RainWise MK4-C

Cellular Weather Station

Instruction Manual

www.rainwise.com

RainWise®
WEATHER BETTER.

Welcome to Rainwise

When weather matters, get it right.

Adapt to whatever's on the horizon with the RainWise MK4-C, the accurate, reliable and accessible professional-grade weather station.

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Find additional product information, FAQs, technical support, instructional videos and more at **https://rainwise.com/mk4-c**

Getting to Know Your RainWise MK4-C

Components & Hardware:

Vane Anemometer

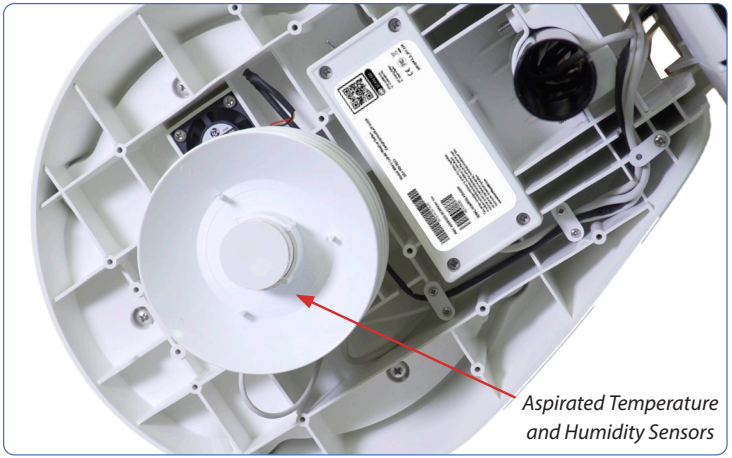
Anemometer Mast Extension

Rain Gauge

PV Power Panel

Station Base Assembly

Components & Hardware (continued):



Expansion Sensors:

The MK4-C will accommodate expansion sensors and sensor upgrades* including:

- An ultrasonic wind sensor upgrade with no moving parts
- A solar irradiance sensor
- A UV sensor
- A 20 ft anemometer cable extension kit
- A family of agricultural sensors for:
  - ✓ Leaf wetness
  - ✓ Soil temperature
  - ✓ Soil humidity

*Sensors and upgrades are in development
Please subscribe to product update
announcements at www.rainwise.net.

Introduction

You are minutes away from the ability to monitor weather with professional-grade accuracy anywhere, for any personal or professional reason.

The RainWise MK4-C Cellular Weather Station delivers accurate hyper-local weather information. It is lightweight, durable, easy to set up and quick to connect.

Your MK4-C station is equipped with CAT/LTE-M and NB-IoT cellular connectivity (including one year of free data) that transports your weather data to a personal dashboard where you can view and share data, view history and graphs, and build reports. Set up your dashboard at ***www.rainwise.net***. Refer to page 12 of this manual for further instruction.

Check your MK4-C weather station data at ***www.rainwise.net***.

View your MK4-C weather station data at www.rainwise.net and via the RainWise iOS & Android app.

Getting Started with Your RainWise MK4-C

IMPORTANT: Read through this guide in its entirety before starting, and complete the steps in the order they're presented:

1. **Plan your station location and mounting. Confirm you have purchased the correct mounting hardware (Tripod or Mono Mount, sold separately) for your chosen location.**
2. **Unbox the station**
3. **Activate your data plan**
4. **Register the station account**
5. **Assemble the station**
6. **Mount the station**
7. **View your data on rainwise.net**

1 Station Siting and Setup

Where you install your RainWise MK4-C can positively or negatively impact accuracy. Natural and artificial obstructions around the weather station, like trees or other structures, could skew the data. You can get more detailed station location and siting guidelines at **https://rainwise.com/mk4-c**

Location Considerations:

» Your station requires direct sunlight to maintain the battery charge at a healthy level. Installing the station in a partially shaded location will have an adverse effect on the battery lifetime and may limit the data transmission frequency.

» Pick a spot you can easily access, as you may have to remove debris from the rain gauge bucket once or twice a year.

» The station should ideally be mounted at least 5 ft (1.52 meters) above ground and away from roads, buildings and other sources of radiant heat.

» The station should be well away from trees that could shade the station, block wind or create a natural umbrella.

» For best results with a roof mount, install the station at the highest point on the roof.

Mounting Considerations:

» The rain gauge must be level to provide accurate rainfall measurements. Ensure that your chosen mounting location is sturdy and does not sway in the wind with the additional weight of the station. Excess motion or tilting will greatly reduce the accuracy of rainfall measurements.

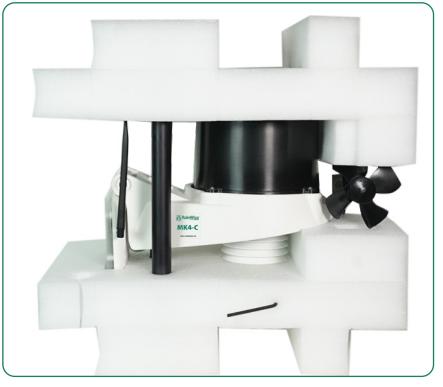
» The assembled station weighs 8.4 lbs, but wind will increase loading on the mount. Mounting hardware is not included with the station.

» In the Northern Hemisphere, the PV power panel must point south to capture maximum solar energy and for the anemometer to provide accurate wind direction. In the Southern Hemisphere, the panel should point north.

2 Unboxing

What's included:

» The pre-assembled station base; including rain gauge, air temperature, RH, and barometric pressure sensors
» Anemometer mast extension
» Vane anemometer (wind speed and direction sensors)
» Assembly tools: 5mm hex key and #2 Phillips tool (Two spare screws included)
» If you opted to purchase a Mono Mount, your package will include the Mono Mount parts



3 Activating Data Plan & Registering Online

You must visit the RainWise registration page and enter your weather station's MAC address and serial number to activate the station's data plan:

» Go to ***https://rainwise.net/inview/register1.php***

» Create a new account or log in to your existing account from **rainwise.net** in the upper right hand corner (fig A).

» Enter your RainWise MK4-C MAC address and serial number, found on the label on the battery door cover under the station (fig B).

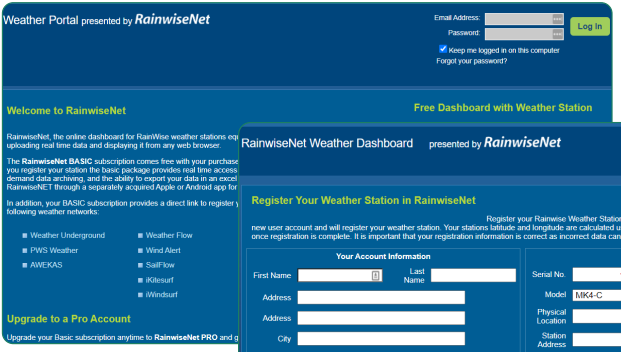


Figure A

Figure B

4 Assembling Your Weather Station

IMPORTANT: Complete these steps before powering up your station to ensure the sensors initiate correctly.

Assemble the Anemometer

» Find the three screws on the anemometer mast extension. Remove and save the small Philips screw at the dimpled end. (fig C).

This screw has a smaller head than the other two.

» Loosen the screw closest to the middle of the extension by three turns.

» The non-dimpled end is marked with red tape. Remove the screw and the tape and save the screw for attaching to the station base (fig D).

» Pull the anemometer cable out of the station base (fig E), and straighten the cable. Feed the cable into the end that was marked by red tape and continue to push the cable through the anemometer mast extension (fig F) while sliding the extension onto the station base so the connector comes out of the dimpled end (fig G).

Figure C

Figure D

Figure E

Figure F

Figure G

Station Assembly

» Rotate the anemometer mast extension until the screw aligns with the slot in the station base, then slide the screw all the way into the slot and hand tighten (fig H).

» Place the screw that was removed from the non-dimpled end of the mast (fig D) into the hole below the station base slot and hand-tighten it well.

» Plug the end of the cable into the anemometer. The red side should be closest to the hub's center and the black side closest to the hubwall (fig I).

» Slide the anemometer hub onto the anemometer mast extension with the slot oriented in line with the dimple as shown (fig J).

» Replace the screw that was removed from the dimpled end of the mast to secure the anemometer in place and handtighten with a Phillips screwdriver (fig K).

Spare screws are provided in the zip lock bag with the assembly tools.

Figure H

Figure I

Figure J

Figure K

Station Assembly

Align the PV Panel

Figure L

» Slightly loosen the 5mm hex bolt with included wrench, adjust the PV power panel angle to match your latitude as indicated in the table below, then re-tighten the bolt (fig L).

Latitude	Angle from vertical	Clicks from vertical
0–22.5	75°	5
22.5–55	45°	3
55–90	15°	1

0 *Clicks*

1 *Click (15°)*

2 *Clicks*

3 *Clicks (45°)*

4 *Clicks*

5 *Clicks (75°)*

6 *Clicks*

5 Connection Status

Confirming Your Station is Online

» Flip the toggle switch on the underside of the station base to "ON" (fig M).

It is best to minimize the number of On/Off cycles during station startup, as frequent switching can lead to cell modem connection delays.

» The LED light on the PV power panel will flash magenta. This means the station is attempting to connect to a cellular network.

» The light will flash green when the station has successfully connected. Go to **rainwise.net** on your mobile device to confirm your station is transmitting data from all sensors. (fig N)

» Refer to the troubleshooting guide at the end of this manual if the LED indicator does not blink green within 20 minutes of turning the station on.

To conserve power, turn the station off if you don't plan on mounting it within 12 hours.

In areas with poor cellular signal strength, you may need to optimize the station location and antenna configuration. Get detailed instructions on your station's signal strength indicators at ***rainwise.com/help/battery-mode***

Figure M

Figure N

***Note:** You may experience cellular service interruption due to weather, location, network limitations and other factors.*

6 Mounting

Refer to https://rainwise.com/mk4-c

» Mount the station.
See appendix for Mono Mount and Tripod Mount mechanical drawings (page 31-32). Find detailed instructions and installation videos at https://rainwise.com/mk4-c.

» Confirm that the rain gauge bucket is level using one of these methods:

✓ Place a level across the top of the rain bucket and take two readings perpendicular to each other (fig O & P).

✓ Cover the rain gauge bucket drain with a piece of duct tape and add approx. 16 oz of water. If level, the edges of the water should be centered in the bottom of the bucket. Remove the tape to allow the water to pass through the drain and test the rain gauge (fig Q).

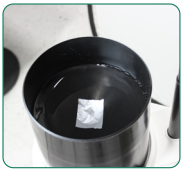


Figure Q

Figure O

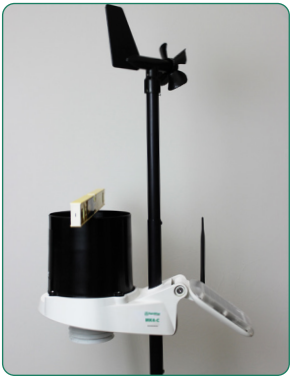


Figure P

Mounting Instructions:

» Mount the support mast securely to the support structure using the Mono Mount or Tripod (sold separately) or standard U-bolts. Do not tighten the support structure to the MK4-C unit, as directional orientation will be required.

» Rotate the assembled unit until the electronics enclosure with the solar panel cover faces south if you're in the Northern Hemisphere, or north if you're in the Southern Hemisphere. This will capture maximum solar energy and help the anemometer provide accurate wind direction. Use a compass for accuracy.

» Secure the support mast to the assembly. Prevent rotation by lining up the two holes in each mast

✓ ***At this point, the entire unit should be secured to the support structure. It is crucial that the device is oriented as precisely as possible.***

7 Powering Up

After mounting the station, confirm the power is ON and the station is transmitting to rainwise.net as shown in figure R.

Data can take up to 15 minutes before it is shown on rainwise.net

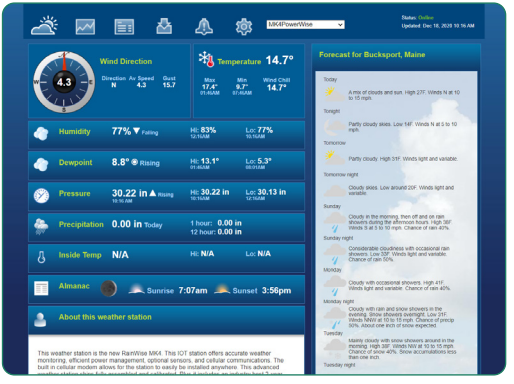


Figure R

Troubleshooting

Refer to ***rainwise.com/support*** for FAQs and additional troubleshooting information.

The MK4-C cellular weather station can ONLY connect to a cellular network and cannot connect to a WiFi network. You can use provider coverage maps or third party tools such as the Open Signal app or RootMetrics app to plan an optimal location for your station.

When power switch is flipped ON, the station will transmit once every 5 minutes for a period of 30 minutes, and then revert to normal operation mode, transmitting every 15 minutes. During that time, the multicolor LED on the PV power panel will indicate the connection status:

Flashing **magenta** (every 10 seconds): Attempting to connect to a cellular network

Flashing **green** (every 10 seconds): Normal Operation

Flashing **blue** (every 10 seconds): Power Saver mode

Flashing **red** (every 10 seconds): Logging mode

Flashing **red** (every 20 seconds): Hibernation mode

The MK4-C station is shipped with a fully charged battery and the station is designed to maintain normal operation in subfreezing weather. If solar charging is insufficient due to extended snow cover or installation in a shaded location, the station will change operating modes to conserve power as detailed in the station specifications operating mode table. In winter conditions, the rain gauge will not measure precipitation until the accumulated contents of the bucket have melted and drained through the strainer at the bottom of the bucket.

IMPORTANT: If the station enters hibernation mode due to a depleted battery, the station must be left turned "on" and placed in direct sunlight to recharge. When the battery is charged sufficiently (typically 1-3 days), the station will switch back to Logging mode, then Normal Operation mode as charging allows. You will receive an email notification when the station returns to Normal Operation mode.

Specifications

SENSORS	Accuracy (+/-)	Resolution	Range	Notes
Wind Speed	5% or 1 mph between 1 to 57 mph	0.1 mph 0.1 knot 0.1m/s 0.1 km/hr	1 to 100 mph 1 to 86.9 knots 1 to 44.7 m/s 1 to 160.9 km/hr	Wind speed is measured continuously and stored in station memory as a series of 2 second averages. The reported wind speed is the average over the 15 minute logging interval. The highest measured speed during the logging interval is reported as the gust value.
Wind Direction	2°	1°	1° ~ 360°	Wind direction is measured continuously and stored in station memory as a series of 2 second averages. The reported wind direction is the average scalar direction over the 15 minute logging interval. The gust direction is the average scalar direction for the 2 second record corresponding to the gust value.
Temperature	0.45° F 0.25° C	0.1° F 0.1° C	-40° to 140° F -40° to 60° C	Temperature is measured once per minute. The reported temperature is the average value for the 15 minute logging interval. High and low temperatures are based on the 1-minute readings.
Relative Humidity (typical)	1.5% between 0 - 80%	1%	0 to 100%	See fig S for accuracy tolerance over the RH range. Humidity is measured once per minute. The reported humidity is the average value for the 15 minute logging interval. High and low RH are based on the 1-minute readings.
Absolute Pressure	1.5 mbar/hPa 0.044 inHg 1.1 mmHg	0.1 mbar/hPa 0.01 inHg 0.1 mmHg	600 to 1100 mbar/hPa 17.72 to 32.48 inHg 450.0 to 825.1 mmHg	Pressure is measured once per minute. The reported pressure is the average value for the logging interval. High and low pressures are based on the 1-minute readings.
Rain Rate	5% at 2"/hr (5% upgradeable to 2%)	0.01 in/hr 0.1 mm/hr	0 to 7.8 in/hr	Rainfall is measured continuously in 0.2 mm increments (tipping bucket calibration volume)

Relative Humidity (typical)

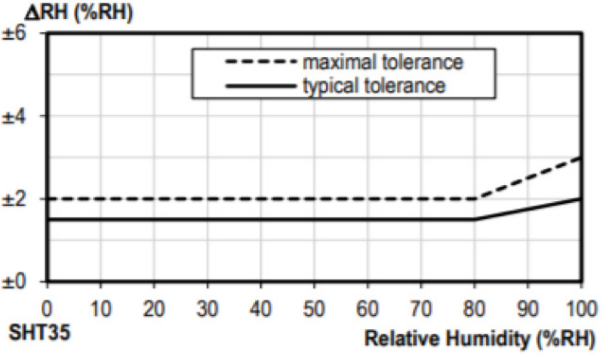


Figure S

SYSTEM

Operating Environment Temperature:	-40° to 140° F (-40° ~ 60°C)
Dimensions	11”x23”x36” (28 x 58 x 91 cm)
Weight	8.9 lbs (4.04 kg)
Certifications	FCC, CE, IC
Data Cache Capacity	365 Days
Logging Rate	Every 15 minutes (See sensor specification notes for details)
Cellular Transmission Rate	Every 15 minutes
Battery Type:	Non-Spillable 4V 4.5Ah AGM sealed lead-acid 1A peak, 12 mA typical
Battery Life:	2 to 5 Years typical
Cellular Modem Type:	CAT-M / NB-IoT
Solar Panel Type:	mono crystaline 7V 2.3 W
Warranty	2 Years

STATION OPERATING MODES	Standard	Power Saver	Logging	Hibernate	Recharge
Battery Status	Battery Charged	Low Battery	Critically Low Battery	Critically Low Battery	Critically Low Battery
Aspirated Sensor Measurement Frequency	1 min	2 mins	5 mins	None	None
Cellular Data Transmission Frequency	15 mins	15 mins	24 hrs	None	None
Panel LED Color	Green	Blue	Red	Red	None
LED Blink Frequency	10 sec	10 sec	10 sec	20 sec	None

Product and Safety Information

WARNING: Read and follow these guidelines to reduce the risk of injury or death.

- ✓ Fully read your RainWise MK4-C user manual to familiarize yourself with the product's features before operating.
- ✓ Failure to operate this product correctly can damage it or produce inaccurate readings.
- ✓ Use good judgement whenever you rely on station readings to make decisions regarding safety, health, or property protection.
- ✓ Allow a margin of safety for changing conditions and reading errors (2-3% of readings is recommended).

Be certain your weather station's accuracy has not been compromised by improper installation, contamination, or damage. When in doubt, verify your weather station's accuracy against a known good standard for the measurement in question, and contact RainWise Technical Support with any questions or concerns.

NOTICE: All instructions and associated documents are subject to change at the sole discretion of the manufacturer. For up-to-date product information, visit **www.rainwise.com/support**

Compliance

MK4-C contains approved transceiver modules:

FCC IDs : MCQ-XB3M1, XPY2AGQN4NNN and A8TBM71S2

This product was type-tested and found to comply with the limits for a class B computing device in accordance with the specifications in Subpart J of Part 15 of FCC rules, designed to provide reasonable protection against such interference in residential installation. We make no guarantee that interference won't occur in a particular installation. If this equipment does cause interference to radio or television reception, which can be determined by turning the equipment off and on, try correcting the interference in one or more of these ways:

» Reorient the receiving antenna.

» Increase the separation between the equipment and the receiver.

» Connect the equipment to an outlet on a circuit different from the one the receiver is connected to.

» Contact the manufacturer or an experienced radio/television technician for additional help.

To satisfy FCC RF exposure requirements for mobile transmitting devices, a separation distance of 25 cm or more should be maintained between the antenna of this device and persons during device operation. To ensure compliance, operations at closer than this distance are not recommended. The antenna used for this transmitter must not be co-located in conjunction with any other antenna or transmitter.

While the antenna is detachable, the MK4-C must only be used with the supplied antenna. Use of an unapproved antenna with regards to compliance and its ramifications will not be the responsibility of the manufacturer.

IC

MK4-C contains approved transceiver modules :

IC IDs: 1846A-XB3M1, 8595A-2AGQN4NNN and 12246A-BM71S2

This product was type-tested and found to comply with the limits for a class B computing device in accordance with the specifications in ICES-003 and Part 15 of FCC rules.

This device complies with Industry Canada license-exempt RSS standard(s). 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 appareil est conforme aux CNR d'Industrie Canada applicables aux appareils radio exempts de licence. L'exploitation est autorisée aux deux conditions suivantes: (1) l'appareil ne doit pas produire de brouillage, et (2) l'utilisateur de l'appareil doit accepter tout brouillage radioélectrique subi, même si le brouillage est susceptible d'en compromettre le fonctionnement.

While the antenna is detachable, the MK4-C must only be used with the supplied antenna. Use of an unapproved antenna with regards to compliance and its ramifications will not be the responsibility of the manufacturer.

CAUTION! This equipment is approved for mobile and base station transmitting devices only. Antenna(s) used for this transmitter must be installed to provide a separation distance of at least 25 cm from all persons and must not be co-located or operating in conjunction with any other antenna or transmitter.

ATTENTION! Cet équipement est approuvé pour la mobile et la station base dispositifs d'émission seulement Antenne(s) utilisé pour cet émetteur doit être installé pour fournir une distance de séparation d'au moins 25 cm à partir de toutes les personnes et ne doit pas être situé ou fonctionner en conjonction avec tout autre antenne ou émetteur.

Compliance

EU Declaration of Conformity

This product was tested and found to comply with EU Council Radio Equipment Directive 2014/53/EU (RED).

EN 61010-1, SAFETY REQUIREMENTS FOR ELECTRICAL EQUIPMENT

EN 55022, Enclosure of Ancillary Equipment

EN 61000-4-3, Radio Frequency Electromagnetic Field

EN 61000-4-2, Electrostatic Discharge

This product contains:

Digi International Modem, Model XB3M1, with a manufacturer

Declaration of Conformity to EU Council Radio Equipment Directive 2014/53/EU (RED).

Microchip Inc Bluetooth Module, Model RN4871, with a manufacturer

Declaration of Conformity to EU Council Radio Equipment Directive 2014/53/EU (RED).

RoHS (Reduction of Hazardous Substances) compliant.

Marked in accordance with the WEEE (Waste Electrical and Electronic Equipment) Directive. **Please do not dispose of the RainWise batteries in your household trash.** Return to RainWise, a RainWise dealer, or a designated recycling center for proper recycling and disposal.

Does not contain greater than >0.1% of the substances of Very High Concern (SVHC) on the REACH European Regulation on the Registration, Evaluation, Authorization and Restriction of Chemicals Candidate List.

CONTACT US AT

support@rainwise.com

(800) 762-5273 • Toll-Free North America

(207) 288-5169 • Continental US

Proposition 65 Warning

WARNING: This product and/or its included or branded accessories can expose you to chemicals, including lead, lead compounds and phthalate DEHP, which are known to the State of California to cause cancer and lead and lead compounds, bisphenol A (BPA), and phthalate DnHP, which are known to the State of California to cause birth defects or other reproductive harm. For more information, go to **www.P65Warning.ca.gov.**

More Information

Many of the elements listed under Proposition 65 are commonly found in products in the electronics industry. Although RainWise's instruments manufacturing process is "lead-free," it remains possible that small amounts of lead could be found in components or subassemblies. Bisphenol A (BPSA) could be found in plastic housings, lenses, labels or adhesives, and DEHP & DINP (phthalates) could be found in PVC wire coatings of cables, housings, carrying cases, an/or power cords. Because we cannot guarantee that these chemicals are never present, we have elected to place the warning on our products to ensure compliance with California law and our customers' right to know. While we have not at-tempted to evaluate exposure, we believe that normal consumer use of this product is unlikely to result in exposure that creates a significant risk of harm. For more information visit **www.rainwise.com/prop65** or contact us directly at **support@rainwise.com**.

Warranty

Your **RainWise MK4-C Cellular Weather Station** from RainWise is warrantied be free of defects in materials and workmanship for a period of **TWO YEARS** from the date of its first consumer purchase. RainWise agrees to repair or replace any defective damage due to the product or part when notified within the warranty period without charge.

The following are excluded from warranty coverage: damage due to improper use, abuse, accident and/or lack of reasonable care; improper storage, maintenance or handling (including corrosion); the fixing of any attachment not provided with the product; lightning strike and/or power surge.

Removal/reinstallation charges and any warranty service performed by a non-authorized repair service are also not covered. RainWise assumes no responsibility for any special, incidental or consequential damages and RainWise authorizes no other warranty, written or oral.

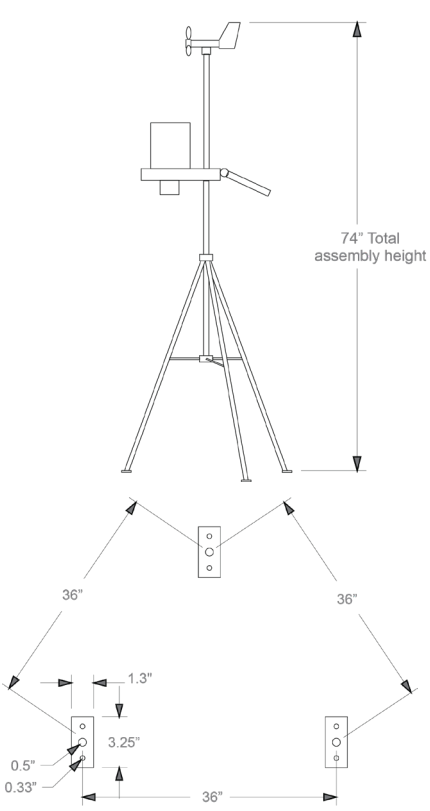
This warranty gives you specific legal rights, and you may have other rights, which vary from state to state. Some states do not allow the exclusion of incidental or consequential damages, and so the above exclusions and limitations may not apply to you.

To return a unit under warranty:
https://rainwise.com/ordering-shipping-warranty-info or call (800) 762-5723

Make sure equipment is properly packed - preferably in the original box. Damage incurred in shipping is not covered under this warranty.

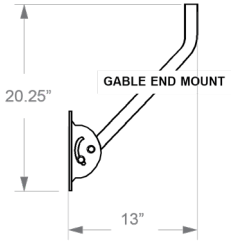
Appendix 1:

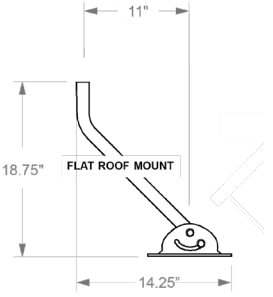
Tripod Mechanical Drawing

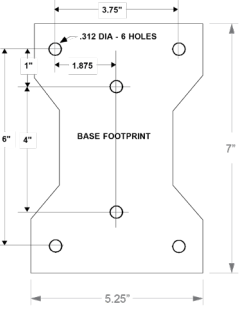


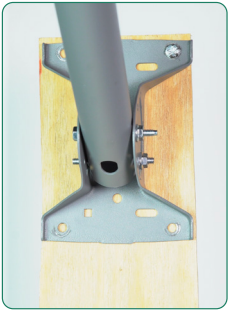
Appendix 2:

Mono Mounts Mechanical Drawings









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