

Thermal Sensing Position Detector

S440C



Description

The S440C Thermal Sensor Head measures the power and position of a light beam originating from low and medium power lasers and is controlled via a connected compatible power meter.

At the core of the S440C is the TD4HR18XP Thermal Position Detector. The sensor is wire connected to a D-Sub 9-pin male connector for instrument control via a compatible Thorlabs power meter. An integrated NTC thermistor allows the assessment of temperature measurements via the power meter interface.

The core TD4HR18XP consists of four contiguous, thermopile-based sensors arranged as quadrants of a square. Their mechanical integration thermally couples the four quadrants. However, the sensor in each quadrant is electrically independent and connected to only the thermocouples in that quadrant. This mechanical integration and electrical separation forms a position sensitive device (PSD). If the beam spot is incident on one quadrant, the output signal from this quadrant will be higher than the output signals of the other three quadrants. If the beam moves towards the center of the PSD, the signals from the four quadrants will become more similar. The X and Y position of the beam is determined by comparing the signal intensities of all four quadrants.

The compact housing features Ø6.0 mm through holes for integration in a 30 mm cage system. An 8-32 / M4 universal tap allows for post mounting.

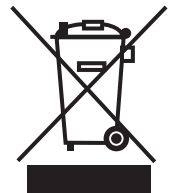
When operating the sensor, allow it to settle to room temperature before setting the zero point. We recommend operating the sensor head mounted on a post or in a cage system, rather than handheld, as thermal contributions from body heat can negatively impact the accuracy of the measurement. Also be sure to protect the active detector area from air flow and other thermal disturbances.

The EEPROM built into the connector contains sensor identification information and the NIST- and PTB-traceable calibration data, which is used by the consoles.

Specifications

S440C	
Detector Type	Thermal Absorber, Four Quadrants
Wavelength Range	190 nm - 20 µm
Optical Power Working Range	0.5 mW - 5 W
Max Average Power Density	1.5 kW/cm ²
Max Pulse Energy	0.3 J/cm ² (1 ns Pulse), 5 J/cm ² (1 ms Pulse)
Resolution ^a	50 µW
Linearity	±1%
Measurement Uncertainty ^b	±5% @ 1064 nm Calibration with Laser ±7% 250 nm - 17 µm Spectral Absorption Measurement
Position Resolution	5 µm
Position Accuracy ^c	50 µm (Ø1 mm Circle); 200 µm (Ø6 mm Circle)
Position Repeatability ^c	15 µm (Ø1 mm Circle); 100 µm (Ø6 mm Circle)
Response Time ^d	<1.1 s

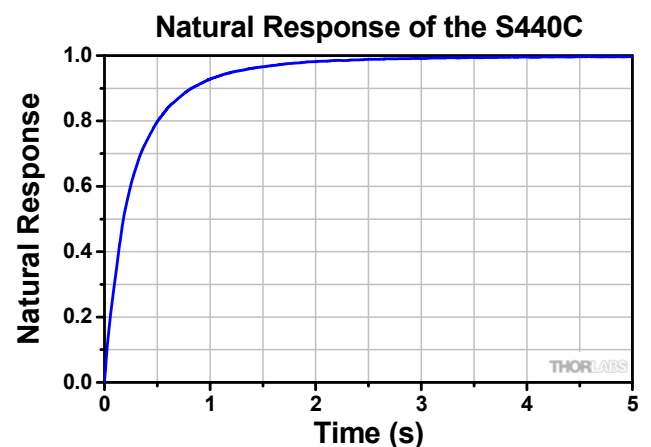
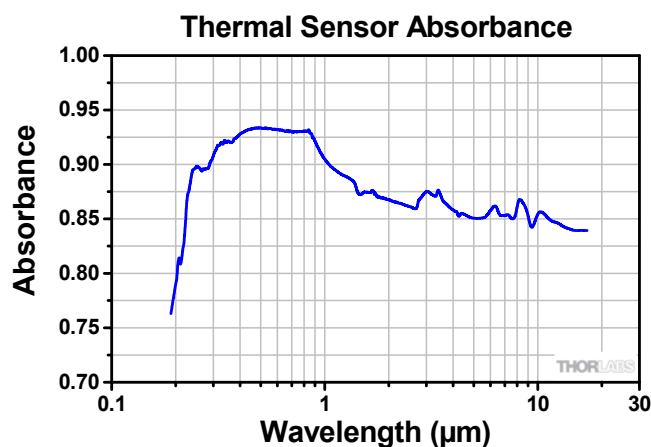
- Measured Using the PM400 Console with the Acceleration Circuit Switched Off
- Beam Diameter > 1 mm
- Valid within the Specified Area at the Center of the Sensor
- Typical Natural Response (0 - 95%)



Specifications (Continued)

S440C	
Typical Application (Laser Types)	Low and Medium Power Lasers (Diode, He-Cd, Arlo, Krlo, Dye, CO ₂ , Nd:YAG)
Coating /Diffuser	High-Power Broadband
Cooling	Convection
Head Temperature Measurement	Thermistor (NTC)
Compatible Thorlabs Consoles (Sold Separately)	PM400, PM102, PM102A, and PM102U
Active Detector Area	18 mm x 18 mm
Input Aperture	17 mm x 17 mm
Sensor Dimensions	40.6 mm x 40.6 mm x 8.9 mm (1.60" x 1.60" x 0.35")
Cable Length	1.5 m
Connector	D-Sub 9-Pin Male
Weight	0.2 kg
Mounting Options	8-32 / M4 Universal Tap, 30 mm Cage Rod Through Holes

Typical Performance Curves



Cleaning and Maintenance

There are no serviceable parts in the device head. The housing may be cleaned by wiping with a soft damp cloth. Do not touch or wipe the absorber surface or use any solvents to clean it! Gently blow off any debris using compressed air. If you suspect a problem with your device, please call Thorlabs and an engineer will be happy to assist you. As long as the sensor has not been exposed to excessive optical power (please pay attention to the maximum ratings in the technical specifications), the calibration should be very stable over long periods of time (well over a year). To maintain the accuracy and performance of the S440C, Thorlabs recommends a yearly recalibration, starting one year after purchase.

Precautions and Warranty Information

These products are ESD (electrostatic discharge) sensitive and as a result are not covered under warranty. Any applied voltage in excess of the maximum specification will cause damage and possible complete failure to the product. The user must use handling procedures that prevent any electrostatic discharges or other voltage surges when handling or using these devices.

The user must avoid any misuse that could cause damage to the detector. Misuse includes, but is not limited to, laser exposure outside Thorlabs' published specifications, high voltage exposure outside Thorlabs' specifications, physical damage due to improper handling and exposure to harsh environments. Harsh environments include, but are not limited to, excessive temperature, vibration, humidity, chemicals or surface contaminants, exposure to flame, aggressive solvents and connection to improper electrical voltage.

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