

AUDITOR

User Manual

One Too Moment Alpha Torque Wrench



Production – Quality



USER MANUAL SOFTWARE VERSION 1.6.1 AND NEWER



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1 General Presentation

1.1 Function

The Moment Alpha Wrench is a unique platform with a single “brain” wrench handle designed to be used with a variety of accessories. By using the correct accessory, the system is able to tighten a fastener in a controlled process, delivering torque at the application from 0.1 to 1,000 NM.

1.2 Kits

Moment Alpha Systems can be configured in different “kits” depending on the needs of the user:

The Bench-Mount Kit includes:

- 1 Bench-Mount Controller with:
 - 1 Serial port RS232 to connect a printer or a barcode reader
 - 1 USB slave to connect a computer
 - 1 Ethernet port RJ45 to connect to network
 - 1 Wifi 2 GHz to connect to network
 - 1 Bluetooth connection for the wrench
 - 1 Power supply 110/220V
- 1 Torque/Angle Wrench Handle (Brain), 0.5 to 5 Nm on Screwdriver mode & 4 to 40 Nm on Flexion mode
- 1 Battery + Charger
- 1 Adapter Flexion mode exit 1/2"

The Portable includes:

- 1 Portable Controller with:
 - 1 USB slave to connect a computer
 - 1 Wifi 2.4 or 5 GHz to connect to network
 - 1 Bluetooth connection for the wrench
 - 1 Power supply 110/220V
- 1 Torque/Angle Wrench Handle (Brain), 0.5 – 5 Nm on Screwdriver mode and 4 – 40 Nm on Flexion mode
- 1 Battery + Charger
- 1 Adapter Flexion mode exit 1/2"

In addition to the hardware kits described, these systems have a variety of preinstalled Software options depending on needs of the user. Production (assembling product) or Quality (auditing preassembled product) are loaded onto the controller hardware prior to delivery

1.3 Features

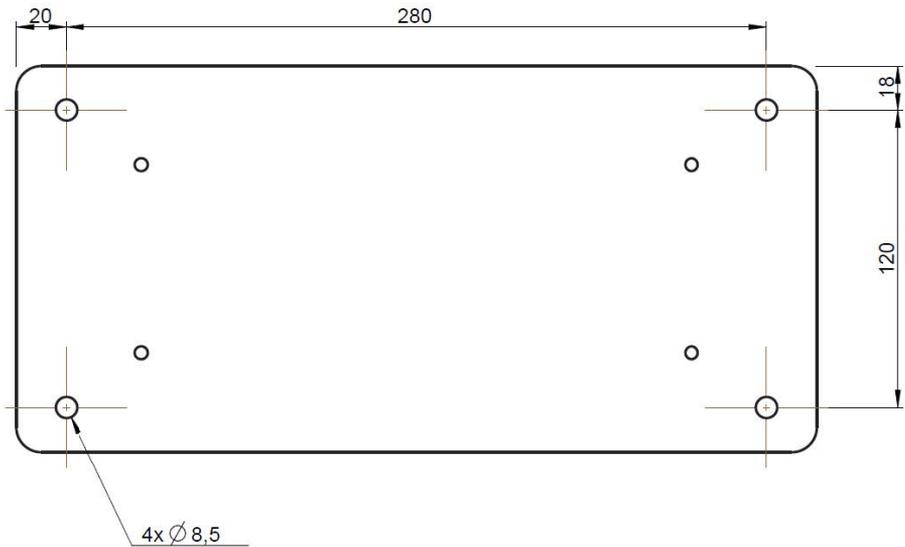
1.3.1 Mechanical

Bench-Mount Controller



Dimensions: 180 x 320 x 83 mm (7.1 x 12.6 x 3.3 in)
Weight: 3.2 kg (7.1 lb)

Size to center to install controller



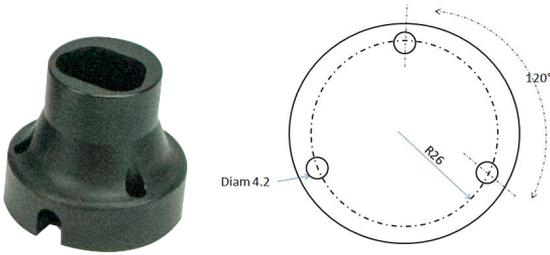
The controller needs to be connected to an Earth Ground.

Portable Controller



Dimensions : 221 x 138 x 32 mm (8.7 x 5.4 x 1.3 in)
Weight: 44 g / 0.1 lb

Battery Charger



Wrench Handle Dimensions



1.3.2 Electrical

The Power Supply connects to standard input voltage 110-240 VAC / 50-60Hz. Use ONLY the supplied Power Supply for the system Controller and Battery Charger. Battery pack is Li-Ion 7.4V providing 5-6 hours of continuous operation.

1.3.3 Measurement

Torque range:

Screwdriver Mode: 0.5 to 5 Nm

Flexion Mode: 4 to 40 Nm

| Model | Description | Dimension | Weight |
|---------|-------------------------------|--------------------|-------------------|
| CPSKS90 | Adapter 60 Nm | 89 mm / 3.5 in | 14 g / 0.03 lb |
| CPSKS93 | Adapter 40 Nm 9 x 12 short | 49 mm / 1.9 in | 10 g / 0.02 lb |
| CPSKS86 | Extension 100 Nm | 145 mm / 5.7 in | 28 g / 0.06 lb |
| CPSKS81 | Extension 200 Nm | 366 mm / 14.4 in | 50 g / 0.1 lb |
| CPSKS85 | Extension 300 Nm | 688 mm / 15.3 in | 1,200 g / 2.6 lb |
| CPSKS87 | Extension 400 Nm | 769 mm / 30.3 in | 1,400 g / 3.1 lb |
| CPSKS82 | Extension 600 Nm | 1,085 mm / 42.7 in | 2,300 g / 5.1 lb |
| CPSKS98 | Extension 1,000 Nm | 1,711 mm / 67.4 in | 6,500 g / 14.3 lb |

Extensions are useable within 20% to 100% of the maximum torque value (i.e. 1,000 Nm extension is usable from 200 – 1000 Nm)

Static torque accuracy: $\pm 1\%$ of the read value (ISO 6789)

Angle accuracy: $\pm 1^\circ$

Resolution: 0.01 Nm

1.3.4 CE Certification



We certify and communicate that the product described in this manual is in conformity with the CE directive for the following:

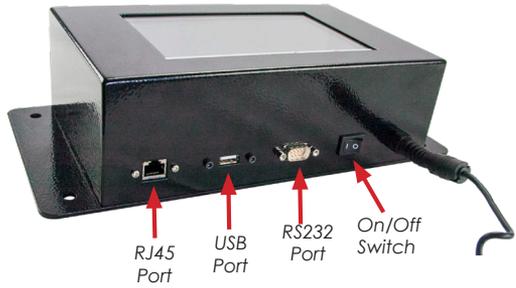
- DIRECTIVE 2014/30/UE of 26 February 2014 concerning the directive CEM
- DIRECTIVE 2014/53/UE of 16 April 2014 concerning the directive RED
- DIRECTIVE 2014/35/UE of 26 February 2014 concerning the Directive low Tension
- DIRECTIVE 2011/65/UE of 8 June 2011 concerning the Directive ROHS
- DIRECTIVE 2012/19/UE of 4 July 2012 concerning the Directive DEEE

1.3.5 Technical Features

- Vibration level: <0.1 m/s
- Noise level: < 75 Db (You can adjust the sound level directly on the controller)
- Bluetooth features: Sensibility input -93 dBm
Max power output: +10 dBm*
Frequency: 2.4 Ghz
- Plastic handle: Polyamide and Isothane 1075A
Clean the Handle with a neutral product like Polywater Rubber Goods Cleaner

1.4 Description

Bench-Mount Controller



Ethernet RJ45 cables should employ a Ferrite if the cable length exceeds 10 meters to eliminate any external electrical interference within the local environment.

Portable Controller



1.5 Software Versions

The Moment Alpha has 4 software versions

| | Production | | Quality | |
|--|------------|---------|---------|---------|
| | Start | Premium | Start | Premium |
| Tightening and Quality Strategy | | | | |
| Re-Tight Mode | | | X | X |
| Angle Control/Peak Torque | | | X | X |
| Residual Torque | | | X | X |
| Torque Control/Angle Monitoring | X | X | X | X |
| Angle Control/Torque Monitoring | X | X | X | X |
| Prevailing Torque | | X | | X |
| Setting Box/Connection | | | | |
| USB: Backup, Restore, Download | X | X | X | X |
| Serial Port (Bar Code/Printer) | X | X | | |
| WiFi | | X | X | X |
| Ethernet RJ45 | | X | | |
| OneToo Protocol | | X | | X |
| Setting Sequence | | | | |
| Sequence number | 10 | 1,000 | 10 | 1,000 |
| Sequence name | X | X | X | X |
| Auto sequence | X | X | X | X |
| Auto reset | X | X | | X |
| Jump | | X | | X |
| Retry | | X | | X |
| Setting Program | | | | |
| Program number | 10 | 99 | 10 | 99 |
| Bare code | | X | | X |
| Tightening direction | | X | | X |
| Batch count | 999 | 999 | 999 | 999 |
| Data viewer | | | | |
| Result Ok/NOK | X | X | X | X |
| Data | X | X | X | X |
| Trace | X | X | X | X |
| Export Data | | | | |
| USB | X | X | X | X |
| Operating System | | | | |
| Trace Memory | 3 | 1,000 | 3 | 1,000 |
| Data Memory | 1,000 | 50,000 | 1,000 | 50,000 |
| Accessories Management | | | | |
| Up to 15 Accessories | X | X | X | X |
| Extension | X | X | X | X |
| Electro-Mechanical Cutout | X | X | X | X |

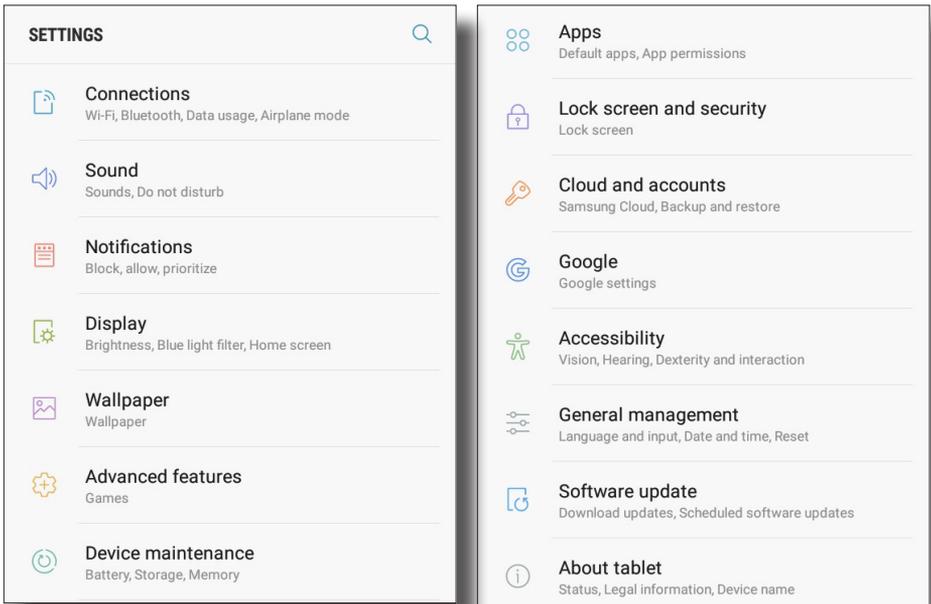
2 Startup Procedure

2.1 General Setup

Moment Alpha software runs on an Android system. To access setup, swipe down from the top of the screen, and select the Settings icon

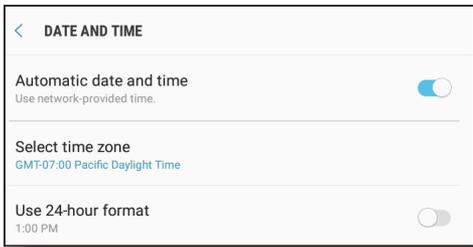
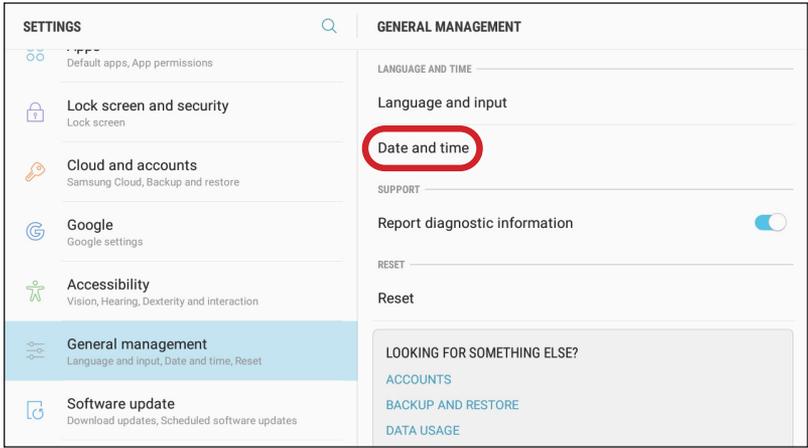


This will open up the **Settings** menu with the following options:



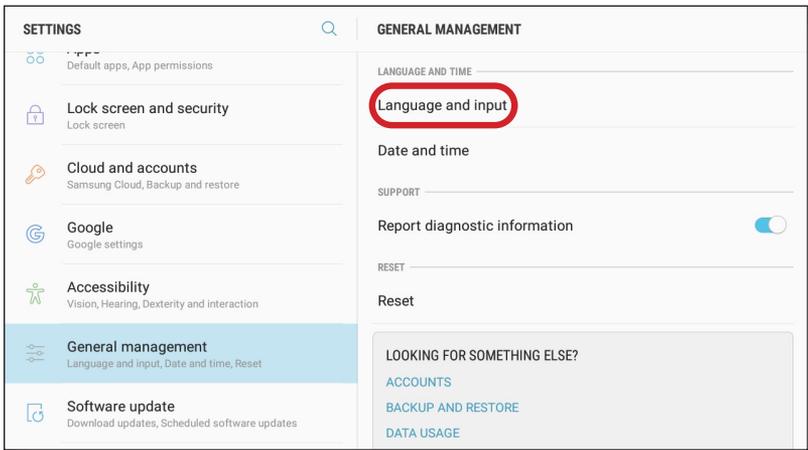
2.1.1 Adjust Time

Click on General Management, then click on **Date and Time** and adjust the value:

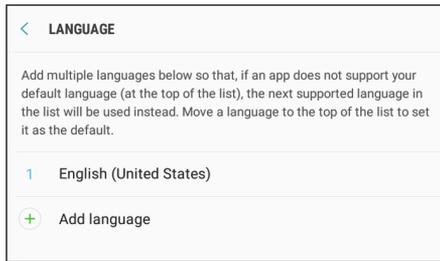


2.1.2 Change Language

Click on **Language and Input** to modify:

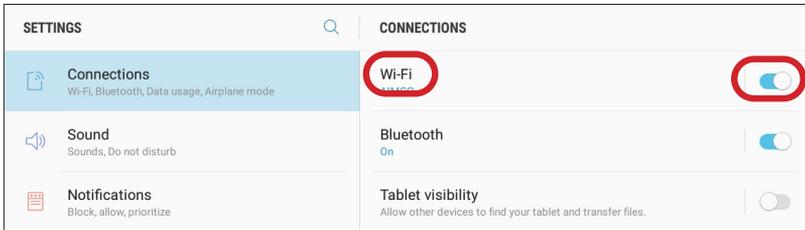


Click on **Language** to select the language that you need. If the Moment Alpha software does not have your language, the default language will be English.

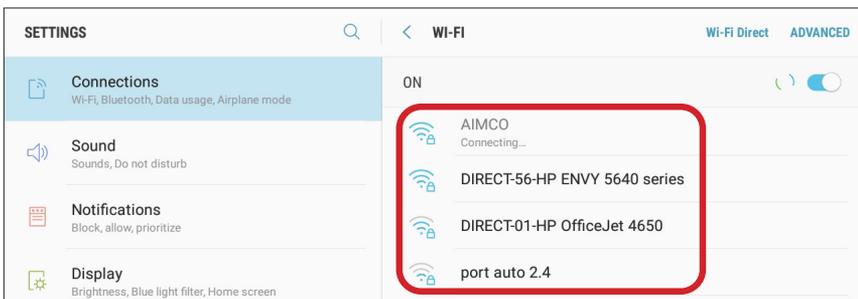


2.1.3 WiFi Management

Click on **Connections**. Make sure that the Wifi switch is toggled to “On”, then select **WiFi**.



Select the appropriate WiFi network from the list of available networks to start the communication.

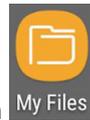
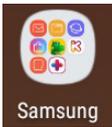
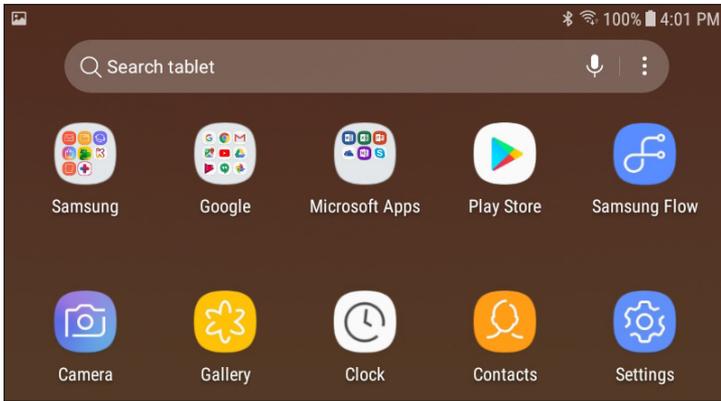


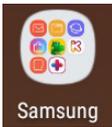
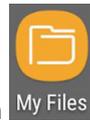
Click on the arrow “back” or “Home” to come back to the main menu.



2.2 Application Management

On the main menu, click on  to bring up the app menu.



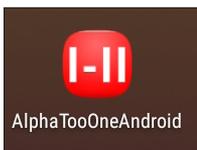
Click on  and then click on . The Internal Storage should show the following folder. All data (results, curves, backup, etc.) is stored here



When you connect your computer to the controller, you have the same folder to download all CSV files.

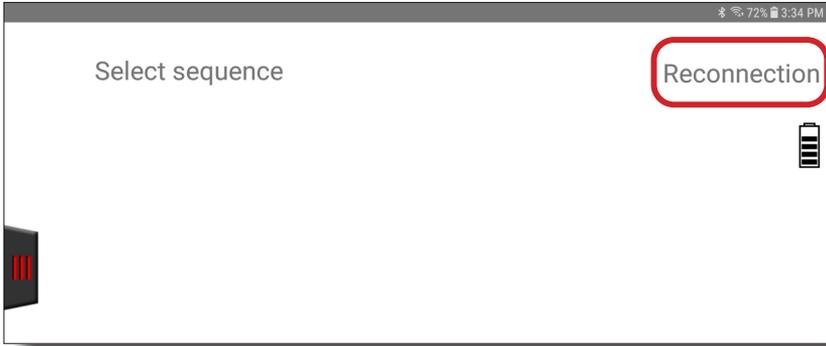
3 Setup Moment Alpha

To begin Moment Alpha setup, click on the Moment Alpha icon on your home screen.



Turn on the wrench by pressing the on/off button.

On the controller screen, click on **Reconnection** if the unit does not connect automatically.

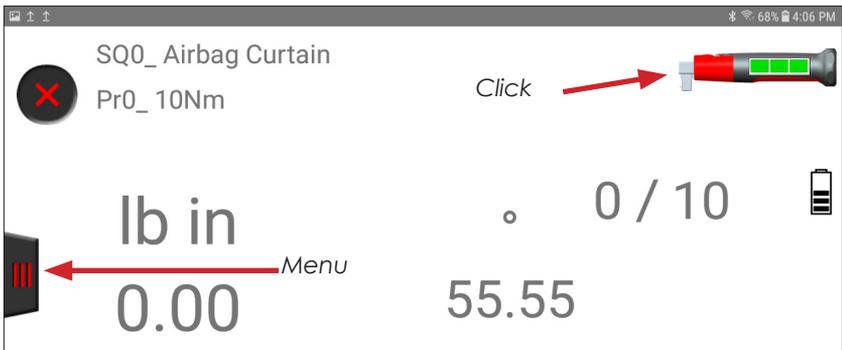


Syncing is complete when **Reconnection** is replaced by the image of a wrench handle on the screen.



3.1 Track Mode

Click on the wrench to activate the Track Mode.



3.2 Setup

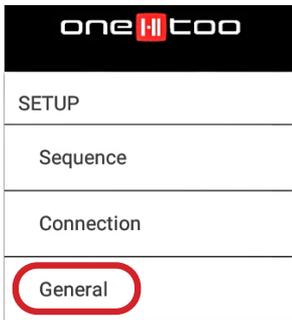
When you open the Menu, Touch the pencil icon, which takes you to the **User name** screen.



Log in using default user name and password.

| User name | |
|-----------|-----------------------------------|
| User name | ← Default User Name: admin |
| Password | ← Default Password: admin |
| CANCEL OK | |

On the main menu, click on General.



You can modify something ONLY if you are on Admin mode.

3.2.1 Controller Setup

This windows give you access to:

- Controller name
- Change language: see 2.2.2
- Date & Time: see 2.2.1
- Torque tolerance by default

- Angle tolerance by default
- Time to see the report (Green or Red)
- Orange Led : Use to activate the vibration of the wrench when the user arrive at x% of the target

General Setup

CONTROLLER
USER
STONE
DETAILS

CHANGE LANGUAGE

Name

Date Sep 7, 2018

Time 9:45 AM

Brightness

Unit lb in ▼

Default torque tolerance (%)

Default angle tolerance (%)

Report display time (s)

Orange led torque threshold (50-99%)

Previbration threshold (0-10%)

ACCESSORIES SET

ACCESSORIES LIST

3.2.2 Torque Wrench Adjustment

You may need to adjust the torque calibration of the wrench with an external transducer.

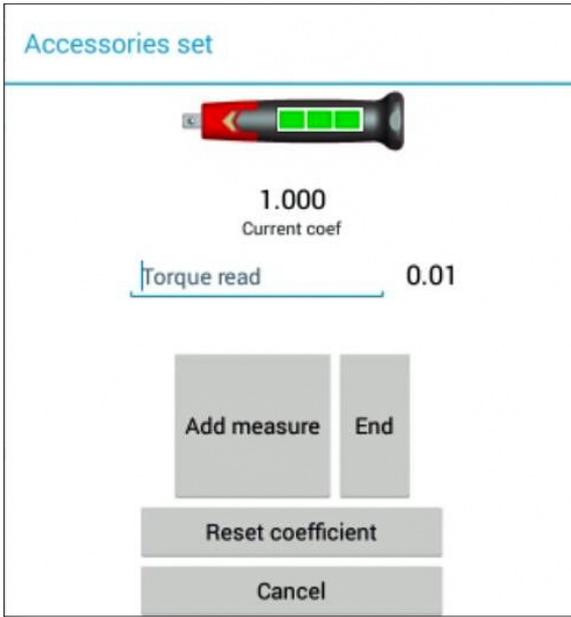
To do that, click on

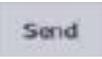
ACCESSORIES SET

Select the right accessory



The following window appears:



Apply a torque with the wrench on an external torque transducer and write the real torque in the field "Torque Read." Click on 

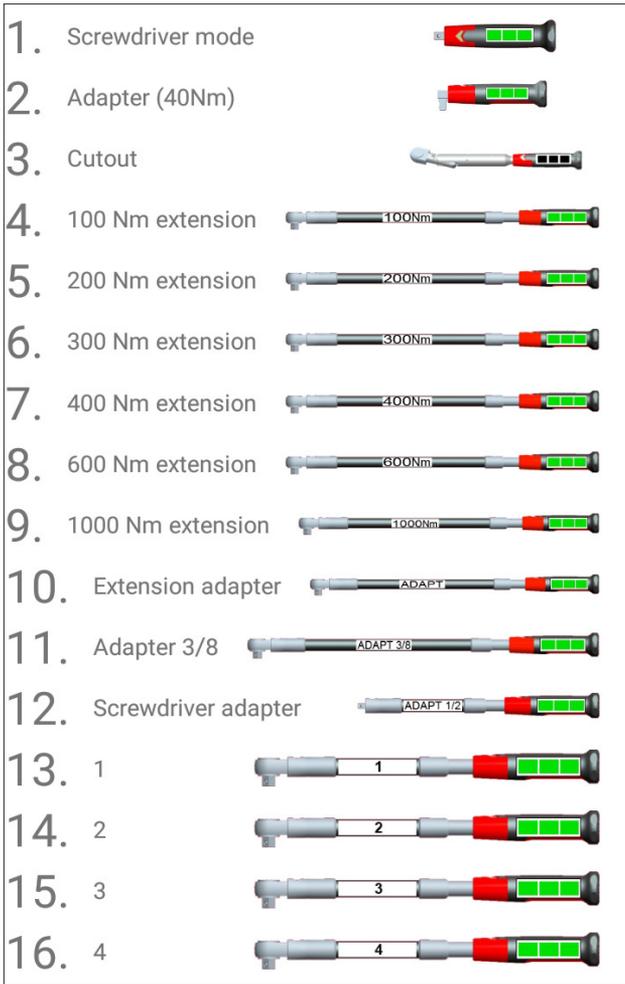
The coefficient of the wrench will be automatically adjusted in function of the external torque.

To save the new wrench calibration, click on "End." If you don't want save the modification, click on Cancel

If you need to change the feature of the accessories, click on

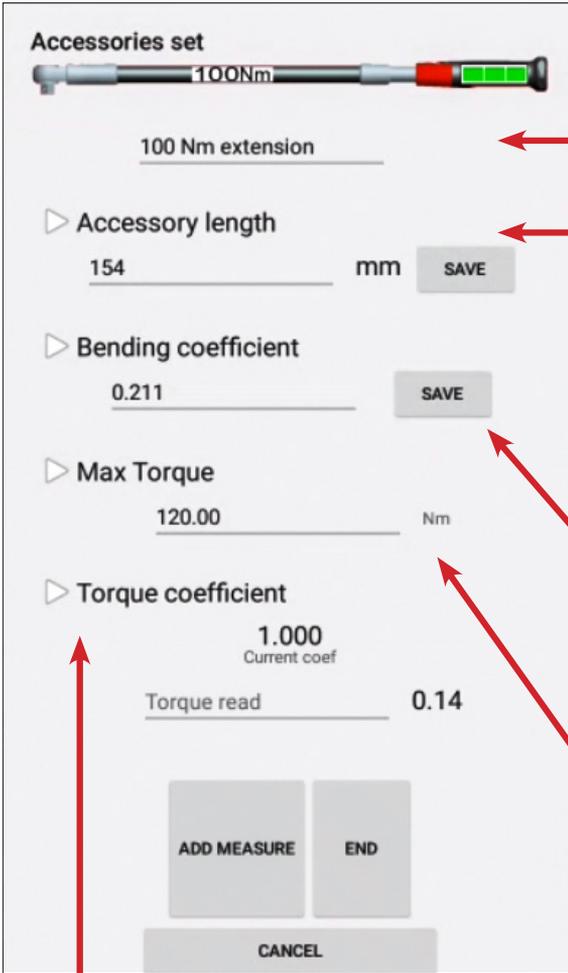


This menu allows you to modify each accessory.



When choosing the accessory, take into account that accurate readings must be greater than 10% of the maximum torque for that accessory.

When you click on an accessory, the following screen appears



You can change the name of the accessory, but not the icon.

The accessory length can be adjusted to its real value. Note: This value must be adjusted prior to use to insure the correct torque coefficient. Once the values are correctly entered, click Save

Bending Coefficient is used to adjust the real Angle value within the accessory connected.

Max Torque defines the maximum torque that can be applied with this accessory. From the max torque setting, the system will automatically define the minimum usable torque of this accessory, which is 10% of the maximum torque defined in this setting.

Torque coefficient is used to calculate the torque reading in function of the length of this accessory.

When you use a click extension type CPSPH00, you need to select "Breakout" on the accessory setup:



This function is needed for the breakout (click type) extension and requires use of "Torque control & Angle monitoring" strategy.

Save the modification by clicking on "End"



Introduction to Accessory Length

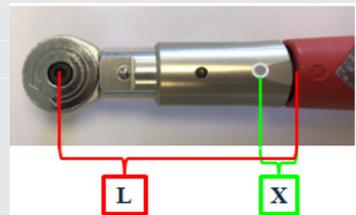
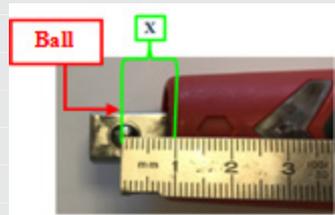
The torque is measured with the accessory length. **If you change the accessory, it is mandatory to change the length in the settings of your key.** Without that, your results will be Not Ok.

Explanation

- The point 0 for the torque calculation is in the ball axis. This axis is at **X** mm from the border of the plastic part. (You have to measure, to 8 from 10 mm).
- The length **L** is the length of the red extremity to the ball.
- The final calculation for the accessory length will be

$$L - X - 10 = \text{Length accessory}$$

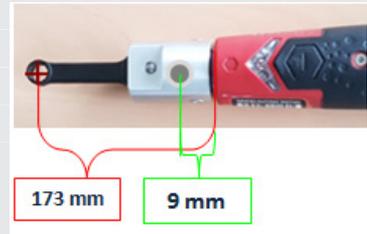
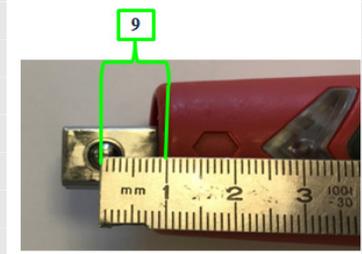
- One-Too extensions are calibrated with FACOM ratchets:
 - FACOM S.372V P
 - FACOM S.382V R



Notes:

- If you use a different ratchet, the length reference will change (up to 10 mm difference). If you don't modify your accessory length, your result will be Not Ok.
- If you modify your accessory, **it is imperative that you redo the calculation** in order to obtain the correct accessory length.

Example: $173 - 9 - 10 = 154$ mm
(new accessory length)



This new accessory length will need to be configured. For that, go to "Accessories list," select the accessory that needs to be adjusted, and change the new value in "Accessory length." Click "SAVE" to store the value on the wrench.



Bending Coefficient

The bending coefficient is calculated as a function of the applied torque. This compensates for angle variation within the mechanical components of the accessory.

Real angle = Actual Angle – (actual torque x bending coefficient)

Example: $75^\circ - (25 \text{ Nm} \times 0.05) = \text{Real Angle}$
 $75^\circ - 1.25^\circ = 73.75^\circ$

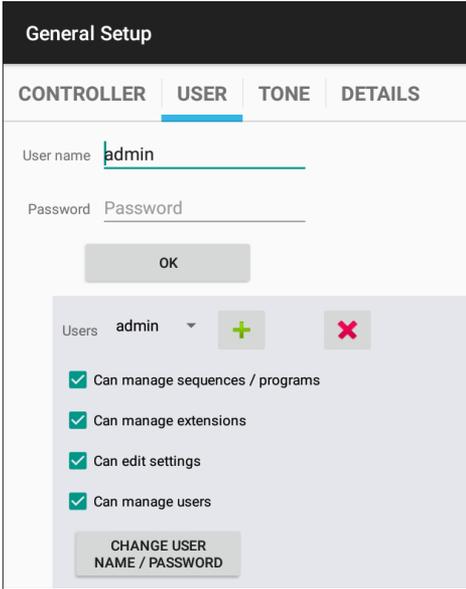
At 25 Nm, we have lost 1.25° on the extension flexion.

After the validation of the modification, the wrench will stop.

Before using the wrench with the accessory modification, ensure that the torque is always Ok with an external torque transducer. These new coefficients are saved on the wrench at the end of the modification.

3.2.3 User Management

In this window, you can modify, add a new user, and allow access.

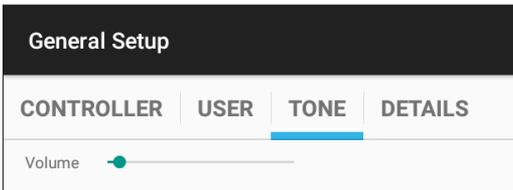


To require operator sign-in prior to use of the wrench, activate the Tightening Permission function. To have the permission time out after X hours of use, enter that amount of time in the Control Frequency. The operator will be required to sign back in to the wrench once that time has elapsed.



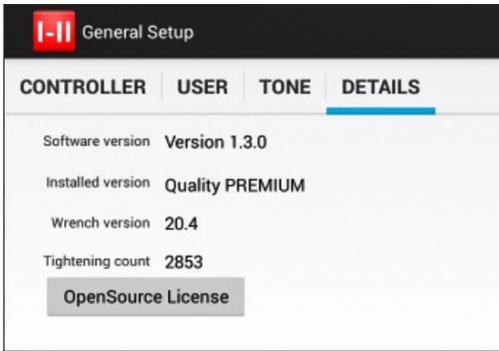
3.2.4 Sound Level

Scroll the bar to increase or decrease the sound level.



3.2.5 Controller Information

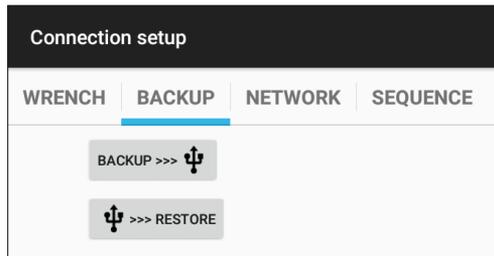
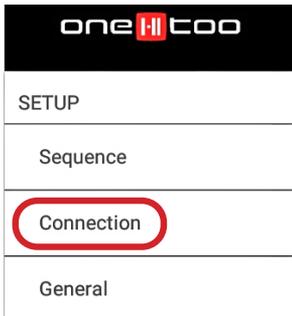
On the Details tab, you can see information about the software and wrench version.



In the future, if you need to change to upgrade the software version (Start to Premium), click 5 times on the "Installed version" and enter the new key.

3.3 Import/Export data

Click on the main menu and select **Connection**. The Connection setup screen opens



3.3.1 Backup

Select what you want to backup. Note: If you select Results and Curves, the backup can take a long time.

What do you want to backup?

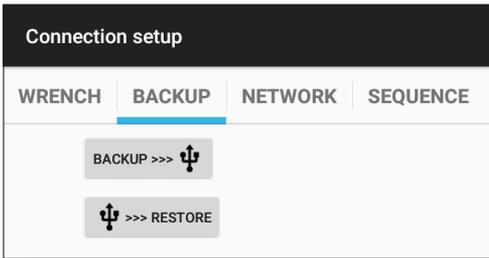
- Settings
- Results
- Curves

CANCEL OK

Once backup is complete, you will see the message "Backup done." Backups are store on the folder "OneToo_Backups."

3.3.2 Restore

The restore function re-installs the last software backup on the controller.



If you use this backup feature on another controller, it will also replace the wrench ID number. Note this ID number before restoring a configuration.

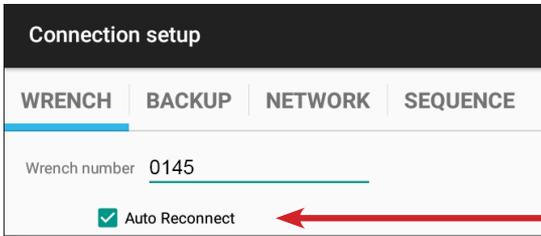
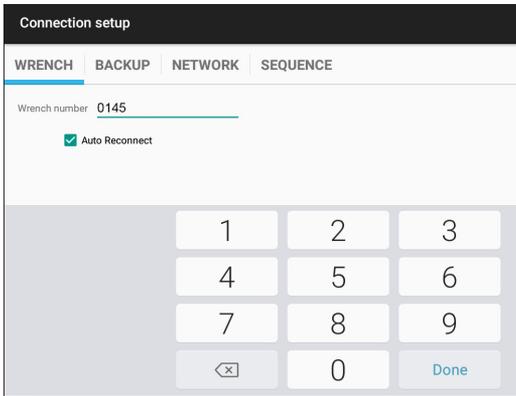


Once complete, you will see the message "Restore Done."

3.3.3 Set up Wrench ID

This setup has already been completed when you received a kit, so you should not need to change anything.

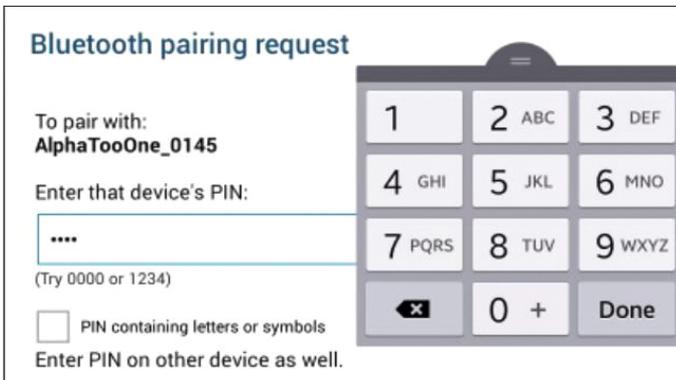
If you need to connect another wrench, you need to change the wrench ID. The wrench ID is written on the battery compartment. For this example, we'll use Wrench number 0145.



Auto Reconnect: When selected, the wrench will automatically re-connect to the controller when the operator changes the battery.

Go back to the tightening window and click on Reconnection

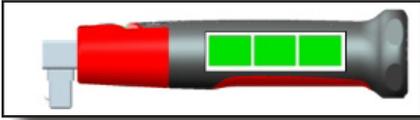
You will see the message: C Search wrench...



The code PIN of the wrench is the ID wrench, but Inverse

ID wrench = 0145 PIN = 4501

Click on OK. Once connected, you will see this image

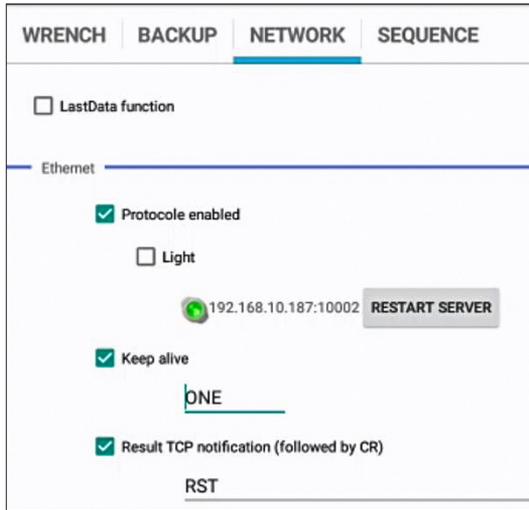


Note: You can't start a new connection while an extension is attached to the wrench. Remove the extension before attempting a connection.

3.3.4 Network

You can use the Network tab to set up:

- **LastData Function:** The last 10 tightening results are stored in CSV files in the folder "OneToo_Lastdata"
This function is used when you want connect the controller to a computer and download live the results of each tightening via the USB port
- **Ethernet:** If you enable this function, you have access through TCP/Client.
The OneToo protocol is used for:
 - Controller input
 - Create a new sequence
 - Delete a sequence
 - Select a sequence number
 - Select a sequence with barcode
 - Stop a sequence, jump a program, etc
 - Reconnect the wrench
 - Controller Output
 - Status: actual torque, angle value, etc
 - Results: torque & angle value (min/max/apply), batch count, etc



- **Light:** Reduces the number of characters sent to the server. Refer to the protocol manual.
- **Keep alive:** Maintains the connection between the controller and the server if needed. When activated, an ASCII message is sent every 7 seconds (default). In the example above, an ASCII message will be sent every "One" second. If the Txt is removed, only a <Carriage return> is sent.

3.3.5 Serial Port Management

RS232: When using a bench-mount controller, you can set up the serial port to

- Send the results after each tightening on a printer or PLC
- Connect a barcode reader to select a sequence

The standard Setup for serial port is:

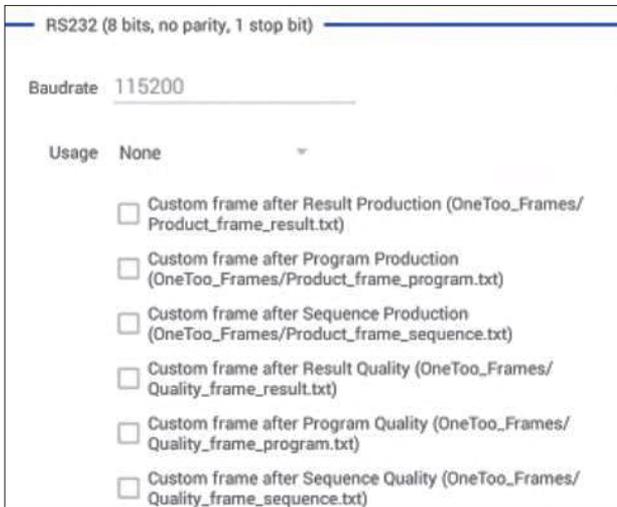
Speed: Baud rate / Data size : 8 / Parity: None / Stop Bit: 1

Software versions 1.3.4 and newer allow you to set up a special frame on a txt file and automatically send an ASCII frame after:

- Each tightening
- Each program
- Each sequence

To set up this function, first create a folder named OneToo_Frames. Inside this folder, you can create up to 6 special frames:

- Tightening sequence
 - Product_frame_result.txt — Frame sent after each tightening
 - Product_frame_program.txt — Frame sent after each program
 - Product_frame_sequence.txt — Frame sent after each sequence
- Quality sequence
 - Quality_frame_result.txt — Frame sent after each tightening
 - Quality_frame_program.txt — Frame sent after each program
 - Quality_frame_sequence.txt — Frame sent after each sequence



3.3.6 I/O 24V Management

A Module Input/output 24V is optional

- **Input:** 8 assignable pins.
By default, all pins are assignable in this way

| | | | | |
|----|-----------------------|---|----|---|
| 0- | Sequence number (b:0) | ▼ | NO | ▼ |
| 1- | Sequence number (b:1) | ▼ | NO | ▼ |
| 2- | Sequence number (b:2) | ▼ | NO | ▼ |
| 3- | Sequence number (b:3) | ▼ | NO | ▼ |
| 4- | Sequence number (b:4) | ▼ | NO | ▼ |
| 5- | Stop sequence | ▼ | NO | ▼ |
| 6- | Reconnect | ▼ | NO | ▼ |
| 7- | Extern validation | ▼ | NO | ▼ |

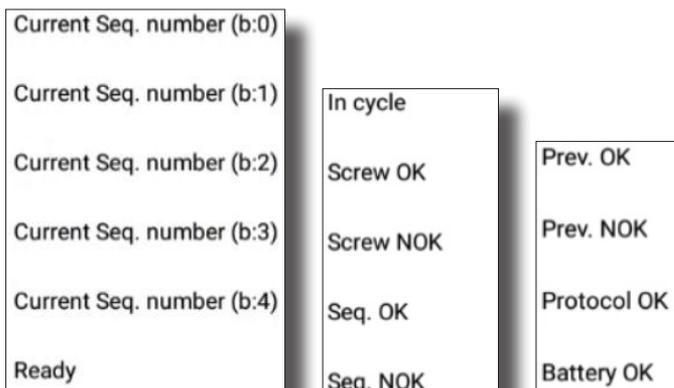
Reconnect: When this input is activated, the controller restarts the connection with the wrench.

Extern Validation: Use this input when you need to have a pop-up that needs validation.

- **Output:** 8 Assignable Pins
By default, all pins are assignable in this way

| | | | | | | |
|-----|------------|--------|---|-------|-----------|---------------------------|
| 8- | Ready | ▼ NO ▼ | 0 | _____ | s (Pulse) | No Validation via input ▼ |
| 9- | In cycle | ▼ NO ▼ | 0 | _____ | s (Pulse) | No Validation via input ▼ |
| 10- | Screw OK | ▼ NO ▼ | 2 | _____ | s (Pulse) | No Validation via input ▼ |
| 11- | Screw NOK | ▼ NO ▼ | 2 | _____ | s (Pulse) | No Validation via input ▼ |
| 12- | Seq. OK | ▼ NO ▼ | 2 | _____ | s (Pulse) | No Validation via input ▼ |
| 13- | Seq. NOK | ▼ NO ▼ | 2 | _____ | s (Pulse) | No Validation via input ▼ |
| 14- | Battery OK | ▼ NO ▼ | 0 | _____ | s (Pulse) | No Validation via input ▼ |
| 15- | Prev. OK | ▼ NO ▼ | 2 | _____ | s (Pulse) | No Validation via input ▼ |

List of Output functions:

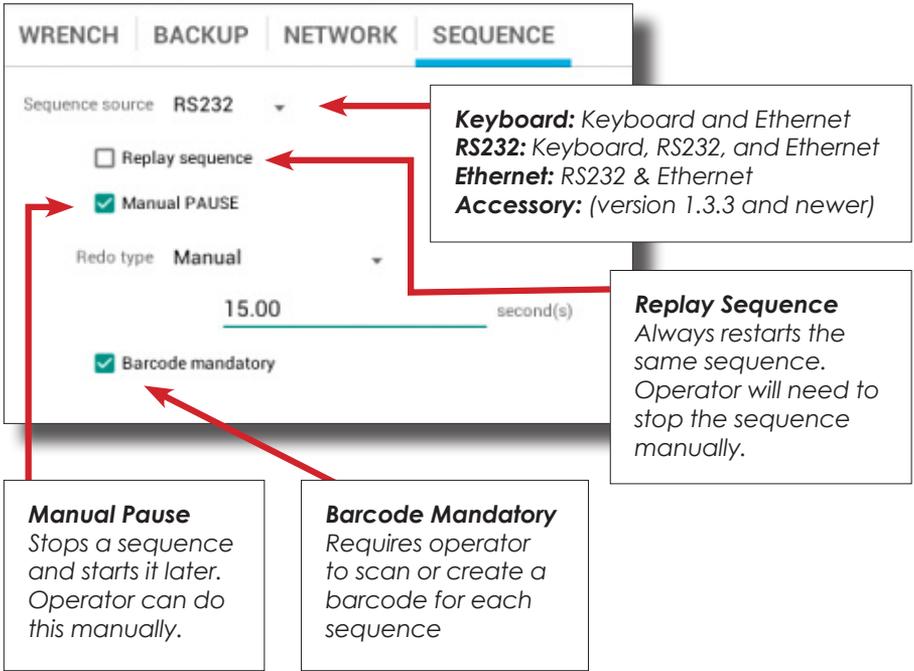


Ready: The controller and the wrench are ready to start a sequence.

In cycle: A sequence is started.

3.3.7 Sequence

Click on the **Sequence** tab to set the sequence source



The screenshot shows the 'SEQUENCE' tab with the following settings:

- Sequence source: RS232
- Replay sequence
- Manual PAUSE
- Redo type: Manual
- 15.00 second(s)
- Barcode mandatory

Keyboard: Keyboard and Ethernet
RS232: Keyboard, RS232, and Ethernet
Ethernet: RS232 & Ethernet
Accessory: (version 1.3.3 and newer)

Replay Sequence
Always restarts the same sequence. Operator will need to stop the sequence manually.

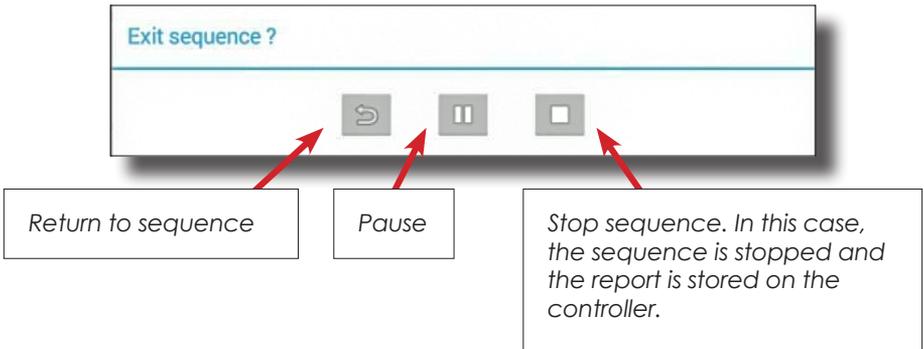
Manual Pause
Stops a sequence and starts it later. Operator can do this manually.

Barcode Mandatory
Requires operator to scan or create a barcode for each sequence

3.3.8 Sequence Pause « II » (version 1.3.7)

When you activate the function « Manual Pause », the operator is allowed to stop a sequence and restart it in the future.

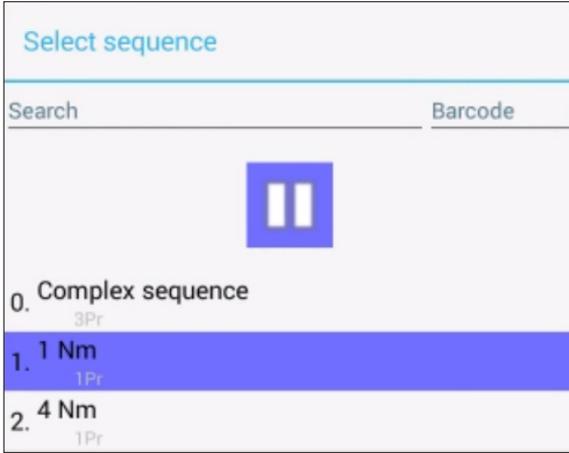
To activate Pause, click on the red "x" icon during a sequence and select "Pause."



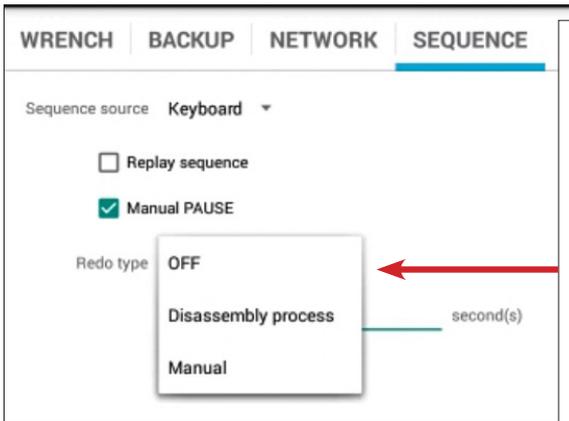
The dialog box titled "Exit sequence?" contains three icons:

- Return to sequence
- Pause
- Stop sequence. In this case, the sequence is stopped and the report is stored on the controller.

When starting another sequence, you will see paused sequence will be highlighted in blue. Simply click on it to finalize the sequence.



3.3.9 Function Redo and Loosening Detection (Version 1.3.7)



Disassembly process

When you disassemble a screw that's already been tightened, the system uncounts the screw. You need to set up the tightening direction (right or left).

Manual

The operator is allowed to retry a tightening event if the result was Ok. The system uncounts the disassembly. You need to set up the tightening direction (absolute).

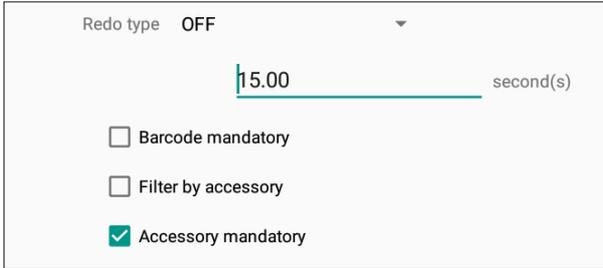
Disassembly Process

When you activate this option, the controller checks to see if the operator disassembled a screw and uncounted if this is the case. You need to setup the tightening direction (right or left) and select a tightening strategy (T/A or A/T). The function Replay Sequence allows an operator to retry the sequence after disassembly.

Manual Redo

When this option is activated, the operator is allowed to retry a good tightening. Just press the button (-1) for 2 seconds and disassemble the screw. The function Retry needs to be activated and the tightening direction set to Absolute.

3.3.10 Filter by Accessory



Redo type OFF

15.00 second(s)

- Barcode mandatory
- Filter by accessory
- Accessory mandatory

Filter by Accessory reduces the sequences shown on the menu "Select sequence" at the sequence link to the connected accessory. When an accessory is not connected, you will see the Screwdriver and 40 Nm sequence. When you attach the 200 Nm accessory, for example, you will see only the sequence where the extension 200 Nm is set up.

3.3.11 Barcode mandatory (Version 1.5.0)

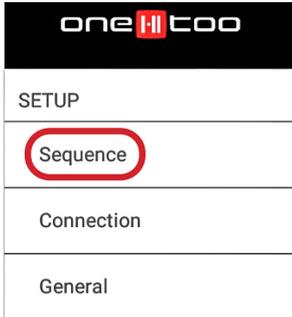
Use this function to ensure that the sequence starts ONLY if the operator types or scans the correct barcode information linked to the sequence. Activate this function when you have to set up 2 barcodes and when you want to start the sequence linked only to these 2 barcodes.

3.3.12 Accessory Mandatory (Version 1.5.3)

Use this function to start a sequence ONLY if the operator connects the right accessory to the wrench

3.4 Add/Modify a Sequence/Program

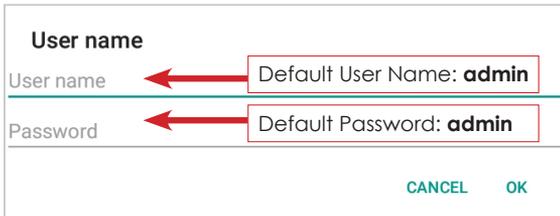
On the main menu, select Sequence.



This opens the **Sequence Setup** screen. Login is required to develop a sequence. Touch the pencil icon, which takes you to the **User name** screen.



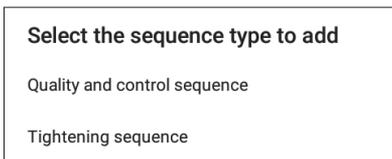
Log in. Default user name and password are shown below.



3.4.1 Add a Sequence

Click on **S+**.

Define which type of sequence you want to add: Quality and Control Sequence or Tightening Sequence.



You can change the sequence number, add a name for the sequence, and add a barcode number to select the sequence with the keypad, Serial port, or Ethernet connection (maximum 32 characters).

- ✔ **Automatic sequence** If you set up more than 1 program on the sequence, the system will move automatically from the actual program to the next one.

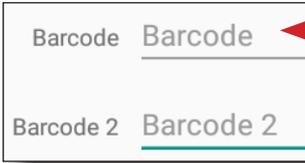
- ✔ **Jump activate** If you don't find the way to finalize a program, the system will jump to the next program.

- ✔ **Times management** When this function is activated, total sequence times are limited. If you don't finish the sequence in time, the sequence stops and the final report is Nok

- ✔ **Retry activate** When this function is activated, on a bad result, the operator is able to retry the tightening. The software counts ONLY the good results.

Barcode 1 and 2 (V1.5.0)

The sequence will start if the first barcode matches. This will only work if "Barcode mandatory" is deselected on the Menu Connection/ Sequence screen.



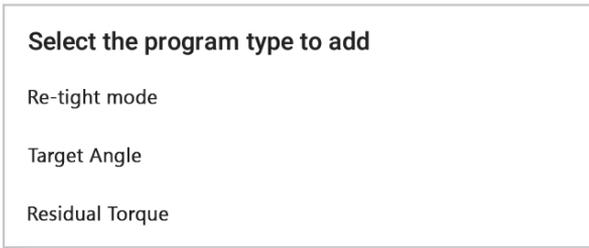
Example of barcode:
Customer serial part = AGTF 12345
The yellow number changes on each part. To be able to launch the correct sequence, you need to set up AGTF*****
The stars are used to replace the variable value.
Note: The barcode from 0 – 1000 is used to directly select a sequence.

3.4.2 Add a Program

Click on **P₊** to create a program.

Each strategy has 3 program options. You need to add at least 1 program per sequence, up to 99 (depending on the software version).

Quality mode



Re-Tight: Unscrew the screw from X° and retighten the screw back to the original position. The system records the disassembly torque and the torque when the screw returns to the same position.

Target Angle: The system records the torque when you reach the target angle.

Residual Mode: The system will analyze when the screw starts to move (Breakout torque) and calculate the torque on the assembly before it moved.

For all of the Quality sequences, you need to set up the estimated torque. The other parameters are set up by default.

Select the correct accessory to determine the final torque estimation.

Tightening Sequence

Select the program type to add

Torque control & Angle monitoring

Torque control

Angle control & Torque monitoring

Torque Control & Angle monitoring: Stops the tightening when target torque is reached. The system reports "Ok" if the final torque is between the Min/Max Torque and if the final Angle is between the Min/Max Angle. This strategy is used to ensure that you don't retighten a screw, and to ensure that the assembly joint meets requirements.

Torque control: Stops the tightening when target torque is reached. The system reports "Ok" if the final torque is between the Min and Max Torque.

Angle Control & Torque monitoring: Stops the tightening when target angle is reached. The system reports "Ok" if the final angle is between the Min/Max Angle and if the Final Torque is between the Min/Max Torque.

For user convenience, the system will populate with default settings once you enter the target value. You may change any of these default settings.

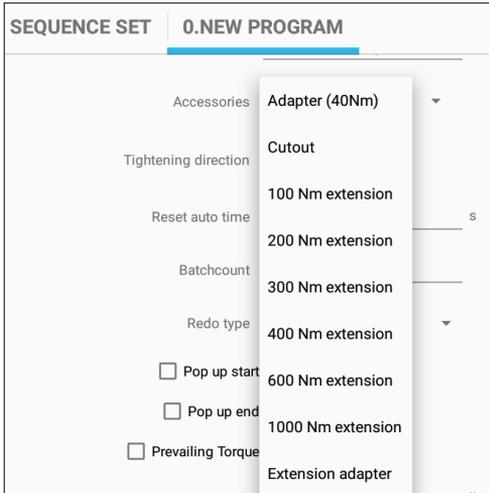
Sequence setup

| 0 Airbag Curtain | SEQUENCE SET | 0.10NM | 1.NEW PROGRAM |
|------------------------|--|--------------------------------|---------------|
| 1 Tom b1 | Torque control & Angle monitoring | | |
| | Target torque | <u>Target torque</u> | lb in |
| | Min Torque | <u>Min Torque</u> | lb in |
| | Max torque | <u>Max torque</u> | lb in |
| | Threshold torque angle | <u>Threshold torque angle</u> | lb in |
| | Min Angle | <u>Min Angle</u> | ° |
| | Max Angle | <u>999.00</u> | ° |
| | Program Number | <u>1</u> ▼ | |
| | Program name | <u>Program name</u> | |
| | Barcode | <u>Barcode</u> | |
| | Threshold torque wrench | <u>Threshold torque wrench</u> | lb in |
| | Accessories | <u>Adapter (40Nm)</u> ▼ | |
| | Tightening direction | <u>Absolute</u> ▼ | |
| | Reset auto time | <u>3.0</u> | s |
| | Batchcount | <u>1</u> | |
| | Redo type | | |
| | <input type="checkbox"/> Pop up start | | |
| | <input type="checkbox"/> Pop up end | | |
| | <input type="checkbox"/> Prevailing Torque | | |
| | Safety torque | <u>0.00</u> | lb in |

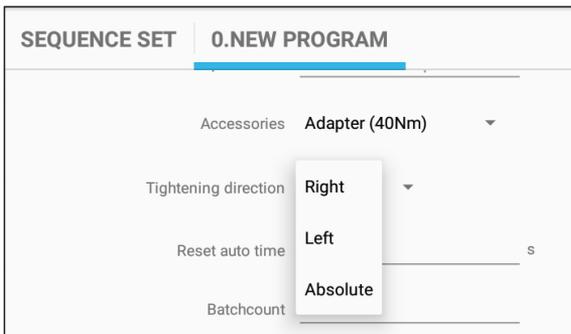
Now you can populate program parameters specific to your application:

- Change the program number
- Add a name for the program

- Set the threshold, which is the torque that needs to be reached before the tightening starts. A report is only generated once this value is reached.
- Select accessories: Be sure to select accessories that are able to reach the target torque (for example, a 60 Nm target requires an accessory of 100 Nm or more). Minimum torque for the accessory is 10% of the max torque.



- Set tightening direction



- Set time (in seconds) to reset the system and store the results.



- Enter number of screws that will be tightened.

Batchcount 1

- Set the Redo Type (see section 3.3.9).

OFF
Disassembly process
Manual

Strategy Add to target torque
Value to use Shift the 0
Nothing

- Set pop-ups. When the time is set to zero, the operator must click the screen to start the program.

Pop up start
 Pop up end

- Set prevailing torque. When using a break nut, you can analyze the average torque of the break and add it to the final torque.

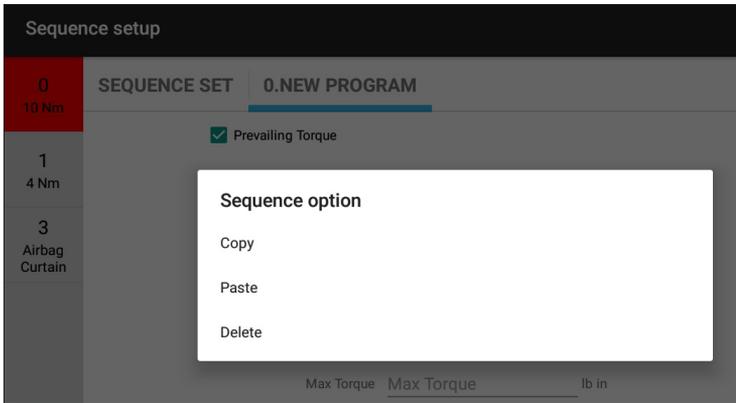
| 0 10 Nm | SEQUENCE SET | 0.NEW PROGRAM |
|------------------------|--|---------------|
| 1 4 Nm | <input checked="" type="checkbox"/> Prevailing Torque | |
| 3 Airbag Curtain | Threshold torque angle <u>Threshold torque angle</u> lb in Start angle <u>Start angle</u> ° Total angle <u>Total angle</u> ° Min Torque <u>Min Torque</u> lb in Max Torque <u>Max Torque</u> lb in Strategy Add to target torque ▾ Value to use Average torque ▾ Accessories Adapter (40Nm) ▾ <input type="checkbox"/> Persistent Safety torque <u>0.00</u> Nm | |

- **Threshold torque angle:** Angle counting starts at this value.
- **Start angle:** When this value is reached, torque is checked up to the total Angle. Threshold torque needs to be set at least at this value.
- **Total Angle:** is used to measure angle from immediate movement of the wrench with no regard to threshold torque.
- **Min/Max Torque:** is used to check if the break nut meets application parameters.
- **Strategy:**
 - o *Add to target torque:* Example: If average torque is 2.1 Nm and target torque is 10 Nm, target torque can be changed to 12.1 Nm.
 - o *Shift the 0:* Example: If average torque is 2.1 Nm and target torque is 10 Nm, tightening can start at -2.1 Nm.
 - o *Nothing:* This function is only used to test if the break nut meets parameters
- **Accessories:** Select an extension to do the prevailing torque (software version 1.5.0 and newer). The sequence will start ONLY if the correct extension is connected.
- **Persistent (version 1.5.0 and newer):** Select to save the prevailing torque value and apply it later in the case of bad tightening (Persistent). To use this function, the operator needs to be allowed to Retry a tightening after a bad result in the sequence parameters.
- **Safety torque:** At this value, show a message that states the screw needs to be changed.

Click on  to add another program.

3.4.3 Copy/Paste or Delete a Sequence/Program

Press your finger for 2 seconds on the Program/sequence window to open this option.



After you've copied a program or sequence, navigate to the window where you want to paste the info, press your finger on the window for 2 seconds, and select "Paste."

4 Tightening/Quality Screen

From the main screen, click on **Select sequence**.



The following menu opens. You can scroll the menu, search a sequence with a name or type a barcode to select a sequence



Stop sequence

Menu button

Battery status

Batch

Tightening Information

Accessories to use: If a bad accessory is connected, this line is highlighted in red as shown.

Bar graph represents progress on the application defined by pre-programmed limits.

SQ0_ Airbag Curtain
Pr0_10Nm

lb in 0.00

0 / 10
55.55

Target torque 10.00 (9.00 - 11.00)
Angle monitoring -12.00 - 999.00
Accessories 100 Nm extension

68% 4:06 PM

5 Results

To access the last results of tightening or curves, open the main menu and click on **Last results** or **Last Curves**:

| |
|--------------|
| SETUP |
| Sequence |
| Connection |
| General |
| RESULTS |
| Last results |
| Last Curves |

5.1 Last Results

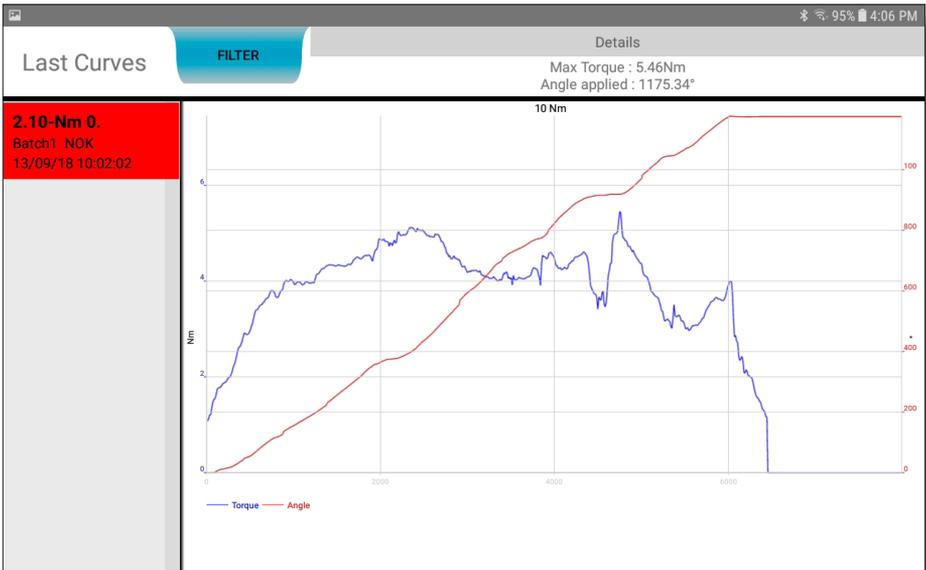
The tightening results are shown as follows:

| Last results | | | | | | | FILTER | Tightening | Quality Control |
|--------------|----------|-----------|-------------|-------|--------|-------|--------|------------|-----------------|
| Date | Time | Sq | Pg | Screw | Torque | Angle | Rp | | |
| 24/08/18 | 10:39:07 | 1. Tom b1 | 4 Pg. | - | - | - | NOK | | |
| 24/08/18 | 10:39:07 | 1. Tom b1 | 0. program0 | 6 | - | - | NOK | | |
| 24/08/18 | 10:38:46 | 1. Tom b1 | 0. program0 | 3 6 | 101.77 | 0.17 | OK | | |
| 24/08/18 | 10:38:32 | 1. Tom b1 | 0. program0 | 2 6 | 101.65 | 0.33 | OK | | |
| 24/08/18 | 10:38:16 | 1. Tom b1 | 0. program0 | 1 6 | 2.86 | 0.00 | NOK | | |
| 24/08/18 | 10:35:55 | 1. Tom b1 | 4 Pg. | - | - | - | NOK | | |
| 24/08/18 | 10:35:55 | 1. Tom b1 | 0. program0 | 6 | - | - | NOK | | |

| Last results | | FILTER | | Quality Control | |
|-----------------------------|--|--------|----------------------|-----------------|--|
| ^0.aimco test | | | | | |
| Re-tight Mode | | | Breakout torque 8.23 | | |
| Date 07/01/19 | | | Torque Angle 0 11.13 | | |
| time 08:50:28 | | | Max Torque 11.34 | | |
| Barcode | | | Angle applied 3.18 | | |
| Sequence N° 0 | | | Wrench number 0631 | | |
| Sequence Name aimco test | | | | | |
| Program N° 0 | | | | | |
| Program Name retite | | | | | |
| Target Angle 3.00 | | | | | |
| Threshold torque angle 2.40 | | | | | |
| Torque apply 10.00 | | | | | |
| Min Torque 8.00 | | | | | |
| Max torque 12.00 | | | | | |
| Screw 5/5 | | | | | |
| Report OK | | | | | |
| Re-tight Mode | | | Breakout torque 8.36 | | |
| Date 07/01/19 | | | Torque Angle 0 10.58 | | |
| time 08:50:15 | | | Max Torque 10.96 | | |
| Barcode | | | Angle applied 3.36 | | |
| | | | Wrench number 0631 | | |

5.2 Last Curves

As many as 1,000 curves can be stored in CSV files. From the Last curves screen, you can zoom, unzoom, and move the trace.



Torque is shown in blue, angle in red. To delete a curve, press your finger on the red curve for 2 seconds and select "Yes."

Erasing the chart

Do you really want to delete this chart?

NO YES

Apply filters to more quickly locate results or curves.

Filter

Results OK

Results NOK

Barcode Barcode

Sequence ID All sequences ▼

Date min

Date max

CANCEL OK

6 Tightening and Quality Strategy

6.1 Tightening Strategy

Torque Control & Angle Monitoring

This tightening strategy is used to:

- Reach a target torque
- Detect all assembly problems (grip, no washer, assembly joint change, etc)
- Detect if you retighten the same screw.

If you want count screws, use this tightening strategy and set up the Min/Max Angle to detect if the operator retightens the same screw.

You will need to set up the following:

Target torque (mandatory)

Once you enter the target torque, the system will set up other parameters by default. You can change them manually.

Threshold torque angle

Angle counting starts at this value.

Min and Max Angle

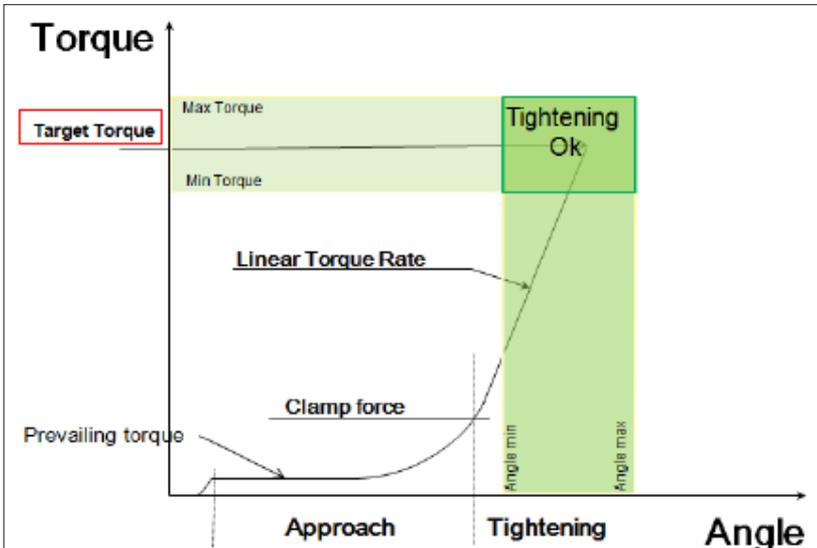
Used to validate that tightenings are done under the right conditions.

| Torque control & Angle monitoring | | |
|-----------------------------------|--------|-------|
| Target torque | 100.00 | lb in |
| Min Torque | 85.00 | lb in |
| Max torque | 110.00 | lb in |
| Threshold torque angle | 15.00 | lb in |
| Min Angle | -5.00 | ° |
| Max Angle | 999.00 | ° |

Select the appropriate accessories

Accessories 100 Nm extension ▾

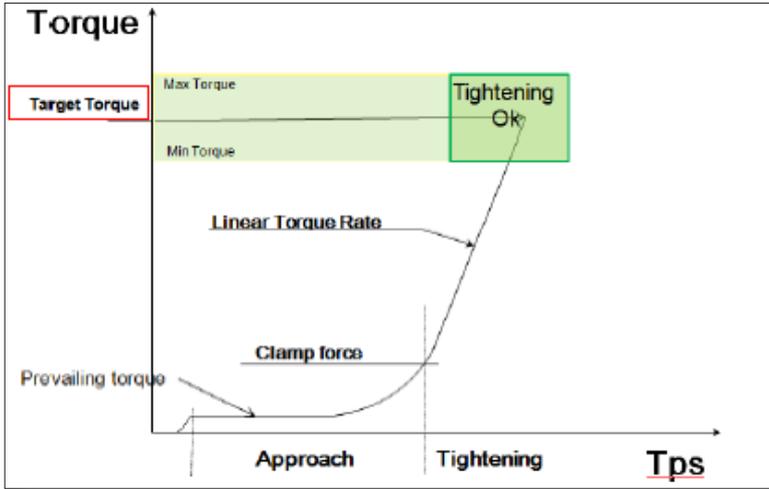
The report shows the torque & angle values. If the final torque is between the min/max torque and the final angle between the min/max angle, the result is OK.



Torque Control

This tightening strategy is used when you don't need to check the quality of the assembly joint or count the number of screws.

The report details ONLY the target torque. If the final torque is between the min/max torque, the result is Ok.



Enter the target torque, and the other fields are populated with default min/max torque.

| Torque control | | |
|----------------|------------------------------------|-------|
| Target torque | <input type="text" value="10.00"/> | lb in |
| Min Torque | <input type="text" value="5.00"/> | lb in |
| Max torque | <input type="text" value="11.00"/> | lb in |

Select the appropriate Accessories

Accessories ▼

Angle Control & Torque Monitoring

This strategy is used when you want improve the repeatability of the tension inside the assembly. Your engineering team can give you the right target.

You will need to set up the following:

Target Angle

Min & Max Torque

Threshold Torque Angle

Angle counting starts at this value.

The other values are set up by default, but you can change them manually

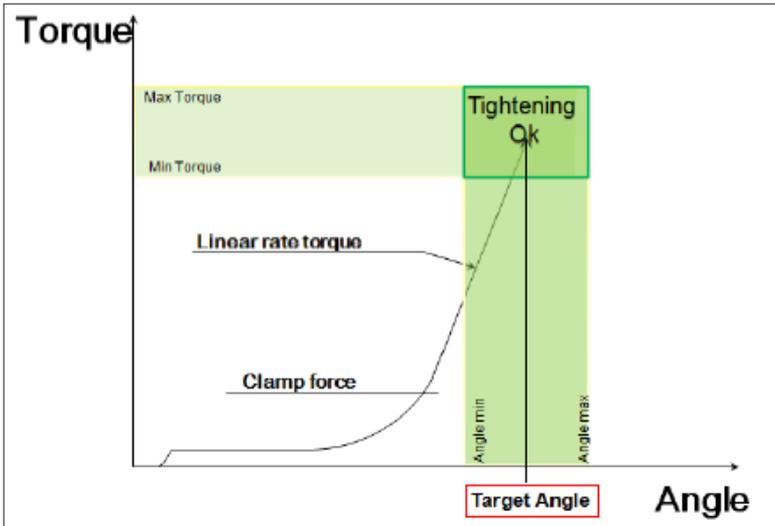
| Angle control & Torque monitoring | |
|-----------------------------------|-------------|
| Angle target | 10.00 ° |
| Min Angle | -1.00 ° |
| Max Angle | 11.00 ° |
| Min Torque | 8.00 lb in |
| Max torque | 12.00 lb in |
| Threshold torque angle | 2.40 lb in |
| Program Number | 3 ▼ |
| Program name | program3 |

Select the appropriate accessories

| | |
|-------------|--------------------|
| Accessories | 100 Nm extension ▼ |
|-------------|--------------------|

The operator will be asked to stop the tightening when the wrench arrives at the target angle.

The report details the final angle & torque. If the “angle apply” and “torque apply” are within the min/max, the final result is Ok.



Prevailing Torque

Set prevailing torque when using a break nut. You can analyze the average torque of the break, and ensure the break nut follows specifications.

This prevailing torque value can be used to:

- *Add to target torque*: Example: If average torque is 2.1 Nm and target torque is 10 Nm, target torque can be changed to 12.1 Nm.
- *Shift the 0*: Example: If average torque is 2.1 Nm and target torque is 10 Nm, tightening can start at -2.1 Nm.
- *Nothing*: This function is only used to test if the break nut meets parameters

Prevailing Torque

Threshold torque angle Threshold torque angle lb in

Start angle °

Total angle °

Min Torque lb in

Max Torque lb in

Strategy **Add to target torque** ▾

Value to use **Average torque** ▾

You will need to set up the following:

Threshold Torque Angle

Angle counting starts at this value.

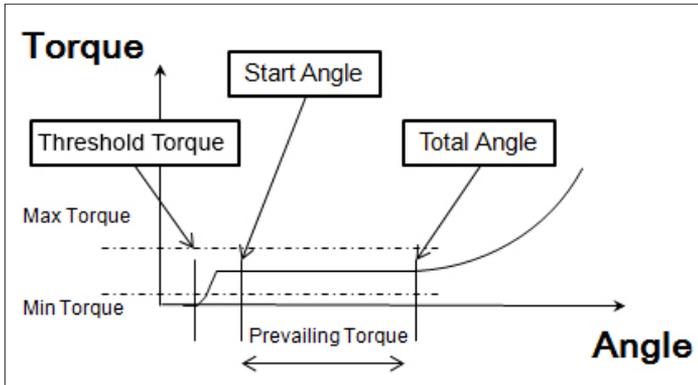
Start Angle

When this value is reached, torque is checked up to the total angle.

Min/Max Torque

Used to validate the break nut torque.

If the prevailing torque is between the min/max torque value, the result is Ok and you can finalize the tightening.



6.2 Quality Strategy

Re-Tight Mode

This strategy involves untightening and retightening a screw to determine torque values.

You will need to set up the following:

Torque Apply

Enter the estimated torque to apply to the screw.

Min/Max Torque

Set up by default

Threshold Torque Angle

Angle counting starts at this value.

Angle Target

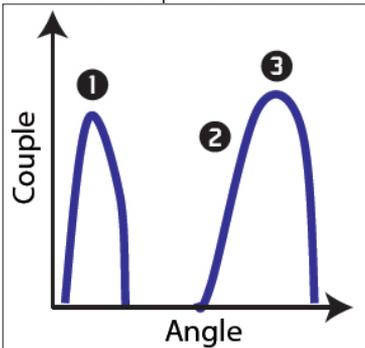
Hard joint: 3° Soft joint: 5°

| Re-tight Mode | | |
|------------------------|------------------------|----|
| Torque apply | Torque apply | Nm |
| Min Torque | Min Torque | Nm |
| Max torque | Max torque | Nm |
| Threshold torque angle | Threshold torque angle | Nm |
| Angle target | 5.00 | ° |

Starting with an already-tightened screw, the process is as follows:

- Unscrew by 5° (on hard joints, select 2° or 3°)
 - The system takes the real angle value
 - The system stores the disassembly torque
- Re-tighten the screw to come back to the initial position
 - The system records the value when the angle returns to the initial position

The report completes when the screw returns to its original position. If the final torque is between the min/max torque, the result is Ok.



- 1) Disassembly torque (breakout) value
- 2) Torque value when the screw returns to the original position
- 3) Max torque apply

Target Angle Mode

This strategy can be used ONLY if you have a soft joint/elastic assembly joint.

| Target Angle | | |
|------------------------|---|----|
| Torque apply | <input type="text" value="Torque apply"/> | Nm |
| Min Torque | <input type="text" value="Min Torque"/> | Nm |
| Max torque | <input type="text" value="Max torque"/> | Nm |
| Threshold torque angle | <input type="text" value="Threshold torque angle"/> | Nm |
| Angle target | <input type="text" value="3.00"/> | ° |

You will need to set up the following:

Torque Apply

Enter the estimated torque to apply to the screw.

Min/Max Torque

Set up by default

Threshold Torque Angle

Angle counting starts at this value.

Angle Target

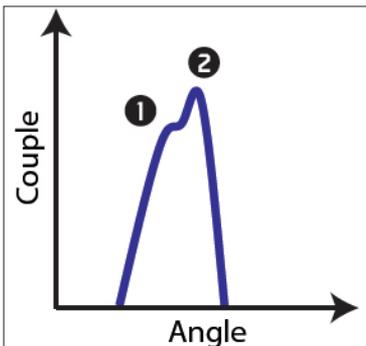
Hard joint: 3°

Soft joint: 5°

The breakout torque is measured when the angle target is reached. The angle target is set by default at 3°, but you can change it. The minimum value is 1°.

Screwdriver mode: Set angle target at 1°.

Flexion mode: Set angle target to 2° or 3°.



1) Breakout Torque

2) Final torque

Residual Torque Mode

This strategy is the best way to check the assembly joint's residual torque. This information can be used to determine how much friction is occurring inside the assembly.

You will need to set up the following:

Estimate torque apply

Enter the estimated torque to apply to the screw.

Min/Max Torque

Set up by default

Threshold Torque Angle

Angle counting starts at this value.

Rate Torque Calculation

Screwdriver mode: 6 pts

Flexion for hard joint: 8 – 10 pts

Flexion for soft joint: 12 – 15 pts

Flexion elastic joint: 15 – 30 pts

Breakout Torque Detection

% of rate of torque change

When the screw moves, the angle increases quickly and the torque slowly, so the rate torque decreases quickly. This value is used to detect when the screw starts to move.

| Residual Torque | | |
|----------------------------------|---|----|
| Estimate Torque Apply | <input type="text" value="Estimate Torque Apply"/> | Nm |
| Min Torque | <input type="text" value="Min Torque"/> | Nm |
| Max torque | <input type="text" value="Max torque"/> | Nm |
| Threshold torque angle | <input type="text" value="Threshold torque angle"/> | Nm |
| Rate Torque calculation (Points) | <input type="text" value="12"/> | |
| Breakout Torque detection | <input type="text" value="150"/> | % |

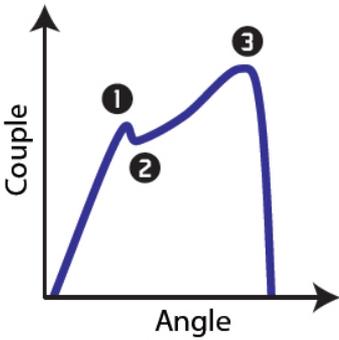
The reference rate torque is calculated during the first step of retightening (when the screw doesn't move).

$$\text{Rate torque} = (\text{Torque 2} - \text{Torque 1}) / (\text{Angle 2} - \text{Angle 1})$$
$$\text{Rate Torque Unit} = \text{Nm}/^\circ$$

During the process, the actual rate torque is compared to the rate torque reference. (The Rate torque reference is the average rate torque of the 10 first values). If the rate torque decreases more than X%, breakout torque is measured. Breakout torque is the point when the screw starts to move.

To detect residual torque, angle and torque values are continually checked:

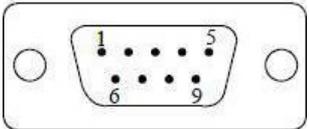
- If the angle increases and the torque decreases, we take the min torque value (on the graph pt. 2)
- If the angle increases and the torque increase, the residual torque = the breakout torque.

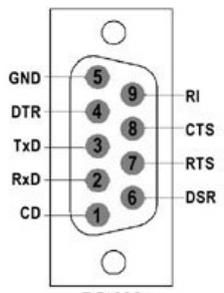


- 1) Breakout Torque
This is the torque when the screw starts to move
- 2) Residual Torque
This is the actual torque inside the assembly
- 3) Final Torque
This is the max torque apply on the assembly

7 Male Serial Port

Pin 2 is used to received data from a barcode and Pin 3 is used to send data to a computer or serial printer. In all cases, Pin 5 needs to be connected to a ground.

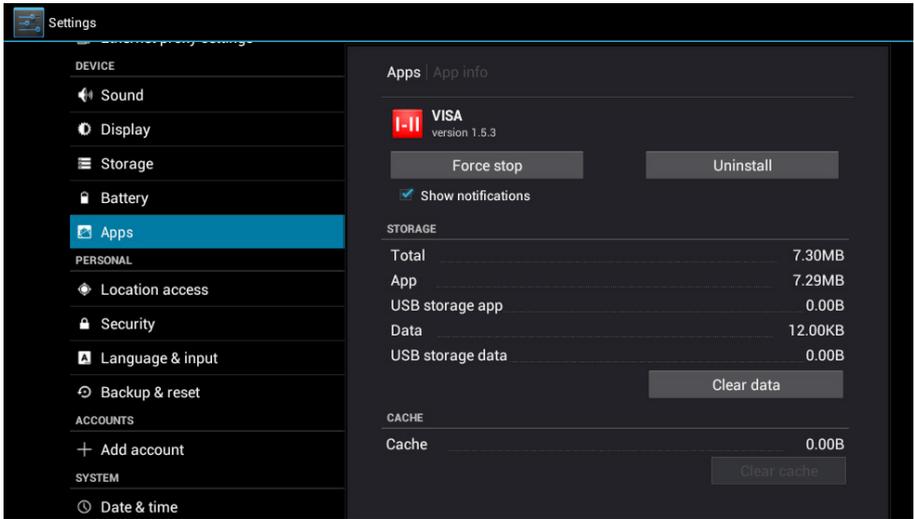
| | DB9 Female (PIN) | RS-232C Interface Signal |
|---|------------------|--------------------------|
|  | 2 | Receiving data SIN (RXD) |
| | 3 | Sending data SOUT (TXD) |
| | 5 | Signal grounding GND |

|  | 1 | (8) | DCD | <---- | Data Carrier Detector |
|--|---|------|-------------|-------|-----------------------|
| | 2 | (3) | RxD (or RD) | <---- | Receive Data |
| | 3 | (2) | TxD (or TD) | ----> | Transmit Data |
| | 4 | (20) | DTR/ | ----> | Data Terminal Ready |
| | 5 | (7) | SG, GND | ---- | Signal Ground |
| | 6 | (6) | DSR/ | <---- | Data Set Ready |
| | 7 | (4) | RTS/ | ----> | Request To Send |
| | 8 | (5) | CTS/ | <---- | Clear To Send |
| | 9 | (22) | RI | <---- | Ring Indicator |

8 Other Information

8.1 Restore Factory Default

In some special case, you will need to restore the factory default, please follow this process to do that. Android Setting
Setting / Application / Onetoo soft
Click on » Clear Data «





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