

HYTORC Tool Basics

Description, Operation and Safety



November 21, 2017

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1. Hydraulic Torque Tools

Hydraulic Torque Tool Technology

PUSH – ADVANCE – CLICK – RELEASE – Tool Drive Turns 24 degrees

PUSH

Pushing the advance button on the remote switches a solenoid valve on the pump and directs hydraulic fluid pressure into the advance side of the tool cylinder.

ADVANCE

Piston in the tool cylinder advances to turn the ratchet 24 degrees/click.
(some tool ratchets are different, the STEALTH turns 18 degrees/click)

CLICK

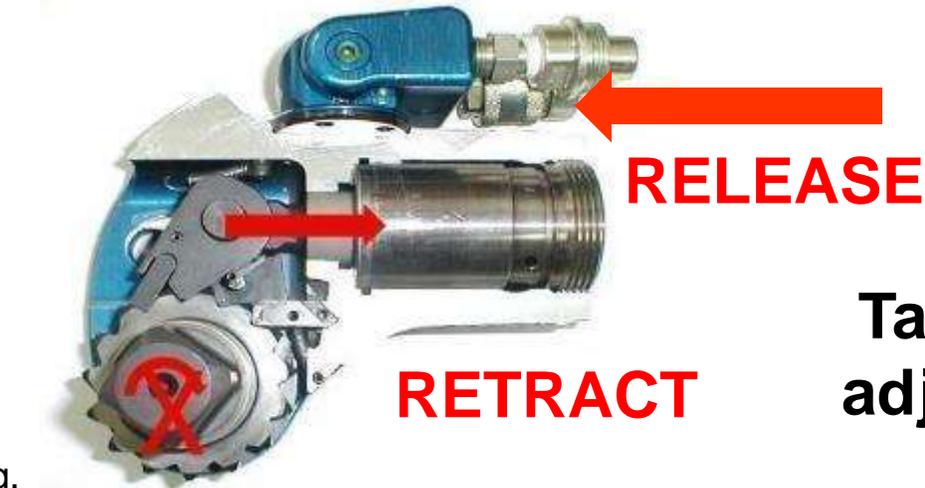
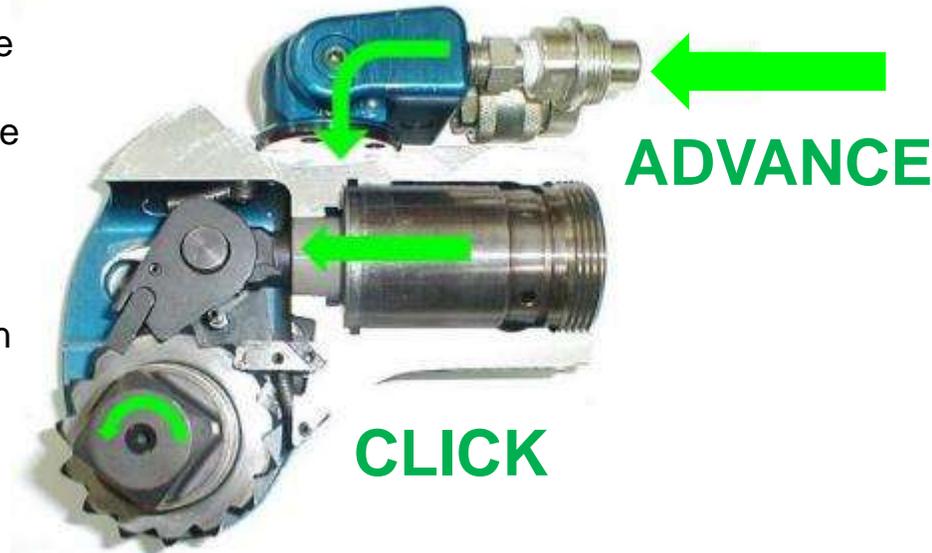
Ratchet locks in place against a pawl with a distinct clicking sound.

RELEASE - RETRACT

Releasing the advance button causes the solenoid valve to direct pressure in the release port to retract the piston.

REPEAT

This sequence is repeated until tool stalls at the desired pressure – nut stops turning.



Target torque value is set by adjusting the pump pressure.

Hydraulic Tool Overview

Square Drive Tools



ICE
.7, 1, 3, 5



AVANTI
.7, 1, 3, 5, 8, 10,
20, 35, 50, 80, 130



MXT
.7, 1, 3, 5, 10, 15, 20, 35



EDGE
2, 4, 6, 8, 12, 30

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XLCT
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VERSA
1, 2, 4, 8, 14, 20, 30

Pumps



HY-115/230



HY-AIR



HY-VECTOR

Accessories



**CRITICAL PATH
TECHNOLOGY**
Safest, leak and
failure-free

**HEAVY
INDUSTRY
TECHNOLOGY**
Most widely used

**MAINTENANCE
TECHNOLOGY**
Durable and
simple to maintain

Hydraulic Torque Tool Comparison



ICE Avanti MXT EDGE Stealth XLCT Versa

| | | | | | | | |
|------------------------------------|----|----|---|---|----|---|---|
| Multi-direction hose swivel | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| Torque accuracy within 5% | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| Torque output up to 35,000 ft-lbs | | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| Torque output beyond 35,000 ft-lbs | | ✓ | | | | ✓ | |
| Lock-on release | ✓ | ✓ | ✓ | | ✓ | ✓ | |
| Hands-free bolting | ✓* | ✓* | | | ✓ | | |
| Industry leading safety | ✓* | ✓* | | | ✓* | | |
| Industry leading load accuracy | ✓* | ✓* | | | ✓* | | |
| Auto pressure release | ✓ | | | | | | |
| Total freedom swivel | ✓ | | | | | | |

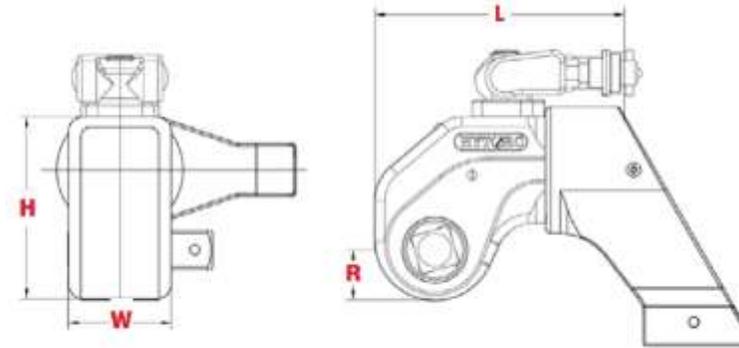
EDGE

For general maintenance that requires high torque values and repeatable results, applying conventional torque with sockets and reaction arms, the EDGE is a workhorse at an economical value.



Simple Design

Three moving parts including tool body, reaction arm and swivel coupling - reduces the number of potential repairs and keeps operating costs to a minimum.



Multi-Axis Swivel

The multi-axis swivel provides for maximum tool positioning flexibility and safety.



Push-Through Drive

Provides quick and simple directional changes and maximum durability.

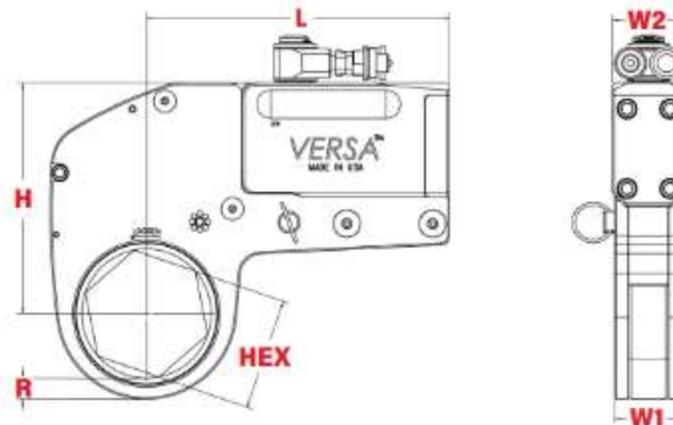


| MODEL NUMBER | H | W | L | R | DRIVE | WEIGHT | TORQUE | |
|--------------|----------------|------|-------|------|-------|--------|----------------|----------------|
| | IMPERIAL (in.) | | | | | lbs. | MIN (ft.-lbs.) | MAX (ft.-lbs.) |
| EDGE - .5 | 2.95 | 1.64 | 4.01 | 0.82 | 3/4 | 3.3 | 106 | 710 |
| EDGE - 2 | 3.53 | 1.97 | 4.94 | 0.97 | 3/4 | 4.05 | 178 | 1,257 |
| EDGE - 4 | 4.71 | 2.63 | 6.4 | 1.31 | 1 | 8.5 | 443 | 3,079 |
| EDGE - 6 | 6.04 | 3.18 | 7.61 | 1.57 | 1-1/2 | 19.2 | 893 | 6,241 |
| EDGE - 8 | 6.57 | 3.57 | 8.69 | 1.86 | 1-1/2 | 20.05 | 1,230 | 8,555 |
| EDGE - 12 | 7.07 | 3.95 | 9.6 | 1.96 | 1-1/2 | 25 | 1,615 | 11,291 |
| EDGE - 30 | 10.1 | 5.64 | 13.71 | 2.79 | 2-1/2 | 64.7 | 4,448 | 29,650 |

| MODEL NUMBER | METRIC (mm) | | | | | kg | MIN (Nm) | MAX (Nm) |
|--------------|-------------|--------|--------|-------|-------|-------|----------|-----------|
| | EDGE - .5 | 74.93 | 41.65 | 101.9 | 20.82 | 19.05 | 1.5 | 143.71 |
| EDGE - 2 | 89.7 | 50.03 | 125.5 | 24.63 | 19.05 | 1.83 | 241.33 | 1,704.30 |
| EDGE - 4 | 119.63 | 66.8 | 162.6 | 33.3 | 25.4 | 3.9 | 600.62 | 4,174.60 |
| EDGE - 6 | 153.41 | 80.8 | 193.3 | 39.9 | 38.1 | 8.7 | 1,210.74 | 8,461.70 |
| EDGE - 8 | 166.87 | 90.7 | 220.72 | 47.24 | 38.10 | 9.09 | 1,667.65 | 11,599.02 |
| EDGE - 12 | 179.6 | 100.33 | 243.84 | 49.8 | 38.1 | 11.33 | 2,189.64 | 15,308.54 |
| EDGE - 30 | 256.54 | 143.25 | 348.23 | 70.9 | 63.5 | 29.34 | 6,030.70 | 40,200 |

VERSA

For general maintenance that requires high torque values and repeatable results, provides the most economical solution with continuous slim profile design throughout the powerhead and hex link.



Simple Design

Straightforward three moving parts in the tool including the power head, ratchet link and swivel coupling - reduces the number of potential repairs and lowers operating cost.



Versa Slim Link

Tool can be configured with a hex link so thin there's almost no limited clearance application it can't handle.



| MODEL NUMBER | H | W1 | W2 | L | R | WEIGHT | TORQUE | |
|--------------|----------------|------|------|-------|------|--------|--------|----------------|
| | IMPERIAL (in.) | | | | | | lbs. | MIN (ft.-lbs.) |
| VERSA - 1 | 3.42 | 0.94 | 1.06 | 4.23 | 0.32 | 2.80 | 150 | 1,050 |
| VERSA - 2 | 3.73 | 1.13 | 1.25 | 5.35 | 0.38 | 3.40 | 261 | 1,920 |
| VERSA - 4 | 5.52 | 1.51 | 1.67 | 7.07 | 0.51 | 7.30 | 654 | 4,503 |
| VERSA - 8 | 6.53 | 1.89 | 2.10 | 8.60 | 0.64 | 11.60 | 1,350 | 9,000 |
| VERSA - 14 | 8.03 | 2.36 | 2.50 | 10.52 | 0.73 | 19.20 | 2,148 | 14,832 |
| VERSA - 20 | 8.87 | 2.89 | 3.00 | 10.93 | 0.92 | 24.50 | 3,088 | 21,458 |
| VERSA - 30 | 10.95 | 3.00 | 3.75 | 13.89 | 1.00 | 39.30 | 5,100 | 36,200 |

| MODEL NUMBER | H | W1 | W2 | L | R | kg | MIN (Nm) | MAX (Nm) |
|--------------|-------------|-------|-------|--------|-------|-------|----------|-----------|
| | METRIC (mm) | | | | | | MIN (Nm) | MAX (Nm) |
| VERSA - 1 | 86.90 | 23.80 | 26.92 | 107.44 | 8.12 | 1.27 | 203.40 | 1,423.60 |
| VERSA - 2 | 94.74 | 28.70 | 31.75 | 135.89 | 9.70 | 1.54 | 353.90 | 2,603.17 |
| VERSA - 4 | 140.20 | 38.40 | 42.41 | 179.60 | 13.00 | 3.31 | 886.70 | 6,105.24 |
| VERSA - 8 | 165.70 | 48.00 | 53.34 | 218.44 | 16.30 | 5.30 | 1,830.40 | 12,202.36 |
| VERSA - 14 | 204.00 | 59.94 | 63.50 | 267.20 | 18.54 | 8.70 | 2,912.30 | 20,109.50 |
| VERSA - 20 | 225.30 | 73.40 | 76.20 | 277.62 | 23.40 | 11.11 | 4,186.80 | 29,093.14 |
| VERSA - 30 | 278.13 | 76.20 | 95.25 | 352.80 | 25.40 | 17.82 | 6,914.70 | 49,080.60 |

MXT Features

MXT series is the all time most requested square drive hydraulic torque equipment by maintenance, service and construction personnel worldwide!

Multi-Directional Coupling

Coupling has 360-180 rotational capability allowing hoses to be arranged to ensure safe operation.

Zero-Slip Square Drive

The MXT series has a powerful drive with faster tightening and a secondary pawl inside the tool that prevents the ratchet from turning backwards during tightening resulting in controlled application of torque at high precision

Lock-Up Release Lever

The MXT was the first tool in the industry to feature the lock-up release lever that allows you to release pressure after torqueing – simply toggle the lever for easy removal.



Super Alloy Option

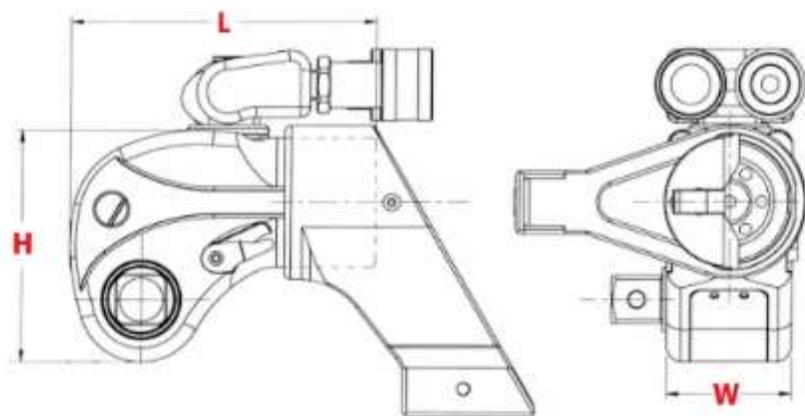
The MXT-SA series provides the proven reliability of the MXT design with advanced materials used to increase lifespan further for extreme usage. The MXT-SA tools come with a 5 year no-questions warranty

Indexing Reaction Arm

Reaction arm can be rotated 360 degrees – simply push the lever and pull out the arm, rotate to desired position and then snap back on the tool body.

MXT Specifications

MXT is available in a range of sizes to tighten bolts across a wide range of applications.



| MODEL NUMBER | H | W | L | DRIVE | WEIGHT | TORQUE | |
|--------------|----------------|------|-------|-------|--------|----------------|----------------|
| | IMPERIAL (in.) | | | | lbs. | MIN (ft.-lbs.) | MAX (ft.-lbs.) |
| MXT - .7 | 4.25 | 1.62 | 3.96 | 3/4 | 2.70 | 118 | 822 |
| MXT - 1 | 4.90 | 1.97 | 4.88 | 3/4 | 3.95 | 200 | 1,340 |
| MXT - 3 | 6.12 | 2.63 | 6.34 | 1 | 8.30 | 480 | 3,230 |
| MXT - 5 | 7.22 | 3.16 | 7.61 | 1-1/2 | 14.20 | 835 | 5,590 |
| MXT - 10 | 8.80 | 3.95 | 9.51 | 1-1/2 | 24.80 | 1,755 | 11,520 |
| MXT - 15 | 9.67 | 4.38 | 10.55 | 2-1/2 | 36 | 2,268 | 15,399 |
| MXT - 20 | 10.24 | 4.73 | 11.41 | 2-1/2 | 43.40 | 2,960 | 19,760 |
| MXT - 35 | 12.42 | 5.82 | 14.03 | 2-1/2 | 77.45 | 5,400 | 37,100 |

| | METRIC (mm) | | | | kg | MIN (Nm) | MAX (Nm) |
|----------|-------------|--------|--------|-------|-------|----------|-----------|
| MXT - .7 | 108 | 41.14 | 100.6 | 19.05 | 1.22 | 160 | 1,114.50 |
| MXT - 1 | 124.5 | 50.03 | 124 | 19.05 | 1.80 | 271.2 | 1,816.80 |
| MXT - 3 | 155.44 | 66.8 | 161.03 | 25.4 | 3.80 | 650.8 | 4,379.30 |
| MXT - 5 | 183.4 | 80.3 | 193.29 | 38.10 | 6.44 | 1,132.70 | 7,579.02 |
| MXT - 10 | 223.52 | 100.33 | 241.60 | 38.10 | 11.24 | 2,379.50 | 15,619.02 |
| MXT - 15 | 24,561 | 111.30 | 268 | 63.50 | 16.32 | 3,075 | 20,878.24 |
| MXT - 20 | 260.09 | 120.14 | 289.81 | 63.50 | 19.70 | 4,013.22 | 26,791 |
| MXT - 35 | 315.50 | 147.82 | 356.36 | 63.50 | 35.13 | 7,321.41 | 50,300.84 |

XLCT Features

**Low Clearance Hydraulic Torque Tool – fits in tight spaces where other tools don't fit
All the power needed to get the job done with high quality, efficiency and flexibility.**

Zero-Slip Drive

The XLCT series features a Zero-Slip ratchet for more controlled and faster tightening and more powerful breakout. Continuous turning provides precise power delivery to turn the nut. The secondary pawl inside the tool prevents the ratchet from turning opposite to the drive direction.

Link



Power Head

Interchangeable Links

The XLCT drive body and links can quickly and easily be separated and snapped back together, secured with the link pin.

Multi-Direction Hose Coupling

360x360 degree adjustment means no hose kinking - tool can be applied even in the most confined areas.



Link Pin

Lock-Up Release Lever

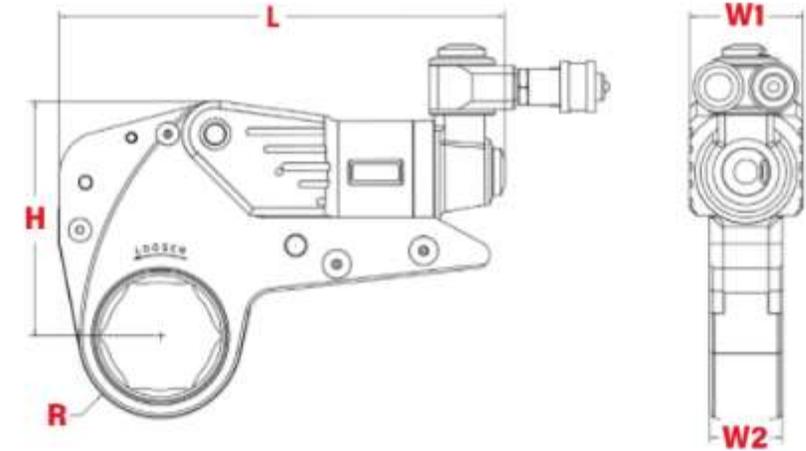
The XLCT features an easy access lock-up release lever that allows you to release pressure after torquing for easy removal.

Flexible Ratchet Link/Drive Options

The tool can be outfitting with a variety of drive configurations including 6-point hex, 12-point hex, allen drives, square drives, open spanners and many other configurations to simplify the most challenging bolting jobs.

XLCT Specifications

XLCT is available in a range of sizes to tighten bolts in a wide range of applications.



| MODEL NUMBER | H | W1 | W2 | L | R | WEIGHT | TORQUE | |
|--------------|----------------|--------|-------|--------|----------------|--------|----------------|----------------|
| | | | | | | | MIN (ft.-lbs.) | MAX (ft.-lbs.) |
| | IMPERIAL (in.) | | | | | lbs. | | |
| XLCT - 2 | 4.02 | 2.00 | 1.25 | 7.33 | 1.03 - 1.76 | 2.05 | 243 | 1,687 |
| XLCT - 4 | 5.36 | 2.58 | 1.67 | 10.19 | 1.33 - 2.32 | 4.25 | 580 | 3,855 |
| XLCT - 8 | 6.70 | 3.23 | 2.09 | 12.29 | 1.77 - 2.89 | 7.15 | 1,143 | 8,151 |
| XLCT - 14 | 8.04 | 3.88 | 2.50 | 14.61 | 2.32 - 3.47 | 11.30 | 2,010 | 13,400 |
| XLCT - 18 | 9.08 | 4.38 | 2.83 | 14.34 | 2.62 - 3.87 | 14.85 | 2,790 | 19,100 |
| XLCT - 30 | 10.71 | 5.17 | 3.35 | 16.82 | 3.07 - 4.80 | 23.80 | 4,579 | 30,986 |
| | METRIC (mm) | | | | | kg | MIN (Nm) | MAX (Nm) |
| XLCT - 2 | 102.10 | 50.80 | 31.80 | 186.20 | 26.20 - 44.70 | 0.92 | 329.50 | 2,287.30 |
| XLCT - 4 | 136.14 | 65.53 | 42.41 | 258.82 | 33.80 - 58.92 | 1.92 | 786.40 | 5,226.70 |
| XLCT - 8 | 170.20 | 82.04 | 53.10 | 312.20 | 45.00 - 73.40 | 3.24 | 15,498.70 | 11,051.30 |
| XLCT - 14 | 204.21 | 98.60 | 63.50 | 312.20 | 58.92 - 88.13 | 5.12 | 2,725.19 | 18,168 |
| XLCT - 18 | 230.63 | 111.30 | 71.90 | 364.23 | 66.54 - 98.30 | 6.73 | 3,782.73 | 25,896.12 |
| XLCT - 30 | 272.03 | 131.31 | 85.09 | 427.22 | 78.00 - 121.92 | 10.80 | 6,208.30 | 42,011.40 |

ICE Features

**ICE is the worlds first auto-lock-release hydraulic square drive tool.
Offers flexibility for use with HYTORC Washer & Nut.**

Total-Freedom Uniswivel Coupler

Provides the worlds only **180-360-360** adjustable coupler, allowing complete freedom in arranging hoses .

Auto-Release - No Lock-Up

The ICE automatically releases pressure after bolting for quick and easy movement from nut to nut and increased operator safety.

Reversible Square Drive

Entire drive is removed with the push of a button and reversible allowing rapid change between tighten and loosen modes.



Concentric Reaction Spline

Reaction arm is fastened to the reaction spline concentric with the square drive, providing less stress in the tool body, less side load and more uniform application of torque.

Multiple Drive Configurations

The ICE is supplied with a standard push-button and adjustable reaction arm for conventional torque applications. The ICE tool can also be configured with a driver for the HYTORC washer and a tensioning driver for use with the HYTORC Nut.

Conventional Torque



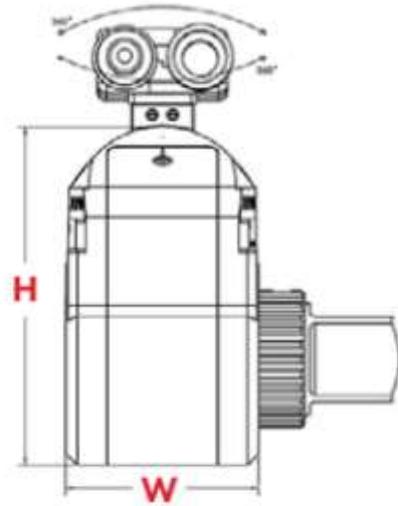
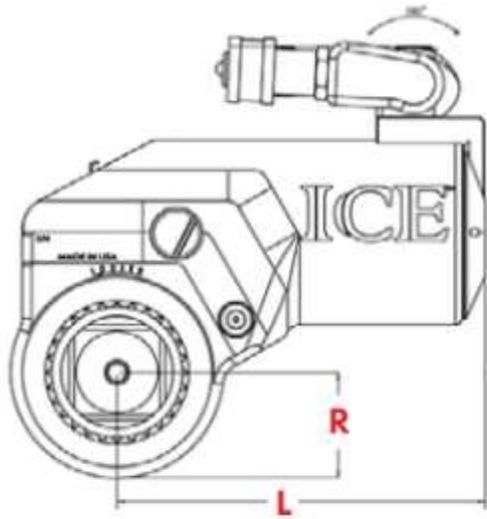
HYTORC Washer



HYTORC Nut



ICE Specifications



| MODEL NUMBER | H | W | L | R | DRIVE | WEIGHT | TORQUE | |
|--------------|--------|-------|-------------|-------|-------|--------|----------------|----------------|
| | | | | | | | MIN (ft.-lbs.) | MAX (ft.-lbs.) |
| ICE - .7 | 4.60 | 1.85 | 3.75 | 25 | 3/4 | 4.55 | 117.00 | 806 |
| ICE - 1 | 5.17 | 2.18 | 4.43 | 1.13 | 3/4 | 6 | 196 | 1,284 |
| ICE - 3 | 6.58 | 2.90 | 5.53 | 1.52 | 1 | 10 | 460 | 3,084 |
| ICE - 5 | 7.63 | 3.38 | 6.44 | 1.80 | 1-1/2 | 18 | 804 | 5,360 |
| | | | | | | | MIN (Nm) | MAX (Nm) |
| | | | | | | | kg | |
| | | | METRIC (mm) | | | | | |
| ICE - .7 | 116.90 | 47.0 | 95.30 | .99 | 19.05 | 2.06 | 158.00 | 1,092.00 |
| ICE - 1 | 131.32 | 55.40 | 112.50 | 28.70 | 19.05 | 2.72 | 265.74 | 1,740.90 |
| ICE - 3 | 167.13 | 73.70 | 140.50 | 38.60 | 25.40 | 4.53 | 623.70 | 4,148.34 |
| ICE - 5 | 193.80 | 85.90 | 163.60 | 45.72 | 38.10 | 8.16 | 1,090.10 | 7,267.20 |

AVANTI Features

The most advanced square drive hydraulic tool on the market with a broad range of configurations and sizes.

Multi-Directional Coupler

Provides 360-120 degree adjustable coupler, allowing freedom in arranging tools and hoses. .

Concentric Reaction Spline

Reaction arm is fastened to the reaction spline concentric with the square drive, providing less stress in the tool body, less side load and more uniform application of torque.

Lock-Up Release Lever

The lock-up release lever allows you to release pressure after torquing – simply toggle the lever for easy removal.

Reversible Square Drive

Entire drive is removed with the push of a button and reversible allowing rapid change between tighten and loosen modes.



Multiple Drive Configurations

The AVANTI tool is supplied with an adjustable reaction arm for conventional torque operation. The AVANTI can also be configured with torque drivers for the HYTORC Washer and tensioning driver for use with the HYTORC Nut.

Conventional Torque



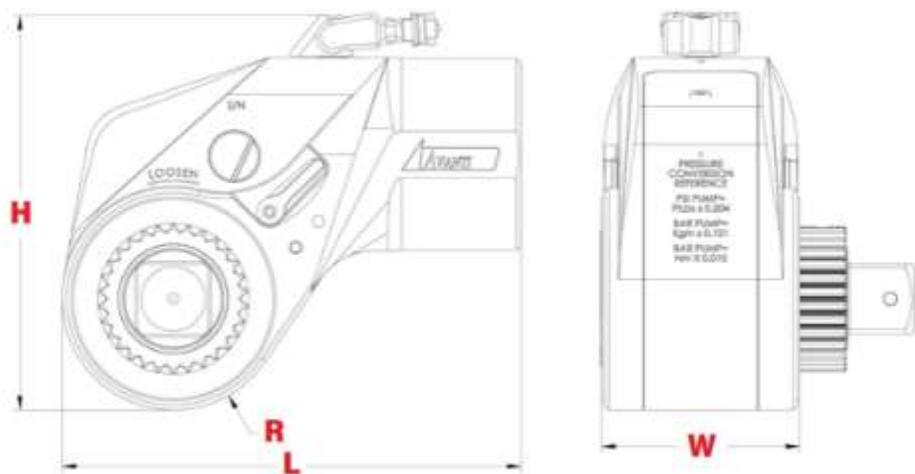
HYTORC Washer



HYTORC Nut

AVANTI Specifications

Available in a broad range of configurations and sizes.



| MODEL NUMBER | H | W | L | R | DRIVE | WEIGHT | TORQUE | |
|--------------|----------------|------|-------|------|-------|--------|----------------|----------------|
| | IMPERIAL (in.) | | | | | lbs. | MIN (ft.-lbs.) | MAX (ft.-lbs.) |
| Avanti - .7 | 4.19 | 1.79 | 4.14 | 0.99 | 3/4 | 3.10 | 115 | 767 |
| Avanti - 1 | 4.76 | 2.18 | 4.71 | 1.13 | 3/4 | 4.50 | 196 | 1,284 |
| Avanti - 3 | 6.20 | 2.90 | 6.15 | 1.52 | 1 | 9.45 | 460 | 3,084 |
| Avanti - 5 | 7.14 | 3.38 | 7.36 | 1.80 | 1-1/2 | 15.60 | 804 | 5,360 |
| Avanti - 8 | 7.90 | 3.86 | 8.24 | 1.94 | 1-1/2 | 20.75 | 1,150 | 7,760 |
| Avanti - 10 | 8.85 | 4.35 | 9.20 | 2.25 | 1-1/2 | 29.20 | 1,800 | 11,743 |
| Avanti - 20 | 10.22 | 5.07 | 10.94 | 2.60 | 2-1/2 | 47.70 | 2,760 | 17,890 |
| Avanti - 35 | 12.22 | 6.23 | 13.45 | 3.19 | 2-1/2 | 82.75 | 4,905 | 31,830 |
| Avanti - 50 | 13.90 | 7.04 | 15.54 | 3.95 | 2-1/2 | 127.70 | 7,202 | 46,126 |
| Avanti - 80 | 16.84 | 7.49 | 19.52 | 4.69 | 3-1/2 | 280.50 | 11,965 | 85,695 |
| Avanti - 130 | 19.40 | 8.50 | 22.73 | 5.31 | 3-1/2 | 585 | 19,395 | 138,510 |

| MODEL NUMBER | METRIC (mm) | | | | DRIVE | kg | MIN (Nm) | MAX (Nm) |
|--------------|-------------|--------|--------|--------|-------|--------|-----------|------------|
| | H | W | L | R | | | | |
| Avanti - .7 | 106.40 | 45.50 | 105.15 | 25.14 | 19.05 | 1.40 | 155.91 | 1,039.91 |
| Avanti - 1 | 120.90 | 55.40 | 119.63 | 28.70 | 19.05 | 2.04 | 265.74 | 1,740.87 |
| Avanti - 3 | 157.50 | 73.70 | 156.21 | 38.60 | 25.40 | 4.32 | 623.70 | 4,181.34 |
| Avanti - 5 | 181.40 | 85.90 | 186.94 | 45.72 | 38.10 | 7.10 | 1,090.07 | 7,267.20 |
| Avanti - 8 | 200.70 | 98.04 | 209.30 | 49.27 | 38.10 | 9.41 | 1,559.20 | 10,521.14 |
| Avanti - 10 | 224.80 | 110.50 | 233.70 | 57.15 | 38.10 | 13.24 | 2,440.50 | 15,921.37 |
| Avanti - 20 | 259.60 | 128.80 | 277.90 | 66.04 | 63.50 | 21.63 | 3,742.10 | 24,255.60 |
| Avanti - 35 | 310.40 | 158.24 | 341.63 | 81.02 | 63.50 | 37.53 | 6,650.30 | 43,155.70 |
| Avanti - 50 | 353.06 | 178.81 | 394.71 | 100.33 | 63.50 | 57.92 | 9,764.60 | 62,538.50 |
| Avanti - 80 | 427.33 | 190.24 | 495.80 | 119.12 | 88.90 | 127.23 | 16,222.40 | 116,186.81 |
| Avanti - 130 | 429.80 | 215.90 | 577.34 | 134.90 | 88.90 | 265.35 | 26,296.08 | 187,794.34 |

STEALTH Features

Industry's most advanced limited clearance hydraulic bolting system. The slim design fits where other tools will not and the dual piston power head provides unparalleled speed and power.

Uniswivel Coupler

360-120 degree coupler adjustment allows free movement and positioning of tool and hoses



Easily Reversible

Simply turn the tool over to change from tighten to loosen – tool clearly labeled.

Lock-Up Release Button

Simply jog the hydraulic pressure and push the release button to release the applied torque and tool if it locks onto the application.

Dual Piston Drive

Second piston driving while first piston is retracting - provides faster cycle stroke than any other other hydraulic tool.

Integrated Reaction Pad

The STEALTH tool provides an integrated reaction pad to quickly brace the tool on adjacent reaction surfaces.

Interchangeable Links with Rapid Release & Installation

Push release pin and hold. Lift power head out of ratchet link. Insert new ratchet link, push release pin to engage new ratchet link.



Release Pin



Link

Power Head

Continuously Slim

The Stealth was the first industrial bolting system in the market to feature a continuous slim body design that fits in even the tightest of confines.



STEALTH Features



STEALTH Reaction Plate Compatible with HYTORC Washer

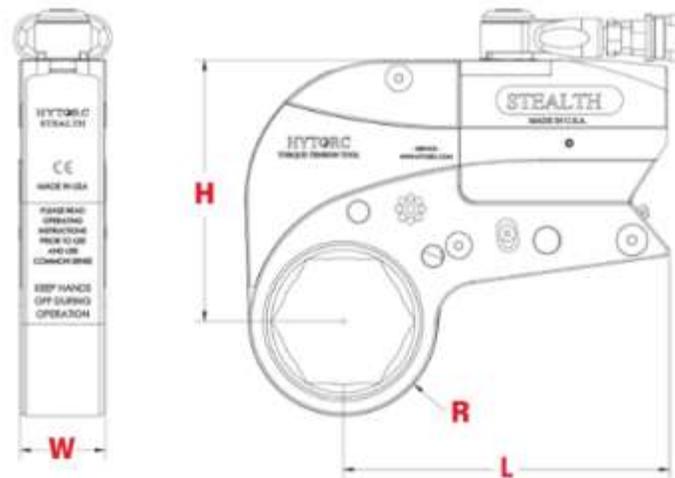
The only low clearance tool compatible with the HYTORC Washer eliminating the need using the reaction pad and a separate reaction surface.



STEALTH Lock-On Adapter for Hands-Free Bolting

For the highest level of safety on industrial bolting jobs, HYTORC recommends hands-free operation. The Stealth Lock-On adapter allows the STEALTH tool to be attached to the stud for hands-free usage in any plane including inverted applications with or without the HYTORC Washer

STEALTH Specifications



| MODEL NUMBER | H | W | L | R | WEIGHT | TORQUE | |
|--------------|-------|------|-------|-------------|--------|----------------|----------------|
| | | | | | | MIN (ft.-lbs.) | MAX (ft.-lbs.) |
| STEALTH - 2 | 4.21 | 1.25 | 5.53 | 1.03 - 1.76 | 4 | 278 | 1,869 |
| STEALTH - 4 | 5.43 | 1.66 | 6.56 | 1.33 - 2.32 | 4.30 | 604 | 4,020 |
| STEALTH - 8 | 6.40 | 2.18 | 8 | 1.77 - 2.89 | 6.70 | 1,199 | 7,984 |
| STEALTH - 14 | 7.94 | 2.50 | 9.35 | 2.32 - 3.47 | 10.40 | 2,105 | 14,255 |
| STEALTH - 22 | 9.18 | 2.91 | 10.80 | 2.62 - 3.87 | 15.40 | 3,250 | 21,875 |
| STEALTH - 36 | 10.81 | 3.41 | 12.71 | 3.07 - 4.80 | 24.10 | 4,917 | 34,722 |

| MODEL NUMBER | H | W | L | R | kg | TORQUE | |
|--------------|--------|-------|--------|---------------|-------|----------|-----------|
| | | | | | | MIN (Nm) | MAX (Nm) |
| STEALTH - 2 | 106.93 | 31.80 | 140.50 | 26.20 - 44.70 | 1.81 | 376.91 | 2,534.02 |
| STEALTH - 4 | 137.92 | 42.20 | 166.62 | 33.80 - 58.92 | 2 | 818.91 | 5,450.40 |
| STEALTH - 8 | 162.60 | 55.40 | 203.20 | 45 - 73.40 | 3.03 | 1,625.62 | 10,824.90 |
| STEALTH - 14 | 201.70 | 63.50 | 241.30 | 58.92 - 81.13 | 4.71 | 2,854 | 19,327.20 |
| STEALTH - 22 | 233.20 | 73.91 | 274.32 | 66.50 - 98.30 | 7 | 4,406.40 | 29,658.51 |
| STEALTH - 36 | 274.60 | 86.61 | 322.83 | 78 - 121.92 | 10.93 | 6,666.55 | 47,076.71 |

STEALTH Applications



HY-115/230 Pump

The HY-115/230 is a high capacity, low-weight, 10,000 psi portable pump designed for continuous/heavy duty operation – will out preform any standard pump.



Analog Pressure Gauge

Pump operates in a range of 500 to 10,000 psi. (+/- 1% accuracy)

4 Ports

Up to four bolting tools of the same type can be connected simultaneously to 4 Port pump.

Oil Reservoir

1.35 Gal (5 liter) with Sight Glass and Drain
- 2.1 Gal (8 liter) option

High Performance Pump

3-stage pump design provides consistent performance over the entire operating range while maintaining low noise less than 69dB.

Oil Cooled

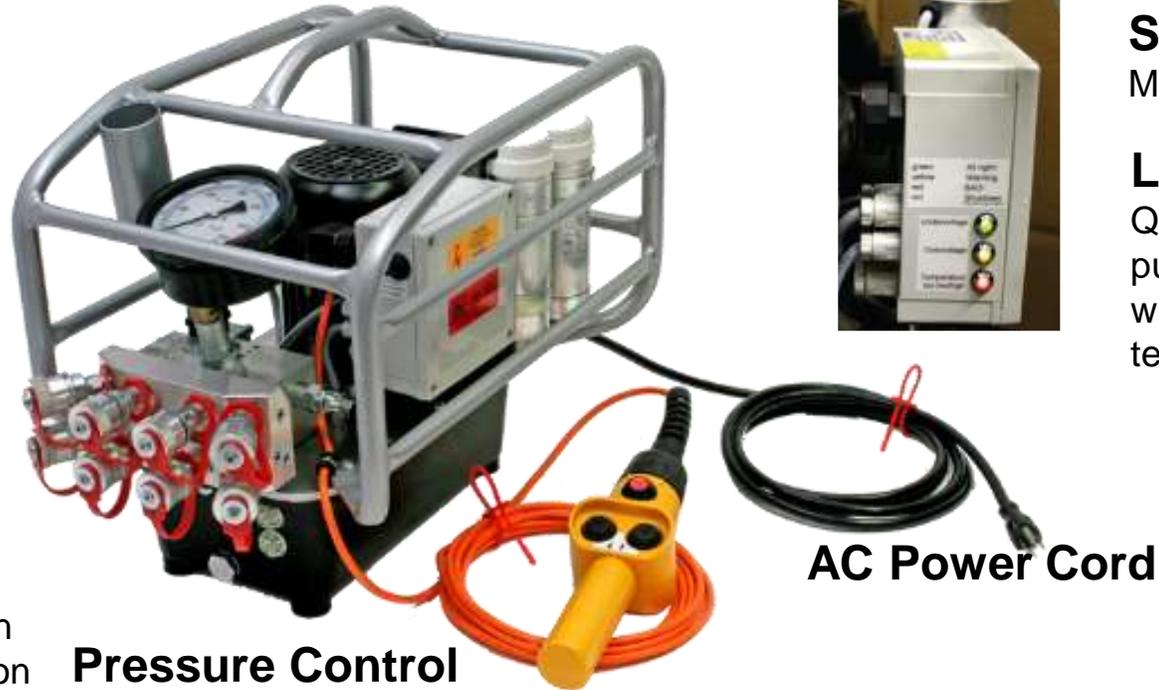
Easily handles extreme work loads.

Simple Controls

Makes setup time easier

LED Indicators

Quickly verify the pump is operating within voltage and temperature limits.



Pressure Control Valve and Lock

Easily adjust and set pump pressure

Remote Control

Start-Stop Buttons, 24V, 15-ft (5m)

AC Power Cord

HY-Air Pump

Innovative air-powered hydraulic pumps are the most reliable pneumatic pumps. Ideal for use within explosive environments or where electricity is unavailable.



Analog Pressure Gauge

Pump operates in a range of 500 to 10,000 psi.



High Performance Pump

3-Stage Hydraulic pump designed to reduce cycle time and improved productivity.

Compact Portable Pump

The compact design with a one or two gallon reservoir alleviates weight restrictions and offers the operator efficient mobility.

Simplified Control

Simple controls make for short set-up times and with the semi-automatic feature, the operators will experience faster and easier tightening.

Air Supply

Air supply input requirement 100psi and 50 cfm.

VECTOR Pump

The VECTOR Pump is the most advanced hydraulic power pack available. The first pump to offer LCD remote control and fully automated regulation – bolting becomes smarter than ever before.

Hand Held LCD Control

Vector pumps do not have a manual torque valve or an external analog pressure gauge, instead the torque is controlled automatically and viewed via the hand-held LCD remote control.



Two primary Versions

Fully Automatic (FA)

The automatic pump is distinguished by a larger manifold for the couplers containing flow meters to measure flow applied to each tool in order to guide the automated bolt tightening.

Manual

The pump does not have the integrated flow meters, instead the pressure is set though the remote control.



High Performance Pump

Powerful 3-stage pump is the world's fastest fully automated pump.

Automated Operation

The operator simply selects the HYTORC tool they are using and the target torque on the remote - then push the button and allow the pump to do the rest.

Data Recording

Record and download all data relevant to the bolting operation.

4 Ports

Up to four bolting tools of the same type can be connected simultaneously to 4 Port pump.

2-Gallon Reservoir

Additional Hydraulic Pumps



BIGJET

Hydraulic Power System for a customer using larger tools and looking for more speed. The Big Jet 3 stage motor will increase oil flow by 30% and thanks to the built in Oil Cooler you won't need to worry about the pump overheating. A compact design with two gallon reservoir alleviates weight restrictions and offers the operator efficient mobility. Simple controls make for short set-up times and with the semi-automatic feature the operators will experience faster and easier tightening.



JETPRO-S

The JETPRO 2 stage hydraulic Power System is the most affordable lightweight pump on the market. The JETPRO's compact design and one gallon reservoir alleviates weight restrictions like no other hydraulic pump which offers the operator efficient mobility. Simple two button manual controls and portability ensures the operators will experience fast and simple bolting. The JETPRO operates at a very quiet 69Db.



HY-TWIN

This hydraulic pump gives the operator the power they need to utilize 10,000 ft. lb. and up Torque Wrenches without compromising speed. Fitted with a 5 gallon reservoir this pump will have enough oil to power up to four large tools at once. Don't worry about the portability because the HY Twin pumps come with wheel casters that ensure you can roll this pump from application to application giving you the mobility you've come to expect when using HYTORC Hydraulic Power Systems.



JETPRO-S-AIR

The JETPRO's compact design and one gallon reservoir alleviates weight restrictions like no other hydraulic pump which offers the operator efficient mobility. Simple one button manual control ensures the operators will experience fast and simple bolting. The HY AIR is an element of HYTORC's ATEX approved Bolting System Package.

H - Hydraulic Torque Tool Procedures

The following operating procedures should be followed to set-up and operate hydraulic torque tools.

- H1 Inspect Tool
- H2 Install Reaction Arm
- H3 Install Socket or Link
- H4 Install Handles
- H5 Set-Up Pump
- H6 Connect Hoses
- H7 Select Pump Pressure
- H8 Adjust Pump to Set Torque
- H9 Position the Tool
- H10 Tighten Bolt
- H11 Release Locked-On Tool
- H12 Loosen Bolt

Inspect Tool

H1 Inspect the Tool before Use

- Check couplers for damage, ensure they are free of debris
- Female coupler has O-ring seated
- Inspect swivels for cracks and damage
- Make sure the swivel retaining ring is attached
- Check the reaction arm for cracks or damage
- Make sure reaction arm is properly attached to tool
- Inspect the housing for cracks/damage
- Inspect reaction spline for damage
- Inspect square derive/linkage for cracks or damage
- Inspect levers for damage



Install Reaction Arm

When using conventional torque with sockets and reaction arms or arm extensions, attach the reaction arm and firmly challenge that the arm is attached to the tool.

H2 Install Reaction Arm

- Slide the reaction arm over the drive spline while aligning the Allen Set Screw with the flat on the Reaction Spline.
- Tighten Allen Set Screw to firmly attach the reaction arm to the spline.
- Challenge the reaction arm to make sure it is firmly secured onto the tool.

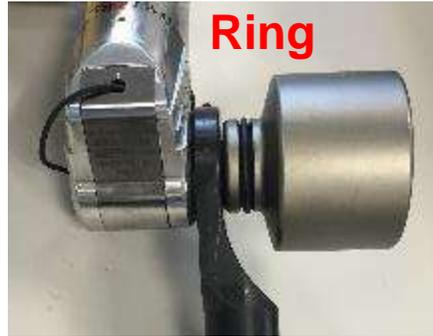
Flat on Spline **Allen Set Screw**



Caution: Never modify a reaction arm! Changes in the reaction arm may lead to personal injury or damage to the tool.

Install Socket or Link

When using conventional torque with sockets or links secure them to the tool.



H3 Install Socket (Square Drive Tools)

- Always Use Premium Impact Grade Sockets
- Always Use the Strongest Socket for the Job
- Always Use the Correct Size Socket
- Take Care with Socket Extensions and Adapters
- Never Use a Cut-Down or Modified Socket
- Inspect Every Socket Before Use
- Slide the socket over the drive and push the Pin through the Socket and the Drive
- Hold Pin in place with a Ring or approved retainer



Or Install Ratchet Link (Low Clearance)

- Always Use the Correct Size Link for the Job
- Simply snap the link in place in the tool
- Challenge the link to make sure it is firmly attached

Install Handles

Always install tool handles if available to ensure maximum safety in handling tools.

H4 Install the Handle

- ❑ Simply thread the handle into the tool with the twist knob on top until firmly attached.
- ❑ Note the tool handle may be easily rotated once the tool is positioned



Set-Up Pump

Use the following procedure to set up, inspect and check standard manual pumps before use.
See more detailed instructions for setting up and operating automated pumps.

H5 Inspect and Setup Pump

- Check power and remote cords for damage
- Check remote control assembly for damage
- Fans are free of debris
- Check oil – fill if to middle of upper site glass
(If oil is dark may be time to replace oil)
- Verify the Following Power Requirements
 - Voltage and frequency supply match the information on the pump plate. (e.g. 120VAC, 60 HZ, 20A Service)
 - AC plug matches voltage/service outlet.
 - Power cable is not damaged.
 - Connected to grounded electrical outlet.
 - Extension cord of equal or greater size to pump cord.
 - Extension cord 12AWG or larger and 50-feet max.**
- Plug-in the Power Cord

Air Powered Pump (optional)

- Verify air supply is 100 psi



Run the Pump

- Turn pump on (green button on remote)
- LED lights should be green
- Check the pressure builds to 10,000 psi in advance, 1,500 psi in retract
- Check for leaks
- Check gauge for damage
- Turn pump off
- Couplers are clean and free of debris



Fill Oil

To middle of upper site glass



Check Pressure

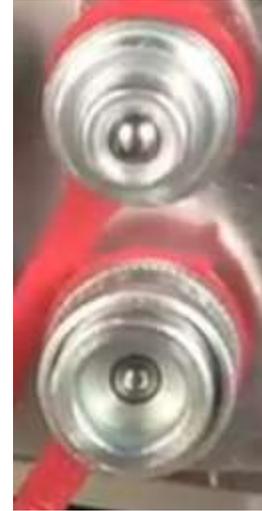
CW increase, CCW decrease

Connect Hoses

HYTORC Hydraulic bolting tools are connected with the same threaded male-female connectors.

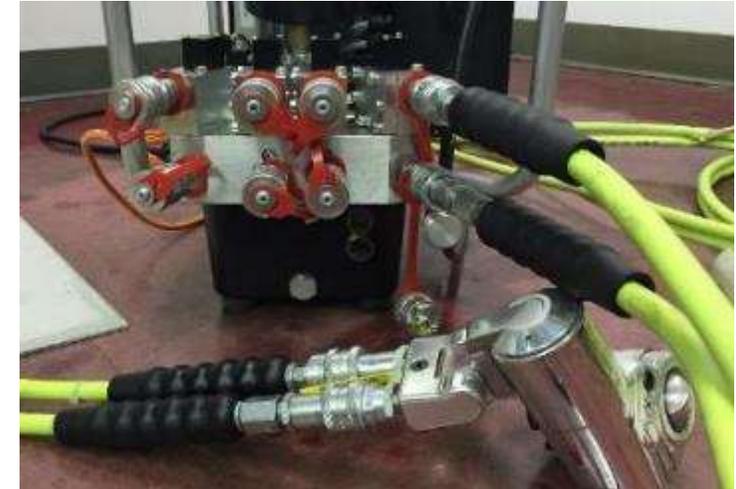
H6 Connect Hoses

- Inspect Hoses –there are no cuts or worn spots
- Inspect High-Pressure Strain Relief – ensure they cover hose with no gaps
- Couplings are clean and free of debris
- Inspect Ball Joints – lightly press ball to test if oil comes out
- Make sure O-rings are seated in female couplings
- Connect Hoses to Pump & Tool
 - Male to female
 - Female to male
 - Should only require finger tight
 - Never use a wrench on couplings
- Turn on Pump, check all connections for leaks



Male

Female



**Blast Caps
(strain relief)**



To extend hose length an odd number of hoses must be used or order a longer hose.



Select Pump Pressure

Each Hydraulic Tool Torque output is calibrated over a range of hydraulic pressures and has it's own torque conversion chart. To achieve a target torque select pressure from the table provided with each tool.

H7 Select Pump Pressure

- Given a target torque (e.g. 750 ft-lbs)
- Read from the chart, required pump pressure(e.g. 4,000 psi).

Torque Conversion Chart for STEALTH-2 Tool calibrated from 1,500 psi (278 ft-lbs) to 10,000 psi (1,869 ft-lbs)

| HYTORC | | | | |
|---|-----------|-----|------|-------------|
| TOOL MODEL: HY-STEALTH 2 with HEX LINK | | | | |
| PRESSURE/TORQUE CONVERSION CHART | | | | |
| Standard Torque Chart | | | | |
| TORQUE CHART FOR TOOLS WITH VALVE REMOVED. FOR SERIAL NUMBER F3110 AND HIGHER | | | | |
| PRESSURE IN | TORQUE IN | | | PRESSURE IN |
| PSI | FT. LBS. | KGM | NM | BAR |
| 1500 | 278 | 38 | 377 | 104 |
| 1600 | 297 | 41 | 403 | 110 |
| 1800 | 336 | 46 | 456 | 124 |
| 2000 | 375 | 52 | 508 | 138 |
| 2200 | 413 | 57 | 559 | 152 |
| 2400 | 450 | 62 | 610 | 165 |
| 2600 | 488 | 67 | 661 | 179 |
| 2800 | 525 | 73 | 712 | 193 |
| 3000 | 563 | 78 | 763 | 207 |
| 3200 | 600 | 83 | 814 | 220 |
| 3400 | 638 | 88 | 865 | 234 |
| 3600 | 675 | 93 | 915 | 248 |
| 3800 | 713 | 99 | 966 | 262 |
| 4000 | 750 | 104 | 1017 | 276 |
| 4200 | 787 | 109 | 1067 | 290 |
| 4400 | 825 | 114 | 1118 | 303 |
| 4600 | 862 | 119 | 1169 | 317 |
| 4800 | 900 | 124 | 1219 | 331 |
| 5000 | 937 | 130 | 1270 | 345 |

| HYTORC | | | | |
|---|-----------|-----|------|-------------|
| TOOL MODEL: HY-STEALTH 2 with HEX LINK | | | | |
| PRESSURE/TORQUE CONVERSION CHART | | | | |
| Standard Torque Chart | | | | |
| TORQUE CHART FOR TOOLS WITH VALVE REMOVED. FOR SERIAL NUMBER F3110 AND HIGHER | | | | |
| PRESSURE IN | TORQUE IN | | | PRESSURE IN |
| PSI | FT. LBS. | KGM | NM | BAR |
| 1500 | 278 | 38 | 377 | 104 |
| 1600 | 297 | 41 | 403 | 110 |
| 1800 | 336 | 46 | 456 | 124 |
| 2000 | 375 | 52 | 508 | 138 |
| 2200 | 413 | 57 | 559 | 152 |
| 2400 | 450 | 62 | 610 | 165 |
| 2600 | 488 | 67 | 661 | 179 |
| 2800 | 525 | 73 | 712 | 193 |
| 3000 | 563 | 78 | 763 | 207 |
| 3200 | 600 | 83 | 814 | 220 |
| 3400 | 638 | 88 | 865 | 234 |
| 3600 | 675 | 93 | 915 | 248 |
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| 4000 | 750 | 104 | 1017 | 276 |
| 4200 | 787 | 109 | 1067 | 290 |
| 4400 | 825 | 114 | 1118 | 303 |
| 4600 | 862 | 119 | 1169 | 317 |
| 4800 | 900 | 124 | 1219 | 331 |
| 5000 | 937 | 130 | 1270 | 345 |
| 5200 | 974 | 135 | 1320 | 358 |
| 5400 | 1011 | 140 | 1371 | 372 |
| 5600 | 1048 | 145 | 1421 | 386 |
| 5800 | 1085 | 150 | 1471 | 400 |
| 6000 | 1122 | 155 | 1521 | 414 |
| 6200 | 1160 | 160 | 1572 | 427 |
| 6400 | 1198 | 166 | 1623 | 441 |
| 6600 | 1235 | 171 | 1675 | 455 |
| 6800 | 1273 | 176 | 1726 | 468 |
| 7000 | 1311 | 181 | 1777 | 482 |
| 7200 | 1348 | 186 | 1827 | 496 |
| 7400 | 1385 | 191 | 1877 | 510 |
| 7600 | 1421 | 197 | 1927 | 524 |
| 7800 | 1458 | 202 | 1977 | 538 |
| 8000 | 1495 | 207 | | |
| 8200 | 1532 | 212 | | |
| 8400 | 1570 | 217 | | |
| 8600 | 1607 | 222 | | |
| 8800 | 1645 | 227 | | |
| 9000 | 1682 | 233 | | |
| 9200 | 1719 | 238 | | |
| 9400 | 1757 | 243 | | |
| 9600 | 1794 | 248 | | |
| 9800 | 1832 | 253 | | |
| 10000 | 1869 | 258 | 2534 | 690 |

Torque Conversion Charts for all HYTORC tools are easily accessed at HYTORC.com

Adjust Pump to Set Torque

H8 Adjust Pump Pressure to Set Torque

- ❑ Loosen the knurled locking ring below the “T” handle on the pump’s external pressure regulator. Then turn the “T” handle counterclockwise (CCW) until it turns freely and easily.
- ❑ Turn the pump “on”. Using the pump’s remote control, push down the advance switch (or button on air pumps) and hold it.
- ❑ While holding the pump in the advance mode, slowly turn the “T” handle clockwise and observe the pump pressure gauge rise. NOTE: Always adjust the regulator pressure up - never down.
- ❑ When your gauge reaches the desired PSI, stop turning the “T” handle and let the gauge settle out.
- ❑ If the pressure continues to rise release the advance button and back off your pressure slightly - by turning CCW on the “T” handle. Then re-depress the advance switch on your remote and slowly bring pressure up to the desired level again.
- ❑ When the pressure is correct, turn the pump “off” and tighten the knurled lock nut provided under the “T” handle. This sets pump pressure, which determines torque tool output.
- ❑ Once your target pressure is set and locked, cycle the pump once more to ensure that your pressure setting did not change as you turned down the knurled knob.



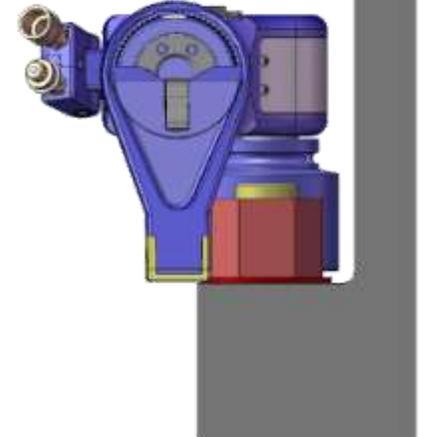
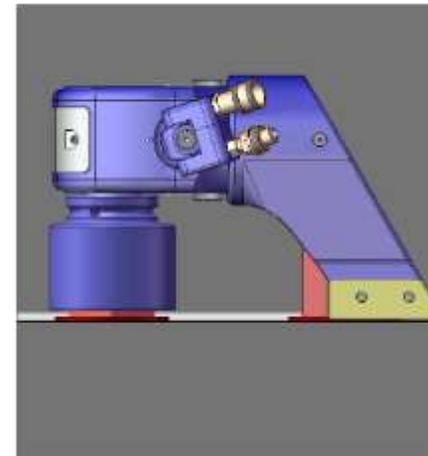
NOTE: Always adjust the regulator pressure up - CW - never down.

Position the Tool

H9 Position Tool and Reaction Arm

- ❑ Make sure the tool is setup appropriately for tighten or loosen.
- ❑ Place the tool socket/link on the nut, making sure that the socket/link has fully engaged the nut.
- ❑ Make sure the reaction arm is firmly abutted against a stationary object (e.g. an adjacent nut, flange, equipment housing etc.)
- ❑ Make sure that the hose connections are well clear of any obstructions, and that all parts are safely out of harm's way.
- ❑ If needed, install back wrench or apply back wrench fixture.
- ❑ THEN, AND ONLY THEN, apply momentary pressure to the system to ensure proper tool placement. If it doesn't look or act right, stop and re-adjust the reaction arm.

Make sure the reaction arm is firmly abutted against a stationary object



Tighten Bolt

H10 Tighten Bolt

- ❑ Push remote advance button, ear of the tool will push back until reaction arm makes contact with reaction surface.
- ❑ Continue to hold advance button as the socket turns until you hear an audible “click” which will signify the tool piston is fully extended and the socket will not turn further.

IMPORTANT: The reading of full preset pressure on the pump after the piston is extended DOES NOT indicate that this pressure (torque) is applied to the bolt. It only indicates that the cylinder is fully extended and cannot turn the socket further until the tool automatically resets itself.
- ❑ Release advance button to retract the tool piston - tool will automatically reset itself and the operator will hear an audible “click” indicating completion of the reset.
- ❑ Continue successive cycles of “PUSH-ADVANCE-CLICK-RELEASE” until the tool “stalls” at the pre-set Torque/PSI – and the nut will no longer visibly turn.
- ❑ ALWAYS ATTEMPT ONE FINAL CYCLE TO INSURE THE “STALL” POINT HAS BEEN REACHED.

Tool Should Read “Tighten”

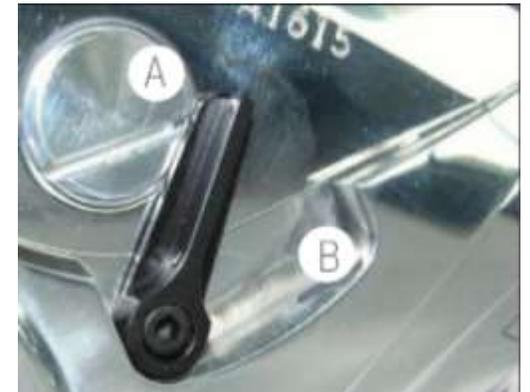
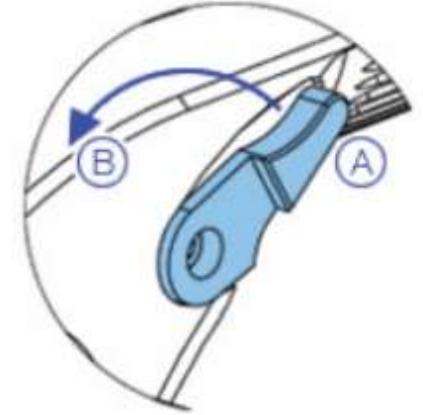


Release Locked-On Tools

Hydraulic tools continue to apply pressure after torque is complete which may lock the tool on to the application. Tools have release buttons/levers to release the pressure to all to tool to be released.

H11 Release Locked-On Tool

- With the pump turned-off, slide the release lever/button to the retract position (B).
- Turn the pump back on and while maintaining pressure, cycle the tool by pushing the button on the remote control.
- Once you can hold the lever/button without resistance, continue holding the button and release the advance button.
- Shut-off the pump
- Remove the tool from the nut.
- Move the release lever back to position A.



The ICE Tool has an automated release feature, generally will not need manual release.

Loosen Bolt

H12 Loosen Bolt

- ❑ Set the pump to 10,000 psi
- ❑ Change tool drive direction to the loosening mode – side labeled “Loosen” should be visible.
- ❑ Position the tool over the nut and assure the reaction arm abuts squarely against a firm reaction point.
- ❑ Press and hold the remote control button down.
- ❑ Pressure will decrease as the socket begins to turn
- ❑ As the piston completes the stroke, you will hear an audible click.
- ❑ Release the remote control button and the piston automatically retracts, again you will hear a click.
- ❑ Repeat the process until the fastener can be removed by hand.
- ❑ NOTE: If the bolt does not release it is an indication that you require a larger tool.

Tool Should Read “Loosen”



2. Pneumatic Torque Tools

Pneumatic Powered Torque Tools



j GUN SINGLE SPEED
.25, .5, 1, 2, 3, 5, 8



j GUN DUAL SPEED
.5, 1, 2, 3, 5, 8



Digital j GUN



FRL

Pneumatic Tool Comparison



**Digital
iGun
(PG. 24)**



**iGun
Single Speed
(PG. 26)**



**iGun
Dual Speed
(PG. 28)**

| | | | |
|-----------------------------------|----|-----|-----|
| Industrial grade gearbox | ✓ | ✓ | ✓ |
| Repeatability within 5% | ✓ | ✓ | ✓ |
| Torque output up to 3,000 ft-lbs | | ✓ | ✓ |
| Torque output beyond 3,000 ft-lbs | ✓ | ✓ | ✓ |
| Industry leading safety | ✓* | ✓* | ✓* |
| Industry leading accuracy | ✓* | ✓* | ✓* |
| Dual speed rundown/torque | | | ✓ |
| Onboard tool readout | ✓ | | |
| Lock-on release | | | |
| Built-in job documentation | | | |
| Wireless/hoseless operation | | | |
| Built-in cycle counter | ✓ | | |
| Operation below 75dB | ✓ | ✓** | ✓** |

* When used with a hytorc washer system

** When used with optional silencer system

jGUN SINGLE SPEED Features

The jGUN Single Speed is the simple choice for air-powered industrial bolting. The tool has industry leading power-to-weight and breakout force - takes over where impact guns and breaker bars don't cut it.



Simple Directional Switch

Switch on the rear face of the tool easily allows the operator to change from tighten to loosen.

Ergonomic Design

The comfort grip, trigger activation and optional silencer ensure the tool operator is comfortable, even on all-day jobs.

Accurate and Repeatable Torque

Provides adjustable and repeatable torque to ensure that bolted joints are assembled right the first time



Rugged Housing

The jGUN series is built using aerospace materials for lightweight design with maximum durability.

Powerful Breakout

The jGUN provides continuous power with no kickback to break out the nuts that other systems can't tackle using precision gearing to give you maximum power without the noise and vibration of impact tools.

Standard Square Drive with Concentric Spline

Provides compatibility with conventional socket drives and reaction arms.

Optional Safety Lever

Patented safety mechanism drastically reduces the chance for operator error which can lead to safety risks. The lever must be depressed while pulling the trigger, thereby ensuring that the tool operator keeps hands away from pinch points.



jGUN SINGLE SPEED Specifications



Multiple Configurations

jGUN is supplied with an standard reaction arm for conventional torque operation with sockets. The tool can also be configured for use with the HYTORC Washer and special drivers such as the wheel gun driver.



| MODEL NUMBER | H | W | L | R | DRIVE | WEIGHT | TORQUE | | RPM |
|--------------|----------------|------|-------|------|-------|--------|----------------|----------------|-----|
| | IMPERIAL (in.) | | | | | lbs. | MIN (ft.-lbs.) | MAX (ft.-lbs.) | |
| J - .25 | 7.06 | 2.72 | 7.15 | 2.5 | 3/4 | 7.2 | 48 | 259 | 65 |
| J - .5 | 7.32 | 2.74 | 8.07 | 2.58 | 3/4 | 7.2 | 129 | 508 | 24 |
| J - 1 | 7.32 | 2.74 | 8.82 | 2.58 | 3/4 | 10 | 301 | 1,231 | 6.5 |
| J - 2 | 7.94 | 3.53 | 10.46 | 3.25 | 1 | 14.5 | 521 | 2,190 | 5.5 |
| J - 3 | 7.94 | 3.53 | 11.11 | 3.25 | 1 | 15.75 | 852 | 3,104 | 5 |
| J - 5 | 8.03 | 4.15 | 12.24 | 4.15 | 1-1/2 | 20.05 | 1,150 | 5,266 | 2.5 |
| J - 8 | 8.46 | 4.23 | 13 | 4.56 | 1-1/2 | 26.5 | 1,743 | 7,924 | 1.5 |

| MODEL NUMBER | METRIC (mm) | | | | | kg | MIN (Nm) | MAX (Nm) | RPM |
|--------------|-------------|--------|--------|--------|-------|-------|----------|-----------|-----|
| | J - .25 | 179.32 | 69.10 | 181.61 | 63.50 | 19.05 | 3.30 | 65.10 | |
| J - .5 | 185.92 | 69.60 | 205.00 | 65.53 | 19.05 | 3.30 | 175.00 | 668.80 | 24 |
| J - 1 | 185.92 | 69.60 | 224.02 | 65.53 | 19.05 | 4.53 | 408.10 | 1,669.01 | 6.5 |
| J - 2 | 201.70 | 89.70 | 265.68 | 82.60 | 25.40 | 6.60 | 706.40 | 2,969.24 | 5.5 |
| J - 3 | 201.70 | 89.70 | 282.20 | 82.60 | 25.40 | 17.14 | 1,155.20 | 4,208.50 | 5 |
| J - 5 | 204.00 | 105.41 | 310.90 | 105.41 | 38.10 | 9.10 | 1,559.20 | 7,139.70 | 2.5 |
| J - 8 | 214.90 | 105.41 | 330.20 | 115.82 | 38.10 | 12.02 | 2,363.20 | 10,743.50 | 1.5 |

jGUN DUAL SPEED Features

For fast run down and powerful torque capability, the Dual Speed jGun Series is the industry's most reliable choice



Simple Directional Switch

Switch on the rear face of the tool easily allows the operator to change from tighten to loosen.



Optional Safety Lever

Patented safety mechanism drastically reduces the chance for operator error which can lead to safety risks. The lever must be depressed while pulling the trigger for the drive to turn, thereby ensuring that the tool operator keeps hands away from pinch points.



Ergonomic Design

The comfort grip, trigger activation and optional silencer ensure the tool operator is comfortable, even on all-day jobs.

3-IN-1 Bolting System

The jGun Dual Speed is the only pneumatic multiplier that gives you the flexibility to use it for rundown, final torque and heavy duty breakout. A simple twist of the collar switches the tool from high speed rundown mode into the max power mode with adjustable torque so you can choose the right output for your job.

Rugged Housing

The jGUN series is built using aerospace materials for lightweight design with maximum durability.

Accurate and Repeatable Torque

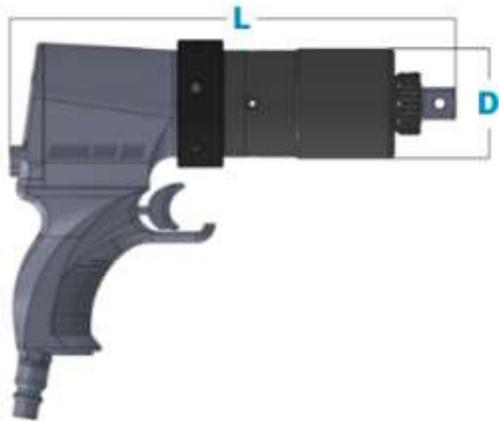
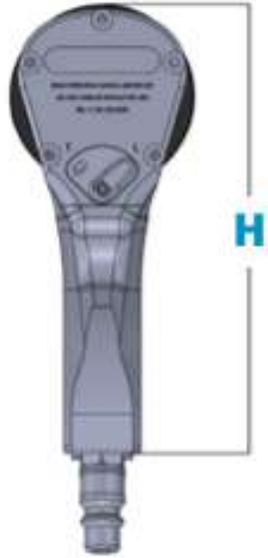
Provides adjustable and repeatable torque to ensure that bolted joints are assembled right the first time

Easily Shift Between High Speed and Max Torque

To shift into high speed mode, push shifter collar down towards the nose of the gun and turn counter-clockwise. To return to Torque mode, simply turn the shifter collar clockwise.



jGUN DUAL SPEED Specifications



Multiple Configurations

jGUN is supplied with an standard reaction arm for conventional torque operation with sockets. The tool can also be configured for use with the HYTORC Washer and special drivers such as the wheel gun driver.

| MODEL NUMBER | H | W | L | R | DRIVE | WEIGHT | TORQUE | | RPM | |
|--------------|----------------|-------|------|------|-------|--------|----------------|----------------|---------|-------|
| | IMPERIAL (in.) | | | | | lbs. | MIN (ft.-lbs.) | MAX (ft.-lbs.) | Rundown | Final |
| J - A.5 - AP | 7.4 | 10.03 | 2.58 | 2.99 | 3/4 | 9.04 | 194 | 259 | 420 | 24 |
| J - A1 - AP | 7.4 | 10.76 | 2.58 | 2.99 | 3/4 | 9.7 | 312 | 508 | 120 | 6.5 |
| J - A2 - AP | 8.42 | 12.51 | 3.25 | 4.48 | 1 | 15 | 520 | 1,231 | 90 | 5 |
| J - A3 - AP | 7.5 | 12.48 | 3.25 | 3.19 | 1 | 12 | 830 | 2,190 | 35 | 2 |
| J - A5 - AP | 8.42 | 14.65 | 4.15 | 4.48 | 1 1/2 | 22.5 | 1,215 | 3,104 | 38 | 2.5 |
| J - A8 - AP | 8.46 | 15.38 | 4.56 | 4.48 | 1 1/2 | 28.75 | 2,079 | 5,266 | 35 | 1.5 |

| MODEL NUMBER | METRIC (mm) | | | | | kg | MIN (Nm) | MIN (Nm) | Rundown | Final |
|--------------|--------------|--------|--------|--------|-------|-------|----------|----------|---------|-------|
| | J - A.5 - AP | 188.00 | 254.80 | 65.53 | 75.94 | 19.05 | 4.10 | 263.02 | 263.02 | 420 |
| J - A1 - AP | 188.00 | 273.30 | 65.53 | 75.94 | 19.05 | 4.40 | 423.01 | 423.01 | 120 | 6.5 |
| J - A2 - AP | 213.90 | 317.80 | 82.60 | 113.80 | 25.40 | 6.80 | 705.02 | 705.02 | 90 | 5 |
| J - A3 - AP | 190.50 | 317.00 | 82.60 | 81.02 | 25.40 | 5.44 | 1,125.32 | 1,125.32 | 35 | 2 |
| J - A5 - AP | 213.90 | 372.11 | 105.41 | 113.80 | 38.10 | 10.20 | 1,647.31 | 1,647.31 | 38 | 2.5 |
| J - A8 - AP | 214.90 | 390.70 | 115.82 | 113.80 | 38.10 | 13.04 | 2,818.74 | 2,818.74 | 35 | 1.5 |

DIGITAL jGUN Features

The Digital jGUN is the world's first torque-adjustable pneumatic multiplier with a digital readout and patented design that eliminates the add-on FRL.

Industrial-Grade Motor

The motor is a workhorse design for heavy industrial use with maximum power and rugged corrosion resistance. This motor eliminates the need for separate air filters and lubricators increasing overall portability and flexibility.

Built-In Torque Adjustment

First industrial torque tool with an onboard air regulator for simple torque adjustment with the twist of the connector at the bottom of the handles. Especially convenient to switch to loosening with full power for fast and easy break-out.

Highest Power to Weight

The design includes enhanced air flow and planetary gearing system combined with the use of innovative aluminum alloys gives the highest power to weight ratio of any tool in the industry and unparalleled durability.

Ergonomic Design

New ergonomic handle design with pistol grip and single finger activation provide comfortable operation even in the most rugged applications.



Standard Square Drive with Concentric Reaction Spline

Designed with a standard square drive and reaction spline provides easy use in conventional torque application using reaction arms and sockets and efficient torque transfer.

Simple Directional Switch with Built-In Safety

Simply push the button beneath the barrel to change from tighten to loosen. As a safety feature the operator must engage this switch to activate the trigger keeping the second hand away from the reaction arm.



Digital Readout

First industrial torque multiplier with an onboard digital readout for instant confirmation of selected torque and pressure.

On-Board Processor

Provides automated torque and unit conversion eliminating the need for pressure-to-torque tables or calculations.

Push Button Setup

Operator can easily adjust torque and pressure for desired units.

DIGITAL jGUN Specifications



Flexible Configuration

The Digital jGUN is easily configured for use with the HYTORC Washer and HYTORC Nut.



| MODEL NUMBER | H | W | L | R | DRIVE | WEIGHT | TORQUE | |
|--------------|----------------|-------|--------|--------|-------|--------|----------------|----------------|
| | IMPERIAL (in.) | | | | | lbs. | MIN (ft.-lbs.) | MAX (ft.-lbs.) |
| DJ - .25 | 7.06 | 2.72 | 7.15 | 2.50 | 3/4 | 7.20 | 48 | 259 |
| DJ - .5 | 7.32 | 2.74 | 8.07 | 2.58 | 3/4 | 7.20 | 129 | 508 |
| DJ - 1 | 7.32 | 2.74 | 8.82 | 2.58 | 3/4 | 10 | 301 | 1,231 |
| DJ - 2 | 7.94 | 3.53 | 10.46 | 3.25 | 1 | 14.50 | 521 | 2,190 |
| DJ - 3 | 7.94 | 3.53 | 11.11 | 3.25 | 1 | 15.75 | 852 | 3,104 |
| DJ - 5 | 8.03 | 4.15 | 12.24 | 4.15 | 1-1/2 | 20.05 | 1,150 | 5,266 |
| DJ - 8 | 8.46 | 4.23 | 13 | 4.56 | 1-1/2 | 26.50 | 1,743 | 7,924 |
| | METRIC (mm) | | | | | kg | MIN (Nm) | MAX (Nm) |
| DJ - .25 | 191.80 | 79.24 | 176.53 | 63.50 | 19.05 | 3.74 | 67.80 | 340 |
| DJ - .5 | 191.80 | 79.24 | 204 | 65.53 | 19.05 | 3.74 | 183.03 | 677.90 |
| DJ - 1 | 191.80 | 79.24 | 223.30 | 65.53 | 19.05 | 4.44 | 474.53 | 1,559.20 |
| DJ - 2 | 205.50 | 82.04 | 274.06 | 82.55 | 25.40 | 7.48 | 732.14 | 2,833.65 |
| DJ - 3 | 205.50 | 82.04 | 291.10 | 82.55 | 25.40 | 8.02 | 1,160.58 | 4,311.50 |
| DJ - 5 | 205.50 | 82.04 | 311.40 | 105.41 | 38.10 | 10.52 | 1,559.20 | 6,846.90 |
| DJ - 8 | 205.50 | 82.04 | 342.64 | 115.82 | 38.10 | 13.40 | 2,474.40 | 10,711 |

FRL Features

The Filter Regulator Lubricator (FRL) provides clean, reliable and precise air supply to the jGUN Tools.

Filter

Removes debris or water from the air line, can be drained as needed with valve at bottom.

Fittings

The FRL is supplied with a variety of fittings allowing the unit to be quickly connected to most common hoses.



Regulator

Meters input air pressure accurately controlling the torque output of the tool.



Tool Hose

Lubricator

Introduces a fine mist of oil into the air stream to lubricate the internal components of the tool to protect them from corrosion or damage.

To fill, depress the detent and twist the clear plastic reservoir to remove it, fill to the indicator mark with a quality air tool oil.

With air flowing to the tool you can see oil drops in the clear plastic knob on top of the lubricator.

Unscrewing increases the flow, screwing in decreases the flow.

Adjust the knob to approximately 1 drop every 10 seconds.

J - jGUN Torque Tool Procedures

The following procedures should be followed to operate the jGUN tools.

- J1 Inspect Tool
- J2 Install Reaction Arm
- J3 Install Socket
- J4 Verify Air Supply
- J5 Setup FRL and Connect Hoses
- J6 Test Flow and Adjust Lubrication
- J7 Shift Tool Speed (jGUN DUAL SPEED)
- J8 Select the Air Pressure for Target Torque
- J9 Adjust the Air Pressure
- J10 Tighten Bolt
- J11 Release Locked-On Tool
- J12 Loosen Bolt

Inspect Tool

J1 Inspect Tool before Use

- Inspect the housing for cracks/damage
- Check square drive/linkage for cracks or damage
- Inspect reaction spline for damage
- Check the reaction arm for cracks or damage
- Make sure reaction arm is properly attached to tool
- Inspect levers and triggers for damage
- Check pneumatic couplers for damage
- Check the FRL unit for any damage or leaks



Install Reaction Arm

Where tools are supplied with separate reaction arms or arm extensions, attach the reaction arm per manufacturer guidelines and firmly challenge that the arm is attached to the tool.

J2 Install Reaction Arm

- ❑ Slide the reaction arm over the drive spline while aligning the Allen Set Screw with the flat on the Reaction Spline.
- ❑ Reaction arm should always point away from the tool.
- ❑ Tighten Allen Set Screw to firmly attach the reaction arm to the spline.
- ❑ Challenge the reaction arm to make sure it is firmly secured onto the tool.



**Flat on
Reaction
Spline**



**Allen
Set
Screw**



- ❑ Follow instructions for installing special reaction arms such as the wheel gun reaction arm.



Caution: Never modify a reaction arm! Changes in the reaction arm may lead to personal injury or damage to the tool.

Install Socket

J3 Install Socket

- ❑ Always Use Premium Impact Grade Sockets
- ❑ Always Use the Strongest Socket for the Job
- ❑ Always Use the Correct Size Socket
- ❑ Take Care with Socket Extensions and Adapters
- ❑ Never Use a Cut-Down or Modified Socket
- ❑ Inspect Every Socket Before Use
- ❑ Slide the socket over the drive and push the Pin through the Socket and the Drive
- ❑ Hold Pin in place with a Ring or approved retainer



Verify Air Supply

J4 Verify Air Supply

- ❑ Verify the air supplied for pneumatic torque gun operation is a minimum of **30 cu-ft/min and 90psi.**
- ❑ Verify that the supply hose has a minimum ID of $\frac{1}{2}$ " – a $\frac{3}{4}$ " ID hose is preferred.
- ❑ Where the air supply is not sufficient, the tool will sputter to a stall. The tool will not produce the correct output without a consistent flow of air
- ❑ Insufficient air supply may result in the tool not being functional



Setup FRL & Connect Hoses

J5 Setup the FRL – With the Air Supply Off

- ❑ Check the FRL and hoses for damage
- ❑ Connect the supply side hose to shop air, using appropriate fittings and Teflon tape as required
- ❑ Connect the tool side of the FRL to the tool using appropriate fittings and Teflon tape as required
- ❑ Check lubricator reservoir, to fill, depress the detent on the bottom and twist the clear plastic reservoir to remove it, fill to the indicator mark with a quality air tool oil.

Connect the Supply Side



Connect the Tool Side



Fill the Reservoir

Fill to the indicator mark with a quality air tool oil.



Test Flow and Adjust Lubrication

The FRL lubrication is not required when using the Digital jGUN.

J6 Test Flow and Adjust Lubrication

- Turn on the Air Supply
- Test the Tool by pulling the trigger and make sure the socket turns continually with no resistance
- With air flowing to the tool you can see oil drops in the clear plastic knob on top of the lubricator.
- Unscrewing increases the flow, screwing in decreases the flow.
- Adjust the knob to approximately 1 drop every 10 seconds.



Select Air Pressure for Target Torque

Each jGUN is calibrated over a range of pressures and has its own unique pressure torque conversion chart. To achieve a target torque select pressure from the table provided with each tool.

J7 Select Air Pressure

- ❑ Given a target torque e.g. 575 ft-lbs
- ❑ Look down the ft-lb column on the chart for 575 ft-lbs (it is close to 577 ft-lbs), read the corresponding air pressure(e.g. 40 psi).

TOOL MODEL: DUAL SPEED J-1
JA101365
PRESSURE / TORQUE CONVERSION CHART

| PRESSURE | | TORQUE | | |
|----------|------|--------|-------|-----|
| psi | bar | ft-lbs | kgf-m | N-m |
| 20 | 1.38 | 315 | 44 | 427 |
| 25 | 1.72 | 380 | 53 | 516 |
| 30 | 2.07 | 446 | 62 | 605 |
| 35 | 2.41 | 511 | 71 | 693 |
| 40 | 2.76 | 577 | 80 | 782 |
| 45 | 3.10 | 642 | 89 | 871 |
| 50 | 3.45 | 708 | 98 | 959 |

Adjust Air Pressure

To achieve a target torque set the air pressure according to the pressure torque conversion chart.

J8 Adjust Air Pressure

- ❑ With the FRL on a stable surface, adjust the air pressure to the pressure selected from the Torque Conversion chart for the specific tool.
- ❑ Always adjust the pressure from low to high.



Shift Tool & Run Down Nuts

The jGUN DUAL SPEED has two modes, shift to the desired mode before operating.

J9 Shift Tool & Run Down Nuts

- ❑ Shift the jGUN DUAL SPEED into high-speed mode by turning the collar at the rear of the drive, sliding the collar toward the operator.
- ❑ Test the Tool by pulling the trigger and make sure the square socket turns continually with no resistance
- ❑ Use the tool to quickly run down the nuts in the high speed mode.

Note: In the high speed mode the jGun operates at several hundred revolutions per minute while torque is limited so the tool does not kick back.

The reaction arm does not engage until the tool is shifted into torque mode

- ❑ When finished with run down, turn and slide the collar toward the front of the tool away from the operator to shift into the torque mode.

Shift to High Speed



Run Down Nuts



Shift Back to Torque Mode



Tighten Bolt

J10 Tighten Bolt

- ❑ Verify air pressure is correctly adjusted.
- ❑ If using the jGUN DUAL SPEED Tool, make sure the tool is shifted to torque mode.
- ❑ Make sure direction lever is switched to T.
- ❑ Position Tool on nut to be tightened
- ❑ Adjust the reaction arm so it is positioned against a firm rigid surface
- ❑ Pull the trigger (and simultaneously push the safety plate lever on the rear if provided) of the tool to apply torque in clockwise direction
- ❑ Run the tool until it stalls and no longer turns the socket/nut

Make sure the directional lever is switched to the Torque (T) mode for CW tightening.



When using the rear optional safety plate, the tool drive will not turn unless the safety plate lever is pushed while simultaneously pulling the trigger – keeping operator hands out of the danger zone.

Release Locked-On Tools

The jGUN tools stall and continue to apply pressure after the target torque has been reached which may lock the tool on to the application.

J11 Release Locked-On Tool

- ❑ To release the tool from the application first set the directional switch to the Loosen (L) position.
- ❑ Jog the trigger once to begin moving the reaction arm in the opposite direction.
- ❑ Once the reaction arm no longer touches the reaction surface lift the tool off the nut.

Make sure the directional lever is switched to the Loosen (L) mode for CCW release.



Loosen Bolt

J12 Loosen Bolt

- ❑ Adjust air pressure to maximum.
- ❑ If using the jGUN DUAL SPEED Tool, make sure tool is shifted to the low-speed torque mode
- ❑ Shift the directional control lever to L.
- ❑ Position tool over the nut to be loosened
- ❑ Make sure the reaction arm is positioned against a firm rigid surface – note that the reaction arm will now turn in the clockwise direction
- ❑ Pull the trigger (and simultaneously push the safety plate lever on the rear of the tool) to apply torque in the counterclockwise direction
 - In the loosen mode the jGUN provides the maximum output of the tool to provide a smooth and powerful breakout.**
- ❑ Loosen the nut until it can be turned by hand.



Make sure the directional lever is switched to the Loosen (L) mode for CCW loosening.



When using the rear optional safety lever plate, the tool drive will not turn unless the safety plate lever is pushed simultaneously with the trigger – keeping operator hands out of the danger zone.

DJ – Digital jGUN Operating Procedures

The following procedures should be followed to operate the Digital jGUN tools.

- DJ1 Inspect Tool
- DJ2 Install Reaction Arm
- DJ3 Install Socket
- DJ4 Verify Air Supply
- DJ5 Connect Hoses
- DJ6 Set Display
- DJ7 Tighten Bolt
- DJ8 Loosen Bolt
- DJ9 Charge Tool

Inspect Tool

DJ1 Inspect Tool before Use

- Inspect the housing for cracks/damage
- Check square drive/linkage for cracks or damage
- Inspect reaction spline for damage
- Check the reaction arm for cracks or damage
- Make sure reaction arm is properly attached to tool
- Inspect levers and triggers for damage
- Check pneumatic couplers for damage
- Check LCD screen and buttons for damage



Install Reaction Arm

Where tools are supplied with separate reaction arms or arm extensions, attach the reaction arm per manufacturer guidelines and firmly challenge that the arm is attached to the tool.

DJ2 Install Reaction Arm

- ❑ Slide the reaction arm over the drive spline while aligning the Allen Set Screw with the flat on the Reaction Spline.
- ❑ Reaction arm should always point away from the tool.
- ❑ Tighten Allen Set Screw to firmly attach the reaction arm to the spline.
- ❑ Challenge the reaction arm to make sure it is firmly secured onto the tool.



Caution: Never modify a reaction arm! Changes in the reaction arm may lead to personal injury or damage to the tool.

Install Socket

DJ3 Install Socket

- Always Use Premium Impact Grade Sockets
- Always Use the Strongest Socket for the Job
- Always Use the Correct Size Socket
- Take Care with Socket Extensions and Adapters
- Never Use a Cut-Down or Modified Socket
- Inspect Every Socket Before Use
- Slide the socket over the drive and push the Pin through the Socket and the Drive
- Hold Pin in place with a Ring or approved retainer



Verify Air Supply

DJ4 Verify Air Supply

- ❑ Verify the air supplied for pneumatic torque gun operation is a minimum of **50 cu-ft/min and 90psi.**
- ❑ Verify that the supply hose has a minimum ID of $\frac{1}{2}$ " – a $\frac{3}{4}$ " ID hose is preferred.
- ❑ Where the air supply is not sufficient, the tool will sputter to a stall. The tool will not produce the correct output without a consistent flow of air
- ❑ Insufficient air supply may result in the tool not being functional



Connect Hoses

DJ5 Connect Hoses

– With the Air Supply Off

- Check the hoses for damage
- Connect the supply hose to the Digital jGUN with appropriate fittings and Teflon tape as required



Set Display

DJ6 Set Display

- ❑ Center Button - Power On – Push the center button to turn the tool on – toggle again to turn the tool off.
- ❑ Left button – Toggle between TORQUE and PRESSURE mode on the display
- ❑ Right Button – When in TORQUE mode, toggle the right button to display torque in different units including PSI, bar and KPa. When in PRESSURE mode, toggle to display different units including ft-lbs and Nm.

NOTE: The digital jGUN contains a calibrated pressure sensor and a processor that can convert and display units of psi, bar and Kpa. The processor has a built in torque conversion chart to convert the pressure to torque – essentially eliminating the need for a separate torque conversion chart.

IMPORTANT: The push buttons on the digital jGUN control only what units is displayed, they do not control the power output or direction of the tool.



Tighten Bolt

DJ7 Tighten Bolt

- Push the Center Button to turn the tool on.
- Adjust the pressure regulator until the desired torque is displayed on the digital display.
- Position Tool on nut to be tightened
- Adjust the reaction arm so it is positioned against a firm rigid surface
- Pull the trigger to apply torque in clockwise direction
Note: To activate the drive the directional control button must be pushed in and held while depressing the trigger. Once started the trigger will hold the directional button in position and both hands can be used to hold the tool.
- Run the tool until it stalls and no longer turns the socket/nut

Release Locked-On Tool

- To release locked-on tool switch the directional control to loosen and jog the trigger to release the tool – adjust pressure regulator to increase pressure as needed.



Make sure the directional switch is pushed in on the left side of the tool and then hold the switch while pulling the trigger to turn the drive clockwise. This is a safety feature to have the operator keep both hands away from danger zones when starting up the tool.

Loosen Bolt

DJ8 Loosen Bolt

- ❑ Push the center button to turn on the tool
- ❑ Shift the directional control lever to the loosen mode
- ❑ Position tool over the nut to be loosened
- ❑ Make sure the reaction arm is positioned against a firm rigid surface – note that the reaction arm will now turn in the clockwise direction
- ❑ Pull the trigger to apply torque in the counterclockwise direction

Important: In the loosen mode the jGUN provides the maximum output of the tool to provide a smooth and powerful breakout.

Note: The trigger cannot be depressed unless the directional button is displaced. Once depressed the trigger will hold the directional button in position and both hands can be used to hold the tool.

- ❑ Loosen the nut until it can be turned by hand.



Make sure the directional control switch is switched to the Loosen (L) mode for CCW loosening.



Charge Battery

The Digital jGun contains a non-removable rechargeable Li-Ion Battery that powers the Display Electronics. Follow the instructions below for charging the battery.

DJ9 Charge Battery

- Monitor the three-segment battery charge indicator on the lower right side of the screen - when the level drops the tool can easily be recharged.
- Use the USB cable provided in the case with the tool to recharge the tool.
- Connect the charger to the USB connector on the right side of the display housing on the rear of the gun.
- The battery will be recharged in less than an hour - it is fully charged as indicated by three bars.



3. Electric Torque Tools

Electric Powered Torque Tools

Corded



FLASH 2.0
1, 2, 3

Cordless



Lithium Series
BTM
250, 700, 1000, 2000, 3000

Industrial

Commercial



LION GUN
250, 700

FLASH 2.0 Features

The Flash Gun Series offers continuous power with unprecedented repeatability and documentation capability to ensure that the bolted joint is assembled right the first time and maintains the torque over time.

Industrial Grade Repeatability

For maximum joint integrity, all of the bolts on a connection need to have an even and accurate load. The Flash Gun provides industry-leading repeatability to ensure that the bolted joint is assembled right the first time and maintains the torque over time.



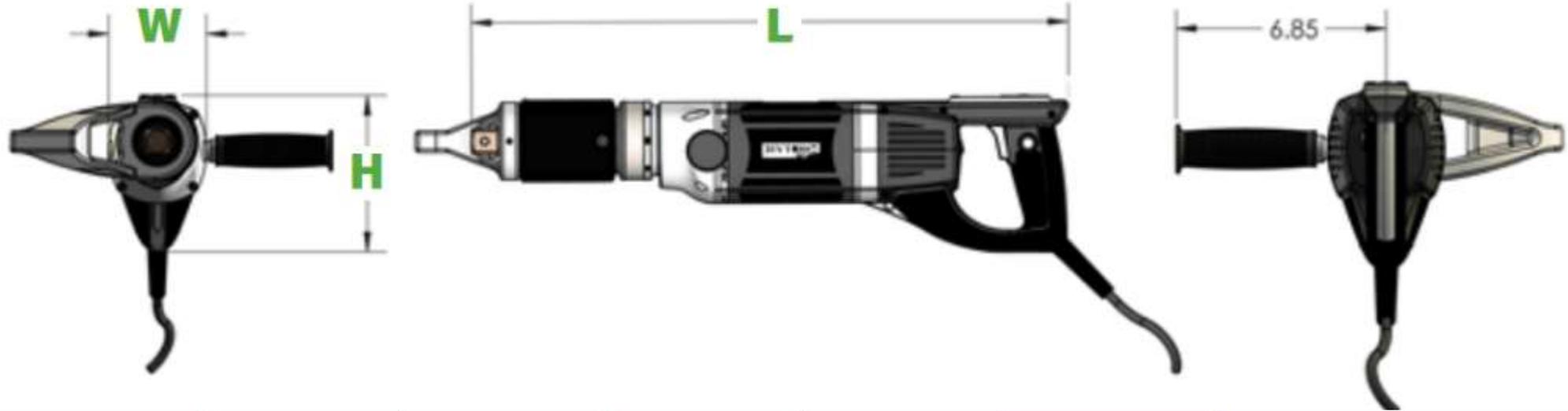
Dual-Speed Operation

With a shift collar, the Flash Gun goes from high speed rundown mode to accurate final torque mode, eliminating the need for multiple systems on a job. The precision machined gearbox provides constant power without the vibration and noise found in impact guns. Adjust the power through the digital readout on the back of the gun to fine-tune the torque output for any job.

Data Recording

Built-in data recording capability allows the user to maintain a log of all completed bolting jobs. For improved quality control and accountability, the information can be saved to a PC or tablet to provide a permanent record of the work performed.

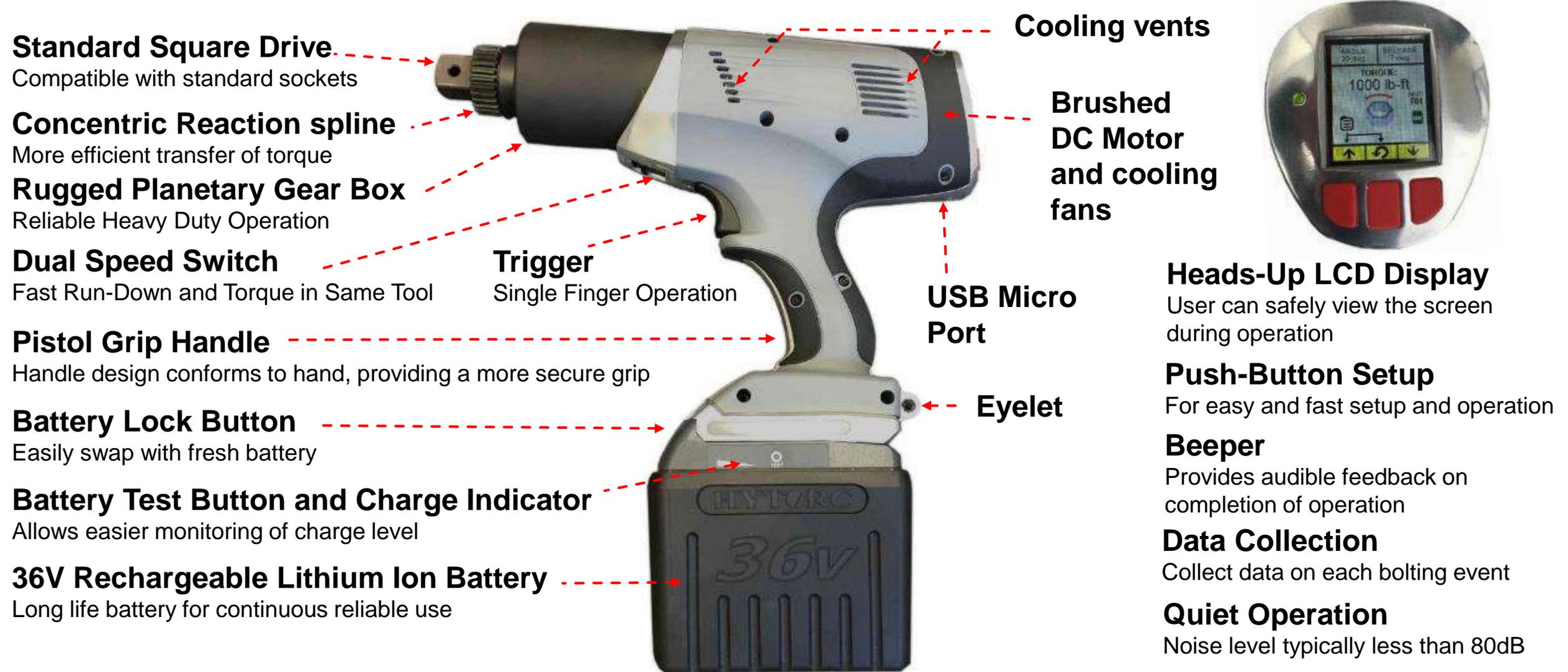
FLASH 2.0 Specifications



| MODEL NUMBER | H | W | L | DRIVE | WEIGHT | TORQUE | |
|--------------|----------------|-------|--------|-------|--------|----------------|----------------|
| | IMPERIAL (in.) | | | | lbs. | MIN (ft.-lbs.) | MAX (ft.-lbs.) |
| FLA - 1000 | 6.15 | 3.83 | 21.4 | 3/4 | 14.2 | 120 | 1,000 |
| FLA - 3000 | 6.15 | 3.83 | 23.4 | 1 | 18.5 | 315 | 3,000 |
| FLA - 5000 | 6.3 | 3.83 | 24.9 | 1-1/2 | 23.3 | 520 | 5,000 |
| | METRIC (mm) | | | | kg | MIN (Nm) | MAX (Nm) |
| FLA - 1000 | 156.21 | 97.30 | 543.60 | 19.05 | 6.44 | 162.70 | 1,355.81 |
| FLA - 3000 | 156.21 | 97.30 | 594.40 | 25.40 | 8.39 | 427.10 | 4,067.50 |
| FLA - 5000 | 160.02 | 97.30 | 632.50 | 38.10 | 10.56 | 705.02 | 6,779.10 |

LITHIUM SERIES Features

The LITHIUM SERIES Battery Gun is a rugged industrial tool designed for precise application of torque using electronic control features packaged in an ergonomic hand-held tool.



Standard Square Drive
Compatible with standard sockets

Concentric Reaction spline
More efficient transfer of torque

Rugged Planetary Gear Box
Reliable Heavy Duty Operation

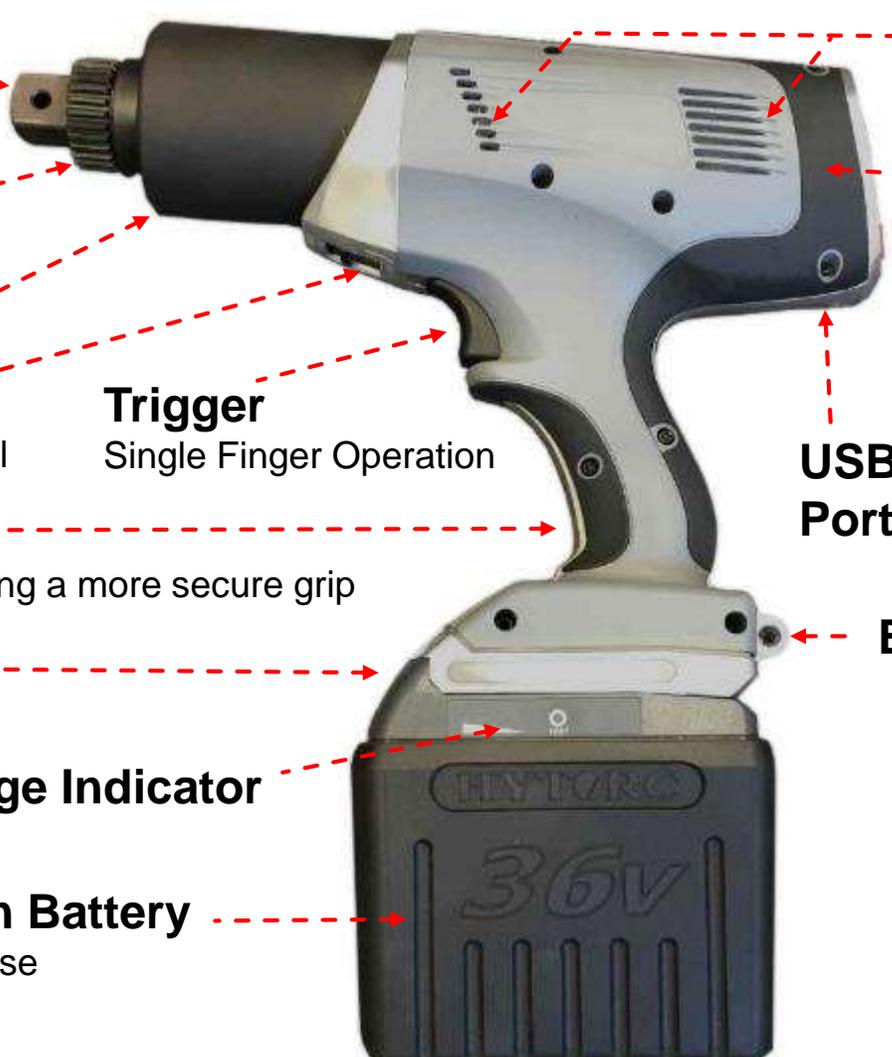
Dual Speed Switch
Fast Run-Down and Torque in Same Tool

Pistol Grip Handle
Handle design conforms to hand, providing a more secure grip

Battery Lock Button
Easily swap with fresh battery

Battery Test Button and Charge Indicator
Allows easier monitoring of charge level

36V Rechargeable Lithium Ion Battery
Long life battery for continuous reliable use



Trigger
Single Finger Operation

Cooling vents

Brushed DC Motor and cooling fans

USB Micro Port

Eyelet



Heads-Up LCD Display
User can safely view the screen during operation

Push-Button Setup
For easy and fast setup and operation

Beeper
Provides audible feedback on completion of operation

Data Collection
Collect data on each bolting event

Quiet Operation
Noise level typically less than 80dB

LITHIUM SERIES Control Panel Features

Tool has (3) push-buttons and a simple graphical LCD Display Screen on the rear to control all functions, menus and features.



LITHIUM SERIES Dual Mode Control

The Lithium Tool has a toggle switch beneath the barrel to easily change drive from High-Power “TORQUE” to Fast “RUNDOWN”.”

TORQUE



RUNDOWN



The dual mode provides greater speed and productivity allowing the operator to use one tool for run-down and torque.

LITHIUM SERIES Data Recording

The LITHIUM SERIES Tools can record and store torque data in the tool memory and when complete a CSV file can be downloaded with a complete record for the job.

USB Connection to tool



Automatically record torque parameters for all events.

Reduces the time and cost of automatically collecting data at the source, allowing data to be used for quality assurance and as a permanent job record.

Stores up to 9999 jobs

Allows better administrative tracking of each bolt and each job, file transfer can occur after the fact so that does not impact work schedules.

Standard USB - PC connection to tool.

Use readily available USB cables, saves time and cost for downloading data

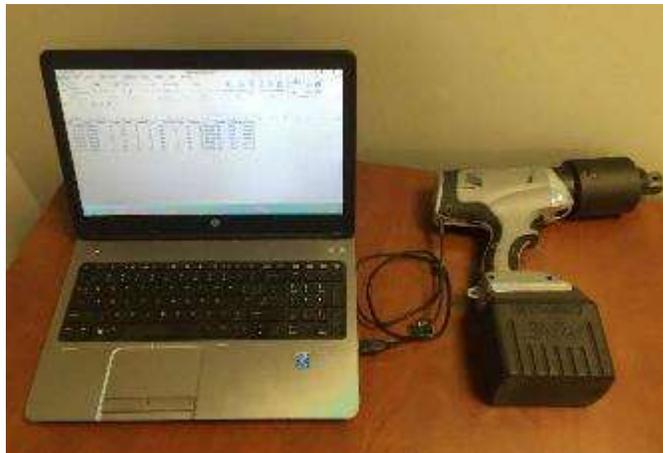
Plug-and-play file transfer to a PC.

Data may be easily transferred to a PC by simply connecting the cable.

File automatically generated in a standard CSV format

CSV format is imported in the PC as an Excel file (when Excel is installed on the PC) making it faster to analyze and share data.

USB Connection to computer



LITHIUM SERIES Configurations

The Lithium Series Tool may be quickly configured for different configurations.

**Conventional Reaction Arm
and Socket**



**Compatible with Standard
Sockets and Reaction Arms**

Conventional torque applications
consistent with existing procedures.

**Dual Driver for HYTORC
Washer System**



**HYTORC Reaction Washer
Eliminates Reaction Arm**

Eliminates dangerous pinch points and
significantly improved safety.

**HYTORC Backup Washer
Eliminates Backup Wrench**

Eliminates backup wrenches means faster and
safer operation

Driver for HYTORC Nut

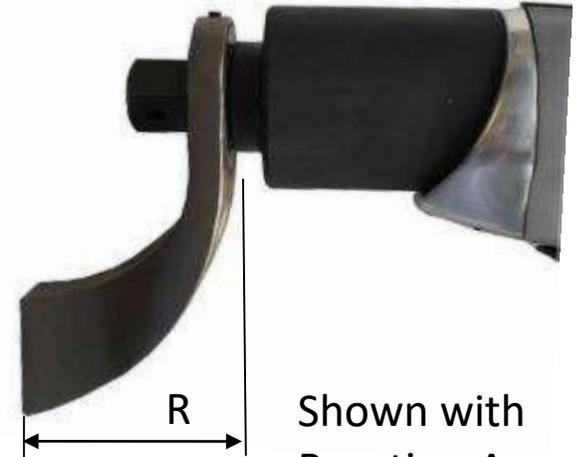


HYTORC Nut

Precision application of torque
for mechanical tensioning

LITHIUM SERIES Specifications

The Lithium Series consists of a series of 36V power tools with following specifications.



Shown with Reaction Arm

| MODEL NUMBER | H | W | L | R | DRIVE | WEIGHT | TORQUE | |
|--------------|----------------|------|-------|-------|-------|--------|----------------|----------------|
| | IMPERIAL (in.) | | | | | lbs. | MIN (ft.-lbs.) | MAX (ft.-lbs.) |
| BTM - 0250 | 12.85 | 3.47 | 10.12 | 2.50 | 1/2 | 9.52 | 35 | 325 |
| BTM - 0700 | 12.85 | 3.47 | 11.12 | 2.58 | 3/4 | 10.20 | 150 | 700 |
| BTM - 1000 | 12.85 | 3.47 | 11.44 | 2.58 | 3/4 | 10.60 | 200 | 1,200 |
| BTM - 2000 | 13.20 | 3.47 | 11.44 | 3.187 | 1 | 14.20 | 325 | 2,000 |
| BTM - 3000 | 13.20 | 3.47 | 13.29 | 3.187 | 1 | 15.60 | 500 | 3,000 |

| MODEL NUMBER | METRIC (mm) | | | | | kg | MIN (Nm) | MAX (Nm) |
|--------------|-------------|--------|--------|--------|-------|-------|----------|----------|
| | BTM - 0250 | 326.40 | 88.13 | 257.04 | 63.50 | 12.70 | 4.31 | 47.50 |
| BTM - 0700 | 326.40 | 88.13 | 282.44 | 63.50 | 19.05 | 8.64 | 203.40 | 949.07 |
| BTM - 1000 | 326.40 | 88.13 | 290.60 | 65.53 | 19.05 | 8.64 | 271.20 | 1,627 |
| BTM - 2000 | 338.30 | 88.13 | 290.60 | 80.94 | 25.40 | 6.44 | 440.64 | 2,711.63 |
| BTM - 3000 | 338.30 | 88.13 | 337.60 | 80.94 | 25.40 | 7.07 | 677.90 | 4,067.50 |

LION GUN Features

The LION GUN is a rugged industrial tool designed for precise application of torque using electronic control features packaged in an ergonomic hand-held tool

Standard Square Drive

Compatible with standard sockets

Concentric Reaction spline

More efficient transfer of torque

Rugged Planetary Gear Box

Reliable Heavy Duty Operation

Trigger

Single Finger Operation

Pistol Grip Handle

Handle design conforms to hand, providing a more secure grip

Battery Lock Button

Easily swap with fresh battery

Battery Test Button and Charge Indicator

Allows easier monitoring of charge level

18V Rechargeable Lithium Ion Battery

Long life battery for continuous reliable use



Cooling vents

Brushless DC Motor and cooling fans

USB Micro Port

Directional Switch

Easily switch between tighten and loosen



Heads-Up LCD Display

User can safely view the screen during operation

Push-Button Setup

For easy and fast setup and operation

Beeper

Provides audible feedback on completion of operation

Data Collection

Collect data on each bolting event

Quiet Operation

Noise level typically less than 80dB

LION GUN Control Panel Features

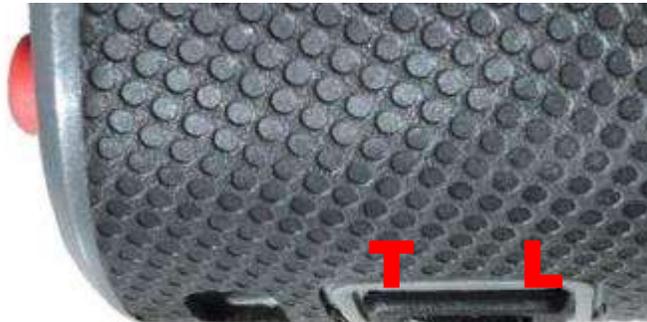
The LION GUN tool has (3) push-buttons and a simple graphical LCD Display Screen on the rear to control all functions, menus and features.



LION GUN Directional Control

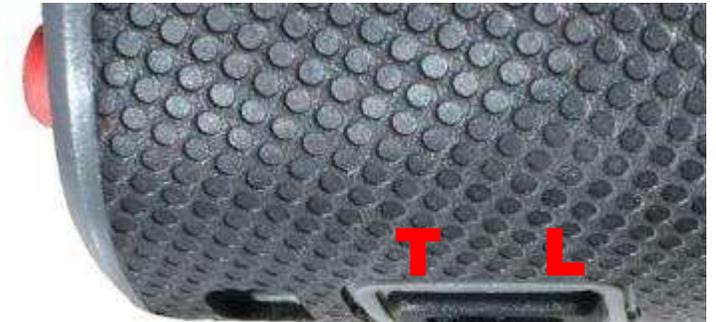
The LION GUN Tool has a toggle switch beneath the barrel to easily change drive direction from tighten to loosen by pressing the switch - Screen also Changes from TORQUE to LOOSEN.

TIGHTEN



Tighten

LOOSEN



Loosen

Toggle-switch directional control allows the operator to easily change to tighten or loosen nuts without the need to remove drives or sockets

Reduces setup time by allowing the operator to select tighten or loosen without reconfiguring the tool; significantly improving productivity.

LION GUN Data Recording & Offload

The LION GUN Tool can record and store torque data in the tool memory and when complete download a CSV file with a complete record for the job; compatible with Excel, text & other formats.

USB Connection to tool



Automatically records torque parameters for all events for a job.

Reduces the time and cost of automatically collecting data at the source, allowing data to be used for job quality assurance and as a permanent job record.

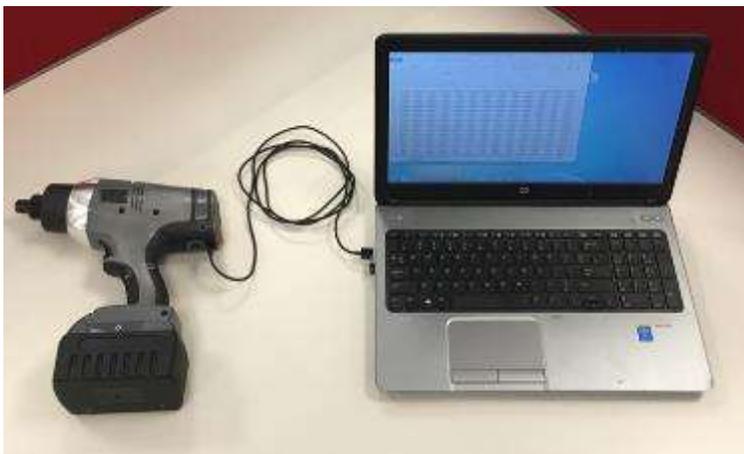
Stores up to 9999 jobs

Allows better administrative tracking of each bolt and each job, file transfer can occur after the fact so that does not impact work schedules.

Standard USB - PC connection to tool.

Use readily available USB cables, saves time and cost for downloading data

USB Connection to computer



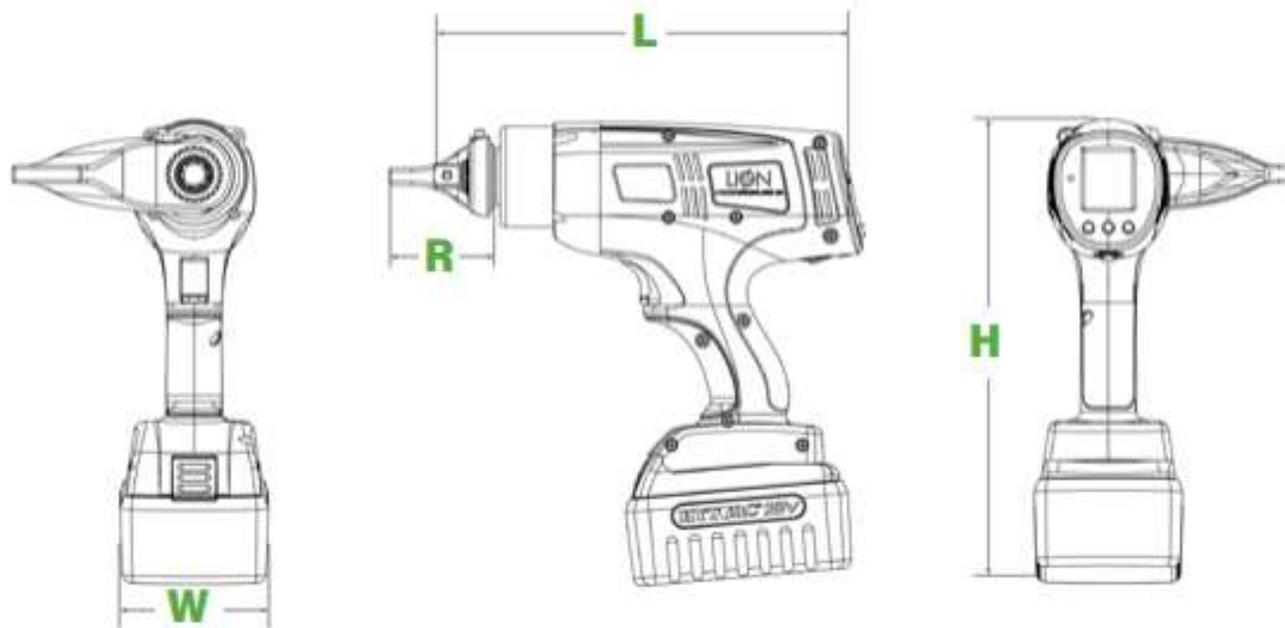
Plug-and-play file transfer to a PC.

Data may be easily transferred to a PC by simply connecting the cable.

File automatically generated in a standard CSV file format.

CSV format is imported in the PC as an Excel file (when Excel is installed on the PC) making it faster to analyze and share data.

LION GUN Specifications



**Compatible with
HYTORC Washer Driver**
Eliminates need for reaction arm
and backup wrench – eliminates
safety risk and improves quality

| MODEL NUMBER | H | W | L | R | DRIVE | WEIGHT | TORQUE | |
|--------------|--------|-------|--------|-------|-------|--------|----------------|----------------|
| | | | | | | | MIN (ft.-lbs.) | MAX (ft.-lbs.) |
| | | | | | | | IMPERIAL (In.) | |
| LION - .25 | 10.83 | 3.46 | 10.16 | 2.35 | 1/2 | 7.30 | 25 | 250 |
| LION - .7 | 10.83 | 3.46 | 10.80 | 2.38 | 3/4 | 7.81 | 150 | 700 |
| | | | | | | | METRIC (mm) | |
| LION - .25 | 275.08 | 87.90 | 258.06 | 59.69 | 12.70 | 3.31 | 33.90 | 339 |
| LION - .7 | 275.08 | 87.90 | 274.32 | 71.90 | 19.05 | 3.72 | 203.40 | 949.07 |

L - Lithium Battery Gun Tool Procedures

The following operating procedures should be followed to set-up and operate Lithium Battery Gun torque tools (LITHIUM SERIES, LION GUN).

- L1 Inspect Tool
- L2 Handle Tool Properly
- L3 Charge Battery
- L4 Test Battery
- L5 Install Battery
- L6 Install Reaction Arm (Conventional Torque)
- L7 Install Socket (Convention Torque)
- L8 Install Washer Driver (HYTORC Washer)
- L9 Install Nut Driver (HYTORC Nut)
- L10 Turn on Power
- L11 Toggle Torque, Angle, Release
- L12 Set Torque
- L13 Set Angle
- L14 Set Release
- L15 Access Menus
- L16 Setup and Position Tool
- L17 Tighten Bolt
- L18 Torque and Angle Qualification
- L19 Loosen Bolt
- L20 Recording and Downloading Job Data

See LITHIUM SERIES and LION GUN BOSS Documents for more detailed instructions regarding menu

Inspect Tool

Inspect Tools Upon Receipt, Safely Store Tools when not in use.

L1 Inspect Tool

- Inspect all components as they are received; if damaged report any sign of damage to the shipper and do not use the tool.
- Inspect the tool before each use; repair or replace any obviously worn or damaged parts.
- Maintenance must be performed by a qualified technician.
- Modifying any of the components invalidates the warranty.
- Check the calibration date on the tool. If more than a year has passed since last calibration, contact HYTORC for recalibration.
- When not in use store all tool components in the storage case.
- Save all instructions and calibration reports in the storage case.



Check Calibration Sticker for Due Date



Store all components, calibration reports, operations manual, in the carrying case when not in use.

Handle Tool

The Lithium Battery Gun Tools have electronic motors and components that will stand up under rugged use when handled properly to ensure reliable long term operation.

L2 Handle Tool

- Avoid Liquids/Humidity – The tool will withstand light splashing but should not be submerged or subjected to continuous rain or extreme humidity.
- Check Operating Temperature – The operating temperature of the tool should be less than 150 deg. F.
- Keep Vents Clean – All Cooling Vents should be kept clear of dust, dirt and debris to allow internal fans to maintain airflow to keep the motor and electronics within temperature limits, do not subject the tool to extreme dust environments that would clog the vents or do not cover the vents with your hand.
- Do Not Use in Explosive environments – The tool and electronic components are not certified or approved for explosive environments or areas containing combustible chemical materials.
- Do Not Drop – Secure tool to protect from damage if dropped.

Keep cooling vents clear



Secure Tool according to local practice to prevent damage from dropping.



Charge Battery

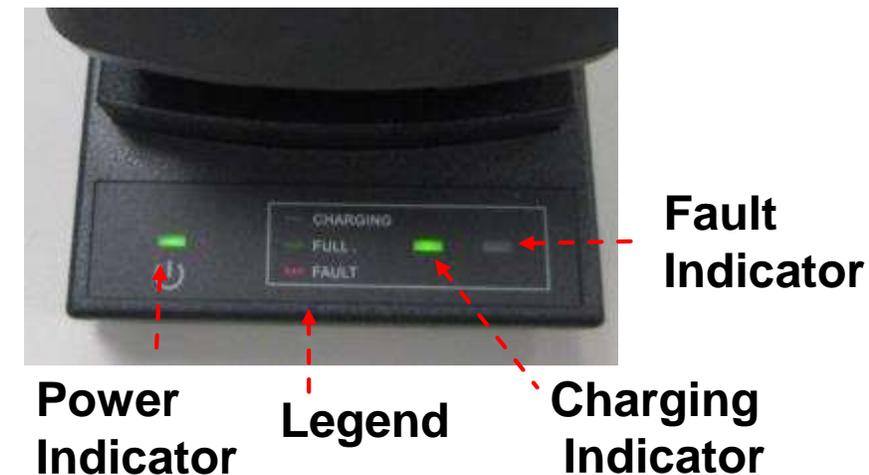
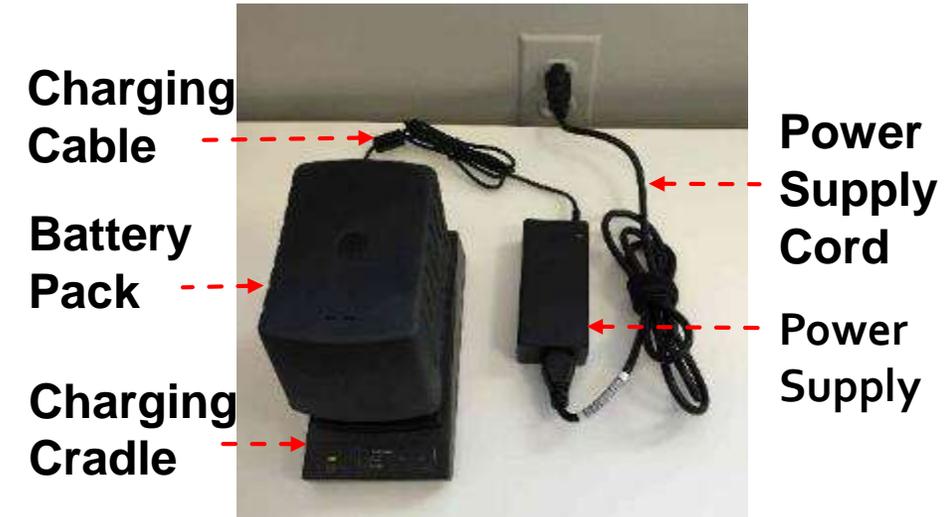
The battery is quickly charged in less than 4 hours.

L3 Charge Battery

- ❑ Verify power supply voltage - power supply can operate at 110V or 220V AC. Note: Compatible 100V to 240V AC, 50/60 Hz.
- ❑ Verify power plug - supply cord is configured for North American outlets/plugs, other regions may require adapters.
- ❑ Connect the power charging cable into the charger cradle.
- ❑ Plug the power supply cord into the appropriate AC outlet before inserting a battery pack.
- ❑ Insert the battery pack by sliding it into the charger cradle and locking it in place.
- ❑ Battery 80% charged in 2-hours, fully charged in 4-hours.

Charging Indicators

POWER INDICATOR green when charger is plugged into AC outlet.
CHARGING INDICATOR is flashing green while battery is charging.
CHARGING INDICATOR solid green when battery is fully charged.
FAULT INDICATOR is flashing red for battery fault not charging.



Test Battery

The operator can easily test the battery to verify the battery has a charge, and estimate how much charge remains.

L4 Test Battery

- ❑ Push the TEST button on the side of the battery and the LED's will provide an approximate indicator of remaining battery life:
 - 1 LED On \leq 25% Battery Charge Left
 - 2 LEDs On \leq 50% Battery Charge Left
 - 3 LEDs On \leq 75% Battery Charge Left
 - 4 LEDs On \leq 100% Battery Charge Left

36 V Battery
Weight 3.3lbs



18 V Battery
Weight 1.9lbs



Operation

- ❑ The Lithium-Ion battery is designed for long running times with quick recharges and operates at full speed until depleted, so there is no gradual drop in power during use.
- ❑ Batteries can be charged hundreds of times without any noticeable loss in capacity.
- ❑ A typical charged battery can tighten hundreds of bolts (estimated 100-to-200 bolts), depending on the torque requirements.
- ❑ For continuous use, workers will typically have one or more spare battery packs charging while the tool is in use and quickly swap batteries as they are drained.
- ❑ HYTORC has partnered with the RBRC (Rechargeable Battery Recycling Corporation) in the US, and batteries can be returned at no charge for recycling at HYTORC service centers or local recycling centers.

Note: Check local and country guidelines for shipping Lithium Ion batteries.

Install Battery

The battery easily slides onto the tool body and snaps into place.

L5 Install Battery

- ❑ Press the release button on the battery and slide battery pack off the charger.
- ❑ Align the base of the tool with the rails in the battery and slide the battery pack firmly into the handle until you hear (or see) the lock snap in place.
- ❑ Note: To remove the battery pack from the tool, press the release button on the battery and firmly pull the battery pack out of the tool

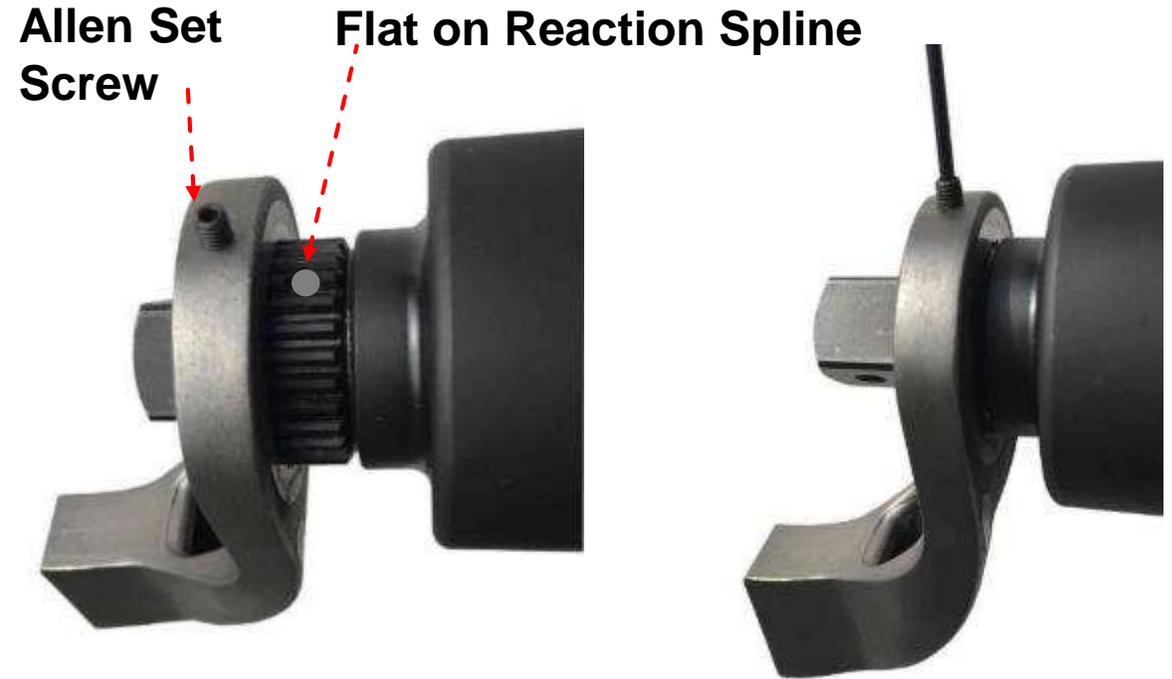


Install Reaction Arm

The reaction arms is quickly installed and secured with an Allen wrench.

L6 Install Reaction Arm (Conventional Torque)

- ❑ Slide the reaction arm over the drive spline while aligning the Allen Set Screw with the flat on the Reaction Spline.
- ❑ Tighten Allen Set Screw to firmly attach the reaction arm to the spline.
- ❑ Challenge the reaction arm to make sure it is firmly secured onto the tool.



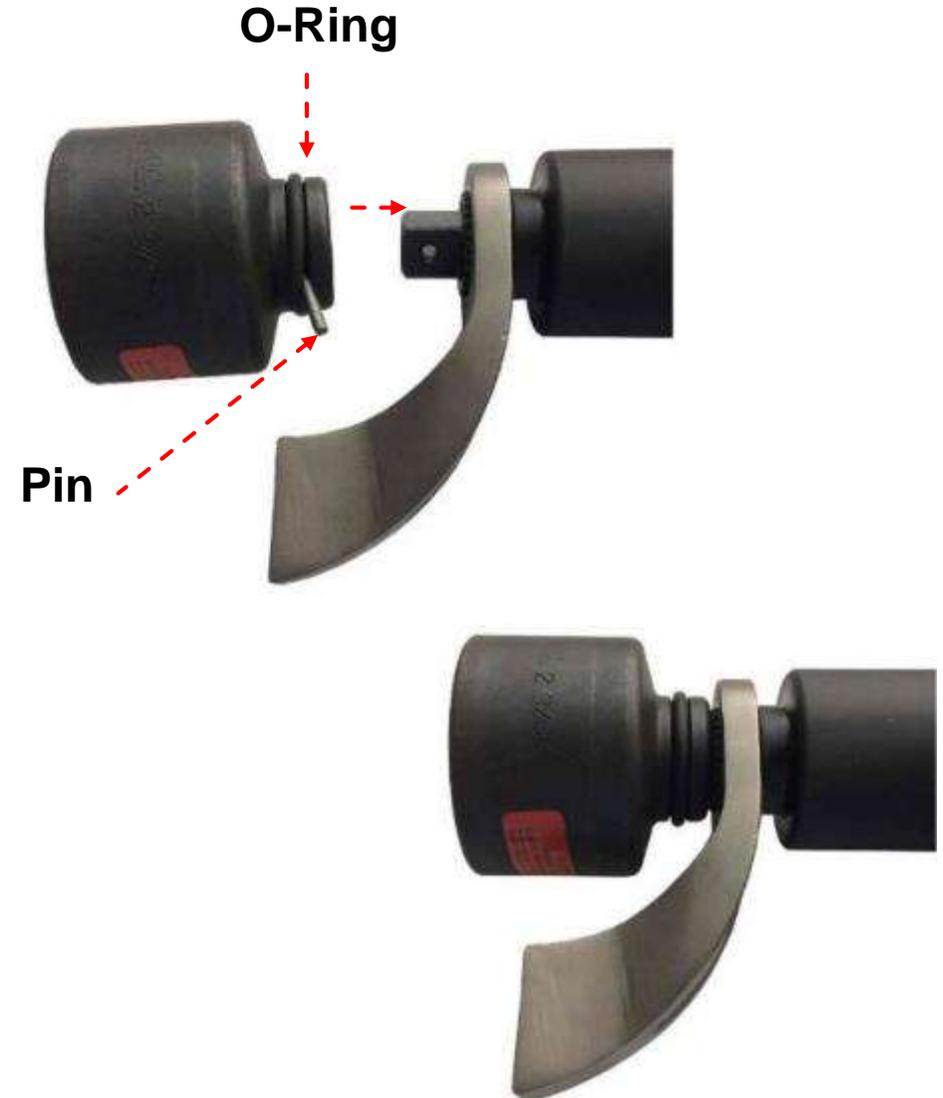
Caution: Never modify a reaction arm! Changes in the reaction arm may lead to personal injury or damage to the tool.

Install Socket

Standard square-drive sockets are easily installed and pinned to secure to the drive.

L7 Install Socket (Conventional Torque)

- ❑ Align the pin hole in the socket with the hole in the square drive.
- ❑ Make sure the O-ring is installed on the socket – insert the pin part way into the socket.
- ❑ Slide socket on square drive while aligning the pin hole in the socket with the hole in the square drive.
- ❑ Push the pin through socket and square drive and seat the pin flush against the socket.
- ❑ Slide O-ring in place to cover the pin and hold it in place.



Install Washer Driver

The HYTORC Washer Driver is easily installed for use with the HYTORC Washer.

L8 Install Washer Driver

- Slide washer driver over the square drive and spline while aligning the thumb screw with the flat on the spline.
- Tighten the thumb screw to secure Washer Driver.
- Challenge the washer driver to make sure it is securely attached to the spline.



Install Nut Driver

The HYTORC Nut Driver is easily installed for use with the HYTORC Nut.

L9 Install Nut Driver

- ❑ Slide nut driver over the square drive and spline while aligning the Allen screw with the flat on the spline.
- ❑ Tighten the Allen screw to secure Nut Driver.
- ❑ Challenge the nut driver to make sure it is securely attached to the spline.



Turn On Power

L10 Power On:

- ❑ Push and release any of the 3 red buttons to power-up the tool.
- ❑ The tool displays initial settings which are easily adjusted for specific job conditions. (see operations instructions to adjust settings)
- ❑ Tool powers off automatically after 5 minutes of “Trigger” inactivity in order to save battery charge.
- ❑ When the tool is powered off, or the battery is removed, all settings are saved as a Current Working Profile (CWP) and loaded automatically when the tool is powered back on.



Toggle Torque, Angle & Release

L11 Toggle Torque, Angle & Release

□ Push and hold the center button for approximately 3-seconds and release – repeat to scroll through the setup displays in the sequence of TORQUE, ANGLE AND RELEASE.

TORQUE Display



①

Push
Hold 3s
Release

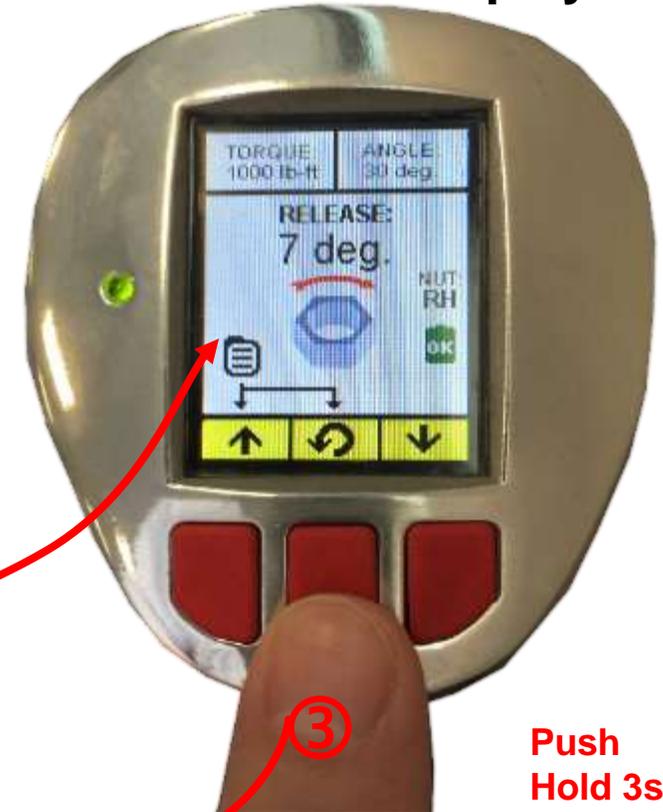
ANGLE Display



②

Push
Hold 3s
Release

RELEASE Display



③

Push
Hold 3s
Release

Set Torque

L12 Set Torque

- ❑ While in the Torque Display, push the left button ↑ to increase the torque or push the right button ↓ to decrease the torque.
- ❑ Torque may be set to any value from the minimum to the maximum capability of the tool (or MAX MIN Torque Limits set in the ADMIN menu).
- ❑ Output units may be displayed in lb-ft, N-m, Kgf-m or %. (See ADMIN menu to change output unit setting)
- ❑ The Torque rotational direction arrow and the rotating nut icon associate with the specific fastener type. (the fastener type may be set under the Operation– Fastener Type menu ; Right-Hand, Left-Hand, HYTORC NUT and HYTORC Washer).



Torque is set to 1000 ft-lbs.

Set Angle

L13 Set Angle

- ❑ Certain bolt tightening specifications may require an Angle Value in addition to or instead of a Torque Value.
- ❑ The tool provides the ability to set an Angle value anywhere from 0 degrees to 360 degrees.
- ❑ The Angle Value is increased simply by pushing the left button ↑ to increase the angle or by pushing the right button ↓ to decrease the angle.
- ❑ If an Angle Value is set the gun will add the desired angle of rotation by applying additional torque after the completed torque operation up to the maximum output of the tool.
- ❑ The angle feature is actuated by continuing to hold the trigger after the tool successfully completes the TORQUE.
- ❑ The angle force is applied after a time delay set in the Angle Delay menu – typical ½ second to 3 seconds.



ANGLE set to 30 degrees.

Set Release

L14 Set Release

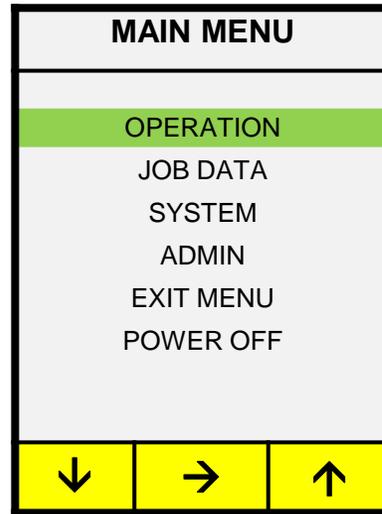
- ❑ When the tool achieves the TORQUE value (and ANGLE if set) the motor automatically stalls and the gear box continues to exert force (and reaction force) which may lock the tool onto the nut.
- ❑ The gun provides a feature to release the tool from the nut by setting a RELEASE Angle to reverse the motor slightly thus taking the applied force off the gear box and reaction point and releasing the tool from the nut without loosening the nut.
- ❑ The RELEASE Angle Setting may vary depending on the application and may need to be developed iteratively by testing the value on the application; the objective is to set the minimum RELEASE angle required to release the tool without applying a force in the opposite direction that would turn or loosen the nut.
- ❑ While the tool has a capability to set the RELEASE between 0 and 359 degrees, the RELEASE is typically set on the lower end and less than 10 degrees (1-to-3 degrees for HYTORC Washer, or 3-to-7 degrees for reaction arms) so that nut is not loosened. Under certain conditions the operator may need higher RELEASE Angle settings and these should be verified to make sure that the nut is not being loosened by the higher setting.
- ❑ The automatic release feature is actuated by continuing to hold the trigger after the tool successfully completes TORQUE (and ANGLE if set).
- ❑ During the operation the screen will change to show the release angle and direction, the tool motor will reverse by the desired release angle and then stall again to allow the tool to be removed from the nut.
- ❑ The RELEASE Angle is applied following application of TORQUE (and ANGLE if set) and after an additional time delay set in the Angle Delay menu – typical ½ second to 3 seconds.



RELEASE set to 7 degrees.

Access Menu & Sub-Menus

Main Menu



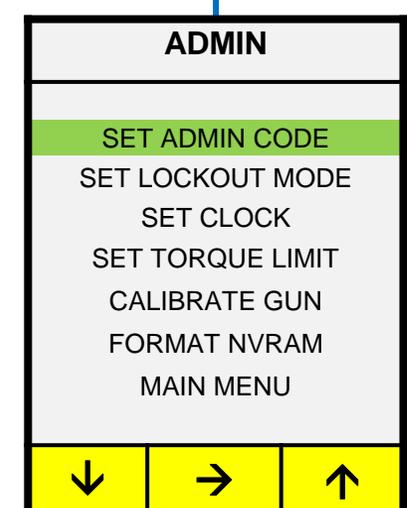
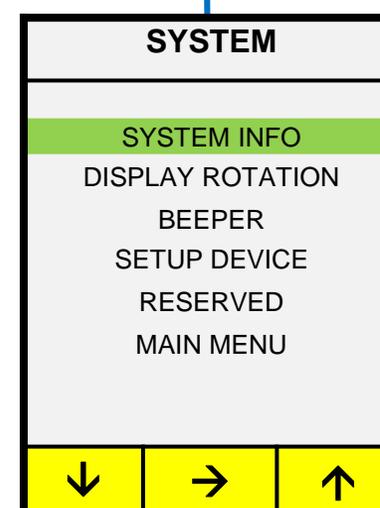
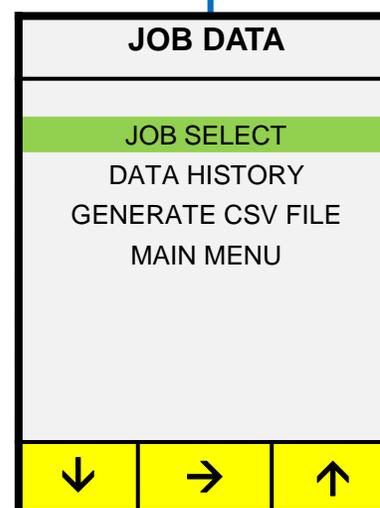
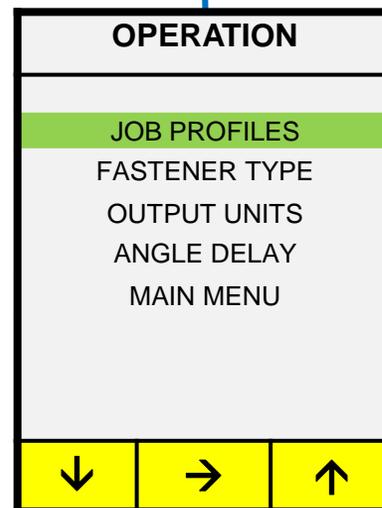
L15 Access Menu and Sub-Menus

- ❑ Press and hold left and center buttons simultaneously for approximately 3-seconds, release buttons when the “MAIN MENU” screen appears

The green bar highlights the current position

Push left button to scroll down ↓, right button to scroll up ↑

Press the center button → to select and display a sub-menu or to select EXIT MENU to return to Home Display or to select POWER OFF DEVICE to shut off the power immediately



Press and hold Left and Center Buttons Simultaneously to Display Main Menu



Setup and Position Tool

L16 Setup and Position Tool

- ❑ **Setup** the Battery Gun to the desired configuration for the job:
 - Assemble appropriate socket and reaction arm for the traditional torque application or assemble appropriate HYTORC Washer Driver or HYTORC Nut Driver as specified for the application.
 - Press any button to turn on the tool power.
 - Select options in the Operations Menu; e.g. Fastener Type, Units, etc.
 - Select options in the System Menu; e.g. Beeper On/Off.
 - Select options in the Job Data menu; e.g. specify Job number to start collecting data.
 - Set desired values for TORQUE, ANGLE and RELEASE
- ❑ **Run Down Nut** either by hand or by using the tool until positioned tight against the flange. When using the tool to run down the nut set the speed control to “RUN DOWN” and position the tool on the nut – pull the trigger to quickly run down the nut until it touches against the flange. After applying the tool to Run Down the nut set the speed control to TORQUE.
- ❑ **Position Back Wrench** - If needed, apply a back wrench to the back nut on the bolt to prevent the back nut from turning during tightening. If using the HYTORC Back Washer a back wrench is unnecessary.
- ❑ **Position Drive/Socket** - Place the tool socket on the nut, making sure that the socket has fully engaged the nut. If using an alternate driver such as the HYTORC Washer Driver or HYTORC Nut driver make sure the driver properly engages the fastener including HYTORC washer or nut if installed.
- ❑ **Position Reaction Arm** - If a reaction arm is used, make sure the reaction arm is firmly abutted against a stationary object (e.g. an adjacent nut, flange, equipment housing etc.)

Tighten Bolt

L17 Tighten Bolt

- ❑ Pull trigger to apply Torque

Note: If RH or LH fasteners are selected the tool will display “Press any button to start operation” and will not operate until the user simultaneously pushes the trigger and any button on the rear of the tool – this is a safety feature to ensure that the operator keeps both hands are clear of the reaction arm. If the reaction arm has not already been positioned against a firm surface, once the tool starts the reaction arm will move until it is firmly abutted against the reaction surface and then the tool will begin to apply torque.

While holding the trigger the tool will apply torque and rotate the nut until the tool stalls at the specified TORQUE value – continue holding trigger if applying angle or release.

- ❑ **Hold for Angle** - Continue holding the trigger if an ANGLE (other than zero) has been specified and the tool will restart (after specified time delay) and then stall again after rotating the nut through the specified ANGLE.
- ❑ **Hold for Release** - Continue holding the trigger if a RELEASE (other than zero) has been specified and the tool will restart (after specified time delay) and then stall again after completing the RELEASE angle to allow the tool to be released from the nut.
:Note: If torque has been applied without a release angle the tool may lock onto the nut. If this happens set the tool to loosen, loosen the nut, set a release angle and try tightening again.
- ❑ **Release Trigger** - Release the trigger after the tool has completed all specified operations (Torque, Angle & Release), the tool stalls for the last time and the BEEPER sounds (if activated); then remove the tool socket/drive from the nut.
- ❑ **Monitor Status** - The status light is amber during operation, if the operation is successful the status light will illuminate green, if unsuccessful the status light will turn red.



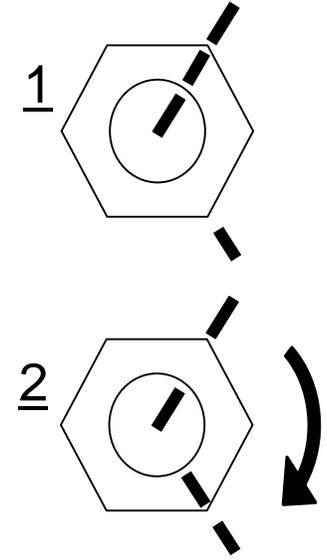
Torque and Angle Qualification

In order to determine if the tool is capable of meeting the combined Torque and Angle requirement for a particular job the following pre-assembly test procedure is suggested.

L18 Torque and Angle Qualification

Caution: This procedure will subject the fastener to max tool output torque. Before tightening with this test procedure make sure to check that the bolts will be tighten below yield and arrange to have a tool with a larger loosening torque capability available to break the fastener free should tightened beyond the capacity of the tool being tested.

- ❑ **Select Sample** - This test procedure should be performed on a sample flange and fastener identical to those specified for the job but with a sample that is not intended to be used in the final assembly.
- ❑ **Tighten to Torque** - Tighten the fastener to the desired torque in Torque Mode; remove the tool from the fastener.
- ❑ **Mark Position** - Mark the position of the fastener by placing a mark on the stud, nut and flange and another mark on the flange at an angle desired in the Angle requirement.
- ❑ **Tighten to Max** - With the tool still in Torque Mode set the tool to max torque output of the tool and measure how far the fastener rotates.
- ❑ **Loosen** - Set the tool to Loosen and loosen fastener; if the tool will not loosen use a tool with greater torque capacity to loosen the fastener.
- ❑ **Determine Result** - If the fastener reaches the angle requirement then it should be suitable to tighten the combined requirement for torque and angle.
- ❑ If the fastener fails to reach the combined torque and angle then this particular tool should not be used for the torque and angle; select a tool with a higher torque capacity.



Loosen Bolt

L19 Loosen Bolt

- ❑ **Setup Tool-** Use the menu to specify the fastener type; e.g. LH, RH, HYTORC Washer.
- ❑ **Set to Loosen -** Press & hold the center button to change mode to TORQUE LOOSEN.
- ❑ **Position Back Wrench -** If needed, install back wrench to keep the back nut from turning.
- ❑ **Position Tool on Nut -** Make sure tool socket/driver is properly positioned on the nut.
- ❑ **Position Reaction Arm -** If a reaction arm is used, make sure the reaction arm is firmly abutted against a stationary object (e.g. an adjacent nut, flange, equipment housing etc).
- ❑ **Pull Trigger to Loosen -** Pull the trigger to turn the nut in the loosen direction.
- ❑ **Release Trigger -** Release trigger to stop loosening and verify nut is completely loose.
- ❑ **Monitor Status -** The status light is green in the loosen mode, once the trigger is pulled the status light turns amber and stays amber through the operation, a status light turning red indicates an error.



Recording & Downloading Job Data

L20 Recording and Downloading Job Data

- ❑ Job Number and Recording is initiated in the Job Data Menu
- ❑ When the RECORDING mode is started, the Home Display provides a display of **JOB ON** and the **Job Number**.

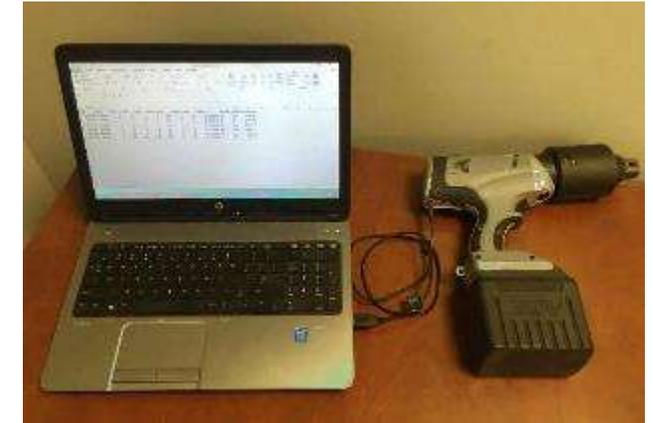


- ❑ The job file is generated in the Job Data menu
- ❑ After the CSV file has been generated, the USB cable is connected and the tool is powered ON the tool will automatically be discovered by the PC just as any other other storage device.
- ❑ If the PC has Excel the CSV file will appear on the PC in Excel format by default and can be opened or saved.

Connect Standard USB Cable

USB Type A
Plug to PC

USB Micro A
Plug to Tool



Sample CSV file in Excel (default).

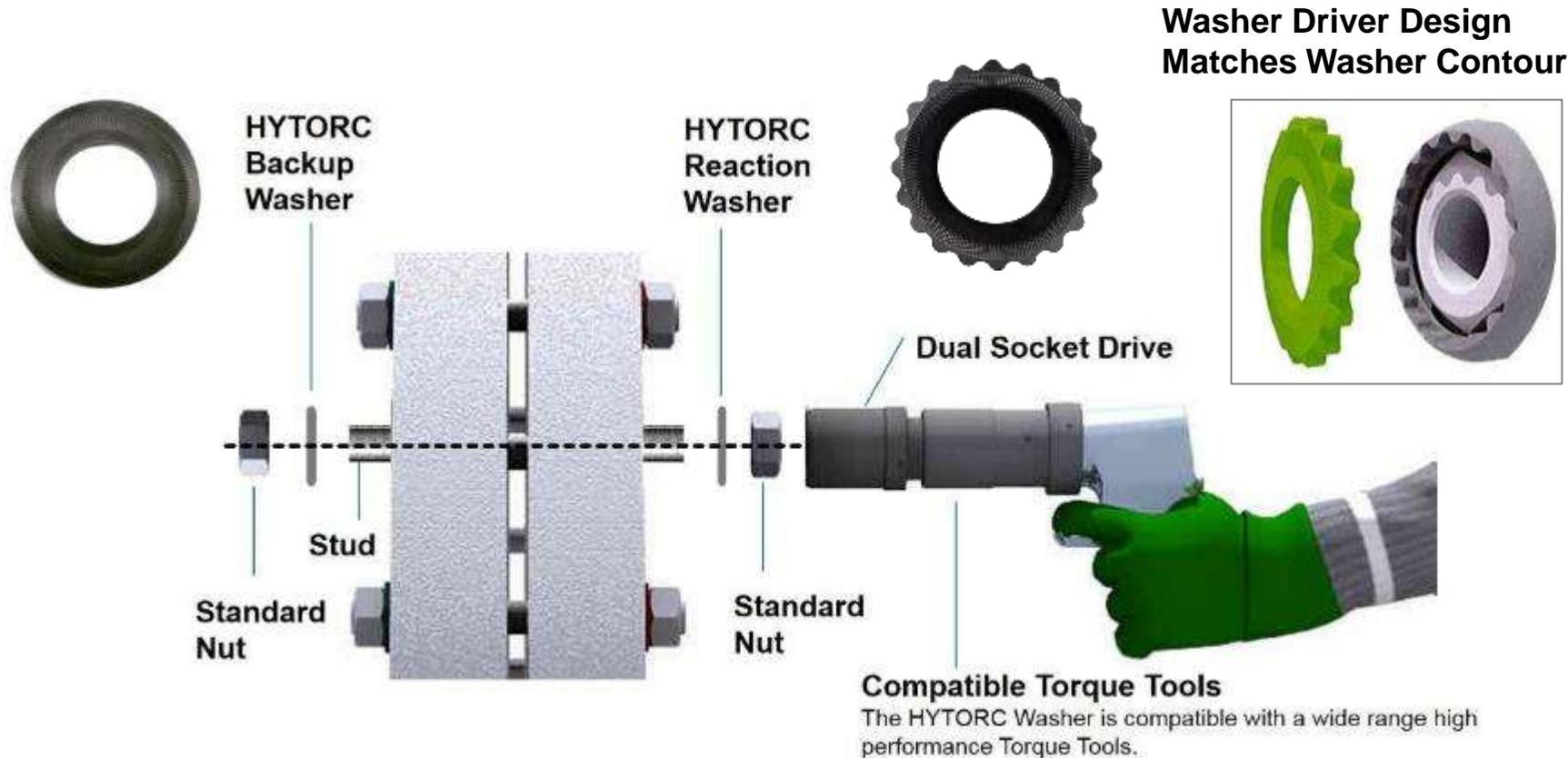
| Date | Time | Event | Torque | Angle | Release | Job | Duration | Temp | Voltage | TL | Fastener | TorqueUn | Compcode |
|----------|----------|-------|--------|-------|---------|-----|----------|------|---------|---------|----------|----------|------------|
| 16-10-10 | 10:45:58 | 2 | 27 | 0 | 0 | 101 | 1 | 25 | 20 | TIGHTEN | RH | lb-ft | Torque OK. |
| 16-10-10 | 10:46:20 | 2 | 27 | 0 | 0 | 101 | 17 | 25 | 20 | TIGHTEN | RH | lb-ft | Torque OK. |
| 16-10-10 | 10:46:49 | 2 | 27 | 0 | 0 | 101 | 1 | 25 | 20 | TIGHTEN | RH | lb-ft | Torque OK. |
| 16-10-10 | 10:46:54 | 2 | 27 | 0 | 0 | 101 | 3 | 25 | 20 | TIGHTEN | RH | lb-ft | Torque OK. |
| 16-10-10 | 10:47:00 | 2 | 27 | 0 | 0 | 101 | 2 | 30 | 20 | LOOSEN | RH | lb-ft | Torque OK. |
| 16-10-10 | 10:47:05 | 2 | 27 | 0 | 0 | 101 | 2 | 30 | 20 | LOOSEN | RH | lb-ft | Torque OK. |
| 16-10-10 | 13:53:51 | 2 | 100 | 100 | 100 | 101 | 9 | 25 | 19 | TIGHTEN | RH | lb-ft | Torque OK. |

4. HYTORC Fasteners



HYTORC Washer System

HYTORC Washer System provides a complete solution for , consists of the HYTORC Reaction Washer, HYTORC Backup Washer & Compatible Torque Tools.



Advantages

- No Reaction Arm
- No Backup Wrench
- No Pinch Points!
- No Safety Issues
- Lower Friction
- No Surface Damage
- No Side Load Misalignment
- No Galling
- Tool Compatibility
- Process Compatibility
- Consistent Performance

HYTORC Reaction Washer

HYTORC Reaction Washer is a substitute for plain flat washers and eliminates the need for reaction arms.

**External reaction lobes
around circumference**



**Side A with knurled
surface & markings
placed against the
flange**

**Side B Smooth
surface faces the
nut**

**Available in all
common materials**

Primary Features

- **Flat - surface provides even nut rotation**
Translates into more even application of torque, more consistently achieves the target load.
- **Smooth - polished surface reduces friction**
Lower friction translates into lower torque needed to achieve the target load, torque can be transferred to the bolt more efficiently, resulting in greater likelihood bolts will be tightened to the required specification, resulting in more reliable joints that don't leak.
- **Thin – fits all bolts, protects flange surface**
Thin profile allows the washer to fit on almost every bolt without modifying hardware. Material separation between nut and flange reduces damage avoids costly maintenance and resurfacing.
- **Through-hardened - stiffness spreads the load**
More distributed load will result in a “stiffer joint” which is less likely to come loose, the joint absorbs the load not the bolt. Reliable long term operation under high force without failure
- **Knurled on one side – grips flange to prevents rotation**
The washer held stationary in place does not cause any friction or damage against the flange surface, provides a stationary reaction fixture, holds the back washer stationary eliminating the need for a back wrench, eliminates significant coordination issues and safety issues.
- **Reaction Lobes - engage to brace tool reaction forces**
Eliminates the need for reaction arms associated safety issues, reduced side-load to increase torque transfer efficiency, reduces risk of thread galling, eliminates additional damage to the flange surface, reduces costly maintenance to repair of flanges, reduces friction and improves accuracy and repeatability of torque applied bolted joints.

HYTORC Backup Washer

HYTORC Backup Washer is a substitute for plain flat washers on the back-side.

HYTORC Backup Washer
has knurls on both sides

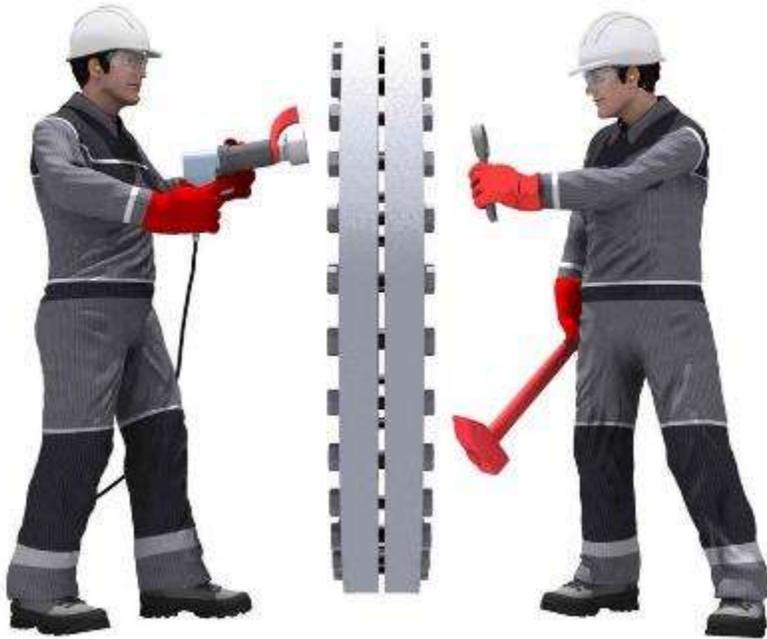


Primary Features

- 1. Knurled - grips back nut and flange**
Prevents rotation of the back nut – eliminates need for back wrench
- 2. Thin – fits all bolts, protects flange surface**
Thin profile allows the washer to fit on almost every bolt without modifying hardware.
Material separation between nut and flange reduces damage avoids costly maintenance and resurfacing.
- 3. Through-harden – stiffness spreads load**
More distributed load will result in a “stiffer joint” which is less likely to come loose, the joint absorbs the load not the bolt. Reliable long term operation under high force without failure

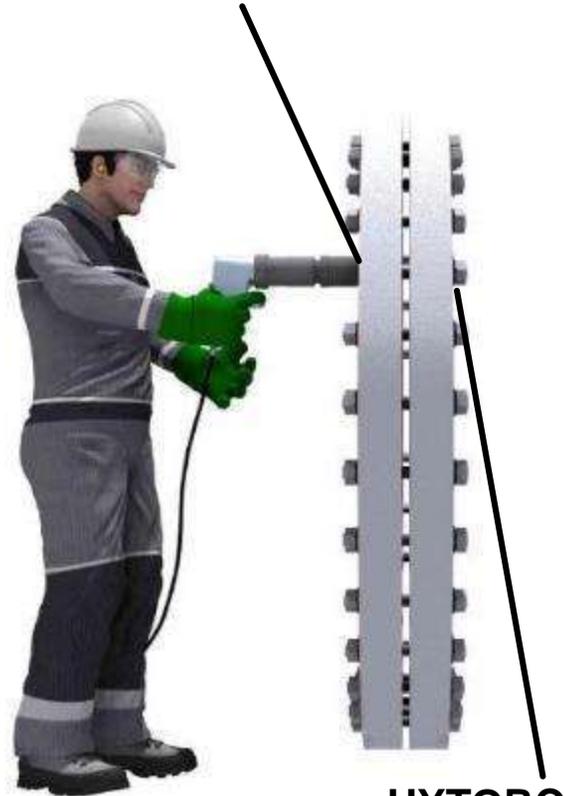
HYTORC Washer Reduces Coordination

Conventional Torque



Pinch hazards and more personnel; damaging side loads; bending forces; shorter lifespan of nuts and bolts.

HYTORC Reaction Washer



HYTORC
Backup
Washer

Eliminates Reaction Arm Issues

The HYTORC Reaction Washer eliminates the need for reaction arms and any complications associated with needing to have the correct reaction arm or needing to order the correct fixture for each application.

No Extra Manpower

The HYTORC Backup Washer holds the back nut in place, offering the possibility of increased productivity where tightening can be done by a single person – requires no extra manpower to secure the back nut.

Eliminates the Backup Wrench The HYTORC Backup Washer holds the back nut in place thus eliminating the back wrench and the need to have the correct back wrench for each application.

No effort to release backup wrench

The HYTORC Backup Washer eliminates the need for the backup wrench so also eliminates the task of releasing a back wrench after tightening.

HYTORC Washer Reduces Safety Issues

Using the HYTORC Washers, the reaction arm and backup wrench are eliminated and tool reaction force is safely transferred directly from the tool driver to the Washer.



Eliminate reaction arm pinch hazard

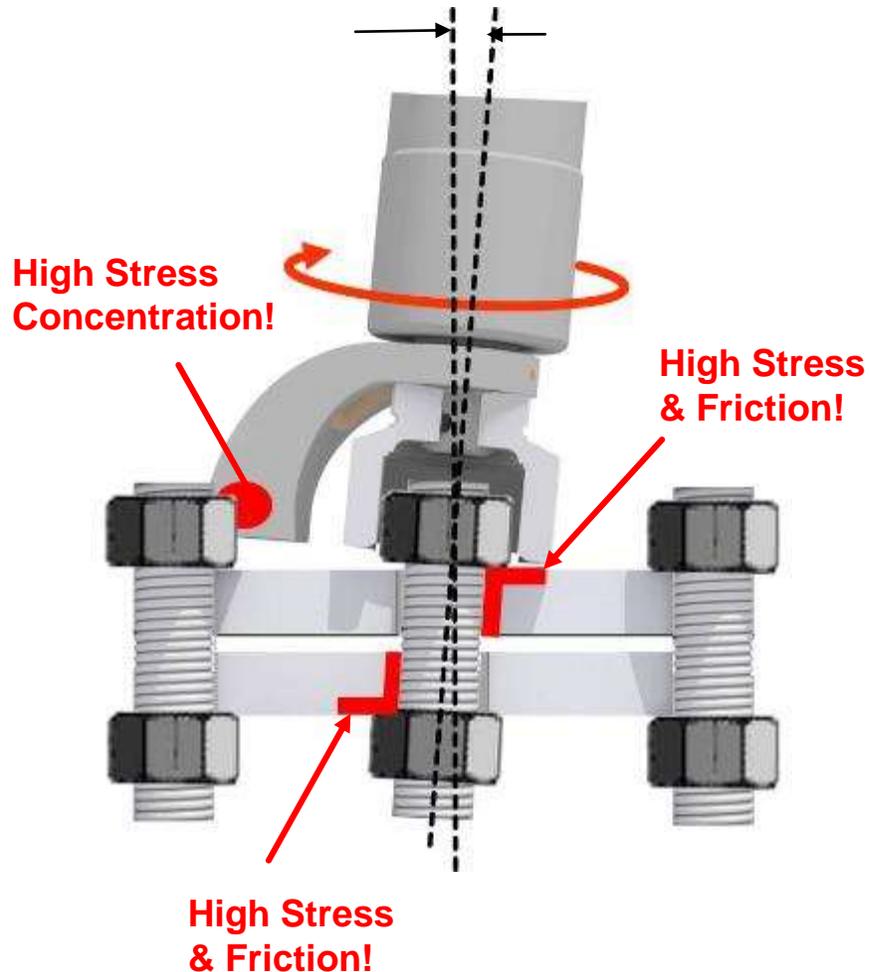


Eliminate backup wrench pinch hazard

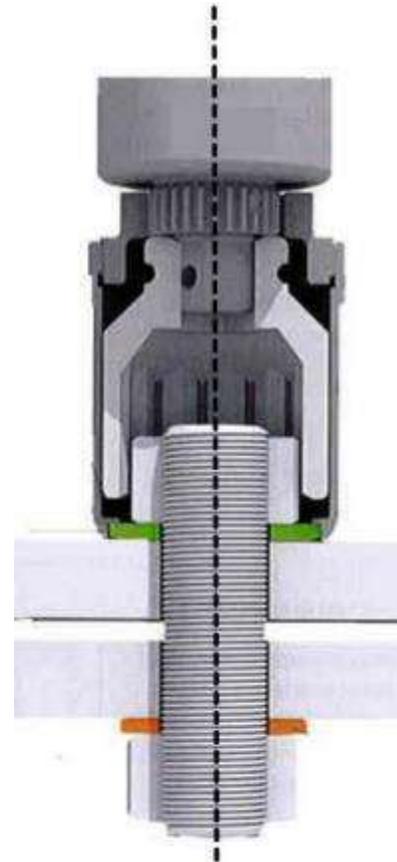
HYTORC Washer Reduces Side-Load

The HYTORC Washer Driver engages with the HYTORC Reaction Washer lobes such that the driver axis is forced into alignment with the bolt axis reducing friction and the effects of side-loading.

Problems With Conventional Torque Side Load



HYTORC Washer



Axial alignment eliminates side-load

HYTORC Reaction Washer, the Bolt and the Torque Tool are all aligned axially, this effectively aligns the bolt just as if it was been stretched in tension. The axial alignment eliminates the side load and improves torque transfer efficiency between the tool and the bolted joint.

Eliminate thread galling

Because side load is eliminated so is the chance of galling threads, reducing maintenance and replacement of studs, nuts and bolts can be reused.

Eliminate flange damage due to side load

Because side load is eliminated there will no longer be extra wear on one side of the flange reducing flange maintenance and repair, extending flange longevity.

Smooth flat washer reduces friction

HYTORC Reaction Washer has a smooth flat surface facing the nut, so that the nut rotates squarely and with significantly reduced friction as it turns on the smooth surface. The HYTORC Reaction Washer significantly improves torque transfer to the bolted and improves the overall reliability of bolted joints.

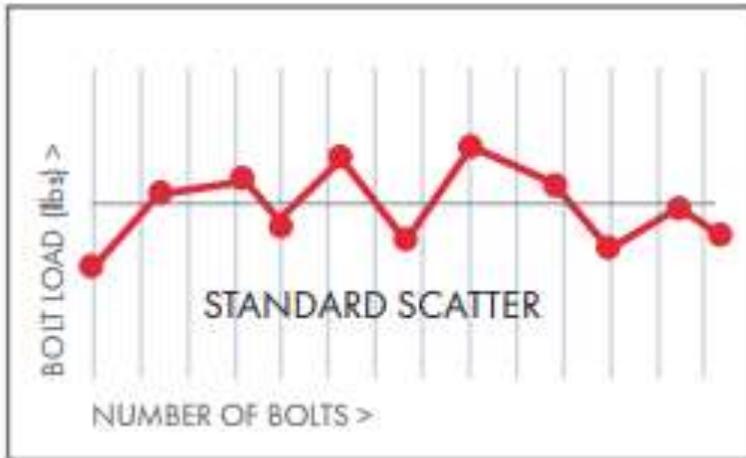
Protects flange from damage due to wear

The HYTORC Reaction Washer creates separation between the nut and the flange surface and between the driver and the flange surface – thus protecting the surface from wear and costly repair issues.

HYTORC Washer Improves Consistency

As a result of reduced side load,
the HYTORC Washer results in more uniform application of torque to the bolt.

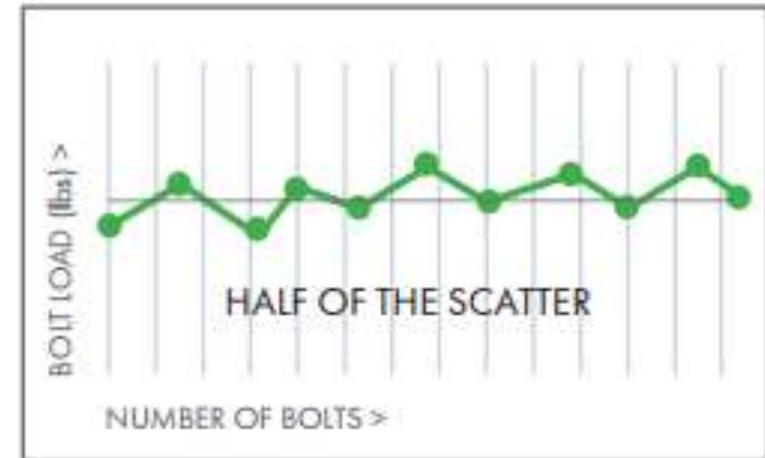
Scatter With Conventional Torque



EQUAL BOLT LOAD

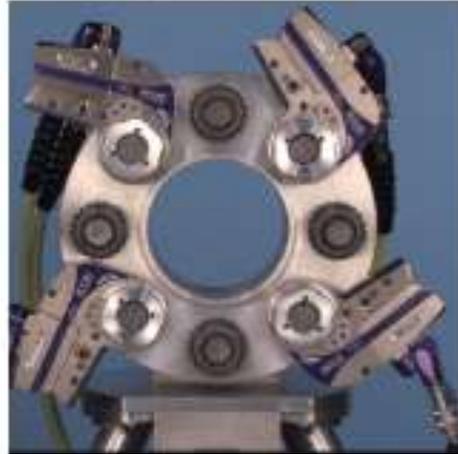
The coefficient of friction and thus the bolt load, depends on many factors. With the WASHER SYSTEM the scatter in bolt load is cut in half.

Scatter With HYTORC Washer



HYTORC Washer Tool Compatibility

To take advantage of all of the HYTORC Washer benefits use HYTORC Tools with HYTORC Washer Drivers/Adapters.



HYTORC Tools with Compatible Drivers/Adapters:

- ✓ ICE
- ✓ AVANTI
- ✓ STEALTH
- ✓ jGUN SINGLE SPEED
- ✓ jGUN DUAL SPEED
- ✓ Digital jGUN
- ✓ LITHIUM SERIES
- ✓ LION GUN

HYTORC Nut

The HYTORC Nut is a dual spline mechanical tensioning device that replaces a regular hex nut that stays in place on the application.



Inner Sleeve

Engages the stud on the inside and the outer sleeve on the outside – does not turn but travels vertically as the outer sleeve turns and stretches the stud

Outer Sleeve

Rotates under the turning force applied by the torque tool

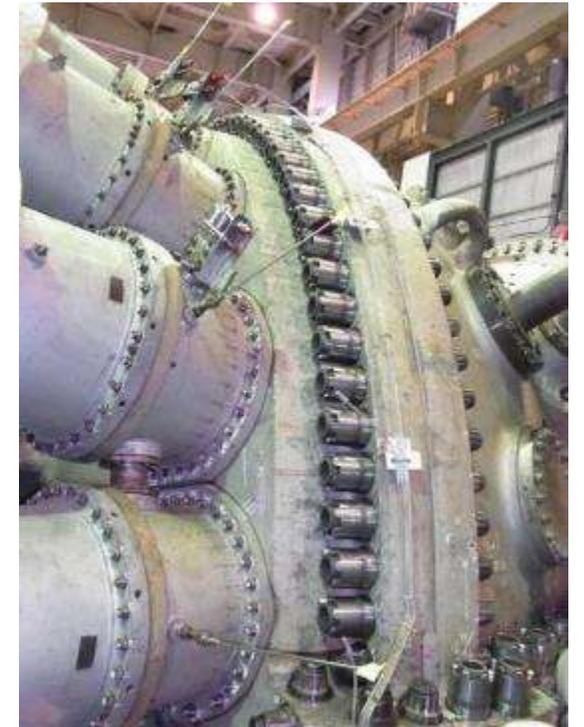
Washer

Bears against the flange and remains stationary as the outer sleeve turns.

Primary Benefits

- ✓ No torsion transferred to stud
- ✓ No chance of thread galling
- ✓ No bending or side load
- ✓ Controlled & predictable friction coefficients
- ✓ No bolt load loss or relaxation as with hydraulic tensioners
- ✓ No need for backup wrench
- ✓ Compatible with square drive or narrow clearance tools
- ✓ Reusable

HYTORC Nut Stays in Place on the Application



HYTORC Nut Configurations

The HYTORC Nut is Available in Multiple Configurations for a range of applications.



TN
Limited Radius
HYTORC Tension Nut



SN
Limited Height
HYTORC Tension Nut



CN
Bolt Protrusion
HYTORC Tension Nut



Smart Stud
Allen Bolt
Replacement



HYTORC Nut Planning

In the planning stage the HYTORC Nut is Configured to match specific bolting application, and a load chart is provided for tightening the nut to achieve desired bolt load.

HYTORC Nut Specified for Specific Bolt Configurations

HYTORC uses a load cell to evaluate specific bolt configurations to determine the load that should be applied to the bolt configuration using the HYTORC tool and HYTORC Nut combination recommended for the application.

Load to Pressure Chart

HYTORC provides a load to pressure conversion chart providing the pump pressure that should be applied for a specific tool in order to properly tighten the HYTORC Nut in the field.



LOAD TO PRESSURE CONVERSION CHART
TN09-M04545-SAT HYTORC-CLAMP

Projected for Tool Avant-5
Clamp Size TN09-M04545-SAT

| PUMP | PUMP | POUNDS | kNewtons | PUMP Mpa |
|--------------|---------------|----------------|---------------|--------------|
| PSI | BAR | FORCE | Force | |
| 1,500 | 103.42 | 38,429 | 170.94 | 10.34 |
| 2,000 | 137.90 | 59,099 | 262.88 | 13.79 |
| 2,500 | 172.37 | 80,687 | 359.91 | 17.24 |
| 3,000 | 206.84 | 102,786 | 457.21 | 20.68 |
| 3,500 | 241.32 | 124,988 | 555.97 | 24.13 |
| 4,000 | 275.79 | 146,985 | 653.38 | 27.58 |
| 4,500 | 310.26 | 168,071 | 747.62 | 31.03 |
| 5,000 | 344.74 | 188,138 | 836.88 | 34.47 |
| 5,500 | 379.21 | 206,679 | 919.35 | 37.92 |
| 5,921 | 408.22 | 220,798 | 982.16 | 40.82 |
| 6,000 | 413.69 | 223,286 | 993.22 | 41.37 |
| 6,500 | 448.16 | 237,551 | 1,056.68 | 44.82 |

Results Using GN METAL ASSY PASTE Lubricant
Target Load = Load Pounds @ Pump PSI = 220798 lbs



HW- HYTORC Washer Install Procedure

The following procedures should be followed to install HYTORC Washers.

- HW1 Setup Flange
- HW2 Install Back Washer & Nut
- HW3 Install Reaction Washer
- HW4 Apply Lubrication
- HW5 Install Active Nut & Tighten

Setup Flange

The HYTORC Reaction Washer is used only on the front side of the bolted joint and no other washers should be inserted on the front surface of the bolt.

WH1 – Setup Flange

- ❑ **Plan Installation Sequence** - Plan for the correct sequence, positioning and methods for installation in order to get the maximum benefits from the washer solution.
- ❑ **Positioning/Rigging** - For optimal results in joint closure, rigging for proper flange alignment and gasket installation is recommended but details are not covered in this document. For rigging and gasket installation refer to site engineering specification.
- ❑ **Define Active and Passive Side** - The active side (or front) of the flange is the side where the bolt nut will be torqued – the opposite side (back side) is the passive side where the nut will be stationary.

Active Side

Side where the HYTORC Washer is installed and the nut is torqued

Passive Side

Back Side where the HYTORC Back Washers are installed and held stationary



Install Back Washer & Nut

The HYTORC Back Washer is placed over the stud on the back side – passive side, and install the back nut.

HW2 – Install Back Washer & Nut

- ❑ **Ridges Both Sides** - The HYTORC back washer has ridges on both sides to keep the back nut from rotating.
- ❑ **Install Either Side Down** - Install the back washer over the stud on the back side, since the washer has ridges on both sides, the washer can be installed with either side down.
- ❑ **Install the back nut to snug tight** - Thread the back nut on the stud leaving enough stud length on the front flange to install the washer and nut on the front side.



Install Reaction Washer

Install the HYTORC Reaction Washer over the stud on the active side with the correct orientation.

HW3 – Install Reaction Washer

- ❑ Install the reaction washer over the stud on the active side with the correct orientation:

Knurled Side - The side of the HYTORC washer with knurls is placed over the stud and face down on the flange – the knurls face the flange.

Smooth Side - The Smooth Polished surface is facing out after the HYTORC Reaction washer has been installed.

Smooth surface should be visible and facing away from the flange

**Side with Knurls
Faces Flange**



**Smooth side faces
the nut**

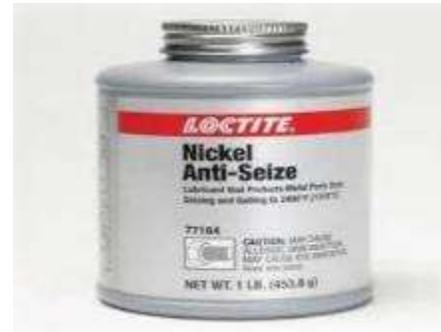


Apply Lubrication

Lubrication should be used with all HYTORC Washer Installations – only on active side.

HW4 – Apply Lubrication

- ❑ **Reaction Washer Smooth Face** - Lubrication should be applied to the smooth load bearing surface of the HYTORC Reaction Washer.
- ❑ **Stud** - Lubrication should be applied to the exposed threads of the stud on the active side.
- ❑ **Nut** - Lubrication should be applied to the nut spot face that will contact against the smooth surface of the HYTORC Washer on the active side.
- ❑ **No Lubrication on Flange** - It is highly recommended that NO lubrication be applied directly to the spot face of the flange or anywhere on the front or back of the flange.



Install Active Nut & Tighten

Install the Active Nut to be tightened over the stud and HYTORC Washer.

HW5 - Install the Active Nut & Tighten

- ❑ **Install Nut Hand Tight** - Thread the Active nut over the stud and snug tight by hand in preparation for tightening with power torque wrench.
- ❑ **Leave 2 to 3 threads exposed** - This is for inspection purposes to ensure the nut and stud are fully engaged. It may be necessary to adjust any additional length to the back of the flange in order to have only 2 to 3 threads showing on the active side above the nut. This also allows the socket to fully engage the nut.

It is permissible in areas of high corrosion for the stud to be flush with the top of the nut.

- ❑ **Tighten Bolt** - Refer to the tightening procedure for the specific tool to tighten the HYTORC washer.



HW- HYTORC Nut Install Procedure

The following procedures should be followed to install HYTORC Nut.

- HN1 Lubricate HYTORC Nut & Stud
- HN2 Assemble HYTORC Nut
- HN3 Assemble Driver
- HN4 Tighten HYTORC Nut
- HN5 Loosen HYTORC Nut

Lubricate HYTORC Nut & Stud

In order to produce uniform tensioning loads the HYTORC Nut comes pre-lubricated. Before reusing HYTORC Nuts they should be disassembled, cleaned and re-lubricated before the next use.

HN1 - HYTORC NUT LUBRICATION

- ❑ Lubricate all Surfaces Shown
- ❑ Although the bolt stud is not subject to any torsion during installation it is recommended to lubricate the bolt stud threads to facilitate future disassembly and removal.



Assemble HYTORC Nut

HN2- HYTORC NUT ASSEMBLY

- ❑ Thread the HYTORC Nut onto the stud by hand.
- ❑ For long studs it may be desirable to use an impact wrench with mating insert to run down the HYTORC Nut.
- ❑ Adjust the height of the stud so that the stud fully engages all the threads of the inner sleeve and the top of the stud is about 2 threads below the lip of the inner sleeve.
- ❑ When the HYTORC Nut is in place check to make sure the inner sleeve fully engages the splined washer and the outer sleeve rests on the washer.
- ❑ The two sleeves should be aligned at the top.



Assemble Driver

A wide variety of HYTORC Torque Tools can be used to tighten the HYTORC Nut. Consult the operating guide for each tool for instructions to assemble the driver.

HN3- Assemble HYTORC Nut Driver



HYTORC Tools with Compatible Drivers/Adapters:

- ✓ ICE
- ✓ AVANTI
- ✓ STEALTH
- ✓ jGUN SINGLE SPEED
- ✓ jGUN DUAL SPEED
- ✓ Digital jGUN
- ✓ LITHIUM SERIES
- ✓ LION GUN

Tighten HYTORC Nut

HN4- Tighten HYTORC Nut

- ❑ Verify that a bolting pattern and pressure should already have been specified for the particular application.
- ❑ Verify if multiple tools will be used – parallel joint closure.
- ❑ Engage the Driver and the HYTORC Nut.
- ❑ Initiate the Driver:
 - Note: No reaction force is applied so no reaction arm is needed.
 - ❑ With Hydraulic Tool advance the tool using the control on the Hydraulic Pump until the outer sleeve no longer turns and the tool stalls at the specified pressure.
 - ❑ With Guns pull the trigger and advance until the outer sleeve no longer turns and the tool stalls at the specified torque.
- ❑ Repeat until all HYTORC Nuts are tightened for the application, following the pattern specified in the bolting plan.



Loosen HYTORC Nut

HN5- Loosen HYTORC Nut

- ❑ Configure the drive for the torque tool to loosen.
- ❑ Turn up the pump pressure or torque value to the maximum or peak value.
- ❑ Engage the Driver and the HYTORC Nut.
- ❑ Apply pressure until the out sleeve moves freely.
- ❑ It may be advisable to loosen the load on the bolts in steps gradually in reverse order of tightening so the joint is not misaligned and the remaining bolts are not overtightened.
- ❑ Remove the nuts by hand.



5. Hydraulic Tensioners

Hydraulic Tensioner Technology

Tensioning is the direct axial stretching of the bolt to achieve preload (bolt load).

Basic Steps

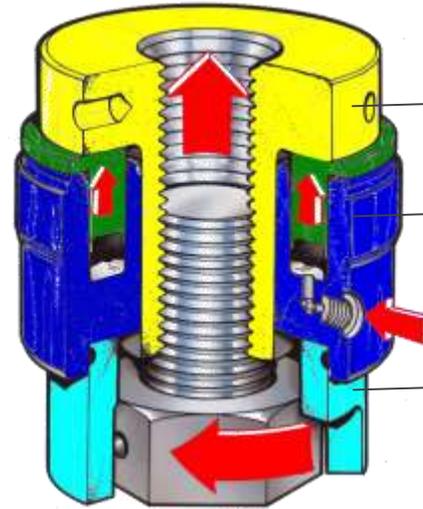
- Attach puller to stud
- Apply hydraulic pressure to tensioner stretching the stud
- Tighten/turn the nut against the flange to hold stretch
- Release pressure and remove tool

Advantages

- No need for reaction point
- No need for backup wrench
- Eliminates inaccuracies due to friction
- No side loading or lateral bending

Disadvantages

- Loads may vary from bolt to bolt
- Allowances for uneven interaction
- Use care so that bolts is not yielded
- Complex process
- Safety concerns

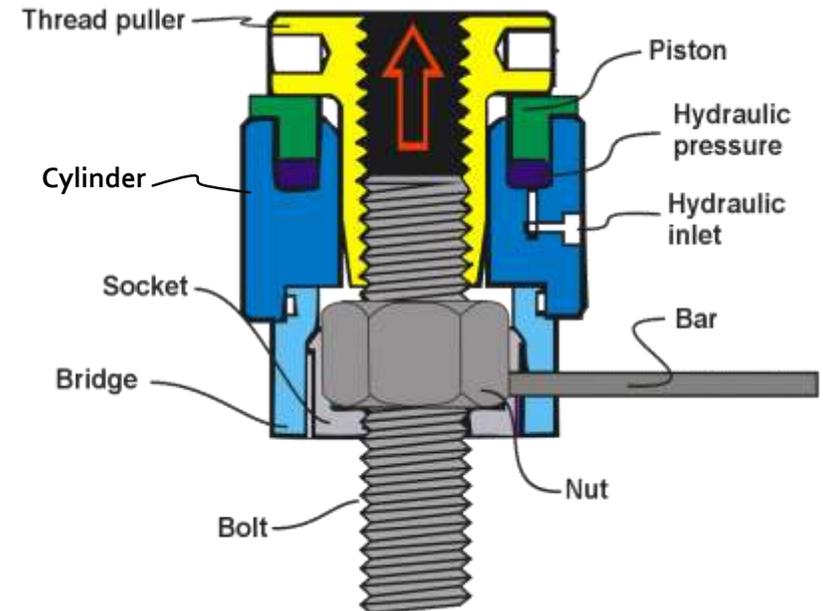


Primary Components

Thread Puller – special nut that engages the stud and stretches the stud

Hydraulic cylinder & piston – cylinder body & piston that lifts puller when hydraulic pressure is applied

Bridge & Socket – platform that allows access to tighten or loosen nut while cylinder is under pressure, retaining the bolt tension



Topside Tensioners



Topside Standard Tensioners

Topside standard tensioners provide a quality, cost-efficient solution designed to fit most standard flanges in a compact size that is easy to handle.



Topside Return Spring Tensioners

Topside spring return tensioners offers the same quality as the standard series, but incorporates a spring-return function and a more robust design to increase efficiency and enhance the tools load capabilities.

Strong, Dependable Tooling

Our standard topside tensioners are made from hardened AISI 4340 steel alloy for uncompromising strength and durability.

Wide Range of Sizing

HYTORC offers the standard series tensioner in standard sizes ranging from ¾" to 4" and metric sizes from M16 to M100.

Customizable to Any Specification

HYTORC's Tensioner Specialists can work with you to customize our spring return tensioners to fit your needs.

Designed for Long Life

Spring return tensioners are made with hardened steel bodies and metal treatments to withstand the toughest of operating environments..

Time and Energy Savings

Spring return feature provide automatic piston retraction when pressure is released saving time and effort required to reset the piston after every stroke, giving you more energy to finish the job.

Customizable to Any Specification

HYTORC's Tensioner Specialists can work with you to customize our spring return tensioners to fit your needs.

Wind & Subsea Tensioners



Wind Single Stage

HYTORC's wind turbine tensioners are designed to provide single stage tensioners in bolting applications that have limited overhead clearance.

Compact Design

HYTORC's single stage tensioners are designed for areas where the tool must be small and powerful.

Manufacturer-specific Designs Available

HYTORC stocks tools for specific applications such as Siemens and Mitsubishi blade bearings and Clipper hub to mainshaft connections.



Wind Multi Stage

Wind turbine tensioners are designed to provide customers with uncompromising performance with the bolting applications that have limited radial clearance.

Slim Design

HYTORC's multi stage tensioners are designed for applications where regular loads are needed with little room for the tool. These tools are capable of high loads with minimal footprint.

Manufacturer-specific Designs Available

HYTORC stocks solutions for every major manufacturer such as Acciona, Clipper, Gamesa, Mitsubishi, Siemens, Vestas, and more.



Wind Foundation

Foundation tensioners provide foundation tensioning solutions for almost every type of foundation used on wind turbines. We stock tooling for foundation studs from 1" up to 3" rock anchor studs.

Made for Wind Turbines

HYTORC's elliptical foundation tensioners are designed to meet the requirements of all popular foundation designs and studs. Specifically, Williams and Dyson foundation studs.

Light but Strong

HYTORC's foundation tensioners are optimized for size and weight as well as strength and durability. Our foundation tensioners are light enough to easily handle, but strong enough to stand up to the toughest jobs.



Subsea

Subsea tensioners are manufactured from high quality materials, fit a variety of sizes and budgets, easy to use and designed for continuous use in demanding environments.

Easy Handling

One-piece body design that allows the operator to handle the tool with confidence.

Long, 30mm Stroke

30mm of piston stroke and a highly visible maximum stroke indicator give the diver maximum tool strokes without over-stroking the tool and leaking oil.

Solid and Split Nuts Available

Split nuts allow for faster assembly times, especially when damaged threads are an issue. Lower cost solid nuts are also available to meet your budgetary needs.

Tensioner Pumps



HBT Pneumatic

HYTORC's HBT pneumatic pumps are available in standard flow rate and high flow rate to meet your specific tooling needs. Each pump comes equipped with an in-line filter, regulator, and lubricator assembly. These pumps are simple to use, simple to maintain, and will last for years to come.



Hand Pumps

HYTORC's hand pumps for tensioning tools are lightweight and mobile by design. With different pressures and capacities available, HYTORC can provide you with the flexibility you need. Our hand pumps have built in gauges with a unique steel handle that protects the gauge from impact.

Tensioner Pumps



Subsea

In order to stand up to the tough offshore environments, HYTORC has taken our tried and true high flow pneumatic pump and reconstructed it with stainless steel components. Additionally, we have doubled the size of the reservoir to suit the demands of subsea tensioning.



PES

The PES pump is HYTORC's workhorse tensioning pump. It has the ability to run multiple tools without sacrificing performance. It is reliable and gives our customers consistent results day in and day out. The PES pump is recommended for all applications including construction and is available in a variety of configurations.



HY Series

The HY Series of tension pumps are our latest design for the tensioning market. This pump was designed with maintenance technicians in mind. With a smaller footprint, HYTORC's HY Series tension pumps are nearly 30 pounds lighter than most tension pumps on the market today.



1507-E

HYTORC's 1507-E pump was designed for the heaviest of jobs. With a 3-phase, 690V motor, the 1507-E provides HYTORC customers with heavy duty performance and reliability. The 1507-E will support multiple tools with little to no effort. With a full protective cage that is lift-rated, the 1507-E is ready for all applications including construction.

Tensioner Accessories



Hydraulic Nuts

Hydraulic nuts are designed to tighten large diameter bolts without causing the damage that occurs when hammer wrenches are employed. With HYTORC's hydraulic nut solutions, customers can tighten large bolts with little to no effort and do so without causing any damage.



Direct Fit Tensioners

Direct fit tensioners are very useful in applications where you have limited clearance in all directions. Additionally, technicians prefer them for overhead work because of the one-piece design. Direct fit tensioners can be customized to fit a wide range of applications



Interconnecting Hose Tee Fitting One End



Link Hose



Manifolds

HYTORC has manifolds for every application and any pressure.

Flexible Hose Assemblies

A wide variety of high pressure hoses are available, come prefilled with oil, multiple configurations.

Tommy Bars

Tommy Bars are short metal rods used to tighten the puller and the captive nut – sizes include 10mm and 8mm.



T - Hydraulic Tensioner Procedures

- T1 Inspect Tools
- T2 Determine Coverage
- T3 Account for Load Loss
- T4 Determine Tool Pressure – 100% Coverage
- T5 Determine Tool Pressure(s) – 50% Coverage
- T6 Setup Pump
- T7 Prepare Bolts
- T8 Install Tensioners
- T9 Connect Hoses
- T10 Tighten Bolt(s)
- T11 Repeat Tensioning Cycle
- T12 Loosen Bolt(s)

Inspect Tools

T1 Inspect Tools

- ❑ Inspect all Tensioner Equipment; Tools, Pumps and hoses for any sign of damage
- ❑ Appropriate number of tensioners to provide minimum coverage – usually enough tensioners to cover 50% or 100% of the bolts to be simultaneously tightened.

If there is any damage or leaking discovered before the operation or during the operation the issue must be corrected before proceeding..



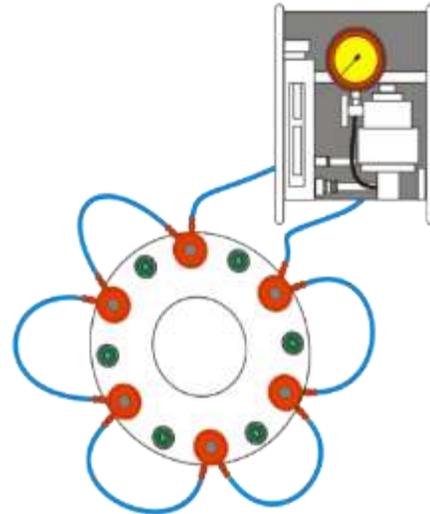
Determine Coverage

T2 Determine Coverage

- ❑ Based on number of tensioners available and number of bolts determine how much coverage will be used

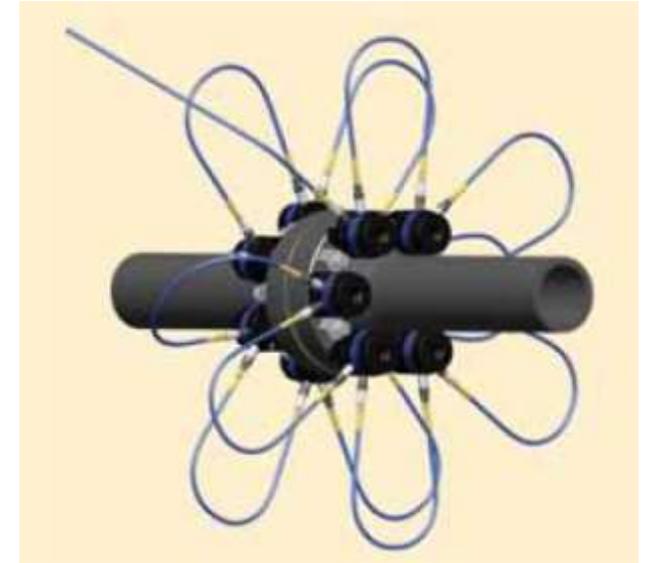
Tensioning permits the simultaneous tightening of multiple bolts; the tools are connected in sequence via a high-pressure hose assembly to a single pump unit. This ensures each tool develops the exact same load and provides a uniform clamping force across the joint. This is especially important for pressure containing vessels requiring even gasket compression to affect a seal.

- Tensioners usually used in sets.
- 100% coverage would be best.
- 50% is common because of space or cost constraints.
- Less than 50% is possible but not covered in this procedure.



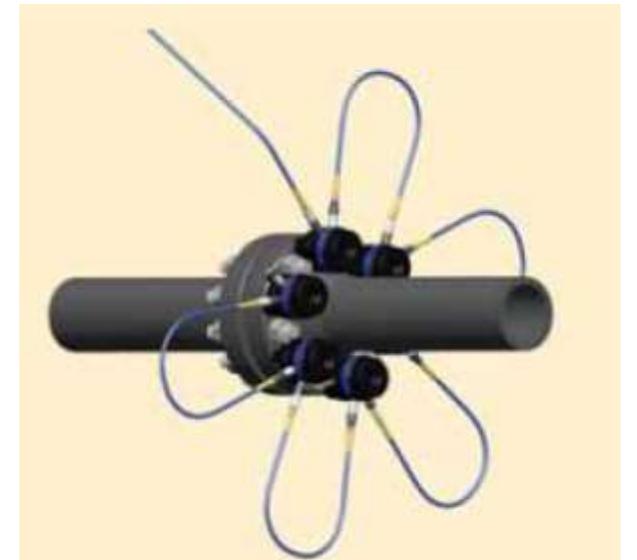
100% Coverage

All bolts are tensioned simultaneously – tensioners are positioned on alternating sides of the flange.



50% Coverage

Half the bolts are tensioned simultaneously, the tools are relocated on the remaining bolts and they are subsequently tensioned.



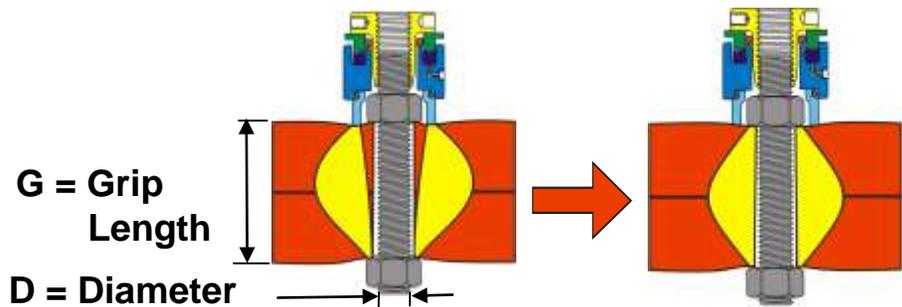
Account for Load Loss

T3 - The tensioning procedure must account for load lost between the tensioner and the bolt and where less than 100% coverage is used the load lost between adjacent bolts on the flange.

❑ Load Loss Factor (LLF)

Accounts for Transfer Loss between Tensioner and Bolt

During the tensioner process there is a loss of bolt elongation that occurs during load transfer between the tensioner and the bolt due to thread deflections, radial expansion of the nut, and embedding of the nut into the joint. Load loss is accounted for by way of a correction factor called the Load Loss Factor (LLF) that increases the pressure (Pressure B) applied to the bolt so that the residual load on the bolt after applying pressure and accounting for loss meets the target bolt load. LLF is based on configuration of bolt diameter and grip length.



$$LLF = 1.01 + D/G$$

(mfg. min. recommended LLF = 1.1)

Pressure B is the pressure applied

Pressure C is the pressure read from the tool chart

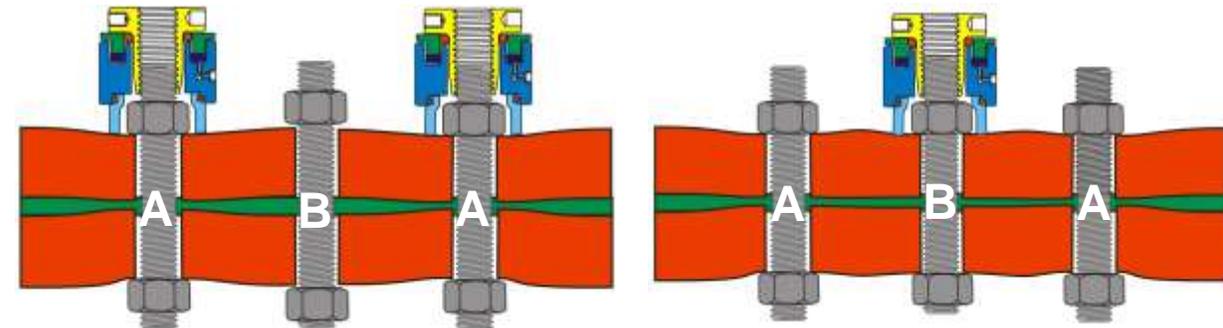
$$Pressure_B = Pressure_C \times LLF$$



❑ Cross-Load Factor (CLF)

Accounts for Elastic Loss between Bolts on the Flange

When Using Less than 100% Coverage (e.g. 50% of bolts tightened followed by the other 50%) the load on the first set of bolts is diminished due to cross elastic interaction through the flange (and gasket) as the second set of bolts are tightened. To account for this loss additional pressure (Pressure A) must be applied to the first set of bolts for the residual load meets the target. A correction factor called the Cross-Load Factor is used to adjust to Pressure A.



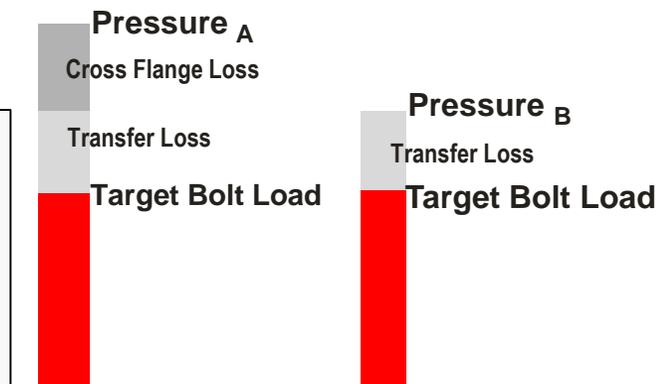
$$CLF = 1.2$$

(mfg. range from 1.15 to 1.25)

Pressure A applied first 50% tensioners

Pressure B applied the next 50%

$$Pressure_A = Pressure_B \times CLF$$



Determine Tool Pressure – 100% Coverage

!All calculations should be verified by a qualified engineer trained in hydraulic tensioning.

T4 Determine Tool Pressure – B

An Applied Bolt Stress/Tool Pressure Graph is provided for each tensioner type. The chart provides lines for different size tensioners at different bolt stress levels.

- Select the target pressure from the chart for the desired bolt pressure and for the specific tensioner used:

Example:

Bolt size 1-1/4" (green line)

Required bolt load 50,000 psi

Pressure C = 10,700 psi (Read from chart)

OR Calculate the target pressure

Pressure C = Bolt Load / Tensioner Area

Example:

Pressure C = 50,000psi/4.65 in²

Pressure C = 10,753 psi (Calculated)

- Calculate "Pressure B" that Accounts for Load Loss.

Pressure B = Pressure C x (1.01 + D/G)

where D = nominal diameter 1.25in and G = Grip length 5in

Example:

Pressure B = Pressure C x LLF

Pressure B = 10,753 psi x (1.01+ 1.25/5)

Pressure B = 10,753 x 1.26

Pressure B = 13,550 psi (Calculated)

This Chart provided by the manufacturer represents to the relationship between tool pressure (Pressure C Chart pressure) and the residual target bolt load.



Determine Tool Pressures – 50% Coverage

!All calculations should be verified by a qualified engineer trained in hydraulic tensioning.

T5 Determine Tool Pressures – A & B

An Applied Bolt Stress/Tool Pressure Graph is provided for each tensioner type. The chart provides lines for different size tensioners at different bolt stress levels.

- ☐ Select the recommended chart pressure from the chart provided for the specific tensioner used:

Example:

Bolt size 1-1/4" (green line)

Required bolt load 50,000 psi

Pressure C = 10,700 psi (Read from chart)

OR Calculate the recommended chart pressure

Pressure C = Bolt Load / Tensioner Area

Example:

Pressure C = 50,000psi/4.65 in²

Pressure C = 10,753 psi (Calculated)

- ☐ Calculate "Pressure B" that Accounts for Load Loss.

Where D = nominal diameter and G = Grip length

Example:

Pressure B = Pressure C x LLF

Pressure B = 10,753 psi x (1.01+ 1.25/5)

Pressure B = 10,753 x 1.26

Pressure B = 13,550 psi (Calculated)

This Chart provided by the manufacturer represents to the relationship between tool pressure (Pressure C chart pressure) and the residual target bolt load.



- ☐ Calculate "Pressure A" that Accounts for Cross Load Factor

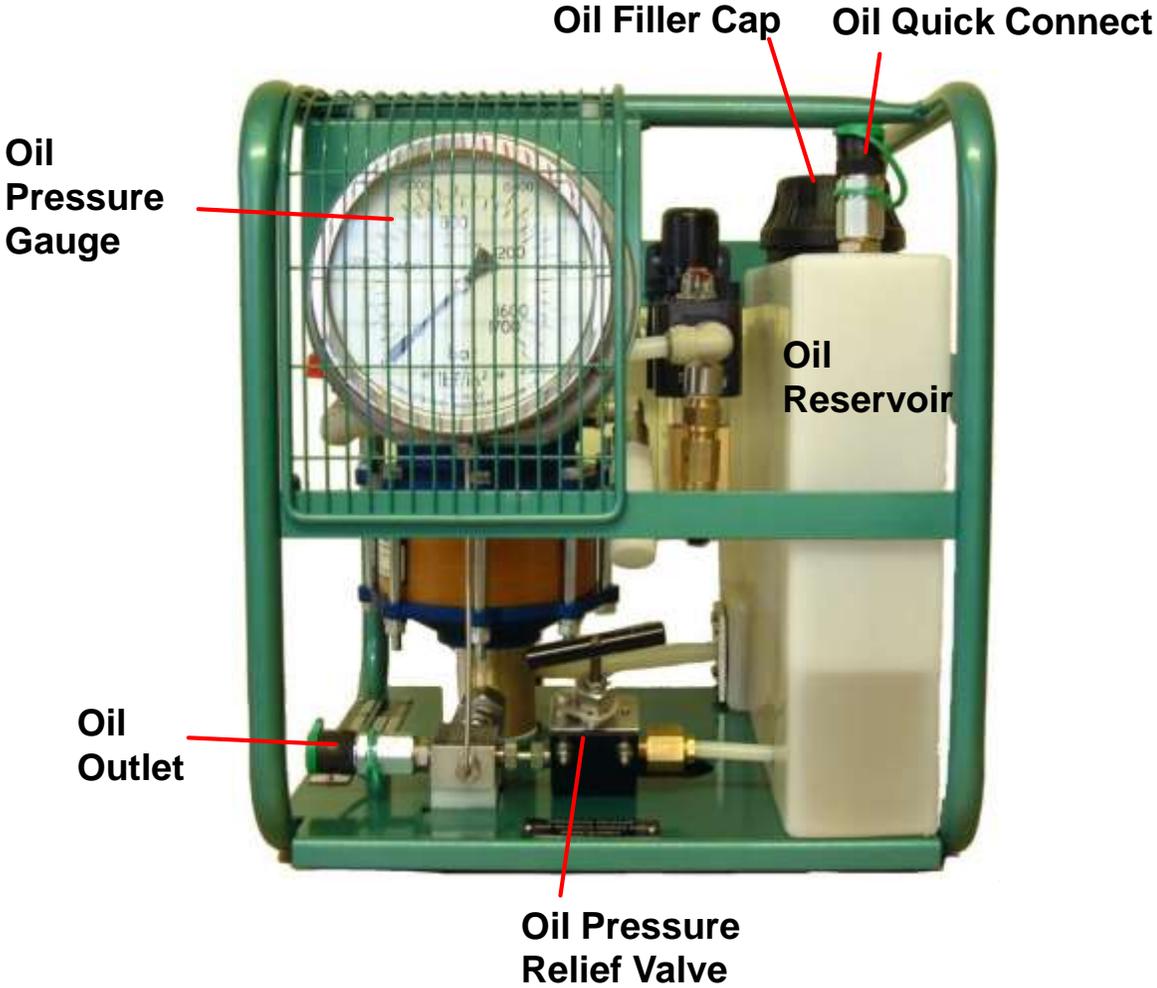
Example:

Pressure A = Pressure B x CLF

Pressure A = 13,550 psi x 1.2

Pressure A = 16,260 psi (Calculated)

Setup Pump



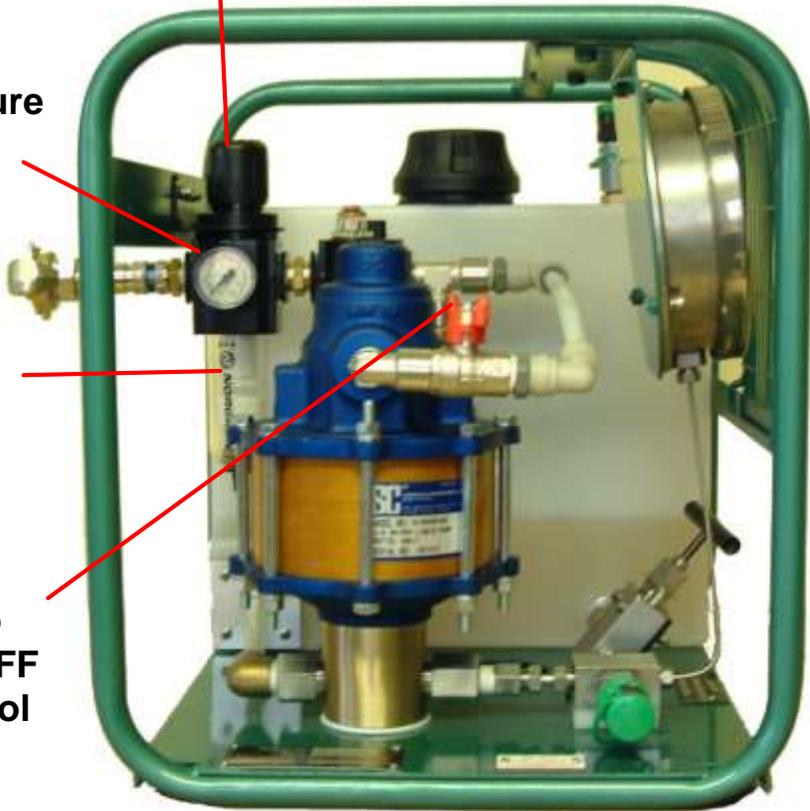
Air Pressure Regulator

Air Pressure Gauge

Air Inlet

Air Filter

Pump ON/OFF Control Valve



OFF Closed



ON Open



Setup Pump

T6 Setup Pump

- With MAIN AIR SUPPLY OFF, fit the correct type air pressure inlet connector and connect the air supply to the pump (70 to- 100 psi).
- Remove the oil filler cap and fill the reservoir with hydraulic fluid until it is about $\frac{3}{4}$ full.
- Check the air lubricator to see if it is filled with lubricating oil – if not fill the lubricator to the maximum level marked on the bowl.
- Fully open the oil pressure release valve – turn CCW to open the valve.
- Close the pump Air (on/off) Control Valve by turning the handle quarter control CW.
- TURN ON MAIN AIR SUPPLY
- Adjust air pressure gauge to zero by lifting the cap of the air pressure regulator to unlock and turn CCW until the air pressure is zero.
- Open the pump ON/OFF Control Valve by turning CCW.
- Slowly turn the air pressure regulator CW until the pump runs at speed between 30 and 60 strokes per minute – allow to run for at least 2 min.
- Observe the air lubricator is applying oil at the rate of 1 drop for every fifty strokes, adjust the red plastic knob as required.
- Close the ON/OFF Control Valve, the pump is ready for use.

Air Inlet Connector



Connect Air Supply



Oil Filler Cap



Air Lubricator



Oil Pressure Release Valve



Close ON/OFF Valve



Air Pressure Regulator



Air Pressure Gauge



Open ON/OFF Valve



Close ON/OFF Valve



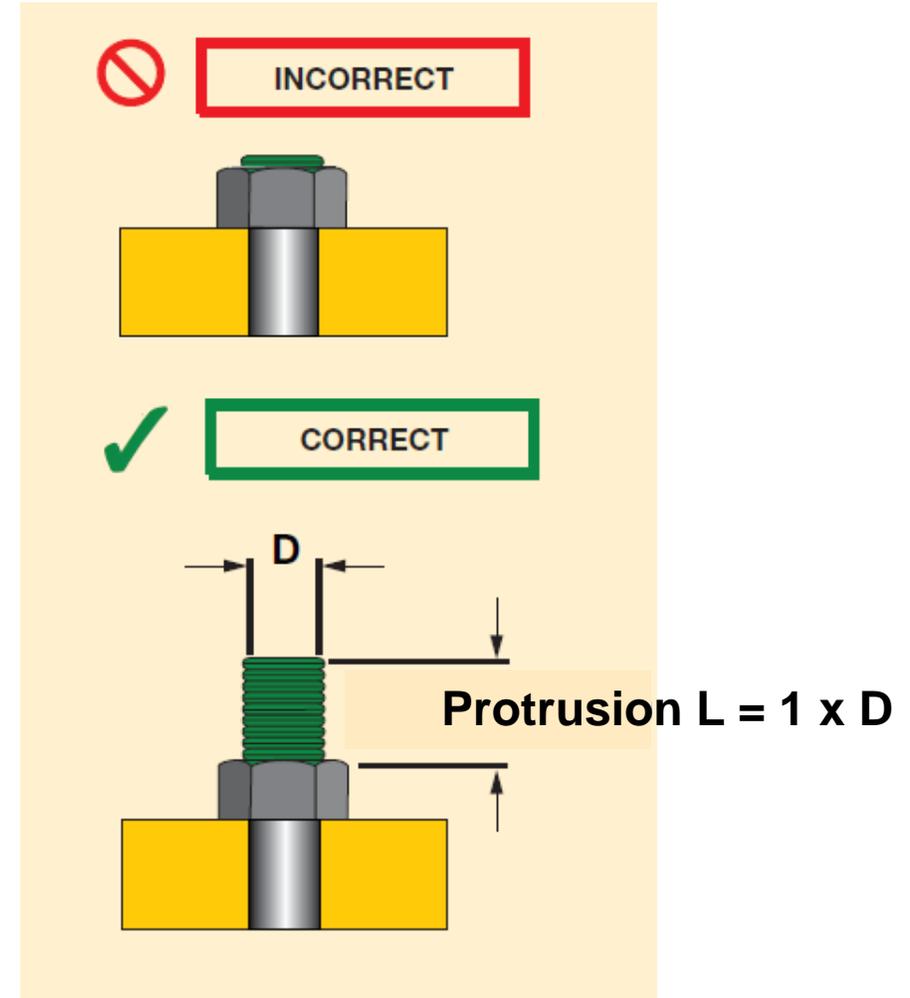
Prepare Bolts

T7 Prepare Bolts

- ❑ Assemble nuts to bolts such that bolt thread protrudes at least 1 times the nominal bolt diameter beyond the nut in order to provide adequate engagement with the thread puller.

Recommendation: Target a protrusion length of 1 x D to ensure adequate and safe thread engagement

- ❑ No Washers are Used
- ❑ No Lubrication is Used



Install Tensioners

T8 Install Tensioners

- ❑ Place the Hydraulic Bridge and socket over the bolt and nut to be tightened.
- ❑ Insert the puller through the Hydraulic Bridge opening and thread onto the bolt.
 - Important Technique – Keep thumb inside the puller when threading and unthreading to avoid accidentally dropping puller.**
- ❑ Thread puller CW all the way over the bolt until the puller is flush with the Hydraulic Bridge.
- ❑ Make sure the window for access to the socket and pressure input couplers are accessible on the outside of the flange.
- ❑ Use the Tommy Bar to apply additional CW pressure to the Thread Pullers to hold them firmly in place.
- ❑ Repeat for all tensioners and bolts to be tightened simultaneously.

**Keep
thumb
in puller**



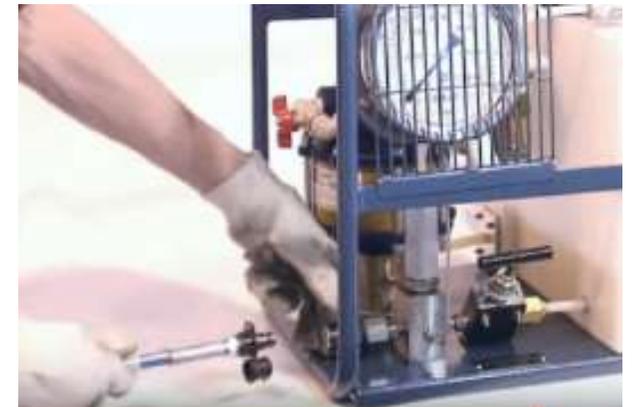
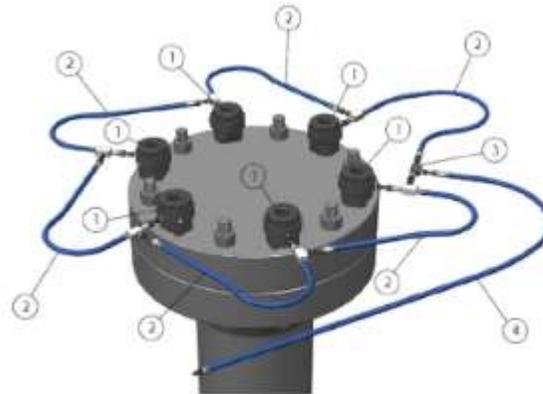
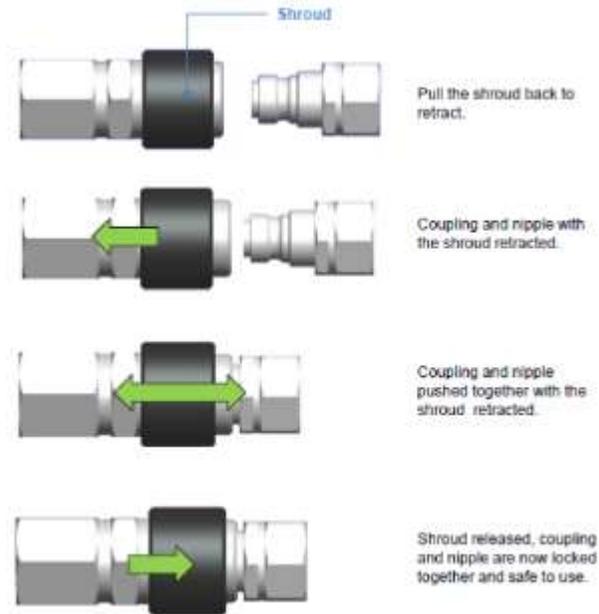
**Make sure
bridge
window,
socket and
pressure
input are
accessible**



Connect Hoses

T9 Connect Hoses

- ❑ Check that there is no pressure in the system.
- ❑ Pull back the shroud and push the coupling onto the nipple.
- ❑ Release shroud which will spring to lock the Coupling and Nipple together.
- ❑ Connect tensioners together in series.
- ❑ Connect the last hose to the pump.
- ❑ To disconnect, check there is no pressure in the system, pull back the shroud and pull the coupling apart.



Tighten Bolt(s)

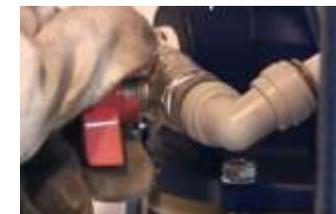
T10 Tighten Tensioner

- ❑ Ensure the tensioning team are aware of the target Pressure for the cycle – A or B.
- ❑ Turn the Oil Pressure Release T-valve handle clockwise to close off the oil reservoir from the pump and hoses.
- ❑ Open the ON/OFF valve turning the valve CCW to apply air pressure to the pump.
- ❑ Build pressure in the system to a nominal pressure of 1000 psi (70bar) and check that the pressure is holding. If the pressure drops investigate any leaks.
- ❑ When using a compliant gasket build pressure to 50% of target, and hold for 90s to allow gasket to seat.
- ❑ Continue to apply more pressure to 100% of the target pressure (Pressure A or B), monitor the gauge as pressure builds to the target pressure and hold at least 60s.
- ❑ Watch the tensioner as it pulls, stop if the color coded maximum stroke indicator color ring becomes visible and stop if there are any leaks.
- ❑ Once pressure is stable, hand tighten tensioner socket with Tommy Bar through the window turning the socket CW to tighten the nuts until the nut is tight against the flange.
- ❑ Complete tightening for all nuts in this pass.
- ❑ Turn the Oil Pressure Release T-valve handle CCW to open the valve and drain oil back into the reservoir to return the pressure down to zero slowly.
- ❑ Pressure is taken off the tensioners and they return back into the tensioner to it's original position – may need to tap tensioners or turn pullers with the Tommy Bar to return all the way.
- ❑ Tensioning this cycle is complete and tensioners can be moved/removed.

Close Oil Pressure Release



Turn ON Air Pressure



Watch Oil Pressure Gage Build to Target



Watch for Maximum Stroke Indicator Yellow Warning as Puller Moves



Tighten Socket and Nut with Tommy Bar – all Tensioners



Open Oil Pressure Valve to Release Pressure



Repeat Tensioning Cycle

T11 Repeat Tensioning Cycle

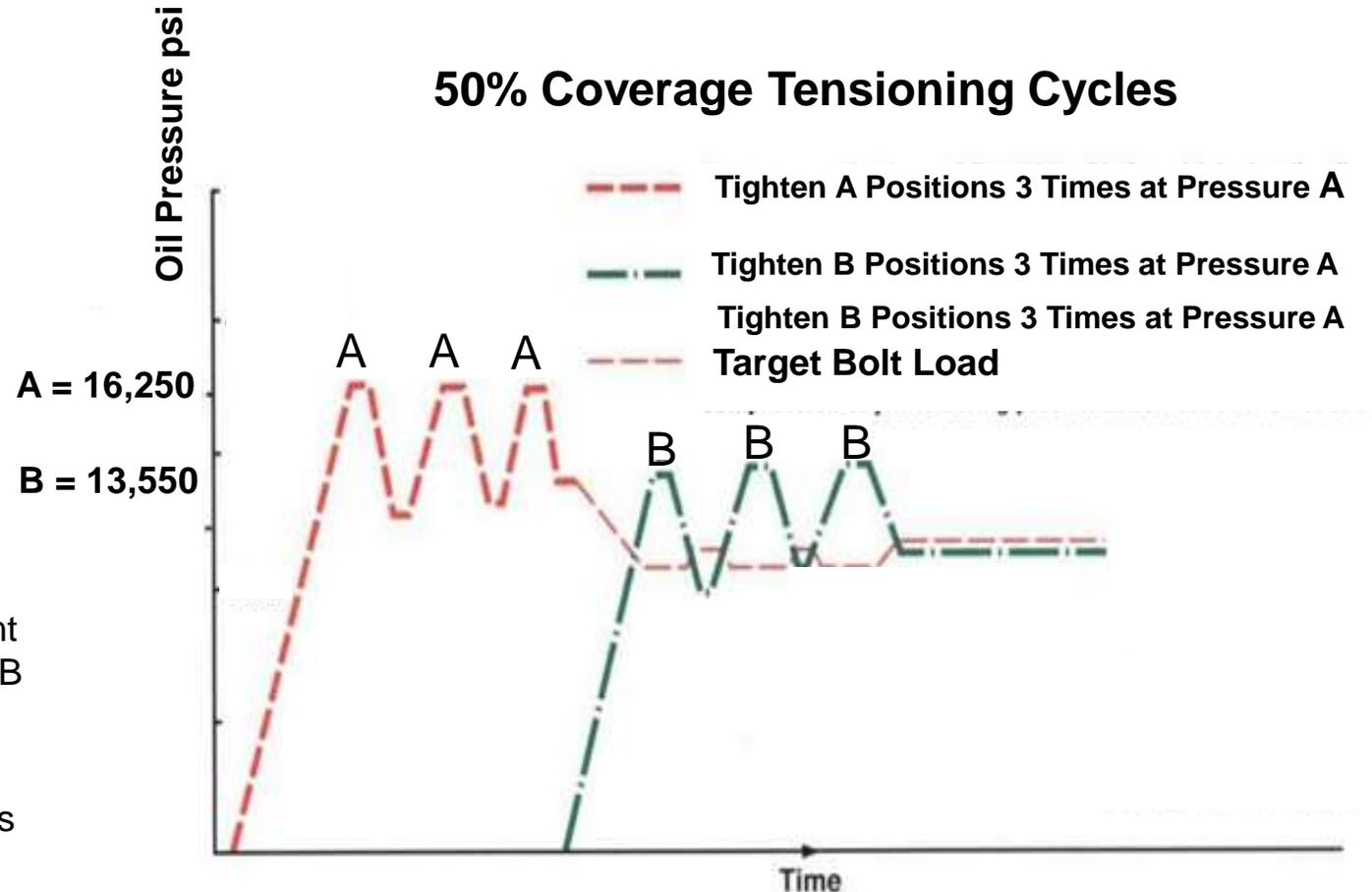
100% Coverage

- The tensioning cycle is repeated two more times at Pressure A
- Tensioners may be removed

50% Coverage (see diagram)

- The tensioning cycle is repeated two more times at the Pressure A – checking that there is no further movement
- Tensioners are moved to the B positions.
- Tension Tighten Bolt procedure is repeated three times on the B nuts at Pressure B, each subsequent time bringing the pressure up to 100% of Pressure B to verify there is no further movement and then pressuring down to zero slowly.
- Tensioners are moved for check pass on A positions – tightened one more time at Pressure B to make sure no further movement
- Check to see if there is any movement in the nuts, if nuts tighten then Pa needs to be higher – try a 5% increase on the next flange.
- Tensioners may be removed

50% Coverage Tensioning Cycles



Loosen Bolt(s)

T12 Loosen Bolt (De-tensioning)

- ❑ Install tensioners on nuts
- ❑ Connect hoses
- ❑ Tighten thread puller so that it is flush against the tensioner body.
 - IMPORTANT – then back off the thread pull one full revolution to give the nut space to loosen**
- ❑ The tensioner is tightened gradually until the nut breaks loose - Starting at 300bar check to see if nut breaks loose, then to 400bar check, then to 500bar check, etc. continuing to increase pressure by 100bar increments until the nut breaks loose.
- ❑ Nuts are turned CCW with the Tommy Bar 3 windows
 - IMPORTANT – turning more than 3 windows can cause the nut to tighten against the puller making further loosening difficult**
- ❑ If other nuts are to be loosened, this is done gradually until all nuts are loosened



6. Safety

Bolting Safety Moment



HEAD PROTECTION

Wear protective hard hat helmets wherever there is possible danger of head injury from impact or from falling or flying objects and from electrical hazards.



HEARING PROTECTION

Wear ear plugs or muffs or both when exposed to excessive or prolonged noise in excess of 80dB.



PROTECTIVE CLOTHING

Wear protective clothing if required
Wear high visible vest if required
Avoid wearing loose fitting clothing or jewelry

! HOSES & CORDS

Arrange associated cords, hoses and equipment to avoid slips, trips and falls.



EYE PROTECTION

Wear eye or face protection to protect against flying objects. Safety glasses should have side shields to provide full coverage

! REACTION ARM SAFETY

Always react against fixed surfaces
Keep hands well clear of any reaction points
Eliminate reaction arms by using HYTORC washers

! SOCKET SAFETY

Use only impact grade sockets
Inspect all sockets before use



HAND PROTECTION

Wear safety gloves to protect against heat and sharp objects.



FOOT PROTECTION

Wear approved safety shoes with steel/reinforced toes
Protects feet from injury of falling object
Provides support to prevent slips, trips or falls



Let's Bolt!

HYTORC®
Since 1968