

AccuFlow to AccuFlow HP Plumbing Upgrade Installation Manual

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CHAPTER

1

IMPORTANT SAFETY INFORMATION

NOTICE

- Read this manual carefully and the operation and safety instructions included with the implement and/or controller.
 - Follow safety information presented within this manual and review operation with your dealer.
 - Contact your dealer for additional assistance or support with any portion of the installation or service of Raven equipment or to obtain replacement parts, manuals, or labels.
- Follow all safety labels affixed to components. Be sure to keep safety labels in good condition and replace any missing or damaged labels.
- Review procedures for safe handling and use of anhydrous ammonia (NH₃) and properties of NH₃ with your NH₃ supplier. If you are not trained to handle, transfer, apply, transport, install, operate, or service NH₃ equipment, contact your dealer, NH₃ supplier, or the appropriate agricultural department for training information.
- NH₃ can be harmful to the environment if not used properly. Follow all local, state, and federal regulations regarding proper handling of NH₃.
- Follow all label instructions for chemical mixing, handling, and NH₃ container disposal methods.
- When operating the machine:
 - Be alert and aware of surroundings.
 - Do not operate the device while under the influence of alcohol or illegal substances.
 - Ensure the device is disabled prior to starting maintenance work on the machine.
 - Follow all label instructions for chemical mixing, handling, and container disposal methods.
- Only NH₃ harness systems, control systems, and on/off valves approved by Raven Industries are recommended for use with this system. Raven shall not be liable for any damages and this warranty shall not cover defects from:
 - The use of a system with a harness not approved by Raven.
 - The use of a control system not approved by Raven.
 - The use of an on/off switch not approved by Raven.
 - The use of the system in a manner that is inconsistent with the instructions.
 - Unauthorized modification to the system or products used in the system.

DANGER

- Anhydrous Ammonia (NH₃) Under Pressure. NH₃ can cause severe burning, blindness, sickness, or death. Understand all safety instructions and warnings before operating or servicing equipment. Review safety requirements associated with NH₃ with your supplier.

- Seek immediate medical attention if symptoms of illness occur during, or shortly after, use of NH₃ products.
- In case of leak or accidental release of NH₃, immediately evacuate the area, contact your local fire department, and identify sources of clean water on the unit.

CAUTION

- Use caution when handling anhydrous ammonia (NH₃) products. Always wear personal protective equipment (PPE) when working with anhydrous ammonia. Appropriate PPE includes, but is not limited to:
 - Indirect vent chemical splash goggles or indirect vent chemical splash goggles with full face shield.
 - Liquid proof gauntlet-style gloves impervious to NH₃.
 - Long sleeved shirt and long pants or protective suit.
- Stand 'up wind' when working around NH₃ and related equipment. Never work on NH₃ equipment in confined spaces. Always keep NH₃ equipment away from buildings, livestock, and other people.
- Keep a full source of clean water (at least five gallons in addition to and separate from the water source on the nurse tank) readily available while working with NH₃. In case of exposure, flush exposed skin or eyes immediately with large quantities of water for at least 15 minutes and seek immediate medical attention.
- Never uncouple an NH₃ applicator or intermediate towing vehicle without appropriate parking stands, wheel chocks, or other braking systems if a nurse tank wagon is attached.
- Always remove the system from NH₃ service before performing maintenance.
 - Thoroughly bleed all system lines and disconnect nurse tank hose before beginning service or maintenance.
 - Remove all NH₃ from the system before disassembling or servicing.
- Use extreme caution when opening a previously pressurized system.
 - Pressure gauges can fail, become plugged, or display incorrect pressure. Every section where NH₃ can be trapped should be treated as if it were pressurized.
- Before performing service or maintenance on the system, read and follow the instructions provided with the equipment to properly discharge NH₃.

CHAPTER

KIT CONTENTS

2

Verify that the following parts have been received prior to beginning to assemble the AccuFlow HP Plumbing Upgrade Kit.

NOTE: An existing AccuFlow dual cooler system is required to complete the AccuFlow HP upgrade. If a single cooler system has been previously installed, contact a local Raven dealer to receive a second cooler for the upgrade. Refer to the AccuFlow and AccuFlow HP Installation and Operation Manual for more information.

PUMP AND HYDRAULIC KIT CONTENTS

The following kits are required for assembling the AccuFlow HP upgrade plumbing assembly.

NOTE: The AccuFlow HP Hydraulic Kit (P/N 117-0141-002) is provided with the Pump and Fittings Kit.

TABLE 1. AccuFlow HP Pump with Fittings Kit (P/N 117-0171-425)

Description	Part Number	Qty.
Weldment, AccuFlow HP Mounting Frame	116-0159-702	1
Pump, Centrifugal AccuFlow HP	416-1001-009	1
Manual, AccuFlow and AccuFlow HP Installation and Operation	016-0171-496	1
Manual, AccuFlow HP Plumbing Upgrade Kit Installation	016-0171-500	1
U-Bolt, 5-1/16 x 6" - 7/16" THD	107-0171-603	4
Kit, AccuFlow HP Hydraulic Kit	117-0141-002	1
Hose, 1-1/4" X 27" Anhydrous	214-0001-043	1
Valve, 10 GPM PWM	334-0001-042	1
Transducer, Sealed 0-250 PSI Pressure	422-0000-090	1
Bolt, 1/4" x 2-3/4"	311-0050-112	2
Bolt, 3/8" x 1-1/4" Hex	311-0054-106	2
Bolt, 1/2" x 3-1/2" Hex	311-0058-105	3
Nut, 3/8" Flanged Lock	312-1001-164	2
Nut, 7/16" Flanged Lock	312-1001-165	8
Nut, 1/4" Nylon Lock	312-4000-057	2
Nut, 1/2" Nylon Lock	312-4000-101	3
Washer, Flat 0.281" x 0.625" x 0.065"	313-2300-010	2
Washer, Flat 0.406" x 0.812" x 0.065"	313-2300-014	2
Washer, Flat 0.531" x 0.062 x 0.095"	313-2300-018	6
Fitting, 1-1/4" Swivel Adapter 45°	333-0001-024	2
Fitting, 1-1/2" x 1-1/4" Pipe Bushing	333-0003-019	1
U-Bolt, 2" x 4" - 3/8" THD	321-0000-363	4
Nut, 3/8" Flanged Lock	312-1001-164	8
Fitting, 1-1/2" Pipe Tee	333-0004-007	1
Fitting, 1-1/2" Pipe Cross	333-0004-031	1
Fitting, 1-1/2" Pipe Elbow 90°	333-0005-007	2
Fitting, 1-1/2" Pipe Union	333-0006-006	2
Pipe, 1-1/2" x 2" Nipple	333-0008-047	5
Pipe, 1-1/2" x 3" Nipple	333-0008-049	4
Pipe, 1-1/2" x 8" Nipple	333-0008-052	1
Bracket, AccuFlow HP Pump Support	107-0171-917	1
Bracket, AccuFlow HP Node Mount	107-0171-918	1
Valve, 1/2 PSI Check	333-0011-083	1

TABLE 2. AccuFlow HP Hydraulic Kit (P/N 117-0141-002)

Description	Part Number	Qty.
Fitting, 9/16" JIC (M) to 1-1/16" SAE O-Ring	333-0012-204	2
Fitting, 9/16" JIC (M/F) 90° Swivel	333-0012-042	1
Fitting, 9/16" JIC (M) to 3/4" SAE O-Ring (M)	333-0012-139	1
Fitting, 3/4" JIC (M) to 7/8" SAE O-Ring (M)	333-0012-056	1
Hose, 1/2" NPT (M) to 9/16" JIC (F), 360"	214-1000-632	1
Hose, 1/2" NPT (M) to 3/4" JIC (F), 385"	214-1000-633	1
Hose, 9/16" JIC (F) to 9/16" JIC (F), 28"	214-1000-642	1

UPGRADE KIT FOR DUAL VALVE SYSTEMS

TABLE 3. AccuFlow HP Dual Valve Plumbing 1" to 1-1/4" Upgrade Kit (P/N 117-0171-332)

Description	Part Number	Qty.
Manual, AccuFlow HP Plumbing Upgrade Kit Installation	016-0171-500	1
Valve, 1-1/4" NPT Anhydrous Control	063-0173-202	1
Valve, 1-1/4" NPT Anhydrous On/Off	063-0173-203	1
U-Bolt, 5-1/16" x 6" x 7/16" THD	107-0171-603	2
Bracket, Valve Support	107-0171-931	2
Nut, 7/16" Flanged Lock	312-1001-165	4
Fitting, 1-1/4" to 1/2" Pipe Bushing	333-0003-017	2
Fitting, 1-1/2" to 1-1/4" Pipe Bushing	333-0003-019	1
Fitting, 1-1/4" Pipe Tee	333-0004-006	2
Fitting, 1/2" x 1/2" x 1/4" Pipe Tee	333-0004-009	1
Fitting, Pipe Cross	333-0004-030	1
Fitting, 1-1/4" Elbow 90°	333-0005-006	1
Fitting, 1-1/4" Pipe Union	333-0006-005	1
Pipe, 1/4" x 2" Nipple	333-0008-002	1
Pipe, 1/2" x 1-1/2" Nipple	333-0008-015	1
Pipe, 1-1/4" x 3" Nipple	333-0008-040	4
Pipe, 1-1/4" x 6" Nipple	333-0008-042	2

Description	Part Number	Qty.
Valve, 1911 Bleed	334-0001-012	1
Gauge, 0-150 PSI Pressure	417-0001-008	1
Gauge, Temperature	417-0001-009	1
Clamp, 1-1/2" Muffler	435-3003-030	2

UPGRADE KIT FOR SINGLE FAST VALVE SYSTEMS

TABLE 4. AccuFlow HP Single Fast Valve Plumbing 1" to 1-1/4" Upgrade Kit (P/N 117-0171-333)

Description	Part Number	Qty.
Manual, AccuFlow HP Plumbing Upgrade Kit Installation	016-0171-500	1
Valve, 1-1/4" NPT Anhydrous Fast Control	063-0173-204	1
U-Bolt, 5-1/16" x 6" x 7/16" THD	107-0171-603	1
Bracket, Valve Support	107-0171-931	1
Nut, 7/16" Flanged Lock	312-1001-165	2
Fitting, 1-1/4" to 1/2" Pipe Bushing	333-0003-017	2
Fitting, 1-1/2" to 1-1/4" Pipe Bushing	333-0003-019	1
Fitting, 1-1/4" Pipe Tee	333-0004-006	2
Fitting, 1/2" x 1/2" x 1/4" Pipe Tee	333-0004-009	1
Fitting, Pipe Cross	333-0004-030	1
Fitting, 1-1/4" Elbow 90°	333-0005-006	1
Fitting, 1-1/4" Pipe Union	333-0006-005	1
Pipe, 1/4" x 2" Nipple	333-0008-002	1
Pipe, 1/2" x 1-1/2" Nipple	333-0008-015	1
Pipe, 1-1/4" x 3" Nipple	333-0008-040	3
Pipe, 1-1/4" x 6" Nipple	333-0008-042	2
Valve, 1911 Bleed	334-0001-012	1
Gauge, 0-150 PSI Pressure	417-0001-008	1
Gauge, Temperature	417-0001-009	1
Clamp, 1-1/2" Muffler	435-3003-030	1

CHAPTER

3


PLUMBING UPGRADE INSTALLATION

The following sections illustrate the proper assembly of the plumbing upgrade kit for an existing dual cooler system.

NOTE: Refer to the AccuFlow and AccuFlow HP Installation and Operation Manual for final hose and electrical connections, operation, service and maintenance instructions.

PREPARATION

The plumbing upgrade kit replaces the hard plumbing fittings and elbows, the product control valve(s) and AccuFlow pressure and temperature gauges. Remaining tubing, flow dividers and vapor tubes from an existing installation may be left alone.

	<p data-bbox="824 974 1110 1024">! DANGER</p> <p data-bbox="685 1041 1221 1318">Use extreme caution when disassembling a previously pressurized system. Exposure to anhydrous ammonia can cause severe burning, blindness or death. Review safety and service information in the AccuFlow and AccuFlow HP Installation and Operation Manual prior to disassembling an existing AccuFlow system. To avoid injury or death, always wear proper personal protective equipment.</p>
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During the disassembly of the AccuFlow system, be sure to:

1. Leave the Y-strainer assembly and pipe fittings on the inlet of the super cooler.
2. Leave all hose barbs installed in the super cooler assembly in place.
3. Remove all iron plumbing fittings and elbows from the outlet of the super cooler. Clean any excess pipe sealant from the threads to simplify reassembly later.

NOTE: If installing the plumbing upgrade kits (P/N 117-0171-332 and 117-0171-333), only remove fittings and hardware downstream of the flowmeter. Skip to step 9 on page 16 for assembly instructions for the plumbing upgrade without installing the AccuFlow HP pump.

4. Disassemble any mounting hardware and remove the super cooler(s) from the implement. Remove any existing mounting hardware that will interfere with the AccuFlow HP mounting frame.
5. Perform service and maintenance procedures outlined in the AccuFlow and AccuFlow HP Installation and Operation Manual if necessary before assembling the AccuFlow HP plumbing.

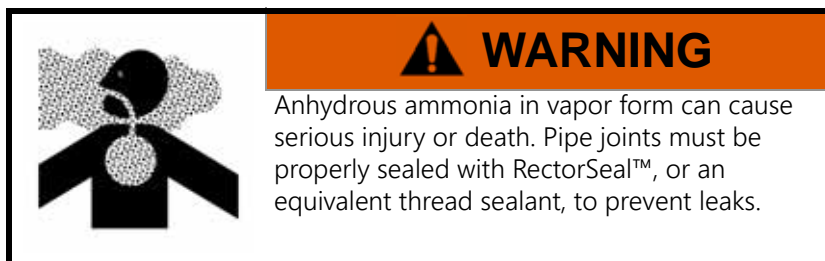
POINT OF REFERENCE

It is recommended to mount the AccuFlow HP assembly with the inlet ports facing toward the back of the implement. All references to left, right, front, or back of the AccuFlow HP assembly are made assuming this orientation and that you are standing at the back of the implement looking toward the vehicle hitch.

REQUIRED TOOLS AND SUPPLIES

Before starting the installation, collect the following tools and supplies:

- Pipe Wrenches (must accommodate 1-1/4" minimum pipe size)
- Set of Combination Wrenches
- Set of Deep Well Sockets and Socket Wrench
- RectorSeal™ or equivalent thread sealant



ACCUFLOW HP UPGRADE PLUMBING ASSEMBLY

NOTE: The following procedures offer instructions for assembling the AccuFlow HP system in a workshop and then mounting the assembly onto the implement. If equipment suitable for lifting the full assembly (approximately 350 pounds [160 kg]) is not available, the system may be assembled on the implement after the AccuFlow Mounting Frame (P/N 116-0159-702) is installed on the implement.

A support member or additional framework may need to be added to the implement to provide a position to mount the AccuFlow HP Mounting Frame.

PUMP SUPPORT BRACKET AND SUPER COOLER MOUNTING

1. Mount the pump support bracket (P/N 107-0171-917) to the mounting frame (P/N 416-1001-009) using three 3-1/2" x 1/2" machine bolts (P/N 311-0058-105), six 1/2" flat washers (P/N 313-2300-018) and three 1/2" nylon lock washers (P/N 312-4000-101).

FIGURE 1. Pump Support Bracket Installation



NOTE: To simplify assembly, do not fully tighten the mounting bracket at this time. The mounting bracket will be tightened once plumbing and cooler spacing is determined.

2. Set one super cooler on the left side of the mounting frame (refer to the Point of Reference section on page 10).

FIGURE 2. Super Cooler Set on Mounting Frame



The outlet port should be outside of the frame upright supports and near the pump support bracket.

NOTE: Assembly of the upgrade plumbing will be easier if only one cooler is mounted to the frame. Once the second cooler is mounted, the super coolers must be even. Do not offset the super coolers on the mounting frame.

3. Loosely secure the cooler using two u-bolts (P/N 107-0171-603) and four 7/16" flanged nuts (P/N 312-1001-165).


NOTE: Spacing between the coolers may vary. Do not tighten the u-bolts holding the cooler to the mounting frame until the plumbing between the cooler outlet ports has been completed.

OUTLET PLUMBING

Plumbing of the cooler outlet ports is critical to allow appropriate spacing between the super coolers and product control valve(s). The following sections are provided to help ensure that the plumbing is assembled to allow spacing for the control valve(s) later in the assembly process.

To help reduce problems assembling the plumbing upgrade kit, read the procedures for the left and right outlet plumbing before beginning assembly.

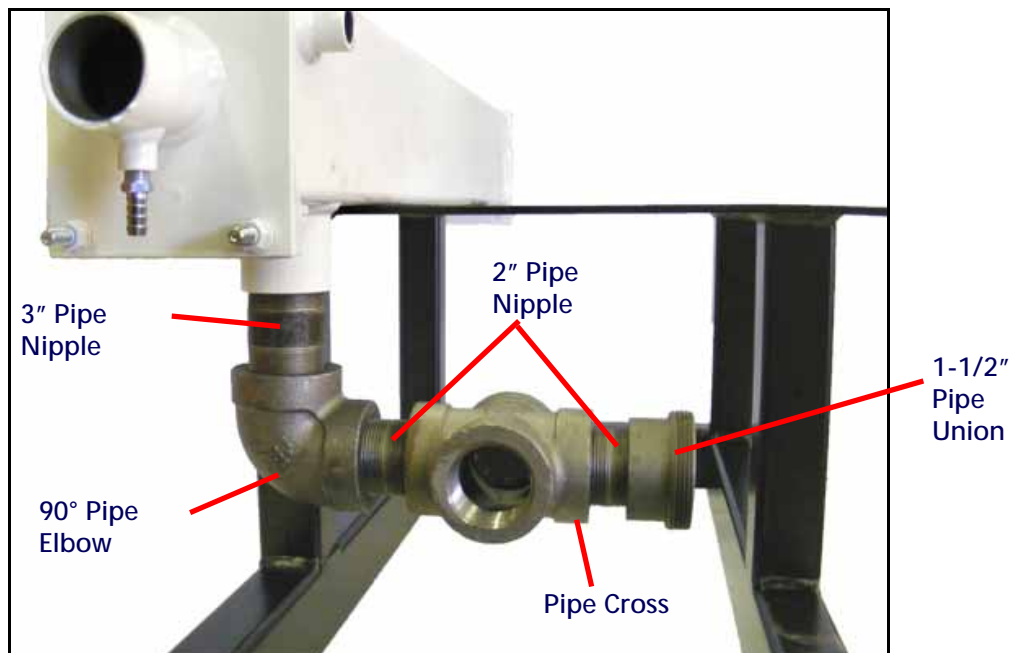
NOTE: Apply RectorSeal™ to all pipe threads and fittings prior to making each connection.

	<p style="text-align: center;">⚠ WARNING</p> <p>Anhydrous ammonia in vapor form can cause serious injury or death. Pipe joints must be properly sealed with RectorSeal™, or an equivalent thread sealant, to prevent leaks.</p>
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LEFT SUPER COOLER

1. Thread a 1-1/2" x 3" pipe nipple (P/N 333-0008-049) into the outlet port on the super cooler.
2. Thread a 90° pipe elbow (P/N 333-0005-007) onto the pipe nipple and use a pipe wrench to tighten the elbow and pipe nipple. Tighten until the open face of the elbow fitting perpendicular to the cooler body and facing the center mounting frame.

FIGURE 3. Outlet Port Configuration Example



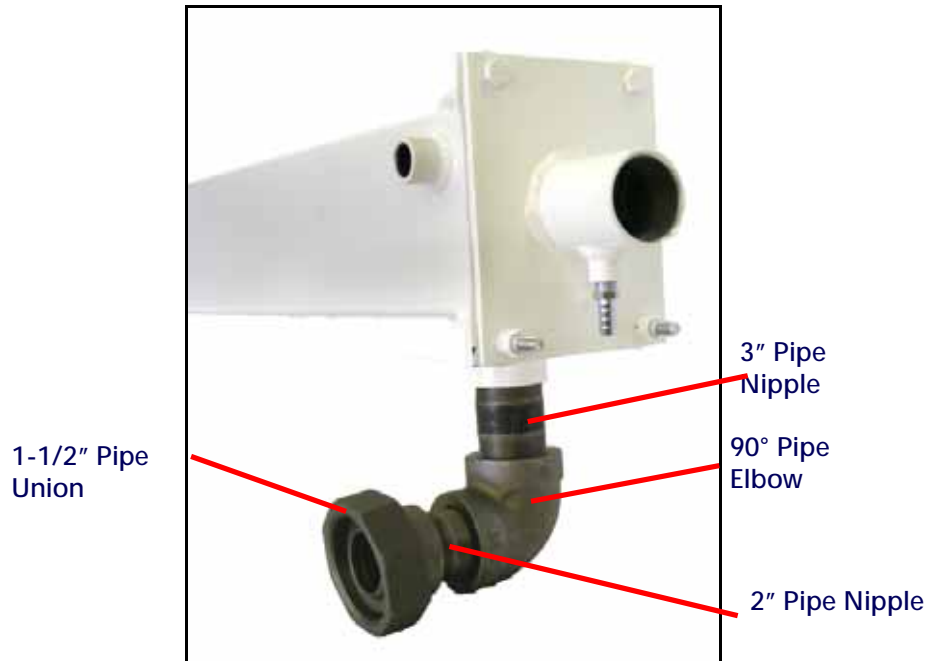
3. Thread a 1-1/2" x 2" pipe nipple (P/N 333-0008-047) and the 1-1/2" pipe cross (P/N 333-0004-031) into the elbow fitting. Use a pipe wrench to tighten these fittings until the branch ports of the pipe cross are parallel with the cooler body.
4. Thread a 1-1/2" x 2" pipe nipple (P/N 333-0008-038) and a 1-1/2" pipe union (P/N 333-0006-047) into the through port on the pipe cross.

RIGHT SUPER COOLER

NOTE: To simplify plumbing assembly, do not mount the right cooler to the mounting frame until the plumbing assembly is completed.

1. Thread a 1-1/2" x 3" pipe nipple (P/N 333-0008-049) into the outlet port on the super cooler.
2. Thread a 90° pipe elbow (P/N 333-0005-007) onto the 3" pipe and use a pipe wrench to tighten the elbow and pipe nipple. Tighten until the open face of the elbow fitting perpendicular to the cooler body and facing to the left as shown in Figure 4.

FIGURE 4. Outlet Port Configuration Example



3. Separate the pipe union previously installed on the pipe cross in the Left Super Cooler section. The pipe union will be used to connect the right cooler to the pipe cross later in the assembly process.
4. Thread a 1-1/2" x 2" pipe nipple (P/N 333-0008-047) and the separated half of the pipe union into the elbow fitting and use a pipe wrench to tighten these fittings.
5. Set the right cooler aside until the plumbing assembly is completed.

PUMP PLUMBING

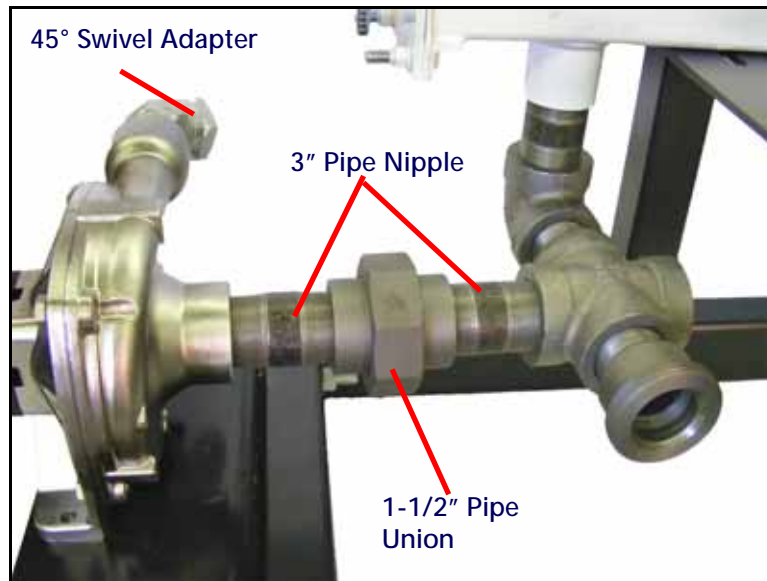
NOTE: Apply RectorSeal™ to all pipe threads and fittings prior to making each connection.

	<p>⚠ WARNING</p>
<p>Anhydrous ammonia in vapor form can cause serious injury or death. Pipe joints must be properly sealed with RectorSeal™, or an equivalent thread sealant, to prevent leaks.</p>	

1. Thread a 1-1/2" x 3" pipe nipple (P/N 333-0008-049), and 1-1/2" pipe union (P/N 333-0006-006) into the pipe cross facing toward the back of the mounting frame or in the same direction as the cooler inlet ports.



FIGURE 5. Pump Plumbing Assembly



2. Separate the 1-1/2" pipe union and use a 1-1/2" x 3" pipe nipple (P/N 333-0008-049) to connect the pipe union to the inlet of the centrifugal pump (P/N 416-1001-009).
3. Install the 45° female swivel adapter fitting (P/N 333-0001-024) into the pump outlet and tighten using a wrench.

MOUNT THE PUMP

1. Mount the pump to the pump support bracket using two 3/8" x 1-1/4" machine bolts (P/N 311-0054-106), two 3/8" flat washers (P/N 313-2300-014) and two 3/8" flanged lock nuts (P/N 312-1001-164).
2. While tightening the pump support bracket, adjust the super cooler assembly to allow space for the pump and connected plumbing. Check that all bolts connecting the pump support bracket are tightened securely.
3. Reconnect the 1-1/2" pipe union and tighten using a wrench.

CHECK VALVE AND FLOW METER

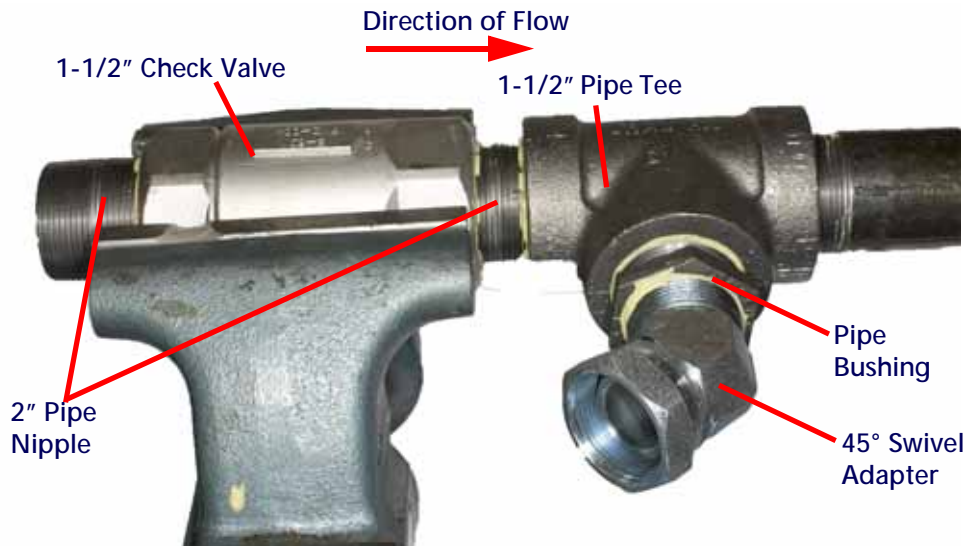
NOTE: Apply RectorSeal™ to all pipe threads and fittings prior to making each connection.

	<p style="text-align: center;">⚠ WARNING</p> <p>Anhydrous ammonia in vapor form can cause serious injury or death. Pipe joints must be properly sealed with RectorSeal™, or an equivalent thread sealant, to prevent leaks.</p>
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1. Identify the outlet port on the check valve (P/N 333-0011-083). Use the arrow on the check valve to determine the direction of flow.
2. Thread a 1-1/2" x 2" pipe nipple (P/N 333-0008-047) and a 1-1/2" pipe tee (P/N 333-0004-007) into the outlet on the check valve body (P/N 333-0011-083).

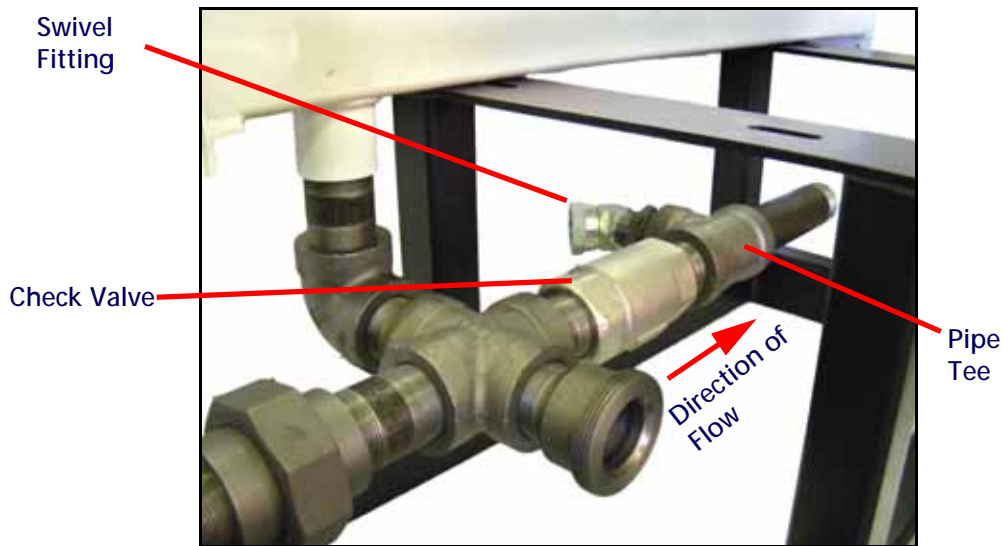
NOTE: The pipe tee must be connected to the outlet port of the check valve.

FIGURE 6. Plumbing the Check Valve



3. Thread the 1-1/2" x 8" pipe nipple (P/N 333-0008-052) onto the through port of the pipe tee.
4. Place the check valve in a vice and use a pipe wrench to tighten the fittings and check valve.
5. On the tee branch, thread a 1-1/2" to 1-1/4" pipe bushing (P/N 333-0008-052) and 45° swivel adapter. Use a wrench to tighten the swivel adapter until the elbow is pointing back toward the check valve.
6. Thread a 1-1/2" x 2" pipe nipple (P/N 333-0008-047) into the inlet side of the check valve and thread the whole assembly into the remaining branch port of the pipe cross.

FIGURE 7. Plumbing the Check Valve



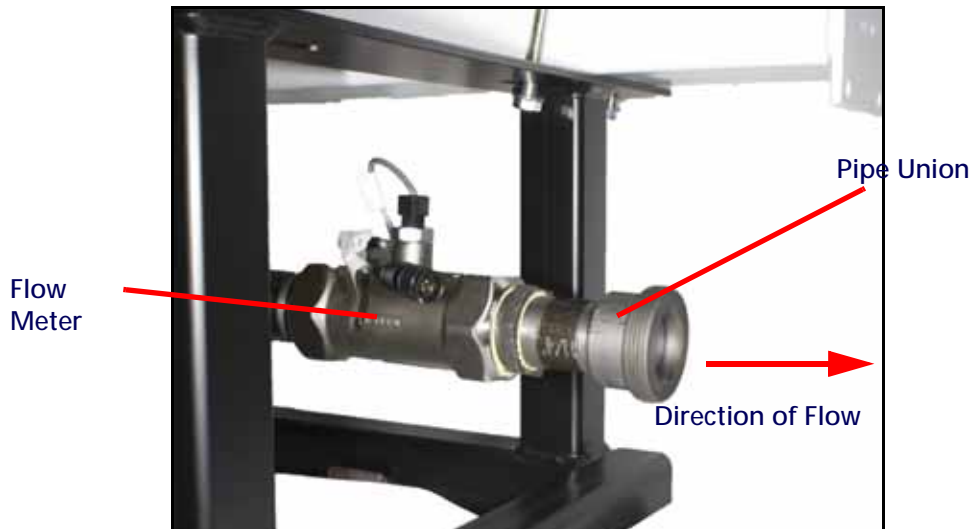
Tighten the assembly until the 45° swivel fitting is parallel with the pipe cross and pointing toward the left cooler.

7. Identify the inlet port on the flow meter (P/N 063-0171-666). Use the arrow on the flow meter to determine the direction of flow.
8. Thread the inlet port of the RFM 60S flow meter onto the pipe nipple connected to the pipe tee and check valve.

NOTE: The flow meter inlet port must point toward the check valve.

9. Thread a 1-1/2" to 1-1/4" pipe bushing (P/N 333-0003-019), a 1-1/4" x 3" pipe nipple (P/N 333-0008-040) and a 1-1/4" pipe union onto the outlet port of the flow meter installed in the previous step.

FIGURE 8. Plumbing the Flow Meter



Use a wrench to tighten the flow meter and fittings together. When fully tightened, ensure that the swivel elbow next to the check valve is still pointing toward the left cooler and the flow meter cable is pointing up as shown in the above figure.

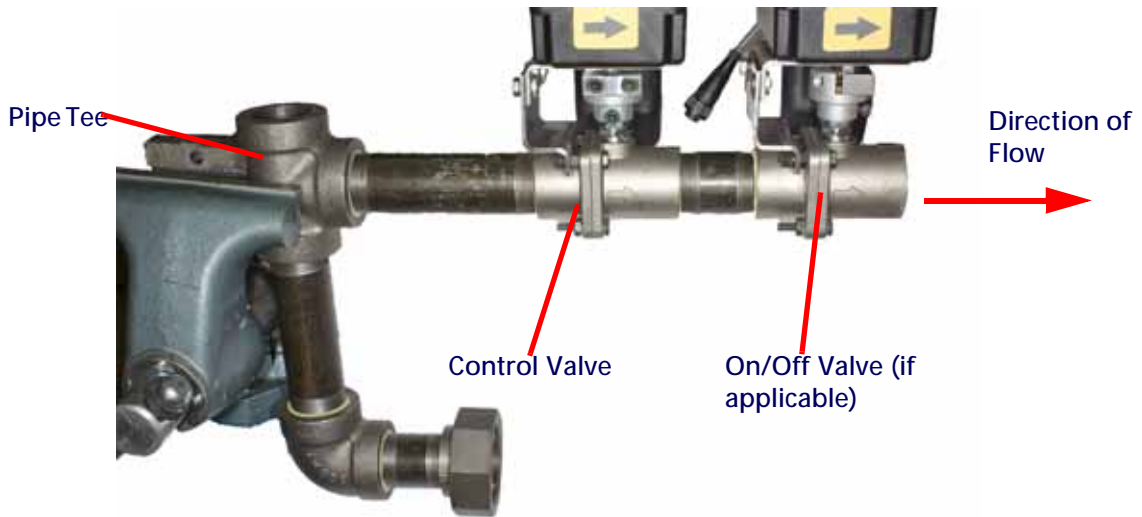
PLUMBING THE CONTROL VALVE(S)

NOTE: Apply RectorSeal™ to all pipe threads and fittings prior to making each connection.

	<p style="text-align: center;">⚠ WARNING</p> <p>Anhydrous ammonia in vapor form can cause serious injury or death. Pipe joints must be properly sealed with RectorSeal™, or an equivalent thread sealant, to prevent leaks.</p>
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1. Thread a 1-1/4" x 6" pipe nipple (P/N 333-0008-042) onto one of the through ports of a pipe tee (P/N 333-0004-006).
2. Thread a pipe elbow (P/N 333-0005-0006) onto the pipe nipple and use a wrench to tighten the fittings until the open elbow port is facing in the same direction as the branch of the tee fitting as shown in Figure 9.
3. Separate the pipe union next to the flow meter. This pipe union will be used to connect the product control valve assembly to the system later in the assembly process.
4. Thread a 1-1/4" x 3" pipe nipple into the elbow and connect the other half of the pipe union separated in the previous step.

FIGURE 9. Plumbing the Product Control Valves




5. Thread a 1-1/4" x 6" pipe nipple (P/N 333-0008-042) into the branch of the pipe tee.

NOTE: To simplify the plumbing support bracket connection later, slide one of the supplied muffler clamps (P/N 435-3003-030) onto the pipe between the pipe tee and the product control valve.

TWO VALVE SYSTEM VALVE PLUMBING

1. Thread the input port of the control valve (P/N 063-0173-202) onto the pipe nipple. Use the directional arrows on the valve body to determine flow direction.

	<p>CAUTION</p>
<p>Do not apply pressure to the valve motor housing to tighten the plumbing connections. Use pipe wrenches and a vice to tighten the plumbing connection between the valves.</p>	


2. Thread a 3" pipe nipple (P/N 333-0008-040) and the on/off valve (P/N 063-0173-203) onto the output port of the control valve.

NOTE: To simplify the plumbing support bracket connection later, slide one of the supplied muffler clamps onto the pipe after the on/off valve.

3. Thread a 1-1/4" x 3" pipe nipple (P/N 333-0008-040) onto the outlet of the on/off valve.

FAST VALVE SYSTEM VALVE PLUMBING


1. Thread the input port of the fast valve (P/N 063-0173-204) onto the pipe nipple.

	<p>CAUTION</p>
<p>Do not apply pressure to the valve motor housing to tighten the plumbing connections. Use pipe wrenches and a vice to tighten the plumbing connection on the valve.</p>	

2. Thread a 1-1/4" x 3" pipe nipple (P/N 333-0008-040) onto the outlet of the on/off valve.

PLUMBING THE COOLING OUTPUT

NOTE: Apply RectorSeal™ to all pipe threads and fittings prior to making each connection.



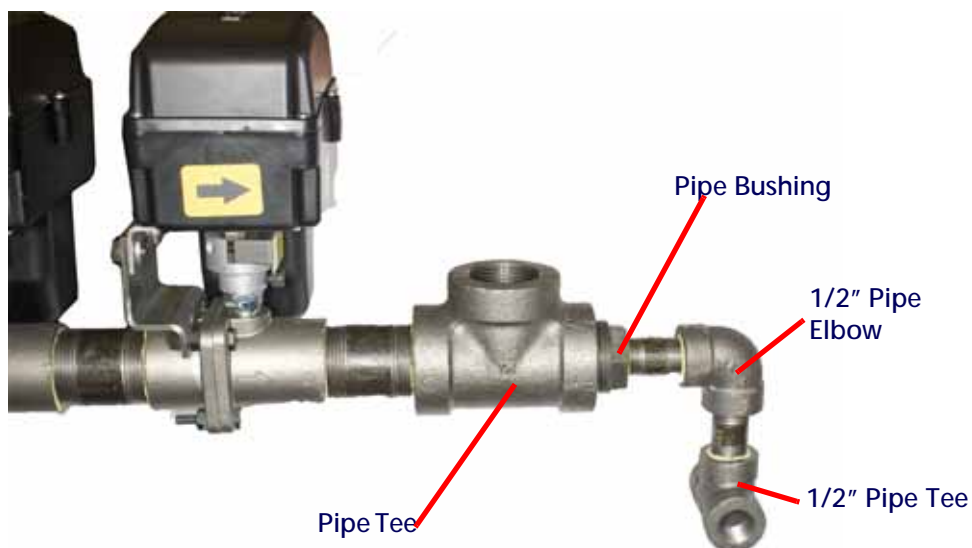
⚠ WARNING

Anhydrous ammonia in vapor form can cause serious injury or death. Pipe joints must be properly sealed with RectorSeal™, or an equivalent thread sealant, to prevent leaks.

1. Thread one of the through ports of a 1-1/4" pipe tee (P/N 333-0004-006) onto the pipe nipple in the on/off valve. Using a wrench, tighten the tee fitting until the branch faces straight up.

NOTE: The branch of this tee fitting will be connected to flow divider(s) to send anhydrous ammonia to the implement knives. Refer to the AccuFlow and AccuFlow HP Installation and Operation Manual for more information.

FIGURE 10. Plumbing the Coolant Return Line



2. Thread the 1-1/4" to 1/2" pipe bushing (P/N 333-0003-017) into the through port on the other side of the pipe tee.
3. Thread a 1/2" x 2" pipe nipple (P/N 333-0008-016) and 1/2" pipe elbow (P/N 333-0005-003) onto the pipe bushing and use a wrench to tighten the fittings until the elbow points straight down.
4. Thread a 1/2" x 2" pipe nipple (P/N 333-0008-016) into the elbow fitting and connect the branch of the 1/2" pipe tee (P/N 333-0004-003). Use a wrench to tighten the fittings until the pipe tee through ports are facing toward the left and right sides of the mounting frame.
5. Thread the supplied 1/2" NPT hose barbs into the through ports of the tee fitting and use a wrench to tighten.

NOTE: Connect these hose barbs to the coolant return lines on the bottom of the cooler inlet ports. Refer to the AccuFlow and AccuFlow HP Installation and Operation Manual for more information.

GAUGE ASSEMBLY PLUMBING

1. Locate the pipe tee on the upstream side of the product control valve(s). The gauge assembly will be connected to the through port facing up.

FIGURE 11. Gauge Assembly Connection Location



2. Thread a 1-1/4" to 1/2" pipe bushing (P/N 333-0003-017) and a 1/2" x 1-1/2" pipe nipple (P/N 333-0008-015) into the pipe tee already installed.

FIGURE 12. Plumbing the Gauge Assembly

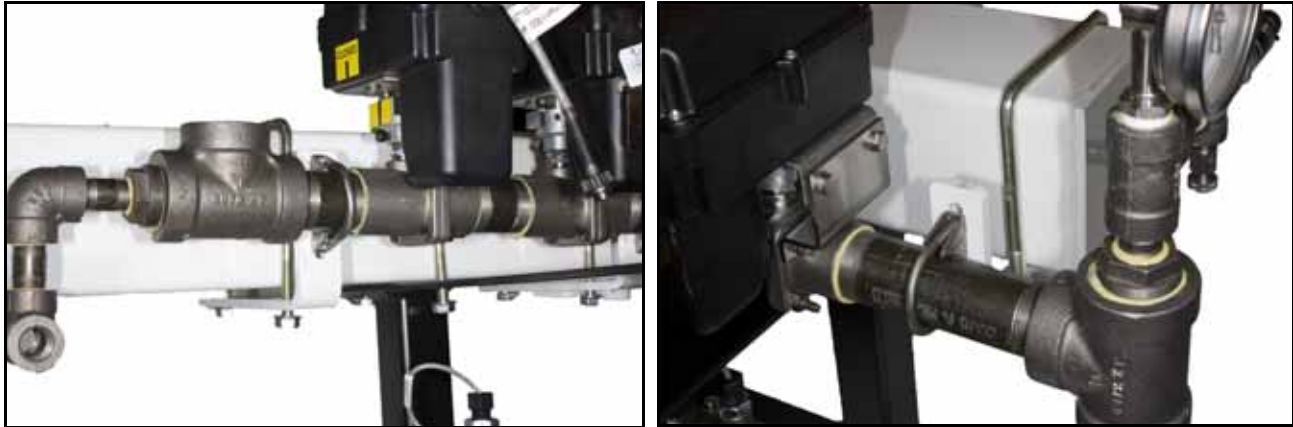


3. Thread one of the through ports of the supplied 1/2" x 1/2" x 1/4" pipe tee (P/N 333-0004-009) to the pipe nipple and tighten until the branch of the tee is perpendicular to the valve line plumbing as shown in the figure above.
4. Thread the 1/4" x 2" pipe nipple (P/N 333-0008-002) into the branch of the installed pipe tee and connect the supplied 1/4" pipe cross (P/N 333-0004-030). Use a wrench to tighten these fittings until the pipe cross is parallel with the installed pipe tee.
5. Thread the temperature gauge (P/N 417-0001-009) into the pipe tee and tighten until the gauge display faces away from the product control valve(s).
6. Thread the pressure gauge (P/N 417-0001-008) into the top branch of the pipe cross and tighten until the gauge display faces away from the product control valve(s).
7. Thread the 1/4" NPT bleed valve (P/N 334-0001-012) into the bottom branch of the pipe cross and tighten.
8. Thread the pressure transducer (P/N 422-0000-090) into the through port of the pipe cross and tighten.

CONNECT THE VALVE ASSEMBLY TO THE ACCUFLOW SYSTEM

1. Loosely secure the valve support brackets (P/N 107-0171-931) to the left cooler using the provided u-bolts (P/N 107-0171-603) and flanged lock nuts (P/N 312-1001-165). Orient the support brackets as shown in the figure below.

FIGURE 13. Valve Support Bracket Mounting



2. Connect the product control valve plumbing assembly to the AccuFlow system using the pipe union next to the flow meter. Use a wrench to tighten the pipe union to prevent leaking.
3. Secure the valve plumbing assembly to the valve support brackets using the provided muffler clamps (P/N 435-3003-030), flat washers (P/N 313-2300-013) and split lock washers (P/N 313-1000-019).

MOUNT THE SECOND COOLER

The major plumbing assembly and connection should now be complete and the second, or right, cooler may be mounted to the mounting frame.

1. Set the second cooler on the mounting frame and thread pipe union connected to the cooler output to the other half of the union next to the pipe cross and centrifugal pump.
2. Secure the cooler to the mounting frame using the provided u-bolts (P/N 107-0171-603) and flanged lock nuts (P/N 312-10001-165).

NOTE: Do not tighten the second cooler to the mounting frame until alignment and spacing is correct.

3. Use a wrench to tighten the pipe union connecting the second cooler to the system to prevent leaking.
4. Tighten the u-bolts on the first and second coolers to secure the coolers to the mounting frame.

MOUNT THE PWM VALVE

1. Align the PWM (Pulse Width Modulation) valve (P/N 334-0001-042) with the pre-drilled holes in the pump support bracket.

FIGURE 14. PWM Valve and Node Support Bracket Mounting



2. Set the node support bracket (P/N 107-0171-918) onto the PWM valve and secure using the two 1/4" x 2-3/4" machine bolts (P/N 311-0050-112), two 1/4" flat washers (P/N 313-2300-010) and two 1/4" nylon lock nuts (P/N 312-4000-057).

The vertical plate of the node support bracket should be next to the centrifugal pump.

CENTRIFUGAL PUMP OUTLET LINE

1. Connect the supplied hose (P/N 214-0001-043) to the swivel elbow fitting connected to the centrifugal pump outlet port.
2. Route the hose to the swivel elbow fitting downstream from the check valve.

FIGURE 15. 1-1/4" Pump Outlet Hose Connection



FINAL HOSE CONNECTIONS

Refer to the AccuFlow and AccuFlow HP Installation and Operation Manual for final product and cooling hose routing and connections.

A

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RAVEN

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.