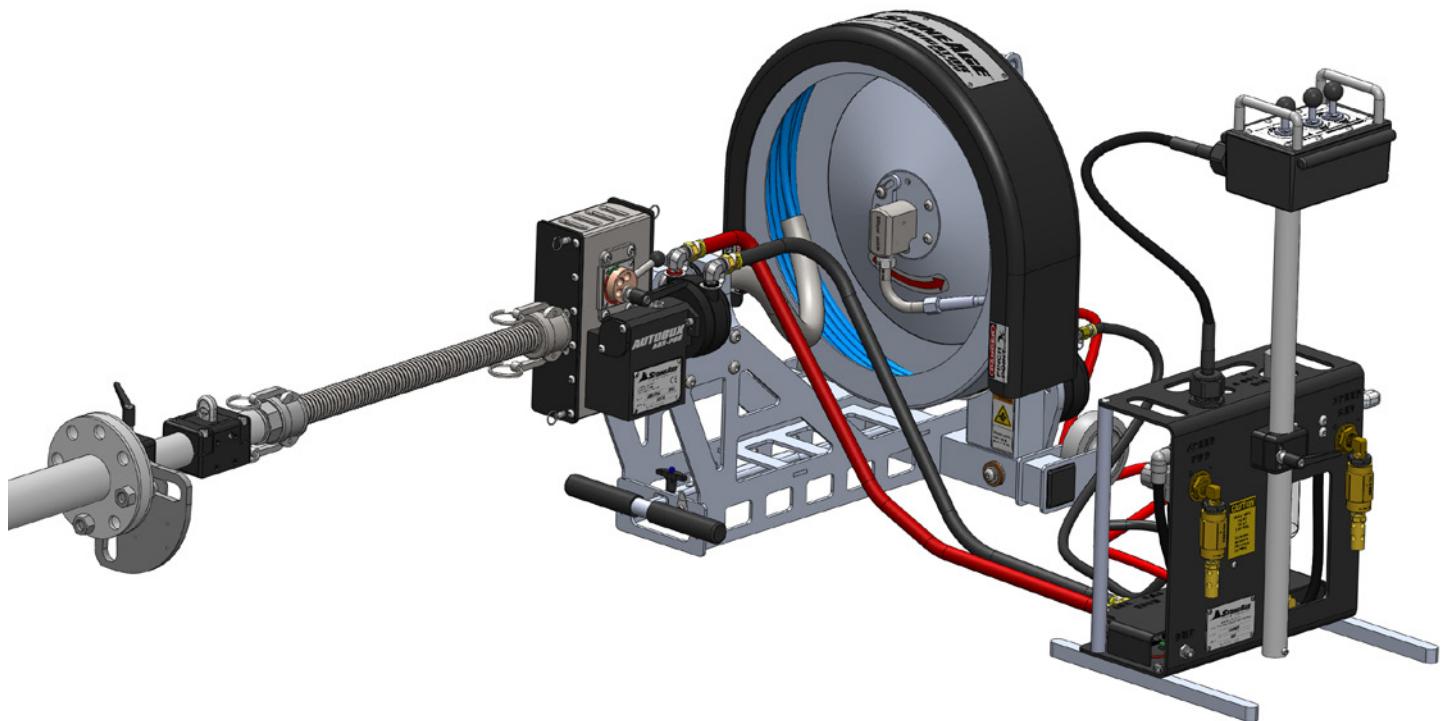




NAVIGATOR (NAV-100) & CONTROL BOX (CB-NAV) USER MANUAL



PL 613 REV G
(10/2019)

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Unit 3 Crucible Business Park
Woodbury Lane, Norton, Worcester,
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This manual must be used in accordance with all applicable national laws. The manual shall be regarded as a part of the machine and shall be kept for reference until the final dismantling of the machine, as defined by applicable national law(s).

Updated manuals can be downloaded at:
<https://www.stoneagetools.com/manuals>

SPECIFICATIONS		
	WEIGHTS	DIMENSIONS
Hose Feed Rate	2.7 in/s to 32 in/sec (69 mm/s to 813 mm/s)	
Cleans Minimum Pipe Size	2 in (51 mm)	
Cleans Maximum Pipe Size	4 in (102 mm)	
Hose Size - 4 layer hose	Outside Diameter range ø.39 in - ø.50 in	
Hose Drum Connection End	9/16"-18 Type M Female Swivel	
Air Connection to Control Box	Chicago Style twist-claw fitting	
Tool Connection End (Recommended for BA or BT tools)	3/8"-24 UNF RH HP Male Fitting (Blast-pro® or equivalent)	
Control Box to Navigator Air Connections	1/2" JIC (x2), 1/4" JIC (x2)	
Main Water Inlet Size	1" Type M comes standard. Other adapters are available	
Maximum Air Supply Pressure	125 psi (0.86 MPa)	
System Operating Pressure	80 psi (0.55 MPa) minimum, 100 psi (0.7 MPa) maximum	
Recommended Operational Temperature Range	32°F to 140°F (0°C to 60°C)	
HOSE DRUM CAPACITY		
Maximum Hose Lengths	Size	Length
	4/4	110ft
	5/4, 6/4	100ft

DESCRIPTION OF EQUIPMENT AND INTENDED USE

The Navigator NAV-100 is a hose feed device designed to quickly and safely clean a broad range of pipes with or without a flange. The Navigator NAV-100 mounts to pipes from 2 inches (51 mm) to 4 inches (102 mm) in diameter. The Navigator NAV-100 will clean past multiple bends and elbows using hose rotation and StoneAge's proven self-rotary tools. Standard safety practices should still be followed, but the Navigator NAV-100 allows the user to be stand away from the pipe entrance and be shielded from a tool.

KEY FEATURES:

Navigator NAV-100

- Modular, lightweight design
- Quick install
- Optional Strap Mount Assembly accommodates a wide variety of pipes

Control Box CB-NAV

- Small, lightweight, ergonomic design that includes a portable floor stand and filter-regulator-lubricator assembly
- 10' (3048 mm) umbilical allows user to move with the controls
- Drive controls: forward/reverse hose feed, rotate drum
- Pneumatic dump control switch



EU DECLARATION OF CONFORMITY

Manufacturer:

StoneAge Incorporated
466 South Skylane Drive
Durango, CO 81303
USA

Authorized Representative:

StoneAge Europe
Unit 3 Crucible Business Park
Woodbury Lane, Norton, Worcester,
Worcestershire, WR5 2DQ
United Kingdom
Steve Ellis, Director StoneAge Europe

Declare that:

Navigator (NAV-100) and Control Box (CBX-NAV)
for high pressure water cleaning of system parts.

Is compliant with the following Directives and Standards:

Directive 2006/42/EC (Machinery Directive)

EN ISO 12100:2010 (E) Safety of machinery – General principles for design – Risk assessment and risk reduction

The Technical File for Navigator (NAV-100) and Control Box (CBX-NAV) is maintained at:

StoneAge Incorporated, 466 South Skylane Drive, Durango, CO 81303, USA and was compiled by the Engineering Manager.
The Technical File is available through the Authorized Representative.

This Declaration of Conformity is issued under the exclusive responsibility of StoneAge Incorporated.

StoneAge Incorporated, Durango, CO, USA
Adam Markham, Engineering Manager, Robotics

02/11/2019
Date

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WARNING AND SAFETY INSTRUCTIONS

OPERATOR TRAINING

Managers, Supervisors, and Operators MUST be trained in Health and Safety Awareness of High-pressure Water Jetting and hold a copy of the Water Jetting Association (WJA) Code of Practice, or equivalent (see www.waterjetting.org.uk).

Operators MUST be trained to identify and understand all applicable standards for the equipment supplied. Operators should be trained in manual handling techniques to prevent bodily injury.

StoneAge has designed and manufactured this equipment considering all hazards associated with its operation. StoneAge assessed these risks and incorporated safety features in the design. StoneAge **WILL NOT** accept responsibility for the results of misuse.

IT IS THE RESPONSIBILITY OF THE INSTALLER/OPERATOR to conduct a job specific risk assessment prior to use. Job specific risk assessment MUST be repeated for each different set up, material, and location.

The risk assessment MUST conform to the Health and Safety at Work Act 1974 and other relevant Health and Safety legislation.

PERSONAL PROTECTIVE EQUIPMENT REQUIREMENTS

Use of Personal Protective Equipment (PPE) is dependent on the working pressure of water and the cleaning application. Managers, Supervisors, and Operators MUST carry out a job specific risk assessment to define the exact requirements for PPE. See Protective Equipment for Personnel (Section 6) of WJTA-IMCA's Recommended Practices For The Use Of High-pressure Waterjetting Equipment for additional information.

Hygiene - Operators are advised to wash thoroughly after all waterjetting operations to remove any waterblast residue which may contain traces of harmful substances.

First aid provision - users MUST be provided with suitable first aid facilities at the operation site.

SAFETY LABEL DEFINITIONS

Replacement labels can be ordered through Stoneage®. See part diagrams for label locations and replace when necessary.

The NAVIGATOR NAV-100 has the potential to cause serious injury if fingers, hair, or clothing become caught between the drive rollers of the drum assembly.

KEEP HANDS CLEAR
OF ROLLERS

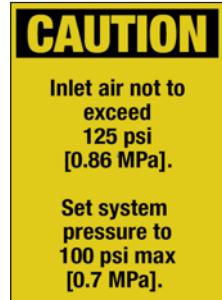


The ABX-PRO Tractor has the potential to cause serious injury if fingers, hair, or clothing become caught between the hose rollers of the ABX-PRO Tractor.

DO NOT OPERATE WITH THE HOUSING DOORS OPEN. ENSURE THAT ALL FOUR DOOR PINS ARE SECURED PRIOR TO OPERATION.



Maximum operating air pressure is 100 psi (0.7 MPa). Never exceed 125 psi (0.86 MPa) supply pressure. Exceeding 125 psi (0.86 MPa) supply pressure may result in injury to the Operator and/or damage to the equipment



WARNING AND SAFETY INSTRUCTIONS

⚠ WARNING

Operations with this equipment can be potentially hazardous. Caution MUST be exercised prior to and during machine and water jet tool use. Please read and follow all of these instructions, in addition to the guidelines in the WJTA Recommended Practices handbook, available online at www.wjta.org. Deviating from safety instructions and recommended practices can lead to severe injury and/or death.

- Do not exceed the maximum operating pressure specified for any component in a system.
- The immediate work area MUST be marked off to keep out untrained persons.
- Inspect the equipment for visible signs of deterioration, damage, and improper assembly. Do not operate if damaged, until repaired.
- Make sure all threaded connections are tight and free of leaks.
- Users of the Navigator NAV-100 MUST be trained and/or experienced in the use and application of high-pressure technology and cleaning, as well as all associated safety measures, according to the WJTA Recommended Practices for the use of High-pressure Waterjetting Equipment.
- An anti-withdrawal device (back-out preventer) MUST be used at all times. The back-out prevention device is located on the Splash Guard of the Navigator NAV-100. The adjustment instruction is located in the "ProDrive Set-up" section of this manual.
- The Control Box should be located in a safe location where the Operator has good visibility of the pipe and hose. The Navigator NAV-100 and Control Box MUST be supervised at all times and should never be left unattended.
- Always de-energize the system before servicing or replacing any parts. Failure to do so can result in severe injury and/or death.

PRE-RUN SAFETY CHECK

Refer to WJTA-IMCA's, Recommended Practices For The Use Of High-pressure Waterjetting Equipment and/or The Water Jetting Association's, WJA Code of Practice for additional safety information.

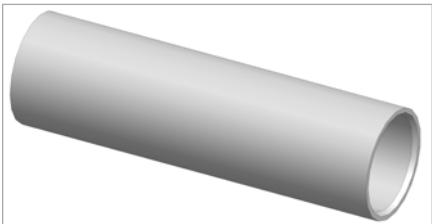
- Complete a job specific risk assessment and act on the resulting actions.
- Adhere to all site specific safety procedures.
- Ensure the waterblasting zone is properly barricaded and that warning signs are posted.
- Ensure the work place is free of unnecessary objects (e.g. loose parts, hoses, tools).
- Ensure all Operators are using the correct Personal Protective Equipment (PPE).
- Check that the air hoses are properly connected and tight.
- Check all hoses and accessories for damage prior to use. Do not use damaged items. Only high quality hoses intended for waterblast applications should be used as high-pressure hoses.
- Check all high-pressure threaded connections for tightness.
- ****Ensure that an anti-withdrawal device (back-out preventer), and all other applicable safety devices are installed and set-up properly.****
- Test the Control Box before operating the Navigator NAV-100 with high-pressure water to verify the control valves move the hose in the intended direction, and that the dump valve and hose clamp are working properly.
- Ensure that Operators never connect, disconnect, or tighten hoses, adapters, or accessories with the high-pressure water pump unit running.
- Ensure no personnel are in the hydroblasting zone.

SYSTEM ASSEMBLY - OVERVIEW

NAVIGATOR PIPE ATTACHMENT AND BACKOUT PREVENTION ASSEMBLIES

RECOMMENDED COLLET SIZES ARE LOCATED IN THE "PART DIAGRAM" SECTION AT THE BACK OF THIS MANUAL

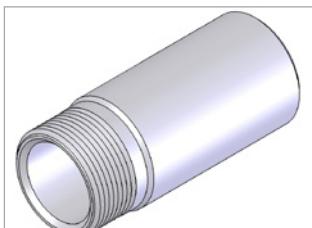
BOP 081-6
SNOUT TUBE



FF-121-XXX
COLLET

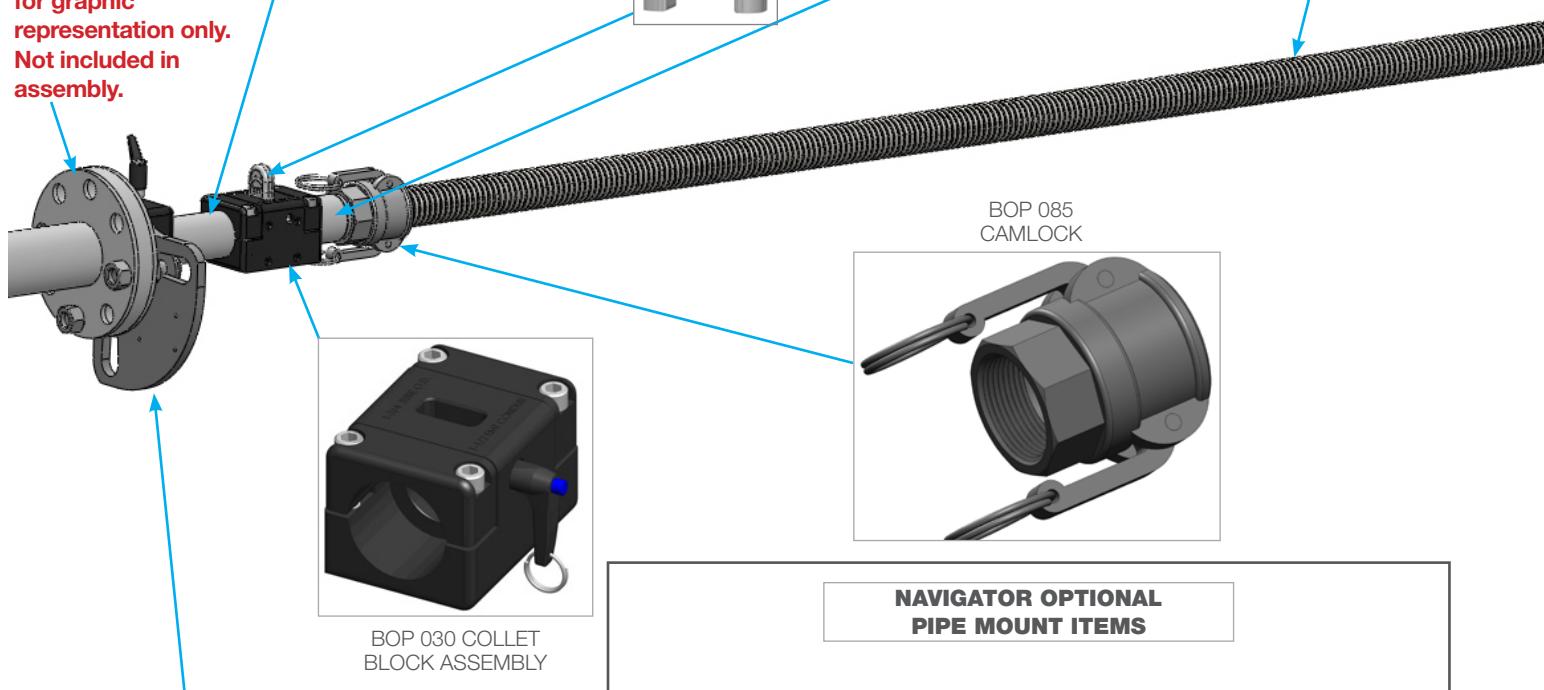


BOP 084
THREADED SNOUT TUBE



SNOUT
BOP 090

Pipe shown for graphic representation only. Not included in assembly.



BOP 085
CAMLOCK

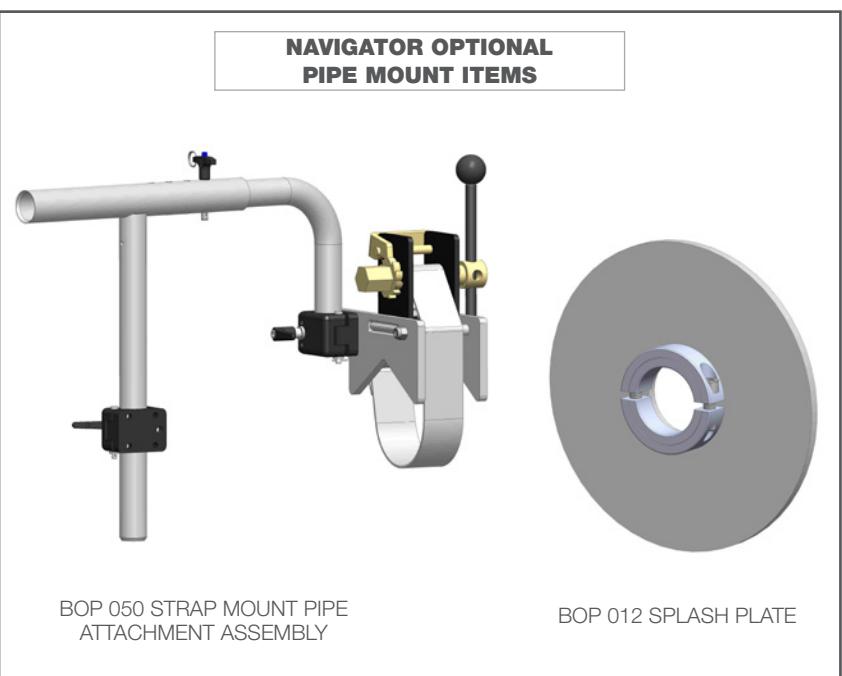


BOP 030 COLLET
BLOCK ASSEMBLY

NAVIGATOR OPTIONAL PIPE MOUNT ITEMS



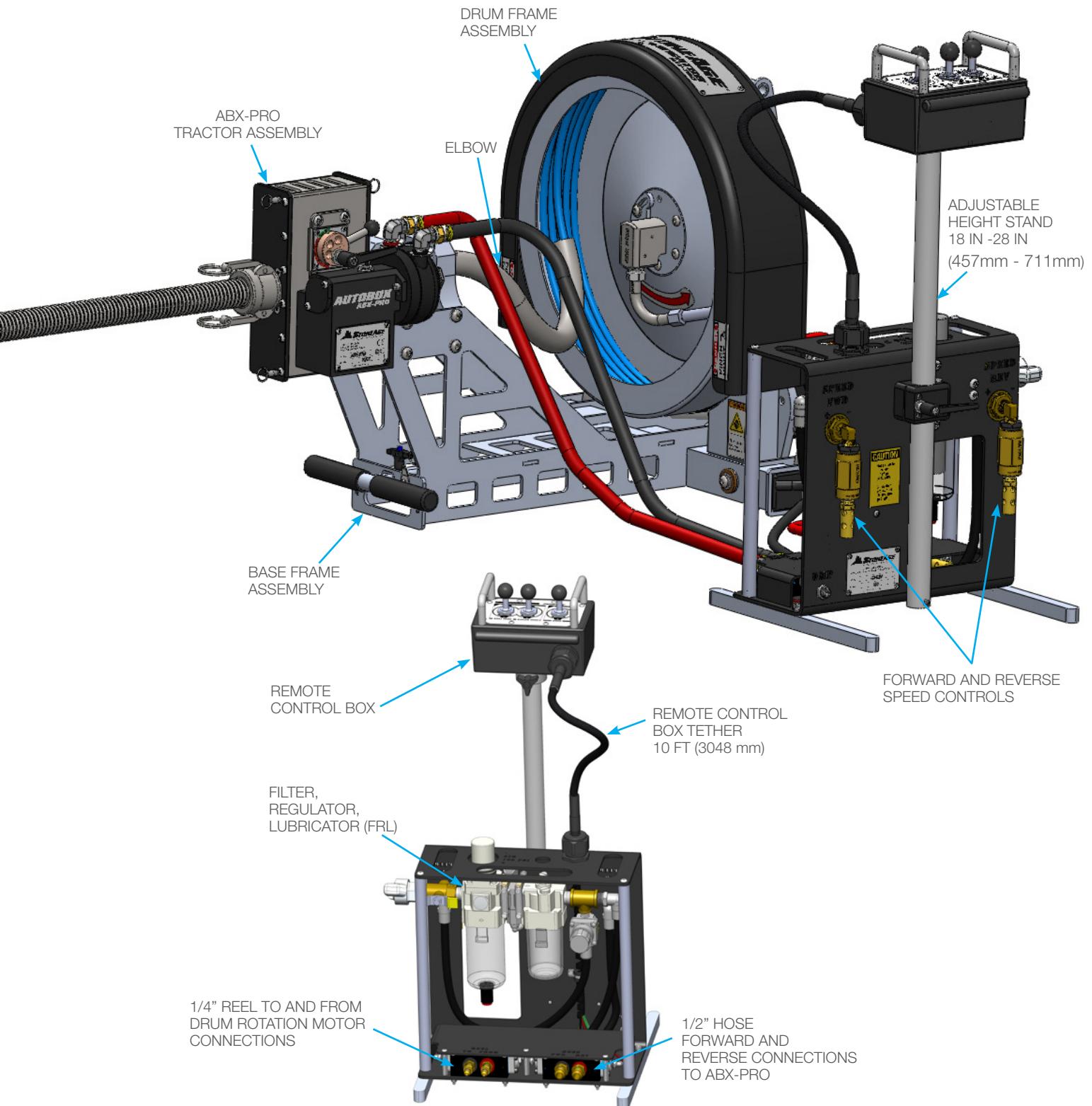
BOP 010-2-4 QTR
QUARTER PLATE FLANGE MOUNT



BOP 050 STRAP MOUNT PIPE
ATTACHMENT ASSEMBLY

BOP 012 SPLASH PLATE

NAVIGATOR WITH CONTROL BOX ASSEMBLY
(NAV-100 AND CB-NAV)



CONTROL BOX ASSEMBLY
(CB-NAV)

NAVIGATOR SET-UP

HOSE DRUM ASSEMBLY TO BASE FRAME ASSEMBLY

1. Remove Quick Release Pin from Base Frame Assembly. Install the Hose Drum Assembly onto the Base Frame Assembly by placing the shoulder screw heads into the notches on the Joint Plates and inserting the Quick Release Pin through the holes in the Joint Plates. **(Figure 1)**

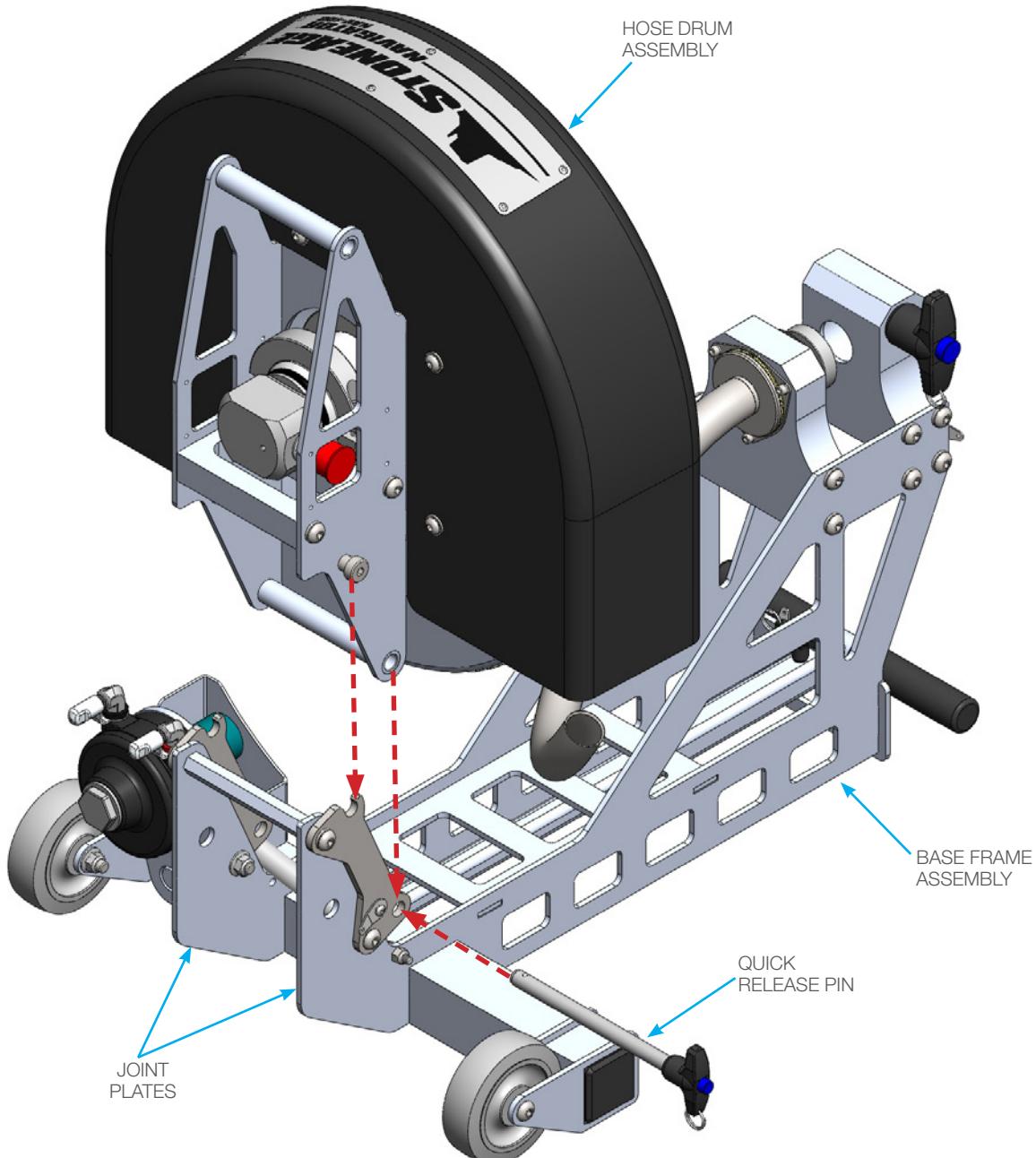
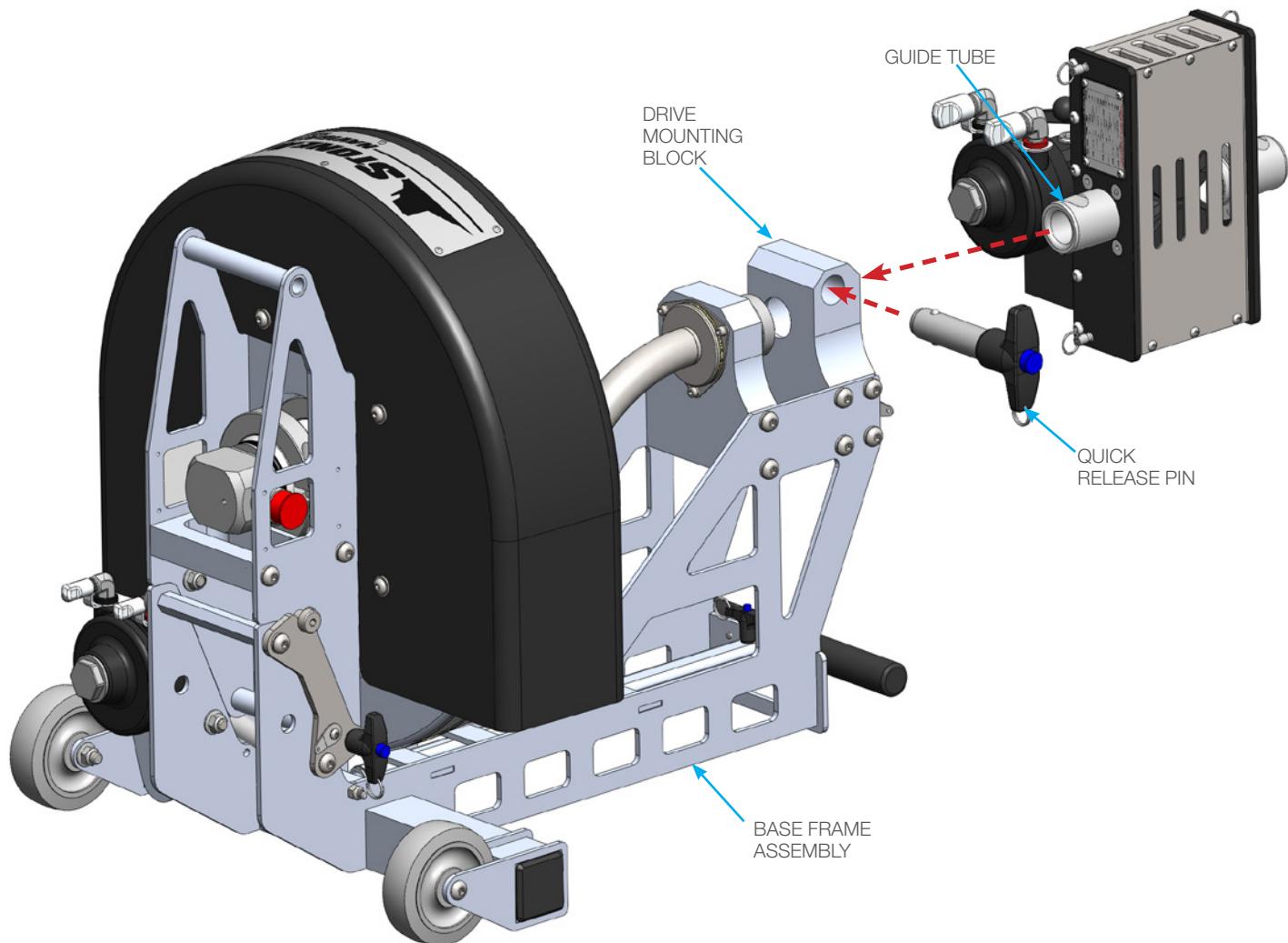


FIGURE 1

ABX-PRO PRODRIVE TO BASE FRAME ASSEMBLY

2. Remove Quick Release Pin from Base Frame Assembly, Install the ABX-PRO PRODRIVE onto the Base Frame Assembly by sliding the Guide Tube into the Drive Mounting Block and inserting the Quick Release Pin. (**Figure 2**)

**FIGURE 2**

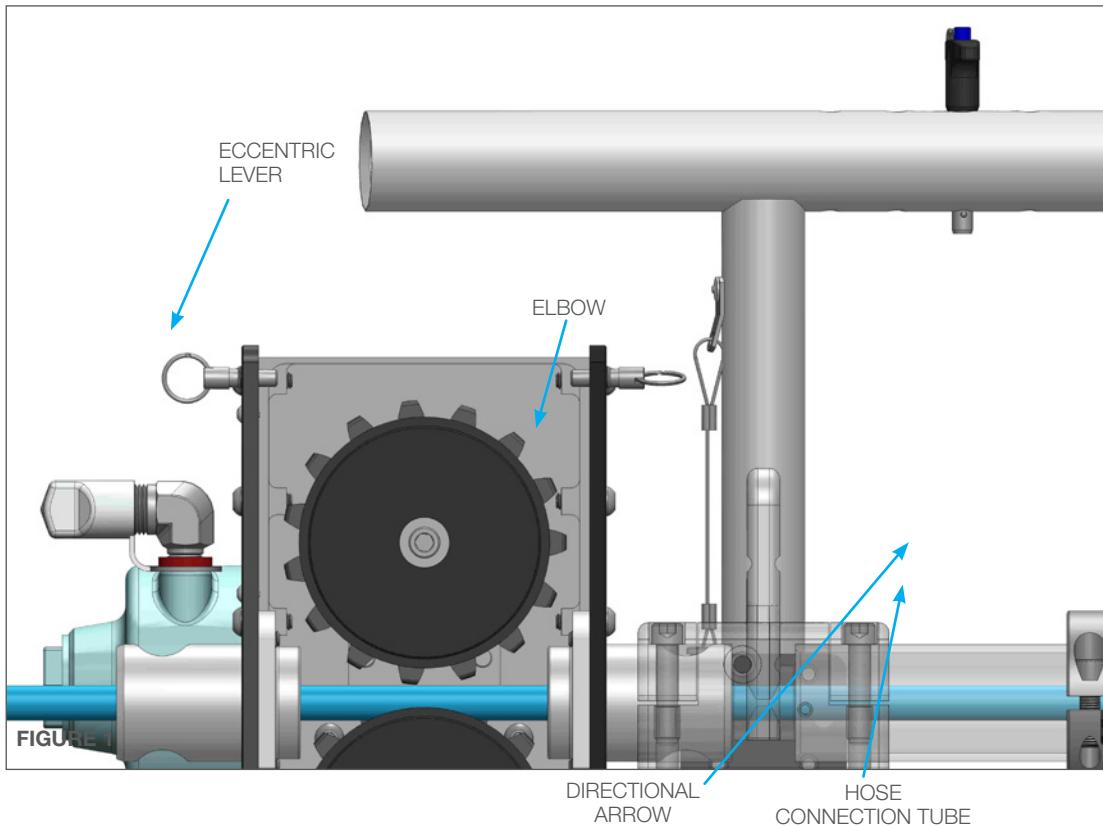
NAVIGATOR SET-UP

LOADING THE HIGH-PRESSURE HOSE

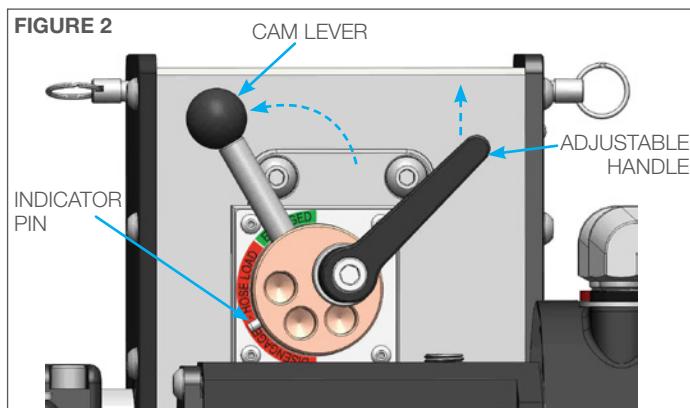
NOTICE

Only high quality hoses intended for waterblast applications should be used as high-pressure hoses. Pressure rating of high-pressure hoses MUST NEVER be exceeded. Do not use a shrouded hose or hose with a steel protective cover. This will cause severe damage to the Rollers.

1. Connect the female hose end to the hose connection tube and wind the hose in the direction of the arrow inside the drum. (**Figure 1**)



2. Load the hose into the ABX-PRO tractor by releasing the Adjustable Handle and rotating the Cam Lever counterclockwise until the Indicator Pin is in the “**Disengaged**” position. This will open up the space between the rollers to allow for the hose to slip between them. (**Figure 2**)



3. With the Rollers open, slip the hose through the Drive Block, Rollers and Guide Tube. Be sure to pull enough extension to feed through the Snout. (**Figure 3**)

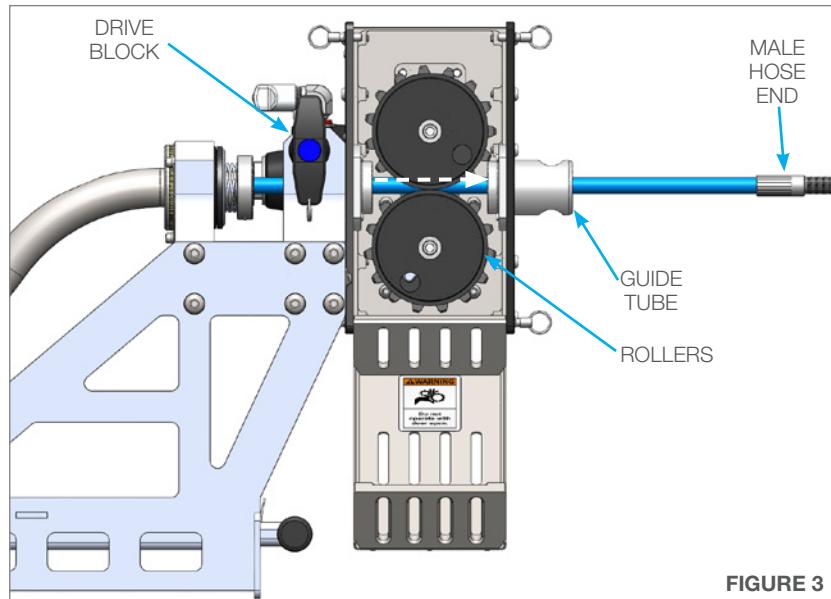


FIGURE 3

4. Rotate the Cam Lever clockwise to the **“Engaged”** position to tighten the Idler Roller down onto the hose. Push the Adjustable Handle down to tighten the bushing assembly. (**Figure 4**)
 5. Push the back cover back into the closed position and secure the two Quick Release Pins on the top of the ABX-PRO AUTOBOX® PRODRIVE TRACTOR. (**Figure 5**)

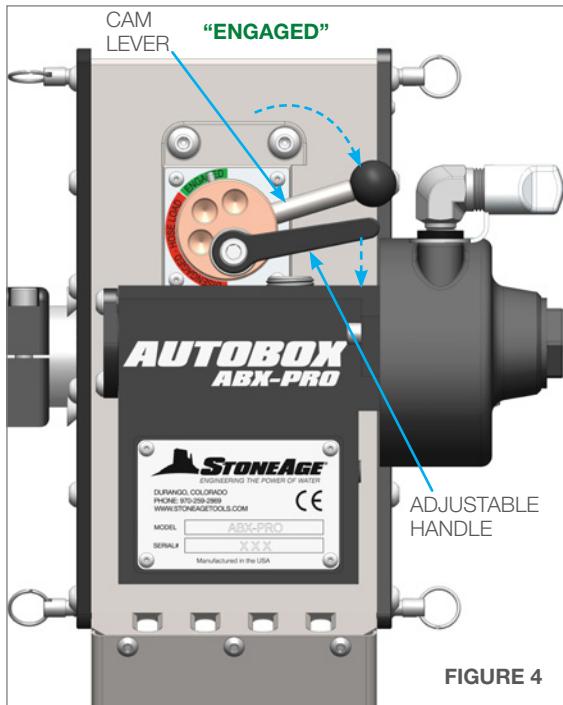


FIGURE 4

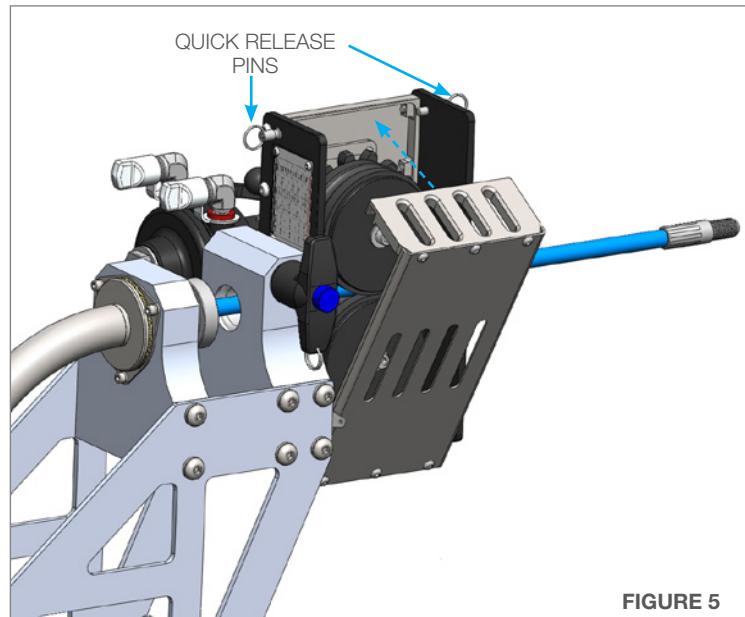
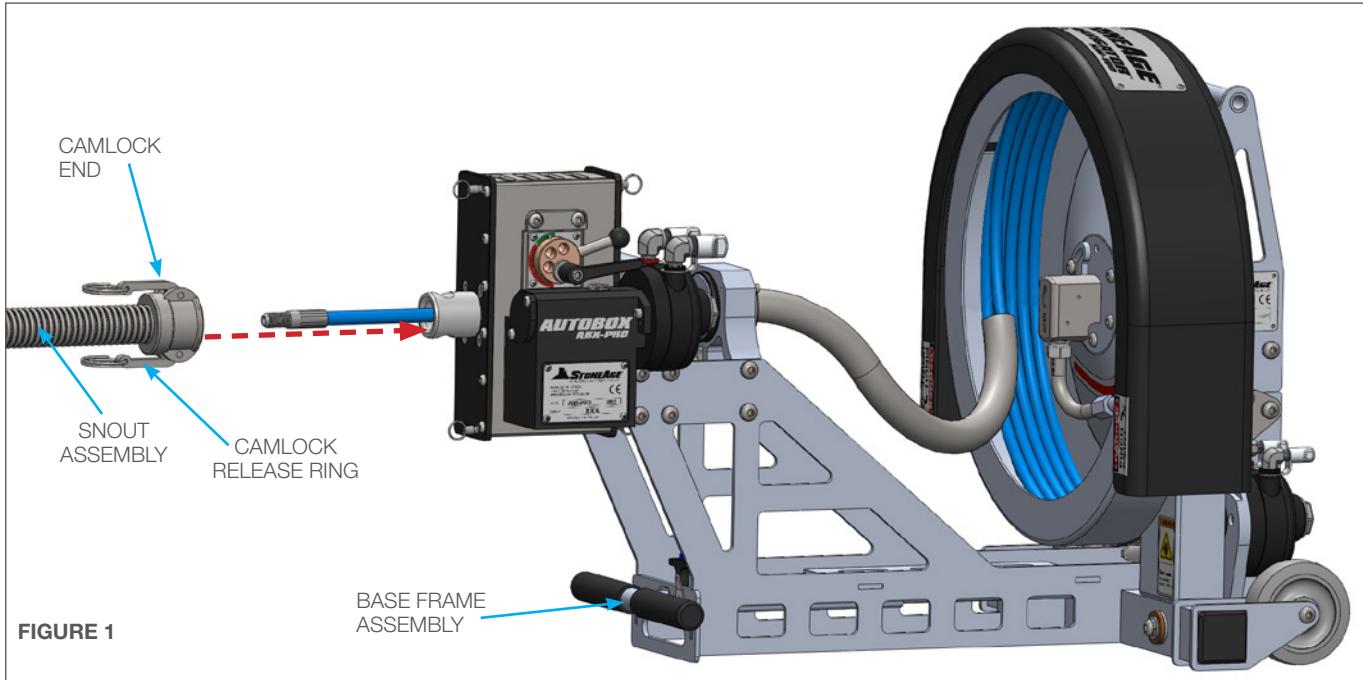


FIGURE 5

NAVIGATOR SET-UP

SNOUT ASSEMBLY TO ABX-PRO PRODRIVE

1. Pull on the Camlock Release Rings and slide the Camlock onto the male end of the ABX-PRO PRODRIVE. Push the Camlock pins back to lock into place. (**Figure 1**) Pull on the Snout Assembly to make sure it is secured. Feed the rest of the hose through the Snout Assembly and leave enough length to feed through a pipe flange attachment.



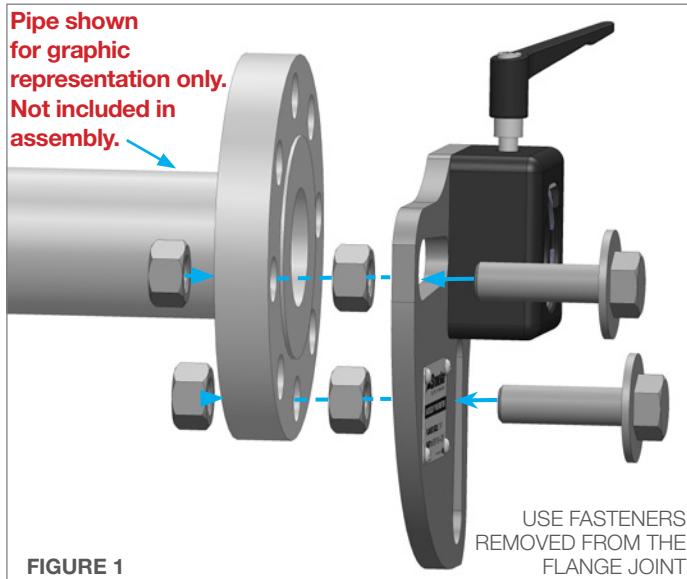
QUARTER PLATE FLANGE MOUNT ASSEMBLY SET-UP - INCLUDED

QUARTER PLATE FLANGE MOUNT (BOP 010-2-4 QTR) TO PIPE

1. Attach the Quarter Plate Flange Mount to the pipe flange using the fasteners that were removed from the flange joint. The nuts shown between the pipe flange and the Quarter Plate Flange Mount are to allow for drainage. Other spacer options are acceptable. (**Figure 1**)
2. Adjust the Quarter Plate Flange Mount by sliding it along the slots to center the inside diameter of the Hinge Clamp with the inside diameter of the pipe. Tighten all hardware to secure in place. (**Figure 2**)

NOTICE

If the cleaning tool diameter is larger than the inside diameter of the snout tubes, the high pressure hose will need to be fed through the Quarter Plate Flange Mount before installing the tool on the male hose end. Skip to the next page if this is necessary.



QUARTER PLATE FLANGE MOUNT ASSEMBLY SET-UP - INCLUDED

SNOUT CONNECTION AND BACKOUT PREVENTION ASSEMBLY

3. Thread the BOP 084 Threaded Snout Tube into the BOP 085 Camlock at the end of the BOP 090 Snout. (**Figure 3**)

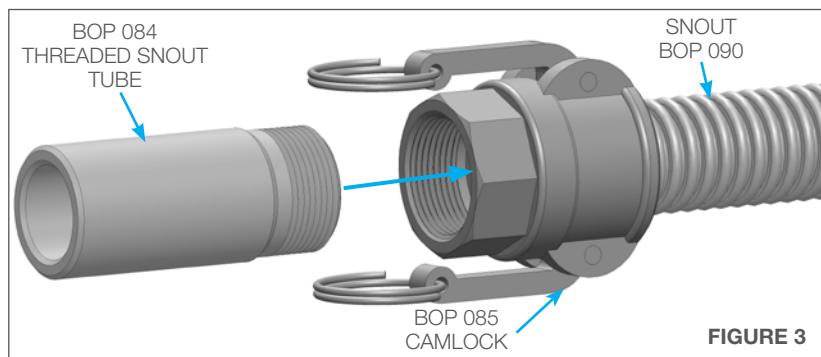


FIGURE 3

4. Loosen the two screws on the collet cap block and slide the BOP 030 Collet Block Assembly onto the BOP 084 Threaded Snout Tube. Push the Collet Block until it stops on the Snout Tube, then tighten the two screws securely. (**Figure 4**)

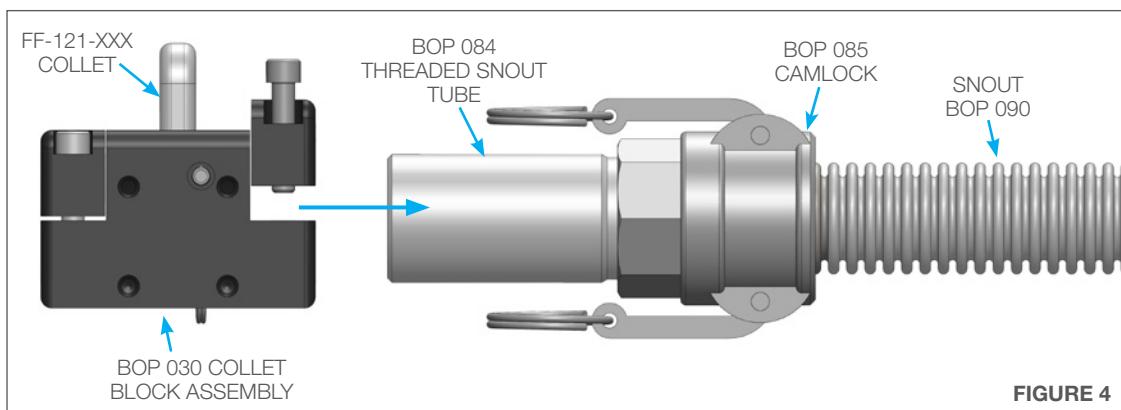


FIGURE 4

5. Loosen the two screws on the collet cap block and slide the BOP 081-6 Snout Tube into the BOP 030 Collet Block Assembly. Push the Snout Tube until it stops in the Collet Block Assembly, then tighten the two screws securely. (**Figure 5**)

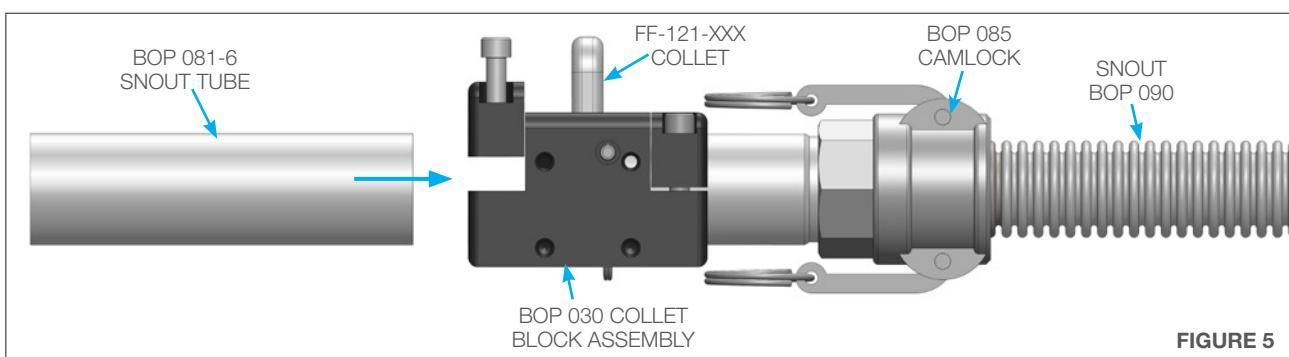


FIGURE 5

QUARTER PLATE FLANGE MOUNT ASSEMBLY SET-UP - INCLUDED

SNOUT CONNECTION AND BACKOUT PREVENTION COLLET

⚠ WARNING

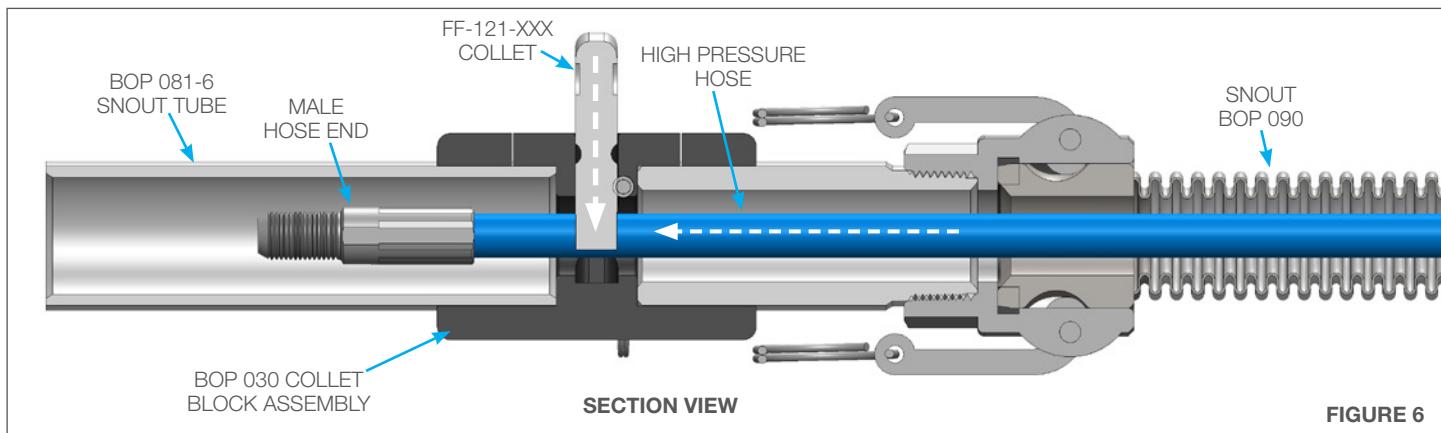
Prior to use, always test the backout preventer to ensure the tool does not pass backward through the Collet Block Assembly. Failure to do so can result in severe injury and/or death. It is the responsibility of the user to select proper collet sizing to assure the end of the hose will not pass through the Collet. Use the chart below in to select proper collet size.

NOTICE

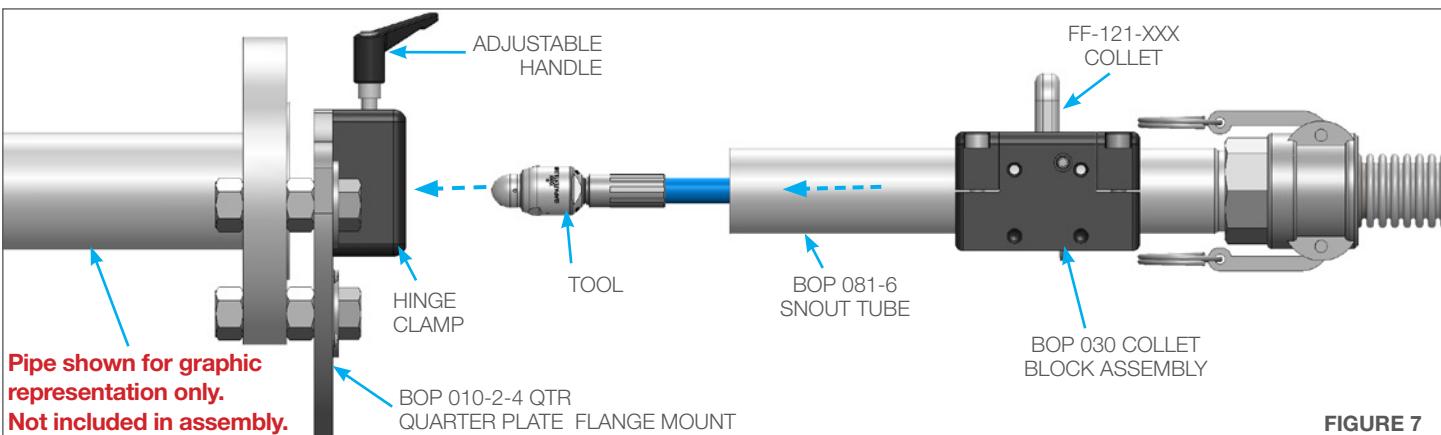
The NAVIGATOR NAV-100 comes with one customer specified FF 121-XXX Collet installed in the BOP 030 Collet Block Assembly. It is necessary to change the Collet size when changing to a different diameter hose. There are additional roller and collet sizes beyond the list below that are only to be used when operating the ABX-PRO as part of the ABX-PRO-100 PRODRIVE Assembly. THE REPLACEMENTS SHOWN IN THE CHART BELOW ARE THE ONLY SIZES TO BE USED WITH THE NAVIGATOR ASSEMBLY. Additional information on the ABX-PRO-100 PRODRIVE Assembly can be found in the ABX-PRO-100 PRODRIVE manual at WWW.STONEAGETOOLS.COM.

POLY ROLLER ABX-PRO	HOSE O.D.	SPIR STAR	PARKER	COLLET SIZE	STONEAGE PART NUMBER
PRO 174-46 Ø 0.46 IN.	0.39 - 0.50 IN. 9.9 - 12.7 MM	4/4	2440D-025	0.438 in. / 11.0 mm	FF 121-438
		5/4		0.460 in. / 11.7 mm	FF 121-460
			2440D-03	0.484 in. / 12.3 mm	FF 121-484
		6/4	2440D-04	0.516 in. / 13.0 mm	FF 121-516

6. Remove the Quick Release Pin and the Collet from the Collet Block Assembly. Push the Male Hose End past the Collet and reinsert the Collet and Quick Release Pin. Test the collet by pulling the hose in the reverse direction of installation to ensure the Male Hose End does not back out past the Collet. (**Figure 6**)



7. Attach desired tool onto the male hose end (Stoneage® Beetle® shown for reference). SEE THE APPLICABLE TOOL MANUAL FOR INSTALLATION INSTRUCTIONS. Loosen the adjustable handle on the Hinge Clamp. Feed the high pressure hose with tool and Snout Tube into the Quarter Plate Flange Mount. Tighten the adjustable handle to secure. (**Figure 7**)

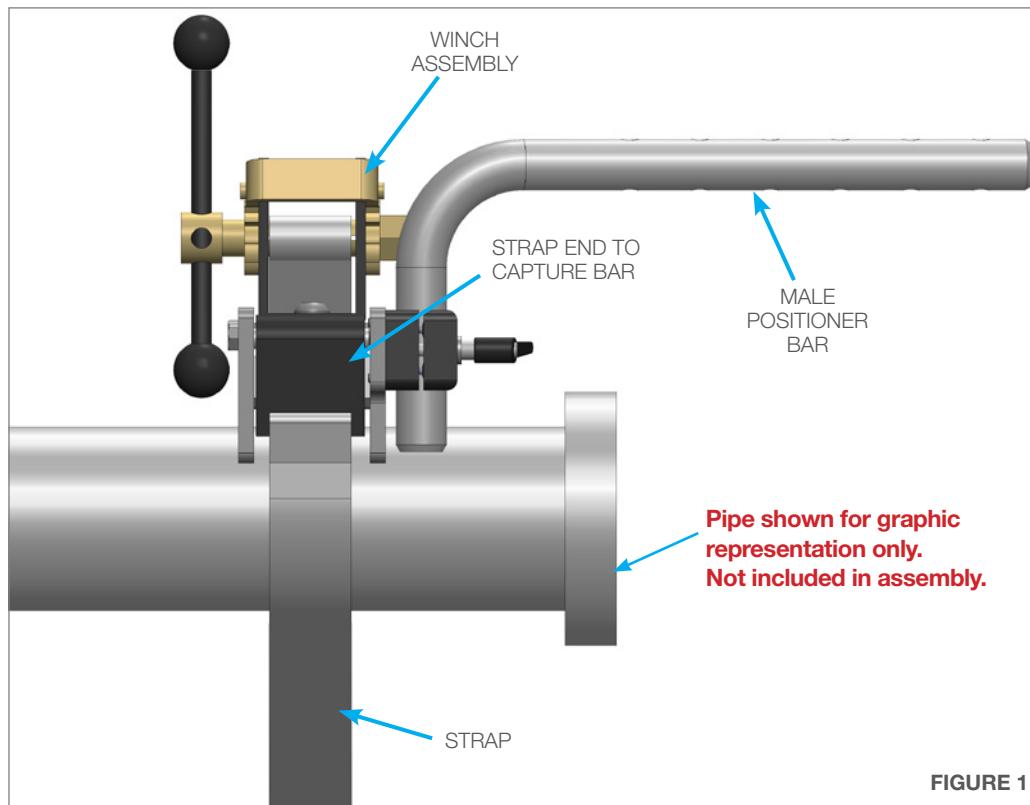


STRAP MOUNT ASSEMBLY SET-UP- OPTIONAL

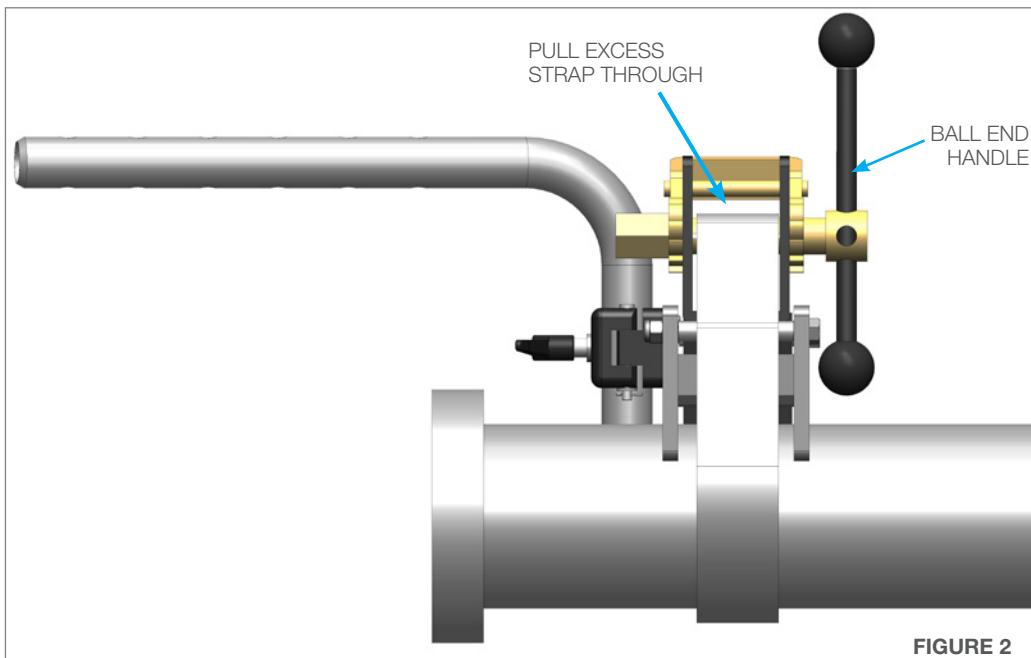
STRAP MOUNT ASSEMBLY (BOP 050) - MALE POSITIONER SIDE

The Strap Mount Assembly (BOP 050) is designed for pipes that do not have flanges.

1. Attach the strap end to the strap capture bar and wrap the strap around the pipe towards the Winch Assembly. (**Figure 1**)



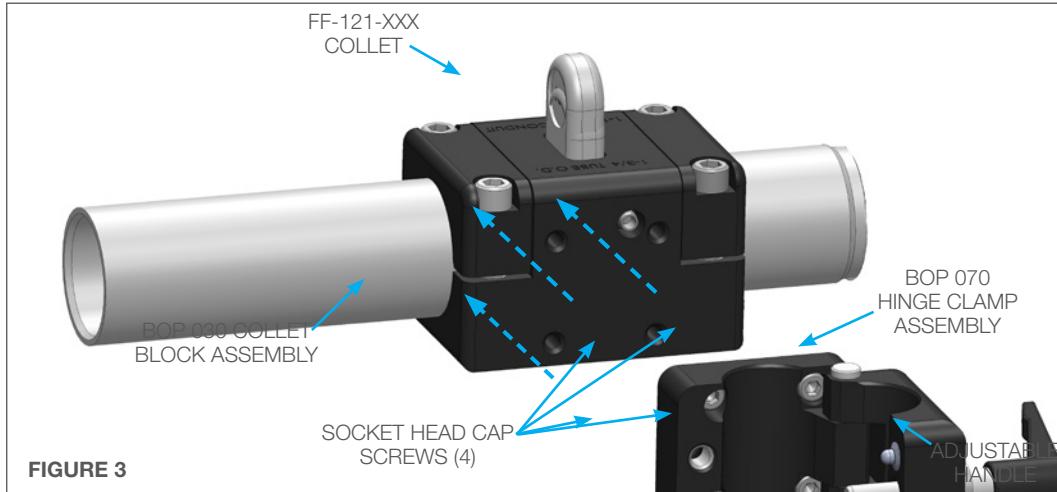
2. Pull excess strap through the Winch Assembly and tighten down with the Ball End Handle. (**Figure 2**)



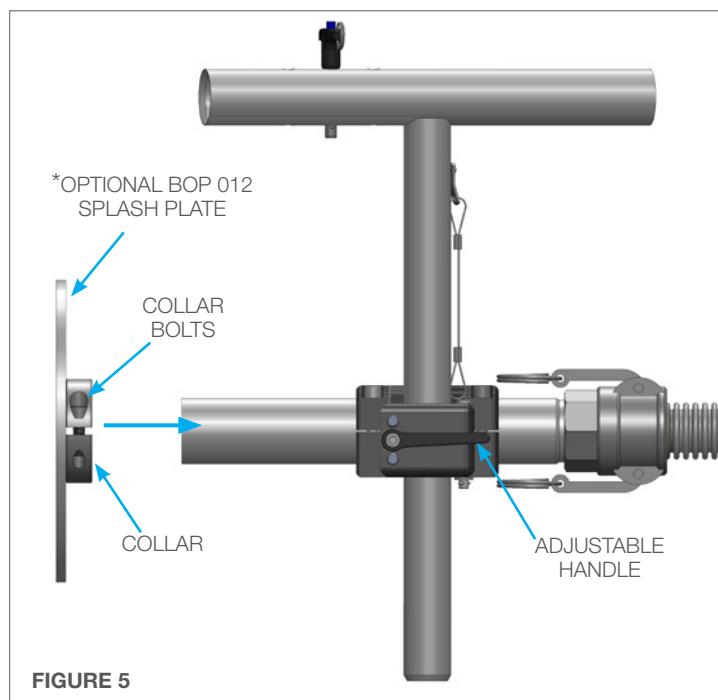
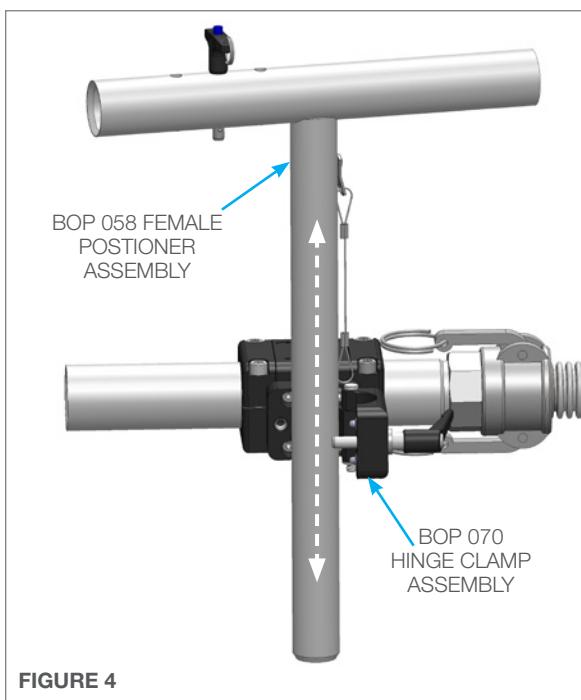
STRAP MOUNT ASSEMBLY SET-UP- OPTIONAL

STRAP MOUNT ASSEMBLY (BOP 050) - FEMALE POSITIONER SIDE

- Release the Adjustable Handle on the BOP 070 Hinge Clamp to access the 4 socket head cap screws. Locate the side of the BOP 030 Collet Block Assembly with 4 threaded holes. Orient the Hinge Clamp so that the hinge is on the right. Fasten the Hinge Clamp Assembly to the Collet Block Assembly using the 4 supplied socket head cap screws. (**Figure 3**)



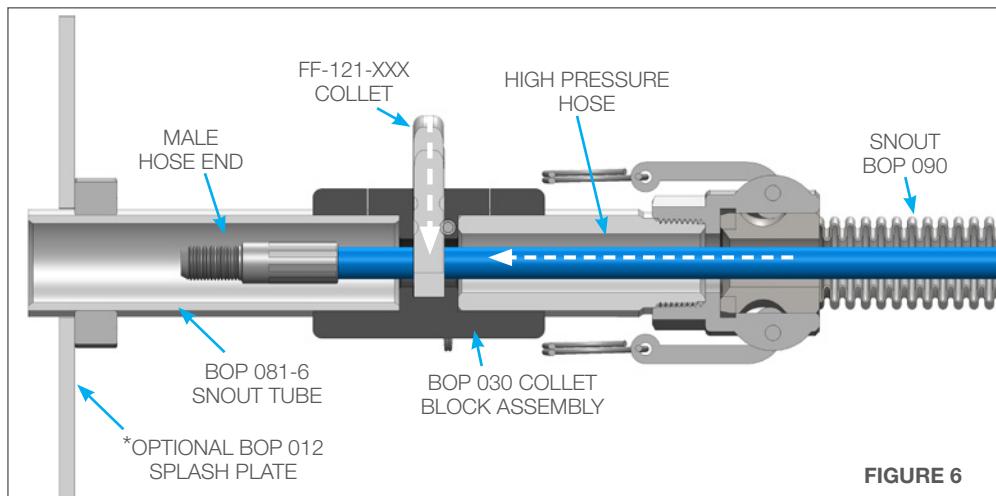
- Insert the BOP 058 Female Positioner Assembly into the Hinge Clamp Assembly. This can be done in the open or closed position and is designed to be adjustable based on the size of the pipe. (**Figure 4**)
- Close the Hinge Clamp Assembly and tighten the Adjustable Handle. To Install the BOP 012 OPTIONAL Splash Plate loosen the two bolts on the collar, slide it onto the BOP 081-6 Snout Tube and hand tighten the collar bolts when in position. (**Figure 5**)



STRAP MOUNT ASSEMBLY SET-UP- OPTIONAL

DRIVE SIDE TUBE MOUNT AND BACKOUT PREVENTION COLLET

6. Remove the Quick Release Pin and the Collet from the Collet Block Assembly. Push the Male Hose End past the Collet and reinsert the Collet and Quick Release Pin. Pull back on the hose to ensure the Male Hose End does not back out past the Collet. (**Figure 6**)



WARNING

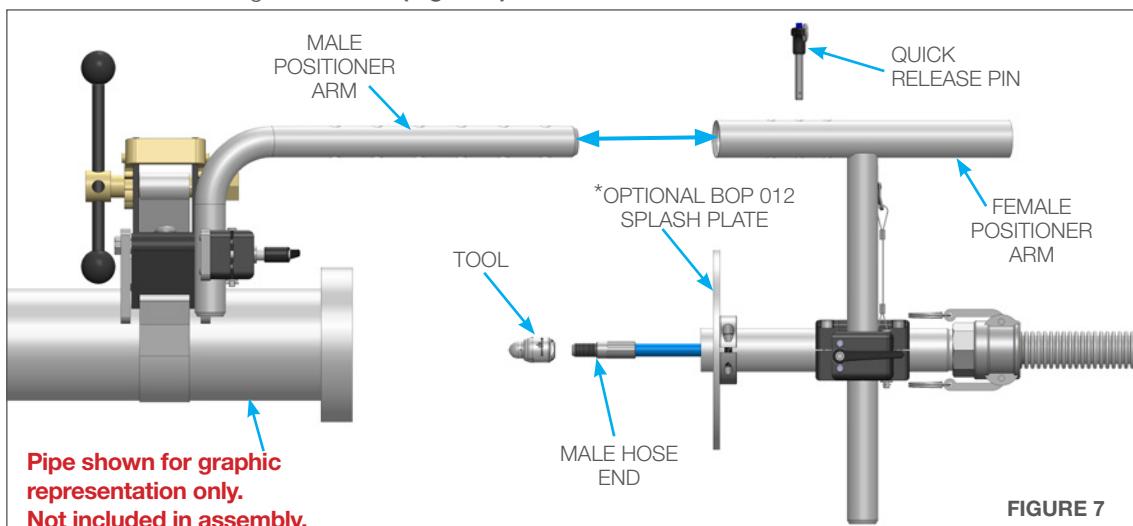
Prior to use, always test the backout preventer to ensure the tool does not pass backward through the Collet Block Assembly. Failure to do so can result in severe injury and/or death. It is the responsibility of the user to select proper collet sizing to assure the end of the hose will not pass through the Collet. Use the chart below in to select proper collet size.

NOTICE

The NAVIGATOR NAV-100 comes with one customer specified FF 121-XXX Collet installed in the BOP 030 Collet Block Assembly. It is necessary to change the Collet size when changing to a different diameter hose. There are additional roller and collet sizes beyond the list below that are only to be used when operating the ABX-PRO as part of the ABX-PRO-100 PRODRIVE Assembly. THE REPLACEMENTS SHOWN IN THE CHART BELOW ARE THE ONLY SIZES TO BE USED WITH THE NAVIGATOR ASSEMBLY. Additional information on the ABX-PRO-100 PRODRIVE Assembly can be found in the ABX-PRO-100 PRODRIVE manual at WWW.STONEAGETOOLS.COM.

POLY ROLLER ABX-PRO	HOSE O.D.	SPIR STAR	PARKER	COLLET SIZE	STONEAGE PART NUMBER
PRO 174-46 Ø 0.46 IN.	0.39 - 0.50 IN. 9.9 - 12.7 MM	4/4	2440D-025	0.438 in. / 11.0 mm	FF 121-438
		5/4		0.460 in. / 11.7 mm	FF 121-460
			2440D-03	0.484 in. / 12.3 mm	FF 121-484
		6/4	2440D-04	0.516 in. / 13.0 mm	FF 121-516

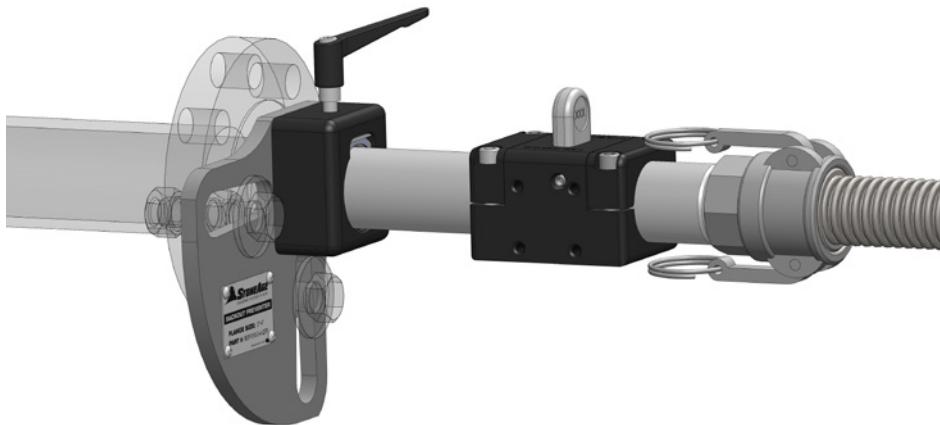
5. Attach desired tool onto the male hose end (Stoneage® Beetle® shown for reference). SEE THE APPLICABLE TOOL MANUAL FOR INSTALLATION INSTRUCTIONS. Connect the Male and Female Positioner Arms. Select the appropriate positioning holes and insert the Quick Release Pin through both arms. (**Figure 7**)



TIGHT PIPE FLANGE JOINT ATTACHMENT OPTIONS

NAV-100 NAVIGATOR ASSEMBLY WITH STRAIGHT MOUNTING OPTIONS

THE MOUNTING OPTION BELOW IS USED ON FLANGED PIPES
(INCLUDED WITH NAVIGATOR PACKAGE)

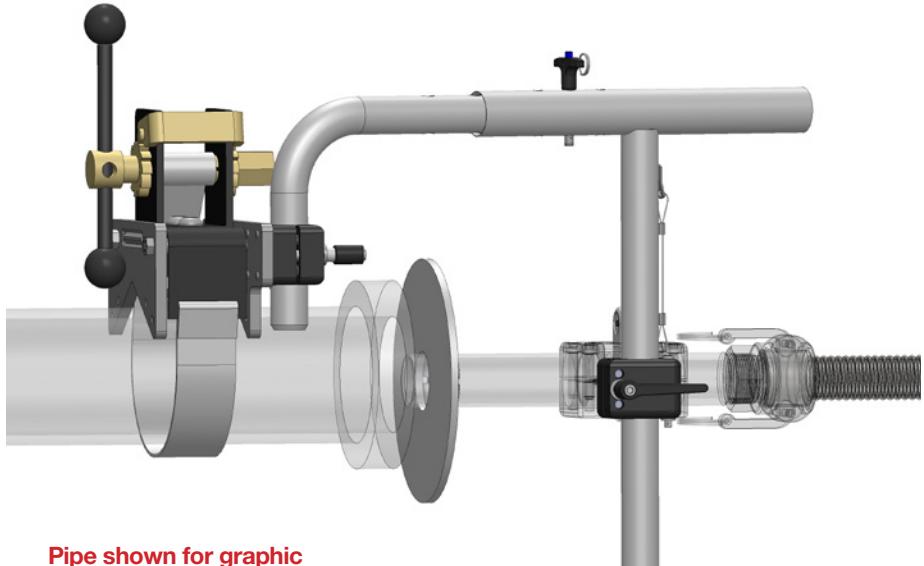


Pipe shown for graphic representation only. Not included in assembly.

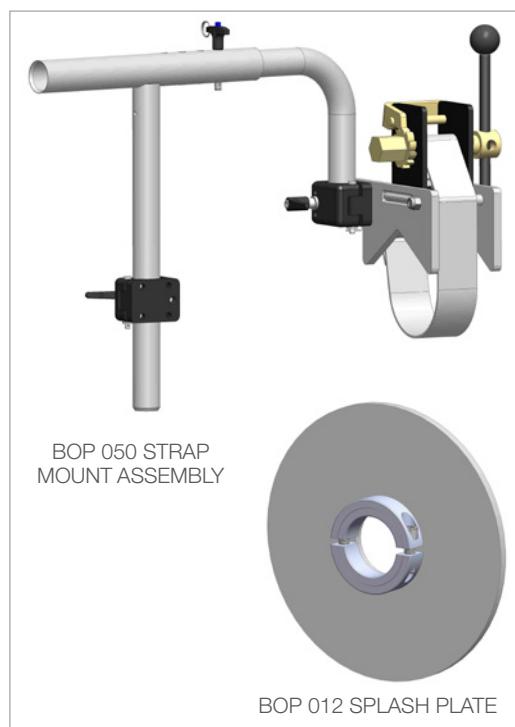


QUARTER PLATE BOP
BOP 010-2-4 QTR

THE MOUNTING OPTION BELOW IS USED ON FLANGELESS PIPES
(NOT INCLUDED WITH NAVIGATOR PACKAGE)



Pipe shown for graphic representation only. Not included in assembly.



BOP 050 STRAP MOUNT ASSEMBLY

BOP 012 SPLASH PLATE

TIGHT PIPE FLANGE JOINT ATTACHMENT OPTIONS

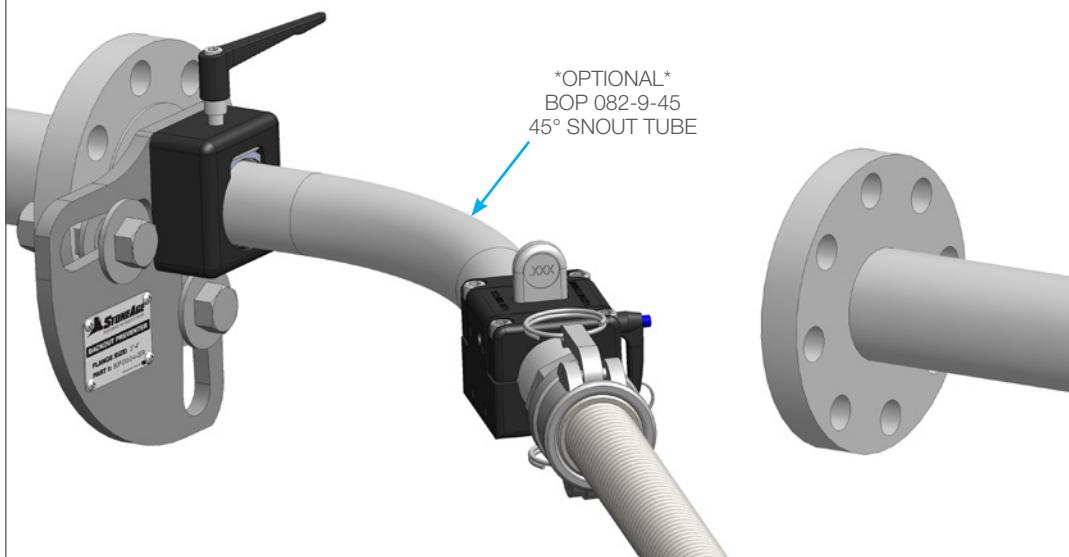
NAV-100 NAVIGATOR ASSEMBLY WITH OFF AXIS MOUNTING OPTIONS FOR TIGHT PIPE JOINTS

THE MOUNTING OPTIONS BELOW ARE FOR USE WHEN THE PIPE JOINT WILL NOT SEPARATE ENOUGH TO ALLOW A STRAIGHT ENTRY CONNECTION.

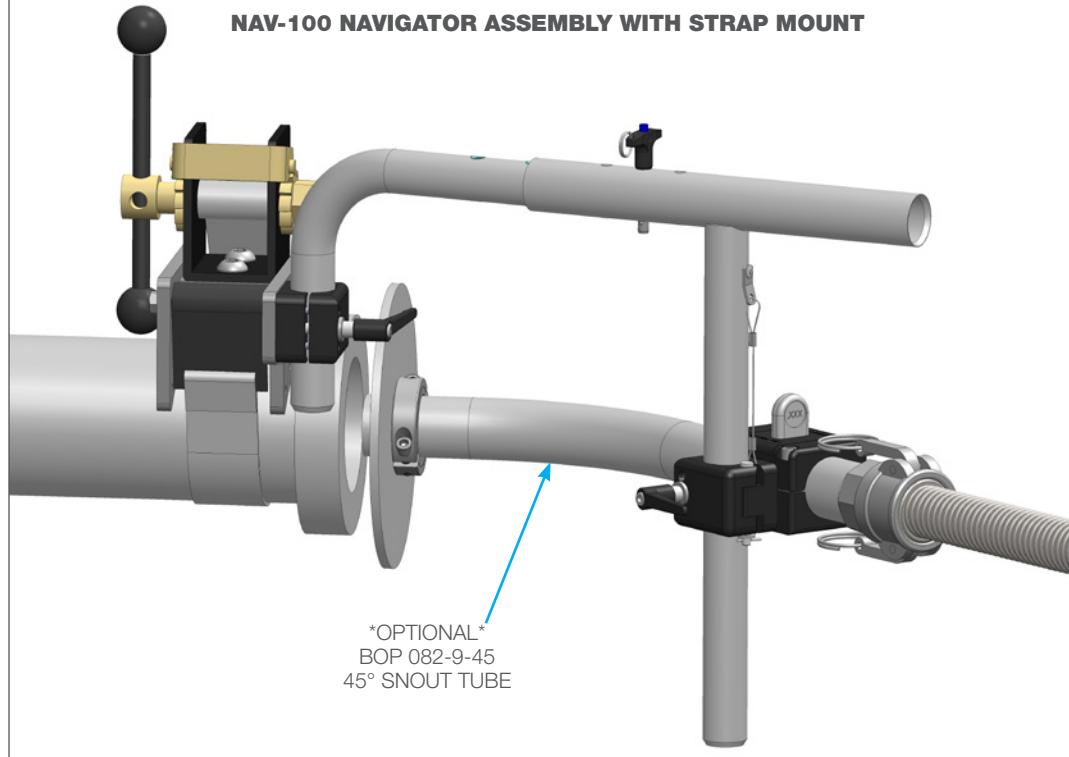
THE BOP 082-9-45 IS AVAILABLE THROUGH STONEAGE® FOR 45° BENDS. A STANDARD 1.75" ELECTRICAL CONDUIT CAN ALSO BE USED FOR CONNECTIONS OF VARYING ANGLES.

MAINTAIN A GREATER THAN 6" CENTERLINE RADIUS BEND TO AVOID CONSTRAINING THE MOVEMENT OF THE TOOL.

NAV-100 NAVIGATOR ASSEMBLY WITH QUARTER PLATE MOUNT



NAV-100 NAVIGATOR ASSEMBLY WITH STRAP MOUNT

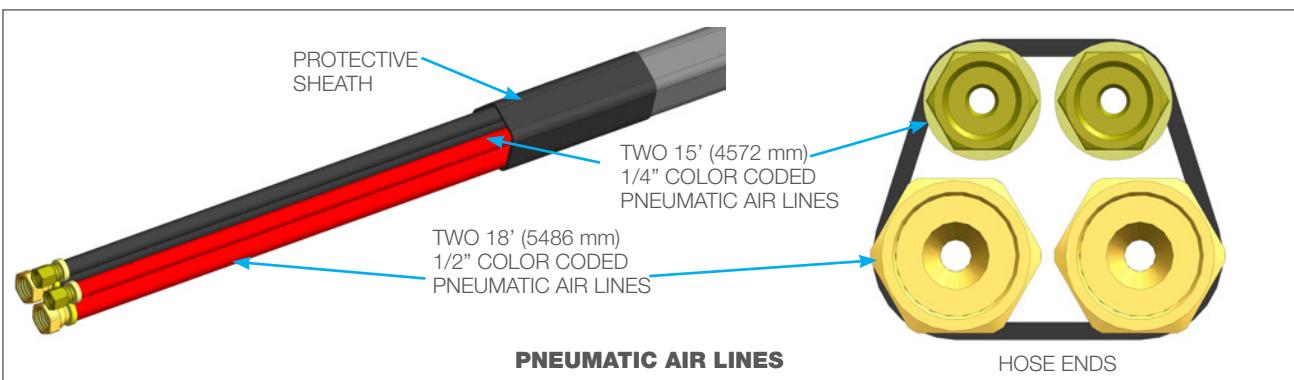
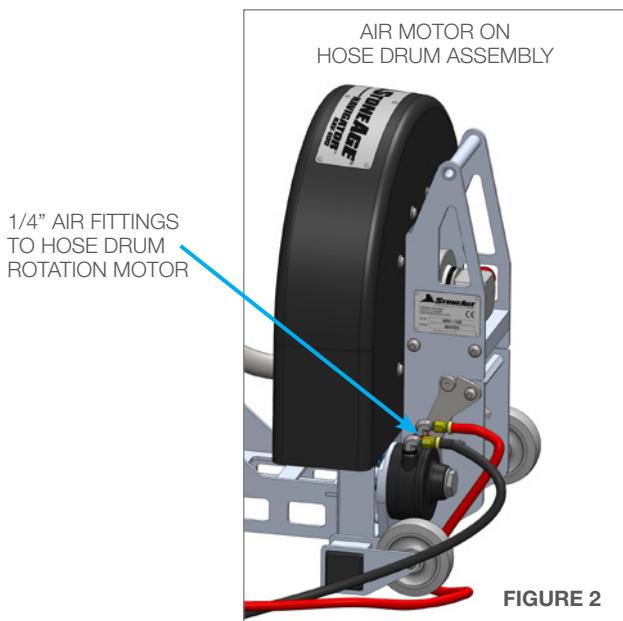
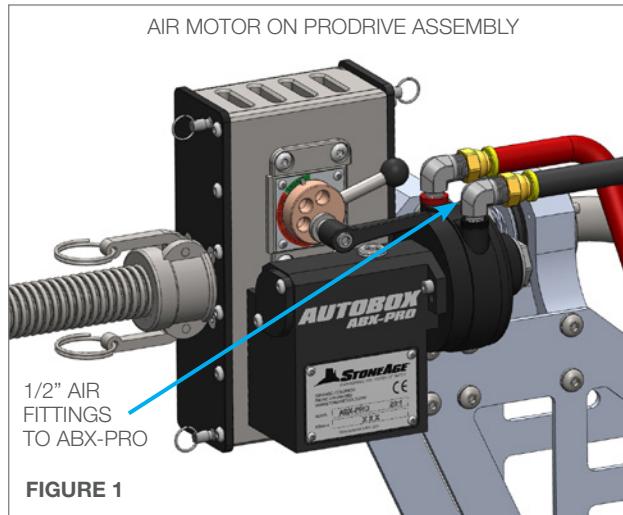
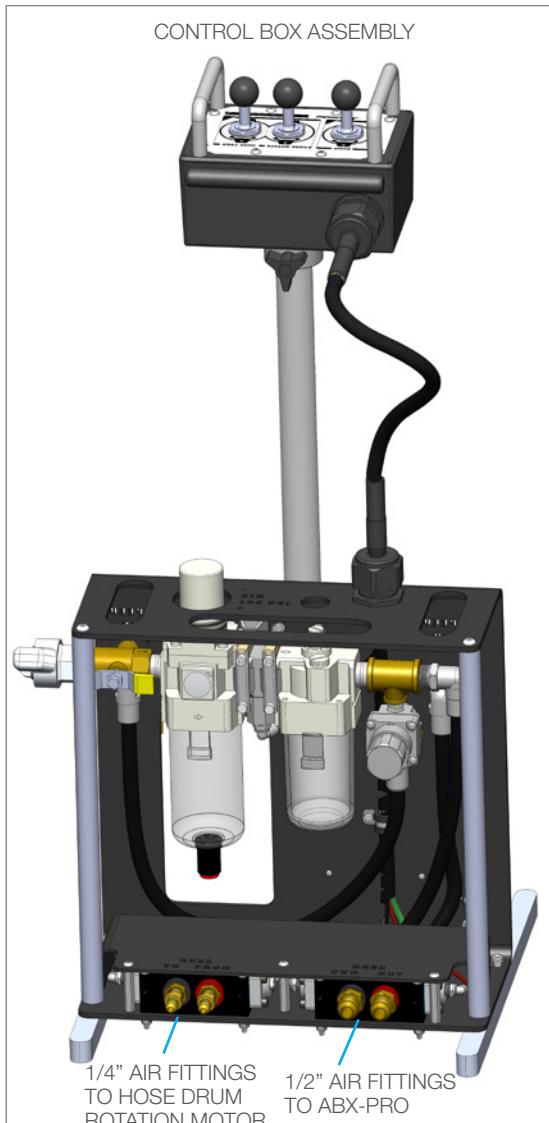


CONTROL BOX SET-UP

PNEUMATIC AIR LINE CONNECTIONS

1. Pull the Dust Caps off the Pneumatic Air Fittings on the control box and the air motors.
2. Connect the 1/2" Pneumatic Supply Lines from the Control Box to the ProDrive Assembly. (**Figure 1**)
3. Connect the 1/4" Pneumatic Supply Lines from the Control Box to the Hose Drum Assembly. (**Figure 2**)

Pay attention to the color coded tabs on the air fittings of the Air Motors and the Control Box. Connect the red hoses to the red banded air fittings and the black hoses to the black banded air fittings. (**Figures 1 & 2**)

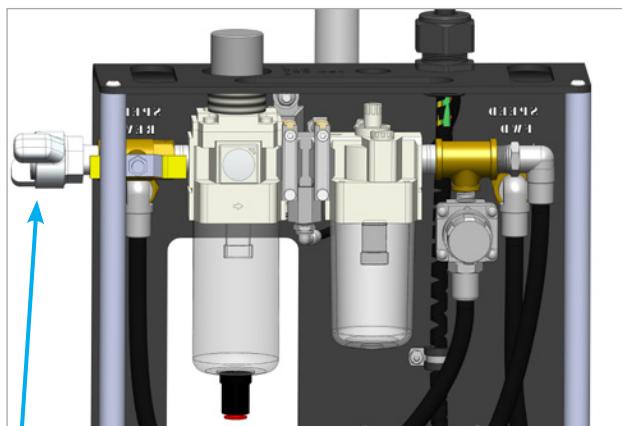


AIR SUPPLY AND LUBRICATOR SETTING

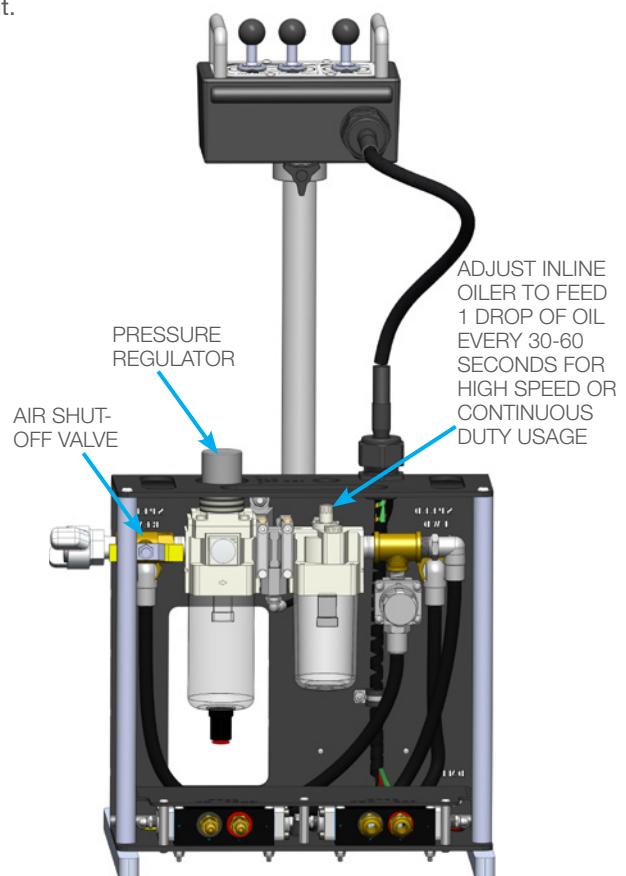
1. The CB-NAV Control Box is supplied with a twist claw style inlet coupling (Chicago style) located on the side of the FRL Assembly. Connect a compatible compressed air line (not included) according to the Manufacturer's instructions.
2. Using the pressure regulator on the FRL, adjust the operating pressure to 100 psi (0.7 MPa) for the application.
3. The CB-NAV Control Box is shipped with a minimum level of ISO Viscosity Grade 46 (SAE 20) air tool oil. The lubricator bowl will need to be filled between the Minimum and Maximum lines with an equivalent air tool oil.

WARNING

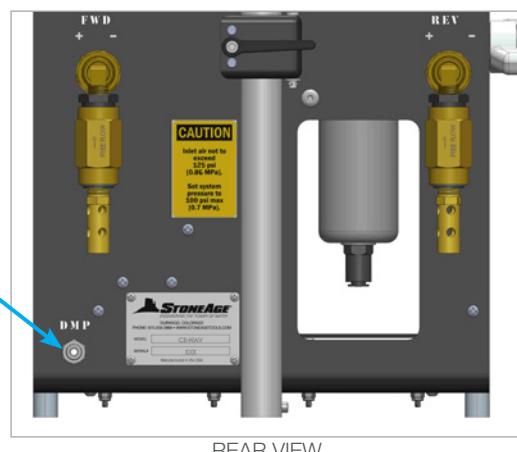
Maximum operating pressure is 100 psi (0.7 MPa). Never exceed 140 psi (0.97 MPa) supply pressure. Exceeding 140 psi supply pressure may result in injury to the Operator and/or damage to the equipment.

**AIR SUPPLY FITTING**

A universal **AIR SUPPLY FITTING** (Chicago style) is located on the FRL. Connect a compatible compressed air line (not included) according to the manufacturer's instructions.

**PNEUMATIC DUMP CONTROL FITTING AND LINE**

A **DUMP CONTROL** is located on the Control Box panel and can be set up to control an air actuated dump valve. To utilize the toggle, the end user will need to install 1/4 in. (6.35 mm) O.D. flexible tubing (not included) between the DUMP CONTROL FITTING and the pneumatic dump valve. (NOT INCLUDED)



OPERATION

CONTROL PANEL OPERATION

The Control Box consists of a base unit with a tethered Remote Box to allow the operator to easily move around if desired. There are three levers on the Remote Box: **DUMP**, **HOSE ROTATE**, and **HOSE FEED**. All three levers are spring loaded to return to the center, OFF position.

The **DUMP** lever, when pushed forward, provides air to the $\frac{1}{4}$ " push-connect fitting that is intended to supply air to a pneumatic dump valve to divert high-pressure water to the tool.

When the **HOSE FEED** lever is pushed forward, it drives the hose forward into the pipe. Drum rotation is automatically coupled with the switch when pushed forward. This rotation is essential to navigating around bends. It also keeps the hose expanded towards the outside of the drum so that it doesn't coil inward and potentially fall out of the drum. When the **HOSE FEED** lever is pulled backward, it retracts the hose from the pipe. Rotation of the drum is not coupled; the hose naturally expands in the drum when retracting.

The **HOSE ROTATE** lever activates the drum rotation only. Either direction of the switch always activates rotation in the same direction. Rotation is used in a couple scenarios:

- When driving forward into a pipe – and the hose is already around several bends – the tool will drive into an elbow and see an increase in rotational resistance. Drum rotation will strain as curvature builds up in the hose. Instead of trying to keep forcing the tool forward, using rotation only will slowly relax the built up hose curvature, which also slowly drives the tool forward through the bend.
- During hose retraction, it's ideal to reverse out of the pipe without rotation; this will reduce wear on the hose and rollers. Occasionally, the tool can get hung up at a bend, especially if it is far into a pipe. Temporarily activating rotation will get the tool moving again.

Forward and Reverse **HOSE FEED** speeds can be adjusted independently using the flow control valves on the base of the control box. Slow speeds are required to go forward through bends. Faster speeds are acceptable during retraction.

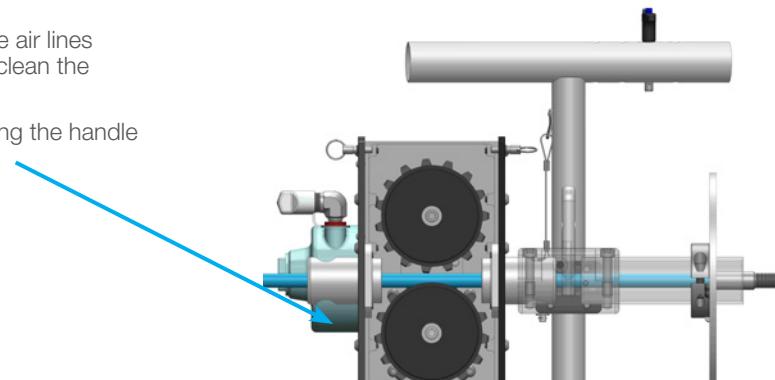
When using the Navigator and the hose is being driven forward in a pipe, the operator should watch the inside of the drum area, specifically where the hose is entering the compound elbow. The amount of force this section of hose can take is the machine's limiting factor. With a lot of elbows in a pipe, there's going to be a lot of torsional resistance and a lot of stress on the hose. Too much stress and the hose would buckle and tie itself into a knot. To help prevent this, a fixed-pressure regulator in the control box limits the air pressure available to the rotation motor.



STORAGE, TRANSPORTATION, AND HANDLING

When storing the unit, use compressed air to blow out the air lines to remove debris and moisture. Use mild soapy water to clean the machine in order to remove corrosive materials.

The Navigator (NAV-100) can be easily transported by lifting the handle on the base assembly and wheeling it to its next location.



MAINTENANCE AND TROUBLESHOOTING

MAINTENANCE

Maintenance Item	Frequency	Maintenance Required
Air Motors	After each use	Apply a small amount of air tool oil directly into the forward and reverse fittings. Then, briefly operate the controls at slow speed for a short duration in each direction to coat the interior parts of the motor.
All Air Fittings	After each use	Reinstall all dust caps to protect from dirt and moisture.
All components the hoses pass through	After each use	As wear occurs the rounded edges could become sharp and damage hoses. Any components showing excessive wear should be replaced.
Roller grooves	Before each use	Replace roller if cuts or roughness is present. (See the Roller Removal and Installation pages in this manual)
Hose	After each use	Install cap on threads to protect threads and prevent contamination.
Lubricator of control box	Before each use	Add oil when fluid drops below minimum level marking.
Snout and BOP Components	After each use	Wash out any material build up to prevent components from being clogged.
Waterblast Tool	After each use	Remove tool, lubricate and store in clean container.
Webbing strap	Before each use	Replace strap when frayed, cut or torn

TROUBLESHOOTING

Problem	Solution
No air is delivered to tool	<ul style="list-style-type: none"> -Check that shut-off valve near regulator is open -Check that regulator is set to 100 psi -Open flow control valves by rotating the brass colored speed controls in the counterclockwise direction.
Hose is being damaged by Rollers	<ul style="list-style-type: none"> -Check that the proper Rollers are installed (see roller and collet reference plate) -Loosen eccentric lever to reduce clamp force on hose.
Hose slippage on Rollers	<ul style="list-style-type: none"> -Check that the proper Rollers are installed (see roller and collet reference plate) -Tighten eccentric lever to retain clamp force on hose. -Check Rollers for excessive wear in groove

Contact StoneAge for Safety Data Sheets for material usage, a complete list of spare part numbers, and service instructions for the Navigator (NAV-100), ProDrive (ABX-PRO), and Control Box (CB-NAV).

ROLLER REMOVAL INSTRUCTIONS

ROLLER REMOVAL

NOTICE

This process will be typical for Poly Roller replacements on the ABX-PRO Tractor Assembly. Installation of the appropriate Roller should be completed prior to installing the hose and tool into the AUTOBOX® ProDrive ABX-PRO-100 Assembly.

WARNING

Always de-energize the system before servicing or replacing any parts. Failure to do so can result in severe injury and/or death.
Keep hands, hair, and clothing clear of rotating parts.

1. Open the back cover of the ABX-PRO Tractor by pulling the top two Quick Release Pins in the outward direction. (**Figure 1**)
2. Push the Adjustable Handle in the counterclockwise direction to loosen the CAM Lever and bushing. Push the Eccentric Lever in the counterclockwise direction, moving the indicator pin to “**Disengaged**”. (**Figure 2**)

FIGURE 1

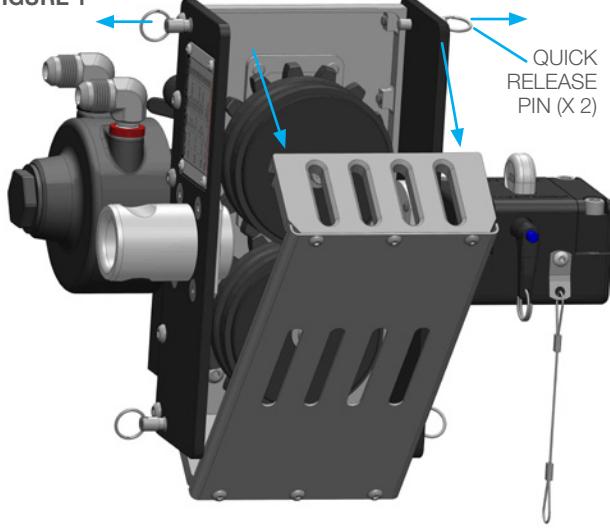
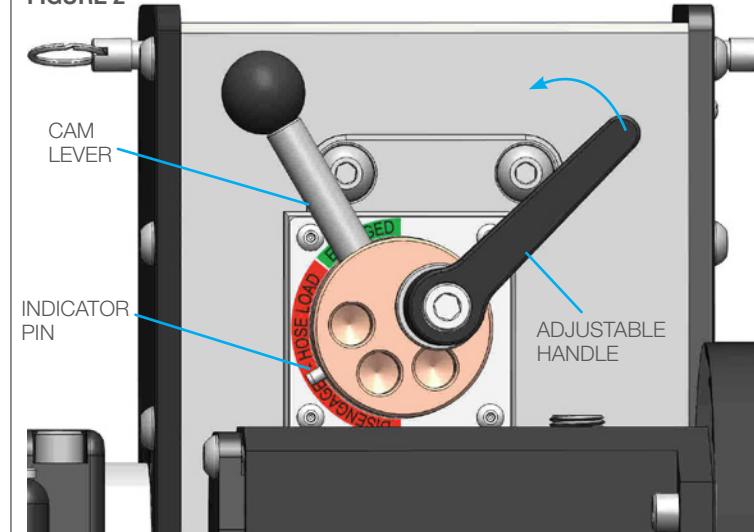


FIGURE 2



3. Loosening the Cam Lever opens up the space between the Spline Roller Assemblies. (**Figure 3**)
4. Remove the two socket head cap screws, Roller Washers, Hub Outer Plates and Rollers. (**Figure 4**)

FIGURE 3

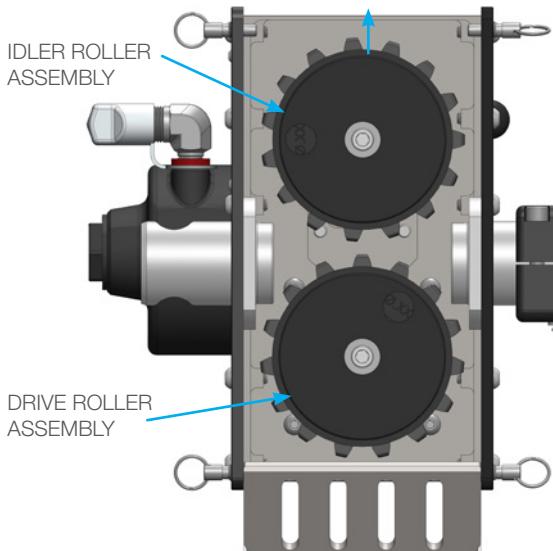
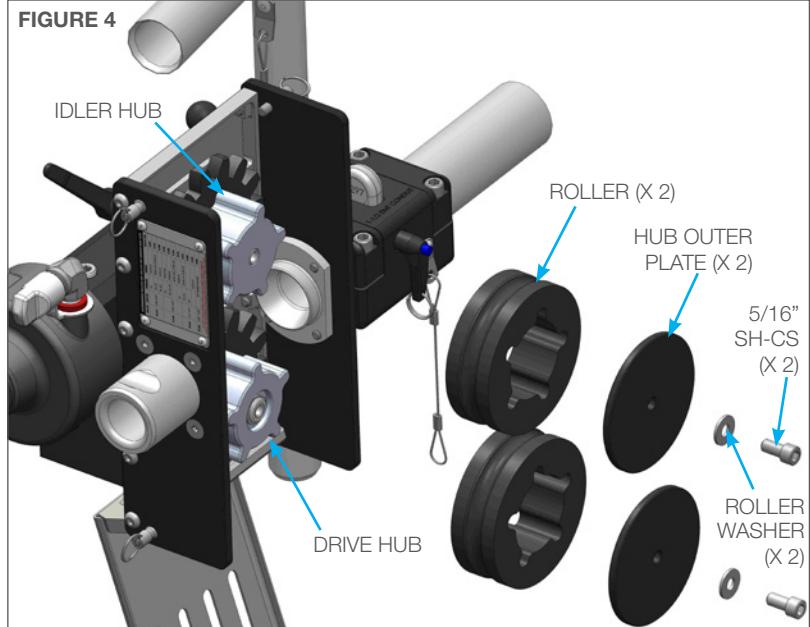


FIGURE 4



ROLLER INSTALLATION

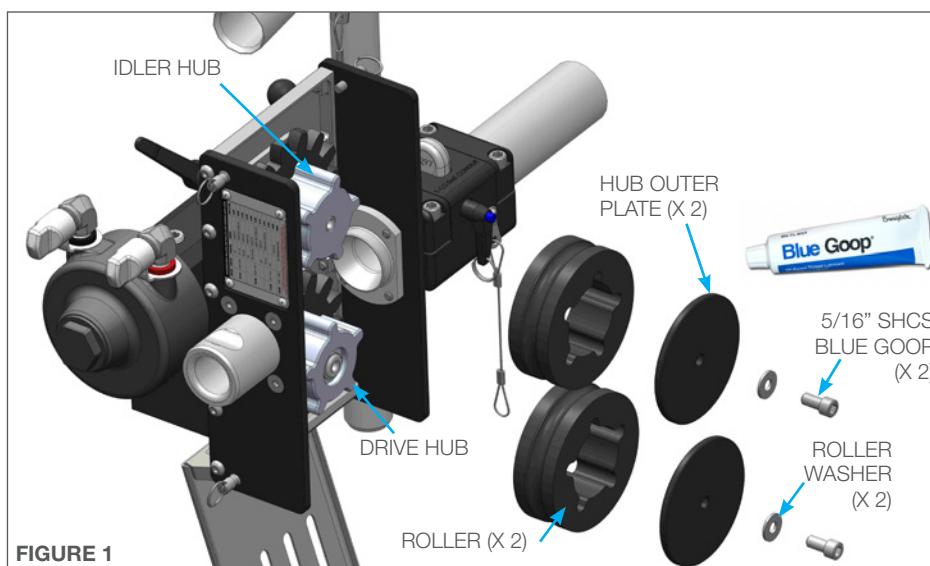
NOTICE

This process will be typical for Poly Roller replacements on for the ABX-PRO Tractor Assembly. Installation of the appropriate Roller should be completed prior to installing the hose and tool into the AUTOBOX® ProDrive ABX-PRO-100 Assembly.

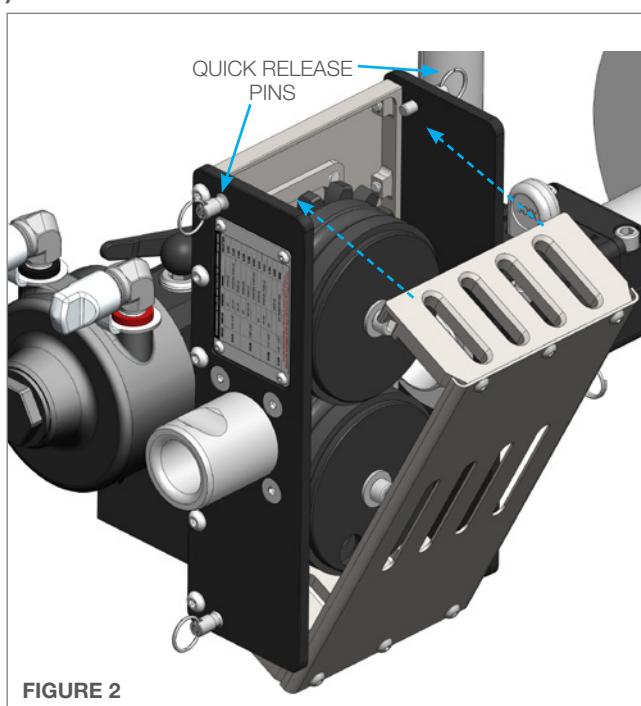
WARNING

Always de-energize the system before servicing or replacing any parts. Failure to do so can result in severe injury and/or death.
Keep hands, hair, and clothing clear of rotating parts.

- Slide the Poly Rollers onto the Hubs. Then fasten the Hub Outer Plates and Roller Washers onto the Spline Load Rollers with the two 5/16" socket head cap screws. (**Figure 1**)

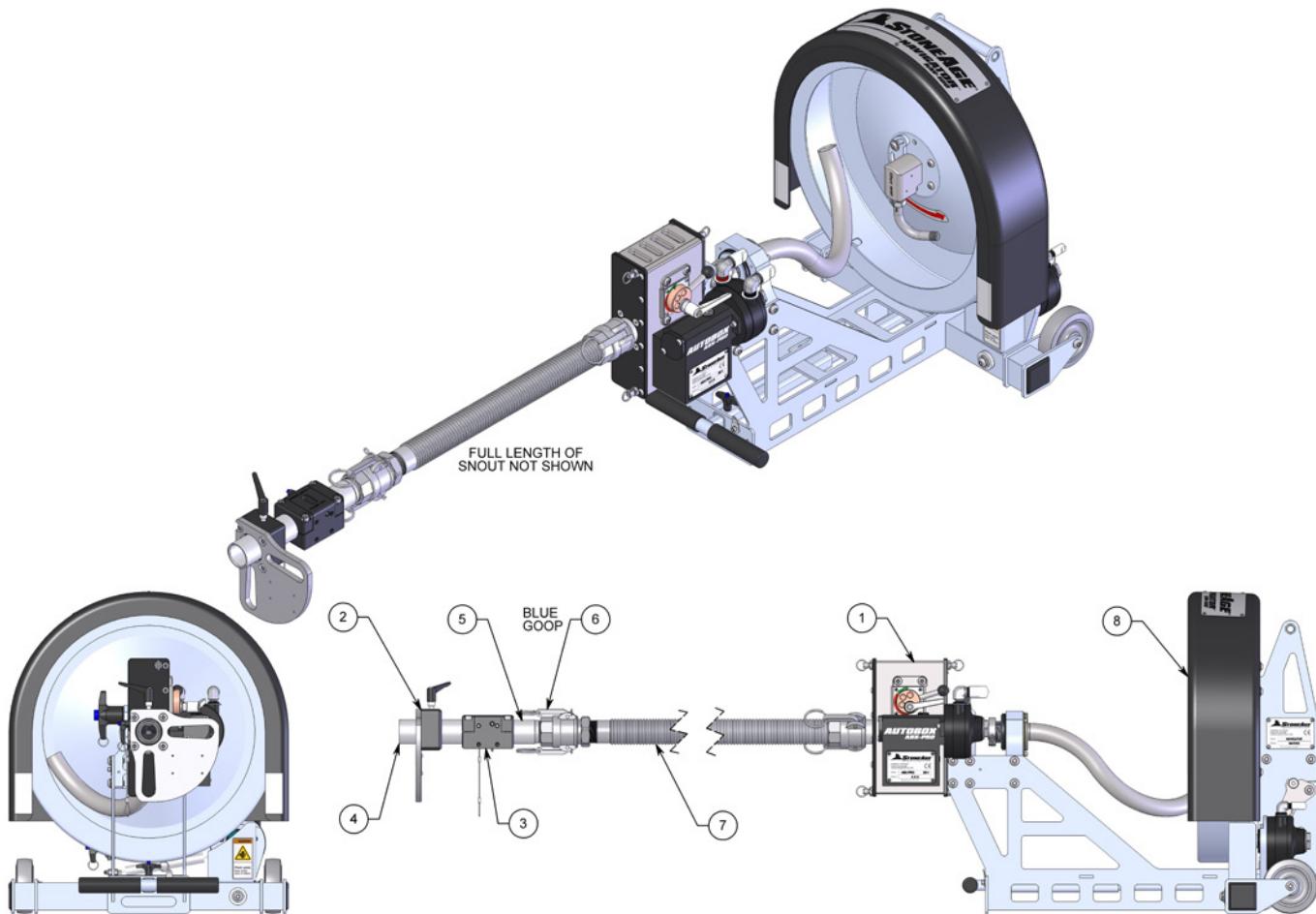


- Push the back cover back into the closed position and secure the two Quick Release Pins on the top of the ABX-PRO AUTOBOX® PRODRIVE TRACTOR. (**Figure 2**)



PARTS DIAGRAM

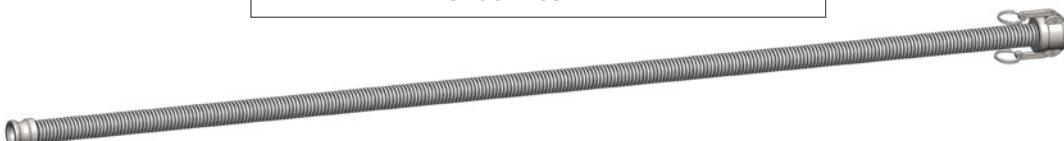
**NAVIGATOR (NAV-100)
FULL ASSEMBLY**



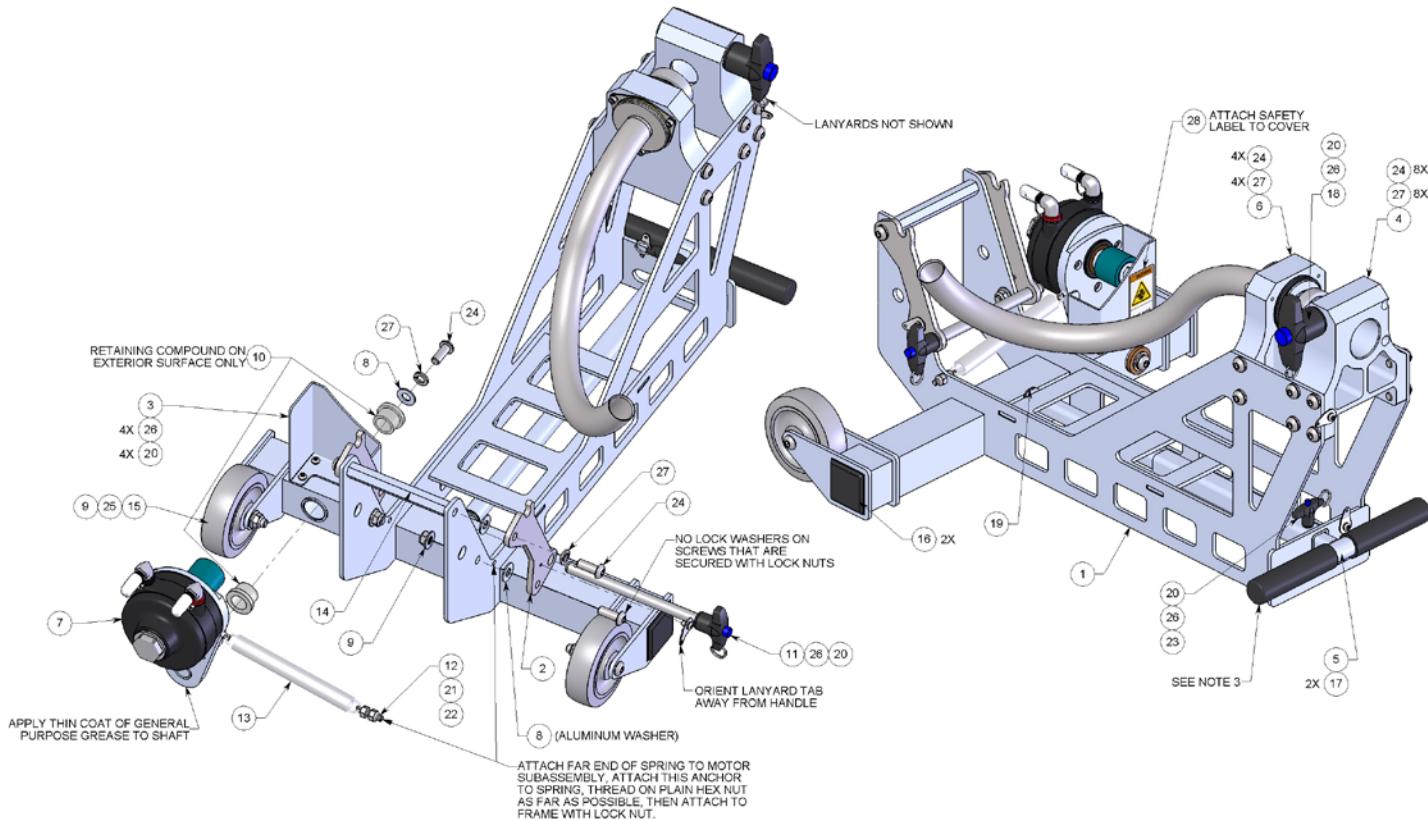
#	PART NUMBER	QTY.
1	ABX-PRO AUTOBOX PRODRIVE TRACTOR ASSEMBLY	1
2	BOP 010-2-4-QTR QUARTER PLATE BOP	1
3	BOP 030 COLLET BLOCK ASSEMBLY	1
4	BOP 081-6 SNOUT TUBE 1.75 X 6 SS	1
5	BOP 084 SNOUT TUBE, 1.75 X 1.25 MNPT AL	1
6	BOP 085 CAM LOCK 1.25F X 1.25 FNPT	1
7	BOP 090-7-001-K SNOUT, CORRUGATED, 1.25 CAMLOCK KIT	1
8	NAV-170 NAV BASE AND DRUM ASSEMBLY	1

LINE ITEM ACCESSORIES FOR THE NAVIGATOR:
CONTROL BOX, PN: CB-NAV
COLLET (BASED ON HOSE SIZE), PN: FF 121-XXX
HIGH PRESSURE WATER HOSE, 9/16-18 TYPE M FEMALE SWIVEL (4/4, 5/4 or 6/4)
TOOL (e.g. BEETLES, BADGERS, ...)
PIPE STRAP MOUNT ASSEMBLY, PN: BOP 050
SPLASH PLATE ASSEMBLY, PN: BOP 012

**NAVIGATOR (BOP 090-7-001-K)
SNOUT ASSEMBLY**



#	PART NUMBER	QTY.
1	BOP 090-7-001 SNOUT, CORRUGATED, 1.25 CAMLOCKS, 7FT	1
2	BOP 091 CAMLOCK, FEMALE SS, 1.25	1

NAVIGATOR (NAV 110)
 BASE FRAME ASSEMBLY


NOTE:

1. APPLY THREAD ADHESIVE TO ALL THREADED COMPONENTS BLUE LOCTITE: PN: 242 OR EQUIVALENT.
2. APPLY GREEN RETAINING COMPOUND, LOCTITE PN: 290 OR EQUIVALENT TO COMPONENTS AS NOTED.
3. ASSURE INSIDE OF GRIP AND OUTER SURFACE OF ALUMINUM BAR ARE FREE OF GREASE, OILS, AND DIRT. COAT THE INSIDE OF THE GRIP AND OUTSIDE OF THE ALUMINUM BAR WITH ISOPROPYL ALCOHOL, THEN SLIDE GRIP FULLY ONTO ALUMINUM BAR TO INSTALL.

#	PART NUMBER	QTY
1	NAV 111 BASE FRAME, WELDMENT	1
2	NAV 112 JOINT PLATE	2
3	NAV 113 COVER, DRIVE ROLLER	1
4	NAV 114 DRIVE MOUNTING BLOCK, CAM GROOVE	1
5	NAV 115 HANDLE WELDMENT	1
6	NAV 150 COMPOUND ELBOW ASSEMBLY	1
7	NAV 160 ROTATION MOTOR ASSEMBLY	1
8	NAV 301 WASHER, FLAT, OVERSIZED OD, ALUMINUM	5
9	NAV 302 NUT, LOCKING, FLANGED	4
10	NAV 303-001 ACETAL BUSHING, FLANGED, 3/4" ID, 1" O.D., 3/4" OAL	2
11	NAV 304 PIN, QUICK-RELEASE, T-HANDLE, 1/2" DIA, 6" L, w/ LANYARD	1
12	NAV 305 SPRING ANCHOR	1
13	NAV 306 SPRING, EXTENSION	1
14	NAV 307 STANDOFF, HEX, 5" L, 3/8-16 TAPPED ENDS	1

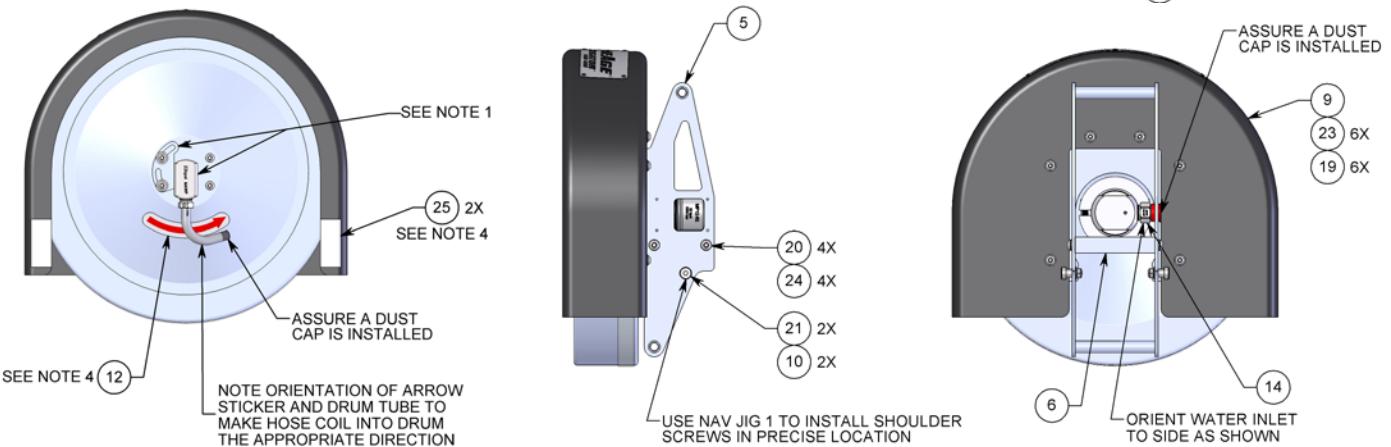
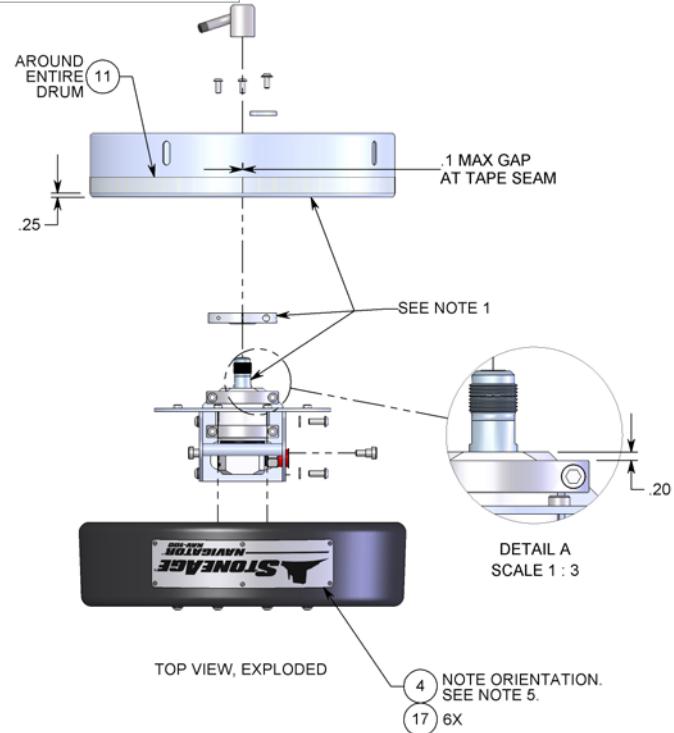
15	NAV 308 WHEEL, 4" DIA x 1-1/4" WIDE, GREY	2
16	NAV 309 FINISHING PLUG, SQUARE	2
17	NAV 311 GRIP, ROUND, HEX SURFACE	2
18	NAV 323 PIN, QUICK-RELEASE, T-HANDLE, 1" DIA, 2.5" L, w/ LANYARD	1
19	NAV 324 RETAINING RING	1
20	GSB 319-015 SCREW, BHSC, #10-24 UNC X 0.375L	7
21	GN 325-H NUT, HEX, 1/4-20	1
22	GN 325-L NUT, LOCKING, 1/4-20	1
23	NAV 325 PIN, QUICK-RELEASE, T-HANDLE, 0.25" DIA, 1.0" L, w/ LANYARD	1
24	GSB 337-04 SCREW, BHSC, 3/8-16 UNC X 1.000L	17
25	GSB 337-10 SCREW, BHSC, 3/8-16 UNC X 2.500L	2
26	GW 319-L WASHER, LOCK, #10, STAINLESS	7
27	GW 337-L WASHER, LOCK, 3/8", STAINLESS	15
28	PL 161 SAFETY LABEL, PINCH POINT, 1.5" X 3"	1

PARTS DIAGRAM

NAVIGATOR (NAV 130)
DRUM FRAME ASSEMBLY SHEET 1
(CONTINUED ON NEXT PAGE)

NOTE:

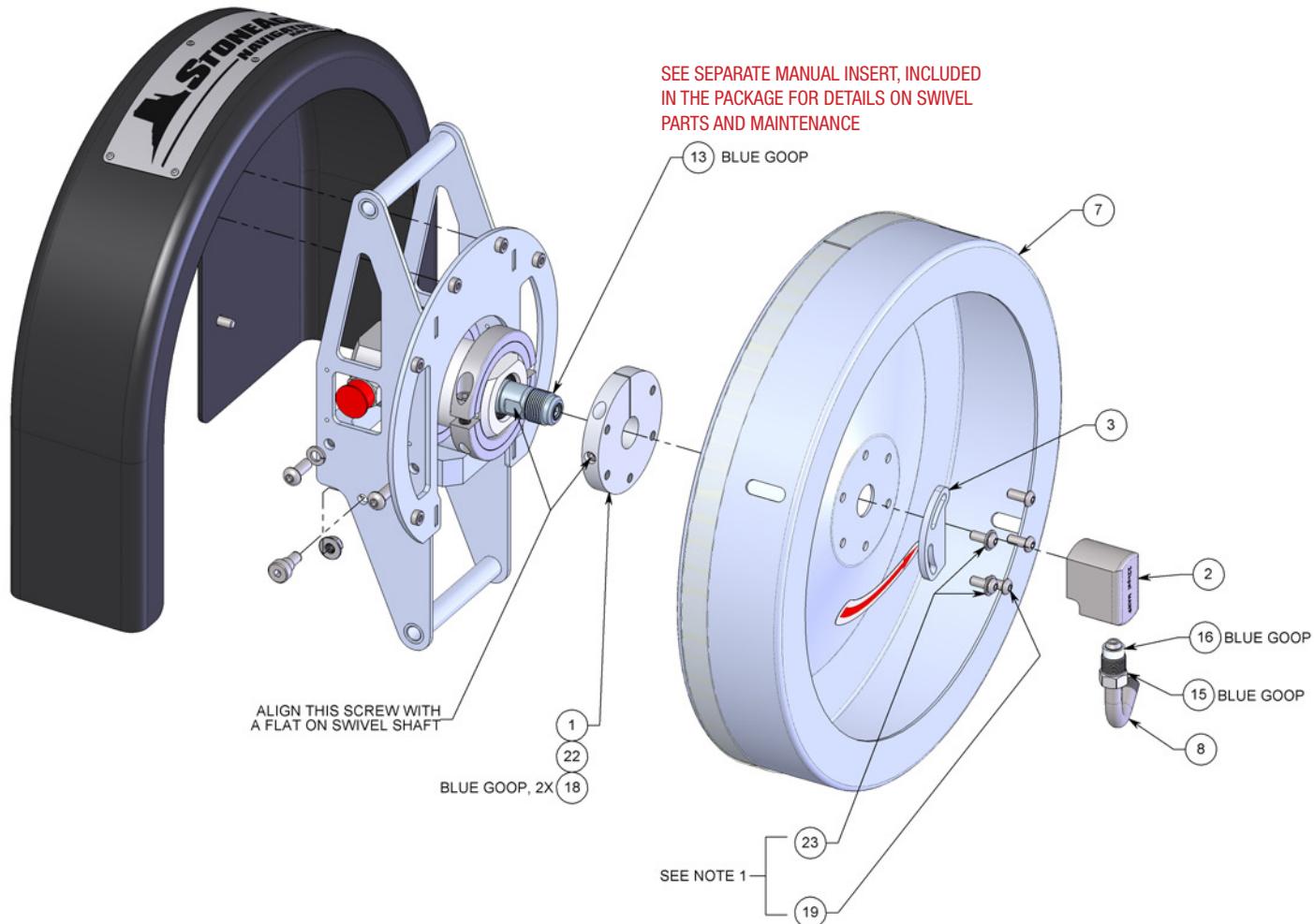
1. SWIVEL, FLANGE, DRUM, ELBOW & LOCKING PLATE INSTALLATION:
 - a) SECURE SWIVEL WITHIN CLAMPS AT LOCATION SHOWN IN TOP VIEW.
 - b) SLIDE ADAPTER FLANGE FULLY ONTO SWIVEL SHAFT (PROFILED SIDE TOWARD SWIVEL), ALIGN SCREW WITH FLAT ON SWIVEL SHAFT AS NOTED, THEN TIGHTEN BOTH SCREWS SECURELY (USE BLUE GOOP).
 - c) PLACE DRUM ON ADAPTER FLANGE (5 OF THE 6 HOLES WILL BE USED) AND ATTACH WITH ALL 5 SCREWS (USE BLUE LOCTITE).
 - d) SECURELY TIGHTEN ELBOW ONTO SWIVEL (USE BLUE GOOP).
 - e) PLACE FLAT SIDE OF LOCKING PLATE UP AGAINST ONE OF THE SIDES OF ELBOW. DETERMINE THE BEST SIDE AND ORIENTATION OF PLATE BY ASSURING 2 SCREWS CAN SECURE THE PLATE. REMOVE THOSE 2 SCREWS, PLACE PLATE FIRMLY AGAINST THE SIDE OF THE ELBOW, ADD FLAT WASHERS AND REINSTALL SCREWS. 2. 4x RED LOCTITE: PN: 262 OR EQUIVALENT
2. BLUE GOOP IS A SWAGELOK BRAND ANTI-SEIZE. AN EQUIVALENT ALTERNATIVE IS ACCEPTABLE.
3. APPLY BLUE LOCTITE: PN: 242 OR EQUIVALENT, TO ALL THREADED FASTENERS.
4. CLEAN AREA WHERE STICKER IS TO BE APPLIED WITH ISOPROPYL ALCOHOL. ATTACH STICKER APPROXIMATELY WHERE SHOWN.
5. ATTACH PLATE TO COVER WITH 2 CENTER RIVETS THROUGH EXISTING HOLES IN COVER. THEN BEND EACH END OF THE PLATE OVER THE COVER TO LOCATE WHERE THE OTHER 4 RIVETS WILL GO. MARK THE 4 LOCATIONS, DRILL <MOD-DIAM>.136 HOLES THROUGH FIBERGLASS COVER. SECURE THE CORNERS OF THE PLATE WITH THE 4 REMAINING RIVETS.



#	PART NUMBER	QTY
1	HCS 103 DRUM ADAPTER FLANGE	1
2	HCS 105 KMP9 ELBOW	1
3	HCS 120 ELBOW LOCKING PLATE	1
4	NAV 102 BRANDING PLATE	1
5	NAV 131 DRUM FRAME, WELDMENT	1
6	NAV 132 SWIVEL MOUNT, WELDMENT	1
7	NAV 133 DRUM, 19" DIA	1
8	NAV 134 HOSE CONNECTION TUBE	1
9	NAV 135 DRUM COVER	1
10	NAV 302 NUT, LOCKING, FLANGED	2
11	NAV 312 TRACTION TAPE, 1" WIDE	1
12	NAV 322 STICKER, ARROW, LEFT	1

13	SG-MP12K-62-90 SWIVEL	1
14	AF 063-MP12 ADAPTER, 3/4 MP MALE X 1 TYPE M MALE	1
15	AF 070-MP9 GLAND, 9/16 MEDIUM PRESSURE	1
16	AF 071-MP9 COLLAR, 9/16 MEDIUM PRESSURE	1
17	CB 747 BLIND RIVET, ALUM, 1/8" DIA X .25	6
18	GS 325-05 SCREW, SHC, STAINLESS, 11/4-20 UNC X 1.250L	2
19	GSB 331-03 SCREW, BHSC, 51/16-18 UNC X 0.750L	11
20	GSB 337-04 SCREW, BHSC, 318-16 UNC X 1.000L	4
21	GSSH 0500-0375-SS SCREW, SHOULDER, 0.500 DIA x 0.375 LENGTH	2
22	GW 325-L-HC WASHER, LOCK, HIGH-COLLAR, 1/4", STAINLESS	1
23	GW 331-F WASHER, FLAT, 5/16", STAINLESS	8
24	GW 337-L WASHER, LOCK, 3/8", STAINLESS	4
25	PL 160 WARNING PINCH POINT 1.5X3 DECAL	

NAVIGATOR (NAV 130)
DRUM FRAME ASSEMBLY SHEET 2

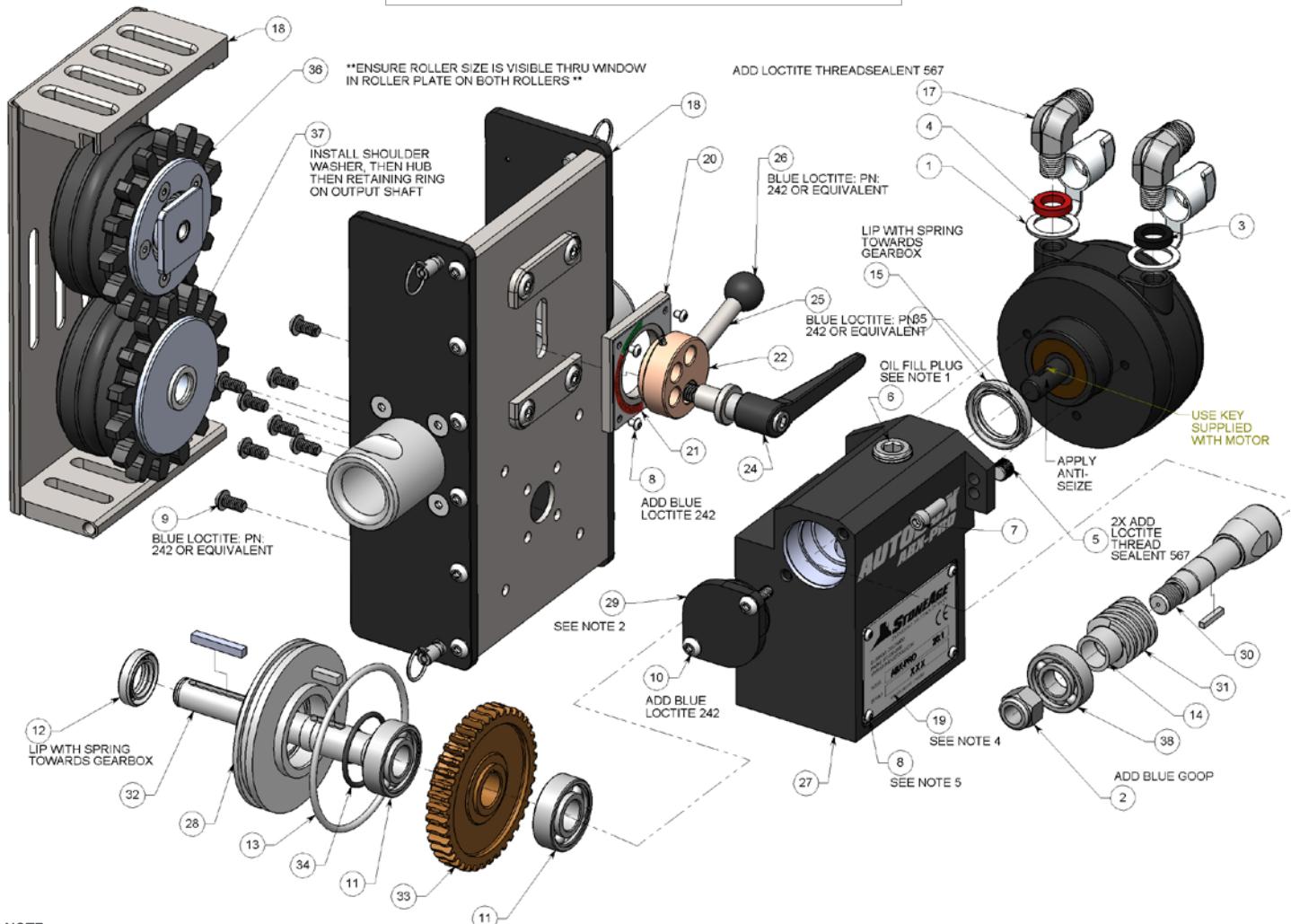


#	PART NUMBER	QTY
1	HCS 103 DRUM ADAPTER FLANGE	1
2	HCS 105 KMP9 ELBOW	1
3	HCS 120 ELBOW LOCKING PLATE	1
4	NAV 102 BRANDING PLATE	1
5	NAV 131 DRUM FRAME, WELDMENT	1
6	NAV 132 SWIVEL MOUNT, WELDMENT	1
7	NAV 133 DRUM, 19" DIA	1
8	NAV 134 HOSE CONNECTION TUBE	1
9	NAV 135 DRUM COVER	1
10	NAV 302 NUT, LOCKING, FLANGED	2
11	NAV 312 TRACTION TAPE, 1" WIDE	1
12	NAV 322 STICKER, ARROW, LEFT	1

13	SG-MP12K-62-90 SWIVEL	1
14	AF 063-MP12 ADAPTER, 3/4 MP MALE X 1 TYPE M MALE	1
15	AF 070-MP9 GLAND, 9/16 MEDIUM PRESSURE	1
16	AF 071-MP9 COLLAR, 9/16 MEDIUM PRESSURE	1
17	CB 747 BLIND RIVET, ALUM, 1/8" DIA X .25	6
18	GS 325-05 SCREW, SHC, STAINLESS, 114-20 UNC X 1.250L	2
19	GSB 331-03 SCREW, BHSC, 516-18 UNC X 0.750L	11
20	GSB 337-04 SCREW, BHSC, 318-16 UNC X 1.000L	4
21	GSSH 0500-0375-SS SCREW, SHOULDER, 0.500 DIA x 0.375 LENGTH	2
22	GW 325-L-HC WASHER, LOCK, HIGH-COLLAR, 1/4", STAINLESS	1
23	GW 331-F WASHER, FLAT, 5/16", STAINLESS	8
24	GW 337-L WASHER, LOCK, 3/8", STAINLESS	4

PARTS DIAGRAM

AUTOBOX® PRODRIVE (ABX-PRO)
TRACTOR ASSEMBLY



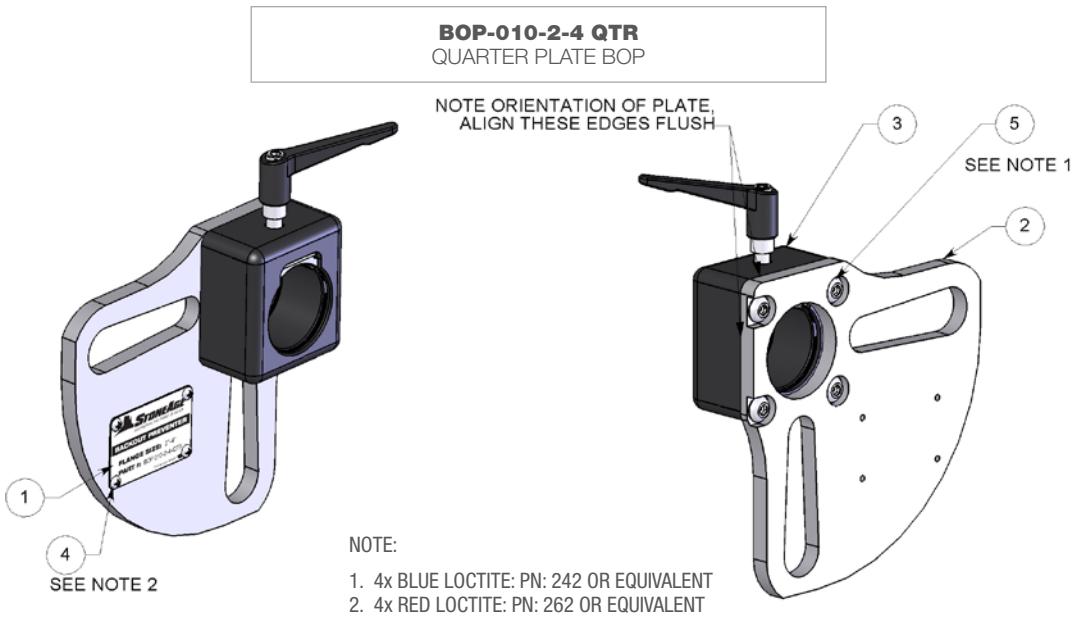
NOTE:

1. ADD 5.0 OUNCES OF MOBIL SYNTHETIC OIL SCH 634 (SA# GP 146.1)
2. THIS WORM CAP WILL BOTTOM ON BEARING, WILL NOT BOTTOM ON HOUSING WHEN TIGHTENED
3. ADD PRELUBE TO ALL SHAFTS, GEARS, BEARINGS, AND SEALS.
4. CLEAN SURFACE PRIOR TO INSTALLING SERIAL PLAQUE. STAMP IN ACCORDANCE WITH WORK INSTRUCTIONS.
5. 4X ADD RED LOCTITE: PN: 262 OR EQUIVALENT.

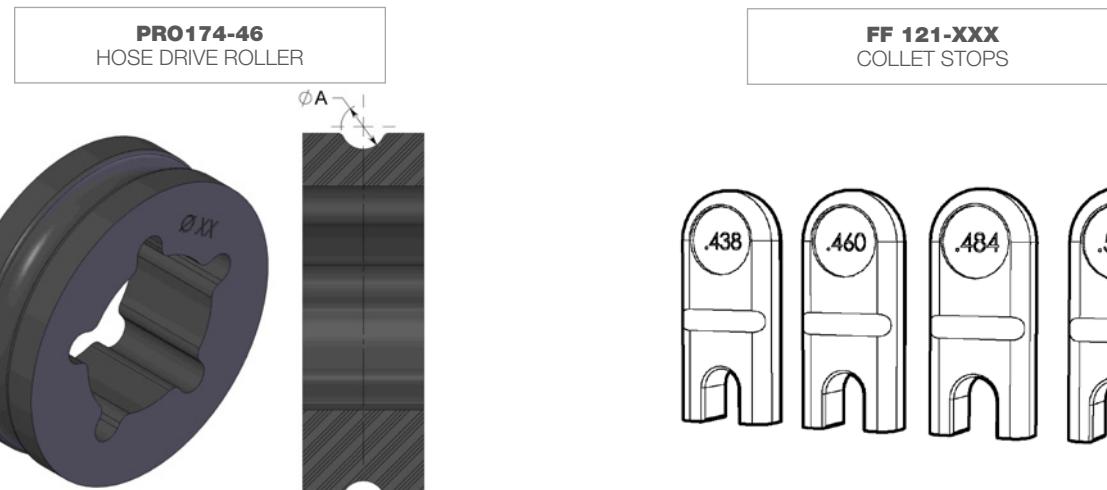
#	PART NUMBER	QTY.
1	BR 167 90° DUST CAP	2
2	GN 550-L NYLOK NUT	1
3	GP 013-BK BLACK ID BAND, SM	1
4	GP 013-R RED ID BAND, SM	1
5	GP 025-P2SS HEX SOCKET PLUG	1
6	GP 025-P8SS HEX SOCKET PLUG	1
7	GS 325-03 SHCS .25-20 X .75 SS (TB 050)	2
8	GSB 313-0075 BHCS 6-32 X .188 LG SS	8
9	GSB 325-02 BHCS .25-20 X .50 LG SS	8
10	GSB 325-03 BHCS .25-20 X .75 LG SS	2
11	HLXD 002 BEARING, OUTPUT	2
12	HLXD 003 SEAL, OUTPUT	1

13	HLXD 006 O-RING, OUTPUT	1
14	HLXD 011 SPACER	1
15	HLXD 013 SEAL, INPUT	1
16	HLXD 017 CAP O-RING, INPUT	1
17	HRS 552 FITTING, ELBOW OUTLET P4J8 90°	2
18	PRO 101 HOUSING ASSEMBLY	1
19	PRO 109 CE SERIAL PLATE	1
20	PRO 112 CAM PLATE	1
21	PRO 113 CAM PLATE, DECAL	1
22	PRO 114 CAM BUSHING	1
23	PRO 115 ROLL PIN	1
24	PRO 116 ADJUSTABLE HANDLE ASSEMBLY	1
25	PRO 117 CAM LEVER SHAFT	1

26	PRO 118 CAM LEVER KNOB	1
27	PRO 130 GEARBOX HOUSING	1
28	PRO 131 BULKHEAD, OUTPUT	1
29	PRO 132 INPUT CAP	1
30	PRO 133 INPUT SHAFT	1
31	PRO 134 WORM 20-1	1
32	PRO 136 OUTPUT SHAFT	1
33	PRO 137 WORM GEAR 20-1	1
34	PRO 138 O-RING	1
35	PRO 155-001 AIR MOTOR	1
36	PRO 170 IDLER ROLLER ASSEMBLY	1
37	PRO 181 DRIVE ROLLER ASSEMBLY	1
38	RJ 009 BEARING	1



#	PART NUMBER	QTY.
1	BOP 001-2-4-QTR DECAL PLATE	1
2	BOP 002-2-4-QTR QUARTER FLANGE PLATE 2-4IN	1
3	BOP 007 TUBE CLAMP ASSY	1
4	BOP 013 SCREW 6-32X.25 SELF TAP	4
5	GSB 331-03 BHCS .31-18 X .75 LG SS	4

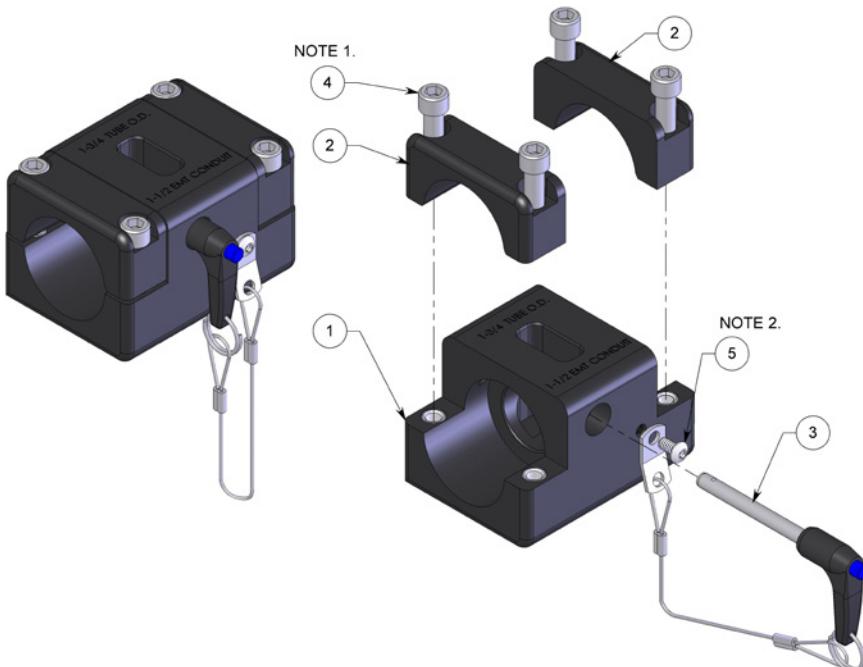


The NAVIGATOR NAV-100 comes with one customer specified FF 121-XXX Collet installed in the BOP 030 Collet Block Assembly. It is necessary to change the Collet size when changing to a different diameter hose. There are additional roller and collet sizes beyond the list below that are only to be used when operating the ABX-PRO as part of the ABX-PRO-100 PRODRIVE Assembly. THE REPLACEMENTS SHOWN IN THE CHART BELOW ARE THE ONLY SIZES TO BE USED WITH THE NAVIGATOR ASSEMBLY. Additional information on the ABX-PRO-100 PRODRIVE Assembly can be found in the ABX-PRO-100 PRODRIVE manual at WWW.STONEAGETOOLS.COM.

ROLLER INSIDE ABX-PRO	HOSE O.D.	SPIR STAR	PARKER	COLLET SIZE	STONEAGE PART NUMBER
PRO 174-46 Ø 0.46 IN.	0.39 - 0.50 IN. 9.9 - 12.7 MM	4/4	2440D-025	0.438 in. / 11.0 mm	FF 121-438
		5/4		0.460 in. / 11.7 mm	FF 121-460
			2440D-03	0.484 in. / 12.3 mm	FF 121-484
		6/4	2440D-04	0.516 in. / 13.0 mm	FF 121-516

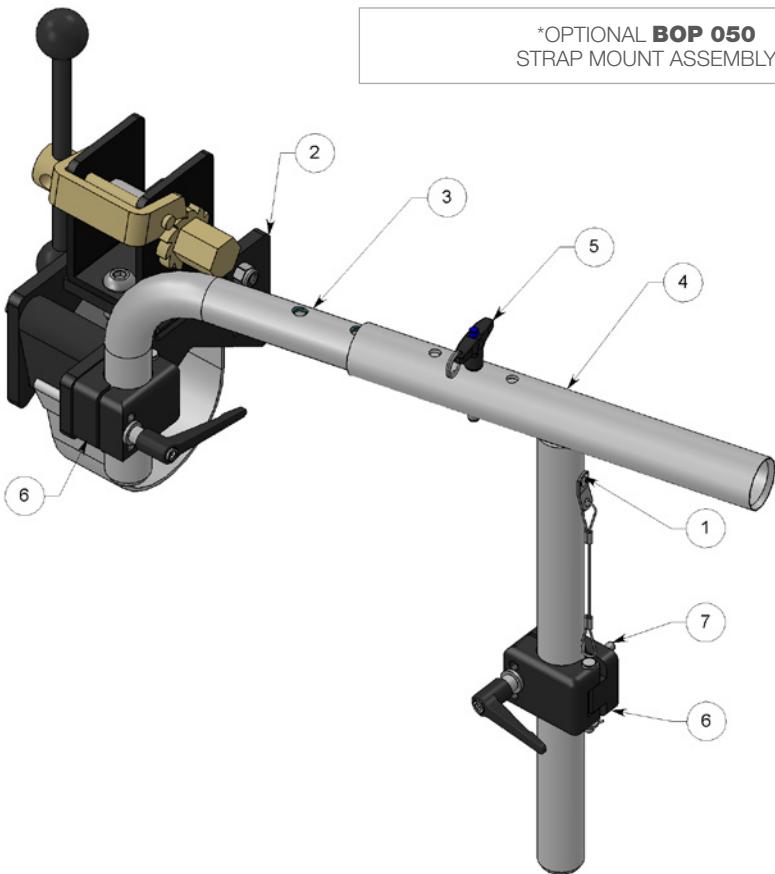
PARTS DIAGRAM

BOP 030
COLLET BLOCK ASSEMBLY

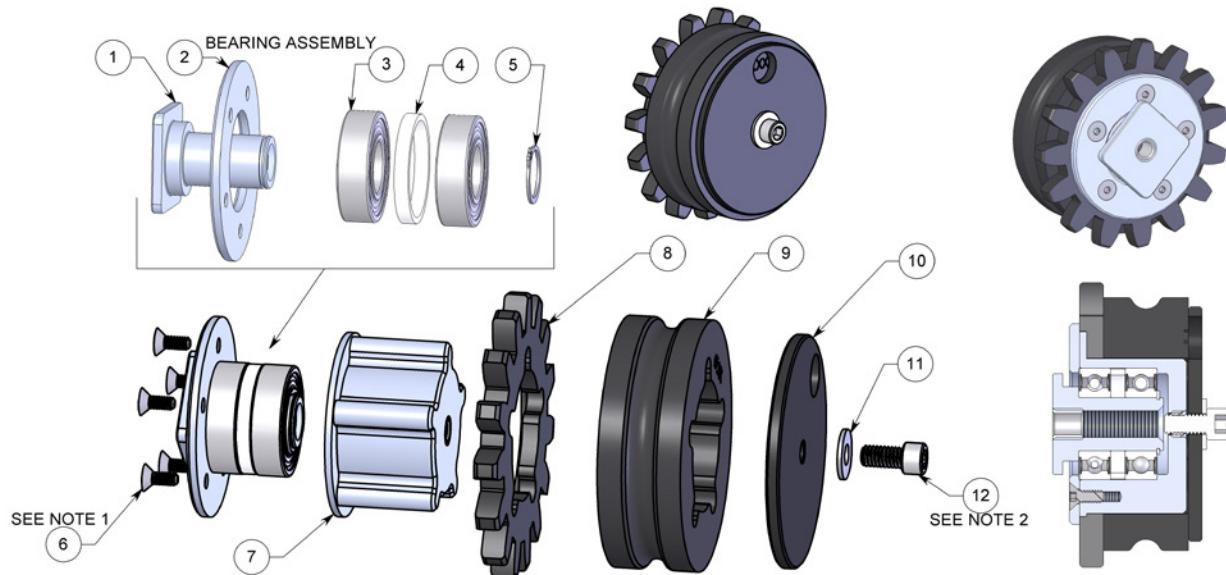


#	PART NUMBER	QTY.
1	BOP 031 COLLET BLOCK BODY	1
2	BOP 032 COLLET BLOCK CAP	2
3	BOP 033 QUICK PIN	1
4	GS 331-06 SHCS .31-18 x 1.50 SS	4
5	GSB 319-015 BHCS .19-24 x .38 Lg SS	1

*OPTIONAL **BOP 050**
STRAP MOUNT ASSEMBLY



#	PART NUMBER	QTY.
1	BOP 049 RIVET SS	1
2	BOP 051 RATCHET STRAP ASSEMBLY	1
3	BOP 057 POSITIONER TUBE, MALE	1
4	BOP 058 POSITIONER TUBE, FEMALE WELDMENT	1
5	BOP 059 QUICK PIN	1
6	BOP 070 HINGE CLAMP ASSEMBLY	2
7	GS 325-025 SHCS .25-20 X .62 SS	8

PRODRIVE (PRO 170)
 IDLER ROLLER ASSEMBLY


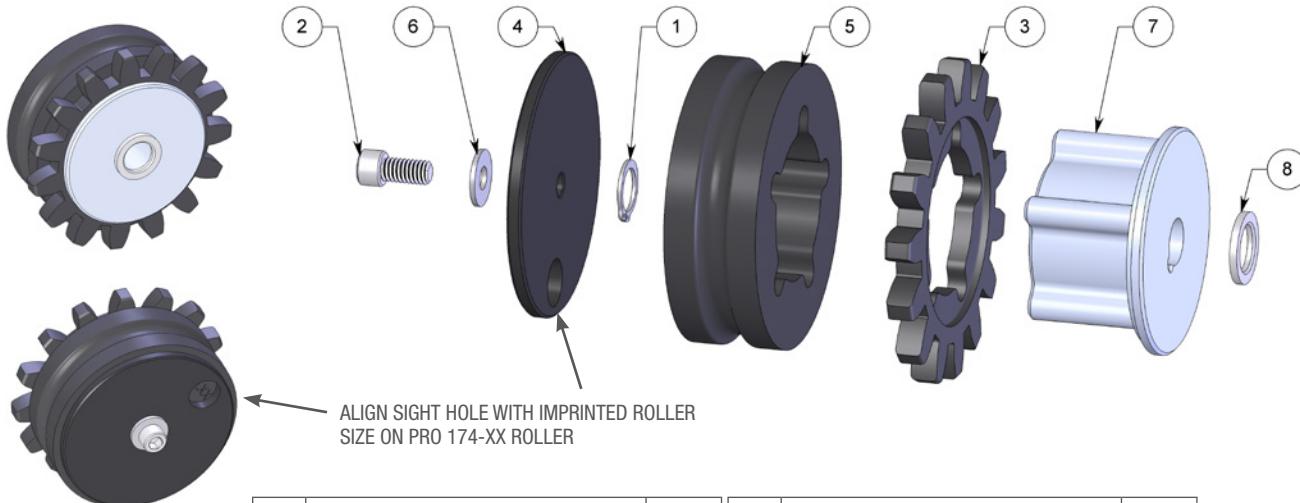
NOTE:

1. 5x BLUE LOCTITE: PN: 242 OR EQUIVALENT
2. APPLY BLUE GOOP (A SWAGELOK BRAND) ANTI-SEIZE.

#	PART NUMBER	QTY.
1	PRO 176 IDLER SHAFT	1
2	PRO 177 IDLER BEARING PLATE	1
3	PRO 178 BEARING	2
4	PRO 179 BEARING SPACER OD	1

5	PRO 180 RETAINING RING	1
6	GSF 319-02-24 FHCS .19-24 X .50 LG SS	5
7	PRO 171 IDLER HUB	1
8	PRO 172 ROLLER GEAR 15T	1

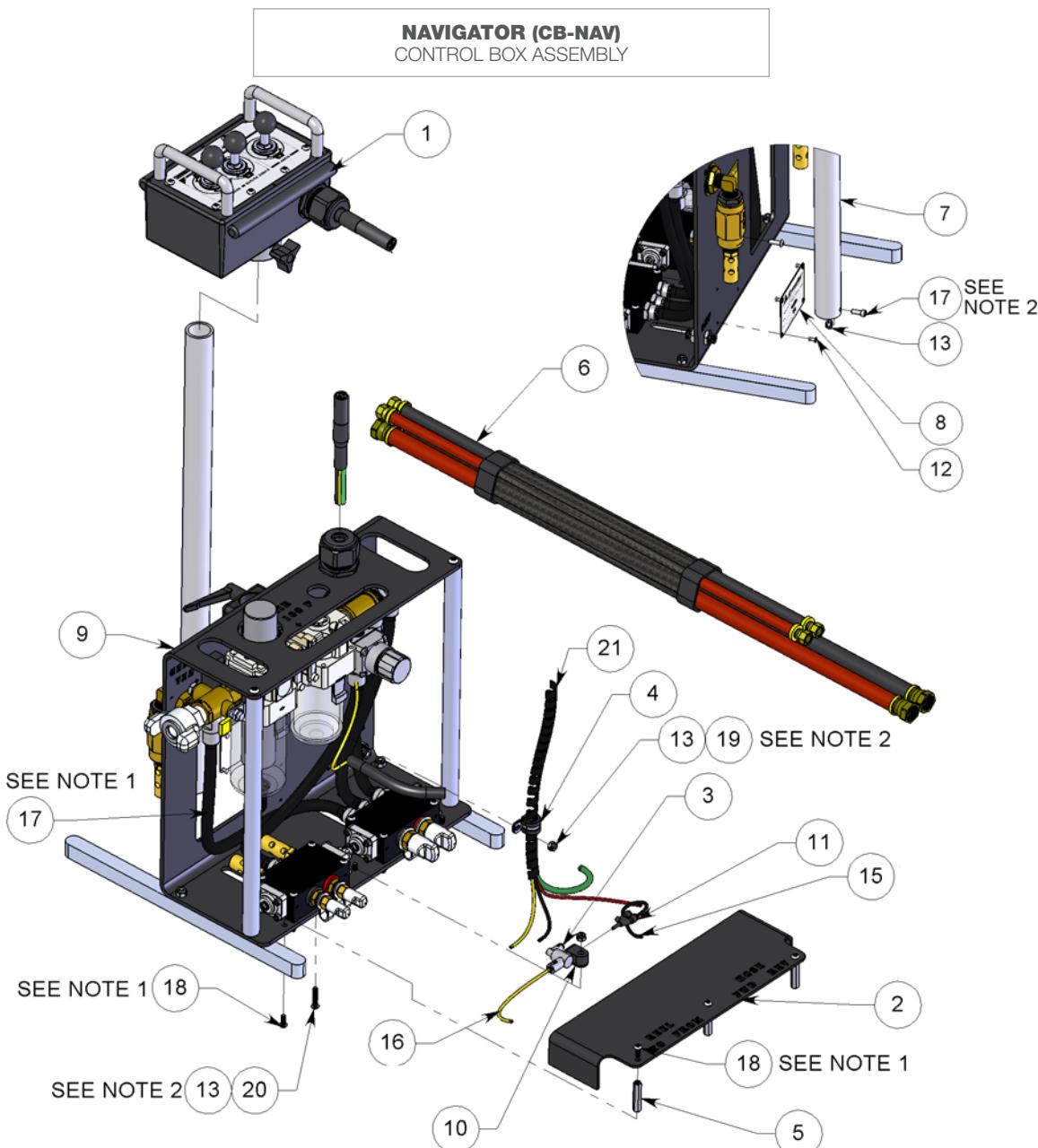
9	PRO 174-46 POLY ROLLER	1
10	PRO 173 ROLLER PLATE	1
11	PRO 175 HIGH-STRENGTH WASHER	1
12	GS 331-025 SHCS .31-18 X .62 SS	1

PRO 181
 DRIVE ROLLER ASSEMBLY


#	PART NUMBER	QTY.
1	ABX 249 RETAINING RING, HD EXT SS	1
2	GS 531-025 SHCS .31-18 X .62 SS	1
3	PRO 172 ROLLER GEAR	1
4	PRO 173 ROLLER PLATE	1

5	PRO 174-46 POLY ROLLER	1
6	PRO 175 HIGH-STRENGTH WASHER	1
7	PRO 182 DRIVE HUB	1
8	PRO 183 SHAFT SHOULDER WASHER	1

PARTS DIAGRAM

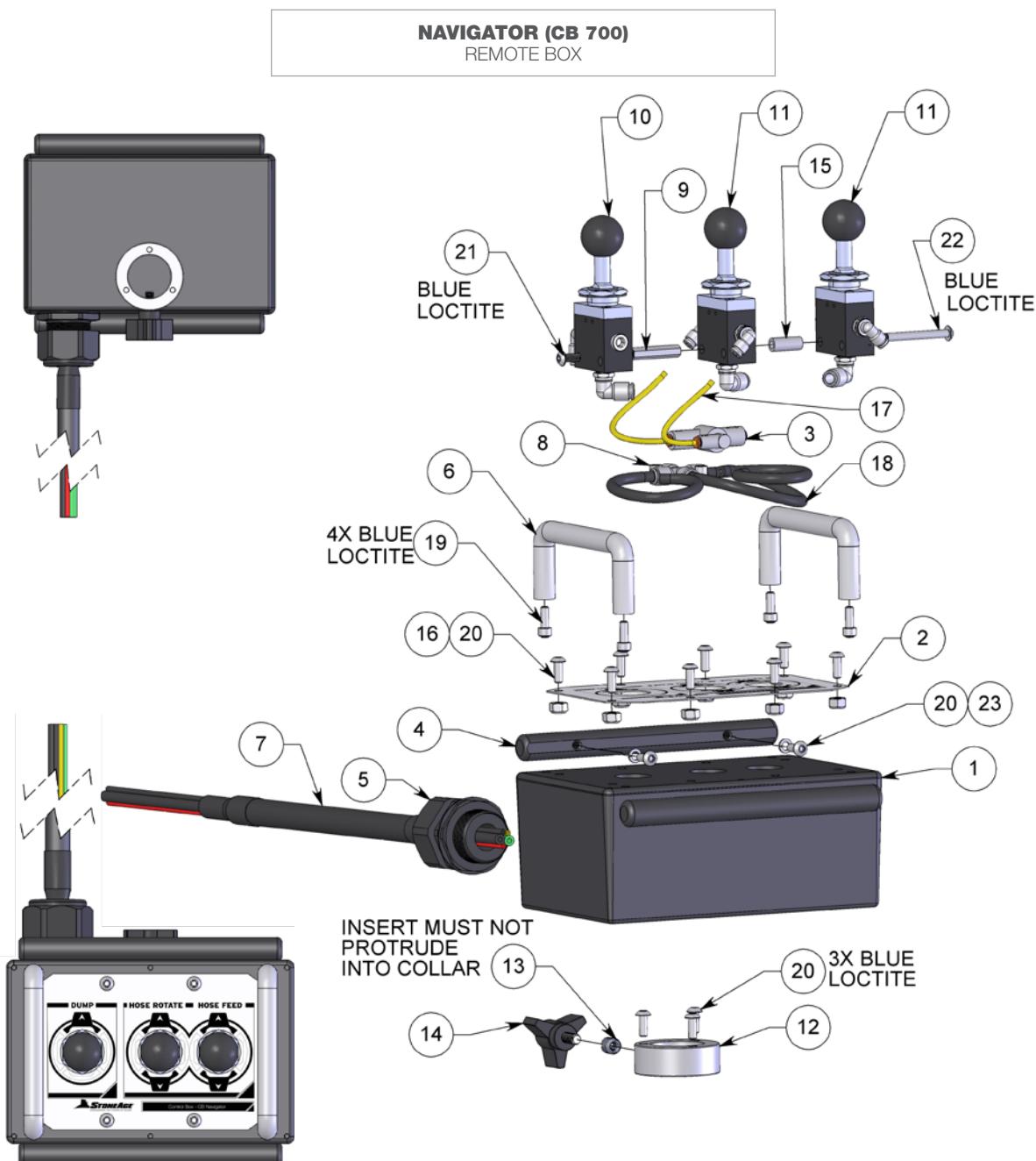


NOTE:

1. BLUE LOCTITE: PN: 242 OR EQUIVALENT
2. APPLY BLUE GOOP (A SWAGELOK BRAND) ANTI-SEIZE.

#	PART NUMBER	QTY.
1	CB 700 NAVIGATOR REMOTE BOX	1
2	CB 705 FRL VALVE COVER	1
3	CB 710 OR VALVE	1
4	CB 711 LOOP CLAMP	1
5	CB 712 HEX STANDOFF	3
6	CB 715-18 NAV HOSE BUNDLE ASSEMBLY	1
7	CB 727 REMOTE BOX POLE, 1.250D	1
8	CB 729 NAVIGATOR SERIAL PLATE	1
9	CB 730 NAVIGATOR FRL BASE	1
10	CB 731 HINGED PLASTIC CLAMP	1

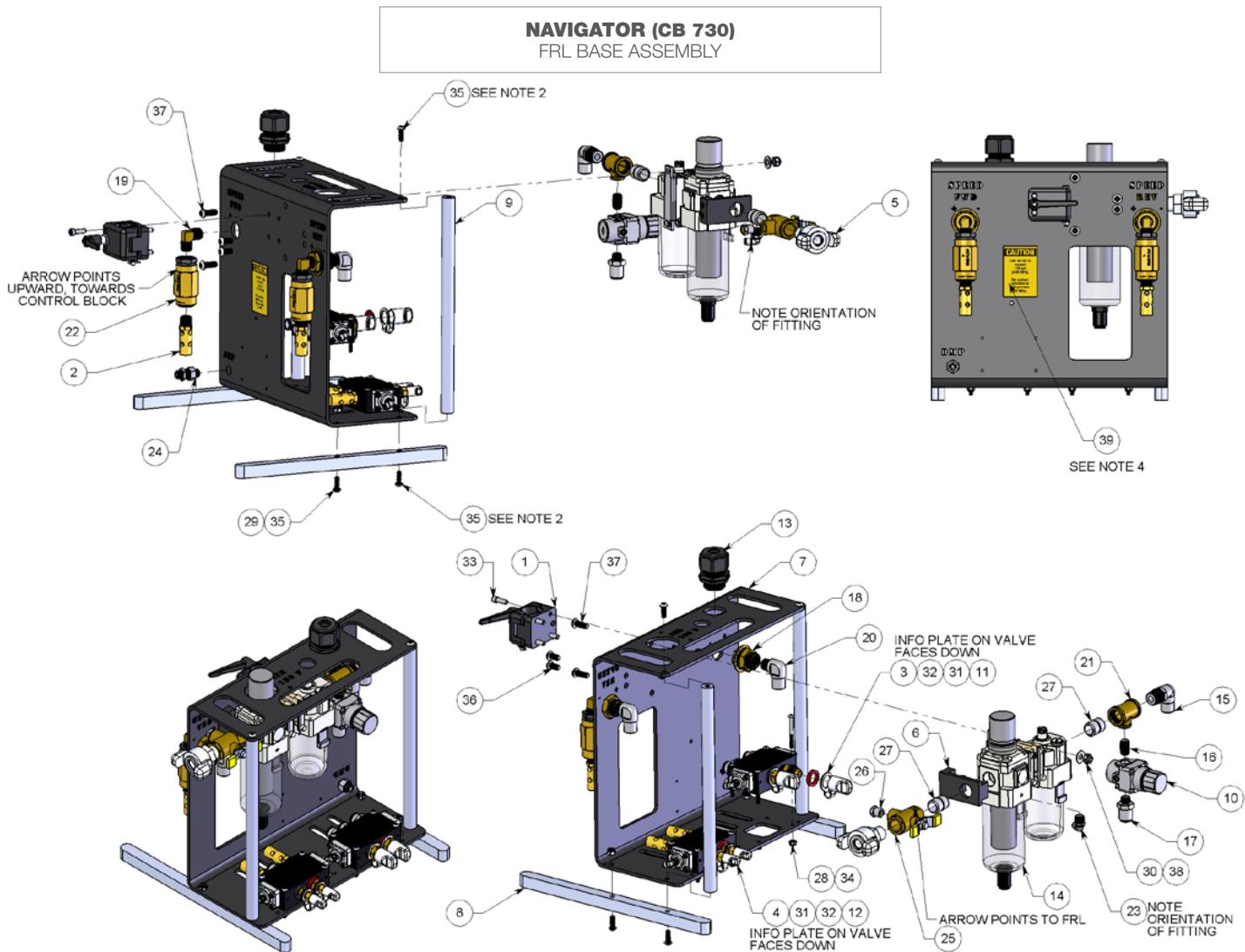
11	CB 732 FTG TUBE STEM WYE, PL2	1
12	CB 747 RIVET 1-8 X .25	4
13	GN 319-L NYLOK NUT SS (HC 025.1)	3
14	GPTB 0125-PUR95A-BK	6"
15	GPTB 0125-PUR95A-YL	6"
16	GPTB 0500-PUR95A-BK	45"
17	GS 319-02 SHCS .19-24 X .50 SS	1
18	GSB 319-02-32 BHCS .19-32 X .50 LG	6
19	GSB 319-025 BHCS .19-24 X .625 LG SS	1
20	GSB 319-04 BHCS .19-24 X 1.00 LG SS	1
21	SBT 511.1 SPIRAL WRAP, .375 ID	1



#	PART NUMBER	QTY.
1	CB 708 ENCLOSURE NAVIGATOR	1
2	CB 709 GRAPHIC NAVIGATOR	1
3	CB 710 OR VALVE	1
4	CB 713 CRIMP RUNG	2
5	CB 714 CORD GRIP, .51-.79	1
6	CB 716 ANODIZED PULL HANDLE	2
7	CB 717-10 NAV UMBILICAL	1
8	CB 718 FITTING, CROSS, PL4	1
9	CB 719 HEX STANDOFF, 1.25 LG 10-32	1
10	CB 721 PNEUM 3WAY ASSY, DUMP	1
11	CB 722 PNEUM 3WAY ASSY, FWD-REV	2

12	CB 724 MODIFIED COLLAR	1
13	CB 725 THREAD LOCKING SLOTTED INSERT	1
14	CB 726 THREE LOBE KNOB, .25-.20	1
15	CB 728 Spacer, .192ID .313OD .75Lg	1
16	GN 519-L-32 NYLOK NUT	8
17	GPTB 0125-PUR95A-YL	10 IN
18	GPTB 0250-PUR95A-BK	23 IN
19	GS 319-02-32 SHCS .19-32 x .50 SS	4
20	GSB 319-02-32 BHCS .19-32 x .50 Lg	15
21	GSB 319-04-32 BHCS .19-32 x 1.00 Lg SS	1
22	GSB 319-10-32 BHCS .19-32 x 2.50 Lg SS	1
23	GW 319-L LOCK WASHER SS	4

PARTS DIAGRAM



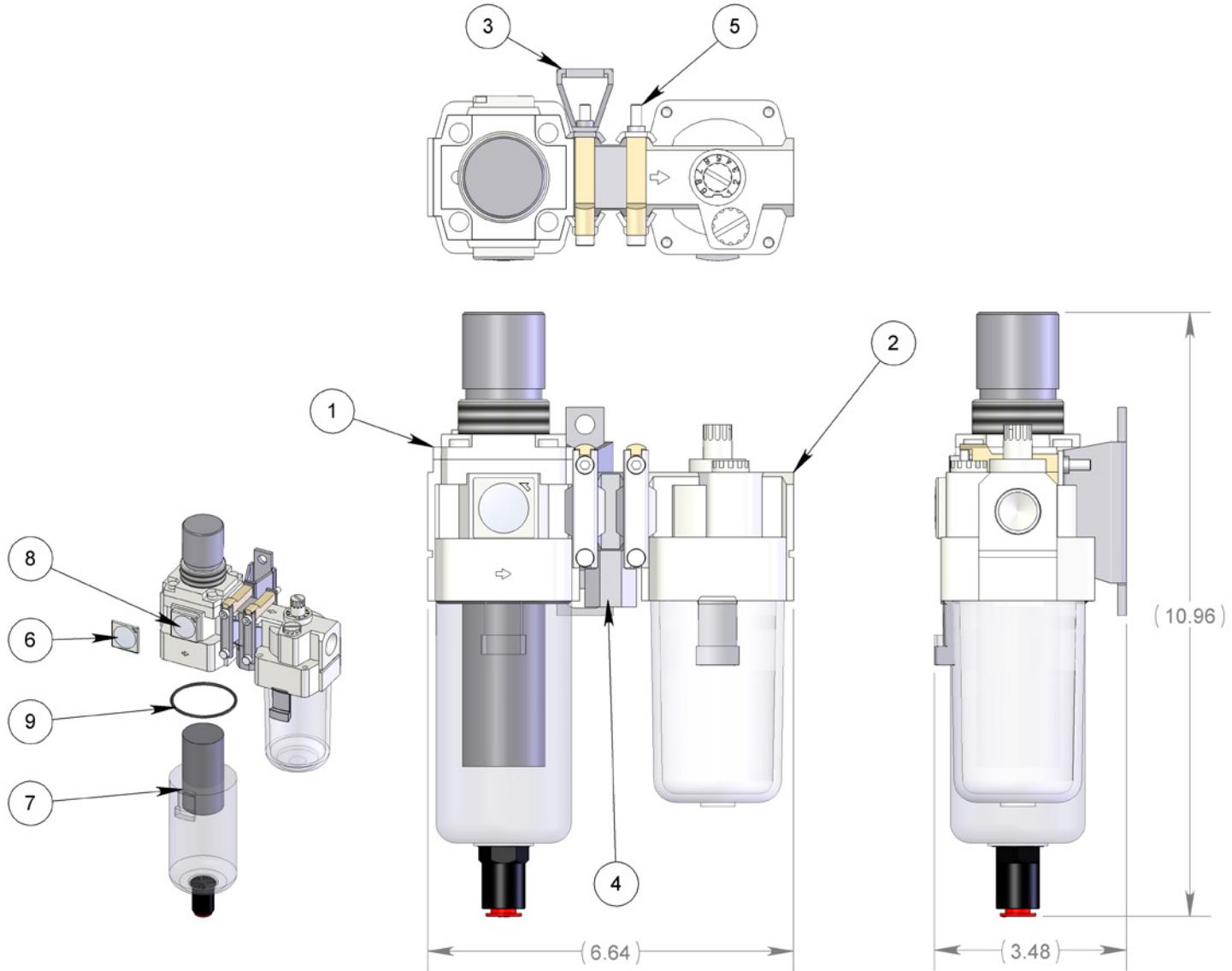
NOTE:

1. APPLY BLUE GOOP (A SWAGELOK BRAND) ANTI-SEIZE.
2. ADD BLUE LOCTITE: PN: 242 OR EQUIVALENT TO ALL THREADED HARDWARE.
3. ADD LOCTITE THREAD SEALANT 567 TO ALL NPT THREADS. AN EQUIVALENT ALTERNATIVE IS ACCEPTABLE
4. CLEAN ALL DEBRIS & OILS BEFORE INSTALLING. INSTALL AT APPROXIMATE ORIENTATION AND LOCATION & AT ROOM TEMPERATURE.

#	PART NUMBER	QTY.
1	BOP 070 HINGE CLAMP ASSEMBLY	1
2	BR 154 MUFFLER	2
3	BR 167 DUST CAP	2
4	BR 168 DUST CAP, J4	2
5	CB 114 INLET FITTING	1
6	CB 395 FRL BRACKET	1
7	CB 701 FRL FRAME	1
8	CB 702 FRL BASE LEG	2
9	CB 703 FRL ROD	2
10	CB 704 PRESSURE REGULATOR, 60 PSI	1
11	CB 706 VALVE ASSY DRIVE	1
12	CB 707 VALVE ASSY DRUM	1
13	CB 714 CORD GRIP, .51-.79	1

14	CB 720 GEN3 FILTER-REGULATOR-LUBRICATOR WITH GEN2 CLAMP WITH AIR TAP	1
15	CB 733 FTG P8PL8 90DEG	1
16	CB 734 FTG P4 NIPPLE	1
17	CB 735 FTG P4PL8	1
18	CB 736 FTG P6 BULKHEAD ASSY	2
19	CB 737 FTG P6P6 90DEG	2
20	CB 738 FTG P6PL8 90DEG	2
21	CB 739 FTG REDUCING TEE P8FP8FP4F	1
22	CB 780-P6 IN-LINE FLOW CONTROL, P6	2
23	CB 786 FITTING, 90DEG SWIVEL, P4MPL4	1
24	CB 790 FITTING, BULKHEAD, PL4PL4	1
25	CB 792 VALVE, AUTODRAIN, P8	1

26	CB 793 BREather, SINTERED BRONZE, P4	1
27	CB 794 PIPE NIPPLE, P8P8 X 1.13 SS	2
28	GN 319-L NYLOK NUT SS (HC 025.1)	8
29	GN 325-L NYLOK NUT SS (TB 044.1)	6
30	GN 331-L NYLOK NUT SS	2
31	GP 011-BK BLACK ID BAND MED	2
32	GP 011-R RED ID BAND MED	2
33	GS 325-03 SHCS .25-20 X .75 SS	4
34	GSB 319-08 BHCS .19-24 X 2.00 LG SS	8
35	GSB 325-03 BHCS .25-20 X .75 LG SS	6
36	GSB 331-025 BHCS .31-18 X .62 LG SS	2
37	GSB 331-035 BHCS .31-18 X .88 LG SS	2
38	GW 331-F FLAT WASHER SS	2
39	PL 156-125 CAUTION INLET AIR, 125PSI MAX	1

NAVIGATOR (CB 720)GEN 3 FILTER, REGULATOR, LUBRICATOR WITH GEN 2 CLAMP
WITH AIR TAP

#	PART NUMBER	QTY.
1	CB 312.1 GEN3 REGULATOR-FILTER	1
2	CB 312.2 LUBRICATOR AL40-N04-Z-A	1
3	CB 312.3 SPACER W BRACKET, GEN2 Y400T	1
4	CB 312.4 SPACER ATTACHMENT Y410-N02-A	1
5	CB 312.5 SPACER WITHOUT BRACKET, GEN2 Y400	1
6	CB 312.1.4 LENS COVER FOR GAUGE	1
7	CB 312.1.6 FILTER	1
8	CB 312.1.7 GAUGE WITH LENS	1
9	CB 312.1.8 O RING	1

NOTES

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TERMS AND CONDITIONS

1. Acceptance of Terms and Conditions. Receipt of these Terms and Conditions of Sale ("Terms and Conditions") shall operate as the acceptance by StoneAge, Inc. ("Seller") of the order submitted by the purchaser ("Buyer"). Such acceptance is made expressly conditional on assent by Buyer to these Terms and Conditions. Such assent shall be deemed to have been given unless written notice of objection to any of these Terms and Conditions (including inconsistencies between Buyer's purchase order and this acceptance) is given by Buyer to Seller promptly on receipt hereof.

Seller desires to provide Buyer with prompt and efficient service. However, to individually negotiate the terms of each sales contract would substantially impair Seller's ability to provide such service. Accordingly, the product(s) furnished by Seller are sold only according to the terms and conditions stated herein and with the terms and conditions stated in any effective StoneAge Dealer Agreement or StoneAge Reseller Agreement, if applicable. Notwithstanding any terms and conditions on Buyer's order, Seller's performance of any contract is expressly made conditional on Buyer's agreement to these Terms and Conditions unless otherwise specifically agreed to in writing by Seller. In the absence of such agreement, commencement of performance, shipment and/or delivery shall be for Buyer's convenience only and shall not be deemed or construed to be an acceptance of Buyer's terms and conditions.

2. Payment/Prices. Unless other arrangements have been made in writing between Seller and Buyer, payment for the product(s) shall be made upon receipt of invoice. The prices shown on the face hereof are those currently in effect. Prices invoiced shall be per pricelist in effect at the time of shipment. Prices are subject to increase for inclusion of any and all taxes which are applicable and which arise from the sale, delivery or use of the product(s), and the collection of which Seller is or may be responsible to provide to any governmental authority, unless acceptable exemption certificates are provided by Buyer in accordance with applicable law. Buyer shall pay all charges for transportation and delivery and all excise, order, occupation, use or similar taxes, duties, levies, charges or surcharges applicable to the product(s) being purchased, whether now in effect or hereafter imposed by any governmental authority, foreign or domestic.

3. Warranty. SELLER MAKES NO WARRANTIES OR REPRESENTATIONS AS TO THE PERFORMANCE OF ANY PRODUCT EXCEPT AS SET FORTH IN THE STONEAGE LIMITED WARRANTY PROVIDED WITH THE PRODUCT.

4. Delivery. Seller is not obligated to make delivery by a specified date, but will always use its best efforts to make delivery within the time requested. The proposed shipment date is an estimate. Seller will notify Buyer promptly of any material delay and will specify the revised delivery date as soon as practicable. UNDER NO CIRCUMSTANCES SHALL SELLER HAVE ANY LIABILITY WHATSOEVER FOR LOSS OF USE OR FOR ANY DIRECT OR CONSEQUENTIAL DAMAGES RESULTING FROM DELAY REGARDLESS OF THE REASON(S).

All product(s) will be shipped F.O.B. point of origin, unless specifically agreed otherwise, and Buyer shall pay all shipping costs and insurance costs from that point. Seller, in its sole discretion, will determine and arrange the means and manner of transportation of the product(s). Buyer shall bear all risk of loss commencing with the shipment or distribution of the product(s) from Seller's warehouse. Order shortages or errors must be reported within fifteen (15) business days from receipt of shipment to secure adjustment. No product(s) may be returned without securing written approval from Seller.

5. Modification. These Terms and Conditions are intended by Seller and Buyer to constitute a final, complete and exclusive expression of agreement relating to the subject matter hereof and cannot be supplemented or amended without Seller's prior written approval.

6. Omission. Seller's waiver of any breach or Seller's failure to enforce any of these Terms and Conditions at any time, shall not in any way affect, limit or waive Seller's right thereafter to enforce and compel strict compliance with every term and condition hereof.

7. Severability. If any provision of these Terms and Conditions is held to be invalid or unenforceable, such invalidity or unenforceability shall not affect the validity or enforceability of the other portions hereof.

8. Disputes. Seller and Buyer shall attempt in good faith to promptly resolve any dispute arising under these Terms and Conditions by negotiations between representatives who have authority to settle the controversy. If unsuccessful, Seller and Buyer shall further attempt in good faith to settle the dispute by nonbinding third-party mediation, with fees and expenses of such mediation apportioned equally to each side. Any dispute not so resolved by negotiation or mediation may then be submitted to a court of competent jurisdiction in accordance with the terms hereof. These procedures are the exclusive procedures for the resolution of all such disputes between the Seller and Buyer.

9. Governing Law. All sales, agreements for sale, offers to sell, proposals, acknowledgments and contracts of sale, including, but not limited to, purchase orders accepted by Seller, shall be considered a contract under the laws of the State of Colorado and the rights and duties of all persons, and the construction and effect of all provisions hereof shall be governed by and construed according to the laws of such state.

10. Jurisdiction and Venue. Seller and Buyer agree that the state or federal courts located within the City and County of Denver, Colorado shall have sole and exclusive jurisdiction over any litigation concerning any dispute arising under these Terms and Conditions not otherwise resolved pursuant to Section 9 as well as any alleged defects of any Products or damages sustained as a result of such alleged defects. Seller and Buyer further agree that should any litigation be commenced in connection with such a dispute, it shall only be commenced in such courts. Seller and Buyer agree to the exclusive jurisdiction of such courts and neither will raise any objection to the jurisdiction and venue of such courts, including as a result of inconvenience.

11. Attorney's Fees. If any litigation is commenced between Seller and Buyer, or their personal representatives, concerning any provision hereof, the party prevailing in the litigation shall be entitled, in addition to such other relief that is granted, to a reasonable sum as and for their attorneys' fees and costs in such litigation or mediation.

STONEAGE TRADEMARK LIST

View the list of StoneAge's trademarks and service marks and learn how the trademarks should be used. Use of StoneAge trademarks may be prohibited, unless expressly authorized.

<http://www.StoneAgetools.com/trademark-list/>

STONEAGE PATENT DATA

View the list of StoneAge's current U.S. patent numbers and descriptions.

<http://www.sapatents.com>

STONEAGE TERMS AND WARRANTY

View StoneAge's Terms and Warranty Conditions online.

<http://www.stoneagetoools.com/terms>

<http://www.stoneagetoools.com/warranty>

Warranties set forth herein extend only to End-Users, meaning customers acquiring, or that have previously acquired, a product manufactured by StoneAge ("Product") for their own use and not for resale, either directly from StoneAge Inc. ("StoneAge") or from a StoneAge Authorized Dealer or Reseller ("Dealer"). No warranty of any kind or nature is made by StoneAge beyond those expressly stated herein.

1. LIMITED WARRANTY PERIOD. Subject to the limitations and conditions hereinafter set forth, StoneAge warrants its Product to be free from defects in workmanship and material for a period of one (1) year from the date of purchase by the End-User, provided that the end of the limited warranty period shall not be later than eighteen (18) months from the date of shipment of the Product to the Dealer or the End-User by StoneAge ("Limited Warranty Period"). All replacement parts which are furnished under this Limited Warranty and properly installed shall be warranted to the same extent as the original Product under this Limited Warranty if, and only if, the original parts were found to be defective within the original Limited Warranty Period covering the original Product. Replacement parts are warranted for the remainder of the original Limited Warranty Period. This Limited Warranty does not cover any component part of any Product not manufactured by StoneAge. Any such component part is subject exclusively to the component manufacturer's warranty terms and conditions.

2. LIMITED WARRANTY COVERAGE. StoneAge's sole obligation under this Limited Warranty shall be, at StoneAge's option and upon StoneAge's inspection, to repair, replace or issue a credit for any Product which is determined by StoneAge to be defective in material or workmanship. StoneAge reserves the right to examine the alleged defective Product to determine whether this Limited Warranty is applicable, and final determination of limited warranty coverage lies solely with StoneAge. No statement or recommendation made by a StoneAge representative, Dealer or agent to End-User shall constitute a warranty by StoneAge or a waiver or modification to any of the provisions hereof or create any liability for StoneAge.

3. WARRANTY SERVICE PROVIDERS. Service and repair of the Product is to be performed only by StoneAge authorized service representatives, including Dealers who are authorized repair centers, with StoneAge approved parts. Information about StoneAge authorized service representatives can be obtained through the StoneAge website at www.stoneagetools.com/ service. Unauthorized service, repair or modification of the Product or use of parts not approved by StoneAge will void this Limited Warranty. StoneAge reserves the right to change or improve the material and design of the Product at any time without notice to End-User, and StoneAge is not obligated to make the same improvements during warranty service to any Product previously manufactured.

4. WARRANTY EXCLUSIONS. This Limited Warranty does not cover, and StoneAge shall not be responsible for the following, or damage caused by the following: (1) any Product that has been altered or modified in any way not approved by StoneAge in advance in writing; (2) any Product that has been operated under more severe conditions or beyond the rated capacity specified for that Product; (3) depreciation or damage caused by normal wear and tear, failure to follow operation or installation instructions, misuse, negligence or lack of proper protection during storage; (4) exposure to fire, moisture, water intrusion, electrical stress, insects, explosions, extraordinary weather and/or environmental conditions including, but not limited to lightning, natural disasters, storms, windstorms, hail, earthquakes, acts of God or any other force majeure event; (5) damage to any Product caused by any attempt to repair, replace, or service the Product by persons other than StoneAge authorized service representatives; (6) costs of normal maintenance parts and services; (7) damage sustained during unloading, shipment or transit of the Product; or (8) failure to perform the recommended periodic maintenance procedures listed in the Operator's Manual accompanying the Product.

5. REQUIRED WARRANTY PROCEDURES. To be eligible for warranty service, the End-User must: (1) report the Product defect to the entity where the Product was purchased (i.e. StoneAge or the Dealer) within the Limited Warranty Period specified in this Limited Warranty; (2) submit the original invoice to establish ownership and date of purchase; and (3) make the Product available to a StoneAge authorized service representative for inspection to

determine eligibility for coverage under this Limited Warranty. This Limited Warranty shall not extend to any person or entity who fails to provide proof of original purchase from StoneAge or a Dealer. No Product may be returned for credit or adjustment without prior written permission from StoneAge.

6. DISCLAIMER OF IMPLIED WARRANTIES AND OTHER REMEDIES. EXCEPT AS EXPRESSLY STATED HEREIN (AND TO THE FULLEST EXTENT ALLOWED UNDER APPLICABLE LAW), STONEAGE HEREBY DISCLAIMS ALL OTHER WARRANTIES, EXPRESS OR IMPLIED, INCLUDING WITHOUT LIMITATION ALL IMPLIED WARRANTIES OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE, AND ANY AND ALL WARRANTIES, REPRESENTATIONS OR PROMISES AS TO THE QUALITY, PERFORMANCE OR FREEDOM FROM DEFECT OF THE PRODUCT COVERED BY THIS LIMITED WARRANTY. STONEAGE FURTHER DISCLAIMS ALL IMPLIED INDEMNITIES.

7. LIMITATION OF LIABILITY. End-User specifically acknowledges that the Product may be operated at high speeds and/or pressures, and that as such it may be inherently dangerous if not used correctly. End-User shall familiarize itself with all operation materials provided by StoneAge and shall at all times use and require its agents, employees and contractors to use all necessary and appropriate safety devices, guards and proper safe operating procedures. In no event shall StoneAge be responsible for any injuries to persons or property caused directly or indirectly by the operation of the Product if End-User or any agent, employee, or contractor of End-User: (1) fails to use all necessary and appropriate safety devices, guards and proper safe operating procedures; (2) fails to maintain in good working order such safety devices and guards; (3) alters or modifies the Product in any way not approved by StoneAge in advance in writing; (4) allows the Product to be operated under more severe conditions or beyond the rated capacity specified for the Product; or (5) otherwise negligently operates the Product. End-User shall indemnify and hold StoneAge harmless from any and all liability or obligation incurred by or against StoneAge, including costs and attorneys' fees, to or by any person so injured.

TO THE FULL EXTENT ALLOWED BY APPLICABLE LAW, STONEAGE SHALL NOT BE LIABLE FOR ANY INDIRECT, SPECIAL, INCIDENTAL, CONSEQUENTIAL, OR PUNITIVE DAMAGES (INCLUDING WITHOUT LIMITATION, LOSS OF PROFITS, LOSS OF GOODWILL, DIMINUTION OF VALUE, WORK STOPPAGE, INTERRUPTION OF BUSINESS, RENTAL OF SUBSTITUTE PRODUCT, OR OTHER COMMERCIAL LOSS EVEN TO THE EXTENT SUCH DAMAGES WOULD CONSTITUTE DIRECT DAMAGES), WITH RESPECT TO THE COVERED STONEAGE PRODUCT, OR OTHERWISE IN CONNECTION WITH THIS LIMITED WARRANTY, REGARDLESS OF WHETHER STONEAGE HAS BEEN ADVISED OF THE POSSIBILITY OF SUCH DAMAGES.

IT IS UNDERSTOOD THAT STONEAGE'S LIABILITY, WHETHER IN CONTRACT, IN TORT, UNDER ANY WARRANTY, IN NEGLIGENCE, OR OTHERWISE SHALL NOT EXCEED THE AMOUNT OF THE PURCHASE PRICE PAID BY THE END-USER FOR THE PRODUCT. STONEAGE'S MAXIMUM LIABILITY SHALL NOT EXCEED, AND END-USER'S REMEDY IS LIMITED TO EITHER (1) REPAIR OR REPLACEMENT OF THE DEFECTIVE WORKMANSHIP OR MATERIAL OR, AT STONEAGE'S OPTION, (2) REFUND OF THE PURCHASE PRICE, OR (3) ISSUANCE OF A CREDIT FOR THE PURCHASE PRICE, AND SUCH REMEDIES SHALL BE END-USER'S ENTIRE AND EXCLUSIVE REMEDY.

YOU, THE END-USER, UNDERSTAND AND EXPRESSLY AGREE THAT THE FOREGOING LIMITATIONS ON LIABILITY ARE PART OF THE CONSIDERATION IN THE PRICE OF THE STONEAGE PRODUCT YOU PURCHASED.

Some jurisdictions do not allow the limitation or exclusion of liability for certain damages, so the above limitations and exclusions may not apply to you. This Limited Warranty gives you specific legal rights, and you may also have other rights which vary from jurisdiction to jurisdiction. If any provisions of this Limited Warranty is held to be invalid or unenforceable, such invalidity or unenforceability shall not affect the validity or enforceability of the other portions hereof.



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