

# **RECON SPRAYSENSE™**

# **INSTALLATION MANUAL**

Document revision: 1.1

Last revised: February 18, 2022



# Recon SpraySense™ Installation Manual

© 2022 Intelligent Agricultural Solutions. All Rights Reserved.

Recon SpraySense™ Installation Manual. All content within is copyrighted by Intelligent Agricultural Solutions, and may not be reprinted without permission.

The content of this manual is furnished for informational use only, is subject to change without notice, and should not be construed as a commitment by Intelligent Agricultural Solutions. Intelligent Agricultural Solutions assumes no responsibility or liability for any errors or inaccuracies that may appear in the content contained in this guide.

Recon, SpraySense™, Intelligent Agricultural Solutions, Intelligent Ag, Intelligent Ag Monitoring Solutions, IAS, and the IAS logo are trademarks or registered trademarks of Intelligent Agricultural Solutions. iPad is a registered trademark of Apple Inc., registered in the U.S. and other countries. App Store is a service mark of Apple Inc. All other trademarks are property of their respective owner.

Intelligent Agricultural Solutions, 1810 NDSU Research Circle North, Fargo, ND 58102 USA.

Visit us online at [intelligentag.com/support](https://intelligentag.com/support)  
Questions? E-mail us at [info@intelligentag.com](mailto:info@intelligentag.com)

## Table of Contents

1.	Getting Started.....	5
1.1.	About Recon SpraySense™ .....	5
1.2.	Compatible Nozzle Bodies.....	5
1.3.	Tools and Equipment.....	5
1.4.	Installation Overview.....	6
2.	Installing Flow Sensors .....	7
3.	Installing the Gateway .....	11
4.	Install Antennas .....	13
5.	Connecting Harnessing.....	16
5.1.	Install Tractor Harness.....	16
5.2.	Install Main Harness .....	16
5.3.	Install Sensor Harnesses.....	17
5.4.	Route Loose Harnessing .....	18
6.	Installing the iPad and Intelligent Ag Universal Mobile App .....	19
6.1.	Install the iPad Mount .....	19
6.2.	Download the Intelligent Ag Universal Mobile App.....	19
6.3.	Connect to the Gateway .....	20
6.4.	Configuring the System .....	20
7.	Daily Maintenance.....	21
8.	Troubleshooting .....	22

<b>Record of Revision</b>			
<b>Revision Number</b>	<b>Change Description</b>	<b>Revision Date</b>	<b>Inserted By</b>
1.0	Initial release	2/10/22	AAL
1.1	Added PPE warning	2/18/22	AAL

# 1. Getting Started

## 1.1. About Recon SpraySense™

Recon SpraySense is a spray quality monitoring system for agricultural sprayers. It actively measure the pressure and flow rate at each nozzle. Using the machines speed, and a pre-compiled database of spray nozzles, SpraySense also provide the application rate, and droplet size, of each nozzle. The system has user-configured thresholds to notify the operator when any spray nozzle is operating outside the desired threshold for pressure, flow, droplet size, or rate.

Recon SpraySense also provide a Spray Quality Score. This single value is a comprehensive calculation of the overall performance of each spray nozzle. The Spray Quality Score provides the operator with a single number that illustrates how much of the spraying performed is On-Target.

For instructions to use and configure Recon SpraySense, see the Recon SpraySense Operator's Guide (Intelligent Ag document number 600890-000073).

For current documentation, visit [intelligentag.com/support](http://intelligentag.com/support).

For iPad and software requirements, refer to the iPad Buying Guide at [intelligentag.com/support](http://intelligentag.com/support).

## 1.2. Compatible Nozzle Bodies

Recon SpraySense is compatible with the following nozzle bodies:

- Hypro standard flow nozzle body

## 1.3. Tools and Equipment

You will need the following tools and equipment to install Recon SpraySense:

- Needle nose pliers
- Standard wrench set
- Pick (optional)
- Ratchet and 30 mm socket
- Channel lock pliers (optional)
- Hypro install tool (included)
- Side cutting pliers
- Phillips head screwdriver

## 1.4. Installation Overview

Recon SpraySense is installed through the following steps:

- Install flow sensors
- Install gateway
- Install antennas
- Connect harnessing
- Install iPad and Intelligent Ag Universal Mobile app

**NOTE:** Detailed wiring diagrams are found in Appendix A.

## 2. Installing Flow Sensors

Flow sensors detect pressure and flow.



**WARNING:** You might come in contact with chemicals from the sprayer when installing Recon SpraySense™ sensors. Make sure that you are wearing appropriate PPE (Personal Protective Equipment) as indicated on the chemical's label and the instructions in the sprayer's manufacturer documentation.

### Provided Parts

Part name	Part number	Quantity
Sensor	153510-000163	1/nozzle body
Adapter	353070-000394	1/nozzle body
Retaining clip	353070-000395	1/nozzle body
O-ring (018)	356070-000090	1/nozzle body

### Additional Parts

These optional parts can be purchased separately if recommended by your dealer.

Part name	Part number	Quantity
Angled adapter kit	153510-000172	varies
1" bracket	353070-000489	varies
.75" bracket	353070-000505	varies

### Required Tools

- Needle nose pliers
- Standard wrench set
- Pick (optional)
- Ratchet and 30 mm socket
- Channel lock pliers (optional)
- Hypro install tool (included)
- Side cutting pliers

### Installation Location

Mounted on each nozzle body.

### Installing Flow Sensors

Complete the steps below for each nozzle body.



\*Pre-installed. Use diagram to re-install if loose.

Figure 1: Flow sensor installation overview

1. Unscrew the existing check valve and check valve gasket from the nozzle body. If your sensor has a ProStop-E valve and adapter, remove these instead of the check valve.

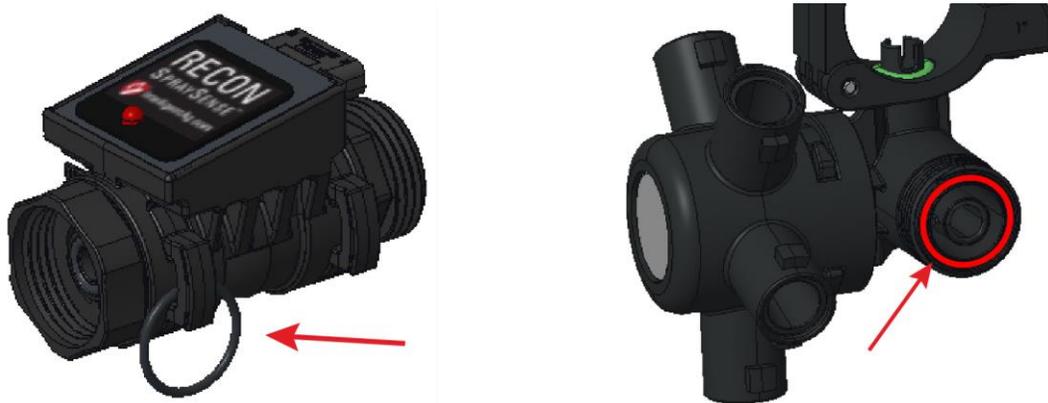


Nozzle body with check valve

Nozzle body with ProStop-E valve

Figure 2: Nozzle body valves

2. Use a pliers to remove the retaining clip holding the adapter to the sensor. Remove the .88" diameter o-ring and install it in the external o-ring gland of the nozzle body (shown in Figure 3).



**Figure 3: Installing the nozzle body o-ring**

3. Make sure that the pre-installed o-rings shown in Figure 1 are still installed in the adapter. Then, loosely screw the adapter onto the nozzle body. Use a 30 mm socket to fully tighten the adapter on the nozzle body. Do not over-tighten.
4. Install the check valve and gasket or ProStop-E valve and adapter onto the threaded side of the sensor. Make sure that the gasket in the check valve is seated correctly.
5. **OPTIONAL:** If you purchased support brackets (353070-000489 or 353070-000505), install them on the boom near the sensors and zip tie the sensor to the bracket.
6. Connect the sensor inlet (opposite of check valve) with the adapter previously installed on the nozzle body. Re-install the clip to connect the sensor to the adapter.

*If there is an obstruction on the machine preventing the sensor from fitting in the installation location, do one of the following:*

- *PREFERRED: Move the obstruction (if possible).*
- *Replace your nozzle body with a left hand nozzle body (purchased from your AGCO dealer).*
- *Use the Intelligent Ag angled adapter instead of the standard adapter (purchased from Intelligent Ag). Refer to the steps in the next section for installation instructions.*

## Installing Angled Adapters (optional)

If there is an obstruction on the machine preventing the sensor from fitting in the installation location, you can purchase angled adapter kits (153510-000172) to angle the sensor away from obstruction.

Part name	Part number	Quantity
Retaining clip	353070-000395	1/nozzle body
Angled adapter	353070-000522	1/nozzle body
O-ring (011) (small)	356070-000045	1/nozzle body
O-ring (021) (large)	356070-000049	1/nozzle body

1. Complete Steps 1-4 in the previous **Installing Flow Sensors** section.
2. Install the small o-ring on the inside of the adapter, and install the large o-ring on the outside of the other side of the adapter (as shown in Figure 4).
3. Push the angled adapter into the open end of the sensor. Insert the retaining clip to connect the adapter and sensor.
4. Push the other end of the angled adapter onto the open end of the standard adapter. Insert the retaining clip to connect the two adapters.

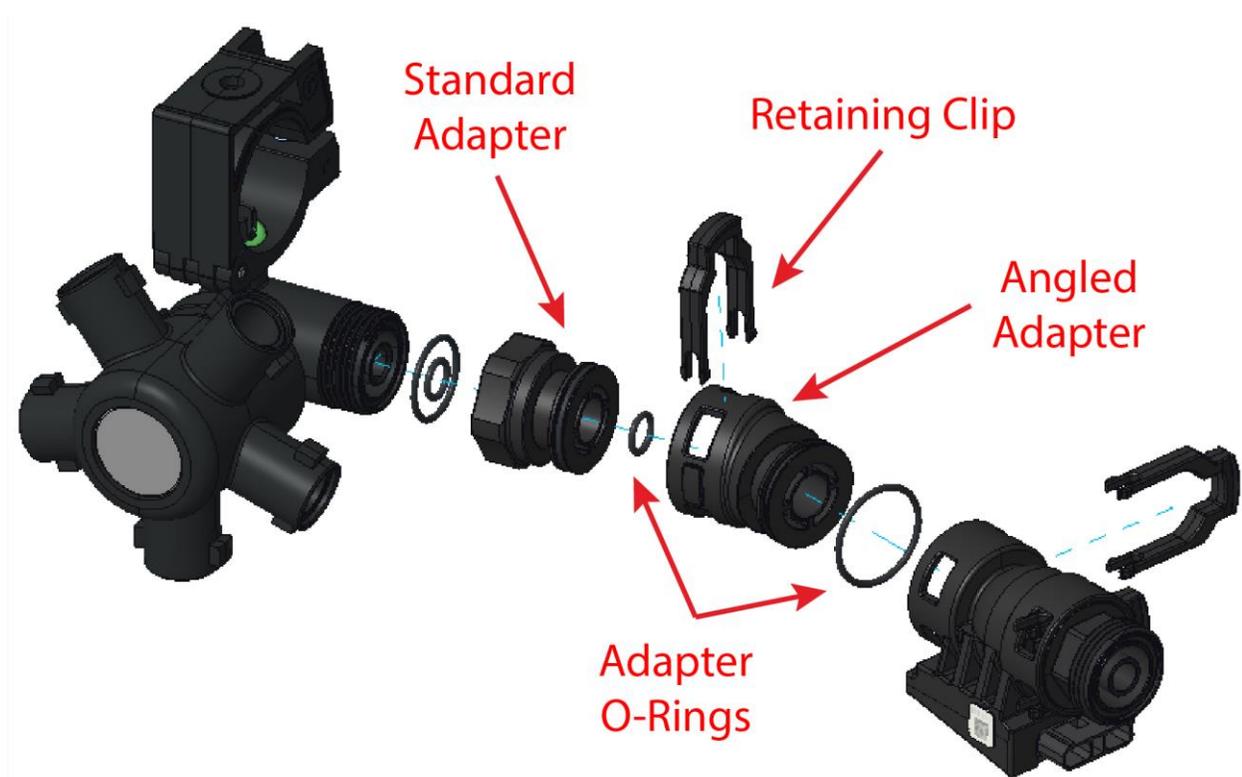


Figure 4: Installing angled adapters

### 3. Installing the Gateway

The gateway is a computing platform that sends sensor data to the iPad through the Wi-Fi antenna.

#### Provided Parts

Part name	Part number	Quantity
Gateway 260	153010-000085	1
1/4" flat washer	352012-000002	8
U-bolt	352013-000007 or 356060-000152	2
Gateway mounting bracket	353070-000079	1
3/8" locknut (for square u-bolt)	356060-000094	4
3/8" washer (for square u-bolt)	356060-000239	4
1/4" nut	356060-000241	4
1/4" x 2-1/2" screw	356060-000303	4

#### Required Tools

- Standard wrench set

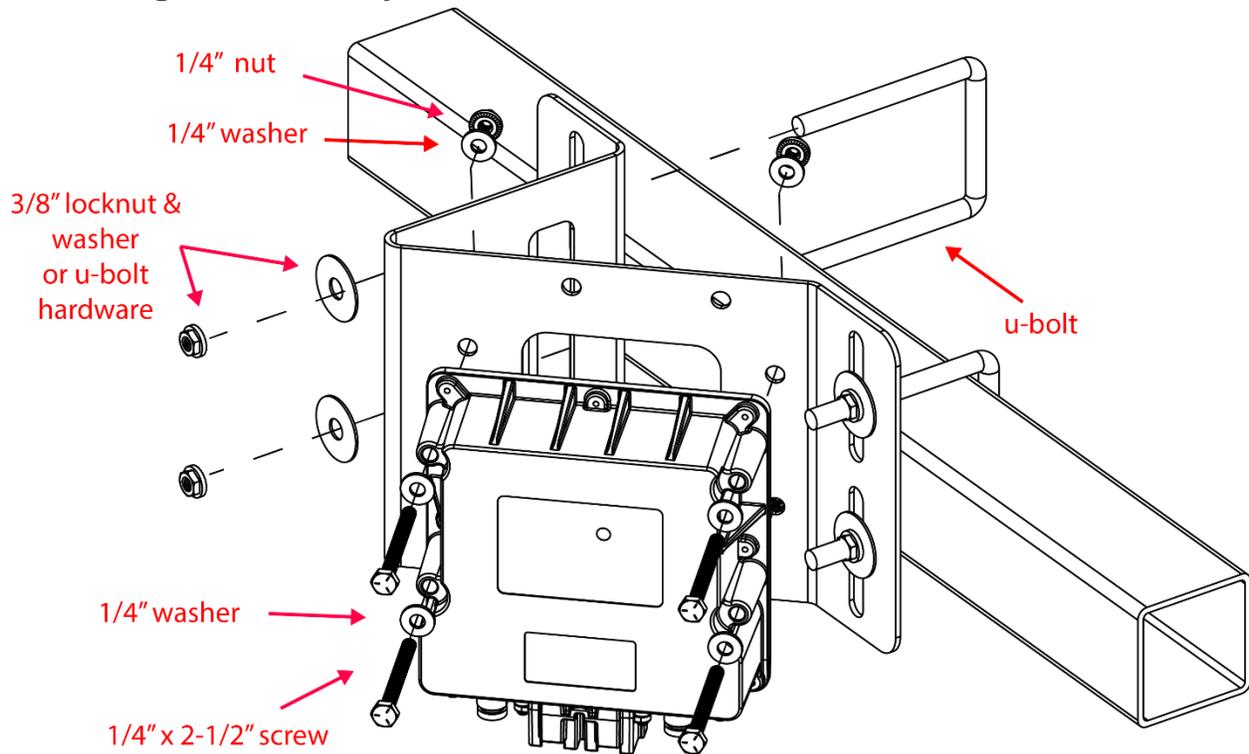
#### Installation Location

Mounted on the rear center mast.



Figure 5: Gateway mounting location

## Installing the Gateway



**Figure 6: Installing the gateway**

1. Position the gateway (153010-000085) on the mounting bracket (353070-000079). The gateway can be mounted on the bracket in any direction, but the connectors should not face up when the bracket is mounted on the beam.
2. Secure the gateway to the mounting bracket using the provided screws (356060-000303), washers (352012-000002), and nuts (356060-000241) as shown in Figure 6.
3. Mount the gateway to the mast using u-bolts (352013-000007 or 356060-000152). Secure with the included u-bolt hardware or locknuts (356060-000094) and washers (356060-000239).

Intelligent Ag recommends installing it in a location where the LEDs are visible from the cab. The mounting location must be at least 8 inches (20 cm) away from the operator to ensure safe operation.

## 4. Install Antennas

Recon SpraySense™ uses a GPS antenna and a Wi-Fi/cell antenna. The GPS antenna sends location information to the iPad through the gateway. The Wi-Fi/cell antenna sends system information to the iPad through the gateway.

### Provided Parts

Part name	Part number	Quantity
SMA cap	251015-000139	2 (use only one)
SMA terminator jack	251015-000272	3
GPS antenna	252005-000009	1
Wi-Fi antenna	252005-000010	1
U-bolt	352013-000007 or 356060-000152	4
Antenna bracket	353070-000083	2
3/8" locknut (for square u-bolt)	356060-000094	8
3/8" washer (for square u-bolt)	356060-000239	8

### Required Tools

- Standard wrench set

### Installation Location

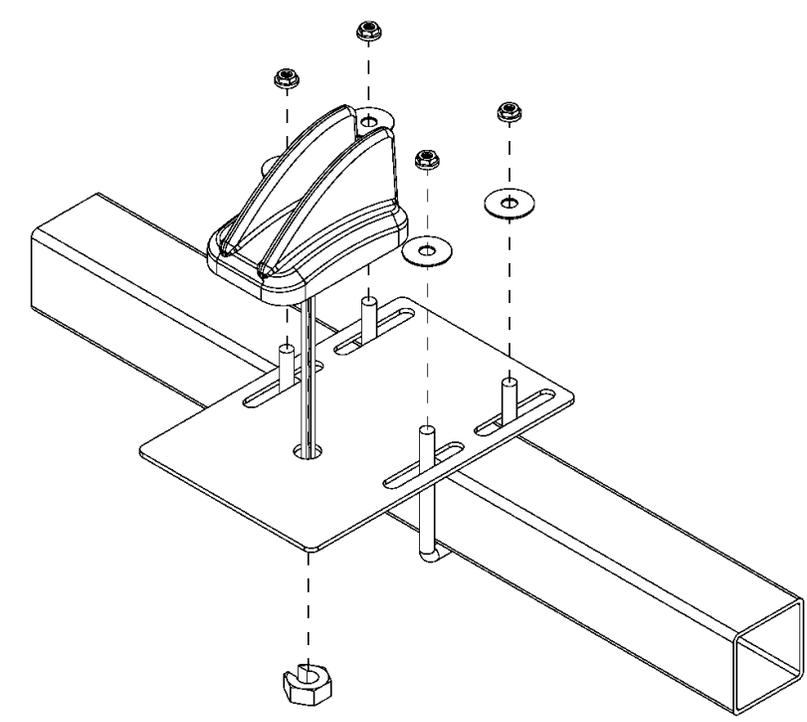
Mounted on the rear center mast.



Figure 7: Antenna mounting location

## Installing the Antennas

1. Identify the GPS and Wi-Fi/cell antennas by their 3 labeled cables:
  - GPS antenna: *Cell diversity, GPS, and Iridium.*
  - Wi-Fi/cell antenna: *Cell, 433 MHz, and Wi-Fi/BT.*
2. Mount each antenna to a bracket.
  - a. Thread the antenna cables through the hole in the mounting bracket (353070-000083) and through the nut.
  - b. Tighten the nut to secure the antenna to the bracket. Do not over-torque.



**Figure 8: Mounting the antennas**

3. Mount the bracket to the back center mast using the u-bolts (356060-000152) and locknuts (356060-000094) in the location specified below and in the orientation shown in Figure 7 (fins pointing away from the machine).

**NOTE:** Even if your machine already has a GPS antenna, you still need to install this antenna.

**NOTE:** Antennas should be mounted at least 24" apart from each other.

- **GPS antenna:** Mount the antenna on the back center mast in a location with a clear view of the sky. Cables must be within reach of the gateway. Mount it at least 2 feet (60 cm) away from the operator and at least 8 inches (20 cm) from the gateway to ensure safe operation.
- **Wi-Fi/Cell antenna:** Mount the antenna in a location within line of sight of the cab. Cables must be within reach of the gateway.

## Connect Cables to Gateway

1. Connect the Wi-Fi/cell antenna's Cellular Main and Wi-Fi/BT antenna cables to the gateway.
2. Connect the GPS antenna's GPS antenna cable to the gateway.

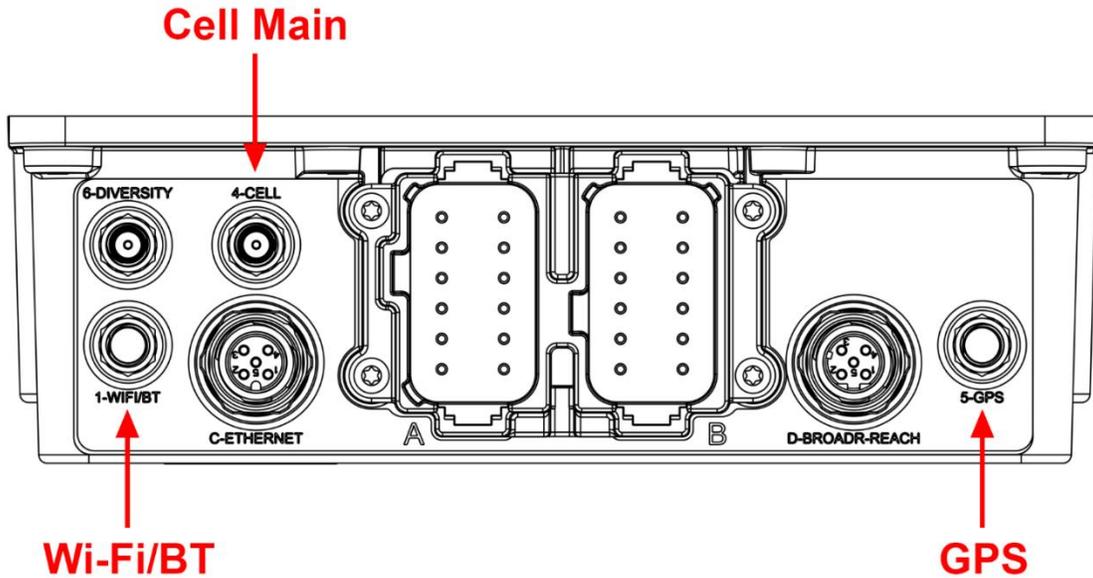


Figure 9: Gateway connectors

3. Cap the unused antenna cables with an SMA terminator jack (251015-000272).
4. Cover connector 6 – Diversity with the provided cap (251015-000139).
5. Zip tie loose antenna cables together and secure them to the implement or other harnessing.

## 5. Connecting Harnessing

Refer to Appendix A for wiring diagrams for the steps below.

### Provided Parts

Part name	Part number	Quantity
CAN terminator (DT 4 pin)	153510-000051	4
Sensor harness	353050-000079	1/sensor
Main harness	353050-000080	1
Intermediate harness (36")	353050-000081	4
Tractor harness	353050-000082	1
Intermediate harness (72")	353050-000085	4
Cable ties	356070-000079	varies
CAN terminator (DT 3 pin)	356070-000104	4

### Required Tools

- None

### 5.1. Install Tractor Harness

**NOTE:** The gateway uses the tractor's key switch for proper operation. Make sure that the key switch is wired to the key switch terminal of the 3-pin power outlet in the tractor cab.

1. Connect **S1** of the tractor harness (353050-000082) to the **tractor's convenience outlet**.
2. Route harnessing through a suitable exit point of the cabin. Route the tractor harness along existing harnessing toward the back of the machine.

*If you're installing on a RoGator, the machine platform has an access panel on the rear right of the operator's cabin.*

### 5.2. Install Main Harness

1. Connect **S1** of the main harness (353050-000080) to **S2** of the tractor harness.
2. Connect **S2** of the main harness to **Port A** of the gateway.
3. Connect **S3** of the main harness to **Port B** of the gateway.
4. Terminate **T1**, **T2**, **T3**, and **T4** of the main harness with a **3-pin CAN terminator** (356070-000104).
5. Route the rest of the main harness along existing harnessing down the back of the machine toward the sensors. Leave **S4**, **S5**, **S6**, and **S7** open for now.

## 5.3. Install Sensor Harnesses

Refer to Appendix A for wiring diagrams for the steps below.

1. Connect **S3** of the sensor harnesses (353050-000079) to the **receptacle on the sensors**. The tab on the connector should face the outside of the sensor.

*If there isn't room to plug in the connector, remove any obstructions or move the nozzle body and sensor assembly.*



**Figure 10: Sensor harness receptacle**

2. Locate the four centermost sensors on the back of the machine, then connect the main harness.
  - a. Connect **S4** of the main harness to **S1** of the left-center sensor harness.
  - b. Connect **S5** of the main harness to **S1** of the right-center sensor harness.
  - c. Connect S6 and S7 according to the steps below, depending on your configuration.
    - **If your system has more than 96 sensors:**
      - Connect **S6** of the main harness to **S1** of the secondmost left-center sensor harness.
      - Connect **S7** of the main harness to **S1** of the secondmost right-center sensor harness.
    - **If your system has less than 96 sensors:** Terminate **S6** and **S7** with a **4-pin CAN terminator** (153510-000051).
3. Daisy chain the remaining sensor harnesses together, using intermediate harnesses (353050-000081 or 353050-000085) on boom pivot points.
  - Starting in the center of the machine, connect **S1** of a sensor harness to **S2** of the sensor harness next to it. Systems with more than 96 sensors will have two separate chains of sensor harnesses, as shown in Appendix A.
  - Insert a 36" or 72" intermediate harness between sensor harnesses on boom pivot points to allow extra length for boom movement.
4. Insert a 4-pin CAN terminator (153510-000051) into **S2** of the leftmost and the rightmost sensor harnesses at the end of the booms.

*If your system has less than 96 sensors, you will cap two sensor harnesses.*

*If your system has more than 96 sensors, you will cap four sensor harnesses.*

**IMPORTANT:** The system will not operate correctly if ends are not capped with terminating plugs.

## **5.4. Route Loose Harnessing**

Coil any loose harnessing around a hydraulic line or existing electrical wire and ensure that harnessing will not get pinched when you fold the booms up. Secure all harnessing to the implement using cable ties (356070-000079).

## 6. Installing the iPad and Intelligent Ag Universal Mobile App

To interface with the system, you need to download the Intelligent Ag Universal Mobile App from the Apple App Store and install it onto your iPad.

### Provided Parts

Part name	Part number	Quantity
Tablet mount arm	352004-000003	1
Rail attachment	352004-000004	1
iPad mount (for 9"-10.5" iPads)	356070-000089	1

### Required Tools

- Phillips head screwdriver

### 6.1. Install the iPad Mount

1. Connect the base of the tablet mount arm (352004-000003) to the back of the iPad mount (356070-000089) using the screws provided with the mount.
2. Insert the ball of the rail attachment (352004-000004) into the other end of the mount arm. Twist the knob on the rail attachment to tighten the mount.
3. Mount the rail attachment to the cab's mounting bar, or other desired installation location, using the u-bolts provided with the rail attachment.
4. Place the iPad into the iPad mount.
5. **OPTIONAL:** Plug the iPad into a USB charger in the cab to keep the iPad charged while using the system.

### 6.2. Download the Intelligent Ag Universal Mobile App

1. Connect the iPad to the internet.
2. Tap the **App Store** icon on the iPad's home screen.
3. Tap **Search** in the bottom right corner of the App Store screen.
4. Type *Intelligent Ag* in the search field, then tap **Search**.
5. Tap the Intelligent Ag Universal Mobile App when it appears in your search results.
6. Tap the **Get** button, then tap **Install**. Enter your Apple ID and password, if prompted. A progress bar will appear over the app's icon while it is downloading.

### 6.3. Connect to the Gateway

1. Ensure that you have power to the gateway. The gateway's LED is green when it's done booting.
2. Tap the **Settings** icon on your iPad's home screen.
3. Tap **Wi-Fi**. Then, connect to the **SpraySense-XXXXXX** network.  
*"XXXXXX" represents your gateway serial number.*
4. Press the iPad's Home button and open the Intelligent Ag Universal Mobile App. Follow the on-screen prompts to begin configuring your system.

### 6.4. Configuring the System

For instructions to configure and use Recon SpraySense™ after installation, see the Recon SpraySense Operator's Manual (Intelligent Ag document number 600890-000073).

**Hold on to the magnet indexing tool; you will use it during configuration.**

## 7. Daily Maintenance



**WARNING:** Use caution when folding and unfolding the booms. Failure to properly fold booms may cause damage to your sensors and other components of the Recon SpraySense™ system.

Intelligent Ag recommends a daily visual inspection of the Recon SpraySense system to ensure proper operation and reduce downtime.

Perform the checks below. Correct any issues before operating the system again.

Harnessing	<ul style="list-style-type: none"> <li>• Make sure that all connections are secure</li> <li>• Make sure that there are no signs of rubbing or pinching</li> </ul>
Sensors	<ul style="list-style-type: none"> <li>• Make sure sensors are:                             <ul style="list-style-type: none"> <li>○ securely mounted</li> <li>○ powered on</li> <li>○ not cracked or broken</li> <li>○ showing a solid green LED</li> </ul> </li> <li>• Make sure that harnesses are correctly connected</li> <li>• Start the system and check each sensor for leaks</li> </ul>
Gateway	<ul style="list-style-type: none"> <li>• Make sure that the gateway is:                             <ul style="list-style-type: none"> <li>○ securely mounted</li> <li>○ powered on</li> </ul> </li> <li>• Make sure that harnesses are correctly connected</li> </ul>
Antenna	Make sure that the antennas are securely mounted

## 8. Troubleshooting



**WARNING:** You might come in contact with chemicals from the sprayer when maintaining Recon SpraySense™ sensors. Make sure that you are wearing appropriate PPE (Personal Protective Equipment) as indicated on the chemical's label and the instructions in the sprayer's manufacturer documentation.

### Sensor showing 0 GPM flow

If a sensor is showing 0 GPM flow, follow the troubleshooting instructions below.

1. Make sure that all harnessing is securely connected and not damaged.
2. Make sure that the sensor LED is solid green.
3. Remove the sensor cone and clean the sensor. Refer to the instructions below.

### Cleaning the Sensor

Required Tools: Needle nose pliers, Hypro install tool (included) or pliers, hose

**NOTE:** Only clean the sensor when troubleshooting an issue. The sensor does not need routine cleaning.

1. Remove the retaining clip that connects the cone to the sensor (opposite side of the LED).
2. Use the install tool or pliers to give the cone a half turn. Pull out the cone, making sure that you don't lose the torus and two o-rings (shown in Figure 11).
3. Clean the sensor by rinsing out any debris inside the sensor or on the cone.
4. Re-install the cone, making sure that the torus and o-rings are in place. Re-insert the retaining clip to connect the cone to the sensor.

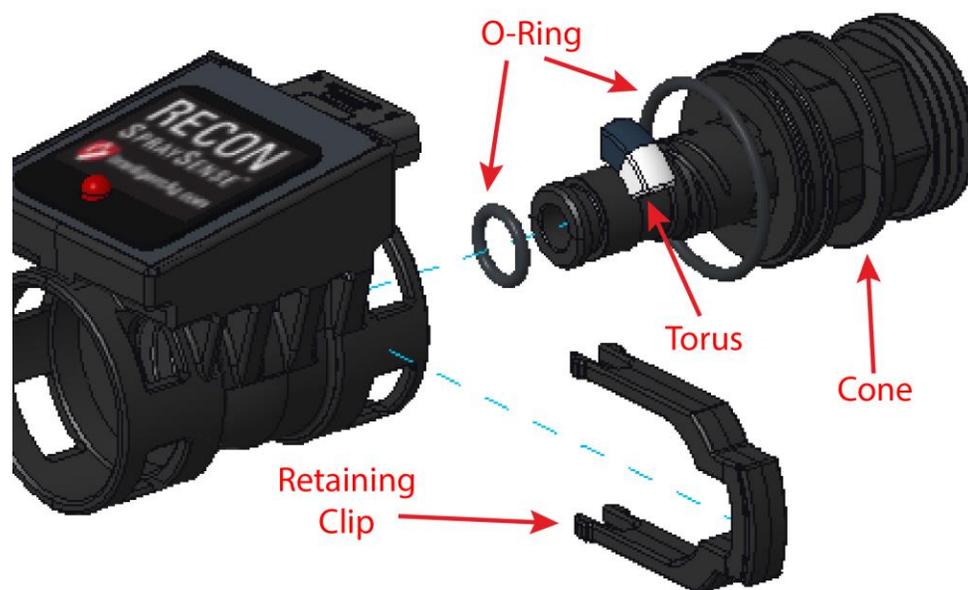


Figure 11: Cleaning the sensor

# Appendix A: Wiring Diagrams

## SYSTEM WITH LESS THAN 96 SENSORS

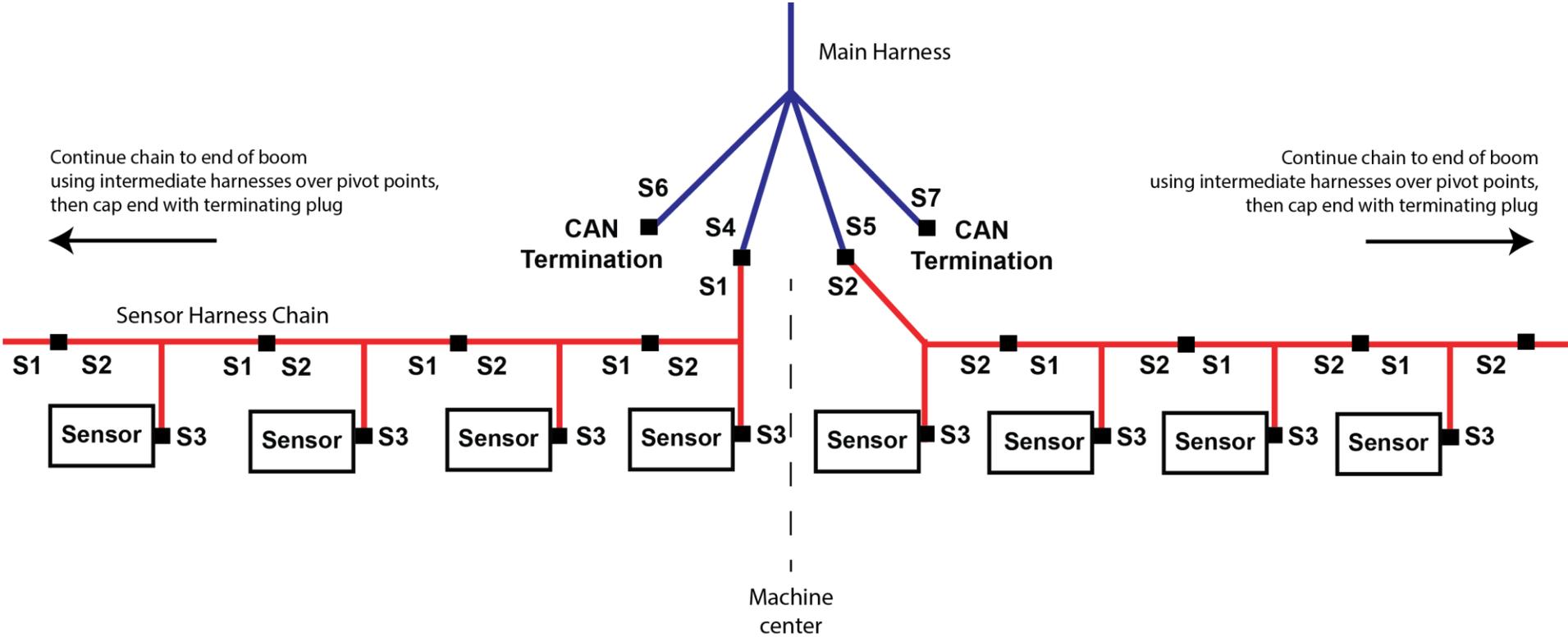


Figure 12: Main harness wiring diagram for systems with less than 96 sensors

# SYSTEM WITH MORE THAN 96 SENSORS

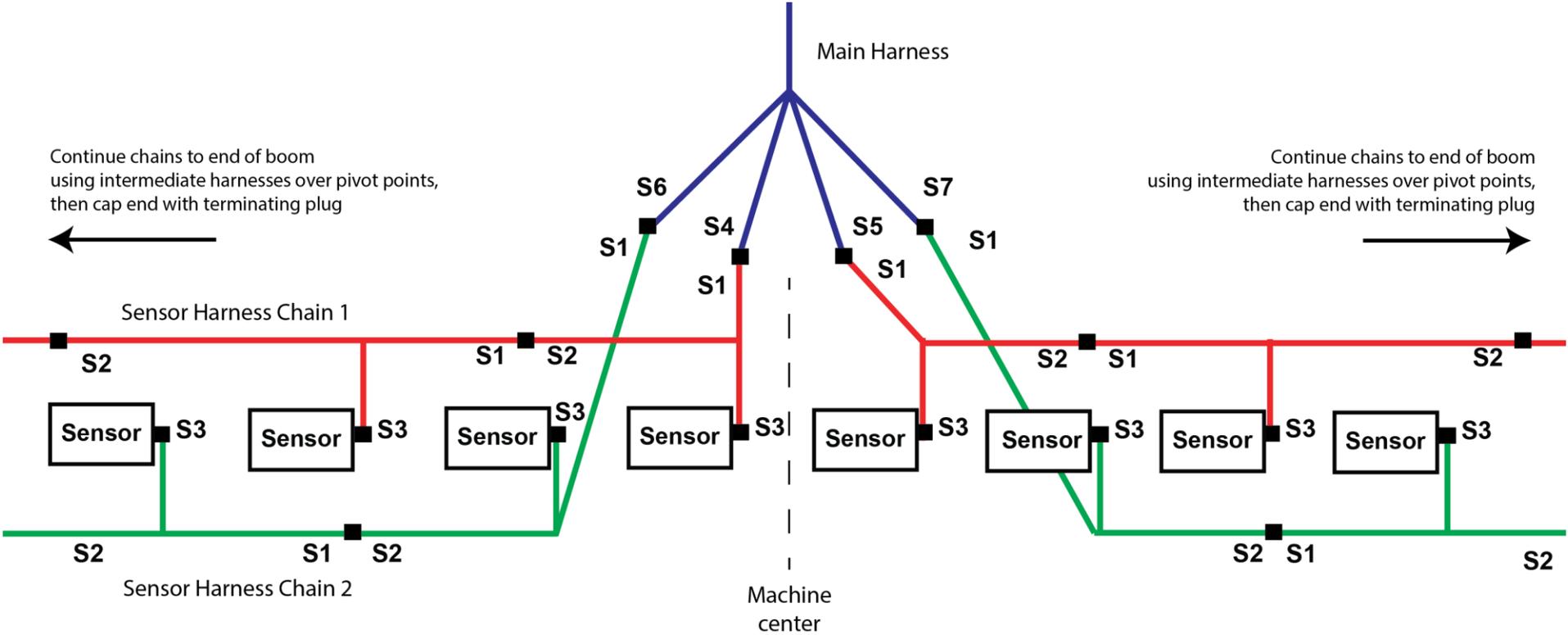


Figure 13: Main harness wiring diagram for systems with more than 96 sensors