



**Operation Unit
V1.0**

1.	Introduction	4
2.	Out of the box.....	4
2.1.	Content	4
2.2.	Note	4
3.	Identifying parts	4
3.1.	Unit.....	4
3.1.1.	Connectors.....	4
3.1.2.	Protection cover.....	4
3.2.	Front panel.....	5
4.	Settings and formulas	6
4.1.	Formula	6
4.2.	Settings	6
4.2.1.	WaterDensity.....	6
4.2.2.	SensorPosition.....	6
5.	Operating.....	7
5.1.	Starting up	7
5.1.1.	Start up screen	7
5.1.2.	Screen layout	8
5.2.	Status indicators	8
5.2.1.	Battery indicator	8
5.2.2.	Net indicator	8
5.2.3.	Connection indicator	9
5.3.	Pages and pagetabs.....	9
5.4.	Context sensitive keys.....	9
5.5.	Monitor page	10
5.5.1.	Main area.....	10
5.5.2.	Sub area	10
5.6.	Setting page	10
5.6.1.	Navigation	11
5.6.2.	Time and date	11
5.6.3.	Calibrate	12
5.6.4.	Water density.....	12
5.6.5.	Sensor range	13
5.6.6.	Sensor position	13
5.6.7.	Filter time constant.....	14
5.6.8.	Factory settings	14
5.6.9.	About.....	15
5.7.	Calibration wizard.....	16
5.7.1.	Introduction (Page1).....	16
5.7.2.	Explanation (Page2)	17
5.7.3.	Progress (Page3).....	17
5.7.4.	Result (Page4)	18
5.7.5.	Errors	18
6.	Wireless connection	19
6.1.	Trouble shooting guidelines	19
6.1.1.	Antenna connection.....	19
6.1.2.	Line of sight	19



6.1.3.	Short range	19
6.1.4.	Restart.....	19
6.1.5.	Antenna alignment	19
6.1.6.	Interference.....	19
7.	Power and charging.....	20
7.1.	Led indicator	20
7.2.	Charging	20
7.3.	Charge output	20
8.	Specifications	20



1. Introduction

This manual describes the OperationalUnit. This unit must be used in combination with a DataAquisitionUnit. The OperationalUnit forms the presentation layer and human interface of a DepthCalibrator setup. The calculated values are presented and interacted in a graphical way by means of a graphical display and a keyboard.

For information on how to setup both units, check the DepthCalibrator manual.

This manual has been written on the V2.4 firmware in the device.

2. Out of the box

2.1. Content

On delivery the Operation Unit is equipped with the following things.

- Power cable
- Charging cable
- Carrying bag
- Antenna with straight and angled connector
- This manual

2.2. Note

The devices might not be fully charged on delivery, make sure to charge it before first time use.

3. Identifying parts

3.1. Unit

3.1.1. Connectors

The unit has 3 connectors.

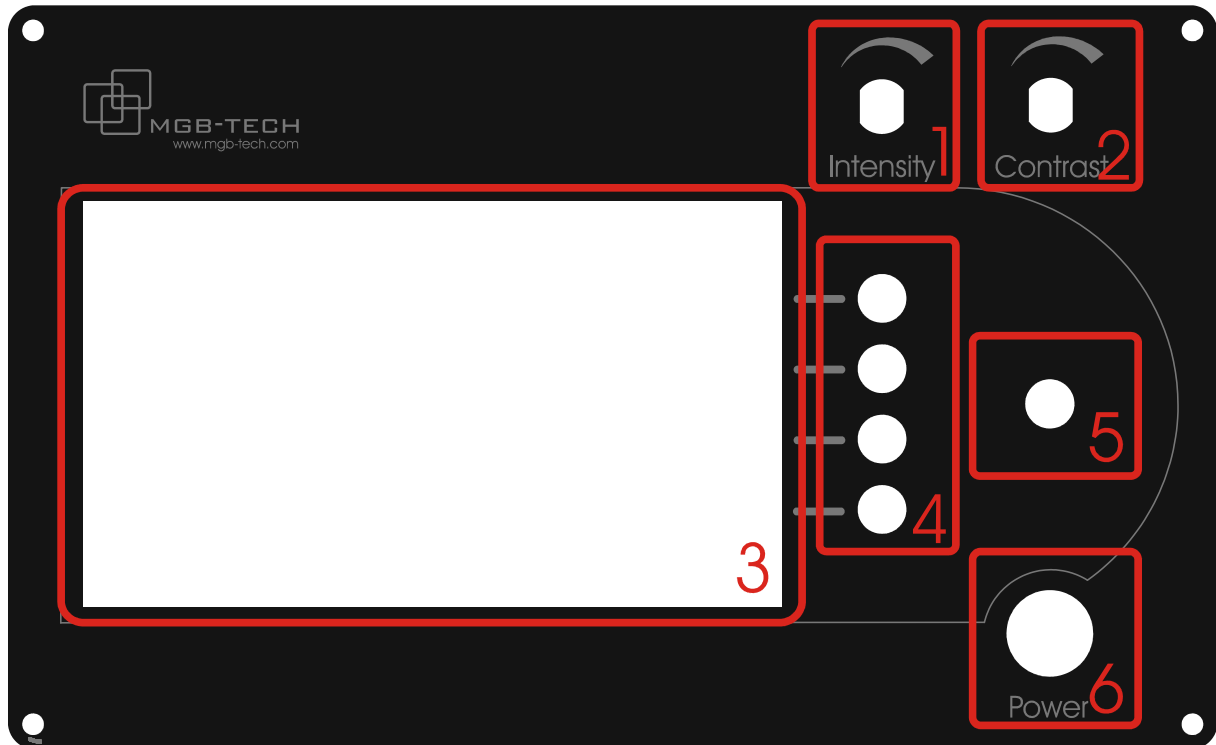
- A TNC radio antenna connector, located on the right.
- A 3 pole male main supply input connector, located on the left.
- A 2 pole female charge output connector, located on the left.

The accompanying antennas and cables can't be interchanged and have pole protection so no wrong connection can be made.

3.1.2. Protection cover

The unit has a transparent protection cover to protect against water and dust. An accompanying key makes it possible lock the cover.

3.2. Front panel



1 Intensity control:

Changes the intensity of the backlight when lit.

2 Contrast control

Changes the contrast of the display to ensure perfect readability

3 Display

4 Context sensitive function keys

Depending on the context these keys can perform different functions

5 Rotary key

Permits to change values.

6 Power on button

Power up or down the device. Holds a LED to indicate the charging state the unit is in.

4. Settings and formulas

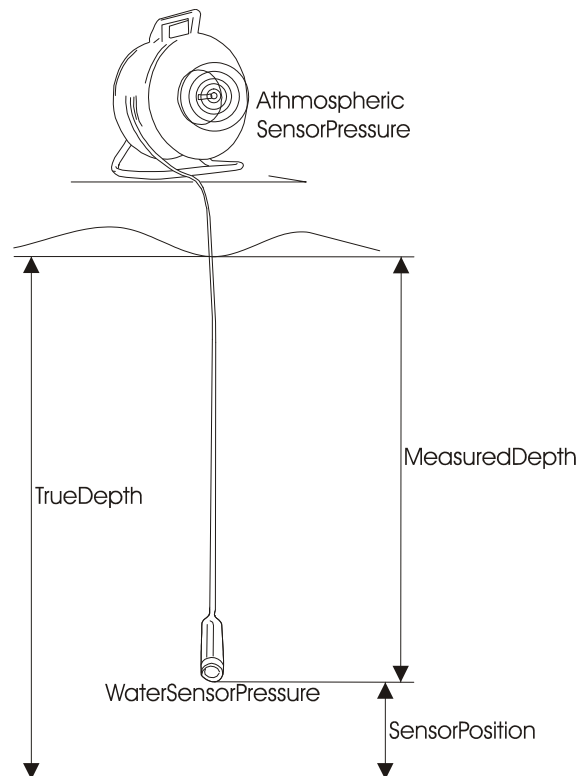
In order to give some insight in how the settings are used to calculate the depth, a generic depth calculation formula is given and all the parts explained.

4.1. Formula

$$\text{MeasuredDepth} = (\text{WaterSensorPressure} * \text{WaterDensity}) - (\text{AthmosphericSensorPressure})$$

$$\text{TrueDepth} = \text{MeasuredDepth} + \text{SensorPosition}$$

4.2. Settings



4.2.1. WaterDensity

The pressure of water on a certain depth will vary depending on the waterdensity. For this reason, the water density should be entered correctly as it will affect the calculated depth.

4.2.2. SensorPosition

Since the sensor can be mounted with an offset to the actual depth that has to be measured, the SensorPosition can be entered. Once the sensor's depth (MeasuredDepth) has been calculated the SensorPosition value is added in order to get the TrueDepth.

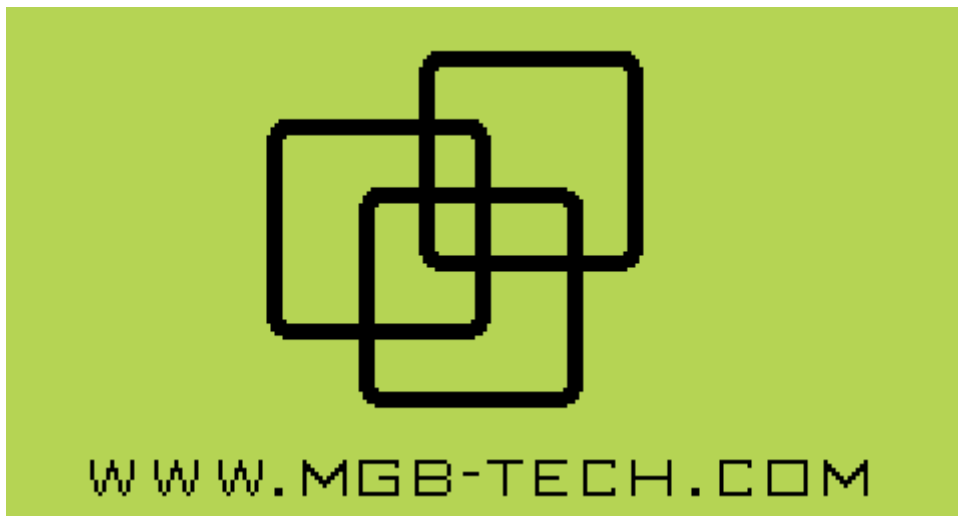


5. Operating

Operating the DepthCalibrator is kept as intuitive as possible. In this chapter we give an overview of all possible screens, identifying all their relevant areas and how they should be used and navigated.

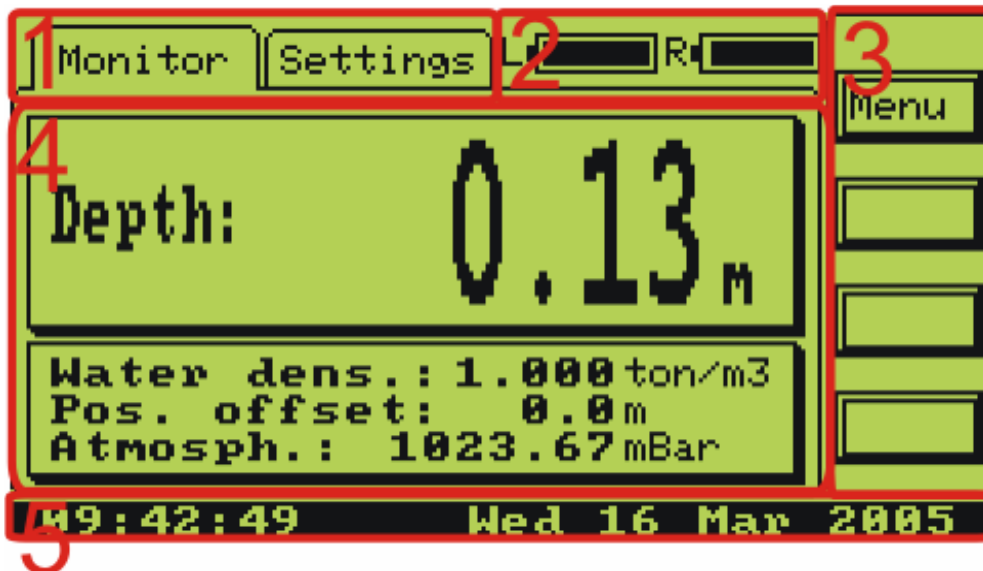
5.1. *Starting up*

5.1.1. Start up screen



On start up, a splash screen with our company logo is shown, this enables the device to perform all start up routine checks and settings.

5.1.2. Screen layout



- 1: page tab area
- 2: status indicator area
- 3: key area
- 4: page contents area
- 5: current time and date area

5.2. Status indicators

There are two status indicators, both are located in the upper right corner. The indicators are preceded with a letter (L and R). The first provides information about the local device, the latter about the remote device.

The following icons are possible:

5.2.1. Battery indicator



Shows the contents of the battery for both the local and remote unit.

When the indicator is nearly empty note that the remaining energy of the battery will drop fast.

5.2.2. Net indicator



Only the local indicator can show this symbol. It simply indicates that the device is connected to a mains supply.

5.2.3. Connection indicator



When shown there is either no connection present or a bad one. Even though both, local and remote can show this symbol it should never or only exceptionally occur at the local side. If it does occur at the local side there is either something wrong with the battery guard processor or the communication cables towards it. Do not try to fix this yourself but turn it in for repair.

For the remote side this isn't an exceptional symbol, although not preferred for proper operation while calibrating. Read the wireless connection chapter for more information.

5.3. Pages and pagetabs

To manage all the contents manageable and intuitive, we have chosen to make use of pages. In the upper left corner two page tabs are shown, monitor and settings. The tabs will indicate in which page you are at the moment.

To switch between the pages use the "Menu" key in the key area.

Note: if you are in the "Settings" page and don't push any key, control and view will be automatically changed to the "Monitor" page, this to assure using the calibrator is possible if a user accidentally enters the "Settings" page, but doesn't know what to do next.

5.4. Context sensitive keys

On the right side of the screen the key area is located. The unit has 4 general purpose keys and one rotary key. The key area indicates what function is bound to each key at every time.

These keys are called context sensitive since they will get different functions depending on the page or mode the user is in.

On the "Monitor" page only calculated data is shown which can't be manipulated by the user directly, that way almost none of the keys have a function in that page. Only the upper key makes it possible to switch between pages since it has the "Menu" function bound to it.

5.5. Monitor page

The monitor page is the default page, it simply shows all calculated data which is from interest while performing calibration tasks. To make a further separation of data the default page is separated into a main area and a smaller sub area.

5.5.1. Main area

This area is the most important during operation and shows the information of main interest, the depth. Since the whole setup is to calculate the depth accurately this data is shown with a larger font to make it easily visible.

Note: In situations where there is no reception or even no connection with the remote unit, a warning “Communication lost!” together with an enlarged connection problem icon will be shown instead of any depth value.

5.5.2. Sub area

Three values are shown into this area with a smaller font. Water density, position offset and atmospheric pressure. Take a look at the settings chapter for more information.

5.6. Setting page

In this page all possible user definable settings can be set. Each subsection will give a brief description of the setting with it’s purpose and how it can be changed.

The first subsection will describe how to navigate between the different settings within this page.



- 1.Current selected setting
- 2.Settings selection area
- 3.Setting content area

5.6.1. Navigation

In the settings page the content sensitive keys have gained the 3 extra functions: UP, DOWN and ENTER, all indicated in the same manner as commonly found on modern keyboard layouts.

With the up and down key a setting can be selected. The settings selection area indicates all the possibilities. The selected setting will be indicated by inverting the text in the selection area and the name will be changed in the name field. Contents in the content field will at all times reflect the selected setting.

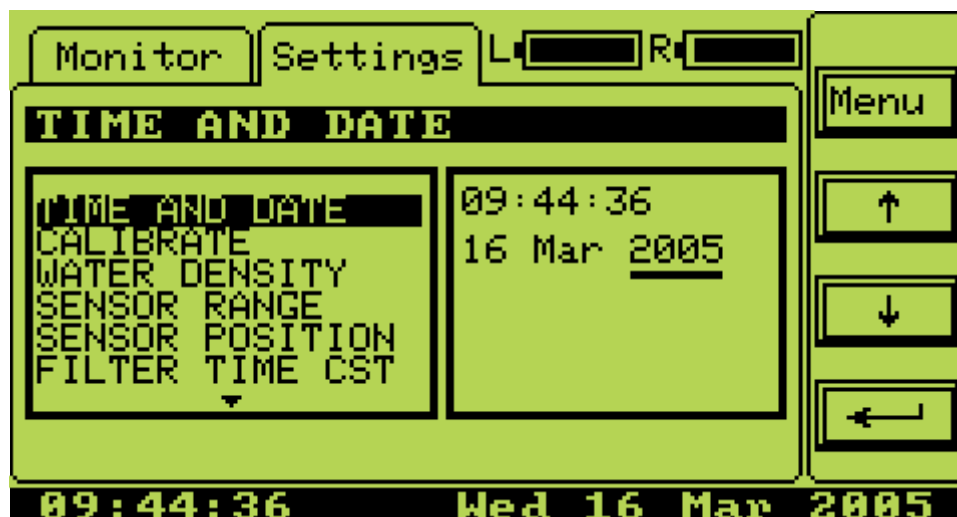
Every setting's values can be changed by rotating the rotary key and are restrained by limits, restricting the user only to insert valid numbers.

In the content area, the field currently in selection mode is indicated by repeatedly underlining it. To enter a setting and possibly change the field the user has to press the enter button.

Tiny arrows on top and bottom of the settings selection area indicate whether user can scroll any further up or down.

Note: always press the enter button when the required value for the setting is reached, only then it will be stored and used. Only allowing changes when enter is pushed will eliminate entries by mistake.

5.6.2. Time and date



Time and date can be set in this area. Changes will have immediate effect. Note that in order to change between the fields the enter button should be pushed.

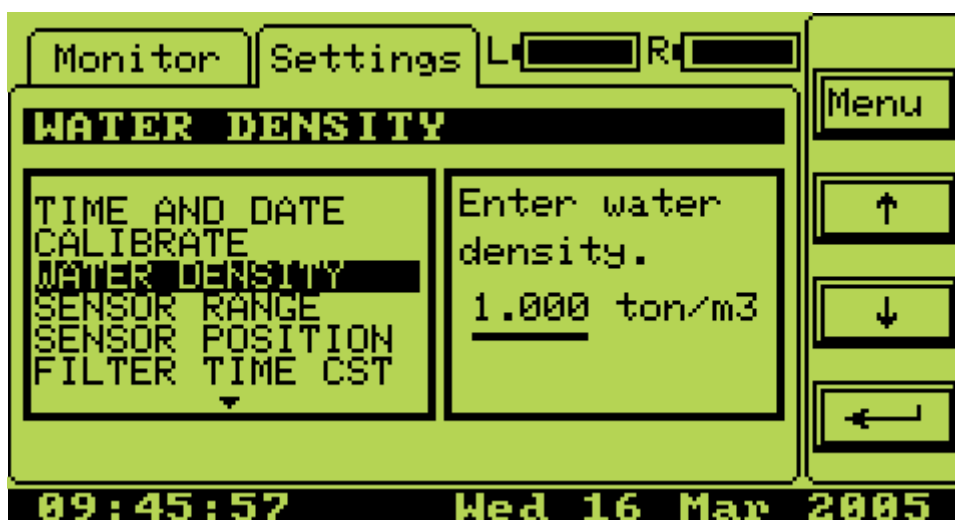
5.6.3. Calibrate



No actually setting can immediately be set in this area. The selection makes it possible for the user to start the calibration wizard. Simply rotate the rotary key until YES is selected and push the enter button.

Information about the calibration wizard can be found in it's respective section.

5.6.4. Water density



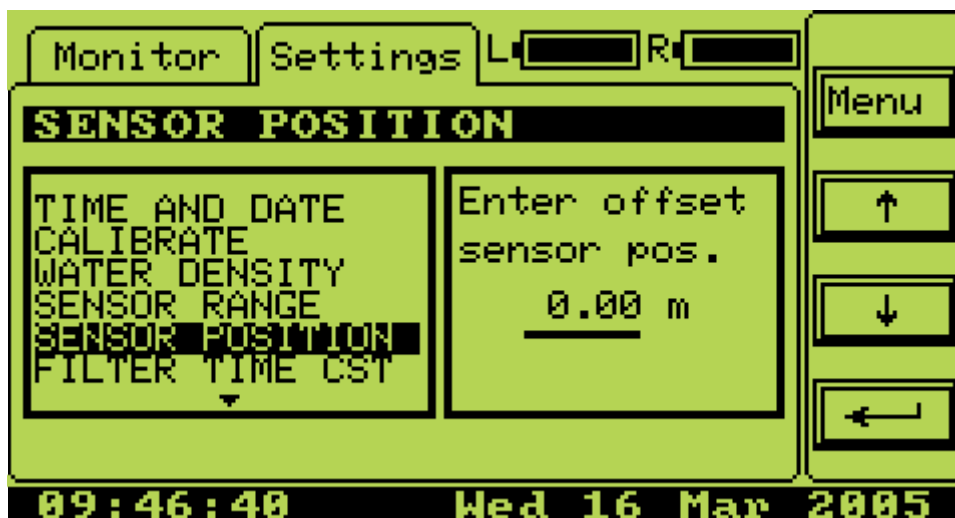
Check the settings section in this manual to find out the purpose of this setting.

5.6.5. Sensor range



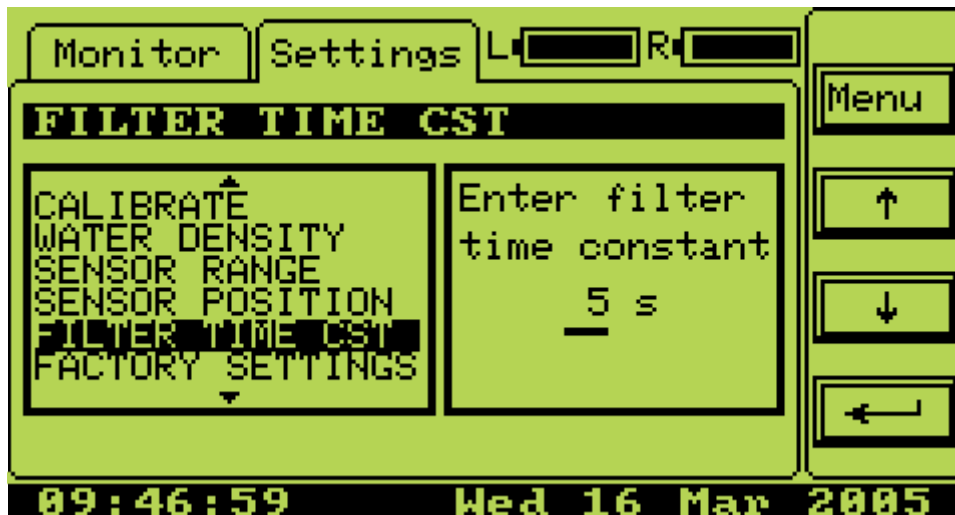
This setting has in the current setup no impact on the calculated depth. Users shouldn't bother about this value, as any will work. As this setting is deprecated this might be removed in future versions..

5.6.6. Sensor position



Check the settings section in this manual to find out the purpose of this setting.

5.6.7. Filter time constant



Data received over the wireless link can be used with different averaging filters, with different depth. User can choose between 3 possibilities. 1s, 5s, 10s.

For example when the 5s filter has been chosen, data received over the wireless link will be averaged over 5 seconds before it's used in the depth calculation.

5.6.8. Factory settings



A simple YES/NO question makes it possible to reset the DepthCalibrator. After pushing the enter button when YES is selected, the DepthCalibrator will be reset as if it just left the factory.

5.6.9. About...



Actually there is no setting in this area, but it allows the user to check which firmware version the DepthCalibrator is using for the moment. When in trouble the user can be asked to check this version.

5.7. Calibration wizard

To make the user interface as intuitive and easy as possible, it has been provided with an easy calibration wizard. A user can enter it through the settings page. When activated the wizard will take the user through a couple of pages, telling him what to do and what is happening.

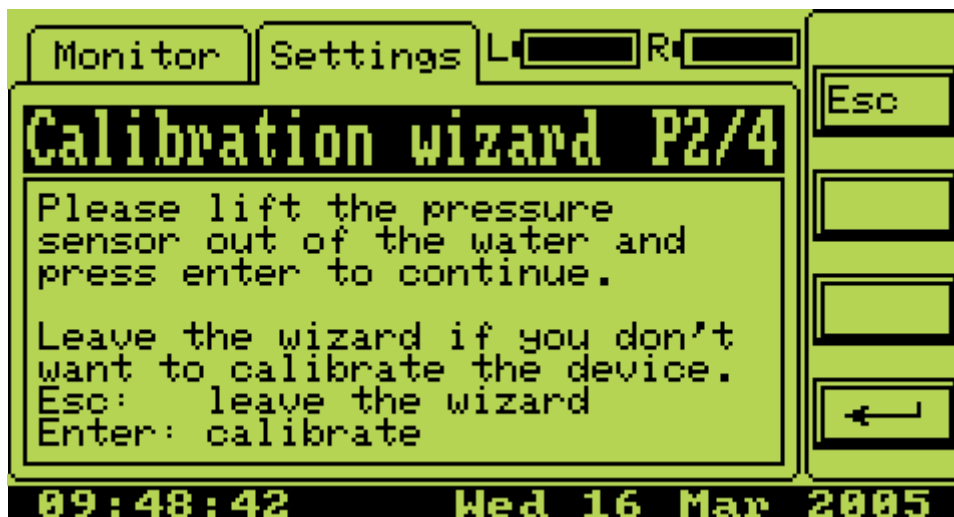
Calibration is the process where the pressure between the water sensor and the atmospheric sensor are equalised. Note that in order to have the best result, the CalibrationUnit should be in the eventual operation place, and the pressure sensor should be lowered just above the water surface, before calibration is started.

5.7.1. Introduction (Page1)



The introduction page gives a short description of what the wizard does, it's main purpose is to give the user the chance to leave again if he entered by mistake.

5.7.2. Explanation (Page2)



To remind the user how calibration is supposed to be done, this page tells the user to make sure the water sensor is out of the water.

5.7.3. Progress (Page3)



Indication of the progress is shown in this page. The normal process takes about 10 seconds to complete.

5.7.4. Result (Page4)



When calibration was successful the collected data is shown to the user. Calibration is to equalize the measured pressure between the water sensor and the atmospheric sensor. The correction value is shown as well. When the difference is too much there must be something wrong, in that case contact the dealer.

5.7.5. Errors



Whenever communication got lost while calibrating the error page will be displayed to the user. This means that there is a bad wireless connection. Check the Wireless connection section to see how troubleshooting can be done.

Note that when the calibration progress takes significantly longer than 10 seconds this indicates already a poor connection.



6. Wireless connection

6.1. *Trouble shooting guidelines*

Following guidelines give a base for troubleshooting whenever a wireless link fails.

6.1.1. Antenna connection

Check whether the antennas on both devices are firmly attached.

6.1.2. Line of sight

Communications functions best when both devices have a clear line of sight. Too many obstacles might prohibit good functioning. Try to reduce the amount of surrounding metal in the communication path.

6.1.3. Short range

When troubleshooting try to startup communication in a as short range as possible. Ideally with both the devices next to each other.

6.1.4. Restart

Shutdown both devices and plug them into their power supply. Restart the devices.

When uncertain whether the devices were charged properly, charge them for an extended period.

6.1.5. Antenna alignment

In case of bad communication, try to align the antennas in the same direction. In example, both vertical.

6.1.6. Interference

The radio connection works on a frequency of 869,525 MHz with a bandwidth of 100kHz. When other devices are working in this frequency area problems might occur. Note: some GSM providers work around this frequency, a cell phone close to the receiver might mess up the connection.



7. Power and charging

The operational unit can operate on mains supply, although the main purpose is to operate it while working on the internal batteries. When connected to the mains supply this will be indicated on the display.

7.1. Led indicator

The power led has following indications:

Off: The unit is off.

On: The unit is on and working.

Blinking: The unit is charging and on when the button has been pressed.

7.2. Charging

The operational unit is smart enough to manage it's own charging.

An internal A/D converter is constantly monitoring the battery state.

When necessary the unit will go into charging mode, up until the batteries are fully charged again. The unit will activate a boost mode automatically when necessary.

7.3. Charge output

Additional this unit incorporates a charging output port. This port outputs a DC voltage whenever the unit is connected to the device. This allows easy charging of the combined equipment. In a normal DepthCalibrator setup the DataAquisitionUnit can be charged by using the accompanying cable.

8. Specifications

- Average charging time: 16 hours
- Average uptime: 10 hours without backlight
- Dimensions: w x h x d: 290 x 160 x 150mm
- Temperature Range: -20 to +60C
- Graphical display with intensity and contrast controls
- Intuitive user interface
- Battery management system
- Charging output: 15VDC
- Input supply: 100-240VAC 50-60Hz
- Input data averaging: (1s, 5s, 10s)
- Frequency : 869,525 MHz
- Bandwidth : 100 kHz