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Member of Berndorf Group

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Meerstetter Heat Flux Sensor

The Meerstetter Heat Flux Sensor is an advanced thermoelectric device for precise heat flux measurement. Unlike conventional solutions, it generates an electromotive force perpendicular to the heat flux, enabling flexible sensor design, improved performance, and better integration into various systems. Designed for seamless integration into the Meerstetter control universe, it offers stability in harsh conditions and is optimized for long-term monitoring in extreme environments. Its flexible properties allow for material selection based on application needs, making it ideal for remote sensing and embedded systems. The customizable geometry allows precise sensor tuning and easy integration into existing setups.

WEBSHOP

Heat Flux Sensor, Gen. 1

Key Features:

- **Simple and Robust Design** - Utilizes a single thermoelectric metamaterial, reducing complexity and easing manufacturing. Lower thermal resistance minimizes impact on measurement accuracy and heat flow.
- **Ultra-Fast Response Time** - Nanosecond response times make it ideal for shock tube experiments, transient heat flux monitoring, rapid phase-change studies, and pulsed laser applications.
- **High Sensitivity & Stability** - Engineered for long-term monitoring in extreme thermal environments with consistent signal output.
- **High Temperature Operation** - Withstands temperatures up to 1300 K, suitable for aerospace, nuclear reactors, industrial furnaces, and high-temperature manufacturing.
- **Passive Operation** - Ideal for remote sensing, IoT-based thermal monitoring, and embedded systems.
- **Compact & Scalable Design** - Various thicknesses and sizes enable seamless integration into industrial process monitoring, energy optimization systems, and advanced thermal diagnostics.
- **Customizable Geometry** - Allows precise mechanical tuning for specific application needs and easy integration into existing setups.

Key Properties	Value
Sensing plate size	from 5x5 to 20x20 mm, larger sizes on-demand
Thickness	0.8 mm standard, 0.5 mm possible
Working temperature	-50°C to 500°C
Sensitivity	5 - 20 µV/W (area-dependent)
Thermal conductivity	~300 W/(m*K)
Response time	Validated down to 10 ns in laboratory conditions for sensor plate [1]
Additional options	Available upon request

[1] Sources are available on request.

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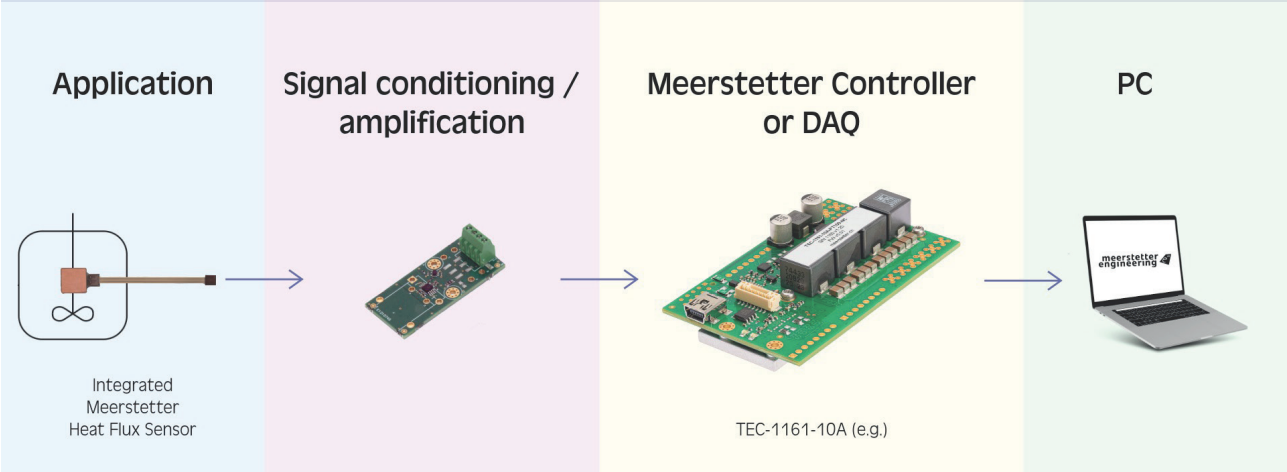
Example of Heat Flux Sensor Implementation into the Meerstetter Ecosystem:



Applications & Use Cases:

- **Industrial Process Monitoring** - Real-time heat flux tracking for process optimization and energy efficiency.
- **Energy Harvesting** - Thermoelectric waste heat conversion for power generation.
- **Aerospace & Space Systems** - High-precision thermal diagnostics for extreme environments, including vacuum conditions.
- **Battery & Electronics Cooling** - Advanced heat dissipation management for critical electronic systems.
- **Condensation & Phase Change Studies** - Heat flux measurement in boiling, evaporation, and condensation processes, aiding nuclear reactor cooling and power plant efficiency.
- **Automotive & Electric Vehicles (EVs)** - Optimization of thermal regulation in electric motors, battery packs, and vehicle power electronics.
- **Laser Processing & Welding** - Measurement of heat flux in laser-based cleaning, welding, and material processing applications.
- **Biomedical Applications** - Application in medical device thermal monitoring and controlled therapeutic heating.
- **Scientific Research & Fundamental Studies** - Used in experiments involving heat transfer, material thermodynamics, and advanced energy system development.

Summary:

Meerstetter Heat Flux Sensors provide high-speed, high-accuracy thermal sensing, functioning in extreme conditions with ultra-fast response times. They decouple electrical and thermal pathways, making them ideal for scientific and industrial applications.

For immediate testing and implementation, off-the-shelf sensor samples are available. Meerstetter supplies signal conditioning and amplification for seamless integration. Customization typically involves a small engineering project, with full support from our team. Contact us via email or schedule a web meeting with our experts to explore how our sensors can fit your application. Unsure if your application can benefit? Talk to our experts.

Meerstetter Engineering is a Swiss engineering company specialized in electronics to drive Peltier elements and laser diodes. Our products are used in industry, medicine and research laboratories, as well as in space and other high-tech applications.

With our excellent know-how we offer development services and collaboration in analog and digital electronics, FPGA, embedded systems and digital interfaces.