| PRECISION MEASUREMENTS, INC. | CALIBRATION PROCEDURE<br>**Torque Wrenches, Torque Watches, And Torque Screwdrivers** | PMI-0003-390 Rev. G<br>Page 1 of 4 |
|---|---|---|
| **APPROVALS** | **PRINT/SIGNATURE** | **ORIGINAL ISSUE** |
| **PREPARED BY** | **R. Ayala /** | **03/10/90** |
| **METROLOGY MGR./SUPV.** | **R. Ayala /** | **03/10/90** |
| **TECHNICAL OPERATIONS** | **R. Ayala /** | **03/10/90** |
| **DOCUMENT CONTROL** | **P. Kirsch /** | **03/10/90** |



| REVISION NO. | DESCRIPTION | DATE | PREPARED BY | APPROVED BY |
|---|---|---|---|---|
| A | Revise to reference ANSI/NCSL Z540-1 | 05/26/97 | R. Bahrs | C. Valdez |
| B | Revision to add detail specific to electric torque drivers. | 09/20/00 | F. Ligan | R. Bahrs |
| C | Revised to add the calibration of pre-set torque drivers/wrenches. See section 5.2.6 | 12/7/12 | F. Loza | D. Miller |
| D | Added a statement in 5.2.6 to require the value of a fixed device to have the setting marked on the unit. | 12/13/13 | A. Torres | D. Miller |
| E | Changed testing at 30% of range to 20% of range to align with industry standards. Added test point at lowest setting of adjustable wrenches is tolerance specified in lowest 20% of range by manufacturer. | 12/11/17 | M. Golden | R. Ayala |
| F | Added requirement to “Exercise” each tool before testing. | 3/27/18 | F. Ligan | A. Torres |
| G | Added instruction for appropriate standard to use, see section 5.2.1 and 8.1 | 1/15/24 | F. Loza | J. Glover |

## 1.0 PURPOSE

1.1 To establish a comprehensive procedure for the calibration of Torque Wrenches, Torque Watches, and Torque Screwdrivers in accordance with ISO/IEC 17025, ANSI/NCSL Z540, and/or customer requirements.

## 2.0 SCOPE

2.1 This procedure provides instructions for the calibration of Torque Devices as described above.

2.2 This procedure includes the testing of essential instrument parameters.

2.3 Tolerances limits (accuracy) are according to individual manufacturer specifications as outlined herein, or as designated by the customer
*Note: Certain, specific procedural elements contained in this procedure may be omitted or altered according to individual customer designated requirements.*

## 3.0 STANDARDS

3.1 The following listed standards, or equivalent, are representative of those required to perform the calibration outlined in this procedure and which are available at Precision Measurements, Inc.

| MANUFACTURER | MODEL # | DESCRIPTION | RANGE | ACCURACY |
|---|---|---|---|---|
| Mountz | BT160Z-V | Transducer | 16” oz. to 160” oz. | .25% |
| Mountz | BT120I-V | Transducer | 12” lb. to 120” lb. | .25% |
| Mountz | BT50I-V | Transducer | 5” lb. to 50” lb. | .25% |
| Mountz | BT100 | Transducer | 10’lb. to 100’lb. | .25% |
| Mountz | BT1000F-V | Transducer | 100’lb. to 1000’lb. | .25% |

3.2 Equipment listed in Section 3.1 shall be calibrated with traceability to the National Institute of Standards and Technology (NIST) or other mutually acceptable Standards Institution.

3.3 Measuring and test equipment shall be calibrated with standards having capabilities for accuracy, stability and resolution for their intended use.

3.4 All test and measuring equipment calibration shall be current.

## 4.0 PRELIMINARY OPERATION

4.1 Clean instrument using M-1 spray (all-purpose lubricant).

4.2 Remove old calibration labels and wipe down with cloth.

4.3 Verify equipment operation by moving the Handle Setting up and down range as applicable. Any discrepancies found should be corrected before calibration.

## *5.0* PROCEDURE

5.1 Mountz Calibration Set Up. Otherwise use the manufacturer instructions for the torque analyzer selected.

5.1.1 Connect Plug-in Module to ETA.

5.1.2 Select the appropriate Transducer by range and insert the Plug-in Module.

5.1.3 Connect to AC Power Source (if battery is not used).

5.1.4 Select the proper range code for the Transducer.

5.1.5 Select the run mode.

5.1.6 Turn on the power to the ETA.

5.1.7 Adjust the zero and span setting of Transducer.

5.1.8 Attach to Torque Device to the Transducer.

*Note: For electric torque drivers, a washer or spring type rundown adapter must be used between the driver and transducer.*

5.2 Torque Calibration Method

5.2.1 Select appropriate standard (see section 8.1) for the target test value(s)

5.2.2 For adjustable models, select points at 20%, 60% and 100% of range to verify.

5.2.3 Perform test starting at 20% of range. Exercise DUT 5 times without taking readings, then take 5 readings to determine the average torque.

5.2.4 Repeat step 5.2.2 for 60% and 100% readings.

5.2.5 If the wrench is adjustable type and manufacturer has specified lower than 20% of range, test at lowest setting as well.

5.2.6 If the wrench is bi-directional repeat step 5.2.1 to 5.2.3.

5.2.7 Return torque wrench with the torque setting at the lowest point.

5.2.8 If the unit under test is a pre-set torque driver/wrench, utilizing appropriate standard, verify setting (fixed point) as required by the customer. Place a label on the unit with

the value of the setting. Cover the label with transparent tape to assure the value will not be rubbed off.

*Note: Per GGG-W-686 and ANSI B107.14M there is no accuracy requirement below 20% of full range.*

## 6.0 TOLERANCES

6.1 Refer to manufacturers tolerance for the accuracies.

6.2 If manufacturers tolerances are not available apply the below tolerances:

- Torque Wrenches w/o Dial ± 4% RD CW or ± 10% CCW
- Torque Wrenches w/ Dial ± 2% RD
- Torque Driver w/ Dial ± 2% RD
- Torque Driver w/o Dial ± 5% RD

## 7.0 DOCUMENTATION

7.1 Record the data as and if appropriate, in accordance with the Precision Measurements, Inc. Operational Procedure requirements.

7.2 Submit completed Certificate of Calibration; Data Report, as applicable, along with the instrument to the Quality Assurance Department for final inspection.

## 8.0 Addenda

8.1 Appropriate standard is a Torque Analyzer that meets the required accuracy of the target value(s), that's within 10% and 100% of it's range. The Torque Analyzer is not to be used below 10% of it's full range.