



APPLIED ACOUSTICS
Underwater Technology

1000 Series Operation Manual

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Revision History

Issue	Change No.	Reason for change	Date
6	1272	Amendments to Section 4 Beacon Charging, refer to DCR note. Addition of Model 1019T. Addition of Revision History log. Other Minor amendments.	16/01/13
7	1333	Beacon ID label graphic updated. Other minor amendments.	08/05/13
8	1398	Addition of 1060 Fatboy Series models. Trickle charge recommended inline fuse change 1030 & 1060. Addition of remote transducer details. 1083 Multi Charger references added. Other minor amendments.	18/10/13
9	1398	Addition of 1050 Seabed Series models.	13/03/14
10	1463	Addition of iXBlue compatibility. Special Features removed. Other minor amendments.	01/07/14
11	1568	PRV Service Amendments	05/01/14
12	1637	Addition of Remote Transducer Weights Amendment of Beacon specifications Other minor amendments	05/05/15
13	1727	Additional note added for in service connector maintenance	01/02/16
14	1835	Addition of AAE Sigma 2 Channel Support	02/06/17

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Thank you for choosing Applied Acoustic Engineering as one of your subsea equipment suppliers.
We hope you experience many years of reliable operational use from our products.

If you do encounter any technical issues with any of our products then please don't hesitate to
contact our Technical Team via the following methods.

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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 1000 Series

The AAE 1000 Series subsea beacons suit a variety of underwater positioning and relocation tasks. This manual covers all standard models in the range.

Beacons can operate as: -

- Acoustically triggered transponder (requires one or two acoustic signals before replying).
- Electrically triggered responder.
- Free running pinger (no interrogations are required).

These beacons can operate on 256 different transmit and receive frequency combinations, defined by AAE and referred to as 'channels', and are compatible with the following systems: -

AAE Easytrak Nexus 2	8 AAE Digital Spread Spectrum Sigma 2 plus all tone channels
AAE Easytrak Nexus	32 AAE Digital Spread Spectrum plus all tone channels
AAE Easytrak USBL system	All 256 channels
AAE VNAV Positioning System	All 256 Channels
Simrad HPR 300 series	Channels 1 to 9 and 11 to 55 (14 in total).
Simrad HPR 400 Series	Channels 1 to 9 and 11 to 55, plus the 56 'HiPAP' channels.
Simrad HiPAP system	All 56 channels.
Sonardyne USBL	Simrad channels 1 to 9 and 11 to 55.
Sonardyne LBL	9 options of CIF and CRF.
ORE Trackpoint II	25 channels as listed, plus pingers.

Firmware permitting, these beacons are iXBlue compatible.

Firmware permitting, these beacons are Sonardyne Wideband™ compatible.

A stainless steel selector switch on the connector end cap combines switch on, switch off, and dedicated charge selection plus depending on the model a pressure relief valve.

The beacons bulkhead connector provides responder electrical trigger input, external 24V input, battery charging and RS232 serial communication for beacon configuration.



NOTE: - The term 'beacon' describes either of the above three types of transmitting device.

The following standard models are available: -

Mini

Model 1015	± 45 degrees	194dB SPL	2000m survival depth rating
Model 1015H	± 30 degrees	196dB SPL	2000m survival depth rating
Model 1019	± 90 degrees	188dB SPL	1500m survival depth rating
Model 1019T	Toroidal	191dB SPL	1500m survival depth rating
Model 1022	± 20 degrees	202dB SPL	4000m survival depth rating

Midi

Model 1035	± 45 degrees	200dB SPL	4000m survival depth rating
Model 1035H	± 45 degrees	203dB SPL	4000m survival depth rating
Model 1039	± 90 degrees	191dB SPL	4000m survival depth rating

Fatboy

Model 1062	± 15 degrees	208dB SPL	4000m survival depth rating
Model 1065	± 45 degrees	203dB SPL	4000m survival depth rating

Seabed

Model 1055	± 45 degrees	195dB SPL	4000m survival depth rating
Model 1055H	± 45 degrees	200dB SPL	4000m survival depth rating
Model 1059	± 90 degrees	188dB SPL	4000m survival depth rating



NOTE: - A published depth rating does not necessarily imply that a particular product will acoustically operate at that depth at all times.

Depth Telemetry Option

1000 Series beacons with a 'D' suffix support depth telemetry. These beacons are identical to the existing 1000 Series models, with the addition of a depth (pressure) transducer and are thus able to reply back to the tracking system with a second telemetry pulse.

The following depth transducers can be supplied as standard: -

- 100 metres
- 300 metres
- 1000 metres
- 2000 metres
- 4000 metres

Other depth transducers can be supplied on request.



NOTE: - Depth beacons are not intended for use at a depth beyond the depth transducers rating. Mechanical damage to the depth transducer will occur.

Remote Transducers

There are also versions of all the above beacons without a transducer fitted, instead an interconnect lead connects to a remote transducer. The following remote transducers are currently available:-

Model RM15	+/-15 degrees
<i>(Replaces 7920A)</i>	
Model RM30	+/-30 degrees
Model RM45	+/-45 degrees
Model RM90	+/-90 degrees

Check with the factory or your area representative for further details.

Applications: - For dedicated tow fish / ROV's where the electronics can be fitted inside and away from potentially damaging, or difficult locations.



Please refer to specifications for Technical Details.



A note on depth ratings: -

A published depth rating does not necessarily imply that a particular product will acoustically operate at that depth at all times. Some units are depth limited to 1000 metres and are not intended for use at a depth beyond 1000 metres. Mechanical damage will occur.

2. Getting Started

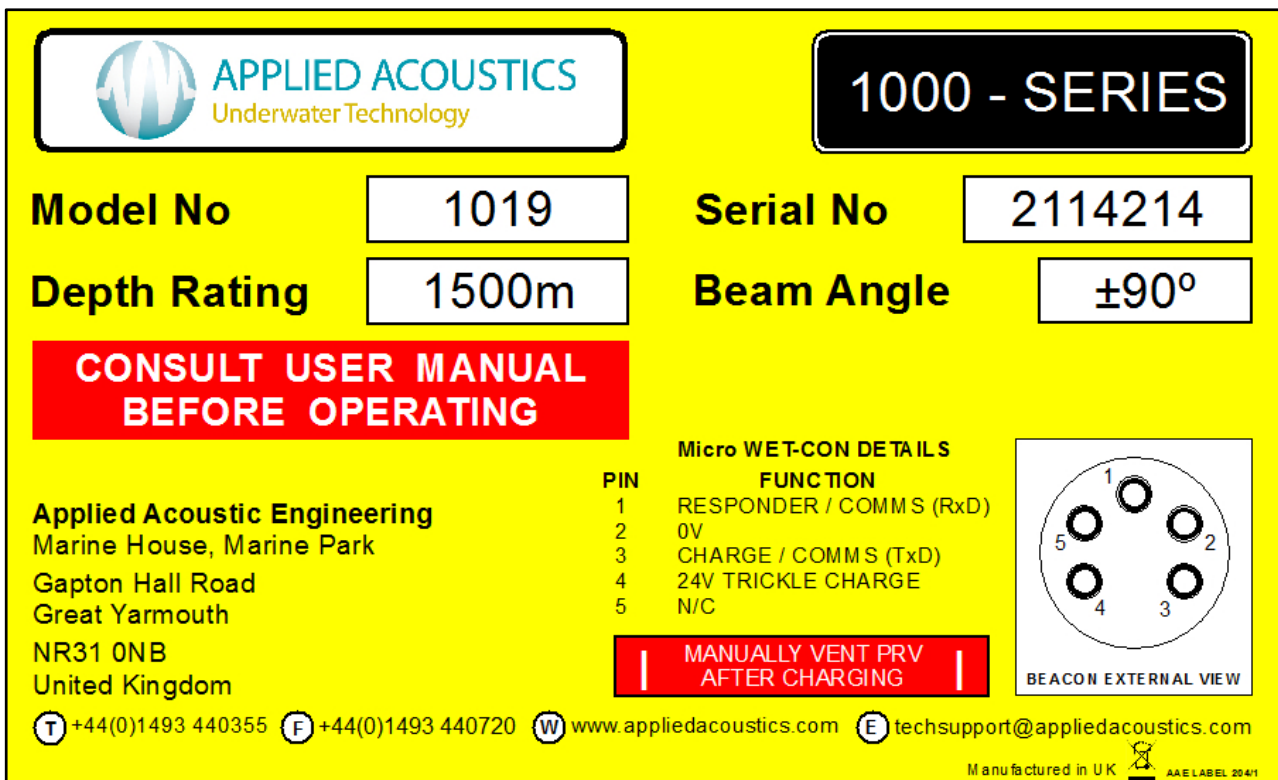
On delivery of your beacon, please check the following: -

- Model number
- Depth rating
- Battery type
- Selector switch in the OFF position.

This information can be found on the beacon product label and on the delivery note.

Please ensure that this information is correct and suits your requirements.

Please check the beacon for any transit damage, if any is found, do not use the equipment and return it to your supplier.



The label is yellow with black and red text. It features the Applied Acoustics logo and 'Underwater Technology' text. A black box contains '1000 - SERIES'. Below this, 'Model No' is 1019 and 'Serial No' is 2114214. 'Depth Rating' is 1500m and 'Beam Angle' is ±90°. A red box says 'CONSULT USER MANUAL BEFORE OPERATING'. A table lists 'Micro WET-CON DETAILS' with 5 pins and their functions. A diagram shows the 'BEACON EXTERNAL VIEW' with 5 pins. A red box says 'MANUALLY VENT PRV AFTER CHARGING'. Contact information for Applied Acoustic Engineering is at the bottom left. A footer says 'Manufactured in UK' and 'AAE LABEL 2041'.

PIN	FUNCTION
1	RESPONDER / COMMS (RxD)
2	0V
3	CHARGE / COMMS (TxD)
4	24V TRICKLE CHARGE
5	N/C

BEACON EXTERNAL VIEW

MANUALLY VENT PRV AFTER CHARGING

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Manufactured in UK AAE LABEL 2041

Example Label Only

Your beacon is charged at the factory before dispatch and should arrive fully charged. If the beacon requires charging prior to commissioning, please refer Section 3 Beacon Charging.



NOTE: - If the beacon has been shipped with the selector switch in the ON position, we recommend charging the beacon before deployment.

Handling

Although these beacons are resistant to mechanical vibration and shock, every effort should be made to avoid careless handling. Dropping the beacon could damage the transducer, which contains piezo ceramic material sensitive to mechanical shock.

Beacon Support and Mounting

Beacons must be held securely by means of a mechanical clamp or clamps. The clamping pressure must not overstress the beacon's main tube and the clamp must not contact the beacon electrically if it is metallic. The fixing method must be electrically isolated using rubber or plastic and preferably the clamping fixture should be plastic.



NOTE: - Damage to the beacon's anodising must be avoided at all cost, as this will reduce the operational life of the beacon.

When mounting a beacon, its position should be considered to maximise its operational performance. Beacons need to be mounted so that there is a clear and unobstructed sound path between the transducer and the ship's tracking system. Directional transducers must be 'aimed' at the vessel in a similar way that a torch would be pointed at an object, so that the vessel is 'illuminated' with signal from the beacon. When using highly directional transducers, the towing angle and cable catenary can have a significant effect on the position of the acoustic beam and comprehensive experimentation with positioning is recommended. Also ensure that ROV thruster noise is taken into account when positioning the beacon. We advise that the tracking system is set to low power when tracking at short distances. This is to reduce any multipath that may occur in some environments.



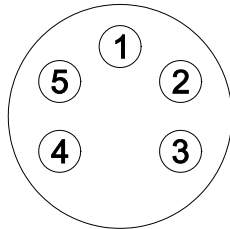
NOTE: - High internal temperatures may occur if the beacon is left out in direct, strong sun light. This may lead to reduced battery operational life span and reduced charge capacity during charging. A 72 degree C thermal fuse is included in the battery pack(s) which will render the beacon inoperative should this temperature be exceeded.



NOTE: - Upon deployment, fit Dummy Connector. Any underwater connections should be greased with O-Lube or Silicone Grease to prevent mating damage occurring and aid water block.

3. 1010 / 1030 / 1060 Beacon Connector

1010 / 1030 / 1060 beacons MCBH5M 5-pin bulkhead connector provides responder electrical trigger input, external 24V input, battery charging and RS232 serial communication for beacon configuration: -



**MCBH5M
CONTACT VIEW**

- PIN 1.** External Trigger Input / RS232 RXD
- PIN 2.** 0VDC Common
- PIN 3.** Fast Charge / RS232 TXD
- PIN 4.** External 24VDC Input / Fast Charge Status
- PIN 5.** Not Connected



WARNING: - Applied Acoustic Engineering cannot be held responsible for injury or damage caused by incorrect use of fuse ratings higher than those recommended above.

PIN 1 functions as both responder trigger input and RS232 serial data input. The beacon can differentiate between a responder trigger and serial data character. Responder trigger specification is a positive going pulse 5V to 25V of duration 2ms to 10ms. Trigger pulses longer than 10ms duration are ignored.

PIN 2 functions as the common 0VDC reference for all electrical signals.

PIN 3 functions as both 30VDC input for fast charging and RS232 serial data output. Serial communication is only possible when the beacon is not being fast charged. Refer Section 4 Beacon Charging.

PIN 4 functions as both external 24VDC input for trickle charging and fast charge status output. Refer Section 4 Beacon Charging.



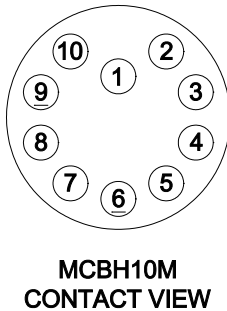
NOTE: - When powered from a 24VDC external power supply, the beacon will work as either responder or transponder. The transponder circuitry is not switched off when a responder is connected or used



NOTE: - Upon deployment, fit Dummy Connector. Any underwater connections should be greased with O-Lube or Silicone Grease to prevent mating damage occurring and aid water block.

4. 1050 Beacon Connector

1059 beacons MCBH10M 10-pin bulkhead connector provides responder electrical trigger input, external 24V input, battery charging and RS232 serial communication for beacon configuration: -



- PIN 1.** External Trigger Input / RS232 RXD
- PIN 2.** 0VDC Common
- PIN 3.** Fast Charge "a" / RS232 TXD
- PIN 4.** External 24VDC Input
- PIN 5.** 0VDC Common
- PIN 6.** Fast Charge "b"
- PIN 7.** 0VDC Common
- PIN 8.** Fast Charge "c"
- PIN 9.** Not Connected
- PIN 10.** Not Connected



WARNING: - Applied Acoustic Engineering cannot be held responsible for injury or damage caused by incorrect use of fuse ratings higher than those recommended above.

PIN 1 functions as both responder trigger input and RS232 serial data input. The beacon can differentiate between a responder trigger and serial data character. Responder trigger specification is a positive going pulse 5V to 25V of duration 2ms to 10ms. Trigger pulses longer than 10ms duration are ignored.

PINS 2, 5 & 7 function as the common 0VDC reference for all electrical signals.

PIN 3 functions as both fast charge for battery "a" and RS232 serial data output. **Note fast charge with Applied Acoustic 1083 Multi Charger only.** Serial communication is only possible when the beacon is not being fast charged. Refer Section 4 Beacon Charging.

PIN 4 functions as the external 24VDC input for trickle charging.

PIN 6 functions as fast charge for battery "b". **Note fast charge with Applied Acoustic 1083 Multi Charger only.**

PIN 8 functions as fast charge for battery "c". **Note fast charge with Applied Acoustic 1083 Multi Charger only.**



NOTE: - When powered from a 24VDC external power supply, the beacon will work as either responder or transponder. The transponder circuitry is not switched off when a responder is connected or used



NOTE: - Upon deployment, fit Dummy Connector. Any underwater connections should be greased with O-Lube or Silicone Grease to prevent mating damage occurring and aid water block.

5. Beacon Charging

Your beacon comes with one of the following battery types: -

- Nickel Metal Hydride (NiMH) rechargeable battery pack
- Alkaline **non-rechargeable** battery pack

1010 / 1030 / 1060 Series beacons feature an on-board fast charger for a typical 3 to 4 hour charge time (1010 & 1030 beacons only). **This fast charger is compatible with Nickel Metal Hydride (NiMH) battery type only. 1010 / 1030 / 1060 Series beacons can only be charged using the Applied Acoustic 1082 Smart Switch or 1083 Multi Charger.**

1050 Series beacons contain three battery packs “a”, “b” & “c”, and do not feature an on-board fast charger. **1050 Series beacons with Nickel Metal Hydride (NiMH) battery type only can only be charged remotely using the Applied Acoustic 1083 Multi Charger.**

The 1000 Series beacon range feature an on-board trickle charger. **This trickle charger is compatible with Nickel Metal Hydride (NiMH) battery type only.** Your beacon can be trickle charged with the 1082 Smart Switch or 1083 Multi Charger, or from a nominal 24VDC power supply.



WARNING: - The sealed beacon must be vented to atmosphere before and after a charge cycle by manually operating the pressure relief valve.



NOTE: - Battery life is quoted in the specification section. Battery life is based on good, recently charged cells. Battery life is quoted as X number of days listening or Y number of replies (operational). Therefore when half the listening life has been used, the number of possible replies has also reduced by half. It is advisable to ensure that operational parameters do not result in the battery pack being discharged before the job is finished! Make sure you have a safety margin!

Trickle Charging

Connecting a nominal 24VDC power supply will trickle charge the beacon battery regardless of selector switch position. Refer Section 3 & Section 4 for beacon connector power supply connection details. Input voltage range is 22VDC to 35VDC with a recommended inline fuse as below: -

Model	Trickle Current	Fuse (MAX)
1010 Mini	80mA	100mA to 200mA
1030 Midi	100mA	200mA
1060 Fatboy	100mA	200mA
1050 Seabed	100mA	200mA



NOTE: - If the inline fuse blows, the beacon should be examined by a competent engineer to establish why the fuse failed. Alternatively, the beacon should be de-commissioned and returned to Applied Acoustic Engineering for evaluation.

Connecting a 24VDC power supply is typical with the beacon fitted to an R.O.V. (Remotely Operated Vehicle) to maximise the beacon's operating life whilst on the R.O.V. It will still be necessary to remove and charge the beacon monthly in order to maintain the beacon battery pack.



NOTE: - The supplied non-shorting dummy connector, complete with locking sleeve, must be fitted when a pigtail is not connected. Always ensure the connector and dummy are greased with O-Lube or Silicon Grease to prevent mating damage occurring and aid water block.

Fast Charging

The beacon selector switch has a dedicated position for fast charging. Set the beacon selector switch to the CHAR position.

Fast charging must take place in a dry environment at normal room temperature (recommended temperature range is between 14°C and 23°C).

Removal of the end cap is not necessary before charging. The sealed beacon must be vented to atmosphere before charging by manually operating the pressure relief valve. If battery gassing should accidentally occur during charging, this gas will vent to atmosphere through the beacon selector switch pressure relief valve. After charging, again the sealed beacon must be vented to atmosphere by manually operating the pressure relief valve.



WARNING: - Do not attempt to charge the beacon if the pressure relief valve is not operational.

The beacon must not be charged if any doubt exists to its operating status. If water ingress is suspected, the beacon should be de-commissioned and returned for evaluation.



WARNING: - Incorrect charging may damage the battery pack, reducing its operational life. Applied Acoustic Engineering cannot be held responsible where incorrect use could prove potentially hazardous.



WARNING: - Do not attempt to recharge the beacon immediately after charging. Attempting to recharge a fully charged battery may reduce the life of the battery and cause damage. Applied Acoustic Engineering cannot be held responsible where incorrect use could prove potentially hazardous.

1010 / 1030 / 1060 Fast Charging

The 1010 / 1030 / 1060 Series beacons feature an on-board fast charger for a typical 3 to 4 hour charge time (1010 & 1030 beacons only). A temperature sensor embedded within the battery pack is monitored by the on-board fast charger.



WARNING: - The sealed beacon must be vented to atmosphere before and after a charge cycle by manually operating the pressure relief valve.

Fast charge termination is qualified using both $-\Delta V$ voltage and $\Delta T/\Delta t$ temperature techniques, and can detect various battery faults. Fast charge termination is also qualified by actual charge time, i.e. fast charger time out, and by battery pack temperature.

The Applied Acoustic 1082 Smart Switch & 1083 Multi Charger activate and monitor charging of 1000 Series beacons, displaying to the user charge status information including cause of termination and charge time. Refer 1082 Smart Switch & 1083 Multi Charger manuals for detailed information on operation.

A typical charge activation and termination cycle with the 1082 Smart Switch follows steps listed below: -

1. Manually vent the beacons PRV.
2. Firmly secure beacon connection cable (supplied with 1082 Smart Switch &) between beacon and 1082 Smart Switch.
3. Select 1082 Smart Switch menu item "Fast Charge".
4. Set beacon selector switch to the CHAR position. Confirm 1082 Smart Switch instruction "Beacon to CHAR".
5. Confirm 1082 Smart Switch instruction "Plug in DC PSU" by inserting 30VDC power supply unit (supplied with 1082 Smart Switch) into the 1082 Smart Switch and switching on.

If 30VDC power supply unit was already inserted into the 1082 Smart Switch and switched on prior to step 5, this step will be omitted.

6. Confirm 1082 Smart Switch instruction "Start charging". While charging, the 1082 Smart Switch will display "Charging...", together with the elapsed charging time.
7. If the pressure relief valve starts to vent water vapour or gas during charging, stop charging immediately and decommission the beacon.
8. If the 1082 Smart Switch indicates "T°C limit!", the battery pack has exceeded an over temperature or under temperature limit, but the charge cycle continues. Fast charging will pause until the battery pack temperature is within limits, then recommence. This will increase overall charging time. Check the following: -
 - Is the charging environment ambient temperature too hot or too cold?
 - Battery pack temperature will increase toward the end of a fast charge cycle.
9. If the 1082 Smart Switch indicates fast charging has terminated due to "Fault!", check the following: -
 - Has the beacon pressure relief valve vented? Decommission the beacon.
 - Was the beacon battery pack already fully charged? Attempting to recharge a fully charged battery may reduce the life of the battery and cause damage.
 - Is the beacon battery pack approaching the end of its operational life? Fast charging may have timed out if the battery pack was not charging correctly.
 - None of the above. Return the beacon to Applied Acoustic Engineering for evaluation.

-
10. If the 1082 Smart Switch indicates fast charging has terminated due to “No status!”, check the following: -
- Is the beacon selector switch set to the CHAR position?
 - Is the beacon connection cable firmly secure?
 - Is the beacon battery pack open circuit?
 - Is the beacon battery pack exhausted? Set the beacon to the OFF or CHAR position and trickle charge for 10 minutes before attempting to fast charge.
11. If the 1082 Smart Switch indicates fast charging has terminated due to “No DC PSU!”, check the following: -
- Is the DC power supply unit inserted into the Smart Switch?
 - Check the mains lead and mains supply.
12. After charging has successfully terminated, the 1082 Smart Switch will display “Charged!”, together with overall charging time.
13. On exit from charge termination display, the 1082 Smart Switch will instruct the user to “Vent beacon PRV”. Manually vent beacon’s PRV.

1050 Fast Charging

1050 Series beacons contain three battery packs “a”, “b” & “c” and do not feature an on-board fast charger. Temperature sensors embedded within the battery packs are monitored by the beacons temperature cut-off circuitry.



WARNING: - The sealed beacon must be vented to atmosphere before and after a charge cycle by manually operating the pressure relief valve.

1050 Series beacons can only be fast charged remotely by the Applied Acoustic 1083 Multi Charger. Fast charge dumps to 1.1V/cell then charges for 12 hours each battery, individually simultaneously. Fast charge termination is also qualified by actual charge time, i.e. fast charger time out, and by battery pack temperature.

The Applied Acoustic 1083 Multi Charger displays to the user charge status information including cause of termination and charge time. Refer 1083 Multi Charger manuals for detailed information on operation.

A typical charge activation and termination cycle with the 1083 Multi Charger follows steps listed below: -

1. Manually vent the beacons PRV.
2. Firmly secure beacon connection cable (supplied with 1083 Multi Charger) between beacon and 1083 Multi Charger.
3. Select 1083 Multi Charger menu item “Charge 4”.
4. Select 1083 Multi Charger menu item “Fast Charge 4”.
5. Select 1083 Multi Charger menu item “Start Charge 4”.
6. Set beacon selector switch to the CHAR position. Confirm 1083 Multi Charger instruction “Beacon(s) to CHAR”.
7. Confirm 1083 Multi Charger instruction “Start charging”. The 1083 Multi Charger will perform a hardware self-test. If the 1083 Multi Charger displays “H/W fault!”, check the following: -
 - Disconnect the beacon from the 1083 Multi Charger and restart fast charge. If hardware self-test completes successfully, hardware fault could be with beacon. Try another beacon if available.
8. After successful hardware self-test, the 1083 Multi Charger will now begin dumping each battery “a”, “b” & “c”. For each battery, the 1083 Multi Charger will display “Dumping”, together with elapsed dump time.
9. When a battery “a”, “b” or “c” is dumped, the 1083 Multi Charger will begin charging the battery. For each battery, the 1083 Multi Charger will display “Charging”, together with elapsed dump and charge time.

10. If the pressure relief valve starts to vent water vapour or gas during charging, stop charging immediately and decommission the beacon.
11. If the 1083 Multi Charger displays “No battery!” for a battery pack “a”, “b” or “c”, check the following: -
 - Is the beacon selector switch set to the CHAR position?
 - Is the beacon connection cable firmly secure?
 - Is the beacon battery pack open circuit?
 - Is the charging environment ambient temperature too hot?
 - Battery pack temperature will increase toward the end of a fast charge cycle.
 - Is a beacon battery pack exhausted? Set the beacon to the OFF or CHAR position and trickle charge for 10 minutes before attempting to fast charge.
12. After charging has successfully terminated, the 1083 Multi Charger will display “Charged!”, together with overall dump and charge time for each battery pack “a”, “b” & “c”.
13. On exit from charge termination display, the 1083 Multi Charger will instruct the user to “Vent beacon PRV”. Manually vent beacon’s PRV.

After Charging



WARNING: - The sealed beacon must be vented to atmosphere before and after a charge cycle by manually operating the pressure relief valve.



NOTE: - The supplied MCDC5F non-shorting dummy connector, complete with locking sleeve, must be fitted when a pigtail is not connected.

Making a note of the date of each charge may be helpful in the field to avoid unnecessary future overcharging of the battery pack or beacon charge status with reference to deployment.

The beacon is now ready to use in service.

5. Operating Instructions

Switching On

Switching on is achieved by rotating the beacon selector switch to the ON position.

Beacon Configuration



NOTE: - Beacon must be switched on to be configured.

1000 Series beacons are configured via RS232 serial communication using the 1082 Smart Switch or 1083 Multi Charger. Configuration options includes channel selection, depth telemetry transmission on/off (if available), battery pack voltage monitoring, etc. Refer 1082 Smart Switch & 1083 Multi Charger manuals for detailed information on operation.

Serial Communication

The beacon supports RS232 serial communications at 9600 baud only. Serial communication is only possible when the beacon is switched on. Serial communication is not possible when the beacon is switched off or during fast charge. Refer Section 10 Specification for detailed serial communication specification.

Depth Telemetry

1000 Series beacons with a 'D' suffix support depth telemetry. These beacons are identical to the existing 1000 Series beacons, except they are fitted with pressure (depth) transducers and are thus able to reply back to the tracking system with the depth.

Depth telemetry transmission is selected ON (enabled) or OFF (disabled) using the 1082 Smart Switch or 1083 Multi Charger. Select beacon configuration menu option followed by "Depth Status".



NOTE: - For non-'D' suffix beacons, depth telemetry cannot be selected ON (enabled).

Depending on the selected mode of operation the depth data is either sent in a data telegram or a time delay between the first transmitted pulse and second transmitted pulse. This is automatically switched depending on selected channel.

For AAE Easytrak Nexus Spread Spectrum operation the depth information is transmitted using a data telegram.

For AAE Easytrak and Trackpoint II operation, an initial delay of 100ms is used to convey 0 metres depth and a maximum delay of 900ms is used to convey maximum depth. This depth is written on the case of the beacon. It follows that the maximum interrogate rate should be limited to 2 seconds in most instances. The frequency of the second reply is 1kHz below the navigation reply for Trackpoint II compatibility unless shown in the following table.

For Simrad HPR / HiPAP operation the 0 metres depth delay is 125ms. The depth reply delay is 0.5ms per metre for HPR300 and 1ms per metre for HPR400 / HiPAP compatibility.

Operation with Easytrak Nexus 2 system (Transceiver Model 2686)

Beacon Channel ID	Nexus 2 Channel ID	Transponder TAT (ms)	Responder TAT (ms)	Description
AA	Sigma 2 Quick Set 1	75	75	AAE Sigma 2, Quick Set
AB	Sigma 2 Quick Set 2	75	75	AAE Sigma 2, Quick Set
AC	Sigma 2 Quick Set 3	75	75	AAE Sigma 2, Quick Set
AD	Sigma 2 Quick Set 4	75	75	AAE Sigma 2, Quick Set
AE	Sigma 2 Quick Set 5	75	75	AAE Sigma 2, Quick Set
AF	Sigma 2 Quick Set 6	75	75	AAE Sigma 2, Quick Set
BC	Sigma 2 Quick Set 7	75	75	AAE Sigma 2, Quick Set
BD	Sigma 2 Quick Set 8	75	75	AAE Sigma 2, Quick Set



NOTE: - Depth Telemetry is not supported.

Operation with Easytrak Nexus system

Channel	ID	Transponder TAT (ms)	Responder TAT (ms)	Description
E0	SS CH 0	100	100	AAE Spread Spectrum
E1	SS CH 1	100	100	AAE Spread Spectrum
E2	SS CH 2	100	100	AAE Spread Spectrum
E3	SS CH 3	100	100	AAE Spread Spectrum
E4	SS CH 4	100	100	AAE Spread Spectrum
E5	SS CH 5	100	100	AAE Spread Spectrum
E6	SS CH 6	100	100	AAE Spread Spectrum
E7	SS CH 7	100	100	AAE Spread Spectrum
E8	SS CH 8	100	100	AAE Spread Spectrum
E9	SS CH 9	100	100	AAE Spread Spectrum
EA	SS CH 10	100	100	AAE Spread Spectrum
EB	SS CH 11	100	100	AAE Spread Spectrum
EC	SS CH 12	100	100	AAE Spread Spectrum
ED	SS CH 13	100	100	AAE Spread Spectrum
EE	SS CH 14	100	100	AAE Spread Spectrum
EF	SS CH 15	100	100	AAE Spread Spectrum
F0	SS CH 16	100	100	AAE Spread Spectrum
F1	SS CH 17	100	100	AAE Spread Spectrum
F2	SS CH 18	100	100	AAE Spread Spectrum
F3	SS CH 19	100	100	AAE Spread Spectrum
F4	SS CH 20	100	100	AAE Spread Spectrum
F5	SS CH 21	100	100	AAE Spread Spectrum
F6	SS CH 22	100	100	AAE Spread Spectrum
F7	SS CH 23	100	100	AAE Spread Spectrum
F8	SS CH 24	100	100	AAE Spread Spectrum
F9	SS CH 25	100	100	AAE Spread Spectrum
FA	SS CH 26	100	100	AAE Spread Spectrum
FB	SS CH 27	100	100	AAE Spread Spectrum
FC	SS CH 28	100	100	AAE Spread Spectrum
FD	SS CH 29	100	100	AAE Spread Spectrum
FE	SS CH 30	100	100	AAE Spread Spectrum
FF	SS CH 31	100	100	AAE Spread Spectrum

Digital Depth telemetry available if depth sensor fitted

Operation with Easytrak system

Channel	RXF1 (Hz)	RXF2 (Hz)	TXF1 (Hz)	TXF2 (Hz)*	Transponder TAT (ms)	Responder TAT (ms)	Pulse Width (ms)
A0	17500	-	30000	29000	30	30	2
A1	18500	-	28000	27000	30	30	2
A2	19500	-	26000	25000	30	30	2
A3	20500	-	29000	28000	30	30	2
A4	21500	-	27000	26000	30	30	2
A5	22500	-	30000	29000	30	30	2
A6	18000	20000	27000	26000	60	30	2
A7	18000	21000	28000	27000	60	30	2
A8	18000	22000	30000	29000	60	30	2
A9	18000	23000	29000	28000	60	30	2
B0	20000	18000	30000	29000	60	30	2
B1	20000	21000	29000	28000	60	30	2
B2	20000	22000	28000	27000	60	30	2
B3	21000	18000	27000	26000	60	30	2
B4	21000	20000	26000	25000	60	30	2
B5	21000	22000	28000	27000	60	30	2
B6	21000	23000	30000	29000	60	30	2
B7	22000	18000	26000	25000	60	30	2

*Depth telemetry transponders only.

Operation with Simrad system

Simrad's HPR systems use 14 channels listed below.

Operation with Simrad 300 series, 400 series (not HiPAP)

Channel	Simrad Channel	RXF1 (Hz)	TXF1 (Hz)	TXF2 (Hz)*	Transponder TAT (ms)	Responder TAT (ms)	Pulse Width (ms)
01	1	20492	29762	32468	30	30	10
02	2	21552	30488	29762	30	30	10
03	3	22124	31250	30488	30	30	10
04	4	22727	31847	31250	30	30	10
05	5	23364	32468	31847	30	30	10
06	6	24038	27173	29070	30	30	10
07	7	24510	27777	27173	30	30	10
08	8	25000	28409	27777	30	30	10
09	9	26042	29070	28409	30	30	10
11	11 Square	21552	27173	32468	30	30	10
22	22 Circle	22727	28409	27173	30	30	10
33	33 Delta	23923	29762	28409	30	30	10
44	44 X	25126	31250	29762	30	30	10
55	55 Y	26455	32468	31250	30	30	10

*Depth telemetry transponders only.

If the beacons are used with the SIMRAD 410 system, the channels listed above and the 56 listed for 'HiPAP' apply and are referred to as the 'B' channels.

Note: - SIMRAD'S HiPAP systems cannot track the above channels. We would also advise that when using the HPR400 series, the operator should use either the above channels or the 56 HiPAP type channels and NOT a mixture of the two as some frequencies are common and can cause interference.

Operation with Simrad HiPAP

Simrad's HiPAP systems use 56 channels listed below and transmit a double interrogation pulse.

Channel	RXF1 (Hz)	RXF2 (Hz)	TXF1 (Hz)	TXF2 (Hz)*	Transponder TAT (ms)	Responder TAT (ms)	Pulse Width (ms)
12	21000	21500	29250	29750	60	30	10
13	21000	22000	29750	30250	60	30	10
14	21000	22500	30250	28750	60	30	10
15	21000	23000	30750	27250	60	30	10
16	21000	23500	27250	27750	60	30	10
17	21000	24000	27750	28250	60	30	10
18	21000	24500	28250	30750	60	30	10
21	21500	21000	28500	29000	60	30	10
23	21500	22000	29500	30000	60	30	10
24	21500	22500	30000	28500	60	30	10
25	21500	23000	30500	27000	60	30	10
26	21500	23500	27000	27500	60	30	10
27	21500	24000	27500	28000	60	30	10
28	21500	24500	28000	30500	60	30	10
31	22000	21000	28750	29250	60	30	10
32	22000	21500	29250	29750	60	30	10
34	22000	22500	30250	28750	60	30	10
35	22000	23000	30750	27250	60	30	10
36	22000	23500	27250	27750	60	30	10
37	22000	24000	27750	28250	60	30	10
38	22000	24500	28250	30750	60	30	10
41	22500	21000	28500	29000	60	30	10
42	22500	21500	29000	29500	60	30	10
43	22500	22000	29500	30000	60	30	10
45	22500	23000	30500	27000	60	30	10
46	22500	23500	27000	27500	60	30	10
47	22500	24000	27500	28000	60	30	10
48	22500	24500	28000	30500	60	30	10
51	23000	21000	28750	29250	60	30	10
52	23000	21500	29250	29750	60	30	10
53	23000	22000	29750	30250	60	30	10
54	23000	22500	30250	28750	60	30	10
56	23000	23500	27250	27750	60	30	10
57	23000	24000	27750	28250	60	30	10
58	23000	24500	28250	30750	60	30	10
61	23500	21000	28500	29000	60	30	10
62	23500	21500	29000	29500	60	30	10
63	23500	22000	29500	30000	60	30	10
64	23500	22500	30000	28500	60	30	10
65	23500	23000	30500	27000	60	30	10
67	23500	24000	27500	28000	60	30	10
68	23500	24500	28000	30500	60	30	10

Operation with Simrad HiPAP cont.

Channel	RXF1 (Hz)	RXF2 (Hz)	TXF1 (Hz)	TXF2 (Hz)*	Transponder TAT (ms)	Responder TAT (ms)	Pulse Width (ms)
71	24000	21000	28750	29250	60	30	10
72	24000	21500	29250	29750	60	30	10
73	24000	22000	29750	30250	60	30	10
74	24000	22500	30250	28750	60	30	10
75	24000	23000	30750	27250	60	30	10
76	24000	23500	27250	27750	60	30	10
78	24000	24500	28250	30750	60	30	10
81	24500	21000	28500	29000	60	30	10
82	24500	21500	29000	29500	60	30	10
83	24500	22000	29500	30000	60	30	10
84	24500	22500	30000	28500	60	30	10
85	24500	23000	30500	27000	60	30	10
86	24500	23500	27000	27500	60	30	10
87	24500	24000	27500	28000	60	30	10

*Depth telemetry transponders only.

1000 Series beacons comply with 'B' Channels as shown on the monitor screen e.g. "B24" for our channel 24. Please note that the HiPAP system is not able to operate with the 'old' HPR channels 11/22/33/44/55 and 1 to 9.

Operation with Sonardyne USBL systems

The Sonardyne USBL system can use many frequencies including those used by Simrad HPR: -

Channel	Sonardyne Channel	RXF1 (Hz)	TXF1 (Hz)	TXF2 (Hz)*	Transponder TAT (ms)	Responder TAT (ms)	Pulse Width (ms)
01	1	20492	29762	32468	30	30	10
02	2	21552	30488	29762	30	30	10
03	3	22124	31250	30488	30	30	10
04	4	22727	31847	31250	30	30	10
05	5	23364	32468	31847	30	30	10
06	6	24038	27173	29070	30	30	10
07	7	24510	27777	27173	30	30	10
08	8	25000	28409	27777	30	30	10
09	9	26042	29070	28409	30	30	10
11	11 Square	21552	27173	32468	30	30	10
22	22 Circle	22727	28409	27173	30	30	10
33	33 Delta	23923	29762	28409	30	30	10
44	44 X	25126	31250	29762	30	30	10
55	55 Y	26455	32468	31250	30	30	10

*Depth telemetry transponders only.

Operation with Sonardyne PAN / Compatts

1000 Series beacons will operate as transponders if acoustically interrogated within a LBL array. Note that TAT accuracy is not as precise as Compatts.

Channel	Sonardyne Channel	RXF1 (Hz)	TAT (ms)	TXF1 (Hz)
91	Ch 1 CRF	19230	125	26042
93	Ch 3 CRF	20491	125	26042
94	Ch 4 CRF	21186	125	26042
95	Ch 5 CRF	21929	125	26042
96	Ch 6 CRF	22522	125	26042
97	Ch 7 CRF	23148	125	26042
98	Ch 8 CRF	23810	125	26042
9A	Ch 10 CIF	24752	125	28733
9B	Ch 11 CIF	24752	125	29411

Note: - Responder not supported.

Pinger Operation

1000 Series beacons can be set to operate as pingers, as the following table shows. Note that channels 4A and 5B are common emergency frequencies.

Channel	Repetition Rate (ms)	Pulse Width (ms)	TXF1 (Hz)
49	1000	5	26000
4A	995	5	27000
4B	990	5	28000
59	985	5	29000
5A	980	5	30000
5B	1000	10	37500

Operation with ORE LXT; Trackpoint II and II+ Systems

ORE's Trackpoint II and LXT systems operate in the MF band with interrogate frequencies between 16KHz and 21KHz and reply frequencies between 22KHz and 30KHz. It is increasingly common for beacons to be supplied which operate on LXT's pre-defined channels 1 to 5. 1000 Series beacons operate on three 'codes' as listed below: -

Channel	LXT Channel	RXF1 (Hz)	TXF1 (Hz)	TXF2 (Hz)*	Transponder TAT (ms)	Responder TAT (ms)	Pulse Width (ms)
0A		18000	24000	23000	15	15	1.5
0B		17000	24000	23000	15	15	1.5
00	LXT Code 1	17000	23000	22000	15	15	1.5
09		18000	25000	24000	15	15	1.5
1A		16000	25000	24000	15	15	1.5
1B		21500	26000	25000	15	15	1.5
20	LXT Code 2	19000	25000	24000	15	15	1.5
29		18000	26000	25000	15	15	1.5
2A		17500	28500	27500	15	15	1.5
2B		18500	26500	25500	15	15	1.5
30	LXT Code 3	17000	27000	26000	15	15	1.5
40	LXT Code 4	19000	29000	28000	15	15	1.5
50	LXT Code 5	17000	30000	29000	15	15	1.5
60		18000	28000	27000	15	15	1.5
69		16000	23000	22000	15	15	1.5
6A		18000	23000	22000	15	15	1.5
6B		20500	23000	22000	15	15	1.5
70		18000	30000	29000	15	15	1.5
79		17000	24000	23000	15	15	1.5
7A		19000	24000	23000	15	15	1.5
7B		17000	25000	24000	15	15	1.5
80		21000	29000	28000	15	15	1.5
89		17000	26000	25000	15	15	1.5
8A		21000	33000	32000	15	15	1.5
8B		18000	31000	30000	15	15	1.5

*Depth telemetry transponders only.

Select a 10ms transmitted pulse width within the Trackpoint II / II+ system.

1000 Series beacons can be interrogated at 1 PPS (faster than the standard 'Multibeacon'). For responder work, the 1000 series require a positive going trigger pulse. Although this is not usual with Trackpoint, the system can be configured quite easily. Refer to your Trackpoint documentation.

iXBlue compatible operation

Firmware and option permitting, these beacons are iXBlue compatible as detailed below: -

The Interrogate Frequency is selectable from 19.5kHz to 22.5kHz in 1kHz steps.

The Reply Code is selectable from 00 to 09, 22 & 23 for a total of 12 codes.

Turn-Around-Time is selectable from 20 milliseconds to 200 milliseconds in 1 millisecond steps.

Sonardyne Wideband™ compatible operation

Firmware and option permitting, these beacons are Sonardyne Wideband™ compatible as detailed below: -

The Interrogate Channel is selectable from CIF and MF0 to MF14 for a total of 16 channels.

The Acoustic Command Address, comprised of 4 decimal digits, is selectable from 0101 to 1514 and 3301 to 4714 for a total of 420 command addresses.

Turn-Around-Time is selectable from 62.5 milliseconds to 875.0 milliseconds in 62.5 millisecond steps.

Quickset schemes A1 to C3 are selectable for a total of 9 schemes using 1082 Smart Switch or 1083 Multi Charger.

Expandability

There are a number of channels that have not been defined. If your company has the need for additional channels for any reason, please contact us and we may be able to help.

6. Operational Range

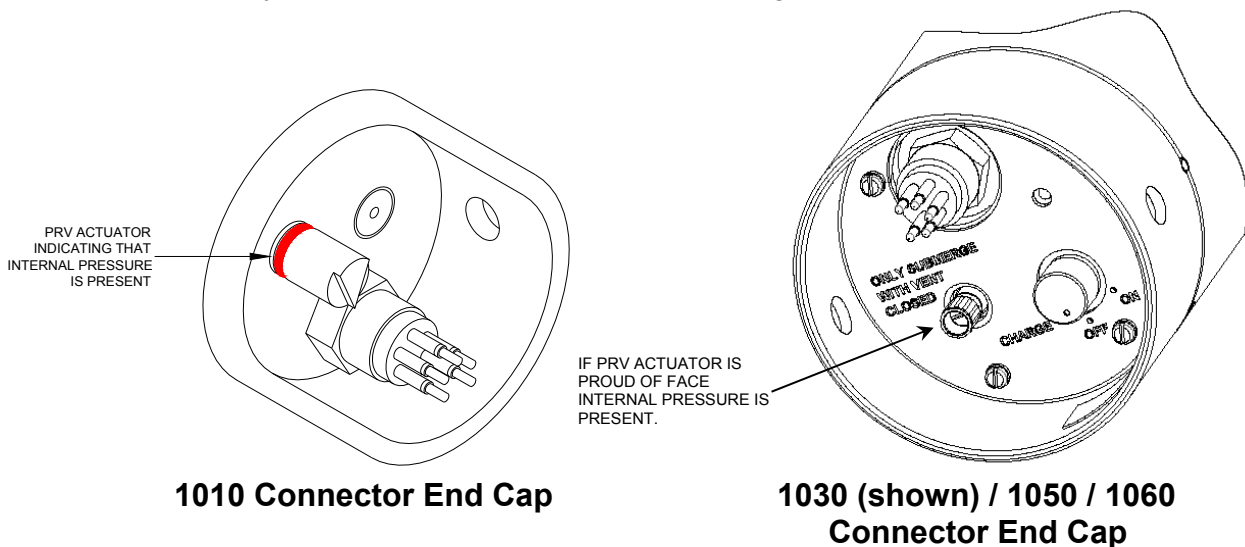
This is the most commonly asked question and there is no direct answer. Acoustic conditions, tracking system type and quality of installation all have an effect upon range. Experience with the vessel and system in question is the governing factor.

7. Maintenance

Initial Inspection

Inspect the beacon for obvious signs of mechanical damage or corrosion prior to attempting disassembly.

- Is there damage to, or corrosion of, the beacons anodised exterior?
- Is the Pressure Relief Valve (Switch Actuator) proud of the lower end-cap, indicated (as shown below) by the red indicator ring? This indicates that there is a build-up of internal pressure, manually vent PRV immediately by simply pulling out the PRV actuator until you can audibly hear the internal air pressure releasing.

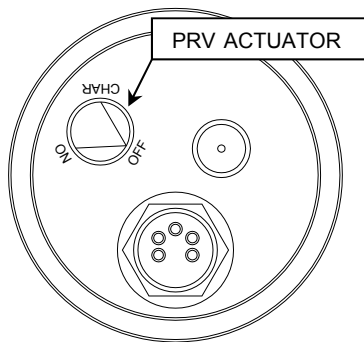


- Is the bulkhead connector corroded? This could cause problems charging the beacon, operating on external power, using responder trigger or configuring the beacon.
- Is the beacon hot / warm to touch (above 40°C)? Has the beacon been exposed to high temperatures? Has the beacon been over charged? Manually vent PRV immediately.
- Is the bulkhead connector secure on the connector end cap? Check for rotation of the connector and correct during disassembly if movement is detected.

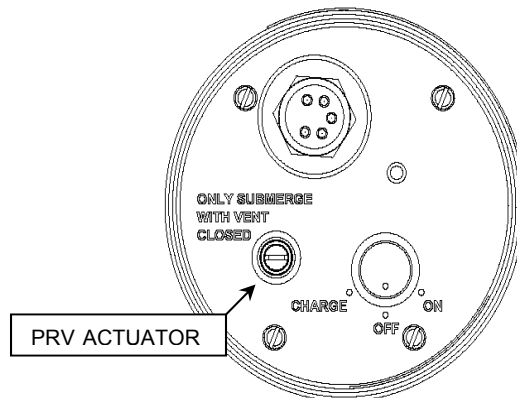


WARNING: - IF YOU SUSPECT THE BEACON HAS FLOODED, DO NOT ATTEMPT TO CHARGE OR OPERATE THE BEACON. The beacon must be carefully examined before it can resume service. Even the smallest amount of contamination can seriously destabilise the battery cells, reducing operational life and leading to internal pressure build up.

Disassembly



1010 Mini Connector End Cap



**1030 / 1050 / 1060
Connector End Cap**



WARNING: - Vent any internal pressure by manually actuating the pressure relief valve (PRV). During pressure housing disassembly, orientate end caps away from the engineer. Always assume that there is pressure internally.



NOTE: - Take appropriate anti-static precautions during disassembly to prevent damage to beacon electronics. In addition, when working internally, ensure the large storage capacitor is discharged.

- Disconnect all cables and ensure beacon is switched off by rotating the beacon selector switch to the OFF position.
- Manually vent the PRV switch actuator to atmosphere to equalise any internal pressure build up.
- 1010 Mini Series
 - Remove the four white plastic screws from the beacon connector end.
 - Remove the connector end cap carefully from the housing, ensuring it does not drag on the sealing face of the tube.
 - Disconnect the internal interconnecting cable from the connector end cap and remove the mechanical safety strap.
 - Remove the four white plastic screws from the beacon transducer end.
 - Remove the transducer end cap and electronics assembly from the housing, ensuring it does not drag on the sealing face of the tube.

- 1030 Midi Series
 - Remove securing strip from the beacon transducer (upper) end.
 - Remove the transducer end cap carefully from the housing, ensuring it does not drag on the sealing face of the tube.
 - Disconnect the mechanical safety strap from transducer endcap.
 - Disconnect IDC interconnect cable and beacon transducer assembly from tube.
 - Remove the securing strip from the connector end-cap (lower).
 - Remove the connector end cap and battery assembly from the housing, ensuring it does not drag on the sealing face of the tube.
- 1060 Fatboy Series
 - Remove the four white plastic screws from the beacon transducer end.
 - Remove the transducer end cap & electronics assembly carefully from the housing, rotating counter clockwise 45° from start position to disengage stop bracket. Ensure it does not drag on the sealing face of the tube.
 - Disconnect the IDC interconnect cable from the transducer end cap & electronics assembly.
 - Remove the four white plastic screws from the beacon connector end.
 - Remove the connector end cap & battery assembly carefully from the housing, ensuring it does not drag on the sealing face of the tube.
- 1050 Seabed Series
 - Remove the six nyloc nuts retaining the beacon transducer end cage then remove cage from beacon transducer end flange and collar.
 - Remove the transducer end cap & electronics assembly carefully from the housing. Ensure it does not drag on the sealing face of the tube.
 - Disconnect the IDC interconnect cable from the transducer end cap & electronics assembly.
 - Remove the six nyloc nuts retaining the beacon connector end cage then remove cage from beacon connector end flange and collar.
 - Remove the connector end cap & battery assembly carefully from the housing, ensuring it does not drag on the sealing face of the tube.
- Check the O-rings and clean or replace them if necessary before re-assembly. During re-assembly, ensure all seals and sealing faces are undamaged and contamination free, with a light covering of O-ring lubricant.
- Reassembly is the reverse of the above. During reassembly, do not over-tighten the white plastic screws (where fitted).

Contact Applied Acoustic Engineering for spares and assistance.



NOTE: - The pressure relief valve is a non-serviceable item, if it is faulty or mechanically damaged then the beacon should be returned to the factory or service centre for replacement.

Battery Replacement

In due course, rechargeable batteries will require replacement and this can be achieved quite simply with the 1000 Series. We recommend a maximum 3 year life for re-chargeable packs.



NOTE: - Replace battery packs with Applied Acoustic Engineering battery packs only. Applied Acoustic Engineering battery packs are constructed with numerous safety features for long operational life. Refer Section 9 Spares for battery pack part numbers. Applied Acoustic Engineering cannot be held responsible for damage or injury caused by incorrect battery replacement or fitment by non-Applied Acoustic Engineering personnel.

Nominal battery voltages are as follows: -

1010 Mini Series NiMH Battery Pack	15 cells at 1.2V / cell = 18V.
1010 Mini Series Alkaline Battery Pack	12 cells at 1.5V / cell = 18V.
1030 Midi Series NiMH Battery Pack	14 cells at 1.2V / cell = 16.8V.
1030 Midi Series Alkaline Battery Pack	12 cells at 1.5V / cell = 18V.
1050 Seabed / 1060 Fatboy Series NiMH Battery Pack	14 cells at 1.2V / cell = 16.8V.
1050 Seabed / 1060 Fatboy Series Alkaline Battery Pack	14 cells at 1.5V / cell = 21V.



NOTE: - Ensure that replacement battery packs are the same as the original type and complete the battery pack information label. Refer to the label on the old pack.

Checking Alkaline Batteries

Estimating the remaining life of an alkaline battery pack is not precise and the following advise should only be regarded as a guide.

Nominal voltage is 1.5V per cell. We recommend connecting a 680 ohm 1 watt resistor to the battery pack, then wait for 30 seconds and measure the battery pack voltage under load across the resistor. A new pack will measure approximately 21V under load. We would consider a battery pack to require replacement if it measures 17V or less. Using a flat (straight line) discharge curve between 21V and 17V would indicate that at 19V, the battery's energy has depleted by 50%. We do not recommend using battery pack below 17V.



NOTE: - Do not use alkaline in equipment designed to operate with rechargeable batteries as this could lead to an explosion and injury. Applied Acoustic Engineering cannot be held responsible for damage or injury caused by incorrect battery replacement or fitment by non Applied Acoustic Engineering personnel.

O-Rings

It is recommended that the O-rings are inspected annually for integrity and foreign matter.

O-ring seals that are exposed to high pressure cycles (working depths in excess of 1500 metres) should be changed annually to ensure operational reliability.

Typical O-ring guidelines are to check their integrity and are clean, ensure all seals and sealing faces are undamaged and contamination free, with a light covering of O-ring lubricant. Contact Applied Acoustic Engineering for spares and assistance.

Pressure Relief Valve (PRV)

As the pressure relief valve is a user accessible safety device on the 1000 series beacons the operator should during routine use visually inspect the condition of the PRV actuator for debris or reduction in o-ring lubrication. Any interim cleaning and lubrication required should be performed by the operator to maintain the integrity of the valve. Failure to maintain the valve throughout life cycle voids warranty and compromises safety.

Typical O-ring guidelines are to check their integrity and are clean, ensure all seals and sealing faces are undamaged and contamination free, with a light covering of O-ring lubricant. Contact Applied Acoustic Engineering for spares and assistance.

Applied Acoustic Engineering strongly recommend that all pressure relief valves are annually tested for safe reliable operation, as a minimum. This is done on a service-repair or exchange scheme at the factory. Pressure relief valves which are not serviced may become contaminated with marine growth or debris, leading to water ingress or pressurisation of the beacon housing.



Inspect pressure relief valve during routine operation, perform interim maintenance or cleaning as required to ensure safe operation.



NOTE: - See Page 33 for PRV location.

8. End of Life Recycling / Disposal



Within the EU all electronic components and batteries must be taken for separate collection at the end of their working life under EU WEEE directives. Applied Acoustics as a manufacturer within the EU will responsibly dispose of any returned end of life Applied Acoustics components / batteries through a registered WEEE scheme. In order to prevent uncontrolled waste disposal and promote re-cycling please return any end of life Applied Acoustic components postage paid by sender to our UK head office. Please contact Tech Support for a RMA number prior to shipping.

9. Spares

The following beacon spares are available from stock. A part number is not necessary to order. The description below is acceptable to us. Please reference the model number and serial number of the unit you require spares for.

O-Rings

1010 Mini Series Body Kit (all kits include O-ring lubricant)
1030 Midi Series Body Kit (all kits include O-ring lubricant)
1050 Seabed Series Body Kit (all kits include O-ring lubricant)
1060 Fatboy Series Body Kit (all kits include O-ring lubricant)

1010 / 1030 / 1060 Connector Parts

MCBH5M bulkhead connector	Part Number	ECN050028
MCDC5F non-shorting dummy connector (with locking sleeve)	Part Number	ECN050038

1050 Connector Parts

MCBH10M bulkhead connector	Part Number	ECN050043
MCDC10F non-shorting dummy connector (with locking sleeve)	Part Number	ECN050048

Battery Packs

1010 Mini Series NiMH battery pack	Part Number	BCN-1010-3000
1010 Mini Series Alkaline battery pack	Part Number	BCN-1010-3001
1030 Midi Series NiMH battery pack	Part Number	BCN-1030-3000
1050 Seabed / 1060 Fatboy Series NiMH battery pack	Part Number	BCN-1060-3000
1050 Seabed / 1060 Fatboy Series Alkaline battery pack	Part Number	BCN-1060-3001

10. Fault Finding

It doesn't work, what can we do?

Most instances of failure are due to mechanical damage or user error but the possibility of component failure is always there.

Did it ever work?

If the answer is yes, either the battery is not charged or the beacon is faulty. Look for mechanical damage and also check for damage to the charging connector.



WARNING: - If there are any signs of mechanical damage which could result in water ingress, do not charge the beacon. Vent any internal pressure by manually operating the pressure relief valve. Return the beacon to Applied Acoustic Engineering for repair.



WARNING: - If the pressure relief valve has vented water or vapour during charging, stop charging and decommission the beacon. Return the beacon to Applied Acoustic Engineering for repair.

If the beacon has been over-charged, do not use. Replace the battery pack or return the beacon to Applied Acoustic Engineering.

If there are no signs of mechanical damage, try charging the beacon.

Check the beacon with the 1082 Smart Switch or 1083 Multi Charger responder test function. If the beacon responds, the battery and the transmitter are functional.

Is the beacon configured correctly?

Try turning the beacon off for minimum of 1 minute then turning beacon back on and retry operation.

If these tests do not help or resolve the problem, contact Applied Acoustic Engineering immediately for technical assistance.

Is performance poor?

If the answer is yes, please consider the following: -

- If you have a similar model, is the performance the same? This will identify if there is just one faulty beacon.
- Are you out of range? Again check with a similar model. Maybe a higher powered beacon is required.
- Is multipath present? Try slowing down the interrogation rate.
- Are you within the beam pattern of the transducer? If the signal from the beacon is not illuminating the vessel, then it cannot be tracked. If you are tow fish tracking, cable catenary has been known to cause problems occasionally, the signal could transmit at the wrong angle and miss the vessel.
- If you are tow fish tracking and there is a large water temperature change between the surface of the water and the beacon position, you may be experiencing severe ray bending.
- Are results different to another model? You may be comparing different models and different specifications.
- Check on a different channel (frequency) to see if performance changes.

If you can't find a solution, contact Applied Acoustic Engineering immediately for technical assistance.

11. Specification

Model Types

	Beam Pattern	SPL	Diameter	Length	Survival Depth	Weight Air/Water
Model 1015*	± 45°	194dB	74mm	410mm	2000m	3.08kg / 1.46kg
Model 1015H	± 30°	196dB	74mm	410mm	2000m	3.08kg / 1.46kg
Model 1019*	± 90°	188dB	74mm	395mm	1500m	2.88kg / 1.38kg
Model 1022*	± 20°	202dB	95mm	418mm	4000m	5.0kg / 2.75kg
Model 1035*	± 45°	200dB	100mm	540mm	4000m	6.86kg / 3.0kg
Model 1035H	± 45°	203dB	100mm	540mm	4000m	6.86kg / 3.0kg
Model 1039*	± 90°	191dB	100mm	540mm	4000m	6.86kg / 3.0kg
Model 1062	± 15°	208dB	130mm	652mm	4000m	14.82kg / 6.62kg
Model 1065	± 45°	203dB	130mm	652mm	4000m	14.82kg / 6.62kg
Model 1055	± 45°	195dB	125mm	1095mm	4000m	22.84kg / 11.0kg
Model 1055H	± 45°	200dB	125mm	1095mm	4000m	22.84kg / 11.0kg
Model 1059	± 90°	188dB	125mm	1095mm	4000m	22.80kg / 11.0kg

*includes 'D' suffix models.

Physical

Housing Material	Hard anodised aluminium
External Connector	MCBH5M 5-way bulkhead plug (1010 / 1030 / 1060) MCBH10M 10-way bulkhead plug (1050)
External Switch	Combined selector switch / pressure relief valve. Stainless-steel freely rotating with 3 positions (1010). Indexed selector switch / separate pressure relief valve (1030/1060). ON Switch on beacon OFF Switch off beacon CHAR Charge beacon
Operating Temperature	-5°C to 30°C
Storage Temperature	0°C to 45°C Battery pack maximum storage temperature is 55°C Temperatures above 70°C will render the battery pack unserviceable.

Although unlikely, published specifications are subject to change. Please consult the factory if a particular specification is critical. Changes to the existing design are possible - please consult the factory for information.

CE. These units conform to the European directive 89/336/EEC for electromagnetic compatibility when used in the proper manner.

Electrical (All Models)

AAE 'Channels'	Total Available	256
	AAE Nexus 2 Easytrak	8
	AAE Nexus Easytrak	32
	AAE Easytrak	18
	HPR300	14
	HPR400	56
	Sonardyne USBL	14
	Sonardyne LBL	9
	ORE Trackpoint II	25
	Pinger	5
	Emergency Pinger	1 (37.5kHz)
	Test channels	3
AAE 'Channels' Spare	Yes	
AAE Turn-Around-Time	15ms / 30ms / 60ms / 100ms depending on AAE 'channel' selected	
iXBlue	Compatible, firmware permitting Interrogate Frequency 19.5kHz to 22.5kHz in 1kHz steps. Reply Code 00 to 09, 22 & 23 for a total of 12 codes. Turn-Around-Time 20ms to 200ms in 1ms steps.	
Sonardyne Wideband™	Compatible, firmware permitting Interrogate Channel CIF, MF0 to MF14 for a total of 16 channels Acoustic Command Address 0101 to 1514 & 3301 to 4714 for a total of 420 command addresses Turn-Around-Time 62.5ms to 875.0ms in 62.5ms steps Quickset schemes A1 to C3 for a total of 9 schemes	
Responder Trigger	Positive going logic pulse 5V to 25V of duration 2ms to 10ms	
Serial Communication	RS232 compliant 9600 baud rate 8 data bits 1 stop bit No parity No flow control	
Power Supply	NiMH rechargeable battery pack (3 off for 1050) Alkaline non-rechargeable battery pack (3 off for 1050) External 22VDC to 35VDC (with recommended fuse)	

Battery Life*

1010 Mini Series

60 days listening or

Model 1019 150 hours at 1 reply per second

Model 1015 150 hours at 1 reply per second

Model 1015H 100 hours at 1 reply per second

Model 1022 100 hours at 1 reply per second

1030 Midi Series

90 days listening or

Model 1039 150 hours at 1 reply per second

Model 1035 60 hours at 1 reply per second

Model 1035H 30 hours at 1 reply per second

1060 Fat boy Series

90 days listening or

Model 1062 110 hours at 1 reply per second

Model 1065 110 hours at 1 reply per second

1050 Seabed Series

120 days listening or

Model 1059 1800 hours at 1 reply per second

Model 1055 1200 hours at 1 reply per second

Model 1055H 500 hours at 1 reply per second

*Operation Battery life quoted in AAE Mode, operational life reduced by 60% when in other operational modes.

AAE Charge

1010 / 1030 / 1060 on-board charger.

1010 Mini / 1030 Midi 3 to 4 hour typical fast charge

1060 Fatboy 12 hour maximum charge

- ΔV voltage and $\Delta T/\Delta t$ temperature charge termination techniques

Activated and monitored via 1082 Smart Switch or 1083 Multicharger

1010 Mini: 667mA \pm 30mA @ 30VDC

1030 Midi: 1100mA \pm 50mA @ 30VDC

1060 Fatboy: 700mA \pm 30mA @ 30VDC

1050 Seabed remotely dumped & charged by 1083 Multi Charger

Each battery pack "a", "b" & "c" dumped then charged for 12 hours individually simultaneously, cycle time is 20 hours typical.

Trickle Charge

1010 Mini: 80mA \pm 2mA* @ 22VDC to 35VDC

1030 Midi: 100mA \pm 5mA* @ 22VDC to 35VDC

1060 Fatboy: 100mA \pm 5mA* @ 22VDC to 35VDC

1050 Seabed: 100mA \pm 5mA* @ 22VDC to 35VDC

* Max charge current dependent on battery charge status

Although unlikely, published specifications are subject to change. Please consult the factory if a particular specification is critical. Changes to the existing design are possible - please consult the factory for information.

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Depth Models (Suffix 'D')

Depth Span	As written on housing label
Depth Rating	Twice depth span or 1500 metres, whichever is less
Number of Replies	As non-depth model when depth transmission is disabled 48% of the above when depth transmission is enabled
Depth Transducers	100 metres 300 metres 1000 metres 2000 metres 4000 metres

Although unlikely, published specifications are subject to change. Please consult the factory if a particular specification is critical. Changes to the existing design are possible - please consult the factory for information.

Remote Transducer Models

There are also versions of all the above beacons *without a transducer fitted*, instead an interconnect lead connects the electronics bottle to a remote transducer. The following transducers are currently available:-

Model RM15 +/-15 degrees
Size 125mm diameter
206dB with 1030 Midi Series
208dB with 1060 Fatboy Series
Weight in Air / Water: 5.85Kg / 3.4Kg

Model RM30 +/- 30 degrees
Frequency 27 – 33 kHz
Size 95 mm diameter
203dB with 1030 Midi Series

Model RM45 +/-45 degrees
Size 75 mm diameter x 160 mm long.
200dB with 1030 Midi Series
203dB with 1060 Fatboy Series
Weight in Air / Water: 1.8Kg / 1.0Kg

Model RM90 +/-90 degrees
Size 75 mm diameter x 160 mm long
187dB with 1010 Mini Series
190dB with 1030 Midi Series
Weight in Air / Water: 1.8Kg / 1.0Kg

Check with the factory or your area representative for further details.

CE These units conform to the European directive 89/336/EEC for electromagnetic compatibility when used in the proper manner.

12. Transportation by Air

All equipment should be switched off prior to air transportation. Switching off is achieved by rotating the beacon 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 beacons that use these battery types should state this clearly.

13. General Arrangement

1015 / 1015H & 1019 Mini Beacon

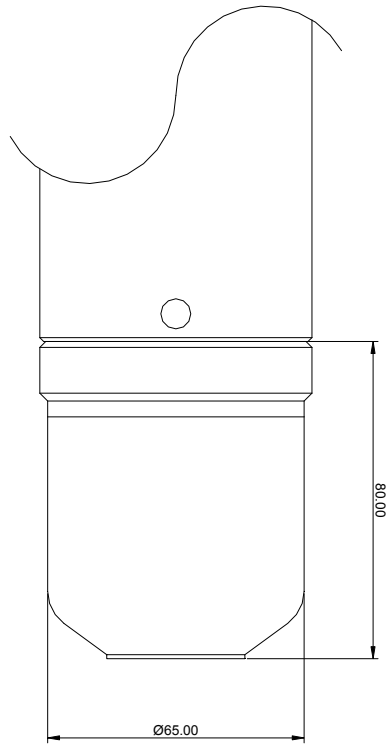


DIAGRAM B - 1015/1015H TRANSPONDER

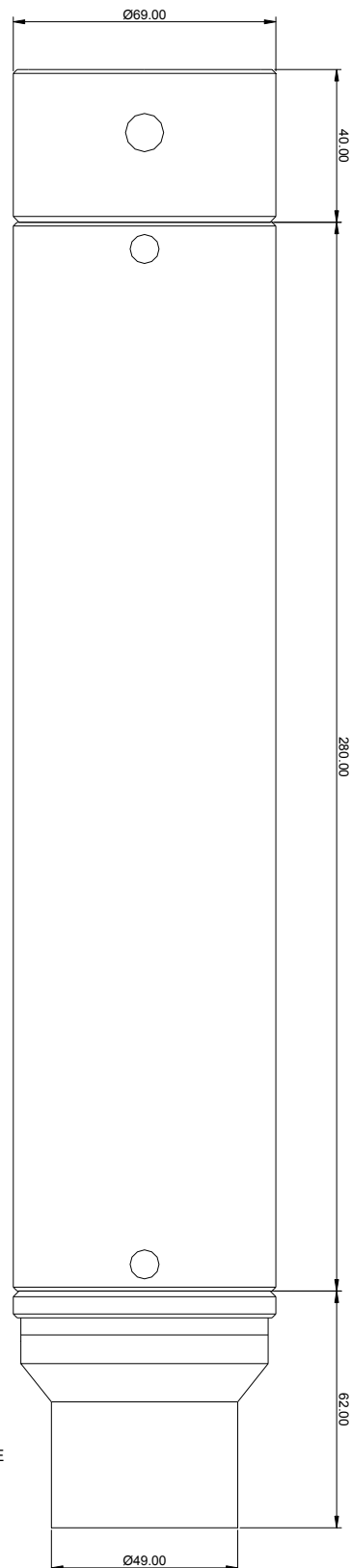
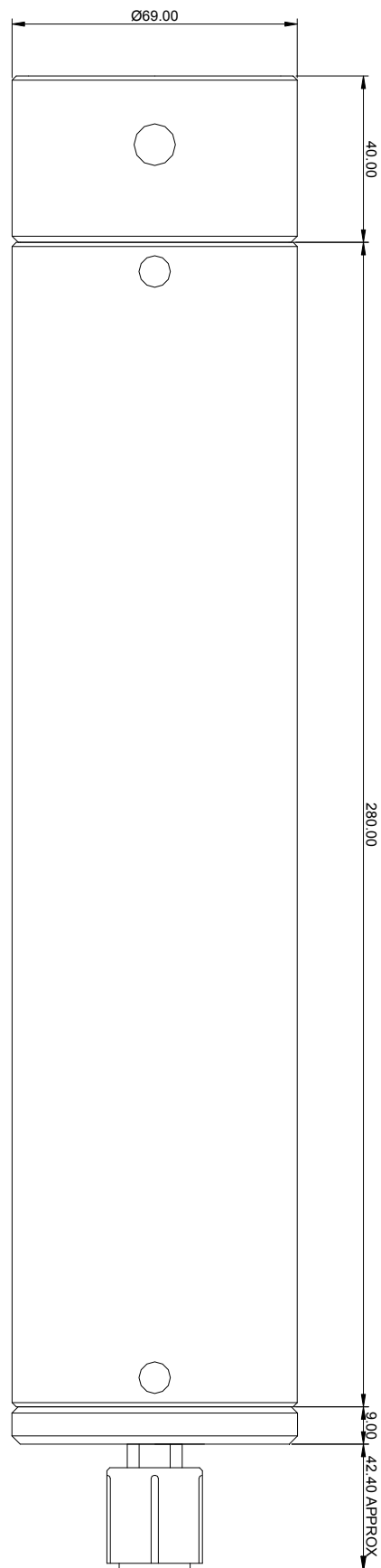


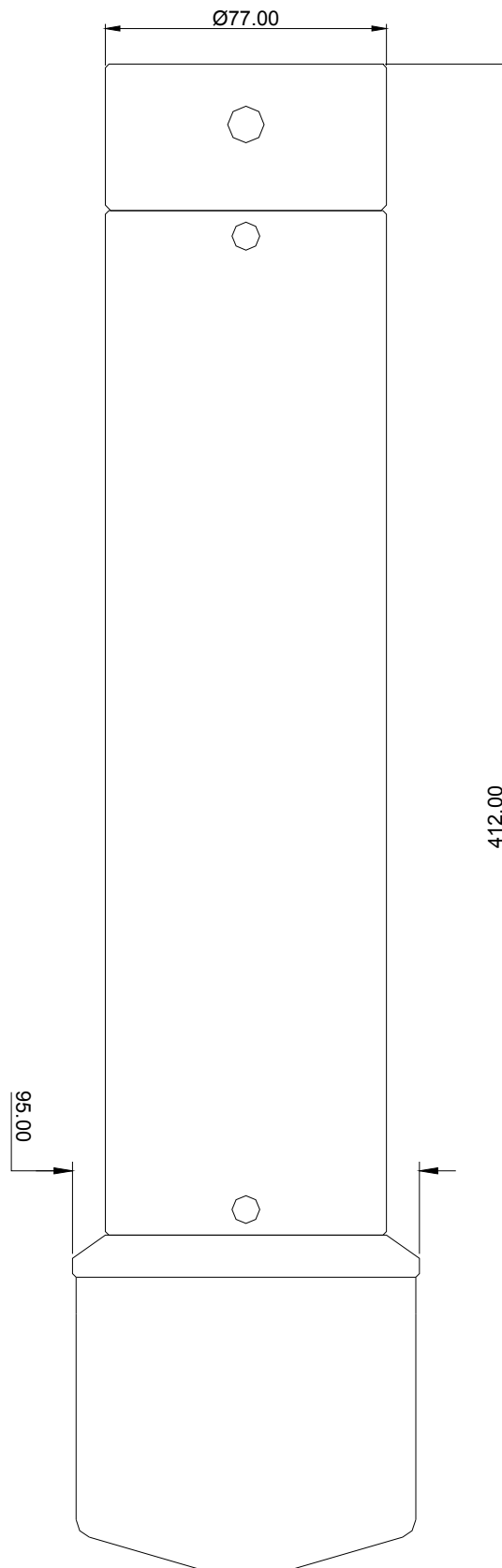
DIAGRAM A - 1019 TRANSPONDER

PHYSICAL DIMENSIONS FOR THE
1015/1015H AND THE 1019 ARE THE SAME
EXCEPT FOR THE DIMENSIONS OF THE
TRANSDUCER.
REFER TO DIAGRAM B.

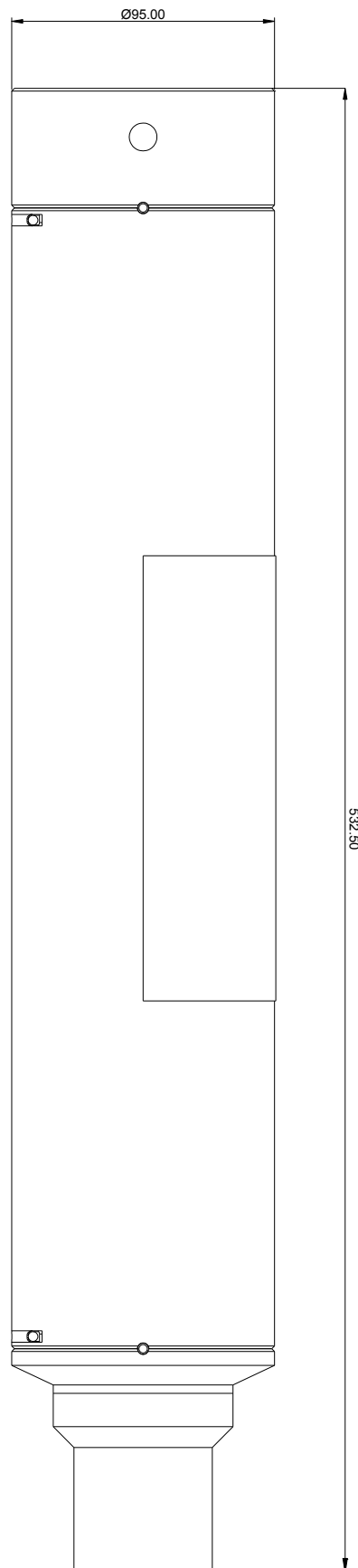
1010 Mini Beacon



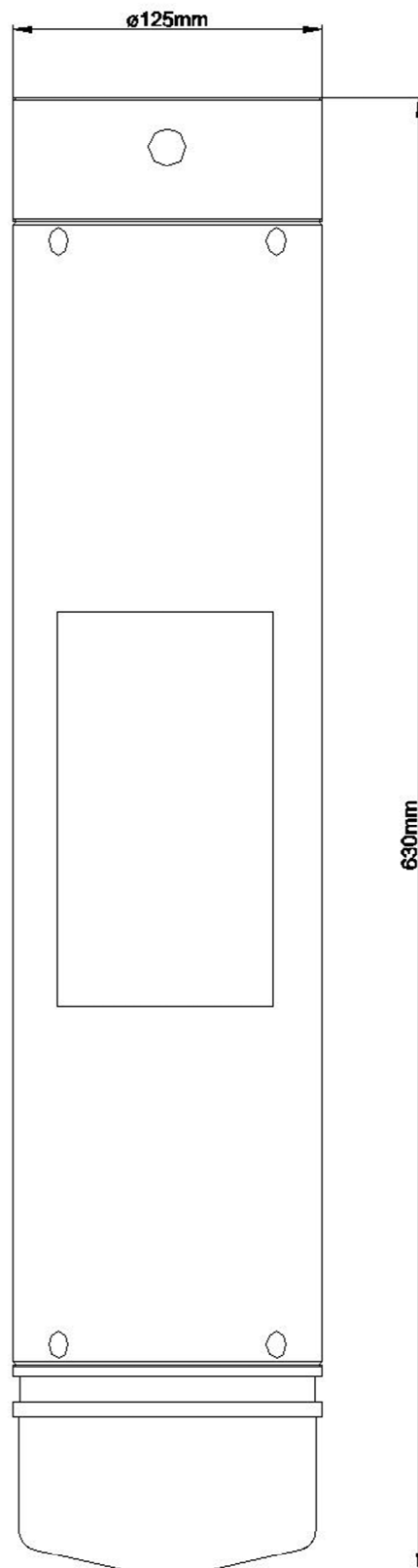
1022 Mini Beacon



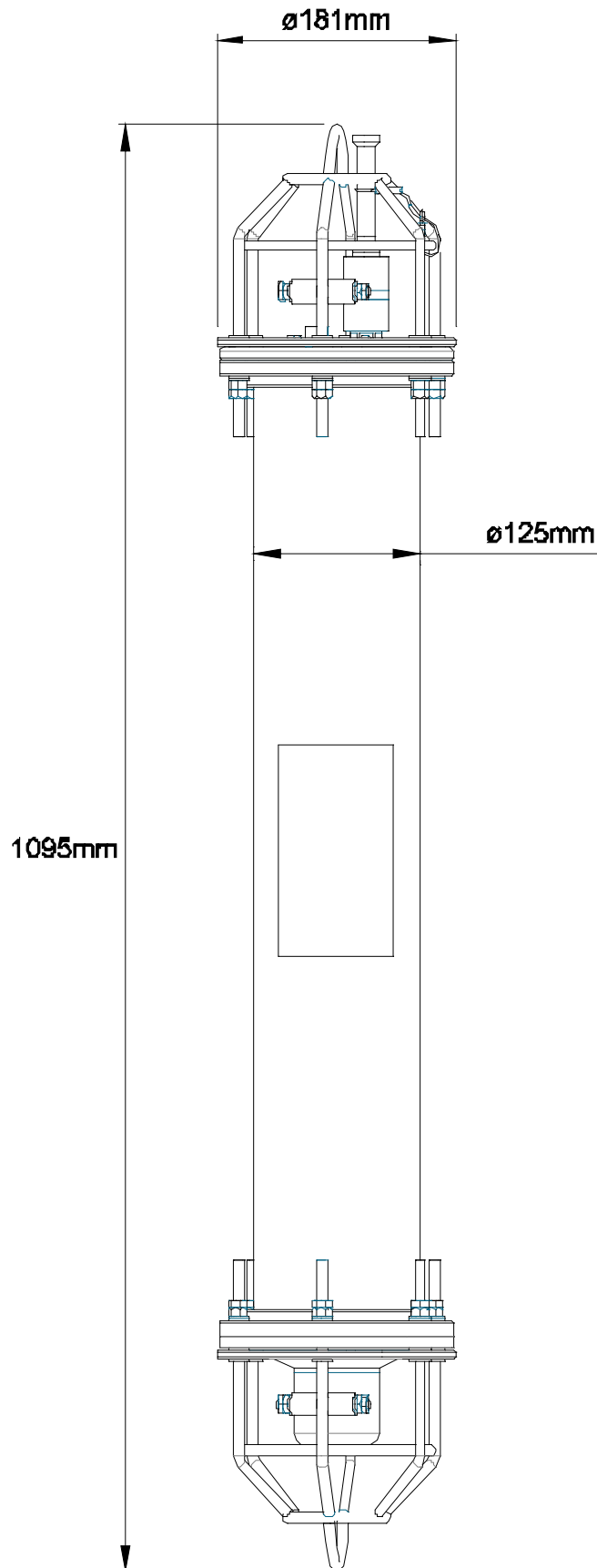
1039 Midi Beacon



1062 / 1065 Fatboy Beacon



1055 / 1059 Seabed Beacon



Use with Remote Transducers

Some beacons can be fitted with remote transducers. This can make installation easier in some instances. The three transducers all connect to the electronics with the same cable:-

Cable Type: 4-4 I/C Lead

Connectors: IL-4-FS and IL-4-MP

Connections:

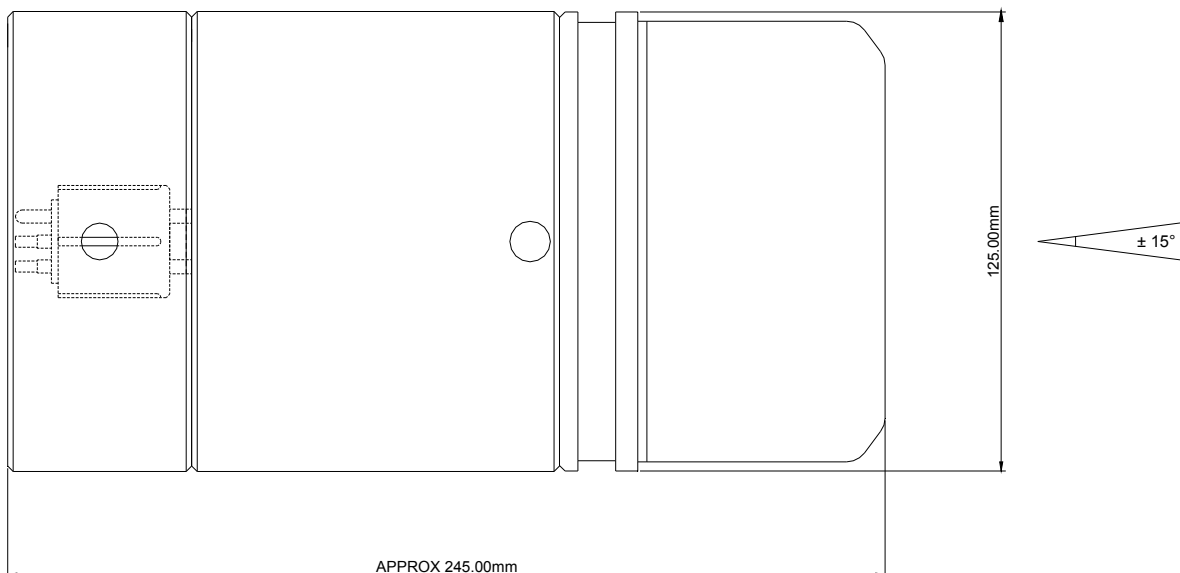
Free Plug	Free Socket
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Pin 1	Pin 1
Pin 2	Pin 2
Pin 3	Pin 3
Pin 4	Pin 4

The cable length is a standard 1.5 metres minimum (typically 1.8 metres). We would not usually recommend that this length be increased to any great extent. As the cable is not screened, it is advisable to ensure that it is not secured close to any electric motors or electrical equipment. We can supply shorter cable lengths to order.

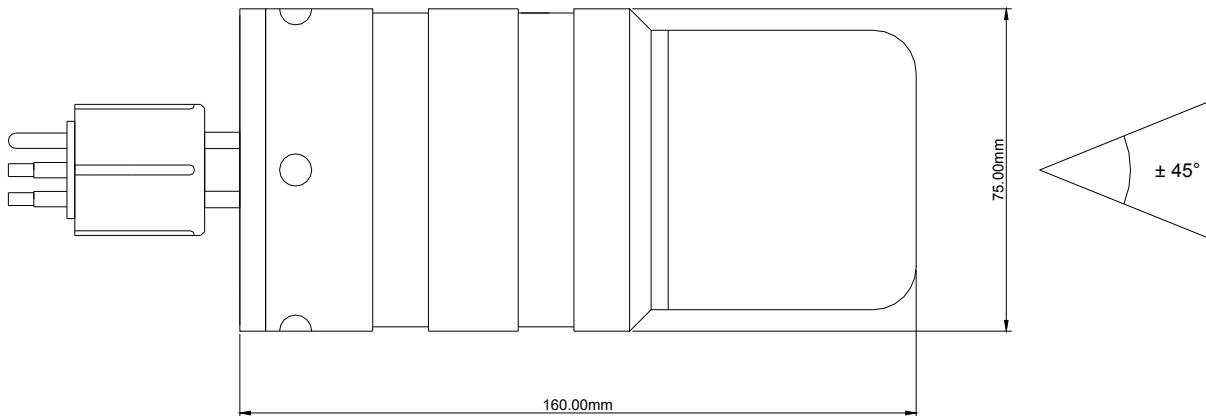
RM15

This has a highly directional transducer beam pattern of $\pm 15^\circ$ and is used for deep water work (ROV's Ploughs etc.). The black potted face is the radiating surface which must be positioned on the vehicle to point directly towards the tracking system. Because of the directional nature of this product, it is unlikely that it will be used for tow fish / ROTV tracking.



RM45

This is the same transducer element as used with the 935 beacon. When mounted in the RM45 housing it has a directional beam pattern of ± 45 degrees and a depth rating of 3000 metres. The same precautions about mounting apply to this model as the 7920A.

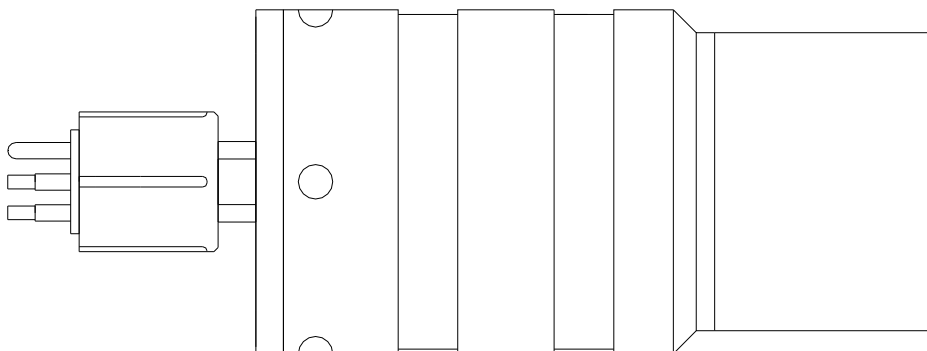


RM30

With a 95mm body diameter and a beam pattern of ± 30 degrees, the RM30 can give source levels of up to 206dB RMS.

RM90

This transducer has a hemispherical beam pattern (omni directional) and has a depth rating of 1500 metres. Being non directional, the source level from the transducer is less than the other models listed above. We would not recommend this unit for long range work.



Note that the RM45 and the RM90 have been drawn without a protector ring for the electrical connector. This is usually supplied but can also be removed easily (4 screws). Electrical connectors should be clean and grease free. Rubber mating parts should be O-lubed (see elsewhere in the manual). Contact pins should be clean.

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Applied Acoustic Engineering 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 devices for offshore geotechnical and seabed analysis known as sub-bottom profiling.

All products use acoustics, underwater sound waves, in location, positioning, navigation and data acquisition applications. system, Easytrak, a variety of positioning and release beacons and seismic devices for offshore geotechnical and seabed analysis known as sub-bottom profiling.



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