

800 Series Acoustic Pinger Operating Manual

The 800 Series Pingers are high specification pingers used for pig tracking and other subsea marking and location functions intended for use in pipeline diameters of 6” to 8”.



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ACCEPTED**

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| CONFIGURATION INFORMATION | |
|----------------------------------|--|
| MODEL: | |
| SERIAL NUMBER: | |
| FREQUENCY: | |
| ACOUSTIC POWER: | |
| PULSE LENGTH: | |
| PING RATE 1: | |
| PING RATE 1 BATTERY LIFE (+5°C): | |
| PING RATE 2: | |
| PING RATE 2 BATTERY LIFE (+5°C): | |
| SPECIFIED ON PRESSURE: | |
| SPECIFIED OFF PRESSURE: | |

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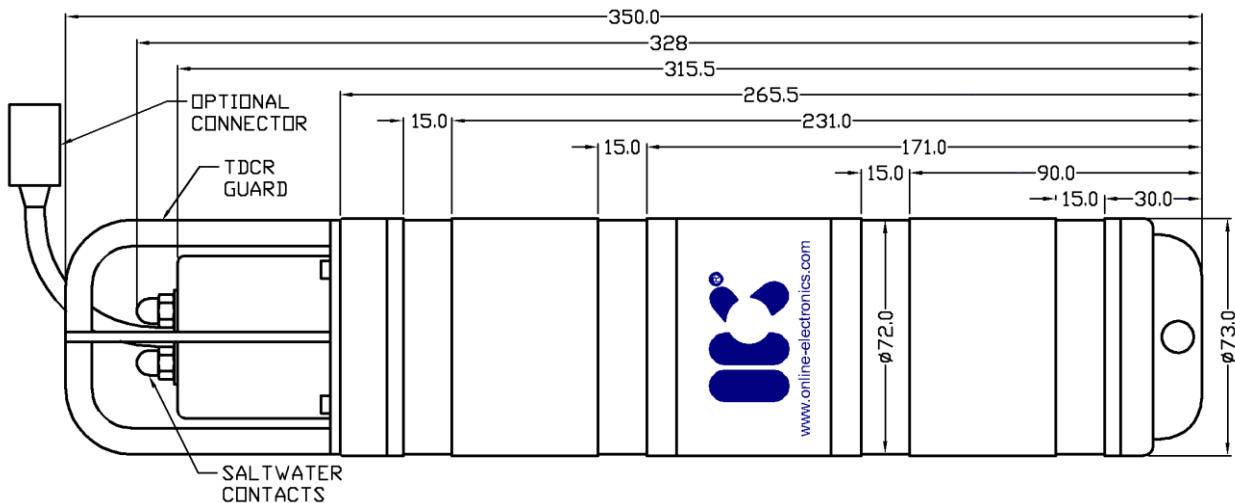
1. GENERAL DESCRIPTION

The 800 Series Pingers are high specification, microprocessor controlled acoustic transmitters developed for use as advanced PIG transmitters and for other subsea marking and location functions.

An 800 Series Pinger may be fitted to a PIG for use in offshore, fluid filled pipelines. The acoustic signal generated by the pinger is exceptionally powerful and stable, allowing the rough PIG location to be determined from the surface using an acoustic receiver and hydrophone (e.g. OEL 2001). The exact location can then be established using a directional receiver such as the diver operated OEL PR1, or ROV mounted OEL 2001RS/2401 system.

The 800 Series Pingers are highly configurable and their performance and functionality can be tailored to meet specific customer requirements. For example, if two pingers are required to operate in close proximity to one another, different frequencies can be configured during manufacture to allow for differentiation between their transmissions.

The 800 Series Pingers are capable of sending acoustic transmissions over several km, although the effective range is dependent upon the specific configuration, mounting arrangement, and environmental conditions.



The standard 800 Series model is can produce up to 20W of acoustic power and has a single operating frequency in the range of 24-30 kHz (configured at time of manufacture). In addition to the standard model, a number of alternative configurations are available that offer additional functionality and/or performance:

LOW AND HIGH FREQUENCY OPTIONS: Low frequency and high frequency options are available with frequencies in the range of 9-18 kHz and 30-40 kHz respectively (configured at time of manufacture). Low Frequency configurations incorporate a larger $\phi 85$ mm transducer and do not include a transducer guard, reducing the overall length of the unit to 334.1mm. The housing dimensions remain the same for all configurations.

PRESSURE SWITCH OPTION: 800 Series Pingers can be configured with a mechanical pressure switch that can be used to activate the transmitter once the external pressure exceeds a set threshold value (typically 3 to 5 bar). For example, an 800 Series Pinger with a pressure switch could be installed inside a 'wet' pipeline at atmospheric pressure, several weeks before it is required to activate. The Pinger would only activate once the pipeline internal pressure reached the threshold value.

DUAL RATE OPTION: 800 Series Pingers with the dual rate option incorporate an external connector cable that allows them to be interfaced with an external piece of equipment for use as a long range, remote alarm. For example, an 800 Series Pinger with the dual rate option may be interfaced with an OEL Smart Gauge Plate and used to send an alert over several km if the gauge plate is triggered.

MODEM OPTION: 800 Series Pingers with the modem option incorporate an external connector cable that allows them to be interfaced with an external piece of equipment and used as a long range, simple, robust, low data rate modem for remote monitoring applications. For example, an 800 Series Pinger with the modem option may be interfaced with OEL’s 6000 subsea logger and used to transmit pressure readings every 2 minutes over several km.

2. SPECIFICATIONS

REFER TO THE PAGE 2 OF THIS MANUAL FOR THE SPECIFIC CONFIGURATION OF THE TRANSMITTER ACCOMPANYING THIS MANUAL.

GENERAL:

Battery Type..... 24V DC, 16 x Alkaline AA Cells
 Acoustic Output Power 20W ±3dB
 RangeUp to 8km (Dependent on configuration, mounting and environmental conditions)
 Beam Pattern..... Omni-directional ±3dB
 Frequency Pre-Configured within 24-30 kHz. (9-18 kHz and 30-40kHz options available)
 Pulse Length1msec to 30msec
 Ping Rate..... From 1 Ping every Second, to 1 Ping every 10 Seconds
 Operating Temperature Range-2°C to +54°C
 External Pressure Rating 4500m / 450bar
 Weight in Air..... 4.1kg

MATERIALS:

Housing Material2205 DUPLEX STAINLESS STEEL
 Endcap Material..... 316 STAINLESS STEEL
 Transducer Material PEEK / PU
 O-Ring MaterialNBR70

2.1. BATTERY LIFE EXAMPLES

The following table shows the battery lifetimes for typical configurations of a 20W 800 Series Pinger at +5°C. The acoustic power, pulse length and ping rate all affect the battery life and can be tailored to meet specific project requirements. Please contact Online Electronics for more information.

| Ping Rate | 4ms Pulse Length | 5ms Pulse Length | 10ms Pulse Length |
|------------------------|------------------|------------------|-------------------|
| 1 Ping Every 1s | 13 days | 11 days | 5 days |
| 1 Ping Every 2s | 25 days | 21 days | 11 days |
| 1 Ping Every 3s | 37 days | 30 days | 16 days |
| 1 Ping Every 4s | 47 days | 39 days | 21 days |
| 1 Ping Every 5s | 56 days | 47 days | 25 days |

Note: The battery life is dependent on the operating temperature and will vary significantly across the operational temperature range.

3. RULES FOR SAFE OPERATION

⚠ **WARNING:** Any operation involving pressure is potentially hazardous. No person should use this equipment unless they are fully aware of the potential hazards of working with pressurised vessels. The purchaser of this equipment is responsible for the training and competence of operators and the manner in which it is used. This manual should be read through and understood before installation and commissioning so that the operator is familiar with the equipment. Contact Online Electronics Ltd immediately should any difficulty arise in the use of this equipment.

⚠ **WARNING:** Always use caution when opening equipment which has been in a pressurised environment. It is possible for pressure to leak into the equipment and remain there even after external pressure has been removed. ALWAYS point the end to be opened towards a safe area and away from yourself or others. Contact Online Electronics immediately if there is a suspicion that the equipment has become pressurised.

⚠ **WARNING:** Replace all batteries at the same time. NEVER install used batteries. NEVER install a mix of new and used batteries. USE ONLY new batteries from the same package or manufacturing batch. DO NOT mix different brands or types of batteries. ALWAYS observe correct battery polarity. New batteries should be installed before each deployment.

⚠ **CAUTION:** Do not expose the unit to aggressive solvents or chemicals which could be harmful to the Housing, PU Transducer, Nitrile Rubber O-Rings or Connectors.

⚠ **CAUTION:** All subsea connections must be terminated or blanked prior to deployment.

⚠ **CAUTION:** Equipment should only be opened in a clean laboratory environment.

⚠ **CAUTION:** To prevent the formation of condensation within the unit, allow the unit temperature to stabilise within the laboratory environment for a minimum of 6 hours prior to opening.

⚠ **CAUTION:** It is possible for liquids to become trapped in threads and/or gaps around openings. ALWAYS point the end to be opened downwards to allow any trapped liquid to drain out of and not into the equipment.

⚠ **CAUTION:** If the unit is to be placed in storage, always ensure that it is turned OFF and the batteries are removed and stored separately.

4. OPERATION

Familiarise yourself with all the rules for the safe operation of this equipment as described in Section 3 RULES FOR SAFE OPERATION.

4.1. IN PIG INSTALLATION

⚠ **WARNING:** The unit must be mounted in such a way that no movement or vibration whatsoever is possible (e.g. clamped). If the unit is allowed to rattle and/or vibrate within the pig then the resultant hammering effect can exceed the bump rating of the unit leading to damage and/or failure. Wedging blocks of PU should be used as required to reduce any movement or vibration of the pinger within the pig. Note: The wedging blocks should only be in contact with the pinger body, not the transducer.

⚠ **WARNING:** The pinger transducer must be left protruding from the PIG body to minimise attenuation of the acoustic transmission.

⚠ **CAUTION:** Ensure that the Battery Endcap is tightened.

⚠ **CAUTION:** The transducer head must be protected against physical impact.

⚠ **CAUTION:** Ensure that there is adequate access for water to flood the saltwater links if the mechanical link is not going to be used.

⚠ **CAUTION:** If the pinger is fitted with an external connector then it MUST be terminated or blanked.

4.2. BATTERY REPLACEMENT

Online Electronics assume a pessimistic battery capacity to calculate a stated battery lifetime which is typically 5% to 10% lower than what will be achieved during normal operation. Operating temperature will have a significant effect on the lifetime achieved. The lifetime achieved at +20°C will typically be at least 10% more than what will be achieved at +5°C.

Familiarise yourself with all of the warnings given at the start of Section 3 RULES FOR SAFE OPERATION.

1. Slowly unscrew the Battery Endcap to relieve any internal pressure and remove from housing. Ensure that the O-ring seals are protected from damage and contamination while the unit is open.
2. Replace the batteries, ensuring the correct orientation (top-to-tail within each tube and alternating orientation as you go around the battery compartment, such that the -ve battery terminals always meet the spring contacts on the Battery PCBs).
3. Examine the O-ring seals for any signs of damage or contamination. Replace and/or lubricate with silicone grease as necessary.
4. Ensure all the O-rings are in place and refit the Battery Endcap, ensuring that the dowel on the battery compartment is inserted properly into the Battery PCB.

4.3. FUNCTION TEST

An acoustic receiver system (such as the OEL 2001 Acoustic Receiver and hydrophone) is required in order to function test an 800 Series Pinger. Note: Units with the pressure switch option cannot typically be function tested on-site, as they require external pressure to activate.

The function test is carried out as follows:

1. Ensure that the Battery Endcap is tightened.
2. Activate the pinger by closing the saltwater links using the mechanical link provided or by simply bridging the links with bare fingers. Note: if using the mechanical link to bridge the contacts, the heat shrink will need to be removed beforehand. If the pinger frequency is approximately 20 kHz or less, then the acoustic transmission should be audible without using a receiver.
3. Set the frequency of the acoustic receiver system to match the frequency of the pinger (refer to Page 2 of this manual), set the receiver sensitivity to maximum and position the hydrophone approximately 30cm from the front of the pinger (in air). With the pinger activated, confirm that transmitted signal is being picked up by the acoustic receiver. If a 2001 Acoustic Receiver System is being used, the signal reading should be at approximately 50% of the maximum level.
4. Ensure that acoustic pulses are received by the acoustic receiver system at the correct ping rate (refer to Page 1 of this manual).
5. If a pinger with the dual rate option is being tested, then either the first or second ping rate will be transmitted, depending on whether the DR contact is open or grounded (Refer to Section 4.5 DUAL RATE for further information). If the wrong ping rate is being transmitted, this would suggest that the external equipment is either damaged or not connected properly. If this happens, contact OEL for advice before initiating any investigation process.

Disclaimer – Any investigation without taking advice could potentially damage the pinger/external equipment.

6. Providing the correct ping rate and signal level have been measured as above, the system operation has been verified and the function test is complete.

4.4. DEPLOYMENT

Prior to deployment, the following checks should be completed:

1. At least 24 hours prior to deployment, any personnel who are to be involved in the operation of the pinger should review this entire manual and be given time to practice operating the pinger and receiver system by completing a function test as described in Section 4.3 FUNCTION TEST. By familiarizing themselves with the system operation prior to deployment, the chances of a potentially costly operator error are greatly reduced.
2. Refer to Page 2 of this manual for the expected battery lifetime and ensure that it is adequate for the planned duration of operations.
3. Ensure that the Battery Endcap is properly tightened.
4. If the pinger is fitted with an external connector then it must be terminated or blanked.

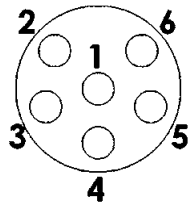
5. It is recommended that the pinger is activated by bridging the saltwater links with the mechanical link provided, however the transmitter will activate if the saltwater links are flooded with a conducting fluid such as water. If using the mechanical link to bridge the contacts, the heat shrink will need to be removed beforehand.
6. Perform a function test using a 2001 Acoustic Receiver as described in Section 4.3 FUNCTION TEST. Providing the function test has been completed successfully, deployment can proceed.

4.5. DUAL RATE

800 Series Pingers with the dual rate option are configured with two different ping rates and are typically fitted with an MCIL6 Female subsea connector moulded into the transducer (see the figure below).

When the pinger is active and the DR contact is open, the pinger will transmit at ping rate 1. When the pinger is active and the DR contact is connected to ground, the pinger will transmit at ping rate 2.

This behaviour can be used to indicate a condition change over a number of km in open water. The contacts are usually controlled by an external piece of equipment but may also be opened or closed mechanically. Refer to Page 2 of this manual for the configuration and ping rates of the pinger supplied with this manual.



| Socket | Connection |
|--------|------------|
| 1 | GND |
| 2 | Rx |
| 3 | Tx |
| 4 | ARGF0 |
| 5 | BWGPO |
| 6 | DR |

4.6. PRESSURE SWITCH

The 800 Series (Pressure Switch) Pingers are fitted with a mechanical pressure switch (piston arrangement) which is configured at OEL to turn the unit ON or OFF when specified external pressure thresholds are crossed. Refer to Page 1 of this manual for the pressure thresholds specified for this unit. Any applied pressure below the SPECIFIED OFF PRESSURE will guarantee that the unit will be OFF. Any applied pressure above the SPECIFIED ON PRESSURE will guarantee the unit will be ON. If a pressure between these two thresholds is applied, then the unit may be ON or OFF. Note that all pressure thresholds are gauge pressures relative to atmospheric pressure (1bar absolute).

The pressure inlet is an M5 threaded hole visible on the outer circumference of the endcap and should not be blocked or covered.

The saltwater contacts on a pinger with a pressure switch are normally disconnected and thus do not need to be bridged for activation.

5. ROUTINE MAINTENANCE AND STORAGE

Familiarise yourself with all of the rules for the safe operation of this equipment as described in Section 3 RULES FOR SAFE OPERATION.

All Online Electronics Ltd products are designed to require minimum maintenance. The housing should be cleaned using fresh water and cleaning agents as necessary. Do not use chemicals which could be damaging to the housing, the PU transducer, the nitrile rubber O-rings, or any connectors.

If the unit is to be placed in storage for a long period of time, ensure the unit has been cleaned and the batteries removed.

6. WARRANTY

Online products are guaranteed for one year from the date of purchase. Goods should be returned, transportation pre-paid, to Online Electronics Limited.

There is no charge for parts or labour should any product require repair due to a manufacturing deficiency during the guarantee period.

In the event of a manufacturing deficiency, the inward transportation costs will be repaid to the client.

7. DISPOSAL OF UNIT

Online Electronics Ltd takes its responsibilities under the WEEE Regulations extremely seriously and has taken steps to be compliant in line with our corporate and social responsibilities. In the UK, OEL has joined a registered compliance scheme WeeeCare (registration number **WEE/MP3538PZ/SCH**).

Electrical and electronic equipment should never be disposed of with general waste but must be collected separately for the proper treatment and recovery.

The crossed-out bin symbol, placed on the product, reminds you of the need to dispose of it correctly at the end of its life.

When buying a new product, you will have the opportunity to return, free of charge, another end of life product of equivalent type that has fulfilled the same functions as the supplied equipment. These items may be deposited at: Online Electronics Ltd, Online House, Blackburn Business Park, Woodburn Road, Aberdeen, AB21 0PS, UK.

Alternatively, to arrange a collection of any waste electrical equipment, obligated to Online Electronics Ltd, please telephone WeeeCare on **0844 800 2004**.