various forms of damage collectively known as “hand-arm vibration syndrome” (HAVS). The best known form of damage is “vibration white finger” (VWF) which is a proscribed industrial disease.

The upper part of the tubular carrying frame vibrates at comparatively high levels when the PowerPack is operating. It is important that operators are instructed not to hold onto the upper tubular carrying frame when the unit is in operation. The maximum recommended time for contact with this part is 16 minutes per day.

The prescribed method for stabilising the unit during operation is for the operator to stand on the base of the frame (see page 14). The vibration levels measured on the base of the frame are low and within recommended Health and Safety guidelines. The maximum recommended daily exposure for standing on the base is 192 minutes. However, it is recommended that workers who regularly operate the machine in this way are included in a health and safety surveillance programme. A suitable programme should enable symptoms to be assessed and appropriate information to be given to individuals regarding further exposure to vibration.

Operators should be warned of the risks posed by exposure to vibration and be informed of the symptoms which may arise from excessive exposure. Operators should be instructed to report any symptom immediately to a designated person.

Component safety features



Start/Stop Switch:

In an emergency, to switch off engine, turn knob to off position (O).

To ensure safe operation, please read the guidelines on the following pages:

SAFETY INSTRUCTIONS

! WARNING

Operator responsibility

- Any part of the machine is a potential source of danger if the machine is used in abnormal conditions or if maintenance is not done correctly.
- Read the Manual carefully. Be familiar with the controls and their proper use. Know how to stop the engine rapidly and how to release the ratchet strap quickly when it is used to secure the PowerPack to a borehole.
- Use the machine only for the purpose it is intended for.
- Never allow people unfamiliar with this Manual (including the Honda Engine Manual) to use the PowerPack. Local regulations may restrict the age of the operator.
- If you lend or resell the PowerPack to a third party, instruct him/her how to handle the product and alert him/her to read the Manual carefully before use.
- Never use the PowerPack while user is fatigued or under medication, or if the user has swallowed substances known to affect judgement or reactions.
- Ensure untrained people and animals are at least 5 metres away from the operator and any assistant should be at least 2 metres from the machine. We recommend that a stop signal and other signals between operator and assistant be decided prior to operation and that they are used for safety during operation.
- Keep in mind that the operator or user is responsible for accidents or hazards occurring to other people or their property.
- While operating the PowerPack always wear the following protective clothing and protective devices:
 - ◇ Protective clothing: wear adequate clothing, which fits closely. Do not leave sleeves and the bottom of shirt/jacket loose. Do not wear clothes with tapes, laces and /or ribbons, necktie, necklace etc during operation, as they could be caught in the machine. Bind your hair if it is long and do not let your hair fall below your shoulders.
 - ◇ Protective devices: Wear appropriate ear protection to protect your hearing from high pitched noise; wear safety footwear with toe protectors to avoid damaging your feet by dropping the PowerPack.
- Before each use, visually inspect the PowerPack for any damage or loose fixings.
- Never mount an incorrect part and do not tamper with the PowerPack, as this could result in personal injury or damage to the equipment.
- Do not change the engine governor settings or over-speed the engine.
- Start the engine carefully according to the instructions.
- Never pick up or carry the PowerPack while the engine is running.

SAFETY INSTRUCTIONS

! WARNING

- Stop the engine in the following cases:
 - ◇ Before checking, cleaning or working on the PowerPack.
 - ◇ If the PowerPack starts to vibrate abnormally. Check immediately and carry out any repair work necessary before re-use.
 - ◇ Whenever leaving the PowerPack unattended.
 - ◇ Before refuelling.
- Keep all nuts, bolts and screws tight to be sure the PowerPack is in safe working condition.
- When using the backpack, ensure that the PowerPack frame is correctly located on the backpack frame and securely fixed by the retaining clip before transportation.
- Allow the engine to cool before attempting to attach the PowerPack to the backpack.
- Do not use the PowerPack with worn or damaged parts. Parts must be replaced, not repaired. Replace with genuine parts approved by the manufacturer. Contact Waterra for all maintenance. Non-equivalent quality parts may damage the machine and be prejudicial to your safety.
- Do not hold the upper tubular carrying frame when the machine is in operation as prolonged and regular contact with the hand could result in injury caused by vibration.
- Do not smoke while working.

Fire and Burn Hazard

Petrol/gasoline is extremely flammable and petrol/gasoline vapour can explode. Use extreme care when handling petrol/gasoline. Keep out of the reach of children.

- Store fuel in containers specifically designed for this purpose.
- Refuel outdoors only and do not smoke or use a mobile phone while refuelling or handling fuel.
- Add fuel before starting the engine and before mounting above a borehole. Never remove the cap from the fuel tank or add petrol while the engine is running or when the engine is hot.
- If fuel is spilled, do not attempt to start the engine but move the PowerPack away from the area of spillage and avoid creating any source of ignition until the gasoline vapours have dissipated.
- Tighten all fuel tanks and container caps securely. When starting the engine after refuelling, be sure to start the engine at least 3m away from the refuelling spot.
- Never store the PowerPack with petrol in the tank inside a building where fumes may reach an open flame, spark or high temperature source.
- Allow the engine to cool before transportation or before storing in any enclosure.
- If the fuel tank has to be drained, this should be done outdoors, with a cold engine.

SAFETY INSTRUCTIONS

! WARNING

Carbon Monoxide Hazard

Exhaust contains poisonous carbon monoxide, a colourless, odourless gas. Breathing exhaust can cause loss of consciousness and may lead to death.

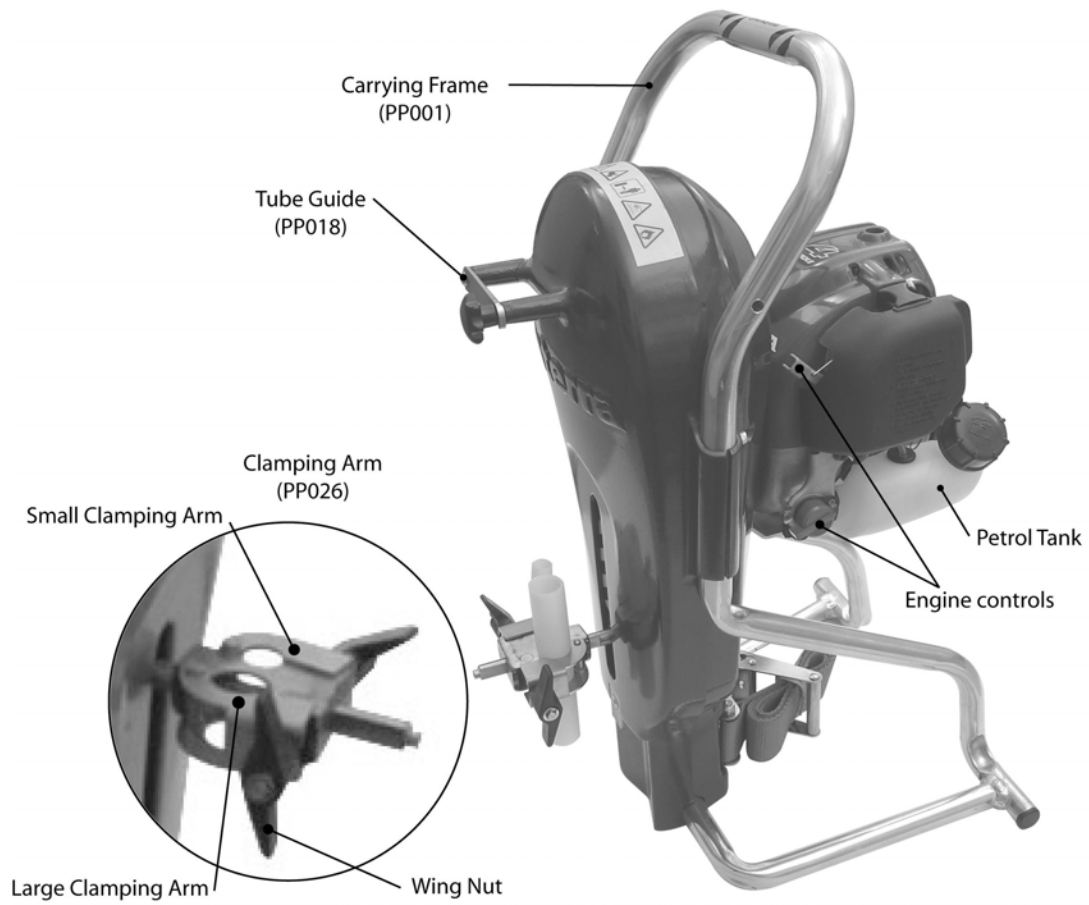
If you run the engine in an area that is confined or even partially enclosed, the air you breathe could contain a dangerous amount of exhaust gas.

- To keep exhaust gas from building-up, provide adequate ventilation.
- Do not operate the engine in a confined space where dangerous carbon monoxide fumes can collect.

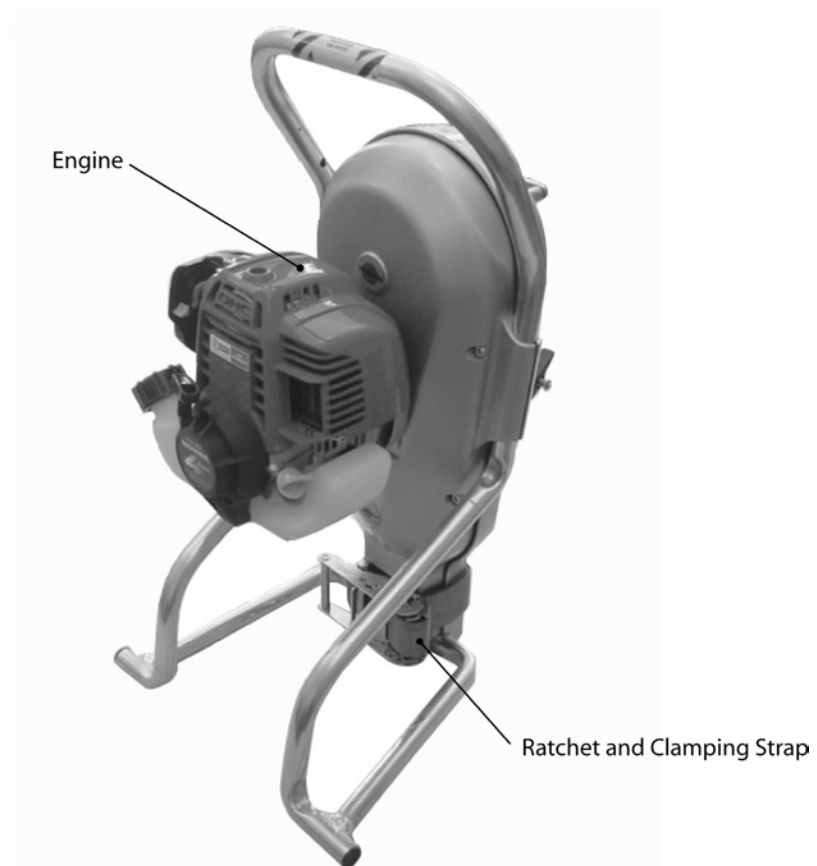
Spark Arrestor

The engine exhaust is fitted with a Honda manufactured and fitted spark arrestor. The spark arrestor must be serviced every 100 hours to keep it functioning as designed.

COMPONENT IDENTIFICATION



Bracketed codes are for spares identification. A full list of parts is available from Waterra or your local dealer.



COMPONENT IDENTIFICATION

Engine control location



The throttle control and the Stop/Start switch are located on the side of the engine, near the fuel tank filler cap. (See picture)

Throttle control



To adjust the throttle setting, move lever (indicated in the picture) anti-clockwise to slow the engine or clockwise to speed it up.

NB: The maximum throttle setting is limited. Do not override this setting as it could damage the machine.

Engine Start/Stop switch



The Stop/Start switch is located on the side of the engine, near the fuel tank filler cap. (See picture on page 9)

For the choke controls, refer to the Honda Engine Manual.

PRE-OPERATION CHECKS

Engine

Refer to Honda Engine Manual.

NOTE: Check oil and top up before each usage. See Honda Engine Manual.

Actuator



Check all components are secure.
Check for loose fixings.
Inspect clamping strap for wear (see picture).

Borehole Assessment

Check borehole depth and water level prior to pumping.

Ensure that the maximum depth of the pump in the borehole and the borehole water level will not exceed the performance of the PowerPack. Refer to specifications page 19 for recommended pumping depths.

NOTE: Water levels on some boreholes will drop during the pumping operation. This may affect the rate of pumping.

PUMPING OPERATION

! WARNING

Read and understand the Safety Instructions on pages 4 to 8 before operating the PowerPack. If you notice any abnormal sound, smell or vibration, or other unusual signs, stop the motor immediately and consult Waterra.

Basic operation

These instructions assume the inertial pump tubing has already been installed into the borehole and the PowerPack fuel tank has been filled.

Before use, remove the PowerPack from the backpack frame if used.

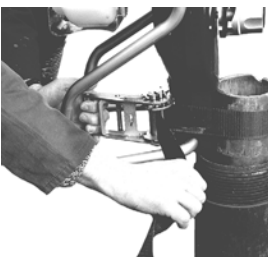
When pumping from a borehole with protective headworks or where the borehole lining is raised above ground level:



1. Lift PowerPack and hook onto the lip of the borehole lining or headworks (see picture).



2. Take the strap around the circumference of the borehole lining or headworks and pass it through the ratchet slot. Pull tightly to remove slack (see picture).



3. Operate ratchet arm backwards and forwards until the strap is fully tightened.

4. Check that the clamping strap is securely attached by trying to lift the PowerPack vertically.

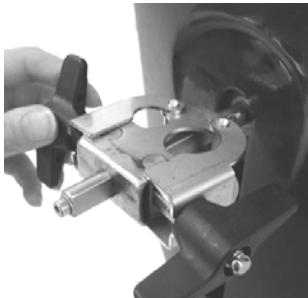


5. Re-tighten the strap until the PowerPack is secure
6. Ensure the tube clamp is positioned over the centre of the borehole.

PUMPING OPERATION



7. Withdraw inertial pump tubing to the required height above the base of the borehole. Pass the tube fully through the appropriate aperture in the tubing clamp (options are for Standard or High Flow tubing) and pass it through the tube guide at the top of the pump body (see picture).



8. When tubing is in position, rotate the wing nut on small clamping arm clockwise to hold tube and clamp firmly in place.

9. The discharge end of the tubing can either be held manually or taped to the side of the PowerPack. Extension discharge hose can be supplied by Waterra.

Clamping heavy tubing

High flow tubing is particularly heavy at 25-30m depth. If the tubing starts to slip through the clamp, check that the appropriate clamp wing nut is tightened. Also check tube and/or clamp are not damaged.

PUMPING OPERATION

When pumping from a borehole which is flush with ground surface:



1. Stand the PowerPack directly above the centre of the borehole.
2. Ensure the tube clamp is positioned over the centre of the borehole by sliding the clamp along the clamp arm to align with the centre of the borehole lining (see picture).
3. Follow instructions 7 to 9 as described on page 13.
4. During pumping it is recommended that the operator pins the frame legs to the ground with one or both feet. Alternatively, and if practical, use sand bags or similar to provide an equivalent weight across the frame legs.



! WARNING

Do not touch the upper part of the tubular carrying frame whilst the pump is in operation, as workers whose hands are regularly exposed to high vibration may suffer from injuries to the hand or arms.

Starting the pump

Confirm that the inertial tubing is tightly clamped and the ratchet strap holding the PowerPack to the borehole (where used) is fastened tightly.

Confirm that the throttle control on the engine is set at "Slow" speed.



1. The engine may now be started. Follow Honda Engine Manual for this procedure.
2. The rate of oscillation of the clamp arm can be varied by increasing or decreasing the throttle speed control.
3. Adjust the speed of the clamp arm to obtain optimum pumping rate. At greater depths of operation, pumping rates may be optimised by reducing the speed control (this compensates for the increased elasticity of tubing at depth).

Note:

Actual pumping rates will vary between boreholes. Pumping rates are dependent on the diameter of borehole, the depth to pump intake, water level and the size of inertial pump tubing. Estimates of pumping rates in two commonly used situations are indicated in graphs in the Specifications section (Page 19). Where boreholes are heavily laden with silt, the pumping performance may be reduced.

! WARNING:

Ensure untrained observers are kept at least 5 metres away whilst the pump is running.

PUMPING OPERATION

To stop the pump:

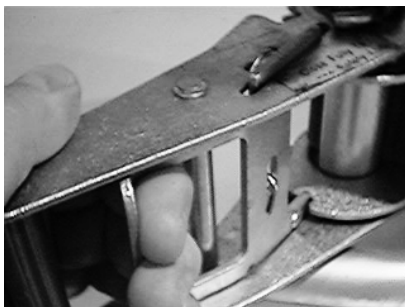


1. Position the throttle control lever fully to SLOW. This stops the actuator operating.

2. Turn the engine switch to the off position (0).



Releasing the clamping strap from the borehole



Squeeze the ratchet release slide and rotate the handle anticlockwise until it engages in the slots provided (see picture).

This action releases the ratchet so you can slacken the clamp strap and remove it from the borehole.

BACKPACK IN USE



The Backpack is an optional accessory and may not be supplied with your PP1. It can be ordered separately. Please quote part description: PP1 Backpack.

1. Before fitting the PowerPack to the backpack, adjust the harness by trial fitting to the operator. Adjust the bottom harness strap to allow the clips to engage. Then adjust the bottom harness strap to remove any slack (see picture).



2. Adjust the top harness strap to allow the clips to engage. Then adjust the top harness strap to remove any slack (see picture).

! WARNING:

Ensure the engine is cool before fitting to the backpack.



3. Whilst holding the PowerPack handle, tilt it back on the out-turned legs of the frame. Engage the backpack retaining hooks located at the bottom of the backpack underneath the PowerPack frame as shown.
4. Tilt the PowerPack frame back to the horizontal position to engage fully the retaining hooks as shown.



5. Locate the backpack retaining pin into the hole in the PowerPack frame and insert the retaining clip to prevent the PowerPack from becoming dislodged during transportation (see picture).
6. Lift the assembly and place arms through backpack and secure the clips as described above for harness adjustment.

To remove, reverse the procedure described above.

MAINTENANCE

! WARNING:

Before performing any maintenance, stop the engine.

Caution:

Use only authorised replacement parts. There are no user-serviceable parts in this product.

Maintenance schedule for pump

<i>OPERATING INTERVAL</i>	<i>Actioned by:</i>	<i>Examine clamp strap</i>	<i>Lubricate bearings & slide</i>	<i>Tighten fixings</i>	<i>Replace drive belts</i>
<i>Each use</i>	Operator	✓		✓	
<i>Every 6 months or 100 hours</i>	Waterra approved service engineer		✓		
<i>Every 12 months or 200 hours</i>	Waterra approved service engineer		✓		✓

Recommended lubricant for bronze bush bearings:
ISO VG60 or OSI VG15 (SAE30 or SAE40)

Recommended lubricant for guide rails:
Multi-purpose grease, e.g. Castrol CL.

Maintenance schedule for engine

NOTE: Check oil level each use.
See Honda Engine Manual.

TROUBLE SHOOTING

Refer to Honda Engine Manual for any problems with the engine.

- If the engine starts and runs but there is no drive to the actuator, contact Waterra service department.
- If the ratchet strap shows sign of wear, contact Waterra service department for replacement parts.
- If the backpack shows signs of wear or fails, contact Waterra service department for replacement parts.

SPECIFICATIONS

Dimensions

Height : 640mm approx (to the top of the frame)
Width : 365mm
Depth : 390mm

Dry Weight

12.5 kg without backpack

Fuel tank capacity/Running Time

Capacity: 0.55 litres. This enables approximately one hour per tank of fuel

Actuator Stroke/Max Stroke Rate

150mm/152cpm

Peak Flow Rates

6 litres/min for standard tube
14 litres/min for high flow tube

NOTE: These flow rates will vary according to the borehole diameter, water level, depth to pump intake and the presence of silt in the water sample.

Noise Level

91dB(A) recorded at the operator's position with the engine running at a maximum speed of 8,000 rpm. The noise was measured as a short-term sampled equipment continuous sound pressure, using a Dawe D-1422C precision sound level meter.

The recommended safe working distance without ear protection is 2 Meters away from the PowerPack.

Vibration Level

The PowerPack was restrained by placing a plank of wood, on the lower part of the frame (Bottom/Foot Rail) and applying 50kg of weight on either end of the plank, with a load applied to the slider to replicate 33 meters of high flow tube with a ball valve on the end and a 30m column of water and the engine running at a maximum speed of 8,000 rpm.

The Bottom/Foot Rail vibrates at an average of 3.9 m/s^2 when standing on concrete, which allows a maximum daily exposure of 251 minutes to this level of vibration. On soil the average is 4.4 m/s^2 giving a maximum daily exposure of 192 minutes.

The Hand/Top Rail vibrates at an average of 14.7 m/s^2 with the unit standing on concrete, which allows a maximum daily exposure of 17 minutes to this level of vibration. On soil the average is 15.3 m/s^2 giving a maximum daily exposure of 16 minutes.

The vibration levels were measured using a Castle Pocket HARM Vibration Meter model GA2003 and Piezo-electric Accelerometer. The magnitude of the vibration was measured in the 3 axes (X,Y and Z) for each of the 2 positions.

NOTE: The Hand/Top Rail should not be held during operation of the PowerPack.

Engine

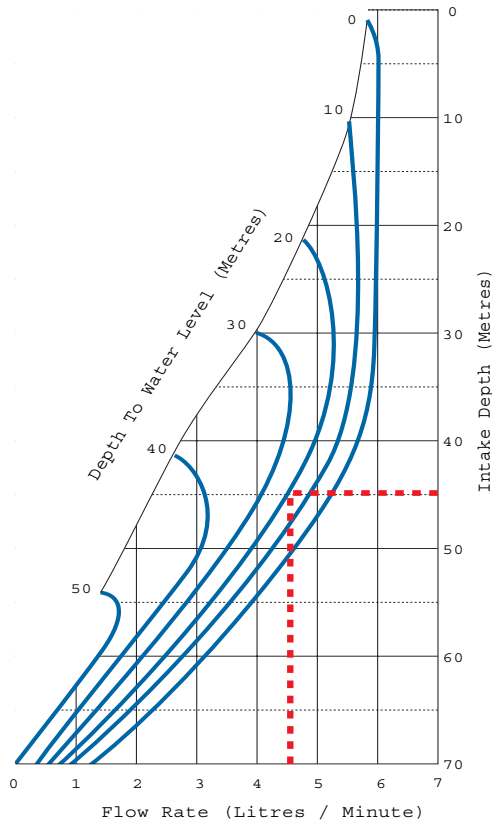
Refer to Honda Engine Manual for engine specifications.

SPECIFICATIONS

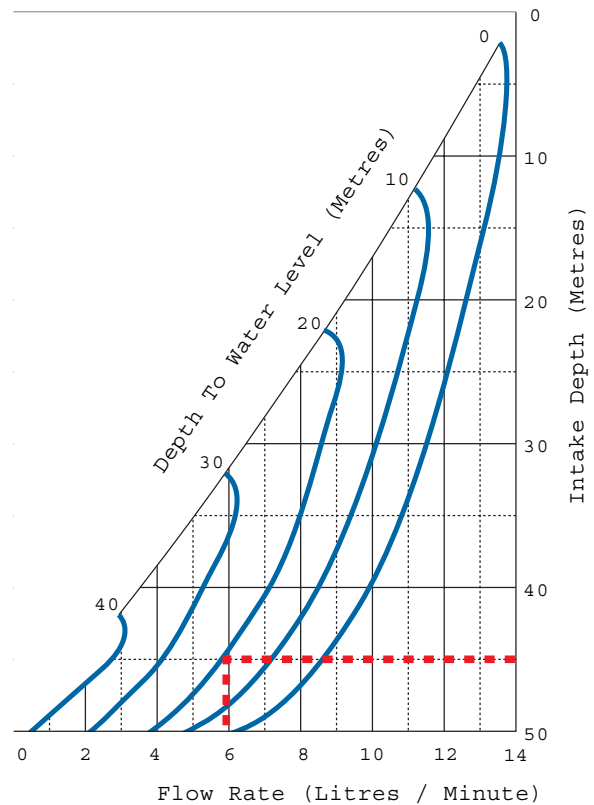
Pumping Performance

See performance graphs below.

Standard Flow System
in 50mm diameter borehole



High Flow System
in 100mm diameter borehole



Example.....

Intake depth 45m.

Water level 20m.

Flow rate with Standard Flow: 4.5/ /min

Flow rate with High Flow: 6/ /min

Notes

Flow rates based on field trials using PowerPack PP1 operating at up to 132 cpm.

Flow rates vary in different diameter boreholes. Reduced flow rates will occur where silt is pumped.

SERVICE ADDRESSES

Waterra UK Limited
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Email: sales@WaterraUK.com
Website: www.WaterraUK.com

Honda (UK) Limited
Power Road
Chiswick
London
W4
UK

Tel: 0208 747 1400
Fax: 0208 747 3594

Service Options

6 Month and 12 month end of Warranty inspection and ongoing six monthly services.
Contact Waterra service department or local Waterra dealer.

SPARES

Commonly requested parts for the actuator (see Page 9 for identification)

PP1 Backpack
PP004 Ratchet and clamp strap
PP018 Tube guide assembly
PP022 Packaging carton and inserts
PP024 Replacement owner's manual
PP026 Tubing clamp assembly

Refer to Waterra service department or local Waterra dealer for any parts.

GUARANTEE

Warranty Period

This warranty is not transferable and covers the actuator only.

See Honda Engine manual for details of engine warranty.

Waterra (UK) Limited warrants that under normal use and correct maintenance it will replace at no cost to the customer any defects in material or workmanship for a period of 1 year from date of purchase as follows:

6 months: All parts and labour

1 year: All parts and labour subject to completion of 100 hour or 6 month service.

Normal use and maintenance must follow the guidance in this manual. Warranty claims must be accompanied by:

- A copy of the actuator usage record card
- A copy of a service certificate for the first 100 hour or 6 monthly service by a Waterra approved servicing agency (for claims between 6 months and 1 year)

Warranty Exclusions

- Repairs required as a result of incorrect maintenance, accidental damage or use outside the recommended pumping depth parameters
- Repairs required as a result of non-approved third parties maintaining the product or any unapproved modifications
- Repairs required on any unit which has been loaned or rented to third parties by the purchaser
- Normal maintenance requirements, such as lubrication and tightening screws, etc.
- Clamping strap (except for material faults)

See our Terms & Conditions which can be supplied on request.

This does not affect your Statutory Rights.

For Warranty conditions outside the UK and Ireland, refer to local Waterra dealer.

STORAGE

Proper storage preparation is essential to keep the PowerPack trouble free. The following steps should be carried out when storing the PowerPack:

- Clean all exterior surfaces. Most base materials are aluminium, but if paintwork is damaged, it is recommended that this is touched in with a paint stick.
- Wipe ratchet clean with a lightly oiled cloth.
- Drain fuel.
- **Retain packing carton** in case equipment needs to be shipped. It will be needed for transit by courier for servicing.

NOTES
