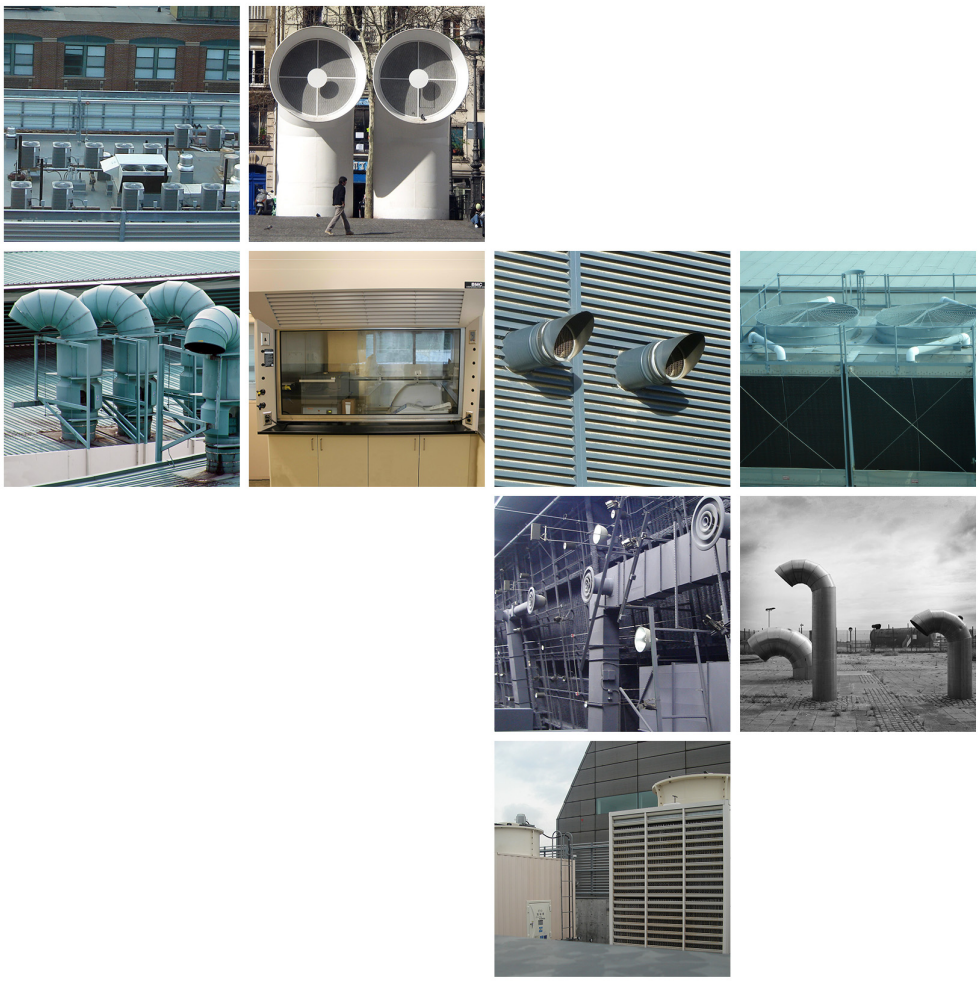
Technical Reference

KURZ INSTRUMENTS INC.™

Tel: 800.424-7356
www.KurzInstruments.com

Series 490 Portable Velocity Meter User Guide



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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
service@kurzinstruments.com

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Series 490

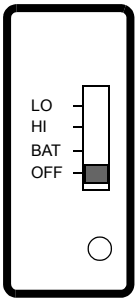
Overview

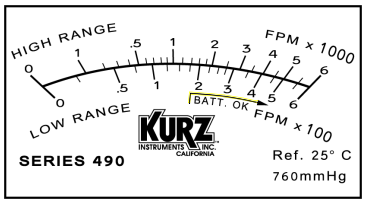
The Kurz Series 490 provides reliable air flow measurement in a high-quality, portable velocity meter. Each unit works up to 50 hours on a set of batteries. The low-power sensor exhibits extraordinary sensitivity to airflow. The nonconductive graphite probe shaft is extremely strong. Each model offers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

Operating the Series 490

Before taking a measurement:

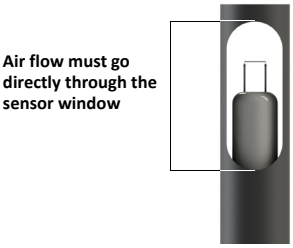
- When the Series 490 is powered ON, a red indicator light illuminates.
- Check the battery voltage by sliding the power switch to BAT. The needle must be to the right side of the scale in the BATT OK area.





- 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.



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

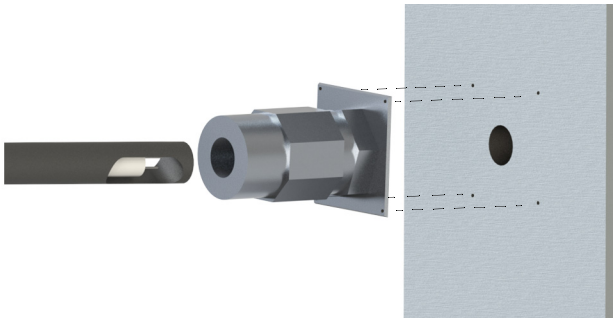
Proper HEPA air circulation ensures that clean air is efficiently issued from a HEPA ceiling duct and contaminated air is expelled from the protected zone. The probe can be positioned at various points in the clean room in a variety of orientations, establishing major flow lines and investigating the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

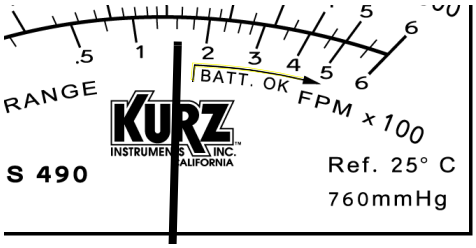
T_a = actual air temperature, absolute units, Kelvin or Ranken

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 warranty, 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 warranty.
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	