

QUICK INSTRUCTION MANUAL

Weather Flow Tempest system and smart weather stations



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1. Parts List:

- Tempest sensor device
- Flat base and pole mount attachments
- WiFi hub
- USB power cable and wall socket for Hub
- Does not include hardware for installation.



2. Measured variables and characteristics:

- Outdoor temperature, humidity, dew point, temp. Perceived
- Station pressure and sea level pressure
- Wind speed, wind direction, average and gusts
- Lightning activity (hits and range up to 25 miles)
- Beginning, intensity, duration and accumulation of rain
- DeltaT, wind chill, wet bulb temperature, air density
- UV index, brightness, solar radiation
- IOS and Android app and free personal weather page
- Free personal weather page: <https://tempestwx.com/station/12949/Self-calibrationwithcontinuouslearningsystem>
- Works with Alexa, Google Home, IFTTT, and more



3. Detailed installation instructions

Download the app and create an account

1. Download the 'Tempest Weather' mobile app. Follow these links to get the Tempest Weather app in the [Google Play Store](#) or the [Apple App Store](#).
2. Enable Bluetooth on your smartphone or tablet and launch the app. If you are using an Android device, make sure you enable Location Services for the Bluetooth connection services to work properly.
3. Enter an email address and password. (Write it down so you don't forget!) The hardware (Hub + Tempest device) can only be configured on one account at a time. You can share the account login or public URL generated for your station after it is set up.
4. Now tap "Setup Station" and follow the guided steps in the app to set up your hardware on a "station". A station consists of a Hub and connected sensor devices, such as the Tempest device.
5. Plug in the hub. Tap the NEXT button and proceed with the configuration.
6. Twist off the base of your AIR & SKY device. (It's water tight - *twist hard!*). Insert 4 AA lithium batteries in AIR and use the solar panel accessory for SKY device (recommended) or 8 AA batteries. Make sure batteries are oriented correctly. See [Batteries & Solar Power](#) for further installation instructions. Tap NEXT and proceed.
7. Enter your Hub serial number (located on a sticker at the bottom of your Hub). Tap the NEXT button.
8. Give the station a name. (We suggest you choose a name that describes the place like "NW River Bend" or even the name of the town and street works great.)
9. Tap "Set" to set the geographic location. A map should appear to pinpoint your geographic location (make sure location services on your phone or tablet are enabled). If necessary, you can drag the map to adjust the marked position. Once the pin is in the desired location, tap the check mark in the top right corner. Tap NEXT and proceed. The altitude above sea level is automatically determined based on your geographic location.
10. Click the "Next" button.
11. Give your AIR/ SKY device a familiar name (e.g. for AIR - backyard, upper deck, or patio and for SKY - roof, chimney, or fence). Choose if the device will be located outdoors or indoors. Input the approximate height you will place the device above the ground. Then tap the "Save" button.
12. Gather your home WiFi network name and password. Tap the "Next" button.

13. Select your desired WiFi network. Enter the WiFi password. (If you don't see your desired WiFi network, tap "Refresh" in the upper right and/or reboot your WiFi router.)
14. Success! Wait about 5 minutes for the initial sensor data to start filling in, then it's time to site your sensors.
15. See, [AIR & SKY siting and installation](#) for the installation. Here are installation examples: <https://help.weatherflow.com/hc/en-us/articles/360059011334-Tempest-Installation-Gallery>. Step by step guide for mounting on flat base and pole: <https://help.weatherflow.com/hc/en-us/articles/360047672153-Flat-Base-Pole-Mount-Step-by-Step-Guide>

Check out the [community forum](#)! Chat with other station owners, forecasters, weather enthusiasts, developers, and WeatherFlow staff and stay up to date on all of Tempest.

4. Positioning and installation of the AIR & SKY device

Location and installation for AIR & SKY

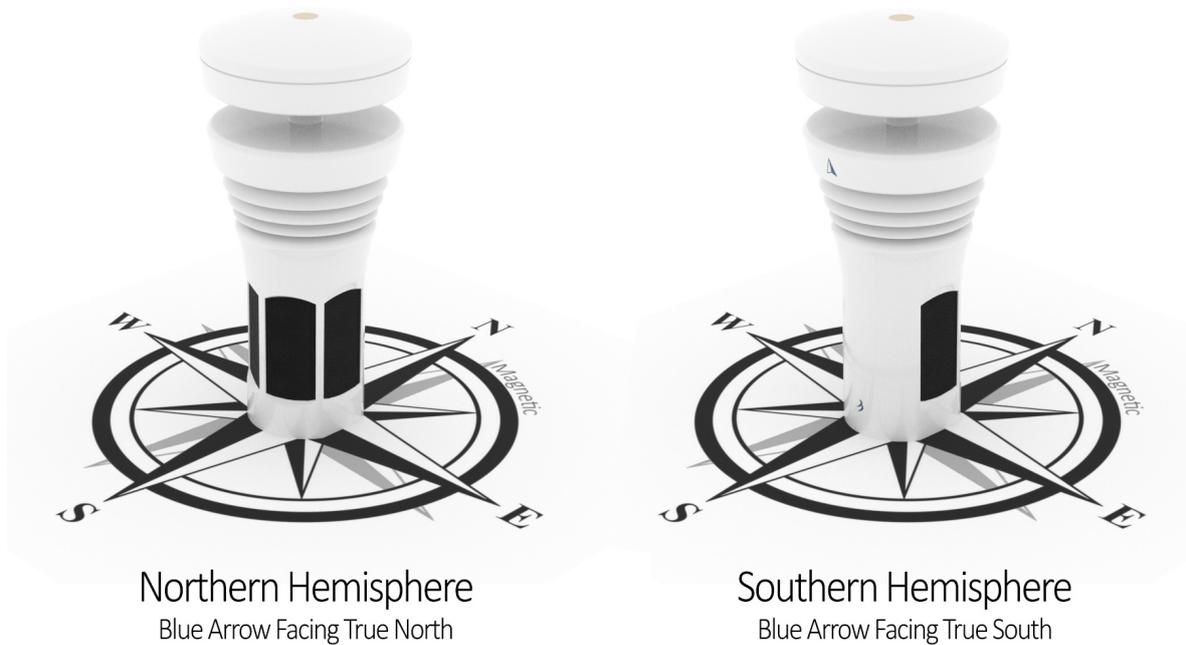
AIR and SKY can be easily placed and installed in various locations around your property. The sensor devices are capable of maintaining a connection to the hub up to 1000 feet (300m) away without obstacles.

The Tempest device can maintain a connection to the hub up to 300m away with direct line of sight. Obstacles such as walls and ceilings will reduce signal strength and weather. You can make sure your Tempest device is getting a good signal with the hub by viewing the RSSI value in the app, go to settings> stations> select station> status. An RSSI close to 0 indicates a good connection while weaker connections are between -80 and -100.

The Tempest device should be mounted vertically and as horizontal as possible for accurate wind readings.

Correct alignment is critical for accurate wind direction and exposure of the panels to the sun for solar charging.

Correct orientation of Tempest



The blue arrow  on the side of the device should face true north or true south and the solar panels aligned south for optimal sun exposure. If your station is in the Southern Hemisphere, point the arrow south with the panels aligned north. Tempest devices configured in the Southern Hemisphere will automatically receive a 180 ° wind direction correction via the software.

True or geographic north / south is not the same as magnetic north / south. A compass will point towards the magnetic poles. Geographical north / south is the true center point of a hemisphere and is the basis for referring to wind direction.

A compass can help you align your Tempest, but you need to adjust the compass reading with your magnetic declination. An easy way to accurately align the device is to find a north or south landmark on the map when locating the station and use it to align the arrowhead. For example, the side of your house or any landmark you can see that gives you a clue to a known cardinal direction.

5. Simple Installation Kit Instructions

Be sure to read our [Siting & Installation guide](#) to help you decide the best location on your property to install your Tempest. The Simple Installation Kit, [available in our online store](#), can be attached to any vertical structure like a fence post, a shed, the side of your house, etc. The Tempest should extend above the structure as far as possible.



Basic Instructions

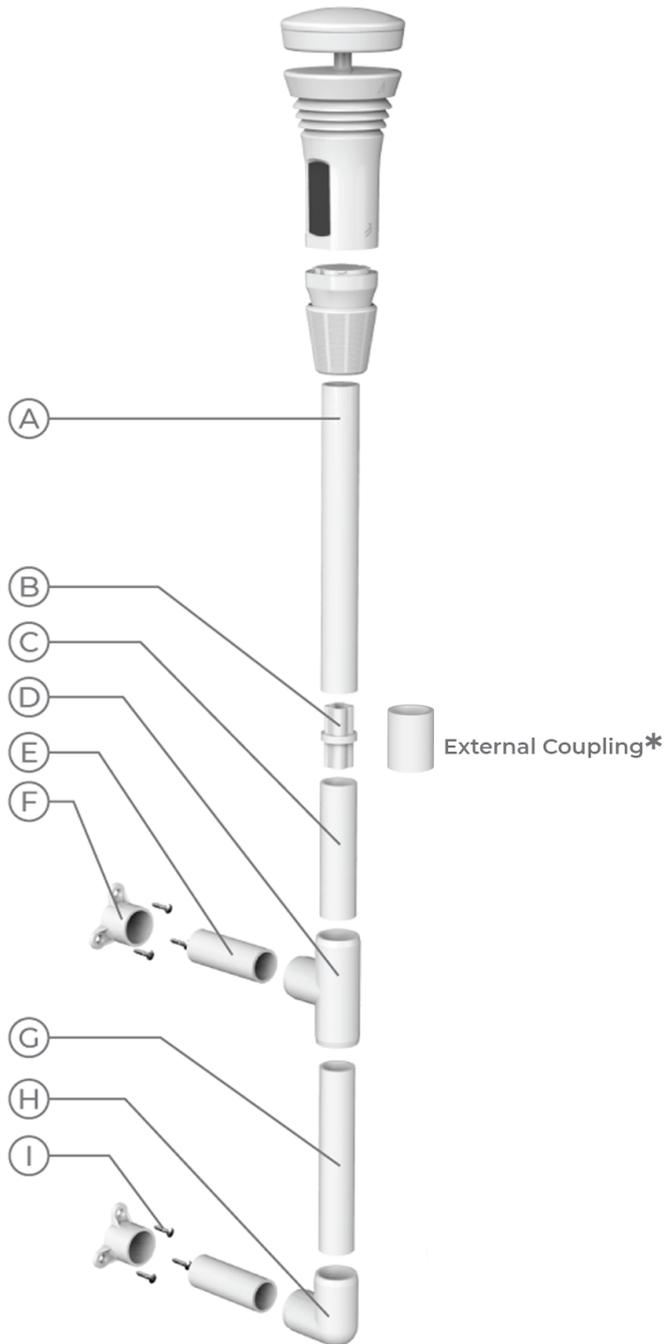
Follow the diagram to assemble your Simple Installation kit. The PVC parts can be press-fit together. For a more secure installation, PVC glue may be used, but it is not required. The kit includes six stainless steel screws suitable for attachment to sturdy wood, plastic or metal. You may need to obtain alternative hardware if the screws are not appropriate.

MOUNTING KIT - PARTS LIST		
#	PART DESCRIPTION	QUANTITY
A	11" Pipe	1
B	Coupling	1
C	5" Pipe	1
D	Tee	1
E	3.5" Pipe	2
F	Screw Cap	2
G	7" Pipe	1
H	Elbow	1
I	Screw	6

Parts can be press-fit
(no glue required)

Pipe sections A, C, G are interchangeable to suit various installation needs.

*Coupling included with kit will be either External or Internal



Customization

Feel free to make adjustments if you find that the dimensions of the Simple Installation Kit do not accommodate your installation location. You can customize the length of the pipes by cutting the included pipes or by purchasing additional PVC pipe from your local hardware store. Be sure to use schedule 40 or schedule 80 PVC pipe. Individual pipe sections should not exceed 36 inches.

6. Solar Power & Rechargeable Battery

Solar Power Module & Internal Rechargeable Battery

The Tempest device uses an integrated solar power charge module with four south-facing (north-facing in the southern hemisphere), vertically-oriented solar panels. This geometry provides optimal solar charging even in low sun angles at high latitude locations.

The internal rechargeable battery in Tempest is an LTO (Lithium-titanate) type, 1300mAh battery. This is ideal for use outdoors and in extreme temperatures. LTO batteries are safe on the environment and have a very long lifetime of almost 50,000 cycles - which is decades of recharging.

Operation

Your Tempest is shipped with a full battery and should give you about 2 weeks of operation without any additional power input, but you should put it in the sun as soon as possible. Note, it must be powered on in order for battery charging to occur.

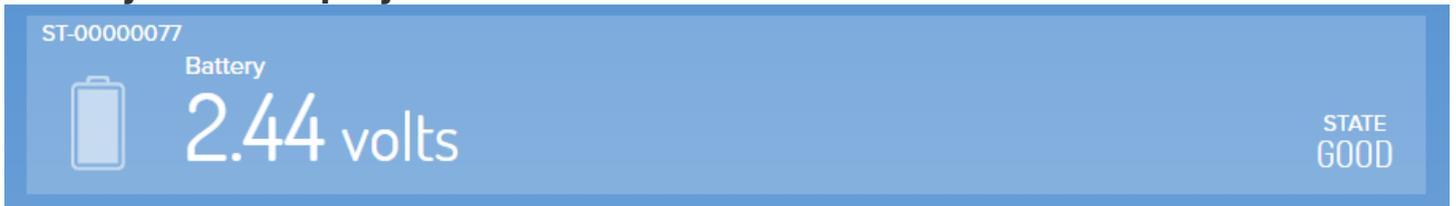
From an empty state, it takes about 4 hours of adequate sunlight (350 W/m² or so) on one or more of the four solar panels to reach a full charge. This is a rule-of-thumb and your mileage may vary. It will charge faster in direct sun but can still charge slowly with indirect sunlight. As long as your Tempest gets the equivalent of at least 4 hours of adequate sunlight every two weeks, it will continue happily running along. In the event of extended periods of low light conditions, power management code in the firmware will help your Tempest operate for as long as possible.

The LTO battery will continue normal charging up to about 113°F (45°C) and down to about -40°F (-40°C). And the battery will continue providing power well outside this temperature range for as long as it has a charge - usually long enough to return to a range where the battery can resume charging again.

Battery Level Indicator

You can check the battery level for your device by viewing the status page for your station: In the app, go to Settings > Stations > (choose a station) > Status

Battery Card Display



You can display a device's battery voltage in the app. To enable a battery card indicator on the data display, go to Settings > Stations > (choose a station) > Advanced > toggle Enable Battery Card

If you're watching the voltage level (because you are a true weather geek!), it may appear the Tempest is not charging even when the sun is out. That's because there is a "start-charge" threshold that must be reached before charging begins. This prevents the battery from going through a multiple charge cycle "yo-yo" during the day. Don't worry, that's normal. Every battery is a little different, but once it starts charging it will continue until the sun is no longer shining or it gets to a maximum of around 2.7 or 2.8 volts. From there, with no further input, it will decrease relatively quickly (over a couple hours) to around 2.6v, and then very slowly from there until the cycle starts again when the sun comes back out. This is perfectly normal too!

Power Save Modes

Mode 0: Voltage ≥ 2.455

- All sensors enabled and operating at full performance

Mode 1: Voltage ≤ 2.415 from Mode 0 or ≥ 2.41 from Mode 2

- Wind sampling interval set to 6 seconds

Mode 2: Voltage ≤ 2.39 from Mode 1 or ≥ 2.375 from Mode 3

- Wind sampling interval set to one minute

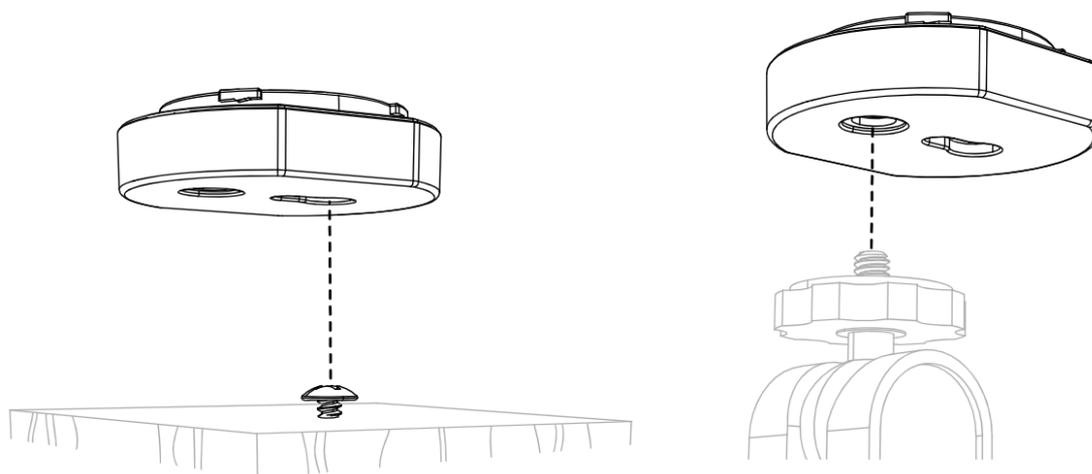
Mode 3: Voltage ≤ 2.355

- Wind sampling set to 5 minutes
- All other sensors' sampling interval set to 5 minutes
- Lightning sensor disabled
- Haptic Rain sensor disabled

Need some simple installation ideas? Check out some simple installation example [esempi di installazione!](#)

More information about the installations and height from the recommended land ...

- About 4 feet above the surface are sufficient for good reading and humidity reading.
- If you measure the speed and direction of the wind is important for you, we recommend that you get a cleaner wind. At about 6-10 feet from the ground is better if the surrounding area is free and open. Mounting above any nearby obstacles is better for ideal winds, but do so if the installation is feasible and easily accessible. Do not worry about mounting a roof line or a line of trees if it is too tiring. Professional anemometers are positioned at a standard height of 10 m (~ 33 feet from the ground) and have a clean wind detection (no obstacle to that height) for 10 times the distance of height, eg. It is almost impossible for the owner of a home meteorological station to meet these professional installation standards.
- For more ideal rain readings, it is recommended to place any all-in-one weather station at soil level in a waterproof area, away from trees, etc. For a higher precision, mounting on a robust structure, lowering the ground is particularly important for the Tactile Rain Temperature, which detects and quantifies the rain from vibrations.



Flat base, wood screw & keyhole slot
mount option

Flat base & 1/4-20 camera
mount option

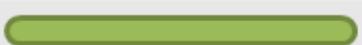
Additional Resources

Here is a link to the CWOP guide which outlines the general advice for the location of the personal meteorological stations: <https://www.weather.gov/media/epz/mesonet/cwop-siting.pdf>.

The CWOP location guide is a great reference, but for the vast majority of the user-friendly users simply you can not satisfy every guide line (especially being 100 feet from any concrete and no closer to 4 times the height of trees or buildings). It's okay! Your Tempest system is not a reference location for climate research. We invite you to consider your unbealing challenges / opportunities and observation needs when you decide where to fit your Tempest. Do not discuss you if your options are not ideal for each parameter. A common question among the observer meteorologists is that "you know a observation, is more useful", so we encourage all users to maintain their accurate and up-to-date metadata. This will improve your capacity of the Tempest system to provide you with the best weather data for your location.

7. Tempest device LED status indicators

The Tempest device LED will not remain illuminated, even when powered. To activate the LED status indicator, press the translucent button on the base of the unit once next to the power switch.

Light Pattern	When?	Meaning	Duration
	Initial state OR following reset*	All good but not joined	15 min
	On joining to hub	Successful join to hub	5 sec
	On boot OR after button tap	Joined, all good	5 sec
	On boot OR after button tap	Joined, no connection	5 sec
	On boot OR after button tap	Bad sensor**	5 sec

RED LED: sensor fault; the state replaces all other states. If you see a failed sensor status in the app or a red LED on the device itself, check the Tempest device troubleshooting steps above. Contact us <https://help.weatherflow.com/hc/en-us/requests/new> for assistance if you can't solve the problem.

1. Try turning the unit off and on again; For AIR, open and close the battery door. For SKY, disconnect and reconnect the solar power accessory. Check the status again: Press the clear button on the base of the unit for an indicator light. Do you use the SKY solar accessory? Use a thin tool to go

through the slot in the bottom of the solar power accessory and press the LED button.

2. If your unit still has a bad sensor status (red LED) you may need to contact us <https://help.weatherflow.com/hc/en-us/requests/new> for assistance.

PURPLE LED: The device has not connected properly to a hub. Reset the device and reconnect it to the Station Hub:

1. Remove the mounting attachment from the Tempest device.
2. On the base of the device, press and hold the translucent button next to the power switch until the LED lights up flashes.
3. After a few seconds, the LED will slowly flash green, indicating it is ready to pair with a Hub.
4. Open the app, go to settings> stations> (select your station)> manage devices> tap "+" to add the device to the station Hub.

GREEN LED: the device is associated with a Hub.

The Tempest device should be connected and reporting data to the station hub. If you have a green status and don't see any minute-by-minute observations, you may need to reset and re-pair your device:

1. Reset the drive: Press and hold the clear LED button next to the battery door for five seconds, then release it when the LED flashes green.
2. Using the SKY Solar Panel Accessory: Use a thin tool to go through the slot in the solar panel and press and hold the LED button for five seconds, then release when the LED flashes green.
3. Reboot the hub - Unplug the hub for a few moments, then reapply power.
4. Add the device to your station again: go to Settings> Stations (select station)> Manage devices> tap "+" (top right) to add the device and follow the procedure.

8. Web Access and Sharing Station Data

Private online access: You can access your weather data anytime, anywhere from any browser. Go to <https://tempestwx.com/> and login with the same username & password that you created for the mobile app.

Shared online web access: To enable others to see your weather data, make sure your station is sharing data publicly. Check the settings in the mobile app: Go to Settings > Stations > choose your station > Public Data > Share Publicly (toggle on).

Then simply log into <https://tempestwx.com/> and click on the share button in the

bottom left corner to get your station URL. You can also find the share button in the mobile app.

Shared mobile app access: Each station can only be linked to one user account. If you want to share your station data with someone else in the app, they will need to sign into your account. There are no sign in restrictions with the app, so you and multiple family members can all have the app open at the same time.

9. Hub Power Bank

The *Hub Power Bank* (HPB) is designed to be used with the WiFi Hub device from the [Tempest Weather System](#) and is [available for purchase in our store](#).

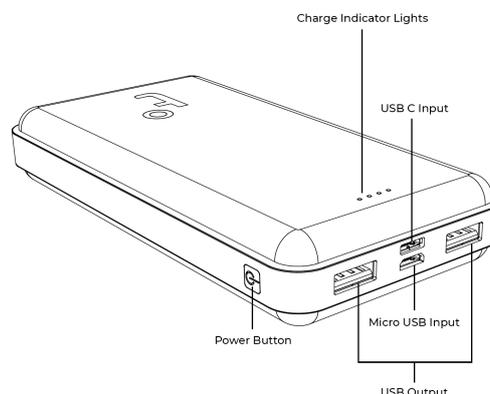
Using a battery backup to keep power to your Hub is ideal for Tempest owners living in areas prone to power outages or severe weather. While powered, the Hub will continue to receive weather observations from Tempest devices and can store up to 7 days worth of data from a single Tempest device. Once an internet connection is restored, the Hub will be able to backfill stored weather data.



The power bank provides pass-through charging, powering the Tempest's WiFi Hub while charging itself. It will fully charge in 1-2 hours, and can keep a single Hub powered for up to 7 days. Upon power loss, the device will automatically begin powering the Hub so the Hub can continue storing data.

Operation

- Use the **Power Button** to turn on the device, allowing power bank to supply power to the Hub.
- The power adapter gets plugged into the power bank's **Input** port and plugged into a wall outlet.
- There are two **Outputs** to supply power to multiple Hubs if you have them. Plug your Hub's USB power cable into the first or second output port on the power bank.



- The power bank has four **Charge Indicator Lights** to indicate charge level. Pressing the power button with nothing plugged in lights up the LEDs to indicate the current charge level of the battery.

Technical Specifications

- Capacity: 20000mAh 74 WH
- Input: 5V-2.0A, (Micro USB/Type-C)
- Output 5V-1.0A (USB1), 5V-2.0A (USB2)
- Weight: 1.1 lbs

10. TECHNICAL DATA

MEASUREMENTS	RANGE	ACURACY	INTERVAL
Air Temperature	-35°F - 140°F -37°C - 60°C	±0,7°F o ±0,7°C	1 minute
Relative humidity	0 - 100%	±2%	1 minute
Atmospheric pressure	Up to 1100mb	±1mb; station and sea level	1 minute
Lighting activity	0 to 40km (25 miglia)	Varies by distance	Instantly
Wireless	300 m (1000 ft++)	Sub-gHz telemetry	
Wind speed	0 to 100 mph 0 to 160km/h	±0,5 mph or ±0,5km/h	Continuous sampling
Wind direction	0 - 359°	±5°	Continuous sampling
Ambient light	1 to 128 kLUX	±100 mLUX	1 minute
UV index	0 to 11 +index		1 minute
Solar irradiance	0 to 1900 w/m2	±5%	1 minute
Rain onset		First rain drops	Instantly
Rain intensity	Light to torrential	±0,2mm / hr	Instantly
Rain duration	Daily total	1 minute	1 minute
Rain accumulation	Daily total	±10%	1 minute
Mount	Adjustable pole mount		
Power	Solar powered		

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