Broadweigh® Original Instructions Gen 3

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BROAD WEIGH

Load monitoring for live events
Solved by Mantracourt®

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Introduction / Overview

Broadweigh is a portable modular wireless weighing system offering real-time load monitoring for a wide variety of rigging applications without the need for cabling.

Broadweigh enables users to know precise loads on any given point thereby ensuring structures and rigging points are balanced and within safe working loads.

A user-friendly wireless Handheld Telemetry Display provides load monitoring of any Broadweigh Shackle.
In addition, a PC interface can be used to view and log multiple inputs on a single screen via the use of the Broadweigh Log100 Software and USB Base Station.

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 orange 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.

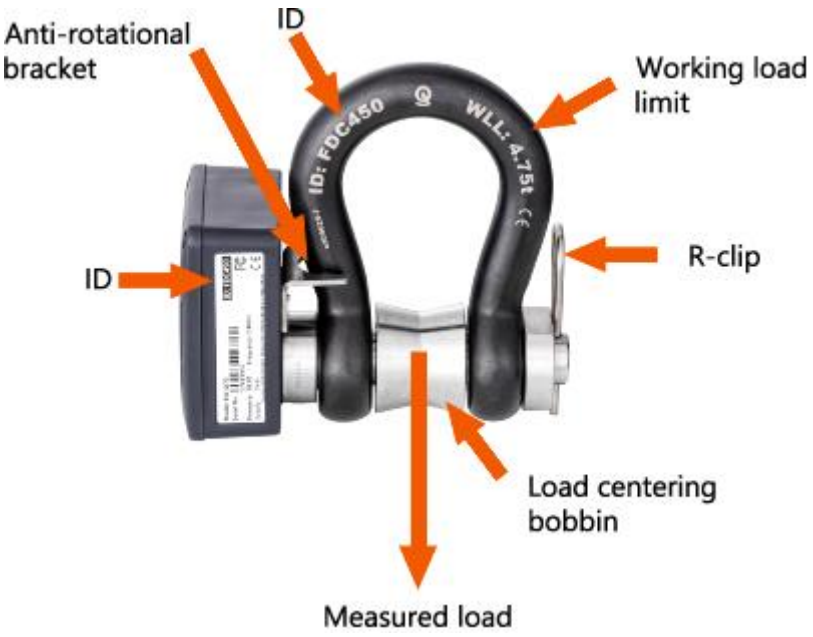
The Broadweigh Shackle is a bow shackle with load pin and integrated electronics which features the following:

- Available in 4 ¾ tonne or 3 ¼ tonne WLL options
- Up to 800 m line of sight wireless transmission range
- IP67
- 5:1 safety factor
- Low rigging profile of 70 mm or 130 mm with TwistLink
- 2000 hr battery life at transmission 1 per second
- Smart Sleep function to preserve battery life when not needed
- Typical accuracy of ±1% of current load or 25 kg, whichever is the greater value
  (When used with original bobbin or TwistLink. There may be a reduction in accuracy if you swap these, see full specification in main manual)

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.

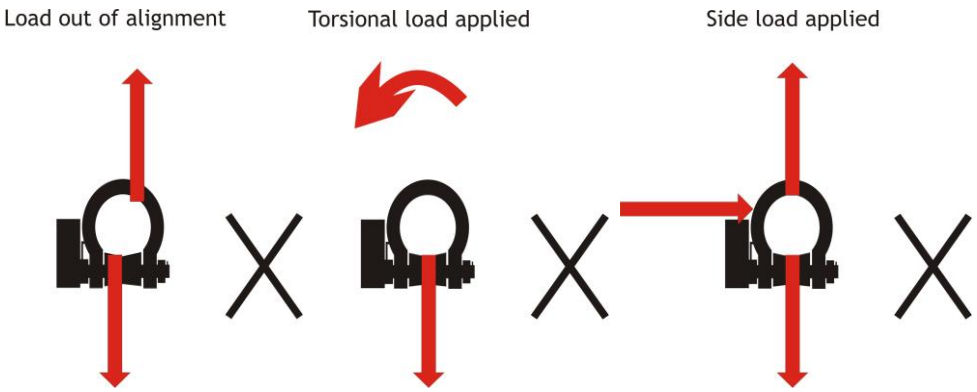
The shackle pin and bow are calibrated and load tested together. It is therefore essential for the accuracy of the system that the following information is adhered to:

- 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 calibrated with the shackle markings and the label visible as shown below.
- The shackle must be used in conjunction with a bobbin or TwistLink, nut and retaining clip as shown:

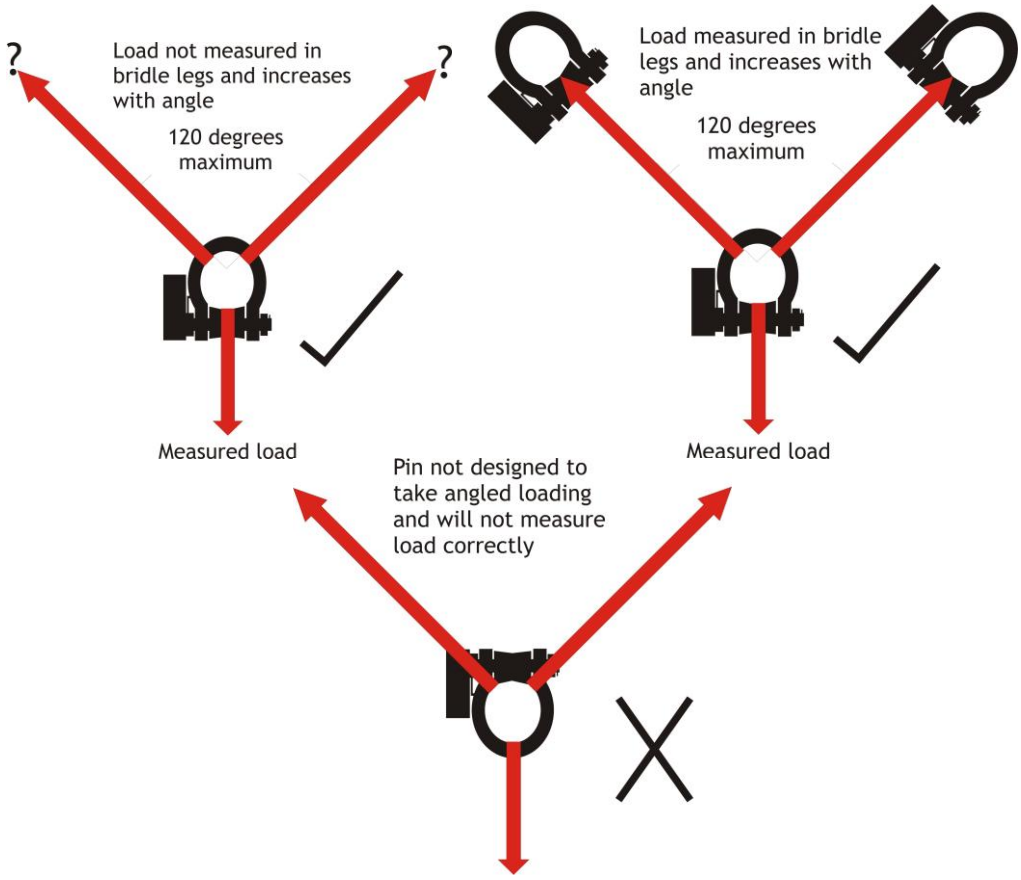


If using a TwistLink, ensure that the load sensing pin is in the side of the TwistLink marked 'Sensor'.

The Broadweigh Shackle is a sensitive measuring device calibrated to ensure accuracy and reliability. Care must be taken during use, transportation and storage to avoid unnecessary mechanical damage.
To ensure accuracy, load must be applied perpendicular to the pin and the load must be centralised with a bobbin or TwistLink. 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.



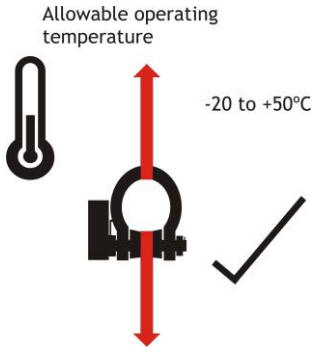
If using the shackle as part of a bridle, remember that the load in legs of the bridle will increase with the angle. If the Broadweigh shackle pin is not connected to that part of the leg then it will not register this increase.



No part of the shackle, pin, bobbin or TwistLink 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°C.



The working load limit (WLL) of Broadweigh shackles assumes the absence of exceptionally hazardous conditions. These include offshore activities and lifting of potentially dangerous loads such as molten metals. With every use the degree of hazard should be assessed by a competent person and the safe working load (SWL) reduced accordingly from the working load limit.
The product should never be used above the WLL. If the WLL is exceeded the unit should be removed from use and a Broadweigh representative contacted. When Gen 3 shackles are paired in the Toolkit, you can see the highest measured load that the shackle has seen. If this is greater than the WLL of the shackle it must be returned to Broadweigh for evaluation to ensure its continued safety.

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 and legislation.
Broadweigh requires that the integrator fully assess product suitability as part of any control system and that Broadweigh products are used within their published parameters at all times.

Broadweigh bows are subjected to a 200% proof load (static test coefficient of 2) and Broadweigh pins are subjected to a 150% proof load (static test coefficient of 1.5) before being calibrated as a whole assembly.

Inspection and Maintenance

As with all rigging equipment, Broadweigh shackles and TwistLinks should be inspected before and after every use, ensuring that all the components are present and correct (bow, pin, bobbin or TwistLink, nut and r clip) and the serial IDs 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 offset 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 zero offset 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. (Remember that the bobbin must be centred and the pin perpendicular to the load to get the most accurate reading).

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 are unlikely to be less than every 6 months. Records of all thorough examinations should be kept.

In line with the Lifting Equipment Engineers Association (LEEA) guidance we would recommend returning your shackle to the factory every twelve months for re-calibration. You may also choose to check your shackle's output with a known load more often than that.

When Gen 3 shackles are paired in the Toolkit, you can see the highest measured load that the shackle has seen. If this is greater than the WLL of the shackle it must be returned to Broadweigh for evaluation to ensure its continued safety.

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.

Mantracourt Electronics recommends using Energizer® L91 Ultimate Lithium ™ AA batteries.
See the Energizer website for details.
https://www.energizer.com/batteries/energizer-ultimate-lithium-batteries

Advantages over other batteries:

- High capacity (As much as 50% more capacity than other big brand batteries).
- Wide temperature range.
- Very long shelf life.
- Leak resistant construction.

Pre Use Checks

Before rigging, check the shackles all work. Remove cover and insert 2 x AA batteries, observing polarity and ensuring that there are no foreign objects the compartment. Wake them up by switching the handheld display on- ⏻ . All shackles on the same radio channel with the same group key will wake and their LEDs should start to flash at the fast rate.

Cycle through the shackles on the display by pressing the select button- ▶ and check that the data tag shown on the handheld matches the one on the shackle with its LED constantly on.

Alternatively, you can use the LOG100 software once the project has been configured (see below) to wake/sleep the shackles and confirm that they are transmitting as expected.

It is a good idea to note down all the shackles' data tags and IDs and where they are located within the rig plot. This is crucial for identifying which loads are being measured and where. The ID will be needed to soft pair.

Broadweigh Roaming Handheld Display

Signal Low
The radio signal from the Broadweigh transmitter is low. Signal may be intermittent when this indicator is visible until ------ is displayed.
Note: Even with a degraded signal the displayed value will always be correct.

Battery Low
The batteries in the handheld are low and need to be replaced.

Remote Error
The Broadweigh transmitter has reported an error.

Remote battery Low
The batteries of the Broadweigh transmitter are low and may need replacing.

Select button
Press to cycle through available Broadweigh transmitters. Press and hold to see selected device **Data Tag.**

Power button
Press and hold to power on/off. The handheld regularly wakes all Broadweigh transmitters on the same radio channel that are in range and are using the same group key.

Other displays are available, see broadweigh.com for further information.

System Record

Data Tag + ID	Radio Channel + Group Key	Units	Location

Pre use check list

- ☐ Shackles power up
- ☐ Shackles talk to handheld or LOG100
- ☐ Data tags match as expected
- ☐ Pins and bows match
- ☐ Anti-rotation brackets are correctly positioned
- ☐ Bobbins or TwistLinks are in place
- ☐ Nuts and R-clips are in place
- ☐ Shackles' data tags and rig location are noted
- ☐ All load bearing components **must** be free from cuts, nicks, cracks, gouges or excessive wear and distortion

Log 100

LOG100 PC logging and mapping software will be provided by your distributor. The **Broadweigh Toolkit** is used for the initial setup of the hardware and to monitor wireless traffic in the area (see below).

With LOG100, up to 100 channels of data can be viewed real time or logged via CSV to an application such as Microsoft Excel. Mapping, report generation and webserver are also available.

Install the LOG100 software and follow the instructions. The software is also available via our website as above. Once the software is installed connect the **base station** and launch the software.

File
New project
Open project
Save as project

Sleep and Wake
Wake
Wakes all Broadweigh devices on the same radio channel
Sleep
Sends all modules on the same radio channel to sleep

View
All channels
Shows this view
Visualisation
Shows visualisation view

Display channel title

Information
Low battery
NET Display has been zeroed
Module error
Signal strength

Edit
Configure project
Set up how the data display screen is organised
Edit visualisation
Configure the visual representation
Preferences

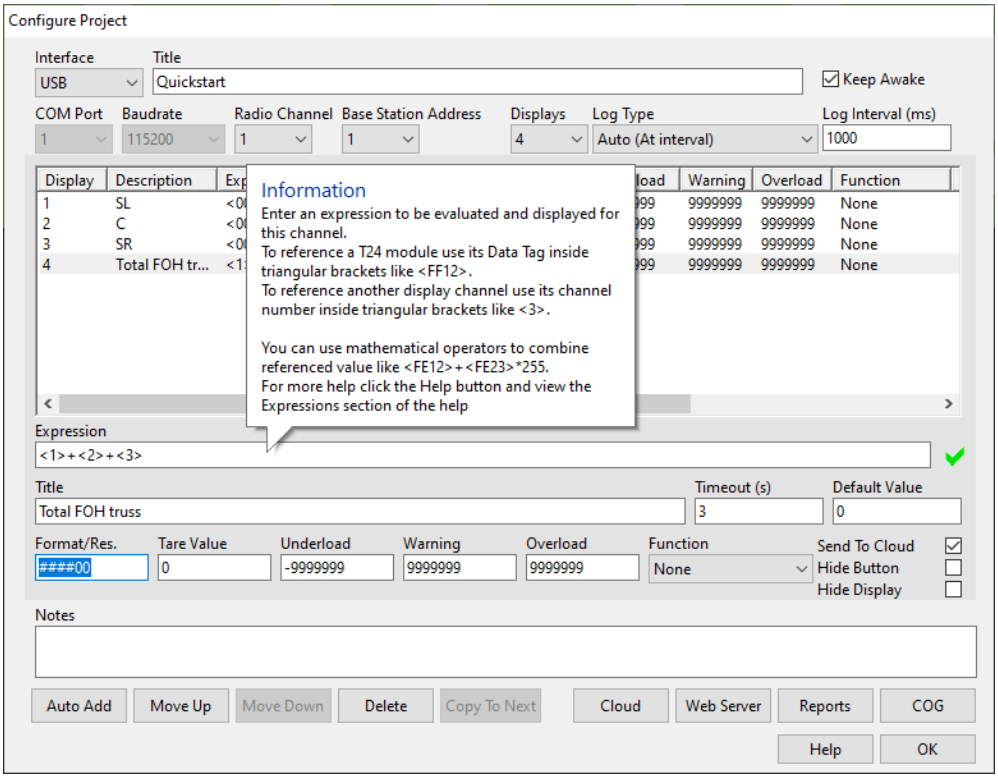
Logging
Start logging
Opens a file save dialog window to allow the user to select the name and destination of the log file
Stop logging
Stops a previously started log.
View last log
Opens the last logged file with the default CSV application.

Alarm
Reset alarms and indicators

A window similar to the one above will appear (four display channels are shown). This is the **all channels** display window. Each display channel does not necessarily need to display data from a single Broadweigh shackle; they can be set up to show mathematical calculations involving as many shackles as required.

In the case above, display channel 4 is showing the sum of display channels 1, 2, and 3.

The **configure project** window below is where the display channels are set up.



As shown, hovering over an area within the window gives tool-tip help which, with the online help should provide enough information to aid setup.
For a simple setup, select the number of display channels required, assign Data Tags to the expression section **(ensuring that they are enclosed in triangular brackets, <FF69>)** and change any other parameters as necessary.
The triangular brackets allow the expression field to identify the Data Tag for what it is.
For more detailed information, see the online helpfile in LOG100.

Toolkit

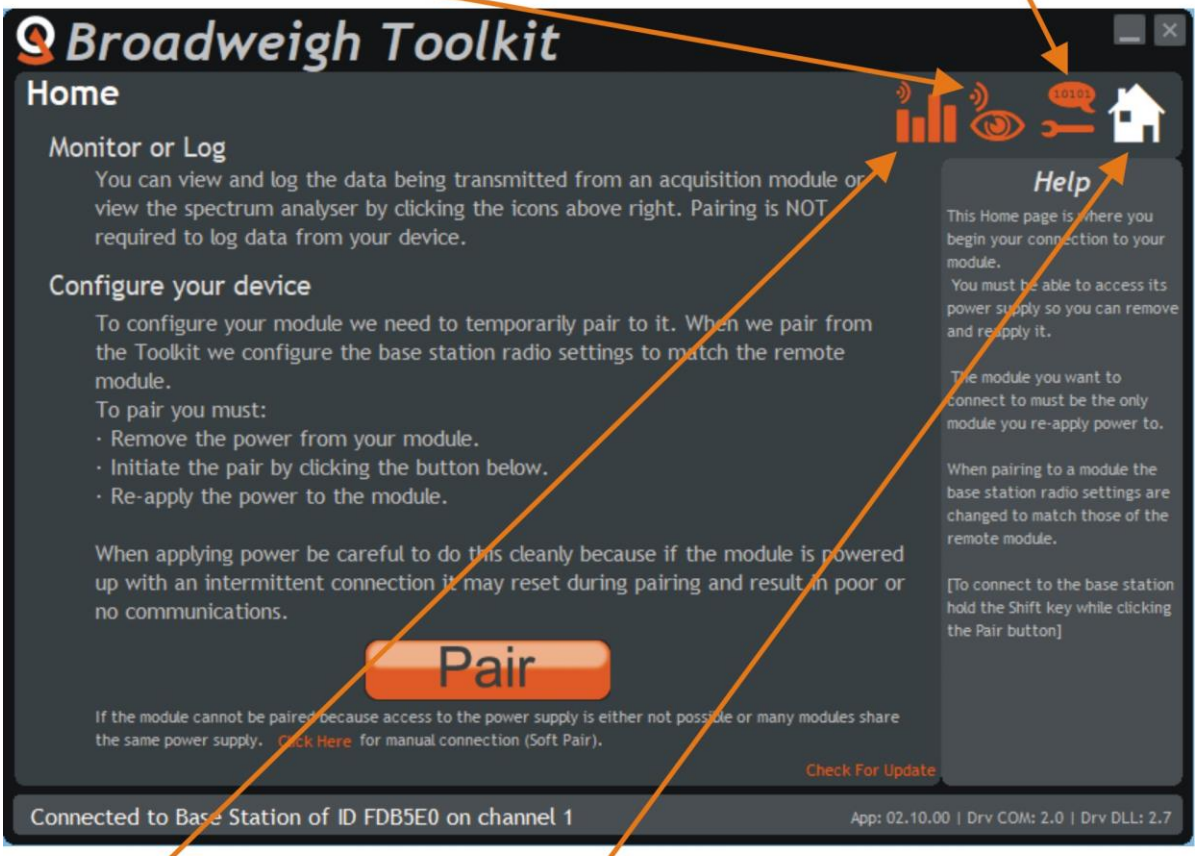
The **Broadweigh Toolkit** allows detailed interrogation and setup of the Broadweigh devices and base station. This is achieved via various dialog windows and editable boxes (coloured orange).

It is essential to setup and test all components of a system before planned use. This should mean that all the software is pre-loaded, data tags and radio channels are set and components are labelled making on-site use as smooth as possible. More detailed information on the Broadweigh Toolkit is available in the main user manual at www.broadweigh.com/support.

Install the Broadweigh Toolkit by downloading from the website here: https://www.broadweigh.com/support/ and following the instructions. Then connect the **base station** and launch the software.

Channel monitor
View and log data from Broadweigh transmitter modules.
Monitor sleeping devices.
Move group channel

Settings
Configure base station connection



Spectrum analyser
Planar and spectral views of local radio traffic to check for possible congestion.

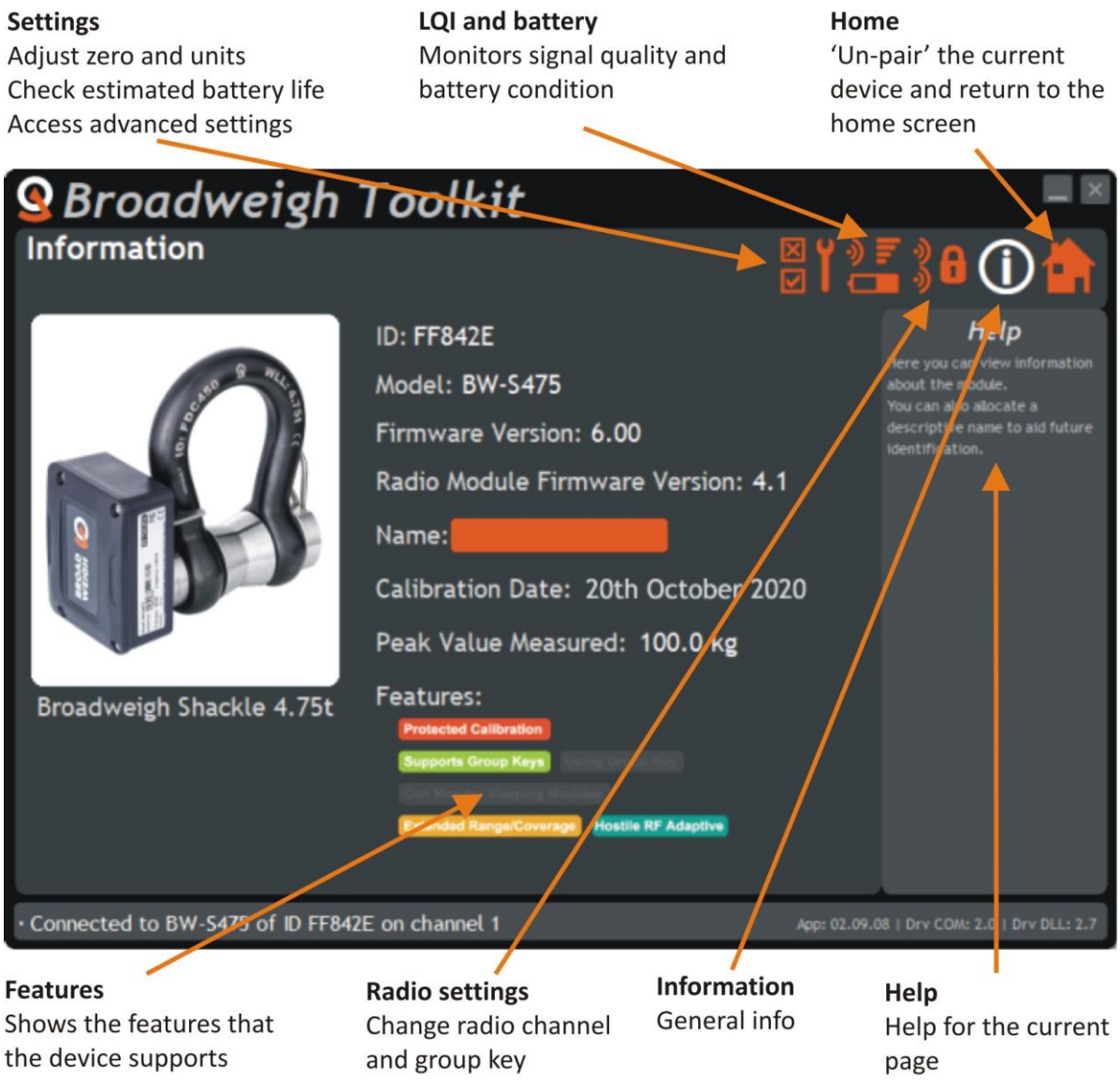
Home
Pair and configure your device. Follow the onscreen instructions. If power cycling is not available it is possible to pair using the device's ID and data tag but you need to be on the correct radio channel.

Pairing

This is the system used for configuring the Broadweigh devices. Click the 'Pair' button (on the home screen, see above) and then slowly swipe the magnetic tag along the underside of the electronics enclosure. (Alternately power cycle by removing a battery and reconnecting). This makes a very reliable link without needing to know the device's ID or radio channel.

Sample Paired Device- Broadweigh Shackle

Gen 3 shackles leave the factory in simple mode with most of the settings being hidden:



Further details on the advanced settings are available in the full manual.
If you switch from advanced to simple mode then these parameters will be set as follows:
Sleep Delay = 900 seconds (15 minutes)
TX Interval = 1 second
Zero Indication Band = 5 kg
Sample Time = 5 ms
Low Power Mode = On
Battery Low Level = 2.7 V

On Gen 3 shackles supporting Smart Sleep:
Smart Sleep Mode = Active
Smart Sleep Level = 5 kg
Smart Sleep TX Interval = 10 seconds

Note in simple mode it is assumed that L91 batteries are being used. Other battery types will cause the battery low indication to appear prematurely i.e. while there is still a lot of life left in the batteries.
Also note that the battery life estimator in Simple mode assumes L91 batteries. Using other types of battery may mean battery life could be as low as 60% of the life estimated.

Troubleshooting

No data displayed in LOG100 display window

Are the shackles awake?

Use the wake function within LOG100. Either 'Ctrl+W' or 'Sleep and wake>Wake' in the drop down menus. It may then be necessary to check the 'Keep awake' box in the configure project window.

Is the expression correctly entered?

Make sure that the device data tags are entered within triangular brackets in the form <FF69>. Remember that the data tag is (by default) the last 4 characters of the device ID.

Are the base station, shackles and LOG100 workspace all on the same radio channel?

- The easiest method to check is to go through and methodically try different channels in the LOG100 configure project window. (Return to display window to manually wake each channel).
- You can also use the Broadweigh Toolkit to monitor activity on various channels via the Channel Monitor page. Change the channel and then manually wake all data providers on that channel (it will take around 10 seconds to update). This will then show all available data providers on the channel and may highlight errors in Data Tag entry. Base stations purchased after June 2015 can also monitor sleeping modules.

Be aware that the base station can only be set to one radio channel. Therefore you cannot log data and pair devices at the same time. It is good practice to configure the hardware via the Broadweigh Toolkit before using the LOG100 software as it is possible for the two programs to give conflicting instructions.

Do all relevant transmitters and receivers have the same group key set?

Group keys were enabled from June 2015. For communication to happen between devices they must be on the same radio channel with the same group key set.
It is still possible to use 'old' with 'new' devices but the group keys must all be left blank.

Is there heavy radio traffic in the area?

It is possible that 'wake' signals from the base station could not be getting through to the shackles and that they are going to sleep as they think they don't need to be used.
One possible solution is to increase the sleep delay time or disable sleep by setting sleep delay to zero. This will have battery life implications. Also ensure that 'Keep awake' is ticked in Log100 'Configure Project'.

Unexpected values displayed

- Check to see if the display channel has been zeroed ('NET' shown below channel display). To clear a zero either go to configure project or click the gross button in the display window.
- Check to see if an unnecessary or incorrect function has been used in the expression field of LOG100.
- Check to see that correct units have been set in the toolkit (kg or lb etc)

Intermittent signal

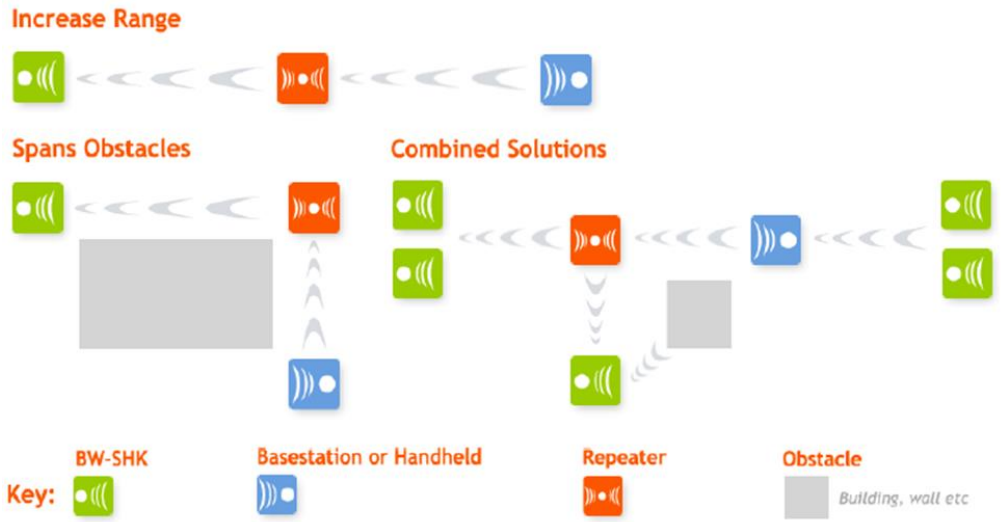
(LOG100 or handheld display fluctuates between the correct load and horizontal dashes)

Check timeout settings

The timeout settings in LOG100 and handheld displays should be at least three times the transmission rate.
Also remember that if the shackle is in Smart Sleep it will only be transmitting at the slower rate until it is woken up.

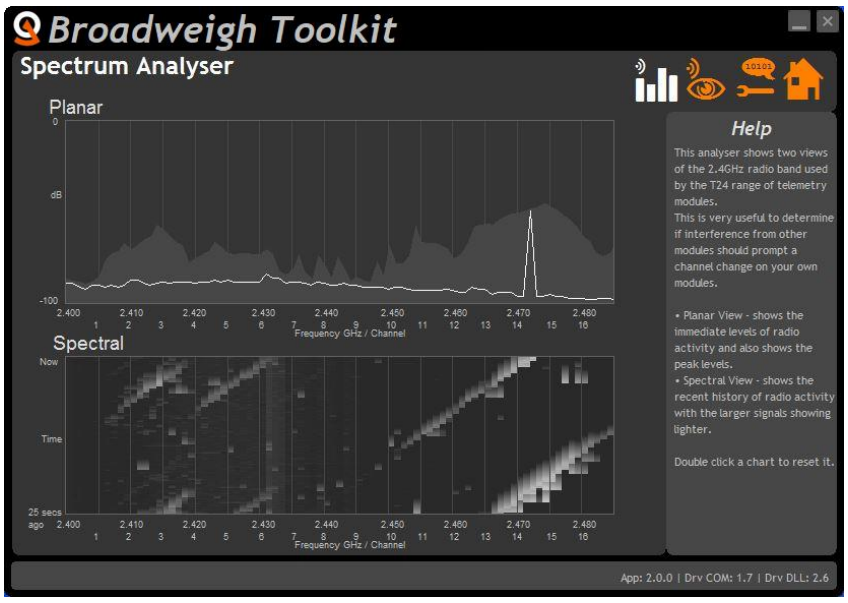
Check location of Broadweigh shackles and USB base station.

A poor line of sight between the shackle and base station or objects in close proximity will affect the range. Try re-siting the base station. It may be worth considering a wireless repeater if the problem persists.



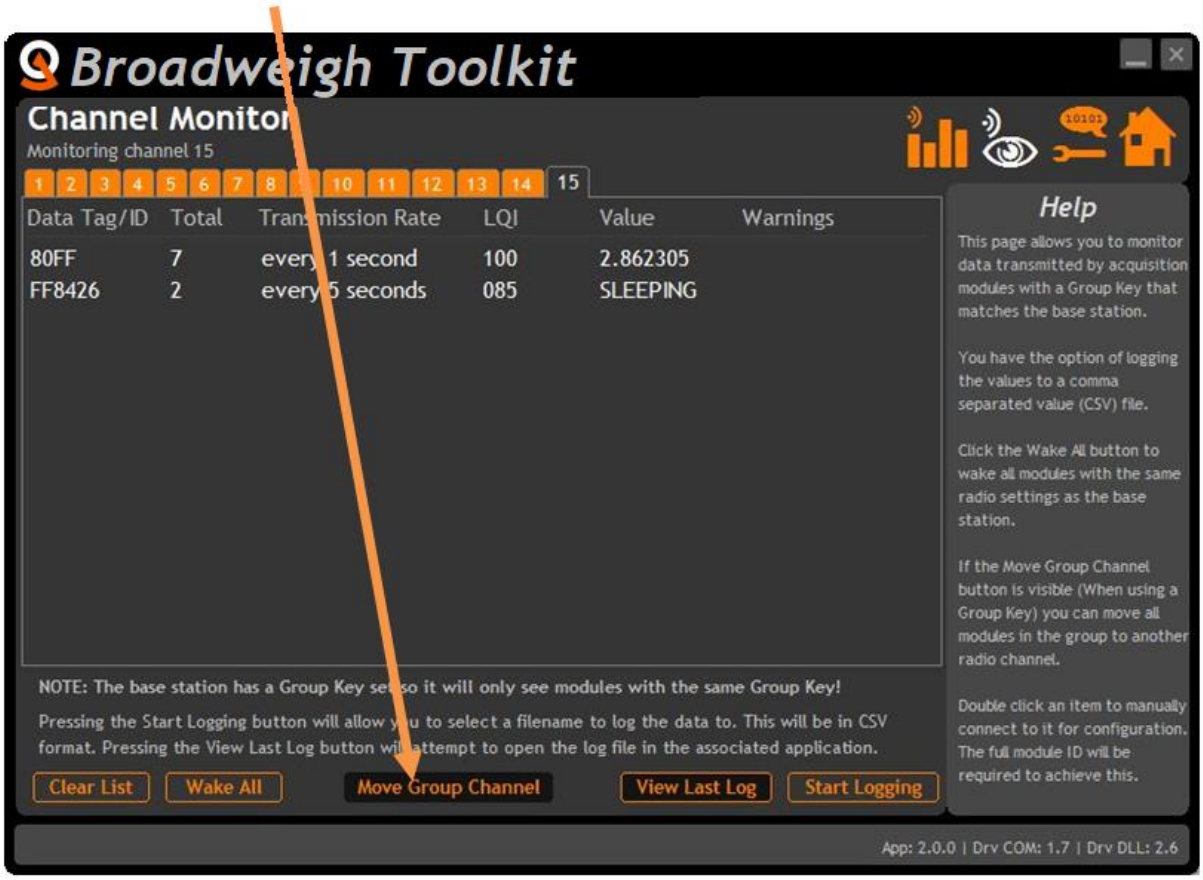
Check local traffic on the 2.4 GHz radio band.

Using the Broadweigh Toolkit, go to the Spectrum Analyser page. This will show local traffic on the 2.4 GHz radio band and highlight any potential congestion. You can then change the radio channels for all devices via pairing.



The previous chart show the traffic from a Wi-Fi network and it can be seen to be operating over channels 12 to 16. It would be best (though not essential) to avoid using these channels. One of the useful features of Group Keys is that an entire group can move radio channel all at the same time.

To do this, go to the **Channel Monitor** page of the Toolkit, click 'Move Group Channel' and follow the instructions.



Make sure that all the devices required are visible and make sure that any receivers to be moved are powered up. (They won't be visible on this page to check).

Please see our website or scan QR code for quick start videos, the manual and associated software:

www.broadweigh.com/support.html

EU DECLARATION OF CONFORMITY

We, the undersigned:

Name of Manufacturer:	**Mantracourt Electronics Ltd**
Address:	**The Drive, Farrington, Exeter, Devon, EX5 2JB**
Country:	**United Kingdom**

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

LVD Directive 2014/35/EU
EMC Directive 2014/30/EU
RoHS Directive 2011/65/EU
Radio Equipment Directive 2014/53/EU
Machinery Directive 2006/42/EC

Based on the following harmonised standards:

EN 61326-1:2013
EN 61326-2-3:2013
EN 61010-1:2010
EN 300328 V1.9.1

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:	**2nd November 2018**

FCC ID: VHARA24 IC:7224A-RA24

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.

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Document Title:	**Broadweigh Original Instructions**
Applies To:	**Broadweigh Product Range**
Part Number:	**517-940**
Issue Number:	**01.04**
Dated:	**14th September 2022**

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

www.mantracourt.com

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