# Energy Head with Metal Coating

**ES412C**



## Description

The ES412C is a pyroelectric sensor that directly transforms radiation energy pulses with a high repetition rate of up to 2 kHz into voltage pulses.

The aperture diameter of the ES412C is 12 mm. For best performance it is recommended to choose a sensor with an area slightly larger than the beam's cross section. The active sensor area is covered with a metal coating, which is unique in its fast response and therefore makes this sensor the right choice for fast pulsed lasers. Please note that the metal coating is spectrally less flat compared to a black coating. An EEPROM located in the BNC to DE-9 mating adapter (included) stores the spectral response calibration parameter required to provide an accurate energy reading. Please find the calibration parameter also on the included Certificate of Calibration.

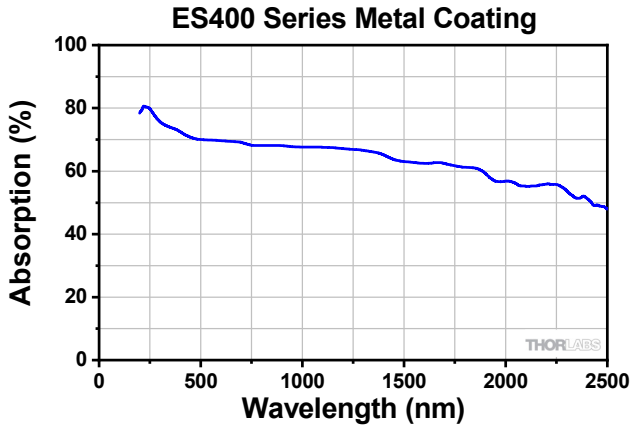
The housing of the ES412C features a combined 8-32 and M4 mounting thread to accommodate both metric and imperial posts and post holders. For attaching fiber adapters or other optics, the SM1 external aperture thread is compatible with Thorlabs accessories with an internal SM1 thread.

The ES412C can directly connect to an oscilloscope with 1 MΩ input resistance via the BNC connector.

## Specifications

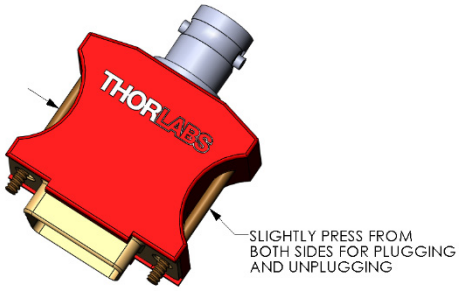
| Technical Specifications | |
|---|---|
| **Detector Type** | Pyroelectric Sensor |
| **Energy Range** | 50 µJ - 500 mJ |
| **Resolution** | 1 µJ |
| **Wavelength Range** | 185 nm - 2.5 µm |
| **Max. Repetition Rate (@ 1 MΩ Load Resistor)** | 2 kHz |
| **Coating** | Metal Coating |
| **Detector Size (Active Area)** | 113.1 $mm^2$ |
| **Input Aperture** | Ø12 mm (0.47") |
| **Distance Frontface to Detector** | 2 mm (0.08") |
| **Measurement Uncertainty** | +/- 5% @ 185 nm - 2.5 µm |
| **Linearity** | +/- 1% |
| **Max. Average Power** | 0.5 W |
| **Max. Power Density (Pulse Width)** | 5 $MW/cm^2$ (10 ns Pulse) |
| **Max. Pulse Energy Density (Pulse Width)** | 50 $mJ/cm^2$ (10 ns Pulse) |
| **Thermal Time Constant** | 0.5 ms |
| **Cooling** | Convection |
| **Aperture Thread** | SM1 |
| **Connector Cable Length** | 1.5 m (60") |
| **Connector** | BNC Male / DE-9 Male, Adapter Included |
| **Post** | #8-32 and M4 Combi Mounting Thread |
| **Sensor Dimensions** | Ø38 mm x 15 mm |
| **Weight** | 0.09 kg |
| **Compatible Consoles** | PM100D, PM400 |
| **Compatible Interfaces** | PM103, PM103A, PM103U, PM100USB |

## Typical Performance Plots

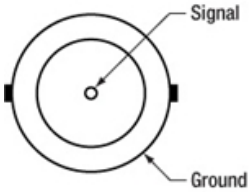


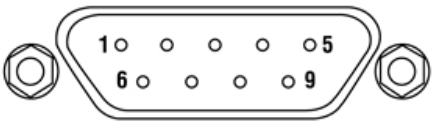

## Included Adapter

BNC Male / DE-9 Male Adapter




Pin Assignment




| PIN Assignment DE-9 | |
|---|---|
| **2** | EEPROM Data |
| **3** | Pyroelectric Sensor Ground |
| **5** | Pyroelectric Sensor + |
| **6** | EEPROM Ground |
| **7** | Present: Sensor Recognition |
| **1, 4, 8, 9** | N.C. |

## Available Accessories

The ES412C is compatible to the Thorlabs imperial and metric post and post-holder series. Thorlabs accessories with an internal SM1 thread, for example fiber adapters or lens tubes, fit the SM1 external aperture thread.

# Cleaning and Maintenance

There are no serviceable parts in the ES412C head. The housing may be cleaned by wiping with a soft damp cloth. The sensor on the pyroelectric heads cannot be cleaned. Gently blow off any debris using compressed air. If any scratches of other signs of damage remain on the sensor area, contact Thorlabs service department for repair or replacement. If you suspect a problem with your ES3412C 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, the calibration should be very stable over long periods of time (well over a year). However, the detector should be calibrated once a year to ensure accuracy. Please contact Thorlabs via the Recalibration Service Website:
https://www.thorlabs.de/thorproduct.cfm?partnumber=CAL-THPY

