



# AEInnova

ALTERNATIVE ENERGY INNOVATIONS

**INDUEYE® NETZERO BATTERY-LESS THERMOELECTRIC SELF-POWERED IOT SYSTEM  
FOR A MORE SUSTAINABLE AND ENERGY EFFICIENT INDUSTRY 4.0**

# WHO WE ARE?



AEInnova recognized as the most sustainable technology in EU (European Commission EU Innovation radar prize). Founded in 2014 by researchers of the Microelectronics department of the Autonomous University of Barcelona.

At AEInnova, we reduce maintenance costs while increasing productivity and profitability with minimal environmental impact. We develop a battery-free, heat-powered wireless sensor, ATEX/IECEX certified, for predictive maintenance, steam leak detection, and thermal monitoring.



Having the **European Commission and the EIT InnoEnergy as shareholders**, positions us in the market as a solution for the **future, trust and sustainability**



# CHALLENGES FOR THE INDUSTRY 4.0

## 1- Energy inefficiency

21% EU energy is lost in industrial waste heat



## 2 - Reactive / preventive Maintenance VS predictive maintenance

Machine is used to its limits until it breaks or a pre-established lifetime



- EXPENSIVE
- INEFFICIENT
- MANUAL INSPECTION / WIRED / BATTERY WIRELESS

## 3 - Steam leaks detection in steam-traps and valves

Reducing steam-trap losses unlocks major energy savings, lowers operating costs, and boosts overall plant efficiency.



- EXPENSIVE
- INEFFICIENT
- MANUAL INSPECTION / WIRED / BATTERY WIRELESS
- UNSAFE

## 4 - Furnace / kiln thermal monitor

Continuous furnaces suffer from hidden temperature imbalances that reduce efficiency, increase fuel consumption, and accelerate equipment wear.



- NOT CONTINUOUS
- MANUAL INSPECTION
- LATE TEMPERATURE DEVIATIONS DETECTION
- EQUIPMENT STRESS

# ACTUAL MARKET TECHNOLOGIES

## WIRED SENSORS

- **HIGH INVESTMENT**
- **COMPLEX CLOUD INTEGRATION**
- **LOW FLEXIBILITY**
- **DIFFICULT RETROFIT**
- **LOW ADOPTION IN BIG FACILITIES**
- **IDEAL FOR CRITICAL OPERATIONS**
- **REAL TIME**
- **EASY ATEX CERTIFICATION**



## BATTERY-POWERED WIRELESS SENSORS

- **HIGH ENVIRONMENTAL IMPACT (BATTERY)**
- **COMPLEX ON PREMISES / SCADA INTEGRATION**
- **DIFFICULT RETROFIT**
- **LOW RANGE WIRELESS (<20m)**
- **HIGH DATA LATENCY (EVERY HOUR / DAY)**
- **NEW TAXES COMING (BATTERY RECYCLING / CO2)**
- **COMMONLY NON ATEX CERTIFICATION**
- **MEDIUM MAINTENANCE COSTS (BATTERY REPLACEMENT)**
- **MEDIUM ADOPTION IN BIG FACILITIES**
- **MEDIUM INVESTMENT**
- **IDEAL FOR NON CRITICAL OPERATIONS**
- **HIGH FLEXIBILITY**



# AEINNOVA'S TECHNOLOGY

## THE BEST OF BOTH WORLDS BATTERY-LESS WIRELESS SENSORS

- **LOW INVESTMENT**
- **HEAT-POWERED OR 230V/110VAC OR 24VDC**
- **NO BATTERY / NO MAINTENANCE**
- **EASY CLOUD / PREMISES / SCADA INTEGRATION**
- **HIGH FLEXIBILITY**
- **EASY TO ADOPT IN BIG FACILITIES DUE TO LONG RANGE WIRELESS**
- **IDEAL FOR SEMICRITICAL AND NON-CRITICAL OPERATIONS**
- **QUASI REAL TIME / LOW LATENCY (DATA SERVED FROM EVERY 1 MINUTE)**
- **HIGH FLEXIBILITY**
- **ATEX / IECEX CERTIFIED**
- **NETZERO / LOW CARBON**
- **PREPARED FOR HEAT INTENSIVE INDUSTRIES**

# USE CASES / INDUSTRIAL SECTORS

**OIL&GAS  
&ENERGY**



**CHEMICAL&  
LUBRICANTS**



**IRON&STEEL**



**ALUMINUM**



**PAPER**



**RUBBER  
&TIRES**



**DARK WATER  
TREATMENT PLANTS**



**CEMENT**



**TEXTILE**



**PHARMA**



**SUBWAY&  
RAILWAYS**



Transports Metropolitans  
de Barcelona

**FOOD**



# 1 - SOLUTION FOR ENERGY INEFICIENCY

*Heat to electricity power generator for iloT. From 30°C Delta T. Up to 150°C and 1Wp power.  
Maintenance-free, ATEX / IECEX, CE, MIC, IP67 (Anatel / FCC in process)*



# 2- SOLUTION FOR PREDICTIVE MAINTENANCE MOTORS

Long-range wireless, battery-less, maintenance-free 3-axis vibration & temperature sensor

## InduEye Vibro 3

### WIRELESS IIOT + SENSOR (ALL-IN ONE)

Wireless Long range (Global Multiband LoRaWAN)

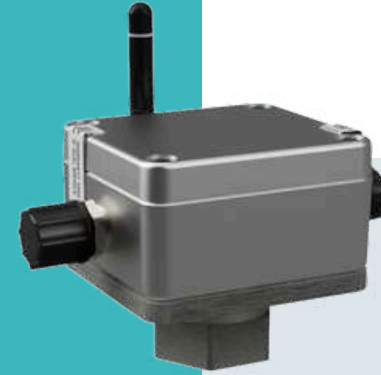
Ideal for unbalance / misalignments / bearing defects

No battery, no maintenance & data sent every minute

ATEX / IECEX / MIC / CE. FCC & Anatel ongoing

#### MULTI OPTION

- Velocity (RMS) and Acceleration (spectrum)
- High precision temperature PT100 (250°C)
- High spectrum Bandwidth 4KHz or 6 KHz, in all 3-axis
- High sampling rate (up to 16Ksps)
- Full FFT o WINDOWED every 10 minutes
- Waveform / Phase / Kurtosis / peak - peak / crest factor Q1/2026
- Powered by heat / 230/110VAC / 24VDC



LoRa



### SAVINGS

**25%**

Reduction in maintenance costs

**75%**

Elimination of breakdowns

**35%**

Reduction in downtime

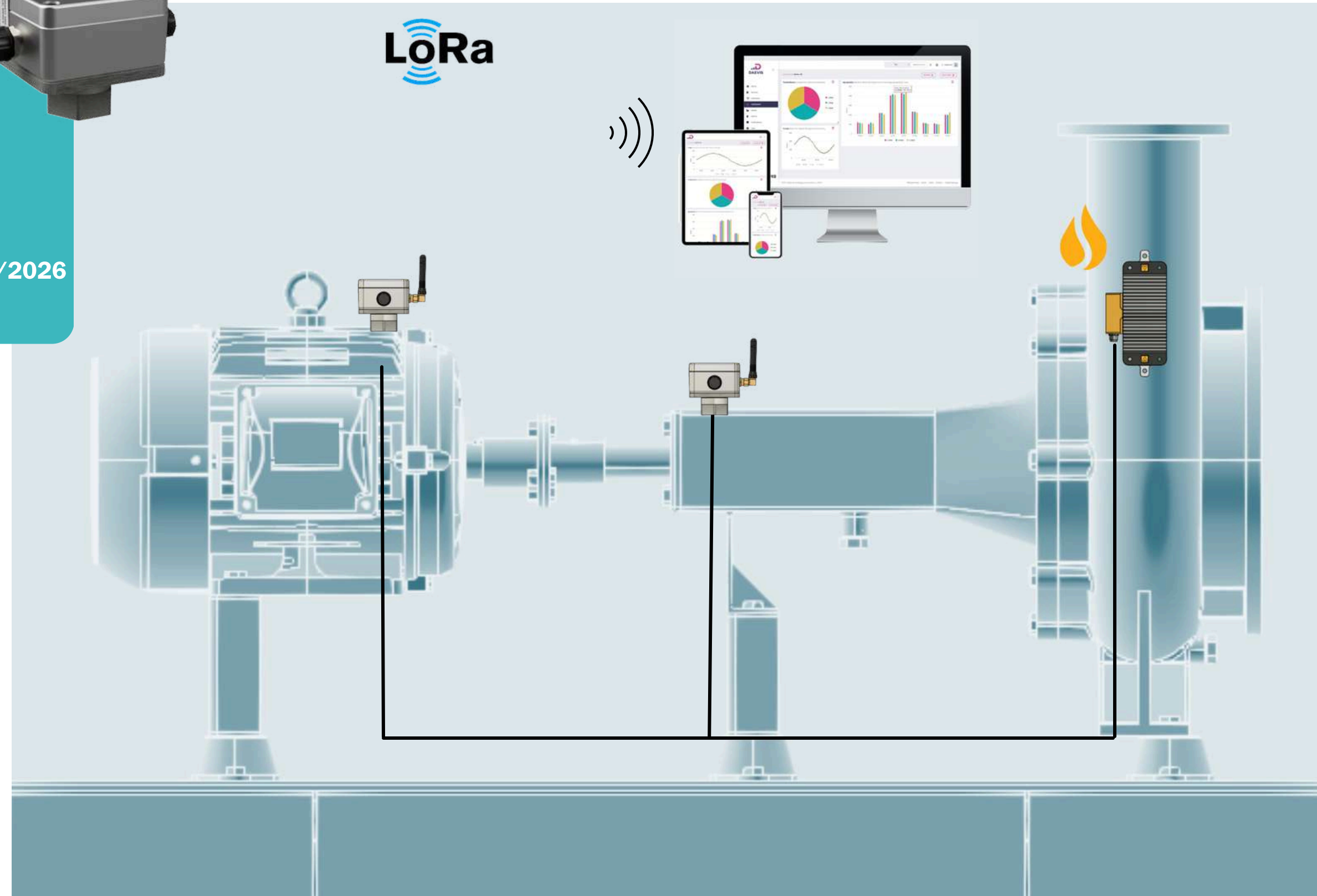
**25%**

Increase in productivity

**14%**

Reduce risks on:

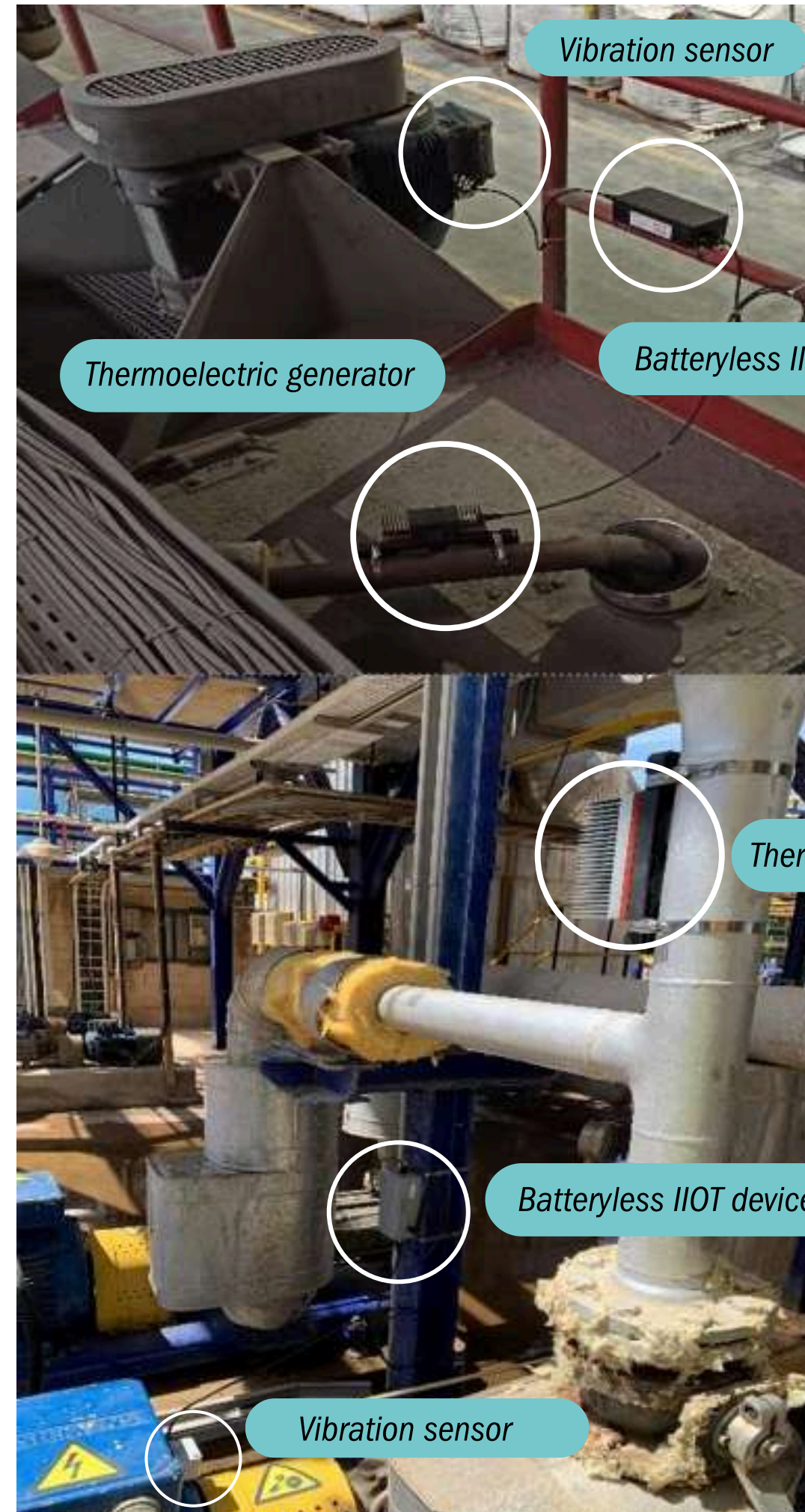
- Safety
- Health
- Environment
- Quality



# CHEMICAL INDUSTRY

## InduEye VibroSense 1

**VIBRATION MONITORING ON RECIRCULATION  
TURBINE AND PUMPS IN A CHEMICAL PRODUCTION  
PLANT**



Vibration sensor

Thermoelectric generator

Batteryless IIOT device

Thermoelectric generator

Batteryless IIOT device

Vibration sensor

# CEMENT INDUSTRY

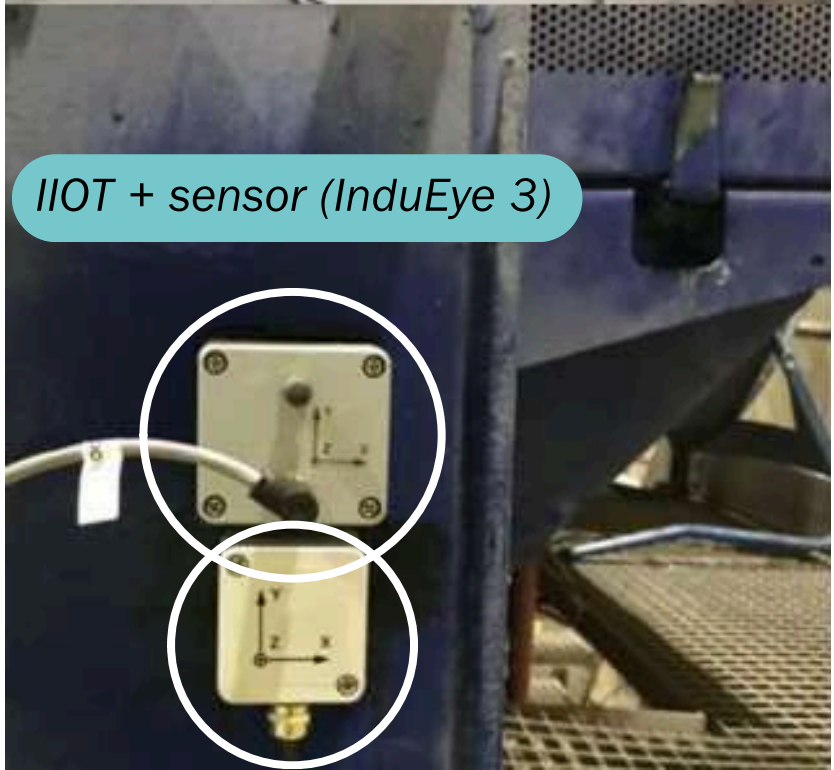
## InduEye VibroSense 1 - 3

### VIBRATION AND TEMPERATURE MONITORING IN MIXERS

Thermoelectric generator



Batteryless IIOT device (InduEye 1)



IIOT + sensor (InduEye 3)

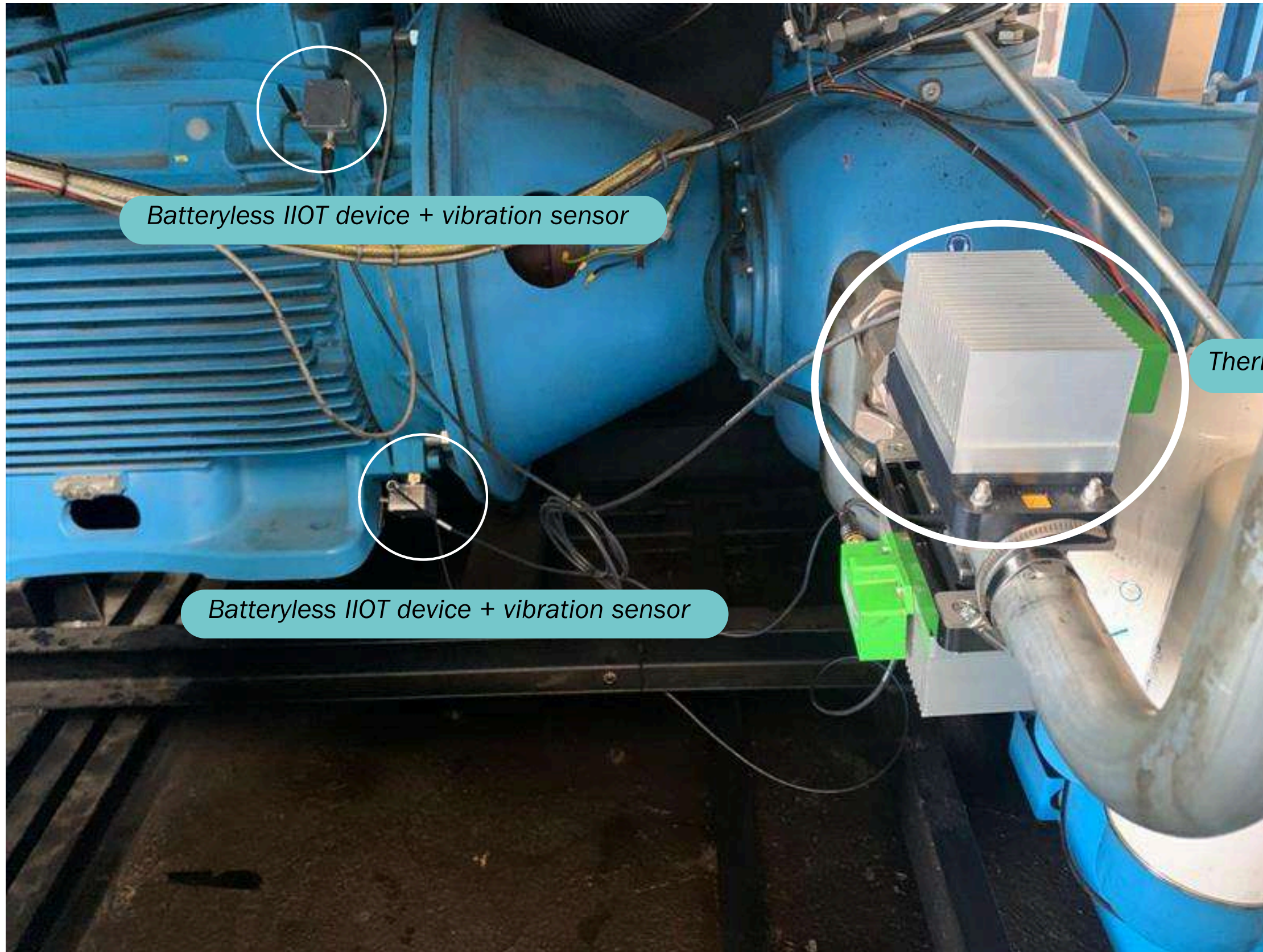


Vibration sensor (InduEye 1)

# FOOD INDUSTRY

## VIBRATION ON MIXER

## InduEye VibroSense 3



Batteryless IIOT device + vibration sensor

Batteryless IIOT device + vibration sensor

Thermoelectric generator

# DAEVIS

Powered by AEInnova

## Dynamic AEInnova VISualizer



SaaS platform for IIoT



Dynamic reporting



Customizable alarms (email...)



Machine learning



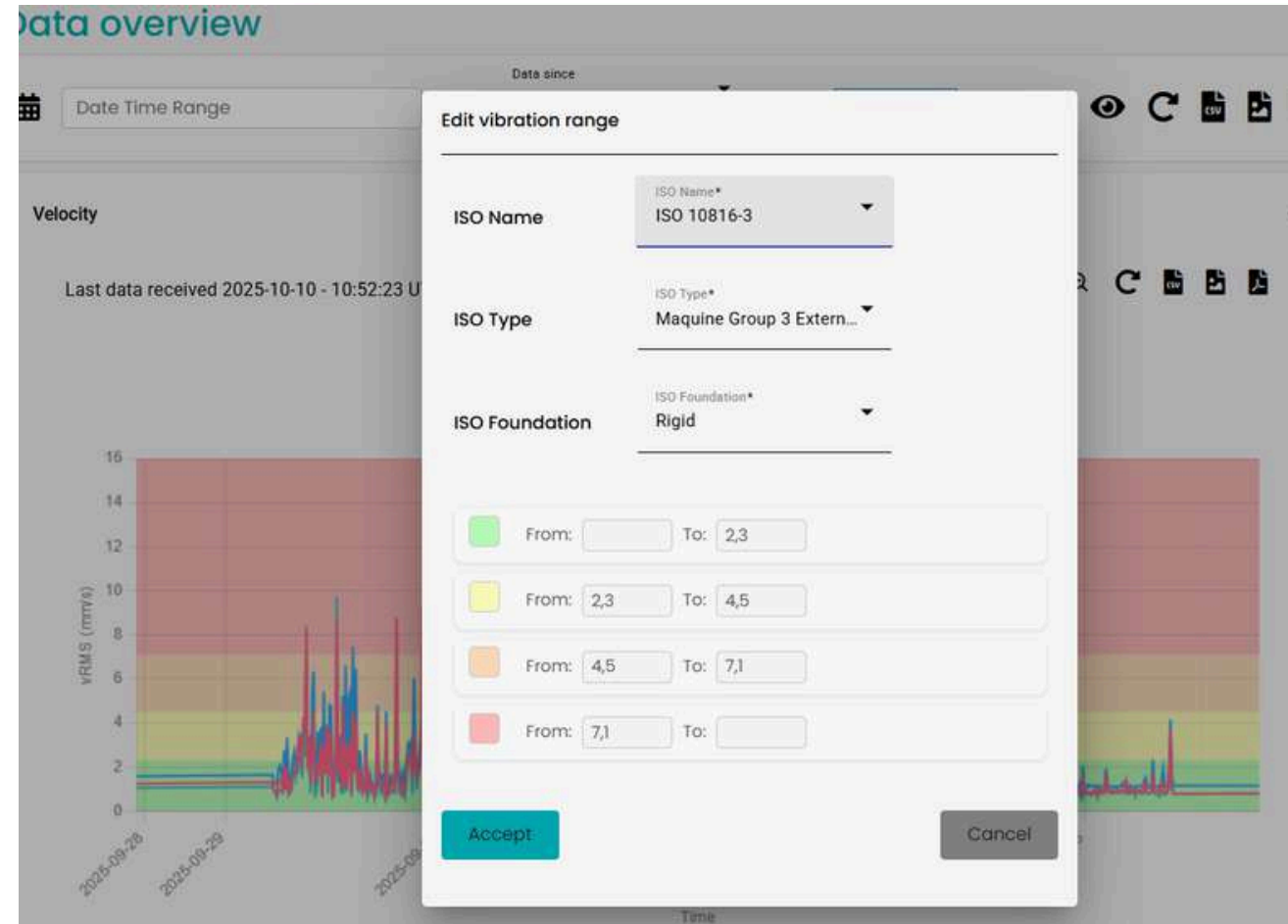
SCADA integration (MQTT, OPC-UA, Modbus-TCP/IP)



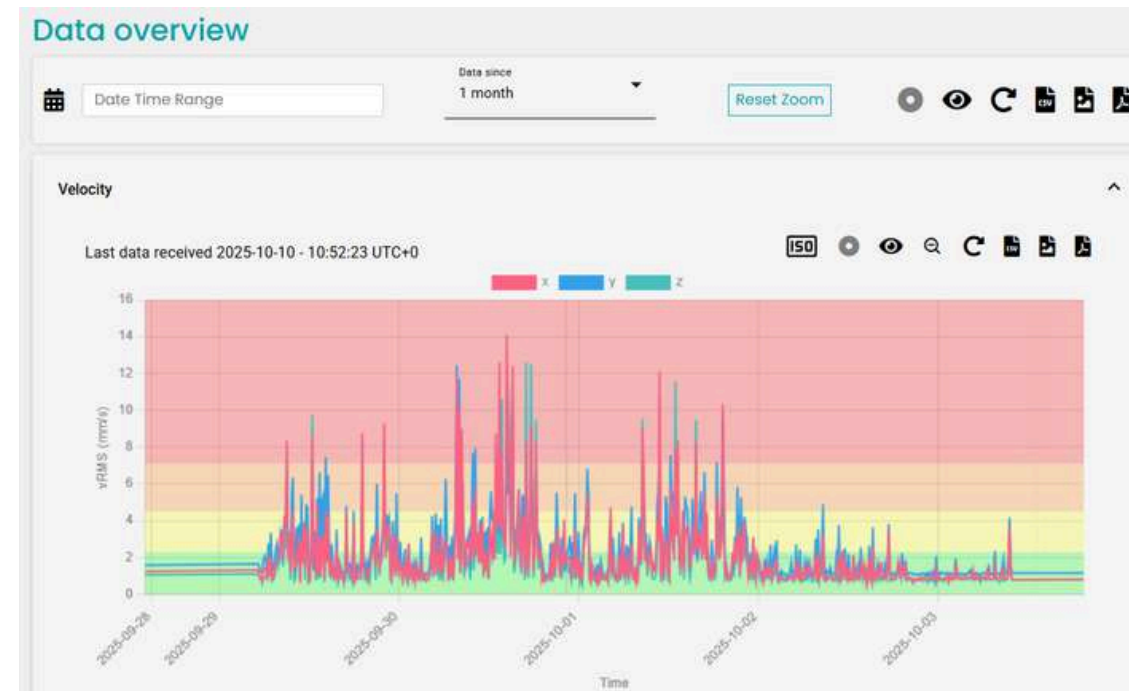
Best cost-to-value

# THE CLOUD PLATFORM

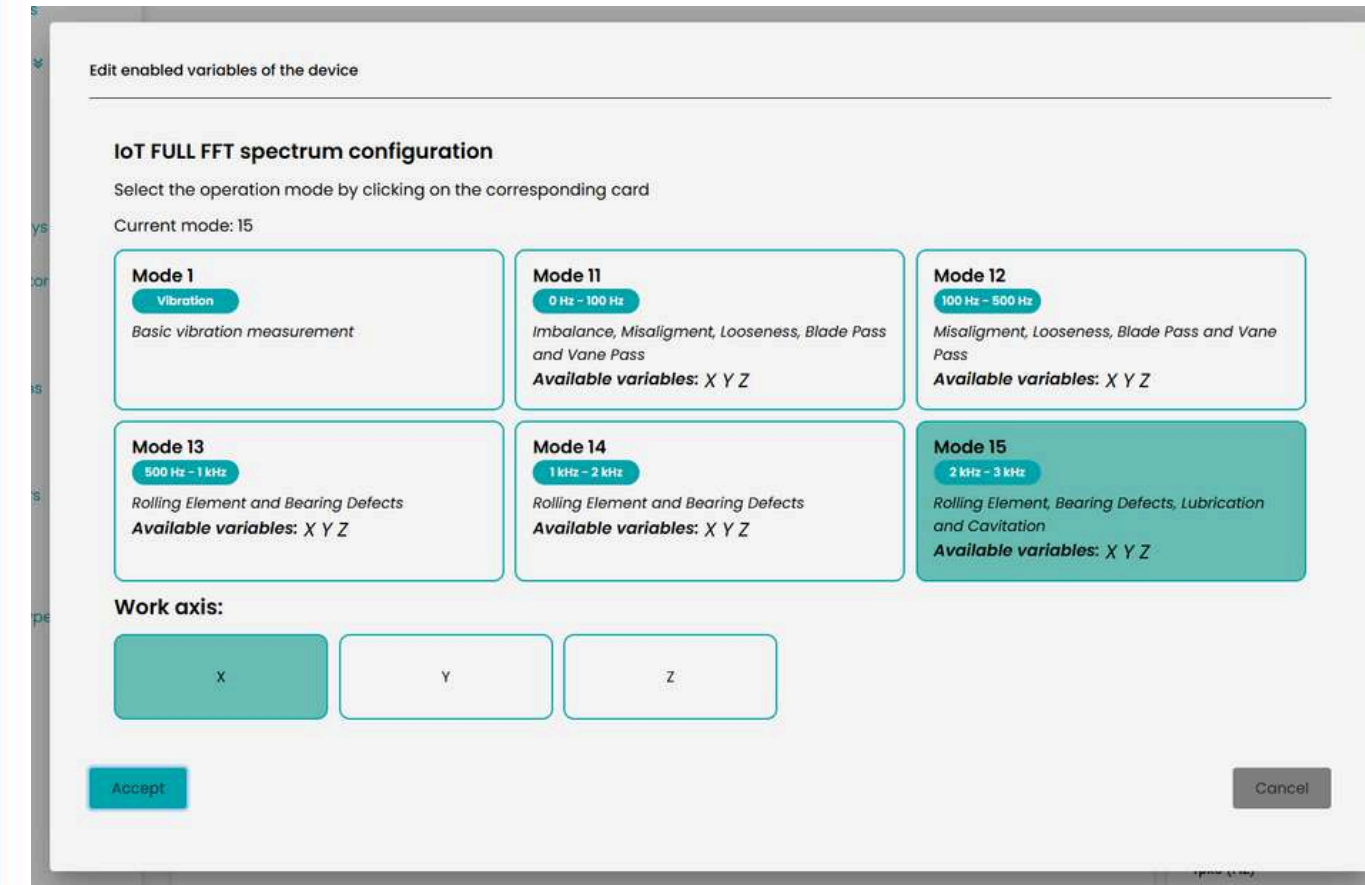
Example for vibration monitoring with spectrum (predictive maintenance)



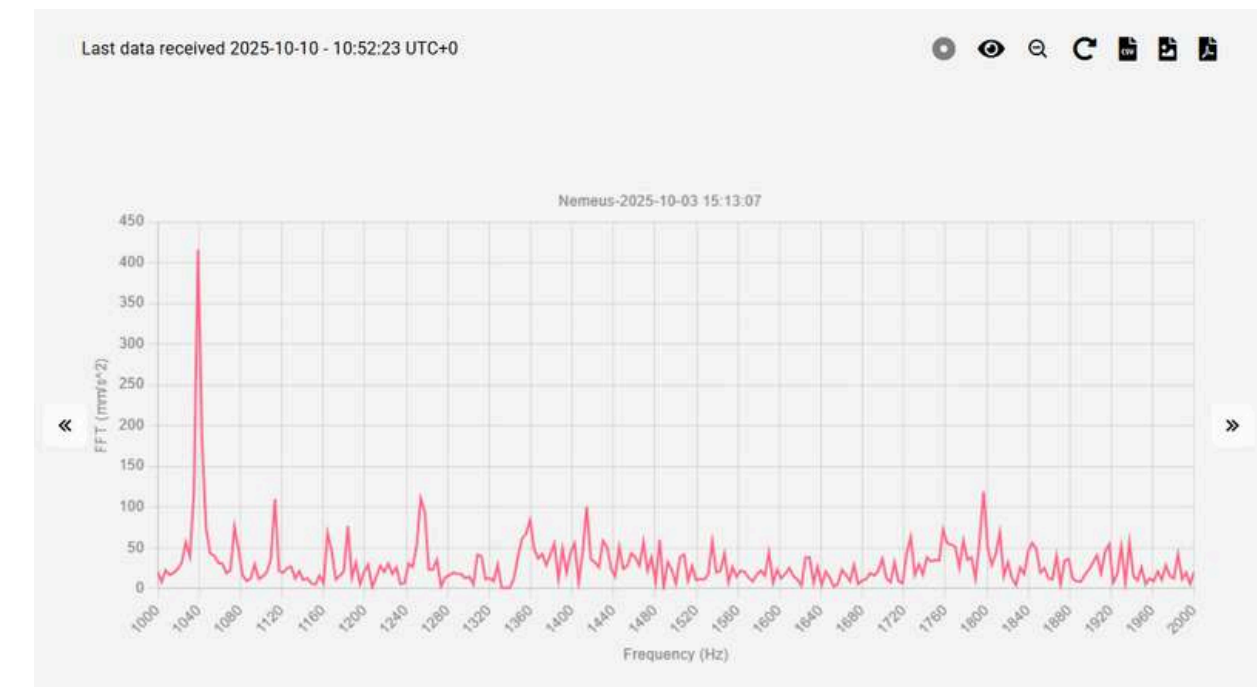
Iso 10816 Setup



Real-time control of the asset



Full spectrum (FFT) for a precise machine malfunction analysis

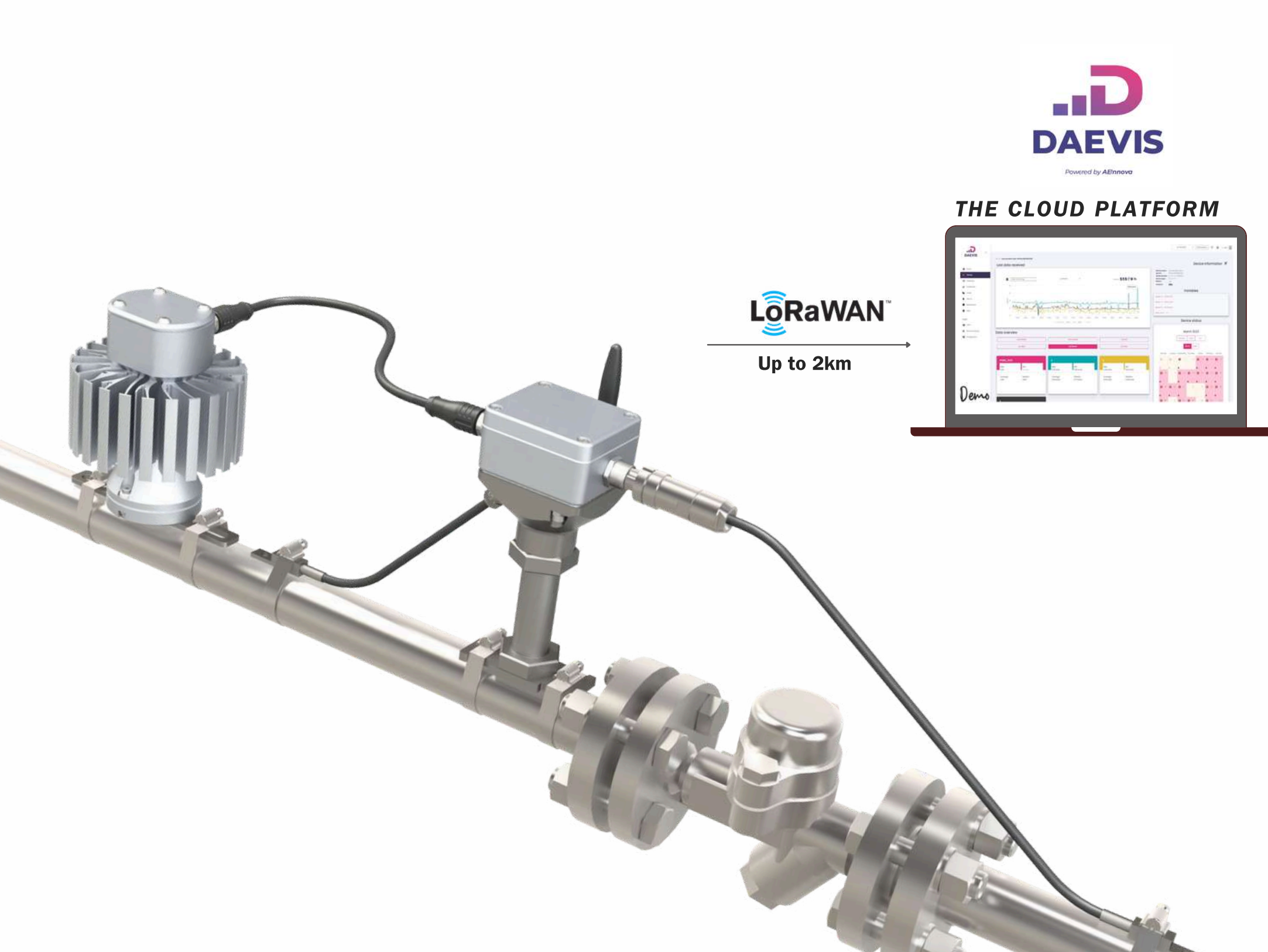


Detailed spectrum visualization

# 3 - SOLUTION FOR STEAM LEAKS DETECTION

Long-range wireless, heat-powered, battery-less, maintenance-free ultrasound acoustic and bi-temperature multi-sensor

## InduEye TempSense & LeakSense



### WIRELESS IIOT + SENSOR (ALL-IN ONE)

Wireless Long range (Global Multiband LoRaWAN)

No battery, no maintenance & data sent every minute

Thermoelectric upto 200°C

ATEX, IECEX, CE. FCC & Anatel in Q1/2026

- High precision temperature PT100 (250°C)
- High spectrum Bandwidth Up to 40KHz
- High sampling rate (up to 120Ksps)
- Spectrum RMS / N° of counts per minute ...
- Peak to peak / crest factor in Q1/2026
- Powered by heat / 230/110VAC / 24VDC

### SUITABLE FOR:

- Steam leaks detection in steam traps.
- Valves / Oil leaks in hydraulic pistons.
- Early bearing defects/lack of lubrication.
- Electric motors / pumps / compressors.

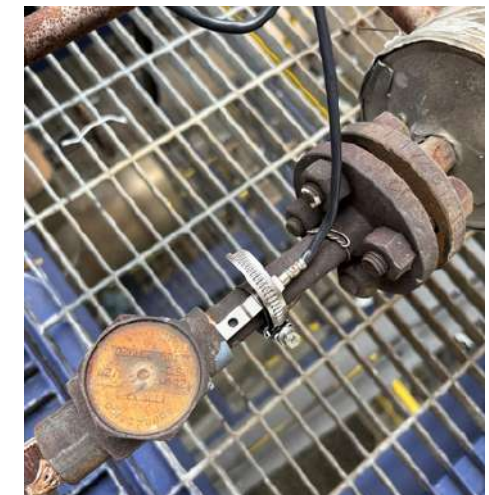
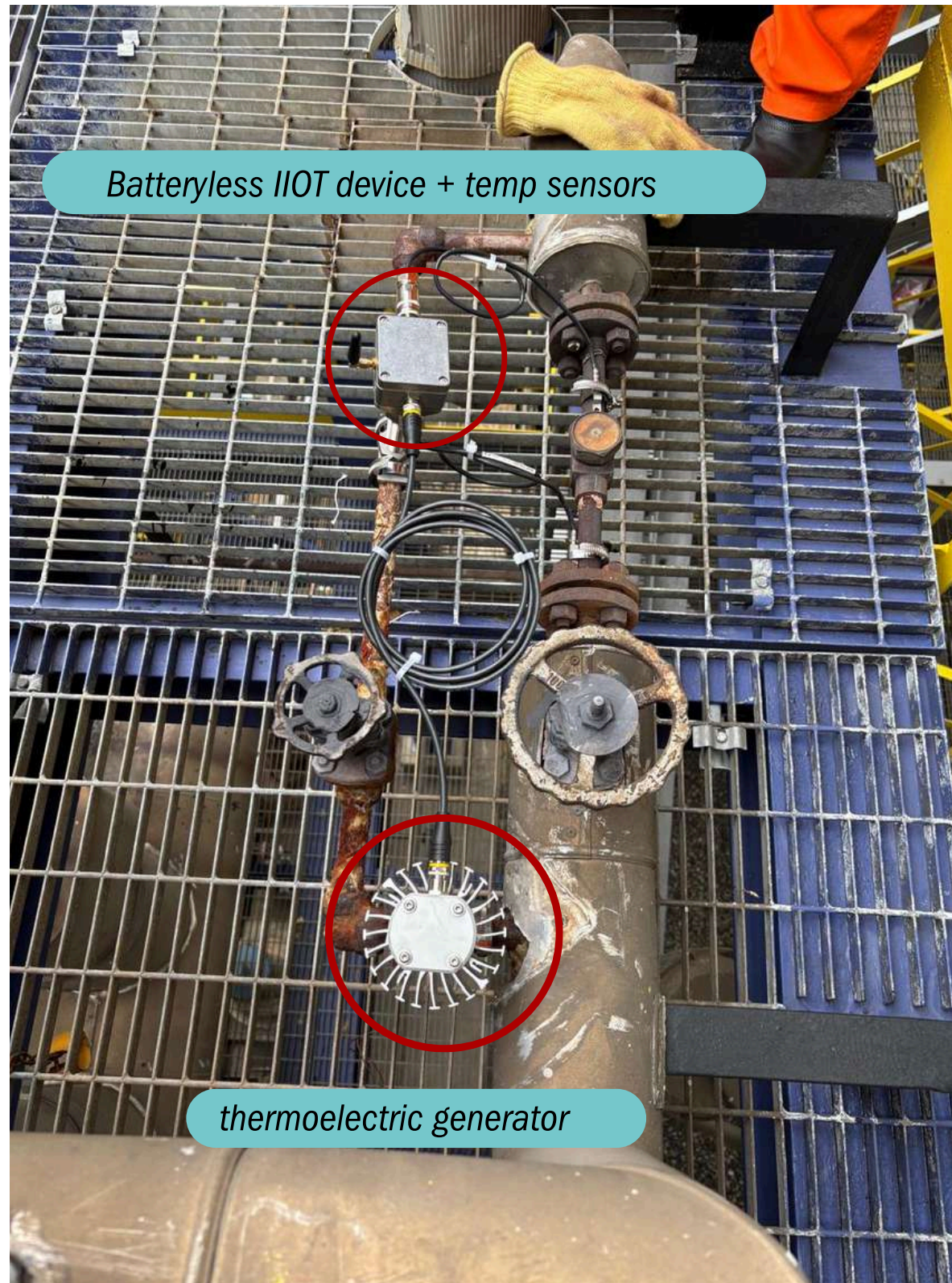
# OIL REFINERY

## InduEye TempSense

### SCENARIO 1

High **precision** and accuracy:

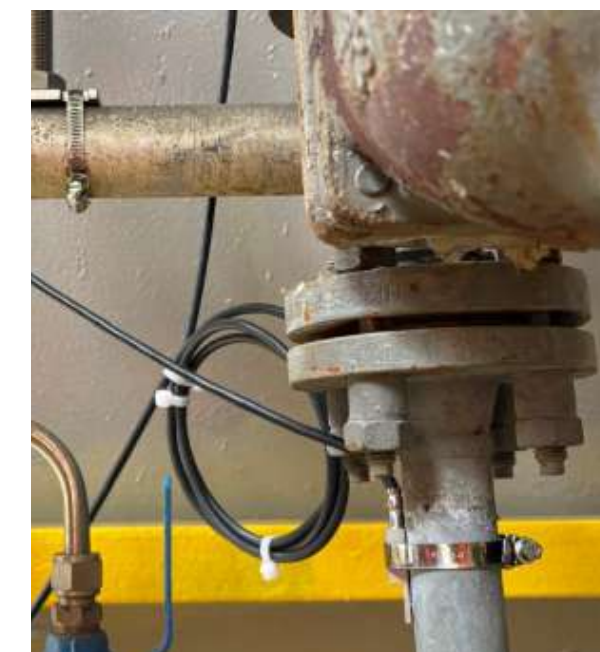
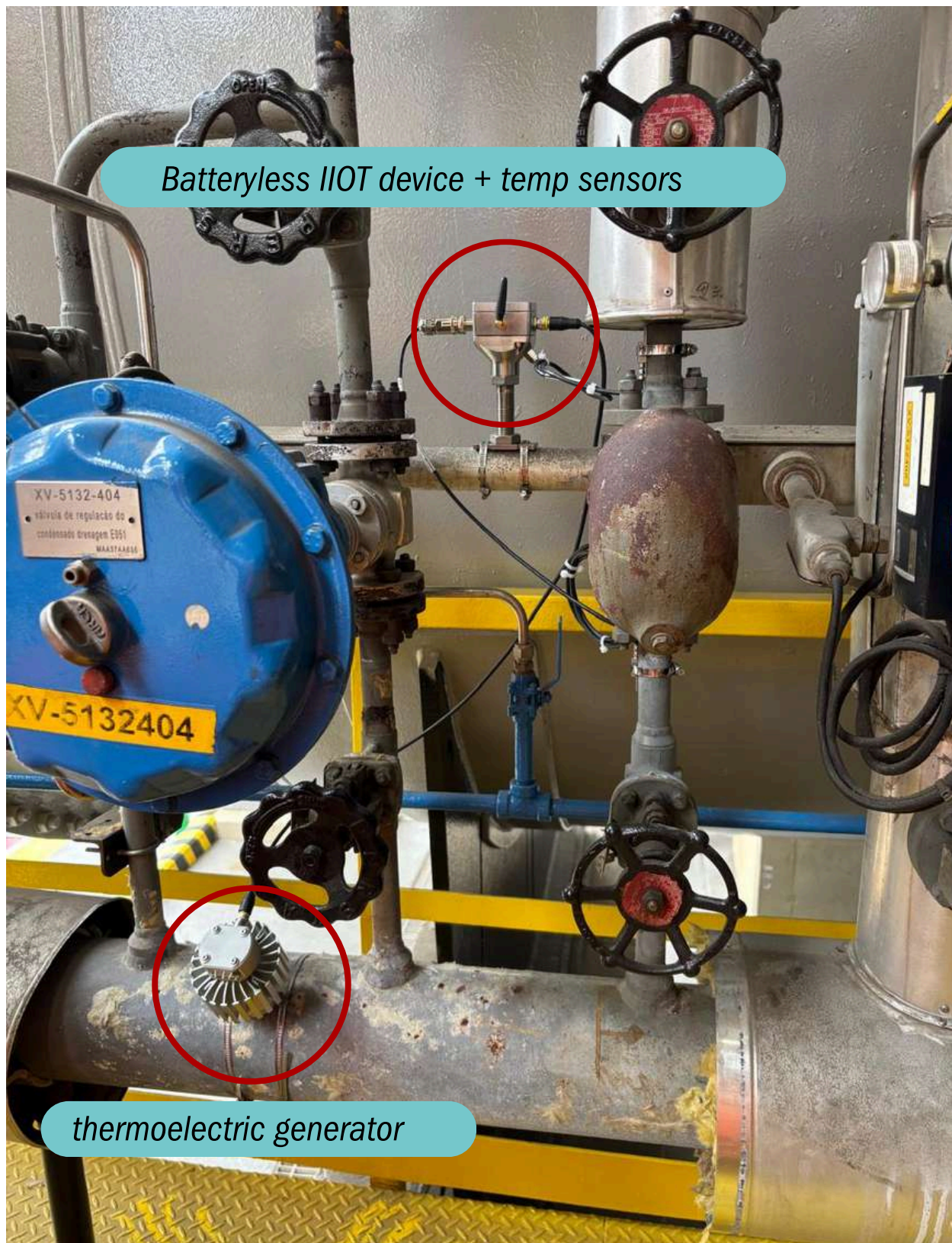
- **Number sensors** = 2 \* PT100 up to 200°C (peak up to 250°C)
- **Accuracy of the measurement** = 0,1°C
- **Data rate:** Quasy real-time (data every 1 minute)
- **Wireless protocol:** LoRaWAN (up to 2Km)



# OIL REFINERY

## InduEye TempSense

### SCENARIO 2

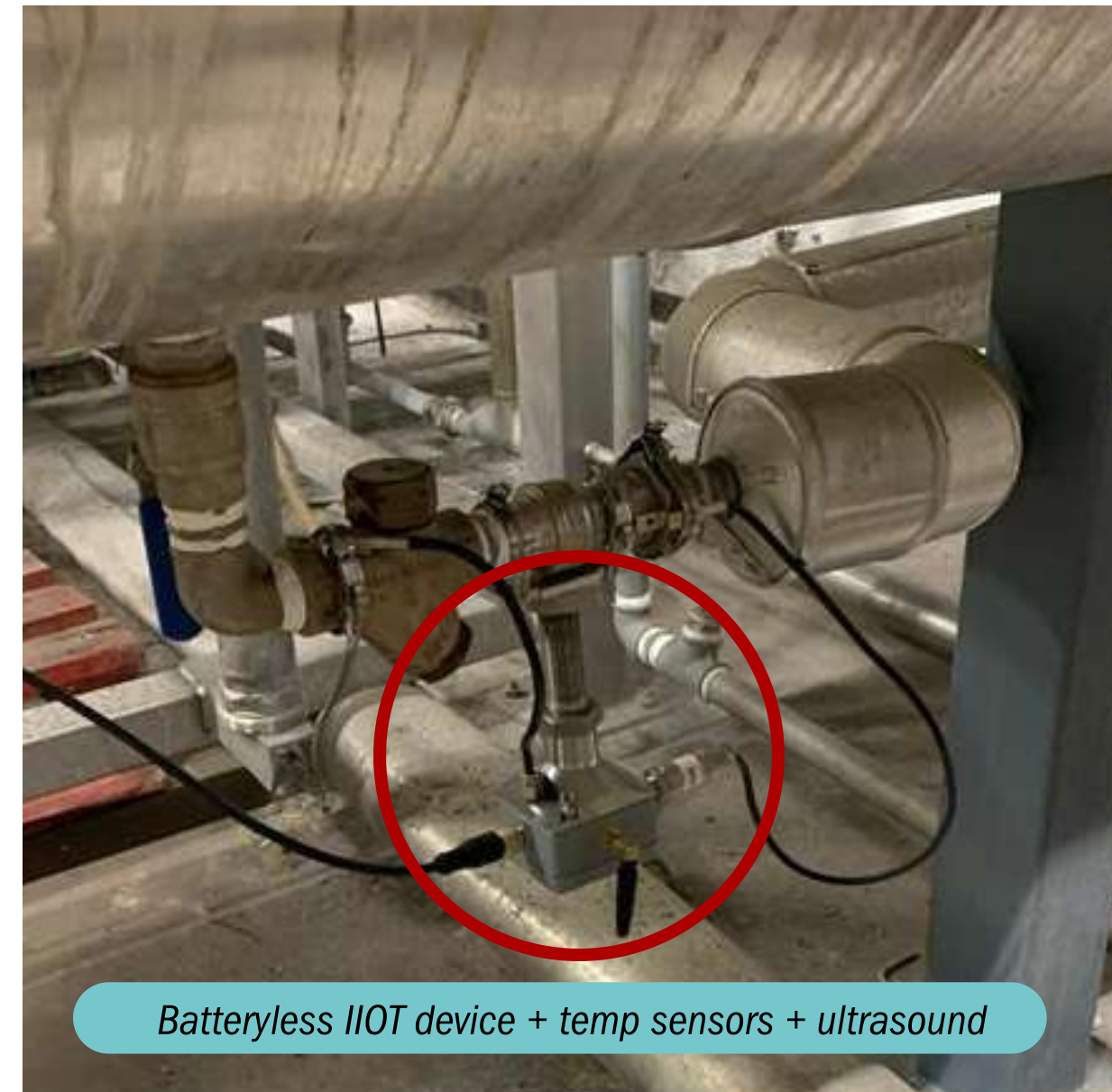


# FOOD PLANT

## InduEye Leaksense Beta Commercial in Q1-2026

High **precision** and accuracy:

- **Number sensors:**
  - 2 \* PT100 up to 200°C (peak up to 250°C)
  - 1 \* Ultrasound (up to 50KHz)
- **Accuracy of the measurement = 0,1°C**
- **Data rate:** Quasy real-time (data every 1 minute)
- **Wireless protocol:** LoRaWAN (up to 2Km)



# DAEVIS

Powered by AEInnova

## Dynamic AEInnova VISualizer



SaaS platform for IIoT



Dynamic reporting



Customizable alarms (email...)



Machine learning



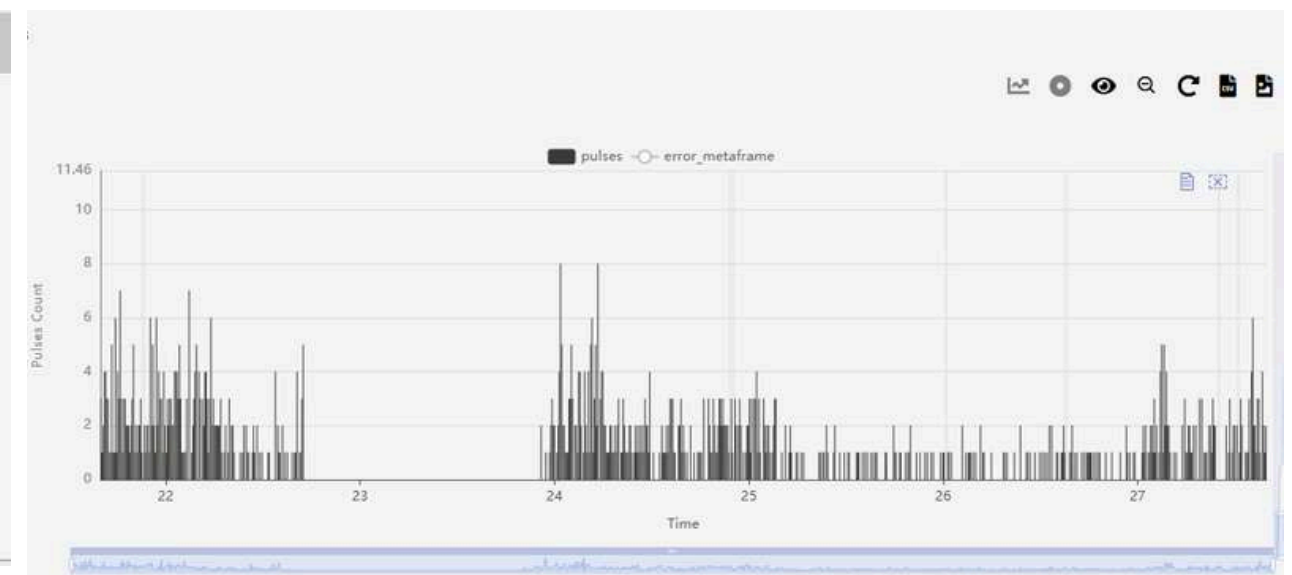
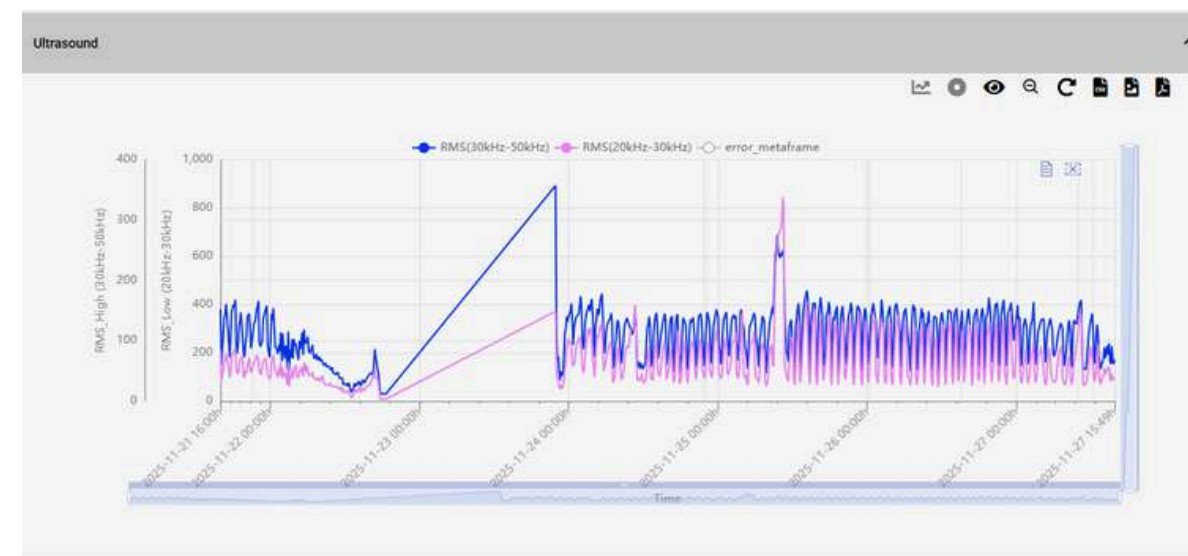
SCADA integration (MQTT, OPC-UA, Modbus-TCP/IP)



Best cost-to-value

# Steam trap leak analysis

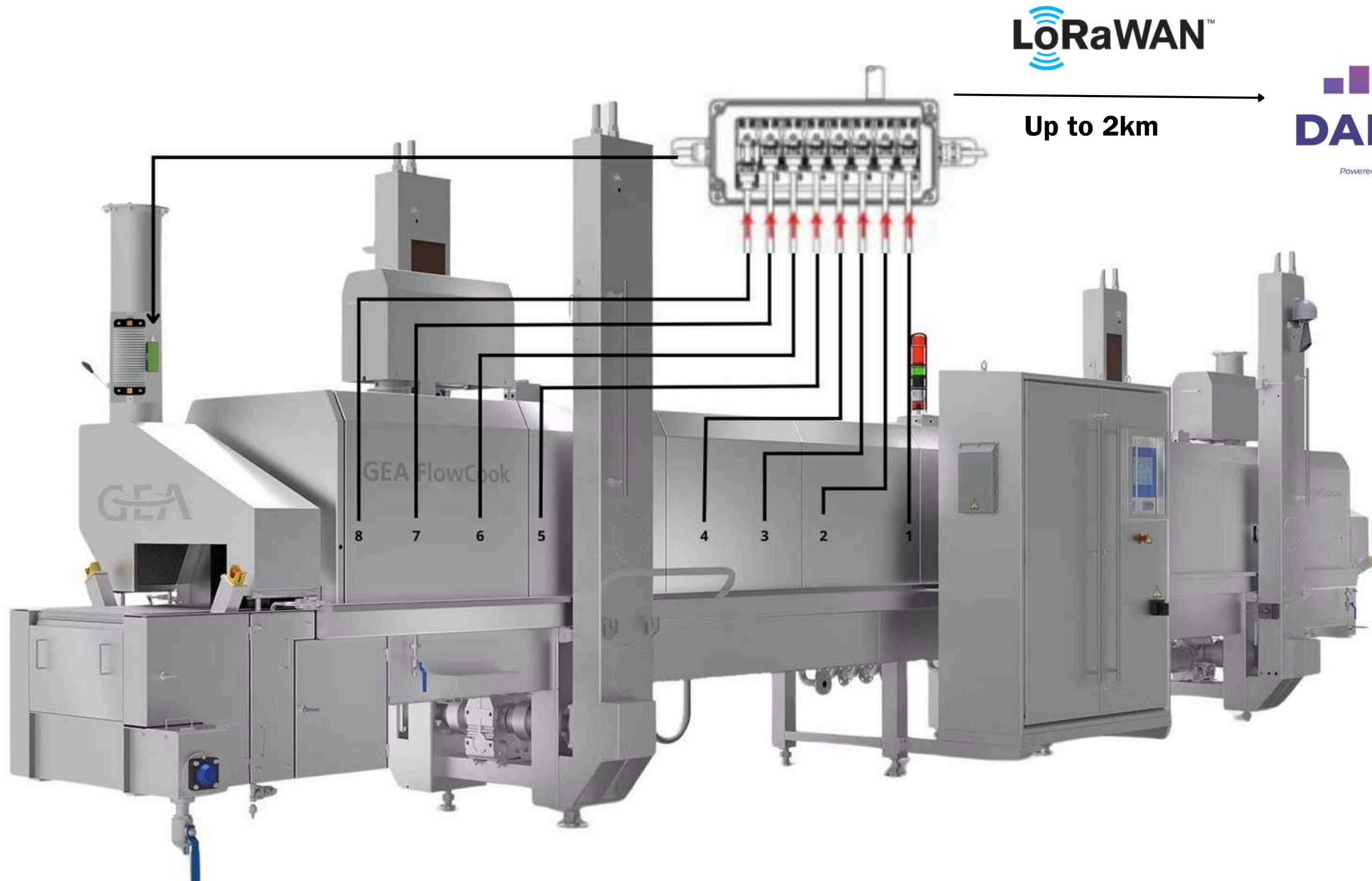
## Example for steam leaks detection with ultrasound and temperature



# 4 -SOLUTION FOR FURNACE THERMAL MONITOR

*Long-range wireless, heat-powered, battery-less, maintenance-free multi-thermocouple monitor for continuous furnace and boilers temperature control*

## InduEye Extreme Temperatures Monitor

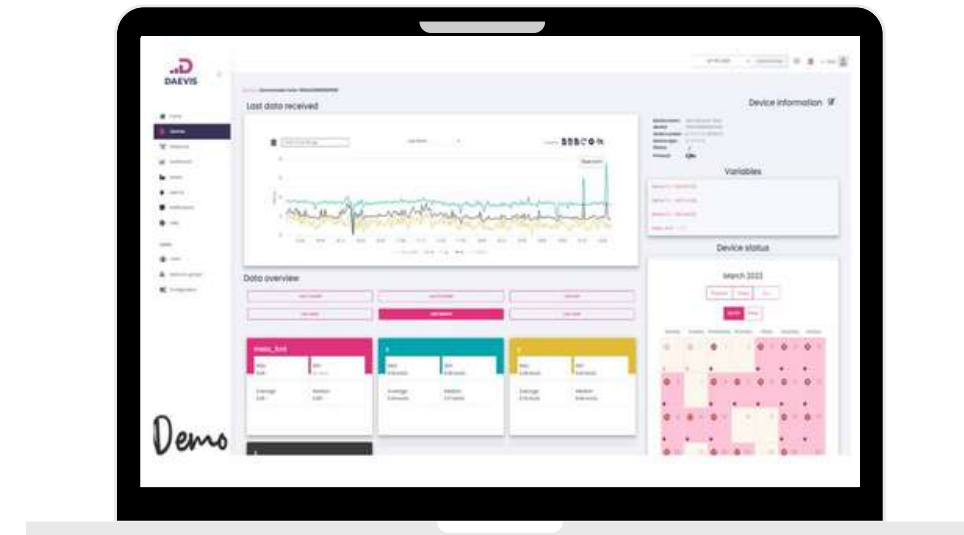


LoRaWAN™

Up to 2km

DAEVIS  
Powered by AEInnova

### THE CLOUD PLATFORM



# STEEL INDUSTRY

## PREHEATING / POSTHEATING FURNACE MONITOR

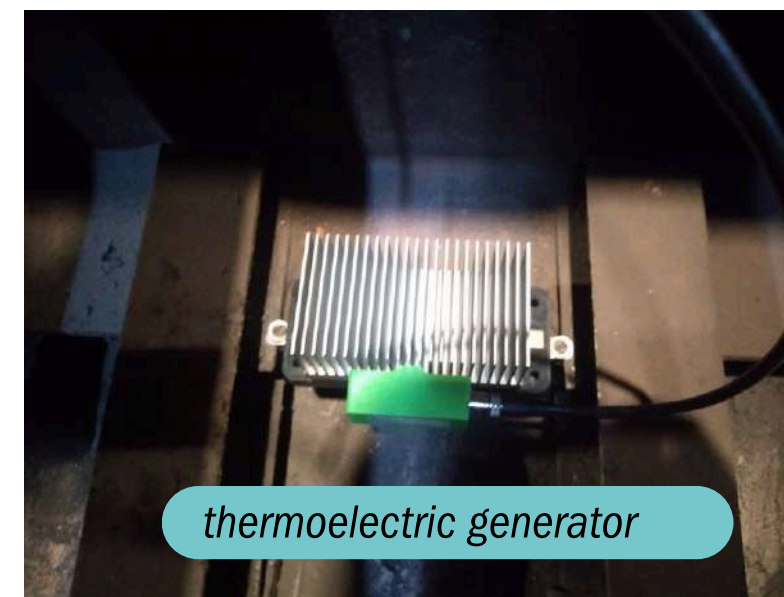


Batteryless IIOT device + 8 Thermocouples



High **precision** and accuracy:

- 8 Thermocouples Type K
- **Range of temperatures:** -40°C - 1.100°C
- **Accuracy of the measurement = 1 °C**
- **Data rate:** Quasy real-time (data every 1 minute)
- **Wireless protocol:** LoRaWAN (up to 2Km)



thermoelectric generator



# Extreme Temperature Monitoring

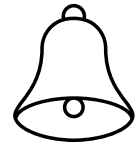
## Dynamic AEInnova VISualizer



SaaS platform for IIoT



Dynamic reporting



Customizable alarms (email...)



Machine learning

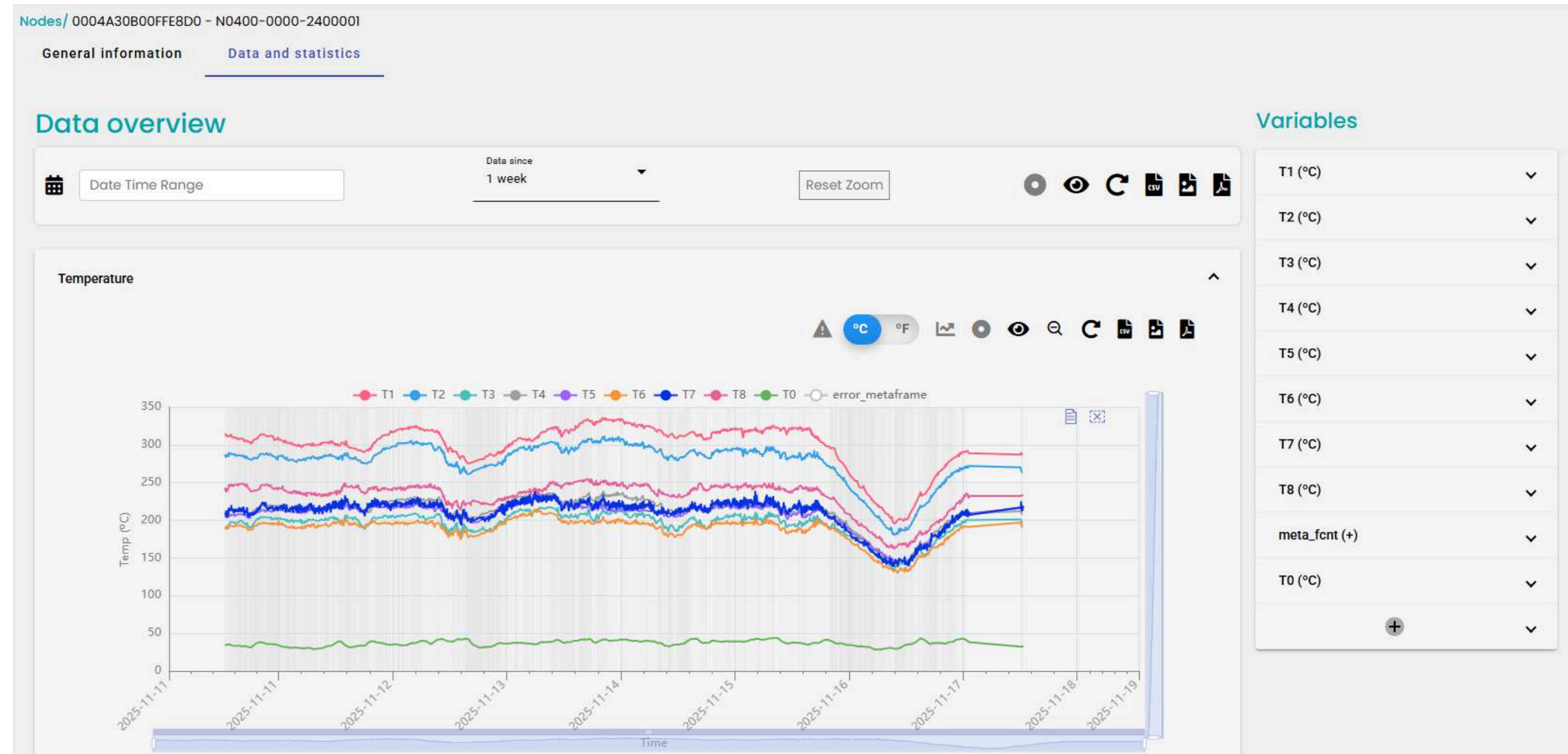


SCADA integration (MQTT, OPC-UA, Modbus-TCP/IP)



Best cost-to-value

## Example for Extreme Temperatures Monitor with 8 K-type thermocouples



# SHAREHOLDERS & 11 EUROPEAN UNION R&D GRANTS



## 31 INTERNATIONAL AWARDS & PARTNERS



*Most sustainable technology in EU and Key Innovator in heat-powered iloT*

# CERTIFICATION & PATENTS



**Certificado ES1985464**

Controla la gestión

**ALTERNATIVE ENERGY INNOVATIONS, S.L.**

C/ Pare Lluísador, 169  
08224 Terrassa (Barcelona)

Este certificado es válido desde  
7 de febrero de 2020 hasta 11 de febrero de 2022  
Edición 2. Certificado con SGS desde febrero de 2019.

**ISO 9001:2015**

Proceso de desarrollo de productos

Diseño y desarrollo de equipos para la recuperación del calor residual de procesos industriales, I+D Industrial y la comercialización de los mismos.

Este certificado es válido desde  
7 de febrero de 2020 hasta 11 de febrero de 2022  
Edición 2. Certificado con SGS desde febrero de 2019.

**IAF ENAC**

INTERNATIONAL CERTIFICATION SERVICES BERNE, S.A.S.  
1, rue de l'Industrie | CH-3000 Berne | Suisse



*United States of America*

*The Director*

*of the United States Patent and Trademark Office has received an application for a patent for a new and useful invention. The title and description of the invention are enclosed. The requirements of law have been complied with, and it has been determined that a patent on the invention shall be granted under the law.*

*Therefore, the United States*

# Patent

*grants to the person(s) having title to this patent the right to exclude others from making, using, offering for sale, or selling the invention throughout the United States of America or importing the invention into the United States of America, and if the invention is a process, of the right to exclude others from using, offering for sale or selling throughout the United States of America, products made by that process, for the term set forth in 35 U.S.C. 3510(c) or (c)(5), subject to the payment of maintenance fees as provided by 35 U.S.C. 409. See the Maintenance Fee Notice on the inside of the cover.*

*Archer Bureau*

DIRECTOR OF THE UNITED STATES PATENT AND TRADEMARK OFFICE



**LABORATORIO OFICIAL J. M. MADARIAGA**

**CERTIFICADO DE EXAMEN UE DE TIPO**

1. Equipos y sistemas de protección destinados a ser utilizados en atmósferas potencialmente explosivas - Directiva 2014/34/UE	
2. Certificado de Clasificación CE de Tipo número	<b>LOM 24ATEX0468 rev. 1</b> <b>Exhibido B</b>
3. Producto	Sistemas de ventilación LUT Tipo Sello Esp. Sello, 11.000 l/min
4. Fabricante	Alternative Energy Innovations, S.L.
5. Dirección	C/ Pare Lluísador, 169 08224 Terrassa (Barcelona) ESPAÑA

Este certificado es válido hasta 2027-01-19 y puede ser retirado si el fabricante no satisface el seguimiento del sistema de calidad de la producción y del producto.

Este documento sólo puede reproducirse íntegramente y sin cambios algunos.



**LABORATORIO OFICIAL J. M. MADARIAGA**

**NOTIFICACIÓN DEL ASEGURAMIENTO DE LA CALIDAD DEL PROCESO DE PRODUCCIÓN Y DEL PRODUCTO**

**PRODUCTION PROCESS AND PRODUCT QUALITY ASSURANCE NOTIFICATION**

- Equipos o Sistemas de Protección o Componentes para uso en Atmósferas Potencialmente Explosivas. Módulos D y E de la Directiva 2014/34/UE. *Equipment or Protective Systems or Components Intended for use in Potentially Explosive Atmospheres. Modules D and E of Directive 2014/34/UE.*
- Número de la Notificación: LOM 24ATEX9003
- Equipos o Sistemas de Protección o Componentes listados en el Anexo adjunto a esta Notificación. *Equipment or Protective Systems or Components as listed in the Annex attached to this Notification.*
- Fabricante (Manufacturer): Alternative Energy Innovations, S.L. Dirección (Address): Carrer del Pare Lluísador, 169. 08224, Terrassa, Barcelona, Spain.
- Lugar de fabricación (Manufacturing site): / Colón, 451, Vial C, Nave 41, 08223, Terrassa, Barcelona, Spain.
- El Laboratorio Oficial J.M. Madariaga (LOM), Organismo Notificado nº 0163 para los Módulos D y E, de conformidad con el Artículo 17 de la Directiva 2014/34/UE del Parlamento Europeo y del Consejo, de 26 de febrero de 2014, notifica que el fabricante tiene un sistema de calidad para la producción y para el producto que cumple con los Módulos D y E de la Directiva. *The Laboratory Official J.M. Madariaga (LOM), Notified Body No. 0163 for Modules D and E, in accordance with article 17 of Directive 2014/34/UE of the European Parliament and of the Council, of 26 February 2014, notifies that the manufacturer has a quality system for the production and for the product which complies with Modules D and E of the Directive.*
- Esta Notificación está basada en el informe de auditoría LOM 23-04189, emitido en fecha 2023-06-28. La información relativa a la evaluación se recoge en el expediente confidencial 23-65405. Esta Notificación puede ser retirada si el fabricante no satisface los requisitos de los Módulos D y E. Los resultados de las reevaluaciones periódicas del sistema de calidad forman parte de esta Notificación. *This Notification is based on audit report No. LOM 23-04189, issued on 2023-06-28. The information related to this assessment is contained in the confidential file 23-65405. This Notification can be withdrawn if the manufacturer no longer satisfies the requirements of Modules D and E. Results of periodic re-assessment of the quality system are part of this Notification.*
- Esta Notificación es válida hasta 2027-01-19 y puede ser retirada si el fabricante no satisface el seguimiento del sistema de calidad de la producción y del producto. *This Notification is valid until 2027-01-19 and can be withdrawn if the manufacturer does not satisfy the surveillance of the production and product quality system.*
- De acuerdo con el Artículo 16 (3) de la Directiva 2014/34/UE, el marcado CE deberá estar seguido por la identificación N° 0163 del LOM, como Organismo Notificado que interviene en la fase de control de la producción. *According to article 16 (3) of the Directive 2014/34/UE, the identification number 0163 of LOM shall follow the CE mark as the Notified Body involved in the production control stage.*

Fecha de certificación inicial (Date of initial certification): 2024-01-15

Firmado electrónicamente por: FRANCISCO JAVIER GARCIA TORRENT (Signature)

Comité de Certificación (Certification Committee)

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