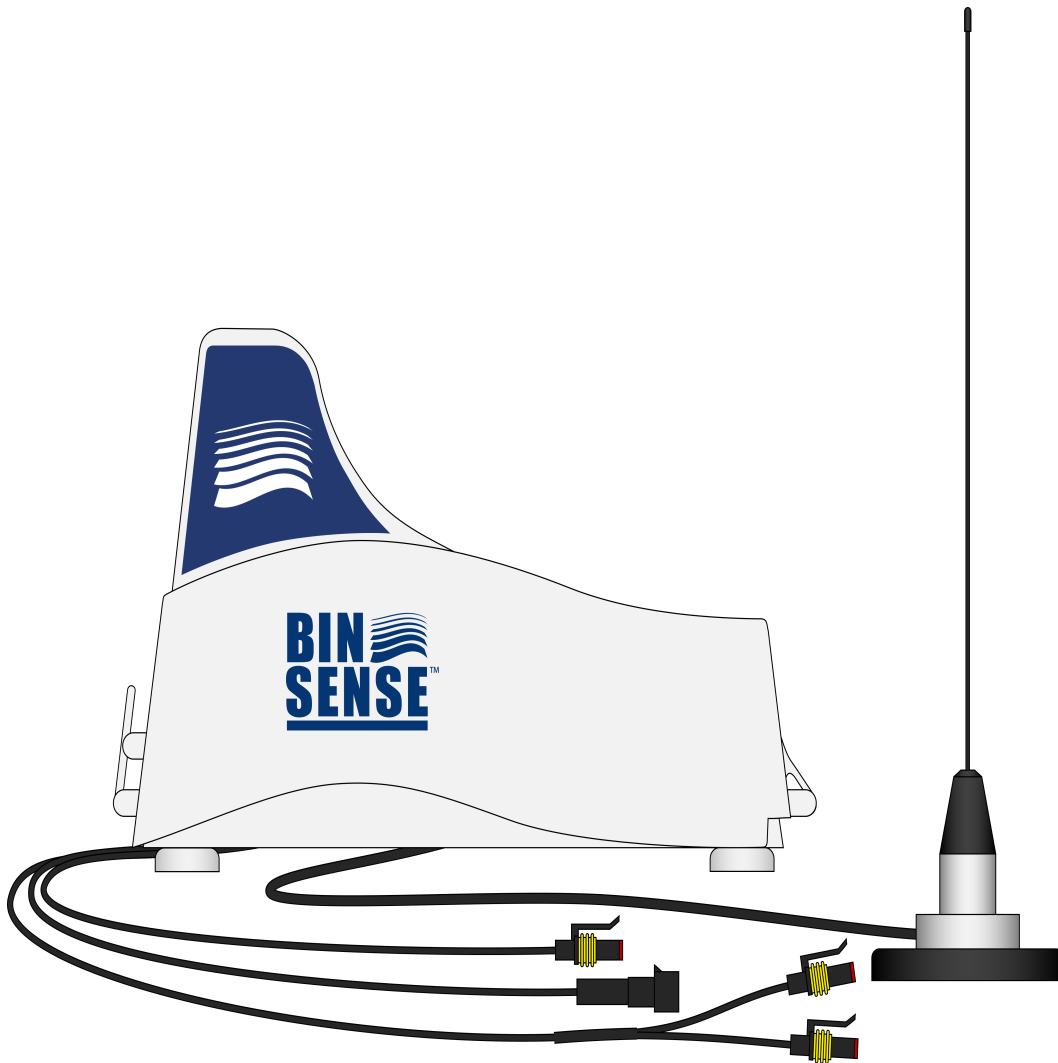
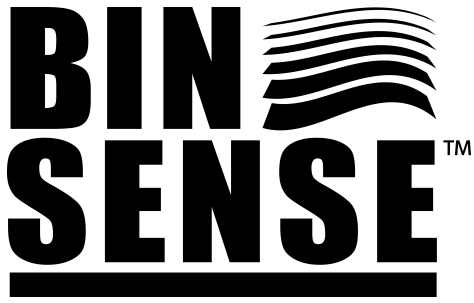




# MASTER UNIT

## USER MANUAL





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## CUSTOMER SUPPORT

For warranty service, please contact your local dealer.

For product support, troubleshooting, or additional questions with your Bin-Sense™ device, please contact your local dealer ([www.binsense.com/locate-a-dealer](http://www.binsense.com/locate-a-dealer)) or IntraGrain Technologies Inc. at:



**[support@intragrain.com](mailto:support@intragrain.com)**



**1.833.570.7979**



**[www.binsense.com](http://www.binsense.com)**



## BIN-SENSE MASTER CERTIFICATIONS

**FCC ID: 2AUTY-106103MU-V06**

Contains FCC ID: XPY1EIQ24NN; IC: 8595A-1EIQ24NN

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.

Changes or modifications not expressly Approved by IntraGrain Technologies Inc. could void the user's authority to operate the equipment.

***CAUTION: This equipment has been tested and found to comply with the limits for a class a digital device, pursuant to part 15 of the FCC rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense.***

***WARNING: RADIO-FREQUENCY RADIATION EXPOSURE RISK. THIS EQUIPMENT COMPLIES WITH RADIATION EXPOSURE LIMITS PRESCRIBED FOR AN UNCONTROLLED ENVIRONMENT FOR FIXED AND MOBILE USE CONDITIONS. THIS EQUIPMENT SHOULD BE INSTALLED AND OPERATED WITH A MINIMUM DISTANCE OF 20 CM BETWEEN THE RADIATOR AND THE BODY OF THE USER OR NEARBY PERSONS. THIS TRANSMITTER MUST NOT BE CO-LOCATED OR OPERATING IN CONJUNCTION WITH ANY OTHER ANTENNA OR TRANSMITTER EXCEPT AS AUTHORIZED IN THE CERTIFICATION OF THE PRODUCT.***



## **MANUFACTURER'S WARRANTY**

### **INTRAGRAIN LIMITED ONE-YEAR WARRANTY**

IntraGrain Technologies Inc. (IntraGrain) warrants that for a period of one (1) year from the date of original purchase, this product will be free from defects in material and workmanship. IntraGrain, at its option, will repair or replace this product or any component of the product found to be defective during this warranty period. Replacement will be made with a new or re-manufactured product or component. No warranty is provided for batteries.

### **WHAT THIS WARRANTY DOES NOT COVER**

This warranty does not cover normal wear of parts or any damage resulting from any of the following: negligent use or misuse of the product; damage in transport, natural disaster, improper installation or use, improper abuse or improper handling. This warranty is limited to only those manufacturing defects that were caused or allowed by IntraGrain.

### **HOW TO OBTAIN WARRANTY SERVICE**

Please contact the local dealer you purchased the product from. For additional support, please contact IntraGrain Technologies Inc. at 1.833.570.7979 or visit [www.intragrain.com](http://www.intragrain.com)

### **CONTACT US**

For support questions, troubleshooting, or help with your Bin-Sense device, please contact your local dealer for more information and assistance, or IntraGrain Technologies Inc. at [support@intragrain.com](mailto:support@intragrain.com) or 1.833.570.7979.





## SAFETY

**READ AND FOLLOW ALL INSTRUCTIONS.**

**SAVE THESE INSTRUCTIONS.**

Use the Bin-Sense device for its intended use only, as described in this manual. Do not use attachments not recommended by the manufacturer.

## STANDARDS

This manual will use the following standard safety terms and conventions to indicate conditions:

***WARNING: INDICATES A HAZARDOUS SITUATION RESULTING IN SERIOUS INJURY OR DEATH.***

***CAUTION: Indicates a hazardous situation which, if not avoided, could result in moderate injury and/or property damage.***

**Note:** Indicates an important message not related to personal injury or property damage.



## OVERVIEW

Master Units are the central piece of hardware used in Bin-Sense Live systems. Master units read cables and communicate with Remote units to collect grain temperature and moisture data for an entire Bin-Sense Live site. The Master unit sends the data to the Bin-Sense website through a cellular data connection.

Master units are marked with a blue antenna fin with a white logo.

## PACKAGE CONTENTS

- Master Unit
- Master Unit Battery
- 2 x Solar Panels

## MASTER UNIT OVERVIEW

- A. LID LATCH CLIPS
- B. MAGNETIC FEET
- C. PRIMARY (EXTERNAL) REMOTE ANTENNA
- D. BATTERY CABLE
- E. SENSOR LINK CABLE
- F. SOLAR PANEL CONNECTORS

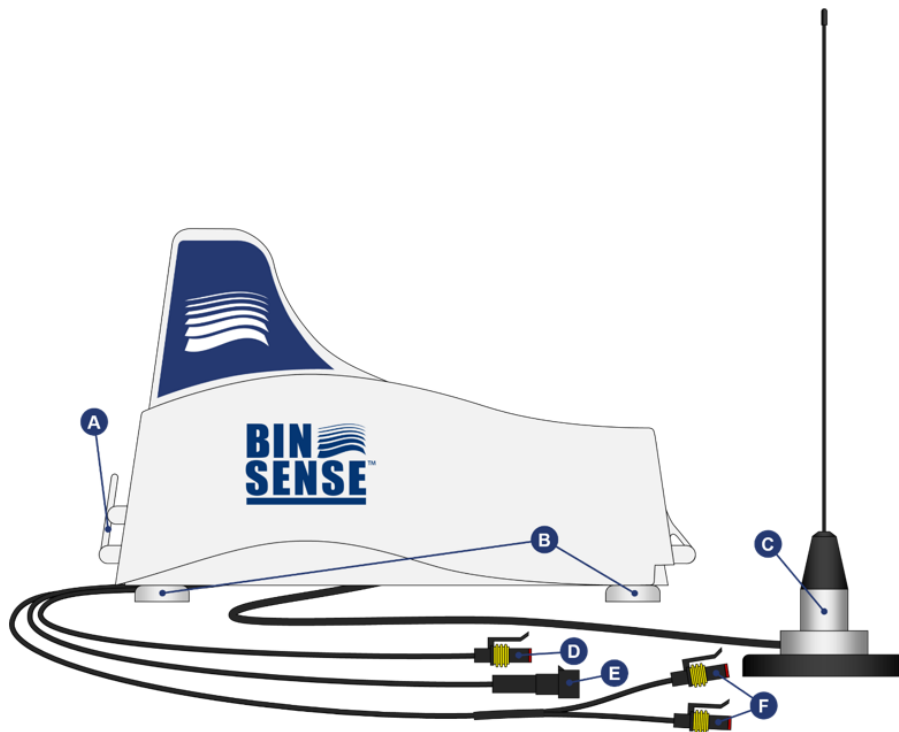


Figure 1: Master Unit Components

## INSIDE THE MASTER UNIT

- A. CELLULAR ANTENNA
- B. SCAN BUTTON
- C. SECONDARY (INTERNAL) REMOTE ANTENNA
- D. DIAGNOSTIC PUSHBUTTON
- E. DIAGNOSTIC LED
- F. J2 - SPARE SENSOR CABLE CONNECTION
- G. J1 - SENSOR CABLE CONNECTION
- H. J11 - SOLAR CONNECTION
- I. VENT
- J. RADIO CHANNEL DIP SWITCHES
- K. SIM CARD
- L. J9 - BATTERY CONNECTION
- M. MODEM STATUS LEDS

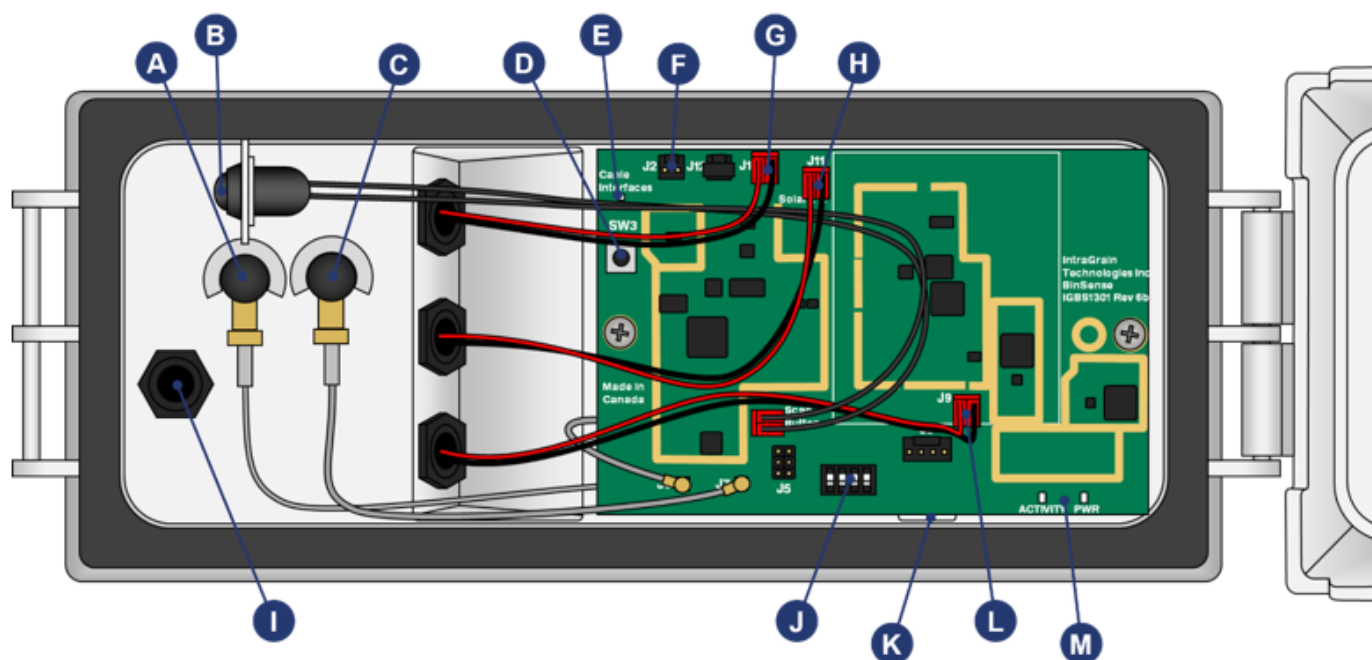


Figure 2: Master Unit Circuit Board

## INSTALLATION



**WARNING: FALL HAZARD - EXTREME CARE AND CAUTION MUST BE USED WHEN CLIMBING IN A BIN OR SILO. BE SURE TO USE APPROVED SAFETY PROCEDURES AND MATERIALS. WHEN WORKING ABOVE 1.2 METERS, WEAR A SAFETY HARNESS OR PERSONAL PROTECTIVE EQUIPMENT. AN APPROVED TOOL BELT MUST BE WORN TO KEEP BOTH HANDS FREE WHEN CLIMBING UP AND DOWN A LADDER.**

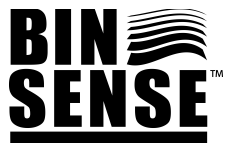
## INSTALLATION TIPS

- When possible, position the Master unit near the bin roof ladder so that it is easily accessible for future service and maintenance.
- The solar panels will provide power to run the Master unit and to recharge the Master unit battery. Ensure the solar panels have good sun exposure to keep the Master unit battery properly charged.
- When positioning the Master unit and related accessories, remember to consider things like bin lid movement and the path the auger will take and avoid placing components where they will interfere.
- Whenever possible, secure link cables so that they run downward, away from the enclosure and cable grip. This will prevent water from running along the cable and towards the Master unit enclosure.
- If you open the enclosure lid during installation, make sure you prevent moisture (e.g. rain, snow) from entering the enclosure.
- When finished with the installation, make sure the enclosure lid is closed and latched securely and there are no wires, tags, or other objects caught between the lid and the enclosure which could cause water ingress.

## MASTER UNIT INSTALLATION

Carry the Master unit and all the included accessories to the top of the bin in a backpack or something that allows you to have both hands free to safely climb the bin.

1. Place the Master unit on the top of the bin with the lid latches and link cables pointing towards the ground. Place the unit where it is easily accessible for future service and maintenance. The magnetic feet will hold the unit in place on the roof of the bin.
2. Place the external Remote antenna so that its signal will reach the most Remote units possible. Whenever possible, place the antenna so that it has clear line-of-sight to remote units
3. Mount the two solar panels side-by-side on the bin facing the direction of maximum sunlight (face south in the northern hemisphere, face north in the southern hemisphere).
4. Place the Master unit battery on the roof of the bin close enough to the master unit that the battery cable will reach the Master unit power cable.
5. Connect the Master unit sensor link cable to all the sensing cables and to any other Bin-Sense accessories (e.g. Fan Controllers). You'll need to use a terminal box or splitter to connect more than one device to the sensor link cable.
6. Connect the Master unit power cable to the Master unit battery.



7. Connect the Master unit solar panel connections to both solar panels. Both solar panels connections are the same and can be connected to either solar panel.
8. Refer to the Bin-Sense Live Startup Manual for further instruction on how to get Bin-Sense Live system up and running.

# OPERATION

## CONNECTING TO REMOTE UNITS

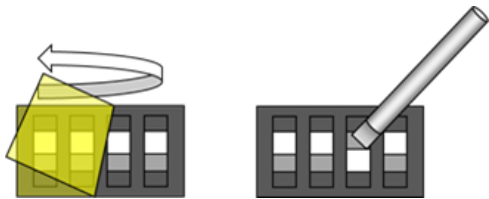


Figure 3: DIP Switches

Master units connect wirelessly to Bin-Sense Remote units using a radio system similar to Wi-Fi. In order to connect to Remote units, the units must be associated through the Bin-Sense Live website and must be on the same radio channel. Associations must be performed by authorized Bin-Sense dealers.

The radio channel is set using the radio channel DIP switches. Channels 12 through 23 are available with the default channel being

23. The radio channel only needs to be changed if there are other Bin-Sense Live systems installed nearby (within roughly 2 km).

To set the radio channel, use a small flat screwdriver to change the individual switches to match the pattern of the desired channel as shown below. The transparent yellow film covering the switches can be removed with tweezers or you can push through it with the screwdriver.

12	13	14	15	16	17
↓1 ↓2 ↓3 ↓4	↓1 ↓2 ↓3 ↓4	↓1 ↓2 ↓3 ↓4	↓1 ↓2 ↓3 ↓4	↑1 ↓2 ↓3 ↓4	↑1 ↓2 ↓3 ↓4
18	19	20	21	22	23
↑1 ↓2 ↓3 ↓4	↑1 ↓2 ↓3 ↓4	↑1 ↓2 ↓3 ↓4	↑1 ↓2 ↓3 ↓4	↑1 ↑2 ↑3 ↓4	↑1 ↑2 ↑3 ↑4

Figure 4: DIP Switch Settings

More details about connecting to Remote units can be found in the Bin-Sense Live Startup Manual.



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## DIAGNOSTICS

### LED DIAGNOSTICS

The diagnostic LED on the Master unit circuit board flashes different patterns to give information about what the device is connected to. Most of the information is related to what the unit detects on the sensor cable interface.

The diagnostic LED will automatically start the flashing pattern shortly after powering on the Master unit, and once the Master unit has finished scanning all the attached cables and accessories. The flashing pattern can be replayed by pressing the diagnostic pushbutton.

The diagnostic LED flashes different colors to convey different information. Red flashes indicate what equipment is being scanned, and orange and green flashes indicate the number of items. The LED will flash red first, and then orange and/or green. The process will repeat until all the information has been communicated.

### LED FLASH SEQUENCE

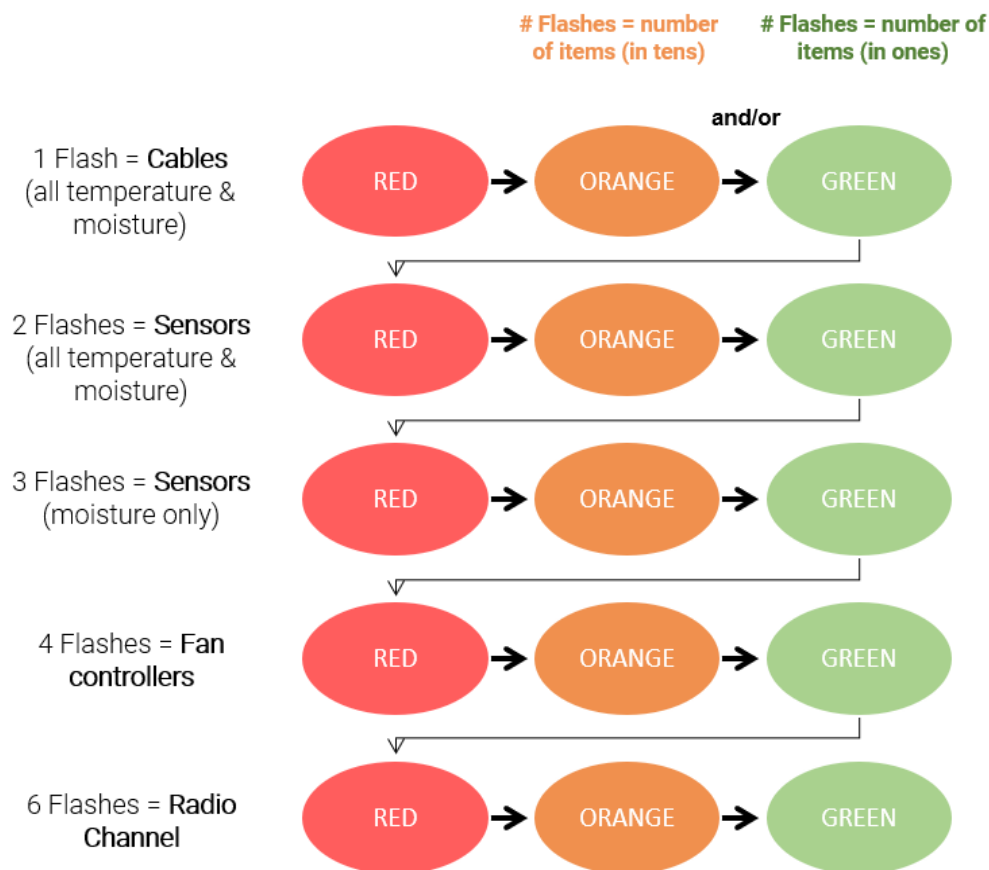


Figure 5: Diagnostic LED Sequence

The diagnostic LED will only flash a specific number of red flashes if the corresponding number is not zero. For example, if there are no moisture cables connected to the Master unit, the LED will not flash three red flashes. If





nothing is detected on the sensor cable interface, the LED will flash one red flash followed by a long pause, and then six red flashes for the radio channel.

**EXAMPLE:**

If you have one eight-sensor temperature cable, and one eight-sensor moisture cable connected to a Master unit that is set to radio channel 22, you would expect the following flashing pattern:

- **One** red flash (for total temperature & moisture cables) followed by two green flashes (for number of cables).
- **Two** red flashes (for the total number of sensors) followed by one orange flash (for 10) and six green flashes (for a total value of 16).
- **Three** red flashes (for the number of moisture sensors) followed by eight green flashes (for eight).
- **Six** red flashes (for the radio channel) followed by two orange flashes (for 20) and 2 green flashes (for a total value of 22).

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