
Particle Analysis and Display System (PADS): Sonic Anemometer Module Manual

DOC-0270 Rev A

PADS 3.6.2, Sonic Anemometer 3.6.2



2545 Central Avenue
Boulder, CO 80301-5727 USA

Copyright © 2011 Droplet Measurement Technologies, Inc.

**2545 CENTRAL AVENUE
BOULDER, COLORADO, USA 80301-5727
TEL: +1 (303) 440-5576
FAX: +1 (303) 440-1965
WWW.DROPLETMEASUREMENT.COM**

All rights reserved. DMT licenses PADS software only upon the condition that you accept all of the terms contained in this license agreement. Each PADS license you purchase allows you to acquire data on one computer only. Data can be viewed in playback mode on an unlimited number of computers.

This software is provided by DMT “as is” and any express or implied warranties, including, but not limited to, the implied warranties of merchantability and fitness for a particular purpose are disclaimed. Under no circumstances and under no legal theory, whether in tort, contract, or otherwise, shall DMT or its developers be liable for any direct, indirect, incidental, special, exemplary, or consequential damages (including damages for work stoppage; computer failure or malfunction; loss of goodwill; loss of use, data or profits; or for any and all other damages and losses).

Some states do not allow the limitation or exclusion of implied warranties and you may be entitled to additional rights in those states.

Trademark Information

All Droplet Measurement Technologies, Inc. product names and the Droplet Measurement Technologies, Inc. logo are trademarks of Droplet Measurement Technologies, Inc.

All other brands and product names are trademarks of their respective owners.

Risks of Installing Additional Software

Instrument computers from DMT are configured to acquire data in a reliable, robust manner. Typically, such instruments are either not connected to a network or are connected to a small, local network that is isolated from the internet, reducing the risk of viruses. Since anti-virus programs can cause erratic behavior when run in the background on data acquisition computers, DMT does not install anti-virus, anti-spam, or anti-malware programs. If you choose to install these programs, you accept the risk associated with them in terms of potential performance degradation of the software installed by DMT.

For similar reasons, DMT recommends that you do not install or run other software on the dedicated instrument computer. Although the installation of some software may be unavoidable, it is particularly important not to run other software while the computer is acquiring data.

CONTENTS

1.0	Introduction	4
2.0	Configuration.....	4
2.1	Requirements	4
2.2	Configuring the Sonic Anemometer in the PADS Software.....	4
2.3	Configuring the Sonic Anemometer Display.....	7
3.0	The Sonic Anemometer Window	8
3.1	Wind Speed and Temp	9
3.2	Selectable Plots.....	9
3.3	Tools Tab	10
4.0	Zooming In and Out	10
	Appendix A: Sonic Anemometer Channels	11

List of Figures

Figure 1: Sonic Anemometer Configuration Editor Window	5
Figure 2: Sonic Anemometer Display Editor Window	7
Figure 3: Sonic Anemometer Window	9
Figure 4: Time-Range Controls	11

1.0 Introduction

The Particle Analysis and Display System (PADS) is a software package that interfaces with instruments produced by Droplet Measurement Technologies (DMT) and other leading instruments used in the atmospheric sciences. This manual describes the PADS Sonic Anemometer module version 3.6.3.

For an explanation of the basic PADS setup and instructions on how to acquire data using PADS, consult the *PADS Overview Manual, DOC-0300*. Definitions and calculations used in the Sonic Anemometer module are also described in the *PADS Overview Manual*.

2.0 Configuration

The section below describes the requirements for making your anemometer interface with PADS. The next sections describe how to configure PADS software and the Sonic Anemometer display in PADS.

2.1 Requirements

PADS supports three types of Sonic Anemometers:

- Wind Master Ultrasonic by Gill Instruments
- Three Axis Sonic by Applied Technologies, Inc.
- Ventus by Lufft

These instruments should be configured at DMT, as they must operate in certain modes in order to communicate properly with PADS.

2.2 Configuring the Sonic Anemometer in the PADS Software

To configure the PADS software for the anemometer, follow the steps below.

1. Click on the “Sonic Anemometer” tab.
2. From the **Configure** menu, select **Configure Instrument**. You will see the following window.

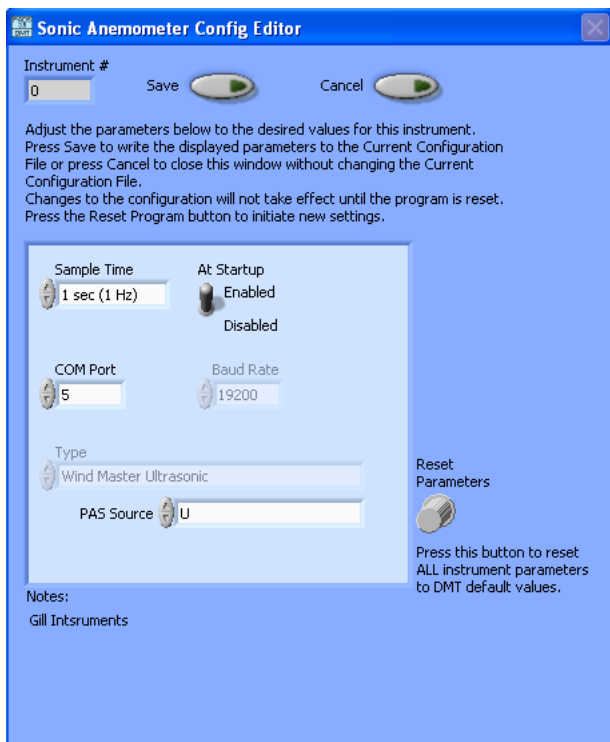


Figure 1: Sonic Anemometer Configuration Editor Window

3. Now you can configure the instrument parameters to your desired specifications. You will find a list of the parameters you may want to reconfigure below. If at any time you would like to revert to the previously saved values for the Sonic Anemometer parameters, press **Cancel** to exit the window without saving changes.
4. When you are done configuring the Sonic Anemometer parameters, press **Save** at the top of the Config editor window. (If you would instead like to revert to the previously saved values, click **Cancel**.) Then press the green **Reset Program** button for the new configuration to take effect. Note that pressing the **Reset Program** button will clear any data currently being displayed.

Sonic Anemometer Configuration Editor Parameters

The Sonic Anemometer configuration editor screen allows you to specify the parameters listed below.

Instrument #: This lists the number corresponding to the instrument you are viewing, in this case the Sonic Anemometer. If your Sonic Anemometer has been assigned instrument number

one, you will see “1” in this field. You should not need to modify the instrument number, and in fact you are unable to do so from within PADS.

Sample Time: This parameter shows the time interval you’d like between samples. You can have the anemometer sample at intervals of .1, .2, .5, 1, 2, 5, or 10 seconds (10, 5, 2, 1, 0.5 or 0.1 Hz).

At Startup Enabled / Disabled: If you want the anemometer to acquire data when PADS begins sampling, make sure this parameter is in the “Enabled” mode. In some cases, such as if the anemometer is inoperative, you may want to use this control to disable the anemometer. Disabling the anemometer allows data to transmit from other instruments without interference.

COM Port: This is the serial communications port that the Sonic Anemometer uses to connect with the computer. This number should match the computer hardware configuration for the particular computer you are using. If you are not using multiple computers, this number should not be changed.

Baud Rate: The baud rate for the anemometer is defined at manufacture. This parameter has been grayed out and you should not need to change it. If you reconfigure your hardware, however, the baud rate may change. If this occurs, contact DMT for help in changing your baud rate in PADS.

Type: This parameter lists the model of your sonic anemometer. PADS supports three different anemometers:

- Wind Master Ultrasonic by Gill Instruments
- Three Axis Sonic by Applied Technologies, Inc.
- Ventus by Lufft

This parameter has been grayed out because it is set to work with your particular instrument. If you purchase a new sonic anemometer, contact DMT for help with configuration.

PAS Source: This parameter determines which of the anemometer’s four wind readings (see below) becomes the shared PAS value for the sonic anemometer. This shared value is stored in

the anemometer’s **PAS (m/s)** channel, and other instruments that use the Sonic Anemometer as their PAS source use this shared value as their PAS.

Options for the anemometer’s PAS Source are as follows:

- U: The wind component along the x-axis of the sonic anemometer
- V: The wind component along the y-axis of the sonic anemometer
- W: The wind component along the z-axis of the sonic anemometer (not available for Ventus)
- Total Vector: The magnitude of the vector sum of the three components above. For the two-axis Ventus, this is the sum of the U and V vectors.

At the bottom of the Config Editor is a “Notes” section, which lists the manufacturer of the anemometer specified in the **Type** field.

2.3 Configuring the Sonic Anemometer Display

To configure the Sonic Anemometer display, click on the Sonic Anemometer tab if you have not already done so. Then select **Configure** from the menu bar and click on **Configure Display**. This will bring up the following window.

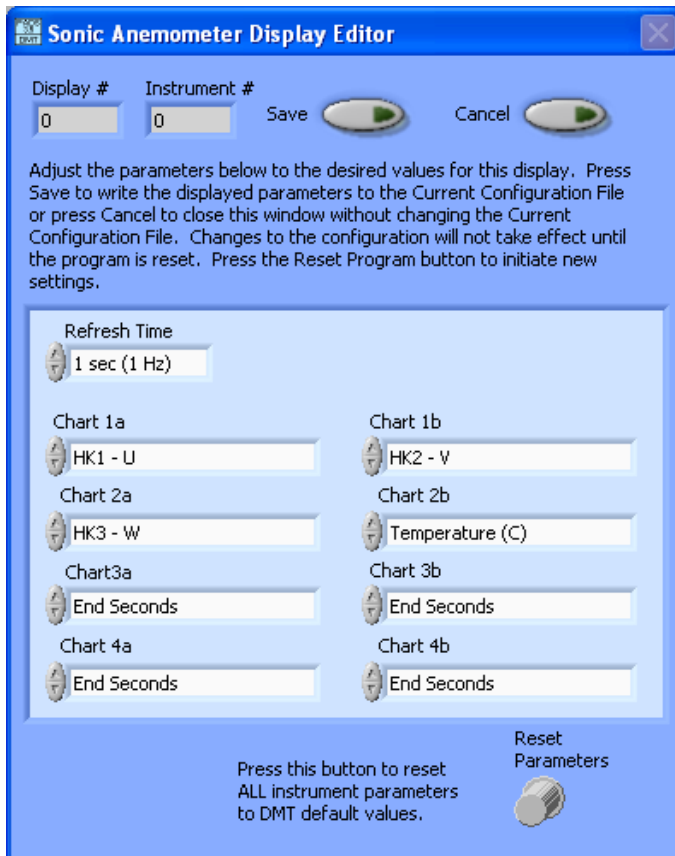


Figure 2: Sonic Anemometer Display Editor Window

You do not need to modify the **Display #** or **Instrument #**. Changing the **Refresh Time** allows you to set the time intervals for data display during acquisition mode; you can choose any time that is equal to or greater than the sample time. (Choosing a time less than the sample time is not useful, since the same data will be displayed multiple times.)

The chart controls allow you to select channels to be displayed in the Selectable Plots tabs. Chart 1 and 2 are the top and bottom chart respectively on the **Selectable Plot** tab, while Chart 3 and 4 are the top and bottom chart on **Selectable Plot 2** tab. “a” channels are graphed in green with their legends displayed on the left side of the graph. “b” channels are graphed in blue with their legends displayed on the right.

Pressing the **Reset Parameters** button resets all parameters to their DMT-supplied default values.

When you are done configuring the display, click on **Save** to update the configurations or **Cancel** to revert to the previous configurations. After you reset PADS, you will be able to see any changes on the Sonic Anemometer tab. Note that clicking **Reset Program** will clear out any data currently being displayed.

3.0 The Sonic Anemometer Window

The Sonic Anemometer Window is shown in Figure 3.

For explanations of the **Enable** button, **COM Port** indicator, and **Fault/No Fault** button, see the “Instrument Tabs” section of the *PADS Overview Manual*.

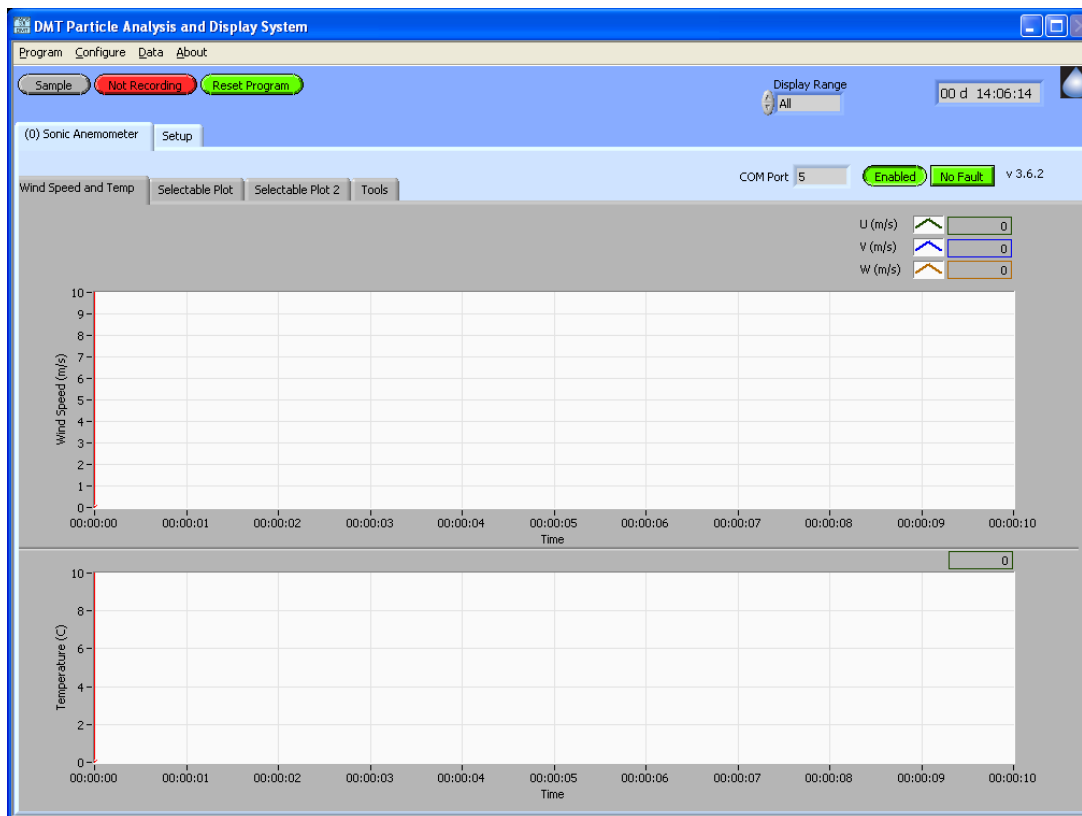


Figure 3: Sonic Anemometer Window

The Sonic Anemometer module has several sub-tabs, which are discussed below.

3.1 Wind Speed and Temp

This sub-tab displays time-series charts of Wind Speed (m/s) and Temperature (°C). The Wind Speed graph displays the three vector components (U, V, W) in different colors. Note that for the Ventus, PADS does not display the W vector component in the graph, as the Ventus does not supply this value. Also, the numeric **W (m/s)** value displayed in the upper right of the window is set to NaN for the Ventus.

3.2 Selectable Plots

The **Selectable Plot** and **Selectable Plot 2** sub-tabs display user-selectable channels graphed across time. To change the channels plotted in the selectable charts, you have two options:

- 1.) To change the charts for the current session only, use the controls in the upper corners of the chart to select the channel you desire. You can either click on the text control to the right, which brings up a selectable list of channels, or you can use the button on the left to scroll between channels.
- 2.) To change the channels shown in the chart's display when PADS starts, go to the **Configure** menu, select **Configure Display**, and choose the desired channel for the desired chart. Then press the **Reset Changes** button to apply this configuration.

3.3 Tools Tab

The Tools tab allows users to change the **PAS Source** while the session is running. (To change this value upon PADS start-up, do so from the Configuration Editor as described in section 2.2.) This parameter determines which of the anemometer's four wind readings becomes the shared PAS value for the sonic anemometer. This shared value is stored in the anemometer's **PAS (m/s)** channel. Options for the anemometer's PAS Source are as follows:

- U: The wind component along the x-axis of the sonic anemometer
- V: The wind component along the y-axis of the sonic anemometer
- W: The wind component along the z-axis of the sonic anemometer (not available for Ventus)
- Total Vector: The magnitude of the vector sum of the three components above. For the two-axis Ventus, this is the sum of the U and V vectors.

The Tools tab also lists details about the Sonic Anemometer's manufacturer and communications protocol. These parameters are grayed out so you cannot change them. If you change your Sonic Anemometer, contact DMT for help in configuring your system for the new device.

4.0 Zooming In and Out

There are several ways to zoom in or out on Sonic Anemometer charts and the histogram. As described in the *PADS Overview Manual*, you can use the time-range controls (Figure 4) to zoom. To zoom in on the data, move the green and red controls close to the white control, which will narrow the range of displayed data. To zoom out, move the two colored controls away from the white control.

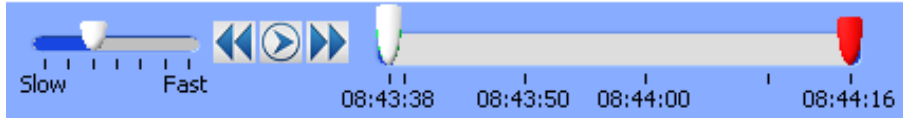


Figure 4: Time-Range Controls

On the chart itself, you can also type numbers directly into the first and last labels on the x and y axis to change the scaling.

Note: Do not right-click on chart and change the auto-scaling using the drop-down menu. This can interfere with the chart display. PADS autoscales most charts automatically. You can turn off autoscaling on the histogram using the buttons in the lower right of the window.

Appendix A: Sonic Anemometer Channels

The Sonic Anemometer has several channels, which are listed below. PADS records data for each of these channels during each sampling instance.

End Seconds	Temperature (C)
Day of Year	Spare 1 - 8
Year	Total Vector
Status	PAS (m/s)
U (m/s)	UTC Time
V (m/s)	Date
W (m/s)	Time

For definitions of these channels, see *Appendix A* in the *PADS Overview Manual*.