

OHMEX INSTRUMENTS

TideM8 – Miniature Tide Gauge System



THE TIDEM8 PORTABLE TIDE GAUGE

For current specification and warranty terms please visit www.ohmex.com/tidem8.htm

User Guide

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TideM8 System Guide

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General Information

A general introduction to the TideM8 hardware, transducers and cables.

Introduction






The TideM8 Portable Tide Gauge has been designed to provide either an instrument that provides the facilities of a Tide Gauge and data logger for local hydrographic survey work or a fixed installation such as a gauge for use by a harbourmaster in a VTS situation.

When used as a temporary device for isolated surveys, the nearest Tide Gauge may be a permanent device that could be several kilometers from the survey site, interpolating over long distances can lead to large errors in tidal correction, particularly in constrained estuaries and harbours. The TideM8 can be easily deployed and left in remote locations for several days collecting data at user defined intervals or even transmitting the information by radio telemetry.

The TideM8 is also suitable to be used as a permanent gauge at a fixed location such as within a port or river. The device then becomes a flash memory backed device capable of direct connection to a computer system or indirect connection via a radio telemetry to remote users such as dredging contractors.

The TideM8 uses a combination of pressure transducers to measure the height of water as seen. These can be various ranges such as 1 Bar or 2 Bar transducers that are Absolute (unvented) devices. The transducer is a single temperature compensated precision pressure transducer used to measure the head of water seen above the transducer element. The unvented transducer uses the internal Barometer to calculate the current adjustment for barometric pressure. The user should take care not to block the small hole found in the body of the TideM8 which is internally connected to the barometer.

INFO KEY

	Introduction
	Weatherproofing
	Transducer Care
	Barometer vent
	Warranty Disclaimer



Weatherproofing

The TideM8 has been designed to conform to the IP65 waterproofing standard, this benchmark describes equipment which can withstand a light spray of water from a hose for a short period of time. It does not imply the device is suitable for immersion in any depth of water or exposed to prolonged harsh weather conditions. The weatherproofing also assumes the connectors or cover caps are fully screwed on to their rubber sealing rings. The weatherproofing does not apply to certain components which are by definition not designed for outdoor use such as the mains battery charger and D9 serial cable connectors. The front panel of the instrument is designed to rest on a rubber seal leaving a small gap around the edge, there is no need to over-tighten the retaining screws to close this gap as it actually makes sealing less reliable if the panel is stressed in any way. Similarly the connector caps sit on rubber seals and do not need over tightening in order to seal them to water ingress. **THERE ARE NO USER SERVICABLE PARTS WITHIN THE TIDEM8, BREAKING THE ANTI-TAMPER SEALS WILL VOID ANY WARRANTY.**

Protecting Transducers

The pressure transducer cable can be easily damaged by a boat scuffing along the mounting or by being crushed in a collision. Care should be taken in protecting the cable and keeping any surplus cable neatly tied out of the way. There are no user serviceable parts within the transducer and the end cap is there to protect an extremely sensitive stainless steel diaphragm, poking cleaning wires into the end of the transducer **WILL** damage the unit and render it unusable. The only cleaning required is to stand the transducer in an alien solution (e.g. Fresh Water if it has been used in Salt Water or visa versa) for half an hour to kill any organisms such as barnacles that have adhered to the surface.

System Description

A list and description of the components supplied together as parts of the TideM8 system.

Main Components

The TideM8 system includes the following major components

- The System Box






- Serial Data cable



- Interconnection Cable



- A pressure Transducer element and cable

INFO KEY	
	Main Components
	Typical Configuration
	Optional Components

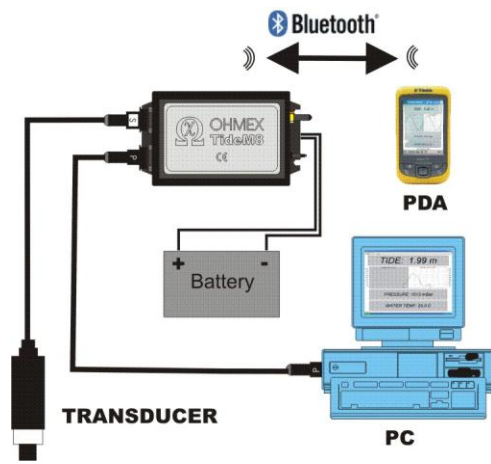


- Mains/Battery power adaptor



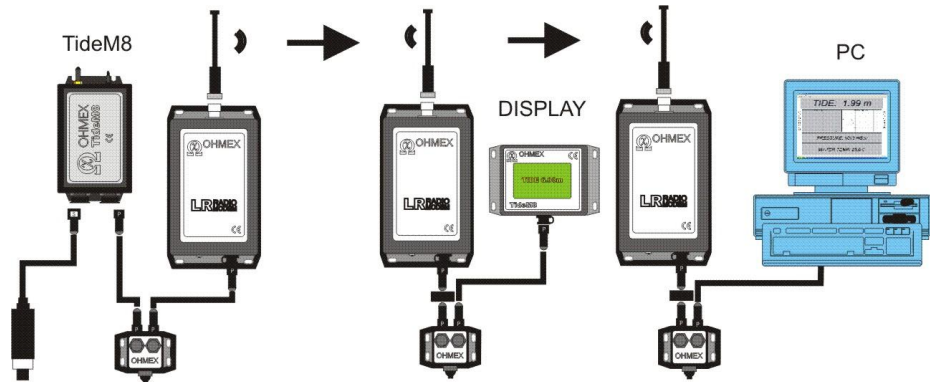
Typical System Configuration

The basic TideM8 does not require any more components than the basic system box + power + transducer to function. Additional leads and Bluetooth are provided to allow the user to configure the local installation.



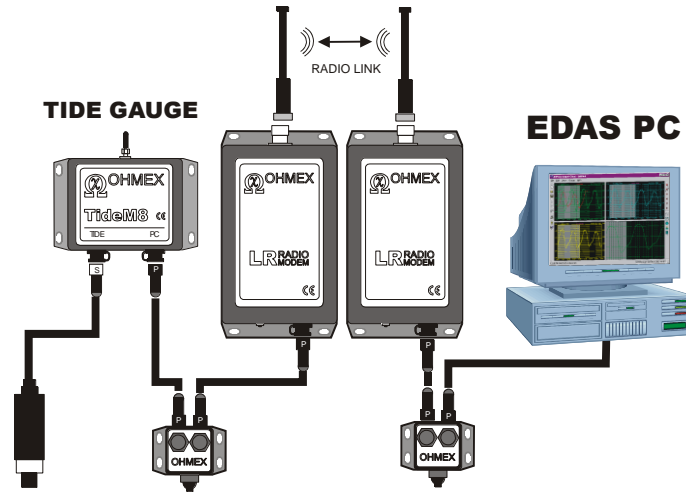
TYPICAL PC/PDA SYSTEM

In the next example the user requires to see the current Tide value at a remote location using a simple LCD display device...



TYPICAL RADIO MODEM TO LCD SYSTEM

In the next example the user requires to see the current Tide information and save/process the raw data using the EDAS software on a remote PC, the system shown uses radio modems to transmit the data ...






TYPICAL RADIO MODEM TO PC SYSTEM

Optional Components

In addition to the previously listed core components the following is a list of major component options that may be supplied as part of your system or available as an update from your distributor ...

- ◆ Radio modem data link. - The TideM8 can be used with a short or long-range radio modem link.
- ◆ Remote LCD display - The TideM8 can be used with an LCD display connected directly or remotely as a simple display device.
- ◆ EDAS Server software - Software for the data to be processed and collated with other sensor data and quality controlled before saving into a standard database for subsequent retrieval.
- ◆ EDAS Client software - Software for the distribution of data over a clients computer network system to provide a working VTS system.
- ◆ Weather Station – The PB100 weather sensor can be added to the input data of the EDAS data collection system.
- ◆ Solar Battery Pack – For data logging applications in remote sites

INFO KEY

-  Preparation for Use
 -  Transducer Mounting
 -  Set Transducer to LAT
-

Installation & Use

A description of the steps to install a TideM8 and illustration of its typical field use.

This chapter describes how the TideM8 Portable Tide Gauge would normally be installed and used. There are two typical ways in which the device can be used for hydrographic surveying applications, either as a record only tide gauge or as a record and transmit gauge connected via a serial cable to a PC or telemetry unit.

Preparing the Instrument

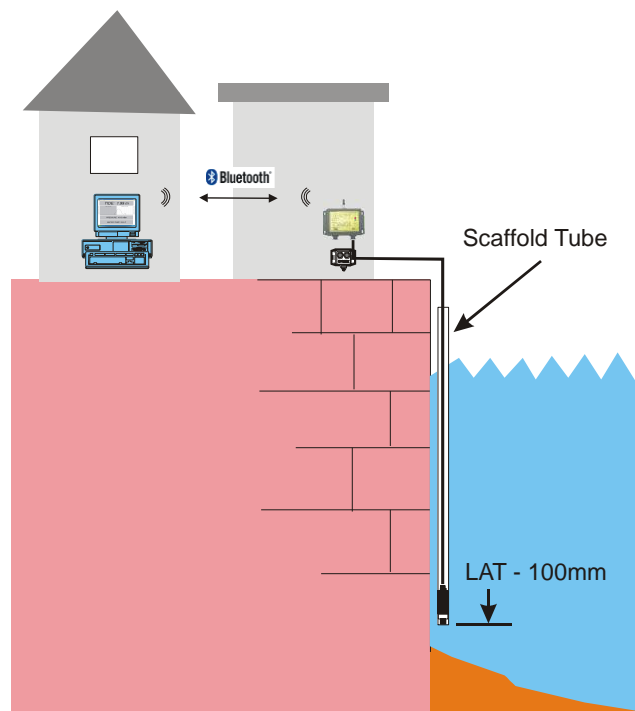
Before the instrument is used in the field the user should go through the following check list

- Has any data on the instrument been downloaded
- Has the internal memory been cleared
- Is the internal date and time correct
- Is internal data logging enabled
- Has the correct water density been set
- Has the correct tide datum offset been entered
- Are the output formats set correctly
- Has the output/storage timing been set

Before the survey is started the transducer should be connected and the 'Density' and 'Offset' functions adjusted until the front panel displays the correct Reduced Level value. To ensure that the device is functioning the transducer should be raised and lowered to known elevations and the new values checked. Minor errors in range should be adjusted by altering the 'Density' setting on the front panel as below.

Transducer Mounting

The TideM8 system uses a sealed pressure transducer and cable assembly, the recommended method of mounting this transducer is within a galvanized steel tube such as scaffolding standard.







TYPICAL INSTALLATION

The transducer should normally be suspended in the tube to the LAT level (lowest astronomic tide value) or slightly below. A cable clip will suffice to mark the transducer cable position and retain the transducer at the correct depth. The steel mounting tube should either be regularly perforated or 'butt jointed' to prevent excessive level 'stilling'.

Terminal Settings

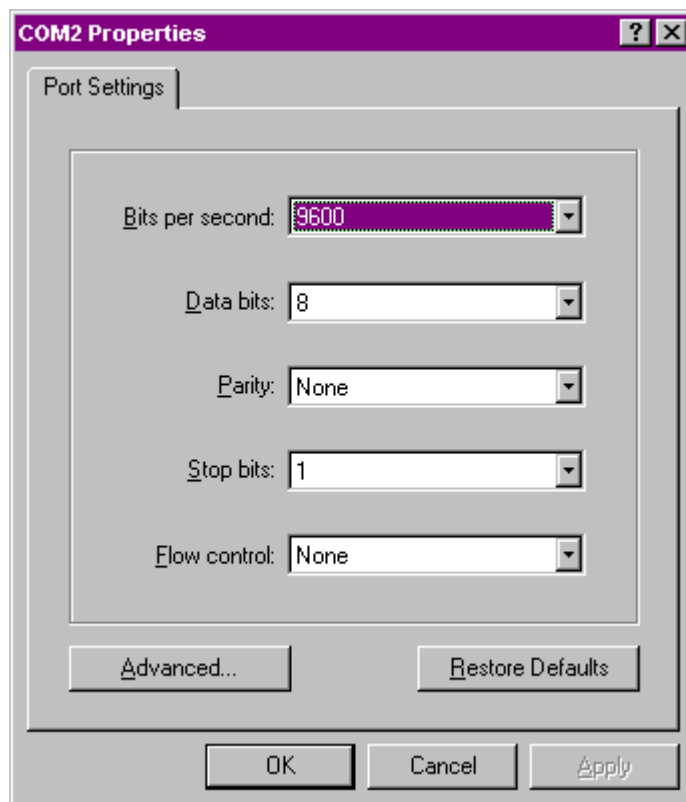
The TideM8 instrument has been designed to connect to a PC running a terminal program so users can make system settings and download the internal data. The illustration shown here is the popular 'Hyperterminal' program supplied with the various Windows operating systems.

INFO KEY

-  Comm Settings
-  ASCII setup
-  No Flow control
-  No local echo

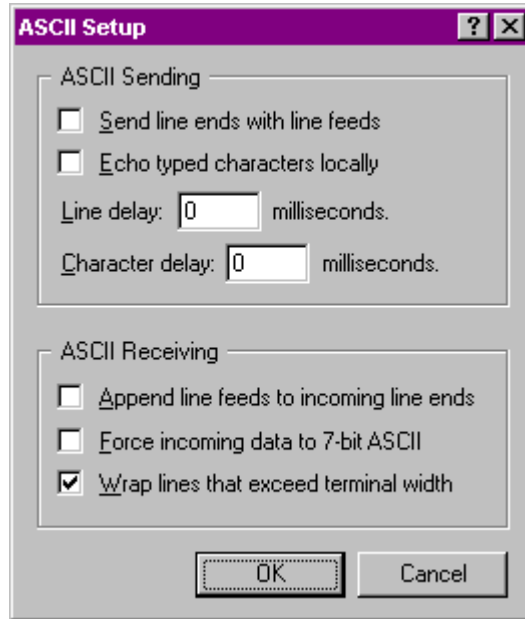
Communications Setup

To access the operating program of the TideM8 the user needs to connect a PC to the instrument using the SERIAL DATA CABLE provided. The terminal program settings need to be as follows ...







ASCII Terminal Settings

The operating system of the TideM8 recognizes commands as being delimited by a <cr> not a <cr/lf> pair, so the following settings should also be checked ..



INFO KEY

-  Inside TideM8 box
-  Main Components
-  Warranty waiver
-  Changing Clock battery

System Box

A description of the components that can be seen within the TideM8 system box.



THERE ARE NO USER SERVICABLE PARTS WITHIN THE TIDEM8, BREAKING THE ANTI-TAMPER SEALS WILL VOID ANY WARRANTY

System Clock Battery

Above the PC serial connector will be found the system clock backup battery, this will last for about 5 years but should it need changing this should only be done by a technician as the circuitry is very sensitive to static electricity. Replacement battery is type CR1632 or similar 3v clock battery cell.

INFO KEY

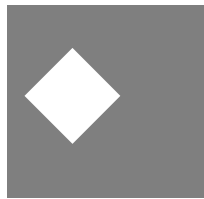
📁 Sensor Calibration

🖨 Connection Diagrams

📖 Setting Commands

Technical Appendix

New Sensor Calibration



A detail description of the method used to calibrate a new tide gauge pressure sensor.

Calibration

The TideM8 is a **METRIC** device, linearly calibrated for head of fresh water (density of 1000gm/ltr), the normal user calibration is to apply a numeric offset for elevation. There are several sources of error in the water density calibration ...

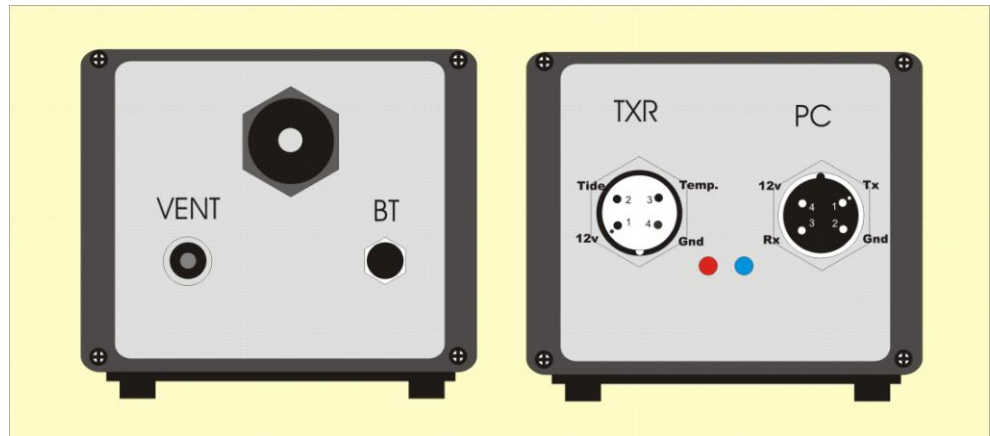
- Water Temperature
- Water Salinity
- Water Turbidity

Considering the TideM8 is normally used for survey applications (top half of the tidal cycle) the errors generated by the above parameters were deemed to be small so a general 'Density' adjustment function has been provided. To compensate for this the user can vary the internal density value by using the front panel setting described later in this manual. The normal density ranges encountered are 1000 gm/ltr in warm fresh water to 1035 gm/ltr in cold saline water.

To avoid confusion and possible error in the data collected the TideM8 is only available in a METRIC form, all adjustments and offsets are similarly metric. If the user requires IMPERIAL data this has to be preformed by conversion using post-processing software.

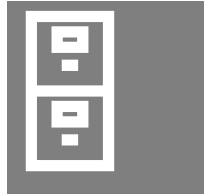


Connection Diagrams



Key

+ve = 10 to 30vDC
-ve = Gnd = (0vDC)
VCC = 9vDC
Tide = 0 to 5vDC
W.Temp = 2.5-3.5vDC
Rx = RS232 Receive
Tx = RS232 Transmit



Serial Data Commands

The TideM8 system can be setup using single control characters sent over the Serial or Bluetooth ports.

The TideM8 can be setup using a simple terminal program such as Hyperterminal. The term ^C is interpreted as pressing the 'C' key while holding down the 'Ctrl' shift key, also referred to as 'Control C'. The user is warned that some single commands such as (^E)rase and (^Z)ero are dangerous as they do not confirm before they execute (and erase the complete recorded memory or recalibrate the sensor).

(^C)lear clock & memory

Reset system clock to a start date in 2007, clear all clock alarms and flags to enable the clock values to be updated, the command will also reset the internal property settings to their default values.

(^E)rase

Erase all recorded data stored in system flash memory, data is stored in fixed size sequential records, on reboot the processor winds through memory to find the first available slot to start appending data records. This command resets and clears the flash memory using internal block delete commands. Erasing is a **DANGEROUS** command as it is irreversible and erased data is permanently deleted.

(^U)pload

This command is used internally by the PC software to send the 'Property' settings to the processor flash memory area.

(^D)ownload

This command is used internally by the PC software to receive the 'Property' settings so they can be adjusted using the dialog box in the PC/PDA software.

(^R)eplay

This command is used in conjunction with a terminal program to replay and capture the entire data set stored in the TideM8 flash memory area ...

```
^R
12/7/7 7:50:47,1.83,0.02,1017,56.8,f
12/7/7 8:0:47,1.83,0.02,1017,56.8,0
12/7/7 8:10:47,1.83,0.02,1017,56.8,0
12/7/7 8:20:47,1.83,0.02,1017,56.8,0
12/7/7 8:30:47,1.83,0.02,1017,56.8,0
12/7/7 8:40:47,1.83,0.02,1017,56.8,0
12/7/7 8:50:47,1.83,0.02,1017,56.8,0
12/7/7 9:0:47,1.83,0.02,1017,56.8,0
12/7/7 9:10:47,1.83,0.02,1017,56.8,0
12/7/7 9:20:47,1.83,0.02,1016,56.8,0
12/7/7 9:30:47,1.83,0.02,1016,56.8,0
12/7/7 9:40:47,1.83,0.02,1016,56.8,0
12/7/7 9:50:47,1.83,0.02,1017,56.8,0
```

(^S)how data

Similar to the Replay command the Show command will replay the last 288 records (2 Days at 10 minute interval). This command is also used by the TM8 software to load the data shown in the 2 day time history graph.

(^V)ersion

Output version and copyright information of the TideM8 firmware.

```
^V
TideM8 v1.31 (c)2007 L.M.Technical Services Ltd
```

(^N)ow

Output current time and date with number of records currently held in memory.

```
0.01 1028 25.7 1020 9
^N
25 8 7 11 17 13 : 96 records
0 1029 25.7 1020 9
```

(^M)ode reset

Set to mode 1 (standard) for use by TM8 software

(^Z)ero transducer offset

This command is used to reset the internal settings of the tide and barometer pressure settings. This command is **DANGEROUS** and can loose all current settings and calibration. When this command is used the transducer should be connected and OUT OF WATER, the firmware then reads the internal pressure sensor values and stores these as the base calibration of the current sensor at Zero water pressure and current barometric pressure.



Output formats

The TideM8 system can be set to output the following data formats either as on-line data or replayed from internal memory.

STANDARD 'TideM8 FORMAT

Format Description

The TideM8 output is a simple ASCII output of 6 parameters separated by a single space character.

t.tt bbbb ww dddd vv<cr><lf>

Element description

The following describes the elements above ...

tt	The tide value in meters
bb	The barometer in millibars
ww	The water temperature in centigrade
dd	The relative density (1000 is fresh water)
vv	The internal power voltage

VYNER FORMAT

The Vyner output is designed to emulate the format used by gauges manufactured by the late David.J.Vyner. Being a pioneer in the electronic tide gauge meant that his format is the most commonly encountered format used by many existing gauge and software installations. The addition of this format gives users of the TideM8 a large degree of flexibility in installation. To set the output from the front panel set the required port number to '5' (e.g. **PORT 1 = 5**)

Format Description

Each line in the output file represents a single data element and consists of the following elements output in ASCII format...

;nnnn<cr><lf> or :nnnn<cr><lf>

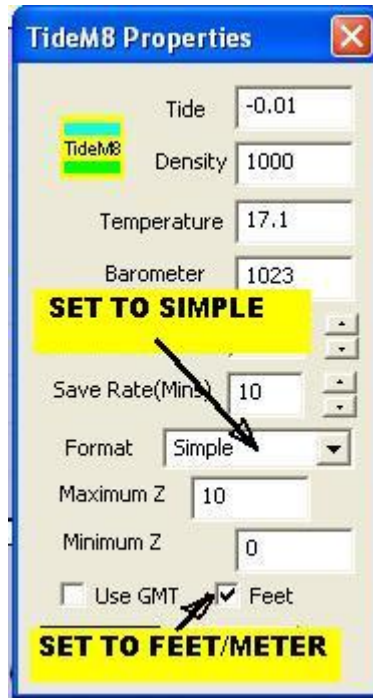
Element description

The following describes the elements above ...

;	The data is negative
:	The data is positive
nnnn	The tide height in centimeters

SIMPLE FORMAT

The Simple output is a single decimal ASCII number output as meters or feet as defined in the configuration software.



Format Description Each line in the output file represents a single tide data value and consists of the following elements output in ASCII format...

10.99 f<cr><lf>
Or
3.35 m<cr><lf>

LCD FORMAT

The LCD output is a single decimal ASCII number output as 32 characters for simple 2 line x 16 character LCD display devices.

Format Description Each line in the output file represents a single line of data formatted as 32 characters to display in a simple LCD display.

TIDE: -0.01 m 1031 mBar 26.4 C<cr><lf>
TIDE: -0.01 m 1031 mBar 26.6 C<cr><lf>
TIDE: 0 m 1030 mBar 26.2 C<cr><lf>
TIDE: 0 m 1030 mBar 25.7 C<cr><lf>
TIDE: 0 m 1030 mBar 26.1 C<cr><lf>
TIDE: 0 m 1030 mBar 26.4 C<cr><lf>
TIDE: 0 m 1030 mBar 26 C<cr><lf>
TIDE: -0.01 m 1031 mBar 26 C<cr><lf>
TIDE: -0.01 m 1031 mBar 26.2 C<cr><lf>

REPLAY FORMAT

The TideM8 system is set to output the following data format either as on-line data or replayed from internal memory.

Format Description Each line in the output file represents a single data element and consists of the following elements output in ASCII format...

`d/m/y h:mi:se,tt,rr,bb,ww,ff<cr/lf>`

Element description The following describes the elements above ...

- tt** The tide value in meters
- bb** The barometer in millibars
- ww** The water temperature in centigrade
- rr** The maximum range (TTmax-TTmin).
- ff** The internal flag settings
- d/m/y** The date
- h:mi:se** The time

Example Data

```

12/7/7 7:50:47,1.83,0.02,1017,56.8,f
12/7/7 8:0:47,1.83,0.02,1017,56.8,0
12/7/7 8:10:47,1.83,0.02,1017,56.8,0
12/7/7 8:20:47,1.83,0.02,1017,56.8,0
12/7/7 8:30:47,1.83,0.02,1017,56.8,0
12/7/7 8:40:47,1.83,0.02,1017,56.8,0
12/7/7 8:50:47,1.83,0.02,1017,56.8,0
    
```



Technical Specifications

A general overview of the technical specification for the TideM8 Portable Tide Gauge hardware, transducers and cables.

- TRANSDUCER RANGE - 1 Bar (2 Bar option)
- DEPTH RANGE – 0.00 to 10.30m (0.00 to 20.50m option)
- BAROMETER – Internal absolute +/- 0.5mbar
- WATER TEMPERATURE (on sensor) - +/- 1 degree Celsius
- DEPTH ACCURACY - +/-0.013m (RMS)
- MEASUREMENT FREQUENCY - 2Hz
- EXTERNAL LCD DISPLAY – 2 x 16 Character reflective green LCD
- POWER CONSUMPTION - 5ma to 10ma (Duty cycle dependent)
- EXTERNAL POWER – 10 to 30vDC
- INTERNAL MEMORY – 16Mb (10 Years at 10 Minute readings)
- DATA OUTPUT – LCD, Direct RS232, radio telemetry, Bluetooth
- DATA FORMAT – TideM8, LCD, Simple ASCII, Vynr
- OPERATING TEMPERATURE - 0 to 45 degree Centigrade
- OVERALL DIMENSIONS WITH ANTENA (mm) - 140w x 140h x 35d
- WEIGHT – 1.0Kg