# ITK FLOW MASTER QUICK START GUIDE

| PRODUCT | MODEL |
|---|---|
| FLOW MASTER | MAST001 |

# Content

# Regulatory Information

## 47 CFR Part 15 Regulation Class B Devices

This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and receiver.
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
- Consult the dealer or an experienced radio/TV technician for help.

**Warning**: Changes or modifications to this unit not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

## RF Radiation exposure statement

This device complies with FCC RF radiation exposure limits set forth for general population.
This device must be installed to provide a separation distance of at least **20cm** from all persons and must not be co-located or operating in conjunction with any other antenna or transmitter.

## FCC Notice

ITK provides software code meant to operate the radio to a level that maintains compliance with the operating modes under which these radio devices were certified. To ensure this level of compliance, the software code is provided in binary form only. Users are prohibited from making any changes that affect the operation of the radio performance. Accessing or controlling the radio through any means other than the provided binary software will require the user to obtain their own intentional radiator license from the certification body governing their locality, as all precertification provided with Flow Master & Flow Sensor will have been made invalid.

## FCC Regulatory Approval

ITK Flow Master
FCCID : 2AUIF-MAST001

# Antenna

## Antenna location

The ITK-FlowMaster comes with an external antenna. Antenna is plugged to the ITK-FlowMaster. It has a 5m wire. Antenna should be placed at 5m above ground to ensure an efficient reception of radio frequency frames.

## Antenna Type

The ITK-FlowMaster has been approved by FCC to operate with the antenna type listed below with the maximum permissible gain indicated. Antenna type not included in this list, having a gain greater than the maximum gain indicated for that type, are strictly prohibited for use with this device: recertification will be required.

## Round Solutions Antenna

Manufacturer: RoundSolutions
Description: 824-960 MHz omni-directional antenna including  5000mm low loss coax cable.
Model Number: **ANT-GXS108-CO100B**

## Antenna Specification

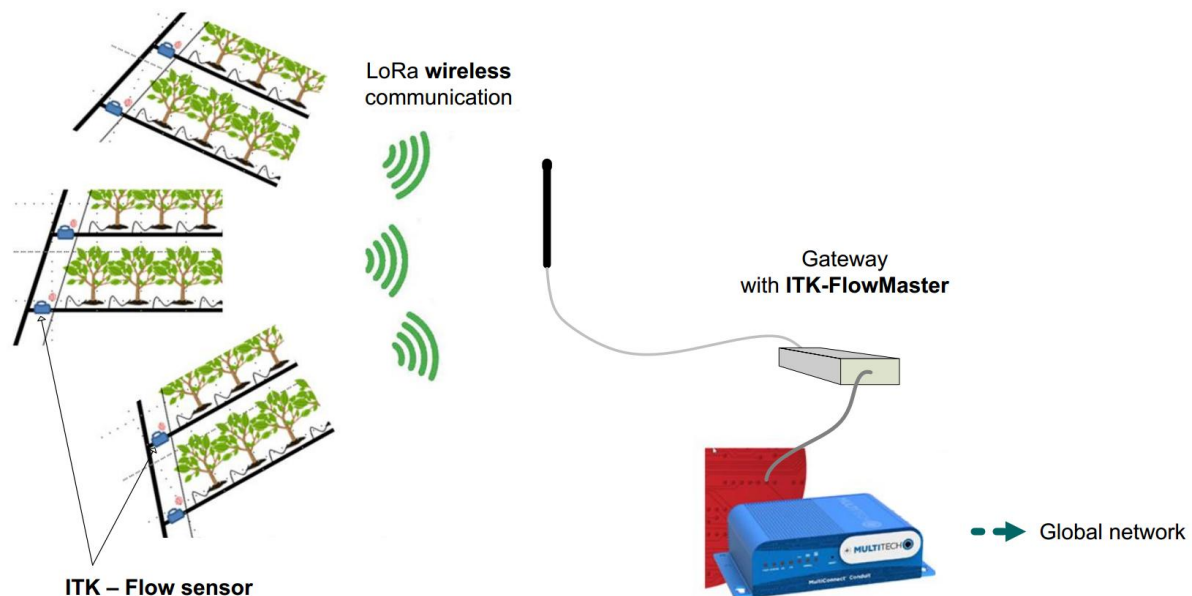| Frequency range | 824-960MHZ |
|---|---|
| Gain | 2.14 dBi |
| Polarization | Vertical |
| Radiation | Omni |
| Rod lenght | 240 mm |
| VSWR | < 2.0 |

# Connectivity

## Introduction



**Figure 1.** Connectivity

### Principle
The ITK-FlowSensor (flow meter) embeds a **wireless** technology to send the measured amounts of water to a dedicated receiver: the ITK-FlowMaster. The ITK-FlowMaster is connected to a gateway over an UART link using a USB port. It is then up to the gateway to recover the data packets and to interpret them into an embedded application software. To work properly, the ITK-FlowSensor must first be **paired** to a unique ITK-FlowMaster (see section "Features / Easy-install").

### Event-driven communication
The ITK-FlowSensor communication is **event-driven**. The ITK-FlowSensor communicates data to its paired ITK-FlowMaster when it has data ready to send (after a delay of some seconds, see below). Typical duration of a data transmission frame is 3.5 seconds.

### Number of ITK-FlowSensor devices per ITK-FlowMaster
An ITK-FlowMaster can manage multiple ITK-FlowMeter devices. In the current version of the product, in order to avoid any message collision at the ITK-FlowMaster, a different transmission time slot is dynamically attributed to each unique ITK-FlowSensor. A single ITK-FlowMaster can manage a maximum of 30 ITK-FlowSensor devices. In the next version of the product, time-slots will be enhanced and a single ITK-FlowMaster will be able to manage up to 75  ITK-FlowSensor devices.

# LoRa® wireless communication from ITK-FlowSensor to ITK-FlowMaster

The communication between an ITK-FlowSensor and an ITK-FlowMaster is done through LoRa® technology (radio frequency).

**Radio Frequency**
ISM bands: 902-928 MHz (FCC compliant).

**Radio range**
Up to 2 miles Loss-Of-Signal with receiving antenna 5m above floor.
Typically 0.5 miles in a vineyard

**Communication protocol**
Clover-Net® protocol (private LoRa radio network).

Please refer to the ITK flow sensor technical specifications for more details.

# Communication between ITK-FlowMaster and gateway

The ITK-FlowMaster is physically connected to a gateway over an UART link through a USB port. It is up to the gateway to recover the data packets sent by the ITK-FlowMaster and to interpret them into an embedded application software.

**UART physical link description**
The application embedded in the ITK-FlowMaster uses a serial link to receive orders and to return results. UART implements a transmission speed = 115200 Bauds, no parity check and 1 single stop bit.

**Standby and wake up**
The ITK-FlowMaster stays in *standby* mode to optimize power consumption. It wakes up periodically for a RF scan, where it checks if there is activity in a pre-defined RF channel to receive possible frames sent by an ITK-FlowSensor. The ITK-FlowMaster also wakes up when a serial frame is received from the gateway, from the UART physical link over a direct memory access management.[1]

# Easy-install

The installation of the ITK-FlowSensor is done through an automated *gateway discovery* process. The *gateway discovery* pairs the ITK-FlowSensor with the best available ITK-FlowMaster and gateway around. At any time after the initial installation, the link between the ITK-FlowSensor and the gateway can be tested with a *link check* process.

See ITK Flow Sensor Quick Start Guide for launching gateway installation.

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[1] In order to give enough time to the ITK-FlowMaster to wake up, a synchronization character is required at the beginning of the serial frame sent by the gateway. This synchronization character is 0xFF in hexadecimal notation or an "A" in ASCII. The same synchronization character is also sent at the beginning of frame transmissions sent by the ITK-FlowMaster to the gateway.

# Technical specifications

The ITK-FlowMaster is the device used to communicate with the ITK-FlowSensor and with a gateway.

**Model**
ITK-FlowMaster

**Dimensions & weight**
115x64x29mm
200 grams

**Power supply**
Power supply from connected gateway through USB port.
Power consumption in standby mode: ~100 µA
Power consumption in emission mode: ~40mA
Power consumption in reception mode: ~20mA

**Operating conditions**
-20°C to +70°C
Indoor

**Shielded Housing**
The ITK-FlowMaster electronic board is enclosed in a metal case.

**Antenna**
The ITK-FlowMaster comes with an external antenna. Antenna is plugged to the ITK-FlowMaster. It has a 5m wire. Antenna should be placed at 5m above ground to ensure an efficient reception of radio frequency frames.

**Radio Frequency**
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**Radio range**
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Typically 0.5 miles in a vineyard.

**Communication protocol**
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# Contact

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