Delta Electronics, Inc.

UNOcentral

Indoor Air Quality Monitor Control System

User Manual v1.3.11

Smarter. Greener. Together.

Revision History

Date	Firmware	Description
2022/12/31	1.3.00	1. Support to control ventilation equipment by BACnet IP. 2. Support to UNOlite and PM1. 3. Support yearly data download and batch download of monthly/yearly. 4. Support max. 32 UNOsensors based UNOcentral HW version.
2023/06/14	1.3.03	1. Support Gridview.
2023/11/30	1.3.06	1. Support UNOweb Mail Relay (Experiment Feature). 2. Add network limitation description for BACnet/IP using. 3. Append the UNO sensor alias name after the description of BACnet/IP Object. 4. Add [Reboot System] and [Remote Support Service] switch buttons.
2024/01/01	1.3.07	1. Support independent images for each UNO Sensor.
2024/04/01	1.3.09	1. Align ID display settings for Signage, Globalview, Gridview. 2. Show the current ventilation control mode in Gridview. 3. It prompts that downloading data requires the use of a remote computer.
2024/10/25	1.3.11	1. Support unit μg/m^3 for TVOC and HCHO. Includes display pages, data chart, data download, HTTP API, MQTT API, BACnet IP. 2. Change chart zoom function from mouse wheel to drag. 3. Remove LINE Notify support because LINE will end this service.

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1. UNOcentral Product Descriptions

UNOsensors (includes models of UNOnext and UNOlite) are indoor air quality monitors. they detect temperature, humidity, and the concentration of various gases, and can link with ventilation equipment for automatic or manual operation according to air quality. The combination of gas sensors varies with each model. The full-featured model includes sensors for temperature, humidity, illuminance, carbon dioxide (CO_2), carbon monoxide (CO), formaldehyde (HCHO), total volatile organic compounds (TVOC), ozone (O_3), PM10, PM2.5 and PM1 (Only UNOlite supports). **UNOcentral is the web GUI management host** for UNOsensors. UNOcentral can monitor, manage, and control ventilation equipment for up to 16 or 32 UNOsensors through the RS485 connection communication between UNOcentral and UNOsensors (based on UNOcentral HW version). If the operator cannot easily set up the RS485 connection, UNOcentral can use the MQTT protocol to receive the monitoring data of the WiFi-enabled UNOsensor (hereinafter referred to as UNOsensor WiFi) via the network through the support of the system integrator and distributor. For the functional differences between multi-models of UNOsensors after linking with UNOcentral, see Table 1. **Note: The ventilation equipment linked to UNOsensors cannot be controlled by UNOcentral when the communication between UNOsensors and UNOcentral is conducted through MQTT.**

UNOcentral provides Globalview/Gridview and Signage functions. With Globalview/Gridview, you can view the statuses of all connected UNOsensors at the same time: Including connection status, sensor value, on/off and operation mode of linked ventilation equipment. While Signage is for a single UNOsensor’ s sensor value display. In terms of management control, UNOcentral provides the UNOcentral Management Panel to manage UNOcentral; the UNOsensor Operation Panel is used to view and control

the detailed information of each UNOsensor.

UNOcentral provides UNOsensor data warehouse and event alarm functions. For all UNOsensor devices connected to UNOcentral, the sensor values will be stored at a frequency of 1 every 6 minutes, and the data can be browsed for any day within 3 years. In addition, if event alarms are set correctly, UNOcentral will continue to detect abnormal events, such as: If air quality exceeds standards, UNOsensor is abnormal, or the ventilation equipment is abnormal, it will be sorted and sent to the designated email inbox.

We hope that users can conveniently monitor and manage all-important places through the combination of UNOsensor, UNOcentral, and ventilation equipment—in that way, everyone can enjoy good air quality and a good living environment.

Table 1 Comparison of Functions When UNOcentral Connects to Different Models of UNOnext

UNOsensor (WiFi) Product No.	Connection		Ventilation Equipment Control * Only RS485 connection	Sensor Data Warehouse
	RS485	MQTT		
UNO-**R	O	X	X	O
UNO-**B	O	X	X	O
UNO-**W (WiFi)	O	O	O	O
UNO-L	O	X	X	O
UNO-LW	O	O	X	O
UNO-LWD	O	O	X	O

1.1 UNOcentral Installation

If UNOcentral is connected to a power supply, the system will begin to operate. Through the HDMI connection on the back of UNOcentral, UNOcentral's screen can be output to displays with HDMI interfaces, such as computer monitors and TVs. UNOcentral is managed through a web GUI. Users can remotely manage UNOcentral through the browsers of other hosts, or directly output UNOcentral to a display and use a USB keyboard and mouse for management. To use UNOcentral remote management or other network services, **it is recommended to connect the network cable to the LAN1 port on the back of UNOcentral (The MAC address of LAN1 is provided on the UNOcentral' s label)**. As shown in Figure 1.

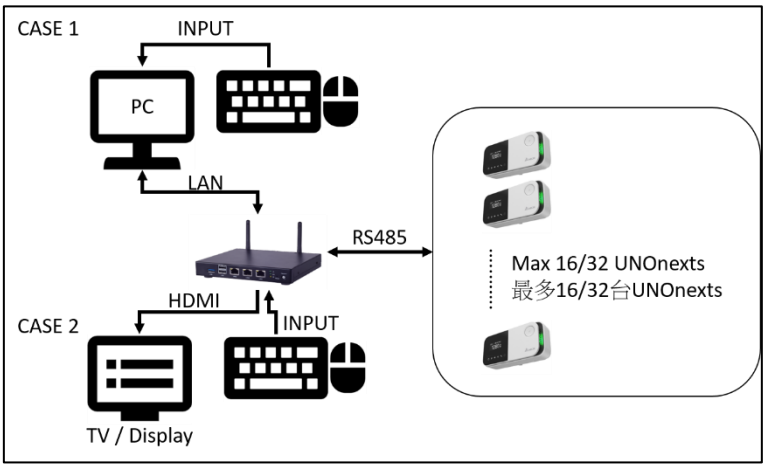

Figure 1 Example of UNOcentral Management Method (Connection via RS485)

1.2 UNOsensor Connection Method (RS485)

If RS485 communication interface is used between UNOcentral and UNOsensor, they must be used Daisy-Chain, and the communication mode is Modbus/RTU protocol. **It is recommended to use 22AWG multi-core shielded twisted pair cable or above to achieve the best results**. The simple wiring instructions is below, please use the RS485 adapter include in the box (Please plug-in on the COM1 of the UNOcentral).

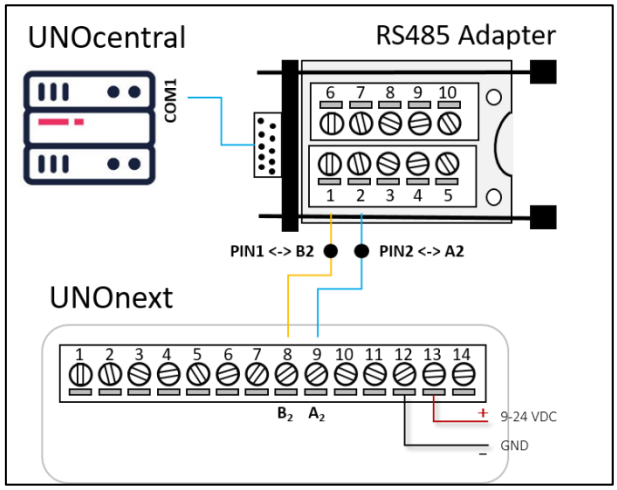

Figure 2 Wiring Instruction of UNOcentral and UNOnext

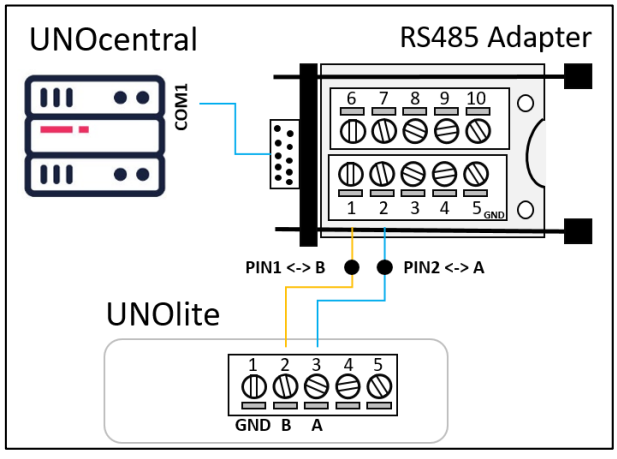

Figure 3 Wiring Instruction of UNOcentral and UNOlite

The UART configurations of the UNOcentral and UNOsensors must be the same as

followed.

- **Baud Rate: 9600**
- **Data-bit: 8**
- **Parity: None**
- **Stop-bit: 1**

If the UART settings of UNOsensor have been modified, please modify to the default settings above before connecting to UNOcentral.

The Modbus slave address of UNOnext/UNOlite can be set by dip switch following below table. Others detail UNOnext/UNOlite settings can be referred the UNOnext/UNOlite user manual.

Table 2 Set Modbus Slave Address of UNOnext

Modbus Salve Address		PIN No. of DIP switches			
Decimal	Hexadecimal	2	3	4	5
208	0xD0	↓	↓	↓	↓
209	0xD1	↓	↓	↓	↑
210	0xD2	↓	↓	↑	↓
211	0xD3	↓	↓	↑	↑
212	0xD4	↓	↑	↓	↓
213	0xD5	↓	↑	↓	↑
214	0xD6	↓	↑	↑	↓
215	0xD7	↓	↑	↑	↑
216	0xD8	↑	↓	↓	↓
217	0xD9	↑	↓	↓	↑
218	0xDA	↑	↓	↑	↓
219	0xDB	↑	↓	↑	↑
220	0xDC	↑	↑	↓	↓
221	0xDD	↑	↑	↓	↑
222	0xDE	↑	↑	↑	↓
223	0xDF	↑	↑	↑	↑

Table 3 Set Modbus Slave Address of UNOlite

Modbus Salve Address		PIN No. of DIP switches				
Decimal	Hexadecimal	1	2	3	4	5
208	0xD0	↓	↓	↓	↓	↓
209	0xD1	↓	↓	↓	↓	↑
210	0xD2	↓	↓	↓	↑	↓
211	0xD3	↓	↓	↓	↑	↑
212	0xD4	↓	↓	↑	↓	↓
213	0xD5	↓	↓	↑	↓	↑
214	0xD6	↓	↓	↑	↑	↓
215	0xD7	↓	↓	↑	↑	↑
216	0xD8	↓	↑	↓	↓	↓
217	0xD9	↓	↑	↓	↓	↑
218	0xDA	↓	↑	↓	↑	↓
219	0xDB	↓	↑	↓	↑	↑
220	0xDC	↓	↑	↑	↓	↓
221	0xDD	↓	↑	↑	↓	↑
222	0xDE	↓	↑	↑	↑	↓
223	0xDF	↓	↑	↑	↑	↑
224	0xE0	↑	↓	↓	↓	↓
225	0xE1	↑	↓	↓	↓	↑
226	0xE2	↑	↓	↓	↑	↓
227	0xE3	↑	↓	↓	↑	↑
228	0xE4	↑	↓	↑	↓	↓
229	0xE5	↑	↓	↑	↓	↑
230	0xE6	↑	↓	↑	↑	↓
231	0xE7	↑	↓	↑	↑	↑
232	0xE8	↑	↑	↓	↓	↓
233	0xE9	↑	↑	↓	↓	↑
234	0xEA	↑	↑	↓	↑	↓
235	0xEB	↑	↑	↓	↑	↑
236	0xEC	↑	↑	↑	↓	↓
237	0xED	↑	↑	↑	↓	↑
238	0xEE	↑	↑	↑	↑	↓
239	0xEF	↑	↑	↑	↑	↑

1.3 UNOsensor WiFi Connection Method (MQTT)

If the owner is unable to set up RS485 cables for UNOcentral and UNOsensors due to certain reasons, UNOcentral can also use the MQTT connection to receive information from UNOsensor’ s sensors and linked ventilation equipment. The set up requirements are as follows:

1. UNOcentral must be switched to MQTT mode, and the MQTT parameters and UNOsensor information must be correctly set.
   - Switch Mode: Refer to **2.1.1.1 A System Management** to switch.
   - MQTT Settings: Refer to **2.1.1.4 MQTT-Link settings** to set parameters.
   - UNOsensor WiFi Settings: Refer to 2.1.1.5 UNOsensor WiFi Settings to set.
2. Purchase UNOsensor WiFi version (Please refer to Table 1), and correctly set WiFi and MQTT parameters via **UNOnext Engineer App**.

   The connection parameters for UNOsensor to connect the UNOcentral built-in MQTT server is below.
   - IP: follow UNOcentral network settings, may be checked by network manager or IT personnel.
   - Port: 1883
   - SSL/TLS is not supported.
   - Username: isdunocentral
   - Password: hellocentralmqtt

This function is an advanced function of UNOcentral and UNOsensor. If you need to use it, please consult your system integrator or distributor for support.

1.4 UNOweb Support

UNOcentral also supports browsing from an external network (Internet) via UNOweb to browse data on a UNOsensor connected to UNOcentral. UNOweb is a cloud service provided by the UNO team that allows users to conveniently browse the sensor data of UNOcentral and UNOsensor WiFi with external network functionality on the external network. It also provides historical data from different times for download, according to the differences in the capabilities of UNOcentral and UNOsensor WiFi products.

When UNOcentral is installed, if the physical network cable (**installation on the LAN1 port recommended**) can transmit externally, then UNOcentral will provide the data to UNOweb. Users can register a user account on the UNOweb website and add the UNOcentral device; they can then view the data of UNOsensors connected to UNOcentral by UNOweb. For the use of UNOweb, see the UNOweb operation documentation. The UNOweb link: https://isdweb.deltaww.com

Note:

1. UNOweb support limitations for UNOcentral: Port **443** is required to be open for external connection and let UNOcentral to communicate with the UNOweb host.
2. UNOweb' s browsing restrictions: Port **80/443** used for standard web page HTTP/HTTPS browsing. If UNOweb cannot be used normally on the internal network, please check the firewall rules with the network manager or IT personnel.
3. If official remote support for UNOcentral is required, it is recommended to open port **8443**. Please refer to the section of **Remote Support Service** in 2.1.1.1A System Management.

2. Web GUI

This chapter will start to describe the web GUI of UNOcentral. If the user uses an input device (keyboard, mouse) directly in UNOcentral and uses the HDMI interface to output to the screen, then the user may open the browser and enter http://127.0.0.1:8888 in the address bar to open the web GUI of UNOcentral. **If you are using other hosts for management, you need to confirm that the management host and UNOcentral can use port 8888 for HTTP communication. This should be discussed with the IT unit of the operator or user, and it is recommended to set a fixed IP for UNOcentral; it is also recommended for the network cable to be connected to the LAN1 port**. See Figure 1. Different cases will use Table 4 sample URL as an example.

Table 4 UNOcentral Web GUI URL List

Case	**UNOcentral Web GUI example URL**
CASE 1	http://127.0.0.1:8888
CASE 2	http://x.x.x.x:8888 This IP location needs to be discussed with the IT unit or network manager

Support for the UNOcentral web management interface is shown in the following table. The test environment is based on post-2018 operating system and browsers.

Table 5 System/Browser Support

Operating Systems (OS)	Windows, Linux, macOS
Browsers	Chrome, Firefox, Safari
Recommended resolution	**The best resolutions for display are 1280x720, 1920x1080, and 3840x2160, in full screen without scaling.**

The correctness and completeness of the layout cannot be guaranteed for other combinations not in the above list. If there are other display problems, it is recommended to upgrade to the newest versions of the operating system and browser and to browse in the recommended resolution.

2.1 Globalview

This chapter will describe Globalview. In Globalview, you will see all UNOsensors that are set to **enabled** and connected to UNOcentral. See the method for enabling in the UNOcentral Management Panel chapter description.

Globalview is the default home page of the UNOcentral web GUI, it is can be switched to Gridview. As shown in Figure 4, Globalview is divided into display and control/management functions, and provides use of **Carousel Mode**, **Gridview**, **IAQ Alert Table**, **UNOcentral Management Panel**, **UNOsensor Operation Panel** (e.g. 208 :), **Language Switching**, **UNOsensor Signage**. Note. To click the carousel mode button, the page will be re-directed to **UNOsensor Signage** and run as **Carousel Mode** based on enabled UNOsensor. Please refer to 2.1.1.2 to enable/disable UNOsensor.

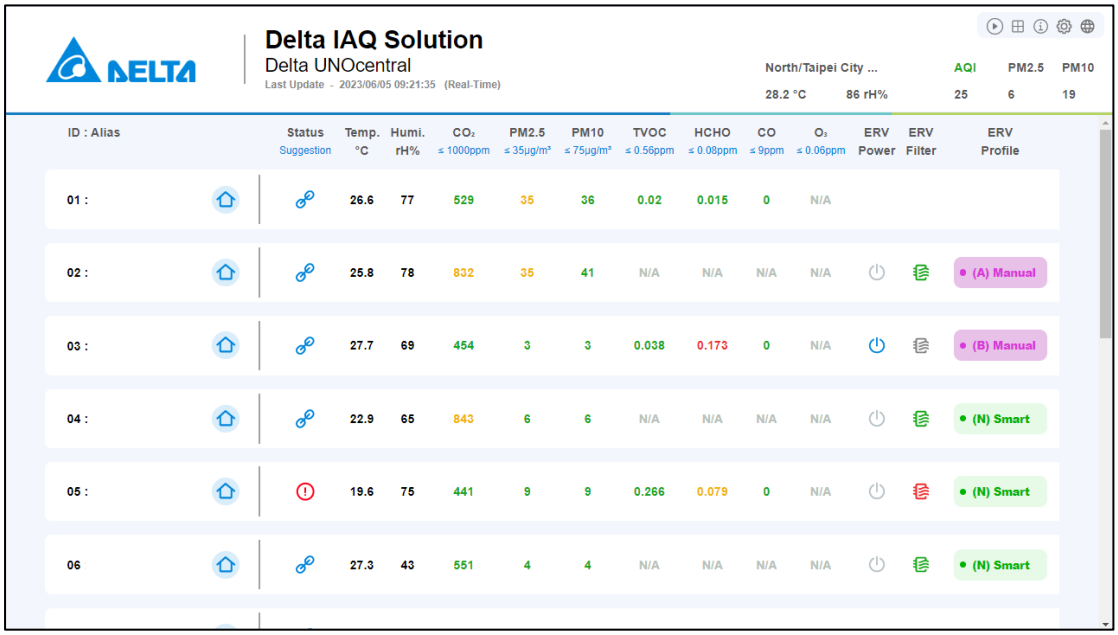

Figure 4 Analysis of the Globalview Function

Main display functions are as follows:

- UNOsensor list (most values will display detailed information on mouseover for the engineer to interpret)

A. Connection status: There are three states: connected, disconnected, and UNOsensor abnormality warning. Shown with different icons. As shown in Table 6.

Table 6 UNOsensor Connection Status Icon

Status	Icon
Connected	
Disconnected	
UNOsensor abnormality warning	

B. Temperature and humidity sensor values.

C. Air quality sensor value: UNOcentral will detect whether the sensor on the connected UNOsensor has been installed. If it is not installed, it will display [N/A]. At the same time, Table 7 will determine the value display method and color.

Table 7 Description of UNOsensor Values

Sensor	Unit	Good: Green	Warning: Yellow	Poor: Red
Carbon dioxide CO_2	ppm	800	< Value ≤	1000
PM1	$\mu g/m^3$	28		35
PM2.5	$\mu g/m^3$	28		35
PM10	$\mu g/m^3$	60		75
Total volatile organic compounds (TVOC)	ppm	0.448		0.56
Total volatile organic compounds (TVOC)	$\mu g/m^3$	2047		2559
Formaldehyde (HCHO)	ppm	0.064		0.08
Formaldehyde (HCHO)	$\mu g/m^3$	78		98
Carbon monoxide (CO)	ppm	7.2		9
Ozone (O_3)	ppm	0.048		0.06

Poor is based on Taiwanese regulations. N/A: Indicates that this sensor is not installed in UNOsensor. --: Means that the sensor is warming up; if it continues to display for more than 10 minutes, it is abnormal.

D. Ventilation equipment switch: There are three states: on, off, and equipment abnormality warning, each of which is displayed using a different icon. As shown in Table 8.

Table 8 Description of Power Supply Icons on Ventilation Equipment

Status	Icon
On	
Off	
Ventilation equipment abnormality warning	

E. Ventilator equipment filter status: Displays Table 9 in 4 different colors according to the remaining life of the filter.

Table 9 Description of Filter Life Icon

Remaining life of filter	Icon	Description and color
> 50%		Healthy - green
> 30%		A bit dirty - gray
> 0%		Very dirty - brown
0%		Life is 0 - red
Formula for remaining life: Assuming the filter life is 90 days and units are in 10 minutes, the total filter life is 12960 × 10 minutes. If the time used is N × 10 minutes, the remaining life of the filter will be: $[1-(N/12960)]\times 100\%$ Then round up.		

F. Operation mode of ventilation equipment: According to the command source and operation mode. As in Table 10.

Table 10 Description of Ventilation Equipment Operation Mode

Display format: (Control source) mode	
Possible control source	**Possible mode**
B: Physical button	Manual

N: UNOsensor (UNOnext/UNOlite)	Turbo: If any sensor value exceeds the limit, it will run at full speed
C: UNOcentral	ECO: Dynamically adjust the fan speed according to the sensor values and thresholds.
A: Mobile App or UNOweb	Manual
Example: **(N) Turbo** Note: Because of design difference between UNOnext, if using App or UNOweb to control the ventilation connected to UNOlite, it will be showed as. ● Fan Speed [Low/Mid/High]: **(A) Manual** ● [Off]：**(B) Manual**	

Note: D, E and F are displayed according to the method by which the ventilation equipment is connected to UNOsensor.

- RS485: If all devices are disconnected, it will not be displayed. And the reverse: it will be displayed if any one device is connected.
- Dry contact: Always displayed.

- Outdoor information

  A. Real-time weather.

  B. Weather forecast.

  C. Outdoor Air Quality Index (AQI), outdoor PM2.5 concentration, outdoor PM10 concentration. AQI value color will be displayed according to Table 11.

Table 11 Description of Outdoor Air Quality Index (AQI)

Value range	Color
> 100	**Red**
> 50	**Yellow**
≥ 0	**Green**

Note: The outdoor information data is retrieved from the OpenData API provided by the Taiwanese government or other resources based on the set data site, and the browser updates itself approximately every hour. The continuity of OpenData API data

is maintained by the Open Data API server, and this device does not guarantee the continuity of data.

In addition, the entry points of the UNOcentral Management Panel and the UNOsensor Operation Panel are marked on Globalview according to Figure 4, which will be explained in the following chapters.

2.1.1 UNOcentral Management Panel

This chapter will explain the UNOcentral Management Panel. There are slight differences in the management panel when using a RS485 connection versus a MQTT connection. These differences will be explained below. As shown in Figure 5, UNOcentral Management Panel in RS485 mode has following tabs, **UNOcentral, Outdoor Information**, **UNOsensor**, **BACnet/IP**, **Schedule**, **Event**, and **Update**. As shown in Figure 6, compared to RS485 mode, UNOcentral in MQTT mode differs in that the **UNOsensor** and **Schedule** tabs are hidden, while there are two additional tabs: **MQTT-Link** and **UNOsensor WiFi**.

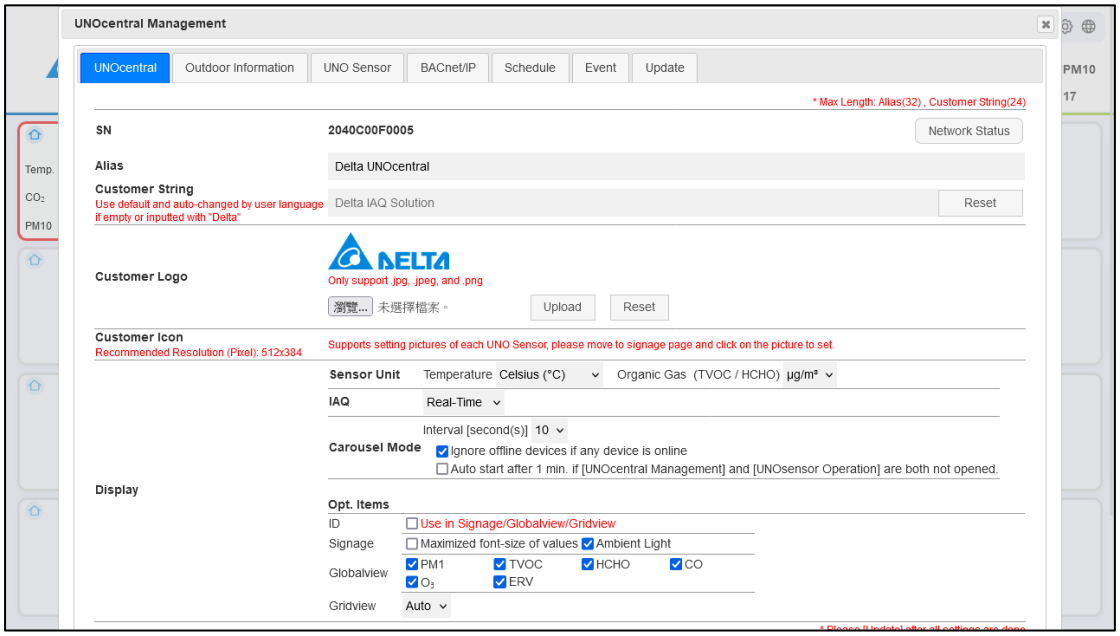

Figure 5 UNOcentral Settings Tab (RS485)

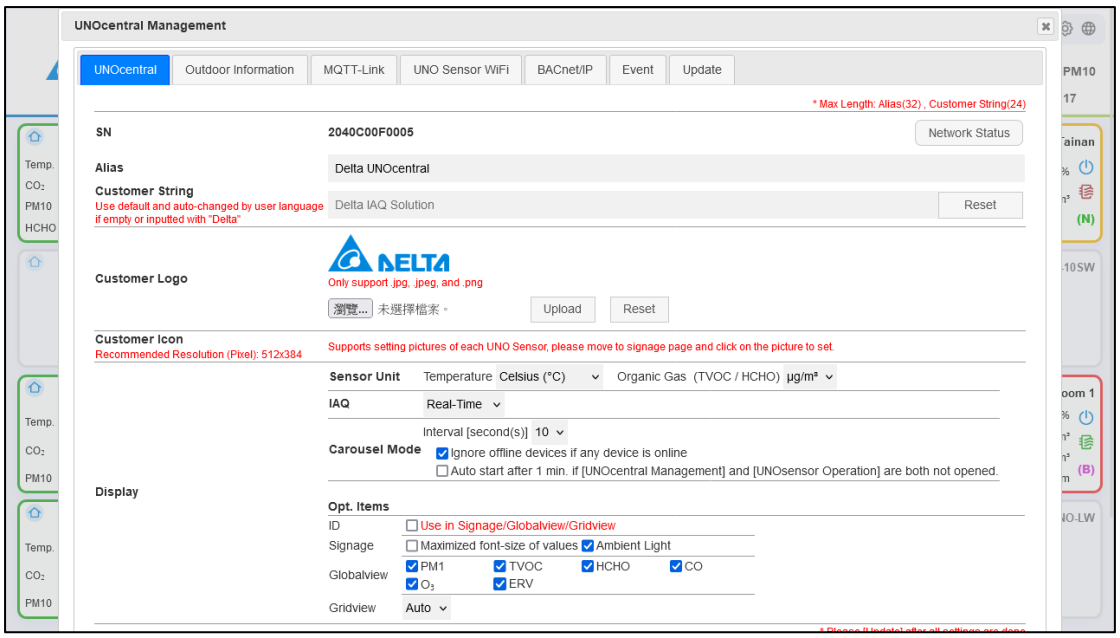

Figure 6 UNOcentral Settings Tab (MQTT)

2.1.1.1 UNOcentral settings

The main purpose of the UNOcentral settings tab is to modify the relevant settings of UNOcentral, as shown in Table 12.

Table 12 Description of the UNOcentral SettingsTab

<table>
<tr><th>Data</th><th>Description</th></tr>
<tr><td>Serial number (SN)</td><td>The serial number of UNOcentral cannot be modified.</td></tr>
<tr><td>Alias</td><td>The alias of UNOcentral can be set for easy management.</td></tr>
<tr><td>Customer name</td><td>Customer name can be set. The string “Delta” is considered as default value.</td></tr>
<tr><td>Customer logo</td><td>You can set the picture that the customer wants to use; click upload after selecting the picture.</td></tr>
<tr><td>Customer Icon</td><td>Supports setting pictures of each UNO Sensor, please move to signage page, and click on the picture to set.</td></tr>
<tr><td>Display</td><td><u>Sensor</u>
1. It can determine the temperature display unit for Globalview and Signage.
2. It can determine the display unit of TVOC and HCHO for Globalview and Signage.
3. It can determine the display mode of the air quality sensor for Globalview and Signage.
Real-time value: The current value is displayed.
Average regulation value: According to Taiwan regulations, there are average calculation methods for each sensor.
<table><tr><th>Sensor</th><th>Calculation method</th></tr><tr><td>Carbon dioxide (CO_2)</td><td>8-hour moving average</td></tr><tr><td>PM1</td><td>24-hour moving average</td></tr><tr><td>PM2.5</td><td>24-hour moving average</td></tr><tr><td>PM10</td><td>24-hour moving average</td></tr><tr><td>Total volatile organic compounds (TVOC)</td><td>1-hour moving average</td></tr><tr><td>Formaldehyde (HCHO)</td><td>1-hour moving average</td></tr><tr><td>Carbon monoxide (CO)</td><td>8-hour moving average</td></tr><tr><td>Ozone (O_3)</td><td>8-hour moving average</td></tr></table></td></tr>
</table>

	Carousel Mode 1. Determine the interval between each UNOsensor in carousel mode. 10/20/30 seconds can be set. 2. Determine to auto-start carousel mode in Globalview after 1 minute or not. **Opt. display items** 1. ID: display or hide UNO sensor ID. 2. Signage: Maximized font-size of values (Adjust layout and font-size of sensor values), Ambient light reading (Relative values are for reference only). 3. Globalview: Status for non-standard version sensors, ventilation equipment (such as: ERV) or ID is displayed. 4. Gridview: auto, 2x4, 4x4, 6x6. Refer to 2.2 Gridview.

The serial number cannot be modified. The customer picture is effective immediately after the user selects and [Upload] it. Other settings take effect after clicking [Update].

In addition to modification of UNOcentral settings, the **UNOcentral** tab also provides advanced **system management** functions and **network management** functions.

A. System Management

Click the UNOcentral serial number on the **UNOcentral** tab to open the advanced [**System Management**] window. As shown in Figure 7.

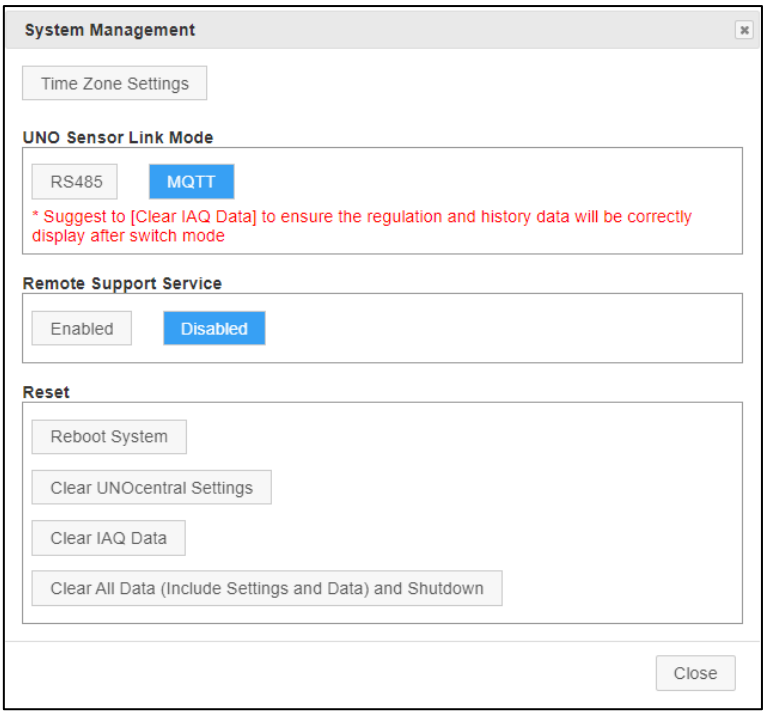

Figure 7 System Management Window

The system management window contains the following functions:

- Time Zone Settings: Adjust the operating time zone of UNOcentral. This setting mainly affects the functions of 2.1.1.7 Schedule Settings and 2.1.2.4 Data and Chart described in subsequent chapters, please set it correctly. As shown in Figure 8, the current system time zone of UNOcentral and the time zone of the current browser (such as Chrome) will be listed here, as well as matching settings results. Finally, the user, operator, or professional will decide the setting.

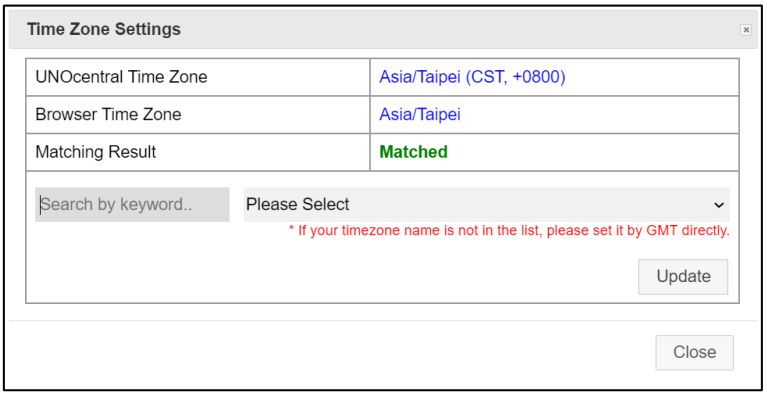

Figure 8 Time Zone Setting Window

- UNO Sensor Link Mode: You can switch UNOcentral here to collect UNOsensor

data via RS485 or MQTT connection. **The default is RS485 mode**. Because MQTT mode needs to be set in conjunction with a UNOsensor that has WiFi functionality, **it is recommended to contact the professional personnel of the system integrator or distributor for operation**. In addition, suggest to [Clear IAQ Data] to ensure the regulation and history data will be correctly display in following 24 hours after switching mode.

- Remote Support Service: You can enable/disable the remote support service. If enabled, the UNO technical staff can support to perform troubleshooting remote. **It is recommended that the operation be performed by network manager professional personnel from the system integrator / distributor**.
- Reset: There are 4 functions; please operate with caution, since they will change UNOcentral' s system settings. **It is recommended that the operation be performed by professional personnel from the system integrator or distributor**.

1. Reboot System: Only reboot UNOcentral.
2. Reset UNOcentral Settings: Including UNOcentral settings and UNOsensor settings, BACnet/IP settings, Schedule settings, Event settings. If UNOcentral is in MQTT mode, MQTT-Link settings and UNOsensor WiFi settings will also be cleared.
3. Clear IAQ Data: Clear all recorded sensor history data.
4. Clear All Data and Shutdown: Clear 1. and 2. at the same time and automatically restart UNOcentral.
5.

B. Network Management

Click the **[Network Status]** button on the **UNOcentral** tab to open the network management window, as shown in Figure 9.

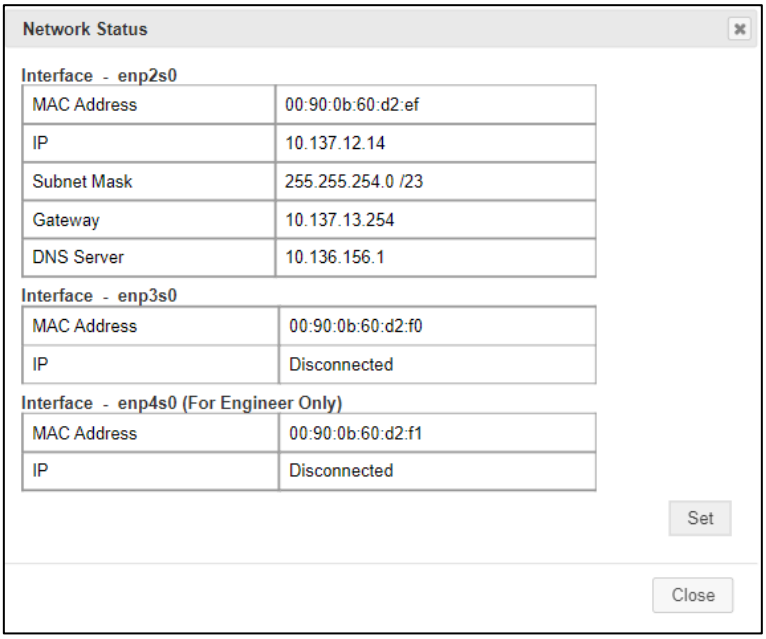

Figure 9 Network Status Window

In this window, you can view the MAC Address and IP status of the three physical network interfaces of UNOcentral. If the network interface is currently plugged in and connected, it will display the IP (such as 192.168.1.168), otherwise it will display Disconnected. **Note: The three ports, LAN1, LAN2, and LAN3, on the UNOcentral device correspond to the Figure 9 marks enp2s0, enp3s0, enp4s0. It is recommended that the network cable be plugged into LAN1 (especially BACnet/IP applications). LAN3 is defined for engineer debugging and cannot be modified.**

LAN3 information is below:

- IP: *192.168.168.1*
- Subnet Mask: *255.255.255.0/24*
- Gateway: *192.168.168.1*

Click [Set] in the network settings window to open the network settings window, as shown in Figure 10. In that window, you can set 2 groups of MAC interface parameters. Parameters that can be set are:

- DHCP: Whether to enable the DHCP client; the IP is allocated by the upper router. If enabled, no other settings are required.
- IP/Subnet Mask: IP is entered manually, e.g. *192.168.1.168*; subnet mask is chosen by dropdown list, e.g. *255.255.255.0/24.*
- Default Gateway: Such as *192.168.0.1*.
- DNS Server: Such as *8.8.8.8*.

It is recommended that this item be set by IT personnel or under the guidance of IT personnel. Setting errors will cause the network of UNOcentral to not work properly. The scope of influence includes but is not limited to: Remote use of web management interface, BACnet/IP, MQTT-Link, etc.

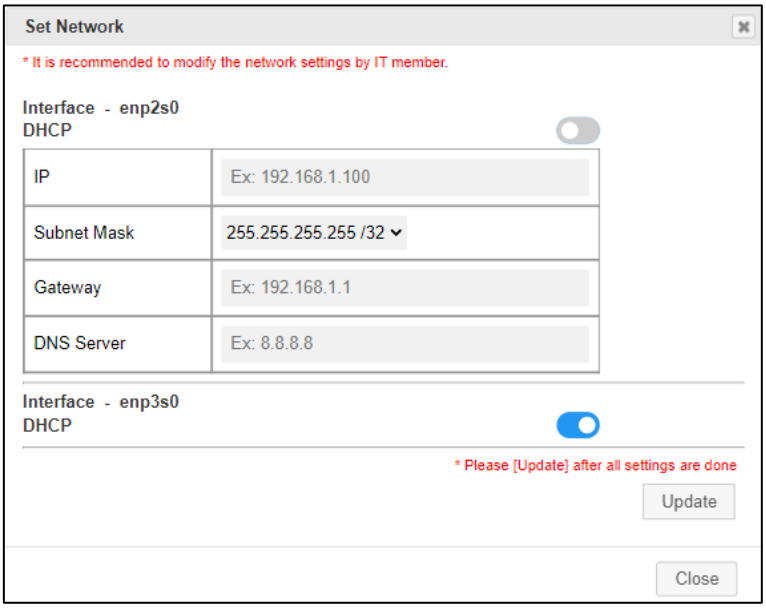

Figure 10 Network Configuration Window

2.1.1.2 Outdoor Information Settings

As shown in Figure 11 and Figure 12, you can set the source of outdoor information stations for Globalview / Gridview / Signage. These are divided into Air Quality Index (AQI), PM2.5 concentration, and PM10 concentration. If Taiwan is selected, the sources for AQI, real-time weather, and weather forecasts can be individually selected; for other regions, the source is selected directly from the map. Note: This feature requires UNOcentral and the computer to be connected to the internet.

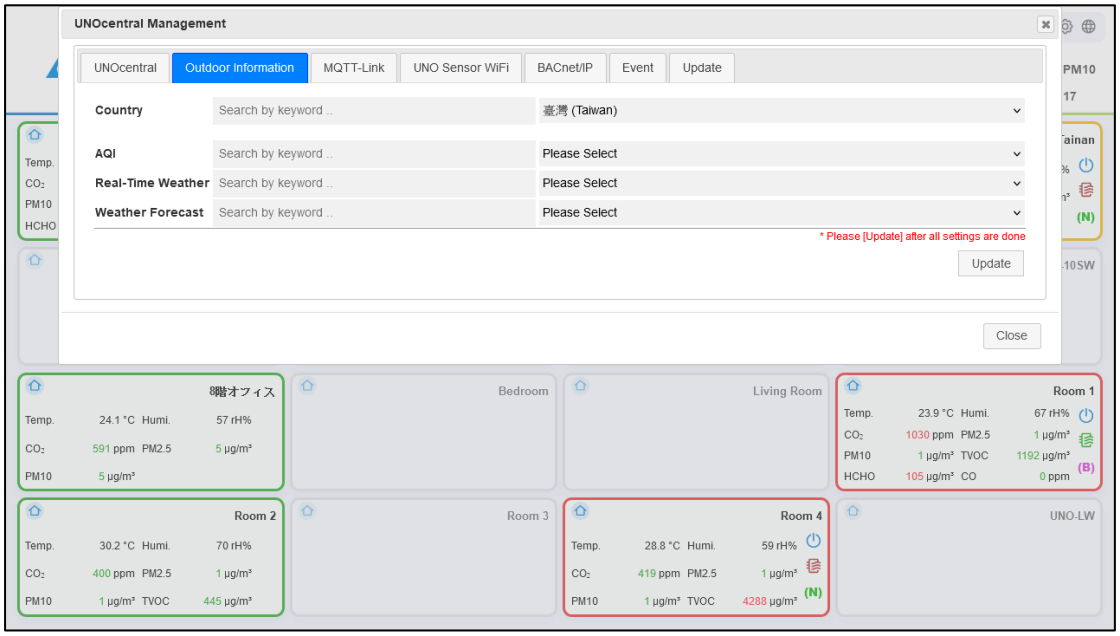

Figure 11 Outdoor Information Settings Tab - Taiwan

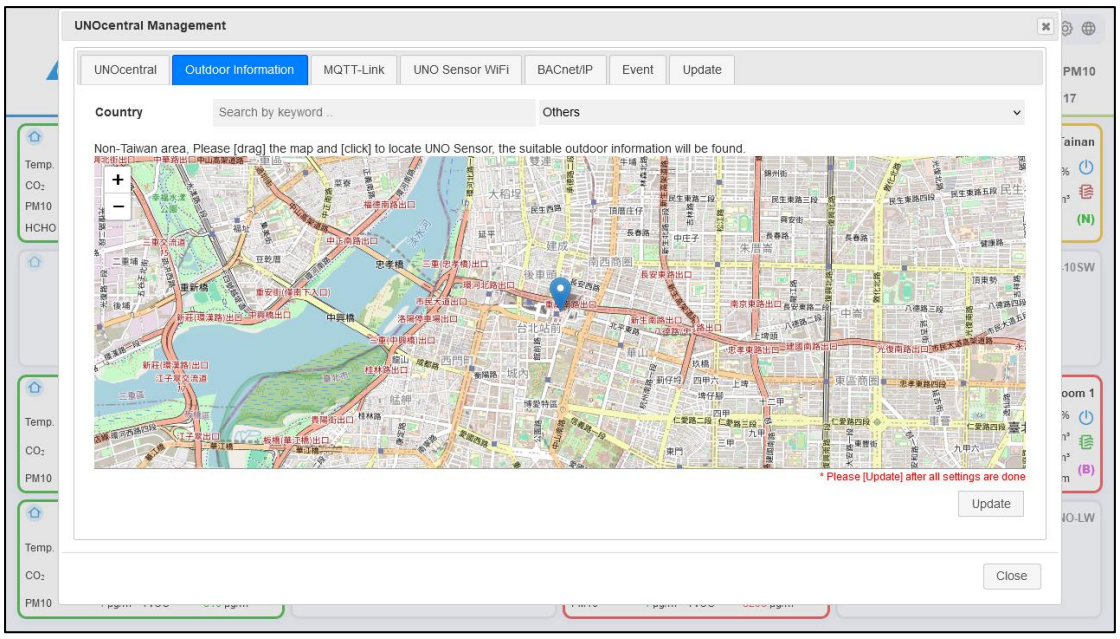

Figure 12　Outdoor Information Settings Tab - Others

2.1.1.3 UNOsensor Settings

As shown in Figure 13, there are 2 main functions on the UNOsensor settings tab: **Central Lock switch and UNOsensor data settings and enabling**.

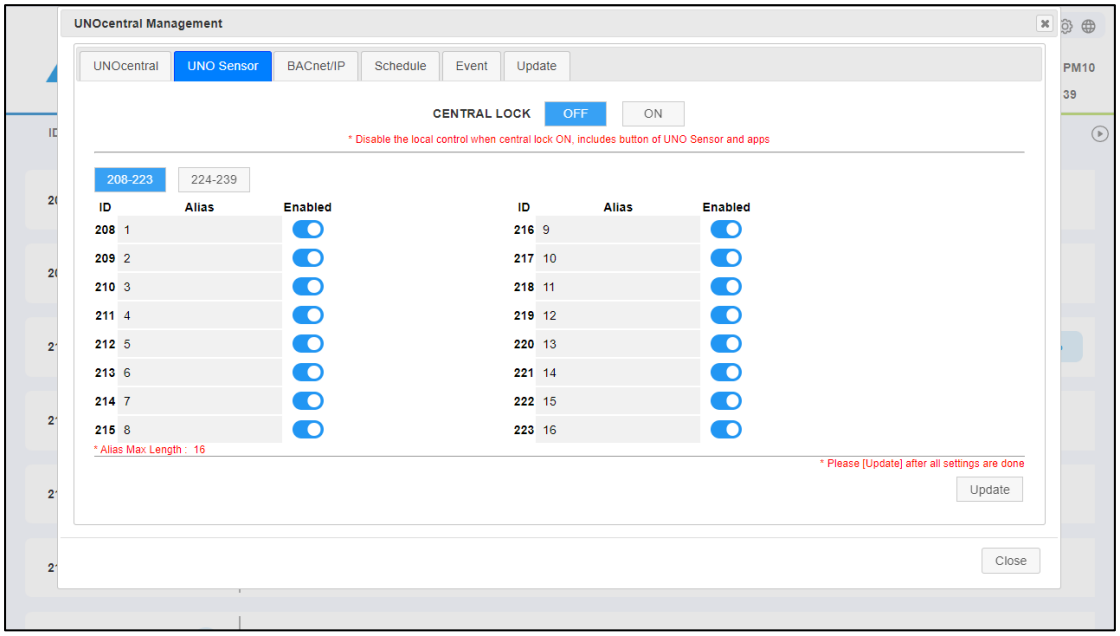

Figure 13 UNOsensor Settings Tab

The Central Lock is used to determine whether the UNOsensor connected to UNOcentral allows the physical button to operate with the UNOsensor App. **If the Central Lock is OFF, it is allowed; if the central control lock is ON, it is not allowed**. If the UNOcentral supports 32 UNOsensors, user can switch settings between tab [208-223] and tab [224-239].

Concerning UNOsensor data and enabling: here is the data of up to 16/32 UNOsensor units, including Modbus ID, Alias, and Enabled. As shown in Table 13.

Table 13 Description of the UNOsensor Settings Tab

Data	Description
ID	Modbus ID of UNOsensor. From 208 to 223 or 208 to 239 according to UNOcentral HW version. The UNOcentral supported 32 UNOsensors can be set the device 224~239 by switch tabs. **See the UNOsensor installation manual to set the Modbus ID of UNOsensor**.
Alias	The alias of UNOsensor can be set and will be displayed on Globalview/Gridview and

	Signage.
Enabled	After a UNOsensor is enabled, it will be displayed on Globalview/Gridview.

After setting all UNOsensor devices, click [Update] for the setting to take effect. **When UNOsensor is enabled, the UNOsensor data bar will be displayed on Globalview, and then the data will be updated after UNOcentral communicates with that UNOsensor**. Therefore, if a certain UNOsensor is enabled here, but the UNOsensor is disconnected from UNOcentral, the data will not be displayed or updated.

2.1.1.4 MQTT-Link settings (MQTT mode)

If UNOcentral has switched to MQTT mode, you will see the **MQTT-Link** tab in the UNOcentral Management Panel. On this tab, you can set UNOcentral to connect to the MQTT server. **As long as UNOsensor WiFi is connected to the same MQTT server, UNOcentral can collect the data of those UNOsensor sensors and linked ventilation equipment**. By default the UNOcentral uses the Local MQTT server, as shown in Figure 14, connection parameters can be found in 1.3 UNOsensor WiFi Connection Method (MQTT).

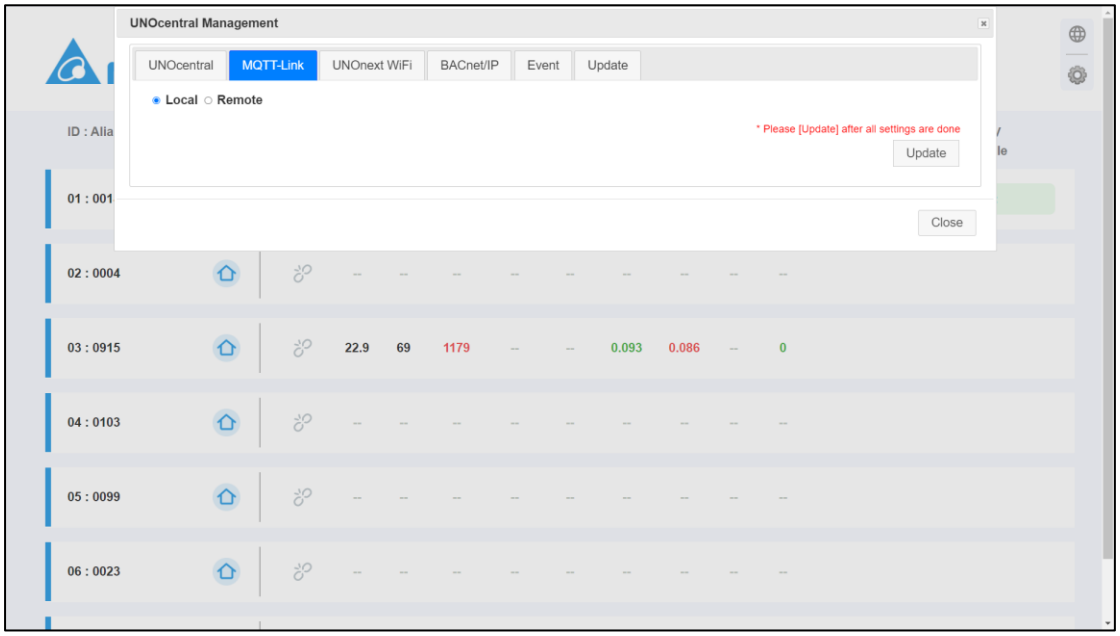

Figure 14 MQTT-Link Settings Tab (Local)

If the operator has another MQTT server to use, the operator can switch to remote. At this time, the connection information of the MQTT server is required, as also shown in Figure 15. The MQTT server information that UNOcentral can set is as follows:

- MQTT Server: The address of the MQTT server to be used. This is a required field.
- MQTT Port: The server provides a port for MQTT services. This is a required field.
- Security: Whether encryption mode (TLS) is enabled for this server.
- Username: The user account provided by the MQTT server.

- Password: The user password corresponding to the user account.

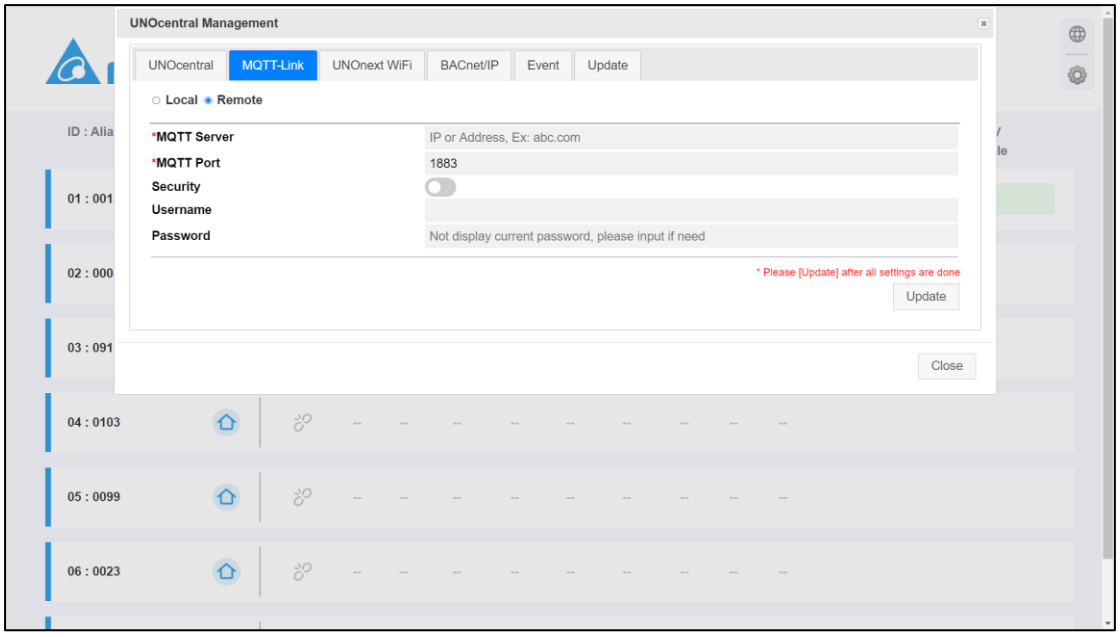

Figure 15 MQTT-Link Settings Tab (Remote)

Note: Regardless of whether a local or remote MQTT server is used, it may be necessary to adjust the Server address and Port access restrictions and firewall rules with the network manager or IT personnel to ensure that it can operate normally.

2.1.1.5 UNOsensor WiFi Settings (MQTT mode)

If UNOcentral has switched to MQTT mode, you will see the **UNOsensor WiFi** tab in the UNOcentral Management Panel, as shown in Figure 16. This tab allows you to set the UNOsensor WiFi data that UNOcentral collects through an MQTT connection. **Note: UNOsensor WiFi connected via MQTT does not support control functions.**

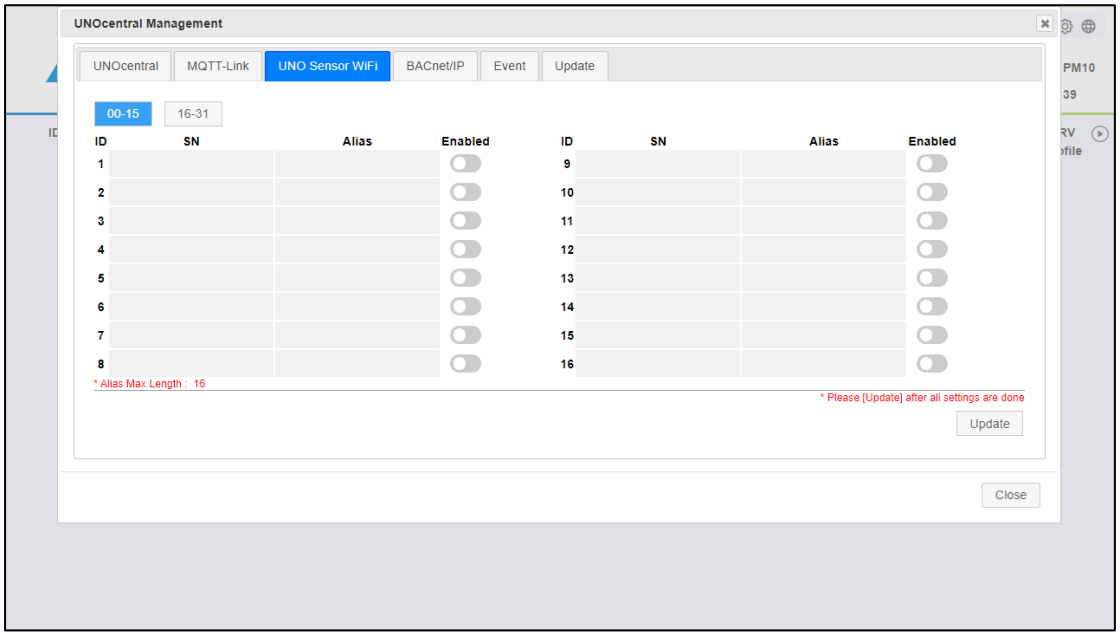

Figure 16 UNOsensor WiFi Settings Tab

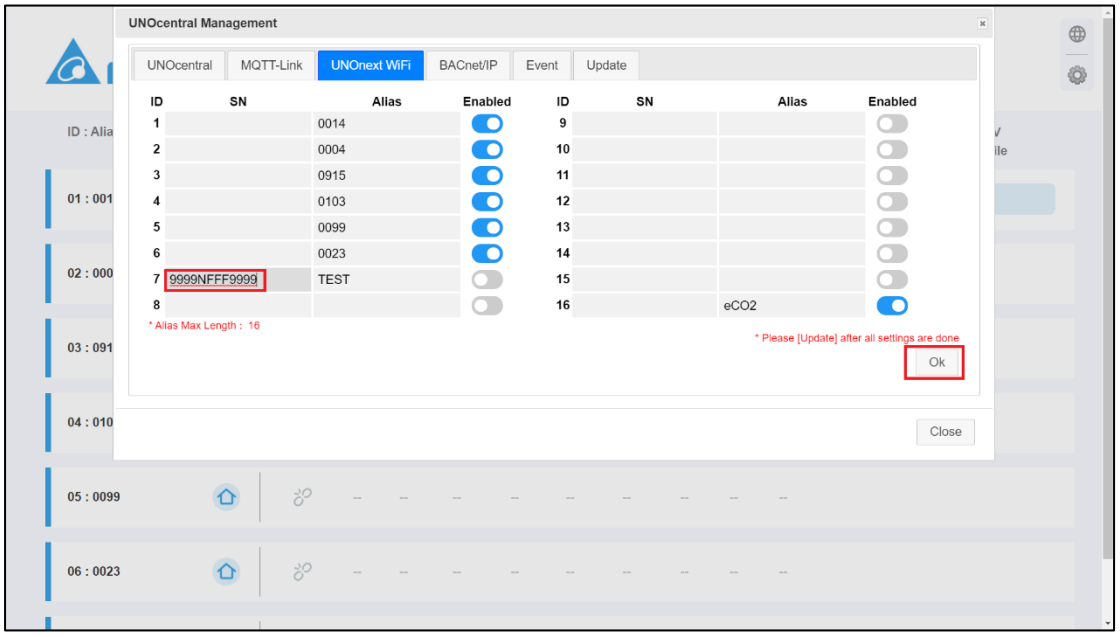

Figure 17　Serial number editing on the UNOsensor WiFi settings tab

The information that needs to be set on the UNOsensor WiFi settings tab is shown in Table 14. **When filling in the serial number, an [OK] button will appear in the lower right corner. After filling in, click elsewhere on the screen or [OK]. If the serial number differs after editing, you will be asked to enter the device verification code (Pin Code); the Pin Code must be correct for the serial number to be entered.** As shown in Figure 17.

The Pin Code can be found on the label on the UNOsensor WiFi device or its packaging; the label style is shown in Figure 18. After all UNOsensor WiFi settings are completed, press [Update] for settings to take effect. The rest of the operations are similar to the **UNOsensor** tab, so the description will not be repeated here.

Table 14　Description of the UNOsensor WiFi Settings Tab

Data	**Description**
Serial number (SN)	The serial number of UNOsensor WiFi; a required field after Enabled. If filled in incorrectly, UNOcentral will not receive data correctly.
Alias	The alias of UNOsensor WiFi can be set and will be displayed on Globalview and Signage.
Enabled	After enabled, the UNOsensor WiFi will be displayed on Globalview.

Figure 18 How to Find the Pin Code

2.1.1.6 BACnet/IP Settings

UNOcentral supports publishing the connected UNOsensor data through the building automation standard protocol BACnet/IP. On the **BACnet/IP** tab, you can set the unique Device Instance of the BACnet/IP server in the subnet, as shown in Figure 19. Fill in the Device Instance to be set. The default value is 260001. Press **[Update]** and wait for a short period of time (about 30 seconds) for it to take effect. The information provided by UNOcentral through BACnet/IP will be described in the appendix 5 Description of BACnet/IP Data. **Importance: Please only use LAN1 when using BACnet/IP.**

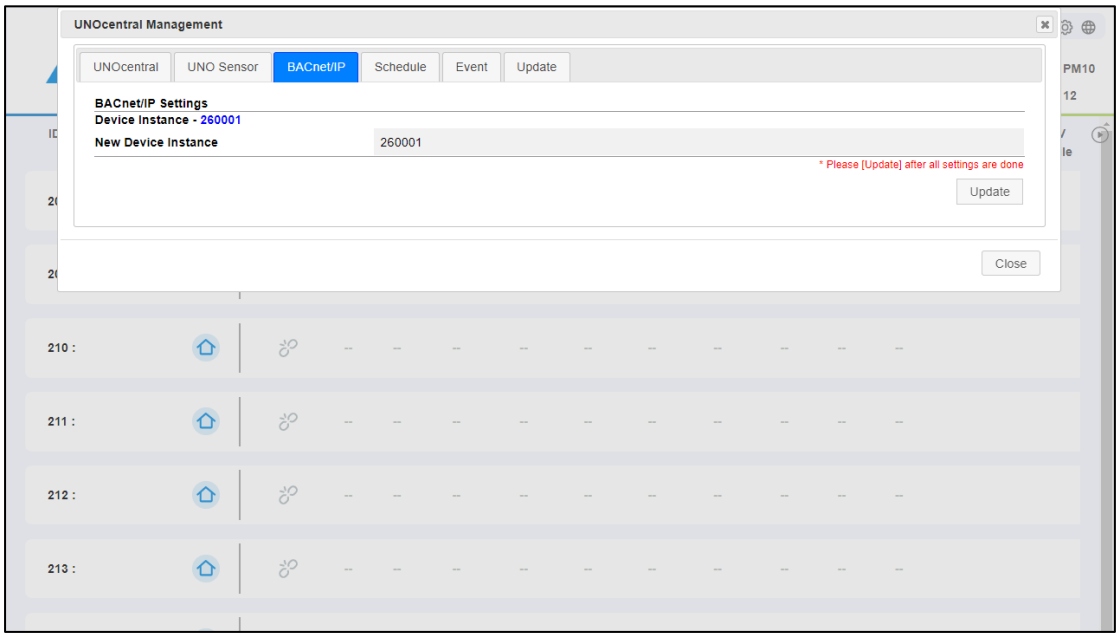

Figure 19 BACnet/IP Settings Tab

Note: BACnet/IP uses port 47808 and the UDP protocol to communicate on the internal network. It is recommended to adjust the Server address and Port access restrictions and firewall rules with the network manager or IT personnel to ensure that it can operate normally.

2.1.1.7 Schedule Settings

The scheduling function means that by defining the control plan of UNOcentral, UNOcentral will calculate control methods for all UNOsensor devices to operate the ventilation equipment. There are two categories of control plans: **Year-Based** and **Workday-Based**. The former is the combination of the **specified year** and **[Date Combination] [Time Period]**, the latter is a combination of **[All Work Day] [Time Period]**. A control plan can consist of up to 4 schedules, and each UNOcentral can set up to 4 control plans.

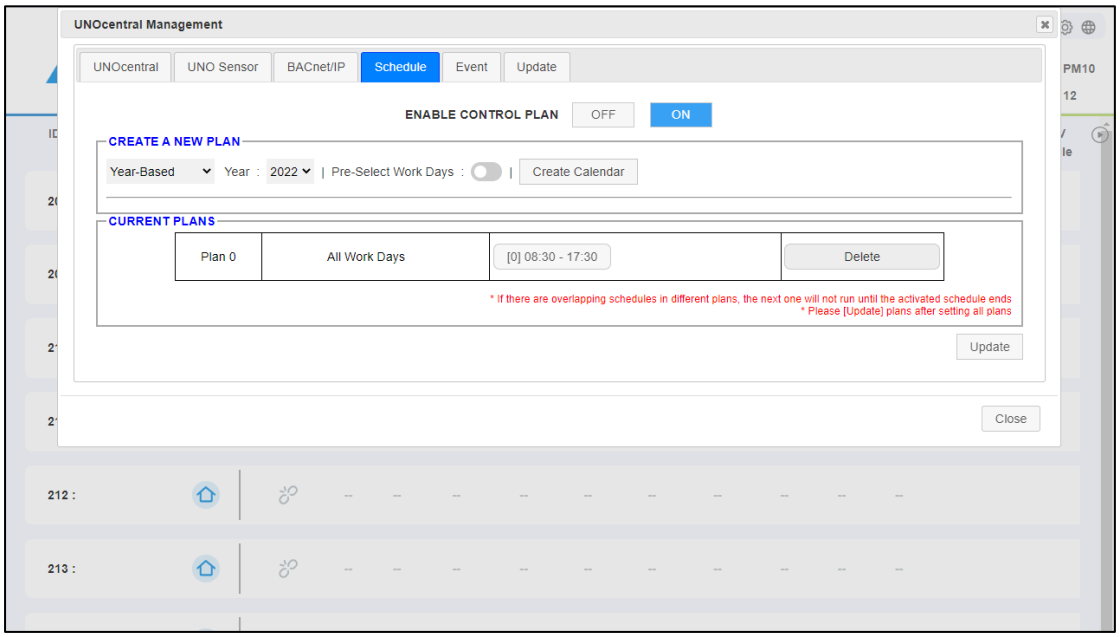

Figure 20 Schedule Settings Tab

See Figure 20; the **Schedule** tab is divided into three blocks.

- Enable control plan: After the control plan is enabled, UNOcentral will control the ventilation equipment linked to UNOsensor according to the definitions in the control plan. It can take effect immediately after switching.
- Create a new plan: You can create a schedule based on the selected year, working day, time period, schedule mode and then create a new control plan when enabling

control. Maximum of 4.

- Current plans: View details of the currently established control plan of UNOcentral; you can also delete it.

Here is an example of establishing a [By Year] control plan:

1. Select the year, decide whether to Pre-Select Work Days, and then Create Calendar. Figure 21 is the result of selecting 2020 for the year and enabling the Pre-Select Work Days to Create Calendar It is currently an unedited control plan without any schedules.

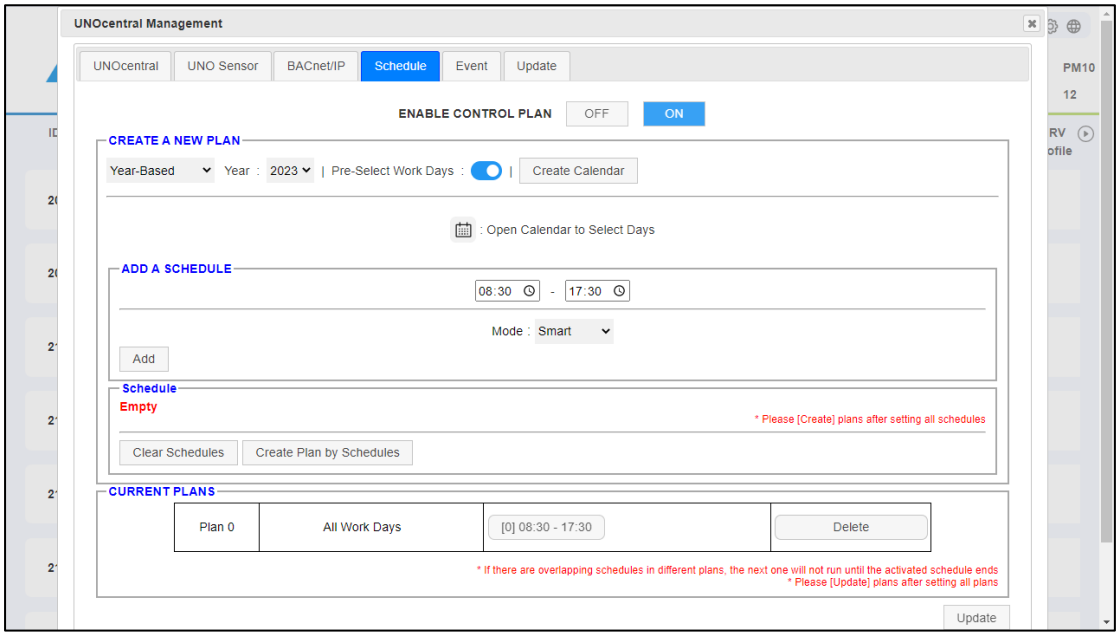

Figure 21 Create a Control Plan Calendar

You can click on the Calendar icon and then edit the date to be selected; past dates cannot be selected. As shown in Figure 22.

Figure 22　Edit Date of Plan

2. Then in the displayed **Add a schedule** blocks, select the **time interval** and the **scheduling mode**. The mode can be set as **turbo scheduling**, and it is displayed as **(C) Turbo**; or be set as **UNOeco**, displayed as **(C) ECO**, the differences between Turbo and ECO modes can be referred to Table 10. Press [Add] to create a schedule. Click the button on the schedule to view the schedule details, as shown in Figure 23. After this step, users can create up to 4 schedules in one control plan. After editing all schedules, click Create plan by schedules. **Note: At this time, the control plan has not yet taken effect.**

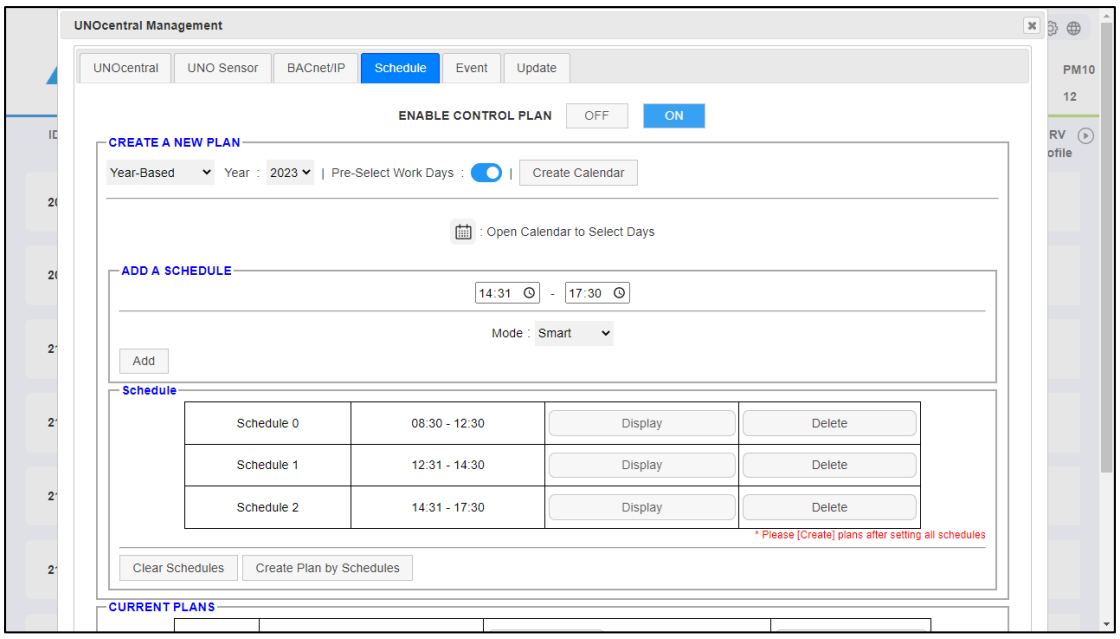

Figure 23　Add a Schedule for New Plan

3. As shown in Figure 24, after successfully creating a new plan, you will see the newly created plan in the [Current Plans] block below. The calendar icon and buttons can be clicked to view the details of the control plan and schedule, and you can also delete a specific control plan. When all the control plans are set, click [Update] to write to settings.

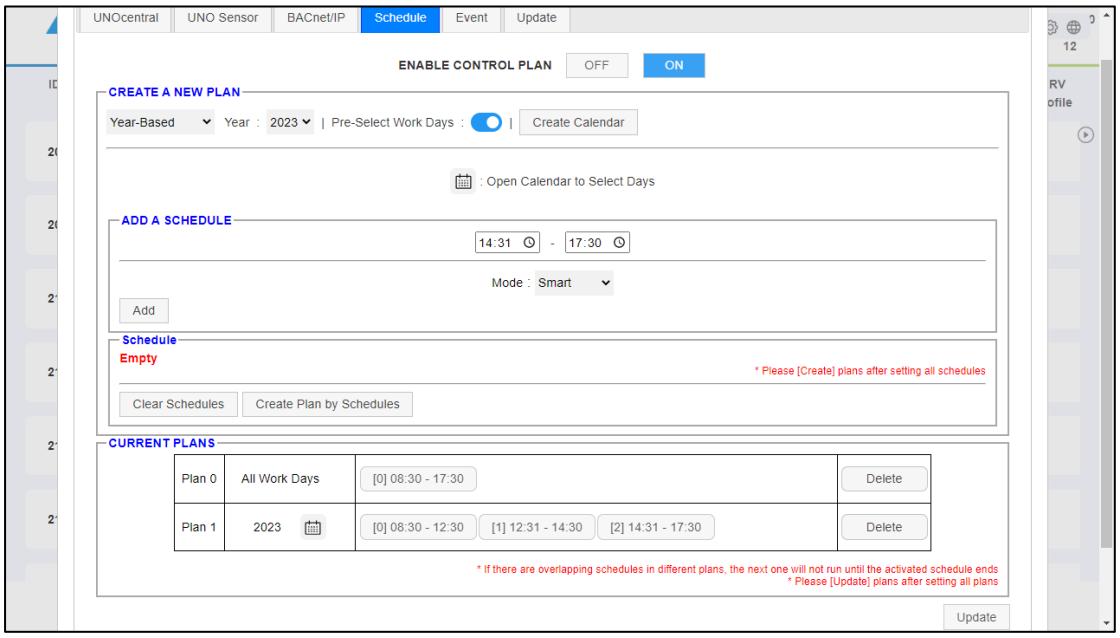

Figure 24　Project Added

4. After the update, you need to confirm whether the control plan is enabled at the top of the page. If enabled, it will take effect within one hour.

Note 1: The [All Work Day] means all Monday to Friday, so Workday-based control plans do not expired.

Note 2: **After the control plan takes effect**, there is a set time period that UNOcentral will use the sensor value of UNOsensor to calculate the Turbo/ECO mode to control the UNOsensor ventilation equipment; the **unset time period will force the ventilation equipment to be turned off**. System will **disable** control plan if schedules in all plans are expired.

Note 3: If different plans have schedules which are overlapped, after the activated schedule is completely finished, the next valid schedule will be started.

Note 4: It is no need to choose date in a [By Work Day] plan. Click [Create Schedule] and operate in [Add a Schedule] block, e.g. step 2 to step 4.

2.1.1.8 Event Settings

UNOcentral will monitor the UNOsensor hardware status, sensor status, whether the sensor value exceeds the standard, and the status of the connected equipment. If an abnormality occurs, it will send a notification to the designated email address. This chapter will explain the **Event** tab.

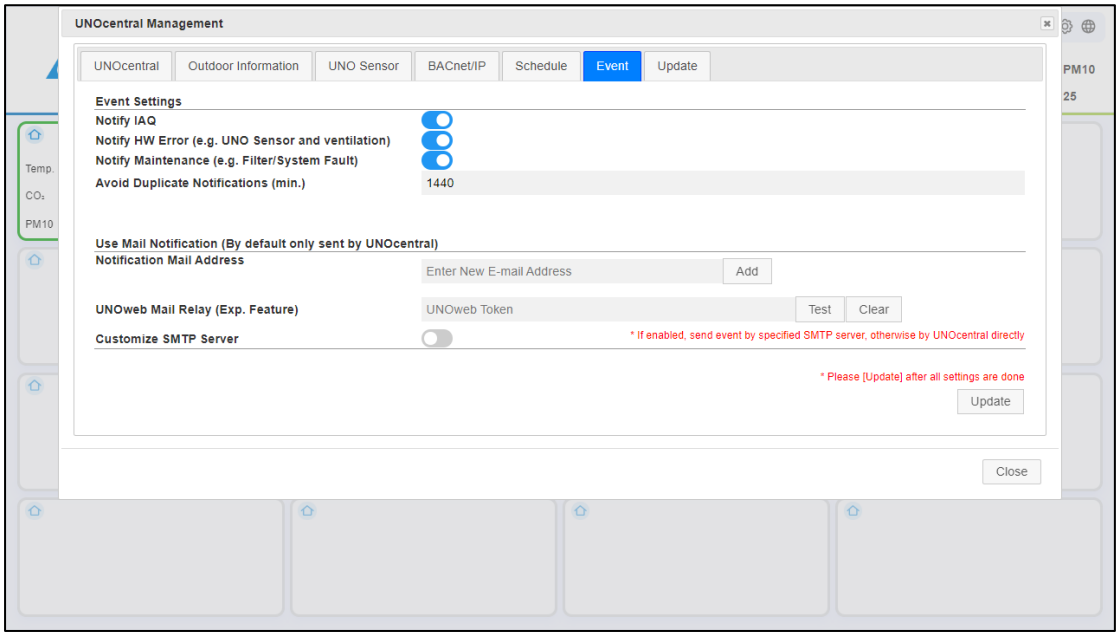

Figure 25 Event Settings Tab

As shown in Figure 25, the **Event** tab is divided into following blocks. **Event Settings** and **Use Mail Notification**. By default, UNOcentral will try to send the notification letter by itself, but it also supports other mail notification. Other mail notification performs if the user has a third-party SMTP server that applied for or rented, the user can also set it to send. Such as: Gmail; or use the UNOweb mail relay function by paid account.

- The Event Settings information is as follows:

Table 15 Description of Event Settings Parameters

Item	Description
Notify IAQ	Notification when indoor air quality is poor. Currently subject to Taiwanese regulations.
Notify HW Error	When a UNOsensor/Sensor/Ventilator hardware error occurs, a

	notification will be sent.
Notify Maintenance	When **an error** occurs in the **system** or the **filter life reaches zero**, a notification will be sent.
Avoid Duplicate Notifications	Units are in minutes; this value determines the shortest time interval for UNOcentral to send notifications.

- Use Mail Notification information is as follows; the part of customized SMTP server should be confirmed the relevant setting parameters with the service provider:

Table 16 Description of Mail Notification Setting Parameters

Item	**Description**
Notification Mail Address	Up to 10 inboxes can be set.
UNOweb Mail Relay	Fill the UNOweb token of paid account, click [Test] to send the test mail.
Enabled	Decide whether to enable custom SMTP server. Not enabled by default, UNOcentral will try to send the letter by itself.
SMTP Server	SMTP server address.
SMTP Port	The port number used by the SMTP server.
Security	SMTP server address security settings.
Username	SMTP server username.
Password	SMTP server user password.
Sender Address	Customize the sender address of the notification letter. (Optional) The SMTP server provider decides whether it will take effect.

After the above information is set, you can click [Send Test Mail] and then click [Update] for it to take effect after testing is valid.

Note: If there is a problem with the notification sent by UNOcentral, you can seek assistance from the IT unit of the site. If there is a problem sending from a custom SMTP server, you need to confirm with the SMTP provider that the settings are correct and whether the server is working properly. The above information in this tab will take effect after clicking [Update].

2.1.1.9 Update

The following is the description of the **Update** tab. As shown in Figure 26, you can see the **Current System Version**. Click [Update], and UNOcentral can automatically download the latest version of the software package for installation. The system will automatically restart after installation.

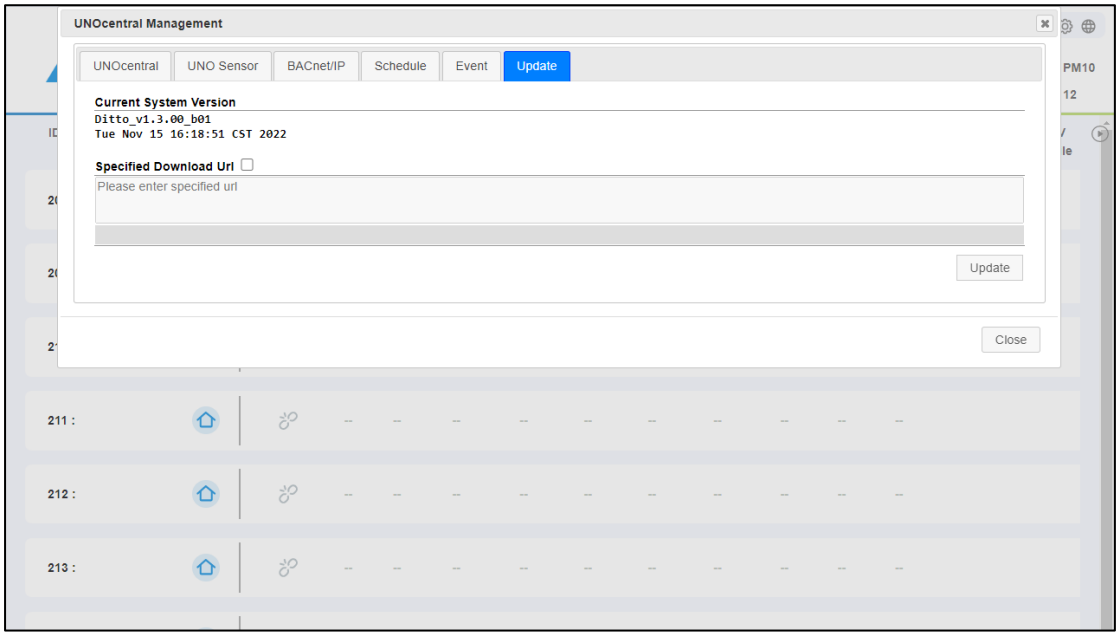

Figure 26 Update Tab

If the user selects **Specified Download URL** and enters the customized download path, and then finally clicks [Update], the software installation package can be downloaded and updated according to the path specified by the user. **Note: Incorrect updates may cause the system to become inoperable, so please exercise caution.**

2.1.2 UNOsensor Operation Panel

This chapter describes the operation panel of UNOsensor. As shown in Figure 27, the UNOsensor Operation Panel currently has 4 tabs, namely **Control Panel**, **Status**, **Sensor**, and **Chart**. Note: If the UNOsensor does not have a control function, only the **Status** and **Chart** tab will be displayed.

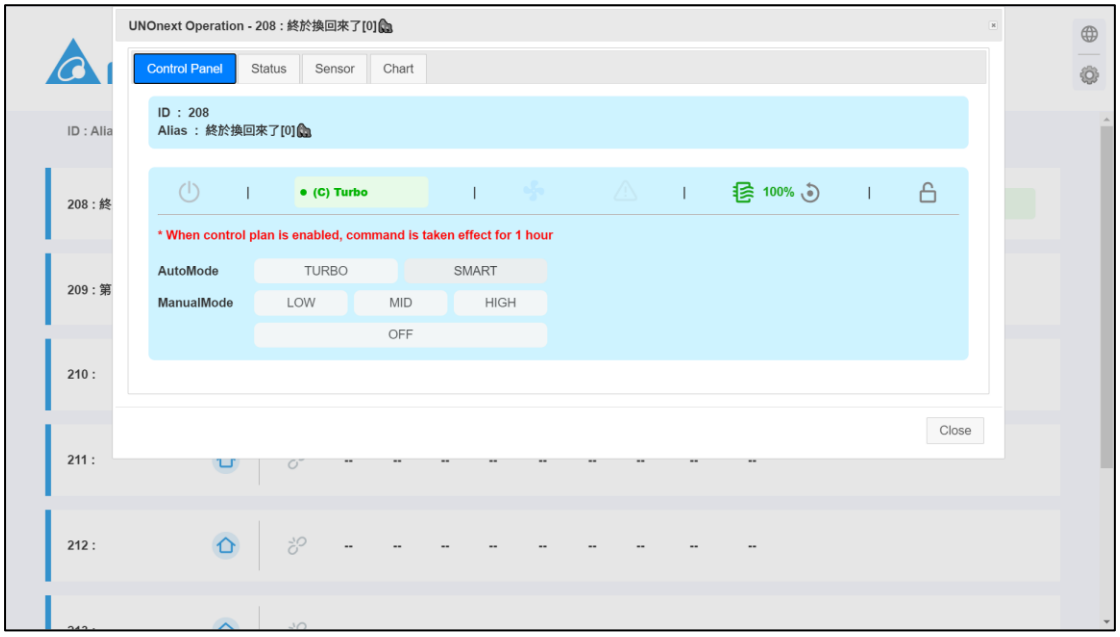

Figure 27 UNOsensor Operation Panel - Control Panel Tab

2.1.2.1 Control Panel

As shown in Figure 27, the Control Panel is basically divided into an upper and lower block:

- UNOsensor Data: Contains Modbus ID and alias.
- Control block: Divided into **status bar** and **control item**.
  - See the description of the status bar Table 17.

Table 17 Description of the UNOsensor Control Panel status bar

Status	**Description**
Power supply	See Table 8.
Mode	See Table 10.
Rotation speed	The speed will be indicated by the icon; see the table below Low Mid High The maximum operating speed of the ventilation equipment linked to UNOsensor will be limited by the hardware DIP SWITCH on UNOsensor; see the UNOsensor installation manual.
Filter status	See Table 9.
Filter reset	 After the device filter is replaced, you can click to reset the filter life. Note: It is recommended that the filters of all connected devices of a single UNOsensor be replaced at the same time.
Central Lock status	Shows whether Central Lock is enabled Enabled Deactivated When the Central Lock is enabled, UNOsensor cannot accept physical button or app commands.

- The control items have AutoMode: Turbo, UNOeco (Also referred to as ECO), ManualMode: 6 buttons for low, mid, and high speeds, and off. See the description in Table 18 for details.

Table 18 Descriptions of UNOsensor Control Panel control items

Options	**Description**
AutoMode	Set UNOsensor to AutoMode, and there will be two modes to choose from:

	Turbo and **UNOeco**. Turbo: If any sensor value exceeds the limit, it will run at full speed. The display mode is **(N) Turbo**. **UNOeco**: The wind speed is dynamically adjusted according to the value and thresholds. The display mode is **(N) ECO**.
ManualMode	There are three speeds to choose from: **low, mid, and high**. The display mode is **(C) Manual**. But the actual upper speed limit will be determined by the hardware DIP SWITCH on UNOsensor.
Off	Turn off the ventilation equipment.
To-All	Check this option, the [AutoMode], [ManualMode], and [Off] command will be sent to all UNOsensor.
Note: When the control plan is enabled, control here will only be effective for 1 hour.	

2.1.2.2 Status

The Status tab is divided into 3 blocks, as shown in Figure 28. There are UNOsensor Information, UNOsensor Error Code, and Device Status.

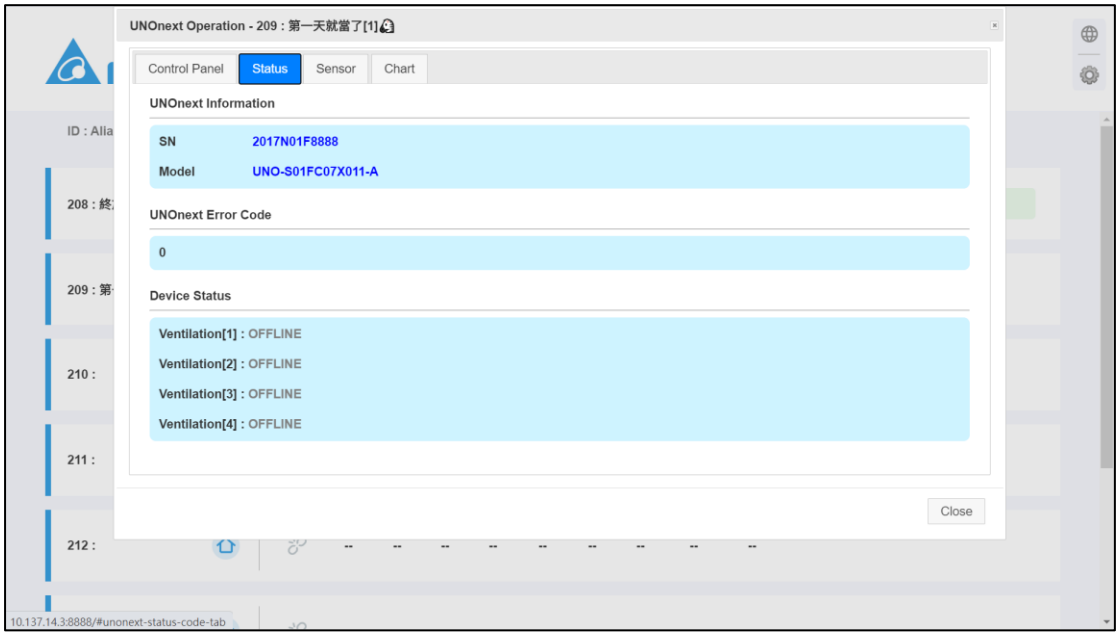

Figure 28 Status Tab

- UNOsensor Information: Includes non-modifiable static information, such as UNOsensor serial numbers (SN) and UNOsensor model.
- UNOsensor Error Code: If an abnormality occurs in UNOsensor, a value other than 0 will be displayed. **For details, see the UNOsensor user manual**.
- Device Status: If UNOsensor is connected to the ventilation device via RS485, the connection status of up to 4 ventilation devices will be displayed here: **In ONLINE and OFFLINE**, if the connected device is abnormal, the **error code** will **be displayed directly behind**. **See the ventilation equipment manuals and documentation for details**. If UNOsensor is connected to the device with dry contact, it will directly display **Use Dry Contact** here, as shown in Figure 29.

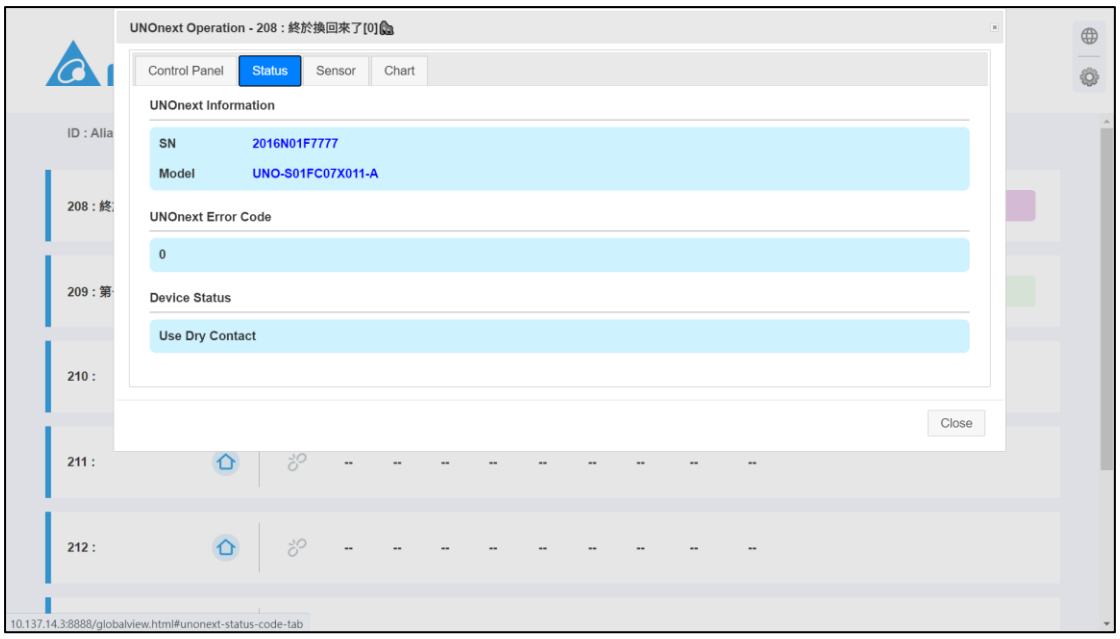

Figure 29　Use dry contact connection status tab

2.1.2.3 Sensor

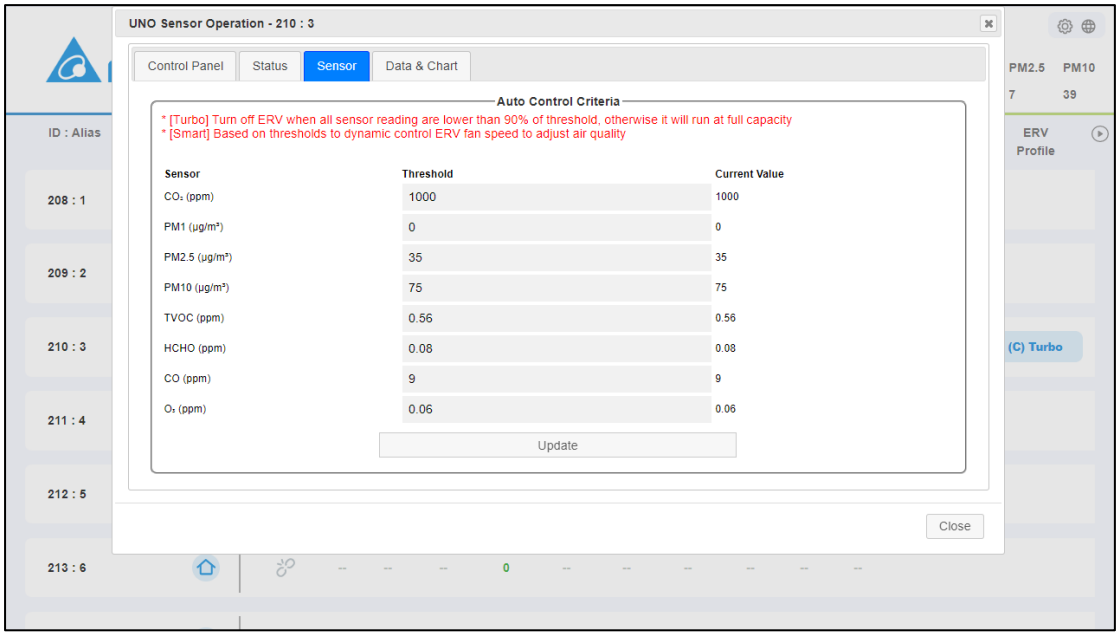

Figure 30 Sensor Tab

As shown in Figure 30, the Sensor Settings tab can be used to set the threshold for UNOsensor to automatically control the equipment for air quality. The **UNOsensor sensor threshold** and its **default value can be set**. As shown in Table 19:

Table 19 Default Values and Units of UNOsensor Sensor Control

Sensor	**Default value**	**Unit**
Carbon dioxide (CO_2)	1000	ppm
PM2.5	35	$\mu g/m^3$
PM10	75	$\mu g/m^3$
Total volatile organic compounds (TVOC)	0.56	ppm
Formaldehyde (HCHO)	0.08	ppm
Carbon monoxide (CO)	9	ppm
Ozone (O_3)	0.06	ppm

After the setting is completed, click [Update] for it to take effect.

When UNOsensor runs as **Turbo** mode, if the real-time value of any of the sensors in the above table exceeds the set threshold, UNOsensor will activate the ventilation equipment, and will not shut down until the real-time sensor data of these sensors fall

below 90% of the threshold. When UNOsensor runs as **ECO** mode, it controls the ventilation equipment to adjust the indoor air quality based these thresholds. **Note: Only sensors installed in this model of the UNOsensor will be used for automatic control.**

2.1.2.4 Data and Chart

As mentioned previously, UNOcentral will provide a data warehouse for sensor data of UNOsensor with a frequency of 1 every 6 minutes. The data can be browsed using the **[Data & Chart]** tab in the UNOsensor Operation Panel. As shown in Figure 31, this tab provides a historical data chart and data download in recent 5 years for one or more UNOsensors. **Important: The download function must be operated by a remote computer. Please refer to case 1 showed as Figure 1.**

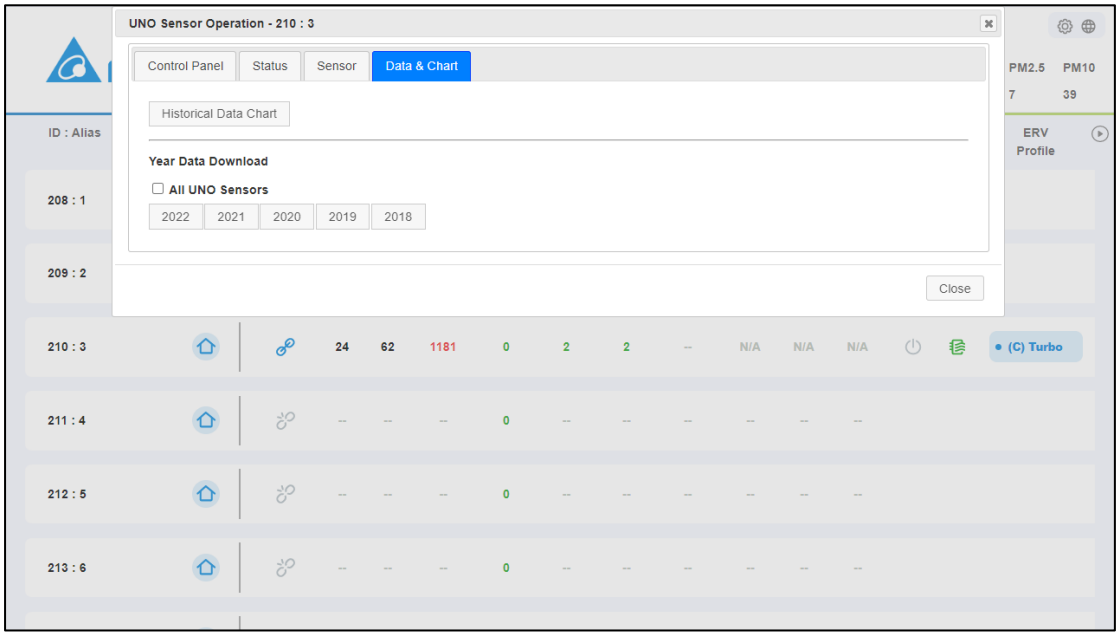

Figure 31 Data and Chart Tab

After clicking the **Historical Data Chart**, a historical data chart page will be opened, as shown in Figure 32.

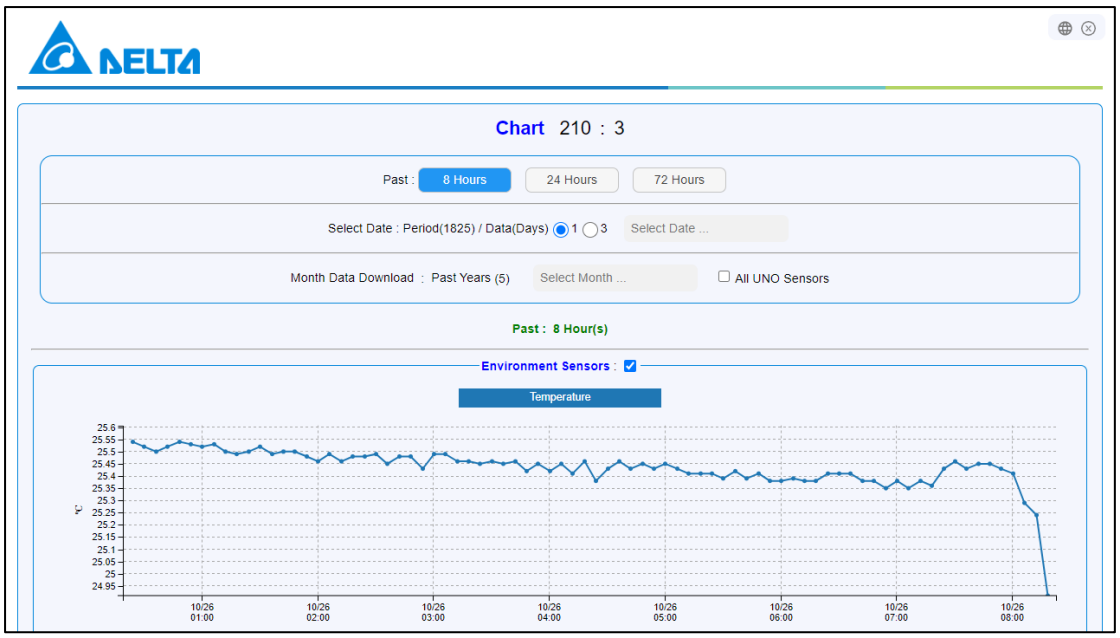

Figure 32 Historical Data Chart Page

The content of the Historical Data Chart page contains the following:

- Select display mode
  - Past: Designate to display the sensor data of the past N hours. N is based on different system version.
  - Select Date: Through selection in the calendar, designate to display the sensor data of a certain day or 3 days from the past 5 years (365×5=1825 days). As shown below.

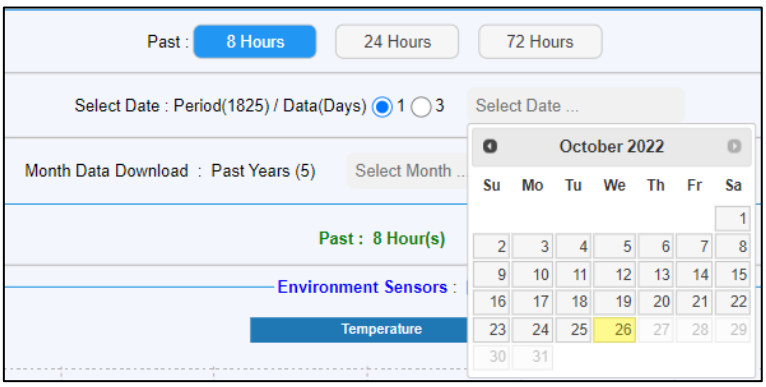

Figure 33 Select Historical Data for the Specified Date

- Download monthly data. Select in the monthly calendar in the past 5 years, also download all data of UNOsensors by checking [All UNOsensors], as shown below.

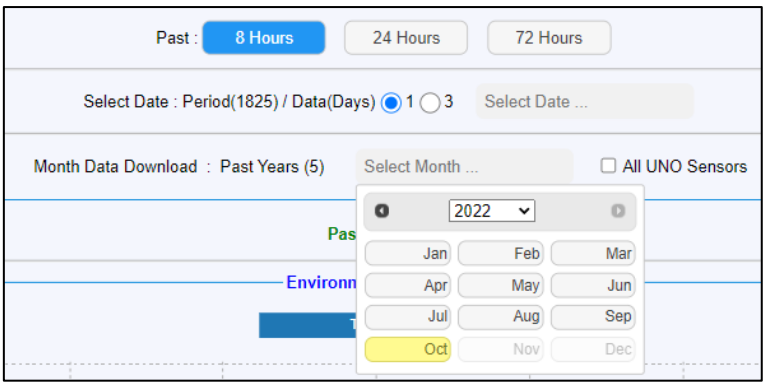

Figure 34 Select Historical Data for the Specified Month

- There are two types of data display: environmental sensor and indoor air quality (IAQ) sensor, which can be selected to be displayed/not displayed. **If the UNOsensor does not have a specific sensor installed, or there is no related sensor data for the selected time period, it will not be displayed.**
  - Historical data of the environmental sensor: Including temperature, humidity and ambient light.
  - Historical data of the air quality sensor: Contains carbon dioxide (CO_2), carbon monoxide (CO), formaldehyde (HCHO), total volatile organic compounds (TVOC), ozone (O_3), PM10, PM2.5 and PM1. The historical air quality data chart will also display the moving average calculated in accordance with Taiwanese regulations and the operation status of the ventilation equipment at that time. For the calculation of moving average, see Table 12; **the number of fan stages (FAN SPEED) is 0 to 3: 0 for off, 1 for low, 2 for mid, and 3 for high**. As shown in Figure 35.

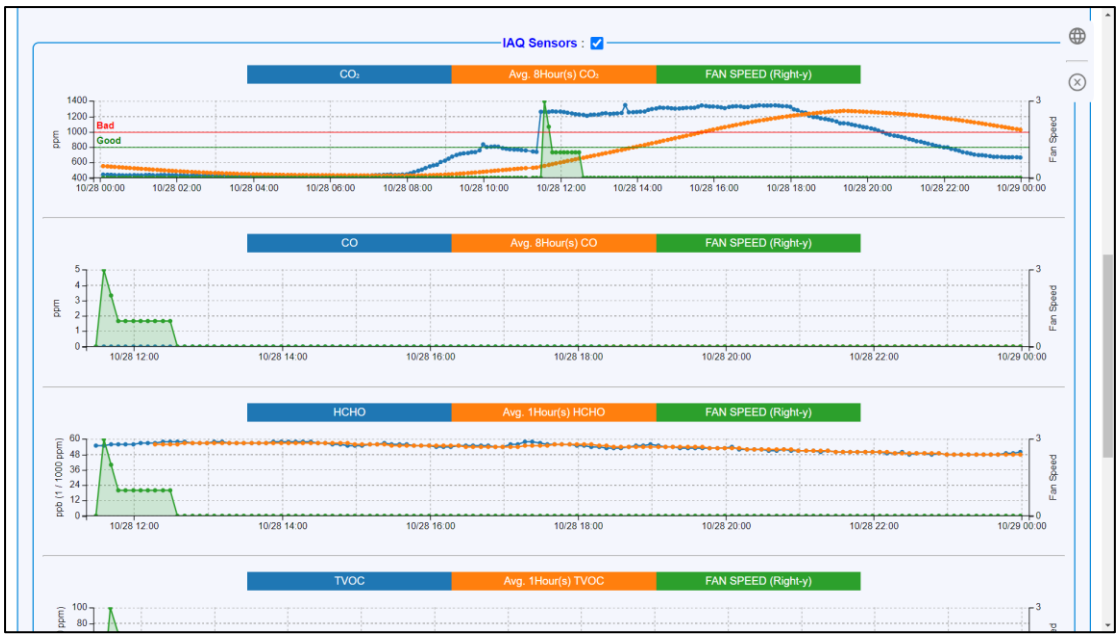

Figure 35　Historical Data of the Air Quality Sensor

Note: For easily browsing, all chart support functions of zoom in/out by mouse drag and reset, clicking icon to switch data display.

Note: If formaldehyde (HCHO), total volatile organic compounds (TVOC), and ozone (O_3) are displayed in ppm, data in this chart is displayed in ppb, because the ppm values are too small to browse easily. $1\ \text{ppb} = \frac{1}{1000}\ \text{ppm}$。

2.2 Gridview

Gridview is designed for browsing more UNOsensor data, click can to be switched to Globalview. There are 4 modes of Gridview: Auto, 2x4, 4x4, 6x6, refer to Figure 36, Figure 37, Figure 38. Auto mode wills be auto adjusted according to the number of enabled UNOsensor. The data display logic of Gridview is similar as Globalview, see section **2.1 Globalview** to get more information. Additionally, clicking the alias of UNOsensor, the UNOsensor operation panel will be opened.

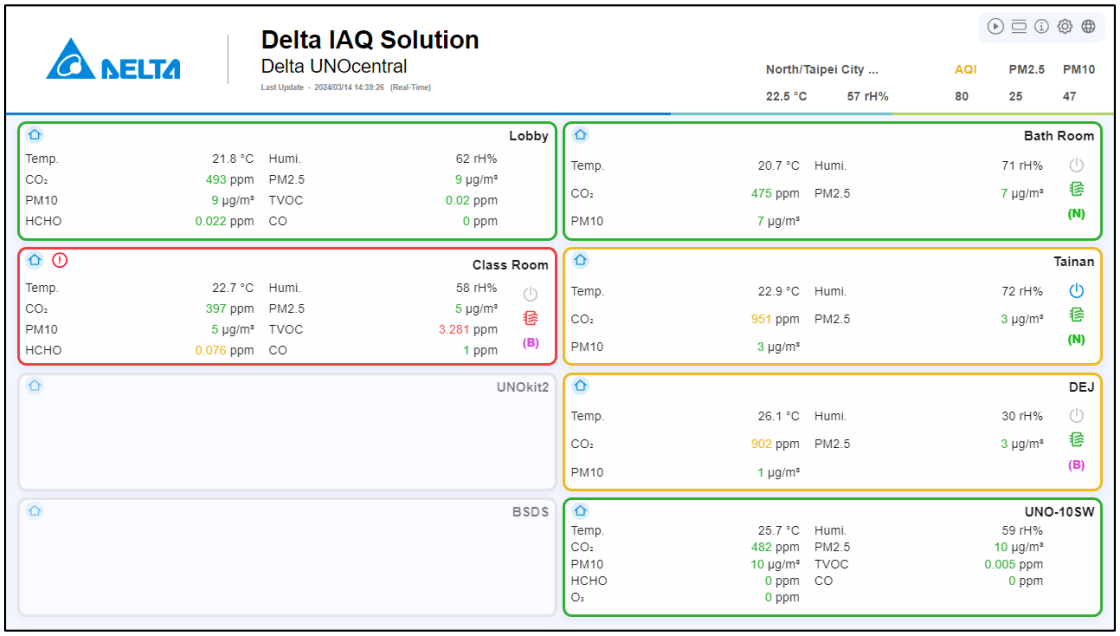

Figure 36 Gridview 2x4

Figure 37 Gridview 4x4

Figure 38 Gridview 6x6

Note: Because the amount of data displayed by default is large in 6x6 mode, it is recommended to browse it on a 24-inch screen with a resolution of 1920x1080 or higher for a better experience.

2.3 Signage

Signage is used to display the information of a single UNOsensor. As shown in Figure 39, Signage is divided into display and control management functions, and provides use of **language switching**, **UNOsensor Operation Panel**, **and Globalview**. The display logic for the numerical value and the icon is basically the same as that of Globalview; see Globalview.

Figure 39 Signage Function Analysis

Please refer to Figure 40 if enabling the [Maximized font-size of values], you can back to Globalview by clicking the UNOcentral alias on the top-left side. (E.g. Delta UNOcentral in this figure)

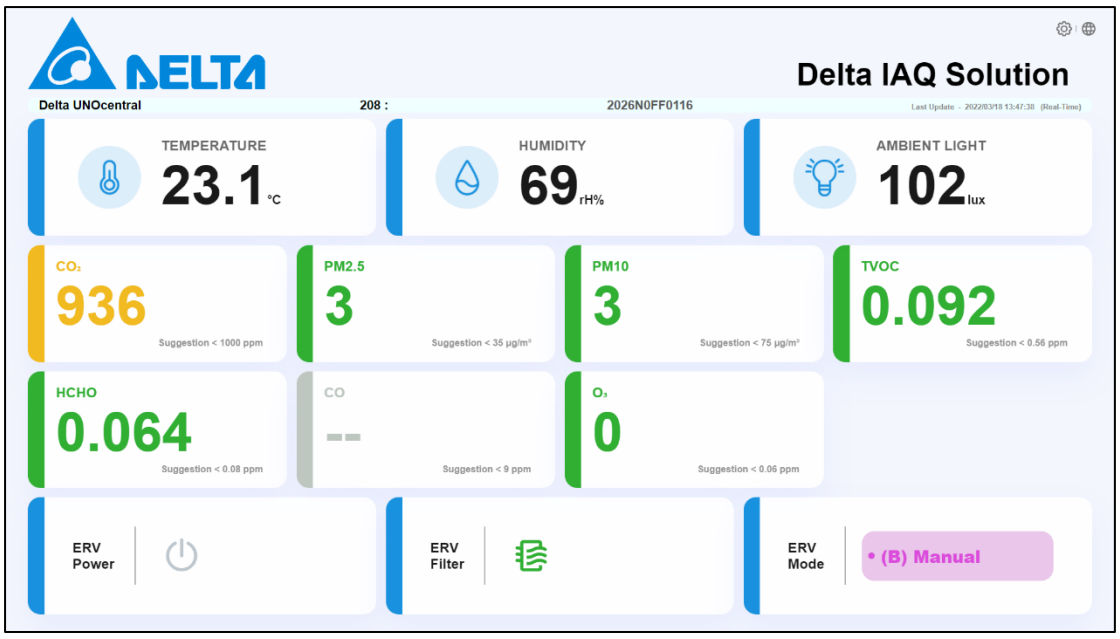

Figure 40　Signage Function Analysis (Maximized Font-Size of Values)

Main display functions are as follows:

- Temperature and humidity sensor values.
- Air quality sensor value: UNOcentral will detect whether the sensor on the connected UNOsensor is installed. If it is not installed, the information will be hidden. At the same time, it will be according to Table 7 to display values and corresponding colors.
- Ventilation equipment switch (note): There are three states: on, off, and equipment abnormality warning, each of which is displayed using a different icon. As shown in Table 8.
- Ventilation equipment filter status (note): Displays Table 9 in 4 different colors according to the remaining life of the filter.

Operation mode of ventilation equipment (note): According to the command source and operation mode. As in Table 10.

Note: The ventilation equipment switch, ventilation equipment filter status, and ventilation equipment operation mode are determined by the method of connection to the UNOsensor.

- **RS485: If all devices are disconnected, it will not be displayed. And the reverse: it will be displayed if any one device is connected.**
- **Dry contact: Always displayed.**

- Outdoor Information (note)

  A. Real-time weather.

  B. Weather forecast.

  C. Outdoor Air Quality Index (AQI), outdoor PM2.5 concentration, outdoor PM10 concentration. AQI value color will be displayed according to Table 11.

  Note: The outdoor information data is retrieved from the OpenData API provided by the Taiwanese government or other resources based on the set data site, and the browser updates itself approximately every hour. The continuity of OpenData API data is maintained by the Open Data API server, and this device does not guarantee the continuity of data.

2.3.1 Set UNO Sensor Picture

Click the picture in Signage, the device image management dialog will be prompted, it can use to edit the picture of the UNOsensor displayed in signage, showed as Figure 41. In this dialog, you can [Upload] a new picture, [Delete] the old picture and [Close] the dialog. If you delete the old picture or never upload picture, the signage will show the default picture.

Note. RS485/MQTT UNOsensor will share the same picture if they are the same sequence. E.g., 208=01, 209=02, and so forth.

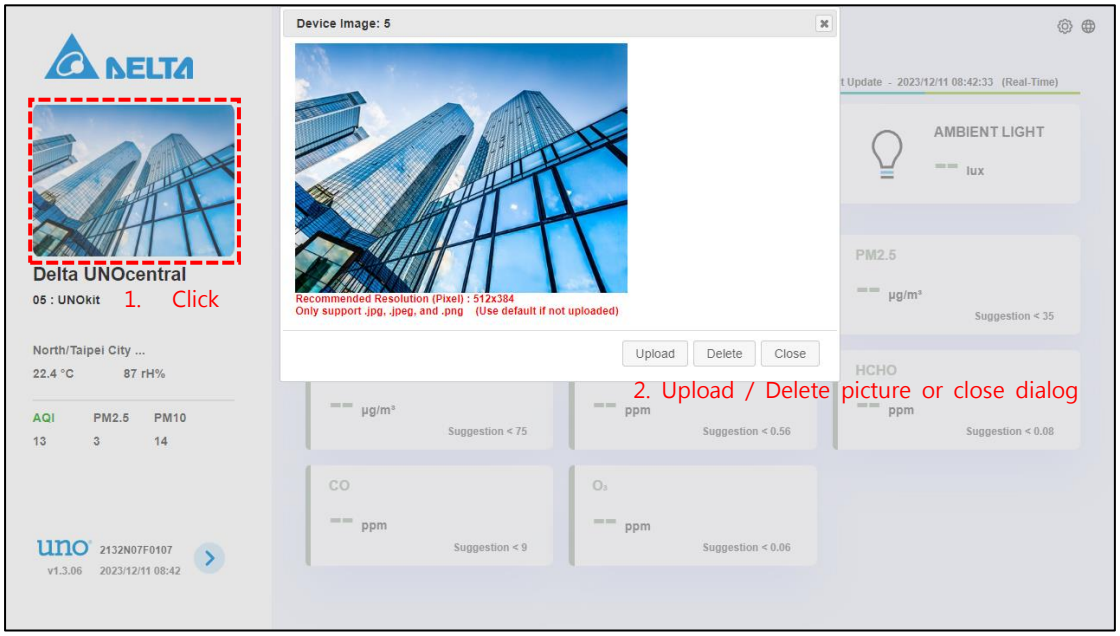

Figure 41 Modify UNOsensor Picture

2.4 Carousel Mode

Carousel mode is the special mode of signage. It uses the list of enabled UNOsensor and the interval settings of carousel mode in [UNOcentral Management Panel] to display the UNOsensor data. Carousel mode is different from signage as shown below.

1. The words [Carousel Mode] will appear in the upper left corner.
2. UNOsensor Control Panel and picture setting function are not supported in Carousel Mode.

Appendix

1. Demo Mode

You may sometimes want to use UNOcentral to display simulated data for certain purposes, so we have set up a simple display mode. Add the parameter &demo=1 at the end of the Signage URL to make Signage enter display mode. Such as the URL: http://[IP]:8888/signage.html?id=208&demo=1. This mode mainly displays the possible link behaviors of CO2 concentration changes, corresponding ventilation equipment switches, operation modes, and filter statuses. It will be displayed cyclically in the order of the following.

Table 20 Demo Mode Case

Case	CO_2	ERV switch	Filter status	ERV operation mode
1	783	Off	Healthy	ECO
2	850	Off	Healthy	ECO
3	1280	On	Healthy	ECO
4	1500	On	A bit dirty	Turbo
5	1800	On	Very dirty	Turbo
6	1800	Filter replacement tips	The filter life is zero	Manual

2. Mandatory Language Settings

In consideration of some cases that user cannot switch language manually or user wants to force language setting, user can append the query string parameter *&lang=[language string]* at the end of Signage or Globalview urls. Possible language string: zh-tw, en, ja. Please check the UNOcentral system is update to date to ensure all

language string are supported.

Example:

- Signage
  - Traditional Chinese: http://[IP]:8888/signage.html?id=208&lang=zh-tw
  - English: http://[IP]:8888/signage.html?id=208&lang=en
- Globalview:
  - http://[IP]:8888/?lang=zh-tw
  - http://[IP]:8888/globalview.html?lang=zh-tw

Note: Parameters of **display mode** and **mandatory language setting** are url parameters. Parameter can be concatenated, the first parameter is marked by "?", following parameters are marked by "&", all parameters are set value by "=". **Additionally, language switch button will be not worked when using mandatory language settings.**

3. Mandatory UNOsensor in Carousel Mode

If you want to show the specified UNOsensor instead of all enabled UNOsensor, you can append the UNOsensor index separated by comma "," after the url parameter "id". The UNOsensor index in RS485 Mode is from 208 to 215 or 208 to 239, while 1 to 16 or 1 to 32 in MQTT mode.

Example：

- RS485 mode：http://[IP]:8888/signage.html?id=208,210
- MQTT mode：http://[IP]:8888/signage.html?id=1,15

4. Mandatory to Maximize the Font-Size in Signage

If you do not want to change the settings of [Maximized font-size of values], but

you need to force the setting, you can append the url parameter “&noSideBar=1” in the end of url.

Example：

- http://[IP]:8888/signage.html?id=208,210&noSideBar=1

Note. The url parameters from appendix 2 to 4 can be used in combination.

Example:

http://[IP]:8888/signage.html?id=208,209,210,211,216,217,&lang=ja&noSideBar=1

5. Description of BACnet/IP Data

After setting and confirming the BACnet/IP Device Instance of UNOcentral (the default is 260001), you can use the BACnet/IP client to read the information provided by UNOcentral through BACnet/IP, which includes the sensor values of up to 16/32 connected UNOsensor devices and status of linked ventilation equipment. In addition, BA system can use the BACnet IP control points provided by UNOcentral to control the ventilation equipment. The UNOcentral supported different count of UNOsensor provides different BACnet/IP data support as show below.

- Support 16 UNOsensors: If U represents UNOsensor number 00 to 15, the UNOsensor number corresponds to the UNOsensor connected in RS485 mode and UNOsensor WiFi in MQTT mode; see Table 21. According to the connected UNOsensor number, BACnet objects for each UNOsensor listed in Table 22. The update frequency is once every 5 seconds, and the response time is about 1 second.

Table 21 Table of Corresponding UNOsensor BACnet Numbers (For UNOcentral Supported 16 Devices)

UNOsensor BACnet number	UNOsensor Modbus ID (RS485)	UNOsensor WiFi ID (MQTT)
00	208	1
01	209	2
02	210	3
03	211	4
04	212	5
05	213	6
06	214	7
07	215	8
08	216	9
09	217	10
10	218	11
11	219	12

12	220	13
13	221	14
14	222	15
15	223	16

Table 22 BACnet Object Table (For UNOcentral Supported 16 Devices)

Name	Type	Number	Unit	Description
[U]_ERROR_CODE	AI	U*17+0	N/A	UNOsensor Error Code 0: Normal Other: Please allow professionals to make the judgement
[U]_BTN_STATUS	AI	U*17+1	N/A	UNOsensor physical button status No control function: 0, 1 With control function (UNOnext): 0, 1, 2, 3, 4 With control function (UNOlite): 0, 1
[U]_TEMP	AI	U*17+2	°C	Temperature
[U]_TEMP_HP	AI	U*17+3	°C	High precision temperature
[U]_TEMP_F	AI	U*2+272	°F	Temperature (°F)
[U]_TEMP_HP_F	AI	U*2+1+272	°F	High precision temperature (°F)
[U]_HUMIDITY	AI	U*17+4	rH%	Humidity
[U]_LIGHT	AI	U*17+5	lux	Illuminance
[U]_CO2	AI	U*17+6	ppm	Carbon dioxide
[U]_CO	AI	U*17+7	ppm	Carbon monoxide
[U]_HCHO	AI	U*17+8	ppm	Formaldehyde
[U]_TVOC	AI	U*17+9	ppm	Total volatile organic compounds 1ppm=4500μg/m^3
[U]_O3	AI	U*17+10	ppm	Ozone
[U]_PM10	AI	U*17+11	μg/m^3	Suspended particulate matter PM10
[U]_PM2.5	AI	U*17+12	μg/m^3	Suspended particulates matter PM2.5
[U]_PM1	AI	U*2+1+272	μg/m^3	Suspended particulates matter PM1
[U]_HCHO_UGM3	AI	U*2+1+272	μg/m^3	Formaldehyde. 1ppm=1230μg/m^3.
[U]_TVOC_UGM3	AI	U*2+1+272	μg/m^3	Total volatile organic compounds. 1ppm=4500μg/m^3.
[U]_SET_CMD_PWR_FAN	AV	U*1+0	N/A	Control the ventilation equipment linked to UNOsensor. Always presents 255 to mean *wait for*

				command. Valid inputted valued are follows: 0: Manual – Off 1: Manual – Low speed (On) 2: Manual – Mid speed (On) 3: Manual – High speed (On) 6: Auto – Turbo 7: Auto – ECO Only workable on RS485 mode and the UNOsensor is enabled.
[U]_DEV_1_ERROR_CODE	AI	U*17+13	N/A	Ventilation equipment 1 error code Contact the ventilation equipment supplier
[U]_DEV_2_ERROR_CODE	AI	U*17+14	N/A	Ventilation equipment 2 error code Contact the ventilation equipment supplier
[U]_DEV_3_ERROR_CODE	AI	U*17+15	N/A	Ventilation equipment 3 error code Contact the ventilation equipment supplier
[U]_DEV_4_ERROR_CODE	AI	U*17+16	N/A	Ventilation equipment 4 error code Contact the ventilation equipment supplier
[U]_ENABLED	BI	U*3+0	N/A	Is UNOsensor enabled? 0: Disabled 1: Enabled
[U]_ONLINE	BI	U*3+1	N/A	For the connection status between UNOsensor and UNOcentral, either RS485 mode or MQTT mode can be used. 0: Offline 1: Online
[U]_CMD_PWR	BI	U*3+2	N/A	Ventilation equipment switch command set for UNOsensor 0: Off 1: On
[U]_CMD_FAN	MI	U*1+0	N/A	Number of fan segments of the ventilation equipment set for UNOsensor

				1: Low 2: Mid 3: High

As shown in the table above, the object name of the no. 13 UNOsensor carbon dioxide (CO_2) value is [13]_CO2 and its ID is AI.227 (OBJECT_ANALOG_INPUT:227).

- Support 32 UNOsensors: Assuming that U represents UNOsensor number 00 to 31, the UNOsensors number corresponds to the UNOsensors connected in RS485 mode and UNOsensors WiFi in MQTT mode; see Table 23. According to the connected UNOsensor number, BACnet objects for each UNOsensor listed in Table 24. The update frequency is once every 5 seconds, and the response time is about 1 second.

Table 23 Table of Corresponding UNOsensor BACnet Numbers (For UNOcentral Supported 32 Devices)

UNOsensor BACnet number	UNOsensor Modbus ID (RS485)	UNOsensor WiFi ID (MQTT)
00	208	1
01	209	2
02	210	3
03	211	4
04	212	5
05	213	6
06	214	7
07	215	8
08	216	9
09	217	10
10	218	11
11	219	12
12	220	13
13	221	14
14	222	15
15	223	16
16	224	17
17	225	18
18	226	19
19	227	20
20	228	21
21	229	22
22	230	23
23	231	24
24	232	25
25	233	26
26	234	27
27	235	28
28	236	29
29	237	30
30	238	31
31	239	32

Table 24 BACnet Object Table (For UNOcentral Supported 32 Devices)

Name	Type	Number	Unit	Description
[U]_DEV_1_ERROR_CODE	AI	U*24+0	AI	Ventilation equipment 1 error code Contact the ventilation equipment supplier
[U]_DEV_2_ERROR_CODE	AI	U*24+1	AI	Ventilation equipment 2 error code Contact the ventilation equipment supplier
[U]_DEV_3_ERROR_CODE	AI	U*24+2	AI	Ventilation equipment 3 error code Contact the ventilation equipment supplier
[U]_DEV_4_ERROR_CODE	AI	U*24+3	AI	Ventilation equipment 4 error code Contact the ventilation equipment supplier
[U]_ERROR_CODE	AI	U*24+4	AI	UNOsensor Error Code 0: Normal Other: Please allow professionals to make the judgement
[U]_BTN_STATUS	AI	U*24+5	N/A	UNOsensor physical button status No control function: 0, 1 With control function (UNOnext): 0, 1, 2, 3, 4 With control function (UNOlite): 0, 1
[U]_TEMP	AI	U*24+6	N/A	Temperature
[U]_TEMP_HP	AI	U*24+7	N/A	High precision temperature
[U]_TEMP_F	AI	U*24+8	N/A	Temperature (°F)
[U]_TEMP_HP_F	AI	U*24+9	N/A	High precision temperature (°F)
[U]_HUMIDITY	AI	U*24+10	°C	Humidity
[U]_LIGHT	AI	U*24+11	°C	Illuminance
[U]_CO2	AI	U*24+12	°F	Carbon dioxide
[U]_CO	AI	U*24+13	°F	Carbon monoxide
[U]_HCHO	AI	U*24+14	rH%	Formaldehyde
[U]_TVOC	AI	U*24+15	lux	Total volatile organic compounds
[U]_O3	AI	U*24+16	ppm	Ozone
[U]_PM10	AI	U*24+17	$\mu g/m^3$	Suspended particulate matter PM10
[U]_PM2.5	AI	U*24+18	$\mu g/m^3$	Suspended particulates matter PM2.5
[U]_PM1	AI	U*24+19	$\mu g/m^3$	Suspended particulates matter PM1
[U]_HCHO_UGM3	AI	U*24+20	$\mu g/m^3$	Formaldehyde. 1ppm=1230$\mu g/m^3$.

[U]_TVOC_UGM3	AI	U*24+21	µg/m^3	Total volatile organic compounds. 1ppm=4500µg/m^3.
[U]_RESERVED_AI	AI	U*24+22 ~ U*24+23	N/A	Reserved fields.
[U]_SET_CMD_PWR_FAN	AV	U*1+0	N/A	Control the ventilation equipment linked to UNOsensor. Always presents 255 to mean *wait for command*. Valid inputted valued are follows: 0: Manual – Off 1: Manual – Low speed (On) 2: Manual – Mid speed (On) 3: Manual – High speed (On) 6: Auto – Turbo 7: Auto – ECO Only workable on the UNOsensor is enabled and its control function is also enabled.
[U]_RESERVED_AV	AV	U*4+1 ~ U*4+3	N/A	Reserved fields.
[U]_ENABLED	BI	U*8+0	N/A	Is UNOsensor enabled? 0: Disabled 1: Enabled
[U]_ONLINE	BI	U*8+1	N/A	For the connection status between UNOsensor and UNOcentral, either RS485 mode or MQTT mode can be used. 0: Offline 1: Online
[U]_CMD_PWR	BI	U*8+2	N/A	Ventilation equipment switch command set for UNOsensor 0: Off 1: On
[U]_RESERVED_BI	BI	U*8+3 ~ U*8+7	N/A	Reserved fields.
[U]_CMD_FAN	MI	U*1+0	N/A	Number of fan segments of the

				ventilation equipment set for UNOsensor 1: Low 2: Mid 3: High
[U]_RESERVED_MI	MI	U*4+1 ~ U*4+3	N/A	Reserved fields.

As shown in the table above, the object name of the no. 13 UNOsensor carbon dioxide (CO_2) value is [13]_CO2 and its ID is AI.324 (OBJECT_ANALOG_INPUT:324).

In addition, for BACnet objects of the sensor type, special status codes are defined, as shown in Table 25. If the value of the object is a special status code, it means that the sensor corresponds to a special status.

Table 25 Sensor Status Code

Name	Value	Description
SENSOR_UNMOUNTED	-40000	This model of UNOsensor does not come installed with this type of sensor.
DATA_ABNORMAL	-50000	This sensor is installed, but abnormal.
SENSOR_INIT_CODE	-99999	This sensor is initializing. The normal value will be reported for up to 5 minutes. If the status code continues, it is abnormal.

If the status code is -50000 or continues to be -99999, contact technical support personnel for assistance in determining the status of the sensor.

6. BACnet/IP Test Method

UNOcentral’ s BACnet/IP data reading function is tested by the free open-source software Yet Another Bacnet Explorer (YABE). You can download from the link below and test.

https://sourceforge.net/projects/yetanotherbacnetexplorer/

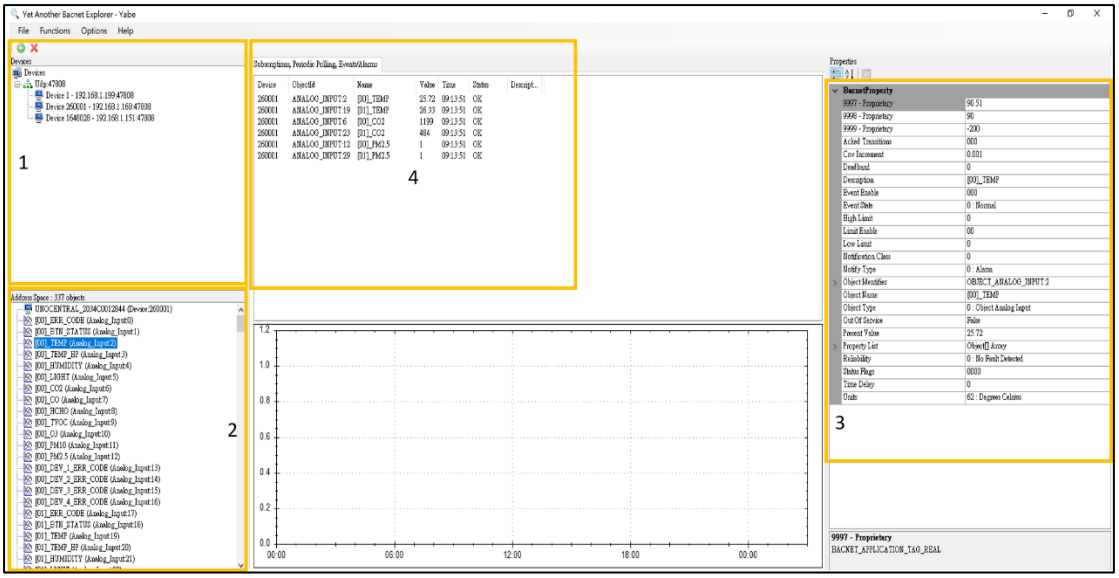

Figure 42　BACnet/IP Data Reading Test Method

As shown in Figure 42. After completing the settings with YABE, you can see all the BACnet/IP objects provided by UNOcentral. The object naming logic is as given in Table 22 and Table 24. The test steps are as follows:

A. In block [1], click on , and after adding the BACnet/IP device, you can see that the serial number is 12 characters long (such as 2034C0012844) and the default Device Instance 260001 UNOcentral is in block [1]. Next, click on the UNOcentral item and the provided BACnet objects will be displayed.

B. Click the BACnet object in block [2], and the detailed data of the object, including Presented Value, will be displayed in block [3]. Entering a new value in the **Present Value** field will take effect if the object is writable.

C. Right-click on the BACnet object in block [2], and use the right-click function menu to subscribe to the displayed value of the object. If the object does not support the subscription function, it will be realized by period grabbing. Successfully subscribed objects will be displayed in block [4], and the first subscription value may take a short time to update.

Note: The actual serial number is different for each UNOcentral, and the Device Instance

is decided by the settings in 2.1.1.6 **BACnet/IP Settings** each chapter.