

Modbus TCP Manual for PLC Applications



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1 Overview

This document describes how to connect to IQ Home Gateway Modbus TCP interface. IQ Home Gateway Modbus TCP interface provides a solution to access Modbus Slave devices with IQ Home MB Series (MB-XXX-XX) products and read periodically collected battery powered sensor values as virtual devices.

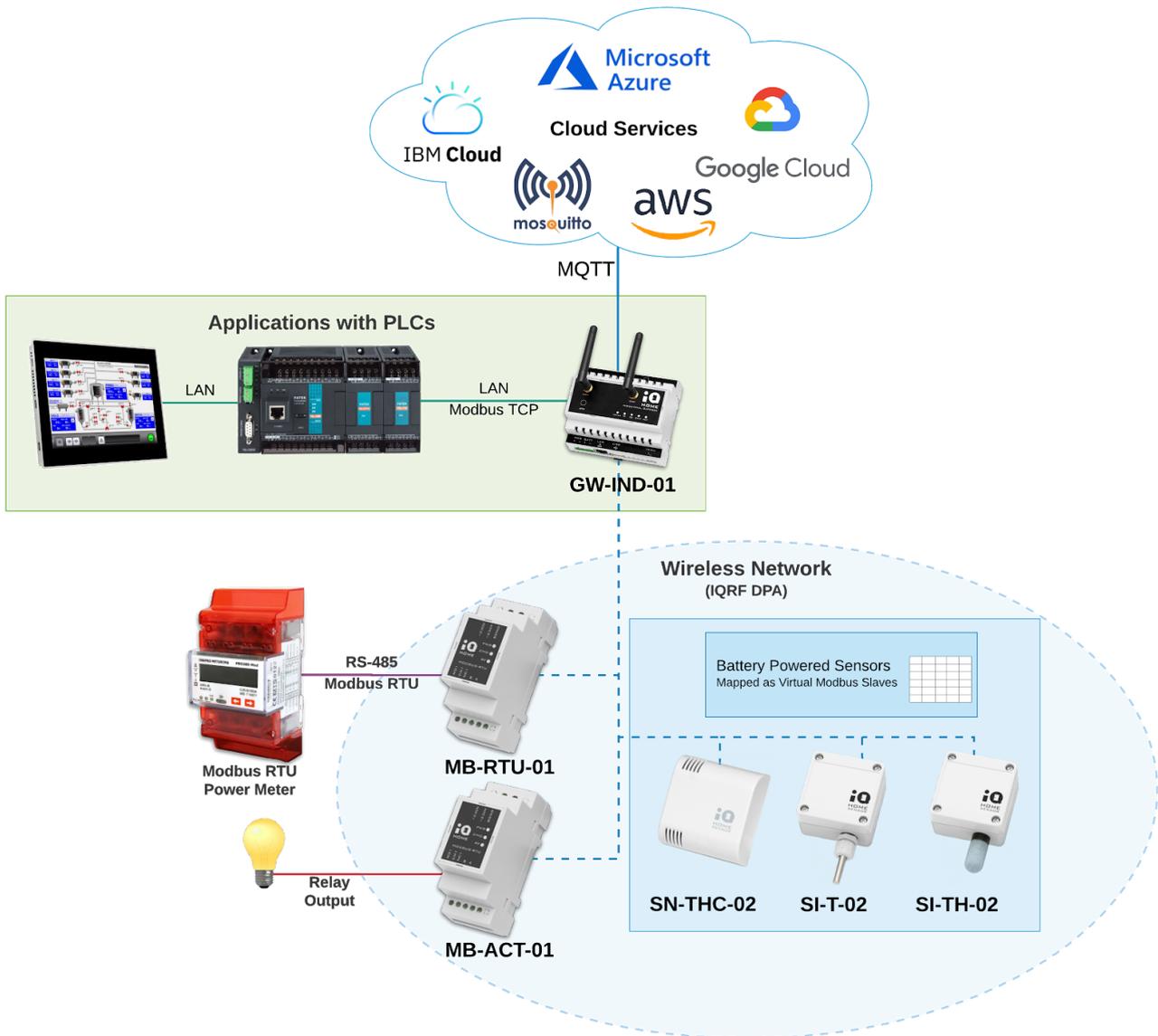


Figure 1 Architecture of using IQ Home Gateway Modbus TCP/IP interface using PLC applications

2 Connect to Modbus TCP Slaves

2.1 Connect to gateway

To connect to the gateway with Link It! Gateway Management Tool please follow the video tutorials at the following link:

<https://www.youtube.com/playlist?list=PLN9Mt98EPzN30TyGCDs-M0s0zSJRZdNpY>

You can download the Link It! Gateway Management Tool at the following link:

<https://www.iqhome.org/linkit>

2.2 IP address

IQ Home gateways in PLC applications have to be connected on the same local area network (LAN) as shown in Figure 2.

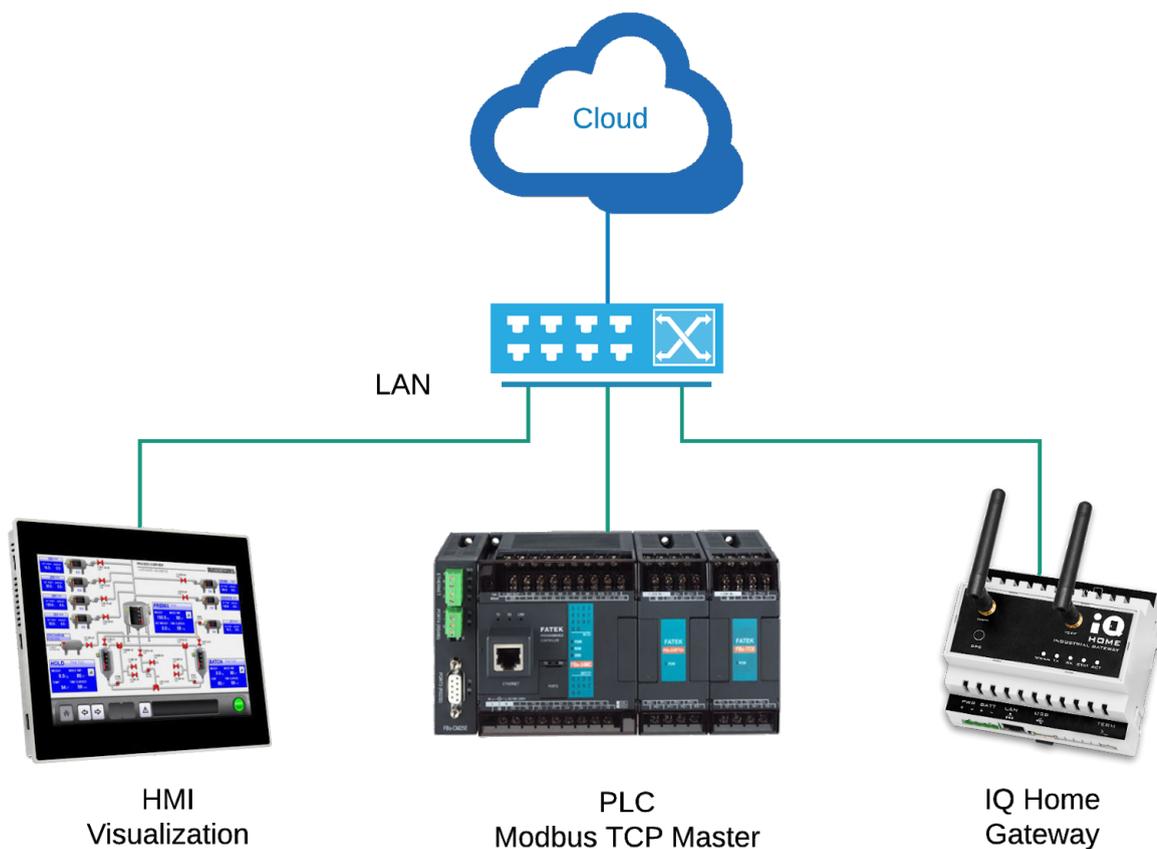
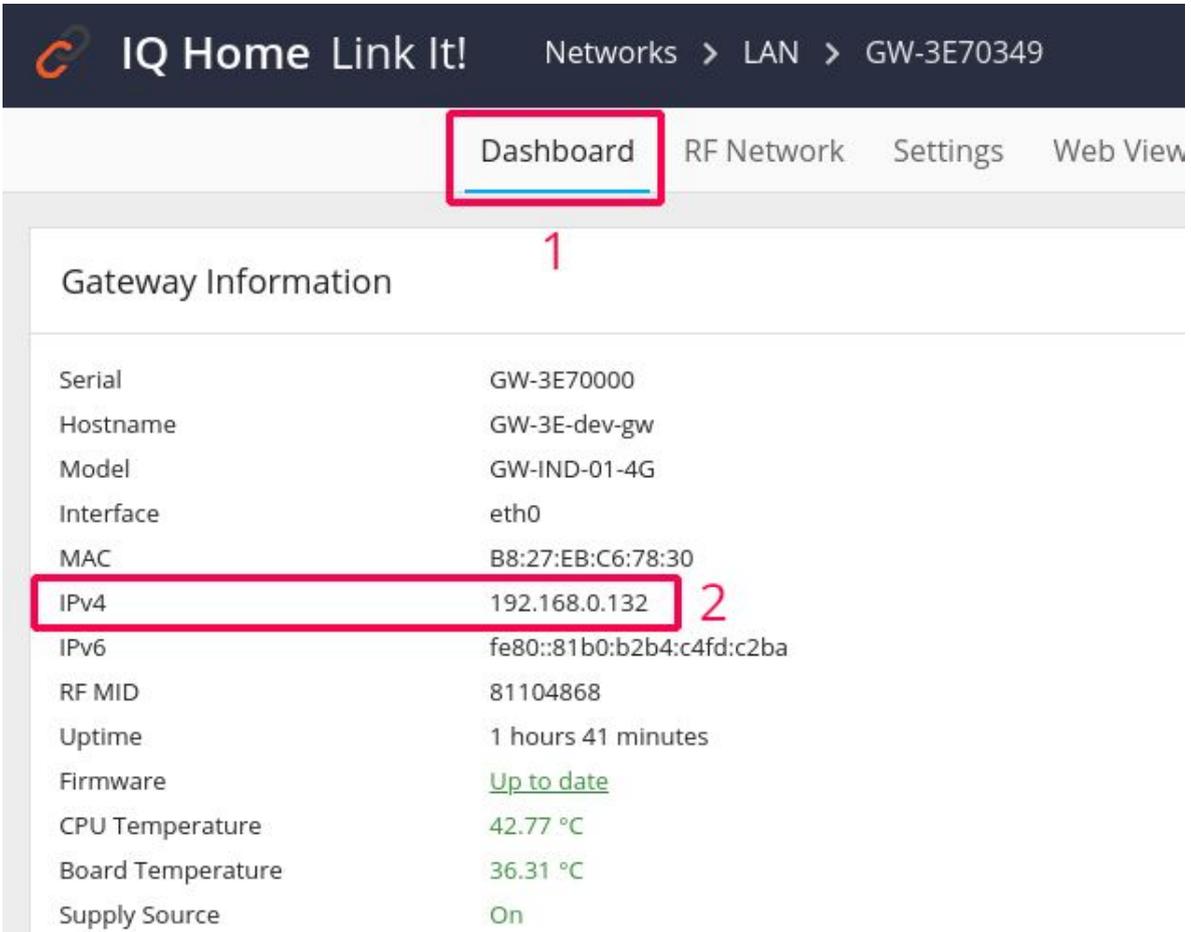


Figure 2 Local access to IQ Home Gateway Modbus TCP interface

The IQ Home gateways use DHCP for IP address configuration as default and can use with [Fixed IP address](#). The IP address information can be found in Link It at gateway Dashboard page shown on Figure 3 or ask your network administrator for the IP address of the gateway.



The screenshot shows the IQ Home Link It! interface. The breadcrumb navigation is "Networks > LAN > GW-3E70349". The "Dashboard" menu item is highlighted with a red box and labeled with a red "1". Below the navigation is the "Gateway Information" section, which contains a table of system details. The "IPv4" row is highlighted with a red box and labeled with a red "2".

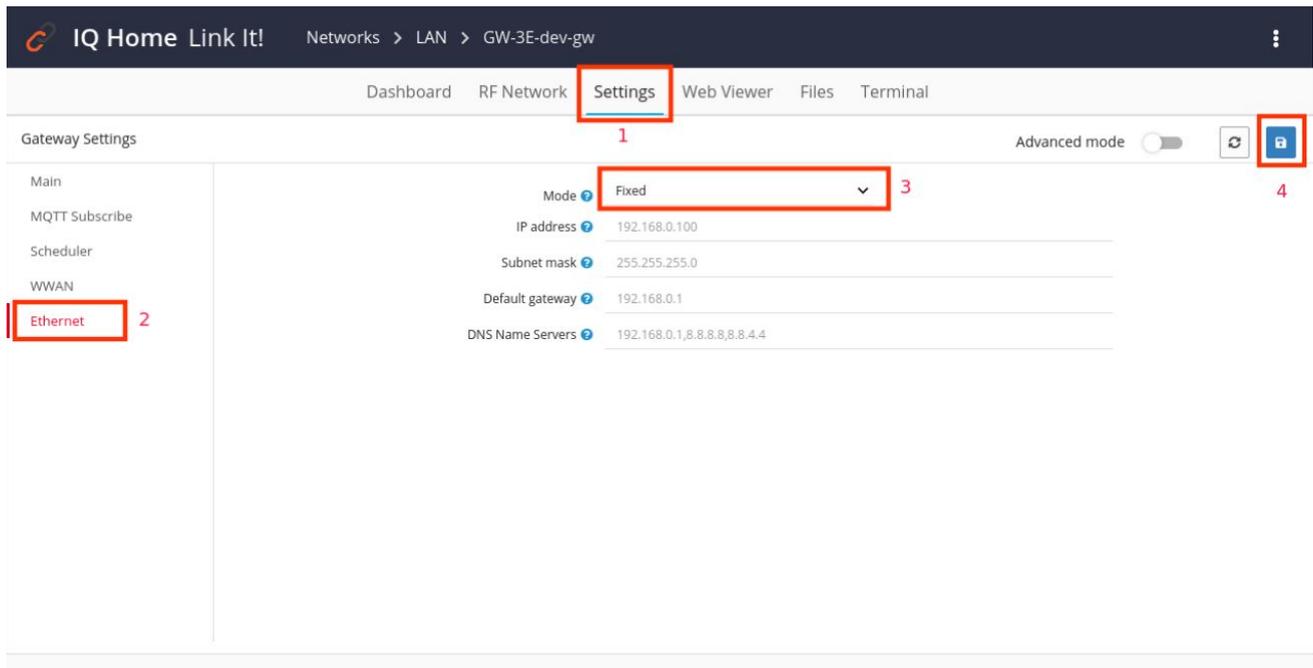
Gateway Information	
Serial	GW-3E70000
Hostname	GW-3E-dev-gw
Model	GW-IND-01-4G
Interface	eth0
MAC	B8:27:EB:C6:78:30
IPv4	192.168.0.132
IPv6	fe80::81b0:b2b4:c4fd:c2ba
RF MID	81104868
Uptime	1 hours 41 minutes
Firmware	Up to date
CPU Temperature	42.77 °C
Board Temperature	36.31 °C
Supply Source	On

Figure 3 LinkIt Gateway dashboard with IPv4 address

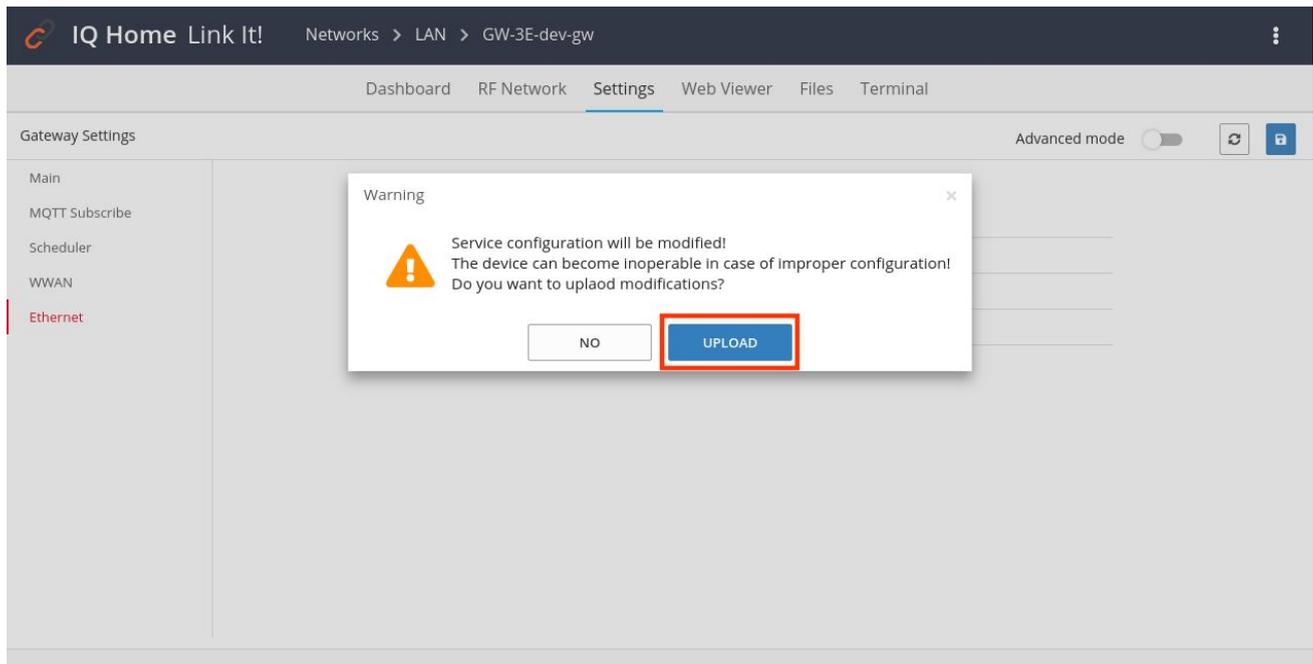
2.3 Static/Fixed IP address

The gateway supports setting up a static IP address or as known as fixed IP address.

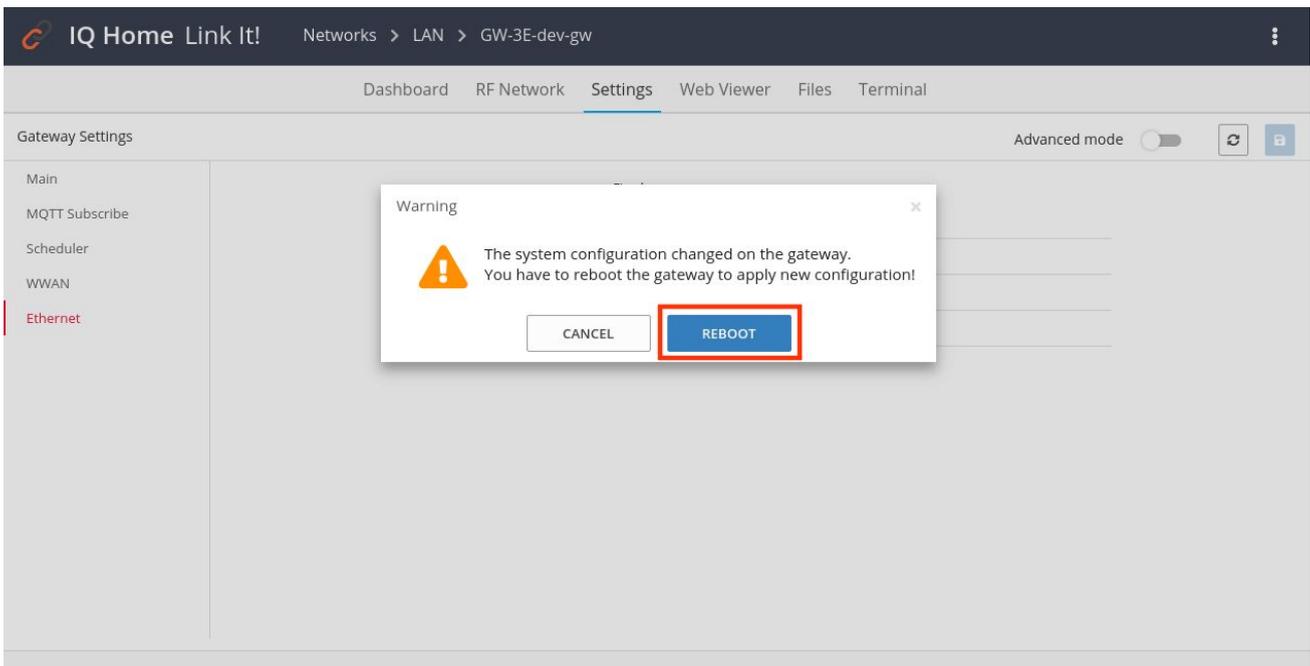
1. Click on the Settings tab
2. Click on the “Ethernet” tab on the left sidebar
3. Select Fixed option from the drop down menu and set IP properties
4. Save the configuration



5. Confirm configuration upload



6. Confirm to reboot the gateway



2.4 Enable Modbus interface

The Modbus TCP interface is not enabled as default. The remote access for external devices disabled too. You can enable the interface in LinkIt (Figure 4):

1. Click on the Settings tab
2. Scroll down on the bottom of the page and enable Modbus TCP interface
3. Enable Modbus TCP remote access
4. Click on the save button and confirm configuration upload and service restart

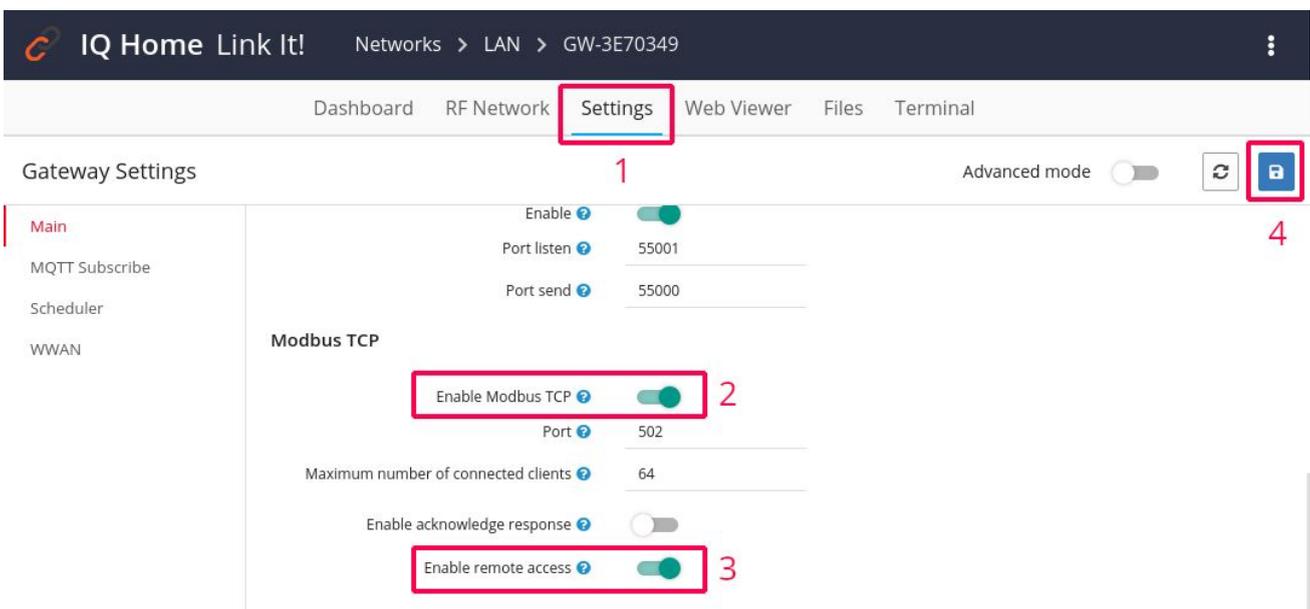


Figure 4 Enable Modbus TCP interface and remote access in LinkIt

2.5 Port number

IQ Home gateway Modbus TCP/IP service listening on the default port 502 to access Modbus Slave devices.

2.6 Modbus RTU Master device unit ID

IQ Home gateways with Modbus TCP feature handles Modbus TCP Slaves from the wireless network. Wireless Modbus RTU slave devices with IQ Home MB series network node address are the Modbus TCP Unit ID. The MB series devices can be placed in the network from address 1 to 239. The network address 240 is reserved for virtual devices.

Unit ID/ Node address	Device type
1-239	MB series device
240	Battery powered sensors as virtual devices

3 Read virtual device data

Battery powered IQ Home sensor values can be read from the gateway as virtual Modbus devices. The scheduler in the gateway requests sensor data periodically with \$GW/iqhome topic. The responses are stored in the gateway in-memory database. Sensor values can be accessed with register read Modbus commands. The registers are read only registers.

To setup the scheduler for virtual devices use the LinkIt software. After successful connect to the gateway go to the Settings tab (Figure 4 - 1) and click on the Scheduler menu option (Figure 4 - 2).

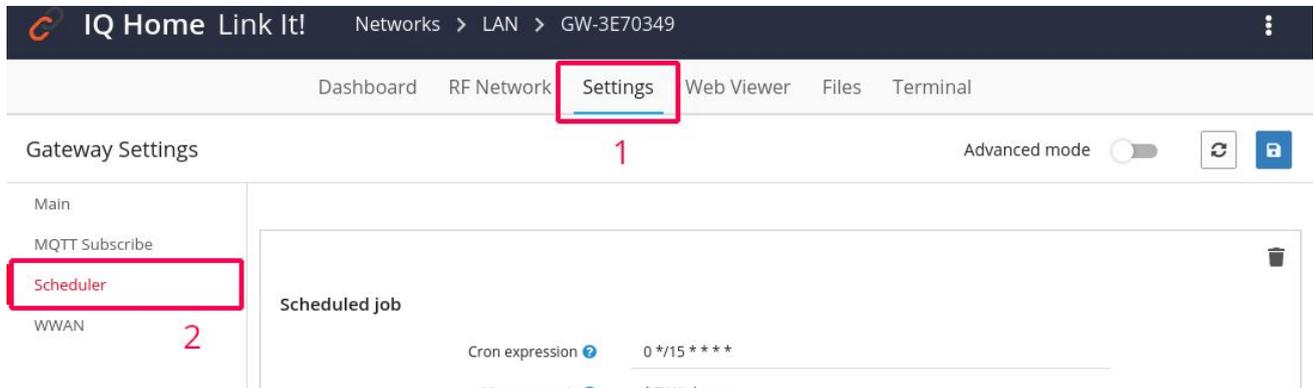


Figure 5 Setup scheduler for virtual devices - Scheduler menu

Now you can add a new scheduler job and remove them (Figure 5).

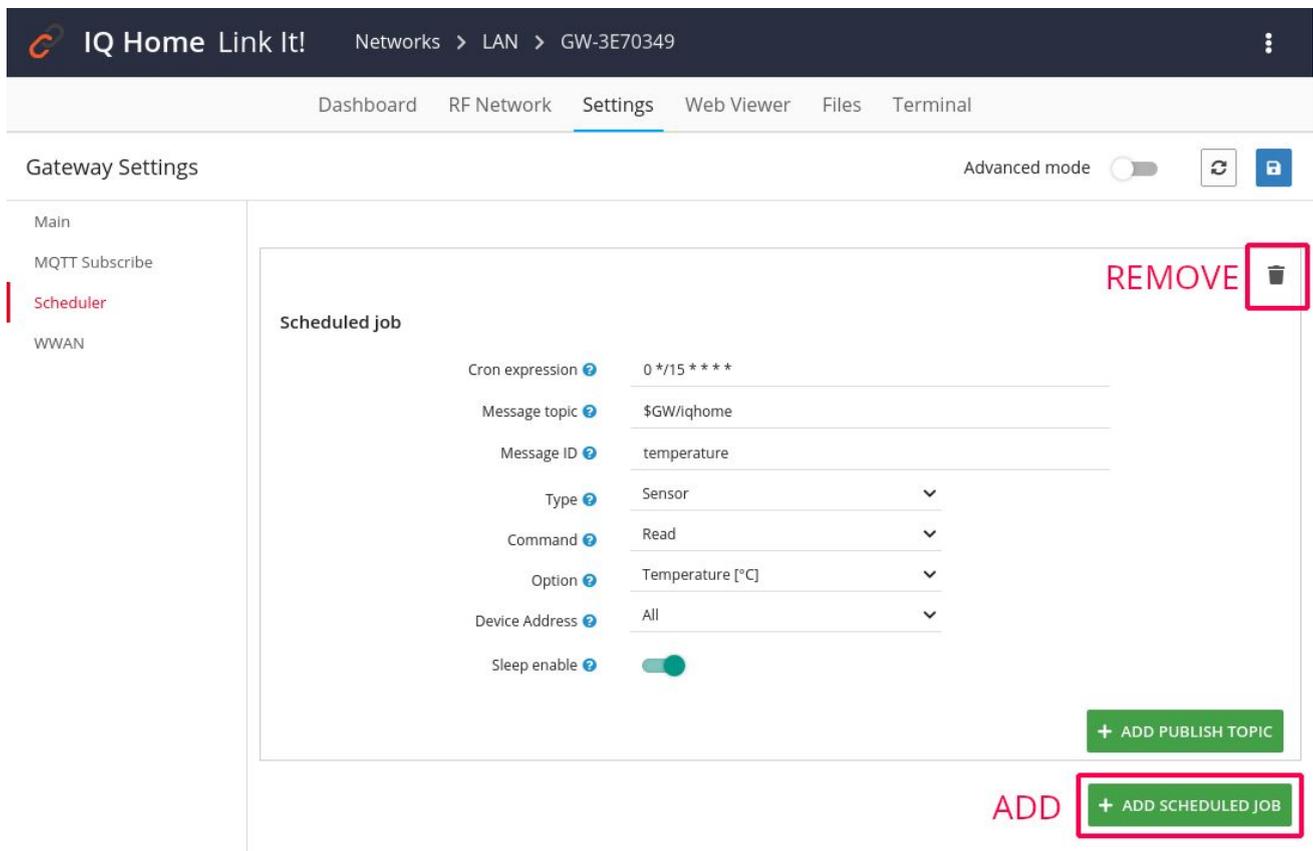


Figure 6 Setup scheduler for virtual devices - Add add remove scheduler jobs

The following table shows the proper scheduled job configuration for virtual Modbus devices. The values with red color required by virtual Modbus devices.

Scheduled job setting	Value	Descriptions
Cron expression	0 */15 * * * *	Expression for matching moments when the scheduled job should be run. The example means the job runs in every 15 minutes. Further information you can find here .
Message topic	\$GW/iqhome	For virtual devices the message topic have to be \$GW/iqhome
Message ID	temperature	The Message ID can be any user defined value. The Message ID not affected on virtual devices.
Type	Sensor	This option shows to collect data from sensors
Command	Read	
Option	Temperature [°C]	The option can be any of the following: Temperature [°C] Relative Humidity [%rH] CO2 [ppm]
Device Address	All	Device address shows to collect data from all devices
Sleep enable	Enabled	Sleep should be enabled to increase battery lifetime of sensor devices

NOTICE

In case of battery powered sensors and MB-RTU-XX devices used in the same network the request from scheduler and Modbus master are enqueued in the gateway. In the Modbus master consider the queue and RF network response time when defines timeout values.

3.1 Virtual devices unit ID

The Unit ID of the virtual devices is 240 (0xF0).

3.2 Memory map

IQ Home Gateway provides a solution for access battery powered IQ Home sensor values as Modbus slaves. The virtual devices mapped into the gateway in-memory database and can be read from Modbus master. The table below describes the sensor values memory map.

Contents	Start Address	End Address	Function Code	Register Length	Unit	Format
Timestamp	0x0000	0x00F0	0x03	2	UNIX Epoch timestamp	UINT32
Temperature	0x0100	0x01F0	0x03	2	°C	FLOAT
Relative Humidity	0x0200	0x02F0	0x03	2	%rH	FLOAT
CO2	0x0300	0x03F0	0x03	2	ppm	FLOAT

Format

Virtual device data stored in Big Endian (ABCD) format and can be read continuously in the valid ranges.

Format	Description	Example
UINT32	32-bit unsigned integer	0x12345678 = 305419896
FLOAT	32-bit single precision floating point number	0x41EF9999 = 29.949999

Example:

Request CO2 sensor value from device with network address 2.

Request						
Transaction ID [2B]	Protocol ID [2B]	Data length [2B]	Unit ID [1B]	Function code [1B]	Data [4B]	
0x0001	0x0000	0x0004	0x0F	0x03	0x0306	0x0002

CO2 sensor value with network address 2 at 0x0306

CO2 values range start: 0x0300

Number of holding registers: 2

Data address of CO2 sensor value with network address 2 is $0x3000 + 3 \cdot 2 = 0x0306$

Response						
Transaction ID [2B]	Protocol ID [2B]	Data length [2B]	Unit ID [1B]	Function code [1B]	Data [4B]	
0x0001	0x0000	0x0004	0x0F	0x03	0x447D	0x0000

In the example the CO2 level converted as a floating point number is 1012 ppm.