

Contents

1	Measurement theory.....	3
2	Usage	4
2.1.1	Graphic reference convention	4
2.2	Power up.....	4
2.3	Measuring	5
2.4	Settings.....	6
2.4.1	Season	6
2.4.2	Offset.....	6
2.4.3	Menu interface.....	6
2.4.4	Menu structure	7
2.4.5	Extensions and offset	9
2.5	Recharging	10
3	Specifications	11

1 Measurement theory

The digiplop is an acoustic distance measurement device, relying on the acoustic properties of a pipe to determine the water level inside the pipe.



The digiplop probe contains sensitive electronics. Please avoid applying pressure to the protective foam.

The air temperature within the pipe itself influences the acoustic properties. This temperature has a certain gradient, which depends on the season. This gradient is known and the digiplop has a comparison table for each month, which gives a good approximation of the real gradient.

By entering the correct month in the digiplop, the measured value will be calculated according to the right gradient.

2 Usage

This chapter explains the following operations:

- Power up
- Measuring
- Settings
- Recharging

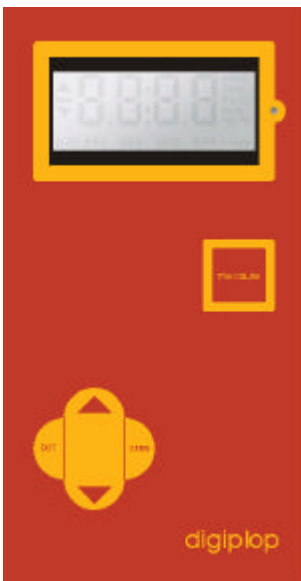
As you may notice the digiplop has no on/off switch. The unit switches on when the “measure” button is pressed and it switches off automatically after approximately 60 minutes of inactivity.

2.1.1 Graphic reference convention

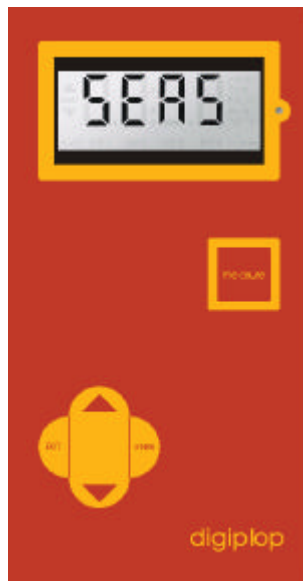
If a number is placed between brackets, the number refers to an image in the sequence directly below the text.

2.2 Power up

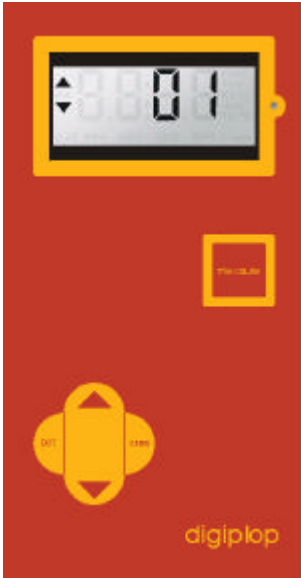
Pressing “measure” if the device is off [1], will turn it on. It shows “SEAS” [2] indicating that the season has to be set. See chapter 1 for more information on season selection. The “SEAS” message will be replaced after 0.5 seconds by Up / Down arrows and the previously selected month [3]. The arrows indicate that the number can be increased as well as decreased. If you decrease the month while it is one (January) it will automatically rollover to twelve (December) and vice versa. After selecting the appropriate season, press “ENTER”. The unit will beep three times, and show four dashes [4], indicating it is ready to take measurements.



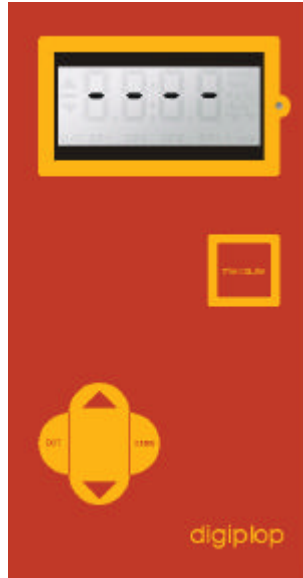
1. Press “measure”



2. Wait



3. Select month number using up/down, confirm by pressing "ENTER"



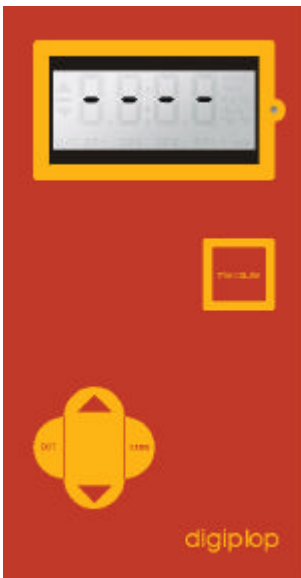
4. Device is ready for use

2.3 Measuring

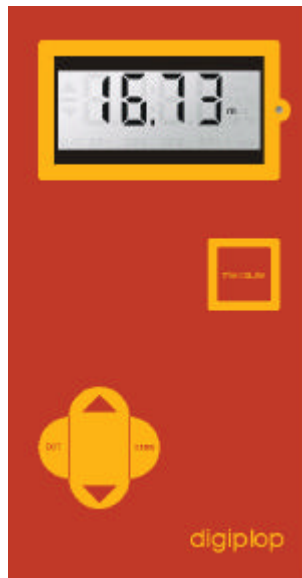
Place the measuring probe on top of a pipe. Try to avoid large gaps between the pipe and the probe. Press "measure". The measured distance from the probe to the water level in the pipe will be shown [2]. You may press "measure" again to repeat the measurement. If the device was unable to detect a pipe, the connection between probe and pipe is bad or if the depth is beyond the digiplop's range, the display reads "OPEN" [3]. Try repositioning the probe.

Keeping "measure" down will initiate continuous measurement until released.

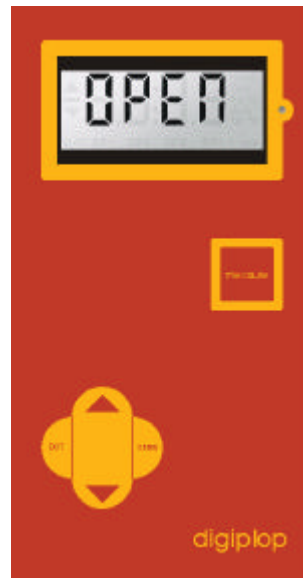
If an offset was set (see paragraph 2.4.2) the results are shown flashing.



1. Device is ready for use. Press "measure"



2. The depth is shown.



3. The device was unable to determine depth.

2.4 Settings

In order to increase the accuracy and ease of measurement, the digiplot introduces two settings.

2.4.1 Season

The calculations performed to determine depth, depend on the season (See chapter 1). In this menu the user may adjust the month, in case it was done incorrectly during power up.

2.4.2 Offset

Measuring in tight spots, or under extreme angles may require the use of extensions. This introduces a certain offset to the returned value. Entering this offset in this menu will automatically correct the value. Paragraph 5 explains how to create extensions, and determine their offset.

2.4.3 Menu interface

2.4.3.1 Input

The menu uses the following buttons:



ENTER: Enter the menu / save a setting

EXIT: Exit the current menu, going back one step. Cancel setting

UP / DOWN: Move up / down in a menu, increase / decrease value

2.4.3.2 Feedback

The arrows on the display's left-hand side shows whether you are able to go up and/or down.



In the example above, the number can be increased, as well as decreased. In picture below, only downward scrolling is possible.



2.4.4 Menu structure

When in normal measuring mode, tap "ENTER" to enter the menu. You now have five options (Diameter [2], Season [3], Temperature [4], Offset [5] Power off [6]), through which you can browse using the up / down buttons. The arrows on the left hand side of the display show the direction(s) in which you can browse (see paragraph 2.4.3.2).

To modify the value for the currently selected option, press "ENTER". You will now be presented with the options' current value. Pressing up / down will increase / decrease the value. If you go beyond the upper or lower limit of the value, the value rolls over to the lowest or highest value respectively.

Press "ENTER" to save the new value, or "EXIT" to cancel. If you cancel, the previously set value is retained, and you are returned to the menu. If you have chosen to save the new value, you exit the menu and return to measuring mode [7]. The display shows four dashes, and beeps three times.

The "-OFF" option [6] is an exception. Pressing "ENTER" if it is selected, switches the device off [11]. Refer to paragraph 1 for information on powering on the device.

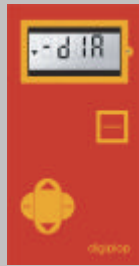
Please refer to the navigation diagram on the next page.



Switching off manually is not necessary. The unit switches off automatically after an hour of inactivity.



1. Normal measuring mode. Press "ENTER" to enter menu.

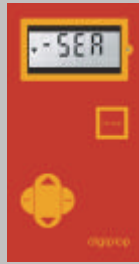


2. Diameter

ENTER
EXIT



7. Editing the pipe diameter range
Value: 0.07m or 0.125m

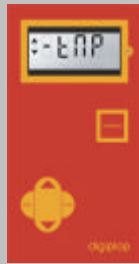


3. Season

ENTER
EXIT



8. Editing the season.
Season is set by setting the month. Month 0 disables the temperature gradient calculation. (S. Measurement theory)
Range: 0 - 12



4. Temperature

ENTER
EXIT

ENTER
EXIT



9. Editing pipe temperature
Affects distance calculation if temperature gradient is disabled (Season setting: Month 00)
Range : 0°C - 40°C

ENTER
EXIT



5. Offset

ENTER
EXIT



10. Editing offset
Subtracts this value from the measured value, to account for extensions.
Range: 0.0m to 0.5m



6. Switch off

ENTER
EXIT



11. Digiplop is off



12. Unit is ready to measure. If you have introduced an offset, the display blinks.

2.4.5 Extensions and offset

2.4.5.1 Making extensions

Extensions can be manufactured from off-the-shelf piping material, as long as the inside is smooth. For best results, keep the diameter equal to the pipe you wish to use it on.

If you are using multiple segments to construct an extension, make sure the joints are smooth. Our example extension consists of a small piece of pipe, joined with a knee.

2.4.5.2 Determining offset

To determine the offset, take two measurements; with and without the extension.

First, find a pipe that can be measured without extensions [1]. Place the probe without your extension on top of the pipe [2]. Measure the distance, and take note of it. In our example the distance between probe and water is 0.52 meters [3].

Fit your extension onto the probe [4], and place the assembly on the same pipe [5]. The distance will be larger, 0.61 meters [6].

The offset can be calculated by subtracting the first value from the second. In our example, this is $0,61 - 0,52 = 0,09$ meters

Go to the offset setting menu, (ENTER – DOWN – ENTER) [7] and adjust the offset to 0,09 meters [8]. Confirm by pressing ENTER again.

Now measure the same pipe again. The distance should be equal to the first measurement. To indicate that the shown value is not the true measured value, but a corrected one, the value blinks [9].

Remember to set the offset to 0.00 after removing the extension.



1. Find a pipe to measure



2. Take a measurement without extensions



3. Remember the value



4. Fit the extension to the probe



5. Place the assembly on the pipe



6. Measure again. Subtract the first measurement from this value. The result is the extension's offset.



7. Go to the menu, and select the offset adjustment



8. Enter the offset



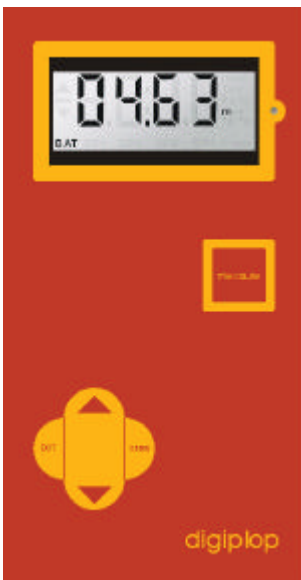
9. Measure again to confirm the correct offset. Note that the screen is blinking now.

2.5 Recharging

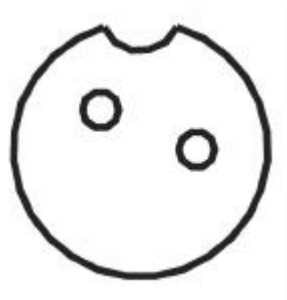
Depending on usage, the digiplop can be used up to several months on one charge. If the batteries' energy level has declined to a certain point, the "BAT" text [1] will be shown on screen. You will still be able to use the digiplop, but it is advised to recharge the device as soon as possible.

Insert the charger into the mains outlet. Remove the protective metal cap from the back of the digiplop, by turning it counter clockwise. Now insert the metal plug, the notch facing upward [2]. The Digiplop will shut down, and the charging indicator, to the right of the screen, will illuminate [3]. Charge an empty unit for about 12 hours.

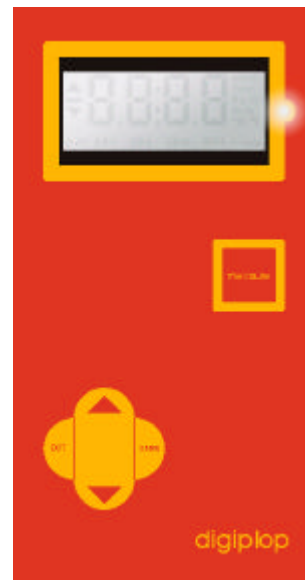
Please make sure to replace the protective cap after charging.



1. Batteries are almost empty

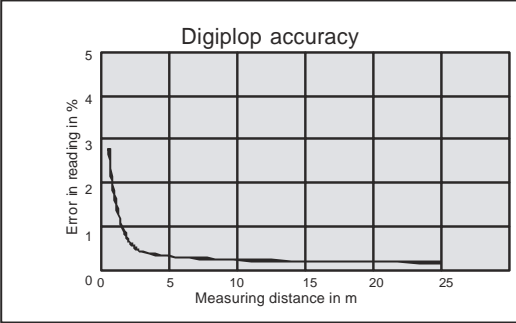


2. Insert the power connector, notch facing upward



3. The charging indicator will illuminate

3 Specifications

<p>Performance Measuring error</p>	
<p>Range</p>	<p>Beyond 4 m the error is $\pm 0.02m$ 0.15m through 30m @ $\varnothing 30mm - 70mm$ buis</p>
<p>Electrical Peak power Average power Battery capacity</p>	<p>400 mW 1.5 mW 1100 mAh</p>
<p><u>Charge</u> current voltage duration</p>	<p>90 mA 12 V 12 hrs</p>
<p>Dimensions <u>hand held unit</u> Dimensions (L x W x H) Weight Material</p>	<p>152mm x 83mm x 33.5mm 260g ABS</p>
<p><u>Sensor</u> Dimensions (\varnothing x W) Weight Material</p>	<p>45mm x 40mm 120g PVC</p>