

SEKIDENKO 4100T OPTICAL FIBER THERMOMETER

Delivering precision temperature measurement across multiple processes and substrates



AT A GLANCE

Temperature Range

60 to 3500°C (140 to 6332°F)
250 to 1200°C (482 to 2192°F)
on bare silicon wafers

Channel Configurations

1 to 4 channels, individually configurable

Filter Range

UV to 2300 nm

Read Rate

Up to 1 kHz temperature read rate, per channel with 4 active

Advanced Energy's Sekidenko 4100T multi-channel optical fiber thermometer (OFT) follows the leading Sekidenko OR4000T series pyrometers. It provides superior performance in non-contact temperature measurement by precisely measuring lower signal levels and reading lower temperature targets where speed and accuracy are key process requirements. The Sekidenko 4100T provides multi-channel capability and supports fast read rates up to 1 kHz for the most demanding temperature measurements. The instrument is modular in design and is readily tailored to meet the unique requirements of each process application.

FEATURES

- Improve temperature measurement accuracy
- Enhance wafer-to-wafer and within-wafer uniformity
- RF/EMI immune temperature sensing
- Increase productivity, yield, and throughput
- Multiple wavelengths possible with one instrument
- RS-232/422, Ethernet, EtherCAT, and analog interfaces with trigger and sync capabilities included

BENEFITS

- In-situ, non-contact temperature measurement
- Materials processing and analysis
- Industry-leading temperature read rates
- Highly flexible, module-based platform architecture

IMPROVE TEMPERATURE MEASUREMENT ACCURACY

Advanced Energy's Sekidenko 4100T multi-channel optical fiber thermometers (OFTs) deliver accurate, non-contact temperature measurements in a compact, modular platform designed to meet each unique application's requirements. AE's OFTs are ideally suited to measure temperature in the most tightly controlled applications where uniform, repeatable temperatures are required to enable process success. The 4100T model is commonly used in RTP, laser annealing, HDPCVD, MOCVD, ALD, UV cure and solar cell manufacturing and packaging.

The 4100T is designed as a drop-in replacement for the OR4000T, utilizing the same enclosure but offering a new touch screen for easier on-site control. The 4100T features a new touch screen display for users to easily adjust settings without the need for a laptop.

ENHANCE REPEATABILITY AND MINIMIZE VARIATION

Traditional thermocouple or other contact sensor measurements are unsuitable for many applications where physical contact with the substrate will cause damage and inaccuracy due to heat transfer effects. The 4100T OFT measures direct target temperature in situ—without contacting the object to be measured. This minimally invasive measurement approach lends itself well to cleanroom environments, extreme high temperature environments, and highly chemically reactive situations where sensor-process interactions are unwanted. This leads to improved accuracy and repeatability in temperature readings.

Each OFT system consists of an instrument, an optical sensor, and optical fiber cables. The sensor gathers emitted near-infrared (NIR) light from the target, typically a substrate. A fiber optic cable then transmits the NIR light from the sensor to the instrument, where the collected light intensity is converted to a temperature reading. The use of a fiber optic cable allows for remote positioning of the instrument in a controlled environment away from the process environment. This places sensitive electronics well outside of the influence of electromagnetic radiation, rapidly changing ambient temperatures, and frees up precious space in the process environment. Each sensor is custom-designed to meet the functional and mechanical requirements of the unique, individual application. The results: reliable measurements, higher repeatability, and increased yield.

SPECIFICATIONS

Feature	4100T
Description	Multi-channel capability, high-speed performance, and read rates up to 1 kHz per channel
Channel Configurations	1 to 4 channels of temperature measurement capability; channels are individually configurable
Temperature Range(s)	60 to 3500°C (140 to 6332°F), depending on wavelengths
Filter Range	UV to 2300 nm
Read Rate	0.1 Hz 1 kHz per channel
Accuracy	±1.5°C
Resolution	0.001°C
Control/Repeatability	±0.1°C
Display	4.3 inch color touchscreen for easy setup and temperature reading
Data I/O	RS-232, RS-485, USB, Ethernet, and EtherCAT
Analog Output	0 to 10 V or 4 to 20 mA
Control Interface	CMOS/TTL compatible I/O; 30V, 1A carry solid state relays, settable high and low alarm levels Independent, floating SPST connection for each
Power Requirements	AC: 90 to 263 VAC; 47 to 63 Hz DC: +24 VDC
Power Supply Line Current	< 0.7 A @ 100 VAC
Environmental	Operational: 10 to 45°C (50 to 113°F)
Physical Dimensions (H x W x D)	86 x 152 x 218 mm (3.4 x 6.0 x 8.6 in)
Weight	1.31 kg (4 channel version)
Mounting	M5 X 0.75 threaded inserts in case bottom (consult manual for more information)
Response Sample	< 1 read cycle
Sensor	Optical sensor or sapphire lightpipe (customizable)

SAPPHIRE LIGHTPIPES, LENSED SENSORS, AND FIBER OPTIC CABLE OPTIONS

Sapphire Lightpipes

- Perfect for penetration into the vacuum chamber
- Available in custom lengths up to 325mm
- Typical sapphire diameters are 1.27 and 2mm
- Options of sapphire, stainless steel, or alumina sheath to protect the lightpipe
- Probe body customizable to fit existing standard chamber fittings

Lensed Sensors

- Adjusted for desired working distance
- Highly customizable (as shown)

**Fiber optic cables**

- Available in standard 3 m and 5 m lengths (different lengths available on request)
- Typical core diameters are 300, 600, 1000, and 1500 µm



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ABOUT ADVANCED ENERGY

Advanced Energy (AE) has devoted more than three decades to perfecting power for its global customers. We design and manufacture highly engineered, precision power conversion, measurement and control solutions for mission-critical applications and processes.

Our products enable customer innovation in complex applications for a wide range of industries including semiconductor equipment, industrial, manufacturing, telecommunications, data center computing, and medical. With deep applications know-how and responsive service and support across the globe, we build collaborative partnerships to meet rapid technological developments, propel growth for our customers, and innovate the future of power.

PRECISION | POWER | PERFORMANCE

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