

# Synchro™

## Spray Application

### Installation Guide



Thank you for your business!

At CapstanAG, our goal is to redefine the way people do their chemical application. Our PWM control systems have been setting the bar for maximum productivity for more than 20 years. Our focus on performance, support, and education have dramatically changed the landscape of agricultural chemical application.

CapstanAG specializes in creating proprietary systems for the agricultural industry, primarily focusing on chemical and fertilizer applications. Our inventive process involves research, engineering, design, and lab and field testing.

## Service Contact Information

If a problem occurs with your system that cannot be corrected with the information in this manual, please contact your dealer for service and technical assistance. If further assistance is needed, contact CapstanAG.

System Purchased: \_\_\_\_\_

Dealer: \_\_\_\_\_

Contact: \_\_\_\_\_

Phone: \_\_\_\_\_

Address: \_\_\_\_\_

City,State/Province, Zip: \_\_\_\_\_

## Factory Service/Repairs

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# Chapter 1: Introduction

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## This Manual

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This manual includes operation, maintenance, and installation information for the system you purchased.

Make sure that all personnel have read this manual and that they thoroughly understand the safe and correct operation and maintenance procedures. Failure to do so could result in personal injury or equipment damage.

This manual should be considered a permanent part of your system and should remain with the system at all times and when you sell it.

Right and left sides of the system are determined by facing the direction of forward travel of the machine on which the system is installed.

The information, screenshots, and other illustrations were correct at the time of publication. Changes can occur without notice.

This manual contains important information on how to safely and correctly install, operate, and maintain CapstanAG products. These instructions will help keep personnel safe, reduce downtime, and increase the reliability and life of the equipment, its components, and related systems.

Review the safety information in the manual(s) from the Original Equipment Manufacturer (OEM).

Follow the instructions (in this manual) and in the OEM manual(s) for each step, to make sure that work conditions in and around the OEM equipment are safe.

It is important for all individuals working with chemicals to understand the potential risks, necessary safety precautions, and proper response in the event of accidental contact.

Review the OEM manual(s) for chemical safety information.

Read, understand, and review the procedures in this manual and OEM manual(s). Use the Safety Data Sheets (SDS) and the required Personal Protective Equipment (PPE) for hazardous chemicals.

Please keep this manual and all enclosed documentation in an accessible location known to all operators, installation, and maintenance personnel.

If you do not understand the CapstanAG equipment after reading this manual, please obtain the proper training before working with equipment, to make sure that your own safety, as well as your co-workers' safety, is maintained.

Do not attempt to operate any equipment or system until you completely understand why, when, and how it operates. If you are uncertain after studying this manual, please contact CapstanAG.

## System Identification

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Write the system name, serial number, and other information down in the Service Contact Information on the inside cover of this manual. Your dealer will use these numbers when you order parts. File a copy of the identification numbers in a secure place off the machine.

If you are not the original owner of this machine, it is in your interest to contact your local CapstanAG dealer to inform them of this unit's serial number. Providing this information will help CapstanAG notify you of any issues or product improvements.

# Chapter 2: Safety

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## Signal Words

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**DANGER:** Indicates an imminent hazard which, if not avoided, will result in death or serious injury. This signal word is limited to the most extreme situations, typically for aircraft components that, for functional purposes, cannot be guarded.



**Warning:** Indicates a potential hazard which, if not avoided, could result in death or serious injury, and includes hazards that are exposed when guards are removed. It may also be used to alert against unsafe practices.



**CAUTION:** Indicates a potential hazard which, if not avoided, may result in minor or moderate injury. It may also be used to alert against unsafe practices.

**Important:** This is used to draw attention to specific information that is necessary for the operation, setup, or service of the system.

**Note:** This is used for additional information that can help understand or operate the system.

## Emergency Safety

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Fire extinguishing systems must meet the applicable OSHA requirements, and all users of portable/ fixed fire suppression equipment must know the types, limitations, and proper uses of this equipment; including hazards involved with incipient stage firefighting.

Keep emergency numbers for doctors, ambulance service, hospital, and fire department near your telephone.

Know the location of fire extinguishers and first aid kits and how to use them.

Examine the fire extinguisher and service the fire extinguisher regularly.

Follow the recommendations on the instructions plate.

Very small fires can be put out (extinguished) with a fire extinguisher. Use an appropriate method to extinguish a fire (water for paper fires, and chemical extinguishers for electrical or chemical fires).

## Personal Protective Equipment

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Wear close-fitting clothing and the correct personal protective equipment (PPE) for the job. See the specific chemical manufacturer documentation or other information for correct PPE.

## Pressurized Fluid Lines

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Do not heat by welding, soldering, or using a torch near pressurized fluid lines or other flammable materials. Pressurized lines can accidentally burst when too much heat is present.

## Chemical Safety

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Chemicals used in agricultural applications can be harmful to your health and/or the environment if not used correctly. Always follow all label directions for effective, safe, and legal use of agricultural chemicals.

## Battery Safety

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Use the procedure in the appropriate agricultural equipment manual for connecting, disconnecting, and jump-starting the machine's battery.

Keep sparks and flames away from the battery. Battery gas can explode and cause serious injury. Do not smoke in the battery charging area.

Remove jewelry, which might make electrical contact and create sparks.



# Chapter 3: Installation

## Clean the Existing System

Before installation of a new system, you must make sure that the existing system is clean of debris and the filtering system is functioning correctly. Flush all plumbing and any inline filters and tips.

For the new system to function correctly, the filter must be 80-mesh or finer.

**Note:** Debris can cause lodging of the nozzle valves, prevent the system from operating correctly, and damage internal components.

1. Release pressure from the system before servicing.
2. Thoroughly clean the system.

Avoid high-pressure spray when cleaning the spray system components, valves, and wiring connectors.

## Before Installation



**CAUTION:** Before installation, operation, or service to the system, read and understand the machine's operator manual and the system operator manual. Chemical residue may be present on/in the OEM equipment. Use the correct personal protective equipment.



**Warning:** Chemical residues may be present in the agricultural equipment. Always use the proper personal equipment to avoid personal injury.

**Important:** Before installation, make sure that all parts are included in the shipping boxes using the list of parts included in the order.

**Important:** Do not connect the battery harness terminals to the battery until the installation of the system is complete.

**Important:** Do not attach the harnesses with cable ties until the test of the system is complete.

## Nozzle Valve Assembly

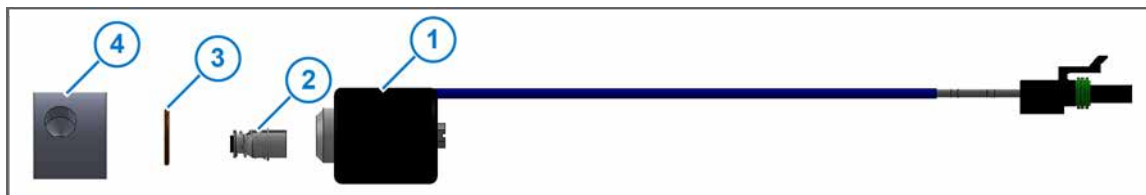


Figure 1:

| Item | Description | Part Number | Item | Description | Part Number |
|------|-------------|-------------|------|-------------|-------------|
| 1    | Coil        | 625147-011  | 3    | O-ring      | 715022-204  |
| 2    | Plunger     | 716009-111  | 4    | Valve Body  | 621083-001  |

## System Layout

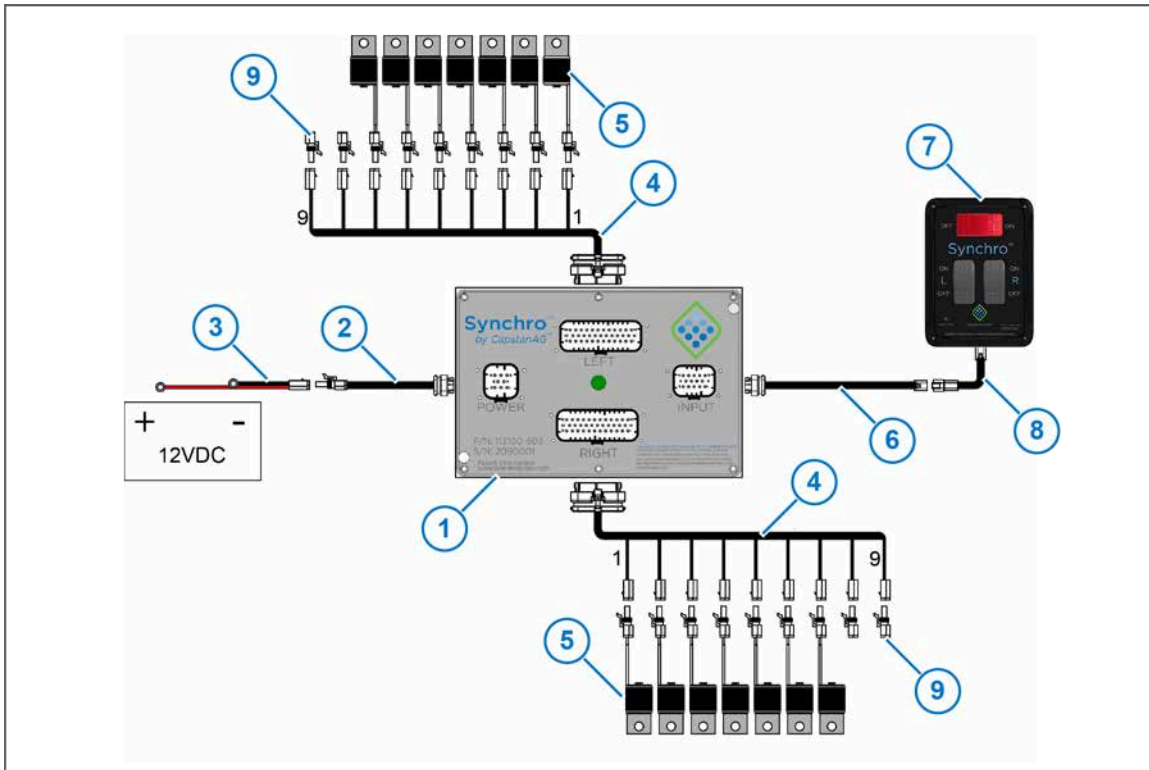


Figure 2:

| Callout | Description     | Callout | Description               |
|---------|-----------------|---------|---------------------------|
| (1)     | Control Module  | (6)     | Cab Box Harness           |
| (2)     | Power Harness   | (7)     | Cab Box                   |
| (3)     | Battery Harness | (8)     | Cab Box Extension Harness |
| (4)     | Valve Harness   | (9)     | 2-pin WP Tower Dust Plug  |
| (5)     | Valve Assembly  |         |                           |

## Parts List

**Table 1: System Base Components**

| Part Number | Description               | Drawing Description                            | Qty |
|-------------|---------------------------|--|-----|
| 113100-503  | Control Module            | Control Module Assembly, Synchro Orchard       | 1   |
| 113100-542  | Cab Box                   | Cabbox Assembly, Synchro Orchard               | 1   |
| 113100-514  | Power Harness             | Power Harness, 20ft Synchro Orchard            | 1   |
| 113100-530  | Cab Box Harness           | Cabbox Harness, 35ft Synchro Orchard           | 1   |
| 113100-543  | Cab Box Extension Harness | Cabbox Extension Harness, 10ft Synchro Orchard | 1   |

**Table 2: Valve Assembly**

Amount should equal the number of nozzle locations on the sprayer

| Part Number | Description    | Drawing Description                                    | Qty    |
|-------------|----------------|--|--------|
| 113100-570  | Valve Assembly | Valve Assy 12W Std spring, 15 series, 1/4 x 1/4 NPT SS | Varies |

**Table 3: Battery Extension Harness**

| Part Number | Description           | Drawing Description                   | Qty |
|-------------|-----------------------|---------------------------------------|-----|
| 113100-510  | Battery Harness—5 ft  | Battery Harness, 5ft Synchro Orchard  | 1   |
| 113100-512  | Battery Harness—20 ft | Battery Harness, 20ft Synchro Orchard |     |

**Table 4: Valve Harnesses**

Need two harnesses-one for the right side and one for the left side of the sprayer

| Distance from the control box to nozzles is less than 15 ft |                             |   |     |
|---|-----------------------------|---|-----|
| Part Number   | Description                 | Drawing Description                         | Qty |
| 113100-550  | 16-drop Valve Harness—15 ft | 16 Drop Valve Harness, 15ft Synchro Orchard | 2   |
| 113100-551  | 9-drop Valve Harness—15 ft  | 9 Drop Valve Harness, 15ft Synchro Orchard  |     |
| Distance from the control box to nozzles is less than 30 ft |                             |   |     |
| Part Number   | Description                 | Drawing Description                         | Qty |
| 113100-555  | 16-drop Valve Harness—30 ft | 16 Drop Valve Harness, 30ft Synchro Orchard | 2   |
| 113100-556  | 9-drop Valve Harness—30 ft  | 9 Drop Valve Harness, 30ft Synchro Orchard  |     |

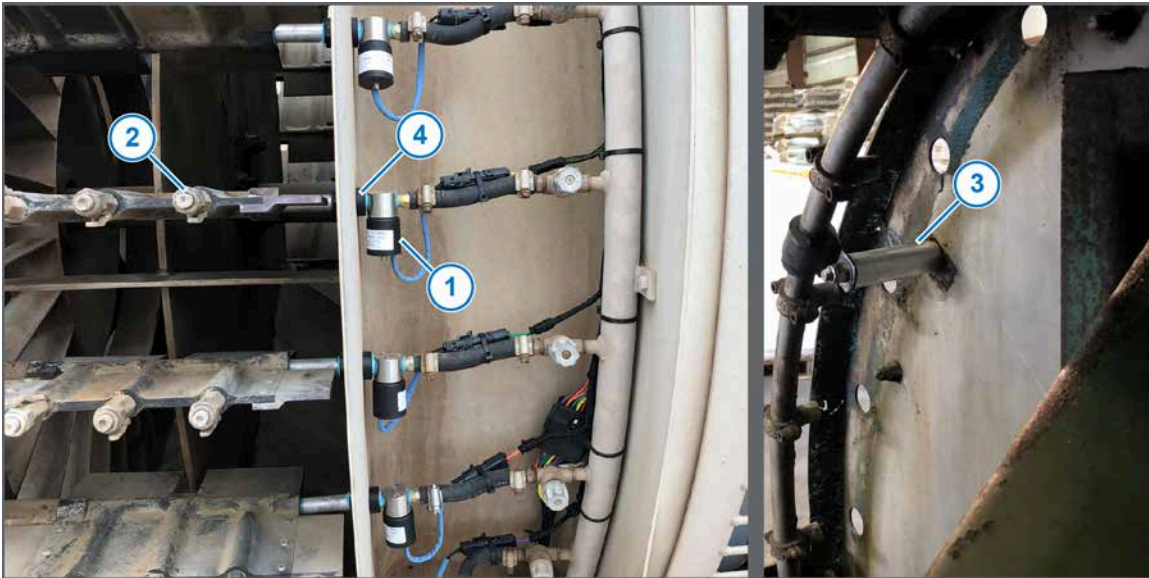
**Table 5: Miscellaneous**

| Part Number | Description              | Drawing Description   | Qty    |
|-------------|--------------------------|---|--------|
| 113100-595  | Installation Guide       | Installation Guide, Synchro Orchard                                   | 1      |
| 113100-596  | Operator Manual          | Operators Manual, Synchro Orchard                                     | 1      |
| 113100-597  | Quick Start Guide        | Quick Start Guide, Synchro Orchard                                    | 1      |
| 113100-590  | Mounting Kit             | Mounting Kit—RAM cabbox mount, and custom controller mounting bracket | 1      |
| 116200-045  | 2-pin WP Tower Dust Plug | Dust Plug, 2 Pin WP Tower   | Varies |
| 120100-010  | Installation Kit         | Install Kit, Cable Ties   | 1      |
| 113100-594  | ID Decal                 | Decal, Synchro Orchard ID   | 2      |

**Table 6: Optional OEM Specific Installation Kits**

| Part Number | Description                |
|-------------|----------------------------|
| 113100-580  | Air-O-Fan Install Kit      |
| 113100-581  | Rears 24 Valve Install Kit |
| 113100-582  | Lectro Blast Install Kit   |
| 113100-583  | Durand Wayland Install Kit |

## Install the Valve Assemblies



**Figure 3:**

**1.** Identify the location for the valve assemblies (1).

The valve assembly location must be as close to the tip (2) as possible without being in the airstream.

Modifications may be needed to move mounting of manifold in order to insert CapstanAG valves out of the airstream.

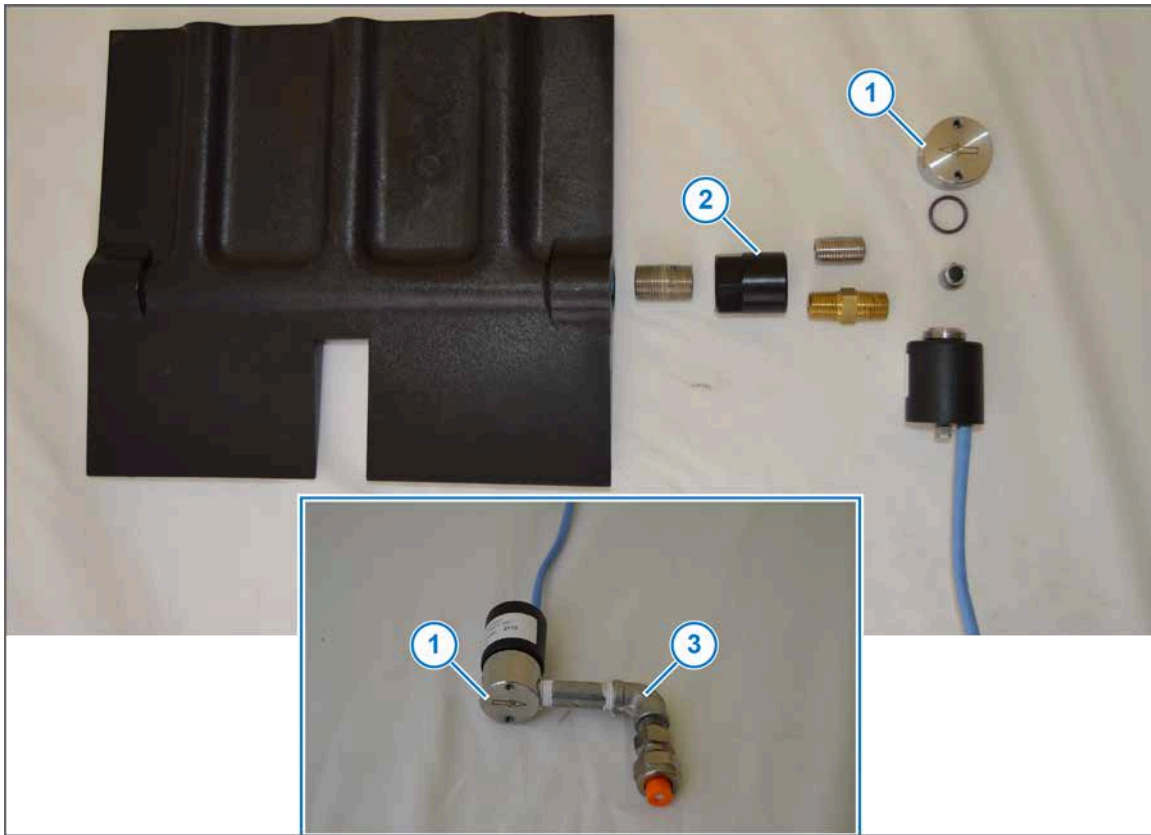
Standoffs (3) may be needed in certain applications to move the boom away from the panel to allow for clearance for CapstanAG valves. This may vary for each make/model of sprayer.

**Note:** Make sure that the new mounting location does not require flexible hose between the valve assemblies and the tips. Do not install a valve assembly upstream from a flexible hose. Only use rigid plumbing components between the valve assemblies and the tips

**Note:** The AOF bushing (PN: 706530-145) shown (4) is an optional purchase from CapstanAG that can be used when installing system on Air-O-Fan make sprayers. Contact your dealer or CapstanAG representative for more information.

**Note:** Make sure that you route the harnesses where damage is minimized. Make sure that the harnesses are not exposed to impact or debris.

**Note:** Make sure that you avoid pinch points, or other sharp edges that can cause damage.



**Figure 4:**

2. Install the valve assemblies between the existing system parts and inline of the fluid distribution system.

Make sure that the valve assemblies are in the correct orientation—the arrow (1) on the assembly is pointing with the direction of flow.

Additional fittings may be necessary to connect the parts with the existing system parts.

**Note:** Do not install plastic pipe fittings in between of stainless pipe fittings. Only use plastic pipe fittings if your existing system already has plastic pipe fittings.

**Note:** Do not install a valve assembly upstream from a flexible hose. Only use rigid plumbing components between the valve assemblies and the tips

**Note:** The AOF bushing (PN: 706530-145) shown (2) is an optional purchase from CapstanAG that can be used when installing system on Air-O-Fan make sprayers. Contact your dealer or CapstanAG representative for more information.

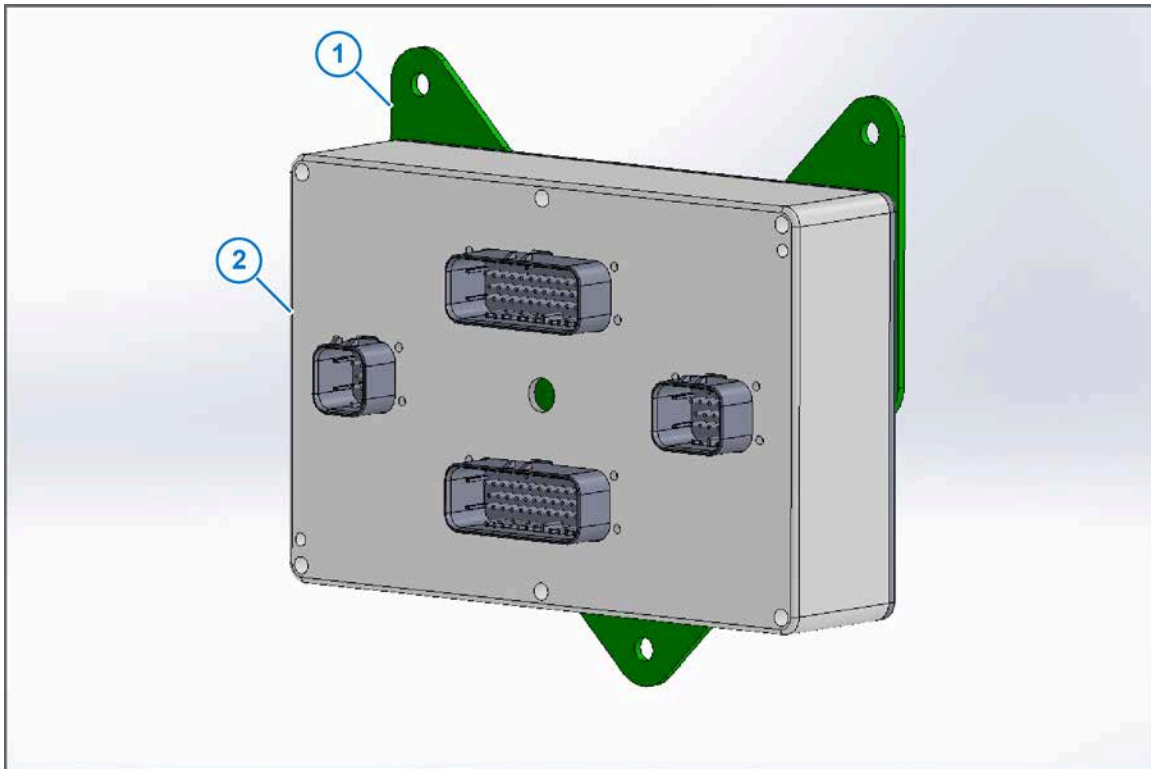
Another example of parts needed is shown (3).

## Install the Controller



Figure 5:

1. Find a central mounting location for the controller (1) where all of the harnesses will reach. The mounting locations must be on a solid surface with minimal vibrations, not in the airstream, and minimal exposure to any chemical spray.  
Make sure that the controller is not installed on an external surface where it can be damaged.
2. If only using the tabs (2) to mount the controller using the supplied hardware.



**Figure 6:**

3. If using the optional mounting kit (PN: 113100-590), install the bracket1 (1) to the controller (2).
4. Install the brackets and controller.  
For improved Wi-Fi, do not install the controller in a contained area.



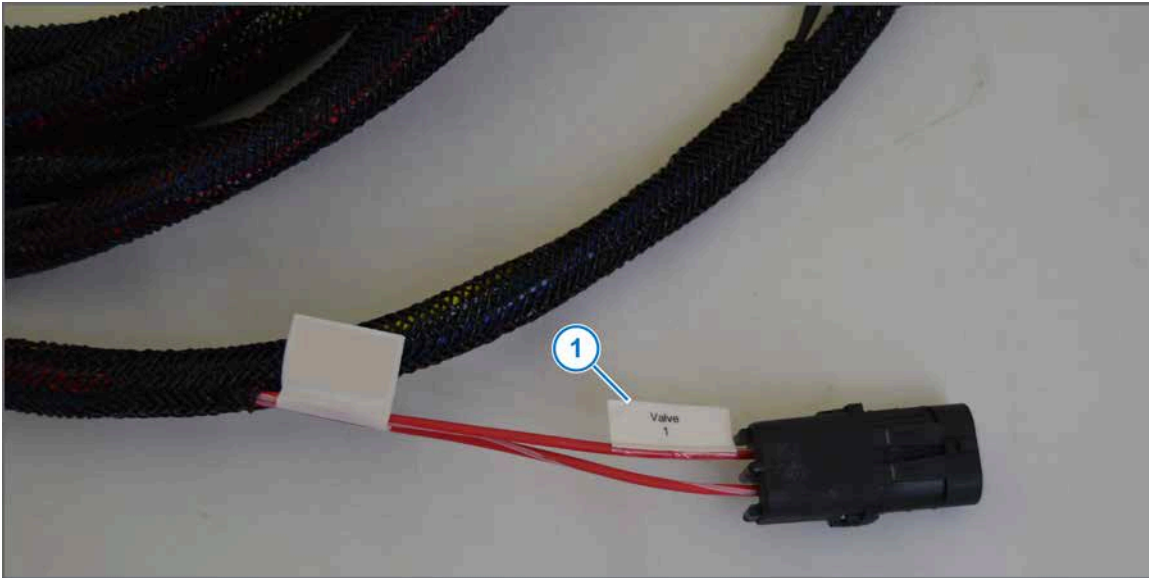
## Install the Cab Box



**Figure 7:**

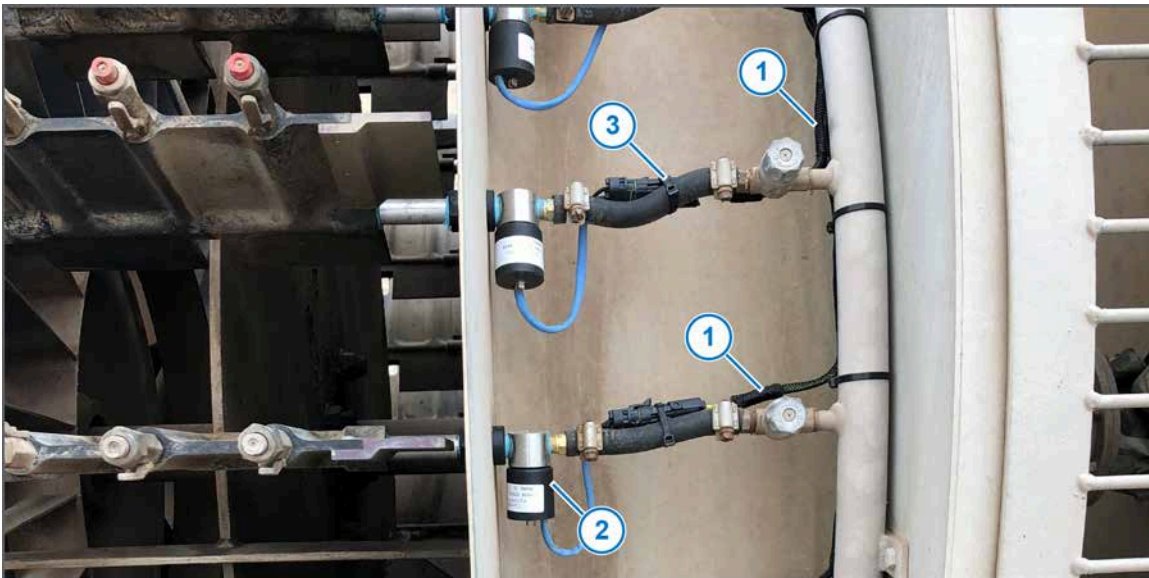
1. In the cab of the machine, install the cab box (1) if optional mounting kit purchased, use hardware supplied.  
Make sure that the cab box is within reach of the operator.
2. Connect one end of the cab box harness to the 6-pin connector on the bottom of the cab box.
3. Route the harness to the back of the machine cab.  
**Note:** Make sure that you route the harnesses where the potential for damage is minimized. Make sure that the harnesses are not exposed to impact or debris.  
**Note:** Make sure that you avoid pinch points, or other sharp edges that can cause damage.
4. Find a location to route the harness outside of the cab.
5. Once the harness is outside the cab, continue routing the harness to the controller.  
Make sure to allow for movement at the hitch.  
Place connection point near hitch for ease of unhooking/decoupling sprayer from machine. If necessary, use the optional cab box extension harness (PN: 113100-543).  
**Note:** Make sure that you route the harnesses where the potential for damage is minimized. Make sure that the harnesses are not exposed to impact or debris.  
**Note:** Make sure that you avoid pinch points, or other sharp edges that can cause damage.
6. Connect to the 14-pin connector on the controller labelled **INPUT**.

## Install the Valve Harnesses



**Figure 8:**

There are two identical valve harnesses. The left and right side of the sprayer will be symmetrical. Each harness has a label Valve #1 (1) on the connector for the first valve. Valve #1 will also have a red/white tracer wire color, in case the label is missing.



**Figure 9:**

1. Connect one of the valve harnesses (1) to Valve 1 on the sprayer. Valve 1 will be the valve closest to the controller.
2. Route the valve harness from Valve 1 around half of the sprayer.
3. Connect each valve (2) sequentially to the harness.
4. If there are unused connectors on the harness, install dust plugs (PN: 116200-045).
5. Continue routing the valve harness to the controller.
6. Repeat steps 1 to 4 for the other side.
7. Use the cable ties (3) to attach the harnesses to the machine.

**Note:** Make sure that you route the harnesses where the potential for damage is minimized. Make sure that the harnesses are not exposed to impact or debris.

**Note:** Make sure that you avoid pinch points, or other sharp edges that can cause damage.

## Install the Battery Harness

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**Note:** This system can only operate on a 12 V DC power supply.

1. Start at the battery, but do not connect the terminals to the battery yet.
2. Route the battery harness toward the controller.

The battery harness will not reach the controller.

**Note:** Make sure that you route the harnesses where the potential for damage is minimized. Make sure that the harnesses are not exposed to impact or debris.

**Note:** Make sure that you avoid pinch points, or other sharp edges that can cause damage.

3. Connect the end of the battery harness with 4-pin connector to the power harness.

If connecting to a tractor battery, try and place the 4-pin connector near the hitch to allow for easy disconnect.

4. Route the power harness to the controller.

**Important:** Make sure that there is enough slack in the harness to avoid pinch points at the hitch.

**Note:** Make sure that you route the harnesses where the potential for damage is minimized. Make sure that the harnesses are not exposed to impact or debris.

**Note:** Make sure that you avoid pinch points, or other sharp edges that can cause damage.

5. At the controller, connect the power harness to the 8-pin connector on the controller labelled **POWER**.
6. At the battery, connect the positive (+) red cable to the red power terminal of a 12 V DC battery.
7. Connect the negative (-) black cable to the black ground terminal of a 12 V DC battery.

## Install the ID Decal

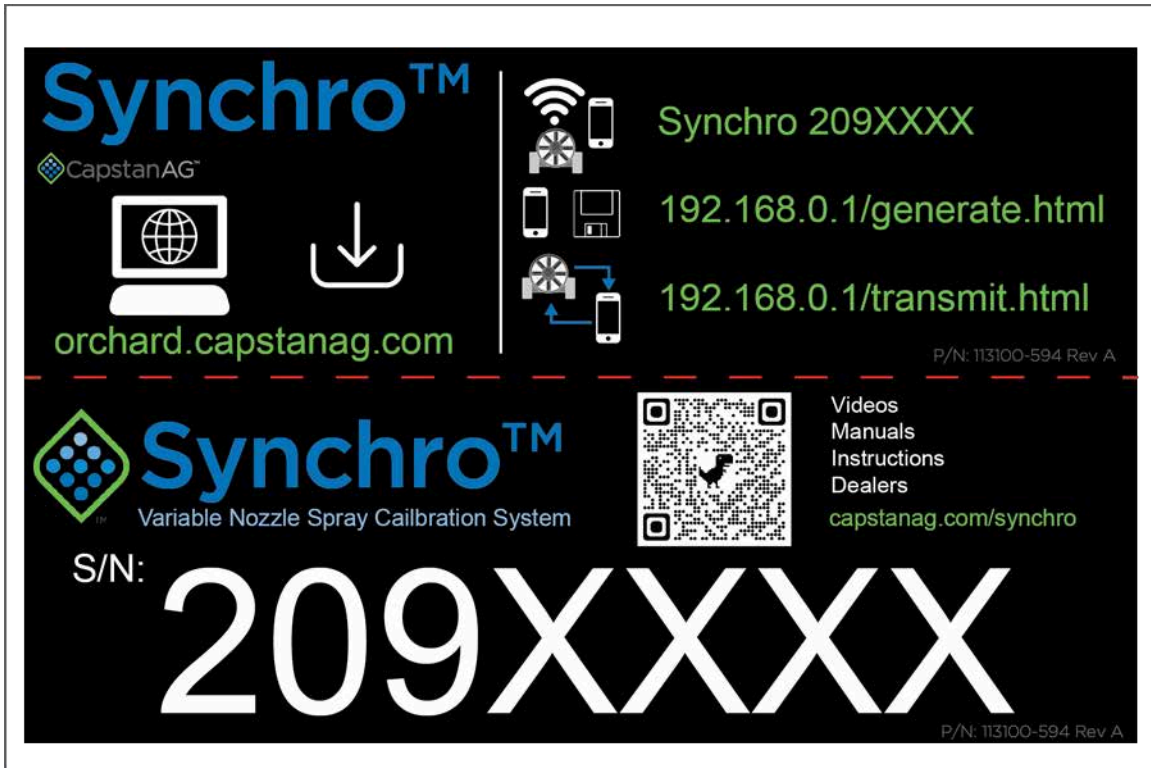


Figure 10:

Install the ID decals on the exterior of the sprayer in a location that can be seen from a distance as a system identification.



# Chapter 4: Setup

## System Dry Test



Figure 11:

1. Make sure that the sprayer is off.
2. On the cab box (1), toggle the red **Synchro** switch (2) to **ON**.  
The LED (3) in the switch will illuminate.  
The system should come with an active profile from the factory.
3. Toggle the **L** switch (4) to **ON**.  
The LED (5) in the switch will illuminate.
4. Make sure that you can hear the nozzles click on the left side of the machine.
5. Toggle the **L** switch to **OFF**.  
The LED in the switch will not illuminate.
6. Toggle the **R** switch (6) to **ON**.  
The LED (7) in the switch will illuminate.
7. Make sure that you can hear the nozzles click on the right side of the machine.
8. Toggle the **R** switch to **OFF**.  
The LED in the switch will not illuminate.
9. Start the system wet test.

## System Wet Test



Figure 12:

1. Use water to pressurize the system.
2. On the cab box (1), toggle the red **Synchro** switch (2) to **ON**.  
The LED (3) in the switch will illuminate.  
The system should come with an active profile from the factory.
3. Toggle the **L** switch (4) to **ON**.  
The LED (5) in the switch will illuminate.
4. Make sure that all of the nozzles spray on the left side of the machine.
5. Do a check for leaks and repair as necessary.
6. Toggle the **L** switch to **OFF**.  
The LED in the switch will not illuminate.
7. Toggle the **R** switch (6) to **ON**.  
The LED (7) in the switch will illuminate.
8. Make sure that all of the nozzles spray on the right side of the machine.
9. Do a check for leaks and repair as necessary.
10. Toggle the **R** switch to **OFF**.  
The LED in the switch will not illuminate.
11. If the system test fails, see the troubleshooting chapter in the operator manual.
12. If the system test passes, attach the harnesses with cable ties.  
**Note:** Make sure that you route the harnesses where damage is minimized. Make sure that the harnesses are not exposed to impact or debris.  
**Note:** Make sure that you avoid pinch points, or other sharp edges that can cause damage.
13. Installation is now complete and the system is ready for operation.  
See the quick start guide and/or the operator manual for system operation.



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## Application Systems for Professionals™

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