



## Flow Visor IoT Device (MQTT)



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## 1. Introduction

**JDH Flow Visor IoT (MQTT) Device** has the following main characteristics:

- ✓ Designed to work with our JDH Flowmeter liter counters. Compatible with the [miniLitcnt](#), [Litcnt](#) and [Litcnt-X5](#) models. Automatic recognition of the device, and report accordingly.
- ✓ Compact, ergonomic design. 77\*35\*26 millimeters, 35 grams only.
- ✓ LED indicators to know the current status of the device.
- ✓ Easy setup. Users can configure the device quickly using any mobile phone or tablet or computer equipped with Wi-Fi connectivity and a web browser.
- ✓ Reads the flow every second, and can report the average flow after 1 to 99 readings, plus the total count and the alarm countdown and status
- ✓ The report is made by Publishing to any MQTT standard Broker. Please contact us if interested in our [JDH FlowVisor MQTT Server](#) application designed specifically for our Flowmeters!
- ✓ Compatible with our [JDH Flow Visor IoT Software](#) for real time graphical plotting and monitoring of the total counts, countdowns and alarms. Please visit our website for more details!

## 2. Application Essentials

The **JDH Flow Visor IoT (MQTT) Device** is mainly intended to be used for applications in which the users want to monitor their JDH Flowmeters remotely. It requires a Wi-Fi Access Point within range and a local or remote (in the “cloud”) MQTT Server.

### 2.1. About MQTT

MQTT stands for Message Queuing Telemetry Transport. MQTT is a machine-to-machine internet of things (IoT) connectivity protocol. It is an extremely lightweight and publish-subscribe messaging transport protocol. This protocol is useful for the connection with the remote location where the bandwidth is a premium. These characteristics make it useful in various situations, including constant environment such as for communication machine to machine and internet of things contexts. It is a publish and subscribe system where we can publish and receive the messages as a client. It makes it easy for communication between multiple devices. It is a simple messaging protocol designed for the constrained devices and with low bandwidth, so it's a perfect solution for the internet of things applications.

The MQTT has some unique features which are hardly found in other protocols. Some of the features of an MQTT are given below:

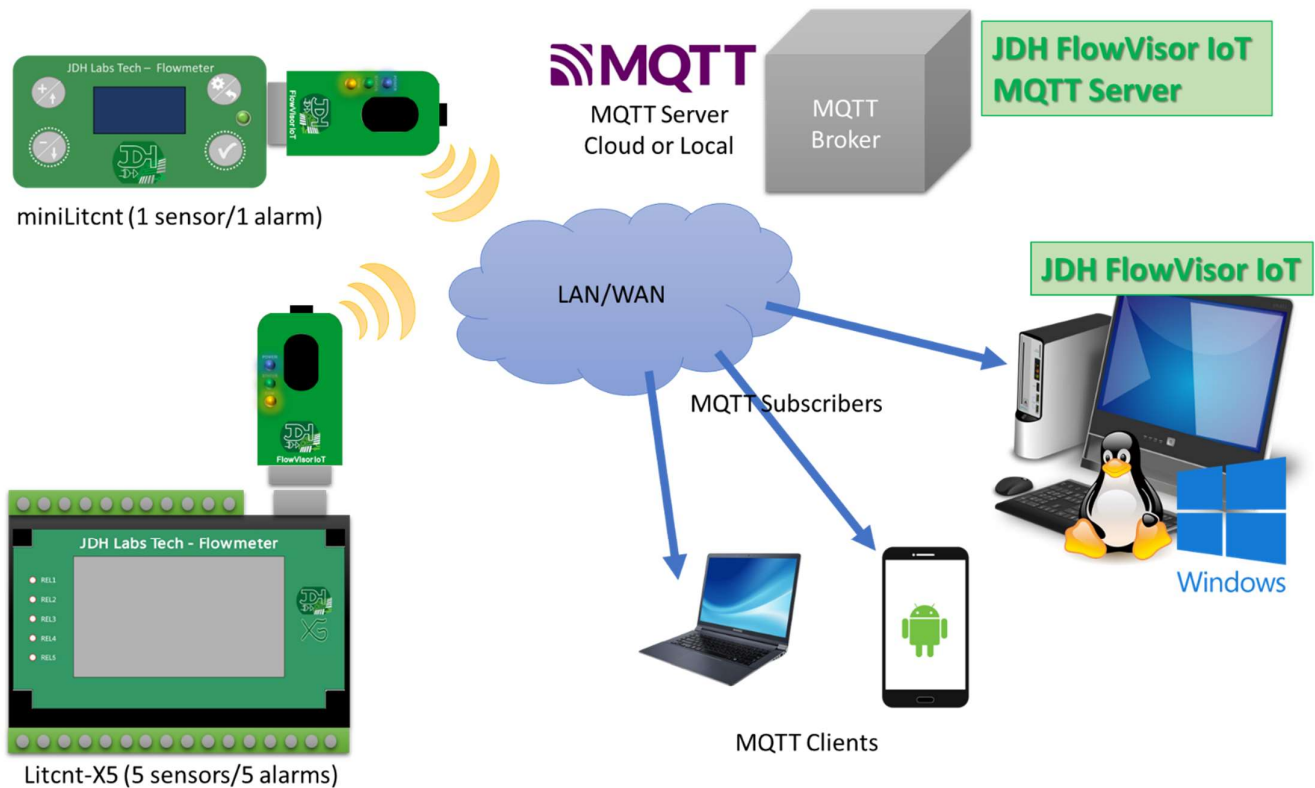
- It is a machine-to-machine protocol, i.e., it provides communication between the devices.
- It is designed as a simple and lightweight messaging protocol that uses a publish/subscribe system to exchange the information between the client and the server.
- It does not require that both the client and the server establish a connection at the same time.
- It provides faster data transmission, like how WhatsApp/messenger provides a faster delivery. It's a real-time messaging protocol.
- It allows the clients to subscribe to the narrow selection of topics so that they can receive the information they are looking for.

For more details about the MQTT protocol, we recommend the following resources:

- <https://mqtt.org/>
- <https://en.wikipedia.org/wiki/MQTT>
- <https://www.hivemq.com/blog/how-to-get-started-with-mqtt/>

## 2.2. Network Topology

The **JDH Flow Visor IoT (MQTT) Device** implements MQTT over a Wi-Fi network. The MQTT Server can be within its Local network or can be in “the cloud”, on the Internet. The users can implement their own Server or hire some cloud service available on the Internet.



Users can also implement their own MQTT Client or adapt any commercial client software according to their needs, or to their devices (Android, Windows, iOS, Linux, etc). Optionally, you can visit our online shop to get the JDH FlowVisor IoT software, which is designed specially to graphically display the data from our Flowmeters in a user-friendly customizable dashboard for Windows or Linux systems.

Currently, many companies on the Internet offer the MQTT Server services for monthly fees. We do not recommend any in particular, it is up to the customers to find and select one according to their preferences.

## 2.3. Applications

Our JDH Flowmeters are equipped with a Serial port that is used to communicate with our JDH FlowVisor software, which is widely used by our customers to graphically monitor the measurements in a

computer screen. This approach is fine for local monitoring, where the installation involves maybe just one Flowmeter or a few. But in some cases, if the customer's installations involve several sensors with several Flowmeters, then it definitely makes more sense to use a Wireless approach instead of wiring several serial cables to a computer to gather the data.

In case that the user needs to carry out a remote monitoring of the sensors, it is also not convenient to extend the Serial cable for more than a few tens of meters. So, for applications when our customers need to install the sensors and Flowmeters in a remote location, and need to monitor the data from a different, remote place, then this is the best solution. These are the reasons why we developed the JDH FlowVisor IoT Device and the [JDH FlowVisor IoT \(MQTT\) Software](#).

In this case, the requirement is that remote location must count with a Wi-Fi network with Internet connectivity. The customer can hire a public MQTT server to manage the device's data and the Clients. Another option, is to implement a customized MQTT server according to the user's needs.

The IoT device can only be used to report Flow, Volume and Alarms from our JDH Flowmeters to any private, public or commercial, on-the-Cloud MQTT Server. Alternatively, the users can implement their own MQTT Server in a LAN network to locally to keep their flow data for privacy.

## 3. How to Setup

Before setting up the IoT device, you must make sure that the JDH Flowmeter Liter Counter system is running and working normally. Make sure that the power supply is well dimensioned for feeding the whole system. We recommend to use a 12V/2A power supply for any of our flowmeters equipped with sensors and the IoT device.

### 3.1. Setup the IoT device

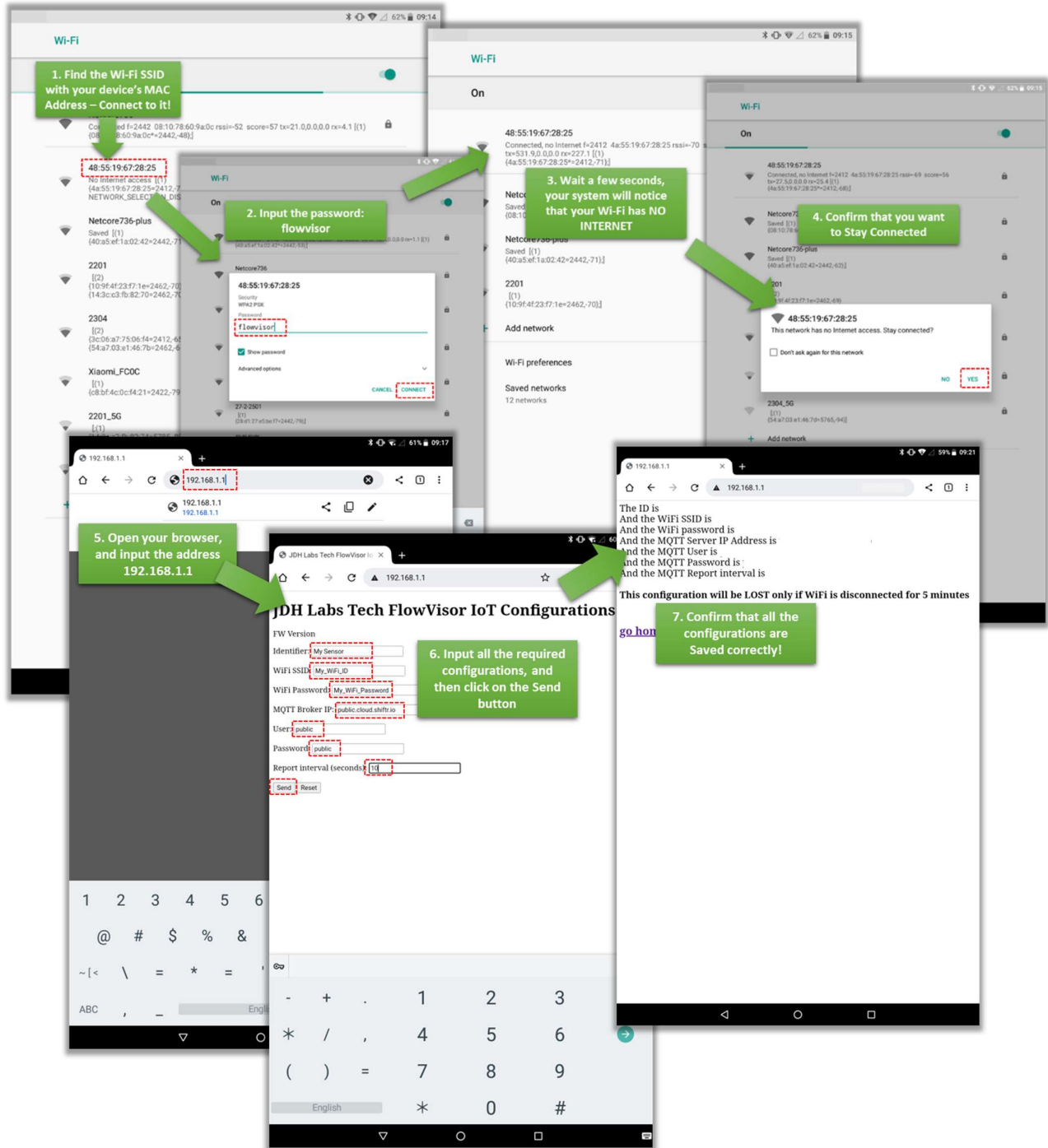
Make sure that the place where the IoT device is deployed is close enough to the Wi-Fi Access Point of your network to have a reliable connectivity.

The connection is straightforward, you can install the IoT device directly connected to the DB9 connector of the JDH Flowmeter. In case it is needed, for improving Wi-Fi signal reception purposes, you can use a DB9-male to DB9-female RS-232 cable to extend the connection from 1m to several meters.

The required power supply voltage is from 6 to 25VDC, same as the Flow Meters. Make sure that it can reliably deliver up to 3W peaks (6V/500mA or 25V/120mA). If you connect to the same power supply that feeds the Flow Meter, please consider the corresponding power load capacity.

#### 3.1.1 Configure the Device

Once the device is powered up, it will check its internal memory for a valid configuration. If no valid configuration is found, then it will set itself as a Wi-Fi access point, with SSID number matching its own MAC address. User must follow the next steps to configure the device:



The parameters required to configure are the following:

- Identifier: This is the name that describes the device that you are installing. It could be the name of the place where it is located or the liquid that you are sensing. For example, “Kitchen”, or “Tank 1”, or “Input flow”. Max 30 characters. Restricted to Letters A-Z, a-z and numbers, 0-9. The use of SPACES or other invalid characters will be automatically substituted with an underscore ‘\_’ instead.

- Wi-Fi SSID: This is the SSID of the Wi-Fi to which the IoT device will connect to
- Wi-Fi Password: This is the Password of the Wi-Fi to which the IoT device will connect to
- MQTT Broker IP: This is the IP address to which the IoT will connect to. This can be a local LAN address or a remote (internet) address. Max 30 characters.
- User: The username to access the MQTT Server. Max 30 characters.
- Password: The password credential to access the MQTT Server. Max 30 characters.
- Report interval: The number of samples that the IoT device will take of the flow before publishing to the MQTT Server. The IoT device takes 1 sample every second. Valid values: 1-99.

These configurations will stay in the internal memory after power-cycle. If you happen to introduce wrong configuration values, the only way to erase them is to keep the IoT device without access to the Wi-Fi access point for More than 5 minutes, and this way, the IoT device will automatically erase all its configuration values and set itself into the Request Configuration mode all over again.

Because of the above, it is very important to keep your Wi-Fi Access Point working within a good Signal strength area and preferably with an Uninterrupted Power Source, so it will always be available for the JDH FlowVisor IoT devices to connect.

### 3.1.2 LED Indicators

The IoT device has 3 LEDs, that have different meanings.

- The POWER LED emits blue light, and it is ON when there is power source connected
- The STATUS LED emits red and green light, and blinks according to the following status:
  - Device NOT configured: Short Blink Red light, once every 3 seconds. The device is requesting user to connect to its Wi-Fi SSID to get configurations.
  - Device trying to connect to the local network: Long Blink Red light, 1.5 seconds every 3 seconds. The device is trying to connect to the configured network.
  - Device already connected to the Wi-Fi, now trying to connect to the MQTT Server: Long Blink Green/Red light, 1.5 seconds each
  - Device now connected to MQTT Server: Short Blink Green light, once every 3 seconds. The device is now working normally! – It will quickly blink RED every time that it publishes a Report.
- The COM LED emits yellow light, each time that it is communicating with the Flowmeter. This means, that the device is working normally, with Wi-Fi connection and MQTT connection already working. If you see it blinking, it means that the full system is working!

## 3.2. Setup the MQTT Broker Server

The requirement for the MQTT Broker server is that it must be setup to be able to handle clients and publishers compliant with the MQTT 3.1 protocol specification and newer. Currently, our JDH FlowVisor IoT device and JDH FlowVisor IoT software do NOT support Payload data encryption, so just make sure that your server is not configured with mandatory TLS certificate or similar. Should you need to implement a Broker with TLS encryption, please contact us with your request ([shop@jdhlabstech.com](mailto:shop@jdhlabstech.com)) so we can arrange a special production for your project.

The only parameters needed for the IoT device configuration are the MQTT Broker Server IP address, the Username and the Password to open a session.

### 3.3. Setup the MQTT Clients

There are many options for MQTT Clients. You can find several on the internet. From our own research, we can recommend the following...

**HELLO IOT** -> <https://github.com/adrianromero/helloiot>

**MQTT BOX** -> <https://apps.microsoft.com/detail/9NBLGGH55JZG>

Alternatively, you can get the newest JDH FlowVisor IoT (MQTT) software, which runs a MQTT Client specifically designed for our Flow monitoring systems. See Section 4.2 for more details.

The settings that you will configure on the MQTT Client software are all according to the MQTT Broker that you are connecting to. So please refer to the specific documentation to confirm the connection configurations.

The MQTT topic is [Name]\_[MAC Address], where [Name] is the name given by the user during the installation (see section 3.1 ).

The subtopics are organized as follows: */[sensor]/total\_cnt*, */[sensor]/alarms*, */[sensor]/ave\_flow*, and */events*. In case that the JDH FlowVisor IoT device is connected to a Flowmeter X5, then there will be five *[sensor]* subtopics, numbered from 0 to 4. Otherwise, for the Mini and the Litcnt versions, there will only be one *[sensor]* subtopic, named '0'.

The details for each of the MQTT published messages are as follows...

#### 3.3.1 Total count

The total count is published as a float number, with 2 decimal digits. The format of the message is:

[Name]\_[MAC Address] / [sensor] / total\_cnt / [value]

**Example:**

**Kitchen\_112233445566/0/total\_cnt/256.34**

In this example, the Device named "Kitchen" with MAC Address "112233445566" is reporting 256.34 Liters of total count from its sensor numbered '0'.

#### 3.3.2 Alarms

The alarms are published for each sensor, the value is reported as a float number, with 2 decimal digits. Each report contains the current status and the configuration options of the alarm setting itself. The format of the message is:

[Name]\_[MAC Address] / [sensor] / alarms / [value][0][(alarm status)][V: Volume | F: Flow];  
 [value][1][(alarm status)][V: Volume | F: Flow] ; ... up to 5 alarms

**Example:**

**Kitchen\_112233445566/2/alarms/ 563.17[2](OFF)V; 5.00[3](ON)F;**

In this example, the Device named “Kitchen” with MAC Address “112233445566” is reporting two alarms, both from the same sensor numbered ‘2’ (Only valid for a Litcnt-X5)...

ALARM 2: Alarm set by Volume, current countdown value is 563.17 Liters, Alarm OFF

ALARM 3: Alarm set by Flow, Setting is 5.00 L/min, Alarm ON

### 3.3.3 Average Flow

The IoT device takes one sample of the flow reading every 1 second. The user can configure the device to report the average of those samples, from 1 to 99. On each report, the average flow is published as a float number, with 2 decimal digits. The format of the message is:

[Name]\_[MAC Address] / [sensor] / ave\_flow / [value]

**Example:**

**Kitchen\_112233445566/0/ave\_flow/256.34**

In this example, the Device named “Kitchen” with MAC Address “112233445566” is reporting 256.34 Liters of total count from its sensor numbered ‘0’.

### 3.3.4 Events

The events are published only to report when something happens to the monitored Device. The messages are the following:

When the IoT device is rebooted or if for some reason a different Liter counter is connected...

[Name]\_[MAC Address] / events / New Litcnt: 2 FW Ver. 1.0 WiFi RSSI: -95

**Example:**

**Tank\_112233445566/events/New Litcnt: 2 FW Ver. 1.0 WiFi RSSI: -95**

When the Liter counter is not responding...

[Name]\_[MAC Address] / events / LITCNT OFF!

**Example:**

**Tank\_112233445566/events/LITCNT OFF!**

When the “RSSI?” query is published to the main topic...

[Name]\_[MAC Address] / [sensor] / events / WiFi RSSI: -95

**Example:**

**Tank\_112233445566/events/WiFi RSSI: -95**

## 4. Online Support, Accessories and Shop catalog

### 4.1. Sensors, Electro valves, Accessories catalog

Our catalog of sensors is growing constantly. Feel free to look for a sensor that better fits your application in the following link

<https://jdhlabstech.com/jdshop/en/sensors-and-transducers/flow-sensors-control/>

Feel free to contact us through the online chat or the email with your specific requests for control, automation or monitoring applications for personal, commercial or industrial fields. We will be glad to help with consulting and assistance to cooperate with your business and projects.

### 4.2. JDH FlowVisor IoT

JDH FlowVisor software is a program that can run in a PC, laptop or even in a single board computer like Raspberry Pi. It allows you to create your own visualization dashboard for your specific industrial application. You can see more details in the following link

<https://jdhlabstech.com/jdshop/en/sensors-and-transducers/flow-sensors-control/jdh-flow-visor-iot-mqtt-software-multi-platform-solution-for-remote-flow-monitoring-windows-linux.html>

### 4.3. JDH Flowmeters Liter counters

You can find the Litcnt Systems to measure flow and count the liters/gallons running through your pipes. Please find more information at our shop: [www.jdhlabstech.com](http://www.jdhlabstech.com)

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