Grupo

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Suministros de Conectores
Profesionales, s.a.

**SINTERSA**
Sistemas de Interconexión, s.a.

# DIGITAL TORQUE TOOL



**TORQUE RANGE:**

IN-LB = 15 ~ 300 IN-LB

FT-LB = 1.25 ~ 25 FT-LB

KG-CM = 1.7 ~ 345 KG-CM

N M = 1.7 ~ 33N.M

Higher Torque ratings to meet mechanical fastening requirements and the need for improved electrical bonding have fostered the need for an improved Torque Tightening System. DMC has responded to that need with a unique Digital Torque System that is rugged, flexible, and easy to use. This highly repeatable Digital Torque System can be easily used with other BETA™ Connector Accessory Tools to maintain precise tightening consistency through every facet of wiring system final assembly.

Normally, torque is only thought of as a means to prevent an assembly from loosening under vibration or other external forces. But in the present environment it is equally important not to over tighten an assembly risking damage to plating, threads, or fastening components made of metal or composite materials, and risking

failure, or a reduced service life of the wiring system.

DMC introduces the BT-ST-300D Digital Torque Tool which provides OEMs and field service techs with a simple and efficient way to precisely measure the torque values. This state-of-the-art product was developed specifically to meet the demands of connector and connector/accessory final assembly. The optional Static Mount Base was an integral design objective to provide OEM and Depot level operations utilization of the Digital Torque Tool as a bench-top or wiring board mountable Torque Station.

Several features of the tool make it a great addition to the DMC BETA™ Connector Accessory Tool product line. A few of the many features are listed to the right:
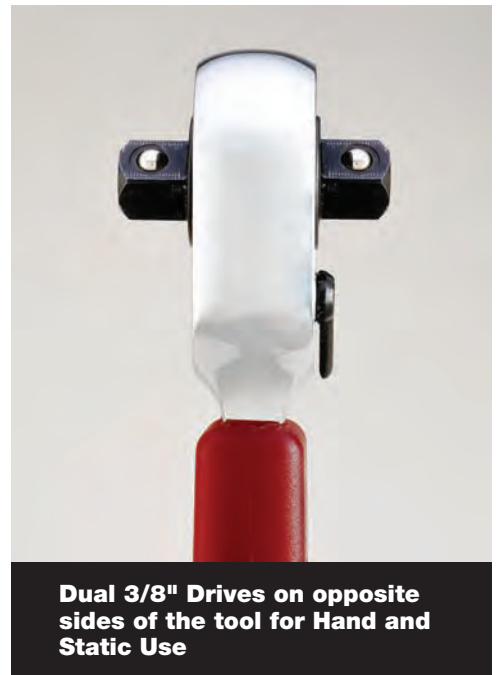


**Dual 3/8" Drives on opposite sides of the tool for Hand and Static Use**

- Visual and audible warning when the force torque reaches 90%, 100%, and 110% of the set torque.

- Saves last 99 torque values.

- Clear, sliding cover helps prevent accidental touching of keys.

- 1/4" drive adapter included

- Standard AAA batteries (2 batteries are included).

| HAND-HELD DIGITAL TORQUE TOOLS | |
|---|---|
| **BT-ST-300D** | DIGITAL TORQUE TOOL, 15-300 INCH POUNDS |
| **BT-D-0551** | ADAPTER – 3/8" DRIVE TO 1/4" SOCKET (Included) |

| TORQUE ACCURACY | | | | |
|---|---|---|---|---|
| IN-LB | FT-LB | KG-CM | N.M | ACCURACY |
| 30-300 | 2.5-25 | 34.5-345 | 3.4-33 | CW +/-2% / CCW +/-3% |
| 15-29 | 1.25-2.4 | 17.3-33.4 | 1.7-3.3 | CW +/-4% / CCW +/-6% |
| DMC torque wrench calibration data is traceable to NIST. | | | | |

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# DIGITAL TORQUE TOOL ACCESSORIES

## STATIC MOUNT BASES FOR DIGITAL TORQUE TOOLS

DMC's Static Mount Base is a secure system to mount the Digital Torque Tool in a static position. Until now, it required two separate torque devices to have the ability for portable or static (or stationary) use, but DMC has designed one system that allows the conversion of a hand-held portable unit into a stable, high production torque station in just a few minutes. This will allow a hands-free environment that is accurate, repeatable, and a far more ergonomic torque station for final assembly.

The base can be configured for horizontal or vertical positioning of the tool and allows the tool to tilt 90 degrees in each configuration for usability. The tool can still be switched between clockwise and counter-clockwise functions while attached to the Static Mount Base. Because of their compact size and lightweight construction, it can be mounted in a variety of locations either on workbench or even on harness form board.

There will sometimes be applications where the use of a static unit is impractical. In which case, the Digital Torque Tool is easily removed from the Static Mount Base.

**Horizontal Configuration**

**Vertical Configuration**
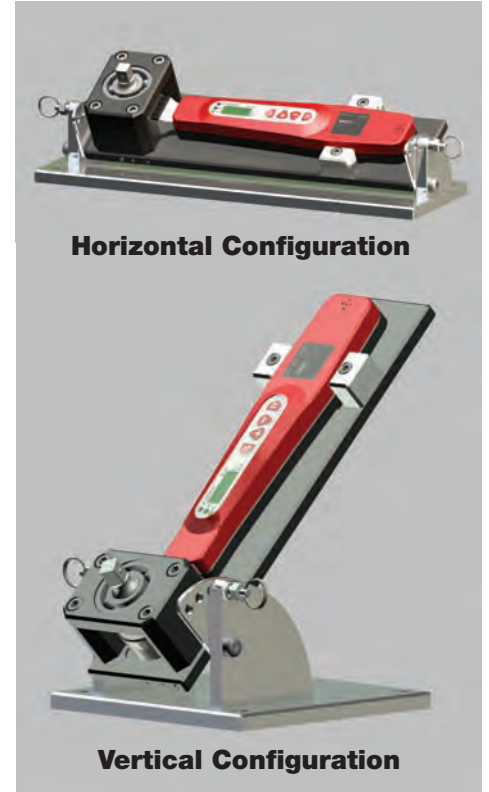
| STATIC MOUNT DIGITAL TORQUE TOOL | |
|---|---|
| BT-ST-300D | DIGITAL TORQUE TOOL, 15-300 INCH POUNDS |
| BM-6 | STATIC MOUNT BASE FOR BT-ST-300D |

## STRAP WRENCH ATTACHMENT FOR THE DIGITAL TORQUE TOOL

DMC's handle-less strap wrench line has been specifically designed for torque accurate connector assembly. Based on DMC's established line of torque wrenches, the handle-less strap wrench attaches to the BT-ST-300D and provides accurate torque without the interference of the strap wrench handle.

Modern connectors and accessories comprised of lightweight materials, torque sensitive threads, and critical platings have mandated the requirement for precision strap wrenches. DMC Strap Wrenches meet this need by applying a uniform grip around the diameter and avoid pressure points or metal-to-metal contact.

*The BT-BS-611T is shown here.*

| PART NUMBER | STRAP WIDTH | GRIPPING DIAMETER |
|---|---|---|
| BT-BS-609T | 1/2" | .50" to 2.50" |
| BT-BS-610T | 1/2" | .25" to 1.50" |
| BT-BS-611T | 5/8" | 1.00" to 4.00" |
| BT-BS-618T | 1" | 1.00" to 4.00" |

Different colored straps and strap configurations have different part numbers. See page 35.

A variety of widths and lengths of straps is available in several different head configurations, so the system is suited to all common connector applications. See page 35 or our Web site for a full list of handle-less strap wrench part numbers.

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# TORQUE CONVERSION FORMULA

Torque is a standard term that is comprised of "distance and force". Since the force is applied to a threaded component in a circular motion, the distance applies to the radius (center of the torque wrench drive to a designated point on the torque wrench handle). In the case of wire harness applications, it is usually expressed in INCH-POUNDS, NEWTON-METERS, or KILOGRAM-CENTIMETERS. When extensions such as a crowfoot, or strap wrench is added to a torque wrench, it changes the distance (radius), so a mathematical formula is used to determine the correct torque readings on the torque wrench to compensate for the added length. We have included the following formulas for your convenience.
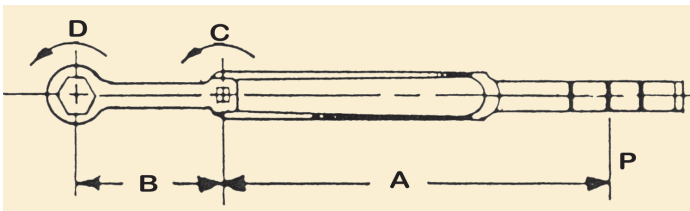




When an adapter or extension is used on a torque wrench it increases the torque range of the wrench. The formulae for computing torque when using an adapter or extension is explained below.

**A** = (Length) Distance from center of torque wrench square drive to center of the puller's hand grip.

**B** = Distance from center of torque wrench square drive to center of drive at end of extension.

**C** = (Torque) Torque wrench setting.

**D** = Torque desired at drive on end of extension.

**P** = (Force) Pull applied.

To determine torque wrench setting:
   **C = (D∗A) / (A+B)**

**NOTE**: After computing "**C**" and setting wrench to computation, measure and mark "**A**" where pull is applied.

It is recommended that the axis of the extension always be used in line with axis of the torque wrench as shown above.
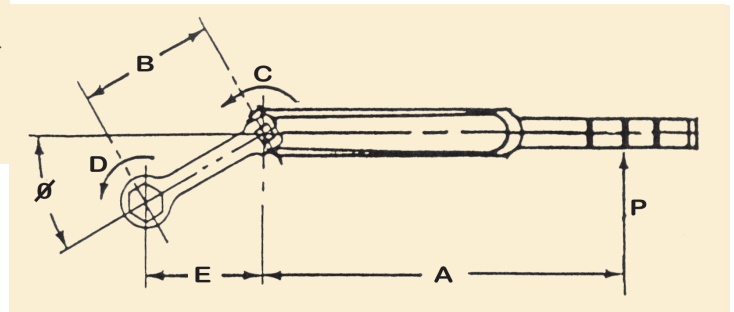
Should it be necessary, due to obstructions, to have an angle between the two axes, then the above formula is modified as follows. Due to increasing rounding errors, keep the angle as small as possible.

**A**, **B**, **C**, **D**, & **P** are the same as above.

**E** = Effective moment arm of the extension.

**Ø** = Angle between extension axis and torque wrench axis.

**E = (B)(COS Ø)**

Therefore:
   **C = (D∗A) / (A+(B∗COS Ø))**

When **Ø** = 0, **COS Ø** = 1, then equation is reduced to
**C = (D∗A) / (A+B)**

When **Ø** = 90°, **COS Ø** = 0 then **C = D**
(Regardless of the length **B**)

# TORQUE CONVERSION CHARTS

These torque conversion charts were calculated for the **BT-ST-300D Digital Torque Tool**. If any other torque tool or instrument is used, calculate the torque conversion by using the mathematical formula to page 36.

## TORQUE CONVERSION CHART FOR BT-BS-611 AND BT-BS-618 SERIES USED WITH BT-ST-300D

| Diameter of Part Being Tightened | DESIRED TORQUE VALUE (in-lbs) ("D") | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | 40 | 60 | 80 | 100 | 120 | 140 | 160 | 180 | 200 |
| 1.00" | 31 | 46 | 61 | 76 | 92 | 107 | 122 | 137 | 153 |
| 1.50" | 30 | 45 | 59 | 74 | 89 | 104 | 119 | 134 | 148 |
| 1.75" | 29 | 44 | 59 | 73 | 88 | 103 | 117 | 132 | 147 |
| 2.00" | 29 | 43 | 58 | 72 | 87 | 101 | 116 | 130 | 145 |
| 2.25" | 29 | 43 | 57 | 71 | 86 | 100 | 114 | 129 | 143 |
| 2.50" | 28 | 42 | 56 | 70 | 85 | 99 | 113 | 127 | 141 |
| 2.75" | 28 | 42 | 56 | 70 | 84 | 97 | 111 | 125 | 139 |
| 3.00" | 28 | 41 | 55 | 69 | 83 | 96 | 110 | 124 | 138 |
| 3.25" | 27 | 41 | 54 | 68 | 82 | 95 | 109 | 122 | 136 |
| 3.50" | 27 | 40 | 54 | 67 | 81 | 94 | 107 | 121 | 134 |
| 3.75" | 27 | 40 | 53 | 66 | 80 | 93 | 106 | 119 | 133 |
| 4.00" | 26 | 39 | 52 | 66 | 79 | 92 | 105 | 118 | 131 |
| TORQUE READING ON INSTRUMENT ("C") | | | | | | | | | |

## TORQUE CONVERSION CHART FOR BT-BS-609 SERIES USED WITH BT-ST-300D

| Diameter of Part Being Tightened | DESIRED TORQUE VALUE (in-lbs) ("D") | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | 40 | 60 | 80 | 100 | 120 | 140 | 160 | 180 | 200 |
| 0.50" | 34 | 50 | 67 | 84 | 101 | 118 | 135 | 151 | 168 |
| 0.75" | 33 | 50 | 66 | 83 | 99 | 116 | 133 | 149 | 166 |
| 1.00" | 33 | 49 | 65 | 82 | 98 | 114 | 131 | 147 | 163 |
| 1.50" | 32 | 48 | 64 | 79 | 95 | 111 | 127 | 143 | 159 |
| 1.75" | 31 | 47 | 63 | 78 | 94 | 110 | 125 | 141 | 157 |
| 2.00" | 31 | 46 | 62 | 77 | 93 | 108 | 124 | 139 | 155 |
| 2.25" | 31 | 46 | 61 | 76 | 92 | 107 | 122 | 137 | 153 |
| 2.50" | 30 | 45 | 60 | 75 | 90 | 105 | 121 | 136 | 151 |
| TORQUE READING ON INSTRUMENT ("C") | | | | | | | | | |

## TORQUE CONVERSION CHART FOR BT-BS-610 SERIES USED WITH BT-ST-300D

| Diameter of Part Being Tightened | DESIRED TORQUE VALUE (in-lbs) ("D") | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | 40 | 60 | 80 | 100 | 120 | 140 | 160 | 180 | 200 |
| 0.25" | 36 | 54 | 72 | 89 | 107 | 125 | 143 | 161 | 179 |
| 0.50" | 35 | 52 | 70 | 87 | 104 | 122 | 139 | 156 | 174 |
| 0.75" | 34 | 51 | 68 | 86 | 103 | 120 | 137 | 154 | 171 |
| 1.00" | 34 | 51 | 67 | 84 | 101 | 118 | 135 | 152 | 169 |
| 1.50" | 33 | 49 | 65 | 81 | 98 | 114 | 130 | 146 | 163 |
| TORQUE READING ON INSTRUMENT ("C") | | | | | | | | | |

# SUGGESTED TORQUE VALUES

Daniels Manufacturing Corp takes no responsibility for the suggested torque values stated on this page. They were obtained from members of SAE Technical Standards Committee (AE-8C1, Connectors and Accessories), and will be published in a technical standard which is under development in the committee. If you need more information, contact DMC for the latest status on the ARP***** Torque for Wiring System Components Standard.

Torque values used to assemble connectors, backshells, and other wiring system components are the responsibility of the user/installer to determine the best torque range for the application. It is also the responsibility of the user/installer to select the appropriate tool for the work and the user conditions/environment.

## CIRCULAR ELECTRICAL CONNECTOR ACCESSORIES SUGGESTED TORQUE VALUES

| SHELL SIZES | GROUP 1 (±5 IN-LBS) Light & Medium Duty AS50151 (MS3100 Series) MIL-DTL-26482 Series I MIL-DTL-26500 MIL-DTL-27599 MIL-DTL-38999 Series I, II MIL-C-81511 Series I, II, III, IV MIL-DTL-81703 Series I | GROUP 2 (±5 IN-LBS) Heavy Duty AS50151 (MS3400 Series) MIL-DTL-22992 MIL-DTL-26482 Series II MIL-DTL-28840 MIL-DTL-38999 Series III, IV MIL-DTL-81703 Series III MIL-DTL-83723 Series I, II, III |
|---|---|---|
| 8, 9, A | 40* | 56 |
| 3, 10, 10SL, 11, B | 40* | 76 |
| 7, 12, 12S, 13, C | 40 | 108 |
| 14, 14S, 15, D | 40 | 116 |
| 16, 16S, 17, E | 40 | 116 |
| 18, 19, 27, F | 40 | 116 |
| 20, 21, 37, G | 80 | 136 |
| 22, 23, H | 80 | 136 |
| 24, 25, 61, J | 80 | 136 |
| 28, 29 | 120 | 148 |
| 32, 33 | 120 | 148 |
| 36 | 120 | 148 |
| 40 | 170 | 164 |
| 44 | 170 | 164 |
| 48 | 170 | 164 |

*Indicates 35 Inch-Pounds for composite coupling nut.
NOTES:  1. Group 1 values based on 80% of MIL-DTL-85049 light duty thread strength.
   2. Use Group 1 values for composite connector accessories.

## CABLE CLAMP SCREW SUGGESTED TORQUE VALUES

| SCREW SIZE | TORQUE (+/- .5 IN-LBS) |
|---|---|
| 2-56 | 2 |
| 4-40 | 4 |
| 6-32 | 6 |
| 8-32 | 8 |
| 10-32 | 10 |
| .250-20 | 12 |

## JAM NUT INSTALLATION SUGGESTED TORQUE VALUES

| SHELL SIZE | INCH-POUNDS ± 5% |
|---|---|
| 10 | 95 |
| 12 | 110 |
| 14 | 140 |
| 16 | 170 |
| 18 | 195 |
| 20 | 215 |
| 22 | 235 |
| 24 | 260 |

**CAUTION**: Over tightening (Torque) connectors, backshells, and other wiring system components can damage threads, metal or composite structure, or rubber components, and cause them to fail. Under-tightening (Torque) wiring system components can cause the components to loosen during use and fail.

Tightening or loosening system components beyond the specified range of a torque wrench may damage a torque wrench, and affect its accuracy and repeatability.

**NOTE**: For additional information about torque calculation, see page 36.