BeeSMART

WiFi controlled filling machine - the smart way

Introduction

BeeSMART is a filling system for honey focusing on few components and thereby a relatively low price. The system can naturally be used in other contexts if desired. BeeSMART is WiFi-based and provides you with a user interface on either PC, tablet, or smartphone without the need for an app.

The system consists of a BeeSMART module with integrated WiFi control and servo, servo horn and pull rod, BeeSMART weight, power supply, and mounting brackets. The bracket is mounted on taps with a collar of approximately 54mm in diameter and at least 10mm in width. Inserts for 50mm diameter collar are included.

The following pages provide instructions for the installation and use of the system.

Bill of Materials

2 x M3 self-locking nuts

2 x M4 nuts

1 x M3 x 16 bolt

1 x M3 x 25 bolt

2 x M4 x 25 bolts

1 x BeeSMART module mounted with servo and WiFi control

1 x Pull rod

1 x Servo horn, extender, and screw

2 x Inserts for 50mm tap

1 x 1kg BeeSMART weight

1 x USB-C power supply

Video material

Video instructions for assembly and installation of the updated version of BeeSMART, as well as a couple of short demonstrations of the first version of BeeSMART, can be found at the following links. The functionality is the same for the updated version.

The following pages contain a user manual for the system.

Demo #1 of BeeSMART

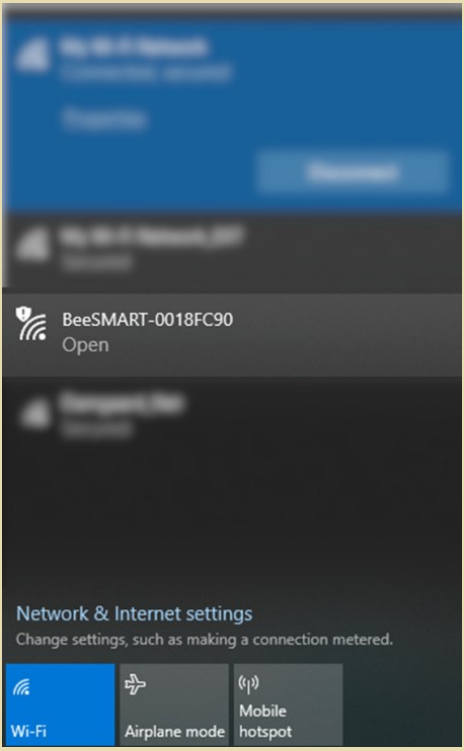
BeeSMART assembly

Demo #2 of BeeSMART

Demo #3 of BeeSMART

User manual | Setup

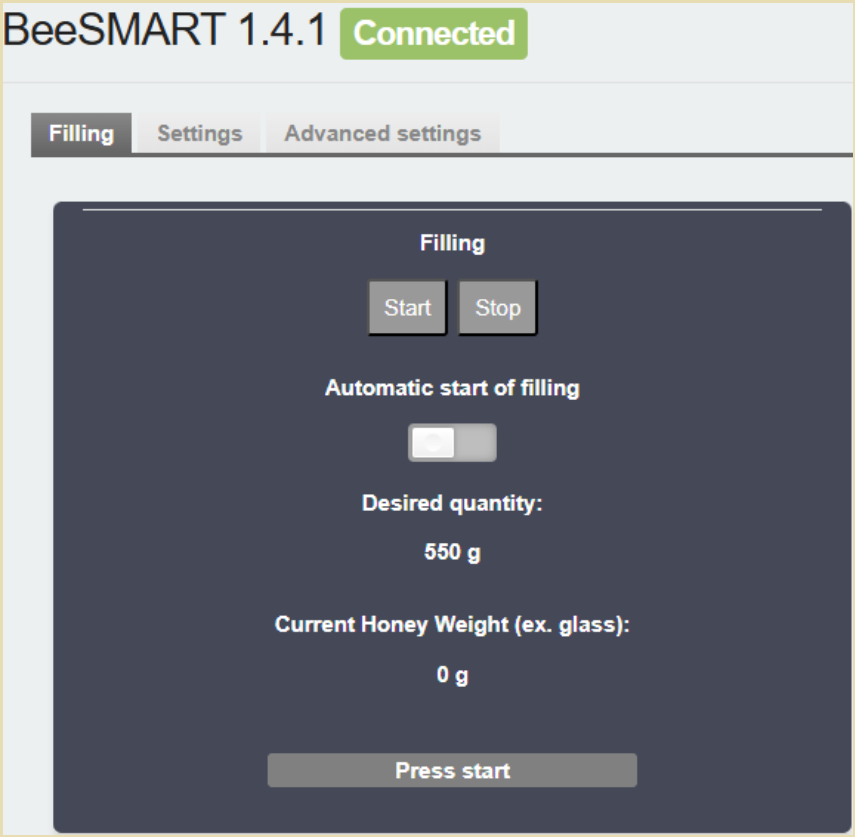
After connecting the USB power supply, servo, and weight, a WiFi access point will appear. If this does not happen within 30 seconds, press the reset button on the module briefly.



Connect to BeeSMART from either a PC, tablet, or phone. In most cases, a browser with the BeeSMART interface will open automatically. If that's not the case, make sure you are connected to BeeSMART, open a browser, and type the following into the address bar: 192.168.4.1

User manual | Setup

You will now see:

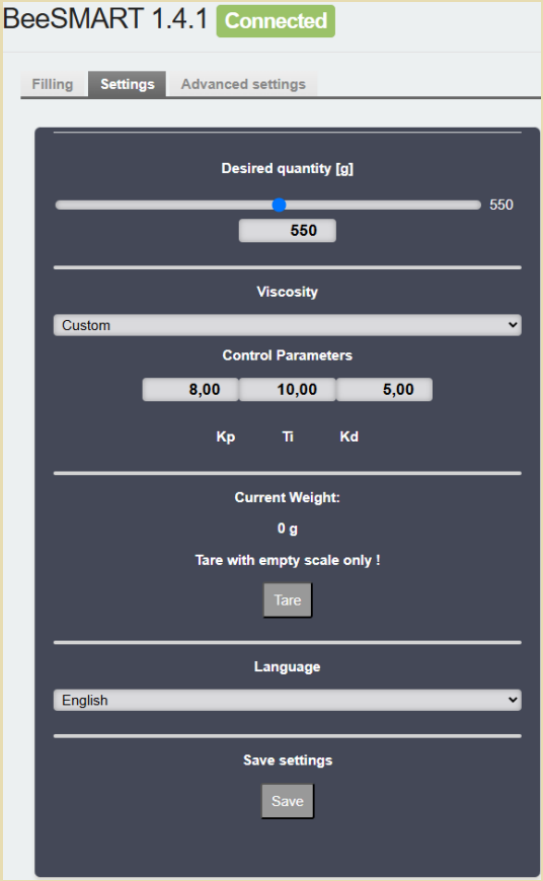


Here's an overview of the quantity that will be tapped, the current weight, and at the bottom, an information text that will provide you with the status.

The "Start" button initiates filling, while "Stop" interrupts filling. The switch "Automatic start of filling," if activated, will automatically start a new filling session when a new empty glass is placed on the scale.

User manual | Setup

Under **Settings**, you can set the desired amount, "Control Parameters," reset the weight (Tare), and select the language.

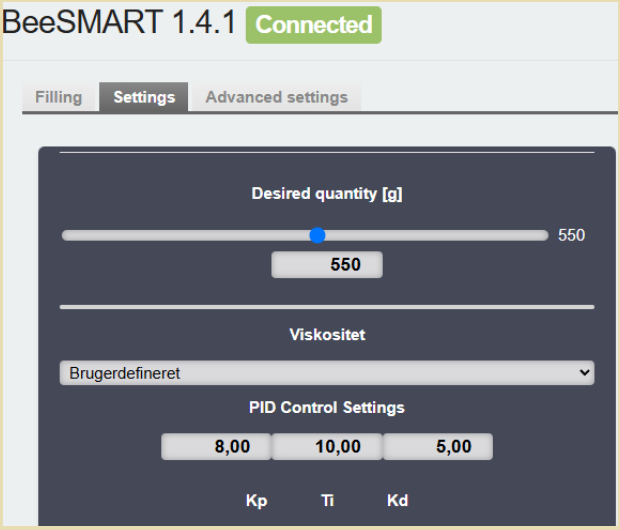


The **desired quantity** can be selected by moving the slider back and forth or by entering the value in the field below the slider.

Viscosity changes the **Control Parameters** Kp, Ti, and Kd. You can choose Custom, Low, Medium, and High. If **Custom** is selected, Kp, Ti, and Kd can be changed and saved by pressing Save. If **Low**, **Medium**, or **High** is selected, preset values are used that typically fit. So, if you want to change the values, select **Custom** and press **Save** after the change!

User manual | Control Parameters

The **Kp**, **Ti**, and **Kd** values depend on the thickness of the honey AND the distance from the tap to the jar. But generally, a **Kp** of 2, a **Ti** of 5, and a **Kd** of 5 are reasonable values.



Kp is multiplied by the difference between what is in the jar and what you want to have in the jar – so what is missing. A small **Kp** will give a small opening of the tap compared to a large **Kp** with the same amount of missing honey.

Ti is the system's "patience". A low **Ti** means that the system will react quickly to the lack of honey in the jar – and thereby open the tap quickly. A high **Ti** means great patience – and the system will react slowly to the lack of something in the jar.

Kd reacts to how quickly the weight changes. If the jar is filled very quickly, **Kd** will ensure that the speed is reduced. When the speed is reduced, **Kd** will lose its effect and the tap will open again. Therefore, a large **Kd** can result in an open, close, open behavior.

Kd may be necessary to avoid overshooting the target when the barrel being tapped is full and/or the consistency is on the thin side.

Larger **Kp** = faster filling, but greater risk of exceeding the desired weight

Smaller **Ti** = faster filling, but greater risk of exceeding the desired weight

In general, **Kd** should not be increased too much and typically can remain at 0.

User manual | Setup

Pressing **Tare** resets the weight. This should only be done with an empty scale!

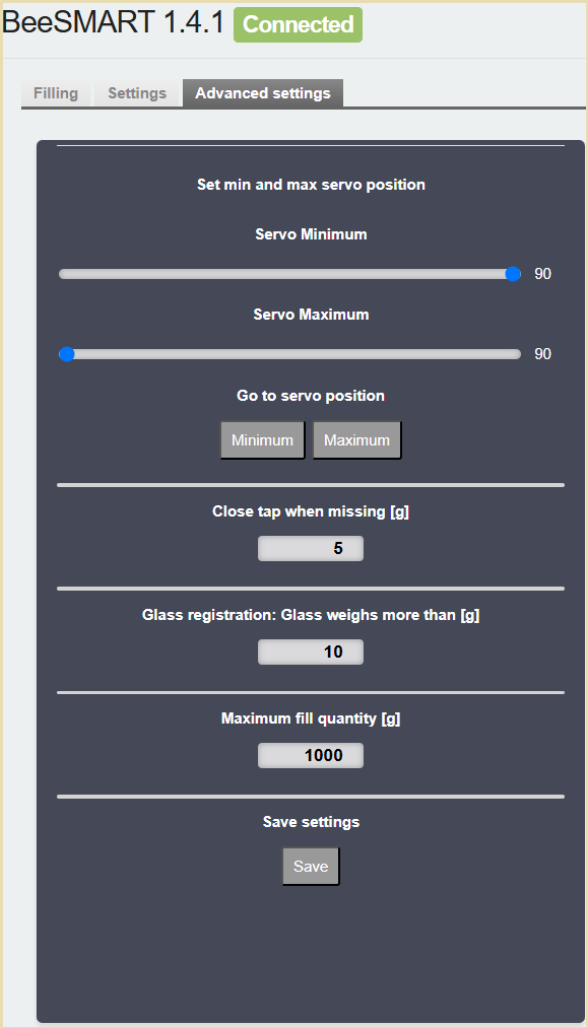
Language can be set to Danish, English, or German.

Press **Save** to save the setting for **Desired quantity**, **Control Parameters**, and **Language**.

User manual | Setup

In **Advanced settings**, the **Servo Minimum** and **Servo Maximum** positions are set. This is done only during the initial setup, and press Save once this setting is completed!

When changing the **Servo Minimum**, press the "**Minimum**" button to make the servo follow the setting. **See the next page for the first-time setup.**



User manual| Servo Setup

It is recommended to set the **Servo Minimum** to a low number (between 1 and 20) and attach the servo horn to the servo when the servo is in the **Minimum** position, so that the tap is closed.

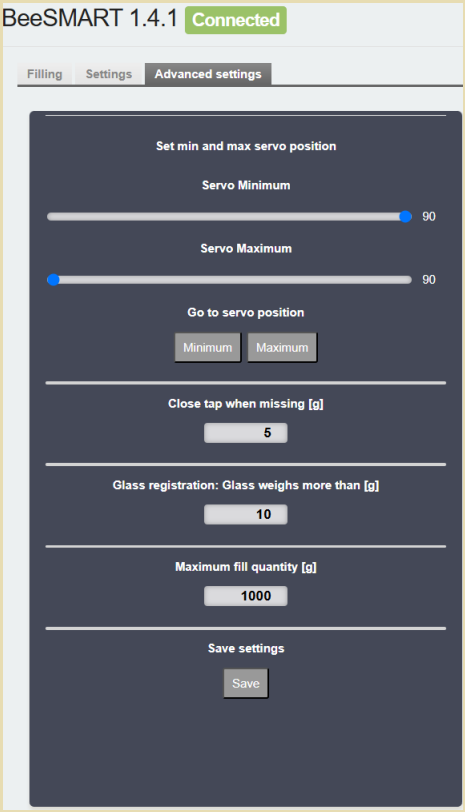
Now attach the servo horn and tighten it. After this, you can gradually find a **Maximum** setting.

Remember to press "Save" when the settings have been changed!

User manual | Setup

In **Advanced settings**, there is also an option to set a value for when the tap closes completely under "**Close tap when missing [g]**" which in the example below is 5g, and the tap therefore closes when 5g is missing compared to the **Desired quantity**.

"**Glass registration: Glass weighs more than [g]**" is the field where the approximate weight of the glass is indicated. This is used to detect a glass on the scale and ensure that tapping does not start with an empty scale.



”**Maximum fill quantity [g]**” allows you to increase or decrease the Max tapping amount that can be selected under **Desired quantity** (on the **Settings** page). It is important that the Max weight that the scale itself can handle is not exceeded—it is typically 1Kg unless otherwise specified.

Remember to press Save when the settings are changed!

User manual | General Use

The system is now ready for use.

Desired quantity and any changes to **Control Parameters** are set under **Settings**. After this, only the "**Filling**" page is used during normal operation.