

Thermal Sensing Position Detector

S442C



Description

The S442C Thermal Power 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 S442C is the TD4HP18XA Thermal Position Detector. The sensor is equipped with a cooling body and a 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 TD4HP18XA 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 an SM1 (1.035"-40) internal thread concentric with the input aperture. An SM1 thread coupler is included to allow mounting of Thorlabs' internally SM1-threaded components. Two 8-32 / M4 universal taps allow 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 post mounted, 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

| S442C | |
|--------------------------------------|---|
| Detector Type | Thermal Absorber, Four Quadrants |
| Wavelength Range | 190 nm - 20 μ m |
| Optical Power Working Range | 10 mW - 50 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 | 1 mW |
| Linearity | $\pm 1\%$ |
| Measurement Uncertainty ^b | $\pm 5\%$ @ 1064 nm Calibration with Laser $\pm 7\%$ 250 nm - 17 μ m Spectral Absorption Measurement |
| Position Resolution | 10 μ m |
| Position Accuracy ^c | 100 μ m ($\varnothing 1$ mm Circle); 300 μ m ($\varnothing 6$ mm Circle) |
| Position Repeatability ^c | 25 μ m ($\varnothing 1$ mm Circle); 150 μ m ($\varnothing 6$ mm Circle) |
| Response Time ^d | <0.6 s |

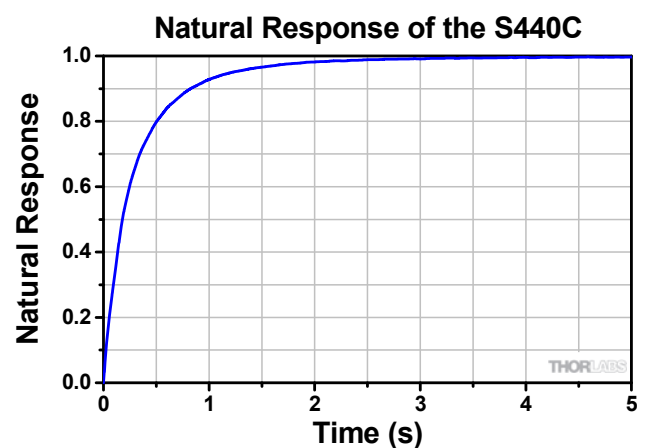
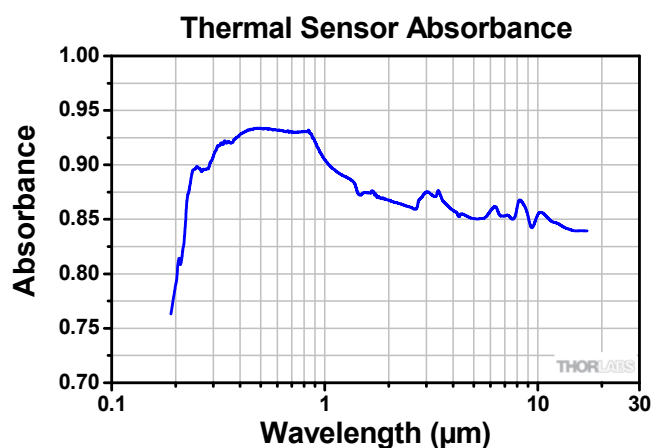
- Measured Using the PM400 Console with the Acceleration Circuit Switched Off
- Beam Diameter > 1 mm
- Valid within the Specified Area at the Center of the Sensor
- Typical Natural Response (0 - 95%)



Specifications (Continued)

| S442C | |
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| 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 | Ø17.5 mm |
| Sensor Dimensions | 100.0 mm x 100.0 mm x 57.8 mm (3.94" x 3.94" x 2.28") |
| Cable Length | 1.5 m |
| Connector | D-Sub 9-Pin Male |
| Weight | 0.75 kg |
| Post Mounting | Two 8-32 / M4 Universal Taps |
| Aperture Thread | SM1 (1.035"-40) Internal Thread, Externally Threaded SM1 Coupler Included |

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 S442C, 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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