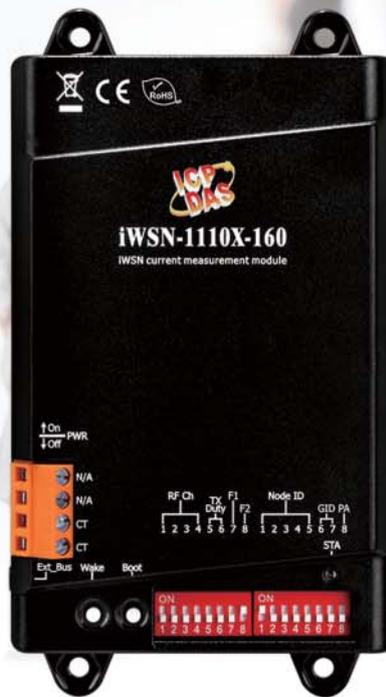ICP DAS

iWSN Solution

iWSN series (**I**ndustrial **W**ireless **S**ensor **N**etwork)

iWSN-2200 series
Wireless Data Concentrator

iWSN-1100 series
Wireless Signal Sensing Module

iWSN-700 series
Expansion module

iWSN Solution

Overview

With the trend toward smart manufacturing and flexible manufacturing, the production process is becoming increasingly complicated, and each production stage is interlocked. The condition of the equipment is evaluated using the concept of predictive maintenance to maintain the operation of the production line. In response to the Internet of Things (IoT), big data analysis, Industry 4.0, energy-saving and carbon-reduction requirements, ICPDAS has developed the "Industrial Wireless Sensor Network" solution. In addition to integrating current, temperature measurement, and wireless transmission functions into a single module, the ultralow 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.

Comparison between Traditional and iWSN methods

Item	Traditional Meter	iWSN Series
Main function	Measuring power parameter data	Measuring current, temperature and DI (Continuous development of vibration, gas detection, etc.)
Accuracy	<1%	<3% or ±0.3A
Cycle	At least once per second	1/10/30/60 seconds
Power	DC power provides an additional transformer AC power provides power lines	CT charging, battery storage (Easy to install and maintain, and easy to build)
Power configuration	100% (7W) (Wireless Module + Meter + Power Supply)	0.3% (20mW) Power saving design
Parameter setting	Software Utility	DIP switch setting
Hardware cost	General	Low
System defect	Long construction time, system needs to be powered off to be built, complicated to set up, and difficult to maintain	Easy functions, low data update speed
Application	Monitoring system, electricity billing, energy efficiency actuarial or power quality analysis	Big data analysis, system monitoring, trend analysis and predictive maintenance

## AC cable current required for supply and demand balancing

The built-in lithium battery in the iWSN is charged via the tiny current induced by the CT from the power line, and the power consumption of the lithium battery is related to the iWSN's wireless signal transmission period and whether there is an expansion module connected to the iWSN-700 module. Therefore, when building an iWSN data acquisition scheme, the current of the power line to be measured must be greater than the current value of the "balance between supply and demand". The current values for the supply and demand balance under different conditions are as follows:

Transmission Interval	iWSN-1110X iWSN-1120X	iWSN-1121-DI	iWSN-1131	iWSN-1110X+iWSN-750P iWSN-1120X+iWSN-750P	iWSN-1110X+iWSN-757P iWSN-1120X+iWSN-757P
1s	11A	12A	19A	20A	21A
10s	3A	5A	12A	12A	13A
30s	3A	4A	5A	11A	12A
60s	3A	4A	5A	11A	12A

Features

Wireless Sensing

The iWSN wireless signal sensing module is fastened to the circuit being measured wire via the CT. The CT is usually in charging mode and can store the current received from the charging circuit in the battery. When the charging energy is greater than or equal to the power consumption, the wireless sensing module can operate continuously. If it is necessary to measure the current information from the power line, the module will automatically switch to operating mode to introduce the current signal into the circuit being measured. The result and state parameters for the module will be transmitted to the iWSN concentrator via wireless communication, and then the module will switch back to the charging state until the next measurement.
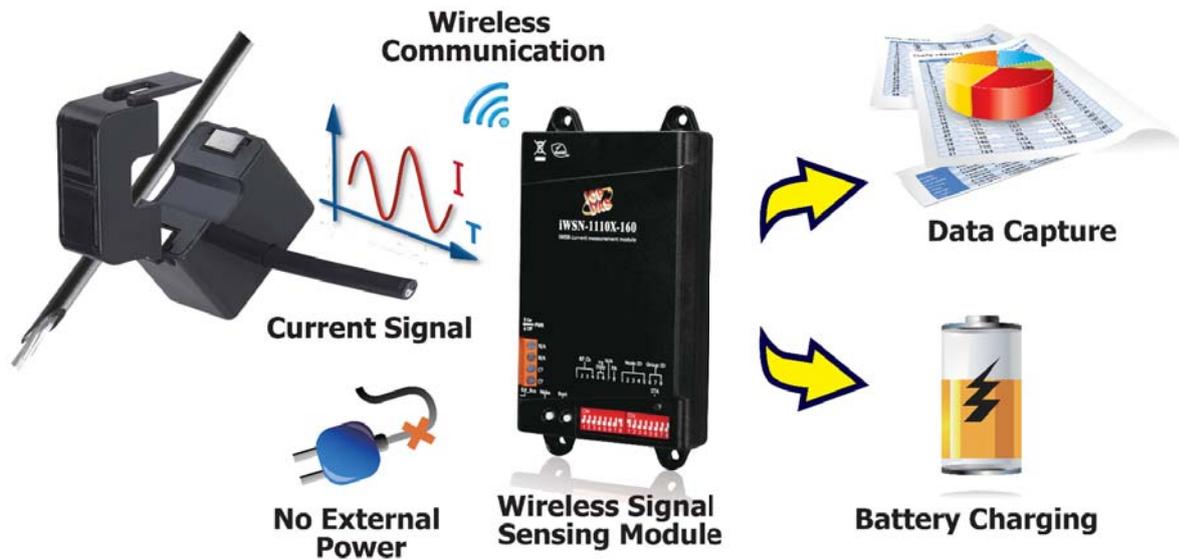

Rapid Deployment

System Structure

The iWSN network system includes a wireless data concentrator and a wireless sensing module. If there are more signal points to be collected, the IO interface on the iWSN I/O expansion module can be used to connect to these devices. The information collected by the iWSN data concentrator can be used to provide information to the field personnel through the ICP DAS touch panel controller, or the data can be sent to the cloud via a WISE series IIOT smart controller, or even connecting to instant messaging software. For the connection between the field communication network and the backbone of the network, ICP DAS also provides a series of converters, allowing data to be instantly uploaded to the control center for subsequent big data analysis.
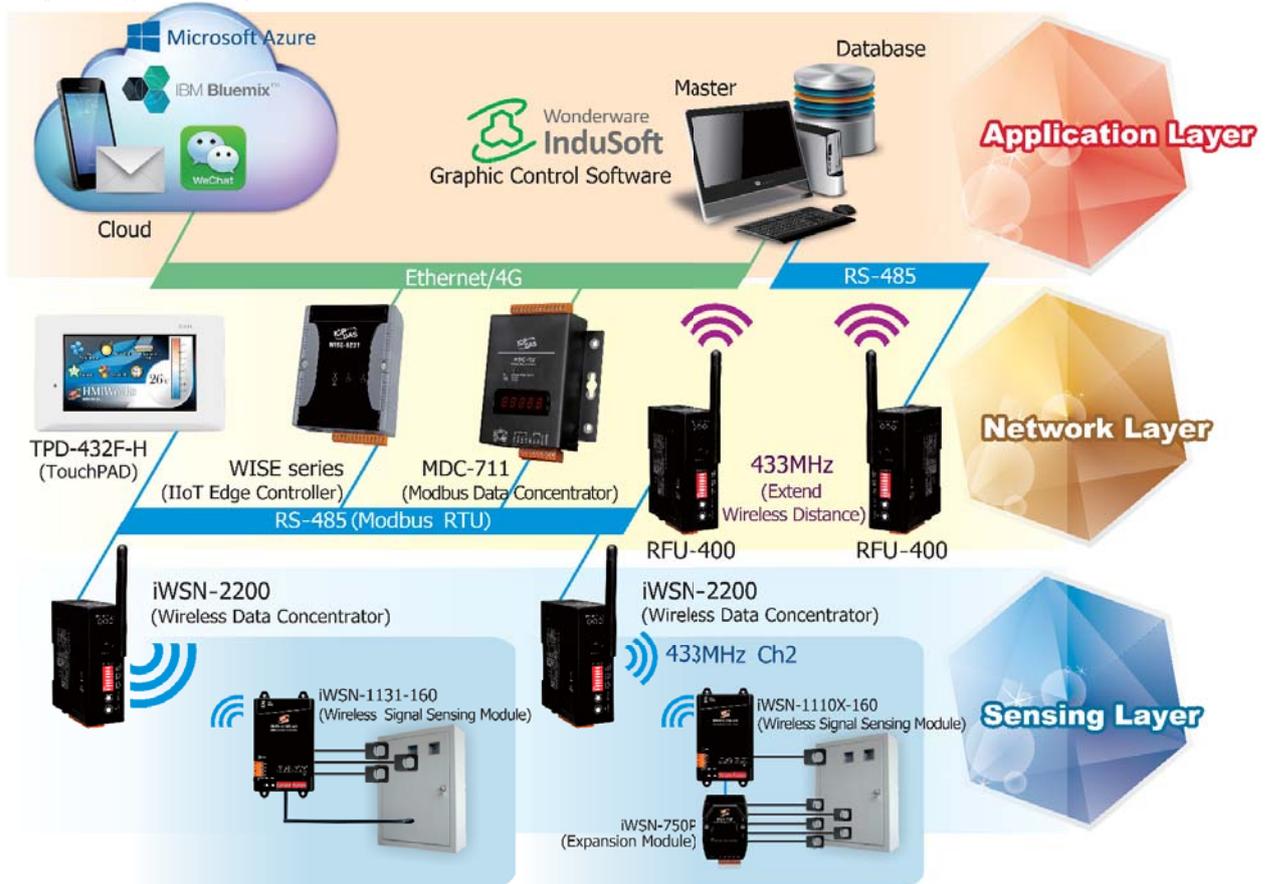
The functions of each device in an iWSN network system are described as follows:

Wireless Data Concentrator: iWSN-2200 series

The iWSN-2200 series collects and returns data from the sensor, and includes the Modbus RTU or Modbus TCP standard communication protocol that allows you to connect with upper system or graphics control software.

Wireless Signal Sensing Module: iWSN-1100 series

In addition to the acquisition of energy data via the connected CT, the current value on the cable on the CT is also measured and transmitted back to the data concentrator via wireless communication. Depending on the model, channels or expansion interfaces such as a split-core type CT, a Rogowski coil, temperature, and DI dry contact methods are also available.

I/O expansion module: iWSN-700 series

The iWSN-700 series is an expandable CT and temperature measurement interface, which series connects to the sensing module via wireless communication, and transmits the value collected by the expansion module to the sensing module, or, further, to the data concentrator.

Applications

Predictive Equipment Maintenance

- Use the iWSN-1110X series and iWSN-1120X series products to detect the current consumption by each machine.
- Observe the difference in current consumption and change it during the operation of the same type of equipment. If the consumption behavior from a certain machine is significantly different from the average performance of the device, it is considered a high-risk group where the equipment is abnormal. Functional testing should be performed as early as possible to prevent further losses.

Machines are usually expensive, and the damage caused by poor parameter adjustment or long-term use will affect the stability and reliability of the machine. If staff can monitor the operational status of the equipment at any time, they can not only determine whether the equipment is operating normally, but also Perform preventive maintenance for specific machines where the power consumption behaviour is abnormal. In addition to preventing sudden equipment failures, maintenance staff can also plan or prepare For maintenance of components that are aging or are about to be damaged.

Energy Saving

- Use the iWSN-1110X series with the iWSN-750P module to monitor the current consumption of each group of devices.
- Based on the difference between the consumptive standby current for the same type machine, the power consumption by each machine can be estimated. When the current consumption for a certain machine is significantly larger than the average value, staff can review the status of the energy consumption and the standby status of the machines.

Ideally, the standby power consumption should not be too great for similar machines. If the power consumption performance for a certain machine is significantly different from the average value, the machine may have some issues related to power management or equipment standby operation. At this time, the hardware device and the software parameter settings for this machine can be checked in detail to prevent any increase in electricity costs due to abnormal power consumption, or to prevent the machine from shutting down due to sudden failure.

✅ *Machine Diagnosis*

■ Use the iWSN-1110X-160 with the iWSN-757P to monitor current and temperature data.

■ If a machine is working abnormally or is overloaded, and based on the relationship between the temperature of the machine and the current power consumption over an extended duration, an alarm will be issued and the fault can be eliminated to prevent more serious damage or loss of the machine caused by forced operations.

If the operation of the machine is not normal, both the current and the temperature follow certain rules. Abnormal data is very likely to indicate that the machine is not operating properly. If the machine is not immediately scheduled for maintenance, more serious damage may be caused to the machine, and may even affect the safety of the operator, resulting in accidents.

If it is discovered that the parts are worn out after the machine is repaired, you can prepare a maintenance plan and order the spare parts in advance so that the production capacity for the production line can be properly planned so as to prevent accidental production line stagnation and loss of raw materials.
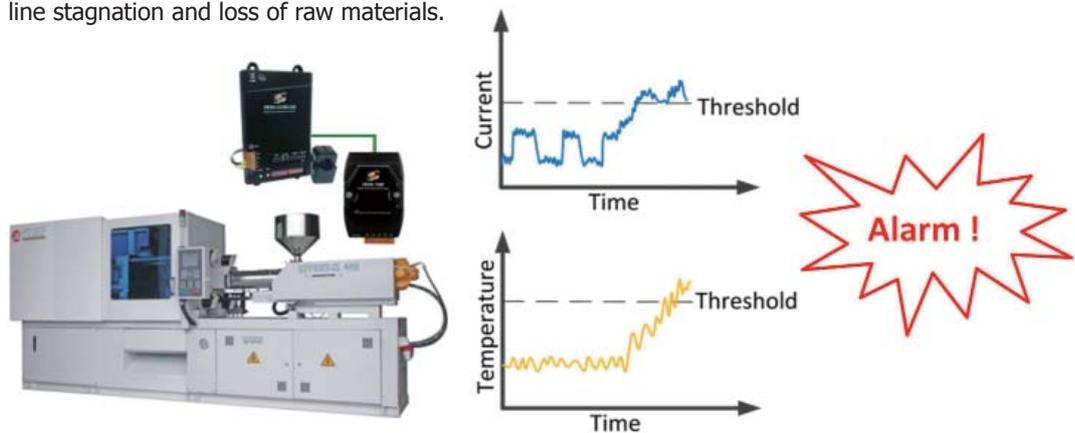
✅ *Monitoring the Utilization of a Machine*

■ Use the iWSN-1121-DI-240 module to monitor the current data on the panel.

■ The two CT channels on the iWSN-1121-DI-240 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.

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.

Wireless Data Concentrator

iWSN-2200 Series Features

- Supports 433 MHz Radio Frequency
- Provides 16 RF Channels
- Support Modbus RTU Protocol (Slave)
- Temporary storage for 31 sets of iWSN wireless signal sensing modules
- ESD Protection: +/- 4 kV Contact
- Isolation: 3000 VDC for DC-to-DC, 2500 Vrms for photo-couple
- DIN-Rail Mounting
- Operating Temp.: -25 to +75 °C

Optional Accessories

Magnetic installation

External Cable : 3S001-1
RG58A/U 1-Meter Long RP-SMA
Male to RP-SMA Female

Antenna Base : ANT-Base-02
Antenna Base/1500 mm

Module Name	iWSN-2200	iWSN-2200-E
RF interface		
Radio Frequency	433 MHz	
Channels	0 to 15 (set by DIP/Rotary 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	Ethernet x 1
Protocol	Modbus RTU	Modbus TCP
Baud Rate	1200 to 115200 bps, N81	10/100 Mbps
Mechanical		
Dimensions (L x W x H)	108 mm x 84 mm x 33 mm (without antenna)	
Antenna Dimensions (L x Ø)	108 mm x 10 mm	
Installation	DIN-Rail Mounting	
Other		
Input Voltage Range	10 ~ 30 VDC	
Power Consumption	0.5W	1W
Operating Temperature	-25 to +75 °C	
Certification	CE+RED	CE only

Ethernet

RS-232/485

iWSN-2200
Series

433 MHz

Max. 31
Sensing Modules

iWSN-1121

iWSN-1110X

Extension
bus

iWSN-750P/
iWSN-757P

iWSN-1120X

Extension
bus

iWSN-1131

Wireless Signal Sensing Module

iWSN-1100 Series Features

- Built-in rechargeable Li-ion battery power supply
- Li-ion battery can be charged using the CT
- The CT is easy to mount
- Supports up to 1000 amps of cable current
- Supports 433 MHz Radio Frequency
- Provides 16 RF channels
- Provides extended interface for flexibility and scalability
- Wall-mounting and magnetic mechanism for installation

Split-Core CT

iWSN-1110X   **iWSN-1131**   **Rogowski coil**

Module	iWSN-1110X-160 iWSN-1110X-240 iWSN-1110X-360 iWSN-1110X	iWSN-1121-DI-160 iWSN-1121-DI-240 iWSN-1121-DI-360	iWSN-1131-160 iWSN-1131-240 iWSN-1131-360 iWSN-1131P	iWSN-1120X-240-RCT1000P iWSN-1120X-360-RCT1000P
RF Interface				
Radio Frequency	433 MHz			
Channels	0 to 15 (set via DIP Switch)			
Transmission Distance (LoS)	100 m			
Split-Core CT specifications				
CT Channels	1	2	3	1 (For charging only)
CT Input Voltage	50Hz / 60Hz, up to 500V			
CT Type	Φ16mm (100A), Φ24mm (200A) and Φ36mm (400A), 8m (Note 1)			Φ24mm (200A)
CT Error	<3% or 0.3A			-
Rogowski Coil Channel	-			1
Rogowski Coil Input Voltage	-			50Hz / 60Hz, up to 500V
Rogowski Coil Type	-			Φ80mm (1000A), 4m
Rogowski Coil Error	-			3% or 2A
Thermistor (Optional)				
Channels	-	1	1	-
Measurement Range	-	0 to 80 °C	0 to 80 °C	-
Temperature Error	-	< 2 °C	< 2 °C	-
DI specification				
Channels	-	1	-	-
Type	-	Dry contact	-	-
Mechanical				
Dimensions (L x W x H)	152 mm x 85 mm x 36 mm			
Installation	Wall-mounting or magnetic mounting			
Other				
Battery	3.7V, 800mAh with 1.25mm connector (UV, OV, Short protection)			
Operating Temperature	0 to +45 °C			
Expansion Interface (Supports the iWSN-700 series)	Yes	-	-	Yes
Certification	CE + RED	CE only	CE only	CE + RED

Note 1: The accessories for the iWSN-11□□□-160, iWSN-11□□□-240 and iWSN-11□□□-360 are Φ16 mm (100 A), Φ24 mm (200 A), and Φ36mm (400A).

I/O Expansion module

iWSN-700 Series Features

- Supports Multi-channel I/O Expansion
- Supports Split-Core CT using different measurement ranges
- Power is provided by the iWSN-1100X or iWSN-1120X sensing module
- Easy-to-maintain detachable screw terminal block
- Rail-mounting and magnetic mounting

iWSN-750P   iWSN-757P   Magnetic rail

Module	iWSN-750P	iWSN-757P
Split-Core CT specifications (Optional)		
Channels	5	
Input Voltage	50Hz / 60Hz, up to 500V	
Type	Φ16mm (100A), Φ24mm (200A) and Φ36mm (400A), 8m	
Error	<3% or 0.3A	
Form	Split-Core	
Thermistor (Optional)		
Channel	-	7
Measurement Range	-	0 to 80 °C
Temperature Error	-	< 2 °C
Mechanical		
Dimensions (L x W x H)	115 mm x 72 mm x 35 mm	
Installation	Wall-mounting or magnetic mounting	
Other		
Operating Temperature	0 to +45 °C	
Certification	CE	

Optional accessories

CA-SCT16I-100A-L080
8 m, 100 A, Φ16 mm Split-Core CT

CA-SCT24I-200A-L080
8 m, 200 A, Φ24 mm Split-Core CT

CA-SCT36I-400A-L080
8 m, 400 A, Φ36 mm Split-CoreCT

CA-TM-M200-L050P
5 m Magnetic Plug Thermistor

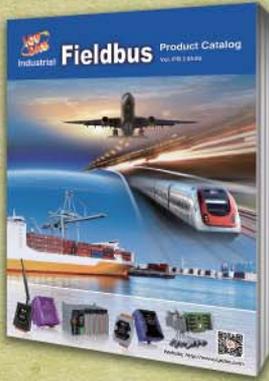**CA-TM-M100-L050P**
5 m Metal Plug Thermistor

CA-TM-P100-L020P
2 m Black Plastic Plug Thermistor

CA-TM-P100-L050P
5 m Black Plastic Plug Thermistor

ICP DAS Catalogs & Brochure

Industrial Fieldbus

- RS-485
- Industrial Ethernet
- Profinet
- CAN bus
- CANopen
- Devicenet
- J1939
- PROFIBUS
- HART
- Ethernet/IP
- BACnet

Acquisition and Control I/O Products for PC-based Systems

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

Energy Management Solution

- InduSofftt SCADA Soffttwarre
- Smart Power Meter Concentrator
- Smart Power Meter
- True RMS Input Module
- TouchPAD Devices - VPD Series

WISE Product Line
Smart Front-end for Industrial IoT

- WISE - IIoT Concentrator
- WISE - WISE I/O Module
- WISE-52XX - IIoT Concentrator
- WISE-58XX - WISE I/O Module
- WISE-71XX - WISE I/O Module
- WISE-75XXM - WISE I/O Module

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
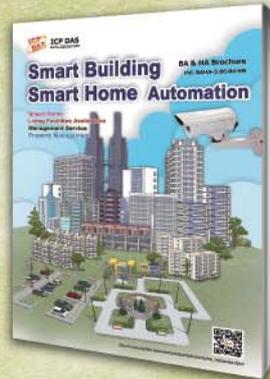
Smart Building, Smart Home Automation

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

TuchPAD HMI Solutions

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

Remote I/O Modules and I/O Expansion Units Products Catalog

- RS-485 Products
- Ethernet Remote I/O Modules
- FRnet I/O Modules
- CAN Bus Products
- PROFIBUS Remote I/O Modules
- HART Products
- Smart Power Meter
- WISE I/O Module

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