



## CS240DM

Pt-1000 Class A, Back-of-Module Temperature Sensor with Digital Modbus RS-485 Output



## Proven, Rugged Design

Class A accuracy, best-in-class performance

### Overview

The CS240DM is a best-in-class smart sensor with a rugged, surface-mountable platinum resistive thermometer (PRT) that measures back-of-module temperature on solar photovoltaic (PV) panels. The CS240DM includes a new Campbell Scientific

precision analog-to-digital, smart-sensor module that makes back-of-module temperature measurements that are among the most accurate measurements available today.

### Benefits and Features

- › Best-in-class measurement accuracy and technology
- › Modbus RTU RS-485 digital serial communications
- › Precision Pt1000 Class A sensing element
- › Compliant with IEC 60751, DIN EN 60751
- › Meets 61724-1 PV System Performance Standard
- › Optional NIST traceable calibration certificate
- › Purchased with any cable length
- › Rugged design proven in more than 4,000 installations worldwide

### Detailed Description

The CS240DM consists of a Pt-1000 Class A PRT encased in an aluminum disk. The disk protects the PRT, particularly during installation when pulled through conduit, and promotes heat transfer from the surface while minimizing convective heat loss to the surroundings. An adhesive tab on the disk fastens the CS240DM to the measurement surface. If the temperature may exceed 70°C, Kapton tape is also required to secure the probe.

The precision analog-to-digital, smart-sensor module is based on the CR1000X. The module design is optimized for the Class A PRT that minimizes self-heating and lead-wire resistance. Measurement electronics are surge protected, include 1200 V

isolation, and are environmentally protected with a rugged over-molding featuring an IP65 rating. Data is differentially transmitted in cabling that is well suited for industrial energy applications with excellent noise rejection and high voltage, NEC outdoor, UV, UL, and NEC ratings.

The CS240DM provides PV stakeholders with highly accurate back-of-module temperature—even at long cable lengths—for use in power-performance modeling and simulation of solar energy applications. Back-of-module temperature is critical for any evaluation of effective irradiance and power conversion.

## Specifications

|   |  |
|---|--|
| Sensor  | Platinum resistive thermometer (PRT)                                   |
| System Uncertainty  | ±0.3°C   |
| Disk Material   | Anodized aluminum  |
| Surge Protection  | 1200 V isolation   |
| Supply Voltage of the Sensor                                    | 5 to 30 Vdc  |
| Power Draw  | 15 mA  |
| Compliance Information  | › UL AWM 2586 1000V 105°C approval<br>› CSA AWM 600V 105°C FT approval |
| Conforms with Electromagnetic Compatibility Directive           | (EMC)  |
| Conforms with the Restriction of Hazardous Substances Directive | (RoHS2)  |
| Disk Diameter   | 2.54 cm (1.0 in.)  |
| Overall Probe Length  | 6.35 cm (2.5 in.)  |
| Overmolded Joint Dimensions                                     | 5.72 x 1.12 x 1.47 cm (2.25 x 0.44 x 0.58 in.)                         |
| Weight  | 90.7 g with 3.2 m cable (0.2 lb with 10.5 ft cable)                    |

### Sensing Element

|           |   |
|-----------|---|
| Precision | 1000 ohm Class A platinum sensing element (Pt-1000) |
|-----------|---|

|                                       |  |
|---------------------------------------|--|
| Accuracy                              | ±(0.15 + 0.002T)°C   |
| Temperature Coefficient of Resistance | TCR = 3850 ppm/K   |
| Long-Term Stability                   | Maximum R <sub>0</sub> drift 0.04% (after 1000 h at 400°C) |
| Operating Temperature Range           | -40° to +135°C   |

### Communications

|           |   |
|-----------|---|
| Protocol  | Modbus RTU protocol (over RS-485)                                   |
| Format    | 8 data bits, 1 stop bit, even parity as default (user-configurable) |
| Baud Rate | 19,200 bps as default (user-configurable)                           |
| Modbus ID | Last two digits of serial number as default (user-configurable)     |

### Cable

|                       |  |
|-----------------------|--|
| Description           | › High-flex construction with jacket for pulling through conduit<br>› Weld spatter and oil resistant |
| Jacket Material       | Black semi-gloss PVC, UL VW-1 sunlight resistant for outdoor use                                     |
| Agency Approvals      | › UL AWM Style 2463<br>› NEC/CEC CMX outdoor   |
| Nominal Wire Diameter | 0.61 mm (0.024 in.)  |

For comprehensive details, visit: [www.campbellsci.com/cs240dm](http://www.campbellsci.com/cs240dm) 



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