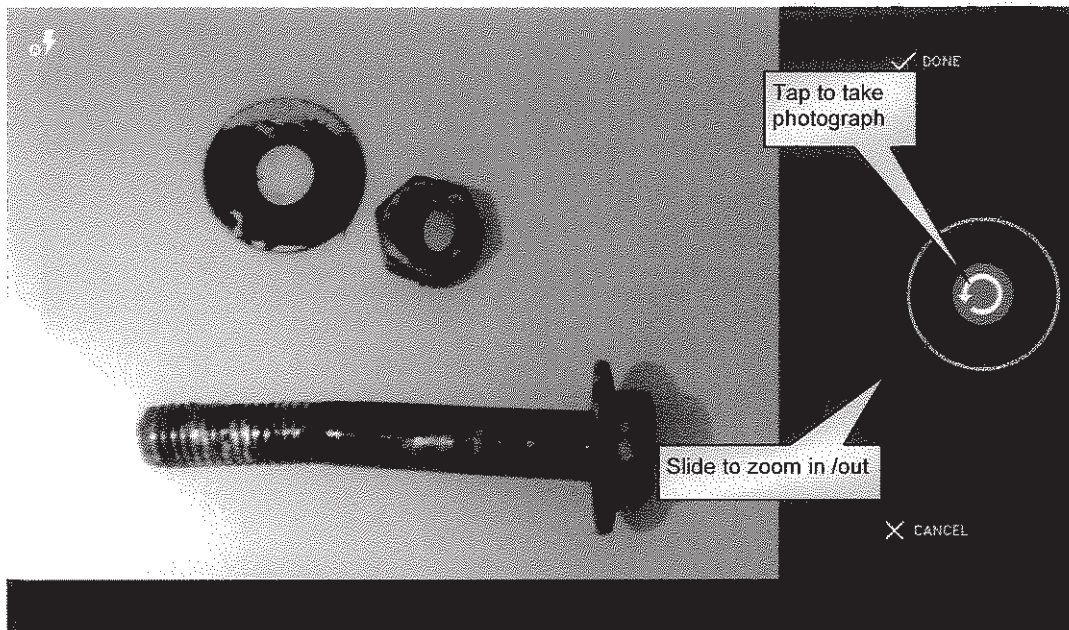
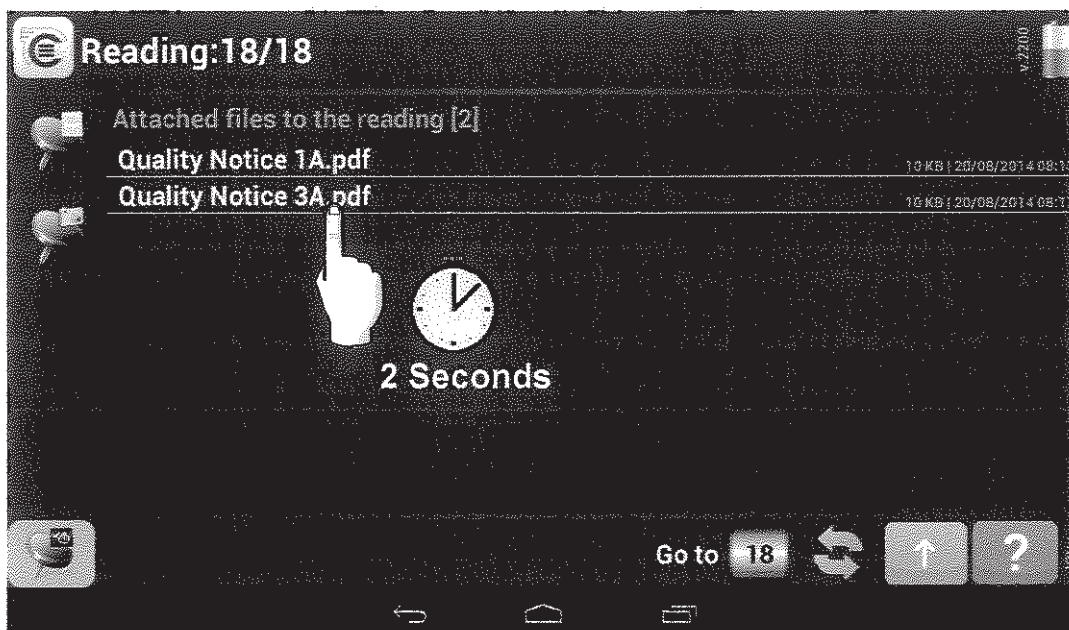


CHECK MODE VIEW READINGS / ADD ATTACHEMENT CONTINUED

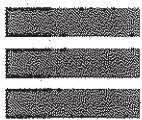
To attach a photograph click on the "Add Photograph" icon. This will automatically load the on board camera app



To remove an attachment from the reading simple tap and hold on the file for 2 seconds

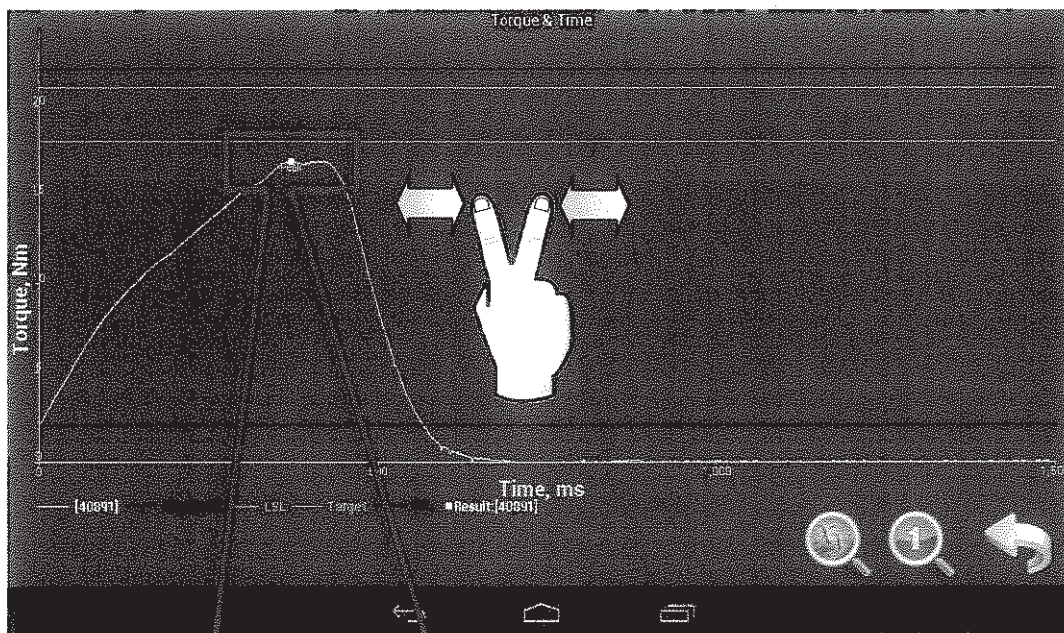


IQVu will display a "Delete" popup message, followed by a confirmation "Yes / No."

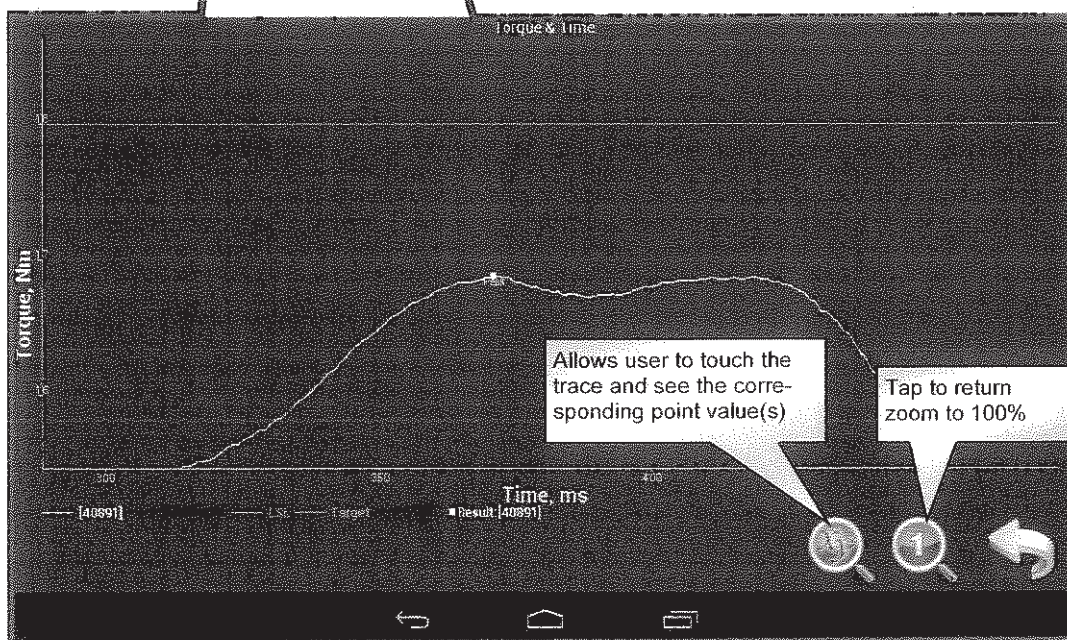


CHECK MODE VIEW READINGS / RUNDOWN TRACE

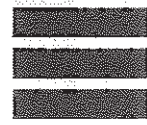
When in view readings it is possible to view the rundown trace in greater detail. Simply select the reading to examine and tap on the trace



Using 2 fingers to tap and hold, pinching together will zoom out, pinch apart will zoom in.

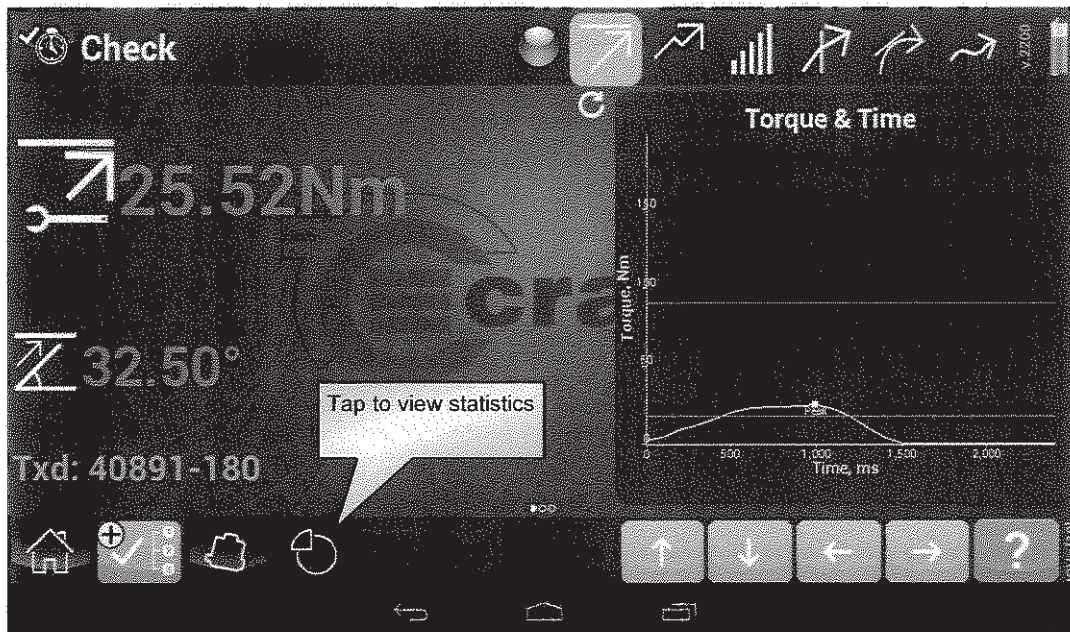


Using a single finger to tap and hold dragging around the screen will pan over the trace.

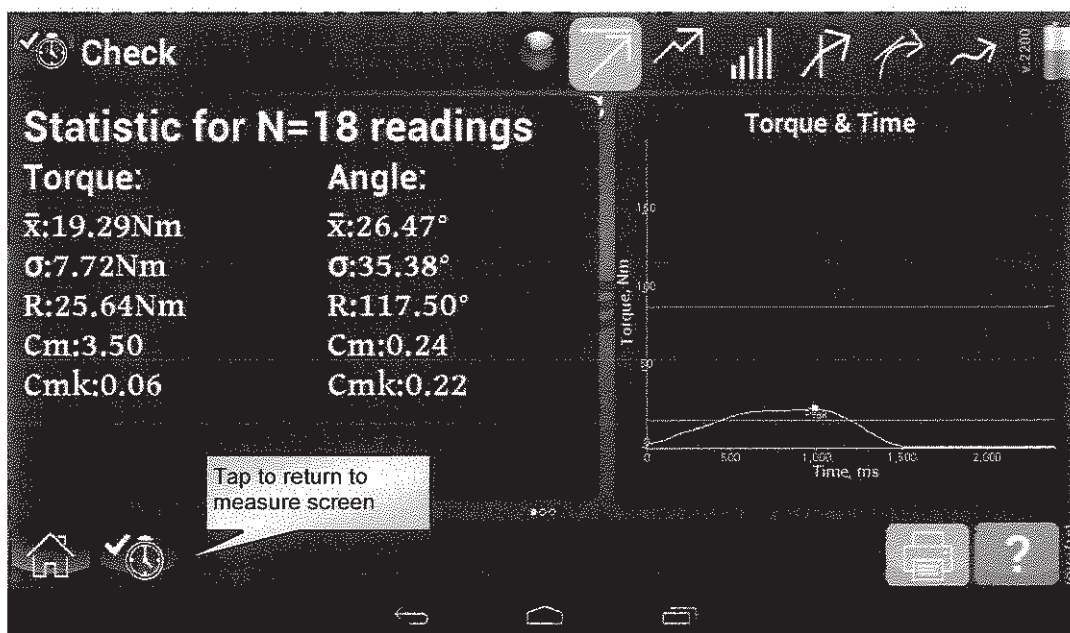


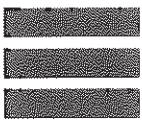
CHECK MODE VIEW STATISTICS

IQVu provides statistical analysis for the readings taken.



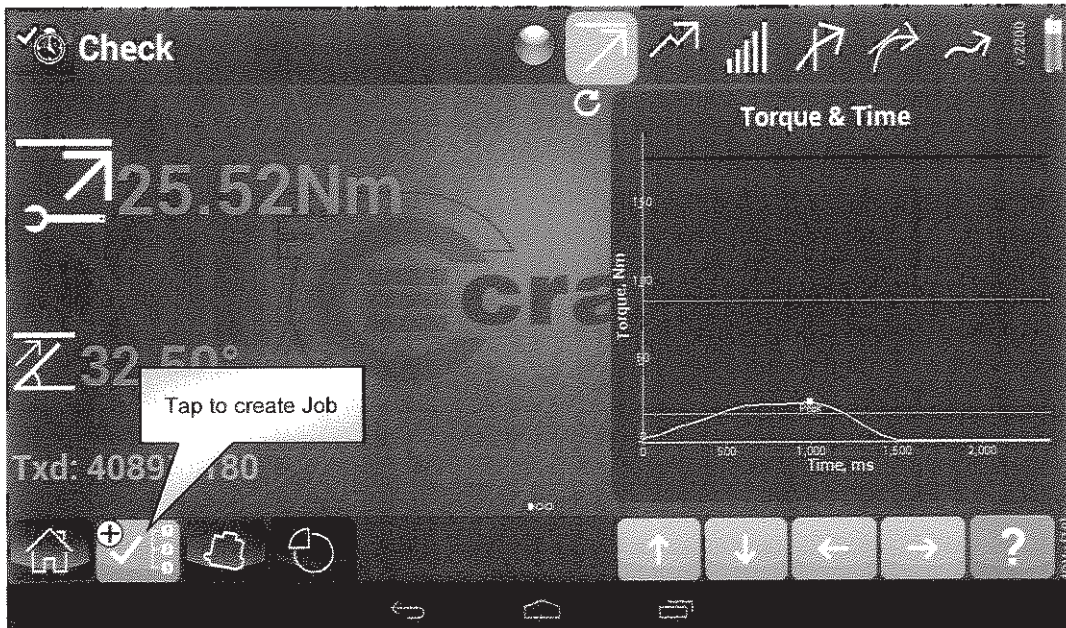
Calculations include σ , \bar{x} , R, Cp, Cpk, Cm and Cmk





CHECK MODE SAVE TO JOB

After a check mode configuration is complete it is possible to create a job from the settings.



Jobs contain more settings than check measurement such as "Name", "Description", "Readings", "Subgroups" and "Transducer Type". Enter the required values to complete the Job setup.

TIP Padlock needs to be opened before editing is allowed. Please refer to "IQVu navigation" in this manual for further details.

Store graph	Control	Direction	Limits	2nd param
Manual	Angle	CCW	Percentage	None
Always	Torque	CW	Absolute	Angle
Never	Angle	Auto	Percentage	None

☐ Comments required for subgroups ☐ Use CL ☒ Use Graph

Retries Type	Txd Type
Manual	Model
Never	Exact
Retry	Any

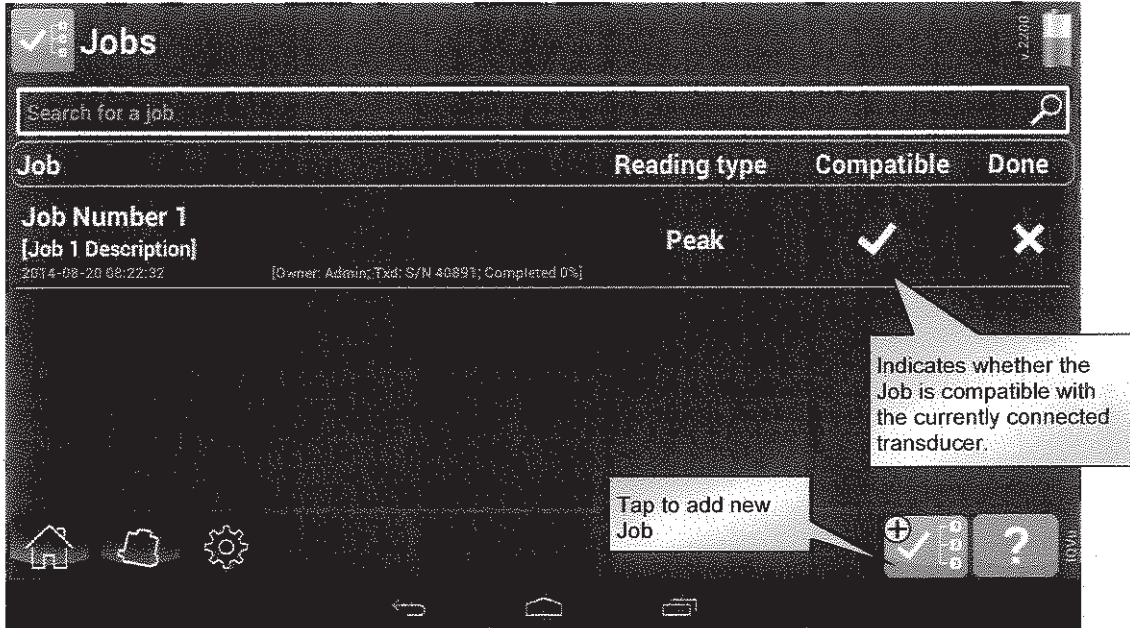
Readings per subgroup: 1 Subgroups per job: 1

After saving the Job setup IQVu will automatically navigate to the Job list screen



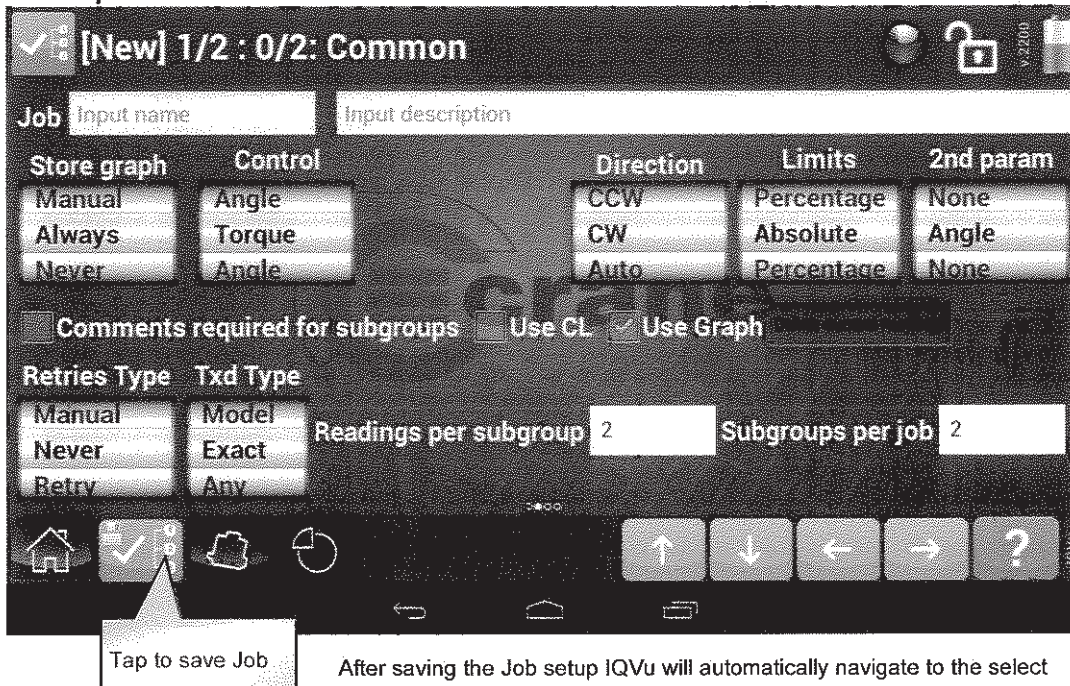
JOB MODE

When selecting the Job icon from the Home menu the user is presented with the list of currently stored Jobs.

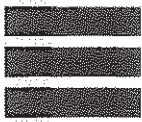


To create a new Job tap the "Add Job" icon in the bottom corner of the screen. The IQVu will prompt for transducer selection, followed by requiring the user to select a measurement mode.

With the mode selected swipe to the left or press the right arrow icon and configure the settings as required.



After saving the Job setup IQVu will automatically navigate to the select transducer screen, then to the measure screen.



JOB MODE CONTINUED

IQvu features the ability to attach a file or photo to the Job setup. This can be accessed by the user when performing the Job and used a work instruction.

Job

Store graph	Control	Direction	Limits	2nd param
Manual	Angle	CCW	Percentage	None
Always	Torque	CW	Absolute	Angle
Never	Angle	Auto	Percentage	None

☐ Comments required for subgroups ☐ Use CL ☒ Use Graph

Retries Type	Txd Type
Manual	Model
Never	Exact
Retry	Any

Readings per subgroup Subgroups per job

Navigation icons: Home, Checkmark, Camera, Refresh, Left Arrow, Down Arrow, Up Arrow, Right Arrow, Question Mark.

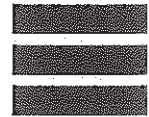
To attach a file or photograph work instruction tap and hold the left arrow key

Attached files to current job [0]

Buttons: Add File attachment, Add photograph attachment

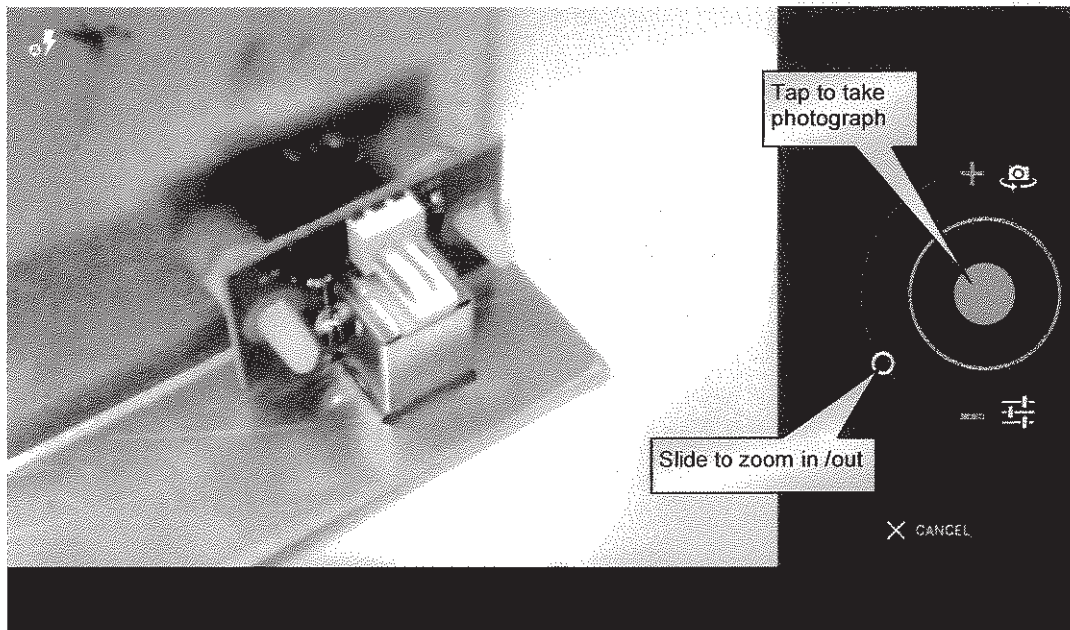
Navigation icons: Home, Checkmark, Camera, Refresh, Left Arrow, Down Arrow, Up Arrow, Right Arrow, Question Mark.

To attach a file tap on the "Add file" icon and select the required file. Tapping the "Add Photograph" icon will automatically launch the camera app..

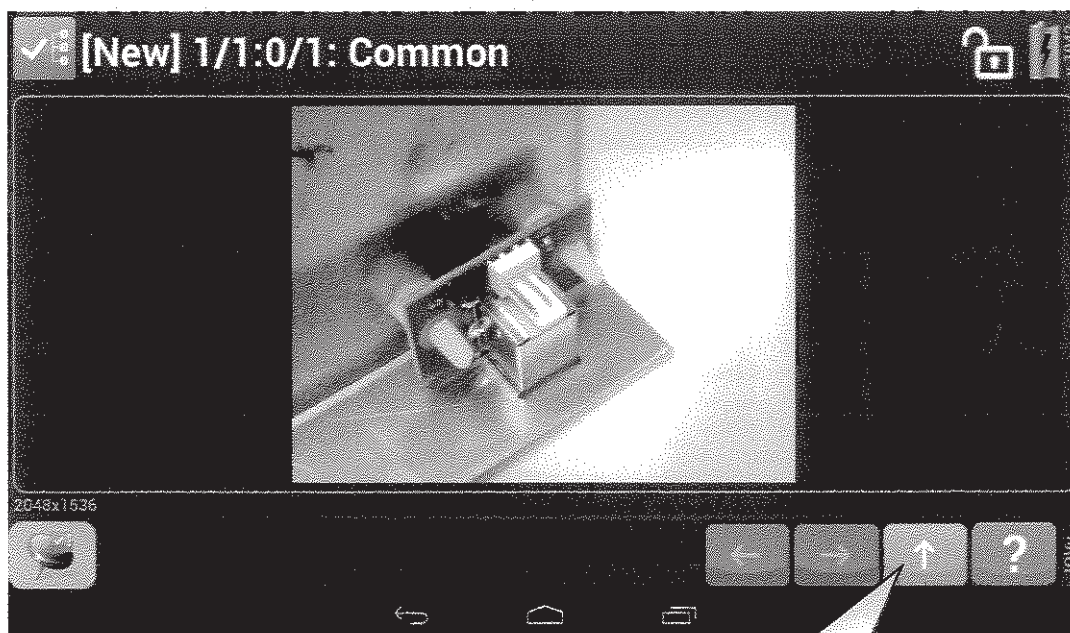


JOB MODE CONTINUED

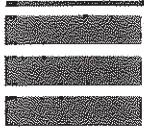
Use the camera controls on the right side of the screen to zoom in / out and take the photograph



Tap "Done" to accept the photograph or "Cancel" to return to the attachments screen.



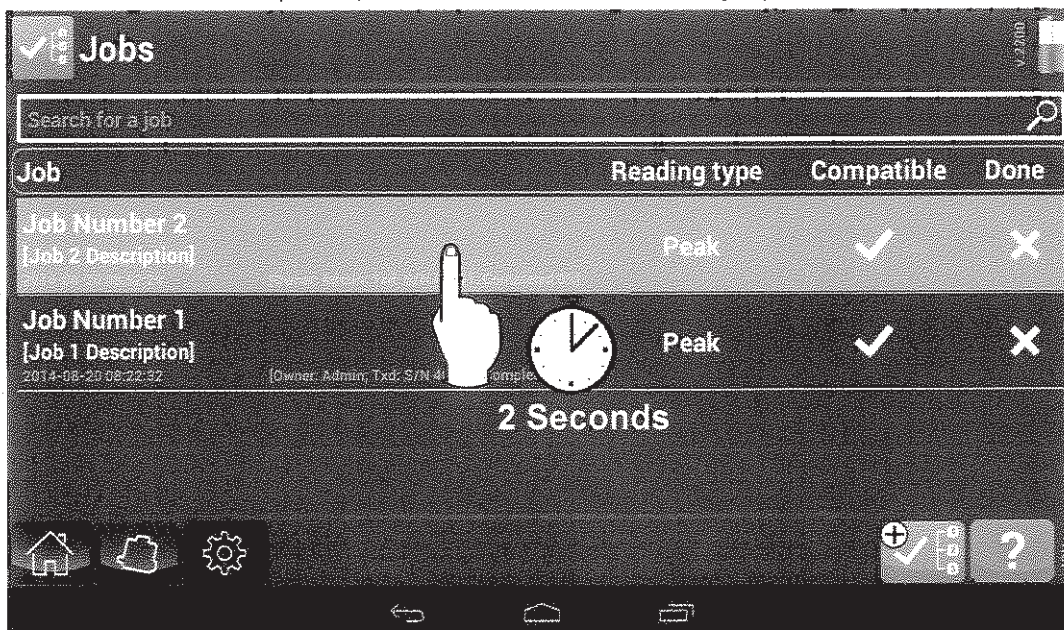
Tap to return to the attachments screen



JOB MODE CONTINUED

Once a Job is stored in IQVu, it is possible to perform a number of actions with it.

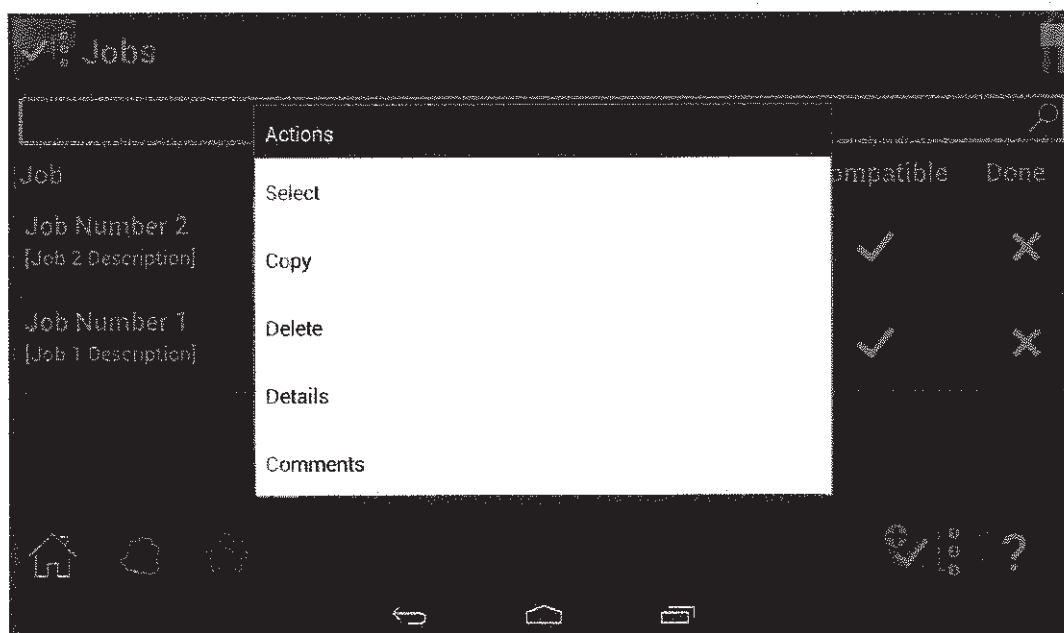
The Job can either be copied, exported or modified to allow more subgroups worth of information.



Tap and hold on the Job required and IQVu will display a popup menu.

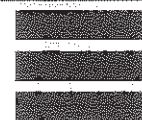


Jobs originating from a PC are not allowed to be modified.



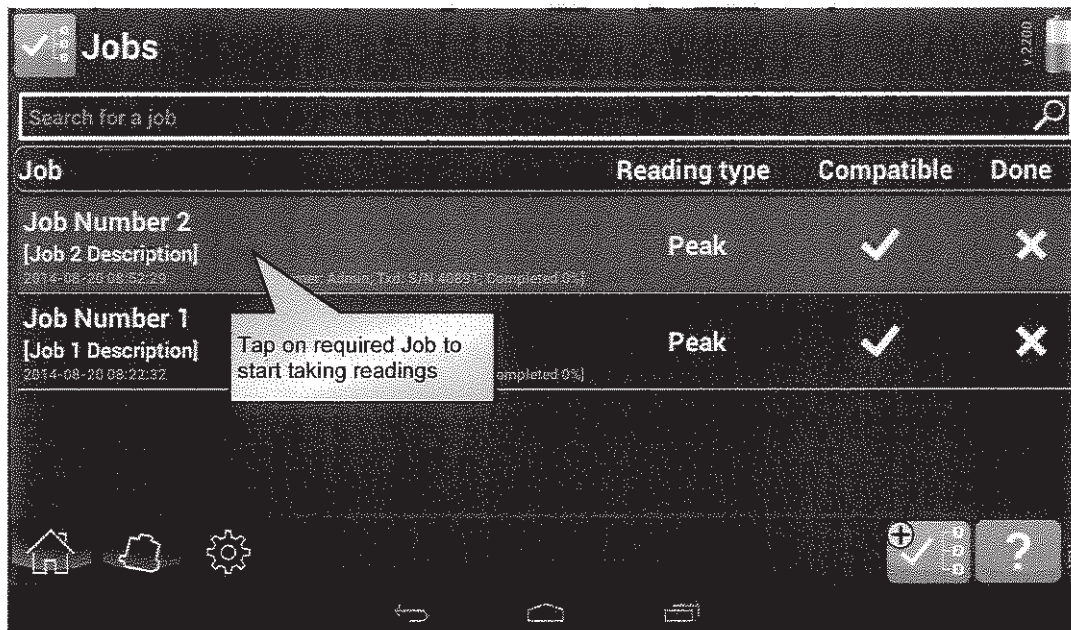
Tap on the action to perform. If a Job is complete, a further option will be displayed to "Add Subgroup"

If a subgroup is added the Job will no longer be marked as complete and the user may take further readings.



JOB MODE PERFORMING MEASUREMENTS

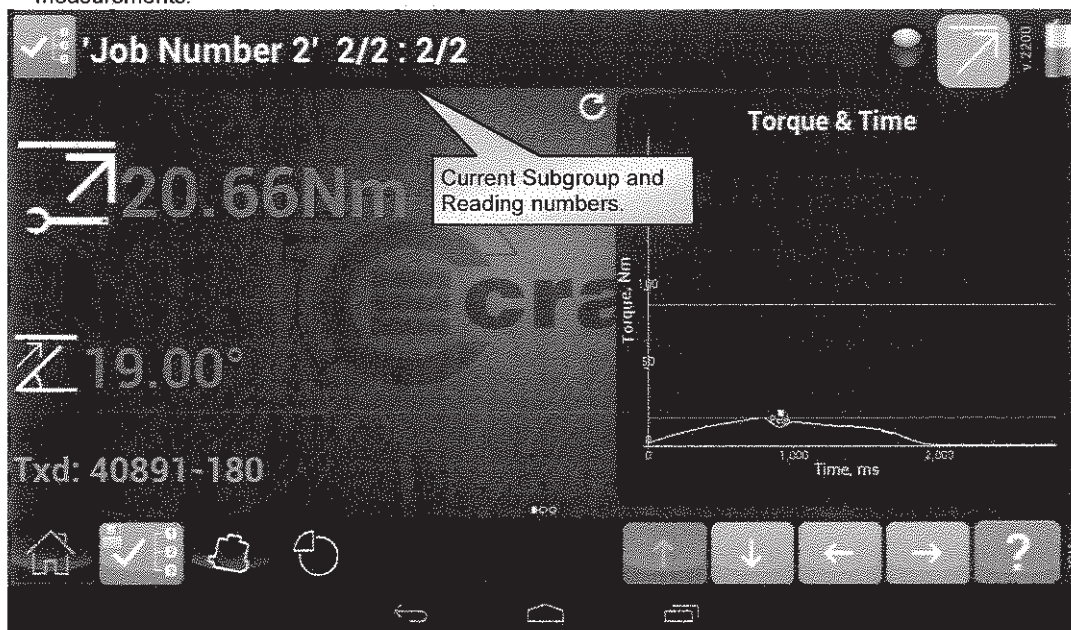
It is possible to search for jobs using the input box provided. With the use of optional barcode reader the User can also scan the Job name to search for.



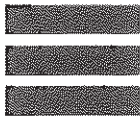
To starting taking readings against a Job simply tap on the required name in the list displayed.

See "Performing Check Measurement" for example of hardware use.

When the defined number of readings have been taken, IQVu will display "End" and will not allow further measurements.

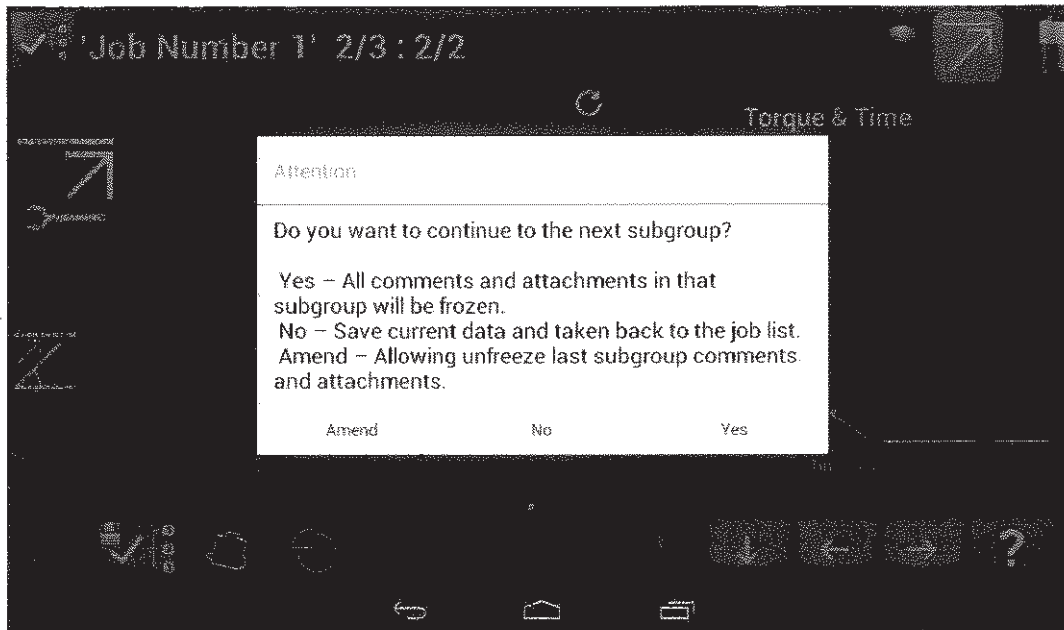


TIP To view readings, statistics rundown traces and add files / photographs use the same method as defined for check mode in this manual.

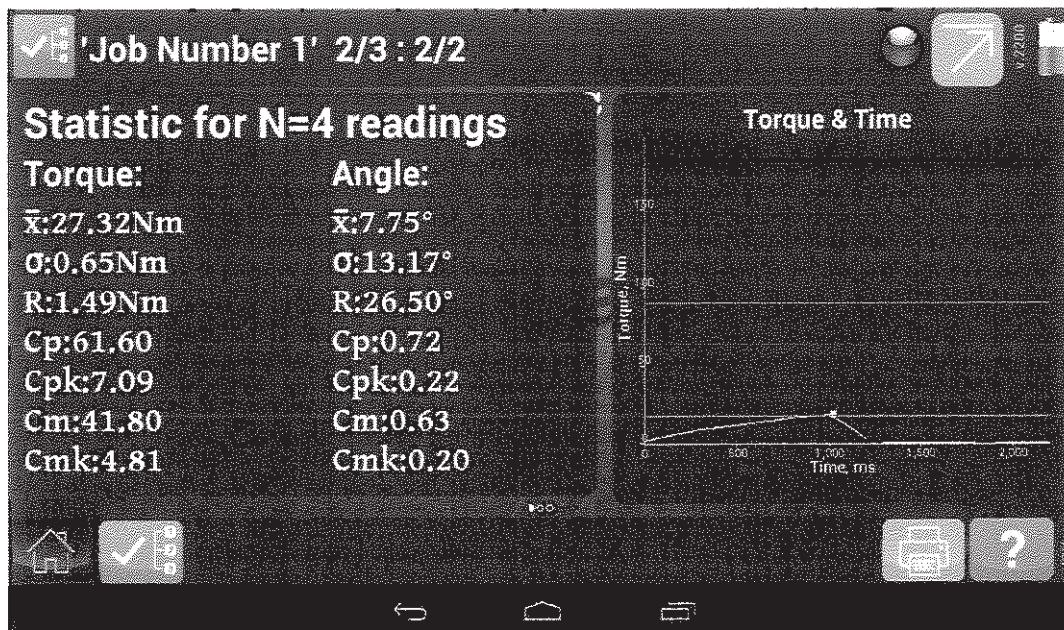


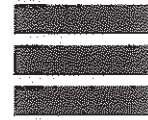
JOB MODE PERFORMING MEASUREMENTS / VIEW STATISTICS

If a job is configured for multiple subgroups IQVu will prompt the user at the end of each subgroup



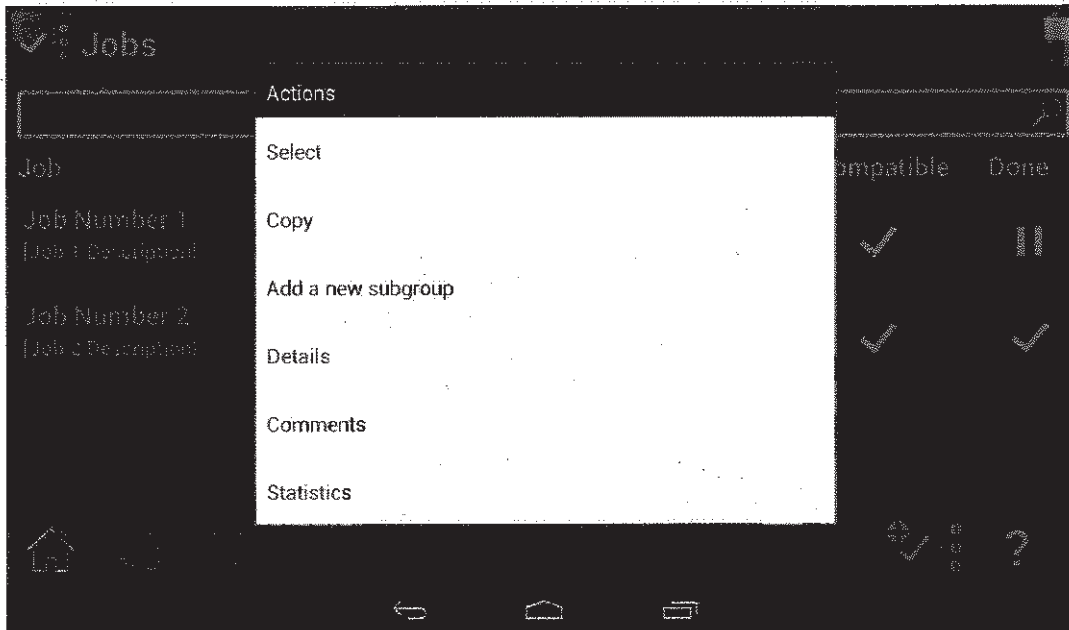
To view statistics in Job mode tap on the Statistics icon



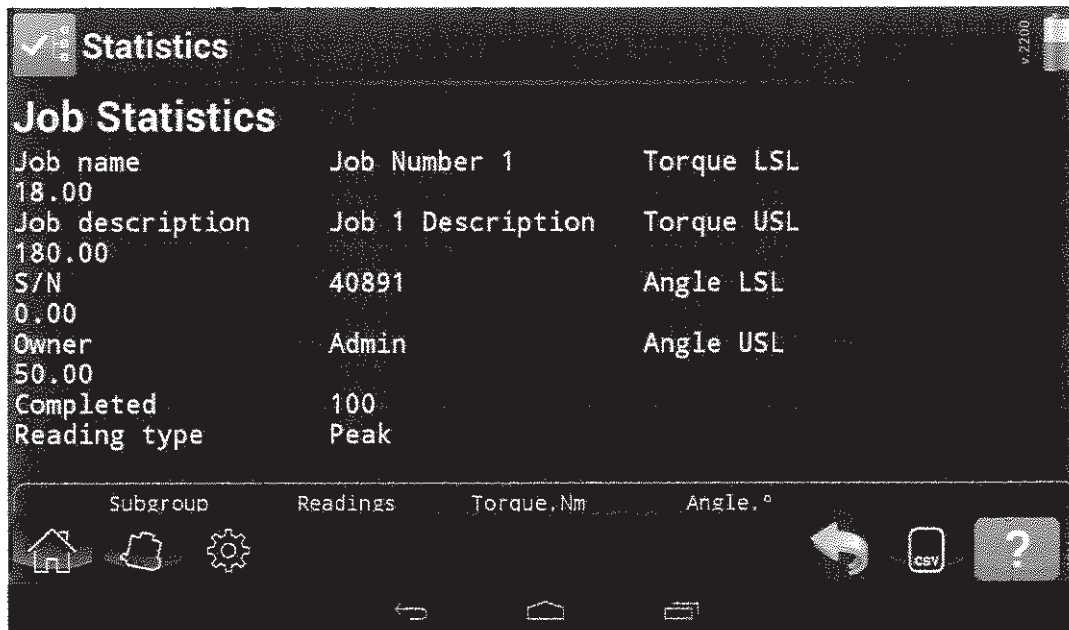


JOB MODE PERFORMING MEASUREMENTS / VIEW STATISTICS

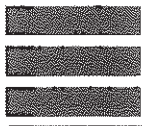
Statistics can also be viewed directly from the Job list. Tap and hold on the required Job to reveal the pop-up menu and select "statistics"



The IQVu will display the Job header information followed by the readings for each subgroup, including summary. After the last subgroup data IQVu will display statistical analysis for all completed subgroups

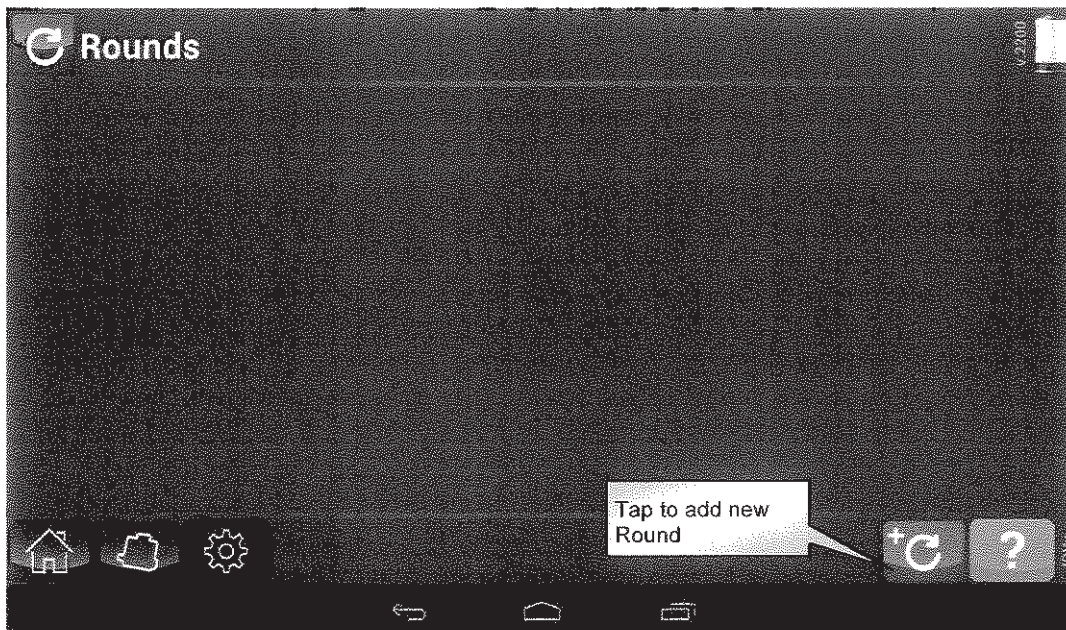


To view more data swipe up/down.

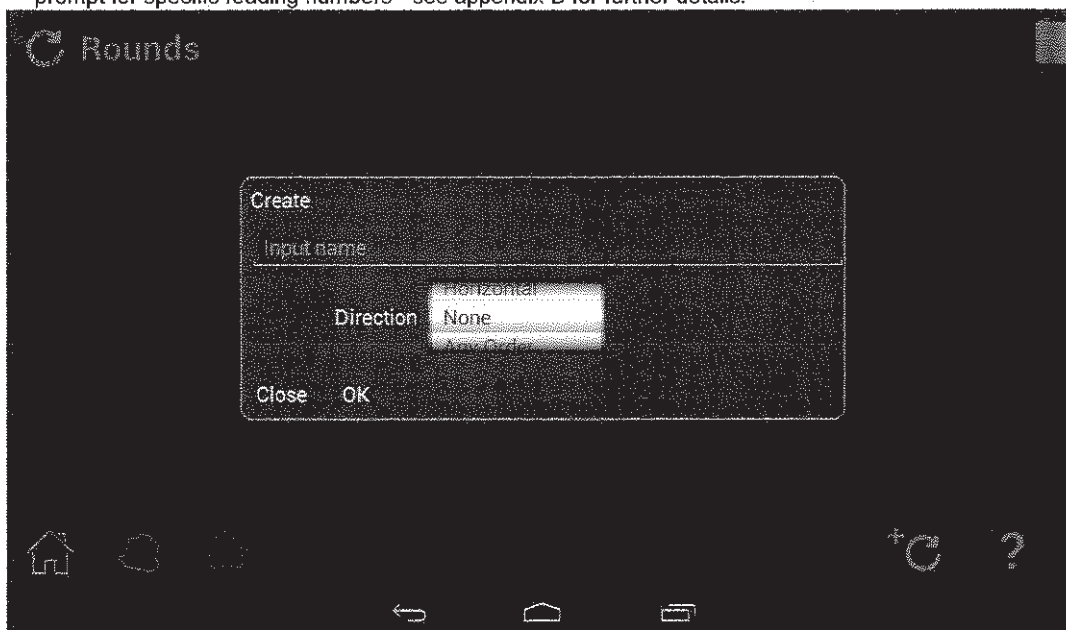


ROUND MODE

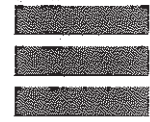
IQVu features a "Round" mode which allows the user to group together Jobs and configure the order in which readings are taken



A new Round can be created as either SMLTN (simultaneous) or SQNTL (sequential)
SQNTL allows the user to configure either Any order, Vertical or Horizontal reading entry.
Any order allows the user to select a given job from the list provided whilst Vertical and Horizontal prompt for specific reading numbers - see appendix B for further details.

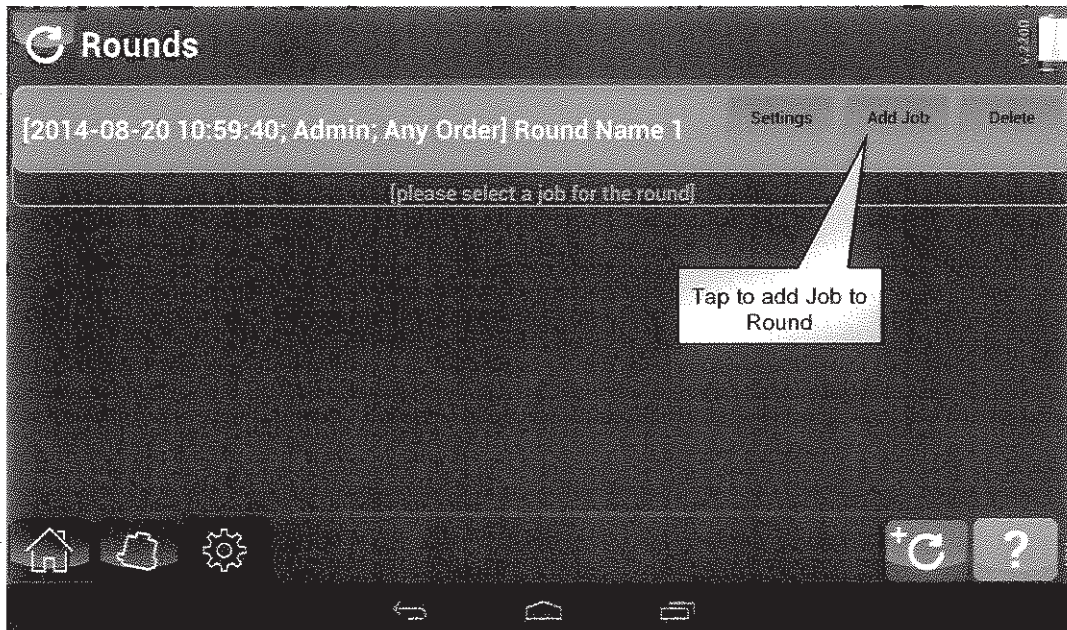


Enter data into fields presented and tap OK to create the Round.

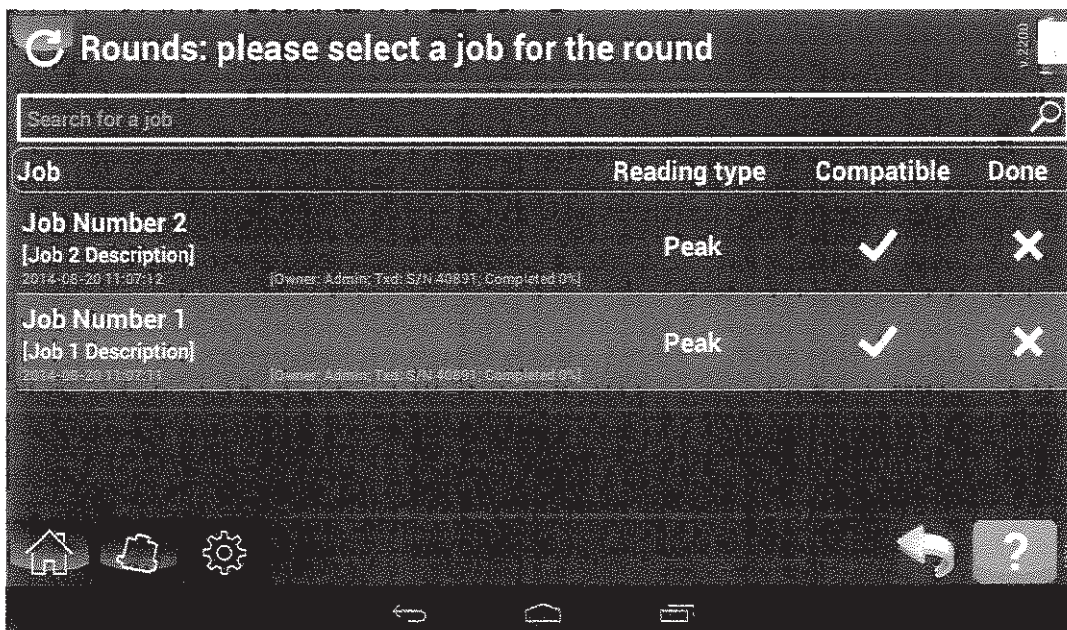


ROUND MODE CONTINUED

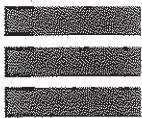
Once a round is created Jobs can be added to it.



Simply tap on the Job to be added from the list displayed.

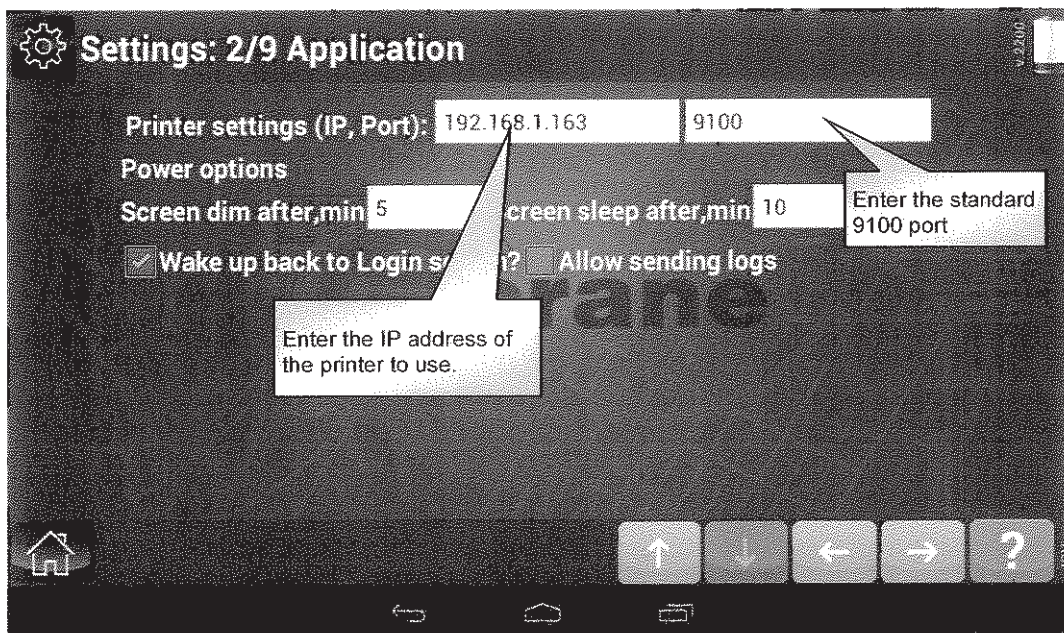


Once selected the IQVu will return to the Round list screen.

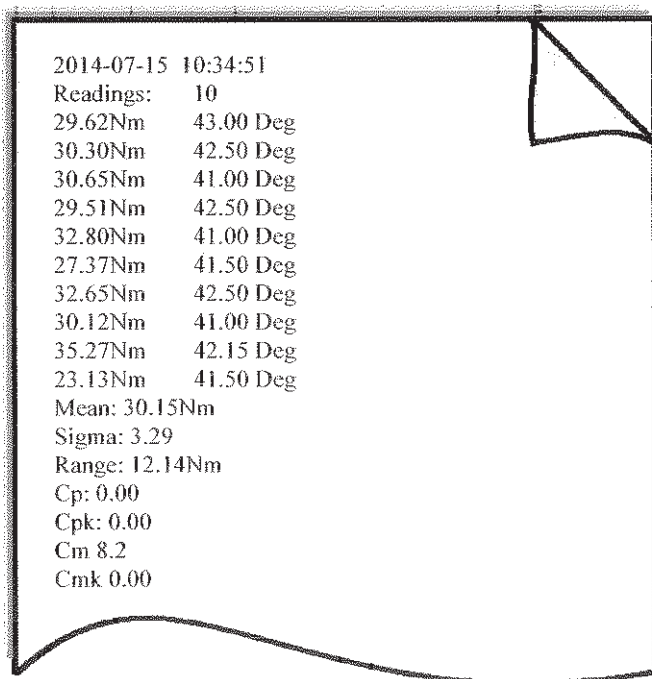


PRINTING

There are a number of areas in the IQVu app that allow printing. Printing from the IQVu is done via wifi connection. A valid printer must be configured in order to access this function.

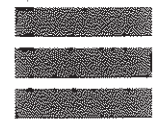


The print information is in "raw" format and therefore there are no formatting options.



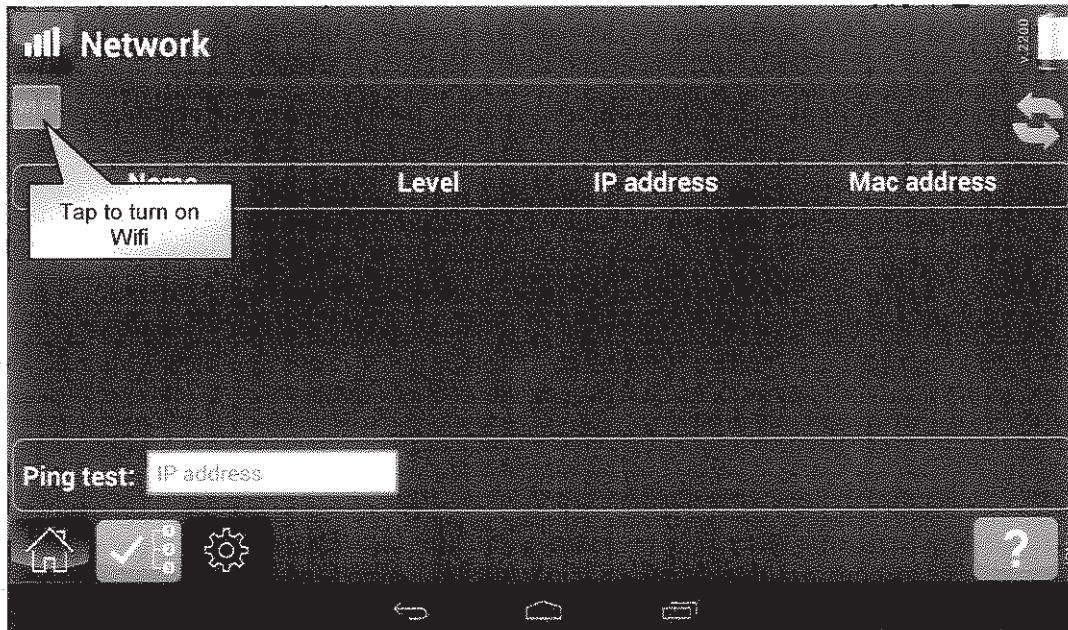
Where the option to print is available simply tap on the print icon





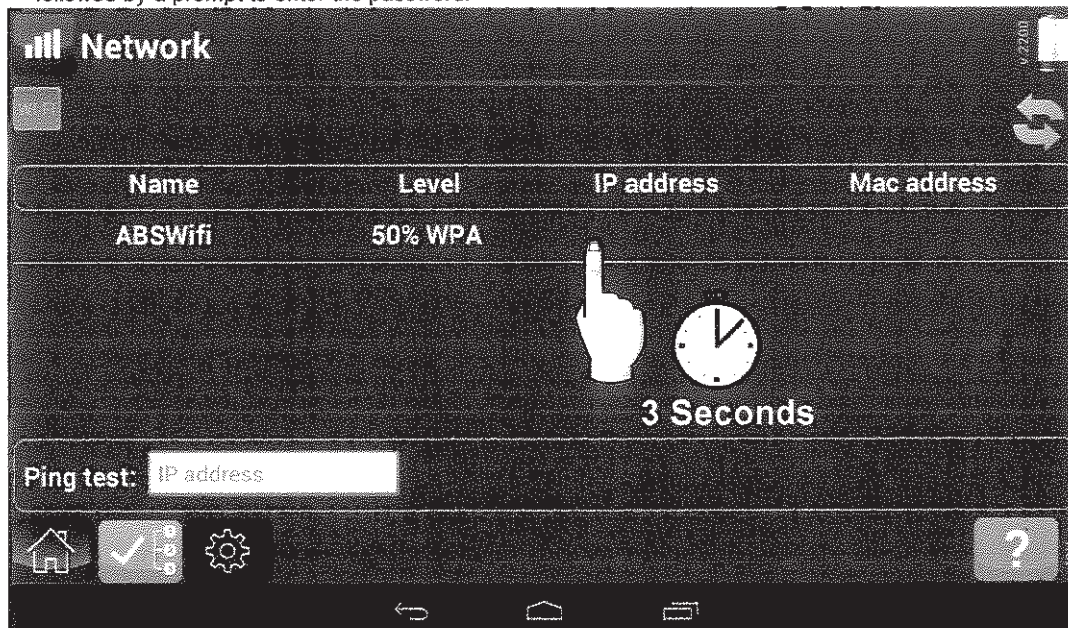
NETWORK

IQVu can be configured to join a Wifi network. There are various functions that will require a valid network connection including email, export of readings or connection to tool controllers.

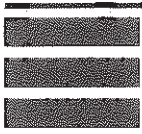


When the Wifi function is ON IQVu will display a list of available networks.

To join a network tap and hold the required line for 3 seconds and a popup menu will prompt to "Connect" followed by a prompt to enter the password.

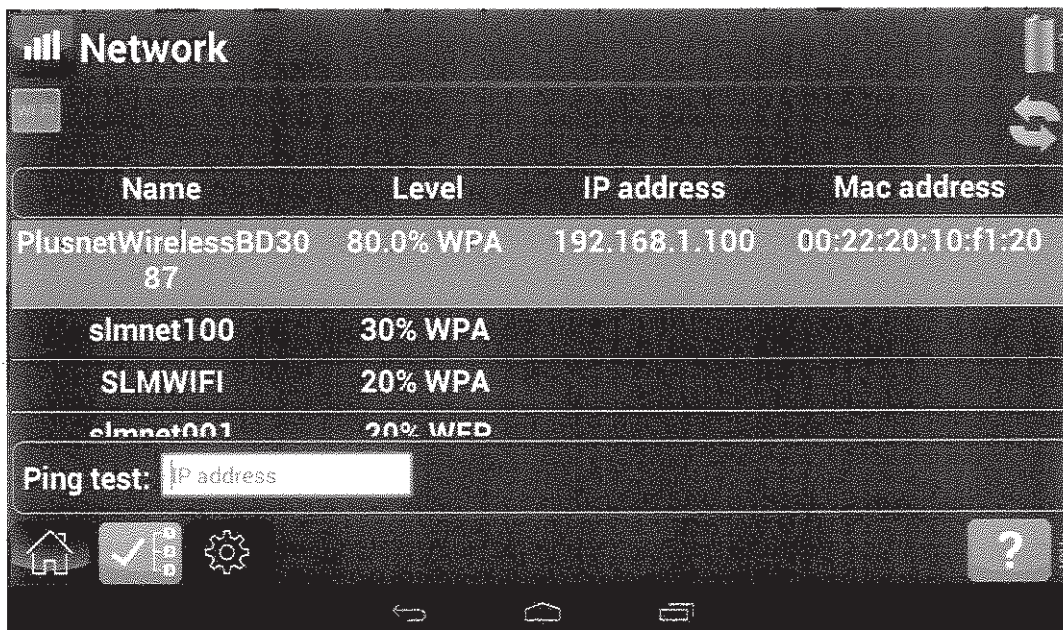


To disconnect from a network use the same procedure,. The popup menu will display "Forget" in place of connect.

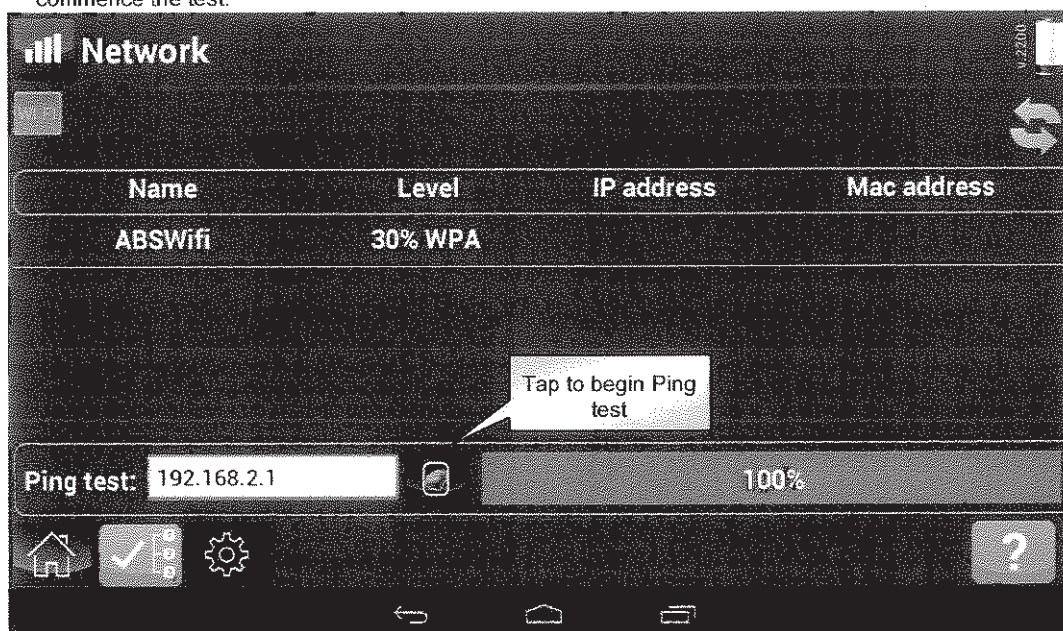


NETWORK CONTINUED

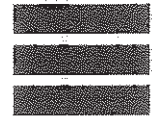
Once connected to a network IQVu will display the IP and Mac addresses.



To test the connection IQVu has the ability to perform a "Ping" test. Simply enter the IP address of a known computer on the same network, ensuring it is on with a valid connection, then tap the icon to commence the test.



As the ping test progresses, the status bar will change from red to amber and finally to green if successful.



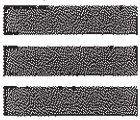
EMAIL

To setup an email account select the email icon from the from SOTI Mobicontrol screen.
Enter the address and password in the fields provided.

Select the type of account to setup



Contact your I.T representative for the required account settings.



SETTINGS

Settings in the IQVu can only be accessed by an admin level User.

Settings: 1/9 Application

Change language: [Flag icons]

Delete logs after, days: [0]

Min battery warning level: [30]

Critical battery warning level: [15]

☐ Prompt before saving in Check ☒ Save attachments locally

☐ Use GPS record

Tap to add GPS co-ordinates to data export

Navigation buttons: Home, Up, Down, Left, Right, ?



TIP GPS needs to be enable via SOTI in order to use this setting. Please contact Crane.

Settings: 2/9 Application

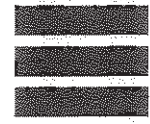
Printer settings (IP, Port): [192.168.1.163] [9100]

Power options

Screen dim after, min [5] Screen sleep after, min [10]

☒ Wake up back to Login screen? ☐ Allow sending logs

Navigation buttons: Home, Up, Down, Left, Right, ?

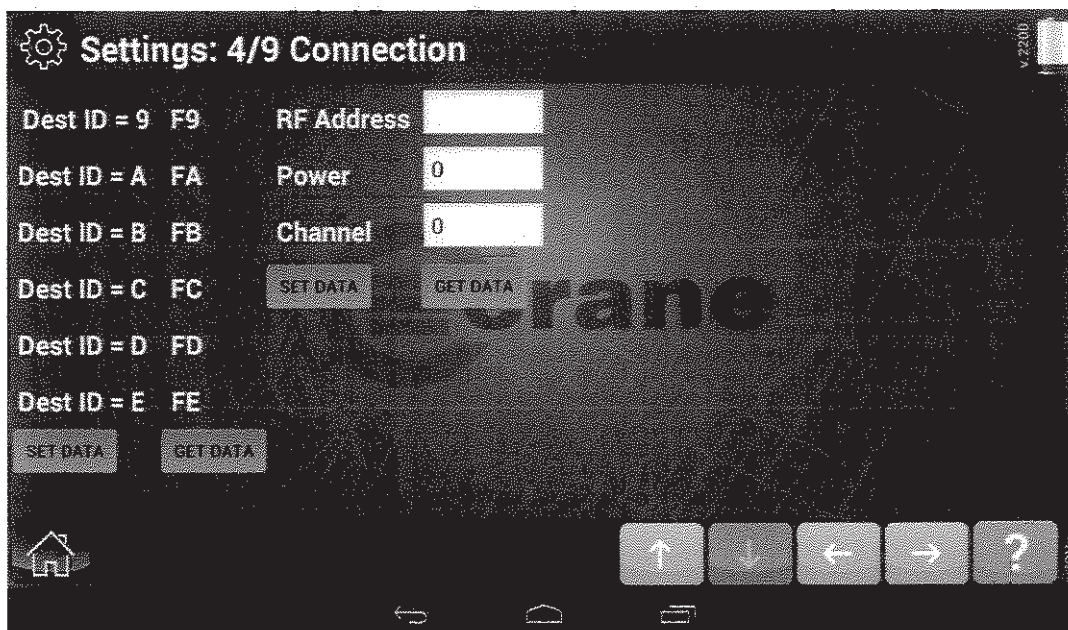


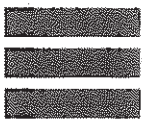
SETTINGS

The Module version refers to the firmware revision running in the torque module on the rear of the IQVu.



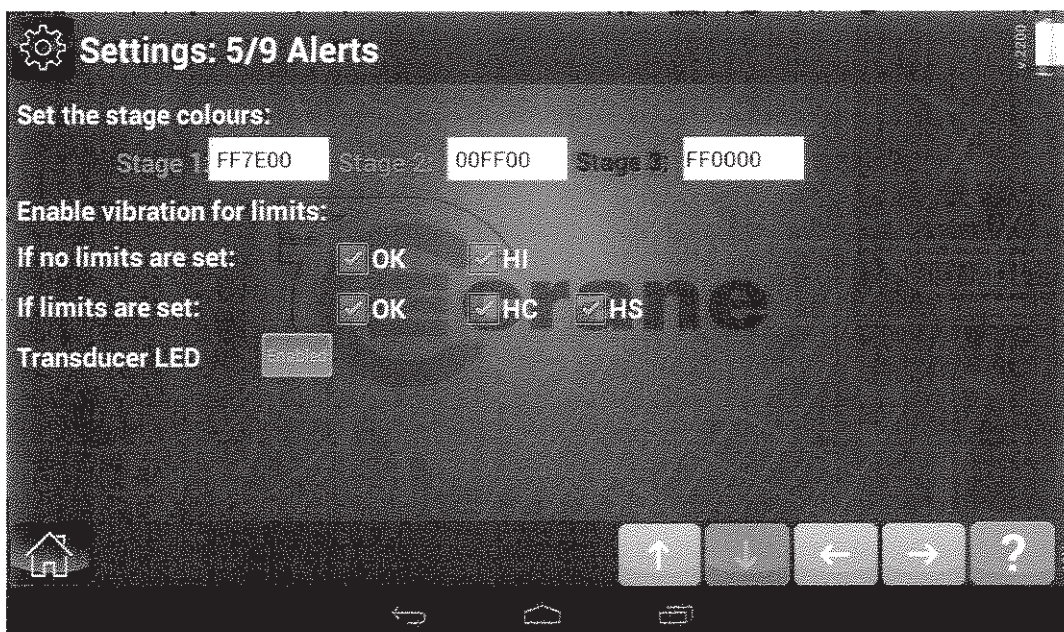
All settings on page 4 are reserved for future use and should not be changed.





SETTINGS

Please see appendix E for colour chart.



Settings: 5/9 Alerts

Set the stage colours:

Stage 1: Stage 2: Stage 3:

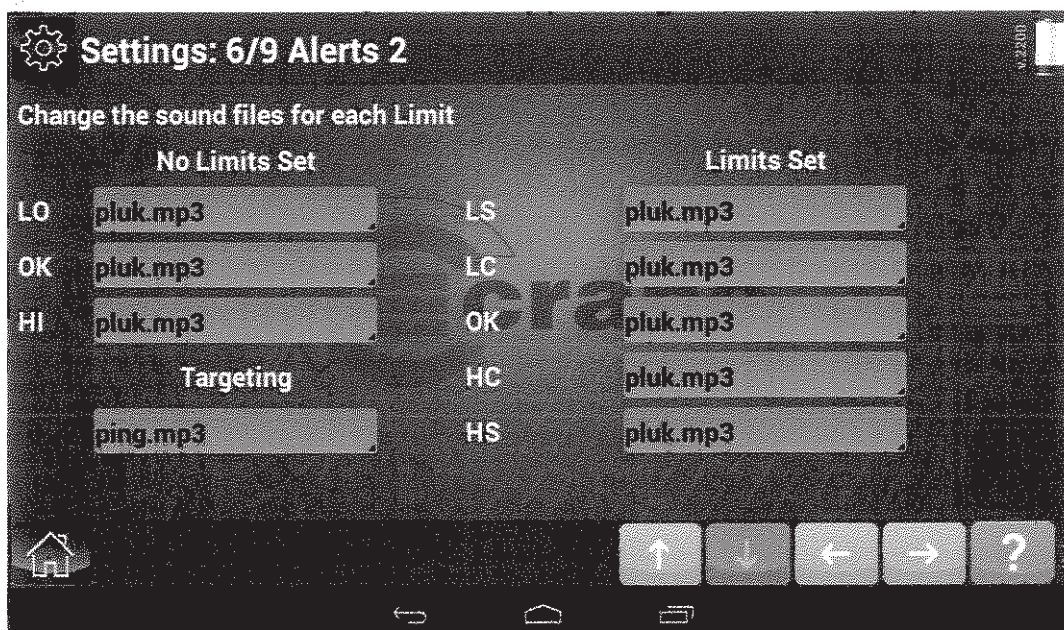
Enable vibration for limits:

If no limits are set: ☒ OK ☒ HI

If limits are set: ☒ OK ☒ HC ☒ HS

Transducer LED ☒ Enabled

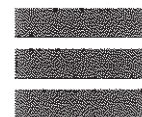
Audible alerts can be configured for the various conditions within a measurement cycle. Each condition listed can have a sound file assigned to it. Sound files must be chosen from the preinstalled list as available in the drop down boxes.



Settings: 6/9 Alerts 2

Change the sound files for each Limit

No Limits Set		Limits Set	
LO	<input type="text" value="pluk.mp3"/>	LS	<input type="text" value="pluk.mp3"/>
OK	<input type="text" value="pluk.mp3"/>	LC	<input type="text" value="pluk.mp3"/>
HI	<input type="text" value="pluk.mp3"/>	OK	<input type="text" value="pluk.mp3"/>
Targeting	<input type="text" value="ping.mp3"/>	HC	<input type="text" value="pluk.mp3"/>
		HS	<input type="text" value="pluk.mp3"/>



SETTINGS

IQVu can be configured to accept reading data from a tool control via Open Protocol. In order to do this IQVu must have a valid wifi network connection on the same network as the controller.

Settings: 7/9 Tool controller

Enabled No connection

IP address	192.168.1.163
Port	2055
Timeout request,ms	3000
Keep alive timeout, ms	15000
Keep alive period, ms	5000

Turn On Log

Open protocol connection settings

Navigation buttons: Home, Up, Down, Left, Right, ?

Functionality for capturing tool controller readings is reserved for future use.

Default values for frequency response on a by measurement mode basis can be configured by selecting Both values on the cylinders below.

Settings: 8/9 Readings

Reading type: Track, Peak, Click

Frequency: 384, 542, 768 Hz

Update graph freq, ms: 100

Update values freq, ms: 100

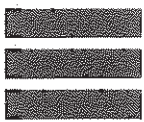
Reading timeout,s: 120

Immediately start saving readings every,count: 1

Use ☒ Peak angle ☐ Final angle

Navigation buttons: Home, Up, Down, Left, Right, ?

Tap the check box(s) to include "Peak" and/or "Final" angle. Please see Appendix G for details.

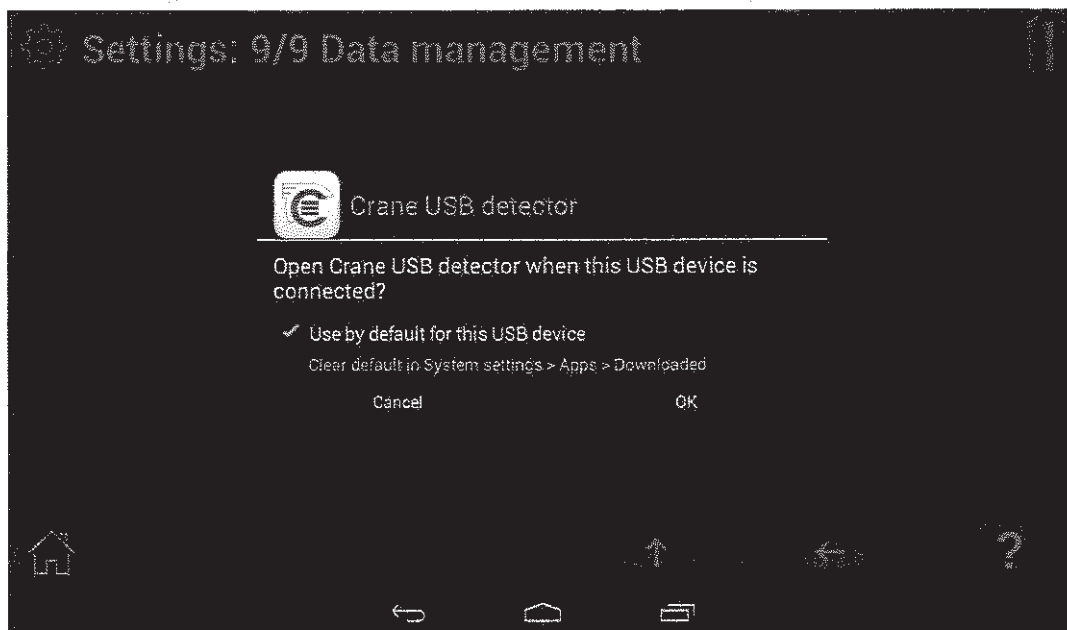


SETTINGS

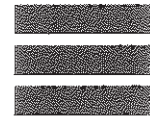
The IQVu features a backup and restore feature which can be used to protect data and/or transfer to a different unit.



Insert a USB stick into the USB client connector or SD card into the SD card slot see "Controls and Connections" in this manual for further details.

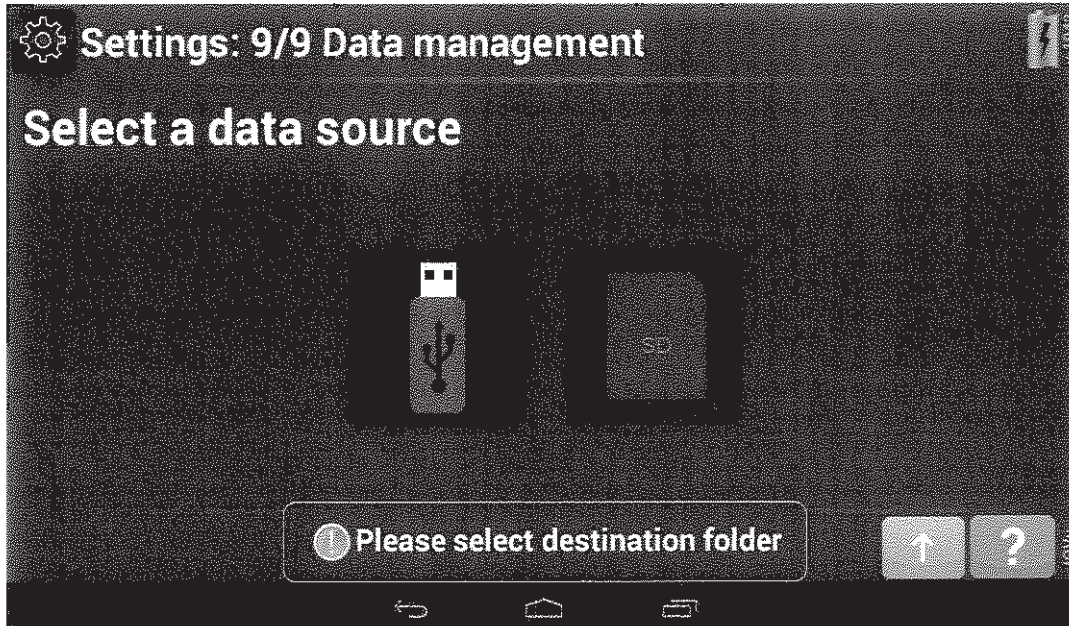


When the IQVu detects a USB stick ensure the check box is ticked and tap OK to accept.



SETTINGS

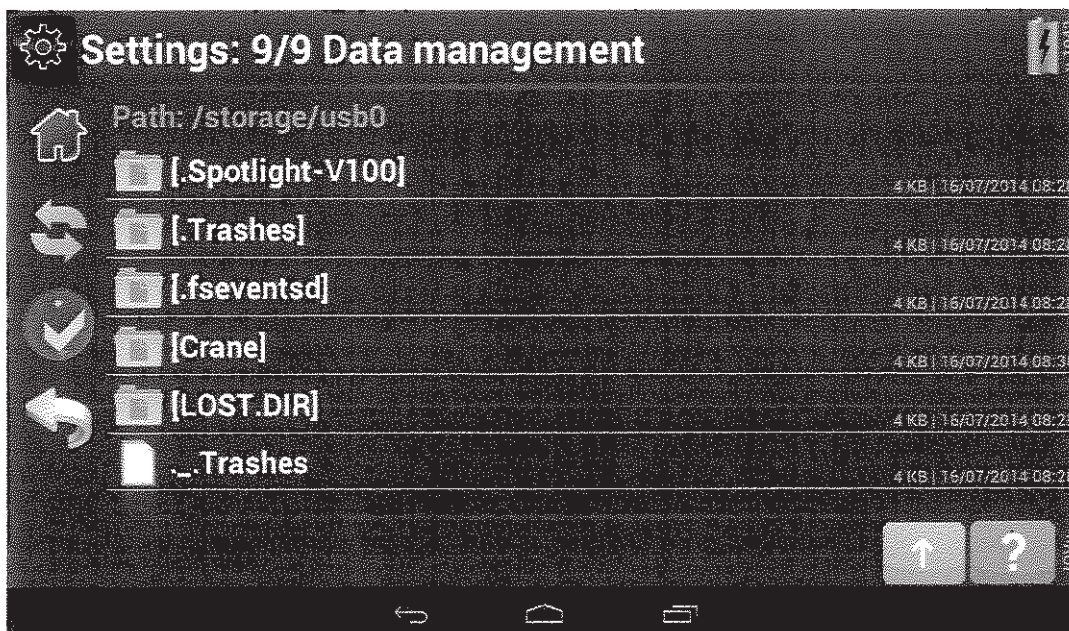
When a valid data source is present the corresponding icon will become active. Simply tap on which source is preferred to save the backup to.

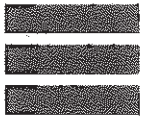


When a backup is performed, if not already present, a new folder "Crane" will be created.



TIP If the Crane directory already exists, do not tap to select it. Doing so will create a new Crane folder within the existing one.



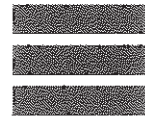


APPENDIX A

Users

The table below shows the permissions granted to the available user types.

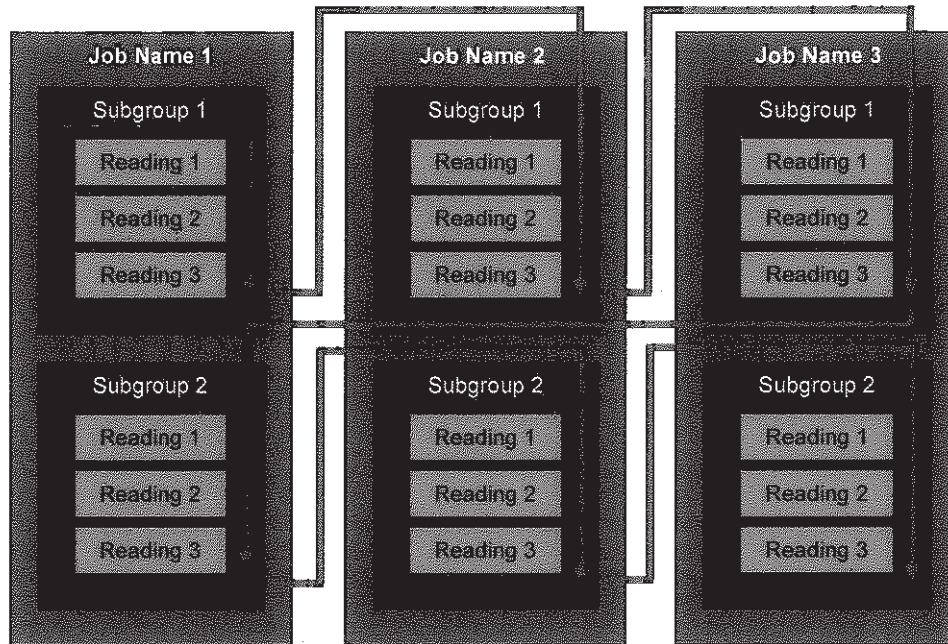
Feature	Admin	Team Leader	User
Close App (Power)	Yes		
Users	Yes		
Settings	Yes		
Edit Check	Yes	Yes	
Edit Job (include adding work instructions)	Yes	Yes	
Backup and Restore	Yes		
Measure	Yes	Yes	Yes
Reports	Yes	Yes	Yes
Statistics	Yes	Yes	Yes
Export	Yes	Yes	Yes
Attach Comment to Reading	Yes	Yes	Yes



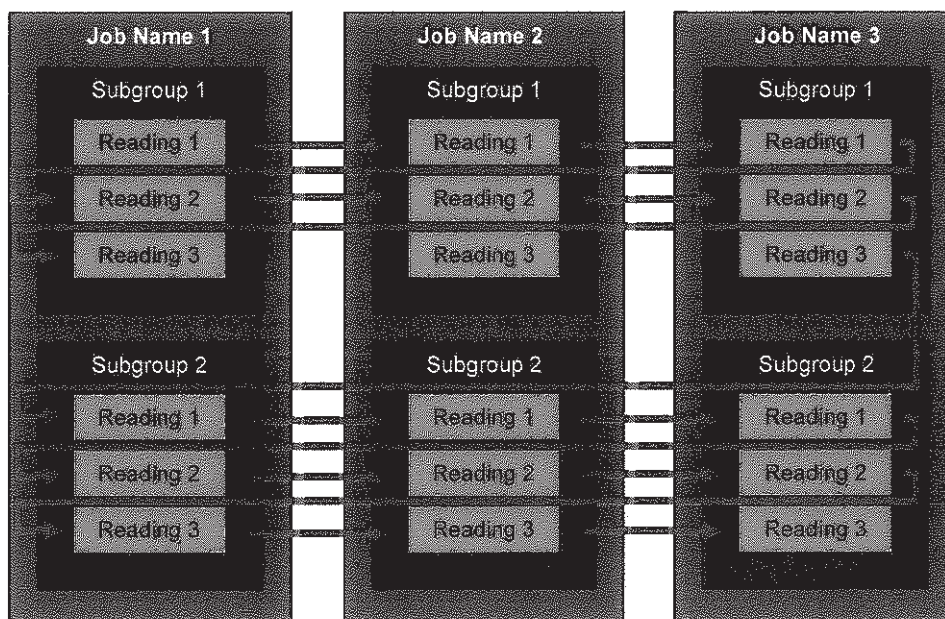
APPENDIX B

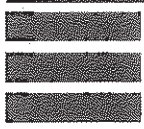
Rounds

The flow diagram below shows the order of reading entry when a Round is configured as Vertical



The flow diagram below shows the order of reading entry when a Round is configured as Horizontal



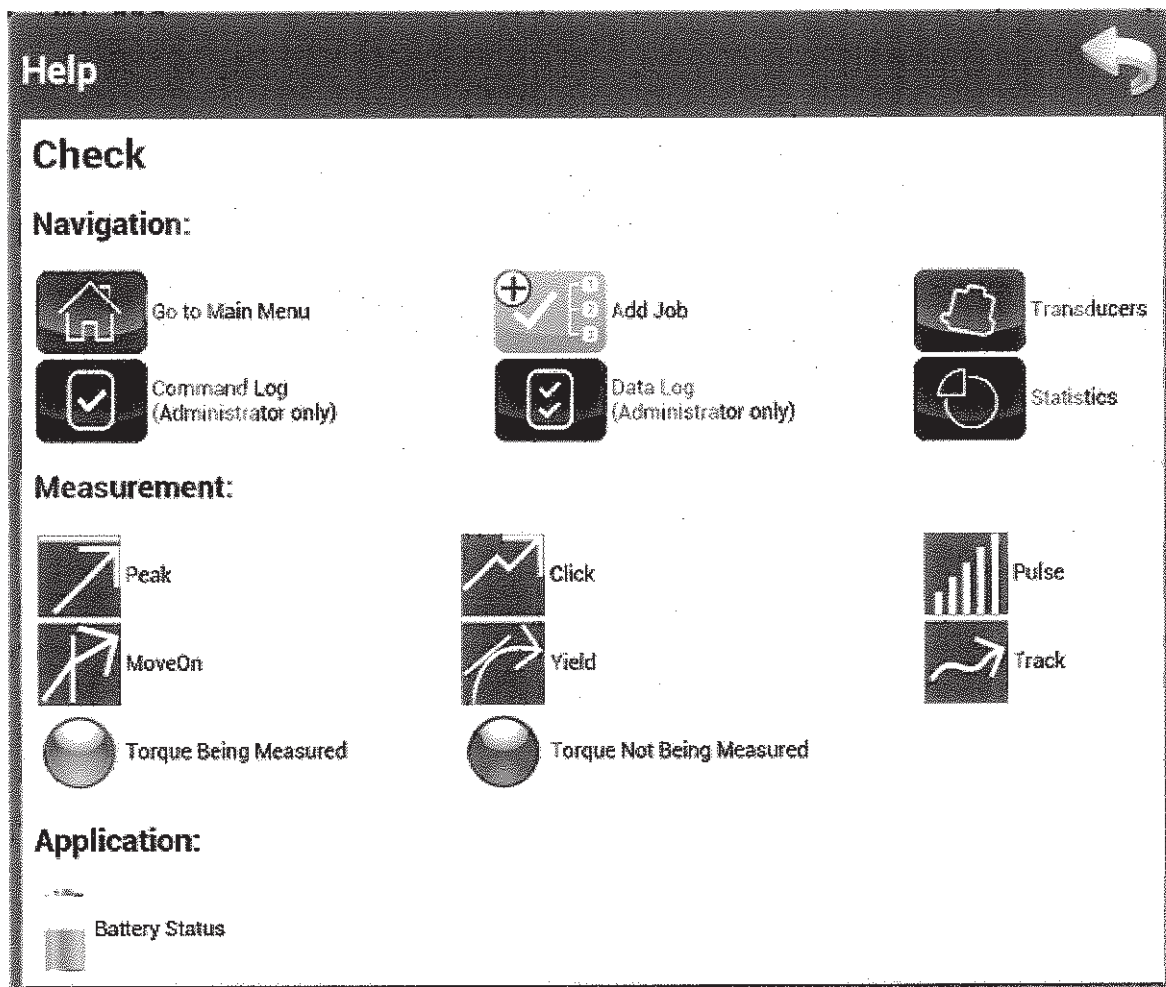


APPENDIX C

Each IQVu screen has a help icon



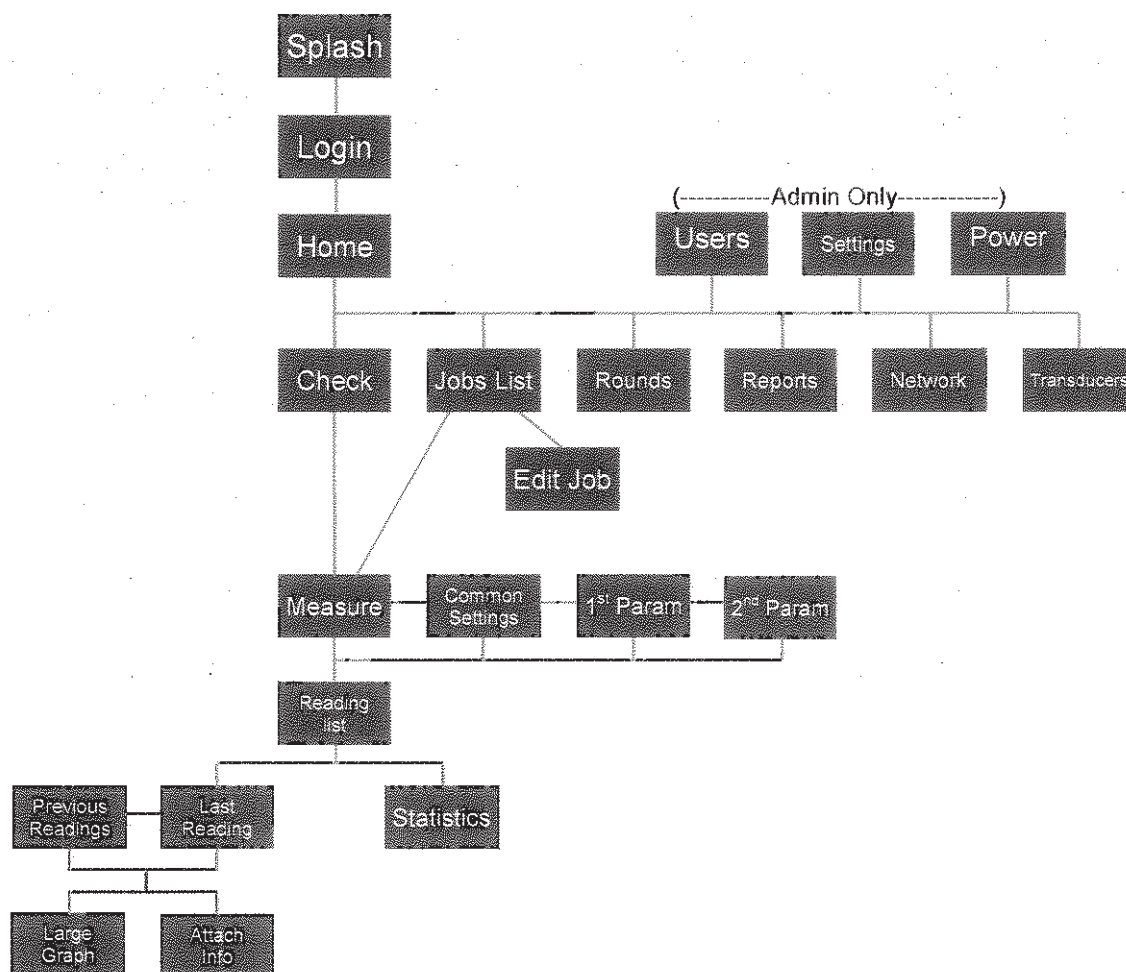
Help pages are tailored to the current page and will provide icon descriptions as the example shows.

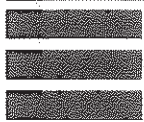




APPENDIX D

Below shows the screen map of the IQVu app.





APPENDIX E

Below provides a colour reference palette for setting the visual alerts in IQVu

FFFFFF	000000	333333	666666	999999	CCCCCC	CCCC99	9999CC	666699
660000	663300	996633	003300	003333	003399	000066	330066	660066
990000	993300	CC9900	006600	336666	0033FF	000099	660099	990066
CC0000	CC3300	FFCC00	009900	006666	0066FF	0000CC	663399	CC0099
FF0000	FF3300	FFFF00	00CC00	009999	0099FF	0000FF	9900CC	FF0099
CC3333	FF6600	FFFF33	00FF00	00CCCC	00CCFF	3366FF	9933FF	FF00FF
FF6666	FF6633	FFFF66	66FF66	66CCCC	00FFFF	3399FF	9966FF	FF66FF
FF9999	FF9966	FFFF99	99FF99	66FFCC	99FFFF	66CCFF	9999FF	FF99FF
FFCCCC	FFCC99	FFFFCC	CCFFCC	99FFCC	CCFFFF	99CCFF	CCCCFF	FFCCFF



APPENDIX F

Cp

This is a capability index which shows the process capability potential but takes no account of how centred the process is. Cp is used for capability studies and may range in value from 0 to infinity. A large value indicates greater potential capability and a value of 1.33 or greater is generally desirable.

$$Cp = \frac{USL - LSL}{6\left(\frac{\bar{w}}{d2}\right)}$$

Cpk

This is an index which indicates whether the process will produce units within the tolerance limits. If the process is centred on the nominal value then Cpk will have a value equal to Cp. For values of Cpk between 0 and 1 then some of the 6 sigma spread will fall outside tolerance limits but for values greater than 1 these will all be within tolerance. A negative value of Cpk indicates that the process mean is outside tolerance limits. A value of 1.33 or greater is desirable.

The Lesser of:

$$Cpk = \frac{USL - \bar{\bar{x}}}{3\left(\frac{\bar{w}}{d2}\right)}$$

$$\text{or} \quad \frac{\bar{\bar{x}} - LSL}{3\left(\frac{\bar{w}}{d2}\right)}$$

d2

Is derived from a look up table as below

Number of samples per sub-group	d2*	Number of samples per sub-group	d2
2	1.128	17	3.588
3	1.693	18	3.64
4	2.059	19	3.689
5	2.326	20	3.735
6	2.534	21	3.778
7	2.704	22	3.819
8	2.847	23	3.858
9	2.97	24	3.895
10	3.078	25	3.931
11	3.173	26	3.965
12	3.258	27	3.999
13	3.336	28	4.032
14	3.407	29	4.064
15	3.472	30	4.095
16	3.532		

\bar{w}

Is the Mean average of the Subgroup Ranges

$\bar{\bar{x}}$

Is the Mean average of the Subgroup Mean averages

σ

(Standard Deviation)

Is a measure of the variation of the samples of a statistical group. If a group of n values has a mean of x then its standard deviation is given by;

$$\sigma = \sqrt{\frac{\sum (x - \bar{x})^2}{n - 1}}$$

APPENDIX F

Cm :

This is a capability index which shows the machine capability potential but takes no account of how centred the process is. Cm is used for capability studies and may range in value from 0 to infinity. A large value indicates greater potential capability and a value of 1.33 or greater is generally desirable.

$$Cm = \frac{USL - LSL}{6\sigma}$$

Cmk

This is an index which indicates whether the process will produce units within the tolerance limits. If the process is centred on the nominal value then Cmk will have a value equal to Cm. For values of Cmk between 0 and 1 then some of the 6 sigma spread will fall outside tolerance limits but for values greater than 1 these will all be within tolerance. A negative value of Cmk indicates that the process mean is outside tolerance limits. A value of 1.33 or greater is desirable.

The Lesser of:

$$Cmk = \frac{USL - \bar{\bar{x}}}{3\sigma}$$

$$\text{or } \frac{\bar{\bar{x}} - LSL}{3\sigma}$$



APPENDIX G

Industry Standard Transducer (I/S)

Type of transducer, with no pre-amplifier or coding links, but with the exact rated torque, marked on the body.

Job

Specification of one particular torque value to be collected.

USL Value

Upper Specification Limit of any reading. This can equal but not exceed the torque rating of the transducer to be used.

LSL Value

Lower tolerance level of any reading. This value **MUST** be greater than threshold

Round

A sequence of Jobs to be collected either horizontally or vertically. Each round has a name of up to 14 characters, 8 if downloaded from the PC.

Sub group

Grouping of samples to enable analysis, with an allowable range of 1 - 50.

Threshold Torque Value

Level of torque, which a signal must rise above and then fall below, to be considered a valid torque cycle. The minimum value is 1% of rated span of transducer.

Units of Measure

It is possible with IQVu to read a transducer calibrated in say Nm, and convert internally to display and store in any of the other torque units.

UTA Tx

Family of torque transducers which Crane products can identify by onboard EEPROM.

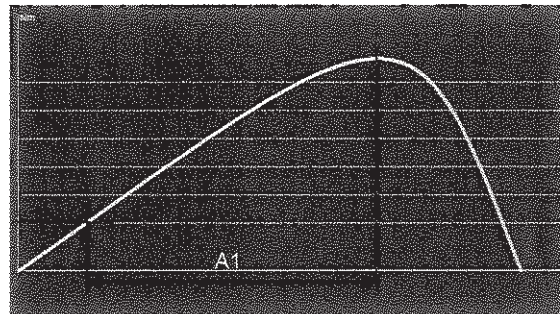
UTA Tx ID

Specification of transducer by rating in preselected units. Used as an identity or 'name'.

Peak Angle

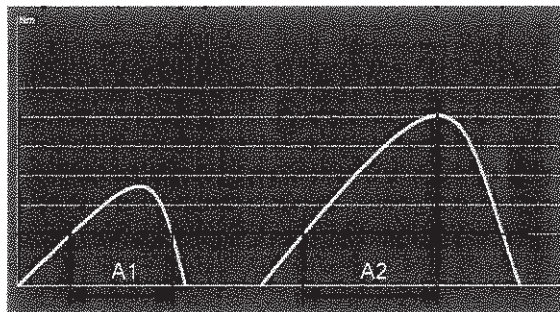
Summation of all angle measurements taken above second parameter threshold from first time above threshold until the peak torque within a given cycle.

Ex. 1

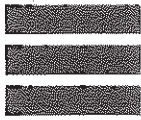


Peak Angle = A1

Ex. 2



Peak Angle = A1 + A2

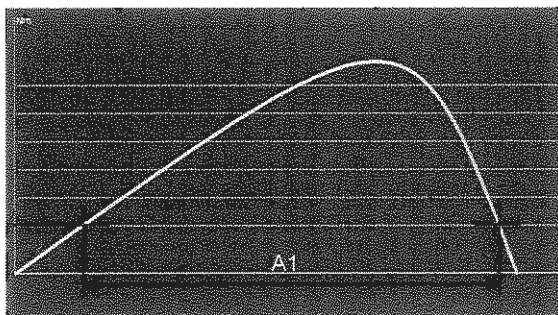


APPENDIX G

Final angle

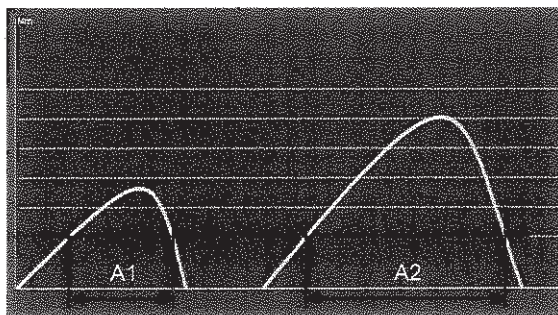
Summation of all angle measurements taken above second parameter threshold from first time above threshold until final time below second parameter threshold within a given cycle.

Ex. 1



Final Angle = A1

Ex. 2



Final Angle = A1 + A2