



MASS FLOW METER PRODUCT GUIDE



Kurz Instruments, Inc., pioneered the development of thermal instrumentation and rugged thermal industrial devices in 1976. For more than 40 years, Kurz has maintained a reputation for designing and manufacturing Thermal Mass Flow Meters capable of operating in harsh and difficult environments.

Kurz thermal mass technology uses dual stings - one as a temperature reference and one as a process flow measurement. Thermal mass devices introduce heat into the flow stream, using the concept that stronger flows cause a greater cooling effect.

Thermal mass technology can be more reliably accurate when compared against differential pressure, ultrasonic, and Coriolis devices. Thermal devices also can be much more cost-effective in purchase, installation, or maintenance costs.

Today, the fully digital Kurz sensor design outperforms its competitors by:

- Providing a very high level flow signal-to-noise ratio.
- Withstanding the wide temperature swings, vibration, dust, and process contaminants found throughout the world in heavy industry, research, and manufacturing.
- Effectively immune to condensing liquid entrained in the flow stream.

NEW FEATURES

- **Support for Shifting Gas Compositions via manual or automatic adjustment.**
- **Access for up to 5 individual calibrations (individual or mixed gases) per instrument via manual or automatic adjustment.**
- **Titanium aluminum nitride coating with 28 nano-hardness rating for erosive applications.**
- **Expanded flow range up to 70,000 SFPM while retaining a live zero flow.**
- **Profibus-DP communications protocol.**
- **Polycarbonate wall mount remote electronics.**
- **Stainless steel remote electronics.**

	454FTB Single-Point Insertion	454FTB-WGF Single-Point Insertion	504FTB Inline	534FTB Inline	KBAR-2000B Multipoint Insertion
Process Line Size	2" → 36"	2" → 36"	3/8" → 4"	1/2" → 8"	24" → 450"
Velocity Range or Mass Rate	0 → 70,000 SFPM (0 → 325 NMPS)	0 → 4,000 SFPM (0 → 18.6 NMPS)	0 → 4,000 SCFM (0 → 6,240 NCMH)	0 → 7,016 SCFM (0 → 10,944 NCMH)	0 → 12,000 SFPM (0 → 56 NMPS)
Turndown Ratio	20,000:1	2,000:1	9,000:1	9,000:1	20,000:1
Process Temperature Rating	-40°F → 500°F (HT) or → 932°F (HHT) (-40°C → 260°C or → 500°C)	-40°F → 248°F (-40°C → 120°C)	-40°F → 257°F (-40°C → 125°C)	-40°F → 257°F (-40°C → 125°C)	-40°F → 500°F (HT) or → 932°F (HHT) (-40°C → 260°C or → 500°C)
Process Pressure Rating	Up to 300 PSIG (20 BARg)	Up to 150 PSIG (10 BARg)	Up to 300 PSIG (20 BARg)	Up to 300 PSIG (20 BARg)	not applicable
Accuracy*	±(1% of reading +20 SFPM)	±(1% of reading +20 SFPM) (dry)	±(1% of reading + (A x 20 SFPM))	±(1%+2000 x A/F)%	±(1% of reading +20 SFPM)

Flow accuracy is based on laboratory conditions. where: A = flow body area (ft²)
 Inline flow meter ranges depend on model and calibration option. F = SCFM

For example, to determine accuracy for a Model 504-32 with a 0.023 sqft. area and a 100 SCFM flow rate:
 $\pm(1 + 2000 \times 0.023/100)\% = \pm(1 + 2000 \times 0.00023)\% = \pm(1 + 20 \times 0.023)\% = \pm(1 + 0.46)\% = \pm 1.46\%$

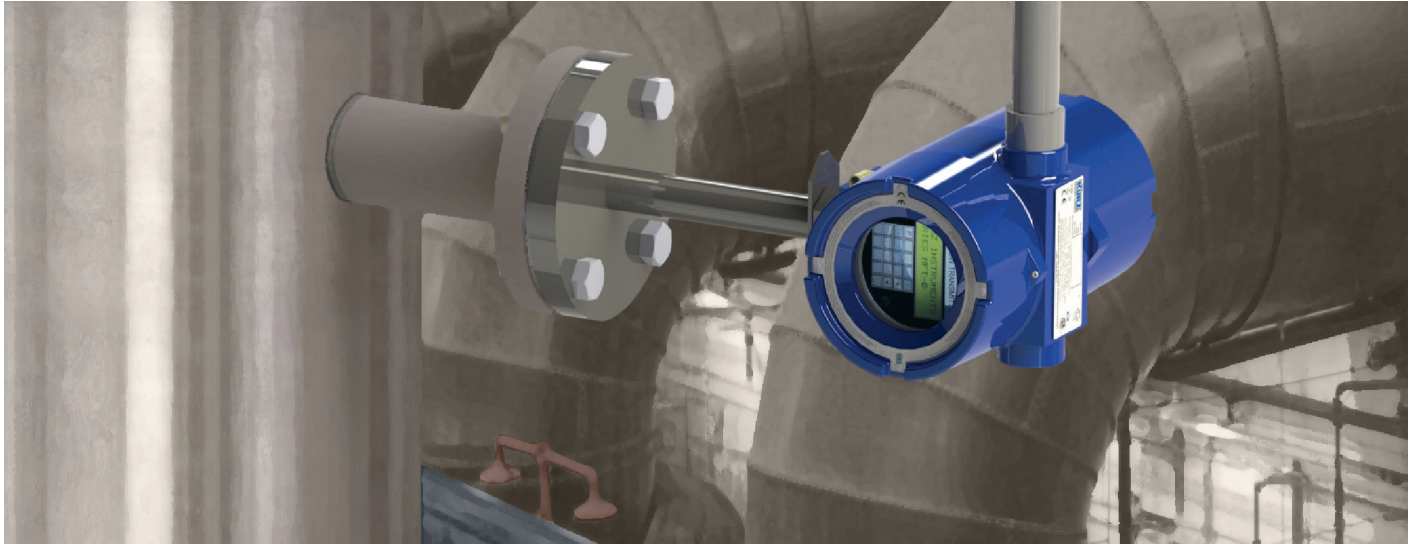
Please visit KurzInstruments.com for complete technical specifications.

The qualities and features found in all Kurz thermal flow meters that make them outperform all other currently available thermal mass flow meters include:

- The highest repeatability, accuracy, and reliability available
- Mass balanced sensors provide the fastest response to temperature and velocity changes in the industry
- Exceptionally low end-to-end inline pressure drop
- Sensors that do not overheat at zero flow
- Sensor lead length independent circuitry
- A rugged all-welded design
- Completely field configurable electronics
- Continuous self-monitoring electronics that verify the integrity of sensor wiring and measurements
- Velocity-temperature mapping (VTM) for wide ranging velocities and temperatures
- Interchangeable sensor and electronics (single circuit board) – no matched sets
- Availability of custom flow rates and temperatures outside standard ranges



454FTB INSERTION METER



The Kurz 454FTB single-point insertion flow meter incorporates the most advanced state-of-the-art microprocessor and electronics technology to provide accurate and realtime diagnostics in a variety of environments.

The 454FTB product line supports process temperatures ranging from -40°F to 500°F (-40°C to 260°C) (HT version) or from -40°F to 932°F (-40°C to 500°C) (HHT version).

Process pressure ratings are supported up to 300 PSIG (20 BARg) with a velocity range from 0 to 70,000 SFPM (325 NMPS).

The 454FTB is ATEX certified for Zone 1 and Zone 2, and CSA Explosion-Proof.

Applications

- Stacks, flares & emissions (CERM, AMS)
- Boilers & recovery boilers
- Combustion air
- Primary, secondary & tertiary air
- Gas lines
- Chemical processing
- Aeration air
- Utilities & cogeneration
- Pulp & paper mills
- Metal smelters, foundries, refineries, mills & recyclers
- Cement plants
- Petrochemical plants
- Bulk powder drying
- Incinerators
- Coal pulverizers



The Kurz WGF single-point insertion flow meter for condensing gas environments is the first thermal mass flow meter offering accurate, reliable, and realtime condensing gas flow measurements. The WGF technology is ideal for applications that include digesters, landfills, and wet stacks.

The WGF has a built-in dry gas flow calculation for saturated processes that provides a true gas flow for accurate reporting.

The WGF product line supports process temperatures ranging from -40°F to 248°F (-40°C to 120°C).

Process pressure ratings are supported up to 150 PSIG (10 BARg) with a velocity range from 0 to 4,000 SFPM (18.6 NMPS).

The 454FTB-WGF is ATEX certified for Zone 1 and Zone 2, and CSA Explosion-Proof.

Applications

- Wastewater digesters
- Landfills
- Livestock lagoons
- Dry & wet stacks
- Greenhouse gas reporting
- Flare management
- Pulp & paper mills
- Chemical processing
- Gas lines (methane)
- Utilities & cogeneration

504FTB INLINE METER



The Kurz 504FTB inline flow meter is designed for applications where flow disturbances or line-size changes are not an issue. The 504FTB is available in 10 models for inline sizes from 3/8" to 4" pipes.

The 504FTB product line supports process temperatures ranging from -40°F to 257°F (-40°C to 125°C). A condensing gas option is available.

Process pressure ratings are supported up to 300 PSIG (20 BARg) with a mass rate up to 4,000 SCFM (6,240 NCMH).

The 504FTB is ATEX certified for Zone 1 and Zone 2, and CSA Explosion-Proof.

Applications

- Fuel lines
- Natural gas
- Treatment & control gases
- Compressed air
- Combustion air
- Chemical processing
- Air sampling
- Gas blending
- Isokinetic sampling
- Pulp & paper mills
- Pharmaceutical production
- Petrochemical plants
- Nuclear
- Incinerators



The Kurz 534FTB is designed with built-in inlet and outlet piping reducers/expanders to produce exceptional immunity to upstream and downstream flow disturbances caused by elbows, valves, and line size changes.

The patented technology results in output with exceptional low end-to-end pressure drop and the fastest response to velocity and temperature changes in the industry.

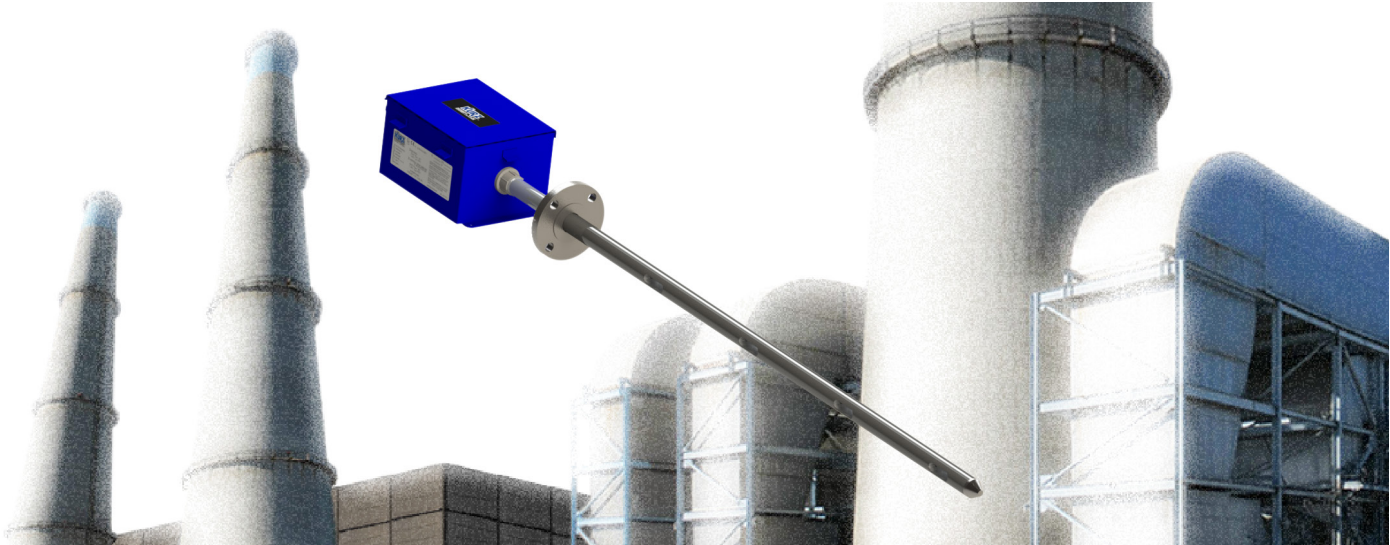
The 534FTB product line includes models constructed for corrosive and noncorrosive applications, with a range of models supporting flow rates up to 7,016 SCFM (10,994 NCMH).

The 534FTB product line supports process temperatures ranging from -40°F to 257°F (-40°C to 125°C). Process pressure ratings are supported up to 300 PSIG (20 BARg).

The 534FTB is ATEX certified for Zone 1 and Zone 2, and CSA Explosion-Proof.

Applications

- Fuel lines
- Natural gas
- Treatment & control gases
- Compressed air
- Combustion air
- Chemical processing
- Air sampling
- Gas blending
- Isokinetic sampling
- Pulp & paper mills
- Pharmaceutical production
- Petrochemical plants
- Nuclear
- Incinerators



The KBAR-2000B multipoint insertion flow meter uses up to four sensors to calculate the mass, velocity, or temperature at each point across large ducts and stacks that have wide-ranging velocity and temperature profiles. Multiple sensors provide measurement redundancy to ensure accuracy. Its rugged design withstands the high stress and high vibration found in industrial applications.

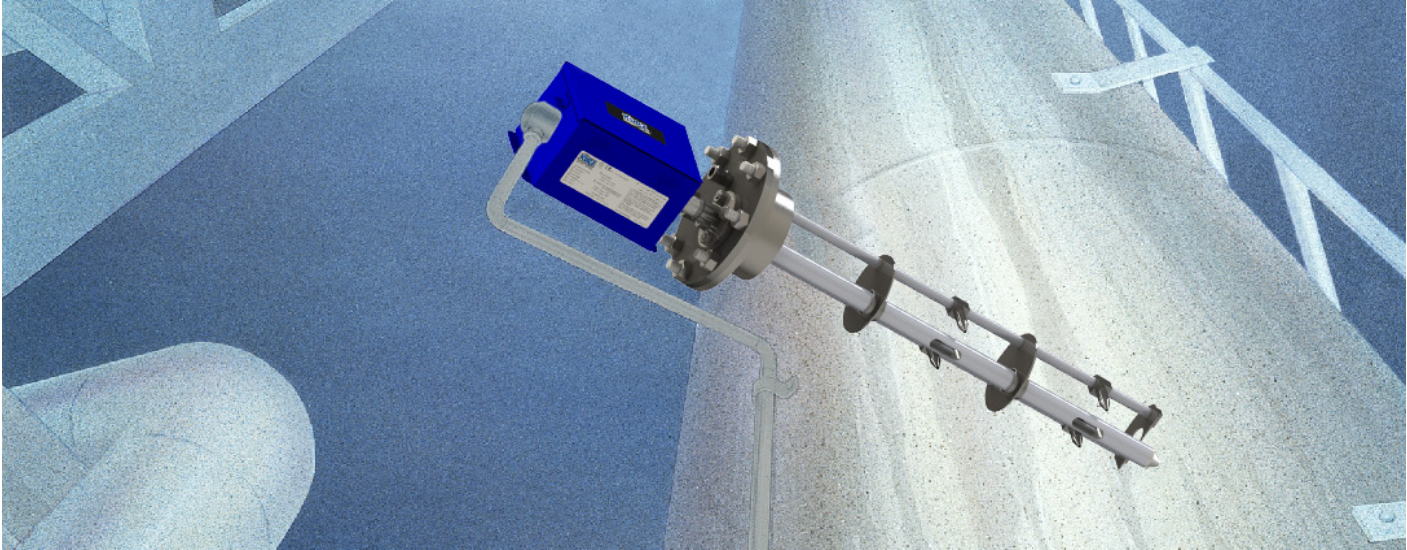
Kurz KBAR-2000B flow meters comply with the EPA's CEM system under 40CFR60 and 40CFR75 and the European Union's Automated Measuring System (AMS) requirements under EN14181, QAL1 certification.

The KBAR-2000B product line supports process temperatures ranging from -40°F to 500°F (-40°C to 260°C) (HT version) or from -40°F to 932°F (-40°C to 500°C) (HHT version) with a velocity range from 0 to 12,000 SFPM (56 NMPS). A condensing stack option is available.

Applications

- Stacks & flares
- Emissions (CEM)
- Boilers & recovery boilers
- Primary, secondary & tertiary air
- High temperature air flows with nonuniform temperature and velocity profiles
- Incinerators
- Coal pulverizers

The KBAR-2000B is designed to work seamlessly with the Series 155 Mass Flow Computer. The Series 155 Mass Flow Computer integrates the functions of temperature and flow measurement, closed loop flow control, flow totalization, alarms, input/output calibration, and data acquisition for up to 22 sensors.



All Continuous Emissions Monitoring (CEM) systems must be able to sample, analyze, and record data at least every 15 minutes. All emissions and flow data are reduced to one hour averages using specific rules.

The Kurz Emissions and Sampling System provides accurate sample collection for use in environmental, process, and nuclear applications. It eliminates under- or over-reporting gas or particulate constituents. A wet stack option is available.

Kurz offers a complete isokinetic sampling system to ensure true sample composition — from stack flow monitoring and sample capture to sample flow control.

- The KBAR-2000B multipoint insertion flow meter
- The Series 220 Isokinetic Sampling System combines high accuracy mass flow measurement in the process with effective sampling nozzles, and fine control and measurement of the sampling rate.
- A Kurz 504FTB or 534FTB inline flow meter
- The Kurz 730 Rotary Ramp Valve provides fine control of the sample flow
- The Series 155 Mass Flow Computer integrates the functions of temperature and flow measurement, closed loop flow control, flow totalization, alarms, input/output calibration, and data acquisition for up to 22 sensors.

SERIES 2440 PORTABLE METERS



The Series 2440 are rugged and reliable portable thermal air velocity meters for nearly all flow measurement applications requiring accurate measurements of mass flow, volume, and velocity.

The five models in the Series 2440 range from lab grade to heavy duty and up to industrial high heat for conditions from -40°F to 932°F (-40°C to 500°C) and up to 12,000 SFPM (60 NMPS). All models are extremely sensitive and provide rapid response. Its rugged design make the Series 2440 an excellent choice for heavy field work.

The Series 2440 provides easy-to-use configurable English or metric units, and supports data logging, saving, and exporting. Data can be easily exported for spreadsheet use.

Applications

- Emissions / air pollution
- Combustion air
- Clean rooms
- HVAC
- Industrial hygiene
- Fume hoods
- Thermal vent monitoring
- Stack & duct velocity traverses
- In-situ calibration
- Survey tests
- Air sampling

Thermal mass devices use two sensors - one as a reference and one as a process temperature measurement. Thermal mass technology introduces a heated element into the flow stream, using the concept that higher mass flows cause a greater cooling effect. There are two types of thermal mass technology:

- Constant temperature thermal devices heat the reference sensor to a fixed temperature and use the process sensor to monitor the flow temperature. Mass flow is determined based on the amount of electrical current used to maintain a constant temperature difference between the two sensors.
- Constant power thermal devices heat the reference sensor with constant fixed current and use the process sensor to monitor the flow temperature. Mass flow is determined based on the temperature difference between the reference sensor and the process sensor.

The fixed current of constant power devices can cause the heated sensor to overheat when a lower flow does not draw off enough heat. This limited capability of a stable zero flow limits the range of temperature compensation.

Poorly designed thermal devices can have the two sensors too close together, causing the heated reference sensor to transfer heat to the process flow sensor and create erroneous readings.

For insertion meters, the sensors must be aligned correctly with the flow. Otherwise, heat from the heated sensor enters the flow stream without interacting with the gas flow sensor.

CONSTANT TEMPERATURE VS. CONSTANT POWER

Constant temperature flow meters have several advantages over constant power flow meters:

- Constant temperature devices have a fast response time to velocity changes, about 1-3 seconds.
- Constant power devices are slow to respond to changes in velocity and temperature, from 15 to 30 seconds.
- Constant temperature devices have a high range of output, from zero velocity to 200 SFPS.
- Constant power flow devices do not have a stable zero because of the increased free convection caused by the sensor's high temperature at zero flow.
- Constant temperature devices can be compensated for temperature differences and the rate of changes of the temperature difference.
- Unless specifically corrected, constant power devices have a limited range of temperature compensation ($\pm 30^{\circ}\text{F}$)
- Constant power devices are very sensitive to non-axial velocity components.



Kurz Instruments, Inc., manufactures thermal mass flow meters designed to accurately monitor and measure dry air, dry gas, and condensing gas environments.

Kurz thermal mass flow meters are immune to issues that inhibit the accuracy of other technologies, such as low velocities, errors caused by particulates in the flow, buildup in the duct, or buildup on the sensor.

Even among thermal manufacturers, Kurz is the only company using a constant temperature method that auto adjusts the power to protect the sensor at high temperatures, eliminate sensor burnout, and support a stable zero point.

Whether an application calls for general information, exacting accuracy, or system protection, Kurz offers the highest quality and most dependable solutions available in a wide array of products that are simple to install and easy to operate.

Kurz constant temperature thermal mass flow meters:

- Support a wide range of flow rates
- Work accurately even with extremely low flows
- Operate at higher process temperatures than other thermal devices
- Responds very quickly to flow and temperature changes (perfect for control systems)
- Requires no temperature or pressure corrections
- Do not impose any type of significant flow restriction in ducts or pipes, which increases performance and efficiency.
- Are fully digital and have no moving parts
- Use constant temperature technology - sensor signal increases with increasing flow

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