

# KEPLER 4



## User Manual

USER MANUAL



**AWS**

**Advanced Witness Systems Ltd.**

*Torque Measurement & Calibration*

## USER MANUAL

# Advanced Data & Measurement Systems

## Kepler 4©

VERSION 3.25

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# Introduction

## What is Kepler 4?

Kepler 4 is a combined program for the calibration and conformity of torque wrenches to BS EN ISO 6789:2017, BS EN ISO 6789:2003 or your own in-house standards. It uses a system of databases to keep track of each individual torque wrench and all associated information.

## Key Conformity Features

- Complies with BS EN ISO 6789:2017 Part 1 and BS EN ISO 6789:2003 allowing the automatic calculation of the mean deviation and mean value for each setting.
- Also calculates the deviation for each reading, and indicates by colour whether the reading is within tolerance to the selected standard.

## Key Calibration Features

- Complies with BS EN ISO 6789:2017 Part 2 and BS EN ISO 6789:2003 allowing the automatic calculation using new formulae of the combined uncertainty of each set of readings, for each torque tool and mechanical drive component.
- Verification of the Coverage Factor (k) for every reading, using an additional module (sold separately).
- Full tracking of tools calibration performance and history. Produce a report listing tools that require calibrating.
- Production line capabilities, for hourly or daily tool reliance performance.

## Keyboard/ Device Test Data Entry or Barcode Scanner

Data may either be entered via the keyboard or imported directly from test equipment linked to the PC via a COM port. The latter method reduces the amount of information the operator has to key in and also helps eliminate the chance of errors. The “**Auto Input Configuration**” tab enables electronic Torque Tool Test Equipment to be set up and tested to work with Kepler 4. Non-readings data may also input using a barcode scanner instead of a keyboard.

## Certificate Generation

Kepler 4 can auto generate certificate numbers, or use in house numbering systems, and has facilities that allow the creation of bespoke calibration certificates. It also has the ability to print the certificate as soon as the readings are finished.

## Label Generation

Kepler 4 has the facilities that allow the creation of bespoke labels. It also has an auto print option, to print the label as soon as the readings are finished.

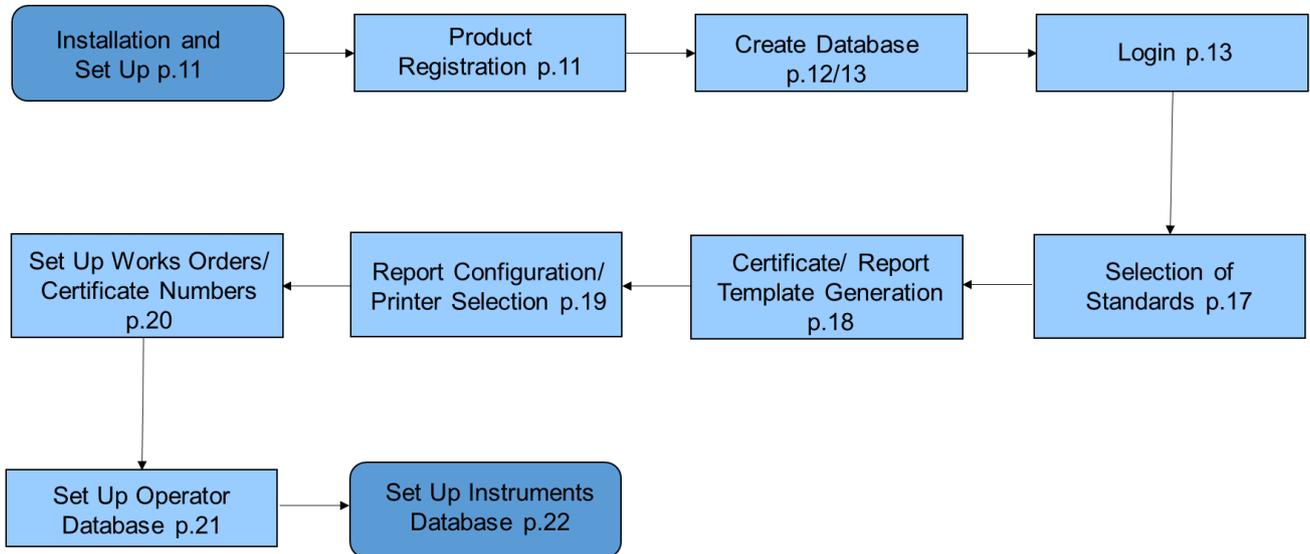
## Report Generation

Kepler 4 has facilities to create reports on tools that require calibration, have no retest interval or have no reading.

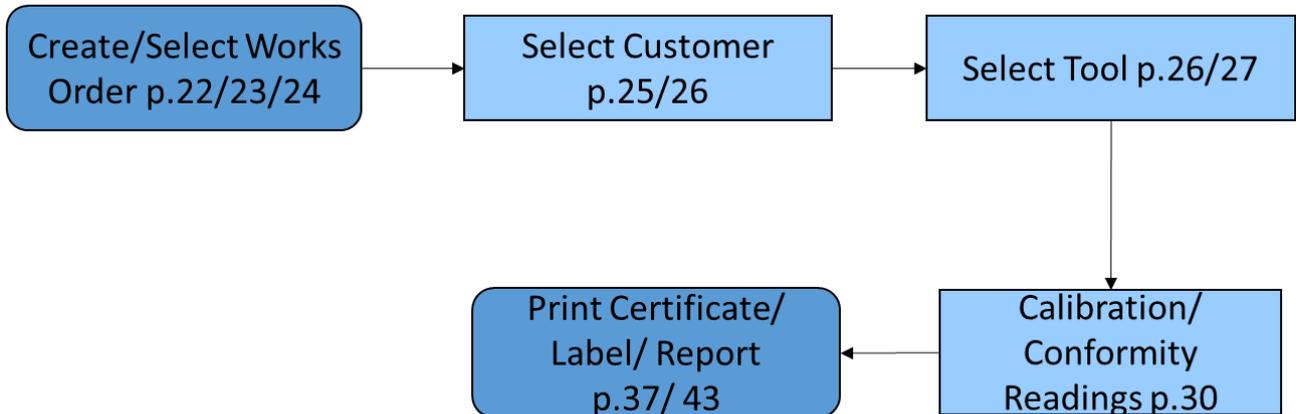
# General Information

## Kepler 4 Flow Chart - First Time Use

This flow chart shows the recommended order for setting up Kepler 4 for the first time.



## Kepler 4 Flow Chart – General Use



This flow chart shows the order in which tasks must be done in order to successfully calibrate a tool using Kepler 4 and print out a certificate.

## System Requirements

Microsoft Windows 7, 8, 8.1, 10, 11

Minimum System: i5 Processor or equivalent, 4GB RAM, on board graphics.

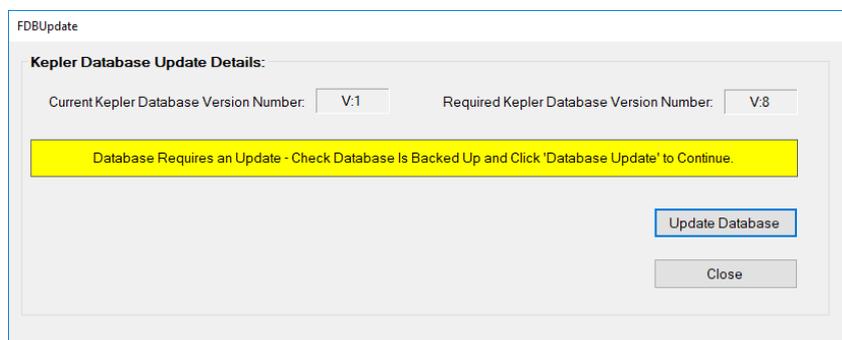
Keyboard & Mouse Interface.

Minimum/Recommended Screen Resolution: 1920x1080.

Software is a .NET application using an SQL Database.

## Updates

Kepler 4 will update automatically when connected to the internet. Once updated the screen below will be displayed if the database needs updating. Please backup the database before updating.



## Default Colour Conventions

These are the colour conventions used throughout Kepler 4. You may change them at any time by going to the “**Colour Configuration**” tab in “**Settings**”.

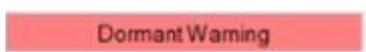
- Light blue boxes are mandatory fields. They must be populated before saving/ updating.



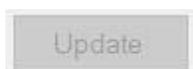
- Orange boxes show alerts for example on the “**Select Readings Details**” screen when Conformity mode is selected.



- Light red/ pink warning boxes will appear when database field is made “**Dormant**”



- Greyed out buttons or fields indicate when buttons cannot be changed or selected.



- When taking readings, the “**Save and Continue**” box has blue text. This is to indicate that it is necessary to continue to the next reading page.

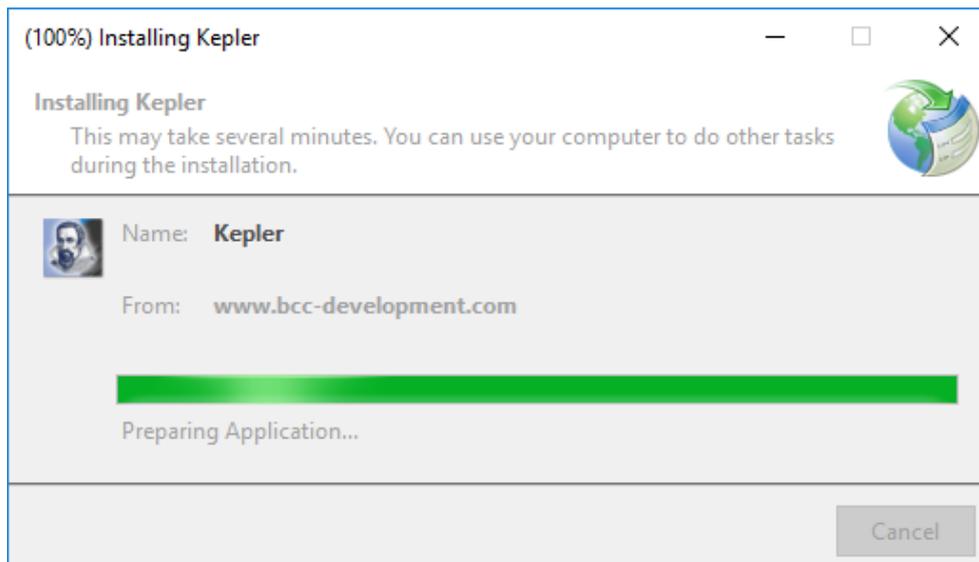


# Getting Started

## Installation & Set Up

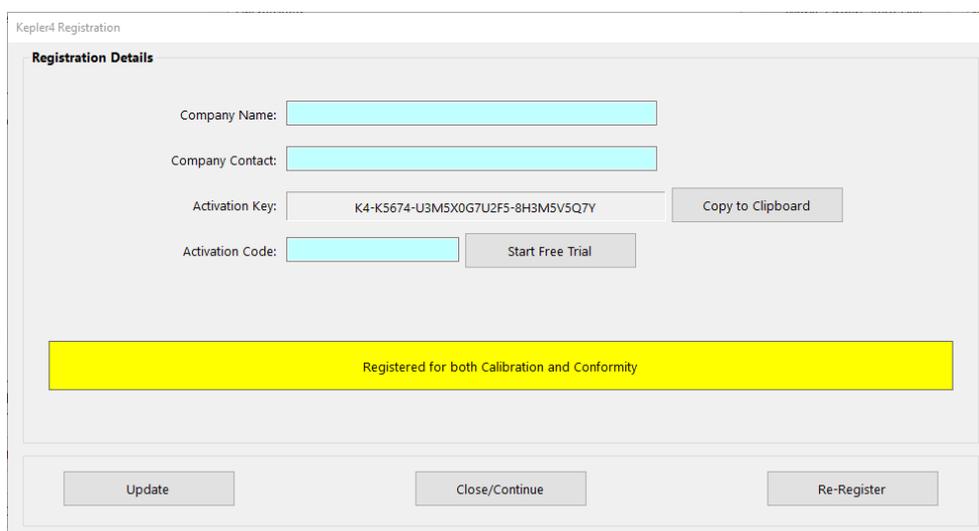
Before installation, please ensure that you have installed the latest updates for your operating system.

After downloading from the website, the program launcher will install Kepler 4 automatically.



## Product Registration

During installation a window will pop up named "**Kepler4 Registration**". First fill out the "**Company Name**" and "**Company Contact**" boxes. You will be required to contact Advanced Witness Systems Ltd in order to receive a unique "**Activation Code**". Please email us at [sales@awstorque.co.uk](mailto:sales@awstorque.co.uk) and quote the "**Activation Key**". You can copy this "**Activation Key**" to your clipboard by clicking the "**Copy to Clipboard**" button. For the free 2-day trial the activation code is 99999, or alternatively, you can click the "**Start Free Trial**" button.

A screenshot of the "Kepler4 Registration" window. The title bar says "Kepler4 Registration". The main area is titled "Registration Details" and contains several input fields: "Company Name:" with a light blue text box, "Company Contact:" with a light blue text box, "Activation Key:" with a text box containing "K4-K5674-U3M5X0G7U2F5-8H3M5V5Q7Y" and a "Copy to Clipboard" button to its right, and "Activation Code:" with a light blue text box and a "Start Free Trial" button to its right. At the bottom of the main area is a yellow banner that says "Registered for both Calibration and Conformity". Below the main area are three buttons: "Update", "Close/Continue", and "Re-Register".

To continue please select "**Update**" then "**Close/Continue**".

## Local or Remote Database Storage Location

After the product is registered the program will load and there is the option to store the Kepler 4 database either on the machine the program is installed on (Local) or on a network server (Remote). This location can be changed in the future if required (See page 47).

### Local DB

FDBLocate - Locate Kepler4DB

**Kepler4 Database Location:**

On the Local Machine

On a Remote Server

OK

Cancel

Please select the location of your Kepler4 database

If “**On the Local Machine**” is selected the database will be stored in Local Disk (C:) > Users > “Username” > My Documents > K4Data. This is where the database can be found for back up purposes on a Local Machine. You may be prompted to restart your computer at this point before running Kepler 4 for the first time.

### Remote DB

Storing the Kepler 4 database on a remote server allows multiple databases to be stored in the same location for more efficient back up of the multiple databases. Please note this does not allow a single copy of Kepler 4 to access multiple databases; or multiple copies of Kepler 4 to access a single database.

FDBLocate - Locate Kepler4DB

**Kepler4 Database Location:**

On the Local Machine

On a Remote Server

OK

Cancel

**Remote Server Details:**

Remote Server Name:

Database Instance:

Database User:

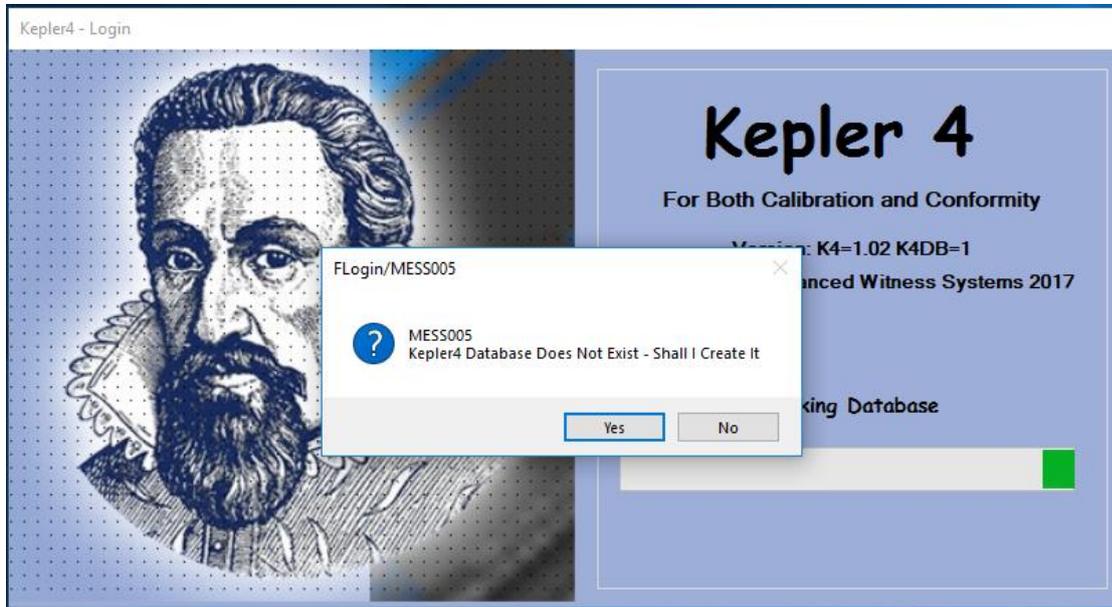
Database Password:  Show

You have selected to have the database on a remote server

If you require more information on this option please contact Advanced Witness Systems Ltd by emailing [sales@awstorque.co.uk](mailto:sales@awstorque.co.uk).

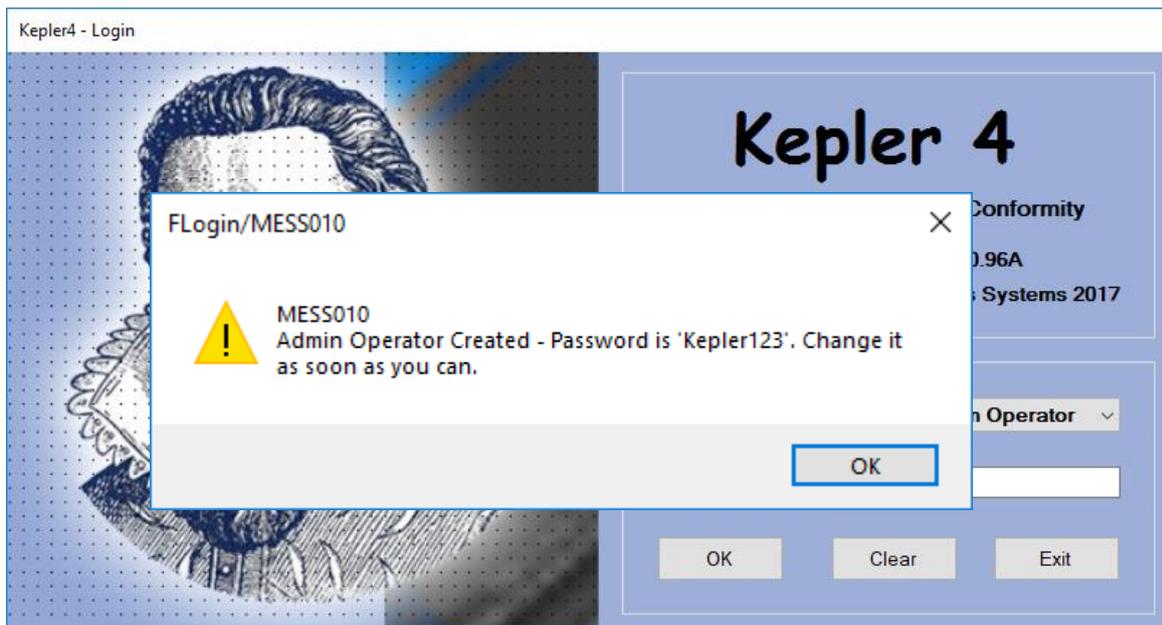
## Create Database

After the product is registered and the database location is selected the program will load and ask whether it should create a new database in that location if it cannot find an existing database. Select “**Yes**” in order to create a new database.



## Login Page

After the database is created the Login screen will appear. The first time the program is used it will generate a new administrator user and assign a default password. This should be changed immediately and recorded. The default password is “Kepler123”.

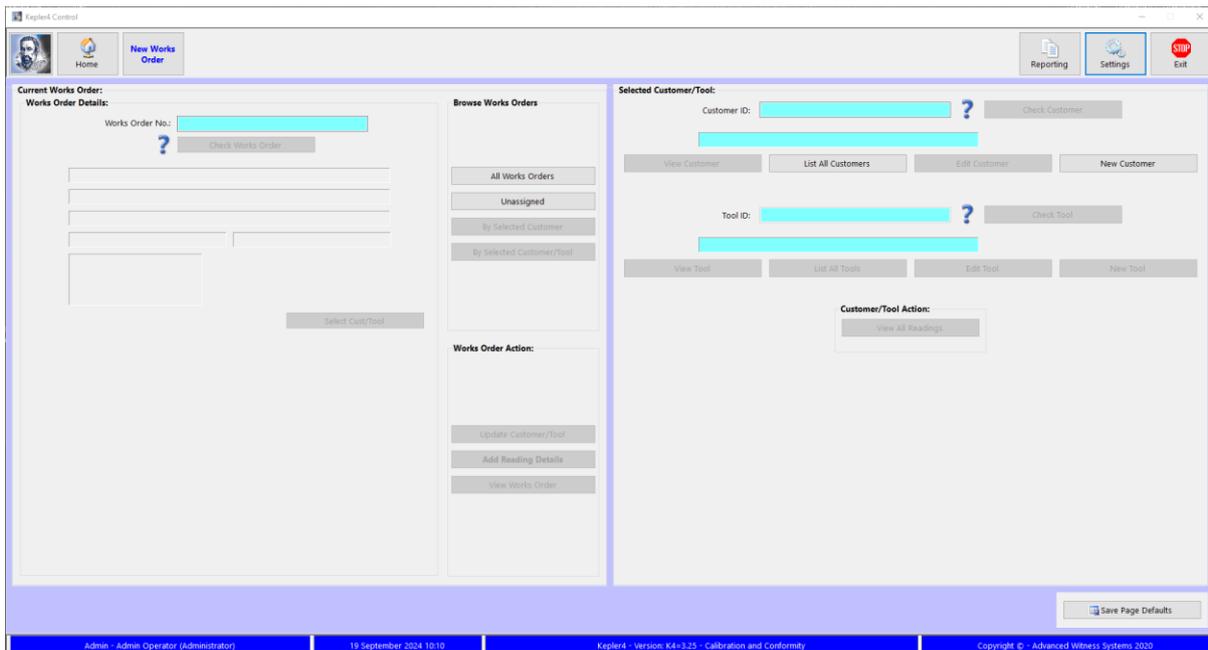


Passwords are changed by selecting “**Settings**”, “**Database Maintenance**”, “**Operators**” then “**Edit**” and then editing the password for the required operator. Only an Administrator can change a password therefore it is recommended to have two administrators in case of a lost administrator password.

# First Time Use of Kepler 4

## Home Page

Using Kepler 4 for the first time it will be necessary to set up Standards, Works Order/ Certificate Numbers, Operators, Instruments and Create a Report/ Certificate Template. This is the “Home” page “Kepler4 Control”. For information on the “Current Works Order” and “Selected Customer / Tool” boxes see pages 25/26.



## Icons (Buttons) Descriptions/ Functions:

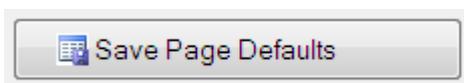
### Home

This icon returns the user to Homepage from the “Reading Details” page after saving a reading.



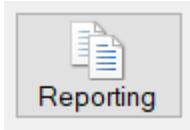
### Save Page Defaults

This icon allows the user to save the current details of the page, saving time re- entering the information for the next calibration.



## Reporting

This Icon brings up the “**Tool Report**” window, which is used to print out lists of tools that require retesting, have no retest interval or have no readings. Tools from all customers or selected customers can be included (See page 29).



## Settings

This icon opens the “**Fsettings**” window where program settings may be changed, databases maintained and reports configured.



## Stop/ Exit

Closes Kepler 4.



## New Works Order

From the “**Home**” page select “**New Works Order**”.



This brings up the “**New Works Order**” Window. If both calibration and conformity versions of Kepler 4 are purchased Calibration or Conformity Modes can be changed from the box on the right. Please note the mode cannot be changed after the Works Order is created.

## Database screens

All database screens in Kepler 4 have similar formats and options. This is the “**Database Tools**” screen. It is where data for individual operators is added, stored, edited and made dormant.

The other database screens are “**Readings**”, “**Customer**”, “**Operators**”, “**Instruments**”, “**AutoGen**”, “**Models**”, “**Standards**” and “**Reports**”.

Tool ID	Description	Manufacturer	Man. Ref. No. 1	Man. Ref. No. 2	Man. Ref. No. 3	Location 1	Location 2	Capacity	Last Reading
Tool1	Torque Wrench 1							50.00 Nm	29/11/2018 10:0

The “**Search**” function allows you to find a database entry by typing the required text in the search box.

When the “**Use Filter**” box is ticked another box appears underneath it. The “**Use Filter**” function filters the database fields by only showing results with what is typed in the box. This only filters the “**Description**” or “**Name**” columns.

The “**Tools**” and “**Readings**” database screens have a tick box “**Work with Misc Tools**” which when ticked shows miscellaneous tools only. (See Page 44)

## Delete / Dormant Database Entry

It is not possible to delete most database fields, only make them “**Dormant**”. When the “**Delete / Make Dormant**” button is selected for a database field it cannot be viewed/ searched for unless the “**Include Dormant**” option is selected.

## Deleting Works Order

Works orders without readings may be deleted by an “**Administrator**” or a “**Maintainer**”; this is done by selecting the “**Delete WO**” button in “**Database Readings**”.

Works orders with readings may be deleted however this has added levels of security. If this function is required please contact Advanced Witness Systems Ltd by emailing [sales@awstorque.co.uk](mailto:sales@awstorque.co.uk) for instructions on how to do this.

## Selection of Standards (FSettings)

### Import ISO 6789:2017 and ISO 6789:2003 Standards

To Import ISO Standards, from Homepage go to top right of screen and click on “**Settings**” this displays “**FSettings**”. Go to “**Database Maintenance**” tab and then under “**Data Import**” click on “**Import ISO Standards**”. This will populate database with ISO 6789:2017 and ISO 6789:2003 standards to be used in calibration/ conformity of tools.

The screenshot shows the 'FSettings' application window with the 'Database Maintenance' tab selected. The interface is divided into several sections:

- Data Maintenance:** Contains buttons for Operators, Instruments, Certificates and Works Orders, Models, Standards, and Reports.
- Data Import:** Contains buttons for Import ISO Standards, Import Customers, Import Models, Import Tools, and Import Instruments.
- Delete Database:** Contains a button for Delete Database.
- Database Location Reset:** Contains a button for Database Location Reset.
- Model Defaults:** Contains a button for Update Model Defaults.

At the bottom of the window, there are 'Update' and 'Close' buttons. A data source string is displayed: Data Source=(LocalDB)\\Kepler4;Database=KEPLER4DB;Trusted\_Connection=yes;Connect Timeout=30.

### In House Standards (FStandards)

Alternatively, in house standards may be applied. To form your own In-House standards, go to “**Database Maintenance**” then “**Standards**”. In the bottom right of the “**Database Standards**” screen (See page 16), select “**New**” which will open the “**Standard Maintenance**” window.

The screenshot shows the 'Standard Maintenance (FStandards)' window. The 'Standard Details' section includes:

- Standard ID: [Text Field]
- Standard Body: [Text Field]
- Description: [Text Field]
- Standard Selection:  Standard 6789:2017,  Standard 6789:2003,  In-House Standard
- Include Exercise Readings:

Additional settings include:

- Tool Type: Type 1 (dropdown)
- Tool Class: A (dropdown)
- Number of Readings: 5 (slider)
- Tolerance: 3% (slider)
- Dual Tolerance:
- Number of Settings: 3 (slider)
- Setting 1 %: 20 (input)
- Setting 2 %: 60 (input)
- Setting 3 %: 100 (input)

Buttons for 'Update' and 'Close' are located at the bottom.

Select the “**In-House Standard**” option which allows you to “**Include Exercise Readings**”, “**Include Uncertainties**” or “**Reverse Readings**”. Next decide the “**Number of Readings**”, “**Tolerances**”, “**Number of Settings**” and the value for each setting. Select “**Update**” when finished to save the standard.

## Report/ Certificate template Generation (FReports)

Here you can create your own bespoke templates for Reports, Labels and Certificates.

To create templates, first go to “**Database Maintenance**”, “**Reports**” then on the “**Database Reports**” screen (Page 16) select “**New**”. This brings up the “**Report Maintenance**” window. Firstly the “**Report ID**” and “**Description**” fields must be completed, and the “**Default Font**” must be set. Select the “**Update**” icon to save and proceed with creating the template.

See **Appendix C** (Page 55) for a sample template built using these commands. There is also an example certificate template “K4SampleCert.txt” which can be imported from C:\Users\{USERNAME}\Documents\K4Data using the Import button.

- “**Add Row**” - Displays “**Report Item Details**” shows a list from the drop-down menu to add to the end of template.
- “**Insert**” - Displays same as above but you can insert item type on any line in the template.
- “**Copy Row**” - Allows user to copy a selected line and add it to the end of template
- “**Edit Row**” - Allows user to edit a selected line.
- “**Delete Row**” - Allows user to delete selected line.
- “**Move Row Up**” - Allows user to move selected line up.
- “**Move Row Down**” - Allows user to move selected line down.

Each item in a certificate must then be entered as a row. When a new row is added using the “**Add Row**” icon the “**Report Item Maintenance**” window opens which gives a list of items available to insert into the template. Each item must have its X and Y coordinates in mm stated. The X-axis is the left-hand edge of the page and the Y-axis is the top of the page.

Rows may be inserted in any order with two exceptions. For example images, (<ImageStart><ImageEnd>), boxes and lines must have the end row directly below the start row. Any row below a new page row (<NewPage>) will be added to the new page.

The “**Import**” button allows the user to import report template text files into Kepler 4.

The “**Export**” button allows a user to export the report template into a text file to allow external editing, backup and sharing between multiple copies of Kepler 4.

In order to preview the certificate “**Preview Cert**” the “**Update**” icon must be selected and a printer selected in the “**Report Configuration/Printer Selection**” section (See below). A set of active readings will also be required to preview the certificate (See page 30). Alternatively, a miscellaneous tool reading may be selected (See page 44). It is possible as a service option to have a certificate provided by AWS Ltd. Please contact Advanced Witness Systems Ltd by emailing [sales@awstorque.co.uk](mailto:sales@awstorque.co.uk) for this service.

Please note: After a reading has been printed using a certificate template, that template is locked and can no longer be edited. If an edit is required, the template can be cloned and the new version of the template used.

## Report Items Maintenance (FReportItems)

Here you can add items to the report/ certificate template. See “**Appendix B**” (Page 52) for a list of item types and database fields.

## Report Configuration/ Printer selection (FSettings)

From Home page, click on “**Settings**” then select “**Report Configuration**” to bring up “**Report Selection**”. This allows the operator to select a printer to print Certificates, Labels or Reports based on the template created in the previous section. Use the drop-down boxes to select printer and templates.

The selected template can be changed on the post readings details using the “**Certificate Template**” and the “**Label Template**” drop down boxes (See page 36 or 42).

The “**CSV Selection**” section allows the operator to select the location on the computer where the “**Extract CSV**” button on the “**Results**” page extracts a .CSV file with the results into (which can be opened with MS Excel); and the preferred formatting.

The “**K Factor Verification**” section allows the operator to select the location on the computer where the K Factor Verification Module is stored. For more information, see “**Appendix E**” (Page 59).

## Works Order / Certificate Number Set up (FautoGen)

This section allows you to set up automatically, generated works orders and certificate numbers. It is not compulsory; if you want to use your own in-house Works Order and Certificate Numbers please skip this step.

To set up Works Order/ Certificate numbers go to “**Settings**” and then “**Database Maintenance**”. Select “**Certificates and Works Orders**” bringing up the “**Database AutoGens**” (See page 16) and then select “**New**” in bottom right corner to bring up the “**Auto Generated Numbers**” screen.

The screenshot shows the 'Auto-Generated Numbers (FAutoGen)' form. In the 'Details' section, the 'AutoGen ID' is 'W01', 'Description' is 'Live Works Order', and 'Works Order' is selected. The 'AutoGenerate' section shows a 'Prefix' dropdown with 'W' selected, 'Next Number' as '1', and a preview of 'W000001'. There is a 'Find Highest Used' button. At the bottom are 'Update' and 'Close' buttons.

Fill out the pale blue boxes and choose a prefix. Select “**Update**” in order to save the information. There is a preview of the next WO/ Cert number to the right side of the “**AutoGenerate**” box.

The screenshot shows the 'Auto-Generated Numbers (FAutoGen)' form. In the 'Details' section, the 'AutoGen ID' is 'CERT1', 'Description' is 'Live Certificate', and 'Certificate' is selected. The 'AutoGenerate' section shows a 'Prefix' dropdown with 'C' selected, 'Next Number' as '1', and a preview of 'C000001'. There is a 'Find Highest Used' button. At the bottom are 'Update' and 'Close' buttons.

After the database has been populated with completed works orders and certificates it is possible to find the highest number used by a particular prefix by selecting prefix currently used and then click on “**Find Highest Used**”. This function allows you to search for the highest Works Order number used with a certain prefix and then carry on from that number.

In order to use the Auto generated Works Order/ Certificate numbers they must be enabled under “**General Settings**”, “**Automatic Works Orders**”.

**Automatic Works Orders:**

ID	Description
Unspecified	
W01	Live Works Order
W02	Test Works Order

**Automatic Certificates:**

ID	Description
Unspecified	
CERT1	Live Certificate
CERT2	Test Certificate

Select the Works Order “**ID**” or “**Description**” from the “**Automatic Works Orders**” box and then select either “**Works Orders Auto Live**” or “**Works Orders Auto Test**” to use that prefix (See page 20) for auto generated numbers.

Certificates must be set up using the same process. If the Works Order/ Certificate ID does not appear in the box select “**Refresh Works Order**” or “**Refresh Certificate**” respectively.

- “**Live Works Order**” – Live Works Orders are used for general calibrations.
- “**Test Works Order**” – Test Works Orders are used for testing Kepler 4 and training.

## Operators Database/ Maintenance (FOperators)

From Home page select “**Settings**”, and then select “**Database Maintenance**”. Under “**Data Maintenance**” click on “**Operators**”, Go to bottom right of the “**Database Operators**” screen (See page 16) and click on “**New**”. This will bring up the “**Operator Maintenance**” window. Each Operator must be assigned an access level and password.

Operator Maintenance (FOperators)

**Operator Details**

Operator ID:  Dormant

Name:

Password:

Employee Number:

Department:

Level: 

User  
Maintainer  
Administrator

See “**Appendix A**” (Page 51) for Operator Level privileges. Only an Administrator may create, edit, make users dormant, or change a password.

## Instruments Database/ Maintenance (FInstruments)

In order to add new instruments, go to “**Settings**”, “**Database Maintenance**” and then select “**Instruments**” to open “**Database Instruments**” (See page 16) and “**New**” to open “**Instrument Maintenance**” window.

The value for “**Wmd**” is the relative expanded measurement uncertainty of the measuring instrument at the calibration torque as defined in BS EN ISO 6789:2017 Part 2.

**Note:** When using figures from a Transducer Calibration Certificate issued to BS 7882:2017, this figure is the Expanded Uncertainty,  $U$ .

The value for “**bep**” is the stated relative measurement error of the measurement instrument as defined in BS EN ISO 6789:2017 Part 2.

**Note:** When using figures from a Transducer Calibration Certificate issued to BS 7882:2017, this figure is the Relative Error of Indication/Interpolation,  $rd$  ( $E_i$ ,  $E_{id}$ ,  $E_{it}$  or  $E_{itd}$ ).

## General Use

General use of Kepler 4 involves creating Works Orders, adding customers, tools and readings; and printing certificates and labels.

### New Works order

This is where new Works Orders are created and Calibration or Conformity mode selected. A “**Miscellaneous Tool**” Works Order can also be selected here (See page 44). From “**Home**” page select “**New Works Order**”

## Method

- **“Unassigned Works Order”** - This will have no customer or tool assigned.
- **“Clone from Current Works Order”** – This allows cloning the customer; tool; standards; readings tolerances; readings settings; direction of rotation and the mode from the **“Current Works Order”**.
- **“Use Selected Customer Details”** – This allows use of the customer details from the **“Select Customer/Tool”** box to create the Works Order.
- **“Use Selected Customer/Tool Details”** – This allows use of the customer and tool details from the **“Select Customer/Tool”** boxes to create the Works order.

## How to Generate

- **“Manual Works Order Number”** – This allows the operator to manually enter the works order number, not an auto generated number created by the software.
- **“Auto generate Live Works Order”** – This function, when selected will create a works order number generated by the software which has a prefix particular to Live Works Order, as in the set up produced earlier.
- **“Auto generate Test Works Order”** - This function, when selected will create a works order number generated by the software which has a prefix selected by the user in the works order set-up to show it is a test only works number.
- **“Suffixes”** - This slider allows the operator to create multiple works orders with the same customer for multiple tools.
- **“Make This Works Order Current”** - Having created a works order number in the light blue field above click on **“Make This Works Order Current”** to show a tick in the box. This works order number will now be used for the calibration.
- Select **“Calibration”**, **“Conformity”** or **“Miscellaneous Tool”** type for the Works Order. Please note this cannot be changed in subsequent steps.

## Current Works Order

On the left-hand side of the “Home” page there is the box “**Current Works Order**”. This section displays the Works Order Number and details of the current Works Order.

**Current Works Order:**

**Works Order Details:**

Works Order No.:

**?**

**Browse Works Orders**

**Works Order Action:**

### Browse Works Orders

- “**All Works Orders**” - This will display a list of all works orders in “**Database Readings**” (See page 16). Choose a works order by clicking on it. Then click on “**Select**” which will take you back to the homepage and populate all relevant details on left side of the screen in “**Works Order Details**”. Works Order can be deleted up until the readings are saved on the Post Readings Details screen.
- “**Unassigned**” - This will bring up a list of Works Orders without an assigned Customer or Tool. *Please Note Unassigned Works orders will still either be in Calibration or Conformity mode.*
- “**By Selected Customer**” - This will bring up a list of Works Orders for the selected customer in the “**Selected Customer/Tool**” box
- “**By Selected Customer/Tool**” - This will bring up a list of Works Orders for the selected customer and tool in the “**Database Readings**”.

### Works Order Action

- “**Update Customer/Tool**” - This will populate the Current Works Order with the “**Customer/Tool**” from the “**Selected Customer/Tool**” box.
- “**Add Reading Details**” - This will open the “**Calibration Instrument and Lab Settings**” window (See “**Readings**” page 30).
- “**View Works Order**” - This will reopen the “**Readings Details**” window after the readings have been saved.

## Selected Customer/Tool

On the right-hand side of the “Home” page there is the box “**Selected Customer/Tool**”. This is where you can search for, edit and add new customers and tools.

The screenshot shows a web interface titled "Selected Customer/Tool:". It is divided into two main sections. The top section is for customers, with a "Customer ID:" label, a text input field, a blue question mark icon, and a "Check Customer" button. Below this are four buttons: "View Customer", "List All Customers", "Edit Customer", and "New Customer". The bottom section is for tools, with a "Tool ID:" label, a text input field, a blue question mark icon, and a "Check Tool" button. Below this are four buttons: "View Tool", "List All Tools", "Edit Tool", and "New Tool". At the bottom right, there is a box labeled "Customer/Tool Action:" containing a "View All Readings" button.

### Customers

- “**Check Customer**” – Allows you to manually enter a customer ID or name then search for the customer.
- “**New Customer**” - Allows you to add a new customer using the “FCustomer” screen (See page 25).
- “**Edit Customer**” – Allows you to view and change customer information on the “FCustomer” screen.
- “**View Customer**” - Allows you to view customer information but not make any changes on the “FCustomer” screen.
- “**List All Customers**” - Allows you to manually search through a list of customers in “**Database Customers**” (See page 16).

### Tools

- “**Check Tool**” – This allows you to manually enter a Tool ID or description then search for the tool.
- “**New Tool**” – This allows you to add a new torque tool or miscellaneous tool using the “FTools” screen (See page 25).
- “**Edit Tool**” – This allows you to view and change tool information on the “FTools” screen.
- “**View Tool**” – This allows you to view tool information but not make any changes on the “FTools” screen.
- “**List All Tools**” – This allows you to manually search through a list of tools in “**Database Tools**” (See Page 16).
- “**Customer/Tool Action**” – This allows you to view all previous readings for the selected tool.

## Add New Customer (FCustomer)

From “**Home**” page to the right of the screen headed “**Selected Customer/Tool**” click “**New Customer**”. Fields shown in light blue must be populated. The rest of the fields are optional.

Customer Maintenance (FCustomers)

**Customer Details**

Customer ID:  Dormant  **New**

Name:

Contact:

Address Line 1:

Address Line 2:

Address Line 3:

Address Line 4:

Post Code:

Phone Number:

Fax Number:

Email Address:

Comments:

Select “**Update**” to save the information.

## Add New Tool (FTools)

From the “**Home**” page select “**New Tool**” to bring up a page which allows operators to add a tool to the database. If “**Allow New Misc Tools**” is selected in “**Settings**” a pop-up box will appear to give the option to select “**Misc Tools**” or “**Torque Tools**”. Fields shown in light blue must be populated. The rest of the fields are optional. Clicking on “**Re Test Interval**” allows the operator to set an approximate time interval when the tool requires retesting.

Click on “**Update**” when complete and then “**Close**”. Please note tools can only be added after information for an individual customer is populated “Selected Customer/Tool”.

Tool Maintenance (FTools)

**Tool Details:**

Customer ID: AWS Advanced Witness Systems Ltd **Torque Tool** Dormant  **New**

Tool ID:

Locations:

Comments:

Model ID:

**Last Reading Details (For Info Only):**

Last Reading:

Last Works Order No:

Last Certificate:

Reading Type:

Reading Status:

**Manufacturer Details:**

Description:

Manufacturer Name:

Reference 1:

Reference 2:

Reference 3:

Nominal Torque:  Units of Measure: **N.m**

Decimal Places:  2  (999.99)

Re Test Interval: **None**

**Tool Defaults:**

Temperature Constant (k):

Manufacturer Temperature:  20

Tolerance: Use Standard

Resolution (f):

The “**Nominal Torque**” of the tool is the maximum torque the tool can produce.

The “**Tool Defaults**” box can be used to set the “**Resolution**”, “**Manufacturer Temperature**” and “**Temperature Constant**” of the tool. For Conformity and Calibration to In-House standards the “**Tolerance**” can be set to values other than the default standard (See page 39).

To add a tool of an existing model, click “**Select Model**” to open “**Database: Models**” then select the required model. The model ID may also be manually entered. Clicking “**Get Model Details**” will populate the “**Manufacturer Details**” box on the “**Tool Maintenance**” page. “**Get Model Details**” can also be used to update a tool if the model details have been changed. “**Clear Model**” will clear the “**Model ID**” field.

### Save As New Model

In “**Tool Maintenance**” after filling the compulsory blue fields and selecting “**Update**” you can select “**Save as New Model**” which opens the “**New Model from Tool**” window. Typing a “**Model ID**” and clicking “**OK**” will save the information to “**Database: Models**”.

The screenshot shows a dialog box titled "New Model from Tool (FModelKey)". Inside, there is a section labeled "Model Details:" containing a text input field for "Model ID:". Below the input field are two buttons: "OK" and "Cancel".

## Model Database/ Maintenance (FModels)

From Home page select “**Settings**” then select “**Database Maintenance**”. Under “**Data Maintenance**” click on “**Models**” then select “**New**”. This will bring up the “**Model Maintenance**” window which allows a user to manually add a new model to the database.

The screenshot displays the "Model Maintenance (FModels)" window. It includes a "Model Details" section with fields for Model ID, Model Description, Manufacturer Name, Reference 1, Reference 2, Reference 3, Nominal Torque, Units of Measure (set to Nm), Decimal Places (set to 2), and Re Test Interval (set to None). There is also a "Dormant" checkbox and a "New" button. Below this is a "Manufacturer Supplied Defaults" section with fields for Temperature Constant (k), Resolution (r), Manufacturer Temperature (set to 20), Tolerance (set to User Standard), Variation due to output drive (bod), Variation due to interface (bint), and Force loading point variation (bl). At the bottom are "Update" and "Close" buttons.

Alternatively, model data can be saved, from an existing tool, in “**Tool Maintenance**” by selecting “**Save as New Model**” and manually entering the Model ID. Model data may be imported from Kepler 3, Kepler 2002 and Kepler 2000. Please contact Advanced Witness Systems Ltd by emailing [sales@awstorque.co.uk](mailto:sales@awstorque.co.uk) if this is required.

The uncertainties bod, bint and bl can be added manually to the model on this page. Kepler 4 can calculate average values for the uncertainties bod, bint and bl on the “**Model Defaults**” page, found in the “**Database Maintenance**” screen under “**Update Model Defaults**”.

## Model Defaults

From the “**Database Maintenance**” page select “**Update Model Defaults**” to open the “**Model Defaults**” page. This page is used to report on the averages of uncertainties bod, bint and bl, taken by default from the latest 10 readings from tools of the same model.

Selecting “**All Models**” and clicking “**OK**” displays a list of every model in the database whether it has readings or not. Models with less than 10 readings will be marked as “**Not Enough Relevant Readings**”.

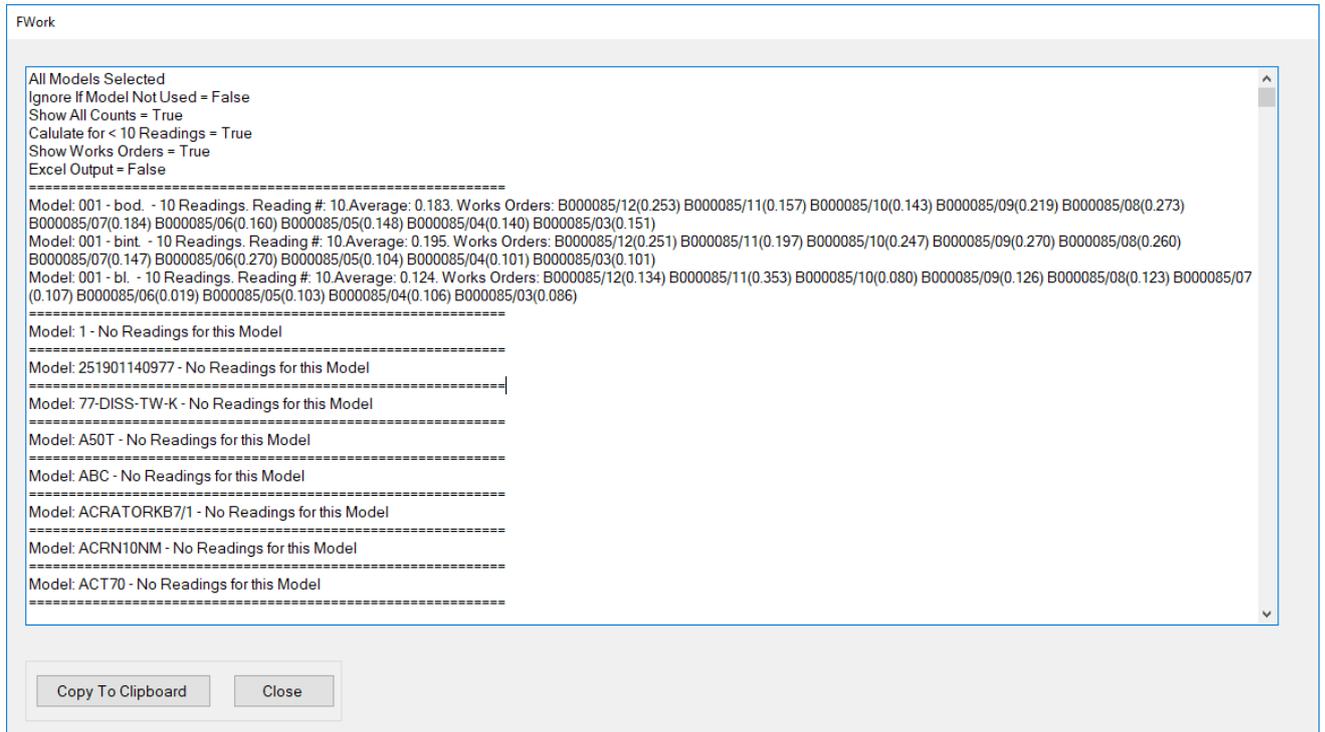
The “**Select Model**” option allows manual entry of a “**Model ID**” and after clicking “**Check Model**” and then “**OK**”; only reports values for the specified model. It is also possible to search for a model in the database by selecting “**List All Models**”.

There are 5 tick boxes with options:

- “**Ignore if Model Not Used**” - Displays only models with readings.
- “**Show All Counts**” – Displays the number of readings taken for models with less than 10 readings.
- “**Calculate for Models with Less Than 10 Readings**”- Calculates averages for bod, bint and bl for models with less than 10 readings and displays the values when “**Show All Counts**” is also selected.
- “**Show Works Order**” – Displays the individual Works Orders numbers and the corresponding bod, bint and bl values used to calculate the averages.
- “**Format Output for Excel**” – Displays the report in a format that can be imported into Microsoft Excel using the “Import Text Wizard”. Select the option “Delimited”, tick the “comma” box only and set the “text qualifier” to “. The output format should look like this:

	A	B	C	D	E	
1	All Models Selected					Ignore If Model Not Used = True / Show All Counts = True / Calculate for < 10 Readings
2	Model ID	Message	Status	Readings #	Average	Works Orders
3		1 bod	10 Readings	10	0.183	B000085/12(0.253) B000085/11(0.157) B000085/10(0.143) B000085/09(0.219) B000085/08(0.183)
4		1 bint	10 Readings	10	0.195	B000085/12(0.251) B000085/11(0.197) B000085/10(0.247) B000085/09(0.270) B000085/08(0.247)
5		1 bl	10 Readings	10	0.124	B000085/12(0.134) B000085/11(0.353) B000085/10(0.080) B000085/09(0.126) B000085/08(0.126)

Below is a sample report displayed in the “FWork” page after selecting the required options and clicking “OK”.



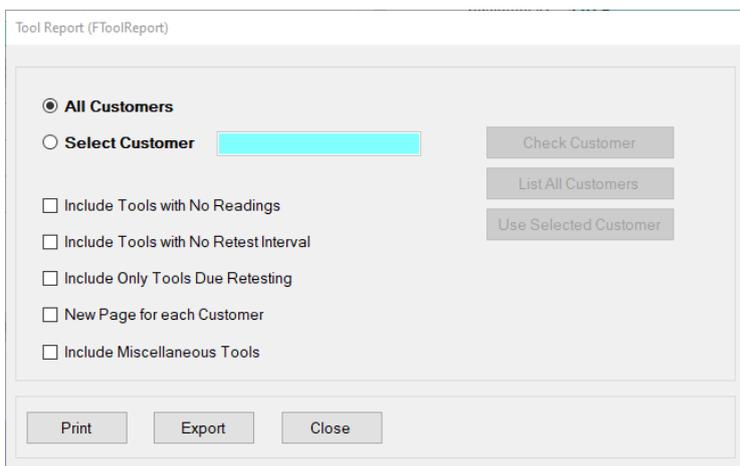
The “Copy to Clipboard” button copies the report to the clipboard allowing it to be pasted into other applications such as Notepad or Microsoft Excel.

## Tool Report (FToolReport)

From the “Home” page select “Reporting” to open the “Tool Report” page. This page is used to print out lists of tools that require retesting, have no retest interval or have no readings. Tools from all customers or selected customers can be included. If no selections are made, by default it will print out a list of tools with readings and a retest interval.

The buttons “Check Customer” and “List All Customers” allow the user to select a customer by searching “Database: Customers”.

The “Use Selected Customer” button updates the “Select Customer” field with the customer selected in the “Selected Customer/Tool” box on the “Home” page.



# Readings

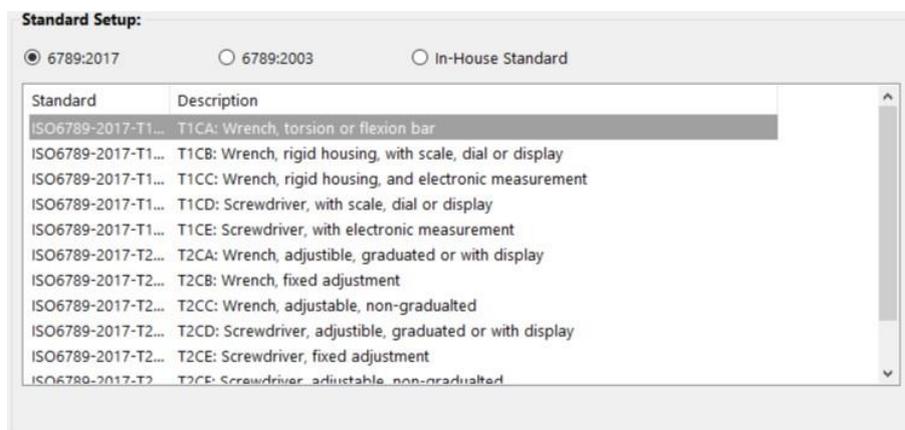
Before readings can be taken, a Works Order must have been created from the “**New Works Order**” (See page 22) section and customer/tool added by selecting “**Update Customer/Tool**” (See page 25).

Please note that calibration or conformity mode is selected when the Works Order is initialized.

## Selection of Standard prior to Readings

The “**Add Readings Details**” button will open the “**Select Readings Details**” window.

In the “**Standards Setup**” box the section of the standard for the type of tool can be applied. For more information on tool types see ISO 6789:2017 Part 1.



Please note: If an incorrect resolution for the tool type is inputted into “**Model Maintenance**” (e.g. accidentally inputting zero into the resolution field in “**Model Maintenance**” and selecting an indicating type in “**Readings Details**” or vice versa if a resolution greater than zero is inputted into “**Model Maintenance**” and a non-indicating type selected in “**Readings Details**”) there will be a popup after selecting “**Enter Readings**” on the “**Readings Details**” page stating the model resolution and tool type are incompatible. An operator will be unable to proceed until the model resolution and selected tool type are compatible. See Appendix D for more information.

There are four different versions of ISO 6789 that may be applied:

- Calibration ISO6789:2017 Part 2 (See page 31).
- Conformity ISO6789:2017 Part 1 (See page 38).
- Conformity ISO6789:2003 (See page 38).
- Calibration ISO6789:2003 (See page 44).

There are two versions of In-house standards that may be applied:

- Calibration In-House Standard uses the same method as calibration to ISO 6789:2017 Part 2 (See page 31).
- Conformity In-House Standard uses the same method as conformity ISO 6789:2017 Part 1 (See page 38).

An example image of the tool type and class is shown at the bottom of the “**Readings Details**” page to aid Standard selection.

## Calibration ISO6789: 2017 Part 2

This is the “**Select Readings Details**” screen for calibration to ISO 6789:2017 Part 2. This screen is used to modify the settings used for the calibration. Please note that calibration mode must have been selected when the Works Order was created.

The screenshot displays the 'Select Reading Details' window. It features a 'Calibration Instrument and Lab Settings' section with a table of instruments (Instrument ID, Description) and 'Select >>' and '<< Deselect' buttons. Below this are sliders for 'Lab Temperature °C' (set to 20) and 'Lab Humidity %' (set to 40). The 'Standard Setup' section includes radio buttons for '6789:2017', '6789:2003', and 'In-House Standard', and a list of standards with descriptions. The 'Reading Settings' section shows 'Nominal Torque: 120.00 cN-m' and three settings: Setting 1 (20% \*\* = 24.00), Setting 2 (60% = 72.00), and Setting 3 (100% = 120.00). There are 'Reset Values' and 'Clockwise/Counter Clock' options. The 'Control' section has 'Enter Readings', 'Cancel Reading', and 'Save Page Defaults' buttons. A diagram of a torque wrench is shown at the bottom right.

### Calibration Instruments and Lab Settings

- “**Calibration Instrument and Lab Settings**” - Choose an Instrument to be used to calibrate the tool then click on “**Select**” to move the chosen instrument to the right-hand box. Multiple instruments can be selected. To remove an instrument from the right-hand box select it and click on “**Deselect**”. Average of the uncertainty values and measurement errors for the instruments selected is shown on the right of the window.
- “**Lab Temperature**” - This sliding scale can be adjusted to show the ambient temperature of the laboratory.
- “**Lab Humidity**” – This sliding scale can be adjusted to show the ambient humidity of the laboratory.

### Standard Setup

- “**Standard Setup**” Choose a standard, tool type and class to calibrate to. This can be ISO 6789:2017, ISO 6789:2003 or In-House standards.
- “**Nominal Torque**” - This box displays the maximum torque of the tool.
- “**Setting**”- These boxes each show the percentage of maximum torque to be taken as readings. The torque values can be manually changed for each setting, for example to allow the lowest scale graduation to be entered instead of 20%. The “**Reset Values**” button reverts each “**Setting**” back to the default value.

### Direction

- Direction of rotation of the calibration can be selected.

## Use default Model Values

Ticking the boxes under “**Use Default Model Value**” allows an operator to use previous uncertainties for a specific tool rather than taking readings to calculate uncertainties:

- “**bod**” – Variation due to the geometric effects of the output drive of the torque tool as described by ISO 6789:2017 Part 2 6.2.3.2. Grayed out if “**Tool has a fixed drive**” is selected.
- “**bint**” – Variation due to geometric effects of the interface between the output drive of the torque tool and the calibration system as described by ISO 6789:2017 Part 2 6.2.3.3. Grayed out if “**No adaptors required**” is selected.
- “**bl**” – Variation due to the variation of the force loading point as described by ISO 6789:2017 Part 2 6.2.3.4.

## Output Drive Selection (wod)

- “**Tool has a fixed drive**” – Tick this box to use  $wod=0$  for the calibration if the tool has a fixed drive. See ISO 6789:2017 Part 2, 6.2.3.2 for more information.
- “**4 positions**” – Select this option if the tool has a drive with equal positions divisible by 4 such as a square drive.
- “**6 Positions**” – Select this option if the tool has a drive with equal positions divisible by 6 such as a hexagonal drive.

## Interface Selection (wint)

- “**No Adapters Required**” – Tick this box to use  $wint=0$  for the calibration if there are no adaptors used. See ISO 6789:2017 Part 2, 6.2.3.3 for more information.
- “**4 positions**” – Select this option if the tool has a drive with equal positions divisible by 4 such as a square drive.
- “**6 Positions**” – Select this option if the tool has a drive with equal positions divisible by 6 such as a hexagonal drive.

## Force Loading point (wl)

- “**Not Applicable (wl=0)**” – Select this option if the tool is a torque screwdriver, or a torque wrench where the force loading point uncertainty is not applicable.

## Selections Made

This box summarizes the selections the user has made.

## Comments

Any additional comments may be made in this box. These can be edited after the reading is taken.

When the required settings have been applied, select “**Enter Readings**” to begin taking the readings.

## Enter Readings

After the settings for the calibration have been applied in “**Select Reading Details**” the “**Exercise Readings**” screen will appear. This is the first of up to six screens where readings must be entered in order to calibrate a tool to ISO 6789:2017 Part 2.

Readings can be entered either manually or using test equipment.

- In manual entry; to move to the next reading entry box press the “**Tab**” key.
- When test equipment is used the reading will be entered by the equipment. The cursor will automatically move to the next reading entry box (See page 50 to set up test equipment).

Please note selecting “**Review All Readings**” before “**Save and Continue**” on a “**Readings**” page will delete any unsaved readings.

## Exercise Readings

Before taking readings there are several exercise readings that must be completed. These are to exercise the tool and not used to calculate results.

The screenshot displays the 'Exercise Readings' interface. At the top, there are tabs for 'Exercise Readings', 'Regular Readings', 'wrep Readings', 'wod Readings', 'wint Readings', and 'wl Readings'. The 'Exercise Readings' tab is active. Below the tabs, the 'Readings' section shows 'Nominal Torque: 120.00 cNm'. Underneath, there are three 'Exercise' settings, each with a 'Setting' of 120.00 cN-m. Three reading boxes are visible: 'Reading 1' with value 119.54, 'Reading 2' with value 118.87, and 'Reading 3' with value 121.24. On the right side, there is a 'Reading Control' section with buttons for 'Save and Continue', 'Clear These Readings', 'Review All Readings', and 'Restart All Readings'. At the bottom right, there is a 'Cancel' section with a 'Cancel Reading' button.

After the readings have been entered select “**Save and Continue**” to move on to the next screen. Please Note all pale blue fields must be populated in order to continue.

## Regular Readings

The next screen is the Regular Readings.

After the readings have been recorded select “**Save and Continue**” to move on to the next screen. Please Note all pale blue fields must be populated in order to continue.

## wrep wod, wint and wl Readings

These four screens are the Readings taken to calculate the uncertainties in compliance with Calibration ISO 6789:2017 Part 2.

The “**Paste from Regular Readings**” button allows the operator to reuse the first setting readings from the regular readings screen.

After the readings have been recorded select “**Save and Continue**” to move on to the next screen. Please Note all pale blue fields must be populated in order to continue.

## Readings Complete

After all readings have been recorded select “**Save and Continue**” to move on to the “**Readings Complete**” screen. At any time selecting “**Clear These Readings**” will clear the readings on the current page.

Readings

2017

Exercise Readings Regular Readings wrep Readings wod Readings wint Readings wl Readings

Reading Control:

Readings Complete. Submit or Review

Review All Readings

Restart All Readings

Submit Readings

Cancel

Cancel Reading

On the “**Readings Complete**” screen selecting “**Submit Readings**” will store all the readings and move to the next screen. “**Restart All Readings**” will clear all the readings. All readings may be reviewed by selecting “**Review All Readings**”.

## Post-Reading Details

On the “**Post Readings Details**” screen the users can be selected for the following roles:

- “**Readings By**” - The operator taking the readings.
- “**Operator**” - The operator who inputted the readings into Kepler 4.
- “**Signatory**” -The operator who signed off the calibration.

Comments about the readings can also be added or edited in the bottom left box.

In the “**Control**” box there are four options:

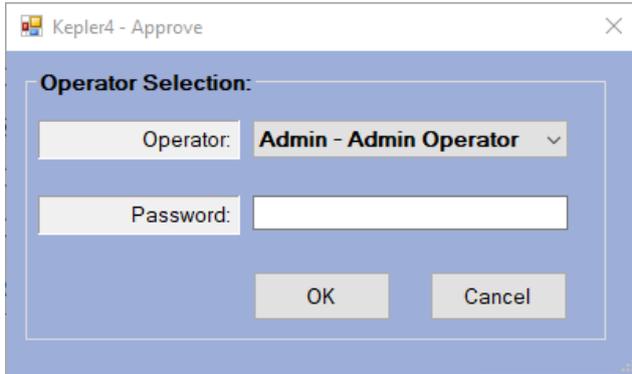
- “**As Found/ As Left**” – Torque wrench requires no adjustments and can be returned to the customer.
- “**As Found**” - Torque wrench requires adjustments and retesting before returning to the customer. After adjustment and retesting the tool will be “As Left” if it is now ready to return to the customer.
- “**As Left**” – Torque wrench has been adjusted and is ready to return to the customer.
- “**Unserviceable**” – Torque wrench has significant fault and cannot be calibrated or used safely by the customer.

The “**Certificate Details**” box can auto generate a certificate number from “**Works Order No. / Certificate No. Setup**” (See page 20) or a certificate number may be added manually if preferred.

The “**Certificate Template**” and “**Label Template**” dropdown boxes allow the user to select the required templates from those stored in the “**Reports Database**”. These will default to the selection made on the “**Report Configuration**” screen (See page 18). To create a new template, see page 18.

The “**Review Coverage Factor (k)**” section allows the operator to check the Coverage Factor (k) using the AWS k Factor Verification Module (sold separately). Clicking on the “**Review Coverage**” button will open up the “**Update Coverage (k)**” window. For more information, see “**Appendix E**” (Page 59).

The “Specify Date/ Time of Reading” box allows the readings date to be backdated by up to a month. This is in case there is a delay between completing the reading and inputting into Kepler 4. This requires permission from an administrator to change the readings date.



Please note this is your last chance to correct a reading before it is saved.

After these details have been finalized select “Save Readings” to go to the results screen.

Please note after the readings have been saved it is no longer possible to delete a Works Order.

## Readings Results

Once the readings are saved, the readings results screen will be shown.

This screen displays the results from the readings taken, additionally all the information required for a calibration certificate.

Readings	Setting1		Setting2		Setting3	
Tool Type/Class	Setting		Setting		Setting	
Type 1A	20% **		60%		100%	
Clockwise	10.00 N.m		30.00 N.m		50.00 N.m	
	Reading	as	Reading	as	Reading	as
Reading 1:	10.04	-0.398%	35.00	-14.286%	60.00	-16.667%
2:	11.20	-10.714%	30.13	-0.431%	52.00	-3.846%
3:	12.00	-16.667%	30.14	-0.464%	50.18	-0.359%
4:	11.00	-9.091%	32.00	-6.250%	56.00	-10.714%
5:	10.07	-0.695%	47.00	-36.170%	50.18	-0.359%
Mean Value (Xbar):	10.862		34.854		53.672	
Mean of Error (asbar):	-7.513%		-11.520%		-6.389%	
Uncertainty Expanded (W):	6.888%		18.160%		7.107%	
Uncertainty Interval (W):	14.501%		29.780%		13.596%	

From this page there are seven tabs available;

- “Readings” - Shows results generated from current readings.
- “General” – Lists general information about the reading, certificate and instrumentation.
- “Customer” – Customer details.

- **“Tool”** – Tool details.
- **“Standard”** – Details of the standard applied.
- **“Other Readings”** - Other readings taken such as those for exercises or uncertainties.
- **“Calculations”** – Calculations used to generate the results, including the k factor.

All information on these tabs is recorded at the time the reading was taken. For example, if customer details are changed in the future, this reading will always show the customer details at the time the reading was taken.

The **“Available Readings”** box shows a list of previous readings taken for that specific tool.

The **“Colour the Calibration”** tick box colour codes the results to indicate whether the deviation is within tolerance for the tool type as defined in ISO 6789:2017 Part 1.

At this point you may print the results, as a certificate, by selecting **“Print Reading”** or as a label by selecting **“Print Label”** (which can then be attached to the calibrated tool). The results may be exported to a .CSV format as used in MS Excel using the **“Extract to CSV”** button. To set up this feature please see P19. Please note certificate/ label templates must be set up before printing.

## Conformity ISO6789: 2017 Part 1/ Conformity ISO6789: 2003

After selecting the **“Add Readings Details”** icon the **“Select Readings Details”** window will appear. This is the screen where either ISO 6789:2017 Part 1 or ISO 6789:2003 standards can be applied for the model of torque wrench, instruments selected and torque settings adjusted. In-House standards may also be applied here. Please note that conformity mode must have been selected when the Works Order was created.

Select Reading Details

**Calibration Instrument and Lab Settings:**

Instrument	Description
2014	250Nm Torque Transducer
CM145	Precision Torque Adaptor 1 inch to 3/8 inch

Select >>

<< Deselect

Instrument	Description

Lab Temperature °C:

Lab Humidity %:

**Standard Setup:**

6789:2017  
  6789:2003  
  In-House Standard

Standard	Description
ISO6789-2017-T1...	T1CA: Wrench, torsion or flexion bar
ISO6789-2017-T1...	T1CB: Wrench, rigid housing, with scale, dial or display
ISO6789-2017-T1...	T1CC: Wrench, rigid housing, and electronic measurement
ISO6789-2017-T1...	T1CD: Screwdriver, with scale, dial or display
ISO6789-2017-T1...	T1CE: Screwdriver, with electronic measurement
ISO6789-2017-T2...	T2CA: Wrench, adjustable, graduated or with display
ISO6789-2017-T2...	T2CB: Wrench, fixed adjustment
ISO6789-2017-T2...	T2CC: Wrench, adjustable, non-graduated
ISO6789-2017-T2...	T2CD: Screwdriver, adjustable, graduated or with display
ISO6789-2017-T2...	T2CE: Screwdriver, fixed adjustment
ISO6789-2017-T2...	T2CF: Screwdriver, adjustable, non-graduated

**Reading Settings:**

Nominal Torque:

Setting 1: 20% **\*\***

Setting 2: 60%

Setting 3: 100%

Reset Values

Clockwise  
 Counter Clock

(\*\* or lowest scale graduation)

**Comments:**

**Selection:**

Conformity: 6789:2017

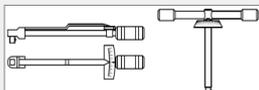
S Readings: + 3 Exercise Readings.

Tolerance (6%)

Clockwise

Tool Model ID: Not Defined

**\*\* Conformity Selected \*\***



Combined expanded measuring device uncertainty (Wmid %)

Selected measuring device measurement error (bep %)

**Control**

## Calibration Instruments and Lab Settings

- **“Calibration Instrument and Lab Settings”** - Choose an Instrument to be used to calibrate the tool then click on **“Select”** to display the chosen instrument in the right-hand box. Multiple instruments can be selected. To remove instruments from the right-hand box, click on **“Deselect”**. Average of the uncertainty values and measurement errors for the instruments selected is shown on the right of the window.
- **“Lab Temperature”** - This sliding scale can be adjusted to show the ambient temperature of the laboratory. “
- **Lab Humidity**” – This sliding scale can be adjusted to show the ambient humidity of the laboratory.

## Standard Setup

- **“Standard Setup”** - Choose a standard, tool type and class to calibrate to. This can be ISO 6789:2017, ISO 6789:2003 or In-House standards.
- **“Nominal Torque”** - This box displays the maximum torque of the tool.
- **“Setting”**- These boxes each show the percentage of maximum torque to be taken as readings. The torque values can be manually changed for each setting, allowing the lowest scale graduation to be entered instead of 20%. The **“Recalculate”** button reverts each **“Setting”** back to the default value.

## Direction

- Direction of rotation of the calibration can be selected.

## Selections Made

- This box summarizes the selections the user has made.

## Comments

- Any additional comments may be made in this box. These can be edited after the reading is taken.

## Tool Tolerance for In House Standards

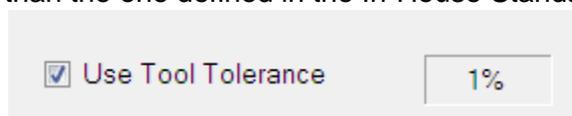
To use the tool tolerance in conformity mode while applying In-House Standards you need to do the following:

- From **“Home”** page go to **“Edit Tool”** and set the tolerance slider in **“Tool Defaults”** to the required tolerance, and select **“Update”**.



- Select **“Update Customer/Tool”** on Homepage and then **“Add Readings Details”**
- Select **“In-House standard”** in **“Select Reading Details”**.

This brings up the option to **“Use Tool Tolerance”** which uses the tool tolerance rather than the one defined in the In-House Standard.



## Enter Readings

After the settings for the calibration have been applied in “**Select Reading Details**” the “**Exercise Readings**” screen will appear. This is the first of two screens where readings must be entered in order to test that a tool conforms to ISO 6789:2017 Part 1/ ISO 6789:2003.

Readings can be entered either manually or using test equipment.

- In manual entry; to move to the next reading entry box press the “**Tab**” key.
- When test equipment is used the reading will be entered by the equipment. The cursor will automatically move to the next reading entry box (See page 50 to set up test equipment).

Please note selecting “**Review All Readings**” before “**Save and Continue**” on a “**Readings**” page will delete any unsaved readings.

## Exercise Readings

Before taking readings there are several exercise readings that must be completed. These are to exercise the tool and not used to calculate results.

The screenshot shows the 'Readings' interface with the following details:

- Mode:** Exercise Readings (selected), Regular Readings
- Year:** 2017
- Readings:**
  - Exercise Readings:** (selected)
  - Nominal Torque:** 100.00 N.m
  - Tolerance:** 6%
  - Setting:** 100.00 N.m
  - Tolerance:** 6.00 N.m
  - Reading 1:** 99.86
  - Reading 2:** 100.01
  - Reading 3:** 103.54
- Reading Control:**
  - Status: **\*\* Conformity Selected \*\***
  - Buttons: Save and Continue, Clear These Readings, Review All Readings, Restart All Readings

After the readings have been entered select “**Save and Continue**” to move on to the next screen. Please Note all pale blue fields must be populated in order to continue.

## Readings

The next screen is the “**Regular Readings**” entry screen. Each reading field will display a colour background depending on whether or not the reading is inside the tolerance detailed in the standard applied. Default colours are:

- “**Green**” – This reading is within tolerance.
- “**Red**” – This reading is outside the tolerance.
- “**Yellow**” – This reading is more than 3x the specified tolerance.

Readings

2017

**Exercise Readings** **Regular Readings**

Readings:

**Regular Readings** Nominal Torque: 100.00 N.m Tolerance: 6%

	Setting 1	Setting 2	Setting 3
Setting:	20.00 N.m	60.00 N.m	100.00 N.m
Tolerance:	1.20 N.m	3.60 N.m	6.00 N.m
Reading 1:	20.54	60.99	100.89
Reading 2:	23.48	60.47	105.65
Reading 3:	21.19	64.01	93.99
Reading 4:	18.75	71.59	81.65
Reading 5:	16.30	54.78	118.49

Reading Control:

**\*\* Conformity Selected \*\***

**Save and Continue**

Clear These Readings

Review All Readings

Restart All Readings

Cancel

Cancel Reading

After the readings have been recorded select **“Save and Continue”** to move on to the next screen. Please Note all pale blue fields must be populated in order to continue.

## Readings Complete

After all readings have been recorded select **“Save and Continue”** to move on to the **“Readings Complete”** screen. At any time selecting **“Clear These Readings”** will clear the readings on the current page.

Readings

2017

**Exercise Readings** **Regular Readings**

Reading Control:

**Readings Complete. Submit or Review**

Review All Readings

Restart All Readings

**Submit Readings**

Cancel

Cancel Reading

On the **“Readings Complete”** screen pressing **“Submit Readings”**, this will store all the readings and move to the next screen. **“Restart All Readings”** will clear all the readings.

All readings may be reviewed by selecting **“Review All Readings”** after **“Submit Readings”** otherwise readings data will be lost.

## Post-Reading Details

On the “**Post Readings Details**” screen the users can be selected for the following roles:

- “**Readings By**” - The operator who took the readings.
- “**Operator**” - The operator who inputted the readings into Kepler 4.
- “**Signatory**” - The operator who signed off the calibration.

Comments about the readings can also be added or edited in the central box.

In the “**Control**” box there are four options:

- “**As Found/ As Left**” – Torque wrench requires no adjustments and can be returned to the customer.
- “**As Found**” - Torque wrench requires adjustments and retesting before returning to the customer.
- “**As Left**” – Torque wrench has been adjusted and is ready to return to the customer.
- “**Unserviceable**” – Torque wrench has significant fault and cannot be calibrated or used safely by the customer.

The “**Certificate Details**” box can auto generate a certificate number from “**Works Order No. / Certificate No. Setup**” (See page 20) or a certificate number may be added manually if preferred.

The “**Certificate Template**” and “**Label Template**” dropdown boxes allow the user to select the required templates from those stored in the “**Reports Database**”. These will default to the selection made on the “**Report Configuration**” screen (See page 19). To create a new template, see page 18.

The “**Specify Date/ Time of Reading**” box allows the readings date to be backdated by up to a month. This is in case there is a delay between completing the reading and inputting into Kepler 4. This requires permission from an administrator to change the readings date.

Please note this is your last chance to correct a reading before it is saved.

After these details have been finalized select “**Save Readings**” to go to the results screen.

Please note after the readings have been saved it is no longer possible to delete a Works Order.

## Readings Results

This screen displays, once the readings have been saved, the results from the taken readings along with all the information required for a calibration certificate.

**Customer:** HSS    **Banbury Tool Hire**  
**Tool:** 001    **Torque Wrench**

**Reading Details**

**Date/Timestamp:** 05-Mar-19 12:12:14  
**Works Order No.:** CONFORMITYTEST1  
**Certificate:**  
**Tool Capacity:** 50.000 N.m  
**Standard:** ISO6789-2017-T2CA  
**Reading Type:** As Found  
**Conformity Reading 6789-2017**  
 Some Readings Badly Outside Tolerance  
**Retest Date:** 05-Mar-19 12:12:14

Readings	Setting1		Setting2		Setting3	
	Setting	Tolerance	Setting	Tolerance	Setting	Tolerance
Type 2A	20% **	4%	60%	4%	100%	4%
Clockwise	10.000 N.m	0.400	30.000 N.m	1.200	50.000 N.m	2.000
	Reading	ad	Reading	ad	Reading	ad
Reading 1:	10.000	0.000%	28.800	-4.000%	50.000	0.000%
2:	9.600	-4.000%	28.700	-4.333%	48.000	-4.000%
3:	9.500	-5.000%	26.400	-12.000%	47.900	-4.200%
4:	8.800	-12.000%	26.300	-12.333%	44.000	-12.000%
5:	8.700	-13.000%	30.000	0.000%	43.900	-12.200%
Mean Value (Xbar):		9.320	28.040	46.760		
Mean of Deviation (adbar):			-6.800%	-6.533%	-6.480%	

(\*\* or lowest scale graduation)

**Control**

**Available Readings:**

05-Mar-19 12:12:14 <  
 16-Aug-18 14:31:40

Print Reading  
 Print Label  
 Extract to CSV  
 Save Page Defaults

Admin - Admin Operator (Administrator)    Monday, 14 October, 2019    Kepler4 - Version: K4=1.17A - Calibration and Conformity    Copyright © - Advanced Witness Systems 2017

From this page there are seven tabs available;

- **“Readings”** - Shows results generated from current readings.
- **“General”** – Lists general information about the reading, certificate and instrumentation.
- **“Customer”** – Customer details.
- **“Tool”** – Tool details.
- **“Standard”** – Details of the standard applied.
- **“Other Readings”** - Other readings taken such as those for exercises or uncertainties.
- **“Calculations”** – Calculations used to generate the results.

All information on these tabs is recorded at the time the reading was taken. For example, if customer details are changed in the future, this reading will always show the customer details at the time the reading was taken.

The **“Available Readings”** box shows a list of previous readings taken for that specific tool.

At this point you may print the results, as a certificate, by selecting **“Print Reading”** or as a label by selecting **“Print Label”** (which can then be attached to the calibrated tool). The results may be exported to a .CSV format as used in MS Excel using the **“Extract to CSV”** button. To set up this feature please see P19. Please note certificate/ label templates must be set up before printing.

## Calibration ISO6789: 2003

Calibration to ISO 6789:2003 uses the same methodology as Conformity ISO 6789:2017 Part 1 and conformity ISO 6789:2003 (See page 38). Please note that calibration mode must have been selected when the Works Order was created.

## Reprinting Certificate/Label

From “**Home**” page select “**All Works Orders**” to open “**Database Readings**”. Select historic Works Order from the list. This will take you back to the “**Home**” page. Select “**View Works Order**” which will bring up the “**Readings Details**” page and results for the historic Works Order. Select “**Print Reading/ Label**” to print out the certificate or label.

## Miscellaneous Tools

The Miscellaneous Tools feature allows storage of non-torque tool information for use in building Miscellaneous Tool certificate front pages. To use miscellaneous tools, the tick box “**Allow New Misc Tools**” must be selected. To create a new Misc Tool select “**New Tool**” from the Homepage (Page 25) and then “**Misc Tool**” from the pop up. To use Misc Tool information in a calibration certificate, a Misc Tool Works Order must be created by selecting “**Miscellaneous Tool**” Under “**New Works Order**”. The information is added to the WO by selecting “**Update Customer/Tool**” and the “calibration” can be started by selecting “**Add Reading Details**”. This process is different to standard calibrations as Kepler 4 cannot calibrate non-torque tools.

After selecting “**Add Readings Details**” the next screen is the “**Post Readings Details**” screen (Page 42).

Selecting “**Save Reading**” to complete the “calibration” and go to “**Results**”. These steps are required to produce a certificate template with a Miscellaneous Tools Works Order.

The “**Specify Date/ Time of Reading**” box allows the readings date to be backdated by up to a month. This is in case there is a delay between completing the reading and inputting into Kepler 4. This requires permission from an administrator to change the readings date.

The screenshot shows the Kepler4 Control software interface. At the top, there are navigation buttons for Home, New Works Order, Reporting, Settings, and Exit. The main header displays the Customer as 'AWS - Advanced Witness Systems Ltd' and the Tool as 'MISCTOOL1 - Misc Tool 1'. The central area is divided into three tabs: General, Customer, and Tool. The 'General' tab is active, showing a table of 'General Reading Details' with the following information:

General Reading Details	
Customer:	AWS - Advanced Witness Systems Ltd
Tool ID:	MISCTOOL1 - Misc Tool 1
Reading Timestamp:	11/12/2020 14:15:23
Works Order:	AWS001
Certificate:	2600115
Reading Type:	As Found
Reading Status:	Miscellaneous Tool
Kepler Version Used:	K4=3.06
Comments:	
Operator:	Admin - Admin Operator
Readings By:	Admin - Admin Operator
Signatory:	Admin - Admin Operator
Certificate Timestamp:	No Date (Not Printed Yet)

On the left side, under 'Reading Details', there are fields for Date/Timestamp (11/12/2020 14:15:23), Works Order No. (AWS001), Certificate (2600115), Tool Capacity, Standard, Reading Type (As Found), and Retest Date (11/12/2020 14:15:23). On the right side, under 'Control', there is a section for 'Available Readings' with a list containing the selected date and time, and buttons for 'Print Reading', 'Print Label', 'Extract to CSV', and 'Save Page Defaults'.

The footer of the application displays: Admin - Admin Operator (Administrator) | 11 December 2020 14:15 | Kepler4 - Version: K4-3.06 - Calibration and Conformity | Copyright © - Advanced Witness Systems 2020

With a Miscellaneous Tool Works Order with results selected it is now possible to print out certificate pages with the **“Print Reading”/ “Print Labels”** using the non-torque tool information.

# Settings (Fsettings)

From the “Home” page click on “Settings”. This will display “FSettings” showing you several tabs to choose from:

- “General Settings” (See page 46).
- “Database Maintenance” (See page 47).
- “Colour Configuration” (See page 48).
- “Report Configuration” (See page 19).
- “Translations” (See page 49).
- “Auto Input Configuration” (See page 50).
- “Recent Updates”

## General Settings

The “General Settings” tab allows a user to set up Automatic Works Orders and Certificates (See page 20), view product registration information and change whether or not warnings and acknowledgements occur throughout the program.

The screenshot shows the 'FSettings' application window with the 'General Settings' tab selected. The interface includes several sections for configuration:

- General Options:** A list of checkboxes for 'Database Backup Warning?', 'Extra Acknowledgements?', 'Reading Warning', 'Use Translation', 'Default to Conformity', and 'Allow New Misc Tools'.
- Other Options:** Three buttons: 'Product Registration', 'Reset Database Grids', and 'Show Decimal Separator'.
- Automatic Works Orders:** A table with columns 'ID' and 'Description'. The table contains three rows: 'Unspecified', 'LIVEWO', and 'TESTWO'. To the right are buttons for 'Works Orders Auto Live', 'Works Orders Auto Test', and 'Refresh Works Orders'.
- Automatic Certificates:** A similar table with columns 'ID' and 'Description', containing 'Unspecified', 'LIVECERT', and 'TESTCERT'. To the right are buttons for 'Certificate Auto Live', 'Certificate Auto Test', and 'Refresh Certificates'.
- Uncertainty Confidence Factor:** Two input fields: 'Coverage Factor (k):' with a value of 2.00 and 'Coverage Probability (p):' with a value of 95.00%.

At the bottom of the window are 'Update' and 'Close' buttons.

- “Database Backup Warning?” – Change whether or not the database backup warning occurs upon opening or close of Kepler 4.
- “Extra Acknowledgements?” – Change whether a pop-up window occurs when saving/ updating data.
- “Reading Warning” – Change whether a pop-up reminder window occurs after each set of readings.

- **“Use Translation”** – Use the settings from the translations page to change the language.
- **“Default to Conformity”** – Default to conformity in **“New Works Orders”** window.
- **“Allow New Misc Tools”**–Gives the option for Misc Tools when you click **“New Tool”**
- **“Product Registration”** – Shows details and allows re-registration.
- **“Reset Database Grids”** – Resets the default width of the grids in the database windows.
- **“Show Decimal Separator”** – Shows which character is used as a decimal point.

## Coverage Factor (k) and Coverage Probability (p)

The **“Uncertainty Confidence Factor”** section allows you to change the default Coverage Factor (k), and Coverage Probability (p), that Kepler uses for 2017 and In-House Calibrations. These values are stored against completed readings, can be added as database fields to report templates, and can be exported as part of the CSV file. These values are superseded if the K Factor Verification Module is used (See Appendix E, Page 59).

- **“Coverage Factor (k)”** – Coverage factor applied to the relative measurement uncertainty to achieve the required confidence level. This defaults to 2.00. This must be a number between 1.00 and 3.00.
- **“Coverage Probability (p)”** – This is the confidence interval generated by the selected Coverage Factor. This can be found using lookup tables. This must be a percentage between 0 and 99.99.

## Database Maintenance

The **“Database Maintenance”** tab allows a user to add or modify data stored in the Kepler 4 database. *Please note it is not possible to delete information from the database but only make it “Dormant”.*

The screenshot shows the 'FSettings' window with the 'Database Maintenance' tab selected. The interface is divided into several sections:

- General Settings:** Includes buttons for 'Operators', 'Instruments', 'Certificates and Works Orders', 'Models', 'Standards', and 'Reports'.
- Data Import:** Includes buttons for 'Import ISO Standards', 'Import Customers', 'Import Models', 'Import Tools', and 'Import Instruments'.
- Delete Database:** Includes a 'Delete Database' button.
- Database Location Reset:** Includes a 'Database Location Reset' button.
- Model Defaults:** Includes an 'Update Model Defaults' button.

At the bottom of the window, there are 'Update' and 'Close' buttons. A status box at the bottom right displays the following information:

```
Data
Source=(LocalDB)Kepler4;Database=KEPLER4DB;Trusted_Connection = yes;Connect Timeout=30
```

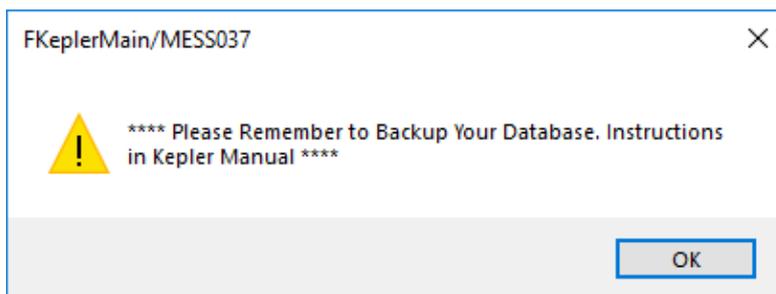
The “**Data Import**” box is used to import the database fields for the ISO standards, and if you are upgrading to Kepler 4 from Kepler 3, 2002 or 2000 software programs, it is possible to import “**Standards**”, “**Customers**”, “**Models**”, “**Tools**” and “**Instruments**” from those programs with the use of database conversion software. This software is available on request; please contact Advanced Witness Systems Ltd by emailing [sales@awstorque.co.uk](mailto:sales@awstorque.co.uk) if you require this service.

The “**Delete Database**” will completely delete the database. This has added levels of security so please contact Advanced Witness Systems Ltd by emailing [sales@awstorque.co.uk](mailto:sales@awstorque.co.uk) should you wish to use this function.

The “**Database Location Reset**” can be used to change whether the database is stored locally or on a server. This has added levels of security so please contact Advanced Witness Systems Ltd by emailing [sales@awstorque.co.uk](mailto:sales@awstorque.co.uk) should you wish to use this function. See page 12.

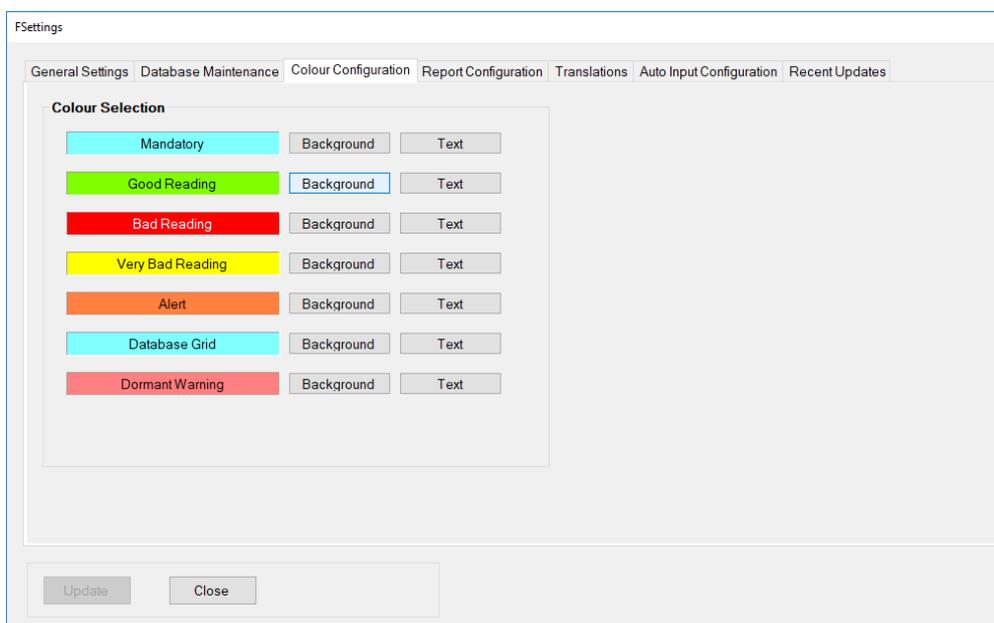
## Backup Database

The Database is stored in a folder called “**K4Data**” in the user’s documents folder on the PC. The database consists of two files “**KEPLER4DB.mdf**” and “**KEPLER4DB\_log.ldf**”, which should be copy and pasted into a different file location of your choosing. Please remember to backup database regularly.



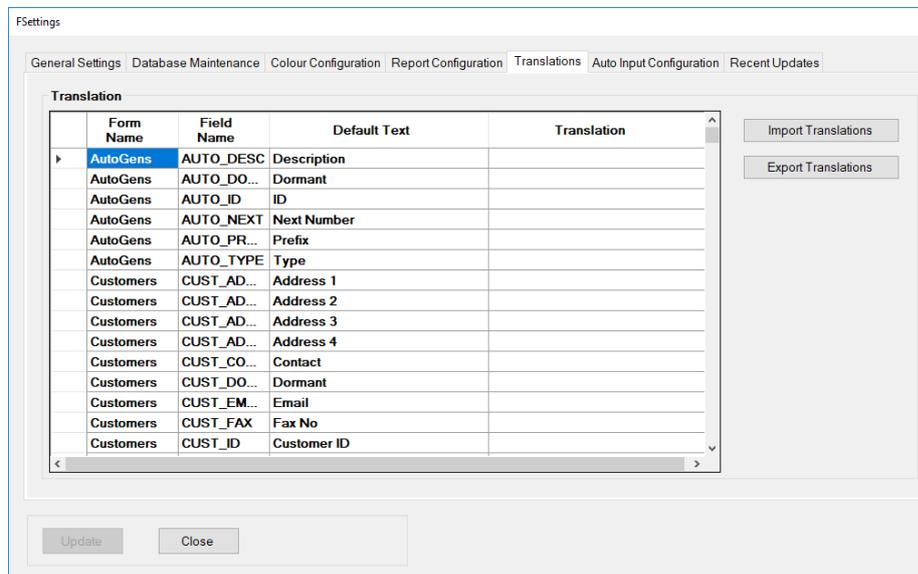
## Colour Configuration

The “**Colour Configuration**” tab displays options to colour code certain fields. Click on whichever is to be changed to bring up choice of colours.



## Translations

This tab allows the program to be translated into other languages. Translations are carried out by Exporting the translations file, and Importing it again.



Select **“Use Translation”** under **“General Settings”** and restart Kepler 4 in order to apply the translations.

## Importing New Translations

This will populate the **“Translations”** column using a .txt file from the PC. First select the **“Export Translations”** and save the .txt file to the PC. Fill in the translation in the empty set of **“”** marks and then save the .txt file. Then select **“Import Translations”** and the translations will be imported from the .txt file.

```

K4Trans - Notepad
File Edit Format View Help
"AutoGens", "AUTO_DESC", "Description", "Beschreibung", "<EOL>"
"AutoGens", "AUTO_DORMANT", "Dormant", "", "<EOL>"
"AutoGens", "AUTO_ID", "ID", "", "<EOL>"
"AutoGens", "AUTO_NEXT", "Next Number", "", "<EOL>"
"AutoGens", "AUTO_PREFIX", "Prefix", "", "<EOL>"
"AutoGens", "AUTO_TYPE", "Type", "", "<EOL>"
"Customers", "CUST_ADDRESS1", "Address 1", "", "<EOL>"

```

## Auto Input Configuration

This allows Torque Tool Test Equipment to be connected to the computer in order to input data directly into Kepler 4.

Connect the device to the computer and install drivers as required by the device manufacturer. The drop-down boxes on the left should be set up using the information in the device handbook. Clicking refresh will bring up the correct port in the “**Available Ports**” box.

The “**Terminator**” selection can be set as “**CR**” for data streams ending in a Carriage Return only, or “**CRLF**” for data streams ending in a Carriage Return and Line Feed.

When the information on the left is configured select “**Open Com Port**” in order to communicate with the device. Take a test reading using the device, if it is working correctly the reading should appear in the “**Data from Device**” box. Device is now ready to use to take readings.



This icon on the top right of the “**Readings**” screens indicates that the device is connected.



This icon on the top right of the “**Readings**” screens indicates that the device has lost connection.

# Appendix A

## Operator level privileges

Kepler 4 Operator Privileges	USER	MAINTAINER	ADMINISTRATOR
<b>Database Maintenance:</b>			
Operators - Add/Edit/Clone/Delete (Make Dormant)	No	No	Yes
Operators - View	Yes	Yes	Yes
Standards - Add/Edit/Clone/Delete (Make Dormant)	No	No	Yes
Standards - View	Yes	Yes	Yes
AutoGens (WO and Cert Numbers) - Add/Edit/Clone/Delete (Make Dormant)	No	No	Yes
AutoGens - View	Yes	Yes	Yes
Instruments - Add/Edit/Clone/Delete (Make Dormant)	No	Yes	Yes
Instruments - View	Yes	Yes	Yes
Reports/Certificates - Add/Edit/Clone/Delete (Make Dormant)	No	Yes	Yes
Reports/Certificates - View	Yes	Yes	Yes
Customers - Add/Edit/Clone/Delete (Make Dormant)	Yes	Yes	Yes
Customers - View	Yes	Yes	Yes
Tools - Add/Edit/Clone/Delete (Make Dormant)	Yes	Yes	Yes
Tools - View	Yes	Yes	Yes
Models - Add/Edit/Clone/Delete (Make Dormant)	Yes	Yes	Yes
Models - View	Yes	Yes	Yes
<b>Works Order Maintenance:</b>			
Works Order - New	Yes	Yes	Yes
Works Order without Readings - Delete	No	Yes	Yes
Works Order with Readings - Delete	No	No	No
<b>Reporting:</b>			
Reporting	Yes	Yes	Yes
<b>Post Readings Details:</b>			
Specify Date and Time	No	No	Yes
K Factor Verification Module	Yes	Yes	Yes
<b>Settings: General Settings:</b>			
General Options	No	No	Yes
Other Options - Product Registration	No	No	Yes
Other Options - Reset Database Grid	Yes	Yes	Yes
Other Options - Show Decimal Separator	Yes	Yes	Yes
Automatic Works Orders (Selection)	No	No	Yes
Automatic Certificates (Selection)	No	No	Yes
<b>Settings: Database Maintenance:</b>			
Data Maintenance	View Only	Yes	Yes
Data Import	No	No	Yes
Delete Database	No	No	No
Database Location Reset	No	No	No
Update Model Defaults	Yes	Yes	Yes
<b>Settings: Colour Configuration Tab</b>			
Colour Selection	No	Yes	Yes
<b>Settings: Report Configuration</b>			
Report Selection	No	Yes	Yes
<b>Settings: Report Configuration</b>			
Translations - Details (View)	Yes	Yes	Yes
Translations - Import Translations	No	No	Yes
Translations - Export Translations	No	No	Yes
<b>Settings: Auto Input Configuration</b>			
Device Details	No	No	Yes

# Appendix B

## Commands for creating Certificates/Labels

<DBField> This item has another drop down menu and is used import data from other parts of the program:

**READ\_WO:** Imports Works Order number.

**READ\_Certificate:** Imports certificate number.

**READ\_TimeStamp:** Imports the date and time of readings in 24-hour format.

**READ\_Date:** Imports the date of readings.

**READ\_Time:** Imports the time of readings in 24-hour format.

**READ\_Type:** Imports whether the tool is “**As Found**”, “**As Left**” etc.

**READ\_Status:** Imports whether the tool is within tolerances after taking readings.

**READ\_Comments:** Imports comments made about tool.

**READ\_Clock:** Imports clockwise or counter clockwise information.

**READ\_CertDate:** Imports the date and time of when the certificate was first printed. This will be populated the first time the certificate is printed.

**READ\_CertDate\_Date:** Imports the date of when a certificate was first printed. This will be populated the first time the certificate is printed.

**READ\_CertDate\_Time:** Imports the time in 24-hour format from when a certificate was first printed. This will be populated the first time the certificate is printed.

**READ\_CoverageFactor:** Imports the default Coverage Factor, k, entered under settings. See page 47.

**READ\_CoverageProbability:** Imports the default Coverage Probability, p, entered under settings. See page 47.

**READ\_WMD:** Imports the Combined Expanded Measuring Device Uncertainty (Wmd %) for the instruments selected, on your certificates.

**READ\_BEP:** Imports the Selected Measuring Device Measurement Error (bep %) for the instruments selected, on your certificates.

**CUST\_ID:** Imports customer ID.

**CUST\_Name:** Imports customer contact name.

**CUST\_Address1:** Imports line 1 of customer address.

**CUST\_Address2:** Imports line 2 of customer address.

**CUST\_Address3:** Imports line 3 of customer address.

**CUST\_Address4:** Imports line 4 of customer address.

**CUST\_Postcode:** Imports customer postcode.

**CUST\_Phone:** Imports customer phone number.

**CUST\_Fax:** Imports customer fax number.

**CUST\_Email:** Imports customer email address.

**TOOL\_ID:** Imports tool ID.

**TOOL\_Desc:** Imports tool description.

**TOOL\_Manufacturer:** Imports tool manufacturer.

**TOOL\_Capacity:** Imports capacity of tool.

**TOOL\_UofM:** Imports tool unit of measurement.

**TOOL\_Model:** Imports Model ID.

**STANDARD\_ID:** Imports standard ID.

**STANDARD\_Body:** Imports body who control standard.

**STANDARD\_Desc:** Imports description of standard.

**INST\_ID1:** Imports instrument 1 ID.

**INST\_Desc1:** Imports instrument 1 description.

**INST\_ID2:** Imports instrument 2 ID.

**INST\_Desc2:** Imports instrument 2 description.

**INST\_ID3:** Imports instrument 3 ID.

**INST\_Desc3:** Imports instrument 3 description.

**INST\_ID4:** Imports instrument 4 ID.

**INST\_Desc4:** Imports instrument 4 description.

**INST\_ID5:** Imports instrument 5 ID.

**INST\_Desc5:** Imports instrument 5 description.

**OPER\_Name:** Imports name of operator who took the readings.

**OPER\_ReadingsName:** Imports name of operator who entered the readings into Kepler 4.

**OPER\_SignatoryName:** Imports name of signatory.

**LAB\_Temp:** Imports temperature of lab.

**LAB\_Humidity:** Imports humidity of lab.

**<Text>:** Inserts a line of text.

**<Readings>:** Inserts the table of readings from the “**Readings Details**” window.

**<Readingsk>:** As above, but includes a row for the Coverage Factor, k, for each setting.

**<ReadingsExtra>:** Inserts the table of readings from the “**Readings Details**” window but includes “#” for readings out of tolerance and “##” for readings more than three times out of tolerance. For use on conformity certificates.

**<ReadingsExtrak>:** As above, but includes a row for the Coverage Factor, k, for each setting.

**<ReadingsExtraNC>:** Inserts the table of readings from the “**Readings Details**” window but includes “#” for readings out of tolerance and “##” for readings more than three times out of tolerance. This can be used on calibration certificates for information purposes only as it is not part of ISO 6789:2017 Part 2. The **<Readings Key>** field is placed below the **OPER\_SignatoryName** field.

**<ReadingsExtraNck>**: As above, but includes a row for the Coverage Factor, k, for each setting.

**<ReadingsKey>**: Inserts the key for tool tolerance (“#” for readings out of tolerance and “##” for readings more than three times out of tolerance). This must be included beneath the **OPER\_SignatoryName** field on a calibration certificate as it is not part of ISO 6789:2017 Part 2.

**<Range>**: Inserts the range of the tool as defined in “**Readings Details**” as “**Setting 1**” - “**Setting 3**”.

**<NewPage>**: Inserts a new page.

**<ImageStart>**: Inserts the top left coordinate of an image.

**<ImageEnd>**: Inserts the bottom right coordinate of an image and requires an image file name to find the image from the computer. Please note this must be the row below **<ImageStart>**.

**<PageBorder>**: Inserts a page border.

**<PageVLine>**: Inserts a vertical line down the whole page.

**<PageHLine>**: Inserts a horizontal line down the whole page.

**<LineStart>**: Inserts an XY coordinate for the start of a line.

**<LineEnd>**: Inserts an XY coordinate for the end of a line. Please note this must be the row below **<LineStart>**.

**<BoxStart>**: Inserts the top left coordinate of a box.

**<BoxEnd>**: Inserts the bottom right coordinate of a box. Please note this must be the row below **<BoxStart>**.

**<RegCompany>**: Imports company name from the “**Product Registration**” window

**<RegContact>**: Imports registered contact name from “**Product Registration**” window.

**<Date>**: Imports current date when certificate is printed.

**<Time>**: Imports current time when certificate is printed.

**<NormalLineWidth>**: Modifies line width of the line or box function for all lines below it.

**<LightLineWidth>**: Modifies line width of the line or box function for all lines below it.

**<HeavyLineWidth>**: Modifies line width of the line or box function for all lines below it.

# Appendix C

## Sample Certificate

Sample certificate template built using the commands in Appendix B in Kepler 4. For details on how to build a template see page 18.

There is also an example certificate template "K4SampleCert.txt" which can be imported from C:\Users\[USERNAME]\Documents\K4Data using the Import button.



**Advanced Witness Systems Ltd.**

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Unit 8 Beaumont Business Centre, Banbury. OX16 1TN Tel: +44 (0) 1295 266939 Fax: +44 (0) 1295 263503  
Email: sales@awstorque.co.uk



**Advanced Witness Systems Ltd.**

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Unit 8 Beaumont Business Centre, Banbury. OX16 1TN Tel: +44 (0) 1295 266939 Fax: +44 (0) 1295 263503  
Email: sales@awstorque.co.uk

Certificate Of Calibration

Page: 2 of 2

Date of Issue: 26 October 2018  
Certificate Number: Cert1  
Issued by: Advanced Witness Systems Ltd

Readings	Setting 1		Setting 2		Setting 3	
	Setting		Setting		Setting	
Type 1A	20%		60%		100%	
Clockwise	50.60 N.m		151.80 N.m		253.00 N.m	
	Reading	as	Reading	as	Reading	as
Reading 1:	10.04	403.984%	30.10	404.319%	50.12	404.789%
2:	10.07	402.483%	30.13	403.817%	50.15	404.487%
3:	10.07	402.483%	30.14	403.650%	50.18	404.185%
4:	10.09	401.487%	30.10	404.319%	50.18	404.185%
5:	10.07	402.483%	30.13	403.817%	50.18	404.185%
Mean Value (Xbar):	10.068		30.120		50.162	
Mean of Error (asbar):		402.584%		403.984%		404.366%
Uncertainty Expanded (W):	1.333		0.468		0.307	
Uncertainty Interval (W):	404.017		404.552		404.773	

**Traceability**  
The calibration requires that the length and mass standards used in the process are traceable to national standards via a UKAS accredited laboratory. These standards have been used in accordance with Advanced Witness Systems Ltd requirements to maintain accurate and traceable equipment.

**BS EN ISO 6789:2017**  
This torque wrench has been classified as a Type 2 Class A wrench, adjustable, graduated tool in accordance with the above standard.

Signatory: Admin Operator

Signed: *Admin Operator*

1st Floor, No 1 Carrera House, Merlin Court, Gatehouse Close, Aylesbury, Buckinghamshire, HP19 8DP  
Registered in England Company Number: 2565074

Certificate of Calibration

018  
s Systems Ltd

s 2, 3.4 and 4 of BS EN ISO 6789:2017

ow Torque Wrench was Calibrated by the  
ion of torque while attached horizontally to  
ated Torque Display Instrument. The  
nty of the applied torque was 1% or better  
accuracy of the equipment to Class 0.5 in  
nce with BS 7882:2017.

ue wrench was fitted into the transducer  
level checked to ensure it was within ± 3 degrees  
ontal.

4  
A: Wrench, adjustable, graduated or with display  
ue Wrench  
00N.m

oration  
kwise  
ug/2018 03:59:34  
in Operator

court, Gatehouse Close, Aylesbury, Buckinghamshire, HP19 8DP  
England Company Number: 2565074

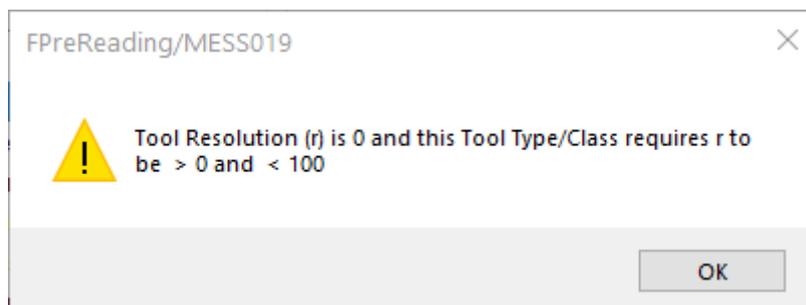
Item Type	Text	XPos	YPos	Align	Colour
<ImageStart>		6	6		
<ImageEnd>	C:\Users\Kepler\Desktop\AWS Header Graphic.jpg	202	57		
<Text>	Certificate of Calibration	80	64	Left	Black
<Text>	Page 1 of 2	32	73	Left	Black
<Text>	Date of Issue:	32	83	Left	Black
READ_Date		62	83	Left	Black
<Text>	Certificate Number:	32	88	Left	Black
READ_Certificate		69	83	Left	Black
<Text>	Issued by: Advanced Witness Systems Ltd	32	93	Left	Black
<Text>	Customer:	32	103	Left	Black
CUST_ID		55	103	Left	Black
<Text>	Address:	32	108	Left	Black
CUST_Address1		55	108	Left	Black
CUST_Address2		55	113	Left	Black
CUST_Address3		55	118	Left	Black
CUST_Address4		55	123	Left	Black
<LightLineWidth>					
<LineStart>		45	135		
<LineEnd>		179	135		Black
<LineStart>		45	135		
<LineEnd>		45	198		Black
<LineStart>		45	198		
<LineEnd>		179	198		Black
<LineStart>		69	135		
<LineEnd>		69	198		Black
<LineStart>		45	145		
<LineEnd>		179	145		Black
<LineStart>		179	135		
<LineEnd>		179	198		Black
<Text>	Basis of	46	136	Left	Black
<Text>	Calibration:	46	140	Left	Black
<Text>	Sections 2, 3.4 and 4 of BS EN ISO 6789:2017	71	136	Left	Black
<Text>	Part 2.	71	140	Left	Black
<Text>	Method:	46	146	Left	Black
<Text>	The below Torque Wrench was Calibrated by the	71	146	Left	Black
<Text>	application of torque while attached horizontally to	71	151	Left	Black
<Text>	a Calibrated Torque Display Instrument. The	71	156	Left	Black
<Text>	uncertainty of the applied torque was 1% or better	71	161	Left	Black
<Text>	and the accuracy of the equipment to Class 0.5 in	71	166	Left	Black
<Text>	accordance with BS 7882:2017.	71	171	Left	Black

First 40 lines of commands used to build the sample certificate template on page 55.

# Appendix D

## Tool Resolution

If a resolution  $r$  is not inputted into the  $r$  field on either the “**Tool Maintenance**” page or the “**Model Maintenance**” page then  $r$  is defaulted to 0 when “Update” is selected on these screens. On the “**Readings Details**” screen when “**Enter Readings**” is pressed the below notification will pop up and prevent you from continuing to readings if the tool type requires resolution  $r$  greater than 0.



The below table shows whether a resolution greater than zero is required for tool types as defined in ISO 6789:2017 Part 1.

Tool Type and Class	Description	Resolution ( $r$ ) greater than 0 required?
T1CA	Wrench. Torsion or flexion bar	YES
T1CB	Wrench. Rigid housing, with scale, dial or display	YES
T1CC	Wrench. Rigid housing, and electronic measurement	YES
T1CD	Screwdriver. With scale, dial or display	YES
T1CE	Screwdriver. With electronic measurement	YES
T2CA	Wrench. Adjustable. Graduated or with display	YES
T2CB	Wrench. Fixed adjustment	NO
T2CC	Wrench. Adjustable. Non-graduated	NO
T2CD	Screwdriver. Adjustable, graduated or with display	YES
T2CE	Screwdriver. Fixed adjustment	NO
T2CF	Screwdriver. Adjustable, non-graduated	NO
T2CG	Wrench. Flexion bar, adjustable, graduated	YES

For more information on tool types, please see ISO 6789:2017 Part 1.

**Determining resolution  $r$  (See ISO 6789:2017 Part 2 for more information)**

**Analogue scales or dials:** The torque value is read from the position of the active or moving cursor or pointer on a scale or dial.

- Where the pointer or tip width is less than  $1/5$  of the scale or dial increment  $r$  is  $1/5$  of the scale or dial increment.
- Where the pointer or tip width is equal to or greater than  $1/5$  but less than  $1/2$  of the scale or dial increment  $r$  is  $1/2$  of the scale or dial increment.
- Where the pointer or tip width is equal to or greater than  $1/2$  but less than the scale or dial increment  $r$  is the scale or dial increment.

**Micrometre scales:** The torque value is read from main scale or if the tool has a secondary scale it may be read from the secondary scale.

- Where there is no secondary scale  $r$  is  $1/2$  of the main scale increment.
- Where there is a secondary scale  $r$  is  $1/2$  of the secondary scale increment.

**Digital scales:**

- The value of  $r$  is the single increment of the last active digit, provided the display does not fluctuate by more than one digit when the device is at the lowest calibrated torque value.
- Where the values fluctuate by more than one digit when the device is at the lowest calibrated torque value the value of  $r$  is a single increment of the last active digit plus  $1/2$  of the fluctuation range.

# Appendix E

## K Factor Verification Module

The Advanced Data & Measurement Systems K Factor Verification Module (Copyright 2022) is an additional package which allows Kepler 4 Calibration and Combined users to check if an adjustment is required to the k Factor, used to calculate the Expanded Uncertainty (W).

The module is only applicable to ISO 6789:2017 or In-House Calibrations.

The k Factor is verified using the M3003 document, the GUM, Appendix B (Unreliable Inputs) and Appendix C (Dominant Uncertainty Contributions). Resolution (r) is assumed by experience and prior knowledge to be the dominant uncertainty, however where preset tools without scales are concerned (Type 2 Classes B, C, E and F), the Dominant Uncertainty Contributions verification is ignored as the resolution is zero (no scale fitted). Coverage probability is taken as 95.45%. The calculated k value at each setting is taken as the worst case of the two methods covered under the above appendixes.

Kepler 4 uses the preset k Factor (see Page 47) to generate an initial Expanded Uncertainty (W), which is then verified, before generating a new Expanded Uncertainty based on the imported k Factor.

The K Factor Verification Module requires MS Excel to be installed on the computer running Kepler 4.

## Operation

The K Factor Verification Module is accessed by pressing the “**Review Coverage (k)**” button on the Post-Readings Screen.

The screenshot shows the 'Post-Reading Details' form with the following sections and controls:

- Reading Details:** WO Number: AWS00064; Readings By: Admin - Admin Operator; Operator: Admin - Admin Operator; Signatory: Admin - Admin Operator; Certificate Template: Cert1; Label Template: Cert1.
- Control:** Radio buttons for As Found/As Left, As Found (selected), As Left, and Unserviceable.
- Certificate Details:** Radio buttons for No Certificate, Manual Certificate (selected), Autogenerate Live Certificate, and Autogenerate Test Certificate. Certificate Number: 220525.
- Reading Comments:** A large text area for entering comments.
- Specify Date/Time of Reading:** A checkbox for 'Specify Date and Time' with a note '(Requires Administrator Approval)'. A 'Review Coverage Factor (k)' button is located below this section.
- Control Buttons:** Save Reading, Cancel Reading, and Save Page Defaults.

This will open the “Update Coverage (k)” window.

Update Coverage (k) (FCoverage)

**Readings Values**

Works Order:

Tool Type:

Tool Class:

Number of Readings:

Mean Value (Xbar) S1:

Uncertainty Expanded (W) S1:

Mean Value (Xbar) S2:

Uncertainty Expanded (W) S2:

Mean Value (Xbar) S3:

Uncertainty Expanded (W) S3:

Resolution (r):

Reproducibility Variation (brep):

Output Drive Variation (bod):

Interface Variation (bint):

Force Loading Point Variation (bl):

Repeatability Variation (bre) S1:

Repeatability Variation (bre) S2:

Repeatability Variation (bre) S3:

Stated Expanded Measuring Device Uncertainty (Wmd):

**Send 'Readings Values' to Calculate Coverage Factor (k)**

Workbook:

Worksheet:

**Assign Calculated k Values**

Setting 1 Coverage Factor (k):

Setting 2 Coverage Factor (k):

Setting 3 Coverage Factor (k):

Please note:  
The k Factor is verified Using the M3003 document, the GUM, Appendix B (Unreliable Inputs) and Appendix C (Dominant Uncertainty Contributions). Resolution (r) is assumed to be the dominant uncertainty, however, where preset tools without scales are concerned (Type 2 Classes B, C, E and F), the Dominant Uncertainty Contributions verification is ignored as the resolution is zero. Coverage probability is taken as 95.45%. The calculated k value at each setting is taken as the worst case of the two methods covered under the above appendices.

**Exit Options:**

- **“Reading Values”** – These are the values calculated from the readings taken, which will be sent over to the K Factor Verification Module. These fields are read-only.
- **“Send “Reading Values” to Calculate Coverage Factor (k)”** – This section sends the values across to the K Factor Verification Module.
  - **“Workbook”** – This field contains the location and file name of the K Factor Verification Module. The location can be changed in General Settings (See Page 20). The field is read-only.
  - **“Worksheet”** – This field is read-only, to communicate with the K Factor Verification Module.
  - **“Calculate k Values”** – This button sends the “Readings Values” data to the K Factor Verification Module.
- **“Assign Calculated k Values”** – This section returns the calculated k values from the K Factor Verification Module.
  - **“Assign Calculated k Values”** – This button returns the k values from the K Factor Verification Module.
  - **“Setting 1 Coverage Factor (k)”** – This field contains the k value calculated for Setting 1.
  - **“Setting 2 Coverage Factor (k)”** – This field contains the k value calculated for Setting 2 (if applicable).
  - **“Setting 3 Coverage Factor (k)”** – This field contains the k value calculated for Setting 3 (if applicable).
- **“Exit Options”:**
  - **“Calculate New Expanded Uncertainty”** – This button stores the calculated k value, and generates a new Expanded Uncertainty (W), returning the user to the Post-Readings Screen.
  - **“Cancel – Make No Changes”** – This button returns the user to the Post-Readings Screen without storing any changes.

To purchase this additional module, or to find out more information, please email us:  
[sales@awstorque.co.uk](mailto:sales@awstorque.co.uk).

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**AWS**

**Advanced Witness Systems Ltd.**  
*Torque Measurement & Calibration*