MALDA Handpump Installation and Maintenance Manual
Installation and Maintenance Manual
for the Malda Handpump

REVISION 0 - 2003

This manual has been prepared to cover installation and maintenance aspects of the Malda Handpump.

This document results from several years of work carried out by UNICEF Malawi in partnership with SKAT-HTN, NGO’s, handpump field workers and the private sector in several countries.
The experience gained in recent years has been incorporated into this Specification.

This Manual is intended to assist all users of the Malda Handpump, especially to give a guideline for the installation procedure and also for preventive maintenance.

Suggestions for improvements and requests for further information are welcome, and should be sent to SKAT at the address given below.


Author: Karl Erpf

Photographs: skat_foundation

Copyright: SKAT - HTN
Provided the source SKAT - HTN is acknowledged, extracts of this publication may be reproduced.

Distribution: skat_foundation
Vadianstrasse 42
CH-9000 St.Gallen
Switzerland

Phone: +41 71 228 54 54
Fax: +41 71 228 54 55
E-mail: info@skat.ch
or karl.erpf@skat.ch
Homepage: www.skat.ch
# Installation and Maintenance Manual for the Malda Handpump

## Contents

<table>
<thead>
<tr>
<th>Section</th>
<th>Page No.</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.0 Background of the Malda Handpump Development</td>
<td>3</td>
</tr>
<tr>
<td>2.0 Pump Features</td>
<td>4</td>
</tr>
<tr>
<td><strong>Installation of the Malda Pump:</strong></td>
<td></td>
</tr>
<tr>
<td>3.0 Preparation work</td>
<td>5</td>
</tr>
<tr>
<td>4.0 Selection Chart for correct Cylinder Setting</td>
<td>6</td>
</tr>
<tr>
<td>5.0 Pump Installation Sequences</td>
<td>7</td>
</tr>
<tr>
<td>6.0 Recording of Installation Details</td>
<td>13</td>
</tr>
<tr>
<td>7.0 Regular Monitoring of Pump Performance</td>
<td>13</td>
</tr>
<tr>
<td><strong>Maintenance of the Malda Pump:</strong></td>
<td></td>
</tr>
<tr>
<td>8.0 Preventive Maintenance</td>
<td>13</td>
</tr>
<tr>
<td>9.0 Repair of Pump</td>
<td>14</td>
</tr>
</tbody>
</table>
Installation and Maintenance Manual
for the Malda Handpump

1.0 Background of the Malda Handpump Development

The Shallow Well Programme in Malawi was established in the late 1970s in order to protect potable groundwater sources in rural areas, which were dug wells. The main areas covered include Lilongwe, Mzimba and Dowa. At that time approximately 6500 dugwells and shallow boreholes have been protected and furnished with „Direct Action Pumps“ (DAP). The most commonly used DAPs in Malawi were Mark V, Madzi, Shire, Nira AF 85.

The direct action version of the Afridev Handpump was developed as an early prototype in Kenya in 1987/88. A small number was installed in Kenya and Malawi in 1988 for assessment. UNICEF installed a larger batch of 45 pumps in 1990/91 at Ntchisi, north of Lilongwe.

In 1993 the Water Department of the Ministry of Works in Malawi requested an evaluation of all DAP used in Malawi. The work was carried out by a mission consisting of staff from UNDP-World Bank, Regional Water & Sanitation Group, East Africa (RWSG-EA), the Water Department and UNICEF Lilongwe.

After the evaluation process was completed it was decided to develop a new handpump on the basis of the Afridev Direct Action Pump as soon as possible.

A Research and Development (R&D) programme was started with the participation of UNICEF, the Water Department of the Ministry of Water Development, a potential pump manufacturer and NGOs for testing and monitoring of pumps. UNICEF offered the financial support and UNDP-World Bank, RWSG-EA in Nairobi and SKAT-HTN Switzerland agreed to participate on a technical assistance and monitoring base.

In 1994, UNICEF placed an initial order of 100 pumps and they were produced locally and installed in the project areas of Inter Aide near and Concern Universal.

This new pump type was named **MALDA Pump (Malawi Direct Action Pump)**.

The “MALDA Pump Specifications” were officially released in March 1997, after the HTN-Workshop 97 in Mangochi Malawi.

Since then many more pumps were produced and installed in Malawi and also in other countries like Kenya and Madagascar.
2.0 Malda Pump Features

[Diagram of pump features labeled as follows:
- Spout
- Handle
- Pump stand
- Standing plate
- Cement/Platform
- Ground
- ISO Flange
- Casing pipe
- Rising main
- Socket
- Pumprod
- Plunger
- Bobbin
- Split ring
- Footvalve
- O-Ring
- Flange ring
- Socket
- Suction pipe

Scale 1:5]
Installation of Malda Handpumps

The installation procedure of the Malda Pump is extremely easy, after the preparations have been completed. Preparation work means to cast the pedestal on an apron of a borehole or in a steel reinforced concrete cover of a dugwell.

3.0 Preparation work
4.0 Selection Chart for correct Cylinder Setting

Select the correct length of Riser pipes

<table>
<thead>
<tr>
<th>Setting-depth (m)</th>
<th>Nos + length of Riser pipes</th>
<th>Sockets</th>
</tr>
</thead>
<tbody>
<tr>
<td>2</td>
<td>1m 1m</td>
<td>1 1</td>
</tr>
<tr>
<td>3</td>
<td>2m 1m</td>
<td>1 2</td>
</tr>
<tr>
<td>4</td>
<td>1m 1m</td>
<td>1 2</td>
</tr>
<tr>
<td>5</td>
<td>2m 1m</td>
<td>1 2</td>
</tr>
<tr>
<td>6</td>
<td>1m 2m</td>
<td>1 3</td>
</tr>
<tr>
<td>7</td>
<td>2m 1m</td>
<td>1 3</td>
</tr>
<tr>
<td>8</td>
<td>3m 1m</td>
<td>1 3</td>
</tr>
<tr>
<td>9</td>
<td>2m 2m</td>
<td>1 4</td>
</tr>
<tr>
<td>10</td>
<td>3m 1m</td>
<td>1 4</td>
</tr>
<tr>
<td>11</td>
<td>4m 1m</td>
<td>1 4</td>
</tr>
<tr>
<td>12</td>
<td>3m 2m</td>
<td>1 5</td>
</tr>
<tr>
<td>13</td>
<td>4m 1m</td>
<td>1 5</td>
</tr>
<tr>
<td>14</td>
<td>5m 1m</td>
<td>1 5</td>
</tr>
<tr>
<td>15</td>
<td>4m 2m</td>
<td>1 6</td>
</tr>
</tbody>
</table>

Note: - The 1m pipe is mainly used as Suction pipe.
- Use the matching (shorter) pipes always at the top end of the Rising main.

Select the correct length of Pumprods

<table>
<thead>
<tr>
<th>Setting-depth (m)</th>
<th>Numbers + length of Pumprod pipes</th>
<th>Handle pipe</th>
</tr>
</thead>
<tbody>
<tr>
<td>2</td>
<td>1m 1m</td>
<td>1</td>
</tr>
<tr>
<td>3</td>
<td>2m 1m</td>
<td>1</td>
</tr>
<tr>
<td>4</td>
<td>1m 1m</td>
<td>1</td>
</tr>
<tr>
<td>5</td>
<td>2m 1m</td>
<td>1</td>
</tr>
<tr>
<td>6</td>
<td>3m 1m</td>
<td>1</td>
</tr>
<tr>
<td>7</td>
<td>2m 1m</td>
<td>1</td>
</tr>
<tr>
<td>8</td>
<td>3m 1m</td>
<td>1</td>
</tr>
<tr>
<td>9</td>
<td>4m 1m</td>
<td>1</td>
</tr>
<tr>
<td>10</td>
<td>3m 2m</td>
<td>1</td>
</tr>
<tr>
<td>11</td>
<td>4m 1m</td>
<td>1</td>
</tr>
<tr>
<td>12</td>
<td>5m 1m</td>
<td>1</td>
</tr>
<tr>
<td>13</td>
<td>4m 2m</td>
<td>1</td>
</tr>
<tr>
<td>14</td>
<td>5m 1m</td>
<td>1</td>
</tr>
<tr>
<td>15</td>
<td>5m 1m</td>
<td>1</td>
</tr>
</tbody>
</table>

Note: The total length of Pumprod pipes (including Handle pipe) is equal to the total length of Riser pipes, without counting the Suction pipe.

This example shows a setting for 10 m
5.0 Pump Installation sequences

The borehole / dugwell has to be completed prior to the installation of the pump.

The depth of this dugwell is being checked, in order to be able to determine the exact length of the “down hole components”.

The Pump Surrounding

The complete pump surrounding of the dugwell shown above needs to be developed as follows:

- A platform with a long drainage needs to be constructed, which prevents spilled water from flowing back into the well (danger of contamination).
- The drained water will be collected in a “soak away pit” (for easy penetrating into the ground) or can be used for cattle watering or watering of a vegetable garden.
- The well needs to be safeguarded by a fence, so that animals cannot come close to the water point (contamination).
The pump flange needs to be cast in the reinforced concrete cover of the dugwell or in the concrete platform of a borehole. After the curing time of 5 to 7 days, the cover can be moved on top of the dugwell and is ready for installation.

For pumps installed on boreholes, the platform needs to be cured for 5 to 7 days prior to the installation.
Disinfection of the well

As soon as the water point is ready for the pump installation, the well needs to be disinfected. Mix 300 grams of bleaching powder thoroughly with about 15 liters of water in a bucket and pour the solution into the well.

Preparation for the pump installation

After the exact length of the down hole components are known, assembling of the rising main with footvalve and suction pipe can start. As soon as the assembly of the rising main is completed, it will be layed on the ground and the assembly of pumprod with plunger and handle can start.

Note:
- Clean any dirt or sand from the threads of rising main pipes or pumprod pipes prior to assembling.
- The connections of the rising main pipes and the pumprod pipes need to be tightened by hand only. Never use tools like spanners or else, because too hard tightening can spoil the threads of the relatively soft HDPE pipe material.

As soon as the pumprod assembly is completed, it can be layed next to the rising main pipe and the correct length can be checked easily.

Now all components are ready to be installed.
Installation of the Malda Pump

As the first step of the installation procedure, the rising main will be introduced into the dugwell or the borehole.
- If the rising main is directly connected to the pump stand, it can be attached to the end of the rising main prior to the introduction procedure (as shown in the picture).
- The newest model, the “Steel cone assembly” has been reintroduced (as in the first models of the Malda Pump). In this case, the pump stand will be attached as soon as the steel cone assembly rests on the pump flange.

Note: - The rising main should be lowered into the dugwell or borehole with one big bow. If the pump stand is already attached to the end of the rising main, support the pump stand with a wooden stick while introducing the rising main.
- In order to eliminate the stress in the connecting threads when a big bow is formed, the long sockets with the guiding part have to be used.
In the next step, the pump stand has to be fitted onto the pump flange by tightening four M12 bolts and nuts.

Note:  
- Make sure that the pump stand is fitted as such that the spout is showing to the right direction.  
- The spanner used for this operation is the only tool needed for the installation of the Malda Pump.
In the last step, the pumprod is introduced with a **big bow** and the guiding bush is tightened by hand.

Now the Malda Pump is ready for operation.
6.0 Recording of Installation Details

It is very important to record all details of the pump installation.

7.0 Periodically Monitoring of Pump Performance

The performance of each Malda Pumps should be tested at least every 6 month and the test results recorded in the Monitoring sheet.

Maintenance of the MALDA Handpumps

The Malda Handpump is very easy to maintain by the users, only few operations require simple tools, the rest is done by hand only. However, handling of Plastic materials like all down hole components and the Guide bush, needs special care.

8.0 Preventive Maintenance

Preventive maintenance means regular check-up of the handpump (including pump surrounding). At a fixed time interval, wearing parts have to be checked and replaced before they are fully worn out.

For example:- If the estimated lifetime of the split ring is one year, the seal will be changed after a period of one year even it is still functional.
- If during a preventive maintenance check, the footvalve is leaking, the caretaker will carry out repairs in the valve even though the pump has not broken down.

Such interventions help in preventing the sudden failure of the handpump.

Checks needed during preventive maintenance

Monthly checks:
- Check if flange bolts are tight – if not, tighten them.
- Check if guide bush is tight – if not, tighten it.
- Check if all pumprods are tight – if not, tighten them.
Halve yearly checks:
- If unusual noise is noticed during operation of the pump handle, check for the reason and take corrective action.
- If the pump flange is shaky during operation, check whether the pump flange is loose in the foundation. Take corrective measures to repair the foundation.
- Should any fasteners of the bottom flange be missing, replace missing parts.
- Check if there is any leakage in the pump. If more than 10 strokes are required before water comes out of the spout, it means the pump is leaking beyond an acceptable limit. This needs attention and it may be necessary to replace the bobbin of the footvalve or the rising main connections (long sockets) are not tight.
- Check the discharge of the pump. If the discharge is less than 18 liters for 40 continuous full strokes within a minute, there may be a need to change the plunger seal, the bobbin or the different seals of the cylinder.

The leakage test and the discharge tests can be conducted as described below.

Leakage test:
Operate the pump handle until water is flowing and then collect water in a bucket for continuous 40 full strokes in approximately one minute and measure the quantity of water collected. Allow the pump to rest for 30 minutes. Repeat the test and measure the discharge. The difference between the first and the second rating of discharge indicates the leakage. Also note down the number of strokes required before water comes out of the spout. If the number of strokes required before water comes out of the spout exceeds 10, it is an indication that there is a leakage and it is advisable to take corrective action.

Discharge test:
Operate the pump handle until water is flowing and then collect water in a bucket for continuous 40 full strokes in approximately one minute and measure the quantity of water collected. The discharge will generally not be less than 18 liters, unless there is a leakage in the footvalve or the seals of the cylinder or the plunger seal is worn out.

9.0 Repair of pump
Major repairs such as the pulling out the rising main for replacement of any cylinder parts or fishing out of dropped components are beyond the capacity of the handpump caretaker and therefore will need to be carried out by a skilled mechanic.

Recording of repair details
Make necessary entries in the maintenance record card. The information to be recorded will include date of breakdown, date of repair, nature of complaint, parts replaced and nature of repair or any other important observation.