

Injection Cabinet Installation and Operation Manual

P/N 016-0171-671 Rev. A 03/18 E30421

Disclaimer

While every effort has been made to ensure the accuracy of this document, Raven Industries assumes no responsibility for omissions and errors. Nor is any liability assumed for damages resulting from the use of information contained herein.

Raven Industries shall not be responsible or liable for incidental or consequential damages or a loss of anticipated benefits or profits, work stoppage or loss, or impairment of data arising out of the use, or inability to use, this system or any of its components. Raven Industries shall not be held responsible for any modifications or repairs made outside our facilities, nor damages resulting from inadequate maintenance of this system.

As with all wireless and satellite signals, several factors may affect the availability and accuracy of wireless and satellite navigation and correction services (e.g. GPS, GNSS, SBAS, etc.). Therefore, Raven Industries cannot guarantee the accuracy, integrity, continuity, or availability of these services and cannot guarantee the ability to use Raven systems, or products used as components of systems, which rely upon the reception of these signals or availability of these services. Raven Industries accepts no responsibility for the use of any of these signals or services for other than the stated purpose.

Table of Contents

Chapter 1	Important Safety Information	1
	Chemical Handling and Safety	1
	Electrical Safety	2
	Instructions for Wire Routing	2
	Instructions for Hose Routing	4
Chapter 2	Introduction	7
	System Overview	7
	Injection System Components	7
	Sidekick Pro ICD Features	8
	Integrated Motor Control ECU	8
	Fast Rate Response	9
	System Diagnostics	9
	Sidekick Pro ICD Pump Specifications	9
	Pump Dimensions	10
	Mixer Flow Specifications	11
	Internal Plumbing Overview	11
	Updates	12
Chapter 3	Installation	13
	Mount the Injection Cabinet	13
	In-Line Mixer Assembly Mounting	13
	best Practices	13
	In-Line Mixer Mounting	14
	Plumbing Cabinet to Mixer	14
	Plumbing Installation	15
	Verifying Installation of the Sidekick Pro™ ICD	15
	CANbus and Power Connections	15
Chapter 4	Calibration and Operation	17
	Sidekick Pro™ Tab Information	17
	Sidekick Pro™ ICD Menu	17
	Enabling Agitation and Rinse Assist	18
	Sidekick Pro™ ICD System Settings	19
	Current Totals Data	20
	Device Totals	21
	System information	21
	Tests	22
	Pump Prime	22
	Prime the Injection Pump	22
	Catch Test	23
	Demonstration Mode	24
	Diagnostic Trouble Codes	24
Chapter 5	System Maintenance	27
	Maintenance and Storage	27

Table of Contents

Check Valve O-Rings	28
Pump Cam and Bearing	30
Piston Seal Replacement	31
Returning the Pump for Service or Repair	33
Chapter 6 Troubleshooting.....	35
Motor Control ECU LED Status Indicators	35
Motor Control ECU LED Status Indicators	35
Diagnostic Trouble Codes	36
Chapter 7 Replacement Parts.....	39
Sidekick Pro™ ICD Injection Module Parts	39
Injection Pump Flow Monitor Sensor	44
Appendix A Flowcharts.....	47
Flowcharts	47

CHAPTER

1

IMPORTANT SAFETY INFORMATION

NOTICE

Read this manual carefully before installing the Raven Sidekick Pro™ ICD, injection module or any other system components.

- Follow all safety information presented within this manual.
- Keep safety labels in good condition. Replace missing or damaged safety labels as necessary and verify labels are included on replacement parts or new equipment components. Replacement safety labels are available from any local Raven dealer.
- If you require assistance with any portion of the installation or service of Raven equipment, contact a local Raven dealer for support.

When operating the machine after installing the Raven Sidekick Pro™ ICD, observe the following safety measures:

- Be alert and aware of surroundings.
- Do not operate any agricultural equipment while under the influence of alcohol or an illegal substance.
- Determine and remain a safe working distance from obstacles or other individuals. The equipment operator is responsible for disabling the system when a safe working distance has diminished.

Review the operation and safety instructions included with the implement and/or controller.

WARNING

CHEMICAL HANDLING AND SAFETY

Chemicals used in agricultural applications may be harmful to your health or the environment if not used responsibly. Review the safe, effective, and legal use and disposal of agricultural chemicals with a chemical supplier.

- Always follow safety labels and instructions provided by the chemical manufacturer or supplier.
- Store agricultural chemicals in original containers and do not transfer to unmarked containers or containers used for food or drink. Store chemicals in a secure, locked area away from human or livestock food and keep children away from storage areas.
- Avoid inhaling chemical dust or spray particulate and avoid direct contact with agricultural chemicals. Always wear appropriate personal protective equipment as recommended by the chemical and/or equipment manufacturer. Wash hands and face after using agricultural chemicals and before eating, drinking, or using the rest room.
- Seek medical attention immediately if illness occurs during or shortly after the use of chemicals.

- Fill, flush, calibrate, and decontaminate sprayer systems in an area where runoff will not reach ponds, lakes/streams, livestock areas, gardens, or populated areas. Thoroughly flush or rinse equipment used to mix, transfer, and apply chemicals after use.
- Before servicing any component of the system, thoroughly flush or rinse components with water.
- Improper disposal of waste may threaten the environment and ecology. Dispose of empty containers properly. Triple-rinse empty containers and puncture or crush when disposing. Contact a local environmental or recycling center for additional information.

CAUTION

If the system malfunctions or becomes clogged, stop the engine or pump and relieve pressure from the spraying system before servicing.

Do not operate machinery without instruction and keep equipment in proper working condition. Unauthorized modification to equipment may impair machine function and/or safety and may shorten the working life of equipment.

Wear clothing appropriate for the job being performed and avoid loose fitting clothing while working on or near moving components. Keep long hair away from moving components.

ELECTRICAL SAFETY

Do not reverse power leads. Doing so could cause severe damage to the equipment. Always make sure that the power leads are connected to the correct polarity as marked. Ensure that the power cables are the last cables to be connected.

Remove rings and other jewelry to prevent electrical shorts or entanglement in moving parts.

INSTRUCTIONS FOR WIRE ROUTING

The word "harness" is used to mean all electrical leads and cables, bundled and unbundled. When installing harness, secure it at least every 30 cm (12in) to the frame. Follow existing harness as much as possible and use these guidelines:

Harness should not contact or be attached to:

- Lines and hoses with high vibration forces or pressure spikes
- Lines and hoses carrying hot fluids beyond harness component specifications

Avoid contact with any sharp edge or abrading surfaces such as, but not limited to:

- Sheared or flame cut edges
- Edges of machined surfaces
- Fastener threads or cap screw heads
- Ends of adjustable hose clamps
- Wire exiting conduit without protection, either ends or side of conduit
- Hose and tube fittings

Routing should not allow harnesses to:

- Hang below the unit
- Have the potential to become damaged due to exposure to the exterior environment. (i.e. tree limbs, debris, attachments)
- Be placed in areas of or in contact with machine components which develop temperatures higher than the temperature rating of harness components
- Wiring should be protected or shielded if it needs to route near hot temperatures beyond harness component specifications

Harnessing should not have sharp bends

Allow sufficient clearance from machine component operational zones such as:

- Drive shafts, universal joints and hitches (i.e. 3-point hitch)
- Pulleys, gears, sprockets
- Deflection and backlash of belts and chains
- Adjustment zones of adjustable brackets
- Changes of position in steering and suspension systems
- Moving linkages, cylinders, articulation joints, attachments
- Ground engaging components

For harness sections that move during machine operation:

- Allow sufficient length for free movement without interference to prevent: pulling, pinching, catching or rubbing, especially in articulation and pivot points
- Clamp harnesses securely to force controlled movement to occur in the desired harness section
- Avoid sharp twisting or flexing of harnesses in short distances
- Connectors and splices should not be located in harness sections that move

Protect harnesses from:

- Foreign objects such as rocks that may fall or be thrown by the unit
- Buildup of dirt, mud, snow, ice, submersion in water and oil
- Tree limbs, brush and debris
- Damage where service personnel or operators might step or use as a grab bar
- Damage when passing through metal structures

IMPORTANT: Avoid directly spraying electrical components and connections with high pressure water. High pressure water sprays can penetrate seals and cause electrical components to corrode or otherwise become damaged. When performing maintenance:

- Inspect all electrical components and connections for damage or corrosion. Repair or replace components, connections, or cable as necessary.
- Ensure connections are clean, dry, and not damaged. Repair or replace components, connections, or cable as necessary.
- Clean components or connections using low pressure water, pressurized air, or an aerosol electrical component cleaning agent.
- Remove visible surface water from components, connections, or seals using pressurized air or an aerosol electrical component cleaning agent. allow components to dry completely before reconnecting cables.

INSTRUCTIONS FOR HOSE ROUTING

The word "hose" is used to mean all flexible fluid carrying components. Follow existing hoses as much as possible and use these guidelines:

Hoses should not contact or be attached to:

- Components with high vibration forces
- Components carrying hot fluids beyond component specifications

Avoid contact with any sharp edge or abrading surfaces such as, but not limited to:

- Sheared or flame cut edges
- Edges of machined surfaces
- Fastener threads or cap screw heads
- Ends of adjustable hose clamps

Routing should not allow hoses to:

- Hang below the unit
- Have the potential to become damaged due to exposure to the exterior environment. (i.e. tree limbs, debris, attachments)
- Be placed in areas of or in contact with machine components which develop temperatures higher than the temperature rating of hose components
- Hoses should be protected or shielded if it needs to route near hot temperatures beyond hose component specifications

Hoses should not have sharp bends

Allow sufficient clearance from machine component operational zones such as:

- Drive shafts, universal joints and hitches (i.e. 3-point hitch)
- Pulleys, gears, sprockets
- Deflection and backlash of belts and chains
- Adjustment zones of adjustable brackets
- Changes of position in steering and suspension systems
- Moving linkages, cylinders, articulation joints, attachments
- Ground engaging components

For hose sections that move during machine operation:

- Allow sufficient length for free movement without interference to prevent: pulling, pinching, catching or rubbing, especially in articulation and pivot points
- Clamp hoses securely to force controlled movement to occur in the desired hose section
- Avoid sharp twisting or flexing of hoses in short distances

Protect hoses from:

- Foreign objects such as rocks that may fall or be thrown by the unit
- Buildup of dirt, mud, snow, ice, submersion in water and oil
- Tree limbs, brush and debris
- Damage where service personnel or operators might step or use as a grab bar
- Damage when passing through metal structures

- High pressure wash

SYSTEM OVERVIEW

The Raven Sidekick Pro™ ISOBUS Client Device (ICD) injection system is designed to provide efficient and accurate application of liquid chemicals applied from an injection module. Using a separate injection module, or tank, eliminates mixing chemicals and reduces chemical waste, and simplifies equipment care and maintenance.

Sidekick Pro™ ICD provides connectivity to an ISOBUS system to allow an existing ISOBUS Universal Terminal (UT) to control the rate of the chemical injection system.

After proper installation and calibration of the injection system and ISOBUS controller, including a set target rate for the carrier and injected chemicals, the operator enables the product control system and the UT will automatically maintain the flow regardless of vehicle speed or active boom sections.

Performance of the ISOBUS injection system relies upon proper installation and maintenance of the complete application system. Please review this manual before installing or operating this system to help ensure proper setup and follow instructions provided for proper care and maintenance of the Raven injection system.

INJECTION SYSTEM COMPONENTS

The Raven injection system consists of:

- ISOBUS based control console and appropriate cabling
- Sidekick Pro™ ICD injection pump
- In-line mixer
- Cabling required to connect injection system components and existing CANbus
- Check valves

The following ISOBUS Universal Terminal (UT) may be used with the injection system:

- Viper® 4
- CR7™
- Approved ISOBUS Universal Terminal (UT)

NOTE: Task controller compatibility must be unlocked by the manufacturer or OEM.

SIDEKICK PRO ICD FEATURES

INTEGRATED MOTOR CONTROL ECU

Sidekick Pro™ ICD features an integrated motor control ECU mounted directly on the pump housing for simplified installation and enhanced performance. The control ECU features status LEDs for calibrating or system troubleshooting.

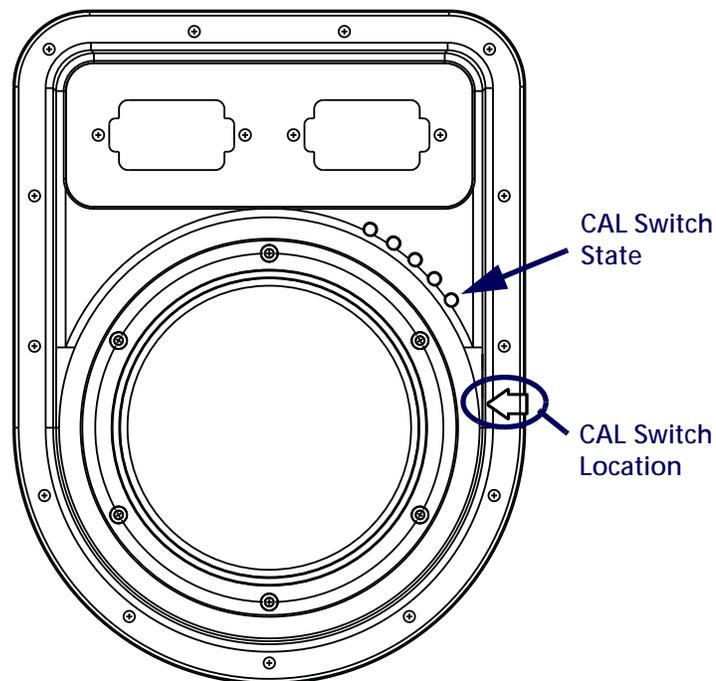
INTEGRATED CALIBRATION SWITCH

The integrated motor control ECU also features a sealed calibration switch. The sealed calibration switch allows the operator to begin the pump calibration process by passing a magnetic metallic object, such as a screwdriver, across the switch sensor on the Sidekick Pro ICD injection pump. This feature allows the operator to run multiple calibration tests quickly and easily and ensure the system is ready for operation.

NOTE: Calibration may also be initiated from the control console in the vehicle cab.

The CAL switch state LED light will flash when the calibration sensor registers a metallic object by the switch. Pass the metal object past the sensor twice to initiate a pump calibration.

FIGURE 1. Motor Control ECU Calibration Sensor



The integrated calibration switch can also:

- Prime the pump
- Calibrate the pump
- Catch test
- Rinse the pump

FAST RATE RESPONSE

The Sidekick Pro™ ICD direct injection system is capable of making accurate adjustments to chemical injection rates to help ensure accurate and proper chemical applications in the field.

SYSTEM DIAGNOSTICS

Enhanced diagnostic features are monitored by the control console during operation of the Sidekick Pro™ ICD injection system to help identify potential issues and minimize equipment down time.

FLOW MONITORING

The CAN integrated Sidekick Pro™ ICD offers enhanced monitoring of pump operation during chemical injection applications to alert the operator to conditions such as an empty chemical supply tank, low injection pressure, incorrect calibration, or issues with the injection pump valves.

SIDEKICK PRO ICD PUMP SPECIFICATIONS

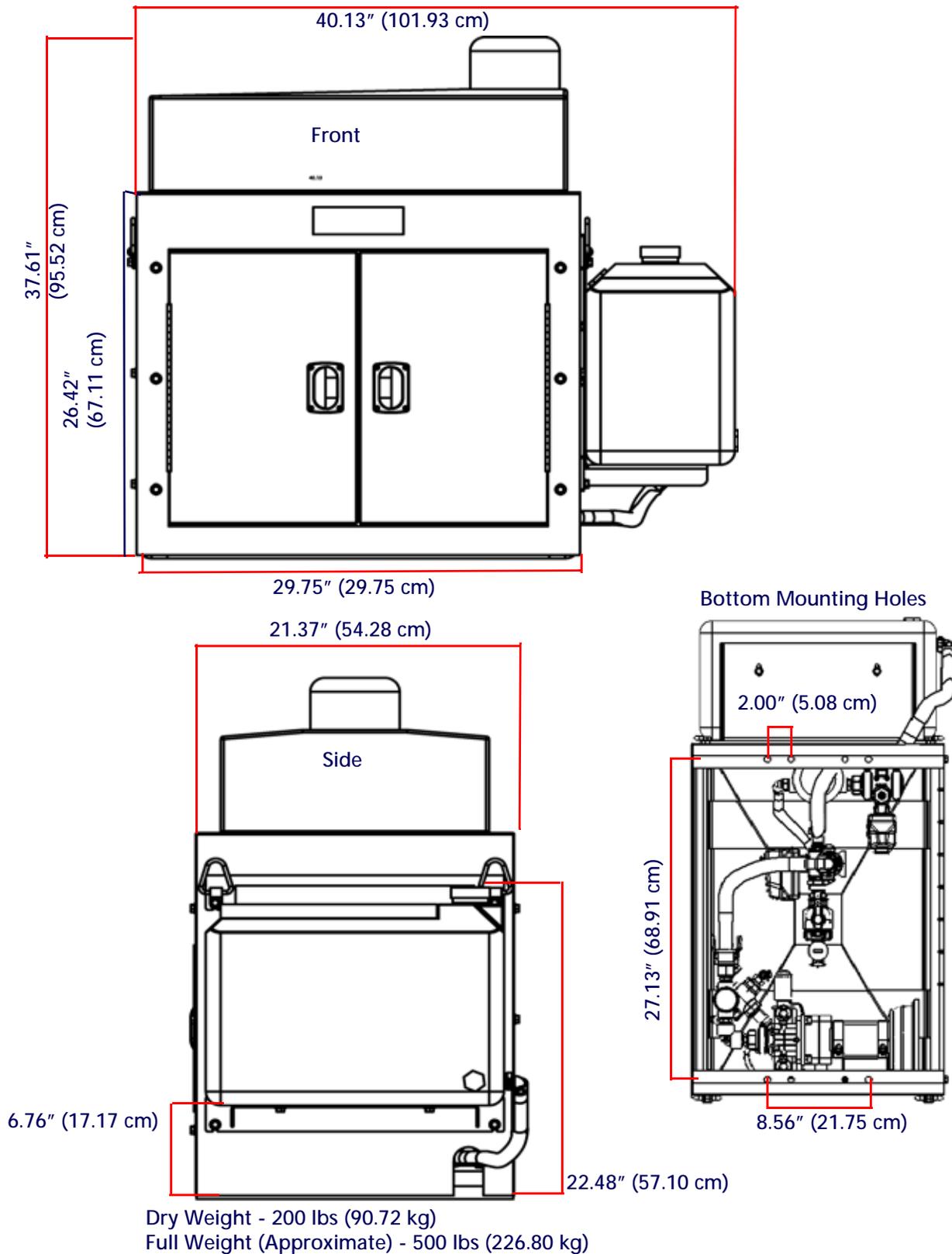
The Raven Sidekick Pro™ ICD injection pump is a positive displacement, variable speed piston pump used for direct chemical injection applications.

Dimensions	Pump (See Figure on page 9)
	Injection Module Width - 28.5" [71.12 cm] Depth - 12" [30 cm] (17" [43 cm] with plumbing) Height - 42" [106.75 cm]
Pistons	1 (Dual Acting) at 0.750 in Dia. [1.910 cm]
Maximum Stroke Length	0.390 in [0.99 cm]
Flow Output Range	P/N 063-0173-768 1-40 oz./min. [0.3-11.8 dL/min.]
Maximum Operating Pressure	150 psi [1034 kPa]
Maximum Power Required	1/4 HP [186.4 W]
Maximum Recommended Suction Lift	2 ft. [0.6 m]
Inlet and Outlet Plumbing	Mates with Banjo M100 Flange and 3/4" Female NPT
Wetted Parts	Polypropylene Stainless Steel
Body Material	Polypropylene
Wetted Seals/O-Rings	Type GF Viton and Graphite Filled Teflon



PUMP DIMENSIONS

FIGURE 2. Pump Enclosure Dimensions



MIXER FLOW SPECIFICATIONS

For 36 GPM of water there is approximately a 10 PSI drop. For 36 GPM of fertilizer there is approximately a 20 PSI drop.

INTERNAL PLUMBING OVERVIEW

FIGURE 3. Internal Cabinet Plumbing

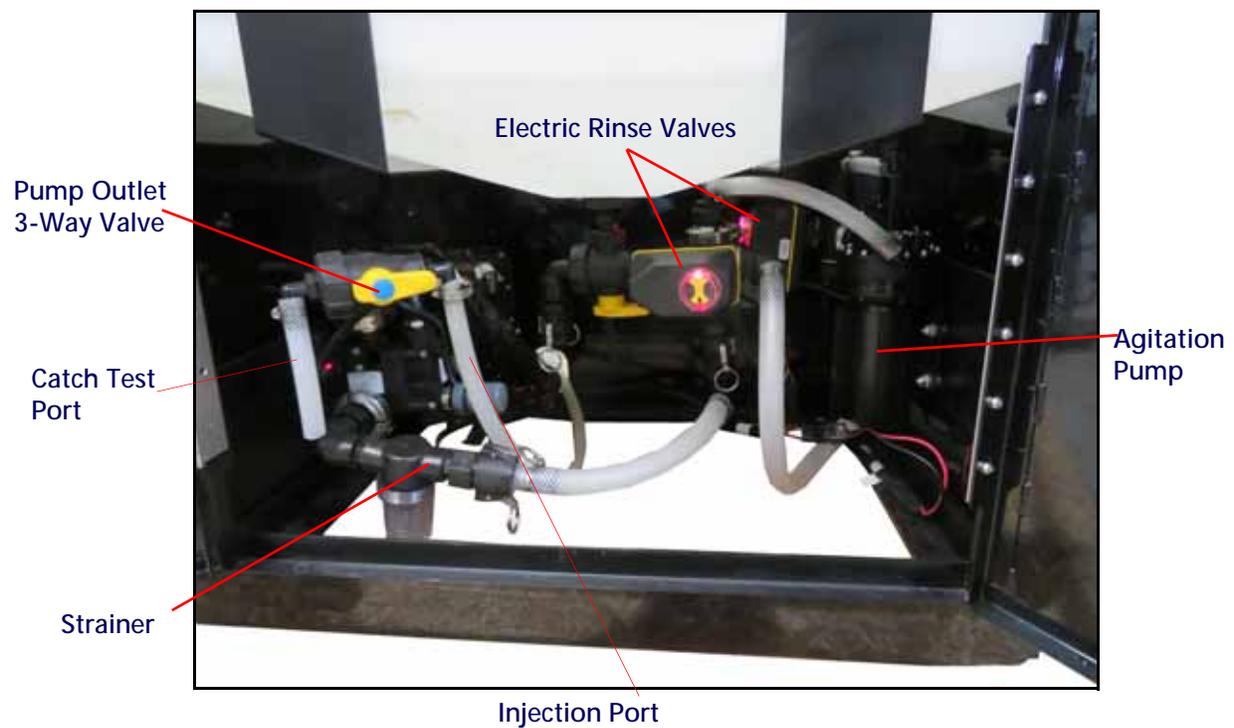
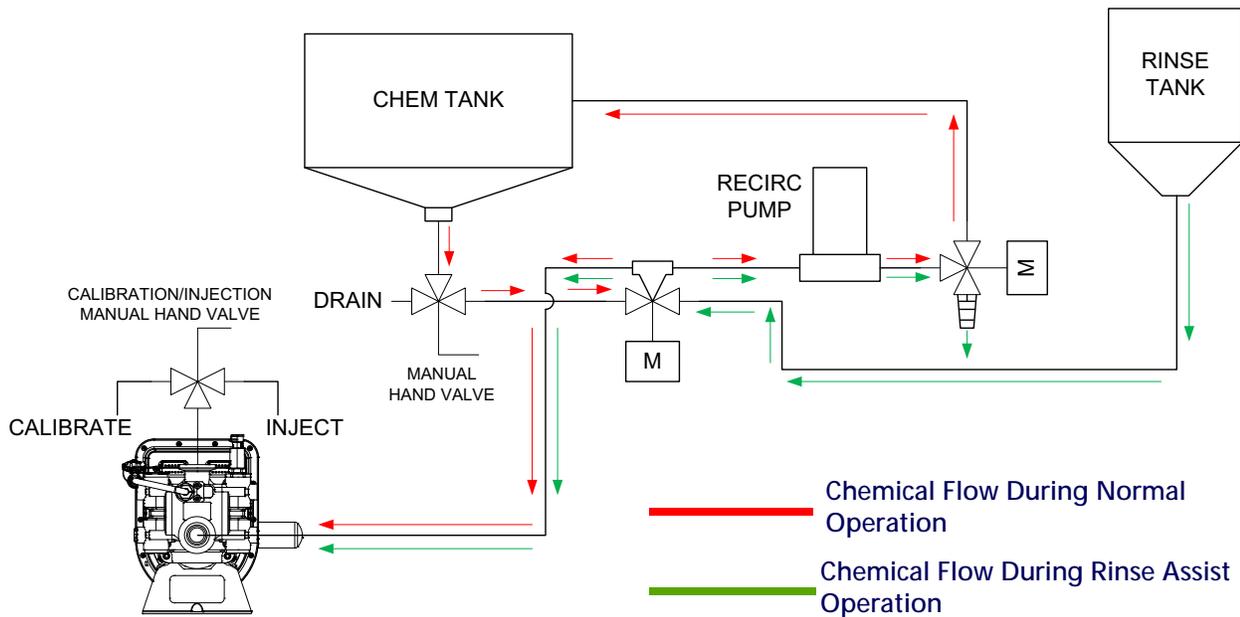


FIGURE 4. Planter Injection Cabinet Plumbing Diagram



UPDATES

Updates for Raven manuals as well as several system components are available at:

<https://ravenprecision.com/>

Sign up for e-mail alerts to receive notice when updates for your Raven products are available on the Raven web site.

At Raven Industries, we strive to make your experience with our products as rewarding as possible. One way to improve this experience is to provide us with feedback on this manual.

Your feedback will help shape the future of our product documentation and the overall service we provide. We appreciate the opportunity to see ourselves as our customers see us and are eager to gather ideas on how we have been helping or how we can do better.

To serve you best, please send an email with the following information to

techwriting@ravenind.com

- Injection Cabinet Installation and Operation Manual
- P/N 016-0171-671 Rev. A
- Any comments or feedback (include chapter or page numbers if applicable).
- Let us know how long have you been using this or other Raven products.

We will not share your email or any information you provide with anyone else. Your feedback is valued and extremely important to us.

Thank you for your time.

MOUNT THE INJECTION CABINET

Installation and mounting of the injection cabinet will vary between implements. Use the following sections to help select an appropriate mounting location on the implement.

1. Identify a location on the planter that has enough space to mount the cabinet (40.13" x 37.61" x 21.37" [101.93 cm x 95.52 cm x 54.28 cm]) and can support the cabinet weight with a full supply tank (approximately 500 lbs).

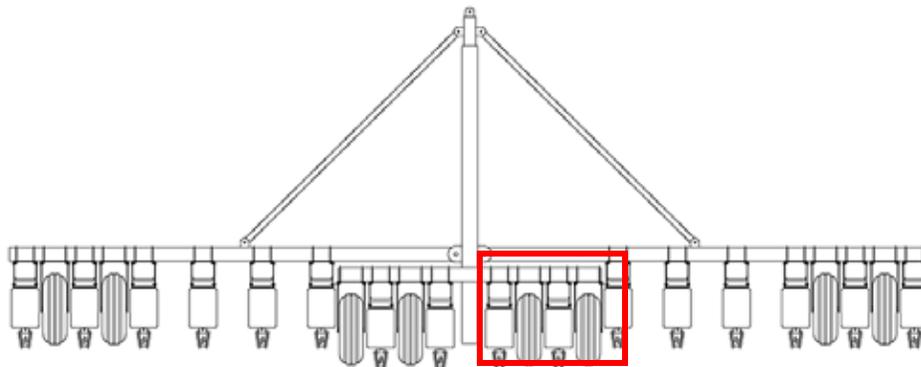
NOTE: The mounting location should be in a convenient location to allow for easy operation and tank refilling.

A custom built bracket may be required for proper mounting.

Ensure there is plenty of clearance from moving planter parts like row units, markers, CCS Scale and folding/unfolding of the planter.

2. After the cabinet is mounted, carefully fold and unfold the planter to verify normal planter operation is not obstructed.

FIGURE 1. Injection Cabinet Mounting Location



IN-LINE MIXER ASSEMBLY MOUNTING

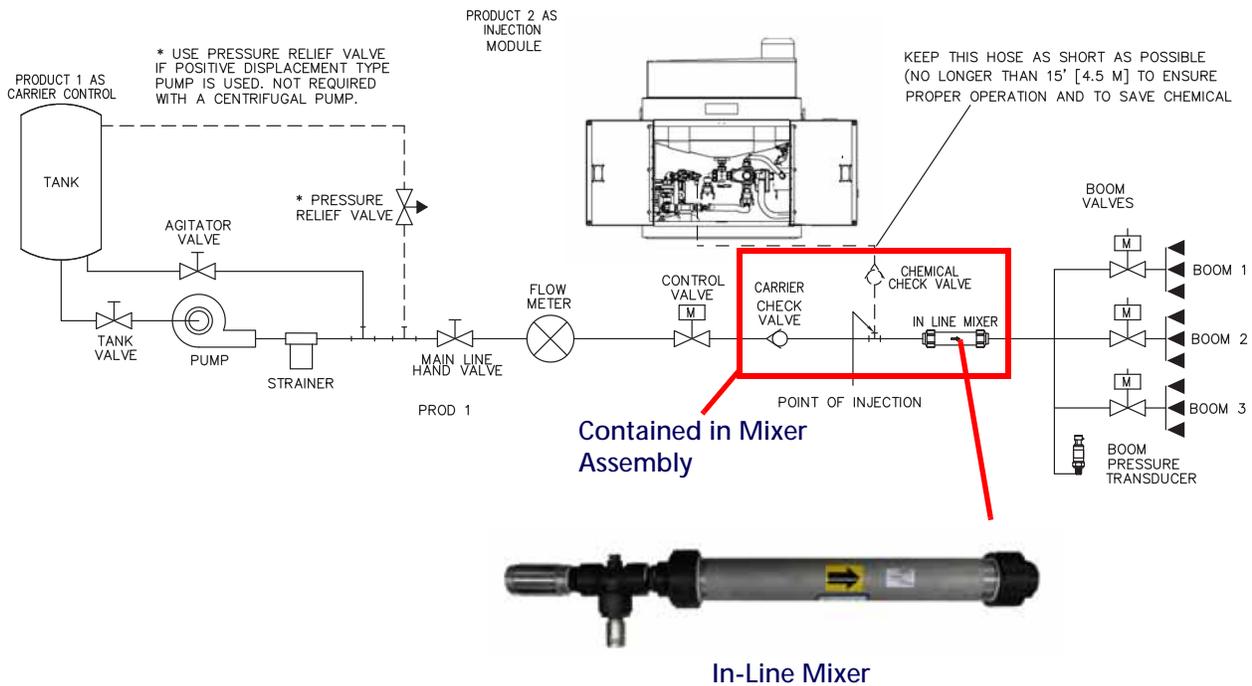
BEST PRACTICES

- The Raven Sidekick Pro™ ICD injection system pumps chemical into the main carrier line at the point of injection. This point must be on the pressure side of the carrier product pump and should be as close to the boom section valves as possible.

- It is not necessary for injected products or chemicals to be measured by the flowmeter. Depending upon the type of applications or chemical mixtures the injection system will normally be used with, it may be more desirable to place the injection point after the flow meter. This configuration may help to extend the service life of the flow meter by minimizing flow meter components exposure to corrosive chemicals.

IN-LINE MIXER MOUNTING

FIGURE 2. Example Sidekick Pro ICD Injection System



- Select the point of injection.
- Install the in-line mixer.

PLUMBING CABINET TO MIXER

NOTE: Avoid product lines longer than 15 ft. [4.5 m] between the pump outlet and the point of injection. Long runs can cause increased pressure in the pump heads which cause the pump to pull more electrical current and may raise the temperature of the injection pump motor and integrated motor control ECU. See the Initial Setup and Calibration section on page 49 for details on injection system diagnostics and to monitor pump pressure and ECU temperature.



⚠ CAUTION

Hoses used on the outlet of the injection pump must be re-enforced, chemically resistant hose rated for at least 150 PSI at 100° F [1034 kPa at 66° C].

PLUMBING INSTALLATION

1. Locate the injection side of the 3-way valve on the injection pump outlet.

FIGURE 3. Injection Plumbing Installation



2. Connect and secure 1/2" reinforced tubing from the pump outlet to the injection point on the installed mixer.

VERIFYING INSTALLATION OF THE SIDEKICK PRO™ ICD

Before filling the tank with chemical for the first time, thoroughly inspect the chemical supply tank and clean any plastic or metal particles that may be left from the manufacturing or installation process. If these particles get stuck within the injection pump, they may cause a significant reduction in pump accuracy. Turn the hand valve(s) to allow the tank to drain without running through the pump or injection plumbing and thoroughly rinse tank prior to testing or running the injection system for the first time.

Verify that the system is installed properly.

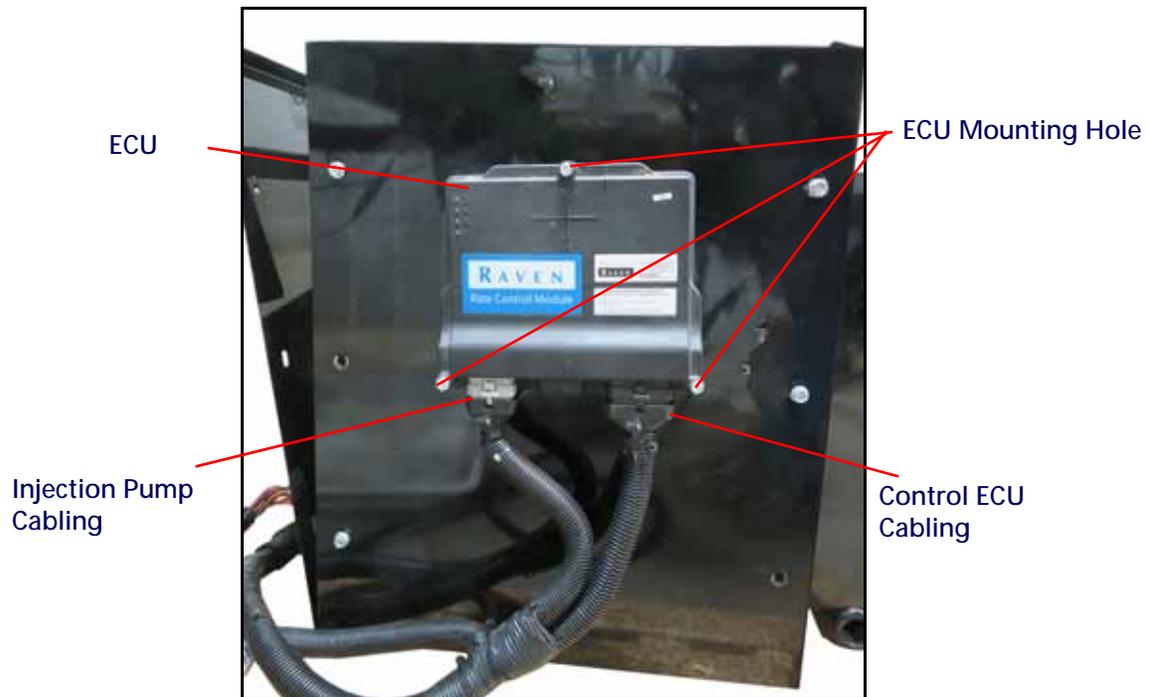
Fill the chemical supply tank with clean water when checking the installation. Check for any leaks on all plumbing connections before applying chemicals with the injection system. It is recommended to check the system periodically and replace worn or damaged connections, valves, or hoses.

CANBUS AND POWER CONNECTIONS

NOTE: This cabinet is designed to be used in conjunction with a RCM or JDRC2000 product control Electronic Control Unit (ECU). These ECU's are sold separate from the injection cabinet. Contact your dealer for specifics on acquiring and integrating these systems.

1. There are provisions to mount the ECU on the left hand side of the cabinet. Mount the ECU and cabling with 1/4" - 20 hardware.

FIGURE 4. Node Mounting



2. Locate the injection pump cabling routed out the rear access cutout of the cabinet.
3. Connect the control node cabling to the injection cabinet cabling.
4. Connect the cabling to the existing cabling on the planter.

NOTE: Contact your dealer for specifics to connect into the existing system.

SIDEKICK PRO™ TAB INFORMATION

Refer to Appendix A, Flowcharts, to view an example of how the screens flow.

SIDEKICK PRO™ ICD MENU

To access the calibration and diagnostics for a specific injection product:



1. Open the UT Menu and select the desired Sidekick Pro™ ICD Menu button.
2. Press the Home icon. The following information will display:

FIGURE 1. Sidekick Pro™ ICD Main Screen

Display		Description
Actual Flow		Displays the actual flow rate of the pump during operation.
Target Flow		Displays the target flow rate of the pump.
Actual Pump State		Shows if the actual state of the pump is ON or OFF.
Pressure		Displays the pressure at the injection pump pressure transducer.
DI Efficiency		Displays the efficiency value of the pump during operation. Typical values range from 60-100% and will vary depending on ambient temperature, product viscosity, system plumbing, and system pressure.

Display		Description
Current Volume		Displays the volume of product dispensed during field operation and is resettable by the user.
Motor PWM		Displays the motor Duty Cycle (between 0 to 100%) value during operation.
Motor Voltage		The voltage for the high current bus circuit. High current power is provided to system components such as the motor.
Motor RPM		Displays the Motor RPM of the injection pump during operation.
Rinse Assist	N/A	Allows the user to toggle the state of the Rinse Assist feature if equipped. If ON, the pump will ignore target rate messages and will allow the user to perform rinse cycles. If OFF, the pump returns to normal operation.
Agitation		Allows the user to toggle the state of the agitator to ON or OFF if the agitator is equipped.

ENABLING AGITATION AND RINSE ASSIST



1. Open the UT Menu and select the desired Sidekick Pro™ ICD Menu icon.
2. Select Product Setup.
3. Select System Settings.
4. Select the Agitator Equipped and Rinse Assist Equipped check boxes.

NOTE: Agitator Enable must be selected every morning if agitation is desired.

5. Select Home to return to the UT Home screen.

FIGURE 2. Rinse Assist and Agitation Enabled.



PERFORMING RINSE ASSIST

To turn on Rinse Assist:

1. Select Rinse Assist on the UT Home screen. A Rinse Assist window will open.
2. Enter the desired Rinse Volume.
3. Press the check mark. The UT Home Screen will open and the Rinse Assist process will begin.
4. When Rinse Assist is complete, press Rinse Assist.

PERFORMING AGITATION

1. Select Agitation on the UT Home screen. The Agitation process will begin.
2. When Agitation is complete, select Agitation.

SIDEKICK PRO™ ICD SYSTEM SETTINGS



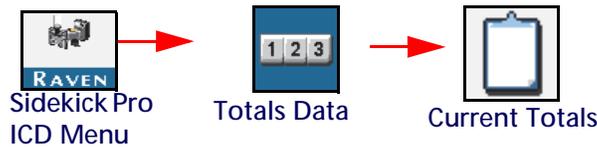
1. Open the UT Menu and select the desired Sidekick Pro™ ICD Menu button.
2. Press the Product Setup button.
3. Select Settings. The following information will display:



TABLE 1. System Settings Page Information

Display	Additional Setting Information
Tank Capacity	Displays the capacity of the direct injection chemical supply tank in gallons (US) or liters (SI).
Tank Level	Displays the volume of product currently in the injection chemical supply tank. This volume is used to calculate the volume remaining in the tank and for the low tank alarm if enabled.
Flow Correction	Used to adjust the actual amount pumped by the injection pump for a given target amount. A positive value will increase the amount pumped. A negative value will decrease the amount pumped. If the volume caught during a catch test or pumped during normal operation is less than the desired volume pumped, increase the Flow Correction% by the% difference. If the volume caught is greater than the desired volume pumped, decrease the Flow Correction% by the% difference. Typical error should be no more than +/-3%.
Agitator Duty Cycle	This displays the amount of time during a ten minute cycle the agitator is on. For example, a 20% duty cycle would turn on the agitator for two minutes and off for eight minutes.
Agitator Equipped	Enables the agitator feature. Check the box to enable the feature if agitation is required and the system is equipped with the direct injection chemical supply tank agitation system.
Rinse Assist Equip	Enables the rinse assist feature. Check the box to enable the feature if the injection system is equipped with the direct injection automated rinse system.

CURRENT TOTALS DATA



1. Open the UT Menu and select the desired Sidekick Pro™ ICD menu icon.
2. Select the Totals Data icon then Current Totals. The following information will display:

FIGURE 3. Current Totals

Display	Icon	Description
Actual Flow		Displays the actual flow rate of the pump during operation.
Target Flow		Displays the current flow rate of the pump set from the controlling ECU.
Tank Percentage		Displays the current percentage of the tank volume to the tank capacity.

Display	Icon	Description
Pressure		Displays the pressure at the injection pump pressure transducer.
Current Volume		Displays the volume of product dispensed during a field operation and is resettable by the user.

DEVICE TOTALS

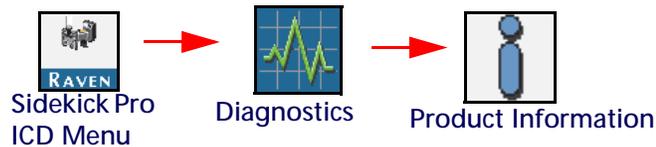


1. Open the UT Menu and select the desired Sidekick Pro™ ICD menu icon.
2. Select the Totals Data icon then Device Totals. The following information will display:

TABLE 2. Device Totals

Display	Icon	Description
Device Volume		This register keeps a running tally of the operating life of the system cannot be reset by the machine operator.
Engaged Hours		Displays the amount of time the pump has actively pumping product.
Software Hours		Displays the amount of time the software has been on the injection pump.

SYSTEM INFORMATION



1. Open the UT Menu and select the desired Sidekick Pro™ ICD Menu icon.
2. Select the Diagnostics icon.
3. Select Product Information.
4. Select the desired information from the drop-down. The options are:
 - Hardware/Software
 - System Readings
 - System Hours
 - CAN Bus Information
 - Reset Defaults



HARDWARE/SOFTWARE

This screen includes the Hardware Part Number, Hardware Serial Number, Hardware Revision, Software Part Number, Bootloader Version Number, and Software Version Number.

SYSTEM READINGS

This screen displays the ECU Power, Motor Power, and ECU Temperature.

SYSTEM HOURS

This screen shows the Software Hours and Engaged Hours.

CAN BUS INFORMATION

The CAN Bus Information screen shows CAN Address, Instance Number, and Extended Identify Number.

RESET DEFAULTS

Select the Reset Defaults icon to restore the default system settings.

TESTS

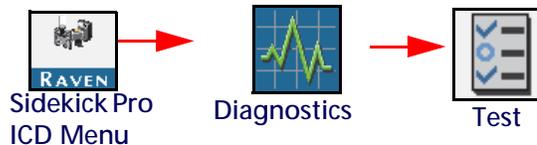
PUMP PRIME

Prime the injection pump before regular season operation to ensure the system is full of fluid and air is removed from the injection point system plumbing. Before starting an application using the injection system, perform the following procedures to ensure the system is properly calibrated and ready for chemical application.

1. Ensure the plumbing is properly installed to and from the injection pump.
2. Ensure the chemical tanks for the pump(s) have liquid in them for priming functions.

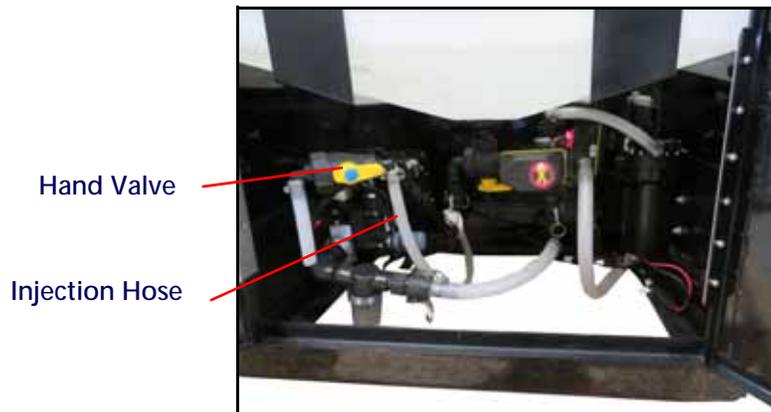
NOTE: It may required 3 - 5 gallons (11 - 19 liters) of liquid in the chemical tank to ensure the system is primed properly.

PRIME THE INJECTION PUMP



1. Open the hand valve(s) between the supply tank and injection pump so that the valves direct flow from the tank towards the pump. Ensure any tank valves, fill station valves, rinse valves, and drain valves are in the correct position.

FIGURE 4. Hand Valve Position



2. Verify the following conditions exist:
 - a. Injection pressure is less than 12 PSI [82.7 kPa].
 - b. Pump is off.
 - c. Vacuum pressure is less than 11.5" [29 cm] of mercury.

NOTE: The vacuum switch on the pump will engage and a flow alarm will display if the product cannot be drawn into the pump (e.g. vacuum pressure at or above 11.5" [29 cm] of mercury)). Check screens, chemical tank lids, hose diameter and any hand valves between the chemical tank and pump inlet. Also, verify that the product is flowing freely. Cold temperatures and high viscosity products may cause high vacuum pressures and cause the pump to not operate properly.

3. Select the Sidekick Pro™ ICD Menu icon.
4. Select Diagnostics.
5. Select Test.
6. Select Prime Pump from the drop-down list.
7. Follow the on-screen prompts to complete pump priming. Allow the pump to prime. The priming procedure will run until the controller detects the pump is primed. If the pump is unable to prime, the console will end the priming procedure after two minutes and display an error.

NOTE: If the console displays an error message during the priming process, verify that the conditions listed in step 2 exist. Press Stop at any time to stop the priming procedure. If the pump fails to prime after the first attempt, restart the priming procedure. If the pump is still unable to prime successfully, check the system for leaks, verify the valves are turned on, and verify the hoses are filled with product. It may not be necessary to recalibrate the pressure transducer.

CATCH TEST

Prior to starting a chemical injection application, perform a catch test (if desired) to manually verify the pump output before operation. This test ensures the desired catch volume, volume caught, and flow correction are correct. To perform a catch test:

1. Verify the catch test vessel is large enough to catch the desired volume.
2. Ensure the end of the hose going from the pump to the catch vessel has a check valve to prevent excess fluid from exhausting when the pump has stopped pumping.
3. Set the hand valve on the injection pump outlet to pump the fluid to the catch vessel.
4. Ensure the pump and hoses are primed.

5. Verify the following conditions exist:
 - a. Injection pressure is less than 12 PSI [82.7 kPa].
 - b. Pump is off.
 - c. Vacuum pressure is less than 11.5" [29 cm] of mercury.

NOTE: The vacuum switch on the pump will engage and a flow alarm will display if the product cannot be drawn into the pump (e.g. vacuum pressure at or above 11.5" [29 cm] of mercury]). Check screens, chemical tank lids, hose diameter and any hand valves between the chemical tank and pump inlet. Also, verify that the product is flowing freely. Cold temperatures and high viscosity products may cause high vacuum pressures and cause the pump to not operate properly.

6. Press the Sidekick Pro™ ICD icon for the desired pump product number.
7. Select Diagnostics.
8. Select Test.
9. Select Catch Test from the drop-down.
10. Check the amount caught in the catch vessel after the catch test is complete. The caught volume should be within +/- 3% of the desired amount. If the caught volume is off by more than +/- 3%, adjust the Flow Correction percentage value. Increase the Flow Correction% by approximate error percentage to pump more fluid if needed. Decrease the Flow Correction% to pump less fluid if needed.

NOTE: If the console displays an error message during the catch test, verify the conditions listed in step 5 exit, If the problem persists, refer to the Chapter 6, Troubleshooting for assistance.

DEMONSTRATION MODE

Use Demonstration Mode to simulate pressure with a specified value and to stimulate flow. To operate the Sidekick Pro™ ICD in demonstration mode:

1. Select the Diagnostics icon.
2. Select Test.
3. Select Demonstration Mode.

DIAGNOSTIC TROUBLE CODES

The Diagnostic Trouble Code (DTC) list provides a list of recent errors for the equipment operator. access the DTC list to review the previous error conditions, the tally for each condition, during operation. Refer to DTC section in Chapter 6, Troubleshooting for additional information on Diagnostic Trouble Codes.

CLEAR DIAGNOSTIC TROUBLE CODES

Press the Clear DTC's icon to clear the diagnostic trouble codes.

VIEW DTC INFO

Press View DTC Info to view the alarm mask associated with the highlighted active DTC.

View Active DTC's

Shows the SPN and FMI for all the active DTC's along with a short description and the number of times this error occurred.

VIEW INACTIVE DTC'S

Shows the SPN and FMI for all of the inactive DTC's along with a short description and the number of times the error occurred.

Proper injection pump maintenance is critical to maintain system performance and extend the lifetime of the injection pump. Perform these maintenance procedures periodically over a season and be sure to store the pump properly when not being used.

**WARNING**


Always use caution when performing maintenance or servicing an injection pump or system which has been previously pressurized. Wear appropriate protective equipment to prevent contact with hazardous chemicals and rinse the chemical system as instructed by the chemical manufacturer prior to performing maintenance.

MAINTENANCE AND STORAGE

**WARNING**


Always use caution when performing maintenance or servicing an injection pump or system which has been previously pressurized. Wear appropriate protective equipment to prevent contact with hazardous chemicals and rinse the chemical system as instructed by the chemical manufacturer prior to performing maintenance.

Perform the following procedure before storing the injection pump for long periods:

NOTE: Failure to perform seasonal maintenance may result in damage to injection system or reduce the working life of the injection pump.

1. Empty product from the chemical supply tank and flush the injection pump with water.
2. Remove hardened chemical residues or build up by flushing the injection system with:
 - a. kerosene or fuel oil if the last product through the pump was petroleum based.
 - b. soap and water if the last product through the pump was water based.

- Remove the intake and discharge valve assemblies from the pump.

	<p style="text-align: center;">⚠ CAUTION</p> <p>Chemical residue or build up may be present on internal pump components. Wear gloves when servicing internal pump assemblies.</p>
---	--

- Remove the pressure transducer and clean the cavity and transducer body of excess build up.
- Clean and inspect each assembly as instructed in the Check Valve O-Rings section on page 28.

NOTE: Be sure to reinstall the intake and discharge valves into the correct ports on the injection pump. Refer to "Check Valve Assemblies" on page 42 for additional for valve information.

- Perform the procedure described in the Pump Cam and Bearing section on page 30 to service the cam and bearing.
- Recirculate a 50% water and automotive antifreeze or 100% RV antifreeze mixture through the injection pump to check pump operation after reassembly as well as prevent freezing of pump components.

CHECK VALVE O-RINGS

	<p style="text-align: center;">⚠ CAUTION</p> <p>Valve assembly contains small parts and springs under compression. Wear safety glasses when maintaining or cleaning valve assemblies.</p> <p>Chemical residue and build up may be present on internal pump components. Wear gloves when servicing internal pump assemblies.</p>
--	--

Small particles of rust, sand, or grit may build up around the check valve seals. Over time, this may cause a noticeable decrease in the accuracy of injected product application rates. Clean or replace the o-ring seals periodically to ensure accuracy of the injection system.

- Empty and rinse product from the chemical supply tank and flush the injection pump with water.
- Carefully remove the intake and discharge valve cartridges from the injection pump using a 9/16" Allen wrench.

NOTE: The intake and discharge valve assemblies contain parts which are not interchangeable. To ensure proper re-assembly, clean and inspect the intake and discharge valve assemblies separately.

- Examine the valve assembly O-ring and replace if cut or nicked. These o-rings are made of a chemical resistant compound and should only be replaced with O-rings supplied by a local Raven dealer.
- Disassemble the check valve assemblies as shown in Figure 1 below.

NOTE: Valve assembly contains tension springs and small parts. To prevent the loss of parts, place the valve assembly inside a clear plastic bag while disassembling.

- Examine the guide, spring, poppet and poppet o-ring for wear, pitting, swelling or foreign matter. Clean or replace if necessary. O-rings inside valve assembly are made of a chemical resistant compound and should only be replaced with o-rings supplied by a local Raven dealer.
- Reassemble the intake and discharge plugs as shown in Figure 1 on page 30.
- Apply petroleum jelly to valve body o-rings and replace valve assemblies into the pump head and tighten valve plug.

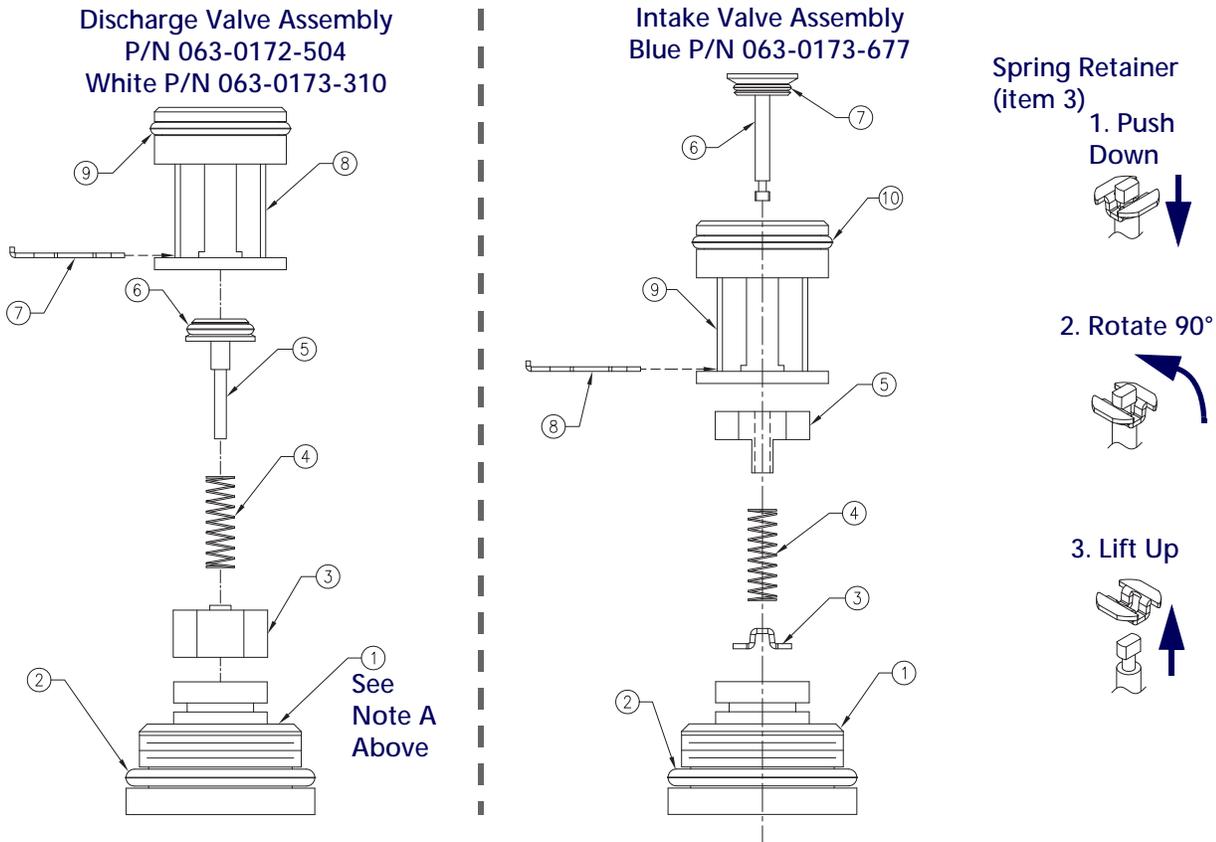
TABLE 1. Check Valve Assembly Replacement Parts

Discharge Valve Assemblies			Intake Valve Assemblies		
Item	Description	Raven P/N	Item	Description	Raven P/N
1	Fitting, Plug	107-0171-519 or 107-0171-955 ^a	1	Fitting, Plug	107-0171-519
2	O-Ring	219-0002-912	2	O-Ring	219-0002-912
3	Guide, Poppet	107-0159-934	3	Retainer, Intake	107-0171-459
4	Spring	314-0000-006	4	Spring	314-0000-005
5	Poppet	107-0159-935	5	Guide, Poppet	107-0171-092
6	O-Ring (Viton)	219-0007-011 ^b	6	Stem, Poppet	107-0171-447
7	Clip, Retainer	107-0171-576	7	O-Ring (Viton)	219-0007-011 ^b
8	Valve Body, Discharge	106-0159-621	8	Clip, Retainer	107-0171-576
9	O-Ring (Viton)	219-0002-018 ^b	9	Valve, Body Intake	106-0159-622
			10	O-Ring (Viton)	219-0002-018 ^b

a. Plug fitting (P/N 107-0171-955) is used with check valve assemblies (P/N 063-0173-310).

b. O-Rings included in Pump Seal Kit (P/N 117-0159-987).

FIGURE 1. Check Valve Assemblies



PUMP CAM AND BEARING



 **CAUTION**

Chemical residue or build up may be present on internal pump components. Wear gloves when servicing internal pump assemblies.

Chemicals may seep into the bearing cavity. The pump cam and bearing housing should be cleaned and inspected periodically to prevent maintenance issues.

1. Loosen the four socket head screws holding the pump head to the motor assembly.
2. Remove pump from motor and clean surfaces of cam and bearing.
3. Examine the sealed bearing. If the bearing does not turn freely or smoothly, replace the bearing.
4. Apply a heavy coating of automotive grease to the area where the piston engages the cam bearing and reassemble pump to motor.

PISTON SEAL REPLACEMENT



⚠ CAUTION

Chemical residue or build up may be present on internal pump components. Wear gloves when servicing internal pump assemblies.

The piston seals within the injection pump motor housing should be replaced periodically to keep chemical from seeping into the pump housing. The piston seals should be serviced or replaced if chemical begins leaking from the weep hole on the underside of the pump housing.

NOTE: New piston seals are supplied in the Pump Seal Kit (P/N 117-0159-987) available through a local Raven dealer.

FIGURE 2. Pump Head and Motor Separation

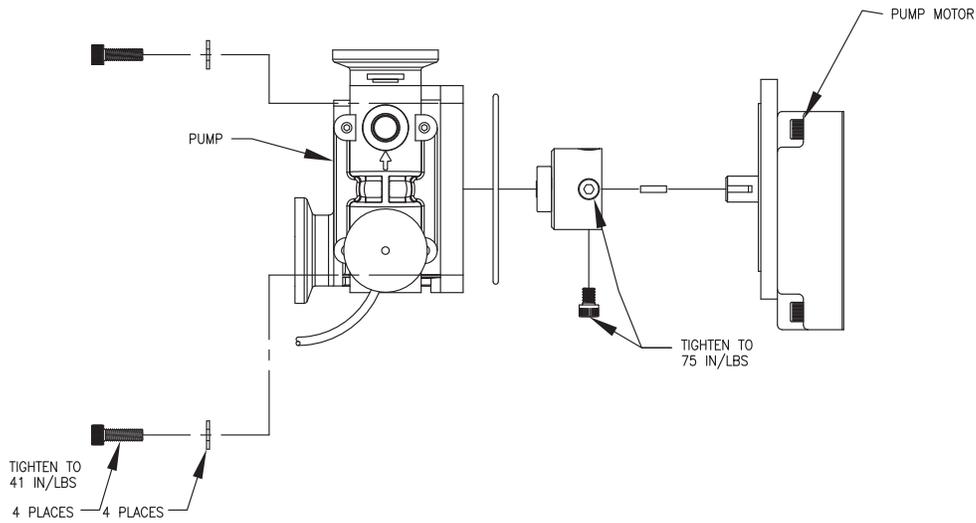


FIGURE 3. Bearing Assembly to Motor Spacing

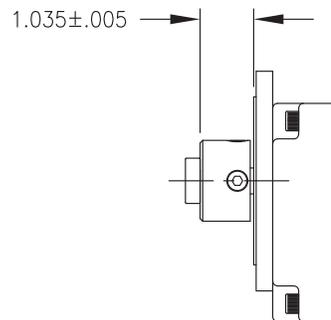
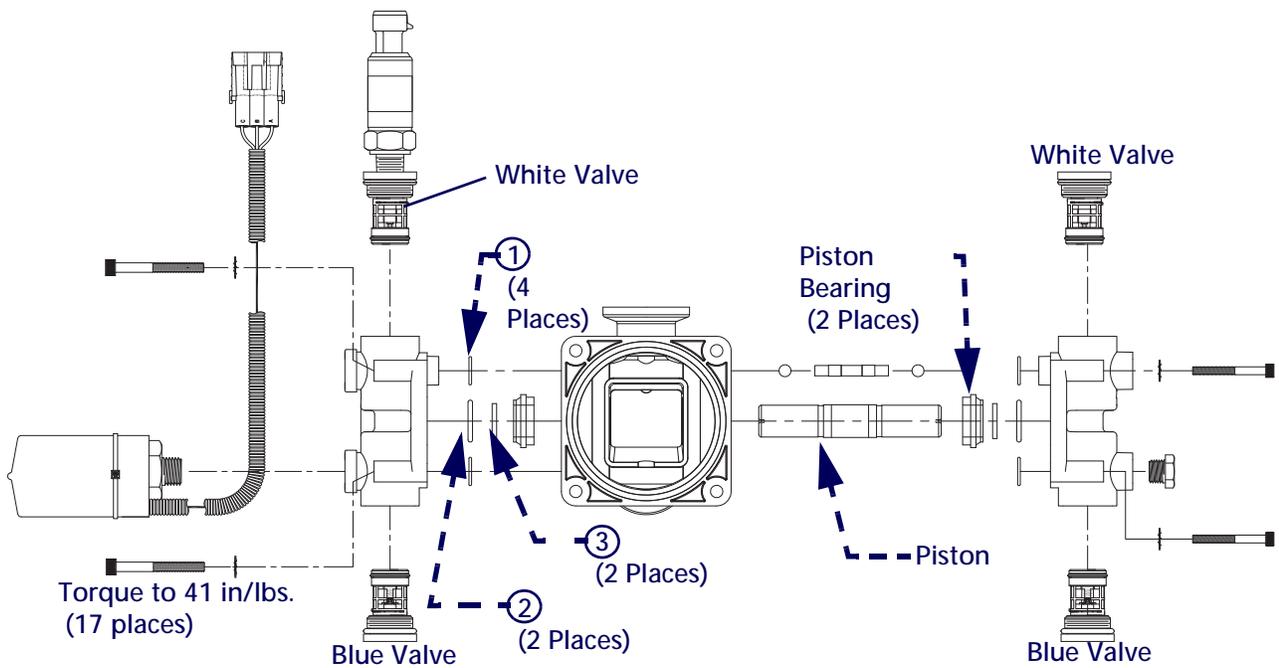


FIGURE 4. Pump Head Parts and Seal Installation



Item	Description	Raven P/N	Qt.
1	O-Ring, Viton	219-0002-015	4
2	O-Ring, GF Viton 117965-80	219-0007-117	2
3	Seal, 3/4" Slipper	219-0000-125	2

1. Empty product from the chemical supply tank and flush the injection pump with water.
2. Disconnect the injection pump plumbing and cabling. Remove the injection pump from the implement and take to a suitable work area to perform maintenance.
3. Separate the pump from the motor by removing the four socket head screws.
4. Loosen the four socket head screws securing each pump head to the crank case.
5. Carefully remove the pump heads. While removing the pump heads, take care not to damage the exposed finish on the piston during disassembly.
6. Remove the slipper seals and O-rings from the pump.

NOTE: During removal of the piston, the slipper seal and o-rings may stick within the pump housing. Be sure to remove and inspect both of the two slipper seals and two o-rings used with the piston.

The seals and o-rings are made of a chemical resistant compound and should only be replaced with O-rings supplied by a local Raven dealer.

7. Inspect the piston for scratches. If the finish is scratched or damaged, replace the piston.
8. Inspect the piston bearing for wear and replace if necessary.
9. Replace the seals and O-rings into the pump housing:

NOTE: Complete one side of the piston and head assembly before starting on the other side.

- a. Install the slipper seal onto the piston.

- b. Using general purpose grease, lubricate the O-ring and seat over the slipper seal.
 - c. Replace pump head O-rings into pump heads. If the o-rings tend to slip before the head is installed, use a small amount of additional grease on the O-ring to help hold it in place.
 - d. Install the pump head to the pump assembly.
 - e. Repeat the above steps to install the remaining pump head.
10. Tighten socket head screws to the torque specified in Figure 4 on page 32.

RETURNING THE PUMP FOR SERVICE OR REPAIR

	<p>WARNING</p> <p>Always follow safety labels and instructions provided by the chemical manufacturer or supplier. Always wear proper personal protective equipment when handling or disposing chemicals.</p>
	<p>CAUTION</p> <p>Injection pumps must be cleaned prior to shipping for service or repair. Pumps returned with chemical residue or contamination will not be accepted or subject to service fees.</p>

Refer to the following procedure should it be necessary to return the Sidekick Pro™ ICD injection pump for service or repairs:

1. Prior to disconnecting the injection pump, drain the chemical tank and rinse with clean water.
2. If pump is operating, refer to the Returning the Pump for Service or Repair section on page 33 and run clean water through the injection pump. If pump is not operational, proceed with the following steps.
3. Remove the inlet and outlet cartridge valves and rinse with clean water.
4. Place cartridges in a plastic envelope for shipping.
5. Run clean water through both the inlet and outlet port on the pump head.
6. Run clean water through the both cartridge ports.

MOTOR CONTROL ECU LED STATUS INDICATORS

MOTOR CONTROL ECU LED STATUS INDICATORS

The Sidekick Pro™ integrated motor control ECU displays the status of the injection pump with the following ECU status indicators.

FIGURE 1. LED Status Indicators

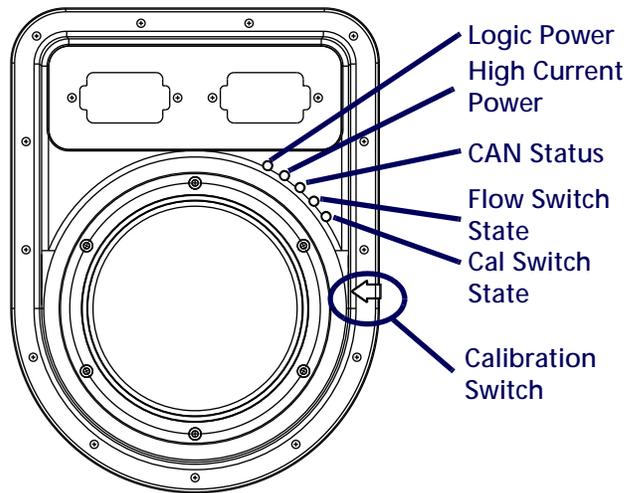


TABLE 1. LED Status Indicators

LED	Status Display
Logic Power	If logic power is present at the motor control ECU, the logic power indicator will be on.
High Current Power	If high current power is present at the motor control ECU, the high current power indicator will be on.
CAN Status	The CAN status indicator will flash once per second if the motor control ECU is communicating on the CANbus. If the motor control ECU cannot communicate via the CANbus, the CAN status indicator will flash four times per second.
Flow Switch State	The flow switch indicator will flash when flow is detected from both sides of the pump.
Calibration Switch State	The calibration switch indicator will flash when a metal object is passed by the calibration switch sensor.

DIAGNOSTIC TROUBLE CODES

FIGURE 2. Diagnostic Trouble Codes

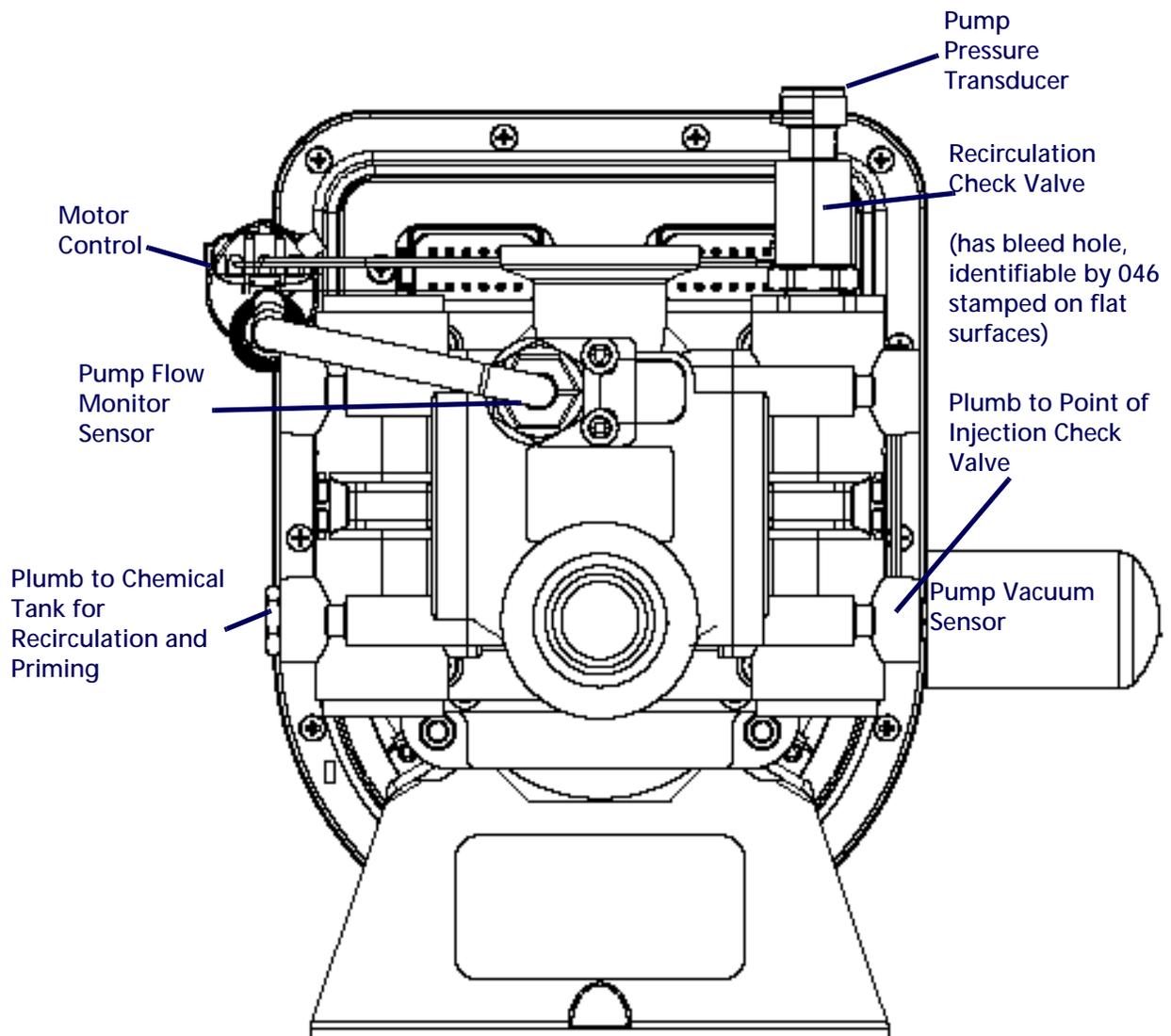
Code ID		Description	Recommended Actions
523152	31	Invalid pump state	Verify the communication setup/shutdown alarm.
523154	9	Lost communication	Verify the communication setup/shutdown alarm.
	16	Target flow too high	1. Reduce the equipment speed. 2. Reduce the target application rate.
	18	Target flow too low	1. Increase the equipment speed. 2. Increase the target application rate.
523160	1	Chemical tank is empty	Refill the product to continue field applications.
	17	Low tank volume remaining	Refill the product to continue field applications.
523167	2	Injection pressure sensor disconnected	1. Verify good connection to the pressure sensor on the pump. 2. Verify the sensor is getting supply voltage. 3. Verify the signal voltage is getting back to the pump ECU.
	16	High injection pressure	1. Verify the communication setup/shutdown alarm. 2. Check for an obstruction in the injection system discharge hose. 3. Verify the carrier pressure is not exceeding 150 PSI.

Code ID		Description	Recommended Actions
523169	4	Low motor voltage	<ol style="list-style-type: none"> 1. Verify high current breaker is not tripped. 2. Verify battery connections. 3. Verify speed sensor and signal. Refer to the field computer operation manual for information on testing speed and flow cabling and troubleshooting the speed sensor.
523175	18	Low pump efficiency	<p>Check for:</p> <ol style="list-style-type: none"> 1. Fouled pump check valves. 2. Air leaks on the injection pump inlet plumbing. 3. Air in the chemical. 4. Plugged inlet strainer. 5. Chemical too thick to flow through the pump. 6. Calculate the volume per minute for the application and verify the rate is within the range of the injection pump. 7. Check the flow monitor sensor.
523176	16	Off rate high	<ol style="list-style-type: none"> 1. Check calibration for the correct data entry. 2. Calculate the volume per minute for the application and verify the rate is within the range of the injection pump.
	18	Off rate low	<p>Check for:</p> <ul style="list-style-type: none"> • Fouled pump check valves • Air leaks on the injection pump inlet. • Air in the chemical. • Plugged inlet strainer. • Chemical too thick to flow through the pump. • Calculate the volume per minute for the application and verify the rate is within the range of the injection pump.
523188	16	DI high vacuum error	<ol style="list-style-type: none"> 1. Disconnect the vacuum switch from the product cable. Test for continuity between pins A and C. If the OHM meter reads a short, the switch is good. If it reads open, the vacuum switch is bad. 2. Check for obstructions from the inlet of the tank. There may be debris in the inlet, a plugged filter/strainer, hand valve turned the wrong directions or obstruction in the outlet of the chemical tank.
523189	7	Injection pump fault	Return pump to a local Raven dealer for service.
	16	Invalid pump calibration	Adjust the flow correction offset.
524025	31	Security failure	Cycle the device power.

SIDEKICK PRO™ ICD INJECTION MODULE PARTS

SIDEKICK PRO™ PUMP REPLACEMENT PARTS

FIGURE 1. Injection Pump Components

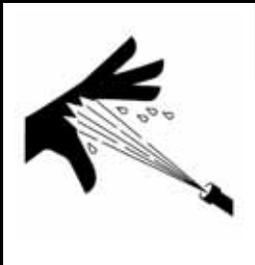


INJECTION PUMP PRESSURE TRANSDUCER

	<p style="text-align: center;">⚠ WARNING</p> <p>Always use caution when performing maintenance or servicing an injection pump or system which has been previously pressurized. Wear appropriate protective equipment to prevent contact with hazardous chemicals and rinse the chemical system as instructed by the chemical manufacturer prior to performing maintenance.</p>
---	---

To replace the pressure transducer:

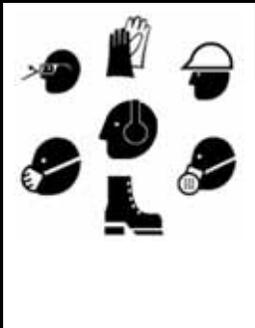
1. Disable and shutdown any automatic product control features of the Sidekick Pro™ injection system and turn off the vehicle when replacing the pressure transducer assembly.

	<p style="text-align: center;">⚠ WARNING</p> <p>Hazardous chemicals may be under pressure even if the pump has not been in service recently. Before replacing any components on the injection pump, thoroughly rinse the injection pump with clean water to remove excess chemical residue.</p>
---	--

2. Disconnect the pressure transducer connector on the top of the pressure transducer body. Be careful to keep dust, debris, or liquid chemicals which may seep from the injection pump head from contaminating the cable connection.
3. Loosen the pressure transducer while securing the connected fitting to prevent damage to the pump head.
4. Apply RectorSeal® or equivalent thread sealant to the new pressure transducer and thread into the pump head.
5. Tighten the pressure transducer body to secure the pressure transducer.

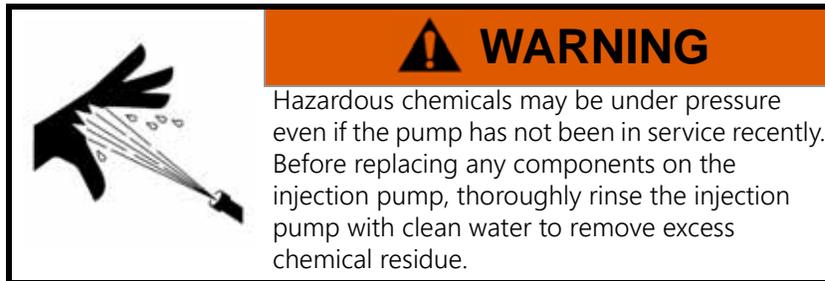
NOTE: Do not over tighten the pressure transducer. Overtightening the pressure transducer may damage the pump head.

INJECTION PUMP VACUUM SWITCH

	<p style="text-align: center;">⚠ WARNING</p> <p>Always use caution when performing maintenance or servicing an injection pump or system which has been previously pressurized. Wear appropriate protective equipment to prevent contact with hazardous chemicals and rinse the chemical system as instructed by the chemical manufacturer prior to performing maintenance.</p>
---	---

To replace the vacuum switch (P/N 063-0171-035):

1. Disable and shutdown any automatic product control features of the Sidekick Pro injection system and turn off the vehicle when replacing the vacuum switch assembly.



2. Disconnect the vacuum switch connector from the motor control cabling. Be careful to keep dust, debris, or liquid chemicals which may seep from the injection pump head from contaminating the cable connections.
3. Loosen the vacuum switch while securing the connected fitting to prevent damage to the pump head.
4. Apply RectorSeal[®] or equivalent thread sealant to the new vacuum switch and thread into the pump head.
5. If necessary, slide the protective covering on the vacuum switch back slightly to expose the hex surface for tightening the vacuum switch body.
6. Tighten the vacuum switch body to secure the vacuum switch.

NOTE: Do not over tighten the vacuum switch. Overtightening the vacuum switch may damage the pump head.

7. Be sure to replace the protective cover over the vacuum switch before operating the pump.

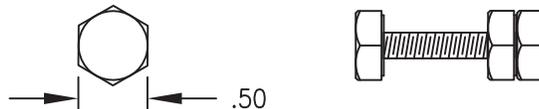
FLOW MONITOR SENSOR ADJUSTMENT PROCEDURE

1. Set the hand valves for the system to recirculate product to the chemical tank and prime and calibrate the pump.
2. Run the injection pump at the lowest injection rate within tolerance for the pump (1 oz./min. for 1-40 oz./min. pumps).

The LED indicator should be flashing while the pump is running. If the indicator light is not flashing, turn the sensor body a few degrees until the LED flashes.

NOTE: The line on the sensor body should not be more than 45° off of vertical to ensure maximum sensitivity.

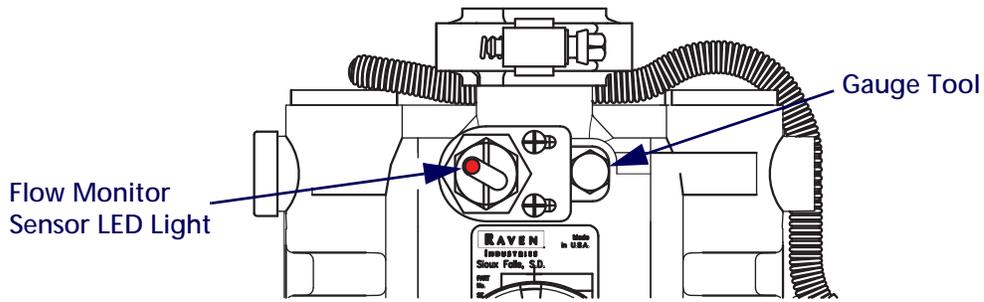
3. Once the sensor assembly is properly set and the LED indicator is flashing, tighten the sensor lock nut to secure the sensor body to the bracket.
4. Thread two 5/16" nuts (not supplied) onto a 5/16" bolt (not supplied) to make a gauge tool.



The gauge tool will be used to help align the sensor bracket and ensure the sensor body is mounted properly on the pump head.

5. Insert the gauge tool into the recess in the pump head to the right side of the sensor bracket as shown in Figure 2 below.

FIGURE 2. Gauge Tool and Flow Monitor Sensor Bracket Alignment



6. Tighten the two Allen head screws to secure the sensor bracket.

NOTE: Leave the gauge tool in place to ensure that the sensor bracket stays properly aligned during the rest of the process. The gauge tool may be removed once the sensor lock nut is tightened.

7. Thread the new flow monitor sensor into the pump head until the sensor body contacts the pump head.

8. Tighten the sensor assembly a partial turn until the line on the flow monitor sensor is near vertical and the LED is on the left side of the line. Do not over tighten.

CHECK VALVE ASSEMBLIES

FIGURE 3. Injection Pump Valve Cartridge Replacement Parts

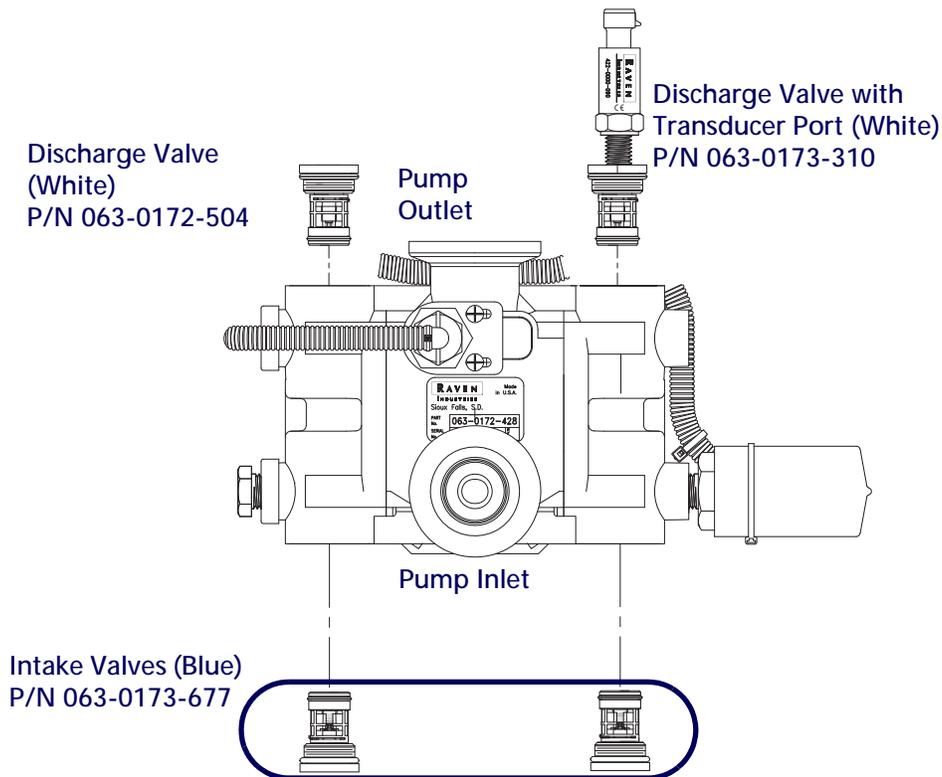
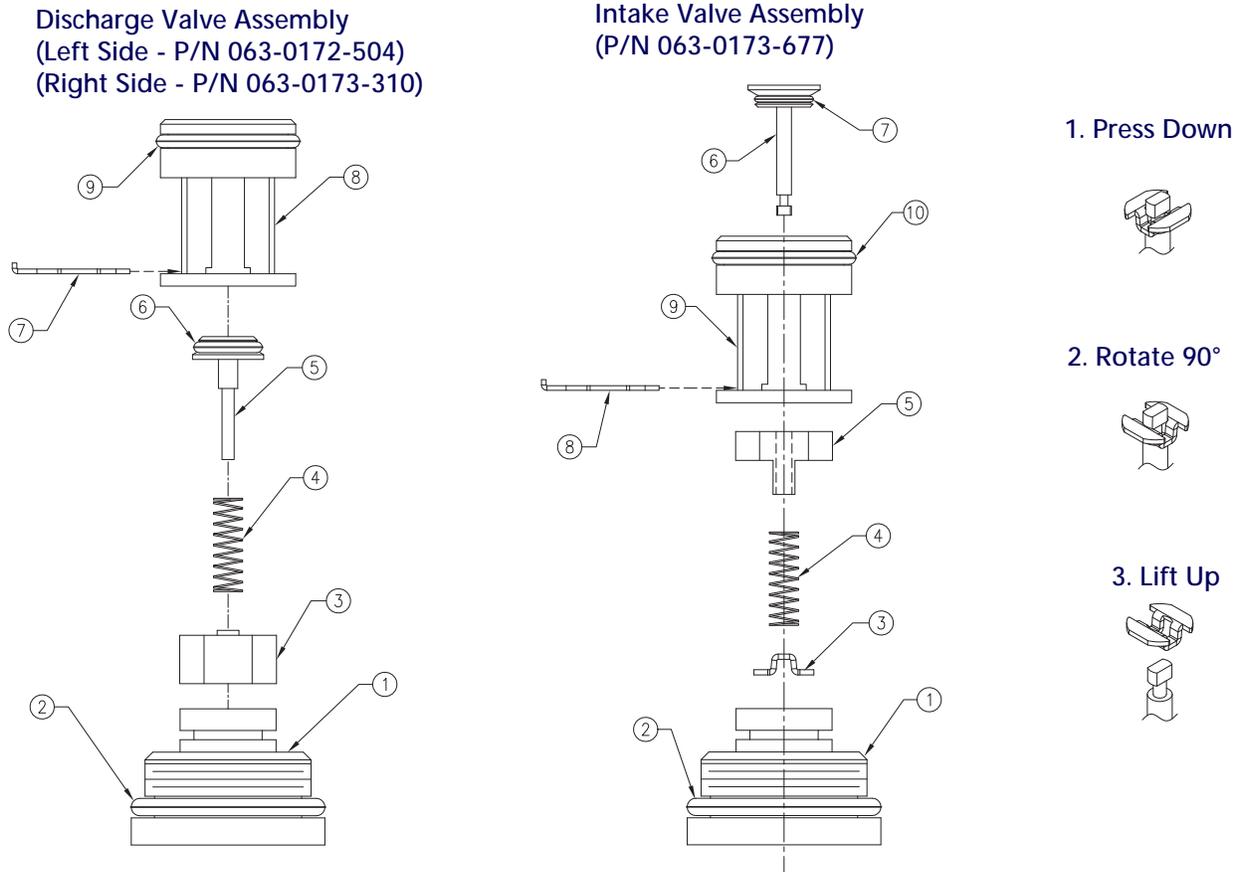


TABLE 1. Check Valve Assembly Replacement Parts

Discharge Valve Assemblies			Intake Valve Assemblies		
Item	Description	Raven P/N	Item	Description	Raven P/N
1	Fitting, Plug	107-0171-519 or 107-0171-955 ^a	1	Fitting, Plug	107-0171-519
2	O-Ring	219-0002-912	2	O-Ring	219-0002-912
3	Guide, Poppet	107-0159-934	3	Retainer, Intake	107-0171-459
4	Spring	314-0000-006	4	Spring	314-0000-005
5	Poppet	107-0159-935	5	Guide, Poppet	107-0171-092
6	O-Ring (Viton)	219-0007-011 ^b	6	Ste., Poppet	107-0171-447
7	Clip, Retainer	107-0171-576	7	O-Ring (Viton)	219-0007-011 ^b
8	Valve Body, Discharge	106-0159-621	8	Clip, Retainer	107-0171-576
9	O-Ring (Viton)	219-0002-018 ^b	9	Valve, Body Intake	106-0159-622
			10	O-Ring (Viton)	219-0002-018 ^b

- a. Plug fitting (P/N 107-0171-955) is used with check valve assemblies (P/N 063-0173-310).
- b. O-Rings included in Pump Seal Kit (P/N 117-0159-987).

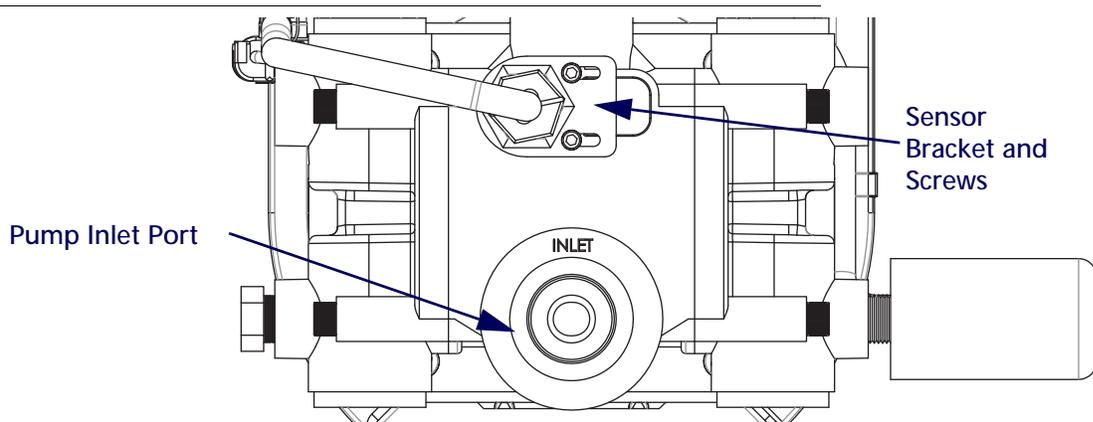
FIGURE 4. Check Valve Spring Retainer Assemblies



INJECTION PUMP FLOW MONITOR SENSOR

Perform the following procedure to replace the flow monitor sensor (P/N 063-0173-492).

FIGURE 5. Pump Head and Flow Monitor Sensor



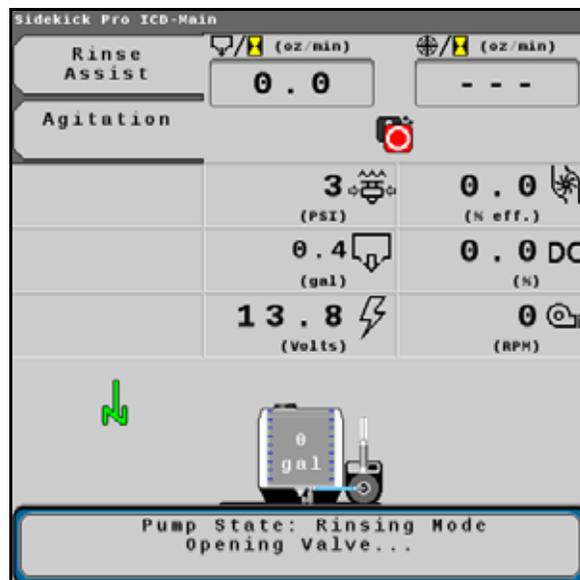
1. Disconnect the sensor cable from the motor control cabling.
2. Loosen the locking nut on the switch assembly and remove the old sensor assembly from the pump head.
3. Loosen the sensor bracket mounting screws enough to allow the bracket to slide freely on the pump head.
4. Adjust the flowmeter as needed using the "Flow Monitor Sensor Adjustment Procedure" on page 41.

A

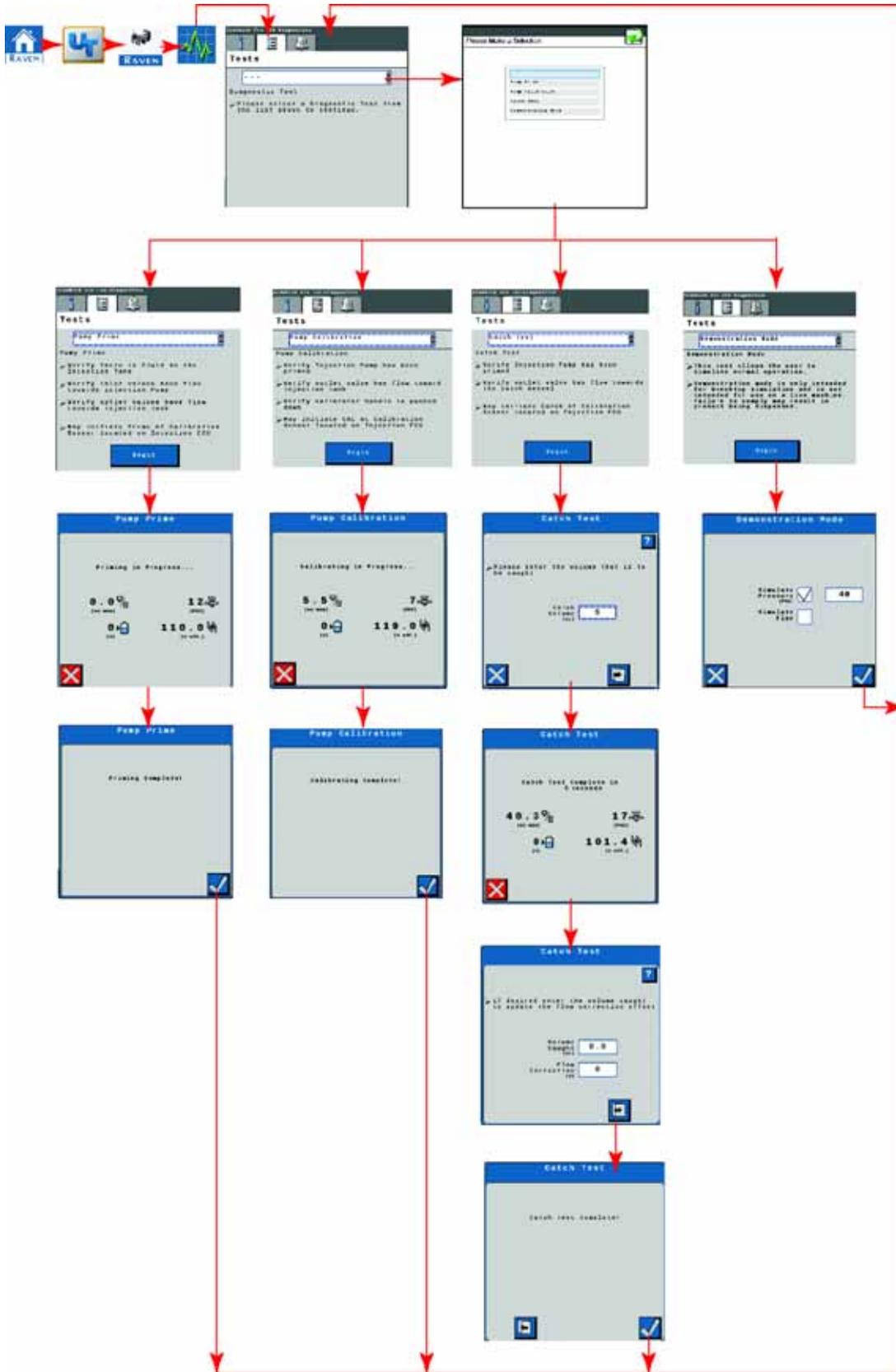
FLOWCHARTS

This section provides a flowchart of screens that may be useful during operation.

UT HOME SCREEN WITH RINSE ASSIST AND AGITATION ACTIVE



ICD Tests Screen Flow



C

Calibration and Operation 17
CAN (Controller Area Network)
 CANbus and Power Connections 15
Catch Test 23
Current Totals Data 20

D

Demonstration Mode 24
Device Totals 21
Diagnostic Trouble Codes 24

F

Fast Rate Response 9
Features 8
 Integrated Motor Control Node 8
 System Diagnostics 9

I

Important Safety Information 1
 Chemical Handling and Safety 1
 Electrical Safety 2
Injection Cabinet Mounting 13
In-Line Mixer Mounting 14
Installation
 Verifying Sidekick Pro 15
Internal Plumbing 11

M

Maintenance 27
 Seasonal Maintenance and Storage 33
Maintenance and Storage 27
Mixer Flow Specifications 11

O

Overview 7
 Injection System Components 7

P

Piston Seal Replacement 31
Plumbing Installation 15
Power Connections 15
Pump Dimensions 10
Pump Prime Test 22

R

Replacement Parts 39
 Check Valve Assemblies 42
 Injection Pump Flow Switch 39, 44
 Injection Pump Pressure Transducer 39, 40
 Sidekick Pro Pump 39
Rinse Assist 18

S

Sidekick Pro ICD Menu 17
Specifications 9
System Information 21

T

Tests 22
Troubleshooting
 Alarms 36
 Motor Control Node LED Status Indicators 35

U

Updates 12

V

Verifying Installation of the Sidekick Pro 15

LIMITED WARRANTY

WHAT DOES THIS WARRANTY COVER?

This warranty covers all defects in workmanship or materials in your Raven Applied Technology Division product under normal use, maintenance, and service when used for intended purpose.

HOW LONG IS THE COVERAGE PERIOD?

Raven Applied Technology products are covered by this warranty for 12 months from the date of retail sale. In no case will the Limited Warranty period exceed 24 months from the date the product was issued by Raven Industries Applied Technology Division. This warranty coverage applies only to the original owner and is non-transferable.

HOW CAN I GET SERVICE?

Bring the defective part and proof of purchase to your Raven dealer. If the dealer approves the warranty claim, the dealer will process the claim and send it to Raven Industries for final approval. The freight cost to Raven Industries will be the customer's responsibility. The Return Materials Authorization (RMA) number must appear on the box and all documentation (including proof of purchase) must be included inside the box to be sent to Raven Industries.

WHAT WILL RAVEN INDUSTRIES DO?

Upon confirmation of the warranty claim, Raven Industries will (at our discretion) repair or replace the defective product and pay for the standard return freight, regardless of the inbound shipping method. Expedited freight is available at the customer's expense.

WHAT IS NOT COVERED BY THIS WARRANTY?

Raven Industries will not assume any expense or liability for repairs made outside our facilities without written consent. Raven Industries is not responsible for damage to any associated equipment or products and will not be liable for loss of profit, labor, or other damages. The obligation of this warranty is in lieu of all other warranties, expressed or implied, and no person or organization is authorized to assume any liability for Raven Industries.

Damages caused by normal wear and tear, misuse, abuse, neglect, accident, or improper installation and maintenance are not covered by this warranty.

EXTENDED WARRANTY

WHAT DOES THIS WARRANTY COVER?

This warranty covers all defects in workmanship or materials in your Raven Applied Technology Division product under normal use, maintenance, and service when used for intended purpose.

DO I NEED TO REGISTER MY PRODUCT TO QUALIFY FOR THE EXTENDED WARRANTY?

Yes. Products/systems must be registered within 30 days of retail sale to receive coverage under the Extended Warranty. If the component does not have a serial tag, the kit it came in must be registered instead.

WHERE CAN I REGISTER MY PRODUCT FOR THE EXTENDED WARRANTY?

To register, go online to www.ravenhelp.com and select Product Registration.

HOW LONG IS THE EXTENDED WARRANTY COVERAGE PERIOD?

Raven Applied Technology products that have been registered online are covered for an additional 12 months beyond the Limited Warranty for a total coverage period of 24 months from the date of retail sale. In no case will the Extended Warranty period exceed 36 months from the date the product was issued by Raven Industries Applied Technology division. This Extended Warranty coverage applies only to the original owner and is non-transferable.

HOW CAN I GET SERVICE?

Bring the defective part and proof of purchase to your Raven dealer. If the dealer approves the warranty claim, the dealer will process the claim and send it to Raven Industries for final approval. The freight cost to Raven Industries will be the customer's responsibility. The Return Materials Authorization (RMA) number must appear on the box and all documentation (including proof of purchase) must be included inside the box to be sent to Raven Industries. In addition, the words "Extended Warranty" must appear on the box and all documentation if the failure is between 12 and 24 months from the retail sale.

WHAT WILL RAVEN INDUSTRIES DO?

Upon confirmation of the product's registration for the Extended Warranty and the claim itself, Raven Industries will (at our discretion) repair or replace the defective product and pay for the standard return freight, regardless of the inbound shipping method. Expedited freight is available at the customer's expense.

WHAT IS NOT COVERED BY THE EXTENDED WARRANTY?

Raven Industries will not assume any expense or liability for repairs made outside our facilities without written consent. Raven Industries is not responsible for damage to any associated equipment or products and will not be liable for loss of profit, labor, or other damages. Cables, hoses, software enhancements, and remanufactured items are not covered by this Extended Warranty. The obligation of this warranty is in lieu of all other warranties, expressed or implied, and no person or organization is authorized to assume any liability for Raven Industries.

Damages caused by normal wear and tear, misuse, abuse, neglect, accident, or improper installation and maintenance are not covered by this warranty.