TRAX

Intelligent Pipeline Technology

EMTx50 Operating Manual

Electromagnetic Transmitter

www.iktrax.com

CONFIGURATION INFORMATION	
SERIAL NUMBER :	
PRODUCT CODE :	
FREQUENCY :	
PULSE LENGTH :	
REPETITION RATE :	
BATTERY LIFE AT +5°C :	

CONTENTS **Page**

1. GENERAL DESCRIPTION

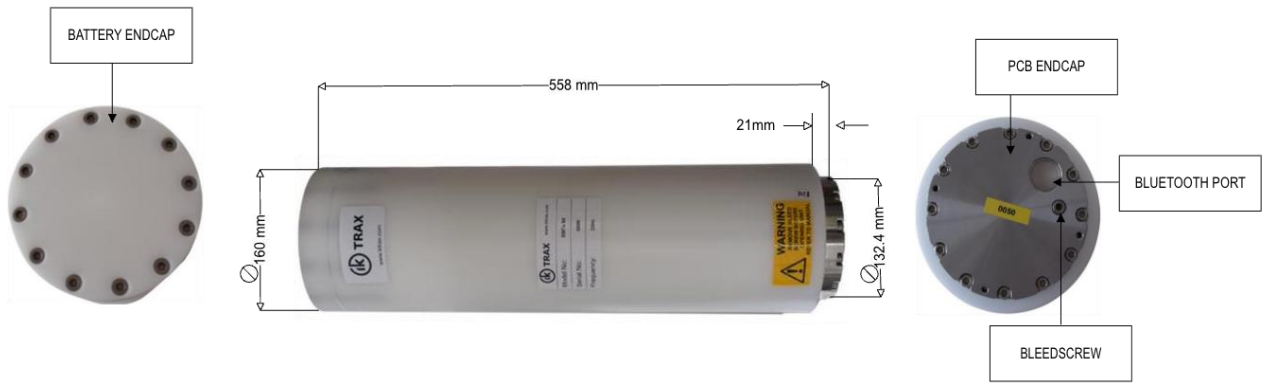
The EMTx50 EM Transmitter is an electromagnetic transmitter which can be used for pig tracking and locating functions. The transmitter operates effectively in buried pipelines, pipelines carrying gas or liquid and in pipeline bundles where acoustic transmitters are either less effective or ineffective.

The standard transmission frequency is 22.0Hz, however the frequency is factory and user programmable. An inherent EM null spot is detectable when an EM receiver antenna is at 90 degrees to and pointing towards the centre of the transmitter, allowing for centimetre accurate locating of the pig.

Pigging discs can be fitted directly to the transmitter, meaning the transmitter becomes the pig body. This dramatically increases the received EM signal as it no longer needs to propagate through the pig body in addition to the pipeline

Using the IK Trax EMTx Config application (Windows or Android) the transmitter frequency, power and pulse pattern can be configured to optimise performance and battery life.

The EMTx50 transmitter produces a very strong signal which can be detected through even the heaviest pipeline walls. Received signal strength is dependent on several factors including pipeline diameter, pipeline material, pig design, pig speed, transmitter configuration, receiver equipment and background electromagnetic noise levels. Please contact IK Trax to discuss the most effective transmitter configuration.



1.1. IK TRAX SHORTCUT

IK Trax offers a comprehensive range of resources to support the operation and configuration of the EMTx 50 device. To make accessing these materials easier, we've provided a QR code that allows you to instantly connect to our online resource hub using any mobile device. Simply scan the QR code to explore detailed guides, troubleshooting tips, and other essential materials to help you get the most out of your EMTx 50.

1.2. ENDCAP OPTIONS

All EMTx50 transmitters come fitted with PCB and Battery Endcaps as standard. The PCB Endcap incorporates a Bleedscrew and Bluetooth test port as a standard.

2. OPERATION

The following instructions are for a unit fitted with the standard Battery Endcap and PCB Endcap.

⚠ **WARNING**: The Special Conditions for Safe Use as detailed in Appendix C must be always followed. Familiarise yourself with all the rules for the safe operation of this equipment as described in Appendix B

2.1. TOOLKIT

The following tools are provided to perform the endcap removal.

Spanner

M6 Allen key

M8 Allen key

2.2. TURNING ON

Refer to the image below to identify the PCB endcap on the transmitter. Once located, use the same image to find the bleedscrew on the endcap.

To power on the transmitter, use an M6 Allen key to tighten the bleedscrew until it is flush with the PCB endcap.

Note: very little torque is required. Damage may occur if over tightened. The transmitter takes approximately 15 seconds to turn on.

2.3. TURNING OFF

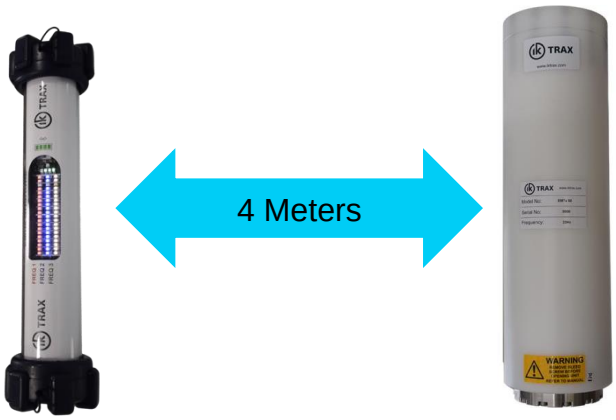
To turn off the transmitter, use an M6 Allen key to remove the bleedscrew from the PCB endcap. The transmitter should power off immediately.

Use an EM receiver such as the IK Trax EMRx Ex to confirm that the transmitter has turned off.

2.4. FUNCTION TEST

To receive the signal from the transmitter, an EM receiver is required. For optimal performance, it is recommended to use the IK Trax EMRx receiver. Refer to the EMRx manual for instructions on setup and operation.

1. Place the EMRx receiver antenna approximately 4m away and parallel to the transmitter.



2. Confirm that the received signal frequency and pulse rate are as expected.

3. If all results were as expected, then the system is functional.

3. CONFIGURATION

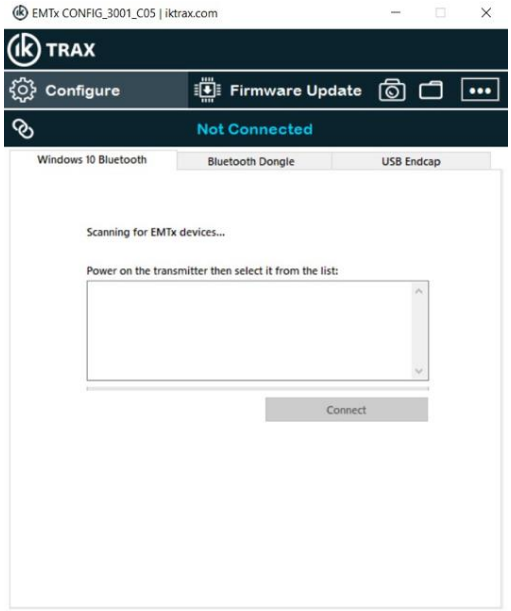
An EM Transmitter has configurable parameters that can be changed via a Bluetooth connection using either the EMTx CONFIG for Windows app or the EMTx CONFIG for Android app. Ensure that the laptop/desktop computer or Android mobile phone/tablet has Bluetooth turned on and that all devices are discoverable. If the laptop/desktop does not have built in Bluetooth, a USB Bluetooth dongle can be used; see the EMTx CONIG manual for more details. The following section assume built in Bluetooth in Windows 10 (or 11).

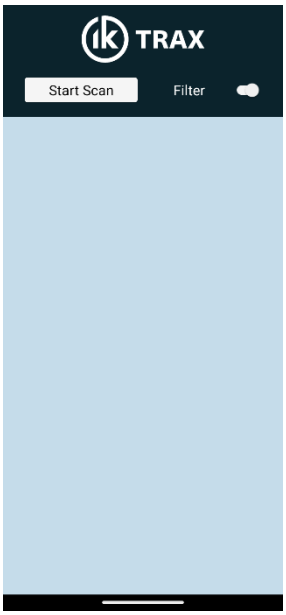
The windows app is available for download from the company website via this link.

In addition, the following QR code provides quick access to the IK Trax resource hub.
It includes shortcuts to manuals, application downloads, and other essential materials.

3.1. EMTX CONFIG FOR WINDOWS OR ANDROID

Launch the Android or Windows app.





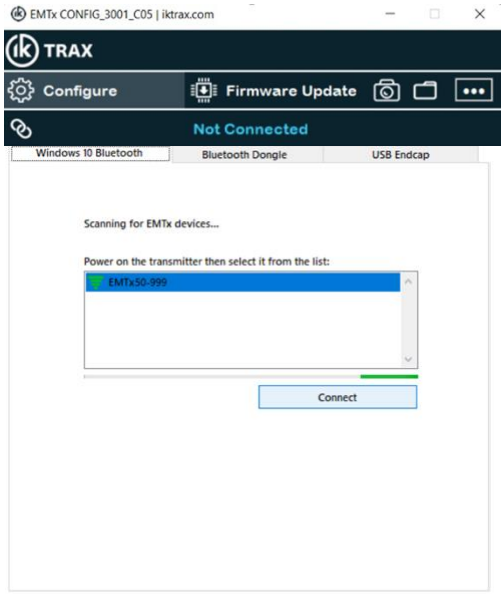
Refer to the image below to identify the PCB endcap on the transmitter. Once located, use the same image to find the bleedscrew on the endcap.

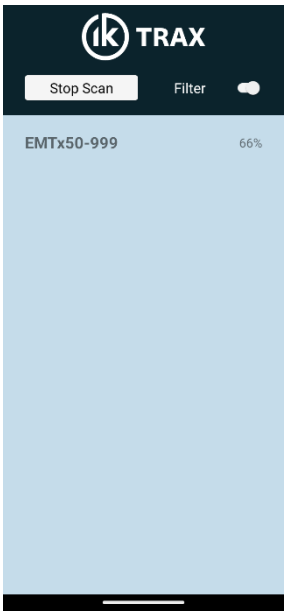
To power on the transmitter, use an M6 Allen key to tighten the bleedscrew until it is flush with the PCB endcap.

Note: very little torque is required. Damage may occur if over tightened.

Once the transmitter is switched on, On Android app press “Start Scan” button to initialize the Bluetooth scan. It is not necessary to press anything on Windows app as the scanning happens automatically.

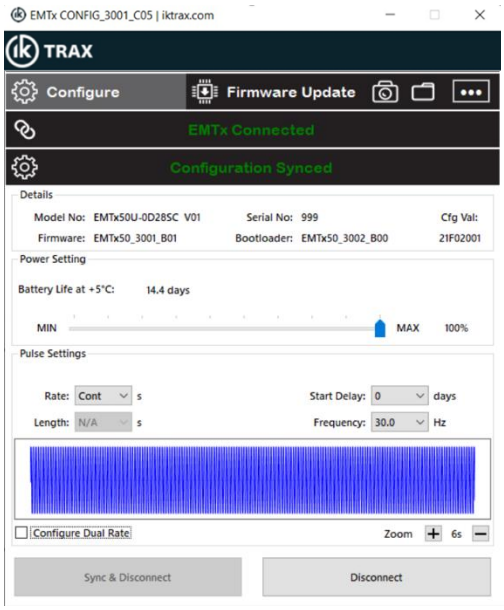
The transmitter should then appear in the scanned list. Tap on the device name in the list on Android, or the “Connect” button on Windows to proceed.





NOTE: The Bluetooth is discoverable only for 15 seconds so be aware that you may have to repeat this process if it doesn’t connect.

On the Windows app proceed to make the required changes, then press “Sync & Disconnect” to send the new configuration to the device, the app will then disconnect.



After making any changes to the configuration in the Android app, the “Sync” button will change colour to red. Click it to send the updated configuration to the device. Once the process is complete and the button returns

to its original colour, the new configuration has been successfully sent. You can then disconnect from the device by clicking the “Disconnect” button.

Once Disconnected from the transmitter it will start transmitting as per new configuration.

3.2. DEPLOYMENT

Before each deployment ensure that the following checks have been completed.

1. Ensure that the transmitter has been installed as detailed in Appendix C: Installation.
2. Visually inspect all system components to ensure that they are secure and undamaged.
3. Refer to Appendix D of this manual for the expected battery lifetime and ensure that it is adequate for the planned operations.
4. Activate the transmitter. (page 5)
5. Perform a function test. (page 6)

4. MAINTENANCE

⚠ **WARNING**: The Special Conditions for Safe Use as detailed in Appendix C must be always followed. Familiarise yourself with all the rules for the safe operation of this equipment as described in Appendix B

The EMTx50 EM transmitters are designed to require minimum maintenance. The transmitter should be cleaned using fresh water and cleaning agents as necessary (e.g. WD40). Do not use chemicals which could cause damage to the housing or O-rings.

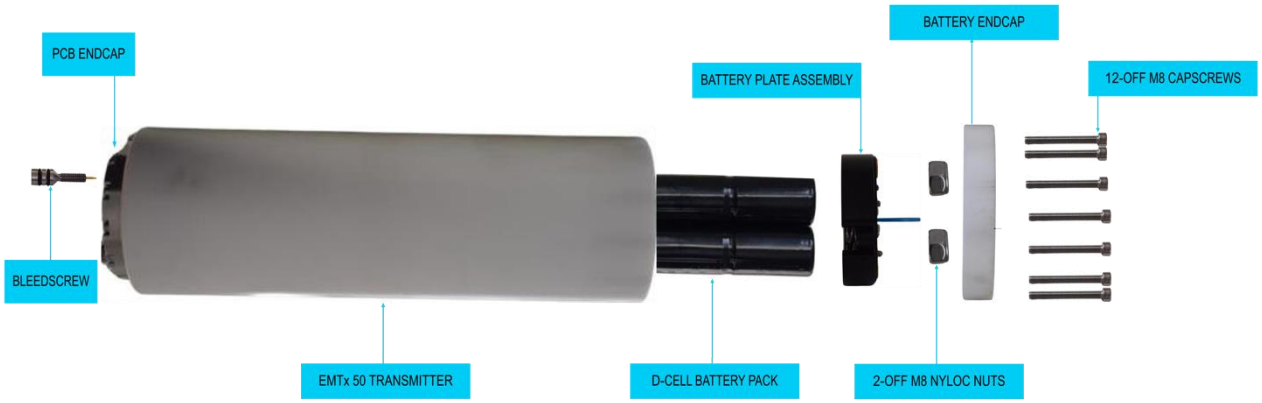
Check screw threads on the housing body and endcaps for signs of corrosion or damage. If badly pitted or damaged, consult IK Trax for advice on replacing the relevant part.

All parts which are replaced must be in accordance with the manufacturers’ specifications. Failure to use such components may invalidate the warranty and may make the equipment dangerous.

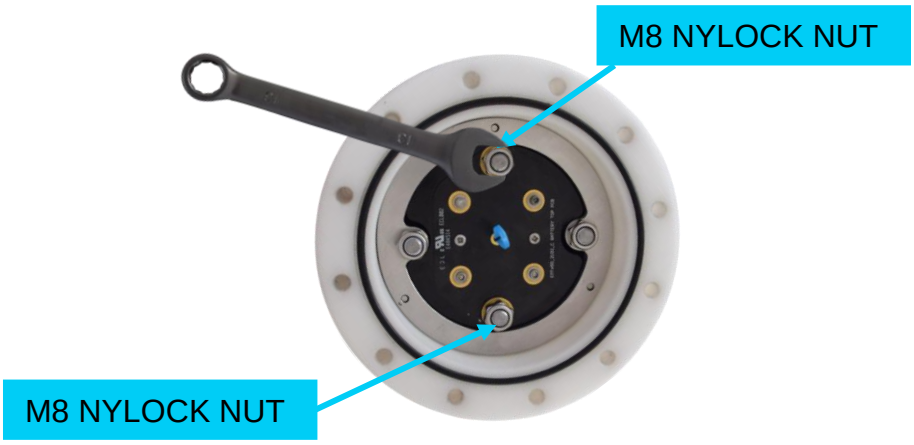
IK Trax can supply redress kits containing a complete set of replacement battery packs, O-rings, O-ring grease and thread lubricant, contact IK Trax for more information.

4.1. BATTERY REPLACEMENT

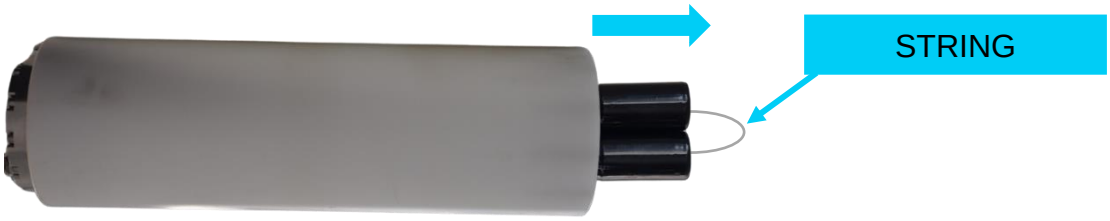
⚠ **WARNING**: The Special Conditions for Safe Use as detailed in Appendix C must be always followed. Familiarise yourself with all the rules for the safe operation of this equipment as described in Appendix B.



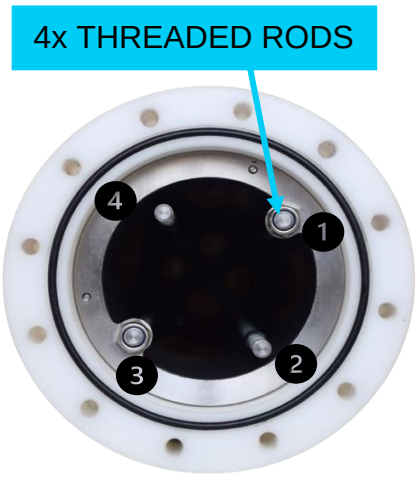
Remove the BLEEDSCREW from PCB endcap using an M6 Allen key to turn off transmitter. Then remove BATTERY endcap by removing 12-off M8x70 Cap screws using an M8 Allen key.



Remove 2-off TYPE A NYLOC NUTS from the BATTERY PLATE ASSEMBLY as shown above and then remove the BATTERY PLATE ASSEMBLY from the transmitter.

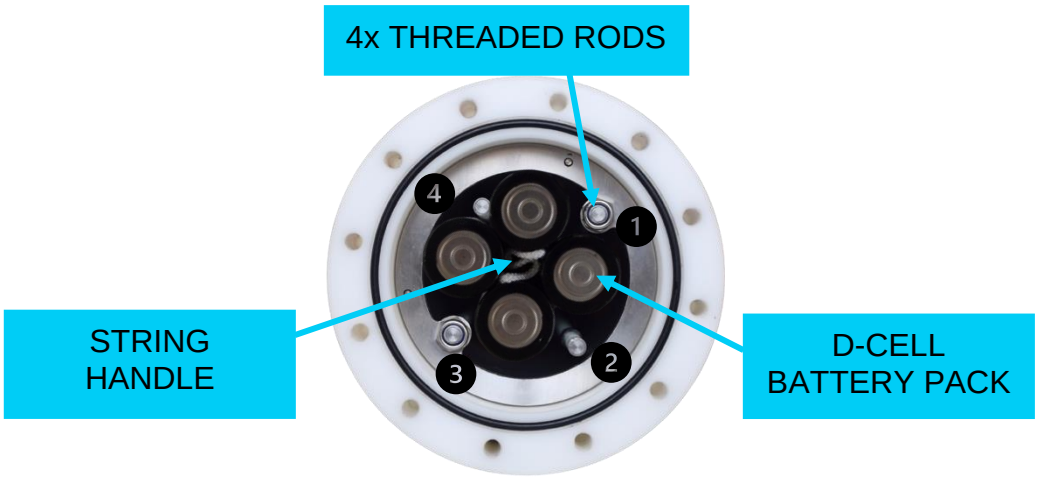


Remove D-CELL BATTERY PACK from the transmitter by use of the string handle on the battery pack.

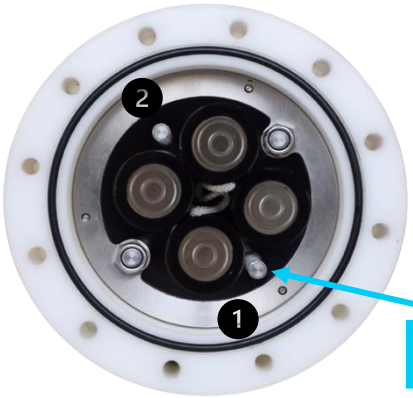


Ensure that the M8 RODS do not rotate/become free during this process. Contact IK Trax immediately if this occurs.

Observing correct battery pack orientation (string handle at free end of transmitter), insert new D-CELL BATTERY PACK into the transmitter until its butted against D-cell springs at the bottom of the transmitter. Note that the 4x slots on the battery pack align with 4x M8 rods in the transmitter.



Once D CELL BATTERY PACK is installed, ensure when looking into the open end of the transmitter with the string handle is available for removal for future battery replacements.

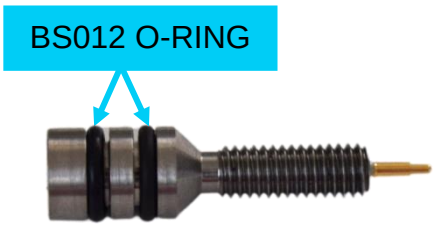


2x M8 RODS

Slide BATTERY PLATE ASSEMBLY into the transmitter with the holes engaging the inner M8 Rods (a black section of heat shrink can be seen on these rods only) and secure with 2-off M8 NYLOC NUTS

Examine the O-ring seal on the transmitter for any signs of contamination or damage, replace and/or re-grease if necessary.

Referring to the figure below, remove all O-rings and clean all sealing surfaces on all parts.



Examine all surfaces for signs of corrosion, scoring, and other damage. If there is excessive damage the mechanical parts may need to be replaced.

Lightly grease all sealing surfaces and O-ring using a suitable grease (e.g. DOW CORNING MOLYKOTE 111 COMPOUND).

Apply a small amount of an oil-based thread lubricant such as “Blue Goop” to the BLEEDSCREW threads.

Secure the BATTERY endcap to the transmitter with 12-off M8x70 Capscrews.

Once assembled the transmitter is ready for operation.

5. STORAGE

Familiarise yourself with all of the rules for the safe operation of this equipment as described in Appendix B.

If the transmitter is to be placed in storage for a long period of time remove the batteries from the transmitter and store separately.

As a minimum the BLEEDSCREW must be loosened 5 full turns to switch the transmitter off.

6. DISPOSAL OF UNIT

IK Trax 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, IK Trax 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 separately collected 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 possibility 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
Doing business as IK Trax
Blackburn Business Park
Woodburn Road
Blackburn
Aberdeen
AB21 0PS
UK

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

7. WARRANTY

IK Trax products are guaranteed for one year from the date of purchase. Goods should be returned transportation prepaid to IK Trax.

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.

8. SAFETY INSTRUCTIONS

SPECIAL CONDITIONS FOR SAFE USE:

1. Only use a new IK Trax D-CELL BATTERY PACK.
2. The battery pack must be installed into the enclosure in accordance with Appendix C.
3. Where used, the bleed screw must be tightened to a torque between 4Nm and 8Nm. Do not exceed 8Nm.

APPENDIX A: SPECIFICATIONS

NOTE THAT THE SPECIFICATIONS BELOW ARE VALID FOR THE STANDARD CONFIGURATION ONLY. REFER TO PAGE 1 OF THIS MANUAL FOR THE CONFIGURATION INFORMATION SPECIFIC TO THE TRANSMITTER BEING USED.

Battery Type…… Alkaline D Cell Pack

Frequency ..... adjustable 10Hz to 30Hz in 0.1Hz increments

Power .....adjustable 10% to 100% in 10% increments

Pulse length ..... adjustable 0.3 second to 1.0 second in 0.1 second increments

Pulse rate .....adjustable 1 second to 10 seconds in 1 second increments

Temperature range…….-20°C to + 50°C (-4°F to + 122°F)

Bump rating 20G

Housing and Battery Endcap material ..... Copolymer Ertacetal C

PCB Endcap material .....316L Stainless Steel

O-ring material .....NBR70 & NBR90

Transmitter weight in (including batteries).....24kg (52.9lbs)

Length 558mm

External pressure rating in..... 153bar (2200psi)

Lifetime in other configurations..... See APPENDIX D: APPENDIX D: BATTERY LIFETIME

EMTx50 predicted lifetimes (days), 0.4s pulse length, +5°C

Power Setting	Cont.	1 sec	2 sec	3 sec	4 sec	5 sec
100% (2400mVpp)	14.4	36.8	73.6	110.4	147.2	184

APPENDIX B: OPERATION WARNINGS

⚠ **WARNING**: The Special Conditions for Safe Use as detailed in section 8 must be followed at all times.

⚠ **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 IK Trax 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 IK Trax immediately if there is a suspicion that the equipment has become pressurised.

⚠ **WARNING**: USE ONLY IK Trax new Alkaline D Cell battery Pack. ALWAYS observe correct battery polarity. A new battery pack should be installed before each deployment.

⚠ **WARNING**: Do not expose to aggressive solvents or chemicals which could be harmful to the HOUSING, O-RINGS, CONNECTORS or any other parts of the equipment.

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

⚠ **CAUTION**: To prevent the formation of condensation within the transmitter, allow the transmitter 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.

APPENDIX C: INSTALLATION

⚠ **WARNING**: The Special Conditions for Safe Use as detailed in SECTION 8 must be always followed.

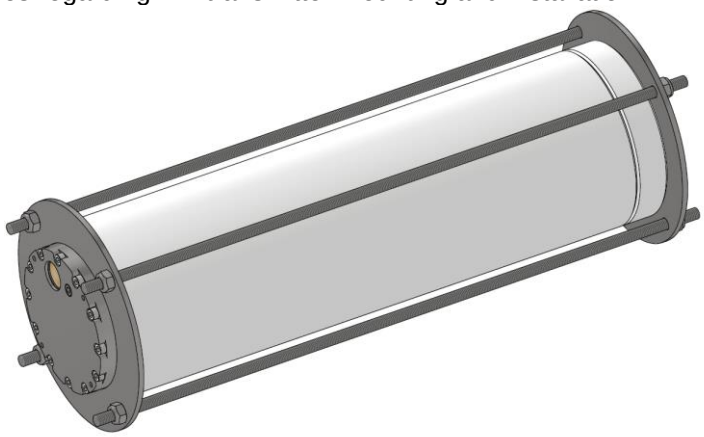
⚠ **WARNING**: The transmitter must be mounted in such a way that no movement or vibration is possible whatsoever (e.g. clamped). If the transmitter is allowed to rattle and/or vibrate within the pig then the resultant hammering effect can exceed the bump rating of the transmitter leading to damage and/or failure. This is particularly important in gas pipelines.

⚠**CAUTION**: 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 and leaving 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.

⚠ **CAUTION**: 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 and leaving 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. 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 (µΩ.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

For optimum performance the transmitter should be clamped inside a plastic pig body. A alternative mounting arrangement is shown below. It uses several lengths of threaded studding to clamp the transmitter between two plates. The advantage of this arrangement is that it has limited amounts of metal around the transmitter and will therefore have limited effect on the transmitter performance. Please contact IKTRAX for further information and guidelines regarding EM transmitter mounting and installation.



⚠ **CAUTION**: In extreme circumstances strong magnets in close proximity to EM transmitters may dramatically impact signal and lifetime. Where possible maintain a separation of at least 200mm between the EM transmitter and any magnets

APPENDIX D: BATTERY LIFETIME

The operating temperature at which the transmitter is used alters the operating lifetime with colder temperatures typically shortening achievable lifetime.

Transmitter frequency effects lifetime because pulse lengths are restricted to a whole number of cycles of the transmitter frequency. The lifetimes stated in this manual are all at 22.0Hz unless stated otherwise and will not vary by more than 10% at other frequencies. The EMTx Config Windows and Android applications include the effects of frequency in their lifetime predictions.

In extreme circumstances the transmitter operating lifetime may be reduced by how the transmitter is installed on a pig. Refer to section APPENDIX C: **Error! Reference source not found.** within this manual for tips on how to achieve optimum performance from the transmitter with regards to the mounting arrangement.

The tables below show predicted lifetimes for a range of configurations. The mVpp values show the predicted signal received in open air at 1m with IK Trax reference antenna.

Please contact IK Trax to discuss any project specific requirements.

EMTx50 predicted lifetimes (days), 0.4s pulse length, +5°C						
Power Setting	**Cont.**	**1 sec**	**2 sec**	**3 sec**	**4 sec**	**5 sec**
100% (2400mVpp)	14.4	36.8	73.6	110.4	147.2	184
50% (1600mVpp)	28.9	73.6	147.2	220.7	294.3	367.9
20% (960mVpp)	72.2	184	367.9	551.9	735.8	919.8

EMTx50 predicted lifetimes (days), 0.4s pulse length, +20°C						
Power Setting	**Cont.**	**1 sec**	**2 sec**	**3 sec**	**4 sec**	**5 sec**
100% (2400mVpp)	18	46	92	138	184	230
50% (1600mVpp)	36.1	92	184	275.9	367.9	459.9
20% (960mVpp)	90.3	230	459.9	689.9	919.8	1149.8