applied acoustics

underwater technology

MiniPod GPS Receiver
Operation Manual

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Revision History

Issue	Change No.	Reason for change	Date
1	n/a	First Issue	09/05/2019
2	2242	Internal switch image added to page 17	09/03/2020
3	2365	Update to specification and wireless correction protocols	08/06/2020
4	2465	UKCA mark and parallel standards updated	05/01/2021
5	2540	Update to include all models of MiniPod. Update for new MiniPod Editor	23/07/2021
6	2563	General updates	01/11/2021
7	2571	New receiver protocol	08/03/2022

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modulus technology ltd carries out all technical support, servicing and repairs for all companies in the aae technologies group. If you have any technical issues with our products please contact the modulus technology team:

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applied acoustic engineering ltd has made every effort to ensure that the information contained in this manual is correct at time of print. However our policy of continual product improvement means that we cannot assume liability for any errors which may occur.

These written instructions must be followed fully for reliable and safe operation of the equipment that this manual refers to. applied acoustic engineering Ltd cannot be held responsible for any issues arising from the improper use or maintenance of equipment referred to in this manual or failure of the operator to adhere to the instructions laid out in this manual. The user must be familiar with the contents of this manual before use or operation.

1. Introduction to the MiniPod Series

This manual provides the user with information on the installation, operation and maintenance of the MiniPod series and peripherals.

The MiniPod series is a lightweight, ruggedised GNSS receiver / AHRS, designed to survive immersion for use in harsh marine applications where surface positioning is required. The MiniPod provides options for wired and wireless communications.

The interconnect flexibility of the MiniPod allows for wired RS232, RS485 4-wire and RS485 2-wire or alternatively an internal RF module allows for wireless data transfer back to a RFR-101G receiver up to 800m as standard.

The vessel has a PC application interface which allows for received data to be fed via Ethernet or serial interface to the client navigation / logging application.

Variants

Model	GNSS Receiver	AHRS/INS	RF Antenna	Depth Rating	RF Directional Range
BCN-101G	☑	☐	Internal	50m	800m
BCN-101GA	☑	☑	Internal	50m	800m
BCN-101A	☐	☑	Internal	50m	800m
BCN-101G-EXT	☑	☐	External	IP67	2000m
BCN-101GA-EXT	☑	☑	External	IP67	2000m
BCN-103G	☑	☐	Internal	1000m	800m
BCN-103GA	☑	☑	Internal	1000m	800m
BCN-106G	☑	☐	None	6000m	n/a

Note: The above variations are standard models currently manufactured by applied acoustics, if there is any functionality not listed that is desired please contact Technical Support who will be happy to discuss any requirements for your project. The RF Range is a guide only and may vary.

Supplied Parts

- BCN-10*Xxx* MiniPod
- BCN-101G-2002 Mounting Bracket & Hardware
- Subconn Pigtail Connector, Female, 8-Way
- Support Flash Drive

2. MiniPod System Information

The MiniPod is supplied configured ready to go straight out of the box, upon power up the MiniPod will start transmitting a standard $GPGGA NMEA string at 10Hz (default) through both the Primary Port A RS232 (230400,8,N,1) on the bottom end and over the RF link. The GNSS will initiate <60s and the AHRS (when applicable) will start to transmit straight away although will take approximately 120s to settle and provide a stable reading.

A compass calibration should be performed prior to first operation after installation to compensate for magnetic interferences. (Applicable to AHRS versions only)

Due to continual product development and improvement enhanced speed capabilities and data transfer may become available over RF link and this specification is subject to change. For further information and to discuss specific system applications please contact technical support.

The MiniPod can be configured to output GNSS data up to 3 different NMEA data strings at 10Hz transmission rate as standard, the MiniPod is configured using the 'MiniPod Editor App'. This provides configuration options for update rates, NMEA formats, and serial protocols.

Changing communication settings will immediately change the port configuration. Setting the MiniPod incorrectly may result in having to open the MiniPod for a mechanical reset.

Recommended RS485 to RS232 converters - MOXA UPort 1150I/ 1250I/ 1450I Series.

For High Voltage applications using Applied Acoustic Equipment an optional Cable [HVC-3501] and Interface Box [BCN-101G-7024] can be purchased to provide a safe and reliable isolated power supply and RS485 communications from the MiniPod to user interface.

Integrated GPS Receiver

The integrated GNSS receiver is an OEM Hemisphere Phantom 34 unit (P326 for older MiniPod's), configured for dual band L1 and L2 reception plus Multi GNSS providing worldwide reliable positioning coverage utilising the full constellation of positioning satellites.

The receiver can be configured directly to output multiple NMEA and Binary data strings through Port C on RS232 using the PocketMax application from Hemisphere. Link below:-

https://hemispheregnss.com/Resources-Support/Software

Do not change the com port settings of Port A directly on the GPS Receiver, otherwise communications will be lost with the internal micro controller.

Port C is also available for External Corrections to be input through a wired connection which is configurable using PocketMax.

GPS PPS Sync Pulse

The internal hardware supports an optional 1PPS +5V sync pulse output from the GPS module. This can be configured through additional internal hardware to output on the bulkhead connector (pin 6) to synchronise the MiniPod with other user equipment for easy integration and operational control. Please contact technical support for more information.

RF Interface

As standard the MiniPod is fitted with an internal RF antenna, the operating range of the standard internal antenna is typically 800m directional. The MiniPod has been developed to support bi-directional communications via RF link, this allows for RTCM (V3.0) or CMR corrections to be sent over RF for accurate positioning.
Refer to the 'MiniPod Receiver Operation Manual' [RFR-101G-8000] for further information.

Recommended maximum operation is up to 8 GPS Pods operating at 10Hz with a single NMEA position string output. Other NMEA strings can be enabled but these use more bandwidth and 8 simultaneous position strings may not be achievable.

External Antenna Option

An external RF Antenna can be fitted to increase the maximum wireless range back to the receiver or to give full hemispherical communication, without an External RF Antenna the maximum range expected would be approximately 800m providing the antenna faces towards the vessel. Fitting the external directional antenna will increase this to 2000m. Directional and Omni Directional antenna options provided for different coverage applications.

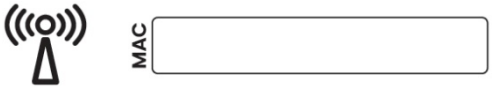
External RF Antenna is not submersible although is suitable for Marine Applications. For surface applications only.

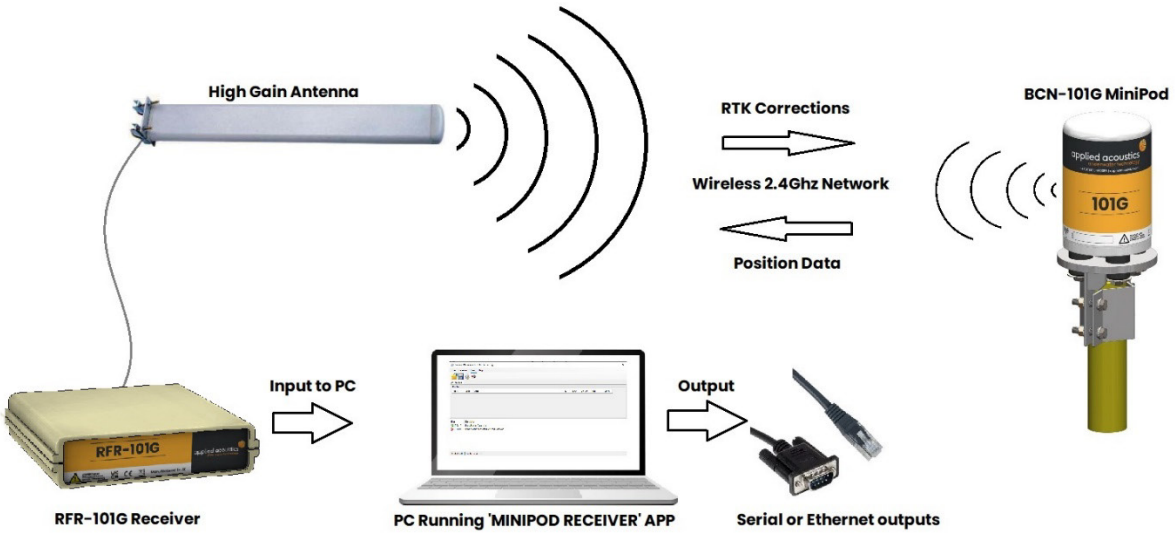
3. MiniPod Installation & Operation

Positioning of the MiniPod

The unit must have a clear unobstructed view of the sky. In particular, large vertical surfaces in proximity above the antenna may cause problems with accurate position determination, due to the signal(s) taking an indirect path.

The RF Antenna is indicated by a notch on the MiniPod Endcap and by an antenna logo on the main housing, as show, next to the MAC address of the MiniPod. This is directional and for the best results the MiniPod should be mounted to align with the receiver.





Ensure the BCN-101G MiniPod internal antenna is in alignment with directional RFR receiver antenna

The directional External RF Antenna must also be mounted facing aligned to the receiver to reach 2Km specification.

The External RF antennas are not pressure rated and should only be used on permanent above surface applications. If submersing the MiniPod the internal antenna can be connected and the external connector output should be fitted with a dummy connector available from applied acoustics to protect the connections.

Connections

	101G/103G standard Configuration of MC-BH-8M			101GA/ 103GA standard Configuration of MC-BH-8M
Pin	RS232	RS485 Full Duplex	RS485 Half Duplex	RS232
1	18-30V DC	18-30V DC	18-30V DC	18-30V DC
2	COMMON GND	COMMON GND	COMMON GND	COMMON GND
3	Port A, RS232, TX. 230400 Baud 8,n,1.	Port A Line 1 +, TX 115200 Baud 8,n,1.	Port A RS485+, Rx/TX 115200 Baud 8,n,1.	Port A, RS232, TX. 230400 Baud 8,n,1.
4	N/C	Port A Line 1 -, TX 115200 Baud 8,n,1.	Port A RS485-, Rx/TX 115200 Baud 8,n,1.	AHRS Port B, RS232, TX. 115200 Baud 8,n,1.
5	Port A, RS232 Rx 230400 Baud 8,n,1.	Port A Line 2 +, Rx 115200 Baud 8,n,1.	N/C	Port A, RS232, RX. 230400 Baud 8,n,1.
6	N/C *	Port A Line 2 -, Rx 115200 Baud 8,n,1.	N/C	AHRS Port B, RS232, TX. 115200 Baud 8,n,1.
7	Port C, RS232, (Tx). 19200 Baud 8,n,1	Port C, RS232, (Tx). 19200 Baud 8,n,1	Port C, RS232, (Tx). 19200 Baud 8,n,1	GNSS Port C, RS232, (Tx). 19200 Baud 8,n,1
8	Port C, RS232, (Rx) 19200 Baud 8,n,1	Port C, RS232, (Rx) 19200 Baud 8,n,1	Port C, RS232, (Rx) 19200 Baud 8,n,1	GNSS Port C, RS232, (Tx). 19200 Baud 8,n,1

*Pin 6 is configured as PPS output when applicable.

The MiniPod requires a constant 18V-36V DC (nominal 24V) and has no ON / OFF switch, connecting power via the bulkhead connector will switch the unit on. Ensure power lines are protected by suitable fuse and from electrical interference.

Port A is the primary data out port and can be configured for RS232, RS485 4 wire and RS485 2 wire communication protocols. (101G Only, If required on 101GA contact tech support)

Port B (AHRS models only) is primarily a calibration communication port to the AHRS module for direct connection to perform a calibration of the magnetic heading. It can also be used as a second dedicated AHRS output.

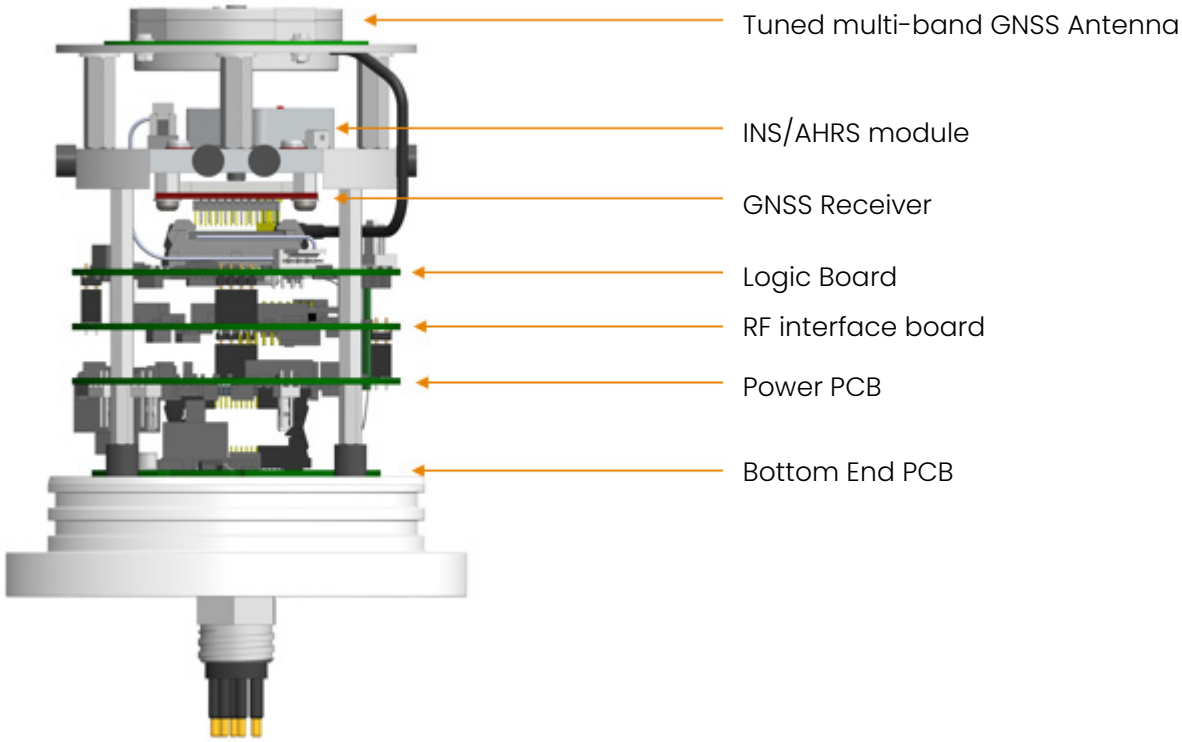
Port C is primarily a diagnostic communication port to the GPS receiver for direct connection for configuration and diagnostics. Port C can also be configured as a differential correction input.

Make electrical connections before attaching mounting bracket. Connection to the unit must be lubricated with silicone gel, otherwise corrosion of the connector will occur, and the MC-IL-8F and locking collar is the compatible connector type to mate to this unit.

If the application has no means of wired power, applied acoustics has a range of external battery packs that can be interfaced to provide a stable DC power supply to the MiniPod.

MiniPod Configuration.

The default configuration of the MiniPod will be delivered as follows:
PORT A, RS232 + RF ENABLED

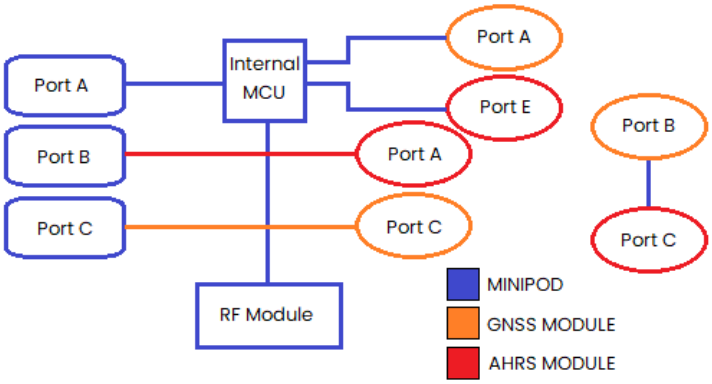


Pin	Configuration of Bulkhead Connector (MC-BH-8M)	RS232 Port A	RF
1	18V-36V DC	Default: 10Hz GGA NMEA or *GPGGA 5Hz & PRDID 5Hz	Default: 10Hz GGA NMEA or *GPGGA 5Hz & PRDID 5Hz
2	GND		
3	Port A, RS232, (Tx). 230400 Baud 8,n,1		
4	N/C or *AHRS Port A, RS232, (Tx). 115200 Baud 8,n,1		
5	Port A, RS232, (Rx). 230400 Baud 8,n,1		
6	N/C or *AHRS Port A, RS232, (Tx). 115200 Baud 8,n,1		
7	GNSS Port C, RS232, (Tx). 19200 Baud 8,n,1		
8	GNSS Port C, RS232, (Rx). 19200 Baud 8,n,1		

*Only applicable to AHRS variants of MiniPod.

Any internal switches should not be changed without instruction from AAE Technologies Group or outside the contents of this manual. The switches are installed for fault finding and test purposes only.

The control of the MiniPod system is set by the on board micro controller using the 'MiniPod Editor'.

Device	Connected	System Diagram
Micro Controller (MCU)	☑	
GPS (If Installed)	☑	
RF Module	☑	
AHRS (If Installed)	☑	

When the MCU is fitted all other devices are controlled via the micro controller and the outputs to the bulkhead connector and to the RF module can be toggled On/Off via software using the 'MiniPod Editor' application through Port A.

Atlas correction service

The Atlas correction service provided by Hemisphere provides standalone L-Band corrections. Atlas achieves instant global sub-meter positioning accuracy, comparable to, and typically more robust than SBAS, since Atlas corrections contain data from multiple available constellations.
The following subscriptions available are:
Atlas Basic – 50 cm 95% (30 cm RMS)
Atlas H30 – 30 cm 95% (15 cm RMS)
Atlas H10 – 8 cm 95% (4 cm RMS)

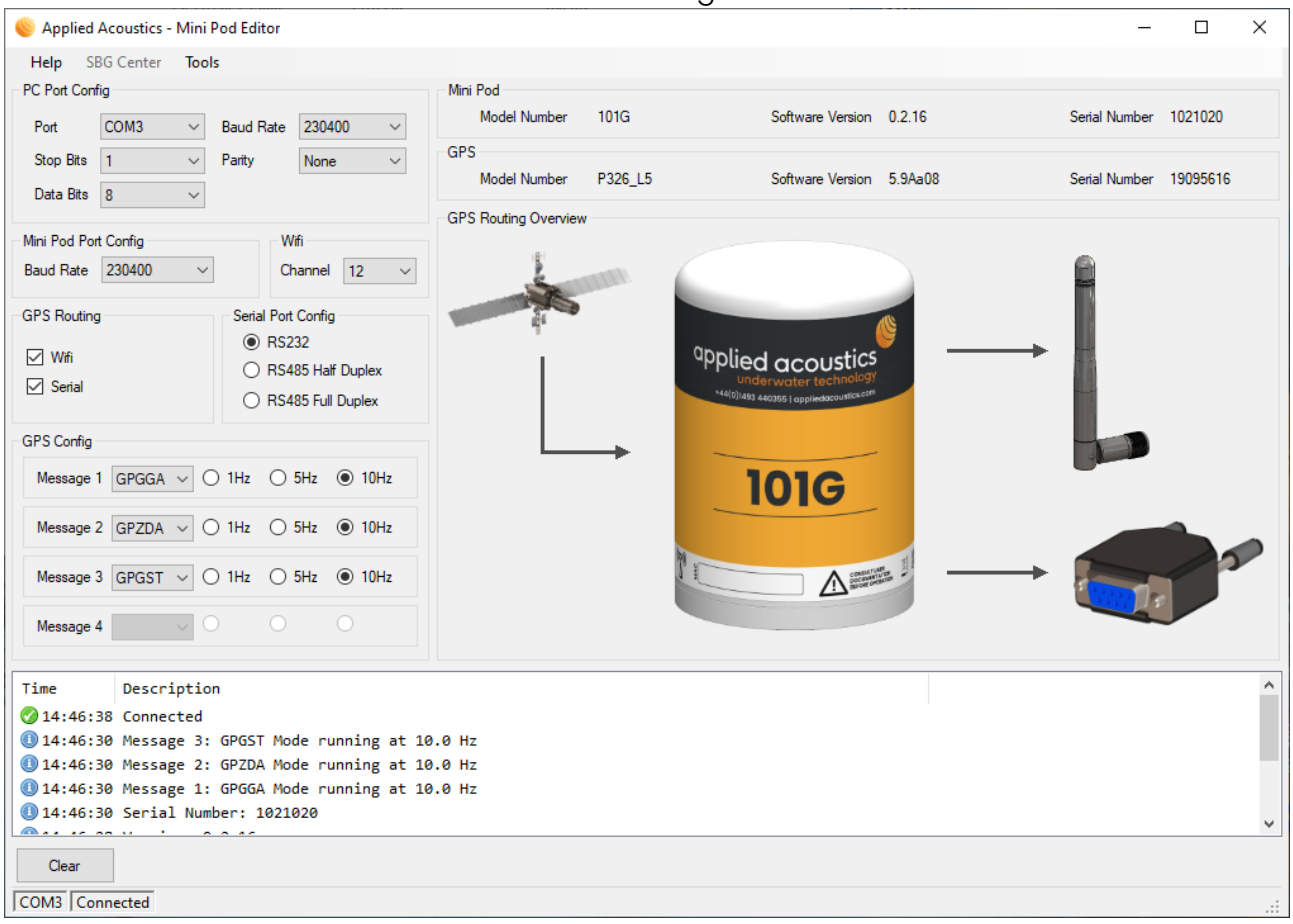
The correction service can be obtained direct from the UK distributor, Saderet.

When installing the subscription code it can be entered using any terminal application and can be sent by either communication PORT A or PORT C as the user desired baud rate, for 10XGA please use PORT C only.

4. Introduction to the MiniPod Editor

Overview

The MiniPod Editor is a software solution to configure MiniPod's.



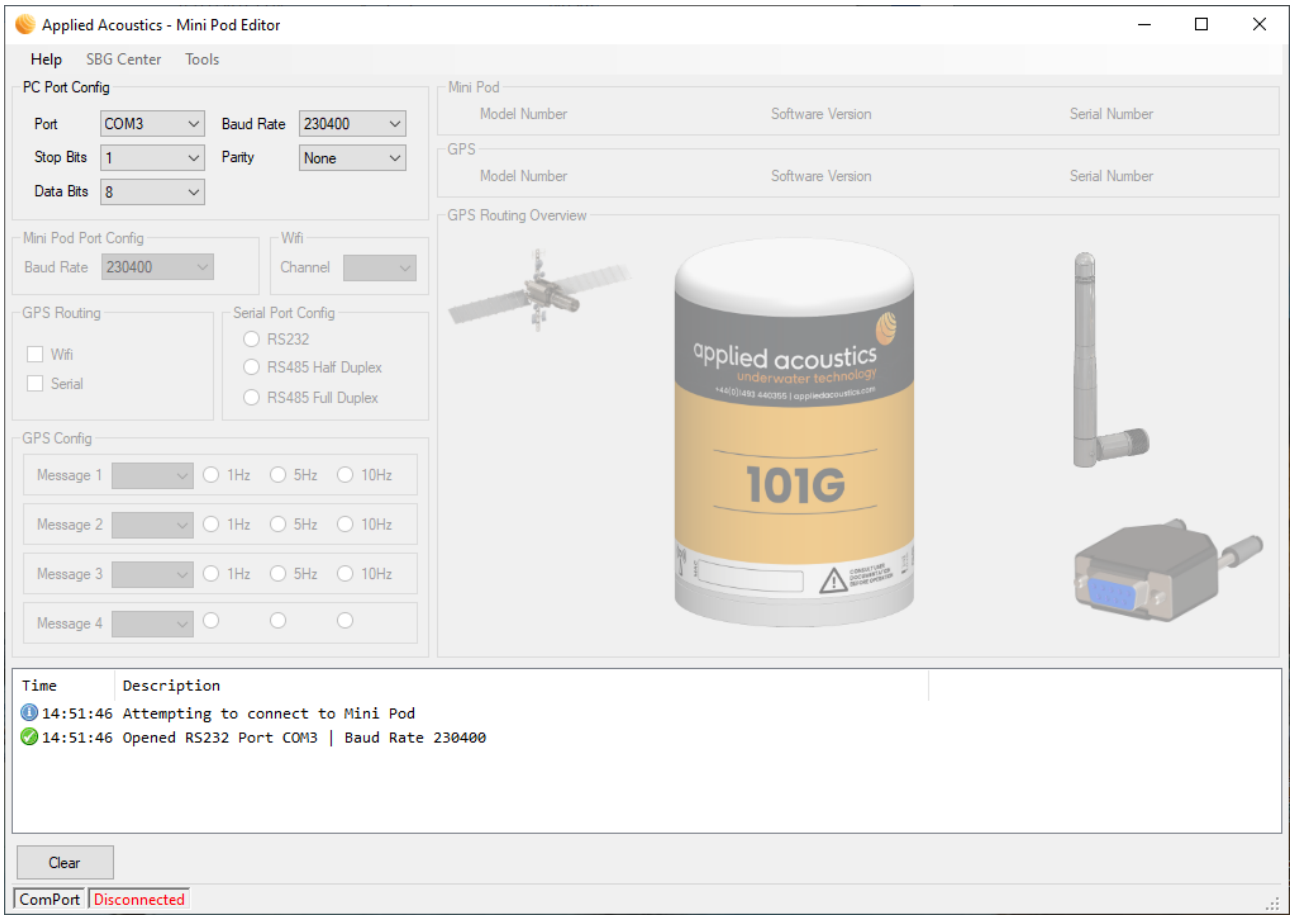
The MiniPod Editor is a Windows based software that connects to a MiniPod via a serial interface and allows configuration of interface and GPS output.

Software Installation

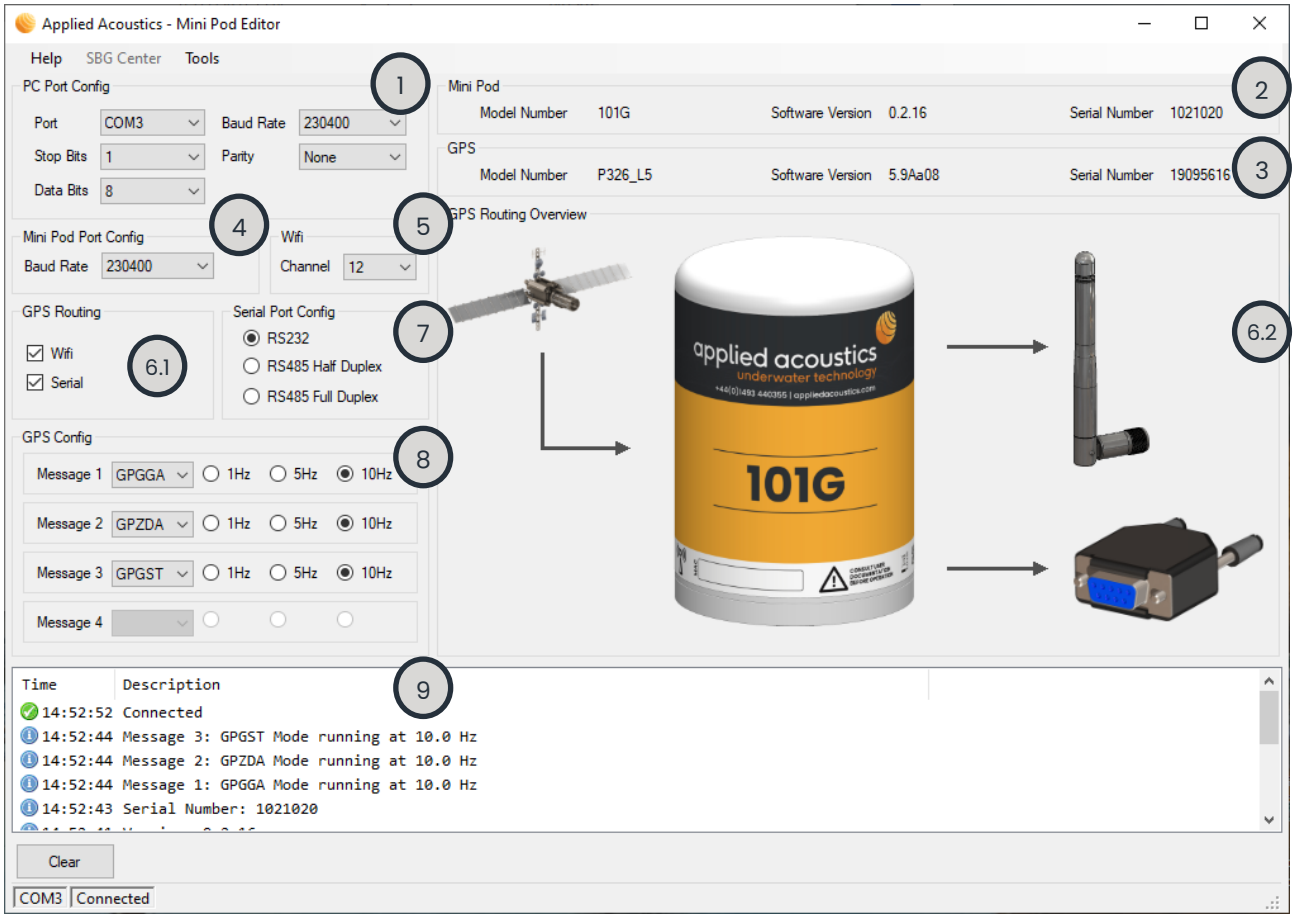
Install the MiniPod Editor Software by running the 'Setup.exe' package supplied.

Software Operation & Initial Configuration

The MiniPod should be connected to the computer using PORT A only, when the 'MiniPod Editor' software is run it will attempt to connect to a MiniPod on the selected installed com port. If no connection is made then the controls will remain transparent to indicate that they are not in use.



Ensure that the correct Port and baud rate has been set for communication, the default is 230400 baud.
When a connection to the MiniPod is made the controls will activate and information will be displayed for model and serial number.



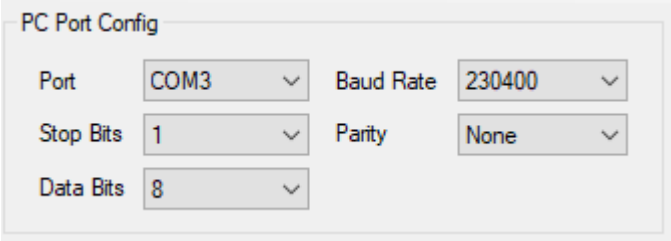
The main window contains 9 areas.

1. PC Port Config: This area is used to specify the port settings for communication from PC to MiniPod.
2. MiniPod Information: This area will display the model number, serial number and software version currently installed in the Mini Pod.
3. GPS Information: This area displays the model number of the GNSS receiver, current firmware and serial number. The serial number will be required when purchasing the Atlas subscription service.
4. MiniPod Port Config: This area is used to set the MiniPod Baud rate.
5. This will set the wifi channel of the MiniPod RF module for configuration of networks.
6. MiniPod Setup: This area is used to configure the MiniPod which is then graphically represented.
7. Serial Port Config: This will change the Port Configuration
8. GPS config: This area shows the current MiniPod data strings that are output via the serial interface. There are 3 strings selectable from the GPS receiver and a further string from an AHRS device which can be enabled or disabled, full control is via SBG centre software supplied with communication through PORT B.

9. System Messages: This area displays system messages including information, warnings, errors and progress messages.

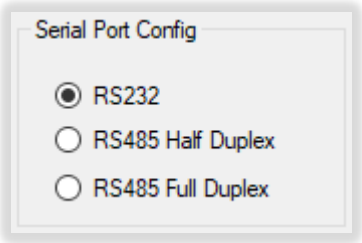
PC Port Configuration

To initiate communications, specify the correct serial port configuration. The 'MiniPod Editor' will continually scan the chosen port for a response from the MiniPod. Once a response is received a system message will display saying "Found MiniPod" the editor will collect all the data from the MiniPod and once received allow full functionality.



Serial Port Configuration

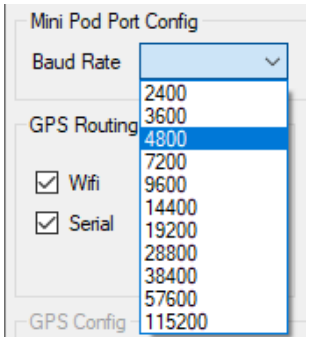
By default, the serial port is configured to use RS232, this can be changed to support RS485 Half Duplex or RS485 Full Duplex.



Please note, once the serial port configuration is changed communication will stop working until the correct hardware is used if this is done by mistake go to section 6 for instructions on manually resetting the MiniPod.

MiniPod Port Configuration

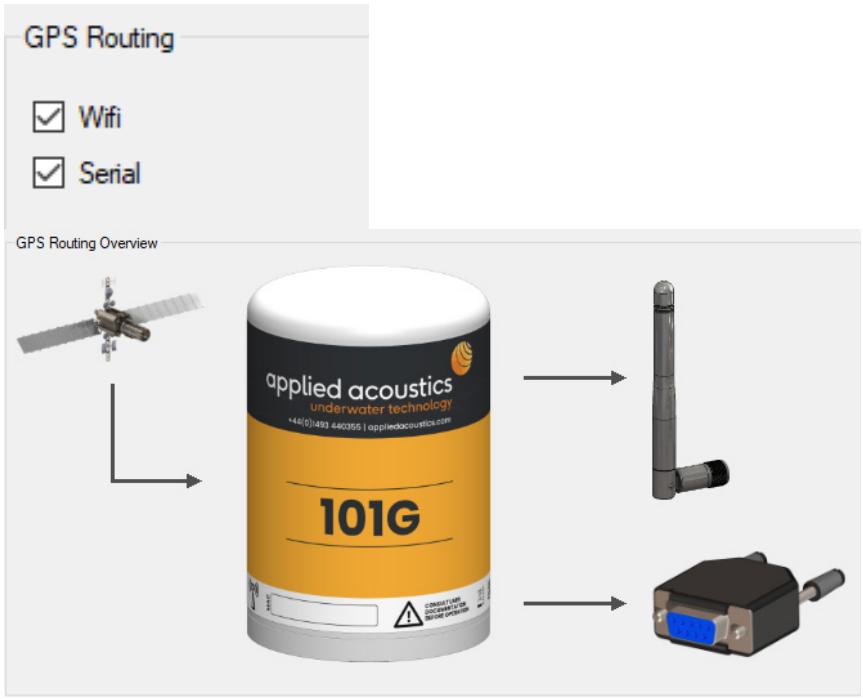
The baud rate for the MiniPod communication PORT A can be set by the drop down box, once a selection has been made the MiniPod will change settings and the correct baud rate will automatically change to re-establish communications.



Changing baud rate of the MiniPod will result in less data being able to be sent so the maximum GNSS frequency may not be achievable.

GPS Routing

The current GNSS output path will be selected by the GNSS Routing checkboxes and indicated by the GNSS Routing Overview. The GNSS output can be configured to use both WiFi and serial, WiFi only, serial only or to have no output.

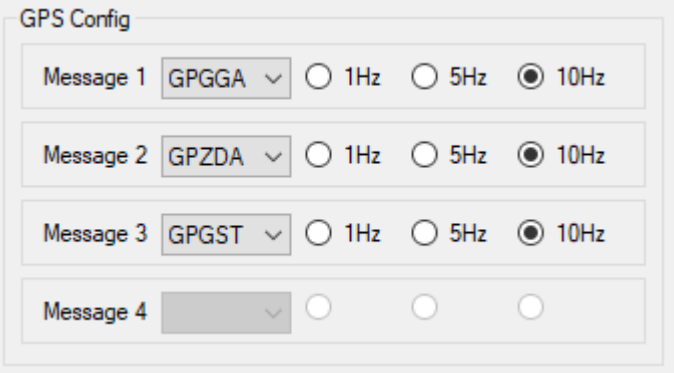


Wi-Fi Channel

This is individual to each MiniPod and must be set to correspond with the receiver Wi-Fi channel. Up to 11 separate channels are available use for network management of multiple MiniPod's and RFR receivers and to avoid any clashes with other Wi-Fi band equipment on board the vessel. Please see the RFR manual for further information.

GNSS Configuration

The GNSS receiver is configurable through the MiniPod editor when up to 3 NMEA strings can be enabled,
Message 1; allows selection of a position string (GGA, GGL, RMC)
Message 2; allows for a timing string to be enabled
Message 3; allows for a data quality string to be enabled
Message 4; allows for a Heading/ Pitch & Roll string to be enabled, if applicable hardware is present.



Please note, when a GNSS command is sent to the MiniPod it will require a moment to save the GNSS settings. If power is removed from the MiniPod during this time the GNSS setting will not be saved. A system message will be displayed once saving is complete.

If additional data strings not displayed are required such as simultaneous GGA and RMC please contact technical support for further advice.

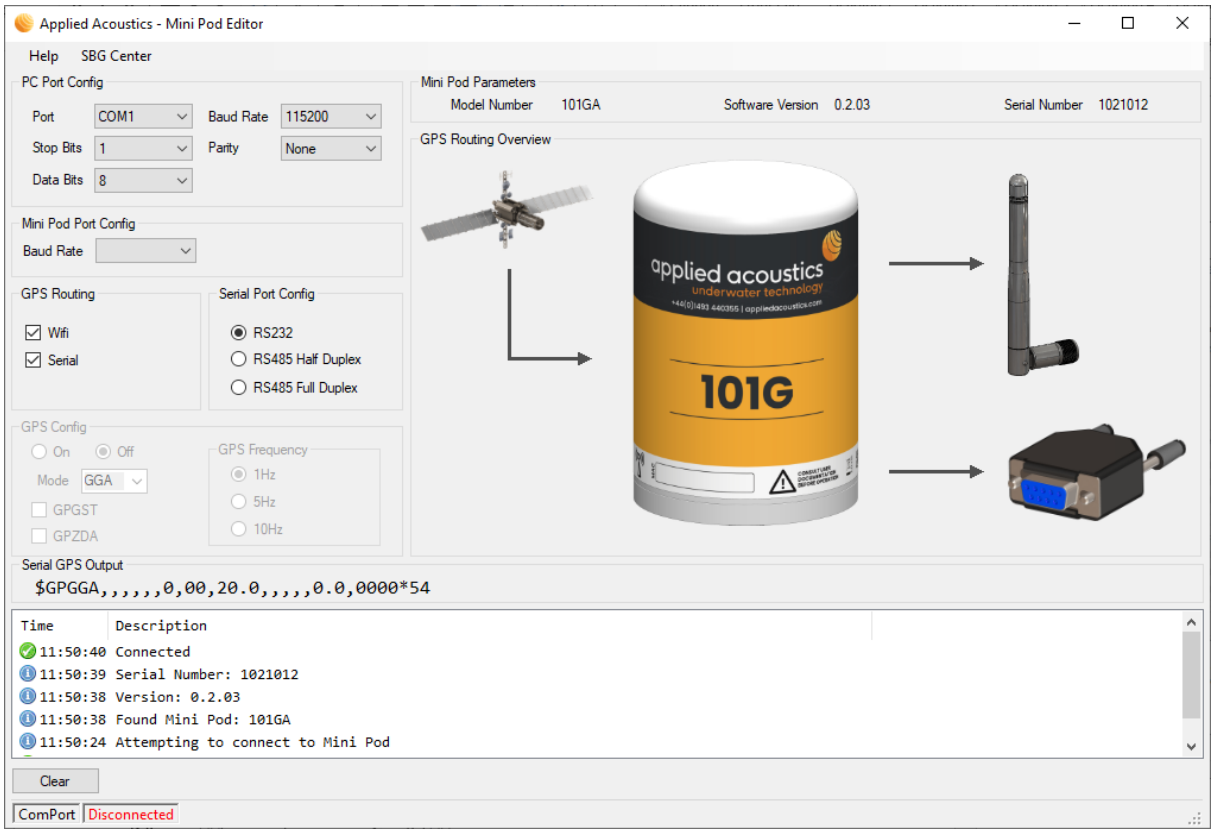
5. MiniPods fitted with INS/AHRS.

Overview

MiniPods that are fitted with INS/AHRS must be calibrated and configured by a separate SBG application through PORT B, the SBG application is delivered ready to install on the support flash drive and must be installed seperately. The MiniPod communications differ from the standard MiniPod configuration and do not allow configuration for RS485 connections as standard.

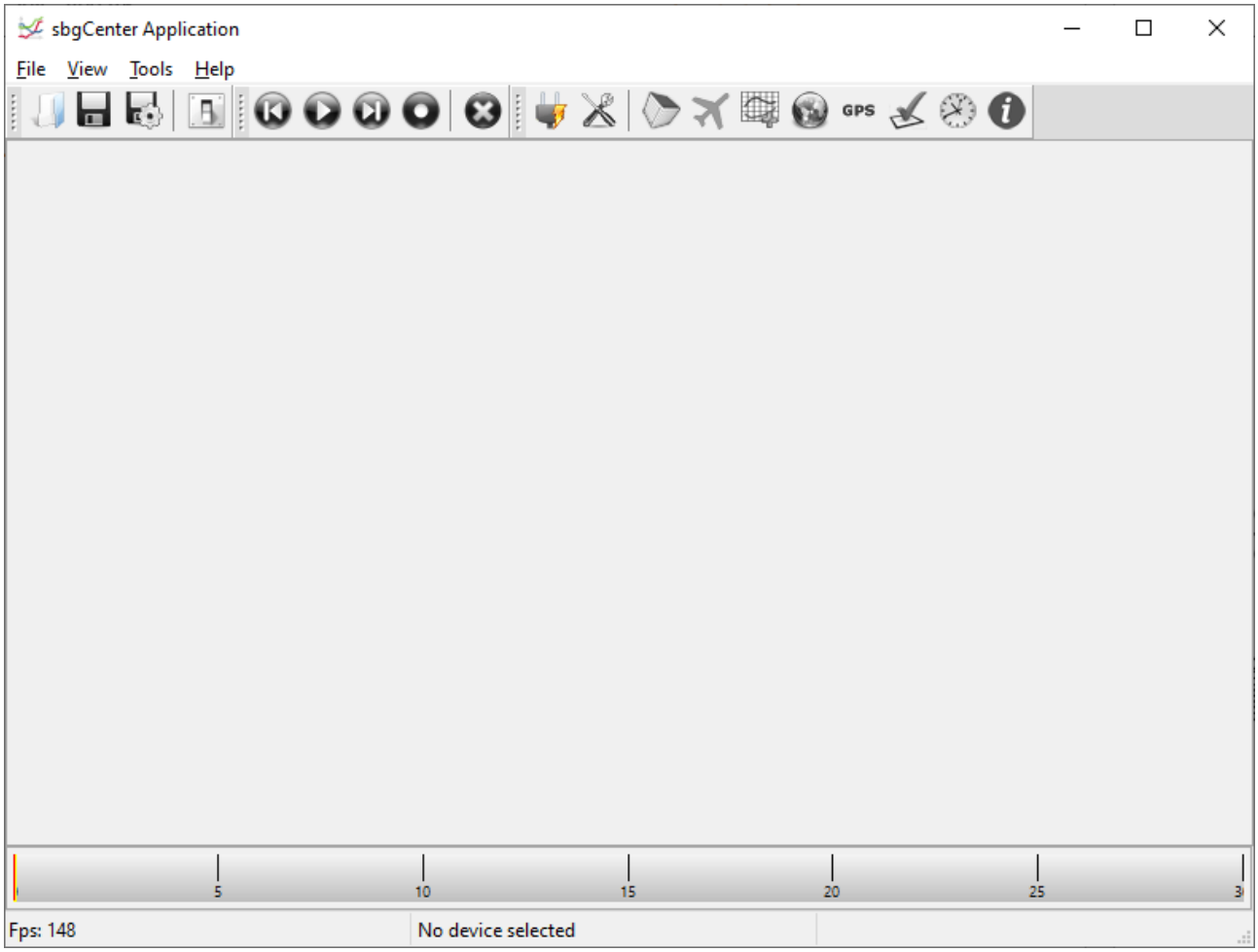
When an 'A' suffixed MiniPod is connected then an additional datastring will become available allowing the toggling ON/OFF of the AHRS string output.

The positioning NMEA strings should not be used for the 101GA unless using for INS purposes, which is not recommended. The MiniPod with AHRS is only recommend for use with the following data strings: HDT, PRDID, PSBGI, PASHR, TSS1, KVH

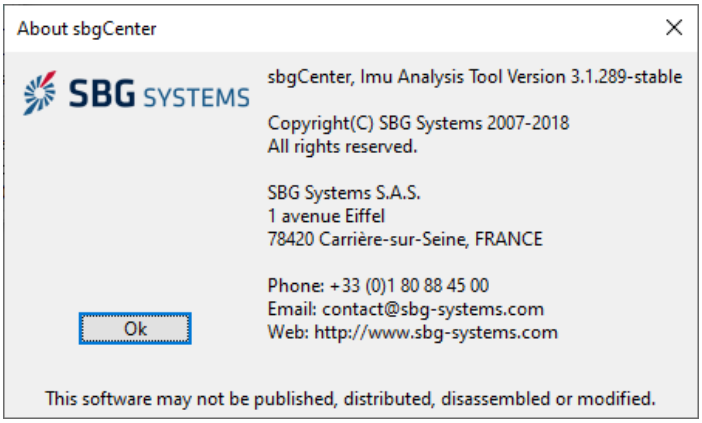


Setting up communications

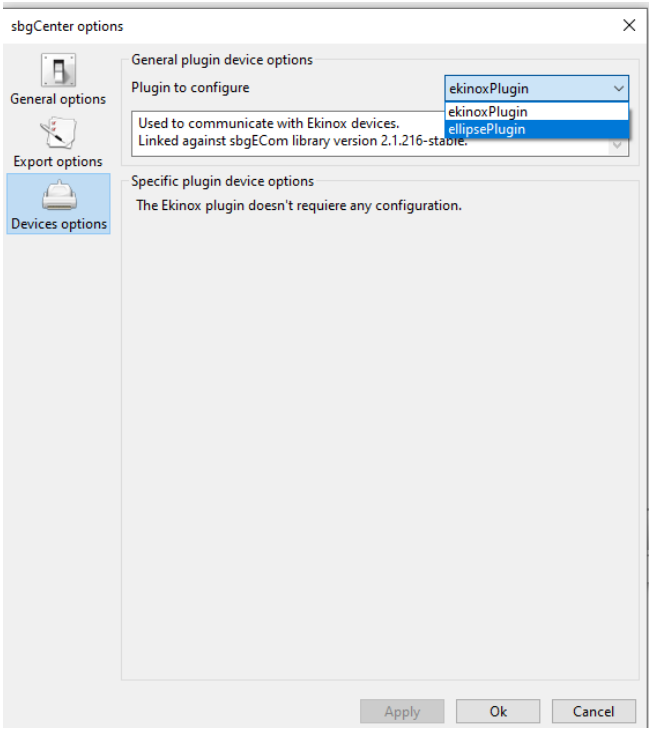
When SBG Center first opens the following screen will be displayed.



Press 'F2' ensure the SBG version is V3.1.289-stable or newer. Older versions will not operate.

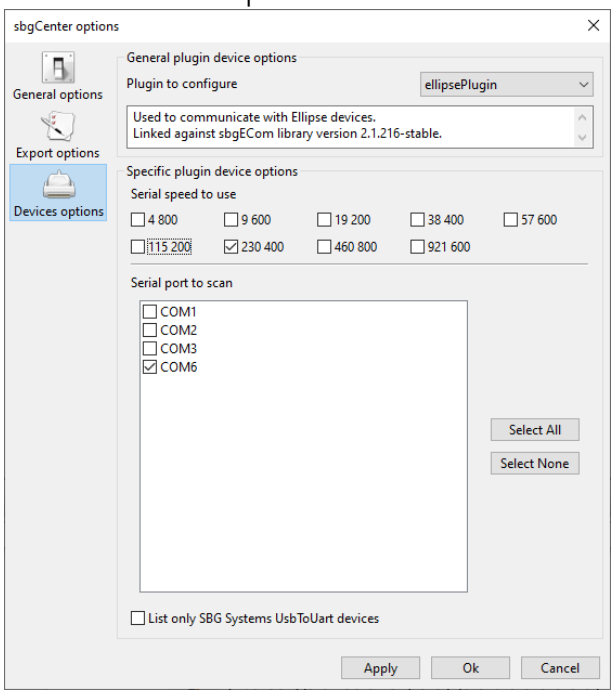


Press the light switch Icon 



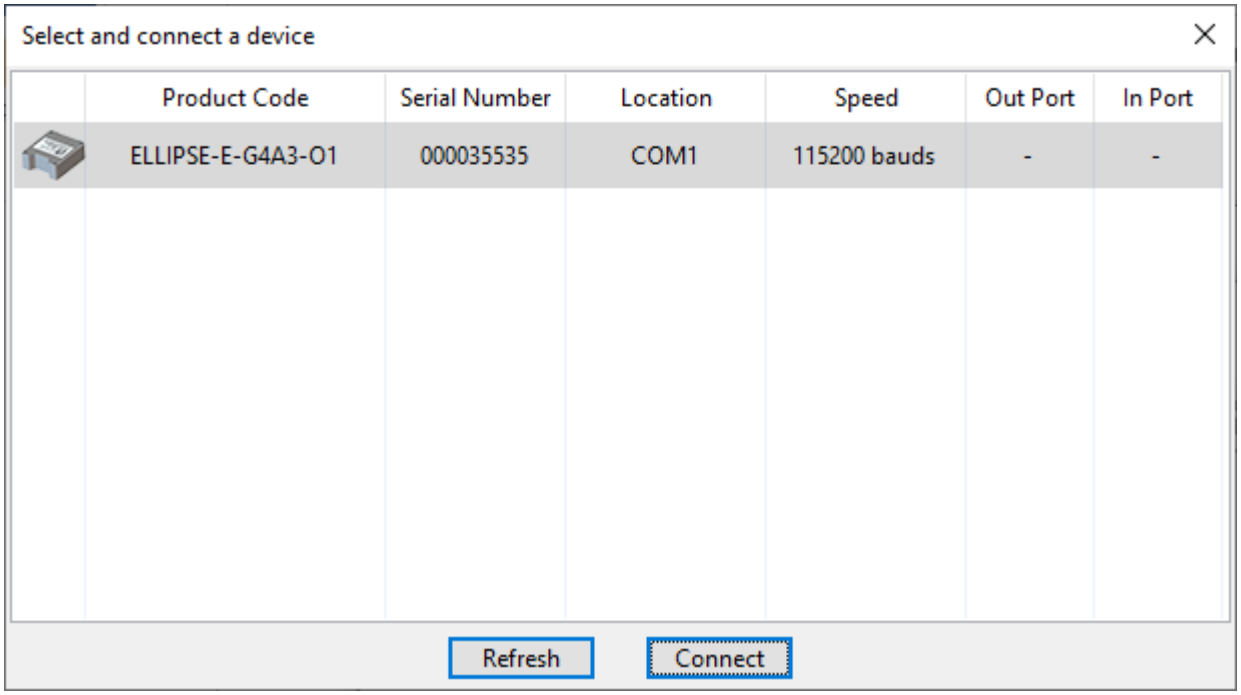
On the first configuration of the SBG center the communications will have to be set up. To do this go to device options and change 'ekinox plugin' to 'ellipse plugin'.

Untick the list only SBG systems UsbToUart device box at the bottom and select the communication port that the MiniPod is connected to. Leave baud rate 115200 ticked.

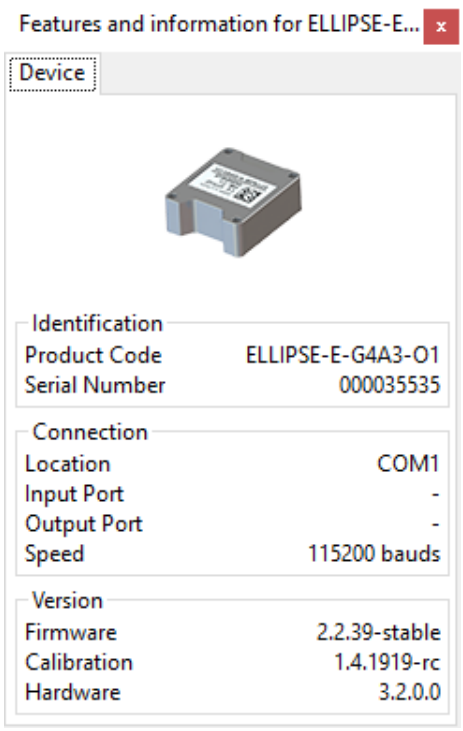


Click 'Apply' followed by 'Ok'

From the main tool bar connect to the target by pressing the power cord icon. 
This will display the below window clicking 'Refresh' will search for and then display the target module to connect to. Click 'Connect'.



After successful connection the full details of the device will be displayed.

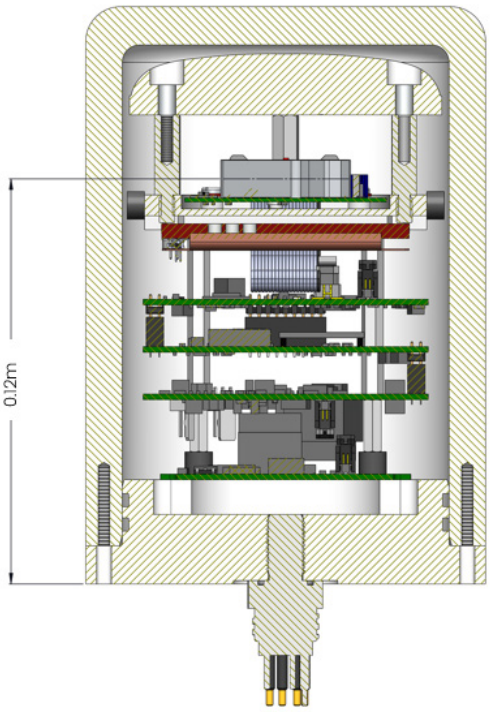


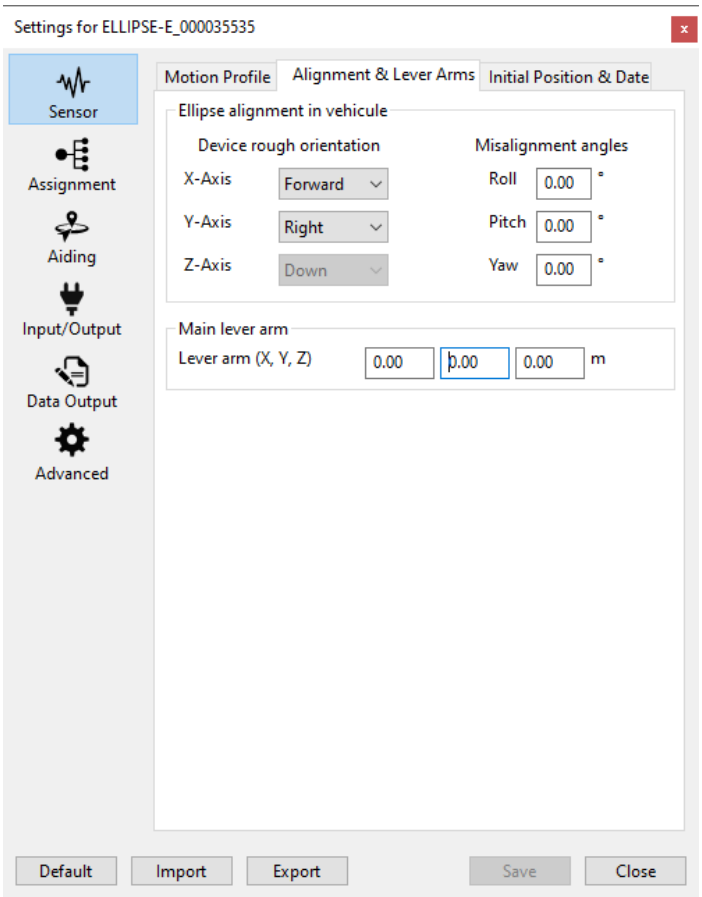
Installation & Output Configuration

The MiniPod can be configured by using the tools icon  this will after a short pause open a configuration window.

DO NOT CHANGE SETTINGS OUTSIDE THE SCOPE OF THIS MANUAL OR WITHOUT EXPLICIT INSTRUCTION FROM AAE TECHNOLOGY GROUP PERSONNEL DOING SO MAY RESULT IN THE MINIPOD HAVING TO BE RETURNED TO THE FACTORY TO BE RESET.

When mounting the MiniPod on a vehicle the point at which the motion is required may not be the point at which the MiniPod is mounted for best GNSS reception. Under the Alignment & Lever Arms tab of the sensor the installation offset of the MiniPod can be entered the internal location of the INS module is 0.12m which should be added to any z measurement measured from the base of the MiniPod. Please see section 15 for full internal offsets.

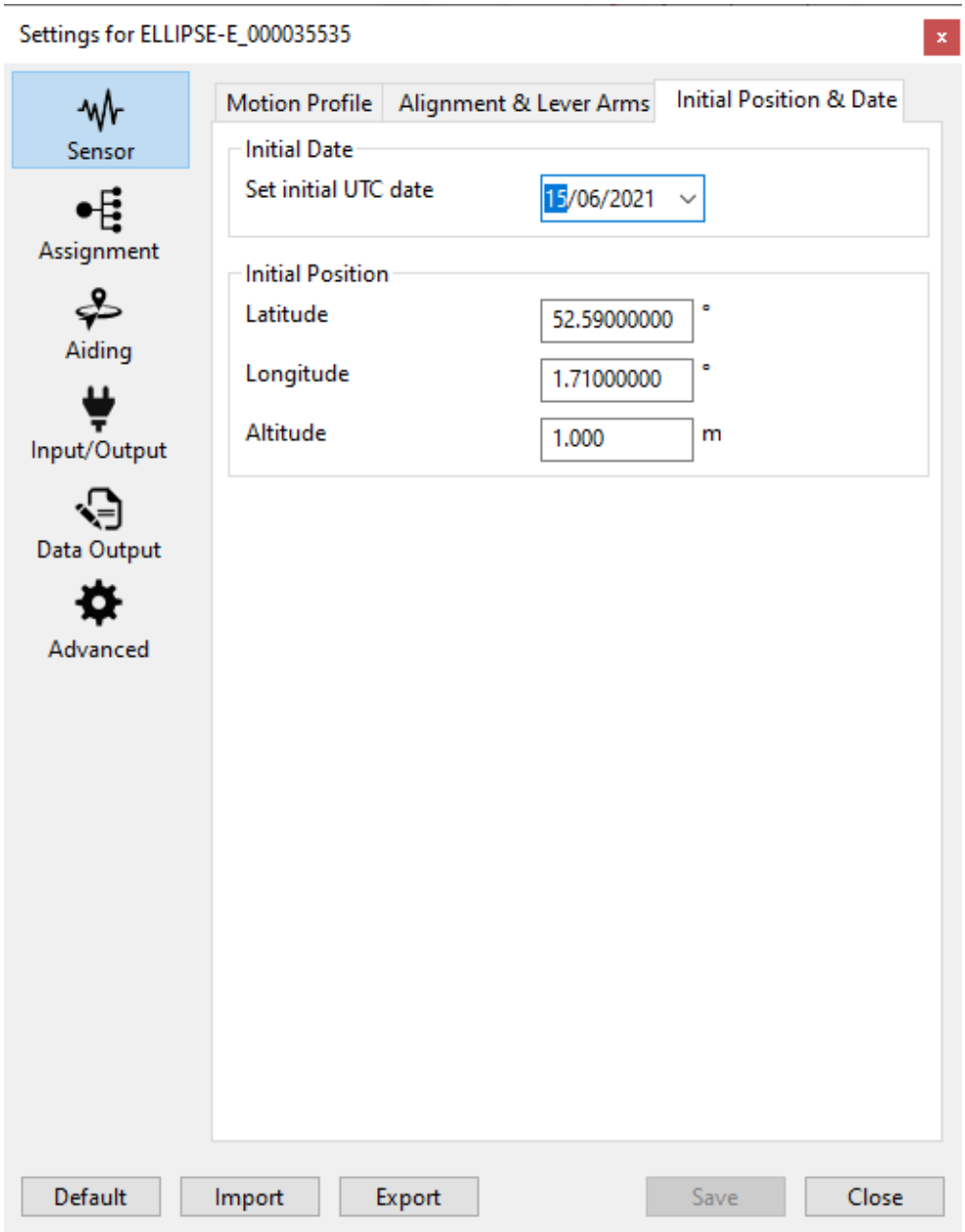




Measurements values for each of the positions are as below:
X Axis = Positive Forward, Negative Aft.
Y Axis = Positive Starboard, Negative Port.
Z Axis = Positive Down, Negative Up.

The notch on the front of the MiniPod Indicates the forward reference of the MiniPod, if this point is mounted offset to forward motion then the Yaw alignment should be entered, this is only the fixed installation offset and should be aligned within 1°, magnetic declination offsets will need to be applied to any output data string.

Initial position and date does not need to be changed or configured for MiniPod's fitted with GNSS. Only on MiniPod's with standalone AHRS will this need to be set to compensate for magnetic declination at each geographical location



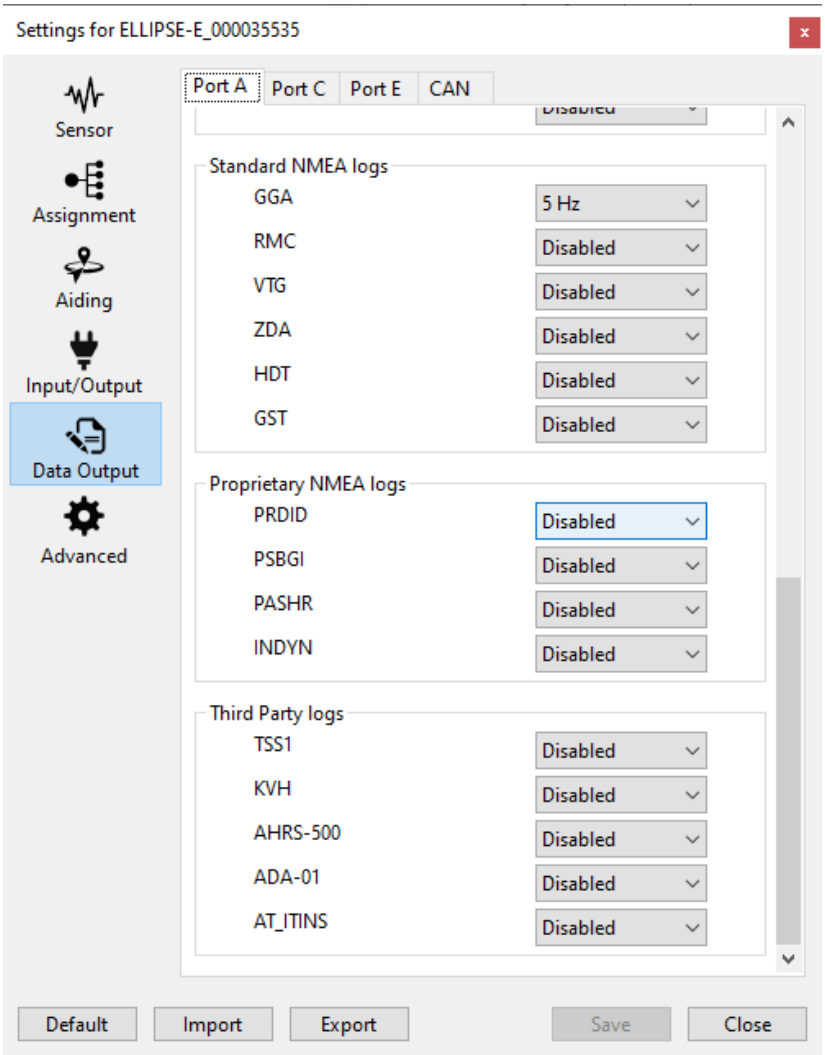
To configure the Data Output from the compass to the Wifi/Serial select the Data Output tab on the left hand side.

For output over the RF Port E should be configured, ensure NMEA strings only are output. Scroll to the bottom of the page where the standard NMEA strings are displayed. Any of these strings can be turned on to output. For BCN-101GA as standard GGA@5Hz providing the corrected GNSS position and HDT@1Hz will be active.

Do not turn on binary data strings, unless for diagnostic purposes while use SBGcenter. Having binary data strings turned on for normal MiniPod operation may cause the unit to fail and require return to the factory to be reset.

Ensure that the bandwidth capabilities when transmitting over Wifi are not exceeded. We only recommend 1 data string operating at a maximum frequency of 10Hz with other data strings operating at 1Hz, or 5Hz on 2 data strings.

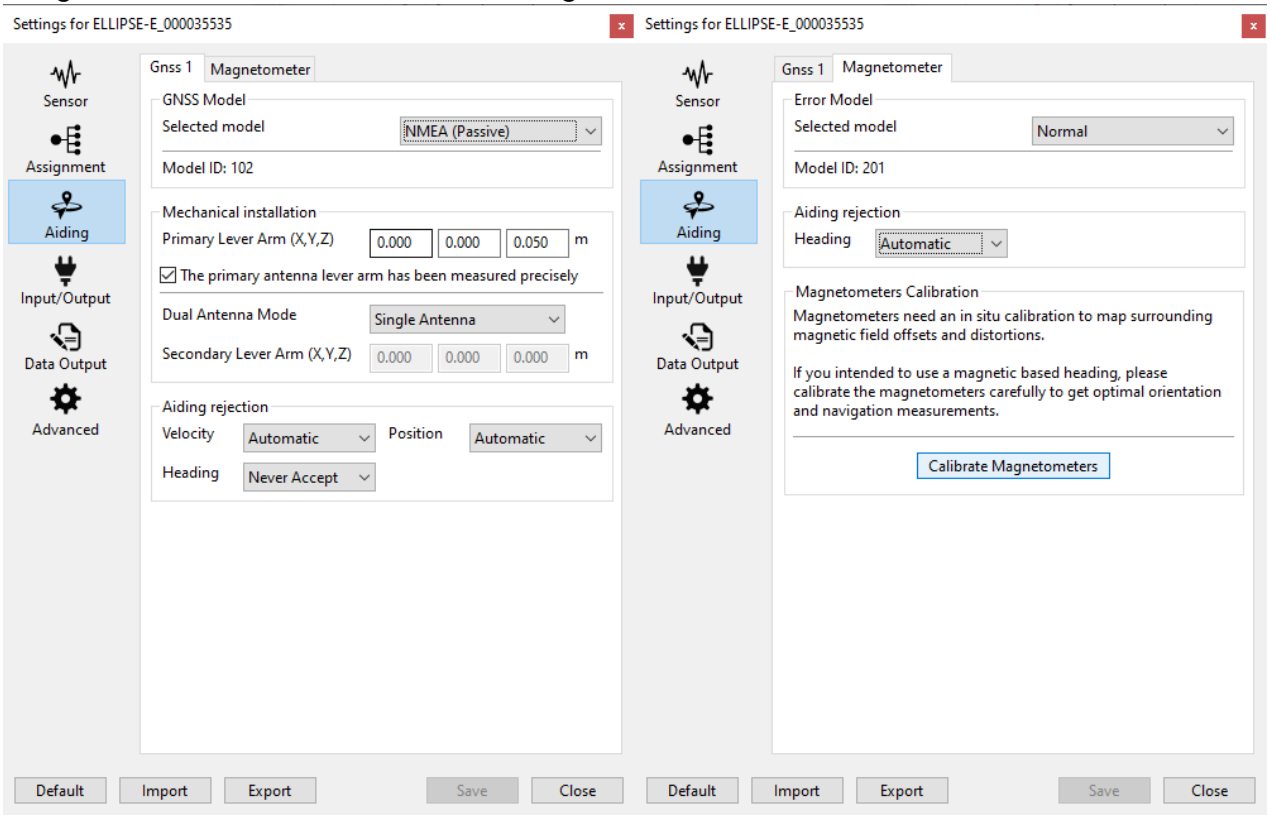
The positioning NMEA strings should not be used for the 101GA unless using for INS purposes, which is not recommended. The MiniPod with AHRS is only recommend for use with the following data strings: HDT, PRDID, PSBGI, PASHR, TSS1, KVH



Calibration

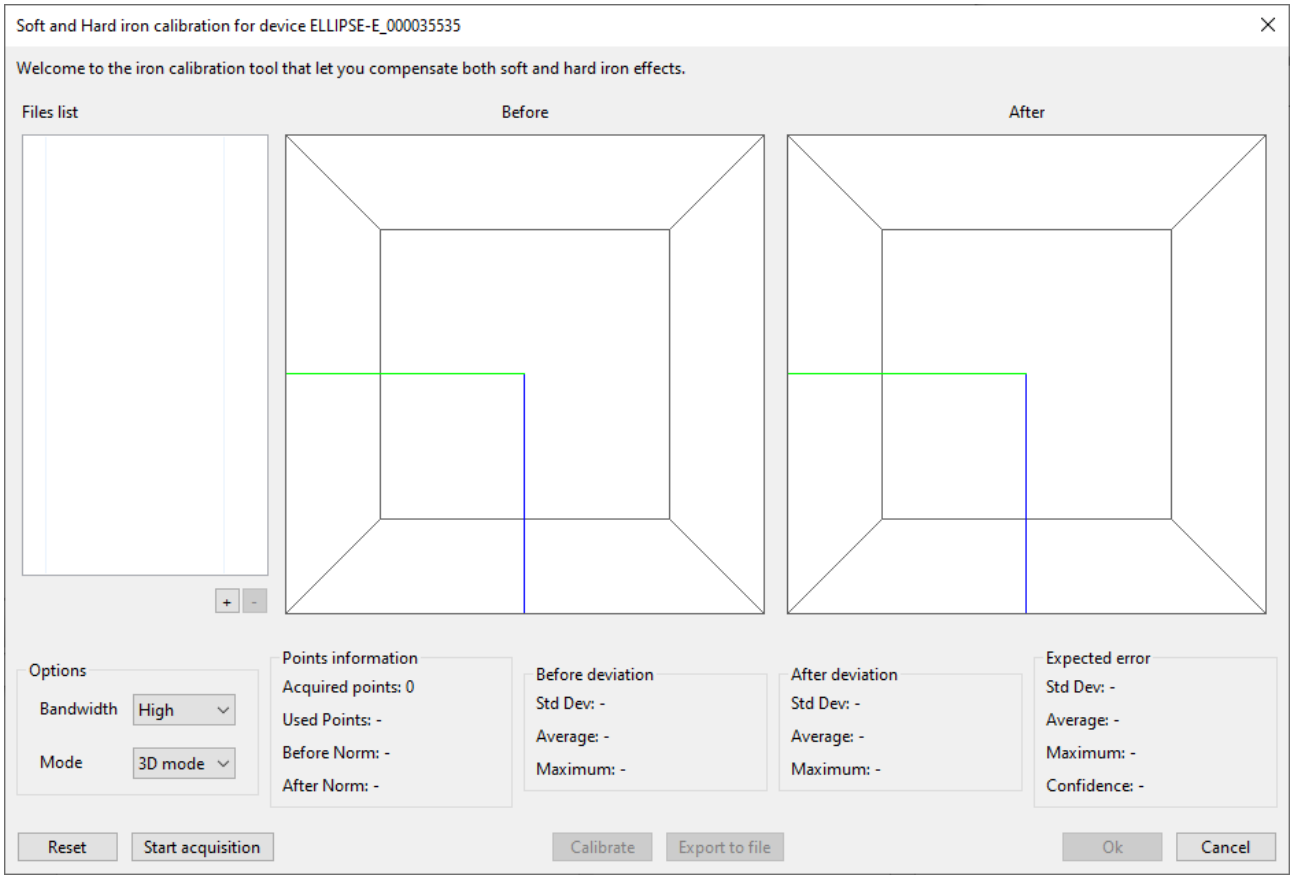
The MiniPod is factory calibrated when built to compensate for any local magnetic interference and to ensure the proper operation of the INS and magnetometers. The MiniPod will require calibration when installed on any new piece of equipment with a large metallic signature. But does not require calibration if just being moved from one geographical location to another.

To initiate a calibration click on the 'Aiding tab' on the settings menu. The 'GNSS 1' ribbon should not be changed and should appear as shown below left. Click on the 'Magnetometer' ribbon shown below right.



Ensure that the model is set to normal and the heading is set to automatic then click 'Calibrate Magnetometers'.

The calibration window will open:



Bandwidth should be left on High and the Mode where possible set to 3D when ready click the start acquisition button to start the magnetometer readings.

Magnetic calibration for marine applications

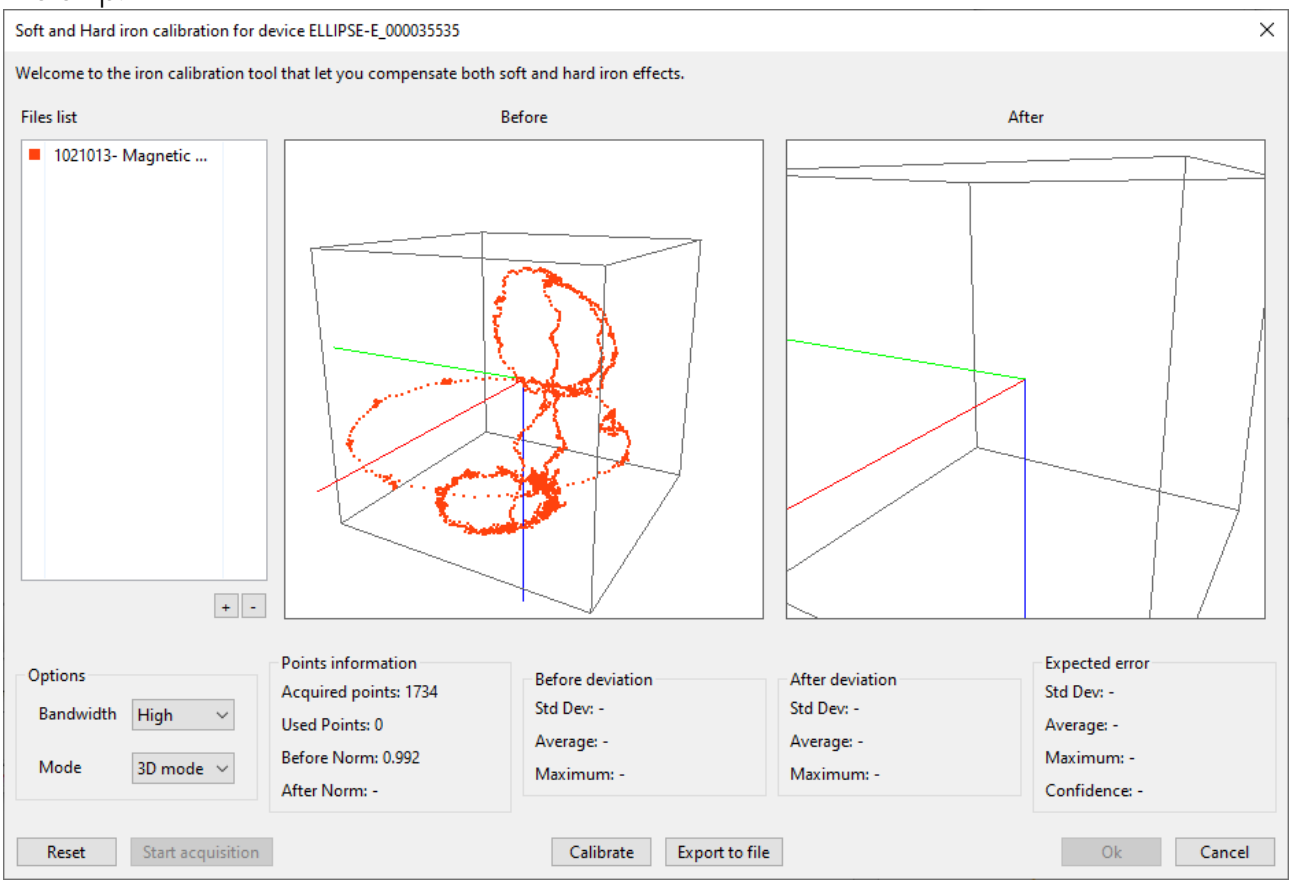
When magnetometers are used as heading reference, a magnetic calibration is mandatory for normal sensor operation. Different calibration methods are provided, depending on accuracy or ease of use requirement.

Large ship calibration

In case the boat is a heavy ship and it is not possible to move it by hand, it will be necessary to calibrate the magnetometers while cruising. The goal will be to collect data in every direction, so you will have to make a 360° with the ship (the turn radius and speed does not matter).
You should prefer a 3D calibration if your boat can heel, if not then a 2D calibration should be done.

Navigate in an 8 shape pattern, so you will be able to capture points in the Y-axis while heeling slightly on both sides. It doesn't need to be a critical angle, 20° would

be enough for instance, and it has to be representative of the usual behaviour of the ship.



Check that the 3D method is used (in case of very large ship, or when the roll/pitch angles could not be changed significantly during calibration, a 2D method can be used). Press "Calibrate" and check calibration results.

Light boat calibration (ASV, ROV, AUV)

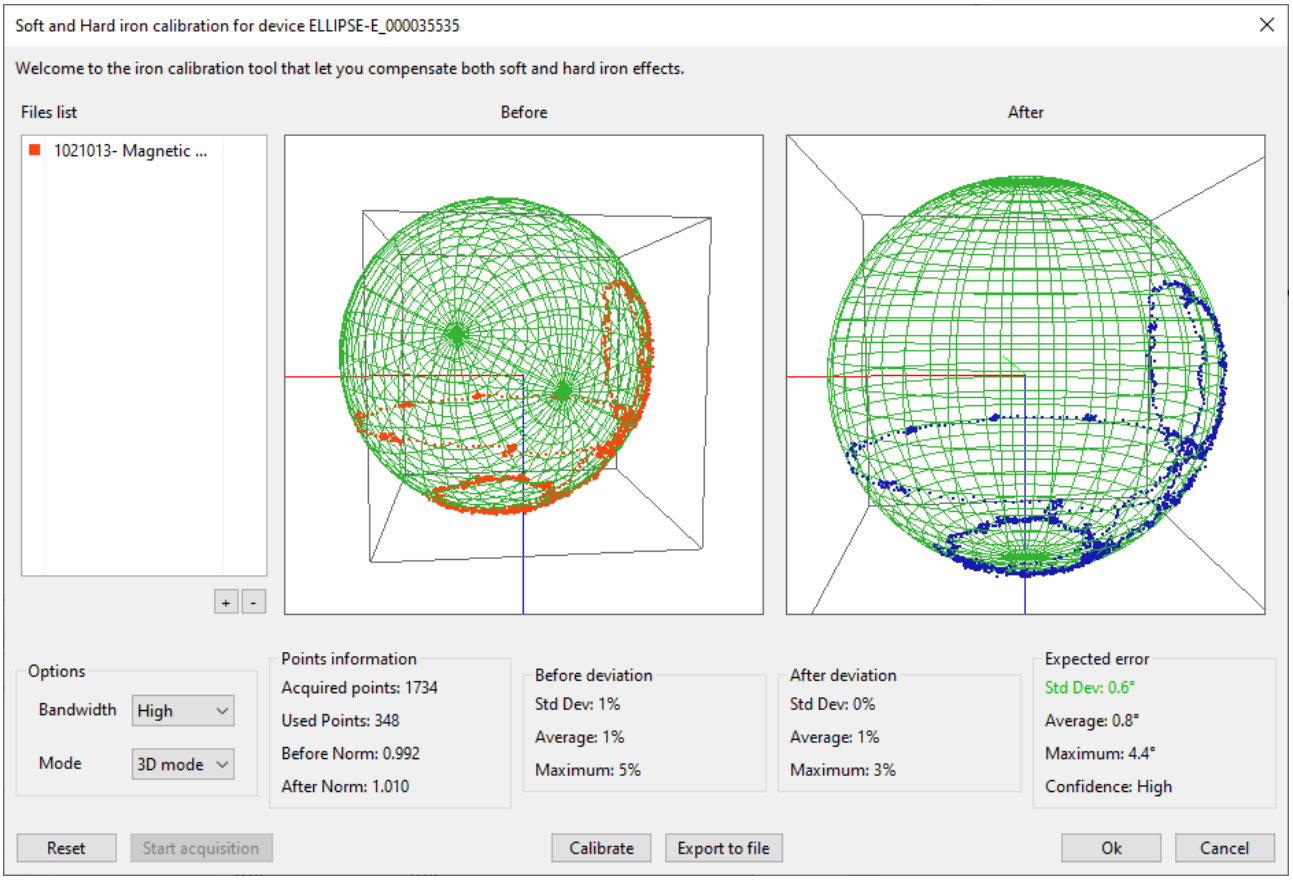
As long as a boat is light enough to be held by a few persons (especially unmanned vehicles), a 3D calibration, made on the ground is to be preferred. The basic procedure remains the same, and you should just rotate the system in as much orientations as possible.

Calibration Results

The Calibration should display results plotting the motion of the magnetometers onto a sphere. (Motion of a vessel will look very different to the below factory calibrated motion.)

For a good calibration we are looking for the After Norm value to be **1.000 ±0.01** the expected error of standard deviation should be below **1°.**

If the calibration results are not within this specification then the calibration should be repeated by pressing the reset button.



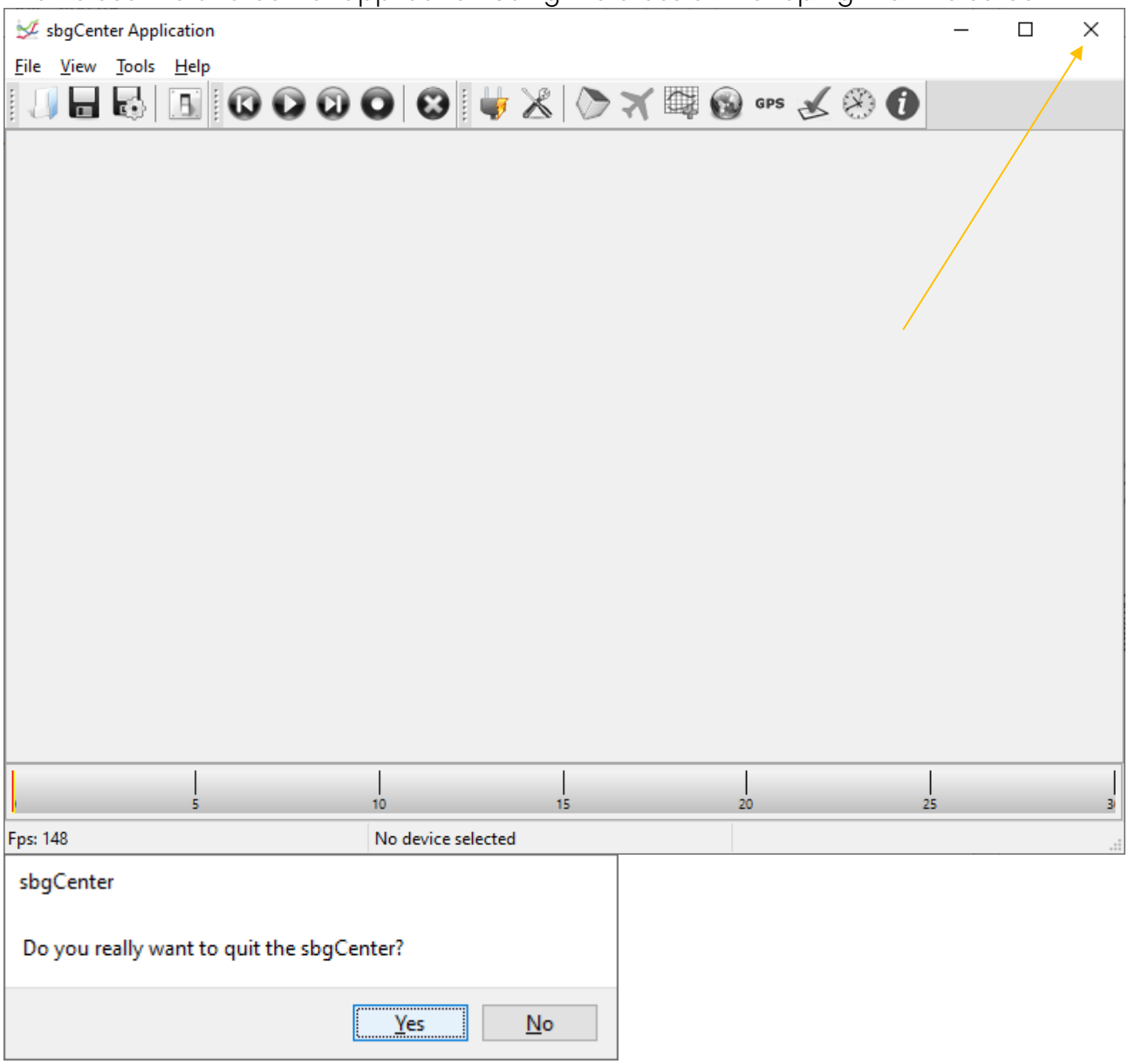
If results are satisfactory then the 'Ok' button should be clicked to save the calibration.

We recommend exporting the calibration to file before saving the calibration. This allows for any problems in calibration to be diagnosed.

Once the Calibration has been saved, do not turn off.

You must exit the 'SBG center' by disconnecting the MiniPod, first click the power cord icon.

Then close the SBG center application using the cross at the top right of the screen

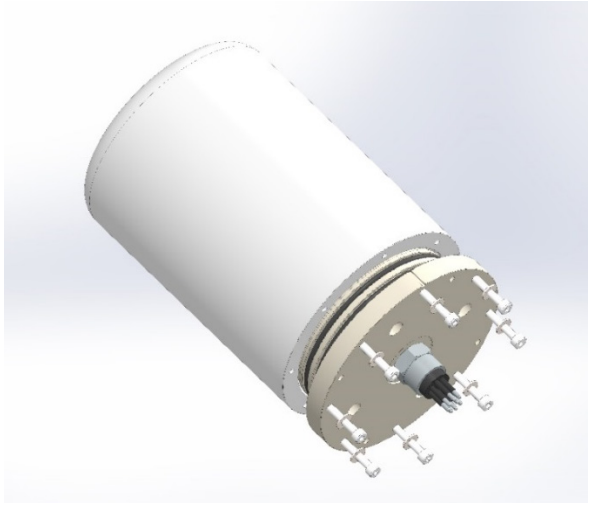


The MiniPod is now ready for operation. Power should be cycled to ensure the calibration has taken effect.

6. Fault Finding

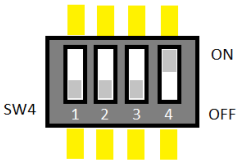
Internal Switch Configuration

To force the unit into RS232 communications for fault finding purposes, or if communications have been changed by mistake, the unit must be removed from its subsea housing. There are 8 screws that should be removed as shown, 4 jack off screw locations are positioned to aide removal of the housing.



Once open the switches on the logic PCB need to be configured to bypass the initial Micro controller setup.
SW3-4 and SW4-4 are the only ones used.
At power on these switches are scanned and if set to 'ON' will override the internal settings.

SW3-4	SW4-4	Function
Off ↓	Off ↓	USE INTERNAL SETTINGS
Off ↓	On ↑	SET RS485 230400
On ↑	Off ↓	SET RS232 230400
On ↑	On ↑	Factory Reset



- To reset the configuration to factory default, with power removed, set both switches to 'ON' and power up the unit. All settings will be set to default. (see MiniPod Configuration)
- Wait >60s.
- Remove power and change switches both to 'OFF'
- Power on the unit and factory default communications will be set.
- Resume using 'MiniPod Editor' Application.

If only certain hardware is available RS232 or RS485 may be set by using the other switch configurations.

The following commands will then be required to be sent to set the MiniPod to the desired communications before changing the switches to enable use with the 'MiniPod Editor' again.

Configuration Command $MP,SPS

To configure the MiniPod bulkhead Port A in RS232 / RS485 (Full Duplex) / RS485 (Half Duplex) the $MP,SPS command can be sent to the micro controller.

Note: this is not available with the 101GA Please contact technical support for assistance.

Bulkhead Port A configuration	Command Data String
RS232	$MP,SPS,1110001000110000:?
RS485 4-wire (Full Duplex)	$MP,SPS,1111101000110000:?
RS485 2-wire (Half Duplex)	$MP,SPS,0011101000110000:?

Configuration Command $MP,SPC

The MiniPod bulkhead Port A parameters can be user configured by sending the $MP,SPC string and is terminated by a carriage return and line feed.
Command: (Eg. $MP,SPC,ON,RS485,1,19200,8,None,1:?)

$MP,SPC,ON,RS485,x,nnnnn,l,p,b:?CL

String code	Description	User Configuration
$MP,SPC	String Header Identifying the Mini Pod followed by setup port configuration	N/A
ON	Telling the MCU this is active.	DO NOT CHANGE
RS485	Identifying Bulkhead Port A	N/A
x	Not Used	Default 1
nnnnn	Baud Rate	Set between 9600 to 115200
l	Character length	Set 7 or 8
p	Parity	Set 'None' or 'Even' or 'Odd'
b	Stop Bits	Set Value 1 or 2
C	Carriage return (CR)	N/A
L	Line Feed (LF)	N/A

Configuration Command $MP,RVN

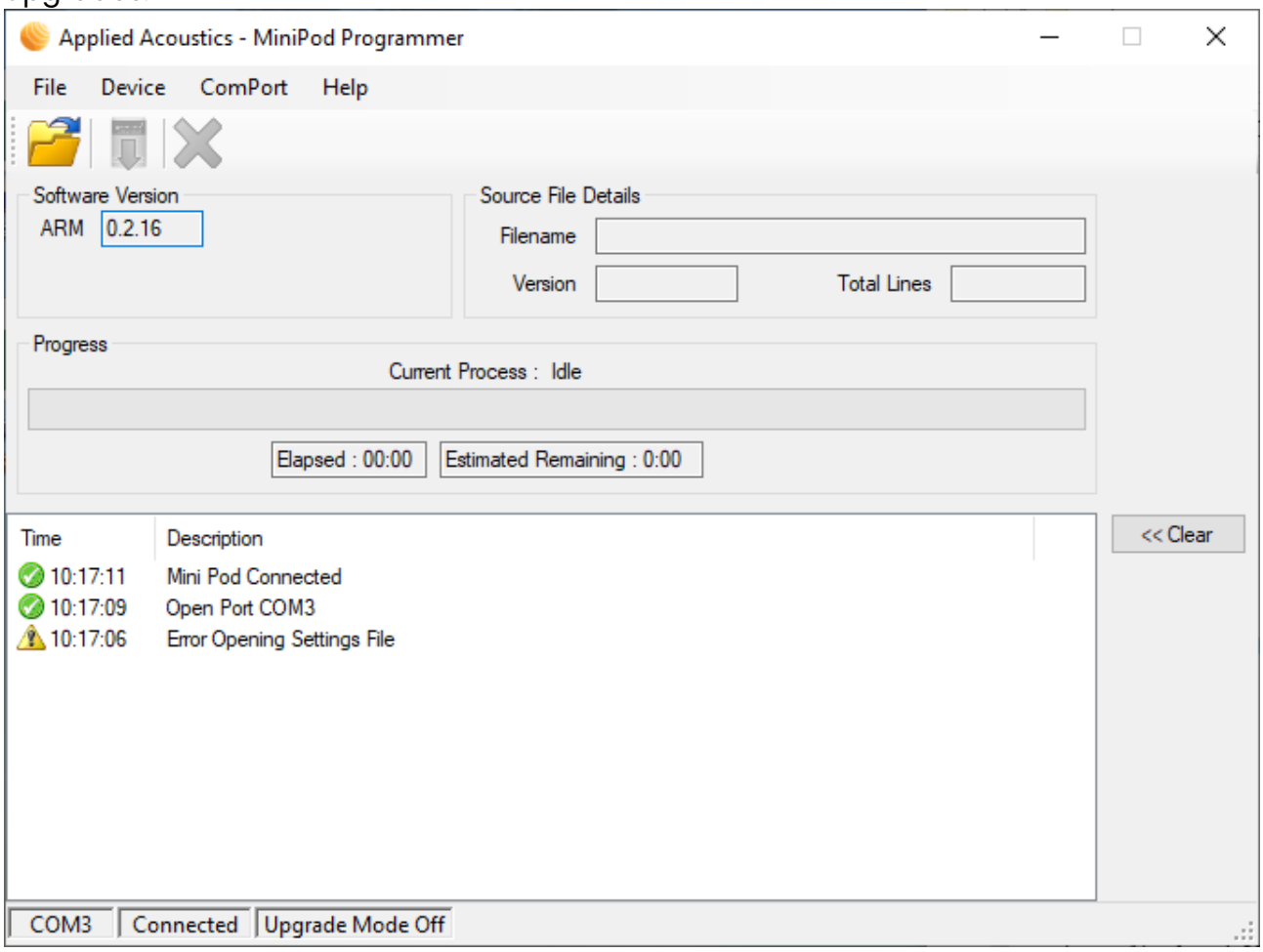
Once the correct port settings have been changed sending the $MP,RVN:?CL command will read back the software revision, confirming bi-directional communication to the MCU has been achieved.
A reply similar to the below example will be given:

$MP,00000010,RVN,0.1.05,101G,Nov 27 2018,15-27-33,0C9D,00063649,000:1DE8

7. Updating Firmware Using the MiniPod Programmer

Overview

The 'MiniPod Programmer' is a software solution created to allow MiniPod firmware upgrades.



The 'MiniPod Programmer' is a Windows based software that connects to a MiniPod via serial interface and allows firmware updates.

Software Installation

Install the 'MiniPod Programmer' software by running the 'Setup.exe' package supplied.

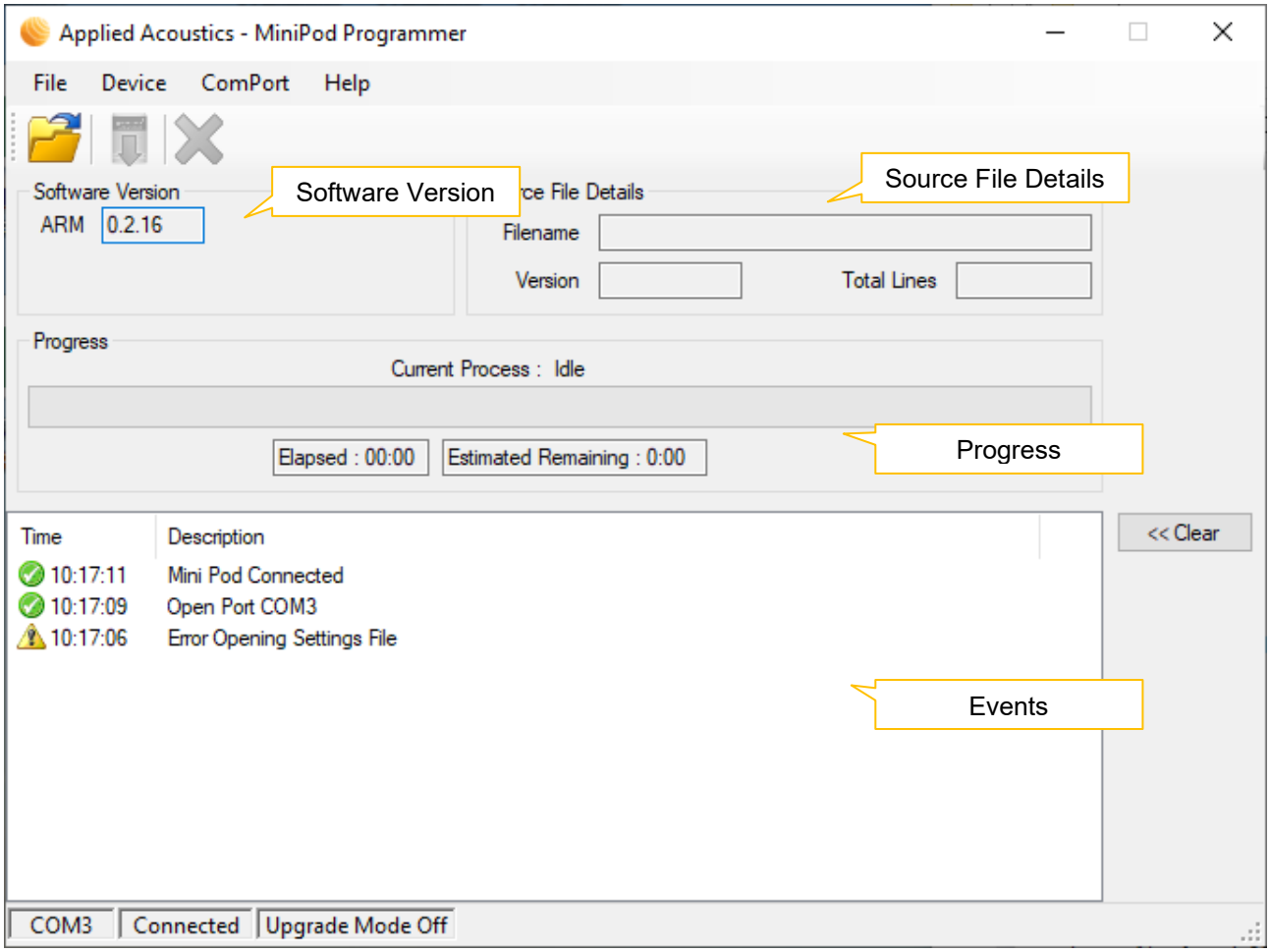
Software Operation

The 'MiniPod Programmer' software can be used to update the MiniPod software.
The software communicates with the MiniPod via a serial interface.

When the application is launched it will attempt to establish communication with the connected MiniPod.

Note: If the MiniPod is not detected please ensure the correct serial port is selected. To change the serial port, select 'Com Port' from the main menu and select the correct COM port. Note that the selected port will be automatically saved and used when the software is next launched.

Initial Configuration



The window contains four areas.

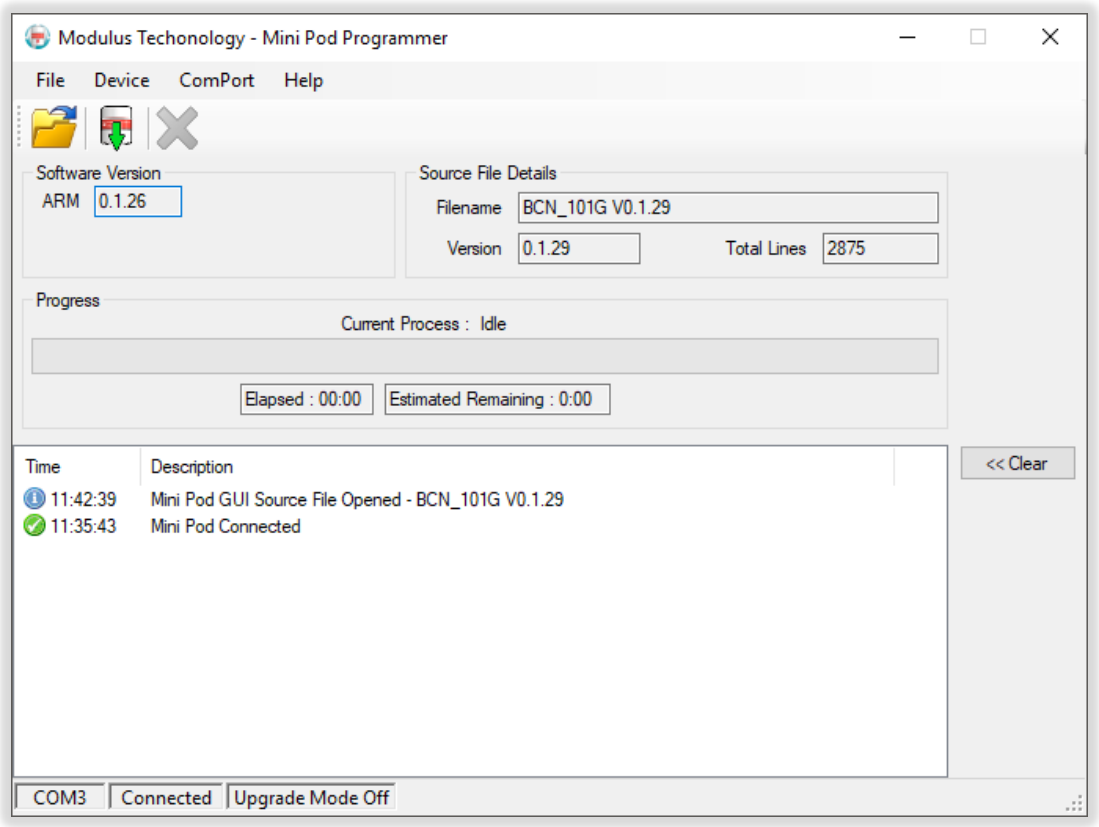
- Software Version: This area will display the version of software currently installed in the unit.
- Source File Details: This area will display information about the file that has been selected to update the MiniPod.

- Progress: This area will display information about the current progress of any operation selected.

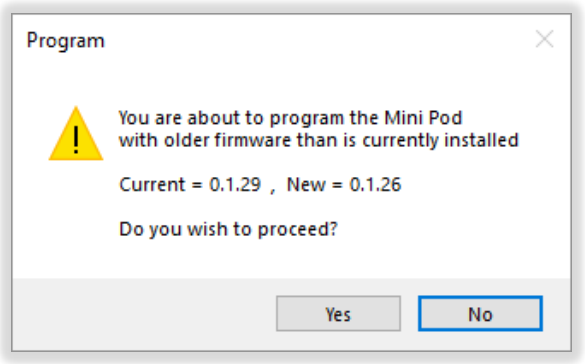
- Events: This area displays system messages including information, warnings, errors and progress messages. The window may be cleared at any time by pressing the 'Clear' button.

Programming Procedure

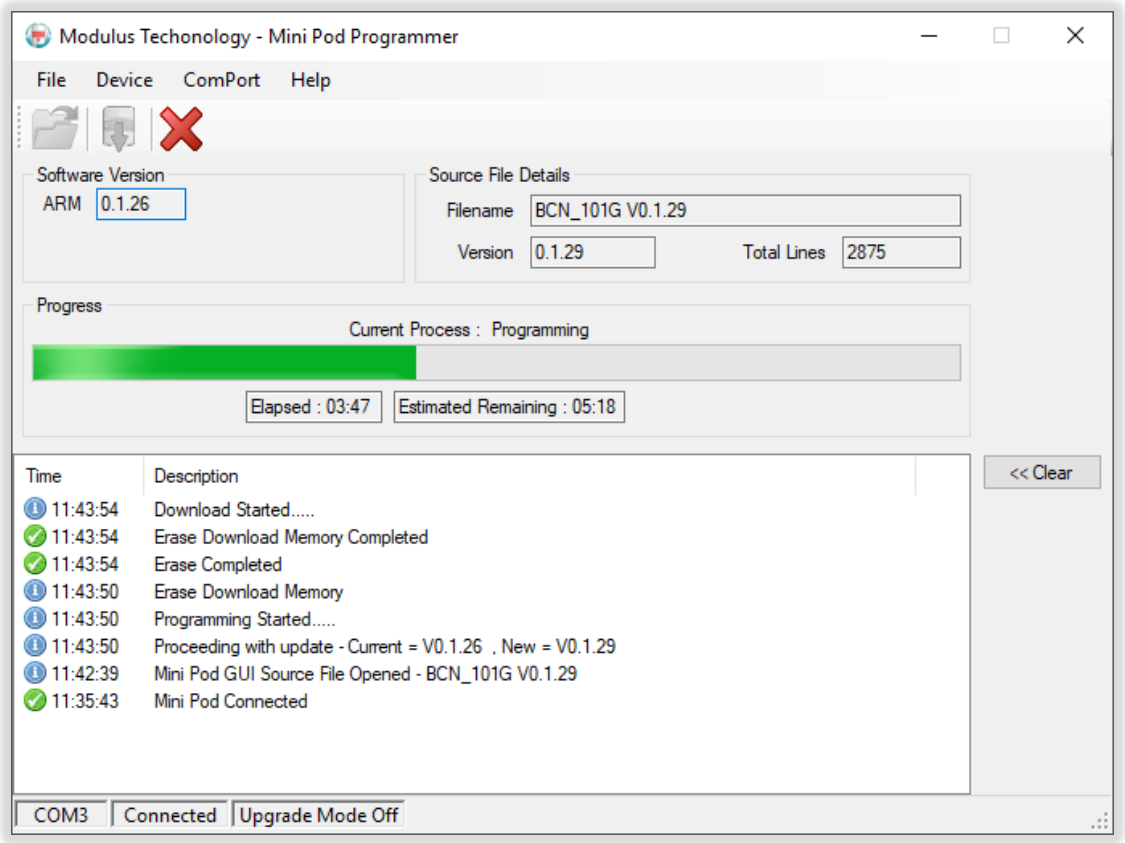
Open the source file of the software you wish to update by pressing the open file button on the toolbar. The open file window will show only the files relevant to the source file type selected. Once selected the information about the file selected will be displayed in the 'Source File Details' area as below



To proceed with the programming press the 'Program MiniPod' button on the toolbar. Confirm you wish to program at the next confirmation prompt. If you are programming a version of software that is either older or the same as the currently installed version you will be presented with an extra confirmation as below.



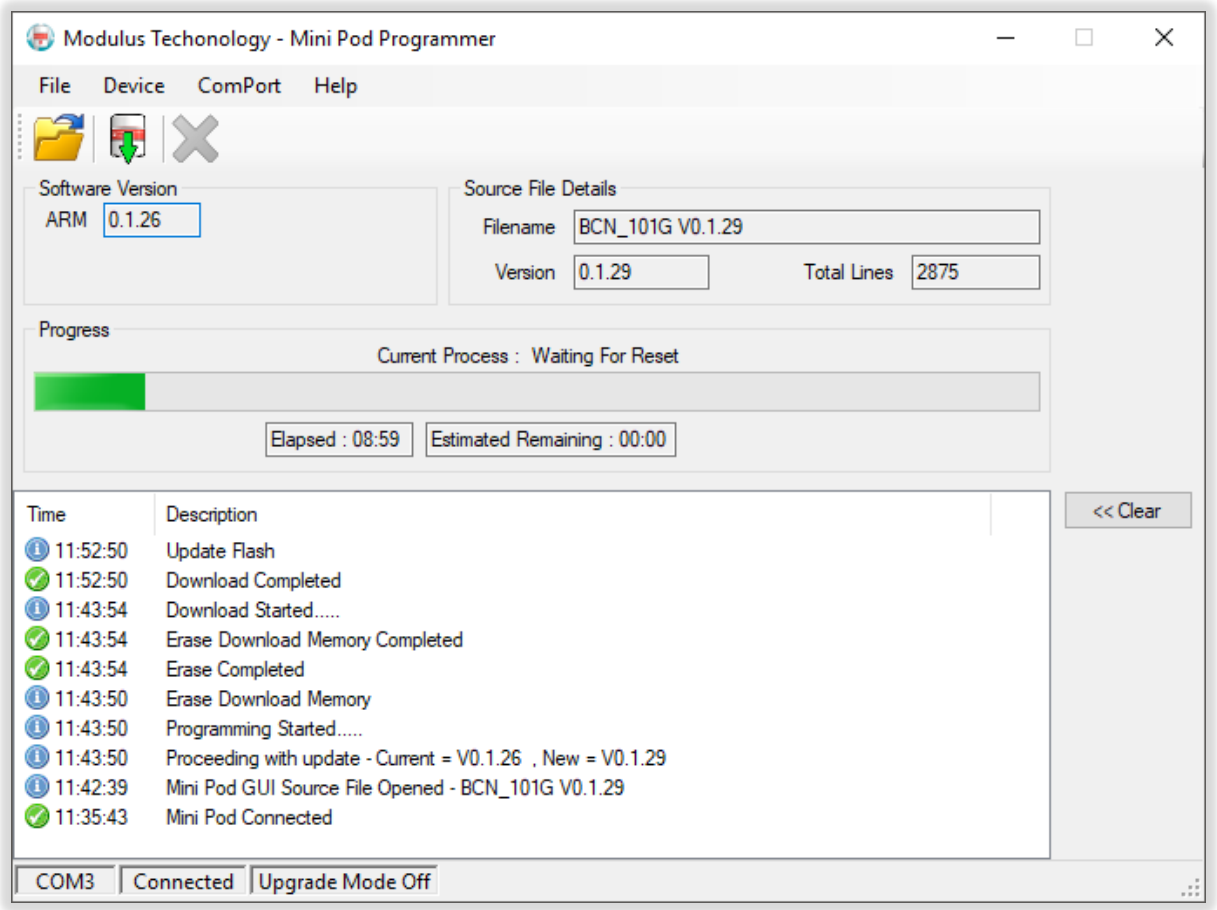
If confirmed, programming will proceed with the following screen displayed.



The progress and an estimated time to complete will be displayed along with various messages in the event window to show current progress.

Note: During this phase, the programming may be aborted if required.

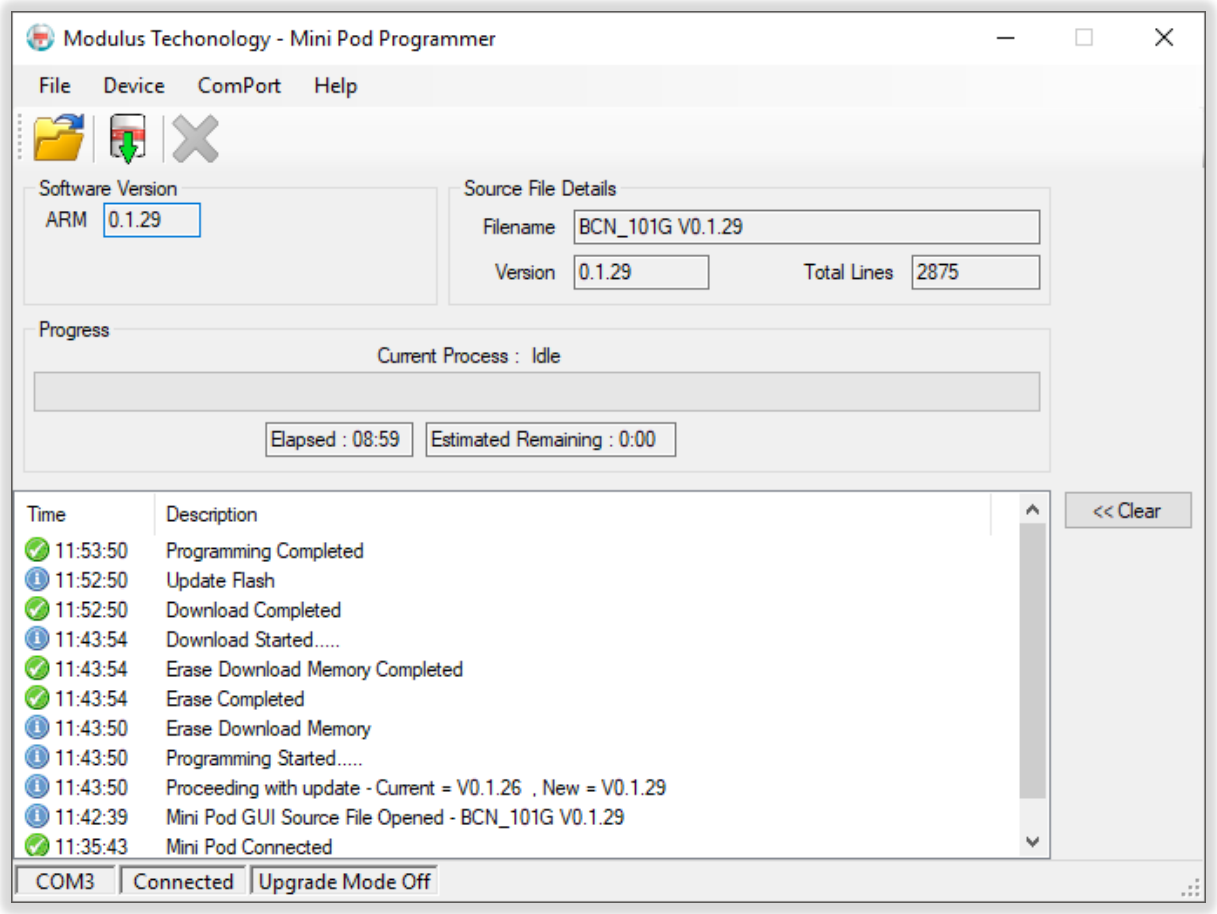
When the programming phase is complete the MiniPod will carry out an internal re-flash process and then automatically reset. During this phase the following screen will be displayed



- **This phase can take up to 90 seconds to complete**

It is critical that during this phase the unit must not be powered down or tampered with in any way. Failure to comply may result in the unit becoming unserviceable and would have to be returned to the factory for repair.

After the unit is reset the MiniPod will automatically restart to complete the programming, as shown in the screen below.



Confirm that the software version is correct.

This completes the programming process.

Remember to disconnect the serial cable after confirming software revision.

8. Updating MiniPod GNSS firmware using the Rightarm Utility.

Periodically new firmware will become available for the GNSS receiver inside the GNSS enabled MiniPod Receiver. This can be updated by using the Hemisphere RightARM utility which is available from the hemisphere website.

To perform the update the instructions issued with the firmware release should always be followed. The firmware update should be performed through PORT C set to 19200 baud all other baud rates will not operate correctly.

9. Introduction to the RFR-101G Receiver

The hardware and software provides the operator with the tools to manage a network of RF enabled MiniPod(s) using the hardware interface RFR-101G-7000. The RFR-101G Receiver is supplied with a RF High Gain Directional & Omni Directional antenna, a standard 20m RF Receiver Cable (customer specific lengths optional), and a custom build software package. Enabling the user to fully interface with the MiniPod(s) and set up an RF Network. With the network configured the software allows the received GPS data to be fed via Ethernet or serial interface to the client navigation / logging application.

The RFR-101G-6000 MiniPod receiver application is a windows .net application compatible with windows 8 and windows 10. Ensure .net v4.5 or above is installed.

Each system is capable of running 8 MiniPod's, each outputting at 10Hz, or more at lower output rates.

Refer to RFR-101G-8000 for more information.

Due to continual product development and improvement enhanced speed capabilities and data transfer may become available over RF link and this specification is subject to change. For further information and to discuss specific system applications please contact technical support.

10. Introduction to the BPK-101G Battery Pack

The BPK-101G has been designed to supply a stable 18V DC Voltage to subsea equipment. This external battery pack has a mechanical ON/OFF switch for ease of storage and transportation and runs off 24 industrial grade alkaline D cells which can provide up to 10-days operational life and can replaced easily by the user in the field.

Refer to BPK-101G-8000 for more information.
Other subsea power packs are available.

11. End of Life Recycling / Disposal

Within the UK, all electronic components and batteries must be taken for separate collection at the end of their working life under the Waste Electrical and Electronic Equipment (WEEE) Regulations 2013 and Waste Batteries and Accumulators Regulations 2009 respectively. The AAE Technologies Ltd group (AAE Tg) of companies as UK manufacturers will responsibly dispose of any returned end of life AAE Tg components/batteries through registered/approved recycling schemes. In order to prevent uncontrolled waste disposal and promote recycling, please contact Technical Support for a RMA number and return any end of life items (if safe to do so) carriage paid by the sender to our UK head office.

12. Spares

13. Transportation by Air

All equipment should be switched off prior to air transportation. Switching off is achieved by rotating the battery pack (BPK-101G) selector switch to the OFF position.

NiMH and Alkaline Battery Packs

These battery packs are **not** classified as dangerous goods for transportation by air.
Any paperwork accompanying equipment that use these battery types should state this clearly.

14. Specifications

BCN-101G

Environmental

Survival Depth Rating:	50m
Temperature:	85°C Antenna Limit
Dimensions	170.0mm x 115.0mm OD
Weight	1.95Kg Air 101G
	3.00Kg Air 101G + Bracket

Configuration

Receiver type:	GNSS Multi-frequency L1 & L2, RTK with carrier phase
GNSS compatibility:	GPS, GLONASS, BeiDou, QZSS & GALILEO
Channels:	372
SBAS tracking:	3 channel parallel tracking
Differential options:	SBAS, Autonomous, External RTCM (V3.2) or CMR, RTK, L-Band (Atlas) DGPS

Accuracy (dependant on correction):

RMS 67%:	Horizontal	Vertical
RTK:	8mm + 1 ppm	15mm + 2ppm
SBAS (WAAS):	0.3m	0.6m
Unaided:	1.2m	2.4m
Atlas H10:	0.04m	
Atlas H30:	0.15m	
Atlas H100:	0.50m	

Accuracies dependent on multipath environment, number of satellites in view, geometry and ionospheric conditions.

Warm up time (Typical):

From cold:	<60s	(No almanac or real time clock)
Warm start:	<30s	(Almanac & RTC, no position)
Hot start	<10s	

Connectivity

Connector:	8 pin MCBH connector (male)
Power:	18-36VDC
24v 160mA nominal	
Communication:	RS232 (2 bi-directional ports)
	RS485 (2 wire bi-directional)
	RS485 (4-wire)
Position protocol:	NMEA 0183 protocols supported, (GPGGA, GPRMC & GPGLL standard)
Refresh rate:	10Hz standard, 20Hz optional
Correction I/O protocol:	Hemisphere GNSS proprietary, ROX Format, RTCM v2.3, RTCM (v3.2) (wired only), CMR, CMR+
1pps	5V, 1ms pulse width, 20mA optional

Integrated AHRS

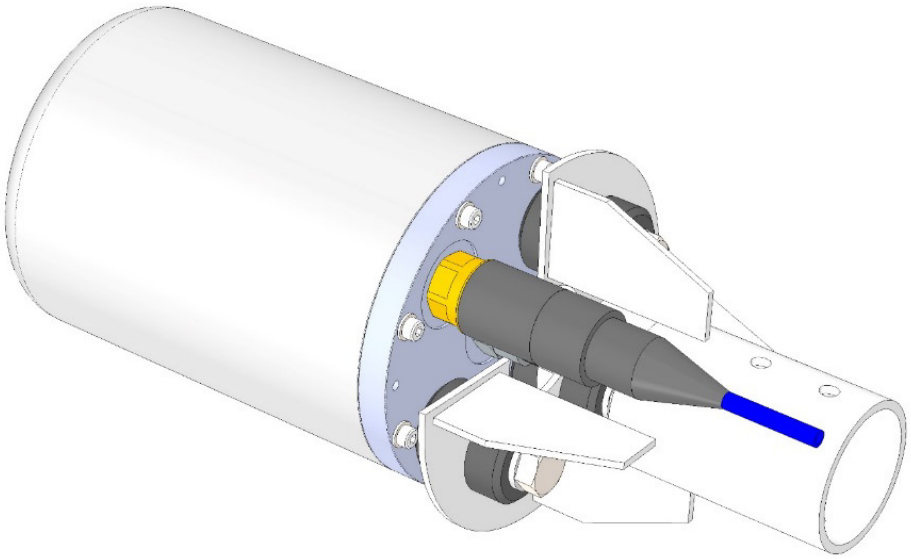
Bearing resolution:	0.1° displayed. Internally calculated to 0.01°
Heading sensor accuracy:	0.8° RMS standard; ±0.1° resolution/repeatability
Pitch/Roll sensor accuracy:	±0.05° RMS ±0.01° resolution/repeatability

OPTIONS

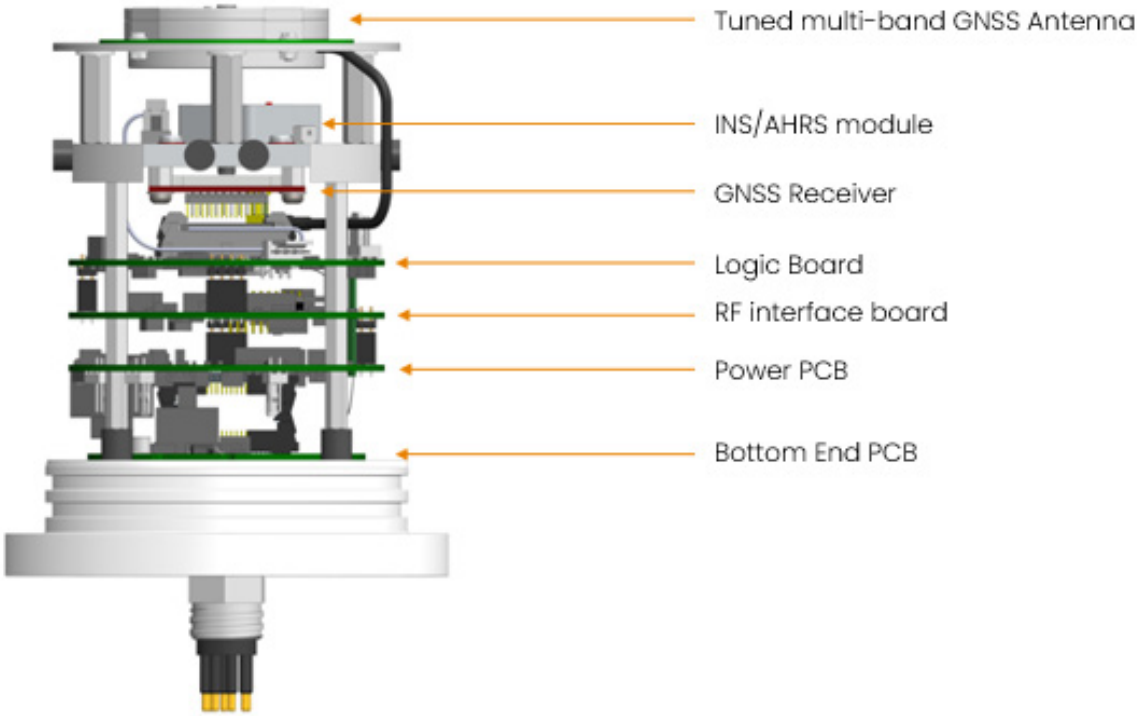
- Wireless modem with optional external antenna: Part number # RFR-101G, RFR wireless data receiver.
- External Battery: Part number # BPK-101G [other options available]
- External Omni-Directional RF Antenna. Part number # BCN-101G-4003.

15. General Arrangement

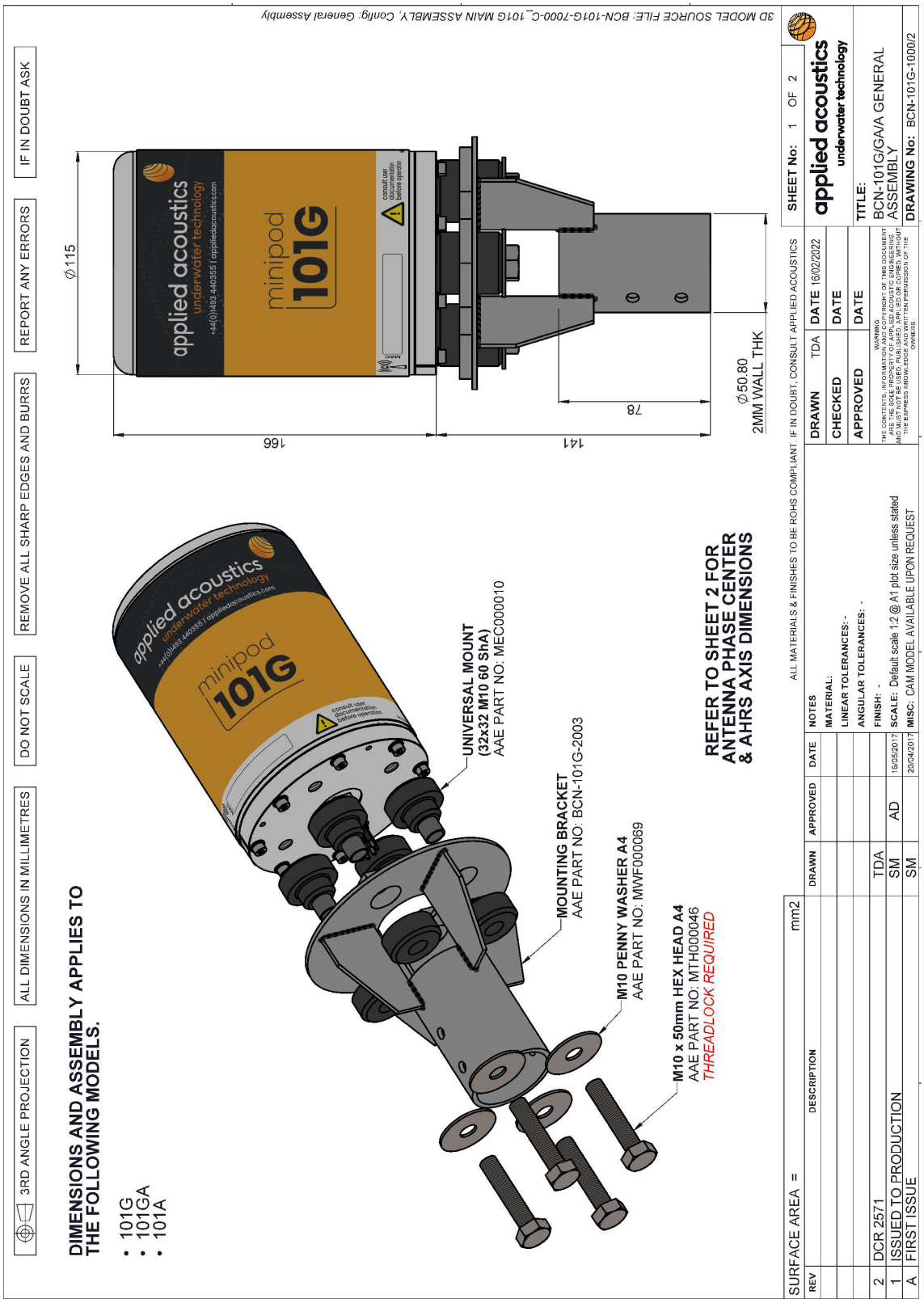
BCN-101G-EXT External Antenna Option

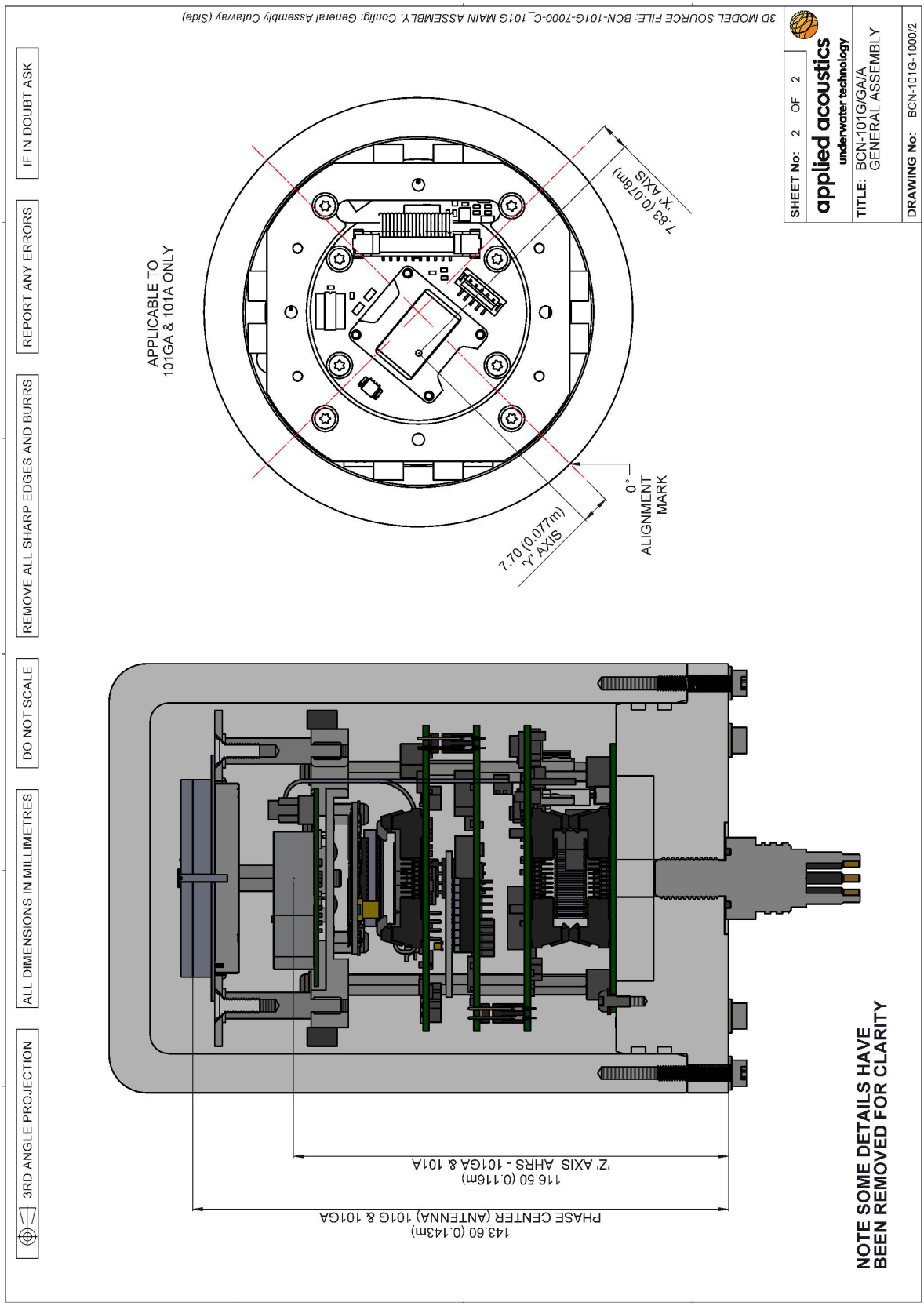


MiniPod Internal Configuration

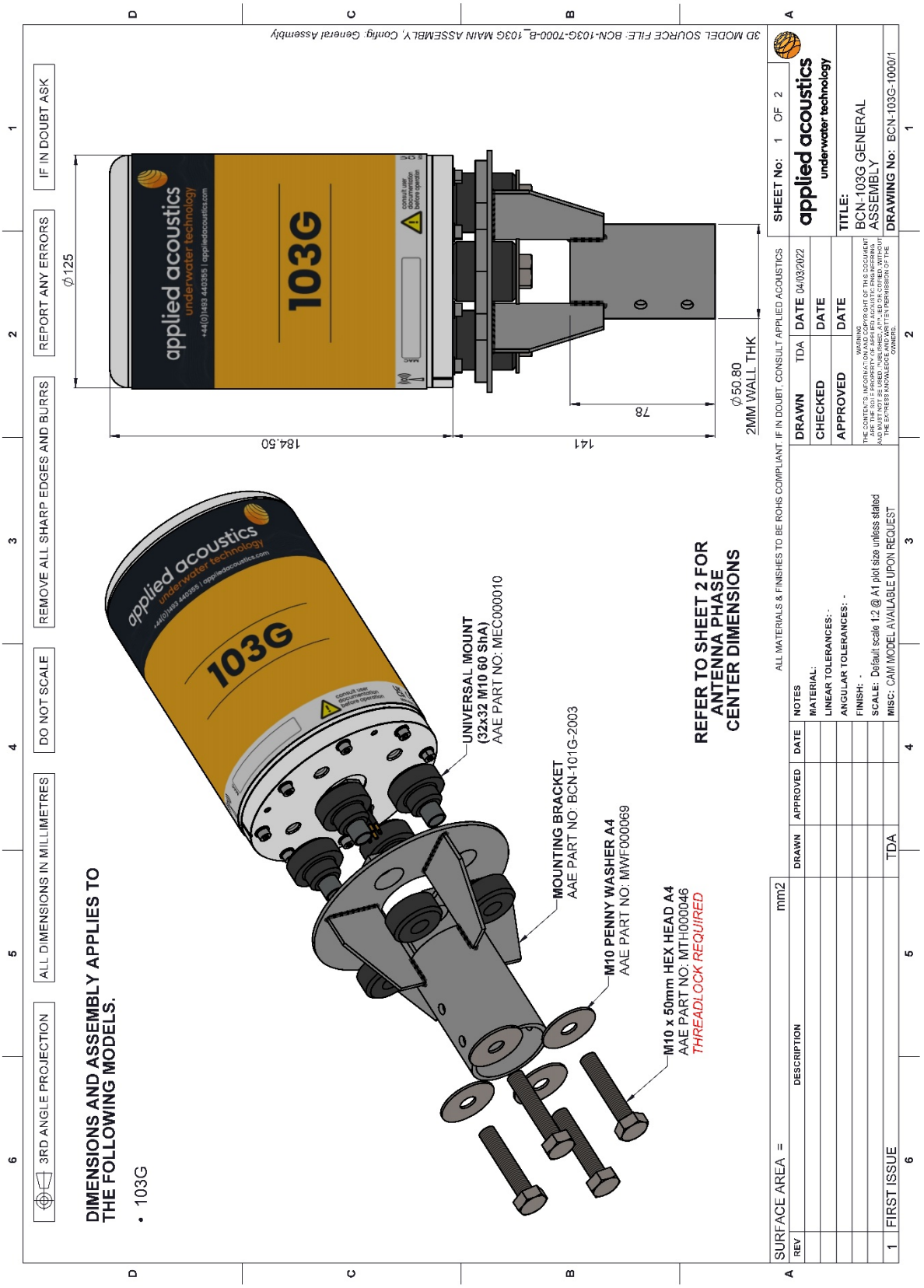


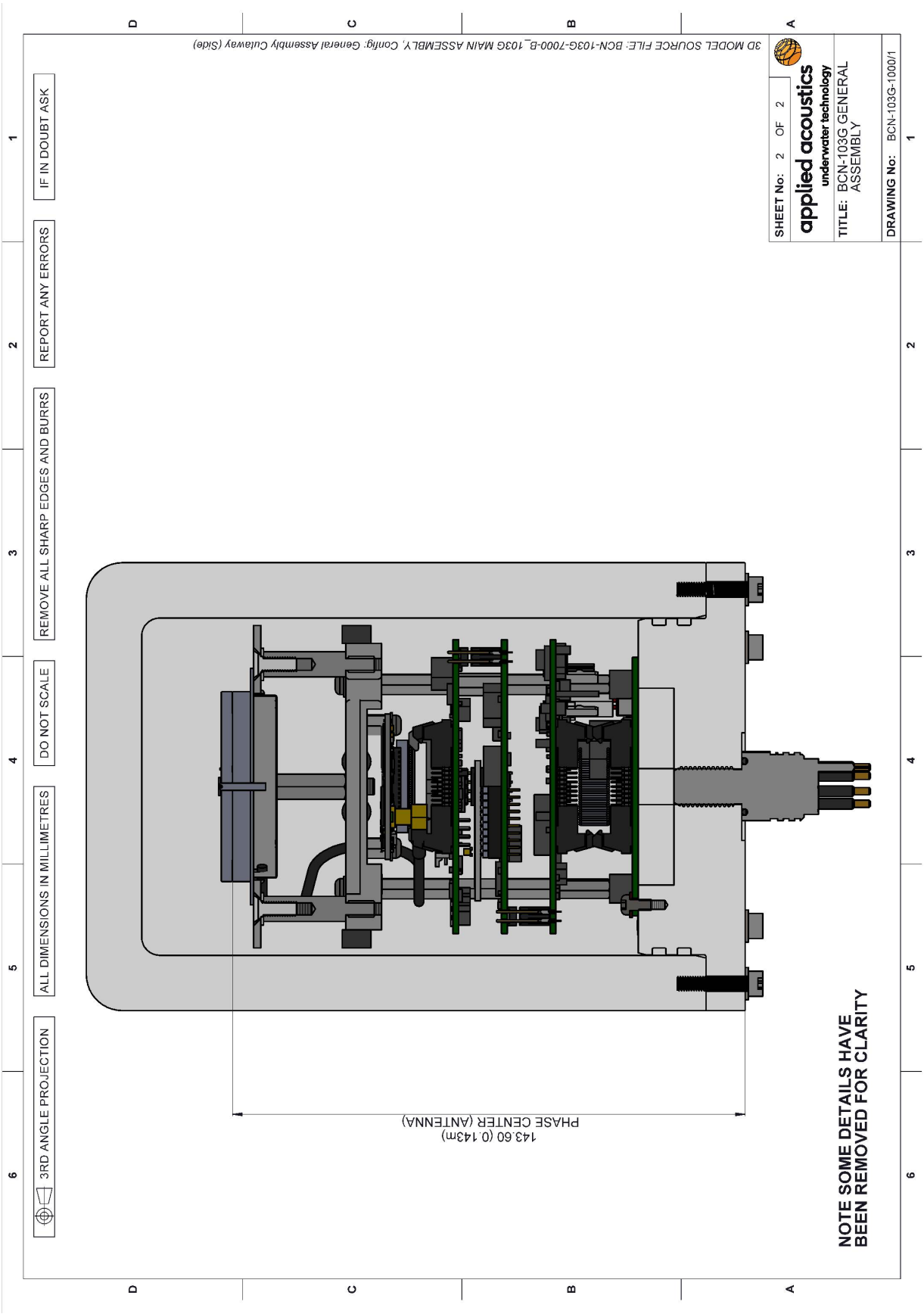
General External Dimensions & Hardware Configuration 101G/101GA/101A



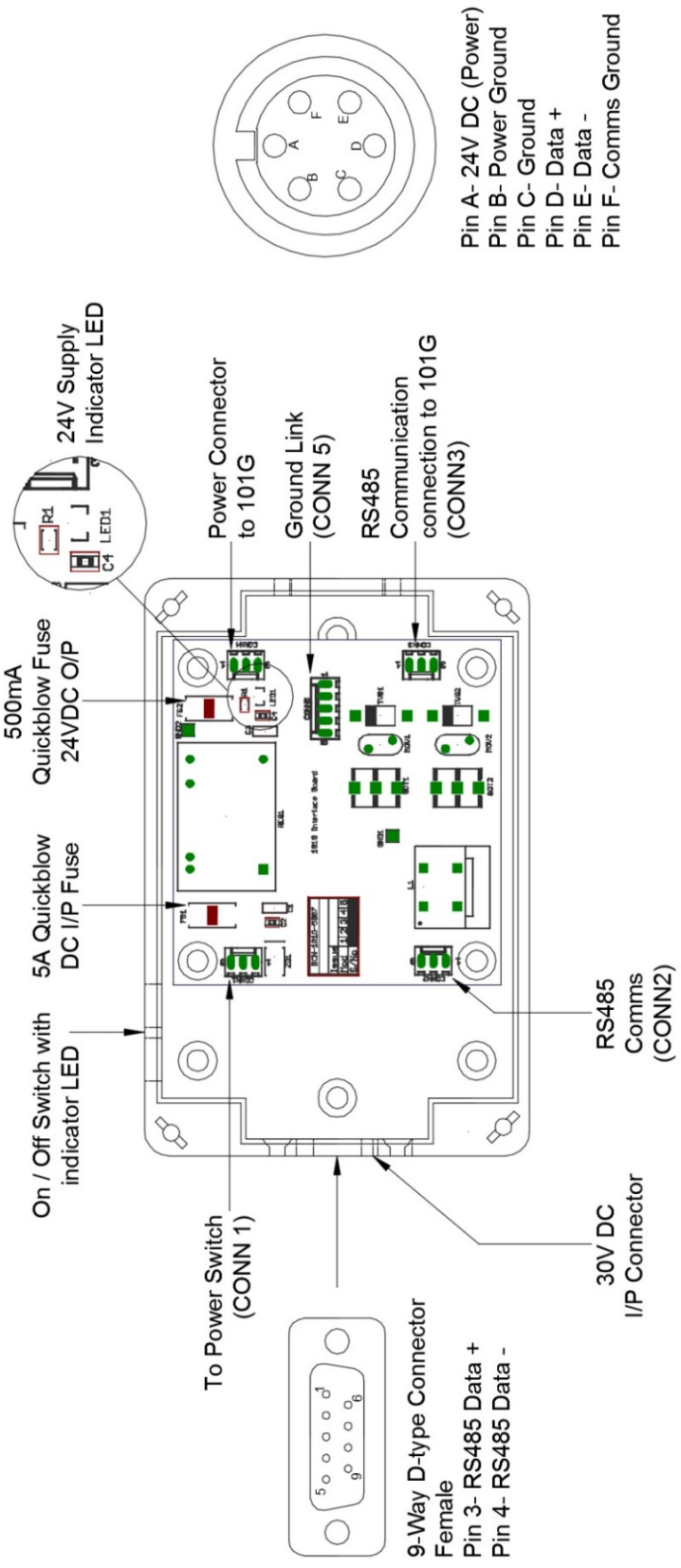

3D MODEL SOURCE FILE: BCN-101G-7000-C_101G MAIN ASSEMBLY, Config: General Assembly Cutaway (Side)
SHEET No: 2 OF 2
applied acoustics
underwater technology
TITLE: BCN-101G/GA/A
GENERAL ASSEMBLY
DRAWING No: BCN-101G-1000/2
APPLICABLE TO
101GA & 101A ONLY
7.83 (0.078m)
'X' AXIS
7.70 (0.077m)
'Y' AXIS
0°
ALIGNMENT
MARK
143.60 (0.143m)
PHASE CENTER (ANTENNA) 101G & 101GA
116.50 (0.116m)
'Z' AXIS AHRS - 101GA & 101A
NOTE SOME DETAILS HAVE
BEEN REMOVED FOR CLARITY
3RD ANGLE PROJECTION
ALL DIMENSIONS IN MILLIMETRES
DO NOT SCALE
REMOVE ALL SHARP EDGES AND BURRS
REPORT ANY ERRORS
IF IN DOUBT ASK

General External Dimensions & Hardware Configuration 103G/103GA/ 103A




3D MODEL SOURCE FILE: BCN-103G-7000-B_103G MAIN ASSEMBLY, Config: General Assembly Cutaway (Side)
SHEET No: 2 OF 2
applied acoustics
underwater technology
TITLE: BCN-103G GENERAL ASSEMBLY
DRAWING No: BCN-103G-1000/1
IF IN DOUBT ASK
REPORT ANY ERRORS
REMOVE ALL SHARP EDGES AND BURRS
DO NOT SCALE
ALL DIMENSIONS IN MILLIMETRES
3RD ANGLE PROJECTION
143.60 (0.143m)
PHASE CENTER (ANTENNA)
NOTE SOME DETAILS HAVE
BEEN REMOVED FOR CLARITY

BCN-101G-7024 HV RS485 Interface Box



Applied Acoustic Engineering Limited is a leading company in the design and manufacture of a wide range of subsea navigation and positioning products, and marine seismic survey equipment.

The extensive product range includes the innovative USBL tracking system, Easytrak, a variety of positioning and release beacons and seismic sub-bottom profiling equipment for offshore geotechnical and seabed analysis.

All products use acoustics, underwater sound waves, in location, positioning, navigation and data acquisition applications.

applied acoustics
underwater technology