

UM-8262-V2

User Manual for Type 8262 Nano Transponders and Transceivers

Issue A Rev 1

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Amendment History

The amendment history records all amendments and additions made to this manual.

Issue	Revision	Date	Comments	Section	Page
A	1	10/03/2021	First Issue	All	All

Section 1 – Introduction

1.1 Scope of this Manual

This User Manual describes the safe installation, operation and maintenance of the Type 8262 6G® family of transponders with the Nano suffix. The information and procedures within this manual are based on Sonardyne's experience and knowledge.

1.2 Purpose of this Manual

This user manual contains information for anyone involved with installing, operating and maintaining the Type 8262 6G® Nano transponder, transceiver and variants.

Note



There are no servicable parts inside Nano Transponders and Transceivers. Internal access to the equipment covered in this manual is only permissible by qualified Sonardyne Personnel.

1.3 Related Publications

The following publications can be referred to in conjunction with this manual.

Table 1-1 Related Publications

Publication	Title
<i>Sonardyne Safety Manual</i>	<i>Operational and Safety Precautions</i>
<i>QSG-OG-8262</i>	<i>Quick Start Guide Nano Transponder</i>
<i>IM-8262</i>	<i>Integration Manual for Type 8262 Nano Transponders and Transceivers</i>
<i>IM-Modem 6</i>	<i>Integration Manual for the Modem 6 Family</i>
<i>UM-8300-099</i>	<i>User Manual for 6G Terminal Lite (included on the 6G Utilities CD)</i>
<i>UM-8315</i>	<i>User Manual for the Type 8315 iWAND (included with the iWAND)</i>

1.4 Conventions

The following conventions are used in this manual.

Table 1-2 Conventions used in this Manual

Format	Convention
Boldface Type	User Input, Menu Options, Keys, e.g. Click OK
Arrow (>)	Selection of an additional menu item e.g. File >Save
<i>Italic Type</i>	References to Figures, Tables, Sections and internal/external source

Section 2 – Safety

2.1 Introduction

Before any activity is carried out on the equipment, it is recommended that the included *Sonardyne Safety Manual* and all warnings and cautions in this manual are read and fully understood.

It is recommended that the operator complies with the Health and Safety Regulations applicable to the vessel and the region before operating this equipment.

Operators and service personnel must be familiar with the normal operating and safety procedures for the subsea equipment being operated.

Documentation must be consulted whenever a  or  warning symbol is found on the equipment, in order to determine the nature of the potential hazard and any actions which must be taken.

If any additional equipment is used, any warnings and cautions in the equipment user manual must be read and fully understood and the equipment must only be used as specified by the manufacturer.

If the equipment is used in a manner not specified by the manufacturer, the protection provided by the equipment may be impaired.

The safety of any system incorporating this equipment is the responsibility of the assembler of the system.

2.2 Safety Procedures

2.2.1 Warnings

 **Personal protection.** Appropriate protective equipment such as protective footwear, hard hat and gloves must be worn when handling or carrying out any procedures involving Sonardyne and other equipment.

 **Heavy equipment.** Many Sonardyne products and equipment types, such as transponders, transceivers, cable drums etc. require Manual Handling Equipment (MHE) for lifting due to their heavy weight. If MHE is not available, it is the responsibility of the operator to perform a manual handling risk assessment prior to carrying out manual lifting/handling. Refer to the individual equipment documentation for weight specifications.

 **High Internal pressure risk.** Due to the high internal pressure risk, dismantling the sub-sea equipment must only be carried out by trained personnel.

 **Risk of toxic gases.** Make sure the work environment is well ventilated. Toxic gases may be released when operating the pressure relief vent valve.

 **When transporting and storing the Nano, the battery must be disconnected.**

 **Risk of burns.** Do not carry out maintenance on the transponder if the housing is hot. Lower the transponder into cold water and wait for the housing to cool. Wear Personal Protective Equipment such as gloves.

 **Risk of Explosion.** For Lithium and Lithium Ion battery packs, Class D fire extinguishers should be used. Do not use any other type of extinguisher.

 **Molykote 44 is a mild irritant.** When lubricating connector faces, personal protective equipment such as gloves and goggles must be worn.

 Risk of toxic gases. Make sure the work environment is well ventilated. Toxic gases may be released when operating the pressure relief vent valve.

 OEM PCB sets must not be active whilst being installing into a vehicle. Refer to *Section 8.7 "Connecting/Disconnecting the Nano Battery"* for instructions on disconnecting the battery by serial command, or if in any doubt remove jumper JP2 from the Nano motherboard (note this may cause loss of stored battery % data until the unit is next fully charged). External power must not be applied.

2.2.2 Cautions

 Battery Power Failure. Do not charge the battery packs in any way not outlined in this manual. Failure to follow instructions may result in a loss of battery pack life or damage to the battery packs.

 Potential heat source. Ensure there are no metal or other foreign objects located inside the docking station cradle while charging.

 Loss of Current Protection. Do not allow the transponder to be cooled or heated during the charging process as the over current protection component characteristics may change adversely.

 Transponder performance. Ensure the Nano has a clear line of sight to the transceiver and is not obstructed by apparatus or expelled gas from underwater breathing equipment.

 Multiple beacon address conflict. Do not operate multiple beacons on the same address in the water at the same time. The address must be unique to any one beacon operating in the same acoustic area.

 Protective coating failure. Do not use any abrasive brushes or sharp tools to remove marine growth when cleaning the instrument.

 Damage to external connector when submerged. The external connector must be covered while the transponder is submerged, either by the protective dummy plug or by the plug of an external power cable.

 Damage to connectors. Do not over apply grease to the connector faces as a build-up of grease in the female connector will affect connector integrity, however sufficient lubricant is required to prevent friction between the mating subconn connectors.

Section 3 – Common Technical Description

3.1 Introduction

The Type 8262 family of Nano Transponders/Transceivers operate in the Medium Frequency (MF) band and includes multiple variants to enable a full suite of functionality in a nano form factor.

Common technical specifics are described below. Technical descriptions specific to individual variants are described in following sections.

3.2 Nano Transponder Types

3.2.1 Transponders

The Nano Transponder hardware includes variants covering three distinct product families as shown below:

Product family	Product Name	Type
Nano	Nano	8262-000-23
	Nano with Connector	8262-000-28
	Nano OEM	8262-000-27
AvTrak 6	AvTrak 6 Nano	8262-000-29
	AvTrak 6 OEM Nano	8262-000-24
Modem 6	Modem 6 OEM Nano	8262-000-22

3.2.2 Transducers

Two OEM transducers are also available as shown below:

Transducer	Depth Rating	Pressure Sensor	Beam pattern	Type
Remote 500 m Transducer Nano OEM	500 m	Yes	Omni-directional	8262-094-01
Remote 3 km Transducer Nano OEM	3000 m	No	Omni-directional	8052-000-05

3.3 Functionality

Functionality across the product family is shown below:

Product Family	Product	Ranging response	Transceiver	SMS	Modem	HPR	Type
Nano	Nano	Yes	No	No	No	No	8262-000-23
	Nano with Connector	Yes	No	No	No	No	8262-000-28
	Nano OEM	Yes	No	No	No	No	8262-000-27
AvTrak 6	AvTrak 6 Nano	Yes	Yes	Yes	Yes	No	8262-000-29
	AvTrak 6 Nano OEM	Yes	Yes	Yes	Yes	No	8262-000-24

Product Family	Product	Ranging response	Transceiver	SMS	Modem	HPR	Type
Modem 6	Modem 6 Nano OEM	Yes	No	No	Yes	No	8262-000-22

Functionality is defined as below:

Functionality	Description
Ranging Response	The transponder/transceiver can be ranged to by another Sonardyne 6G acoustic device for the purpose of measuring a range or calculating its position.
Transceiver	The transceiver can measure range to, and command, other Sonardyne 6G acoustic devices.
SMS	The transceiver can send user payloads in the form of SMS packets to other Sonardyne 6G acoustic devices and can be used to enable swarm operations with Ranger 2 Robotics pack.
Modem	The transceiver can utilize full modem functionality with another modem capable device.
HPR	The transponder can be ranged to by a device using an HPR tone.

3.4 Power

All variants (excluding Nano 8262-000-23) can operate on a dc power supply of 12–28 V.

3.4.1 Typical Power Consumption

All variants of Nano hardware use power from both the internal lithium-ion (li-ion) battery and external power (if available).

Note



The battery is always used to power the receiver circuitry and the processing module. This is to minimise the effect of electrical noise on acoustic performance.

State	Power usage
Wideband Listening (battery)	<5 mW
Wideband Listening (external power)	<20 mW ^{1,2}
Battery Charging	60 mW to 2.5W ² depending on battery charge state
Peak During Transmission	<30 W SMS <20 W Modem

¹ This is an average including periodic “top-up” charging of the battery

² At 24 V applied

3.4.1.1 Battery Specifications

The Nano's li-ion battery specifications are shown below.

Parameter	Specification
Quiescent Battery Life ¹	90 days
One Second Ping Rate Battery Life @ 184dB	>24 hours
Battery Capacity	12.06 Wh

¹ Provided an appropriate Activity Time is set in the Nano; see IM-8262 Nano Integration Guide

Note



When the Nano is in disabled mode the battery is disconnected.

See Sections 8.6 "Battery Status" and 8.7 "Connecting/Disconnecting the Nano Battery". for instructions on how to disconnect the battery and/or display the battery status.

3.4.2 Acoustics

All Nano variants have the following acoustic parameters:

Parameter	Specification
Frequency Band	MF (19–34 kHz)
Transducer Beam Shape	Omni-directional $\pm 130^\circ$
Configurable Transmit Source Level (re 1 μ Pa @ 1 m)	184/175 dB
Pulse Length	8 ms Wideband 1&2, 16 ms Wideband 2+
CIS Turnaround Time (default)	200 ms
Receive Sensitivity	85 dB
Number of Unique Addresses	>300

The Wideband[®]2 technology uses a correlation reception technique with phase encoded signals over a wide range of carrier frequencies. Signal coding allows for hundreds of channels enabling multiple users to work in the same area without interference.

3.5 Housing Labelling

Waterproof labels on the housing uniquely identify the transponder as shown in the example below:

- Type No. 8262-000-2*
- Serial No. 123456-007
- Unit ID 54D4
- Depth 500 m

A temporary label with the configurable acoustic address of the Nano will also be included in the box. This acoustic address is configurable so is not permanently marked on the unit.

A QR code is also available on the insert label which contains the information above as well as a link to the product site.

3.6 Responder Trigger

All variants with a responder line; Nano (with connector), Nano OEM, AvTrak 6 Nano, AvTrak 6 OEM Nano, have the following specifications:

Parameter	Specification
Inactive State	Low
Input Impedance	~100 K Ω
Trigger Pulse	Positive pulse 4–24 V. Leading edge triggered. Responder mode is enabled by command CS:RSP1
Pulse Width	Nominal 10 ms, minimum 0.5 ms, maximum 35 ms
Turn Around Time	TAT reported by CS command is used for IRS replies.
Blocking Time	TAT + BLK reported by CS command

3.7 Serial Communication

The OEM and connector variants of Nano, AvTrak 6 and Modem 6 contain the following ports:

- RS232 UART
- 3V3 TTL UART

The supported baud rates are:

- 2400
- 4800
- 9600
- 19200
- 57600
- 115200

The Nano transponder (NFC connection) will create a virtual RS232 serial port in 6G terminal Lite when connected via docking station and USB cable to a PC.

Section 4 – Variant Specific Technical Description

4.1 Nano

4.1.1 Introduction

The Nano Transponder (8262-000-23) has a connector-less design and can be charged and configured using the Nano Docking Station. The Nano can be configured using; Sonardyne 6G Terminal Lite software, android application or an iWAND hand-held test unit.

The Nano is sealed and contains no user-serviceable parts.



4.1.2 External Interfacing/Docking Station

The Nano has no external interfaces, however a Docking Station can be connected via USB to the 115/230 V ac charger for fast charging or to a PC running Sonardyne 6G Terminal Lite software for configuration and slow charging.

The battery takes approximately 12 hours to fully charge from depleted using the ac charger, and has built in protection to prevent overcharging; see *Section 8.5 "Charging the Battery"*.

When the Nano is placed onto the Docking Station the Enable/Disable LED will light red if the Nano is detected and is disabled or green if the Nano is detected and enabled.

The Nano can be disabled or enabled by pressing the push-button once and reset by pressing and holding the push-button for five seconds.

Notes

 **The battery takes approximately 18 hours to fully charge when the Docking Station is connected to a PC.**

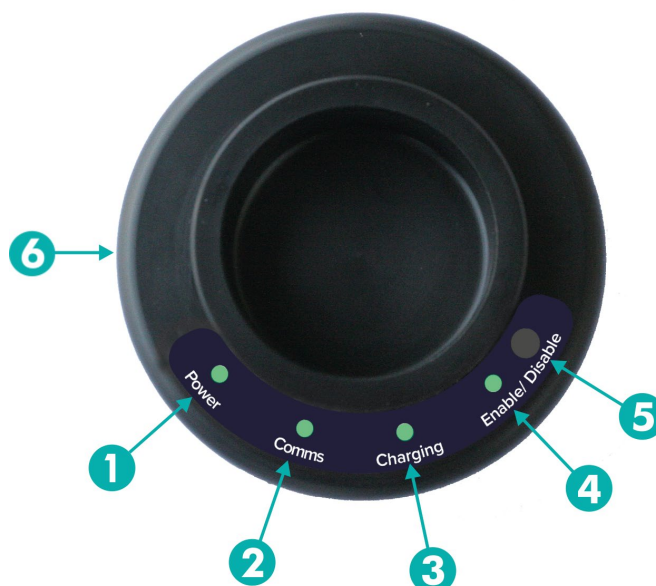
 **In the disabled mode the battery will continue to be charged.**

Figure 4-1 Nano and Docking Station



The Docking Station status LEDs, push-button and micro USB socket are described below.

Figure 4-2 Docking Station Functions



Docking Station	Status		Description
❶ Power LED		Green	Docking station is powered
❷ Communications LED		Flashing Green	Searching for Nano
❸ Charging LED		Flashing Red	Nano charging
		Green	Nano fully charged
❹ Enable/Disable LED		Red	Nano detected and disabled
		Green	Nano detected and enabled
❺ Push-Button		Press to enable Nano	
		Press to disable Nano (disconnects the battery)	
		Press and hold for five seconds to power-cycle Nano	
❻ Micro USB Socket		Provides power from charger to Docking Station	
		Provides communications between PC and Nano	

4.1.3 Pressure Relief Vent Valve

A pressure relief vent valve ❶ is fitted to automatically release any build-up of pressure inside the Nano during deployment. This could be caused by water ingress during deployment and/or the degassing of the battery.



If there is any reason to suspect there may still be pressure inside the transponder, the pressure relief vent valve must be operated; see *Section 8.8 "Pressure Relief Vent Valve"*.

4.2 Nano with Connector (Cabled) & AvTrak 6 Nano Technical Description

4.2.1 Introduction

The Nano with connector (8262-000-28) and AvTrak 6 Nano (8262-000-29) have an external MCBH8MAL subconn connector which mates with an Subconn MCIL8F tail, making it suitable for installation on vehicles and assets where local communications to the device and powering the Nano/AvTrak 6 Nano is always required. The Nano can be configured using Sonardyne 6G Terminal Lite software or an iWAND hand-held test unit.

The Nano is sealed and contains no user-serviceable parts.

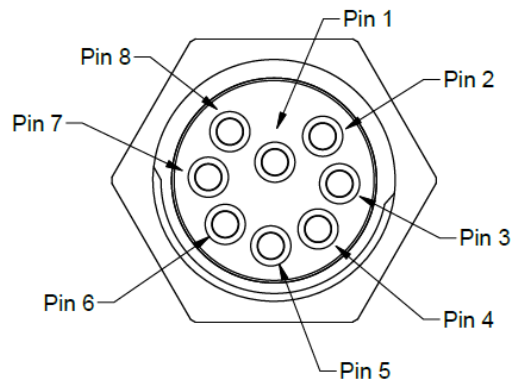


4.2.2 External interfacing

The endcap connector provides electrical connections for:

- Responder trigger
- RS232 communications
- UART 3v3 TTL communications
- External DC power and charging

4.2.2.1 Connector Pin Functions



Face View

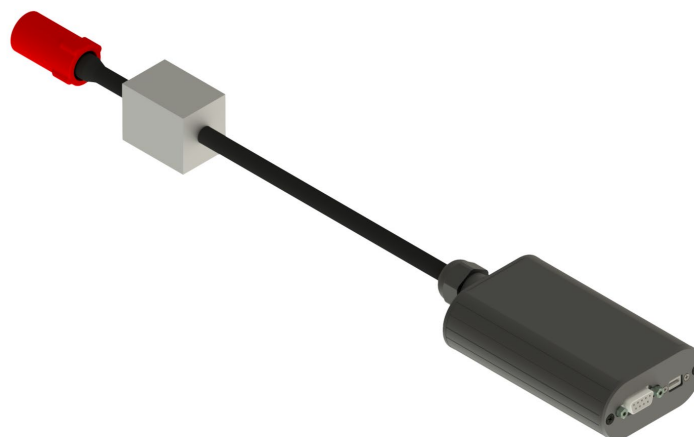
Pin	Function
1	UART 3V3 TTL Rx W.R.T Nano
2	UART 3V3 TTL Tx W.R.T Nano
3	Trigger in
4	0v
5	RS232 Tx W.R.T Nano
6	RS232 Rx W.R.T Nano
7	0v
8	External power +V

Note

 Nano supports RS232 or UART 3v3 TTL but not both at the same time. UART 3v3 TTL will be used if the Nano detects 3v3 on the UART 3V3 TTL Rx line.

4.2.3 Universal Interface Hub

The Nano universal interface hub allows a user to test communications and charge a Nano (cabled) and AvTrak 6 Nano.



4.2.4 Power

The Nano Universal Interface hub is provided with a 24 V 1.25 A charging unit with mains adaptors for the following regions:

- EU EN50075
- US UL1310
- UK BS1363
- Australia AS/NZS 3112

4.2.5 USB connection

When the provided USB A to Micro USB B cable is used the Universal Interface hub will create two serial ports on the PC it is connected to. The first of which can be used for configuring the connected Nano with Connector/AvTrak 6 Nano without requiring a physical DB9 serial port.

4.2.6 DB9 port

The Universal Interface Hub includes an external female DB9 connection with the below pinout.

Note



The responder trigger is not exposed via the interface hub

Pin	Function
1	N/C
2	RS232 RX (W.R.T. PC)
3	RS232 TX (W.R.T. PC)
4	N/C
5	0v
6	N/C
7	N/C
8	N/C
9	N/C

4.2.7 Pressure Relief Vent Valve

A pressure relief vent valve **1** is fitted to automatically release any build-up of pressure inside the Nano during deployment. This could be caused by water ingress during deployment and/or the degassing of the battery.



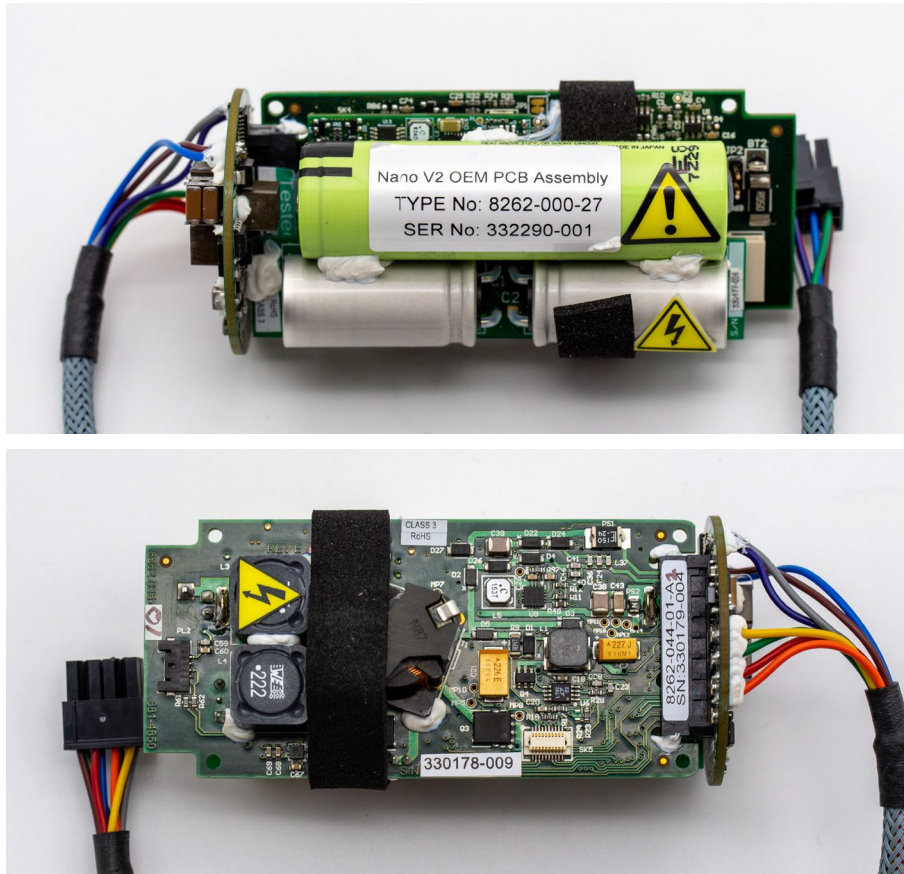
If there is any reason to suspect there may still be pressure inside the transponder, the pressure relief vent valve must be operated; see *Section 8.8 "Pressure Relief Vent Valve"*.

4.3 Nano OEM, AvTrak 6 Nano OEM, Modem 6 Nano OEM Technical Description

4.3.1 Introduction

The OEM variants of Nano (8262-000-27), AvTrak 6 (8262-000-24) and Modem 6 (8262-000-22) all share common hardware. The OEM versions are suitable for permanent installation on vehicles and assets where deep integration and local communications to the device is required.

The top and bottom views of the PCB board are shown below:



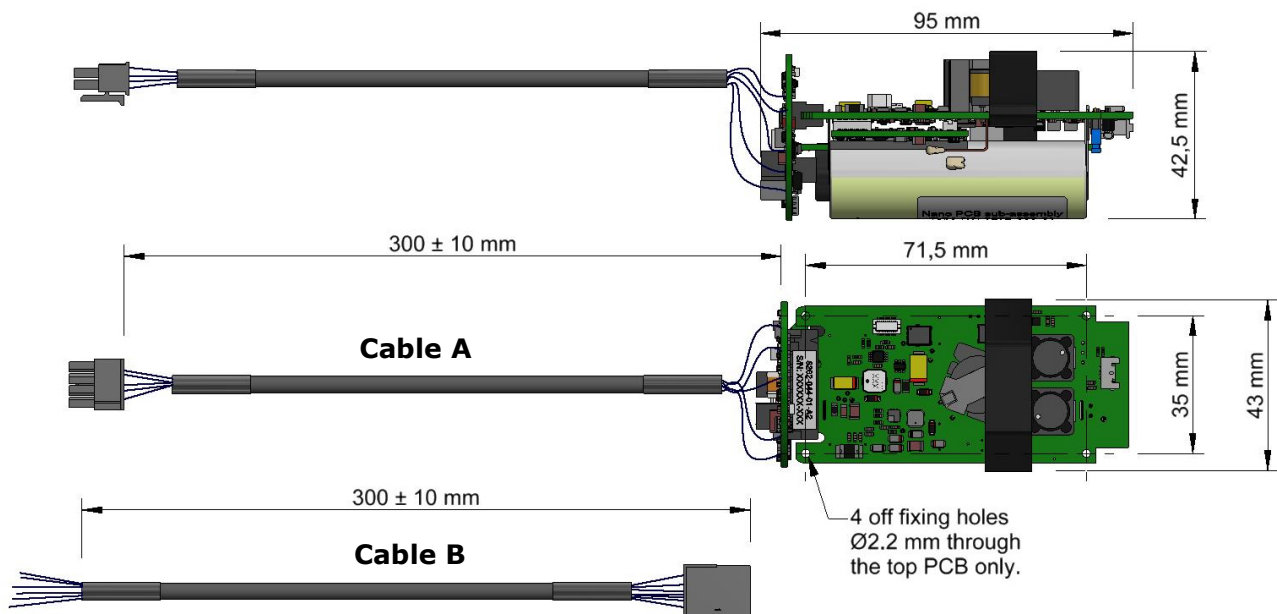
The OEM variants can be configured using Sonardyne 6G Terminal Lite software or an iWAND hand-held test unit.

4.3.2 External Interfacing

OEM variants can be interfaced to by using the supplied interface cable. The interface cables are used as follows:

- Cable A is permanently attached to the OEM PCB set.
- Cable B is for an integrator to connect to a host, e.g. vehicle controller.

Figure 4-3 Cable A and B Connection to OEM PCB



Cable B connections are shown below:

Molex	Wire Colour	Function
1	Brown	EXT V+
2	Red	RS232 Tx
3	Orange	RS232 Rx
4	Yellow	Ext Trig Out ¹
5	Green	Ext Trig in
6	Blue	0V
7	Violet	UART 3V3 TTL Tx
8	Grey	UART 3V3 TTL Rx

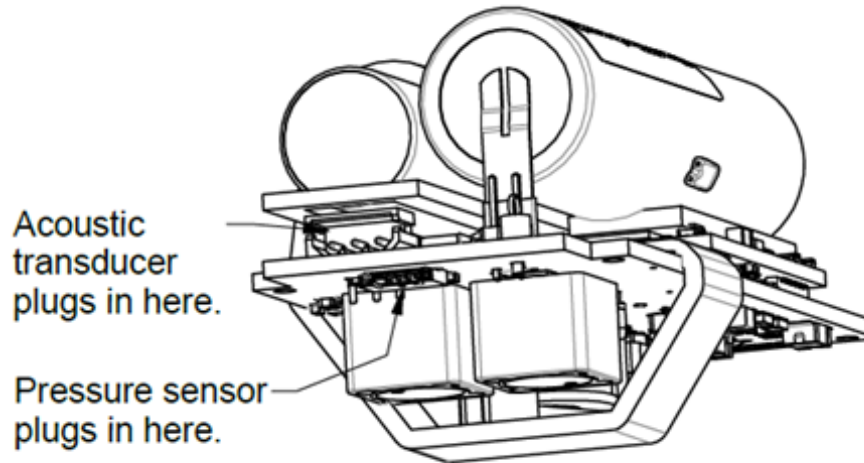
Note

 Nano supports RS232 or UART 3v3 TTL but not both at the same time. UART 3v3 TTL will be used if the Nano detects 3v3 on the UART 3V3 TTL Rx line.

¹ Not currently supported

4.3.3 Internal Interfacing

For connecting an OEM board set to a Sonardyne Nano OEM Transducer the connections are on the opposite end of the PCB to the external integrator connections.



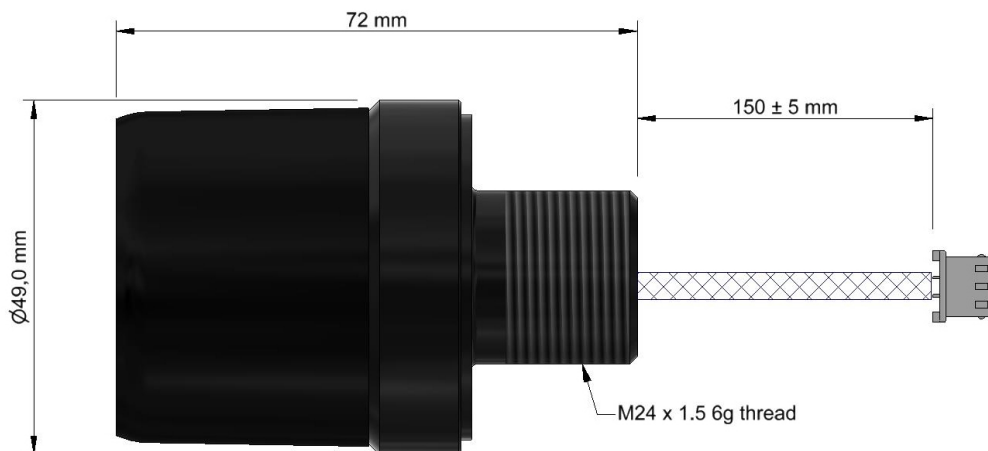
4.4 OEM Transducers

4.4.1 Introduction

Sonardyne provide OEM through hole mounted transducers for integration of OEM Nano, AvTrak 6 Nano and Modem 6 Nano into small vehicles/platforms.

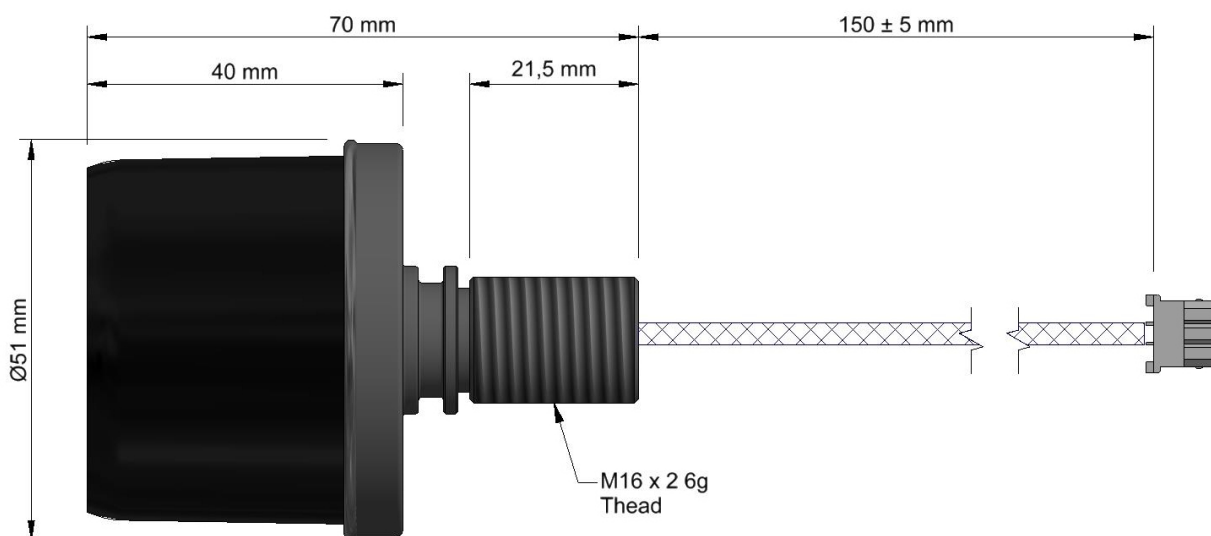
4.4.2 Remote 500 m Transducer OEM Nano

The type 8262-094-01 transducer is designed for use with OEM Nano and AvTrak 6 OEM Nano products. It features an integrated 50 bar (0.7% full scale) pressure sensor which is used to constrain depth and thus improve accuracy when tracking at high elevations.



4.4.3 Remote 3 km

The type 8052-000-05 transducer is designed for use with Modem 6 OEM Nano products and does not feature an integral pressure sensor.



Section 5 – Installation and Deployment

5.1 First Use

Before the Nano is used for the first time, the battery must be charged for a minimum of 12 hours using the supplied ac charger.

On power up a series of pings will indicate remaining battery level as described in section 8.6.2.

5.2 Pre-use Checks

Before installation and deployment, checks should be carried out to make sure the Nano is serviceable and ready for use. These checks include:

- Inspect the Nano for any signs of mishandling, external damage or leakages.
- For non-OEM variants, check the pressure relief vent valve; see *Section 8.8 "Pressure Relief Vent Valve"*.
- Check the battery contains enough charge for the current deployment operation; see *Section 8.6 "Battery Status"*.

5.3 Configuration

Carry out the following procedures to configure the Nano if necessary, ready for deployment.

Note

 **There are two methods of accessing the Nano configuration; using 6G Terminal Lite software or using an iWAND hand held test device.**

1. Connect to the Nano using 6G Terminal Lite; see *Section 9.2.1 "6G Terminal Lite"* or an iWAND hand held test unit; see *Section 9.2.2 "iWAND Hand-Held Test Device"*.
2. For instructions on functional testing and configuring the Nano, see *Section 9 – Functional Testing*.
3. Make sure the Unique Identity (UID) and address are correct.

Note

 **The UID should match the UID printed on the Nano housing label.**

4. Check all the displayed settings are correct.

5.3.1 6G Test Report

A pdf test report can be generated by the software to show the following data:

- Date/Scenario
 - Hardware/Range/Sensor Tests, confirmation of which tests were performed and the end results; PASS/FAIL
 - Unit Status
 - Settings
 - Battery Status
 - Hardware Identification
-

To generate a test report using 6G Terminal Lite, see *Section 9.4.1 "Creating a Test Report"*.

5.4 Deployment

5.4.1 Nano

The Nano can be deployed for short duration acoustic positioning of divers or small underwater vehicles.

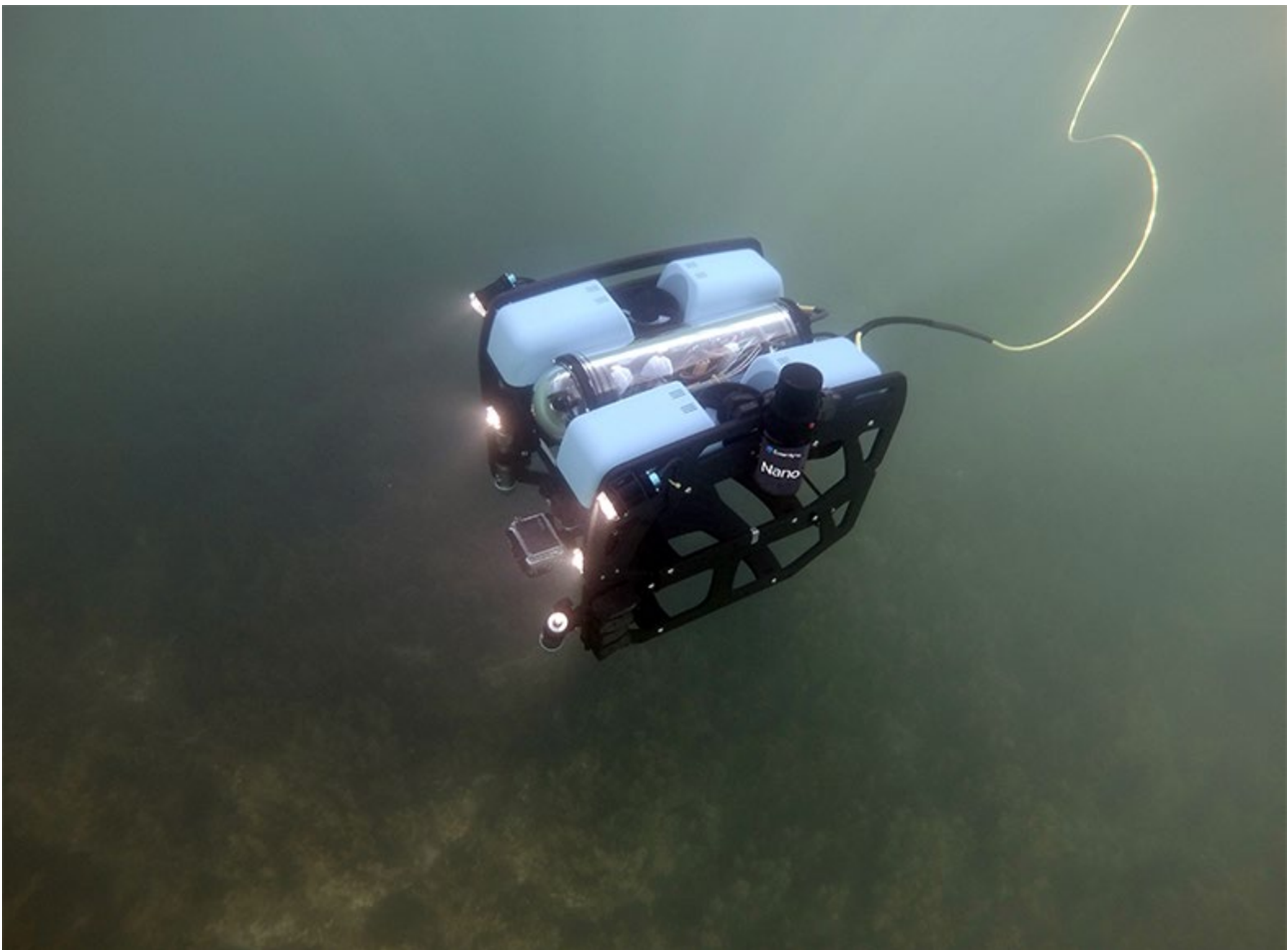
CAUTION



Ensure the Nano has a clear line of sight to the transceiver and is not obstructed by apparatus or expelled gas from underwater breathing equipment.

5.4.2 Nano (cabled) and AvTrak 6 Nano

Nano (cabled) and AvTrak 6 Nano are designed for tracking small underwater vehicles and autonomous vehicles. An example of a Nano with connector attached to an ROV is shown below.



5.4.3 OEM Variants

OEM variants are designed to be deeply integrated into a vehicle or platform with the transducer exposed and with a clear line of sight for communication.



Note

 Consult integration guide *IM-8262* and Sonardyne Support for additional information on mounting Transducers and possible noise sources.

Section 6 – Operation

6.1 Operational Modes

Nano transponders are tracked by a Sonardyne 6G surface system such as Ranger 2.
For operating instructions refer to the system's user manual.

6.2 After Use

After retrieval from the water, see *Section 7 – Retrieval, Transportation and Storage*.

Section 7 – Retrieval, Transportation and Storage

7.1 Retrieval

When retrieving from the water, the Nano must be cleaned and inspected before being stored.

1. Clean the Nano; see *Section 8.2 "Cleaning"*.
2. Inspect the Nano; see *Section 8.3 "Inspection"*.

7.2 Transportation and Storage

The Nano can be transported and placed in storage as described below. See *Table 7-1* for the recommended storage conditions.

WARNING



When transporting and storing the Nano the battery must be disconnected.

1. Disconnect the battery; see *Section 8.7 "Connecting/Disconnecting the Nano Battery"* and then confirm the battery has been successfully disconnected by using 6G Terminal Lite (the 6G Setup tab will not populate when disconnected); see *Section 9.3.4 "Checking the Wideband Acoustics"*.
2. Store the Nano in its transit case.
3. Equipment must be kept in a dry, non-condensing atmosphere (20% to 80% humidity), free from corrosive agents and isolated from sources of vibration.
4. When storing for long periods of time it is recommended to visually inspect the equipment at least annually.
5. When equipment is taken from low temperature storage for immediate use its temperature should be raised to normal operating temperature before use.

Table 7-1 Storage Conditions

Item	Specification
Storage Temperature	-20 to 55°C (<i>see Notes below</i>)
Relative Humidity	20 to 80% (non-condensing)

Notes



To prolong the life of the battery, it is recommended not to exceed the storage temperature range of 0 to 30°C.

Section 8 – Maintenance

Note



There are no servicable parts inside Nano Transponders and Transceivers. Internal access to the equipment covered in this manual is only permissible by qualified Sonardyne Personnel.

8.1 Retrieving from the Water

See *Section 7 – Retrieval, Transportation and Storage*.

8.2 Cleaning

1. Thoroughly wash the Nano in warm clean fresh water, paying particular attention to the pressure relief vent valve.
2. Dry the Nano using a clean lint free cloth.

8.3 Inspection

Regularly inspect the Nano for the following:

1. Inspect the pressure relief vent valve; see *Section 8.8 "Pressure Relief Vent Valve"*.
2. Inspect the transducer and housing for any signs of mishandling, external damage or leakages.

8.4 Lubrication

Sonardyne recommend the use of different lubricants for different connections as below:

Assembly	Lubricants
Micro-Subconn connectors	Molykote 44 Medium
O-ring seals	Petroleum Jelly

8.5 Charging the Battery

8.5.1 Introduction

The battery takes approximately 12 hours to fully charge from depleted with built in protection preventing overcharging.

8.5.2 Charging with Nano Docking Station

Connect the supplied charger to a 115/230 V ac supply and place the Nano in the Docking Station to initiate charging. When fully charged, the **Charging** LED changes from flashing red  to green  (see *Figure 4-2* for a description of the Docking Station LEDs).

CAUTION



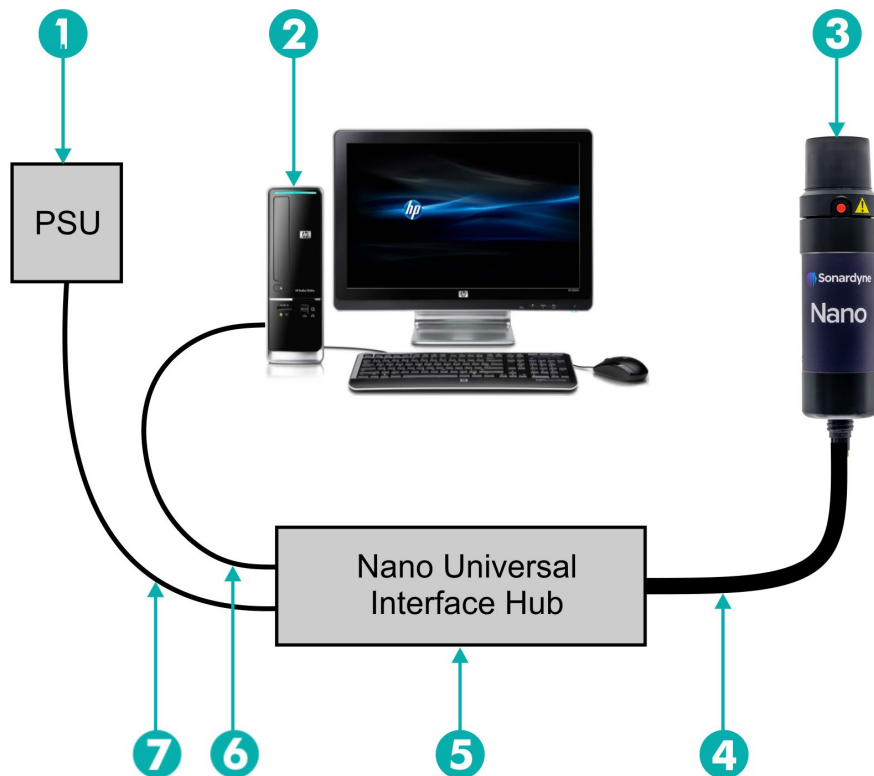
Potential heat source. Ensure there are no metal or other foreign objects located inside the docking station cradle while charging.



8.5.3 Charging with Universal Interface hub

To charge the Nano (cabled) with Subconn connector, the Nano Universal Interface Hub (620-0582) should be used as shown below.

1. Connect the Nano Universal Interface Hub Subconn charging/comms cable ④ to the Nano Subconn connector.
2. Connect the ac charger PSU ① dc jack plug ⑦ to the Nano Universal Interface Hub ⑤.
3. To monitor the charging and battery status: connect the Nano Universal Interface Hub to a PC ② running 6G Terminal Lite using the Type A to Type B USB cable ⑥.
4. The Nano can be left connected to the charger and it will trickle charge the battery as required, stopping when the battery is full.



8.6 Battery Status

8.6.1 Checking the Battery Status using 6G Terminal Lite

Connect the Nano to 6G Terminal Lite as described in *Section 9.3 "Test Procedures"*.

The battery status is displayed on the **6G Setup** tab.



8.6.2 Checking the Battery Status when Powering On

When powering on the device it will emit a number human audible of pings at 0.25s intervals based on the remaining battery level as below:

Remaining power	Number of pings
0–30%	1 ping
30–50%	2 pings
50–70%	3 pings
70–90 %	4 pings
>90%	5 pings

8.6.3 Checking the Battery Status using an iWAND

See *UM-8315 "User Manual for the Type 8315 iWAND"*, *Section "Quick Check > Battery Status"*.

8.7 Connecting/Disconnecting the Nano Battery

The battery can be disconnected/connected by pressing the docking station connect button or by sending a serial command as below. The battery should be disconnected to conserve the battery between deployments and for shipping.

The battery can also be disconnected using the SC (Secure) command as shown below (DIS parameter) where the U##### is the unit's unique id:

```
<SC:U54D6,DIS1
```

```
>SC:2209,U00552A,HPR45,BT1;DIS1;CHG0,OV0,CAS0,LKD0
```

Notes



The unit will stay powered if the battery is disconnected while external power is still applied.



When the battery is disconnected and external power is removed, all nano variants can take up to 40 seconds to shutdown completely. Wait at least 40 seconds before attempting to power it up again.



It is always recommended to disconnect the battery prior to storage. To prevent a deep discharge, the battery automatically disconnects when it reaches approximately 3.1 V. It will however continue to slowly discharge over the course of several months. At 2.3V it will enter a micro-power state to delay deep discharge as long as possible. The battery being at this low level will mean a slow charge rate when power is next applied, until the battery voltage is sufficient to allow fast charging. It may also prevent booting until the batteries have charged enough to be electronically connected.

8.8 Pressure Relief Vent Valve

A pressure relief vent valve is fitted to automatically release any build-up of pressure inside the Nano during deployment. This could be caused by water ingress during deployment and/or the degassing of a battery.

The pressure relief vent valve should be flush with the endcap face. If there is any reason to suspect there may be pressure inside the transponder, the pressure relief vent valve must be operated as described below.

8.8.1 Operating the Pressure Relief Vent Valve

Note



Refer to Warnings in *Section 2 – Safety* “High Internal Pressure, Risk of toxic gases and corrosive liquids, Faulty Battery Pack”.

1. Using your fingers or a suitable tool, carefully withdraw the pressure relief vent valve as far as it will extract and wait for any internal pressure to be released.



Note



If using a tool to extract the valve be careful not to damage the valve's surface.

2. After any pressure has been released, push the valve fully back into its recess.
-

Section 9 – Functional Testing

9.1 Introduction

Ensure the Nano has been cleaned; see *Section 8.2 "Cleaning"*.

To make sure the Nano functions correctly, testing can be carried out including:

- Wideband transmit and receive circuitry
- Hardware self-check
- Checking the sensors
- Changing the Nano's address
- Creating a report

9.2 Equipment

The equipment shown in *Table 9-1* can be used to carry out functional testing of the Nano:

Table 9-1 Test Equipment

Description	Sonardyne Part Number
PC with a USB port	N/A
USB cable (Micro)	820-0503
6G Terminal Lite on 6G Utilities CD-ROM (see <i>Section 9.2.1</i>)	920-2000
iWAND hand held test device (see <i>Section 9.2.2</i>)	8315-0002

9.2.1 6G Terminal Lite

6G Terminal Lite software is supplied on the 6G Utilities CD. See *UM-8300-099 "User Manual for 6G Terminal Lite"* (referred to as *6G Terminal Lite* in this manual).

9.2.2 iWAND Hand-Held Test Device

The Type 8315 iWAND is a hand-held acoustic transponder test and configuration device for use with Sonardyne's 6G product range.



9.3 Test Procedures

The following test procedures are carried out using 6G Terminal Lite. Many of the procedures can also be performed using the iWAND hand-held test unit; for more information, see *UM-8315 "User Manual for the Type 8315 iWAND"*.

9.3.1 Nano

To carry out operational testing of the Nano, connect the USB cable from the Nano Docking Station USB port to a PC running 6G Terminal Lite software; see *Figure 9-1*.

Figure 9-1 Nano/Docking Station Connected to a PC

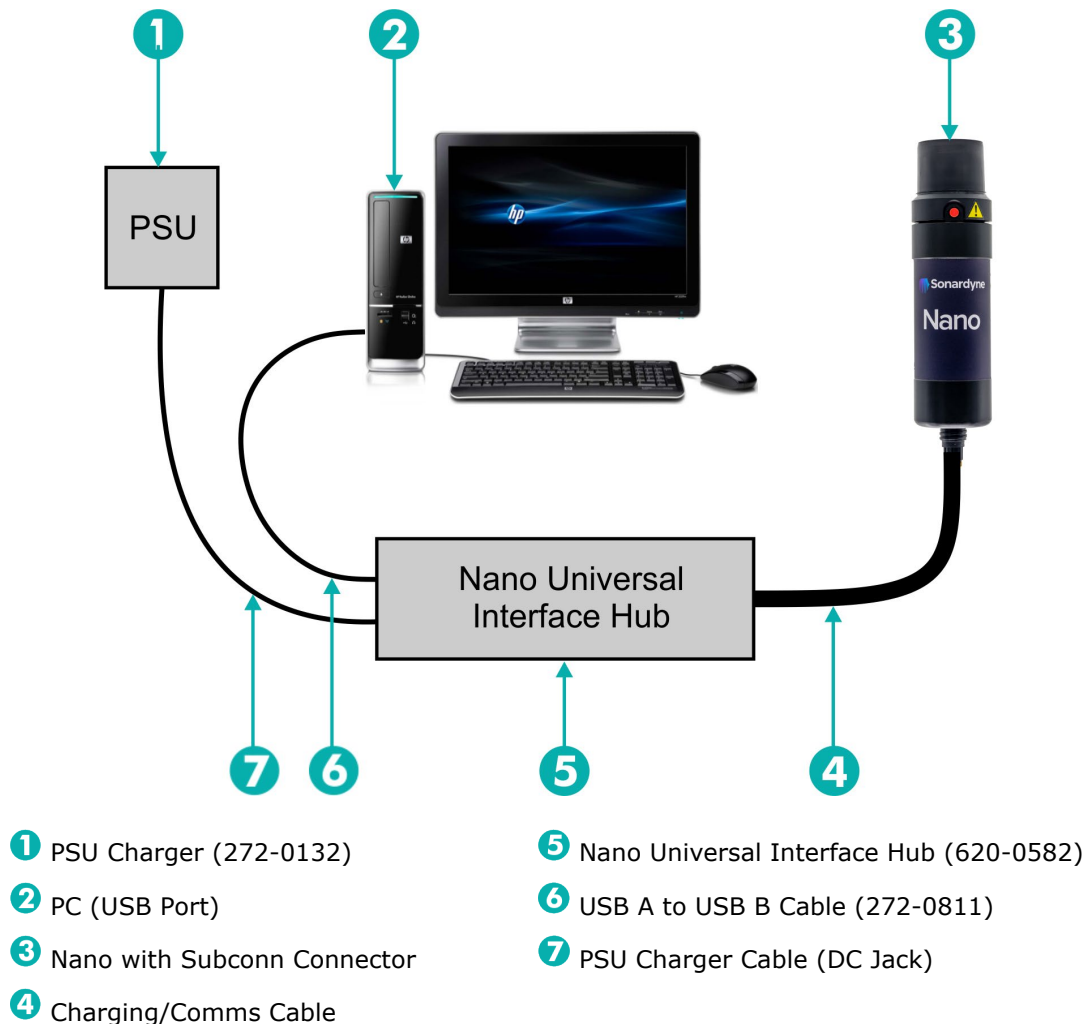


1	PC (Terminal Lite Software)	3	Nano
2	USB Cable	4	Docking Station

9.3.2 Nano with Connector (cabled)

To carry out operational testing of the Nano (with connector) and AvTrak 6 Nano, connect the device to a PC running 6G Terminal Lite software; see *Figure 9-2*.

Figure 9-2 Nano (cabled) Connected to a PC



9.3.3 Nano OEM

OEM variants of Nano, AvTrak 6 Nano and Modem 6 Nano require the following checks to be completed to confirm correct functionality.

Note

 **OEM variants must always be transported with its battery electronically disconnected (see Section 8.7). On receipt of an OEM variant the battery must be connected before serial communications are possible.**

9.3.3.1 Powering On

Connect the transducer using the supplied test lead and wire the Nano OEM to a 12/24 V 30 W power supply and to a PC serial port.

When power is applied, the red and green LEDs on the processor module will light briefly to indicate successful boot up and the following message will be output from the serial port at 9600 baud, reporting the Nano AvTrak 6 OEM address, port number, baud rate and protocol:

```
>PORT:2209,P0;BR9600;CF0;RS232
```

CAUTION



The OEM board will emit acoustic transmissions at start up to indicate battery percentage. Ensure the transducer is fitted to connector PL1 and nothing comes into contact with the PCB during transmission.

9.3.3.2 Normal Boot Sequence

When power is applied, the normal boot sequence of an OEM board starts; the bootloader is executed, the firmware is loaded and the bootloader then passes control to the application firmware.

Note



The firmware will automatically run the last stored user configuration; if a user configuration is not available the firmware will revert to use a saved "Factory" configuration.

9.3.4 Checking the Wideband Acoustics

The following procedure describes the acoustics check using 6G Terminal Lite.

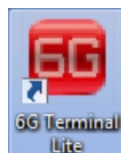
Note



The same checks can also be performed using the iWAND hand held test unit; see *UM-8315 "User Manual for the Type 8315 iWAND"*, Section "Ping Check".

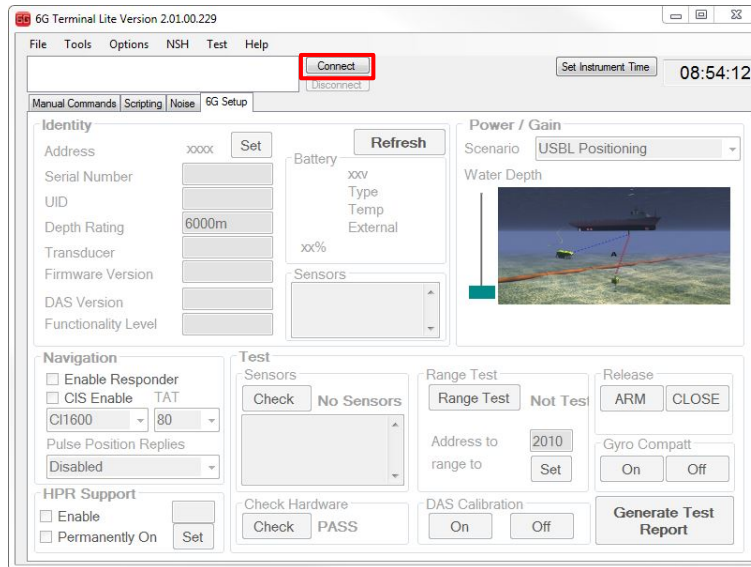
To carry out a check of the Wideband Acoustics of the transponder, it will also be necessary to enter the address of an acoustic target to range to. This can be any 6G Transponder or an iWAND set to Transponder Mode.

1. Connect the Nano:
 - a. Nano (NFC): connect NFC Docking Station to the PC and place the Nano in the Docking Station (ensure it is enabled; see *Figure 4-2*).
 - b. Nano (with connector/OEM): connect to a PC serial port.
2. Double-click the **6G Terminal Lite** desktop icon to start the software.

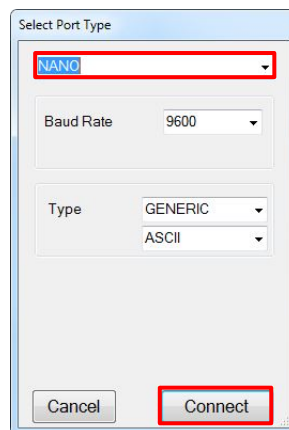


-
-
3. The 6G Terminal Lite dialog box will open on the **6G Setup** tab.

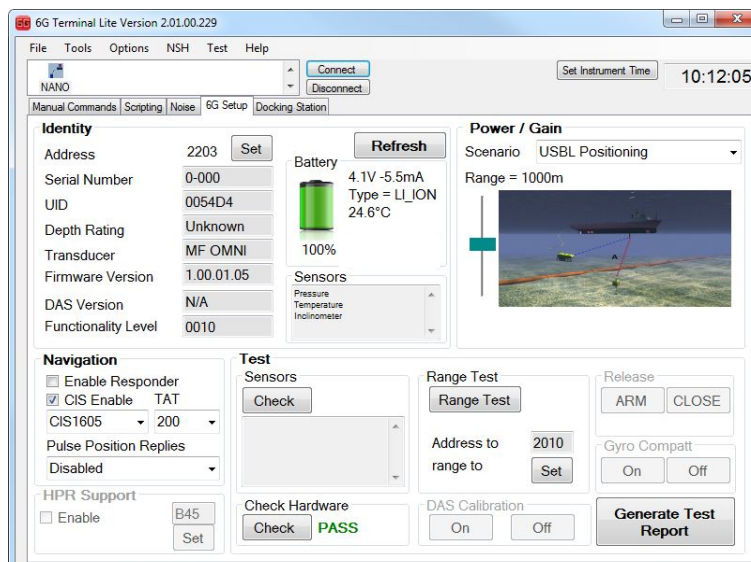
- Click **Connect**.



- On the **Select port type** drop-down list, select **Nano** (or relevant serial port) and then click **Connect** (all other options can be left as default).



- The **6G Setup** tab displays information on the connected transponder including address, serial number, depth rating and battery status.



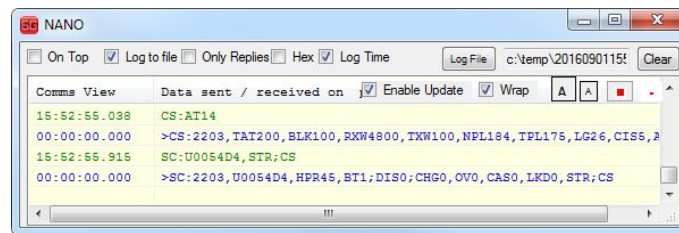
Note

The Battery Connect/Disconnect button is not displayed for the Nano.

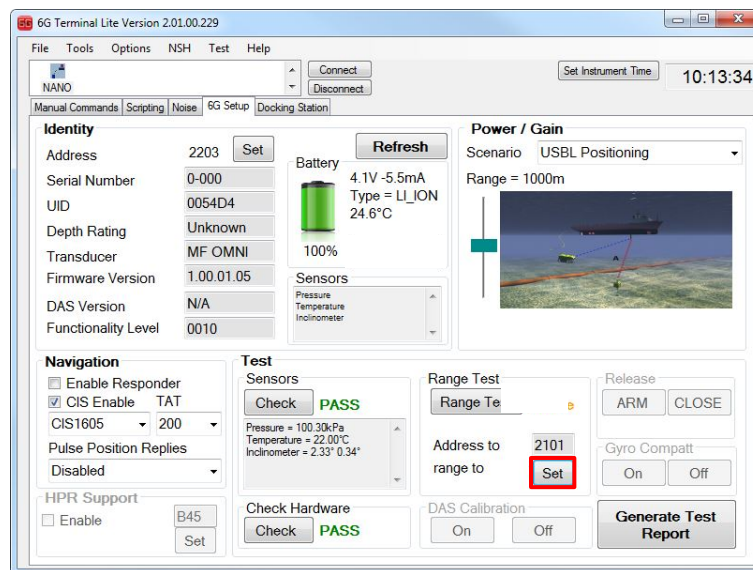
7. A COMMS log window will also open (green text indicates the commands sent from the software to the transponder and blue text is the transponder's response).

Note

This window automatically logs all communications when open and should be left open to ensure communications are logged for diagnostic purposes.



8. To enter the address of the acoustic target (for measuring a test range), click **Set** on the **Range Test** section.



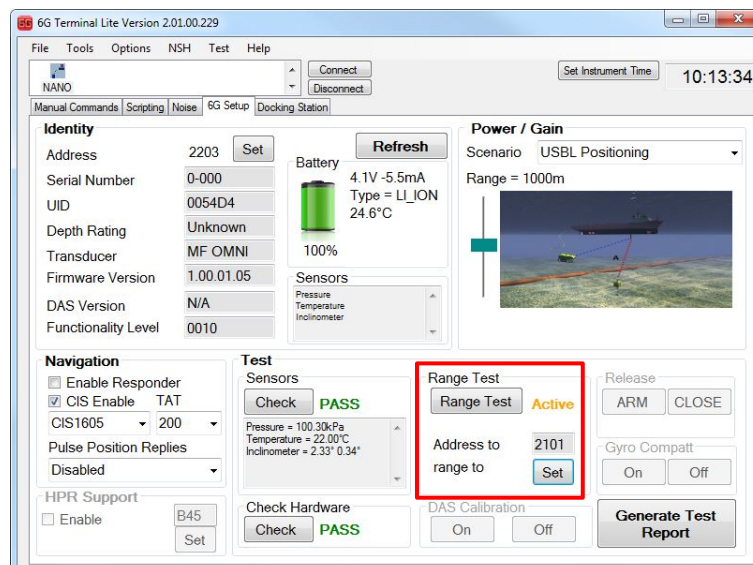
9. An **Address Selector** window will open listing all available addresses for Wideband 2. Select the address for the attached device and then click **OK**.

Note

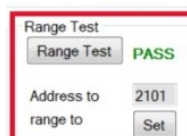
The Ranger 2 system does not support Wideband 1 for the Nano.



10. The 6G Setup tab will open with the selected address next to **Address to Range to**.
11. Click **Range Test** to begin the acoustic check (this will require another 6G device to range to).
12. During the test **Active** will appear next to the **Range Test** button to indicate the test is in progress.



13. If the Acoustic check is successful **Pass** will appear next to the **Range Test** button (If **Fail** appears, move the transponder to a new location and repeat the range test. If the Range Test continues to fail contact Sonardyne Support).



14. The acoustic checks are now complete.

9.4 Checking the Sensor Measurements

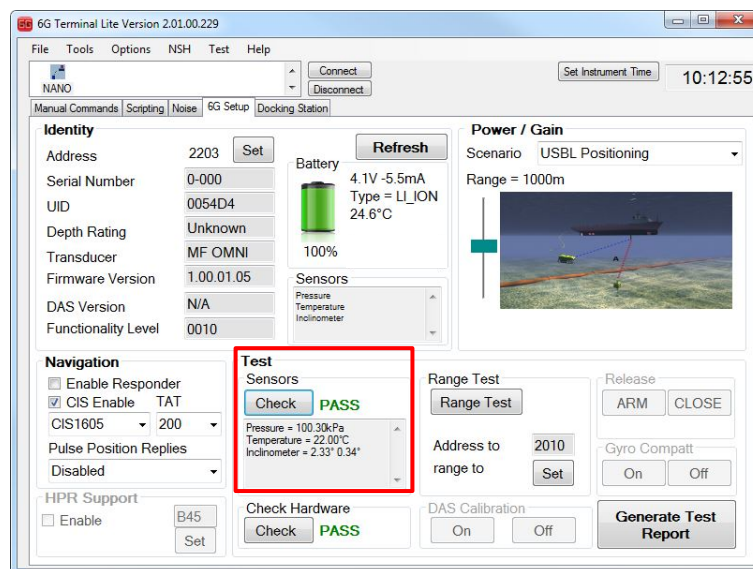
The following procedure describes the sensor measurements check using 6G Terminal Lite.

Note



The same checks can also be performed using the iWAND acoustic transponder; see *UM-8315 "User Manual for the Type 8315 iWAND", Section "View Sensors"*.

1. Click **Test Sensors Check** to perform a test of all sensors installed in the transponder.
2. **Acquiring** appears next to the **Test Sensors Check** button to indicate the test is in operation.
3. **PASS** appears next to the **Test Sensors Check** button to indicate the test is successful (if the test is unsuccessful the word **FAIL** appears).



Note

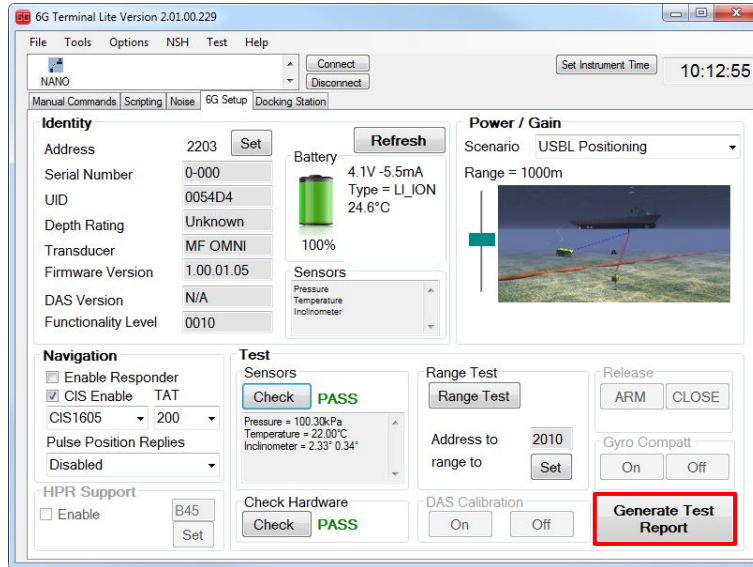


The Inclination values refer to the roll and pitch in degrees.

9.4.1 Creating a Test Report

On completion of a functional testing of the transponder a test report can be created. The report lists detailed information on the transponder, settings, battery and sensors and will indicate if the transponder has passed the tests.

1. Click **Generate Test Report**.



2. Select the folder to save the Test Report.pdf to and then click **OK**.

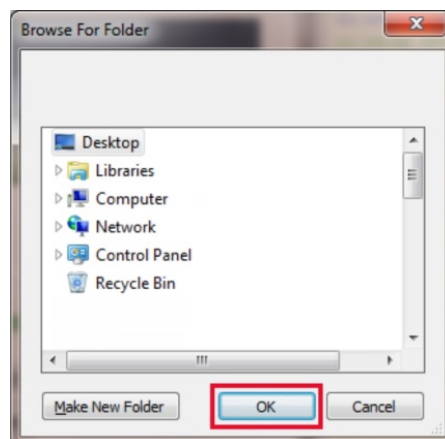
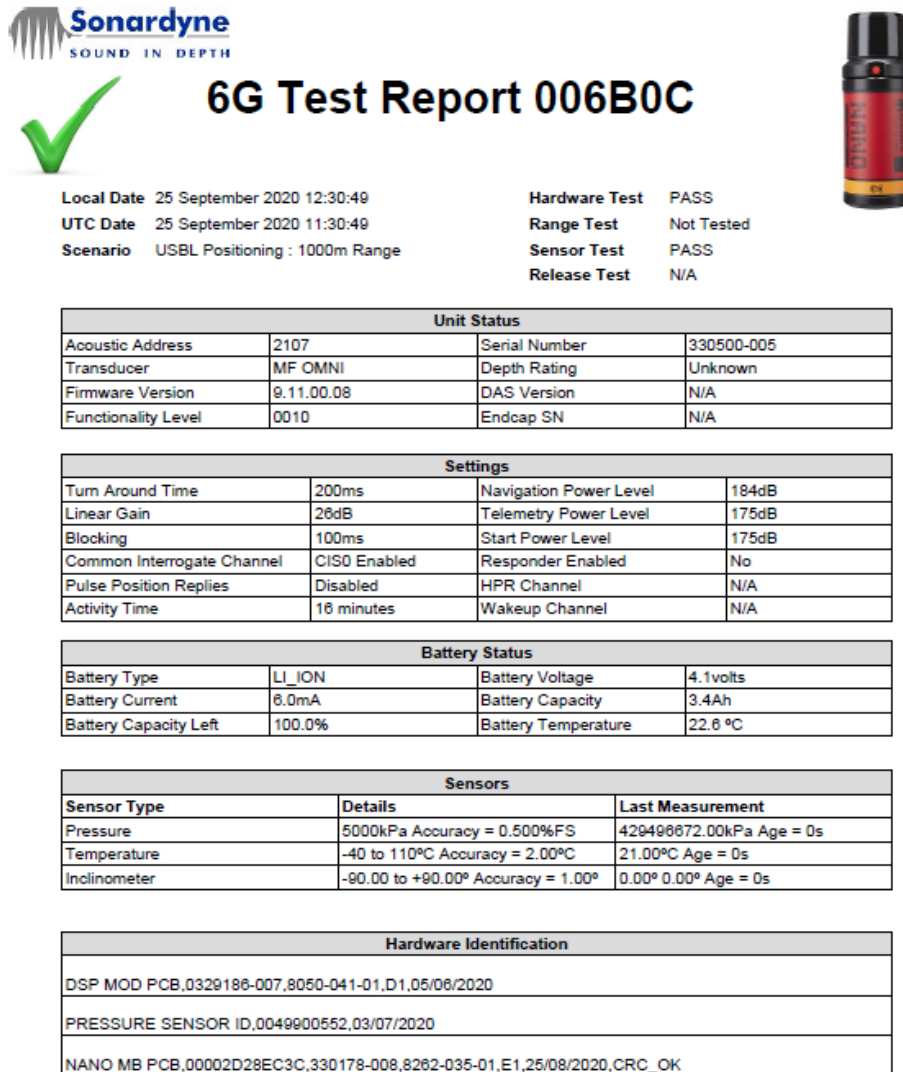


Figure 9-3 Nano Transponder Test Report pdf



25 September 2020 12:30:49

1 of 2

6G Terminal Transponder Report

Section 10 – Fault Diagnosis

10.1 Introduction

The following section assists in diagnosis when the transponder fails to operate correctly. Each section identifies a fault, the possible cause and the recommended action to rectify the fault.

10.2 Fault Types

Fault	Possible Cause	Action
Transponder does not reply to interrogation or commands.	Incorrect transponder address set in the surface transceiver.	Check address and repeat with the correct address.
	Operating at long range.	Increase power to the surface transceiver.
	Ray-bending effects stopping the transponder from receiving.	Use software application RAY_TRACE available from Sonardyne Int Ltd.
	Surface thermocline refracting reply signals.	Lower transducer below thermocline.
	Noise level at surface transducer too high.	Lower the dunking transducer/transceiver and reduce the surface transceiver gain settings.
	Noise level at surface transducer too high.	Do a noise check using the applicable transceiver noise check command.
	Transponder has low battery power.	Check log for battery output before deployment.
		Check battery levels since deployment.
	Transponder is set to low power.	Check log for Navigation Power Level (NPL) in the Configuration Status (CS) Command before deployment.
	Transponder is set to low gain.	Check log for Linear Gain (LG) in the Configuration Status (CS) Command before deployment.
Other acoustic systems maybe operating in the same frequency band.		

Section 11 – Spares

11.1 Introduction

When ordering spare parts, you must provide:

- a) The parts number
- b) The drawing number (if known)
- c) The description

Enquiries about, or orders for spare parts should be directed to your local Sonardyne office or agent. Local agents contact details can be found on the back cover of this manual and at www.sonardyne.com

11.2 Recommended Spares

The following is a list of all available spares.

11.2.1 Miscellaneous Parts

Part Number	Drawing Number	Description	Quantity
641-0529	8262-006-01	Nano Docking Station	1
271-9830	N/A	115/230 V AC Power Supply USB Mains Adapter	1
620-0645	8262-102-A1	Nano Universal Interface hub kit (with PSU and Cable)	1

11.2.2 Cables

Part Number	Drawing Number	Description	Quantity
820-0503	8262-055	USB Cable (Micro)	1
317-2896	n/a	0.5m Subcomm MCIL8F	1
317-2963	n/a	5.0m Subconn MCIL8F	1
317-2672	N/A	Micro Subconn Female Sleeve	1

Section 12 – Technical Specifications

12.1 Nano

12.1.1 Specifications

Feature		Type 8262 NFC
Operating Range		995 m ¹
Depth Rating		500 m
Frequency Band		MF (19–34 kHz)
Transducer Beam Shape		Omni-directional $\pm 130^\circ$
Source Level (re 1 μ Pa @ 1 m)		184/175 dB
Range Precision		Better than 15 mm
Communication Interface		USB in dock
Depth Sensor		50 bar abs $\pm 0.7\%$ FS
Power Supply ²		USB dock
Power Consumption	Wideband Listening (Battery)	n/a
	Wideband Listening (Ext Power)	n/a
	Battery Charging	n/a
	Peak (During Transmission)	n/a
Battery Life	Quiescent Listening	>90 days
	1 Sec Ping Rate	>12 hours
Battery Charge Time		12 hours
External Connections		n/a
Mechanical Construction		Polymer
Operating Temperature ³		-10 to 45°C
Storage Temperature ⁴		-20 to 55°C
Dimensions (Length x Diameter)		160 x Ø55 mm
Weight in Air/Water		486/149 g

¹ When used with Micro-Ranger/range limited Ranger 2 systems.

² Noise on the external dc supply may have an effect on the acoustic performance of the instrument.

³ The battery will not charge above 45°C or below 0°C.

⁴ To maximise battery life, the instrument should not be stored above 30°C.

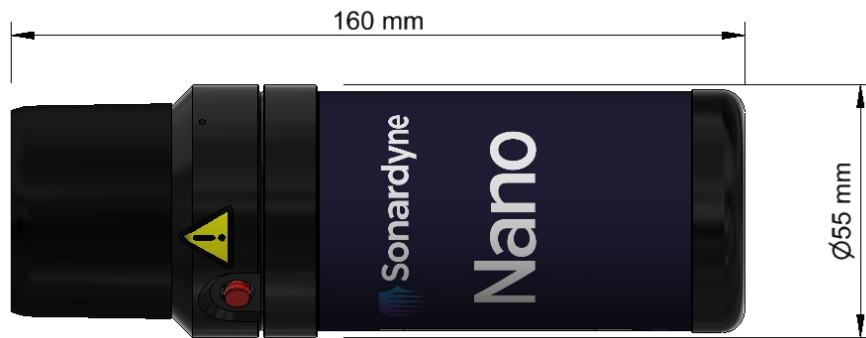
12.1.2 Outline Drawing

Note



.stp files are available from Sonardyne Support.

Figure 12-1 8262-000-23 Nano Transponder with Integrated Pressure Sensor



12.2 Nano with Connector (Cabled)

12.2.1 Specifications

Feature		Type 8262 Cabled
Operating Range		995 m ¹
Depth Rating		500 m
Frequency Band		MF (19–34 kHz)
Transducer Beam Shape		Omni-directional $\pm 130^\circ$
Source Level (re 1 μPa @ 1 m)		184/175 dB
Range Precision		Better than 15 mm
Communication Interface		RS232, 3V3 TTL
Depth Sensor		50 bar abs $\pm 0.7\%$ FS
Power Supply ²		12–28 V dc
Power Consumption	Wideband Listening (Battery)	5 mW
	Wideband Listening (Ext Power) ³	20 mW (including trickle charge)
	Battery Charging	60 mW to 2.5 W (depending on battery charge state)
	Peak (During Transmission)	<30 W SMS, <20 W Modem
Battery Life	Quiescent Listening	>90 days
	1 Sec Ping Rate	>12 hours
Battery Charge Time		12 hours
External Connections		Subconn MCIL8M
Mechanical Construction		Polymer
Operating Temperature ⁴		-10 to 45°C
Storage Temperature ⁵		-20 to 55°C
Dimensions (Length x Diameter)		192 x Ø55 mm
Weight in Air/Water		584/162 g

¹ When used with Micro-Ranger 2/range limited Ranger 2 systems.

² Noise on the external dc supply may have an effect on the acoustic performance of the instrument.

³ Includes top-up charging of the li-ion battery, which could be disabled, or managed intelligently for better efficiency

⁴ The battery will not charge above 45°C or below 0°C.

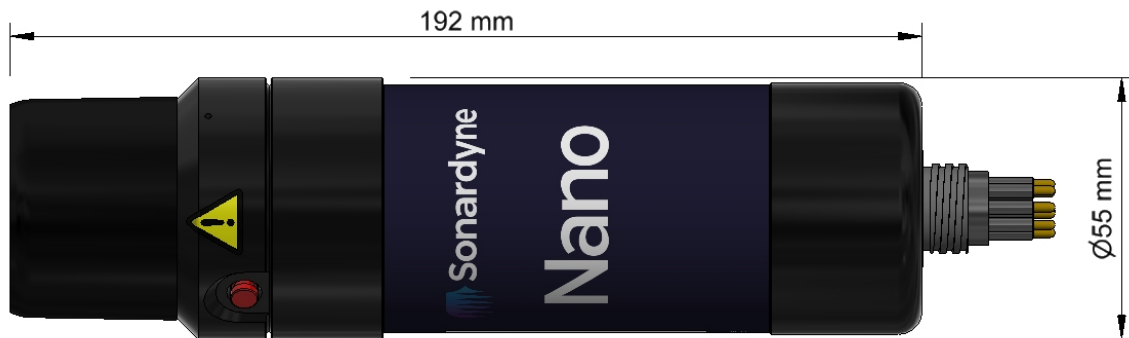
⁵ To maximise battery life, the instrument should not be stored above 30°C.

12.2.2 Outline Drawing

Note



.stp files are available from Sonardyne Support.



12.3 Nano OEM

12.3.1 Specifications

Feature		Type 8262 OEM
Operating Range		995 m ¹
Transducer Depth Rating		500 m
Frequency Band		MF (19–34 kHz)
Transducer Beam Shape		Omni-directional $\pm 130^\circ$
Source Level (re 1 μ Pa @ 1 m)		184/175 dB
Range Precision		Better than 15 mm
Communication Interface		RS232, 3V3 TTL
Depth Sensor		50 bar abs $\pm 0.7\%$ FS
Power Supply ²		12–28 V dc
Power Consumption	Wideband Listening (Battery)	5 mW
	Wideband Listening (Ext Power) ³	20 mW (including trickle charge)
	Battery Charging	60 mW to 2.5 W (depending on battery charge state)
	Peak (During Transmission)	<30 W SMS, <20 W Modem
Battery Life	Quiescent Listening	>90 days
	1 Sec Ping Rate	>12 hours
Battery Charge Time		12 hours
External Connections		Molex Microfit
Transducer Wire Length ⁴		150 mm (6")
Operating Temperature ⁵		-10 to 45°C
Storage Temperature ⁶		-20 to 55°C
Dimensions	Transducer (Length x Diameter)	72 x Ø49 mm
	PCB Board Assembly (L x W x H)	95 x 43 x 42.5 mm
	Hole Centres (M2 clearance – L x W)	71.5 x 35 mm
Weights	PCB in Air	138 g PCB + 12 g cable
	Transducer in Air/Water (estimated)	200/150 g

¹ When used with Micro-Ranger/range limited Ranger 2 systems.

² Noise on the external dc supply may have an effect on the acoustic performance of the instrument.

³ Includes top-up charging of the li-ion battery, which could be disabled, or managed intelligently for better efficiency

⁴ It is possible to increase the transducer wire length if required; contact Sonardyne for more information.

⁵ The battery will not charge above 45°C or below 0°C.

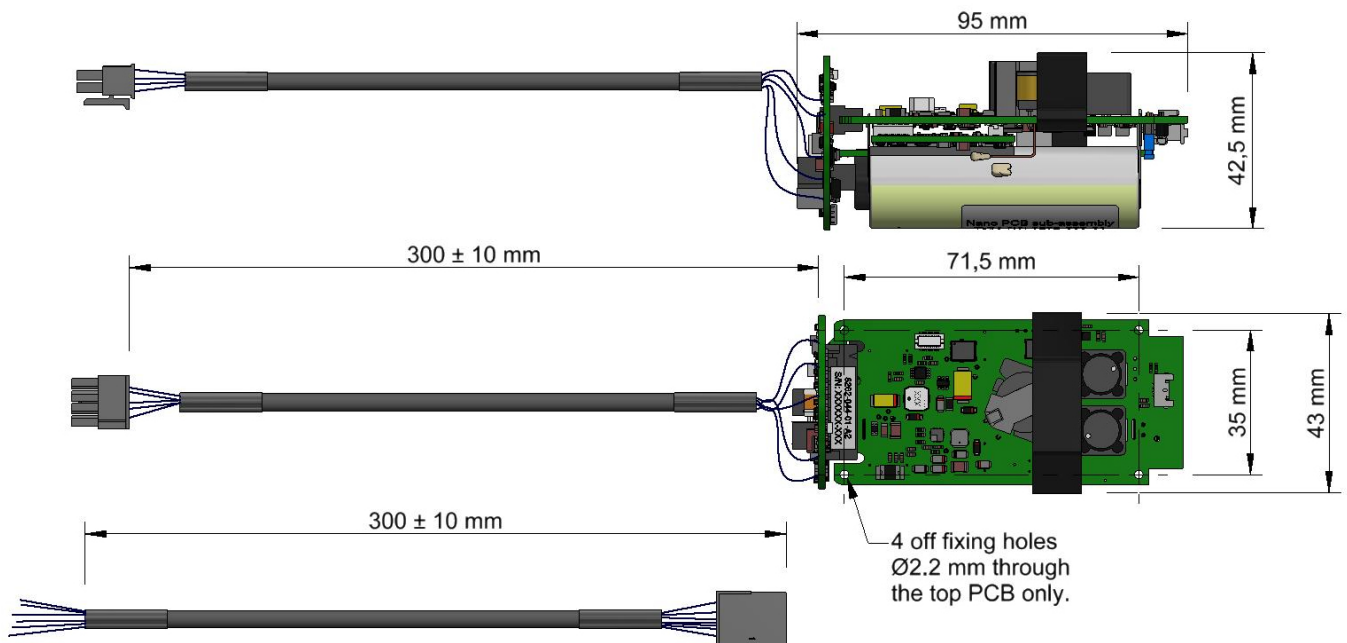
⁶ To maximise battery life, the instrument should not be stored above 30°C.

12.3.2 Outline Drawing

Note



.stp files are available from Sonardyne Support.



12.4 AvTrak 6 Nano

12.4.1 Specifications

Feature		Type 8262 AvTrak 6 Nano
Operating Range		>3000 ¹ m
Depth Rating		500 m
Frequency Band		MF (19–34 kHz)
Transducer Beam Shape		Omni-directional $\pm 130^\circ$
Source Level (re 1 μ Pa @ 1 m)	Modem	175 dB
	Tracking & Telemetry ²	184/175 dB
Range Precision		Better than 15 mm
Communication Interface		RS232, 3V3 TTL
Depth Sensor		50 bar abs $\pm 0.7\%$ FS
Power Supply ³		12–28 V dc
Power Consumption	Wideband Listening (Battery)	5 mW
	Wideband Listening (Ext Power) ⁴	20 mW (including trickle charge)
	Battery Charging	60 mW to 2.5 W (depending on battery charge state)
	Peak (During Transmission)	<30 W SMS, <20 W Modem
Battery Life	Quiescent Listening	>90 days
	1 Sec Ping Rate	>12 hours
Battery Charge Time		12 hours
External Connections		Subconn MCIL8M
Mechanical Construction		Polymer
Transducer Wire Length ⁵		n/a
Operating Temperature ⁶		-10 to 45°C
Storage Temperature ⁷		-20 to 55°C
Dimensions (Length x Diameter)		192 x Ø55 mm
Weight in Air/Water		584/162 g

¹ UK export licensable, license free available with limited range. Range dependent on environment. 995m range when used with Micro-Ranger 2/range limited Ranger 2 systems

² Configurable

³ Noise on the external dc supply may have an effect on the acoustic performance of the instrument.

⁴ Includes top-up charging of the li-ion battery, which could be disabled, or managed intelligently for better efficiency

⁵ It is possible to increase the transducer wire length if required; contact Sonardyne for more information.

⁶ The battery will not charge above 45°C.

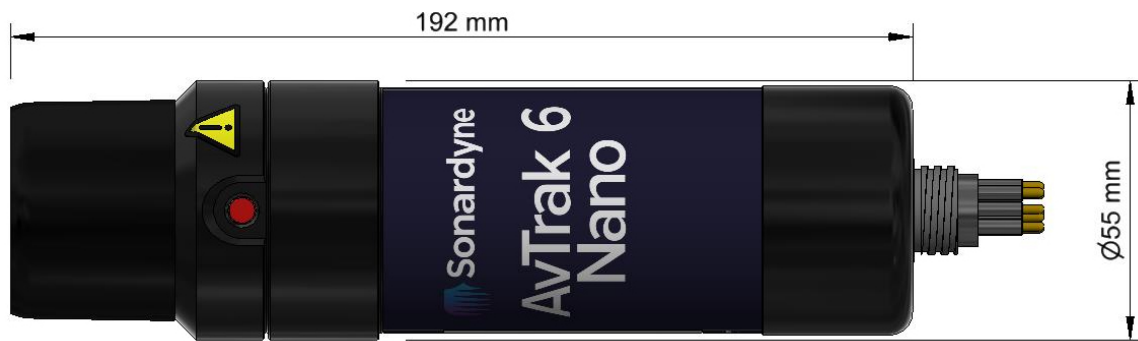
⁷ To maximise battery life, the instrument should not be stored above 30°C.

12.4.2 Outline Drawing

Note



.stp files are available from Sonardyne Support.



12.5 AvTrak 6 OEM Nano

12.5.1 Specifications

Feature		Type 8262 AvTrak 6 OEM Nano
Operating Range		>3000 ¹ m
Transducer Depth Rating		500 m
Frequency Band		MF (19–34 kHz)
Transducer Beam Shape		Omni-directional $\pm 130^\circ$
Source Level (re 1 μ Pa @ 1 m)	Modem	175 dB
	Tracking & Telemetry ²	184/175 dB
Range Precision		Better than 15 mm
Communication Interface		RS232, 3V3 TTL
Depth Sensor		50 bar abs $\pm 0.7\%$ FS
Power Supply ³		12–28 V dc
Power Consumption	Wideband Listening (Battery)	5 mW
	Wideband Listening (Ext Power) ⁴	20 mW (including trickle charge)
	Battery Charging	60 mW to 2.5 W (depending on battery charge state)
	Peak (During Transmission)	<30 W SMS, <20 W Modem
Battery Life	Quiescent Listening	>90 days
	1 Sec Ping Rate	>12 hours
Battery Charge Time		12 hours
External Connections		Molex Microfit
Transducer Wire Length ⁵		150 mm (6")
Operating Temperature ⁶		-10 to 45°C
Storage Temperature ⁷		-20 to 55°C
Dimensions	Transducer (Length x Diameter)	72 x Ø49 mm
	PCB Board Assembly (L x W x H)	95 x 43 x 42.5 mm
	Hole Centres (M2 clearance – L x W)	71.5 x 35 mm
Weights	PCB in Air	138g PCB + 12g cable
	Transducer in Air/Water (estimated)	200/150 g

¹ UK export licensable, license free available with limited range. Range dependent on environment. 995m range when used with Micro-Ranger 2/range limited Ranger 2 systems

² Configurable

³ Noise on the external dc supply may have an effect on the acoustic performance of the instrument.

⁴ Includes top-up charging of the li-ion battery, which could be disabled, or managed intelligently for better efficiency

⁵ It is possible to increase the transducer wire length if required; contact Sonardyne for more information.

⁶ The battery will not charge above 45°C.

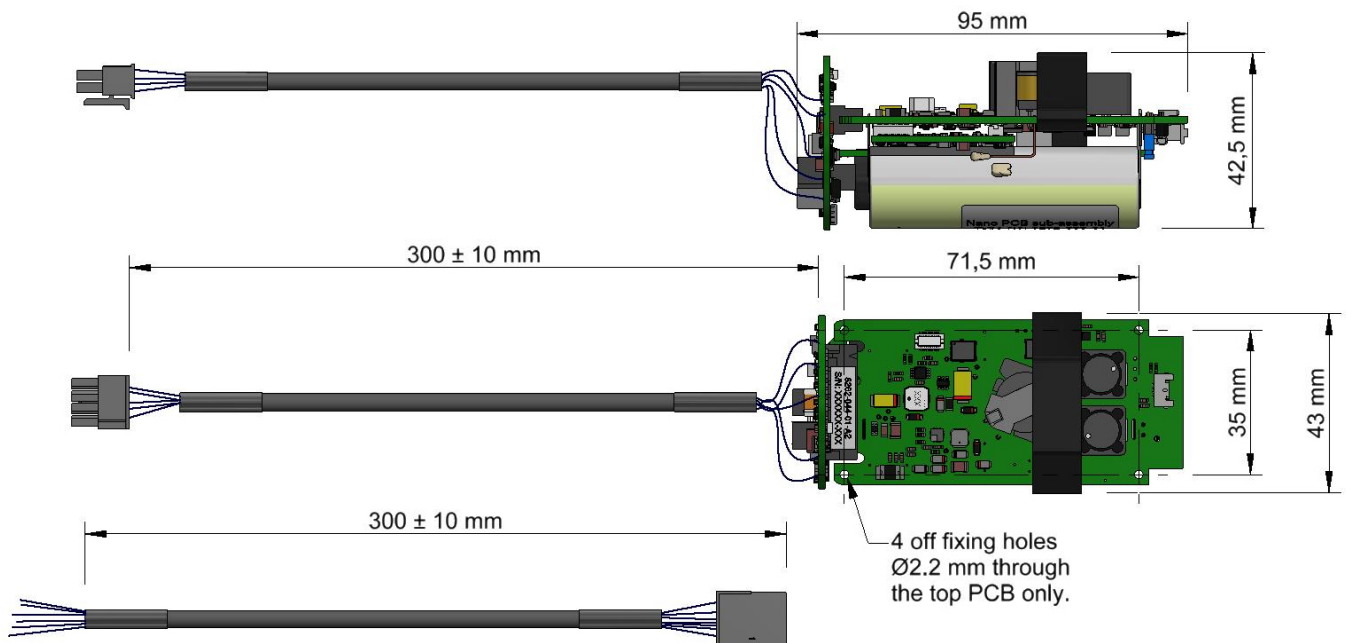
⁷ To maximise battery life, the instrument should not be stored above 30°C.

12.5.2 Outline Drawing

Note



.stp files are available from Sonardyne Support.



12.6 Modem 6 OEM Nano

12.6.1 Specifications

Feature		Type 8262 Modem 6 OEM Nano
Operating Range		2,000 m
Transducer Depth Rating		3,000 m
Frequency Band		MF (21–32.5 kHz)
Transducer Beam Shape		Omni-directional $\pm 130^\circ$
Source Level (re 1 μ Pa @ 1 m)		175 dB
Communications Interface		RS232 (2,400–115,200 baud), 3V3 TTL
Power Supply		12–28 V dc
Bit Rate		200 - 9000 bits/sec
Bit Error Rate		$>10^{-10}$
Buffer Size		512 kB
Power Supply ¹		12–28 V dc
Power Consumption	Wideband Listening (Battery)	5 mW
	Wideband Listening (Ext Power) ²	20 mW (including trickle charge)
	Battery Charging	60 mW to 2.5 W (depending on battery charge state)
	Peak (During Transmission)	<30 W SMS, <20 W Modem
Battery Life - Listening		>90 Days
Battery Charge Time		12 hours
Tilt Sensor		$\pm 90^\circ$
Transducer Wire Length ³		150 mm (6")
External Connections		Molex Microfit
Operating Temperature ⁴		-5 to 45°C
Storage Temperature ⁵		-20 to 55°C
Dimensions	Transducer (Length x Diameter)	72 x $\varnothing$ 49 mm
	PCB Board Assembly (L x W x H)	95 x 43 x 42.5 mm
	Hole Centres (M2 clearance – L x W)	71.5 mm x 35 mm
Weights	PCB in Air	138g PCB + 12g cable
	Transducer in Air/Water (estimated)	200 g/150 g

¹ Noise on the external dc supply may have an effect on the acoustic performance of the instrument.

² Includes top-up charging of the li-ion battery, which could be disabled, or managed intelligently for better efficiency

³ It is possible to increase the transducer wire length if required; contact Sonardyne for more information.

⁴ The battery will not charge above 45°C or below 0°C.

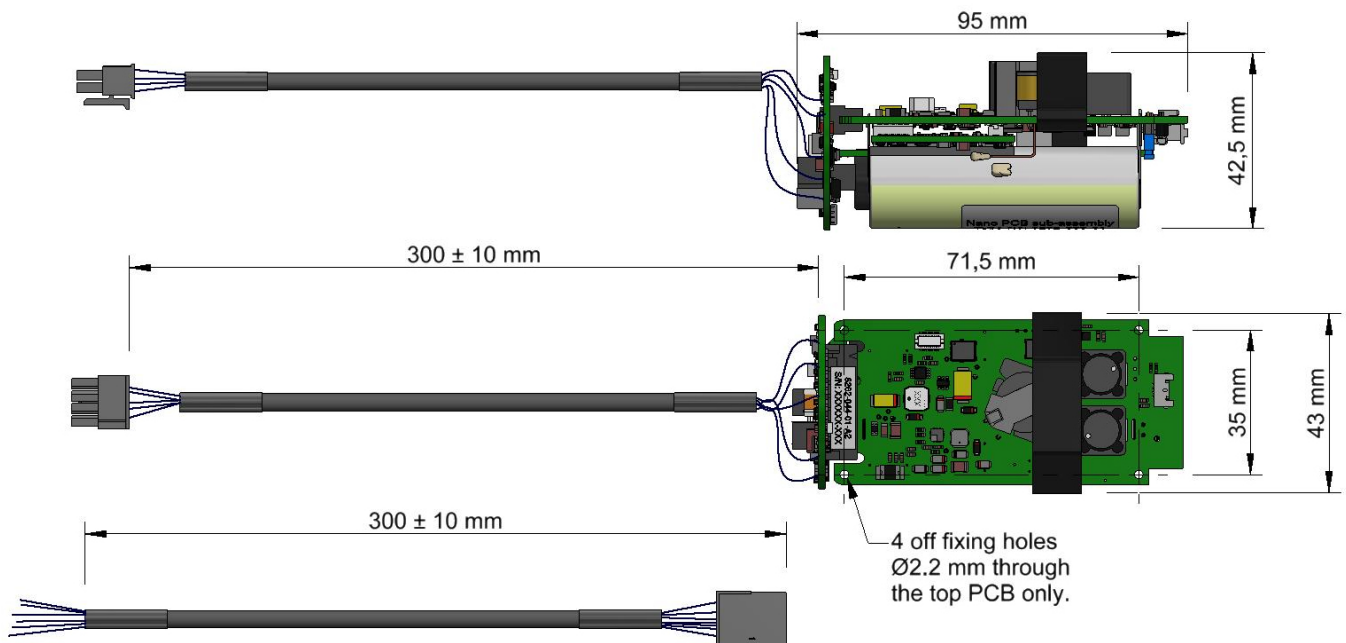
⁵ To maximise battery life, the instrument should not be stored above 30°C.

12.6.2 Outline Drawing

Note



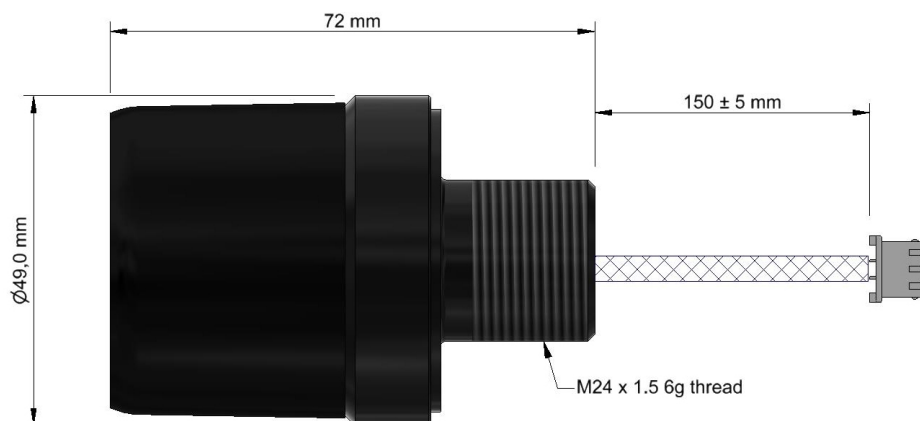
.stp files are available from Sonardyne Support.



12.7 Transducers

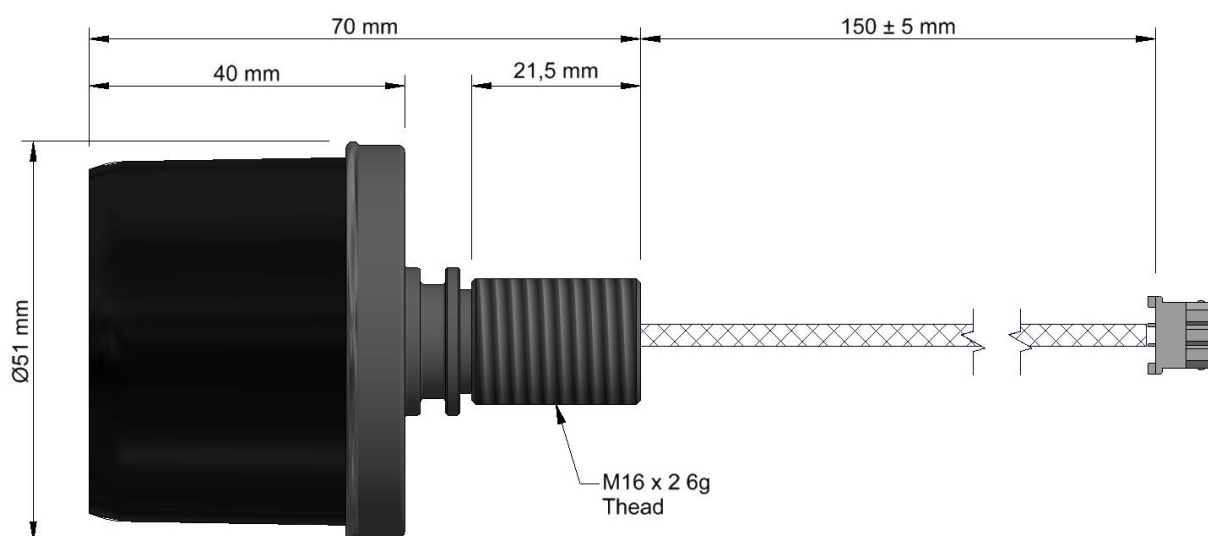
12.7.1 Remote Transducer 500 m

500 m depth-rated remote OEM transducer for use with AvTrak 6 OEM Nano and Nano OEM.



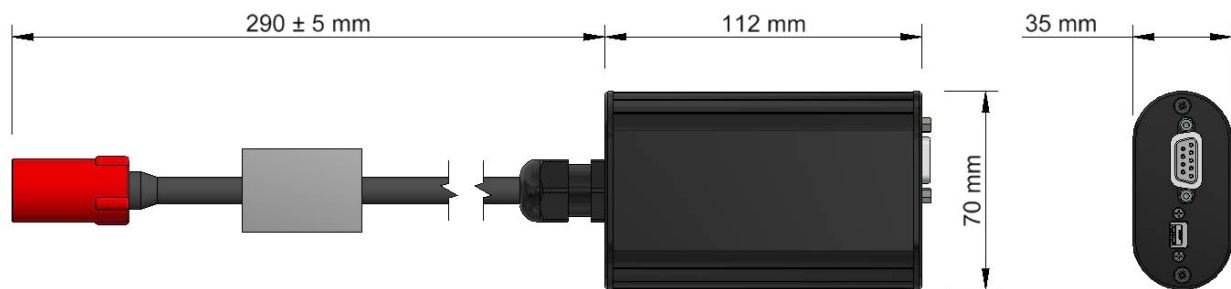
12.7.2 Remote Transducer 3,000 m

3,000 m depth-rated remote OEM transducer for use with AvTrak 6 OEM Nano and Nano OEM.



12.8 Universal Interface Hub

12.8.1 Outline Drawing



Appendix A – Sonardyne Frequency Chart

The Sonardyne Frequency Chart can be used for guidance on optimising USBL accuracy vs. range and avoidance of other acoustic systems operating in the vicinity.



Appendix B – Open Source Software License Notices and Terms

B.1 CMSIS (Cortex® Microcontroller Software Interface Standard)

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Definitions

Term	Definition
6G®	Sonardyne's sixth generation technology hardware platform.
Acoustic Signal	Information carried by sound pressure waves through water. The Sonardyne acoustic signal has a finite length.
Acoustic Responder	An instrument that emits an acoustic signal in response to an electrical signal carried to it by cable.
Acoustic Transceiver	An instrument that emits and receives acoustic signals, and extracts information from them. Transceivers can measure the time it takes a signal to travel from its transducer to a transponder and return. Some can encode and send data in a message and extract digital data from a message (Acoustic Telemetry). Used on a surface vessel or to mark a point on the seabed, or fixed to a mobile for tracking or positioning.
Acoustic Transducer	A device that converts electrical signals into acoustic signals and vice versa.
Acoustic Transponder	An instrument that emits an acoustic signal when it detects an interrogating acoustic signal.
CIS	Common Interrogate Signal
Firmware	The firmware installed on the transponder. Firmware updates can be installed via 6G Terminal Lite. The Tx firmware refers to the transmission signal synthesiser.
HPR	Hydroacoustic Position Reference
LED	Light Emitting Diode
PC	Personal Computer
ROV	Remotely Operated Vehicle
SBL	Short Base-Line
Sonardyne	Sonardyne International Limited and its affiliates.
Sonardyne Wideband®2	6G transponders and transceivers use Sonardyne Wideband 2 ultra-wide bandwidth signals giving a faster and robust transmission of data, more precise ranging and mitigation from multipath in shallow water and amongst steel structures in deep-water.
UID	Unique Identity Description
USB	Universal Serial Bus
Ultra-Short Base Line Positioning System (USBL\)	A system similar to an SBL system except the system uses three or more elements in a single transducer array. The measurements it makes are the differences in "time-phase" of the signals from each element. The co-ordinate frame is fixed to the transducer array which must be oriented in the vessel frame to be equivalent to the SBL.

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