Spray Height Controller

Flexi-Coil / NH / Case IH
(68 Series, SF210/216, SRX100/160)
Installation Manual
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Introduction

Congratulations on your purchase of the NORAC UC5 Spray Height Controller. This system is manufactured with top quality components and is engineered using the latest technology to provide operating reliability unmatched for years to come.

When properly used the system can provide protection from sprayer boom damage, improve sprayer efficiency, and ensure chemicals are applied correctly.

Please take the time to read this manual completely before attempting to install the system. A thorough understanding of this manual will ensure that you receive the maximum benefit from the system.

Your input can help make us better! If you find issues or have suggestions regarding the parts list or the installation procedure, please don’t hesitate to contact us.

⚠️ Important

Every effort has been made to ensure the accuracy of the information contained in this manual. All parts supplied are selected to specially fit the sprayer to facilitate a complete installation. However, NORAC cannot guarantee all parts fit as intended due to the variations of the sprayer by the manufacturer.

Please read this manual in its entirety before attempting installation.
2 General UC5 System Layout

Figure 1 illustrates the general layout of the UC5 system components:

Figure 1: General UC5 System Layout
3 Kit Parts

3.1 Kit Overview

Figure 2: FC02 System Parts
3.2 Hydraulic Plumbing: Single Acting

Remove existing coupling from between accumulator and tee fittings on both cylinders. Reconnect accumulators with combination of F07 and F04 as shown.

Figure 3: Hydraulic Plumbing: Single Acting

⚠️ Important
For single acting hydraulics use fittings kit 44865-08 and 44865-24. The items marked with an asterisk (*) are from kit 44865-24. Not all fittings are used for this installation.
3.3 Hydraulic Plumbing: Double Acting

For double acting hydraulics use fittings kit 44865-07 and 44865-24. The items marked with an asterisk (*) are from kit 44865-24. Not all fittings are used for this installation.

⚠️ Important

"For double acting hydraulics use fittings kit 44865-07 and 44865-24. The items marked with an asterisk (*) are from kit 44865-24. Not all fittings are used for this installation."
## 3.4 List of Parts

<table>
<thead>
<tr>
<th>Item</th>
<th>Part Number</th>
<th>Name</th>
<th>Quantity</th>
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<tbody>
<tr>
<td>B05</td>
<td>44706-01</td>
<td>KIT CABLE TIE BLACK 10 PCS 21 IN 150 PCS 7.5 IN</td>
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<tr>
<td>B10</td>
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<td>MOUNTING BRACKET COMPLETE UC4 BREAKAWAY EXTENDED</td>
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<td>B11</td>
<td>44743</td>
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<td>P01</td>
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<td>UC5 NETWORK 6 PIN PLUG</td>
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* For systems purchased BEFORE October 1, 2011, the roll sensor part number is 43740.
### 3.5 Hydraulic Fitting Kit Details (P/N: 44865-08)

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<tr>
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## 3.6 Hydraulic Fitting Kit Details (P/N: 44865-07)

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3.7 Hydraulic Fitting Kit Details (P/N: 44865-24)

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<td>*F02</td>
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<td>*F04</td>
<td>103839</td>
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<td></td>
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</tbody>
</table>

Fitting Name Example:

Size in 1/16ths
Gender: Male or Female

Type:
B - ORB
J - JIC
O - Flattened Faces
P - Pipe

90° Angle Swivel
Type
Gender
Size

⚠️ Important

There are three fittings kits included: 44865-08, 44864-07 and 44865-24. For single acting hydraulics, use 44865-08 and 44865-24. For double acting hydraulics, use 44865-07 and 44865-24. The items marked with an asterisk (*) are from kit 44865-24. Not all fittings are used for this installation.

⚠️ Important

The use of dielectric grease is not recommended on any NORAC electrical connections.

⚠️ Important

To ensure all stainless steel hardware does not gall or seize apply a light coating of the supplied Permatex Anti-seize grease to all threaded parts upon installation. Permatex Anti-seize lubricant is preferred, but other similar anti-seize products may be used.
4 Pre-Install Checklist

The pre-install checklist is necessary to check the existing sprayer functionality before the installation.

1. Unfold the sprayer over a flat, unobstructed area (i.e. no power lines…etc.).

2. Ensure all boom-fold operations are functional (place a check mark in boxes below).

3. Bring engine to field-operational RPM and record below.

4. Record the time (seconds) it takes for a full stroke for all boom functions. To ensure repeatable measurements, take the average of 3 trials.

5. Not all sprayers will have the functions listed below in Figure 5.

⚠️ Important

Ensure the boom has sufficient travel so it does not contact the ground during these tests.

Figure 5: Pre-Install Boom Speeds
5 Ultrasonic Sensor Installation

5.1 Bracket Assembly

Assemble the breakaway sensor bracket as illustrated in Figure 6, following the instructions below.

1. Compress the spring and insert it together with the collar into the base.
2. Slide the tube through the assembled part.
3. Using the bolt and nut, tighten the collar to the tube with the sensor tube centered.
4. Apply a small amount of grease to the rotating surfaces of the bracket.

Figure 6: Breakaway Bracket Assembly
5.2 Ultrasonic Sensor Serial Number Arrangement

When installing the UC5 sensors, start with the smallest serial number on the left-hand side, and proceed to the largest serial number on the right hand side. Each UC5 sensor has a serial number stamped on the sensor housing.

Apply a light coating of the supplied Permatex Anti-seize grease to all threaded parts upon installation.

Figure 7: Sensor Serial Number Arrangement
5.3 Ultrasonic Sensor Mounting Guidelines

The following guidelines will ensure optimal sensor performance and prevent sensor measurement error. These rules should be followed for both the wing sensors and the main lift (middle) sensor.

1. In its lowest position, the sensor must be 9 inches (23 cm) or more from the ground (A).

2. The centerline of the acoustic cone should be approximately vertical at normal operating heights (A).

3. The bottom of the sensor must be at least 9 inches in front of the spray nozzles and boom structure (B). (This does not apply for the main lift sensor)

4. The bottom of the sensor must be at least 9 inches above the spray nozzles (C).

5. Ensure there are no other obstructions with a 12 inch (23 cm) diameter circle projected directly below the sensor (D).

Figure 8: Sensor Mounting Guidelines
5.4 Wing Sensor Installation

1. The sensor bracket should be oriented forward (ahead of the boom).

2. Typically the best mounting location for the wing sensor brackets will be near the end of the boom tips, approximately two feet (60cm) from the end.

3. Depending on the boom design, some breakaway sections will lift upwards as they break back. If the sensor is mounted to this portion of the boom, the system will force the boom downwards towards the ground as the boom folds backwards.

4. Mount the NORAC UC5 ultrasonic sensor into the sensor bracket and run the sensor cable through the sensor tube.

⚠️ Important
A problem can arise if a sensor is not mounted correctly. It is possible for the sensor to read off of the boom instead of the ground. This may only become apparent once the controller is switched from soil to crop mode.

Also be careful that the sensor bracket does not collide with any other part of the boom when the boom is folded to transport position. If possible, mount the sensor brackets while the booms are folded to ensure they will not cause interference.

Figure 9: Sensor Reading Off Boom
5.5 Main Lift Sensor Installation

1. There are a variety of ways to mount the main lift bracket on most sprayers. The bracket should position the sensor approximately in the center of the sprayer, forward of the boom. An example of this mounting is illustrated in Figure 11.

2. Mount the ultrasonic sensor to the main lift bracket. Run the sensor cable down the center of the main lift bracket tube.

⚠️ Important
Avoid mounting the main lift sensor over or near a wheel-track. Measurements from the wheel-track do not provide an accurate crop height and will cause measurement and control error.

Ensure the bracket does not collide with any other part of the sprayer throughout the full range of main lift motion.
6 Roll Sensor Installation

6.1 Bracket Assembly

1. Securely mount the roll sensors to the included roll sensor brackets using the #6 machine screw and nylon lock-nuts.

2. The orientation of the mounted roll sensor to the roll sensor bracket will depend on the bracket mounting. The roll sensor CANbus connector must be pointing towards the right side of the sprayer.

![Figure 12: Mounting Roll Sensor to Bracket](image12)

![Figure 13: Roll Sensor Orientation - Connector Facing Right Wing](image13)
6.2 Roll Sensor Mounting Guidelines: Center Pivot Booms

1. When mounting the roll sensors, mount one to the boom frame and one to the chassis (non-pivoting portion of the sprayer). For optimal performance, minimize the distance between the roll sensors (A) and minimize the height from each roll sensor to the pivot point (B).

![Figure 14: Roll Sensor Mounting on a Center Pivot Suspended Boom](image)

2. Ensure the roll sensors are relatively level when the sprayer boom and chassis are level.

3. Both roll sensor cables should be pointing towards the right hand wing of the sprayer.

4. Ensure both roll sensors are mounted adequately and that the cables provide enough slack to allow sufficient boom roll.

5. The chassis roll sensor can also be mounted inverted to minimize the distance between the roll sensors (Figure 15).

![Figure 15: Inverted Chassis Roll Sensor Mounting on a Center Pivot Suspended Boom](image)
6.3 Roll Sensor Mounting on a Flexi-Coil Sprayer

Figure 16: Roll Sensor Mounting (Viewed from the rear of sprayer)
7 Module Installation

An optional module mounting bracket kit is available for purchase from NORAC. The mounting brackets are compatible with control modules and input modules. One kit is needed per module.

<table>
<thead>
<tr>
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<th>Part Number</th>
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7.1 Control Module

1. Refer to Figure 1 and Figure 17.

2. Securely mount the control module (E01) near the hitch of the sprayer using screws, cable ties or optional brackets.

3. Connect the display terminal to the control module using the display CANbus cable. This cable must be connected to the end of the control module with only one Deutsch connector.

4. Connect the power cable to one of the two CANbus connectors on the other end of the control module.

5. Route cable C01 from the other CANbus connector towards the rear of the sprayer.

Figure 17: Control Module Mounting
### 7.2 Valve Module

1. Install the valve module (E02) to the top of the NORAC valve block. Orient the 6-pin Deutsch (CANbus) connectors towards the P and T ports with the label facing up.

![Figure 18: Valve Module](image)

<table>
<thead>
<tr>
<th>Output Number</th>
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<tbody>
<tr>
<td>1</td>
<td>Left Up</td>
</tr>
<tr>
<td>2</td>
<td>Left Down</td>
</tr>
<tr>
<td>3</td>
<td>Right Up</td>
</tr>
<tr>
<td>4</td>
<td>Right Down</td>
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<td>Option 3</td>
</tr>
<tr>
<td>8</td>
<td>Option 4</td>
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</table>

2. Verify the valve coil connectors are oriented vertically (Figure 19).

![Figure 19: Align Coils](image)

3. Place the valve module between the valve coils. Slide a valve mounting bracket over the connectors of the valve module and the valve coil connectors. This may require flexing the plastic bracket slightly (Figure 20).

4. Ensure the bracket is pushed over the connectors far enough to allow the clips to engage behind the valve connectors.
5. Connect the valve module CANbus to cable C01 from the control module. Route cable C02 from the other CANbus connector to the input module.

6. With the valve module securely mounted to the valve block, connect the valve cables (C10), to the valve coils as illustrated in Figure 18 and Figure 21. Insert the 2-pin plugs (P01) into the unused 2-pin connectors on the valve module.

7. Connect the temperature probe to the valve block using the supplied 3/8” x 1/2” hex bolt.
7.3 Input Module

1. Install the input module (E03) on the boom near the sprayer valve block. Secure it to the boom using cable ties or optional brackets.

2. Connect the free end of the CANbus cable (C02) from the valve module to the input module.

3. Insert the 12 pin plug (P02) into the OEM 3 connector on the end of the input module.

4. Connect the 12 pin connector on the tilt interface cable (C20) to the Thru 2 connector on the side of the input module.

5. Insert the other connectors on C20 into the tilt connectors on the sprayer valve block.

6. Connect the 12 pin connector on the main lift interface cable (C21) to the Thru 1 connector on the side of the input module.

7. Insert the other connectors on C21 into the main lift connectors on the sprayer valve block.

8. If your sprayer has a bypass valve, insert the 2-pin tee connector marked “AUX 1” into the bypass valve connection. If your sprayer does not have a bypass valve, connect the male and female “Aux 1” connectors together.

9. Connect the male and female “Aux 2” connectors together.

Figure 22: Input Module Connections
8 Connecting the Sensors to the CANbus

1. Route cable C03 from the input module to the 8-way coupler (E11).

2. Connect both roll sensors to the 8-way coupler. Fasten the 8-way coupler to the boom with cable ties.

3. Connect the main lift sensor to the 8-way coupler using cable C04 and a 2-way coupler (E12). Cable C04 and item E12 may not be needed if the 8-way coupler is mounted close enough to the main lift sensor.

4. Connect two cables (C05) to the 8-way coupler and route along the booms to the wing sensors. Follow existing cables and hoses to be sure the cable will not be pinched or stretched.

5. At the sensor brackets, attach a 2-way coupler with terminator (E20) to the sprayer boom. The 2-way coupler with terminator is the white two way coupler. Plug the sensor and the CANbus cable into the 2-way coupler.

Figure 23: UC5 Module Locations and Cable Connections
9 Hydraulic Installation

⚠️ Warning!

Ensure all pressure has been bled from the system before disconnecting any lines or fittings. Hydraulic pressure will exist on the wing tilt circuits unless the wings are being supported by other means. You may wish to perform the hydraulic installation with the wings in transport position, resting on the ground or with the tilt cylinders fully extended.

⚠️ Important

Component failure due to oil contamination is not covered under the NORAC UC5 system warranty. It is recommended that a qualified technician perform the hydraulic installation.

9.1 Valve Assembly: Single Acting

1. On a clean surface remove the plastic plugs from the block.

2. Install the 6MB-6MJ (F05) fittings into the P and T ports. Tighten to 18 ft-lbs (24 Nm).

3. Insert the two orifices (F06) into the “B” ports with the notch facing out (Figure 24).

4. Install the 6MB-6MJ (F05) fittings into the “B” ports. Tighten to 18 ft-lbs (24 Nm).

5. Install the 6MBP (F02) fittings into the “A” ports. Tighten to 18 ft-lbs (24 Nm).

Figure 24: NORAC Valve Block Details
9.2 Valve Assembly: Double Acting

1. On a clean surface remove the plastic plugs from the block.

2. Install the 6MB-6MJ (F06) fittings into the P and T ports. Tighten to 18 ft-lbs (24 Nm).

3. Insert the two orifices (F07) into the “B” ports with the notch facing out ([Figure 25]).

4. Install the 6MB-6MJ (F06) fittings into the “B” ports. Tighten to 18 ft-lbs (24 Nm).

5. Insert the two orifices (F07) into the “A” ports with the notch facing in ([Figure 25]).

6. Install the 6MB-6MJ (F06) fittings into the “A” ports. Tighten to 18 ft-lbs (24 Nm).

[Figure 25: NORAC Valve Block Details]
9.3 Valve Block Mounting

1. Mount the valve block on the center section of the boom near the sprayer valve block, as illustrated in Figure 26.

2. Insert the threaded rod into the block and use a hex nut to hold the rod. The block holes are 3/8” NC-1” deep. If bolts are used instead of the threaded rod, ensure the bolts thread in at least 3/8”.

3. Use the remaining hardware to secure the block to the sprayer.

4. Cut off excess threaded rod, if necessary.

Figure 26: Valve Block Mounting
9.4 Hydraulic Plumbing: Single Acting

⚠️ Warning!

From this point on in the installation the booms will be inoperative until the hydraulics are fully installed.

1. For single acting hydraulics use fittings kit 44865-08 and 44865-24. The items marked with an asterisk (*) are from kit 44865-24. Not all fittings are used for this installation.

2. After the NORAC valve is mounted, the hydraulic hoses and fittings can be plumbed. The plumbing for the hydraulic circuit is shown schematically in Figure 3.

3. Disconnect the tilt raise lines from the sprayer valve block and insert the two tees (*F05) between the hoses and the valve block.

4. Connect two hydraulic hoses (H02) from the free ends of the tees to the NORAC valve block. The raise lines must be connected to the “B” ports.

5. Remove the existing coupling from between the accumulator and tee fittings on both cylinders. Reconnect the accumulators using the 6JFX union (F04) and the 6MB-6MJ 2-way orifice (F07).

6. There must be no other orifices in the hydraulic circuit between the NORAC valve block and the tilt cylinders.

7. Disconnect the pressure and tank lines from the sprayer valve block and insert the two tees (F03) between the hoses and the valve block.

8. Connect two hydraulic hoses (H01) from the free ends of the tees to the pressure and tank port on the NORAC valve block.
9.5 Hydraulic Plumbing: Double Acting

⚠️ Warning!

From this point on in the installation the booms will be inoperative until the hydraulics are fully installed.

1. For double acting hydraulics use fittings kit 44865-07 and 44865-24. The items marked with an asterisk (*) are from kit 44865-24. Not all fittings are used for this installation.

2. After the NORAC valve is mounted, the hydraulic hoses and fittings can be plumbed. The plumbing for the hydraulic circuit is shown schematically in Figure 4.

3. Disconnect the tilt raise and lower lines from the sprayer valve block and insert the four tees (*F05) between the hoses and the valve block.

4. Connect four hydraulic hoses (H02) from the free ends of the tees to the NORAC valve block. The raise lines must be connected to the “B” ports and the lower lines must be connected to the “A” ports.

5. There must be no other orifices in the hydraulic circuit between the NORAC valve block and the tilt cylinders.

6. Disconnect the pressure and tank lines from the sprayer valve block and insert the two tees (F04) between the hoses and the valve block. Use adapter F03 between the tee and the existing hoses, and use adapter F05 between the tee and the valve block.

7. Connect two hydraulic hoses (H01) from the free ends of the tees to the pressure and tank port on the NORAC valve block.
10 Software Setup

1. Start up your sprayer and test the sprayer's functionality. The display terminal does not need to be powered on for the original boom function switches to operate. Unfold the booms and raise/lower each boom and the main section.

⚠️ Important

Confirm that the cabling and hoses are agreeable to the entire range of motion.

2. If any functions do not work, review the hydraulic and electrical portions of this manual to check for proper installation.

3. Turn on the power for the display terminal using the switch on the side.

4. The procedure for the installation of the UC5 Spray Height Control system is now complete. Begin the AUTOMATIC SYSTEM SETUP procedure as described in the UC5 Spray Height Control Operator's Manual.

5. For optimal performance of the UC5 system, there should be very little play at the hitch clevis. The addition of polymer washers can help tighten up this connection (Figure 27).

![Figure 27: Hitch Point](image-url)
11 Cable Drawings

11.1 ITEM C01: 43220-10 - CABLE UC5 NETWORK 14 AWG - 10M

11.2 ITEM C02: 43220-01 - CABLE UC5 NETWORK 14 AWG - 1M
11.3 ITEM C03: 43210-03 - CABLE UC5 NETWORK 18 AWG - 3M

11.4 ITEM C04: 43210-01 - CABLE UC5 NETWORK 18 AWG - 1M
11.5 ITEM C05: 43210-20 - CABLE UC5 NETWORK 18 AWG - 20M

11.6 ITEM C10: 43230-04 – CABLE UC5 VALVE DT TO DT
11.7 ITEM C20: 43240-01 – CABLE UC5 INTERFACE TILT DT
11.8 ITEM C21: 43240-07 – CABLE UC5 INTERFACE MAIN DT (WITH AUX 1 & 2)