Portable Flow Meter
Series 2440

The Series 2440 provides air flow measurements in mass, volume, and velocity. The Series is designed for measuring ducts, pipes, stacks, vents, in situ calibrations, and airflow traverses. Models range from lab grade to industrial high heat. The Series 2440 includes:

• The highest repeatability, accuracy, and reliability available
• The fastest response to temperature and velocity changes in the industry
• Constant temperature thermal technology
• Excellent sensitivity to low velocities
•Insensitive to dirt and particulates in the flow stream
•Insensitive to installation angle
• 1,500 point data memory for recording traverses and other measurements
•Internal and exportable data logging

• Completely field configurable using the local user interface
• User-configurable low velocity cut-off, reference conditions, time constraints, and flow area
• Built-in flow totalizers and elapsed time
• Velocity-temperature mapping for wide ranging velocity and temperature
• Sensors do not overheat at zero flow by using a unique constant temperature control method and power limiting design
• Sensor lead-length independent circuitry

Kurz Instruments is dedicated to manufacturing and marketing the best thermal mass flow meters available and to support our customers in their efforts to improve their businesses.

Applications
Industrial hygiene
Survey tests
HVAC supply and return ducts, grills, diffusers, and testing
Flow balancing
Clean rooms
Fume hoods
Combustion air velocity and flow calibration
Duct, stack, and pipe velocity traverses
Coal-fired power plant stacks
Research and development
General purpose air flow measurements

Kurz Instruments, Inc.
2411 Garden Road
Monterey, CA 93940
800-424-7356
www.KurzInstruments.com
SERIES FEATURES & SPECIFICATIONS

- Easy-to-use interface
  Backlit display / keypad
  2-lines of 16-characters each

- Configuration upload/download

- User-configurable English or metric units for mass flow rate, mass velocity, and process temperature
  °C, °F, KGH, KGM, NMPS, PPH, PPM, SCFH, SCFM, SCMH, SFPM, SLPM, SMPS

- Excellent resolution and noise rejection
  16-bit ADC, 50 Hz or 60 Hz

- Time constant (configurable)
  0 to 600 seconds

- User-selectable flow display
  (scrolling or static)

- All-metal aluminum display module

- Battery charger, 100-240 VAC, 50/60 Hz
  Nickel-Metal-Hydride 4.5 AH high-performance battery, 2.5 hour /full charge

- Rugged carrying case

- European Union CE compliance
  EN 50081-1 for emissions, EN 50082-2 for immunity, EN 61000-4-5 for surges

OPTIONS

- Digital outputs
  Modbus, RS-232C, or RS-485 serial port support; allows external/remote terminal configuration and data log access via a Windows computer

- Analog 4-20 mA outputs
  Configurable as velocity, flow rate, or temperature; 12-bit resolution, maximum loop resistance is 500 at 18 VDC, 800 at 24 VDC, 1400 at 36 VDC; NAMUR NE43 compliant

- Hardware accessories
  Available hardware includes sensor support extensions, extension cables, batteries, battery chargers, and adapters

2441 FEATURES & SPECIFICATIONS

Laboratory-grade applications.

The Model 2441 Lab Grade Portable Flow Meter is excellent and well-suited for industrial hygiene and HVAC measurements.

- 13” sensor support length
- 1/4” diameter sensor support
- Sensors temperature rated
  -40°F to 257°F (-40°C to 125°C)
- Electronics operating temperature range
  -25°C to 65°C, noncondensing
- Velocity time constant
  50 milliseconds for velocity changes at 6000 SFPM at a constant temperature and 300 milliseconds for temperature changes at a constant velocity of 6000 SFPM
- Process temperature time constant
  8 seconds at a velocity of 6000 SFPM
- Pressure rating up to 150 PSIG
- Velocity range 0 to 12,000 SFPM
- Temperature accuracy
  ± (0.5% of reading + 1°C) for velocities above 100 SFPM
- 0.25% repeatability

2442 FEATURES & SPECIFICATIONS

HVAC applications.

The Model 2442 HVAC Portable Flow Meter is designed specifically for HVAC applications. The bendable gooseneck design and telescopic wand allows maximum flexibility in obtaining accurate traverse measurement in typically difficult location, such as ceilings, supply grates, and open areas.

- Unique flexible “gooseneck” between the sensor element and sensor support
- Extendable four-segment telescopic wand
- 47” sensor support length when fully extended
- 1/4” diameter sensor support
- Sensors temperature rated
  -40°F to 257°F (-40°C to 125°C)
- Electronics operating temperature range
  -25°C to 65°C, noncondensing
- Velocity time constant
  50 milliseconds for velocity changes at 6000 SFPM at a constant temperature and 300 milliseconds for temperature changes at a constant velocity of 6000 SFPM
- Process temperature time constant
  8 seconds at a velocity of 6000 SFPM
- Pressure rating up to 150 PSIG
- Velocity range 0 to 12,000 SFPM
- Temperature accuracy
  ± (0.5% of reading + 1°C) for velocities above 100 SFPM
- 0.25% repeatability
2443 FEATURES & SPECIFICATIONS

Small-to-medium pipe and duct applications.
The Model 2443 Flow Meter is a small, rugged sensor designed for velocity and temperature traverses in small- to medium-sized pipes/ducts, such as in industrial ventilation systems.

- 13" sensor support length
  Probe shield can be reversed to extend support length up to 22".
- 3/8" diameter sensor support
- Sensors temperature rated
  -40°F to 392°F (-40°C to 200°C)
- Electronics operating temperature range
  -25°C to 65°C, noncondensing
- Velocity time constant
  1 second for velocity changes at 6000 SFPM at a constant temperature and
  1 second for temperature changes at a constant velocity of 6000 SFPM
- Process temperature time constant
  8 seconds at a velocity of 6000 SFPM
- Pressure rating up to 300 PSIG
- Velocity range 0 to 12,000 SFPM
- Temperature accuracy
  ± (0.5% of reading + 1°C) for velocities above 100 SFPM
- 0.25% repeatability

2444 FEATURES & SPECIFICATIONS

Large pipe and duct applications.
The Model 2444 Heavy Industrial Portable Flow Meter provides the flexibility for a wide variety of field measurement applications because of multiple 16” sections that can connect up to 64.5” long.

- Up to four extension support lengths
  16.5", 32.5", 48.5", 64.5"
- 3/4" diameter sensor support
- Sensors temperature rated
  -40°F to 392°F (-40°C to 200°C)
- Electronics operating temperature range
  -25°C to 65°C, noncondensing
- Velocity time constant
  1 second for velocity changes at 6000 SFPM at a constant temperature and
  1 second for temperature changes at a constant velocity of 6000 SFPM
- Process temperature time constant
  8 seconds at a velocity of 6000 SFPM
- Pressure rating up to 300 PSIG
- Velocity range 0 to 12,000 SFPM
- Temperature accuracy
  ± (0.5% of reading + 1°C) for velocities above 100 SFPM
- 0.25% repeatability

2445 FEATURES & SPECIFICATIONS

High temperature applications.
The Model 2445 High-Temperature Portable Flow Meter is designed for very high temperatures (500°C) applications, such as coal-fired power plant stacks, and primary and secondary air ducts.

- Five fixed support lengths
  24", 36", 48", 60", 72"
- 3/4" diameter sensor support
- Mineral-insulated sensor cable
- Sensors temperature rated
  -40°F to 932°F (-40°C to 500°C)
- Handle (6") temperature rated up to 200°C
- Electronics operating temperature range
  -25°C to 65°C, noncondensing
- Velocity time constant
  1 second for velocity changes at 6000 SFPM at a constant temperature and
  1 second for temperature changes at a constant velocity of 6000 SFPM
- Process temperature time constant
  8 seconds at a velocity of 6000 SFPM
- Pressure rating up to 300 PSIG
- Velocity range 0 to 12,000 SFPM
- Temperature accuracy
  ± (0.5% of reading + 1°C) for velocities above 100 SFPM
- 0.25% repeatability
Series 2440

MODEL 2441 SENSOR

[Diagram of 2441 Sensor]

DETAIL ‘A’

SECTION B-B

2441 PORTABLE EXTENSION

[Diagram of 2441 Portable Extension]

MODEL 2442 WAND & SENSOR

[Diagram of 2442 Wand & Sensor]

Dimensions are in inches [millimeters]
MODEL 2443 SENSOR

2443 PORTABLE EXTENSION

MODEL 2444 SENSOR

SENSOR SECTION

2444 PROBE EXTENSION

2444/2445 3/4" MNPT SENSOR SUPPORT PIPE EXTENSION (OPTIONAL)

Dimensions are in inches [millimeters]
DISPLAY MODULE CARRYING CASE TYPE 1

CARRYING CASE FOR MODELS WITH PROBE SUPPORT LENGTHS 24”, 30”, AND 36”

DISPLAY MODULE CARRYING CASE TYPE 2

CARRYING CASE FOR MODELS WITH PROBE SUPPORT LENGTHS 48” TO 60”

Dimensions are in inches [millimeters].
PROCESS TEMPERATURE & COMPENSATION

Kurz thermal flow meters determine the flow rate of gases by recognizing the mass density of molecules in the flow stream. The density of any gas is influenced by temperature changes. Specifying the temperature range experienced by a gas flow ensures repeatability and accuracy.

- **Standard Temperature Compensation (STC)** is used for small process temperature ranges, in this case from -15°C to 75°C, over a moderate velocity range.
- **Velocity Temperature Mapping (VTM)** is used when the process temperature and gas velocity vary widely. Multiple velocity calibrations are stored in the meter. VTM compensation is based on Air; specific gas correlations are required to ensure accuracy at high temperatures.

GAS VELOCITY CALIBRATION RANGE

The velocity data is taken in English units and Standard Temperature and Pressure (STP) reference conditions of 77°F and 14.69 PSIA. If metric velocity units or a different STP is required, the user can easily change the STP reference, and select English or metric units using the display/keypad. A sufficient number of calibration data points are taken to ensure accuracy over the entire range.

TIME RESPONSE

Time response is the time required to attain 63% (1 time constant) of the original reading after a step change in process temperature in constant velocity, or a step change in velocity at constant process temperature at an initial mass velocity of 6000 SFPM.

<table>
<thead>
<tr>
<th>Series 2440 Accessories</th>
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<tbody>
<tr>
<td><strong>Part Number</strong></td>
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<td>451029</td>
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### Series 2440

#### Parent Number

<table>
<thead>
<tr>
<th>Parent Number</th>
<th>Model</th>
<th>Description</th>
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<tbody>
<tr>
<td>754010</td>
<td>2441</td>
<td>Laboratory-grade</td>
</tr>
<tr>
<td>754020</td>
<td>2442</td>
<td>HVAC</td>
</tr>
<tr>
<td>754030</td>
<td>2443</td>
<td>Small-to-medium pipes and ducts</td>
</tr>
<tr>
<td>754040</td>
<td>2444</td>
<td>Large pipes and ducts</td>
</tr>
<tr>
<td>754050</td>
<td>2445</td>
<td>High temperature</td>
</tr>
</tbody>
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#### Model Options

<table>
<thead>
<tr>
<th>Model Number</th>
<th>Option</th>
<th>Sensor Type &amp; Material</th>
</tr>
</thead>
<tbody>
<tr>
<td>2441</td>
<td>11</td>
<td>CD-AT; Glass-coated platinum wire over ceramic with epoxy sealant</td>
</tr>
<tr>
<td>2442</td>
<td>11</td>
<td>CD-AT; Glass-coated platinum wire over ceramic with epoxy sealant</td>
</tr>
<tr>
<td>2443</td>
<td>13</td>
<td>MC-MT; C-276 alloy with epoxy sealant</td>
</tr>
<tr>
<td>2444</td>
<td>13</td>
<td>FD-MT; C-276 alloy</td>
</tr>
<tr>
<td></td>
<td>17</td>
<td>FD-MT; C-276 alloy with chromium nitride coating</td>
</tr>
<tr>
<td>2445</td>
<td>13</td>
<td>FD-HHT; C-276 alloy</td>
</tr>
<tr>
<td></td>
<td>17</td>
<td>FD-HHT; C-276 alloy with chromium nitride coating</td>
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<table>
<thead>
<tr>
<th>Model Number</th>
<th>Option</th>
<th>Sensor Support Length &amp; Material</th>
</tr>
</thead>
<tbody>
<tr>
<td>2441</td>
<td>22</td>
<td>13&quot;; 316L stainless steel</td>
</tr>
<tr>
<td>2442</td>
<td>02</td>
<td>47&quot; extended length; 316L stainless steel support chrome-plated flexible gooseneck anodized aluminum four-section telescopic wand</td>
</tr>
<tr>
<td>2443</td>
<td>22</td>
<td>13&quot;; 316L stainless steel</td>
</tr>
<tr>
<td>2444</td>
<td>22</td>
<td>16.5&quot; (base length); 316L stainless steel</td>
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<tr>
<td>2444</td>
<td>23</td>
<td>32.5&quot; (base length + one extension); 316L stainless steel</td>
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<tr>
<td>2444</td>
<td>24</td>
<td>48.5&quot; (base length + two extensions); 316L stainless steel</td>
</tr>
<tr>
<td>2444</td>
<td>25</td>
<td>64.5&quot; (base length + three extensions); 316L stainless steel</td>
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<tr>
<td>2445</td>
<td>24</td>
<td>24&quot;; 316L stainless steel</td>
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<tr>
<td>2445</td>
<td>25</td>
<td>36&quot;; 316L stainless steel</td>
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<td>2445</td>
<td>26</td>
<td>48&quot;; 316L stainless steel</td>
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<td>27</td>
<td>60&quot;; 316L stainless steel</td>
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<tr>
<td>2445</td>
<td>28</td>
<td>72&quot;; 316L stainless steel</td>
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<table>
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<tr>
<th>Model Number</th>
<th>Option</th>
<th>Sensor Cable Length &amp; Material</th>
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</thead>
<tbody>
<tr>
<td>2441</td>
<td>11</td>
<td>8 feet; Teflon-insulated cable</td>
</tr>
<tr>
<td>2442</td>
<td>12</td>
<td>12 feet; Teflon-insulated cable</td>
</tr>
<tr>
<td>2443</td>
<td>11</td>
<td>8 feet; Teflon-insulated cable</td>
</tr>
<tr>
<td>2444</td>
<td>13</td>
<td>16 feet; Teflon-insulated cable</td>
</tr>
<tr>
<td>2445</td>
<td>12</td>
<td>12 feet; Teflon-insulated cable</td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th>Model Number</th>
<th>Option</th>
<th>Gas Velocity Calibration Data Range</th>
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</thead>
<tbody>
<tr>
<td>2441</td>
<td>18</td>
<td>12,000 SFPM</td>
</tr>
<tr>
<td>2442</td>
<td>18</td>
<td>12,000 SFPM</td>
</tr>
<tr>
<td>2443</td>
<td>18</td>
<td>12,000 SFPM</td>
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<tr>
<td>2444</td>
<td>20</td>
<td>15,000 SFPM</td>
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<td>2445</td>
<td>18</td>
<td>12,000 SFPM</td>
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<tr>
<td></td>
<td>16</td>
<td>9,000 SFPM</td>
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### Specialty Gas Velocity Calibration

<table>
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<tr>
<th>Model</th>
<th>Option</th>
<th>Calibration Range</th>
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<td>All</td>
<td>01</td>
<td>Air</td>
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### Gas Velocity Calibration Data Range

<table>
<thead>
<tr>
<th>Model</th>
<th>Option</th>
<th>Calibration Range</th>
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<tbody>
<tr>
<td>2441</td>
<td>03</td>
<td>Standard temperature compensation (STC) for the process temperature range -15°C to 75°C; Accuracy: ± [3% of reading + 10 SFPM]</td>
</tr>
<tr>
<td>2441</td>
<td>22</td>
<td>Velocity-temperature mapping (VTM) with two calibration data sets for the process temperature range -40°C to 125°C. Accuracy: ± [3% of reading + (10 SFPM + 0.25 SFPM/°C)], above or below 25°C.</td>
</tr>
<tr>
<td>2442</td>
<td>03</td>
<td>Standard temperature compensation (STC) for the process temperature range -15°C to 75°C; Accuracy: ± [3% of reading + 10 SFPM]</td>
</tr>
<tr>
<td>2442</td>
<td>22</td>
<td>Velocity-temperature mapping (VTM) with two calibration data sets for the process temperature range -40°C to 125°C. Accuracy: ± [3% of reading + (10 SFPM + 0.25 SFPM/°C)], above or below 25°C.</td>
</tr>
<tr>
<td>2443</td>
<td>03</td>
<td>Standard temperature compensation (STC) for the process temperature range -15°C to 75°C; Accuracy: ± [3% of reading + 10 SFPM]; Velocity range 12,000 to 15,000 SFPM.</td>
</tr>
<tr>
<td>2443</td>
<td>24</td>
<td>Velocity-temperature mapping (VTM) with three calibration data sets for the process temperature range -40°C to 200°C. Feature 4, Option 18 only. Accuracy: ± [3% of reading + (20 SFPM + 0.25 SFPM/°C)], above or below 25°C.</td>
</tr>
<tr>
<td>2444</td>
<td>24</td>
<td>Velocity-temperature mapping (VTM) with three calibration data sets for the process temperature range -40°C to 200°C. Accuracy: ± [3% of reading + (20 SFPM + 0.25 SFPM/°C)], above or below 25°C.</td>
</tr>
<tr>
<td>2445</td>
<td>26</td>
<td>Velocity-temperature mapping (VTM) with four calibration data sets for the process temperature range -40°C to 500°C. Accuracy: ± [3% of reading + (30 SFPM + 0.25 SFPM/°C)], above or below 25°C.</td>
</tr>
</tbody>
</table>

### I/O Adapter & Digital Outputs

<table>
<thead>
<tr>
<th>Option</th>
<th>I/O Adapter (first digit)</th>
<th>Digital Outputs (second digit)</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>No I/O adapter</td>
<td>No digital outputs</td>
</tr>
<tr>
<td>1</td>
<td>I/O adapter includes a 2-foot cable with a multipin adapter, a 6-foot RS-232 cable with DB9F connectors to support connection between the I/O adapter and a Windows computer, and a connector used for firmware upgrades. I/O adapter supports RS-495 or RS-232 and two 4-20 mA isolated, loop-powered outputs.</td>
<td>Two 4-20 mA loop-powered outputs, AC/DC optically isolated.</td>
</tr>
</tbody>
</table>