



# WatchDog®

# Pup Stations

## PRODUCT MANUAL

Model #'s

3900 ET / WS / PD

3905 ET / WS / PD

3930 ET / WS / PD



**Spectrum®**  
**Technologies, Inc.**

# QUICK START

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## HARDWARE UNBOXING & ASSEMBLY

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*(Check components included in the box)*
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7. **Level the Solar Radiation Sensor** (ET) Pg 14
8. **Connect Leaf Wetness Sensor** (PD) Pg 14

This manual will familiarize you with the features and operation of your new WatchDog Pup Station. Please read this manual thoroughly before launching the units.

For customer support or to place an order, call Spectrum Technologies, Inc. at 800-248-8873 or 815-436-4440, FAX at 815-436-4460, or e-mail at [info@specmeters.com](mailto:info@specmeters.com).

[www.specmeters.com](http://www.specmeters.com)

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

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# INTRODUCTION

Thank you for purchasing a Watchdog Pup Station for use in a Retriever & Pup Wireless Sensor Network. This manual describes the setup and use of three station models:

- WatchDog ET Pup Station
- WatchDog Pup Weather Station
- WatchDog Plant Disease Pup Station

The Sensor Pup component of the Station has been preconfigured to use the included sensors. The Pup Weather and the Plant Disease Stations have port “A” available for a sensor of your choice.

The Pup transmits sensor data to the Retriever either directly or via a Repeater Pup. For details on how to configure the Sensor Pup Station into the network, refer to the “*Retriever and Pup Wireless Network Product Manual*”.

## PACKAGE CONTENTS

Assembled Pup Station with sensors shown in Table 1 (p. 5)

- Bagged items:
  - \* Wind vane with Allen key  
(except Plant Disease Station)
  - \* 6 AA alkaline batteries
  - \* Antenna with stabilizer
  - \* 2 sets of U-bolt and clamp
- Leaf Wetness Sensor with bracket  
(Plant Disease Pup Station only)
- Manual

# SPECIFICATIONS

TABLE 1 - Pup Station Configurations

Sensor	Freq	Name	A	B	C	D
3900ET	900 MHz	ET Pup Station	Solar Radiation	Anemometer	Rainfall	Temp/RH
3905ET	2.4 GHz					
3930ET	868 MHz					
3900WS	900 MHz	Weather Station	available	Anemometer	Rainfall	Temp/RH
3905WS	2.4 GHz					
3930WS	868 MHz					
3900PD	900 MHz	Plant Disease	available	Leaf Wetness	Rainfall	Temp/RH
3905PD	2.4 GHz					
3930PD	868 MHz					

Sensor	Measurement	Accuracy
Wind Speed	0, 1-200 mph (1.6-322 kph)	±2 mph (±3 km/h), ±5%
Wind Direction	0-359°, 1° increments	±3°
Air Temperature	-40° to 257°F -40° to 125°C	±0.54°F(-40 to 194°F) ±0.3°C (-40 to 90°C)
Relative Humidity	0 to 100%	±2% @ 77°F (25°C)
Rainfall	0.01" (0.25mm) resolution	±2% at < 2 in (5 cm) /hr
Solar Radiation	1-1500 W/m <sup>2</sup>	±5%
Leaf Wetness	0% (dry), 15% (wet)	

**Data capacity:** 256 data interval records can be stored on the Pup until it is able to send them to the Retriever

**Dimensions:**

20.5 in (57.07 cm) H x 18 in (45.72 cm) L x 11 in (27.94 cm) W.

**Weight:** 5.75 lbs (2.61 kg)

**Power Source :** 6 AA batteries (alkaline or lithium)

**Battery Life:** 6 months with alkaline batteries

**Operating Temperature Range:** -22° to 130°F (-30° to 55°C)

# INSTALLING THE ANEMOMETER

This procedure applies only to the Pup Stations that include the Digital Anemometer (3900/3905 ET/WS).

1. For shipping, the anemometer arm is tucked into the rainfall bucket. Lift the anemometer arm as high as possible within the 2 loop clamps. Orient the arm as shown in Figure 1.

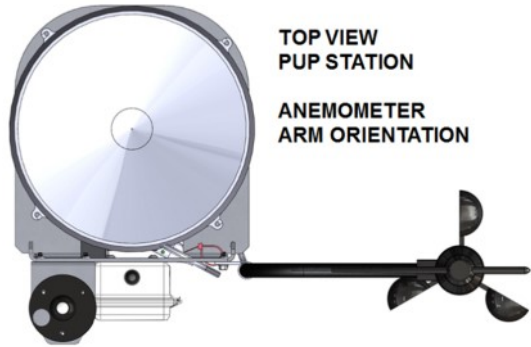


FIGURE 1

2. Remove the Allen key from the wind vane bag .
3. Install the wind vane on the anemometer shaft (see Figure 2). Use the Allen key to tighten the set screw on the side of the wind vane.

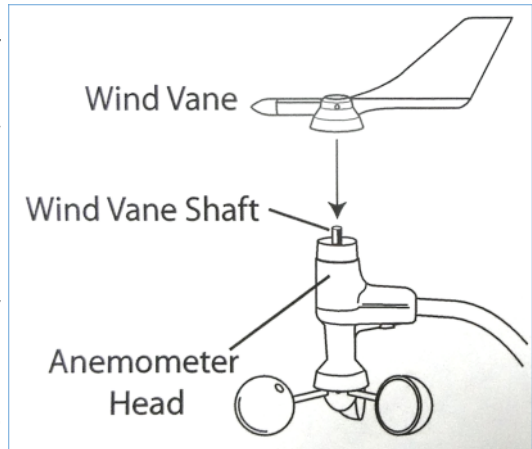


FIGURE 2

4. Tape the Allen key to a convenient location inside the Sensor Pup's housing.
5. Push the wind cups onto the bottom of the shaft, flush with the bottom of the assembly, and tighten the set screw. When released, the cups should drop slightly. If the cups do not spin freely, loosen the set screw and lower the cups slightly. The gap between cup hub and assembly should be about 1/16 inch.

# INSTALLING BATTERIES

Ensure correct polarity of all AA batteries when placing them in the battery holder. (fig. 3). The battery holder has markings that indicate the polarity.

The Pup's batteries will last for about 6 months under normal Retriever-Pup network operation.

Caution: When using the Solar Power Package (item 3999), do not install non-rechargeable batteries in the Pup.

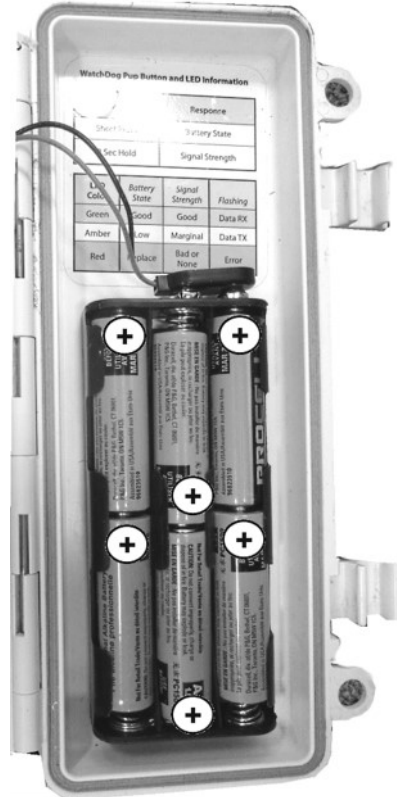


FIGURE 3

# CHECKING BATTERY LEVEL

To view the battery level, briefly press the button inside the Pup. The battery state will be indicated by the color of the status LED: Green = Good; Amber = Low; Red = Replace.

The battery level of the Pup can also be checked with RPLU software on a PC directly connected to the Retriever or remotely via the Spec-Connect website.

# PUP STATION INSTALLATION

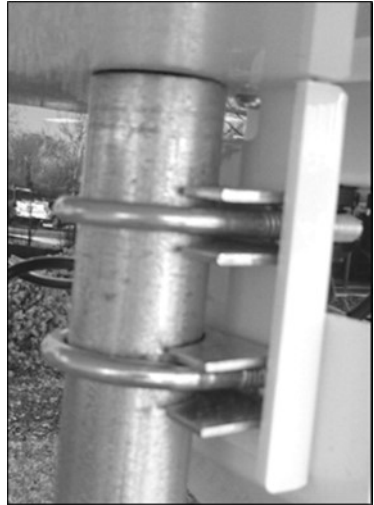
The Pup Station should be located in an open, unobstructed, grassy area to ensure accurate measurement of wind, rainfall and sunlight.

If you are using the mounting tripod (item # 3396TPS), place it where the Pup Station is to be located. Slide the 3' post through both center screw clamps, adjust the height as desired, and tighten the screws such that the post is perpendicular to the ground.

Take two sets of U-bolt, clamp and nuts from the bag. Assemble them on the bracket below the Pup. Finally, attach the Pup Station to the post by sliding the U-bolts over the top of the center post (Figure 4).

Do not tighten the U-bolt nuts until you have oriented the station (see Orienting the Station, p. 9).

Figure 5 shows the assembly on the 3396TPS tripod.



**FIGURE 4**



**FIGURE 5**



# ORIENTING THE STATION

After installing the Pup Station, it needs to be oriented properly.

There is no restriction in orienting the Plant Disease and Pup Weather stations. For stations with an anemometer, if the arm is not facing true north, the wind vane will have to be calibrated.

For ET stations, the solar radiation sensor should be facing towards the equator (*southward in the northern hemisphere*).

Figure 6 shows the top view of a couple of options for installing the Pup Station with an anemometer. If set up as in Figure 6a (arm points north), there is no need to recalibrate the wind vane. If set up as in Figure 6b (arm not pointing north), the vane needs to be calibrated. (see Setting the Wind Vane Direction, p 10).

Tighten the nuts on the U-bolts and the anemometer arm clamp screws to hold them securely.

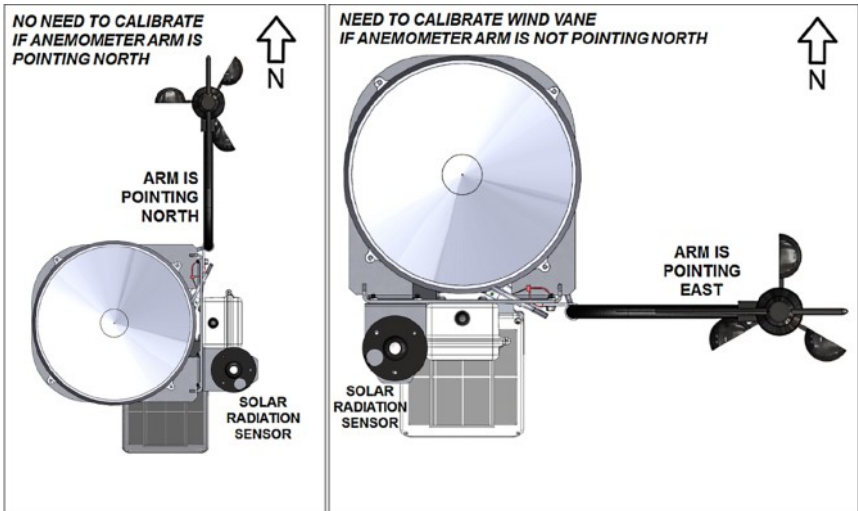


FIGURE 6a

FIGURE 6b

# SETTING THE WIND VANE DIRECTION

The wind vane rotates 360° to measure current wind directions. To obtain accurate readings, the vane must be correctly oriented when mounting the anemometer. By default, the wind vane considers the direction of the anemometer arm to be true north. To ensure correct orientation of the wind vane, mount the anemometer so that the arm points to true north

If it is not possible to point the anemometer arm toward true north, the following procedure allows you to reprogram the sensor so wind direction will be accurate. You will need a strong magnet, such as those used on refrigerators. Flat, flexible business-card types are not usable; hard, disk-type magnets (such as rare-earth magnets) are preferred.

1. Ensure the unit is plugged into the Pup.
2. Align the wind vane such that tip points toward the north. A compass or map reference should be used to ensure accurate direction (Figure 8)
3. With the vane pointing north, hold the magnet just below the LED of the molded adapter. See Figure 9 for proper positioning of the magnet.
4. The LED on the molded adapter of the cable will light up when the magnet is on the right position.
5. Keep the magnet in place for until the LED flashes (about 5 seconds). The new north direction has been set. The magnet should be removed and the wind vane released.



FIGURE 8

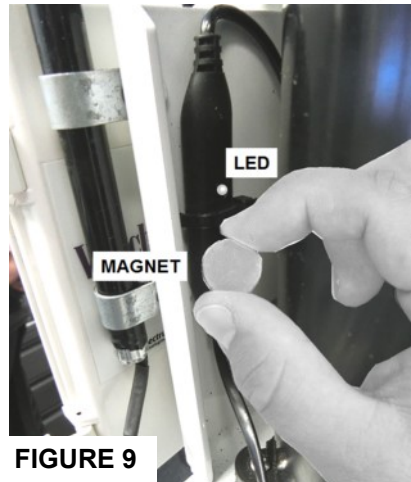


FIGURE 9

## **Troubleshooting**

While your anemometer is designed to provide years of trouble-free operation, occasionally problems may arise. The following troubleshooting procedures should allow you to solve many common problems. If, after checking these procedures you are unable to solve the problem, please call Spectrum Technical Support for further instructions.

### **Wind speed constantly or intermittently reads 0.**

- Make sure anemometer is fully plugged into jack on Sensor Pup.
- The cups may have been installed so they are too far from the anemometer hub and cannot be sensed. Adjust the cups to be as specified in "Installing the Anemometer" (p. 6).
- Check for broken wire along length of anemometer cable. Carefully check areas where the cable has been secured.
- If you still do not get a reading, the problem is with the anemometer.

### **Wind speed reading seems too high or too low.**

- Check installation by spinning wind cups. If the wind cups spin freely and the Sensor Pup logs a wind speed, the wind cups are installed correctly. If the wind cups don't spin freely, then try dropping the wind cups approximately 1/16" to 1/8" (1.5 to 3 mm). Use the included Allen wrench to loosen and retighten the wind cup assembly.
- Check for any obstructions blocking the wind near the anemometer.

### **CAUTION:**

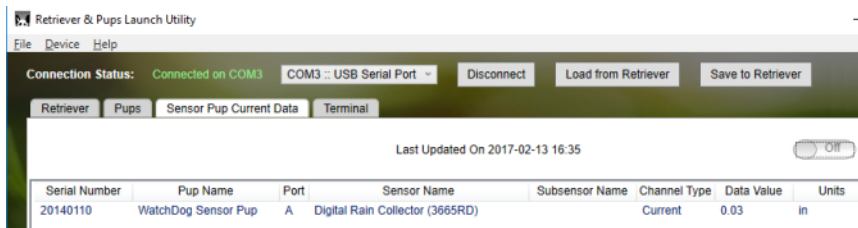
DO NOT attempt to lubricate the wind cup shaft and bearings or the wind vane shaft. Natural or synthetic lubricants will inhibit the normal operation of the anemometer.

# RAIN COLLECTOR ADJUSTMENT

If rain collector is not reading correctly (or at all), check the inside of the rain bucket for debris such as leaves that may be blocking the grid at the bottom of the bucket. 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.

Testing the data measurement and transmission from the rain collector requires establishing a connection to the Pup via a Retriever connected to a PC running the Retriever/Pup Launch Utility (RPLU). See the "Retriever and Pup Wireless Network" product manual for full details. The procedure is summarized below:

- If the Retriever is not in Setup mode (flashing amber), press the button for 2 seconds.
- Set the Retriever logging interval for 5 minutes.
- Sync the Pup to the Retriever by pressing the button for 10 seconds.
- Wait for Pup data to appear in "Sensor Pup Current Data" tab.



1. Manually move the tipping spoon back and forth several times. Within 5 minutes, a reading should appear in the data list. Each tip of the spoon should correspond to 0.01" or rain. Do this several times.

If the tips are being counted, skip to step 2

If the manual tips are not being counted, it may be that the magnetic sensor on the tipping spoon is too far from the read 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 read switch. Make this adjustment and repeat the above step to determine if the manual tips appear in the RPLU. If so, proceed to step 2. If not, the sensor may need to be sent in for service.

2. 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.

If the reading appearing in the RPLU is slightly high or slightly low, the sensor can be calibrated. 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 a quarter turn and again run a known amount of water through the bucket to determine if additional adjustment is necessary.

# SOLAR RADIATION SENSOR

Once the Pup Station is installed on location, the solar radiation sensor needs to be leveled to measure accurately.

Adjust the spring mounting screws of the sensor to center the bubble as shown on Figure 7.



FIGURE 7

# LEAF WETNESS SENSOR

Locate the sensor in a typical “micro-climate” away from the edge of an orchard, vineyard, or field. Place leaf wetness sensor in a position that will mimic plant conditions while being within reach of Pup data port.

Attach the sensor on a 1” to 1 1/4” mast (pipe) using the u-bolt with the sensor pointing to the north.

Place in an area of the plant canopy with is appropriate for the disease being noticed. For example to simulate the impact of rain only, the leaf wetness sensor would be positioned under the canopy. For full impact of both rain and dew the sensor would be positioned closer to the top of the plant canopy. Contact your cooperative extension office for further suggestions.

Inspect the sensor frequently to make certain the sensor has not fallen from their mounts or that leaves or debris are not stuck to the sensor surface.



# CONNECTING TO A RETRIEVER NETWORK

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The Pup Station collects data from the sensors connected to its ports. The Pup sends logged data to the Retriever at the interval configured for the network.

Refer to the *Retriever and Pup Wireless Network Product Manual* for detailed instructions.

# 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

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

Model Numbers: 3900 ET / WS / PD  
3905 ET / WS / PD  
3930 ET / WS / PD

Description: WatchDog Pup Stations  
Type: Electrical equipment for measurement, control, and laboratory use  
Directive: 2014/30/EU EMC  
Standards: EN 61000-6-1: 2007  
EN 61000-6-3: 2007  
IEC 61000-4-2: 2008  
IEC 61000-4-3:2006, +A1:2007 +A2:2010  
EN 55022:2010

Paul Martis, Project Manager—Weather

March 11, 2015

USA and Canada Conformity Standards:

FCC Part 15 CFR Title 47: 2014  
ICES-003: 2012 Digital Apparatus (Industry Canada)

**Spectrum Technologies, Inc**  
**3600 Thayer Court**  
**Aurora, IL 60504**  
**(800) 248-8873 or (815) 436-4440**  
**Fax (815) 436-4460**  
**E-Mail: [Info@specmeters.com](mailto:Info@specmeters.com)**  
**[www.specmeters.com](http://www.specmeters.com)**