

OPERATOR'S MANUAL



TORQUE WRENCH CALIBRATOR (TWC) TWC 400 & TWC 1500 - Auto



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PART NUMBERS COVERED BY THIS MANUAL

This manual covers the set up and use of the Norbar TWC.

Part Number	Model	Torque Range
60312	TWC 400 AUTO	0 – 400 N·m
60313	TWC 1500 AUTO	0 – 1500 N·m

This product is intended for testing torque wrenches.

TWC Markings

Pictograms	Meaning
	WARNING: LIVE PARTS INSIDE. DO NOT REMOVE COVER. NO USER SERVICEABLE PARTS INSIDE.
	Read and understand Operator's Manual.



WARNING: READ ALL SAFETY WARNINGS AND ALL INSTRUCTIONS. FAILURE TO FOLLOW THE WARNINGS AND INSTRUCTIONS MAY RESULT IN ELECTRIC SHOCK, FIRE AND/OR SERIOUS INJURY.

SAFETY

- The TWC is designed for testing torque tools, do not use for other purposes.
- Always read and understand the Operator's Manual fully before use.
- The TWC weighs up to 45 Kg. Take care when installing. Only lift by the solid metalwork.
- Ensure the operating area is capable of taking the weight of the TWC.
- This is a powerful torque application system. Care MUST be taken or damage may result to the torque wrench, the torque measurement system, the TWC or injury to operating personnel.
- Do not block cooling air entry and exit points.
- Trapping hazard - Keep hands and loose clothing away from the torque wrench during use.
- To avoid damage to the torque wrench under test do not exceed the wrench set torque value.
- To avoid damage to the transducer do not exceed the maximum capacity.
- Never exceed the maximum torque capacity of the TWC.
- Do not operate without a torque measurement system connected and working.
- Ensure wrench guard is in position before using TWC.
- Ensure safety wire at the handle reaction point is in place.
- It is recommended that Portable Appliance Testing (PAT Testing), officially known as "In-Service Inspection & Testing of Electrical Equipment" is completed at regular intervals, see MAINTENANCE section for more information.

INTRODUCTION

The TWC Auto allows torque wrenches to be calibrated and tested in an accurate and repeatable way whilst reducing operator effort.












This manual covers items 60312 & 60313 only.

The TWC Auto can automatically test all torque wrenches that operate on the 'click-action' or 'cam-action' principle, as well as manually testing dial type wrenches.

Parts Included

Description	Part Number	Quantity
TWC Auto 400 / 1500	60312 / 60313	1
TWC Counter Balance Reaction post assembly	62330	1
Display	62321	1
Display stand	62322	1
Power supply including power lead & plug	62323	1
Temperature & humidity sensor	62353	1
USB memory stick with manuals	61143	1
TWC Guard (and fixings)	62346	1
Maintenance grease kit	60325	1
Manual Drive Gear	62336	1

Accessories

Description	Image	Part Number
Static Transducer Support Kit		60318
Short Length Reaction Post		60319
Quick Release FMT Kit		60322
TWC FMT 25 Adapter plate		60327
3 Kg Mass Weight		60329
Angle Offset Plate		60330
Square Drive adapter 1" M to 3/4" F		29214
Square Drive adapter 1" M to 1/2" F		29215
Square Drive adapter 1" M to 3/8" F		29216
Square Drive adapter 1" M to 1/4" F		29217
TWC Hand Pendant		62328

FEATURES AND FUNCTIONS

- Allows torque wrenches to be calibrated or tested in accordance with BS EN 26789:2003, ISO 6789-1:2017 and ISO 6789-2:2017.
- Counterbalance reaction is designed to support the weight of the wrench so that the weight does not become a parasitic force within the calibration system. The floating nature of the support means that the wrench is able to find its own natural level rather than being constrained as in many other loading devices. Any such constraint will be a parasitic force within the system. (Patents apply).
- Lightweight alloy construction ensures the TWC is easily transported, making it well suited for mobile laboratory applications.
- Rotating transducer design ensures that the load is applied 90° to the torque wrench handle. The benefit of this precise alignment is that forces are applied squarely to the load point of the handle.
- Supplied with a powerful yet simple touchscreen User Interface (UI) (keyboard and mouse also supported if desired).
- Flexible tool template system; minimises number of templates required to cover a wide range of tools, aiding efficient use.
- Programmable calibration workflow for each template, can be pre-set to ISO compliant flow for the given tool for a faster set-up or can also support bespoke workflows.
- Calibration job management; book calibrations, track progress of previous bookings and resume them.
- Automated management of calibration and conformance workflows for non-indicating tools.
- Intelligent rate control system ensures fast cycling of tools while maintaining compliance with 2017 standards.
- Environmental monitoring (humidity/temperature) to ensure compliance with calibration standards.
- Automated management of uncertainty data for ISO 6789-2:2017 calibrations, guiding the user through the process using dynamically generated instructions based on the current tool's ISO classification and workflow.
- Inbuilt data analysis and certification generation seamlessly move from calibration/conformance procedure to certificate generation, no third-party software required.
- A substantial amount of inbuilt storage allowing for several years' worth of calibration data through normal use.

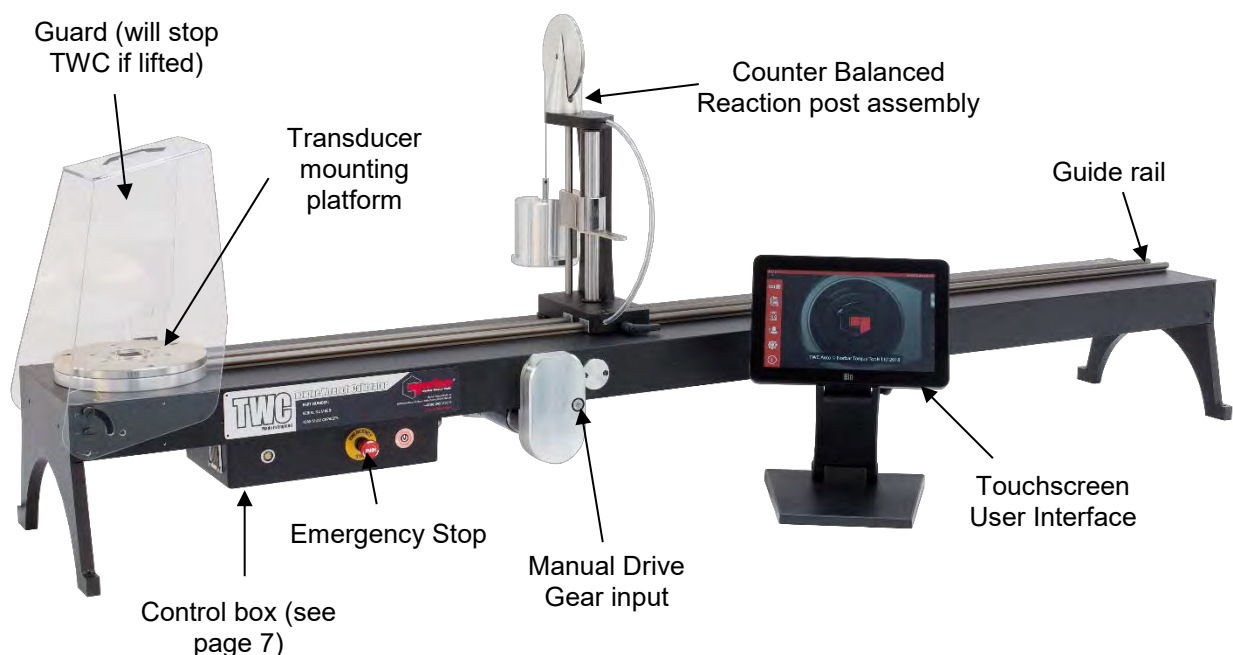


FIGURE 1 – TWC Auto Features

Control Box

Front View

1. Transducer connector
2. Emergency stop
3. ON switch (Lights up RED when ON)



FIGURE 2 – Control Box Front View

Right View

1. Temperature & humidity sensor
2. Motor connector 1 for controls
3. Motor connector 2 for windings
4. Air outlet

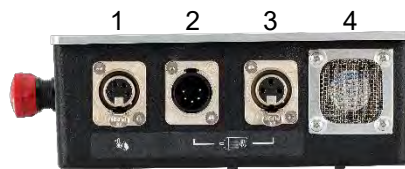


FIGURE 3 – Control Box Right View

Rear View

1. Motor enable switch
2. Power connection
3. Touch screen power connector (USB)
4. Touch screen data connector (HDMI)
5. Network connector
6. 6 x USB connectors (Keyboard, mouse, camera, memory stick, etc)

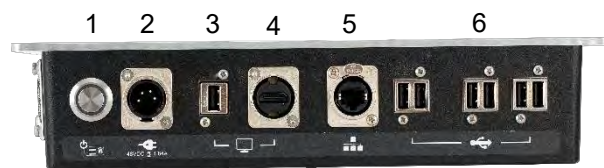


FIGURE 4 – Control Box Rear View

Left View

1. Air inlet



FIGURE 5 – Control Box Left View

SET UP INSTRUCTIONS

NOTE: If the equipment is used in a manner not specified by the manufacturer, the protection provided by the equipment may be impaired.



WARNING: ALLOW THE TWC TO EQUALISE TO THE AMBIENT TEMPERATURE / HUMIDITY BEFORE SWITCHING ON. WIPE OFF ANY MOISTURE BEFORE USE.

1. Locate TWC



WARNING: THE TWC WEIGHS UP TO 45 KG. ALWAYS USE TWO PEOPLE WHEN LIFTING THE TWC.

Ensure location can cope with weight of loader.

Locate the TWC on a level surface at a comfortable working height.

2. Fitting the Guard

Insert two of the four shoulder bolts through the two holes in the guard and slide over the neoprene washer as shown in Figure 6.

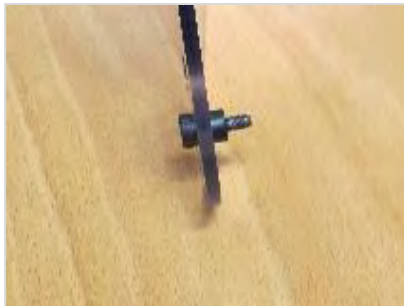


FIGURE 6 – Pairing the Neoprene Washers with Shoulder Bolts

Fasten the above to the two lower threaded holes on the TWC casing as shown in Figure 7. Use the remaining two Shoulder Bolts to secure the guard to the radial slot and check it functions correctly by opening and closing the guard, also shown in Figure 7.



FIGURE 7 – Fitting the Guard

3. Connect Motor

Plug motor wires in.



4. Connect Temperature / Humidity Sensor

Plug in temperature / humidity sensor to its dedicated connector.

5. Connect Display

Connect the display to ports 3 and 4 shown in Figure 4 on page 7.

6. Connect USB Keyboard & Mouse (Optional)

Connect keyboard to 1 of the 6 USB connectors.
Connect mouse to 1 of the 6 USB connectors.

7. Counter Balance Reaction Post Installation

Your TWC has been delivered with the reaction counter balance wheel assembly unattached to the reaction assembly. This has been done to prevent damage to this assembly during transit.



FIGURE 8 – Disassembled Counter Balance Reaction Post Assembly

Place the counter balance wheel onto the top plate of the reaction assembly.



FIGURE 9 – Lining up the Counter Balance Reaction Wheel

Attach the counter balance wheel assembly with the two M4 socket cap screws from the underside of the top plate of the reaction assembly. Tighten to 1 N·m.



FIGURE 10 – Attaching the Counter Balance Reaction Wheel

Assemble the weight carriage over the balance wheel.



FIGURE 11 – Counter Balance Reaction Assembly

Slide the “Counter Balance Reaction Post Assembly” on to the reaction rail.

NOTE: Shown for clockwise calibration, mount the opposite way for anti-clockwise calibration.



FIGURE 12 – Sliding the Counter Balance Reaction Assembly onto the Reaction Rail

Set the locking lever to engage positively when applied. This is done by pulling the lever towards you whilst at the same time winding in the screw with an appropriate screwdriver. When at top dead centre, the lever should start to engage to lock the reaction post's position. Turn the lever to the right and you should start to feel some resistance as the lock is engaged. Before continuing check the reaction post assembly is securely fixed in position.

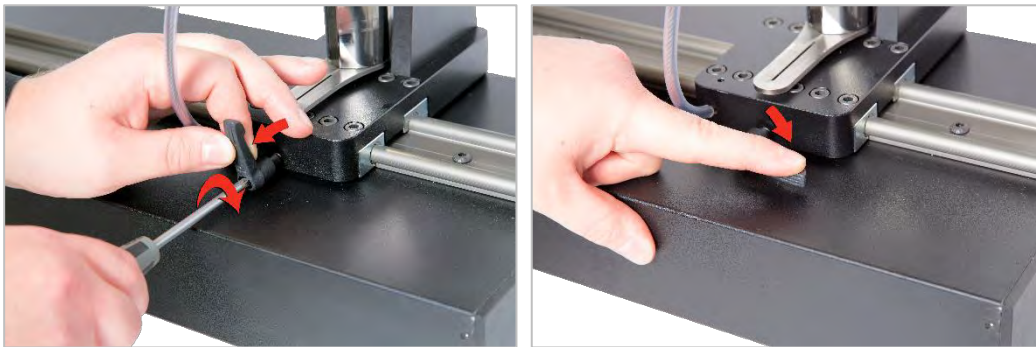


FIGURE 13 – Adjusting and Setting the Locking Lever

8. Mount Transducer (not supplied with TWC)

Select the correct capacity transducer and secure to the platform.

FMT Transducer

Directly mount with 3 fixings. Torque settings are 25 N·m for 400 and 85 N·m for 1500.



FIGURE 14 – Fitting an FMT Transducer

To save time when using multiple FMT transducers use the optional FMT quick release kit (Part number 60322) first (see page 75).

Static Transducer

Use optional static transducer kit ((Part number 60318) see page 73).

Place static transducer male square into the TWC.

Use optional adaptors (Part number 29214, 29215, 29216, 29217) as required (see page 73); to reduce uncertainties these adaptors have been manufactured to close fit tolerances.

Place support over transducer and secure to TWC with socket cap screws provided.



9. Connect Power



WARNING: CHECK THAT THE POWER SUPPLY CORRESPONDS TO THE VOLTAGE ON THE TWC RATING PLATE.



WARNING: THE TWC MUST BE EARTHED
ENSURE POWER SUPPLY HAS AN EARTH
DO NOT OPERATE WITHOUT AN EARTH



WARNING: FOR OPERATOR SAFETY ENSURE THE MAINS SUPPLY HAS A RESIDUAL CURRENT DEVICE (RCD). TEST THE RCD REGULARLY.

Connect plug to local mains supply.

TIP: Use of a Different Local Supply Socket:

Should a different plug be required, the mains cable colours are:

BROWN-LIVE

BLUE-NEUTRAL

GREEN/YELLOW-EARTH

The new plug must have a ground (**EARTH**) connection.
If in doubt consult a qualified electrician.

If the plug has an internal fuse, a 2 amp value is recommended.

10. Turn TWC on

Turn on mains supply. Hold down the power pushbutton (See Figure 2.3 page 7) on the front until it lights up red. Whilst you do this, the TWC will begin the power-on process.

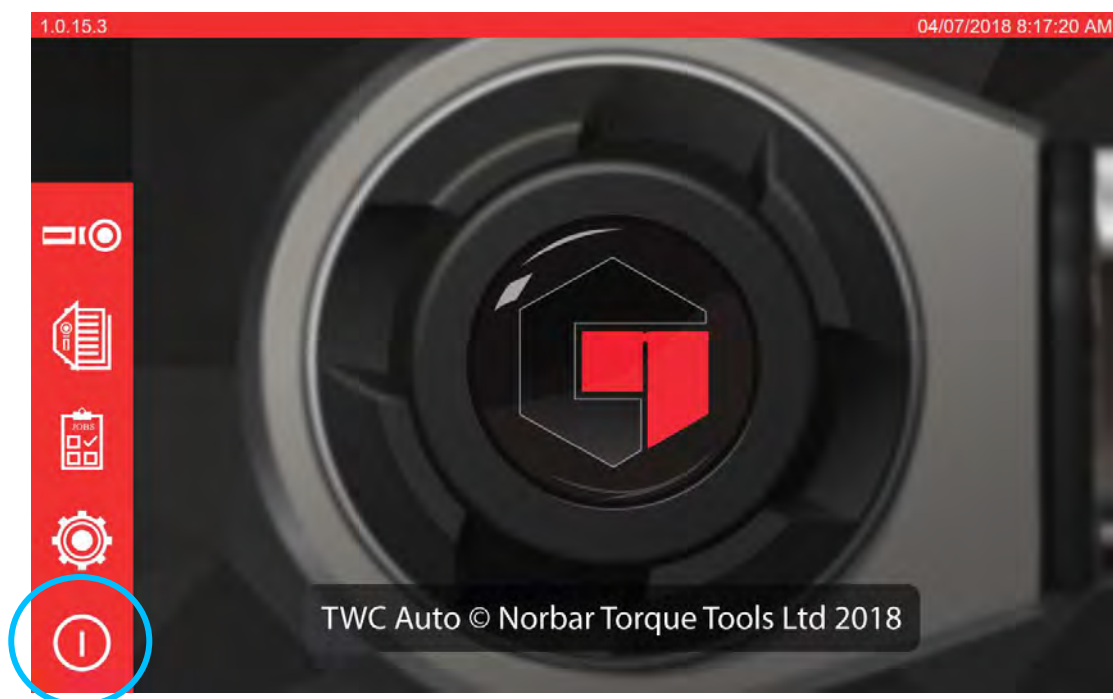
When the process is complete, you will see the main TWC menu, as shown below:



At this point the TWC is fully powered but the motor electronics are not engaged. To do so, press the motor enable pushbutton (See Figure 4.1 page 7). The button should glow blue and remain glowing. If the button turns off after pressing it, check the emergency stop (See Figure 2.2 page 7) is not depressed, as this will disable the motor electronics.

11. Turn TWC Off

The TWC can be turned off via the power icon on the main menu. Press the power icon and press the “shut down” button in the confirmation pop-up.



OPERATING INSTRUCTIONS

Locating a Torque Wrench

Ensure the TWC Guard is lowered.

Use lowest capacity transducer to cover the range of the torque wrench to be tested.

NOTE: For a wrench with a push through ratchet, ensure the drive square is operating on the correct side of the ratchet.

Ensure the transducer has been fitted with the correct adaptor and place the torque wrench drive into the transducer. Ensure that the torque wrench drive is fully engaged (see Figure 15).

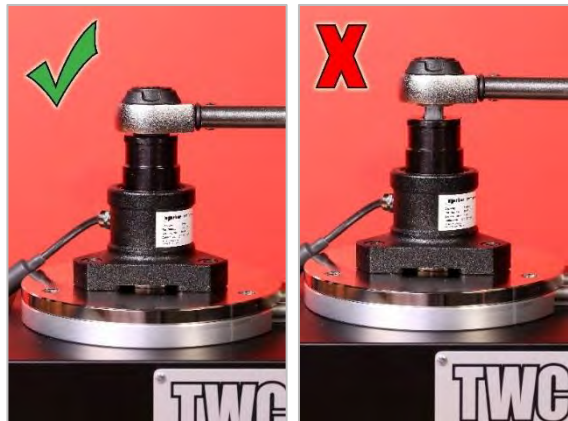


FIGURE 15 – Attaching a Torque Wrench

Set the reaction post position on the reaction arm so it is in the middle of the torque wrench handle (see Figure 16).

Use counter balance reaction (supplied) or optional short reaction post (Part number 60319) to suit wrench to be tested.



FIGURE 16 – Locating a Torque Wrench

Counter balance the wrench by adding weights to the carriage until the wrench is sat horizontally.



FIGURE 17 – Adding Weights to the Counter Balance Reaction Assembly

If you push the reaction balancer up or down at the handle end the wrench should return to a true natural horizontal position.

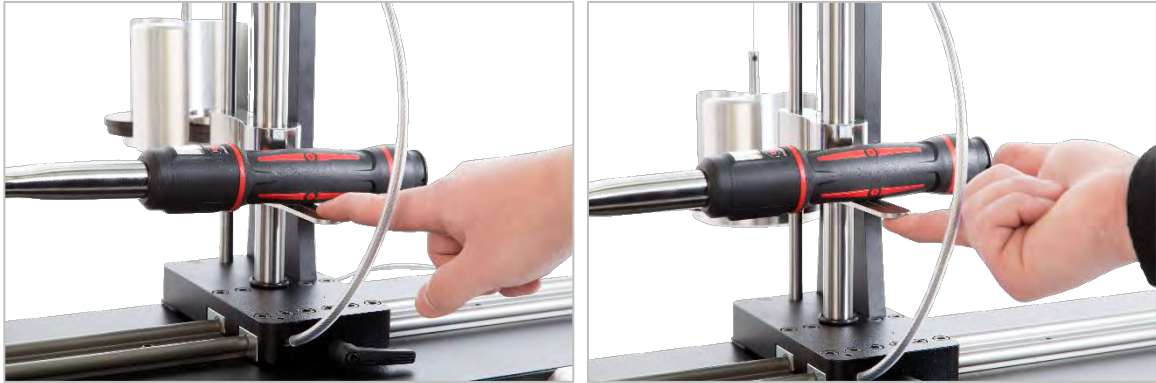


FIGURE 18 – Ensuring the Torque Wrench is in a Horizontal Position

Ensure the TWC is at the extreme minimum of start position (see Figure 19). The two dots to the edge of the bearing housing denote the full travel. To get to the adjustment screen shown in Figure 19 you will first need to ensure both a tool and template have been added (see pages 41 through to 50), from there you can access the adjustment screen by selecting a tool and pressing the adjustment screen icon (see page 50).

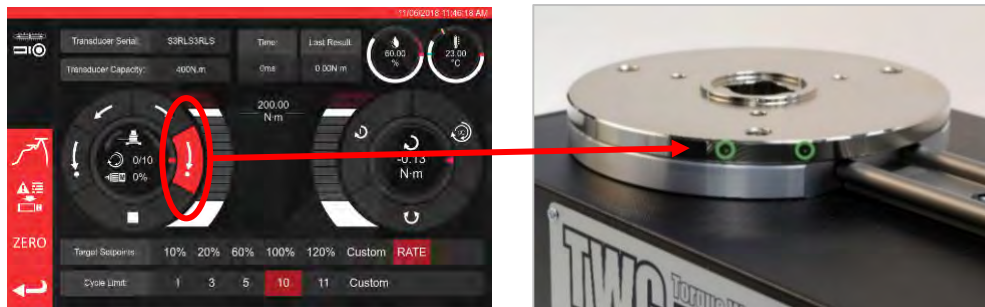


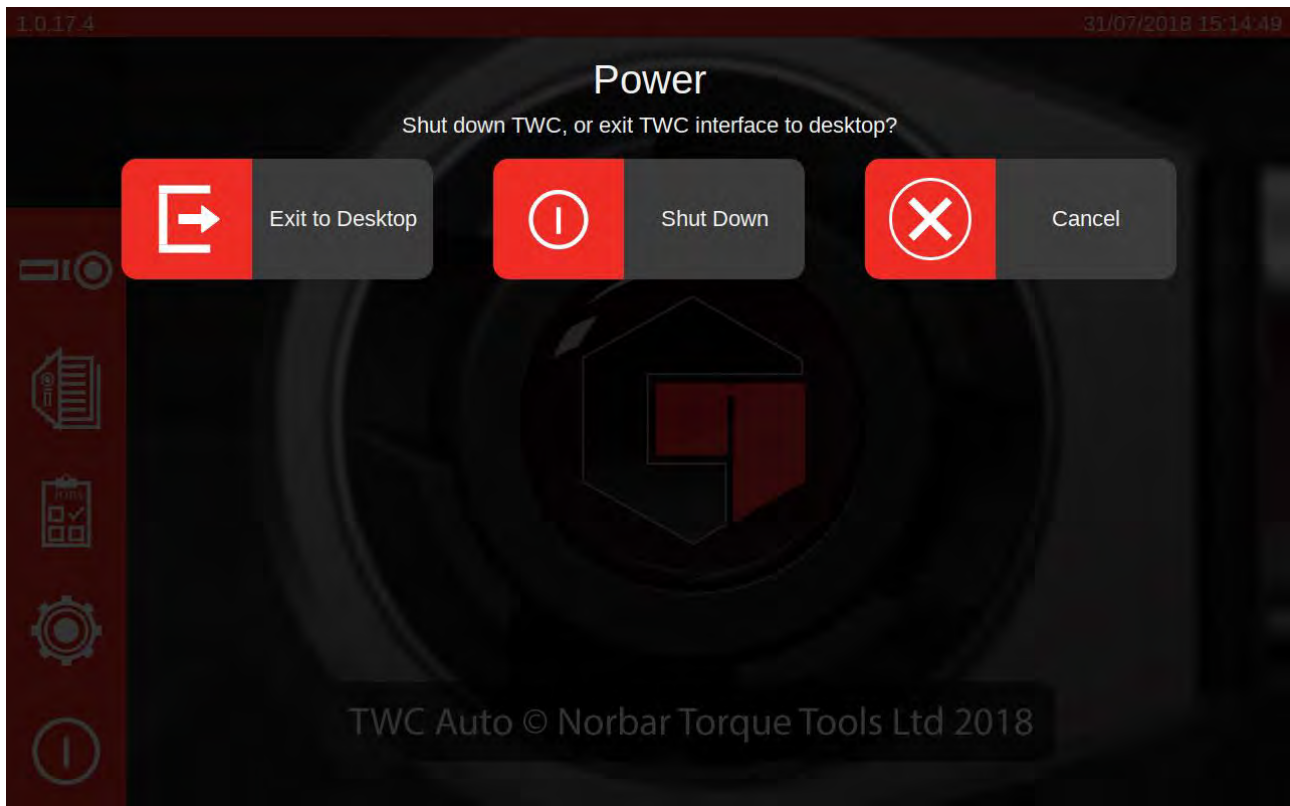
FIGURE 19 – Making Sure the TWC is in the Home Position

Make sure the Guard is in position over the tool before loading.



Exit TWC User Interface

To perform initial setup of a TWC, or to change certain system-level settings, it may be necessary to leave the TWC user interface. To exit the TWC UI, use the power button on the main menu and select “Exit to Desktop”.

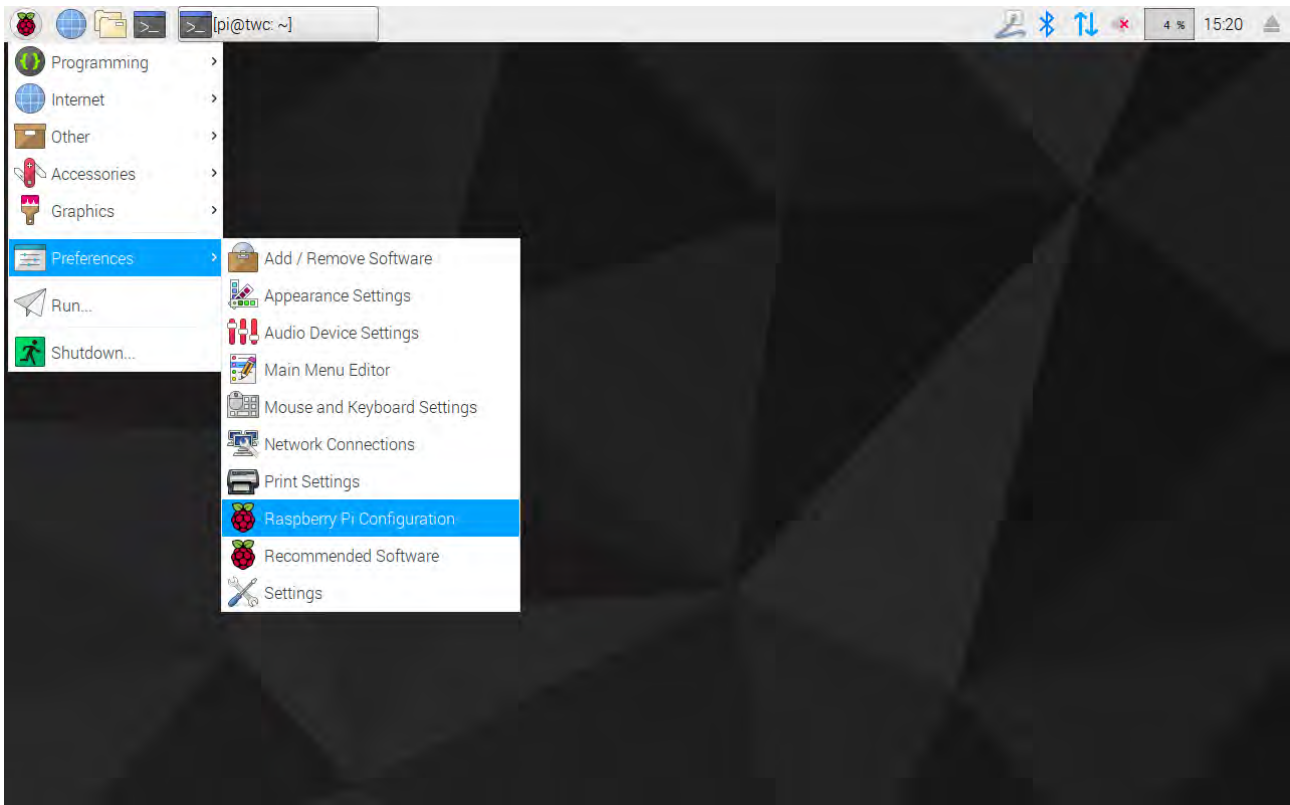


Changing the Default Password

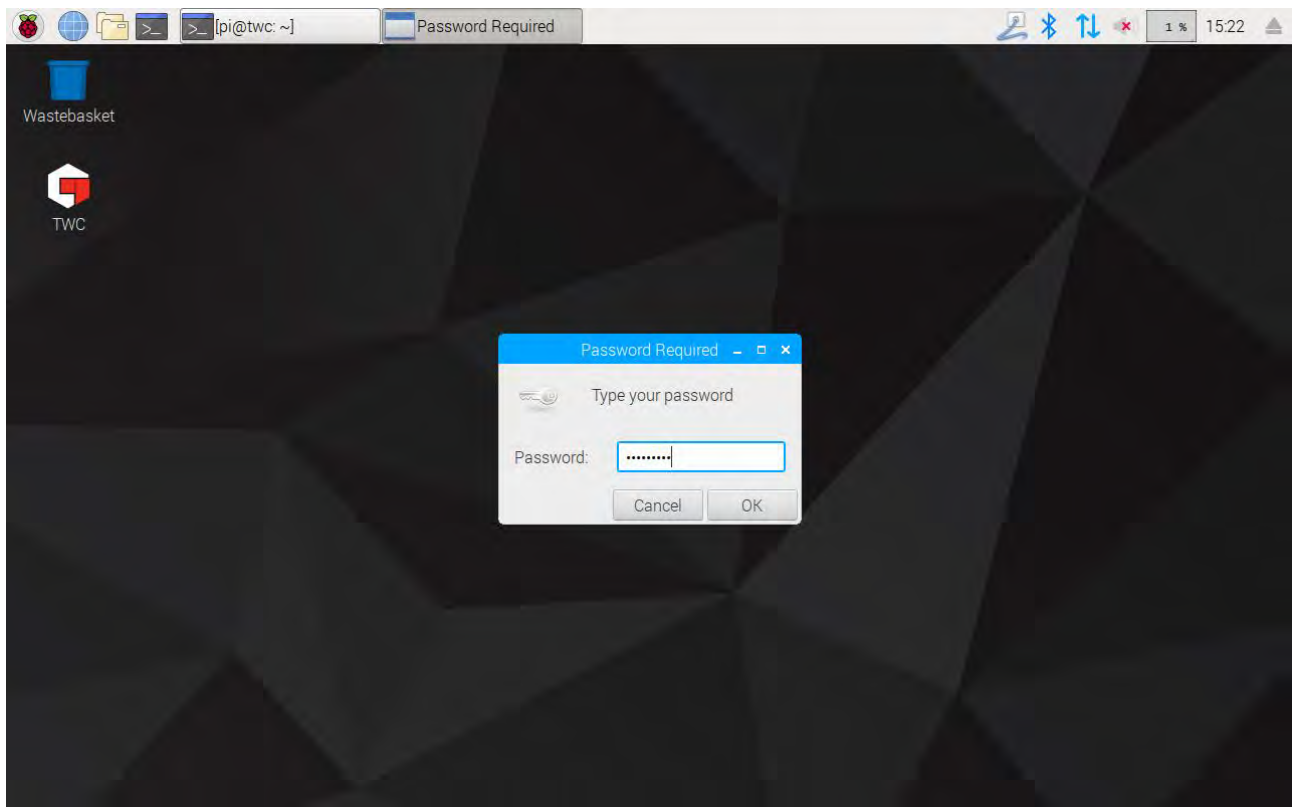
The TWC is supplied with a default user password ("NorbarTWC") which you should change for your security. Once you change this, make sure you do not forget it; you may need to send the TWC back for service if it is forgotten.

NOTE: To change the default password you will need to connect a USB keyboard to the TWC.

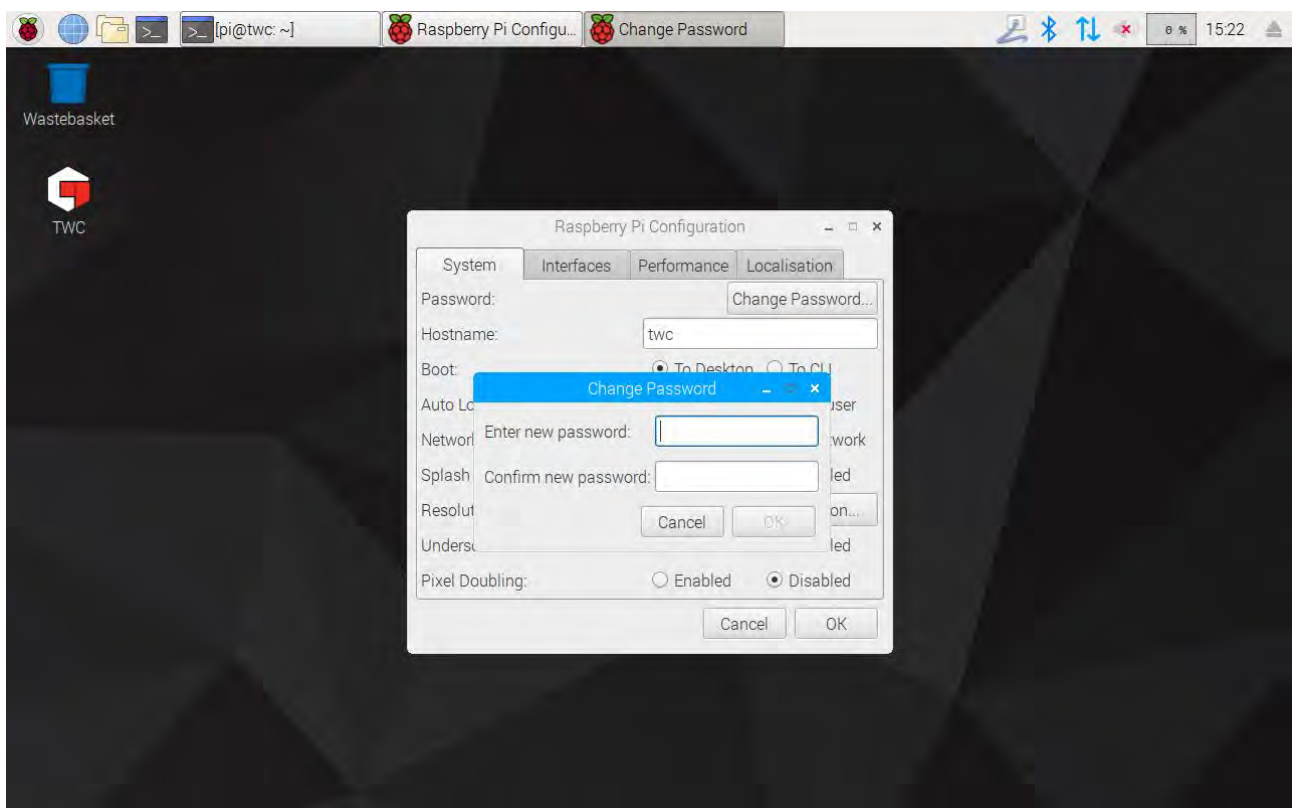
To set your own password, exit the TWC UI as described in the previous section, then open the menu bar and select Preferences > Raspberry Pi Configuration



Next, type in the default password ("NorbarTWC") in the password prompt.



Then in the window that appears, on the System tab, select “**Change Password**” and follow the onscreen prompts to set a password of your own.

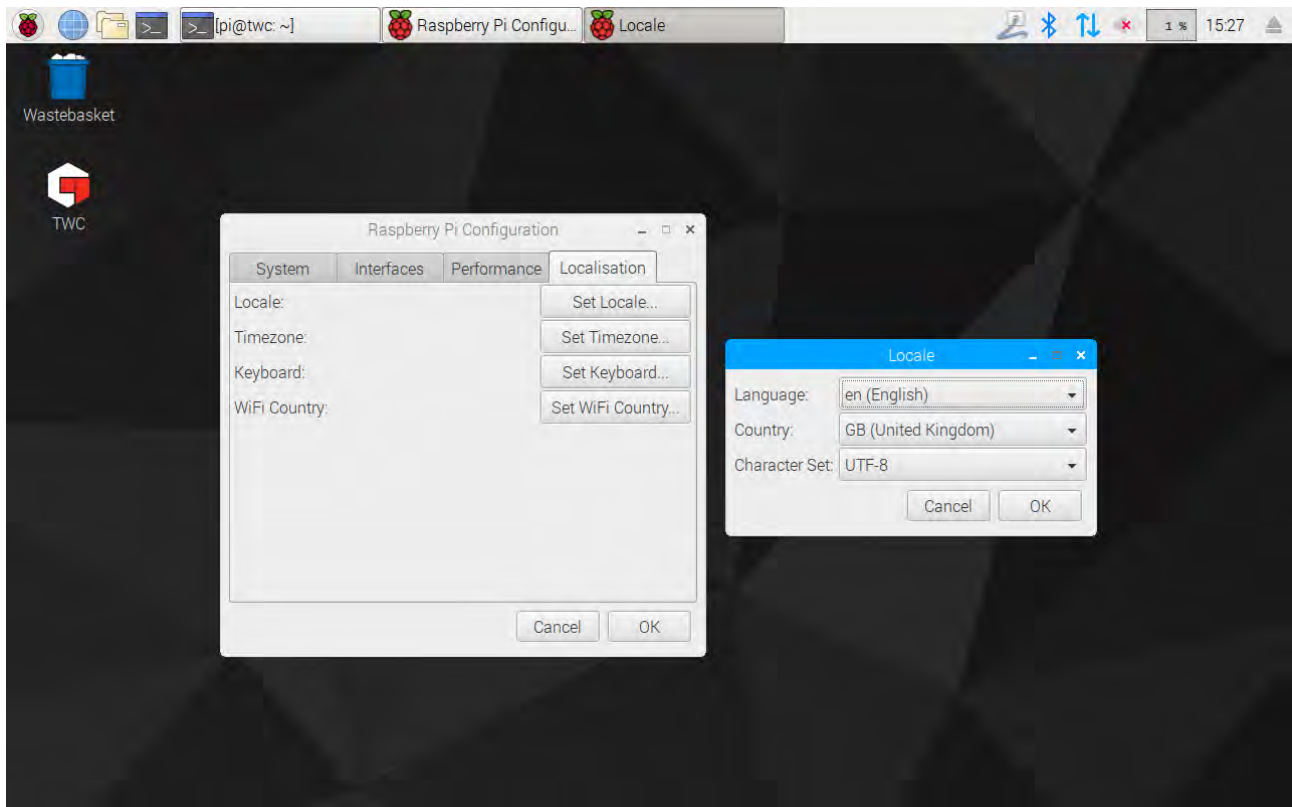


Timezone Setup

The TWC requires accurate timezone settings to keep time properly.

NOTE: To change the timezone and locale, you will need to connect a USB keyboard to the TWC.

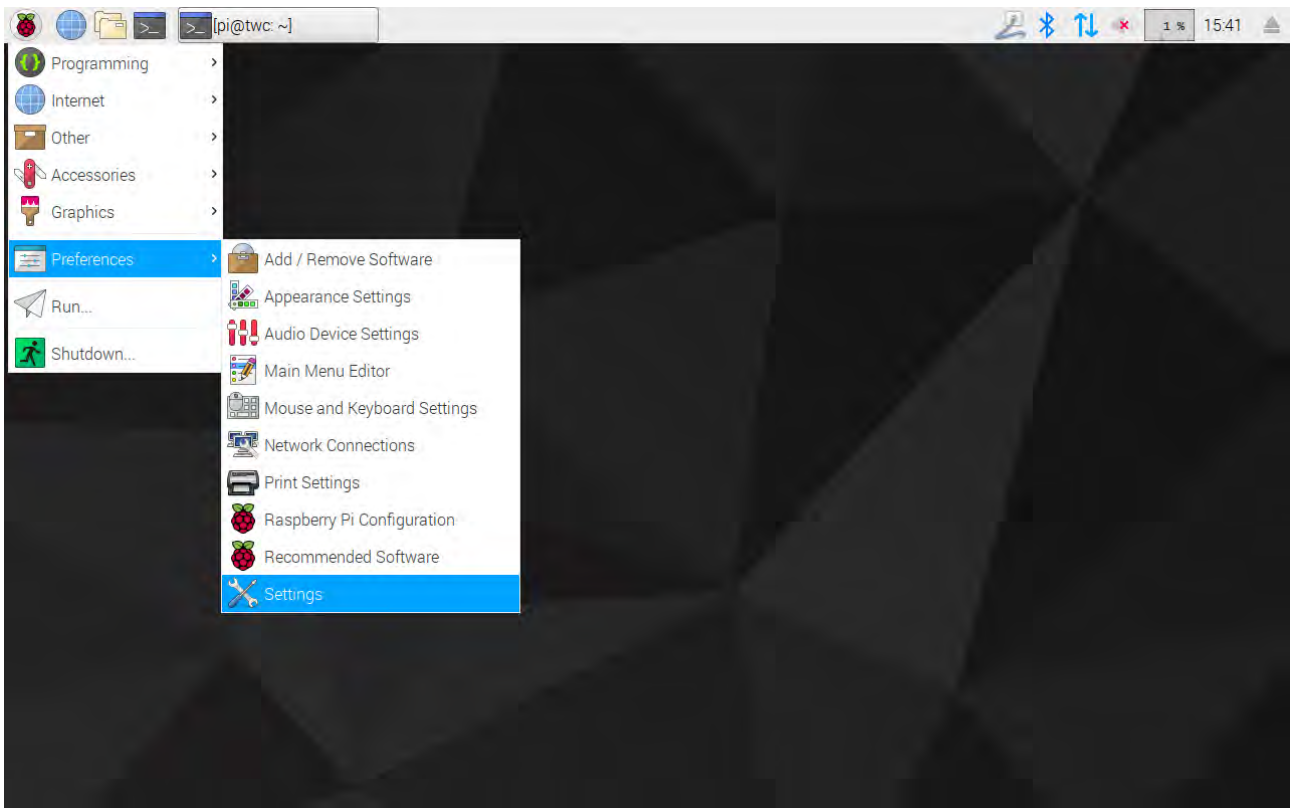
To set/check the timezone, close the TWC UI and open the Raspberry Pi Configuration panel as shown in the “Exit TWC UI” section, and click the Localisation tab to view and change the timezone and locale. You will be asked to select your language and country (please note: the language setting has no effect on the TWC UI, which at time of writing is available in English only).



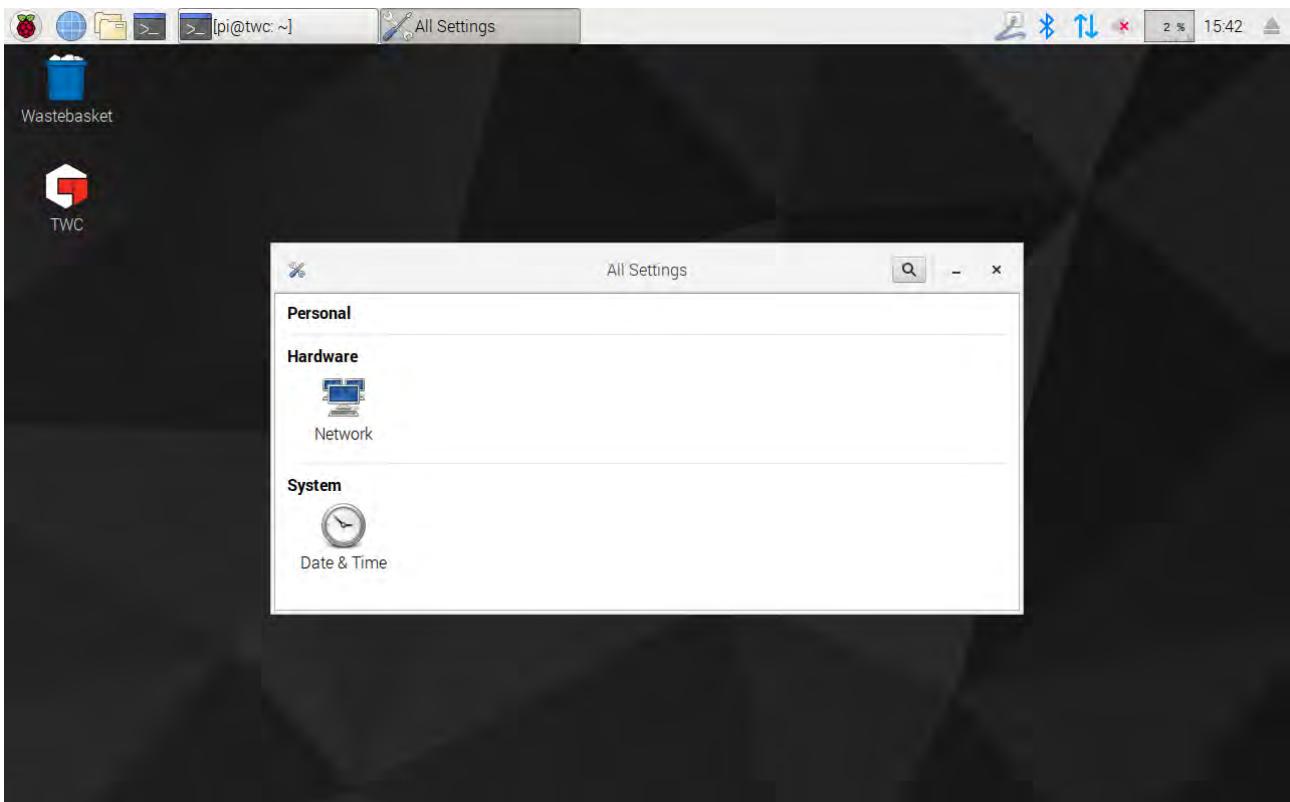
NOTE: When you change timezone, the system time will change to suit; it may take up to a minute for this change to take effect in the menu bar or on the TWC UI. Set the timezone and wait for changes to occur before trying to adjust the system time.

Time Setup

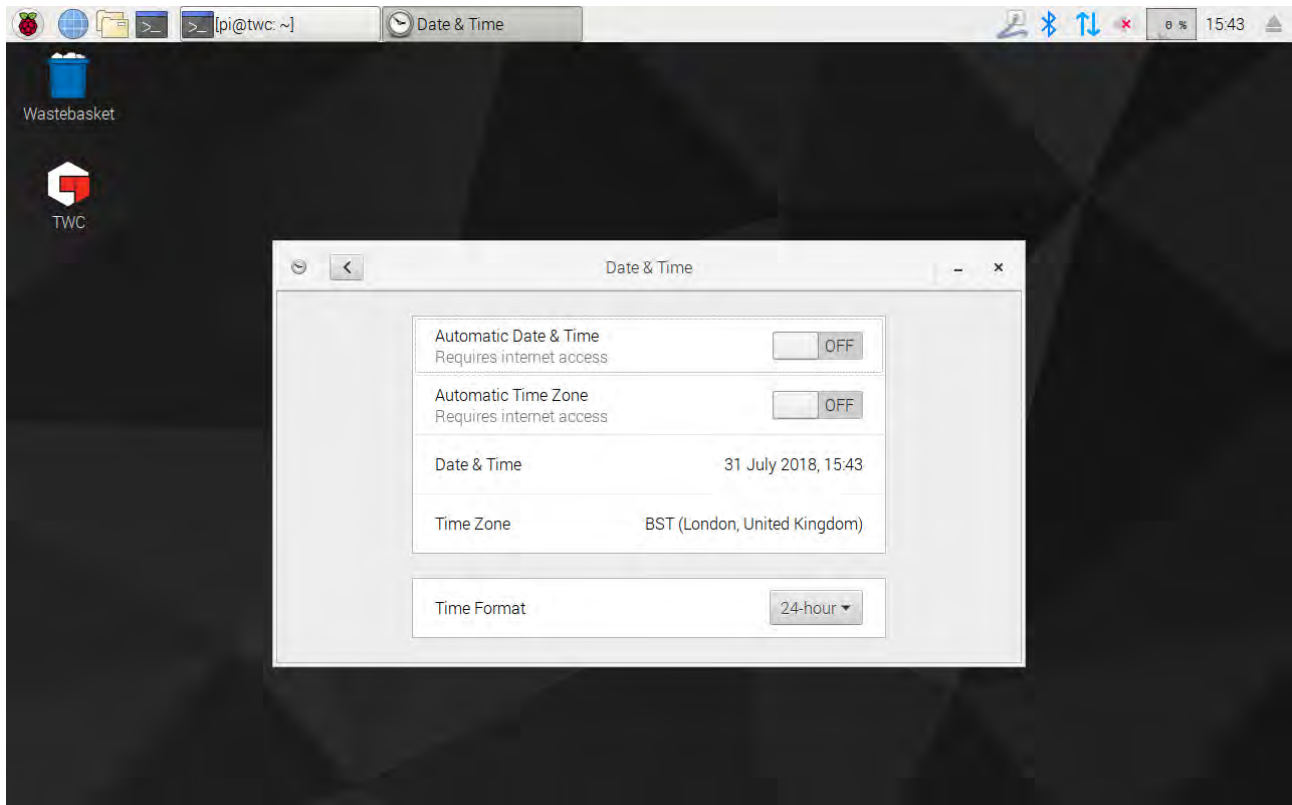
Ideally, setting the timezone is enough to ensure correct time as the time is set at the factory. If, however, the time is still wrong, or if in the future you need to adjust the time, close the TWC UI as shown in the “Exit TWC UI” section, then open the menu bar and go to **Preferences > Settings**.



In the window that appears, select “Date & Time” to change the time.



Toggle “Automatic Date & Time” to “OFF” and tap the “Date & Time” field to make changes.



NOTE: It may take up to a minute for the new time to take effect in the menu bar or on the TWC UI.

Configuring the Network

The TWC has an Ethernet socket which allows you to connect it to a network for printing to network printers. When setting up printers an Internet connection via this network is also necessary.

The TWC is configured to automatically seek the correct network connection settings via DHCP; when you plug the network cable into the TWC, it will immediately request these settings. Once assigned there should be nothing else to do; the TWC is properly connected.

NOTE: You do not need to connect to a network if you do not intend to use a network printer, but you may still need to connect it temporarily while setting up a USB printer, such that any necessary drivers can be acquired during the printer setup process.

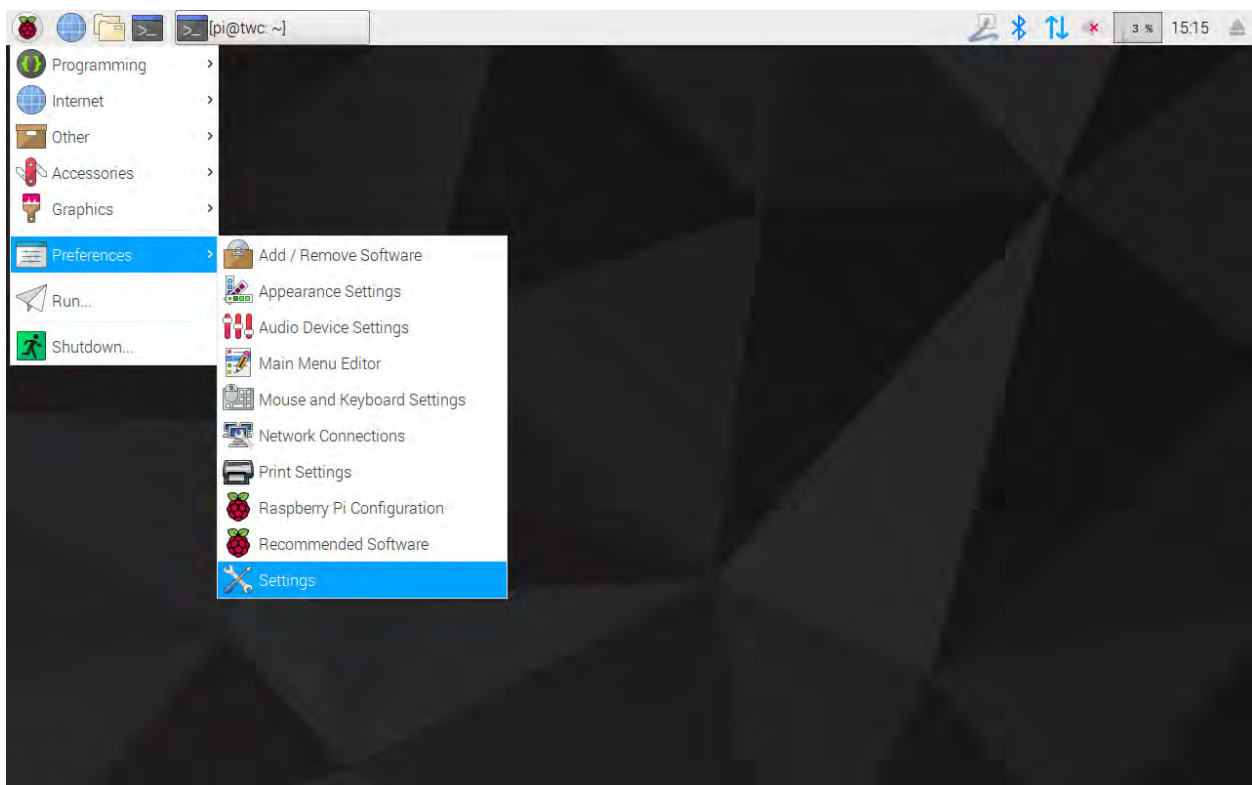
NOTE: You will need a USB keyboard if you intend to edit network configuration.

NOTE: You can test for Internet connectivity by opening the web browser and trying to access a website. If the website loads, the TWC has Internet access.

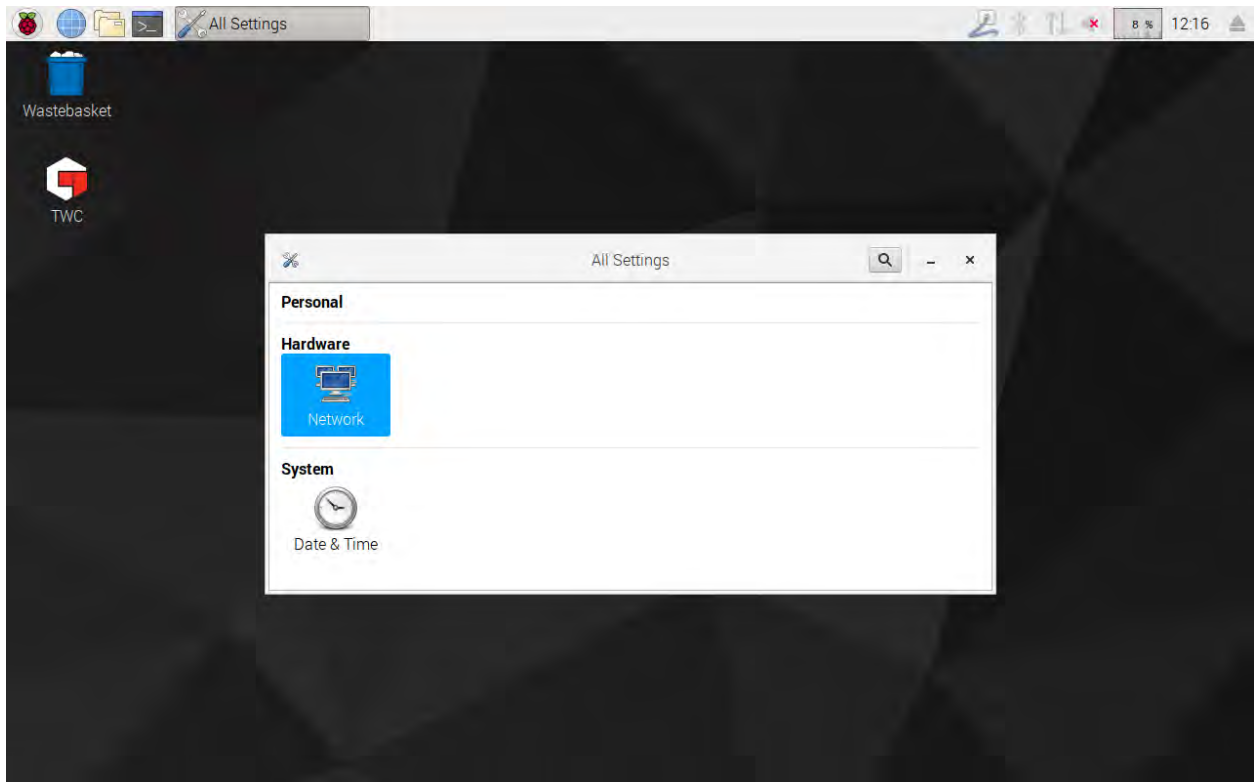
NOTE: Some businesses have policies against connecting unknown devices to the network. Ensure your IT department is aware of your intention to connect the TWC to the network. You may also need their assistance to grant the TWC internet access or even access to the network itself; whether this is the case depends on your company network's configuration and policies.

If DHCP services are not provided by your network, or are not what you need or want the TWC to use, then you must provide your own. This section demonstrates how to change the network configuration if necessary.

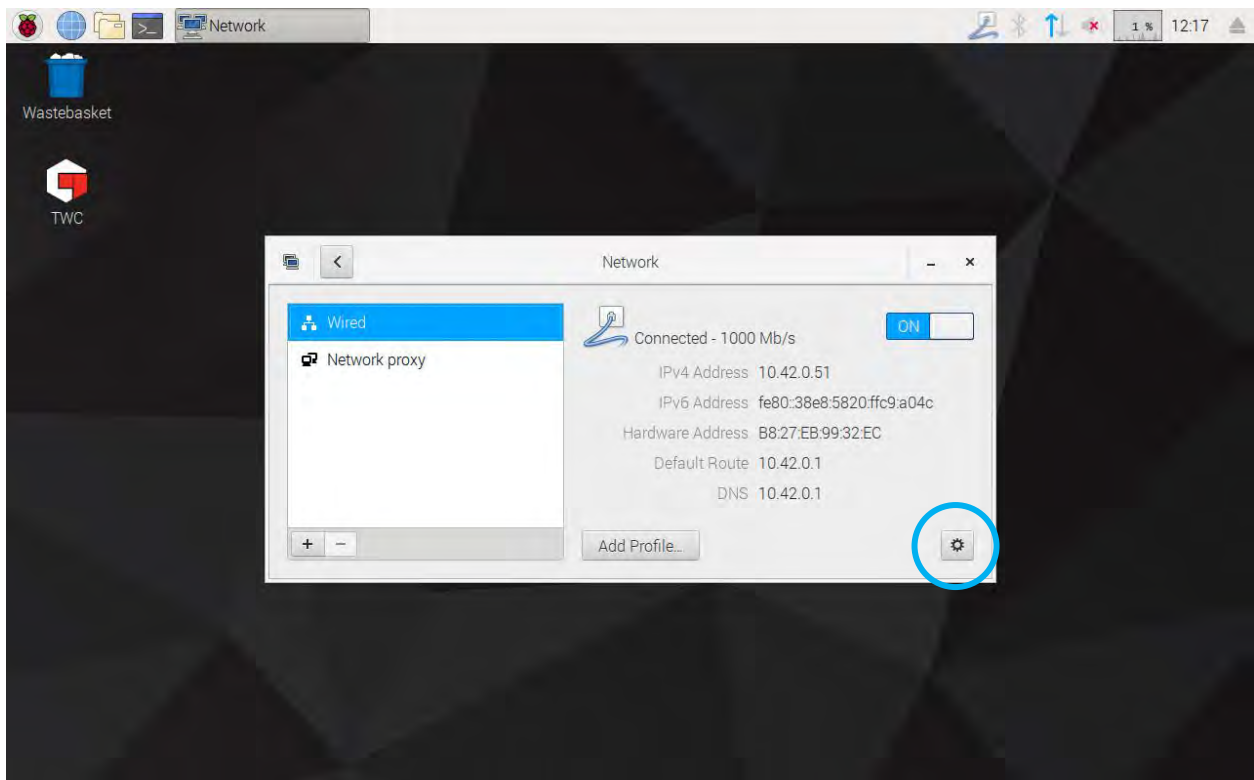
First, close the TWC UI as shown in the “Exit TWC UI” section. Then, open the menu bar, and choose Preferences > Settings.

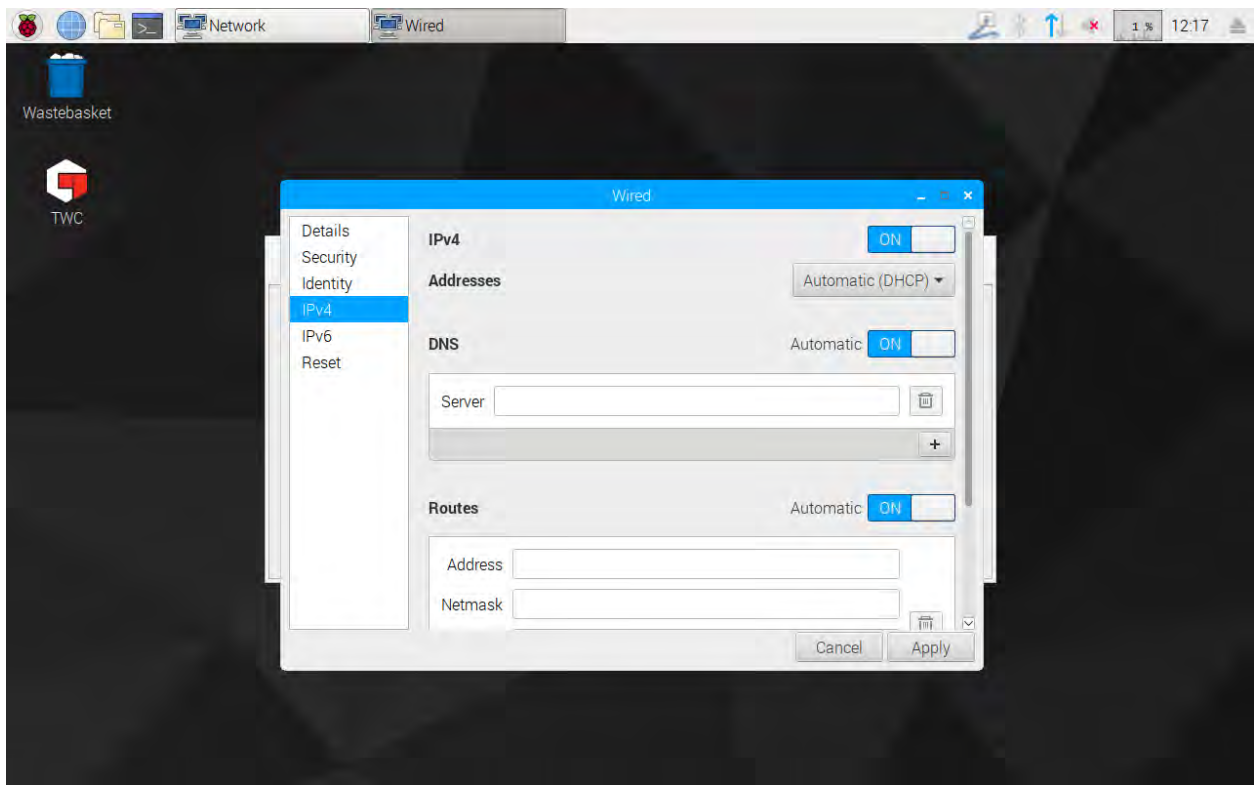


Now Click Network Configuration to open the network configuration panel.

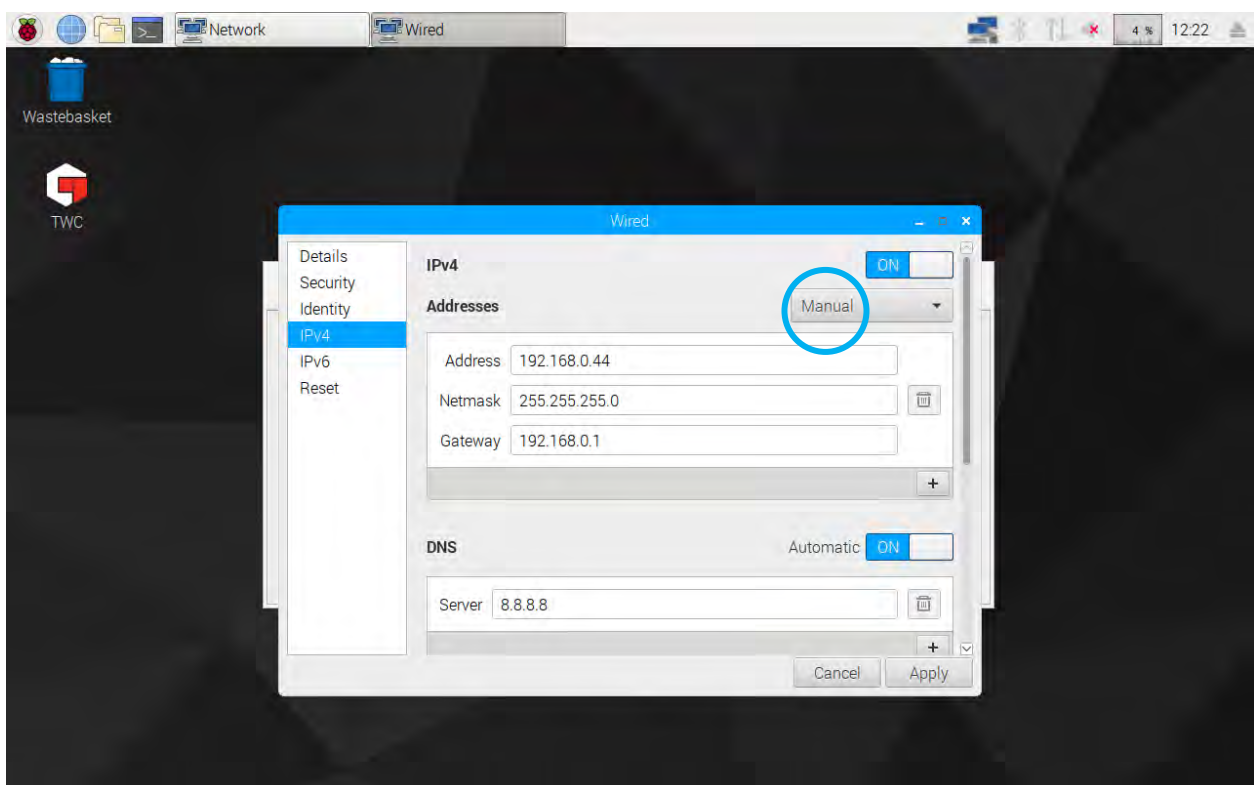


The panel will show the current network state. You should see something like the below if a network cable is connected. Ensure the Wired connection is selected, as shown here, and press the settings icon in the bottom right to open the network settings panel.





Under the IPv4 tab, change the “Addresses” drop-down setting from “Automatic (DHCP)” to “Manual” as shown here, then type in your desired settings using the USB keyboard:



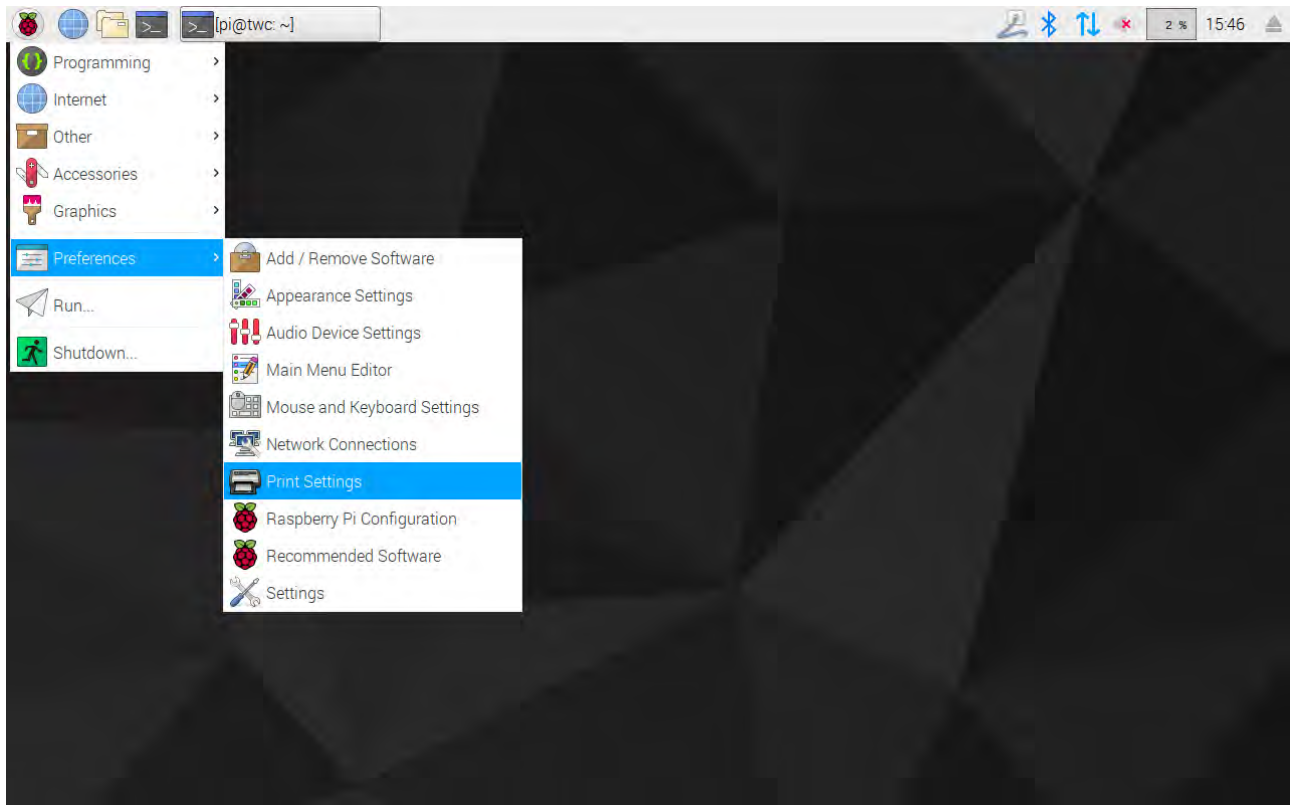
For most networks you are unlikely to need to change any other settings in this window than enter the IPv4 Address, Netmask, Gateway and DNS. You will either already know what you want these to be, or your IT department can advise.

Printer Setup

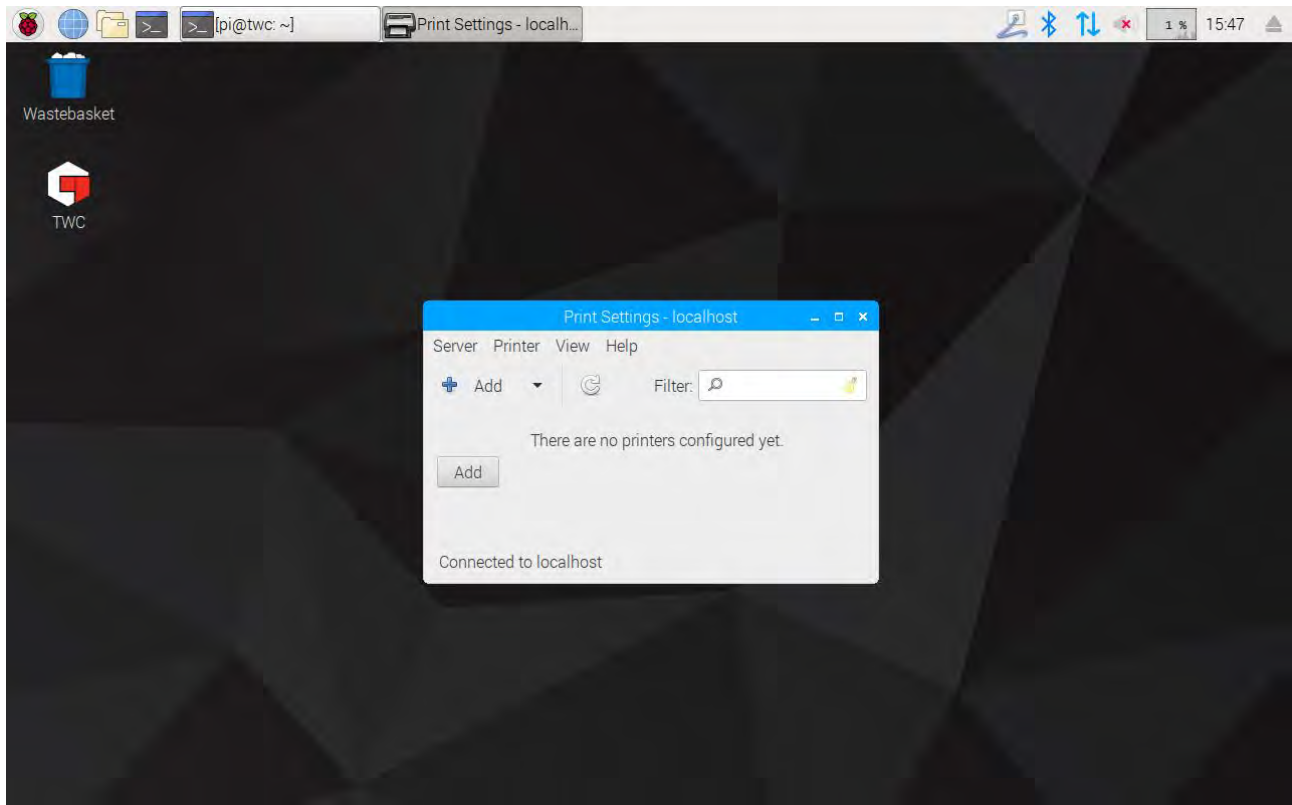
The TWC supports printing directly to a printer attached via either USB or remotely via Ethernet. Alternatively, if no printer is available, documents can be “printed” as PDF files.

NOTE: To add a printer you will need to connect a USB keyboard to the TWC. Network connectivity is required to allow the TWC to search for and attempt to download driver packages for printers when setting up. Network printers will not be visible if the TWC isn't on the network.

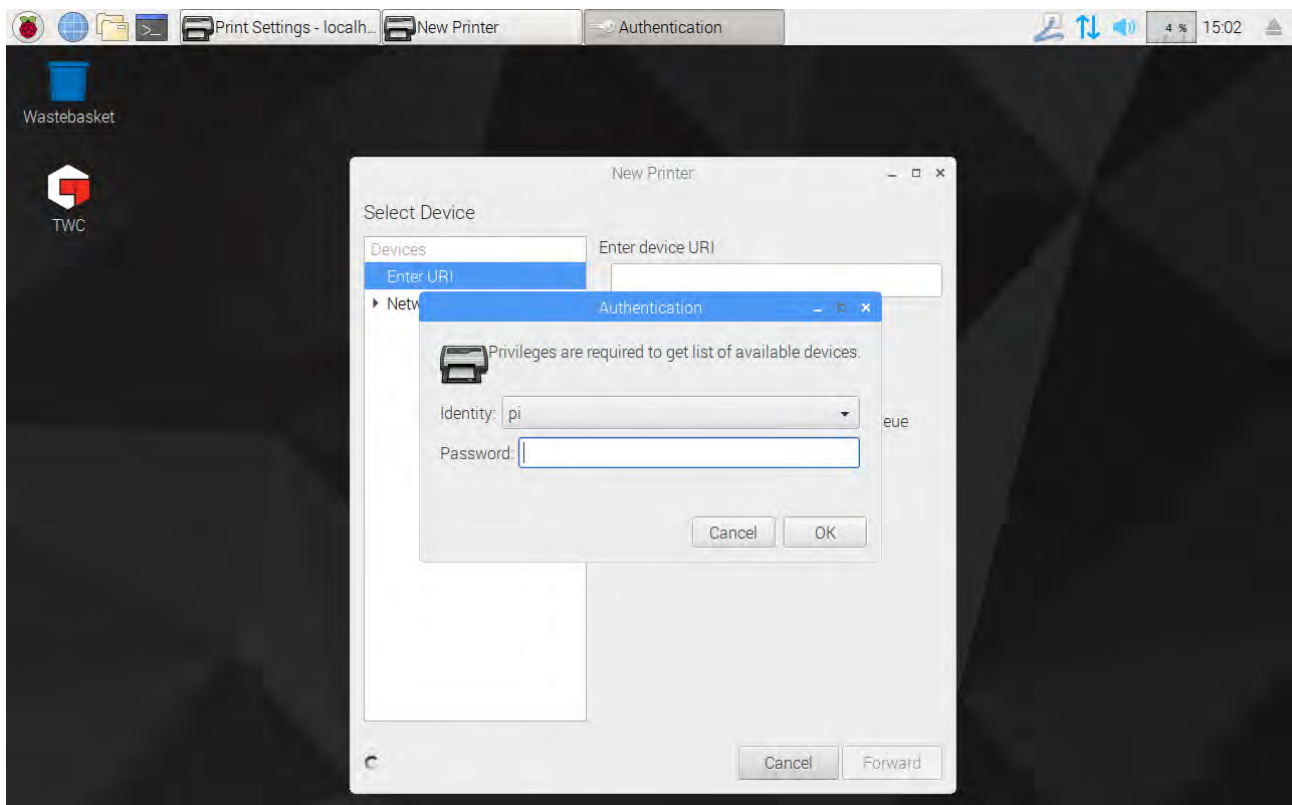
To add a printer, close the TWC UI as shown in the “Exit TWC UI” section, then open the menu bar and go to Preferences > Print Settings



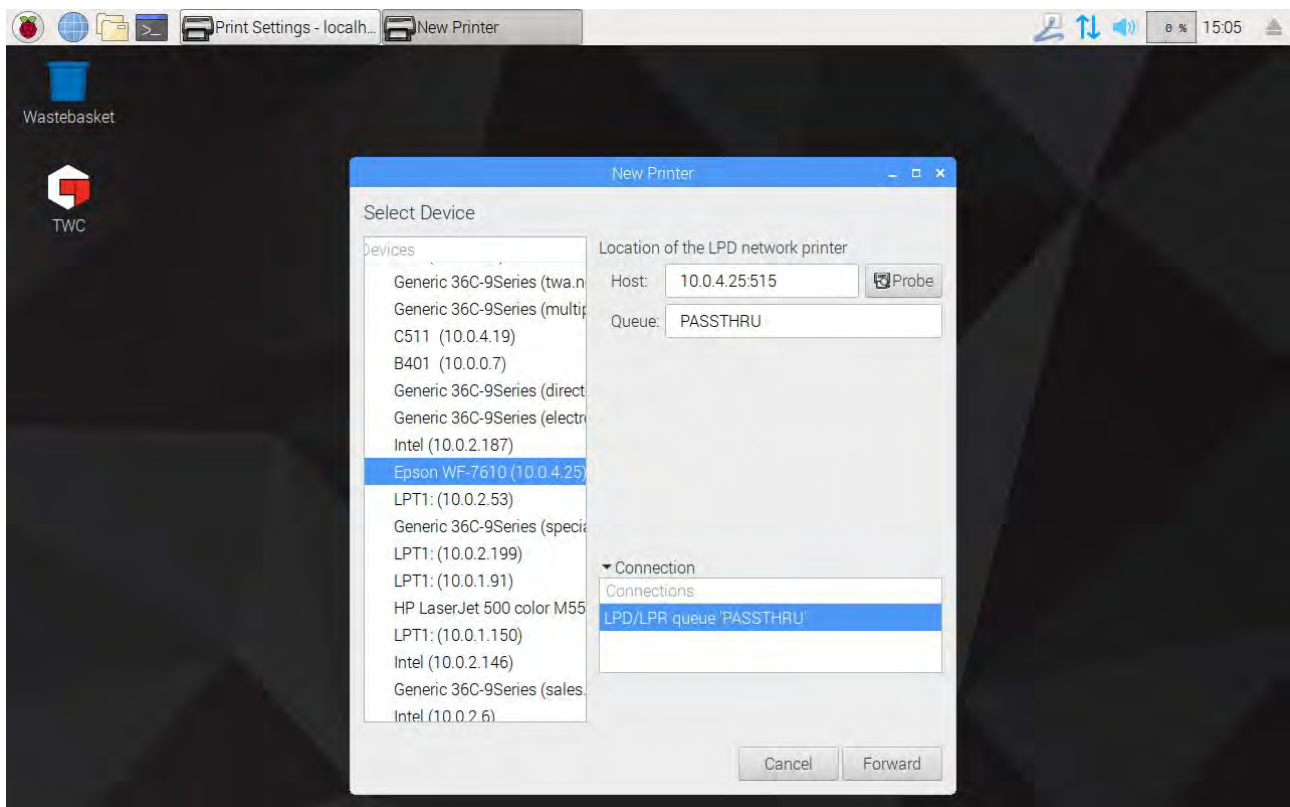
In the window that appears, click “Add” to add a printer.



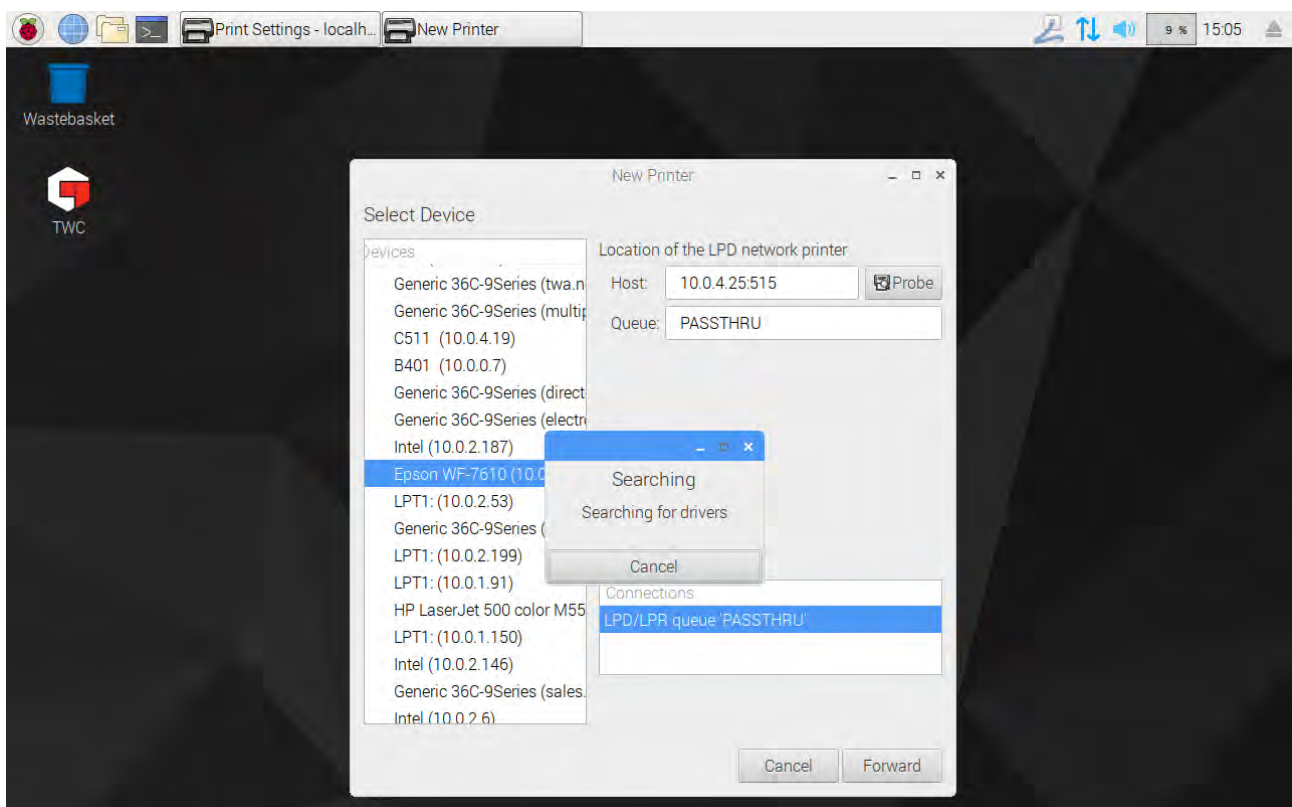
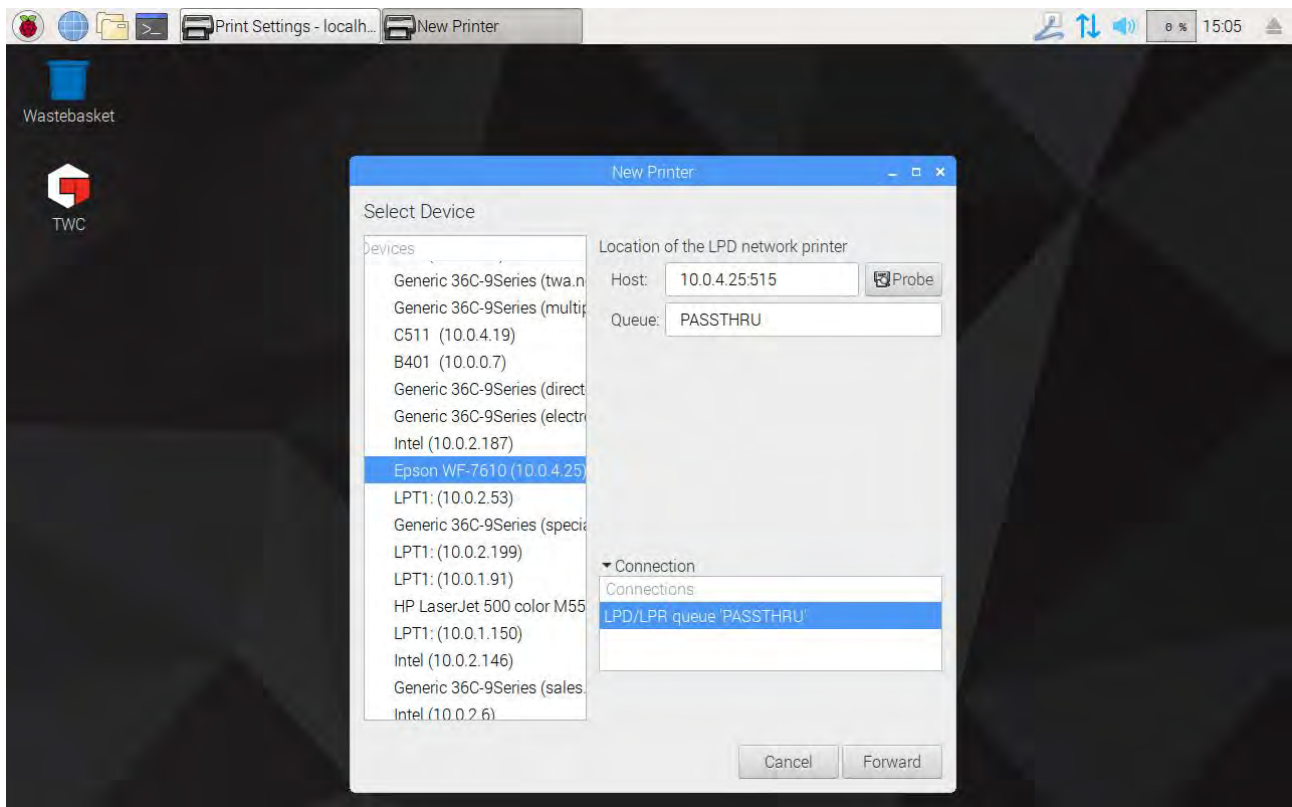
Enter your password (default is “NorbarTWC”) to unlock the printer selection screen.



In the left-hand list will appear a USB-attached printer if currently connected. Beneath this, under the Network Printer drop-down menu, network printers will appear as and when the TWC finds them (this may take several seconds).

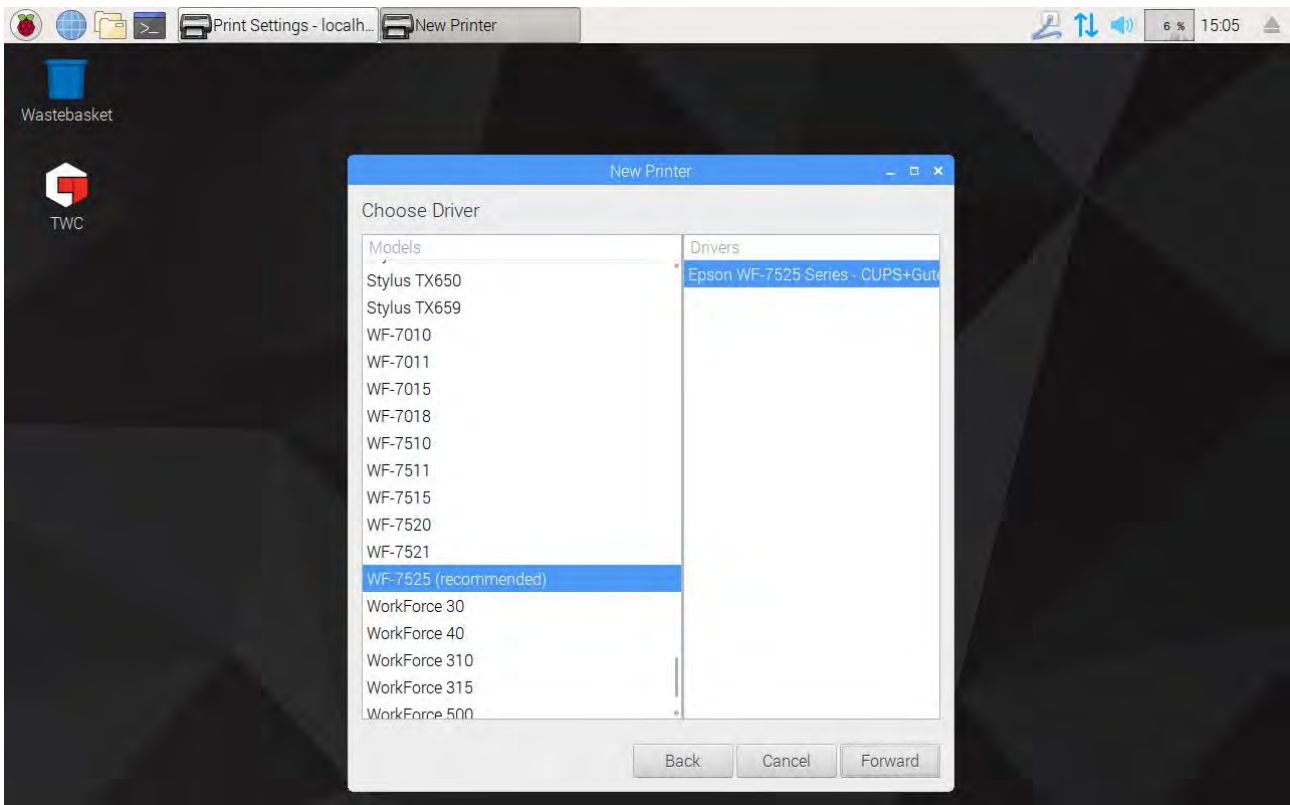
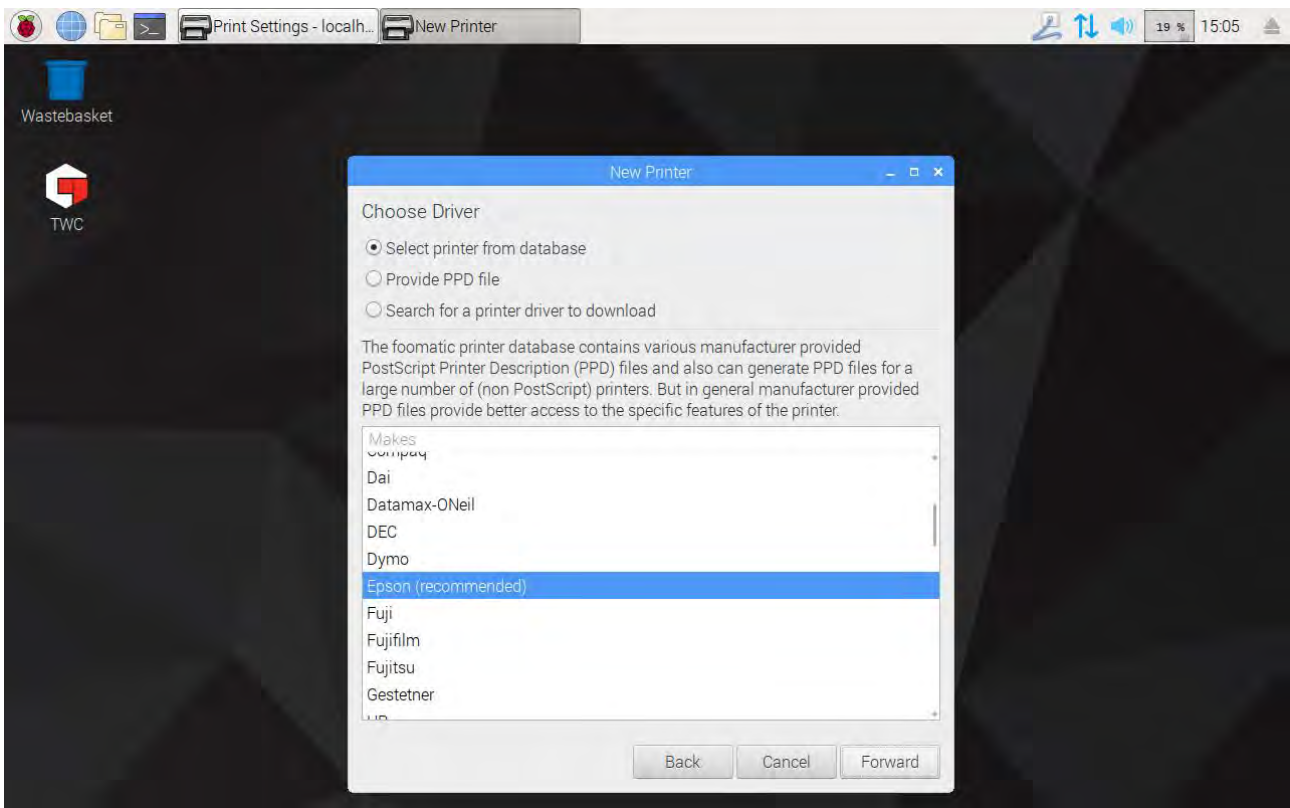


Add a printer by selecting it and clicking “Forward” to follow the on-screen prompts.

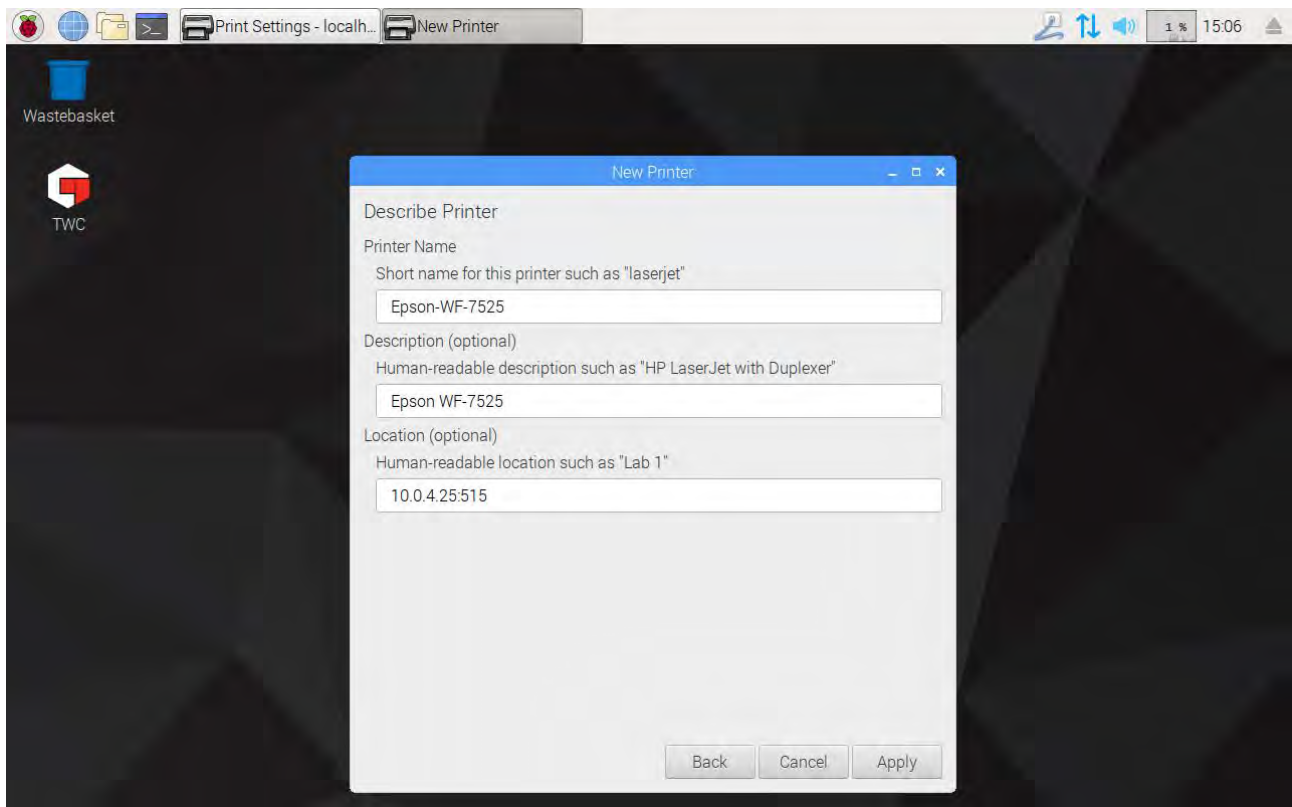


Select a driver for the printer (it's generally best to go with recommended drivers). Press Forward each time when ready to proceed.

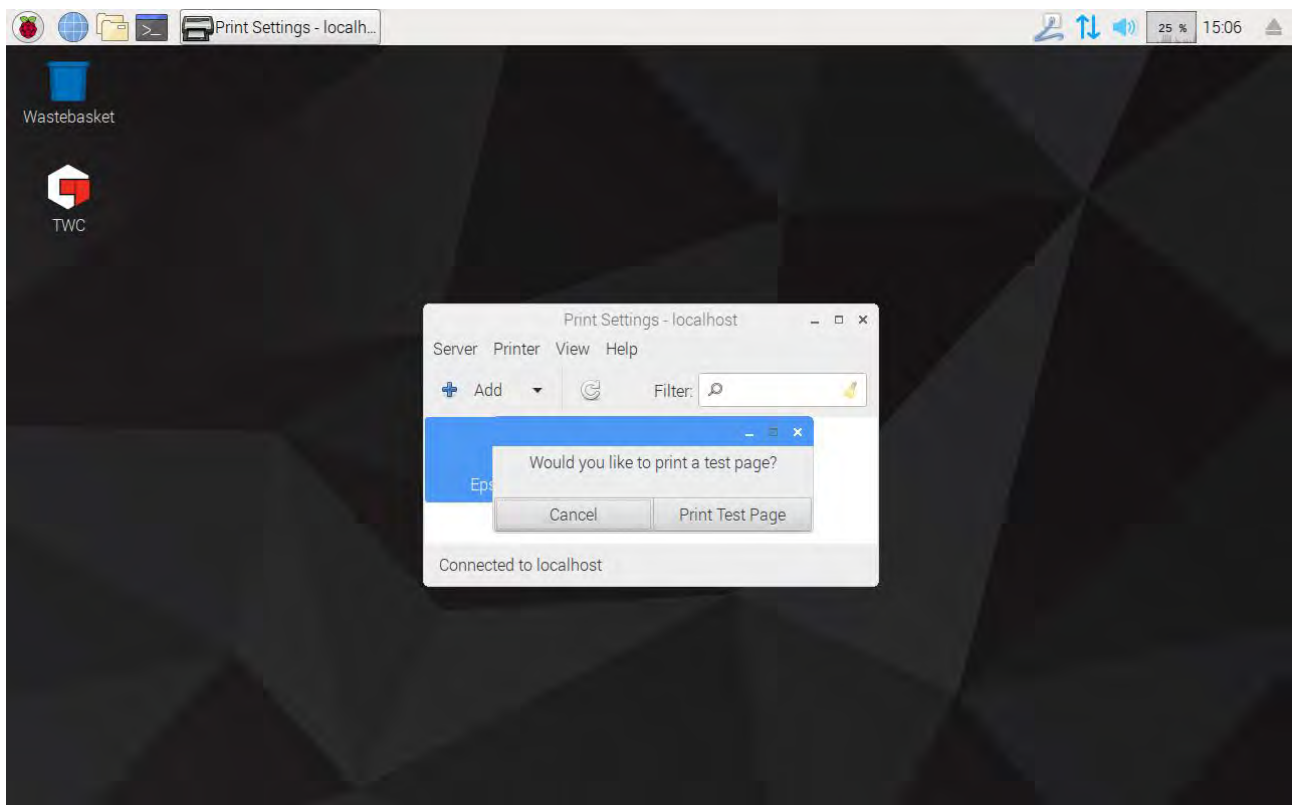
NOTE: Some printers, for example HP printers, may have special driver packages that add or otherwise enhance compatibility with their printers.



Enter a friendly name for the printer if you wish (otherwise it will select a default name for you). When you click Apply, you will need to enter the system password again (default is "NorbarTWC").



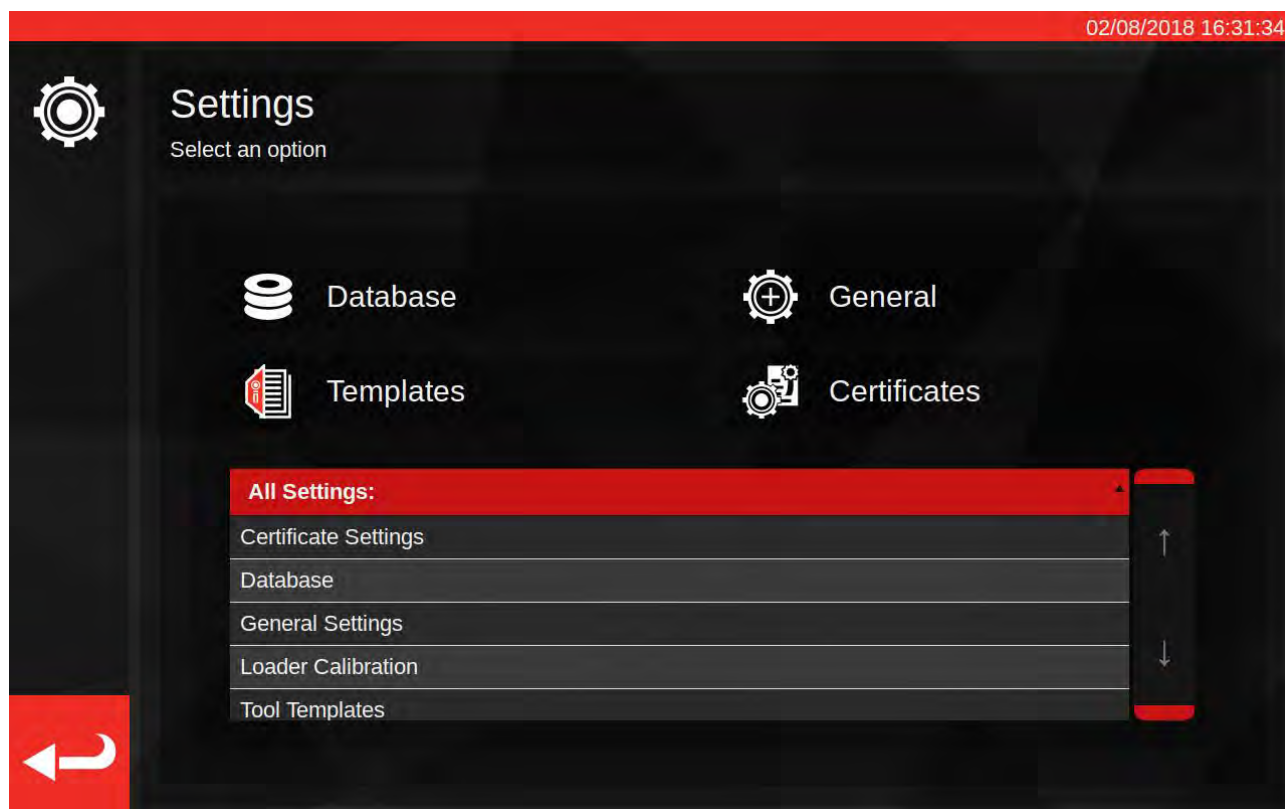
At this point the printer is added and you can print a test page. The printer will appear as an option when printing certificates or declarations of conformance from the TWC UI.



Settings

The settings menu lets users customise document headers (like company name, logo and address), change sensitivity of the peak detection algorithm, backup, restore or erase the database or enter calibration data for the TWC and currently attached transducer.

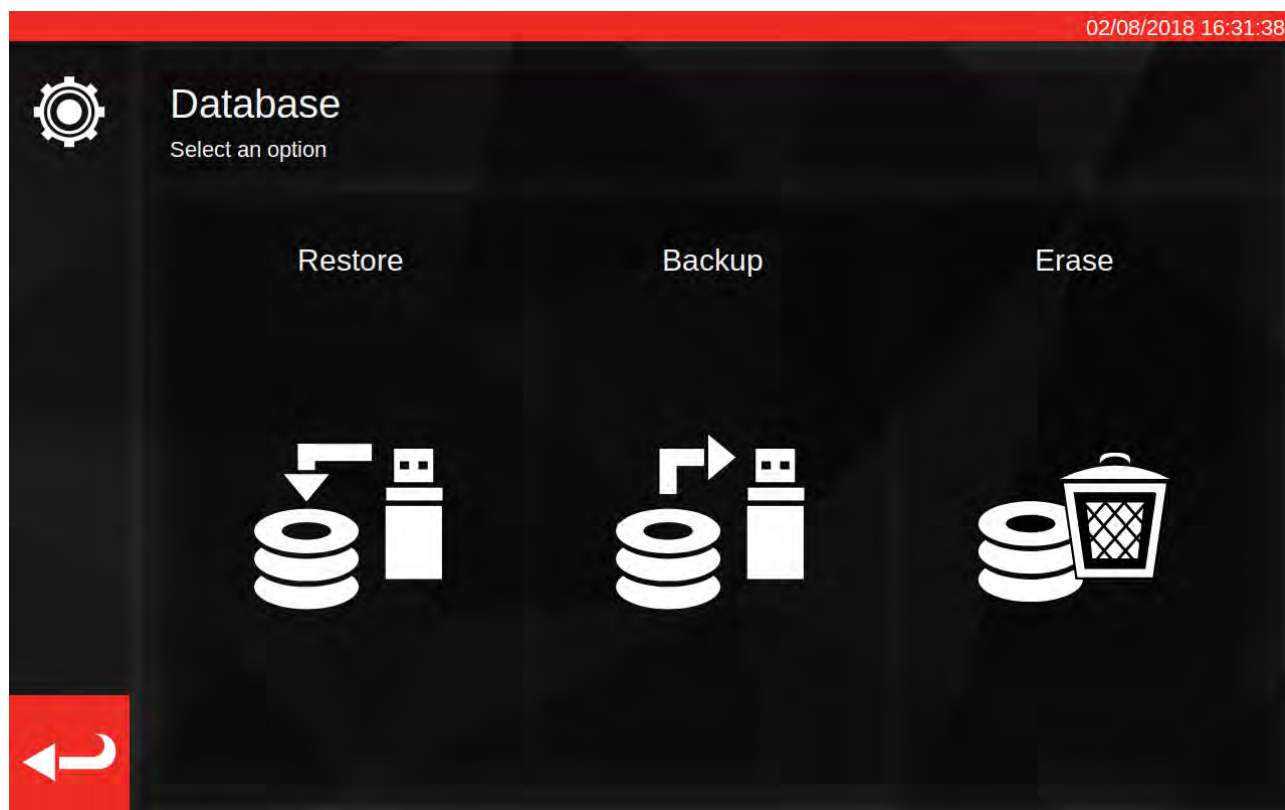
NOTE: Before using any transducer to perform jobs on tools with the TWC, you must provide the TWC with information from the calibration certificate. If you do not do this you will be interrupted and asked to provide the data. See “Loader Calibration” for details.



The settings menu comprises a table of all settings categories and a selection of larger buttons for the most common ones at the top. You may use either the table or the buttons as you please.

Database

This menu allows the TWC data store to be backed up to, or restored from, a USB memory stick. It also allows the data to be erased.



“Data” comprises:

- Tools and tool templates
- Jobs and documents produced from completed jobs
- Uncertainty data

Settings are not considered “data” and therefore are not affected by backup, restore, or erasure options.

To perform a backup or restore, simply insert a USB memory stick, wait a few seconds, and select the desired option.

NOTE: You may see a popup window appear when inserting a memory stick. Simply tap cancel, or tap on the TWC UI behind it, to drop back to the TWC interface.

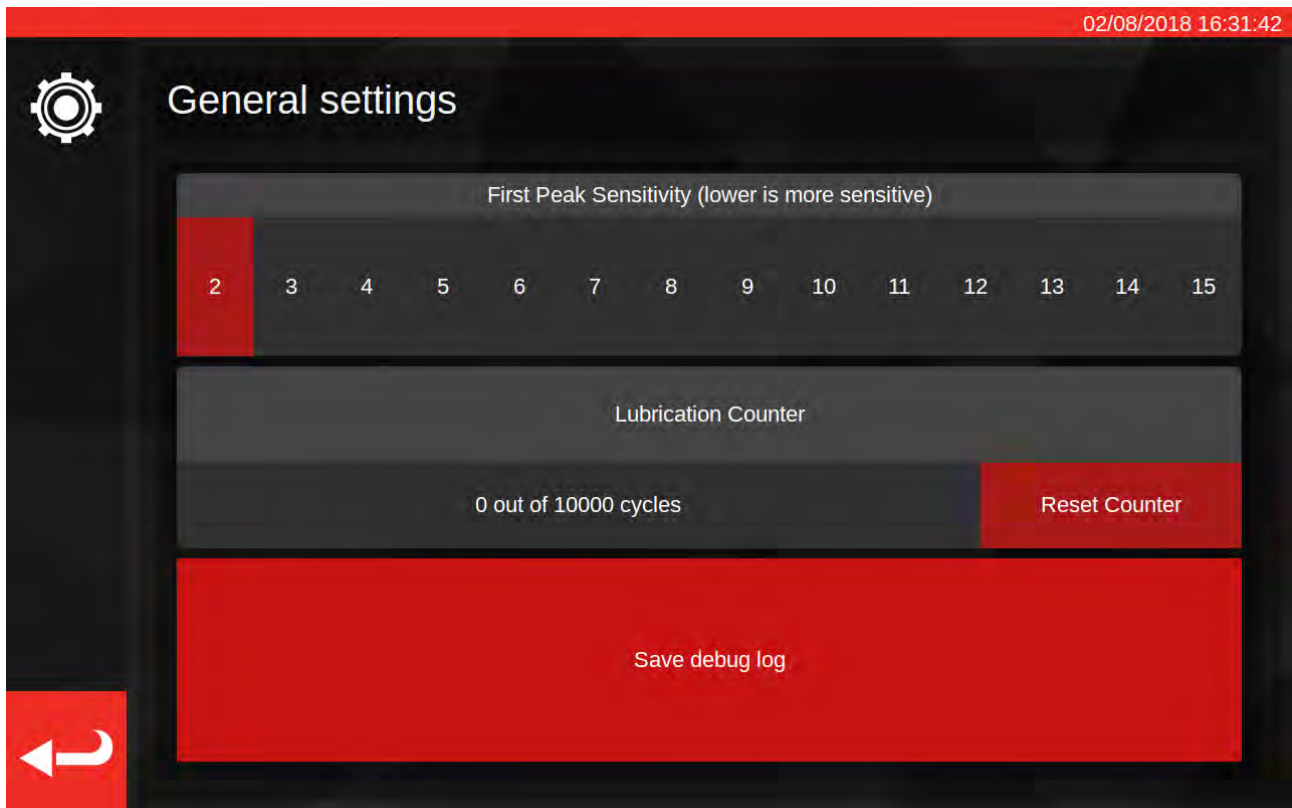
NOTE: Memory sticks are best formatted in FAT32, and should not have more than one partition.

NOTE: You may back up as many times as you wish to a USB stick, but do not restore from a stick that contains multiple backups; whilst it will work, you will not have control over which backup is selected and restored.

NOTE: Restoration is a destructive process; all data already on the TWC will be removed to make way for the backup.

General Settings

This menu lets you change the sensitivity of the TWC to peaks produced by setting tools. It also provides a means to observe and reset the lubrication cycle counter (how many cycles remain until the TWC should be lubricated) and a means to save a debug log in the event of any issues requiring support from Norbar.



The first peak sensitivity setting lets you choose how big of a peak must be observed before it's taken as a legitimate first peak reading. If the TWC does not appear to detect the click of your setting tool, try reducing the first peak sensitivity setting to a smaller value. The default value is 5. Conversely, if the TWC is detecting false peaks, try raising this setting so the TWC only pays attention to larger changes in torque.


To reset the lubrication counter, lubricate the TWC and press "Reset Counter". If the counter ever reaches the 10,000 cycle limit, you will see reminders to lubricate the TWC every time you load a job task or the adjustment screen.



To save a debug log, insert a USB stick, wait a few seconds, and press "save debug log". If you contact Norbar for support, you may be asked to do this in order to help diagnose any issues.

Loader Calibration

In order to produce calibration and conformance certificates, the TWC must know about its own calibration state. This is managed here. In this screen you can input calibration data from both the TWC and the currently attached transducer's calibration certificates. You will need to do this for every transducer you plug into the TWC, but you only need to do this once (at least, until recalibration is required).

14/08/2018 15:53:28



Select Direction  

Recalibration Window 730

Current TD	
Model	50675.LOG
Serial	109067
Cal State	Done: 11/06/2018
Bottom of Scale %	2%
Cert #	227756
Lab #	0256

Transducer Uncertainty Data	
BOS Expanded	BOS Interval
0.30	0.61
5% Expanded	5% Interval
0.20	0.20
10% Expanded	10% Interval
0.11	0.16
>= 20% Expanded	>= 20% Interval
0.079	0.094

TWC	
Model	400
Serial	DEMO123
Cert #	12345
Sys Cal	???
Inst Cal	Done: 30/07/2018
Cal State	Instrument

Rig Uncertainty Data	
5% Expanded	
0.20	
10% Expanded	
0.13	
20% Expanded	
0.11	

The screen is split into the following areas:

1. Direction buttons: use these to view TWC calibration state for CW and CCW directions.
2. Recalibration window: when this many days have passed, the TWC's calibration will be considered invalid. You may change this value to suit your obligation to systematically review the calibration state of your TWC, per ISO 6789. The default value is 730 days, which is two years.
3. Transducer data: The left side of the screen is where you enter data for the transducer; the calibration date from the certificate, the calibrated bottom of scale, the cert number and lab number, and the uncertainty data from the transducer.
4. TWC data: The right side of the screen is where you enter data for the TWC; here you can enter the cert number, and rig uncertainty data from the TWC calibration certificate. You need only fill in these fields if you are using an instrument-calibrated TWC and there is no overriding system calibration for the currently attached transducer. The TWC model, serial, sys cal, inst cal, and cal state fields are automatic and not editable.

How to Fill in Loader Calibration Page

The TWC has two main calibration states: “system” calibration and “instrument” calibration.

A “system” calibration is where the TWC and the transducer have been calibrated as a matched pair (a “system”). In this case, we do not need any data from a TWC calibration certificate as it is all provided by the transducer certificate.

To have a valid system calibration, the TWC must have been system calibrated with the currently attached transducer, and you must fill in:

- Transducer cert number and lab number
- Transducer cal date
- Transducer bottom of scale
- Transducer uncertainty data (see “**How to fill in uncertainty data**”)

An “instrument” calibration is where the TWC and the transducer were calibrated separately. In this case, we need data for both devices, such that their calibration information can be combined.

To have a valid instrument calibration, the TWC must have been instrument calibrated, the transducer must have been calibrated, and you must fill in:

- Transducer cert number and lab number
- Transducer cal date
- Transducer bottom of scale
- Transducer uncertainty data
- TWC cert number
- TWC rig uncertainty data (see “**How to fill in uncertainty data**”)

NOTE: Do not change transducers while within the settings menu. The TWC will not re-enumerate it and you risk corrupting the calibration state of the TWC-TD combination if you change any loader calibration fields after having changed the transducer. If you wish to change transducer, first leave the loader calibration menu, then leave the settings menu entirely, then re-open it from the main menu. The TWC will then detect the new transducer.

NOTE: Always ensure the serial number of the transducer shown in the Current TD “Serial” field matches that of the transducer you are trying to enter data for. If it does not, try leaving the loader calibration menu, leaving the settings menu and re-opening it from the main menu again.

How to Fill in Uncertainty Data

1. Refer to the final page of your TWC/transducer calibration; the page should be titled “Expression of Uncertainties”

For Transducers:

On the “Expression of Uncertainties” page, you should see a table like the following (shown here, an example for a 400 N·m transducer):

	Expanded uncertainty k=2.0	Uncertainty interval k=2.0
At 20.00 N·m	±0.15%	±0.38%
At 40.00 N·m	±0.12%	±0.18%
At 80.00 N·m	±0.099%	±0.11%
At 160.00 N·m	±0.087%	±0.11%
At 240.00 N·m	±0.087%	±0.13%
At 320.00 N·m	±0.084%	±0.12%
At 400.00 N·m	±0.084%	±0.11%

First, fill in the “BOS Expanded” and “BOS Interval” values for the bottom of scale; these come from the expanded uncertainty and the uncertainty interval at the very lowest reading, in this case 20 N·m. That means the BOS Expanded field is 0.15% and the BOS Interval field is 0.38%.

Next fill in the 5% Expanded and 5% Interval fields **using the readings at 5% of transducer capacity**. In this case, this is the same as the BOS Expanded and BOS Interval values, because in our example, the transducer’s bottom of scale is 5%.

Repeat the same procedure for the 10% fields **using the readings at 10% of transducer capacity** (in this case, the Expanded field is 0.12% and the Interval field is 0.18%)

For the final two fields, we need to **select the worst-case (largest) expanded uncertainty of the remaining transducer range equal to and above 20% of transducer capacity**, and its corresponding uncertainty interval. This is usually the next field on from the 10% readings anyway, and indeed this is the case in our example: therefore, the Expanded field should be 0.099% and the Interval field should be 0.11%.

For the TWC (If Instrument Calibrated):

On the TWC certificate’s expression of uncertainties, you should see the following (shown here, an example for a TWC):

At 0.50mV	Is ±0.20%	k=2.0
At 1.00mV	Is ±0.13%	k=2.0
At 2.00mV to 11.00mV	Is ±0.11%	k=2.0


The percentages here tally up with the mV values, so 0.50mV is the 5% value, 1.00mV is 10%, and so on. Enter all three percentage values from the table in the 5%, 10% and 20% fields respectively. In this example, the 5% Expanded field is 0.20%, the 10% Expanded field is 0.13%, and the 20% Expanded field is 0.11%.

IMPORTANT: BE EXTREMELY CAREFUL YOU ENTER THE CORRECT VALUES IN THESE FIELDS. DOUBLE AND TRIPLE CHECK TO MAKE SURE. IF YOU DO NOT ENTER THE CORRECT VALUES, ANY CALIBRATIONS OR CONFORMANCE JOBS PERFORMED BY THE TWC MAY BE RENDERED INVALID.

Certificate Settings











This menu lets you configure the content of the calibration and conformance documents produced by the TWC. You can change the company address, the logo, and customise the certificate numbering scheme.


02/08/2018 16:31:55



Certificates

Enter certificate preferences

	Next Calibration Number	5		Header 1	Norbar Torque Tools Ltd
	Cal # Format	%N 5		Header 2	Wildmere Road Banbury Oxfordshire OX16 3JU UK
	Next Conformance Number	0		Header 3	T +44(0)1295 270333 F +44(0)1295 753643
	Conf # Format	%N 0		Header 4	E inquiry@norbar.com www.norbar.com
	Company logo:	/norbarlogo.png		Extra text:	



Next Calibration / Next Conformance number: for traceability, each calibration or conformance document is numbered, with the number increasing every time one is produced. You can set or change that number here for both types of document.

Cal/Conf Number Format: This allows you to specify a more elaborate numbering scheme than just a flat number by using format modifiers and text of your choosing:

%N – insert the calibration/conformance number. This is the default setting. Output will be “1”, “2”, “3” etc.

%Y – Insert the current year (lowercast %y enters short year, i.e. 18 for 2018)

%m – Insert the current month

%d – Insert the current day

You can combine these with other text to produce more elaborate numbering. For instance:

%Y-CAL-%N

Will produce:

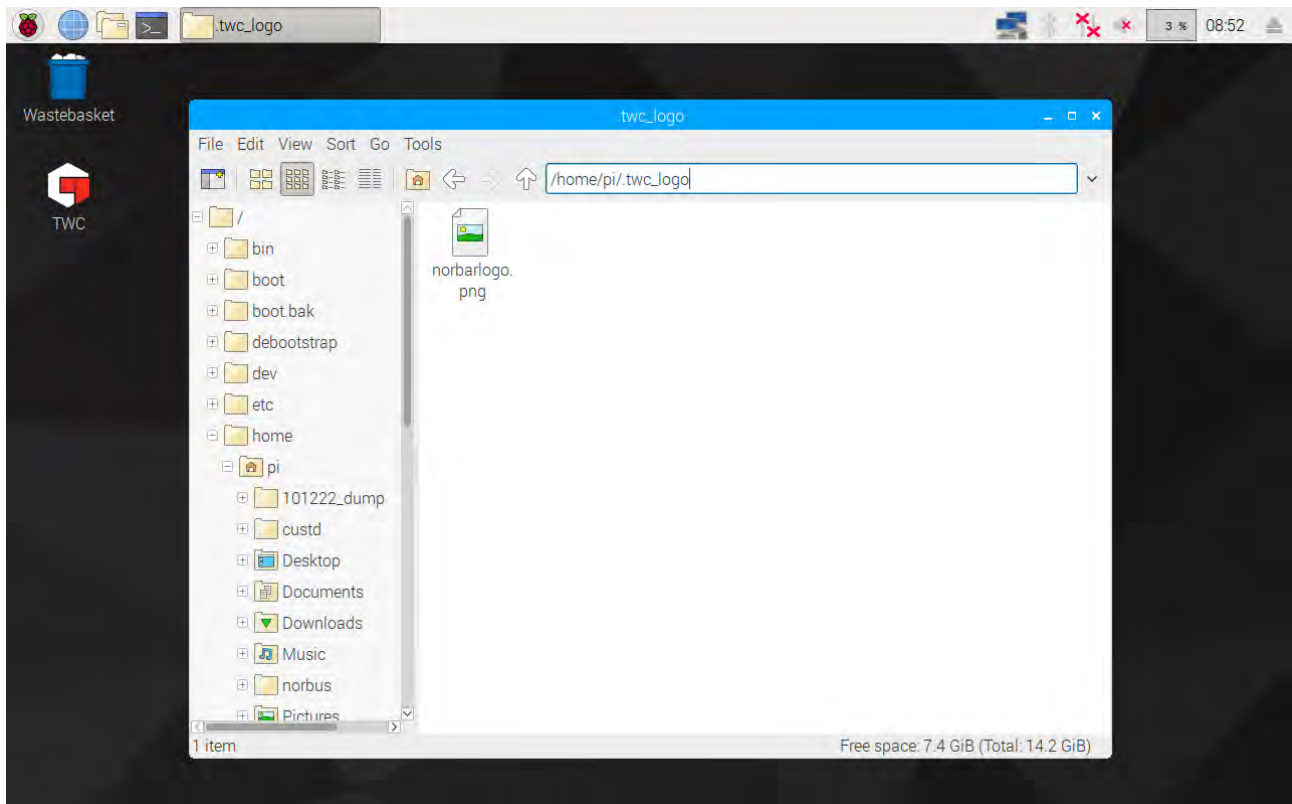
“2018-CAL-1”, “2018-CAL-2”, “2018-CAL-3”, etc.

When you save the format, you will see a preview of the output to be placed on the next document.

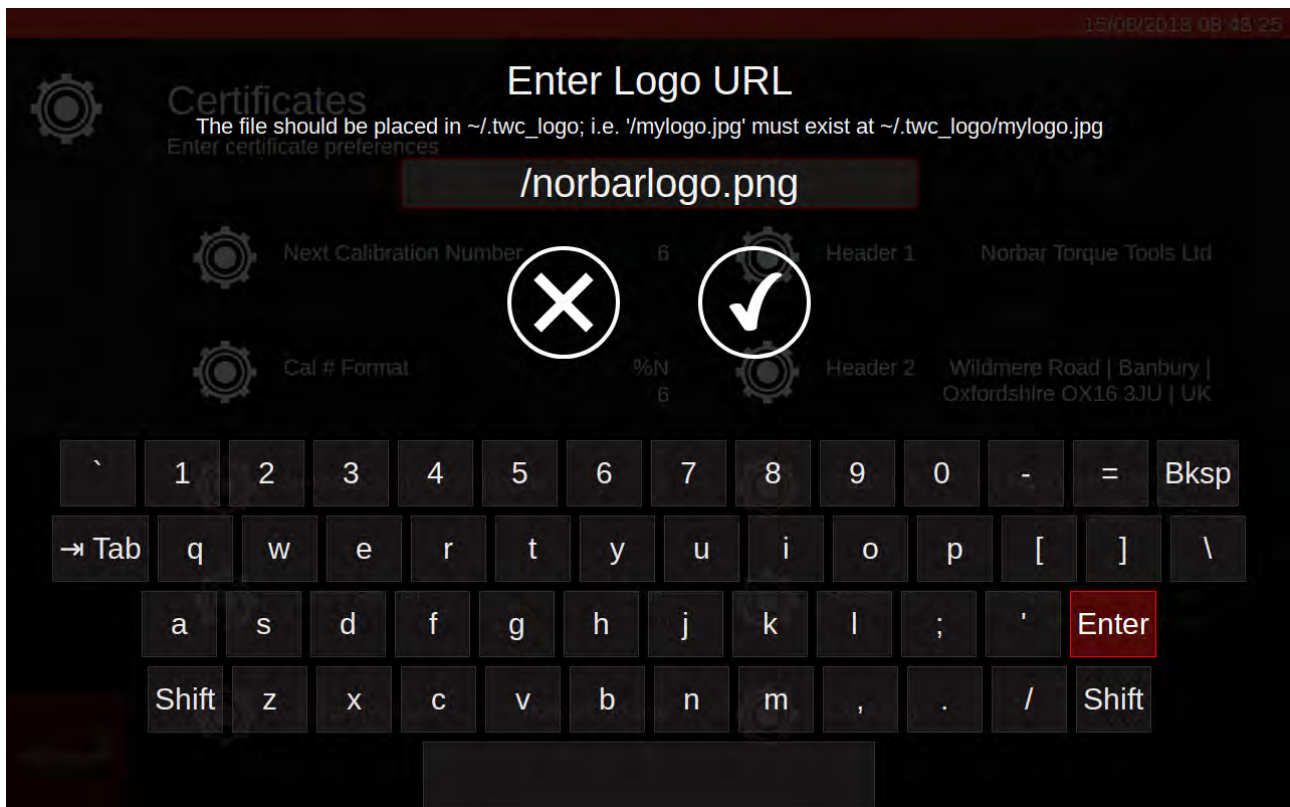
Company logo; this lets you change the logo from the default Norbar logo to one of your choosing. To do this, you must first place an image of your logo in the necessary folder: `~/twc_logo`

To do this:

- Attach a USB keyboard to the TWC (and optionally, a mouse)
- Close the TWC UI using the power icon on the main menu and pressing “Exit to Desktop”.
- Open the file manager; it should start in the user home folder by default
- In the address bar, add “.twc_logo” to the end of the path and press Enter to jump to the .twc_logo folder (as shown below)



- Copy your logo file in here (for instance, by copying it off a USB memory stick), making note of the file name. You can copy and paste a file by right-clicking it with a mouse and clicking “copy” or “paste”, or by highlighting it with the touchscreen and using “Edit > Copy” or “Edit > Paste” in the file manager menu, or by highlighting it with the touchscreen and using CTRL+C and CTRL+V on the keyboard.
- Restart the TWC UI by double-clicking the TWC icon on the desktop
- Go back to Settings > Certificate Settings and enter the name of the logo file, keeping the leading “/” at the start, as shown below:



NOTE: Your logo file should ideally not be larger than 400x160px or the document layout may be affected. Use the existing norbarlogo.png file for a good size reference.

NOTE: PNG and JPEG formats are supported. PNG is a lossless format which makes it a great choice for storing company logos, and is the recommended choice.

Headers and Extra Text Fields; The header fields are shown at the top of the certificate, next to the logo, and by default contain the company address. The extra text field appears above the results table if it is used and can contain anything you choose (though it should be brief, so as not to overrun the document with text and cause any layout issues).

NOTE: Any changes made in the Certificate Settings menu will not take effect until the next document is created. You cannot change documents which have already been created.

TWC Usage Overview

The TWC menu structure is data-centric and designed to follow the logical process of calibrating a tool from start to finish. The process for calibrating a tool is as follows:

Define a tool template (i.e. a torque wrench model) > Add a tool based on that template > Book a job for that tool (describe what you are going to do, i.e. calibration) > Perform the job > Produce documentation.

Templates

The TWC represents a tool using a tool template. The template defines a tool's model, supported units and capacities, physical configuration modifiers like extensions, removable end fittings, square or hex drives, and the calibration and conformance workflow. Before adding a tool to the TWC, you must select or create an appropriate template for it.

You can access the templates menu via the main menu, the settings menu, or even the tools menu (when you try to add a new tool, you will be invited to visit the templates screen to select or create a template).

Every tool requires a template, but a template can be used for more than one tool. For example, if you are calibrating 20x identical tools of same make, model and configuration, you should add them all under the same template. This is necessary if you plan to calibrate large quantities of identical tools and wish to gather uncertainty data for statistical analysis to speed up the process.

NOTE: Always use a specific template that accurately describes a tool. Do not create generic templates when using the TWC to calibrate tools. Only identical tools, with the same physical configuration (i.e. end fitting/extension) can share a template; otherwise, the results produced for ISO 6789-2:2017 calibrations may not be accurate.

Tools

Tools can be added in the tools menu, which is accessible from the main menu. When you add a tool, you will be asked to jump to the templates menu to create/select a template to use, and then enter a serial number. However, you can also copy an existing tool by selecting it before pressing the add button; in this case, you will be asked if you want to create another of those tools and only need to provide the serial number. This lets you quickly add several tools with identical serial numbers.

Jobs

Once you have created a tool, you can book a job for it. This tells the TWC what you wish to do with the tool. You may select between ISO 6789 Conformance or Calibration tasks, pick directions, specify whether taking readings as-found or as-left or both, select your desired units, and make adjustments to the calibration workflow.

Once booked, the TWC will track the progress and automatically mark the job as completed when appropriate. Simply follow the list of tasks and complete each one to complete the job.

You do not need to finish one job before booking and starting another, but each tool can only have one active job at a time. This allows you to book jobs for multiple tools in preparation to perform them later. However, if you start taking torque readings for a job you have booked, you should finish that job before doing anything else.

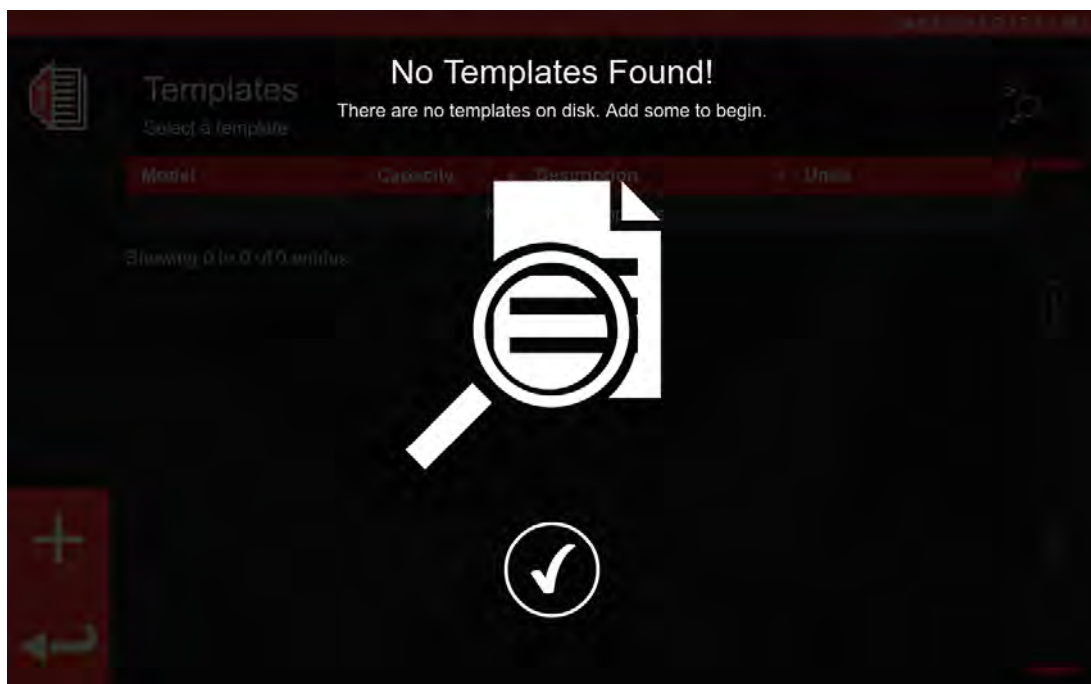
For ISO 6789-2:2017 calibration, the TWC automatically tracks and manages the uncertainty data necessary for statistically determining uncertainties. If you have sufficient data (at least 10x specimens of identical tools using the same tool template), you will be able to skip gathering the uncertainty data and just perform the calibration workflow. This dramatically speeds up the calibration process.

Add/Manage Template

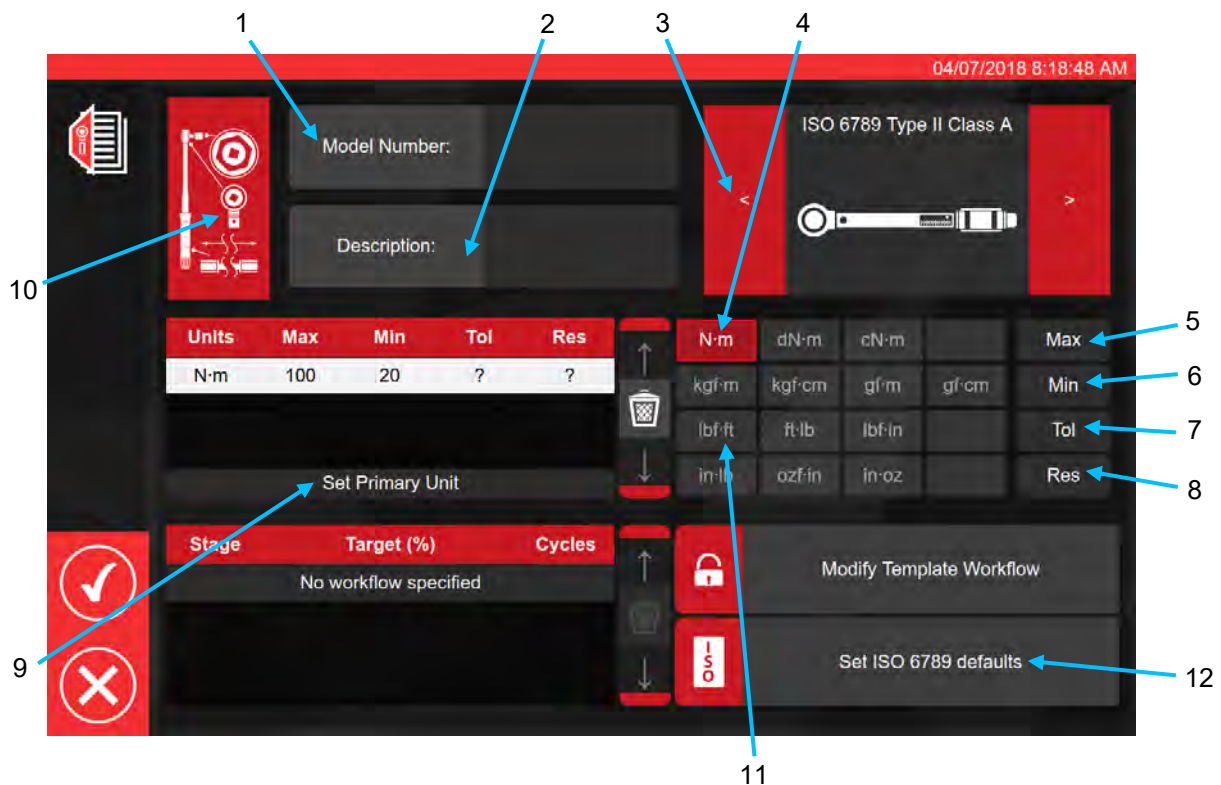
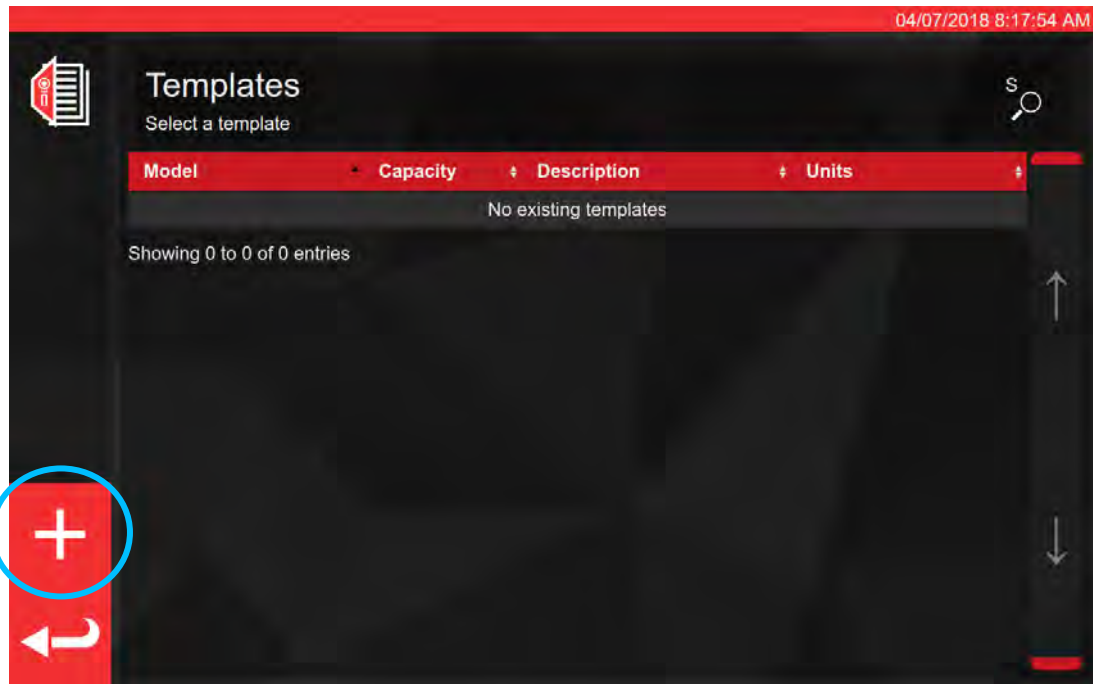
To add/manage a template press the Templates icon on the home screen.



If you have no templates the screen below will be shown.



Press the + icon to add a template.




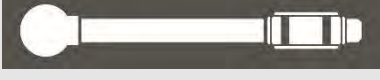

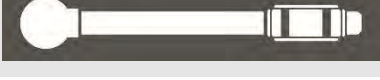



Following the sequence shown above enter all required data as requested for steps 1 through to 8. For step 9 this button needs to be pressed to be able to set the Primary units of measure.

A summary of the ISO tool types is given below; for full details please refer to the ISO standard.

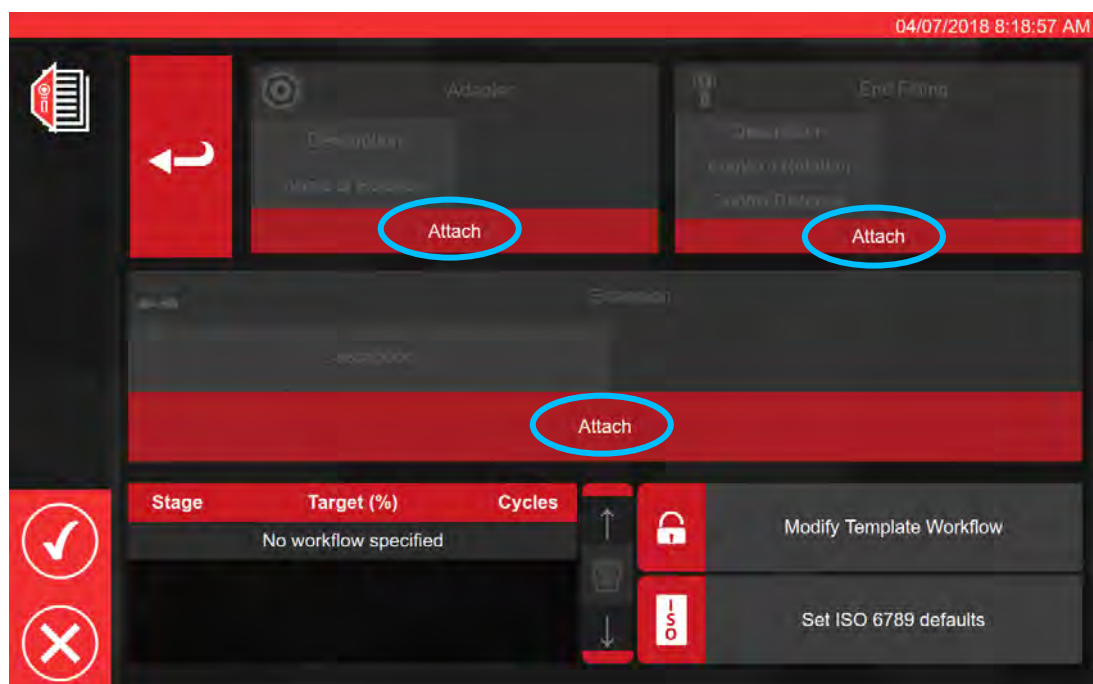
Tool Type I: Indicating torque tools (The torque exerted is indicated on scale, dial or display).

Tool Type II: Setting torque tools (A signal is given when the pre-set torque value is met).

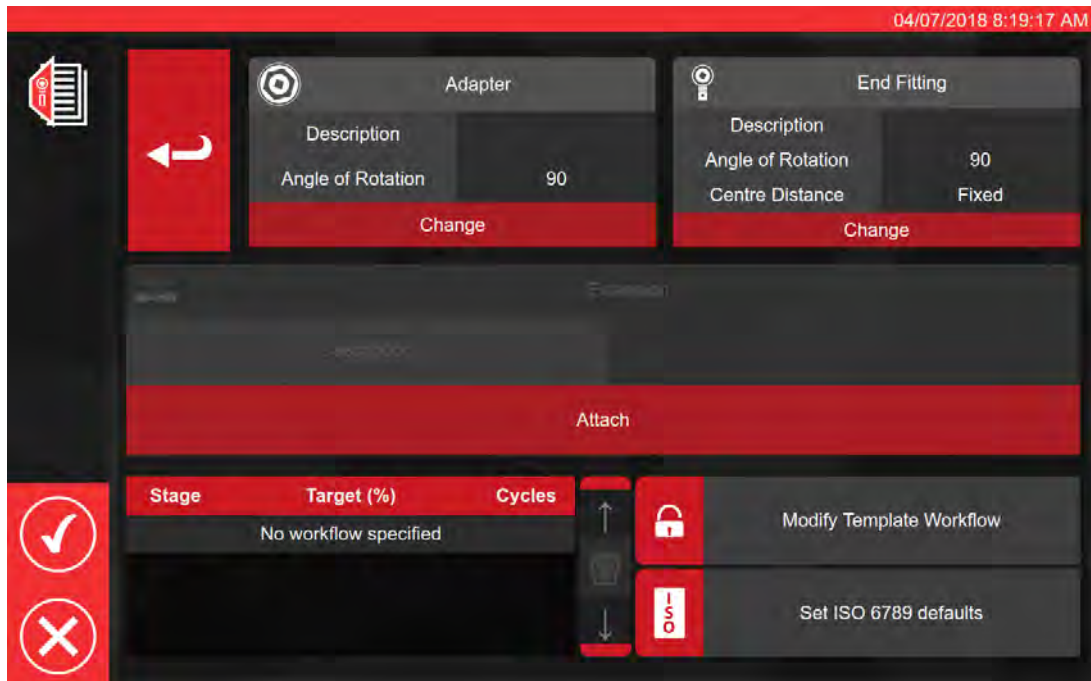
Type	Class	Description:	Example:
I	A	Wrench, torsion or flexion bar.	
	B	Wrench, rigid housing, with scale or dial or display.	
	C	Wrench, rigid housing and electronic measurement.	
II	A	Wrench, adjustable, graduated or with display.	
	B	Wrench, fixed adjustment.	
	C	Wrench, adjustable, non-graduated.	
	G	Wrench, flexion bar, adjustable, graduated.	

For step 10 press the tool configuration icon to enable adaptor/end fitting and extension parameters to be added

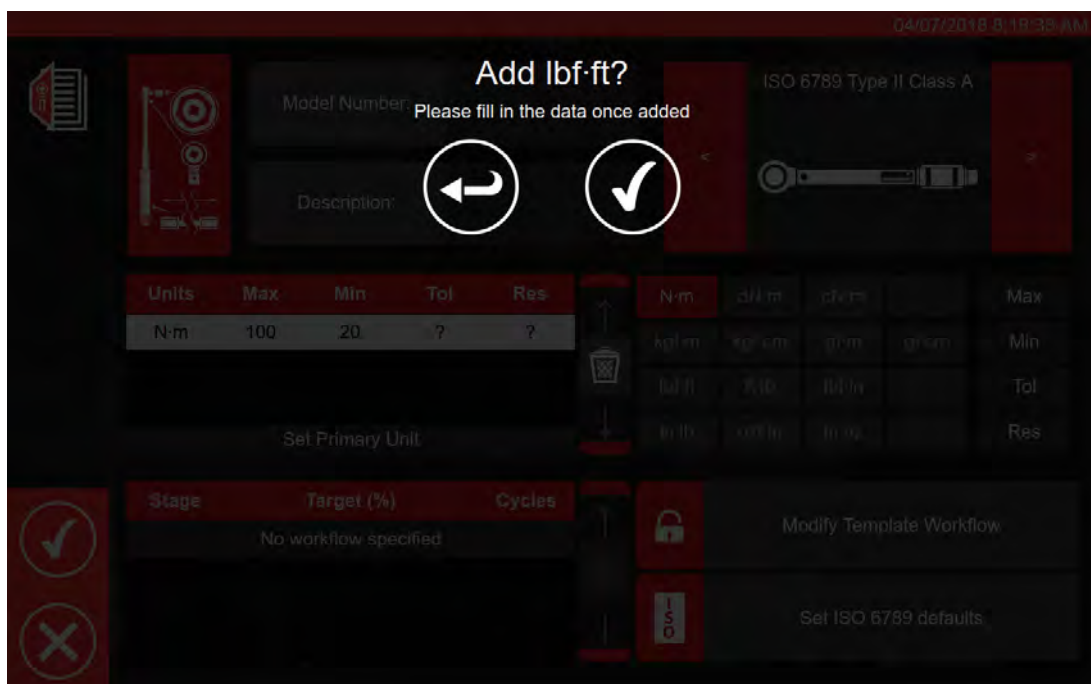
You will be asked to select where required the adaptor, ratchet type or extension used with the tool. Following on screen prompts follow on screen instruction for data entry.



Screen below shows selection of adaptor and ratchet drive with square drives.



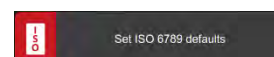
If secondary units are required select the desired units (see step 11).



Follow on screen instruction (most users will only select 1 set of units for calibration within the template).

NOTE: Your resolution might change when entering additional values.

From step 12 Set ISO defaults (following on screen prompts).



04/07/2018 8:22:11 AM

Model Number: 15003
Description: Norbar Prof Model 100

ISO 6789 Type II Class A

Units	Max	Min	Tol	Res
N·m	100	20	4	0.2
lbf·ft	75	25	4	0.2

Set Primary Unit

Stage	Target (%)	Cycles
PRE	100N·m (100%)	3
1	20N·m (20%)	5
2	60N·m (60%)	5
3	100N·m (100%)	5

N·m dN·m cN·m Max
kgf·m kgf·cm gf·m gf·cm Min
lbf·ft ft·lb lbf·in Tol
in·lb ozf·in in·oz Res

Modify Template Workflow
Set ISO 6789 defaults

Press to confirm and save.

The new template will be shown as a new line within TEMPLATES.

04/07/2018 8:23:57 AM

Templates

Select a tool template

Model	Capacity	Description	Units
15003	100 N·m	Norbar Prof Model 100	N·m, lbf·ft

Showing 1 to 1 of 1 entries






Press return to go back to the home screen.

Creating Certificates or Declarations of Conformance

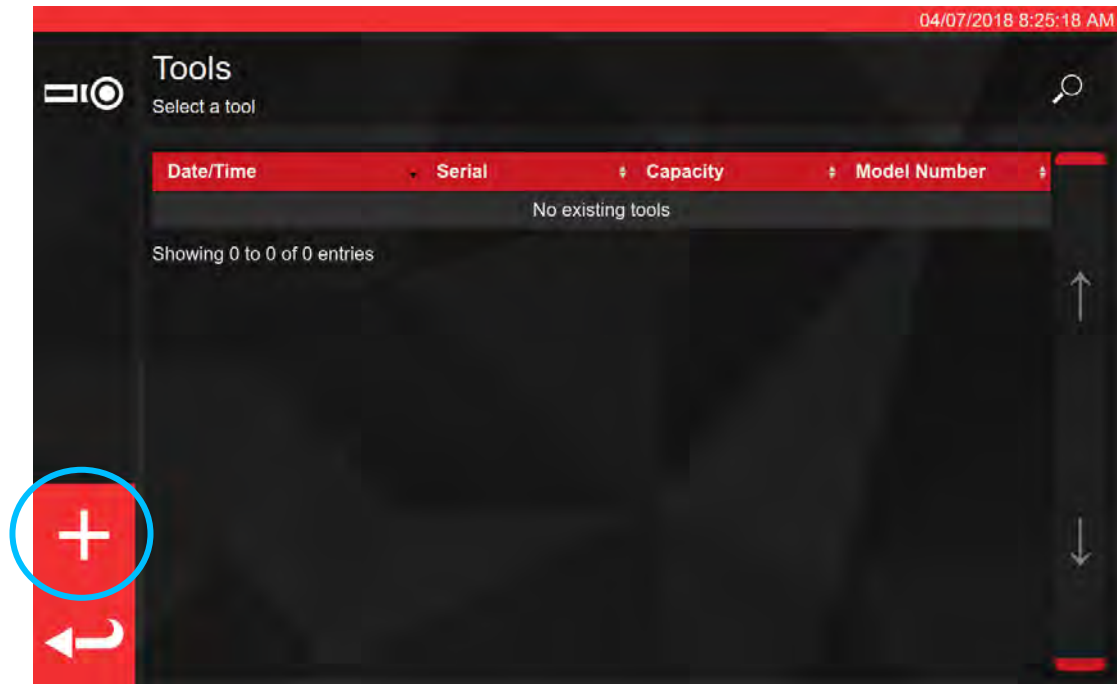
This section shows a start-to-finish walkthrough of how the TWC is normally used. In this section, we will add a tool, book a job for the tool, perform the job and produce a certificate.

First select Tools from the Home screen.

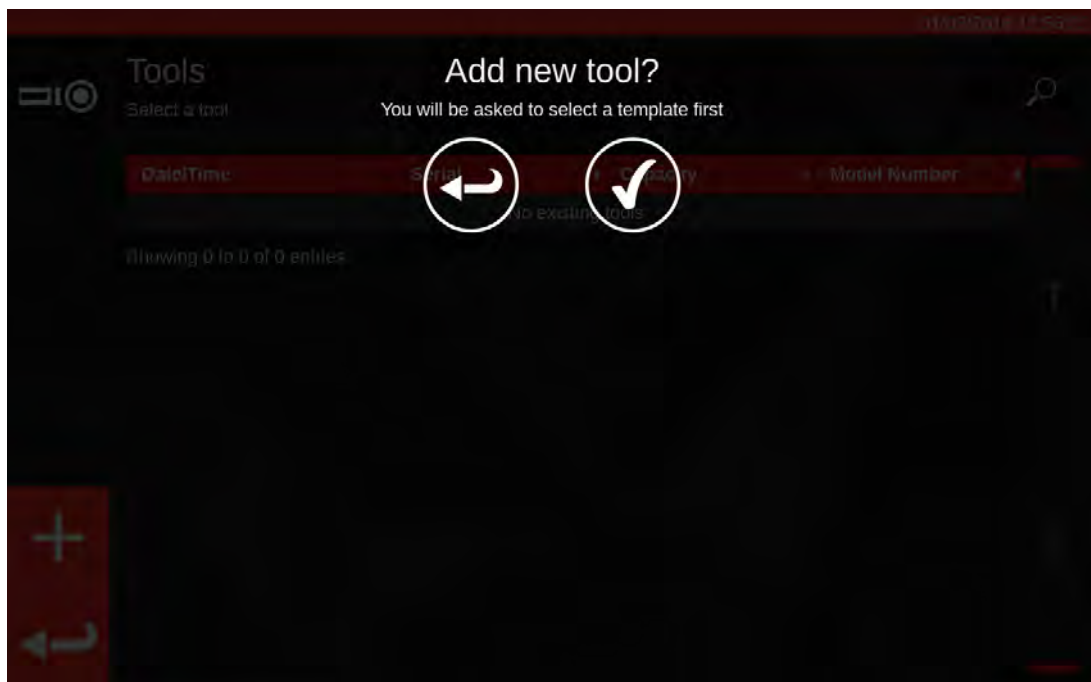



-  Tools
-  Templates
-  Jobs (tools associated with a calibration or conformance)
-  Settings
-  Power Down

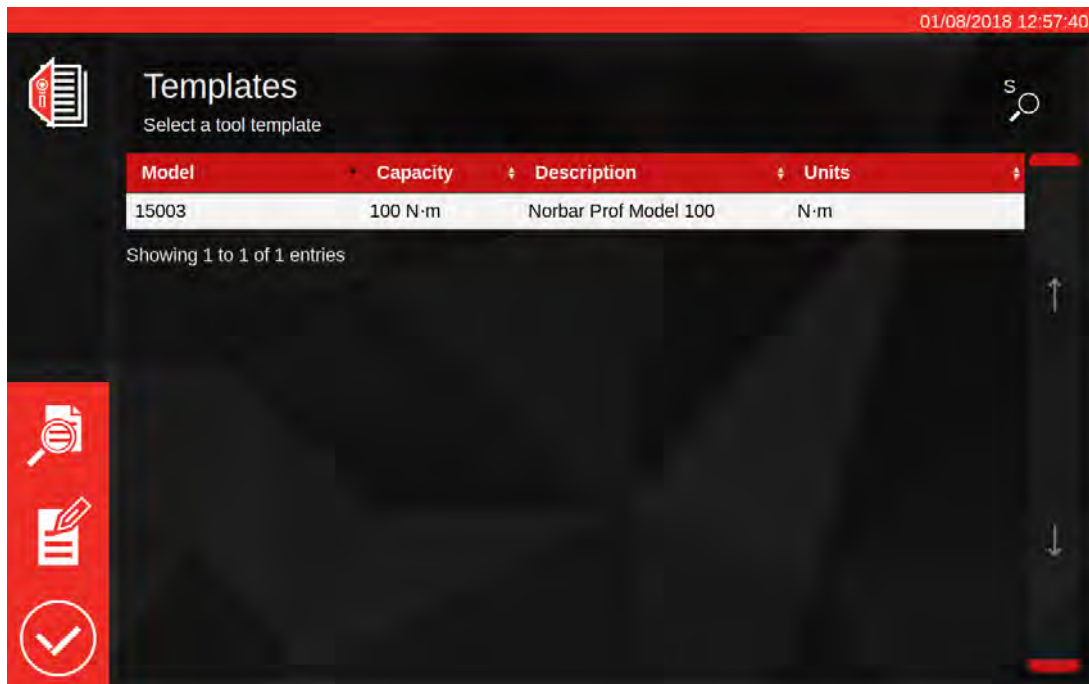
The screen below shows the tools screen when there are no existing tools. Press the + icon to add a tool.







A prompt will appear; confirm you would like to select a template for the tool.



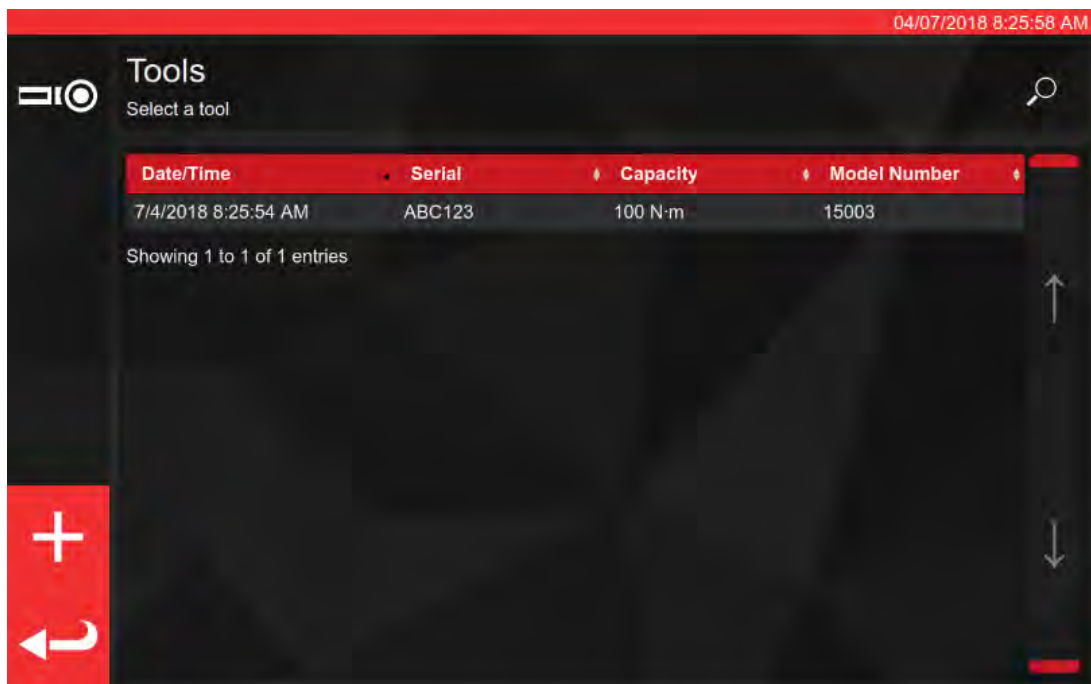
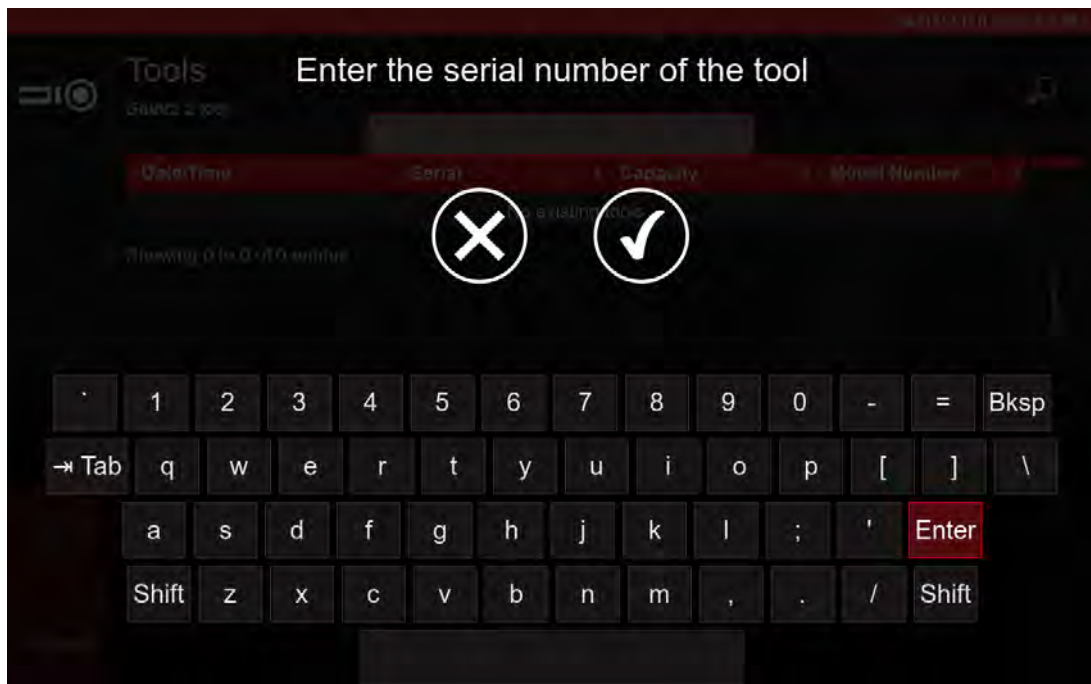
Select the desired template from the templates menu (or create a new one, if necessary, and then select it) and confirm your choice by pressing 



-  Selected template summary
-  Edit selected template
-  Confirm selected template for tool

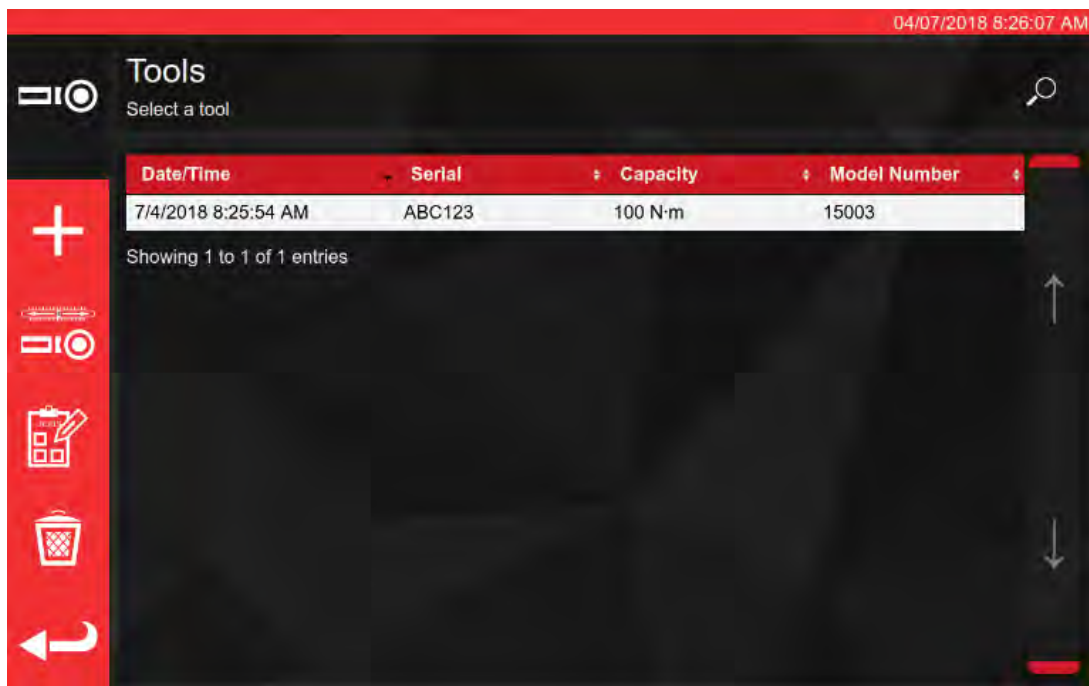
NOTE: To add a tool, the TWC requires you to select a template. Whether you add a new template at this point, or select an existing one is up to you, but a template must be selected in order to proceed. If a template is not selected you will not see the  symbol which allows you to proceed.






Enter the tools Serial number and follow any on screen instructions.



Select the tool.

NOTE: New menu options will now appear in the bottom left of the screen.

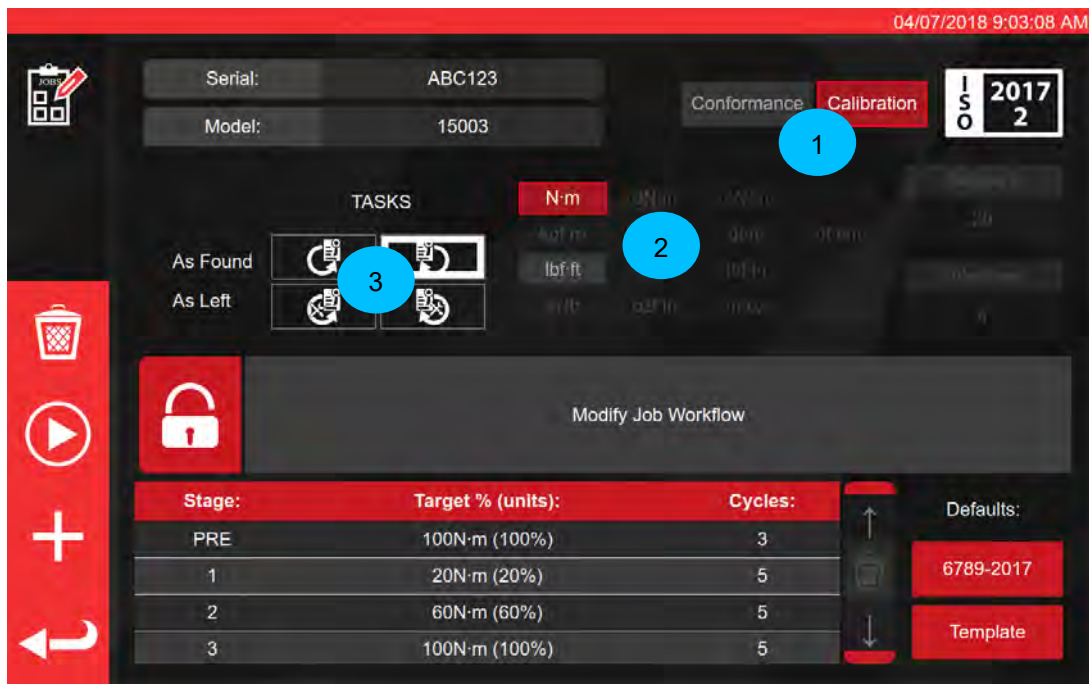


-  Add another of this tool (if tool selected; else just add a new tool)
-  Adjustment screen (test a tool by performing cycles on it)
-  Jobs (book or load an existing open job for the currently selected tool)
-  Delete
-  Go back

Press jobs  to book a new job for the selected tool. The job editor will open as seen below.

Choose between a Calibration or Conformance (1) for ISO part 1 or part 2.


Select units (2) and make selections from direction / As Found / As Left (3) tasks as applicable.



The screenshot shows the job editor interface. At the top right, the date and time are 04/07/2018 9:03:08 AM. The interface includes fields for Serial (ABC123) and Model (15003). There are two tabs: Conformance and Calibration, with Calibration selected and marked with a blue circle 1. Below these are fields for ISO part 1 or 2, with 2 selected. A TASKS section shows units (N-m, lb-ft, etc.) with N-m selected and marked with a blue circle 2. Below the TASKS section are buttons for As Found and As Left, with As Found selected and marked with a blue circle 3. A Modify Job Workflow button is also present. At the bottom, there is a table with columns Stage, Target % (units), and Cycles.

Stage:	Target % (units):	Cycles:
PRE	100N-m (100%)	3
1	20N-m (20%)	5
2	60N-m (60%)	5
3	100N-m (100%)	5

Defaults: 6789-2017, Template

Press PLAY to continue and follow any on screen prompts. 

The TWC will automatically start with any “as-found” tasks for a give direction, because these necessarily come first (you cannot check a tool as-found if you’ve already adjusted it in some way). However, if you’ve selected both clockwise and anti-clockwise directions, the TWC will prompt you to select which to start with first.

After starting a task, you will land on the task summary screen, as shown below. This screen lets you review key information about the job and task as well as the progress made so far.

You will see a list of work required to complete the task in a table at the bottom of the screen. Shown here is the list for a part 2 calibration of a tool that has an adapter and square-drive rotating end fitting. The work required for each task will differ depending on tool ISO classification, job type (conformance or calibration) and tool configuration.

To complete the task, simply select a work item from the table. The PLAY button will appear in the left-hand menu; press it to perform the work.

NOTE: Once an item of work is completed, it will be marked as complete in the “Acquired” column with a white tick. You are free to repeat work which is already completed if you see fit; if you do, the data generated will replace the previous one.

In the case of part 2 calibrations, the TWC automatically manages the uncertainty data. Once enough data has been gathered, you no longer need to gather more as the TWC can perform statistical analysis of previously calibrated tool specimens instead. If enough uncertainty data has been gathered, the Acquired column will show orange tick marks for the uncertainty work items; if this happens, you only need to complete the calibration work item (Index 4.2, as shown below) in order to generate a calibration certificate.

NOTE: The table’s “Index” column refers to the specific section in the ISO 6789:2017 standard which that work pertains to.

The screenshot shows a task summary screen with a red header bar displaying the date and time: 04/07/2018 9:03:19 AM. The screen is divided into several sections. On the left, there is a vertical red bar with icons for help, settings, and a back arrow. The main area contains fields for tool configuration: Serial (ABC123), Model (15003), ISO Class (ISO 6789 Type II Class A), Units (N·m), and a section for Required Adapter and Required Fitting, both set to Angle 90. Below these fields, there are buttons for Clockwise, As Found, and a percentage field set to 0.00 %. At the bottom, there is a table with three columns: Segment, Index, and Acquired. The table lists five items: Calibration (Index 4.2), Reproducibility of the Torque Tool (Index 6.2.2), Output Drive of Torque Tool (Index 6.2.3.2), Output Drive/Cal. System Interface (Index 6.2.3.3), and Length of Force Loading Point (Index 6.2.4). All items in the Acquired column have a red 'X' mark.

Segment	Index	Acquired
Calibration	4.2	X
Reproducibility of the Torque Tool	6.2.2	X
Output Drive of Torque Tool	6.2.3.2	X
Output Drive/Cal. System Interface	6.2.3.3	X
Length of Force Loading Point	6.2.4	X

Select an item in the table, press Play  and follow any on screen instructions.

Once you’ve selected work to perform, you will arrive at the cycling screen (shown on page 53). This screen will guide you through the data collection process; simply follow its instructions until the work is complete. The instructions will vary depending on tool ISO classification, job type, tool configuration, and the currently selected work item.

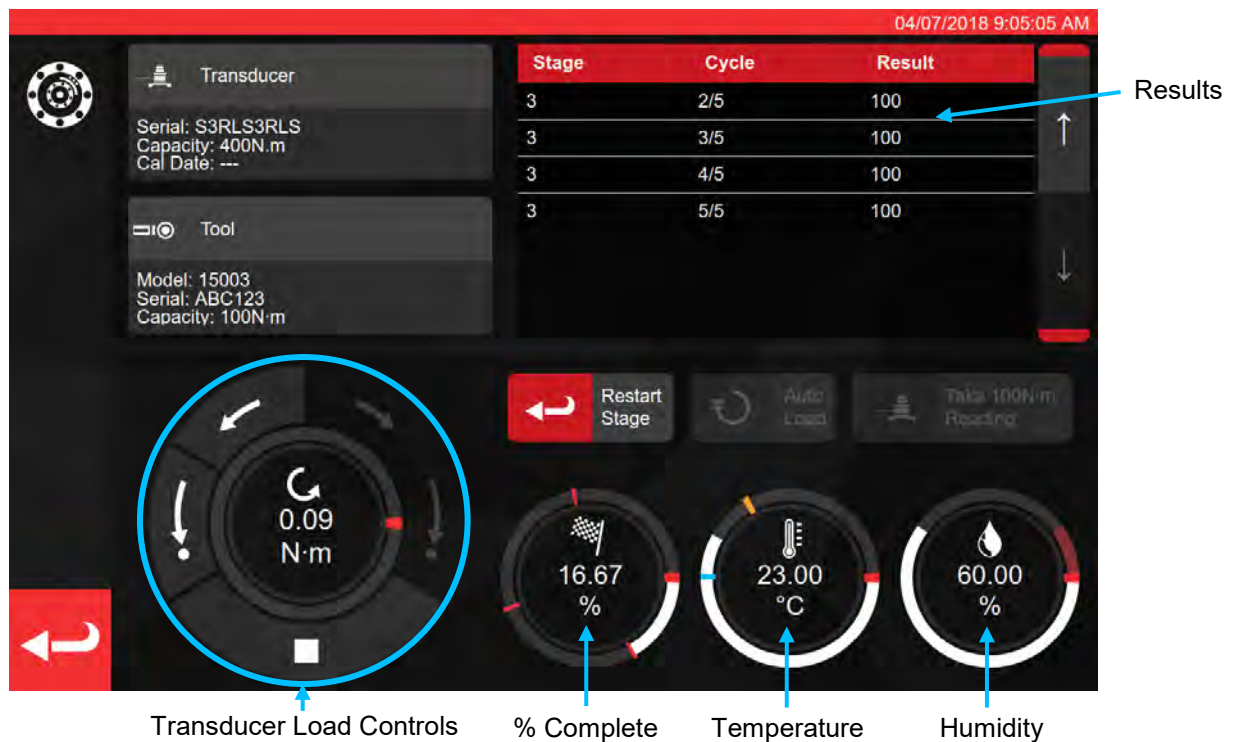
Work items are split into “stages”. Instructions normally occur in between these stages and tell you what to do to get ready for the next stage. For instance, an instruction might tell you to set the tool to a specific target, or to remove the tool, rotate the drive square by 90 degrees, and refit it. The instructions will appear in the form of popup messages. When they appear, you can confirm you have performed what was requested, or cancel the work and return to the task summary screen. If the instruction appears in between stages, you will also be given an opportunity to retry the previous stage, if you wish.

For Setting Tools:

Follow the instructions as they appear; the TWC will gather readings for you.

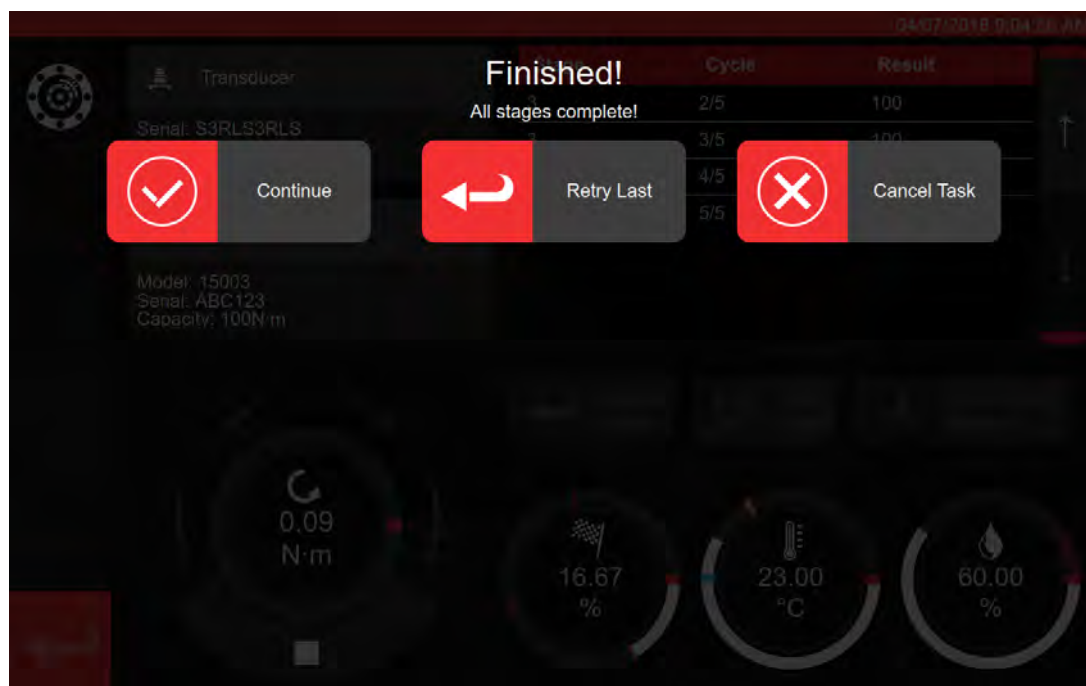
For Indicating Tools:

Follow the instructions as they appear, then use the on-screen controls to gather the readings. You will need to use this screen to load the tool manually because the TWC cannot automatically read a wrench which produces no variation of output on the transducer (by comparison, a setting tool may produce a “click”, which can be detected by the TWC). Despite this, the TWC can, at your request, automatically apply 80% of the target torque to an indicating tool, at which point you may take over to reach the target value and take a reading.



Press the back arrow if you wish to cancel the work and return to the task summary screen.





FOR PART 2 CALIBRATIONS		FOR PART 1 DECLARATIONS	
Continue:	To summary screen	Continue:	Finish or next Cal
Retry last:	Repeat last sequence	Retry Last:	Repeat last sequence
Cancel:	Will delete the results collected during the test	Cancel:	Will delete the results collected during the test

Press Continue.

If performing a Part 2 calibration the screen below will list outstanding steps

04/07/2018 9:08:05 AM

Serial: ABC123 Units TD
Model: 15003 N·m
ISO Class: ISO 6789 Type II Class A

Serial S3RLS3RLS
Capacity 400N·m

Required Adapter
Description
Angle 90

Required Fitting
Description
Angle 90

Clockwise As Found 40.00 %

Segment	Index	Acquired
Calibration	4.2	✓
Reproducibility of the Torque Tool	6.2.2	✓
Output Drive of Torque Tool	6.2.3.2	✗
Output Drive/Cal. System Interface	6.2.3.3	✗
Length of Force Loading Point	6.2.4	✗

Continue through the steps until they are all complete following any on screen prompts.

NOTE: These steps do not need to be completed in the listed order, but calibration should be performed first.

If performing a part 1 declaration or where all steps from a part 2 calibration have been completed the screen below will appear. Select from the available options:

04/07/2018 09:04:26 AM

Transducer
Serial: S3RLS3RLS

Finished!
All stages complete!

Cycle Result
2/5 100
3/5 100
4/5
5/5

Continue Retry Last Cancel Task

Model: 15003
Serial: ABC123
Capacity: 100N·m

0.09 N·m

16.67 %

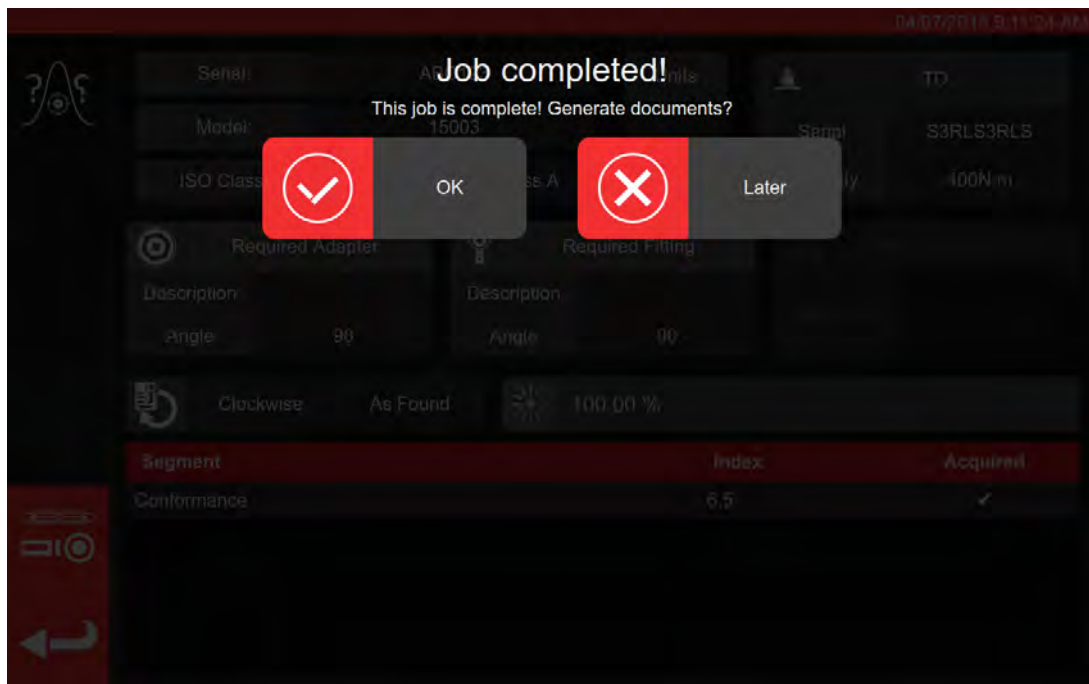
23.00 °C

60.00 %

Press the back arrow



You are now presented with the job complete screen



Select from the options;

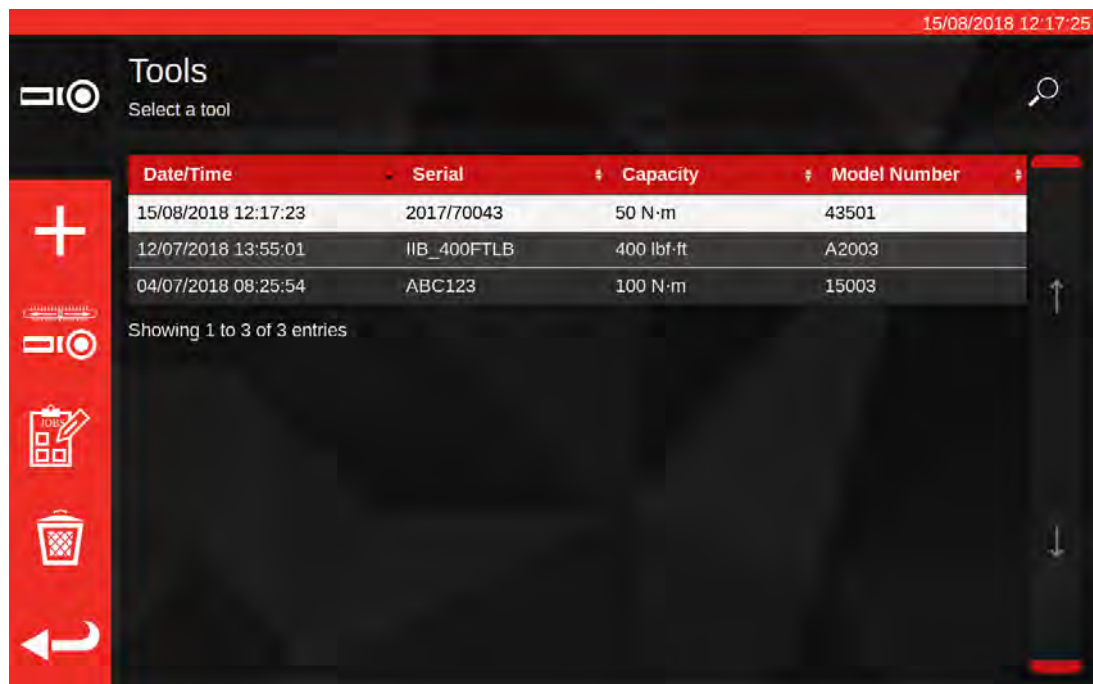
- OK will produce documentation now.
- Later allows you produce/print your documents at a later date.



You can now review the document displayed, print if required or press the back arrow to return to home screen for printing at a later date.

How to Test a Type 1 Indication Tool

From TOOLS select your wrench (refer to templates production for tool template set up).

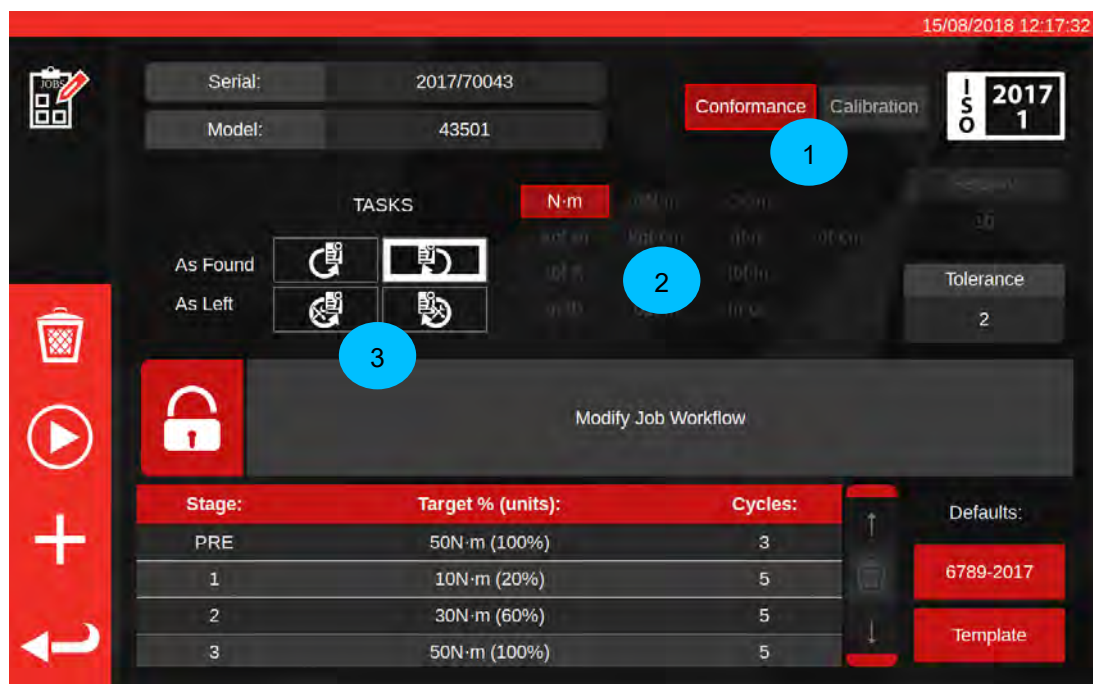


Once selected add to Jobs.

Press jobs.

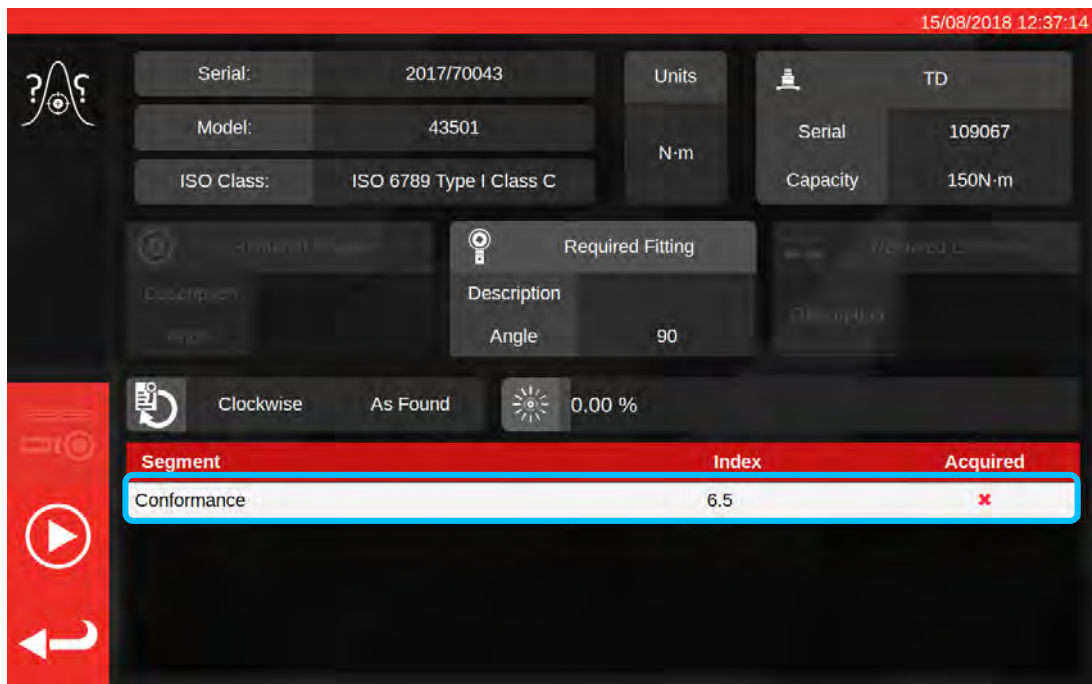


Select (1) for Conformance or Calibration. Select units (2), make selections from direction / As Found / As Left (3) as applicable.




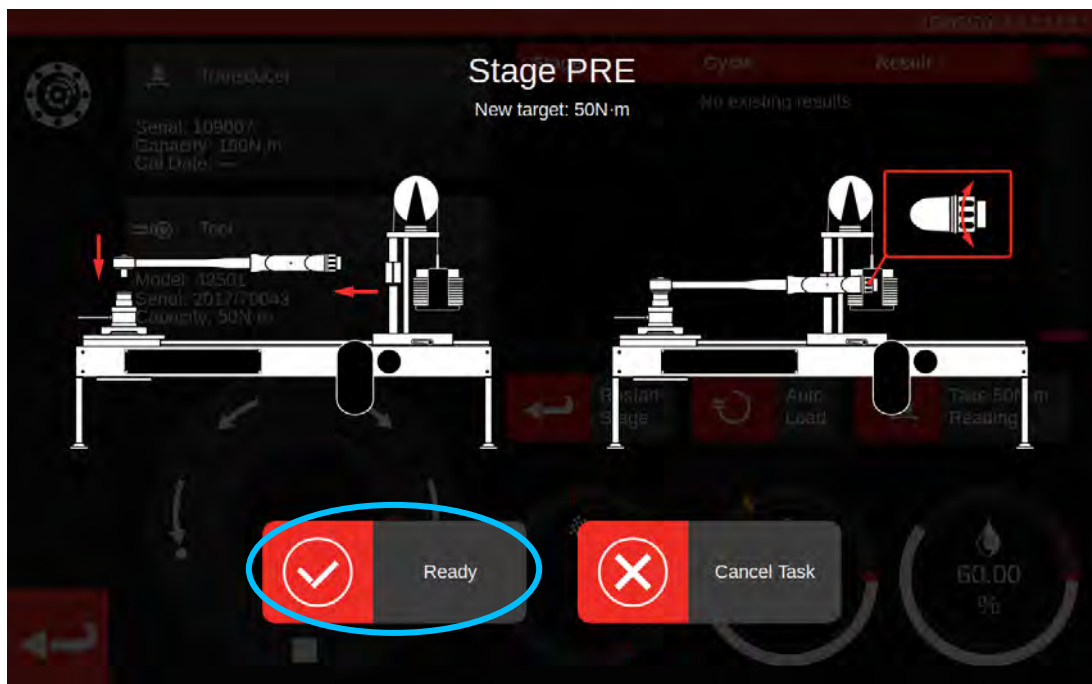
Press PLAY to start task and follow on screen prompts





Highlight segment.

Press play. 



Press Ready



Press Auto Load for a nominal 80% of target to be achieved.

Use the motor control dial buttons and/or the manual I/P drive gear adaptor (pictured below) to increase the torque until the tool indicates the target torque is attained.



Use the Manual I/P drive gear adaptor to achieve the correct value on the Torque tool.



Shown above: target value indicated on the tool. Ready to capture.

Press Take Reading to capture current torque value.

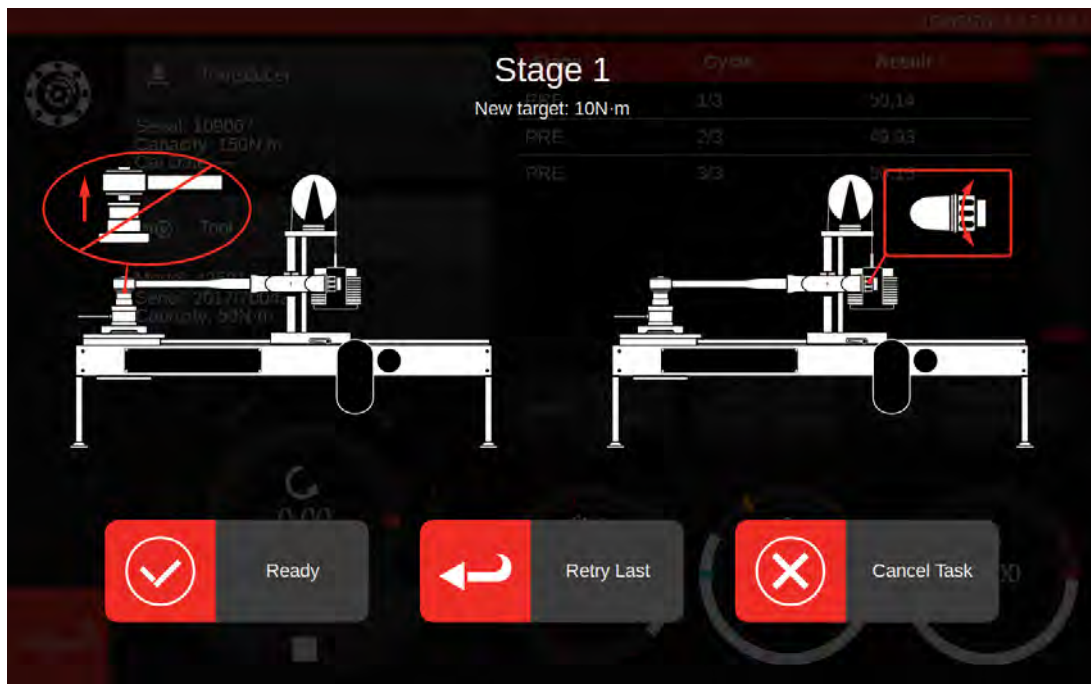
Press the CW home to return the load to Zero and then press stop.

Once returned to zero torque, the next reading can be taken by following the same procedure.

Continue until all readings for the stage are complete.



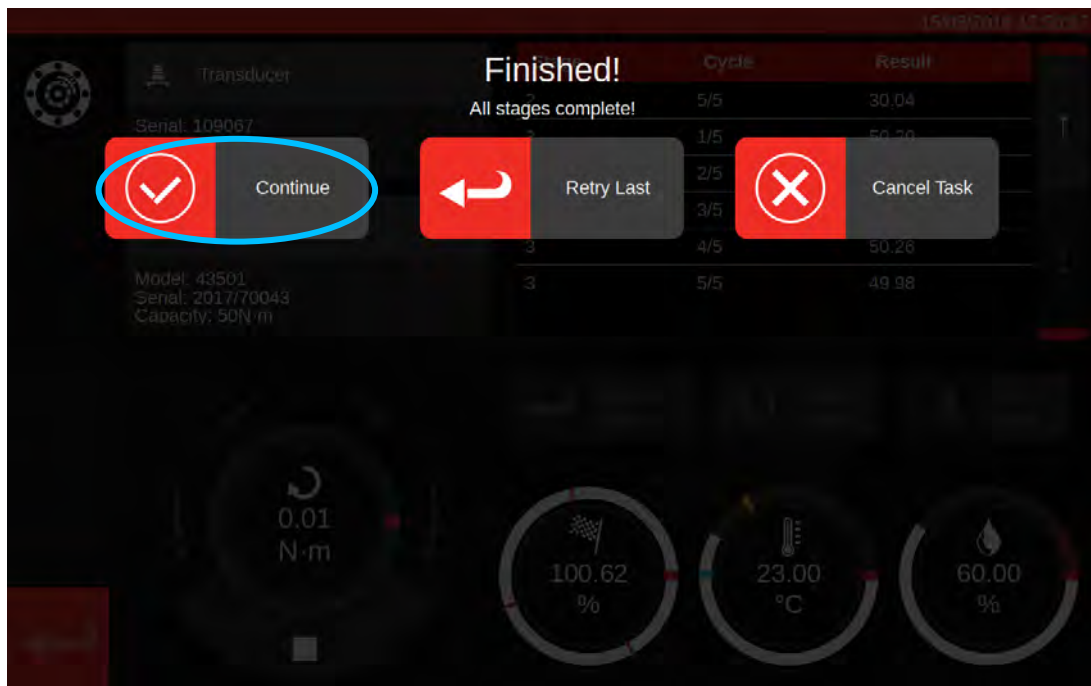
Once Preloading is complete, the Take Reading button will change to Next Stage. Press Next Stage to advance to the next stage of the workflow.



Follow on screen Instructions and complete stage 1 as you did the preload stage. Repeat these actions to collect results for stage 2 and 3.



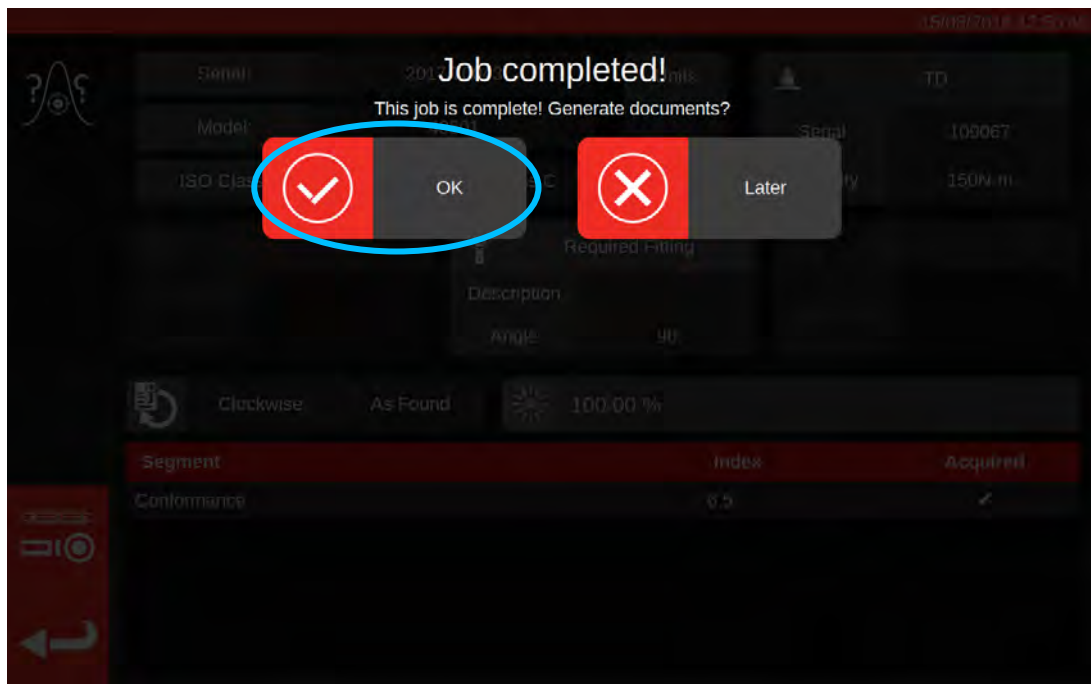
When the final stage is completed, press Next Stage one final time to advance to the finish screen.



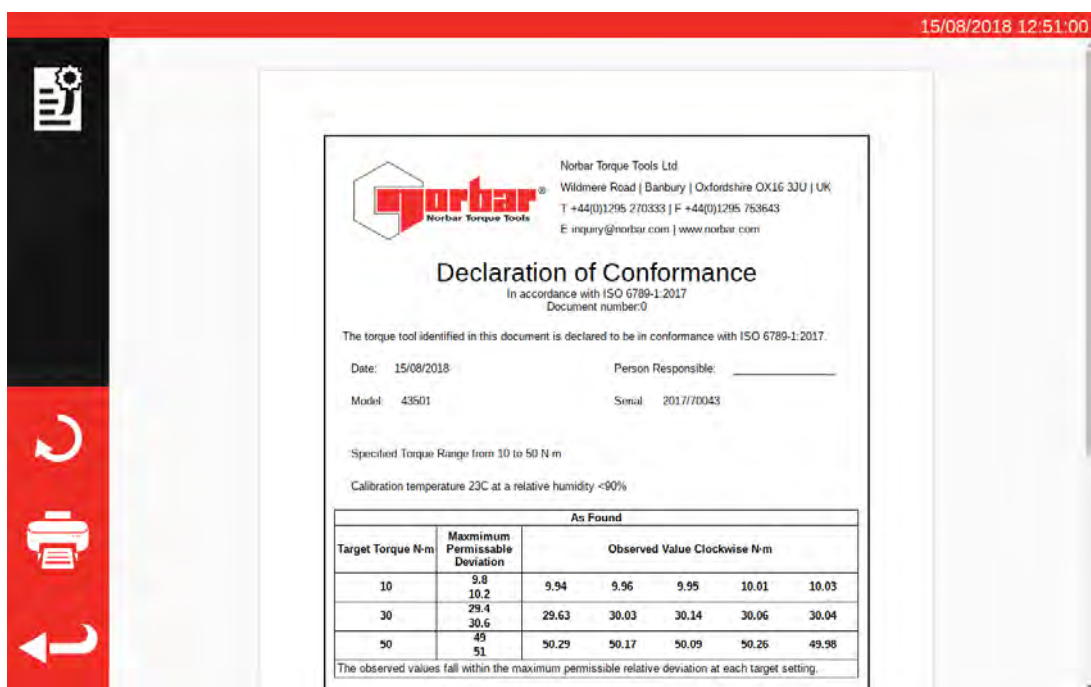
To complete the task press Continue; this will save the results.



Now that the results are saved, press the back button to return to the task summary screen.



If all components of the task are completed, you will see a message offering to generate a document for the completed job. Press OK to generate.



Document displayed ready for printing.

Press return to go back to the home screen.

Adjustment Screen

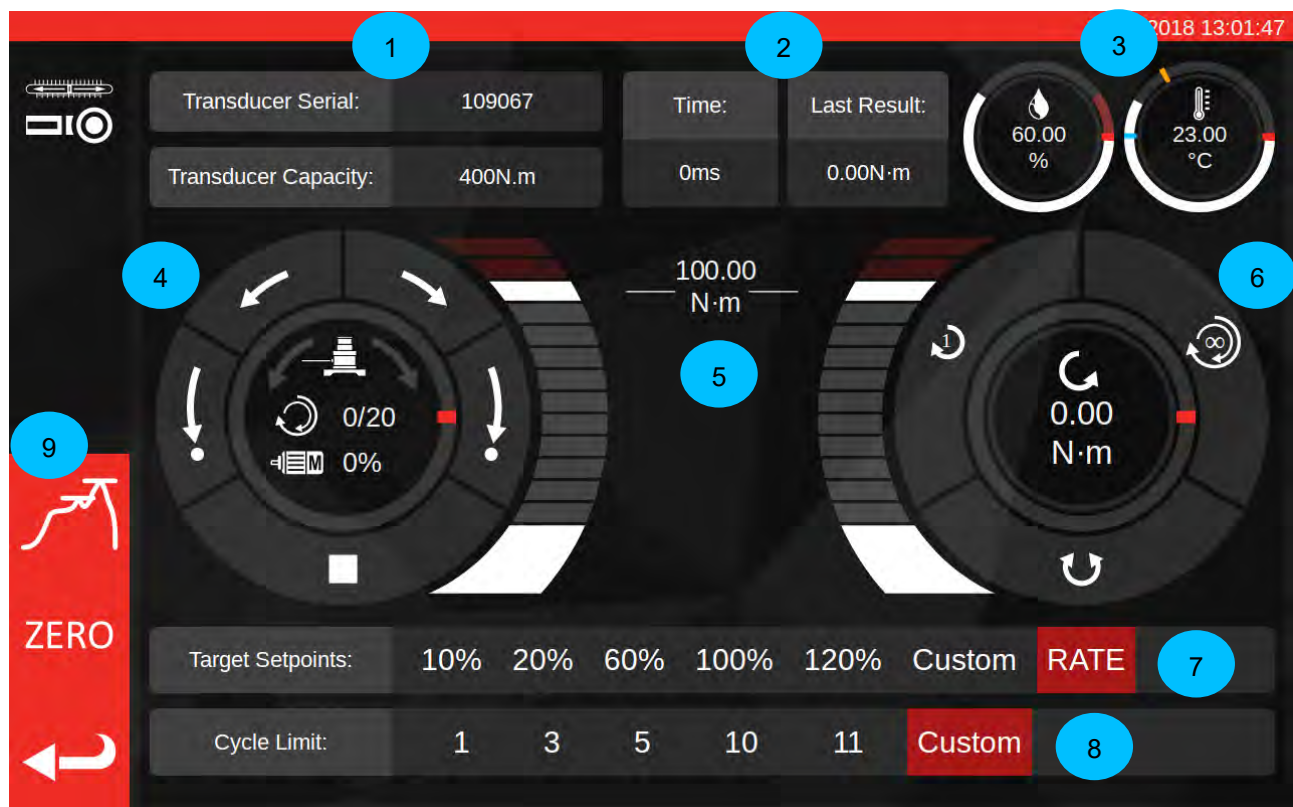
The adjustment screen is for experimenting with and adjusting tools. Use the controls to load the tool and take readings as you see fit.

You may access the adjustment screen by:

- Selecting a tool on the tools page and pressing the button to load the adjustment page
- On the task summary page, when no work is selected to perform

In the latter case, you might use the adjustment screen after having completed an as-found task on a tool and deciding that the tool is badly adjusted. You can then perform adjustment using the adjustment screen, before finishing the job with an as-left task.

NOTE: To know in advance whether you ought to book a job with both as-found and as-left tasks, or just as-found, you may also use the adjustment screen to quickly test a tool beforehand. If it seems like the tool is well adjusted, you may not need to book an as-left task for the job. If it seems like the tool is performing poorly, it will likely perform poorly in the as-found calibration or conformance, and so you can book an as-left in anticipation of it needing adjustment.



The main areas of the screen are as follows:

1. **Transducer summary:** the currently attached transducer serial and capacity.
2. **Last cycle result:** the time duration of the final 20% of the cycle, and the torque reading.
3. **Environment data:** temperature and humidity
4. **Motor control and status dial:** Jog (short arrows) and home (long arrows) the TWC mechanism in either direction, or stop the motor moving. The centre of the dial shows the current direction of motion if the mechanism is moving, the current X out of Y cycles completed if performing continuous cycles, and

the current motor speed. The dial's inner circumference is a graphical representation of the single or multiple cycle work to be completed and will gradually fill up until the rig is finished.




NOTE: The direction buttons rotate the transducer mechanism; for instance, the clockwise arrows will spin the transducer clockwise. Because of this, to build clockwise torque, the mechanism needs to rotate anticlockwise.

5. **Target torque slider:** Drag up and down with your finger or a mouse to quickly set a target up to 120% of the current tool's capacity in the current units.

NOTE: If you need more precision than the slider allows, tap the target torque slider to open an input window and enter your desired target. The slider will jump to the correct setting.

6. **Cycle and transducer dial:** The center of this dial shows the current torque value and direction in the selected units. To cycle between available units, tap or click the unit inside the dial. The dial's inner circumference is a graphical representation of live transducer torque represented as a percentage of the currently set target. It will fill up clockwise (or anti-clockwise) depending on the current torque seen on the transducer. If a torque peak is detected, the flash ring within it will flash.

NOTE: You can only cycle between units which are defined in the current tool's template; in order to toggle units on the adjustment screen, at least two units must be defined in the template.

Click  to initiate a single cycle of a setting tool. Click  to initiate a multi-cycle run. Click  to change the direction between clockwise and anti-clockwise cycles.

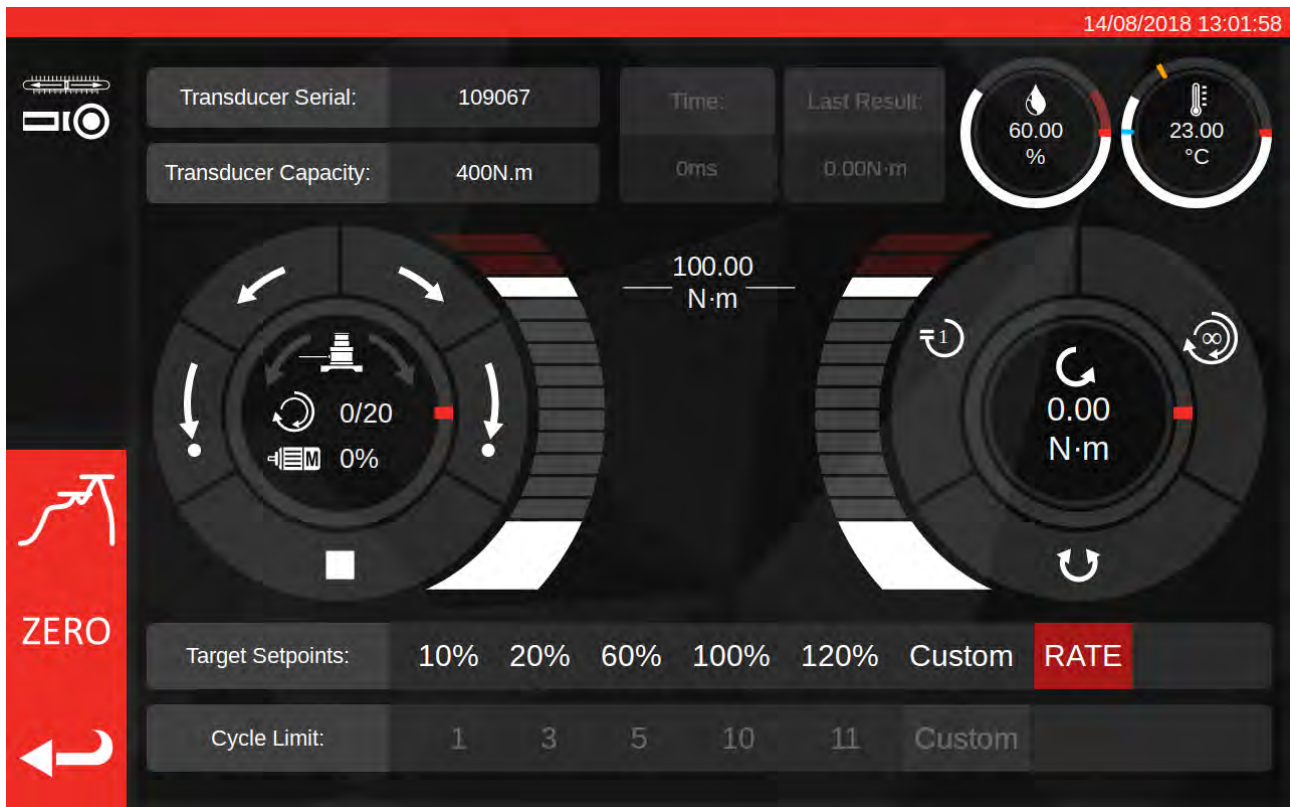
NOTE: When changing direction, the TWC will want to move the mechanism to an appropriate position. Ensure there is no tool installed on the TWC before allowing this to happen.

7. **Target setpoints and rate control:** these are a set of shortcuts to quickly jump to commonly used targets, and a button to disable or enable rate control. If rate control is disabled, readings may not be accurate to the 6789 standard, but will be quicker to perform. Press the "custom" button to open the same target input window used by the torque target slider (5) and enter a more precise target.
8. **Cycle limit settings:** change the number of cycles the TWC will automatically perform in a row when using the multiple-cycle button on the cycle and transducer dial (6). Press the "custom" button to enter your own value if it is not shown on the setting bar.
9. **Peak mode, zero and back buttons:** the peak mode button toggles the UI between modes appropriate for indicating or setting tools. You generally should not need to use this button; the correct mode is already chosen for you based on the currently selected tool, which in turn is derived from its ISO classification. The zero button reads the currently attached transducer's settings (capacity, serial, etc) and zeroes it. The back button will return to the previous screen.

NOTE: Anytime you change transducers whilst on the adjustment screen, you should first press the ZERO button before continuing, to pick up the changes.

Adjustment screen with Indicating Tools

If you are using an indicating tool, or if you use the peak mode button to change modes manually, the adjustment screen will look like this:



In this case, the last cycle results are disabled (as indicating tools do not mark attainment of target torque in a way that the TWC can detect, such as by clicking) and the cycle limit settings are disabled (as the TWC cannot automatically cycle indicating tools since it cannot detect when the target is reached).

The adjustment screen works exactly the same as it does for setting tools, except for the cycle and transducer dial; here, both the single and multiple cycle buttons initiate an auto-load sequence to 80% of the currently set target torque. Because multiple cycles are not supported for indicating tools, the multi-cycle button behaves the same as the single-cycle button.

MAINTENANCE



WARNING: ENSURE THE TOOL IS DISCONNECTED FROM MAINS SUPPLY BEFORE ANY MAINTENANCE.

For optimum performance and safety, regular tool maintenance is required.

User maintenance is described in and should be carried out in accordance with this section.

Any other maintenance or repairs should be carried out by Norbar or a Norbar approved distributor.

Maintenance intervals will depend on the TWC usage and the environment in which it is being used.

The maximum recommended maintenance and recalibration interval is 12 months.

Daily Checks

It is recommended that the overall condition of the TWC is checked before use:

- Check power cord for damage – replace if faulty.
- Ensure PAT test is within date.
- Test the external Residual Current Device (RCD) in the mains supply (if fitted).
- Ensure TWC is clean - DO NOT use abrasives or solvent based cleaners.
- Ensure fan and ventilation slots are clean and dust free. If cleaned with compressed air please wear eye protection.
- Free run TWC to both home positions to ensure operation is smooth and quiet.
- Ensure transducer is within recalibration.

Torque Calibration

Your TWC has been supplied with a certificate of calibration. To maintain the specified accuracy it is recommended that the TWC is recalibrated at least once per year.

Recalibration should be carried out at Norbar or by a Norbar approved distributor, where all the facilities are available to ensure that the instrument is functioning at maximum accuracy.

Temperature & Humidity Accuracy

The TWC is supplied with a sensor for measuring temperature & humidity. It is recommended to check the accuracy of the sensor at least once per year. Accuracy testing should be completed by a testing facility with the relevant equipment. A faulty sensor should be exchanged for a new unit.

Greasing Procedure

The TWC is engineered to be a low maintenance tool. Under normal operation maintenance is not required, however, at 6 monthly intervals or after 10,000 applications (whichever comes sooner) it is recommended that the unit is greased as described in this section.

Use TWC Greasing Kit, Part number: 60325

1. Ensure that the TWC drive wheel is in the 'Home' position

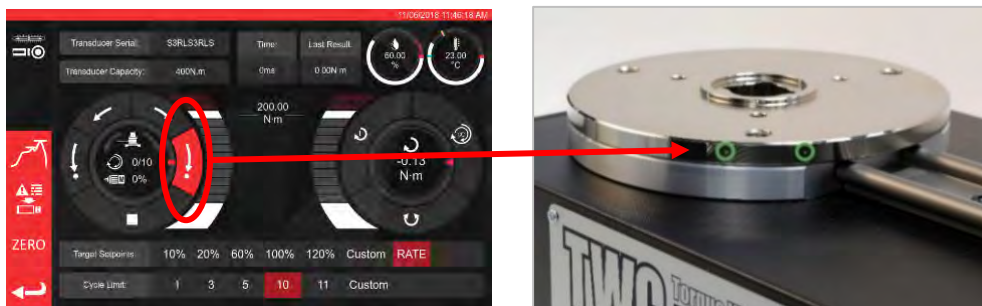


FIGURE 20 - Making Sure the TWC is in the Home Position

2. Remove the button head cap screw which is in-line with the motor

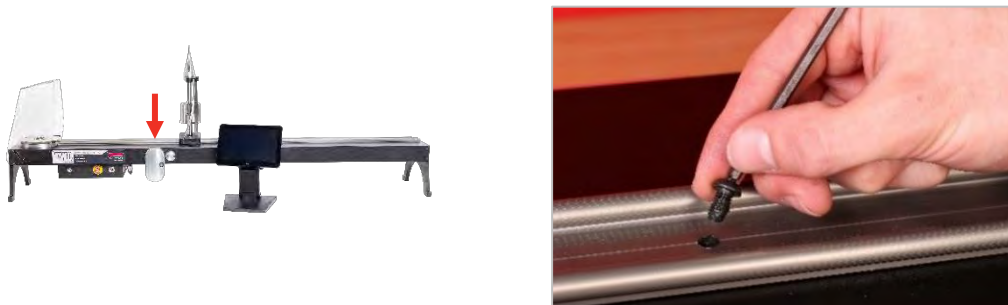


FIGURE 21 – Removing Button Head Cap Screw

3. Inject 50% of the grease through the screw hole using the syringe provided



FIGURE 22 – Applying Grease

4. Wind the drive wheel to the extreme opposite of its current position

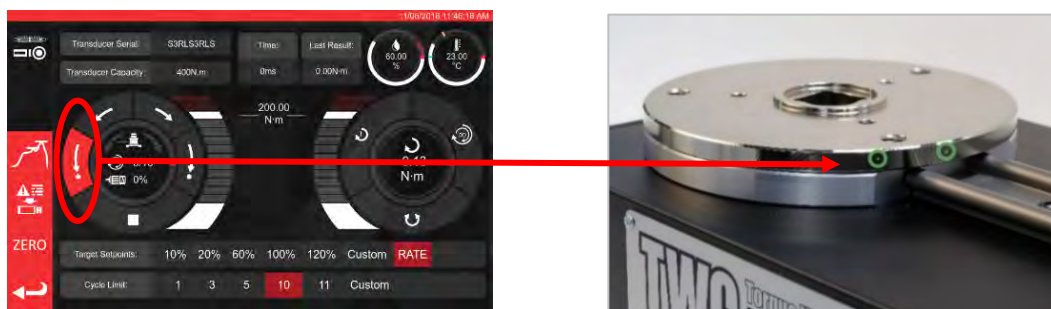


FIGURE 23 – Extreme Maximum Position

5. Inject the remaining grease



FIGURE 24 – Applying Grease

6. Return the TWC to the home position

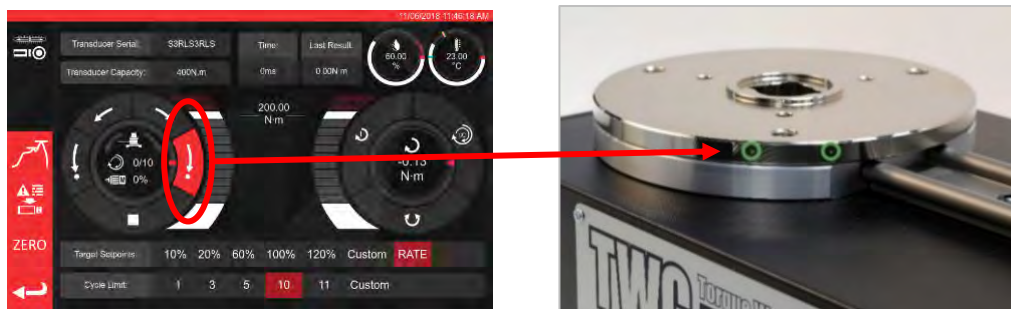
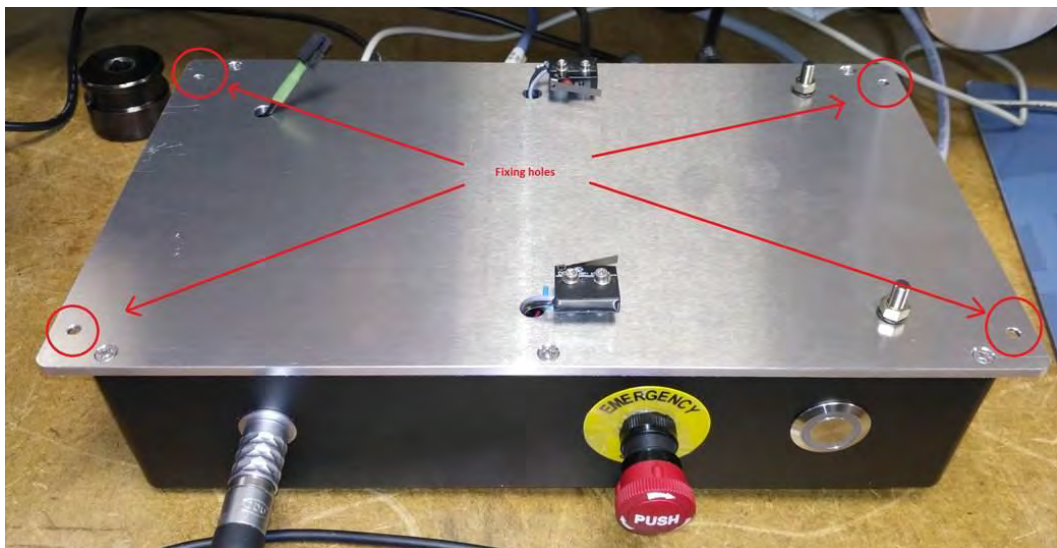


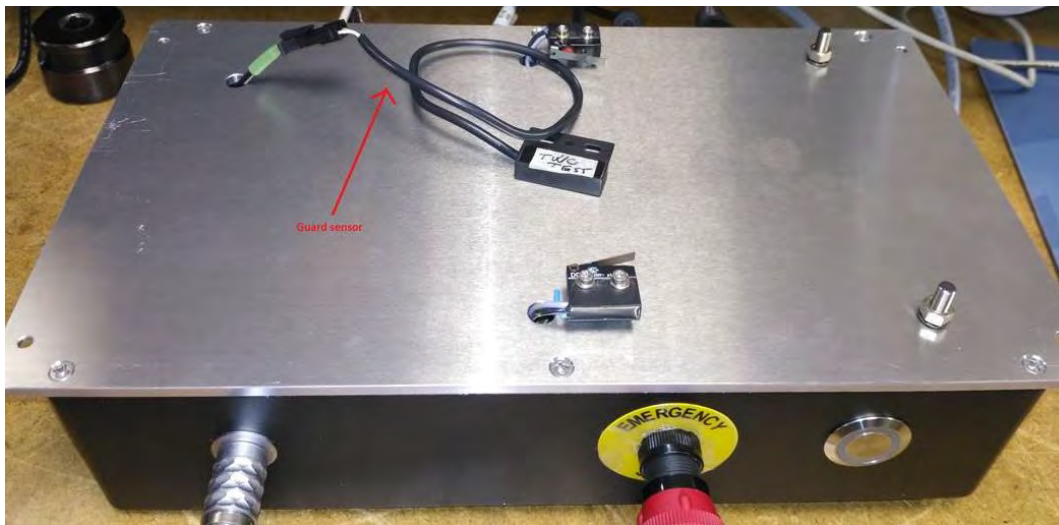
FIGURE 25 – Returning to the Home Position

Disconnecting the Control Box for Calibration

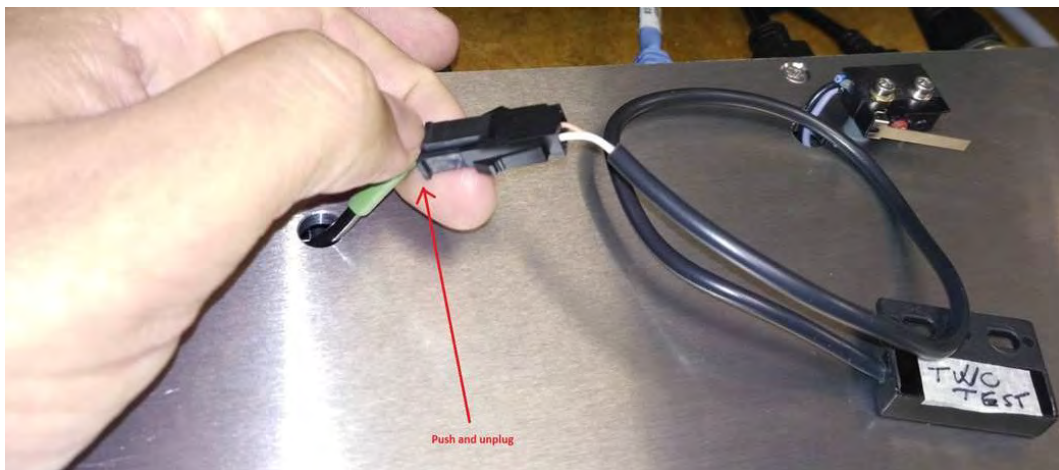
1. There are four holes on the box where the screws fix the box to the rig. First these need to be unscrewed carefully so as not to let the box fall.



2. Next carefully lower the box. The connector of the guard sensor is inside the frame, to expose, gently ease out the cable.



3. Now push the lever on the connector to disconnect.



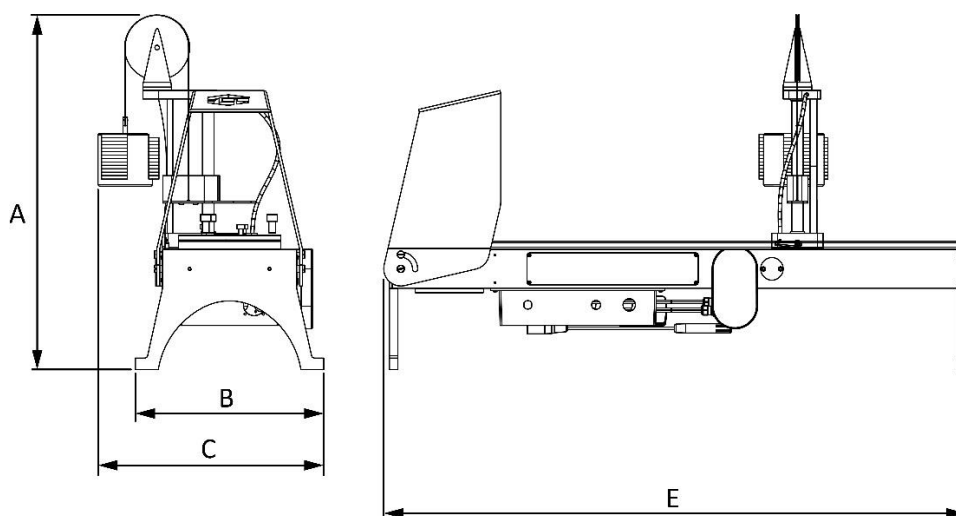
Product Disposal



This symbol on the product indicates that it must not be disposed of in the general waste.

Please dispose of according to your local recycling laws and regulations. Contact your local distributor or see the Norbar website (www.norbar.com) for further recycling information.

SPECIFICATIONS



Specification		TWC 400	TWC 1500
Maximum Output Torque:		400 N·m / 295 lbf·ft	1500 N·m / 1100 lbf·ft
Wrench Length (Torque Radius):	Minimum	135mm	135mm
	Maximum	750mm	1500mm
Wrench Orientation:		Horizontal	Horizontal
Calibration Direction:		Clockwise and Anti-Clockwise	Clockwise and Anti-Clockwise
Operating Temperature:		0°C - 40°C	0°C - 40°C
Dimensions (Maximum):	A	620 mm	620 mm
	B	330 mm	330 mm
	C	395 mm	395 mm
	E	1019 mm	1769 mm
Weight		40 kg	45 kg
Display		25.654 cm (10.1 "), LCD, IntelliTouch Pro, 1280 x 800, 16:10	
Power supply		48VDC, 5.84A, 280.32W	
Voltage Requirements		110 - 240 Volts AC \pm 10% at 47 - 63 Hz.	
Mains Power Fuse:		2 A	
Internal Fuse		Not user replaceable	
Power Consumption:		280 W – maximum	
Operating Temperature Range		0 °C to +40 °C	
Storage Temperature Range		20 °C to +60 °C	
Maximum Operating Humidity		80% Relative Humidity @30°C	
Environment:		Indoor use within a light industrial environment. IP 40	
Overload protection		Between 20%-50% of the set target torque depending on torque value	
Speed		1.22 (Degrees per second)	
Vibration:		The vibration total value does not exceed 2.5m/s ² .	
Sound Pressure Level		L_{pA} = 72.2 dB(A) with no load & 78.7 dB(A) with high torque, with uncertainty K=3dB.	
Humidity sensor accuracy		\pm 2%RH @ 25°C	
Temperature sensor accuracy		\pm 1°C maximum	

Due to continuous improvement all specifications are subject to change without prior notice.

NOTE: If equipment is used in a manner not specified by the manufacturer, the protection provided by the equipment could be impaired.



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QA57
ISSUE 2
24.1.97

EU Declaration of Conformity (No 0021)

This Declaration of Conformity is issued under the sole responsibility of the manufacturer.

The object of the declaration:

Torque Wrench Calibrator (TWC) 400 N·m Auto (Model: 60312).

Torque Wrench Calibrator (TWC) 1500 N·m Auto (Model: 60313).



The object of the declaration described above is in conformity with the relevant union harmonisation legislation:

Directive 2006/42/EC on Machinery Directive.

Directive 2014/30/EU on Electromagnetic Compatibility.

Directive 2011/65/EU of the European Parliament and of the Council of 8 June 2011 on the restriction of the use of certain hazardous substances in electrical and electronic equipment (RoHS).

The object of the declaration described above has been designed to comply with the following standards:

BS EN ISO 12100:2010 Safety of machinery. General principles for design – Risk assessment and risk reduction.

BS EN 61326-1:2013 Electrical equipment for measurement, control and laboratory use. EMC requirements.

The basis on which conformity is being declared:

The technical documentation required to demonstrate that the product meets the requirements of the above directives has been compiled by the signatory below and is available for inspection by the relevant enforcement authorities.

The CE mark was first applied in: 2018.

The product is also compliant with a Norbar transducer connected.

Signed for and on behalf of Norbar Torque Tools Ltd.

Signed:

Full Name:

Trevor Mark Lester B.Eng.

Date:

17 August 2018

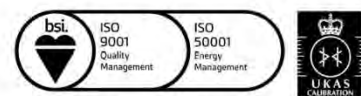
Authority:

Compliance Engineer

Place:

Norbar Torque Tools Ltd., Wildmere Road, Banbury, Oxfordshire. OX16 3JU

United Kingdom | Australia | United States of America
Singapore | China | India



Registered in England No 380480 | VAT No GB 119 1060 05

ACCESSORY INSTRUCTIONS

Square Drive Adaptors – 29214, 29215, 29216, 29217

- The square drive adaptors are all 1" male to a range of female sizes.
- The manufacturing tolerances have been significantly reduced on these components to ensure a close fit and reduced uncertainties.



FIGURE 26 – Inserting Square Adaptor

Static Transducer Support Kit - 60318

- Secure the support to the TWC mounting platform using the socket cap screws provided.
- Static transducers male square drive engages into the 1" female square drive in the TWC mounting plate.
- In some instances, a square drive adaptor may be required. Further details below.
- When smaller bodied static transducers are needed, the reducer is used.



FIGURE 27 – Fitting Static Transducer Support Kit

Short Length Reaction Plate - 60319

- To calibrate small torque wrenches the use of the “Short Length Reaction Plate” may be required.
- The reaction plate assembly simply bolts to the end face of the TWC using the M6 thumb screws provided.
- There are two mounting positions which depend on which style of transducer is being used.

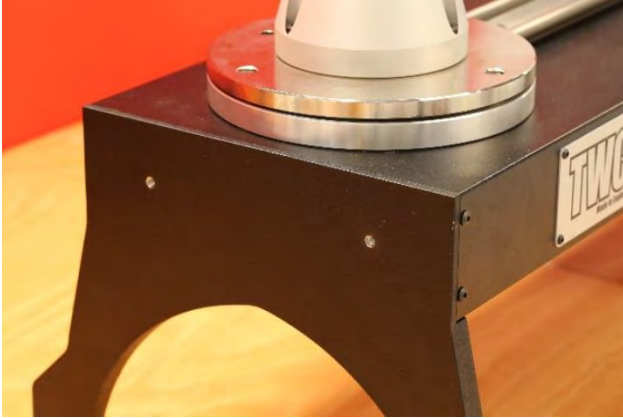


FIGURE 28 – Attaching Short Length Reaction Plate

- Adjust the reaction point as necessary using the thumb screws shown in Figure 29 to secure in place



FIGURE 29 – Adjusting the Short Length Reaction Plates Reaction Point

NOTE: When using the Short Length Reaction Plate the wrench will no longer be counter balanced.

FMT 25 Adaptor Kit - 60327

- Place the adaptor plate on the TWC and secure in place with the three bolts supplied as shown in Figure 30.
- Secure the FMT 25 onto the adaptor plate using the three bolts supplied with the FMT.
- Ensure a suitable reaction device is used. The Counter Balanced Reaction may be too large, in which case the Short Length Reaction Plate (60319) may be required, see page 74.



FIGURE 30 – Attaching FMT 25 Adaptor Kit

FMT Quick Release Kit – 60322

The quick release kit allows for quick exchange of FMT transducers.

- Remove all transducers from the TWC.
- Insert the three threaded screws upright in to the TWC mounting platform. Use cross holes to tighten to a pinch.
- Bolt any FMT selection to the two quick release plates.
- Drop the desired transducer and quick release plate over the top of the uprights and secure with the quick release thumb nuts.

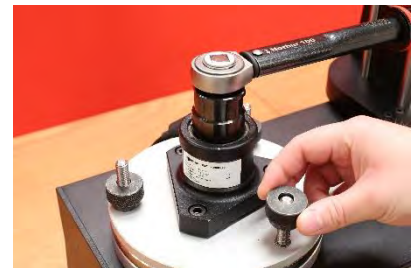
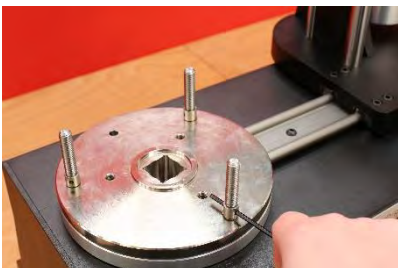


FIGURE 31 – Attaching FMT Quick Release Kit

TWC Angle Offset Plate Kit – 60330

- Place the Angle Offset plate on the TWC and secure in place with the three bolts and washers supplied as shown in Figure 32.
- Secure the FMT onto the adaptor plate.



FIGURE 32 – Attaching TWC Angle Offset Plate

TROUBLE SHOOTING

The following is only a guide, for more complex fault diagnoses please contact Norbar or a Norbar distributor.

Problem	Likely Reason	Likely Solutions
No Display	No mains power	Check electrical mains power is working
	External fuse or circuit breaker has operated	Check fuse or circuit breaker
	External RCD has operated	Check for faults then reset the RCD
Tool output does not rotate when trigger is pressed	Tool is on tight fastener	Remove from fastener Check correct setting of tool direction
	Tool is off	Ensure tool is ON (display lit)
	Tool is in set up mode	Exit set up to return to operate mode
	Output drive square sheared	See MAINTENANCE section to replace drive square
	Gear train or motor is damaged	Contact Norbar
No display	No mains power	Check mains supply
	Fuse in mains plug blown	Replace fuse A value of 2A is recommended
	Touch screen not powered	The USB power plug of the screen plugged into one of the different USB connectors (these do not have power output), must be in designated screen connector
Motor not running	Motor not connected	Connect both cables
	System initially turned on	Press 'Motor Enable' pushbutton
	Emergency stop pressed	Remove hazard Release emergency stop button Press 'Motor Enable' pushbutton
	Motor failed	Release torque with Manual Drive Gear
Overtorque detected / Overload protection activated / End of rig travel tripped	Torque wrench click not detected	Check wrench is not faulty Remove overtorque (if needed use Manual Drive Gear) Press 'Motor Enable' pushbutton
Overtemperature	Ensure fan grills are clear of obstructions. Ensure fan working	Once cooled down and there is no warning message carry on using it
Other	Return to Norbar for repair	

GLOSSARY OF TERMS

Word or Term	Meaning
A	Amps
a.c.	Alternating Current
FMT	Flange Mounted Transducer
Pro-Test	Professional Torque Tester
RCD	Residual Current Device, for disconnecting the electrical supply in the case of a fault; so protecting the operator. A device with a trip value of 30mA or less is recommended.
Target	The Torque that the wrench set to achieve.
STB	Static Torque Block
TWC	Torque Wrench Calibrator
V	Volts

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