VALEPORT LIMITED

GPRS Telemetry

Operating Manual

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1 INTRODUCTION

The Valeport GPRS telemetry module is designed to interface with any Valeport instrument with an RS232 connection; it will monitor real time data transmitted from the instrument and relay the data onto an ftp site via a GPRS connection.

The unit internally buffers data from the connected instrument and uploads on a user defined schedule. For example it can hold over 700 records from a TideMaster tide gauge before uploading data. This buffering allows for extended battery life.

The unit always requires a sufficient GPRS carrier signal to successfully transfer the data.

The units are supplied pre-configured with a pay as you go SIM from World SIM (http://www.worldsim.com/travel-essentials/sim-cards/data-sim-card) which is pre-loaded with £20 of credit.

2 INSTALLATION

2.1 TELEMETRY UNIT

The telemetry unit should be fixed above the water line, away from dripping water. There are four fixing holes through the corner of the housing for permanent attachment to a surface.

The unit should be positioned close enough to the connected instrument to ensure that the comms cable is not under any tension when fitted. If an external 9-28 vDC power supply is available, connect using the cable supplied.

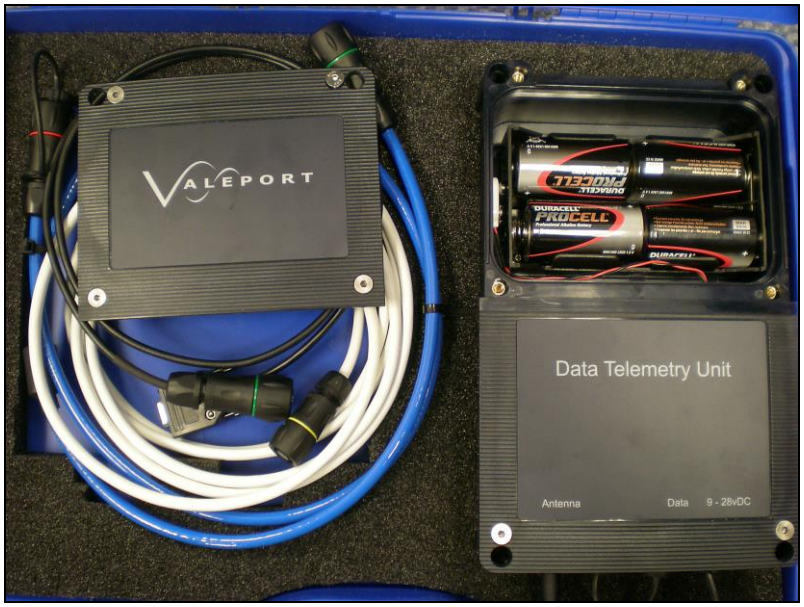
The unit is supplied with a stub GSM/GPRS aerial. If this does not provide sufficient signal strength, it can be removed and an external aerial with a attached in place.

2.2 BATTERY REPLACEMENT

The telemetry unit is fitted with 4 C-Cell batteries. These are intended as backup in the event of external power failure or for short term installations.

Access to the battery compartment is via the upper lid secured by 4 Hex (3mm) screws. Before accessing the batteries compartment, any water should be dried from the outside of the unit.

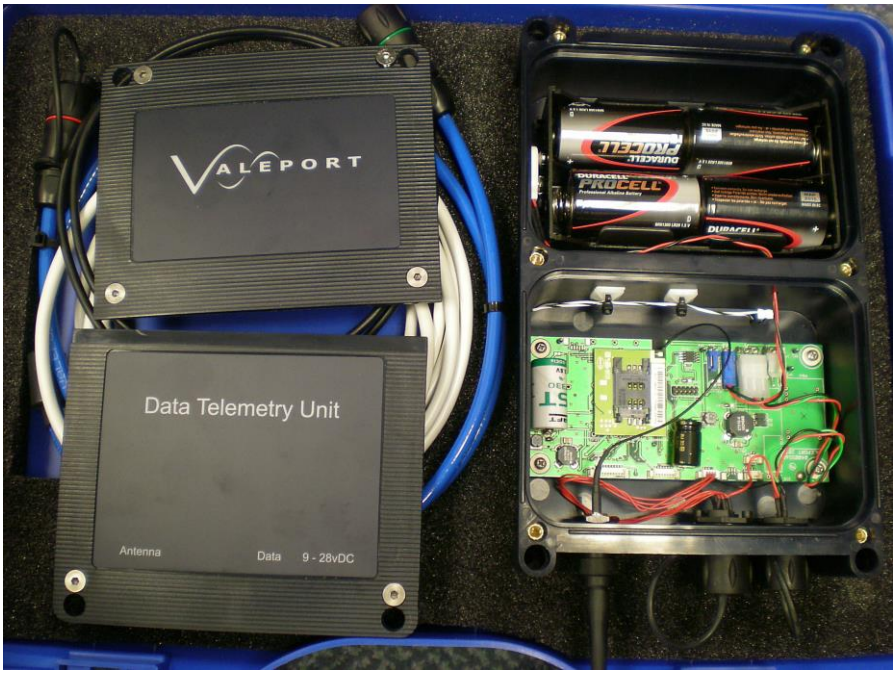
Carefully loosen the screws (they are fitted with a retainer) and remove the upper lid.



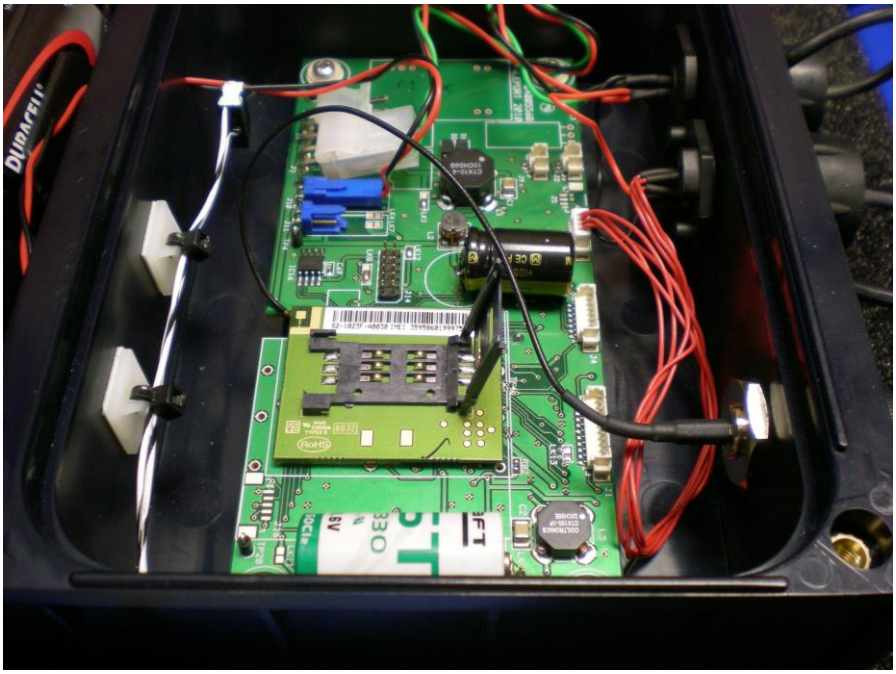
Replace batteries taking care to follow orientation markings. Inspect O-ring on lid for damage and lightly smear with Silicon grease if necessary. Replace Lid and tighten screws.

2.3 SIM CARD INSTALLATION

To change the SIM card, remove the battery compartment lid as in section 2.2. Loosen the bottom two Hex (3mm) screws and carefully remove the lower compartment lid.



The SIM card installs in the SIM card tray to the left hand side of the board.



To install the SIM; slide the holder down, it should release and flip upright. Install the SIM taking care of orientation, push the holder down and slide up to secure.

Inspect O-ring on lids for damage/debris and smear with a light coating of Silicon grease if necessary. Replace lids and tighten screws.

3 SETUP AND CONFIGURATION

To configure the GPRS telemetry module to work successfully there are a number of parameters that need to be entered into the unit.

3.1 INTERUPTING THE UNIT:

Open HyperTerminal and create a new connection named gprs.ht.
Set the properties of HyperTerminal to the following:

Comm port properties – Settings - Windows keys

Backspace key sends	Ctrl + H
Emulation	ANSI
Telnet terminal Id	ANSI
Backscroll buffer lines	500

ASCII set up - Sending

Check the box labelled	
	Send line ends with line feed
Line delay	0
Character delay	0

Receiving

Check the boxes labelled	
	Wrap lines exceeding terminal width

Configuration

Bits	115200
data Bits	8
Parity	none
Stop bits	1
Flow control	none

The unit can only be interrupted at power on by holding down the ! key. To do this:

Open the GPRS.ht connection in hyperterminal (check the right com port is selected)
Hold down the ! key (exclamation symbol, ascii code: 33)
Apply power to the module (remove batteries if on external power)

When successfully connect the module should return a command prompt. The unit can then be interrogated or configured using the following codes.

3.2 CONFIGURING THE UNIT

The module is configured using a series of ! codes. The units are pre-configured for use with a pay as you go SIM and to upload to the Valeport FTP test site.

NB The Valeport FTP site is intended purely for testing purposes and any data uploaded may be deleted at any time.

The tables below shows the ! codes required to configure the sampling pattern, GPRS connectivity and FTP site details. The required GPRS settings should be obtained from the SIM card provider and the FTP login details from the FTP site provider.

Code	Followed By	Operation	Example
General Codes:			
!010	;Station_ID	Sets station ID (1-255)	!010;1
!011	<CR>	Reads Station ID	!011
!017	;DD;MM;CC;YY;hh;mm;ss<CR>	Set Real Time clock, where: DD = day MM = Month CC = century YY = year hh = hour (24h) mm = minute ss = second	!017;16;06;20;10;16;30;33
!018	<CR>	Read Real Time Clock	!018
!032	<CR>	Reads firmware version	!032
!034	<CR>	Read Serial Number	!034

The GPRS buffer is capable of holding 65,000 bytes of data. For a TideMaster the standard output string is 48 bytes in length, so the GPRS unit is capable of buffering ~1350 records before they will start to overwrite.

Uploads can be set to a minimum of 1 reading per upload but there will be power and cost implications to this approach if running at higher sampling rates . The GPRS connection/upload process can take several minutes to complete and during this period no data will be logged from the instrument.

Data/Instrument Settings			
!020	;no_of_records,<CR>	Set number of records to buffer before upload	!020;10
!021	<CR>	Reads number of records to buffer before upload	!021
!025	;0 or 1<CR>	Add timestamp to data	!025;1
!059	;baud<CR>	Set PC/Instrument baud rate	!059;115200

GPRS access setting will need to be obtained from the SIM provider. The units will be shipped pre-configured with World SIM settings but if the sim is changed then these settings will need to be updated. The settings for worldSIM cards are:

APN: mobiledata
Username: leave blank
Password: leave blank

GPRS settings:			
!042	;Username<CR>	Set APN username	!042;
!043	<CR>	Read APN username	!043
!044	;password<CR>	Set APN password	!044;
!045	<CR>	Read APN password	!045
!048	;address<CR>	Set APN name	!048;mobiledata
!049	<CR>	Read APN name	!049

The GPRS units are pre-configured to upload a Valeport FTP test site. This is only to prove connectivity and should not be used for data storage as data stored may be deleted without warning.

Once the GPRS and FTP settings have been completed, it is possible to test connectivity using the !904 command. This will access the GPRS network using the settings provided and upload a small data file to the FTP site defined.

FTP settings:			
!050	;address<CR>	Set FTP site name	!050;63.135.101.55
!051	<CR>	Read FTP site name	!051
!038	;pathname<CR>	Set FTP site folder path	!038;test
!039	<CR>	Read FTP site folder path	!039
!054	;username<CR>	Set FTP site username	!054;valeporttst
!055	<CR>	Read FTP site username	!055
!056	;password<CR>	Set FTP site password	!056;tr0pelav-00
!057	<CR>	Read FTP site password	!057
!904	nn<CR>	Perform FTP upload test with nn minute delay.	!904;nn
!028	<CR>	Sets module into run mode	!028

Once the parameters have been set as required, the module will need to be set into run mode. This can be done with the !028 code or a power cycle.

An LED on the lower right corner of the board will illuminate when the unit is receiving or transmitting data.

4 OPERATION:

4.1 DATA UPLOAD

Once the unit is successfully configured it can be attached to the instrument. It will relay any transmissions made by the instrument. The unit can be set to immediately upload data or buffer a number of data transmissions and upload in a batch. The storage on the GPRS board is 65535 bytes and is a circular buffer. If data is not uploaded before the memory is full then it will start overwriting data from the start.

As an example:

NMEA string from the Tidemaster: ~85 bytes
65535 / 85 = ~770 records

Assuming TideMaster operating on 6 minute cycle
240 records per day
20400 bytes per day
3.2 days to fill buffer

Assuming TideMaster operating on 1 minute cycle
1440 records per day
122400 bytes per day
0.53 days to fill buffer

4.2 VALEPORT TEST FTP SITE

Site Address:	63.135.101.55
Site Folder:	test
User Name:	valeporttst
Password:	tr0pelav-00

The telemetry unit is preconfigured to upload data to this FTP site. Data can be viewed and downloaded from the site using an FTP client such as Filezilla (http://filezilla-project.org/download.php)

NB The Valeport FTP site is intended purely for testing purposes and any data uploaded may be deleted at any time.

4.3 DATA FORMAT

The data files uploaded to the FTP server will be ASCII format containing the data as transmitted by the instrument. The file name will be constructed from the ID number of the telemetry unit followed by the time/date of data collection.

Data Filename is created from:
station ID,
date (CCYYMM)
time (HHMMSS)
file type(DATA),

e.g. for station no 1 on 15th June 2010 @16:25:08

ID01_20100615_162508_DATA.dat

Refer to the user manual for the attached instrument for details of the data structure of the transmitted data.

In addition to the data file, the telemetry unit will also upload a battery voltage report on every upload interval. The voltage info Filename is created from:

station ID
date (CCYYMM)
time (HHMMSS)
file type(SUPPLY)

e.g. for station no 1 on 15th June 2010 @16:25:08

ID01_20100615_162508_SUPPLY.dat

The data structure within the battery file is as follows

StationID identifier	ID
Separator	:
Station ID	01
Separator	,
DATE stamp	ddmmyyyy
Separator	,
TIME stamp	hhmmss
Separator	,
Voltage identifier	Vin
Separator	,
Input voltage	vv.vv
Separator	,
RTC voltage identifier	Vrtc
Separator	,
RTC voltage	vv.vv
Terminating characters	<cr><lf>

e.g.

ID:01,04012000,162500,Vin,12.22,Vrtc, 0.33

4.4 POWER CONSUMPTION

The unit can be powered with an external 9-28 vDC supply or internal batteries. The external supply will be used over the internal supply

Current consumption and battery life of the unit is dependent on the frequency of data transmission and upload.

Sleep Current:	350 μA @ 12vDC / 700 μA @ 6vDC
On Current:	9 mA @12vDC / 18 mA @ 6vDC
Transmit Current:	50-250 mA @ 12vDC / 100-500 mA @ 6vDC Variable according to signal strength ~30-60s to transmit data dependent on network + data volume

4.4.1 INTERNAL BATTERIES

The telemetry unit is fitted with 4 Alkaline D-Cell batteries to provide back-up power during long term deployments or power for short term deployments. Use of lithium cells will extend these lifetimes.

The unit is wired by default to also supply power to the connected instrument.

NB: all battery calculation figures are estimated, and may vary according to deployment temperature and the inherent battery variability.
Valeport accepts no liability for the failure of a battery to last for the expected lifetime

Internal battery Capacity is 13,000mAH @ 6vDC(based on 75% efficiency)

Based on 6 min data cycles with TideMaster, transmitting data every cycle

8s @ 18mA for data capture
30s @ 500mA for data transmission
5m22s @ 700 μA sleep

Average current consumption = 44 mA @ 6 vDC
Average TideMaster consumption = 1.3 mA @ 6vDC
Lifetime of internal batteries would be ~11 days.

Based on 6 min data cycles with TideMaster, transmitting data every hour (10 cycles)

80s @ 9mA for data capture
60s @ 250mA for data transmission
57m40s @ 350 μA sleep

Average current consumption = 4.7 mA @ 6 vDC
Average Tidemaster consumption = 1.3 mA @ 6vDC

Lifetime of internal batteries would be ~90 days.