

## Calibration Procedure

DeFelsko Corporation

# PosiTector UTG, UTG-STD, UTG-ME, UTG-C, UTG-CA, UTG-CLF, UTG-CX, UTG-M & UTG-P

Ultrasonic Thickness Gage

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# 1 Introduction and UUC Performance Requirements

1.1 This procedure describes the calibration of the PosiTector UTG Ultrasonic Thickness Gage and probe.

Table 1-1 Measurement Ranges

Models	Measurement Range *	Velocity Range
UTG, UTG-STD, UTG-C, UTG-CA, UTG-CX	1.0 - 125 mm (0.040 - 5.000")	1,250 to 10,000 m/s (0.0492 to 0.3930 in/ $\mu$ s)
UTG-CLF	2.0 - 125 mm (0.080 - 5.000")	
UTG-M & UTG-ME	2.5 - 125 mm (0.100 - 5.000")	
UTG-P	0.200 - 12.000 mm (0.008 - 0.472")	

\* The actual measurement range of the system depends on the material being measured. Ranges shown are based on carbon steel.

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

2.3 The uncertainty ratio applied in this Calibration Procedure is 4:1 unless otherwise stated. The UTG-P has an uncertainty ratio of 2:1.

Table 2-1 UUC Accuracy Requirements and Description

Model	Range	Performance Specifications	Test Method
UTG, UTG-STD, UTG-C UTG-CA, UTG-CX	1.0 - 125 mm (0.040 - 5.000")	$\pm 0.03$ mm ( $\pm 0.001$ ")	Compare to Step Blocks
UTG-CLF	2.0 - 125 mm (0.080 - 5.000")		
UTG-M & UTG-ME	2.5 - 125 mm (0.100 - 5.000")		
UTG-P	0.200 - 12.000 mm (0.008 - 0.472")	$\pm 0.010$ mm ( $\pm 0.0004$ ")	

Table 2-2 Minimum Use Specification

Model	Range	Accuracy
UTG, UTG-STD, UTG-C UTG-CA, UTG-CX	1.0 - 125 mm (0.040 - 5.000")	± 0.008 mm (± 0.00025")
UTG-CLF	2.0 - 125 mm (0.080 - 5.000")	
UTG-M & UTG-ME	2.5 - 125 mm (0.100 - 5.000")	
UTG-P	0.200 - 12.000 mm (0.008 - 0.472")	± 0.003 mm (± 0.0001")

Table 2-3 Actual Equipment Specification

UUC Model	Equipment Generic Name	Actual Equipment Specifications		Manufacturer & Model Applicable
		Range	Accuracy	
UTG, UTG-STD, UTG-C UTG-CA, UTG-CLF, UTG-CX, UTG-M & UTG-ME	Step Blocks	2.50 - 12.50 mm (0.100 - 0.500")	± 0.005 mm (± 0.00020")	PH Tool Custom 5 Step Block
UTG-P	Step Blocks	0.50 - 2.50 mm (0.020 - 0.098")	± 0.005 mm (± 0.00020")	PH Tool Custom 5 Step Block

**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 Environmental and Warm Up Requirements

Measurement Standards & Support Equipment Environmental Requirements:	Temperature: 23 ± 5° C. Relative Humidity: Less than 95%
Measurement Standards & Support Equipment Warm-up and Stabilization Requirements:	None

### 3 Preliminary Operations

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

#### 3.1 Visual Inspection

##### 3.1.1 Visually inspect the UUC for:

- Probe tip wear or damage
- Other damage or wear
- Proper identification

##### 3.1.2 Damage or excess wear shall be repaired prior to beginning the calibration process.

#### 3.2 Gage Reset

Note: Please refer to UUC instruction manual for menu navigation instructions, details on features and operating instructions (i.e. required amount of couplant and pressure).

- 3.2.1 For bodies with serial number after 700,000; when the unit is powered down, simultaneously hold the “+” and middle buttons until the rest symbol appears. All other bodies press and hold the “+”.
- 3.2.2 All probes except UTG-P: After reset, select the Main Menu “Cal Settings” function and then “Zero”. Follow the on screen prompt to measure the zero plate provided with the probe. After zeroing, verify the probe on the thinnest and thickest steps of the 5-step block. Allowable tolerances following zeroing are  $\pm 0.05$  mm (0.002”).
- 3.2.3 UTG-P probes: Verify the probe face is clean. After reset, select the Main Menu “Cal Settings” function and then “Zero”. Hold the probe in air and follow the on screen prompt. After zeroing, verify the probe on the thinnest and thickest steps of the appropriate 5-step block. Allowable tolerances following zeroing are  $\pm 0.05$  mm (0.002”).

## 4 Calibration Process

Note: Whenever the test requirement is not met, verify the results of each test and take corrective action before proceeding.

- 4.1 Review the Performance Requirements Table 5-1.
- 4.2 Select the 2-Pt Adjust feature from the Cal Settings section of the menu. Perform a two-point calibration using the thinnest and thickest of the steps on the appropriate 5-step block. This will adjust the sound velocity of the gage and the zero reference to the material of the step block.
- 4.3 Using the appropriate Certificate of Calibration template for the UUC, record the thickness from the Reference Standard label.
- 4.4 Determine the allowed range of readings using the calculation methods shown in column A of table 5-1.
- 4.5 Use the UUC to take measurements on each step of the 5-step block. Verify that the readings are within the allowable limits and record the readings on the Certificate of Calibration.

## 5 Performance Requirements

**Note:** The technician will collect the data needed to complete column B of Table 5-1. Do not write in this procedure.

Table 5-1 Performance Requirements and Calibration Data for PosiTector UTG

Reference Thickness (mm)	Min. Reading Allowed <sup>①</sup> (mm)	Max. Reading Allowed <sup>②</sup> (mm)	Actual Gage Measurement (mm)
A			B

For imperial/metric readings convert using 1" = 25.4 mm

- ① For UTG-P: Calculation:  $A - 0.010 \text{ mm}$   
For all other probes: Calculation:  $A - 0.03 \text{ mm}$
- ② For UTG-P: Calculation:  $A + 0.010 \text{ mm}$   
For all other probes: Calculation:  $A + 0.03 \text{ mm}$

## Management Procedure Change Notice

Procedure Number: MP 2585  
 Revision Level: G  
 Date of Change: June 16, 2021  
 Title: Calibration Procedure for PosiTector UTG, UTG STD,  
 UTG-C, UTG-CA, UTG-CLF, UTG-CX, UTG-M, UTG-  
 ME & UTG-P

Reason for Change: <ul style="list-style-type: none"> <li>• Revised UTG-CLF measurement range</li> </ul>
Description of Change: <ul style="list-style-type: none"> <li>• Updated Tables 1-1, 2-1 &amp; 2-2</li> </ul>

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

Printed Name	Signature	Date

Management Form 0010.02-05/1998