# USER GUIDE **Digital Torque Multiplier** with proue sight





860.828.1523



Advanced Torque Product's line of Digital Torque Multipliers offers custom, high accuracy torque from 150 to 40,000 ft-lbs (480,000 in-lbs) at up to ± 0.4% of full scale accuracy. Using the advantages of a mechanical drive system and digital tablet with TorqueSight<sup>™</sup> software, operators can safely and accurately apply large amounts of torque with limited user input. Given the reduced weight and physical force required to torque, ATP Digital Torque Multipliers are an ideal replacement for larger click-out torque wrenches that often require two or more operators to handle. Angular output capabilities can be used with torque-to-yield fasteners to improve tension control in critical joints. ATP's Digital Torque Multipliers are custom fit to customer's specific application specificiations. Common aerospace applications include the assembly and maintenance of main rotor heads, transmissions, engine overhauls and bolt flanges.

## ADVANCED TORQUE PRODUCTS® CUSTOM, HIGH ACCURACY TORQUE

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|----------------------|-------------|---|---|
|----------------------|-------------|---|---|

## **I. SAFETY PRECAUTIONS**

important safety precautions below.



#### READ ALL SAFETY WARNINGS AND INSTRUCTIONS PRIOR TO DIGITAL TORQUE MULTIPLIER OPERATION. FAILURE TO DO SO MAY **RESULT IN PERSONAL INJURY OR DAMAGE TO THE DIGITAL TORQUE MULTIPLIER.**

- $\checkmark$  Always inspect tools before use; check sockets and drives for any signs of wear, damage, or excessive corrosion.
- $\checkmark$  Keep your tools clean and properly stored when not in use to ensure they remain in good working condition.
- ✓ Always wear safety glasses or goggles to protect your eyes from debris while operating any torque equipment. Consider use of additional Personal Protective Equipment (PPE) depending on the working environment to ensure safe operation of the Digital Torque Multiplier.
- $\checkmark$  Always use the correct size socket or drive. Mismatched sizes can lead to damaged tooling or fasteners.
- ✓ Do not use pipes, bars, or other extensions to increase leverage on an input ratchet or other input tool. This can lead to overtorquing, tool damage, or loss of control, resulting in injury.
- ✓ Follow all manufacturer instructions. Always read and follow the manufacturer's instructions for your specific Digital Torque Multiplier or other equipment.
- Do not use this product without the tablet. The tablet provides critical information on torque values and helps prevent  $\checkmark$ overtorquing, which can damage the Digital Torque Multiplier or fasteners. If the tablet is damaged or missing, do not use the Digital Torque Multiplier.



#### This User Guide describes best practices for using the Advanced Torque Products<sup>®</sup> Digital Torque Multiplier, including

✓ Always use the correct Digital Torque Multiplier for your application. Do not exceed rated torque limits for your Digital Torque Multiplier or fasteners. Always ensure stated capacity is rated to meet or exceed torque required for the application.



Standard kit contents are listed below for reference when using this guide. Note that all components may not be supplied with your specific Advanced Torque Products<sup>®</sup> Digital Torque Multiplier assembly.

**Documentation Calibration Certificate** & User Guide



**Connector Cable** (USB-C & LEMO) Part #ATP-CABLE-DM







**NOTE:** Other parts may be present in the case based on your specific kit.



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### **Standard Kit Contents**



| System Accuracy, Durability &           | Usability                   |
|---|-----------------------------|
| Accuracy                                | Preliminary internal trials |
|   | range of the tool, not jus  |
| Resolution                              | 0.08% of capacity (24 in-   |
| Temperature                             | 0° F to 112° F              |
| Vibration                               | Test results for shipping   |
| Drop Testing                            | Test results for shipping   |
| User Accessibility                      | WCAG AA compliance for      |
|   | accesible for those with    |
| <b>Traceability &amp; Documentation</b> |                             |
| Storage                                 | Automaticvally stores the   |
| Data Export                             | Export all events through   |
| Traceability                            | Generates QR code to d      |
| Format                                  | .CSV                        |
| Automation & Motor                      |                             |
| Accuracy (Angle)                        | Automatically powers do     |
| Accuracy (Torque)                       | Automatically powers do     |
| Motor                                   | 7.8 lbs; 6"x4"x4"           |
| Maximum Output Speed                    | 0.224 RPM                   |
| Communication                           | Closed-loop PWM             |
| Safety                                  | Emergency "E-Stop" but      |
| Samsung Active 5 Tablet                 | 1                           |
| Durability                              | Military Certified to MIL-S |
| Battery Life                            | 8-12 hours                  |
| Weight                                  | 1 lb                        |
| Dimensions                              | 8.0" touch-screen           |





### **Specifications**

| show the tool to be 20% more accurate (throughout the entire     |
|--|
| t in the bottom 30%) than current standard                       |
| -lbs for 30,000 in-lbs)  |
|  |
| pending  |
| pending  |
| or color, text size and usability (designed to make the software |
| visual, hearing or cognitive impairments)                        |
|  |
| e last 500 events  |
| n USB  |
| ownload installation data/records                                |
|  |
|  |
| wn within 1 minute (0.016 degrees)                               |
| wn within 10 in-Ibs  |
|  |
|  |
| ton and accordary physical button located within mater acco      |
| ton and secondary physical button located within motor case      |
| STD_810H3 with a durability rating of IP68                       |
| $\frac{1}{1}$  |
|  |
|  |





(More details to come)



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### **Specifications**



### **High Accuracy Digital Torque Multiplier**

(± 0.4% of full scale accuracy)





ATP<sup>®</sup> offers a "High Accuracy" series of Digital Torque Multipliers, identifiable by orange handles and orange label. These Digital Torque Multipliers have higher calibration accuracy, and locked in-lb unit scale and angle output capabilities.

ATP will design and produce custom drive bars and adaptive tooling to integrate any multiplier to your specific application. Available output profiles include but are not limited to Square, Hex, Spline, and Castellated.



### **Optional Components**

### **Custom Drive Bars** & Adaptive Tooling

### **Standard Handheld Digital Display**



ATP offers a standard Handheld Digital Display (ATPC2010A) that can be used instead of the more feature-rich tablet with TorqueSight<sup>™</sup> software.





### **Speed Knob**





The Speed Knob (ATPK5) allows operators to quickly apply low torque in applications with run on.

The Drill Adapter (ATPDA) allows you to use an electric drill to apply torque and eliminates the need for a manual input ratchet. (See page 12 for more information.)



### **Optional Inputs**

### **Drill Adapter**





The Motor Drive (ATPMD) eliminates manual input from an operator by working in tandem with the Drill Adapter and providing input directly to the Digital Torque Multiplier. It is controlled using the tablet with TorqueSight<sup>™</sup> software. (See page 13) for more information.)







Advanced Torque Products® **Digital Torque Multipliers** can be identified by their blue or orange handles. ATP regular (blue handle) and high accuracy (orange handle) Digital Torque Multipliers are available in various capacities as high as 40,000 ft-lbs (480,000 in-lbs) with accuracy of up to  $\pm 0.4\%$ full-scale torque.

**Anti-Rotation Cover** Operator safety

**High Reduction Gearbox** Less than 60 ft-lbs to achieve max torque

**Ergonomic Design** Weight balanced and non-slip industrial coating

Labeling Serialized, custom numbering

Housing Lightweight, FOD-free and durable

**Reaction Pins** Customizable size and spacing

**Drive Bar** Custom and standard designs



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### **Digital Torque Multiplier**









### Simplify

Visually track torque & angle against user-specified targets, in a simple, all-in-one view.

### Automate

Save & manage dedicated multi-step procedures to guide operators through torque processes.

Analyze Record, graph and export

torque events for traceability.







### **TorqueSight<sup>™</sup> Software**

TorqueSight<sup>™</sup> software comes pre-loaded on the touch-screen tablet and is used to easily control, manage and track your Digital Torque Multiplier.

TorqueSight allows for simple yet dynamic torque and angle control and tracking, automation via storing and using multi-step procedures, and built-in logging and data exporting. These functions are described in detail later in the User Guide in sections 3-9.

(Note: For safety and security, only the pre-loaded TorqueSight software will function on the tablet - all tablet features including Wi-Fi, Bluetooth and the camera are locked and cannot be used outside of the software.)





The Anti-Rotation Cover is used to safely prevent motion opposite to the direction of applied torque. As a precaution, the directional pawl should always be engaged when applying torque with 1/2" input. The Anti-Rotation Cover is operated by sliding the pawl to either direction.

NOTE: When applying torque, set pawl in same direction of torque and apply load through input square. To remove the Digital Torque Multiplier, apply slight load in initial torquing direction until pawl can be moved into opposite direction. Safely rotate the input slowly until the Digital Torque Multiplier becomes free.







### **Anti-Rotation Cover**



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### **CW** Position

Pushing the pawl to the right allows the **Digital Torque Multiplier to be operated** in the clockwise direction.

A 3mm allen wrench can be used to lock the pawl in the neutral (center) position, allowing for free rotation in either direction.









### **Anti-Rotation Cover**

#### **Neutral Position**

#### **CCW** Position

Pushing the pawl to the left allows the Digital Torque Multiplier to be operated in the counterclockwise direction.

#### CAUTION: DO NOT USE DIGITAL TORQUE MULTIPLIER IF RATCHET DOES NOT SWITCH DIRECTIONS FREELY WHEN NOT







The Drill Adapter is a tool that makes it possible to adapt a drill input to ATP's Digital Torque Multipliers. The included 5/8" socket is installed in any impact driver and can be used to apply input force instead of a manual input ratchet. Like the Anti-Rotation Cover, the Drill Adapter will safely prevent involuntary motion opposite to the direction of applied torque.

#### **INSTRUCTIONS:**

- Install 5/8" socket into drill chuck securely. 1.
- 2. Mate 5/8" socket to male hex drive in Drill Adapter.
- Use drill to apply or remove torque in clockwise or counter-clockwise 3. directions. (Note input arrows on faceplate.)

#### NOTE:

- $\checkmark$  Do not use a hammer drill or impact driver with the Drill Adapter.
- ✓ Drill should not exceed 2300 RPM. (Note hydraulic/pneumatic drive specifications.)
- $\checkmark$  Do not attempt to pick up or twist Digital Torque Multiplier by the Drill Adapter.
- ✓ ATP recommends Dewalt drill #DCD991B or similar.



### **Drill Adapter**









### **Motor Drive**

The Motor Drive eliminates manual input by an operator by working in tandem with the Drill Adapter and providing input directly to the Digital Torque Multiplier. The Motor Drive is controlled using the tablet. Digital Torque Multipliers equipped with a Motor Drive will have Motor Drive control elements in the Digital Display user-interface automatically populate upon connection to the tablet. Any operatordefined targets and procedures will also automatically be loaded.

Note: The Motor Drive and Digital Torque Multiplier are permanently attached to each other and do not require assembly.

(See separate Motor Drive User Guide for more information on operating a Digital Torque Multiplier with the Motor Drive.)





**Rechargeable long-lasting battery** MIL-STD-810H military grade case;









#### **Note: Disabled Buttons**

All buttons on the front of the tablet (including indicator light) and the green button on the side of the tablet are disabled. Besides the below side power & volume buttons, operators use buttons on the touch screen to operate the tablet.









### **Connecting Multiplier to Tablet**

Follow the below instructions to connect the Digital Torque Multiplier to the

- Plug the **LEMO Connector** found on one end of the **Connector Cable** into the socket located on the back of the hub. There is a keyway orientation for the plug indicated in red on both the plug and socket. Align the plug and push it straight into the socket firmly to secure the connection. To remove, grab the knurled barrel of the plug and pull out straight to release the locking mechanism.
- Plug the other end of the **Connector Cable** into the **USB-C Connector/Charging Port** on the side of the tablet. Ensure it is fully inserted and secure.
- Press the **Power Button** on the tablet and ensure it is receiving data from the Digital Torque Multiplier. Note: On initial connection the startup screen will display the maximum capacity of the Digital Torque Multiplier and then automatically proceed to the "Home" screen, or to the "Tracking Options" screen if procedures are available.



### CHARGING



The tablet is powered by a rechargeable long-lasting battery. An indicator on the screen shows active charging status and battery percentage. As a power-saving feature, after 10 minutes of not being used, the tablet will automatically turn off. The ideal battery charge for optimal software performance is above 15%; if battery charge is less then or equal to 10%, the TorqueSight software will not open until the battery charge reaches 11%. At 11% up until it reaches 16%, the TorqueSight software will open, but a pop-up message will appear at the start of the session that says "Your tablet battery is below 15% now. Please charge the tablet." (Battery life varies depending upon usage. Average battery life after fully charging is 8-12 hours.) The included Charging Cord is used to charge the battery from any standard outlet through the USB-C Connector/Charging Port on the side of the tablet.

### **POWERING ON/OFF**

**To power on:** Press and hold power button. **To power off:** Press and hold power button and volume down button simultaneously. Then select "Power off". **To lock:** Press power button.

Upon startup, the "Splash" screen (shown to the right) will be displayed for 2 seconds, showing the Digital Torque Multiplier's maximum capacity in the bottom left corner of the screen.



### **Charging & Powering ON/OFF**



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### CONNECTED



#### "Splash" screen showing max capacity

If the Digital Torque Multiplier is properly connected, the above "Splash" screen will be displayed for 2 seconds, before the "Home" screen automatically appears. (Exception: If procedures are available the "Tracking" Options" screen shown on the next page will automatically appear after this "Splash" screen.)



### **Connection Screens**

### **NOT CONNECTED**

| v1.27.11. |   |                            |
|-----------|---|----------------------------|
|           | DISCONNECTED!   |                            |
|           | Digital Torque Multiplier is NOT connected to this tablet.<br>Check all cable connections and then press "Reconnect". | Recheck<br>connection and  |
|           | Reconnect   | then select<br>"RECONNECT" |
|           |   |                            |

If you see this screen, please check that the connection between the tablet and the Digital Torque Multiplier is secure. (Ensure the USB-C Connector/Charing Cable is fully inserted and secure in the USB-C Connector/Power Port.)



Below is a summary of the start-up screens with and without stored procedures.





### Start-Up Screens

#### "Procedures" screen

Looks like "Home" screen with procedure bar at bottom.



#### "Home" screen



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If there are stored procedures, the "Tracking Options" screen will appear after the "Splash" and before the "Home" screens.

#### Choose from a list of stored procedures. **Select stored** procedure

#### **Tracking Options** \* Required Field

**Choose a Stored Procedure** 

Engine XXX, #3 Bearing

Engine XXX, #5 Bearing

Engine XXX, #6 Bearing

Engine XXX, #4 Bearing

Step 1: Torque: 500 to 560 ft·lbs **Custom instructions notes** 

Step 2: Angle: 23°, 05' **Custom instructions notes** 

Step 3: Loosen bolt to zero ft·lbs XYZ

Skip selecting a procedure by pressing "SKIP" or press "START" after a procedure is loaded and part # is assigned. Press "SKIP" or "START"



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### **Tracking Options Screen**





If management settings have been set to allow loading a procedure via QR code, the "Tracking Options" screen will look like the below and include a green button to scan a QR code to load a procedure.

#### Load a procedure by scanning a QR code. **Press "SCAN QR** CODE"

The scanned procedure will then show up in the blue procedure bar.

#### **Tracking Options** \* Required Field

**Choose a Stored Procedure** 

Engine XXX, #3 Bearing

#### Scan QR Code

Step 1: Torque: 500 to 560 ft·lbs Custom instructions notes

#### Step 2:

Angle: 23°, 05' **Custom instructions notes** 

#### Step 3: Loosen bolt to zero ft·lbs xyz

Skip selecting a procedure by pressing "SKIP" or press "START" after a procedure is loaded and part # is assigned. Press "SKIP" or "START" (Note: Only allowed to skip if set in management settings.)



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### **Tracking Options Screen - QR Code**

| Assign a Part #*   123456   Press to scan part #:   Scan Barcode    | ♦ 🕸 75%                         |
|---|---------------------------------|
| Assign a Part #*<br>123456<br>Press to scan part #:<br>Scan Barcode | <b>TorqueSight</b> <sup>™</sup> |
| Press to scan part #:<br>Scan Barcode                               | Assign a Part #*<br>123456      |
| Scan Barcode  | Press to scan part #:           |
| Skip Start  | Scan Barcode                    |
|   | Skip   Start                    |

Enter part number of the item you are fastening. Red asterisk = required. **Enter Part #** 

Scan a Bar Code to automatically populate the "Part #" field. **Press "SCAN BARCODE**"



## IV. USING YOUR DTM





- applied.



ADVANCED **TORQUE PRODUCTS** 

### **Pre-Torque Checklist**

### **PRE-TORQUE CHECKLIST**

 $\checkmark$  Ensure that all surfaces, threads, nuts, and any other parts are not damaged and free of any debris.

 $\checkmark$  The tablet should always be on and sufficiently charged to complete the intended torque procedure.

 $\checkmark$  The tablet should display a torque reading of zero (0) before any torque is

 $\checkmark$  The drive bar should be fully engaged in both the application and bottom of the Digital Torque Multiplier to ensure sufficient transfer of torque.

 $\checkmark$  The reaction pins in the hub or adapter plate should be fully engaged in the corresponding reaction on the application. The bottom of the Digital Torque Multiplier should be flush with the resting surface of the application.

### WARNING: KEEP FIRM GRIP ON INPUT RATCHET WHILE SWIT **DIRECTIONS AS LOAD MAY BE PRESENT.**



## IV. USING YOUR DTM

### **STEPS FOR APPLYING TORQUE**

- Place the drive bar and the reaction pins on the appropriate mating surfaces for your specific application. 1.
- 2. the USB-C Connector/Power Port on the side of the tablet. Ensure it is fully inserted and secure.)
- 3. the "Tracking Options" screen will appear.
- Use the touch screen to either select a procedure or begin on the home page. 4.
- 5. desired units (ft-lb, in-lb, N-m), torque mode (Torque or Angle Mode) and set applicable alarms.
- 6. Ensure the center dial "Current" value reads "0".
- Ensure the Anti-Rotation Pawl on top of Digital Torque Multiplier is in same direction of intended torque. 7.
- 8. target torque is achieved on tablet display.
- When desired target is reached, stop applying input force. 9.



### **Applying & Releasing Torque**

Connect the tablet to the Digital Torque Multiplier using the supplied USB-C Connector Cable, #ATP-CABLE-DM. (Plug the LEMO Connector found on one end of the USB-C Connector/Charging Cable into the socket located on the back of the hub. There is a keyway orientation for the plug indicated in red on both the plug and socket. Align the plug and push it straight into the socket firmly to secure the connection. Plug the other end of the USB-C Connector/Charging Cable into

Turn the tablet on by pressing & holding the Power Button, and ensure it is receiving data from the Digital Torque Multiplier. Note: On initial connection the startup screen will display a "Splash" screen showing the maximum capacity of the Digital Torque Multiplier and then automatically proceed to either the "Home" screen, or if there are stored procedures,

If not using a stored procedure, go to "Settings" tab to choose the correct settings for your specific application: Choose

Slowly use the input ratchet (or Drill Adaptor or Motor Drive) to apply torque to the input drive in the desired direction until



## IV. USING YOUR DTM

### **STEPS FOR APPLYING TORQUE**

(continued)

- To release the Digital Torque Multiplier from your application, apply slight pressure to ratchet in initial torquing direction 10. and push the anti-rotation pawl into the opposite direction while keeping a firm grasp on ratchet. (If you are using a Drill Adapter or Motor Drive, simply apply force in the opposite direction until the display reads "0".)
- 11. When the torque application is finished, turn off the tablet by pressing and holding the power and volume down buttons simultaneously, and then safely store all components.

### **STEPS FOR RELEASING TORQUE (BREAKAWAY)**

angle values in the "Home" section of this User Guide.)



### **Applying & Releasing Torque**

The breakaway procedure is the same as the procedure for applying torque, simply performed opposite the direction that the initial torque was applied. The "Peak" torque function can be used to track breakaway torque. (See more on "Peak" torque/



The "Home" view is the automatic default screen that appears (after the opening "Splash" screen) if there are no stored procedures. It can be reached by pressing the "Home" tab in the bottom navigation of the tablet display screen.

The "Home" view is an all-in-one view for operators to easily and accurately torque an application with the Advanced Torque Products® Digital Torque Multiplier. The "Home" view features a simple, all-in-one view of current and maximum torque and angle values.





# V. "HOME" VIEW

The following pages summarize features of the "Home" view.





Below is the all-in-one "Home" view. If there are no stored procedures, the tablet will launch on this screen in torque mode and can be changed to **angle mode** via the toggle in the top left corner.





### **Torque Modes**

The center dial displays current, peak and target values on the inner part of the dial behind large digital numbers, and also in a corresponding manner on the outer part of the dial.





### **Center Dial**

#### **Current Values**









If there are no stored procedures, the Digital Display will launch on the "Home" screen in torque mode. Torque mode is used to dynamically track torque applied by the Digital Torque Multiplier. Torque values are displayed in the center dial, and angle values in the secondary buttons on the left of the screen.



\*Note: If Digital Torque Multiplier is under load, "Current" torque cannot be zeroed, but "Peak" torque and "Current/Peak" angle can. If Digital Torque Multiplier has no load, all can be zeroed.



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### **Torque Mode Buttons & Functions**









Angle mode is used to dynamically track angle of turn applied by the Digital Torque Multiplier. Angle values are displayed in the center dial, and torque values in the secondary buttons on the left of the screen. (Current angle values will be reflected in the center dial via the orange pointer up until negative or positive 1080 degrees, and indefinitely as text in the orange "Current" area.)



\*Note: If Digital Torque Multiplier is under load, "Current" torque cannot be zeroed, but "Current" angle and "Peak" torque can. If Digital Torque Multiplier has no load, all can be zeroed.



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### **Angle Mode Buttons & Functions**



Any time there is an action, a confirmation pop-up box appears. Below are sample confirmation pop-ups when an operator requests to zero current and peak torque or angle values from the "Home" screen.





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### **Confirmation Pop-Ups**







To set a target, press the teal "Target" area in the center dial, and use the pop-up shown the next page to set a target.





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### Setting a Target

Note: Target settings cannot be accessed when you are operating within a procedure.



Once the teal "Target" area in the center dial on the "Home" view screen is pressed, the below "Set Target" pop-up will appear to set a target.



Note: You must set a "Min" and "Max" value. If a "Max" value is not entered, the max value will be the capacity of the tool. You can input negative values. The values around the center dial will change accordingly.



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### Set a Torque Target



Once the teal "Target" area in the center dial on the "Home" view screen is pressed, the below "Set Target" pop-up will appear to set a target.



Note: You must set a "Min" and "Max" value. If a "Max" value is not entered, the max value will be the capacity of the tool. You can input negative values. The values around the center dial will change accordingly.



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### Set an Angle Target

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Any time there is an action, a confirmation pop-up box appears. Below are sample confirmation pages when an operator requests to clear or save values within "Target Settings."

| Set Targe | et   | Exit X | Set       | Target                          |  | Exit X |
|-----------|--|--------|-----------|---------------------------------|--|--------|
| Torque    |  |        | Tor       |                                 | 330°   | 30°    |
| CW        | Save   |        | С         | W Exit                          |  |        |
| Min       | Are you sure you want to save the target settings and return to the home view? | 7000   | Mi        | Are you sure<br>without savir   | you want to exit the home view ng the target settings? |        |
| Max       |  |        | Ma        |                                 |  |        |
|           | NO YES   | - 7000 | Max<br>10 | Torq<br>00 NO                   | ٢  | 120°   |
| Clear Va  | alues in Save D  |        |           | not exceed value<br>ar Values 🗭 | 210°<br>Save   | 150°   |
|           | Save target settings before  |        |           | Exit                            | target settings without                                | t      |

returning to Home view. **Press "YES" to save** 



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### **Setting a Target - Confirmations**

saving / setting a target. **Press "YES" to exit without saving** 

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The "Procedures" section can be reached by pressing the "Procedures" tab in the bottom navigation of the tablet display screen.

Procedures allow you to store your torque sequence within the TorqueSight<sup>™</sup> software. Your single or multi-step procedures can be created or imported to allow for easy start up and use. Once stored, operators can select these procedures to guide them step-by-step and store the event to a specific serial number, part or application.

Scanning a QR code at start-up can allow the latest version of the same procedure to be loaded across multiple Digital Torque Multipliers. And scanning a QR code once a procedure is complete allows procedure results to be exported to an android phone or tablet device.

> See more about our procedures features and operation in the following pages. (Reference the "Management" section for creating procedures.)





# VI. PROCEDURES












"Procedures" can be accessed from any screen via the "Procedures" tab at the bottom of the tablet's display screen.





Choose from a list of stored procedures. **Select stored** procedure and then press "START"

|   | 4) 🕸 🎹 75                     |
|---|-------------------------------|
| Procedures<br>* Required Field                                    | <b>T</b> <pre>rqueSight</pre> |
| Choose a Stored Procedure   | Assign a Part #*              |
| Engine XXX, #3 Bearing  | 123456                        |
| Engine XXX, #5 Bearing  | Press to scan part #:         |
| Engine XXX, #6 Bearing  | Scan Barcode                  |
| Engine XXX, #4 Bearing  |                               |
| Step 1:<br>Torque: 500 to 560 ft·lbs<br>Custom instructions notes |                               |
| Step 2:<br>Angle: 23°, 05'<br>Custom instructions notes           |                               |
| Step 3:<br>Loosen bolt to zero ft·lbs                             | Start D                       |
| Home 🔒 Procedures 🗐   |                               |



### **Procedure Selection**

**ight**<sup>™</sup> bart #: ode

 $\mathbf{C}$ 

If the option to scan a QR Code to load a procedure is set by management, you can also scan a QR code to load a procedure by going to the "Procedures" tab. Pressing "SCAN QR CODE" button (as shown below) will open the camera and allow a QR Code to be scanned using an Android-based tablet, phone or QR scanner. (An iphone or Apple tablet cannot be used.)

|   | أ الله الله الله الله الله الله الله الل |                           |
|---|--|---------------------------|
| Procedures * Required Field                                       | <b>T≎rqueSig</b> ht <sup>™</sup>         |                           |
| Choose a Stored Procedure<br>Engine XXX, #3 Bearing               | Assign a Part #*<br>123456               |                           |
| Scan OR Code  | Press to scan part #:                    |                           |
| Step 1:<br>Torque: 500 to 560 ft·lbs<br>Custom instructions notes |  | Scan QR Code<br>to load a |
| Step 2:<br>Angle: 23°, 05'<br>Custom instructions notes           | Start D                                  | procedure<br>Prose        |
| Step 3:     Loosen bolt to zero ft·lbs     Home   Procedures      |  | "SCAN QRCODE              |
|   |  |                           |
|   |  |                           |





While in a "Procedure" the display screen looks and functions the same as the "Home" screen, except the bottom bar shows the target value and an "Exit" button, and a "Complete Step" button above it.

View step instructions in the bottom bar. If there are no text instructions, the torque or angle target range is summarized as shown in this screenshot. If there is a max torque (for angle steps, that will be displayed to the right of the blue alarm icon.





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### **Procedure Operation**

Below is an example of a procedure details pop-up screen that provides a quick snapshot of the procedure including torque or angle target ranges, custom instructions, check step details, and the status and results for any completed steps.

|  | 4000   | 5000           |
|--|--|----------------|
| Step 8:<br>Loosen bolt to zero in·lbs  | <b>Results:</b><br>Torque : 0 in-lbs<br>Angle: 0° 0'     | Step<br>Comple |
| Step 9:<br>Torque: 1970 to 2160 in·lbs   | <b>Results:</b><br>Torque: 1982 in-lbs<br>Angle: 34° 22' | Step<br>Comple |
| Step 10:<br>Ensure the angle result from<br>Step 9 is less than +2 degrees<br>of the stored reference angle<br>result from Step 6.<br>If not, repeat Step 6.<br>Retry limit: 3 | <b>Results:</b><br>Retries: 2 of 3                       | Step<br>Comple |
| Step 11:<br>Angle: 55°00' to 59°00'<br>Do not exceed 6000 ft·lbs.  | <b>Results:</b><br>Torque : 0 in-lbs<br>Angle: 0° 0'     | Curren<br>Step |
| Step 11: Do not exceed 6000  | in·lbs   |                |

Press the triangle icon to see all procedure details displayed as a "pop up" screen (shown above)



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### **Procedure Details**







There are four types of steps that management can program into a procedure that operators may see in a procedure: torque, angle, custom (breakaway) or a check step. See examples of these below in a sample pull up view of a procedure.





### **Types of Steps**

|   |  |                  | ♦ 🕸 🗱 75%                               |
|---|--|------------------|---|
|   | 4000 5   | 000              | <b>T<b>e</b>rqueSig</b> ht <sup>™</sup> |
| n bolt to zero in∙lbs   | Results:<br>Torque : 0 in-lbs<br>Angle: 0° 0'        | Step<br>Complete |   |
| :<br>e: 1970 to 2160 in∙lbs   | Results:<br>Torque: 1982 in-lbs<br>Angle: 34° 22'    | Step<br>Complete | Above Target                            |
| 0:<br>e the angle result from<br>is less than +2 degrees<br>stored reference angle<br>from Step 6.<br>repeat Step 6.<br>imit: 3 | Results:<br>Retries: 2 of 3                          | Step<br>Complete |   |
| 1:<br>55°00' to 59°00'<br>exceed 6000 ft·lbs.   | <b>Results:</b><br>Torque : 0 in-lbs<br>Angle: 0° 0' | Current<br>Step  |   |
| : Do not exceed 6000 in   | n·lbs  |                  | <b>Exit</b>                             |



In a "Check" step, management can set "if/then" conditions to allow an operator to be able to proceed to the next step. Below are examples of a "Check" step success and failure screen that an operator will see.

### **Check Success Screen**

|                   | Torque    | e Target  | Angle     | Target   | Re         | sults   |
|-------------------|-----------|-----------|-----------|----------|------------|---------|
| ер                | (Min)     | (Max)     | (Min)     | (Max)    | (Torque)   | (Angle) |
| o Torque (in·lbs) | 1970      | 2160      | -         | -        | 2008       | 34°22'  |
| Torque (in·lbs)   | 1970      | 2160      | -         | -        | 1982       | 35°22'  |
| no anglo rocu     | lt from S | Stop Q is | loss that | n +2 doa | roos of th | 0       |

This "Success" screen will appear on a "Check" step if the conditions set by management have been met. Pressing "Continue" will bring the operator to the next step in the procedure.



## **Types of Steps - Check Step**

#### **Check Failure Screen** OR ♦ 🗰 75% **Step 10: Check Failure TerqueSight Torque Target Angle Target** Results (Torque) (Angle) (Min) (Max) (Min) (Max) Step 34°22' 6 Torque (in·lbs) 1970 2008 2160 37°00' 9 Torque (in·lbs) 1970 2408 2160 The torque result from Step 9 is not less than +500 degrees of the stored reference angle result from Step 6. Repeat Step 6. Retry Limit: 2 of 3 remaining. Exit Repeat 🗩

This "Failure" screen with appear on a "Check" step if the conditions set by management have NOT been met. The amount of retries remaining will be shown. Pressing "Repeat" will bring the operator back to the step to be repeated.



After pressing "Complete Step" on the main "Procedures" screen, a "Step Complete" screen will appear. summarizing target values and results for every step. Results that are within the target range show up in green and results that are above the target range show up in red. To the left of each step, any steps that are within range, have a green check mark, and any steps with any value outside the target range have a red X. To continue to the next step, press "CONTINUE" or exit to the "Home" screen by pressing "EXIT".

Continue to the next step, or cancel the procedure and exit to the "Home" screen. **Press "CONTINUE" or "EXIT"** 



**Continue to nex** or exit procedu





### **Step Complete**

|             |                      |    |        |        |            |              |        | ∎» ≯     | 75%     |  |  |
|-------------|----------------------|----|--------|--------|------------|--------------|--------|----------|---------|--|--|
| /12         | ueSight <sup>™</sup> |    |        |        |            |              |        |          |         |  |  |
| nary        |                      |    |        | Torque | Target     | Angle T      | arget  | Re       | Results |  |  |
| )25         |                      |    |        | (Min)  | (Max)      | (Min)        | (Max)  | (Torque) | (Angle) |  |  |
| 240317      | $\checkmark$         | 1  | Torque | 6400   | 6600       | -            | -      | 6552     | 34°22'  |  |  |
| Κ,          |                      | 2  | Custom | -      | -          | -            | -      | 0        | 00°00'  |  |  |
| aring       |                      | 3  | Torque | 1970   | 2160       | -            | -      | 2158     | 34°22'  |  |  |
|             |                      | 4  | Angle  | -      | -          | 55°00'       | 59°00' | 1982     | 34°22'  |  |  |
| ent: In·IDS |                      | 5  | Custom | -      | -          | -            | -      | 0        | 00°00'  |  |  |
|             | $\checkmark$         | 6  | Torque | 1970   | 2160       | -            | -      | 2008     | 34°22'  |  |  |
|             | $\checkmark$         | 7  | Angle  | -      | -          | 55°00'       | 59°00' | 1570     | 34°22'  |  |  |
|             | $\checkmark$         | 8  | Custom | -      | -          | -            | -      | 0        | 00°00'  |  |  |
| t step      | X                    | 9  | Torque | 1970   | 2160       | -            | -      | 2167     | 34°22'  |  |  |
| re?         |                      | 10 | Check  | (con   | npleted in | 2 of 3 tries | )      | -        | -       |  |  |
|             | $\checkmark [$       | 11 | Angle  | -      | -          | 55°00'       | 59°00' | 1982     | 34°22'  |  |  |
|             |                      | 12 | Custom | -      | -          | -            | -      |          |         |  |  |



Once you have completed all steps in a procedure, a "Procedure Complete" screen will appear, summarizing target values and results for every step. As on the "Step Complete" screen, results that are within the target range show up in green and results that are above the target range show up in red. You can then export results, and then save or exit the procedure.

Save

Export results in plain text format (for insertion in a .csv file) by scanning a QR code from an android-baesd tablet, phone or QR reader. (iPhone or Apple tablet cannot be used to export results. See more detailed steps on next page.)

**Press "EXPORT"** 

Save the procedure, or exit and do not save the procedure. **Press "SAVE" or "EXIT"** 

Note: All saved procedures are stored and can be accessed in the "Management" controls tab under "Results". See the "Management" section for info on accessing & exporting saved procedures.



### **Procedure Complete**

### **Procedure Complete**

### **I**<br/> **rqueSight**

♦ 🗱 75%

| Results Summary             |              |    |        | Torque | Target       | Angle T | arget  | Res      | sults   |
|-----------------------------|--------------|----|--------|--------|--------------|---------|--------|----------|---------|
| Date: 05-March-2025         |              |    |        | (Min)  | (Max)        | (Min)   | (Max)  | (Torque) | (Angle) |
| Multiplier Serial #: 240317 | $\checkmark$ | 1  | Torque | 6400   | 6600         | -       | -      | 6552     | 34°22'  |
| Model: Engine XXX,          | $\checkmark$ | 2  | Custom | -      | -            | -       | -      | 0        | 00°00'  |
| Application: #3 Bearing     | $\checkmark$ | 3  | Torque | 1970   | 2160         | -       | -      | 2158     | 34°22'  |
| Unit of Measurement: in·lbs | $\checkmark$ | 4  | Angle  | -      | -            | 55°00'  | 59°00' | 1982     | 34°22'  |
|                             | $\checkmark$ | 5  | Custom | -      | -            | -       | -      | 0        | 00°00'  |
|                             | $\checkmark$ | 6  | Torque | 1970   | 2160         | -       | -      | 2008     | 34°22'  |
| Export Results 💎            | $\checkmark$ | 7  | Angle  | -      | -            | 55°00'  | 59°00' | 1570     | 34°22'  |
|                             | $\checkmark$ | 8  | Custom | -      | -            | -       | -      | 0        | 00°00'  |
| Exit or Save Results?       | X            | 9  | Torque | 1970   | 2160         | -       | -      | 2167     | 34°22'  |
| LAIL OF OUVE RESULTS:       | $\checkmark$ | 10 | Check  | (con   | npleted in 2 | )       | -      | -        |         |
|                             | $\checkmark$ | 11 | Angle  | -      | -            | 55°00'  | 59°00' | 1982     | 34°22'  |
| Exit                        | $\checkmark$ | 12 | Custom | -      | -            | -       | -      | 0        | 00°00'  |



Results for completed procedures can be exported in plain text format using a QR code. You can leverage plain text results according to your specific process and platform needs, but below are the basic steps to exporting results via QR code.

| Procedure (                 |              | )r | nnlo   | to     |              |              |               | • ×      | 3 <b>Ⅲ</b> 75% |  |
|-----------------------------|--------------|----|--------|--------|--------------|--------------|---------------|----------|----------------|--|
| FIUCEUUIE                   |              | 9  |        |        |              |              |               |          |                |  |
| Results Summary             |              |    |        | Torque | Target       | Angle 1      | <b>Target</b> | Results  |                |  |
| Date: 05-March-2025         |              |    |        | (Min)  | (Max)        | (Min)        | (Max)         | (Torque) | (Angle)        |  |
| Multiplier Serial #: 240317 | $\checkmark$ | 1  | Torque | 6400   | 6600         | -            | -             | 6552     | 34°22'         |  |
| Model: Engine XXX,          | $\checkmark$ | 2  | Custom | -      | -            | -            | -             | 0        | 00°00'         |  |
| Application: #3 Bearing     | $\checkmark$ | 3  | Torque | 1970   | 2160         | -            | -             | 2158     | 34°22'         |  |
| Part #. 7343899             | $\checkmark$ | 4  | Angle  | -      | -            | 55°00'       | 59°00'        | 1982     | 34°22'         |  |
|                             |              | 5  | Custom | -      | -            | -            | -             | 0        | 00°00'         |  |
|                             | ~            | 6  | Torque | 1970   | 2160         | -            | -             | 2008     | 34°22'         |  |
| Export Results 🖓            | $\checkmark$ | 7  | Angle  | -      | -            | 55°00'       | 59°00'        | 1570     | 34°22'         |  |
|                             |              | 8  | Custom | -      | -            | -            | -             | 0        | 00°00'         |  |
| Exus suus?                  | X            | 9  | Torque | 1970   | 2160         | -            | -             | 2167     | 34°22'         |  |
| Exit of our encourts:       | $\checkmark$ | 10 | Check  | (con   | npleted in : | 2 of 3 tries | )             | -        | -              |  |
|                             | $\checkmark$ | 11 | Angle  | -      | -            | 55°00'       | 59°00'        | 1982     | 34°22'         |  |
| Exit                        | $\checkmark$ | 12 | Custom | -      | -            | -            | -             | 0        | 00°00'         |  |
| Save                        | _            |    |        |        |              |              |               |          |                |  |



### Step 1

Press the blue "Export Results" button on "Results Summary" screen that appears once all steps in a procedure have been completed.

#### Step 2

QR code will appear on screen and will also be saved in the "ProcedureResults" folder\* on the tablet. Using the camera from a device of your choice (QR reader, or an android-based tablet or phone), scan the QR code by centering your device's camera on the QR code & press the text box that appears under the QR code. The results will be exported to your device in plain textformat. (Note: Apple iphone or tablet cannot be used.)

### **\*TEMPORARY QR CODE FOLDER LOCATION**

Files>storage>emulated>0>Android>data>com.advancedtorque.advancedtorqueapp>files>ProcedureResults



# **Results Exporting via QR Code**



🗳 Format Pain Toraue Breakawa

### Step 3

Plain text format of results will export to whatever device you used to scan the QR code.

### Step 4

Email or download results from your device for sharing, viewing or inserting into your platform of choice. (See next page for splitting plain text into tabs in an Excel file.)















For viewing and saving completed procedures in an Excel file (from the plain text format that is exported from the Torque-Sight software), follow the below Windows instructions for splitting text into different columns:

### Instructions for splitting text into different columns:

- 1. Select the cell or column that contains the text you want to split.
- 2. Select Data > Text to Columns.
- 3. In the Convert Text to Columns Wizard, select Delimited > Next.
- 5. Select Next.
- 6. Select the Destination in your worksheet which is where you want the split data to appear.
- 7. Select Finish.



# Viewing Exported Results in Excel

4. Select the Delimiters for your data (ie. Comma and Space). You can see a preview of your data in the Data preview window.





# VII. USING A MOTOR DRIVE

The Motor Drive eliminates manual input from an operator, and instead automatically provides input directly to the Digital Torque Multiplier. Defined targets and procedures set within the TorqueSight<sup>™</sup> software (loaded on the touch-screen tablet) tell the Digital Torque Multiplier what value to torque to, and easy to use "STOP/START" and "JOG" buttons on the touch-screen tablet are used by an operator to control Motor Drive activity.

The following pages provide more information on Motor Drive features and usage. If you are using a Motor Drive with your Digital Torque Multiplier, these pages should be referenced in conjunction with the rest off this guide on how to properly use your Digital Torque Multiplier.



This section provides information on using a Motor Drive to power an Advanced Torque Products<sup>®</sup> Digital Torque Multiplier, instead of a ratchet, speed knob or drill.





Standard motor drive kit contents are listed below and on the next page for reference. Note that all components may not be supplied with your specific Advanced Torque Products<sup>®</sup> Digital Torque Multiplier assembly. (Images are not exactly to scale.)



**Motor Drive Cable** Part #xxx

**AC Power Cable** Part #xxx



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### **Standard Kit Contents**



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Standard motor drive kit contents are listed below and on the previous page for reference. Note that all components may not be supplied with your specific Advanced Torque Products<sup>®</sup> Digital Torque Multiplier assembly. (Images are not exactly to scale.)



#### **NOTE:** Other parts may be present in the case based on your specific kit.



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### **Standard Kit Contents**



**Documentation Calibration Certificate** & User Guide (in folder shown here)

**Durable Case** Custom fit to each Digital Torque Multiplier to ensure safe transport of calibrated product and accessories



Below is an illustration of the inside of the Motor Drive case showing what components are included and where they are located.

- **A Digital Torque Multiplier**
- **B** Motor Power Cable
- **C** Connector Cable
- **D** AC Power Cable & Tablet Charging Cord
- **E** Tablet
- **F** Emergency Stop Button
- **G** Motor Drive Power Switch
- **H** Certification & User Guide



### **E-Stop Button**

Press to stop within 2 seconds.



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## Motor Drive Case & Components





- **1.** Remove **Digital Torque Multiplier (A)** from case & place it on your application. (The Motor Drive and Digital Torque Multiplier are permanently attached.)
- 2. Ensure connections on **Digital Torque** Multiplier's Motor Drive are secure.

Controller Cable (C)

Motor Power Cable (B)

- 3. Connect other end of split Controller **Cable (C)** to Digital Torque Multiplier (A) using LEMO plug and Tablet (D) using USB-C plug.
- **4.** Enable power and turn components on in this order:
  - Plug AC Power Cable (E) into External Electrical Outlet (F).
  - Y Ensure Emergency Stop Button (G) is in the RUN position.
  - ✓ Turn Motor Drive Power Switch (H) to the <u>ON</u> position.
  - ✓ Press power button to turn **Tablet (D)** <u>ON</u>.
- 5. Follow **TorqueSight**<sup>™</sup> software on tablet to apply torque.

#### **DISASSEMBLY\*:**

Perform the above Quick Start Steps in reverse order. Make sure to turn the Motor Drive Power Switch (H) to OFF, and remove the LEMO plug on the Controller Cable (C) before returning Digital Torque Multiplier (A) to the case.



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### **Quick Start Steps**











When a Motor Drive is used to operate the AeroTorque<sup>®</sup> Digital Torque Multiplier, the system automatically detects the motor and will display the right hand Motor Drive controls on the "Home" screen of the digital touch-screen tablet.





### Home Screen Interface

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There are two ways to control the Motor Drive: Automatically using the "START" / "STOP" button, or manually using the "JOG" buttons.





### **Motor Drive Control Options**

You can interrupt the Motor Drive by pressing the "STOP" button.



**NOTE: Whatever** methold/buttons are not in use, will be grey.

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After setting a target (see target settings) or while in a procedure (see procedures), you can automatically or manually have the motor drive move to the set target torque/angle using the Motor Drive controls on the right of the touch-screen tablet.



### **AUTOMATIC:** Using the START / STOP button

Press and hold the blue **"START"** button for 3 seconds and then then motor automatically moves to the target torque/angle value specified. (Once started the motor can be interrupted using the red "STOP" button.)





## **Controlling the Motor Drive**

#### OR **MANUAL:** Using the JOG buttons



The "JOG CW" (clockwise) and "JOG CCW" (counterclockwise) buttons can be used independently to turn the drive manually while the motor is not performing a target move.

#### (NOTE: Whatever method/buttons are not in use, will be grey.)

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If you've set one specific target (in Settings>Target Settings, see "Target Settings" in this User Guide), below is how the Motor Drive will operate when automatically using the "START" / "STOP" button.



### **Target Set**

This is what the home screen will look like after Min & Max angle targets are set in Target Settings. After the **"START**" button is pressed and held for 3 seconds, the Motor Drive will automatically move to the Min target value.

**Motor Drive Active** When the Motor Drive starts moving to the target value, the **"START"** button changes to a red **"STOP"** which can be pressed at any time to stop the Motor Drive.

### (NOTE: Whatever methods/buttons are not in use, will be grey.)



# **Usage With a Set Target**



### **Target Met**

As soon as the minimum target value is met, the Motor Drive stops and the "START" and "JOG" buttons return in blue. (NOTE: If the current value exceeds the target range, then the "START" button will turn grey and wil be inactive.)







If you're using a saved procedure (see "Procedures" section of this User Guide), below is how the Motor Drive will operate when automatically using the "START" / "STOP" button.



### **Target Set**

This is what the screen will look like in a procedure at the start of a step. After the **"START"** button is pressed and held for 3 seconds, the Motor Drive will automatically move to the Min target value.

**Motor Drive Active** When the Motor Drive starts moving to the target value, the **"START"** button changes to a red "STOP" which can be pressed at any time to stop the Motor Drive.

#### (NOTE: Whatever methods/buttons are not in use, will be grey.)



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# **Usage within a Procedure**

### **Target Met**

As soon as the minimum target value is met for each step, the Motor Drive stops and a "Complete Step" button will appear - pressing it will advance to the next step.









If a target has been set, the "Alarm" icon (blue circle button with the speaker) will show up in blue on the bottom left of the "Home" screen. The next two pages describe in detail when and for how long this happens. (The "Alarm" icon can be pressed to mute and unmute the audio beeping, as shown below.)





### Target Alarm



### **ALARM SOUNDING**

This icon will show when the alarm starts sounding. By pressing the icon it will mute the alarm.



#### **ALARM MUTED**

This icon will show when the alarm has been muted. By pressing the icon it will unmute the alarm.



### **Approaching Target (Torque Mode)**



At 50% of the lowest specified value (either target value or minimum target value if one is set), the alarm beeps intermittently every 3 seconds, the "Target" button remains teal in color. At 75% of the lowest specified value (either target value or minimum target value if one is set), the beeping frequency increases to every 1 second, the "Target" button remains teal in color.



# **Approaching Target**

### **Approaching Target (Angle Mode)**





### **Achieving Target (Torque Mode)**



At 100% of the specified target or while within min to max target limits, the alarm emits a continuous tone and the "Peak" and "Target" buttons turn green in color, indicating the desired target has been achieved.



# **Achieving Target**

### **Achieving Target (Angle Mode)**









### **Exceeded Target (Torque Mode)**



At 110% of the specified target or beyond the max target limit, the alarm emits a higher-pitched continuous tone and the "Peak" and "Target" buttons turn red in color, indicating the desired target has been exceeded. (When in "Angle" mode, the left "Current' and "Peak" torque buttons will also turn red if exceeded.)



## **Exceeded Target**

### **Exceeded Target (Angle Mode)**



### **Exceeded Capacity (Torque Mode)**



**Past 110%** of the specified Digital Torque Multiplier capacity, the "Current" center dial button and left "Current" and "Peak" buttons also turn red (the alarm continues to emit a higher-pitched continuous tone), indicating the target or the max Digital Torque Multiplier capacity has been exceeded.





## **Exceeded Capacity**

### **Exceeded Capacity (Angle Mode)**

### WARNING: CONTINUING MAY CAUSE DAMAGE TO YOUR APPLICATION AND/OR DIGITAL TORQUE MULTIPLIER.



### **Error: Disconnected**



If you see this error screen and are using the cable connection, please check that the connection is fully secured. **Select "CONNECT"** 



### **Error Screens**

### **Error: Overtorqued**

| v1.27.11.27.2   | OVERTOR          | <b>TerqueSig</b> ht <sup>™</sup> |  |  |  |  |  |  |  |  |  |
|---|------------------|----------------------------------|--|--|--|--|--|--|--|--|--|
|   | OVERTOR          |                                  |  |  |  |  |  |  |  |  |  |
|   | OVERTOR          |                                  |  |  |  |  |  |  |  |  |  |
|   |                  | OVERTORQUED!                     |  |  |  |  |  |  |  |  |  |
| D   | igital Torque Mu | ultiplier:                       |  |  |  |  |  |  |  |  |  |
| 2   | 240,000 in·lbs   | Maximum capacity                 |  |  |  |  |  |  |  |  |  |
| 2   | 245,000 in·lbs   | Value loaded in excess           |  |  |  |  |  |  |  |  |  |
| This Digital Torque Multiplier was loaded in excess of its maximum rated capacity and has been locked to prevent damage to the tool. Send to Advanced Torque Products for evaluation: 56 Budney Road, Newington, CT 06111 USA |                  |                                  |  |  |  |  |  |  |  |  |  |

If you see this screen the max capacity of the Digital Torque Multiplier has been exceeded and should be evaluated by ATP. There could be damage to the Digital Torque Multiplier and the calibration is also in question. This cannot be unlocked by management; contact ATP.



### **Error: Motor Fault**



If you see this error screen and are using the cable connection, please check that the connection is fully secured.

### **Select "CONNECT"**



### **Motor Drive Error Screens**

### **Error: Overtorqued**



If you see this screen the max capacity of the Digital Torque Multiplier has been exceeded and should be evaluated by ATP. There could be damage to the Digital Torque Multiplier and the calibration is also in question. This cannot be unlocked by management; contact ATP.







This section is meant to be a one-stop troubleshooting section. It contains a digital version of this user guide as well as helpful videos to guide you through the different features of the Digital Torque Multiplier. The help section is also where you can also find information about your Digital Torque Multiplier including Serial Number, Max Torque Capacity, Date of Last Calibration and Calibration Due Date. The following pages summarize features found in the "Help" tab.

# IX- "HELP" INFO

The "Help" section can be reached by pressing the "Help" tab in the bottom right of the tablet display screen.





In the "?" Help section you can find product user guides and videos. Access these via the "Manuals" and "Videos" tabs at the bottom of the screen.

### "Manuals" Tab



ATP user manuals and guides can be accessed in the "Help" section under the "Manuals" tab.



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### Manuals & Videos

### "Videos" Tab



Videos on Digital Torque Multiplier operation can be accessed in the "Help" section under the "Videos" tab, and also on our website at https://advancedtorque.com/digital-display-2.





In the "?" Help section you can also find an "About" tab that includes product and customer service contact information. This is also where the latest application version can be installed. If the blue "Update Available" "Insall Now" button appear, then an update is available. Press "Install Now" to make update to the latest application version.





### **Product and Service Info**

|                          | ♦ ≹ III 75%<br>TorqueSight <sup>™</sup>   | ATP custome<br>service<br>contact info               |
|--------------------------|---|--|
| ATP2500<br>03401<br>2500 | Customer ServicePhone<br>+1 (860) 828-1523Email<br>info@advancedtorque.comAddress<br>Advanced Torque Products<br>56 Budney Road<br>Newington, CT 06111<br>USA | Access te<br>Managemen<br>Controls<br>Press gear ico |
|                          | Management 1523   | to acces   |
| bout                     | Exit X  |  |





# X. "MANAGEMENT" TAB

The "Management" section can be reached by pressing the "Management" gear icon found in the Help>About section.

**SET UP:** Set units of measurement, time zone/date, calibration and procedure settings including the ability to use one QR code to load the most recent version of a procedure across multiple Digital Torque Multipliers.

**PROCEDURES:** Edit, duplicate or create new procedures for operators to follow.





A passcode is required to access this section and do the following:

**<u>RESULTS</u>**: View or export saved data.

**CALIBRATION:** Guided process for calibrating your Digital Torque Multiplier.

See more about our management features in the following pages.





The management section can be accessed by clicking on the gear icon on the bottom right of the "Help - About Info" screen shown below. A passcode is then required to access the management section and make any set-up or configuration changes.

### **Access to Management section:**

|  | <ul> <li>♦) <a>8</a> </li> <li>75%</li> </ul>                     |
|--|---|
| Help - About Info                          | I orque signt   |
| Product Info                               | Customer Service  |
| Digital Torque Multiplier Model #: ATP2500 | Phone   |
| Digital Torque Multiplier Serial #: PO3401 | +1 (000) 020-1525   |
| Maximum Torque Capacity (ft·lbs): 2500     | Email<br>info@advancedtorque.com                                  |
| Date of Last Calibration: 13-May-24        | Address   |
| Calibration Due: 13-May-25                 | Advanced Torque Products<br>56 Budney Road<br>Newington, CT 06111 |
| Firmware Version: 28                       | USA   |
| Application Version: 1.0.12.13.2023        | Monogoment 1522   |
| Update Available: Install Now              | Management 1523   |
|  |   |
| Manuals 🔨 Videos 🗖 About (1)               | Exit 🗙  |

"How to Videos" on Digital Torque Multiplier operation can be accessed in the "How to Videos" section of the "Help" tab, and also on our website at https://advancedtorque.com/digital-display-2.



## **Section Access**

### Management secton login:



www.advancedtorque.com info@advancedtorque.com





You can make changes to general settings by going to "Set Up" tabin the "Management" section. These settings can only be set or changed by management on this screen.



Note: Be sure to set time and date to your zone for accurate data tracking. A "SAVE" button will appear on screen after any of the above selections are made. To save, press "SAVE".



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# Set Up

Choose the unit



Scanning a QR code at start-up can allow the latest version of the same procedure to be loaded across multiple Digital Torque Multipliers. Below are management steps for setting up using QR codes to load procedures. See "SET UP" section at the start of this guide for operator instructions on scanning a QR code to load a procedure once the below is completed.

| <ul> <li>● 多 IIII);</li> </ul>  | 5% |  | ♦  🎟 75%   |  | ♦ 🕸 75%   |  |
|---|----|--|--|--|---|--|
| Management - Set Up   | тм | Management - Procedure Settings  | <mark>T≎rqueSig</mark> ht <sup>™</sup>   | Management - Procedure Setti   | ngs <b>T<b>∂</b>rqueSig</b> ht <sup>™</sup>   |  |
| Show Calibration Past Due messageat start up       Yes       No       Set Unit Measurement:         Require part # for procedures       Yes       No       Set Date and Time: |    | Create New Procedure Prev<br>or select an existing procedure: App<br>Select all                      | View of selected procedure:<br>Model # Engine XXX<br>plication #3 Bearing  | Create New Procedure  or select an existing procedure: Select all                                    | Preview of selected procedure:<br>Model # Engine XXX<br>Application #3 Bearing  |  |
| Enable bar code scanning<br>to load part # Yes No Date & Time   |    | Engine XXX, #3 Bearing   | rep 8:         posen bolt to zero in·lbs         rep 9:         porque: 1970 to 2160 in·lbs  | Engine XXX, #3 Bearing<br>-47, Main Rotor<br>-ngine XXX, #3 Bearing                                  | Step 8:<br>Loosen bolt to zero in·lbs<br>Step 9:<br>Torque: 1970 to 2160 in·lbs   |  |
| to load procedures Yes No   | )  | Engine XXX, #3 Bearing<br>Engine XXX, #3 Bearing<br>Engine XXX, #3 Bearing<br>Engine XXX, #3 Bearing | tep 10:<br>issure the angle result from Step 9<br>less than +2 degrees of the stored<br>ference angle result from Step 6.<br>not, repeat Step 6. Retry limit: 3. | Engine XXX, #3 Bearing<br>Engine XXX, #3 Bearing<br>Engine XXX, #3 Bearing<br>Engine XXX, #3 Bearing | Step 10:<br>Ensure the angle result from Step 9<br>is less than +2 degrees of the stored<br>reference angle result from Step 6.<br>If not, repeat Step 6. Retry limit: 3. |  |
| Only store data for completed procedures       Yes       No       Save         Set Up       Procedures       Results       Calibration (*)                                    |    | Delete X       Import Import       Export         Set Up       Procedures       Results       Q      | Duplicate     Edit       Calibration ()     ()   | Delete     Import     Export       Set Up     Procedures     Results                                 | Calibration   |  |

#### Step 1

Go to the Management "Set Up" tab. Press "YES" next to "Require QR code to load procedures".

#### Step 2

Go to the Management "Procedures" tab and press "Create New Procedure" to create a new procedure. (See next pages for detaile instructions on creating, editing & reviewing a proce

**\*TEMPORARY EXPORTED PROCEDURES FOLDER LOCATION** Files>storage>emulated>0>Android>data>com.advancedtorque.advancedtorqueapp>files>Procedures



# Loading Procedures via QR Code

#### Step 3

|         | · · · · ·                    |
|---------|------------------------------|
|         | Under Management             |
| S       | "Procedures" select a        |
| )       | procedure to create a QR     |
|         | code for and press "Export". |
| ed      | A pop-up message saying "QR  |
|         | Procedure exported           |
| edure.) | successfully" will appear    |
|         | confirming the export was    |
|         | succesful.                   |
|         |                              |

### Step 4

All exported procedures are saved as .png files in the "Procedures" folder\* on the tablet. (Eventually, the folder with all QR codes will load on screen when the tablet is connected to the device you are exporting to so you can then easily transfer the QR code to your device.)

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In the "Procedures" tab, you can create, import, export, duplicate or edit procedures that operators can then have access to.



**Press "Import" or "Export"** 



## **Procedure Settings**

| e Settin | gs   | Teraues  | * Ⅲ 75% | Colocto  |  |
|----------|--|--|---------|--|--|
|          | Preview of selec<br>Model #  | cted procedure:<br>Engine XXX  |         | Selecte<br>procedur<br>preview pan                                       |  |
|          | Application<br>Step 8:<br>Loosen bol<br>Step 9:<br>Torque: 197<br>Step 10: | #3 Bearing<br>t to zero in·lbs<br>70 to 2160 in·lbs  |         | Once the procedure yo<br>want to delet<br>duplicate, or edit             |  |
| Export   | Ensure the a is less than - reference an If not, repeat                    | ngle result from Step<br>+2 degrees of the stor<br>gle result from Step 6<br>t Step 6. Retry limit: 3. | 9<br>ed | selected, press to init<br>the act<br>Press "Delet<br>"Duplicate" or "Ec |  |
| Results  | Q Calibr   | ation  |         |  |  |

"Export" creates a QR code of an existing procedure that is then stored in a "Procedures" folder on the tablet where you can then transfer it to your device. "Import" allows you to select a file from your device and save it to the same folder.







### X. MANAGEMENT **Creating Procedures: Torque Steps**

#### **Enter Procedure** "Model #" and "Application" name \*Required fields

(Once these are inputed for the first step, they are set for subsequent steps. "Application" name must be unique.)

Set application input direction, target minimum and maximum and any instructions. Default range is ±5%. \*Direction and range

| New Procedure: Step 1 of<br>* Required Field |                  |                   |  |  |
|--|------------------|-------------------|--|--|
|  | Model #* Eng     | gine XXX          |  |  |
|  | Application* #3  | Bearing           |  |  |
|  | Input Direction* | CW CCW            |  |  |
|  |                  | Minimum*          |  |  |
|  | Target Range*    | 1550              |  |  |
|  | Instructions     | Instructions here |  |  |
|  | Cancel X         |                   |  |  |
|  |                  |                   |  |  |
|  | Torque Angle     | Custom Chec       |  |  |
|  |                  |                   |  |  |

Torque step tab

Note: If all the fields (including desceription fields) are filled in for every step, there is an 8-step limit per procedure. If descriptions are NOT typed for each step, then up to 30 steps can be created per new procedure.



| Select unit of   |
|------------------|
| measurement      |
| *Required fields |

Select "Yes" to invert the display output. (This control changes how torque is read. It will reverse torque readings from positive to negative. Only use this feature if you are using the wrench pins to drive a nut instead of the wrench center drive.)

1) 🔺 🔲 75% **I**<br/> **PrqueSight** ft·lbs in·lbs ) N·m ) Units\* Yes No Invert Display Output\* Maximum \* ft-lbs ft·lbs 1570 Save 🕨 Once all info for torque step is

entered, cancel or save the step. **Press "Cancel" or "Save"** 





### X. MANAGEMENT **Creating Procedures: Angle Steps**

### **Enter Procedure** "Model #" and "Application" name \*Required fields

(Once these are inputed for the first step, they are set for subsequent steps. "Application" name must be unique.)

Set application input direction, target minimum and maximum, max torque and any instructions. \*Direction and range required.



Angle step tab

Note: If all the fields (including desceription fields) are filled in for every step, there is an 8-step limit per procedure. If descriptions are NOT typed for each step, then up to 30 steps can be created per new procedure.



| Select unit of   |
|------------------|
| measurement      |
| *Required fields |

Select "Yes" to invert the display output. (This control changes how angle is read. It will reverse angle readings from CW to CCW. Only use this feature if you are using the wrench pins to drive a nut instead of the wrench center drive.)

|            |        |                             | ♦ 🕸 🗱 75%          |
|------------|--------|-----------------------------|--------------------|
| <b>f</b> 1 |        | <b>I</b> erque              | Sight <sup>™</sup> |
|            |        | Units* <b>ft·lbs</b> in·lbs | s) N·m             |
|            | Invert | Display Output* Yes         | No                 |
|            |        |                             |                    |
| e   Minut  | te)*   | Maximum (Degree   Mi        | nute)*             |
|            | 00'    | 59°                         | 00'                |
| eed valu   | е      |                             |                    |
|            |        |                             |                    |
|            |        | Sav                         | ve D               |
| eck        |        |                             |                    |
|            |        | all info for torous         | atan ia            |

Once all into for torque step is entered, cancel or save the step. **Press "Cancel" or "Save"** 






# X. MANAGEMENT Creating Procedures: Custom Steps



Custom step tab

Note: If all the fields (including desceription fields) are filled in for every step, there is an 8-step limit per procedure. If descriptions are NOT typed for each step, then up to 30 steps can be created per new procedure.



Select unit of measurement

\*Required fields

Select "Yes" to invert the display output. (This control changes how torque and angle are read. It will reverse torque reqdings from positive to negative, and angle readings from CW to CCW. Only use this feature if you are using the wrench pins to drive a nut instead of the wrench center drive.)

**I**<br/> **PrqueSight** ft·lbs in·lbs ) N·m ) Units\* Yes No Invert Display Output\* Save Once all info for torque step is entered, cancel or save the step.

♦ 🕸 🚺 75%

**Press "Cancel" or "Save"** 







#### X. MANAGEMENT **Creating Procedures: Check Steps**



Check step tab

#### Note: A Check Step cannot be Step 1 since it needs at least one step to be able to use as a refererence



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|        | ♦ 港 🎞 75%   |  |
|--------|---|--|
| of 10  | <b>TorqueSig</b> ht <sup>™</sup>  | Units<br>(Set in Step 1)   |
|        | Units* (ft·lbs) in·lbs) N·m   |  |
| 3      | Invert Display Output* Yes No<br>Result to reference:* (at least one field required)<br>Step 6 result v by + 2° 00' | Invert Dispaly Output<br>(Set in Step 1 for<br>the full procedure) |
|        | Save 🕟  |  |
| ck     |   |  |
|        | Once all info for torque step is<br>entered, cancel or save the step.<br><b>Press "Cancel" or "Save"</b>            |  |
| eds at | least one step to be able to use  | as a reference   |



#### X. MANAGEMENT **Creating Procedures: Check Steps**

#### Below are screenshots showing the various fields options for a check step.

|  | Ф 🕸 🎹 75%   |  | ● 考 💷   |
|--|---|--|---|
| New Procedure: Step 10 of 1<br>* Required Field  | 0 <b>T≎rqueSig</b> ht <sup>™</sup>  | New Procedure: Step 10 of 10<br>* Required Field   | <b>TorqueSig</b>                                  |
| Model #* Engine XXX  | Units* <b>ft·lbs</b> in·lbs N·m   | Model #* Engine XXX  | Units* <b>ft·lbs</b> in·lbs N                     |
| Application* #3 Bearing  | Invert Display Output* Yes No   | Application* #3 Bearing  | Invert Display Output* Yes N                      |
| Torque Angle   |   | Torque Angle   |   |
| Step result to check:* Comparison:*  | Result to reference:* (at least one field required)                               | Step result to check:* Comparison:*  | Result to reference:* (at least one field require |
| Step 9 result 😽 is less than   | Step 6 result - by + 2° 00'   | Step 9 result 🔶 is greater than/equal to 🛩   | Step 6 result - by + 2° 00'                       |
| Step 2 resultis equal toStep 3 resultis less than/equal toStep 4 resultis greater thanStep 5 resultis greater than/equal toStep 6 resultis withinTorqueAngleCustom | Step 2 result<br>Step 3 result<br>Step 4 result<br>Step 5 result<br>Step 6 result | If the above condition is NOT met:<br>Repeat Step 6 Repeat Step 3<br>Repeat Step 4<br>Repeat Step 5<br>Torque Angle Custom Check | Save  |

**Step result to check**: Any previous step except other check steps. **Types of comparisons:** Is within, equal to, less than, less than/ equal to, great than, greater than/equal to **Result to reference:** Any previous step except other check steps and the step result being checked, and/or an angle or units value.



If condition is not met... **Repeat Step**: Any previous step except Step1. **Retry Limit:** Any value 0 to 10.

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# X. MANAGEMENT

After submitting "COMPLETE" on a new or edited procedure, the below "Procedure Review" allows management to review new procedures entered and either edit, save or cancel them.



Note: You can go back and edit any step of a procedure at any time. If all the fields (including desceription fields) are filled in for every step, there is an 8-step limit per procedure. If descriptions are NOT typed for each step, then up to 30 steps can be created per new procedure.



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### **Procedure Review**

| e Revi                | ew                               |                  |                 | <b>rqu</b> | ♦ *   |     |
|-----------------------|----------------------------------|------------------|-----------------|------------|-------|-----|
|                       |                                  | Units*           | ft·lbs          | in∙lt      | os) N | l·m |
|                       | Invert                           | Display          | Output*         | Ye         | s 🚺   | No  |
|                       |                                  |                  |                 |            |       |     |
|                       |                                  |                  |                 |            |       | 11  |
| than 2 d<br>ep 6. Ret | legrees<br>try Limi <sup>.</sup> | of the s<br>t: 3 | stored ref      | ferenc     | e     |     |
|                       |                                  | Edit             |                 | S          | ave   |     |
| Results               | Q                                | Calib            | ration $\oplus$ |            |       |     |

Cancel, save or edit your procedure. Note: "CANCEL" will discard everything you have created. You will get a warning to confirm. **Press appropriate** button





X. MANAGEMENT

You have the ability to make edits to a procedure at any time by going to "Procedures" within the "Management" tab and selecting "Edit Existing Procedure" or by selecting "EDIT" on the "Procedure Review" page (featured on the previous pages of this guide).



Note: Edits to a procedure will not change any historical data on procedures already performed.



## Editing a Procedure

|        |                      | ● 参 Ⅲ            | 75% |  |
|--------|----------------------|------------------|-----|--|
| diting |                      | <b>rqueSig</b> h | t   |  |
|        | Units* <b>ft·lbs</b> | in·lbs N·m       |     |  |
| Inver  | t Display Output* 🤇  | Yes No           |     |  |
|        | EDIT DELETE          | DUPLICATE        |     |  |
|        | EDIT DELETE          | DUPLICATE        |     | Edit, delete or duplicate<br>a step. Select "EDIT" |
|        | EDIT DELETE          | DUPLICATE        |     | or "DELETE"<br>or "DUPLICATE"                      |
| Add    | d a Sten             | Save             |     |  |
|        |                      |                  |     | Canel editing, add a step                          |
| ults Q | Calibration          |                  |     | or save edits.                                     |
|        |                      |                  |     | Press "Cancel" or                                  |
|        |                      |                  |     | "Add a Stop" or "Savo"                             |



# "

### 17

The TorqueSight<sup>™</sup> software preloaded on the tablet automatically stores information every time the Digital Torque Multiplier is used >3%. Each use is recorded as an event. TorqueSight stores the latest 500 events. (Note: An event ends when <3% for 10 continuous seconds.)

Information is automatically stored for these fields:

- Time
- Date
- Torque
- Angle

If you use our procedures features this information is also stored:

- Model #
- Part #
- Application information

Once stored, data is automatically viewable in graph form on the tablet display. You can search for a specific event by date, time, model, part number or application and view the Torque/Angle curve on the display. If you would like to explore this data for further reporting and exporting, this can be done through a hard-wired USB-C connection.







#### You can access stored data & graphs by going to "Results" in the "Management" section.

Access the "Management" section by clicking the gear icon on the Help>About screen.





Go to stored data/graphs tab. **Select "Results"** 

> Note: The TorqueSight<sup>™</sup> software automatically assigns each stored event a #, date and time. Any information entered by operators on the "Tracking Options" screen at application start-up will be saved.



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## How to Access

| • * ••<br>TorqueSigh                           | A passcode is required to access the store  |
|--|---|
| Password* ****                                 | data settings within the "Management<br>section.*Required fiel<br>Enter passcode and press "LOGIN |
|  |   |
| <b>4</b> )<br><b>75</b> %                      |   |
| Set Unit Measurement:         ft·lbs       N·m |   |
| No     Set Date and Time:       Ves     No     |   |
| Ves No Cancel X                                |   |
| res No Save Save                               |   |





You can export data for one or more events at a time. You can search for specific events by using the search bar, and then select one or more specific events using the check boxes.





## How to Export

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After pressing "Export Selected" on any data you want to export (see previous page), a pop-up messaging saying "Stored Data" exported successfully" appears to confirm the export. The exported .csv data files are saved on the tablet in an "Events" folder\* similar to how any imported or exported procedures are saved in a "Procedures" folder on the tablet. (Eventually the "Events" folder will automatically load on screen when the tablet is connected to the device you are exporting to so you can then easily transfer the exported data to your device.)

| Stored Data   |  |   | i rquesignit   |
|---|--|---|--|
| Search  |  | #015 - 05-May-2024 12:2<br>Serial #: 16<br>Model: PW1100G | 25 Date: 05-May-2024<br>Time: 12:26 PM<br>Part #: 7545899      |
| Select all         X       #015-05-         #014-02-         #013-28-         #012-20-         #011-5-A | -May-<br>-May-<br>-April-<br>April-<br>April-2024 3:25 | ted successfully.   | 1°58<br>,<br>1°29 ¥<br>1°29 ¥<br>,<br>0°59<br>20 40<br>econds) |
| et Up 🗳   | Procedures 🗐   | Results 🔍 Calibratio                                      | n  |

Continue with the export. Select "OK"

**\*TEMPORARY EXPORTED .CSV DATA FOLDER LOCATION** Files>storage>emulated>0>Android>data>com.advancedtorque.advancedtorqueapp>files>Events\_csv



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## **Export Confirmation**

|    | A                        | В                    | С                    | D                       | E      | F      | G       | н           | 1                     |
|----|--------------------------|----------------------|----------------------|-------------------------|--------|--------|---------|-------------|-----------------------|
| 1  | Event                    | <b>Received Time</b> | Peak Torque (in·lbs) | Current Torque (in·lbs) | Degree | Minute | Model   | Application | Manufacturer Serial # |
| 13 | #015 - 05-May-2021 12:26 | 26:03.9              | 0                    | 0                       | 0      | 0      | PW1100G | #3 Bearing  | 16                    |
| 14 | #015 - 05-May-2021 12:26 | 26:04.0              | 0                    | 0                       | 0      | 0      | PW1100G | #3 Bearing  | 16                    |
| 15 | #015 - 05-May-2021 12:26 | 26:04.1              | 0                    | 0                       | 0      | 0      | PW1100G | #3 Bearing  | 16                    |
| 16 | #015 - 05-May-2021 12:26 | 26:04.2              | 0                    | 0                       | 0      | 0      | PW1100G | #3 Bearing  | 16                    |
| 17 | #015 - 05-May-2021 12:26 | 26:04.3              | 0                    | 0                       | 0      | 0      | PW1100G | #3 Bearing  | 16                    |
| 18 | #015 - 05-May-2021 12:26 | 26:04.4              | 0                    | 0                       | 0      | 0      | PW1100G | #3 Bearing  | 16                    |
| 19 | #015 - 05-May-2021 12:26 | 26:04.6              | 0                    | 0                       | 0      | 0      | PW1100G | #3 Bearing  | 16                    |
| 20 | #015 - 05-May-2021 12:26 | 26:04.7              | 0                    | 0                       | 0      | 1      | PW1100G | #3 Bearing  | 16                    |
| 21 | #015 - 05-May-2021 12:26 | 26:04.8              | 0                    | 0                       | 0      | 2      | PW1100G | #3 Bearing  | 16                    |
| 22 | #015 - 05-May-2021 12:26 | 26:04.9              | 0                    | 0                       | 0      | 3      | PW1100G | #3 Bearing  | 16                    |
| 23 | #015 - 05-May-2021 12:26 | 26:05.0              | 0                    | 0                       | 0      | 5      | PW1100G | #3 Bearing  | 16                    |
| 24 | #015 - 05-May-2021 12:26 | 26:05.1              | 0                    | 0                       | 0      | 6      | PW1100G | #3 Bearing  | 16                    |
| 25 | #015 - 05-May-2021 12:26 | 26:05.2              | 0                    | 0                       | 0      | 7      | PW1100G | #3 Bearing  | 16                    |
| 26 | #015 - 05-May-2021 12:26 | 26:05.3              | 0                    | 0                       | 0      | 9      | PW1100G | #3 Bearing  | 16                    |
| 27 | #015 - 05-May-2021 12:26 | 26:05.4              | 0                    | 0                       | 0      | 10     | PW1100G | #3 Bearing  | 16                    |
| 28 | #015 - 05-May-2021 12:26 | 26:05.5              | 0                    | 0                       | 0      | 12     | PW1100G | #3 Bearing  | 16                    |
| 29 | #015 - 05-May-2021 12:26 | 26:05.7              | 0                    | 0                       | 0      | 14     | PW1100G | #3 Bearing  | 16                    |
| 30 | #015 - 05-May-2021 12:26 | 26:05.8              | 0                    | 0                       | 0      | 15     | PW1100G | #3 Bearing  | 16                    |
| 31 | #015 - 05-May-2021 12:26 | 26:05.9              | 0                    | 0                       | 0      | 17     | PW1100G | #3 Bearing  | 16                    |
| 32 | #015 - 05-May-2021 12:26 | 26:06.0              | 0                    | 0                       | 0      | 19     | PW1100G | #3 Bearing  | 16                    |
| 33 | #015 - 05-May-2021 12:26 | 26:06.1              | 0                    | 0                       | 0      | 21     | PW1100G | #3 Bearing  | 16                    |
| 34 | #015 - 05-May-2021 12:26 | 26:06.2              | 0                    | 0                       | 0      | 23     | PW1100G | #3 Bearing  | 16                    |

Sample export as a.csv file.









Many variables can impact the calibration process and the accuracy of your Digital Torque Multiplier. Always use a certified calibration facility to ensure optimal accuracy and to meet regulatory compliance guidelines. To ensure your Digital Torque Multiplier is operating at peak capability, below are important calibration lab considerations to keep in mind.





## **Ensuring Optimal Accuracy**

1. Transducer Range: Ensure your transducer covers the full range of the tool being calibrated. Your transducer will have a recommended minimum to maximum range. Make sure the transducer is at least 4x the accuracy that you are looking to verify. (It is recommend to use a calibration transducer with an appropriate maximum range as the Digital Torque Multiplier you are calibrating. For example, we do not recommend using a 20,000 ft-lb transducer to calibrate a 5,000 ft-lb Digital *Torque Multiplier.*)

2. Resolution & Accuracy: It is best to calibrate your Digital Torque Multiplier directly on a calibration reaction plate with no intermediary adapters. Ensure your reaction is configured to accommodate the precise fittings of the reaction pins on your Digital Torque Multiplier, and has full and even engagement with the reaction plate.



3. Drive Adapter/Input: The top of the adapter and drive input should be as close to flush as possible with the top of the reaction plate touching the Digital Torque Multiplier. The drive input should accurately match the size of the drive bar. This is to enable the drive bar to have maximum engagement throughout the calibration process.

**4. Environment:** While there is no defined temperature requirement, the overarching goal is a stableenvironment. We recommend picking a target temperature and staying within a range of ±3 degrees Fahrenheit. Many facilities fall in the 70 degrees Fahrenheit range for comfort. The room humidity is another critical aspect to maintain. Humidity should always be 10% - 65%. Temperature and humidity gauges should be calibrated annually.



## **Ensuring Optimal Accuracy**







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Below is a checklist to use to confirm that your calibration lab is prepared for accuracy.

- Digital Torque Multiplier.)
- the transducer at least 4x the accuracy that you are looking to verify on the Digital Torque Multiplier?
- engagement on all reaction points.
- can cause drives to twist over time and introduce inaccuracies.
- hours, temperature and humidity gauges calibrated within the past 12 months.



### Checklist

V Do you have the right transducer? Range: Does the full range of the Digital Torque Multplier that you are calibrating fall within the recommended range of the transducer? (You don't want to use a 30,000 ft-lbs transducer to calibrate a 3,000 ft-lbs

**Do you have enough accuracy?** Transducer: If the range is appropriate for the Digital Torque Multiplier, is the accuracy of

**Do you have the correct reaction?** Correct pin spacing with full and equal engagement on all reaction points, no slop in the reactions, made of material that will not deform after repeated use - steel or aluminum with steel bushings, full and equal

**Do you have the proper drive system?** Correct size, correct length: almost horizontal to the reaction plane since distance

**V** Do you have an appropriate environment to calibrate in? Humidity stable and within 10-65%, temperature regulated and stable within allowable variance, room and Digital Torque Multiplier acclimated to stable conditions for a minimum of 12





Calibration of your Advanced Torque Products® Digital Torque Multiplier is a guided process. We offer the ability to only adjust just one direction (CW or CCW) or both directions (CW & CCW) of the Digital Torque Multiplier. You can adjust directions independently, or together if necessary.

To start, As-Found readings can be taken on the "Home" screen set to the "TORQUE" mode with desired units and no targets set. Apply torque using the calibration load cell and record the reading displayed on the dial for each required as-found set point.

After taking As-Found values, there are three possible calibration paths:

- your choice. (Note: No adjustment is needed for Angle.)
- 2. Adjust only CW or only CCW. Only clockwise or counterclockwise values are out of range and need to be adjusted.
- 3. Adjust CW & CCW. Both clockwise & counterclockwise values are out of range and need to be adjusted.

If you are looking for more information, you can also watch our calibration "How-To Video" within the "Help" tab on the tablet, and also on our website at https://advancedtorque.com/digital-display-2.





1. No adjustment needed. Values are within range. Skip making adjustments and simply set a new calibration time interval of



#### You can access calibration by going to the "Calibration" tab in the "Management" section.



Note: You will be required to use a passcode to access calibration mode.



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### **Calibration Access**

Access calibration from within the "Management" tab in the bottom navigation. **Select "Calibration"** 



Date of last calibration. **Cannot be edited** (set during last calibration)

Select the direction(s) you would like to calibrate or cancel before any changes are made to the wrench display values. Select "ADJUST BOTH" or "CLOCKWISE" or "COUNTERCLOCKWISE







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### **Start Calibration**

Note: Going beyond this point will adjust the values the Digital Torque Multiplier displays.







#### Before starting calibration, select your "Calibration Mode" unit of measurement.

| Calibration | Calibration Mode                                  |                                   |  |  |  |
|-------------|---|-----------------------------------|--|--|--|
| Sele        | ect Unit of Measurement for Calibr                | ation                             |  |  |  |
|             | ft·lbs in·lbs N·m                                 | ]                                 |  |  |  |
|             | SET   |                                   |  |  |  |
|             |   |                                   |  |  |  |
|             |   |                                   |  |  |  |
|             | Select unit of measure<br>Select "ft-lbs" or "in- | ement.<br>- <b>Ibs" or "N-m</b> " |  |  |  |

#### Note: All units of measurement will be available on this screen, even if management settings have selected one.



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### **Calibration Mode**

| <b>Calibration Mode</b> | CANCEL CALIBRATION   |
|-------------------------|--|
| Select Unit of Measu    | rement for Calibration   |
| ft-lbs in               | -Ibs N·m   |
| S                       | ET   |
|                         |  |
|                         | "SET" will turn orange when a<br>unit has been selected.<br>Press "SET" to proceed<br>to calibration |





For each step: Apply torque to your Digital Torque Multiplier until the tablet display reads the target number. **Apply torque** 







#### Note: Clockwise and Counterclockwise screens have same appearance and function.



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### **Calibration Mode**



If you're using a Motor Drive as input for your Digital Torque Multiplier, use the "JOG CW" and "JOG CCW" buttons to apply torque for each step. Note: The circular arrow on whatever button is inactive/not being used turns grey.

### **Clockwise Calibration Mode**

Apply torque in the specified direction until the value on the calibration machine is equal to the specified target torque value highlighted in blue. While values are equal, press the orange "NEXT STEP" arrow button to proceed to the next target. Once all targets are satisfied, press the orange "CONTINUE" button to proceed to the next screen. In the event of an incorrect value input, the teal "REDO STEP" arrow can be pressed to return to the previous step for re-entry.

|   |       | REDO STEP |        |
|---|-------|-----------|--------|
| 1 | 2,500 |           | ft·lbs |
| 2 | 0     |           | ft·lbs |
| 3 | 500   |           | ft·lbs |
| 4 | 1,000 |           | ft·lbs |
| 5 | 1,500 |           | ft·lbs |
| 6 | 2,000 |           | ft·lbs |
| 7 | 2,500 |           | ft·lbs |
|   |       | NEXT STEP |        |







## With a Motor Drive



#### **Clockwise Calibration Mode**

Apply torque in the specified direction until the value on the calibration machine is equal to the specified target torgue value highlighted in blue. While values are equal, press the orange "NEXT STEP" arrow button to proceed to the next target. Once all targets are satisfied, press the orange "CONTINUE" button to proceed to the next screen. In the event of an incorrect value input, the teal "REDO STEP" arrow can be pressed to return to the previous tep for re-entr

|         | REDO STEP |        |
|---------|-----------|--------|
| 1 2,500 |           | ft·lbs |
| 2 0     |           | ft·lbs |
| 3 500   |           | ft·lbs |
| 4 1,000 |           | ft·lbs |
| 5 1,500 |           | ft·lbs |
| 6 2,000 |           | ft·lbs |
| 7 2,500 |           | ft·lbs |
| -       | NEXT STEP |        |



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### **Finish Calibration**

# **Digital Torque Multiplier** with proue sight

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