



105E Temperature Probe



Revision: 4/5/2021

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This equipment is guaranteed against defects in materials and workmanship. We will repair or replace products which prove to be defective during the guarantee period as detailed on your invoice, provided they are returned to us prepaid. The guarantee will not apply to:

- Equipment which has been modified or altered in any way without the written permission of Campbell Scientific
- Batteries
- Any product which has been subjected to misuse, neglect, acts of God or damage in transit.

Campbell Scientific will return guaranteed equipment by surface carrier prepaid. Campbell Scientific will not reimburse the claimant for costs incurred in removing and/or reinstalling equipment. This guarantee and the Company's obligation thereunder is in lieu of all other guarantees, expressed or implied, including those of suitability and fitness for a particular purpose. Campbell Scientific is not liable for consequential damage.

Please inform us before returning equipment and obtain a Repair Reference Number whether the repair is under guarantee or not. Please state the faults as clearly as possible, and if the product is out of the guarantee period it should be accompanied by a purchase order. Quotations for repairs can be given on request. It is the policy of Campbell Scientific to protect the health of its employees and provide a safe working environment, in support of this policy a "Declaration of Hazardous Material and Decontamination" form will be issued for completion.

When returning equipment, the Repair Reference Number must be clearly marked on the outside of the package. Complete the "Declaration of Hazardous Material and Decontamination" form and ensure a completed copy is returned with your goods. Please note your Repair may not be processed if you do not include a copy of this form and Campbell Scientific Ltd reserves the right to return goods at the customers' expense.

Note that goods sent air freight are subject to Customs clearance fees which Campbell Scientific will charge to customers. In many cases, these charges are greater than the cost of the repair.



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Email: support@campbellsci.co.uk www.campbellsci.co.uk Some useful conversion factors:

Area: 1 in^2 (square inch) = 645 mm ²	Mass:	1 oz. (ounce) = 28.35 g 1 lb (pound weight) = 0.454 kg
Length: 1 in. (inch) = 25.4 mm 1 ft (foot) = 304.8 mm 1 yard = 0.914 m	Pressure:	1 psi (lb/in ²) = 68.95 mb
1 mile = 1.609 km	Volume:	1 UK pint = 568.3 ml 1 UK gallon = 4.546 litres 1 US gallon = 3.785 litres

Recycling information



At the end of this product's life it should not be put in commercial or domestic refuse but sent for recycling. Any batteries contained within the product or used during the products life should be removed from the product and also be sent to an appropriate recycling facility.

Campbell Scientific Ltd can advise on the recycling of the equipment and in some cases arrange collection and the correct disposal of it, although charges may apply for some items or territories.

For further advice or support, please contact Campbell Scientific Ltd, or your local agent.



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Safety

DANGER — MANY HAZARDS ARE ASSOCIATED WITH INSTALLING, USING, MAINTAINING, AND WORKING ON OR AROUND **TRIPODS, TOWERS, AND ANY ATTACHMENTS TO TRIPODS AND TOWERS SUCH AS SENSORS, CROSSARMS, ENCLOSURES, ANTENNAS, ETC**. FAILURE TO PROPERLY AND COMPLETELY ASSEMBLE, INSTALL, OPERATE, USE, AND MAINTAIN TRIPODS, TOWERS, AND ATTACHMENTS, AND FAILURE TO HEED WARNINGS, INCREASES THE RISK OF DEATH, ACCIDENT, SERIOUS INJURY, PROPERTY DAMAGE, AND PRODUCT FAILURE. TAKE ALL REASONABLE PRECAUTIONS TO AVOID THESE HAZARDS. CHECK WITH YOUR ORGANIZATION'S SAFETY COORDINATOR (OR POLICY) FOR PROCEDURES AND REQUIRED PROTECTIVE EQUIPMENT PRIOR TO PERFORMING ANY WORK.

Use tripods, towers, and attachments to tripods and towers only for purposes for which they are designed. Do not exceed design limits. Be familiar and comply with all instructions provided in product manuals. Manuals are available at www.campbellsci.eu or by telephoning +44(0) 1509 828 888 (UK). You are responsible for conformance with governing codes and regulations, including safety regulations, and the integrity and location of structures or land to which towers, tripods, and any attachments are attached. Installation sites should be evaluated and approved by a qualified engineer. If questions or concerns arise regarding installation, use, or maintenance of tripods, towers, attachments, or electrical connections, consult with a licensed and qualified engineer or electrician.

General

- Prior to performing site or installation work, obtain required approvals and permits. Comply with all governing structure-height regulations, such as those of the FAA in the USA.
- Use only qualified personnel for installation, use, and maintenance of tripods and towers, and any attachments to tripods and towers. The use of licensed and qualified contractors is highly recommended.
- Read all applicable instructions carefully and understand procedures thoroughly before beginning work.
- Wear a hardhat and eye protection, and take other appropriate safety precautions while working on or around tripods and towers.
- **Do not climb** tripods or towers at any time, and prohibit climbing by other persons. Take reasonable precautions to secure tripod and tower sites from trespassers.
- Use only manufacturer recommended parts, materials, and tools.

Utility and Electrical

- You can be killed or sustain serious bodily injury if the tripod, tower, or attachments you are installing, constructing, using, or maintaining, or a tool, stake, or anchor, come in contact with overhead or underground utility lines.
- Maintain a distance of at least one-and-one-half times structure height, or 20 feet, or the distance required by applicable law, whichever is greater, between overhead utility lines and the structure (tripod, tower, attachments, or tools).
- Prior to performing site or installation work, inform all utility companies and have all underground utilities marked.
- Comply with all electrical codes. Electrical equipment and related grounding devices should be installed by a licensed and qualified electrician.

Elevated Work and Weather

- Exercise extreme caution when performing elevated work.
- Use appropriate equipment and safety practices.
- During installation and maintenance, keep tower and tripod sites clear of un-trained or non-essential personnel. Take precautions to prevent elevated tools and objects from dropping.
- Do not perform any work in inclement weather, including wind, rain, snow, lightning, etc.

Maintenance

- Periodically (at least yearly) check for wear and damage, including corrosion, stress cracks, frayed cables, loose cable clamps, cable tightness, etc. and take necessary corrective actions.
- Periodically (at least yearly) check electrical ground connections.

WHILE EVERY ATTEMPT IS MADE TO EMBODY THE HIGHEST DEGREE OF SAFETY IN ALL CAMPBELL SCIENTIFIC PRODUCTS, THE CUSTOMER ASSUMES ALL RISK FROM ANY INJURY RESULTING FROM IMPROPER INSTALLATION, USE, OR MAINTENANCE OF TRIPODS, TOWERS, OR ATTACHMENTS TO TRIPODS AND TOWERS SUCH AS SENSORS, CROSSARMS, ENCLOSURES, ANTENNAS, ETC.

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1. General

The 105E is a robust thermocouple probe suitable for measuring air and soil temperatures in the range -70°C to +100°C. In its standard form the probe comes with 3m of cable and connects directly to current Campbell Scientific dataloggers.



The 105E probes are suitable for burial and are virtually maintenance free. The sensing junction is completely sealed in potting compound in a stainless steel sheath, providing excellent protection. The outer insulation is impervious to water and has good mechanical properties. The cable fitted to 105E probes is fully screened to minimise noise pick-up on long runs.

2. Specifications

Туре:	Chromel-Constantan
Typical Output:	60 μV/°C
Accuracy:	Refer to the <i>Thermocouple Measurement</i> section in the data logger manual.
Operating Temperature Range:	-55° to +125°C (of TPE outer jacket)
Probe Diameter:	0.8 cm (0.3 in)
Plug Dimensions:	1.8 x 3.3 x 1.0 cm (0.7 x 1.3 x 0.4 in)
Weight:	90 g (0.2 lb) with 3.05 m (10 ft) cable

3. Installation Note

The 105E temperature probe can be installed in air or soil. When used in soil, the soil surrounding the probe should be free from stones or other sharp objects which could damage the probe or cable when the soil is compacted. The soil should always be fully excavated before attempting to remove or reposition a probe. Never pull the probe from the soil by its wiring as this could cause damage.

4. Program Examples

The following examples use the 105E probe to measure temperature using a CR10/10X datalogger and an optional 10TCRT thermocouple reference. On the CR1000 example the reference thermistor is built in to the logger wiring panel. The 10TCRT lies between the two analogue input terminal strips of the datalogger wiring panel. The 10TCRT circuitry, measurements and specifications are equivalent to Campbell Scientifics' 107 Temperature Probe.

Table Based Example

The CR1000 has the first of the 5 off 105E in differential channel 1. The other 4 off 105E are in consecutive differential channels 2 through to 5.

The temperature of the reference thermistor moulded in to the CR1000 wiring panel is stored in variable PTemp_C in °C. The thermocouple temperatures are stored in the variable array Temp_C which has been dimensioned with 5 elements to the array.

`Wiring Panel Temperature measurement PTemp_C: PanelTemp(PTemp_C,_50Hz) `Type E (Chromel-constantan) Thermocouple measurements Temp_C(1): TCDiff(Temp_C(1),5,mV2_5C,1,TypeE,PTemp_C,True,0,_50Hz,1,0)

Where:-

"mV2_5c"	is the +/-2,5mV input voltage range
"TypeE"	is the E-type thermocouple
"PTemp_C"	is the reference temperature variable
"True"	performs a reverse measurement with low referenced to High
``_50Hz″	50Hz noise rejection

Array Based Example

The 10TCRT is connected to single-ended channel 1 (1H), excitation channel 3 (E3) and analogue ground (AG). The temperature is measured with Instruction 11, which excites the probe with an AC excitation, makes a single-ended measurement and calculates the reference temperature (°C). In the example program, five differential 105E thermocouples are measured with Instruction 14. (Instruction 13 would be used if making single-ended measurements with the 105E.)

The temperature (°C) of the 10TCRT is stored in input location 1 and the thermocouple temperatures (°C) in locations 2-6.

```
1: Temp (107) (P11)
                                  (Reference temperature from 10TCRT)
1: 1
           Reps
2: 1
            SE Channel
3: 3*
           Excite all reps w/E3 (see NOTE below)
4: 1
            Loc [ REFTEMP
                             ]
5: 1
            Mult
6: 0
            Offset
2: Thermocouple Temp (DIFF) (P14) (105E differential measurement)
1: 5
           Reps
                                              (for 5 thermocouples)
2: 32
            7.5 mV 50 Hz Rejection Range
3: 2
            DIFF Channel
4: 2
            Type E (Chromel-Constantan)
           Ref Temp (Deg. C) Loc [ REFTEMP
5:1
                                               1
6: 2
           Loc [ TC1 1
                             ]
7: 1
            Mult
8: 0
             Offset
```

(* or 03 since excitation/integration code = 0 in this case)



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