## Contents

### 1. Hydraulic Torque Tools
- Hydraulic Torque Technology
- Hydraulic Torque Tool Overview
- Hydraulic Tool Comparison
- EDGE
- VERSA
- MXT
- XLCT
- ICE
- AVANTI
- STEALTH
- HY-115/230
- HY-Air
- Vector
- Additional Hydraulic Pumps
- H - Hydraulic Torque Tool Operating Procedures

### 2. Pneumatic Torque Tools
- Pneumatic Torque Tool Overview
- Pneumatic Tool Comparison
- jGUN SINGLE SPEED
- jGUN DUEL SPEED
- FRL
- Digital jGUN
- J - jGUN Tool Operating Procedures
- DJ – Digital jGUN Operating Procedures

### 3. Electric Torque Tools
- Electric Torque Tool Overview
- Electric Tool Comparison
- FLASH 2.0
- LITHIUM SERIES Gun
- LION GUN
- L – Lithium Battery Gun Operating Procedures

### 4. HYTORC Fasteners
- HYTORC Washer
- HYTORC Nut
- HW - HYTORC Washer Install Procedure
- HN – HYTORC Nut Install Procedure

### 5. Hydraulic Tensioners
- Hydraulic Tensioner Technology
- Top Side Tensioners
- Wind and Subsea Tensioners
- Tensioner Pumps
- Tensioner Accessories
- T - Hydraulic Tensioning Operating Procedures

### 6. Safety
- Bolting Safety Moment
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** 0.7, 1, 3, 5
- **AVANTI** 0.7, 1, 3, 5, 8, 10, 20, 35, 50, 80, 130
- **MXT** 0.7, 1, 3, 5, 10, 15, 20, 35
- **EDGE** 2, 4, 6, 8, 12, 30

Low Clearance Tools
- **STEALTH** 2, 4, 14, 22, 36
- **XLCT** 2, 4, 8, 14, 18, 30, 45
- **VERSA** 1, 2, 4, 8, 14, 20, 30

Pumps
- **HY-115/230**
- **HY-AIR**
- **HY-VECTOR**

CRITICAL PATH TECHNOLOGY
Safest, leak and failure-free

HEAVY INDUSTRY TECHNOLOGY
Most widely used

MAINTENANCE TECHNOLOGY
Durable and simple to maintain

Accessories
# Hydraulic Torque Tool Comparison

<table>
<thead>
<tr>
<th>Feature</th>
<th>ICE</th>
<th>Avanti</th>
<th>MXT</th>
<th>EDGE</th>
<th>Stealth</th>
<th>XLCT</th>
<th>Versa</th>
</tr>
</thead>
<tbody>
<tr>
<td>Multi-direction hose swivel</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>Torque accuracy within 5%</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>Torque output up to 35,000 ft-lbs</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>Torque output beyond 35,000 ft-lbs</td>
<td></td>
<td></td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>Lock-on release</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>Hands-free bolting</td>
<td>✓*</td>
<td>✓*</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>Industry leading safety</td>
<td>✓*</td>
<td>✓*</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓*</td>
<td>✓</td>
</tr>
<tr>
<td>Industry leading load accuracy</td>
<td>✓*</td>
<td>✓*</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓*</td>
<td>✓</td>
</tr>
<tr>
<td>Auto pressure release</td>
<td>✓</td>
<td></td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>Total freedom swivel</td>
<td>✓</td>
<td></td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
</tr>
</tbody>
</table>
**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.
VERSASimple 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.

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.
MXT Features

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 torquing – simply toggle the lever for easy removal.

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

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

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

<table>
<thead>
<tr>
<th>MODEL NUMBER</th>
<th>H (IMPERIAL)</th>
<th>W</th>
<th>L</th>
<th>DRIVE</th>
<th>WEIGHT</th>
<th>TORQUE</th>
</tr>
</thead>
<tbody>
<tr>
<td>MXT - .7</td>
<td>4.25</td>
<td>1.62</td>
<td>3.95</td>
<td>3/4</td>
<td>2.70</td>
<td>118</td>
</tr>
<tr>
<td>MXT - 1</td>
<td>4.90</td>
<td>1.97</td>
<td>4.88</td>
<td>3/4</td>
<td>3.95</td>
<td>200</td>
</tr>
<tr>
<td>MXT - 3</td>
<td>6.12</td>
<td>2.63</td>
<td>6.34</td>
<td>1</td>
<td>8.30</td>
<td>480</td>
</tr>
<tr>
<td>MXT - 5</td>
<td>7.22</td>
<td>3.16</td>
<td>7.61</td>
<td>1 1/2</td>
<td>14.20</td>
<td>636</td>
</tr>
<tr>
<td>MXT - 10</td>
<td>8.80</td>
<td>3.95</td>
<td>9.51</td>
<td>1 1/2</td>
<td>24.80</td>
<td>1,755</td>
</tr>
<tr>
<td>MXT - 15</td>
<td>9.67</td>
<td>4.38</td>
<td>10.65</td>
<td>2 1/2</td>
<td>36</td>
<td>2,268</td>
</tr>
<tr>
<td>MXT - 20</td>
<td>10.24</td>
<td>4.73</td>
<td>11.41</td>
<td>2 1/2</td>
<td>43.40</td>
<td>2,960</td>
</tr>
<tr>
<td>MXT - 35</td>
<td>12.42</td>
<td>5.82</td>
<td>14.03</td>
<td>2 1/2</td>
<td>77.45</td>
<td>5,400</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>MODEL NUMBER</th>
<th>H (METRIC)</th>
<th>W (mm)</th>
<th>L (mm)</th>
<th>DRIVE</th>
<th>WEIGHT</th>
<th>TORQUE</th>
</tr>
</thead>
<tbody>
<tr>
<td>MXT - .7</td>
<td>108</td>
<td>41.44</td>
<td>100.6</td>
<td>19.05</td>
<td>1.22</td>
<td>160</td>
</tr>
<tr>
<td>MXT - 1</td>
<td>124.5</td>
<td>50.03</td>
<td>124</td>
<td>19.05</td>
<td>1.80</td>
<td>271.2</td>
</tr>
<tr>
<td>MXT - 3</td>
<td>155.44</td>
<td>66.8</td>
<td>161.03</td>
<td>25.4</td>
<td>3.80</td>
<td>650.3</td>
</tr>
<tr>
<td>MXT - 5</td>
<td>183.4</td>
<td>80.3</td>
<td>103.29</td>
<td>38.10</td>
<td>6.44</td>
<td>1,322.70</td>
</tr>
<tr>
<td>MXT - 10</td>
<td>223.52</td>
<td>100.33</td>
<td>241.60</td>
<td>38.10</td>
<td>11.24</td>
<td>2,379.50</td>
</tr>
<tr>
<td>MXT - 15</td>
<td>245.61</td>
<td>111.30</td>
<td>268</td>
<td>63.50</td>
<td>16.32</td>
<td>3,075</td>
</tr>
<tr>
<td>MXT - 20</td>
<td>260.09</td>
<td>120.14</td>
<td>289.81</td>
<td>63.50</td>
<td>19.70</td>
<td>4,013.22</td>
</tr>
<tr>
<td>MXT - 35</td>
<td>315.50</td>
<td>147.82</td>
<td>356.36</td>
<td>63.50</td>
<td>35.13</td>
<td>7,321.41</td>
</tr>
</tbody>
</table>
XLCT Features

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.

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.

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.

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.
XLCT Specifications

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

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>XLCT - 2</td>
<td>4.02</td>
<td>2.00</td>
<td>1.25</td>
<td>7.33</td>
<td>1.03 – 1.75</td>
<td>2.05</td>
<td>243</td>
<td>1,687</td>
</tr>
<tr>
<td>XLCT - 4</td>
<td>5.36</td>
<td>2.58</td>
<td>1.87</td>
<td>10.19</td>
<td>1.33 – 2.32</td>
<td>4.25</td>
<td>560</td>
<td>3,855</td>
</tr>
<tr>
<td>XLCT - 5</td>
<td>5.70</td>
<td>3.23</td>
<td>2.29</td>
<td>12.29</td>
<td>1.77 – 2.89</td>
<td>7.15</td>
<td>1,143</td>
<td>8,151</td>
</tr>
<tr>
<td>XLCT - 14</td>
<td>8.04</td>
<td>3.68</td>
<td>2.50</td>
<td>14.61</td>
<td>2.32 – 3.47</td>
<td>11.30</td>
<td>2,010</td>
<td>13,400</td>
</tr>
<tr>
<td>XLCT - 18</td>
<td>9.08</td>
<td>4.38</td>
<td>2.83</td>
<td>14.34</td>
<td>2.62 – 3.87</td>
<td>14.85</td>
<td>2,790</td>
<td>19,100</td>
</tr>
<tr>
<td>XLCT - 30</td>
<td>10.71</td>
<td>5.17</td>
<td>3.35</td>
<td>16.82</td>
<td>3.07 – 4.80</td>
<td>23.80</td>
<td>4,579</td>
<td>30,986</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>MODEL NUMBER</th>
<th>H (mm)</th>
<th>W1 (mm)</th>
<th>W2 (mm)</th>
<th>L (mm)</th>
<th>R (mm)</th>
<th>WEIGHT (kg)</th>
<th>MIN (Nm)</th>
<th>MAX (Nm)</th>
</tr>
</thead>
<tbody>
<tr>
<td>XLCT - 2</td>
<td>102.10</td>
<td>50.80</td>
<td>31.80</td>
<td>186.20</td>
<td>26.20 – 44.70</td>
<td>0.92</td>
<td>329.56</td>
<td>2,287.30</td>
</tr>
<tr>
<td>XLCT - 4</td>
<td>136.14</td>
<td>65.53</td>
<td>42.41</td>
<td>258.82</td>
<td>33.80 – 58.92</td>
<td>1.92</td>
<td>786.40</td>
<td>5,229.70</td>
</tr>
<tr>
<td>XLCT - 5</td>
<td>170.20</td>
<td>82.04</td>
<td>53.10</td>
<td>312.20</td>
<td>45.00 – 73.40</td>
<td>3.24</td>
<td>15,498.70</td>
<td>110,513.0</td>
</tr>
<tr>
<td>XLCT - 14</td>
<td>204.21</td>
<td>96.90</td>
<td>63.50</td>
<td>312.20</td>
<td>58.92 – 86.13</td>
<td>5.12</td>
<td>2,725.19</td>
<td>19,108</td>
</tr>
<tr>
<td>XLCT - 18</td>
<td>230.53</td>
<td>111.30</td>
<td>71.90</td>
<td>364.23</td>
<td>66.54 – 98.30</td>
<td>6.73</td>
<td>3,782.73</td>
<td>25,896.12</td>
</tr>
<tr>
<td>XLCT - 30</td>
<td>272.03</td>
<td>131.31</td>
<td>85.09</td>
<td>427.22</td>
<td>76.00 – 121.92</td>
<td>10.80</td>
<td>6,208.30</td>
<td>42,011.40</td>
</tr>
</tbody>
</table>
ICE Features

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

**Total-Freedom Uniswivel Coupler**
Provides the world's 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

<table>
<thead>
<tr>
<th>MODEL NUMBER</th>
<th>IMPERIAL (in)</th>
<th>METRIC (mm)</th>
<th>WEIGHT (lbs)</th>
<th>MIN (ft-lbs)</th>
<th>MAX (ft-lbs)</th>
<th>WEIGHT (kg)</th>
<th>MIN (Nm)</th>
<th>MAX (Nm)</th>
</tr>
</thead>
<tbody>
<tr>
<td>ICE - 7</td>
<td>4.60</td>
<td>115.90</td>
<td>25</td>
<td>1/16</td>
<td>5/16</td>
<td>8.06</td>
<td>158.00</td>
<td>1,092.00</td>
</tr>
<tr>
<td>ICE - 1</td>
<td>5.17</td>
<td>131.32</td>
<td>25</td>
<td>1/16</td>
<td>5/16</td>
<td>7.66</td>
<td>165.74</td>
<td>1,743.90</td>
</tr>
<tr>
<td>ICE - 3</td>
<td>6.58</td>
<td>167.13</td>
<td>25</td>
<td>1/16</td>
<td>5/16</td>
<td>7.06</td>
<td>182.70</td>
<td>4,148.34</td>
</tr>
<tr>
<td>ICE - 5</td>
<td>7.63</td>
<td>193.80</td>
<td>25</td>
<td>1/16</td>
<td>5/16</td>
<td>6.16</td>
<td>1,090.10</td>
<td>7,267.20</td>
</tr>
</tbody>
</table>
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.

<table>
<thead>
<tr>
<th>MODEL NUMBER</th>
<th>H (in.)</th>
<th>W (in.)</th>
<th>L (in.)</th>
<th>R (in.)</th>
<th>DRIVE</th>
<th>WEIGHT (lbs.)</th>
<th>TORQUE (ft-lbs.)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Avanti - 7</td>
<td>4.19</td>
<td>1.79</td>
<td>4.44</td>
<td>0.99</td>
<td>3/4</td>
<td>3.10</td>
<td>115</td>
</tr>
<tr>
<td>Avanti - 1</td>
<td>4.76</td>
<td>2.18</td>
<td>4.71</td>
<td>1.33</td>
<td>3/4</td>
<td>4.50</td>
<td>186</td>
</tr>
<tr>
<td>Avanti - 3</td>
<td>6.90</td>
<td>2.90</td>
<td>6.35</td>
<td>1.52</td>
<td>1</td>
<td>9.45</td>
<td>460</td>
</tr>
<tr>
<td>Avanti - 5</td>
<td>7.14</td>
<td>3.38</td>
<td>7.36</td>
<td>1.80</td>
<td>1/2</td>
<td>15.90</td>
<td>804</td>
</tr>
<tr>
<td>Avanti - 6</td>
<td>7.50</td>
<td>3.80</td>
<td>8.24</td>
<td>1.94</td>
<td>1/2</td>
<td>20.75</td>
<td>1,150</td>
</tr>
<tr>
<td>Avanti - 10</td>
<td>8.85</td>
<td>4.35</td>
<td>9.20</td>
<td>2.25</td>
<td>1/2</td>
<td>29.20</td>
<td>1,800</td>
</tr>
<tr>
<td>Avanti - 20</td>
<td>10.22</td>
<td>5.07</td>
<td>10.94</td>
<td>2.60</td>
<td>2/3</td>
<td>47.70</td>
<td>2,760</td>
</tr>
<tr>
<td>Avanti - 35</td>
<td>12.22</td>
<td>6.23</td>
<td>13.45</td>
<td>3.19</td>
<td>1/2</td>
<td>82.76</td>
<td>4,905</td>
</tr>
<tr>
<td>Avanti - 50</td>
<td>13.90</td>
<td>7.04</td>
<td>15.54</td>
<td>3.95</td>
<td>2/3</td>
<td>127.70</td>
<td>2,202</td>
</tr>
<tr>
<td>Avanti - 80</td>
<td>16.84</td>
<td>7.49</td>
<td>19.53</td>
<td>4.69</td>
<td>3/3</td>
<td>280.50</td>
<td>11,665</td>
</tr>
<tr>
<td>Avanti - 130</td>
<td>19.40</td>
<td>8.50</td>
<td>22.73</td>
<td>5.31</td>
<td>3/3</td>
<td>595</td>
<td>19,395</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>MODEL NUMBER</th>
<th>H (mm)</th>
<th>W (mm)</th>
<th>L (mm)</th>
<th>R (mm)</th>
<th>DRIVE</th>
<th>WEIGHT (kg)</th>
<th>TORQUE (Nm)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Avanti - 7</td>
<td>106.40</td>
<td>45.50</td>
<td>105.15</td>
<td>25.34</td>
<td>19.05</td>
<td>1.40</td>
<td>155.91</td>
</tr>
<tr>
<td>Avanti - 1</td>
<td>120.50</td>
<td>55.40</td>
<td>110.03</td>
<td>26.70</td>
<td>15.05</td>
<td>2.04</td>
<td>225.74</td>
</tr>
<tr>
<td>Avanti - 3</td>
<td>127.50</td>
<td>73.70</td>
<td>106.21</td>
<td>38.60</td>
<td>26.40</td>
<td>4.32</td>
<td>623.70</td>
</tr>
<tr>
<td>Avanti - 5</td>
<td>180.40</td>
<td>85.50</td>
<td>180.54</td>
<td>45.72</td>
<td>38.19</td>
<td>7.30</td>
<td>1,090.07</td>
</tr>
<tr>
<td>Avanti - 8</td>
<td>200.70</td>
<td>98.04</td>
<td>209.30</td>
<td>49.27</td>
<td>38.19</td>
<td>9.41</td>
<td>1,586.20</td>
</tr>
<tr>
<td>Avanti - 10</td>
<td>224.80</td>
<td>110.50</td>
<td>233.70</td>
<td>57.15</td>
<td>38.19</td>
<td>13.24</td>
<td>2,440.50</td>
</tr>
<tr>
<td>Avanti - 20</td>
<td>253.60</td>
<td>128.80</td>
<td>277.50</td>
<td>66.04</td>
<td>63.50</td>
<td>21.63</td>
<td>3,742.10</td>
</tr>
<tr>
<td>Avanti - 35</td>
<td>310.40</td>
<td>184.26</td>
<td>341.63</td>
<td>81.02</td>
<td>63.50</td>
<td>37.53</td>
<td>6,860.30</td>
</tr>
<tr>
<td>Avanti - 50</td>
<td>353.90</td>
<td>178.81</td>
<td>394.71</td>
<td>103.33</td>
<td>63.50</td>
<td>57.92</td>
<td>9,764.00</td>
</tr>
<tr>
<td>Avanti - 80</td>
<td>427.33</td>
<td>190.24</td>
<td>495.80</td>
<td>119.32</td>
<td>88.90</td>
<td>121.23</td>
<td>16,222.40</td>
</tr>
<tr>
<td>Avanti - 130</td>
<td>429.80</td>
<td>215.90</td>
<td>573.54</td>
<td>154.90</td>
<td>88.90</td>
<td>265.35</td>
<td>25,296.08</td>
</tr>
</tbody>
</table>
### STEALTH Features

**Uniswivel Coupler**
360-120 degree coupler adjustment allows free movement and positioning of tool and hoses.

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

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

**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.

**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.

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

**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.

---

[Image of STEALTH tool components: Power Head, Link, Release Pin]
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

### Imperial (in.)

<table>
<thead>
<tr>
<th>MODEL NUMBER</th>
<th>H</th>
<th>W</th>
<th>L</th>
<th>R</th>
<th>WEIGHT</th>
<th>TORQUE</th>
</tr>
</thead>
<tbody>
<tr>
<td>STEALTH - 2</td>
<td>4.21</td>
<td>125</td>
<td>5.53</td>
<td>1.03 - 1.76</td>
<td>4</td>
<td>278</td>
</tr>
<tr>
<td>STEALTH - 4</td>
<td>5.43</td>
<td>166</td>
<td>6.56</td>
<td>1.33 - 2.32</td>
<td>4.30</td>
<td>604</td>
</tr>
<tr>
<td>STEALTH - 8</td>
<td>6.40</td>
<td>2.18</td>
<td>8</td>
<td>1.77 - 2.89</td>
<td>6.70</td>
<td>1,199</td>
</tr>
<tr>
<td>STEALTH - 14</td>
<td>7.94</td>
<td>2.50</td>
<td>9.35</td>
<td>2.32 - 3.47</td>
<td>10.40</td>
<td>2,105</td>
</tr>
<tr>
<td>STEALTH - 22</td>
<td>9.18</td>
<td>2.91</td>
<td>10.80</td>
<td>2.52 - 3.87</td>
<td>15.40</td>
<td>3,250</td>
</tr>
<tr>
<td>STEALTH - 36</td>
<td>10.81</td>
<td>3.41</td>
<td>12.71</td>
<td>3.07 - 4.80</td>
<td>24.10</td>
<td>4,917</td>
</tr>
</tbody>
</table>

### Metric (mm)

<table>
<thead>
<tr>
<th>MODEL NUMBER</th>
<th>H</th>
<th>W</th>
<th>L</th>
<th>R</th>
<th>WEIGHT</th>
<th>TORQUE</th>
</tr>
</thead>
<tbody>
<tr>
<td>STEALTH - 2</td>
<td>106.93</td>
<td>31.80</td>
<td>140.50</td>
<td>26.20 - 44.70</td>
<td>1.81</td>
<td>376.91</td>
</tr>
<tr>
<td>STEALTH - 4</td>
<td>137.92</td>
<td>42.20</td>
<td>166.62</td>
<td>33.80 - 58.92</td>
<td>2</td>
<td>818.91</td>
</tr>
<tr>
<td>STEALTH - 8</td>
<td>162.60</td>
<td>55.40</td>
<td>203.20</td>
<td>45 - 71.40</td>
<td>3.03</td>
<td>1,625.62</td>
</tr>
<tr>
<td>STEALTH - 14</td>
<td>201.70</td>
<td>63.50</td>
<td>241.30</td>
<td>58.92 - 81.13</td>
<td>4.71</td>
<td>2,854</td>
</tr>
<tr>
<td>STEALTH - 22</td>
<td>233.20</td>
<td>73.91</td>
<td>274.32</td>
<td>66.50 - 98.30</td>
<td>7</td>
<td>4,406.40</td>
</tr>
<tr>
<td>STEALTH - 36</td>
<td>274.60</td>
<td>88.61</td>
<td>322.83</td>
<td>78 - 121.92</td>
<td>10.93</td>
<td>6,666.55</td>
</tr>
</tbody>
</table>
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 perform any standard pump.

**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.

**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

**Pressure Control Valve and Lock**
Easily adjust and set pump pressure

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

**AC Power Cord**

**Simple Controls**
Makes setup time easier

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

**Oil Cooled**
Easily handles extreme work loads.
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.

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 through 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
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
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.

---

**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

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 its 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)

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.
**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 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.
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

<table>
<thead>
<tr>
<th>Feature</th>
<th>Digital (PG. 24)</th>
<th>iGun Single Speed (PG. 26)</th>
<th>iGun Dual Speed (PG. 28)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Industrial grade gearbox</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>Repeatability within 5%</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>Torque output up to 3,000 ft-lbs</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>Torque output beyond 3,000 ft-lbs</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>Industry leading safety</td>
<td>✓*</td>
<td>✓*</td>
<td>✓*</td>
</tr>
<tr>
<td>Industry leading accuracy</td>
<td>✓*</td>
<td>✓*</td>
<td>✓*</td>
</tr>
<tr>
<td>Dual speed rundown/torque</td>
<td>✓</td>
<td></td>
<td>✓</td>
</tr>
<tr>
<td>Onboard tool readout</td>
<td>✓</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Lock-on release</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Built-in job documentation</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Wireless/hoseless operation</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Built-in cycle counter</td>
<td></td>
<td></td>
<td>✓</td>
</tr>
<tr>
<td>Operation below 75dB</td>
<td>✓</td>
<td>✓**</td>
<td>✓**</td>
</tr>
</tbody>
</table>

* When used with a bytorc washer system
** When used with optional silencer system
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.

**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.

**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.
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.

<table>
<thead>
<tr>
<th>MODEL NUMBER</th>
<th>H (in.)</th>
<th>W (in.)</th>
<th>L (in.)</th>
<th>R (in.)</th>
<th>DRIVE</th>
<th>WEIGHT (lbs.)</th>
<th>MAX (ft-lbs.)</th>
</tr>
</thead>
<tbody>
<tr>
<td>J-.25</td>
<td>7.06</td>
<td>2.72</td>
<td>7.15</td>
<td>2.5</td>
<td>3/4</td>
<td>7.2</td>
<td>48</td>
</tr>
<tr>
<td>J-.5</td>
<td>7.32</td>
<td>2.74</td>
<td>8.07</td>
<td>2.58</td>
<td>3/4</td>
<td>7.2</td>
<td>123</td>
</tr>
<tr>
<td>J-1</td>
<td>7.32</td>
<td>2.74</td>
<td>8.62</td>
<td>2.58</td>
<td>3/4</td>
<td>10</td>
<td>301</td>
</tr>
<tr>
<td>J-2</td>
<td>7.94</td>
<td>3.53</td>
<td>10.46</td>
<td>3.25</td>
<td>1</td>
<td>14.5</td>
<td>521</td>
</tr>
<tr>
<td>J-3</td>
<td>7.94</td>
<td>3.53</td>
<td>11.11</td>
<td>3.25</td>
<td>1</td>
<td>15.76</td>
<td>852</td>
</tr>
<tr>
<td>J-5</td>
<td>8.03</td>
<td>4.15</td>
<td>12.24</td>
<td>4.15</td>
<td>1-1/2</td>
<td>20.35</td>
<td>1,150</td>
</tr>
<tr>
<td>J-8</td>
<td>8.40</td>
<td>4.23</td>
<td>13</td>
<td>4.50</td>
<td>1-1/2</td>
<td>26.5</td>
<td>1,743</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>MODEL NUMBER</th>
<th>METRIC (mm)</th>
<th>kg</th>
<th>MIN (Nm)</th>
<th>MAX (Nm)</th>
<th>RPM</th>
</tr>
</thead>
<tbody>
<tr>
<td>J-.25</td>
<td>179.92</td>
<td>69.10</td>
<td>181.01</td>
<td>83.50</td>
<td>15.05</td>
</tr>
<tr>
<td>J-.5</td>
<td>185.92</td>
<td>69.60</td>
<td>205.00</td>
<td>85.53</td>
<td>15.05</td>
</tr>
<tr>
<td>J-1</td>
<td>185.92</td>
<td>69.60</td>
<td>224.02</td>
<td>85.53</td>
<td>15.05</td>
</tr>
<tr>
<td>J-2</td>
<td>201.70</td>
<td>89.70</td>
<td>266.68</td>
<td>82.60</td>
<td>25.40</td>
</tr>
<tr>
<td>J-3</td>
<td>201.70</td>
<td>89.70</td>
<td>262.20</td>
<td>82.60</td>
<td>25.40</td>
</tr>
<tr>
<td>J-5</td>
<td>204.00</td>
<td>105.41</td>
<td>310.90</td>
<td>105.41</td>
<td>38.10</td>
</tr>
<tr>
<td>J-8</td>
<td>214.90</td>
<td>105.41</td>
<td>330.20</td>
<td>115.82</td>
<td>38.10</td>
</tr>
</tbody>
</table>
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.

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.

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.

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.
Multiple Configurations

jGUN is supplied with a 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.

<table>
<thead>
<tr>
<th>MODEL NUMBER</th>
<th>H (in)</th>
<th>W (in)</th>
<th>L (in)</th>
<th>R (in)</th>
<th>DRIVE</th>
<th>WEIGHT (lbs)</th>
<th>MIN (ft-lbs)</th>
<th>MAX (ft-lbs)</th>
<th>Rundown</th>
<th>Final</th>
</tr>
</thead>
<tbody>
<tr>
<td>J-A5-AP</td>
<td>7.4</td>
<td>10.03</td>
<td>2.58</td>
<td>2.99</td>
<td>3/4</td>
<td>9.04</td>
<td>194</td>
<td>259</td>
<td>420</td>
<td>24</td>
</tr>
<tr>
<td>J-A2-AP</td>
<td>8.42</td>
<td>12.51</td>
<td>3.25</td>
<td>4.48</td>
<td>1</td>
<td>15</td>
<td>520</td>
<td>1,231</td>
<td>90</td>
<td>5</td>
</tr>
<tr>
<td>J-A3-AP</td>
<td>7.5</td>
<td>12.48</td>
<td>3.25</td>
<td>3.19</td>
<td>1</td>
<td>12</td>
<td>830</td>
<td>2,190</td>
<td>35</td>
<td>2</td>
</tr>
<tr>
<td>J-A5-AP</td>
<td>8.42</td>
<td>14.65</td>
<td>4.15</td>
<td>4.48</td>
<td>11/2</td>
<td>22.5</td>
<td>1,215</td>
<td>3,104</td>
<td>38</td>
<td>2.5</td>
</tr>
<tr>
<td>J-A8-AP</td>
<td>8.46</td>
<td>15.38</td>
<td>4.56</td>
<td>4.48</td>
<td>11/2</td>
<td>28.75</td>
<td>2,079</td>
<td>5,266</td>
<td>35</td>
<td>1.5</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>MODEL NUMBER</th>
<th>H (mm)</th>
<th>W (mm)</th>
<th>L (mm)</th>
<th>R (mm)</th>
<th>DRIVE</th>
<th>WEIGHT (kg)</th>
<th>MIN (Nm)</th>
<th>MIN (Nm)</th>
<th>Rundown</th>
<th>Final</th>
</tr>
</thead>
<tbody>
<tr>
<td>J-A5-AP</td>
<td>188.00</td>
<td>55.53</td>
<td>75.94</td>
<td>19.05</td>
<td>4.10</td>
<td>263.02</td>
<td>263.02</td>
<td>420</td>
<td>24</td>
<td></td>
</tr>
<tr>
<td>J-A1-AP</td>
<td>188.00</td>
<td>55.53</td>
<td>75.94</td>
<td>19.05</td>
<td>4.40</td>
<td>423.01</td>
<td>423.01</td>
<td>120</td>
<td>6.5</td>
<td></td>
</tr>
<tr>
<td>J-A2-AP</td>
<td>213.90</td>
<td>82.60</td>
<td>13.80</td>
<td>25.40</td>
<td>6.80</td>
<td>705.02</td>
<td>705.02</td>
<td>90</td>
<td>5</td>
<td></td>
</tr>
<tr>
<td>J-A3-AP</td>
<td>190.50</td>
<td>82.60</td>
<td>81.02</td>
<td>25.40</td>
<td>5.44</td>
<td>1,125.32</td>
<td>1,125.32</td>
<td>35</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>J-A5-AP</td>
<td>213.90</td>
<td>105.41</td>
<td>113.80</td>
<td>38.10</td>
<td>10.20</td>
<td>1,647.31</td>
<td>1,647.31</td>
<td>38</td>
<td>2.5</td>
<td></td>
</tr>
<tr>
<td>J-A8-AP</td>
<td>214.90</td>
<td>115.82</td>
<td>113.80</td>
<td>38.10</td>
<td>13.04</td>
<td>2,818.74</td>
<td>2,818.74</td>
<td>35</td>
<td>1.5</td>
<td></td>
</tr>
</tbody>
</table>
**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 airflow 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.
**Flexible Configuration**

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

<table>
<thead>
<tr>
<th>MODEL NUMBER</th>
<th>H</th>
<th>W</th>
<th>L</th>
<th>R</th>
<th>DRIVE</th>
<th>WEIGHT</th>
<th>TORQUE</th>
</tr>
</thead>
<tbody>
<tr>
<td>DJ - .25</td>
<td>7.06</td>
<td>2.72</td>
<td>7.15</td>
<td>2.50</td>
<td>3/4</td>
<td>7.20</td>
<td>48</td>
</tr>
<tr>
<td>DJ - .5</td>
<td>7.32</td>
<td>2.74</td>
<td>8.07</td>
<td>2.58</td>
<td>3/4</td>
<td>7.20</td>
<td>129</td>
</tr>
<tr>
<td>DJ - 1</td>
<td>7.32</td>
<td>2.74</td>
<td>8.82</td>
<td>2.58</td>
<td>3/4</td>
<td>10</td>
<td>301</td>
</tr>
<tr>
<td>DJ - 2</td>
<td>7.94</td>
<td>3.53</td>
<td>10.46</td>
<td>3.25</td>
<td>1</td>
<td>14.50</td>
<td>521</td>
</tr>
<tr>
<td>DJ - 3</td>
<td>7.94</td>
<td>3.53</td>
<td>11.11</td>
<td>3.25</td>
<td>1</td>
<td>15.75</td>
<td>652</td>
</tr>
<tr>
<td>DJ - 5</td>
<td>8.03</td>
<td>4.15</td>
<td>12.24</td>
<td>4.15</td>
<td>14/2</td>
<td>20.05</td>
<td>1,550</td>
</tr>
<tr>
<td>DJ - 8</td>
<td>8.46</td>
<td>4.23</td>
<td>13</td>
<td>4.56</td>
<td>14/2</td>
<td>26.50</td>
<td>1,743</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>METRIC (mm)</th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>DJ - .25</td>
<td>191.80</td>
<td>79.24</td>
<td>178.33</td>
<td>65.53</td>
<td>19.05</td>
<td>3.74</td>
<td>67.50</td>
</tr>
<tr>
<td>DJ - .5</td>
<td>191.80</td>
<td>79.24</td>
<td>204</td>
<td>65.53</td>
<td>19.05</td>
<td>3.74</td>
<td>183.03</td>
</tr>
<tr>
<td>DJ - 1</td>
<td>191.80</td>
<td>79.24</td>
<td>223.30</td>
<td>65.53</td>
<td>19.05</td>
<td>4.44</td>
<td>474.53</td>
</tr>
<tr>
<td>DJ - 2</td>
<td>205.50</td>
<td>82.04</td>
<td>274.06</td>
<td>82.55</td>
<td>25.40</td>
<td>7.48</td>
<td>732.14</td>
</tr>
<tr>
<td>DJ - 3</td>
<td>205.50</td>
<td>82.04</td>
<td>291.10</td>
<td>82.55</td>
<td>25.40</td>
<td>8.02</td>
<td>1,160.58</td>
</tr>
<tr>
<td>DJ - 5</td>
<td>205.50</td>
<td>82.04</td>
<td>311.40</td>
<td>105.41</td>
<td>38.10</td>
<td>10.52</td>
<td>1,559.20</td>
</tr>
<tr>
<td>DJ - 8</td>
<td>205.50</td>
<td>82.04</td>
<td>342.64</td>
<td>116.82</td>
<td>38.10</td>
<td>13.40</td>
<td>2,474.40</td>
</tr>
</tbody>
</table>
**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.

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

**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.

**Tool Hose**

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

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.
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
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.

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 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 ½” – a ¾” 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.
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.

The FRL lubrication is not required when using the Digital jGUN.
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).
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.
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.
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.
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
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.
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 ½” – a ¾” 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
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.
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

<table>
<thead>
<tr>
<th>MODEL NUMBER</th>
<th>H (IMPERIAL)</th>
<th>W (IMPERIAL)</th>
<th>L (IMPERIAL)</th>
<th>DRIVE</th>
<th>WEIGHT (lbs.)</th>
<th>MIN (ft.-lbs.)</th>
<th>MAX (ft.-lbs.)</th>
</tr>
</thead>
<tbody>
<tr>
<td>FLA - 1000</td>
<td>6.15</td>
<td>3.83</td>
<td>21.4</td>
<td>3/4</td>
<td>14.2</td>
<td>120</td>
<td>1,000</td>
</tr>
<tr>
<td>FLA - 3000</td>
<td>6.15</td>
<td>3.83</td>
<td>23.4</td>
<td>1</td>
<td>18.5</td>
<td>315</td>
<td>3,000</td>
</tr>
<tr>
<td>FLA - 5000</td>
<td>6.3</td>
<td>3.83</td>
<td>24.9</td>
<td>1-1/2</td>
<td>23.3</td>
<td>520</td>
<td>5,000</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>MODEL NUMBER</th>
<th>H (METRIC)</th>
<th>W (METRIC)</th>
<th>L (METRIC)</th>
<th>DRIVE</th>
<th>WEIGHT (kg)</th>
<th>MIN (Nm)</th>
<th>MAX (Nm)</th>
</tr>
</thead>
<tbody>
<tr>
<td>FLA - 1000</td>
<td>156.21</td>
<td>97.30</td>
<td>543.60</td>
<td>19.05</td>
<td>6.44</td>
<td>162.70</td>
<td>1,355.81</td>
</tr>
<tr>
<td>FLA - 3000</td>
<td>156.21</td>
<td>97.30</td>
<td>594.40</td>
<td>25.40</td>
<td>8.39</td>
<td>427.10</td>
<td>4,067.50</td>
</tr>
<tr>
<td>FLA - 5000</td>
<td>160.02</td>
<td>97.30</td>
<td>632.50</td>
<td>38.10</td>
<td>10.56</td>
<td>705.02</td>
<td>6,779.10</td>
</tr>
</tbody>
</table>
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

- **Cooling vents**
- **USB Micro Port**
- **Eyelet**
- **Brushed DC Motor and cooling fans**
- **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.

- **Angle**
- **Torque, Angle, Release Setting**
- **Status LED**
- **Menu Shortcut Key**
- **Increase Value**
- **Job Number** (Shown when recording job data)
- **Left Button**
- **Center Button**

- **Release (Angle)**
- **Rotational Direction Arrow**
- **Fastener Setting**
- **Rotating Nut Icon**
- **Battery Charge Icon** (green charged battery, turns red with low voltage)
- **Job On Indicator** (Shown when recording job data)
- **Decrease Value**
- **Right Button**
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”.

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 permeant 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.

USB Connection to computer

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

- Conventional Reaction Arm and Socket
- Dual Driver for HYTORC Washer System
- Driver for HYTORC Nut

Compatible with Standard Sockets and Reaction Arms
Conventional torque applications consistent with existing procedures.

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

HYTORC Nut
Precision application of torque for mechanical tensioning
The Lithium Series consists of a series of 36V power tools with following specifications.

<table>
<thead>
<tr>
<th>MODEL NUMBER</th>
<th>H (in.)</th>
<th>W</th>
<th>L (in.)</th>
<th>R</th>
<th>DRIVE</th>
<th>WEIGHT (lbf.)</th>
<th>TORQUE (ft-lbf.)</th>
</tr>
</thead>
<tbody>
<tr>
<td>BTM - 0250</td>
<td>12.85</td>
<td>3.47</td>
<td>10.12</td>
<td>2.50</td>
<td>1/2</td>
<td>9.52</td>
<td>35</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>325</td>
</tr>
<tr>
<td>BTM - 0700</td>
<td>12.85</td>
<td>3.47</td>
<td>11.12</td>
<td>2.58</td>
<td>3/4</td>
<td>10.20</td>
<td>150</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>700</td>
</tr>
<tr>
<td>BTM - 1000</td>
<td>12.85</td>
<td>3.47</td>
<td>11.44</td>
<td>2.58</td>
<td>3/4</td>
<td>10.60</td>
<td>200</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>1,200</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>2,000</td>
</tr>
<tr>
<td>BTM - 3600</td>
<td>13.20</td>
<td>3.47</td>
<td>13.29</td>
<td>3.187</td>
<td>1</td>
<td>15.60</td>
<td>500</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>3,000</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>MODEL NUMBER</th>
<th>H (mm)</th>
<th>W</th>
<th>L (mm)</th>
<th>R</th>
<th>DRIVE</th>
<th>WEIGHT (kg)</th>
<th>MIN (Nm)</th>
<th>MAX (Nm)</th>
</tr>
</thead>
<tbody>
<tr>
<td>BTM - 0250</td>
<td>326.40</td>
<td>88.13</td>
<td>257.04</td>
<td>65.50</td>
<td>12.70</td>
<td>4.31</td>
<td>47.50</td>
<td>440.04</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>BTM - 0700</td>
<td>326.40</td>
<td>88.13</td>
<td>282.44</td>
<td>65.50</td>
<td>19.06</td>
<td>8.64</td>
<td>203.40</td>
<td>949.07</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>BTM - 1000</td>
<td>326.40</td>
<td>88.13</td>
<td>290.60</td>
<td>65.53</td>
<td>19.05</td>
<td>8.64</td>
<td>271.20</td>
<td>1,627</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>BTM - 2000</td>
<td>338.30</td>
<td>88.13</td>
<td>290.60</td>
<td>80.94</td>
<td>25.40</td>
<td>6.44</td>
<td>440.64</td>
<td>2,711.63</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>BTM - 3000</td>
<td>338.30</td>
<td>88.13</td>
<td>337.50</td>
<td>80.94</td>
<td>25.40</td>
<td>7.07</td>
<td>677.90</td>
<td>4,067.50</td>
</tr>
</tbody>
</table>

Shown with Reaction Arm
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

- **Directional Switch**
  Easily switch between tighten and loosen

- **USB Micro Port**

- **Battery Lock Button**
  Easily swap with fresh battery

- **USB Micro Port**

- **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.

- **Angle**
- **Torque, Angle, Release Setting**
- **Status LED**
- **Menu Shortcut Key**
- **Increase Value**
- **Job Number**
- **Left Button**
- **Center Button**
- **Release (Angle)**
- **Rotational Direction Arrow**
- **Fastener Setting**
- **Rotating Nut Icon**
- **Battery Charge Indicator**
- **Job On Indicator**
- **Decrease Value**
- **Right Button**

- Green charged battery, turns red with low voltage
- Shown when recording job data
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.

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.
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.

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

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

<table>
<thead>
<tr>
<th>MODEL NUMBER</th>
<th>H</th>
<th>W</th>
<th>L</th>
<th>R</th>
<th>DRIVE</th>
<th>WEIGHT</th>
<th>TORQUE</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>IMPERIAL (in.)</td>
<td>lbs.</td>
<td>MIN (ft.-lbs.)</td>
<td>MAX (ft.-lbs.)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>LION - .25</td>
<td>10.83</td>
<td>3.46</td>
<td>10.16</td>
<td>2.35</td>
<td>1/2</td>
<td>7.30</td>
<td>25</td>
</tr>
<tr>
<td>LION - .7</td>
<td>10.83</td>
<td>3.46</td>
<td>10.80</td>
<td>2.38</td>
<td>3/4</td>
<td>7.81</td>
<td>150</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>MODEL NUMBER</th>
<th>H</th>
<th>W</th>
<th>L</th>
<th>R</th>
<th>DRIVE</th>
<th>WEIGHT</th>
<th>TORQUE</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>METRIC (mm)</td>
<td>kg</td>
<td>MIN (Nm)</td>
<td>MAX (Nm)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>LION - .25</td>
<td>275.08</td>
<td>87.90</td>
<td>258.06</td>
<td>59.69</td>
<td>12.70</td>
<td>3.31</td>
<td>33.90</td>
</tr>
<tr>
<td>LION - .7</td>
<td>275.08</td>
<td>87.90</td>
<td>274.32</td>
<td>71.90</td>
<td>19.05</td>
<td>3.72</td>
<td>203.40</td>
</tr>
</tbody>
</table>
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.
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.
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.
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 ≤ 25% Battery Charge Left
  - 2 LEDs On ≤ 50% Battery Charge Left
  - 3 LEDs On ≤ 75% Battery Charge Left
  - 4 LEDs On ≤ 100% Battery Charge Left

**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.

**36 V Battery**
- Weight 3.3lbs

**18 V Battery**
- Weight 1.9lbs
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.
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.
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.
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.
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 reflect the fastener clockwise or counter clockwise rotation 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.
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.
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 Menus & Sub-Menus

Main Menu

L15 Access Menus 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
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.
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.
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.
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 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.

Sample CSV file in Excel (default).

<table>
<thead>
<tr>
<th>Date</th>
<th>Time</th>
<th>Event</th>
<th>Torque</th>
<th>Angle</th>
<th>Release</th>
<th>Job</th>
<th>Duration</th>
<th>Temp</th>
<th>Voltage</th>
<th>TL</th>
<th>Fastener</th>
<th>TorqueUnits</th>
<th>Compcode</th>
</tr>
</thead>
<tbody>
<tr>
<td>16-10-10</td>
<td>10:45:58</td>
<td>2</td>
<td>27</td>
<td>0</td>
<td>0</td>
<td>101</td>
<td>1</td>
<td>25</td>
<td>20</td>
<td>TIGHTEN</td>
<td>RH</td>
<td>lb-ft</td>
<td>Torque OK.</td>
</tr>
<tr>
<td>16-10-10</td>
<td>10:46:20</td>
<td>2</td>
<td>27</td>
<td>0</td>
<td>0</td>
<td>101</td>
<td>17</td>
<td>25</td>
<td>20</td>
<td>TIGHTEN</td>
<td>RH</td>
<td>lb-ft</td>
<td>Torque OK.</td>
</tr>
<tr>
<td>16-10-10</td>
<td>10:46:49</td>
<td>2</td>
<td>27</td>
<td>0</td>
<td>0</td>
<td>101</td>
<td>1</td>
<td>25</td>
<td>20</td>
<td>TIGHTEN</td>
<td>RH</td>
<td>lb-ft</td>
<td>Torque OK.</td>
</tr>
<tr>
<td>16-10-10</td>
<td>10:46:54</td>
<td>2</td>
<td>27</td>
<td>0</td>
<td>0</td>
<td>101</td>
<td>3</td>
<td>25</td>
<td>20</td>
<td>TIGHTEN</td>
<td>RH</td>
<td>lb-ft</td>
<td>Torque OK.</td>
</tr>
<tr>
<td>16-10-10</td>
<td>10:47:00</td>
<td>2</td>
<td>27</td>
<td>0</td>
<td>0</td>
<td>101</td>
<td>2</td>
<td>30</td>
<td>20</td>
<td>LOOSEN</td>
<td>RH</td>
<td>lb-ft</td>
<td>Torque OK.</td>
</tr>
<tr>
<td>16-10-10</td>
<td>10:47:05</td>
<td>2</td>
<td>27</td>
<td>0</td>
<td>0</td>
<td>101</td>
<td>2</td>
<td>30</td>
<td>20</td>
<td>LOOSEN</td>
<td>RH</td>
<td>lb-ft</td>
<td>Torque OK.</td>
</tr>
<tr>
<td>16-10-10</td>
<td>13:53:51</td>
<td>2</td>
<td>100</td>
<td>100</td>
<td>100</td>
<td>101</td>
<td>9</td>
<td>25</td>
<td>19</td>
<td>TIGHTEN</td>
<td>RH</td>
<td>lb-ft</td>
<td>Torque OK.</td>
</tr>
</tbody>
</table>
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**

**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.

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

**Available in all common materials**

**Side B Smooth surface faces the nut**
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

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.

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

HYTORC Reaction Washer

HYTORC Backup Washer
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.

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

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

**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**

- **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.
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.
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](image)

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

![Passive Side](image)

**Passive Side**
Back Side where the HYTORC Back Washers are installed and held stationary
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**
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.
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 in 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.

HYTORC Tools with Compatible Drivers/Adapters:
- ICE
- AVANTI
- STEALTH
- jGUN SINGLE SPEED
- jGUN DUAL SPEED
- Digital jGUN
- LITHIUM SERIES
- LION GUN
Tighten HYTORC Nut

HN2- 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

HN2- 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

**Advantages**
- No need for backup wrench or reaction point
- No side loading or lateral bending forces
- Does not depend on friction factors

**Disadvantages**
- Loads on bolts may be different
- Allowances for uneven interaction
- Use care so that bolts is not yielded.

**Basic Steps**
1. Stretch the stud using hydraulic pressure
2. Tighten/turn the nut manually
3. Release the stud by releasing pressure

**Basic Components**
- **Hydraulic cylinder** – jack that lifts puller when hydraulic pressure is applied
- **Thread Puller** – special nut that engages the stud and stretches the stud
- **Bridge** – platform that allows access to tighten or loosen nut while cylinder is under pressure, retaining the bolt tension
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.

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.

Topside Return Spring Tensioners
Topside spring return tensioners offer 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.

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 reseat 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.

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

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.

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.

Compact Design
HYTORC’s single stage tensioners must be small and powerful.

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.

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.

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.

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

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.
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.

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.

Manifolds
HYTORC has manifolds for every application and any pressure.
T - Hydraulic Tensioner Procedures

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

- 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.

50% Coverage
Half the bolts are tensioned simultaneously, the tools are relocated on the remaining bolts and they are subsequently tensioned.
T3 Select Pump Stall Pressure – 100% Coverage
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. Setting the stall pressure is achieved by adjusting the regulated air pressure to achieve the desired bolt stress.

- 100% Coverage – Select the stall pressure on the chart corresponding to the size of the bolt and bolt load required.

Example:
Bolt size 1-1/4” (green line)
Required bolt load 50,000 psi

Read Stall Pressure: 700 bar or 10,000 psi
Select Pump Pressure – 50% Coverage

When tensioning with 50% coverage the pressures must be adjusted to account for load loss.

T4 Select Pump Pressure – 50% Coverage

- Account for Load Loss
  - Less than 100% Coverage
  Not all applications allow for 100% coverage of tensioners on each bolt, in these cases at least two tensioning pressures are applied. This is to account for a load loss (elastic recovery) that occurs in bolts tensioned first as the next sets are tightened.

To compensate for load loss in 1 & 3, the initial first pass pressure must be increased to a value greater than second pass pressure, these are call Pressure A & B.

When bolt 2 is tightened in the second pass, the bolt load is relaxed on bolts 1 & 3.

Tighten bolts 1 & 3 in first pass.

Pressure A
Pressure B
Pressure A

Bolt Load

Pressure A
Elastic Recovery
Target Load

Target Load

Pressure A
Pressure B
Select Pump Pressure – 50% Coverage

Select Pump Stall Pressure
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. Setting the stall pressure is achieved by adjusting the regulated air pressure to achieve the desired bolt stress.

With 50% coverage the tools are applied in 2 steps referred to as A & B. The Pressure on the first Step A is a calculated value which is higher to allow for load loss in the first sets to relax back to the target preload.

B Pressure – Select Pressure B which is read from the chart corresponding to the size of the bolt and bolt load required.
(similar to 100% coverage)

A Pressure – Calculate Pressure A - that accounts for load lost - by multiplying the B pressure by a “load transfer factor”
LTF = Load Transfer Factor = (1.01 + D/G)
D = Nominal Bolt Diameter
G = Bolt Grip Length (Nut Face to Nut Face)

Pressure A = Pressure B x LTF

Pressure B is first Read from Chart, e.g. 10,000psi

Pressure A is calculated, e.g. for 5” grip length
Pressure A = Pressure B x LTF
= (10,000 psi) x (1.01 + 1.25/5)
= (10,000 psi) x (1.26)
= 12,600 psi

Typically at least 20% higher
Setup Pump

T5 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 ¾ 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.
T6 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 $1.5 \times D$ to ensure adequate and safe thread engagement

- No Washers are Used
- No Lubrication is Used
**Install Tensioners**

**T7 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 are accessible on the outside of the flange.
- Use the Tommy Bar to apply additional pressure to the Thread Pullers to hold them firmly in place.
- Repeat for all tensioners and bolts to be tightened simultaneously.
Connect Hoses

T8 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)

**T9 Tighten Tensioner**
- 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.
- When using a compliant gasket, allow pressure to build to about 50% target pressure and hold for approximately 1-min to allow gasket to seat.
- Reopen the air present to apply pressure, monitor the pressure gauge as pressure builds to the specified pressure.
- Watch the tensioner as it pulls, stop if the color coded stroke limiter 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 of the Hydraulic Bridge 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.
- Pressure is taken off the tensioners and it returns to it’s original position – made need to tap tensioners or turn pullers to return all the way.
- Tensioning this cycle is complete.
**Repeat Tensioning Cycle**

**T10 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.
- Tensioning is repeated three times on the B nuts at the Pressure B, each subsequent time to verify there is no further movement
- Tensioners are moved for check pass on A positions – tightened one more time at Pressure B to make sure no further movement
- Tensioners may be removed

---

**Oil Pressure psi**

- **A** = 12,600
- **B** = 10,000

**50% Coverage Tensioning Cycles**
- Tighten A Positions 3 Times at Pressure A
- Tighten B Positions 3 Times at Pressure A

**Target Bolt Load**

---

**Time**
Loosen Bolt(s)

T11 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
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 objects. Provides support to prevent slips, trips or falls.

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

HEAD PROTECTION
Wear protective hard hat helmets wherever there is possible danger of head injury from impact or from of 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.

SOCKET SAFETY
Use only impact grade sockets. Inspect all sockets before use.

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

TOOL OPERATION & SAFETY
Follow manufacturer recommendations for handling tools. Always use the correct tool for the job. Tools should only be used by fully trained personnel. Inspect all tools before use.
Let’s Bolt!