



AEInnova

Alternative
Energy Innovations

AEInnova

Technology presentation

2026

SENSING A MORE
SUSTAINABLE INDUSTRY



LESS
BATTERIES



LOWER
EMISSIONS



A MORE
EFFICIENT
INDUSTRY

FROM
INDUSTRY HEAT
TO A CLEANER
TOMORROW





AEInnova
Alternative
Energy Innovations

1.

A COMPANY WITH HISTORY

AEInnova is a deep-tech company specialized in **autonomous heat-powered IIoT solutions** that turn waste heat into valuable data.



2014

YEAR FOUNDED

Spin-off from the UAB (Universitat Autònoma de Barcelona).



14

EMPLOYEES

A multidisciplinary team with expertise in electronics, energy harvesting, IoT and industrial applications.



31

INTERNATIONAL AWARDS

Globally recognized for our innovation, sustainability and impact.



GLOBAL PRESENCE

Active presence in 4 continents, with a growing network of partners and customers.

WHAT WE DO



We develop, industrialize and commercialize **batteryless IIoT sensors powered by waste heat**, enabling industry to monitor critical assets in a fully autonomous and sustainable way.

OUR TECHNOLOGY



- Thermoelectric energy harvesting.
- Ultra-low power electronics.
- Wireless connectivity (LPWAN).
- Robust design for demanding environments.
- Zero maintenance and long operational lifetime.

OUR VALUES



INNOVATION

Pioneering sustainable solutions.



RELIABILITY

Designed for the most demanding industries.



COLLABORATION

Growing together with our partners and customers.



SUSTAINABILITY

Generating a positive impact for industry and the planet.



AEInnova
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2. THE MARKET

A large and growing market,
driven by the need for
**efficiency, reliability and
sustainability.**

TARGET INDUSTRIES



Oil and Gas



Chemicals
and Petrochemicals



Iron and Steel



Cement



Pulp and Paper



Pharmaceutical



Wastewater
Treatment Plants



Energy



Aluminium



Food and Beverage



Water Treatment



AEInnova
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Energy Innovations

3. PRODUCT PORTFOLIO

Smart and autonomous sensors
powered by heat.
For a more efficient industry.



**InduEye™
Thermo Duo**



**InduEye™
Thermo 1**



**InduEye™
VibroSense**



**InduEye™
TempSense**



**InduEye™
TempSense/LeakSense**



BATTERY-FREE
Powered by
thermal energy.



WIRELESS CONNECTIVITY
Long range
and high reliability.



ROBUST AND CERTIFIED
ATEX, IECEx, CE,
MIC, ANATEL...



REAL-TIME DATA
Useful information
in real time.



SCALABLE
Flexible solutions
for any industry.

3. PRODUCT PORTFOLIO: APPLICATIONS

Power: Energy inefficiency / batteryless



21% EU energy is lost in industrial waste heat



21%

EU energy lost
as industrial
waste heat



-20%

Lower CO₂
emissions
potential



ZERO

Batteries.
Zero maintenance.
Autonomous.



ROI < 1y

High impact.
Fast return.

Industrial grade IIoT applicatio



Proactive maintenance in rotative machines

- EARLY DETECTION REDUCE:
 - 25% MAINTENANCE COST
 - 75% LOCKDOWNS
 - 35% DOWNTIMES
 - ENERGY INEFFICIENCIES (20% ENERGY LOSS)



Steam leaks detection in steam-traps / valves / bearings

- CONTINUOUS DETECTION AVOIDS:
 - ENERGY INEFFICIENCIES (30% ENERGY LOSS)
 - WATER HAMMERS
 - FAST DEGRADATION
 - EARLY BEARING DEFECTS (MOTORS)



Furnace / kiln thermal monitor

- CONTINUOUS DETECTION AVOIDS:
 - ENERGY INEFFICIENCIES (20% ENERGY LOSS)
 - REFRACTORY DEGRADATION
 - FINAL PRODUCT ISSUES
 - EARLY DETECTION OF TEMPERATURE IMBALANCES
 - REDUCED UNPLANNED DOWNTIMES



Sustainable

Transform waste heat
into valuable insights.
Lower CO₂ footprint.



Reliable

Industrial grade.
Designed for harsh
environments.



Autonomous

Batteryless operation
powered by ambient
energy.



Cost-effective

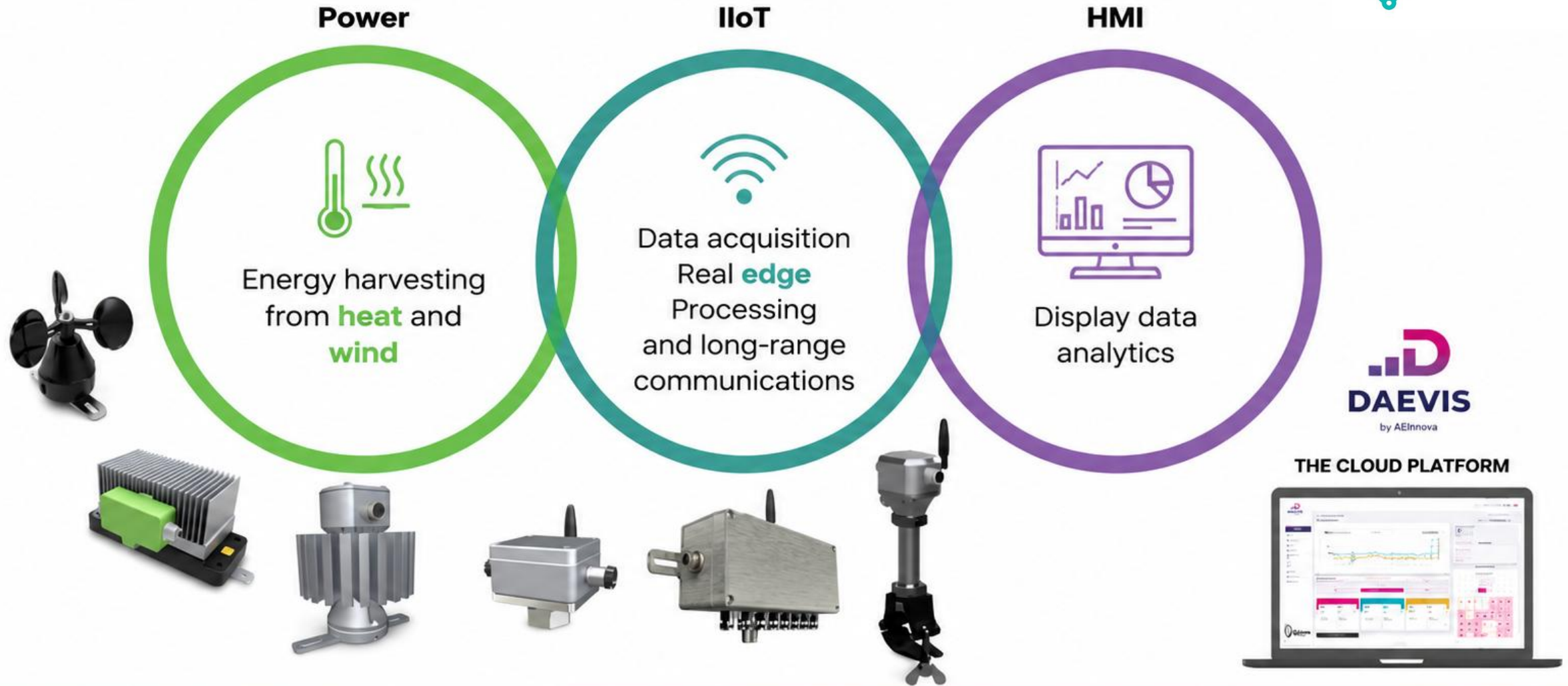
Low CapEx & OpEx.
High ROI.
Easy to deploy.



Connected

Real-time data.
Cloud analytics.
Actionable alerts.

3. PRODUCT PORTFOLIO: VALUE PROPOSITION



Batteryless

No batteries,
no replacements



Sustainable

Uses waste energy,
reduces CO₂



Long-range

Reliable connectivity
(LoRaWAN / NB-IoT)



Actionable data

Real-time insights
for better decisions



Rugged & reliable

Designed for harsh
industrial environments

3. PRODUCT PORTFOLIO: ENERGY HARVESTERS



Heat to electricity power generator for IIoT.
From 30°C Delta T. **Up to 150°C (350°C with adaptors)** and 1Wp.
Powers up to 3 AEInnova's IIoT or 3rd part battery-powered IIoT.



Wind to electricity power generator for IIoT.
From 10km/h / bidirectional power and up to 1Wp
Powers up to 3 AEInnova's IIoT or 3rd part
battery-powered IIoT.
Not commercial but patented.



Thermoelectric Energy Harvester

Operating up to 150°C
(Up to 350°C with adaptors)
Up to 400 mWp



Thermoelectric Energy Harvester

Operating up to 150°C
(Up to 350°C with adaptors)
Up to 1 Wp



Wind Energy Harvester

From 10 km/h (bidirectional)
Up to 1 Wp
Not commercial but patented



Harvest energy
from waste heat
or wind



Autonomous
No batteries,
no replacements



Sustainable
Uses renewable energy,
reduces CO₂



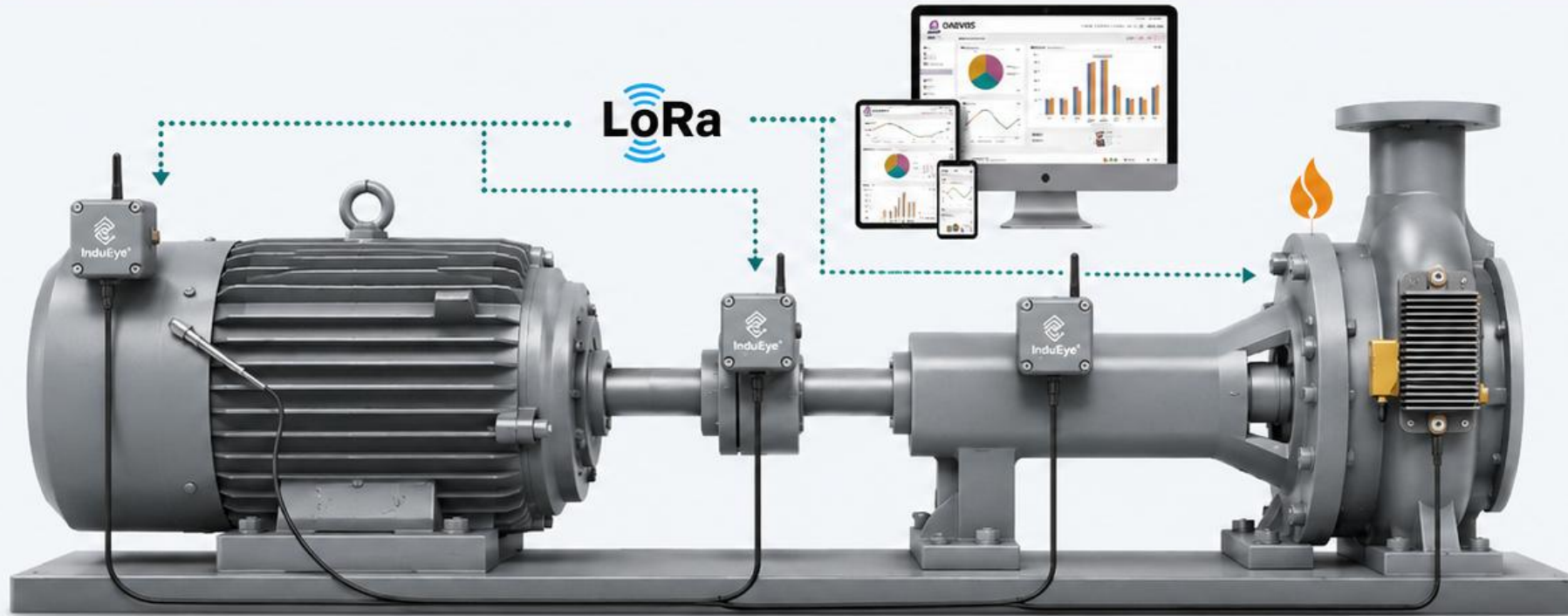
Continuous power
Reliable, maintenance-
free operation



Rugged & reliable
Designed for harsh
industrial environments

3. PRODUCT PORTFOLIO: InduEye™ VibroSense 3

✓ **Proactive maintenance:** Predicts bearing defects, misalignments, unbalancing, lack of lubrication, cavitation...



Best in class **3-axis vibration (6KHz BW) + temperature (-100°C–350°C)** for machinery defects early detection



Standard LoRaWAN
or NB-IoT
(not commercial)



Real edge computing
for proactive maintenance
(RMS velocity, full waveform,
full Spectrum (0Hz to 6KHz),
Kurtosis, Crest factor,
waveform, p2p...)



Quasi-real time
1 minute cadence



AEI cloud platform
(DAEVIS) or
Viking Analytics (with IA)



3rd part integration
in HMI (AVEVA, SCADA...)
with ModBus TCP/IP,
OPC-UA, WINCC...



Early detection of
machinery issues



Reduce unplanned downtime
and maintenance costs



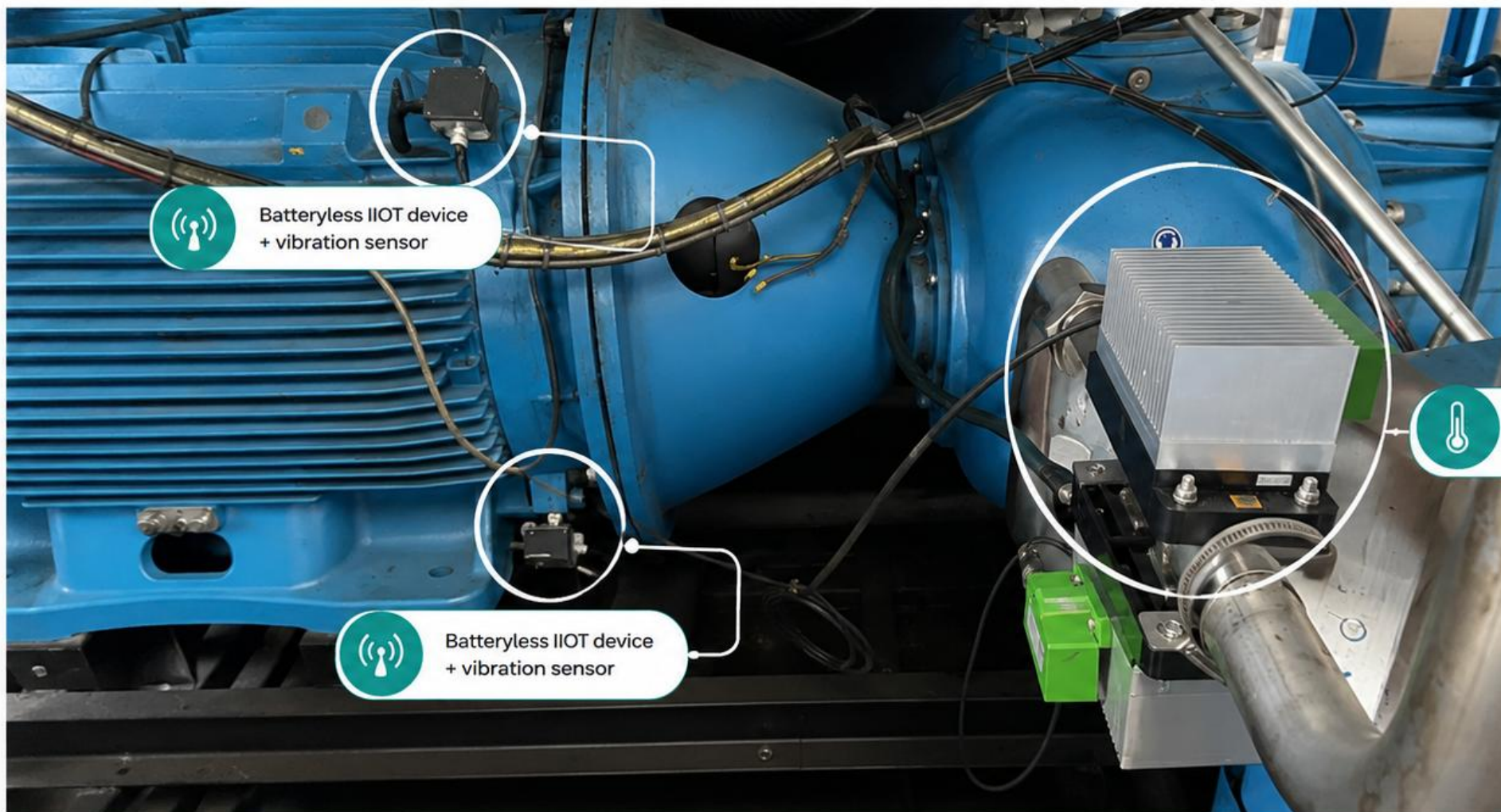
Extend equipment lifetime
and reliability



Improve safety and
operational efficiency

3. PRODUCT PORTFOLIO: InduEye™ VibroSense 3

Example in a food industry / vibrations on a mixer (heat powered)



100% batteryless
operation



Powered by waste heat
(thermoelectric)



Wireless IIoT connectivity
(LoRaWAN / NB-IoT)



Continuous machine
health monitoring



Rugged & industrial
grade design



Zero battery
replacement
& maintenance



Harvests waste heat
from the machine
for clean energy



Early detection
of anomalies
& protection



Reduces downtime
& maintenance
costs



Designed for
harsh industrial
environments

3. AI-POWERED PREDICTIVE MAINTENANCE: Viking Analytics Multiviz

From data to diagnosis. Anticipate failures, optimize maintenance and maximize the availability of your assets.



Real-time failure diagnosis

AI helps identify the root cause of problems in equipment.



Intelligent alarms

Reduces false alarms and prioritizes what really matters.



Periodic and detailed reports

Complete and actionable information for better decision-making.



More than 15 functionalities

Waveforms, spectrum, fault detection, modulation, trends and much more.



Changes Symptoms Data quality

Detected symptoms

The possible anomalies are NOT a diagnosis. An analyst must verify the failures.

Show/Hide possible anomalies



Dominant harmonics 2x

A rotational speed of 48 Hz is assumed. The 2x component is stronger than the 1x and presents higher harmonics.

Possible anomalies:

Misalignment Secondary resonance
Coupling issue

Last seen: 3/24/2024, 2:00:00 AM



Component at impact frequency

Impact detected at 2 Hz.

Possible anomalies:

Bearing damage (outer race)
Mechanical looseness
Process-related impacts

Last seen: 3/24/2024, 7:00:00 AM

3. AI-FREE PREDICTIVE MAINTENANCE: DAEVIS

Example in the food industry / mixer vibrations. Critical machine data powered by **DAEVIS**.



SaaS platform for IIoT

Secure, scalable and accessible from anywhere.



Customizable alarms

Set intelligent thresholds and receive real-time alerts.



Automated learning (in-process)

Advanced analytics to detect anomalies and predict failures.



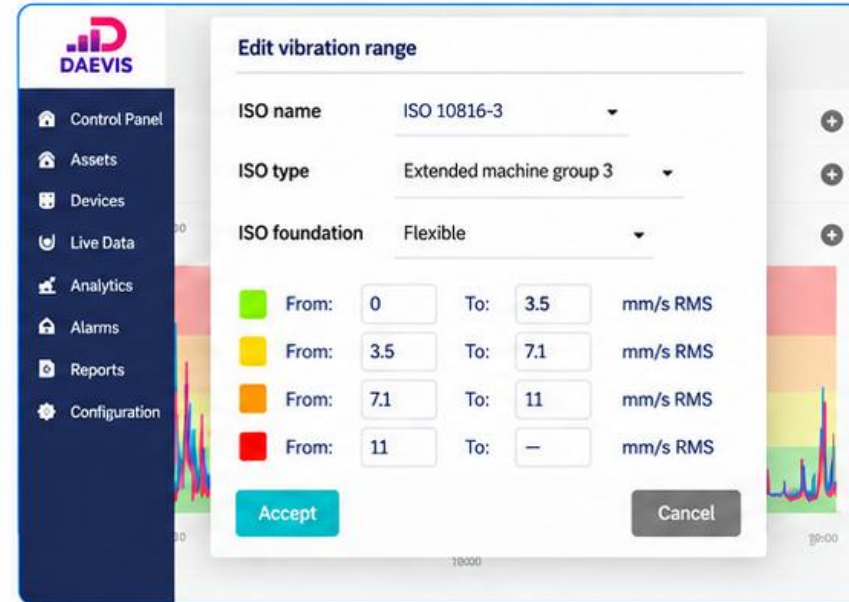
Integration with third-party HMIs

Easy integration with SCADA, CMMS and industrial systems. No DAEVIS license required.

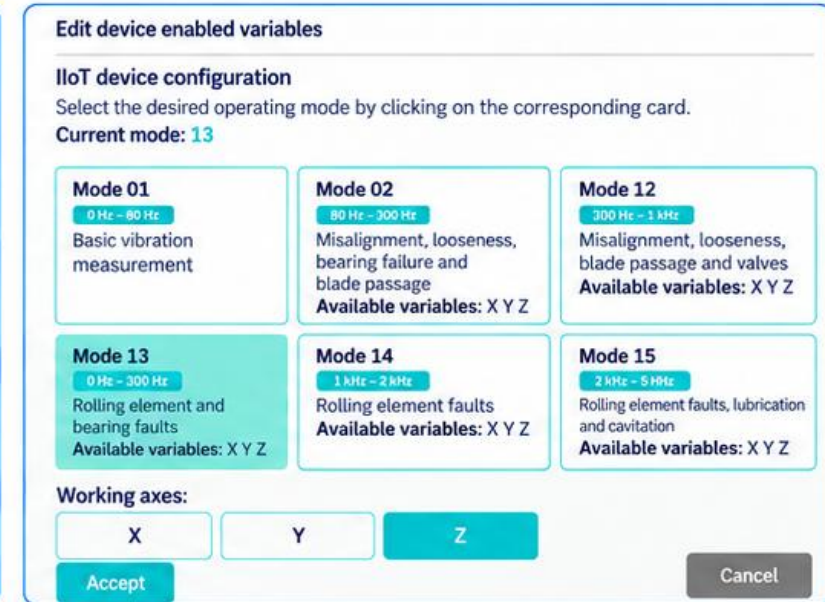


Better cost-benefit ratio

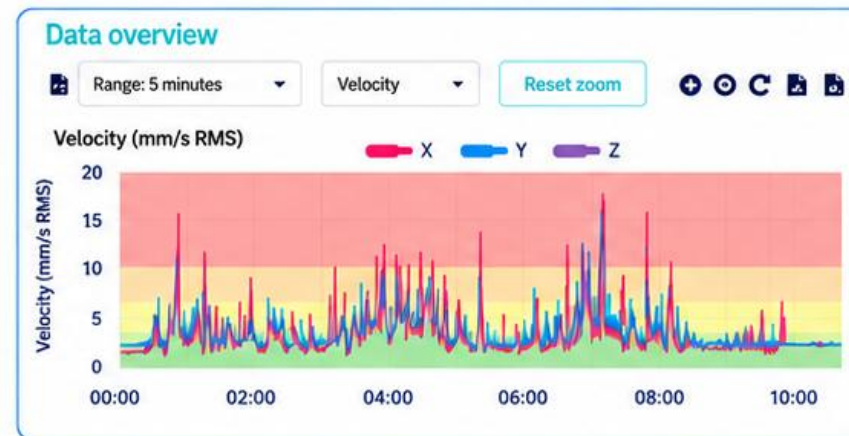
Battery-free technology, low TCO and high return on investment (ROI).



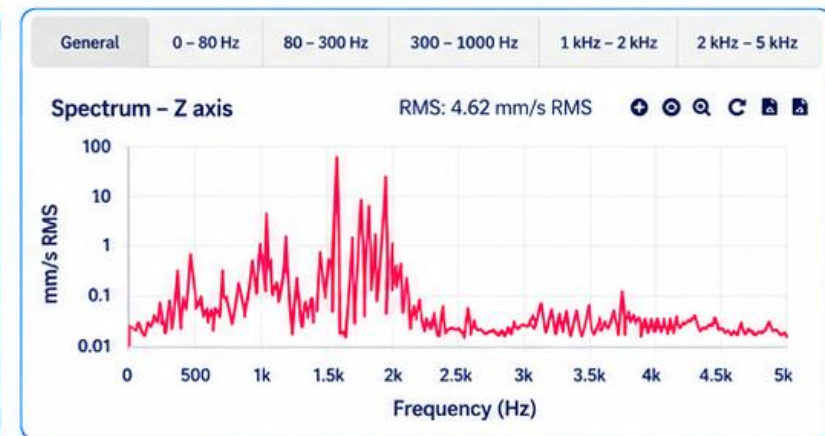
ISO 10816 configuration



Full spectrum (FFT) for precise failure analysis



Real-time asset monitoring



Detailed spectrum visualization

3. PRODUCT PORTFOLIO: InduEye™ TempSense / LeakSense 3



Predicts steam trap & valves locks (open / close), degradation, fluctuation for energy efficiency

THERMOELECTRIC MODULE (TEG)

Harvests heat from the pipe surface

INDUEYE® TEMPSENSE

- 2 temperatures (TempSense -100°C–350°C)
- Ultrasound (LeakSense, 50KHz BW)
- Vibration (option)

Continuous steam leaks process in valves, traps, etc

- 2 temperatures TempSense (-100°C–350°C) + ultrasound LeakSense (50KHz BW)
- Standard LoRaWAN
- Up to 99% detection (2 temperature solutions <60%)
- Real-time (continuous data acquisition)
- Real edge computing (2 temperatures, RMS in BW, kurtosis, counts per minute...)
- DAEVIS or HMI



THE CLOUD PLATFORM



Early detection of steam leaks & valves locks



Reduce unplanned downtime and maintenance costs



Extend equipment lifetime and reliability



Improve energy efficiency and sustainability

3. PRODUCT PORTFOLIO: InduEye™ TempSense / LeakSense 3

Example in an oil refinery in Brazil (Petrobras)



**Steam trap & valve
leak detection**
Early detection of steam
leaks and losses



**Dual temperature
monitoring**
Surface + process
temperature



Ultrasound detection
Detects high-frequency
ultrasound up to 50 kHz



100% batteryless
Powered by waste heat
(thermoelectric)



ATEX / IECEx certified
Safe for hazardous
industrial environments



**Reduce losses
& emissions**
Improve efficiency and
support sustainability

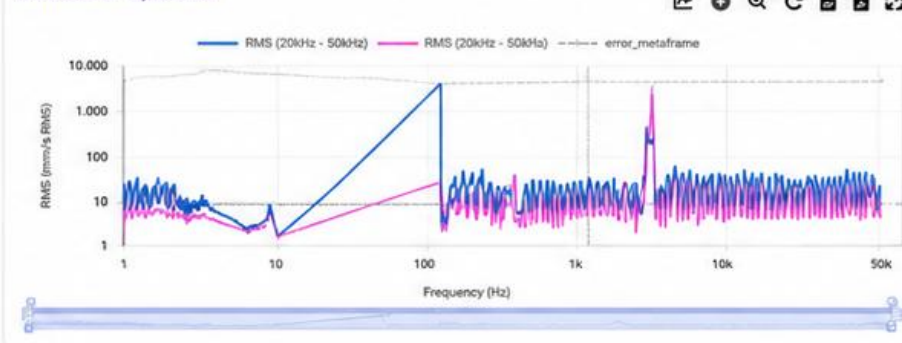
3. PRODUCT PORTFOLIO: InduEye™ TempSense / LeakSense 3

Example in an oil refinery in Brazil (Petrobras). Data presentation in DAEVIS



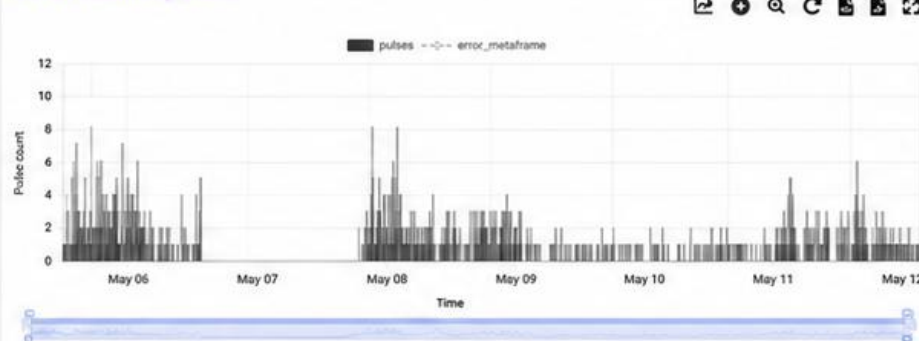
Thermal control
(inlet & outlet)

Ultrasound - Spectrum



Spectrum
analysis

Valve / Steam trap events



Counts
(open/close)
per minute



Early leak detection

Detect steam leaks
before they become costly



Process optimization

Monitor temperatures
and improve efficiency



Real-time visibility

Continuous data
in real time



Cost savings

Reduce energy losses
and maintenance costs



Reliability & safety

Improve asset reliability
and operational safety

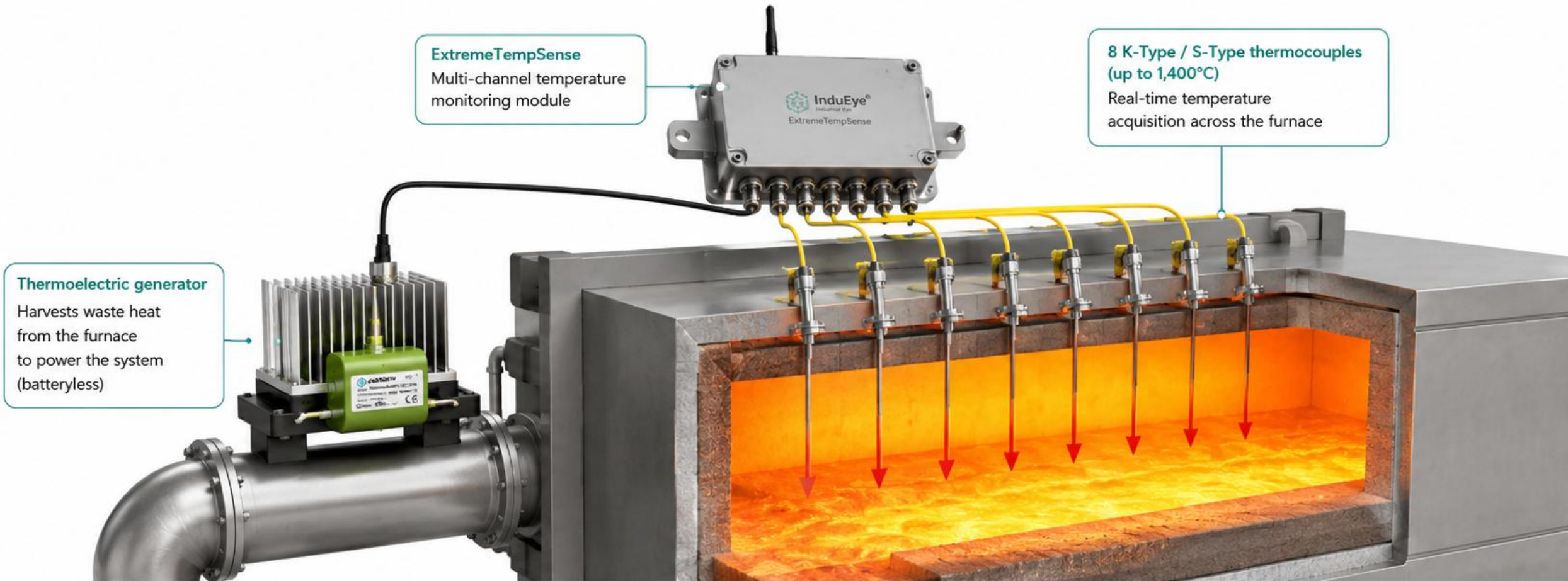


Sustainable operations

Lower emissions
and environmental impact

3. PRODUCT PORTFOLIO: InduEye™ ExtremeTempSense

Enables detection of temperature inconsistencies in large industrial furnaces to improve energy efficiency and quality product



Continuous temperature monitoring

Up to 8 points simultaneously



Real-time insight

Detects temperature inconsistencies, gradients and hotspots



Standard LoRaWAN

Long-range, low-power communication for remote monitoring



Smart data processing

Delta T, gradients, heat mapping and anomaly detection



Easy integration

DAEVIS cloud platform or HMI/SCADA integration

3. PRODUCT PORTFOLIO: InduEye™ ExtremeTempSense

Example in a steel making plant in Morocco (Arcelor Mittal)

ExtremeTempSense

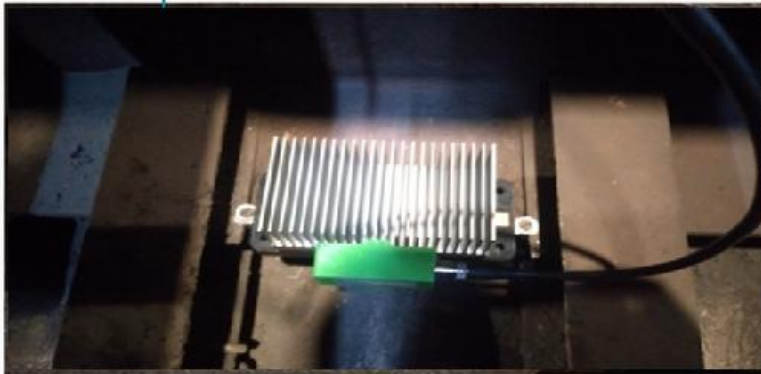
Multi-channel temperature
monitoring module
(8 channels)



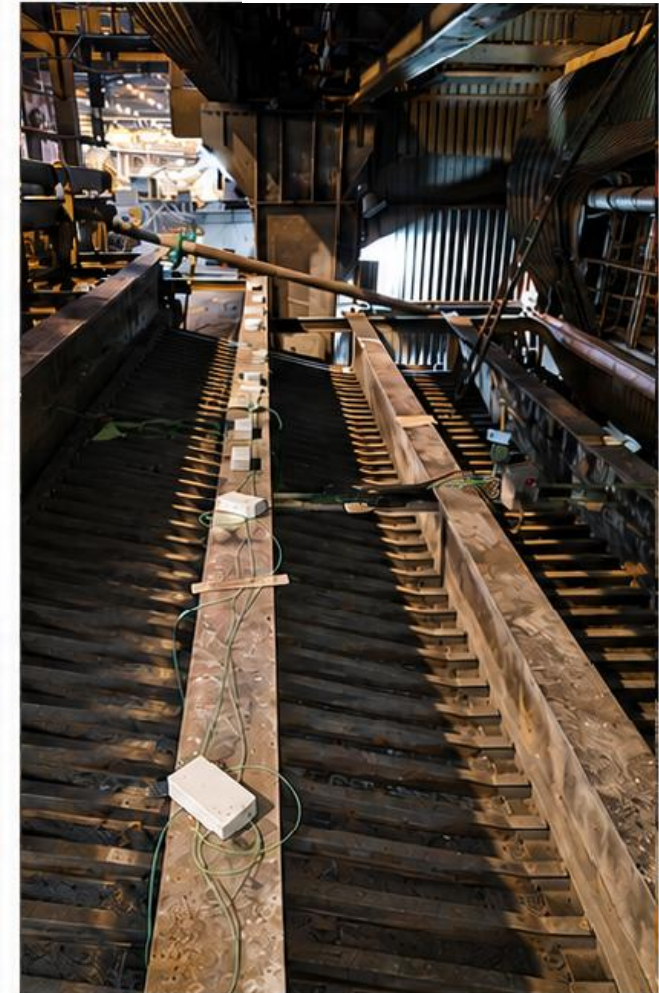
Batteryless IIOT device + 8 K-type Thermocouples

Thermoelectric generator

Harvests waste heat
to power the system
(batteryless)



K-type location on the refractory



8 temperature points
Up to 1,400°C
K-type / S-type
thermocouples



Real-time monitoring
Temperature profile,
gradients and hotspots
in real time



Batteryless solution
Powered by thermoelectric
generator (waste heat
harvesting)



Standard LoRaWAN
Long-range, low-power
communication for harsh
industrial environments



Smart data processing
Delta T, heat mapping,
trend analysis and
alerts in DAEVIS



Easy integration
DAEVIS cloud platform
or HMI/SCADA
integration

3. PRODUCT PORTFOLIO: InduEye™ ExtremeTempSense

Example in a steel making plant in Morocco (Arcelor Mittal). Data presentation in DAEVIS

Nodes / 0004A30B00FFEB00 - N0400-0000-2400001

General information

Data and statistics

Data overview



Date Time Range

Data since

1 week

Reset Zoom



Temperature

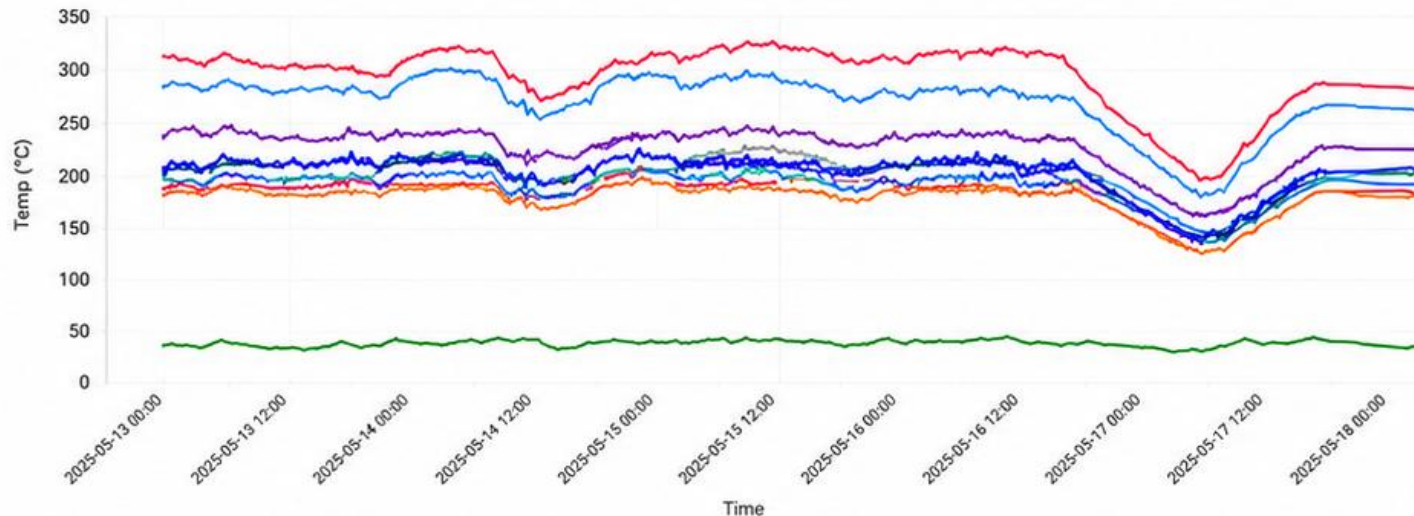


°C

°F



T1 T2 T3 T4 T5 T6 T7 T8 T0 error_metaframe



Variables

T1 (°C)



T2 (°C)



T3 (°C)



T4 (°C)



T5 (°C)



T6 (°C)



T7 (°C)



T8 (°C)



meta_fent (+)



T0 (°C)



8 CHANNELS THERMAL CONTROL

Continuous monitoring
of 8 temperatures
(K-type thermocouples)
up to 1,400°C



DATA DELIVERED EVERY MINUTE

Quasi real-time data
transmission via
LoRaWAN
(1 minute cadence)

4. R&D PROJECTS

Driving innovation through collaborative R&D to advance the **recovery of thermoelectric waste heat, battery-free electronics and industrial IoT.**

OUR R&D AREAS



THERMOELECTRIC ENERGY RECOVERY

High-efficiency systems for thermal and energy management.



BATTERY-FREE ELECTRONICS

Ultra-low power circuits and energy management solutions.



INDUSTRIAL IoT AND CONNECTIVITY

Robust and intelligent architectures at the edge (LPWAN, edge computing).



HIGH-TEMPERATURE BATTERIES

Integration of HT-OIB (OxyBatt) batteries for high-temperature operation.



ADVANCED MATERIALS

New materials and thermoelectric cells for high-performance applications.

IMPACT OF R&D IN FIGURES



12+

European and national R&D projects in which we participate.



20+

Research partners (universities, technology centers and industry).



3+

Patents and utility models granted.



€6M+

Non-dilutive funding obtained.



Preparing 3

EIC Pathfinders in thermoelectrics.

ONGOING PROJECTS



Flexible thermoelectric generators for industrial waste heat recovery.

EUROSTARS | 2023 – 2027



HT-OIB battery (250–400 °C) and integration with thermoelectric generators.

EIC TRANSITION | 2023 – 2027



OUR GOAL

Keep driving next-generation, sustainable technologies enabling autonomous and maintenance-free IoT solutions.

INNOVATION TODAY. IMPACT TOMORROW.



5. MANUFACTURING CAPACITY

Scalable and flexible manufacturing to deliver **high-quality, reliable and certified products** at industrial scale.

OUR MANUFACTURING STRENGTHS



FLEXIBLE MANUFACTURING

Equipment manufactured in Barcelona for small, medium and large volume orders.



HIGH QUALITY AND RELIABILITY

Rigorous testing and quality control at every stage of production.



CERTIFIED AND COMPLIANT

CE, ATEX, IECEx, RoHS and ISO 9001 certifications. FCC and Anatel in process.



SCALABLE OPERATIONS

Ready to grow and respond to global demand.



EXPERT TEAM

Engineers and skilled technicians ensuring excellence in every project.



AEInnova
Alternative
Energy Innovations

OUR MANUFACTURING CAPACITY



25K+

Production units per year



3

Production lines



100%

End-of-line testing



6-8

Weeks standard lead time



Partners in the supply chain and logistics

OUR MANUFACTURING PROCESS



Component supply



SMD assembly



Manual assembly



Testing and calibration



Quality control



Packaging and delivery



QUALITY FIRST

No compromise on product quality and reliability.



BUILT FOR GROWTH

Industrial capacity to meet today's and tomorrow's demand.



RELIABLE DELIVERY

Solutions that reach customers worldwide.



AEInnova

Alternative
Energy Innovations

HARVESTING
INDUSTRY'S
POTENTIAL

THANK YOU

LET'S BUILD A MORE SUSTAINABLE INDUSTRY TOGETHER

Batteryless Industrial IoT.
Real impact. No maintenance.



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NO BATTERIES.
NO LIMITS.



HIGHER
EFFICIENCY



LOWER
EMISSIONS



PREDICT
THE FUTURE



A MORE
SUSTAINABLE WORLD



*Energy
for a smarter
industry*

SENSING
A CLEANER TOMORROW

INDUSTRIAL IOT POWERED BY HEAT