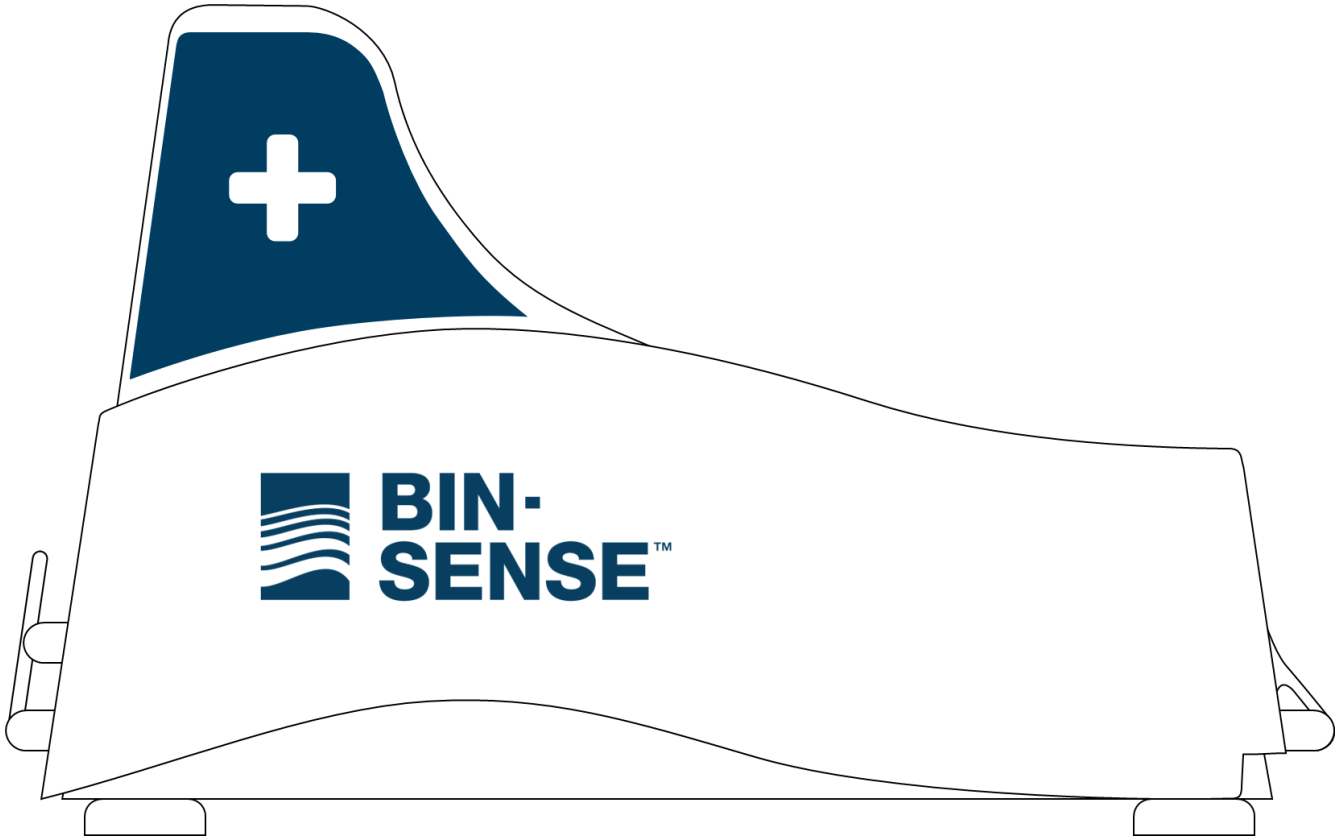
AUTOMATION HUB

USER MANUAL



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BIN-SENSE™

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BIN-SENSE™

TABLE OF CONTENTS

INTRODUCTION

OVERVIEW

INSTALLATION

OPERATION

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) or Calian Agriculture Ltd. at:

support.agriculture@calian.com

1.833.570.7979

www.binsense.com

MANUFACTURER'S WARRANTY

CALIAN LIMITED ONE-YEAR WARRANTY

Calian Agriculture Ltd. (Calian) 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. Calian, 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 Calian.

HOW TO OBTAIN WARRANTY SERVICE

Please contact the local dealer you purchased the product from. For additional support, please contact Calian Agriculture Ltd. at 1.833.570.7979 or visit www.calian.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 Calian Agriculture Ltd. at support.agriculture@calian.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

The Bin-Sense Automation Hub is the central piece of hardware used in a Bin-Sense Plus automated grain monitoring system. The Automation Hub communicates wirelessly with each bin monitored with Bin-Sense Plus, and with the Bin-Sense servers through a cellular data connection. The Automation Hub monitors ambient air conditions and decides when to turn aeration fans on and off based on parameters from the Bin-Sense servers.

Automation Hubs are marked with a blue antenna fin with a '+' sign.

PACKAGE CONTENTS

- Automation Hub
- Bin-Sense AC Power Adapter
- Automation Hub Mounting Bracket
- Antenna Mounting Bracket
- 7 x ¾" self-tapping screws

AUTOMATION HUB OVERVIEW

A. LID LATCH CLIPS
B. MAGNETIC FEET
C. PRIMARY (EXTERNAL) REMOTE ANTENNA
D. POWER LINK CABLE
E. SENSOR LINK CABLE

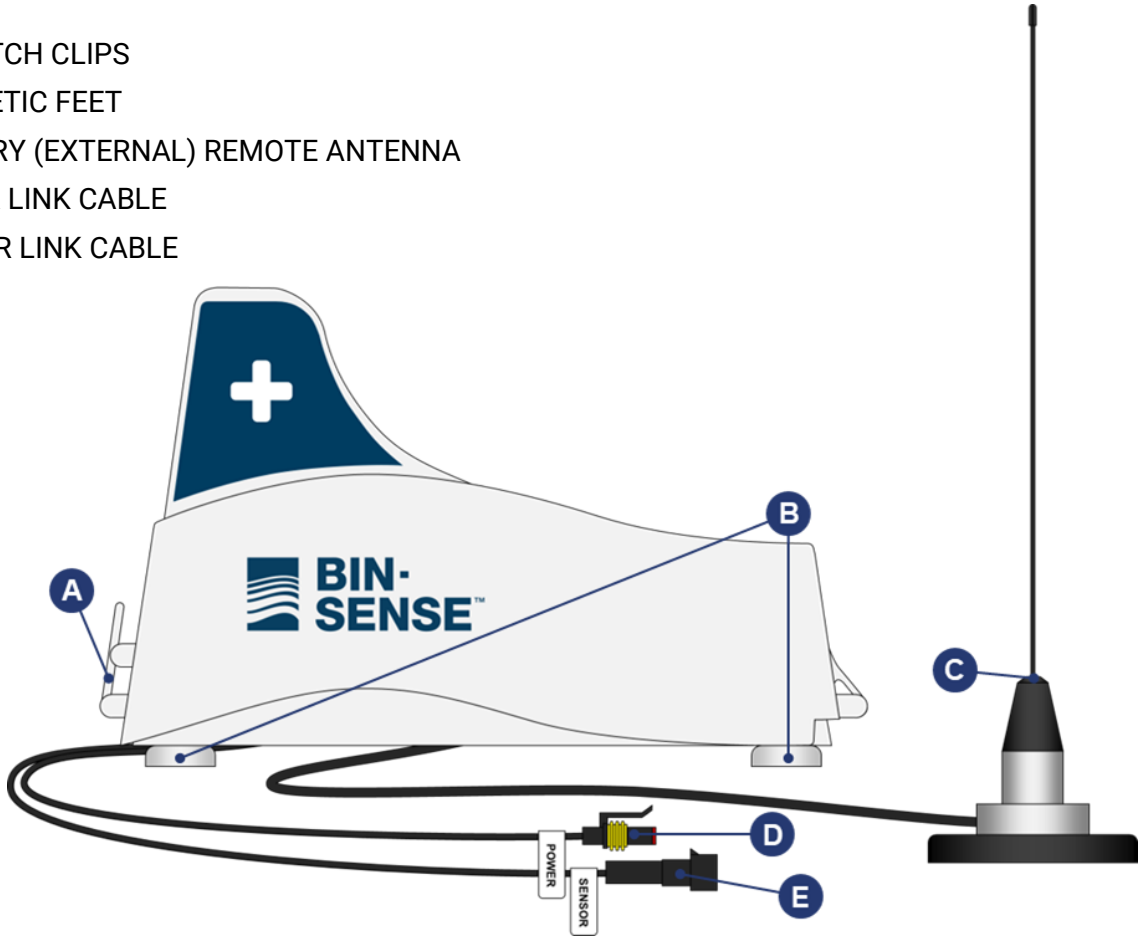

Figure 1: Automation Hub Components

INSIDE THE AUTOMATION HUB

A. CELLULAR ANTENNA
B. SECONDARY (INTERNAL) REMOTE ANTENNA
C. DIAGNOSTIC LED
D. J1 – AMBIENT SENSOR CONNECTION
E. J11 – POWER CONNECTION
F. VENT
G. J6 – PRIMARY (EXTERNAL) ANTENNA CONNECTION
H. RADIO CHANNEL DIP SWITCHES
I. SIM CARD
J. MODEM STATUS LEDS

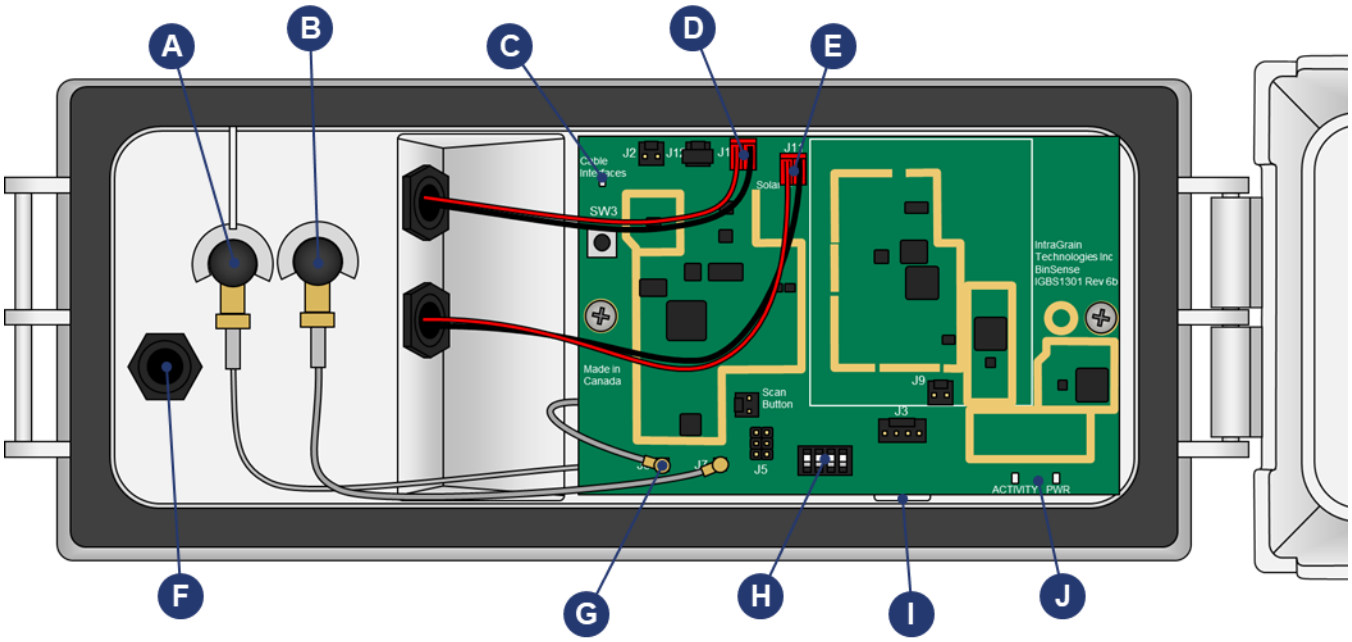

Figure 2: Inside the Automation Hub and Circuit Board Details

INSTALLATION

INSTALLATION TIPS

- Choose a location for the Automation Hub where the antennas will have line of site to the Remote units on all bins equipped with Bin-Sense Plus, and where AC power is available to plug in the Automation Hub. The Ambient Sensor for detecting air temperature and relative humidity plugs into the Automation hub and will be mounted nearby.
- Mount the Automation Hub close to ground level for easy access and service as well as easy connection to power.
- The Ambient sensor should be mounted four to six feet above ground far from buildings and structures that warm up in the sun and may interfere with ambient air measurements. Install the automation hub where the Ambient Sensor can be appropriately installed nearby.
- If available, mounting the Automation Hub and Ambient Sensor on a yard light pole is an excellent option.
- If the enclosure lid is opened during installation, take care to prevent moisture (e.g., rain, snow) from entering the enclosure.
- When finished with the installation, ensure the enclosure lid is closed and latched securely and that there are no wires, tags, or other objects caught between the lid and the enclosure which could cause water ingress.

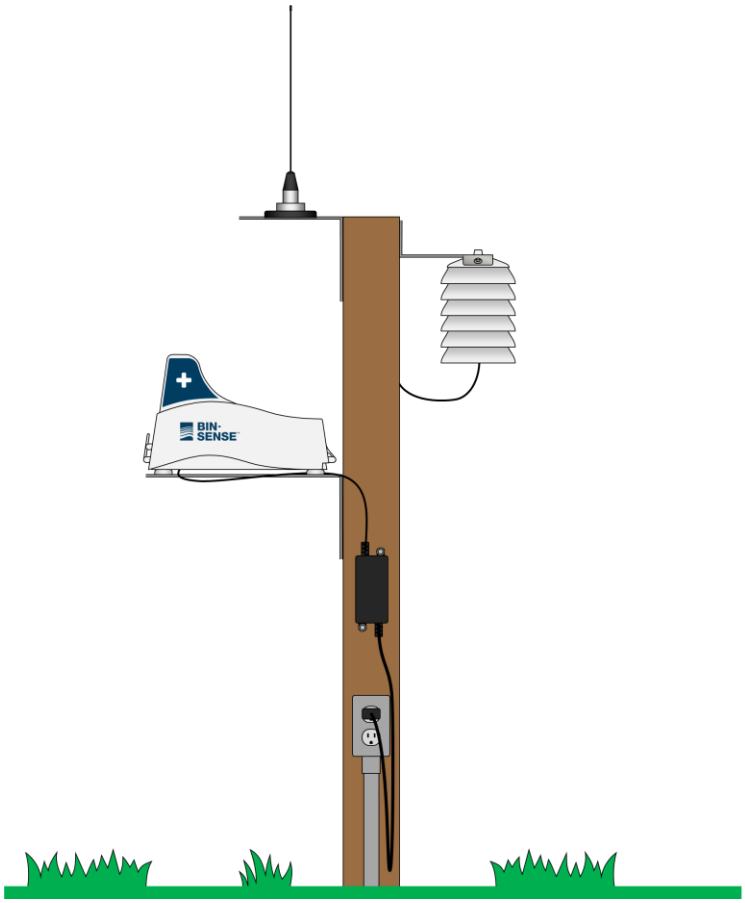

Figure 3: Example Installation on a Post

AMBIENT SENSOR INSTALLATION

The Ambient sensor should be mounted four to six feet above ground far from buildings and structures that warm up in the sun and may interfere with ambient air measurements. Avoid mounting the Ambient Sensor on or near grain bins as heat from stored grain can cause inaccurate readings.

1. Bend the side sections on the wide end of the Ambient Sensor mounting bracket so that the mounting bracket matches shape of the top of the ambient sensor.
2. Use two ¾" self-tapping screws to secure the Ambient Sensor to the mounting bracket.
3. Use three ¾" self-tapping screws to attach the mounting bracket to a post or structure in an appropriate location.

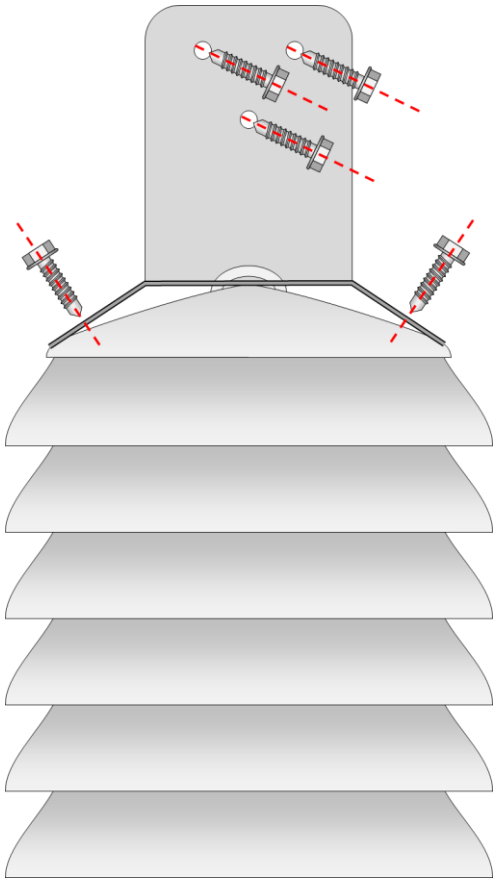

Figure 4: Ambient Sensor Mounting

AUTOMATION HUB INSTALLATION

1. Secure the Automation hub mounting bracket to a wall or structure with four ¾” self-tapping screws.
2. Place the automation hub on the mounting bracket. The magnetic feet will hold the Automation Hub in place on the mounting bracket.
3. Connect the link cable labelled SENSOR to the Ambient Sensor.
4. Bend the antenna mounting bracket 90 degrees and secure the bracket to a wall or structure with three ¾” self-tapping screws so that the antenna mounting surface sits level.
5. Mount the primary (external) antenna on the antenna mounting bracket so that the antenna points directly upwards.
6. Set the Automation Hub to the desired radio channel for the site. The default radio channel of 23 is acceptable for most sites but may need to be changed if there are other Bin-Sense systems operating nearby (within roughly 2 km or 1.5 miles). See Setting the Radio Channel on page 10 for more details on how to change the radio channel.
7. Plug the Bin-Sense AC Power Adapter into an electrical outlet and connect the power adapter output to the Automation Hub link cable labelled POWER.

INSTALLATION CONNECTIONS

A. AMBIENT SENSOR

B. BIN-SENSE AC POWER SUPPLY

C. AUTOMATION HUB

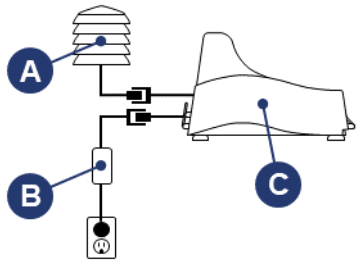

Figure 4: Automation Hub Connections

SETTING THE RADIO CHANNEL

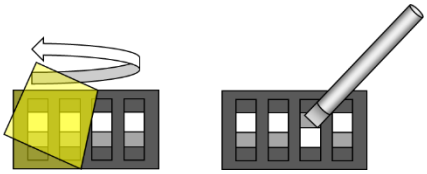

Figure 5: DIP Switches

Automation Hubs connect wirelessly to Bin-Sense Remote units (installed on each automated bin) using a radio system similar to Wi-Fi. In order to connect to Remote units, the units must be associated though the Bin-Sense 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 though 23 are available with the default channel being 23. The radio channel only needs to be changed if there are other Bin-Sense Live or Bin-Sense Plus systems installed nearby (within roughly 2 km or 1.5 miles).

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 be pushed through with the screwdriver.

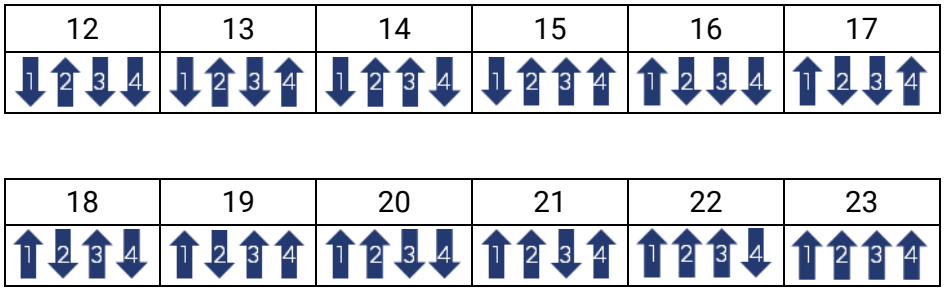

Figure 6: DIP Switch Settings

OPERATION

Once powered on, the Automation Hub will begin operating right away. The Automation Hub operates in cycles that last about five minutes. During each five-minute cycle, the Automation Hub will communicate with the Bin-Sense servers, read the Ambient Sensor, make decisions about which fans to tun on or off, and communicate with the Remote unit on each automated bin of the Bin-Sense Plus system.

When operating, the Automation Hub will decide whether to turn fans on or off depending on the automation parameters set on the Bin-Sense website and based on the current ambient conditions.

To prevent frequent starting and stopping and to reduce unnecessary stress on fan motors, the Automation Hub will not attempt to start a fan of it was stopped in the last 30 minutes, or attempt to stop a fan if it was started in the last 30 minutes.

If the Automation Hub is unable to communicate with the Bin-Sense servers or with the Ambient Sensor for more than two hours, the Automation hub will stop all fans and automation activity.

DIAGNOSTIC LED INFORMATION

The diagnostic LED on the Automation Hub circuit board provides information about what the Automation Hub is currently doing. The table below describes the possible LED colours and patterns and the corresponding behaviour. Note that the LED may be off for up to about 15 seconds while in between tasks.

Table 1: Diagnostic LED status

LED Colour and Pattern	Automation Hub Status
Off	Waiting for next task
Short green flash	No current task, waiting for next task
Magenta	Reading Ambient Sensor
White	Communicating with (or attempting to connect to) a Remote unit
Blue	Communicating with (or attempting to connect to) the Bin-Sense servers via cellular connection

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TROUBLESHOOTING

Problem	Possible Cause	Suggested Solutions
No power at Automation Hub (diagnostic LED off and never flashing).	AC Power Adapter is not receiving power.	Check that the power outlet is energized and that the circuit breaker is not tripped. Check that the AC power plug is securely plugged into the electrical outlet.
	Power link cable is disconnected.	Check that the AC power adapter output link cable is securely connected to the Automation Hub power link cable. Check that the power link cable is plugged into connection J11 on the Automation Hub circuit board.
No Ambient Sensor readings.	Sensor link cable is disconnected.	Check that the Ambient Sensor link cable is securely connected to the Automation Hub sensor link cable. Check that the sensor link cable is plugged into connection J1 on the Automation Hub circuit board.
	Defective or incorrectly configured Ambient Sensor.	Use a Bin-Sense Direct unit to perform a diagnostic scan of the Ambient Sensor. The cable ID should be set to 254 and the diagnostic scan reading should show a single moisture sensor.
No connection to Remote units.	Remote units are outside wireless range.	Ensure Remote units are within 500 meters or 1600 feet of the Automation Hub and have clear line-of-sight.
	Primary antenna connection is loose.	Ensure the primary (external) antenna connection on the bottom of the Automation Hub is tight and secure.
	Antenna connection(s) to the Automation Hub circuit board are loose or disconnected.	Ensure the primary (external) antenna is securely snapped onto connector J6 and that the secondary (internal) antenna is securely snapped onto connector J7.
No connection to Bin-Sense servers.	Outside cellular coverage range.	Move the Automation Hub to a location with better cellular coverage or clearer line of site to the nearest cell tower.
	Cellular antenna is disconnected from circuit board.	Ensure the cellular antenna is securely snapped onto J3 on the modem circuit board on the bottom of the main Automation Hub circuit board.
	SIM card is missing or installed incorrectly.	Ensure the SIM card is securely clicked into place in the SIM card slot.

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