SGS SWH Grain Condition Monitoring Device User Manual

Contents

SGS SWH Grain Condition Monitoring Device

TITLE
SWH – Grain Condition Monitoring Device – Installation and configuration Manual.

SUMMARY
Installation and configuration Manual of Grain Condition Monitoring Device.

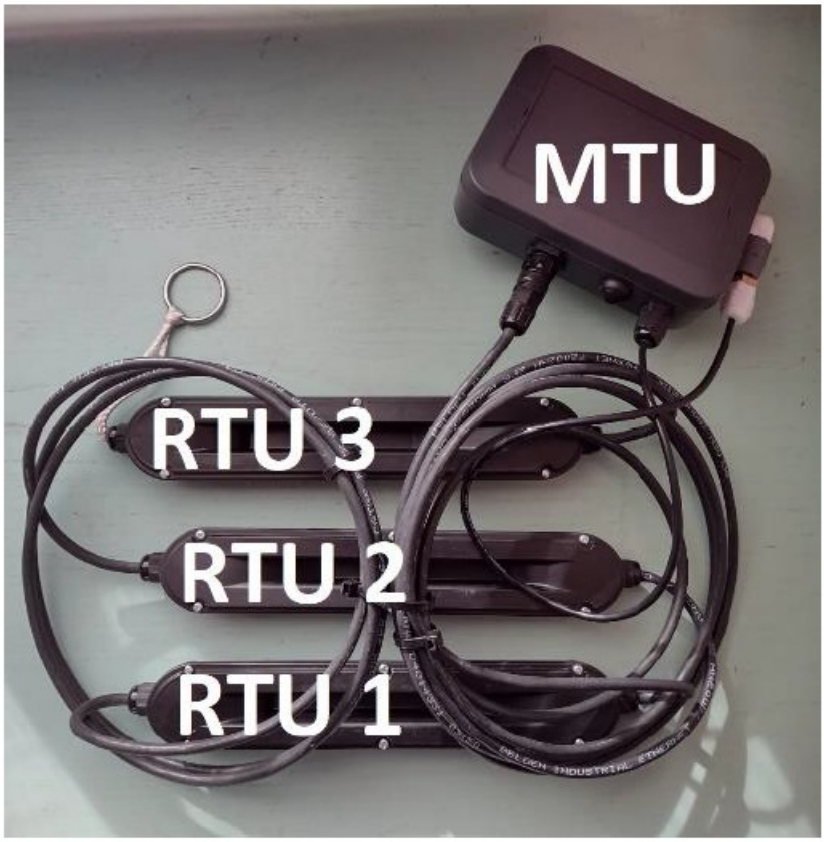
PURPOSE OF THIS DOCUMENT
This document describes the user manual to perform the installation and configuration of the Grain Condition Monitoring Device v3.

HISTORY OF THE DOCUMENT

Rev.	Author	Date	Description
A	SMV	11/02/2022	User manual to install and configure Grain Condition Device v3
B	SMV	11/07/2022	Maintenance, Identification and Certifications added
C	SMV	02/09/2022	FCC updated

PRODUCT INTRODUCTION

Grain Condition Monitoring Device v3 is capable of monitoring critical parameters in grain warehouses, such as: air temperature/humidity, air quality and stored grain temperature/moisture. All data obtained is sent to a web platform via LoRaWAN technology. The whole device is shown in following figure:

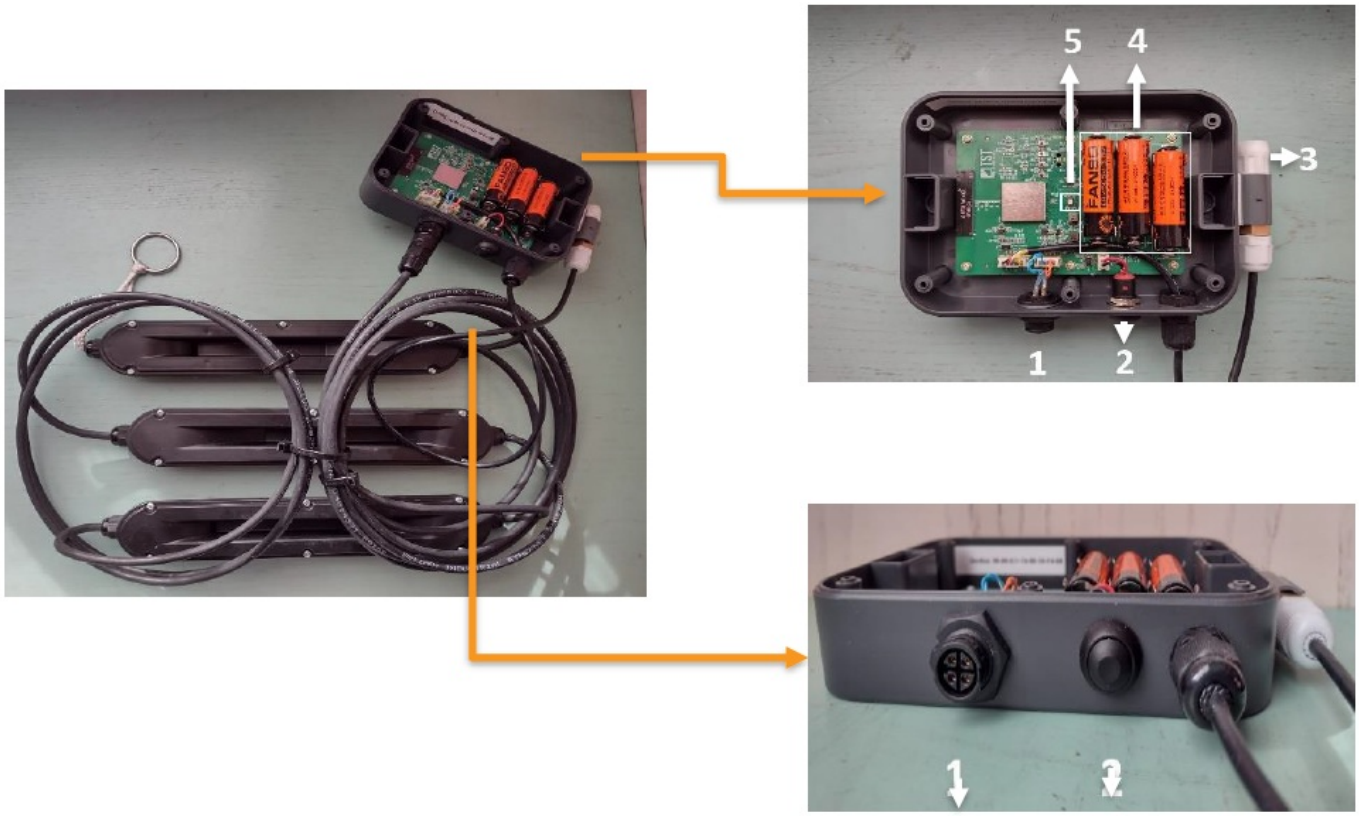


MAIN FEATURES
The Grain Condition Monitoring Device v3 has the following features:

- Compliance with LoRaWAN technology
- Frequency band: EU 868 / US 915 / AS 923 / AU 915 / KR 920 / IN 865 / RU 864
- Replace AA batteries 1.5V/Lithium 3.0V/3.6V
- Operating temperature: -15 to 50 ºC
- Environment resistance: IP65
- Operating relative humidity: 0 to 80 %RH
- MTU Case dimensions: 100 mm x 100 mm x 40 mm.

LORAWAN SENSOR
The following picture shows an overview of the GCMD v3.

1. RTU Cable Connector
2. Power button
3. External Sensors
4. 3xAA Batteries
5. LED



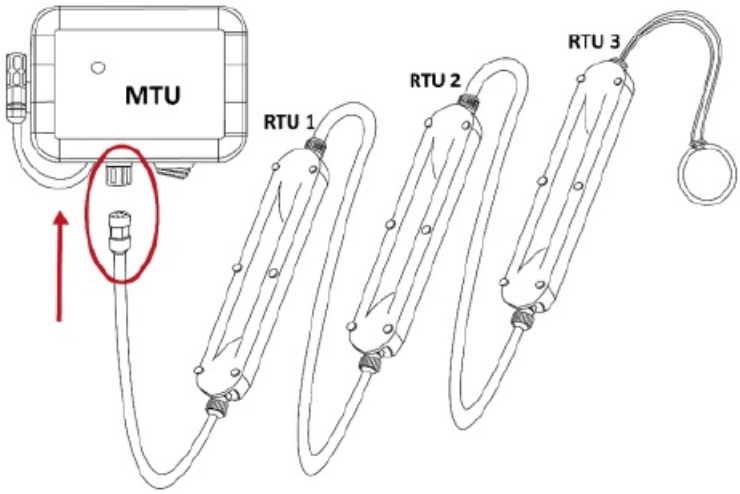
QUICK START GUIDE

The main steps are listed for quick use. Please refer to the following sections for more details.

INSTALLATION

To carry out the installation of the device, perform the following steps.

1. Checklist
   Unpack the package, check the list of devices, and check whether there are any omissions.
2. Assemble the device
   Connect RTUs to MTU through the waterproof connector.



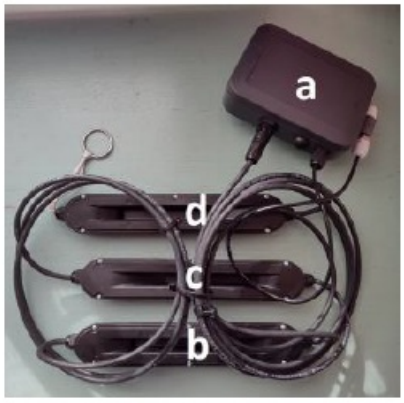
3. Turn on the device
   Press the power button.

CONFIGURATION
The device is already configured so it is not need it to carry out the configuration. For further information, please check section 4 of the manual.

LORAWAN SENSOR INSTALLATION

In this section, the installation process of the device is explained. Before installing, please check the part list to ensure nothing is missing.

PACKING LIST



- a. Master Terminal Unit (MTU)
- b. Remote Terminal Unit 1 (RTU 1)
- c. Remote Terminal Unit 2 (RTU 2)
- d. Remote Terminal Unit 3 (RTU 3)

EQUIPMENT INSTALLATION
In this section, the installation process of the device is explained. Please, click on the following link to see the installation process: TBC

The device is ready to be installed in grain warehouses. The process is as follows:

- A pipe with sensors is introduced into the grain.

- The Smart Warehouse Device is located on the top of the pipe as is shown in following image.

- The device covers an area of 8m of diameter and 350 Tons of grain:

LORAWAN SENSOR CONFIGURATION

In this section, the configuration of the device is explained.

DEFAULT CONFIGURATION

After powering the device, the led will light up in all possible combinations. Then, the device will try to connect to the LoRa gateway, the led will blink red during the process. As soon as it is connected to the network, it will send an uplink message and the led will flash green. Then, it will send frames every 6 hours.

DOWNLINK COMMANDS TO CHANGE THE CONFIGURATION

It is possible to change the configuration of the device through the LoRa gateway via downlink frames. You can check if the downlink has been correctly sent because the led will light up blue. The following are the different payloads for the GCM v3 device:

1. Time Update (Little Endian)

   To change the date and time of the device send a 4 byte frame with desired value in UNIX Timestamp on Port 4. Example:

- Fri Oct 15 2021 06:45:14 GMT+0000
- 1634280314
- 6169237A
- 7A 23 69 61

2. Change transmission windows (Little endian)

   To change the times at which the device sends data send a 2 byte frame with desired value in minutes (UTC Time) on Port 5.

   Example:

   - Sending at 00:00 / 12:00
   - 0 / 720 (Minutes)
   - 0 / 2D0 (Big Endian)
   - 00 00 / D0 02 (Little Endian)

3. Change region

   To change the region in which the device must operate, send 1 byte on Port 6.

   - REGION_AS923 → 00
   - REGION_AU915 → 01
   - REGION_EU868 → 05
   - REGION_KR920 → 06
   - REGION_IN865 → 07
   - REGION_US915 → 08
   - REGION_RU864 → 09

4. Change keys

   To modify ABP or OTAA keys send 1 byte with activation mode 01 or 02 respectively and then 16+16 bytes according to the table on Port 7.

TRAMA DE KEYS	LONGITUD	EJEMPLO	DESCRIPCIÓN
Activación	1B	01	Cambio de la Key de ABP.
AppKey	16B	2B 7E 15 16 28 AE D2 A6 AB F7 15 88 09 CF 4F FF	Nueva AppKey.
NwKey	16B	2B 7E 15 16 28 AE D2 A6 AB F7 15 88 09 CF 4F FF	Nueva NwKey.

5. Change JoinEUI

   To modify JoinEUI send 8 bytes with the new value on Port 8.

6. Change ACK

   To disable or enable the ACK send by the gateway screen you have to send 1 byte (00 / 01) respectively on Port 9.

7. Test

   To show the downlink message via UART send the ‘x’ bytes on Port 10.

MAINTENANCE

In this section, the maintenance of the device is explained.

CHECKPOINTS

The device needs to be checked periodically by qualified inspectors. These are the check points:

- Measurements Integrity: Be sure that values sent to the platform are between expected values.
- Connections: Be sure that connections between RTUs are in good conditions.
- Clean Sensors: Wipe any dirt present on the MTU sensors with a dry cloth. Make sure the device is not covered with any material.
- Batteries: Check the battery level.

  Some recommendations in order to enjoy a longer useful life of the device:
- Handle device with care, do not allow it to drop or move roughly.
- Avoid placing the devices in areas reaching high temperatures that could damage the electronic components.
- Plug sensor probes only in their corresponding connectors.
- Do not use any type of paint on the device, it could affect the operation of connections and closing mechanisms.
- Do not store Device in places exposed to dirt and dust in order to avoid damage to electronic components.
- For cleaning, use a damp cloth, no aggressive chemical products.

BATTERY CHANGE
To perform the battery change, you need to unscrew 6 corners of the case of MTU.

Then you can replace directly the 3 x AA batteries inside the case with standard AA commercial batteries. Screw again the case, assuring the correct assembly of all parts and check all the screws are properly tightened. Ensure the rubber seal is located in the plastic channel to prevent damage to it and to maintain the IP rating and protection.

IDENTIFICATION

Each device has a label on the front of the MTU and another on the back. In the back label will be the following fields:

- Model of the MTU.
- Serial Number of the MTU.

- LORA Id.
- Power Supply.

  Besides, the RTU cable is identified with another label with its serial number:

CERTIFICATIONS

CE
The product is in conformity with the essential requirements and other relevant requirements of the R&TTE Directive (1999/5/EC) and the 2002/95/CE Directive. The product is in conformity with the following standards and/or other normative documents:

- Electro-Magnetic Compatibility:
  - UNE-EN 61326-1.
- Spectrum:
  - EN 300 220-1.
  - EN 300 220-2.
- Electrical Security:
  - UNE-EN 61010-1.

Important: It is the responsibility of the installer to find out about restrictions of use for frequency bands in each country and act in accordance with the given regulations. SGS does not list the entire set of standards that must be met for each country.

FCC
The verification of compliance is based on tests conducted by SGS-CSTC Standards technical Services Co., LtD, on submitted samples of above mentioned product and found to comply with the technical requirement regulations for the evaluation of electromagnetic compatibility.

FCC Warning:
Please take attention that changes, or modification not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.
This device complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions:

1. This device may not cause harmful interference, and
2. This device must accept any interference received, including interference that may cause undesired operation.

SAFETY PRECAUTIONS

Follow the next safety instructions:

- In document, the term Grain Condition Monitoring Device v3 encompasses both the MTU and the RTU unit with their sensors.
- Never submerge the device in any liquid.
- Keep the device in a dry place and away from any liquids that might spill.
- Grain Condition Device contains electronic components that are highly sensitive and can be accessed from outside; handle the device with great care and avoid hitting or scratching any of the surfaces.
- Do not let the electronic parts come into contact with any steel elements, to avoid injuries and burns.

- Do not remove any of the connectors.
- Check the product specifications section for the maximum allowed power voltage and amperage range and always use batteries that work within that range.
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Documents / Resources

	SGS SWH Grain Condition Monitoring Device [pdf] User Manual GCMTST, 2A229GCMTST, SWH, Grain Condition Monitoring Device, SWH Grain Condition Monitoring Device, Monitoring Device