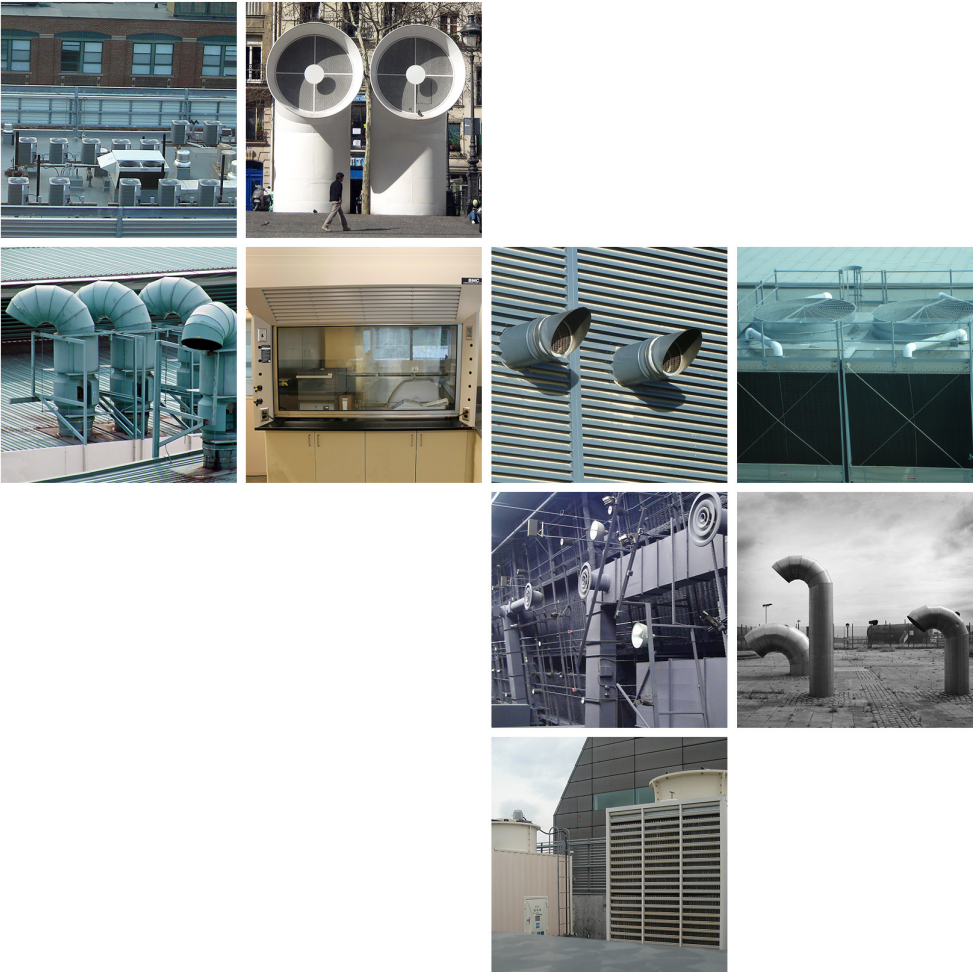




Tel: 800.424-7356  
[www.KurzInstruments.com](http://www.KurzInstruments.com)

# Series 490 Portable Velocity Meter User Guide



## Copyrights and Trademarks

Copyright © 2017 Kurz Instruments, Inc.

All rights reserved.

No part of this publication may be reproduced or transmitted in any form or by any means, electronic or mechanical, including photocopying, recording, or by any information storage and retrieval system without express written permission from Kurz Instruments, Inc., 2411 Garden Road, Monterey, California 93940; Phone: 831-646-5911, Fax: 831-646-8901, or [www.kurzinstruments.com](http://www.kurzinstruments.com)

The material in this manual is for information only and is subject to change without notice. Every reasonable effort has been made to ensure that the information in this manual is complete and accurate. Kurz Instruments, Inc. makes no representations or warranties of any kind concerning the contents of this publication, and therefore assumes no liability, loss, or damages resulting from use, errors, or omissions in this publication or from the use of the information contained herein. Kurz Instruments, Inc., is not responsible for printing or clerical errors.

Kurz Instruments, Inc., reserves the right to make engineering changes, product improvements, and product design changes without reservation and without notification to its users. Consult your Kurz Instruments, Inc. representative or a factory applications engineer for information regarding current specifications.

Kurz Instruments, Inc. assumes no liability for damages or injuries (consequential or otherwise) caused by the improper use and/or improper installation of this product or where this product is used in any application other than what it was designed for and intended. Kurz Instruments, Inc. expressly denies any responsibility if this product has been modified without Kurz Instruments, Inc. written approval or if this product has been subjected to unusual physical or electrical stress, or if the original identification marks have been removed or altered.

Equipment sold by Kurz Instruments, Inc. is not intended for use in connection with any nuclear facility or activity unless specifically sold for such applications and specific conditions for such usage are detailed. If the equipment is used in a nuclear facility or activity without supporting quotation, Kurz Instruments, Inc. disclaims all liability for any damage, injury, or contamination, and the buyer shall indemnify and hold Kurz Instruments, Inc., its officers, agents, employees, successors, assigns, and customers, whether direct or indirect, harmless from and against any and all losses, damages, or expenses of whatever form and nature (including attorneys fees and other costs of defending any action) which they, or any of them, may sustain or incur, whether as a result of breach of contract, warranty, tort (including negligence), strict liability or other theories of law, by reason of such use.

The Kurz logo is a trademark of Kurz Instrument, Inc., registered in the U.S. and other countries. Use of the Kurz logo for commercial purposes without the prior written consent of Kurz Instruments, Inc. may constitute trademark infringement in violation of federal and state laws. MetalClad, Series MFTB, Series 454FTB, Series 504FT, Series 534FTB, and KBar-2000B are trademarks of Kurz Instruments, Inc.

Other company and product names mentioned herein are trademarks of their respective owners. Mention of third-party products is for informational purposes only and constitutes neither an endorsement nor a recommendation. Kurz Instruments, Inc., assumes no responsibility with regard to the performance or use of these products.

Kurz Instruments Inc.  
2411 Garden Road  
Monterey, CA 93940  
831-646-5911 (main)  
831-646-8901 (fax)

Kurz Technical Support  
Customer Service  
800-424-7356 (toll free)  
[www.kurzinstruments.com](http://www.kurzinstruments.com)  
[service@kurzinstruments.com](mailto:service@kurzinstruments.com)

# Table of Contents

<b>Series 490 .....</b>	<b>1</b>
Overview .....	1
Operating the Series 490 .....	2
Application Tips .....	3
Large Duct Openings .....	3
Changing Air Temperature .....	3
Average Air Velocity .....	3
HEPA Air Flow .....	4
Small Duct Flow Rates .....	4
Standard vs. Actual Velocity .....	5
Battery Replacement .....	6
Maintenance & Repair .....	7



# Series 490

## Overview

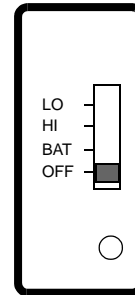
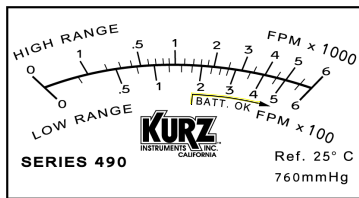
The Kurz Series 490 provides reliable air flow measurement in a high-quality, portable velocity meter. Each unit works up to 50 hours on a set of batteries. The low-power sensor exhibits extraordinary sensitivity to airflow. The nonconductive graphite probe shaft is extremely strong. Each model offers dual range capability, and is available in either standard or metric measurements.



## Operating the Series 490

Before taking a measurement:

- When the Series 490 is powered ON, a red indicator light illuminates.
- Check the battery voltage by sliding the power switch to BAT. The needle must be to the right side of the scale in the BATT OK area.

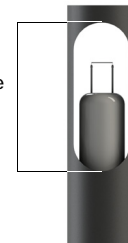


- Slide the power switch to HIGH. Remove the protective shield from the probe window. Ensure that air flow moves the needle by blowing air through the window and across the sensor.
- Slide the power switch to LOW. Ensure that air flow moves the needle by blowing air through the window and across the sensor.

To use a Series 490, place the sensor near the vent so the vent air flows directly through the sensor window opening and read the indicator.



Air flow must go directly through the sensor window



The Series 490 is calibrated for use in air. Gas correction factors for gases other than air are available from third-party sources. Note that gas correction factors can vary from meter to meter.

## Application Tips

The Series 490 measures air velocities for a wide range of applications.

- Supply openings, return openings, and suction openings
- Wind speed for meteorological studies and sports activities (such as sailing, golf, and track & field)
- Clean rooms

Output is relatively unaffected by angular rotation of the probe window until the angle approach reaches approximately 30 degrees of the flow direction.

## Large Duct Openings

The Series 490 allows you to conveniently obtain velocity and total flow of supply openings, return openings, and suction openings. If a supply opening is covered by a grill, the probe should be placed about one inch in front of a grill opening to obtain the average velocity reading. If an opening is covered by a diffuser, refer to the manufacturer's instructions.

To obtain greater accuracy, use a duct extension that is at least 10 percent of the largest dimension of the grill. For example, a grill with dimensions 10" x 8" requires at least a one inch extension. The duct extension is then placed against the grill.

## Changing Air Temperature

For applications with changing air temperature, allow the probe to reach thermal equilibrium to give the temperature-compensation feature time to respond.

## Average Air Velocity

To determine the average air velocity:

- 1> Divide the opening into equal areas.
- 2> Take a velocity reading at the center of each area.

Traverse across the duct in both direction to determine the uniformity of the air velocity. Only a few areas need to be measured if the velocity profile is relatively flat. Several areas should be used if the profile is non-uniform. If the velocity is not constant at one measuring point, use the mean velocity between the upper and lower readings.

- 3> Average the results.

## HEPA Air Flow

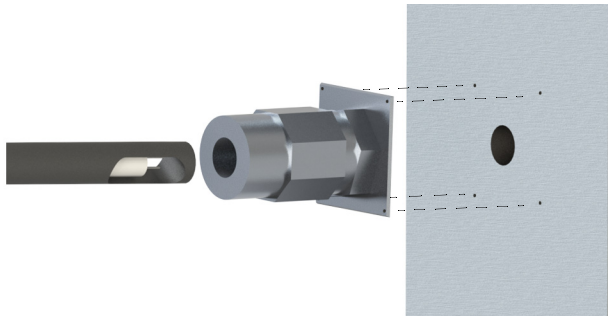
Proper HEPA air circulation ensures that clean air is efficiently issued from a HEPA ceiling duct and contaminated air is expelled from the protected zone. The probe can be positioned at various points in the clean room in a variety of orientations, establishing major flow lines and investigating the differential pressure of various rooms.

The Series 490 can also be used to ensure the uniform laminar airflow through a HEPA filter and to certify HEPA filters in accordance with environmental standards. HEPA certification readings typically fall between 72 and 108 fpm.

## Small Duct Flow Rates

The Series 490 can be used for velocity measurements with duct diameters less than 18 inches and fairly uniform velocities. Whenever possible, choose a measurement location at least 10 duct diameters downstream from the nearest elbow, tee, bend, valve, or other flow obstruction. The total flow rate within the duct can be determined only if the point velocity measurement represents the average flow velocity, which requires an extremely smooth, uniform flow or a multipoint traverse.

The Series 490 probe can be semi-permanently mounted in a duct wall using a Kurz duct mounting bracket. The adapter is easily installed by drilling a 5/16" hole into the duct and mounting the adapter plate with four sheet metal screws.





## Standard vs. Actual Velocity

The basic sensing element consists of a velocity sensor and a temperature sensor. The velocity sensor is heated and operated at a constant temperature.

All Kurz air velocity meters are referenced to standard conditions:

- Temperature: 25°C (77°F)
- Barometric pressure: 760 mm Hg (101.32 kPa)

Thermal flow meters measure the mass velocity of the air. Most applications require only the mass velocity, so no density calculation is required because the correction is small enough to be neglected in most cases. However, you can use the following formula to obtain the actual velocity:

$$V_a = V_i \times (P_s/P_a) \times (T_a/T_s)$$

*where:*

$V_a$  = actual air velocity

$V_i$  = indicated velocity on the Kurz Series 490

$P_s$  = air pressure at standard condition of 25°C or 760 mm Hg

$P_a$  = actual air or barometric pressure

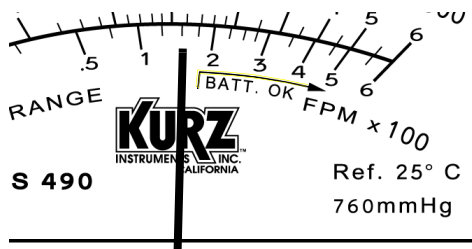
$T_a$  = actual air temperature, absolute units, Kelvin or Ranken

$T_s$  = standard air temperature, absolute units, Kelvin (298°K) or Ranken (536°R)

## Battery Replacement

The Series 490 requires new batteries or must be recharged when the needle is to the left of the vertical line of the battery indicator. Insufficient battery voltage will affect performance, including accuracy and potential deflection at zero. Using a higher voltage battery (above 1.5 VDC AA) voids the safety approval, introduces calibration errors, and can damage the electronics.

**Note** Except for the batteries, there are no user-serviceable components in the meter.



To replace the four alkaline batteries:

- 1> Remove the screws at the top and bottom of the meter case.

**Important** *Do not remove the screws on the base plate.*

- 2> Slide the case away from the base plate to expose the battery compartment.



- 3> Remove the four AA batteries. The batteries are spring-loaded and might need some pressure to remove them.
- 4> Install four new AA alkaline batteries.
- 5> Re-install the meter case and secure it with the screws.

The unit is ready for operation.

## Maintenance & Repair

Although the sensors are generally immune to particulate contamination, continually using the flow meter in dirty environments can require periodically cleaning the sensors. Power off and gently wave the probe sensor in an alcohol bath to remove most dust and grime. Allow the sensor to dry before resuming normal operation.

**Important**     *Do not use a brush or other harsh object to clean the sensor.  
Also, protect the probe when not in use.*

Field modifications or substitutions are not permitted and void the safety approval. Send the meter to the factory for any repairs.

Annual recalibration is suggested based on the accuracy of the data requirements and the amount of use. Before sending in your Series 490 unit, contact Kurz to obtain a return materials authorization (RMA) number. This expedites the calibration/shipping process.

Contact Kurz Customer Service:

(831) 646-5911

service@kurzinstruments.com

Series 490 flow meters can be returned to:

Kurz Instruments, Inc.

2411 Garden Road

Monterey, CA 93940

Have the following information readily available for your Customer Service Representative:

### Series 490 Recalibration

RMA number	
Model number	
Serial number	
Contact name	
Contact phone number	
Complete shipping address	

