

Online ENGINE

3008 SERIES ELECTROMAGNETIC TRANSMITTER OPERATING MANUAL

The 3008 is an electromagnetic transmitter that can be used for pig tracking and locating functions, intended for use in pipeline diameter of 8" to 10"

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CONFIGURATION INFORMATION	
MODEL:	
SERIAL NUMBER:	
FREQUENCY:	22 Hz
PULSE RATE 1:	
PULSE RATE 1 BATTERY LIFE:	
PULSE RATE 2:	
PULSE RATE 2 BATTERY LIFE:	
SPECIFIED OFF PRESSURE:	
SPECIFIED ON PRESSURE:	
SHIPPED PULSE RATE SETTING:	PULSE RATE:

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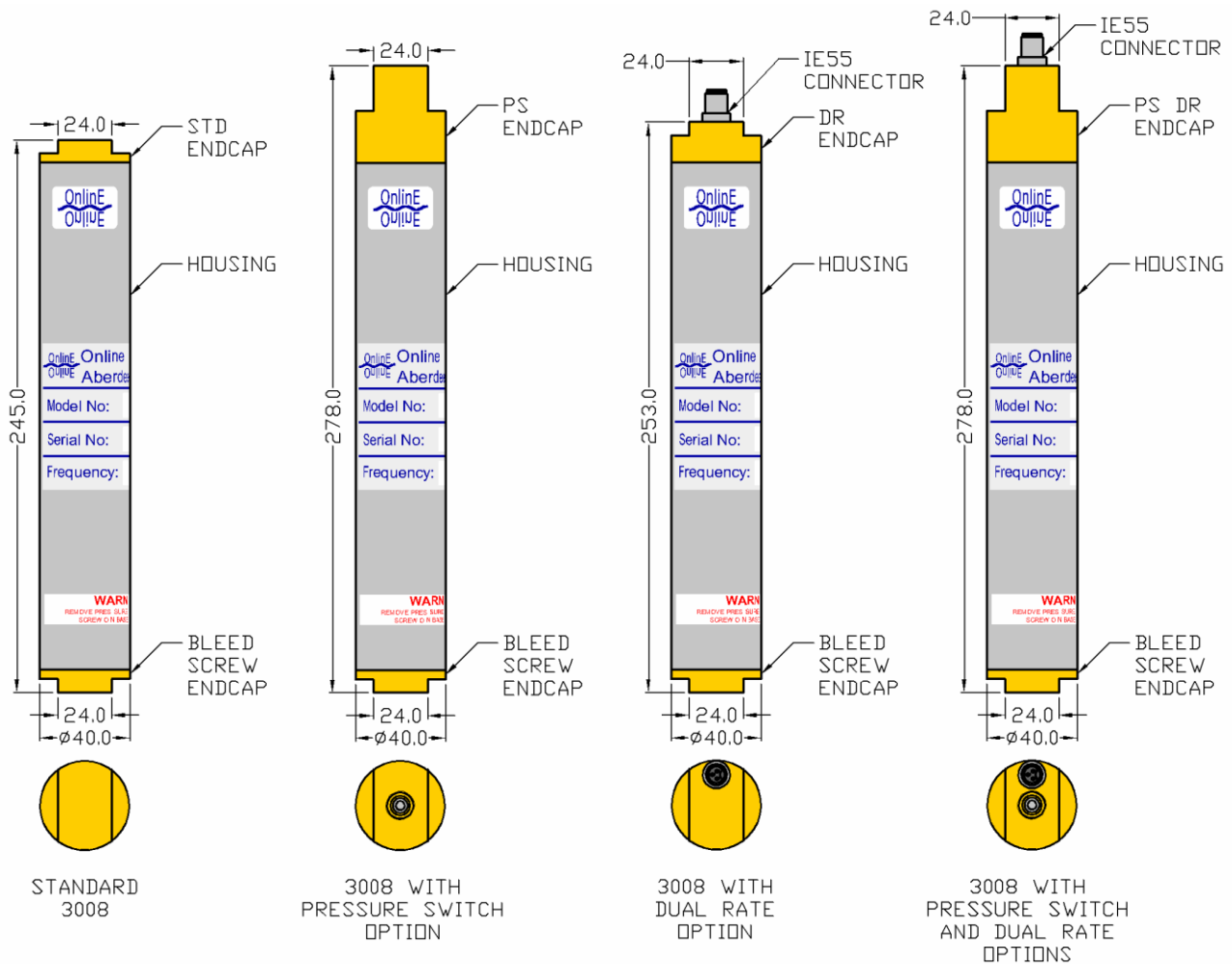
1. GENERAL DESCRIPTION

The 3008 Electromagnetic transmitter is used for pig tracking and locating either subsea or topside. A number of options are available for the 3008 that offer additional functionality.

The transmitter operates effectively in buried pipelines, pipelines carrying gas or fluids and in pipeline bundles where acoustic transmitters are either less effective or ineffective.

The transmitter emits a 22Hz signal and an inherent null spot is detectable when the antenna is 90 degrees to and pointing at the centre of the transmitter allowing accurate positioning of a pig.

The transmitter is pre-programmed with two transmission rates which are toggled via an easily accessible slide switch located inside the transmitter. The rates can be tailored to meet the battery life requirements of a project and to help to differentiate the transmitter's signals from those of other 22Hz EM sources.



2. SPECIFICATIONS

PRESSURE SWITCH OPTION: The transmitter can be configured with a pressure switch that activates the unit while the external pressure exceeds a specified ON threshold (typically 3 to 5 bar). This behaviour can be used to conserve the battery life of the unit. For example, the 3008PS may be installed inside a pipeline at atmospheric pressure several weeks before it is required to activate. The transmitter would only activate once the pipeline internal pressure reaches the specified ON threshold value.

LATCHING PRESSURE SWITCH OPTION: The transmitter can be configured with a latching pressure switch that behaves identically to the standard pressure switch, except that once activated, the transmitter will continue to transmit even if the external pressure drops below the specified ON threshold value.

DUAL RATE OPTION: The transmitter can be configured with an IE55 connector that allows it to be interfaced with an external piece of equipment to control the transmission mode of the unit (in place of the internal slide-switch). For example, a 3008 series transmitter with the dual rate option may be interfaced with an OEL Smart Gauge Plate, so that the pulse rate will change when the gauge plate is triggered.

GENERAL:

Battery Type4.5V DC (3x Alkaline DURACELL INDUSTRIAL ID1400 C Cells)
 Standard signal at 1m with OEL reference antenna at 20°C in air85mVpp
 Frequency 22Hz
 Pulse Length 0.4 Seconds
 Pulse Repetition Rate 1 to 5 Seconds or Continuous
 Operating Temperature Range -20°C to +54°C
 External Pressure Rating 3000m / 300bar
 Weight in Air..... 1.3kg

MATERIALS:

Housing Material 316 STAINLESS STEEL
 Endcap Material.....ALLOY BRONZE CA104 EN 12163
 O-Ring MaterialNBR70

BATTERY LIFE:

The predicted battery lifetimes for the standard repetition rates are shown below. Repetition rates can be tailored to meet specific project requirements. Please contact Online Electronics for more information. NOTE: The battery life is dependent on the operating temperature and will vary significantly across the operational temperature range.

Battery lifetime in continuous transmission at +5°C..... 7 days
 Battery lifetime with a 1s pulse repetition rate (0.4s ON / 0.6s OFF) at +5°C..... 15 days
 Battery lifetime with a 2s pulse repetition rate (0.4s ON / 1.6s OFF) at +5°C..... 30 days
 Battery lifetime with a 3s pulse repetition rate (0.4s ON / 2.6s OFF) at +5°C..... 41 days
 Battery lifetime with a 4s pulse repetition rate (0.4s ON / 3.6s OFF) at +5°C..... 52 days
 Battery lifetime with a 5s pulse repetition rate (0.4s ON / 4.6s OFF) at +5°C..... 62 days

3. OPERATION

NOTE 1 - DO NOT EXPOSE TO AGGRESSIVE SOLVENTS OR CHEMICALS WHICH COULD BE HARMFUL TO THE HOUSING, ENDCAPS, OR NITRILE RUBBER O-RINGS.

NOTE 2 – THE UNIT SHOULD ONLY BE OPENED IN A CLEAN, DRY, LABORATORY ENVIRONMENT.

NOTE 3 - TO PREVENT THE FORMATION OF CONDENSATION WITHIN THE UNIT, ALLOW THE TEMPERATURE OF THE UNIT TO STABILISE WITHIN A LABORATORY ENVIRONMENT FOR A MINIMUM OF 6 HOURS PRIOR TO OPENING.

NOTE 4 – IF THE TRANSMITTER IS BEING OPENED FOR THE FIRST TIME AFTER IMMERSION IN PIPELINE PRODUCTS, EXPECT SOME LIQUID TO BE PRESENT WITHIN THE ENDCAP THREADS. CARE SHOULD BE TAKEN WHEN OPENING THE UNIT TO ALLOW ANY LIQUID TO DRAIN OUT OF, NOT INTO THE TRANSMITTER.

NOTE 5 - ALWAYS LOOSEN THE BLEED SCREW TO RELIEVE ANY INTERNAL PRESSURE PRIOR TO OPENING.

3.1. TURNING ON

The following section only applies to 3008 series transmitters without the pressure switch option. For 3008PS/PSL units refer to Section 3.5 PRESSURE SWITCH for further information on turning ON

1. Familiarise yourself with all of the warnings given at the start of Section 3 OPERATION.
2. To turn the transmitter ON, fully tighten the bleedscrew using a straight bladed screwdriver, taking care not to use excessive torque. Note that the transmitter is usually shipped with a Nylon washer under the bleedscrew to prevent accidental activation during transport. This must be removed before the transmitter can be turned on.
3. Use an EM receiver system to confirm that the transmitter is functioning properly at the expected pulse rate. Refer to Section 3.3 MODE for further information on how to change pulse rates.

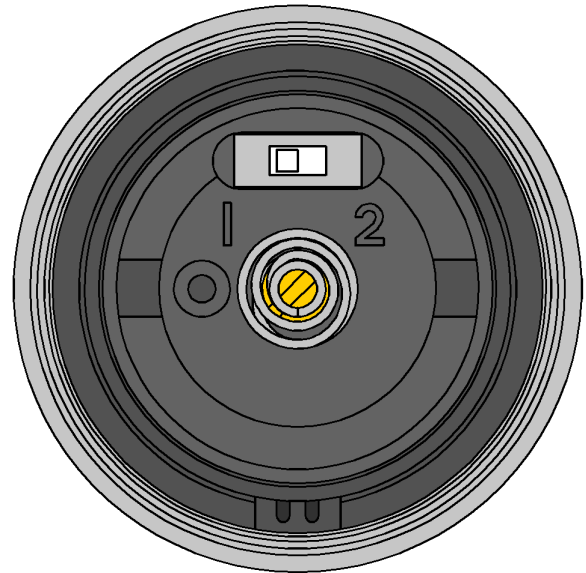
3.2. TURNING OFF

The following section only applies to 3008 series transmitters without the pressure switch option. For 3008PS/PSL units refer to Section 3.5 PRESSURE SWITCH for further information on turning OFF

1. Familiarise yourself with all of the warnings given at the start of Section 3 OPERATION.
2. To turn the transmitter OFF, loosen the bleed screw 4 full turns. To prevent the bleed screw from being lost or the transmitter accidentally being turned back on the bleed screw should be held in this position with some tape or the Nylon washer re-fitted and bleedscrew tightened.
3. Use an EM receiver system to confirm that the transmitter has turned off.

3.3. MODE SELECT

3008 transmitters are pre-programmed with two pulse rates. For transmitters without the Dual Rate option, the pulse rate is determined by the position of a slide switch located inside the unit. Refer to Page 2 for the pulse rates of the unit supplied with this manual. Follow the instructions below to gain access to the switch to toggle between pulse rates 1 and 2.



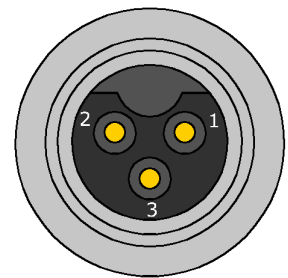
1. Using a straight bladed screwdriver, carefully and slowly loosen the bleed screw approximately 4 full turns to enable any pressure within the housing to escape safely. Wait at least 10 seconds to allow any pressure to escape fully.
2. Using a 24mm spanner and a vice, remove the top endcap (at the opposite end to the bleed screw). Ensure that the O-ring seals and surfaces are protected from damage and contamination while the unit is open.
3. Toggle the mode switch to select the desired pulse rate (pulse rate 1 or pulse rate 2 as indicated by the engraved numbers).
4. Examine the O-ring seals for any signs of damage or contamination. Replace and/or lubricate with silicone grease as necessary.
5. Reassemble the unit following the above instructions in reverse.
6. Carry out a Section 3.6 FUNCTION TEST of the transmitter to confirm the correct pulse rate.

3.4. DUAL RATE

For 3008 transmitters with the Dual Rate option, the transmission mode will be determined by the state of Pin 2 on the IE55 Connector.

If pin 2 is left open, the transmitter will transmit at Pulse Rate 1 when active.

If pin 2 is grounded, i.e. shorted to Pin 1 then the transmitter will transmit at Pulse Rate 2 when active.



This allows external equipment to control the Pulse Rate of the transmitter.

If the IE55 connector is not being used, it must be blanked prior to deployment.

3.5. PRESSURE SWITCH

3008PS/PSL units have a mechanical pressure switch fitted (piston arrangement) that is configured during manufacture to turn the unit ON or OFF when specified external pressure thresholds are crossed. Refer to Page 2 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 that the unit will be ON. If a pressure between these two thresholds is applied then the unit may be ON or OFF. For a PSL (Pressure Switch Latching) unit, the GUARANTEED OFF PRESSURE only

applies up until the unit is first activated, after which it will latch ON irrespective of what happens to the applied pressure. Note that all pressure thresholds are gauge pressures relative to atmospheric pressure (1bar absolute).

The pressure switch is provided with a ¼" BSP female thread. If a pneumatic or hydraulic line can be fitted to this, then the transmitter's function and pressure switch thresholds can be tested. For testing without a pneumatic or hydraulic line, a small screwdriver can be used to push in the pressure switch piston to activate the transmitter instead.

If testing a latching unit, the unit must be turned off manually after activation by loosening the bleed screw by a minimum of 4 full turns and then leaving for at least 10 seconds.

The Pressure Switch hole on the end of the PS/PS Dual Rate Endcaps as shown on the graphic in Section 1 GENERAL DESCRIPTION should not be blocked or covered.

3.6. FUNCTION TEST

An OEL EM receiver system is required in order to test the operation of a 3008 series EM transmitter. Refer to the relevant EM receiver manual for instruction on setup and operation of the EM receiver system.

Typically 3008 transmitters with either the Pressure Switch or Latching Pressure Switch options cannot be easily function tested on-site because they require external pressure to activate. Refer to Section 3.5 PRESSURE SWITCH for further information.

Follow the instructions below to verify the operation of the 3008 transmitter and the receiver system:

1. Place the EM receiver antenna approximately 5m away from and parallel to the transmitter.
2. Activate the transmitter as detailed in Section 3.1 TURNING ON .
3. Referring to the relevant EM receiver manual, turn on the receiver and set the sensitivity to approximately 75%.
4. Confirm that a clear EM signal is received and that the pulse rate is as expected.
5. Switch the transmitter between OFF, RATE 1 and RATE 2 several times to ensure that the signal received reacts as expected. Refer to Section 3.3 MODE for further information on changing transmission rates for non-dual rate units or Section 3.4 DUAL RATE for the dual rate units.
6. An inherent EM null spot is detectable when the receiver antenna is at 90 degrees to the transmitter and pointing towards its centre. Refer to the relevant EM receiver manual for further information.
7. Turn OFF the transmitter as detailed in Section 3.2 TURNING OFF and referring to the relevant EM Receiver manual if required, turn the EM receiver system off.
8. If all results were as expected then the system is functional.

3.7. DEPLOYMENT

At least 24 hours prior to deployment, any personnel who are to be involved in the operation of the transmitter should review this entire manual and be given time to practice operating the transmitter and receiver system by completing a Section 3.6 FUNCTION TEST. By familiarizing themselves with the system operation prior to deployment, the chances of a potentially costly operator error are greatly reduced.

Refer to Page 2 of this manual for the expected battery lifetime and ensure that it is adequate for the planned duration of operations.

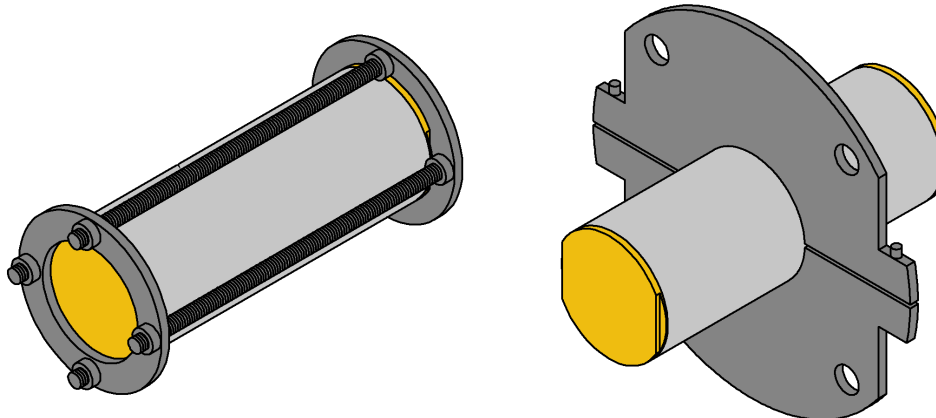
Before each deployment, ensure that the following checks should be completed.

1. Ensure that the desired pulse rate has been selected using the Mode Switch as detailed in Section 3.3 MODE SELECT for non-dual rate units or Section 3.4 DUAL RATE for dual rate units .
2. Activate the transmitter as detailed in Section 3.1 TURNING ON .
3. If the transmitter is fitted with an external connector then it must be terminated or blanked.
4. Complete a Section 3.6 FUNCTION TEST.
5. Ensure the transmitter has been installed as detailed in Section 3.8 INSTALLATION and that the Pressure Switch hole on the end of the PS/PS Dual Rate Endcaps as shown on the graphic in Section 1 GENERAL DESCRIPTION are not blocked or covered.

3.8. INSTALLATION

1. All EM transmitters will induce electrical currents in any conductive materials closely surrounding them which can result in a severe reduction in signal strength and/or battery lifetime. This effect can be minimised by reducing the amount of conducting material surrounding the transmitter. Leave as much of the transmitter exposed as possible. Any slits or apertures which can be made in the surrounding material will help. Use materials with as high resistance as possible. Non-conducting materials such as plastics will not suffer from this effect. EM transmitters must not be surrounded by low resistance metals such as aluminium (including tubes or mounting clamps) under any circumstances.
2. Any magnetic material surrounding the transmitter will tend to block the EM signal from the transmitter and reduce the received signal strength outside the pipeline. This effect can be minimised by reducing the amount of magnetic material surrounding the transmitter. Leave as much of the transmitter exposed as possible. Any slits or apertures which can be made in the surrounding material will help. Use materials with as low magnetic permeability as possible. Non-magnetic materials such as plastics will not suffer from this effect.
3. The transmitter must be mounted in such a way that no movement or vibration whatsoever is possible (e.g. clamped). If the transmitter is allowed to rattle and/or vibrate within the pig then the resultant hammering effect can exceed the bump rating of the transmitter leading to damage and/or failure. This is particularly important in gas pipelines.

For optimum performance the transmitter should be clamped inside a plastic pig body or plastic guide discs should be clamped around the transmitter to form a pig. The advantage of these methods is the fact that there is no metal around the transmitter apart from the pipeline itself. Two alternative mounting arrangements are shown below. The first uses several lengths of threaded studding to clamp the transmitter between two plates. The second uses a clamping disc. The advantage of these arrangements is that they have limited amounts of metal around the transmitter and will therefore have limited effect on the transmitter performance. Please contact Online Electronics for further information and guidelines regarding EM transmitter mounting and installation.



The table below shows the typical characteristics of several potential pig and mounting materials with the best choice at the top, and the worst choice at the bottom. 316 stainless steel provides a good balance of properties and cost. An aluminium alloy would be a very poor choice because of the very low resistivity and should not be used under any circumstances.

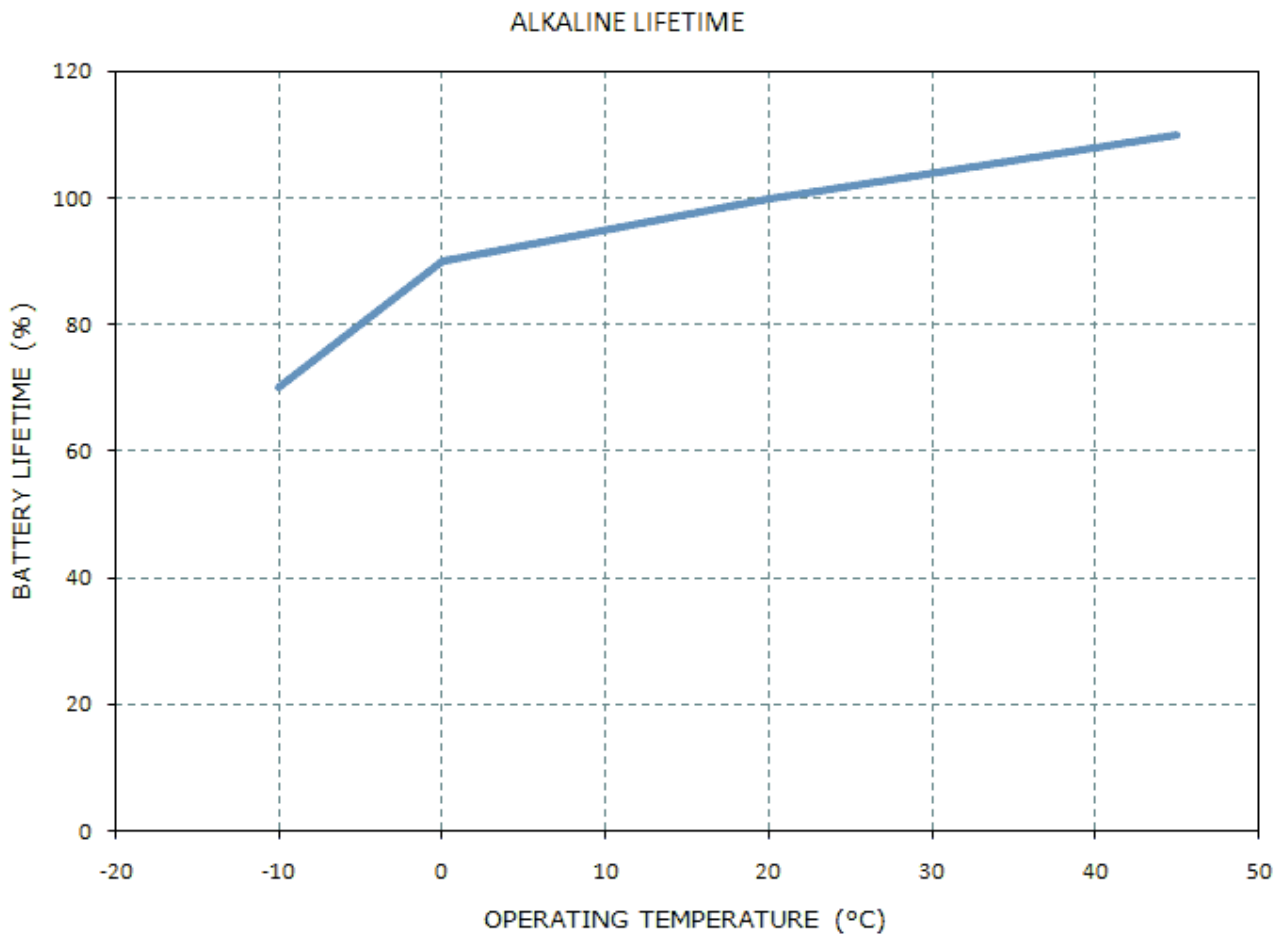
MATERIAL	RESISTIVITY ($\mu\Omega.m$)	MAGNETIC PERMEABILITY
PLASTIC	∞	1.000
316 STAINLESS STEEL	0.75	1.008
2205 DUPLEX SS	0.80	>25.0
1005 STEEL	0.20	>100
ALUMINIUM ALLOYS	0.04	1.000

3.9. BATTERY LIFETIME

The operating temperature which the transmitter is used at alters the operating lifetime. Typically colder temperatures will shorten the stated lifetime as shown by the figure below.

Note that upon customer request, the transmitters can be adjusted at Online Electronics Ltd to provide a stronger signal at the expense of lifetime, or extended lifetime at the expense of signal. Contact Online Electronics Ltd for more details and to discuss your requirements.

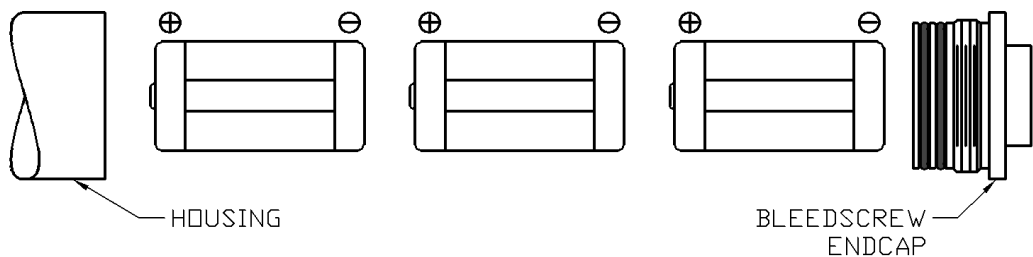
In extreme circumstances the transmitter operating lifetime may be reduced by how the transmitter is installed on a pig. For example, if it is installed inside an aluminium tube, the operating lifetime may be reduced to as little as 50%. Refer to Section 3.8 INSTALLATION within this manual for tips on how to achieve optimum performance from the transmitter with regards to the mounting arrangement.



3.10. BATTERY REPLACEMENT

Online Electronics recommends installing new batteries before each deployment to ensure maximum contingency lifetime. 3008 transmitters use 3x DURACELL INDUSTRIAL ID1400 Alkaline C cells. To replace the batteries, follow the procedure below:

1. Using a straight bladed screwdriver carefully and slowly loosen the bleed screw approximately 4 full turns to enable any pressure within the housing to escape safely. Wait at least 10 seconds to allow the pressure inside the housing to fully equalize with the surrounding environment.
2. Using a 24mm spanner and a vice, remove the bleed screw endcap. Ensure that the O-ring seals and surfaces are protected from damage and contamination while the unit is open.
3. Remove the 3 old batteries and dispose of them responsibly.
4. Referring to the graphic below, insert 3 new PROCELL ID1400 Alkaline C cells, observing the correct polarity (the positive nipple should be inserted first). Never use a mix of old and new batteries. Never mix different brands of batteries.
5. Examine the O-ring seals for any signs of damage or contamination. Replace and/or lubricate with silicone grease as required.
6. Reassemble the unit following the above instructions in reverse.
7. Carry out a Section 3.6 FUNCTION TEST.



4. ROUTINE MAINTENANCE AND STORAGE

NOTE 1 - DO NOT EXPOSE TO AGGRESSIVE SOLVENTS OR CHEMICALS WHICH COULD BE HARMFUL TO THE HOUSING, ENDCAPS, OR NITRILE RUBBER O-RINGS.

NOTE 2 – THE UNIT SHOULD ONLY BE OPENED IN A CLEAN, DRY, LABORATORY ENVIRONMENT.

NOTE 3 - TO PREVENT THE FORMATION OF CONDENSATION WITHIN THE UNIT, ALLOW THE TEMPERATURE OF THE UNIT TO STABILISE WITHIN A LABORATORY ENVIRONMENT FOR A MINIMUM OF 6 HOURS PRIOR TO OPENING.

NOTE 4 – IF THE TRANSMITTER IS BEING OPENED FOR THE FIRST TIME AFTER IMMERSION IN PIPELINE PRODUCTS, EXPECT SOME LIQUID TO BE PRESENT WITHIN THE ENDCAP THREADS. CARE SHOULD BE TAKEN WHEN OPENING THE UNIT TO ALLOW ANY LIQUID TO DRAIN OUT OF, NOT INTO THE TRANSMITTER.

NOTE 5 - ALWAYS LOOSEN THE BLEED SCREW TO RELIEVE ANY INTERNAL PRESSURE PRIOR TO OPENING.

All Online Electronics Ltd products are designed to require minimum maintenance. The housing should be cleaned using fresh water and cleaning agents as necessary (e.g. WD40). Do not use chemicals which could be damaging to the housing or O-rings or any connectors/cables.

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.

5. 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

Woodburn Road

Blackburn Business Park

Blackburn

Aberdeen

AB21 0PS

UK

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

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.