1. INTRODUCTION

This handbook covers operation and service instructions for the model 393 torque multiplier.

2. IMPORTANT INSTRUCTIONS

WARNINGS

- To prevent accidental torque release, which could result in personal injury, the neutral positioning set screw (Fig. 2, Item 2) must be flush with the top of the housing whenever the torque multiplier is operated MANUALLY. The selector pawl (Fig. 2, Item 3) must also operate freely in the CW and CCW positions.
- Inspect output square drive (Fig. 3, Item 2) for visible signs of fatigue or fracture prior to EACH use. Replace if necessary (see Section 8).
- Failure of the output square drive, due to torque overload or fatigue, could result in an immediate torque release, potentially causing the torque multiplier to fall from the fastener, and result in personal injury.
- Do not hold torque multiplier or reaction anchor tube (Fig. 2, Item 5) while applying torque since normal multiplier deflection might cause fingers to be pinched; especially in confined locations.
- Maintain firm hand control of torque wrench or input handle when releasing multiplier, since recoil (wind-up) will be experienced.
- Do not use output drive extensions. Increased deflections, caused by the added length could force the socket off the nut, or break the extension or socket.
- Since reaction torque equals OUTPUT torque, be sure to select an anchor point sufficient to withstand the torque reaction forces created.
- Check reaction tube holding screw periodically to insure it is tight (Fig. 2, Item 6).

2.1 Read and understand these operating instructions before using the Torque Multiplier.

2.2 DO NOT USE AN IMPACT WRENCH ON THE TORQUE MULTIPLIER, DAMAGE TO TOOL COULD OCCUR.

2.3 If using a POWER driven input, be sure the selector pawl (Fig.2 Item 3) has been locked into its neutral position using the neutral positioning set screw (Fig. 2 Item 2).

2.4 When positioning the torque multiplier, be sure socket attached to the output is positioned so that the reaction tube is at a right angle to the fastener. Torque reaction creates a rotational force in the opposite direction from which input force is applied. See Application Information Sheet included with the torque multiplier for additional torque multiplier reaction information.

2.5 Remember: Breakout torque can be much greater than the make up torque value. Be sure that the multiplier being used has sufficient capacity for torque breakout. Allow a minimum of 50% additional capacity in the tool for breakaway torque. Damaged and corroded fasteners can require even greater breakaway torque capacity.

2.6 When using the torque multiplier without a torque wrench to monitor input torque, remember that the output torque is significantly greater than the applied input torque. Do not apply more torque than the application can withstand.

2.7 Use only Hydratight Sweeney approved output square drives and replacement parts.

3. DESCRIPTION AND DESIGN FEATURES

3.1 The 393 torque multiplier uses a planetary geared action to tighten and loosen nuts, bolts and cap screws with a continuous 360° rotation in either clockwise or counterclockwise direction. Input and output rotation directions are the same. (EXAMPLE: Clockwise input rotation creates clockwise output rotation) An internal, two-directional anti-backlash device inhibits accidental torque wind-up release.

3.2 A controlled-shear output square drive (Fig. 3 Item 2) protects internal components in the event maximum output capacity is exceeded. This overload-protection feature causes the drive to fracture when output exceeds from 3% to 10% of rated output capacity. One replacement drive is included with the torque multiplier. Additional replacements can be ordered from Hydratight Sweeney.

3.3 The selector pawl (Fig. 2, Item 3) controls the torque multiplier’s rotational direction for manually-applied input. It can also be set in a neutral position for power driven torque applications.

3.4 An optional pneumatic power drive is available to convert the torque multiplier from manual to pneumatic operation.

4. SPECIFICATIONS

<table>
<thead>
<tr>
<th>Specification</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Output Capacity (Lb-ft)</td>
<td>3.200 (4,340)</td>
</tr>
<tr>
<td>Input Capacity (Lb-ft)</td>
<td>173 (234)</td>
</tr>
<tr>
<td>Gear Ratio</td>
<td>20.25:1</td>
</tr>
<tr>
<td>Torque Ratio</td>
<td>18.5:1</td>
</tr>
<tr>
<td>Accuracy</td>
<td>±5% of reading from 20% to 100% of full-scale rating</td>
</tr>
<tr>
<td>Output Drive Male Square Size (in)</td>
<td>1 (25.4)</td>
</tr>
<tr>
<td>Input Drive Female Square Size (in)</td>
<td>1/2 (13)</td>
</tr>
<tr>
<td>Overall Dimensions</td>
<td>Gearbox Ø: 4.06 (103)</td>
</tr>
<tr>
<td></td>
<td>Height: 6.5 (165)</td>
</tr>
<tr>
<td></td>
<td>Length: 19.6 (498)</td>
</tr>
<tr>
<td>Net Weight Lb. (kg)</td>
<td>18.3 (8.3)</td>
</tr>
<tr>
<td>Planetary Gearing Stages</td>
<td>Two</td>
</tr>
<tr>
<td>Needle Bearings</td>
<td>Yes</td>
</tr>
<tr>
<td>Angle-of-turn Protractor</td>
<td>Yes (5° increments)</td>
</tr>
<tr>
<td>Torque Conversion Chart</td>
<td>Yes</td>
</tr>
<tr>
<td>Shearable Replaceable Output Drive</td>
<td>Yes</td>
</tr>
<tr>
<td>Reaction Anchor Type</td>
<td>Tubular</td>
</tr>
</tbody>
</table>

5. TORQUE CONVERSIONS

5.1 A data plate is attached to the torque multiplier which displays the input torque required to obtain the listed output torque values. If you wish to calculate a specific input value that isn’t listed on the attached chart, divide the desired output torque by the multiplier’s torque ratio (18.5) to determine the input torque required (e.g. 1850 Lb-ft output torque ÷ 18.5 torque ratio = 100 Lb-ft input torque).
6. MANUAL OPERATION

6.1 For manually applied input torque: Set the desired rotation direction by pushing the selector pawl (Fig. 2 Item 3) in the direction indicated by the letters and directional arrows stamped on the input end case (Fig. 2, Item 1). EXAMPLE: If counter-clockwise rotation is desired, push pawl to end of travel in the direction shown by the “CCW” arrow. For clockwise rotation, push pawl in the opposite direction. (See Warnings)

6.2 Mount the proper size square female drive socket onto the torque multiplier's output square drive (Fig. 3 Item 2), then position socket and torque multiplier on the fastener to be tightened.

6.3 Butt the reaction anchor tube securely against a suitable object. Remember: When socket is properly positioned on fastener, reaction anchor tube must be at right angles to the fastener to which torque is being applied. See Application Information Sheet included with the torque multiplier, for additional torque reaction information.

6.4 To tighten manually with torque wrench: Determine the input torque required to obtain the desired output by referring to the torque data plate attached to the torque multiplier's reaction anchor tube. Output torque accuracy requires the use of an accurate torque wrench in series with the torque multiplier.

6.5 Failure of the output square drive, due to torque overload or fatigue, could result in an immediate torque release, potentially causing the torque multiplier to fall from the fastener, and result in personal injury. (See Warnings)

6.6 Apply torque with torque wrench until desired input torque is achieved. To remove torque multiplier from fastener: Apply enough input torque to release internal anti-backlash device, then push selector pawl (Fig. 2 Item 3) into opposite position (EXAMPLE: Pawl in CW positions for tightening. Apply input torque in the CW direction to relieve force on the pawl. While maintaining input torque in the CW direction, slide pawl into the CCW direction for release) and slowly relax input torque.

6.7 To Loosen: Follow same procedure as for tightening except set the selector pawl in opposite position. (EXAMPLE: If fastener requires clockwise tightening rotation, set pawl in counter-clockwise position for loosening.)

7. PNEUMATIC OPERATION

7.1 If you decide to use a non-impact power drive to speed up the process of tightening or loosening fasteners, you MUST remember to lock the selector pawl in the neutral position. Center the selector pawl (Fig. 2 Item 3) between the CW/CCW range of the travel and tighten the setscrew (Fig. 2 Item 2). When properly positioned, the screw will be seated in a groove in the selector pawl, so the pawl cannot be moved in either direction. Take care that the power drive is set to deliver no more than the maximum allowable input torque. A lightweight, reversible air motor is available for use with this line of multipliers. When equipped with the optional air pressure regulator, torque output can be controlled.

8. REPLACING A SQUARE DRIVE ASSEMBLY

8.1 Remove the O-Ring that is on the face of the square drive carrier (Fig. 1 Item 2).

8.2 Remove the square drive retaining pin from the output drive carrier. Pull out the old square drive.

8.3 Insert the new square drive assembly (Fig. 1 Item 3), making certain that the hole in the new square drive assembly lines up with the hole in the square drive carrier.

8.4 Insert dowel pin (Fig. 1 Item 1) in square drive carrier, insuring that the pin engages the hole in the replacement square drive.

8.5 Reattach the O-Ring to the Square Drive Carrier.

---

Figure 1. Replacing Output Square Drive Assembly
1. Retaining Pin
2. O-Ring
3. Square Drive

---

Figure 2. Input Detail
1. Rotational Direction Indicators
2. Neutral Positioning Setscrew
3. Selector Pawl
4. ½" Female Square Input Drive
5. Reaction Anchor Tube
6. Reaction Anchor Holding Screw

---

Figure 3. Output Detail
1. Protractor
2. Controlled-Shear Output Square Drive
3. Protractor Index mark

---

This tool conforms with the requirements for CE Marking.