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

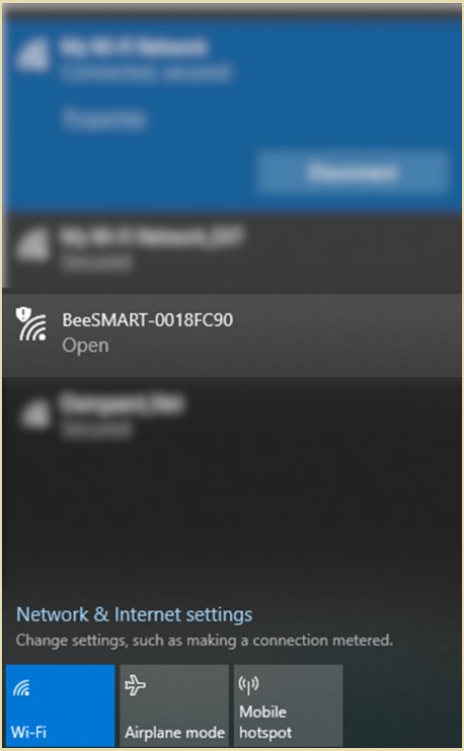
BeeSMART assembly

Demo #2 of BeeSMART

Demo #3 of BeeSMART

User manual

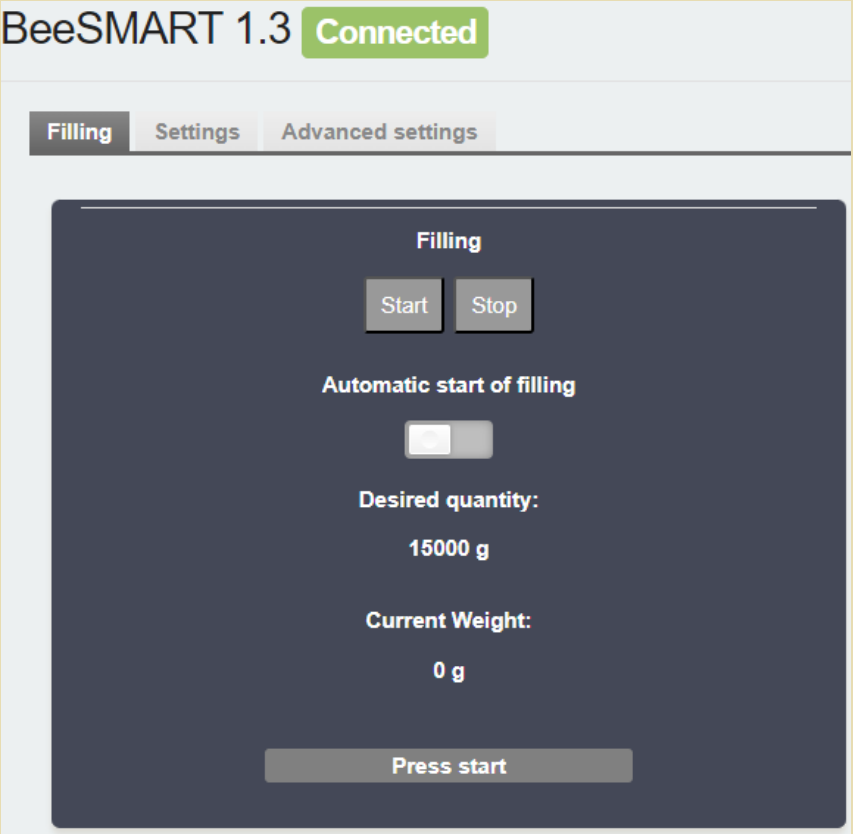
After connecting the USB power supply, servo, and weight, a WiFi access point will appear. If this does not happen within 30 seconds, press the reset button on the module briefly.



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

You will now see:

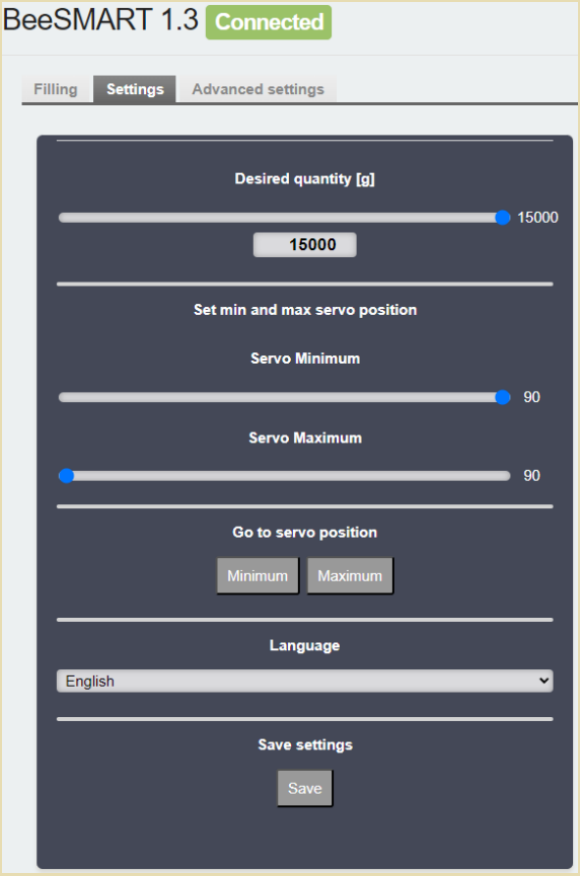


Here's an overview of the quantity that will be tapped, the current weight, and at the bottom, an information text that will provide you with the status.

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

On this page, you can set the desired quantity as well as servo settings.



The servo setting can be tested by pressing respectively minimum and maximum. When first setting up, remove the servo horn from the servo, and set a minimum setting where the tap is closed.

User manual

Now, mount the servo horn and screw it tightly. Then, you can gradually find a maximum setting.

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

User manual

Under advanced settings, the "control parameters" can be adjusted. This determines how the servo should respond to the weight. The values depend on how thick the honey is AND the distance from the tap to the glass. However, 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 glass and what you want to have in the glass – essentially, the amount that is missing. This means that a small Kp will result in a small opening of the tap relative to a large Kp with the same amount of missing honey.

Ti represents the system's "patience". A low Ti means that the system will react quickly to the absence of honey in the glass – and therefore open the tap quickly. A large Ti means greater patience – and the system will react slowly to any absence in the glass.

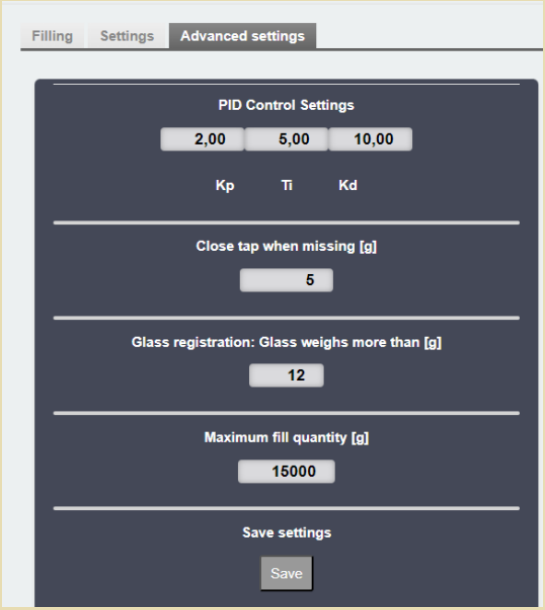
Kd responds to how quickly the weight changes. If the glass is being filled very quickly, Kd will ensure that the pace slows down. Once the pace slows down, Kd loses its effect, and the tap opens again. Therefore, a large Kd could result in an open-close-open behaviour. Kd may be necessary to prevent overshooting when the barrel being tapped is full and/or the consistency is on the thinner side.

User manual

A larger **Kp** leads to faster filling, but there's a greater risk of exceeding the desired weight.

A smaller **Ti** also leads to faster filling, but with a greater risk of exceeding the desired weight.

Generally, **Kd** shouldn't be increased too much, and typically it can remain at 0.



Under advanced settings, there are two additional fields. ”Close tap when missing [g]” indicates at what weight the tap should close completely. For example, with a desired quantity of 500g and a setting of 5g here, the tap will close completely at 495g, leaving room for a 5g 'drip' from the tap.

"Glass registration: Glass weighs more than [g]" tells the system the minimum weight of the glass. The system will only detect a glass when it weighs more than this value. A very low value poses the risk of starting without a glass on the scale.

”Maximum fill quantity [g]” changes the maximum dispensing quantity that can be selected. Please be aware if the scale can handle the quantity selected here!

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