



Real-time Line

# User and Maintenance Manual

Wireless Load Cell Systems for the  
Entertainment Industry



**Flexa Sensors**

Version 1.1 # November, 2022



# FLEXA SENSORS

## Real-time Line

# User and Maintenance Manual

English language version translated from the original Italian language version

## 1 Intended Use

This manual is intended to describe the operations of Flexa Real-time Line devices and Flexa Control Software. The **Load Cell** is a device that converts a force into an electrical signal that can be measured and transmitted. This manual is about Load Cells with radio transmission.

Flexa **Shackle wireless Load Cells**, **DynaCell wireless Load Cells**, **Gateways** and **Repeaters** are radiofrequency devices for real-time monitoring and control of static and dynamic loads, designed to be used mainly in the entertainment sector, from the assembly phase to the disassembly of the structure and for the entire course of the event.

**Flexa Software** It is the GUI (Graphical User Interface) specifically developed to control and set all the Load Cells and their parameters.

**All these devices are NOT for active safety control.**

## 2 Tips

+ INFO 🔍



In addition to this Manual, we suggest you unfold the **Quick Start Manual** for an overview of the most common operations to start working with our devices immediately



For further support, please visit the **Tutorial** area at [flexasensors.com](https://www.flexasensors.com/tutorial/flexa-software-control-tutorial/):  
<https://www.flexasensors.com/tutorial/flexa-software-control-tutorial/>



**UPDATES:** This Manual contains technical data and information on the operating procedures of the management software. These procedures are constantly updated; therefore, this manual may result obsolete. **The updated version is always available by requesting it at [info@areafourindustries.it](mailto:info@areafourindustries.it)**

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### 3 Document Change History

Our commitment is constant to improve the performance of our products and to expand the range of solutions offered. You should always check our website to make sure that the Manual you are using is the most up-to-date version.

Present User Manual Code: LT AMISF002

Issue	Date	Change
1.1	November 2022	On-off paragraph editing, general editing
1.0	June 2022	First issue

## 4 Codes and Definition of Terms

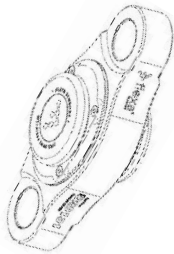
For a better understanding of the information in this Manual Book, please see the most frequently used terms and their definitions for the following products. The codes shown are the official codes of the Flexa Sensors catalogue.



**DynaCell 5.0** (5000 kg WLL) is a Load Cell is made of Stainless Steel. Safety factor 8: 1.

**LT XFW-CDY500H1** FLEXA REAL-TIME  
WIRELESS DYNACELL LOAD CELL 868MHz - 5t

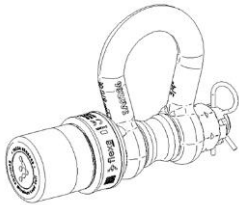
**LT XFW-CDY500H2** FLEXA REAL-TIME  
WIRELESS DYNACELL LOAD CELL 915MHz - 5t



**DynaCell 5.0** (500 kg WLL) is a Load Cell is made of Aluminium Safety factor 8: 1.

**LT XFW-CDY050X1** FLEXA REAL-TIME  
WIRELESS DYNACELL LOAD CELL 868MHz - 500KG

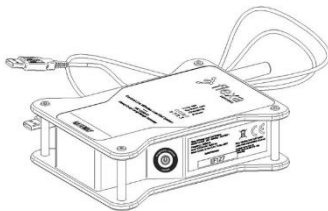
**LT XFW-CDY050X2** FLEXA REAL-TIME  
WIRELESS DYNACELL LOAD CELL 915MHz - 500KG



**Flexa Shackle** (4750 kg WLL) is a Load Cell based on the Van Beest GP Bow Shackle. Safety Factor 5:1.

**LT XFW-CSH475B1** FLEXA REAL-TIME  
WIRELESS SHACKLE LOAD CELL 868MHz - 4,75t

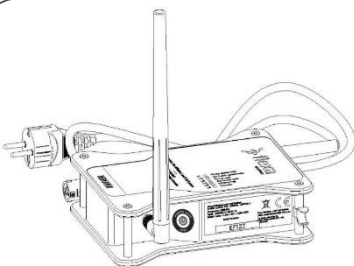
**LT XFW-CSH475B2** FLEXA REAL-TIME  
WIRELESS SHACKLE LOAD CELL 915MHz - 4,75t



**Gateway** It is the device that collects the signals sent by the wireless Load Cells and delivers these signals via a USB cable to a PC.

**LT XFW-CGW100-1** FLEXA WIRELESS GATEWAY 868MHz

**LT XFW-CGW100-2** FLEXA WIRELESS GATEWAY 915MHz



**Repeater:** If longer ranges are required or large obstacles are in between wireless Load Cells and Gateway, it is necessary to add one or more wireless Repeaters.

**LT XFW-CRP100-1** FLEXA WIRELESS REPEATER 868MHz

**LT XFW-CRP100-2** FLEXA WIRELESS REPEATER 915MHz

## 5 Shackle Load Cell Part List

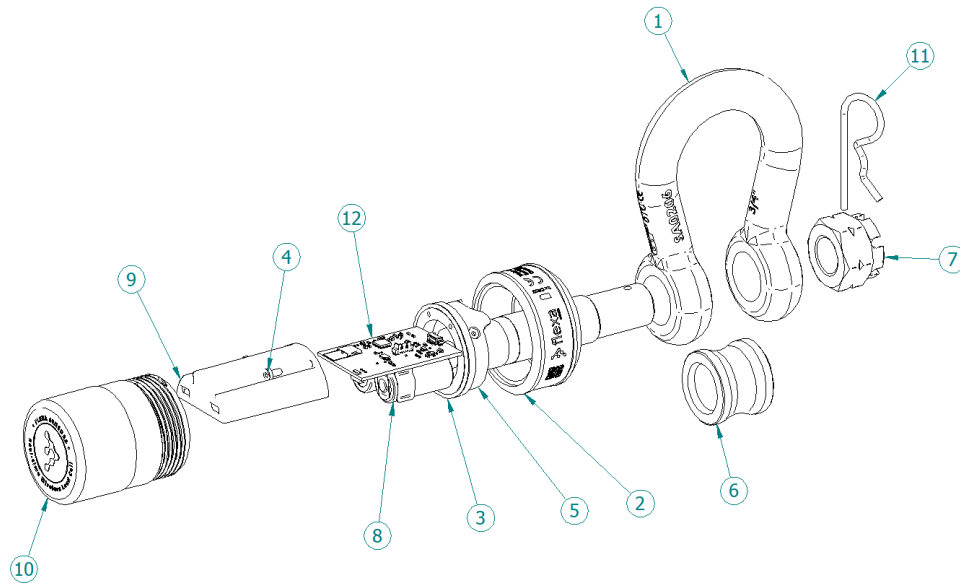


Fig. 1 – Shackle Load Cell – Exploded view

Part #	Description
1	Shackle
2	Aluminium Cylindrical Nut
3	O-Ring Sea
4	Screw DIN7984 M3x6
5	Shear Pin Load Cell
6	Bobbin
7	Crown Nut M20
8	CR123 Lithium Batteries
9	PCB Holder
10	Cylindrical Cap
11	Cotter Pin
12	Load Cell PCB



## 6 DynaCell Load Cell Part List

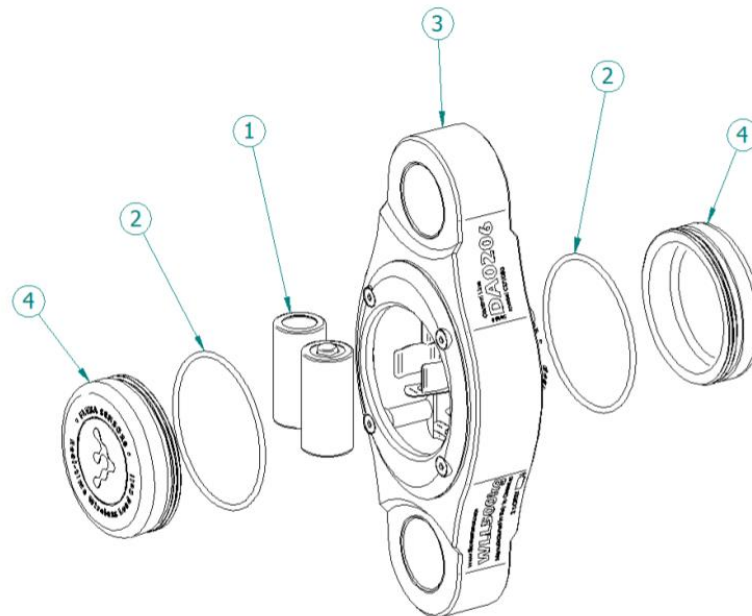


Fig. 2 – DynaCell Load Cell – Exploded view

Part #	Description
1	2x CR123 Lithium Batteries
2	O-Ring Seal
3	Main Body — Aluminium
4	Semi-transparent Polycarbonate Lid

# 7 Technical Data

## 7.1.1 Load Cells – Electronics (all models)

Load Measurement	Every second
Transmission Rate	Every second - According to the load status (when the load is stable, the rate decreases))
Radiofrequency ①	Sub-1GHz
Range (Cell / Gateway)	Up to 600 m - in line of sight, unobstructed (Longer distances using Repeater)
Data Acquisition System	Via Gateway (Flexa Real-time Line)
Data Management and GUI	Flexa Real-time Software on PC (Windows 10)
Batteries	Lithium 2 x CR 123 (1500 mAh, 3 V)
Expected Battery Life ②	5000/7000h
Reverse Polarity Protection Circuit	Yes

### + INFO

① 868MHz in Europe and many other EMEA countries. 915MHz in North America and part of the South American countries, Australia, and other Countries.

For more information about coverage in other countries, please visit [www.flexasensors.com](http://www.flexasensors.com)

② see pages 48/49 for more details

## 7.1.2 Shackle Load Cell – Main Body

Shackle Manufacturer	Van Beest B.V. (NL)
Load Cell pin	Steel - 17-4 PH H925
Bobbin	Stainless Steel
WLL	4,75 t
Safety Factor	5:1 (with Bobbin)
Aluminium Cylindrical Nut	Anodized aluminium
Cylindrical Cap	Semi-transparent polycarbonate
Load Accuracy	35kg or +/- 2% of maximum load
Periodic calibration	In accordance with local national legislation (Suggested: every two years or every 7000 hours of service).
IP Protection Level	IP65
Finishing	Black painted hot galvanised shackle
Weight (w/o batteries)	1,2 Kg

## 7.1.3 DynaCell 0.5t – Main Body

Body	2024 T351 Aluminum
Anti-wear bushing	Stainless steel
Shackle compatibility	See page 22
WLL	500 kg
Safety factor	8:1
Data on the surface	Permanent laser engraving
Cylindrical Cap	Semi-transparent polycarbonate
Load accuracy	<1%
Periodic calibration	Every two years or every 7000 hours of service
IP protection level	IP65
Finishing	Matt black anodizing
Weight (w/o batteries)	300 g

## 7.1.4 DynaCell 5.0t – Main Body

Body	17-4 PH H925 Stainless Steel
Shackle compatibility	See page 22
WLL	5000 kg
Safety Factor	8:1
Data on the Surface	Permanent laser engraving
Cylindrical Cap	Semi-transparent polycarbonate
Load Accuracy	<1%
Periodic Calibration	Every 2 years or every 7000 hours of service
IP Protection Level	IP65
Weight (w/o batteries)	980 g

## 7.1.5 Gateway

### Network INPUT

Rated Voltage:	100-240 V ~ 50-60 Hz (AC)
Rated Current:	0.12A/115V 0.08/230V

### USB INPUT

Rated Voltage:	5 V ~ 50-60 Hz (DC)
Rated Current:	500mA

### Battery INPUT:

Nominal Voltage	 3.7V (DC)
Battery (Integrated):	Lithium 1 x 18650
Charging Time:	approx. 5Hrs

## 7.1.6 Repeater

### Network INPUT

Rated Voltage:	100-240 V ~ 50-60 Hz (AC)
Rated Current:	0.12A/115V 0.08/230V

### Battery INPUT:

Nominal Voltage	 3.7V (DC)
Battery (Integrated):	Lithium 1 x 18650
Charging time:	approx. 5Hrs

## 8 Safety Issues

**Read this manual's safety warnings, instructions, illustrations, and specifications.**



**Failure to follow all instructions listed below may result in serious injury.**

### 8.1.1 Safety in the workspace

Do not use load cells in possible explosive conditions, such as flammable liquids, gases, or dust. Keep children and bystanders away during the operation of a load cell. Distractions can make you lose control

### 8.1.2 Gateway and Repeater Electrical Safety

- The plugs of the Gateways and Repeaters must match the socket.
- Do not try to change the plug in any way.
- When using Gateways and Repeaters connected to the mains, avoid body contact with grounded surfaces, such as pipes, radiators, etc. The risk of electric shock significantly increases when the body is grounded.
- Do not expose gateways and repeaters to rain or moisture. Water entering a power supply device significantly increases the risk of electric shock.
- Do not overload the power cord. Never use the cable to carry, pull, or disconnect devices. Keep the cable away from heat, oil, sharp edges, or moving parts. Damaged or tangled cables significantly increase the risk of electric shock.
- When using an outdoor device, make sure to use an outdoor extension cord in order to reduce the risk of electric shock.
- If it is unavoidable to use a powered device in a wet place, use a power supply protected by a residual current device (RCD). The use of an RCD significantly reduces the risk of electric shock.

### **8.1.3 Personal Safety**

Be careful, pay attention to what you're doing, and use common sense when using a device powered by electricity. Do not use the device when you are tired or under the influence of drugs, alcohol, or medications. A moment of carelessness when operating electrical devices or load control devices can result in serious personal injuries.

Remove any hanging keys or tools before using the load cells. A hanging tool can fall and cause personal injury.

Don't let the familiarity gained from the frequent use of the tools, make you underestimate or ignore the safety standards when using these devices. Even a single negligent action can cause serious injuries in a fraction of a second.

### **8.1.4 Service**

Have load cells, gateways, and repeaters repaired by an expert, and make sure to use only original spare parts. This will ensure the safety of the devices.

## 9 Load Cell Use and Care

Do not force the Load Cell. Instead, use the correct load for your application. The correct Load Cell will do the job better and safer at the rate for which it was designed.

Maintain devices and accessories. Check for misalignment or binding of moving parts, breakage of parts and any other condition that may affect the devices' operation. If damaged, have the device repaired before use since poorly maintained devices cause many accidents.

Use the Load Cells, Gateways and Repeaters by following these instructions, considering the working conditions and the work to be performed. Using power devices and Load Cells for operations different from those intended could result in a hazardous situation.

## 10 Operational Cautions

Use the devices only with designated battery packs. The use of other battery packs may pose a risk of injury and fire.

In case of damaged batteries there may be leakage of liquid; avoid contact. In case of accidental contact, rinse with water. If the liquid comes into contact with the eyes, consult a doctor. Liquid expelled from the battery can cause irritation or burns.

Do not use damaged or modified batteries or devices. Damaged or modified batteries can behave unpredictably leading to fire, explosion, or risk of injuries.

Do not expose batteries or devices to fire or excessive temperatures. Exposure to fire or temperatures above 130 °C (265 °F) may cause explosions.



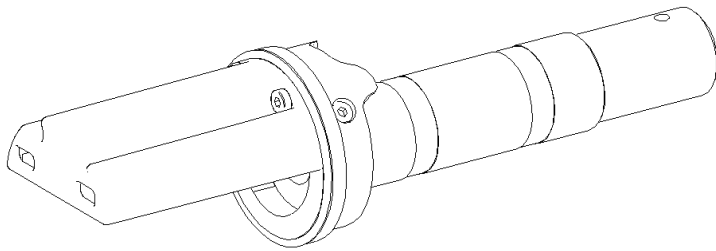
### **RISK OF EXPLOSION!**

**Never charge non-rechargeable batteries**

## 11 Before Use

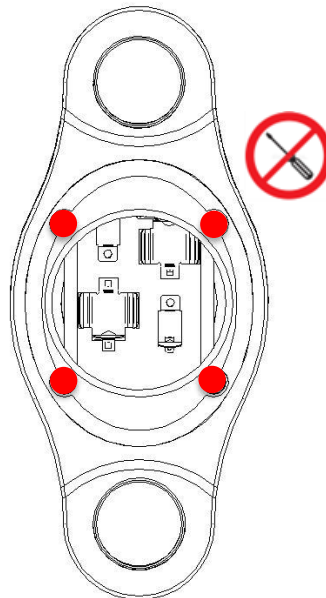
**The user is not allowed to open the PCB Holder in any model.**

The following assemblies are a unique piece



*Fig. 3 - Shackle Load Cell - Strain gauge pin*

**Parts that you must not remove on DynaCell**



*Fig. 4 - DynaCell Load Cell - Non-removable screws*



**WARNING**

**NEVER UNSCREW**

**For no reason should the screws of the frame be unscrewed**

**Tampering with these screws compromises the calibration of the cell**



## 12 Assembly Shackle Load Cell

Once the Shear Pin Load Cell, the Cylindrical Cap and the Aluminium Cylindrical Nut are tight together, start inserting this sub assembly inside the Shackle, **remembering to plug the bobbin**.

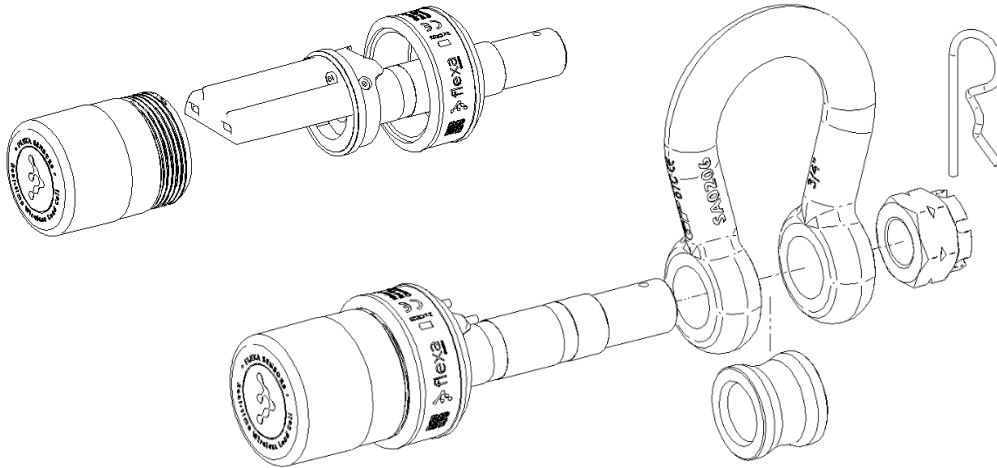


Fig. 5 – Shackle Load Cell - Assembly view

Make sure that the serial numbers always correspond to each other. Pairing with different serial codes alters the cell calibration data.

### WARNING

The serial numbers are marked on:

**Aluminum Cylindrical Nut**  
**Shackle**  
**Shear Pin Load Cell**

The **three serial numbers** MUST correspond each other.

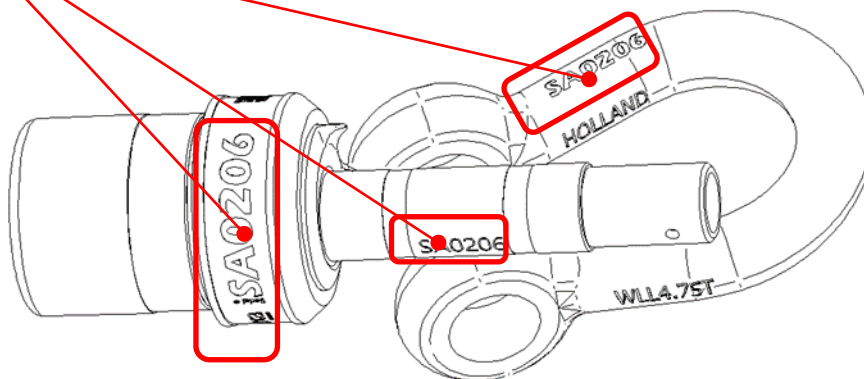
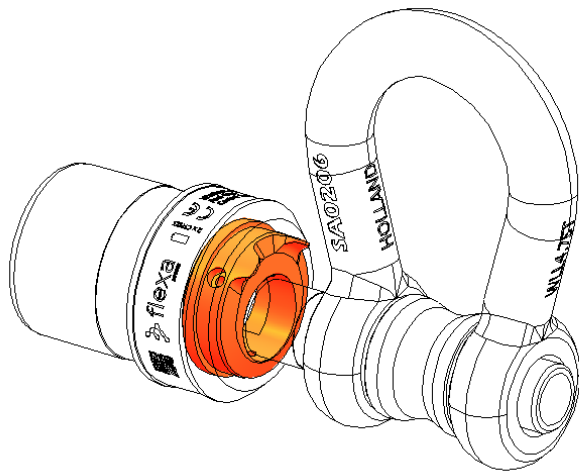


Fig. 6 – Shackle Load Cell - Matching serial codes

**Pay attention to the right positioning for the anti-rotation lock**



**The anti-rotation lock must wrap the shackle**

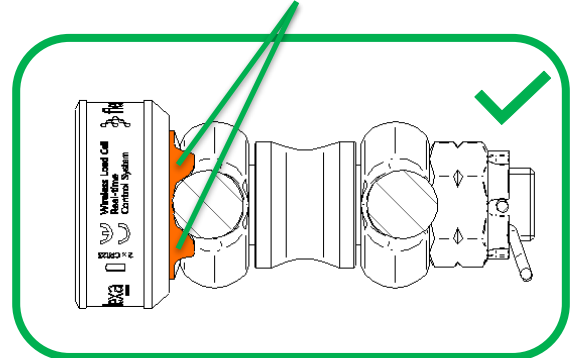


Fig. 7 – Shackle Load Cell – Antirotation lock

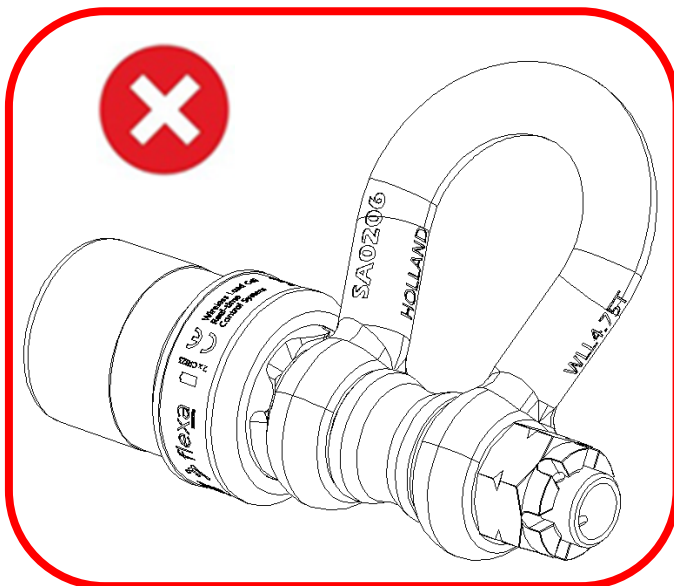


Fig. 8 – Shackle Load Cell – Lock in wrong position

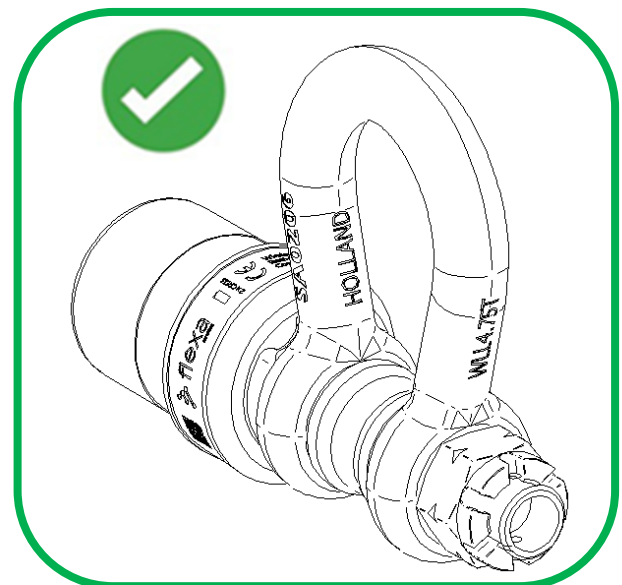


Fig. 9 – Shackle Load Cell – Lock in correct position

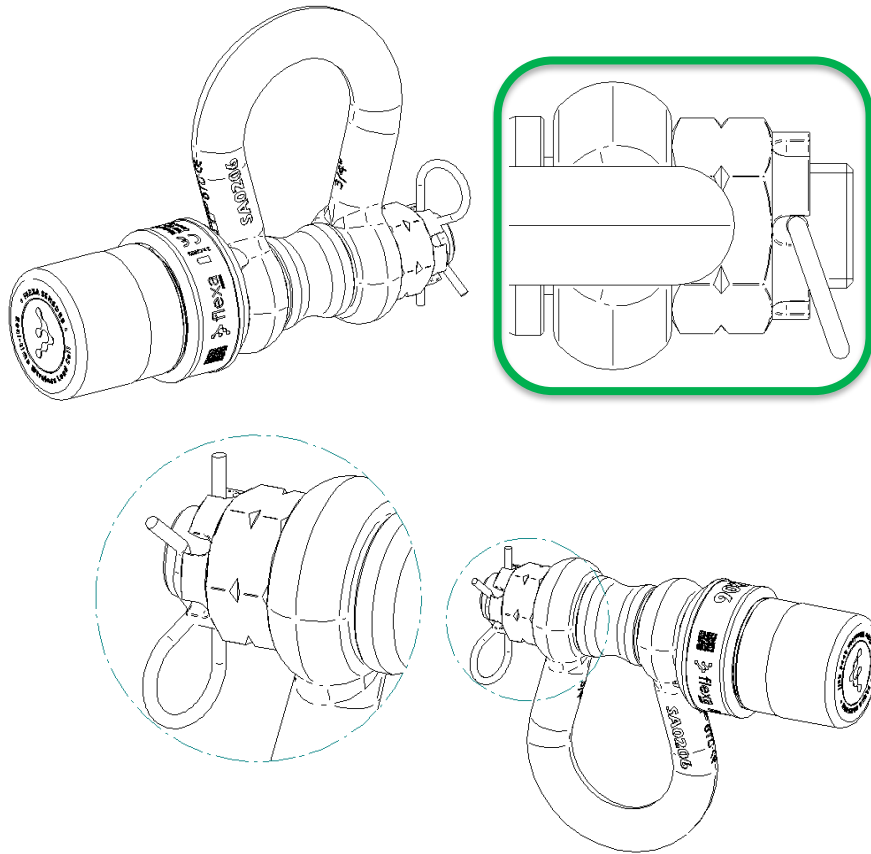
**⚠ WARNING**

**Note: If the anti-rotation does not fit in the right position, the load values are not read correctly.**

**Tight the Crown Nut M20 in the right position.**

You must tighten the nut properly. A too-tight or too-loose screwing would compromise the reading of the load data.

To do this, screw in the nut until it touches the shackle, then unscrew briefly until you can insert the cotter pin.



*Fig. 10 – Shackle Load Cell – Crown nut position*

**! WARNING**

**Note:** If the Nut is not tightened correctly, the loads are not read correctly.

**! WARNING**

**Note:** If the Nut is too loose, the loads are not read correctly, and the Shear Pin Load Cell could rotate.

## 13 Changing Batteries in Shackle L.C.

- 1) Unscrew the *Cylindrical Cap* and remove the old batteries. You do not need a tool.

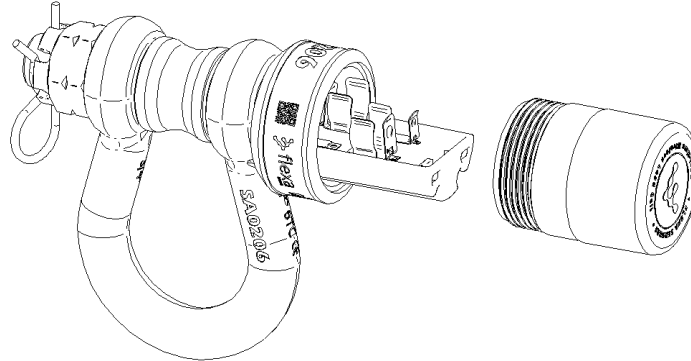


Fig. 11 – Shackle Load Cell – PCB enclosure opening

- 2) Insert the new batteries paying attention to the right polarity

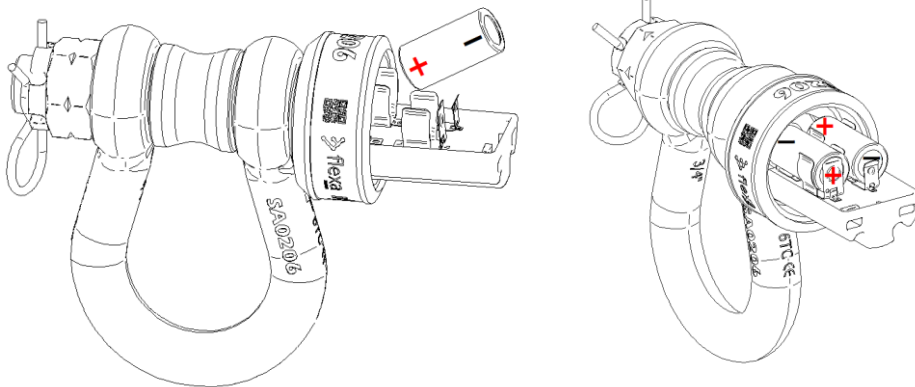


Fig. 12 – Shackle Load Cell – Battery insertion

- 3) Screw the Cap

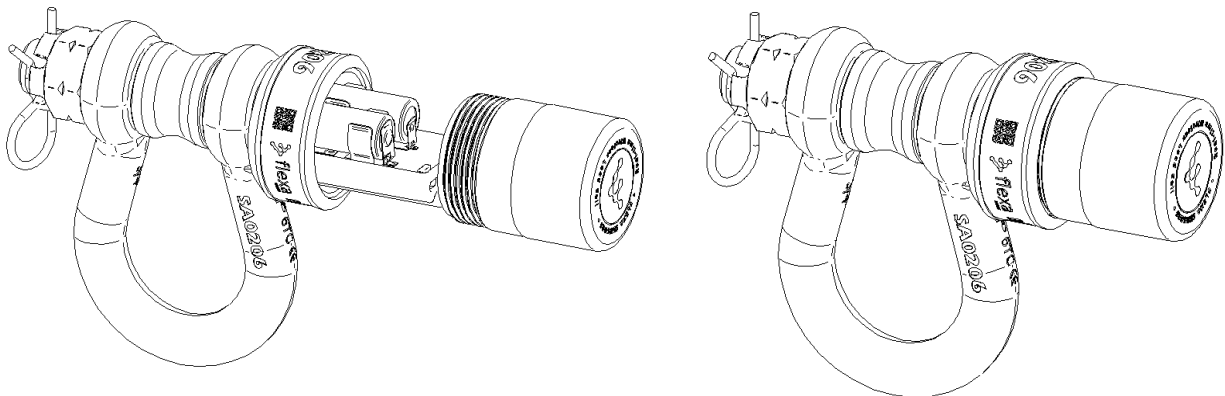


Fig. 13 – Shackle Load Cell – PCB enclosure closing

## 14 Load Cell's Batteries Polarity

Electronic load cell boards have reverse polarity protection.

The batteries are connected in series and generate a 6V voltage. All circuit components work at 3V. The voltage of the batteries is reduced to 3.1V so that the battery is used at a much lower voltage (each battery can be discharged up to 1.6V).

If one or both batteries are installed inverted, the device will not work. All components are protected, including the batteries themselves. The battery won't drain when one or both batteries are installed inverted.

The electronic circuit has the following characteristics:

1. Batteries in series.
2. All the components are protected from reverse connection of the battery.
3. Battery measurement circuit.
4. RF-friendly ultra-low power step-down converter.
5. ESD (electrostatic discharges) protection on PCB.

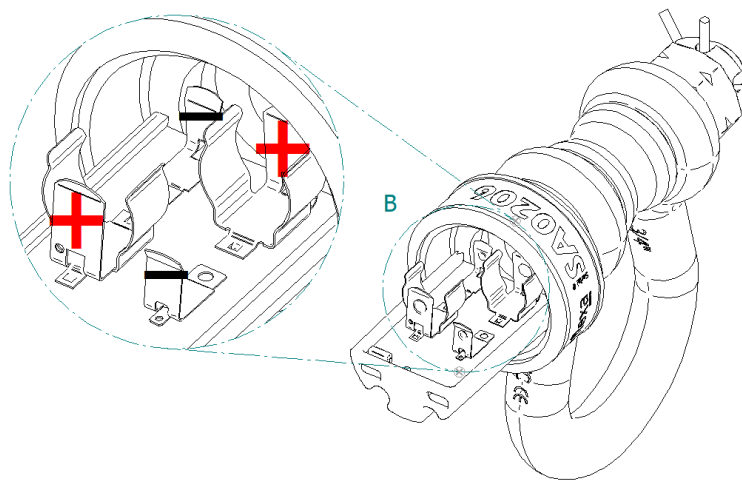


Fig. 14 – shackle Load Cell – Battery polarity

### WARNING

Preferably use **DURACELL Lithium 123 CR17345 3V** battery or equivalent brand. Using poor quality batteries may reduce Load Cell performance.

## 15 Changing Batteries in DynaCell

- 1) Unscrew the round cap and remove the old batteries. You do not need a tool.

The side from which to access the batteries is the one where the four screws are all **raw silver**.

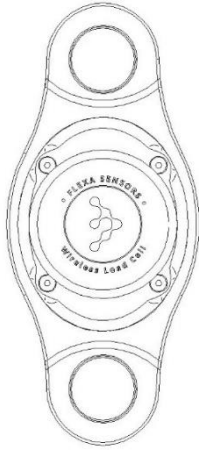
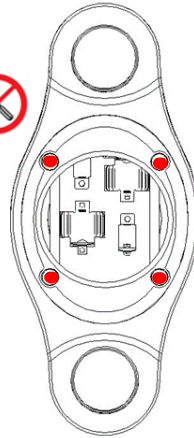


Fig. 15 – DynaCell Load Cell  
battery side – Raw Screws



### NEVER UNSCREW

You should never unscrew the screws of the frame.

Tampering with these screws compromises the calibration of the cell. Changing the tightening of the screws or disassembling the main body compromises the Load Cell calibration and the warranty validity.



### WARNING

Fig. 16 – DynaCell Load Cell - Non-removable screws

### + INFO



**Note:** the side where one of the screws is **orange** is the side where the LED and the magnetic REED are located (see page 24). You can access the battery compartment on the opposite side.

- 2) Insert the new batteries paying attention to the right polarity

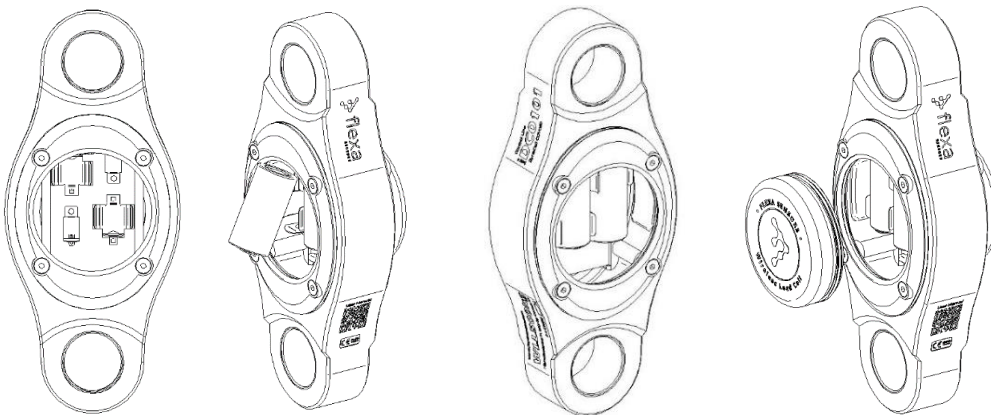
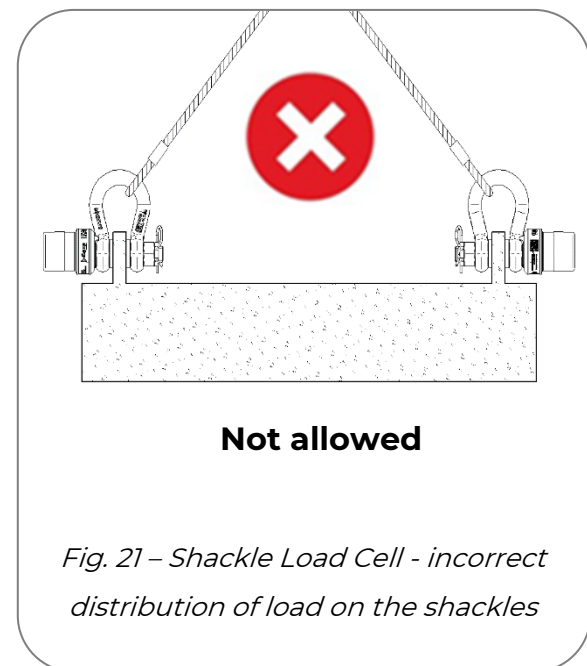
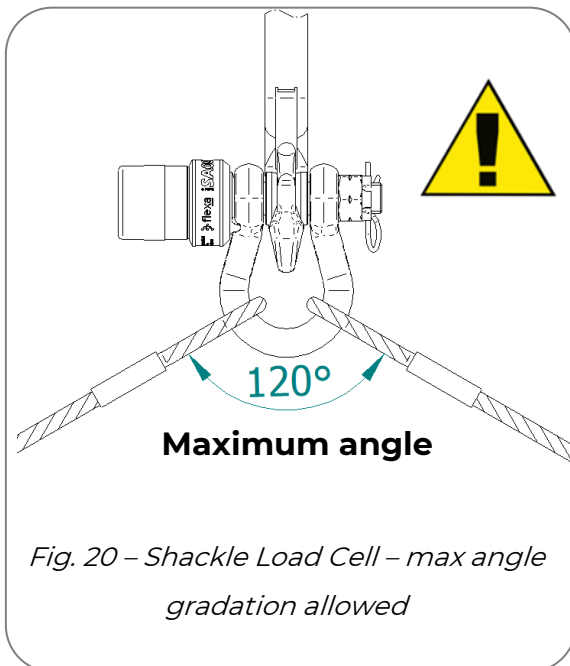
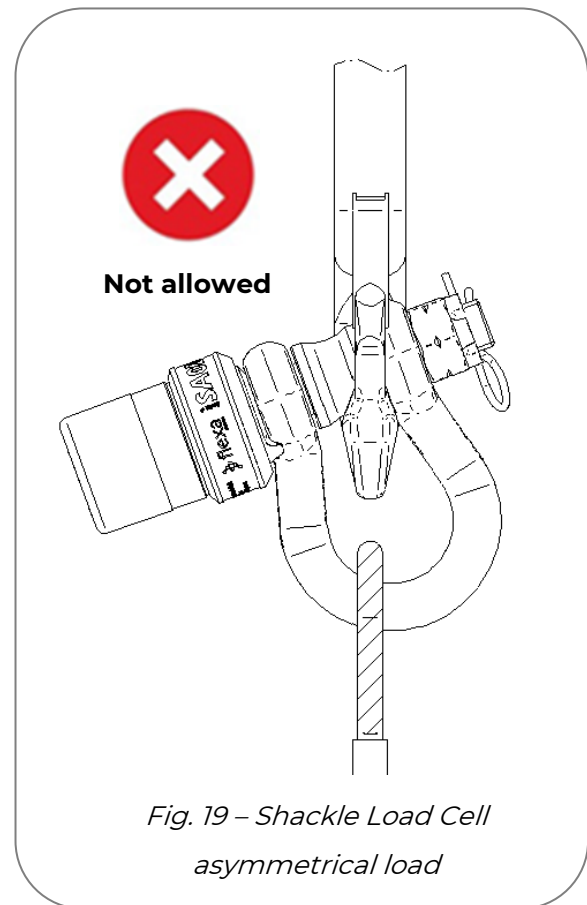
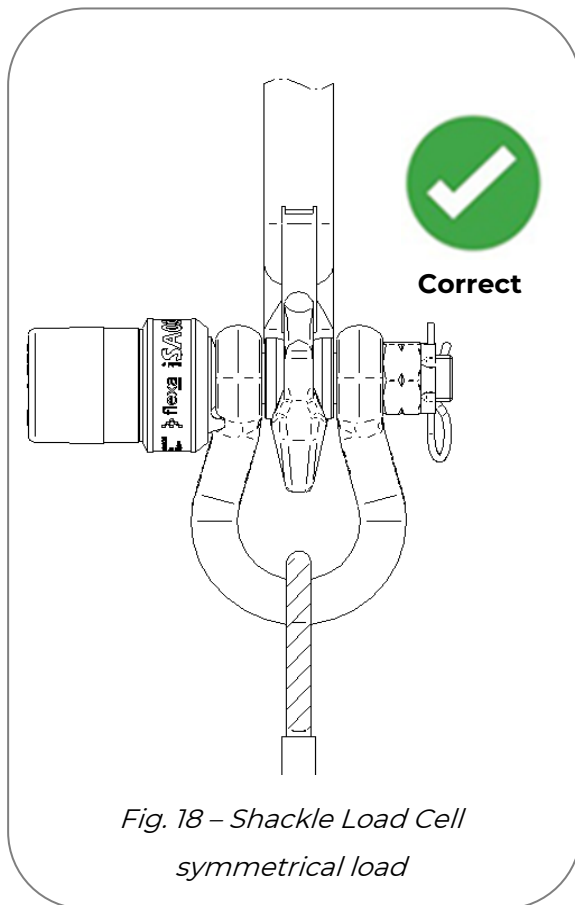


Fig. 17 – DynaCell Load Cell – Battery changing

- 3) Screw the round cap

## 16 Shackle Load Cell Operations



## 17 DynaCell Load Cell

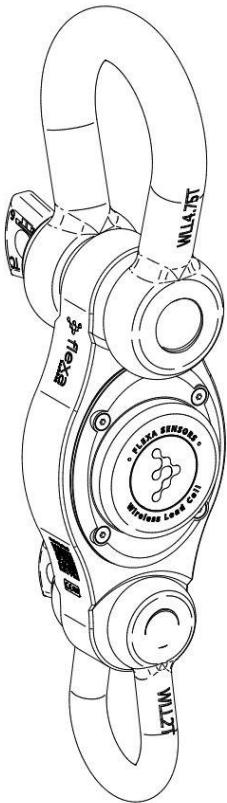


Fig. 24 - DynaCell  
Load Cell  
Multi shackle fitting

### DynaCell 5.0 t

DynaCell 5.0t houses  
3.25 t and 4.75 t shackles.

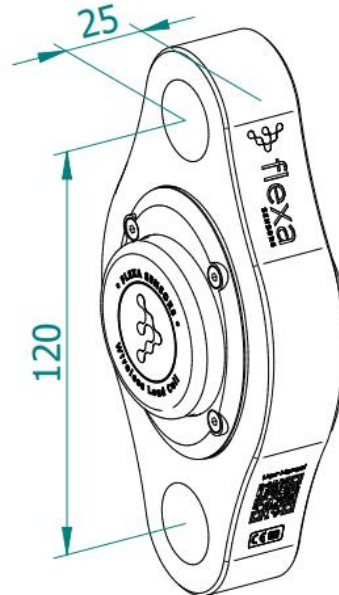


Fig. 22 - DynaCell 5.0t - Measurements



### DynaCell 0.5 t

DynaCell 0.5t houses  
2.0 t, 3.25 t and 4.75 t shackles.

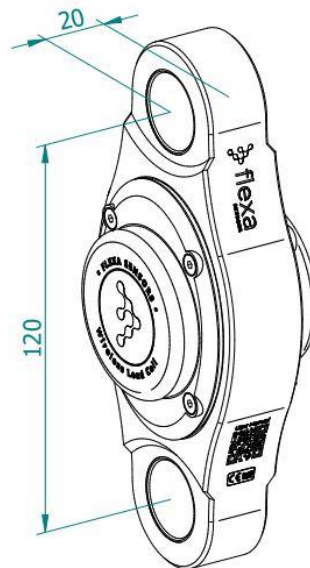


Fig. 23 - DynaCell 0.5t - Measurements



Regardless of the shackles used,  
the WLL must never exceed 500 kg



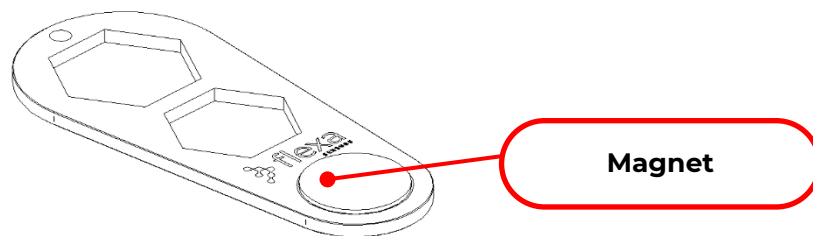
## 18 On/Off and LED's colour meaning

Each device of the Flexa Real-time line turns ON and OFF by bringing the magnetic key (or any other magnet) closer to the area that covers the magnetic switch (REED Switch).

### 18.1.1 The Magnetic Key

The magnetic key is a stainless-steel tool with a built-in magnet disc. The two hex holes unscrew the pin bolts on the shackle cells.

The time necessary to keep the magnet near the magnetic switch to turn on and shut off the devices is at least **500 milliseconds**.



*Fig. 25 – The Magnetic Key*

## 18.1.2 Magnetic Switch Position on Load Cells

Fig. 26 – DynaCell Load Cell  
mag. switch area

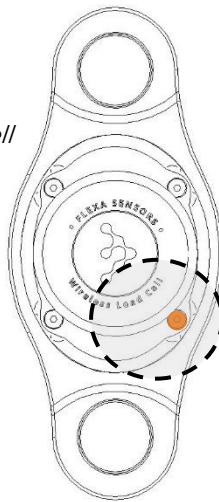
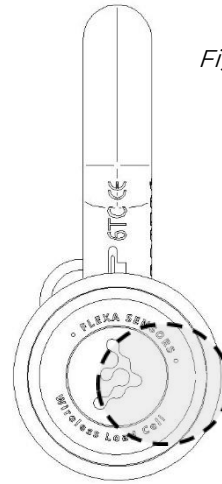


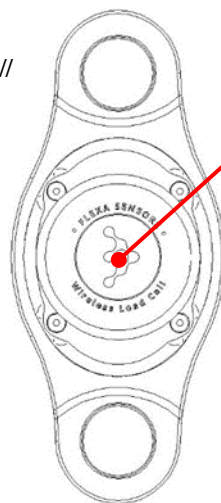
Fig. 27 – Shackle Load Cell  
mag. switch area



In DynaCell models, the magnetic area is behind the **orange screw**

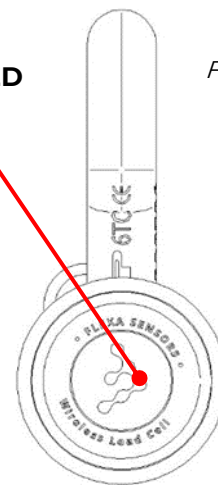
## 18.1.3 LED's Colour Meaning on Load Cells

Fig. 29 – DynaCell Load Cell  
RGB LED position



**RGB LED**

Fig. 28 – Shackle Load Cell  
RGB LED position



**BLUE:** 3 flashes / 2" pause / 3 flashes = cell switched on with Mag Key

**BLUE:** 5 flashes / 5" pause = cell is searching for the network

**GREEN:** On for 2" = Okay connection with the Gateway or Repeater

**MAGENTA + BLUE:** Blinks every minute if it finds no Gateway or Repeater is found

**MAGENTA:** Lit for 1ms for each transmission to the Gateway or Repeater

**RED + MAGENTA:** RED flashes twice and MAGENTA twice = after this sequence, the cell is off

## 18.1.4 Magnetic Switch Position on Gateway/Repeater

Like the Load Cells, the Gateway and the Repeater are switched on and off by a magnetic switch.

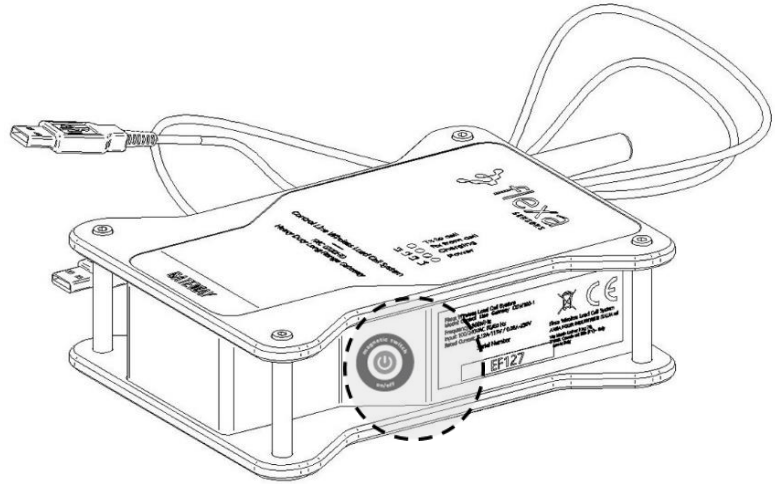


Fig. 30 – Gateway – magnetic switch area

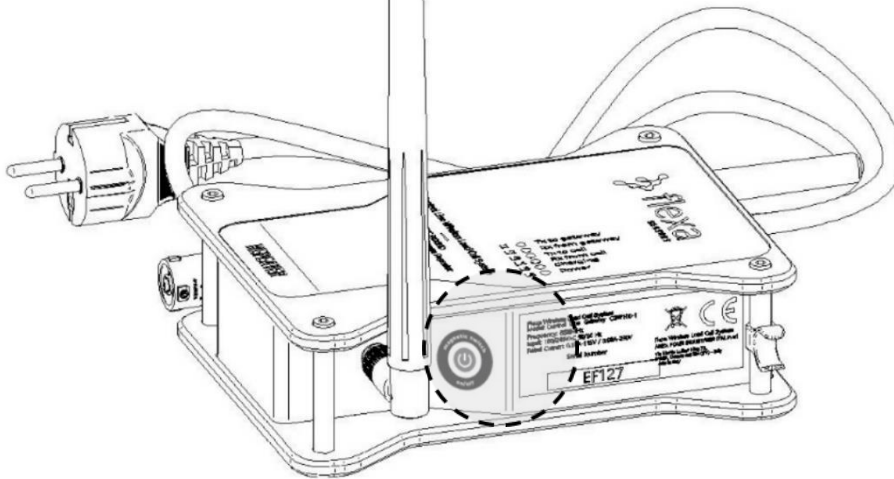


Fig. 31 – Repeater – magnetic switch area



Bring the magnetic key (or any other magnet) close to this symbol

## 18.1.5 LED's Colour Meaning on Gateway

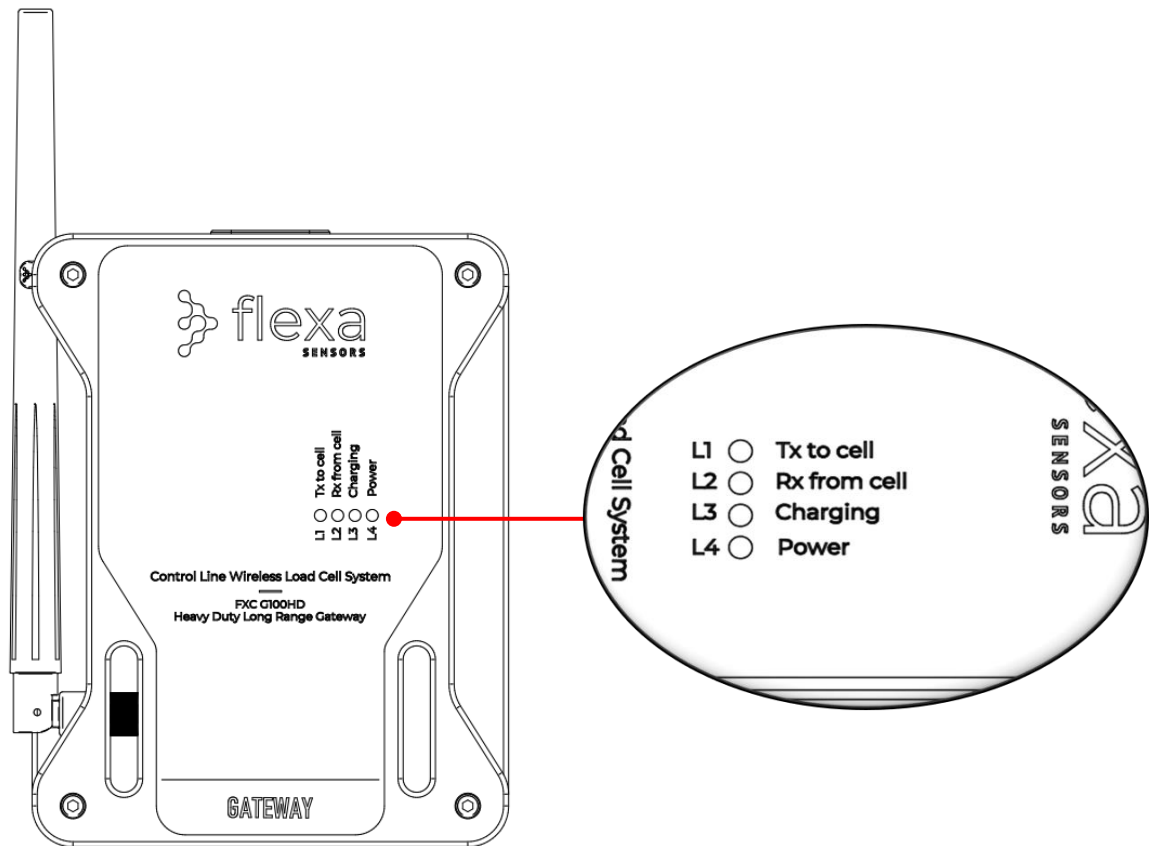


Fig. 32 – Gateway – RGB LED position and colour codes

<b>L1 TX:</b>	<b>BLUE ON</b> during transmission to the cell
<b>L2 RX:</b>	<b>GREEN ON</b> when receiving from the cell
<b>L3 CH:</b>	<b>RED ON</b> (low battery) <b>FLASHING YELLOW</b> (battery charging) <b>YELLOW ON</b> (battery full)
<b>L4 PW:</b>	<b>RED ON</b> (AC disconnected, battery or USB operation) <b>CYAN ON</b> (AC connected)

## 18.1.6 LED's Colour Meaning on Repeater

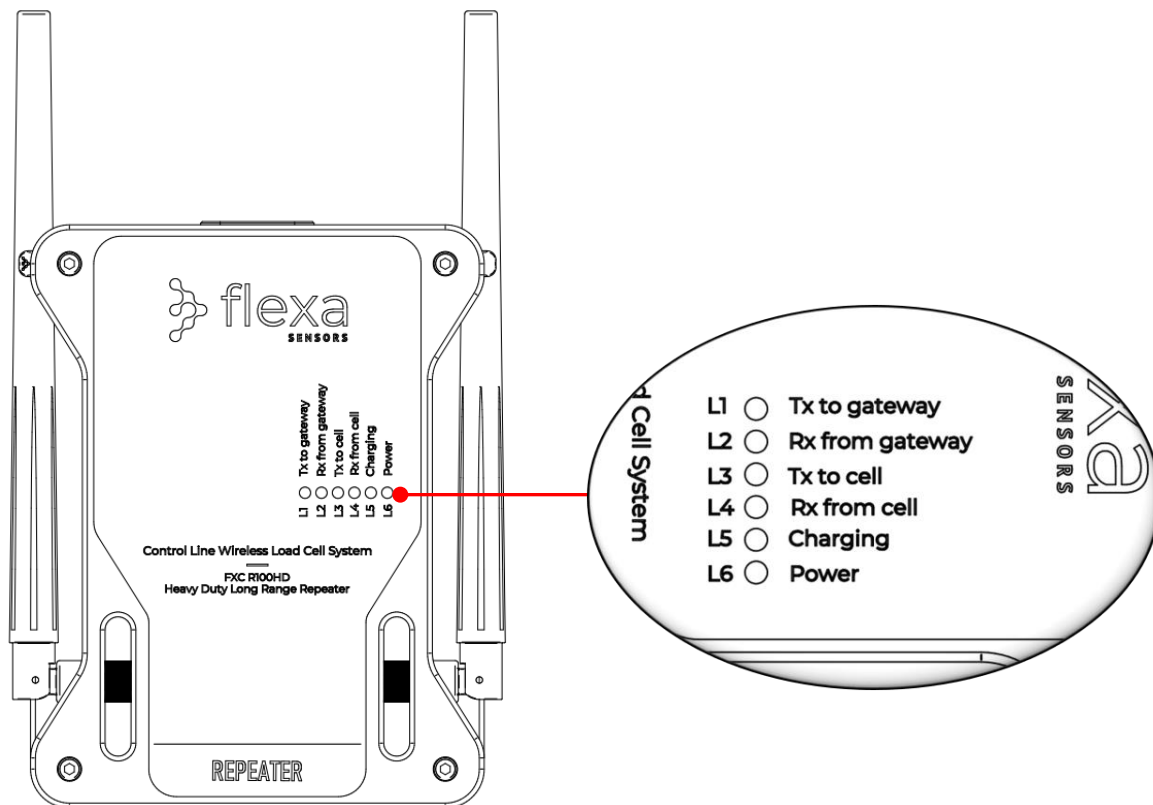


Fig. 33 – Repeater – RGB LED position and colour codes

<b>L1 TX:</b>	<b>BLUE ON</b> during transmission to the Gateway
<b>L2 RX:</b>	<b>GREEN ON</b> when receiving from the Gateway
<b>L3 TX:</b>	<b>BLUE ON</b> during transmission to the cell
<b>L4 RX:</b>	<b>GREEN ON</b> when receiving from the cell
<b>L5 CH:</b>	<b>RED ON</b> (low battery) <b>FLASHING YELLOW</b> (battery charging) <b>YELLOW ON</b> (battery full)
<b>L6 PW:</b>	<b>RED ON</b> (AC disconnected - battery operation) <b>CYAN ON</b> (AC connected)

## 19 Flexa Software



Before reading, go to <http://www.flexasensors.com> and watch the video tutorials. It helps you to familiarise yourself with all functions of the devices and software.

### 19.1.1 System requirement

- PC hardware
- Min. 4 GB RAM working memory
- One free USB 2.0 port
- CPU Intel i5 2nd gen or higher
- Windows 10
- You will require Internet connection only to download the updates

### 19.1.2 Installation Process

- a) **Download the Flexa Software from the internet site [www.flexasensors.com](http://www.flexasensors.com)**
- b) Unzip the downloaded files in a new folder (e.g., C:\Program Files\Flexa)
- c) The new folder will contain flexa\_files folder and flexa.exe file
- d) Double click on flexa.exe to launch the program

### 19.1.3 Software Updates

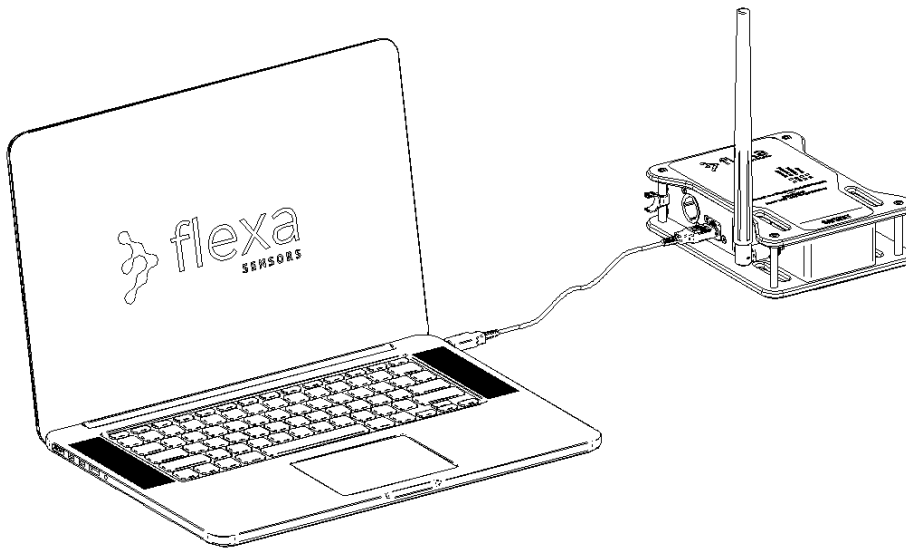
When the PC is connected to the Internet while Flexa Software is running, it will **automatically check** if some **updates are available**.

If so, the software will ask you whether you want to **download the updates**.

## 20 Flexa Software – First use

### 20.1.1 Gateway connection

Connect the Gateway to the PC with the provided USB A - USB A cable.



*Fig. 34 – Gateway connected to PC with USB A cable*

### 20.1.2 Software Launch



Launch the **Flexa Software** just double clicking on the shortcut in the screen or double clicking on the **flexa.exe** file.

# 21 How the System Operates

## 21.1.1 Cell / Gateway / Repeater communication

The calibration parameters are saved in the cell's memory.

At each transmission, the cell waits for a response message from the Gateway or Repeater.

If there is no response from the Gateway or Repeater, the cell starts searching again. This is an energy-intensive operation.

Each cycle consists of two phases: sending and receiving.

The sending phase is distinguished by a blue flash and the receiving phase by a red one.

These two operations happen in a very short time frame (milliseconds), so the color of the flash appears magenta. (blue + red). You can check the meaning of the LED colors on page 24.

If the current cell was already associated with the PC, it will be automatically recognized.

During the first pairing transmission, the cell sends its serial number, calibration parameters, and ADC value to the Gateway.

**These parameters are saved in the Flexa software.**

During this phase, the load cell flashes with stronger intensity.

## 21.1.2 Transfer from PC to PC

All settings are stored in a folder on the PC where the cells were stored. You can transfer the entire folder to another PC by following these steps:

- Download the Flexa Control software to the new PC
- On the PC paired with the cells, compress the folder "flexa\_2.2.16" (or higher version) with all subfolders and files in it (see attached image) into a file .zip
- Copy the entire folder "flexa\_2.2.16.zip".
- Paste the entire folder "flexa\_2.2.16.zip" on the new PC
- Launch the Flexa Control Software on new PC

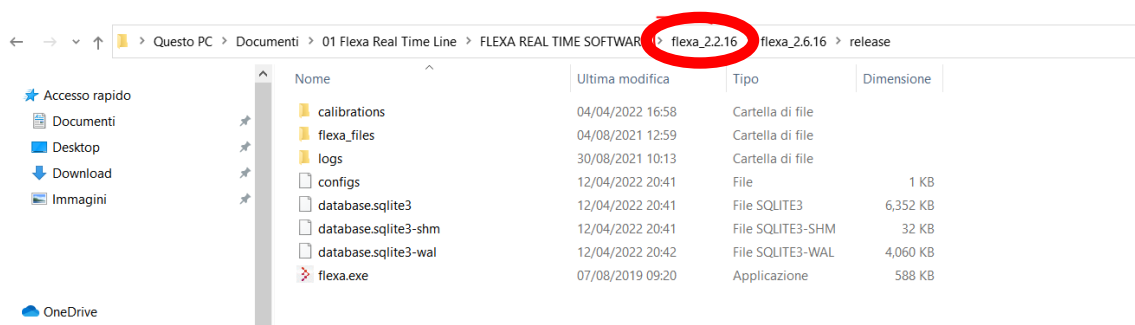


Fig. 35 – Flexa Control Software – Transfer folder from PC to PC



## 22 Flexa Software

How to optimise Flexa Software for the Real-time Wireless Load Cell System.

Flexa Software and its Graphical User Interface (GUI) controls Load Cells and their parameters.

The two main pages of Flexa Control Software: **Home Page** and **Editing Page**

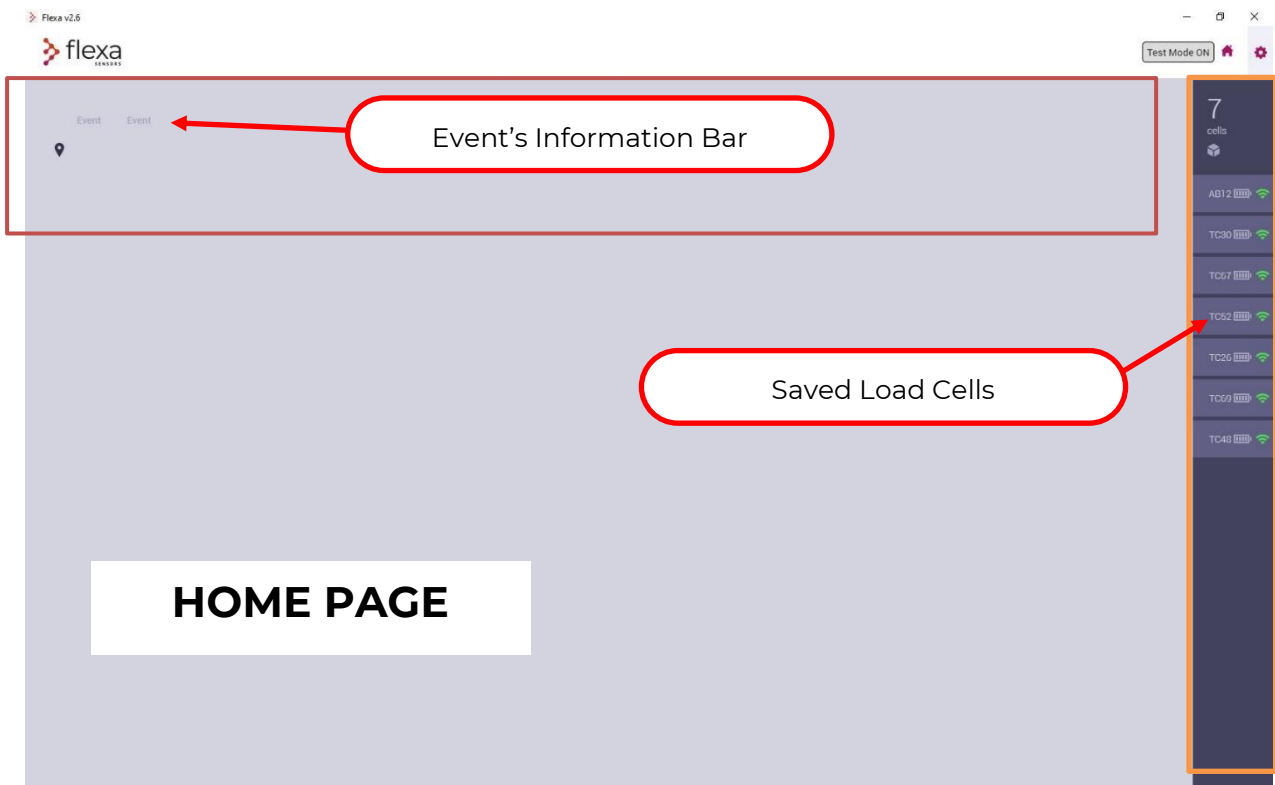


Fig. 36 – Flexa Control Software - Home page

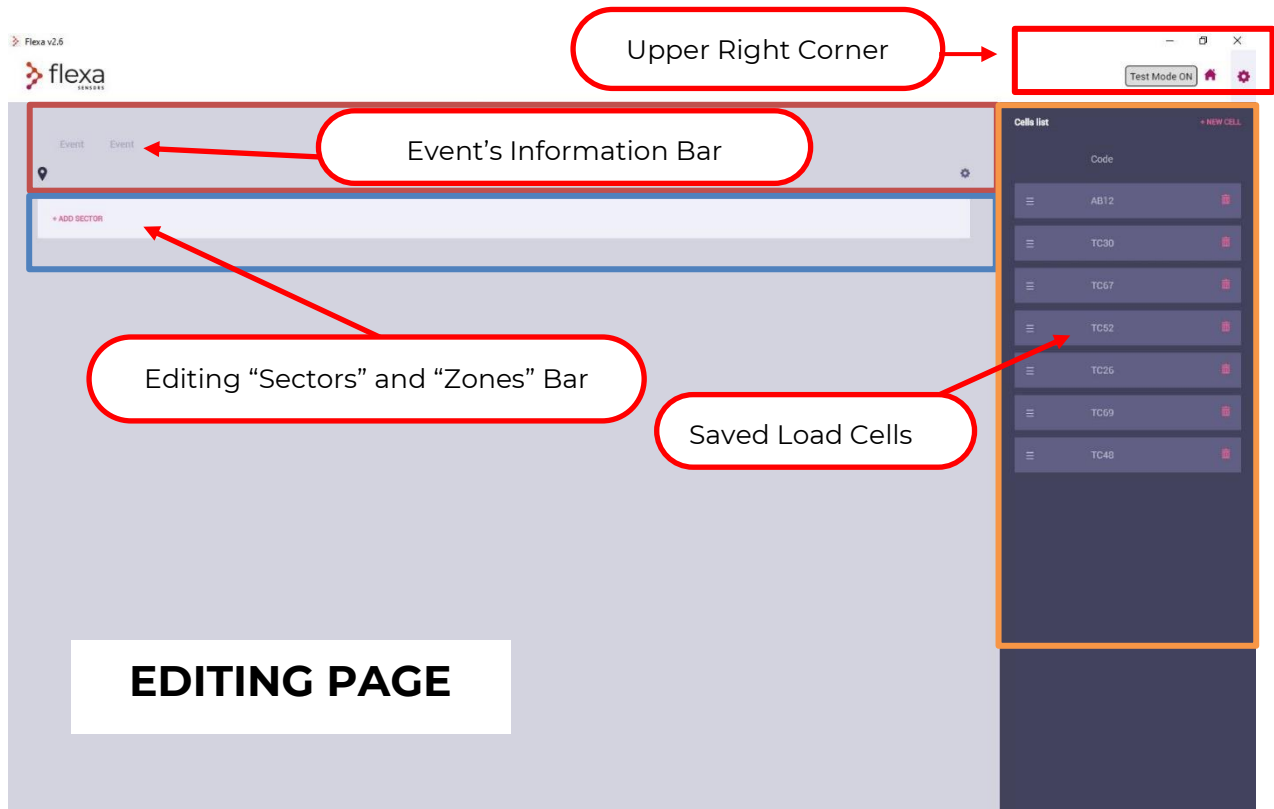


Fig. 37 – Flexa Control Software – Editing page

Click on the icons in the upper right corner to switch from one page to the other.

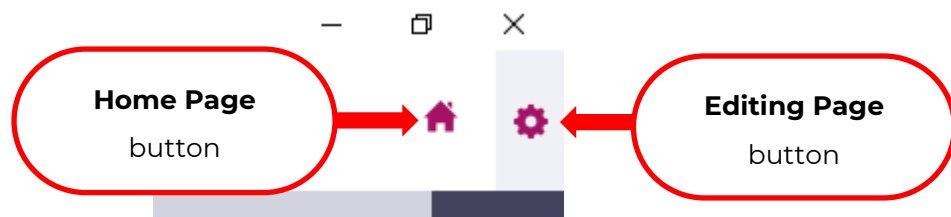


Fig. 38 – Flexa Control Software – Home/Editing buttons

## 22.1.1 Gateway Configuration

A quick Gateway configuration is required the **first time** you set up the Flexa network.

Click on **EDIT GATEWAY CONFIGURATION** to open the pop-up to choose the frequency and choose between the **Gateway only** configuration (network without Repeater) or **Gateway and Repeaters** (in case there is a need to cover greater distances between the Gateway and the cells)

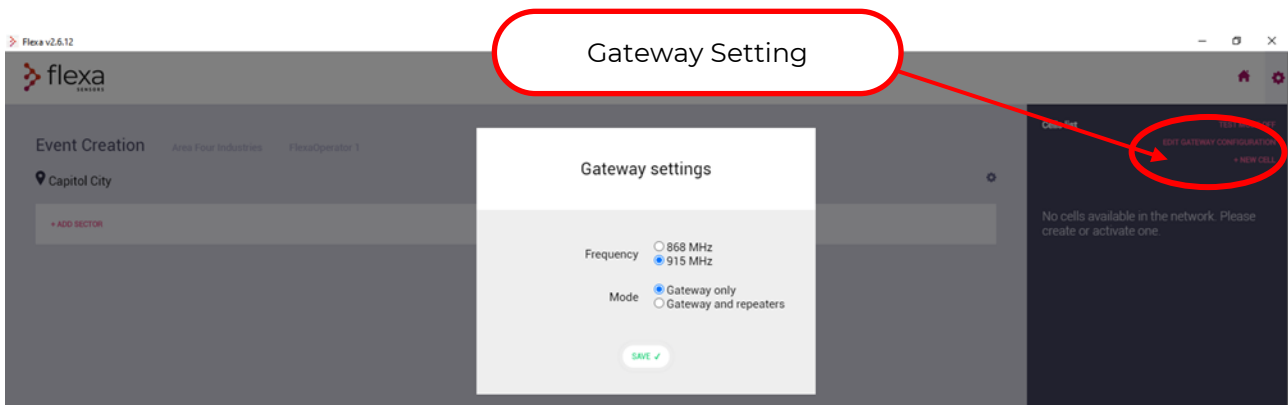


Fig. 39 - Flexa Control Software – Gateway setting

### A) Select Frequency:

**868MHz** is to be set if you are operating in these areas:

Europe – Middle Est – South Africa (India adopts 867MHz – special firmware available)

**915MHz** is to be set if you are operating in these areas:

USA, Canada, Australia

A more detailed list of countries where these frequencies are allowed is available on the **FAQ / Word Wide Frequency Map** section on [www.flexasensors.com](http://www.flexasensors.com).

**Attention:** Each Gateway leaves the factory with its **own established radio frequency and cannot be changed**. The choice between these two frequencies is only to communicate to the Flexa software on which radio frequency the Gateway works.

### B) Select Mode:

- **Gateway only** configuration (network without Repeater).
- **Gateway and Repeater** configuration (with one or more Repeaters in the network)

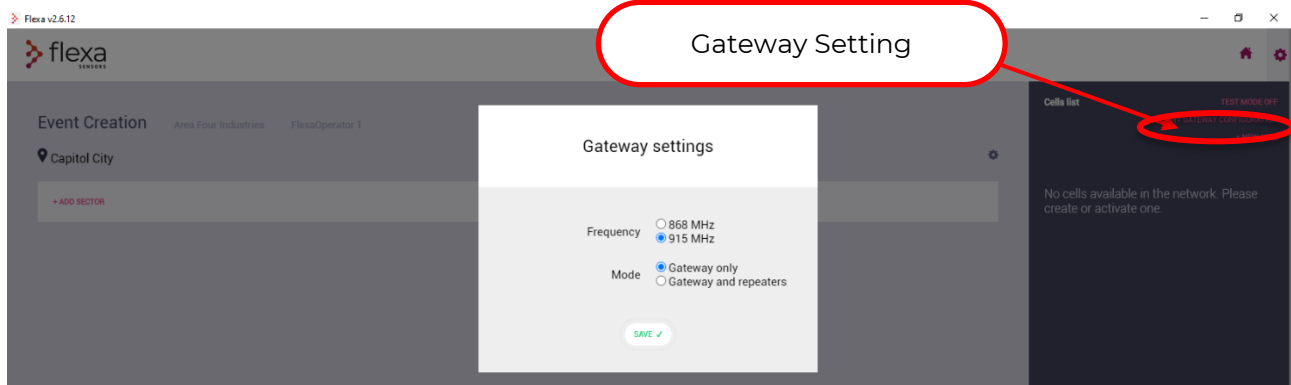


Fig. 40 - Flexa Control Software – Gateway setting

### 22.1.2 Add a Repeater in the Network

If the system is already working with the "Gateway only" mode and you want to add a Repeater:

- 1) Switch the Gateway OFF and ON again. Select **Gateway and Repeaters** mode
- 2) Turn ON the Repeater
- 3) Wait for Load Cells to connect to Repeater. The connection takes place through a registration process. The delay in connecting the load cells with the Repeater depends on the number of active load cells.

Each load cell will search for the Repeater or Gateway every 5 seconds; if all Load Cells attempt to connect to the Repeater at the same time, only one will register, and the other cells will automatically restart the recording process.

**Please be patient until the whole process is completed.**

### 22.1.3 Turn OFF the Repeater

- 1) Check (on PC) if the Gateway is working with "Gateway Only" mode. If the repeater mode is active (Gateway and Repeaters), switch to "Gateway only" and wait 3 seconds. (The time it takes for all load cells to connect to the Gateway depends on the number of load cells in the network.) Please be patient.
- 2) Turn OFF the Repeater with the magnetic key (When the Gateway is in "Gateway only" mode, the **Repeater must be turned OFF** otherwise some cells can connect to the Repeater, but their data will be lost).

## 22.1.4 Demo Mode (TEST MODE ON)

The "**TEST MODE ON**" button activates the test mode, and the "**TEST MODE OFF**" deactivates it.

With test mode, you can recreate a mock cell environment to simulate an event or learn how to use the program.

You can, therefore, use the software without having the cells physically connected.

The system automatically creates a code for each **dummy cell with TC initials** (Test Cell).

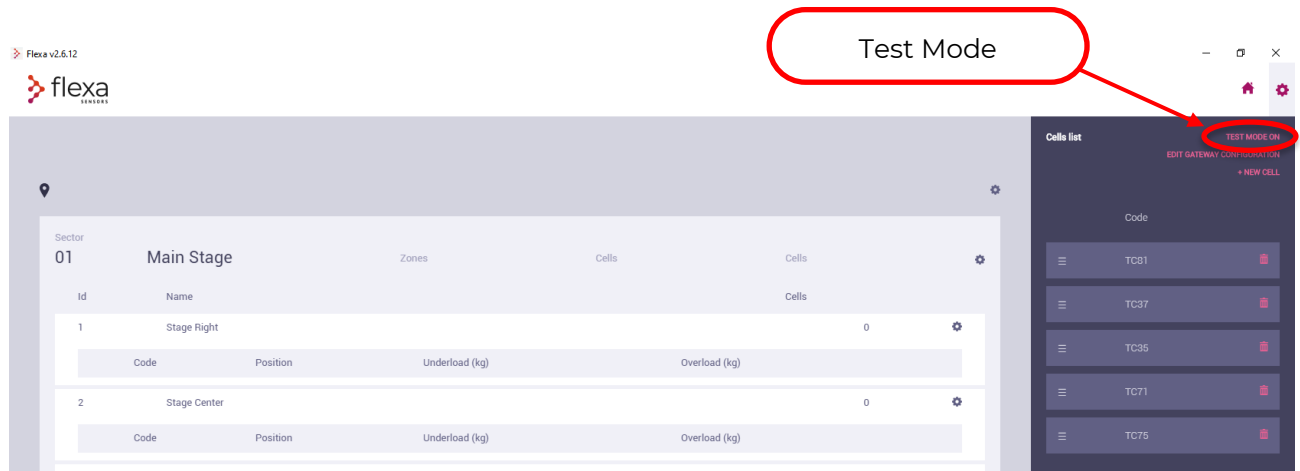


Fig. 41 – Flexa Control Software – Demo mode



Note: If you have to control **real Load Cells**, be sure the demo mode is deactivated: the test mode button must be in "**Test Mode OFF**".

## 22.1.5 Add New Cell

Go into the Setting Page in Flexa Software

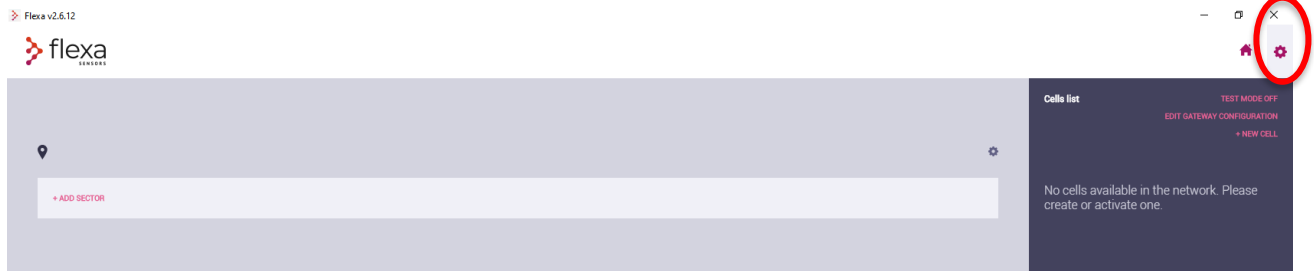


Fig. 42 – Flexa Control software – Add new cell – step 1

If this is **your first-time pairing cells to your PC**, turn ON the cells one at a time. When the LED on the cell **blinks green**, it means that the cell has been successfully connected to the Gateway. Wait for the program to recognize the cell code before turning ON the next cell. When the Gateway recognizes a cell, the message "NEW CELL FOUND" appears in the cell list.

Once the cell has been recognized, you must **TURN it OFF** and repeat the procedure **for each of the other cells**



Fig. 43 – Flexa Control Software – Add new cell – step 2

Once recognized, the cell will appear with its code in the list of active cells, in the right column.



Fig. 44 – Flexa Control Software – add new cell – step 3

At first use, carefully check that the code shown on the screen is **the same code marked in the body** of the Load Cell.

Now you can proceed with the **Event's configuration**, filling **Zone** and **Sector** fields on your PC. Once created at least one Zone, you can fill it by dragging and dropping the available cells from the Cell List.

### 22.1.6 Control the Set-up

Once finished to populate the Zones, return to the Home Page.

Now you can check all the Load Cells in the network.

+ INFO 

For other settings, please check the tutorials on [www.flexasensors.com](http://www.flexasensors.com)

### 22.1.7 Event's configuration

In the Editing Page, click on the Edit Button

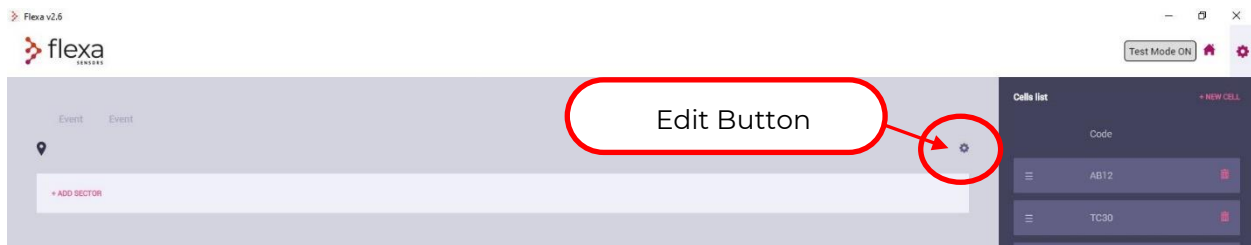


Fig. 45 – Flexa Control Software – Event's configuration – Step 1

Once clicked, you can fill in the data regarding your Event

*Company Name – Operator – Begin Date – End Date – Event's Name – Event's Address*



Fig. 46 – Flexa Control software – Event's configuration – Step 2

## 22.1.8 Add a Sector

For every Event you can create different Sectors by clicking on **+ADD SECTOR** button. Every Sector can have its own ID and Description.  
(e.g., *Main Stage*, *Delay Tower 1*, *Side Stage* and so on).

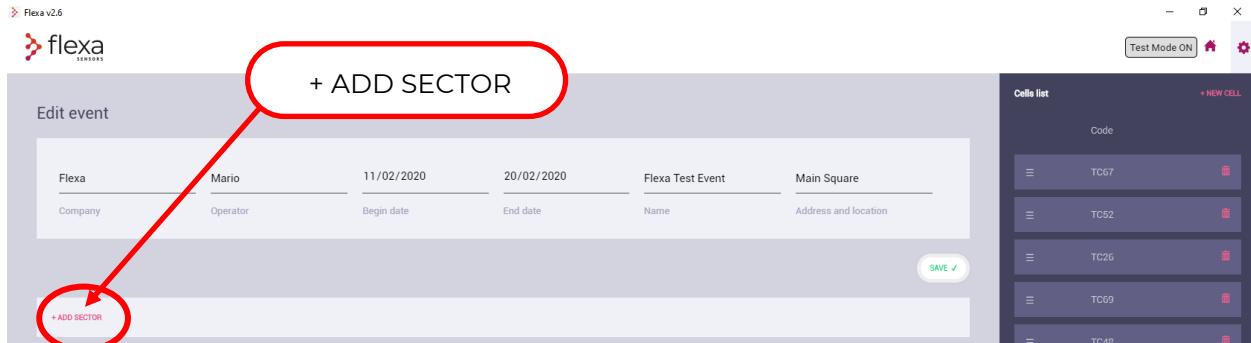


Fig. 47 – Flexa Control Software – Add Sector – Step 1



Fig. 48 – Flexa Control Software – Add Sector – Step 2

Once clicked, fill in the data about the Sector's ID and Description  
Click + ADD SECTOR to create a new sector.



## 22.1.1 Add a Zone

For every Sector you can have different Zones. To create a new Zone, you click on the **+ADD ZONE** button, fill in the editable fields, and then click the **SAVE** button.

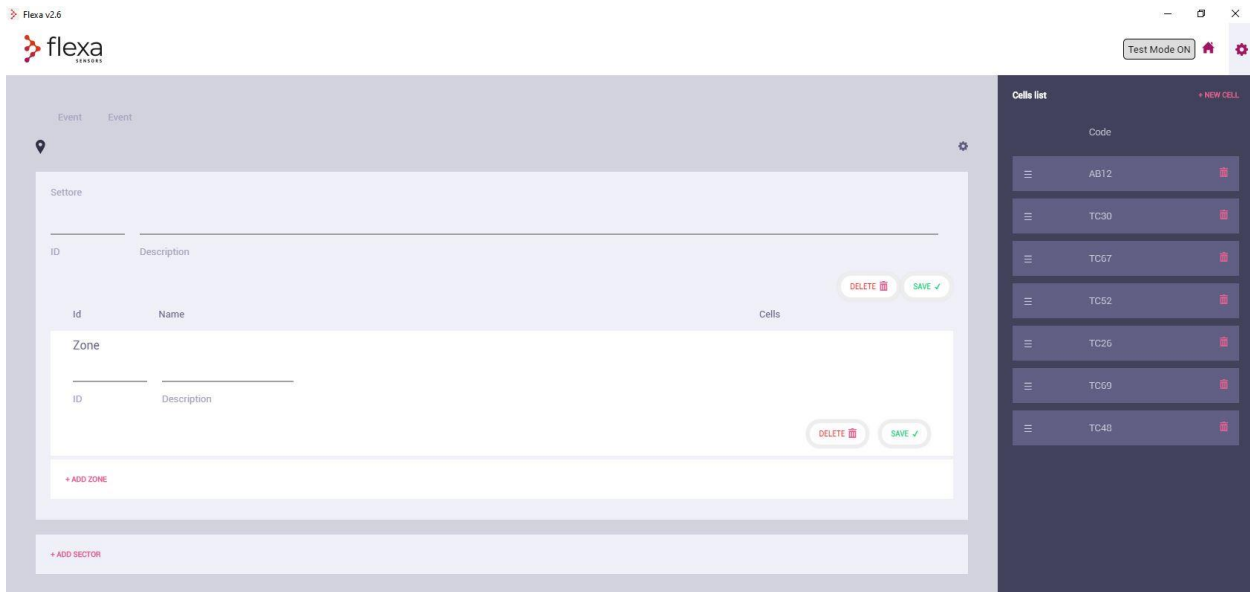


Fig. 49 – Flexa Control Software – Add Zone – step 1

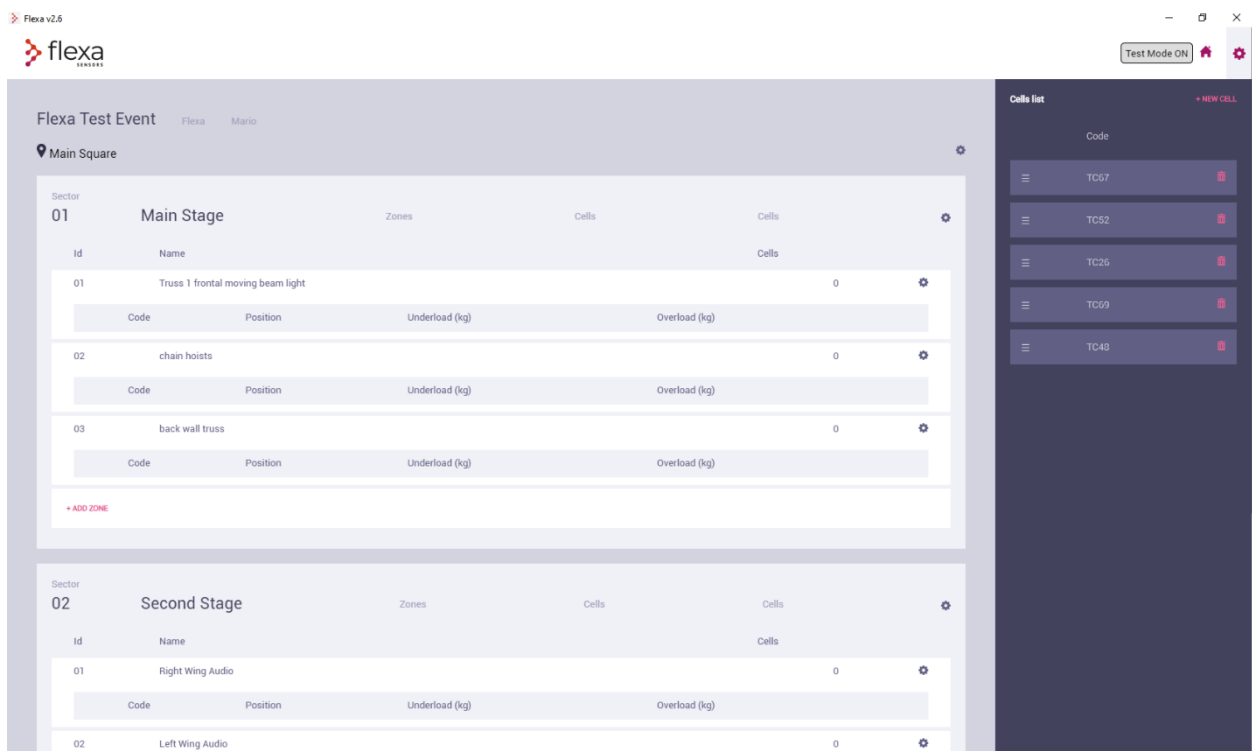


Fig. 50 – Flexa Control software – Add Zone – Step 2

## 22.1.2 Parameter Setting

Once you have finished populating the Zones, go back to the Home Page.  
Now you can check all the Load Cells in the network.

## 22.1.3 Attribution of new Load Cells to an Event

Once you have created your Event with Sectors and Zones, the list of all active load cells is on the right side. To assign a specific Load Cell to a single Zone, take a single cell from the "Cell list", drag it to the desired Zone, and left-click on the dotted area.

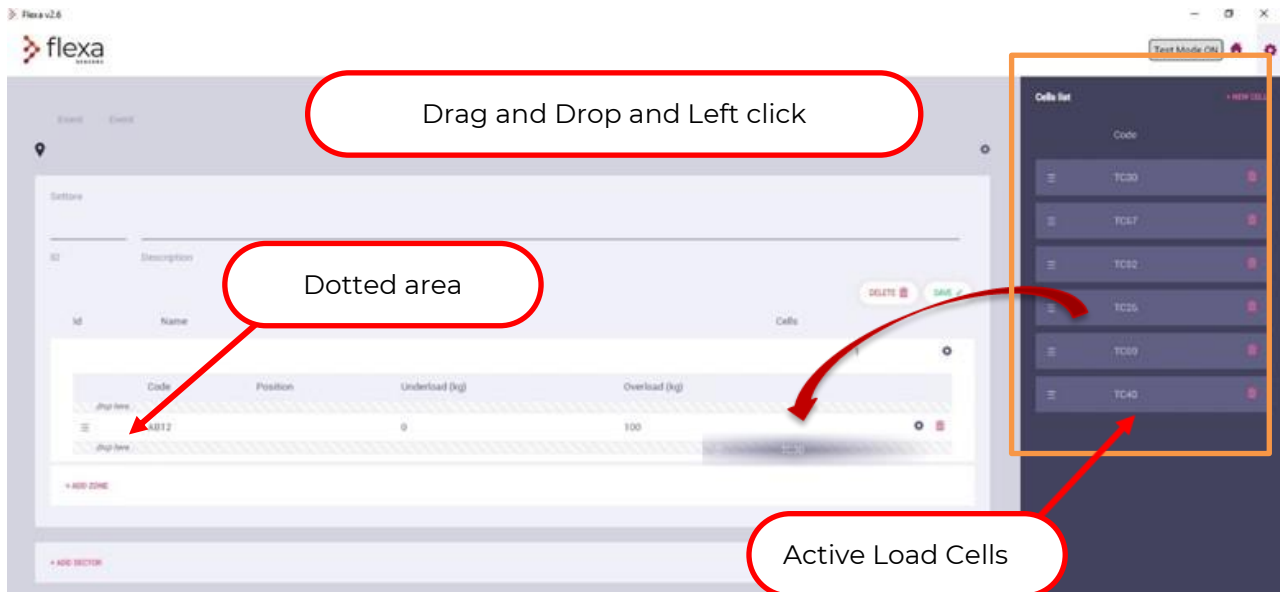


Fig. 52 - Flexa Control software – Drag active cells into current event

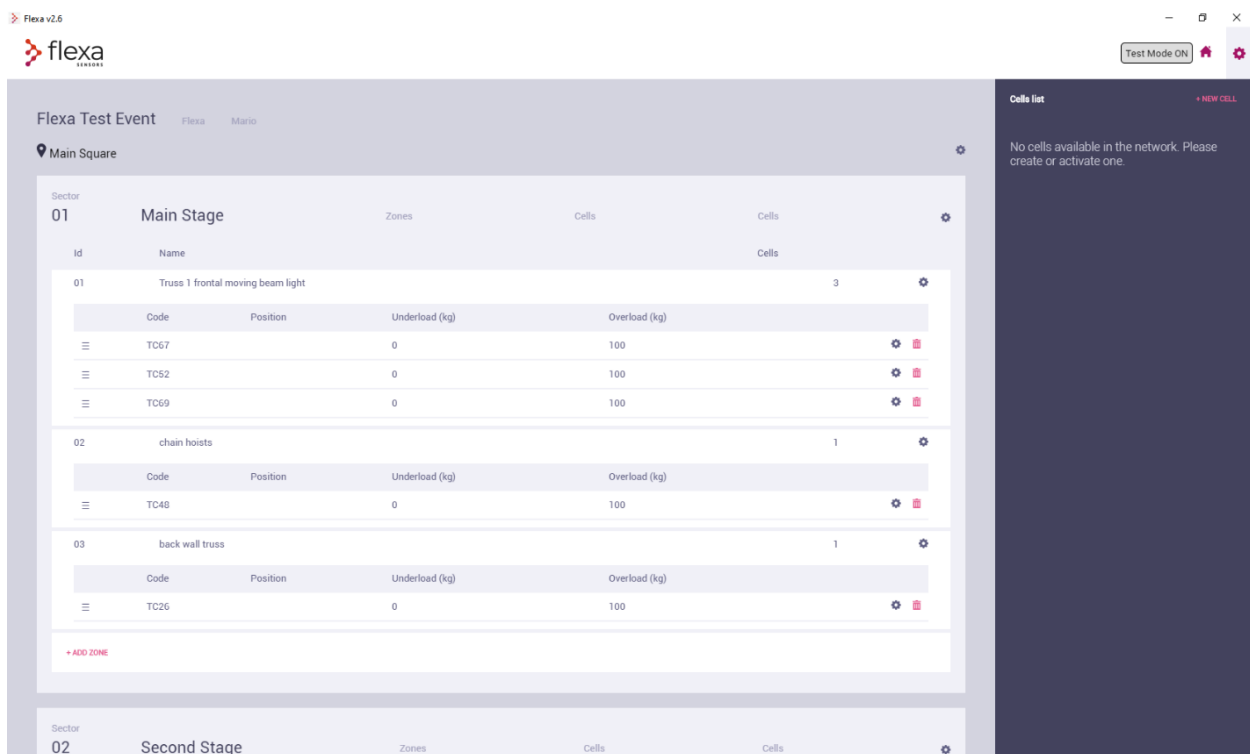


Fig. 51 – Flexa Control Software - View of cell list on current event

## 22.1.4 Load Cell setting

On the **Editing page**, you can set different parameters for every Load Cell.  
Click the **Editing Button** corresponding to a specific Load Cell.

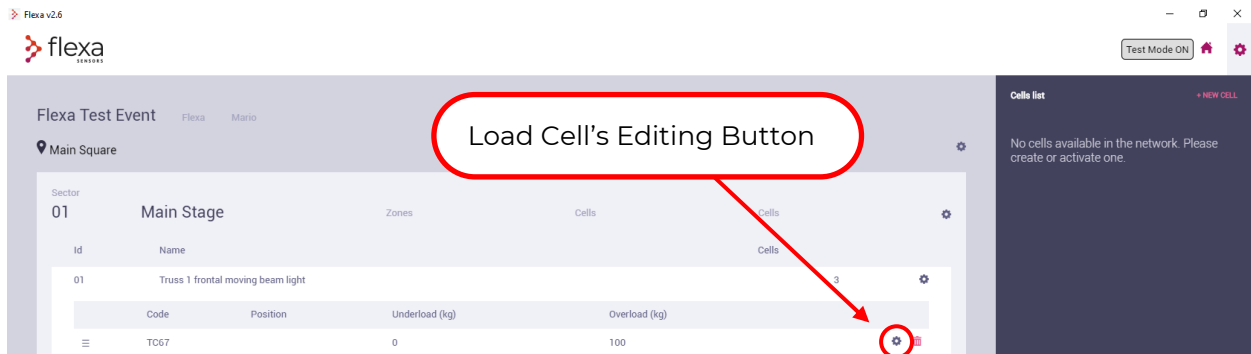


Fig. 53 – Flexa Control Software – Load Cell setting – step 1

You can set the Underload, Overload, and Position for every load cell.  
These three parameters are in the PC and not saved in the Load Cell.

("Position" is the name you want to give the cell for this specific event. Preferably, the cell name can be related to the location to facilitate identification)

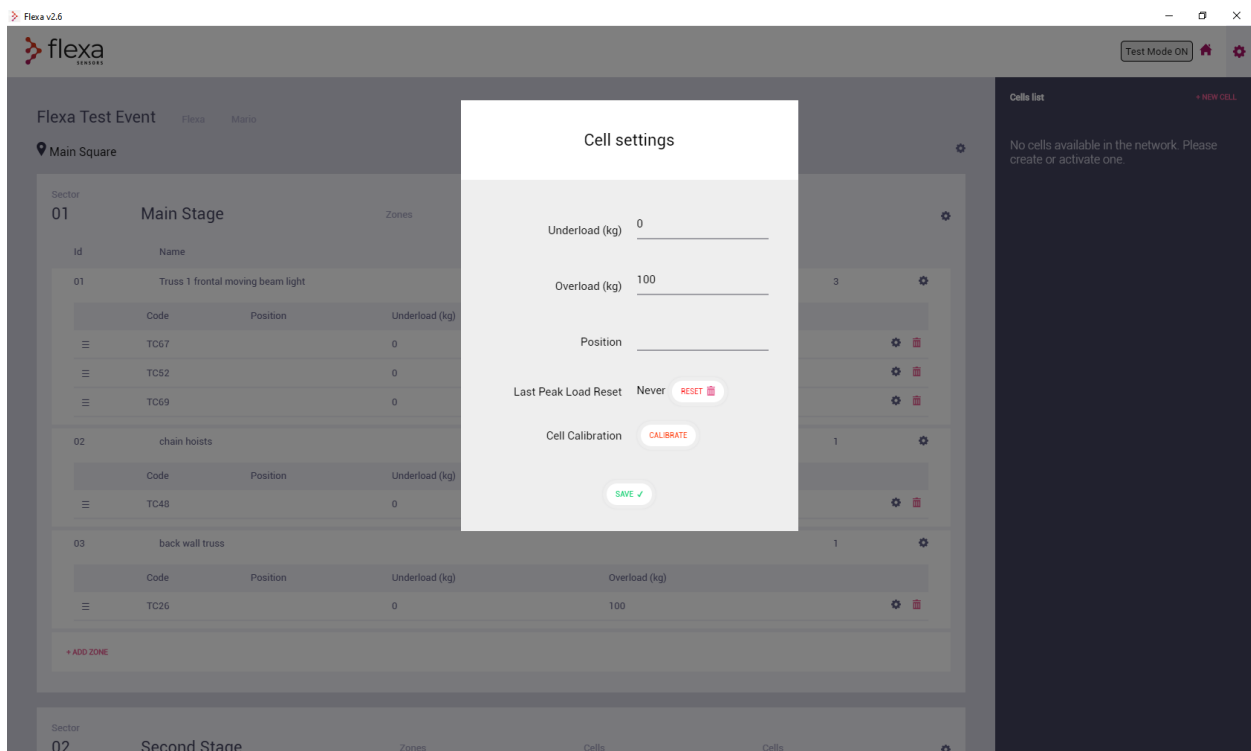


Fig. 54 - Flexa Control Software – Load Cell setting – step 2

Once saved, these three parameters are visible in the Home Page

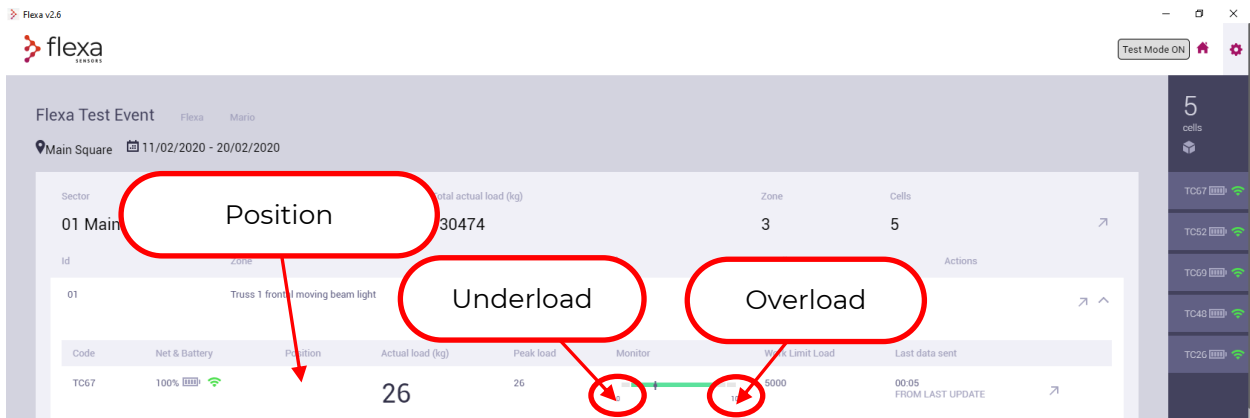


Fig. 55 – Flexa Control Software – Load Cell setting – Step 3

In operation, the load reading is thus compared with the threshold parameters set and generates 3 levels of attention:

If the reading is between the set values of Underload and Overload, the bar stays green

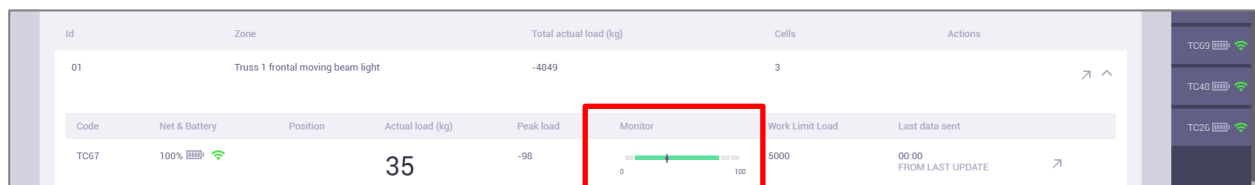


Fig. 56 – Flexa Control Software - load is within limits

If the load is 10% Overload or Underload, the bar is **yellow**

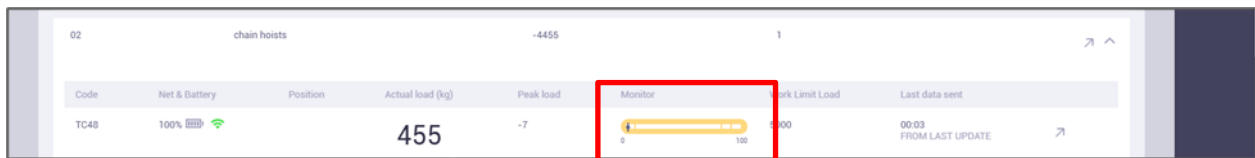


Fig. 57 – Flexa Control Software – Underload alarm

If the load goes over 10% of Overload or Underload the bar is **red**.

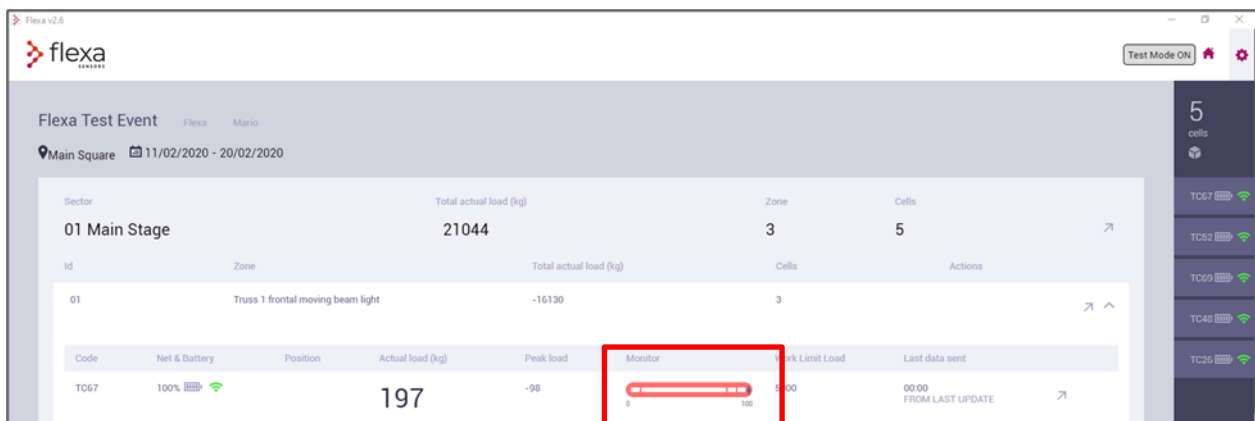


Fig. 58 – Flexa Control Software – Overload alarm

## 23 Infographic

For every level of access (**Entire Event**, **Single Sector**, **Single Zone**, or **Single Load Cell**), some different kinds of graphs are available.

Clicking on the Arrow button in the **Sector bar**

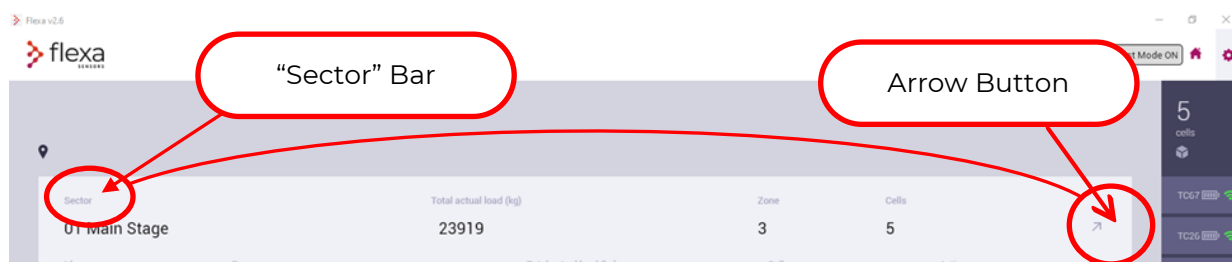


Fig. 59 – Flexa Control Software – Infographic

A **histogram** will open in a new window for every Sector and for Load Cells in the Sector

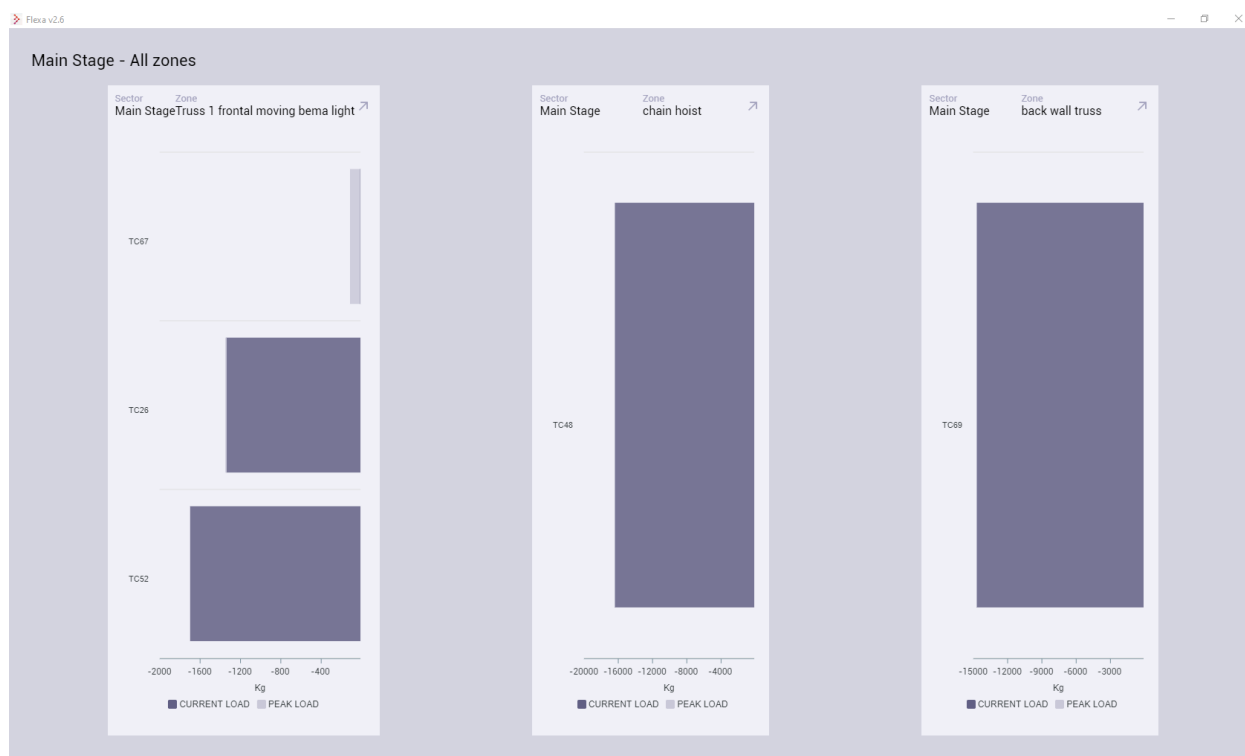


Fig. 60 – Flexa Control Software – Infographic by Sector

Clicking in the **Arrow button** in the **Zone bar**, it will open a new window as follows:

- In the centre, a graph with the load history for every Load Cell in the zone
- On the right, a histogram for every Load Cell
- At the bottom, the summary regarding the Load Cells in the zone



Fig. 61 – Flexa Control Software – Infographic by Zone

Clicking in the Arrow button in the **Load Cell bar**

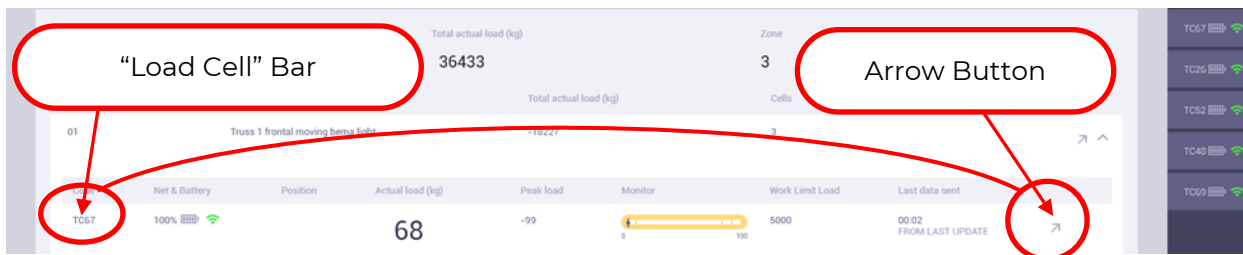


Fig. 62 – Flexa Control software – Details on a single Load cell

It will open a new window with the graph regarding the **load diagram for that single Load Cell**



Fig. 63 – Flexa Control Software – Load Cell Diagram

## 24 The Range

### 24.1.1 Cells to Gateway

The maximum range of any wireless system depends on the propagation conditions: If the propagation between the cell and the Gateway is in line of sight, the maximum range achievable with our system is about **600 metres**.

In the graph, we have simulated the limitations due to various obstacles. In addition, we took data from field tests and theoretical calculations for guidance.

#### Line of sight range

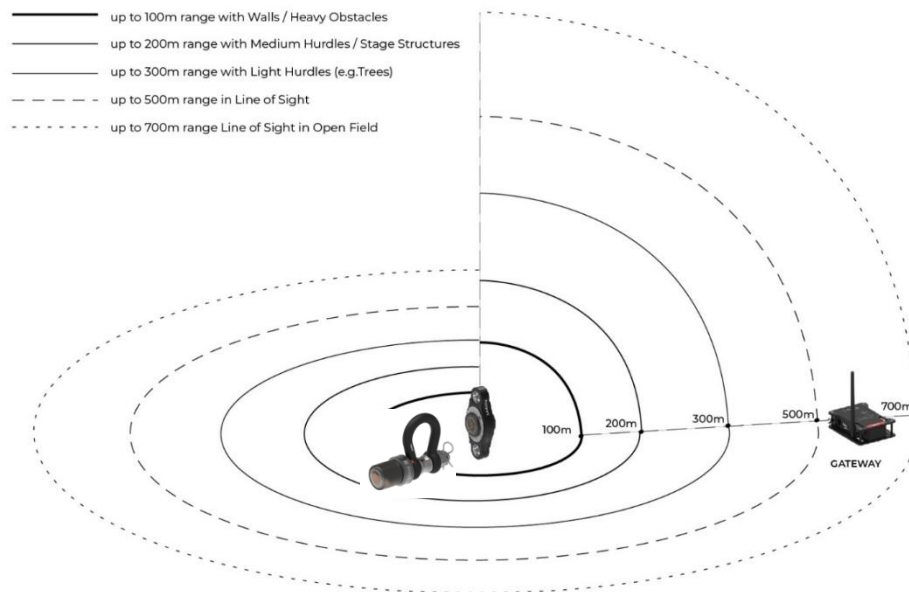


Fig. 64 – Real-time wireless Load Cell – Range Cell/Gateway

### 24.1.2 Signal level

Radio signal level

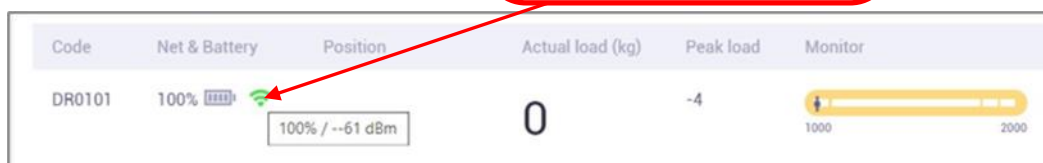


Fig. 65 – Radio signal level

The signal quality is expressed in dBm. You can get the detail by hovering the mouse over the signal symbol in the "Net & Battery" column.

The symbol varies according to the signal value:



Below -90dBm = excellent signal



-90dBm/99dBm = weak signal



Over -100dBm = insufficient signal



### 24.1.3 The Repeater to Extend the Range

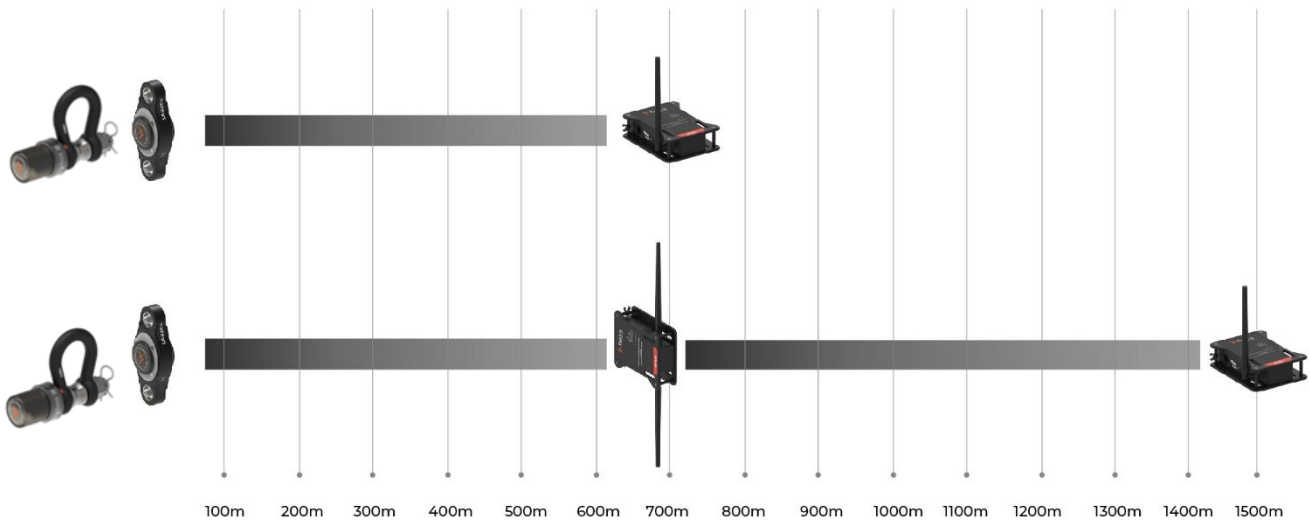


Fig. 66 - Real-time wireless Load Cell – Range Cell/Gateway + Repeater

To cover **longer distances** or in case of large obstacles to overcome, it is possible to add one or more Repeaters, which can be as far as 600 metres from the cells and 700 meters from the Gateway.

Multi-hop communication between Repeaters and Gateway is not allowed.

Each Repeater needs a direct connection to the Gateway.

On the top of each Repeater is a threaded hole fix a clamp.  
Alternatively, you can fix it with zip ties through the slotted holes on the front and back

The antennas' **vertical orientation** probably gives radio waves the best propagation

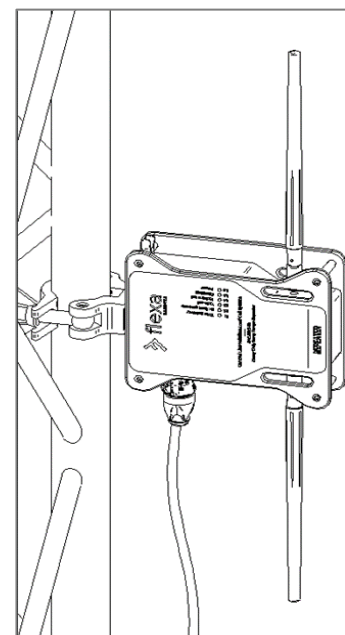


Fig. 67 - Repeater fixing with clamp

## 25 How to preserve Battery life

### 25.1.1 The local network

The Load Cells await confirmation response for each data sent to the Gateway or Repeater.

If all devices are always active in the local network, the process follows the normal data exchange flow, according to the transmission rules managed by our algorithm.

If one or more cells do not receive responses from the Gateway, the device searches again every 10 seconds.

**This process consumes a lot of energy.** For this reason, **you need to always keep your network active. Make sure the Gateway is always ON.**

During normal operation, the Gateway receives power from the PC and all devices connected by radio are in operating condition. If you were to disconnect your PC from the Gateway, you would need to use other power sources to keep your network operational.

Each Gateway has an internal rechargeable battery and a power outlet to receive power from the mains:

- One PowerCON TRUE1 connector with the supplied cable
- One 18650 Li-Ion rechargeable battery

With one of these active power supplies, the operation of the radio network is ensured.



**In this mode, only the maintenance of the network becomes ensured. If you do not have the PC connected to the Gateway, it will not manage the data.**

### 25.1.2 Transmission Algorithm Intervals

The transmission phase is the most energy-intensive process in the cell.

To preserve battery life, transmission intervals change according to load variations. An intelligent sending algorithm adjusts submissions **only if loads are stable** for:

- The first 10 seconds, the transmission interval is 1 second.
- The next 60 seconds, the transmission interval is 10 seconds
- The next 10 minutes, the transmission interval is 60 seconds
- Over 10 minutes, the transmission interval is 10 minutes

**The reading of the load ALWAYS takes place every second, what varies is ONLY the sending of the signal.**

"**Stable load**" means a value that remains below the default threshold.

If the load is less than 2500 kg, the variation threshold is set at 25 kg. If the nominal load is heavier than 2500 kg, the intervention threshold is **1% of the load**.

When the load cell reads a change in weight greater than one of these two values (25kg or 1% of the load), the transmission algorithm restarts the cycle from the beginning, starting from transmission every second until the next stabilization of the load.

*Example: using a cell loaded with 200Kg, if the load remains stable between 175Kg and 225Kg for more than 10 minutes, the cell sends a signal to the Gateway every 10 minutes.*

*If a cell loaded with 4000kg and the load remains stable between 3960kg and 4040kg for more than 10 minutes, the signal is sent every 10 minutes.*

*In both examples, when the thresholds are exceeded, the algorithm restores the initial conditions by sending data every second (and starts again the cycle from the beginning).*



Fig. 68 - Transmission interval algorithm graph

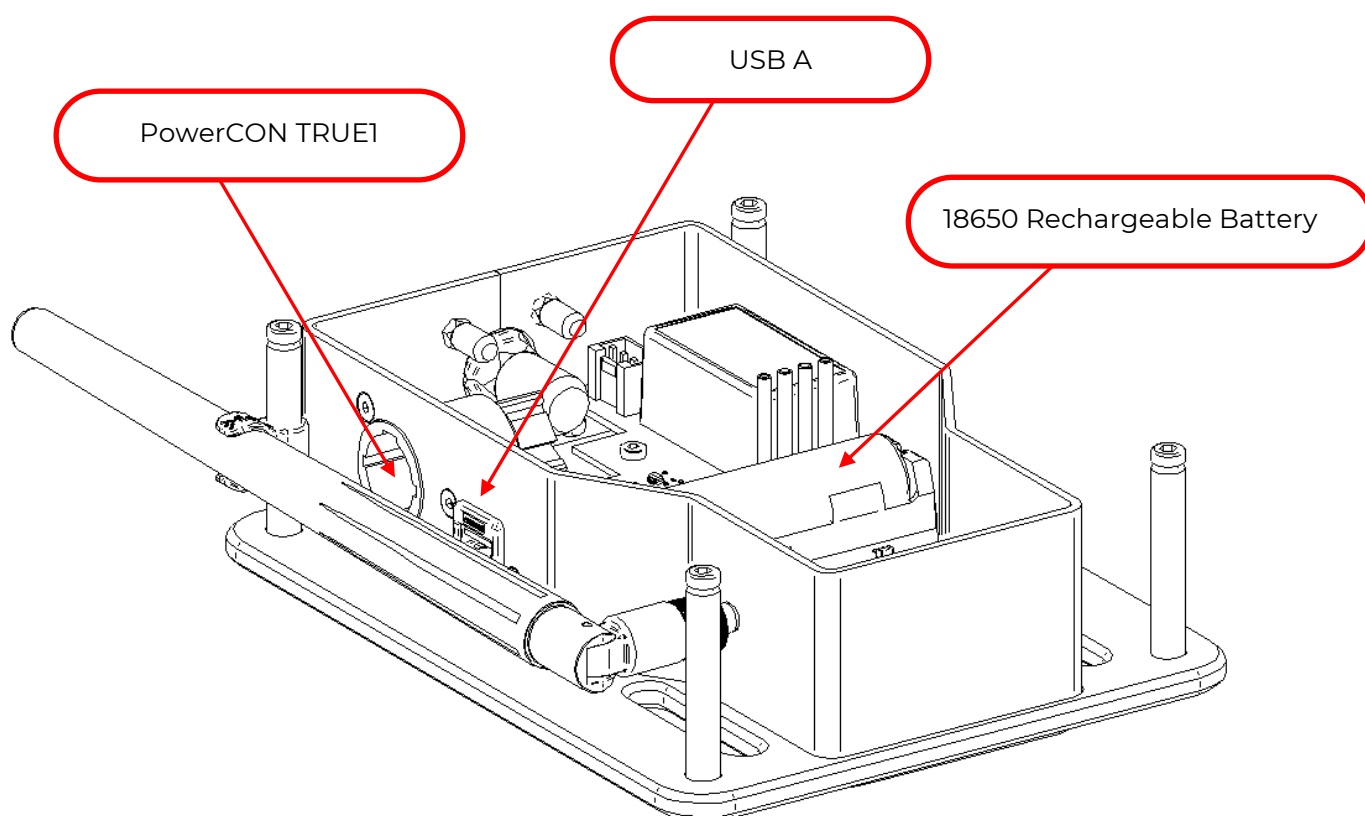
Work Limit Load	Last data sent
500	This cell is not sending data. Time since last update: 69:20:37
4750	This cell is not sending data. Time since last update: 69:27:52
5000	This cell is not sending data. Time since last update: 69:20:39

Fig. 69 - No radio signal over 10 minutes

If the signal is not received within 10 minutes, it means that the cell is switched off or is no longer connected to the Gateway.

## 26 Plugs & Battery on Gateway

The internal battery recharges when the Gateway connects to the PC via USB A cable or when powered by electricity.



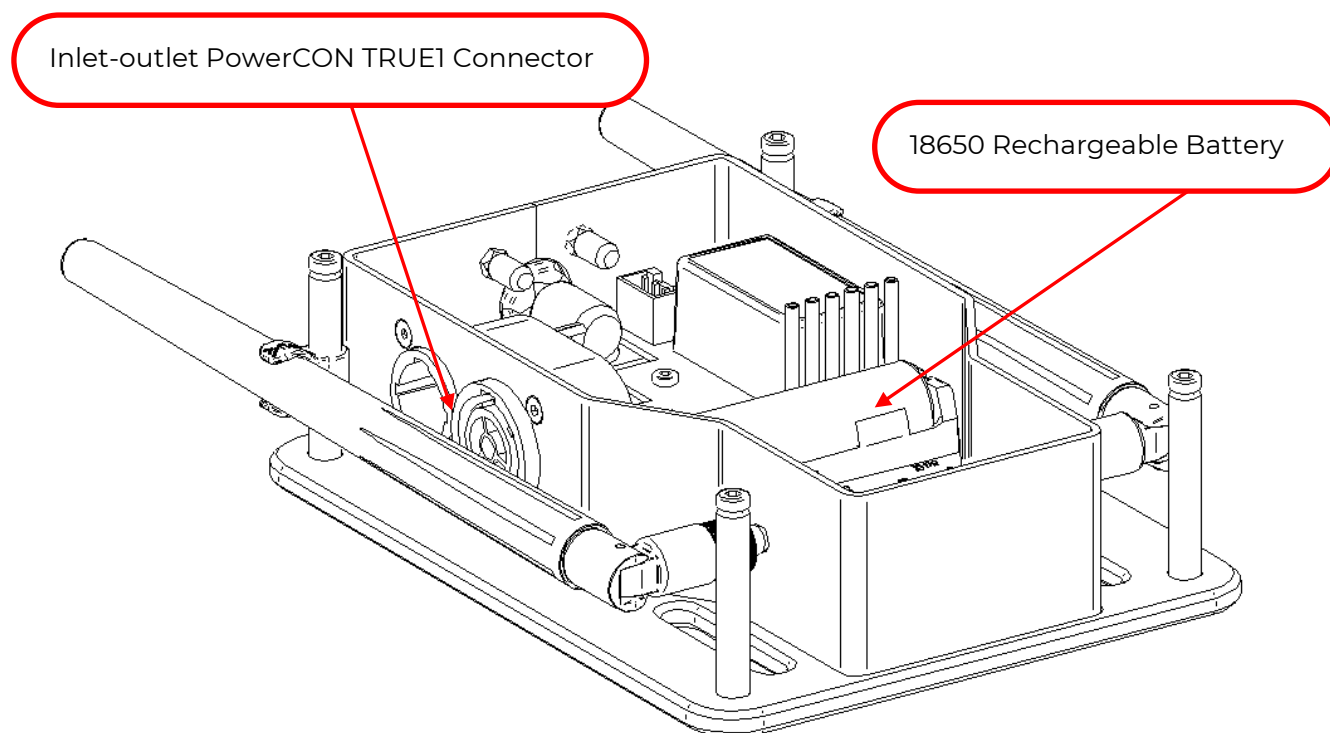
*Fig. 70 – Plugs and battery on Gateway*

### **DANGER**

**Before any other operation, disconnect the power supply.  
Opening the device must be carried out by qualified personnel.**

## 27 Plugs & Battery on Repeater

Repeater is provided with one inlet-outlet PowerCON TRUE1 connector plus one rechargeable battery.



*Fig. 71 – Plugs and battery on Repeater*

### **DANGER**

**Before any other operation, disconnect the power supply.  
Opening the device must be carried out by qualified personnel.**

## 28 Maintenance and Cleaning

All the appliances are maintenance-free.

The appliances must always be kept clean, dry, and free from oil or grease.

Never allow liquids to get into the enclosures.

Please note:

- **Load Cells are waterproof.**
- **Gateways and Repeaters are not waterproof.**

Use a dry cloth to clean the enclosures. Never use petrol, solvents or cleaners which can damage plastic.

## 29 Turn OFF the Devices



### ! WARNING

Before storing Load Cells, Gateways and Repeaters, make sure that all devices have been turned off to avoid battery drain of the cells.

*Fig. 72 - Device storage*

## 30 Calibration and Re-calibration

The Load Cells and other devices of the Flexa Real-time series are not weighing devices and do not comply with the strict regulations as required by the food, medical or any other sector in which there is a reference standard.

However, it is advisable to consult the regulations in force in each country to verify the existence of any obligations.

We suggest re-calibrating the cells every two years of operation.

# 31 Warranty

The performance of FLEXA SENSORS REAL-TIME WIRELESS LOAD CELL SYSTEMS is checked and verified by A4I ITALIA before shipping. The manufacturer or their authorised representative shall ensure that the machine is free from defects in material and workmanship at the time of dispatch.

## WARNING

When you receive our products, you should carry out quantitative and quality controls. If non-compliance is detected, return the goods to the carrier.

During the warranty period, A4I ITALIA will repair or replace defective devices.

The warranty lasts twelve months from the date of delivery shown on the documentation certifying the purchase of the new devices. The warranty covers the products of the Flexa Sensors line, excluding third-party products or accessories.

Warranty repairs do not renew or extend the warranty period and are intended for products of the Flexa Sensors line that have been used according to the standards of use specified in this User Manual.

Warranty replacements and repairs do not cover consumables or moving parts exposed to impact, such as:

- Shackle or parts thereof
- Antennas (on Gateway and Repeater)
- Damaged parts (parts damaged by misuse, bumps, or falls)

In addition, warranty replacements and repairs do not include:

- Transport damage
- Negligent manipulation
- Connection to voltages other than those indicated in this User Manual
- Chemical or abrasive actions
- Overload, eccentric or lateral load
- Excessive heat and outdoor use without proper measures
- Malfunction or defect due to the use of non-original spare parts

A4I ITALIA srl reserves the right to evaluate replacements and repairs of electrical parts under warranty.

The warranty does not include the cost of transporting the goods or any travel expenses for personnel authorized by A4I to repair on site unless otherwise agreed at the time of purchase.

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## NOTES

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For updates or suggestions for use of the devices listed in this manual, please go to the website [www.flexasensors.com](http://www.flexasensors.com) or contact your local distributor or e-mail to **[info@areafourindustries.com](mailto:info@areafourindustries.com)**



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