User Manual

GrainSense®
Combine Analyzer

GrainSense

Imprint

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

This manual is only intended for the GrainSense Combine Analyzer.

Before using the GrainSense Combine Analyzer, the operator must carefully read the detailed instructions for safe and correct use of the GrainSense Combine Analyzer.

Contents

1. Introduction

Thank you for choosing GrainSense.

With GrainSense Combine Analyzer, you analyse your grain even on the move. You can track your grain quality real-time from flowing grain. You receive reliable data, and you can store results in the cloud – so you can make the right decisions to control your outputs.

The GrainSense Combine Analyzer is a revolutionary grain analyzer with advanced NIR (Near Infrared) technology. You get reliable protein, moisture, oil and carbohydrate contents instantly from flowing grain.

2. Safety and correct usage instructions

2.1 Correct use

The following points must be observed to use the GrainSense Combine Analyzer in a correct manner:

- Set up and operation
- Adherence to the maintenance and servicing instructions

2.2 Exclusion of warranty

GrainSense is not liable for the following damages of the GrainSense Combine Analyzer:

- All damage to the Combined Analyzer from misuse.
- Damage to the display resulting from applied pressure and scratches.
- Incorrect storage.
- Usage beyond the range of operational temperatures.

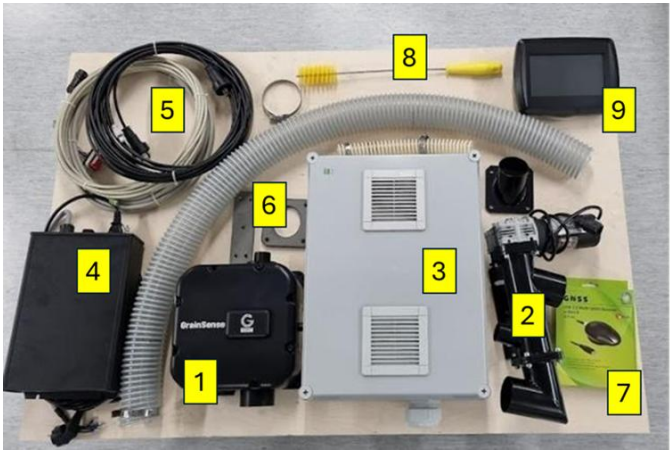
3. GrainSense Combine Analyzer

3.1 Product description

The GrainSense Combine Analyzer has been developed for analyzing real-time grain quality in environments where grains are flowing. Whether installed in a combine harvester, the Grain- Sense Combine Analyzer measures protein, moisture, oil and carbohydrates online during harvesting.

From a grain entry and exit system, the GrainSense Combine Analyzer will continuously extract a sample of the grain from the connected system and perform a real-time quality analysis. The key values can be seen on the display of the device and the measurement data is sent to GrainSense Cloud, enabling the user to monitor the results in real time and to make quality-based decisions.

3.2 Package contents



1. GrainSense Combine Analyzer Sensor unit
2. GrainSense Combine Analyzer Dosing Auger
3. GrainSense Combine Analyzer Gateway unit
4. GrainSense Combine Analyzer Power unit
5. Cables (display, 2x Ethernet, sensor)
6. GrainSense Combine Analyzer Installation parts:
    a. The Input Collector Box
    b. Mounting plates for Dosing Auger for input and output hoses: tube flanges 3 pcs, flanges 3 pcs, housing adapter 1 pcs
    c. (Additional mounting plate for the sensor, not included into the picture, not commonly used)
    d. Connecting pipe (32 mm diameter) between dosing auger and sensor unit
    e. Input/output and bypass pipes (63 mm diameter)
    f. Hose clamps 8 pcs
7. GPS unit
8. Brush for cleaning the glass tube
9. Display

3.2.1 Additional equipment requirements

During installation and operation:

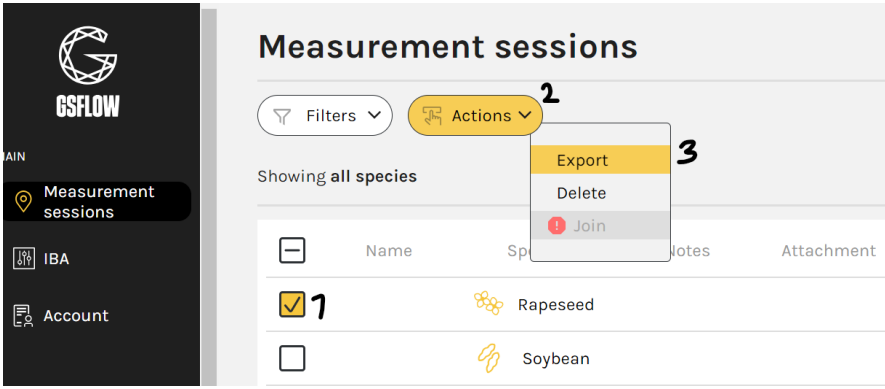
- Wifi- connection

During installation:

- A drill and a screwdriver
- Welding machine (if applicable)
- Alloy wrenches
- Drill bit hole saw 60 mm

3.3 GrainSense Flow Dashboard

The GrainSense Dashboard is a great web tool to analyze and manage measurements on computer or tablet. Visit it at https://flowdashboard.grainsense.com/. The GrainSense Flow Dashboard also allows the user to export the data via an .xls or .csv file.



3.4 GrainSense Data collection

3.4.1 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.

3.4.2 Data infrastructure and protection

GrainSense acts as a data controller and processor, but for processing, it uses an outsourced infrastructure (Amazon AWS). 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)

3.4.3 Data handling

GrainSense gathers data of all registered users to:

- Provide calibrations and other data to users and to their GrainSense Combine Analyzers
- 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

3.4.4 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.

3.5 Technical specifications

Technical specifications	
Size	225x225x110 mm
Weight	5 kg
Power	12 V
Measurement principle	Near infrared transmittance spectroscopy
Sample size	100 grams per second flows through the sensor when measurement is ongoing
Species	Wheat, barley, soybean, maize, rapeseed, oats and rye
Storage temperature	-20 to +85 °C
Operational temperature	0 to +45°C

4. Installation and Operation

Continuous grain flow is extracted from e.g., combine harvester's elevator to GrainSense Combine Analyzer's dosing auger. Dosing Auger feeds a steady grain flow through the GrainSense Combine Analyzer sensor unit.

4.1 Installation instructions

This document describes the installation procedure of the GrainSense Combine Analyzer. The Combine Analyzer can be installed in a combine harvester or in a grain handling facility. Every location is somewhat unique and planning before starting the installation is recommended.

2 Package Contents (see 3.2)

Before starting the installation, check the installation location and carefully plan the exact place for the Sensor unit and the dosing auger. Included mounting plates can be used in combine harvester installation.

3 Installation in Combine Harvester

3.1 Installing the sensor unit and dosing auger

GrainSense Combine Analyzer is installed in the combine harvester's clean grain elevator. The dosing auger and the input pipe are installed above the sensor unit. Before starting the installation, make sure there is enough space for the dosing auger and for the input pipe above the planned location of the sensor unit. Also, the input pipe acts as a grain buffer for the Combine Analyzer, so the longer the input pipe is, the bigger the grain buffer is.

Once the installation location has been determined, mark the exact position for the sensor unit's mounting plate. The plate will be welded (if applicable) to the elevator structure. It is essential to ensure the location is suitable for installation and perfectly horizontal. After marking the position, proceed to weld the mounting plate in place.

Important:

The installation takes place in a dusty environment. Ensure compliance with all local welding regulations and take appropriate safety precautions to reduce the risk of fire during welding.

Installation of Sensor Unit, Dosing Auger, and Input Components

1. Install the Sensor Unit
    - Once the sensor unit's mounting plate has been welded in place, install the sensor unit securely.
2. Determine the installation for the Dosing Auger and Install it
    - With the sensor unit installed, identify the correct position for the dosing auger. It must be mounted directly above the sensor unit, ensuring that the auger's output aligns precisely with the sensor unit's input.
    - Mark the correct location for the dosing auger's mounting plate.
    - Weld the mounting plate using the same procedure as for the sensor unit.
    - After welding, install the mounting bracket and attach the dosing auger.

3. Install Input Collector Box and Related Components

- Next, install the input collector box, the mounting plate for the dosing auger's bypass pipe, and the output pipe for the sensor unit.
- The input collector box, which connects to the dosing auger's input pipe, should be installed above the dosing auger and aligned with its input.
- For optimal grain flow, it is recommended to install the lower parts of the system in a clean section of the elevator.
- A greater vertical distance between the mounting plate and the dosing auger increases the buffer capacity, allowing more grain to flow into the sensor.
- Once the location is finalized, mark the position.
- Then, mark and cut the opening for the collector box and drill the necessary holes for the installation bolts.

Install the Input Collector, Bypass, and Pipe Connections

4. Install the Input Collector Box
   - Apply adhesive mass when installing the input collector box to the elevator. This helps prevent dust leakage from the collector.
   - Ensure the collector is properly aligned with the dosing auger's input.
   - Install the Bypass Pipe Mounting Plate

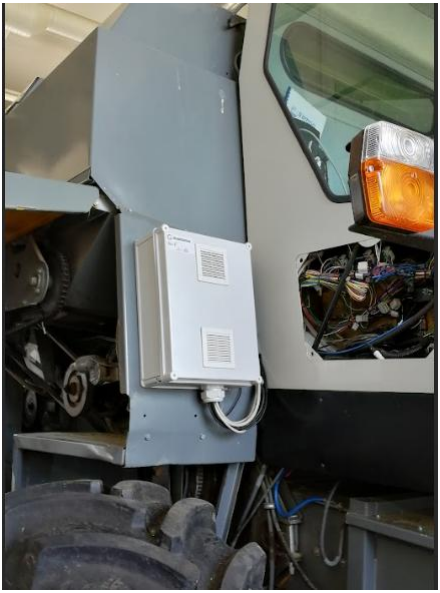
5. The mounting plate for the dosing auger's bypass pipe should be installed directly below the bypass and aligned with it.
   - Weld the mounting plate in place using the same method as for the previous mounting plates.
   - Once welded, install the bypass pipe.

6. Install the Sensor Unit Output Mounting Plate
   - Position the mounting plate directly below the sensor unit, ensuring alignment with the sensor unit's output.
   - Weld the plate in place following the same procedure as above.

7. Connect the Piping System
   - After all mounting plates have been welded and the input collector box is installed, proceed with connecting the pipes:
     - Input pipe
     - Output pipe
     - Bypass pipe
     - Connecting pipe between the dosing auger and the sensor unit
   - Use the hose clamps provided to securely fasten all pipe connections.

3.2 Installing the gateway

The gateway unit is installed in the combine harvester’s cabin. Find a suitable location in the cabin and fix the gateway unit securely. When the gateway unit is installed. Install the wiring between the gateway unit and the sensor unit. Make sure that the wiring is done securely and that the wiring is not subject to any damage.

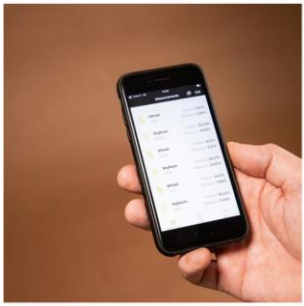


Install a power cable for the Gateway unit following the schematics inside the gateway unit. If needed, use a professional electrician.

Find a suitable location in the cabin for the display and install it. Finally, install the GPS receiver on the roof of the combine harvester. Make sure that the cable is not subject to any damage.

4.2 Registering to GrainSense cloud

1. Go to www.grainsense.com
2. Scroll down until you see the Cloud services -part.



GRAINSENSE

CLOUD SERVICES

Use our devices with Premium GrainSense User Account License. GrainSense will store your data and with the account you will get access to the GrainSense Mobile App and Farmer Dashboard.

GET THE ACCOUNT

3. Click get the account -button.
4. Scroll down and click Purchase now -button on the Grainsense Flow user account licence.

GRAINSENSE FLOW USER ACCOUNT LICENSE

Included in the licence:

- GrainSense Dashboard
- Latest calibrations and updates to your GrainSense device and software
- Updates to your Grainsense Flow device
- Grainsense cloud service with unlimited storage for your measurements
- Access to camera images when applicable

Subscription is valid for 1 year

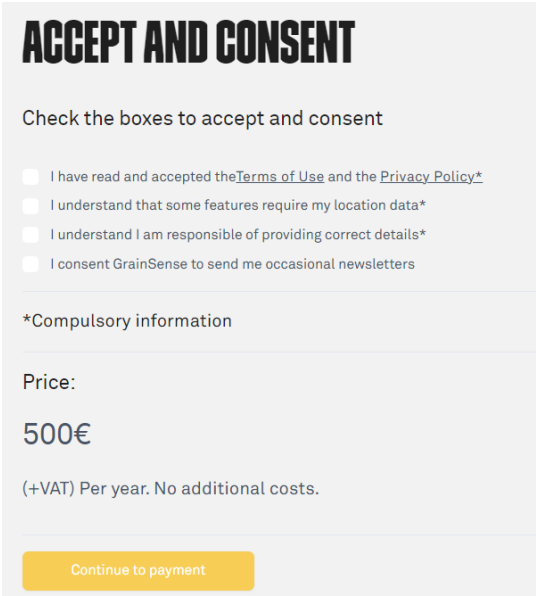
500€
(+VAT) per year

PURCHASE NOW

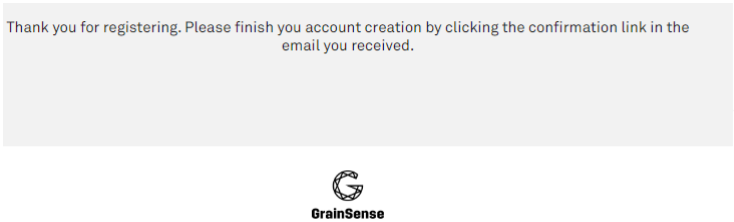
Product code GS-FLW-ACC-LIC-P1

5. Fill in the fields on the registration form.
6. Click the Continue to payment.

7. On the payment -page, select the payment method. Check the I'm not a robot -box and then click on the Register -button.

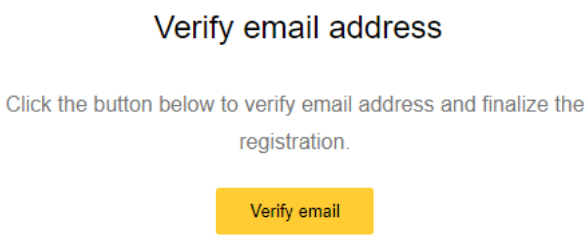


You should see the thank you for registering message.

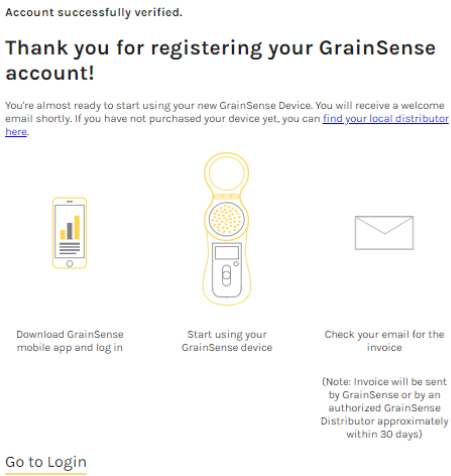


8. Go to your email inbox and open the "Confirm your email with GrainsenSense" -message. Please check your spam folder if you have not received the email.

9. Click the Verify email -button on the message.



10. You have now registered your account. You should see the confirmation message on your browser.



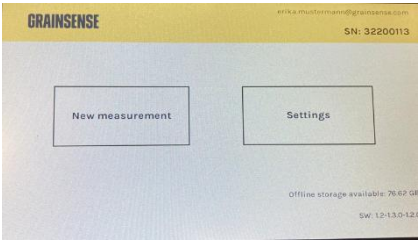
4.3 Operation Instructions

4.3.1 How does it work?

A dosing auger is installed close to a place where grain is flowing.
The GrainSense Combine Analyzer controls the auger and electronics to perform measurements in configured intervals. Measurements are being made until the user ends the measurement session. The measurements are collected by the gateway unit and sent via WiFi network to the GrainSense Flow database. If a Wifi network is not available during the measurement session, the data is saved in the device's memory and it is sent to the cloud, when Wifi becomes available.
The user can access the GrainSense Combine Analyzer measurement sessions anytime from the GrainSense Flow -dashboard with the provided credentials.

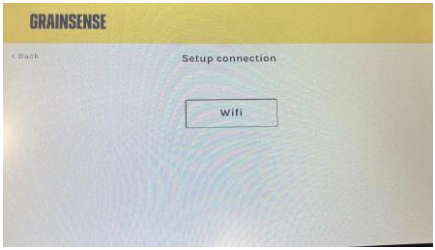
4.3.2 Powering up the GrainSense Combine Analyzer

1. Turn the power switch ON from the GrainSense Combine Gateway unit.
2. Wait until you see the landing page on the screen.

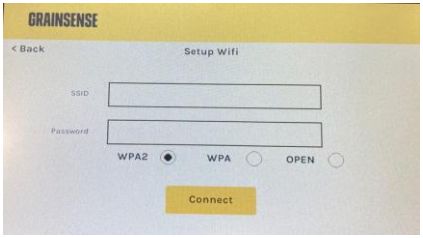


4.3.3 Network settings

GrainSense Combine Analyzer uses Wi-Fi network for internet connection. To have the measurement results available real-time in the GrainSense cloud, Wi-Fi settings need to be configured.



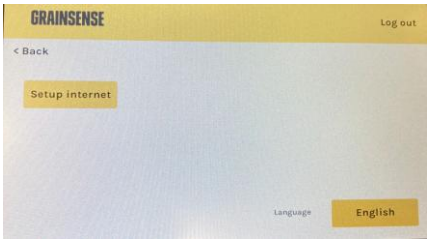
Go to **General settings**-> **Setup internet**-> **WiFi**
Insert SSID (name of your Wi-Fi network) and password and select the security type of your network. Then tap “Connect”.



4.3.3.1 Language selection

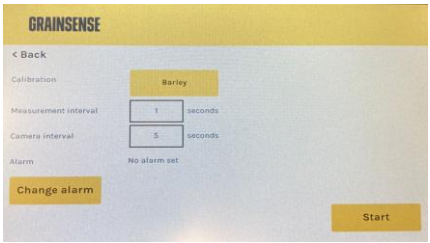
Go to **General settings**-> **Language**

Select the language you want to use with GrainSense Combine Analyzer.



4.3.4 Measurement settings

From the measurement settings main view, you can define measurement interval (how often the measurements are taken during measurement session)

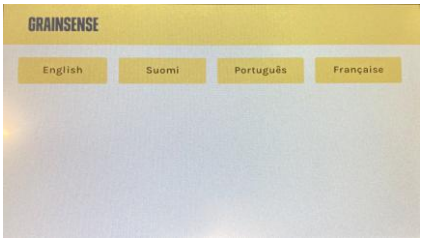


Tap on the Measurement interval value box to change the interval. Use the DEL -button to delete the old value and type in the new value with the keypad. Then tap “OK” to confirm the new value.

4.3.5 Calibration selection

Go to **Measurement settings**-> **Calibration**

Select the calibration that you want to use for the measurement session.

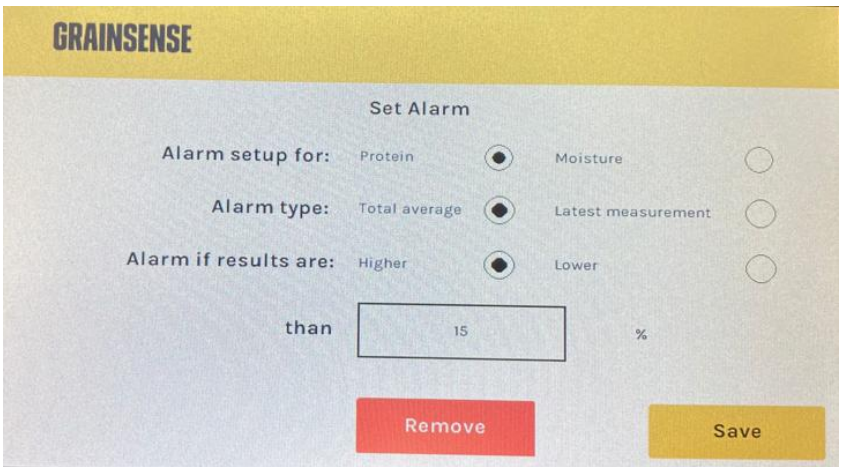


4.3.6 Setting alarms

Go to **Measurement settings**-> **Change alarm**

Define the desired alarm parameters by using the radio -buttons and define the alarm threshold value in the field. Then tap “Save”.

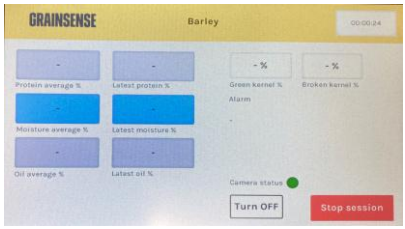
The alarm can be removed from the same dialog by using the “Remove” button.



4.3.7 Starting measurement session

After all the settings have been defined, the measurement session can be started by tapping the “Start” button.

10. In the measurement session -view, the user will see the following information:
11. Selected calibration (e.g. wheat)
12. Latest protein and moisture percentage values
13. Average protein and moisture percentage values from the whole duration of the measurement session
14. If an alarm was defined in the settings, it will be displayed here
15. Duration of the measurement session



4.3.8 Stopping measurement session

When the batch of grain has been measured, the user can stop the measurement session by tapping the “Stop session” button.

4.3.9 Viewing results

The results are automatically uploaded to the GrainSense cloud. The user can log in and view the results in GrainSense Flow dashboard. In GrainSense Flow dashboard, it is possible to add notes and attachments to measurement sessions and share the results via email.

5. Maintenance and servicing

5.1 Preventive maintenance

We recommend cleaning the glass tube after every 20 h of operations.
Check the cables, connections, glass tube and lamp bulb annually.
If the lamp bulb or glass tube is broken, please contact your local distributor.

5.2 Cleaning the glass tube

The glass tube inside the sensor unit should be kept clean. Depending on the measured species and operating environment, the need for cleaning varies. We recommend cleaning the glass tube at least every fortnight, but a shorter interval might be needed.
To clean the glass tube, release the hose clamp on the output of the sensor unit. Remove the output tube and use the supplied brush. After the glass tube is clean, connect the output tube and tighten the hose clamp.

5.3 Updating your GrainSense Combine Analyzer

When the GrainSense Combine Analyzer is connected to the internet, it automatically checks and downloads new calibrations and software updates. Please don’t shut down the Combine Analyzer during an update.

CONTACT

For any support, please contact your local sales representative or support@grainsense.com

www.grainsense.com