iNS-316

User Manual

Ver. 1.0.0, April. 2023

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SUPPORT

iNS-316

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1. Introduction

The iNS-316 is a 16-port 10/100Base-TX IoT switch with easy-to-use web interface. It offers 2 Ethernet ports with LAN Bypass feature, and 8 PoE ports for connecting Power over Ethernet (PoE) devices such as wireless access points (APs), IP cameras, and IP phones to the network.
In compliance with the IEEE 802.3at standard, each PoE port ensures the PSE function and provides up to 30W for powered devices

The iNS-316 web interface enables you to remotely log into the iNS-316 for configuration and maintenance. You can configure the iNS-316 turn off/on or reset the power of the POE Ethernet port, and set power schedule from your browser.



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1.1 Packing List

The shipping package includes the following items:



iNS-316



Quick Start x 1

Note

If any of these items are missing or damaged, please contact the local distributor for more information. Save the shipping materials and cartons in case you need to ship the module in the future.

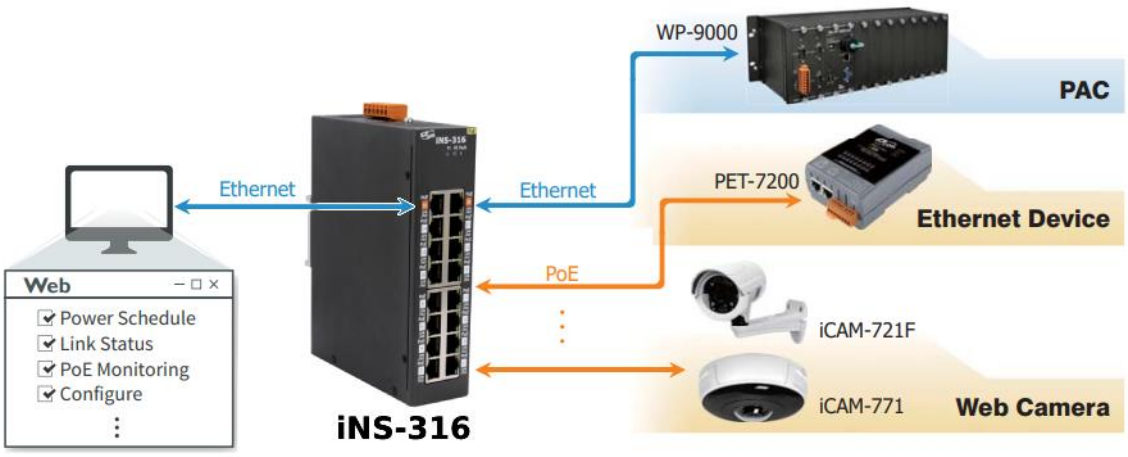
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1.2 Features

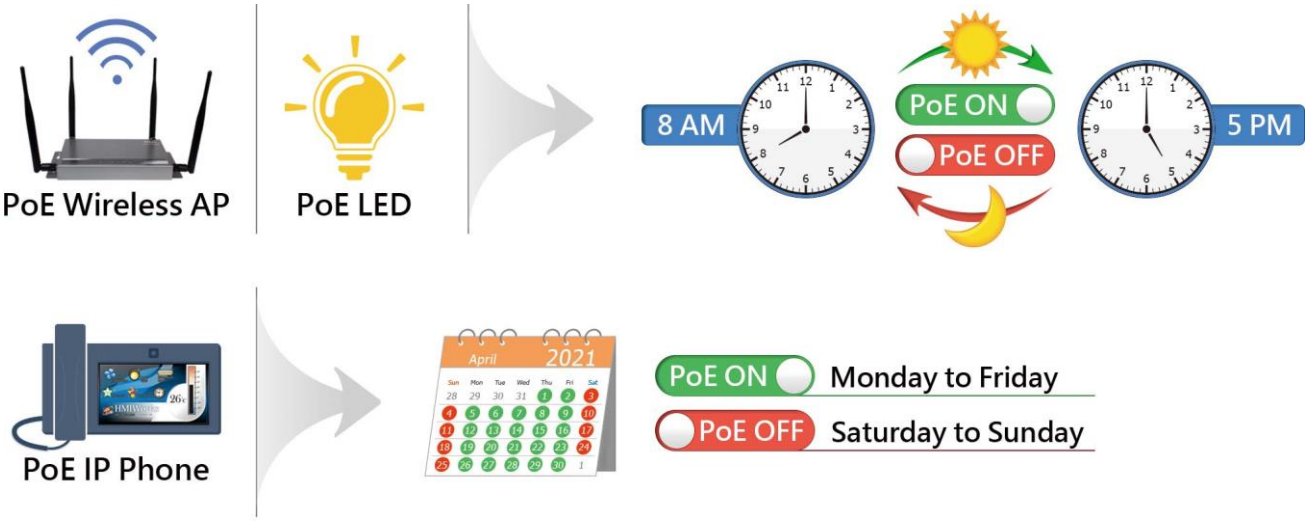
1. Built-in Web Server

The iNS-316 has a built-in web server that allows users to easily configure, monitor and control the module from a remote location using a web browser.



2. Power On/Off Schedule

An individual power on/off schedule is provided for each PoE port of the iNS-316. Auto turning off and turning on the devices at selected times can save manpower, time costs, and power when the devices are not in used.



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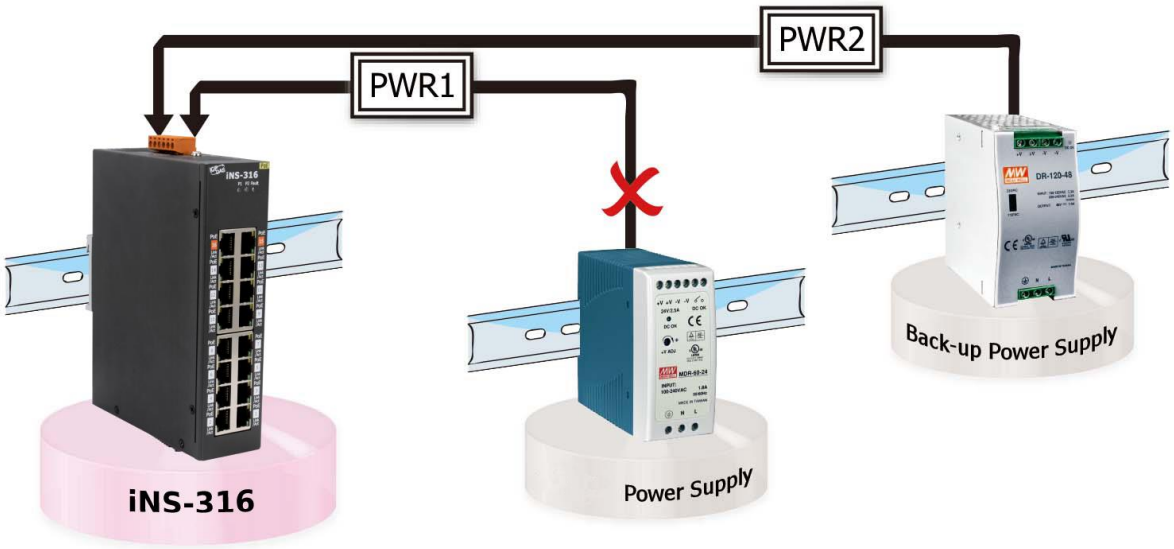
3. Power Reset Schedule

The PoE powered devices may become slow or inoperable if they are left on for too long. A simple reset can help you to solve most problems most of the time. The iNS-316 offers an individual power reset schedule for each PoE port, you can configure the schedule through a web browser to reset your devices regularly and keep them working in good condition.



4. Dual Redundant Power Input

The iNS-316 has dual redundant power inputs to ensure reliability. If the main power system fails, the switch can be powered by an UPS or backup power to prevent network disruptions and close the alarm Relay. If the iNS-316 module will be used on high load conditions (total PoE power load exceeds 60w), it is recommended to configure dual power supplies.



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5. LAN Bypass

LAN Bypass function can guarantees the Ethernet communication. It will automatically active to ensure the continued flow of important network traffic when the iNS-316 loses its power.
(iNS-316 LAN Bypass Function works on Port15 & 16)



6. PoE Power monitoring and management

The iNS-316 web server interface supports remote monitoring of the voltage, current and class on each Ethernet Port,In addition to class over loading protection, it also provides user-defined PoE power output limit, so that if the PD device is damaged or short-circuited, the power will be cut off PoE in time to protect other devices.

7. Advanced Ethernet configure

iNS-316 supports Jumbo frame, broadcast storm filter and auto-negotiation function can be configure for different applications.

8. Modbus Protocol

The Modbus TCP slave functiom on the Ethernet Port can be used to provide data to remote SCADA software.

9. SNMP_v2c Supports

iNS-316 Provide basic MIB (link status & PoE Power control) reading and trap,

10. Highly Reliable Under Harsh Environment

- Wide Operating Temperature Range: -25 ~ +75°C
- Storage Temperature: -40 ~ +85°C
- Humidity: 10 ~ 90% RH (Non-condensing)

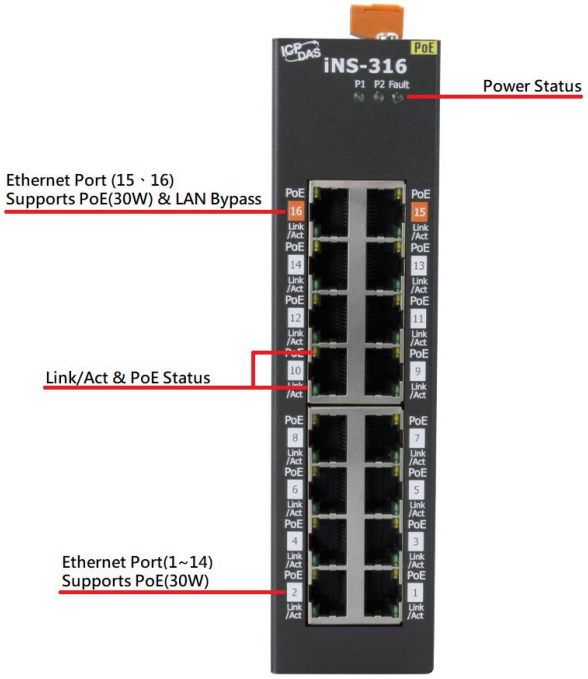
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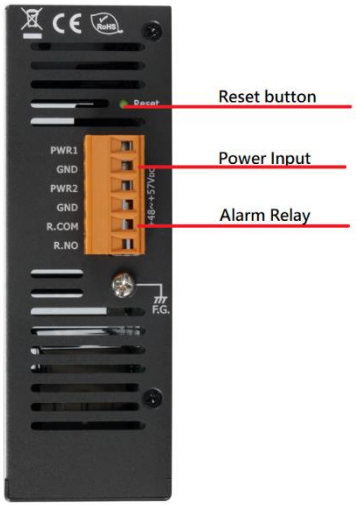
2. Hardware Information

2.1 Appearance

Front View



ToP View



1. Power LED indicator

LED indicator	Color	status	Description
P1	Green	On	Power is being supplied to power input PWR1.
		Off	Power is not being supplied to power input PWR1
P2	Green	On	Power is being supplied to power input PWR2.
		Off	Power is not being supplied to power input PWR2
Fault	Green	On	PWR1 or PWR2 power supplied is fault
		Off	Power supplied is normal

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2. Ethernet Link status LED Indicator

The iNS-316 supply 16 x 10/100Mbps PoE ports. Each port can provide up to 30 W of power (compliant with IEEE 802.3at standard). They can be used to connect and supply power to any PoE-enabled devices such as wireless access points, network cameras, IP phones, as well as to connect Ethernet-enabled devices like computers and printers.

LED Indicator	Color	Stats	Description
Link/Act & speed	Green	On	Link/Act.
		Off	Not Networking

3. PoE Status Indicator

iNS-316 has 16 Port 10/100Mbps PoE Port

independent PoE status LED for per port, when PoE detect the PD device LED will turn on.

LED Indicator	Color	Stats	Description
PoE	Orange	On	PD Device is detect.

4. Reset button

long press button and restart Power, iNS-316 will running form default IP.

5. +48 ~ +57 VDC redundant power Input

The iNS-316 supports +48 to +57 VDC wide power input range and dual redundant power input to ensure stable operation in harsh environments. Once the power is supplied, thecorresponding LED indicator lights up.

Each PoE port can provide up to 30 W of power. If the iNS-316 is utilized under high load (total PoE loadexceeds 60 W), it is recommended to configure dual power supplies.

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2.2 Specification

Model	iNS-316
PoE Technology	
PoE Compliance	100% IEEE 802.3at compliant
PoE Power	Up to 30 watts per port
PoE Pin Assignments	V+ (pin 1, 2), V-(pin 3, 6) , alternative A
PoE Voltage	+48~57 VDC depending on power input
Ethernet	
Ports	16 x RJ-45, 10/100Base-TX
Standards	IEEE 802.3 for 10 Base-T IEEE 802.3u for 100 Base-TX IEEE 802.3x for Flow Control, Back Pressure Flow Control IEEE 802.3af Power Over Ethernet IEEE 802.3at Power Over Ethernet Energy Efficient Ethernet (EEE) as per 802.3az; this provides power savings during idle network activity
Processing Type	Store & forward
MAC Addresses	16K
Frame Buffer Memory	4Mbit
Isolation	1500 Vrms 1 minute
LED Indicators	
Status	PWR1, PWR2, Fault, POE, Link/Act
Power	
Reverse Polarity Protection	Yes
Input Range	48 ~ 57 VDC Redundant dual Input
Redundant Power Inputs	Yes
Consumption	0.10 A @ 53 VDC without PD loading, 10A @ 48VDC with PD full loading (30W per ports)
Mechanical	
Casing	Metal
Dimensions (mm)	DIN-rail mounting: 44 x 179 x140 mm
Installation	DIN-rail mounting or wall mounting (optional)
Environmental	
Operating Temperature	-25 °C ~ +75 °C
Storage Temperature	-40 °C ~ +85 °C
Humidity	10% ~ 90% RH, non-condensing

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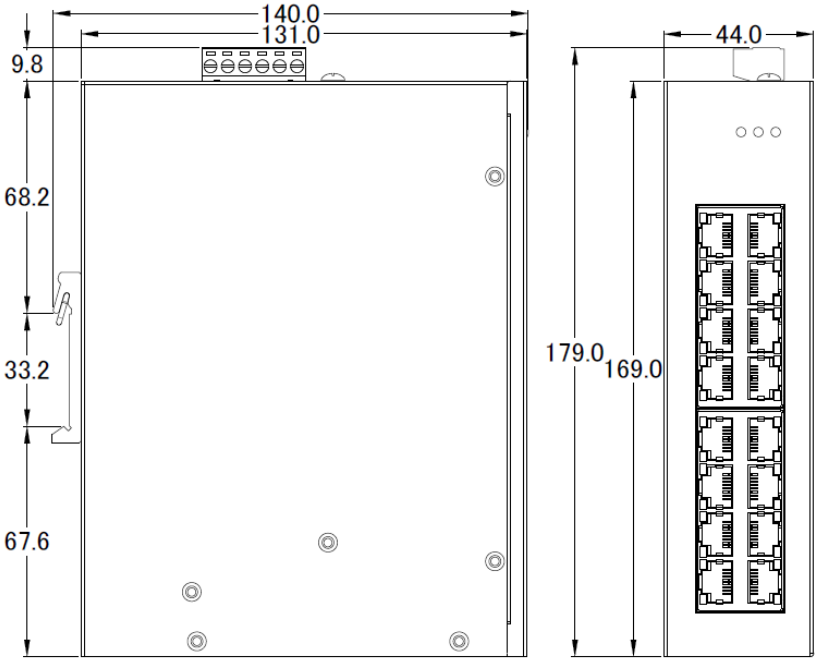
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2.3 Ethernet and PoE Pin Out

The pinout follows the Alternative A of IEEE 802.3af/802.3at standards. Please see the details in the following table

Pin No	Ethernet	PoE
1	Tx+	V+
2	Tx-	V+
3	Rx+	V-
4	--	--
5	--	--
6	Rx-	V-
7	--	--
8	--	--

2.4 Dimensions



(unit = mm)

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3. Getting Started

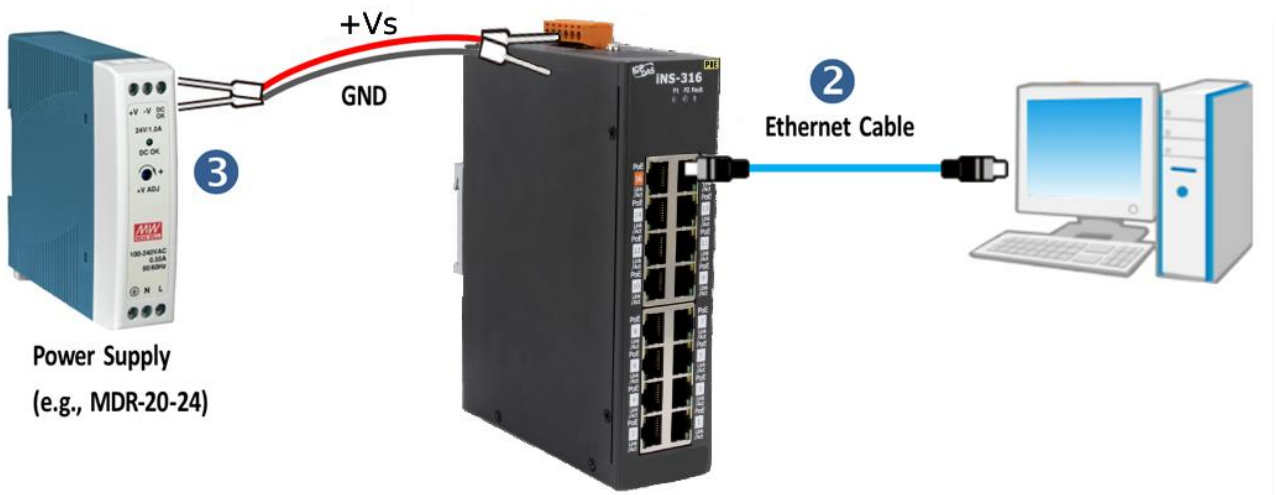
This chapter provides a basic overview of how to configure and operate the iNS-300 series module.

3.1 Connecting the Power and the Host PC

Step 1: Connect both the iNS-300 series module and the Host PC to the same sub network.

Ensure that the network settings on the Host PC have been correctly configured and are functioning normally. Ensure that the Windows firewall or any Anti-Virus firewall is properly configured to allow incoming connections, or temporarily disable these functions, otherwise the **"Search Servers"** function in the eSearch Utility described in Section 3.3"Configuring the Network Settings" may not perform as expected. Contact the System Administrator for instructions of how to do this.

Step 2: Apply power (+48 ~ +57 V_{DC}) to the iNS-316.

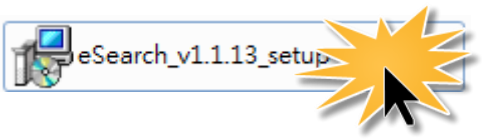


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3.2 Configuring the Network Settings

Step 1: Get the eSearch Utility

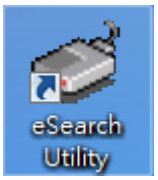


The eSearch Utility can be obtained from the ICP DAS Web site at:

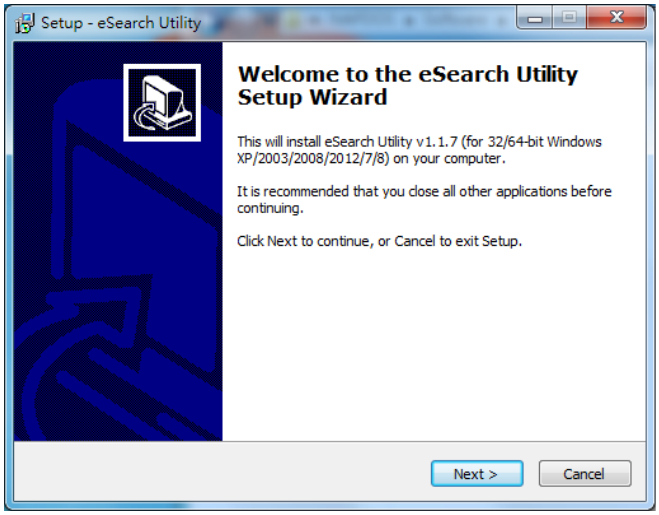
https://www.icpdas.com/en/product/guide+Software+Utility_Driver+eSearch__Utility

Step 2: Install the eSearch Utility

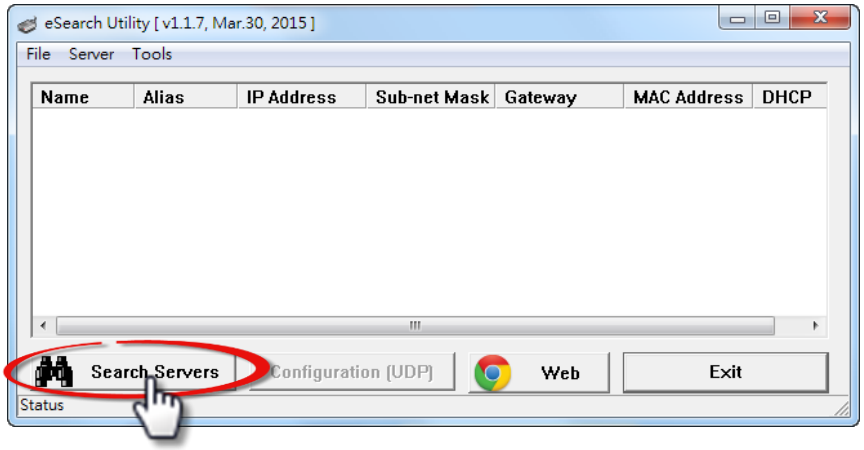
Follow the instructions in the eSearch setup wizard to complete the installation.



After the installation has been completed, a new short cut for the eSearch Utility will be displayed on your desktop



Step 3: Click "**Search Servers**" to search for the iNS-300 series module on the network



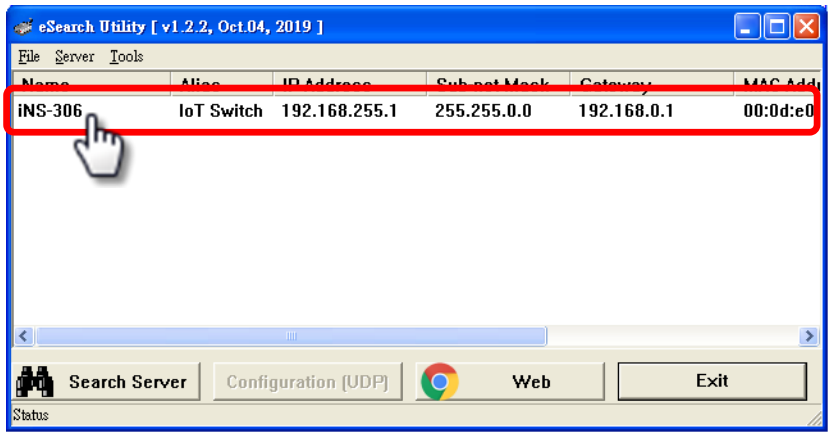
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Step 4: Double-click your module name to open the configuration dialog box

Factory Default Settings

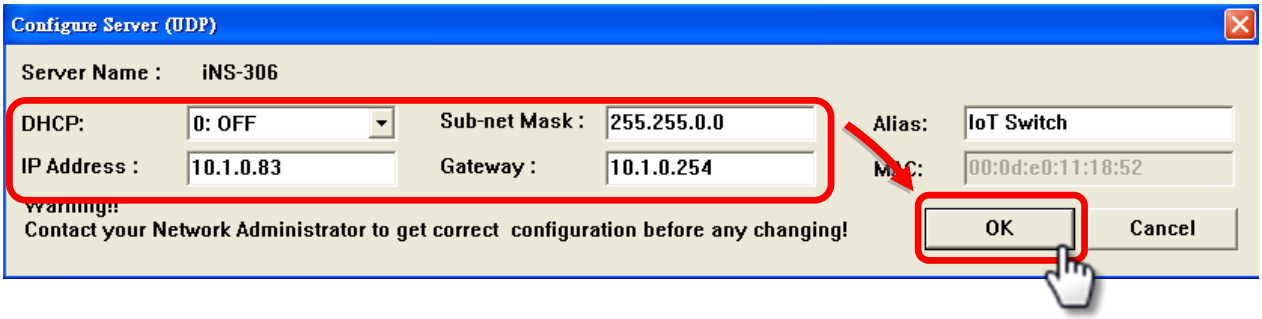
IP	192.168.255.1
Gateway	192.168.0.1
Mask	255.255.0.0



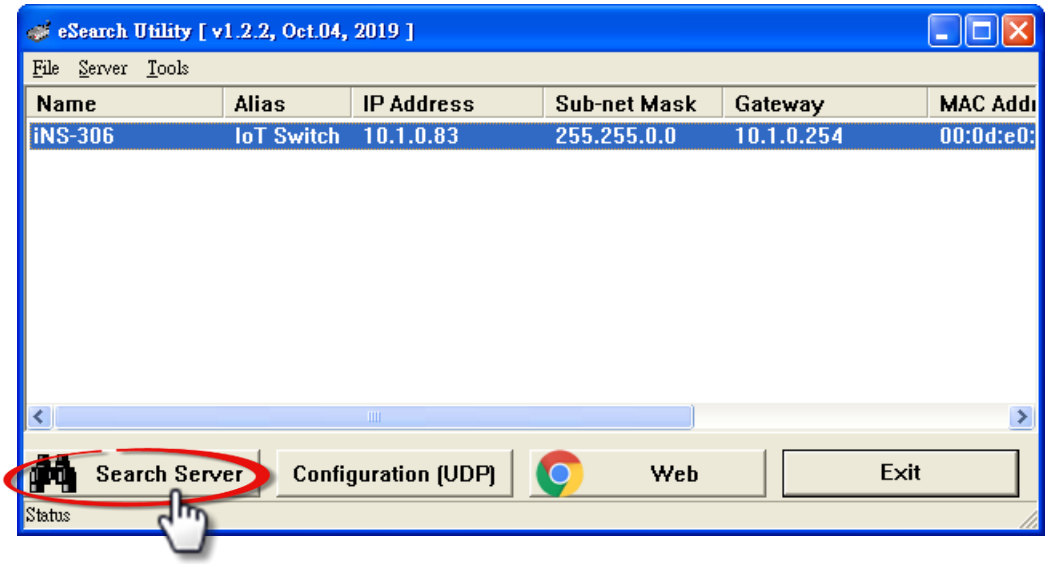
Step 5: Assign new network settings and then click the "OK" button

Enter the relevant values for the **IP Address, Subnet Mask, Gateway**, etc., and then click the **"OK"** button. The new settings will take effect within 2 seconds.

(Contact the Network Administrator to obtain the relevant details)



Step 6: Wait for 2 seconds and then click "Search Servers" again to ensure that the module is functioning properly with new configuration.

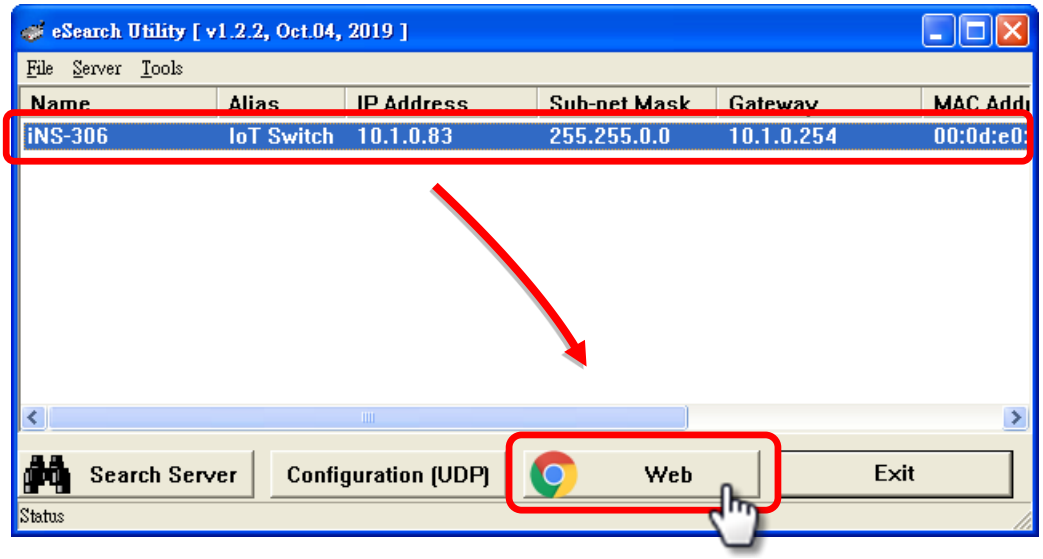


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Step 7: Click the "**Web**" button to connect to the web interface

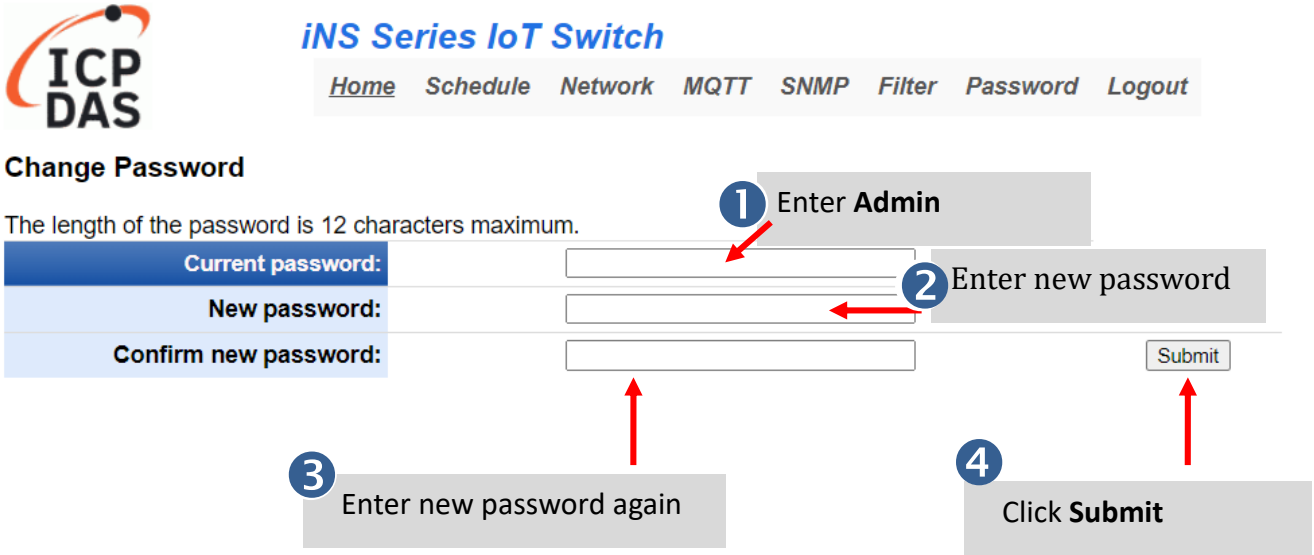
(Or entering the iNS-300's IP address into a web browser)



Step 8: Change password upon first login

The default password for logging in to the iNS-300 web page is **Admin**. You will be prompted to change your password upon first login or when the password is the same as the default.

(Create a 1 to 12 character password using alphanumeric characters only.)



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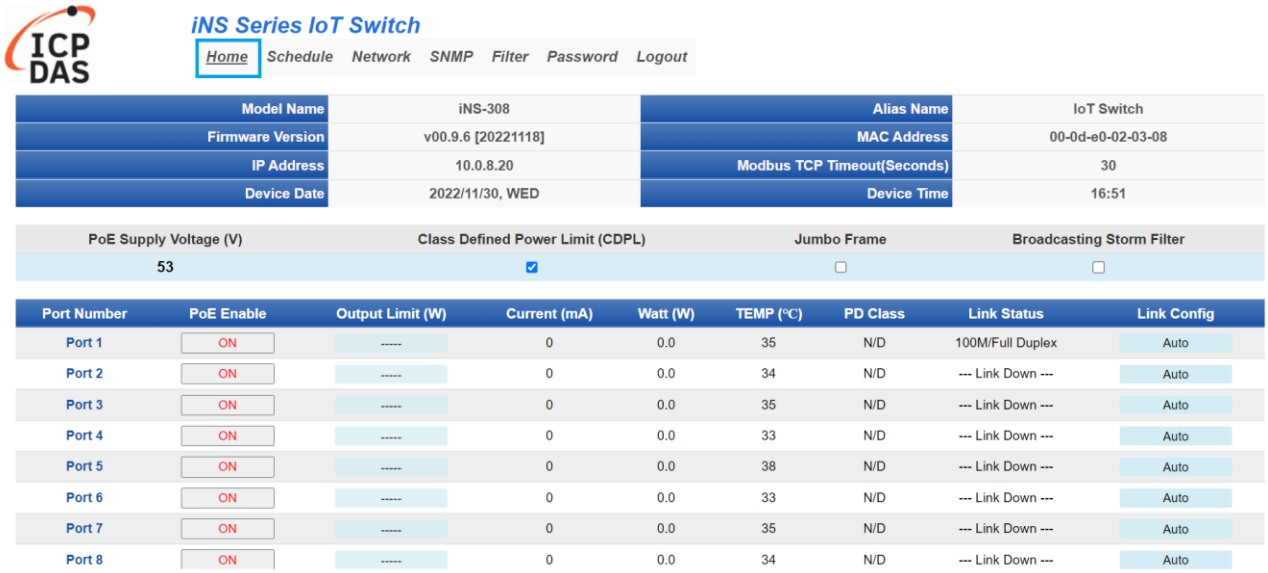
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4. Web Configuration

The iNS-316 has a built-in Web Server, which provides an intuitive web interface, allowing users to login to the module for monitoring the physical status of an Ethernet or PoE port, configuring and managing module settings through a browser.

4.1 Home

The **Home** page is the startup page when you log into the module. It displays detailed information about the module and the connection status and power consumption of the POE devices. You can turn on and off the PoE power, or enable/disable jumbo frame support here.



The first section provides basic information related to the module including the model name, firmware version, IP address, MAC address and so forth.

Model Name	iNS-308	Alias Name	iNS-308
Firmware Version	v00.0.3 [20220601]	MAC Address	00-0d-e0-00-03-08
IP Address	10.0.8.30	Modbus TCP Timeout(Seconds)	30
Device Date	2022/6/20, MON	Device Time	14:39

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The second section displays the PoE Supply Voltage & Advanced Ethernet configure

PoE Supply Voltage (V)	Class Defined Power Limit (CDPL)	Jumbo Frame	Strom Filter
53	☑	☐	☐

Port Number	PoE Enable	Output Limit (W)	Current (mA)	Watt (W)	TEMP (℃)	PD Class	Link Status	Link Config
Port 1	ON	-----	0	0.0	39	N/D	--- No Link ---	Auto
Port 2	ON	-----	0	0.0	39	N/D	--- No Link ---	Auto
Port 3	ON	-----	0	0.0	37	N/D	--- No Link ---	Auto
Port 4	ON	-----	0	0.0	40	N/D	100M/Full Duplex	Auto
Port 5	ON	-----	0	0.0	38	N/D	--- No Link ---	Auto
Port 6	ON	-----	0	0.0	38	N/D	--- No Link ---	Auto
Port 7	ON	-----	0	0.0	38	N/D	--- No Link ---	Auto
Port 8	ON	-----	0	0.0	45	N/D	--- No Link ---	Auto

The third section displays Current、Watt and Ethernet link status of per port

Item	Description
PoE Enable	Displays the power on/off status of a PoE port. Click botton to On/Off Power ON Enable PoE Power OFF Disable PoE Power
Output Limit(W)	Display & configure PoE Power output limit(W) * this function can not used for CDPL mode
Current(mA)	The current of connected PoE devices (unit: mA)
Watt(W)	The power consumption of connected PoE devices (unit: W)
TEMP (℃)	Display iNS-316 PoE Port(inside) temperature
PD Class	Display PoE device Class level for power N/D – No Device Class 0 – Range 0~15.4W Class 1 – Max 3.8W Class 2 – Max 6.8W Class 3 – Max 15.4W Class 4 – Max 30W * Overloading protect only action at CDPL mode
Link Status	Display Port link status and Speed
Link Configure	Configure Port link speed and full/half duplex mode, Default Auto-negotiation

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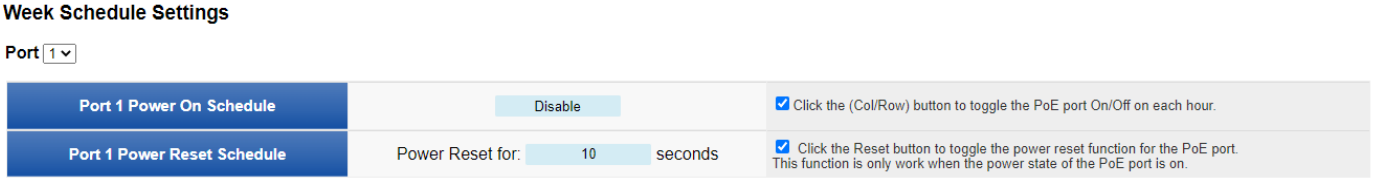
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4.2 Schedule

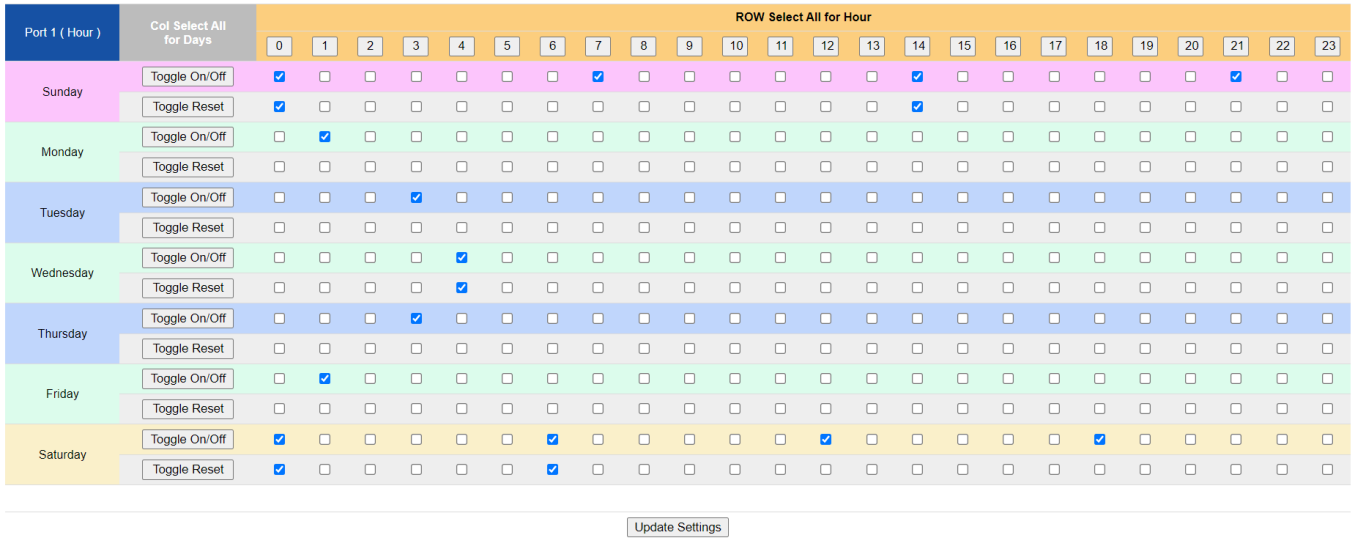
On the Schedule page, you can manage the power schedule for PoE powered device(s) in a week.



The first section provides PoE Port select、schedule Enable/Disable and reset delay configure interface.



Whan, Power On Schedule set to “Enable” and Power schedule setup is complete, must click “Update Settings” button to seved and activation.



* Configure method please refer to Section **5.2 Power Schedule**

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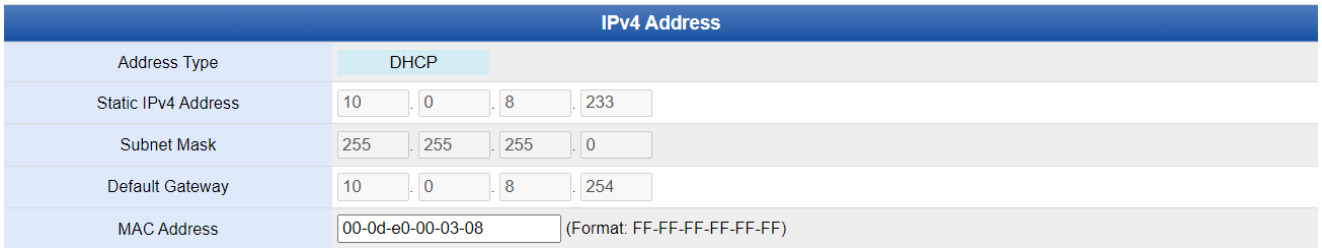
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4.3 Network



will be described in more detail below.

The IP Address Configuration section displays the network parameters of the module allowing you to modify these settings. You can select DHCP to receive a dynamic IP address from a DHCP server, or select static IP to manually assign an IP address to the module here.



Item	Description
Address Type	**Static IP**: Manually set the IP Address, Subnet Mask and Default Gateway.
	DHCP: Using dynamic IP address that the DHCP server assigns.
Static IP Address	Enter an unique IP address on the network that the module is connected. This setting is available only when **Address Type** is Static IP enabled.
Subnet Mask	Enter a subnet mask. (Available only when Static IP is enabled.)
Default Gateway	Enter a default gateway. (Available only when Static IP is enabled.)
MAC Address	Enter a new MAC address if required. (Not recommended to modify.)

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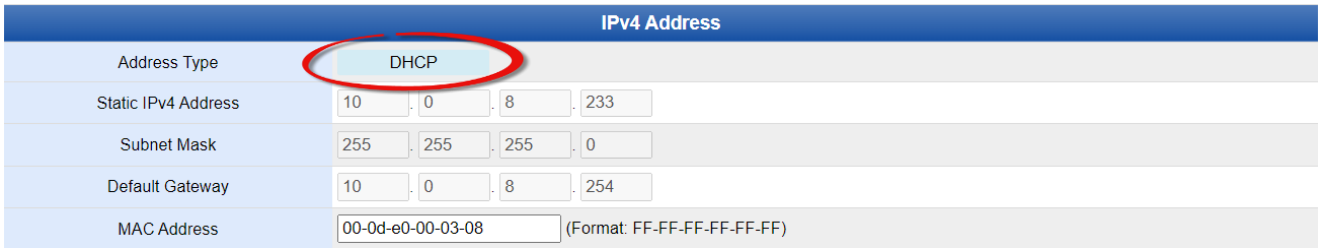
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➢ DHCP Configuration

If a DHCP server is connected to you network, a network address can be dynamically assigned by enabling DHCP client mode.

Step 1: Select **"DHCP"** from the **Address Type** drop-down menu.

Step 2: Click the **"Update Settings"** button to complete the configuration.



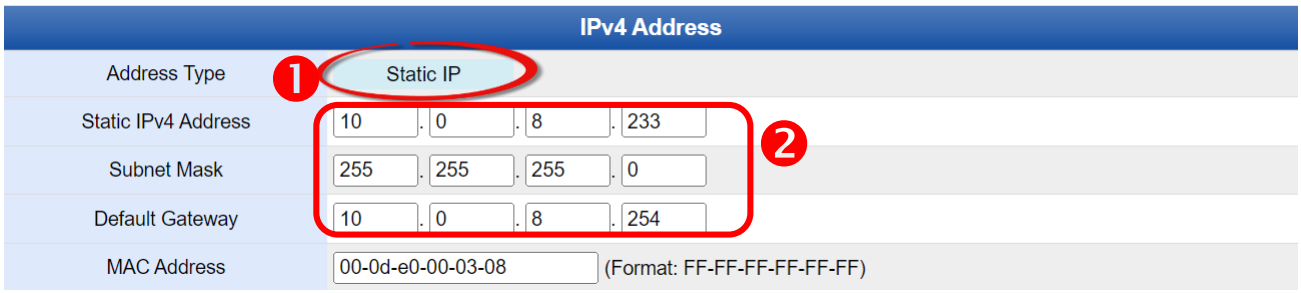
➢ Static IP Configuration

If Static IP is selected, you have to assign an IP address, a subnet mask and default gateway.

Step 1: Select **"Static IP"** from the **Address Type** drop-down menu.

Step 2: Enter the relevant details in the respective **network settings** fields.

Step 3: Click the **"Update Settings"** button to complete the configuration.



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The General Settings section provides options for viewing and changing a variety of network settings, including Ethernet Speed, System Timeout, TCP Timeout, Web Auto-logout, etc.

General Settings

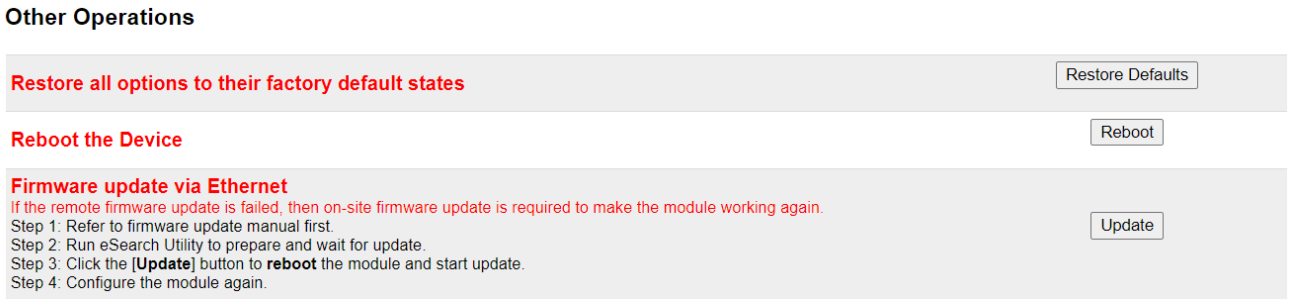
Ethernet Speed	Auto (Auto=10/100 Mbps Auto-negotiation)
Modbus TCP Timeout	30 (5 ~ 65000 s, Default = 180, Disable = 0) Action:Cut-off connection
UDP Heartbeat	0 (20 ~ 300 seconds, 0 = Default Disabled)
UDP Configuration	Enable (Enable/Disable the UDP Configuration, Default = Enable)
Web Auto-logout	0 (1 ~ 65000 minutes, Default = 10, Disable = 0)
HTTP port	80 (Default = 80)
Alias Name	iNS-308 (Max. 18 chars)
	Update Settings

Item	Description
Ethernet Speed	Set the iNS-316 CPU Ethernet speed
Modbus TCP Timeout (unit: sec)	Set the Modbus TCP timeout period. If there is no traffic on the network over the time set in this field, the connection will be automatically closed.
UDP Configuration	Enable or disable the UDP configuration function.
Web Auto-logout	Set the automatic logout time. The user will be log out after the predetermined period of inactivity on web interface has elapsed
Alias Name	Assign the alias name. Assigning a unique alias to each iNS-316 helps to identify multiple modules on the same network.
HTTP Port	Assign an HTTP port for the iNS-300 series module. The new setting will take effect after the module is restarted. The default value is 80. If a custom HTTP port is used, you have to add the port number after the IP address to connect the iNS-300 series module web interface. For example, enter “IP address: HTTP port” as “**xx.xx.xx.xx:81**” in your browser. (iNS-300’s IP address)
Update Settings	Click this button to update the revised settings.

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You can restore the iNS-300 series module to factory default settings or reboot it in the Other Operations section.

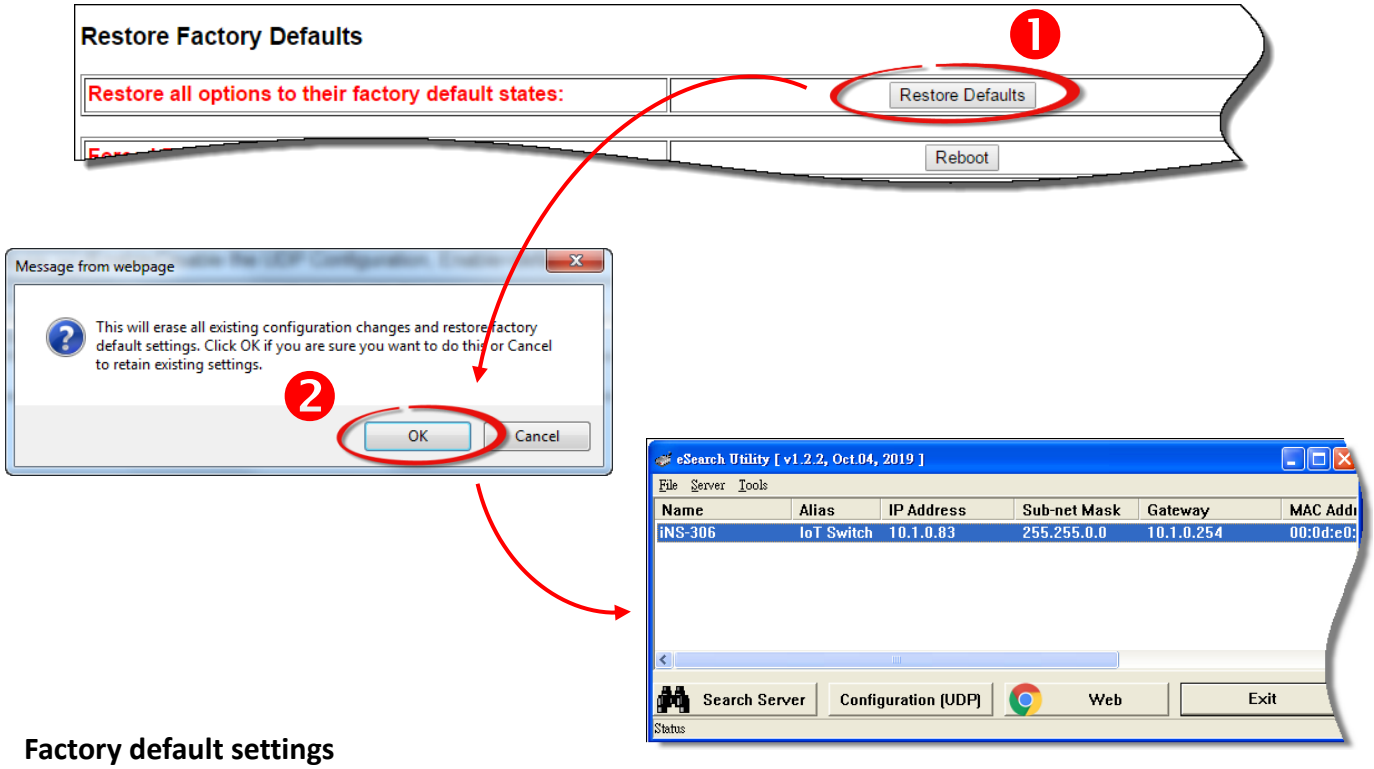


➢ Restoring Factory Default Settings

Step 1: Click the **"Restore Defaults"** button.

Step 2: Click **"OK"** on the pop-up dialog box.

Step 3: Search the iNS-300 series module in the eSearch Utility to confirm if the factory default settings have been restored. Refer to Sec.3.3 Configuring the Network Settings for more detailed information.



Factory default settings	
IP Address	**192.168.255.1**
Gateway Address	192.168.0.1
Subnet Mask	255.255.0.0

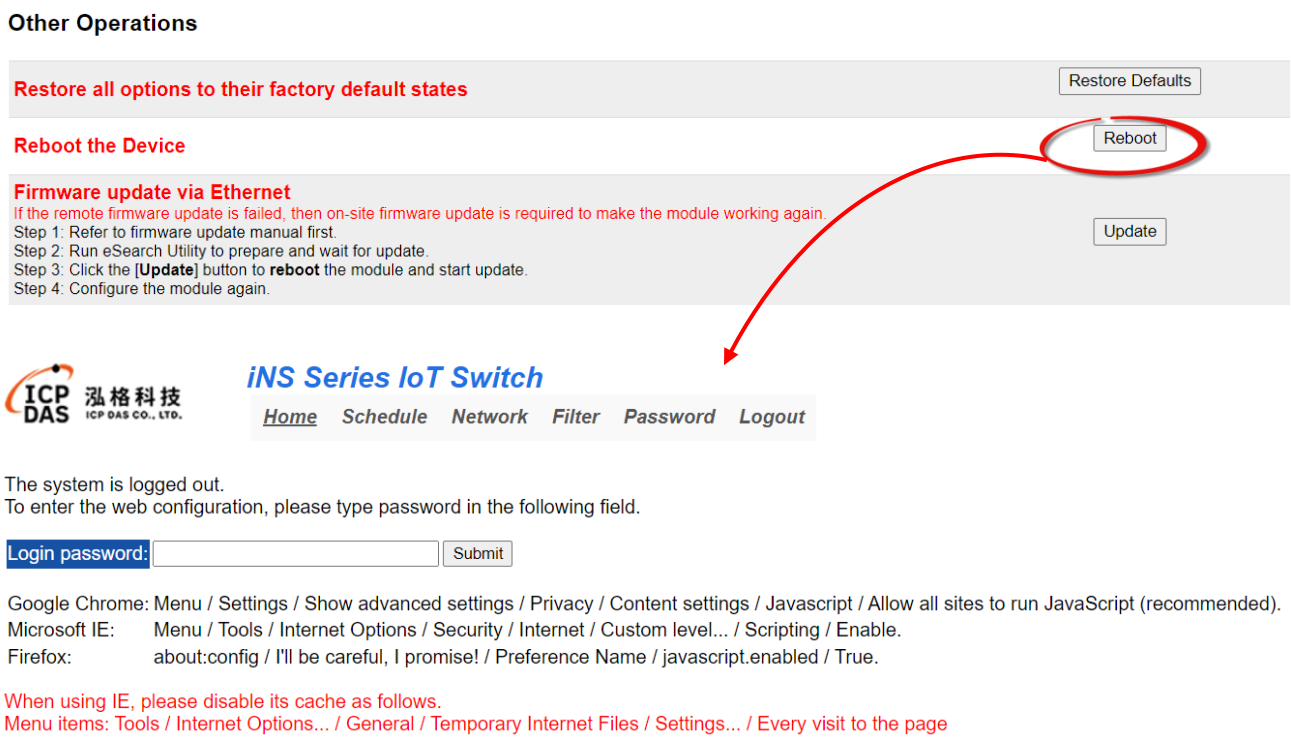
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Rebooting the Module

Step 1: Click the **"Reboot"** button in the right field of Force Reboot.

Step 2: After the module restarts, reload the web interface and log into the module again.



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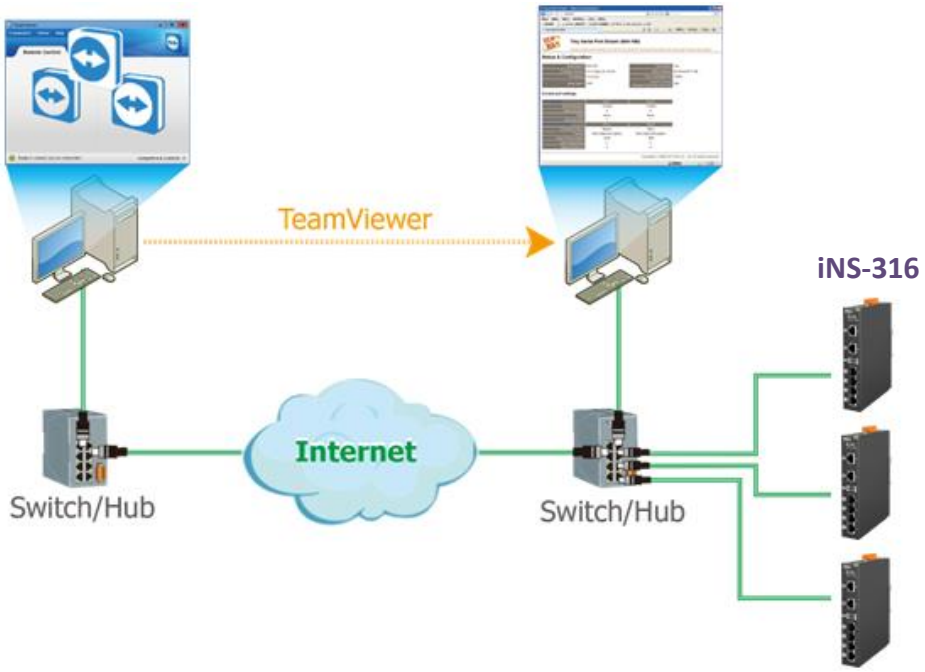
➢ Updating Firmware

Generally, you have to manually put the operating mode switch(1) in INIT position and reboot the iNS-300 series module to update the firmware. But when the iNS-300 series module is deployed on the ceiling or in areas that are isolated and hard to reach, you can update firmware by clicking the **"Reboot"** button in the Firmware Update section via the network without manual adjustment.

Firmware Update

If the remote firmware update is failed, then the traditional firmware update (on-site) is required to make the module working again. Step 1: Refer to firmware update manaul first. Step 2: Run eSearch Utility to prepare and wait for update. Step 3: Click the [**Update**] button to **reboot** the module and start update. Step 4: Configure the module again.	

Note that the iNS-300 series module needs to be connected to the same network as your computer. If not, using remote desktop software like TeamViewer to access to a computer connected to the same network of the iNS-300 series module, you can remotely update firmware in the same way.



⚠ Note If the remote firmware update fails, the module will not work properly. It is necessary to manually update the firmware for the module to function correctly

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4.4 MQTT



➢ Connectivity Settings

Refer to Section **4.8.1 Connectivity Settings** for more details about the setting.

➢ Publication Settings

Refer to Section **4.8.2 Publication Settings** for more details about the setting.

➢ PoE Status

Refer to Section **4.9 MQTT-PoE Status** for more details about the setting.

➢ Restore Factory Defaults

Refer to Section **4.8.3 Restore Factory Defaults** for more details about the setting.

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4.5 SNMP

The SNMP Page contains SNMP Configuration & trap address setup.



Use "SNMP v2c Agent Configuration" to set SNMP basic parameters and Trap IP Address, check the Enable SNMP item and click the **Update Settings** button to enable the function

SNMP v2c Agent Configuration

System Info	Setting
Contact	User (Max. 47 chars)
Location	Site (Max. 47 chars)
Description	EtherIO (Max. 47 chars)
Name	Device (Max. 47 chars)
Function	**Setting**
Read-Only Community	public (Max. 47 chars, example: public)
Read-Write Community	private (Max. 47 chars, example: private)
Trap Community	public (Max. 47 chars, example: public)
Manager / Trap IP #1	10.0.8.43 (IPv4/v6 Address, example: 10.0.8.123, fe80:0:0:0:a8ee:dc07:1cda:5678)
Manager / Trap IP #2	0.0.0.0
Generic Trap	☑ Cold Start ☑ Warm Start
Enable SNMP	☑ Check to enable. (Default disabled)

Update Settings

Note. Modify the SNMP Enable status please reboot the iNS-316 to activate the Modification

iNS-316 provide PoE Power Enable & Link status trap function, then status Modify will sead information to your Trap IP, more information, please refer to Section 4.10 SNMP

SNMP Specific Trap

Port Number	PoE Status Change	Specific ID (1-255)	Link Status Change	Specific ID (1-255)
Port 1	☑	11	☑	21
Port 2	☑	12	☑	22
Port 3	☑	13	☑	23
Port 4	☑	14	☑	24
Port 5	☑	15	☑	25
Port 6	☑	16	☑	26
Port 7	☑	17	☑	27
Port 8	☑	18	☑	28

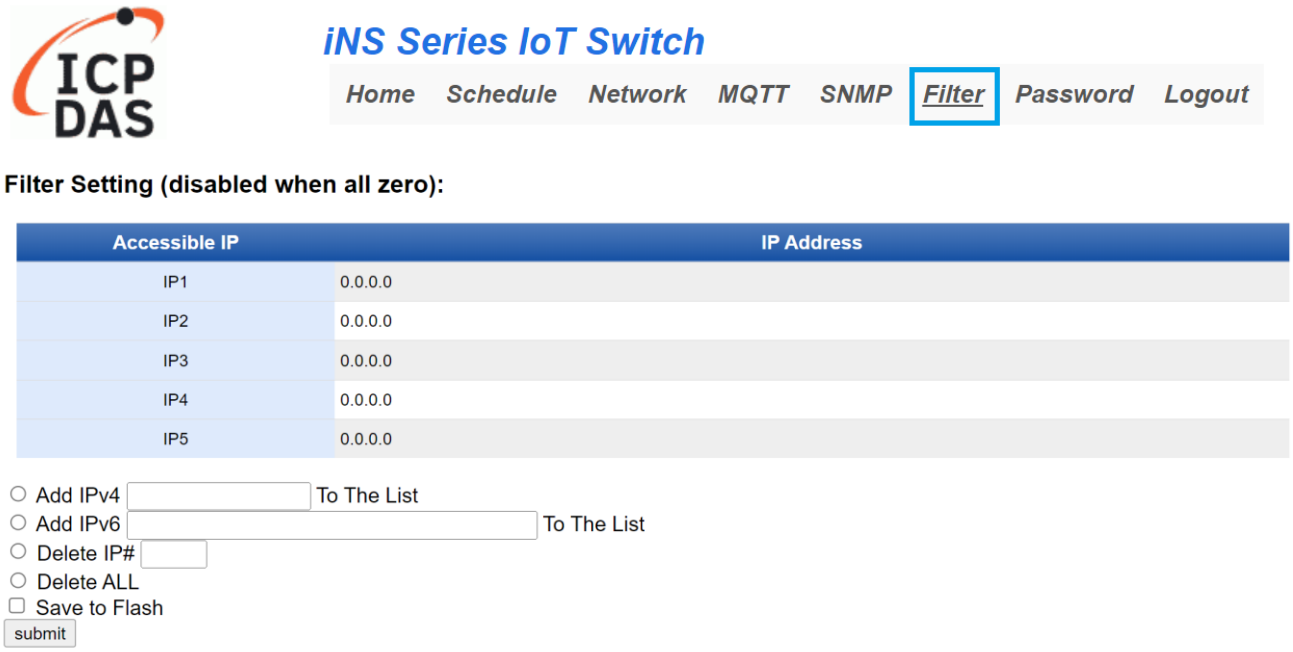
Update Settings

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4.6Filter

The Filter page is used to query or edit the IP Filter list (Allow IP List) for the iNS-300 series module. The IP filter list restricts the access of incoming packets based on the IP address. If one or more IP addresses are saved into the **Allow IP List**, only clients that have an IP address within the filter list can access the iNS-300 series module.



Item	Description
Add “IP” to the List	Enter the new IP address to the Allow IP List.
Delete IP #	Enter the IP# (number = 1 ~ 5) to delete the IP address from the Allow IP List.
Delete All	Delete all IP addresses contained in the Allow IP List.
Save to Flash	Check the checkbox before clicking “**Submit**” to save the content within Allow IP List to the Flash memory.
Submit	Click this button to apply the revised settings.

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4.7 Changing Password



You can change password on the **Password** page.

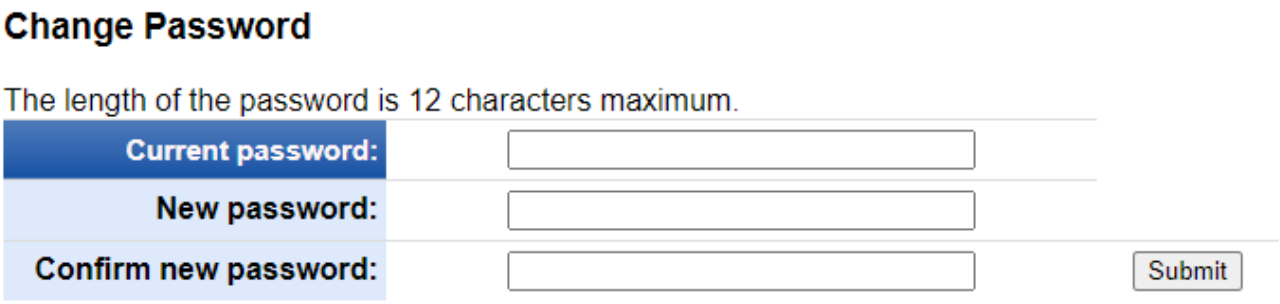
Step 1: Enter your current password in the **"Current password"** field.

Step 2: Enter your new password in the **"New password"** field.

(1 ~ 12 alphanumeric characters are allowed)

Step 3: Enter your new password in the **"Confirm new password"** field.

Step 4: click the "**Submit**" button to update the password.



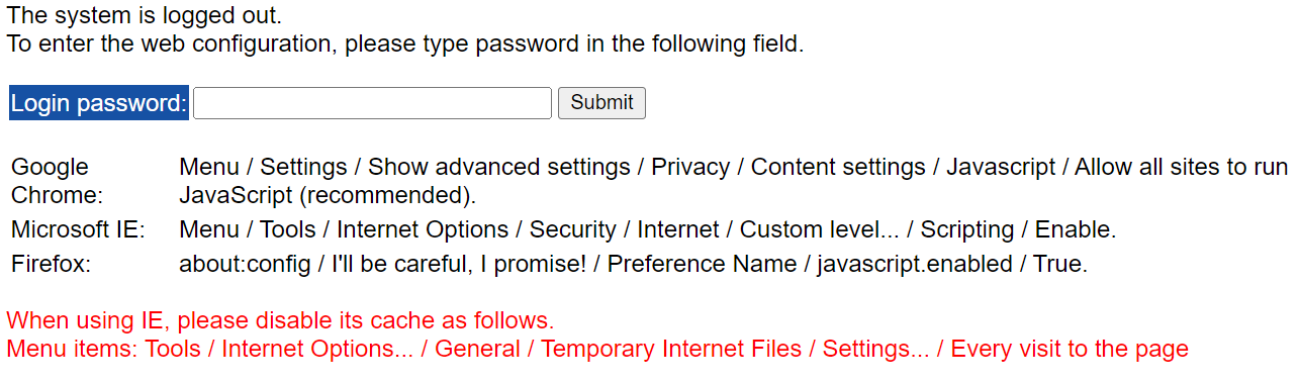
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4.8 Logout



Click “**Logout”** on the navigation bar to log out of your account. It redirects you to the login page



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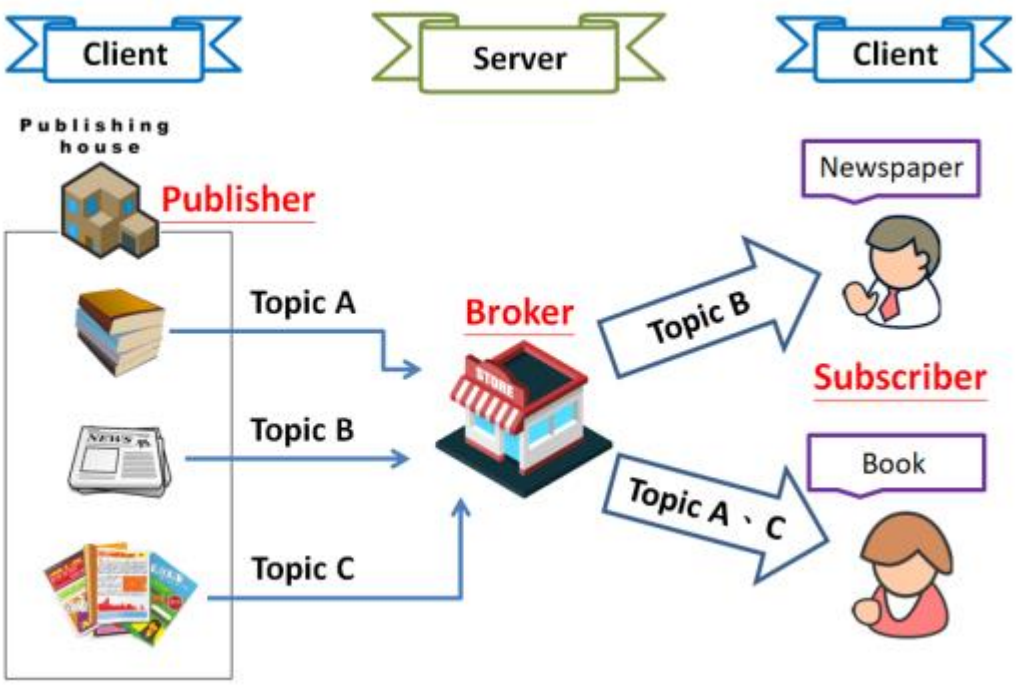
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4.9 MQTT

MQTT is a Client Server Publish/Subscribe messaging transport protocol. It is simple, lightweight, and open, and is designed to be easy to implement. These characteristics make it ideal for use in many situations, including constrained environments such as for communication in Machine-toMachine (M2M) and Internet of Things (IoT) contexts where a small code footprint is required and/or network bandwidth is at a premium.

MQTT is a protocol consisting of a Publish/Subscribe mechanism where the Client only needs to know the IP address of the Broker. The Broker then acts as a central location to handle the sending and receiving of all messages between a Publisher and a Subscriber. The Publisher is the entity that publishes the topic and message, the Subscriber is the entity that receives the updated messages from the Broker.

When the Publisher updates a message related to a specific topic, it is transmitted to the Broker, which will then send the message to all Subscribers that have subscribed to that particular topic. Neither the Publisher nor the Subscriber needs to know the status of the other.



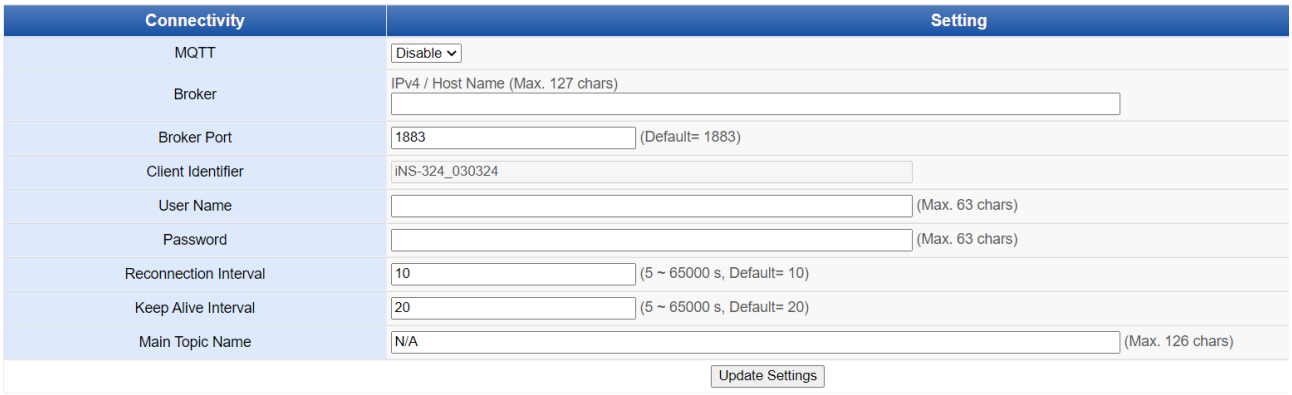
The above is a schematic diagram of the system. Publishers are similar to various forms of the publishing house and focus on updating commodities for different topics such as novels, newspapers, magazines, etc. Subscribers are similar to consumers, who purchase, or subscribe to designated commodities in a bookstore (Broker), which presents the latest information that has been designated by the Subscriber.

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4.9.1 Connectivity Settings

MQTT Configuration



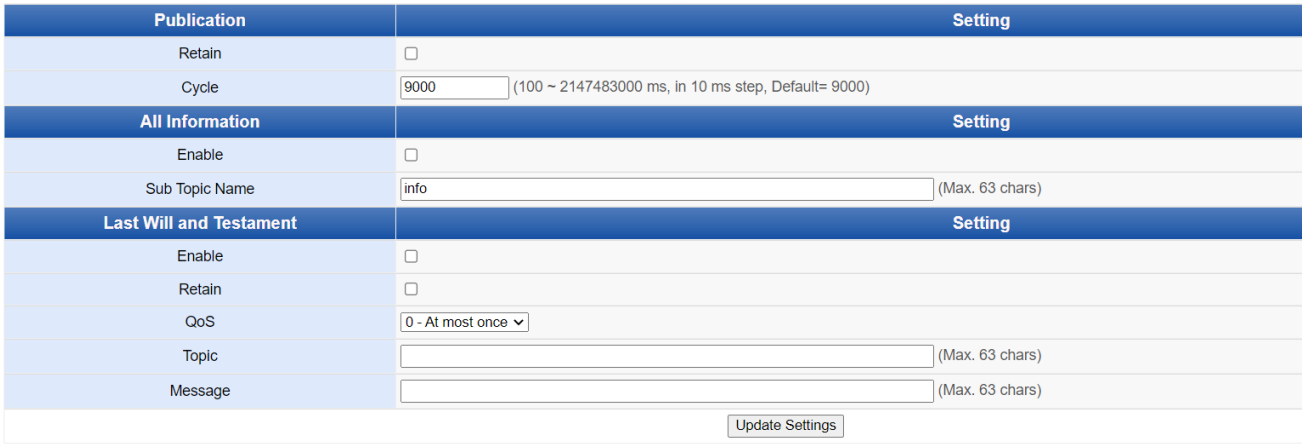
Item	Description	Defaults
MQTT	Select sechedule port number.	Disabled
Broker	Sechedule Enable/Disable select, default Disable.	N/A
Broker Port	Power reset delay time, default 10 Sec.	1883
Client Identifier	The client identifier uniquely identifies the MQTT client to the MQTT broker, and consists of the “module name”+ “_” (underscore character) + “the last 6 digits of the MAC address” and cannot be changed.	
User Name	This parameter is used when the MQTT broker requires authentication. The length should be no more than 63 characters.	N/A
Password	This parameter is used when the MQTT broker requires authentication. The length should be no more than 63 characters.	N/A
Reconnection Interval	The time interval between attempts by the iNS-300 module to connect to the broker if a connection failure occurs. The valid range is 5 to 65000 seconds	10(s)
Keep Alive Interval	The keep-alive mechanism is provided to ensure that both the client and the broker are alive and the connection is still open. If a Client doesn’t send any messages during the Keep Alive period, it must send a PINGREQ packet to the broker to confirm its availability. The broker must reply with a PINGRESP packet to also indicate its availability. The broker will disconnect a client, which doesn’t send a PINGREQ packet or any other message within one and a half times of the Keep Alive Interval. The valid range is 5 to 65000 seconds.	20(s)

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Main Topic Name	The Topic Name is a combination of the Main Topic Name and the Sub Topic Name. The Main Topic Name can be empty. The same part of the Topic Names can be entered in the Main Topic Name field to improve the processing efficiency of all Topic Names. A shorter Topic Name also improves processing efficiency	N/A
Update Settings	Click this button to save any revised settings to the iNS-300 Switch.	

4.9.2 Publication Settings



The table describes the parameters contained in the "Publication Settings" section.

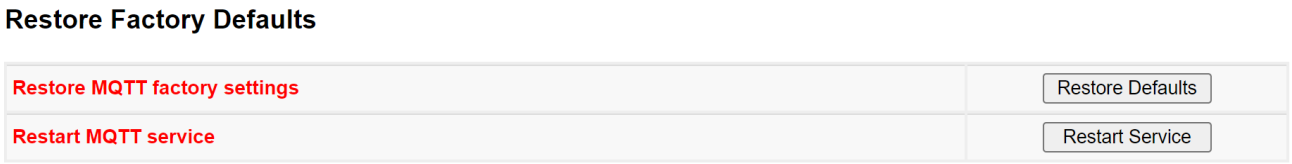
Item	Description	Defaults
Publication		
Retain	Check this option to ensure that the message is retained once it is published.	Disabled
Cycle	The time interval that the iNS-300 module periodically publishes data. The valid range is 100 to 2147483000 milliseconds in intervals of 10 milliseconds	9000(ms)
All Information		
Enable	This option is used to enable or disable the All Information function. All Information adopts Periodic Publish, which includes the Module Name, the MAC address, PoE Enable, and Link states. The publishing period depends on the Cycle setting	Disabled
Sub Topic Name	The Topic Name is a combination of the Main Topic Name and the Sub Topic Name. A shorter Topic Name improves processing efficiency.	info

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Item	Description	Defaults
Last Will and Testament		
Enable	Check this option to enable the Last Will and Testament function	Disabled
Retain	Check this option to ensure that the Last Will and Testament message is retained once it is published.	Disabled
QoS	The QoS for the Last Will and Testament message.	0 - At most once
Topic	The Topic Name for the last will and Testament message. The length should be no more than 63 characters	N/A
Message	The Last Will and Testament message. The length should be no more than 63 characters.	N/A
Update Settings	Click this button to save any revised settings to the iNS-300 Switch.	

4.9.3 Restore Factory Defaults



The table describes the parameters contained in the "Restore Factory Defaults" section.

Item	Description
Restore MQTT factory settings	Click this button to reset all MQTT settings to the default factory settings
Restart MQTT service	Click this button to restart the MQTT service. This function should be used to reconnect with the Broker after adjusting the MQTT settings.

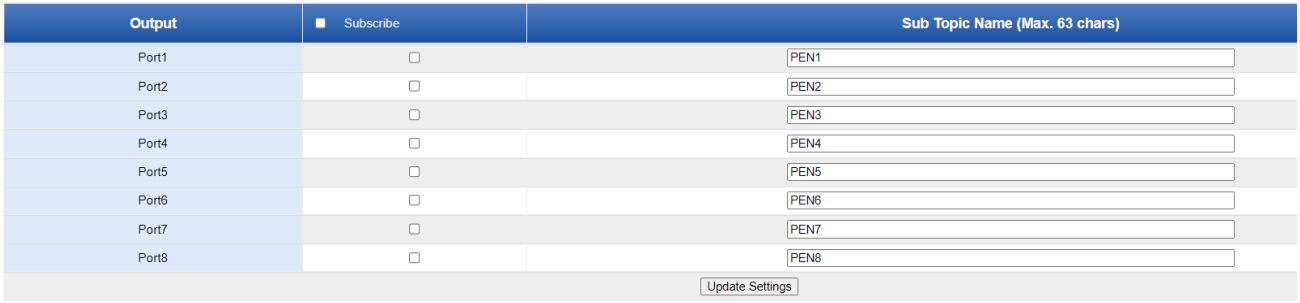
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4.10 MQTT – PoE Status

This page is where you can set a full Topic Name, which is a combination of the Sub Topic Name and the Main Topic name.

4.10.1 MQTT – Output



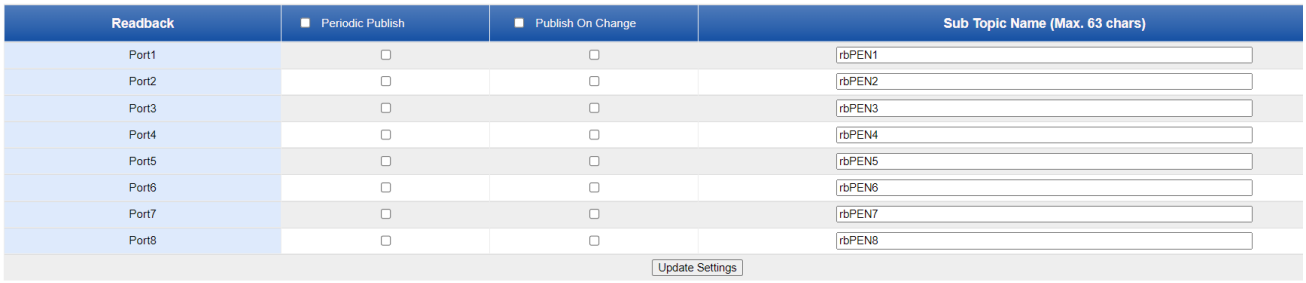
The table describes the parameters contained in the "MQTT – Outputs" section.

Item	Description	Defaults
Subscribe	The PoE Enable status will change with messages updated by subscribed topics.	Disabled
Sub Topic Name	The Topic Name is a combination of the Main Topic Name and the Sub Topic Name. A shorter Topic Name improves processing efficiency	Corresponding Port
Update Settings	Click this button to save any revised settings to the iNS-300 Switch.	

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4.10.2 MQTT – Readbacks of the Outputs



The table describes the parameters contained in the "Readbacks of the Digital Outputs" section

Item	Description	Defaults
Periodic Publish	Used to enable or disable the Periodic Publish function. The publishing period depends on the Cycle settings. Check the box to enable and uncheck it to disable the function	Disabled
Publish On Change	A message will be published when the state of the corresponding PoE Enable is changed. Check the box to enable and uncheck it to disable the function	Disabled
Sub Topic Name	The Topic Name is a combination of the Main Topic Name and the Sub Topic Name. A shorter Topic Name improves processing efficiency	Corresponding Port
Update Settings	Click this button to save any revised settings to the iNS-300 Switch.	

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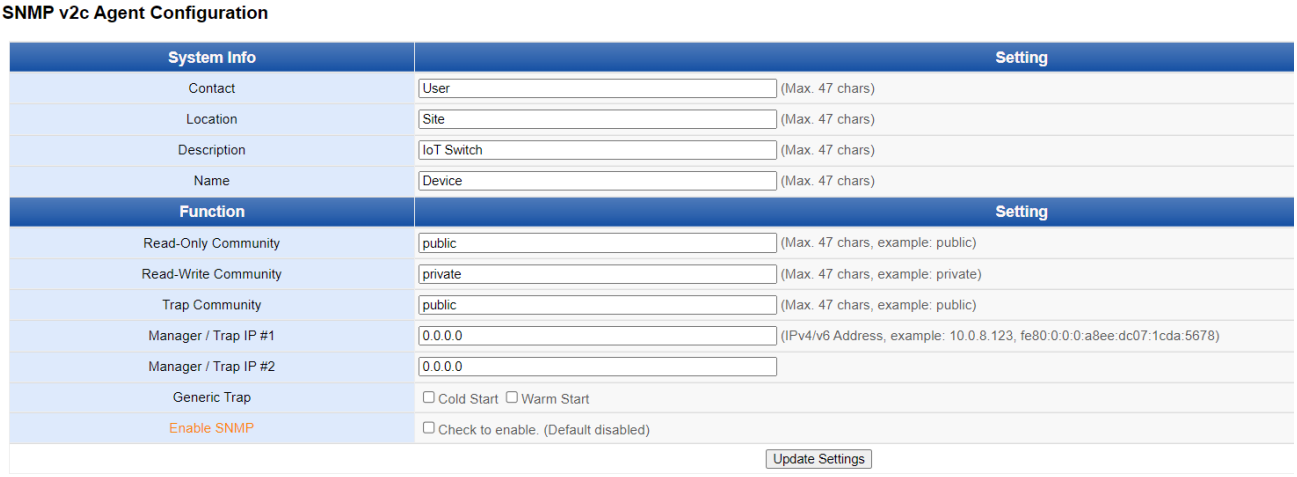
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4.11 SNMP

The "SNMP" page provides the function for iNS-300 series to send module information and I/O information to the SNMP Network Management Software or device to help administrators to monitor the status of the iNS-300 series in real time.

If the Trap function is enabled, iNS-300 series can actively send messages to the SNMP manager to keep track of data when the I/O status of the module changes or restarts. The detailed description is as follows.

4.11.1 SNMP Configuration Setting



The table describes the parameters contained in the **"System Info "** section

Item	Description	Defaults
Contact	The SNMP server's contact person	User
Location	The server's location	Site
Description	The description of the device displayed on the Server	IoT Switch
Name	The name of the device displayed on the Server	Device

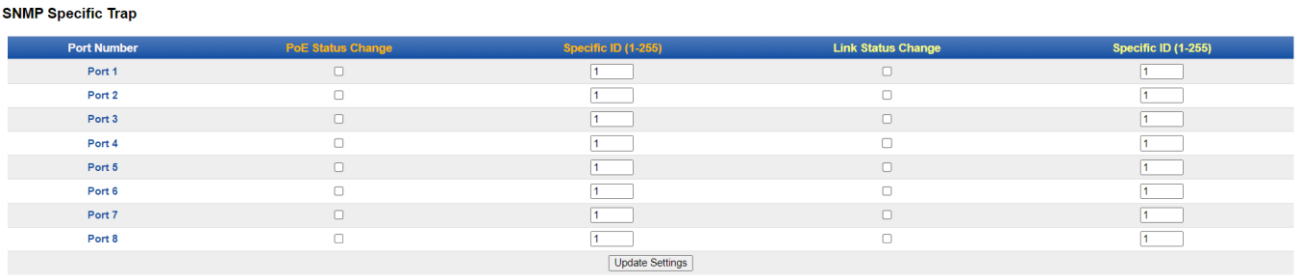
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The table describes the parameters contained in the **"Function"** section.

Item	Description	Defaults
Read-Only Community	Set the community name of the module for read-only data	public
Read-Write Community	Set the community name of the module for read-write data	private
Trap Community	Set the community name of the module for the trap	public
Manager / Trap IP #1	Set the IP address of Trap IP #1	0.0.0.0
Manager / Trap IP #2	Set the IP address of Trap IP #2	0.0.0.0
Generic Trap	Select to enable the Cold Start or Warm Start function	Disabled
Enable SNMP	Select the box to enable the SNMP communication function and deselect to disable it	Disabled
Update Settings	After saving the settings, also reboot the module to take effect	

4.11.2 SNMP Specific Trap



The table describes the parameters contained in the **"Specific Trap"**section

Item	Description	Defaults
PoE Status Change	Each PoE Port has a specific Trap. Check the box to enable the Trap function for that PoE Port Enable Change.	Disabled
Link Status Change	Each Port has a specific Trap. Check the box to enable the Trap function for that Port Link Change.	Disabled
Specific ID (1-255)	Specific ID is the ID number set for individual channel	1
Update Settings	After saving the settings, reboot the module to take effect	

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5. PoE function configure

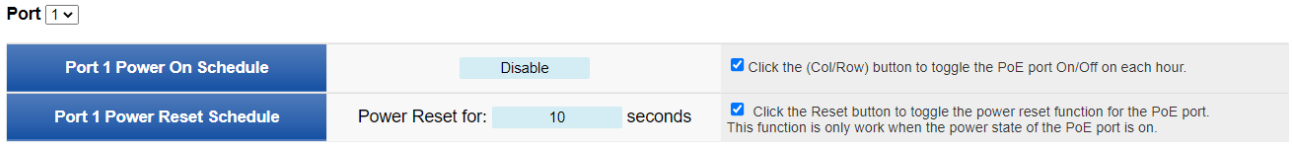
5.1 RTC

Correct system time is essential to network communication and PoE power management. Configure the system time correctly before you run the module on the network, iNS-316 provide Automatic synchronization method to set iNS-316 system time, when iNS-316 Web login, it will auto sync PC system Time to iNS-316

5.2 Power Schedule

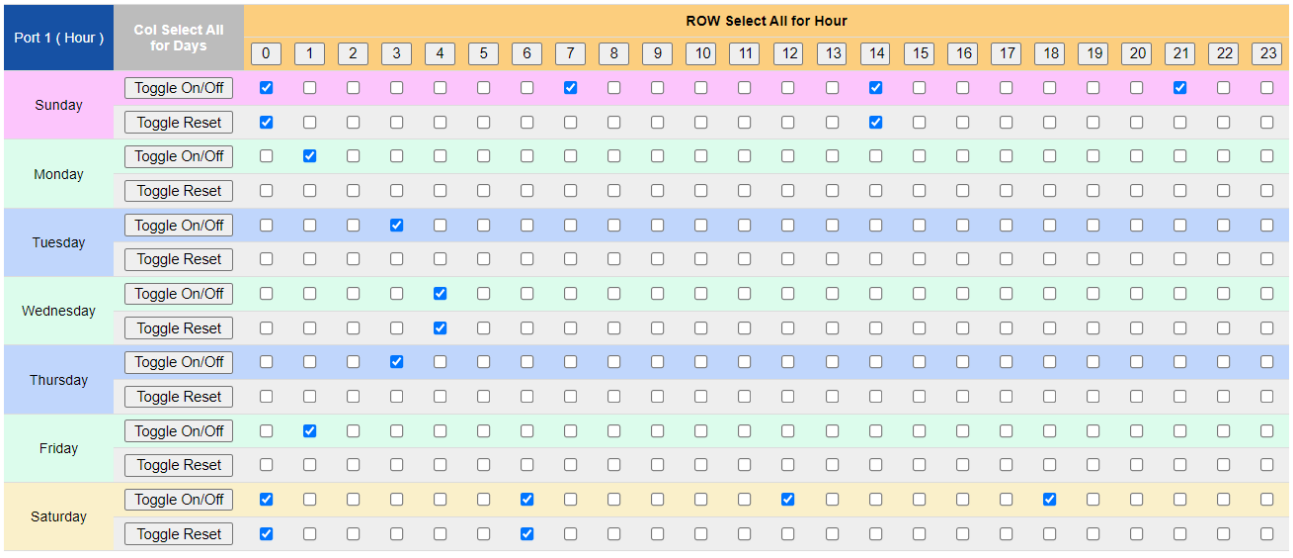
You can configure a weekly schedule for each PoE port individually to reboot the attached devices. The iNS-316 will check the schedule every hour on the hour. If the checkbox for reset function is selected, the power on a POE port will be turned off and turned on again for specified time interval

Step1: Select the PoE port number, setting Enable/Disable and the period between turning off the PoE power and turning it back on again.



Item	Description
Port	Select sechedule port number.
Port Power On Sechedule	Sechedule Enable/Disable select, default Disable.
Port Power Reset Schedule	Power reset delay time, default 10 Sec.

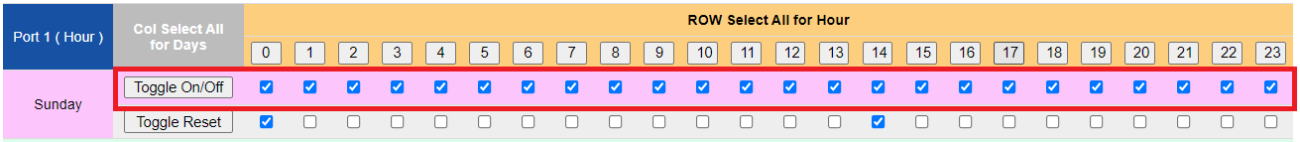
Step2: Click the small box for enabling or disabling the reset function at specfied times.
Step3: Click “update settings” to update the revised settings.



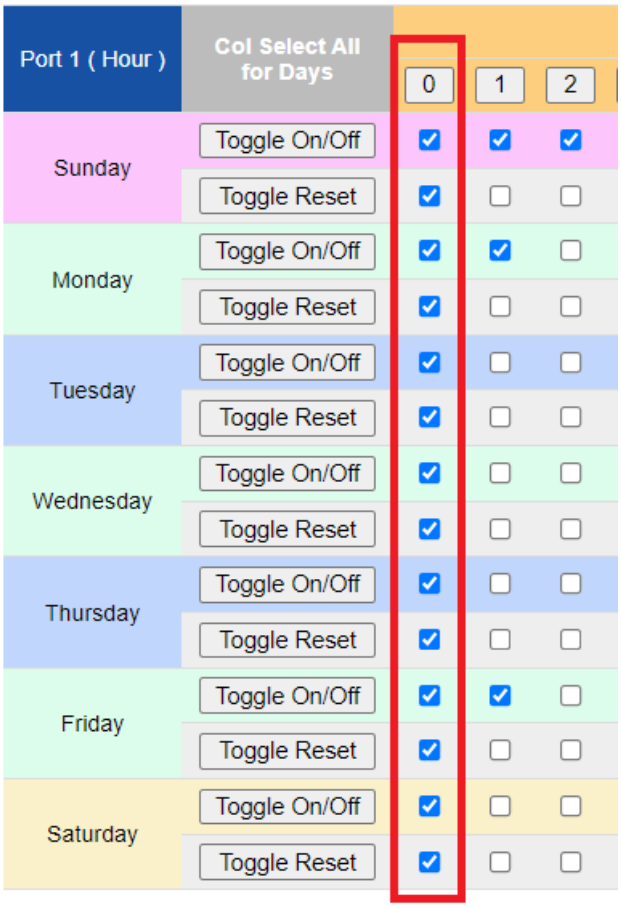
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table provide bulk selection functionality,
Click”Toggle On/Off” or “Toggle Reset” will select all time at a day



Click”0” to “23”will select all day at a time,



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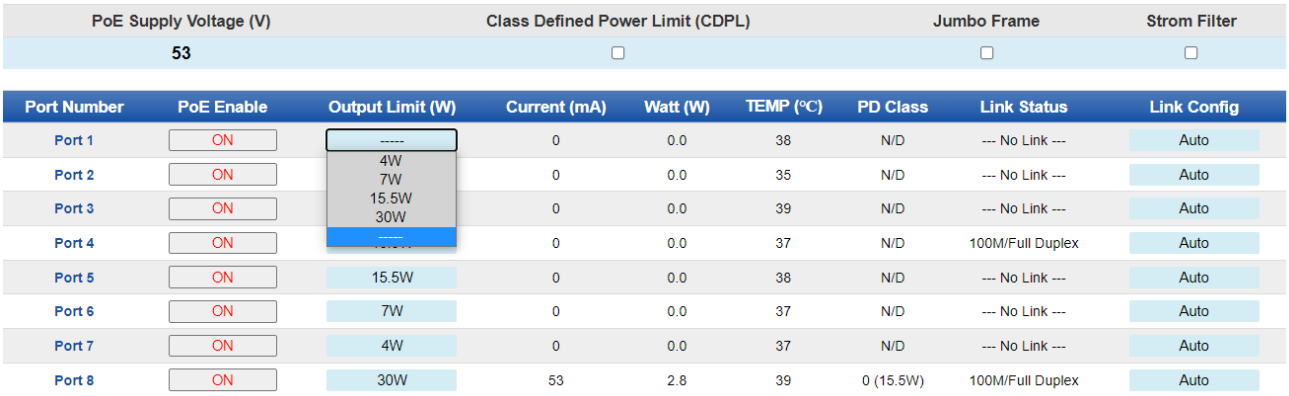
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5.3 PoE Power Limit

In addition to supporting the IEEE802.3af/at Class limit, iNS-316 also provides the PoE Output Limit function for selection.
When the Class Defined Power Limit is checked (default) on the Home page of the web page, the power supply and overload protection will be in accordance with IEEE802.3af The Class classification defined by af/at sets the corresponding power upper limit. When the device load exceeds too much, it will power off and retry to protect the device.
Please refer to the following table for the class classification of the device.

IEEE802.3 af/at Class	CDPL Output Limit
Class 0	0~15.5W
Class 1	Max 4W
Class 2	Max 7W
Class 3	Max 15.5W
Class 4	Max 30W

Class Defined Power Limit When unchecked, it will enter the user-defined mode (Host Defined Power Limit). The upper limit of the power supply of each port is set in the Output Limit (W) menu of the status table below. The iNS-316 provides 4W, 7W, 15.5W and 30W are available.



PoE Supply Voltage (V)	Class Defined Power Limit (CDPL)	Jumbo Frame	Strom Filter
53	☐	☐	☐

Port Number	PoE Enable	Output Limit (W)	Current (mA)	Watt (W)	TEMP (°C)	PD Class	Link Status	Link Config
Port 1	ON	-----	0	0.0	38	N/D	--- No Link ---	Auto
Port 2	ON	4W	0	0.0	35	N/D	--- No Link ---	Auto
Port 3	ON	7W	0	0.0	39	N/D	--- No Link ---	Auto
Port 4	ON	15.5W	0	0.0	37	N/D	100M/Full Duplex	Auto
Port 5	ON	30W	0	0.0	38	N/D	--- No Link ---	Auto
Port 6	ON	-----	0	0.0	37	N/D	--- No Link ---	Auto
Port 7	ON	15.5W	0	0.0	37	N/D	--- No Link ---	Auto
Port 8	ON	7W	0	0.0	37	N/D	--- No Link ---	Auto
		4W						
		30W	53	2.8	39	0 (15.5W)	100M/Full Duplex	Auto

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6. Advanced Ethernet configure

6.1 Loop Detect

iNS-316 has built-in network loop detection. When a loop occurs in the network configuration, iNS-316 will flash a light to remind the loop and perform packet control on the network port where the loop has occurred, which can reduce the loop caused to a certain extent. network is down.

6.2 Broadcast storm filter

iNS-316 provided broadcast storm protect function, after checking “broadcast storm filter” in home page, the iNS-316 will actively control the broadcast type packets(packet Destination Address is MAC FF:FF:FF:FF:FF:FF) to avoid a large number of broadcast packets occupying the network frequency. Broadband leads to degradation of communication quality or network paralysis.

Strom Filter	Description
Disable(default)	Do not detection the packet.
Enable	Limited to only broadcast packets through 1280 packets per second. If iNS-316 detection Broadcast packet over threshold per second, the switch will drop the excess part to protect communication.

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7. Modbus Information

The iNS-316 allow you to remotely control Power & configure terminals via an Ethernet connection and uses a master-slave communication technique in which only one device (the master) can initiate a transaction (called queries), while other devices (slaves) respond by either supplying the requested data to the master, or by taking the action requested in the query.

Most SCADA (Supervisory Control and Data Acquisition) and HMI software, such as Citect (Schneider Electric), ICONICS, iFIX, InduSoft, Intouch, Entivity Studio, Entivity Live, Entivity VLC, Trace Mode, Wizcon (ElUTIONS), and Wonderware, etc. can be used to easily integrate serial devices via the Modbus protocol.

7.1 What is Modbus TCP/IP?

Modbus is a communication protocol that was developed by Modicon Inc. in 1979. Detailed information regarding the Modbus protocol can be found at: http://www.modbus.org.

The different versions of the Modbus protocol used today include Modbus RTU, which is based on serial communication interfaces such as RS-485 and RS-232, as well as Modbus ASCII and Modbus TCP, which uses the Modbus RTU protocol embedded into TCP packets.

Modbus TCP is an internet protocol. The protocol embeds a Modbus frame into a TCP frame so that a connection oriented approach is obtained, thereby making it more reliable. The master queries the slave and the slave responds with a reply. The protocol is open and, hence, highly scalable.

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7.2 Modbus Message Structure

Modbus devices communicate using a master-slave (client-server) technique in which only one device (the master/client) can initiate transactions (called queries). The other devices (slaves/servers) respond by either supplying the requested data to the master, or by taking the action requested in the query.

A query from a master will consist of a slave, or broadcast, address, a function code defining the requested action, any required data, and an error checking field. A response from a slave consists of fields confirming the action taken, any data to be returned, and an error checking field.

➢ The Modbus/TCP Message Structure

Bytes 00 - 05	Bytes 06 - 11
6-byte header	RTU Data

➢ The Leading 6 bytes of a Modbus/TCP Protocol Query

Byte 00	Byte 01	Byte 02	Byte 03	Byte 04	Byte 05
Transaction Identifier		Protocol Identifier		Length Field (upper byte)	Length Field (lower byte)

Transaction identifier = Assigned by the Modbus/TCP master (client)
Protocol identifier = 0
Length field (upper byte) = 0 (since all messages are smaller than 256)
Length field (lower byte) = The number of following RTU data bytes

➢ Modbus RTU Data Structure

Byte 06	Byte 07	Bytes 08 - 09	Bytes 10 - 11
Net ID (Station Number)	Function Code	Data Field	
		Reference Number (Address Mapping)	Number of Points

Net ID: Specifies the address of the receiver (i.e., the Modbus/TCP slave).
Function Code: Specifies the message type.
Data Field: The data block.

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Net ID (Station Number)

The first byte in the frame structure of a Modbus RTU query is the address of the receiver. A valid address is in the range from 0 to 247. Address 0 is used for general broadcast purposes, while addresses 1 to 247 are assigned to individual Modbus devices.

Function Code

The second byte in the message structure of a Modbus RTU query is the function code, which describes what the slave device is required to do. Valid function codes range between 1 and 255. To answer the query, the slave device uses the same function code as contained in the request. The highest bit of the function code will only be set to '1' if an error occurs in the system. In this way, the master device will know whether or not the message has been correctly transmitted.

Code	Function
01 (0x01)	Read Coils status (Readback DO values)
02 (0x02)	Read Input Status (Read DI values)
03 (0x03)	Read Holding Registers (Readback AO values)
04 (0x04)	Read Input Registers (Read AI values)
05 (0x05)	Force Single Coil (Write DO values)
06 (0x06)	Set Single Register (Write AO values)
15 (0x0F)	Force Multiple Coils (Write Dos values)
16 (0x10)	Set Multiple Registers (Write AO values)

Data Field

Data is transmitted in 8-, 16- and 32-bit format. The data for 16-bit registers is transmitted in high-byte first format. For example: 0x0A0B will be transmittd as 0x0A, 0x0B. The data for 32-bit registers is transmitted as two 16-bit registers, and is low-word first. For example: 0x0A0B0C0D will be transmitted as 0x0C, 0x0D, 0x0A, 0x0B.

The data field for messages sent between a master device and a slave device contains additional information about the action to be taken by the master, or any information requested by the slave. If the master does not require this information, the data field can be empty.

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7.2.1 01(0x01) Read the Status of the Coils (Read DO Readback vaslues)

This function code is used to read either the current status of the coils or the current Digital Output readback value from the iNS-316

[Request]

Byte	Description	Size	Value
00	Net ID (Station Number)	1 Byte	1 to 247
01	Function Code	1 Byte	0x01
02-03	Starting DO Address	2 Byte	Byte 02 = high byte Byte 03 = Low byte
04-05	Number of Points (Channels)	2 Byte	Byte 04 = high byte Byte 05 = Low byte

[Response]

Byte	Description	Size	Value
00	Net ID (Station Number)	1 Byte	1 to 247
01	Function Code	1 Byte	0x01
02	Byte Count	1 Byte	Byte Count of the Response (n = (Points+7)/8)
03	Data	n Byte	n= 1; Byte 03 = data bit 7 to 0 n= 2; Byte 04 = data bit 15 to 8 ..... n= m; Byte m+2 = data bit (8m-1) to 8(m-1)

[Error Response]

Byte	Description	Size	Value
00	Net ID (Station Number)	1 Byte	1 to 247
01	Function Code	1 Byte	0x81
02	Exception Code	1 Byte	Refer to the Modbus Standard Specifications for more details

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7.2.2 02(0x02) Read the Status of the Input (Read DI values)

This function code is used to read the current Digital Input value from the iNS-316

[Request]

Byte	Description	Size	Value
00	Net ID (Station Number)	1 Byte	1 to 247
01	Function Code	1 Byte	0x02
02-03	Starting DI Address	2 Byte	Byte 02 = high byte Byte 03 = Low byte
04-05	Number of Points (Channels)	2 Byte	Byte 04 = high byte Byte 05 = Low byte

[Response]

Byte	Description	Size	Value
00	Net ID (Station Number)	1 Byte	1 to 247
01	Function Code	1 Byte	0x02
02	Byte Count	1 Byte	Byte Count of the Response (n = (Points+7)/8)
03	Data	n Byte	n= 1; Byte 03 = data bit 7 to 0 n= 2; Byte 04 = data bit 15 to 8 ..... n= m; Byte m+2 = data bit (8m-1) to 8(m-1)

[Error Response]

Byte	Description	Size	Value
00	Net ID (Station Number)	1 Byte	1 to 247
01	Function Code	1 Byte	0x82
02	Exception Code	1 Byte	Refer to the Modbus Standard Specifications for more details

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7.2.3 03(0x03) Read the Holding Registers

(Read AO Readback values)

This function code is used to readback either the current values in the holding registers or the Analog Output value from the iNS-316. These registers are also used to store the preset valuesfor the Digital Counter, the host watchdog timer, the module name and the TCP timeout, etc.

[Request]

Byte	Description	Size	Value
00	Net ID (Station Number)	1 Byte	1 to 247
01	Function Code	1 Byte	0x03
02-03	Starting AO Address	2 Byte	Byte 02 = high byte Byte 03 = Low byte
04-05	Number of Registers (Channels)	2 Byte	Word Count Byte 04 = high byte Byte 05 = Low byte

[Response]

Byte	Description	Size	Value
00	Net ID (Station Number)	1 Byte	1 to 247
01	Function Code	1 Byte	0x03
02	Byte Count	1 Byte	Byte Count of the Response (n = Points x 2 Byte)
03	Register Values	n Byte	n= 1; Byte 03 = high byte n= 2; Byte 04 = Low byte ..... n= m; Byte m+1 = high byte Byte m+2 = Low byte

[Error Response]

Byte	Description	Size	Value
00	Net ID (Station Number)	1 Byte	1 to 247
01	Function Code	1 Byte	0x83
02	Exception Code	1 Byte	Refer to the Modbus Standard Specifications for more details

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7.2.4 04(0x04) Read the Input Registers (Read AI values)

This function code is used to read either the input registers or the current analog input value from the iNS-316. These registers are also used to store the current value for the digital counter, the number of DI channels and the number of DO channels, etc.

[Request]

Byte	Description	Size	Value
00	Net ID (Station Number)	1 Byte	1 to 247
01	Function Code	1 Byte	0x04
02-03	Starting AI Address	2 Byte	Byte 02 = high byte Byte 03 = Low byte
04-05	Number of Registers (Channels)	2 Byte	Word Count Byte 04 = high byte Byte 05 = Low byte

[Response]

Byte	Description	Size	Value
00	Net ID (Station Number)	1 Byte	1 to 247
01	Function Code	1 Byte	0x04
02	Byte Count	1 Byte	Byte Count of the Response (n = Points x 2 Byte)
03	Register Values	n Byte	n= 1; Byte 03 = high byte n= 2; Byte 04 = Low byte ..... n= m; Byte m+1 = high byte Byte m+2 = Low byte

[Error Response]

Byte	Description	Size	Value
00	Net ID (Station Number)	1 Byte	1 to 247
01	Function Code	1 Byte	0x84
02	Exception Code	1 Byte	Refer to the Modbus Standard Specifications for more details

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7.2.5 05(0x05) Force a Single Coil (Write DO value)

This function code is used to set the status of a single coil or a single Digital Output value for the iNS-316.

[Request]

Byte	Description	Size	Value
00	Net ID (Station Number)	1 Byte	1 to 247
01	Function Code	1 Byte	0x05
02-03	DO Address	2 Byte	Byte 02 = high byte Byte 03 = Low byte
04-05	Output Value	2 Byte	0xFF 00 sets the output to ON 0x00 00 sets the output to OFF Byte 04 = high byte Byte 05 = Low byte

[Response]

Byte	Description	Size	Value
00	Net ID (Station Number)	1 Byte	1 to 247
01	Function Code	1 Byte	0x05
02	DO Address	2 Byte	The value is the same as Bytes 02-03 of the Request
03	Output Value	2 Byte	The value is the same as Bytes 04-05 of the Request

[Error Response]

Byte	Description	Size	Value
00	Net ID (Station Number)	1 Byte	1 to 247
01	Function Code	1 Byte	0x85
02	Exception Code	1 Byte	Refer to the Modbus Standard Specifications for more details

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7.2.6 06(0x06) Set a Single Register (Write AO value)

This function code is used to set a specific holding register to store the configuration valuesfor the iNS-316.

[Request]

Byte	Description	Size	Value
00	Net ID (Station Number)	1 Byte	1 to 247
01	Function Code	1 Byte	0x06
02-03	AO Address	2 Byte	Byte 02 = high byte Byte 03 = Low byte
04-05	Output Value	2 Byte	Byte 04 = high byte Byte 05 = Low byte

[Response]

Byte	Description	Size	Value
00	Net ID (Station Number)	1 Byte	1 to 247
01	Function Code	1 Byte	0x06
02-03	DO Address	2 Byte	The value is the same as Bytes 02-03 of the Request
04-05	Output Value	2 Byte	The value is the same as Bytes 04-05 of the Request

[Error Response]

Byte	Description	Size	Value
00	Net ID (Station Number)	1 Byte	1 to 247
01	Function Code	1 Byte	0x86
02	Exception Code	1 Byte	Refer to the Modbus Standard Specifications for more details

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7.2.7 15(0x0F) Force Multiple Coils (Write DO values)

This function code is used to set the status of multiple coils or to write multiple Digital Output values for the iNS-316

[Request]

Byte	Description	Size	Value
00	Net ID (Station Number)	1 Byte	1 to 247
01	Function Code	1 Byte	0x0F
02-03	Starting DO Address	2 Byte	Byte 02 = high byte Byte 03 = Low byte
04-05	Output Value	2 Byte	Byte 04 = high byte Byte 05 = Low byte
06	Byte count	1 Byte	n = (Points +7)/8
07	Output value	n Byte	A bit corresponds to a channel. A value of 1 for a bit denotes that the channel is ON, while a value of denotes that the channel is OFF. n= 1; Byte 07 = data bit 7 to 0 n= 2; Byte 08 = data bit 15 to 8 ..... n= m; Byte m+6 = data bit (8m-1) to 8 (m-1)

[Response]

Byte	Description	Size	Value
00	Net ID (Station Number)	1 Byte	1 to 247
01	Function Code	1 Byte	0x0F
02-03	DO Address	2 Byte	The value is the same as Bytes 02-05 of the Request
04-05	Output Value	2 Byte	

[Error Response]

Byte	Description	Size	Value
00	Net ID (Station Number)	1 Byte	1 to 247
01	Function Code	1 Byte	0x8F
02	Exception Code	1 Byte	Refer to the Modbus Standard Specifications for more details

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7.2.8 16(0x10) Set Multiple Registers (Write AO values)

This function code is used to set multiple holding registers that are used to store the configuration valuesfor the iNS-316.

[Request]

Byte	Description	Size	Value
00	Net ID (Station Number)	1 Byte	1 to 247
01	Function Code	1 Byte	0x10
02-03	Starting AO Address	2 Byte	Byte 02 = high byte Byte 03 = Low byte
04-05	Number of Registers (Channels)	2 Byte	Byte 04 = high byte Byte 05 = Low byte
06	Byte count	1 Byte	n = (Points +7)/8
07	Register Values	n Byte	n= 1; Byte 03 = high byte n= 2; Byte 04 = Low byte ..... n= m; Byte m+1 = high byte Byte m+2 = Low byte

[Response]

Byte	Description	Size	Value
00	Net ID (Station Number)	1 Byte	1 to 247
01	Function Code	1 Byte	0x10
02-03	Starting DO Address	2 Byte	The value is the same as Bytes 02-05 of the Request
04-05	Number of Registers (Channels)	2 Byte	

[Error Response]

Byte	Description	Size	Value
00	Net ID (Station Number)	1 Byte	1 to 247
01	Function Code	1 Byte	0x90
02	Exception Code	1 Byte	Refer to the Modbus Standard Specifications for more details

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7.3 Modbus Register Table

➢ 0xxxx: DO address (Base 0)

Address	CH	Description	Range	Access Type
00000~000015	16	PoE Enable	0=OFF, 1=ON	R/W
00032	1	PoE CDPL enable Auto Class Define Power Limit	0=Disable 1=Enable	R/W
00040	1	Ethernet Jumbo Frame	0=Disable 1=Enable	R/W
00041	1	Ethernet Loop Detect	0=Disable 1=Enable	R/W
00042	1	Ethernet Broadcast storm filter	0=Disable 1=Enable	R/W

➢ 3xxxx: AI address (Base 0)

Address	CH	Description	Range	Access Type
30000~30015	16	PoE Port Current (mA)	2-Byte, DEC(mA)	R
30032~30048	16	PoE Port watt (mW)	2-Byte, DEC(mW)	R
30096~30111	16	PoE Port TEMP (˚C)	2-Byte, DEC(˚C)	R
30129~30145	16	PoE Port PD Device Class	Detect PD Class 0~4 5 is unknow	R
30160	1	PoE Port Volt	2-Byte, DEC(V)	R
30192~30208	16	Ethernet Link status	1 =>100M Full 2 =>100M Half 3 =>10M Full 4 =>10M Half 5 =>unlink	R
30256	1	Module Name	2-Byte, Hex 0x0316	R
30257	1	FW version	2-Byte, Hex	R
30258	1	HW version	2-Byte, Hex	R

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➢ 4xxxx: AO address (Base 0)

Address	CH	Description	Range	Access Type
40000~40015	16	PoE Host Power output Limit	1 => 4W 2 => 7W 3 => 15.5W 4 => 30W	R/W
40032	1	Ethernet Link status Configure	0 => auto negotiation 1 => 100M Full 2 => 100M Half 3 => 10M Full 4 => 10M Half	R/W

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Revision History

Revision	Date	Description
1.0.0	April.2023	New

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