GrainSense

User Manual

GrainSense® Go analyzer (A-2)

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Contact details can be found on the back page of this manual.

Information
The information included in this manual corresponds to our current state of knowledge and is no claim for completeness.

This manual is only intended for the GrainSense Go analyzer (A-2). Before using the GrainSense Go analyzer, the operator must carefully read the detailed instructions for the safe and correct usage of the GrainSense Go analyzer.

Declaration of conformity
The GS Go analyzer (A-2) comes with a type label included. It proves that the device conforms with applicable regulations. The Declaration of Conformity is available upon request.

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1. Introduction

Thank you for choosing GrainSense.
In farming, timing is everything. You need to know when to act, when to harvest, in which order to harvest, when to store, which grains to select for feed, and when to trade. Grain quality data is key to making all of those decisions.
With GrainSense, you know your grain. You can track your grain quality instantly, anywhere. You receive reliable data quickly, and you can store results in the cloud along with their GPS location– so you can make the right decisions to control your outputs.
The GS Go analyzer is a battery-powered, handheld grain analyzer with advanced NIR (Near Infrared) technology. You get reliable **protein**, **moisture**, **oil** and **carbohydrate** contents **in seconds** from just a **few kernels**.

2. Safety and correct usage instructions

2.1 Correct use

The following points must be observed in order to use the analyzer in a correct manner:

- Set up and Operation
- Adherence to the maintenance and servicing instructions
- The GS Go analyzer performs best under dry conditions

2.2 Avoiding measurement errors

Observe the following points in order to avoid incorrect measurements:

- Do not take measurements when kernels are green or unripened. GrainSense calibrations do not include green kernels
- Do not perform all measurements on the same plant when measuring the average content for the field
- Do not perform all measurements on a small area of the field when measuring the average content for the field
- Do not measure using old calibration versions. Remember to regularly connect the analyzer to your phone to save data and update the latest calibrations
- Do not measure if there is water/humidity on the tray, as it will affect moisture measurement
- Do not measure if batteries are too low. Change or recharge the batteries every 50 to 150 measurements depending on battery quality and usage
- Do not use samples containing dirt, leafs, straws, etc. since they may interfere measurements

2.3 Exclusion of warranty

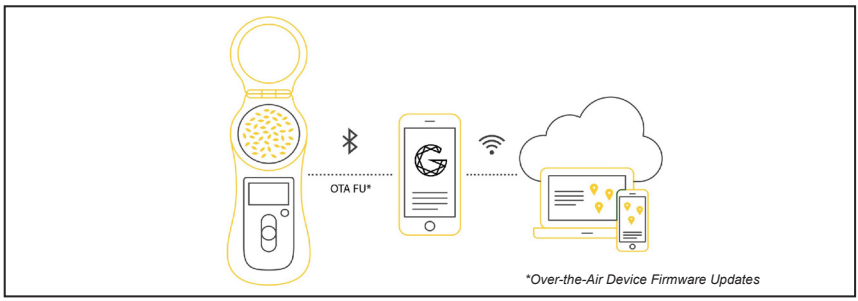
GrainSense is not liable for the following damages to the analyzer:

- Damage to the GS Go analyzer following impacts or vibration
- Damage to the analyzer resulting from moisture or dust
- Damage to the display resulting from applied pressure and scratches
- Malfunctions resulting from cleaning the sample tray with cleaning agents containing alcohol or other chemicals
- Damage caused by heat or intensive solar radiation: The GS Go must not be placed in the immediate vicinity of heat sources or be exposed to direct sunlight
- Incorrect storage

3. The GrainSense Solution (with the analyzer)

3.1 GrainSense solution architecture

The key components of the GrainSense solution are the GS Go analyzer , the GrainSense Mobile Application, and the GrainSense cloud-based database.



The three pillars in the GrainSense system are connected as follows:

1. The **GS Go analyzer** measures the grain quality from a few kernels for any calibrated species. The protein, moisture, carbohydrates and oil contents are measured in a few seconds. The GS Go interacts with the GrainSense Mobile Application via Bluetooth and for Over-the-Air Firmware Updates

2. The **GrainSense App** connects with the cloud to upload calibrations and other settings to the GS Go and sends measurements results from the analyzer to the cloud-based database.

3. The **GrainSense cloud-based database** and API store the measurement results and provide updated calibrations/settings to the GS Go (via the Mobile application). The cloud services include access to the **GrainSense App** and the **GrainSense Dashboard.**

3.2 The GS Go

3.2.1 Package contents

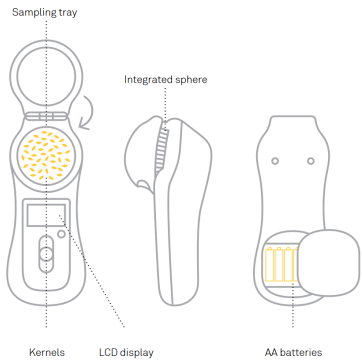
The GS Go Package contains:

- GS Go analyzer
- AA batteries, rechargeable batteries are allowed
- Quick guide
- Set of 4 GrainSense sampling spoons
- Carrying bag
- GrainSense cleaning cloth
- Glassless tray



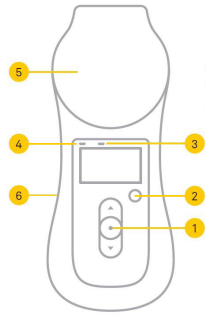

3.2.2 GS Go overview

The GS Go is a handheld and battery-powered device which measures grain kernels in the field and determines protein, moisture, carbohydrate, and oil contents.



The GS Go has:

- An LCD display
- Up and down arrow buttons to select and change view content (If arrows are shown on the screen)
- Confirmation button to move to the next phase of the measurement process
- Dedicated power button
  - Power on by pressing the button until the display turns on
  - Power off by holding the button until the display turns off
- Battery light to indicate battery levels
  - Green: battery level strong
  - Red: batteries should be replaced soon
- Bluetooth light to indicate a connection with the GrainSense App
  - Blink: seeking connection
  - Steady: connected



1. Up / Select / Down button
2. Power button
3. Battery light
4. Bluetooth light
5. Cover
6. Battery lid on backside

Note! As batteries differ widely in performance, the LED color is a rough indication and the user should change the batteries regularly (every 50-100 measurements).

3.3 GrainSense Application

GrainSense provides a mobile application for iOS and Android platforms. The App communicates with the GS Go analyzer via Bluetooth and with the cloud database via REST API. The App downloads the calibrations and user settings from the cloud and sends measurement results back to the cloud. It also communicates with the analyzer for Over The Air Firmware Updates.
Refer to the **GrainSense App sheet** for more information.

3.4 GrainSense Dashboard

The GrainSense Dashboard is a great web tool to analyze and manage the measurements on computer or tablet.
Visit it at **https://dashboard.grainsense.com/**. Use the same login and password for logging in the GrainSense Mobile Application. The GrainSense Dashboard also allows the user to export the data via an .xls or .csv file.
Refer to the **GrainSense Dashboard sheet** for more information.

3.5 GrainSense Data collection

3.5.1 GDPR guidance

GrainSense is fully compliant with the General Data Protection Regulation (GDPR)
The GDPR has been in place since 25.5.2018. and involves all companies handling data from EU citizens. Data controllers (i.e. company) and data processors (company or subcontractor) are required to comply and give more power to a person regarding his data, that includes to:

- Ask explicit consent for all different data types (GPS, email marketing, etc), describe how to data is used and for what purpose
- Allow users to control the data (delete and export)

Companies must also have an internal guidance (this chapter of the User Manual) on GDPR.

3.5.2 Data infrastructure and protection

GrainSense acts as a data controller and processor, but for processing, it uses an outsourced infrastructure (DigitalOcean). GrainSense has taken measures to protect user data by:

- Applying standard encrypted HTTPS (TLS) communication
- Using proper authorization and authentication methods
- Using enterprise level framework (Java Spring)
- Taking nightly backups of the data (last 30 days)
- Limiting admin rights to the databases (two key persons have access to user's personal data)

3.5.3 Data handling

GrainSense gathers data of all registered users to:

- Provide calibrations and other data to users and to their GS Gos
- Provide statistical analyses of the user-specific data, and to showing it only to the user itself
- Verify account status and level
- Store all measured data to provide an access anytime anywhere to the user
- Provide high level customer support and guidance
- Provide higher level statistical data of a specific reason (anonymized) and providing it to all users

3.5.4 User data control

The user can stop their subscription at any time and ask for their data to be deleted by sending a request to **support@grainsense.com** from the account email address. Deletion is made by completely anonymizing the user data: User details (email, address, etc) are anonymized and GPS locations changed. However, measured data itself is not deleted and will be used for statistical purposes.

4. Setup and operation

4.1 Creating a GrainSense User account

4.1.1 Downloading the GrainSense Mobile App from the app store

GrainSense Mobile App is available at official Google Play and iOS app stores. Search using “grainsense”. Download and install the app for compatible Android (OS 7.0 or higher) and iOS (OS 12.0 or higher) phones.

4.1.2 Registering to GrainSense cloud

Registration is done via a separate web application at **www.grainsense.com/register**. There are two alternatives to do the registration:

- Alternative 1:
  - Open GrainSense App on the mobile phone and click on the “**Not yet registered?**” link.
  - A web browser is opening from the mobile phone
  - Create a GrainSense User Account by filling in the details
- Alternative 2:
  - Open a laptop or tablet and go to the registration URL **www.grainsense.com/register**
  - Create a GrainSense User Account by filling in the details

Follow the instructions on the registration page and don’t forget to verify your account by clicking on the email you received.

After successful registration, the user can open the GrainSense App and log in using the email and password provided in the registration application.

4.3 Taking a measurement

4.3.1 Representative sample requirement for reliable measurements

The cornerstones to get reliable measurements with the GS Go are **representative samples** and a **correct use** of the GS Go.

Obtaining a representative sample from a lot of grain is an important and essential part of the grain inspection process. If the sample is not representative, the final quality results will not reflect the true quality of the lot.

Taking samples in the field:

- In order to obtain a representative average reading, the measurements must be carried out randomly distributed across the field.
- When measuring, avoid any atypical areas of the field (e.g. areas with distinctly different soil properties, such as sand banks or similar)!

Taking samples from the truck/silo:

- Different guides about grain sampling already exist, including:
  - AHDB, UK: Grain sampling guide for cereals and oilseeds.
  - USDA, USA: Grain Inspection Handbook - Book I - Sampling.

Note! It is not the responsibility of GrainSense to provide a sampling guide, only recommendations can be given.

4.3.2 Sample size and placement of kernels on the tray

For most cereals, the size of the sample should be about 60–80 kernels corresponding to 3–5 grams. When kernels are bigger, the number of kernels can be reduced. For rapeseed, the amount of seed should correspond to about 2 grams. For sunflower seeds, the amount of kernels is between 1 and 4 grams.

For a more **precise sampling**, use the set of **GrainSense spoons** and choose the proper spoon size according to the grain type selected:

Sample size of different species		
Wheat	3g/5ml	Evenly spread across **Tray**
Barley	3g/5ml	Evenly spread across **Tray**
Oats	3g/5ml	Evenly spread across **Tray**
Rye	3g/5ml	Evenly spread across **Tray**
Rapeseed	2g/2.5ml	Towards bottom of **Tray**, no overlapping
Sunflower (dehulled)	3g/5ml	Evenly spread across **Tray**
Maize	2x2.5ml	Evenly spread across the **Glassless Tray***. Refer to Instructions for the Glassless Tray.
Soybean	2x2.5ml	Evenly spread across the **Glassless Tray***. Refer to Instructions for the Glassless Tray.
Soybean meal	1/2 tsp (2.5 ml spoon) for l**ess finely ground** samples 1/4 tsp (1.25ml spoon) tsp for **more finely ground** samples	Evenly spread across the **Tray**

*** Glassless Tray is used for bigger kernels only.**

The GS Go will also tell you whether the sample is too big or too small with an error message. In this case, take the sample away from the tray and start from the beginning (as for a new measurement).

The tray shall be loaded as follows:


Wheat


Barley


Oat


Rye


Rapeseed


Sunflower (dehulled)


Maize


Soybean


Soybean meal

When taking measurements from a larger batch of grain, it is important to remember the following:

- Make sure the **subsample taken has come from a larger sample** that has been mixed as well as possible.
- For better results, one should **take several subsamples and average the results** together in the app.
- Try to avoid **any foreign matter from being placed on the tray** in addition to the species being tested.

4.3.3 Doing a measurement

Connect the analyzer to your phone

- Turn on Bluetooth and location services
  - Go to the settings of your smartphone and make sure both Bluetooth and the location services are on.
  - For the first connection, a working internet connection is needed on your smartphone.
- Turn on the GS Go and make the connection.
  - Turn on your GS Go analyzer
  - The blue light on it will blink while it searches for your phone.
  - In the GrainSense App, go to the "Analyzer" tab and click on the button "**Connect analyzer**".
  - The GrainSense App will tell you once it is connected to your GS Go analyzer. The analyzer blue light will stop blinking and it will update settings.

Adjust your GS Go analyzer settings from the App

- Select the species you want to analyze
  - In the App "Analyzer" tab, press the button "**Select calibration**" and choose the species you want to load onto your analyzer.
  - Your analyzer will update automatically. Only one species can be loaded at a time.
- Configure an IBA (Individual Bias Adjustment) if needed
  - You can use the IBA feature to adjust your GS Go to a local reference.
  - Click on "**Configure corrections**".
  - If needed, you can disable the auto shutdown of your analyzer.

Please note that IBA calculation can be also accessed from the **GrainSense Dashboard.**

Make a measurement and send it to the App

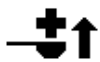
- Make the reference measurement
  - Press (o), verify that the sphere is empty and press again (o).
  - The reference measurement takes only a couple of seconds.
- Load your sample and analyze
  - Open the cover and load the right amount of grains by using the GrainSense spoons.
  - The sample size depends on the species you are analyzing
- Send the results to the App
  - Results are displayed on the analyzer, press (o) twice to send them to the App
- When you're done, remember to open the cover and completely empty the sample tray.

4.4 Viewing the results, adding notes, averaging and sharing results

You can view the results and add notes to a measurement after you have sent the results from the analyzer to your phone. You can also share the results from the App.
Refer to the **GrainSense App sheet** for more information.

4.5 Error icons

7 error icons have been defined and can be displayed on the GS Go screen, those icons are presented in the table below.

Icon	Instruction
	Wait
	Turn on/Turn off
	Try again
	Sample too big, try again with a smaller sample
	Sample too small, try again with a bigger sample
	Change the batteries. Note: Batteries should be labeled with “for industrial use”
	Servicing required, contact your Distributor or GrainSense at support@grainsense.com

A **combination of icons** can also be displayed. Each icon will correspond to a step you have to take in order to get a reliable measurement.
For example, the error icon combination on the GS Go analyzer’s screen below would mean: Wait a bit, then try again, if the error persists servicing is required so contact your Distributor or GrainSense at support@grainsense.com

5. Maintenance and servicing

5.1 Cleaning the sample tray

The sampling tray of the GS Go should be kept clean and the batteries changed when needed.
The tray is removable and opens by turning it counter clockwise, about 10 degrees.
Note! Never use running water or chemical cleaning agents on the sample tray (e.g. domestic cleaner, alcohol or cleaning solvent). If required, clean the sample tray with a dry, clean, soft cloth.

5.2 Replacing the batteries

The batteries should be changed when needed:

- Turn off the GS Go.
- Open the battery cover with a flathead screwdriver
- Replace the old batteries with new batteries of the same type: 6 x AA Alkaline. We recommend using AA batteries labelled for industrial use for maximum performance (i.e. optimized for high drainage) or rechargeable batteries.
- Make sure the batteries are inserted into the analyzer properly.
- Close the cover tightly with a flathead screwdriver.

5.3 Transportation and storage

The GS Go should always be transported and stored in the GrainSense carrying bag. Avoid knocking the analyzer or scratching the display. Only take the analyzer out from the carrying bag when measuring.

5.4 Disposal

The GS Go analyzer and batteries may not be disposed of in normal domestic rubbish. Please refer to your local regulations for disposal.

5.5 Updating the calibrations on the GS Go

To assure the accuracy of the measurement, the GS Go should be connected regularly to the GrainSense App to upload the latest updates from the GrainSense cloud.
When new calibration updates are available, the GrainSense App and the GS Go should be connected with internet connection on the phone. It is advised to push the button “Update settings” from the GrainSense App “Analyzer” page in order to push the news settings to the GS Go.

5.6 Over The Air Firmware Updates (OTA FU)

The GS Go supports Over The Air Firmware Updates (OTA FU). This means that when a new firmware update is available, you will be able to download it from the GrainSense App and then transfer the update to your analyzer remotely!

If there is a firmware update available for your analyzer and you have connected your analyzer to your GrainSense App, you will see in the "Analyzer" App tab a screen informing you that an update is available. You only need to push the button "Update now", and it will start the download. Firmware Update lasts usually from 5 to 10 minutes. During that time, the analyzer should not be disconnected from your App. Please before doing a firmware update, verify that you have deactivated the auto shutdown of your analyzer in the GrainSense App's "Analyzer" tab.

Once the new software upload is complete, your GS Go analyzer will disconnect, restart and install the new software. Do not touch the analyzer during this process.

6. Support

Support materials are available on GrainSense Website at any time.
In case you need further help, please contact your local GrainSense distributor or send an email to the GrainSense support team: **support@grainsense.com**. Contact details can be found in the GrainSense App.

7. Declaration of Conformity

GrainSense Oy (FI2630019-1)
Tutkijantie 9 B
90590 Oulu,
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Declares under our sole responsibility that the product:
GS Go

Is compliant with the following directives:
-Radio Equipment Directive 2014/53/EU
-Low Voltage Directive 2014/35/EU
-RoHS III 2015/863
-WEEE 2012/19/EU

A digital version of this declaration is available from the manufacturer on request.

CONTACT
For any support, please
contact your salesperson or
support@grainsense.com

GRAINSENSE.COM