WatchDog®

Wireless Rain^{+Temp} Station

PRODUCT MANUAL

Item # 3200R1, 3200R2, 3200R4

Spectrum® Technologies, Inc.

CONTENTS

This manual will familiarize you with the features and operation of your new WatchDog Wireless Rain^{+Temp} Station. Please read this manual thoroughly before using your instrument. For customer support, or to place an order, call Spectrum Technologies, Inc.
(800)248-8873 or (815) 436-4440
between 7:30 am and 5:30 p.m. CST,
FAX (815)436-4460,
E-Mail: info@specmeters.com.
www.specmeters.com

General overview

Thank you for purchasing a Watchdog Rain+Temp Station. This Station is designed to communicate on the Sigfox global IoT (Internet of Things) network, simplifying network management. This IoT technology allows users to place Watchdog Rain+Temp Stations exactly where they are needed without the worry of managing a private radio network.

The Watchdog Rain+Temp Station communicates with Sigfox network base stations optimally located to provide coverage primarily to major metropolitan and some rural areas. These base stations send data to Spectrum's SpecConnect interface, where data is organized and displayed in a user-friendly manner. The network functions similarly to a cellular network. However, the Sigfox network is specifically designed to support IoT type devices. Coverage maps can be found on the Sigfox website (https://www.Sigfox.com/en/coverage).

The Watchdog Rain+Temp Station sends temperature data at least once an hour. Rain information is made available in real time by sending a message when rain begins and every 10 minutes thereafter. Using SpecConnect, users can monitor rainfall and temperature data from their computer or mobile device and make real-time decisions that improve yield and quality, conserve resources, and increase profits. The Watchdog Rain+Temp Station is just another tool from Spectrum Technologies, empowering users to make actionable decisions in an increasingly complex environment.

Components

The following parts are included with the Watchdog Rain[+Temp] Station

Standard
- Rain Bucket Assembly (comes pre-assembled)
    * Internal Electronics
    * Plastic rain bucket with base
    * Metal mounting bracket
    * Temperature sensor with radiation shield
    * External mounted antenna
    * 3 AA lithium batteries

- Bird Guard Kit (#3665BG)
    Each kit contains plastic ring with fastener, metal spikes, and assembly/ installation instructions

- U-Bolts
    Contains (Qty 2) 1 ¼ inch U-bolt, Nuts, and saddle clamp (stainless steel)

Optional Accessory
- Tripod: (item 3396TP) – Mounting aide, comes with mast and 3 ground stakes
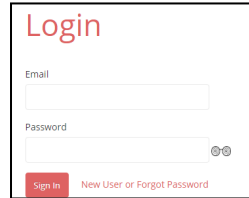
Specifications

Mounting Hardware	1 5/8 to 1 3/4 inch u-bolt, aluminum bracket
Weight	3.6 lbs (1.64 kg)
Power	3 x AA lithium batteries
Battery Life	1yr (subject to amount of rain)
Operating Temperature	-40 to 140 °F (-40 to 60 °C)
Frequency bands: Sigfox IoT Ready	Region 1 (3200R1): 868MHz (EU, South Africa, Oman) Region 2 (3200R2): 902-904 MHz (US, Mexico and Brazil) Region 4 (3200R4) : 920-923MHz (Australia, New Zealand, Singapore, Taiwan, Hong Kong, Colombia, Argentina)
Antenna	Reverse polarity SMA

Configuration

Configuring your Device through SpecConnect:

Your Watchdog Wireless Rain^{+Temp} Station can be configured on Spectrum's SpecConnect web portal. To log on to SpecConnect, type spec-connect.net into your web browser and enter the user name and password for your account. New users will need to use the 'New User or Forgot Password' link to create a password. Once logged in, your Watchdog Wireless Rain^{+Temp} Station will appear in the Equipment table.
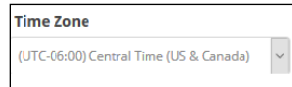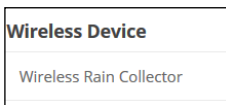
Your device will need to be configured to allow data to be recorded in SpecConnect. In the Equipment table, identify the device you would like to configure. Click on the "Configure" or "Configuration Required" text in the table. This will bring up the configuration screen.

A Time Zone must be selected from the dropdown menu

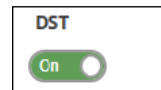You have the option of creating a device name in the Wireless Device field. Each sensor port can be given a descriptive name. There is an option for automatically correcting for daylight savings time.

A device location can be manually entered in the Latitude/Longitude/Altitude fields or by clicking the red map icon.

Be sure to save any configuration changes you make before leaving the page.

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Confirm Transmission

When viewing the Equipment table, click on the device name to display the current conditions. Ensure you are getting data from the device. Remember, in the absence of rain, the Watchdog Wireless Rain^{+Temp} Station will only report temperature once per hour.

To run reports on data collected by the devices, click on the Reports menu. From here, users can choose which reports they would like to run. The example to the right shows the results of a rainfall report.
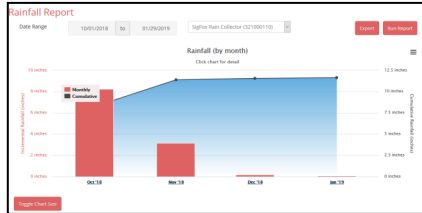
Configuring your device through the WatchDog Mobile App:

Your Watchdog Wireless Rain^{+Temp} Station can also be configured directly on the WatchDog Mobile App. This App provides a mobile friendly view of device data and is also linked to your SpecConnect account. Visit the iTunes or Playstore and search for "Watchdog Mobile" to install.

Log in to the App using the same credentials you use for SpecConnect. Note: new users must log in to SpecConnect prior to logging into the App.

Your device will need to be configured initially to allow data to be read into SpecConnect. Identify the device you would like to configure in the Equipment table. Slide the tile to the left (or click the arrow) then press on the gear icon to access the device configuration.

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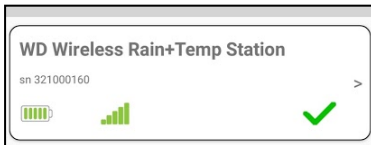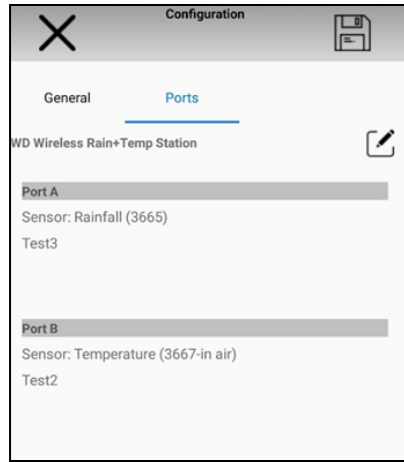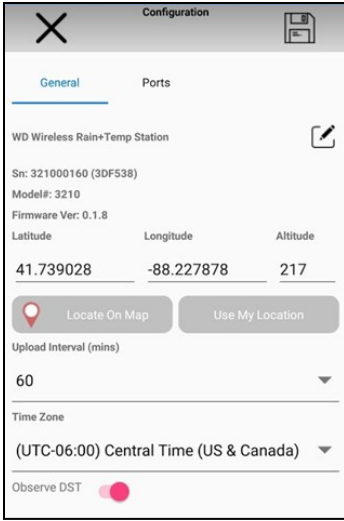
General
A Time Zone must be selected from the dropdown menu

A device location can be manually entered in the Latitude/ Longitude/Altitude fields. Alternately, click the "Locate on Map" or "Use My Location" buttons.

You have the option of creating a device name.

There is an option for automatically cor-recting for daylight savings time.

Ports
Each sensor port can be given a descriptive name. Select the sensor of interest and type the nickname into the text field.
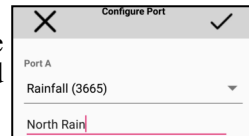
Be sure to save any changes to the configurations.

Important device data can be seen on the equipment activity screen. Slide the equipment tile to the left and press on the magnifying glass icon. The upper bar shows the last time the server received data from the device. The lower bar shows the current device configuration status. If the upper bar is yellow, the device has missed the last 2 uploads. If it is red, it has missed at least 5 uploads.

Equipment Status

WD Wireless Rain+Temp Station
sn 321000154
Device Signal Strength: -67 RSSI

Device Battery Level: 97% [Reset Battery]

◯ Disable Battery Reminder

Firmware Version: 0.2.2

Last Upload: 2/27/2019 1:49 PM

This is a fixed configuration device
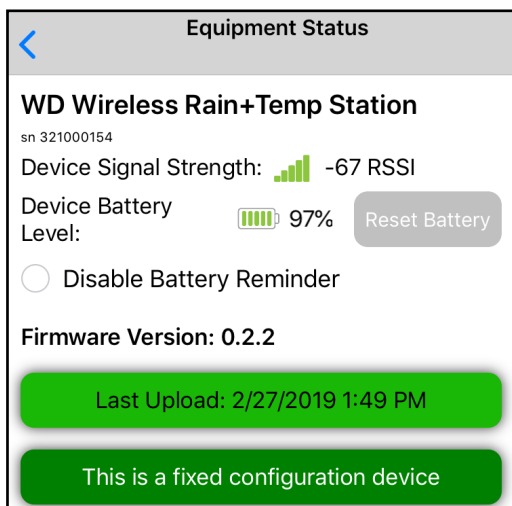
To view device current conditions, slide the equipment tile to the left and press on the thermometer icon. Device Sensors can also be added to the favorite sensors list for easier viewing.

Current Conditions

Rain Collector
WD Wireless Rain+Temp Station
321000153
Data Time: 2/6/2019 3:00 PM

A: Rainfall - 24-hour
0.04 inches

B: Temperature
73.8 F
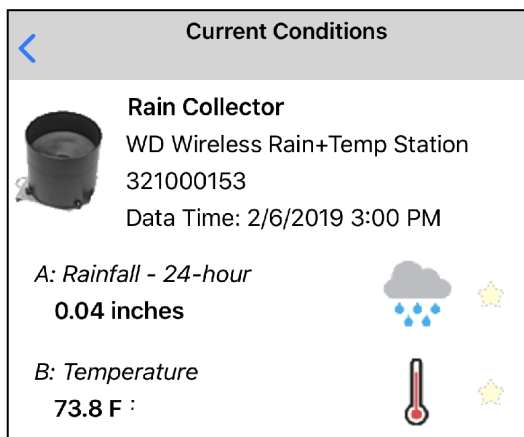
Installation

The following tools will be needed to complete the installation:
- Phillips head screwdriver (#2 or similar)
- 7/16" wrench or deep-well socket
- Carpenter bubble level (recommended)

1. Identify Installation Location

Prepare the installation location for the Watchdog Wireless Rain^{+Temp} Station.

When choosing a location for your rain collector, keep the following in mind:
- **Ensure you have Sigfox coverage in your desired location. See the Specmeters.com website to find a link to the latest coverage map. If you are uncertain of coverage, you may consider waiting to install the mast (skip step 2) until after your device has successfully reported to SpecConnect.**
- The rain collector contains a magnet-operated switch which may not operate correctly if the rain collector is mounted on or near any object which attracts a magnet.
- Choose a location that is easily accessible for normal cleaning and is distant from trees and other sources of pollen or debris.
- Avoid locating the Rain Station close to large metal buildings or structures. These structures can impede the radio signals and cause data loss.

2. Install the Mast
- Use and 1 5/8" or 1 3/4" pole or pipe. This mast MUST be rigid. If the collector moves easily, the wind can create oscillations that may record extra tips, resulting in higher-than-actual rain measurements.
- When installing the mast, make sure that the mast is vertical such that the Rain Station will be perfectly level when mounted to the mast. Use of a level for mast installation is recommended.
- Alternatively, the Tripod Kit can be ordered from Spectrum for mounting purposes
    – (#3396TPS): Kit contains tripod mount for Spectrum Products, and (3) ground stakes.

3. Remove the Rain Bucket

Start by loosening the four screws at the base of the rain bucket. They should be loose enough to twist the bucket in relation to the base. Remove and discard the rubber band from the tipping spoon.

4. Mount the Rain Station to the mast

With the rain bucket removed, mount the Rain Station to the mast (not included) using the provided U-bolts and a 7/16" wrench. It is imperative that the collector is level when mounting the station to the mast. Use the bubble level located on the inside of the Rain Collector to confirm that the collector's base is level. Adjust the U-bolts or mounting mast as required.

5. Power up the Rain Station

Lift the blue cap off of the electronics container, being careful not to disturb the electronics assembly while doing so. **There is a risk of pulling the electronics out with the cap. This can result in damage to the cables.**

Carefully lift the electronics bracket until it is just outside the cylinder. Pay attention to the tension applied to the wiring as you lift the bracket. Take extra care not to apply tension to the thin black antenna cable connected to the board.
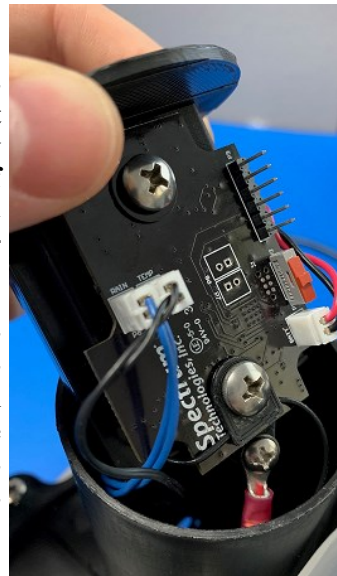
While holding the bracket close enough to the container to avoid wire tension, move the power switch into the "ON" position. The correct "ON" position (see image to the right) will reveal the circular hole in the switch body (also see the 'ON' label on the circuit board). After switching the device on, you should see three flashes from the green LED (positioned on the circuit board, near the base).
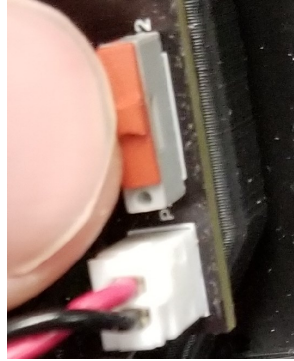
You can now use SpecConnect or the Watchdog Mobile App to complete the configuration of the device and monitor incoming data (see pp. 6 - 9). Note: It can take up to three minutes for data sent from the Station to appear on SpecConnect.

Optional: Once configuration is complete, you can test the function of the Station by manually toggling the tipping spoon several times and watching for the data to appear in SpecConnect or the WatchDog Mobile App. Remember, each tip represents 0.01inches (0.25mm) of rain. If no data is transmitted, see the calibration section of this manual to check for proper tipping spoon adjustment.
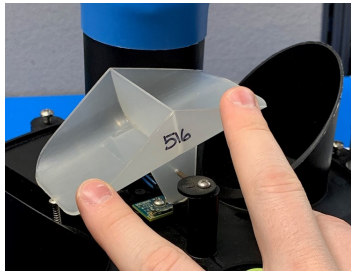
Carefully place the electronics assembly back into the electronics cylinder and replace the blue cap.

6. Install the Bird Guard
Install the bird guard kit onto the Rain Bucket before returning the bucket to the base. Refer to the instructions included in the bird guard kit.

7. Replace the Rain Bucket
Rotate the bucket such that the tabs engage the screws. Tighten the screws with a Philips head screw driver.

Service/Calibration

The rain collector can be calibrated if it is not reading correctly

1. Check the inside of the rain bucket for debris such as leaves that may be blocking the grid at the bottom of the bucket.

2. Remove the rain bucket from the base and check for any obstacles (spider webs, debris, etc.) that may be preventing the tipping spoon from moving freely. If the hole beneath the grid gets clogged with dirt, the cotter key can be removed to allow it to be cleared.

3. Manually move the tipping spoon back and forth several times and wait at least 20min. Check SpecConnect or the Watchdog Mobile App for rain being recorded. Do this several times.

4. If the tips are being counted, continue to the next step. If all the tips are not recorded, it may be that the magnetic sensor on the tipping spoon is too far from the reed switch or that the sensor cable is bad. There are 2 cams on the base of the rain collector that can be rotated to move the tipping spoon closer to or further away from the reed switch. Make this adjustment and check if the device can detect manual tips of the spoon. If so, proceed to the next step. If not, the sensor may need to be sent in for service.

5. If all the tips are being counted, replace the rain bucket and trickle a known amount of water into the bucket. 84 ml of water should register 0.1 inches of water (2.5 mm). This is equivalent to 10 tips of the tipping spoon. The best results are attained when the water is added slowly. It is recommended that the water be put in a Ziplock bag which is then punctured with a pin to allow the water to slowly enter the rain bucket. Be sure to wait at least 10 min after the last tips to ensure all tips are counted and logged to SpecConnect. Alternatively, you can listen for the number of tips rather than waiting for data to be recorded on SpecConnect. If the recorded rain is slightly high or slightly low, continue to step 6.

6. When the spoon tips, it lands on screws on either side. If sensor is reading high, lower the screws. If it is reading low, raise the screws. It is recommended to adjust the screws one full turn and again run a known amount of water through the bucket to determine if additional adjustment is necessary. Make sure the tipping spoon is empty before starting each test.

Changing Batteries

The Watchdog Wireless Rain[+Temp] Station is designed to run an entire growing season (or more) on one set of batteries. Actual battery life depends upon the number of data transmissions which is related to rainfall. The battery level indicator in SpecConnect and the Watchdog mobile App is based upon a count of transmissions. Monitor the reported battery level to determine when to replace the battery.

Important: Only use AA lithium batteries in the Watchdog Rain[+Temp] Station. Do not use AA alkaline batteries. They will have short battery life and the reported battery level will be greatly overstated.

Replacement Procedure

- Carefully remove the electronics assembly from the cylinder. See Step 5 of the Installation procedure (p. 11).
- If the device is not already switched OFF, turn it off by toggling the power switch toward the battery connector
- Remove battery clip and replace the three lithium AA batteries located in the battery holder, reinstall battery clip.

- Return the power switch to the 'ON' position. Ensure the green LED blinks three times.

    Important: After the three flashes (and within 10 seconds), perform a "double tip" of the tipping spoon by moving it back and forth within 1 second. The LED should flash 5 times in quick succession. This indicates the rain sensor is working properly and the device will attempt to send a data packet to SpecConnect within 2 minutes. If the 5 LED flashes are not seen, turn the switch 'Off', wait 30 seconds and repeat the procedure.

- Re-insert the electronics into the cylinder.
- Re-install the blue cap and the Rain Bucket

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Important: Use SpecConnect or the Watchdog Mobile App to reset the battery level

SpecConnect

Click the "Reset Battery" button

Firmware Rev
0.1.8
Reset Battery

Watchdog Mobile App

Tap the "Reset Battery" button on the Equipment Status page. Access the Equipment Status screen by clicking the magnifying glass icon (see p. 7)

Equipment Status
Spectrum Technologies

Wireless Rain Collector
sn 321000110
Device Signal Strength: -89 RSSI
Device Battery
Level: 97 %
Reset Battery
◯ Disable Battery Reminder
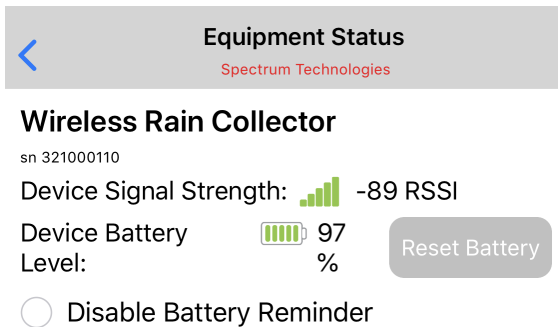
Monitor SpecConnect or the Watchdog Mobile App to ensure device is sending data

Troubleshooting

Connectivity		
Symptom	**Possible Cause**	**Corrective Action**
No data received from device for several hours/days.	Batteries Dead	Replace Batteries, refer to section in this manual
	Radio Reception Blocked/ Degraded (low signal strength)	Check that the device antenna has not been blocked by foliage or metal structures/equipment. Check that antenna is upright and sleeve is installed to prevent bending. Move device, if required, to a more open area.
	Not Configured/ Bad Configuration	Ensure time zone is set in device configuration on SpecConnect. Try re-saving the configuration.
	Defective Unit/ Provisioning issue	Contact Spectrum for service
	Loose Antenna Connection	Check for loose Antenna Connections above and below mounting bracket.
Intermittent Data	Radio Reception Blocked/ Degraded (low signal strength)	Check that the device antenna has not been blocked by foliage or metal structures/equipment. Check that antenna is upright and sleeve is installed to prevent bending. Move device, if required, to a more open area.
	Low Batteries	Check battery levels on SpecConnect or Watchdog Mobile App. Replace batteries. Refer to section in this manual
	Loose Antenna Connection	Check for loose Antenna Connections above and below mounting bracket.

Sensor Issues		
Symptom	**Possible Cause**	**Corrective Action**
Sensor value out of range or not accurate (Rain)	Debris in rain bucket (rain values low)	Clean out rain bucket screen. Ensure no debris inside rain bucket.
	Rain Station not level	Level the Station to ensure accurate rain data
	Tipping spoon out of adjustment	Perform the calibration (see p. 13)
	Wind causing extra tips (rain values high)	Secure mounting pole/mast to prevent movement in the wind.
	Connector on PCB not seated/ corroded/broken wire	Take blue cap off of electronics cylinder and carefully inspect the 'rain connector' on PCB. Contact Spectrum for service if required.
	Defective Rain Sensor	Contact Spectrum for service
Sensor value out of range or not accurate (Temp)	Connector on PCB not seated/ corroded/broken wire	Take blue cap off of electronics cylinder and carefully inspect the 'temp connector' on PCB. Contact Spectrum for service if required.
	Defective Temp Sensor	Contact Spectrum for service

Warranty

This product is warranted to be free from defects in material or workmanship for one year from the date of purchase. During the warranty period Spectrum will, at its option, either repair or replace products that prove to be defective. This warranty does not cover damage due to improper installation or use, lightning, negligence, accident, or unauthorized modifications, or to incidental or consequential damages beyond the Spectrum product. Before returning a failed unit, you must obtain a Returned Materials Authorization (RMA) from Spectrum. Spectrum is not responsible for any package that is returned without a valid RMA number or for the loss of the package by any shipping company.

DECLARATION OF CONFORMITY

CE

Spectrum Technologies, Inc.
3600 Thayer Court
Aurora, IL 60504 USA

Model Numbers: 3200R2
Description: Wireless Rain and Temperature Sensor
Type: Electrical Equipment for Measurement, Control, and
                     Laboratory Use

The undersigned hereby declares, on behalf of Spectrum Technologies, Inc. of
Aurora, Illinois, USA, that the above referenced product, to which this
declaration relates, is in conformity with the provisions of:

Directive: 2014/30/EU EMC
Standards: CENELEC EN 55032: 2015
                     CENELEC EN 61000-6-1: 2007
                     CENELEC EN 61000-6-3: 2007+ A1:2011/AC:2012
                     IEC 61000-6-1: 2016
                     IEC 61000-4-2: 2008
                     IEC 61000-4-3: 2006 +A1:2007 +A2:2010
                     FCC Part 15 CFR Title 47: 2018
                     ICES-003: 2016 (Canada)

Michael J. Dunning,
Director of Product Strategy   November 2, 2018

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Technologies, Inc.

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