Wireless IoT Sensing Solutions

Modularized and Ready-to-Use Solutions
High Adaptability for IoT Sensing

- IoT Sensing Applications
- LPWAN and Wireless Ethernet
  IoT Architecture
- IoT Technology
- Product Highlights
- Selection Guide

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Jump Start to **IoT Solution**…

Data acquisition has played a key role throughout the IoT era. Increasingly more devices are being interconnected and wireless applications have become the preferred network solution.

As a leading provider of IoT solutions, Advantech continues to develop a wide range of wireless sensing devices for various application fields in order to offer customers the latest solutions to complete their IoT application systems.

Be WISE, Make Sense, Boost Your IoT
The WISE-4000 addresses concerns over low-quality wireless networks by utilizing local data storage to store data in the node, ensuring zero data loss when connections are weak or even broken.

To send data from devices to the cloud or widely deployed aggregate devices, one might be afraid that an IoT system would become overly complex. However, with WISE-4000’s cloud access ability, data can be transmitted directly to the cloud without the need for a gateway.

In IoT, the purpose of data acquisition is to connect data to the cloud in order to improve managerial efficiency. The WISE-4000 provides a wireless communication interface, IoT protocols, and pre-integrated major cloud service connectivity to facilitate connecting data to the cloud.
Overcome Barriers to Connectivity with
IoT and Big Data Technology

As the primary source of big data, data sensing plays a key role in the realization of IoT systems. To obtain different types of data for different IoT applications, conventional automation architecture and basic data acquisition alone are no longer sufficient, which is why Advantech has developed the WISE-4000 wireless sensor node (WSN). Based on the latest IoT concepts and technology, the WISE-4000 is a cloud-ready data sensing and communication tool that can help you realize your IoT system.

Cloud Integration

To provide complete IoT sensing solution, the WISE-4000 series goes beyond providing a wireless communication interface for sensors—it also provides cloud connectivity for additional user applications. With support for IoT protocols such as REST and MQTT, the WISE-4000 series can communicate with cloud services or other web services via secure web sockets. The WISE-4000 series comes with pre-integrated APIs for major cloud service providers (e.g., Dropbox) and IoT cloud services (e.g., Azure IoT Hub) and provides support for both private cloud platforms (e.g., private file servers or databases) and ERP/MES systems.

Modbus

Modbus is an automation protocol widely used in PLC communication and SCADA systems. It adopts master-slave system architecture, in which the master polls individual slave devices to determine their status. In such systems, slaves do not send messages unless they have been polled.

RESTful

The REST communication approach can take advantage of not having to leverage much bandwidth while transmitting data. With RESTful web API in JSON format, data can be easily integrated to IoT services and optimized for use over the Internet. Additionally, REST support HTTPS or TLS, which improve security while publishing or retrieving data between devices and the cloud. Furthermore, it also enables end devices to publish data actively.

3 Questions x 3 Minutes, Determine which product is right for you!

What’s the first consideration of your IoT application?

- High-Volume, Real-Time Data
- Limited Power Supply
- Environmental Conditions
**MQTT Protocol**

WISE-4000 series leverages MQTT—a publish/subscribe messaging protocol for constrained IoT devices in low-bandwidth, high-latency, or unreliable networks—to communicate directly with the cloud or ERP/MES systems without a gateway or converter.

With this device-to-cloud architecture, lite payload, and low bandwidth, the WISE-4000 is the ideal solution for high-volume data collection applications because it can simplify the communication and hardware complexity of IoT systems.

**Wireless Communication**

Advancements in IoT have led to the development of many wireless technologies that can be implemented in various hardware products. The WISE-4000 utilizes Wi-Fi, 3G, and LPWAN to meet specific wireless communication requirements.

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**Are devices deployed over a wide area?**

<table>
<thead>
<tr>
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<th>YES</th>
<th>Is the power supply limited?</th>
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<th>N0</th>
<th>WISE-4470</th>
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<td>p.12</td>
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<td>Is GPS required?</td>
<td>N0</td>
<td>WISE-4210</td>
<td>p.8</td>
<td></td>
</tr>
<tr>
<td></td>
<td>YES</td>
<td>Is private network required?</td>
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<td>WISE-4470</td>
<td>p.10</td>
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<tr>
<td></td>
<td>N0</td>
<td>Is private network required?</td>
<td>N0</td>
<td>WISE-4471</td>
<td>p.10</td>
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</tr>
</tbody>
</table>
**Wireless Ethernet Architecture**

Wireless Ethernet is the simplest interface for IoT applications. It can be easily integrated with existing data or web servers. The WISE-4220 supports Wi-Fi for organizing wireless networks with access points that can be extended to WANs via a cellular router. Moreover, the WISE-4470 and WISE-4670 provide direct support for cellular interfaces for distributed data acquisition. With MQTT and RESTful web services, the WISE-4000 series can connect to cloud services without the need for individual IP addresses.

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**Data Storage with RTC Time Stamp**

- **10,000 Samples**

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**Public and Private Cloud Connectivity**

- **MQTT**
  - Batch
  - Push

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**Wireless Ethernet Architecture**

- **Cloud Service**
- **Public Cloud**
- **Private Cloud**
- **MQTT**
- **RESTful**

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**AP**

- **Wireless AP**
  - EKI-6332GN

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**End Node**

- **WLAN Industrial IoT Wireless Sensor Node**
  - WISE-4220-S200
- **3G IP65-Rated Wireless Sensor Node**
  - WISE-4470-S400
- **3G Outdoor Wireless Sensor Node**
  - WISE-4670-S600
Low-Power Wide-Area Network (LPWAN) Architecture

LPWAN technology, including LoRa, SigFox, and NB-IoT, is suitable for applications requiring low-volume, long-range data transmission while maintaining a long battery life, minimal cost, and low levels of interference. The WISE-4000 series provides both standard LPWAN, eMTC/NB-IoT, and LoRa devices to meet different long-range sensing requirements. For the WISE-4210, and WISE-4610 end nodes, Advantech also provides LPWAN access points or LoRa gateways, enabling users can easily build up an LPWAN or LoRa network.

Up to 5-km Communication Range

Better Coverage and Less Interference

LPWAN Architecture

- Cloud Service
- AP / Gateway
- End Node

Public Cloud

Private Cloud

RESTful

CoAP

MQTT

LPWAN AP
WISE-4210-AP

LoRa Gateway
WISE-3610

LPWAN Industrial IoT Wireless Sensor Node
WISE-4210-S200

NB-IoT/ eMTC IP65-Rated IoT Wireless Sensor Node
WISE-4471-S400

LoRa Outdoor IoT Wireless Sensor Node
WISE-4610-S600
**WISE-4200**

*Industrial IoT Wireless Sensor Node*

The WISE-4200 series comprises sensor-integrated WSNs that offer modularized sensor and I/O interface configuration options. With this series, data can be easily collected via a single node without additional development or assembly. WISE-4200 nodes are suitable for environmental monitoring and management applications in factories, pipelines, data centers, and warehouses.

- **Built-In Sensor and I/O**  
  Combination of I/O and sensors makes it a ready-to-use node for various applications.

- **Battery-Powered**  
  Utilizing LPWAN technology means that the WISE-4210 can be powered by 3.6-V AA lithium battery.

- **Flexible Mounting**  
  DIN-Rail, wall and pole mounting enable fitting in any installation environment.

- **IoT Protocols**  
  MQTT and RESTful web API in JSON format for IoT or cloud service integration.
WISE-4210
LPWAN Industrial IoT Wireless Sensor Node
The WISE-4210 utilizes LPWAN technology to provide modularized nodes that can transmit data over long distances without interference.

With low power consumption and wide area communication features, this solution can provide coverage up to 5 km.

- Sub-1-GHz LPWAN with 5-km line-of-sight communication
- 3 x 3.6-V AA lithium batteries for a 5-year lifetime
- Easy to organize LPWAN data access via wireless access points

WISE-4220
WLAN Industrial IoT Wireless Sensor Node
Adopting Wi-Fi technology, the WISE-4220 is a modularized node that can be easily integrated into existing networks.

With the high compatibility and universality of Wi-Fi technology, this solution requires no extra infrastructure cost or implementation effort.

- 2.4-GHz IEEE 802.11b/g/n WLAN for 110-m line-of-sight communication
- Local logging of 10,000 samples with RTC time stamp and SNTP time synchronization
- Access point mode with an HTML5 webpage for direct access and device configuration via mobile devices
The WISE-4400 features a built-in antenna that provides enhanced connectivity for flexible installation. Moreover, the IP65 rating ensures protection against dust, oil, and water, ensuring stable data collection and transmission in harsh industrial environments or CNC processing plants requiring frequent cleaning due to oil and dust accumulation.

### Features

- **Internal Antenna**: Saves installation space and prevents damage while maintaining communication quality.
- **IP65 Housing and M12 Connector**: Resists dust, dirt, and oil in harsh environments, thereby reducing maintenance.
- **USB Configuration Port**: USB port for quick configuration during installation and maintenance.
- **Flexible Mounting**: DIN rails and wall/pole mounting enable fitting in any installation environment.
- **Data Storage**: WISE-4470
- **Input Voltage**: 10 ~ 50V Wide
- **eMTC, NB-IoT, 5G**

The WISE-4400 is an IP65-Rated IoT Wireless Sensor Node designed for robust performance in challenging environments.
WISE-4470
3G IP65-Rated IoT Wireless Sensor Node
The WISE-4470 node utilizes cellular networks and comes with an IP65-rated housing that can transmit data across networks requiring high bandwidth.

With faster data speeds, real-time data can be transmitted from widely distributed remote sites to the control center for immediate action.

- MQTT and RESTful web API with SSL in JSON format for IoT or cloud service integration
- SMS control support
- Local logging of 10,000 samples to prevent data loss

WISE-4471
eMTC/ NB-IoT IP65-Rated IoT Wireless Sensor Node
The WISE-4471 node utilizes eMTC/NB-IoT cellular networks and comes with an IP65-rated housing that can transmit data over long distances without interference.

With superior signal coverage and low degradation, signals can have better signal in concrete and steel buildings, making this solution ideal for high-density environments.

- MQTT and CoAP for IoT or cloud service integration
- Superior signal coverage, low interference
- Reliable cellular network using licensed band radio frequency
WISE-4600
Outdoor IoT Wireless Sensor Node

The WISE-4600 series are solar-powered and designed for wide-area outdoor applications. In addition to a solar rechargeable battery, the WISE-4600 nodes support a wide input power voltage and come with optional GPS for locating and tracking functions, ensuring sustainable operation in outdoor applications such as water treatment, renewable energy, and agriculture.

- **Location Tracking**
  Optional GPS for obtaining location information in wide-area applications.

- **IP65, Anti-UV Housing and M12 Connector**
  Protection against water and dust penetration and UV resistant.

- **Flexible Mounting**
  DIN-Rail, wall and pole mounting enable fitting in any installation environment.

- **Data Storage**
  WISE-4670

- **USB Configuration**

- **Solar Rechargeable Battery**

- **Continuous Power Supply**
  Solar rechargeable battery and external power source ensure continuous power in outdoor areas.
WISE-4610
LoRa Outdoor IoT Wireless Sensor Node
The WISE-4610 adopts LoRa technology, providing outdoor nodes that consume little power when transmitting data over long distances. This means that it can be powered by a solar rechargeable battery, enabling continuous data acquisition.

LoRa LPWAN with 5-km line-of-sight communication
Superior penetration, low interference
Easy to organize LoRa network data access

WISE-4671
eMTC/NB-IoT Outdoor IoT Wireless Sensor Node
The WISE-4671 node utilizes eMTC/NB-IoT cellular networks and comes with an IP65-rated housing that can transmit data over long distances without interference. With superior signal coverage and low degradation, signals can have wide coverage in open space, making this solution ideal for outdoor environment or machine monitoring.

MQTT and CoAP for IoT or cloud service integration
Superior signal coverage, low interference
Reliable cellular network using licensed band radio frequency
## Selection Guide

### Wireless Wi-Fi Private LoRa

<table>
<thead>
<tr>
<th>Model Name</th>
<th>WISE-4220-S231</th>
<th>WISE-4220-S214</th>
<th>WISE-4220-S215</th>
<th>WISE-4610-S672</th>
<th>WISE-4610-S614</th>
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</thead>
<tbody>
<tr>
<td><strong>Description</strong></td>
<td>Wireless IoT WSN with Temperature/Humidity Sensors</td>
<td>Wireless IoT WSN with 4-ch AI and 4-ch DI</td>
<td>Wireless IoT WSN with 4-ch RTD or Digital Input</td>
<td>LoRa WSN with 2 Serial Port &amp; 6-ch DI</td>
<td>LoRa WSN with 4-ch AI and 4-ch DI</td>
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<tr>
<td><strong>IEEE Standard</strong></td>
<td>IEEE 802.11b/g/n</td>
<td>IEEE 802.15.4g LoRa Modulation</td>
<td>-</td>
<td>NA915, EU868, JP925, CN470</td>
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<td>-</td>
<td>-</td>
<td></td>
</tr>
<tr>
<td><strong>Mode / Topology</strong></td>
<td>Infrastructure, Limited AP</td>
<td>-</td>
<td>-</td>
<td>Star</td>
<td></td>
</tr>
<tr>
<td><strong>Outdoor Range</strong></td>
<td>110m (L.O.S.)</td>
<td>-</td>
<td>-</td>
<td>5000m (L.O.S.)</td>
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<td><strong>Network</strong></td>
<td>WLAN</td>
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<td>-</td>
<td>GPS/GLONASS/BeiDou</td>
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<td><strong>GPS</strong></td>
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<td>-</td>
<td>-</td>
<td>Micro-B USB</td>
<td></td>
</tr>
<tr>
<td><strong>Analog / Sensor Input</strong></td>
<td>Built-in Sensors</td>
<td>4-ch</td>
<td>4-ch</td>
<td>4-ch</td>
<td></td>
</tr>
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<td><strong>Channel</strong></td>
<td>Temperature, Humidity</td>
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<td>2, 3-wire Pt RTD</td>
<td>-</td>
<td></td>
</tr>
<tr>
<td><strong>Input Type</strong></td>
<td>V, A</td>
<td>-</td>
<td>V, A</td>
<td>-</td>
<td></td>
</tr>
<tr>
<td><strong>Input Range</strong></td>
<td>-25 ~ 70°C 0 ~ 90% RH</td>
<td>0<del>10V, 0</del>20mA, 4~20mA</td>
<td>Pt:100 ~ 200<del>200°C Pt:1000 ~ 40</del>160°C</td>
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<td>0<del>10V, 0</del>20mA, 4~20mA</td>
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<tr>
<td><strong>Digital Input / Output</strong></td>
<td>4-ch Dry Contact DI</td>
<td>4-ch Dry Contact DI shared with RTD</td>
<td>6-ch Dry Contact DI</td>
<td>4-ch Dry Contact DI</td>
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<td><strong>Serial Port</strong></td>
<td>Port Number</td>
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<td>-</td>
<td>1-port RS-485 1-port RS-232/485</td>
<td></td>
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<td>-</td>
<td>Solar Rechargeable Battery</td>
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<td>-</td>
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<tr>
<td><strong>Protocol</strong></td>
<td>REST, MQTT, Azure</td>
<td>MQTT, CoAP, LWM2M, MQTT-SN</td>
<td>MQTT, CoAP, LWM2M, MQTT-SN</td>
<td>-</td>
<td></td>
</tr>
<tr>
<td><strong>Analog / Sensor Input</strong></td>
<td>V, A</td>
<td>-</td>
<td>V, A</td>
<td>-</td>
<td></td>
</tr>
<tr>
<td><strong>Input Range</strong></td>
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<td>-</td>
<td>0<del>10V, 0</del>20mA, 4~20mA</td>
<td>-</td>
<td></td>
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<tr>
<td><strong>Digital Input / Output</strong></td>
<td>6-ch Dry Contact DI 2-ch Sink-type DO</td>
<td>1-ch Dry Contact DI</td>
<td>1-ch Dry Contact DI</td>
<td>-</td>
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<tr>
<td><strong>Serial Port</strong></td>
<td>Port Number</td>
<td>1-port RS-485 for Modbus/RTU</td>
<td>1-port RS-485 1-port RS-232/485</td>
<td>-</td>
<td></td>
</tr>
<tr>
<td><strong>Power Input</strong></td>
<td>Battery Power</td>
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<td>-</td>
<td>10 ~ 50Vdc</td>
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</tr>
<tr>
<td><strong>External Power</strong></td>
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<td>10 ~ 50Vdc</td>
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### Wireless Cellular eMTC / NB-IoT

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<th>Model Name</th>
<th>WISE-4470-S250</th>
<th>WISE-4470-S414</th>
<th>WISE-4471-S472</th>
<th>WISE-4471-S414</th>
<th>WISE-4471-S472</th>
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<tbody>
<tr>
<td><strong>Description</strong></td>
<td>3G WSN with DI/O and 1-port RS-485</td>
<td>IP65 3G WSN with 4-ch AI</td>
<td>IP65 3G WSN with 2 Serial Port &amp; 1-ch DI</td>
<td>IP65 eMTC/NB-IoT WSN with 4-ch AI</td>
<td>IP65 eMTC/NB-IoT WSN with 2 Serial Port &amp; 1-ch DI</td>
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<tr>
<td><strong>IEEE Standard</strong></td>
<td>GSM/GPRS/HSPA R13 LTE Cat M1 / NB1</td>
<td>R13 LTE Cat M1 / NB1</td>
<td>R13 LTE Cat M1 / NB1</td>
<td>R13 LTE Cat M1 / NB1</td>
<td>R13 LTE Cat M1 / NB1</td>
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<td><strong>Frequency Band</strong></td>
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<tr>
<td><strong>Outdoor Range</strong></td>
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<td>-</td>
<td>-</td>
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<tr>
<td><strong>Network</strong></td>
<td>Micro-B USB</td>
<td>Micro-B USB</td>
<td>Micro-B USB</td>
<td>Micro-B USB</td>
<td>Micro-B USB</td>
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<td><strong>Config. Interface</strong></td>
<td>Micro-B USB</td>
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<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td><strong>Protocol</strong></td>
<td>REST, MQTT, Azure</td>
<td>MQTT, CoAP, LWM2M, MQTT-SN</td>
<td>MQTT, CoAP, LWM2M, MQTT-SN</td>
<td>MQTT, CoAP, LWM2M, MQTT-SN</td>
<td>MQTT, CoAP, LWM2M, MQTT-SN</td>
</tr>
<tr>
<td><strong>Analog / Sensor Input</strong></td>
<td>V, A</td>
<td>4-ch</td>
<td>4-ch</td>
<td>4-ch</td>
<td>4-ch</td>
</tr>
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<td><strong>Channel</strong></td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td><strong>Input Type</strong></td>
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<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td><strong>Input Range</strong></td>
<td>0<del>10V, 0</del>20mA, 4~20mA</td>
<td>-</td>
<td>0<del>10V, 0</del>20mA, 4~20mA</td>
<td>-</td>
<td>0<del>10V, 0</del>20mA, 4~20mA</td>
</tr>
<tr>
<td><strong>Digital Input / Output</strong></td>
<td>6-ch Dry Contact DI 2-ch Sink-type DO</td>
<td>1-ch Dry Contact DI</td>
<td>1-ch Dry Contact DI</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td><strong>Serial Port</strong></td>
<td>Port Number</td>
<td>1-port RS-485</td>
<td>1-port RS-485</td>
<td>1-port RS-485</td>
<td>1-port RS-485</td>
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<tr>
<td><strong>Power Input</strong></td>
<td>Battery Power</td>
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<td>-</td>
<td>-</td>
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<tr>
<td><strong>External Power</strong></td>
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## Wireless LPWAN

### Model Name
- WISE-4210-AP  
- WISE-4210-S231  
- WISE-4210-S251  
- WISE-4210-S214  
- WISE-4210-S215

### Description
- LPWAN Wireless to Ethernet AP  
- LPWAN WSN with Temperature/Humidity Sensors  
- LPWAN WSN with 6-ch DI & 1-port RS-485  
- LPWAN WSN with 4-ch AI and 4-ch DI  
- LPWAN WSN with 4-ch RTD or Digital Input

### Wireless Interface
- **Function**
  - Wireless Access Point  
  - Wireless Sensor Node  
  - Wireless Sensor Node  
  - Wireless Sensor Node  
  - Wireless Sensor Node
- **IEEE Standard**
  - IEEE 802.15.4g FSK/GFSK Modulation  
- **Frequency Band**
  - 433, 868, or 923 MHz
- **Topology**
  - Star
- **Outdoor Range**
  - 5000m (L.O.S.) @ 625bps

### Network
- **Configuration**
  - RJ-45  
  - Micro-B USB
- **Channel**
  - Built-in Sensors  
  - Temperature, Humidity  
  - V, A  
  - 0–10V, 0–20mA, 4–20mA
- **Input Type**
  - 2, 3-wire Pt RTD  
  - Pt-100, –200~200°C  
  - Pt-1000, –40~160°C
- **Input Range**
  - -25°C ~ 70°C  
  - 0 – 90% RH  
  - 0–10V, 0–20mA, 4–20mA
- **Outdoor Range**
  - 5000m (L.O.S.) @ 625bps

### Analog / Sensor Input
- **Input Type**
  - V, A  
- **Input Range**
  - 0–10V, 0–20mA, 4–20mA

### Digital Input / Output
- **Channel**
  - 6-ch Dry Contact DI  
  - 4-ch Dry Contact DI  
- **Input Type**
  - V, A  
- **Input Range**
  - 0–10V, 0–20mA, 4–20mA

### Serial Port
- **Port Number**
  - 1-port RS-485 for Modbus/RTU  
  - 1-port RS-485  
  - 1-port RS-232/485

### Power Input
- **Battery Power**
  - 3 x AA, 3.6V Vcc Lithium Battery
- **External Power**
  - 10 – 50 Vcc

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## eMTC / NB-IoT LPWAN

### Model Name
- WISE-4471-S250  
- WISE-4471-S214  
- WISE-4671-S672  
- WISE-4671-S614  
- PCM-24S1S1

### Description
- eMTC/NB-IoT WSN with 1-port RS-485 and DIO  
- eMTC/NB-IoT WSN with 4-ch AI and 4-ch DI  
- Outdoor eMTC/NB-IoT WSN with 2 Serial Port  
- Outdoor eMTC/NB-IoT WSN with 4-AI & 4-DI  
- LPWAN Wireless iDoor AP

### Wireless Interface
- **Function**
  - Wireless Sensor Node  
  - Wireless Sensor Node  
  - Wireless Sensor Node  
  - Wireless Sensor Node  
  - Wireless Access Point
- **IEEE Standard**
  - R13 LTE Cat M1 / NB1  
  - IEEE 802.15.4g  
  - 433, 868, or 923 MHz
- **Frequency Band**
  - 2, 3, 4, 5, 8, 12, 13, 20, 28
- **Topology**
  - Star
- **Outdoor Range**
  - 2000m (L.O.S.)

### Network
- **Configuration Interface**
  - Micro-B USB  
  - mPCIe
- **Protocol**
  - MQTT, CoAP, LWM2M, MQTT-SN  
  - Modbus/TCP, REST, MQTT
- **Channel**
  - 4-ch  
  - 4-ch  
  - 4-ch  
- **Input Type**
  - V, A  
  - V, A  
  - V, A
- **Input Range**
  - 0–10V, 0–20mA, 4–20mA  
  - 0–10V, 0–20mA, 4–20mA

### Analog / Sensor Input
- **Input Type**
  - V, A  
- **Input Range**
  - 0–10V, 0–20mA, 4–20mA

### Digital Input / Output
- **Channel**
  - 6-ch Dry Contact DI 2-ch Sink-type DO  
  - 4-ch Dry Contact DI  
  - 4-ch Dry Contact DI
- **Input Type**
  - V, A  
- **Input Range**
  - 0–10V, 0–20mA, 4–20mA

### Serial Port
- **Port Number**
  - 1-port RS-485 for Modbus/RTU  
  - 1-port RS-485  
  - 1-port RS-232/485

### Power Input
- **Battery Power**
  - Solar Rechargeable Battery
- **External Power**
  - 10 – 50 Vcc