Enigma₅ User Manual



Enigma5 User Manual

ENIGMA5M ENIGMA5HYQ

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1. System Overview

Enigma 5m & Enigma 5HyQ are correlating noise logger which uses 4G/IoT communications to provide remote location of leaks in water distribution networks. Enigma5m/ Enigma 5HyQ is deployed in underground chambers and requires no costly above ground technology. Both transmit daily leak noise to the Atrium server. Correlation is performed on the sound files from many loggers to accurately locate leak positions. To enable accurate correlations a daily logger time synchronisation is carried out by a new patented technology.

- Rapid overnight identification of leaks
- Small size
- Histogram display of noise data
- Recorded audio data to aid remote leak identification

1.1 Loggers



All loggers have two SMA connectors for connection of the GSM and the radio signals. It is important that these aerials are connected the correct way around.

Logger characteristics

- Contain modem, either 4G or IoT modem. It is Nano SIM, which can be roam to the best available network in the installation area. For more information on the SIM and antenna options please contact Ovarro technical.
- High sensitivity sensor
- Submersible to IP68 at 4 meters for 4 weeks
- Lighter compact design and more recyclable components to reduce environmental footprint
- Battery compartment allows easy access for replacement
- Small size for fitting into underground chambers- no above ground installation required

OVARRO 2. Deployment

2.1 Installation

Enigma 5M are designed to be mounted on metal fittings within the water distribution network. A powerful magnet retains the logger on steel and iron fittings. Each logger should be mounted (preferably) vertically on a clean surface. The position should be adjusted for best acoustic coupling to the fitting. For most situations, it is recommended that the spacing between loggers is no more than 400 metres for metal or asbestos cement pipes.

Step 1: Lift chamber lid and inspect Step 2: Clean pipe/fitting Step 3: Attach magnetic logger

Step 4: Fit 4G aerial to

Step 5: Fit the FM Radio antenna to

Step 6: Ensure aerial/antenna are at the top of the chamber



For plastic pipes or larger diameter metal pipe (>400mm), this recommended to use Enigma 5HyQ. For plastic pipes, it is recommended logger distance at 400 to 650 metre. For large and metal pipes, it is recommended logger distance no more than 700 metres.

Step 1: Lift lid and clean chamber around fitting

Step 2: Shut off water at the installation fitting

Step 3: Install 1" socket at the fitting and tighten with pipe wrench

Step 4: Install hydrophone sensor at the fitting with provided washer, tighten with pipe wrench

Step 5: Turn the valve on and check leaking

Step 6: If leaking, check the connection again

Step 7: Bleed sensor valve on then off to ensure there is pressure

Step 8: Fit 4G aerial to

Step 9: Fit the FM Radio antenna to

Step 10: Ensure aerial/antenna are at the top of the chamber



2.2 Deployment

2.2.1 Centralised Logger Setting at Atrium

All the loggers will be pre-set from Atrium to reduce the configuration time in the field and prevent human error.

Step 1: Users log in to Atrium Leak hub.

Step 2: Users create group for a DMA and assign the loggers into the group.

Step 3: Set the Logger Configuration accordingly.

01 Paul Test E5 Timezone: Set accor	rding to your country	
Analytics Settings Correlation Enigma 5 Configuration LoggerVision		
File Editor Logger record time:	Set the logger logging	
Timezone time where the place	time where the place has the minimal usage	
or quiet, default is 2	am.	
Logger record time		
© 02:00 Frequency: Set the b	pest radio station for	
Frequency (76.0 - 108.0) time synchronisation	n	
88.5		
Recording length (seconds)	econds): Set the logging	
sample. Default is 1	5 seconds	
Noise Depth Noise Rate		
Noise depth	er of bits in each	
sample, default is 8.	Changing of depth will	
Radio Depth Radio Rate affect bit rate and fil	ie size	
8 + 3000 +	noice frequency or	
Save NOISE rate: Refer to	disturbances over time	
	uistoi bances over time,	
Radio denth: Numbe	er of hits in each radio	
audio sample, defau	Ilt is 8	
	ne 15 0.	
Radio rate: Refer to	radio audio frequency.	
default is 2000.		

Step 4: Upload the shape file and edit the pipe network. If the shapefile is not ready, skip Step 4.

Please refer to Atrium Leak hub user manual for pipe network editing

Step 5: Go to 2.2.2 for logger commissioning.

OVARRO 2.2.2 Enigma 5 Deployment App

The Enigma 5 Deployment app enables seamless, efficient logger management. With GPS-based tagging, real-time updates, and Bluetooth connectivity, it allows rapid deployment directly through the app – no communication module needed. Easily access historical data, sync with Ovarro's advanced Atrium analytic platform, and streamline data transfer for quick leak detection and response.



The app currently is only available in Google Playstore

A. Commision a logger with a pipe network

Step 1: Log into the app with account where the loggers are assigned to.

≡ Enigma5	ŧ
Pull down to refresh.	
PaulDemo1 Ovarro Cosham	
+ <u>Add new us</u>	ser

Step 2: Select the group/DMA be assigned from Atrium. Click "Deploy logger".

← Groups	:
Pull down to refresh.	
Recovery	
01 Paul Test E5 Loggers: 4 Active: 4 Refreshed: 10:32	
Deploy logger 🔍 Map	
1 assigned groups	
+ Create grou	P

Step 3: Connect the logger via Bluetooth or scan the logger barcode.



Step 4: Once connected, go to "Attach"tab, it will display the pipe network, current location and logger location which is appeared as green pin. Drag the logger onto a pipe end (yellow dot) by long pressing the logger.



Step 5: Select "Confirm" tab, then "Deploy logger". Wait until the logger commissioned successfully.



Version: 1.0

Step 6: Once the loggers done commissioned, press the back button on the device to go back to group page. Click "Map" button to view the deployment.

← Groups	:
Pull down to refresh.	
Recovery	
01 Paul Test E5 Loggers: 4 Active: 4 Refreghed: 10:32	
🔶 Deploy logger 🛛 🔍 🗣 Map	
+ Crea	ate group

Step 7: From the network, if there are loggers appeared as in grey color, meaning that the logger is in "deploying state". Wait for 10 mins for the logger to commission. During this time press the 'Refresh' button on the map to status. Check the logger pin has changed from grey to either red, orange or green.

- Green: deploy successfully
- Red: unable to retrieve the commission data
- Orange: unable to deploy

OVARRO B. Commission a langer without a pipe r

B. <u>Commision a logger without a pipe network</u>

Step 1: Log into the app with account where the loggers are assigned to.

Step 2: Select the group/DMA be assigned from Atrium. Click "Deploy logger"

Step 3: Connect the logger via Bluetooth or scan the logger barcode

Step 4: Once connected, go to "Attach" tab, it will display the current location and logger location which is appeared as green pin. Drag the logger by long pressing the logger to the desired location.

Step 5: Select "Confirm" tab, then "Deploy logger". Wait until the logger commissioned successfully.

Step 6: Once the loggers done commissioned, press the back button on the device to go back to group page. Click "Map" button to view the deployment.

Step 7: From the network, if there are loggers appeared as in grey color, meaning that the logger is in "deploying state". Wait for 10 mins for the logger to commission. During this time press the 'Refresh' button on the map to status. Check the logger pin has changed from grey to either red, orange or green.

- Green: deploy successfully
- Red: unable to retrieve the commission data
- Orange: unable to deploy

C. Retrieve logger status

Click the "info" button, check status is deployed, signal strength, battery level



OVARRO D. <u>Decommission a logger via the App</u>

- Step 1: Log into the app with account where the loggers are assigned to.
- Step 2: Select "Map" button on the group which has the logger you want to decommission.
- Step 3: Select the logger you want to decommission
- Step 4: Click "Update" tab
- Step 5: Click "decommission" button
- Step 6: Click "Refesh" and observe the logger is decommissioned as dark grey pin.

3. Analysis

The logger will send the audio sound file to cloud Atrium platform every day. Please refer to the Atrium Leak Hub User Manual for more detail on its use for analysing data.

4. Diagnostic

If the logger fails, please contact Ovarro support for further troubleshooting.

OVARRO Appendices

A. Specification

Sensor Specification	Enigma 5M	Enigma 5HyQ	
Sensor type	Integral accelerometer	External Hydrophone sensor	
Sensor Sensitivity	30V/g	-195 db	
Frequency range	1-2,500 Hz	1-2,500 Hz	
Attachment	Magnet Integral to sensor	1"BSP or NPT	
Measurement period	Multiple (user programmed)		
Resolution	8, 16 bit		
Type of Local Communications	Bluetooth		
Range	15 meters		
Programming	IOS or Android App		
Modem Type	4G (Cat-1Bis), IOT (Cat-1M), with 2G fall back		
SIMType	Nano SIM holder		
Transmission Frequency	Multiple depending on user programming		
Battery Type	Lithium Thionyl Chloride (non-rechargeable)		
Battery Operating Life	5 years (Based on a single send per day and dependent upon GSM signal strength and retries)		
Waterproof rating	Robust GRP enclosure to IP68 (tested to 4 meters, 4 weeks)		
Operating temperature range	-20 °C to 70°C		
Dimensions (without antenna)	128mm × 44 mm diameter	132mm x 44mm diameter	
Weight (without antenna)	291 grams	291 grams	
Correlation Result Data Retrieval	API		
Correlation Result Platform	Atrium operating on an internet browser (Chrome recommended)		
Correlation Result Data Storage	WAV files stored in Atrium Cloud		

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