![ICP DAS logo]

IR Thermal Imaging Solution

Touch Panel
IR Temperture Data Concentrator

RUN PWR

ICP DAS

7"
VPD-170-IRT

4.3"
VPD-143-IRT

Baudrate   Node ID   N/A N/A D- D+

PWR

ST

ICP DAS
iSN-812-MRTU

F.G. GND +Vs   Run ◄—►Int
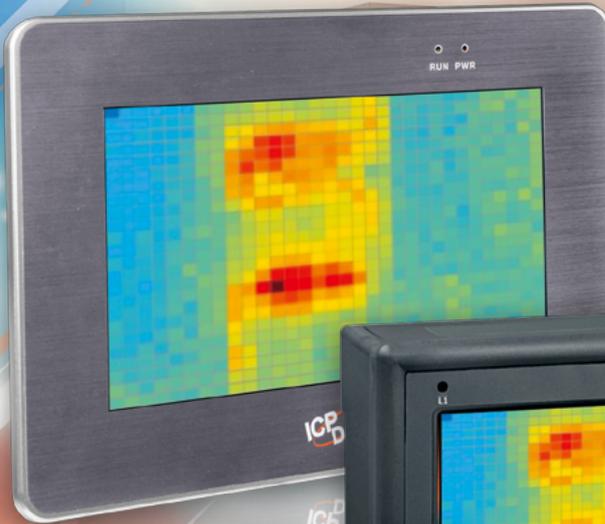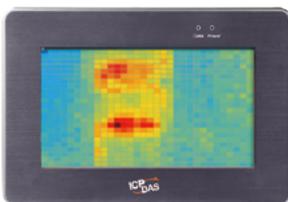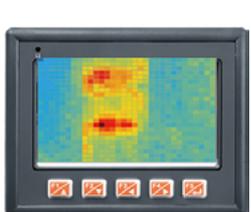
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1. IR Thermal Imaging Series

Temperature sensing can be implement in a variety of fields such as devices failure analysis in steel factory, high temperature warning in electrical room, and body temperature monitor during COVID-19. The most commonly used in industry is measuring through contact devices such as Thermistor, RTD, and TC. But for those areas are unable to install the contact devices will suggest to using non-contact measurement.

In response to the market and customer requirements, the Infrared Thermography Series developed by ICP DAS are non-contact temperature measurement technology. This series have a lot of advantages like measuring temparature of food, pharmaceuticals, chemicals and those moving objects with contactless devices or some dangerous items that are unable to get close to. Precisely measure the surface temperature of fine grain and the instantaneous value of tempereture changes. This series of products support wired and wireless interfaces to meet requirements of markets.
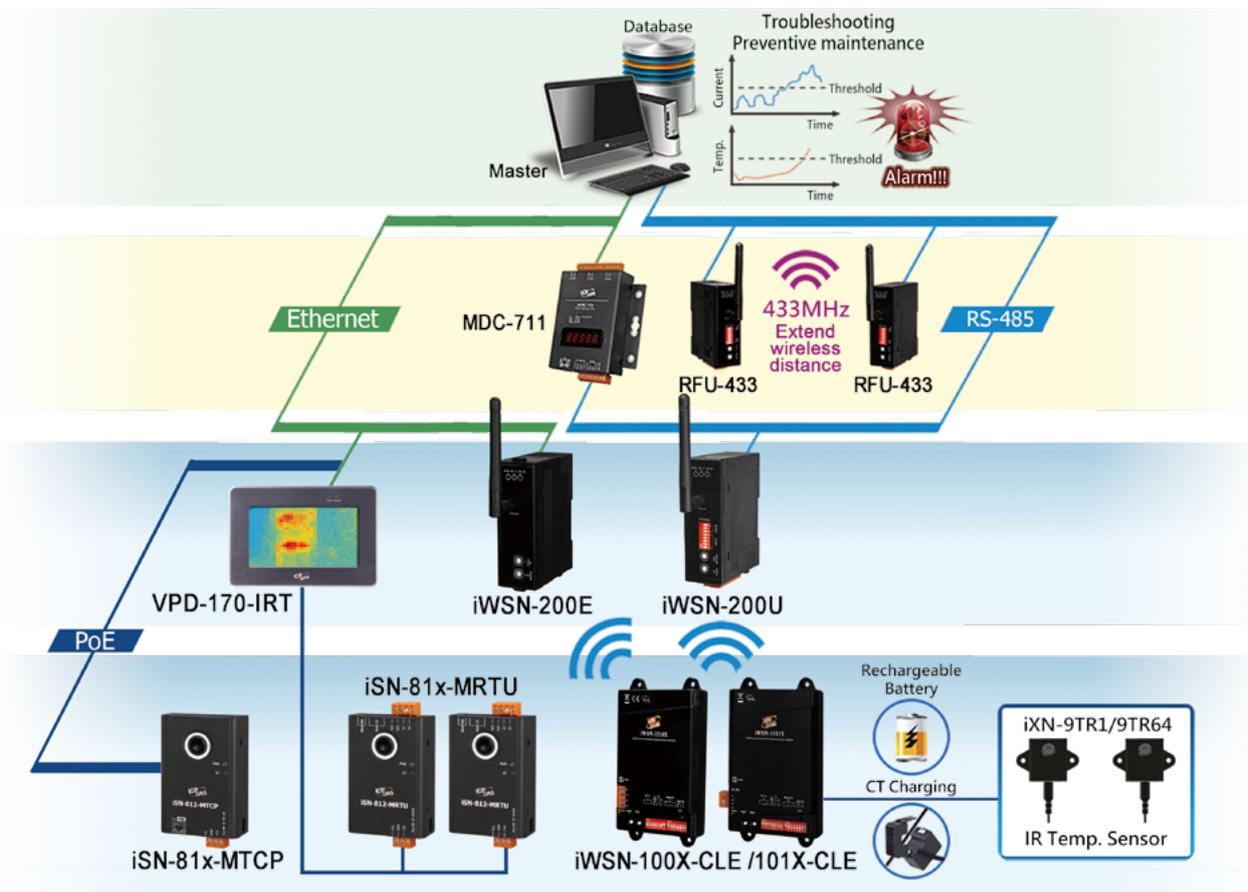
Introduction of Infrared Technology

There are three ways of heat transfer, including heat radiation, heat convection and heat conduction. Heat radiation is infra-red directly came out from the surface. The 8-15 micron long-wavelength infrared is the area where imaging temperature measurement is applied to thermal imaging. Sensors in this band do not require additional light or external heat sources, such as the sun, moon or infrared lights, to obtain a complete passive image of heat emissions.
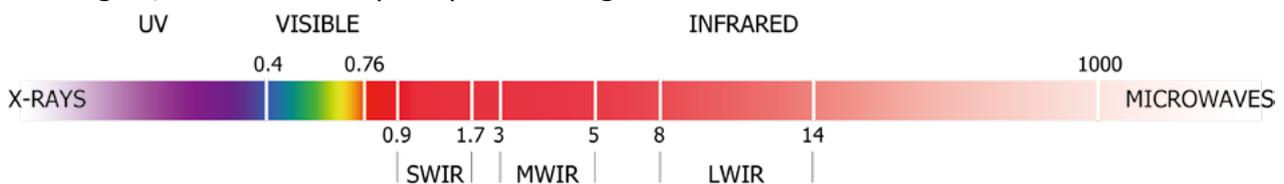
Where the Infrared Thermography Series are implemented in?

- Various electritical devices: Loose joints or poor contact, unbalanced load, overload, overheating and other hidden dangers can be found.
- Transformer: It can be found whether there are loose joints, overheated bushings, poor contact (tap changer), overload, unbalanced three-phase load, and poor cooling pipe blockage.
- Motor/Generator: Excessive bearing temperature can be found, unbalanced load, short circuit or open circuit of winding, heating of carbon brushes, slip rings and collector rings, overload and overheating, and blockage of cooling pipes.

Wiring   Breaker   Electric Control Panel
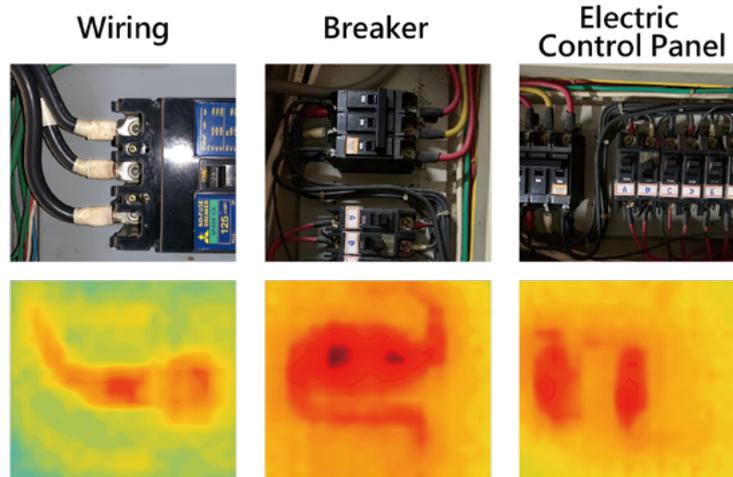
Contact Thermometry V.S. Non-Contact Thermometry

The advantages of infrared temperature measurement include:

1. Wide range of surface temperature and distribution reading temperature value and relative comparison.
2. To ensure hygienic conditions, measuring temparature of food, pharmaceuticals, chemicals with contactless devices.
3. Measuring temparature of the moving objects or some dangerous items that are unable to get close to.
4. Other fields where contact solutions cannot be deployed can also be quickly imported into temperature measurement applications

For the pros and cons of different devices, please refer to the table below:

	Contact	Non-Contact
Type	• Thermocouple • Thermistor • Resistance Thermometer (RTD)	• Infrared
Advantages	• High precision • Real temperature can be measured	• Able to measure moving objects • Wide range of measuring • Perform measurements without interfering with the normal operation of the measured objects.
Disadvantages	• Measure fixed objects • Measure specific points or small areas • Susceptible to corrosion	• Thermal radiation is susceptible to the environment • Only the surface temperature can be measured

Analysis of Temperature Monitoring Elements

- To level up the devices functions or added machines and wirings in the control box will increase the list of examination.
- Lack of securities and lower frequency for checking leads to higher risk of accidents.
- There are many factors for machine failure, but most of the abnormalities will be manifested in temperature changes, and will eventually stop abnormally due to temperature rise and insulation damage.
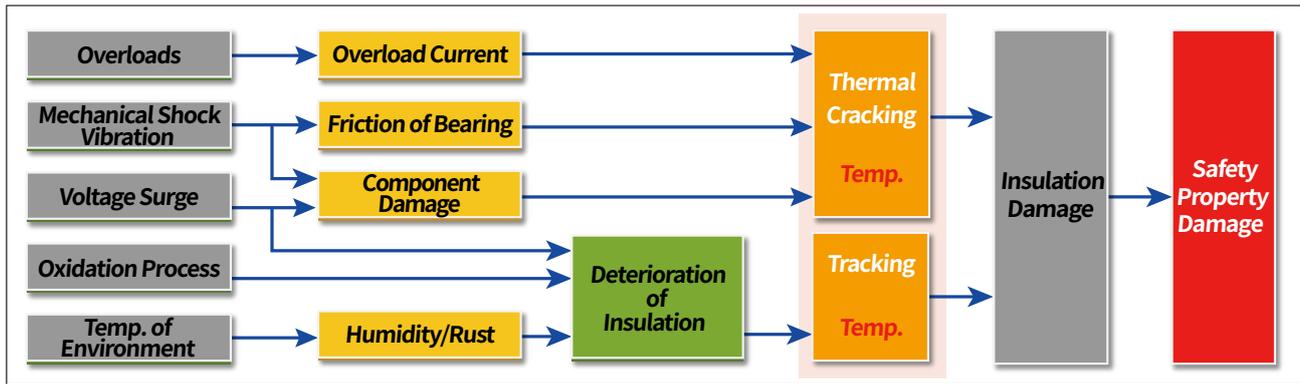
Traditional Monitoring Program

- Rely on professionals and experience for inspection
- Unable to continuously measure the temperature of the device or the panel, or can only detect a single point locally

Brand-new Type of Monitoring

- Quickly check abnormal parts without relying on professionals
- Continuously measure the overall temperature of equipment and trays
- Accumulative analysis of data to achieve purposes of early warning and automation

	Part	Whole
Continuously Measurement	Thermocouple	✖
Regular Monitoring	Heat-resistant Terminal Socket	Thermal Imager

iXN-9TR64 Thermal Imaging Sensor

iWSN-100X-CLE

433 MHz

Thermal Image
32.2   42.5

Control Center

iWSN-200U

Temperature Measurement and Predictive Maintenance

Equipment failures are mostly due to the continuously overheated. If the non-contact temperature measurement is used, the warning threshold and the danger threshold can be set. When the temperature of the object rises abnormally and exceeds the threshold, a warning will be issued immediately, so that the purpose of preventing equipment failure in advance can be achieved.
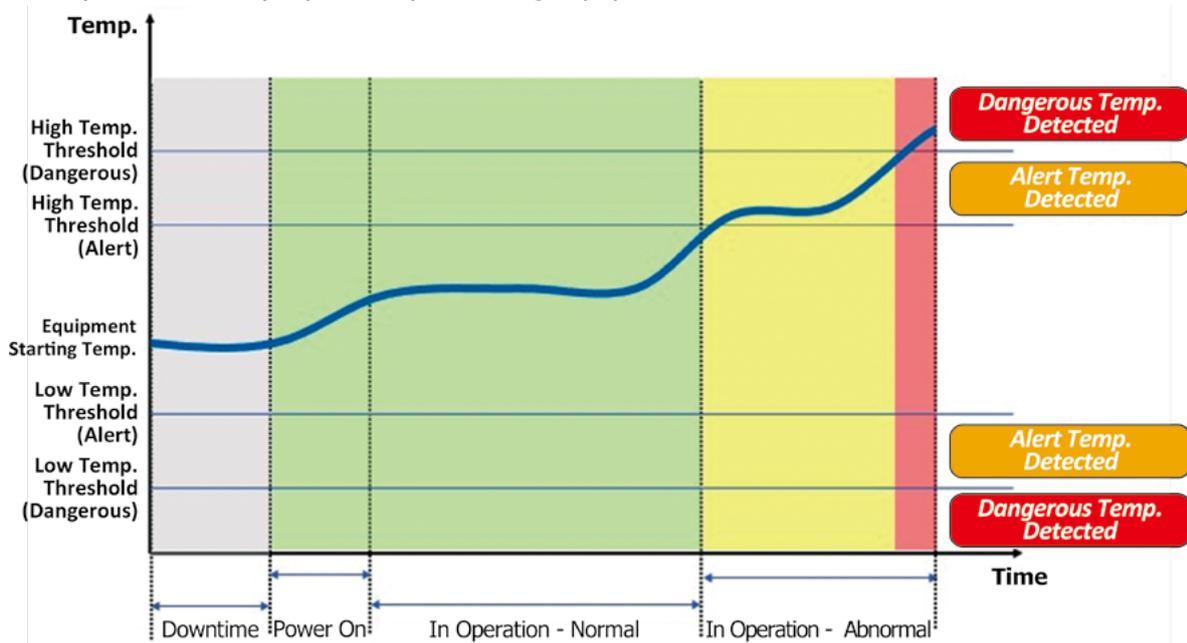
🌥 *The Advantage of Predictive Maintenance*

Provide maintenance guidance based on data analysis, and pre-arrange replacement and maintenance.

Establish an equipment list and define a data list based on maintenance requirements.

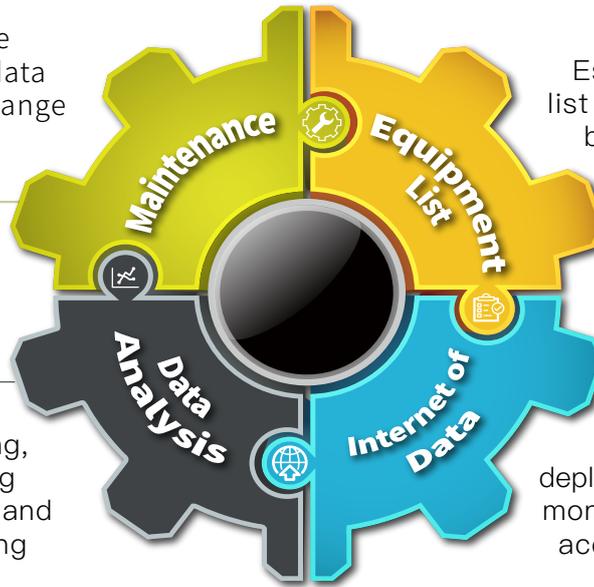Equipment status, information recording, data analysis, setting exception boundary and status, and optimizing settings.

Module/Sensor selection, network deployment, and real–time monitoring are performed according to data types.

Contact v.s. Non-contact Temp. Measurement

| Item	Contact Temp. Measurement	Non-contact Temp. Measurement	
Sensor	Thermistor / Thermocouple / RTD	iSN-81x-MRTU / iSN-81x-MTCP	iXN-9TR1 / iXN-9TR64
Data Receiver	M-7000 / I-8K / I-87K...	VPD-1xx-IRT	iWSN-100X-CLE / iWSN-101X-CLE
Main Function	Temperature measurement: process equipment temperature, product production temperature, power panel circuit breaker and feeder temperature, etc.		
Non-fixed Detection	N/A	Moving objects, large-scale monitoring	
Precision	±0.1 ° C	±5 ° C	
Work Duty	10 Hz	16Hz	Determined by the data receiver
Installation	Fixed to the sensing object	According to FOV, non-contact installation (1 M)	
Communication	Wired	Wired	Wireless
Management Software	Self development	VPD Active Management Demonstration	Self development
Hardware Cost	$	$ $	
Construction Cost	$ $ $	$	
Installation	Long construction time, system shutdown due to power failure	Short set-up time and non-stop installation	
Application Fields	Monitoring system, process analysis, energy saving, production quality analysis	Big data analysis, system monitoring, trend analysis, predictive maintenance	

2. iSN-8xx IR Temperature Measurement Applications

Infrared – Visible temperature, the iSN-8xx series adopts the most advanced infrared imaging technology which can detect infrared radiation or thermal energy. It can also generate clear images according to the detected difference in temperature, which is a non-invasive monitoring method to providing real-time temperature monitoring and alarm solutions for industrial safety and quality control of production line. The iSN-81x-MRTU series is designed as a common Modbus communication interface. With the VPD-1xx-IRT temperature data concentrator or IIoT edge computing controller developed by ICP DAS, the measured temperature data from the iSN-81x-MRTU series products can be collected and sent to the cloud for data analizing. By the way, the alarm output is based on the definition of alarm rule settings to reducing the burden of personnel on duty and inspection.
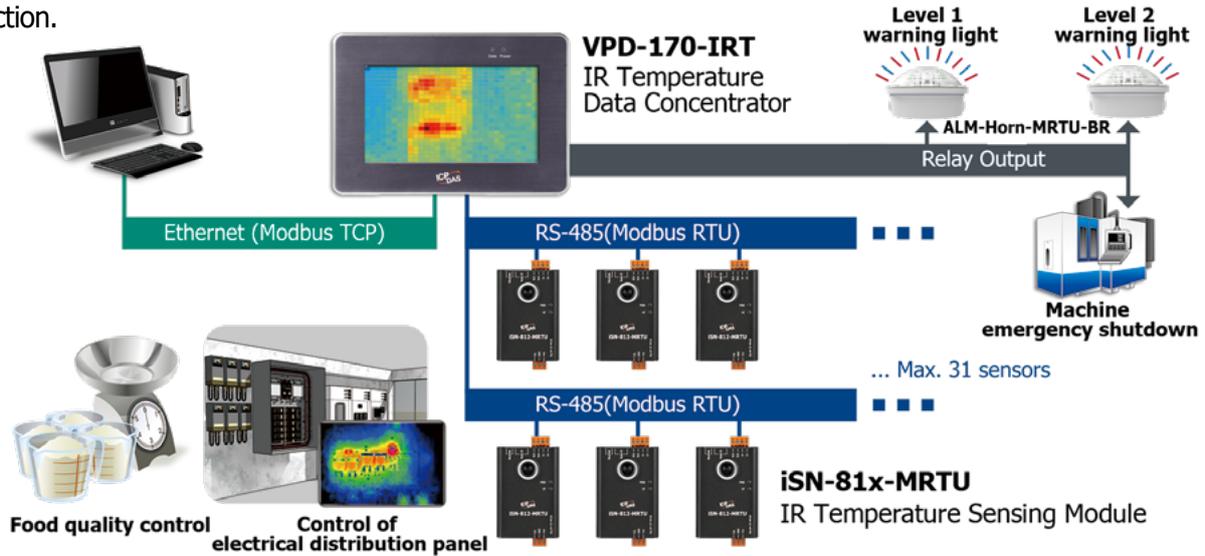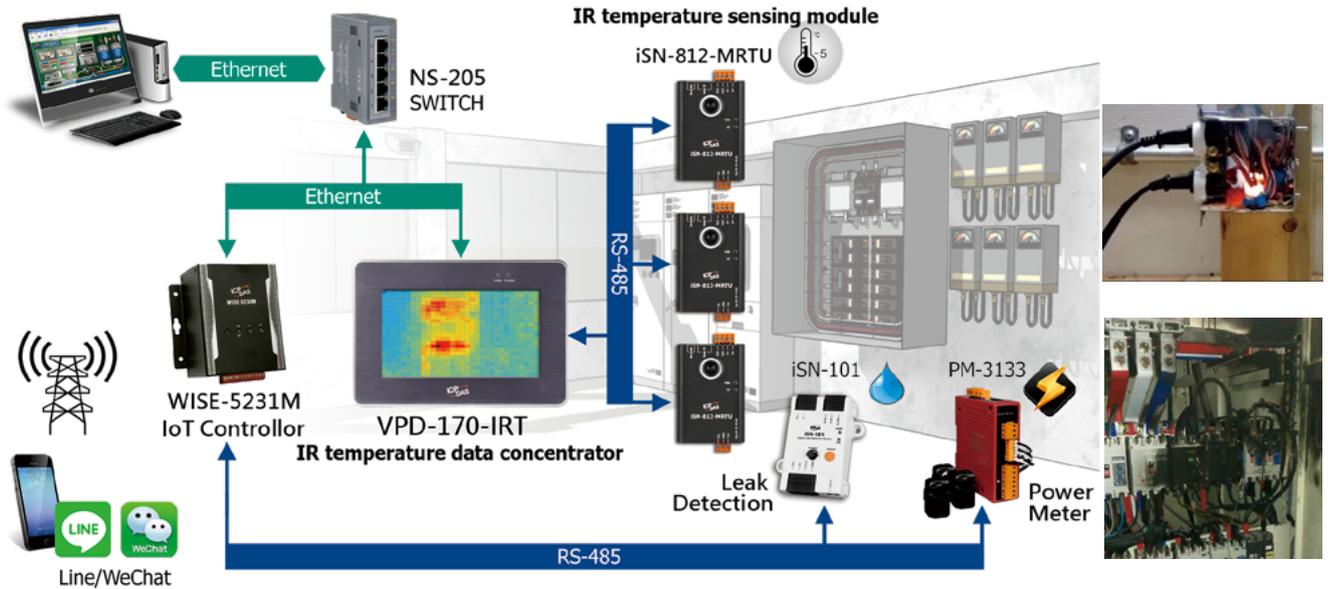

Real-time Temperature Monitoring

iSN-81x-MTCP series supports Power over Ethernet (PoE), users only have to connect PoE network switch to complete power supply and communication. It can be easily integrated into the SCADA system through the Modbus TCP communication protocol, and the temperature measurement information of the object can be obtained in real-time.
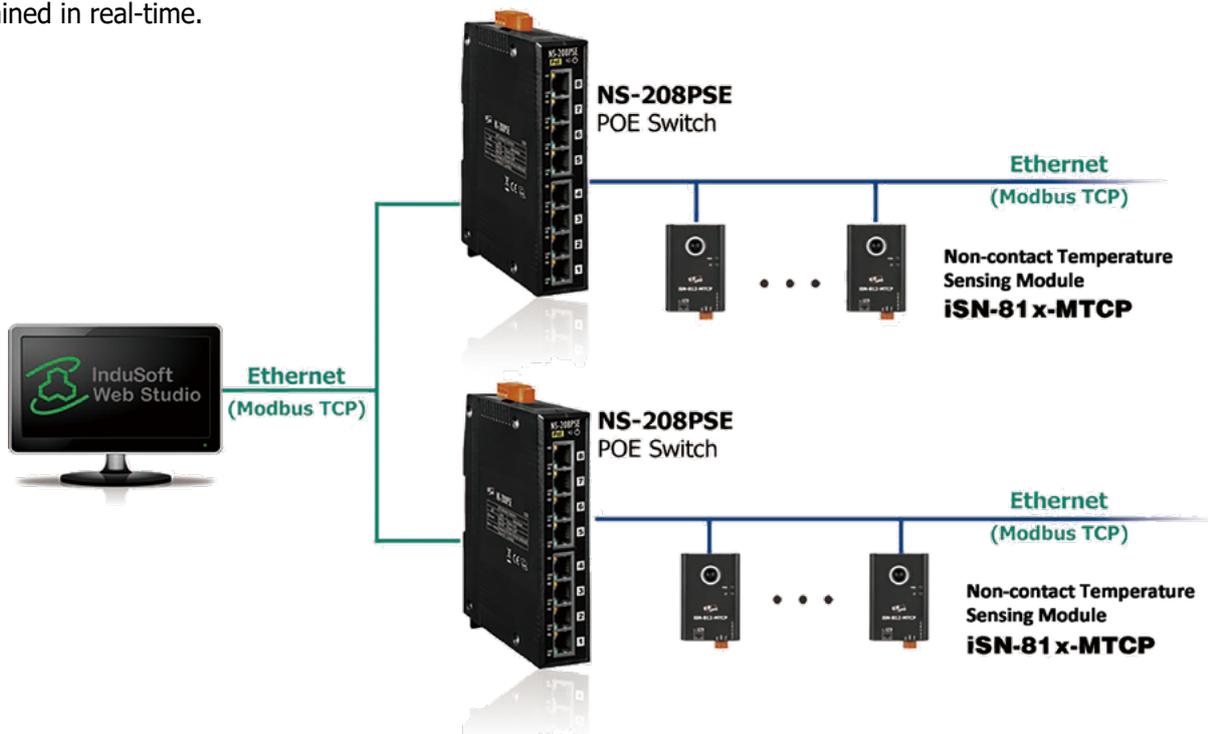
Safety Monitoring System of Distribution Cabinet

Due to various faults of the machine (overload, overcurrent, on-site dust accumulation, etc.), the temperature of the switchboard will rise, resulting in the deterioration of the insulation on the line and causing an industrial safety crisis. VPD-1xx-IRT temperature concentrator series and iSN-81x-MRTU temperature sensor series meet the long-term monitoring and alarm requirements of power transmission and distribution cabinets, and monitor and record the temperature of lines and transformers in the panel. The system also simultaneously extends the monitoring of power and water leakage status, realize all-over safety monitoring, send alarms in case of over-temperature, abnormal power consumption, or water leakage to avoid major losses caused by machine failures, and further evaluate whether it is line aging or equipment overload to facilitate maintenance and replacement.

Comprehensive monitoring, easy installation

- **Non-contact, full-surface temperature monitoring**
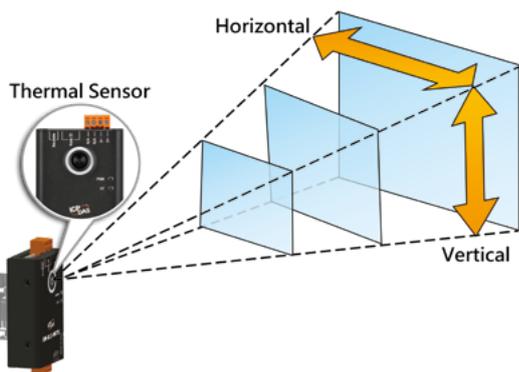
- **Compact product size**

- **Adapt to the complex operating environment**

EMC/EMI Anti-interference

Wide Temperature Operation Capability

- **Various Installation Modes**

Wall Mount

Magnetic Installation

Universal mount installation

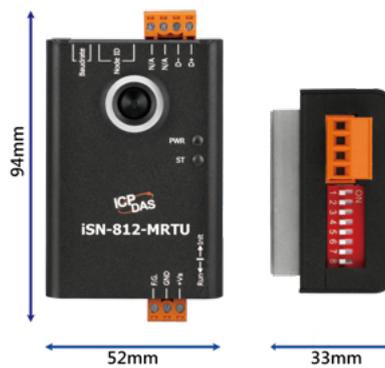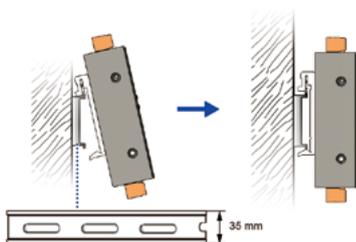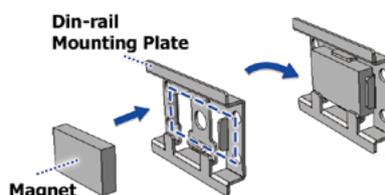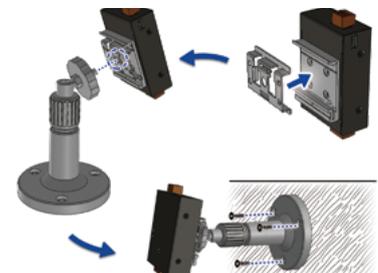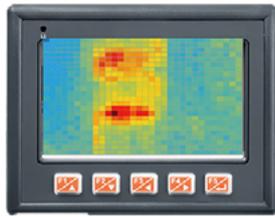# VPD-1xx-IRT Temperture Data Concentrator
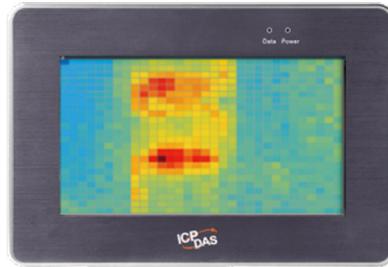
VPD-143-IRT   **VPD-170-IRT**

Features

- High-resolution color touch screen
- Front Panel: IP6S Waterproof
- Temperature threshold detection function
- Thermography available
- Supports up to 31 iSN-81x-MRTU
- Support Modbus TCP/RTU protocols

VPD-1xx-IRT supports 8 Modbus TCP connections, allowing remote monitoring hosts to connect to VPD-1xx-IRT via Ethernet and access temperature data of multiple iSN-81x-MRTUs at one time. Users can set various functions of iSN-81x-MRTU and VPD-1xx-IRT from the touch screen of VPD-1xxIRT, and can also immediately see the temperature and thermal image of the measured object. Through the convenient connection and communication capabilities between the VPD-1xx-IRT temperature data concentrator and the Ethernet network, users can quickly establish a remote monitoring system and conduct centralized management of temperature data.

Software
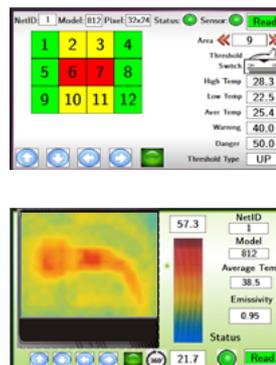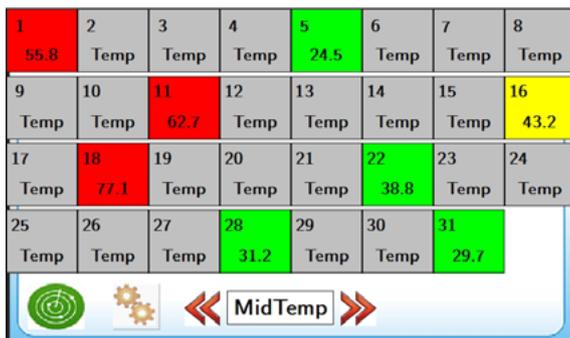
- Display the connection status and temperature data of each thermal sensing module.
- Quickly search and set the thermal sensing module: high temperature alarm, warning threshold type, temperature range and average value display.
- Simultaneous connection of up to 31 modules via software.

Specifications

Model	VPD-143-IRT	VPD-170-IRT
Real Time Clock	YES	
Display Type	4.3″ TFT	7″ TFT
Rubber Keypad	5 keys	N/A
Ethernet	1 (10/100 Base-TX)	
COM Ports	2 x RS-232 / RS-485 including Self-Tuner	2 x RS-232 (3-pin) / RS-485 including Self-Tuner
Protocal	Modbus RTU / Modbus TCP	
Relay Out (Form A)	Signal Relay(Form A): 9 CH (2A@30VDC, 0.24A@220VDC, 0.25A@250VAC)	
Power	Terminal Block: 12 ~ 48 VDC / PoE : IEEE 802.3af, Class1 (48 V)	
Dimensions (mm)	131 x 105 x 54 (W x H x D)	217 x 153 x 33 (W x H x D)
Humidity	10~90% RH, non-condensing	
Operating Temperature	-20 ~ + 50° C	-10 ~ + 60° C

iSN-81x IR Temperature Sensing Module

iSN-81x-MRTU/iSN-81x-MTCP

Features

- Non-contact temperature measurement
- Support Modbus RTU/TCP protocol
- Temperature threshold detection function
- Offers Wall-mount, magnetic and universal joint for installation

iSN-81x-MRTU / iSN-81x-MTCP series is sensing module that designed specifically for non-contact temperature measurement. The module provides a variety of temperature pixels and temperature threshold detection functions to meet various temperature measurement needs. It also provides Modbus RTU/TCP protocol that users can put it into SCADA system very easily.

Specifications

Model	iSN-811-MRTU	iSN-812-MRTU	iSN-811C-MTCP	iSN-812-MTCP
COM Ports	1 x RS-485 (115200 bps Max.)		1 x RJ-45, 10/100Base-TX PoE (IEEE 802.3af, Class 1)	
Protocol	Modbus RTU		Modbus TCP	
Temp. Range	-50 ~+250° C	-40 ~ +300° C	-50 ~+250° C	-40 ~ +300° C
Temp. Accuracy	±5° C Max.			
Temp. Resolution	0.1° C			
Pixels	64 (8x8)	768 (32x24)	64 (8x8)	768 (32x24)
FOV	60° x 60°	110° x 75°	60° x 60°	110° x 75°
Type	IR			
Effective Distance	1 M			
Image Sensor	-	-	CMOS	-
Resolution	-	-	QVGA (320x240)	-
Input Range	+10 ~ +30 VDC			
Consumption	1.7W	1W	1.7W	1W
Dimensions (mm)	52 x 95 x 27 (W x H x D)			
Installation	Wall-mounting or magnetic mounting, gimbal mounting			
Humidity	10% ~ 95% RH, non-condensing			
Operating Temp.	-10 ~ + 70° C			
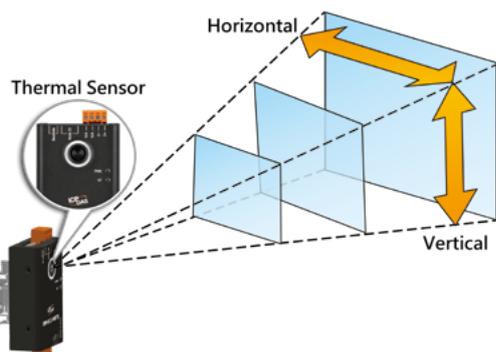
Model	Sensing Range/ Object Distance 25 cm		FOV	
	X axis	Y axis	X axis	Y axis
iSN-811-MRTU	29 cm	29 cm	60°	60°
iSN-811C-MTCP				
iSN-812-MRTU	71 cm	38 cm	110°	75°
iSN-812-MTCP				

3. iWSN Solution

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.

System Integration and Solutions

No Production Line Suspending & Saving Cost

Real-time upload of power information and environmental parameters by current transformers(CT)
Fasten the CT to the power line, the power and environment sensing modules can be operated, then the data will be uploaded to the control center in real-time.

Predictive Maintenance & Environmental Parameters

Easier Installation Process & Planning

Sub 1GHz wireless communication technology, built-in lithium battery and magnetic installation mechanism
Using low-interference long-distance wireless communication, built-in rechargeable lithium battery and magnetic mechanism. Installatig is more faster and easier.

Save Time on Data Capture & Setup

With DIP switch and self-detection, it can be quickly deployed and maintained
The module can be set by DIP switch. The self-detection signal will be sent regularly, that the module can send abnormal alarm in time and replace quickly.

Measurements Difference between Tradition & iWSN Series

Item	Traditional Power Meter	iWSN Series
Main Function	Measuring parameter data of power parameters	Measuring Thermal Imaging, Voltage, Current, Temperature, Humidity, DI, Vibration, CO2e, TVOC, CO
Accuracy	<1%	<3%
Working Duty	At least once per second	1 / 10 / 30 / 60 seconds
Power Supply	DC: Transformer required AC: Power line required	CT charging, battery and various external power sources. (Easy installation, maintenance and construction)
Consumption	100% (7W) (Wireless Module + Sensor + Power Supply)	0.3% (20mW) (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, Electricity Billing, Energy-saving Actuarial Calculation & Environmental Quality Analysis.	Big Data Analysis, System Monitoring, Trend Analysis & Predictive Maintenance.

Features

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
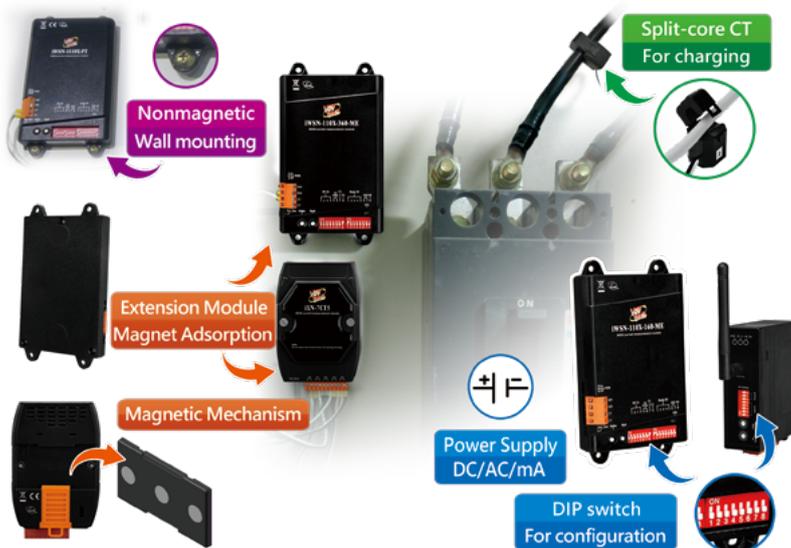
Technology & Advantages

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.

LF Diffraction — Long Distance Communication

Multiple Sensors — Keep Increasing

Multiple Power Supply — DC/AC/mA

CT — Inductive Charging

Low-Power Consumption — Power Supply by Li Battery

Anti-jamming — Stable Transmission

Wireless Data Concentrator

iWSN-200U/iWSN-200E

Features

- Supported data buffers of 31 iWSN sensors
- EMS Protection：+/-4kV Contact
- Isolation Protection：
  3000 VDC DC-to-DC,
  2500 Vrms Photo-isolation Protection

Antenna Magnetic
Base: ANT-Base-02

Antenna Extension
Cable: 3S001-1

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 433 MHz.

Specifications

Models	iWSN-200U	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 / RS-485 x 1	Ethernet x 1
Protocal	Modbus RTU	Modbus TCP
Transmission Speed	1200~115200 bps, N81	10/100 Mbps
Mechanism / Power		
Dimension (L x W x H)	108 mm x 84 mm x 33 mm (Without antenna)	
Antenna (L x θ)	108 mm x 10 mm	
Installation	DIN-Rail Mounting	
Input Voltage Range	+10 ~ +30 VDC	
Consumption	0.5W	1W
Operation Temperature	-25 ℃ ~ +75 ℃	

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
- 16 RF channels
- Wall-mount mechanism and magnet for installation

iWSN-100X-CLE / 101X-CLE

The iWSN environment sensing module is suitable for measuring various signals, such as temperature, humidity, CO2e, TVOC, CO, IR temperature, and vibration. It provides two modes of power supply: CT induced current or DC power supply. Diverse power supply delivers reliable electricity and reduces the cost of wiring.

Specifications

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	
DC Power Supply		1~3 VDC , 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			
Battery		Rechargeable lithium battery 3.7V, 800mAh x 1 (With overdischarge, overcharge & short-circuit protection; 1.25mm connector)	
Operation Temperature		0 ℃ ~ +45 ℃	
Expansion Interface		Y (Support iXN-0TH, iXN-0VOC, iXN1CO, iXN-2VIB1, iXN-2VIB3)	

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.
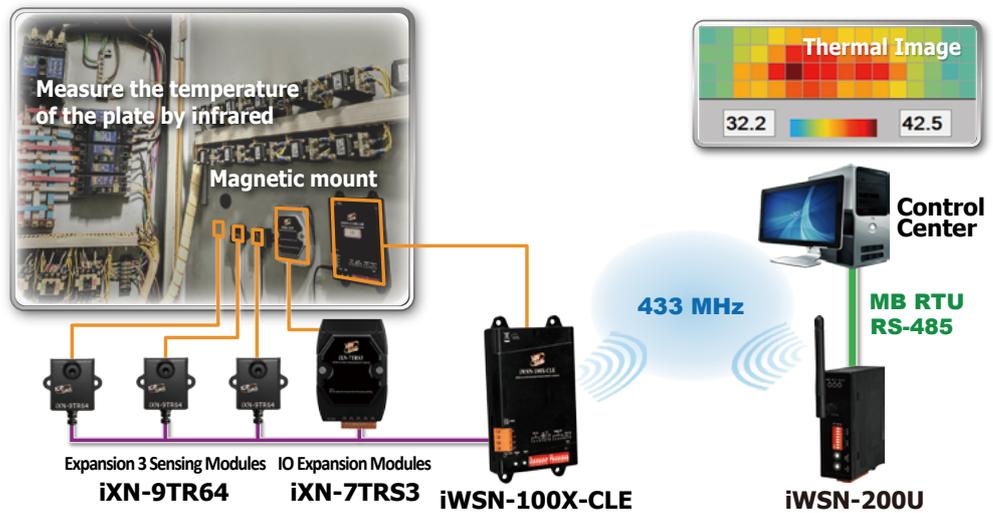

iXN-9TR1/9TR64/7TRS3

Features of iXN-9TR1/9TR64

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

Application - Wireless Temperature Monitoring

- Use iWSN-100X-CLE with iXN-9TR64 to monitor the temperature of the distribution box.
- According to the long-term temperature records of the line, transformer and other equipment of the distribution box, an alarm will be issued when the temperature is abnormal.

Models	iXN-9TR1	iXN-9TR64
Sensing Parameter		
Pixel	1	4x16
FOV	35°	120° x 25°
Range	0℃ ~ 300℃	
Accuracy (Environmental Temp. 25 ℃)	0℃ ~ 180℃ : ±2℃ 180℃ ~ 240℃ : ±3℃ 240℃ ~ 300℃ : ±4℃	±1° C ±1.5%*|To-Ta| To : Temperature of the object Ta : Environmental Temperatuure
Mechanism		
Dimension (L x W x H)	51mm x 35mm x 20mm	
Installation	Wall or Magnetic mounting	
Others		
Operation Temperature	0℃ ~ 125℃	0℃ ~ 85℃

| Models	iXN-7TRS3
Sensing Parameter	
Channels	3
Interface	3.5mm audio cable
Consumption	Working Duty: 1 sec./21 A, 10 sec./13 A, 30 sec./12 A, 60 sec./12A
Input Type	iWSN sensing module powered by audio cable
Mechanism	
Dimension (L x W x H)	115 mm x 72 mm x 35 mm
Installation	DIN-Rail Mounting

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
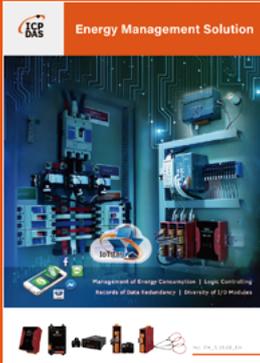
Energy Management Solution

- 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
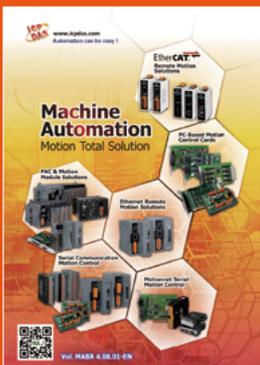
Machine Automation

- Motionnet Solutions
- EtherCAT Motion Control Solutions
- Ethernet Motion Control Solutions
- Serial Communication Motion Control Solutions
- PC-based Motion Control Cards
- PAC Solutions - Motion Modules
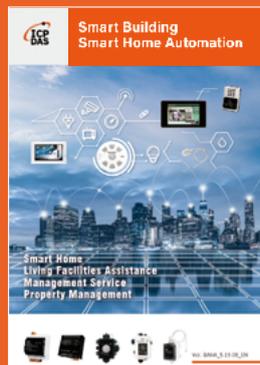
Smart Building, Smart Home Automation

- 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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