ICP DAS
iWSN Utility
User Manual

[Version 1.05]

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1 Introduction

The iWSN network is a set of intelligent sensing data collection network developed based on the requirements of the Industrial Internet of Things (IIOT), including wireless sensing modules of the perception layer and wireless data collectors of the network layer. Different from typical wireless sensor networks, iWSN sensor modules provide several power supply methods and a variety of signal sensors to meet the needs of the complex deployment criteria of the Industrial Internet of Things. The iWSN wireless data collector of the network layer is the key to collecting information in the iWSN network. In addition to being the master station of the iWSN network, it also acts as a bridge between the host computer and the sensing module. Through the open Modbus communication protocol, it helps users to easily collect the iWSN sensing data through Ethernet or RS-485 interface via SCADA or Modbus master station such as PLC. When it is necessary to configure the iWSN wireless sensing module, users can send the Modbus commands to the iWSN data collector. The iWSN data collectors will take care of the communication issues of the sensing modules with different power supply forms, and report the final results to the host machine, no matter the sensing module is in sleeping mode or not.

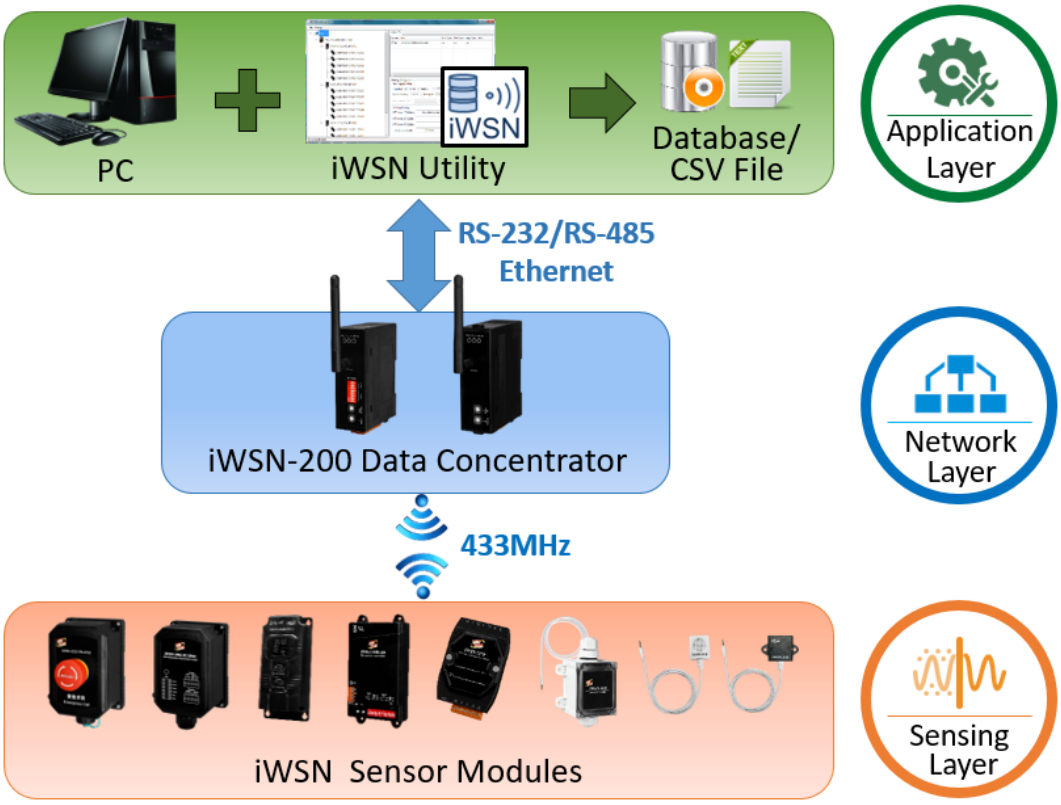

Figure 1-1: iWSN network architecture

iWSN Utility is a special software tool developed to simplify the configuration process and the setup of the iWSN network. It greatly reduces the burden of deploying the iWSN network and let users focus on big data processing and analysis. Through the intuitive visual operation interface of iWSN Utility, users can easily setup an iWSN data collection system on a local computer without knowing the Modbus address configuration of the iWSN data collector. The device tree diagram of the Utility allows users to clearly understand the network structure of the current iWSN network and is convenient to manage and check the configuration status of iWSN devices. In addition to showing the immediate value of iWSN sensing modules, the Utility also provides performance information and CSV/database storage functions, so that users can not only know the execution efficiency of each iWSN data collector, but also save time in building data storage systems.

Some iWSN sensing modules support time calibration and data supplementary functions. By enabling the time calibration and data supplementary functions in the Utility, users don’t need to worry about when and how to execute the time calibration or supplement the lost data. The Utility can automatically calibrate the time of the host computer via the specific NTP server, and pass the local computer time to the iWSN modules based on the pre-configured duty cycle. It also asks the iWSN sensing module to reply the lost data depending on the timestamp of the response data from the modules. These are greatly helpful for users to quickly establish system to energy saving, carbon reduction and big data analysis.

2 System requirements

Before installing the iWSN Utility, please confirm the requirements of the host computer as follows:

- Processor : Intel® Core™ i5-6200 Dual-Core or above
- Operation System: Windows 7 32-bit / 64-bit or above
- RAM: 8GB
- Disk Space: 20MB only for iWSN Utility Software. The space for storage the data of the iWSN sensing modules depends on the data response duty, the node numbers, and the model type of iWSN sensing modules. Take iWSN-9603 series three-phase power meter for example, it provides the data, includes 1-WORD module status information, 6-WORD current information, 2-DWORD three-phase total clock power information, 2-DWORD three-phase total power information, 1-WORD Power factor information, 3-WORD three-phase voltage information, 3-WORD time stamp information (total costs 21 WORDs, that is 42 bytes). In the case of storing one day (86400 seconds) with one response per second, saving this data to .CSV files or into the MySQL database will costs about 17MB and 1.7MB respectively.
- Microsoft .Net Framework: 5.0
- Database: MySQL 8.0 or Microsoft SQL Server 2022 (required only if you want to save data to the database).
- Others: If users would like to use iWSN-200E, it must have at least one 10/100Base-TX Ethernet port or Wi-Fi communication interface. If the iWSN-200U or iWSN-200R is used, at least one RS-232 or RS-485 port is needed.

3 Function Description

While executing the WSN_Utility.exe, users can see the main window of the iWSN Utility. According to the function, it can be divided into four areas which are as follows. The following chapters will give a detailed description of the functions and usage of each area.

A. Application Information
B. Menu Bar
C. Device Tree
D. Information Display
E. Status Bar

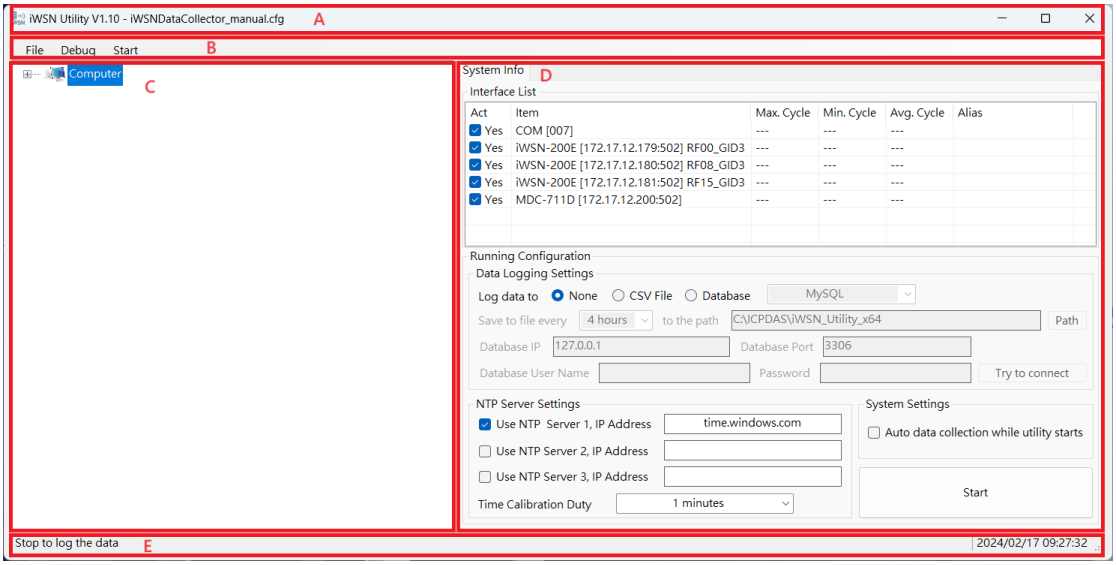

Figure 3-1: The main screen of iWSN Utility

3.1 Application Information

The Application information display the version information of the iWSN Utility. Versions of the iWSN Utility after V1.10 support automatic startup while PC boots up. Therefore, in addition to displaying the version information of the utility, the name of the parameters configuration file currently used or loaded by the utility will be displayed for user confirmation.

Figure 3-2: Application Information

3.2 Menu Bar

The menu bar provides functions such as exporting/importing iWSN Utility configuration, enabling/disabling debug information, and starting or stopping the data collection. ◦

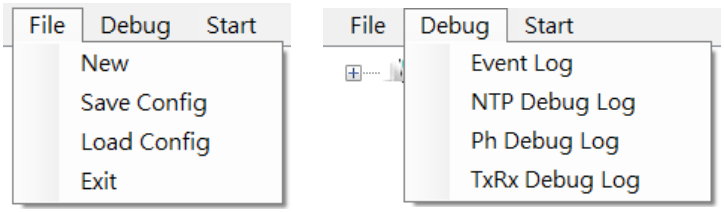

Figure 3-3: The menu bar of iWSN Utility

In the File item of menu bar, the item “New” is to clear the current Utility settings and starts as a new one, the item “Save Config” is to save current settings of iWSN Utility into the configuration file. The item “Load Config” is to load the setting parameters into the iWSN utility from the configuration file. The configuration file is named with .cfg file extension.

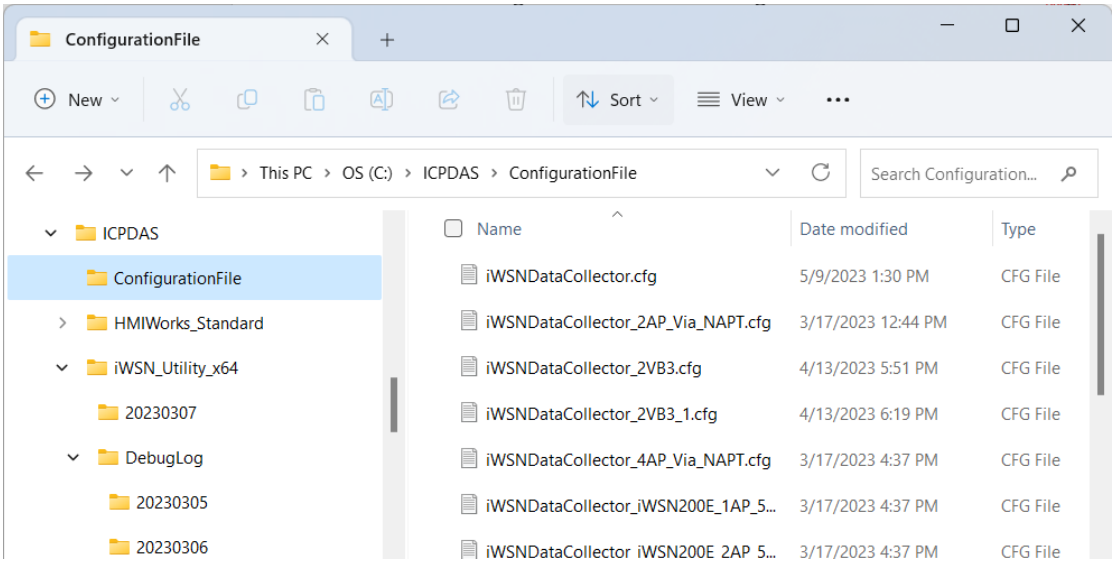

Figure 3-4: Export the settings to configuration file

When uses have troubles in setup an iWSN network, the Debug item of menu bar help users to record the running status of iWSN Utility into log files useful for troubleshooting. There are 4 items, Event Log, NTP Debug Log, Ph Debug Log and TxRx Debug Log, under the Debug item of menu bar, which are corresponding to the log file of events, NTP communication, physical layer communication, and application layer. The Event log records events that occur with the utility and the iWSN module, such as iWSN concentrator communication errors, the iWSN slave being regarding as offline which no data is got from it at least 3 minutes, or a new iWSN slave being detected. The NTP log file records the status information of the communication between local computer and NTP server. The physical log file records the communication processes of physical layer, such as COM or Ethernet. The application log file is for the information about the time calibration of iWSN data collector, data-exchange and supplement status of iWSN sensing module, error responses of iWSN network, and so forth. All of the log files are stored in the folder DebugLog which is under the same folder as iWSN Utility.exe.

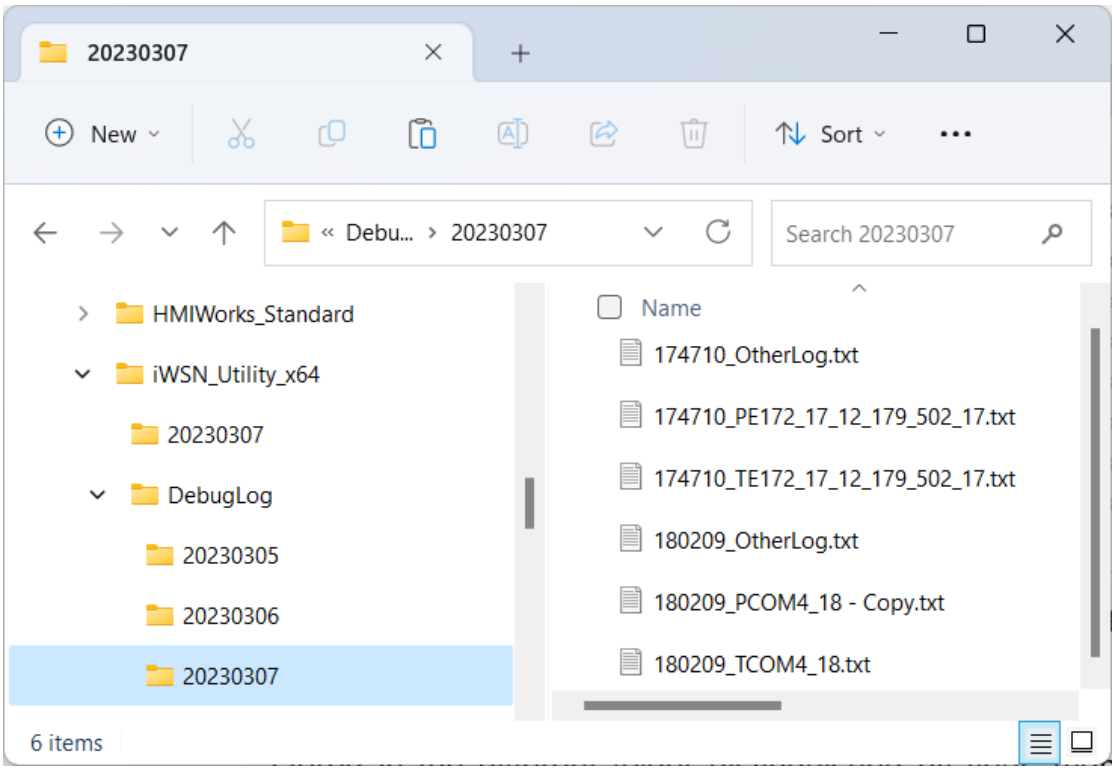

Figure 3-5: Debug log files for troubleshooting

In the DebugLog folder, the log files generated at different times are stored in the different folder distinguished by year, month, and day. For

example, the log files created on March 7, 2023 will be located in the folder named as 20230307. The NTP log file name ends with OtherLog and it is generated a file every day. The Ph Debug Log and TxRx Debug Log log files use the iWSN data collector or communication interface as the file name and is generated a file every hour.

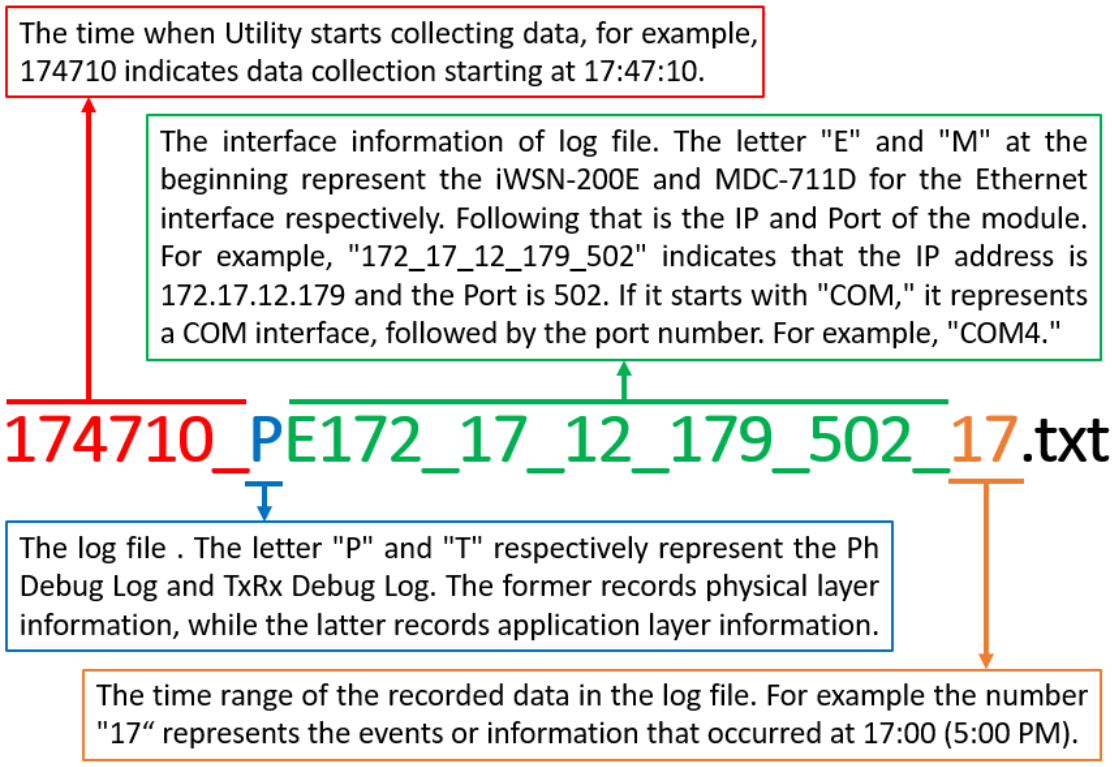

Figure 3-6: Naming rule of debug log files

Take the file name "174710_PE172_17_12_179_502_17.txt" as an example. “174710” indicates the time when the iWSN Utility starts data collection. As long as users don’t click the stop button to stop the data collection of iWSN Utility, all log files will start with this time as the beginning of the file name. It is convenient to distinguish the log files belong to which time the Utility is running at. The log files created at different date will be put in the different folder named by the date. After users click the stop button and then click the start button to collect the data again, the name of log files will start with the time while the start button is clicked. For example, the file “180209_PCOM4_18.txt” in the figure below is generated when the Utility restarts at 18:02:09 after stopping data collection. The letter ‘P’ after the file name of "174710_" indicates that the log file records the event happened in the physical layer, and the letter ‘T’ indicates that the log file records the event happened in application layer. The “E172_17_12_179_502” in the log

file name is the name of the equipment or communication interface, and the letter ‘E’ of it indicates the log file is relative to the iWSN-200E. If the letter ‘E’ is replaced by letter "M", it indicates the log file relative to the MDC-711D. The sequence characters “172_17_12_179_502” is the Ethernet IP and Port of the module. If the name of log files starts with "COM", it indicates the log files relative to the module of iWSN-200U or iWSN-200R which is communicated by the COM port. The appended “_17” of the file name indicates the log file is created at 17:00:00 in the date as the folder of the log file, and it will record the event from 17:00:00 ~ 17:59:59.

After finishing the configuration of iWSN Utility, users can click the Start option in the menu bar, or the "Start" button in the information display area while the “Computer” in the device tree is selected. Then the iWSN Utility starts to initialize the iWSN network and start the data collection. Once the Utility starts to collect the data, the “Start” option and the “Start” button will be changed to “Stop” option and “Stop” button. Users can click the “Stop” option or button to stop the data collection.

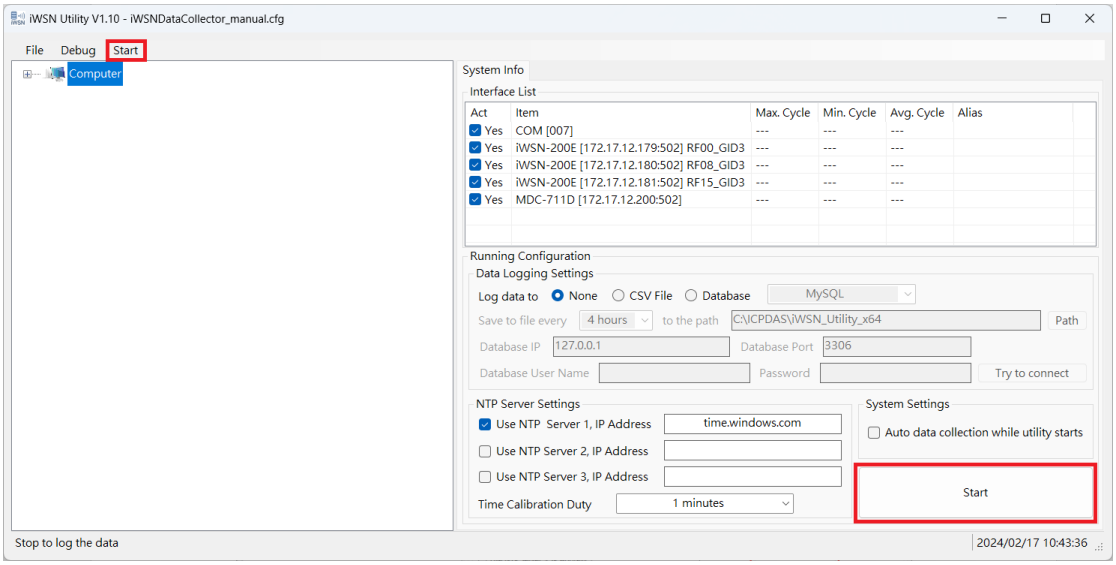

Figure 3-7: Click “Start” button to start the data collection

3.3 Device Tree

The configuration of iWSN Utility starts by the device tree. It helps users to easily understand the iWSN network architecture of applications and the component settings of iWSN network. After the iWSN_Utility.exe is executed. the device tree is initiated with a computer icon, representing the local computer. Users can right-click on the “Computer” item to add devices or communication interface for the iWSN network. The top layer of the iWSN network is the application layer, which indicates the local computer. The middle of the network is the networking layer, which includes iWSN data collector, such iWSN-200U, iWSN-200R, and iWSN-200E. The bottom layer is perception layer which has various iWSN sensing modules. Therefore, when users use the device tree to configure the iWSN network, the added items in the device tree must follows the order from top layer to bottom layer. For example, if users would like to add an iWSN sensor module, the iWSN data collector under the local computer must be added first. According to the type of communication interface of the data collector, if it is the iWSN-200E, it can be added directly under the local computer. If the iWSN-200U or iWSN-200R is used, the COM item or MDC-711D (RS-232/RS-485 data concentrator) must be added first before configuring an iWSN-200U or iWSN-200R. Users can right-click on the icon ‘Computer’ and select the required item in the context menu, as shown in the figure below. The following sections will explain what is meaning of and how to use each option of the context menu.

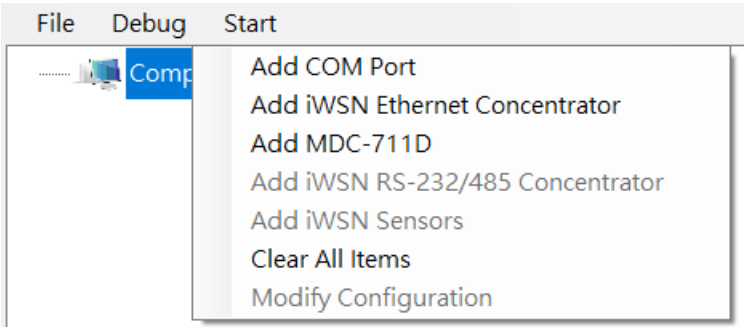

Figure 3-8: The context menu of the Computer item

3.3.1 Add COM Port

When connecting the iWSN-200U or iWSN-200R data collector through the COM interface, the COM item or MDC-711D must be added first before adding the iWSN-200U or iWSN-200R. Take the COM item for an example here, users can click the “Add COM” option in the context menu to pop-up the COM port configuration dialog and configure the COM port which will be used to connect to the iWSN-200U or iWSN-200R. Each configuration parameter on the dialog are described as follows.

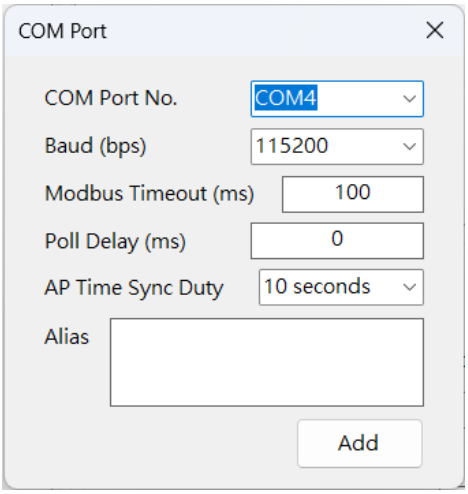

Figure 3-9: COM Port configuration dialog

COM Port No.

Users need to select the RS-232/RS-485 communication port used to communicate with the iWSN-200U or iWSN-200R data collector (also known as iWSN master or iWSN AP) in the “COM Port No.” drop-down list. The utility will automatically detect and list the RS-232 communication ports that are currently available on the local computer. If users use USB to RS-232 converters, the practical COM port No. must be confirmed by checking the device manager of the Windows operating system. Since iWSN-200U and iWSN-200R also support RS-485 interface which is not standard interface supported by general computers, the RS-232 to RS-485 converter or USB to RS-485 converter must be required.

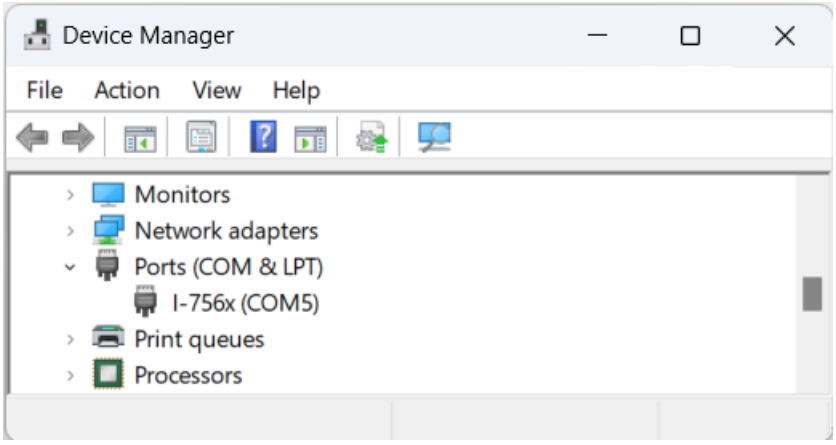

Figure 3-10: COM information in the device manager of Windows OS

Baud (bps)

It must be set according to the COM Baud used to the connected iWSN-200U or iWSN-200R. The factory default of the iWSN-200U and iWSN-200R is 115200 bps, users can check the rotary switch of COM baud of the iWSN-200U or iWSN-200R to select the same baud value in the “Baud (bps)” option. If users connect one COM port to more than one iWSN-200U or iWSN-200R via RS-485 interface. All the baud settings of the iWSN-200U or iWSN-200R must be the same.

Modbus Timeout (ms)

The local computer communicates with the iWSN-200U or iWSN-200R through Modbus RTU protocol. When the Modbus communication command is sent by the PC, it would be regard as communication timeout which there is no response from the target iWSN-200U or iWSN-200R in the time configured by the "Modbus Timeout (ms)" parameter. The local computer will abandon this Modbus command and send the next Modbus TCP command to the target iWSN-200U or iWSN-200R. The parameter setting range is from 10 to 10000 ms.

Poll Delay (ms)

When the local computer communicates with the iWSN-200U or iWSN-200R, users can reduce the communication load by setting the parameter “Poll Delay (ms)”. For example, when the value of “Poll Delay (ms)” is set to 10 ms, it means that after the local computer completes one time of the Modbus communication which includes one query command and one response data, the iWSN Utility will postpone 10 ms to begin the next

Modbus communication. The range of this parameter is 0 ~ 10000 ms.

AP Time Sync Duty

This parameter is used to set the time period which the Utility will calibrate the time of local computer to the iWSN-200U or iWSN-200R by. The value of this parameter is usually less than or equal to the time period which the iWSN-200U or iWSN-200R calibrate the time of iWSN-200U or iWSN-200R to the iWSN sensing module (that is, the parameter “Slave Time Sync Duty” of iWSN-200U or iWSN-200R), so as to ensure the calibrated time to iWSN sensing module is more close to the time of local computer.

Alias

This parameter is used to set an alias for the COM item. Users can more easily identify the purpose of the COM port through the setting of the alias name. The maximum length of the alias is 30 characters.

Add

When finishing the configuration, users can click the Add button to add the COM item into the device tree. At the moment, the COM Port dialog will not automatically close. If there are other COM ports that need to be added, users can continue with another new one. After finishing the configuration of all COM ports, users can close the COM Port dialog by themselves.

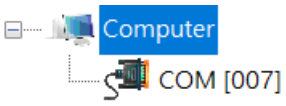

Figure 3-11: Add a COM item into the device tree

3.3.2 Add iWSN Ethernet Concentrator

Right-click the item “Add iWSN Ethernet Concentrator” of the context menu. to add an iWSN Ethernet concentrator to the device tree if necessary. Then, the iWSN-200E parameters need be configured in the iWSN Ethernet Concentrator Configuration dialog as follows.

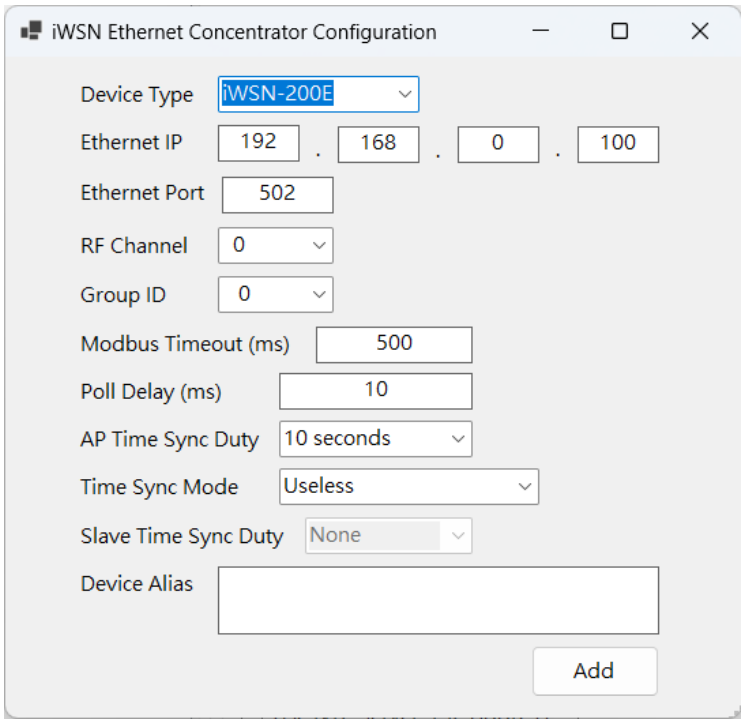

Figure 3-12:iWSN Ethernet Concentrator Configuration dialog

Device Type

The model type for the concentrator. Currently, there is only one Ethernet concentrator, iWSN-200E, supported by iWSN Utility. Here is only one item shown in the list box.

Ethernet IP

This parameter is for the Ethernet IP address of the target iWSN-200E which the local computer would like to connect to. The setting of the IP address must be the same as the network domain of the local computer in order to interconnect with the local computer. The setting value in the above figure indicates that the local computer wants to connect to the iWSN-200E with IP address 192.168.0.100. The setting value can only let iWSN Utility know which IP address to poll for data, and cannot set the IP address of the iWSN-200E. If users want to set the IP address or related parameters of the iWSN-200E, it needs to do by the configuration webpage of the iWSN-

200E. For example, to modify the network parameters of the iWSN-200E whose current IP address is 192.168.0.100, users can enter http://192.168.0.100/ in the web browser to enter the iWSN-200E configuration webpage for parameters setting and modification.

Ethernet Port

This is to set the Ethernet port number which the local computer would be used to connect to the target iWSN-200E. The default value is set to 502 because the iWSN-200E is communicated by the Modbus TCP protocol. In some applications, NAPT (Network Address Port Translation) technology is used. It is necessary to use the same IP but different port numbers to connect different iWSN-200Es by using the gateway with NAPT technology. After finishing the configuration, the iWSN Utility will use the specify Ethernet port number to connect to the iWSN-200E. For details of NAPT technology, please refer to the relevant documentation or website.

RF Channel

Set the parameters of the wireless radio frequency channel (RF Channel) currently used by the iWSN-200E. It only helps users to know the current setting on the rotary switch of iWSN-200E and the deployments of the iWSN network. Because this value will not be used in the communication, the iWSN Utility can work well even If the configured value is not match the current setting of the iWSN-200E.

Group ID

Set the parameters of the wireless group ID (RF Channel) currently used by the iWSN-200E. It only helps users to know the current setting on the rotary switch of iWSN-200E and the deployments of the iWSN network. Because this value will not be used in the communication, the iWSN Utility can work well even If the configured value is not match the current setting of the iWSN-200E.

Modbus Timeout (ms)

The local computer communicates with the iWSN-200E through Modbus TCP protocol. When the Modbus communication command is sent by the local computer, it would be regard as communication timeout which there is no response from the target iWSN-200E in the time configured by the "Modbus Timeout (ms)" parameter. The local computer will abandon this

Modbus command and send the next Modbus TCP command to the target iWSN-200E. The range of this parameter is 500 ~ 10000 ms.

Poll Delay (ms)

When the local computer communicates with the iWSN-200E, users can reduce the communication load by setting the parameter “Poll Delay (ms)”. For example, when the value of “Poll Delay (ms)” is set to 10 ms, it means that after the local computer completes one time of the Modbus communication which includes one query command and one response data, the iWSN Utility will postpone 10 ms to begin the next Modbus communication. The range of this parameter is 0 ~ 10000 ms.

AP Time Sync Duty

This parameter is used to set the time period which the Utility will calibrate the time of the local computer to the iWSN-200E by. The value of this parameter is usually less than or equal to the time period which the iWSN-200E calibrate the time of iWSN-200E to the iWSN sensing module (that is, the parameter “Slave Time Sync Duty” of iWSN-200E), so as to ensure the calibrated time to iWSN sensing module is more close to the time of the local computer.

Time Sync Mode

If users would like to enable the time synchronization function which is supported by the connected iWSN sensor module, this parameter must be set to “Broadcast by duty” to allow the iWSN data concentrators to periodically send the time calibration package to the iWSN sensor module. Set to “Useless” if this function is not required.

Slave Time Sync Duty

If users would like to enable the time synchronization function which is supported by the connected iWSN sensor module, the parameter “Time Sync Mode” must be set to "Broadcast by duty" first. And, users need to decide the period of sending the time calibration package to the iWSN sensor module. This parameter is used to configure the period of sending time calibration command to the iWSN sensor module. The setting value is usually greater than or equal to the AP Time Sync Duty parameter.

Device Alias

This parameter is used to set an alias for the iWSN-200E item. Users can more easily identify the purpose of the iWSN-200E through the setting of the alias name. The maximum length of the alias is 30 characters.

Add

When all parameter settings are completed, users can click the Add button to add the iWSN-200E item into the device tree. At the moment, the iWSN Ethernet Concentrator Configuration dialog will not automatically close. If there are other iWSN-200Es that need to be added, users can continue with another new one. After finishing the configuration of all iWSN-200Es, users can close the iWSN Ethernet Concentrator Configuration dialog by themselves.

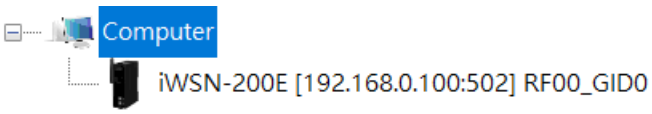

Figure 3-13: Add an iWSN-200E item into the device tree

3.3.3 Add MDC-711D

When users would like to use an iWSN-200U or iWSN-200R concentrator through an MDC-711D module, a MDC-711D item must be added to the device tree first. Users can right click the “Add MDC-711D” in the context menu to popped up the MDC-711D Configuration dialog for setting as follows.

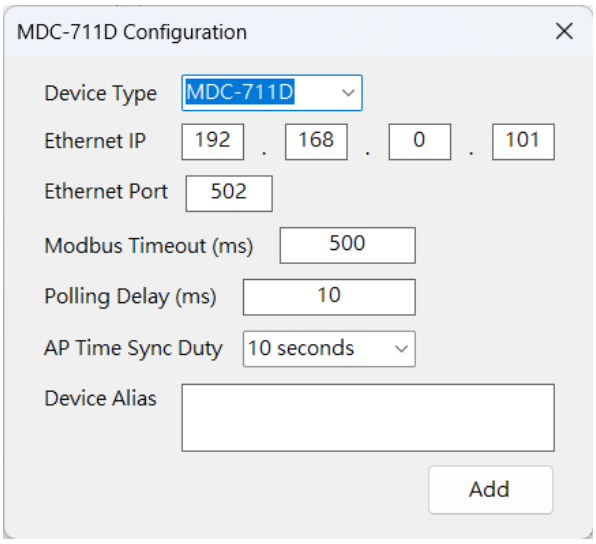

Figure 3-14: MDC-711D Configuration dialog

Device Type

The model type for the MDC-711D. Here is one item shown in the list box.

Ethernet IP

This parameter is for the Ethernet IP address of the target MDC-711D which the local computer would like to connect to. The setting of the IP address must be the same as the network domain of the local computer in order to interconnect with the local computer. The setting value in the above figure indicates that the local computer wants to connect to the MDC-711D with IP address 192.168.0.100. The setting value can only let iWSN Utility know which IP address to poll for data, and cannot set the IP address of the MDC-711D. If users want to set the IP address or related parameters of the MDC-711D, it needs to do by the configuration webpage of the MDC-711D. For example, to modify the network parameters of the MDC-711D whose current IP address is 192.168.0.100, users can enter http://192.168.0.100/ in the web browser to enter the MDC-711D configuration webpage for parameters setting and modification.

Ethernet Port

This is to set the Ethernet port number which the local computer would be used to connect to the target MDC-711D. The default value is set to 502 because the MDC-711D is communicated by the Modbus TCP protocol. In some applications, NAPT (Network Address Port Translation) technology is used. It is necessary to use the same IP but different port numbers to connect different MDC-711Ds by using the gateway with NAPT technology. After finishing the configuration, the iWSN Utility will use the specify Ethernet port number to connect to the MDC-711D. For details of NAPT technology, please refer to the relevant documentation or website.

Modbus Timeout (ms)

The local computer communicates with the MDC-711D through Modbus TCP protocol. When the Modbus communication command is sent by the local computer, it would be regard as communication timeout which there is no response from the target MDC-711D in the time configured by the "Modbus Timeout (ms)" parameter. The local computer will abandon this Modbus command and send the next Modbus TCP command to the target MDC-711D. The range of this parameter is 500 ~ 10000 ms.

Poll Delay (ms)

When the local computer communicates with the MDC-711D, users can reduce the communication load by setting the parameter “Poll Delay (ms)”. For example, when the value of “Poll Delay (ms)” is set to 10 ms, it means that after the local computer completes one time of the Modbus communication which includes one query command and one response data, the iWSN Utility will postpone 10 ms to begin the next Modbus communication. The range of this parameter is 0 ~ 10000 ms.

AP Time Sync Duty

This parameter is used to set the time period which the Utility will calibrate the time of local computer to the iWSN-200U or iWSN-200R through the MDC-711D by. When the MDC-711D get the calibration time from the local computer, it just passes the time to the iWSN-200U or iWSN-200R directly. The value of this parameter is usually less than or equal to the time period which the iWSN-200U or iWSN-200R calibrate the time of iWSN-200U or iWSN-200R to the iWSN sensing module (that is, the parameter “Slave Time Sync Duty” of iWSN-200U or iWSN-200R), so as to ensure the calibrated time to iWSN sensing module is more close to the time of local computer.

Device Alias

This parameter is used to set an alias for the MDC-711D item. Users can more easily identify the purpose of the MDC-711D through the setting of the alias name. The maximum length of the alias is 30 characters.

Add

When all parameter settings are completed, users can click the Add button to add the MDC-711D item into the device tree. At the moment, the MDC-711D Configuration dialog will not automatically close. If there are other MDC-711Ds that need to be added, users can continue with another new one. After finishing the configuration of all MDC-711Ds, users can close the MDC-711D Configuration dialog by themselves.

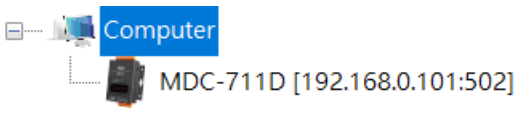

Figure 3-15: Add a MDC-711D item into the device tree

3.3.4 Add RS-232/485 Concentrator

Before adding an iWSN RS-232/485 concentrator item, users must first add a COM or MDC-711D item in the device tree depending on the practical deployment. After adding a COM or MDC-711D item, users can right-click on the COM or MDC-711D item to pop up the context menu of the COM or MDC-711D item, as shown in the figure below.

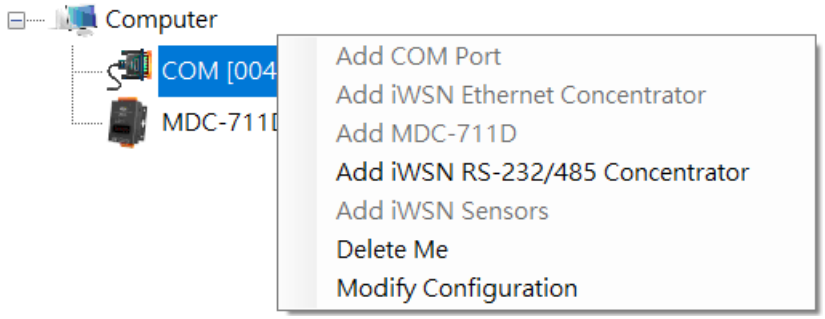

Figure 3-16: Add an iWSN-200U or iWSN-200R item by the context menu

After selecting the “Add iWSN RS-232/485 Concentrator” option in the context menu, the iWSN RS-232/485 Concentrator Configuration dialog is popped up for configuration of the iWSN-200U or iWSN- 200R item which will be added into the device tree.

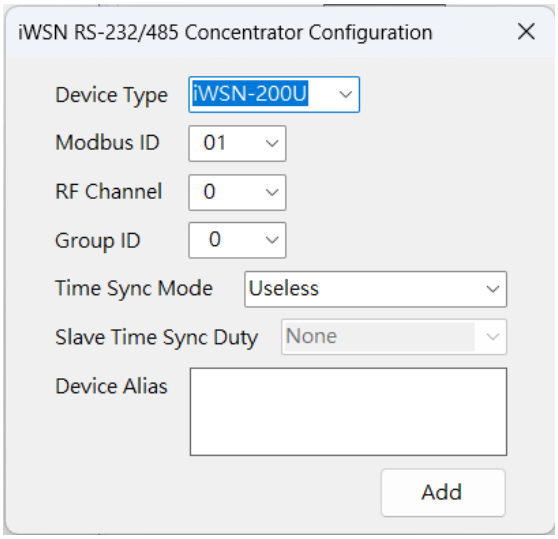

Figure 3-17: iWSN RS-232/485 Concentrator Configuration dialog

Device Type

The model type for the concentrator. The iWSN Utility supports two kinds of RS-232/RS-485 concentrators, iWSN-200U and iWSN-200R. Users can select the proper model type depending on the practical deployment.

Modbus ID

This parameter is for setting the Modbus RTU station number currently used by iWSN-200U or iWSN-200R. Users can obtain the current Modbus ID of the iWSN-200U or iWSN-200R by checking the DIP switch. About the DIP switch information, please refer to the QuickStart of the iWSN-200U or iWSN-200R for details.

RF Channel

Set the parameters of the wireless radio frequency channel (RF Channel) currently used by the iWSN-200U or iWSN-200R. It only helps users to know the current setting on the rotary switch of iWSN-200U or iWSN-200R and the deployments of the iWSN network. Because this value will not be used in the communication, the iWSN Utility can work well even If the configured value is not match the current setting of the iWSN-200U or iWSN-200R.

Group ID

Set the parameters of the wireless group ID (RF Channel) currently used by the iWSN-200U or iWSN-200R. It only helps users to know the current setting on the rotary switch of iWSN-200U or iWSN-200R and the deployments of the iWSN network. Because this value will not be used in the communication, the iWSN Utility can work well even If the configured value is not match the current setting of the iWSN-200U or iWSN-200R.

Time Sync Mode

If users would like to enable the time synchronization function which is supported by the connected iWSN sensor module, this parameter must be set to “Broadcast by duty” to allow the iWSN data concentrators to periodically send the time calibration package to the iWSN sensor module. Set to “Useless” if this function is not required.

Slave Time Sync Duty

If users would like to enable the time synchronization function which is supported by the connected iWSN sensor module, the parameter “Time Sync Mode” must be set to "Broadcast by duty" first. And, users need to decide the period of sending the time calibration package to the iWSN sensor module. This parameter is used to configure the period of sending time calibration command to the iWSN sensor module. The setting value is

usually greater than or equal to the AP Time Sync Duty parameter.

Device Alias

This parameter is used to set an alias for the iWSN-200U or iWSN-200R item. Users can more easily identify the purpose of the iWSN-200U or iWSN-200R through the setting of the alias name. The maximum length of the alias is 30 characters.

Add

When all parameter settings are completed, users can click the Add button to add the iWSN-200U or iWSN-200R item into the device tree. At the moment, the iWSN RS-232/RS-485 Concentrator Configuration dialog will not automatically close. If there are other iWSN-200Us or iWSN-200Rs which need to be added, users can continue with another new one. After finishing the configuration of all iWSN-200Us or iWSN-200Rs, users can close the iWSN RS-232/RS-485 Concentrator Configuration dialog by themselves.

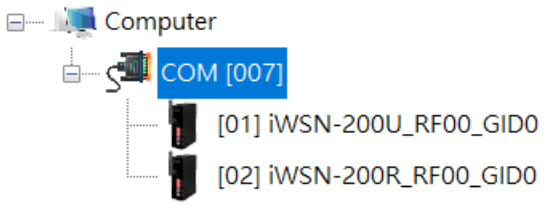

Figure 3-18: Add an iWSN-200U or iWSN-200R item into device tree

3.3.5 Add iWSN Sensors

Before adding an iWSN sensor module, users must first add an iWSN-200E, iWSN-200U or iWSN-200R concentrator in the device tree. After adding the iWSN concentrator, users can right-click on the device tree icon of the concentrator and select ‘Add iWSN Sensor’ in the context menu to open the iWSN Sensor Configuration dialog, as shown in the figure below.

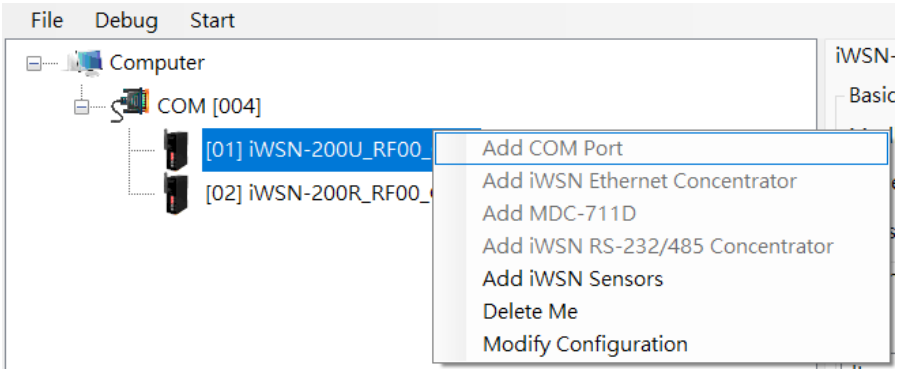

Figure 3-19: Add an iWSN sensor module by the context menu

After selecting the “Add iWSN Sensors” option in the context menu, the iWSN Sensor Configuration dialog is popped up for configuration of the iWSN sensor module which will be added into the device tree.

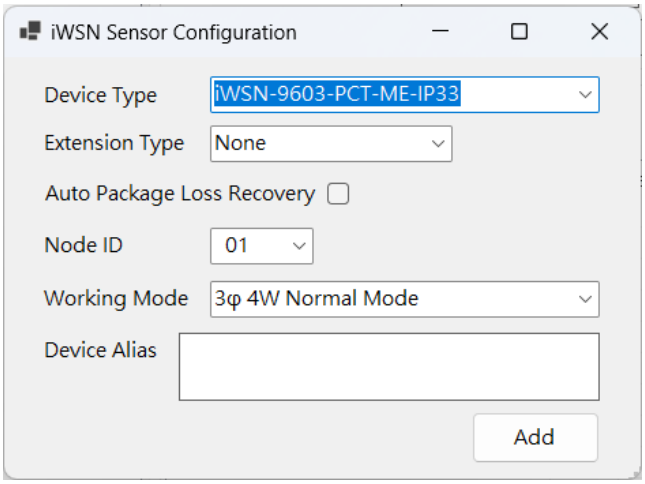

Figure 3-20: iWSN Sensor Configuration dialog

Device Type

Select the type of the iWSN sensor module according to the practical deployment. Some sensor modules allow to expand the sensing functions by the external expansion modules. When the selected sensor module supports this function, the parameter "Extension Type" will list the expandable module for configuration.

Extension Type

According to the iWSN sensor module selected by users (that is, "Device Type"), the supported expansion modules are listed in this parameter. Users must select the expansion module type that matches the actual situation. If there is no expansion module connected to the iWSN sensor module, select “None” in this parameter. iWSN Utility will check each wireless packet received from the sensor module according to the “Device Type” and “Extension Type” configured by users. If the device type and extension type in the content of the received packet does not match the configuration parameters, the packet will be dropped out.

Auto Package Loss Recovery

Some iWSN sensor modules provides data supplement function, that is, when the wireless response data is lost due to some reason, users can use a special wireless command to retrieve the lost data. If the module supports this function, enable this parameter to allow iWSN Utility to automatically perform the data supplement once the response data is lost. Because the iWSN Utility detects whether the response data is lost by the timestamp in the packet, the time calibration to the iWSN sensor module and concentrator is recommanded to be enabled by configuring the parameters “AP Time Sync Duty” and Slave Time Sync Duty” of the iWSN concentrator. It is useful to ensure that the time of the supplemented data matches the time of the local computer.

Node ID

This parameter is used to set the iWSN node ID of the iWSN sensor module. Users can obtain the current iWSN node ID of the iWSN sensor module by checking the DIP switch. About the DIP switch information, please refer to the QuickStart of the iWSN sensor module for details.

Working Mode

Most iWSN sensor modules only have one working mode, so there is no need to set this parameter. The iWSN sensor module which have complex functions may have different working modes. This kind of modules will reply different data while it is operating in different working modes. In order to avoid the incompatibility of the data format between the database and the actual received packet, users need to fill this parameter depending on the practical configuration of the iWSN sensor module. About the working

modes of the iWSN sensor module, please refer to the Modbus address table of the iWSN concentrator for details. If the iWSN Utility receives the data package which is different from the configuration of this parameter, it will not store the data in the database and the background color of the information display filed of the iWSN sensor module will be changed from white to gray for hint. When the iWSN Utility is configured to store the data to the CSV file (not to the database), the data with different working mode will be stored in another CSV file with the different date for file name. About the data store functions of the iWSN Utility and the information display filed of the iWSN sensor module, please refer to the section 3.3.2 and 3.3.5 for details.

Device Alias

This parameter is used to set an alias for the iWSN sensor module item. Users can more easily identify the purpose of the iWSN sensor module through the setting of the alias name. The maximum length of the alias is 30 characters.

Add

When all parameter settings are completed, users can click the Add button to add the iWSN sensor module item into the device tree. At the moment, the iWSN Sensor Configuration dialog will not automatically close. If there are other iWSN sensor modules which need to be added, users can continue with another new one. After finishing the configuration of all iWSN sensor modules, users can close the iWSN Sensor Configuration dialog by themselves.

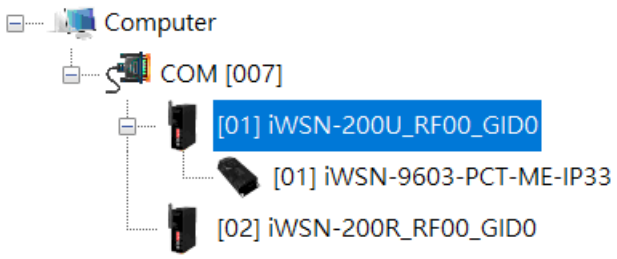

Figure 3-21: Add an iWSN sensor module into the device tree

3.3.6 Clear All Items/Delete Me

Users can remove an item from the device tree by right-clicking the item and selecting the “Delete Me” option in the context menu. Or, the item can also be removed by selecting the item and press the “Delete” key of the keyboard. When the item is removed, any other items under this item will be removed too. For example, when users remove an iWSN-200U item, the iWSN sensor modules connected to the iWSN-200U will also be removed at the same time. If users right-click the "Computer" item, the "Clear All Items" option is shown in the context menu, instead of ‘Delete Me’. Executing this option will clear all items of the device tree except the "Computer" item.

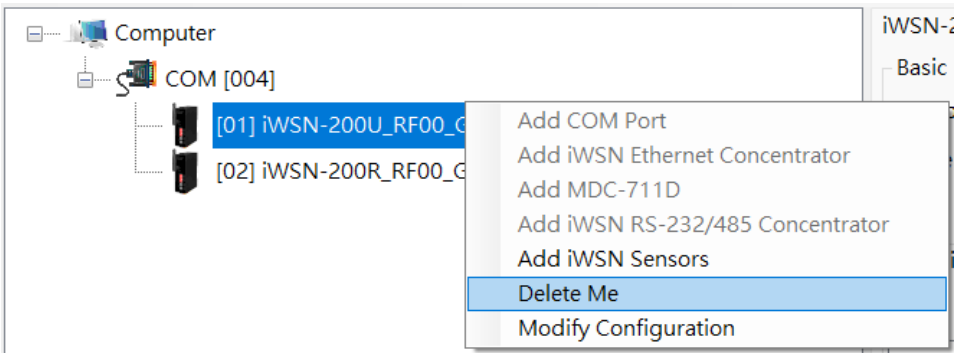

Figure 3-22: Remove an item from the device tree

3.3.7 Modify Configuration

If users need to modify the parameters of an existing item in the device tree, right-click the item and select the "Modify Configuration" in the context menu to pop up the corresponding configuration dialog as the figure below. The current configuration results will be displayed in the configuration dialog according to the selected item.

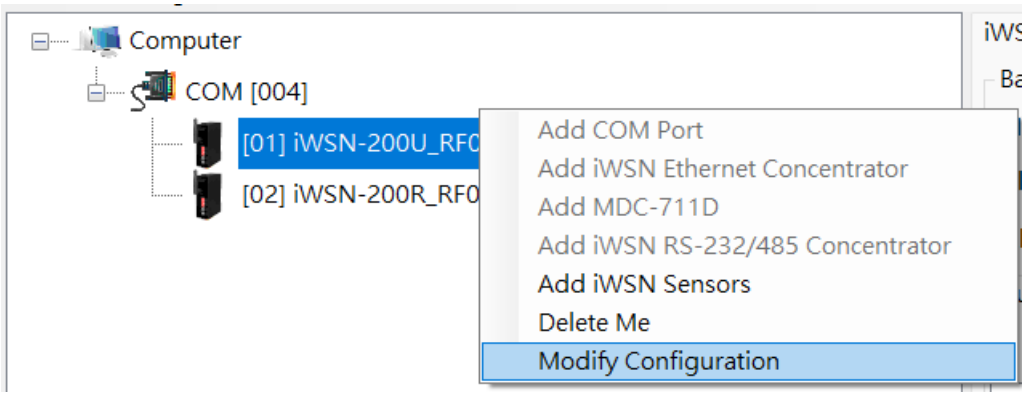

Figure 3-23: Modify the parameters of the item in the device tree

Users can modify any parameter in the configuration dialog if necessary. When finishing the modification, click the “Change” button to activate the parameters. For example, if users want to modify the “Modbus ID” parameter of the iWSN-200U item from 1 to 5, right-click the iWSN-200U item in the device tree and select the “Modify Configuration” option. Then, modify the “Modbus ID” in the iWSN RS-232/RS-485 Concentrator Configuration dialog, and click the "Change" button after finish the modification.

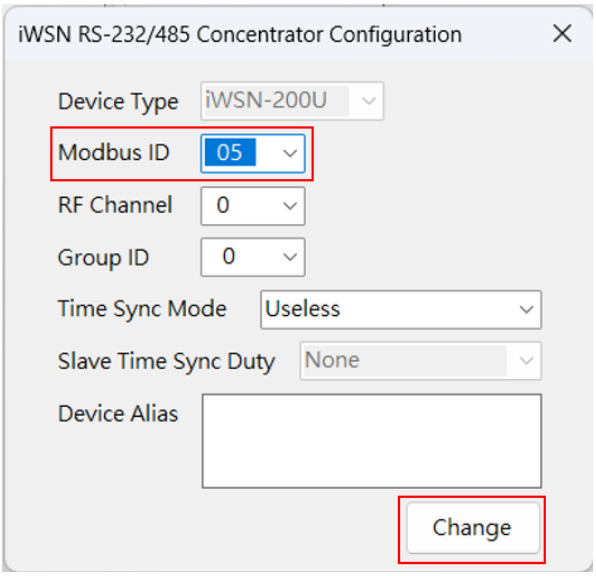

Figure 3-24: Modify the configuration of the iWSN-200U item

3.4 Information Display

This filed displays the parameter setting results of the item in the device tree. Users can select the item in the device tree, and the information display area will show the different configuration information according to the device type of the selected item. For example, clicking the “Computer” item in the device tree will display the configuration information of the local computer.

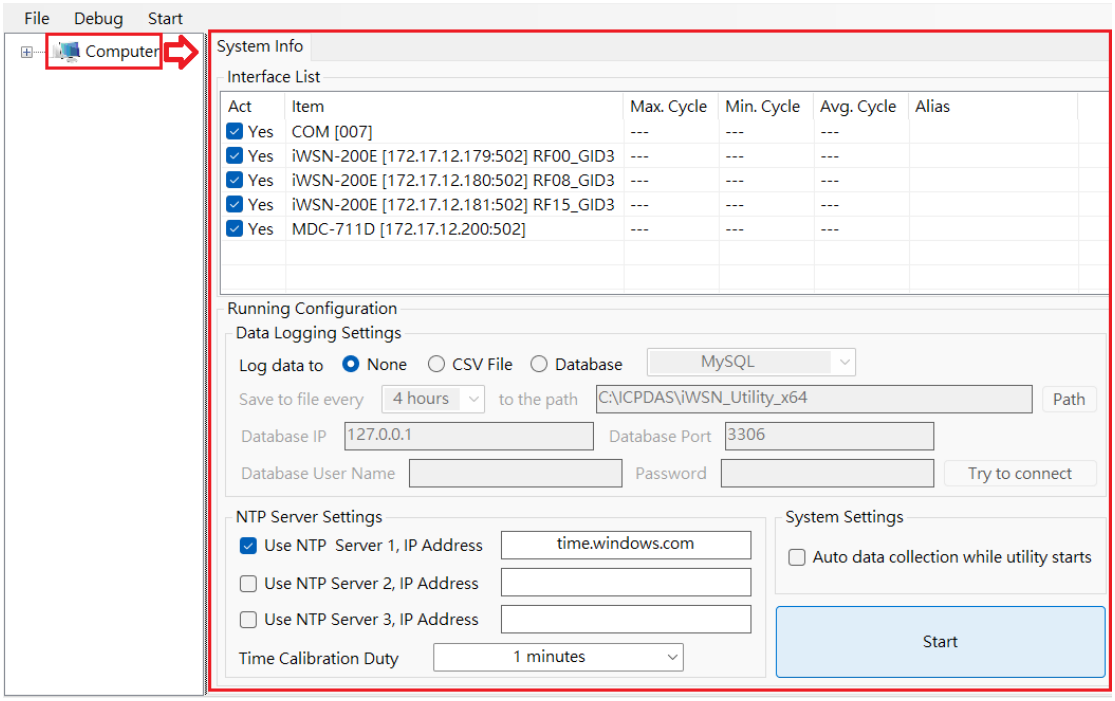

Figure 3-25: The information display area to the Computer item

The following sections will clearly describe the information display area of each kind of device type in the device tree.

3.4.2 Computer Information Display

The information display area to the Computer item includes two parts: Interface Information list and the Running Configuration setting. The Interface Information list shows the status of the COM Port, Ethernet concentrator and MDC-711D set in the device tree.

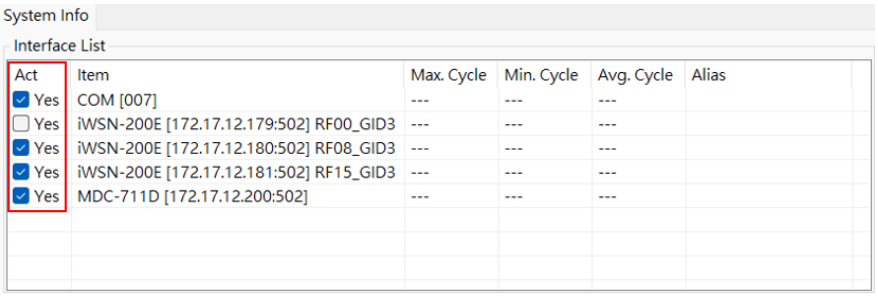

Figure 3-26: Interface Information list of the Computer item

iWSN Utility gets the iWSN data from each COM port and Ethernet address by the corresponding independent thread. The interface information list shows all interfaces added in the device tree. When iWSN Utility starts to collect the iWSN data, it provides the information about the maximum, minimum and average time of one duty cycle for each interface. This is useful to understand the execution performance and bus loading of each interface while collecting data. Before starting the data collection, users can decide which interfaces need to collect data by checking the ACT field at the first column of the interface information list. If there is an interface that does not need to activate, uncheck the ACT column to skip the interface execution. While iWSN Utility is in data collection mode, the ACT setting cannot be changed.

In the Running Configuration, it provides the configuration of two functions, Data Logging Setting and NTP Server Setting, as below.

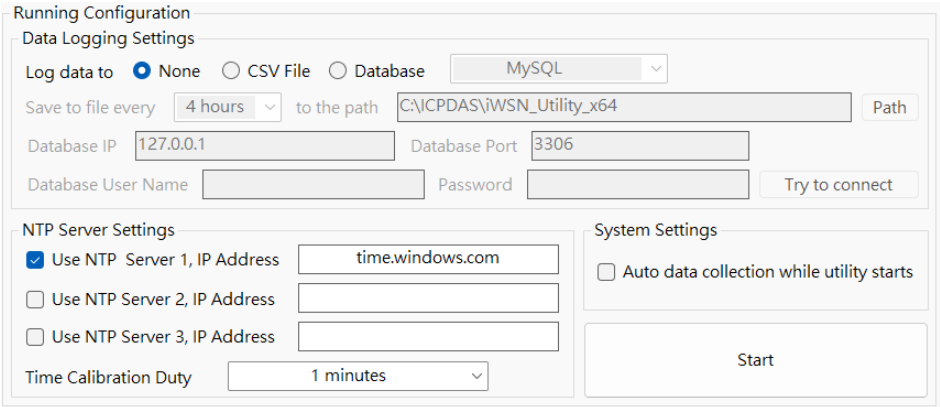

Figure 3-27: Running Configuration of the Computer item

iWSN Utility offer the function of saving the received iWSN data as a .csv file or into a database. If users would not like to save any data, select the “None” option in the “Log data to” parameter to do so. Saving the data as a “CSV File” will record the data with a file name according to the first time and date which the data is got at. For saving data into a database, iWSN Utility only supports MySQL database now, therefore, only the “MySQL” option is shown in the list. When choosing to save the data as a CSV file, users need to decide how long to save as a file and the path to save the file. Since the larger file size of the CSV file gets the lower efficiency to save the data, users must select the proper time interval for a file to avoid the data lose because of no time to save it. It is recommended that if iWSN sensor module replies the data once per second, the data storage interval of the CSV file should not exceed 4 hours for each file.

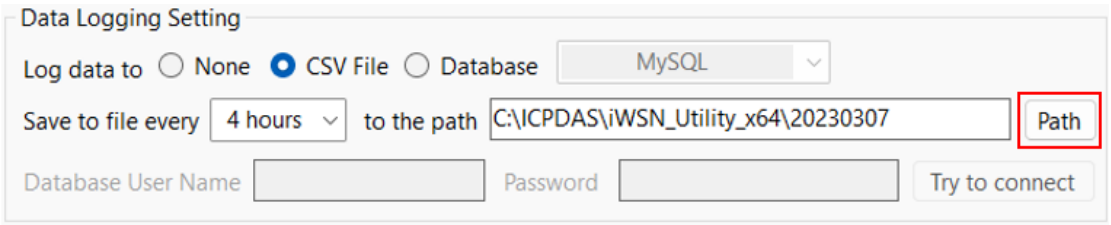

Figure 3-28: The Configuration of saving iWSN data as a CSV file

Users can select the saving location of the produced CSV file through the “Path” button. After setting the path, iWSN Utility creates a folder under the path while the CSV file is creation, and the folder is named as the creation date of the CSV file. The CSV file will be put in the corresponding folder depending on the creation date of the file. As long as iWSN Utility find no folder whose name is a match with the creation date of the CSV file while creating it, the new folder named as that date will be generated automatically. The name of the CSV file follows the rule of "Interface and concentrator information + Sensor module information + The CSV file creation date + The Time while the iWSN Utility starts the data collection + Time interval marker + .CSV".

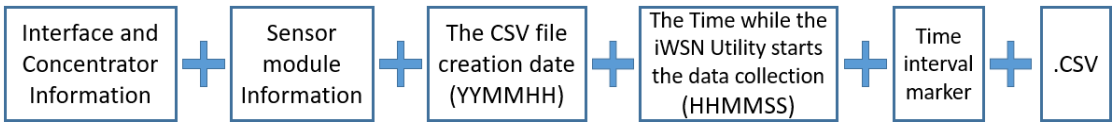

Figure 3-29: The naming rule of the CSV file

In the naming rule, the interface name and data collector information can be divided into three categories: COM, iWSN-200E and MDC-711D, which are defined in the following table.

Interface and concentrator information	Description
COM	COM + Port No. + “AP” + The Modbus ID of the iWSN-200U or iWSN-200R. For example, “COM4_AP1” indicates that the data is from the iWSN-200U or iWSN-200R which uses the Modbus ID 1 and connected to the COM Port 4.
iWSN-200E	“EAP” + The Ethernet IP and port No. of the iWSN-200E. For example, “EAP172_17_12_179_502” indicates the data is from the iWSN-200E whose Ethernet IP is 172.17.12.179 and port No. is 502.
MDC-711D	“MDC” + The Ethernet IP and port No. of the MDC-711D + “AP” + The Modbus ID of the iWSN-200U or iWSN-200R. For example, “MDC172_17_12_180_502_AP2” indicates that the data is from the iWSN-200U or iWSN-200R which uses the Modbus ID 2 and connected to the MDC-711D with the Ethernet IP 172.17.12.180 and port No. 502.

The sensor module information in the naming rule includes the ID of the iWSN network and working mode. For example, if the sensor module uses the ID 5 of the iWSN network and the third working mode, it will be named ID05_M3. Users need to study the meanings of the third working mode described in the Modbus table of the corresponding sensor module to interpret the data. The M0 is used when the sensor module has only one kind of working mode. The time interval marker in the naming rule indicates the storage time interval of each day. If it is set to “save to file every 4 hours”, there will be 6 files every day, and the time intervals are 00:00:00 ~ 03:59:59, 04:00:00 ~ 07:59:59, 08:00:00 ~ 11:59:59, 12:00:00 ~ 15:59:59, 16:00:00 ~ 19:59:59 and 20:00: 00 ~ 23:59:59 which are marked as P0, P1, … P5 respectively. If the CSV file is created at 9:00 AM, it will be named as P2

because the creation time falls between 8:00:00 and 11:59:59. Take the following figure for an example, the folder named “20230307” indicates it was created at March 7, 2023, and all of CSV file which are created at March 7, 2023 will be stored in this folder. There are two files in the folder. The first file stores the data of the iWSN sensor module with ID 1, this module communicates with the iWSN concentrator with Modbus ID 1 through COM port 4. The iWSN sensor module is working in mode 0 (or the default working mode), and the iWSN Utility starts to collect the data at 18:02:09 PM March 7, 2023. The time interval of the stored data is 16:00:00 ~ 19:59:59. The second file stores the data from the iWSN sensor module with ID 1, and the sensor module is connected to the iWSN-200E with Ethernet IP 172.17.12.179 port 502. The working mode of the sensor module is the default working mode (M0), and the iWSN Utility starts to data collection at 17:42:12 PM March 7, 2023. The time interval of the stored data is 16:00:00 ~ 19:59:59. Because these two files has different time of data collection of the iWSN Utility, it indicates that the two files are created in different times to collect the data, and there is no relationship between these two files.

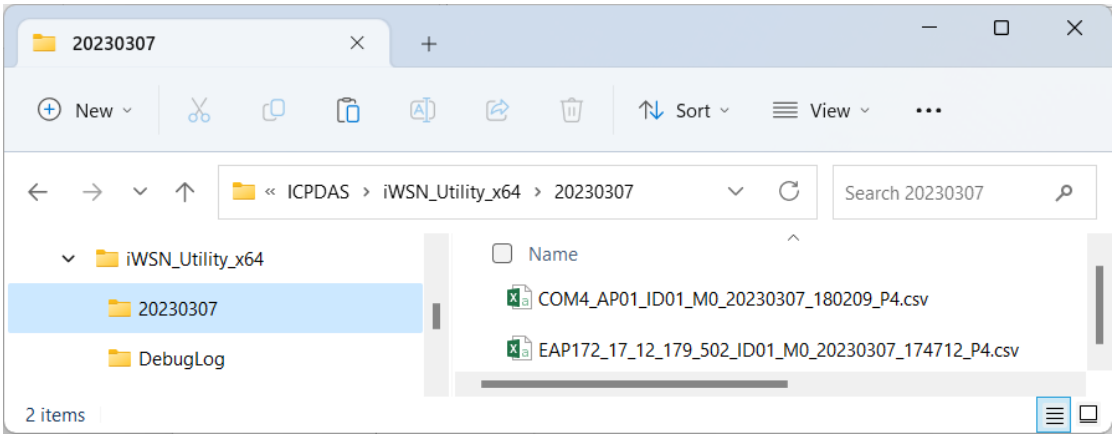

Figure 3-30: The naming rule of the folder and CSV file of the data log

If users can choose the “Database” option and select the type of database which you want to use from the drop-down menu to store the collected data into database. Before saving data into the database, users must install the database system and provide a username and password during the installation process for accessing the database. The iWSN Utility requires the user to fill in information such as the database IP address, port number, username and password for accessing the database. After filling in the information, you can use the "Try to Connect" button to confirm

whether the utility can access the database normally. If it is a local database, it can be connected via IP 127.0.0.1. Users can save the IP and port parameters of the database by using the parameters configuration file. When users save the parameters to the parameters configuration file, the username and password of the database account will be encrypted and saved for the next time when the Utility is opened.

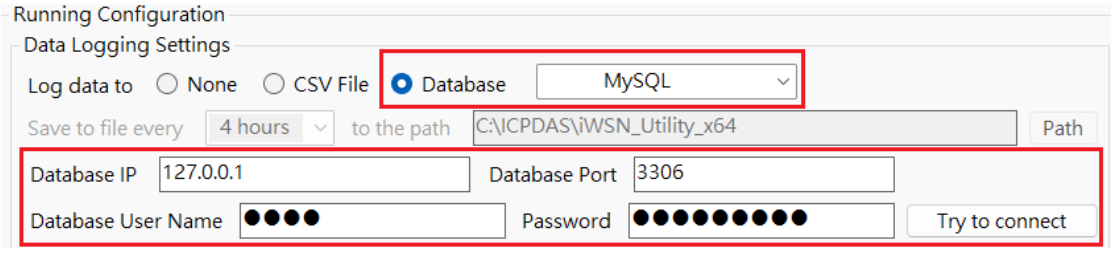

Figure 3-31: Configuration for access database in iWSN Utility

iWSN Utility provides the function to synchronize the time of the iWSN data concentrators and sensor modules with the local computer's time. If users want their local computer to synchronize time with other computers, they need to periodically synchronize it with an NTP (Network Time Protocol) server. Utility provides the configuration interface for synchronizing the local computer's time with the specific NPT server. Once enabled, Utility will automatically apply the time synchronization results to the operating system's time of the local computer. Therefore, if users have also enabled the periodic time synchronization function built into the operating system, it is recommended to disable it to avoid conflicting time synchronization cycles on the local computer.

To disable the time synchronization function of the Windows operating system, users can go to the "Control Panel/Date and Time" setting page, select the "Set the time and date" option, click on the "Internet Time" tab, click the "Change settings" button, uncheck the option "Synchronize with an Internet time server" and then click OK. Please note that different versions of Windows operating system may have different configuration methods, so users can search for the corresponding configuration method for their specific Windows version and make the necessary changes accordingly.

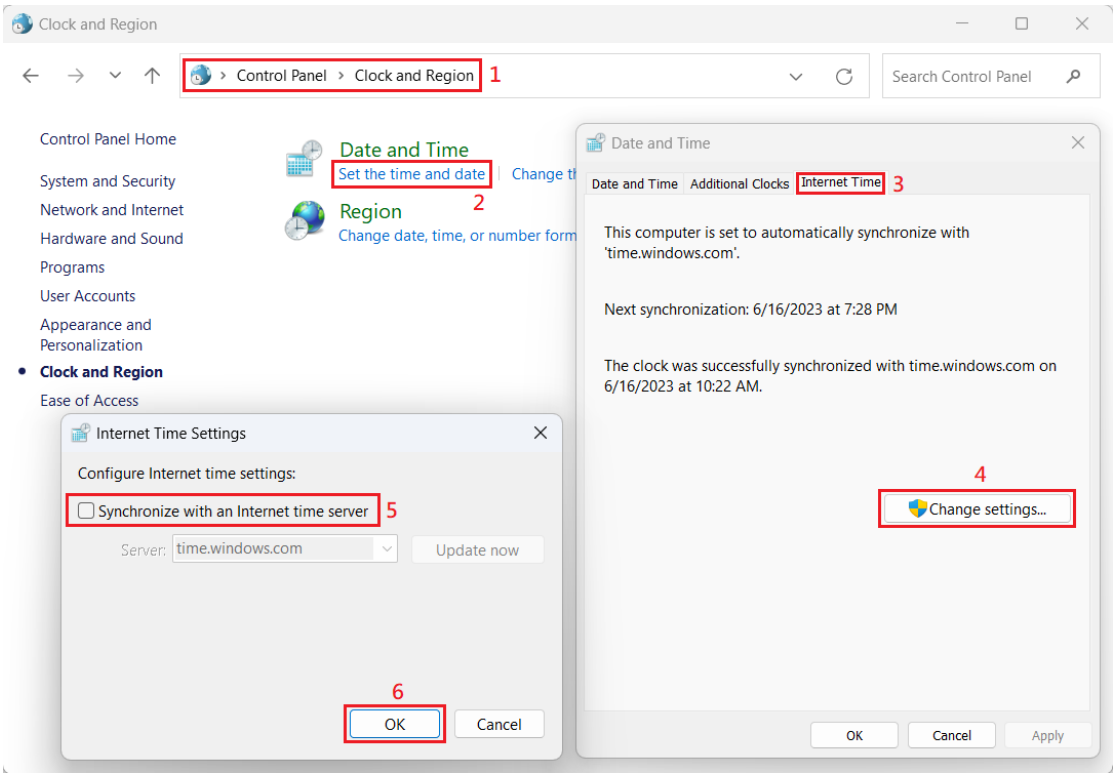

Figure 3-32: Disable the time synchronization on Windows 11

iWSN Utility provides a maximum of three sets of NTP server IP address configurations. Users can choose which sets of NTP servers to enable by checking or unchecking the corresponding options. The priority order of the NTP servers is Server 1 > Server 2 > Server 3. If users enable more than one set of NTP servers, Utility will prioritize the server with the lower server number. For example, it will first attempt to synchronize time with Server 1. If Server 1 is disconnected or the time synchronization fails, Utility will automatically switch to Server 2 or Server 3 for time synchronization.

Additionally, users need to decide how often the local computer should synchronize time with the NTP servers. The time synchronization interval setting depends on the time deviation generated by the local computer each day. Users should consider the tolerable deviation when determining the time synchronization interval.

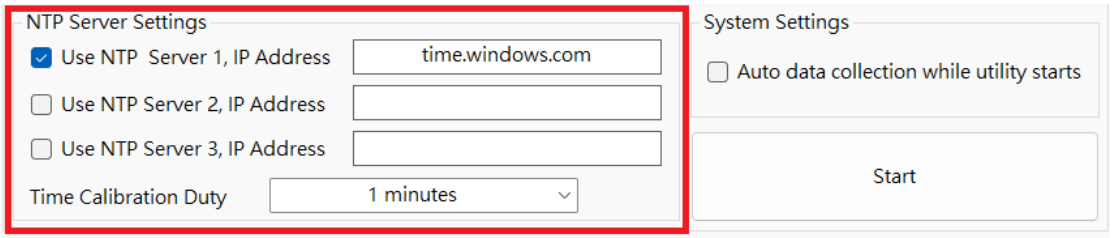

Figure 3-33: Configuration to NTP Servers

After completing all the settings, users can click the 'Start' button or the 'Start' option in the toolbar as described in section 3.1 to activate the data collection by the iWSN Utility. When the data collection is activated, the display of the 'Start' button or the 'Start' option in the toolbar will be changed to 'Stop'. Users can click the 'Stop' button or the 'Stop' option in the toolbar again to stop the data collection process of the Utility if necessary.

There is a "Auto data collection while utility starts" function in the system settings. Users can check this checkbox to allow the utility to automatically load the last used utility configuration file and perform data collection while the computer startup, as shown below.

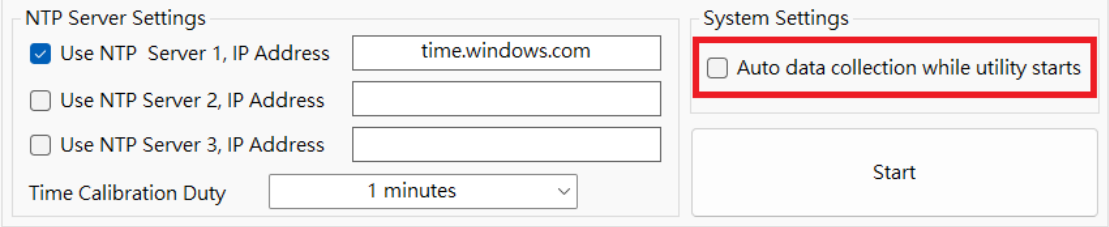

Figure 3-34: The settings of "Auto data collection while utility starts"

Utilizing the startup program function in Windows, users can automatically run the utility when the computer starts and begin the data collection process. In order to configuration the startup program in Windows, users can press the Windows key + R, type "shell:startup" in the Run dialog, and click the OK button to call the startup folder.

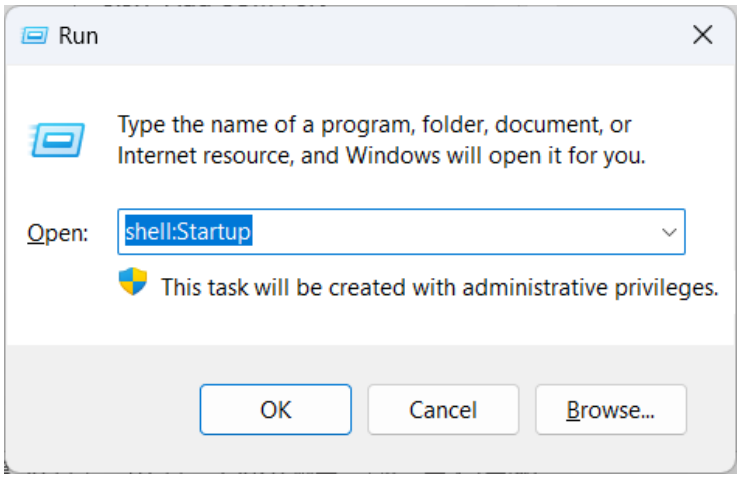

Figure 3-35: Call the Startup folder by Run dialog

With the Startup folder open, copy the shortcut to the iWSN_Utility.exe executable file to that folder. Then, the Windows system will automatically

run the iWSN utility after restart the computer.

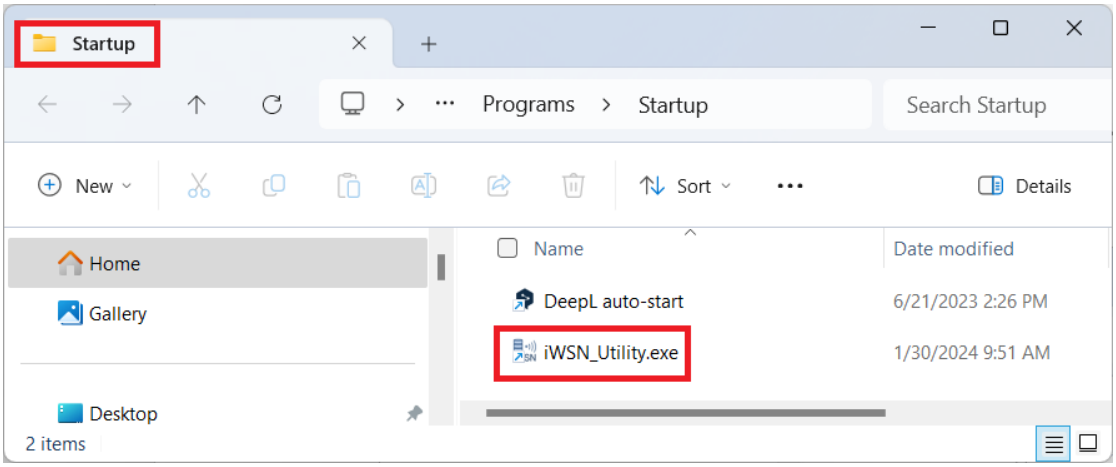

Figure 3-36: Copy the shortcut to the Startup folder

If the execution of the iWSN Utility is hanged by the asking dialog of the system administrator permission during the auto run procedure, users can force close the system administrator permission window. Before deciding whether to close the system administrator permission window, the user must understand and evaluate the risks of closing the window. To close the administrator permission window, open the Change User Control Account Settings window in Console->User Account Settings->User Account Settings, change the User Account Control Settings to No Notification, and click the OK button.

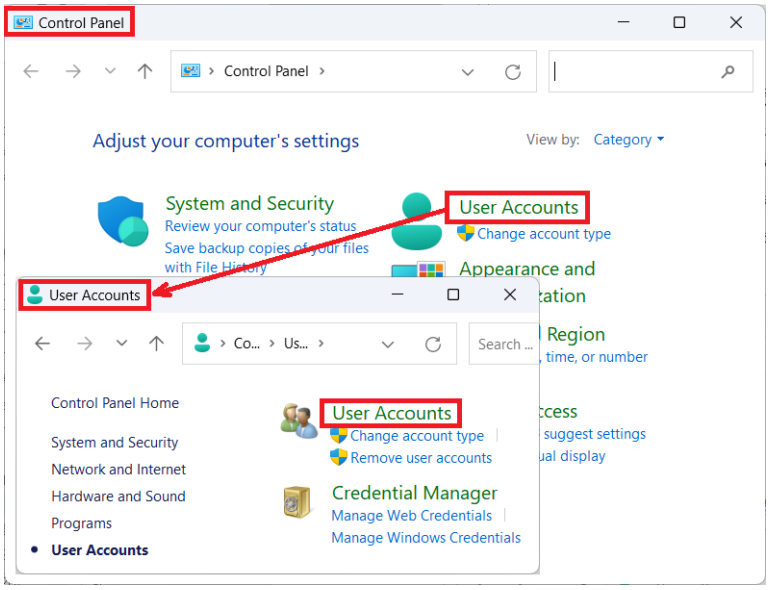

Figure 3-37: Call the User Accounts setting dialog

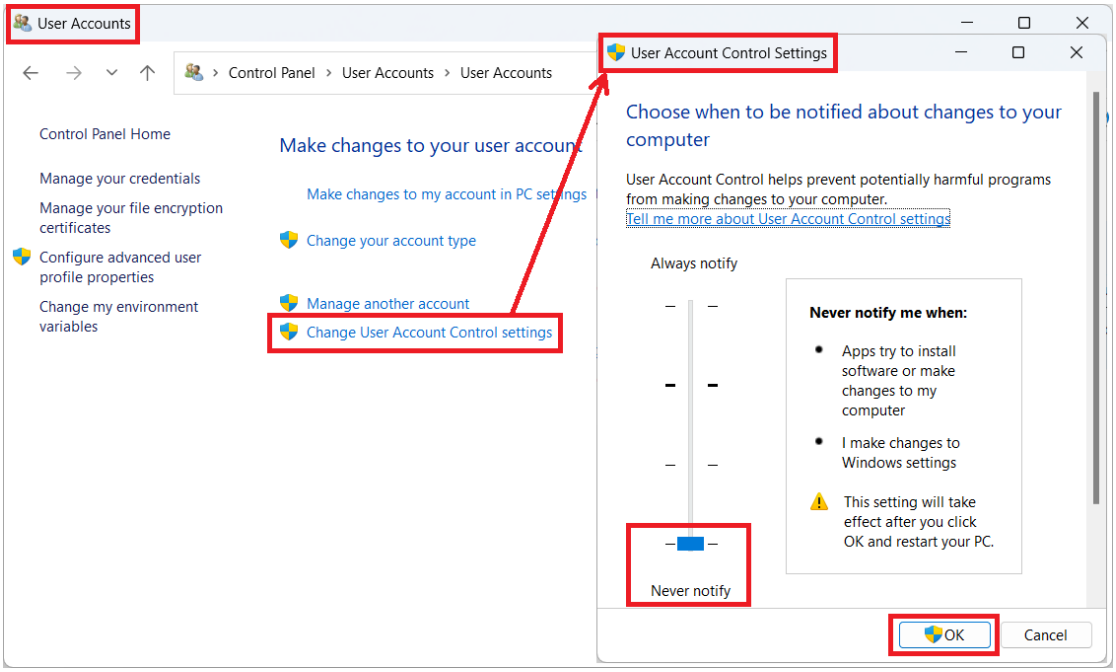

Figure 3-38: The settings to User Account Control Settings

3.4.3 COM / MDC-711D Information Display

When clicking on the COM or MDC-711D item in the device tree, the corresponding module's basic information and running information will be displayed in the information display area. Taking the COM interface as an example, users can view the current configuration parameters of the selected COM item in the basic information section, and right-click on the COM item in the device tree to modify the configuration if necessary. Please refer to section 3.3.7 for detailed instructions. In particular, there is a status field in the basic information of the MDC-711D. When the Utility connects to the MDC-711D under an exception condition, the exception message will be displayed in the status field, at which time the components of the MDC-711D in the device tree will be marked with a red background.

The running information displays the maximum, minimum, and average time required for the local machine to execute one Modbus command (includes one command transmission and on response reception) on the COM port. The information display area for the MDC-711D is similar to that of the COM interface. The running information for the MDC-711D displays the maximum, minimum, and average time required for the local machine to poll the MDC-711D once using Modbus TCP commands.

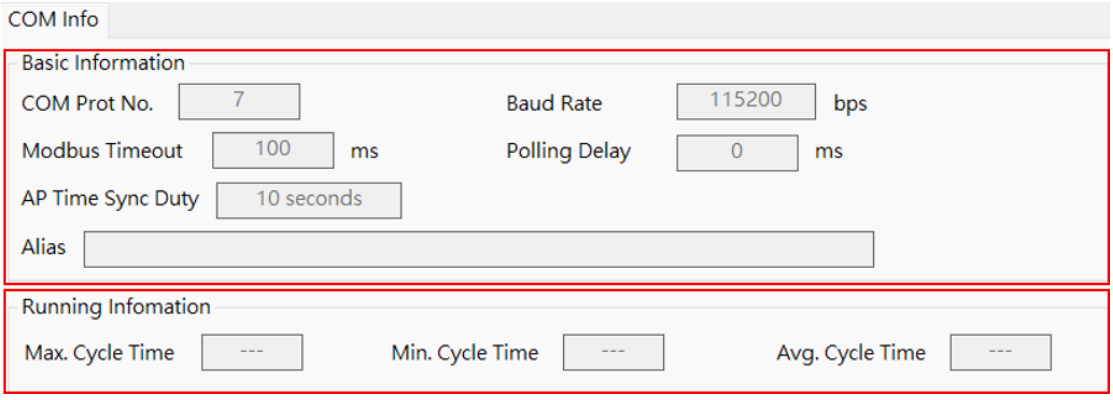

Figure 3-39: Information display area for the COM interface

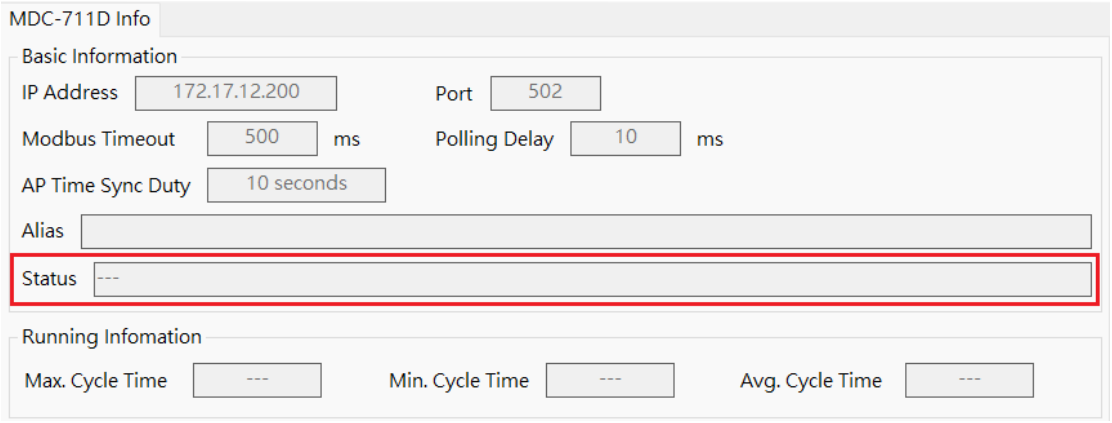

Figure 3-40: Information display area for the MDC-711D

3.4.4 iWSN-200E / iWSN-200U / iWSN-200R Information Display

Clicking on the iWSN-200E, iWSN-200U, or iWSN-200R item in the device tree will display the corresponding module's basic information and running information in the information display area. In the case of iWSN-200E, the basic information area shows the current parameter settings of iWSN-200E, including Ethernet IP address, Port No., RF Channel, Group ID, and so forth. Users can right-click on the iWSN-200E item in the device tree to modify the configuration if necessary. Please refer to section 3.3.7 for detailed instructions. In addition, when the Utility is connected to the iWSN-200E and any exception condition occurs, the exception information will be displayed in the Status field and the components of the iWSN-200E in the device tree will be marked with a red background.

The running information displays the maximum, minimum, and average time required for the local machine to poll the iWSN-200E once, which helps understand the performance of polling iWSN-200E. Additionally, the running information also shows the status information of all iWSN sensor modules connected to the iWSN-200E. This includes the

information of the sensor modules, such as the iWSN network station ID, module name, connection status, last data update time, the number of data received by the iWSN-200E (referred to as "Total Get," which is the sum of normal response data and supplement data), the number of completed data supplementations (referred to as "Supplement"), the proportion of data loss (referred to as "Lost," calculated by dividing the "Supplement" value by the "Total Get" value), and the alias of the sensor module. If a sensor module does not support data supplementation, the number of completed data supplementations will be zero, and the data loss ratio cannot be calculated. If users want to reset the count of received data, it can be done by clicking the "Clear Count" button in the running information. Utility will then clear the current count of received data and start counting again.

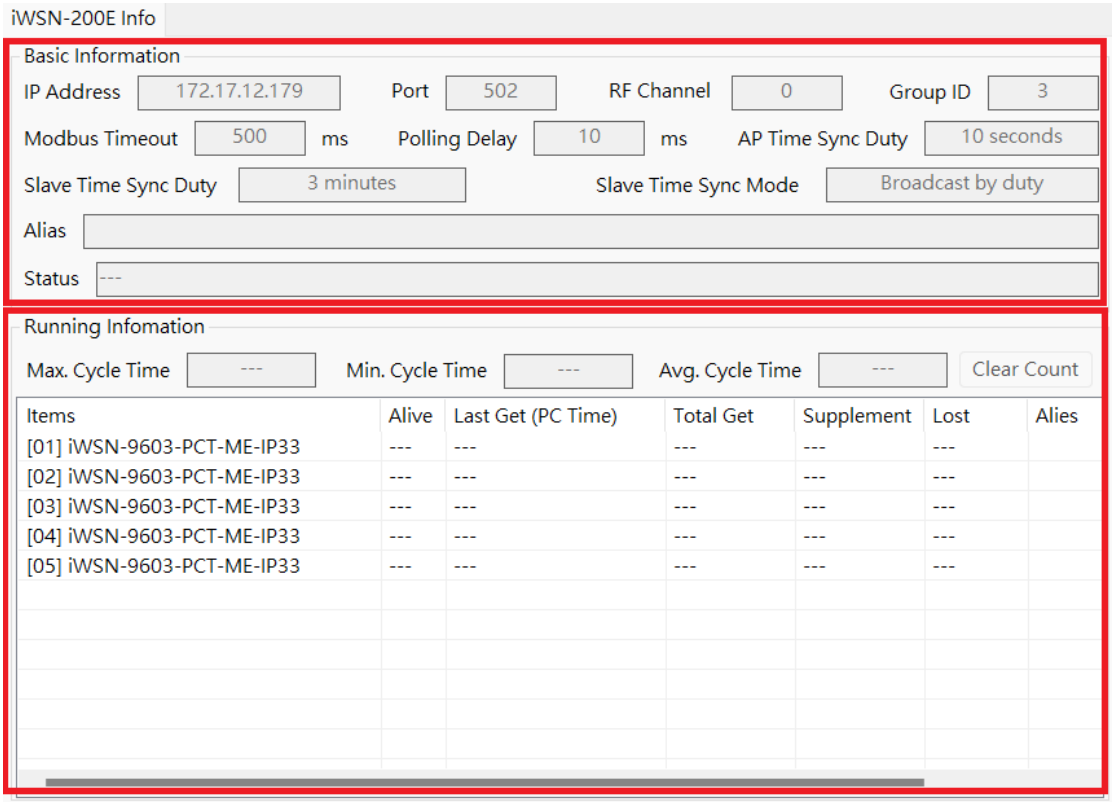

Figure 3-41: Information display area of the iWSN-200E

The information in the information display area for iWSN-200U and iWSN-200R is similar to the display content of iWSN-200E. The different in the basic information of these iWSN concentrator is the configuration parameters due to different type of communication interface. In the part of running information, since iWSN-200U or iWSN-200R must communicate with the local computer through the COM interface or MDC-711D module,

the information display area only shows the status information of all iWSN sensor modules connected to the iWSN-200U or iWSN-200R. If users want to check the performance information of polling the iWSN-200U or iWSN-200R by the local computer, it can be done by checking the information display area of the COM interface or MDC-711D module.

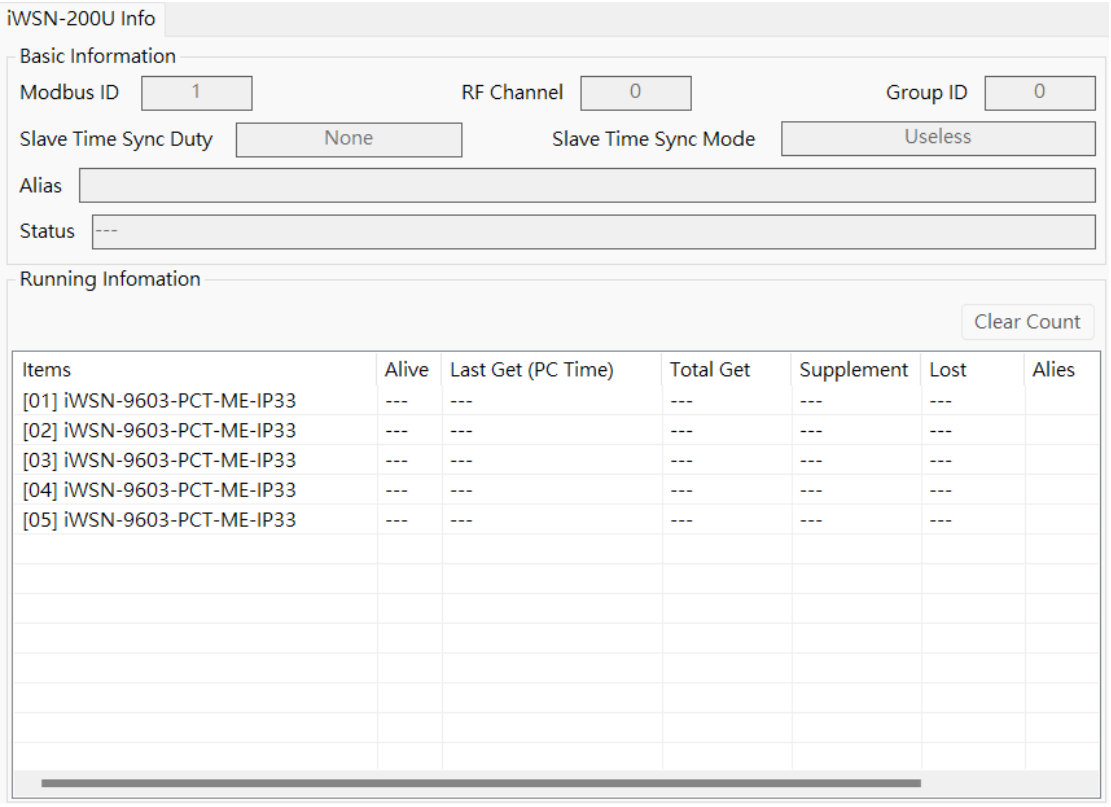

Figure 3-42: Information display area of the iWSN-200U or iWSN-200R

3.4.5 iWSN Sensor Module Information Display

When clicking on an iWSN sensor module in the device tree, its basic information and running information will be displayed in the information display area. The basic information shows the parameter settings of the sensor module. If you need to modify these parameters, you can right-click the iWSN slave module in the device tree, please refer to Section 3.3.7 for details. In addition, when the Utility detects an abnormal condition in the iWSN, it will display an exception message in the status bar, and the iWSN slave module in the device tree will be marked with a red background.

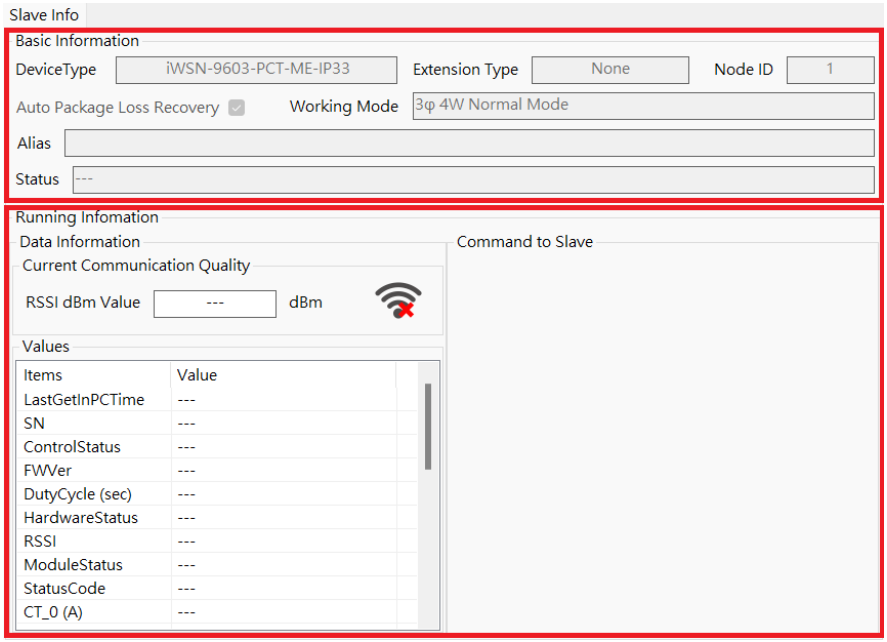

Figure 3-43: Information display area of the iWSN sensor module

The running information displays the content of the last received packet from the sensor module. The Current Communication Quality shows the RF signal strength of the packets received by from the iWSN slave, expressed in dBm and in graphical form. As a rule of thumb, signal strength greater than -71dBm or 2 cells () indicates good signal quality. Since each iWSN sensor module has different functionalities, the displayed information of Values will vary depending on the module type. Taking the example of the running information of the iWSN-9603 series modules, which is a three-phase power meter with complex functionalities, it requires sending commands from the local computer to modify its working modes or configuration. Therefore, the running information area provides a dropdown menu for the users to select iWSN commands. Users can select the needed command from the dropdown menu and then clicks the "Send" button,

which triggers the iWSN Utility to send the command to the iWSN-9603 series module. The list content of the dropdown menus and the existence of the "Send" button may vary depending on the complexity of the functionalities supported by each iWSN sensor module.

The iWSN Utility offers the function to store the sensor module data in a database, and it's important to ensure that the data format of the database matches the data returned by the sensor module. Therefore, before activating the data collection function, it is necessary to verify if the working mode setting of the iWSN sensor module matches the actual working mode. During the data collection process in the Utility, if users changes the module's working mode through the "Send" button or if the module's actual working mode doesn't match the setting in the Utility, for example it is set to Normal Mode but runs in kW_kWh mode, the data information field of the sensor module will be displayed in grayed-out text. It is used to remind that the Utility will not store the data of the sensor module in the database because of the mismatch of the data format. Saving the data as a CSV file is not affected by the mismatch of the data formats. Therefore, if the actual working mode of the sensor module differs from the configured mode, the Utility will use the timestamp of the received data as part of the file name when saving the data as a CSV file. This ensures that the data of which data format is different from the configuration can be stored as a new CSV file with a unique name based on the time it was received.

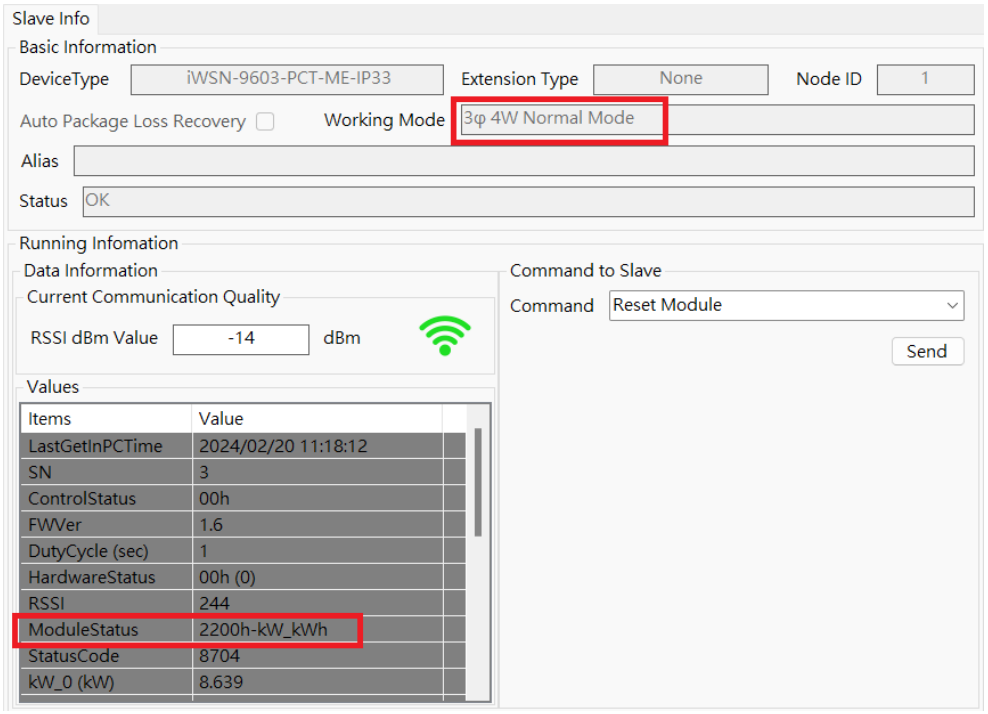

Figure 3-44: The hint for the format mismatch of the iWSN sensor data

3.5 Status Bar

The status bar at the bottom of the iWSN Utility main window displays the current operating status. It provides information about whether the Utility is currently collecting data and the data storage method being used. On the left side of the status bar, users will see the current running status, indicating whether the data collection is active or stopped. On the right side, the status bar displays the system time of the local computer. When users execute the iWSN_Utility.exe, the status will show "Stop to log the data," indicating that it is in a standby mode and not actively collecting data.

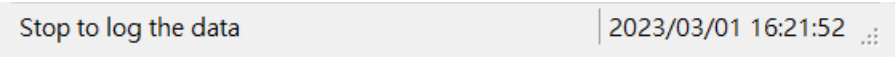

Figure 3-45: The status bar of the iWSN Utility

When users select an appropriate data storage method in the information display area of the local computer and starts the data collection function of the iWSN Utility, the status bar will display the currently selected data storage method and the start time of the data collection. If users choose not to save the data, the status bar will display "Collecting data without save...".

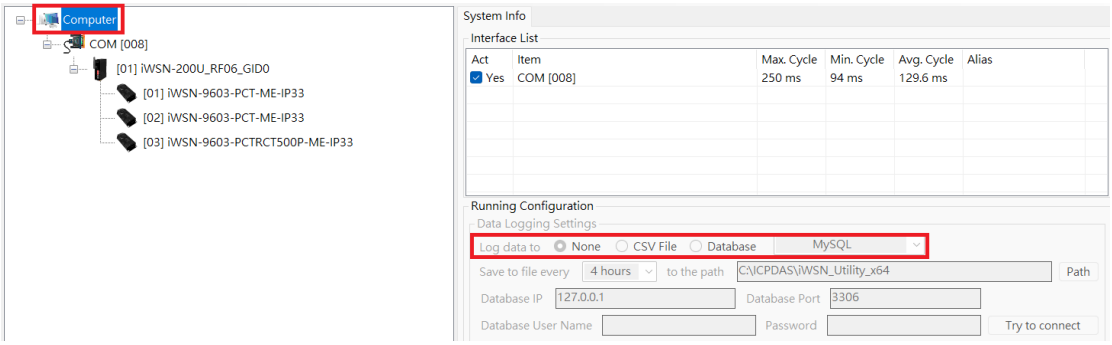

Figure 3-46: Choose the proper method to store the data

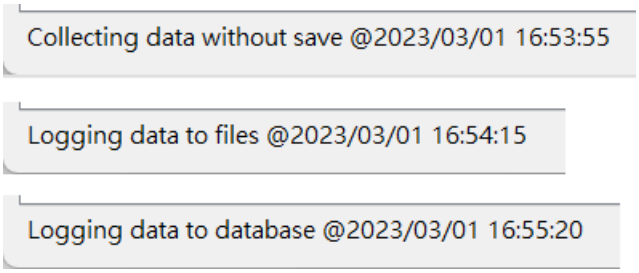

Figure 3-47: The storage methods information in the status bar

4 Demonstrations & Example

This chapter will provide an example of how to use the iWSN Utility in practice, making it easier for users to understand the operation of the Utility.

4.1 iWSN Utility Download & Installation

Before installing the iWSN Utility, users must install Microsoft .NET Framework 5.0 or a higher version on their local computer. Depending on whether they intend to run the 32-bit or 64-bit version of the iWSN Utility, users should choose to install the x86 or x64 version of .NET Framework accordingly. The .NET Framework can be downloaded for free from the official Microsoft website. For the download path of the .NET Framework 5.0 Desktop Runtime version, please refer to the webpage link provided below:

https://dotnet.microsoft.com/en-us/download/dotnet/5.0

Once the installation of .NET Framework 5.0 is complete, users can visit the ICP DAS official website and search for "iWSN Data Concentrator" (for example, search for iWSN-200U, iWSN-200R or iWSN-200E) to access the Data Concentrator webpage. Within the Download Center section of that webpage, users can find the download path for the iWSN Utility. Depending on the user's local computer operating system, whether it is a 32-bit or 64-bit version, they should select the corresponding Utility version. Since most computers are based on a 64-bit platform, the following example will demonstrate the 64-bit version of the Utility. For the 32-bit version, users should refer to the 64-bit example and make the necessary adjustments to ensure proper operation on a 32-bit system.

Figure 4-1: Search for iWSN concentrator on the official website

After extracting the downloaded compressed file, run the iWSN_Utility_x64_Setup.exe installer (if the 32-bit version of the Utility is downloaded, the installer's filename would be iWSN_Utility_x86_Setup.exe). Follow the prompts provided by the installer to complete the installation. If users select the option "Launch iWSN Utility" during the installation and close the installation window, the Utility will automatically start.

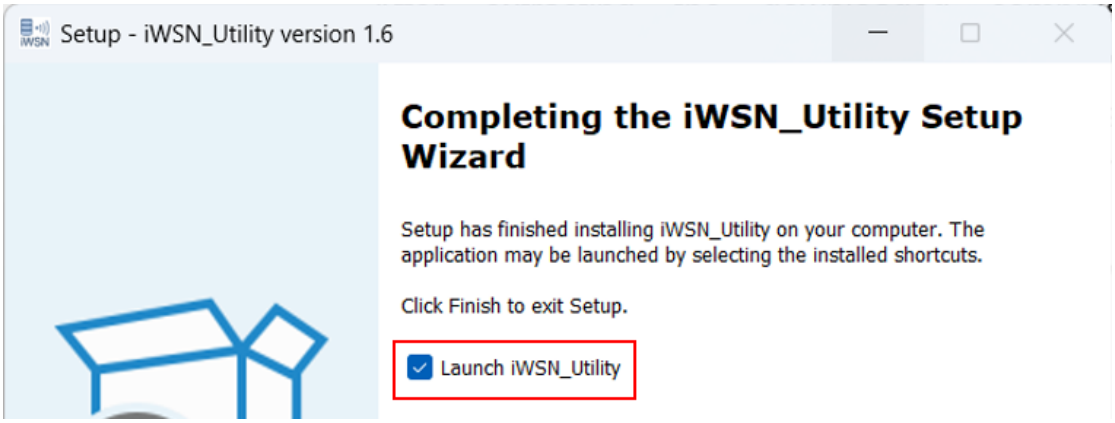

Figure 4-2: Configure to start the iWSN Utility after finish the installation

The default installation path for the iWSN Utility x64 version is "C:\ICPDAS\iWSN_Utility_x64". In the future, users can directly run the iWSN_Utility.exe file located in that folder to launch the Utility.

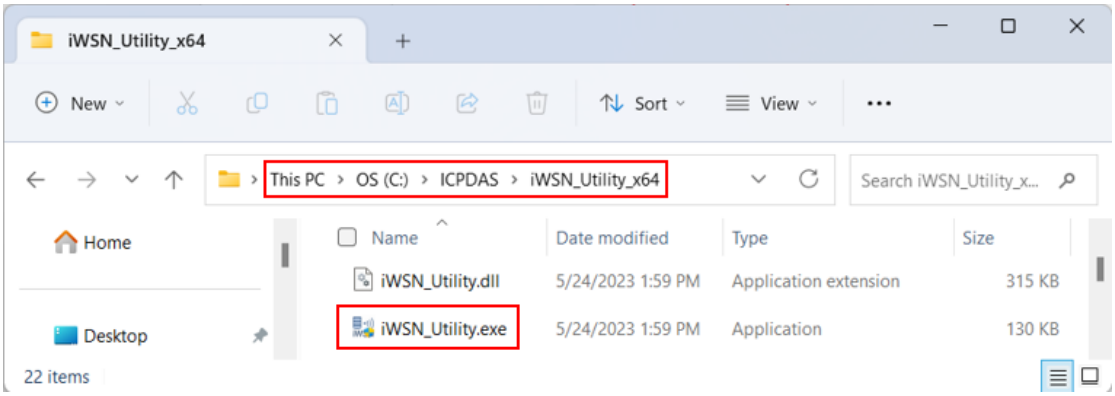

Figure 4-3: Default installation path for the iWSN Utility

4.2 Database Installation

If users need to store data in a database by using the iWSN Utility, the database software must be installed first on their local computer. In this example, we will use the Community Server version of MySQL. Depending on users' Windows operating system version, the corresponding MySQL Community Server software need to be downloaded from the MySQL official website. The download link is provided below:

https://dev.mysql.com/downloads/mysql/

In addition to the necessary MySQL Server installation, it is also recommended to install MySQL Workbench, which allows for easier viewing and verification of MySQL tables and records. Follow the prompts of the installation program to proceed with the installation. When the installation program reaches the step for configuring network parameters, it is recommended to use the default settings: TCP/IP communication, Port 3306, X Protocol Port 33060 for installation.

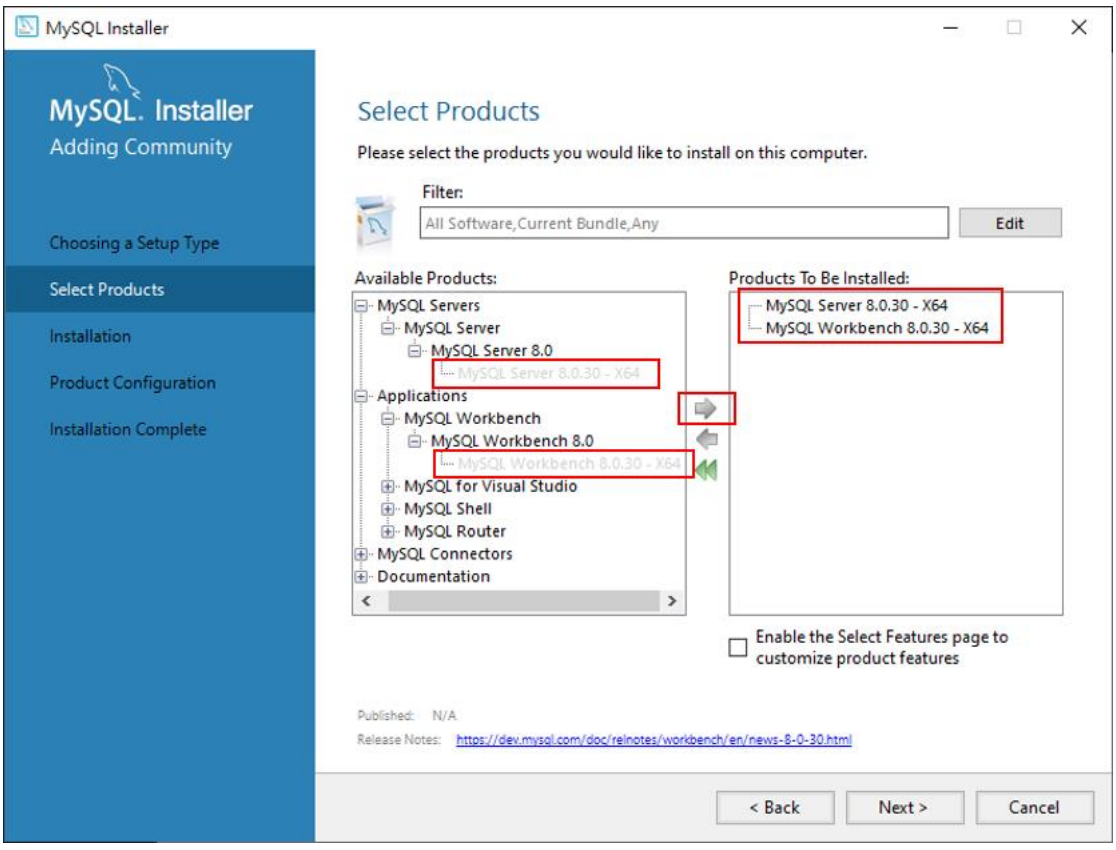

Figure 4-4: Configure to install the SQL Server and Workbench

If the local computer installs the firewall software, users needs to configure the firewall to allow the MySQL access Internet network. For details about how to configure the firewall, please study relational website for it.

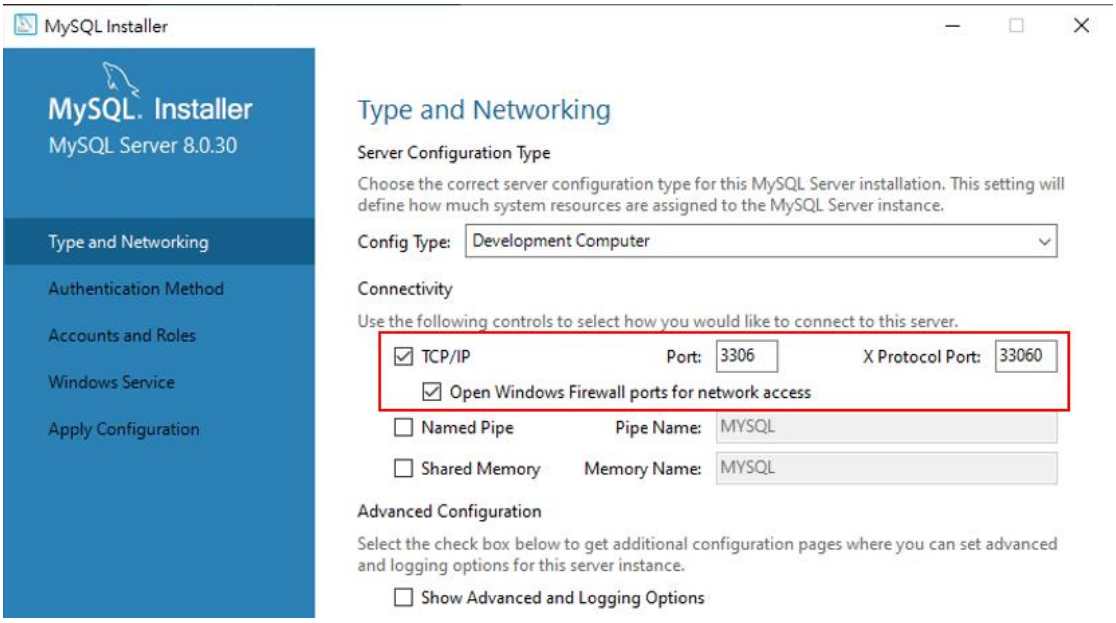

Figure 4-5: Use default parameters to install MySQL

Before completing the installation, users must set a password for the default root account. This password will be used when logging in to MySQL as root in the future. If users require additional accounts, they can also create them. When connecting to MySQL through the iWSN Utility, users will need the username and password with access to MySQL. Therefore, it is important to remember the password set during this step.

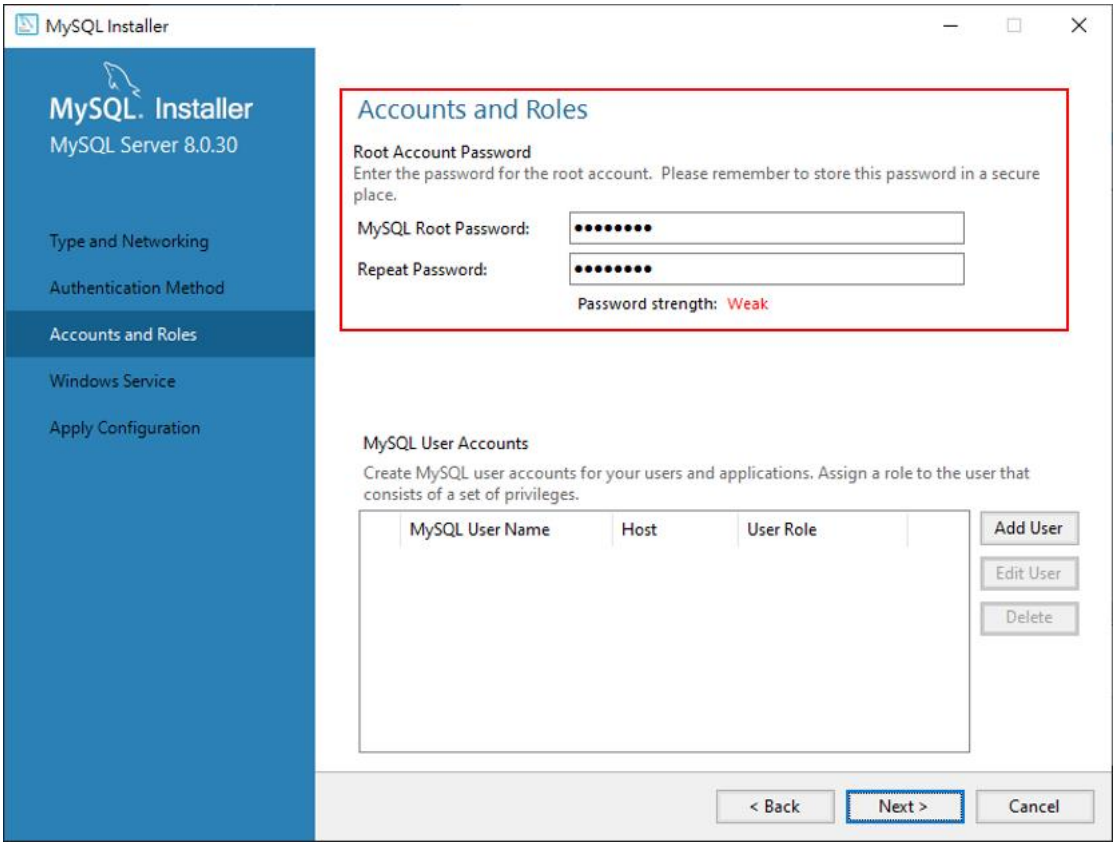

Figure 4-6: Set the password for the root account

After completing the MySQL installation, users need to install the Microsoft Visual C++ 2015-2022 redistributable package to allow the iWSN Utility to access the MySQL database. Here, users need to installed the vc_redist.x64.exe for the 64-bit version of the iWSN Utility. If the 32-bit version of the iWSN Utility is used, the vc_redist.x86.exe is needed. The package can be downloaded for free from the official Microsoft website. The download link is provided as below. Once installed, users can launch the iWSN Utility and prepare for the data collection of iWSN sensor modules.

https://learn.microsoft.com/zh-tw/cpp/windows/latest-supported-vc-redist?view=msvc-170

Figure 4-7: Install 64-bit Microsoft Visual C++ redistributable package

4.3 Demo about how to use the iWSN Utility for data collection

This section will demonstrate how to use iWSN Utility to collect and record data step by step, as shown in the diagram below.

Figure 4-8: The system architecture of the iWSN Utility Demo

Step 1: Build the system as depicted in the above diagram

The iWSN-9603-PCT-ME-IP33 and iWSN-200R need to be configured using the DIP switches first. The parameter settings are as follows:

iWSN-9603-PCT-ME-IP33		iWSN-200U	
RF Ch	6	RF Channel	6
Tx Duty	1 second	COM0 Baud Rate	115200/n,8,1
F1/F2	3 Phase 4 Wire 3 CT	Node ID	1
Node ID	1	Group ID	0
GID	0	PA	ON
PA	ON		

Since iWSN-200U's COM0 provides both RS-232 and RS-485 functionality (but only one can be used at a time), you have the option to connect it to your local computer using either RS-232 or RS-485 interface. If you choose the RS-232 interface, you will need to prepare a CA-0910 cable, which needs to be purchased separately. You can refer to the following website for more information on obtaining the cable:

https://www.icpdas.com/en/product/CA-0910

Depending on whether you are using the RS-232 or RS-485 communication interface, your local computer must also provide the corresponding RS-232 or RS-485 communication interface. If your

computer does not have an RS-232 or RS-485 interface, you can expand it by using a USB to RS-232 or RS-485 converter module. ICP DAS sells this type of module, and you can obtain relevant information from the following webpage:

https://www.icpdas.com/en/product/guide+Industrial__Communication+Serial__Communication+Converter

In the case of RS-232 connection, you need to connect the iWSN-200U's RS-232 pins (TxD, RxD, GND) to the corresponding pins (TxD, RxD, GND) of the CA-0910 cable. The other end of the CA-0910 cable is connected to the COM4 of your local computer (Your local computer may not have COM4. Please replace it with the actual COM port which is used in your local computer.). Once the connection is established, power up the module. When the RF_Rx indicator on the iWSN-200U flashes once per second, it indicates that the iWSN-200U is receiving wireless packets transmitted by the iWSN-9603-PCT-ME-IP33 every second. This confirms that the system setup between the iWSN-200U and iWSN-9603-PCT-ME-IP33 is functioning properly. For detailed information regarding the configuration and wiring details of iWSN-9603-PCT-ME-IP33 and iWSN-200R, please refer to the module's QuickStart or user manual.

Step2: Configure the COM item to the iWSN Utility

Before adding the iWSN-200U or iWSN-200R item to the device tree, it is necessary to create a COM or MDC-711D item to establish a connection between the iWSN-200U or iWSN-200R and the local computer. However, if you are using the iWSN-200E, this step is not required. The following example will demonstrate connecting the iWSN-200U via a COM port.

Navigate to the installation path of iWSN Utility and run the iWSN Utility.exe. After launching the utility, right-click on the "Computer" item in the device tree and select "Add COM Port" to add a new COM item. In the COM Port Configuration window, the COM ports auto-detected by the iWSN Utility are listed in the "COM Port No." option. Since your local computer is connected to iWSN-200U via "COM4," select "COM4" as the port for connection. If you cannot find the desired COM Port No. in the list, you can simply close the configuration window, and confirm the existence of the COM Port in the Device Manager on Windows operation system. Then

reattempt the "Add COM Port" operation to let the iWSN Utility scan the COM ports in your local computer again. As the iWSN-200U is configured with a COM Baud Rate of 115200, the COM Port of local computer must match this setting. Select the "Baud(bps)" parameter as 115200. In the "Alias" field, you can enter "For Demo" to denote the purpose of this COM port. Leave the remaining parameters at their default values. Once you have verified everything, click the "Add" button to complete the COM port configuration.

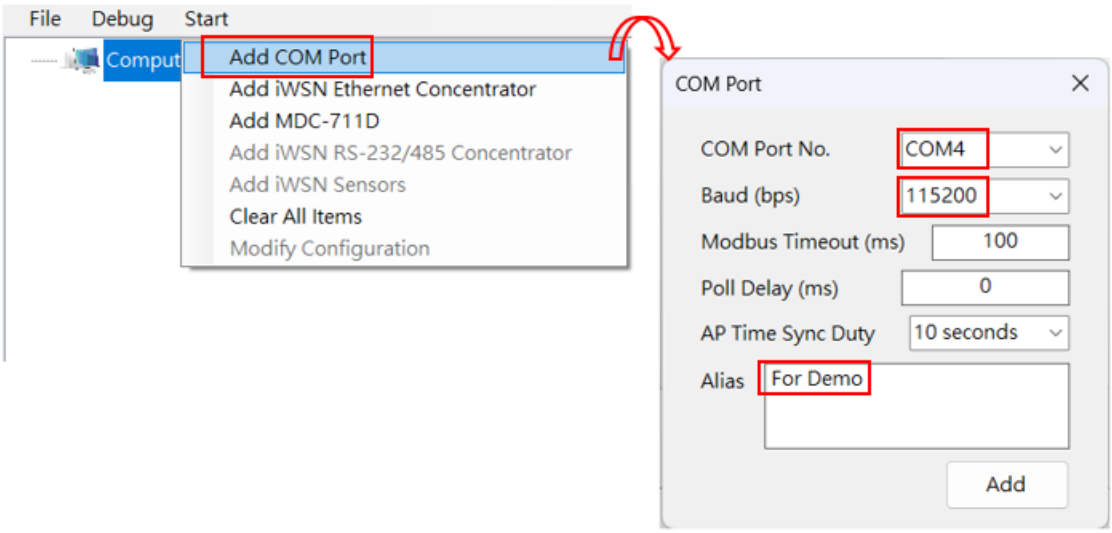

Figure 4-9: Add a new COM item in the device tree for the iWSN-200U

After completing the steps, the configured COM item will appear in the device tree as a completed configuration. It will also be displayed in the Interface List, and by default, it will be enabled (the "Act" option will be checked).

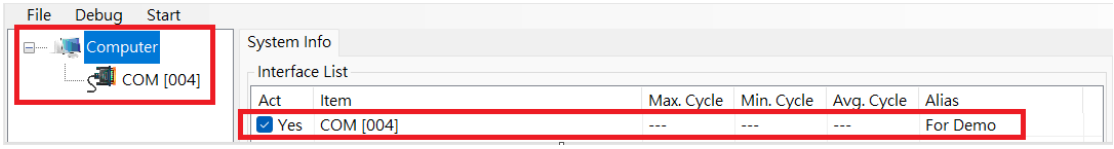

Figure 4-10: The enable status of the new COM item in the Interface List

Additionally, you can click on the COM[004] item in the device tree to review the COM Info section to ensure that the settings are as intended. This allows the user to double-check and confirm that the configuration of the COM port is aligned with their expectations.

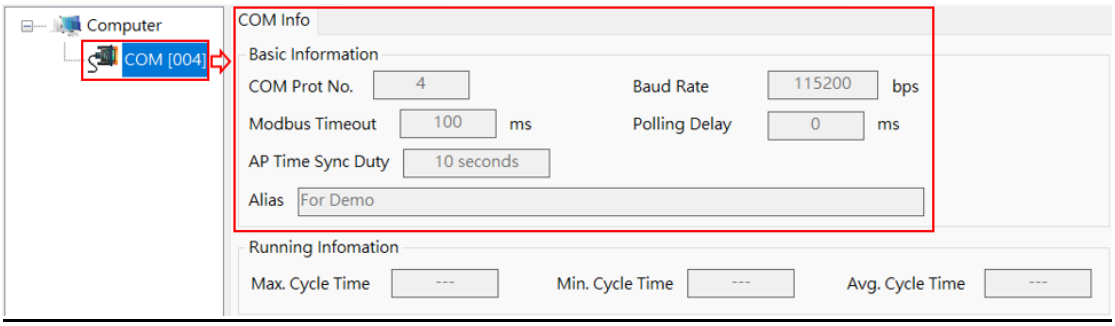

Figure 4-11: Double-check the COM configuration in the COM Info

Step3: Configure the iWSN-200U item to the iWSN Utility

Right-click on the COM[004] item and select "Add iWSN-200U/R" to add an iWSN-200U item. In the UART Collector Configuration window, choose "iWSN-200U" as the Device Type. Since the Node ID parameter of iWSN-200U is set to 1 by DIP switch, select Modbus ID as 1. For RF Channel and Group ID, select 6 and 0 respectively based on the configuration of iWSN-200U. These two parameters are intended to provide a clear understanding of the current system deployment. If the parameters are selected incorrectly, the Utility can still function properly and read data from iWSN-200U.

If you need to periodically synchronize the time of iWSN-9603-PCT-ME-IP33, appropriate parameters can be selected for "Time Sync Mode" and "Slave Time Sync Duty". However, in this case, the default values are maintained, and the time synchronization function is not enabled. Finally, enter "Connect to iWSN-9603-PCT" in the Device Alias field for identification. After completing the configuration, click the “Add” button to add the item into the device tree.

Once the addition is successful, the UART Collector Configuration window will not close automatically. It will remain open and wait for the addition of the next iWSN-200U or iWSN-200R. Since there are no more iWSN-200U or iWSN-200R to add, you can close the configuration window.

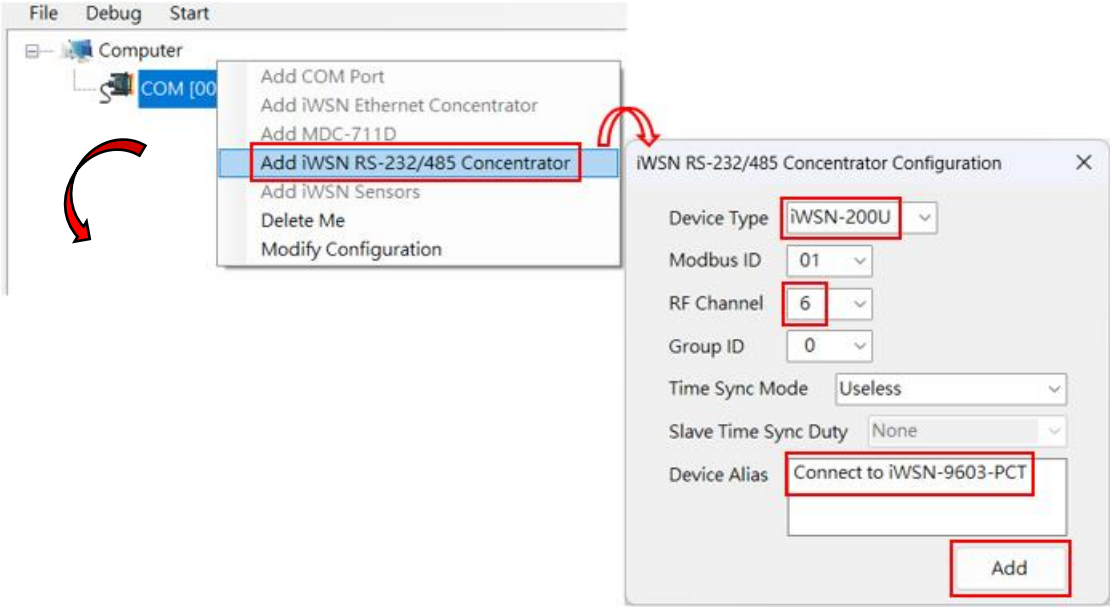

Figure 4-12: Add a new iWSN-200U item into the device tree

After adding the iWSN-200U item, you can also click on the iWSN-200U in the device tree to review the iWSN-200U Info section in the information display area. This will allow you to confirm whether the configuration of the iWSN-200U component is correct.

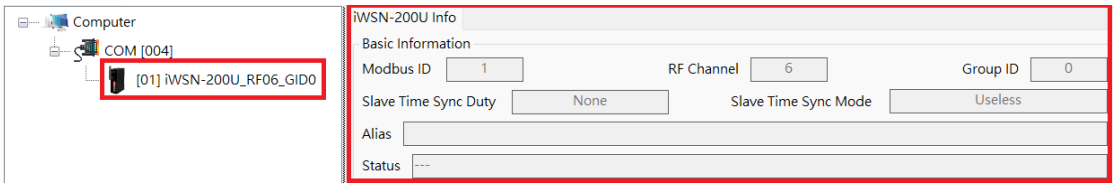

Figure 4-13: Double-check the configuration in the iWSN-200U Info

Step4: Configure the iWSN-9603-PCT-ME-IP33 item to the iWSN Utility

Right-click on the iWSN-200U item and select "Add iWSN Sensors" to add an iWSN-9603-PCT-ME-IP33 module that is connected to the iWSN-200U. In the Slave Configuration window, choose the Device Type as iWSN-9603-PCT-ME-IP33. If you are using a different iWSN slave module, select the corresponding module name from the dropdown menu. Since the iWSN-9603-PCT-ME-IP33 module does not have an expansion module, choose "none" for the Extension Type. In this example, the automatic data recovery feature is not required, so the "Auto Package Loss Recovery" option should not be checked. Based on the Node ID and F1/F2 parameters of the iWSN-9603-PCT-ME-IP33 set in the Step 1, select Node ID as 1 and Working Mode as 3 phase 4 wire system (3ψ 4W Normal Mode). Enter "Test

Wireless Power Meter" in the Device Alias field for identification purposes. Once done, click the “Add” button. Similar to configure the iWSN-200U, the Slave Configuration window will not automatically close upon successful addition. If there is no other iWSN slave module to add, you can manually close the window.

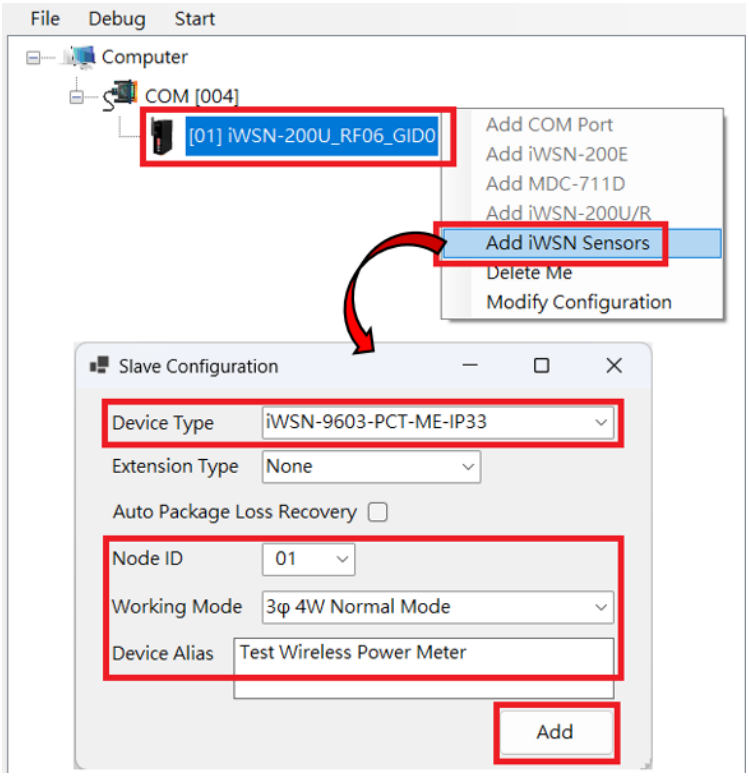

Figure 4-14: Add a new iWSN-9603-PCT-ME-IP33 item in the device tree

After adding the iWSN-9603-PCT-ME-IP33 item, you can also click on the iWSN-9603-PCT-ME-IP33 in the device tree to review the configuration set before. This will allow you to confirm whether the configuration of the iWSN-9603-PCT-ME-IP33 component is correct.

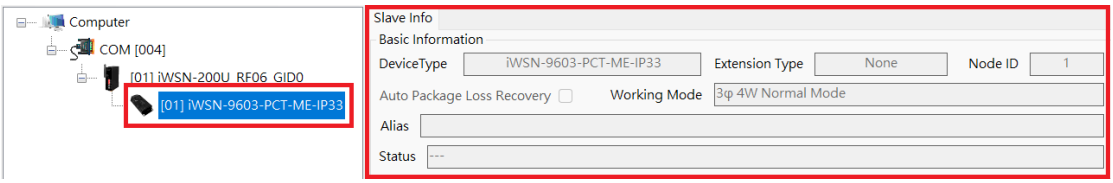

Figure 4-15: Double-check the iWSN-9603-PCT-ME-IP33 configuration

Step5: Configure the system parameters to the iWSN Utility

Click on the "Computer" item to configure the data logging and NTP server functions. In this case, set the following values for the data logging:

Log data to ".CSV File" (default), save data every 4 hours, and use the default storage path "C:\ICPDAS\iWSN_Utility_x64". It's important to note that the CSV file storage speed may slow down as the file size increases. When setting the iWSN-9603-PCT-ME-IP33 slave module to reply the data once per second, it is recommended to store the data in files with a duration of 4 hours or less, or consider using a database for data storage to avoid the data loss due to storage efficiency issues.

If you want to store data in a database, you can choose "Log data to Database" for instead. While connect to database, the username and password for database access are necessary that can be found when built an account for accessing the database. Since NTP server functionality is not required in this case, both NTP server options should remain unchecked. Once the configuration is completed, click on the Start button to start the data collection.

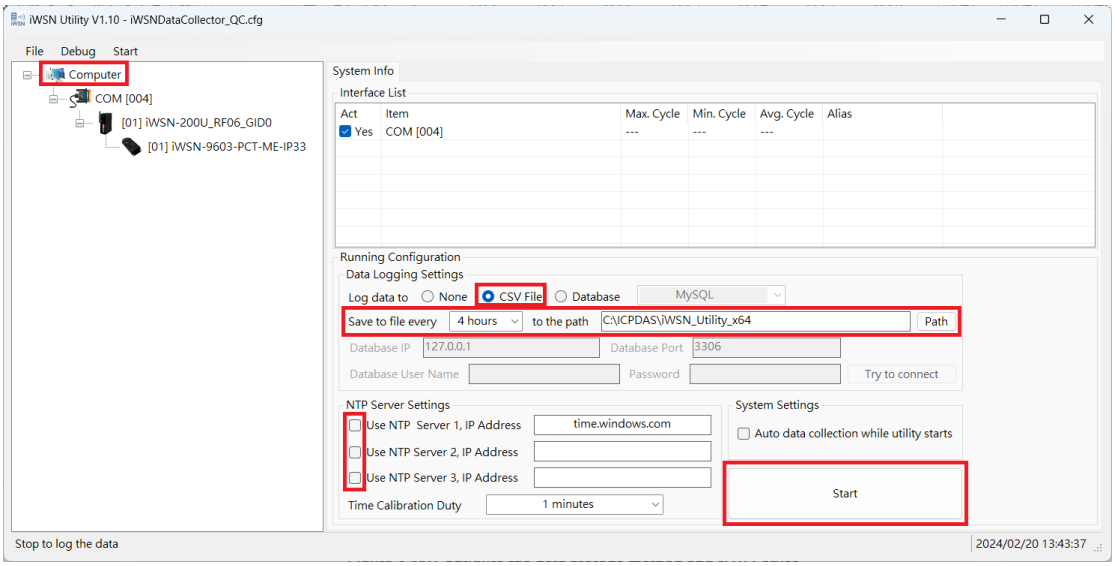

Figure 4-16: Configure the data storage method and NTP Server

Step6: Get the data from iWSN-9603-PCT-ME-IP33 sensor module

When the Utility starts collecting data, the status bar at the bottom will display the start time of data storage and the data storage method. You can click on the iWSN-9603-PCT-ME-IP33 item to view the current status of data collection and real-time values from the sensor module. Additionally, you can also utilize the "Command to Slave" function to send commands to the iWSN-9603-PCT-ME-IP33 module if necessary.

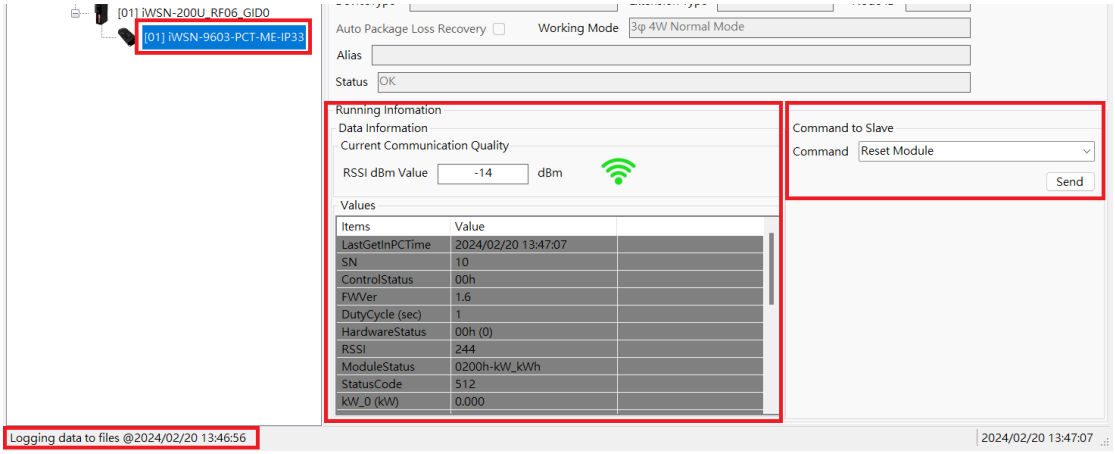

Figure 4-17: The real-time value and status of the iWSN sensor module

5 FAQ

For common issues encountered during usage of iWSN Utility, there are the explanations and troubleshooting. If following the troubleshooting does not resolve the issue, please contact your distributor or ICP DAS for further assistance.

Issue	Troubleshooting
iWSN Utility can't display the data from the iWSN sensor module	1. Please first check if the red power LED indicator on the iWSN concentrator is consistently lit. If not, please check the power supply of the concentrator. 2. Verify that the communication interface between the local computer and iWSN concentrator is properly configured. If using a COM port to connect with iWSN-200U or iWSN-200R, please check the COM port number in the Device Manager of the Windows operating system. Depending on the settings of the DIP switches on iWSN-200U or iWSN-200R, confirm if the COM baud rate and Modbus RTU network ID are set correctly. If using iWSN-200E, ensure that the local computer and iWSN-200E are on the same network segment and not blocked by a firewall. Users can use the ping command in the Windows operating system to test the Ethernet communication. After confirming the settings are correct, reboot the iWSN concentrator for testing. 3. Check for any loose connections in the communication cable between the local computer and iWSN concentrator. 4. Verify if the yellow data reception LED indicator on the iWSN collector is flashing correctly. The indicator should flash once for each wireless data received from an iWSN sensor module.

	5. Check the status bar of the iWSN Utility to confirm if it is in data collection mode. 6. According to the DIP switches on the iWSN sensor module, check if the module's model, iWSN network ID, working mode, extension module model is matched with the settings in the iWSN Utility. 7. Check if the power LED indicator on the iWSN sensor module is lit. Refer to the QuickStart of the iWSN sensor module to confirm the behavior of the status indicator lights.
The iWSN Utility is unable to retrieve data according to the configured interval of the iWSN sensor module	1. Reboot the iWSN sensor module and try it again. 2. Turn off all other iWSN sensor modules that have the same wireless parameters (including RF Channel and Group ID) as the one being used. Check if the yellow data reception LED indicator on the iWSN concentrator is still flashing. If it continues to flash, it indicates that there are other iWSN networks using the same wireless parameters causing data interference. Please turn off the devices causing the data interference. 3. Check if there are any obstacles or obstructions in the deployment area between the iWSN sensor module and the iWSN concentrator, which may cause communication issues.