TideStation Portable
Operating Manual

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1. Safety

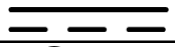
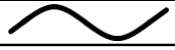
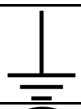
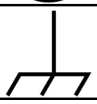
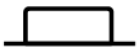
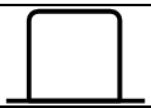
Throughout this manual there are specific and general safety notices.

The following notices must be viewed with particular consideration.

	• In order to comply with FCC and IC RF exposure compliance requirements, maximum antenna gain is 14 dBi and a separation distance of at least 1 meter must be maintained between the antenna of this device and all persons. The device must not be co-located or operating in conjunction with any other antenna or transmitter. • The TideStation contains a Lead Acid battery that can be charged using Solar PV or DC voltage inputs. All sources of power should be disconnected from the TideStation before opening the enclosure. - See specific safety notices for Lead Acid Batteries - Lead Acid Battery Safety Statement. • Only ever use rechargeable Lead Acid Batteries in the TideStation. • The enclosure should be locked when in operation to prevent unauthorised access. There is a risk of electric shock. • The Vitron Energy Solar Charge Controller Cautionary Warnings are found in Victron section of the manual Important Safety Instructions. • The Scannex ip.Buffer, if fitted, Cautionary Warnings are found in Scannex section of the manual GPRS Safety Precautions
	The TideStation Portable is heavy at 25kg (without accessories in the enclosure) and when ever transporting it care must be taken. It is marked with a 'Heavy' label. The three carrying handles of the TideStation Portable have been tested to 90kg load that is more than 3x the operational weight: Always ensure safety footwear is warn when handling the TideStation Portable. A single person should not lift the TideStation above waist height. The TideStation, when operational, should be laid down, on a flat surface with the lid upwards. For further information on safe lifting at work please see: http://www.hse.gov.uk/pubns/indg143.pdf Recommendations may vary from region to region.

- The safety of any system incorporating the TideStation is the responsibility of the assembler of the system.
- If the TideStation is used in a manner not specified by the manufacturer, the protection provided by the equipment might be impaired.

1.1. Graphical Symbols for Use on Equipment

Number	Symbol	Reference	Description
1		IEC 60417-5031 (2002-10)	Direct Current
2		IEC 60417-5032 (2002-10)	Alternating current
3		IEC 60417-5033 (2002-10)	Both direct and alternating current
4		IEC 60417-5032-1 (2002-10)	Three-phase alternating current
5		IEC 60417-5017 (2006-08)	Earth (ground) Terminal
6		IEC 60417-5019 (2006-08)	Protective conductor terminal
7		IEC 60417-5020 (2002-10)	Frame chassis terminal
8			Not used
9		IEC 60417-5007 (2009-02)	On (power)
10		IEC 60417-5008 (2009-02)	Off (power)
11		IEC 60417-5172 (2003-02)	Equipment protected throughout by Double Insulation or Reinforced Insulation
12		IEC 60417-6042	Caution, possibility of electric shock
13		IEC 60417-5041 (2002-10)	Caution hot surface
14		ISO 7000-0434B (2004-01)	Caution
15		IEC 60417-5268 (2002-10)	In position of a bi-stable push control
16		IEC 60417-5269 (2002-10)	Out position of a bi-stable push control
17		ISO 361	Ionising Radiation

2. Introduction

2.1. Description

The TideStation is a self-contained Tidal Observation solution packaged to optimise performance, be flexible in its configuration and simple to install and maintain.

TideStation has TideMaster at its core - Valeport's industry leading Tide Gauge system. Offering Pressure, Radar and hybrid tidal observation techniques coupled with interfaces to other meteorological and 3rd party systems. All data can be recorded locally and broadcast to a central command and control point as required.

Within the TideStation enclosure you will find all required ancillary infrastructure to maintain power to the Tide and Met equipment interfaced and your chosen telemetry system whether it be radio or GSM based.

2.2. TideStation Portable Features

There are 2 standard TideStation Portable variants

0741022-GPRS IP67 Transportable, wheeled hard case 25kg	Internal frame Power loom and Solar PV charging wiring for: • single port Scannex ip.buffer and antenna • 24Ah rechargeable lead acid battery • TideMaster tide gauge and associated sensor (vented pressure sensor or VRS20 Radar level sensor)
0741022-UHF IP67 Transportable, wheeled hard case 25kg	Internal frame Power loom and Solar PV charging wiring for: • a selectable frequency (403 - 470MHz) UHF transmitter • 24Ah rechargeable lead acid battery • TideMaster tide gauge and associated sensor (vented pressure sensor or VRS20 Radar level sensor)

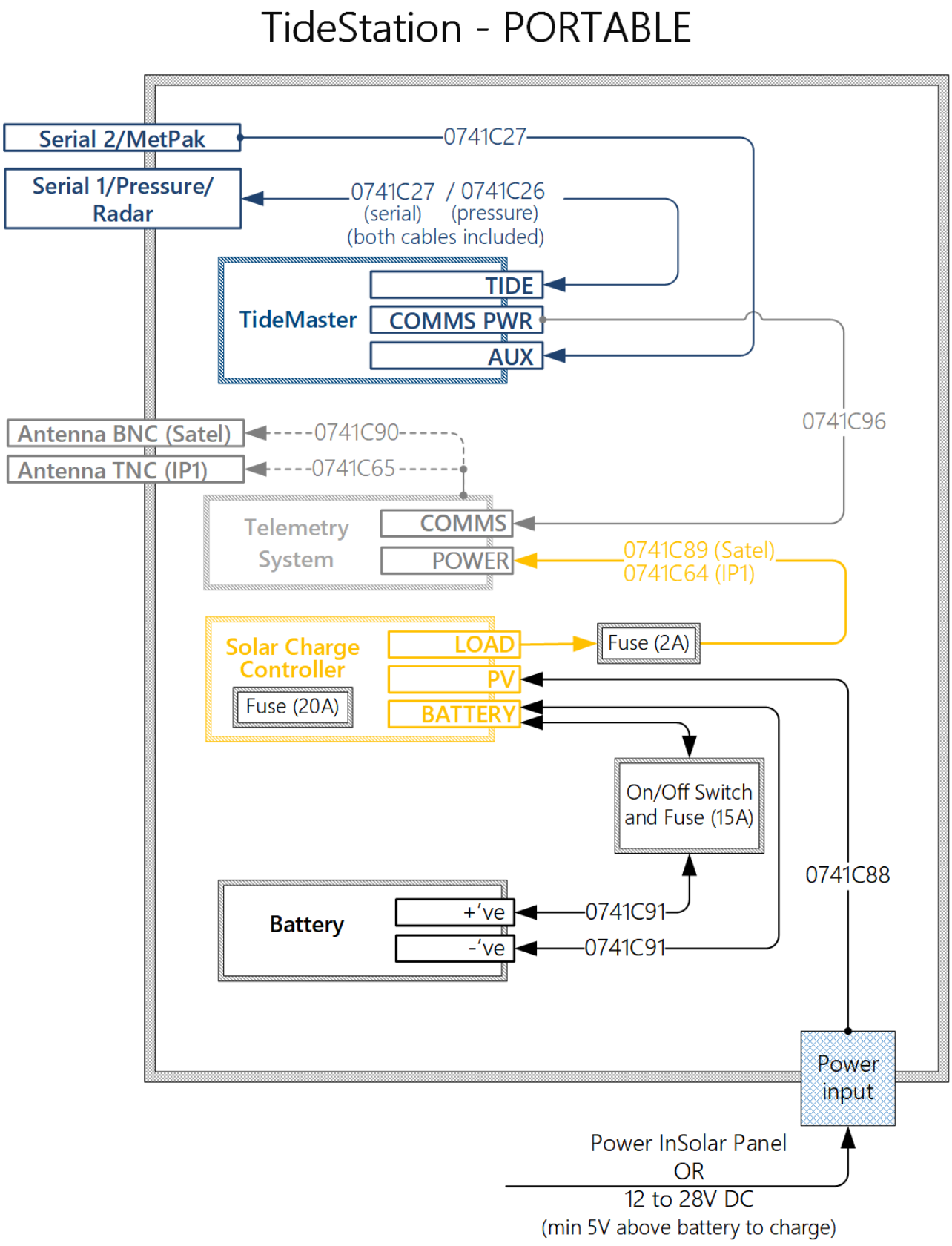
The unit as described above (0741022-GPRS\UHF) does not include a TideMaster, sensors, telemetry equipment, battery or solar panels which should be ordered separately

2.2.1. Enclosure

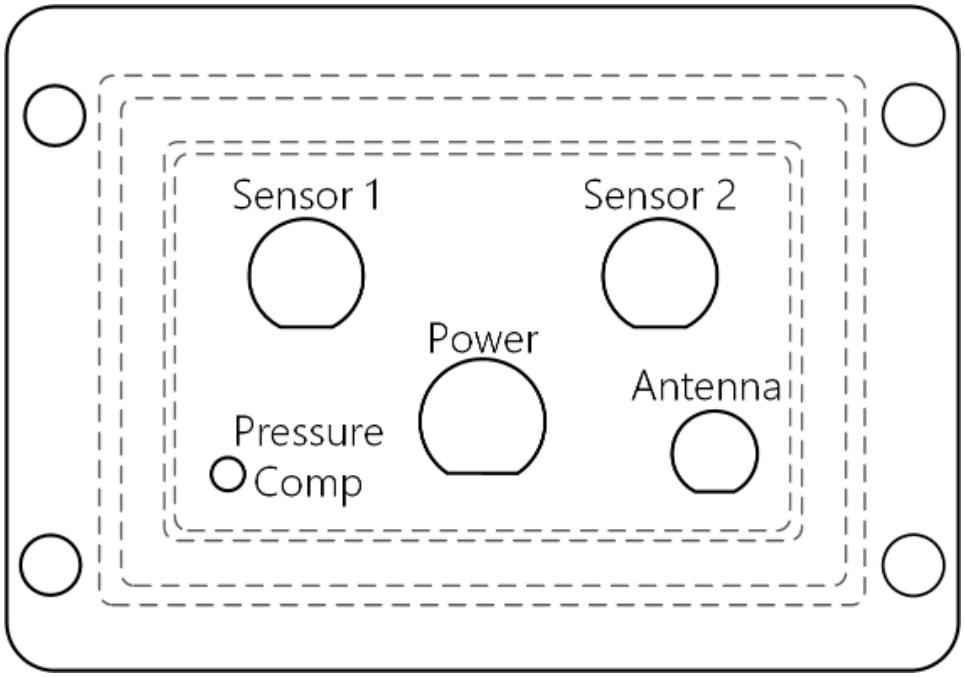
- Adapted Peli 1560 - transportable hard case which has a retractable extension handle and strong polyurethane wheels.
  - 560 x 455 x 265 mm
  - Corrosion-proof, Crush-proof, IP67
- Power:
  - 12 - 28 V DC input
  - Lead Acid battery module (24Ah)
    - 12V regulator (for solar charging)
- Fittings for:
  - TideMaster
  - Telemetry Options
    UHF or GPRS (ipBuffer - single port)
- Pressure relief valve

2.2.1.1. TideStation Enclosure - External Dimensions

2.2.2. TideStation Portable Schematics



2.2.2.1. TideStation Portable External Connectors



2.3. Sensor Specifications

Pressure Transducer Option

Type:	Vented strain gauge with stainless steel mounting bracket
Range:	Standard 10dBar (~10m), with 20m cable Other ranges and lengths available
Accuracy:	±0.1% of full scale.

Radar Level Sensor Option (see VRS-20 data sheet for full details)

Minimum Range:	0.8 m
Maximum Range:	20 m
Beam Angle:	±6°
Frequency:	25 GHz
Accuracy:	±10 mm
Precision:	1 mm

Weather Sensor Options

WindSonic Ultrasonic Anemometer

Wind Speed:	0-60m/s
Wind Direction:	0-359°
Calibration:	Held within sensor.
Dimensions:	142mm x 160mm.

METPak II TM Weather Station

Wind Speed:	0-60m/s
Wind Direction:	0-359°
Air Temperature:	-35°C to +70°C
Relative Humidity:	0 – 100% RH
Barometric Press:	600 – 1100 hPa/mbar
Dew Point:	As per temperature range
Calibration:	Held within sensor.
Dimensions:	142mm x 274mm.

To interface other sensor packages please contact Valeport for details

2.4. EU Declaration of Conformity - CE Marking

2.4.1. Radio Equipment Directive 2014/53/EU

Radio Equipment Directive 2014/53/EU	Standards
Safety & Health (Article 3.1a)	EN 60950-1:2006+A2:2013 EN 61010-1:2010 EN 62311:2008 EN 62479:2010
EMC (Article 3.1b)	EN 301 489-1 V2.1.1 EN 301 489-5 V2.1.1 EN 301 489-17 V3.1.1 EN 301 489-52 V1.1.0 EN 61326-1-2013 (Basic and Industrial Level)
Radio Spectrum (Article 3.2)	EN 300 113 V2.2.1 EN 300 328 V2.1.1 EN 301 511 V12.5.1 EN 301 908-1 V11.1.1 EN 301 908-2 V11.1.1

2.4.1.1. Approved Antennae

Antenna name	Manufacturer	Comment	Gain
CELLBASE2	Badland	(GSM) PENTABAND END FED DIPOLE	3dbi
FUC3	Radio Structures	Colinear Omni-directional	3dB

2.4.2. Environmental

- RoHS Compliance

RoHS Directive 2011/65/EU	Standards
Prevention (Article 4.1)	BS EN 50581:2012

- WEEE Compliance
  End of Life Disposal Instructions (WEEE)
  For disposal instructions see https://www.valeport.co.uk/Portals/0/Docs/Valeport-B2B-Compliance.PDF

2.4.3. Export Control

- UK
  - ECO Classification NLR (No License Required)

2.4.4. CE Certificate

EU Declaration of Conformity

CE Marking

Manufacturer:	Valeport Ltd
Address:	St Peter's Quay, Totnes, Devon, TQ9 5EW
Certification marking:	CE
Product Description:	TideStation Permanent

We the manufacturer declare that the product **TideStation Permanent**, is in conformity with the following EU Directives and harmonised standard(s):

Radio Equipment Directive 2014/53/EU	**Standards**
Safety & Health (Article 3.1a)	EN 60950-1:2006+A2:2013 EN 61010-1:2010 EN 62311:2008 EN 62479:2010
EMC (Article 3.1b)	EN 301 489-1 V2.1.1 EN 301 489-5 V2.1.1 EN 301 489-17 V3.1.1 EN 301 489-52 V1.1.0 EN 61326-1-2013 (Basic and Industrial Level)
Radio Spectrum (Article 3.2)	EN 300 113 V2.2.1 EN 300 328 V2.1.1 EN 301 511 V12.5.1 EN 301 908-1 V11.1.1 EN 301 908-2 V11.1.1

RoHS Directive 2011/65/EU	**Standards**
Prevention (Article 4.1)	BS EN 50581:2012

Name:	
Position:	
Place of issue:	Valeport Ltd, Totnes, UK
Date of issue:	20th April 2018
Signature:	

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VAT No: GB 165 8753 67 Registered in England No: 1950444

2.4.4.1. Approved Antenna

Approved antenna

Antenna name	Manufacturer	Comment	Gain
CELLBASE2	Badland	(GSM) PENTABAND END FED DIPOLE	3dbi
FUC3	Radio Structures	Colinear Omni-directional	3dB

Valeport Limited, St. Peter's Quay, Totnes, Devon, TQ9 5EW UK
Tel: +44 (0)1803 869292 Fax: +44 (0)1803 869293
E-mail: sales@valeport.co.uk Web: www.valeport.co.uk

VAT No: GB 165 8753 67 Registered in England No: 1950444

3. Operation

The TideStation should always be stored with the Battery Isolation switch in the OFF position and the TideMaster turned off.

During the installation the battery isolation switch should be OFF and it is strongly recommended that the battery is not installed until the TideStation is fixed in its final location.

If a telemetry system is to be operated with the TideStation the antenna should be fitted before power is applied, if a radio is powered up without an antenna, damage may result.

Once the battery is installed, see section Battery Installation, for instructions on how to set the system to work.

3.1. Setting Up

3.1.1. TideMaster

See Operating Manual - 0741822nn TideMaster Operating Manual for full details on how to set up and operate the TideMaster.

3.1.2. VRS20 Radar Level Sensor

See Operating Manual 0745813 - VRS20 Radar Level Gauge Operating Manual for full details on how to set up and operate the VRS20 level gauge.

3.1.3. Scannex IP-Buffer

Please refer to the specific Scannex manual for the model installed in your TideStation for detailed operational instructions.

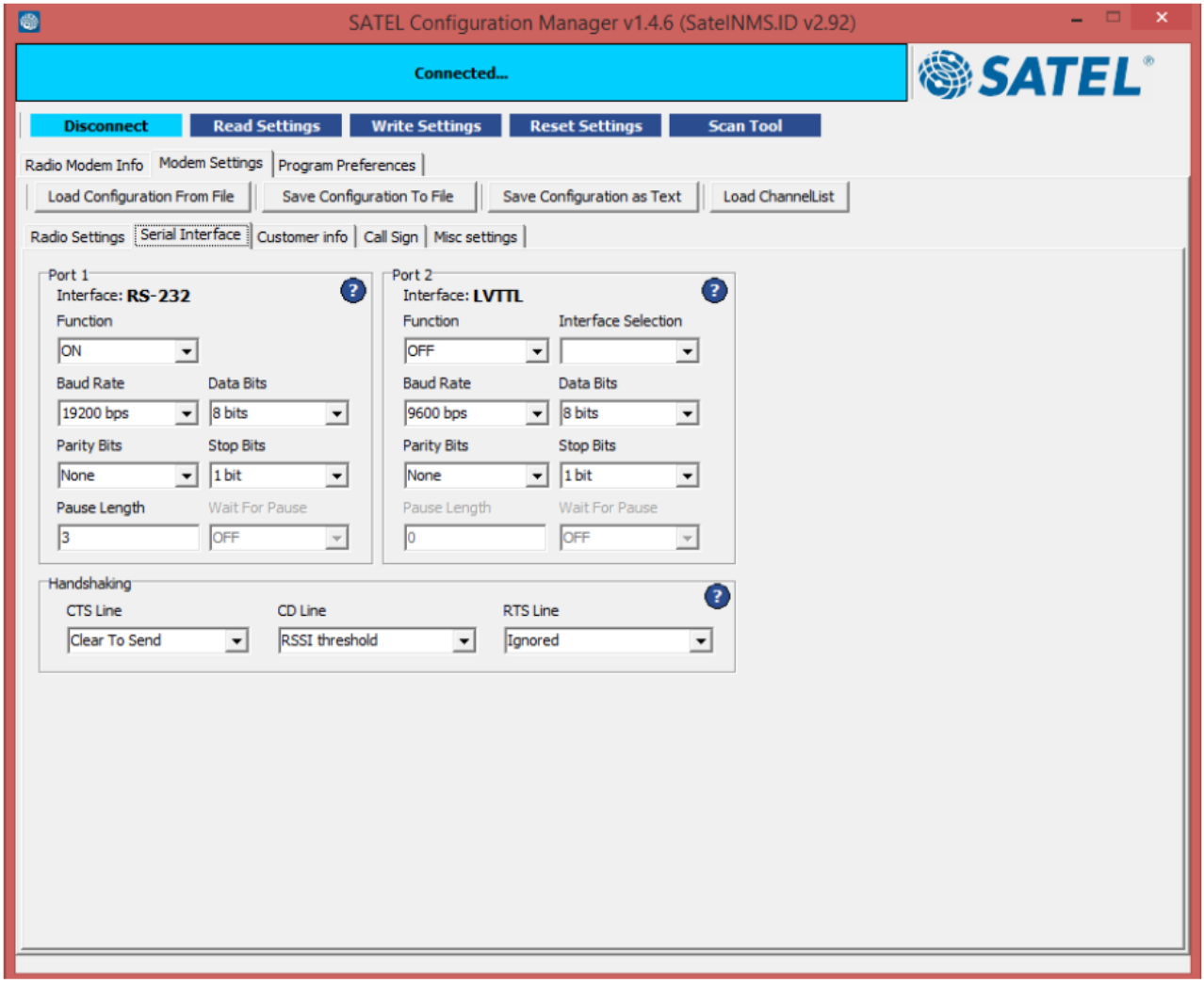
Please contact Valeport Support for assistance with configuration and operation of a Scannex ip.Buffer
support@valeport.co.uk

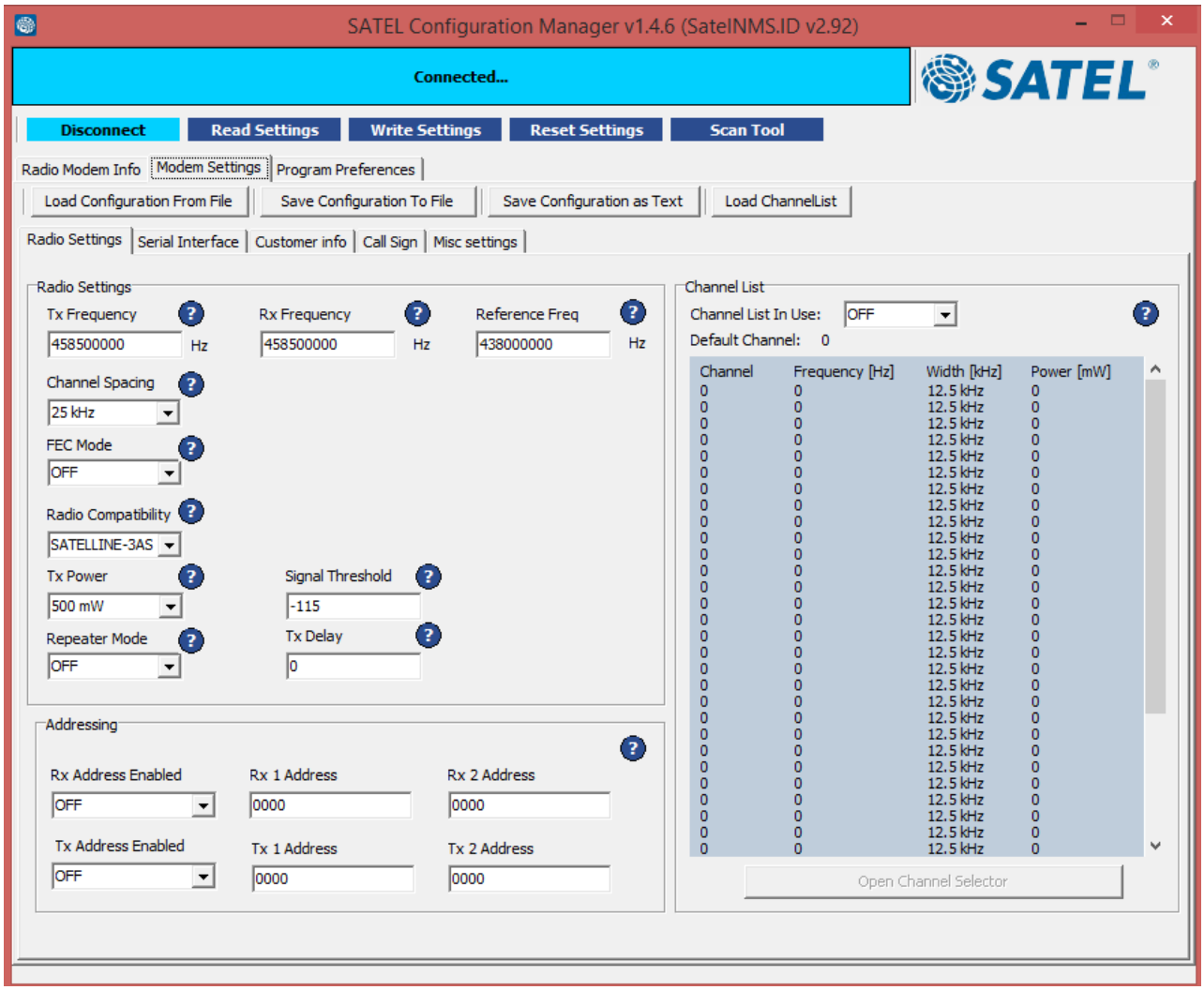
3.1.4. Satel UHF Radio

Please refer to the specific Satel manual for the model installed in your TideStation for detailed setup instructions.

Also see Valeport Manual - 0741836 UHF Telemetry Manual for further details on operation of the Satel Radio with TideMaster.

Using the provided configuration software from Satel ensure the setup is as follows (unless you have specifically been instructed to configure the radio differently).





In the UK the maximum permitted transmit power is 500mW
Please ensure that all national and local regulations are strictly adhered to

3.1.5. Powering the TideStation

A 38Ah battery is fitted as standard in the TideStation Permanent where as a 24Ah battery is fitted to the Portable variant. The lead acid battery is normally sourced locally to reduce shipping weight and costs.

The TideStations have been designed to work with an external Solar PV Panel (min 55W) with an internal solar regulator charging a lead acid battery.

> The DC input should not be connected directly to a DC distribution network without adequate surge protection.

The Battery Isolation switch, as its name implies, isolates the battery but does not switch the TideStation off. If a power source is still available and the Battery Isolation switch is OFF power will still be available to the TideMaster and Telemetry systems in the TideStation.

> As the TideStation contains a large battery and can be used with solar PV panels it should be locked when in operation to prevent unauthorised access.

The Battery Isolation switch must be switched ON for the battery to be charged.

The Battery Isolation switch module contains a 15A fuse in both the Permanent and Portable systems

There is a 5A fuse in TideStation Junction Box

There is a 20A fuse in Victron Solar Controller

3.1.5.1. Battery Installation

1. Disconnect any external supply
2. Set the battery isolation switch to OFF (0)
3. Ensure the TideMaster is switched OFF
4. Fit the battery and ensure it is fully secured with the clamp plate
5. Fit and torque the plain nuts to 2Nm (TideStation Permanent)
6. Fit and torque the dome nuts to 8Nm (TideStation Permanent)
7. Fit the battery cables
8. Fit the battery terminal cover plate

3.1.5.2. Lead Acid Battery Safety Statement

Installation

Can be installed and operated in any orientation except permanently inverted.

Handles/Weight

Lead Acid batteries can be heavy. They must not be suspended by their handles (where fitted).
Always be aware of safe lifting practices when transporting.

Vent valves

Each cell is fitted with a low pressure release valve to allow gasses to escape and then reseal.

Gas release and Fire

- VRLA Batteries emit hydrogen gas which is highly flammable and will form explosive mixtures in air from approx 4% to 76%. This can be ignited by a spark at any voltage, naked flames or other sources of ignition.
- Batteries in use will be part of an electrical circuit and must be isolated from the power source before attempting to put out a fire. Switch the power OFF before disconnecting the batteries from the power source.
- Damaged batteries may expose negative plates (grey) colour, which may ignite if allowed to dry out. These plates may be wetted down with water after the battery has been removed from all electrical circuits.
- Suitable Extinguisher types: CO2; Foam; Dry Powder.
- Unsuitable Extinguisher types: Water extinguishers must never be used to put out an electrical fire.
- Hazardous decomposition products: Carbon monoxide, Sulphur Dioxide, Sulphur Trioxide, lead fume and vapour, toxic fumes from decomposition of battery case materials.
- Special protective equipment for fire fighters: Full face visor or safety goggles; respiratory protective equipment or self-contained breathing apparatus; full acid resistant protective clothing must be worn in fire fighting conditions.

Temperature

Stable operation is achieved within the operational temperature range -20 to +50 °C.
Do not charge VLRA Batteries above + 50 ºC, discharge or store above + 60 ºC.

Recycling

VRLA batteries must be recycled at the end of life in accordance with local and national laws and regulations

Battery Acid

The Hazard

Batteries contain Sulphuric Acid which may leak for various reasons. Also acid may be given off as droplets and/or spray/mist during recharge.
Sulphuric Acid is a corrosive and poisonous liquid which will cause burns and irritation to the skin and eyes and could severely damage clothing.
Refer to Health & Safety Executive Guidance Note EH40 for the latest occupational exposure limits for acid mist in air.

Precautions

- Always handle batteries with care
- Never overfill with acid
- Always store upright
- Never allow children access to a battery
- Always charge in a well ventilated area
- Never allow battery vents to become blocked
- Always wear eye protection
- Always wear protective clothing

Accident or Emergency Action and Treatment

Skin contact –
Immediately soak the affected area with copious amounts of clean water, remove any contaminated clothing and seek medical attention if irritation persists.
Eye contact –
Immediately irrigate eyes for at least 10 minutes with clean water, seek medical attention.
Ingestion –
Immediately drink as much water as possible – do NOT induce vomiting, seek urgent medical attention.
Spillages –
For small spillages wash away with large quantities of water. For larger volumes dispose of in suitable acid resistant containers, clearly labeled.

Electrical Energy

The Hazard

Accidental short circuit of battery terminals by a conductive object, such as a metal tool or item of jewelery etc. may generate sufficient heat to cause severe burns, create arcing or cause any metal to melt and splash.

Precautions

Always remove metal objects from hands, wrists & neck e.g. rings, bracelets, watches & necklaces.

- Switch off all electrical loads
- Refer to manufacturer's handbook
- Make the first disconnection and the last reconnection the earth point as far from the battery as possible

Always take great care to avoid shorting the live terminal to earth.
Never place tools or metal objects near to or on top of a battery.
Accident or Emergency Action and Treatment

Burns

Apply a dry sterile dressing and seek medical treatment.

Electric shock

Approach person with care. If the individual is clear of the conductor then, with caution, switch off equipment or break the current. If the individual is still attached to the conductor do not touch with bare hands. If possible use a suitable insulating material e.g. wood, rubber, plastic or rolled paper, to detach the conductor from the victim. If necessary, summon assistance then give artificial respiration until it arrives.

Emission of Gases

The Hazard

Hydrogen gas emitted during charging is explosive at concentration levels above 4%. Hydrogen & oxygen gases are both evolved during battery recharging. These gases may also be emitted at other times, for example, if the battery is moved or shaken.

Precautions

- Always charge in a well ventilated area
- Always ensure the charging leads are correctly fitted
- Always ensure the PV array is disconnected first, before disconnecting the charging leads
- Always use eye protection and protective clothing
- Always wait at least 5 minutes after ceasing recharge before disconnection
- Always take care to ensure that cables and connections are handled in a way that avoids accidental sparking
- Static electricity can provide an ignition source for hydrogen gas within a battery. Static charge can build up on an open circuit battery if, for instance, it has been rubbed against man-made fibres. Where possible minimise static build up and always wear protective clothing when handling batteries

Never smoke near a battery
Never allow naked flames near a battery
Never create sparks near a battery

Accident or Emergency Action and Treatment

Seek medical advice as appropriate to injury.
In an explosion acid will have been sprayed and ejected and plastic & metal parts may have caused severe lacerations.

Weight

The Hazard

Batteries are awkward and heavy to handle resulting in possible strains to the human body as well as potential for dropping the battery, with resultant acid spillage, injury etc.

Precautions

Always use correct lifting procedures to minimise strain to the human body.
Always use lifting handle or lifting ledges if available on the battery.

Accident or Emergency Action and Treatment

Seek medical advice as appropriate to the injury. Remember that acid may have been spilled.

Repairing of Damaged Batteries

No attempt should ever be made to renovate or repair a damaged battery.

Disposal of Batteries & Associated Waste

All spent batteries and waste arising from spillages and fires must be disposed of in conformance with the Environmental Protection Act, the Special Waste Regulations 1996 and the Environmental Protection (Duty of Care) Regulations 1991.
Yuasa offer a complete battery disposal service.
For further information please contact us at:
Tel: +44 (0) 1793 833555
Email: enquiries@yuasaeurope.com

REACH Regulation (EC) No 1907/2006
Registration, Evaluation, Authorisation and Restriction of Chemicals Industry is required by REACH to evaluate and manage the risks posed by chemicals, and to provide safety information to product users.
Information on up-to-date additions to the Substances of Very High Concern (SVHC) Candidate List is available from the ECHA (European Chemicals Agency) web site: www.echa.europa.eu

4. Data

The TideStation can be configured to use a number of Telemetry methods. The file format of the data transmitted will be as the TideMaster is configured.

4.1. Logged Data (Pressure Tide & Met)

Firmware version:	0741709nn
File Creation Date:	23/01/2018 14:27:23
Battery Level:	5.7
TideMaster S/N:	3
Station ID:	01
Site info:	Valeport test site!
Calibrated:	18/07/2012
Mode:	B1
Pressure units:	m
output format:	TIDEMASTER
User Pressure cal:	
Gain:	1.234000
Offset:	1.000000
Vale Pressure cal:	
P0:	-4.353197e-10
P1:	0.003194
P2:	-1.795884
Wind speed units:	Knots
Air Pressure units:	mBar
Air Temperature units:	DegC

Time Stamp [TAB] Depth [TAB] Depth SD [TAB] Wspeed [TAB] Wspeed SD [TAB] Max Gust [TAB] Wdir [TAB] Wdir SD [TAB] Air Pressure [TAB] Air Pressure SD [TAB] Air Temperature [TAB] Air Temperature SD [TAB] Dewpoint [TAB] Dewpoint SD [TAB] Humidity [TAB] Humidity SD [TAB] Batt Status.

When interfaced to a Gill MaxiMet instrument the wind direction reported is corrected.

4.2. Logged Data (Pressure Tide & CT)

Firmware version:	0741709nn
File Creation Date:	23/01/2018 14:30:56
Battery Level:	5.7
TideMaster S/N:	3
Station ID:	01
Site info:	Valeport test site
Calibrated:	18/07/2012
Mode:	B1
Pressure units:	m
output format:	TIDEMASTER
User Pressure cal:	
Gain:	1.234000
Offset:	1.000000
Vale Pressure cal:	
P0:	-4.353197e-10
P1:	0.003194
P2:	-1.795884
Water Temperature units:	DegC
Water Conductivity units:	mS

Time Stamp [TAB] Depth [TAB] Depth SD [TAB] WaterTemp [TAB] WaterCond [TAB] Batt Status

4.3. Logged Data (Radar Tide and Met)

Firmware version:	0741709nn
File Creation Date:	23/01/2018 10:28:01
Battery Level:	9.1
TideMaster S/N:	3
Station ID:	01
Site info:	Valeport test site
Calibrated:	18/07/2012
Mode:	B1
Pressure units:	m
output format:	TIDEMASTER
Radar:	
Min limit:	0.500
Max Limit:	2.000
Datum:	2.000
Pre amble:	4
Wind speed units:	Knots
Air Pressure units:	mBar
Air Temperature units:	DegC

Time stamp [TAB] Depth [TAB] Depth SD [TAB] Wspeed [TAB] Wspeed SD [TAB] Max Gust [TAB] Wdir [TAB] Wdir SD [TAB] Air Pressure [TAB] Air Pressure SD [TAB] Air Temperature [TAB] Air Temperature SD [TAB] Dewpoint [TAB] Dew point SD [TAB] Humidity [TAB] Humidity SD [TAB] Batt Status

4.4. Logged data (Radar Tide and CT)

Firmware version:	0741709nn
File Creation Date:	23/01/2018 14:33:36
Battery Level:	5.7
TideMaster S/N:	3
Station ID:	01
Site info:	Valeport test site!
Calibrated:	18/07/2012
Mode:	B1
Pressure units:	m
output format:	TIDEMASTER
Radar:	
Min limit:	0.500
Max Limit:	20.000
Datum:	2.000
Pre amble:	4
Water Temperature units:	Deg C
Water Conductivity units:	mS

Timestamp [TAB] Depth [TAB] Depth SD [TAB] WaterTemp [TAB] WaterCond [TAB] Batt Status

4.5. Real Time Data - NMEA

Real Time data is broadcast in NMEA format only.

A NMEA style output is the standard data format and provides the most detailed information from the instrument.

4.5.1. $PVTMA and $PVRS1 - Tide Data

$PVTMA - Pressure data

$PVTMA,ID,ccyymmdd,hhmmss,tt.ttt,h.hhh,U,vv.v,vv.v,nnnn,,,*hhCL
example: $PVTMA,01,20180528,171600,01.724,0.004,0,06.3,12.4,1024,,,*35

// Station ID	XX (integer)
// Date	CCYYMMDD
// Time	hhmmss
// Tide Height	tt.ttt
// Tide height stdev	h.hhh
// Tide height units	U d = DBar m = Metres f = Feet (multiplier = 0.30480370641307)
// Internal Battery voltage	Volts
// External Battery voltage	Volts
// Data Status	nnnn
Pressure	DBar (native units)
reserved 1	
reserved 2	
// *hh	checksum
// CL <cr><lf>	end of string

$PVRS1 - Radar level data

$PVRS1,ID,CCYYMMDD,hhmmss,tt.ttt,l.lll,h.hhh,nnnn,U,,*hhCL
example: $PVRS1,01,20180105,061800,5.011,0.694,0.017,000,*64

// Station ID	XX (integer)
// Date	CCYYMMDD
// Time	hhmmss
// Range	tt.ttt
// Level	l.lll
// Standard Deviation	h.hhh
// Data Status	nnnn
// Units	U m = Metres f = Feet (multiplier = 0.30480370641307)
// *hh	checksum
// CL <cr><lf>	end of string

4.5.2. $PVTM1 - Meteorological Data

$PVTM1 = Meteorological Data, same format for Windsonic or MetPak II

$PVTM1,ID,CCYYMMDD,hhmmss,sss.ss,kk.kk,mmm.mm,U,ddd.d,nn.nn,aaaa.a,A,ttt.t,T,ppp.p,hhh.h*hh CL (85 chars)
example: $PVTM1,01,20180301,011000,001.70,00.18,001.96,1,357.2,07.15,1032.5,0,011.2,0,010.4,094.4,*15

// Station ID	XX (integer)
// Date	CCYYMMDD
// Time	hhmmss
// wind speed	sss.ss
// wind speed stdev	stdev kk.kk
// max gust	mmm.mm
// wind speed units	U 0 = kts (multiplier = 0.51486061341309) 1 = metres per second (multiplier = 1) 2 = miles per hour (multiplier = 0.44704)
// wind direction	ddd.d
// wind direction stdev	stdev nn.nn
// air pressure	aaaa.a
// air pressure units	A 0 = mbar (multiplier =) 1 = hpa (multiplier =) 2 = inHg (multiplier =) 3 = mmHg (multiplier =)
// air temperature	ttt.t
// temperature units	T 0 Deg C 1 Deg F
// dew point	ppp.p
// humidity	hhh.h
// *hh	checksum
// CL <cr><lf>	end of string

4.5.3. $PVTM2 - Water Temperature and Conductivity Data

$PVTM2,ID,CCYYMMDD,hhmmss,tt.ttt,U,CC.CCC,mS,*hhCL
example: $PVTM2,01,20180301,022000,-9.900,0,-9.900,mS,*20

// Station ID	XX (integer)
// Date	CCYYMMDD
// Time	hhmmss
// Water Temperature	tt.ttt
// Water Temperature Units	U 0 = Degs C 1 = Degs F (multiplier=0.555555556; offset=-17.777778
// Water Conductivity	CC.CCC
// Water Conductivity units	mS always (mS = ms/cm)
//Checksum	*hh
// CL <cr><lf> end of string	

5. SATEL - M3 - TR1

Introduction

SATELLINE-M3-TR1 transceiver module is a compact, flexible and lightweight solution with low power consumption. The module is specifically designed for small mechanics.
It is an excellent choice for applications requiring long-range distances.

Lightweight solution for long-range connections

The module has a wide (90 MHz / 70 MHz) tuning range and the operation frequency can be selected within the ranges 330...420 MHz and 403...473 MHz. The channel spacing 12.5, 20 and 25 kHz are software-selectable. The output power of up to 1W enables long connection distances.

The key features include:

- 330-420 / 403-473 MHz frequency range – 90 / 70 MHz wide tuning range enables two radio modems in the stock and all the channels available
- User selectable channel spacing 12.5 / 20 / 25 kHz
- Compatible with the widely used SATELLINE-EASy radio modem family
- Compatible also with Pacific Crest-4FSK/GMSK/FST or TRIMTALK450s protocols
- Half duplex radio data transfer
- Over-the-air data rate:
  - 9600 bps @ 12.5 kHz channel spacing
  - 9600 bps @ 20 kHz channel spacing
  - 19200 bps @ 25 kHz channel spacing
- Small current consumption, sleep modes
- Power level of the transmitter 100 mW...1 W
- RS-232 / RS422 / LVTTL / TTL serial interface at 300...38400 bps data rates
- Routing/repeater functions
- Error correction (FEC)
- External command language (SL commands)
- OEM versions available

5.1. Specification

RADIO	RECEIVER	TRANSMITTER
Frequency Range	330...420 Note[1] / 403...473 MHz (Tuning range 90 / 70 MHz)	
Channel Spacing	12.5 kHz / 20 kHz / 25 kHz programmable	
Communication Mode	Half-Duplex	
Frequency Stability	<1 kHz	
Modulation	4-FSK, GMSK	
Radio Compatibility	SATELLINE-3AS, Pacific Crest FST/4-FSK/GMSK, TRIMTALK450s	
Spurious Radiation	< 2 nW	EN 300 113 and CFR47 part90
Sensitivity	-114 dBm @12.5 kHz -111 dBm @25 kHz Note[2&3]	
Co-channel Rejection	>-12 dB Note[2]	
Adjacent Channel Selectivity	> 47 dB @12.5 kHz > 52 dB @ 25 kHz Note[2]	
Inter-modulation Attenuation	> 60 dB Note[2]	
Blocking	> 86 dB Note[2]	
Spurious Rejection	> 60 dB Note[2]	
Spurious Emission	< -100 dBm	<-80 dBm on 3rd harmonic @1215–1240 MHz
Type of Emission		F1D
Carrier power		100, 200, 500, 1000 mW
Adjacent Channel Power		EN 300 113 and CRF47 part90
Carrier power stability		< ±1.5 dB
DATA MODEM		
Electrical Interface	Port 1:RS-232 / Port 2: LVTTL, TTL or RS-232/422 (depends on the assembly)	
Interface Connector	D-15 (female)	
Data speed of Serial interface	300 – 38400 bps	
Data speed of Radio Interface	19200 bps (25 kHz channel) / 9600 bps (12.5 or 20 kHz channel)	

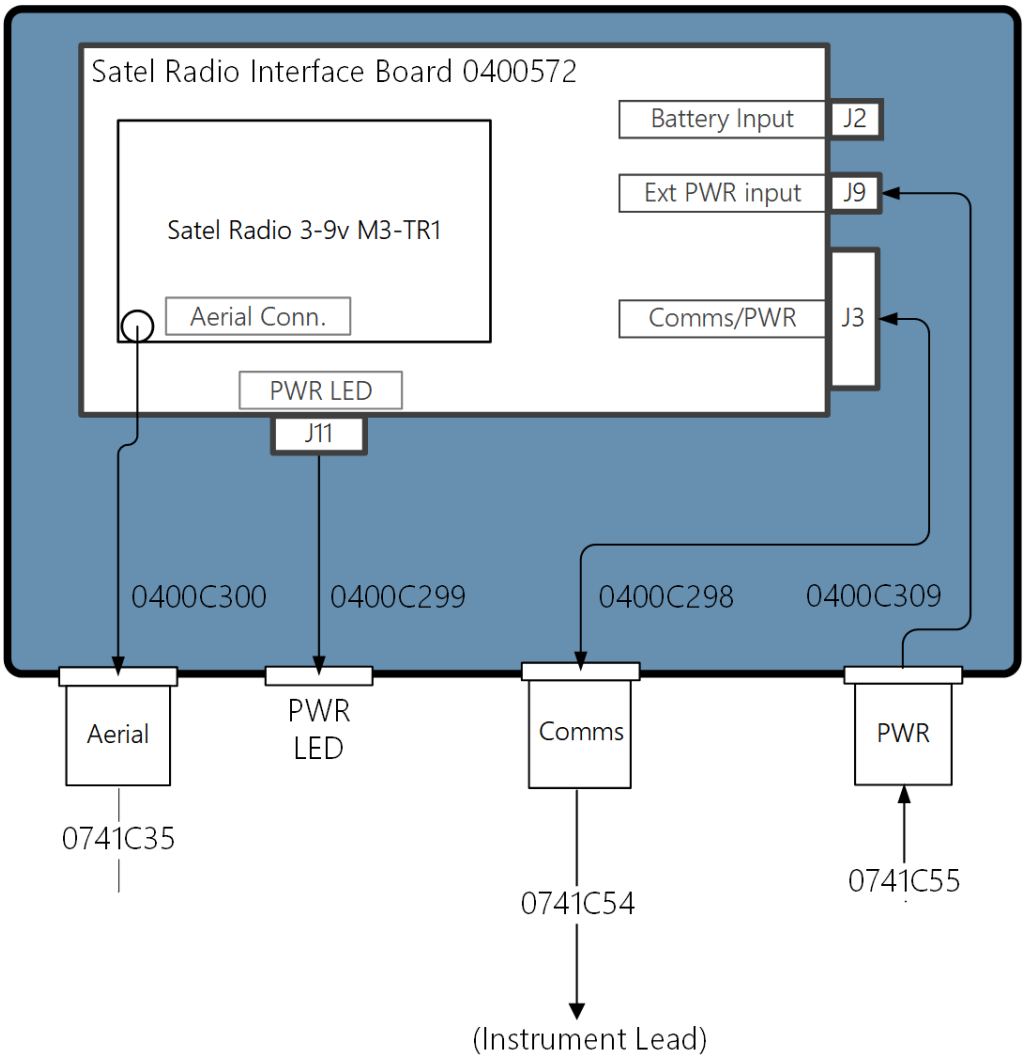
GENERAL		
RADIO	RECEIVER	TRANSMITTER
Power Consumption	<1.2 W (Receive), <3.0 W (Transmit @ 0.5 W), <7.0 W (Transmit @ 1 W), 0.12 W (Sleep mode), 10 mW (DTR Power save)	
Temperature Ranges	-25 °C ... +55 °C Complies with standards -30 °C ... +65 °C Functional -40 °C ... +75 °C Absolute min./max. -40 °C ... +85 °C Storage	
Antenna Connector	TNC female 50 ohm	
Construction	Aluminium housing or without housing	
Size L x W x T	129 x 63.5 x 23 mm (+/- 1 mm) or 89 x 49 x 9 mm	
Weight	250 g or 50 g	

Note[1] 330.000 – 389.950 MHz, 390.050 – 420.000 MHz

Note[2] Values apply with FEC ON @ BER<10E-3

Note[3] Due to radio electronic design, the receiver is about 6 – 15 dB less sensitive on the following frequencies: 403.000, 416.000, 429.000, 442.000, 455.000, 468.000, 409.5875 and 469.200 MHz.

5.1.1. SATEL Radio Schematic



5.2. Safety Note

- Warranty will be void, if the product is used in any way that is in contradiction with the instructions given in the operator's manual, or if the radio modem housing has been opened or tampered with.

- The radio modem is only to be operated at frequencies allocated by local authorities, and without exceeding the given maximum allowed output power ratings. SATEL and its distributors are not responsible, if any products manufactured by it are used in unlawful ways.

- The devices mentioned in this manual are to be used only according to the instructions described in this manual. Faultless and safe operation of the devices can be guaranteed only if the transport, storage, operation and handling of the devices is appropriate. This also applies to the maintenance of the products.

- To prevent damage both the radio modem and any terminal devices must always be switched OFF before connecting or disconnecting the serial connection cable. It should be ascertained that

different devices used have the same ground potential. Before connecting any power cables the output voltage of the power supply should be checked.

- Any radio link can susceptible to external interference and signal degradation by its nature. Because of that, the effects of possible interference mechanism and the sufficient back-up schemes must be taken into account in the system design of the critical applications.

5.2.1. Restrictions on Use

SATELLINE-M3-TR1 radio modem modules have been designed to operate on frequency ranges, the exact use of which differs from one region and/or country to another. The user of a radio modem must take care that the device is not operated without the permission of the local authorities on frequencies other than those specifically reserved and intended for use without a specific permit.

SATELLINE-M3-TR1 is allowed to be used in the following countries, either on licence free channels or on channels where the operation requires a licence. More detailed information is available at the local frequency management authority.

Countries: AT, AU, BE, BG, CA, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, HR, HU, IE, IS, IL, IN, IT, KZ, LT, LU, LV, MX, MT, NL, NO, OM, PL, PT, RU, RO, SE, SG, SI, SK, TR, UA, US, VN and ZA.

WARNING! Users of SATELLINE-M3-TR1 radio modem modules in North America should be aware, that due to the allocation of the frequency band 406.0 – 406.1 MHz for government use only, the use of radio modem on this frequency band without a proper permit is strictly forbidden.

WARNING! In order to comply with FCC and IC RF exposure compliance requirements, maximum antenna gain is 14 dBi and separation distance of at least 1 meter must be maintained between the antenna of this device and all persons. The device must not be co-located or operating in conjunction with any other antenna or transmitter.

Note on label requirements: SATELLINE-M3-TR1 is intended to be integrated into a host device or an enclosure. Therefore the product related FCC ID and IC ID must be visible in the host device chassis.

SATELLINE-M3-TR1 869 radio modem module has been designed to operate on 869.4125 – 869.6375 MHz, the exact use of which differs from one region and/or country to another. The user of a radio modem must take care that the device is not operated without the permission of the local authorities on frequencies other than those specifically reserved and intended for use without a specific permit.

SATELLINE-M3-TR1 869 is allowed to be used in the following countries, either on licence free channels or on channels where the operation requires a licence. More detailed information is available at the local frequency management authority.

Countries: AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, HR, HU, IE, IS, IT, LT, LU, LV, MT, NL, NO, PL, PT, RO, SE, SI, SK and TR.

5.3. Approvals

COMPLIANT WITH THE INTERNATIONAL STANDARDS	
RF-requirements	EN 300 113-2 / FCC CFR47 section 90
EMC-requirements	EN 301 489-1 & -5 (8 kV contact, 15 kV air discharge)
Safety Standard	EN 60950-1
Immunity	EN 61000-4-3 (2006) (10V/m)

Hereby, SATEL Oy declares that radio modem modules are in compliance with the essential requirements (radio performance, electromagnetic compatibility and electrical safety) and other relevant provisions of Directive 2014/53/EU. Therefore the equipment is labelled with the following CE-markings.

6. Victron Energy Solar Charge Controller

Please refer to the specific Victron Energy manual for the model installed in your TideStation.

General Description

Ultra fast MPPT tracking

Especially in case of a clouded sky, when light intensity is changing continuously, a fast MPPT algorithm will improve energy harvest by up to 30% compared to PWM charge controllers and by up to 10% compared to slower MPPT controllers.

Load Output

Deep discharge of the battery can be prevented by connecting all loads to the load output. The load output will disconnect the load when the battery has been discharged to a pre-set voltage. Alternatively, an intelligent battery management algorithm can be chosen: see Battery Life.
The load output is short circuit proof.
Some loads (especially inverters) can best be connected directly to the battery, and the inverter remote control connected to the load output. A special interface cable may be needed.

Internal Temperature Sensor

Compensates absorption and float charge voltages for temperature.

Automatic Battery Voltage Recognition

The controller will automatically adjust itself to a 12V or a 24V system one time only.
If a different system voltage is required at a later stage, it must be changed manually.

Three Step Charging

The controller is configured for a three step charging process:
Bulk | Absorption | Float. See below for details.

Bulk

During this stage the controller delivers as much charge current as possible to rapidly recharge the batteries.

Absorption

When the battery voltage reaches the absorption voltage setting, the controller switches to constant voltage mode.
When only shallow discharges occur the absorption time is kept short in order to prevent overcharging of the battery. After a deep discharge the absorption time is automatically increased to make sure that the battery is completely recharged.
Additionally, the absorption period is also ended when the charge current decreases to less than 1A.

Float

During this stage, float voltage is applied to the battery to maintain a fully charged state. When the battery voltage drops below float voltage during at least 1 minute a new charge cycle will be triggered.

6.1. Important Safety Instructions

SAVE THESE INSTRUCTIONS - This manual contains important instructions that shall be followed during installation and maintenance.

Danger of explosion from sparking

Danger of electric shock

- It is advised to read this manual carefully before the product is installed and put into use.
- This product is designed and tested in accordance with international standards. The equipment should be used for the designated application only.
- Install the product in a heatproof environment. Ensure therefore that there are no chemicals, plastic parts, curtains or other textiles, etc. in the immediate vicinity of the equipment.
- The product is not allowed to be mounted in a user accessible area.
- Ensure that the equipment is used under the correct operating conditions.
- Never use the product at sites where gas or dust explosions could occur.
- Ensure that there is always sufficient free space around the product for ventilation.
- Refer to the specifications provided by the manufacturer of the battery to ensure that the battery is suitable for use with this product. The battery manufacturer's safety instructions should always be observed.
- Protect the solar modules from incident light during installation, e.g. cover them.
- Never touch uninsulated cable ends.
- Use only insulated tools.
- Connections must always be made in the following sequence
  - First: connect the cables to the load, but ensure that all loads are switched off.
  - Second: connect the battery (this will allow the controller to recognize system voltage).
  - Third: connect the solar array.
- The installer of the product must provide a means for cable strain relief to prevent the transmission of stress to the connections.

6.2. Installation

WARNING: DC (PV) INPUT IS NOT ISOLATED FROM BATTERY CIRCUIT
CAUTION: FOR PROPER TEMPERATURE COMPENSATION THE AMBIENT CONDITION FOR CHARGER AND BATTERY MUST BE WITHIN 5°C.

General

- Mount vertically on a non-flammable substrate, with the power terminals facing downwards.
- Mount close to the battery.
- Improper internal temperature compensation (e.g. ambient condition battery and charger not within 5°C) can lead to reduced battery lifetime.
- In Canada battery installation must be done in accordance with the storage battery rules of the Canadian Electrical Code, Part I.
- The battery and PV connections must be guarded against inadvertent contact.

Grounding

- Battery grounding: the charger can be installed in a positive- or negative-grounded system.
- *Chassis grounding:* A separate earth path for the chassis ground is permitted because it is isolated from the positive and negative terminal.
- The USA National Electrical Code (NEC) requires the use of an external ground fault
- protection device (GFPD). These MPPT chargers do not have internal ground fault protection. The system electrical negative should be bonded through a GFPD to earth ground at one (and only one) location.
- The charger must not be connected with grounded PV arrays.

WARNING: WHEN A GROUND FAULT IS INDICATED, BATTERY TERMINALS AND CONNECTED CIRCUITS MAY BE UNGROUNDED AND HAZARDOUS.

PV Configuration

- Provide means to disconnect all current-carrying conductors of a photovoltaic power source from all other conductors in a building or other structure.
- A switch, circuit breaker, or other device, either ac or dc, shall not be installed in a grounded conductor if operation of that switch, circuit breaker, or other device leaves the grounded conductor in an ungrounded state while the system remains energised.
- The controller will operate only if the PV voltage exceeds battery voltage (Vbat).
- PV voltage must exceed Vbat + 5V for the controller to start. Thereafter minimum PV voltage is Vbat + 1V.
- Maximum open circuit PV voltage: 75V respectively 100V

at low temperature the open circuit voltage of a 108 cell array may exceed 75V and and the open circuit voltage of a 144 cell solar array may exceed 100V, depending on local conditions and cell specifications. In that case the number of cells in series
must be reduced.

Cable Connection Sequence

First: connect the cables to the load, but ensure that all loads are switched off.
Second: connect the battery (this will allow the controller to recognize system voltage).
Third: connect the solar array (when connected with reverse polarity, the controller will heat up but will not charge the the battery).

The system is now ready for use.

The Load Output

A jumper can be used to to configure the load output as follows:

- No jumper: Battery Life algorithm (see 1.4)
- Jumper between pin 1 and pin 2: conventional
  Low voltage load disconnect: 11,1V or 22,2V
  Automatic load reconnect: 13,1V or 26,2V
- Jumper between pin 2 and pin 3: conventional
  Low voltage load disconnect: 11,8V or 23,6V
  Automatic load reconnect: 14V or 28V

LEDs

Green LED: indicates which load output control algorithm has been chosen.
On: one of the two conventional load output control algorithms (see Fig 2)
Blinking: BatteryLife load output control algorithm (see Fig 2)

Yellow LED: signals charge sequence
Off: no power from PV array (or PV array connected with reverse polarity)
Blinking fast: bulk charge (battery in partially charged state)
Blinking slow: absorption charge (battery charged to 80% or more)
On: float charge (battery fully charged)

Battery Charging Information

The charge controller starts a new charge cycle every morning, when the sun starts shining.

Default setting:

The maximum duration of the absorption period is determined by the battery voltage measured just before the solar charger starts up in the morning:

Battery voltage Vb (@start-up)	Maximum absorption time
Vb < 23.8V	6h
23.8V < Vb < 24.4V	4h
24.4V < Vb < 25.2V	2h
Vb > 25.2V	1h

(divide voltages by 2 for a 12V system)

If the absorption period is interrupted due to a cloud or due to a power hungry load, the absorption process will resume when absorption voltage is reached again later on the day, until the absorption period has been completed.

The absorption period also ends when the output current of the solar charger drops to less than 1Amp, not because of low solar array output but because the battery is fully charged (tail current cut off).

This algorithm prevents over charge of the battery due to daily absorption charging when the system operates without load or with a small load.

User defined algorithm:

The default settings can be modified via VE.Direct.

Automatic Equalization

Automatic equalization is default set to ‘OFF’. With the Victron Connect app this setting can be configured with a number between 1 (every day) and 250 (once every 250 days). When automatic equalization is active, the absorption charge will be followed by a voltage limited constant current period. The current is limited to 8% of the bulk current for the factory default battery type, and to 25% of the bulk current for a user defined battery type. The bulk current is the rated charger current unless a lower maximum current setting
has been chosen.

When using the factory default battery type, automatic equalization ends when the voltage limit 16.2V / 32.4V has been reached, or after t = (absorption time)/8, whichever comes first. For the user defined battery type automatic equalization ends after t = (absorption time)/2. When automatic equalisation is not completely finished within one day, it will not resume the next day, the next equalisation session will take place as determined by the day interval.

6.3. Trouble Shooting

Problem	Possible Cause	Solution
Charger does not function	Reversed PV connection	Connect PV correctly
	No fuse inserted	Insert 20A fuse
Blown fuse	Reversed battery connection	1. Connect battery correctly 2. Replace Fuse
The battery is not fully charged	A bad battery connection	Check battery connection
	Cable losses too high	Use cables with larger cross section
	Large ambient temperature difference between charger and battery ($T_{ambient\_chrg} > T_{ambient\_batt}$)	Make sure that ambient conditions are equal for charger and battery
	Only for a 24V system: wrong system voltage chosen (12V instead of 24V) by the charge controller	Set controller manually to the required system voltage (see section 1.8)
The battery is being overcharged	A battery cell is defect	Replace battery
	Large ambient temperature difference between charger and battery ($T_{ambient\_chrg} < T_{ambient\_batt}$)	Make sure that ambient conditions are equal for charger and battery
Load output does not become active	Maximum current limit exceeded	Make sure that the output current does not exceed 15A
	DC load in combination with capacitive load (e.g. inverter) applied	Disconnect DC load during start-up of the capacitive load Disconnect AC load from the inverter, or connect inverter as explained in section 3.6
	Short-circuit	Check for short-circuit in the load connection

6.4. Specification

BlueSolar charge controller	MPPT 75/10	MPPT 75/15	MPPT 100/15
Battery voltage	12/24V Auto Select		
Maximum battery current	10A	15A	15A
Nominal PV power, 12V 1a,b)	145W	220W	220W
Nominal PV power, 24V 1a,b)	290W	440W	440W
Max. PV short circuit current 2)	13A	15A	15A
Automatic load disconnect	Yes, maximum load 15A		
Maximum PV open circuit voltage	75V		
Peak efficiency	98%		
Self consumption	12V: 20 mA 24V: 10 mA		
Charge voltage 'absorption'	14,4V / 28,8V (adjustable)		
Charge voltage 'equalization' 3)	16,2V / 32,4V (adjustable)		
Charge voltage 'float'	13,8V / 27,6V (adjustable)		
Charge algorithm	multi-stage adaptive or user defined algrithm		
Temperature compensation	16mV / °C resp. -32mV / °C		
Continuous load current	15A		
Low voltage load disconnect	11,1V / 22,2V or 11,8V / 23,6V or BatteryLife algorithm		
Low voltage load reconnect	13,1V / 26,2V or 14V / 28V or BatteryLife algorithm		
Protection	Battery reverse polarity (fuse) Output Short Circuit / Over Temperature		
Operating temperature	-30 to +60°C (full rated output up to 40°C)		
Humidity	100%, non-condensing		
Maximum altitude	5000m (full rated output up to 2000m)		
Environmental condition	Indoor type 1, unconditioned		
Pollution degree	PD3		
Data communication port	VE.Direct see the data communication white paper on the victron energy website		

1a) If more PV power is connected, the controller will limit input power.
1b) The PV voltage must exceed Vbat + 5V for the controller to start.
Thereafter the minimum PV voltage is Vbat + 1V.
2) A higher short circuit current may damage the controller in case of reverse polarity connection of the PV array.
3) Default setting: OFF

6.4.1. Enclosure

BlueSolar charge controller	MPPT 75/10	MPPT 75/15	MPPT 100/15
	Enclosure		
Colour	Blue (RAL 5012)		
Power terminals	6mm² / AWG10		
Protection category	IP43 (electronic components) IP22 (connection area)		
Weight	0.5kg		0.6kg
Dimensions (h x w x d)	100 x 113 x 40mm		100 x 113 x 50 mm

6.4.2. Standards

Standards	
Safety	EN/IEC 62109-1 / UL 1741 / CSA C22.2 NO.107.1-16

6.5. Configuration

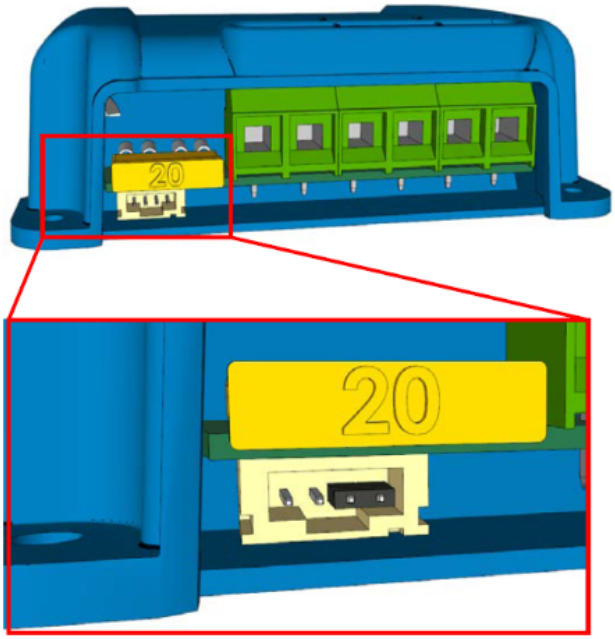


Figure 1a: configuration pins of the VE.Direct communication port, 75V models

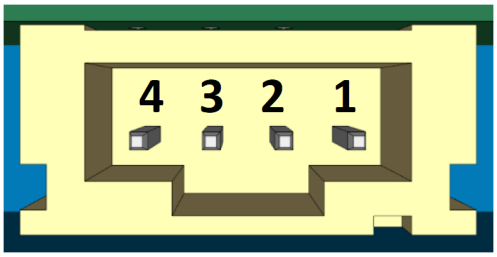
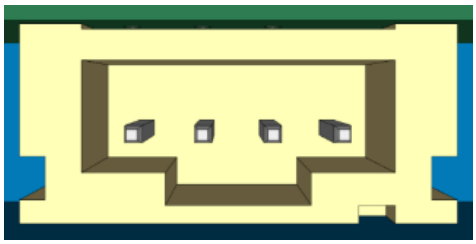
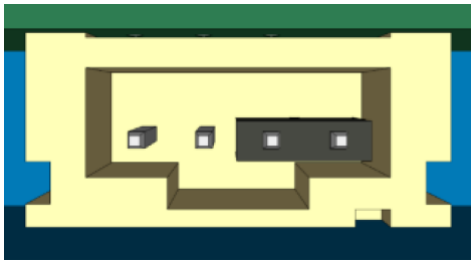
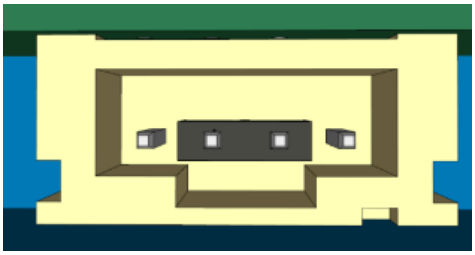


Figure 1b: pin numbering of the VE.Direct communication port

6.5.1. Battery Management Options

No bridge: BatteryLife algorithm	
Bridge between pin 1 and 2: Low voltage disconnect: 11.1V or 22.2V Automatic load reconnect: 13.1V or 26.2V Standard setting for TideStation. Contact Valeport before making any change to this setting.	
Bridge between pin 2 and 3: Low voltage disconnect: 11.8V or 23.6V Automatic load reconnect: 14.0V or 28.0V	

6.5.2. Power Connections

7. Scannex ip.Buffer

Please refer to the specific Scannex manual for the model installed in your TideStation for more detailed operational instructions.

Introduction

The Range

The ip.buffer is designed to collect and store information from such devices as telephone PBXs – for CDR/SMDR collection, for alarm and traffic management, and to allow pass-through access for moves and changes.

The product range includes two main devices:

- ip-4 = 128Mbyte memory with 4 serial ports
- ip-1 = 32Mbyte memory with 1 serial port

The ip-4 device includes internal temperature monitoring, built in global or GPRS modem, plus the SEbus expansion connector. They are both built inside a metal box that can be rack mounted in a 1U high bay.

The ip-1 device has an optional global PSTN or GPRS modem and is housed in a plastic casing with facilities for wall mounting, tie-wrapping, and DIN rail mounting.

Both devices allow battery backup using 3 standard AA NiMH batteries. With fully charged cells the unit can continue to operate for approximately 2 hours.

Features

All devices have proprietary Scannex features and advanced facilities:

- Collection
  - Auto pin detection on the serial ports[1]
  - Auto baud rate and protocol detection on the serial ports
  - Collection from serial and TCP/IP enabled devices[2]
  - Collection from devices that perform FTP push
  - Collection of UDP data including syslog information, SNMP Traps (with trap decoding and SNMP get queries on connected devices), and RADIUS Accounting
  - Collection from a web server running Scannex C# or PHP scripts.
  - Support for ASCII, Binary and iSDX data sources
  - Automatic partitioning of NAND flash memory with optional settings for limiting memory sizes of each channel
- Various delivery options including:
  - HTTP/HTTPS post to web Cloud Server
  - FTP/SFTP push
  - FTP server
  - Email/SMTP push
  - TCP/IP push o TCP/IP server
  - COM port serial

- LAN and management features
  - Fully web-based setup and status information
  - “Reflective Routing” on the LAN to allow easy access from different subnets[3]
  - Email, HTTP POST, and SNMP alert mechanisms to enable a pro-active system
  - Extremely powerful Lua[4] scripting engine
  - SNTP (Simple Network Time Protocol) time synchronisation with daylight saving option
  - Settings can be quickly replicated across multiple ip.buffers for bulk installations
  - All changes to the settings occur immediately – no need for reboot[5]
  - Fully fail-safe firmware upgrades. The power can fail at any point in the upgrade process and the ip.buffer will recover with the old version (or the new version if successfully uploaded).
  - Simple SNMP v1/v2c agent to provide inventory information to SNMP clients
  - Centralised updates via standard web-server (See section 8.2.16)
  - Supports Proxy servers running HTTP, SOCKS 5 and SOCKS 4a protocols.
- Security features
  - Option to authenticate to one or two RADIUS servers
  - https (SSL) access for web pages (optional)
  - SSL/TLS link encryption for HTTP post, FTP, email, and TCP connections (optional)
  - SFTP/SSH encryption for SFTP push (See section 11.4)

[1] The detection is performed using voltage sensing, so the ip.buffer can detect whether the data source is DCE or DTE wired even with no data

[2] Each ip.buffer can collect data from as many TCP/IP devices as there are serial ports. Each channel can be assigned to either the serial port or a TCP/IP or UDP/IP collection.

[3] In practice it means you do not have to have a gateway address, or the correct gateway, programmed in the ip.buffer when connecting into it for web services and the like.

[4] See www.lua.org However, several extensions have been applied to the Lua base.

[5] Even Lua script changes can occur while the ip.buffer is still running

Only an authorised repair facility is allowed to service the modem. Please contact your supplier or Scannex for details of how to have repairs made. Unauthorised repairs could void authority to use the ip.buffer and be dangerous

7.1. Specification

Serial Port(s)	RS232/V24, 9-pin plug. Auto DCE/DTE selection (rx pin 2 or 3) Output pin resolves according to input detection (or manually set). Baud: 300-115200 baud Data: 7-bit odd/even, 8-bit odd/even/none Full autobauding and parity detection within this range.
Network	100base-TX/10base-T, RJ-45 unshielded, full/half duplex, auto MDIX (auto cross-over).
Memory	32Mb/64Mb/128Mb flash. 10 year data hold up without battery (4Mb used for firmware)
Power consumption	(including PSU): 3W / 10BTU/h
Physical	Temperature: 5-50°C (40-122°F)
	Humidity: 20-80% R.H. (non condensing)
ip.1-32(m) Dimensions:	160 x 120 x 45mm / 6.3” x 4.7” x 1.8” (LxWxH) Weight: 0.25kg / 0.55lb
ip.4-128.m Dimensions:	250 x 160 x 42mm / 9.8” x 6.3” x 1.7” (LxWxH) Weight: 1kg / 2.20lb
GPRS Modem	*(only applicable to ip.buffers containing a GRPS modem)* SIM 1.8/3V Mini-Subscriber Identity Module (SIM) compatible. Antenna Interface Female SMA. Frequency bands EGSM 900, DCS 1800, and PCS 1900, GSM 850 capability. Antenna gain 2 dBi in mobile applications and 7dBi in Fixed. GSM/GPRS features supported: Provides for all GSM/GPRS authentication, encryption, and frequency hopping algorithms. GPRS coding schemes: CS1-CS4 supported. Multi-Slot Class 10 (4rx/2tx, maximum

7.2. GPRS Operation with a Cellular/Mobile Network

The ip.buffer is fitted with a GPRS modem allowing delivery of data and remote access over the cellular/mobile network.

An appropriate SIM card for the country of installation (SIM 1.8/3V Mini-Subscriber Identity Module (SIM)) will be required and only an approved antenna suitable GPRS operation should be used.

Operational Frequencies
800/850/900/1900/2100MHz@UMTS
850/900/1800/1900MHz@GSM

Output Power
Class 3 (24dBm+1/-3dB) for UMTS bands
Class E2 (27dBm±3dB) for EDGE 850/900
Class E2 (26dBm+3/-4dB) for EDGE 1800/1900
Class 4 (33dBm±2dB) for GSM 850/900
Class 1 (30dBm±2dB) for GSM 1800/190

7.2.1. GPRS Safety Precautions

Be sure the use of this product is allowed in the country and in the environment required. The use of this product may be dangerous and has to be avoided in the following areas:

Where it can interfere with other electronic devices in environments such as hospitals, airports, aircraft, etc.

Where there is risk of explosion such as gasoline stations, oil refineries, etc

It is responsibility of the user to enforce the country regulation and the specific environment regulation.

- Avoid contact with the ip.buffer or ancillary equipment during an electrical storm; there is a risk of electrical shock.
- Do not use the equipment in the vicinity of a gas leak.
- Avoid contact with liquids and do not use if the unit is suspected to be damp.
- There are no user serviceable parts inside.
- for operation within the TideStation only.
- Power surges on power lines, such as those caused by lightning strikes, can destroy or damage the ip.buffer. Therefore, we recommend that the DC Power supply and all interfaces are connected via surge protectors.

7.2.2. GPRS Radiation Exposure Statements

Failure to meet these requirements may mean the maximum permissible exposure (MPE) limit is exceeded!

- The device should be used in such a way that a separation distance of at least 20 cm (8 inches) is maintained between the transmitter's antenna and any nearby persons.
- The antenna gain must not exceed 3 dBi relative to an isotropic radiator
  see approved antennae list here

7.3. Fitting Batteries

The ip.buffer can run from 3 x standard AA-size Ni-MH batteries when the mains power fails (supplied without batteries). With fully charged batteries the ip.buffer should run for at least 2 hours (although this run time can be limited using the configuration options).
Batteries are not supplied

7.3.1. Battery Precautions

- Use only AA sized rechargeable Ni-MH batteries capacity of at least 2000mAH.

- Batteries should all be of the same capacity, manufacturer, and type.
- RISK OF EXPLOSION IF BATTERIES OF INCORRECT TYPE ARE FITTED.

- Never use non-rechargeable batteries.

- Do not burn or puncture the batteries. The cells may explode.
- Check with local requirements for possible special disposal instructions.
- When replacing batteries all batteries should be replaced at the same time.
- Remove the batteries from the product if the product will not be used for some time (several months or more).
- Check with local requirements for shipping restrictions before shipping with batteries fitted. Some authorities strongly recommend shipping without batteries fitted!

7.4. Front Panel LED

The LED on the front panel shows the following information:

When the ip.buffer boots up, the Modem LED will flash if there is a modem present. If no modem is installed, the Modem LED will not light (except for the regular 8 second flash)

	Channel 1..4	Off On Flashing	Source not connected Source Connected Data Arriving
	L: LAN	Off On Flashing	No Ethernet Connection Ethernet Connected Ethernet Activity
	M: Modem	Off Slow Flash Fast Flashing On	Modem Off-Line Answering or Dialling Negotiating PPP[1] Modem On-Line
	S: Status	Blinks every second to indicate the ip.buffer is functioning normally	
	E: Error	Blinks when booting. Normally off	

[1] When the ip.buffer boots up, the Modem LED will flash if there is a modem present. If no modem is installed, the Modem LED will not light (except for the regular 8 second flash)

7.5. Approvals

7.5.1. EMC

- CE Marks Class B (EN55022, EN55024)
- FCC CFR 47: Part 15 Class B
- CISPR 22 Class B (Emissions)
- CISPR 24 (Immunity)
- AS/NZS 3548 Class B (Australia & New Zealand accept CISPR 22)
- ICES 003 Class B (Canada accepts FCC)

European Union (EU) Statement

EMC, Safety, and R&TTE Directive Compliance

This is to certify that this product complies with the EU Directive 89/336/EEC and the amending directive 93/68/EEC,relating to Electromagnetic Compatibility, by application of CISPR 22/European Standard EN 55022 (Class B) requirements for Information Technology Equipment and EN55024 and Council Directive 1999/5/EC on radio equipment and telecommunications terminal equipment and the mutual recognition of their conformity.

7.5.2. Safety

- CE (EN60950)
- IEC 60950-1
- CB

7.5.3. Environmental

- RoHS Compliant
- WEEE Compliant
  End of Life Disposal Instructions (WEEE)
  For disposal instructions see http://www.scannex.co.uk/weee

7.5.4. GPRS Modem

(only applicable to ip.buffers containing a GPRS modem)

- GCF Type Approval
- PTCRB Type Approval
- FCC Certification (Part 24)
- RTTE
- CE (European Community Certification)
- IC (Industry Canada) Approval
- EMC Emissions: FCC Parts 15,22 & 24, Class B 3GPP TS 51010-1, Section 12.2 EN55022 Class B
- Cellular Listings: FCC, Industry Canada, PTCRB
- ICASA TA-2009/1363 (South Africa)

7.5.5. Export Control

- UK
  - ECO Classification NLR (No License Required)

- US
  - Hardware: ECCN 5A992 (NLR)
  - Firmware: ECCN 5D992 (NLR)
  - CCATS: G135797

7.5.6. FCC Rules Part 15 (Computing Devices)

Note: This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to Part15 of the FCC rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses and can radiate radio frequency energy and, if not installed and
used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a
particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the
user is encouraged to try to correct the interference by one or more of the following measures:

- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and receiver.
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
- Consult the dealer or an experienced radio/TV technician for help.

7.5.7. Industry Canada Information

Notice: The Industry Canada label identifies certified equipment. This certification means that the equipment meets telecommunication network protective, operation and safety requirements as prescribed in the appropriate Terminal Equipment Technical Requirements document(s).

The Department does not guarantee the equipment will operate to the user's satisfaction. Before installing this equipment, users should ensure that it is permissible to be connected to the facilities of the local telecommunications company. The equipment must also be installed using an acceptable method of connection. The customer should be aware that compliance with the above conditions may not prevent degradation of service in some situations.

Repairs to certified equipment should be coordinated by a representative designated by the supplier. Any repairs or alterations made by the user to this equipment, or equipment malfunctions, may give the telecommunications company cause to request the user to disconnect the equipment. Users should ensure for their own protection that the electrical ground connections of the power utility, telephone lines and internal metallic water pipe system, if present, are connected together. This precaution may be particularly important in rural areas.

Caution: Users should not attempt to make such connections themselves, but should contact the appropriate electric inspection authority, or electrician, as appropriate.

Notice: The Ringer Equivalence Number (REN) assigned to each terminal device provides an indication of the maximum number of terminals allowed to be connected to a telephone interface. The termination of an interface may consist of any combination of devices subject only to the requirement that the sum of the Ringer Equivalence Numbers of all devices does not exceed 5.

7.6. Changing GPRS APN Settings

The following chapter describes the procedure to update the APN Settings of a Scannex N4X ip.buffer.
The Scannex IP buffer can be configured if connected to LAN or direct to a computer.

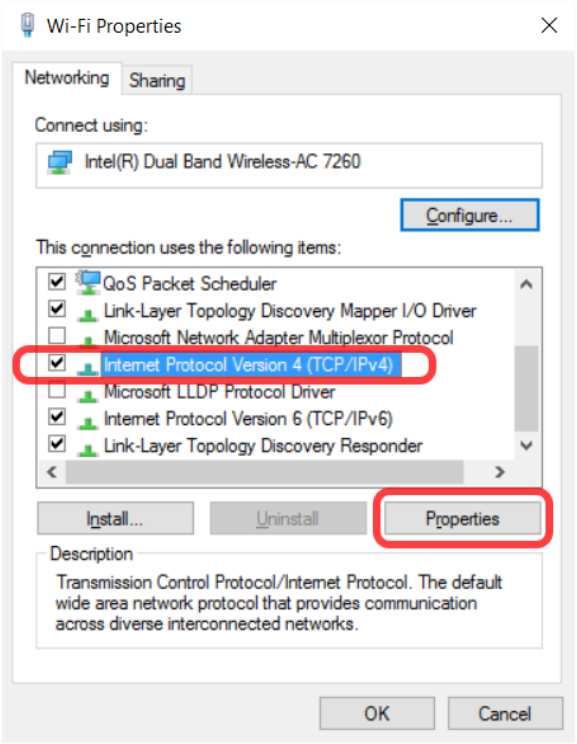
Method A). Connection to network hub or switch.
Using Green M12 Cat5 cable, connect LAN port of Ip.buffer to the LAN.
Attach the TideMaster Cable and provide 12v/500mA source power, alternatively, switch TideStation on, switch TideMaster on, enter the menu on TideMaster, select Output, select Telemetry Setup, select radio on. This will enable power to the Scannex IP buffer from the integral charger unit. Ensure that the internal battery is in a good state of charge.
Run SEDiscover application – this can be downloaded directly from the Scannex website here. This utility will show all ip.buffers on the LAN. Select the relevant one to access the setup web page.

Method B). Using direct connection to Computer Ethernet port.
Using Green M12 Cat5 cable, connect LAN port of Ip.buffer to the computer.

1) Configure the Ethernet port of the computer to have a static IP Address – 192.168.0.100, subnet 255.255.255.0. The ip.buffer is pre-configured with 3 IP Addresses – one dynamic, two are fixed at 192.168.0.235 and 192.168.1.235 – for configuration.

   On the computer:

a) go to “Control Panel\Network and Sharing Centre” – or search for sharing centre
b) Choose “Change Adapter Settings”
c) Right-Click the appropriate adapter, choose “Properties”



d) Scroll down and choose “Internet Protocol Version 4 (TCP/IPv4)” and click “Properties”

e) Choose “Use the following IP address”, and enter:

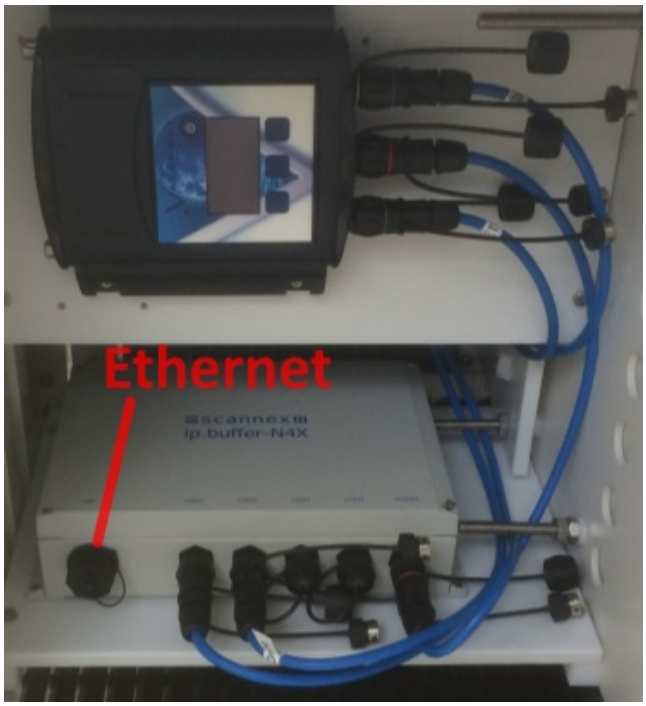
IP Address:	192.168.0.100
Subnet Mask:	255.255.255.0
Default Gateway:	192.168.0.1

The other settings have no effect.

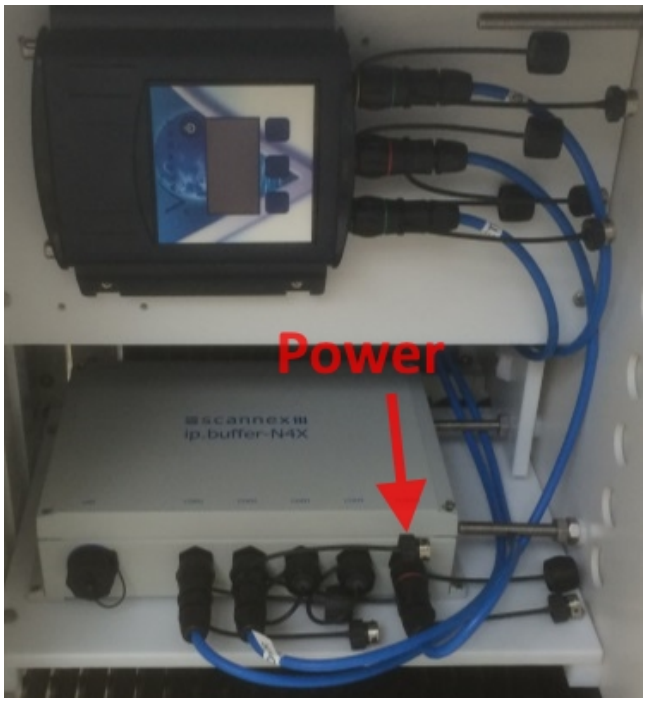
f) Click “OK” and “OK” to return to the “Change Adapter Settings” screen.

The computer now has a static IP Address and can be connected directly to the ip.buffer. At the end of this procedure it can be reverted to having a dynamic IP Address by repeating this process, but choosing “Obtain an IP address automatically”

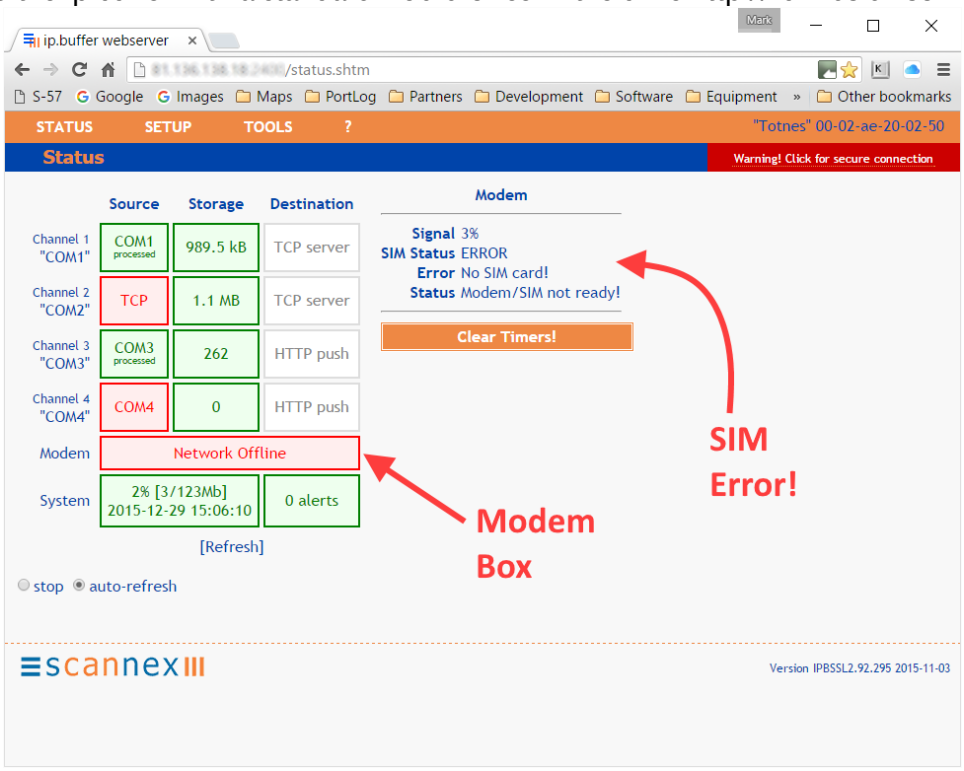
2) Connect the computer and the ip.buffer with the supplied green M12 to CAT5 cable – note longer cables 5m can be ordered if required.



3) Cycle the power on the ip.buffer – disconnect, wait 30 seconds and reconnect the power cable. The Ethernet port on the ip.buffer automatically powers down when it is not being used – it is, however, switched on for 10 seconds on boot, and will remain on if it detects another Ethernet device connected.

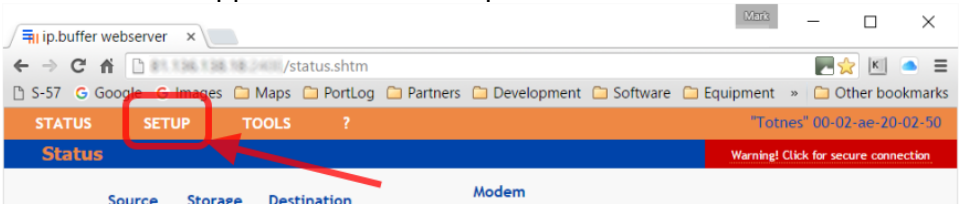


4) Browse to the ip.buffer with a standard web browser – the url is http://192.168.0.235



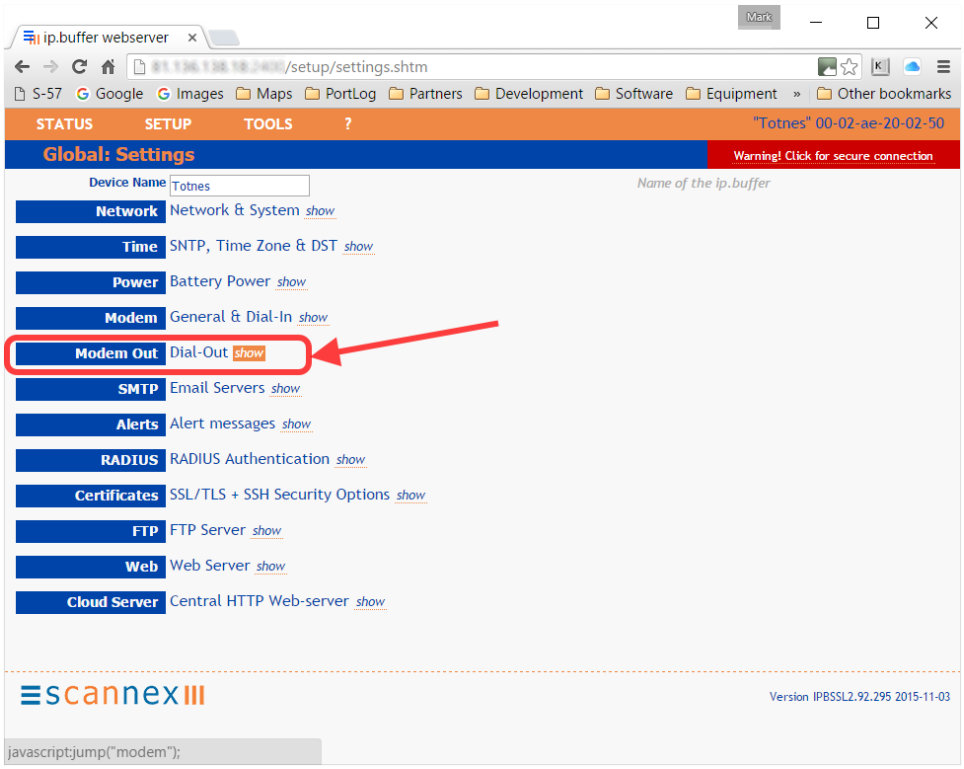
To the right of the "Modem" label is a box – this will probably be red with an error. When you hover the mouse over the box, you will see a description of the error in the panel on the right hand side.

5) The status screen should appear – choose "Setup" from the menu.

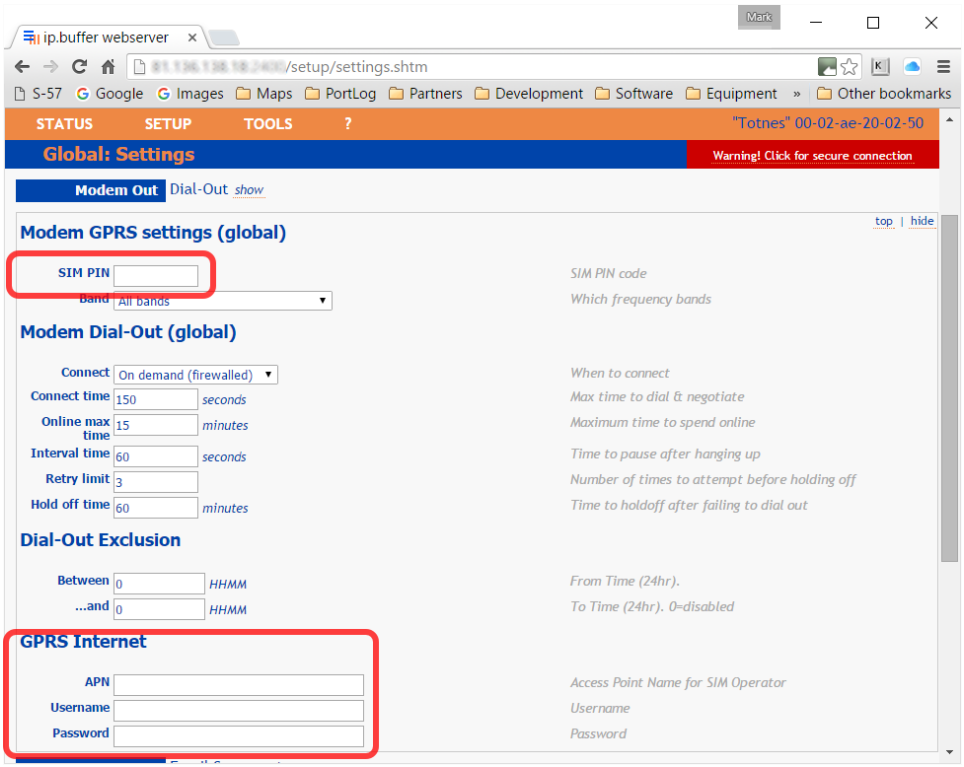


6) You will be prompted for a user name/password – use "admin" and "secret" – which are case sensitive.

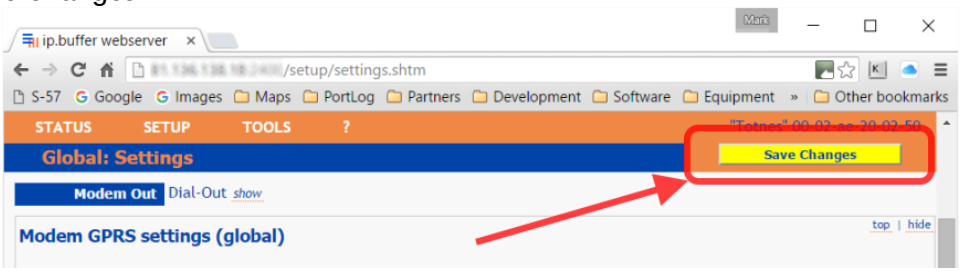
7) Go to the GPRS settings – choose “Settings” and “Modem Out” – click the “show” button to the right of “Modem Out”.



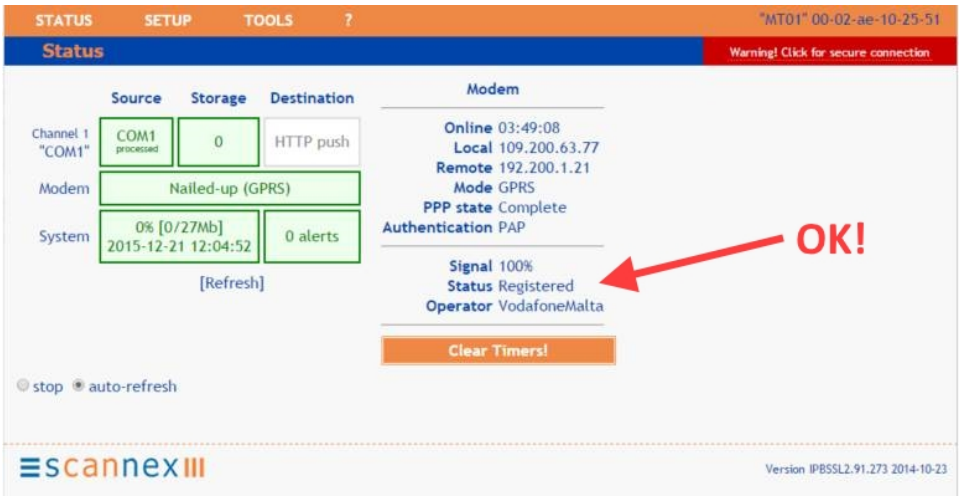
8) Enter the correct GPRS APN Settings – you will have to get these from the SIM Provider.



9) Click “Save Changes”



10) Go back to the “Status” screen, and after a minute or two – if the new settings are correct – the GPRS should connect and start sending data.



When it has successfully connected, the modem “box” will turn green and say “Nailed Up (GPRS)”. Any other errors will be displayed in the panel on the right when you hover the mouse over the modem box.

11) Remove the CAT5 cable and re-fit the dust cover – this ensures the IP66 rating for the ip.buffer enclosure.

7.7. Changing the SIM Card

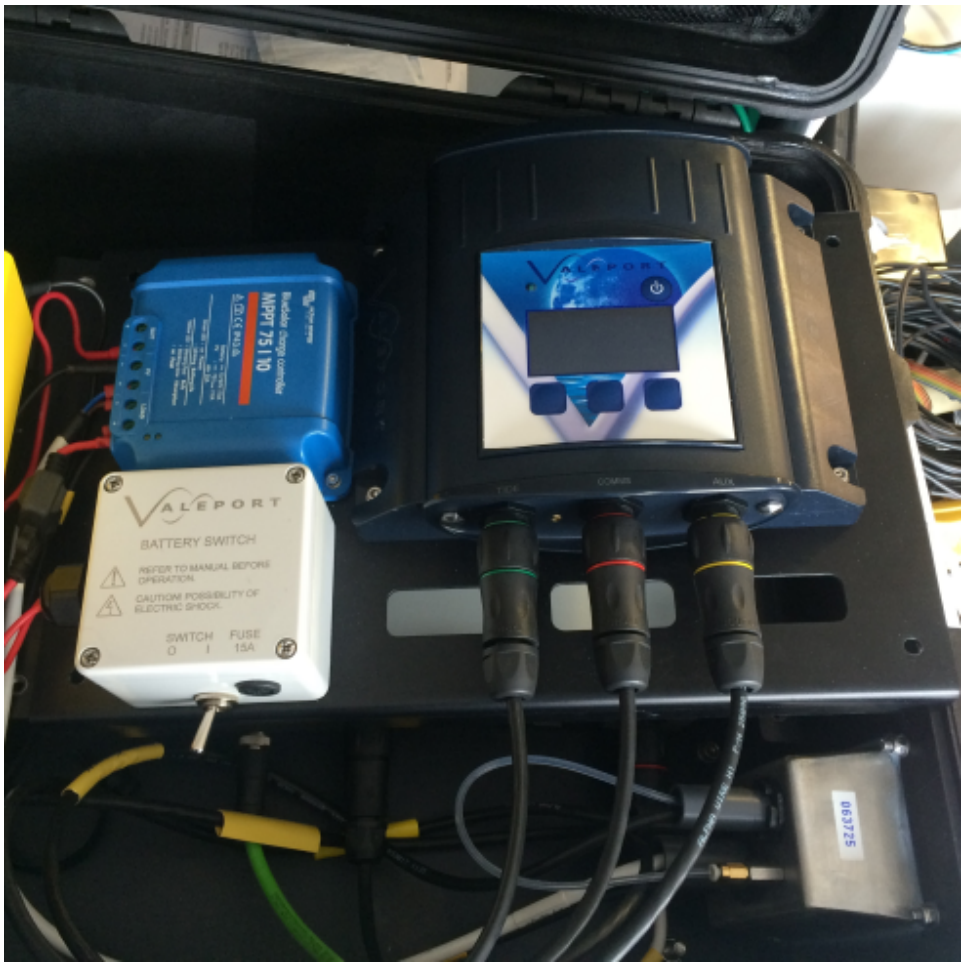
Valeport do not supply TideStation systems with activated SIM cards as standard.
A SIM card can be fitted and activated under contract.

Should you require to fit or change the SIM card in your Scannex ip.buffer please follow the procedure below.

The pictures below illustrate the Portable TideStation but the same is valid for the TideStation Permanent.

1. Open the case and identify the TideMaster, Bluesolar charger and the battery switch. In the picture below the system is powered - lights are visible on the Bluesolar charger and the battery switch is set to ON.

2. Disconnect any external power source and switch the Battery switch to OFF: Ensure there are no lights showing on the Bluesolar charger.

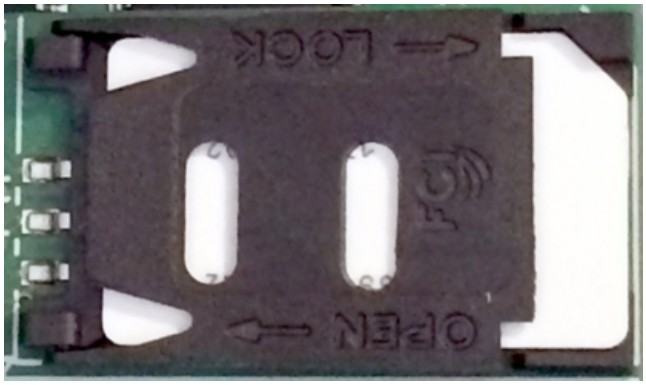


3. TideStation Portable - Remove the plate that holds the TideMaster, Bluesolar charger and battery switch as shown above.
   TideStation Permanent - Remove the plate that holds the Data Telemetry Unit (Radio) and Bluesolar Charger as shown below:

The Scannex ip.buffer will be found underneath

4. Remove the 4 screws securing the ip.buffer lid. The SIM card can be found close to the battery box. Make a note of the orientation of the SIM card before removing it.

5. Slide the SIM card and cage in the direction indicated to OPEN →.



6. Flip up the cage and slide the SIM card out.

Replace the card; noting the orientation of the 'cut off corner'.
Push the cage back into position and slide as indicated to ← LOCK the SIM in place.

6. Replace the lid on the Scannex unit and reassemble the TideStation.

8. Cable Details

Wiring colours are correct at the time the manual was printed. However, it is advised that continuity checks are performed prior to all terminations

8.1. Instrument Cables

8.1.1. 0741C26 - Tide: Pressure

CABLE	END 1: Pressure Sensor	END 2: 6Way Connector UTS6JC10E6P		
WIRE COLOUR		CONNECTOR	PIN	PRESSURE
RED	Druck PDCR1830	6 Way Modified UTS - UTS6JC10E6P	A	V+
WHITE			B	GND
YELLOW			C	SIG+
BLUE			D	SIG-
BLACK			E	N/C
SCREEN			F	Screen

8.1.2. 0745C08 - Tide: Radar (TideStation Portable)

END 1: From Radar	END 2: UTS6JC10E6P			
WIRE COLOUR	PIN	CONNECTOR	PIN	FUNCTION
BLACK	1	6 Way UTS -UTS6JC10E6P	B	POWER_GND
RED	2		A	POWER_IN
YELLOW	3		D	RS232_OUT OF RADAR
BLUE	4		C	RS232_IN TO RADAR
GREEN	5		E	RS232_GND
SCREEN	6		E	SCREEN

8.1.3. 0741C17 - miniCT

CABLE		END 1: MiniCT Sensor		END 2: 6Way UTS -UTS6JC10E6P		
WIRE TYPE	WIRE COLOUR	CONNECTOR	PIN	CONNECTOR	PIN	FUNCTION
8Way 600	RED	6 WAY MALE LINE CONNECTOR MCIL6M	4	6 WAY UTS - UTS6JC10E6P	A	V+ Supply to MiniCT
	BLACK		6		B	GND Supply to MiniCT
	ORANGE		3		C	RS232 Out to MiniCT
	YELLOW		2		D	RS232 In from MiniCT
	GREEN		1		E	MiniCT 232 Gnd
	SCREEN				F	Screen

8.2. Internal Loom Cables

8.2.1. 0741C26 - Internal Pressure Input to TideMaster

CABLE: 8 Core screened Cable	END 1: Enclosure 6Way Jam Nut Connector UTS710E6S		END 2: TideMaster 6 Way Line Connector UTS6JC10E6P		FUNCTION
WIRE COLOUR	CONNECTOR	PIN	CONNECTOR	PIN	PRESSURE
RED	6 Way Modified UTS710E6S	A	6 Way UTS - NCCM6 UTS6JC10E6P	A	V+
BLACK		B		B	GND
BLUE		C		C	SIG+
YELLOW		D		D	SIG-
		E		E	N/C
SCREEN		F		F	Screen

8.2.2. 0741C27 - Internal RADAR/Gill/CT Serial input to TideMaster

	END 1: Enclosure 6Way Jam Nut Connector UTS710E6S		END 2: TideMaster 6 Way Line Connector UTS6JC10E6P		FUNCTION
WIRE COLOUR	CONNECTOR	PIN	CONNECTOR	PIN	RADAR
RED	6 Way UTS710E6S	A	6 Way UTS UTS6JC10E6P	A	V+
BLACK		B		B	GND
BLUE		C		C	RS232 Out to Radar
YELLOW		D		D	RS232 In from Radar
GREEN		E		E	RS232 Gnd
SCREEN		F		F	Screen

8.2.3. 0741C35 - Radio BNC to N Type RG58

	END 1: Radio Straight BNC Male Line connector		END 2: TideStation N type Jack Female Bulkhead connector		
WIRE COLOUR	CONNECTOR	PIN	CONNECTOR	PIN	FUNCTION
Core	BNC Plug RG58	Centre	N type Bulkhead Jack female IP67	Centre	Signal
Sheath		Screen		Screen	Screen

8.2.4. 0741C63 - Victron BlueSolar Solar Controller to Battery

WIRE COLOUR	END 1: Solar Controller PIN	END 2: Toggle Switch PIN	END 3: Panel Mounted Fuse Holder PIN	END 4: Battery PIN	FUNCTION
RED	Batt+	tbc (in)			Solar battery +ve output
		tbc (out)	Live		Switched +v output
			B	1	Battery +ve Terminal
BLACK	Batt-	through		2	Battery -ve Terminal

8.2.5. 0741C64 - Victron BlueSolar Solar Controller to ip.Buffer

WIRE COLOUR	END 1: Solar Controller		END 2: In Line Fuse Holder	
	CONNECTOR	PIN	Connector	Pin
BROWN	Screw Terminal	load +'ve (red)	solder and adhesive heatshrink	Fuse Line In
BROWN				Fuse Line Out
BLUE	Screw Terminal	load-'ve (yellow)		

END 3: ip.Buffer		FUNCTION
Connector	Pin	
Souriau 7 Way Female UTS6JC10E7S		Solar Load output +ve
	A	Fused system supply +v
	B	system supply -ve

8.2.6. 0741C65 - ip.Buffer/GSM Aerial Lead - Right Angle TNC to TNC bulkhead

CABLE: RJ	END 1: Right Angle TNC Line connector		END 2: TideStation TNC Bulkhead Connector		
WIRE COLOUR	CONNECTOR	PIN	CONNECTOR	PIN	FUNCTION
Core	TNC Right Angle Plug RG58	Centre	TNC Bulkhead Jack female IP67	Centre	Signal
Sheath		Screen		Screen	Screen

8.2.7. 0741C77 - External DC Input to 3 Way Female UTS Connector

WIRE COLOUR	END 1: Pig Tail		END 3: 3 way female UTS cable plug		FUNCTION
	Connector	PIN	Connector	Pin	
BROWN	Free End	+ve	3 way Female UTS connector plug	A	DC +ve
BLUE		-ve		B	DC -ve

8.2.8. 0741C80 - ip.Buffer LAN Cable and Bulkhead

3rd party supply
End 1 Connector: M12 LAN plug
End 2 Connector: RJ45 into Bulkhead (BULGIN PX0833)
Screened Shielded twisted pairs

8.2.9. 0741C88 - DC Input from 3 Way UTS Jam Nut to Solar Charger PV Input

	END 1: 3 way UTS Jam Nut		END 2: Free end (Solar charger screw terminal)		
WIRE COLOUR	3 way UTS Jam Nut	PIN	Connector	Pin	FUNCTION
BROWN	6.6mm Crimp	A	screw terminal (using crimp blade connector)	1	+ve input
BLUE		B		2	-ve input
YELLOW/GREEN					

8.2.10. 0741C89 - Victron Solar Controller to Satel Power input

	END 1: Solar Controller		END 2: In Line Fuse Holder		END 3: Satel Power Input		FUNCTION
WIRE COLOUR	CONNECTOR	Pin	Connector	Pin	Connector	Pin	
BROWN	Screw Terminal	load+ (red)	solder and adhesive heat-shrink	Fuse Line In	Souriau3 Way Female UTS6JC10E 3S		Solar Load output +ve
BROWN				Fuse Line Out		A	Fused system supply +v
BLUE	Screw Terminal	load- (yellow)				B	system supply -ve

8.2.11. 0741C90 - Antenna BNC Wiring

	END 1: BNC Line connector		END 2: TideStation TNC Bulkhead connector		
WIRE COLOUR	CONNECTOR	PIN	CONNECTOR	PIN	FUNCTION
Core	BNC Plug RG58	Centre	BNC Bulkhead Jack female IP67	Centre	Signal
Sheath		Screen		Screen	Screen

8.2.12. 0741C91 - Victron Solar Controller to Battery (switch)

Wire Colour	END 1: Solar Controller		END 2: SPSW Switch		END 3: Fuse Holder		END 4: Battery		Function
	Connector	Pin	Connector	Pin	Connector	Pin	Connector	Pin	
RED	Screw Terminal (crimp blade connector)	Batt +'ve	solder and adhesive heat-shrink	tbc (in)	solder and adhesive heat shrink		Battery Crimp Terminal Ring		Solar battery +'ve output
				tbc (out)		Live			Switched +'ve output
						B		1	Battery +'ve Terminal
BLACK		Batt -'ve						2	Battery -'ve Terminal

8.2.13. 0741C96 - TideMaster to Telemetry System Interface Lead

WIRE COLOUR	END 1: GSM/Scannex ip.buffer (7 Way Souriau UTS Connector)		END 2: TideMaster (7 Way Souriau UTS Connector)		FUNCTION
	CONNECTOR	PIN	CONNECTOR	PIN	
RED	7 way size 10 Male	A	7 way size 10 Female	A	POWER IN to TideMaster from GSM unit
BLACK		B		B	POWER GND
BLUE		C		D	RS232 INTO TideMaster
YELLOW		D		C	RS232 OUT FROM TideMaster
GREEN		E		E	RS232 GND
BROWN		n/c		F	COMMS_SEL
WHITE		G		G	RADIO ON
SCREEN		F		E	SCREEN