Datum 10.01.2020                    Ura: 14:37:20

Temp.: 21.65c          Št. tehtnic: 4
Tlak: 95.39hPa        Tehtnica: 2
Vlaga: 39.28%         Teža: 46.36kg
Povprecje: 46.59kg   Razlika: 0.02

Nastavitve              Tehtnica

ON / OFF

BeeConn

# BeeConn

**Instructions for use
of BeeConn control device**

http://app.beeconn.si

Mobile phone

On/off

Shows Current values

Concentrator

Bluetooth
WiFi
LoRa
GPRS

Internet

Beekeepers input

Bluetooth reader

Weather station

WIFi Camera

Beehives

1    2    30

...

Hive scales

Bluetooth
LoRa

WiFi

Temperature
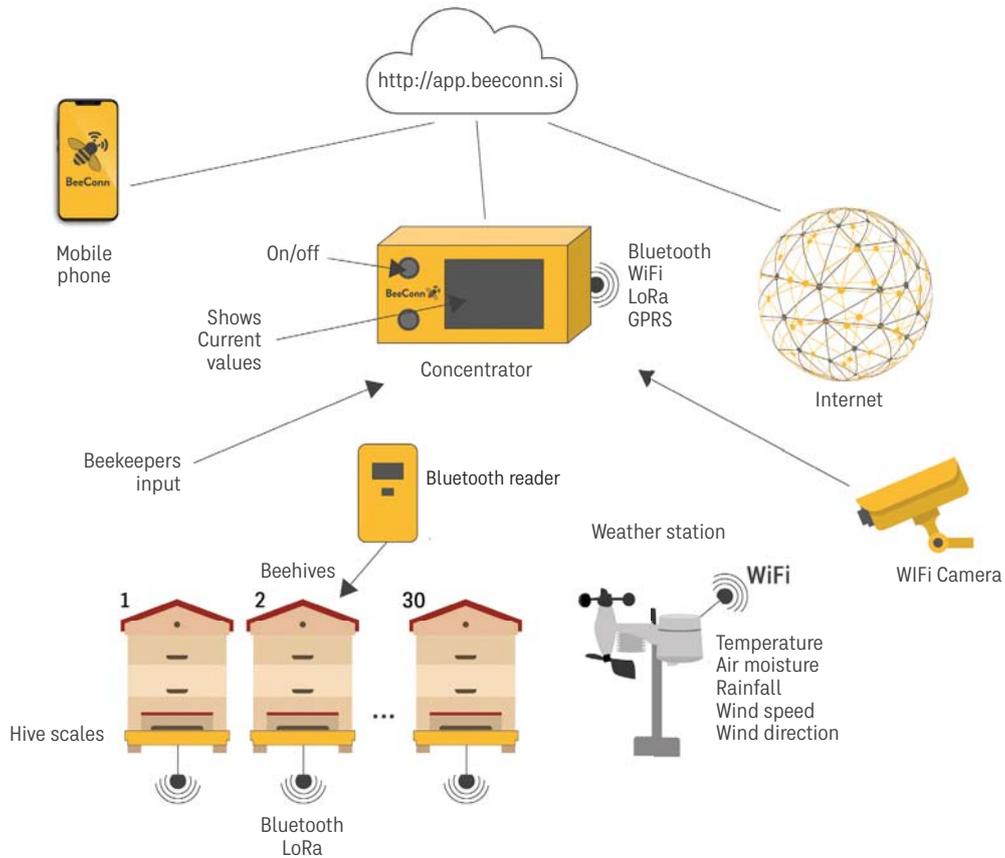Air moisture
Rainfall
Wind speed
Wind direction

**Image 1: Schematic representation of device operation**

**Available equipment with power supply connections**

| Code | Name | Pos. |
|------|------|------|
| 1104600 | Solar power controller | 1a |
| | Solar module | 1b |
| | Power cord | 1c |
| | Battery cords | 1d |
| | Battery 12V, min. 12Ah | 2 |
| 1104242 | Concentrator | 3 |
| 1104241 | Hive scale | 4 |
| 1104431 | Weather sensors | 5 |
| 1104433 | Digital camera | 6 |
| 1104661 | Concentrator power cord | 7 |
| 1104655 | Scale power cord | 8 |
| 1104437 | Connecting cord for scales | 9 |
| 1104662 | Camera power cord | 10 |
| 1104654 | External antenna with cable | 11 |
| 1104653 | Cable for external antennas | 12 |
| 1104434 | Concentrator power adapter | 13 |
| 1104435 | Scale power adapter | 14 |
| 1104436 | Battery holder | 15 |
| 1104680 | Bluetooth reader | 16 |

The concentrator (3) can be powered by an adapter (13) from the mains or from the solar (1) with a cable (7).
The scales can be powered from the solar (1) with a cord (8) or a mains adapter (14) or with 3xAA batteries (15).
The scale has two connections - one for the supply and the other for the connecting (9). The camera (6) is powered by a cord (10) from the concentrator. The weather station (5) has its own batteries.

# Content

# Introduction

The manual allows you to get acquainted in detail with the BeeConn digital beekeeping control device, which allows monitoring the weight of individual beehives, weather conditions at the apiary location and video control, so it needs to be studied in detail to choose the right equipment and use it successfully. The device can be optionally upgraded at any time. You can monitor the data on the concentrator screen, with text messages and the BeeConn web application.
The basic unit consists of a concentrator and a scale (Image 2).



Concentrator        Scale
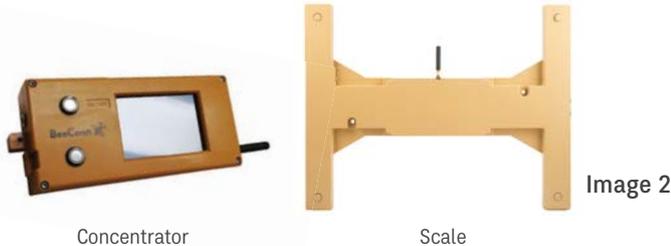
**Image 2**

The concentrator is the basic and central unit of the device (Image 3), which periodically receives weight data from individual scales, weather station and other units.

A scale is a unit that is inserted under the beehive and manages the periodic measurement of the beehive weight, which is sent wirelessly to the concentrator that forwards this data to the web application.

On/off switch

Power supply input 12V DC

Screen illumination button

GPRS antenna



**Image 3**

# 1. Installation and power supply of the concentrator



Space for SD card

**Image 4**

Two li-ion batteries    CR2032 battery

Install it in a place which is no more than 1km from the scales (in the apiary) within the visual range and is safe from the sun and rainfall. The operating conditions of the electronics are also that the ambient temperature should not exceed 50 °C and should not drop below -20 °C and must be protected from rain. In case you want to monitor the results of measurements using a web application and text messages, a sufficiently strong mobile phone signal or an accessible Wi-Fi network must be available at the location. In a location with no accessible Wi-Fi network and no reliable mobile phone signal, which is common in transport beehives, we recommend installing an external antenna connected with a suitable coaxial cable. Even in cases where the beehives and the concentrator are installed in a metal container, the antenna must be installed outside the container.

The concentrator has a DC 12V (2.1 x 5.5 mm) external power connector on the side. If a power grid is available, we recommend powering it with a standard adapter 100–240V AC at least 1A with the connection 2.1×5.5 mm. If the power grid is not available, you need to ensure a power supply with a solar panel with the power of 20W and a cycle AGM battery of 12V with the minimal capacity of 10 Ah. For bridging the short-term loss of the external power supply, the concentrator has a built-in base for two li-ion batteries 14500 3.7V 860 mAh. The concentrator uses an average current of 50 mA for its operation. The real-time clock is powered by a CR2032 battery. Li-ion batteries are included and if agreed upon, they can be inserted by the manufacturer or supplier.
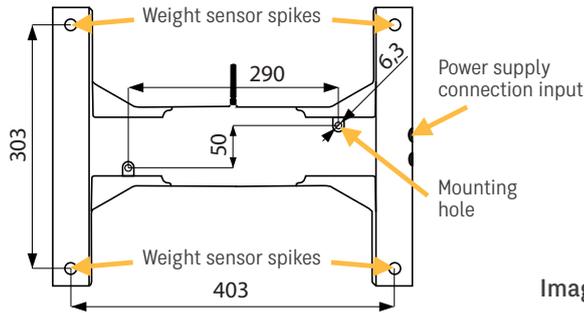
## 2. Installation and power supply scales



Weight sensor spikes

290

6.3

Power supply connection input

303

50

Mounting hole

Weight sensor spikes

403

**Image 5**

The scale must be placed on an even, horizontal hard surface with a minimal surface area of 450 × 350 mm in such a way that the weighing sensor spikes are turned upwards and the two power supply connections is on the back side of the beehive. The scale has two holes with a 6.3 mm diameter used for attaching the beehive and prevent any possible thefts.

Place the beehive on the scale that has been installed in such a way and confirm that the bottom of the beehive is standing only on the weighing sensor spikes. To ensure proper weight measurements, the bottom of the beehive must not touch any other part of the scale and the beehive should not be allowed to lean on the next beehive or any other obstacle.

In the case of hives that do not have a suitable flat bottom, you must therefore place suitable crossbars over the weight sen-
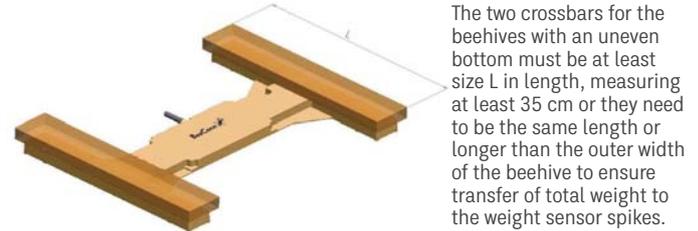


The two crossbars for the beehives with an uneven bottom must be at least size L in length, measuring at least 35 cm or they need to be the same length or longer than the outer width of the beehive to ensure transfer of total weight to the weight sensor spikes.

**Image 6**

sor spikes, and then place the beehive on crossbars so they can transfer all the weight (Image 6).

The scales are powered by three AA batteries, which you need to place in the battery housing with the connection 2.1 × 5.5 mm. If an electrical connection is available in the beehive, you can provide power to the scales with a standard 100-240V AC to DC 5V 3A adapter with a 2.1 x 5.5 mm connection. If you have a solar power system for powering the concentrator, you can power the scales from the USB port on the solar power control unit with the appropriate cable connection. You can connect all scales to one power supply with the connecting cables (Image 7). Given that the three batteries provide power to the scale for 2 years and to avoid cable connections, we recommend powering with AA batteries.
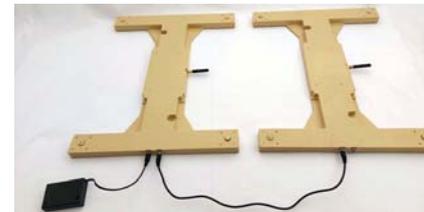


**Image 7**

# 3. Inserting SIM card and batteries

The concentrator is equipped with the GPRS module as standard. For monitoring the data remotely by using the BeeConn web application where there is no Wi-Fi network, you need to insert the SIM card (Image 8) into the GPRS module. You can purchase a SIM card for data transfer and texts from your network operator. By entering a subscription contract, they also activate it for you.



Image 8

**The SIM card and batteries are inserted into the GPRS module as follows.**
1. First you need to turn off the concentrator using the ON/OFF switch, which is off when the screen is not illuminated and there is no text.
2. Unscrew the 4 screws with a TORX T10 screwdriver, carefully open the lid and remove it only enough (Image 9) to insert the SIM card and batteries, being careful not to break the wired connections.



Image 9

3. Insert the SIM card into the holder on the bottom of the GPRS module as shown in Image 10 (the cut-off part must be on the bottom right) and slide it to the left to lock it in place. If you wish to remove it, you need to push it to the left again. Then insert the batteries correctly.



GPRS module   Micro SIM card      Image 10

4. Make sure all wire connections are closed, then carefully place the lid back on the base and make sure the wires do not peek out from the housing. Tighten the screws and the supplied antenna as shown in Image 11. This makes the concentrator ready for settings for sending texts, connecting to the Internet to use the web application, and coupling with the scales.
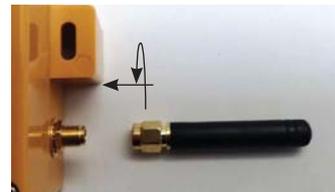


Image 11

Li-ion batteries and CR2032 battery and SIM card can be inserted by the manufacturer or supplier, if you agree on this when ordering.

# 4. Description of displays on the screen of the concentrator

Each time the concentrator is switched on, the Introductory display (Display 1) is displayed first, then the various displays are displayed alternately at short intervals (see Chapter 5, point 2 on page 17) until the Basic display (Display 2) appears.



**Display 1**
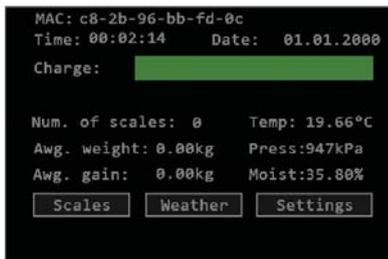


**Display 2**

## 4.1 Basic display

The terms on the screen mean:
**MAC:** displays MAC address, resp. identification code of the concentrator.
**Time:** displays the real time of the hour:minutes:seconds.
**Date:** shows the date day:month:year.
**Charge:** displays the status of li-ion batteries.
**Num. of scales:** shows the number of scales being coupled with this concentrator.
**Awg. weight:** shows the current average weight calculated from the sum of all measured weights.
**Awg. gain:** shows the difference between the current.
**average weight and average weight at the last 20.00 hours.**
**Temp:** shows the temperature of the BME sensor (°C), installed on the concentrator.
**Press:** displays the pressure of the BME sensor (kPa) installed on the concentrator.
**Moist:** shows the humidity of the BME sensor (%) installed on the concentrator.
**Scales:** the Scales menu button.
**Weather:** the weather station menu button.
**Settings:** the settings menu button.

## 4.2 Description and use of Scales menu


Display 3

By pressing the Scales menu button on the Basic display, Display 3 appears.
The terms mean:
**Triangular arrows:** to scroll through the numbers of scales.
**Weight in kg:** by pressing the kg button, you can select weight in lbs (pounds).
**Scale:** the column shows the sequence numbers of the coupled scales from 1 to 30.
**Today:** the column shows the last measured weight of the scale, which is refreshed once an hour.
**Diff.:** the column shows the difference between the current weight and the weight at the last 20.00 hours.
**Charge:** the column shows the status of the batteries powering the scales. In case it turns red, batteries need to be changed.
**Note:** a column of scales buttons for marking interventions.
**New scale:** coupling button, that is adding new scales.
**Back:** button to return to Basic display.

### 4.2.1 Entering notes in web application
When inspecting or intervening in the beehive, you can easily record this by pressing the button in the Note column in Display 3 so it turns green. This sends a note to the web application, which will be displayed on the graph as an asterisk ( * ). After a while, the color of the button disappears.

## 4.3 Description and use of Settings menu

By pressing the Settings menu button on the Basic display, Display 4 appears.
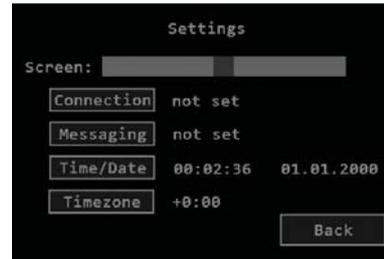

Display 4

### 4.3.1 Screen brightness settings
By moving the slider with your finger in the Screen field: you can change the screen brightness in Display 4 by sliding to the left or right. After the desired brightness is set, press the Back button to return to the Basic display.

### 4.3.2 Time zone and daylight savings time setting
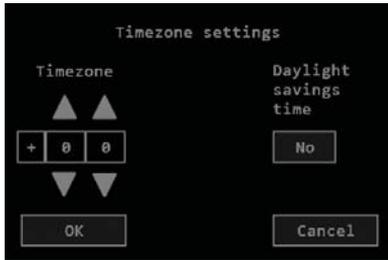


Display 5

By pressing the Time zone button in Display 4, Display 5 appears. In this display, you must use the up and down arrows to set the time zone the concentrator is in (that is +1:00 in Europe).
By pressing the button below the text saying Daylight savings time, you can switch between daylight saving time and standard time ("Yes" means daylight saving time, "No" means standard time).
These settings are important for the correct graphical display of data on the web application (Chapter 11, page 26).

### 4.3.3 Connection settings
By pressing the Connection button in Display 4, Display 6 appears. You can select the Wi-Fi connection setting, if available, or a mobile GPRS connection with a SIM card. Both connections can be set up, with the mobile connection serving as a backup in the event of a failure of the selected Wi-Fi network.
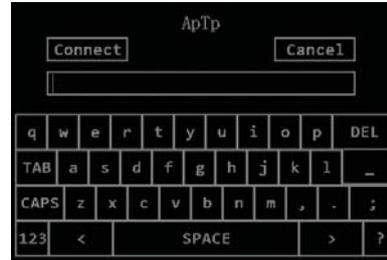


Display 6

### 4.3.3.1 Wi-Fi settings
Press the Wi-Fi button on Display 6 so it turns green (Display 7 and Display 8). Then press the Choose network button at the top right or the network name, for example ApTp the concentrator was previously connected to and Display 9 appears. It lists available Wi-Fi networks and their strength.
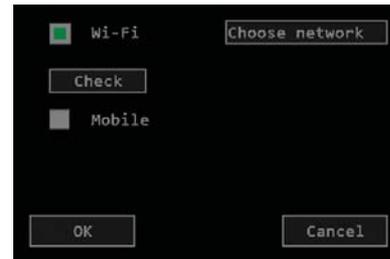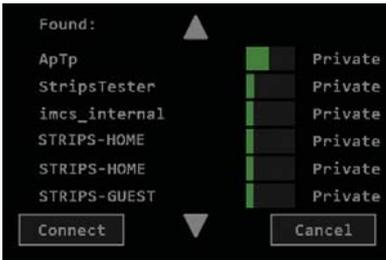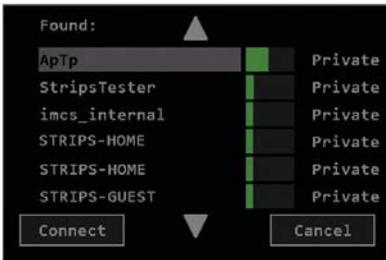


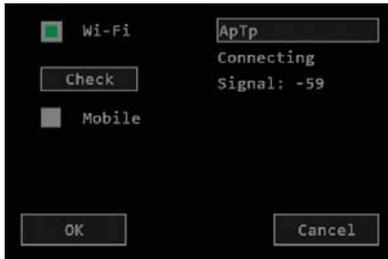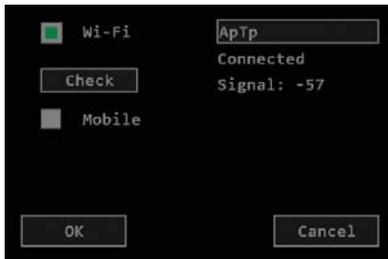Display 7

Display 8


Display 11


Display 9


Display 12


Display 10

In Display 9, press the name of your Wi-Fi on the left (example Display 10) and then press the Connect button to display Display 11. Then enter the password in the empty field and press the Connect button to display Display 12. After a few seconds Display 13 appears, showing Connecting and Signal: -59 in written, where the number indicates the strength of the Wi-Fi signal. An automatic connection is in progress, which may take a few minutes for Display 14 to appear together with the word Connected.

When Display 14 appears, press the OK button for Display 15: Settings to appear, then press the Back button to return to the Basic display.
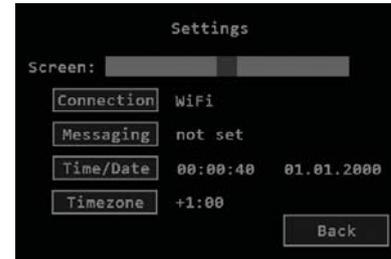


Display 15

If Display 16 appears, it means that the clock has been updated. In this case, you need to press the Check button to see if the device has connected to the Internet (Display 14).
Any other display means that an error has occurred, which is displayed below the Wi-Fi network selection button. Examples: No Wi-Fi, Server error, Time error…



Display 13
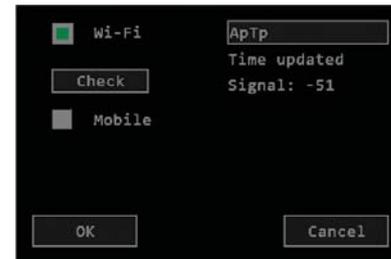


Display 14



Display 16

### 4.3.3.2 Mobile network settings

You must have an activated SIM card inserted in the concentrator (see Chapter 3, page 8). In Display 6, press the button in front of the word Mobile to Display 17.



Display 17
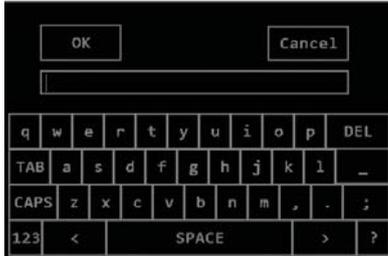


Display 18

Empty fields for APN:, user: and pass: must be filled with the data provided by the operator that activated your SIM card. Touching an empty field will make the keyboard (Display 18) show up for you to enter data. Display 20 shows an example for the A1 operator for Slovenia!



Display 19



Display 20

After entering the data, press OK button and Display 21 should appear with the word Connecting on it.

Display 21


Display 23


Display 22


Display 24

Then Display 22 is displayed with the word Connected, which means that the connection has been established, so confirm it by pressing the OK button and return to the Home page.
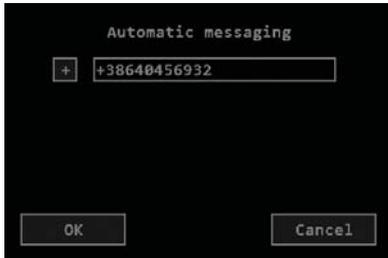
**4.3.4 Connection settings for text messages**
Press the Messaging button on Display 4 so Display 23 appears.
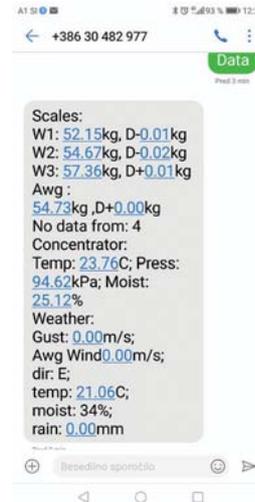

Display 25

Display 26


Display 27

Up to three users (mobile numbers) can have access to receive text messages. By pressing an empty field in Display 23 will open a dial pad (Display 24) to enter your mobile phone number in international format, as shown in Display 25. There must be no spaces between the numbers! Confirm the correct entry by pressing OK on the dial pad and Display 26 will appear. By pressing the + button in front of the number will confirm the entry of the first digit (Display 27). By pressing the text button, you will send a Hello text message to the entered number. Within a dozen seconds, the number holder will receive a Hello message on his/her phone. Pressing the OK button will complete the connection pro-

cess with the first user. If you wish, you can enter two more users to receive text messages using the same procedure. Each user can send a text message "Data" to the number of the SIM card, which is visible from the received message Hello! In a few seconds you will receive a text message reply with all the data of the last measurements.

You also have the option of setting up automatic daily data sending at 21.00 hours with data measured at 20.00 hours (example Display 28). To do this, press the button below the word Enable in the number bar to turn green. You can cancel automatic sending
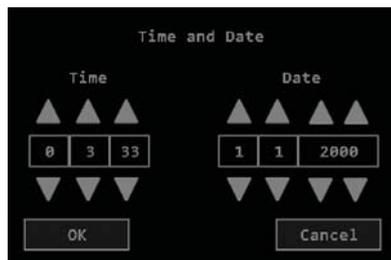

Display 28


Display 29

by pressing the button again to clear the green color.
If the measured weight of the beehive drops by 1 kg (2 lbs) or more in one hour, you will automatically receive a text message Rapid change on scale: X, as shown in Display 29.

### 4.3.5 Time and date settings
Press the Time/Date button on Display 4 so Display 30 appears.


Display 30

From left to right using the arrows, enter the hours, minutes, seconds, the day, month and year in the individual fields. After completing the entry, confirm the correctness of the data by pressing the OK button. Then return to the Home page. If you have changed your mind, press the Cancel button.
If you are monitoring the data via the web application, then there is no need to set this, as the time will be updated automatically.

## 5. <u>First activation and coupling of scales</u>

After installing the scales and preparing the concentrator, you can start the activation procedure. If you are only monitoring data on the concentrator screen, or if the concentrator is installed in a Wi-Fi access area, you do not need a SIM card to use the web application. The activated SIM card in the concentrator represents the mobile network, so you need it to turn on the camera and receive text messages, while also providing Wi-Fi for the web application.
The first activation procedure is as follows:

1. Approach the scale with the concentrator and switch the concentrator on with the ON/OFF switch.


On/off
Image 12

2. The display first shows Display 1, then the installation information of the SD card, BME 280 sensor, GPRS and SIM card is automatically displayed at short intervals. Finally, Display 31, which is the Basic Display, is displayed. To save power, the screen automatically dims in Basic Display, so re-illuminate it with the backlight button or by touching the screen.

```
MAC: c8-2b-96-bb-fd-0c
Time: 00:02:14    Date:   01.01.2000
Charge:

Num. of scales: 0      Temp: 19.66°C
Awg. weight: 0.00kg    Press:947kPa
Awg. gain:   0.00kg    Moist:35.80%
  Scales     Weather     Settings
```

**Display 31**

```
        Couple
     Coupling off


        Back
```
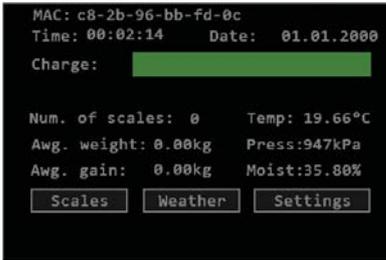
**Display 33**

3. Approach the first scale with a turned on concentrator at a distance of about half a metre and press the Scales button so Display 32 appears. Then press the New scale button to make Display 33 appear. Press the Couple button and Display 34 appears, showing Coupling on.

```
 ▲    Weight in   kg
Scale  Today  Diff.  Charge Note
  1    Free
  2    Free
  3    Free
  4    Free
  5    Free
  6    Free
 ▼    New scale    Back
```

**Display 32**

```
        Cancel
     Coupling on


        Back
```

**Display 34**

4. Turn on the power supply for only the first scale and after a few seconds Display 35 appears saying New scale: 1, confirming the successful coupling of the first scale. Then approach the second scale with the concentrator at a distance of about half a meter, connect it to the power supply and after a few seconds a Display 36 New scale: Will appear on the screen. 2. Repeat this procedure until the final scale in the device with this concentrator.

Image 13



Display 35



Display 36

5. To couple the scale under the selected number, you must press the Free in Display 37 that is on the right side of the desired scale number X.



Display 37

Display 38 appears, where you must press the Couple X button for Display 39 to appear. You must then turn on the power for the scale and wait up to 20 seconds for Display 40 to appear.
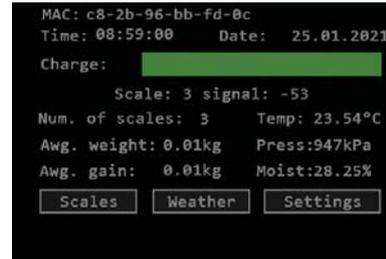


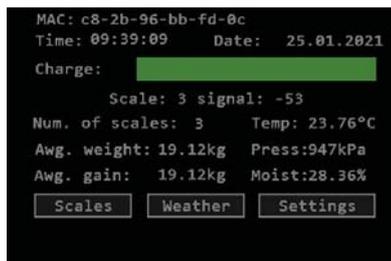Display 38

Display 39



Display 41



Display 40



Display 42

6. When the last scale is coupled, press the Back button for Display 41 to appear, which shows the example of a device with three scales. In this display, press the Back button to return to the Home page, which will look like Display 42 shows. You have successfully coupled the concentrator with scales that can be installed at a distance of up to 1 km in the field of view. You can now disconnect the concentrator with the ON/OFF switch and all scales from the power supply.

**Note: The customer can avoid coupling the scales with the concentrator, inserting the SIM card and batteries into the concentrator, if this is agreed with the manufacturer or supplier of the BeeConn device.**

7. Install and connect the concentrator according to Chapter 1 on page 6, and place the scales under the beehives according to Chapter 2 on page 7 and connect them to the power supply. Within a few minutes, the scales will send the measured weights of their beehives and a display will appear on the Basic display as shown in Display 43. Pressing the Scales button will make Display 44 appear with the current weights of individual beehives. After a few minutes after the first full hour, the data will be refreshed, and Display 43 and Display 44 will show the current data. This information will then be automatically refreshed every hour.
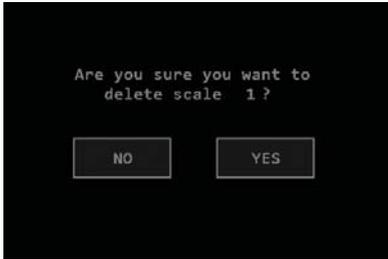


**Display 43**



**Display 44**

# 6.  <u>Erasing scale</u>

If you want to remove or replace an individual scale in the system, you must first delete the scale from the system. To do this, press the corresponding scale number in Display 45 to display Display 46. Press the "Yes" button and Display 47 will appear, displaying the word Deleting. Deleting can take up to an hour. Successful deletion is confirmed by the word Free on Display 49, where the word Deleting was previously displayed. This completes the deletion process. Press the Back button to return to the Home display. You have decoupled the scale, so you can couple it again with any concentrator.



**Display 45**

Display 46



Display 49



Display 47



Display 48

# 7. Block and reset of concentrator and scales

Due to atmospheric influences such as: thunderstorms, storms and in case of possible conflict of simultaneous data sending to the concentrator from different units of the BeeConn device, the operation of the concentrator may stop (block). The inactivity is reflected in the fact that you cannot select the menus on the concentrator screen, the web application is not being refreshed and you cannot send text messages, so it needs to be reset! To do this, turn it off with the ON/OFF switch for a few seconds and turn it on again.

In the event of a mains voltage failure or other cause of a power failure of the scale for up to 30 minutes, its operation stops (blocks). The non-functioning is reflected with "No data" displayed on the concentrator screen in the Scales menu, and there is simply no weight data on the web application, and the note is missing in the text message, so the scale needs to be reset!! To do this, turn off the power for the scales for half an hour or more to discharge the capacitors in the circuit, and then reconnect the scales to the power supply.

# 8. Uncoupling of scales without of the concentrator

If it is necessary to replace the concentrator or the coupled scale is to be transferred to a device with another concentrator, it must first be uncoupled according to the following procedure:

1. Unscrew the 4 screws on the scale electronics lid and remove it. Then carefully spread the weights of the weighing sensors so that you can press your finger on the micro switch shown in Image 14.
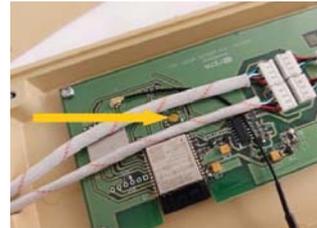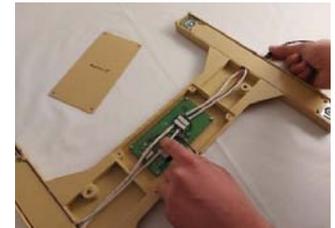


Image 14        Image 15

2. Press your finger on the micro switch to turn it on and hold it turned on, while connecting the power with your other hand and removing your finger from the micro switch after about 5 seconds. This uncouples the scale so you can re-couple it with any BeeConn concentrator according to the procedure described in Chapter 5 on page 17.
3. Place the electronics lid back and screw it with all 4 screws.
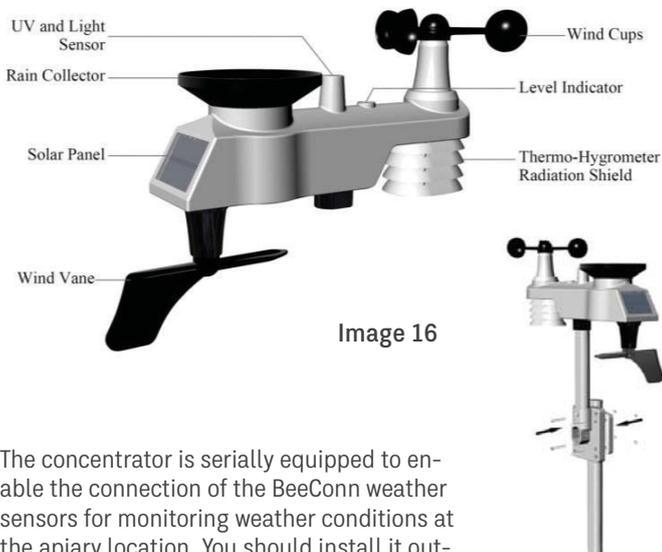
# 9. BeeConn weather station



Image 16

The concentrator is serially equipped to enable the connection of the BeeConn weather sensors for monitoring weather conditions at the apiary location. You should install it outside on a pole at least 1.5 m above the ground and at least 30 m from the concentrator. You need to make sure that the solar cells are directed towards the south as much as possible. The weather station monitors temperature, pressure, humidity in the air, rainfall quantity, wind speed and direction, brightness and UVI. A detailed user manual in English containing the information on the installation and maintenance of the BeeConn weather sensors is enclosed.

## 9.1 Weather station settings

The weather station does not require any special settings. Insert three standard AA batteries into the battery compartment and the station will start sending data to the concentrator.
The funnel for collecting the rain needs to be cleaned every 3 months. To do this, rotate the funnel 30° counterclockwise and carefully remove it from the sensor housing. Remove any impurities and dry it, then slide it back into the housing and rotate it 30° clockwise.

## 9.2 Weather station menu

When pressing the Weather menu button on the Home page on the concentrator screen, Display 50 appears. If the data is empty as shown on Display 48, a button on the right side of the word Station must be pressed to display the Display 51. Press the Refresh button to refresh the display, which will show the new weather station connection number and also the numbers of any other LoRa connections newly detected by the concentrator.
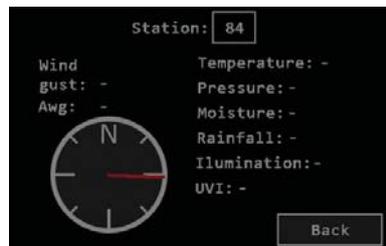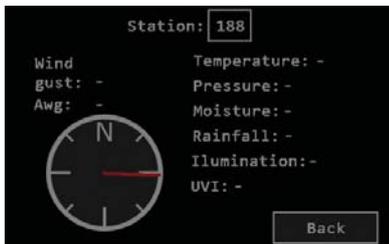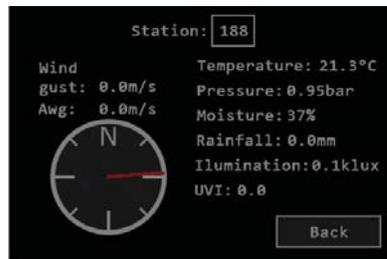


Display 50

Display 51


Display 53

If only one number is displayed, press it to highlight it, and then press the Connect button to display Display 52, and after a maximum of 60 seconds, Display 53 appears. If no data is displayed after one minute, it may mean that the concentrator is not close enough to the weather station, that the weather station is not powered, or that the weather station number has changed, which may happen if you reset it with a button or when removing and inserting the batteries. In this case, it is best to turn off the concentrator for a moment and turn it on again, and repeat the previous steps. If several numbers appear after refreshing, gradually press the numbers until Display 53 appears. Then press the Back button to return to the Basic display.

### 9.2.1 Data description
The weather station continuously automatically sends the measured data to the concentrator every 16 seconds, so the data on the screen is also refreshed every 16 seconds.
With the help of the windmill, we get the data of the maximum speed in a 16-second period and it is displayed as gust. From the received speed measurements in the period, the average speed is calculated and displayed as Awg. The wind direction is shown graphically by a red arrow. North is at the top, South is at the bottom, East is on the right and West is on the left. Rainfall shows the amount of rain that fell from midnight to the time of reading. It is expressed in mm, which corresponds to $l/m^2$. The data is refreshed when the amount of rainfall increases by 0.3 mm, which corresponds to 0.3 $l/m^2$. Other indicators show: temperature, pressure, moisture, humidity, illumination and UVI index.
To return to the Home page, press the Back button.


Display 52

# 10.  Digital camera



Image 17

At the request of the beekeeper, the supplier of the BeeConn device can add a suitable connector to power the digital camera with a connecting cable, as shown in Image 17. By sending an "On" text, you can turn on the camera at any time for 5 minutes. During this time, it connects to its server via the Wi-Fi network and records a short video, which you can watch on your mobile phone or computer. If there is no Wi-Fi network at the camera location, you must have a mobile Wi-Fi router for the camera. When the camera is turned on for the first time, it is accessible only directly via its own Wi-Fi network, which allows you to set up a connection to a Wi-Fi network with Internet access. To set up the camera, you need to download the CamHi app to your mobile phone and connect to Wi-Fi from the camera.
The camera comes with detailed instructions in English for connecting and operating.

# 11.  Web application

The BeeConn web application enables the review of current and historic data received from the concentrator. It is adapted to be used and displayed on mobile phones (vertical positioning). For more advanced analysis of data, it is recommended to use a personal computer, since you can edit the received data with greater visibility.

## 11.1 Instructions for using the application

For the proper functioning of the web application, the concentrator must be connected to the internet – via the Wi-Fi connection or via a mobile network. To display the data, you need to first log into the web application to your user account. The user account will be opened by the supplier at the time of purchase, or at any time later.

The web application is available at: **http://app.beeconn.si**

After the login window appears in Image 18, you must enter your user name in the User field and your password in the Password field to access your user account. The user name and password will be given to you by the device supplier based on the MAC address of your concentrator (see Chapter 4.1 on page 9). Then press Remember me button and Login button. This completes the login and allows you to use the web application. You can have multiple devices in one user account.
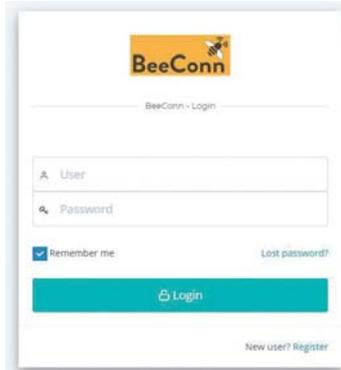


**Image 18**

After logging in to the app, you see an overview list of your own devices that you manage and other devices if you have been granted access/ insight, as shown in Image 19. The list of devices in your user account is assigned to you by the supplier.



**Image 19**

For each concentrator, the basic data is displayed seen in Image 20:
1. Apiary/concentrator name that can be changed.
2. Basic weather data: current wind, current humidity, precipitation in last 24 hours and current temperature.
3. Average yield (all scales) from the last measurement at 20.00 hours up to the current time.
4. Yield on an individual scale from the last measurement at 20.00 hours up to the current time.
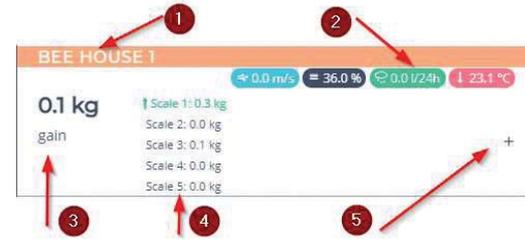5. The button that enlarges the display area with the option of reviewing the details.



**Image 20**

The displayed data is refreshed every hour – in case of normal operations 15 minutes past the hour. By pressing on the empty field or the + button (5), a Graph 1 appears for individual concentrator with the possibility of expanding the graphical display of trends. At the top (1) is a tab to be used to switch between the review modes. The graphic display of data is located in the central part (2) of the screen. The (3) Device detail button Instructions for use takes you to a new page, which offers a more detailed display of

the concentrator data and is meant particularly for use on a personal computer.
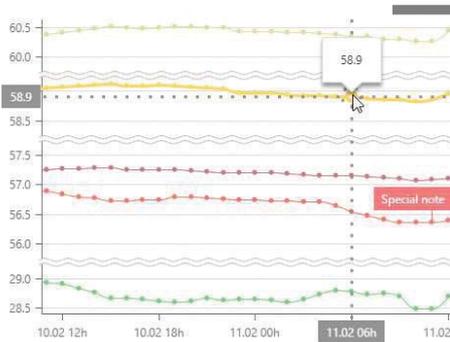


Graph 1

- The graphic display allows you the following options: You can move over the time axis by sliding (mobile device) or by using the drag & drop function with the mouse (personal computer). This way you can review the data history.
- You can zoom into the display on the mobile device by enlarging/minimising the display with two fingers or you can use the scroll wheel on the mouse when using a personal computer. This way you can, for example, review more data simultaneously when reviewing the weight fluctuation (default on Graph 2 is 1 day) and you can, for example, review the data from 4 days.
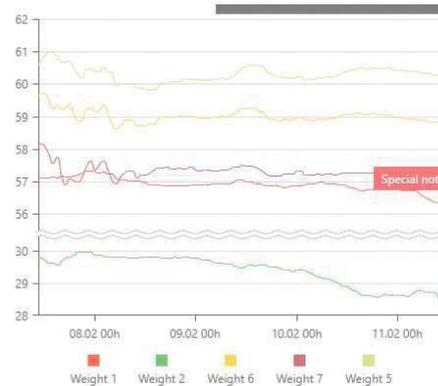


Graph 2

By selecting a specific point (click) on the graph, the details of that point appear, e.g. the time and current weight appear on the weight fluctuation graph.



**Graph 3**

## 11.2 Language selection and logout from the application

The captions on the graphs can be selected from the available languages via the language selection (4) in Image 21.
To log out of the application, use the upper menu as shown in Image 21 and log out according to the procedure from (1) to (3).



**Image 21**

## 11.3 Data display modes

You can choose between the following displays on the Graph 1:
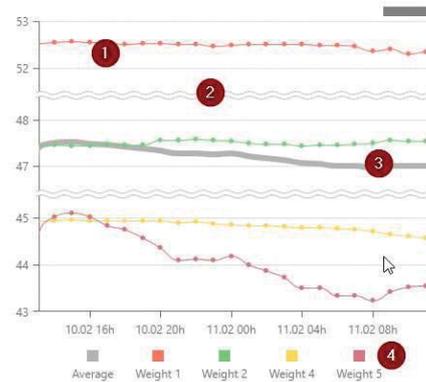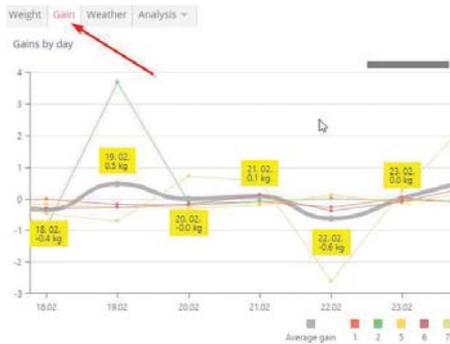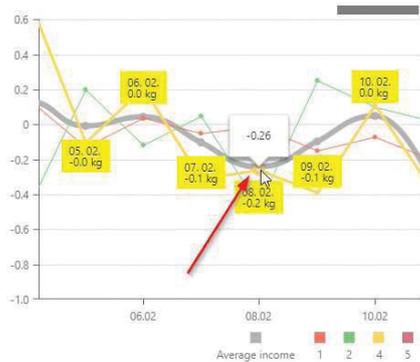


**Graph 4**

The weight fluctuation display (default display) shows you the weight fluctuation of an individual scale (1) and the weight average (3) by d fault. If you have scales of very different weights, the weight scale (2) is broken up to ensure a better display. The graph legend (4) appears on the bottom.

### 11.3.1 Graph of returns

It shows you the individual and average daily yield for all scales tied to this concentrator.
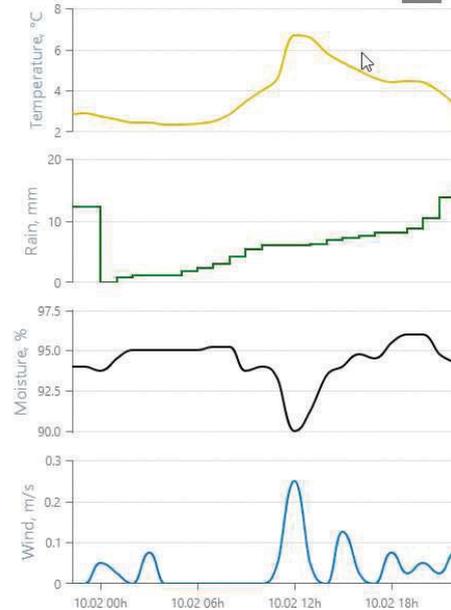


**Graph 5**



**Graph 6**

The points that display the average daily yields are equipped with values (yellow squares). To view the average yield of each scale, you need to select the point that you wish to view. You will see additional details (left).

### 11.3.2 Graphs of weather data



**Graph 7**

By activating the Weather tab in the basic display in Graph 1, Graph 7 is displayed. It shows 4 weather graphs one below the other:

a. Temperature display with time stamps

b. Display of the cumulative precipitation in a day
c. Humidity display with time stamps
d. Wind speed with time stamps
By clicking the selected point, you can view the values of each individual parameter.

## 11.4 Detailed data analysis

By choosing the "Analysis" tab, you have the option to perform a detailed analysis of individually selected parameters. To ensure the visibility of the display, we recommend the use of those functionalities on the personal computer (landscape view), where you can see more data at once. You can choose between two ways of reviewing the data:
1. Graphic analysis – data is displayed on a graph
2. Tabular analysis – parameters are shown in a tabular form (PivotTable) with a simple graphic display

### 11.4.1 Graphic analysis
The graphic analysis offers a selection of individual parameters sent by the concentrator over the selected period of time. The view is divided into three sections:
1. Selection of individual parameters
2. Display of data on the graph
3. Selection of the time period



Graph 8

First, select the parameters you wish to display (1), then select the time period of the display on the time axis (3). The values on the graph will be refreshed.

### 11.4.2 Tabular analysis

The tabular analysis enables the review of numeric data in the PivotTable.

First, you need to select the time period for the analysis – from/to (1). After choosing the time period, the displayed values will be refreshed – tabular (4) and graphic display (5).



<div align="right">
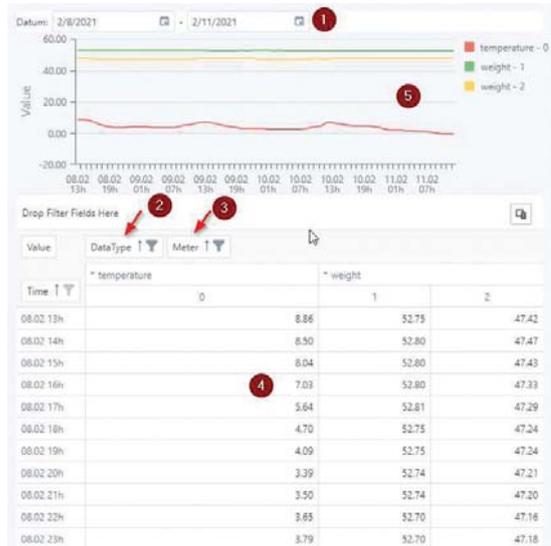
**Graph 9**

</div>

You can also choose between the type of data you wish to display (2) by clicking on the filter icon or sensor/scales icon you wish to include in the analysis (3). Sensor 0 is the weather station, and sensors from 1 onwards are the scales you have coupled with the system.

## 11.5 Concentrator name

You have the option of changing the name of each concentrator. By clicking the "Device details" button (see Graph 1 on page 28), the details of individual concentrator open up as shown in Image 22.
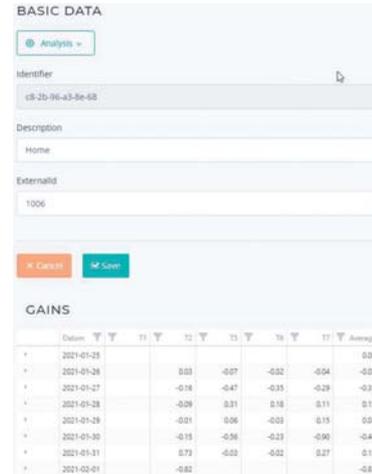


<div align="right">

**Image 22**

</div>

Basic data are displayed on top. The Description field is used for a descriptive mark of your concentrator or apiary in which the BeeConn device is installed. To change the existing name, enter a new mark and click the Save button.

The Identifier field cannot be changed because it identifies your concentrator (MAC address).

## 11.6 Note entry

The web application allows you to enter notes for a more advanced historical analysis. These are descriptive remarks that you assign in a specific time badge (date and time) to a particular sensor/scale. After the Device detail display, there is a tabular display of yields in the lower part. This table also allows you to enter notes. If you have at least one note for a particular day entered, this is marked in the table in Image 23.



Image 23

In case the note was entered using the concentrator (Chapter 4.2.1), an additional description of the entered note can be edited in this way. A note entered using the concentrator will have a **\*** written as the content; which, of course, can be replaced with any description.

By clicking the arrow on the left side (1) in Image 24, you can expand the details for an individual day, where you can view the existing notes (2) and add new ones – click on the + button (3). In the table you can also edit or delete notes (4).



Image 24

If you are adding a new note (3), the window for entering notes is displayed (shown below).

You need to enter:
- The time the note refers to. If you want to enter a note for the previous date, be sure to use the date selector (click on the calendar icon), where you select the appropriate day and time
- Scale/sensor which the note refers to (e.g. 1, 2, 3)
- Content of the note

You save the note by pressing "Save".



Image 25

Notes that you have entered will later also be shown on the basic graph of display of weight fluctuation as shown in Graph 10. This way, you can mark extraordinary events (e.g. pouring, swarm, intervention in the beehive, feeding).



Graph 10

# 12. <u>Diagnostics</u>

The BeeConn device is a quality certified industrial product. The concentrator periodically receives a large amount of data from individual units via wireless communication, so various interferences can cause congestion. The following describes possible congestions and how the user can correct them himself. In the event of damage, the supplier will take care of the repair even after the warranty period has expired.

| Error description | Error correction |
| --- | --- |
| **Loss of all or part of data** on the concentrator screen and consequently in the web application and text messages. The causes can be: failure in powering the concentrator, scales or weather station, conflict in data transmission, due to lightning or influence of some electromagnetic interference. | The concentrator must be reset by turning it off for a few seconds using the ON/OFF switch and turning it on again. In case there is no weight data, it is necessary to reset the scales, which is done by turning off the power for half an hour. **Any interruption of the power supply to the scales for up to 30 minutes causes a blockage, so it is necessary to reset them!** |

| Error description | Error correction |
|---|---|
| **The concentrator is completely inactive:** the screen is unlit and cannot be illuminated and there is no data. The cause is a power failure or damage. | Check the power supply: voltage in the mains socket and check the operation of the adapter. In the case of solar power, it is necessary to check the condition of the battery. In the event that the power supply is in order and still not working, the concentrator must be sent to your supplier for repair! |
| **Communication with the scales is interrupted** after the installation of a repaired or new concentrator. If, at the repair, it was necessary to replace the microprocessor, the connection will have been lost. | All scales must be uncoupled and re-coupled. See Chapter 8 on page 23! |
| **Wrong time on the concentrator.** The wrong time is displayed on the concentrator screen. The cause is a power failure of the CR2032 battery due to wear or poor contact. It is only relevant if you are not using a web application. | Remember or write down the time displayed on the concentrator, then reset the concentrator. If a completely different time is displayed than it was before switching off, it means that the CR2032 battery in the concentrator is exhausted, so it must be replaced and then the time set (see Chapter 4.3.5 on page 17). However, if the time has not changed, the battery is adequate you only need to set the correct time. |
| **The scale stops sending data,** there is no weight data on the concentrator or on the web application. Display 49 on page 22 shows "No data". This can be caused by a power failure of the scale, a data transmission interference, lightning and a possible electromagnetic interference. | The scale must be reset by turning off the power for at least 30 minutes. During this time, it is necessary to reset the concentrator and check the power supply of the scale: the correct installation of the batteries and their condition, i.e. the network and the adapter. After switching on, the scale will send the concentrator fresh information about the weight of the hive within one hour. |
| **Web application failure.** This could be due to a failure of the Wi-Fi connection of the concentrator to the server, a failure of the user account, or an unpaid bill for using the web application. | First of all, it is necessary to check or establish the Wi-Fi connection. If it still does not work, you need to log in again at http://app.beeconn.si (Chapter 11). If it still does not work, make sure to check the bill for the use of the application has been paid. |

The updated manual is available on the www.beeconn.si website

# Manufacturer information

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www.beeconn.si

For more information and customer support, contact the BeeConn website or send an email to help@beeconn.si

The BeeConn web application is available at: http://app.beeconn.si

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