BeeSMART Manual

Wi-Fi controlled tap/fill machine

Version 3.0

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1 Introduction

BeeSMART is a Wi2009Fi based honey dispensing system focused on few components, simple operation and relatively low cost. The system can of course also be used for other liquids where weight-based filling is desired.

The system is browser-based and requires no app. Access it from a PC, tablet or smartphone as long as the device can connect to the BeeSMART Wi2009Fi.

The system typically consists of:

- BeeSMART module with integrated Wi2009Fi control and servo
- Servo horn and pushrod
- BeeSMART scale (5 kg)
- USB-C power supply
- Mounting bracket and inserts for different taps

The mounting bracket fits taps with a collar of about 54 mm diameter and at least 10 mm width. Inserts for 40 mm collars are included.

2 Parts List

Contents of a standard BeeSMART kit:

Quantity	Component
2 ×	M3 self-locking nut
2 ×	M4 nut
1 ×	M3 × 16 screw
1 ×	M3 × 25 screw
2 ×	M4 × 25 screw
1 ×	BeeSMART module with servo and Wi2009Fi control
1 ×	Pushrod
1 ×	Servo horn, extension and screw
2 ×	Inserts for 40 mm tap
1 ×	5 kg BeeSMART scale
1 ×	USB-C power supply

3 Video material

There are videos for BeeSMART covering:

- Assembly and mounting of BeeSMART
- Demonstration of dispensing functions
- Usage examples with different settings

The videos are especially useful during initial setup and for fine-tuning the servo and control parameters.

Demo 1
BeeSMART in use

Demo 2
BeeSMART in use

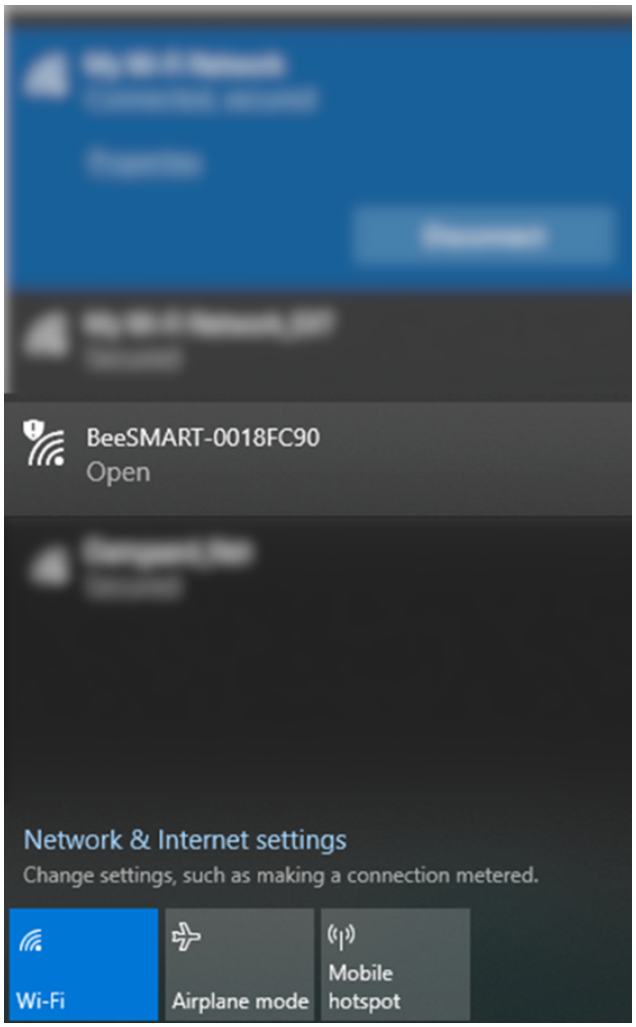
Demo 3
Advanced features in 3.0

Mounting
Tap and bracket

4 User guide

4.1 Connection and access

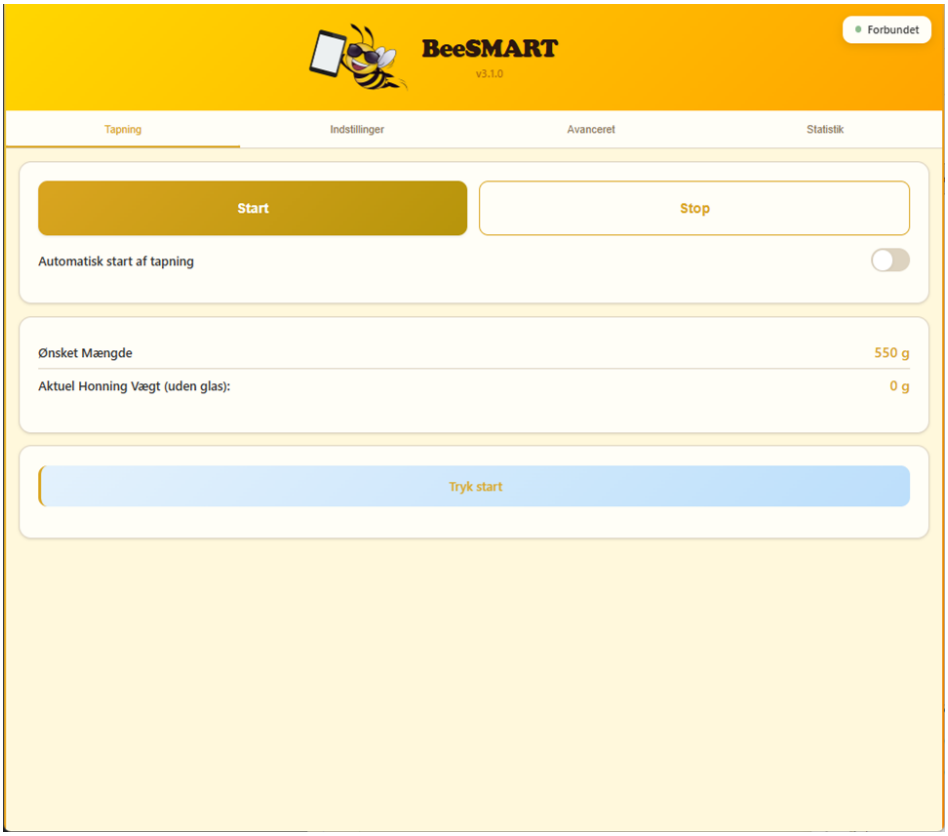
After connecting USB power, the servo and the scale, BeeSMART will create a Wi2009Fi Access Point. This should appear within approximately 30 seconds. If not, briefly press the reset button on the module.



Connect to the displayed BeeSMART network from a PC, tablet or smartphone. In many cases a browser will open automatically with the BeeSMART interface. If this does not happen, open a browser manually and enter the following address:

`192.168.4.1`

4.2 Main screen



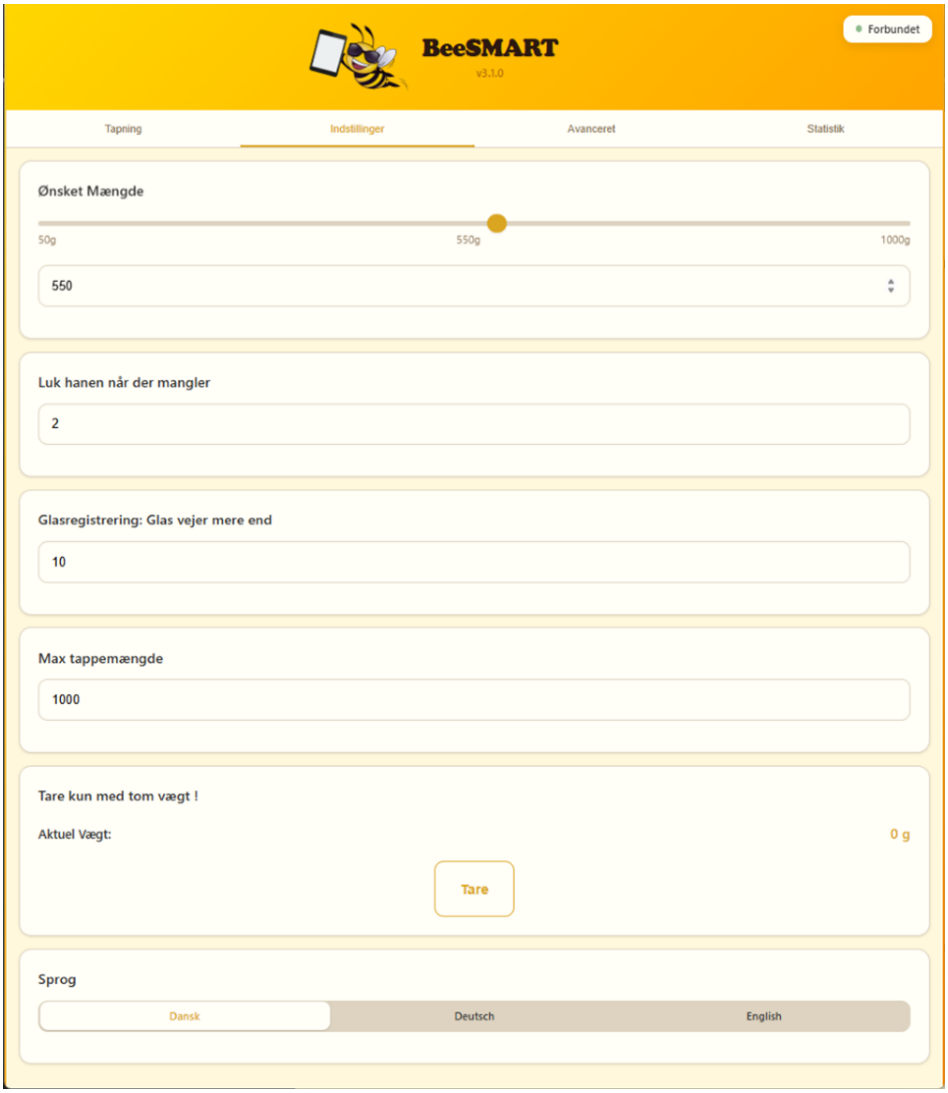
The main screen provides an overview of:

- Desired quantity to be dispensed (excluding jar)
- Current weight on the scale
- Status text at the bottom describing what the system is doing

The **Start** button begins a dispense cycle, while **Stop** interrupts a running dispense.

The **Automatic start of dispensing** feature can be enabled via a switch. When enabled, BeeSMART will automatically start a new dispense when a new empty jar is detected on the scale.

4.3 Settings



On the *Settings* page you can configure:

- **Desired quantity** (honey without jar)
- **Close tap when X g remain**
- **Jar detection: Jar weighs more than**
- **Max dispense quantity**
- **Tare** (reset scale)
- **Language selection** (e.g. Danish, German, English)

Close tap when X g remain

This setting specifies how many grams before the desired quantity the tap is fully closed. It compensates for dripping and the last honey remaining after closing.

Jar detection

The jar weight threshold sets how heavy an empty jar must be to be detected. This prevents dispensing without a jar on the scale.

Max dispense quantity

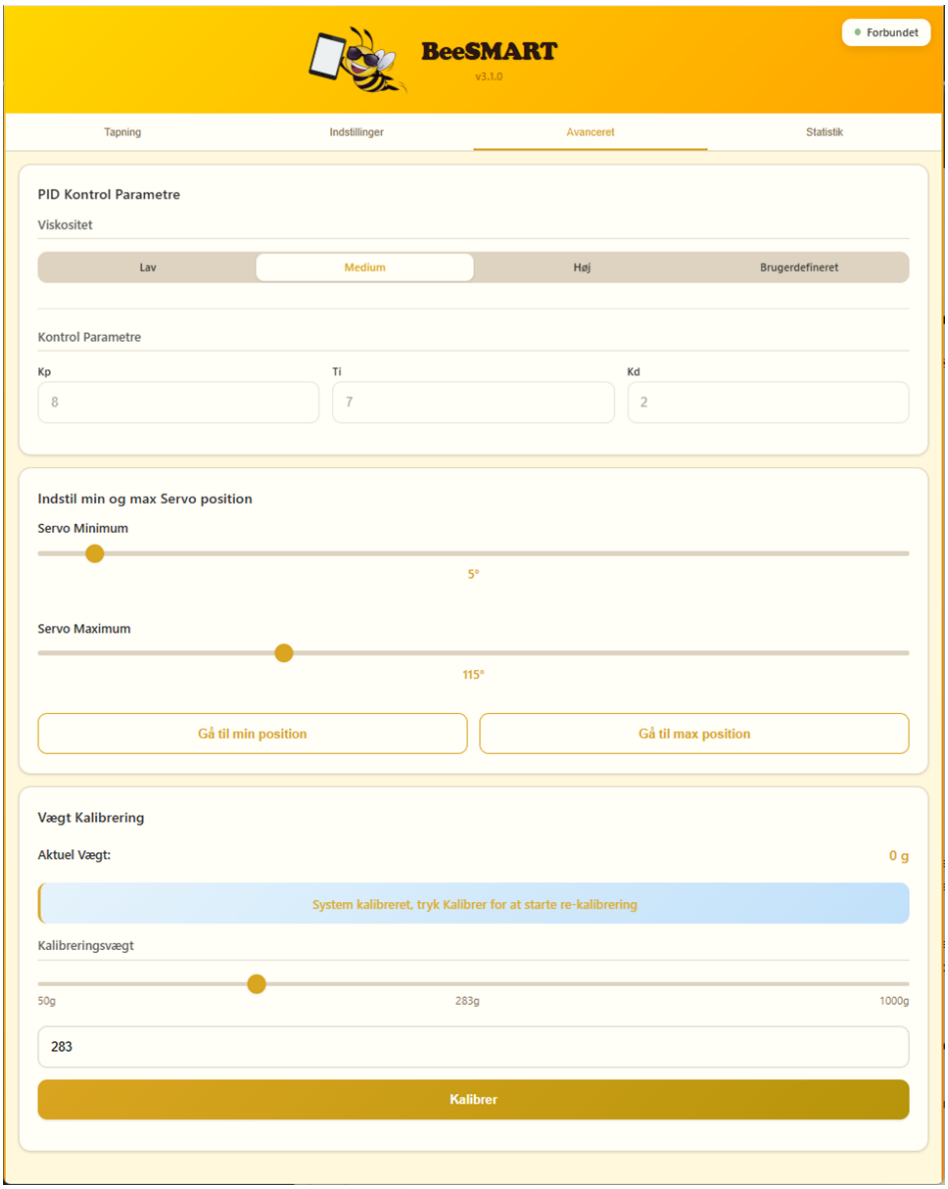
This value increases the maximum of the *Desired quantity* slider if larger fills are needed. The default maximum the scale can handle is 5 kg.

Tare

Tare resets the scale. Use with an empty scale.

5 Advanced

On the *Advanced* page you can adjust control parameters (PID), the servo travel and the scale calibration.



The scale is calibrated at the factory. Calibration is normally not required unless significant deviations are observed.

5.1 PID control parameters

BeeSMART uses PID-like control parameters to control servo opening relative to measured weight. Predefined viscosity profiles are available:

- **Low** – for thinner honey/liquid
- **Medium** – default
- **High** – for very thick honey
- **Custom** – free adjustment of Kp, Ti and Kd

Typical default values that often work well are:

- Kp = 8
- Ti = 7
- Kd = 2

Kp (Proportional)

Kp is multiplied by the difference between desired weight and current weight in the jar — i.e. the missing amount. A small Kp yields a small tap opening, while a larger Kp yields a larger opening for the same error.

- Larger Kp typically means faster filling.
- Too large Kp increases the risk of overfilling.

Ti (Integral/time constant)

Ti describes the system's *patience*. A small Ti means the system reacts quickly to missing honey and opens more. A large Ti causes slower reactions.

- Smaller Ti leads to faster correction.
- Too small Ti can cause overshoot and instability.

Kd (Derivative)

Kd reacts to how fast the weight is changing. If the jar fills very fast, Kd helps temporarily reduce servo opening so the rate slows. When the weight change becomes smaller again, Kd loses effect and the tap can open more.

- Too high Kd can cause an *open–close–open* behavior.
- Kd can help avoid overshoot when the source is nearly empty or the honey is relatively thin.
- Generally Kd can often be set to 0 unless extra damping is needed.

General recommendations

- Larger Kp = faster filling, but higher risk of overshoot.
- Smaller Ti = faster filling, but higher risk of overshoot.
- Increase Kd only cautiously and in small steps.

5.2 Servo setup

On the same page you can set *Servo Minimum* and *Servo Maximum*. Buttons are provided to move the servo to min and max positions for testing.

Setting servo travel

1. Remove the servo horn from the servo.
2. Ensure the tap is physically closed.
3. Set *Servo Minimum* to a suitable value and move the servo to the min position.
4. Mount the servo horn so the tap is just closed in the min position and tighten the screw.
5. Increase *Servo Maximum* gradually while testing the opening until a suitable full opening is reached.

5.3 Scale calibration

The scale is delivered calibrated. Calibration is normally only necessary if systematic deviations are repeatedly observed.

On the page select a calibration weight (e.g. 50 g, 283 g or 1000 g) and follow the calibration procedure. NOTE: The scale must be empty when pressing "Calibrate". Use a as-accurate reference weight as possible.

6 Control parameters — Details

The control parameters Kp, Ti and Kd work together to control fill speed and ensure the desired weight is reached as accurately as possible.

When adjusting parameters

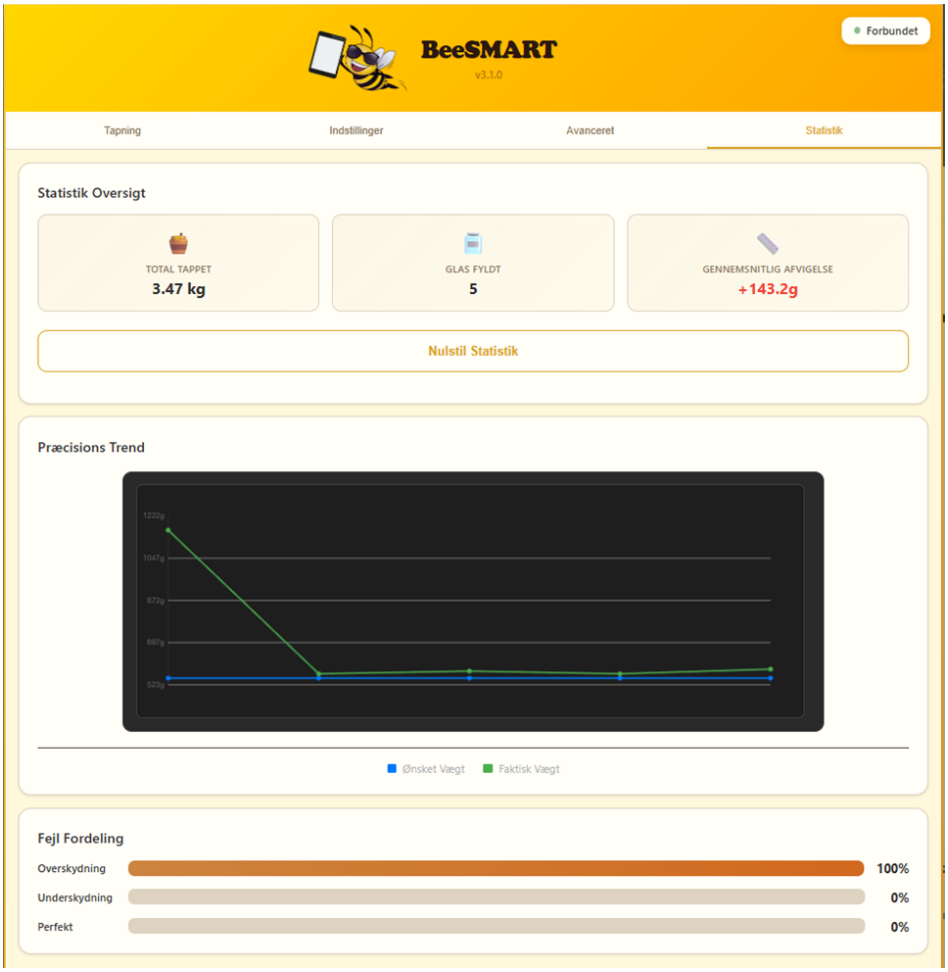
- Always start from the default values.
- Adjust only one parameter at a time.
- Use the Statistics page to evaluate results over multiple fills.

Typical scenarios

- If fills typically end below the desired weight, increase Kp or Ti.
- If often overfilled, decrease Kp and/or increase Ti; consider slightly increasing Kd.
- Very thick honey may require larger Kp to maintain good flow.

7 Statistics

The Statistics page provides an overview of how fills performed relative to the desired weight.



Typically shown:

- **Total dispensed volume** (e.g. in kg)
- **Number of jars filled**
- **Average deviation** in grams
- **Graph of last 10 fills** (desired vs actual)
- **Error distribution** — share of overfills, underfills and *perfect* fills

These data can be used to:

- Evaluate if control parameters are suitable
- Identify systematic overfilling or underfilling
- Support production documentation and quantity tracking