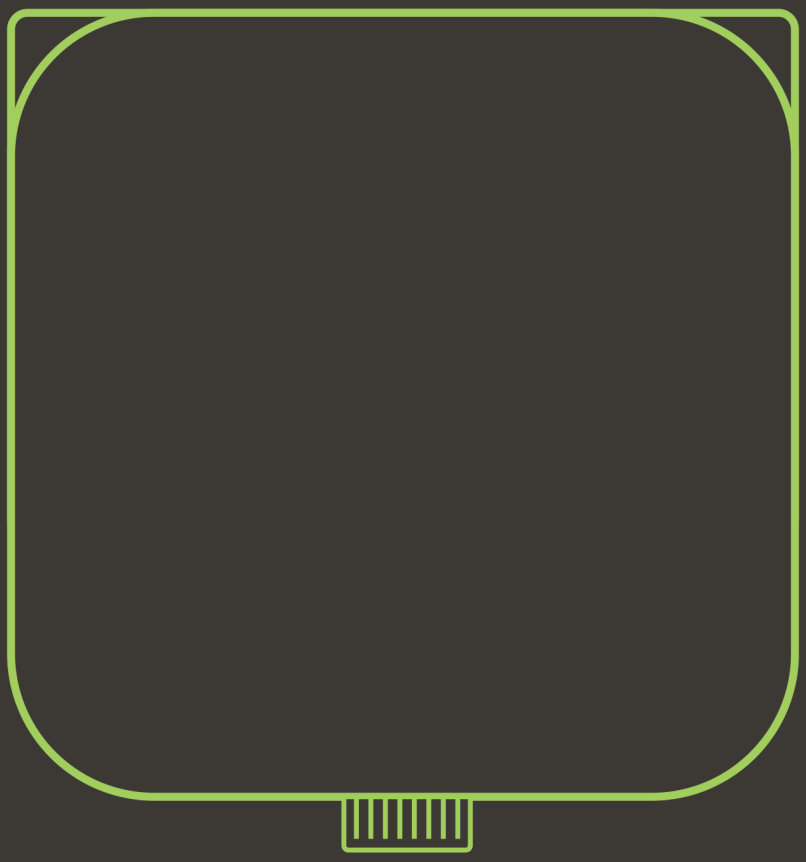
Using the Flex

Wireless Monitoring Device for Irrometer Sensors



REALM

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1 Terms and Conditions

You agree to follow RealmFive Terms and Conditions by using RealmFive devices and material.

Read and follow all the instructions for installing Flex so it will function and perform properly. A best practice is to test the Data Gateway and Flex before going out to the field to ensure that everything operates correctly.

Site selection of the Flex can impact the validity of the data that is collected.

Disclaimer: RealmFive is not responsible for poor site selection of Flex and is not held responsible for management decisions based on data collected.

Flex is water resistant but not waterproof. Avoid subjecting the Flex to direct spray. Install Flex only in approved mounting orientation.

Flex must be installed upright to decrease the probability of water entering the case.

Flex should not be immersed in liquid or buried. Improper installation, product misuse, and unsuitable protection may cause damage to the Flex and void the warranty.

1.1 Precautionary Statements

The area needs to be free of any obstacles or objects that may impact the installation. All power to the pivot and towers must be disconnected before installing Flex in a pivot irrigated field.

Use proper safety practices to reduce risk to users, their property, and equipment. RealmFive will not be held responsible for any personal injury and damage to equipment and proper- ty. RealmFive will also not be held responsible for the spread of any pests due to not following sanitary and quarantine practices; improper footwear, tool, or equipment cleaning; or any other negligent practices. Below is a list of recommended practices (but certainly not an all-inclusive list):

Avoid injuries by practicing good ergonomics such as:

- Not carrying too heavy of a load like all the equipment into the field at once.
- Avoid awkward positions and/or overextending your body or muscles.
- All equipment and footwear should be cleaned after use taking care to remove all soil residue in the installation field. Store equipment in dry, enclosed place.
- Read and follow all manufacturer's safety instructions and guidelines for each installation tool and sensor(s).
- Use hand protection such as suitable gloves to protect your hands during installation.
- Use suitable eye protection.
- Wear proper protective clothing.

1.2 Batteries

Do not mix batteries together such as type, chemistry, or age.

Battery life estimates are not guaranteed because of environmental conditions of operation and initial battery conditions.

Do not heat above 85 degrees C (185 degrees F), burn, or recharge the batteries. Extreme heat or cold may cause the batteries to explode and damage or destroy the Flex.

Do not expose battery contents to water.

Dispose of batteries and the Flex according to local regulations. Do not dispose of the Flex or batteries in fire.

1.3 Maintenance

Flex is designed for outdoor use, but it is important to periodically check Flex for (but certainly not an all-inclusive list):

- Inspect the case to ensure it is free of any damage or cracks.
- Dry the Flex off before opening if there is any water or condensation on the enclosure.
- Check all free wire holes to ensure they clean of all foreign material and that wires from the sensors are still properly installed. Safely remove the foreign material if possible. Do not attempt to open Flex internal case if you can't remove the material. Contact RealmFive customer support.
- Look at sensor wires to ensure that they are not damaged.
- Replace batteries as necessary.
- Look at the battery holders to verify they are free of corrosion and clean.
- Ensure the Flex properly shuts when closing the lid and the interior seal has happened.

1.4 Compliance

Changes or modifications not expressly approved by the manufacturer could void the user's authority to operate this equipment.

This product meets the applicable FCC Part 15 rules. Operation is subject to the following two conditions: (1) this device may not cause interference, and (2) this device must accept any interference, including interference that may cause undesired operation of the device.

Le présent materiel est conforme aux CNRexempts de licence d'Industrie Canada. Son fonctionnement est soumis aux deux conditions suivantes: (1) cet appareil ne peut pas

provoquer d'interférences, et (2) cet appareil doit accepter toute interférence, y compris celles susceptibles de provoquer le fonctionnement du dispositive.

To limit RF exposure, please ensure 4 inches (10 cm) of sepa- ration from the transmitter antennas at all times.

Interference may occur even after proper installation. Correct the interference by

- Make sure all VFD motors in the area have the proper filtering.
- Make sure all other electrical equipment and RF communications in the area is FCC approved and not preventing use of the 900 MHz ISM band.

2 Soil Mositure Sensor Testing

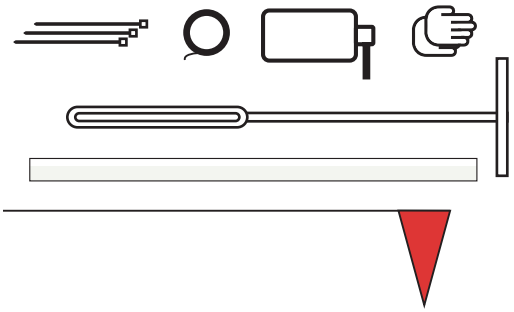
2.1 Test Sensors

Before using the sensors, test them; this is especially important if you've used the sensors in previous seasons. Test the soil moisture probes per the manufacturer's instructions.

2.2 Field Install Tools

2.2.1 Gather Instiallation Tools

- 3⁄4" CPVC pipe (available for purchase, see part numbers section)
- Gloves
- Tape
- Zip ties WD-40
- Wire cutters Wire stripper Flags
- 7/8 inch soil probe
- Soil probe cleaning tool
- Appropriate safety gear
- Tools needed for soil moisture and temperature sensor installation per the manufacturer's instructions



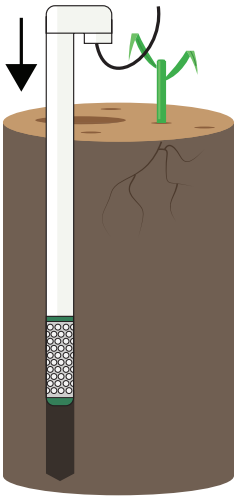
2.3 Sensor Installation

2.3.1 Verify Gateway Installation

Flex needs the Data Gateway to send in its data packets. Data Gateway must be installed before Flex. See Data Gateway Installation manual to set up the Data Gateway.

2.4 Install Probes

Install the soil moisture and temperature sensors per the manufacturer's instructions.

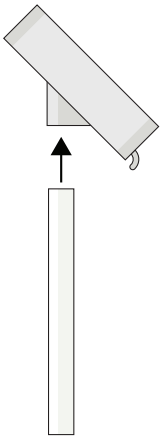


2.5 Attach Pole to Flex

Install Flex on a 5 feet length of the same 3⁄4" CPVC pipe (sold separately). The CPVC pipe is attached to Flex by pushing and twisting into a hole on the back of the unit. You may need to add an extension to the pole to provide more height to improve RSSI strength. Consider these factors when you determine RSSI strength:

- Equipment height: ensure that the equipment going through the field will clear the height of Flex.
- Proximity to the Data Gateway: The higher the Flex can be installed, the better the RSSI strength.
- Maximum crop height: taller crops will interfere more with the RSSI signal.
- Install the Flex as high as possible. Device wireless range will typically improve with greater installation height. RealmFive recommends an installation height of approximately 4 feet off the ground, as long as it

does not interfere with field machin- ery operation. For best results in corn, install Flex above the height of the corn ear.

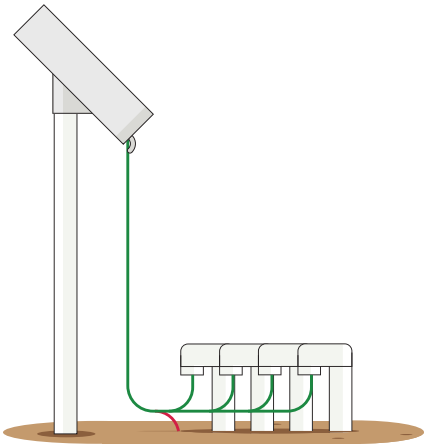


2.6 Install Flex in Field

Install Flex near the sensor so there is sufficient length of wire to reach the Flex.

Coat the outside and inside of the soil sampling probe with WD-40 and make a hole about 1 foot deep. Clean the soil sampling probe with the soil probe cleaning tool.

The Flex's flat side or the side with the logo must face the Data Gateway for best RSSI strength.



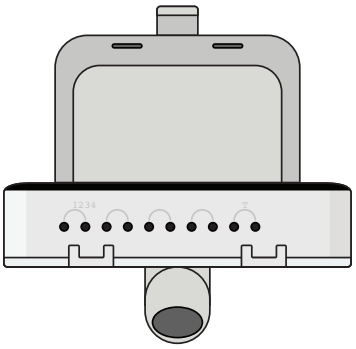
2.7 Inspect Flex and Wires

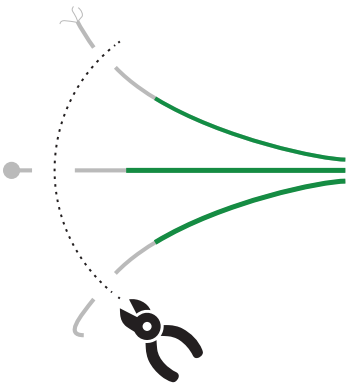
Open the Flex lid. The front of the device has holes to plug wires into. The molded-in numbers correlate to the num- bers on the mobile installation app.

Installation depths should correlate to numbers 1-4 on the installation app for the Flex.

Zip tie the sensor's wire 4-6 inches off the ground onto the sensor's CPVC pipe to prevent damage from rodents.

The wires from Watermark soil moisture sen sors come pre-soldered. Inspect the ends of the sensor wires; remove any hooks, globs, or solder balls off the tinned wires with wire cutters or wire strippers. This prevents issues with plugging the wires into the Flex.





2.8 Attach Watermark Sensors

Up to (4) Watermark soil moisture probes can be added per Flex.

Plug the two leads of Watermark soil moisture sensor with correct label into the respective connector holes (1, 2, 3, and 4) on Flex.

The wire needs to go straight into the hole on Flex. You may need to wiggle the wire around a little to get the wire all the way into the hole.

The release tab may be pressed down while inserting the wire to ensure the wires are all the way in the hole. Take your finger off the release tab and give each wire a light tug to make sure they are properly plugged in.

- The wires are frayed and are not fitting into the cor- responding Flex hole. Re-cut wire and strip about 1⁄2 - 3⁄4 inch of the insulation with wire cutters. You can also determine the insulation length to be removed by comparing it to other sensor's leads. Twist the wire so no stray wires are sticking out before inserting into Flex.

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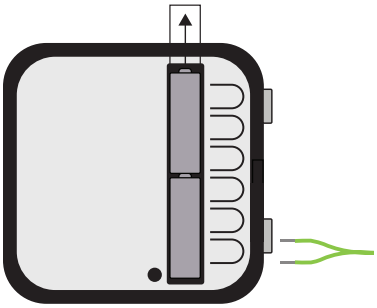


2.9 Install One Temperature Sensor

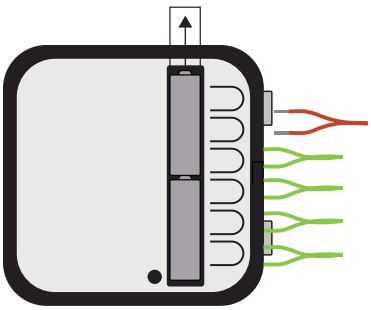
Inspect the ends of the sensor wires; remove any hooks, globs, or solder balls off the tinned wires with wire cutters or wire strippers. This prevents issues with plugging the wires into the Flex.

Plug the two leads of the temperature sensor into the corresponding temperature probe connector holes (marked with a "5") on Flex.

The wires on the temperature probe are not group tinned together. Twist the wires so they do not fray when going into the Flex hole.

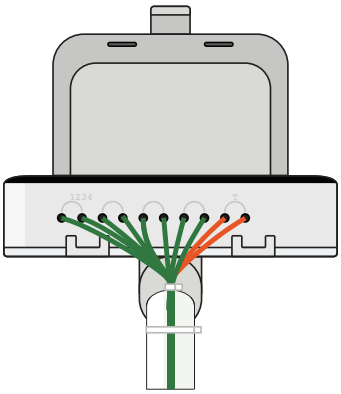
The wire needs to go straight into the hole on Flex. You may need to wiggle the wire around a little to get the wire all the way into the hole.

The release tab may be pressed down while inserting the wire to ensure the wires are all the way in the hole. Take your finger off the release tab and give each wire a light tug to make sure they are properly plugged in.



2.10 Gather Wires

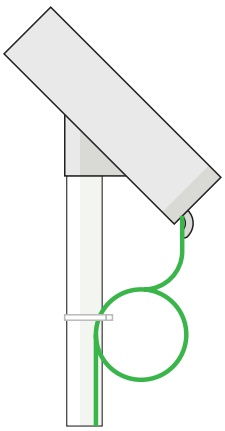
Wires from Watermark soil moisture and temperature sensors coming out of the Flex should be pulled together to the center and zip tied to CPVC pipe mount. This will prevent the wires from being accidentally pulled out of the Flex's internal board clips and allowing Flex lid to shut properly.



KEEP WIRES OFF GROUND

Tidy up the extra length of sensor's wires by coiling them and zip tying them to Flex's CPVC post.

Keep wires off the ground to reduce likelihood of damage from rodents or other animals.



2.11 Power Device

Pull the tab on the two (2) AA batteries in Flex to turn it on. Make sure to hold down the batteries so they do not come out of the holder when pulling the tab.

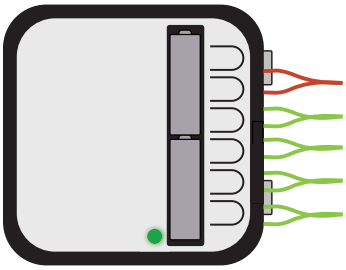
RealmFive recommends the use of Energizer Lithium Ultimate (L91) batteries for best performance on devices that are not labeled "Alkaline Only".

Devices labeled "Alkaline Only" should use alkaline batteries. Their soil moisture reading will read slightly drier than they should when the series voltage is over 3.4 V. Energizer

Lithium Ultimate batteries have a starting voltage close to 3.6 V. Note that the battery voltage will read higher when the temperature is warmer.

Alkaline batteries will work in all devices and should last an entire growing season.

Batteries should NOT be left in the device during the off season.



2.12 Observe LED

Once batteries are installed, the LED will repeatedly blink red- yellow-green-yellow as it boots. It will then blink cyan while it acquires time and location via GPS.

While the device is acquiring GPS, it will also blink magenta-green or magenta-red, indicating it is sending or unable to send radio packets.

Magenta-green means it received an acknowledge from Data Gateway.

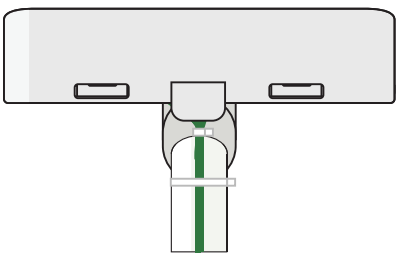
Magenta-red means no acknowledge was received. This may occasionally happen if other devices are sending packets at the same time or if there is short interference with the signal. If every single packet is magenta-red, the device needs to be mounted higher or closer to Data Gateway.

2.13 Close Lid

Close the lid on Flex, taking care to route the wires out of the slot provided between the base and the lid.

Do not cut the insulation on the wires by pinching the wires between the lid and the base.

The lid is properly closed after hearing a soft snap or click sound.



2.14 Flag and Tape Location

The Flex should be made visible for machinery operators using flagging tape to avoid damaging the device when equipment is in the field.

Flag Row

Add a flag at the end of the row and in the end rows near the ditch to mark its location if you installed Flex in the field. This will help you find the Flex easier if it needs to be replaced or serviced.

2.15 Use Sonalert

Another tool to help find the sensors is a feature called sonalert. You can create an audible alert from the Realm-Five website to have the device make sound to help find its location.

4 Support

4.1 Contact Customer Support

Contact customer support with issues by reaching us at

E-mail: support@realmfive.com

Phone: 402-318-3583

Slack: Company specific channel provided to you after purchasing Flex

4.2 Part Numbers

Product	Part Number
Flex	100-00580
(1) Watermark 42 inch soil moisture sensor (marked at 12”, 18”, 24”, and 36”)	100-00569
(1) Watermark 30 inch soil moisture sensor (marked at 8” and 24”)	100-00570
Irrometer Temperature Probe	EAM-00589
Mounting Post	3E0-00546