

## Calibration Procedure

# DeFelsko PosiTector IRT Infrared Thermometer Probes

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# 1 Introduction and UUC Performance Requirements

1.1 This procedure describes the calibration of the DeFelsko PosiTector IRT probes with the following specifications:

Table 1-1 Measurement Ranges

Function	Measurement Range	Resolution
Surface Temperature	-70 to 380°C (-94 to 716°F)	0.1°C (0.1°F)

1.2 The unit being calibrated will be referred to as the UUC (Unit-Under-Calibration).

# 2 Measurement Standards and Support Equipment Performance Requirements

2.1 The UUC accuracy requirements are based upon the published UUC performance specifications.

2.2 The test uncertainty ratio applied in this calibration procedure is 4:1 unless otherwise stated. The minimum surface temperature uncertainty ratio is 2:1.

2.3 Minimum-Use-Specifications are the minimum test equipment specifications required to meet all the UUC accuracy requirements and the test uncertainty ratio applied.

Table 2-1 UUC Accuracy Requirements and Description

UUC Function	Range	Accuracy	Test Method
Surface Temperature	-70 to 380°C (-94 to 716°F)	$\pm (1.0\text{ }^{\circ}\text{C} + 0.01\text{ }^{\circ}\text{C per }^{\circ}\text{C})$ $\pm (1.8\text{ }^{\circ}\text{F} + (0.01\text{ }^{\circ}\text{F per } ^{\circ}\text{F}-32 ))$	Infrared Calibrator

Table 2-2 Minimum Use Specifications

Function	Range	Accuracy
Surface Temperature	-70 to 380°C (-94 to 716°F)	$\pm 0.25\text{ }^{\circ}\text{C}$ $\pm (0.45\text{ }^{\circ}\text{F})$

Table 2-3 Actual Surface Temperature Test Equipment Specifications

Manufacturer/Model #'s Applicable	Actual Equipment Specifications	
	Range	Accuracy
Fluke 4180 Infrared Calibrator	-15 to 0°C	$\pm 0.40\text{ }^{\circ}\text{C}$
	>0 to 100°C	$\pm 0.50\text{ }^{\circ}\text{C}$
	>100 to 120°C (5 to 32°F)	$\pm 0.55\text{ }^{\circ}\text{C}$ $(\pm 0.72\text{ }^{\circ}\text{F})$
	(>32 to 212°F)	$(\pm 0.90\text{ }^{\circ}\text{F})$
	(>212 to 248°F)	$(\pm 0.99\text{ }^{\circ}\text{F})$

**Caution:** The instructions in this Calibration Procedure relate specifically to the equipment and conditions listed in this section. If other equipment is substituted, the information and instructions must be interpreted accordingly.

Table 2-4 Calibration Environment and Warm-Up Requirements

Measurement Standards & Support Equipment Environmental Requirements:	Temperature: $23 \pm 5^\circ \text{C}$ . Relative Humidity: Less than 95%
Measurement Standards & Support Equipment Warm-up and Stabilization Requirements:	Fluke 4180 Infrared Calibrator: 30 minutes

### 3 IR Temperature Calibration Set-Up Discussion

To limit the effect of extraneous infrared (IR) radiation during the calibration process it is recommended that the calibration target be 2 to 3 times larger than the detecting spot size of the IR sensor. The Fluke 4180 has a 152.4mm (6”) diameter target so the IR sensor spot diameter needs to be between 50.8mm (2”) and 76.2mm (3”) to maintain the recommended ratio. The test set-up DeFelsko uses produces a 57mm (2.24”) diameter detector spot centered on the calibration target.

The IR sensor used in the IRT has a distance to spot ratio of 5.7:1 when measured at a 90% energy level. This means that 145mm (5.7”) from the target 90% of the IR energy from a 25.4mm (1”) spot is within the sensor field of view. To produce the previously mentioned 57mm (2.24”) detector spot the DPM IR probe needs to be 325mm (12.8”) from the target during calibration.

### 4 Preliminary Operations

**Note:** Review the entire document before starting the calibration process.

#### 4.1 Visual Inspection

4.1.1 Damage or excess wear must be repaired prior to beginning the calibration process.

4.1.2 Visually inspect the UUC for:

- Wear or damage to the probe body or tip
- Missing parts
- Proper identification

4.1.3 If the probe has a protective cap, remove it before proceeding.

4.1.4 Connect a PosiTector 6000 gage to the sensor fixture.

### 5 Surface Temperature Calibration

5.1 Verify the Fluke 4180 is set to an emissivity of 0.95 then set the temperature to  $5^\circ\text{C}$  and wait for the unit to beep indicating the set point has been achieved. Turn on the PosiTector gage.

**Note:** If moisture condenses on the target you cannot take readings, you will need to wait for the target to dry and the Dewpoint to decrease.

- 5.2 Place the UUC in the sensor fixture (to ensure the IR sensor is centered and perpendicular to the calibration target at a distance of 325mm (12.8")). Record the UUC and test equipment reading.

Figure 5-1



- 5.3 Adjust the Fluke 4180 to 100°C and wait for the unit to beep indicating the set point has been achieved. Record the UUC and test equipment reading.
- 5.4 Remove the UUC from the sensor fixture.

## 6 Performance Requirements

**Note:** The technician will collect the data needed to complete columns A and B. The technician shall then calculate the values for Column C and record all information as shown in table 7-1. Do not write in this procedure.

Table 7-1 Requirements and Calibration Data for DeFelsko PosiTector IRT Probes

Reference	Units	Set Point	Test Equipment Reading (A)	Gage Reading (B)	Probe Measurement Accuracy (C)	Allowable Tolerance
Surface Temperature Low	°C	5				± 1.0
Surface Temperature High	°C	100				± 2.0

Note: To convert from °C to °F →  $T_{°F} = 1.8 * T_{°C} + 32$

## Management Procedure Change Notice

Procedure Number: MP 2569  
Revision Level: A  
Date of Change: April 12, 2018  
Title: Calibration Procedure for DeFelsko PosiTector IRT Infrared Thermometer Probes

Reason for Change: <ul style="list-style-type: none"><li>• New product</li></ul>
Description of Change: <ul style="list-style-type: none"><li>• New procedure</li></ul>

I confirm I have read and understand the procedure and the change described above.

Printed Name	Signature	Date

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