

Broadweigh® Bluetooth® User Manual

mantracourt.com



BROAD WEIGH

Load monitoring for live events
Solved by Mantracourt®

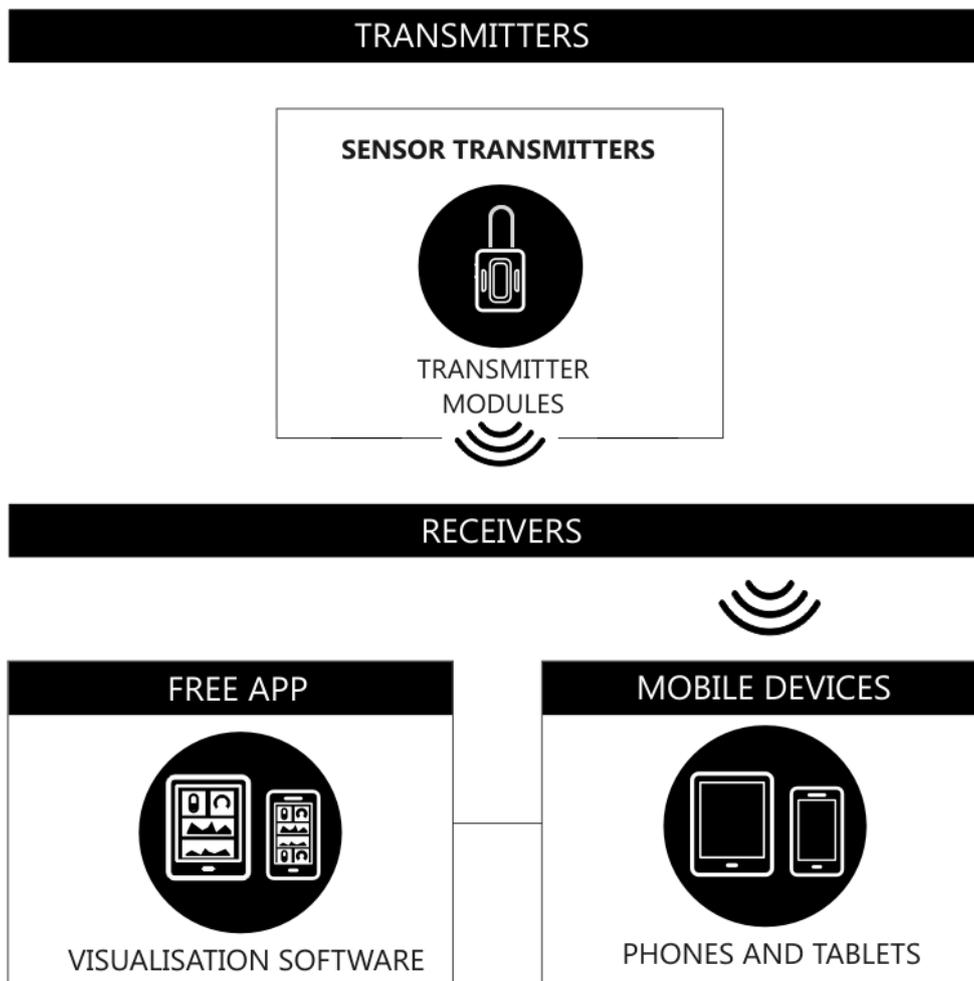
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Introduction / Overview

The Broadweigh Bluetooth product range provides access to quality measurements on a mobile platform such as a phone or tablet. The delivery mechanism is Bluetooth Smart which utilises the flexibility and availability of Bluetooth receivers while maintaining the low power requirements of embedded systems. Broadweigh Bluetooth is built upon two complimentary principles of Bluetooth Smart, broadcast advertising data which enables users to deliver the same data to multiple receivers and low power paired connections which can be used in a point to point connection for configuration.

Throughout this document the transmitter shackles may be referred to as simply transmitters.



Navigating This Manual

When viewing this PDF manual the following tips will help you navigate.

Viewing bookmarks ( or ) to the left of the page, in the PDF viewer, will allow easy navigation to the relevant chapters of this manual. Alt-left arrow is a useful shortcut back to the last page viewed after a hyperlink is clicked. Hyperlinks are coloured green and are underlined.

Safe Use

Designed to aid rigging professionals on a daily basis, the Broadweigh wireless load cell shackles offer simple, real-time, effective and accurate load monitoring. It allows users to know the precise loads on any given rigging point, guy wire or hoist in a rigging system. This valuable data enables the rigger to safely distribute weight for indeterminate loads, roof structures and mother-grids as well as indicate alarms to avoid overload situations.

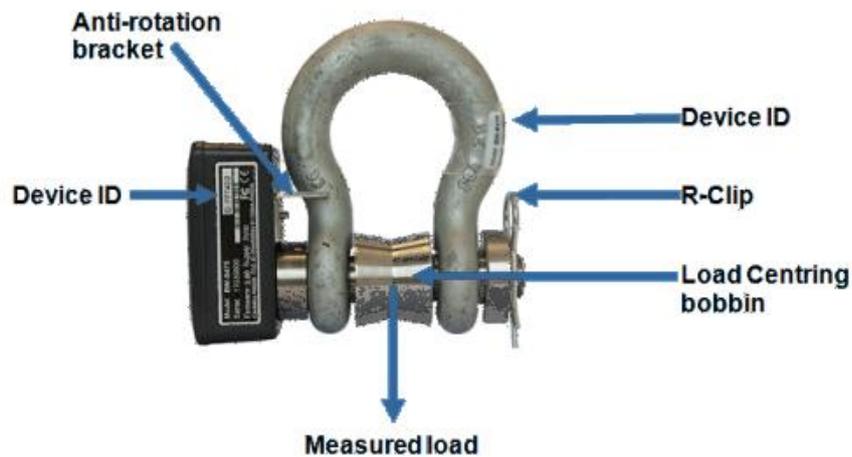
The Broadweigh Shackle is a safety bow shackle with load pin and integrated electronics which features the following:

- Available in 3.25 tonne WLL
- Up to 90 m line of sight wireless transmission range
- IP67
- 5:1 safety factor
- Low rigging profile of 130 mm
- 10 month battery life at transmission 1 per second, always on
- Accuracy of $\pm 1\%$ of current load or 25 kg, whichever is the greater value (When using original bobbin. There may be a reduction in accuracy if these are swapped.)

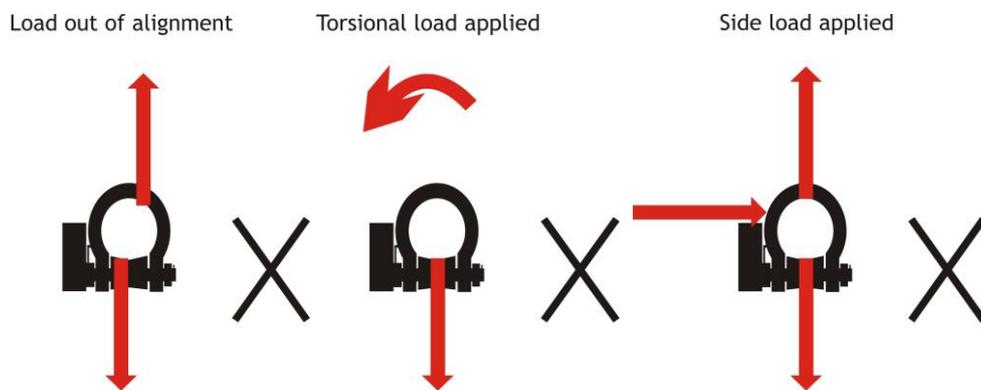
Shackles must be correctly selected for the specific application required. As well as safe working load, physical size and fitment with other components needs to be considered.

The shackle pin and bow are calibrated and load tested together. It is therefore essential for the accuracy of the system that the following information is adhered to:

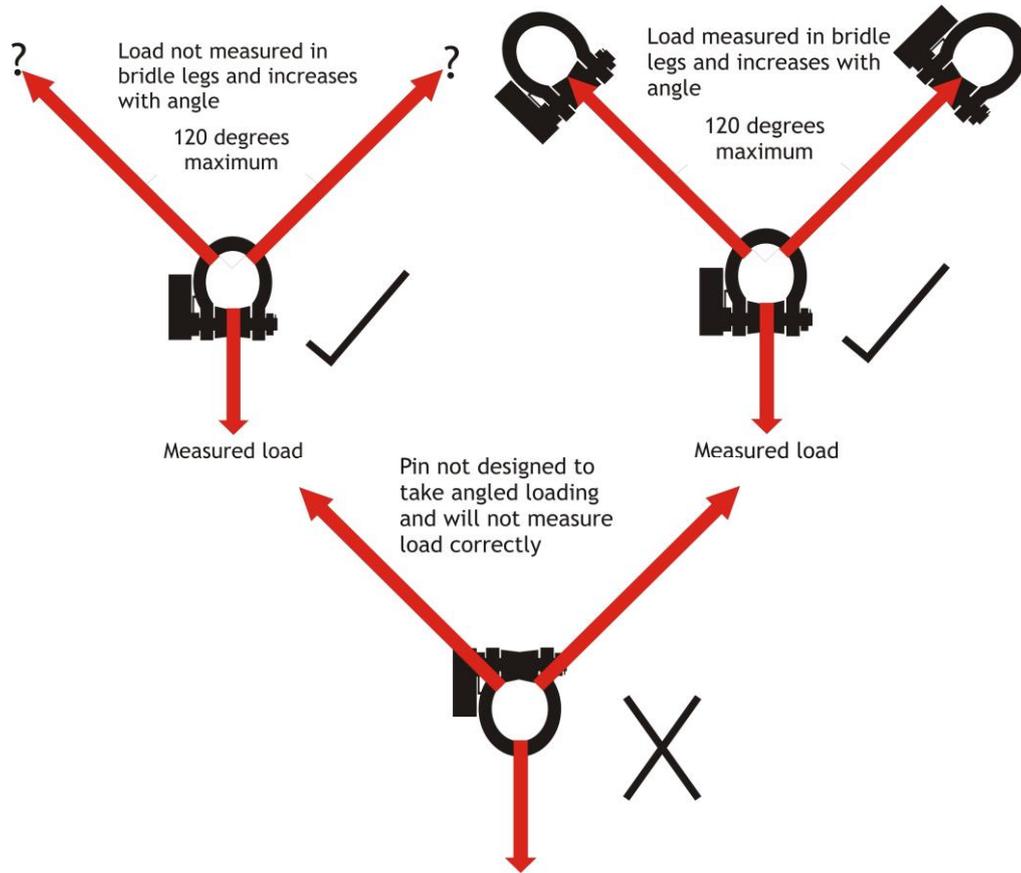
- Each pin and bow must be kept as a pair and not interchanged. The bow is marked with the ID of the pin it is associated with as shown.
- The pin must be aligned in the same orientation with the bow as it was when calibrated.
- The Broadweigh shackle is designed to only fit together in one orientation, the anti-rotational bracket will only fit around the bow shackle on the side with CE marking. This is the opposite side to the ID marking.
- The shackle must be used in conjunction with a bobbin, nut and retaining clip as shown:



Any out of alignment, side or twist loading will affect the readings given as well as load the shackle in a way that it was not designed for.



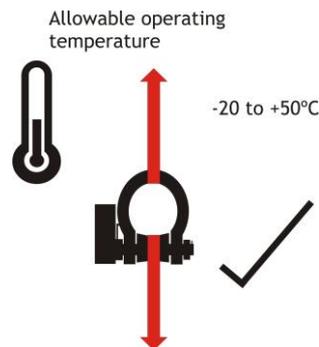
If using the shackle as part of a bridle, remember that the load in legs of the bridle will increase with the angle. If the Broadweigh shackle pin is not connected to that part of the leg then it will not register this increase.



No part of the shackle, pin, bobbin should be modified by welding, grinding or similar.

Always ensure that the load is stable.

The allowable operating temperature range is -20°C to $+50^{\circ}\text{C}$.



The working load limit (WLL) of Broadweigh shackles assumes the absence of exceptionally hazardous conditions. These include offshore activities, lifting of persons and lifting of potentially dangerous loads such as molten metals. In such cases the degree of hazard should be assessed by a competent person and the safe working load (SWL) reduced accordingly from the working load limit.

Please remember that Broadweigh does not give advice as to how the data from Broadweigh shackles is used. All lifting operations are different and must be supervised by suitably qualified and experienced riggers. It is the user's responsibility to ensure conformity with local regulations.

Broadweigh is not designed to be used as part of a safety critical control system. If it is required for one then the integrator would need to fully assess its suitability.

Broadweigh shackle assemblies are subjected to a 150 % proof load (static test coefficient of 1.5) before being calibrated.

Inspection and Maintenance

As with all rigging equipment, Broadweigh Bluetooth shackles should be inspected before and after every use, ensuring that all the components are present and correct (bow, pin, bobbin, nut and r clip) and the serial numbers match. All load bearing components must be free from cuts, nicks, cracks, gouges or excessive wear and distortion. Any damaged Broadweigh shackles or components must be taken out of service and returned to your dealer to arrange refurbishment or scrapping. If you attempt to replace or swap any load bearing parts yourself the unit's calibration will be void.

It is also important before every use to check that all the settings are as expected. The most safety critical settings to check are that the system zero and the units are correctly set (see the relevant sections in the manual). If these have been unknowingly changed you could end up with unexpected and misleading readings. Before moving system zero or checking any readings please ensure that the shackle's temperature has stabilised. When moved from different temperatures it can take up to an hour to reach the local ambient temperature. Once it has done so, the readings can accurately be checked.

Always remember that damage to the shackle or its calibration can happen at any time. If you need to move the system zero significantly then further investigation is required. This could take the form of a thorough examination and calibration check with a known load. Records should be kept of any calibration check so that you can see any movement over time. If the readings are out by more than 1% or 25 kg or you have to zero out more than 50 kg, please return to your dealer to arrange recalibration.

These measures should be used in conjunction with your own thorough examination routine at the same intervals you have set for normal shackles. This will vary due to local regulations but should not be less than every 6 months. Records of all thorough examinations should be kept.

We would recommend checking your shackle's output with a known load at least once a year and a return to the factory for a calibration check every two years.

There are very few maintenance requirements. The Broadweigh shackles, TwistLinks and battery enclosures need to be kept clean, threads clear of debris and protected from corrosion.

Do not overtighten screws when replacing batteries. Damage caused by overtightening is not covered under manufacturer warranty.

Remove the batteries if being stored for an extended period. Leaking batteries can damage the circuitry.

Product Quick Locator

This section allows you to locate your product quickly to navigate to the correct section of the manual.

Broadweigh Bluetooth 3.25 Tonne Shackle

[BB-S325](#)



Broadweigh Bluetooth Telemetry Basic Principles

There are some basic radio settings and concepts that should be understood to effectively configure, deploy, optimise and troubleshoot Broadweigh Bluetooth telemetry systems.

Transmission Range

The flexibility of the Broadweigh Bluetooth range is that the user may utilise their mobile phone rather than using a specific handheld receiver or base station. This flexibility does mean that we have no control over the quality of the receiver. This imparts a large variation in the transmission range capability of the module.

Data rate

The Bluetooth specification specifies the maximum rate at which advertisement information can be delivered. The Broadweigh Bluetooth modules may be configured to deliver data in the range between 10 samples per second and 1 every 25 seconds.

Resolution

The noise free resolution of the BB-S325 is up to 16.5 bits. This is equivalent to 1 in 92000 counts, or better than 0.1 kg.

Transmitter Module Modes of Operation

The Broadweigh Bluetooth module disconnects the power from the load cell and sleeps the micro-controller in between measurements. This improves the battery lifetime of the system a makes the most efficient use of the battery's energy.

Data Tag

The advertising packets transmitted by Broadweigh Bluetooth modules are identified by their Data Tag. The Data Tag is a four character hexadecimal identifier that defaults to the last 4 characters of the modules ID printed on the silver side label.

The Data Tag can be changed by configuring the module.

Broadweigh Toolkit App

The Broadweigh Toolkit App is available for iOS and Android devices and is available for free from the App Store and Google Play store.

i Use the QR codes below to access the app in the store or tap the store banner if you are viewing this document on your device.

Google Play Store



Apple App Store



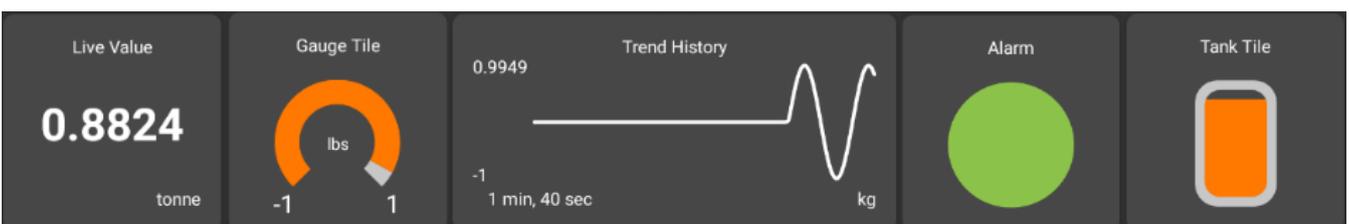
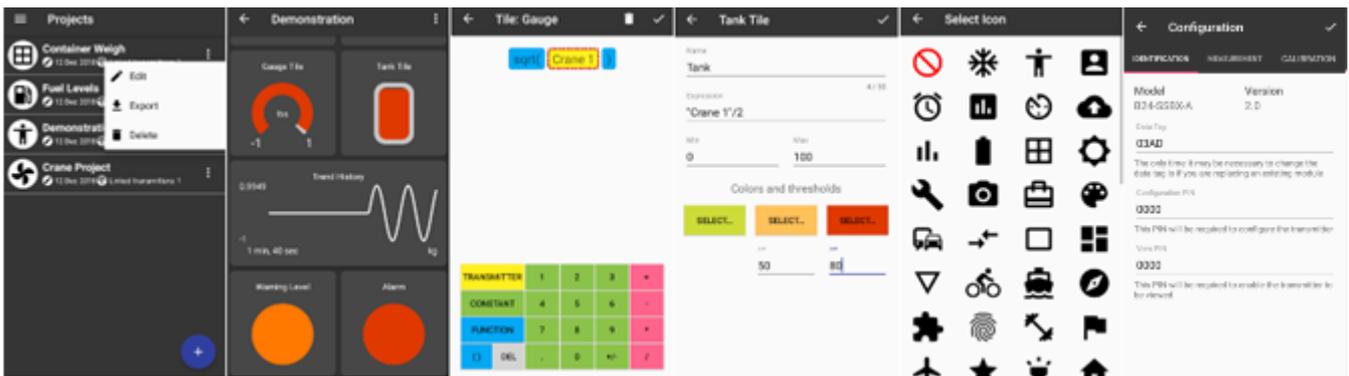
! This app requires access to the Bluetooth Services which are part of Location Services so the user may need to grant permission for the app to access Location even though the app does not use any location data.

The App allows the user to create multiple Projects. Each project can contain a list of Broadweigh Bluetooth shackles.

Each project has a Dashboard which can be populated with display Tiles that use data from the Shackles to represent values in different formats.

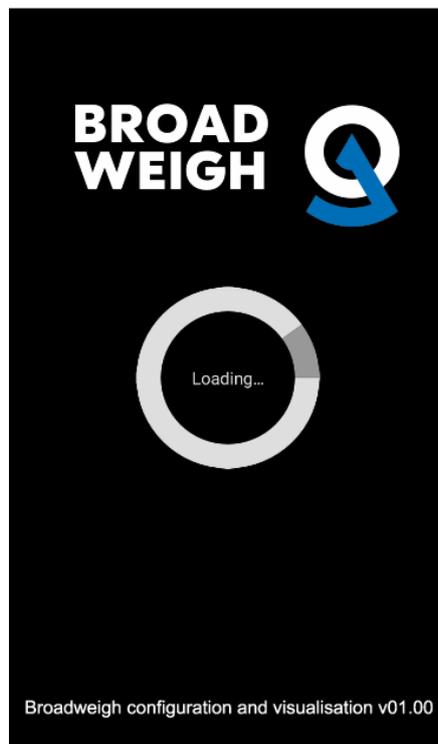
When in run mode the App uses the data from the shackles to populate the dashboard Tiles in real time.

The App will also support one to one connections with the Broadweigh shackles to enable configuration.



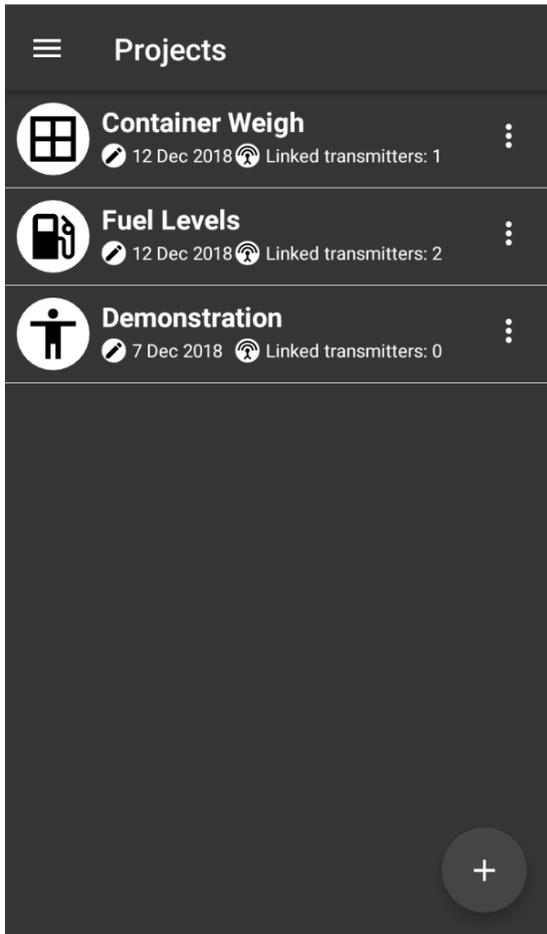
Splash Screen

On launching the app the splash screen will be displayed.

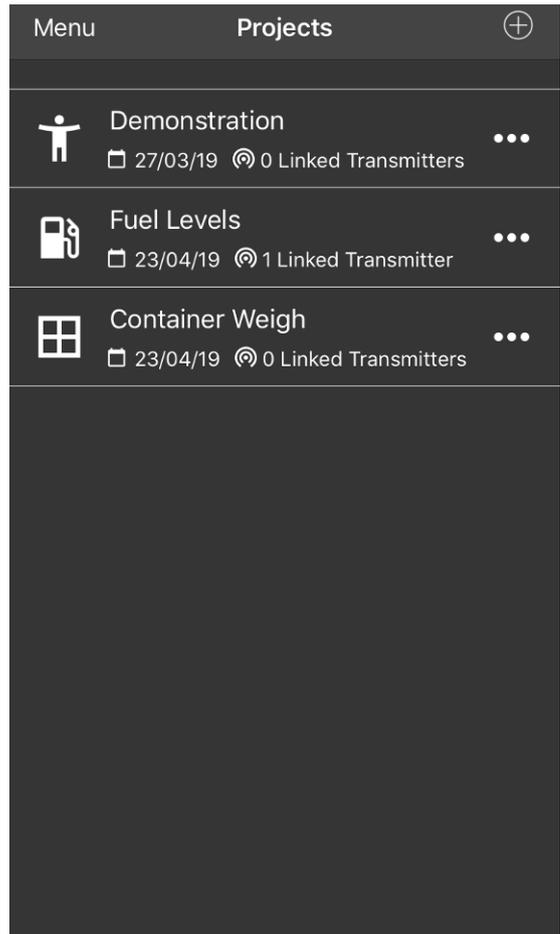


This displays the app version number at the bottom of the screen.

Project List



Android



iOS

The first page that appears after the Splash Screen is the Project List. This contains a scrollable list of all existing projects. The number of projects you can add will be limited only by the memory of the phone or tablet. Next to the user selectable icon the project title is shown and below is shown the date of the last change to the project and the number of transmitters in that project.

After initial app installation the list will contain a single project called Demonstration.

Once you create your own project and delete the demonstration project (so only one project exists), on next launching the app the project list will be skipped and the project dashboard will be displayed.

Controls and Actions:

x / Menu

Main Menu – See [Main Menu](#) section. From this menu you can import a project and configure transmitters.

v /

Add Project – adds a new project to the list. See [New Project](#) page

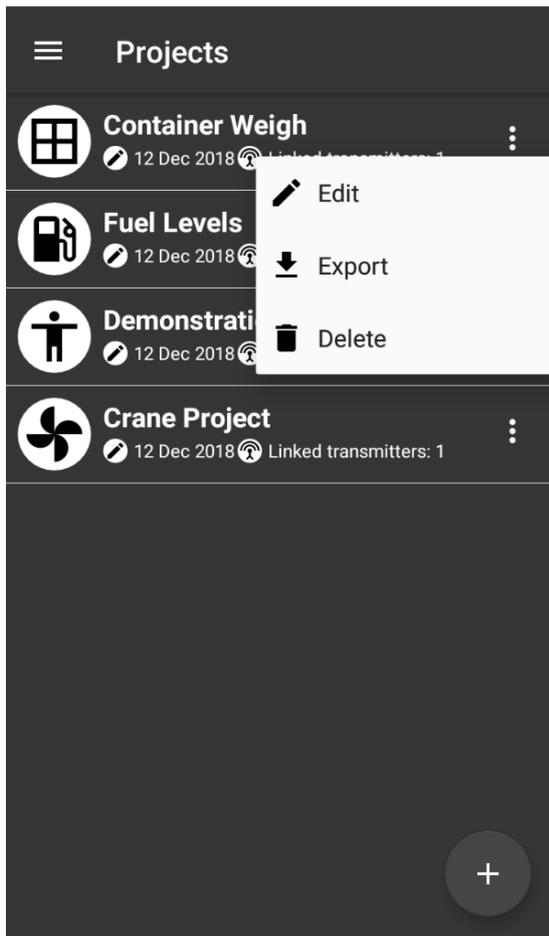
u / mantracourt

Menu – opens the options for each project to allow editing, export and deletion of the project. See [Project List Edit](#) page.

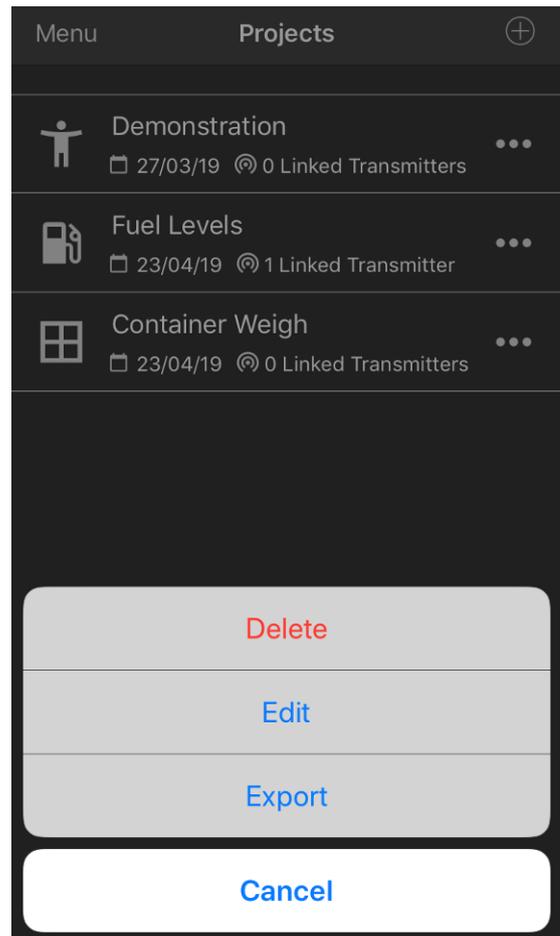


Tapping on a project item in the list will open that project in Dashboard View. If no files have been added yet then the dashboard will be blank. See [Project Dashboard Blank](#) page. Otherwise the dashboard will be displayed with files visible. See

Project List Edit



Android



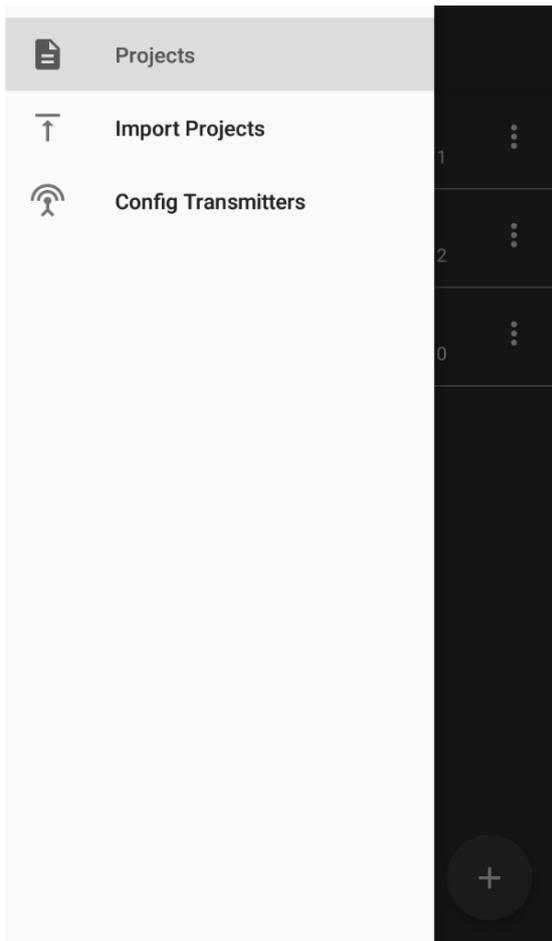
iOS

Tapping the  icon next to a project opens the project menu.

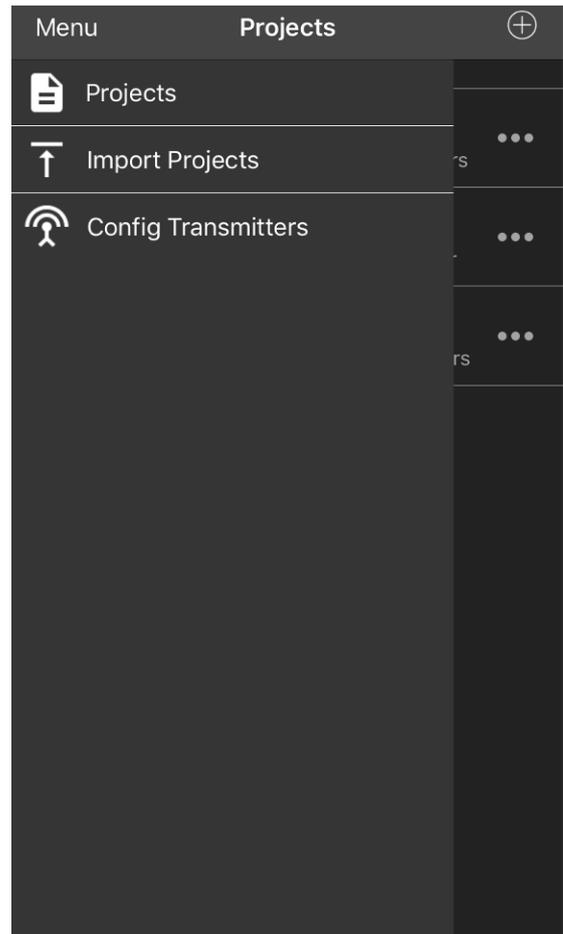
Controls and Actions:

- k Edit Edit the project details. See [Edit Project](#).
- H Export In Android devices this will open an email client with the body of the email pre-filled with the data for the selected project. You can then email (or copy the message body to transfer in an alternative way) to the target device where the data can be pasted into the [Import Project](#) page. There are more options with an Apple device as you can save to local or cloud storage.
- n Delete This will delete the project from the app.

Main Menu



Android



iOS

Controls and Actions:

Projects

Takes you back to the [Project List](#).

Import Projects

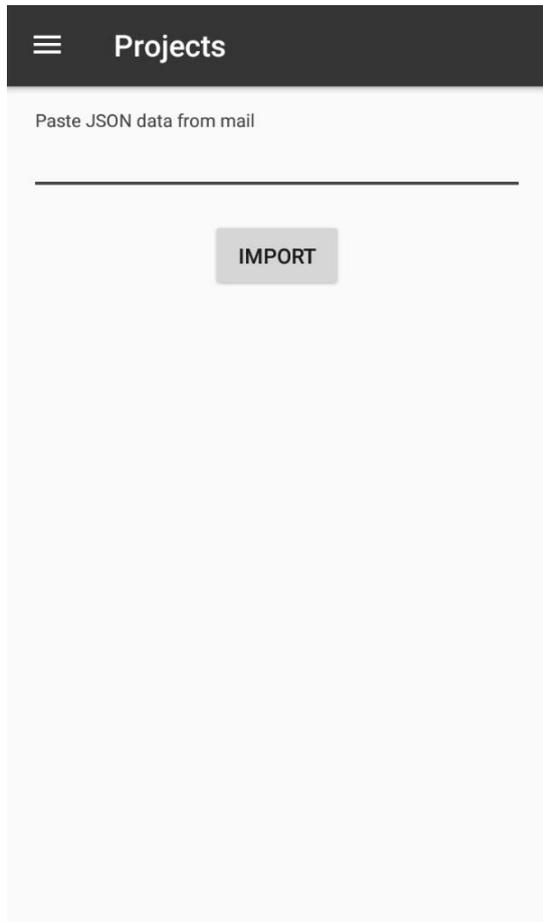
Allows you to paste information exported from another app to import the project into this app. See [Import Projects](#)

Config Transmitters

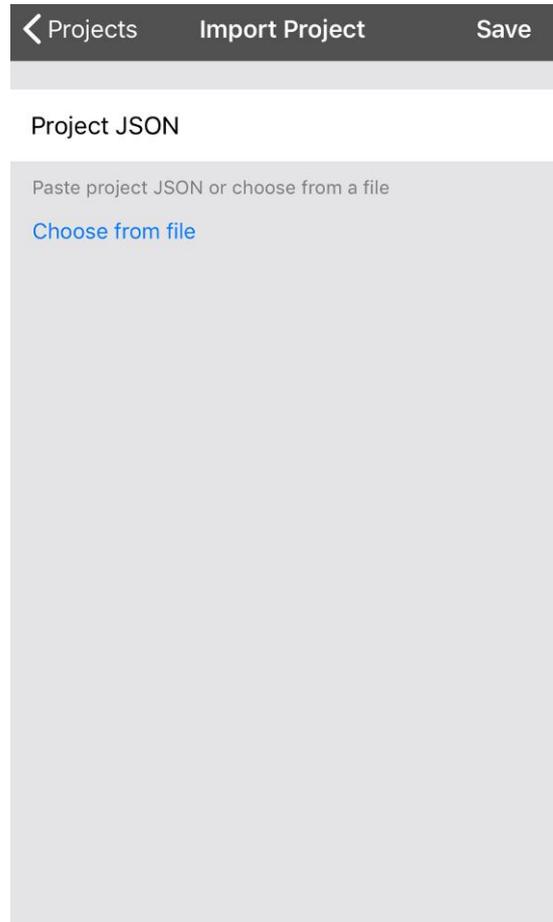
This opens the [Find Transmitters](#) page and will list all detected shackles. Use the menu to the right of the required transmitter and select Configure to select that transmitter for configuration. See [Configure Transmitter](#) page.

Import Project

Paste the data and tap the Import button. You will be taken back to the [Project List](#) and the new imported project will appear in the list.



Android



iOS

In Android paste the data and click the Import button.

In iOS you can either paste the data or click Choose from file to navigate to cloud or on-phone storage to select a file created by a previous export.

Also see [Project List Edit](#) for exporting projects.

New Project

← New Project ✓

Project Name

0 / 30

No icon selected

+

View PIN

0000

If transmitters are using a PIN, then provide this PIN here to be able to use them in the project

Timeout

12 seconds ▾

Transmitters

Linked transmitters: 0

Android

← Projects New Project Save

Project Name

0 / 30

Icon

+

View Pin

0000

IF TRANSMITTERS ARE USING A PIN

Timeout

1 second

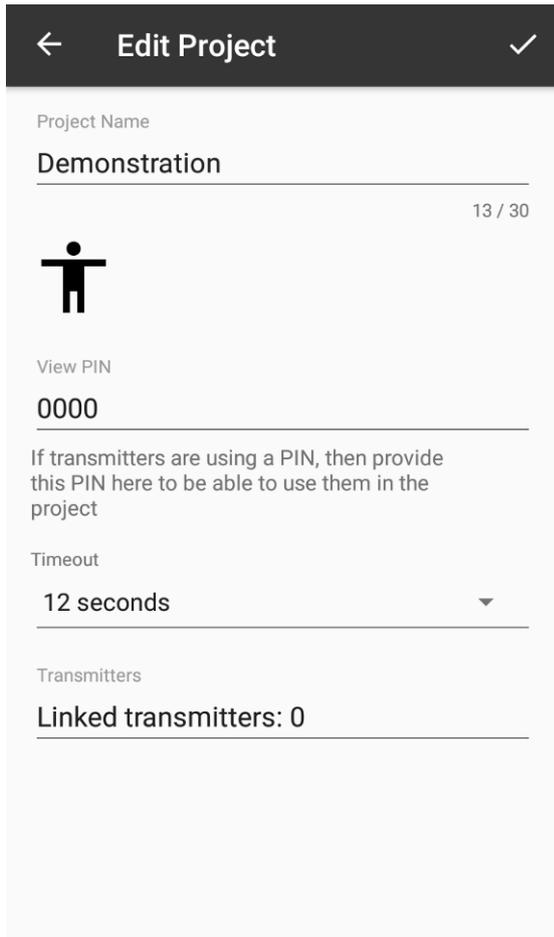
Linked Transmitters

0

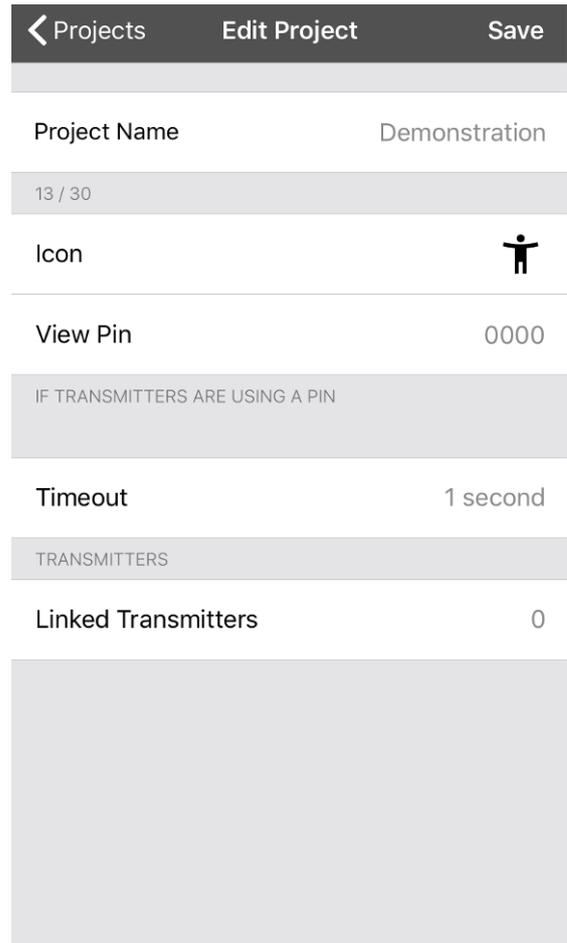
iOS

The settings and actions on this page are identical to those on the [Edit Project](#) page.

Edit Project



Android



iOS

This page is where you define and edit the characteristics of the project (Not the dashboard).

Controls and Actions:

y / <Projects

This will take you back to the [Project List](#) page. You can use this to cancel any changes made. You will be asked if you want to save or discard any changes.

p / Save

OK – Finish editing so go back to Project List page. See [Project Edit List](#) page

Project Name

Set the project title/description.



Icon – Tap the existing icon to select a new icon from the icon list. (If no icon is set for this project tap the V to add one.

View PIN

The View PIN you set in the project must match the View PIN configured in each of the transmitters you add to the project. Without the correct PIN you cannot see the data from the transmitters. The View PIN defaults to 0000.

Timeout

Select from the list the number of seconds that can elapse without receiving data from a transmitter before it is flagged as Out of Range. See [Error Bar](#).



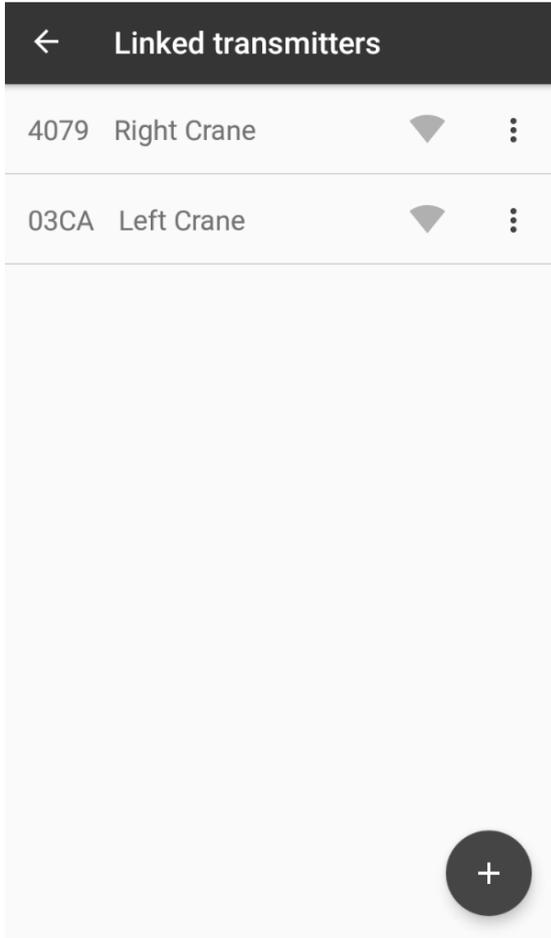
This should be at least 3 X the transmit interval of the transmitters.

Linked Transmitters

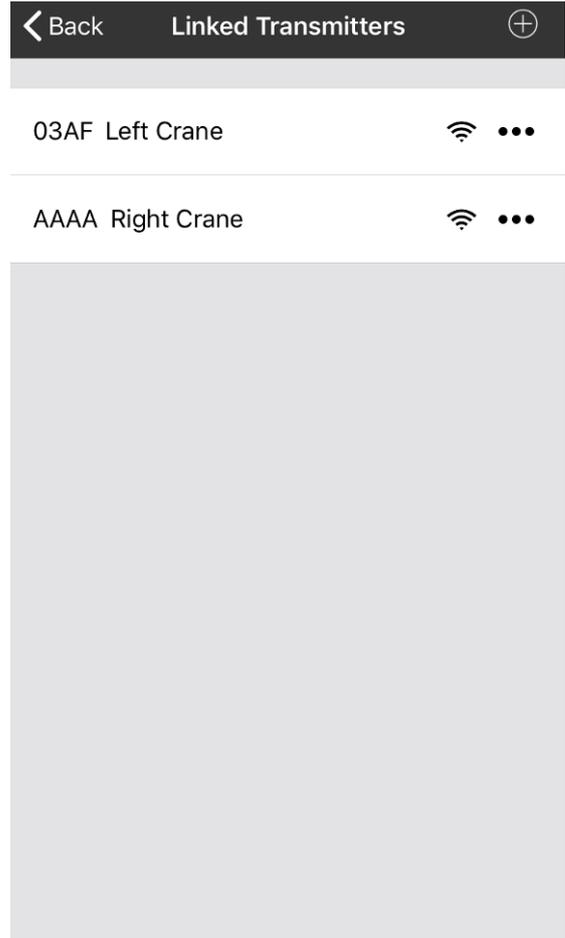
This shows the total number of transmitters linked to this project. Tap to configure the linked transmitters.

See [Linked Transmitters](#).

Linked Transmitters



Android



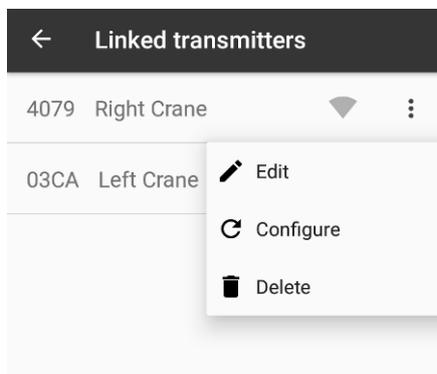
iOS

This page shows the list of transmitters linked to this project and will be available to be referenced in file expressions for this project. Linking transmitters does not stop them being used by different projects even at the same time on different phones or tablets.

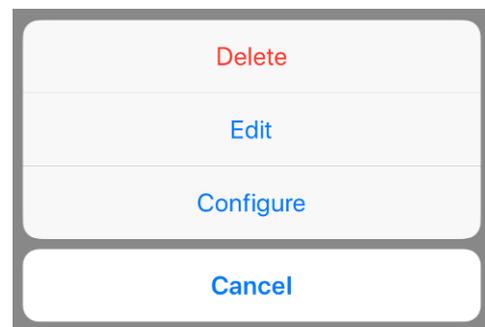
Controls and Actions:

y / <Back This will take you back to the [Edit Project](#) page.

u / Transmitter menu – The menu allows you to edit, configure or delete this transmitter.



Android



iOS

See [Edit Transmitter](#). See [Configure Transmitter](#).

You will not be able to delete a transmitter if it is referenced in the expression of any files on the dashboard.



Add a new transmitter to the list. This opens the [Add Transmitter](#) page.

Add Transmitter

Android

iOS

Add a new transmitter to the project either by manually entering the Data Tag and description or searching for transmitters. By adding a transmitter it becomes available to be referenced in the expressions for tiles on the dashboard.

Controls and Actions:

y \ <Back

This will take you back to the [Linked Transmitters](#) page. You can use this to cancel any changes made. You will be asked if you want to save or discard any changes.

w

Find Transmitters – This displays a list of currently detected transmitters allowing you to select or configure one. See [Find Transmitters](#) page.

p \ Save

Accept the currently entered data and return to the Linked Transmitters page.

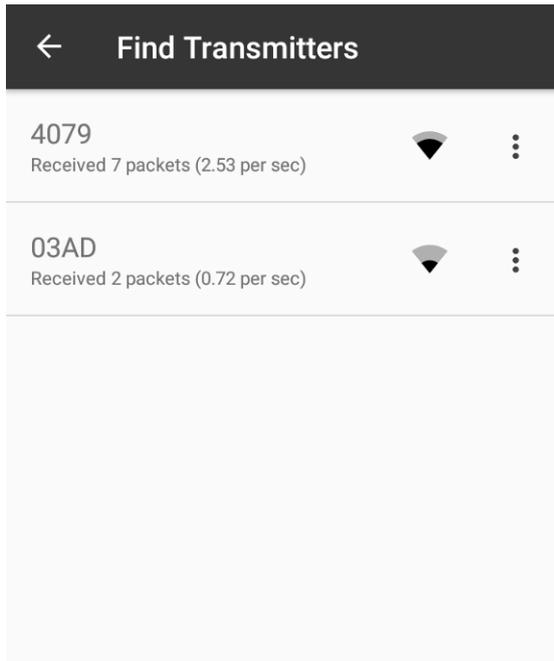
Data Tag

The Data Tag of the transmitter.

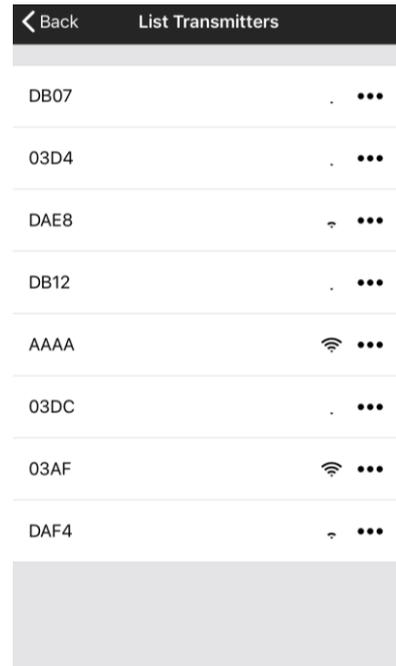
Description

Your description for this transmitter. This name will be used in the expression builder.

Find Transmitters



Android



iOS

This page is displayed after selecting Configure Transmitter from the [Main Menu](#) or selecting search when adding a transmitter to a project. This lists all detected transmitters regardless of any PIN settings. If you are searching for transmitters to add to a project simply tap on the transmitter item to select it.

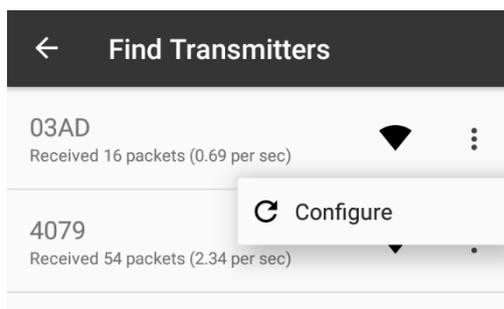
Controls and Actions:

⏪ \ <Back

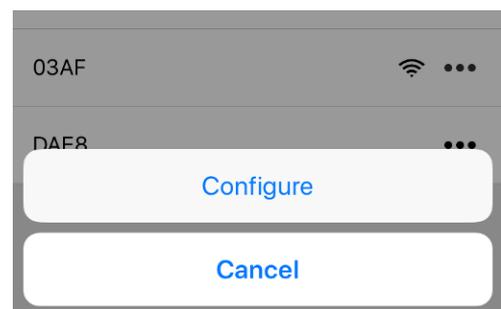
Back to the [Main Menu](#) or [Add Transmitter](#) page.

⋮ /

Transmitter menu – The menu allows you to configure the selected transmitter.



Android

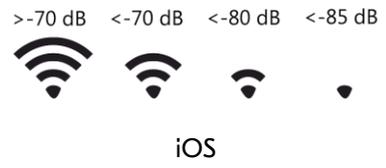


iOS

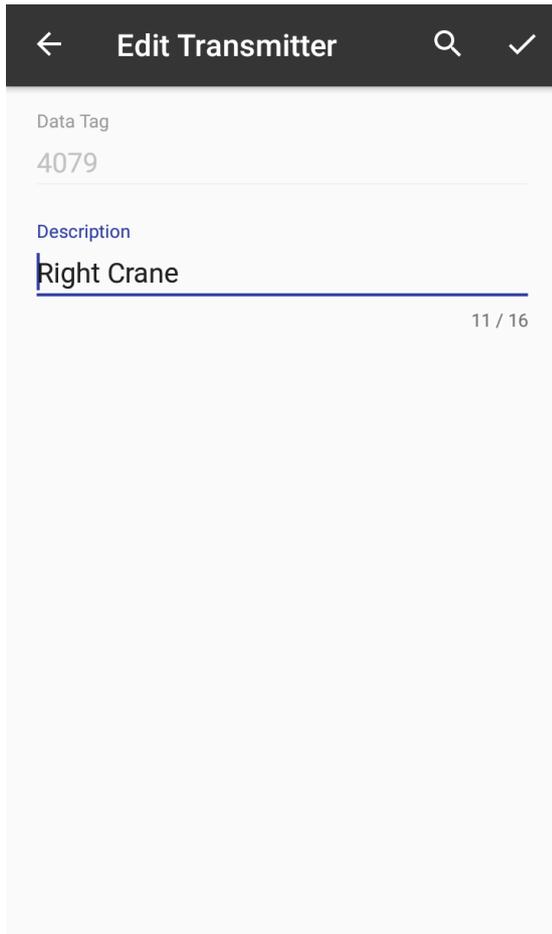
See [Configure Transmitter](#).

For each transmitter there is a display of the count of the number of packets received and the rate at which they are received.

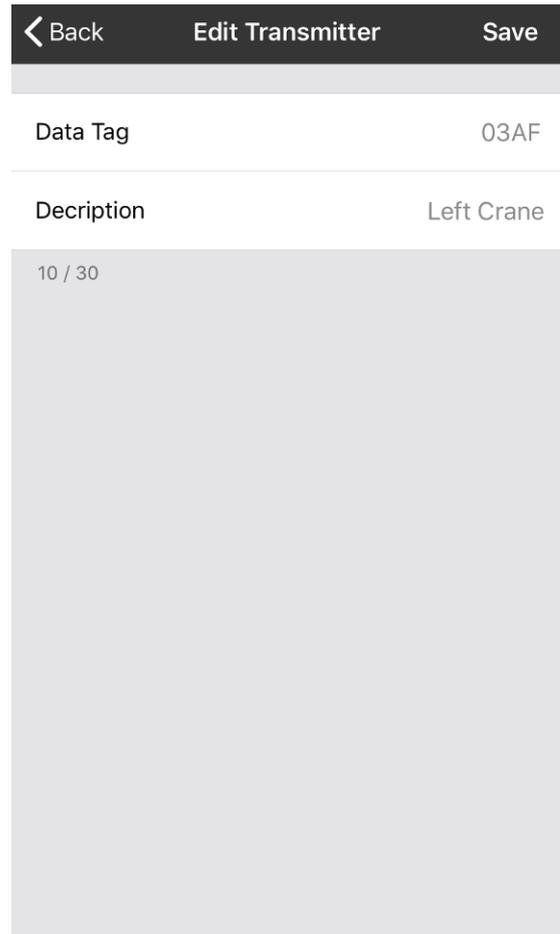
An indicator showing the strength of the received signal is also displayed.



Edit Transmitter



Android



iOS

This page is where you can edit the description of a linked transmitter. Note that you cannot change the Data Tag.

Controls and Actions:

y \ <Back

Back to [Linked Transmitters](#) page.

p \ Save

OK – Finish editing so go back to the Linked Transmitters page.

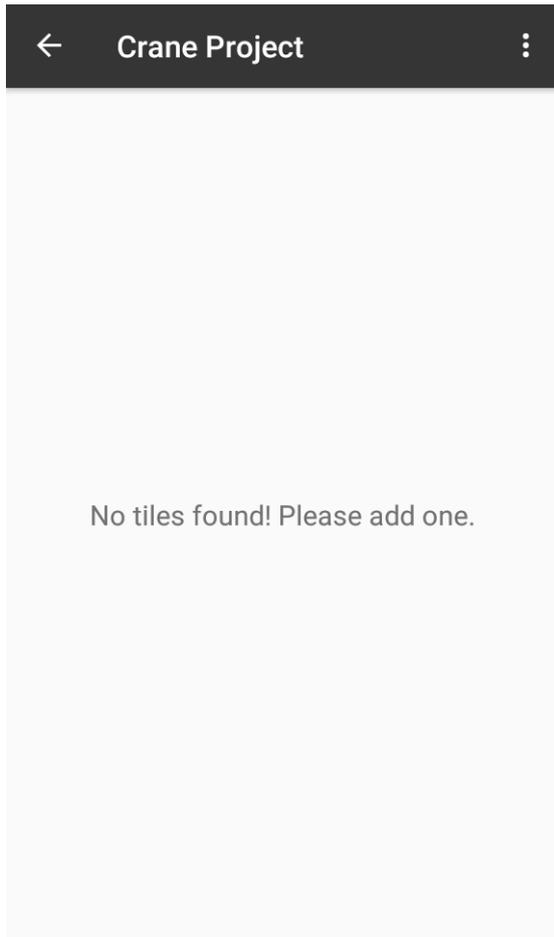
Data Tag

This is displayed but cannot be changed.

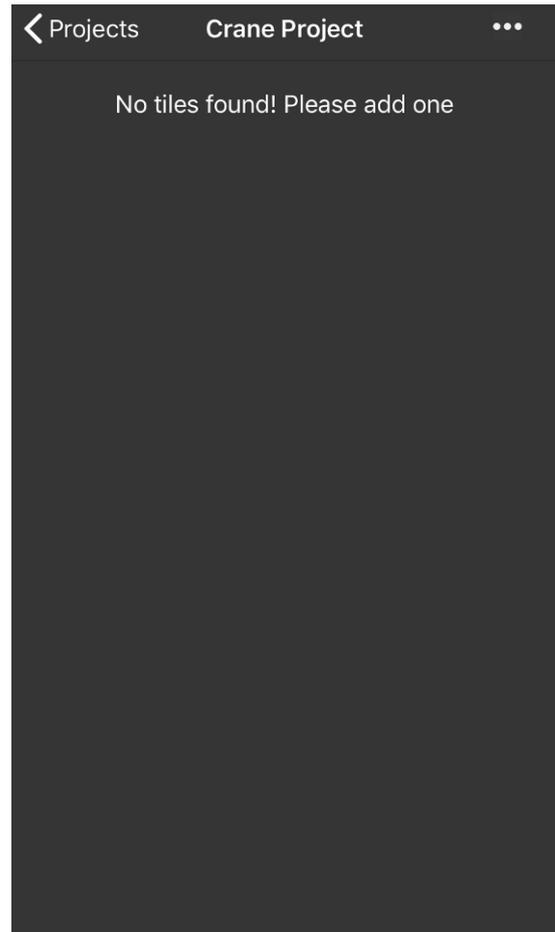
Description

Allows you to the description for this transmitter. The description is used to recognise the transmitter when referencing it in the file expressions. This description is only relevant to this particular project.

Project Dashboard Blank



Android



iOS

After creating a new project then selecting it from the Project List you will be presented with an empty Dashboard.

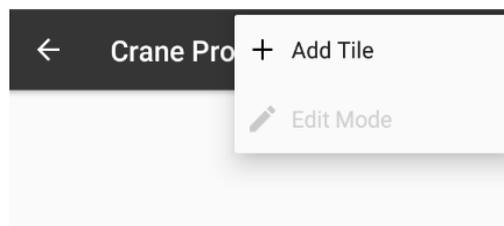
Controls and Actions:

y \ <Projects

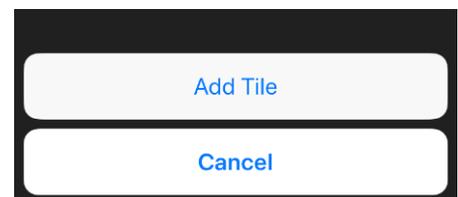
This will take you back to the [Project List](#) page.

u /

Opens the dashboard menu where you can add a new file.



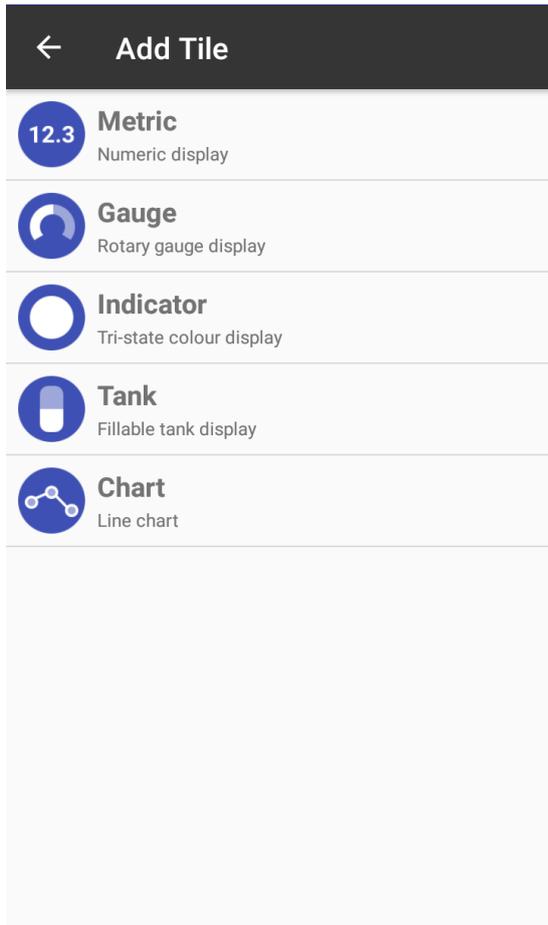
Android



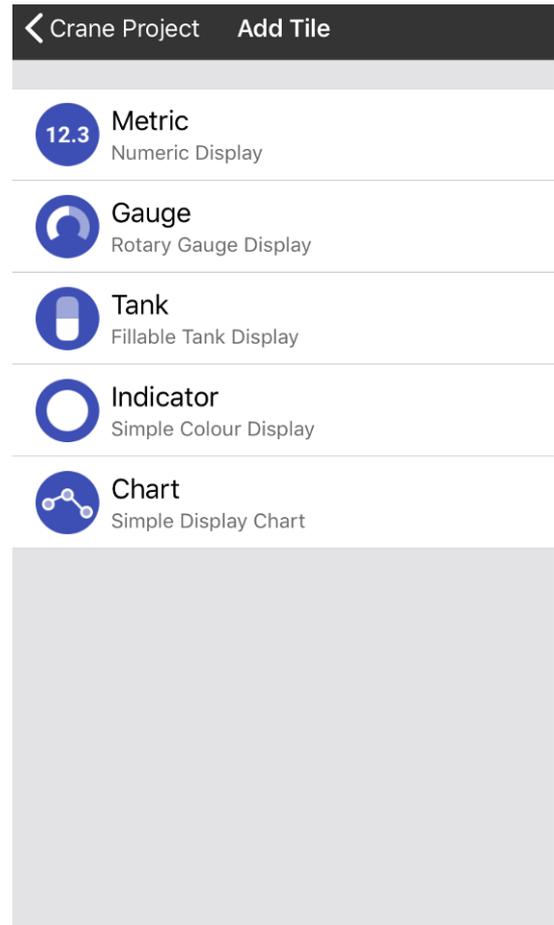
iOS

See the [Add Tile](#) page.

Dashboard Add Tile



Android



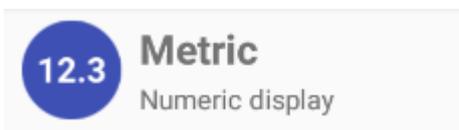
iOS

After tapping on Add Tile in a Dashboard menu you are presented with this page to allow selection of the required Tile.

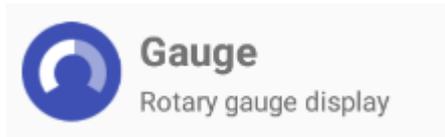
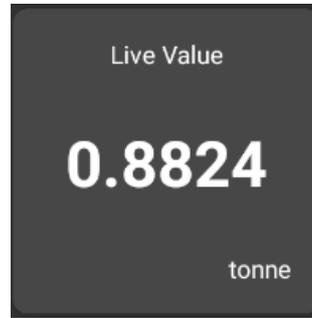
Controls and Actions:

y \ <Project

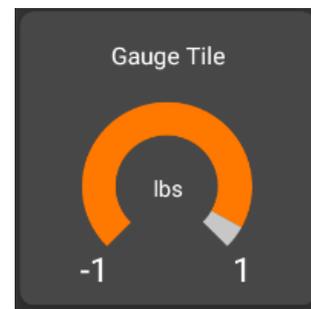
Go back to the dashboard. See [Dashboard Example](#) page



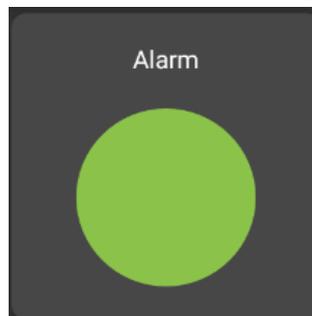
[Metric Tile](#) – Displays a numeric value and can optionally capture peak and valley values. A long press on the tile can optionally reset peak or valley or tare the tile value or tare the transmitter value of all transmitters used by this tile which will affect all files referencing the same transmitters in the project



[Gauge Tile](#) – Shows a graphical gauge representation of a numeric value. You can specify the minimum and maximum values of the range and also define two value points giving the ability to display three different gauge colours depending on the value.

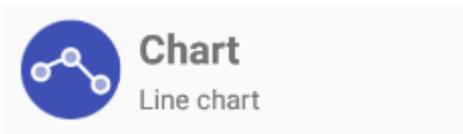


[Indicator Tile](#) - A simple coloured indicator that can display up to three colours depending on the value.

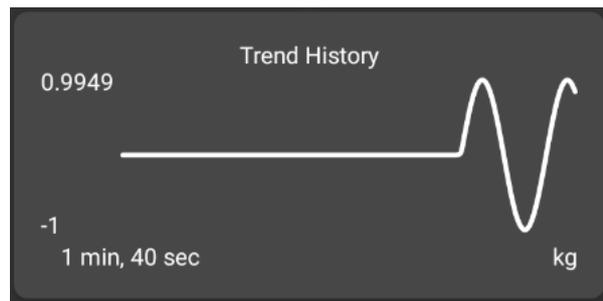


[Tank Tile](#) – This tile graphically represents a filling tank. You can specify the minimum and maximum values and two value points giving the ability to display three different tank fill colours depending on the value.



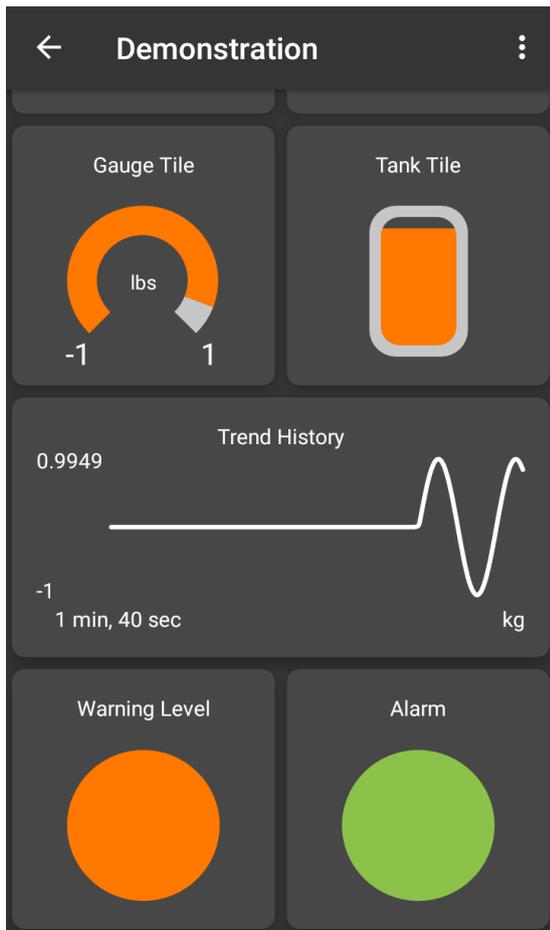


[Chart Tile](#) – This tile displays a definable number of historic values in a scrolling chart. You can specify the minimum and maximum values for the Y axis or let the chart auto scale. The trace colour can also be defined.

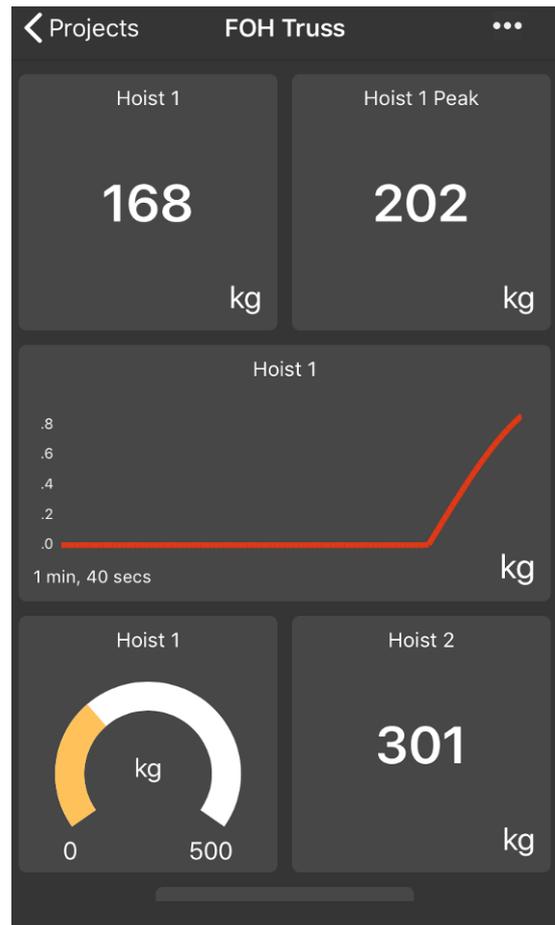


Tap the required file to open the properties page. After configuring the Tile you will be returned to the dashboard.

Project Dashboard Populated Example



Android



iOS

This page shows an example of a populated dashboard. The files will be displaying the real-time data from their evaluated expressions and will include the live data from the linked transmitters.

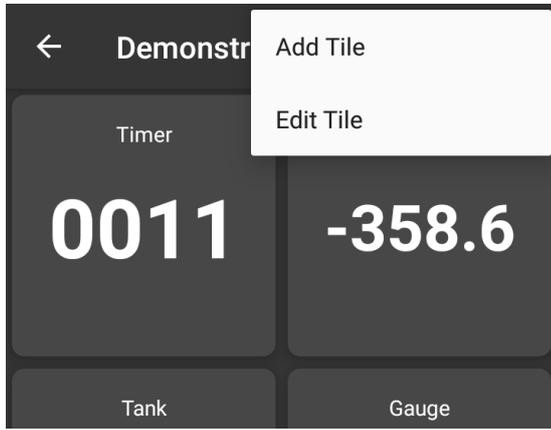
If errors are detected in any of the transmitters an error bar will appear at the bottom of the screen. See [Error Bar](#)

Controls and Actions:

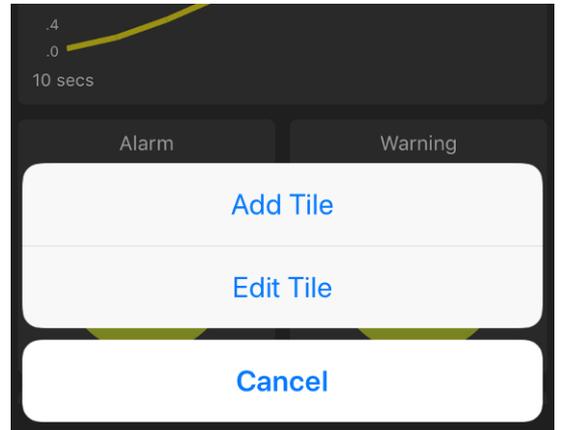
 This will take you back to the [Project List](#) page.

 Opens the dashboard menu where you can add a new tile or enter edit mode.

 mantracourt



Android



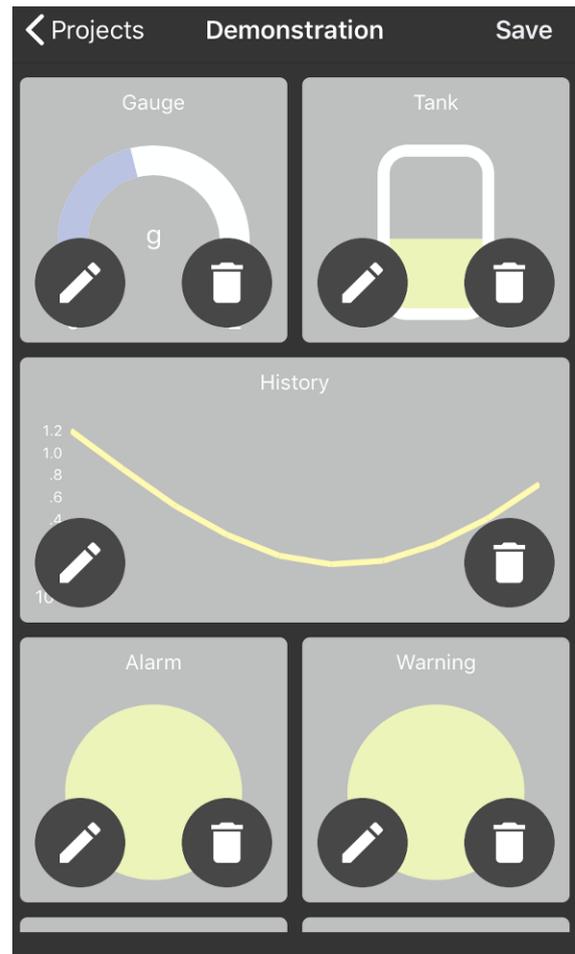
iOS

See the [Add Tile](#) page. See [Edit Mode](#) page.

Project Dashboard Edit Mode



Android



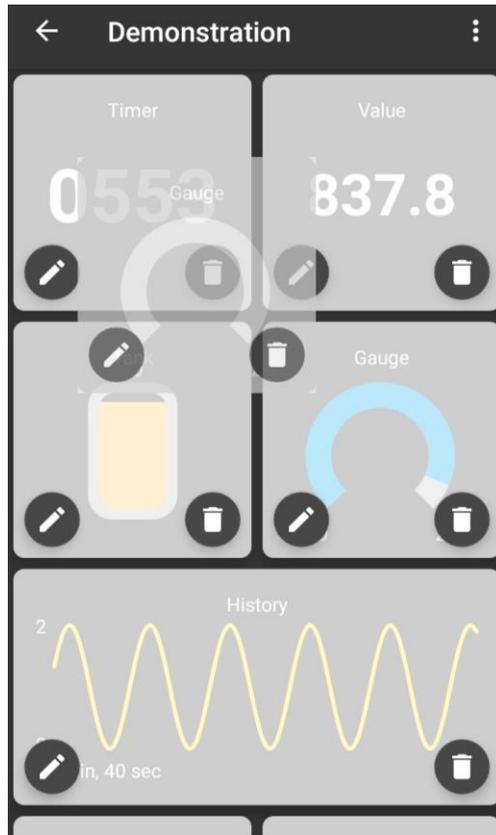
iOS

When in edit mode each Tile on the Dashboard displays edit controls.

Controls and Actions:

- y \ <Projects This will take you back to the [Project List](#) page.
- u \ Save Android - Opens the dashboard menu where you choose to go back to View Mode.
iOS – saves the changes and goes back to View Mode.
- k This will open the edit page for the file.
See [Metric Tile](#), [Indicator Tile](#), [Gauge Tile](#), [Tank Tile](#), [Chart Tile](#).
- n This will allow you to delete the file.

To re-arrange the files, simply press and hold on a file for a second or two then drag it over, and drop it onto, the file you would like to change positions with. In iOS you can see the files change places as you drag them around.



Metric Tile

Android

iOS

This page is where you define the characteristics of the Metric Tile after either adding the tile or choosing to edit the tile.

The Metric Tile displays a numeric value that can optionally show maximum or minimum values. The tile can also optionally reset minimum or maximum or tare (zero) when pressed.

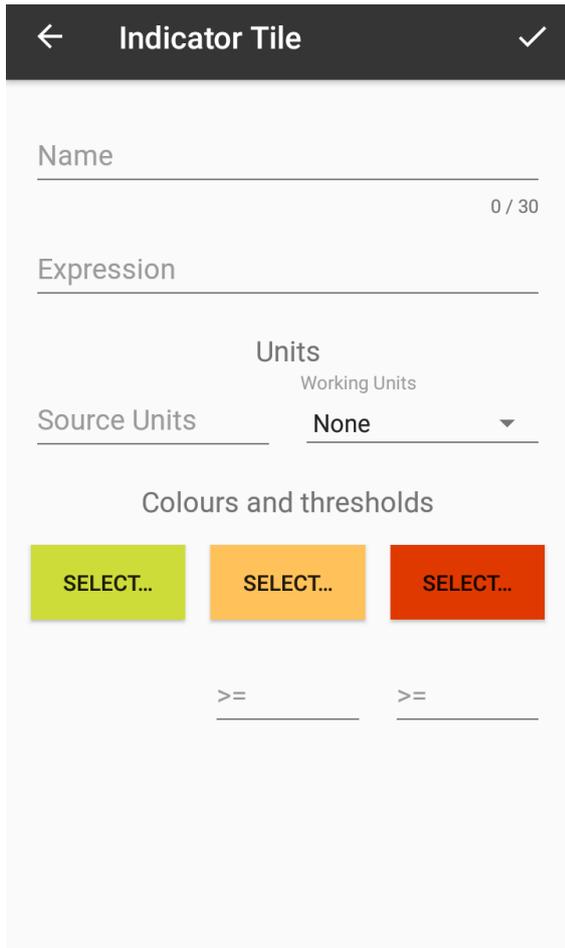
Controls and Actions:

y <Back	Cancel the edit and go back to the previous page. You will be offered the chance to save unsaved changes.
p \ Save	OK – Finish editing and go back to the dashboard page.
Name	Set the title to appear at the top of the tile. Each tile must have a name.
Expression	This is where you define the value that is displayed in the tile. You can include references to any of the transmitters defined in the Linked Transmitters list along with various math functions. Tap in this area to open the Expression Editor . Note that although you can see the text representation of the expression it must be edited in the Expression Editor.
Source Units	This will display the engineering units that have been determined from the transmitters referenced by the expression. As long as there is just a single transmitter, or all transmitters share the same unit type, then this will show the

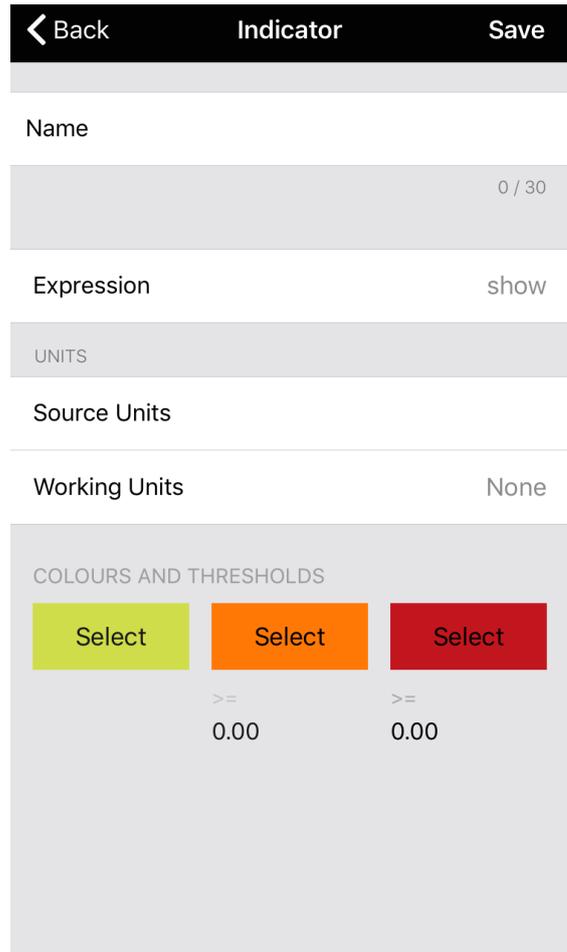
engineering unit here. If the engineering units cannot be determined by the expression you entered, or you just want to override it, you can enter your own text instead.

Working Units	<p>When the Units (Entered above) are recognised then on tapping this section you will be presented with a list of engineering units that the displayed value can be automatically converted to. See Unit Conversions.</p> <p>If the Units are not recognised you get the option of choosing your custom text to display.</p> <p>In all cases you can choose to display no units by selecting None.</p>
Output	<p>Select either Actual Value, Maximum Value or Minimum Value. The maximum and minimum are only recorded during the lifespan of the displayed dashboard and can be reset by a long press on the tile if the correct action has been selected below.</p>
Numeric Format	<p>Select the format for the displayed data. There are options available for different combinations of integer and decimal digits. Note that if the integer numeric value will not fit into the requested format then the value <i>will</i> be displayed.</p>
Action	<p>Select the action to execute when you tap and long hold the tile.</p> <p>None – No action occurs.</p> <p>Individual Sources – This effectively zeroes the values of all transmitters referenced in the expression in this file. If the transmitters are used in the expressions of any other files then those will be affected as well. (This does not zero the actual value transmitted by the module)</p> <p>Tile Only – Zero the current tile display only.</p> <p>Reset Min/Max – If the tile action is to capture minimum or maximum then this option will reset the captured value back to the current value.</p>

Indicator Tile



Android



iOS

This page is where you define the characteristics of the Indicator Tile after either adding the file or choosing to edit the file.

The Indicator Tile shows a coloured circle whose colour depends on the value of the expression. This can be used for fast go/no go verification of value range. i.e. are all my sensors below 100kg? Or to show blue below 10kg, green between 10kg and 50kg then red above 50kg.

Controls and Actions:

y <Back	Cancel the edit and go back to the previous page. You will be offered the chance to save unsaved changes.
p \ Save	OK – Finish editing and go back to the dashboard page.
Name	Set the title to appear at the top of the file. Each file must have a name.
Expression	This is where you define the value that is displayed in the file. You can include references to any of the transmitters defined in the Linked Transmitters list along with various math functions. Tap in this area to open the Expression Editor . Note that although you can see the text representation of the expression it must be edited in the Expression Editor.
Source Units	This will display the engineering units that have been determined from the

transmitters referenced by the expression. As long as there is just a single transmitter, or all transmitters share the same unit type, then this will show the engineering unit here. If the engineering units cannot be determined by the expression you entered, or you just want to override it, you can enter your own text instead.

Working Units

When the Units (Entered above) are recognised then on tapping this section you will be presented with a list of engineering units that the displayed value can be automatically converted to. See [Unit Conversions](#). The selected working units will be used when the tile refers to your entered colour change thresholds.

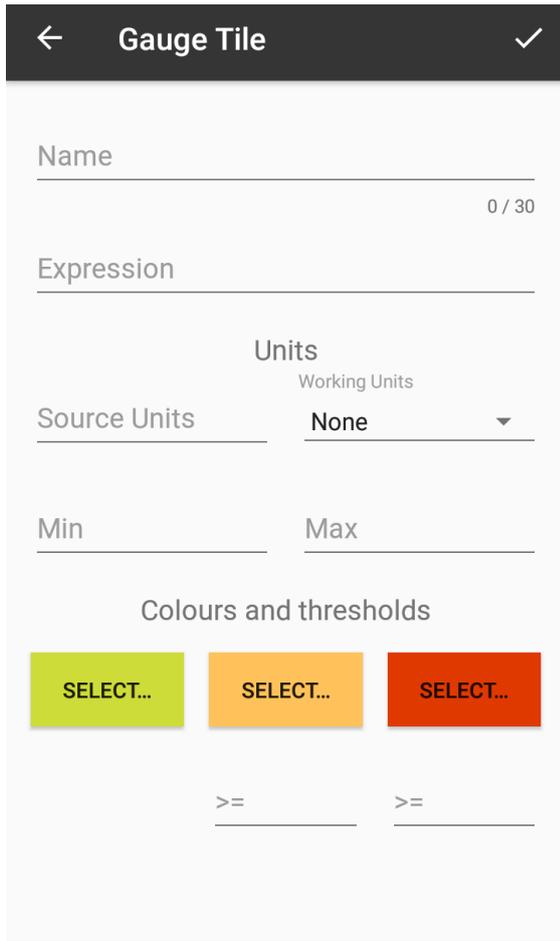
If the Units are not recognised you get the option of choosing your custom text to display.

In all cases you can choose to display no units by selecting None.

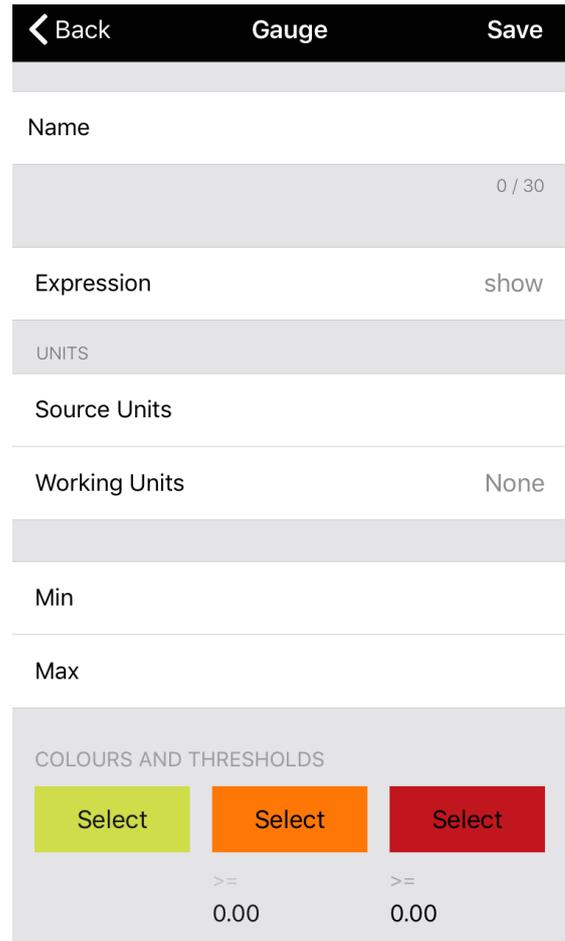
Colours and thresholds

Enter two threshold values which will determine the colour of the indicator. When the value is less than the first threshold the first colour will be used. When the value is greater or equal to the first threshold and less than the second threshold the middle colour will be used. When the expression value is greater or equal to the second threshold the third colour will be used.

Gauge Tile



Android



iOS

This page is where you define the characteristics of the Gauge Tile after either adding the file or choosing to edit the tile.

The Gauge Tile shows a gauge mimic where the expression value is indicated over a range defined by the user. The filled part of the gauge can also change colour depending on the expression value.

Controls and Actions:

- y **<Back**

Cancel the edit and go back to the previous page. You will be offered the chance to save unsaved changes.
- p **\ Save**

OK – Finish editing and go back to the dashboard page.
- Name**

Set the title to appear at the top of the tile. Each file must have a name.
- Expression**

This is where you define the value that is displayed in the tile. You can include references to any of the transmitters defined in the Linked Transmitters list along with various math functions. Tap in this area to open the [Expression Editor](#). Note that although you can see the text representation of the expression it must be edited in the Expression Editor.
- Source Units**

This will display the engineering units that have been determined from the transmitters referenced by the expression. As long as there is just a single transmitter, or all transmitters share the same unit type, then this will show the

engineering unit here. If the engineering units cannot be determined by the expression you entered, or you just want to override it, you can enter your own text instead.

Working Units

When the Units (Entered above) are recognised then on tapping this section you will be presented with a list of engineering units that the displayed value can be automatically converted to. See [Unit Conversions](#). The selected working units will be used when the tile refers to your entered colour change thresholds and min/max values.

If the Units are not recognised you get the option of choosing your custom text to display.
In all cases you can choose to display no units by selecting None.

Min

The expression value at which, or below, the gauge will show a minimum level.

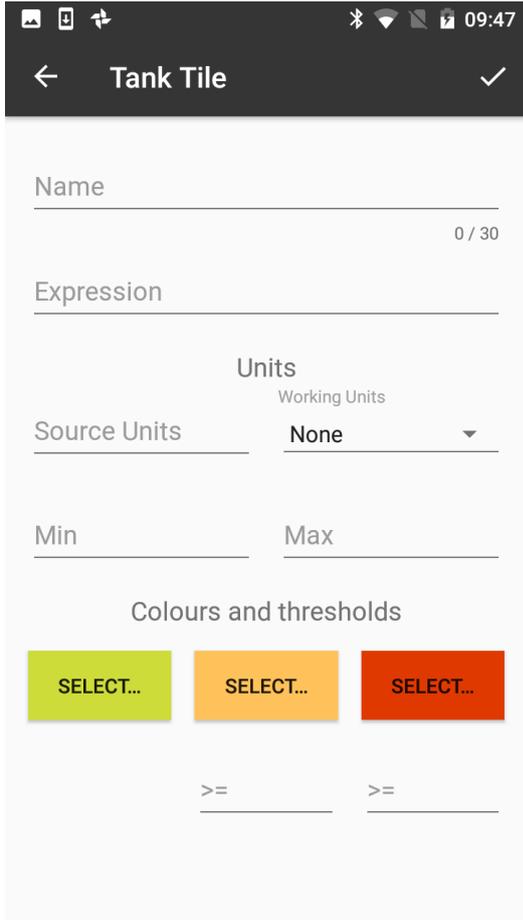
Max

The expression value at which, or above, the gauge will show a maximum level.

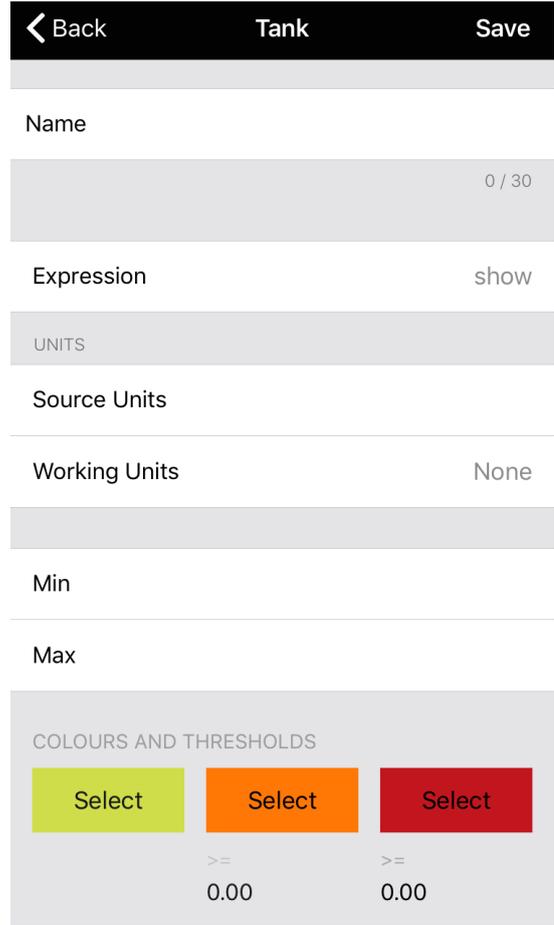
Colours and thresholds

Enter two threshold values which will determine the colour of the indicator. When the value is less than the first threshold the first colour will be used. When the value is greater or equal to the first threshold and less than the second threshold the middle colour will be used. When the expression value is greater or equal to the second threshold the third colour will be used.

Tank Tile



Android



iOS

This page is where you define the characteristics of the Tank Tile after either adding the tile or choosing to edit the tile.

The Tank Tile shows a tank mimic where the expression value is indicated as a fill level over a range defined by the user. The filled part of the tank can also change colour depending on the expression value.

Controls and Actions:

- y **<Back** Cancel the edit and go back to the previous page. You will be offered the chance to save unsaved changes.
- p **\ Save** OK – Finish editing and go back to the dashboard page.
- Name** Set the title to appear at the top of the file. Each file must have a name.
- Expression** This is where you define the value that is displayed in the file. You can include references to any of the transmitters defined in the Linked Transmitters list along with various math functions. Tap in this area to open the [Expression Editor](#). Note that although you can see the text representation of the expression it must be edited in the Expression Editor.
- Source Units** This will display the engineering units that have been determined from the transmitters referenced by the expression. As long as there is just a single transmitter, or all transmitters share the same unit type, then this will show the

engineering unit here. If the engineering units cannot be determined by the expression you entered, or you just want to override it, you can enter your own text instead.

Working Units

When the Units (Entered above) are recognised then on tapping this section you will be presented with a list of engineering units that the displayed value can be automatically converted to. See [Unit Conversions](#). The selected working units will be used when the tile refers to your entered colour change thresholds and min/max values.

If the Units are not recognised you get the option of choosing your custom text to display.
In all cases you can choose to display no units by selecting None.

Min

The expression value at which, or below, the tank will show a minimum level.

Max

The expression value at which, or above, the tank will show a maximum level.

Colours and thresholds

Enter two threshold values which will determine the colour of the indicator. When the value is less than the first threshold the first colour will be used. When the value is greater or equal to the first threshold and less than the second threshold the middle colour will be used. When the expression value is greater or equal to the second threshold the third colour will be used.

Chart Tile

Android

iOS

This page is where you define the characteristics of the Gauge Tile after either adding the file or choosing to edit the tile.

The Chart Tile shows a historical trend chart where the expression value is used to plot points. The history is only shown during the duration of the dashboard being displayed. Note that there are no units shown for the X axis. Unlike the other tiles, the user can specify the rate at which the chart is updated as well as the number of points to display.

A long press on the chart tile will allow the data held in the chart to be exported in the form of a CSV file. The options for exporting the file will be dependent on the device operating system and capabilities.



NOTE: iPhones prior to version 13 iOS may clear the chart after choosing to export data.

Controls and Actions:

y <Back

Cancel the edit and go back to the previous page. You will be offered the chance to save unsaved changes.

p \ Save

OK – Finish editing and go back to the dashboard page.

Name	Set the title to appear at the top of the file. Each file must have a name.
Expression	This is where you define the value that is displayed in the file. You can include references to any of the transmitters defined in the Linked Transmitters list along with various math functions. Tap in this area to open the Expression Editor . Note that although you can see the text representation of the expression it must be edited in the Expression Editor.
Source Units	This will display the engineering units that have been determined from the transmitters referenced by the expression. As long as there is just a single transmitter, or all transmitters share the same unit type, then this will show the engineering unit here. If the engineering units cannot be determined by the expression you entered, or you just want to override it, you can enter your own text instead.
Working Units	<p>When the Units (Entered above) are recognised then on tapping this section you will be presented with a list of engineering units that the displayed value can be automatically converted to. See Unit Conversions. The selected working units will be used when the file refers to your entered Y axis min and max values.</p> <p>If the Units are not recognised you get the option of choosing your custom text to display. In all cases you can choose to display no units by selecting None.</p>
Y Axis Min	The minimum value to display on the Y axis.
Y Axis Max	The maximum value to display on the Y axis.
History Points	Select how many data points to display. Once the chart fills the old data will be scrolled off to the left. You can enter from between 10 and 1000 points.
Update Interval	Select how often to add a new data point to the chart.
Trace Colour	Select a colour to use to plot the chart data.

Expression Editor

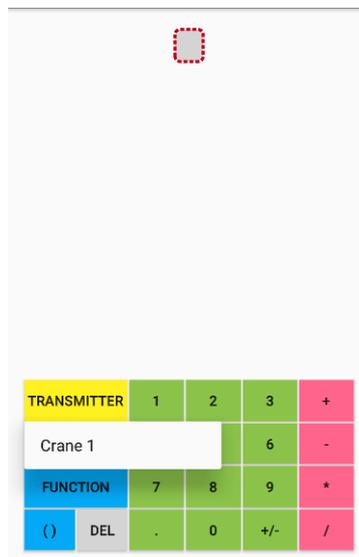
The Expression Editor is used to define what value to display in the file. You can build a mathematical expression that can contain references to the Transmitters that have been assigned to the Project. These references are converted to the actually transmitted value when the expression is evaluated.

Expressions can range from a simple single transmitter value through to complex math functions applied to multiple transmitter values.

The Expression Editor starts off with an empty cell.



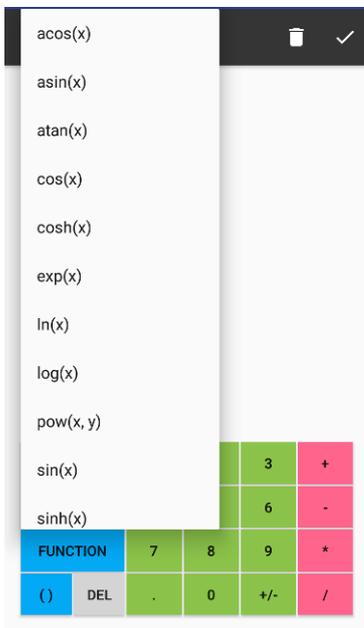
To add a reference to a Transmitter tap the Transmitter button and you will see a list of Transmitters that have been assigned to the Project.



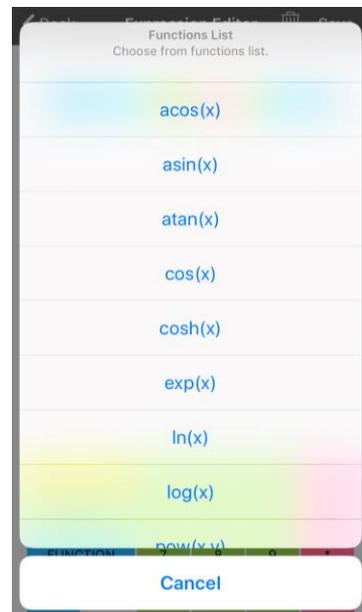
In this case there is just one transmitter named Crane 1. Just tap on the transmitter name to add it to the expression.



This would be enough to simply use the transmitter's value in the file. If you wanted to view the Square Root of the transmitter value you can add a square root function. Select the required cell, in this case the Crane 1, and tap the Function button.



Android



iOS

Scroll down to find the required function and tap to select.



To add further items to the expression you need to select the appropriate cell before tapping more buttons. If we wanted to add some math to the Crane 1 value *inside* the square root function you would highlight the Crane 1 cell as shown above. Then when you tap the * followed by the 2 button the expression will be built like this.



Had you wanted the *2 to be applied after the square root function the **sqr**(cell should have been selected.

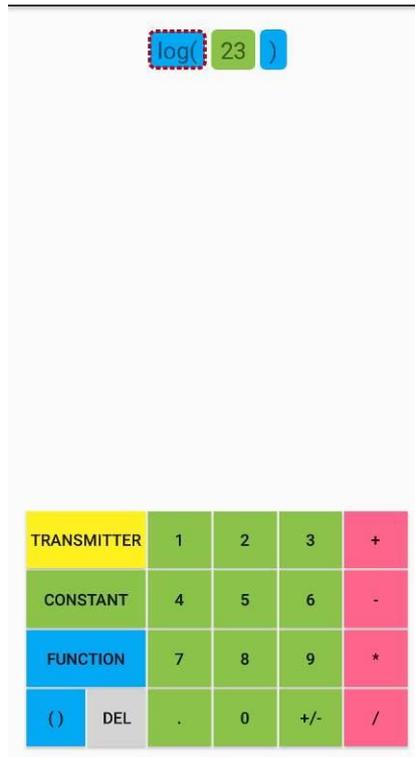


Then when you tap the * followed by the 2 button the expression will be built like this.

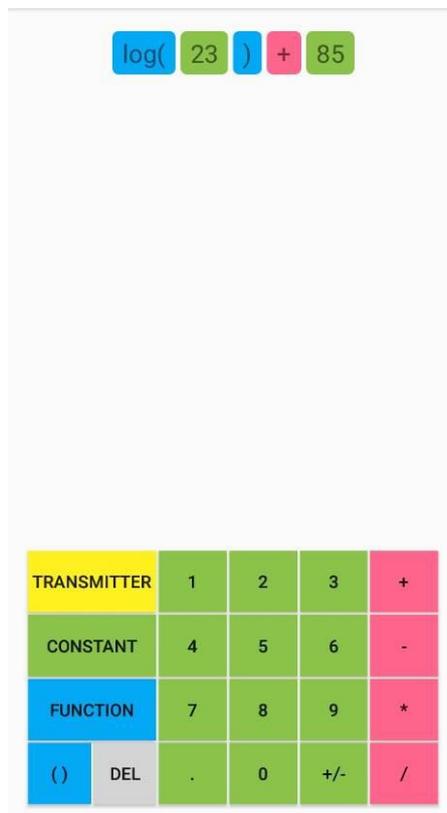
sqrt(Crane 1) * 2

TRANSMITTER	1	2	3	+
CONSTANT	4	5	6	-
FUNCTION	7	8	9	*
()	DEL	.	0	+/-
				/

If there is an existing function or set of brackets when you first open the Expression Editor and you want to add something after it, just highlight the function name or the leftmost bracket first.



Then when you type the characters will be added after the rightmost bracket.



Functions, Constants and Operators for Use in Expressions

Here is the complete list of available functions, operators and constants that can be used in expressions.

Button

TRANSMITTER

Functionality

Display a list of Transmitters allocated to the Project. Tap the desired transmitter name to add it to the expression.

CONSTANT

pi – PI, approximately equal to 3.14159

e – base of the natural logarithm

time – a simple second counter zeroed from when the dashboard is displayed. This can be used to create a timer file or as a source for demonstration files.

FUNCTION

acos(x) - ArcCosine

asin(x) - ArcSine

atan(x) - ArcTangent

cos(x) - Cosine

cosh(x) - Hyperbolic Cosine

exp(x) - Exponential

ln(x) – Natural Logarithm

log(x) – Logarithm (Base 10)

pow(x,y) – Power x^y

sin(x) - Sine

sinh(x) – Hyperbolic Sine

sqrt(x) – Square Root

tan(x) - Tangent

tanh(x) – Hyperbolic Tangent

()

Place a set of brackets around the selected cell.

DEL

Delete the selected cell. Deleting a left bracket will delete everything enclosed within the bracket pair.

1

0

Enter the numeric digits 0-9 into the expression.

.

Add a decimal point to a numeric value.

+/-

Toggle the sign of the selected cell or value between negative and positive.

+

Addition operator.

-

Subtraction operator.

*

Multiplication operator.

/

Division operator.

The icons along the top of the screen do the following:

y / < Back

Go back to the Tile Edit page. You will be asked if you want to discard any

unsaved changes.

n

Clear everything in the expression editor.

p / Save

Save and finish editing the expression and return to the Tile Edit page.

Unit Conversions

The app is able to convert between units automatically if the calibrated units of the transmitters are known. The following table shows the different categories that are recognized. If a unit is not in the list it is always possible to use the file expressions to perform the desired unit calculations.

Group	Unit	Symbol
Ratiometric	mV/V	mV/V
Angle	radians	rad
	degrees	°
	circumference	
	grade	
	minutes	'
	seconds	"
	revolutions	rev
Length	meters	m
	angstrom	Å
	astronomical unit	AU
	centimeters	cm
	chains gunters	ch
	ell	ell
	em	em
	fathoms	fm
	feet	ft
	furlongs	fur
	inches	in
	kilometers	km
	league	lea
	leagues	league
	light years	ly
	lines	ln
	microns	μ
	miles nautical	mi n
	miles	mi
	millimeters	mm
	mils	mil
	nanometers	nm
	parsec	pc
yards	yd	

Mass	kilograms	kg
	drams	dr av
	grains	gr
	grams	g
	milligrams	mg
	ounces	oz
	pennyweights	pwt
	pounds	lb
	kilopounds	klb
	scruples	s ap
	slug	slug
	tons long	ton
	tons metric	T
	tonnes	tonne
tons short	sh tn	
Force	newtons	N
	kilonewtons	kN
	millinewtons	mN
	meganewtons	MN
	crinals	crinal
	dynes	dyn
	grams force	gf
	joules per cm	J/cm
	kilograms force	kgf
	kilograms force kp	kp
	kilograms meter/second ²	kg ms ²
	ounces force	ozf
	pounds force	lbf
	poundals	pdl
	tons force long	tonfl
	tons force short	tonfs
	tons force metric	tonfm
Pressure	bar	bar
	atmosphere techn	at
	atmosphere phys	atm
	dyne/cm ²	dyncm ²
	foot of water (39°F)	ftH ₂ O
	inch of water (39°F)	inH ₂ O
	gigapascal	GPa
	hectopascal	hPa
	kg force / cm ²	kgfcm ²

	kg force / m ²	kgf/m ²
	microbar	μbar
	pascal	Pa
	newton/m ²	N/m ²
	ounce(avdp)/square inch	oz/in ²
	pounds per square foot	lb/ft ²
	pounds per square inch	psi
	tonne per square cm	T/cm ²
Speed	meter/sec	m/s
	centimeters/sec	cm/s
	feet/min	ft/min
	feet/sec	ft/s
	kilometers/hr	km/h
	kilometers/min	km/min
	kilometers/sec	km/s
	knots	kn
	meters/hr	m/h
	meters/min	m/min
	miles/hr	mph
	miles/min	mpm
	miles/sec	mps
	nautical miles/hr	n mph
	nautical miles/min	n mpm
	nautical miles/sec	n mps
Torque	newton meter	N m
	meter kilogram	m kg
	foot pound	ft lbf
	foot poundal	ft pdl
	inch pound	in lbf
Arbitrary	counts	counts

Error Bar

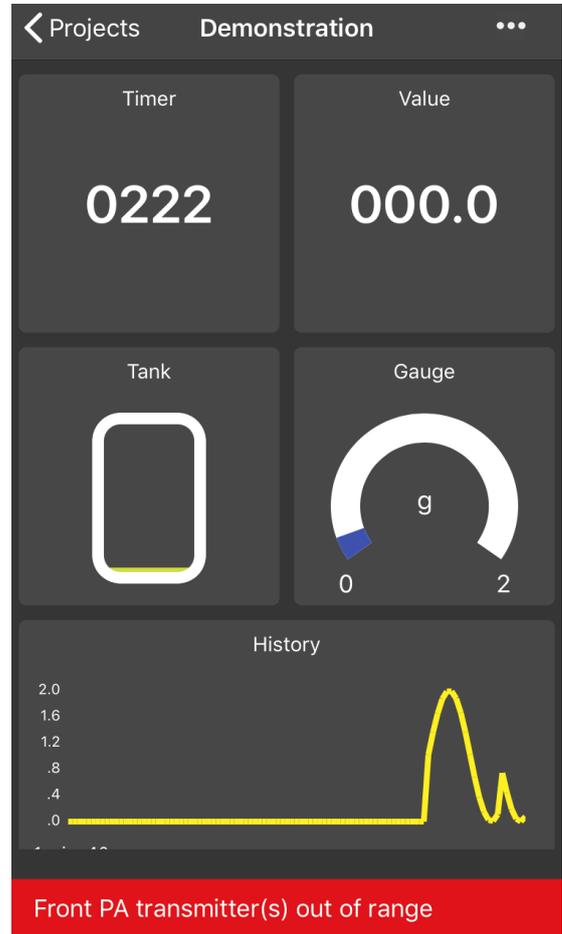
The Error Bar appears at the bottom of the page in Dashboard View and informs you of problems with the transmitters.

Any errors (apart from Low Battery) will also cause all files containing the problematic transmitter to be rendered in a lighter colour.

If the warning is that the battery is low in one or more transmitters then the Error Box will be orange otherwise it will be red.



Android

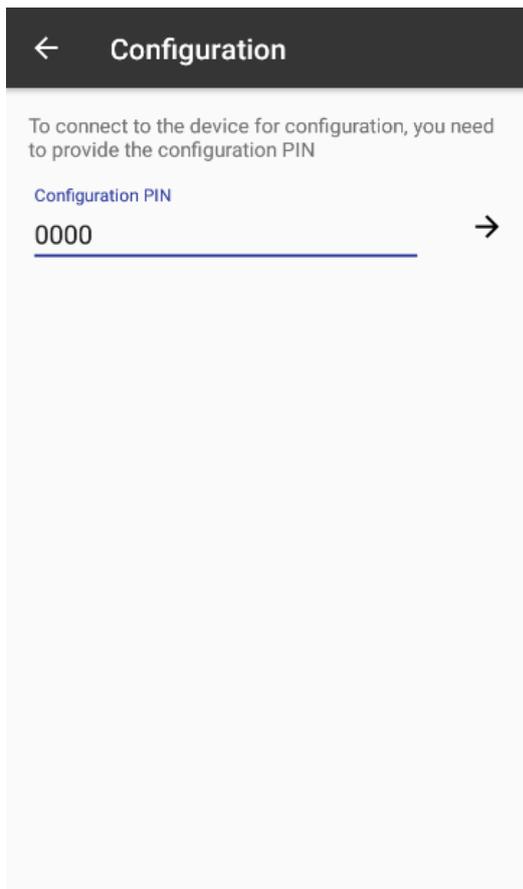


iOS

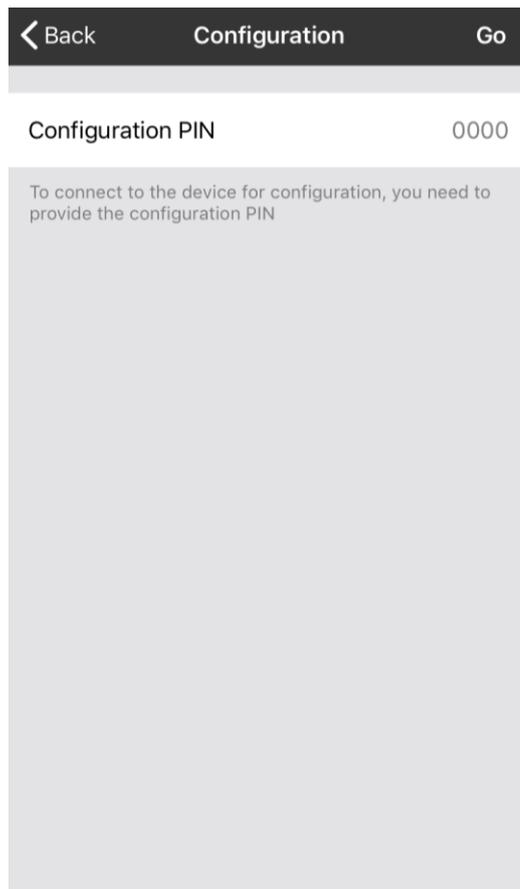
The following errors may be displayed followed by a list of the transmitters reporting the error identified by Data Tag.

Battery Low	The transmitter reports that its battery is low.
Integrity Error	The transmitter reports a detected problem with its connected sensor.
Overrange Error	The bridge input is too high.
Out of Range	The app has not received any data from the transmitter for longer than the timeout period.
Shunt Cal Active	The module is in shunt calibration mode which will affect its transmitted value. (The app cannot force a module into this mode)

Configure Transmitter



Android



iOS

This page is where you connect to a transmitter to configure or calibrate it.

Controls and Actions:

y / <Back

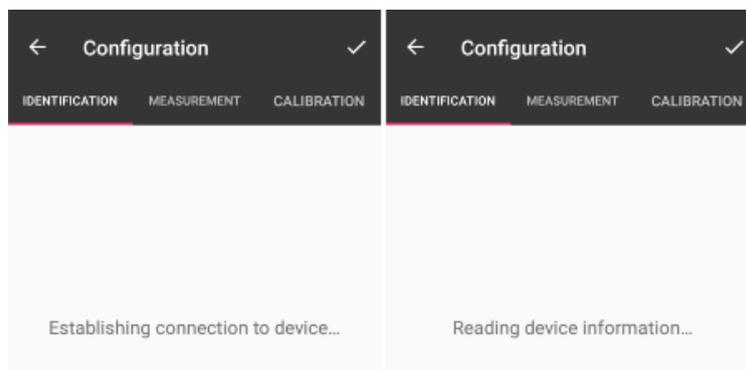
Back to the [Find Transmitters](#) page.

Configuration PIN

Enter the 4 digit configuration PIN that has been set in the transmitter. The connection will fail if the wrong configuration PIN is supplied.

z / Go

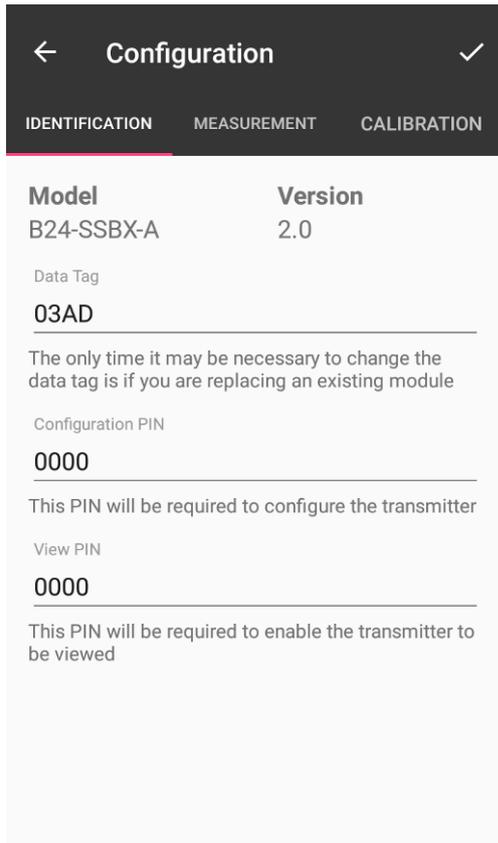
Tap to attempt to connect to the transmitter. While the connection is being established messages will be displayed.



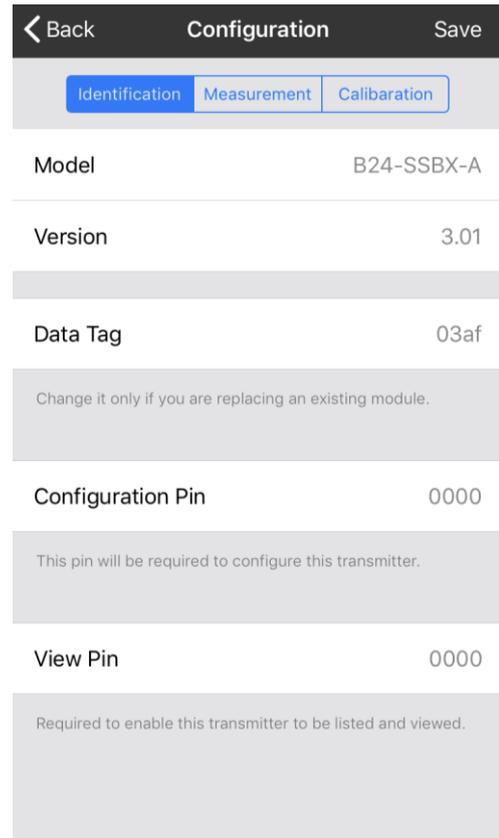
If the connection is successful then you will be able to see the three configuration tabs.

See [Configuration – Identification](#)
See [Configuration – Measurement](#)
See [Configuration – Calibration](#)

Configuration Identification



Android



iOS

This page is shown after a successful connection to a Source and displays its main identification settings and allows some to be changed.

Controls and Actions:

y / <Back	Cancel changes and go back to the previous page. Either Find Transmitters or Linked Transmitters page.
p / Save	OK – Finish editing, save and go back to the previous page. Either Find Transmitters or Linked Transmitters page.
Model	Read only display of the transmitter module model number.
Version	Read only display of the transmitter module's firmware version.
Data Tag	This allows the Data Tag to be changed. The Data Tag is used to identify the transmitter module. You may want to change this if you are replacing an existing module for example.
Configuration PIN	This PIN will be required to configure this module.
View PIN	This PIN will be required to view the transmitted data from this module.
Identification Measurement Calibration	This is simply a menu/navigation mechanism to switch between the three pages that are available when configuring a Source.

Configuration Measurement

Android

iOS

This page handles the measurement and transmission characteristics of the module.

Controls and Actions:

y / <Back

Cancel changes and go back to the previous page. Either [Find Transmitters](#) or [Linked Transmitters](#) page.

p / Save

OK – Finish editing, save and go back to the previous page. Either [Find Transmitters](#) or [Linked Transmitters](#) page.

Transmit Rate

Select the rate at which the module will transmit data. The slower the transmission rate the better the battery life will be. Available options are: 1 every 10 seconds, 1 every 5 seconds, 1 every 2 seconds, 1 per second, 3 per second, 5 per second, 10 per second and Sleep.

Resolution

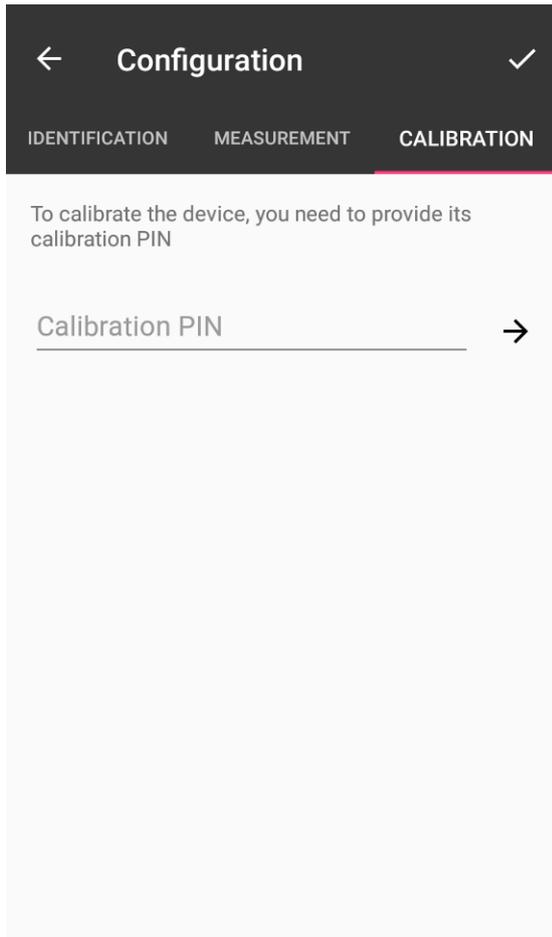
Select the required noise free resolution. Higher resolution will result in the module spending longer averaging its input so will result in lower battery life. Options are: 14.25 bits (Max battery life), 15.25 bits (75% Battery Life), 16 bits (50% Battery Life), 16.5 bits (37% Battery Life) and 16.75 bits (30% Battery Life)

Low Battery Level

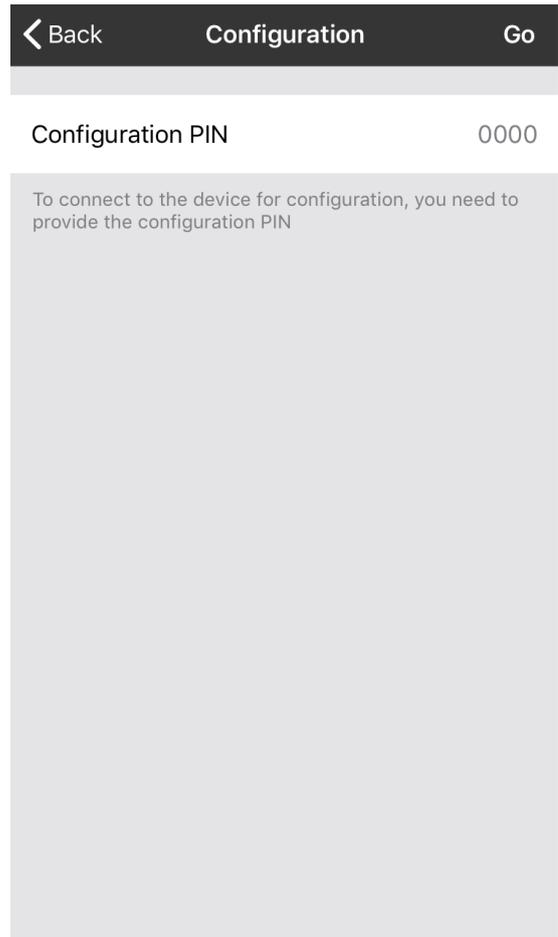
Set the voltage at which the module will indicate Low Battery.

Actual Battery Level	Read-only value of the measured battery voltage.
Value	Shows the current value that will be transmitted. This value is the measured value minus the System Zero value.
System Zero	This shows, and allows you to set manually, the System Zero value. This value is subtracted from the measured value to create the transmitted value. This will have no effect unless a calibration has been performed.
Zero Now Button	Tapping this will set the System Zero value so that the transmitted value will show zero with the currently applied input.
Identification Measurement Calibration	This is simply a menu/navigation mechanism to switch between the three pages that are available when configuring a Source.

Calibration (Locked)



Android



iOS



These modules are pre-calibrated so there is no access to this feature.

Transmitter Modules

Broadweigh Bluetooth Transmitters are the modules that connect to a sensor or have an input signal applied and periodically transmit messages containing the value read from the sensor or input.

BB-S325

Overview

The Broadweigh Bluetooth product range currently consists of a 3.25t shackle.

Order Codes

BB-S325



3.25t shackle.

Connections

Connecting Power

To ensure optimum battery life, only quality alkaline batteries or Energizer L91 are recommended.

 Rechargeable batteries are not suitable.

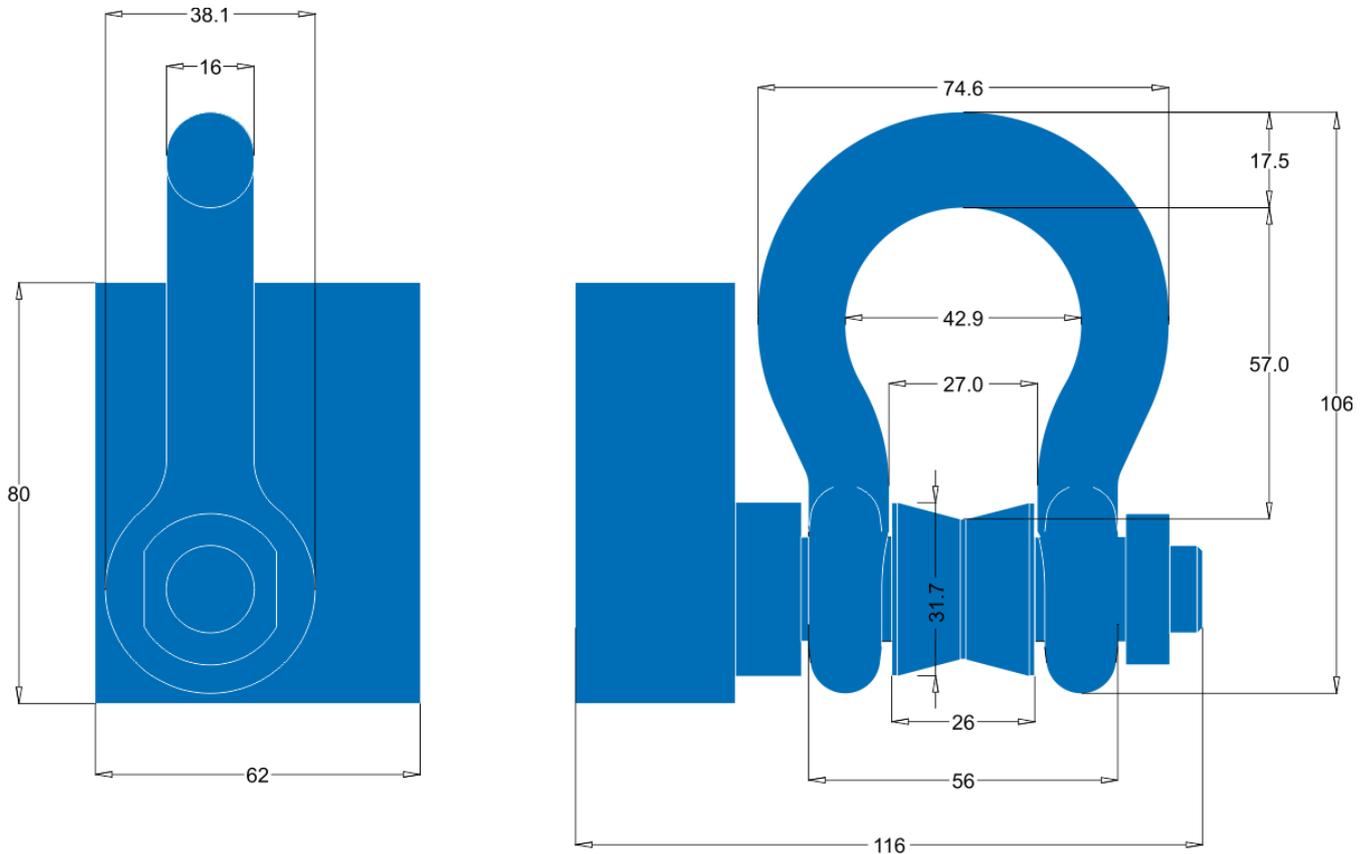
Remove the four screws. Insert two alkaline 1.5 V AA batteries. Refit the lid.



Enclosure & Mounting

This module is available in a number of different enclosure types. Locate your module and follow the link to view dimensional and mounting information for that particular enclosure.

Dimensions



Opening the Case

Remove the four screws, see [Connecting Power](#)

LED Indicator

The Shackle is fitted with an LED to provide a visual indication of data transmission from the module inside. The LED flashes whenever a data transmission occurs. Modules are pre-configured to provide readings once per second by default.

Flashing data transmitting

Specification

Specification with 1000R bridge, 2.5mV/V, at 3V supply at 25°C

Measurement	Min	Typical	Max	Units
Offset Temperature Stability		±5		ppm/°C
Gain Temperature Stability		1	4	ppm/°C
Non Linearity before Linearization		6	15	ppm of FR
Internal Resolution		16,000,000 / 24		Resolution / Bits
Noise Free Resolution @ 2.5 mV/V	19,000 / 14.25	110,000 / 16.75		Resolution / Bits

1. From original offset at any time.
2. First year.

Environmental	Min	Typical	Max	Units
Operating temperature range	-40		+85	°C
Storage Temperature	-40		+85	°C
Humidity	0		95	%RH

Power Supply	Min	Typical	Max	Units
Standby		6	10	µA
Power Supply voltage	2.3	3.0	3.75	Vdc
Power Supply ripple			50	mV ac pk-pk
Peak Current		20	30	mA

Battery Life Generating Results at 1Hz with 1000 Ohm Load Cell	Usage	Battery Life
Pair AA cells (3000 mAh)	Constantly on	10 months

Appendices

Appendix A - Radio Specification

Bluetooth certification

The module with embedded stack and profile has been qualified in accordance with SIG qualification rules:

- Declaration ID: D028766
- Qualified design ID: 71984
- Product type: End Product
- Core spec version: 4.1
- Product description: Bluetooth Smart v4.1 module

Appendix B – Antennas

This module uses an integral chip antenna.

Radio performance at microwave wavelengths is very dependent upon the operating environment; any structure within the operating region of the radios will give rise to three effects:

Obscuration. Obscuration will result in reduced range and occurs when an obstruction masks the line-of-sight between radios.

Aberrations to the horizontal and vertical space patterns. Distortion of these patterns may occur if structures or objects are placed in the near or intermediate field of the antenna. The effect will be to distort the coverage patterns, adversely affecting range and link quality.

Reflection. Any object placed in line-of-sight of the transmit antenna will result in signals arriving at the receiver by an indirect path. Degradation of performance due to reflection (multipath effects) appears as reduced range or poor link quality.

Any of the above will reduce RSSI figures, an increase in the packet loss rate and in extreme cases complete loss of signal. Fortunately, if consideration is given to these effects at the integration stage then a good quality link will be obtained.

Guidelines for installation:

When planning installations ensure that line-of-sight between nodes is maintained and that objects or structures are kept at least one metre away from antennae wherever possible.

Improvement will also be obtained by altering the height above ground of the transmitter; a small increase in antenna elevation will often improve reception.

Antenna Range

The achievable range in the Broadweigh Bluetooth module is heavily dependent upon the Bluetooth Low Energy receiver. Each mobile platform manufacturer specify different limits on the receive sensitivity of their hardware. In our tests the Apple products achieved the best range. Mobile phones less than two years old exhibit a range of between 50 and 90 metres line of sight. Table 1 gives the maximum range in an open field site between a Broadweigh Bluetooth transmitter module and specific mobile phones. All range tests are conducted in an open field site with the transmitter mounted 3.0 metres off the ground on a plastic pole. The mobile receiver was held at 1.5m off the ground directed towards the transmitter.

The testing conducted shows a trend towards an improved range as the Bluetooth low energy technology has matured on the mobile devices.

Bluetooth Low Energy Receiver	Transmission Distance	Year of Release
Apple iPhone 7	> 90 m	2016
Apple iPhone 5s	65 m	2013
Samsung Galaxy S6	65 m	2015
HTC One m8	25 m	2014
HTC One m7	25 m	2013

Table 1: Transmission range

Appendix C – Approval Statements

Bluetooth® low energy v4.1

Certifications

CE Certification



Complies with EMC directive. 2014/30/EU
The Radio Equipment Directive, 2014/53/EU,

European Community, Switzerland, Norway, Iceland, and Liechtenstein

English:	This equipment is in compliance with the essential requirements and other relevant provisions of Directive 14
Deutsch:	Dieses Gerät entspricht den grundlegenden Anforderungen und den weiteren entsprecheden Vorgaben der Richtlinie 2014/53/EU.
Dansk:	Dette udstyr er i overensstemmelse med de væsentlige krav og andre relevante bestemmelser i Direktiv 2014/53/EU.
Español:	Este equipo cumple con los requisitos esenciales así como con otras disposiciones de la Directiva 2014/53/EU.
Français:	Cet appareil est conforme aux exigences essentielles et aux autres dispositions pertinentes de la Directive 2014/53/EU.
Íslenska:	Þessi búnaður samrýmist lögboðnum kröfum og öðrum ákvæðum tilskipunar 2014/53/EU.
Italiano:	Questo apparato é conforme ai requisiti essenziali ed agli altri principi sanciti dalla Direttiva 2014/53/EU.
Nederlands:	Deze apparatuur voldoet aan de belangrijkste eisen en andere voorzieningen van richtlijn 2014/53/EU.
Norsk:	Dette utstyret er i samsvar med de grunnleggende krav og andre relevante bestemmelser i EU-direktiv 2014/53/EU.
Português:	Este equipamento satisfaz os requisitos essenciais e outras provisões da Directiva 2014/53/EU.
Suomalainen:	Tämä laite täyttää direktiivin 2014/53/EU oleelliset vaatimukset ja on siinä asetettujen muidenkin ehtojen mukainen.
Svenska:	Denna utrustning är i överensstämmelse med de väsentliga kraven och andra relevanta bestämmelser i Direktiv 2014/53/EU.

This equipment is in compliance with the essential requirements and other relevant provisions of Directive 2014/53/EU.

Manufactured in the UK by: Mantracourt Electronics Ltd, The Drive, Farringdon, Exeter, Devon, EX5 2JB, UK

CE certification for SPBTLE-RF module

The SPBTLE-RF module has been certified according to the following standards:

- EN 60950-1:2006 + A11:2009 + A12:2011 + A1:2010 + A2:2013 + AC:2011
- ETSI EN 301 489-1 V1.9.2:2011
- ETSI EN 301 489-17 V2.2.1
- ETSI EN 300 328 V1.8.1:2012
- ETSI EN 300 328 V1.9.1 (2015)
- EN62479:2010

CE Expert opinion: 0561-ARSP00053

The module is CE certified:

CE0051

FCC Certification

- This device complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions:
 - (1) This device may not cause harmful interference, and
 - (2) This device must accept any interference received, including interference that may cause undesired operation.
- This equipment complies with FCC radiation exposure limits set forth for an uncontrolled environment. End users must follow the specific operating instructions for satisfying RF exposure compliance. This transmitter must not be co-located or operating in conjunction with any other antenna or transmitter.
- Changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment

Manufactured in the UK by: Mantracourt Electronics Ltd, The Drive, Farringdon, Exeter, Devon, EX5 2JB, UK

FCC Modular approval

FCC ID: S9NSPBTLERF

In accordance with FCC part 15, the SPBTLE-RF is listed as a modular transmitter device.

This module is evaluated for stand-alone use only. Finished products incorporating multiple transmitters must comply with colocation and RF exposure requirements in accordance with FCC multi-transmitter product procedures. Collocated transmitters operating in portable RF Exposure conditions (e.g. <20 cm from persons including but not limited to body worn and hand held devices) may require separate approval.

IC Certification

The SPBTLE-RF module has been tested and found compliant with the IC RSS-210 rules.

These limits are designed to provide reasonable protection against harmful interference in approved installations.

This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications.

However, there is no guarantee that interference may not occur in a particular installation.

This device complies with RSS-210 of the IC rules. Operation is subject to the following two conditions:

1. this device may not cause harmful interference, and
 2. this device must accept any interference received, including interference that may cause undesired operation.
- Modifications or changes to this equipment not expressly approved by STMicroelectronics may render void the user's authority to operate this equipment.

Manufactured in the UK by: Mantracourt Electronics Ltd, The Drive, Farringdon, Exeter, Devon, EX5 2JB, UK

IC Modular approval

IC: 8976C-SPBTLERF

In accordance with IC RSS-210, the SPBTLE-RF is listed as a modular transmitter device.

This module is evaluated for stand-alone use only. Finished products incorporating multiple transmitters must comply with colocation and RF exposure requirements in accordance with IC multi-transmitter product procedures. Collocated transmitters operating in portable RF Exposure conditions (e.g. <20cm from persons including but not limited to body worn and hand held devices) may require separate approval.

OEM / Reseller Marking and Documentation Requirements

CE Labelling Instructions

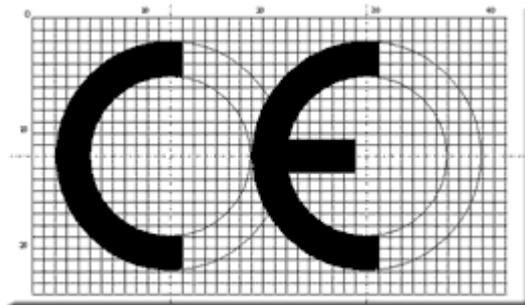
The Broadweigh Bluetooth series has been certified for several European countries.

If the transmitter module is incorporated into a product, the manufacturer must ensure compliance of the final product to the European harmonized EMC and low-voltage/safety standards. A Declaration of Conformity must be issued for each of these standards and kept on file as described in Annex II of the R&TTE Directive. Furthermore, the manufacturer must maintain a copy of the Broadweigh Bluetooth device user manual documentation and ensure the final product does not exceed the specified power ratings, antenna specifications, and/or installation requirements as specified in the user manual. If any of these specifications are exceeded in the final product, a submission must be made to a notified body for compliance testing to all required standards.

OEM Labelling Requirements

The 'CE' marking must be affixed to a visible location on the OEM product.

The CE mark shall consist of the initials "CE" taking the following form:



- If the CE marking is reduced or enlarged, the proportions given in the above drawing must be respected.
- The CE marking must have a height of at least 5 mm except where this is not possible on account of the nature of the apparatus.
- The CE marking must be affixed visibly, legibly, and indelibly.

FCC Labeling Instructions

When integrating the Broadweigh Bluetooth module into the final product, the OEM must ensure that the FCC labelling requirements are satisfied. A statement must be included on the exterior of the final product which indicates the product includes a certified module. The label should state the following (or similar wording that conveys the same meaning):

The OEM must include the following statements on the exterior of the final product unless the product is too small (e.g. less than 4 x 4 inches):

This device complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions:

Contains FCC ID: S9NSPBLERF

OR

This product contains FCC ID: S9NSPBLERF

1. this device may not cause harmful interference,
and
2. this device must accept any interference received, including any interference that may cause undesired operation.

FCC Product Manual Instructions

This section applies to OEM final products containing the Broadweigh Bluetooth module, subject to FCC compliance. The final product manual must contain the following statement (or a similar statement that conveys the same meaning):

Warning: Changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment. (Part. 15.21)

In the case where an OEM seeks Class B (residential) limits for the final product, the following statement must be included in the final product manual:

Note: This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and receiver.

- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
- Consult the dealer or an experienced radio/TV technician for help.

In the case where an OEM seeks the lesser category of a Class A digital device for the final product, the following statement must be included in the final product manual:

Note: This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his expense.

IC Labeling Instructions

When integrating the SPBTLE-RF into the final product, the OEM must ensure that the IC labeling requirements are satisfied. A statement must be included on the exterior of the final product which indicates that the product includes a certified module. The label should state the following (or similar wording that conveys the same meaning):

The OEM must include the following statements on the exterior of the final product unless the product is too small (e.g. less than 4 x 4 inches):

This device complies with RSS-210 of the IC Rules. Operation is subject to the following two conditions:

1. this device may not cause harmful interference,
and
2. this device must accept any interference received, including any interference that may cause undesired operation.

Contains IC: 8976C-SPBTLERF

OR

This product contains IC: 8976C-SPBTLERF

IC Product Manual Instructions

This section applies to OEM final products containing the SPBTLE-RF module, subject to IC compliance. The final product manual must contain the following statement (or a similar statement that conveys the same meaning):

Warning: Changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment. (RSS-210)

In the case where an OEM seeks Class B (residential) limits for the final product, the following statement must be included in the final product manual:

Note: This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to RSS-210 of the IC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and receiver.
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
- Consult the dealer or an experienced radio/TV technician for help.

In the case where an OEM seeks the lesser category of a Class A digital device for the final product, the following statement must be included in the final product manual:

Note: This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to RSS-210 of the IC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his expense.

Appendix D - Worldwide Regional Approvals

<i>Region</i>	Product Conforms To
Europe	CE
USA	FCC
Canada	IC

Important Note

Mantracourt does not list the entire set of standards that must be met for each country. Mantracourt customers assume full responsibility for learning and meeting the required guidelines for each country in their distribution market.

For more information relating to European compliance of an OEM product incorporating the Broadweigh Bluetooth range of modules, contact Mantracourt, or refer to the following web site: www.ero.dk

Appendix E - Declaration of Conformity

EU DECLARATION OF CONFORMITY

We, the undersigned:



Name of Manufacturer:
Address:

Mantracourt Electronics Ltd
The Drive, Farrington, Exeter, Devon, EX5
2JB

Country:

United Kingdom

Declare under our sole responsibility that the Broadweigh Bluetooth Product Range is in conformity with the following relevant Union harmonisation legislation:

Radio Equipment Directive 2014/53/EU
EMC Directive 2014/30/EU
Machinery Directive 2006/42/EC

RoHS Directive 2011/65/EU
Radio Equipment Directive 2014/53/EU

Based on the following harmonised standards:

EN 61326-1:2013
EN 61326-2-3:2013

EN 300328 V1.9.1

The SPBTLE-RF Bluetooth module has been certified according to the following standards:

EN62479:2010
ETSI EN 301 489-1 V1.9.2:2011
ETSI EN 301 489-17 V2.2.1

ETSI EN 300 328 V1.8.1:2012
ETSI EN 300 328 V1.9.1 (2015)
EN 60950-1:2006 + A11:2009 + A12:2011 +
A1:2010 + A2:2013 + AC:2011

CE Expert opinion: 0561-ARSP00053

The module is CE certified: **CE 0051**

Name and position of person binding the manufacturer or authorised representative:

Signed

Name: Robert Willmington-Badcock
Function: Managing Director
Location: Mantracourt Electronics Ltd
Date of issue: 16th January 2019

Contains: FCC ID: S9NSPBTLERF IC: 8976C-SPBTLERF



Warranty

All Telemetry products from Mantracourt Electronics Ltd., ('Mantracourt') are warranted against defective material and workmanship for a period of one (1) year from the date of dispatch.

If the 'Mantracourt' product you purchase appears to have a defect in material or workmanship or fails during normal use within the period, please contact your Distributor, who will assist you in resolving the problem. If it is necessary to return the product to 'Mantracourt' please include a note stating name, company, address, phone number and a detailed description of the problem. Also, please indicate if it is a warranty repair.

The sender is responsible for shipping charges, freight insurance and proper packaging to prevent breakage in transit.

'Mantracourt' warranty does not apply to defects resulting from action of the buyer such as mishandling, improper interfacing, operation outside of design limits, improper repair or unauthorised modification.

No other warranties are expressed or implied. 'Mantracourt' specifically disclaims any implied warranties of merchantability or fitness for a specific purpose.

The remedies outlined above are the buyer's only remedies. 'Mantracourt' will not be liable for direct, indirect, special, incidental or consequential damages whether based on the contract, tort or other legal theory.

Any corrective maintenance required after the warranty period should be performed by 'Mantracourt' approved personnel only.



Document Title: Broadweigh Bluetooth User Manual
Applies To: Broadweigh Bluetooth Product Range
Part Number: 517-946
Issue Number: 01.01
Dated: 3rd February 2020

In the interests of continued product development, Mantracourt Electronics Limited reserves the right to alter product specifications without prior notice.



www.mantracourt.com