Milesight

SUCCESS STORY

The Smart Islands Project in Rarotonga
- Cook Islands, New Zealand

LoRaWAN®

——Milesight Helps to Improve Water Distribution and Leak Detection,
Building Automaton, Energy Efficiency, and Indoor Air Quality

Contents

Background

The Cook Islands, renowned for its stunning coastal areas and lush mountains, has become a popular tourist destination. The tourism sector has played a significant role in the country's economic growth over the past decade. In 2021, the government of this South Pacific nation introduced the SMART Economy Initiative, aiming to further enhance its development.

Picture 1 Cook Islands

As part of this initiative, the Smart Islands project was launched, encompassing following key sub-projects:

- Efficient water distribution management
- Water tank level monitoring
- Energy management, Building Automation, and indoor air quality enhancement through a closed-loop and centralized HVAC systems.

By incorporating Milesight's LoRaWAN® sensors into these projects, overall efficiency and sustainability in both work and daily life on the islands are being improved.

Picture 2 Satellite map of Cook Island

Challenges

Implementing innovative projects in the Cook Islands poses several challenges due to its unique location and climate. These challenges include:

Poor Network Coverage

Due to the remote location of the Cook Islands, ensuring reliable cellular and internet communication coverage presents inherent difficulties. Limited connectivity can lead to network downtime, hindering seamless operations and data transmission. To overcome this challenge and establish robust connectivity throughout the islands, innovative solutions and infrastructure improvements are necessary.

Installation Challenges

Installing pressure sensors in concrete valve pits with steel manhole covers has proven to be a complex and time-consuming task. The combination of different materials, precise positioning requirements, and sealing needs have posed installation challenges for the project.

Supply Chain

Timely availability of the required products is crucial for the smooth implementation of the Smart Islands project. Meticulous planning, coordination, and stock management are necessary to overcome supply chain difficulties and avoid project timeline delays.

Harsh Environmental

The challenging tropical island climate exposes equipment to severe environmental conditions, including intense winds, high temperatures, UV radiation, high humidity combined with seawater, and frequent heavy rainfall. Airborne salinity further exacerbates the corrosion aggressiveness. These conditions can lead to elevated corrosion rates and potentially impact the performance and functionality of the products.

Insect and Animal Interference

Insects such as ants and wasps, as well as animals like geckos, have the potential to invade or occupy protective housings, enclosures, sensors, and gateways, which can compromise their functionality. Implementing effective measures and safeguards is essential to prevent and mitigate such interference, ensuring uninterrupted operation and accuracy of the sensors and related systems.

Why Choose Milesight

> ICTnexus/IQnexus made the decision to opt for Milesight products for the Smart Islands project due to their alignment with the project's specific system requirements. Apart from offering long battery life, high product quality, and low-cost maintenance, the selection of Milesight products was also influenced by their outstanding service.

"Their strong reputation for providing reliable customer support and prompt technical assistance played a significant role in our decision-making process,"

—— Michael Welzel, CTO of ICTnexus/IQnexus

Project

Water Distribution Management

To guarantee a consistent and dependable water supply to residents of Rarotonga, the largest and most populated of the Cook Islands, a meticulously designed water distribution system is in place. The process begins by sourcing water from natural sources such as creeks, rivers, or underground reservoirs. This water is collected at intake points and undergoes treatment processes to meet quality standards, preparing it for distribution.
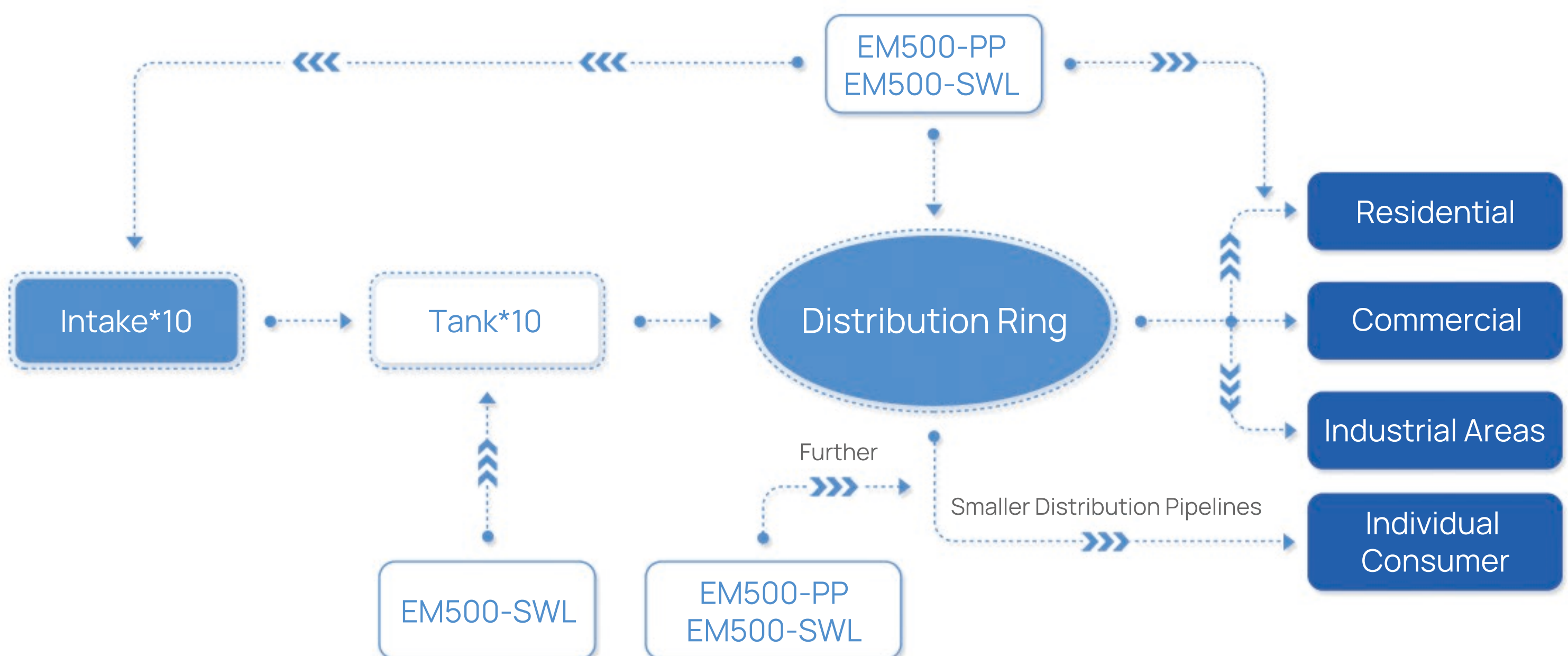
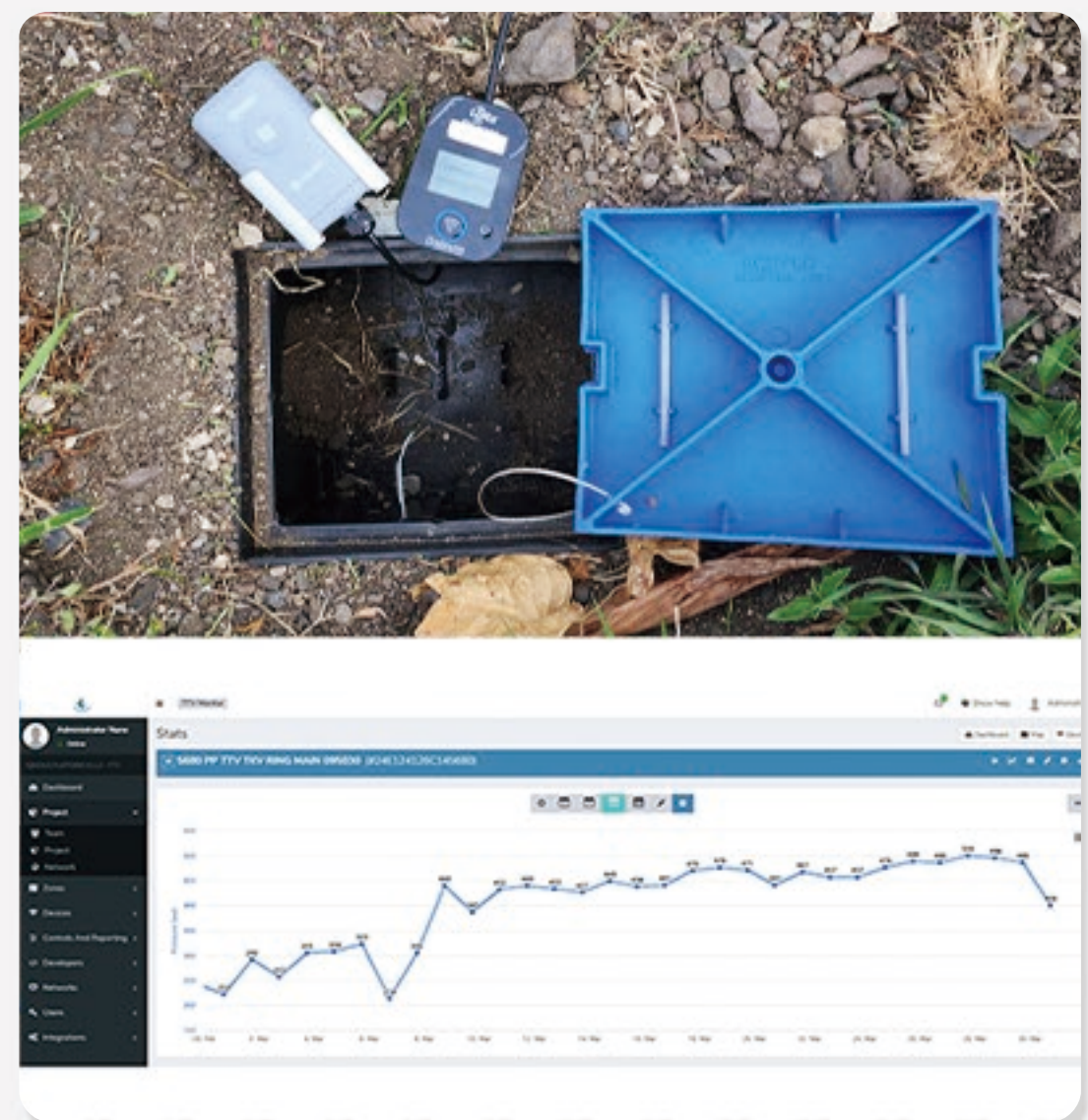Picture 3 Full scale future Monitoring System

To enable efficient monitoring and analysis of the water distribution system, the project utilizes LoRaWAN® technology. At each intake point, various LoRaWAN® sensors from Milesight are employed to monitor different parameters, including buffer tank levels, pressure, and water volume produced. These sensors provide valuable and actionable data for managing the system effectively.
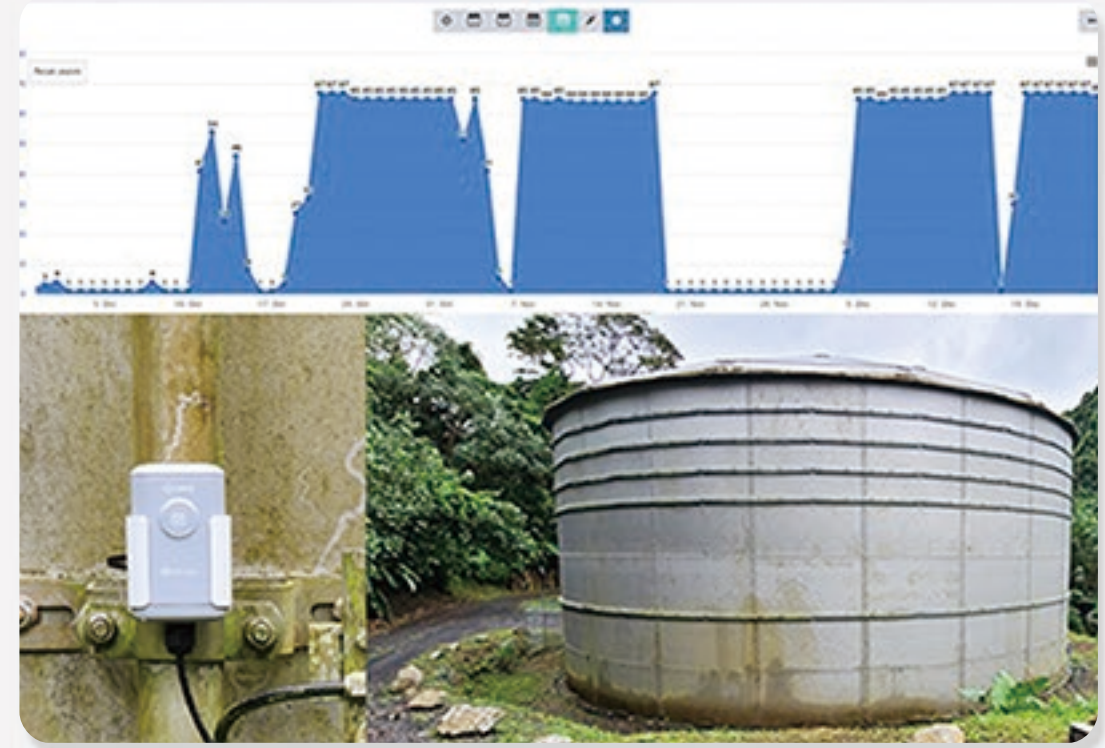
Picture 4 Tank Pressure

After treatment, the water from the ten main intake points is transported to the main distribution ring. Each intake point is connected to the main ring through pipelines equipped with connection points. These connection points are installed with water meters and Milesight EM500-PP Pipe Pressure sensors. The EM500-PP sensors are specifically designed to measure pressures of liquids and gases, facilitating pressure monitoring of tank levels and pipe pressure and leakages. The data collected by these sensors and the LoRaWAN® ModBus transceivers, which are connected to the water meters, are transmitted using LoRaWAN® technology.

Picture 5 Ring Pressure

To enable efficient monitoring and analysis of the water distribution system, the project utilizes LoRaWAN® technology. At each intake point, various LoRaWAN® sensors from Milesight are employed to monitor different parameters, including buffer tank levels, pressure, and water volume produced. These sensors provide valuable and actionable data for managing the system effectively.

Picture 6 Project Deployment

From the central ring, smaller distribution pipelines extend to individual consumers, delivering water to their respective locations. As part of future plans for the intakes and distribution, EM500-PP Pipe pressure sensors and EM500-SWL Submersible Water Level Sensors will be installed to accurately monitor water pressure and consumption, further enhancing the efficiency of the system.

Picture 7 Project Deployment

Benefits

The implementation of these sensors brings significant benefits by accurately measuring water production, consumption, levels, and pressure, providing valuable data for the early detection of any abnormalities or issues. With strategically positioned pressure-regulating valves, the system maintains optimal pressure levels throughout the network, ensuring smooth water flow.

To ensure an uninterrupted water supply, regular maintenance activities such as inspections, leak detection, and infrastructure upgrades are conducted. Water management authorities closely monitor the system, promptly identifying and addressing any leaks, blockages, or inefficiencies that may arise. The solution includes the utilization of the IQnexus IoT Platform, which offers actionable insights and analytics to optimize the performance of the water distribution system.

The ultimate goal of the water distribution system in Rarotonga is to provide residents and businesses with reliable and efficient access to water. Through meticulous design, continuous monitoring, and proactive maintenance, the system guarantees the delivery of clean and safe water for everyday needs.

Water Tank Level Monitoring

In residential and commercial settings, it is common to have a buffer water tank connected to the main water supply, which is equipped with a pump to facilitate efficient pressure for water distribution.

To ensure an adequate water supply, the installation of Milesight EM500-SWL Submersible Water Level Sensors proves invaluable as it provides accurate and real-time information about the current tank level.

The EM500-SWL sensor plays a significant role, particularly in situations where the buffer tank is partially filled with rainwater. By monitoring the level of rainwater accumulation, the EM500-SWL sensor enables precise tracking of the availability of rainwater as an alternative water source. This reduces reliance on the main water supply and promotes sustainable water management practices.

Alongside the EM500-SWL sensor, a water meter is installed in the building's water supply system to measure overall water consumption. This allows for comprehensive monitoring of water usage and leak detection within the building.
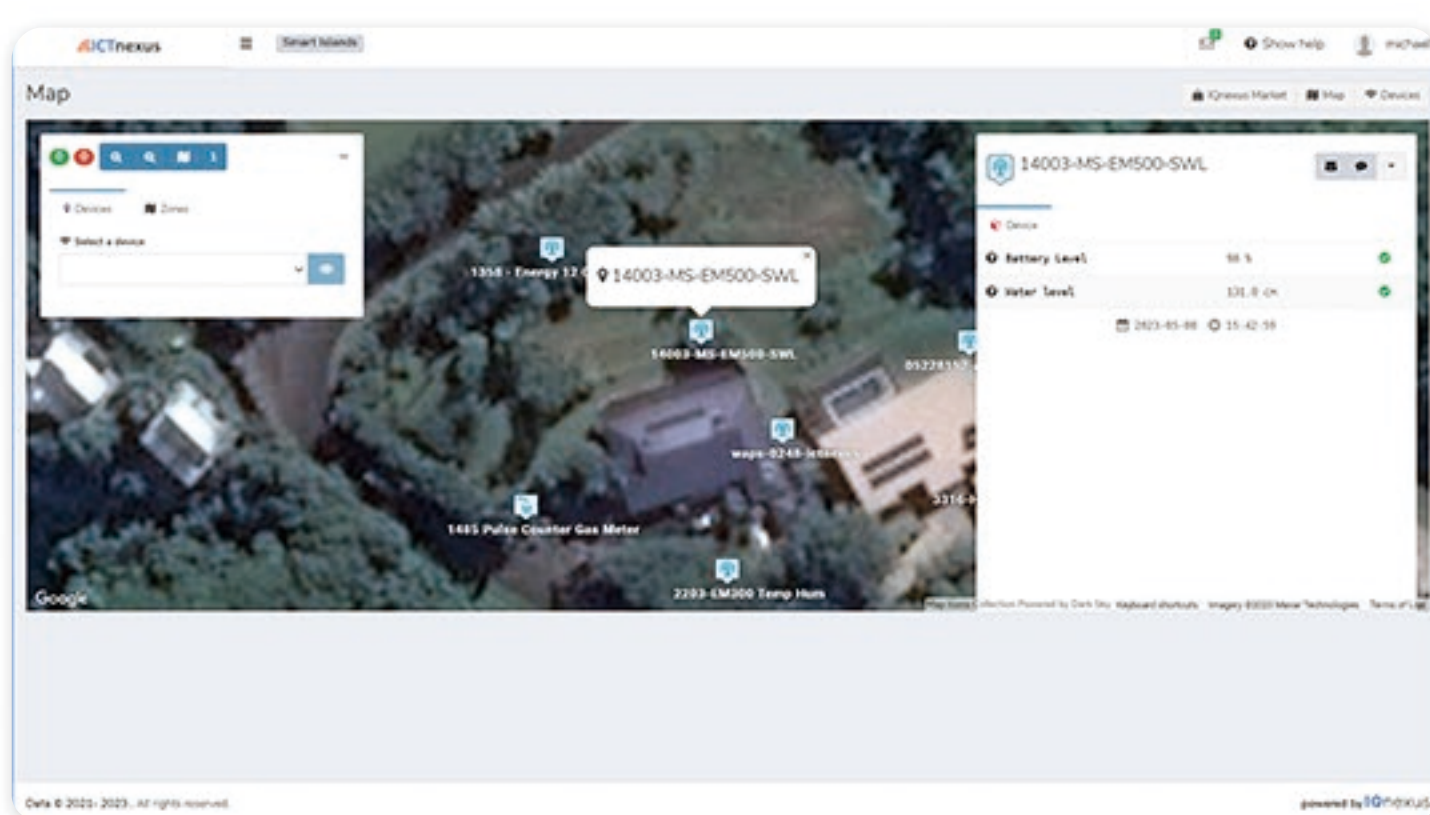
Picture 8 EM500-SWL Water Level Sensor on Map

Picture 9 EM500-SWL Water Level Status

Benefits

• Efficient Water Management

The data collected by the EM500-SWL sensor and water meter empowers building managers or homeowners to make informed decisions regarding water usage and management. With insights into consumption patterns and tank levels, they can optimize water distribution, promptly detect and address leaks, and implement water-saving practices.

• Cost Savings and Sustainability

Monitoring the buffer tank level and analyzing water consumption through the EM500-SWL sensor contributes to cost savings and promotes sustainable water management. By identifying opportunities to utilize rainwater or implement water conservation measures, dependence on the main water supply is reduced, resulting in lower water bills and a decreased environmental footprint.

IAQ Enhancement

Creating a healthy and comfortable indoor environment relies on maintaining excellent indoor air quality (IAQ). However, achieving optimal IAQ in closed loop HVAC (Heating, Ventilation, and Air Conditioning) systems poses challenges due to limited fresh air exchange, due to the system character and the high outdoor temperatures.
This case study explores how Milesight's advanced products enhance IAQ in closed loop systems through the integration of IAQ sensors, controllers, and outdoor air intake.
In addition to measuring energy consumption, gas usage, and water usage with meters, the Indoor Air Quality (IAQ) also plays a crucial role in creating a healthy and productive indoor environment.

## Milesight Sensors for IAQ Improvement

Milesight's range of sensors, including the LoRaWAN® AM Series IAQ Sensors (AM103, AM307, and AM319) and EM300-TH LoRaWAN®Temperature and Humidity Sensors, have proven to be powerful tools in building automation and management.

These sensors effectively monitor and measure key IAQ parameters such as temperature, humidity, carbon dioxide levels (CO_2), TVOC, light, PM2.5 and PM10 particles, HCHO, O_3, and PIR motion.

By collecting real-time data, Milesight IAQ sensors provide valuable insights into the indoor environment, enabling proactive measures to maintain optimal IAQ.
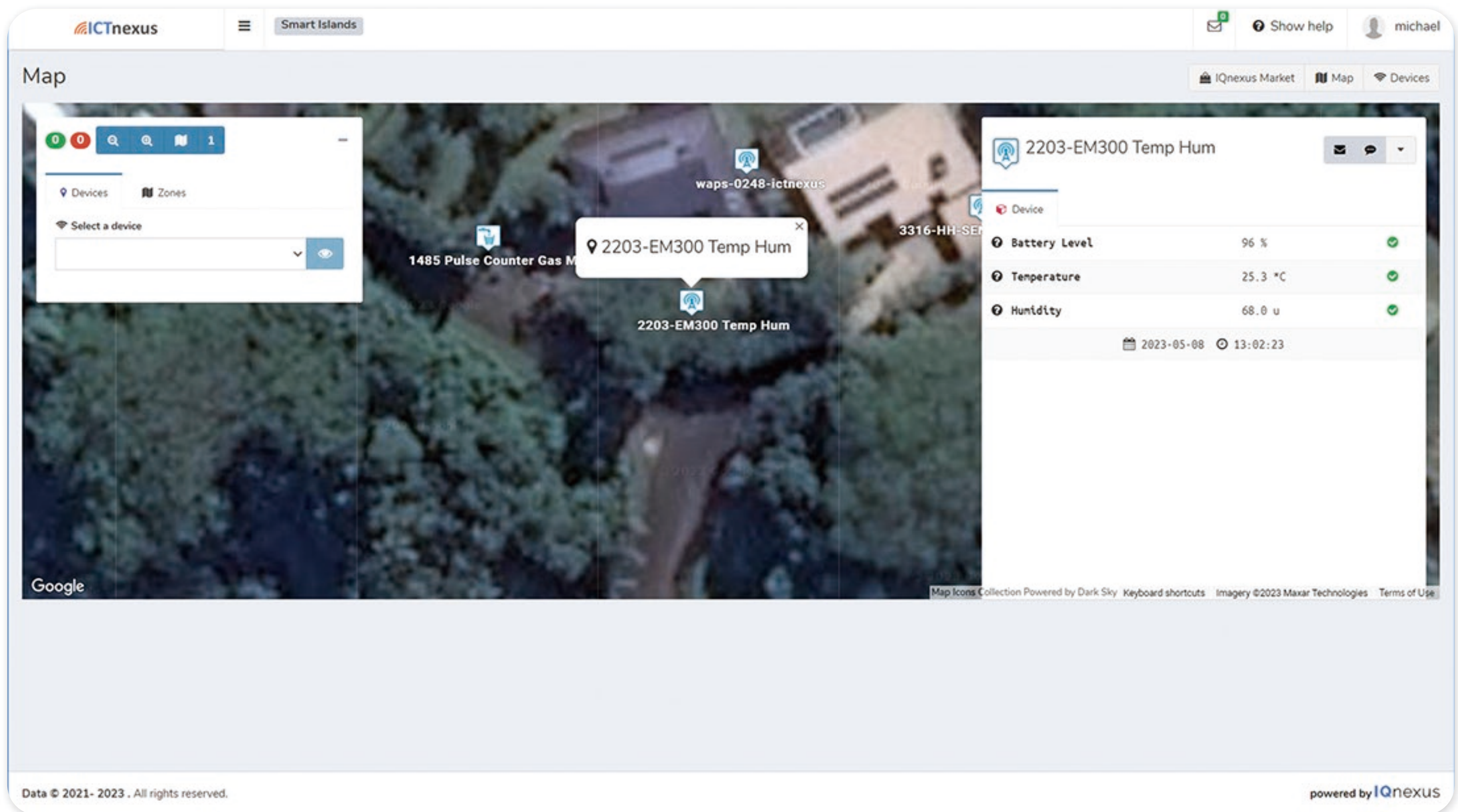

Picture 10 Indoor Air Quality Data
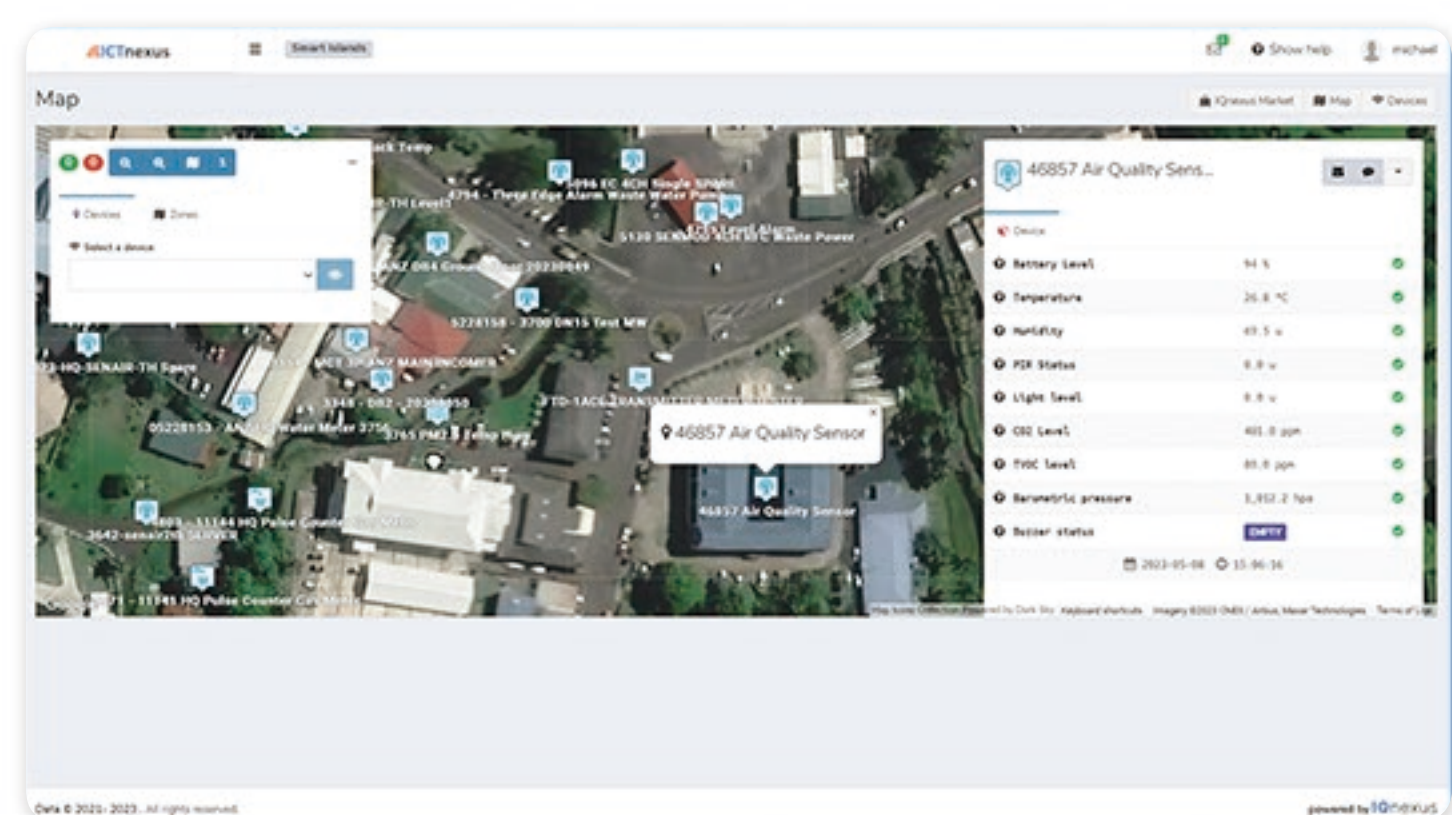
Picture 11 Indoor Air Quality Sensor in Map

control, ensuring comfort and optimizing energy management. These sensors are specifically designed for environments like storage, archives, and server rooms.

Picture 12 EM300-TH Sensor on Map

By integrating Milesight sensors into closed loop and centralized HVAC systems, building automation is enhanced, energy efficiency is optimized, and indoor air quality is significantly improved. These advancements contribute to a healthier and more comfortable environment for occupants while ensuring efficient energy usage.

The data collected by Milesight sensors can be subjected to advanced algorithms and machine learning techniques for analysis. This analysis enables the identification of patterns, detection of deviations, and prediction of potential Energy & IAQ issues. Armed with this information, building operators can take timely actions to address Energy & IAQ problems and create a healthier indoor environment for occupants, save Energy and lower the carbon footprint.

Milesight Sensors for Lower Energy Consumption

In closed-loop HVAC systems, maintaining good IAQ necessitates the intake of outdoor air. By introducing fresh outdoor air, the concentration of indoor pollutants can be reduced. However, this outdoor air intake has energy implications. Conditioning the outdoor air to meet desired indoor temperature and humidity levels consumes a significant amount of energy.

To optimize energy efficiency while still ensuring good IAQ, the ventilation rate can be adjusted based on the data collected by Milesight Indoor Air Quality Sensors. If the IAQ remains at a satisfactory level, the ventilation rate can be reduced, thereby minimizing energy consumption while still meeting IAQ requirements.

During night-time, cool air can be utilized to lower the temperature and refresh the building with fresh air. This process necessitates the measurement of outdoor parameters such as temperature, humidity, and air quality, as well as the corresponding indoor values.

By monitoring the outdoor conditions, including temperature, humidity, and air quality, building operators can determine when it is suitable to take advantage of the cooler air during the night. This allows for the strategic opening of windows or adjusting ventilation systems to bring in fresh air while simultaneously lowering the indoor temperature.

The measurement of indoor parameters, including temperature, humidity, and air quality, is equally important. By continuously monitoring these factors, building operators can ensure that the indoor environment remains comfortable and healthy for occupants.

The integration of Milesight sensors enables the accurate measurement of both outdoor and indoor parameters, providing the necessary data to make informed decisions regarding night-time cooling and ventilation strategies. This approach not only helps to maintain a pleasant indoor environment but also contributes to energy efficiency by reducing the reliance on mechanical cooling systems during cooler night-time conditions.

Conclusion

Enhancing indoor air quality (IAQ) in closed-loop HVAC systems is essential for establishing a healthy and comfortable indoor environment. By harnessing the capabilities of Milesight LoRaWAN® sensors and implementing outdoor air intake strategies, it becomes possible to improve IAQ while also addressing the associated higher energy consumption and its impact on energy management.

By deploying Milesight LoRaWAN® sensors, key IAQ parameters such as temperature, humidity, carbon dioxide levels, volatile organic compounds, and particulate matter can be accurately monitored in real-time. This comprehensive monitoring enables proactive measures to be taken in maintaining optimal IAQ levels.

In conjunction with IAQ monitoring, implementing effective outdoor air intake strategies becomes crucial. While outdoor air intake is vital for refreshing the indoor environment, it can also result in increased energy consumption due to the need for conditioning the incoming air. Therefore, careful consideration must be given to strike a balance between optimal IAQ and energy management.

By integrating Milesight sensors and incorporating outdoor air intake strategies, building operators can effectively manage IAQ while mitigating excessive energy consumption. This approach allows for the provision of a healthy and comfortable indoor environment while optimizing energy usage and promoting sustainable energy management practices.

Related Products

EM500-PP Pipe Pressure Sensor

- Shock-Resistant and Vibration-Resistant
- 10 Years Battery Life
- IP67 Rating Enclosure

EM500-PP Pipe Pressure Sensor

- Customizable Measuring Range up to 200m
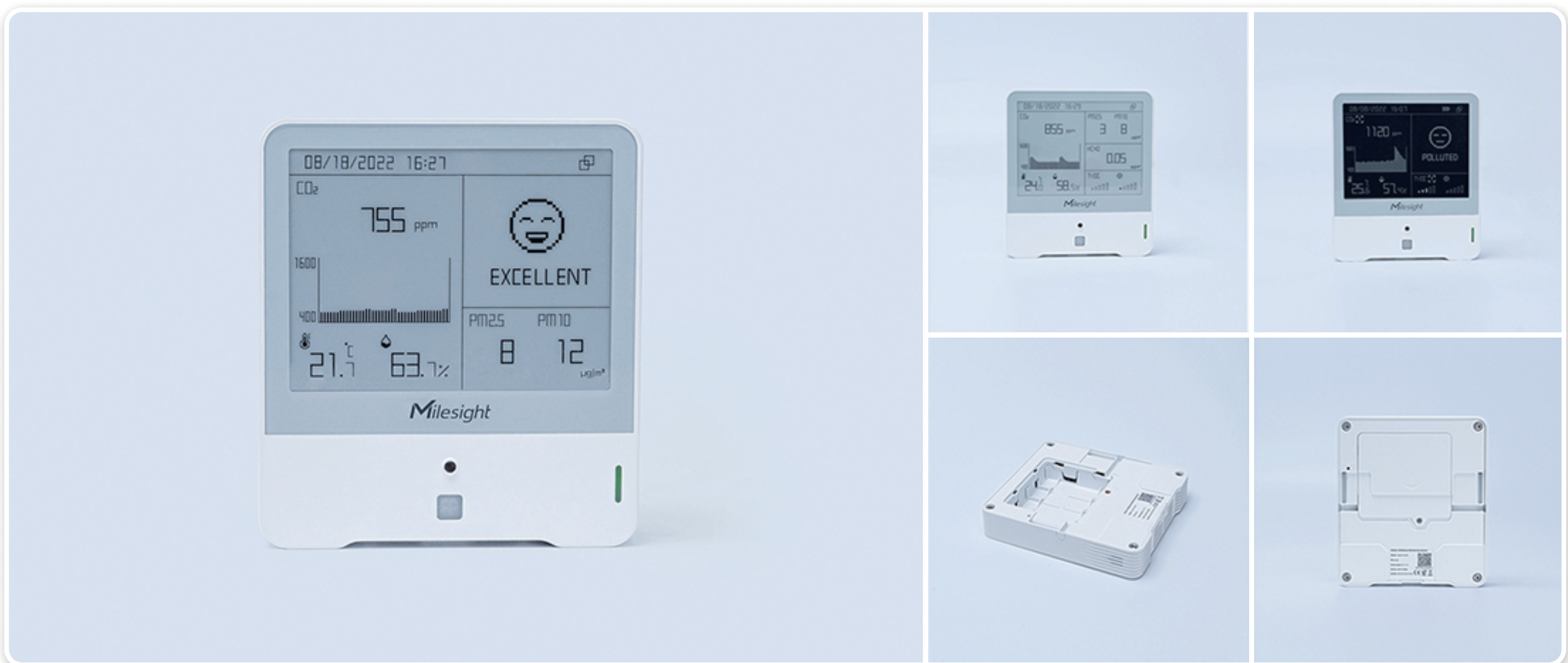- 10 Years Battery Life
- IP67 Rating Enclosure

AM307 7-in-1 Indoor Air Quality Sensor

- 7 Sensors in 1
- 4.2 Inch E-ink Screen
- Traffic Light Status Indicator
- Vivid Emoticon Indication

AM319 9-in-1 Indoor Air Quality Sensor

- 9 Sensors in 1
- 4.2 Inch E-ink Screen
- Traffic Light Status Indicator
- Vivid Emoticon Indication

EM300-TH Temperature and Humidity Sensors

- High Sensitive Sensor
- 5/10 Years Battery Life
- IP67 Waterproof
- Easy Configuration (via NFC)

About IQnexus

IQnexus is a market-leading provider of sophisticated IoT solutions for a wide range of applications, including Building Automation, Air Quality Monitoring, SCADA (Supervisory Control and Data Acquisition), Energy Management, Water Management, and other related industrial and commercial sectors. With a strong reputation in the industry, IQnexus specializes in delivering complex IoT solutions that meet the unique needs and challenges of their clients.

About ICTnexus, the local partner of IQnexus in the Cook Islands

ICTnexus is a prominent company based in the Cook Islands, offering a wide range of services and solutions in the field of information and communication technology. With a strong presence in the local market, ICTnexus serves as a trusted partner for businesses and organizations seeking innovative technology solutions.

Milesight

Tel: 86-592-5085280
Sales Email: iot.sales@milesight.com
Address: Building C09, Software Park Phase III, Xiamen 361024, Fujian, China

Support Email: iot.support@milesight.com
Website: www.milesight.com