Wireless Sensing Solution

Vol. iWSN_2.23.08_EN

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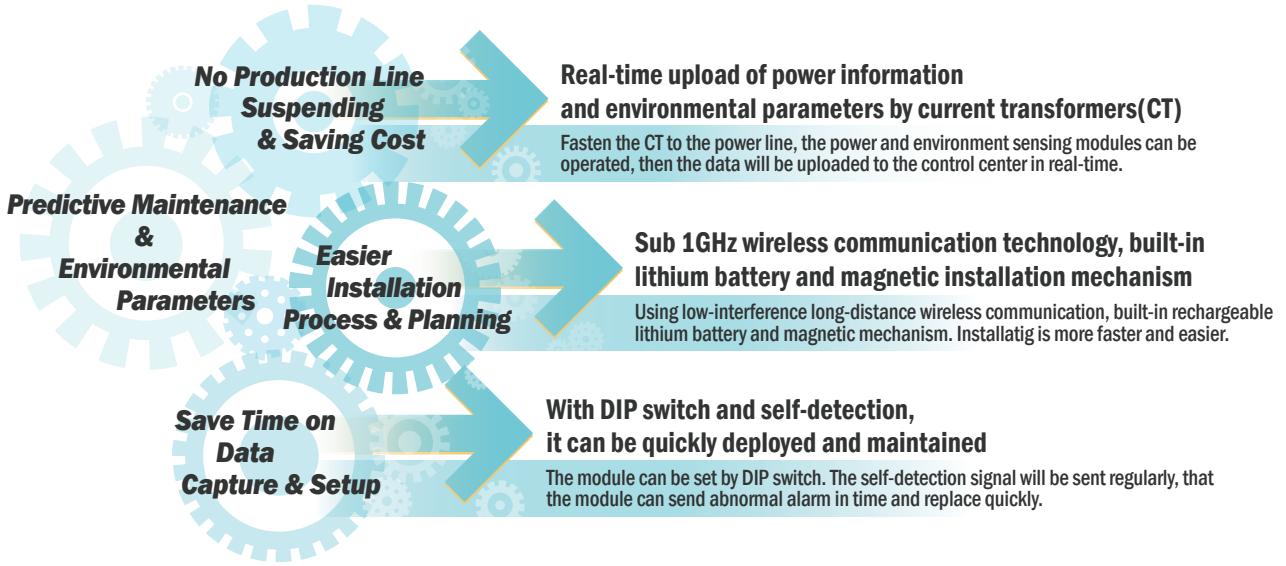
1. Industrial Wireless Sensor Network - iWSN Solution

Overview:

With the trend of smart manufacturing and flexible manufacturing, the production process is becoming more and more sophisticated, and each production stage is interlinked. Adopting the concept of predictive maintenance, the health status of the equipment can be estimated to maintain the smooth operation of the production line. To meet the needs of Internet of Things, big data analysis, Industry 4.0 and energy saving, ICP DAS developed the "Industrial Wireless Sensor Data Network Solution". In addition to integrating vibration, temperature measurement, and wireless transmission functions into a single module, it features low power consumption and can be used with CT inductive charging function. The supply and demand of working power are balanced to achieve continuous and uninterrupted power data measurement. The settings can be completed by using a DIP switch, so that the production process will not be interrupted, and can greatly save system construction time and reduce maintenance costs. By monitoring equipment vibration status, performing predictive maintenance and equipment temperature monitoring, it is helpful for maintaining production line, avoiding accidents and unexpected shutdowns caused by mechanical aging of production equipment.



Measurements Difference between Tradition & iWSN Series

Item	Traditional Sensor	iWSN Series
Main Function	Measuring single parameter data	Measured Voltage, Current, Temperature, Humidity, DI, Vibration, CO2e, TVOC, CO, Thermal Imaging, SOS.
Working Duty	At least once per second.	1 / 10 / 30 / 60 seconds; 3 / 5 / 10 / 30 minutes.
Power Supply	DC: Transformer required AC: Power line required	CT charging, battery and various external power sources. (Easy installation, maintenance and construction)
Consumption	Normal (Wireless Module + Sensor + Power Supply)	Low (Low power consumption design)
Parameter Configure	Utility / Built-in custom software	DIP switch
Hardware Cost	$$$	$
Disadvantage	Long construction time, system needs stoppage at breakpoints and complicated settings.	Simple function and low-speed data update
Application	Monitoring System, Parameter Control in Production.	Big Data Analysis, System Monitoring, Trend Analysis and Predictive Maintenance.

Features and Advantages

Sub GHz Low Frequency Wireless Transmission

Wired communication is the traditional plan for factory automation. The harsh working environment of high temperature, oil pollution and dust in the manufacturing industry, as well as the limitation of moving lines, will cause difficulties in the deployment of wired communication. Therefore, wireless communication is more flexible for smart factories. Sub-GHz and 2.4 GHz are currently available frequency bands in industry, science and medicine. The data transmission of the factory is usually light in amount, but there is a need for long-distance transmission. ICP DAS proposes iWSN series products, which can provide more advantages as follows:

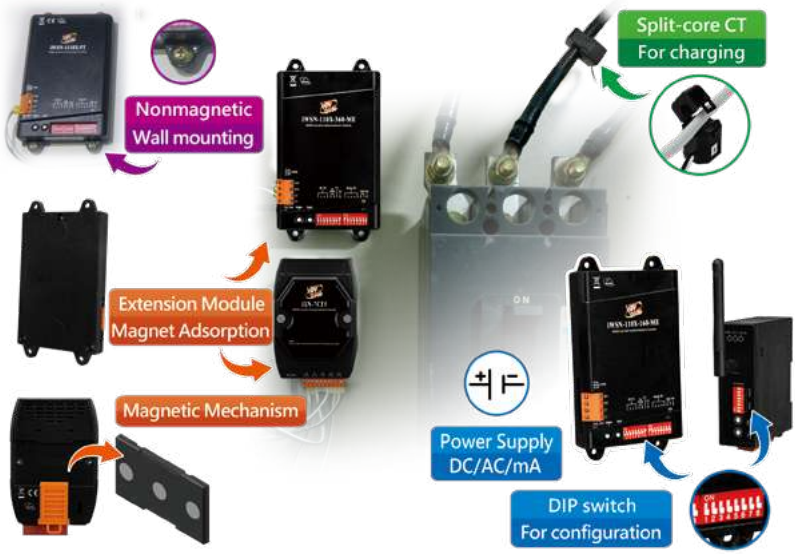
Long Transmission Distance: The transmission distance of Sub-GHz radios is up to 1 km or more. With better diffraction, the wireless device node can directly access the remote hub (Hub).

Interference-free: The frequency band is mostly used for dedicated and low duty cycle connections. It is not easy to be disturbed, making data transmission more stable.

Low-power Consumption: Narrow bandwidth allows receivers to have better sensitivity, operate efficiently at lower transmission frequencies, and reduce power consumption.

Diversified power supply: AC Inductive Charging (with current transformer), DC power, and Battery.

	2.4GHz	Sub GHz
Standard	IEEE 802	IEEE 802
Transmission Distance	≤ 75M	≥ 1000M
Transmission Speed	≥ 54Mbps	≤ 54Mbps
Nodes	32	32
Security	High	High
Consumption	High	Low
Anti-jamming	Low	High
Power Supply	AC / DC	AC Inductive Charging, DC , Battery



Technology & Advantages

ICP DAS integrates wireless transmission functions and various data measurement, such as current, vibration, temperature, humidity, thermal imaging, into one module. The ultra-low power consumption of this series of products can be matched with current transformer (CT) inductive charging. When the power supply is appropriate, the supply and demand balance is achieved, and the data is continuously measured. Then, transmit the data with low frequency and low interference manner.

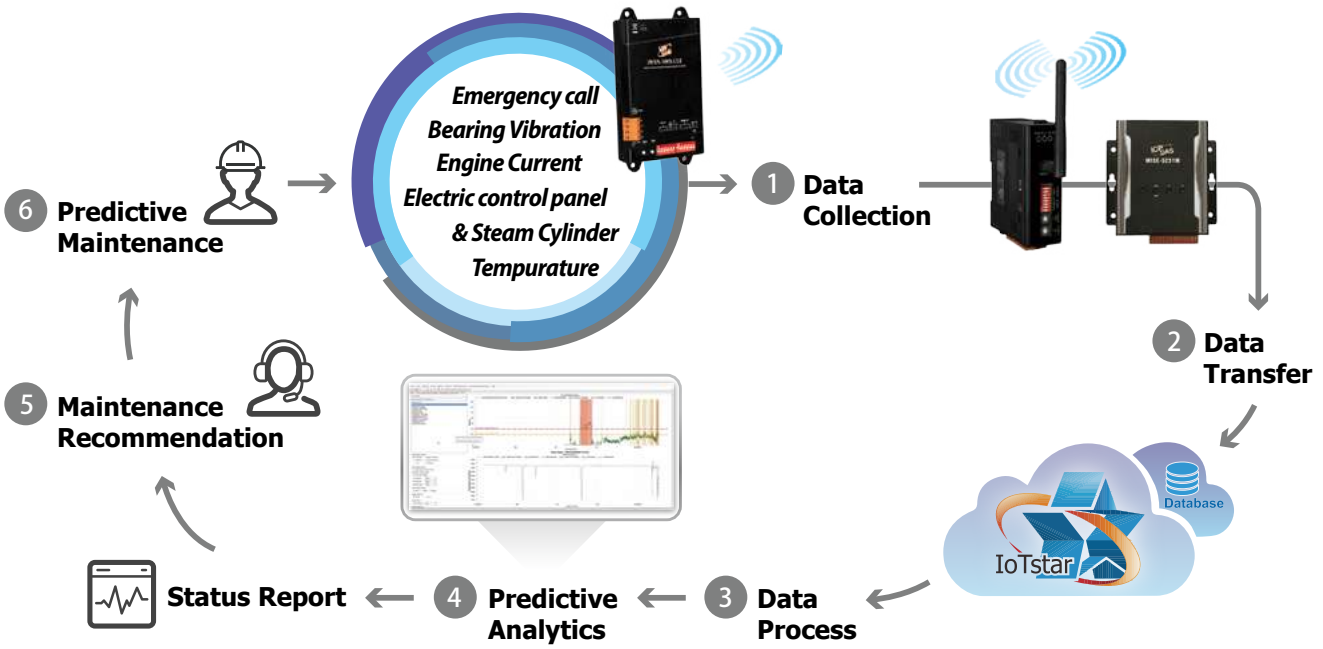
Deployment Process Difference between Tradition & iWSN Series

Step	Project	Traditional Solution	ICP DAS Solution	Work Team
1	Wiring Plan	Design drawing analysis, network routing, tube wiring evaluation... etc. Heavy work load.	Install nearby the power supply within the receiving range of the receiver	Light-current construction contractor
2	Shutdown Plan	According to the production plan and order forecast, perform partition shutdown. The operation is with low accuracy and complex.	Not Required	Require collaboration of sales & production department
3	Grooving Plan	The implementation cost is high, the amount of dust is large, and the restoration work is difficult.	Sub-GHz wireless communication makes short wiring distance	Light-current construction contractor
4	Power Off & Equipment Shutdown	Difficulty in shutting down precision device	Not Required	Facility, production departments, and equipment manufacturers
5	Installation	Wiring and installation of the module and equipment	The installation can be implemented by magnetic adhesion module and CT.	System Integrator
6	Restart the Equipment	Restart the equipment, parameter adjustment, ensure production quality	Not Required	Facility, production departments, and equipment manufacturers
7	Module Setting	Set the network for each module one by one and make sure the data can be received successfully	Rotary Switch for easy settings	System Integrator

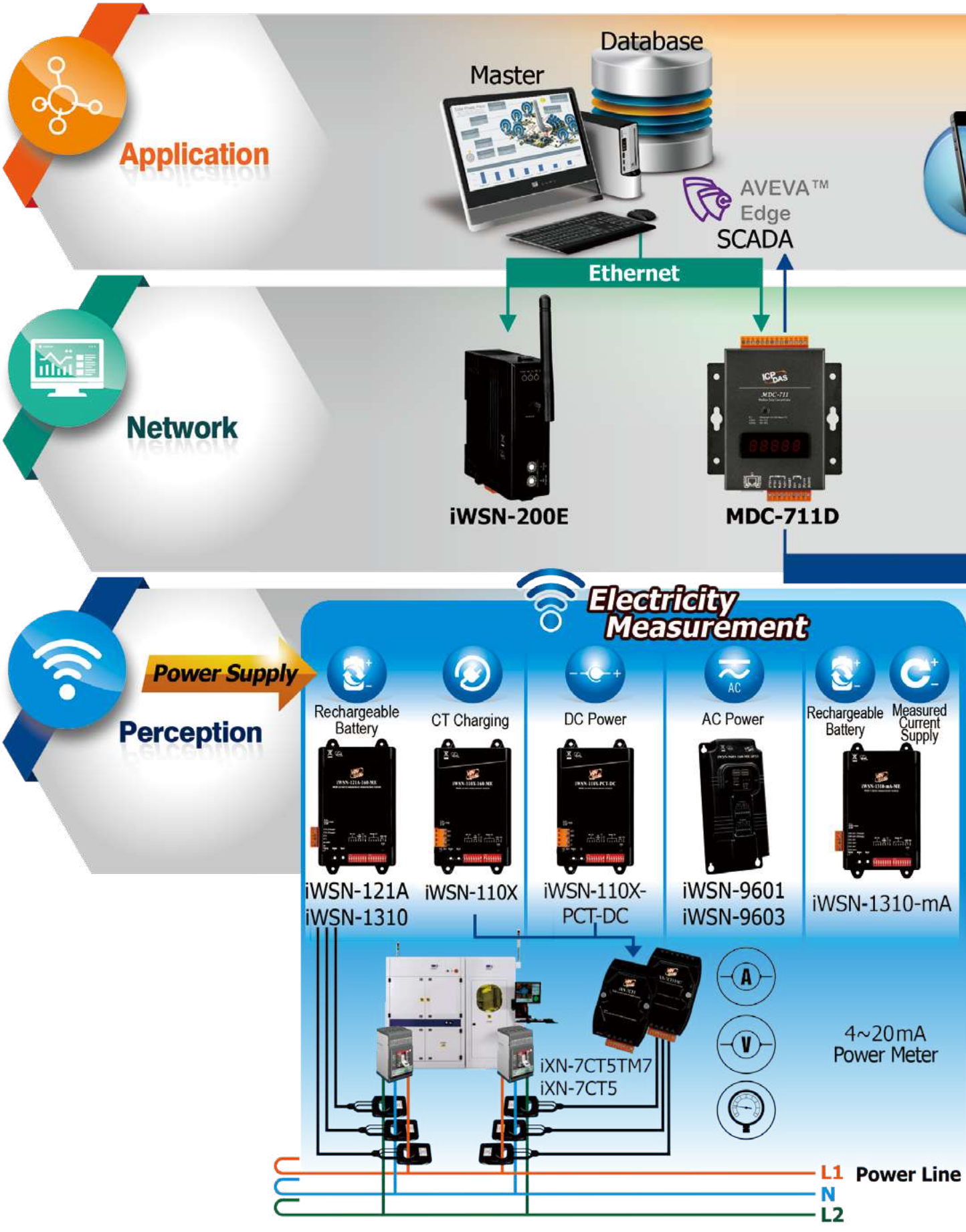
Monitoring for Predictive Maintenance

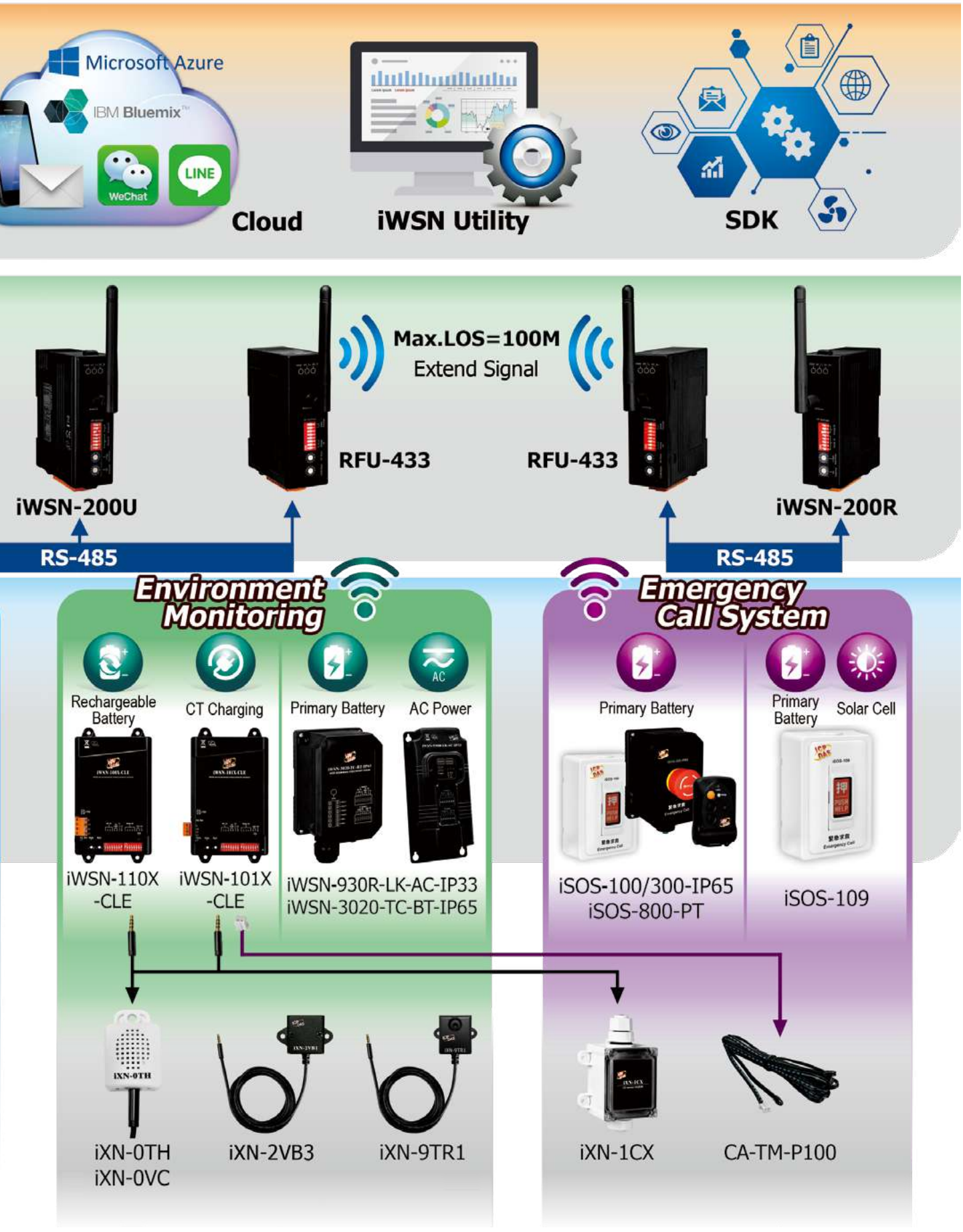
Now a day most maintenance in a factory can fall into run-to-failure maintenance or planned maintenance. However, it may still be damaged due to unexpected factors, and resulting in the cost of downtime and underutilization.

Predictive maintenance has been gaining significant attention over recent years. The main purpose is to prevent equipment failure due to component fatigue, personnel factor or equipment wear before the maintenance. The introduction of predictive maintenance system is mainly based on analysis technologies such as vibration, temperature and humidity. It is because solutions can be quickly found through the above basic data when encounters problems in equipment or processes, and schedule maintenance at most appropriate time.



Architecture, Properties Comparison & Selection Guide




Microsoft Azure
IBM Bluemix
WeChat
LINE
Cloud
iWSN Utility
SDK
Max.LOS=100M
Extend Signal
RFU-433
RFU-433
iWSN-200U
iWSN-200R
RS-485
RS-485
Environment Monitoring
Emergency Call System
Rechargeable Battery
CT Charging
Primary Battery
AC Power
Primary Battery
Primary Battery
Solar Cell
iWSN-110X -CLE
iWSN-101X -CLE
iWSN-930R-LK-AC-IP33
iWSN-3020-TC-BT-IP65
iSOS-100/300-IP65
iSOS-800-PT
iSOS-109
iXN-0TH
iXN-0VC
iXN-2VB3
iXN-9TR1
iXN-1CX
CA-TM-P100

Selection Guide:

Data Concentrator

Signal Sensing Module

Expansion Module

Data Concentrator			
Models	**iWSN-200U**	**iWSN-200E**	**iWSN-200R**
Comm. Interface	RS-232 / RS-485	10/100 Base-T	RS-485
Relay Output	-		1

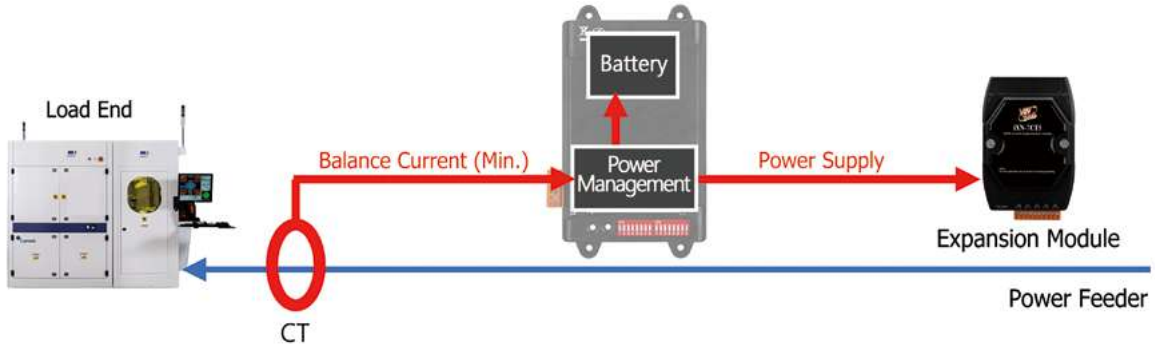
Signal Sensing Module (Electricity Information)					
Models	**iWSN-110X iWSN-110X-RCT**	**iWSN-121A iWSN-1310**	**iWSN-110X-PCT-DC**	**iWSN-9601 iWSN-9603 iWSN-9603-RCT**	**iWSN-1310-mA**
Rechargeable Battery	✓	✓			✓
CT Charging	✓	✓			
DC Power			✓		
AC Power				✓	
Measured Current Supply					✓
Measurement Type	Current			Current/Voltage/ Electricity	Current (4~20mA)
Commutator	CT / RCT (iWSN-110X-RCT)		Self-purchase Commutator	CT / RCT (iWSN-9603-RCT)	-
Expansion Module	iXN-7CT5 / iXN-7CT5TM7			-	

Signal Sensing Module (Environmental Monitoring/Emergency Call System)				
Models	**iWSN-100X-CLE iWSN-101X-CLE**	**iSOS-100/800-PT iSOS-300-IP65 iSOS-109**	**iWSN-930R-LK-AC-IP33**	**iWSN-3020 Series**
Rechargeable Battery	✓	✓ (iSOS-109)		
Primary Battery		✓		✓
CT Charging	✓			
Solar Cell		✓ (iSOS-109)		
AC Power			✓	
Commutator	CT	-	-	-
Measurement Type	▪ iXN Series (Gas, vibration, thermal imaging, temp. and RH) ▪ CA-TM Thermistor (Only iWSN-101X)	Emergency Call	Leak Detection	Temperature

AC Cable Current Required to Supply & Demand Balance

The built-in lithium battery of the iWSN can be charged by inducing a tiny current from the power line through CT. The power consumption of the lithium battery is related to the wireless signal transmission cycle and the number of connected expansion modules and sensors. Therefore, when constructing the iWSN data acquisition solution, the current of the power line to be measured must be greater than the value of "balance of supply and demand". Modules not listed in the following table can be approximated from the information in the following:

Shot Cycle	iWSN-110X	iWSN-121A	iWSN-1310	iWSN-110X + iXN-7CT5	iWSN-110X + iXN-7CT5TM7
1 sec.	11 A	12 A	19 A	20 A	21 A
10 sec.	3 A	5 A	12 A	12 A	13 A
30 sec.	3 A	4 A	5 A	11 A	12 A
60 sec.	3 A	4 A	5 A	11 A	12 A



Application Types & Suitability

A. Emergency Call System

- Built-in primary battery or lithium battery.
- Upload power and status actively to ensure system operation.
- Combined with dye-sensitive charging technology and charged by indoor lighting.
- For security protection in public spaces and high-risk areas.

B. Power Monitoring System

- Multiple power supplies: CT charging, AC, DC, current power.
- No Downtime Installation
- Achieve energy saving and high utilization rate through power measurement and 24-hour monitoring data analysis.

C. Environment Monitoring System

- Various environmental monitoring modules: Temperature (Thermistor/Thermal Imaging), RH, Vibration, Noxious gas, etc.
- Implement preventive maintenance in order to provide a stable production environment and equipment operation.

2. Data Concentrator

Overview:

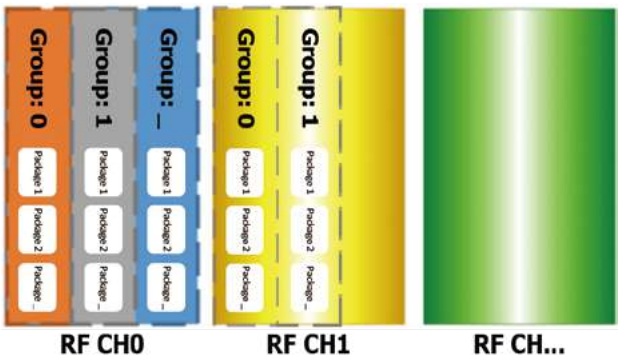
The iWSN-200 series is wireless data concentrator in the iWSN system, providing 433MHz wireless, Ethernet,RS-232/RS-485 communication interfaces. The series supports the Slave function of the Modbus RTU/TCP communication protocol, allows users to access the data of 31 iWSN wireless signal sensing modules. It can set 16 wireless channels and 8 group numbers, which is convenient to distinguish and control the wireless network of the iWSN system.

Applications

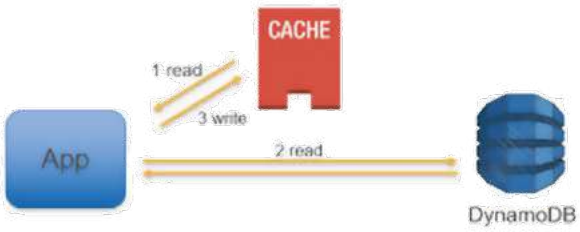
The iWSN-200 series supports Modbus RTU/TCP protocol, and users can read the corresponding data from the Modbus table on the computer side.

Features:

- Can be divided into 16 channels and 8 groups of independent channels to improve data stability and reduce interference.



- Support rotary switch and DIP switch to set the parameters, simplify the setting process.
- Isolation: 3000 VDC DC-to-DC,
  2500 Vrms for photo-couple
- Support 31 sets of iWSN wireless signal sensing modules.
- ESD Protection: +/- 4 kV Contact.
- iWSN-200E supports Read-cache to accelerates the Modbus TCP communication.



- iWSN-200E supports UDP Search.
- iWSN-200E provides a simplified web page for module settings.
- iWSN-200E provides dual power input: PoE(IEEE 802.3af, Class 1) and DC input.

Wireless Data Concentrator

iWSN-200U / 200R / 200E

Accessories

Antenna Magnetic Base: ANT-Base-02
Antenna magnetic base with 1.5M cable

Antenna Extension Cable: 3S001-1
RG58A/U, RP-SMA Male to RP-SMA Female, 1M

The **iWSN-200** series is wireless data concentrator in the iWSN system, providing 433MHz wireless, Ethernet, RS-232/RS-485 communication interfaces. The series supports the Slave function of the Modbus RTU/TCP communication protocol, allows users to access the data of 31 iWSN wireless signal sensing modules. It can set 16 wireless channels and 8 group numbers, which is convenient to distinguish and control the wireless network of the iWSN system.

Models		iWSN-200U	iWSN-200R	iWSN-200E
RF Interface				
Radio Frequency		433 MHz		
Channels		0 ~ 15 configured by DIP switch		
Transmission Distance		LoS 100 M		
Connectivity		Supports up to 31 iWSN wireless signal sensing modules		
Communication				
Interface		RS-232 or RS-485 x 1	RS-485 x 1	Ethernet x 1
Protocal		Modbus RTU		Modbus TCP
Transmission Speed		1200 ~ 115200 bps, N81		10/100 Mbps
Relay Output				
Channels		-	1 (Form A)	-
Type			Power Relay (SPST N.O.)	
Power Relay (Form A)	Load Current (Max.)		5A @ 250VAC 5A @ 30VDC	
	Operate Time		10ms (Max.)	
	Release Time		5ms (Max.)	
Mechanism				
Dimension (L x W x H)		108 mm x 84 mm x 33 mm (Without antenna)		
Antenna (L x Ø)		108 mm x 10 mm		
Installation		DIN-Rail Mounting		
Other				
Input Voltage Range		+10 ~ +30 VDC		
PoE Power		-		IEEE 802.3af, Class 1
Consumption		1W Max.		
Operation Temperature		-25 °C ~ +75 °C		

3. Emergency Call System

Overview:

The emergency call system can be applied to enterprises, hospitals, schools, and to build effective protection and emergency call systems in public spaces such as blind spot area, bathrooms, and production lines. It provides reliable, fast and effective alarm return, avoiding regrets caused by processing delays. Once a emergency call is triggered, the system can immediately locate the sending location for the fastest and most accurate treatment.

One-click Instant Help

Simultaneous Alarm & Monitoring

Accurate Positioning

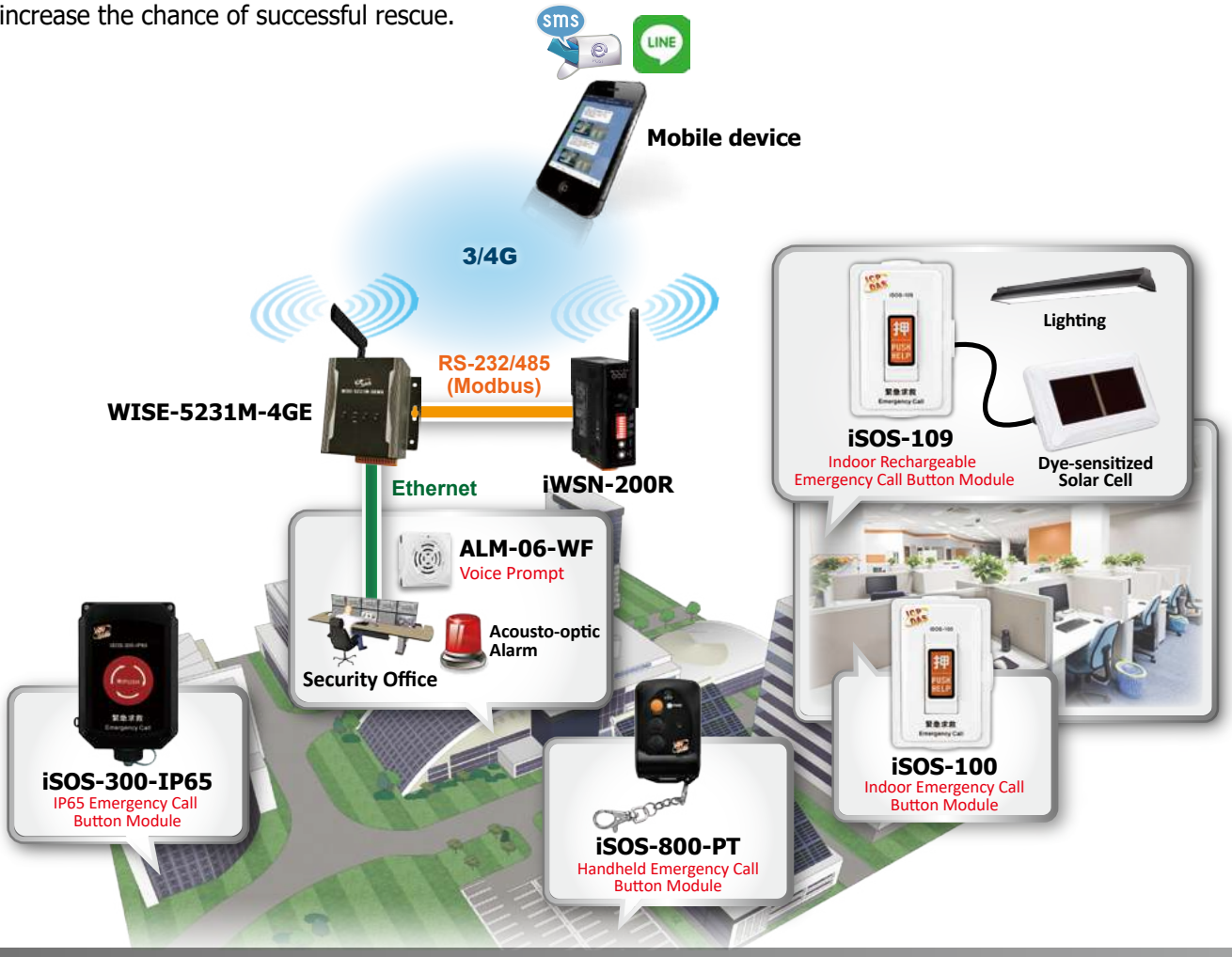
Save Time by Locating Alarm Locations

Multiple Power Supplies

Use Primary Battery or Dye-sensitized Solar Cell

Application Architecture

In a factory or a public space, whether in a restroom, a parking lot, etc., an emergency situation may occur and call for help. When an emergency situation occurs, the parties or security personnel only need to press the emergency call button, and the module will immediately send an emergency call to the control center in a high-frequency state. The emergency call system is also combined with instant messaging, which can send alarm messages to the mobile phones of relevant management personnel, so as to call for help at the first time and increase the chance of successful rescue.



Emergency Call Button Module

iSOS-100
Indoor
Emergency Call Button

iSOS-300-IP65
IP65
Emergency Call Button

iSOS-800-PT
Handheld
Emergency Call Button

Features:

- Powered by built-in disposable lithium batteries
- Support 433MHz Radio Frequency
- Selectable 16 Radio Frequency Channels
- Ensure system stability by Handshaking

Models	iSOS-100	iSOS-300-IP65	iSOS-800-PT
RF Interface			
Radio Frequency	433 MHz		
Channels	0 ~ 15 configured by DIP switch		
Transmission Distance	LoS 50 M		
Working Duty	1/10/30/60 sec., 3/5/10/30 min. configured by DIP switch; Emergency Trigger: 1 sec.		
Other			
Dimension (L x W x H)	138mm x 92mm x 52mm	146mm x 85mm x 95mm	70mm x 43mm x 21mm
Ingress Protection/Installation	- / Wall mounting	IP65 / Wall mounting	- / lobster clasp
Battery	CR123A (3.0 V) x 1; Battery Life: 2 years (Working Duty: 1 min.)		
Operation Temperature	-25 °C ~ +60 °C		

iSOS-109
Indoor Rechargeable
Emergency Call Button

SP-S2-DS
Dye-sensitized
Solar Cell

Features:

- Built-in rechargeable lithium battery for power supply
- Battery charging with dye-sensitive solar powered modules

Models	iSOS-109
RF Interface	
Radio Frequency	433 MHz
Channels	0 ~ 15 configured by DIP switch
Transmission Distance	LoS 50 M
Working Duty	1/10/30/60 sec., 3/5/10/30 min. configured by DIP switch
Emergency Trigger Duty	1 sec.
Other	
Dimension of Emergency Call Button	138mm x 92mm x 52mm (L x W x H)
Dimension of Dye-sensitized Solar Cell	133mm x 85mm x 84 mm (L x W x H)
Ingress Protection/Installation	- /Wall mounting
Battery	Rechargeable lithium battery 3.3V, 1100mAh x 1 (With overdischarge, overcharge and short-circuit protection)
Dye-sensitized Solar Cell	SP-S2-DS
Dye-sensitized Solar Cell Specification	Output Power: 1.96mW; Voc: 0.65V; Isc: 4.10mA
Operation Temperature	-25 °C ~ +60 °C

4. Power Monitoring System

Overview:

The iWSN modules integrate current, temperature measurement, and wireless transmission functions into a single module, the ultra low power consumption can be matched with a current transformer (CT) for inductive charging. It can meet the supply and demand balance of working power and supply the required continuous uninterrupted measurement equipment parameters with sufficient power. The settings can be completed using a DIP switch, which not only doesn't affect the production process, but also greatly saves system construction time and reduces maintenance costs. To meet the power consumption needs of monitoring equipment, predictive maintenance and power panel temperature monitoring, it's helpful to maintain the production line equipment and prevent accidents caused by the aging of power panel equipment and cables.

Applications

- Strengthen the safety and management efficiency of plant and equipment
- Analyze and improve product costs
- Avoid unnecessary energy waste
- Analysis history reports and graphs
- Improve electricity safety and reduce the chance of failure
- Alarm logging and proactive notification
- Improve the management efficiency of factory staff




Power Measurement Applications to Solve Enterprise Challenges

❶ Create Data Acquisition System

- Centralized management and control of power information for industry and manufacturing.
- Establish a complete management system.
- Record and analyze data, master the energy consumption indicators of equipment, and realize preventive maintenance.

❷ Create Management System

- Realize data analysis, data forecasting, and database technology.
- Monitor data such as equipment temperature, vibration, energy consumption status, and production environment
- Regular output of daily and monthly reports, and annual reports.

Power Measurement Solution

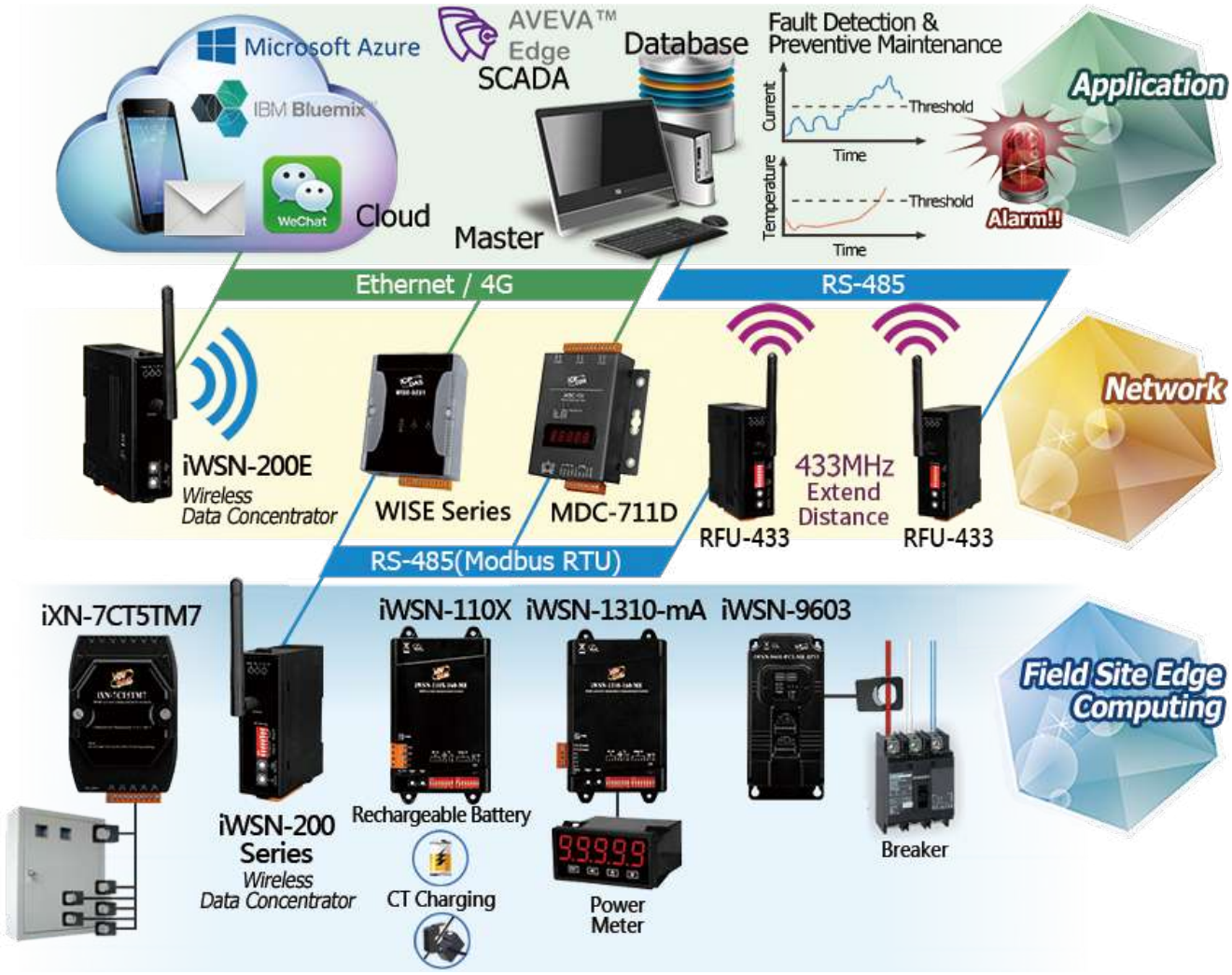
❸ Regulate Control System

- Help industrial enterprises propose energy saving measures to reduce emissions.
- Improve the operation management and automation of energy equipment.
- Reduce energy costs based on objective data and improve corporate profitability.

❹ Save Power & Reduce Emissions

- Equipment management and operating status are evaluated based on real data.
- Keep abreast of real power consumption and propose management measures for power conservation and consumption reduction.
- Improve the efficiency of power management.

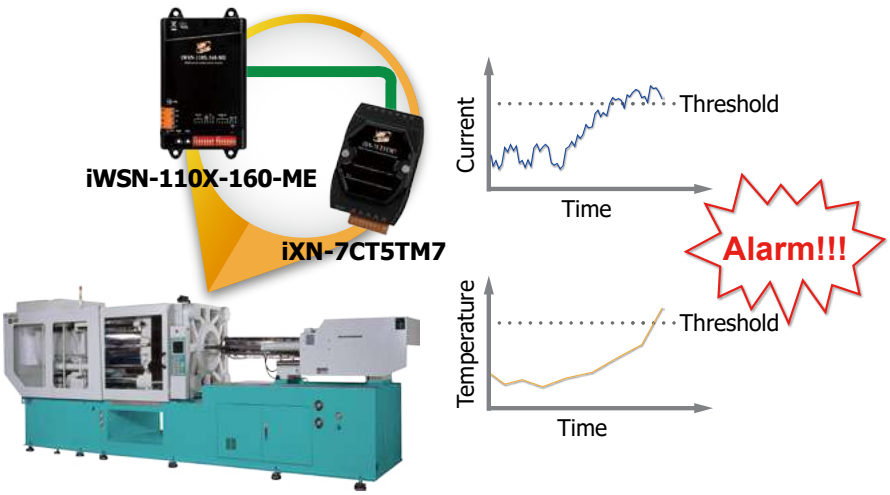
System Architecture & Applications



Machine Diagnosis

When the machine is in normal operation, the current and temperature will meet the normal range. Abnormal data may indicate that the machine is in abnormal working state. If maintenance is not arranged immediately, it may cause serious damage to the machine and even affect the safety of the operator, resulting in industrial safety accidents. If parts are found to be worn out after machine maintenance, you can plan a warranty plan and prepare spare parts in advance. So that the production line can properly plan production capacity and avoid accidents that cause production line stagnation and raw material scrap loss.

- Use iWSN-110X-160-ME with iXN-7CT5TM7 to monitor current and temperature.
- According to the correlation between temperature and consumption of the machine recorded, an alarm will be issued and troubleshooting will be performed when the machine is working abnormally or overloaded.
- Avoid forced operation to cause more serious damage to the machine and expand losses.



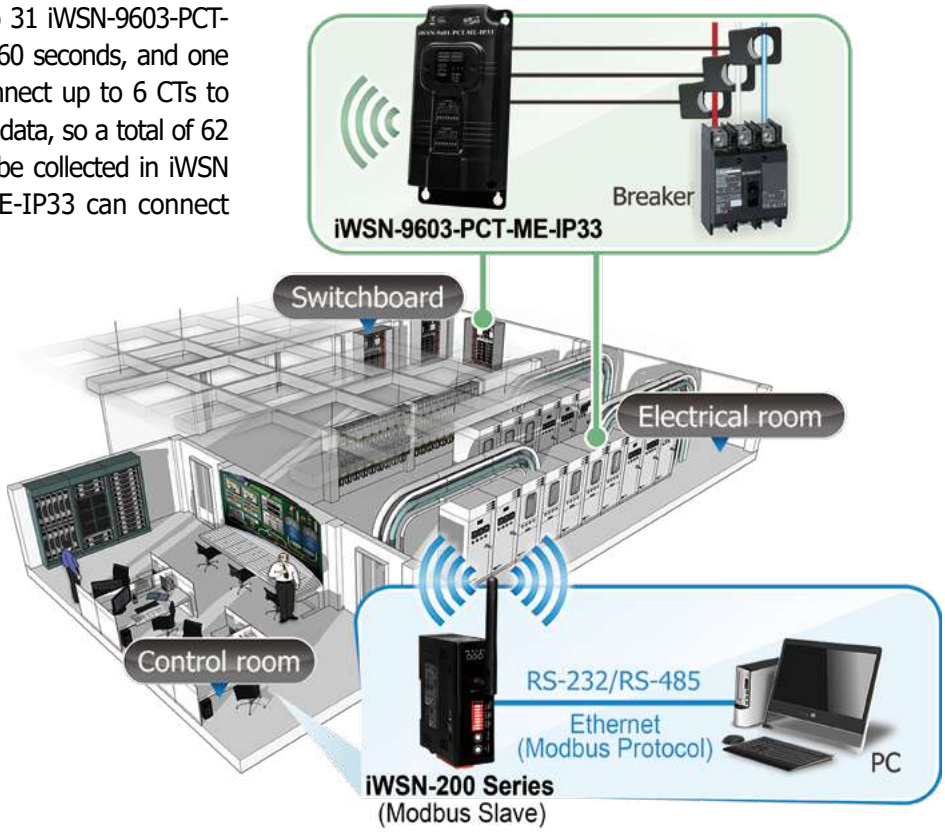
Activation Monitoring

The floorspace of some factories is large and contains a lot of equipment. If the owner of the factory can keep track of the production status of each machine, the problem where the waiting time or standby time is too long can be avoided. The traditional method is for the employees to fill in the operating time themselves. Not only does it take time to organize this information, it is also impossible to control the artificial floating time behavior and dynamically understand the productivity of the production line machine. The iWSN network system provides the staff with an instant understanding of the operating status of the field production line, while, in addition, also giving an indication where any necessary raw materials need to be immediately replenished, allowing the machine to continue to operate efficiently and achieve optimal production capacity.

- Use the iWSN-121A-240-ME module to monitor the current data on the panel.
- The two CT channels on the iWSN-121A-240-ME module are used to detect the total current consumption of both the device and the main motor so as to determine whether the machine is in either standby or running condition.

Machine Room Power Monitoring

One iWSN-200U can collect up to 31 iWSN-9603-PCT-ME-IP33's wireless data in 10/30/60 seconds, and one iWSN-9603-PCT-ME-IP33 can connect up to 6 CTs to measure 2 sets of 3-phase power data, so a total of 62 sets of 3-phase power data can be collected in iWSN system. One iWSN-9603-PCT-ME-IP33 can connect up to 6 CTs to measure 2 sets of 3-phase power data, so a total of 62 sets of 3-phase power data can be collected by iWSN system. In addition, each wireless data collection network can operate independently on each of the 16 wireless channels without interfering with each other, so a total of 992 sets of 3-phase power data can be collected. Users only need to communicate with iWSN-200U via Modbus RTU to read back the power data returned by iWSN-9603-PCT-ME-IP33.



AC Current Sensing Module

iWSN-110X Series

Features:

- Self-powered by built-in a chargeable Li-ion battery.
- Energy harvest from the CT induced electricity.
- Uses 433 MHz radio frequency for communication.
- 16 RF Channels and 4 Group ID, consist of maximum 64 RF sub-networks.
- Provides expansion interface for flexibility and expansibility.

iWSN-110X Series is a self-powered module for AC current. It harvests the demand electricity from CT induced current so that there is no necessary to supply the power line for power supply. By means of sub-1G RF communication interface, iWSN series can approach to the real wireless deployment. The iWSN sensing module can be widely used in the application of saving power, big data analysis, and predict maintenance.

Models	iWSN-110X-PCT-DC	iWSN-110X-PCT-ME	iWSN-110X-160-ME iWSN-110X-240-ME iWSN-110X-360-ME	iWSN-110X-RCT1000P-CT iWSN-110X-RCT1000PL-CT
RF				
Radio Frequency	433 MHz			
Channels	0 ~ 15 configured by DIP switch			
Transmission Distance	LoS 100 M			
Working Duty	1 / 10 / 30 / 60 sec. configured by DIP switch			
CT				
Channels	Optional CT x 1		Split core CT x 1	1 (Charge only)
Input Voltage	50Hz or 60Hz, 500V (Max.)			
Type	Φ16mm(0.1A~100A), Φ24mm(0.2A~200A), Φ36mm(0.3A~400A) (i)			Φ24mm(0.2A~200A)
Accuracy	<3% or 0.3A			-
RCT Channels	-			1
RCT Input Voltage				50Hz or 60Hz, 500V (Max.)
RCT Type				Φ24mm(200A), Φ36mm(400A)
RCT Accuracy				3% or 2A
Mechanism				
Dimension	152 mm x 85 mm x 36 mm (L x W x H)			
Installation	Wall or Magnetic mounting			
Other				
Power	10 ~ 30 VDC	Rechargeable lithium battery 3.7V, 800mAh x 1 (With overdischarge, overcharge & short-circuit protection; 1.25mm connector)		
Operation Temperature	-25 °C ~ +75 °C	0 °C ~ +45 °C		

(i) iWSN-110X-PCT-ME has not attached CT; iWSN-110X-160-ME has attached Φ16mm(100A) CT, iWSN-110X-240-ME has attached Φ24mm(200A) CT, iWSN-110X-360-ME has attached Φ36mm(400A) CT; iWSN-110X-RCT1000P-CT has attached Φ24mm(200A) CT and Rogowski Coil, iWSN-110X-RCT1000PL-CT has attached Φ36mm(400A) CT and Rogowski Coil.

AC Current/Temperature Expansion Module

iXN-7CT5

iXN-7CT5TM7

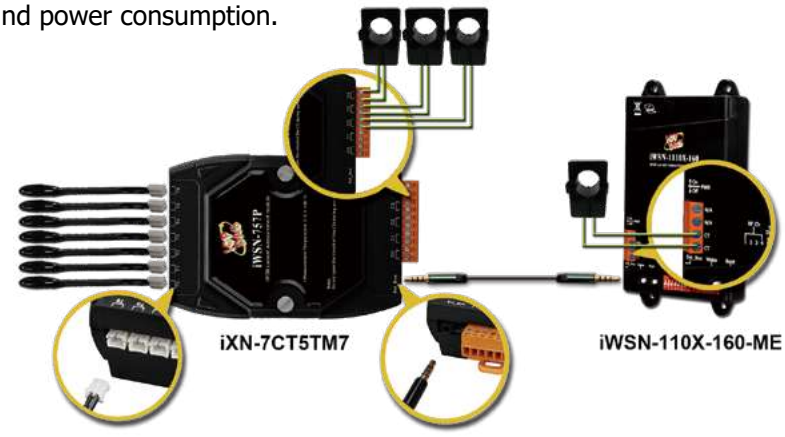
Features:

- Supports multi-channel IO expansion
- Allows connecting different measurement range of CTs in one expansion module.
- Powered by iWSN sensing module.
- Easy-to-maintain detachable screw terminal block
- Rail-mounting and magnetic mounting

The iXN expansion module is developed to connect to the iWSN sensing module, in order to extend the current and temperature measurement channels. The iXN expansion module is energized by iWSN sensing module so that there is no external power supply needed.

Models		iXN-7CT5	iXN-7CT5TM7
Split core CT			
Channels		5	
Type		Φ16mm(100A), Φ24mm(200A) and Φ36mm(400A); 8 M (i)	
Input Voltage		60Hz, 500V (Max.)	
Accuracy		<3% or 0.3A	
Thermistor (Optional)			
Channels		-	7
Range/Accuracy			0°C ~ 80°C / ±2°C
Power			
Input Type		iWSN sensing module powered by audio cable	
Consumption (Including iWSN-110X)(i)	1 sec. Working Duty	20 A	21 A
	10 sec. Working Duty	12 A	13 A
	30 sec. Working Duty	11 A	12 A
	60 sec. Working Duty		
Other			
Dimension		115 mm x 72 mm x 35 mm (L x W x H)	
Installation		DIN-Rail or Magnetic mounting	
Operation Temperature		0 °C ~ +45 °C	

(i) The minimum required current of the AC cable, this current is used to balance the supply and demand of module charging and power consumption.



AC Current/Temperature Multiple Sensing Module

iWSN-121A

iWSN-1310

Features:

- Self-powered by built-in a chargeable Li-ion battery. Energy harvest from the CT induced electricity.
- Use 433 MHz radio frequency for communication.
- 16 RF Channels and 4 Group IP, consist of maximum 64 RF sub-networks.
- Built-in 2 or 3 CT measurement channels
- iWSN-121A includes a DI channel to measure the output of the equipment.

The iWSN-121A/1310 series is a self-powered modules for AC current. It can harvest the demand electricity from CT induced current so that there is no necessary to supply the power line for power supply.

Models	iWSN-121A-160-ME iWSN-121A-240-ME iWSN-121A-360-ME	iWSN-1310-160-ME iWSN-1310-240-ME iWSN-1310-360-ME iWSN-1310-PCT-ME	iWSN-1310-mA-ME
RF Interface			
Radio Frequency	433 MHz		
Channels	0 ~ 15 configured by DIP switch		
Transmission Distance	LoS 100 M		
Working Duty	1 / 10 / 30 / 60 sec. configured by DIP switch		
Split core CT			
Channels	2	3	-
Input Voltage	50Hz or 60Hz, 500V (Max.)		
Type	Φ16mm(100A), Φ24mm(200A) and Φ36mm(400A); 8 M (i)		
Accuracy	<3% or 0.3A		
Thermistor (Optional)			
Channels	1		
Range	0 °C ~ 80 °C		
Accuracy	< 2 °C		
I/O Interface			
Channels	DI (Dry Contact) x 1	-	AI (4~20mA) x 3
Other			
Dimension	152 mm x 85 mm x 36 mm (L x W x H)		
Installation	Wall or Magnetic mounting		
Power	Rechargeable lithium battery 3.7V, 800mAh x 1 (With overdischarge, overcharge & short-circuit protection; 1.25mm connector)		
Battery Charging	By inductive charging of split core CT		By current of measured object
Operation Temperature	0 °C ~ +45 °C		

(i) iWSN-1310-mA-ME has not attached CT; iWSN-121A-160-ME/iWSN-1310-160-ME has attached Φ16mm(100A) CT, iWSN-121A-240-ME/iWSN-1310-240-ME has attached Φ24mm(200A) CT, iWSN-121A-360-ME/iWSN-1310-360-ME has attached Φ36mm(400A) CT.

Power Meter

Features:

- Provides 6 100A split current transformers (CT)
- Provides watt-hour information suitable for energy-saving systems
- Supports up to 6 cirbuits current measurement
- Supports up to 2000A of cable current.
- Adopt power from the AC power source. No need for external power transformer

iWSN-9601

iWSN-9603

The iWSN-9601 and iWSN-9603 are AC power meters, which provide a voltage input and current CT inputs, and suits measuring the power information of different equipment powered by the same AC source. By means of wireless communication and powering from the measured voltage cable, it can greatly reduce the cost and duration of installation, and satisfy to the demand of distributed deployment and quick setup. Based on the above features, this series is suitable for applications such as energy saving, big data analysis and predictive maintenance.

Models	iWSN-9601-160-ME-IP33 iWSN-9601-240-ME-IP33 iWSN-9601-360-ME-IP33	iWSN-9603-PCT-ME-IP33	iWSN-9603-160-ME-IP33 iWSN-9603-240-ME-IP33 iWSN-9603-360-ME-IP33	iWSN-9603-RCT500P-ME-IP33 iWSN-9603-RCT1000P-ME-IP33 iWSN-9603-RCT2000P-ME-IP33
RF Interface				
Radio Frequency	433 MHz			
Channels	0 to 15 configured by DIP switch			
Transmission Distance	LoS 100 M			
Working Duty	1 / 10 / 30 / 60 sec. configured by DIP switch			
Measurement				
Wiring	1P2W-1CT / 1P3W-2CT	3P4W-3CT / 3P3W-2CT / 3P3W-3CT / 1P2W-1CT / 1P3W-2CT		
Channels	Single-phase x 1	Three-phase x 1		
Input Voltage	110 - 240 VAC, 277VAC	Three-phase 100 - 480 VAC (58 - 277 VAC single-phase)		
Input Frequency	50 Hz or 60 Hz			
Wh Accuracy	± 1%	± 2%	± 1%	
Parameter Measurement	True RMS voltage(Vrms), True RMS current(Irms), Active Power(kW), Active Energy(kWh), Power Factor(PF), Date and time(Year/Month/Date/Hour/Minute/Second)			
CT				
Includes CTs	6			
Type	Split core CT	Optional CT	Split core CT	RCT Rogowski coil
Specification	Φ16mm(100A), Φ24mm(200A) and Φ36mm(400A); 8 M (i)			Φ55mm(500A), Φ80mm(1000A) and Φ105mm(2000A); 4 M (ii)
Other				
Dimension	185mm x 85mm x 45mm (L x W x H)			
Operation Temperature	-25°C ~ +75 °C			

(i) iWSN-9601-PCT-ME-IP33 has not attached CT; iWSN-960x-160-ME-IP33 has attached Φ16mm(100A) CT, iWSN-960x-240-ME-IP33 has attached Φ24mm(200A) CT, iWSN-960x-360-ME-IP33 has attached Φ36mm(400A) CT.

(ii) iWSN-9603-RCT500P-ME-IP33 has attached Φ55mm(500A) CT, WSN-9603-RCT1000P-ME-IP33 has attached Φ80mm(1000A) CT, iWSN-9603-RCT2000P-ME-IP33 has attached Φ105mm(2000A) CT.

IP33 Protection Design

Water Resistant Material

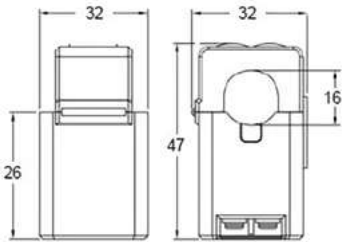
Protective Case of DIP Switch

iWSN-9601 Wiring

iWSN-9603 Wiring

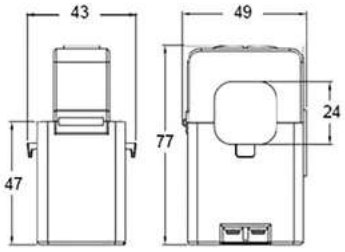
CT Dimension (Units: mm)

CA-SCT16I-100A-L080 (100A)



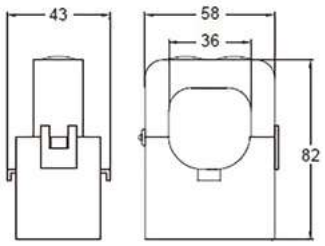
Left Side | Front Side

CA-SCT24I-200A-L080 (200A)



Left Side | Front Side

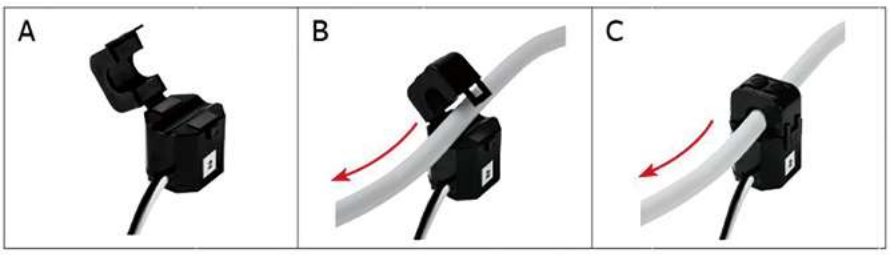
CA-SCT36I-400A-L080 (400A)



Left Side | Front Side

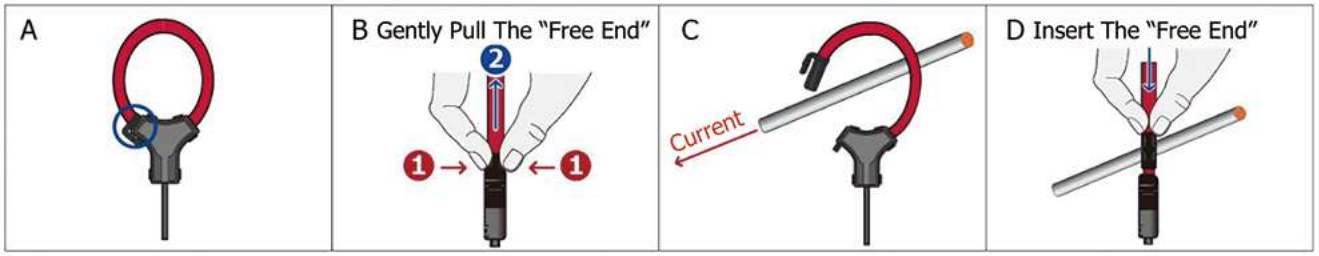
Models	A (Internal Diameter)	B (External Diameter)
iWSN-110X-RCT1000P-CT	80	93
iWSN-110XI-RCT1000PL-CT	80	93
iWSN-9603-RCT500P-ME-IP33	55	68
iWSN-9603-RCT1000P-ME-IP33	80	93
iWSN-9603-RCT2000P-ME-IP33	105	118

CT Installation



Clip-on CT for Easy Installation

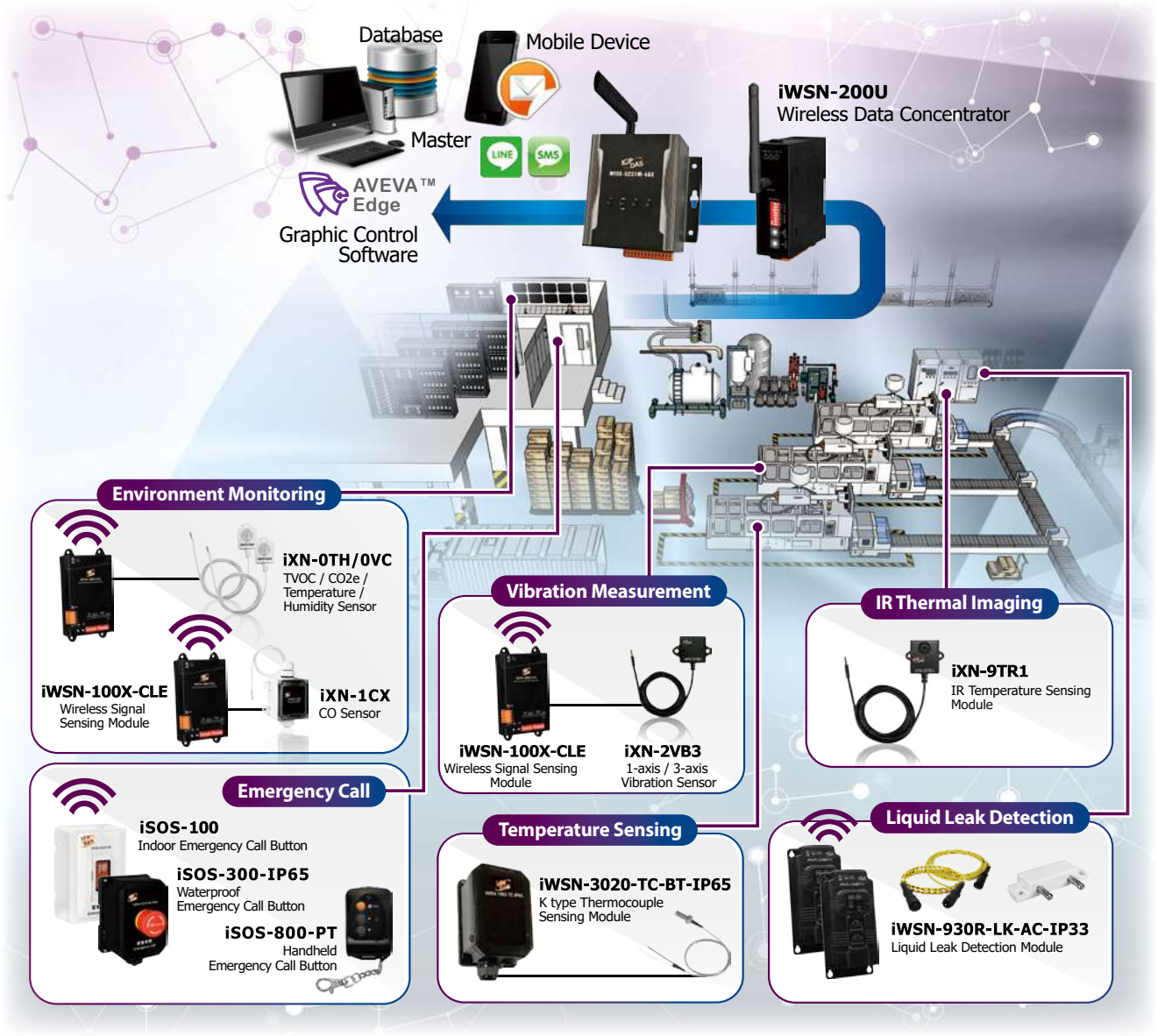
Expansion Module Connection



Rodowski Coil Soft CT Installation

5. Environment Monitoring System

iWSN Series use in Environment Monitoring System integrates temperature and humidity, gas (CO, CO2e, TVOC), vibration, IR Thermal Imaging, and wireless transmission functions. Its low power consumption can be used with the CT inductive charging and only need to adjust the DIP switch to complete module settings. There is no need to stop the production process, which can significantly save system setup time and reduce maintenance costs. In addition, the iWSN series is also available in an external power supply and disposable battery to meet different field requirements. The iWSN series is also equipped with a Wireless Emergency Alert system, which can meet the needs of security warnings at the same time.



Functions	Models	
Data Concentrator	iWSN-200U/iWSN-200E	iWSN-200R
Wireless Signal Sensing Module	iWSN-100X-CLE/iWSN-101X-CLE	iSOS Series
Sensor	iXN-0TH/iXN-0VC/iXN-1CX/ iXN-2VB3/iXN-9TR1	-
Power Supply	DC Power/ Rechargeable battery + CT charging	Primary Battery/ Rechargeable battery + Solar Cell

Descriptions

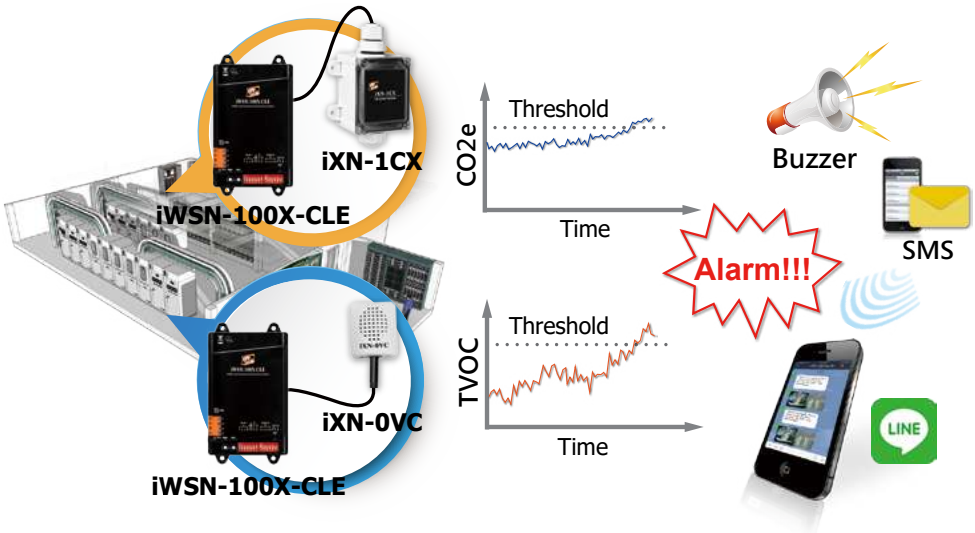
Due to the rising risks of environmental disasters, personal safety, and property losses in the manufacturing process, the risk of production interruptions for enterprises also increases. To keep business operations uninterrupted, through data integration, enhance factory automation, and environmental safety monitoring. For example, importing a factory monitoring system to perform centralized monitoring and automation management of remote control for the operating status of various industrial equipment. It has become an important trend in factory automation. Based on the maturity of network technology, The application of factory automation and environmental monitoring takes shape, however, the network technology is limited by the wired solutions for various sensors, difficulties during installation and construction, resulting in a dilemma for the enterprise. ICP DAS iWSN series provide a wide range of monitoring technologies with wireless communication technology, improving industrial safety issues, and promoting the factory to move towards the servitization of manufacturing.

Applications

Factory Environment Detection

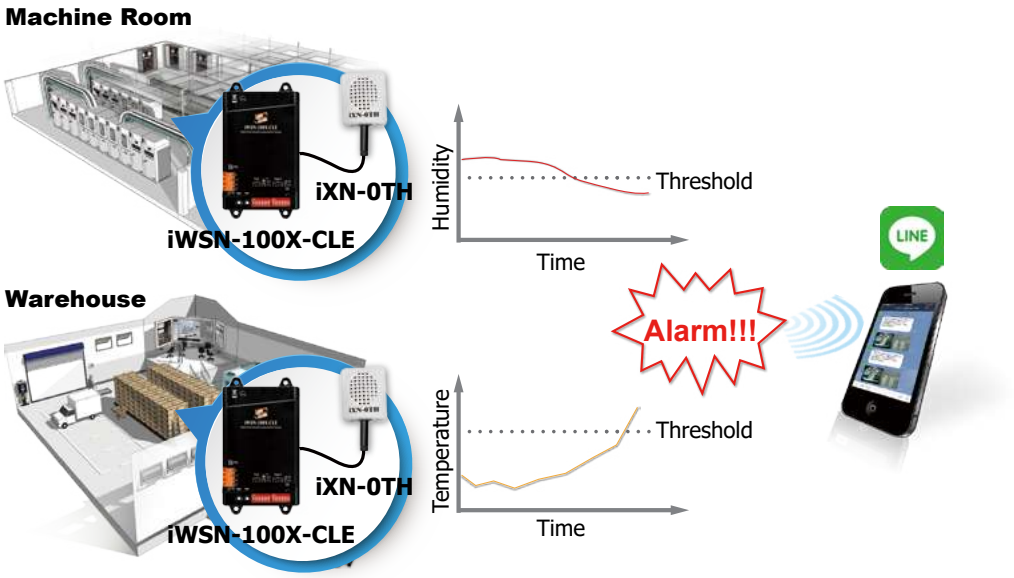
When the factory is in normal operation, regardless of CO2e, TVOC and CO data must follow the standard specifications, and make sure it is within the normal range, the data is abnormal, it probably means that the machine or air conditioner is in abnormal working condition. If the air ventilation is not carried out in time, it may lead to the abnormal physical condition of the personnel. In serious cases, it may even affect the lives of the personnel and cause unmanageable occupational accidents.

- Use iWSN-100X-CLE / iWSN-101X-CLE with iXN-0CX and iXN-0VC to monitor CO2e, TVOC, and CO data.
- According to long-term records of the relationship between motor operation and the atmosphere in the factory, when the air data is abnormal, an alarm will be issued and ventilation will be performed. Avoid the loss of personal safety caused by environmental factors.



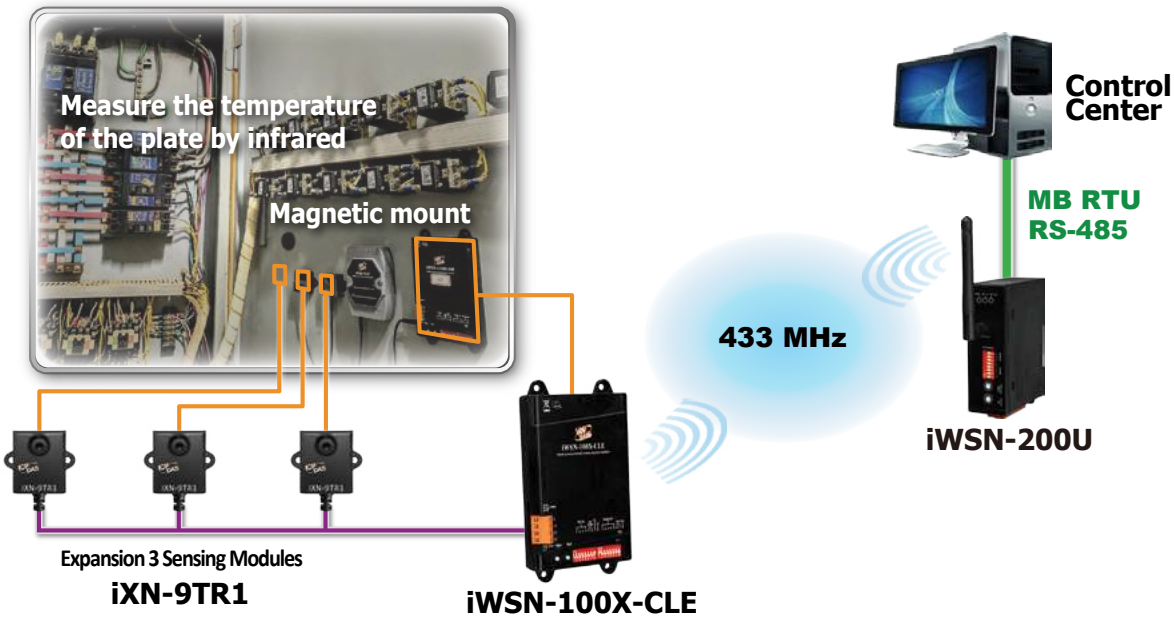
Temperature & Humidity Detection

The server and IT equipment in a control room usually have high standard requirements in temperature and humidity control. When the temperature and humidity exceed the standard for equipment to operate normally, it may cause calculation errors, equipment parts failure or premature damage, which may affect the operation of the equipment and my cause unpredictable losses to entities such as banks or carrier that require to perform data exchange in real time. iWSN-100X-CLE can work with iXN-0TH to provide solution for continuous monitoring of temperature and humidity in control rooms and warehouses. When the temperature and humidity data is abnormal, and alarm can be triggered to notify relevant personnel in advance to adjust or repair the air-conditioning system to avoid unusual changes in temperature and humidity that may cause equipment failures or premature damage to inventory materials.



Security Monitoring Applications of Thermal Imaging

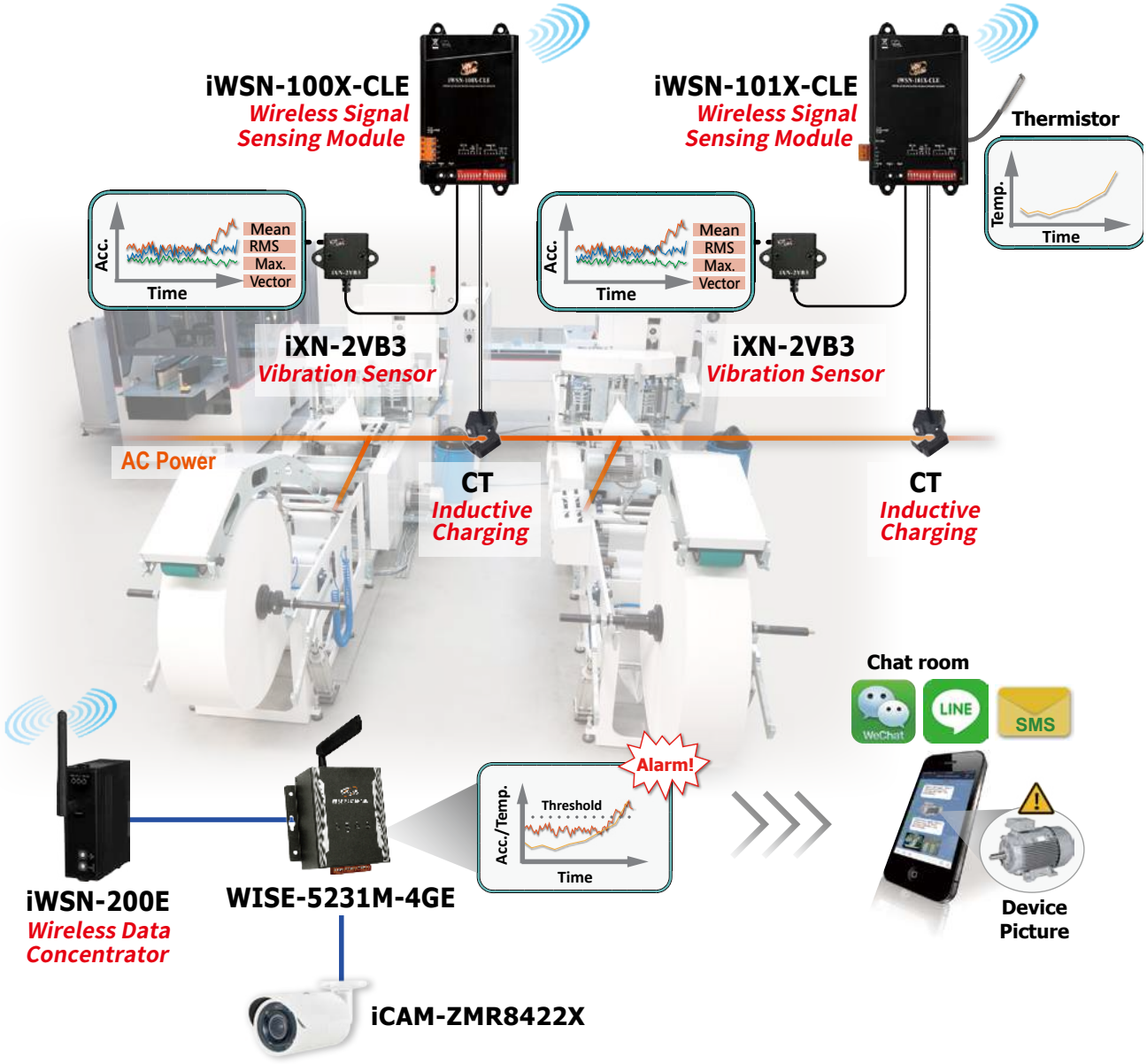
The distribution board will be damaged due to various failures of the machine.(overload, overcurrent, dust accumulation on-site, etc.) Eventually, the rising temperature causes insulation deterioration on the line and leads to an industrial safety crisis. iWSN-100X-CLE/iWSN-101X-CLE with iXN-9TR1 temperature sensor series to meet the long-term electrical switchboard monitoring and alarm requirements. Provides temperature monitoring records of wiring and transformer equipment in the distribution board. The system also extends the monitoring of electricity and water leakage to achieve all-around monitoring. Alarms will be issued in case of over-temperature, abnormal power consumption, or water leakage, to avoid accidents caused by machine failure and to evaluate whether it is a case of aging wiring or equipment overload for repair and replacement.



Vibration Measurement

In order to maintain normal production operations in factories, regular maintenance must be performed on important equipment. In the past, the vibration data is obtained by on-site inspection; the equipment is regularly checked one by one in a regular route. The data is manually recorded on papers which is labor-intensive, time-consuming and error-prone. The data is not easy to retrieve and analyze, and duplicate measurements or inappropriate inspections may occur.

ICP DAS iWSN Vibration Sensor Series uses **iWSN-100X-CLE/iWSN-101X-CLE**, and **iXN-2VB3** with thermistor for measuring vibration of the device and temperature detection. The data of vibration/temperature can be long-term recorded and then effectively solve the reliability issue that on-site inspection may involve. Its self-powered wireless design makes it easy to be installed and maintained. The onsite personnel can also set the limit range via WISE series IIoT Edge Controller so that when the collected data exceeds the range of the limit, the alarm message or image of the device can be sent via SMS or LINE/WeChat groups immediately. The control center or related personnel can be notified in real time and estimate or arrange when maintenance should be performed.

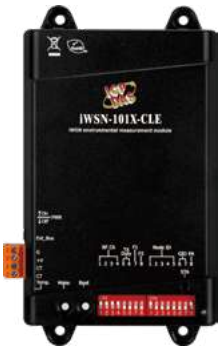


Wireless Signal Sensing Module

Features:

- Built-in a chargeable Li-ion battery, and energy harvest from the CT induced electricity
- Split-core current transformer (CT) for easy installation
- Uses 433 MHz RF communication
- CT induced current or DC power supply
- Wall-mount mechanism and magnet for installation

iWSN-100X-CLE



iWSN-101X-CLE

The iWSN environment sensing module is suitable for measuring various signals, such as temperature, humidity, CO2e, TVOC, CO, IR temperature, and vibration. In addition, it can also be widely used in energy saving, big data analysis and predictive maintenance applications.

Wiring Display

Models		iWSN-100X-CLE	iWSN-101X-CLE
RF Interface			
Radio Frequency		433 MHz	
RF Channels		0 ~ 15 configured by DIP switch	
Transmission Distance		LoS 100 M	
Working Duty		1 / 10 / 30 / 60 sec., and 3 / 5 / 10 / 30 min. configured by DIP switch	
Temperature Measurement (Optional)			
Channels		-	1
Range			0 °C ~ +80 °C
Accuracy			± 2 °C
Power			
Split-Core CT	Channels	1	
	Input Voltage	50Hz or 60Hz, 500V (Max.)	
	Input Type	Φ16mm(100A); Φ24mm(200A); Φ36mm(400A): Only for charging	
Battery		Li-ion battery (Compliant with UL1642) charged by CT induced current	
DC Power Supply		1~3 V_{DC} , 1A	
Mechanism			
Dimension (L x W x H)		152 mm x 85 mm x 25 mm	152 mm x 94 mm x 21 mm
Installation		Wall or Magnetic mounting	
Others			
Operation Temperature		0°C ~ +45°C	
Expansion Interface		Y (Support iXN-0TH, iXN-0VOC, iXN1CO, iXN-2VIB1, iXN-2VIB3)	

Gas Monitoring Expansion Module

Features:

- Approach to the real wireless deployment with iWSN-100X-CLE
- iXN-0TH provides temperature, humidity measurement
- iXN-0VC provides CO2e, TVOC measurement
- iXN-1CX provides CO measurement

The iXN-0TH can measure temperature and humidity, the iXN-0VC can measure CO2e and TVOC, and the iXN-1CX can measure CO. Connected iWSN-100X-CLE/iWSN-101X-CLE by audio cable, user can approach to the real wireless deployment, and widely use in the application of saving power, big data analysis, and predict maintenance.

iXN-0TH/iXN-0VC

iXN-1CX

Models	iXN-0TH	iXN-0VC	iXN-1CX
Temperature Measurement			
Range	-20°C ~ +60°C	-	-
Resolution	0.1°C		
Accuracy	±0.3°C		
Humidity Measurement			
Range	10 ~ 95% RH	-	-
Resolution	0.1% RH		
Accuracy	±3% RH @ 20~80% RH		
IAQ Measurement			
Range	-	TVOC: 0 ~ 60000 ppb CO2e: 400 ~ 60000 ppm	CO: 0 ~ 1000 ppm
Resolution		TVOC: 1 ppb (0 ~ 2008 ppb) 6 ppb (2008 ~ 11110 ppb) 32 ppb (11110 ~ 60000 ppb) CO2e: 1 ppm (400 ~ 1479 ppm) 3 ppm (1479 ~ 5144 ppm) 9 ppm (5144 ~ 17597 ppm) 31 ppm (17597 ~ 60000 ppm)	CO: 1 ppm
Power			
Consumption	0.005W	0.16W	0.017W
Input Type	iWSN sensing module powered by audio cable		
Mechanism			
Dimension (L x W x H)	30mm x 25mm x 20.2mm		131mm x 91mm x 20.2mm
Installation	Wall or Magnetic mounting		
Cable Length	27 cm		22 cm
Environment			
Operation Temperature	-20°C ~ +60°C	0°C ~ +45°C	
Storage Temperature	-30 ~ +80°C		
Humidity	10 ~ 95% RH, non-condensing		

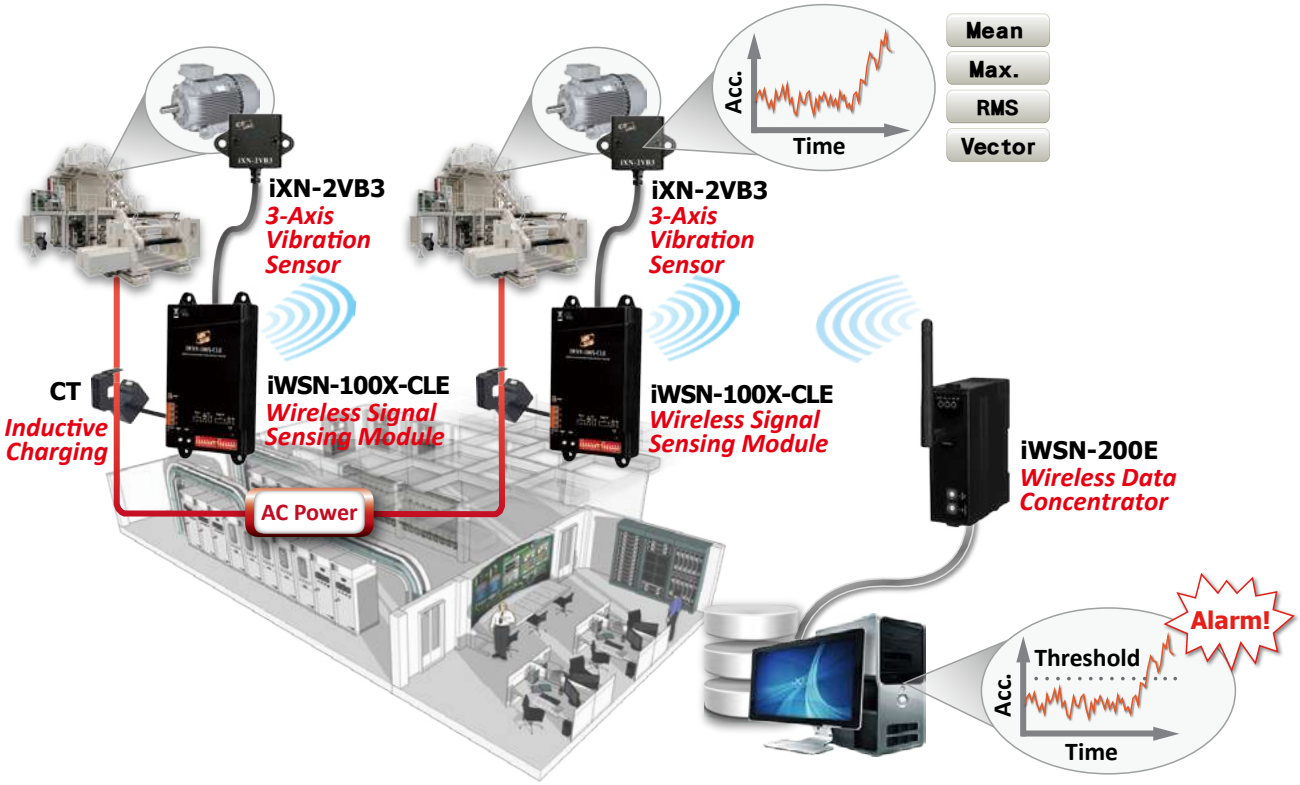
Vibration Sensing Module

The iXN vibration sensing module is suitable for measuring vibration data. The data can be provided to field personnel for reference through the controller of ICP DAS.

iXN-2VB3

Features:

- Suitable for sampling low frequency rotating equipment.
- Wireless transmission, easy to build and maintain.
- Edge computing, low power consumption.



Models	iXN-2VB3
Sensing Parameter	
Type	3-Axis MEMS
Sampling Rate	1.5 kHz (Max.)
Range	±8g
Output Interface	
Type	Acceleration: RMS, Max., triaxial vector
Mechanism	
Dimension (L x W x H)	51mm x 30mm x 15mm
Installation	Wall or Magnetic mounting
Others	
Operation Temperature	-25°C ~ +75°C

IR Temperature Sensing Module

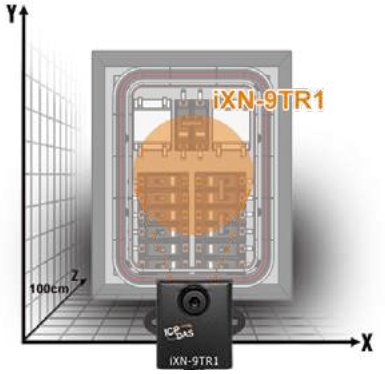
The iXN IR Temperature Sensing Module uses non-contact temperature measurement and wireless transmission , enabling temperature measurement for objects that are dangerous and inaccessible.

iXN-9RT1

Features:

- Wireless transmission, easy to build and maintain.
- Measurements can be performed without disturbing the normal operation.

Models	iXN-9TR1
Sensing Parameter	
Pixel	1
FOV	35°
Range	0°C ~ 300°C
Accuracy (Temp. 25°C)	0°C ~ 180°C: ±2°C / 180°C ~ 240°C: ±3°C / 240°C ~ 300°C: ±4°C
Mechanism	
Dimension (L x W x H)	51mm x 35mm x 20mm
Installation	Wall or Magnetic mounting
Others	
Operation Temperature	0°C ~ 125°C



Sensing Range/ Object Distance 25 cm	
X axis	**Y axis**
16	16

FOV	
X axis	**Y axis**
35	35

Temperature Sensing Module

Features:

- 16 RF channels
- Built-in a disposable lithium battery
- Support 433MHz Radio Frequency
- Temerature measurement range:
  0°C ~ +150°C / 0°C ~ +1300°C
- Supports 2 channels K-Type thermocouple temperature measurement
- Wall-mount, DIN-Rail or magnet adsorption

iWSN-3020-TC-BT-IP65
iWSN-3020-TCF-BT-IP65
iWSN-3020-TCF-DC-IP65

Temperature Monitoring of Conveyor Bearings

During the operation of belt conveyor, the bearing of the roller will generate heat due to friction. The greater the wear, the higher the temperature. To monitor the bearing temperature can not only evaluate service life and maintenance timing, but also avoid unplanned downtime. However, working sites are often dusty, with no power available or with difficult wiring. In response to problems above, iWSN-3020 series, which features IP65 outer case, built-in batteries and wireless communication mechanism, can function adequately in application under harsh environments and monitor the conveyor belt constantly.

Models		iWSN-3020-TC-BT-IP65	iWSN-3020-TCF-BT-IP65	iWSN-3020-TCF-DC-IP65
RF Interface				
Radio Frequency/Channels		433 MHz / 0~15 configured by DIP switch		
Transmission Distance		LoS 100 M		
Working Duty		1 / 10 / 30 / 60 sec. configured by DIP switch		
Sensing Parameter				
Thermocouple Temperature	Channels/Type	2 (Differential) / K-Type		
	Range/Accuracy	0°C ~ 150°C / ±2°C	0°C ~ +1300°C / ±1°C	
Power				
Power Supply		One-shot battery (CR123A, 3.0V, 1700mAh) x 2		+10 ~ +30 VDC
Others				
Dimension (L x W x H)		160 mm x 89 mm x 72 mm		
Ingress Protection/Installation		IP65 / Wall, DIN-Rail or Magnetic mount		
Operation Temperature		0 °C ~ +60 °C		-25°C ~ +75°C

Liquid Leak Detection Module

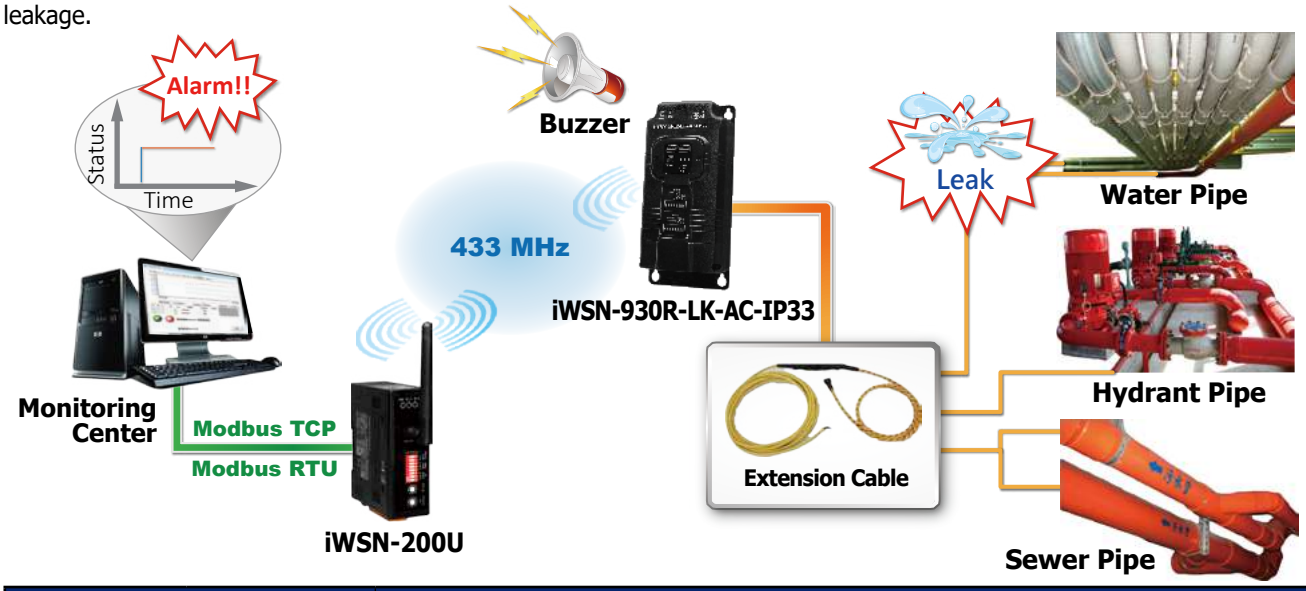
Features:

- Support 3-ch leakage detection, adjustable detection sensitivity
- Extension cables and detection cables up to 500 meters
- AC power supply, no need for external power transformer
- Built-in leakage buzzer alarm and relay output
- Support mute contact to mute the buzzer alarm

iWSN-930R-LK-AC-IP33

Leakage monitoring of pipelines

iWSN-930R-LK-AC-IP33 will periodically report the detection status to the iWSN-200 series module through the wireless interface. The HMI software of the central monitoring center can read back this status by iWSN-2200 series module through Modbus TCP/RTU protocol. When the module detects a liquid leakage, the buzzer alarm will be triggered to notify the personnel on-site to react to the emergency in time, and will automatically send the leakage event to iWSN-2200 series module so that the central monitoring center can read this status and then notify the relevant personnel. This series of modules can not only eff ectively meet the needs of water saving, but also quickly detect liquid leakage onsite, protecting the personnel from falling due to wet fl oor and avoiding short circuit damage to electrical equipment caused by liquid leakage.



Models		iWSN-930R-LK-AC-IP33
RF Interface		
Radio Frequency/Channels		433 MHz / 0 ~ 15 configured by DIP switch
Transmission Distance		LoS 100 M
Working Duty		1 / 10 / 30 / 60 sec. configured by DIP switch
Sensing Parameter		
Analog Input	Channels	3
	Cable Length	500 公尺 (Including extension/leakage detection cable)
	Contact	1 (Built-in buzzer)
Relay Output	Channels	1
	Specification	0.5 A @ 125 VAC ; 2 A @ 30 VDC
Mechanism		
Dimension (L x W x H)		185 mm x 85mm x 45mm
Installation		Wall-mounting
Others		
Power		50/60 Hz 100 ~ 240 VAC
Operation Temperature		-20°C ~ +50°C

Industrial Fieldbus

- Wi-Fi
- PROFINET
- CAN bus
- CANopen
- DeviceNET
- J1939
- PROFIBUS
- HART
- EtherNet/IP
- BACnet
- M-Bus

PC-based I/O Boards

- PCI Express Bus Data Acquisition Boards
- PCI Bus Data Acquisition Boards
- ISA Bus Data Acquisition Boards

Energy Management Solution

- InduSoft SCADA
- Power Meter Concentrator
- IIoT PMC with Display
- Three-phase Smart Power Meter
- Single-phase Smart Power Meter
- Multi-circuit Smart Power Meter
- True RMS Input Module
- Smart Power Meter with LED Display

IIoT Cloud Solution - UA SERIES : IIoT Communication Server

- Built-in OPC UA Server Service
- Built-in MQTT Broker Service
- Support Logic Control IFTT
- Support IoT Cloud Platforms
- Connection and IoTstar Cloud Management
- IIoT Factory Application of MES
- Pumping Station IoT Application
- BA Smart BuildingIoT Application
- Robotic Arm Co-operation Application

Machine Automation

- Motionnet Solutions
- EtherCAT Motion Control Solutions
- Ethernet Motion Control Solutions
- Serial Communication Motion Control Solutions
- PC-based Motion Control Cards
- PAC Solutions - Motion Modules

Smart Building, Smart Home Automation

- Video Intercom & Access Control
- Touch HMI - TouchPAD Series
- Smart Lighting Control
- Energy Saving - PM/PMC Series
- Environmental - DL/CL Series
- Motion Detector - PIR Series
- Wi-Fi Wireless - WF Series
- Infrared Wireless - IR Series
- ZigBee Wireless - ZT Series
- IIoT Server & Concentrator
- LED Display - iKAN Series

TouchPAD HMI Solutions

- TPD/VPD Products Series
- Video Intercom & Access Control Series
- TPD/VPD Application

Wireless Solution

- WLAN Products
- Radio Modems
- 3G/4G Products
- NB-IoT Solution
- GPS Products
- Bluetooth LE Converters
- ZigBee Products
- Infrared Wireless Modules
- Wireless Modbus Data Concentrators
- WLS (Wireless Locating System)

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