# FASTENER TORQUE TENSION

# ANALYSER MACHINE

## OPERATORS HANDBOOK (PART NO. 34145)

ISSUE 7

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PART NUMBERS COVERED BY THIS MANUAL: 41900, 41901, 41902,41903

# INTRODUCTION

For quality control and basic research into the torque tension relationship in nuts and bolts, the torque tension machine provides a means of analysing the effects of lubrication, surface finishes, washer types, prevailing torque lock nuts, thread locking compounds etc.

The unit incorporates load and torque transducers for simultaneous torque and bolt tension measurements. (An optional angle encoder is available for the measurement of angular rotation).

The torque/tension results may be read directly off 2 display units. The transducer signals can also be fed via the analogue output, into an XY plotter to record test results graphically.

There are four models available covering bolt sizes from M3 to M36 (4BA to 1 1/2" dia).

This handbook is to be used in conjunction with the relevant operators handbook for the display unit, and transducers being used.

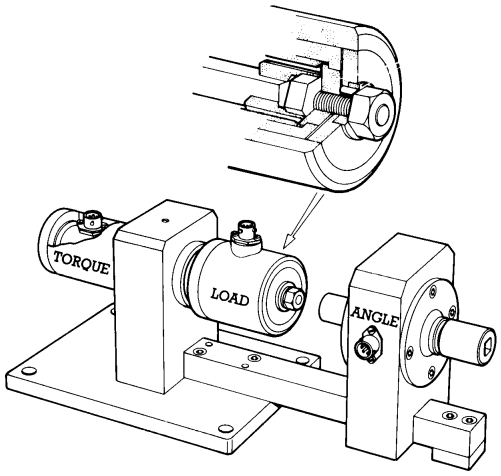



**Fig 1: Model 1 TT Machine**

The Norbar Torque Tension Machine provides rapid accurate data on the following:

- Fastener Quality Control.
- Torque Tension relationships.
- Torque/Angle/Load measurement.
- Effect of Lubrication.
- Effect of protective finishes.
- Effect of lock nuts/washers etc.
- Test of prevailing torque nuts.

# SPECIFICATION FOR TORQUE TENSION MACHINES

## TT MODEL 1

| | | |
|---|---|---|
| PART NUMBER | | 41900 |
| DESCRIPTION | | TT MACHINE MODEL 1 |
| MAX. CAPACITY | | 250 N.m/50 KN |
| | | 250 lbf.ft/10000 lbf. |
| ACCURACY | | AS PER TRANSDUCER |
| DIMENSIONS | LENGTH | 215mm |
| | HEIGHT | 202mm |
| | WIDTH | 152mm |

PARTS SUPPLIED AS STANDARD WITH THIS MODEL

| | | | |
|---|---|---|---|
| 42800 | TORQUE DRIVE SHAFT | 42801 | REACTION END CAP |
| 42802 | TORQUE DRIVE SQUARE | 42803 | BARREL HOUSING |
| 42823 | MOUNTING BLOCK | 42824 | BASE PLATE |

## TT MODEL 2

| | | |
|---|---|---|
| PART NUMBER | | 41901 |
| DESCRIPTION | | TT MACHINE MODEL 2 |
| MAX. CAPACITY | | 500 N.m/100 KN |
| | | 500 lbf.ft/25000 lbf. |
| ACCURACY | | AS PER TRANSDUCER |
| DIMENSIONS | LENGTH | 325mm |
| | HEIGHT | 324mm |
| | WIDTH | 152mm |

PARTS SUPPLIED AS STANDARD WITH THIS MODEL

| | | | |
|---|---|---|---|
| 42813 | BASE PLATE | 42814 | BODY FOR 41901 |
| 42815 | MOUNTING BLOCK | 42816 | SUPPORT SHAFT |
| 42817 | DRIVE SQUARE | 42818 | REACTION BOSS |
| 42819 | FRONT PLATE | 42820 | BEARING SPACER |

# SPECIFICATION FOR TORQUE TENSION MACHINES

## TT MODEL 3

| | | |
|---|---|---|
| PART NUMBER | | 41902 |
| DESCRIPTION | | TORQUE TENSION MODEL 3 |
| MAX. CAPACITY | | 1000 N.m/500 KN |
| | | 1000 lbf.ft/100000 lbf. |
| ACCURACY | | AS PER TRANSDUCER |
| DIMENSIONS | LENGTH | 1000mm |
| | HEIGHT | 324mm |
| | WIDTH | 190mm |

PARTS SUPPLIED AS STANDARD WITH THIS MODEL

| | | | |
|---|---|---|---|
| 16010 | HT1 5:1 GEARBOX | 42804 | REACTION END PLATE |
| 42805 | TORQUE TRANSDUCER HOUSING | 42806 | END PLATE |
| 42807 | BEARING SPACER | 42808 | SUPPORT SHAFT |
| 42809 | DRIVE SQUARE | 42810 | CLAMPING PLATE |
| 42811 | NO. 2 GEARBOX PLATE | 42812 | NO. 6 GEARBOX REACTION PLATE |
| 42822 | BASE | | |

## TT MODEL 4

| | | |
|---|---|---|
| PART NUMBER | | 41903 |
| DESCRIPTION | | TT MACHINE MODEL 4 |
| MAX. CAPACITY | | 5000 N.m/50 KN |
| | | 5000 lbf.ft/250000 lbf. |
| ACCURACY | | AS PER TRANSDUCER |
| DIMENSIONS | LENGTH | 1300mm |
| | HEIGHT | 425mm |
| | WIDTH | 190mm |

PARTS SUPPLIED AS STANDARD WITH THIS MODEL

| | | | |
|---|---|---|---|
| 16070 | HT9 25:1 | 42828 | BASE PLATE |
| 42805 | TORQUE TRANSDUCER HOUSING | 42829 | REACTION PLATE |
| 42807 | BEARING SPACER | 42830 | TRANSDUCER END PLATE |
| 42831 | SUPPORT SHAFT | 42810 | CAMPING PLATE |
| 42832 | DRIVE SQUARE | 42833 | GEARBOX REACTION PLATE |
| 42834 | 1 ½” – ¾” ADAPTOR | 42835 | 1 ½” – 1” ADAPTOR |
| 42836 | 1 ½” – 1 ½” ADAPTOR | | |

# OPERATING INSTRUCTIONS

1. Bolt the TT machine to a bench using the four fixing holes located in the base plate.

2. Fit selected torque transducer into the unit, and secure reaction cap, (or reaction plate on Models 3 and 4).

3. Assemble fastener to be tested in load transducer using the appropriate bushing sets (see Fig 2).

Note: *Bolts of longer grip lengths can be accommodated by bushing spacers with or without locking pins.*

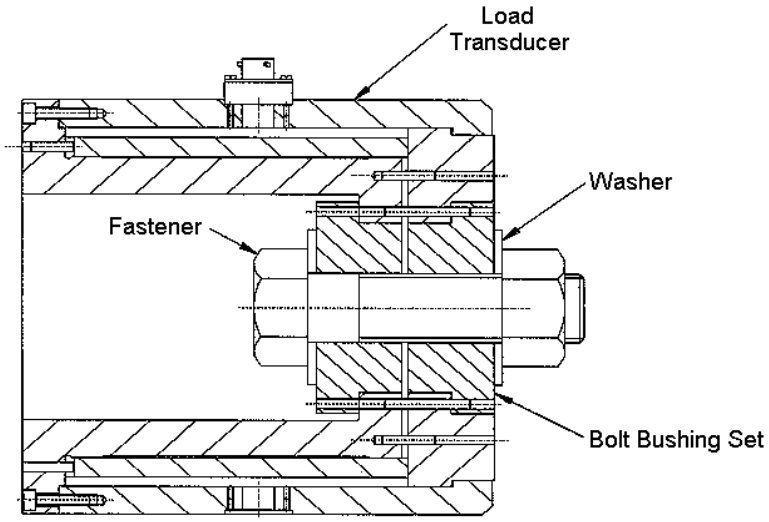



**FIG 2**

4. Follow the instructions in the relevant operators handbook for display instrument and transducers, to connect cables and set up instrument. Ensure that both transducer signals read zero on the meters before applying the load. Adjust respective zero controls, if necessary.

   PLEASE NOTE:

   *It is recommended that the Instrument used for torque readings is operated in Memory mode. This will retain the torque if relaxation takes place during fastener tightening, ie. caused by ratchet action of a Torque Wrench using several positions of wrench during test.*

   *If testing the fastener to failure the Tension Instrument should ideally also be operated in Memory mode to capture the peak failure point.*

   **WARNING: THE MEMORY MODE CAPTURES PEAK FORCES. IF STRESS RELAXATION IS REQUIRED TO BE INVESTIGATED DO NOT OPERATE IN MEMORY MODE.**

5. Fit appropriate drive socket to the fastener under test.

6. The load transducer may now be fitted. (A lifting device ie. pulley set /balancer will be required for the Model 4 Tension Transducer). Rotate until the fastener head locates in the reaction socket drive.

**WARNING: THE NO. 4 LOAD CELL IS VERY HEAVY AND SHOULD BE HANDLED IN SUCH A WAY AS TO NOT SUSTAIN CRUSH INJURIES.**

7. If used, slide the angle encoder up to the fastener and engage its drive socket.

8. Connect leads and set instruments as per instructions for angle encoder.

9. If required connect plotter, or data logger to the appropriate instrument dependant on whether you wish to record torque/angle, load/angle or load/torque.

10. On Models 3 & 4 slide gearbox along base until drive square is located within the drive socket.

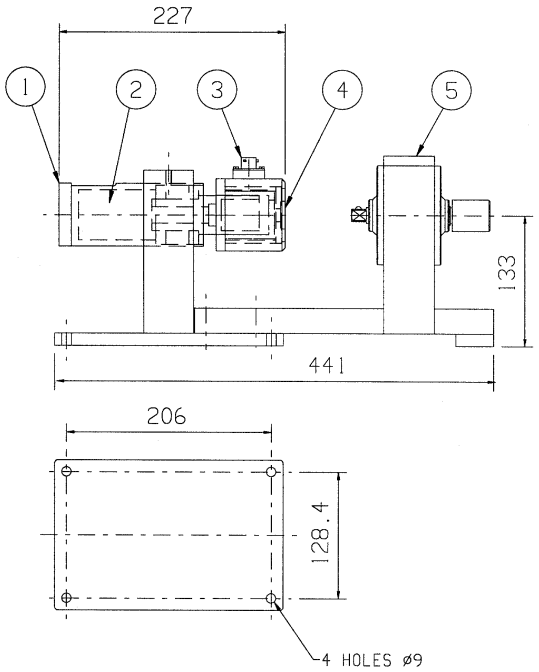
11. The fastener may now be tightened.

12. Once the test has been completed, undo fastener.

# MODEL 1 TT MACHINE

| | SIZE | MODEL 1<br>1/2" | |
|---|---|---|---|
| | CAPACITY | 250 Nm - 250 lbf.ft<br>50 KN - 10000 lbf | WEIGHT |
| 1 | FRAME | 41900 | 11.5 Kg |
| 2 | TORQUE TRANSDUCER | 50006 (1000 lbf.in)<br>50028 (100 Nm)<br>50008 (100 lbf.ft) | 0.5 Kg |
| | | 50333 (250 Nm)<br>50332 (250 lbf.ft) | 0.5 Kg |
| 3 | LOAD TRANSDUCER | 53033 (50 KN)<br>53002 (5000 lbf)<br>53003 (10000 lbf) | 4.0 Kg |
| 4 | BOLT BUSHING SETS | 3mm 55145 + 55144<br>4mm 55119 + 55130<br>5mm 55117 + 55128<br>6mm 55116 + 55127<br>8mm 55115 + 55126<br>10mm 55113 + 55124<br>12mm 55111 + 55122<br>4BA 55120 + 55131<br>2BA 55118 + 55129<br>1/4" 55116 + 55127<br>5/16" 55115 + 55126<br>3/8" 55114 + 55125<br>7/16" 55112 + 55123<br>1/2" 55110 + 55121 | |
| 5 | ANGLE ENCODER | 60044 | 6.0 Kg |

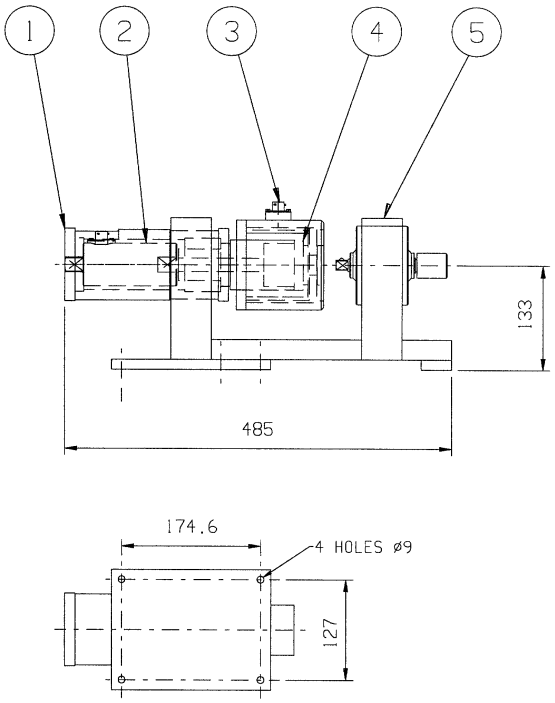
NOTE: ITEMS 4 & 5 ARE OPTIONAL EXTRA'S




# MODEL 2 TT MACHINE

| | SIZE | 2<br>3/4" | |
|---|---|---|---|
| | CAPACITY | 500 Nm - 500 lbf.ft<br>100 KN - 25000 lbf | WEIGHT |
| 1 | FRAME | 41901 | 12.0 Kg |
| 2 | TORQUE TRANSDUCER | 50029 (250 Nm)<br>50010 (250 lbf.ft) | 0.5 Kg |
| | | 50030 (500 Nm)<br>50011 (500 lbf.ft) | 1.6 Kg |
| 3 | LOAD TRANSDUCER | 53026 (100 KN)<br>53035 (25000 lbf) | 4.5 Kg |
| 4 | BOLT BUSHING SETS | 5mm 55079 + 55090<br>6mm 55080 + 55091<br>8mm 55081 + 55092<br>10mm 55082 + 55093<br>12mm 55083 + 55094<br>14mm 55084 + 55095<br>16mm 55085 + 55096<br>2BA 55086 + 55097<br>1/4" 55080 + 55091<br>5/16" 55081 + 55092<br>3/8" 55087 + 55098<br>7/16" 55088 + 55099<br>1/2" 55089 + 55100<br>9/16" 55084 + 55095<br>5/8" 55085 + 55096 | |
| 5 | ANGLE ENCODER | 60044 | 6.0 Kg |

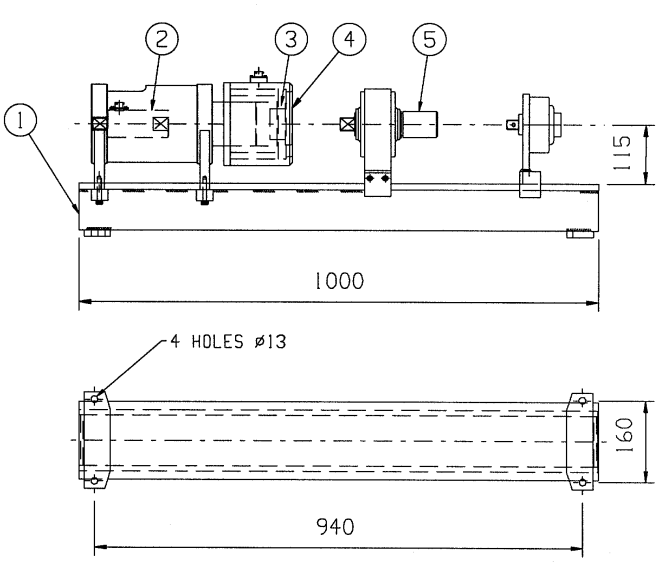
NOTE: ITEMS 4 & 5 ARE OPTIONAL EXTRA'S



# MODEL 3 TT MACHINE

| | SIZE | MODEL 3<br>1" | |
|---|---|---|---|
| 1 | CAPACITY | 1000 Nm - 1000 lbf.ft<br>500 KN - 100000 lbf | WEIGHT |
| | FRAME | 41902 | 75 Kg |
| 2 | TORQUE TRANSDUCER | 50031 (1000 Nm)<br>50012 (1000 lbf.ft) | 1.6 Kg |
| 3 | LOAD TRANSDUCER | 53015 (500 KN)<br>53036 (100000 lbf) | 11.0 Kg |
| 4 | BOLT BUSHING SETS | 12mm 2 x 55032<br>14mm 2 x 55030<br>16mm 2 x 55029<br>18mm 2 x 55028<br>20mm 2 x 55026<br>22mm 2 x 55025<br>24mm 2 x 55024<br>27mm 2 x 55033<br>30mm 2 x 55035<br>1/2" 2 x 55031<br>9/16" 2 x 55030<br>5/8" 2 x 55029<br>3/4" 2 x 55027<br>7/8" 2 x 55025<br>1" 2 x 55023<br>1 1/8" 2 x 55034 | |
| 5 | ANGLE ENCODER | 60060 | 6.0 Kg |

NOTE: ITEMS 4 & 5 ARE OPTIONAL EXTRA'S




# MODEL 4 TT MACHINE

| | SIZE | 4<br>1 1/2" | |
|---|---|---|---|
| 1 | CAPACITY | 5000 Nm - 7000 lbf.ft<br>50 KN - 10000 lbf | WEIGHT |
| | FRAME | 41903 | 110 Kg |
| 2 | TORQUE TRANSDUCER | 50292 (2500 Nm)<br>50043 (5000 Nm)<br>50013 (5000 lbf.ft)<br>50117 (7000 lbf.ft) | 4.2 Kg |
| 3 | LOAD TRANSDUCER | 53034 (1000 KN)<br>53037 (250000 lbf) | 33.0 Kg |
| 4 | BOLT BUSHING SETS | 20mm 2 x 55050<br>22mm 2 x 55049<br>24mm 2 x 55048<br>27mm 2 x 55046<br>30mm 2 x 55044<br>33mm 2 x 55042<br>36mm 2 x 55041<br>3/4" 2 x 55051<br>7/8" 2 x 55049<br>1" 2 x 55047<br>1 1/8" 2 x 55045<br>1 1/4" 2 x 55043<br>1 3/8" 2 x 55041<br>1 1/2" 2 x 55040<br>1/2" 2 x 55151<br>5/8" 2 x 55150 | |
| 5 | ANGLE ENCODER | 60061 | 6.0 Kg |

NOTE: ITEMS 4 & 5 ARE OPTIONAL EXTRA'S