VELOCICALC®
Air Velocity Meter
Models 9545/9545-A

Operation and Service Manual

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CONTENTS

Chapter 1

Unpacking and Parts Identification

Carefully unpack the instrument and accessories from the shipping container. Check the individual parts against the list of components below. If anything is missing or damaged, notify TSI immediately.

1. Carrying case
2. Instrument
3. USB cable
4. CD-ROM with downloading software

Chapter 2

Setting-up

Supplying Power to the Model 9545/9545-A

The TSI Model 9545/9545-A VELOCICALC Air Velocity Meter is powered with four size AA batteries.

Installing the Batteries

Insert four AA batteries as indicated by the diagram located on the inside of the battery compartment. The Model 9545/9545-A is designed to operate with either alkaline or NiMH rechargeable batteries, although it will not recharge NiMH batteries. Battery life will be shorter if NiMH batteries are used. Carbon-zinc batteries are not recommended because of the danger of battery acid leakage.

Using the Optional AC Adapter

When using the AC adapter, the batteries (if installed) will be bypassed. Be sure to provide the correct voltage and frequency, which is marked on the back of the AC adapter. The AC adapter will not recharge the batteries.

Using the Telescoping Probe

The telescoping probe contains the velocity, temperature, and humidity sensors. When using the probe, make sure the sensor window is fully exposed and the orientation dimple is facing upstream.

NOTE: For temperature and humidity measurements, make sure that at least 3 inches (7.5 cm) of the probe is in the flow to allow the temperature and humidity sensors to be in the air stream.

Extending the Probe

To extend the probe, hold the handle in one hand while pulling on the probe tip with the other hand. Do not hold the cable while extending the probe as this prevents the probe from extending.

Retracting the Probe

To retract the probe, hold the handle in one hand while pushing on the probe tip with the other hand. If you feel the probe antenna binding, pull gently on the probe cable until the smallest antenna section is retracted. Collapse the rest of the antenna by pressing the probe tip.

Connecting to a Computer

Use the Computer Interface USB Cable provided with the Model 9545/9545-A to connect the instrument to a computer for downloading stored data or for remote polling. Connect the end labeled "COMPUTER" to the computer USB port and the other end to the data port of the Model 9545/9545-A.

For more information on how to download stored data see Chapter 3 section titled LogDat2™ Downloading Software.

Caution: This symbol is used to indicate that the data port of the Model 9545/9545-A is **not** intended for connection to a public telecommunications network. Connect the USB data port only to another USB port.

Chapter 3

Operation

Keypad Functions

ON/OFF Key	Press to turn the Model 9545/9545-A on and off. During the power up sequence the display will show the following: Model Number, Serial Number, Software Revision and Last Date Calibrated.
Arrow (▲▼) Keys	Press to scroll through choices while setting a parameter.
↵ (Enter) Key	Press to accept a value or condition.
Arrow (◀ or ▶) and Menu Soft Keys	Press arrow keys to change choices while setting a parameter. Press the Menu soft key to select the Menu selections, which are Display Setup, Settings, Flow Setup, Actual/Std Set up, Data Logging and Calibration.

Common Terms

In this manual there are several terms that are used in different places. The following is a brief explanation of the meanings of those terms.

Sample	Consists of all of the measurement parameters stored at the same time.
Test ID	A group of samples. The statistics (average, minimum, maximum, and count) are calculated for each test ID. The maximum number of test IDs is 100.
Time Constant	The time constant is an averaging period. It is used to dampen the display. If you are experiencing fluctuating flows, a longer time constant will slow down those fluctuations. The display will update every second, but the displayed reading will be the average over the last time constant period. For example, if the time constant is 10 seconds, the display will update every second, but the displayed reading will be the average from the last 10 seconds. This is also referred to as a "moving average".

Menus

DISPLAY SETUP

Display setup menu is where you will setup the desired parameters to be displayed on the running screen. With a parameter highlighted you can then use the ON soft key to have it show up on the running screen or select the OFF soft key to turn off the parameter. Use PRIMARY soft key to have a parameter show up on the running screen in a larger display. Only one parameter can be selected as a primary, and up to 2 secondary parameters can be selected at one time.

SETTINGS

Settings menu is where you can set the general settings. These include Language, Beeper, Select Units, Time Constant, Contrast, Set Time, Set Date, Time Format, Date Format, Number Format, Backlight and Auto Off. Use the ◀ or ▶ soft keys to scroll through the settings for each option and use the ↵ key to accept settings.

FLOW SET UP

In Flow Setup mode, there are 4 types: Round Duct, Rectangle Duct, Duct Area, and Horn. Use the ◀ or ▶ soft keys to scroll through the types and then press the ↵ key to accept the desired type. To change the value, highlight the Enter Settings option and press the ↵ key. Use the instructions below to change the value of the type that you selected.

NOTE: *The horn numbers are the models of the horns. For example, 100 refers to a horn model number AM 100. Only horns with Model numbers as follows can be used with this function: AM 100, AM 300, AM 600 and AM 1200. If a horn model number is chosen, the instrument will return to measuring mode and use a preprogrammed curve to calculate flow rate from velocity.*

ACTUAL/STANDARD SETUP

Choose Actual/Standard measurements and parameters in the Act/Std Setup menu. Within this menu, the user can also select Standard Temperature, Standard Pressure and a source for the actual temperature. The actual barometric pressure must be entered to convert air velocity and volume measurements to actual conditions.

DATA LOGGING

Measurements

Measurements to be logged are independent of measurements on the display, and must therefore be selected under DATA LOGGING → Measurements.

Log Mode/Log Settings

You can set Log Mode to Manual, Auto-save.

- Manual mode does not automatically save data, but instead prompts the user to save a sample.
- In Auto-save mode, the user manually takes samples that are automatically logged.

Delete Data

Use this to delete all data, delete test or delete sample.

% Memory

This option displays the memory available. Delete All, under Delete Data, will clear memory and reset the memory available.

LogDat2™ Downloading Software

The Model 9545/9545-A comes with special software called LogDat2 Downloading Software, which is designed to provide you with maximum flexibility and power. To install this software on your computer, follow the instructions on the label of the LogDat2 CD-ROM.

To download data from the Model 9545/9545-A, connect the supplied computer interface USB cable to the Model 9545/9545-A and to a computer USB port. Then run the LogDat2 software. Within the LogDat2 software, either select the tests to be downloaded or double-click on a test to open it.

Chapter 5

Troubleshooting

Table 5-1 lists the symptoms, possible causes, and recommended solutions for common problems encountered with the Model 9545/9545-A. If your symptom is not listed, or if none of the solutions solves your problem, please contact TSI.

Table 5-1: Troubleshooting the Model 9545/9545-A

Symptom	Possible Causes	Corrective Action
No Display	Unit not turned on	Switch unit on.
	Low or dead batteries	Replace batteries or plug in AC adapter.
	Dirty battery contacts	Clean the battery contacts.
Velocity reading fluctuates / unstable	Fluctuating flow	Reposition probe in less-turbulent section or use longer time constant.
Instrument Error message appears	Memory is full	Download data if desired, then DELETE ALL memory.
	Fault in instrument	Factory service required on instrument.

WARNING!
Remove the probe from excessive temperature immediately: excessive heat can damage the sensor. Operating temperature limits can be found in Appendix A, Specifications.

11

Appendix A

Specifications

Specifications are subject to change without notice.

Velocity Probe:
Range: 0 to 6000 ft/min (0 to 30 m/s)
Accuracy[1&2]:   ±3% of reading or ±3 ft/min (±0.015 m/s),
                 whichever is greater
Resolution: 1 ft/min (0.01 m/s)

Duct Size:
Range: 1 to 250 inches in increments of 0.1 in. (1 to 635 cm in
                 increments of 0.1 cm)

Volumetric Flow Rate:
Range: Actual range is a function of actual velocity, and duct size

Temperature from Velocity Probe:
Range: 14 to 140°F (-10 to 60°C)
Accuracy[3]:   ±0.5°F (±0.3°C)
Resolution: 0.1°F (0.1°C)

Relative Humidity from Velocity Probe:
Range: 0 to 95% RH
Accuracy[4]:   ±3% RH
Resolution: 0.1% RH

Wet Bulb Temperature from Velocity Probe:
Range: 40 to 140°F (5 to 60°C)
Resolution: 0.1°F (0.1°C)

Instrument Temperature Range:
Operating (Electronics): 40 to 113°F (5 to 45°C)
Operating (Probe):   14 to 140°F (-10 to 60°C)
Storage: -4 to 140°F (-20 to 60°C)

Instrument Operating Conditions:
Altitude up to 4000 meters
Relative humidity up to 80% RH, non-condensing
Pollution degree 1 in accordance with IEC 664
Transient over voltage category II

Data Storage Capabilities:
Range: 12,700+ samples and 100 test IDs (one sample can contain
                 fourteen measurement types)

Logging Interval:
Intervals: 1 second to 1 hour

Time Constant:
User selectable

Response Time:
Velocity: 200 msec
Temperature: 2 minutes (to 66% of final value)
Humidity: <1 minute (to 66% of final value)

External Meter Dimensions:
3.3 in. × 7.0 in. × 1.8 in. (8.4 cm × 17.8 cm × 4.4 cm)

Meter Probe Dimensions:
Probe length: 40 in. (101.6 cm)
Probe diameter of tip: 0.28 in. (7.0 mm)
Probe diameter of base: 0.51 in. (13.0 mm)

Articulating Probe Dimensions:
Articulating section length: 7.8 in (19.7 cm)
Diameter of articulating knuckle: 0.38 in (9.5 mm)

Meter Weight:
Weight with batteries: 0.6 lbs (0.27 kg)

Power Requirements:
Four AA-size batteries (included) or AC adapter (optional) 9 VDC, 300 mA, 4-18 watts (input voltage and frequency vary depending on which adapter is used)

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[1] Temperature compensated over an air temperature range of 40 to 150°F (5 to 65°C).

[2] The accuracy statement of ±3.0% of reading or ±3 ft/min (±0.015 m/s), whichever is greater, begins at 30 ft/min through 6000 ft/min (0.15 m/s through 30 m/s).

[3] Accuracy with instrument case at 77°F (25°C), add uncertainty of 0.05°F/°F (0.03°C/°C) for change in instrument temperature.

[4] Accuracy with probe at 77°F (25°C). Add uncertainty of 0.1% RH/°F (0.2% RH/°C) for change in probe temperature. Includes 1% hysteresis.