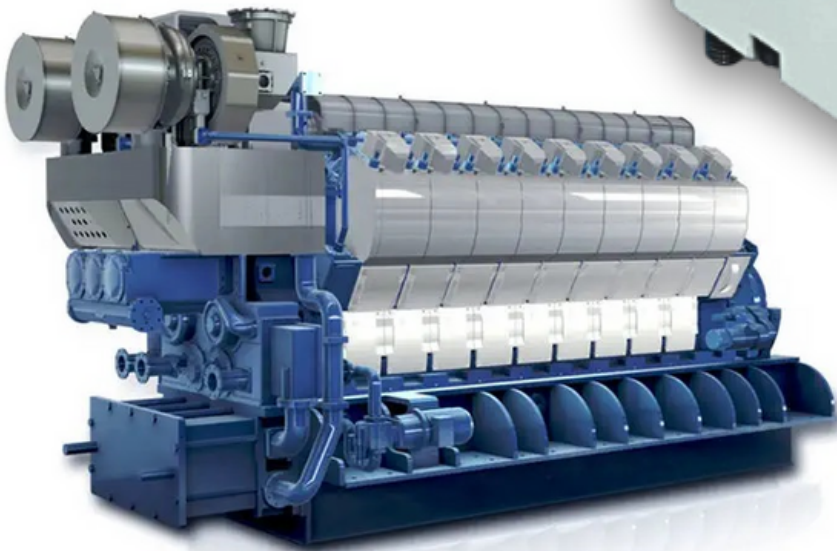


VaRoM

Valve Rotation Monitoring



Sense Freely
Self-Powered
Wireless-Batteryless

**VALVE ROTATION
MONITORING**
for Wärtsilä



ESCOM Enhanced Solutions

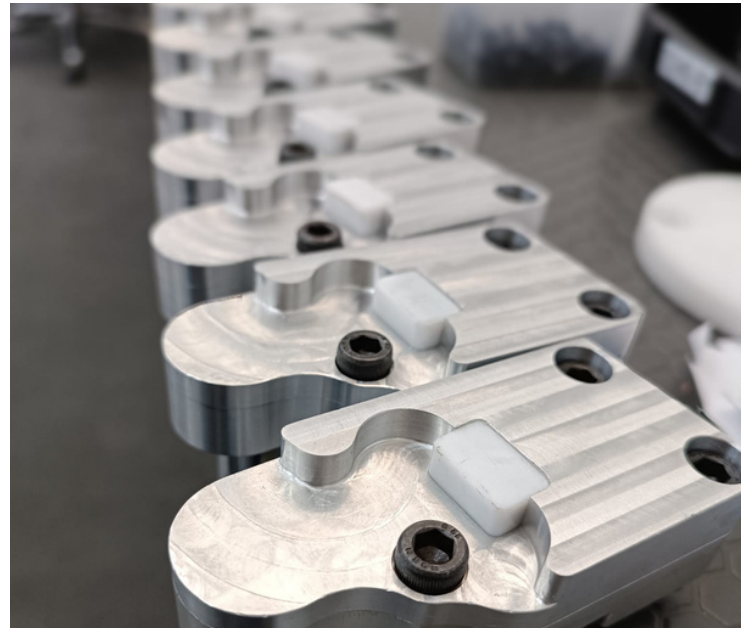
The Future of Wireless - Batteryless Energy Harvesting Sensing Technologies

ESCOM-ES is the R&D center founded in 2018 and owned by ESCOM Power Plants Engineering Services LTD.. We are focusing on and developing Self Powered - Wireless - Batteryless Sensors which is eliminating all wiring and cabling cost and workmanship which can reach many kms in a simple industrial plant. And offering smart and green solutions getting rid of batteries and cables...

No Battery - No Cable - No Wiring

ESCOM-ES offers a wide range of domestic and industrial sensing systems that can be used in harsh environment harvests its own power from ambient sources such as motion, temperature, sunlight, magnetic fields, or where energy is available to scavenge...

Self-powered, wireless sensing technology, combined with engineering expertise and rich analytics provide real-time information for our customer's needs...



SUSTAINABLE MEASUREMENT TECHNOLOGY

Industry-specific Solutions

We produce innovative and economical industrial solutions specific to the problems occurring in internal combustion engines. We ensure that physical information such as temperature, pressure, required in risky areas that are difficult to access in internal combustion engines are received and monitored securely.



NO MORE VALVE FAILURE

VaRoM will minimize the risks of VALVE FAILURE or SEIZURE by enabling 7/24 monitoring of valve rotation and temperature. and transmits the collected data via wireless communication protocols to Main Engine Control Interface.

Operators can monitor and follow each valve's real time data on SCADA, and long term information with engine conditions at once.

Combining these information with the clear and colorful images you will gain a full picture of engine valve's condition through VaRoM.



VaRoM will monitor the rotation speeds, and temperature of the valves in a continuous, reliable and safe manner.

In this way, it is to minimize the possibility of malfunction with a preventive, predictive and superior technological approach to the valve failure problem, which causes large work and production loss, very high repair, spare parts and labor costs, which are frequently seen in diesel engines.

Via ESCOM Enhanced Solutions, we are be able to go in depth in accessible knowledge.

SELF POWERED

VaRoM harvests its own power from vibration on the valve, No battery or power cable required.

Compatible for different resonance frequencies.

DATA OVER WIRELESS

VaRoM transmits the processed data to HMI over wireless protocols.

SENSOR FUSION

VaRoM equipped with Ultra Low Power magnetic sensor, temperature and optional sensors, so that combine all datas to valuable informations with a Sensor Fusion Technology.

7/24 MONITORING

VaRoM has adaptable interfaces or own scada application for operators to visualize.

DATABASE

All data from VaRoM can be stored in requested database options. Fully flexible on customizable options.

TECHNICAL SUPPORT

ESCOM Enhanced Solutions supports customers 7/24 on every point.

TURNKEY SOLUTIONS

ESCOM Enhanced Solutions offers turnkey solutions for your brand new or existing engines.

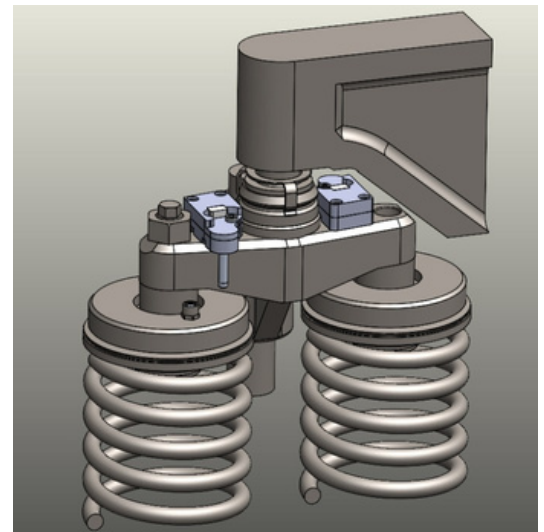
For more information on any of our products or services please visit us on the Web at: www.escom-es.com

VaRoM

Valve Rotation Monitoring

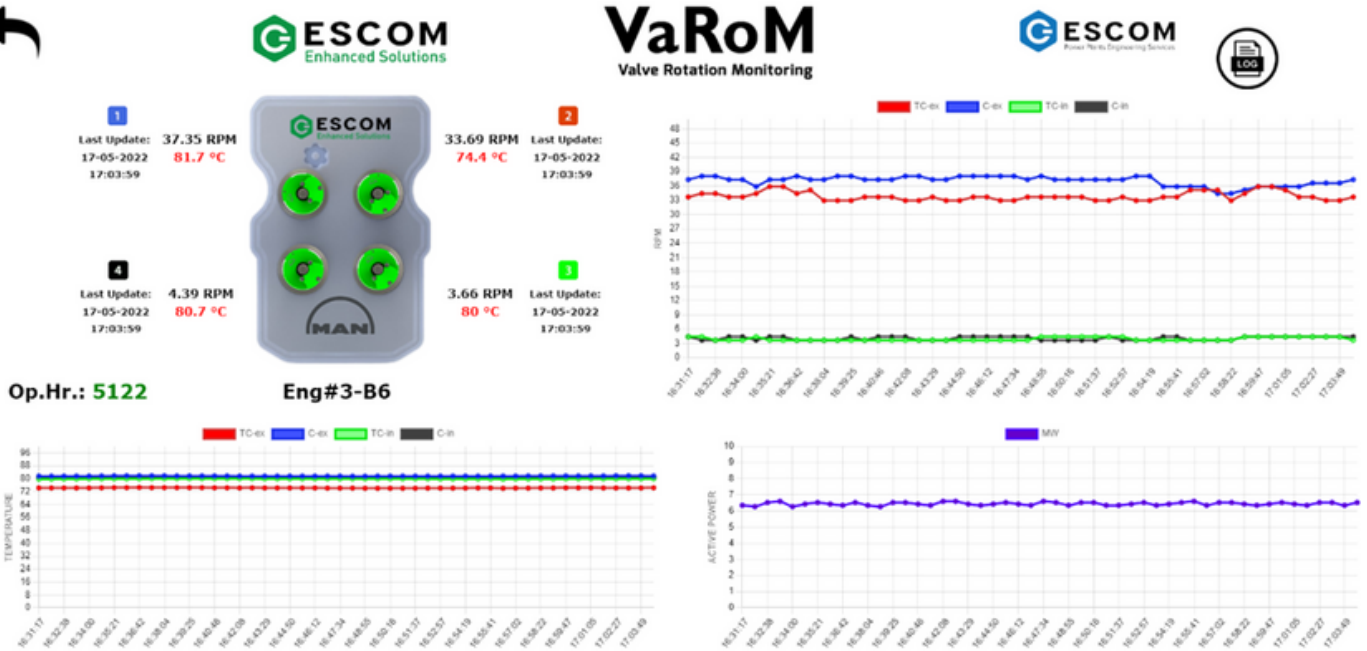
VaRoM is the first solution to be installed on the inlet and exhaust valves of engines and provides vital data about the valve rotation and temperature. Thus, operators can follow the valve conditions and apply preventive and protective maintenance against valve break failures which are very common failures in reciprocating engines and one single valve failure can cause millions to recover the engine.

- Integrated Batteryless - Wireless sensor solution
- Plug and play
- Energy harvesting by vibration
- Power management circuit
- 7/24 monitoring the rotation and temperature of valves
- Predictive & protective approach against to valve failure of reciprocating engine

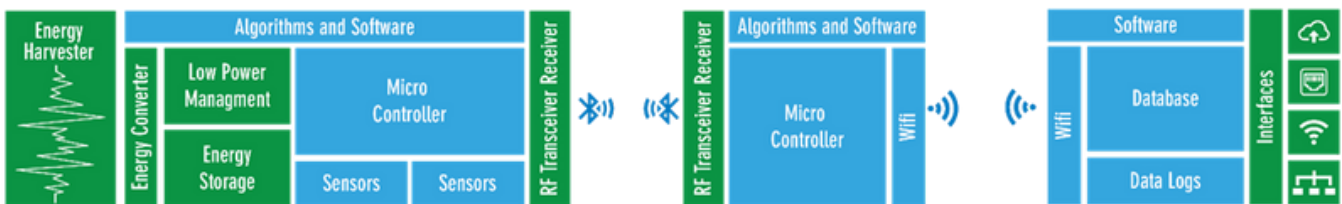


FEATURES and BENEFITS

- Easy-to-use SCADA application to visualize and analyze sensor data
- Automatically collects BLE data sent from the sensor
- Can store the data locally and visualize the data in HMI
- Energy harvesting at low frequencies for reciprocating engines
- Available in a range of different resonance frequencies
- High power to weight ratio
- Highly efficient AC/DC and DC/DC Power Management System (PMS)
- MPPT (Maximum power point tracking) to extract energy as efficiently as possible in different vibration conditions
- Integrated sensors and wireless communication
- Ultra-low power magnetic sensor
- Temperature sensor
- BLE (Bluetooth Low Energy) communication
- Custom DC power analyzer which continuously measures the charge power generated from the harvester and transmits information via BLE



Easy-to-use SCADA application to visualize and analyze sensor data. Automatically collects BLE data sent from the sensor. Can store the data locally and visualize the data in HMI.



No need to transfer power or data via wire, data collected from batteryless bluetooth sensors network (BSN) are transferred over Wi-Fi or BLE technology, converted, and transmitted to the server via sensor hub module within complete wireless scheme to integrate into your system with various industrial interface options.

- 01 What is VaRoM ?**
VaRoM is an innovative patented product, provides a vital data for Diesel/HFO engines which has never been monitored before.
- 02 What does VaRoM do ?**
VaRoM measures
- Valve rotation speed (rpm),
 - Temperature
- 03 Why VaRoM ?**
Valve seizure or valve break failure is one of the catastrophic incidents that frequently happens in Diesel/HFO engines due to bad combustion deposits and corrosion on valve stem and guides and result in very expensive property damages like cylinder head, piston, connecting rod, liner, and turbocharger. Rehabilitation and repair works will take too much time, effort and costs.
- VaRoM will minimize this risk by enabling 7/24 monitoring of valve rotation and temperature. Conventional sensor technology cannot be used inside the engine, and on moving parts, due to harsh working environment. VaRoM is the first product introduces batteryless and wireless sensor solution and can be installed inside the engine. No cables or power source is needed, because VaRoM generates its own power by energy harvesting from vibration of the valves. And transmits the collected data via wireless communication protocols. Operators can monitor and follow each valve's real time data on SCADA, and in case of any indication of valve seizure, pre-alarm or shutdown alarms will save the engine components on time. VaRoM can be easily adopted and installed on various engine types and models.
- 04 What are the advantages of VaRoM ?**
- Innovative sensor technology
 - No need to batteries or cables
 - Continuous monitoring and control of valves
 - Predictive and preventive approach for valve break failure
 - Easy to adopt and install on different engine models
 - Customizable, flexible, and scalable for customers' requirements
- 05 For whom VaRoM was developed ?**
VaRoM is developed for diesel engine manufacturers, power plant owners, marine shipowners, power ships, operation and maintenance service providers



Power Source:
Vibration Harvester
Power Consumption: <math><150\mu\text{W}</math>

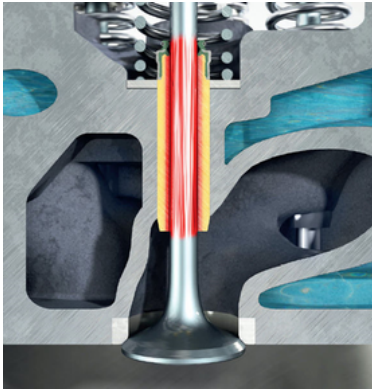
Sensors:
Magnetic sensor
Temperature

Easy installation with :
3x M6 Bolts

Data Transmisson: BLE
RF Transmission: +8dBm
Sampling Rate:
per revolution of valves



Importance of VALVE ROTATION



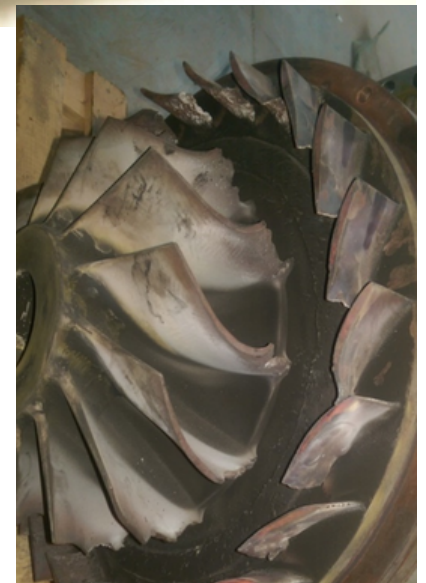
At a typical 500-RPM engine, each inlet/exhaust valve opens and closes 250 times a minute, each valve rotates app. 5/30 rev. per minute. and Inlet / Exhaust valves are designed to rotate, and this rotation is essential to valve longevity since it helps.

- To prevent deposits from building up around the seat, stem, and guide
- To reduce the wear, the friction
- To increase the life period of the components
- To maintain the conical valve face and seat clean of carbon or soot deposit that might appear on surfaces during valve opening providing a good sealing of the cylinder
- To uniform the thermal stress of the valve head because of the asymmetry exhaust manifold
- To avoid another unwanted phenomenon Valve Burning

Another important result of the valve rotation is the uniformity of the oil film in the valve guide and on the valve stem. The wear caused by the contact between valve and rocker arm is reduced by varying the contact point. Precise alignment of the rocker arm is essential for proper valve rotation.

A poorly aligned rocker arm can wear out a valve guide within 100 hours of engine operation and that wear can cause improper valve seating, hot spots, and valve damage or failure.

The different failure modes affecting the valve failures can cause costly and consequently vital equipment damage as piston, liner, turbocharger and crankshaft damages.



Traditional cylinder compression checks or visual valve rotation checks with 2 technical staff were only diagnostic methods till VaRoM.

Low readings on a compression test, and the sound of flame leaking from the exhaust, are obvious warning signs of valve problems. Integrating all these check results needs an experienced eye and ear to submit a failure result.

TECHNICAL SPECIFICATIONS

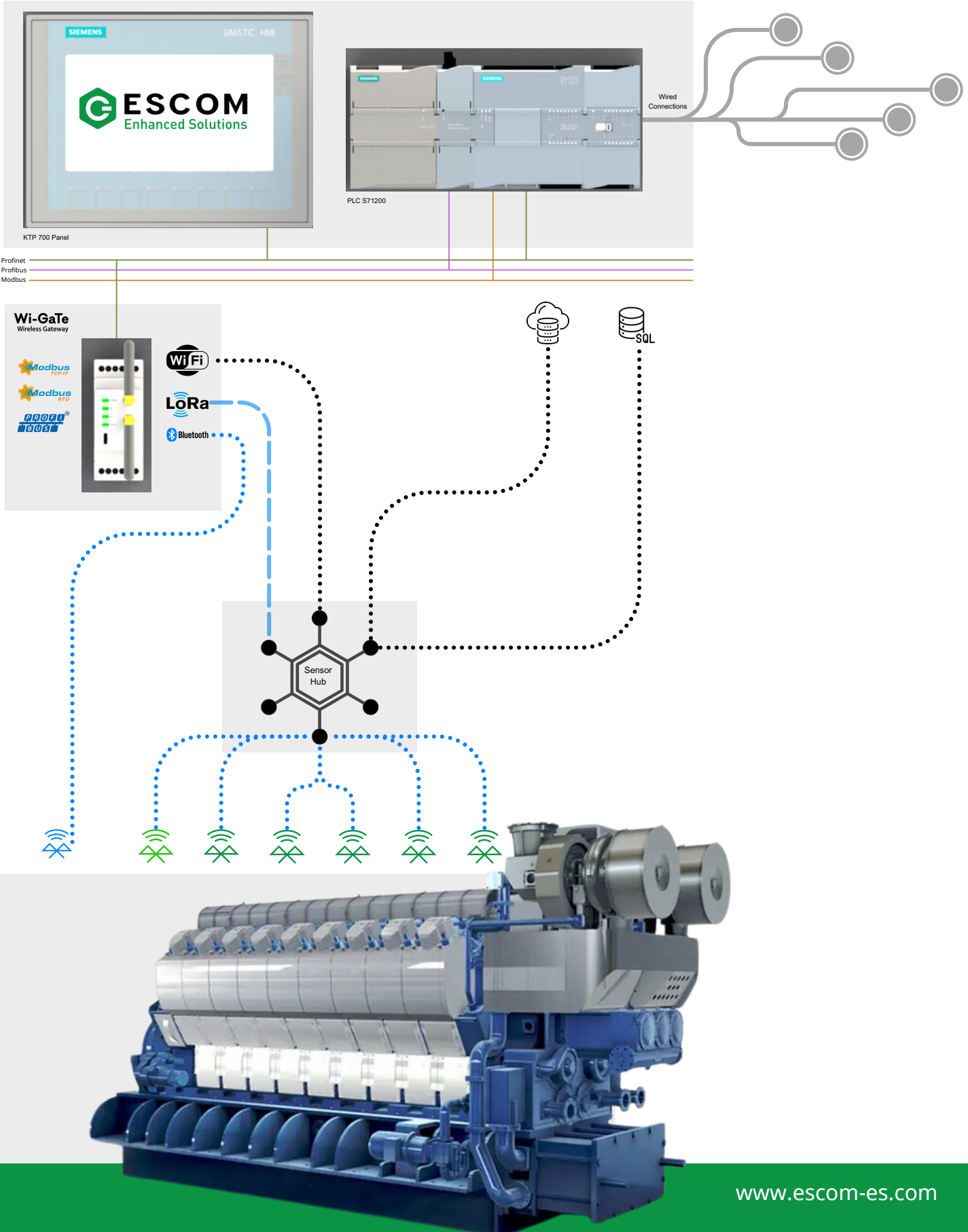
Power Source (Self Powered)	Vibration Harvester
Installed Sensors	Magnetic Sensor, Temperature
Data Transmission	BLE
Rf Transmission Power	+8 dBm
Sampling Refresh Rate	Per Revoluton of Valves
Data Output	Rpm, Temperature
Weight	215 grams
Dimensions	L= 86mm W=40mm H=59mm
Operating Temperature	-40 +105°C
Power Consumtuion	<150μW
Customizable	Yes

Innovative Energy Harvesting for the Enhanced Industrial Sensing Solutions

Our innovative energy harvesting, low power consumption, and wireless data transmission technologies are paving the way for a smarter, more connected future. Explore our cutting-edge solutions and revolutionize the way you collect and process data in your industrial systems

INDUSTRIAL IoT

Wireless BatteryLess Sensors & Network





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