

**Case IH 21XX, 23XX, 25XX, and
X088 Series SmarTrax™ MD
Installation Manual**

Manual No. 016-5030-052 Rev. B 01/17

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CHAPTER

1

IMPORTANT SAFETY INFORMATION

NOTICE

Read this manual and the operation and safety instructions included with your implement and/or controller carefully before installing the SmarTrax™ MD system.

- Follow all safety information presented within this manual.
- If you require assistance with any portion of the installation or service of your Raven equipment, contact your local Raven dealer for support.
- Follow all safety labels affixed to the SmarTrax MD system components. Be sure to keep safety labels in good condition and replace any missing or damaged labels. To obtain replacements for missing or damaged safety labels, contact your local Raven dealer.

When operating the machine after installing SmarTrax MD, observe the following safety measures:

- Be alert and aware of surroundings.
- Do not operate SmarTrax MD or any agricultural equipment while under the influence of alcohol or an illegal substance.
- Remain in the operator's position in the machine at all times when SmarTrax MD is engaged.
- Disable SmarTrax MD when exiting the operator's seat and machine.
- Do not drive the machine with SmarTrax MD enabled on any public road.
- Determine and remain a safe working distance from other individuals. The operator is responsible for disabling SmarTrax MD when the safe working distance has diminished.
- Ensure SmarTrax MD is disabled prior to starting any maintenance work on SmarTrax MD or the machine.

WARNING

- The machine must remain stationary and switched off during SmarTrax MD installation or maintenance.

INSTRUCTIONS FOR WIRE ROUTING

CAUTION

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.

CHAPTER

INTRODUCTION

2

Congratulations on your purchase of the SmarTrax™ MD system!

SmarTrax MD-assisted steering takes the stress out of driving and makes it quick and easy for you to improve your operating efficiency and performance. SmarTrax MD is compatible with Cruiser II™ and Cruiser II™ RTK, Envizio Pro™, Envizio Pro®, Envizio Pro XL™, and Viper Pro™ systems.

The following instructions are designed to assist with the proper installation of the SmarTrax MD system. Refer to the SmarTrax MD Calibration & Operation Manual (P/N 016-5030-020) for assistance with calibrating the software and using the SmarTrax MD system.

This manual applies to the following machines:

MAKE: Case IH

MODEL: 21XX Series - 2144, 2166, and 2188

23XX Series - 2344, 2366, 2377, and 2388

25XX Series - 2577 and 2588

X088 Series - 5088, 6088, and 7088

FIGURE 1. Case IH 2144



PREPARING FOR INSTALLATION

Before installing the SmarTrax MD system, park the machine where the ground is level, clean, and dry. Turn off the machine and leave it turned off for the duration of the installation process.

During the installation process, follow good safety practices. Be sure to carefully read the instructions in this manual as you complete the installation process.

RECOMMENDATIONS

Raven Industries recommends the following best practices when installing or operating the SmarTrax MD system for the first time, at the start of the season, or when moving the SmarTrax MD system to another machine:

- Use part numbers to identify the parts.
- Do not remove the plastic wrap from a part until it is necessary for installation.
- Do not remove plastic caps from a part until it is necessary for installation.

POINT OF REFERENCE

The instructions in this manual assume that you are standing behind the machine, looking toward the cab.

UPDATES

Software and manual updates are available on the Raven Applied Technology website:

<http://www.ravenhelp.com>

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

- Case IH 21XX, 23XX, 25XX, and X088 Series SmarTrax™ MD Installation Manual
- Manual No. 016-5030-052 Rev. B
- 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.

KIT CONTENTS

This section contains a list of the components that are included in the SmarTrax MD kit. Before beginning the system installation, compare the items in the kit with the components on this list. If you have questions about the kit, contact your Raven dealer.

IMPORTANT: Modification/alteration of any part in the SmarTrax MD system or the use of any non-Raven approved parts will void the warranty on the system. Raven Industries assumes no liability for using modified, altered, or non-Raven approved parts or components.

TABLE 1. SmarTrax MD Installation Kit (P/N 117-5030-052)

Picture	Item Description	Part Number	Qty.
Not Pictured	Manual - Case IH 21XX, 23XX, 25XX, and X088 Series SmarTrax MD Installation	016-5030-052	1
	Assembly - Ring Gear	063-4001-011	1
	Assembly - Spline Adapter	063-4001-024	1
	Trim - Ring Gear Protective	019-0159-590	1
	Bracket - Node Mounting	107-0172-055	1
	Bracket - Anti-Rotation	107-4001-031	1
	Bearing - 1/2" Plastic Flanged	325-0000-036	1
	Screw - #10-16 x 3/4" Self-Tapping	310-1002-073	4

TABLE 1. SmarTrax MD Installation Kit (P/N 117-5030-052)

Picture	Item Description	Part Number	Qty.
	Spacer, MD, 1/2" (for 7/8" Adapter)	107-4001-027	1
	Screw - #10-24 x 1-1/4" Screw	311-0068-195	2
	Screw, #10-24 UCN x 2" SHCS, Black Oxide	311-0068-198	6
	Bolt - #10-24 x 3/4" UNC Carriage	311-0069-082	2
	Nut - 3/8"-16 Zinc Flanged Lock	312-1001-167	3
	Nut - #10-24 Wing	312-3000-013	2
	Washer - 0.265" ID x 0.505" OD x 0.060" Thick	313-2300-120	4
	Tape - 3" Double-Sided	332-0000-019	6

TABLE 2. SmarTrax MD Controller Kit (P/N 117-5030-020)






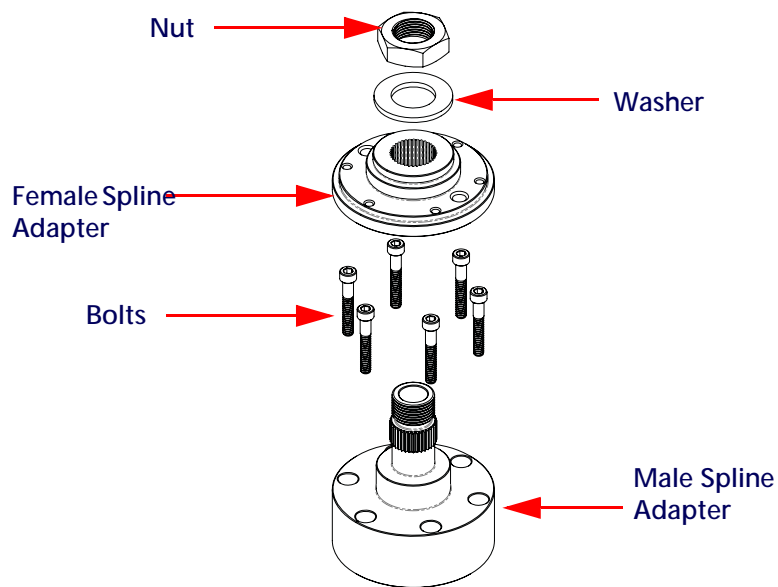
Picture	Item Description	Part Number	Qty.
Not Pictured	Manual - SmarTrax MD Calibration & Operation	016-5030-020	1
	Assembly - SmarTrax MD Mechanical Drive Unit	063-4001-010	1

TABLE 2. SmarTrax MD Controller Kit (P/N 117-5030-020)

Picture	Item Description	Part Number	Qty.
	Node - SmarTrax MD	063-4001-013	1
	Pin - Anti-Rotation	107-4001-004	1
	Cable - SmarTrax MD Node Harness	115-4001-157	1
	Switch - Foot	063-0173-593	1

DISASSEMBLE THE MECHANICAL DRIVE SPLINE ASSEMBLY**FIGURE 1. Spline Assembly Disassembled**



1. Locate the 7/8" 36 tooth spline adapter assembly (P/N 063-4001-024).
2. Disassemble the spine adapter assembly as shown in Figure 1 above.

REMOVE THE STEERING WHEEL

NOTE: The steps in this section require use of a steering wheel puller (not supplied). For questions on the proper procedure for removing the steering wheel, contact your local equipment dealer.

FIGURE 2. Steering Wheel Cap



3. Remove the cap from the center of the steering wheel.

FIGURE 3. Nut to be Removed



4. Remove the nut used to secure the steering wheel to the steering column.

FIGURE 4. Steering Wheel Removed



5. Using the steering wheel puller, remove the steering wheel from the steering column.

INSTALL THE ANTI-ROTATION BRACKETS

FIGURE 5. Bolts to be Removed



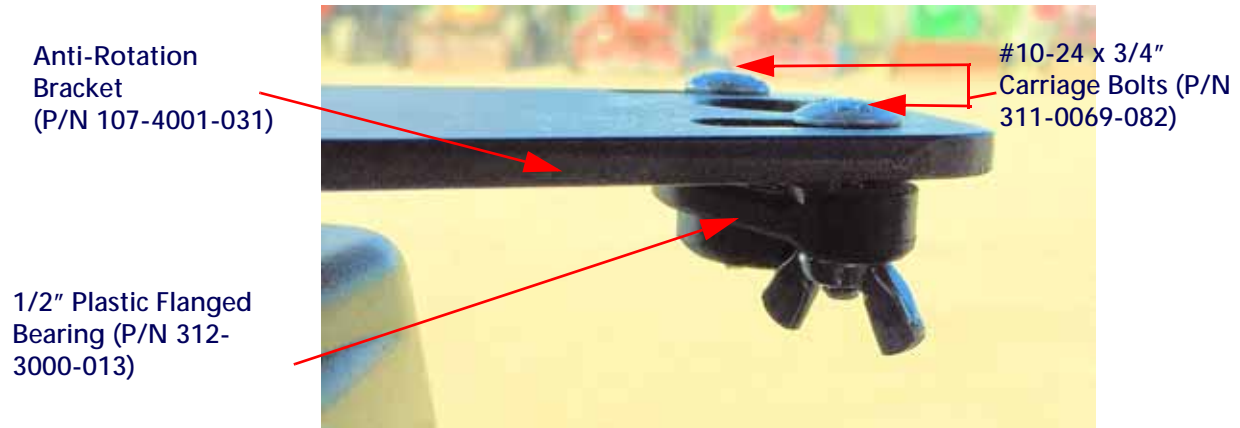
1. Remove the screw on both sides of the steering shaft.

FIGURE 6. Anti-Rotation Bracket Aligned on Steering Shaft



2. Place the anti-rotation bracket (P/N 107-4001-031) over the steering shaft, aligning the holes in the bracket with the screw holes in the steering shaft.
3. Secure the anti-rotation bracket with two #10-24 x 1-1/4" socket head set screws (P/N 311-0068-195).

FIGURE 7. Flanged Bearing Assembly Installed



4. Install the 1/2 plastic flanged bearing (P/N 325-0000-036) on the bottom side on outside end of the anti-rotation bracket using two #10-24 x 3/4" carriage bolts (P/N 311-0069-082) and two #10-24 wing nuts (P/N 312-3000-013).

INSTALL THE SPLINE AND RING GEAR ASSEMBLIES

FIGURE 8. Female Spline Adapter Installed on Steering Column



1. Install the female spline on the machine's steering column.
2. Install the machine's steering wheel nut that was removed during the steering wheel removal.
3. Install the 1/2" Spline Spacer (P/N 107-4001-027) on top of the female spline and align holes.

FIGURE 9. Ring Gear Installed



4. Place the ring gear assembly (P/N 063-4001-011) over the female spline adapter with the V-ring facing down and the holes in the ring gear aligned with the holes in the female spline adapter.

FIGURE 10. Male Spline Adapter Installed



5. Align the bolt holes in the male spline adapter with the holes in the ring gear assembly.
6. Install and tighten the spline assembly bolts (P/N 311-0068-198) to secure the male spline adapter and ring gear to the female spline adapter.

REINSTALL THE STEERING WHEEL

FIGURE 11. Steering Wheel Placement



Nut and Washer
from Spline
Assembly Installed

1. Align the spokes of the steering wheel with the spokes on the ring gear.
2. Install the steering wheel on the male spline adapter.
3. Install the spline's washer and nut on the protruding male spline adapter.

FIGURE 12. Steering Wheel Cap Reinstalled



4. Replace the steering wheel cap.

CHAPTER

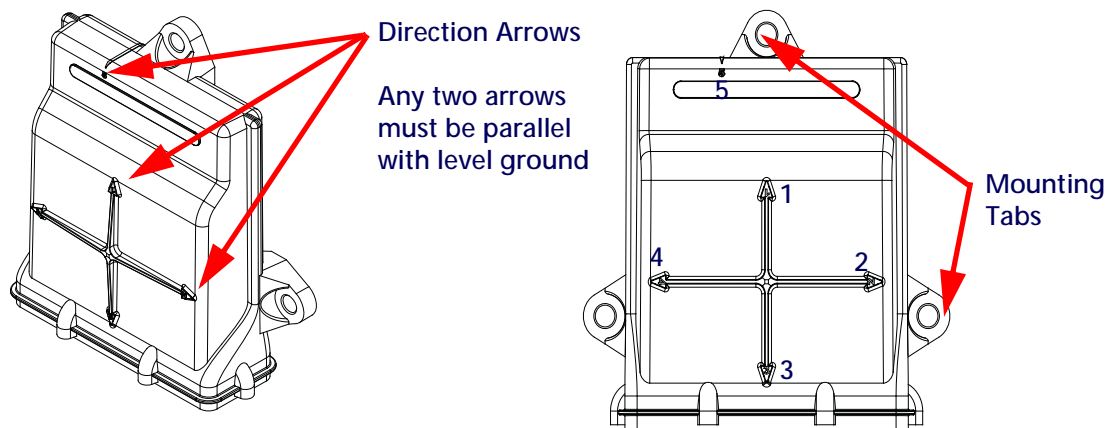
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NODE AND WIRING INSTALLATION

INSTALL THE SMARTRAX MD NODE

NODE MOUNTING LOCATIONS

FIGURE 1. Node Mounting



Identify the node mounting location appropriate for the machine's cab configuration. When choosing the location for the SmarTrax MD node, consider the following points:

- Mount the SmarTrax MD node inside the machine's cab on a flat, level surface for proper performance and cable connection.
- One of the six numbered direction arrows on the node must be oriented in the direction of forward vehicle travel, one arrow pointing straight up, and two of the arrows parallel to the ground.

NOTE: Make a note of the number of the arrow that is oriented in the direction of forward vehicle travel. This number will be needed during the SmarTrax MD calibration process.

- The node mounting location must not create tripping hazards.
- Mount the node in a location where it will not be kicked or jarred during normal equipment operation.
- The location must allow cable routing to avoid crimping or damaging the cables or the node connections.
- Securely fasten the node using bolts or screws through at least two of the three mounting holes. When mounted properly, the node should not become loose or rotate.

MOUNT THE SMARTRAX MD NODE

NOTE: The orientation of the node mounting plate may vary, depending on the machine's harness and hose routing.

1. Open the instructional seat.

FIGURE 2. Node Harness Installed



2. Position the node mounting bracket (P/N 107-0172-055) on the floor of the instructional seat compartment so that one of the arrows on the node casing will point straight ahead when the node is installed.
3. Secure the node mounting bracket to the floor using two #10-16 x 3/4" self-tapping screws (P/N 310-1002-073).
4. Install the two large, rectangular node connectors of the node harness (P/N 115-4001-109) into the correct ports of the node (P/N 063-4001-013).
5. Tighten the bolts on the harness connectors to secure the connections.
6. Install the node on the node mounting bracket using three 3/8"-16 flanged lock nuts (P/N 312-4001-167).
7. Connect the female 4-pin Deutsch connector to the cable of the installed foot switch (P/N 063-0173-593).
8. Connect the node harness to the operator presence switch, if applicable.
 - a. Locate and disconnect the machine's existing OPERATOR PRESENCE connection behind the operator's seat, if applicable.
 - b. Connect the round 4-pin connector from the node harness to the machine's mating OPERATOR PRESENCE connector.

FIGURE 3. Mechanical Drive Connection



9. Connect the 8-pin Deutsch connector from the node harness into the 8-pin port of the mechanical drive (P/N 063-4001-010).
10. Ensure the terminator (P/N 063-0172-369) supplied with the node harness is securely installed in the remaining 4-pin Deutsch connector.

INSTALL THE FOOT SWITCH

FIGURE 4. Foot Switch Installed



1. Select a suitable location for the foot switch (P/N 063-0173-593) to be installed.

NOTE: The foot switch should be installed in a location where the operator has easy access to it and is able to fully press the pedal.

2. Using the holes in the foot switch as a template, drill holes in the floor of the cab.
3. Secure the foot switch to the floor by installing the supplied screws in each of the mounting holes.
4. Locate the ENABLE connector on the node harness (P/N 115-4001-157) and connect it to the foot switch cable connector.

INSTALL THE CHASSIS CABLE - SMARTRAX MD-ONLY SYSTEMS (IF APPLICABLE)

If the machine does not contain an existing chassis power system (such as AutoBoom, product control, etc.), it is necessary to install the chassis power cable to operate the SmarTrax system. If a CAN system already exists on the machine, refer to Connect SmarTrax MD to an Existing Chassis Cable (If Applicable) below to connect power to the SmarTrax MD system.

NOTE: The chassis cable is sold separately. Contact your local Raven dealer for ordering information.

1. Locate the SmarTrax chassis cable (P/N 115-4001-085).
2. Connect the TO SMARTRAX NODE connector from the chassis cable to the round 16-pin connector on the node harness (P/N 115-4001-157).
3. Connect the TO CONSOLE CABLE connector to the Raven console cable.
4. Install a terminator (P/N 063-0172-369) on the CAN cable connector.
5. Loop and tie-off the REMOTE SWITCH cable connection, securing it with plastic cable ties as necessary.

NOTE: The REMOTE SWITCH connector is not used in the SmarTrax MD system. Ensure the cable is secured away from moving parts and heat sources.

6. Connect the ring terminals to the battery.

NOTE: The positive connectors are fused.

CONNECT SMARTRAX MD TO AN EXISTING CHASSIS CABLE (IF APPLICABLE)

NOTE: The SmarTrax interface tee is sold separately. Contact your local Raven dealer for ordering information.

1. Locate and disconnect the connection between the Raven console cable and chassis cable on the machine's existing CAN system.
2. Install the SmarTrax interface tee cable (P/N 115-4001-070 or 115-4001-071) between the chassis and Raven console harness.
3. Connect the SmarTrax MD node harness (P/N 115-4001-157) to the remaining SmarTrax interface tee connection.

CALIBRATE THE SMARTRAX MD SYSTEM

Refer to the SmarTrax MD Calibration & Operation Manual (P/N 016-5030-020) for instructions on calibrating the SmarTrax MD system, adjusting system settings, and system operation.

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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.