



PRO (WT)  
ROTARY SWIVEL NOZZLES  
3/8", 1/2", AND BSPP OPTIONS  
USER MANUAL



# TABLE OF CONTENTS

<b>MANUFACTURER'S INFORMATION</b> .....	<b>3</b>
SPECIFICATIONS .....	3
DESCRIPTION AND INTENDED USE .....	3
KEY FEATURES .....	3
EC DECLARATION OF CONFORMITY .....	4
UK DECLARATION OF CONFORMITY .....	5
<b>WARNING AND SAFETY INSTRUCTIONS</b> .....	<b>6</b>
BACKOUT PREVENTION .....	6
OPERATOR TRAINING RISK ASSESSMENT .....	7
PPE .....	8
PRE-RUN SAFETY CHECK .....	9
<b>WARTHOG® PRO (WT) OVERVIEW</b> .....	<b>10</b>
WARTHOG® PRO (WT) MODEL INFORMATION .....	11
<b>OPERATION</b> .....	<b>12</b>
<b>TROUBLESHOOTING</b> .....	<b>13</b>
<b>TOOL SERVICE INFORMATION</b> .....	<b>14</b>
<b>VISCOUS FLUID FILL INFORMATION</b> .....	<b>14</b>
<b>DISASSEMBLY</b> .....	<b>15</b>
<b>ASSEMBLY</b> .....	<b>17</b>
<b>PART NAMES AND SERVICE KITS</b> .....	<b>18</b>
<b>TERMS AND CONDITIONS AND WARRANTY</b> .....	<b>20</b>

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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>

WARTHOG® PRO (WT) SPECIFICATIONS		
Tool Family:	Warthog® PRO (WT)	
Tool Model:	WT-1/2	WT-3/8
Pipe Size:	3-6 in. (80-150 mm)	3-6 in. (80-150 mm)
Pressure Range:	1200-5000 psi (83-350 bar)	1200-5000 psi (83-350 bar)
Flow Range:	9-21 gpm (34-79 Lpm)	9-12 gpm (34-79 Lpm)
Flow Rating:	.75 Cv	.75 Cv
Visc Service Life:	50 Hours	50 Hours
Rotation Speed:	300-500 rpm	300-500 rpm
Inlet Connection:	1/2" NPT or BSPP8	3/8" NPT or BSPP6
Jet Port Size:	5 x 1/8" NPT	5 x 1/8" NPT
Jet Type:	AP2	AP2
Port Plug Type:	AP2 002	AP2 002
Outside Diameter:	1.9 in. (48 mm)	1.9 in. (48 mm)
Overall Length:	3.4 in. (86 mm)	3 in. (76 mm)
Weight:	1.2 lbs (.54 kg)	1.2 lbs (.54 kg)
Max Water Temperature:	160 °F (70 °C)	160 °F (70 °C)

## DESCRIPTION AND INTENDED USE

The Warthog® PRO (WT) Series models can negotiate elbows and clean-outs commonly found in laterals at homes, buildings, restaurants and other light commercial facilities. This tool is most commonly used on small capacity pumps and cart jetters. Also an excellent choice for cutting roots, clearing ice and removing blockages.

The Warthog® PRO WT-3/8, WT-BSPP6, WT-1/2, & WT-BSPP8 are rotary sewer nozzles designed to clean 3 to 6 inch pipes and sewers with elbows. The tools can be used at operating pressures up to 5000 psi (345 bar). See WT HEAD OFFSET CHART for Inlet and Head options.

## KEY FEATURES:

- Excellent for navigating elbows
- Cuts roots, clears ice and blockages
- Carbide buttons extend tool life up to 5 times
- Replaceable AP2 jets.

**EC DECLARATION OF CONFORMITY**

**Manufacturer:** StoneAge Incorporated  
466 South Skylane Drive Durango, CO 81303 USA

**Authorized Representativ** StoneAge Netherlands BV  
Reedijk 7Q  
3274 KE Heinenoord Netherlands  
Sander de Korte, Customer Service Manager

**Declare that:** Warthog® PRO (WT-XXX)  
are rotary swivel tools designed for cleaning pipes with bends.

**Are 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 Files for the Warthog® PRO (WT-XXX) are maintained at:

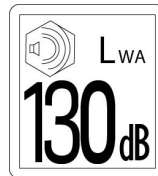
StoneAge Incorporated, 466 South Skylane Drive, Durango, CO 81303, USA and were compiled by Sander de Korte. The Technical File is available through the Authorized Representative. This Declaration of Conformity is issued under the exclusive responsibility of StoneAge Incorporated.



StoneAge Incorporated, Durango, CO, USA  
Liz Mancuso, Director of Engineering

02/15/23

Date



**UK DECLARATION OF CONFORMITY**

**Manufacturer:** StoneAge Incorporated  
466 South Skylane Drive Durango, CO 81303 USA

**Authorized Representative:** StoneAge UK  
Unit 3  
Crucible Business Park  
Woodbury Lane  
Norton  
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Worcestershire, WR5 2DQ  
United Kingdom  
Steve Ellis, Managing Director StoneAge UK

**Declare that:** Warthog® PRO (WT-XXX)  
are rotary swivel tools designed for cleaning pipes with  
bends.

**Are compliant with the following Statutory Requirements and Designated Standards:**

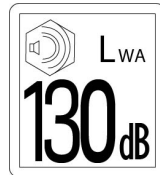
S.I. 2008 No. 1597 (E) Safety of machinery – General principles for design – Risk assessment and risk reduction  
EN ISO 12100:2010 (E) Safety of machinery – General principles for design – Risk assessment and risk  
reduction

**The Technical Files for the Warthog® PRO (WT-XXX) are maintained at:**

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StoneAge Incorporated, Durango, CO, USA  
Liz Mancuso, Director of Engineering

02/15/23  
Date



# WARNING AND SAFETY INSTRUCTIONS

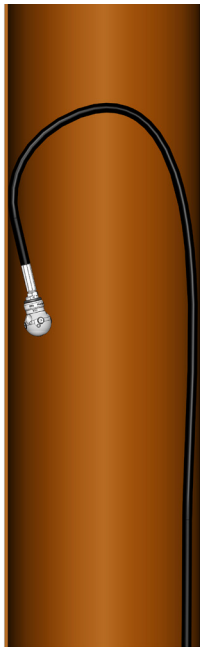
## ⚠️ WARNING

Because of the short length of the Warthog® PRO (WT), the tool can turn around in pipes and come back at the operator at a high rate of speed. A rigid “stinger” should be used between the hose and the tool. The rigid length of the tool including hose end must be 1-1/2 times the inside diameter of the pipe being cleaned (see below).

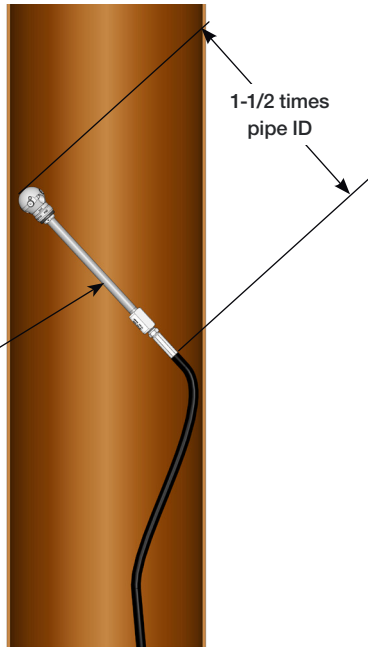
Make sure there is an operator controlled dump in the system, operated by the person closest to the cleaning job. It is recommended that the hose be marked a few feet from the end with a piece of tape so the operator knows when to stop when retracting the tool.

## ⚠️ DANGER

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](http://www.wjta.org). Deviating from safety instructions and recommended practices can lead to severe injury and/or death.



**IMPROPER USE:**  
PRO (WT) will turn around in  
large diameter pipe  
**VERY DANGEROUS!**



**PROPER USE:**  
PRO (WT) with rigid “stinger”  
to prevent turnaround, still  
able to pass through elbows.

# 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 the Water Jetting Association (WJA) Code of Practice, or equivalent (see [www.waterjetting.org.uk](http://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.

Operators **MUST** read, understand, and follow the Operational and Training Requirements (Section 7.0) of WJTA-IMCA's Industry Best Practices For The Use Of High-pressure Waterjetting Equipment, or equivalent.

Operators **MUST** read, understand and follow the Warnings, Safety Information, Assembly, Installation, Connection, Operation, Transport, Handling, Storage, and Maintenance Instructions detailed in this manual.

The risk assessment **MUST** consider potential material or substance hazards including:

- Aerosols
- Biological and microbiological (viral or bacterial) agents
- Combustible materials
- Dusts
- Explosion
- Fibers
- Flammable substances
- Fluids
- Fumes
- Gases
- Mists
- Oxidizing Agents

# WARNING AND SAFETY INSTRUCTIONS

## 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.

PPE may include:

- **Eye protection:** Full face visor
- **Foot protection:** Kevlar® brand or steel toe capped, waterproof, non-slip safety boots
- **Hand protection:** Waterproof gloves
- **Ear protection:** Ear protection for a minimum of 85 dBA
- **Head protection:** Hard hat that accepts a full face visor and ear protection
- **Body protection:** Multi-layer waterproof clothing approved for waterjetting
- **Hose protection:** Hose shroud
- **Respiratory protection:** May be required; refer to job specific risk assessment



# WARNING AND SAFETY INSTRUCTIONS

## **WARNING**

Operations with this equipment can be potentially hazardous. Caution **MUST** be exercised prior to and during equipment 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](http://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 Warthog® PRO (WT) **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.
- Install mechanical stops, stingers and back out preventers as appropriate when doing any tube, pipe or vessel cleaning.
- 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 workplace 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.
- Operate the high-pressure water at full pressure and use the Pneumatic Foot Pedal Dump Control to verify that the dump valve is 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.

## WARTHOG® PRO (WT)

PIPE SIZE: 3"-6" LINES (80-150 MM)

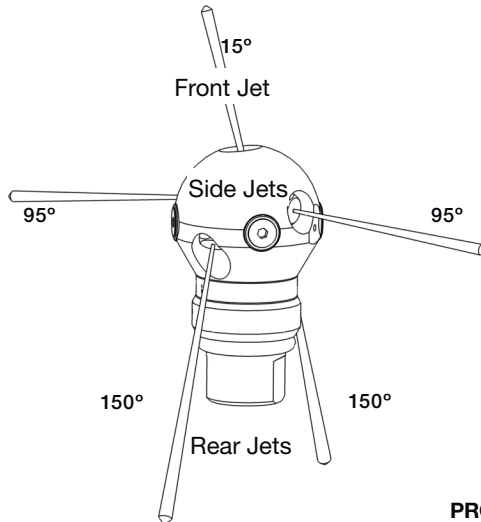
INLET: 1/2" AND 3/8" NPT OR BSPP

FLOW RATE: 9-21 GPM (34-79 LPM)

SERVICE INTERVAL: 40-50 HOURS

The PRO (WT) is configured to deliver top performance in the most common applications so you can get right to work and deliver great results.

The compact size and unique shape of the PRO (WT) enables it to negotiate elbows and clean-outs commonly found in laterals at homes, buildings, restaurants and other light commercial facilities. It is also an excellent choice for cutting roots, clearing ice and removing blockages.



### UNIVERSAL

- Jetting is configured for an equal balance of pulling, flushing, cleaning, and cutting
- Carbide bumpers protect the head from wear in the pipe

### DESCALER

- Jetting is configured for an equal balance of pulling, flushing, cleaning, and cutting
- Two side jets are added and are angled to reduce stand-off distance to the pipe wall, delivering intense jet impact to remove tough build up, calcium deposits, and scaling with ease.
- Carbide bumpers protect the head from wear in the pipe

#### PRO (WT)

3 Ports:  
1 @ 15°  
2 @ 150°

DESCALING



PULLING/  
FLUSHING



#### PRO (WT)

5 Ports:  
1 @ 15°  
2 @ 95°  
2 @ 150°

DESCALING



PULLING/  
FLUSHING



## RECOMMENDED HOSES

**WT-1/2:** StoneAge recommends a 1/2" ID hose be used, especially when using longer hose lengths.

**WT-3/8:** StoneAge recommends a 3/8" ID hose be used; if 1/4" ID inch hose is used, too much pressure is lost (at 5 gpm, each 100 ft of 1/4" hose will take away 700 psi due to friction).

## JET AND PLUG LOCATIONS

Jet thrust powers rotation and also pulls the tool through the line. The Warthog® PRO (WT) can be jetted in different configurations depending on the application. The front jet is useful for unblocking pipes. The front jet decreases the pulling power of the rear jets. Plugging the front jet will increase the ability of the tool to pull itself down the line and increase descaling power. A thick viscous fluid inside the tool controls the rotation speed.

Pumps are commonly sold based on their *theoretical* maximum flow output; in reality, none are 100% efficient. We try to take this into account when supplying you the jets. If you are not getting to the operating pressure desired, the sizes of the jets may need to be changed.

The tables below are provided as an overview of common jetting parameters. For more precise jetting information, please use the StoneAge Jetting App to determine jet sizes:

[jetting.stoneagetools.com](http://jetting.stoneagetools.com)

For more information regarding the Warthog® PRO (WT) or other Warthog® Sewer Tools, contact your factory authorized Warthog® Distributor or go to;

[www.sewernozzles.com](http://www.sewernozzles.com)

Warthog® PRO (WT-3/8) HEAD OFFSET CHART							
WT WITH 300' OF Ø3/8" HOSE			PRESSURE				
			2500 PSI	3000 PSI	3500 PSI	4000 PSI	4500 PSI
FLOW	GPM	L/MIN	170 BAR	210 BAR	240 BAR	280 BAR	310 BAR
	5	19	R22	R22	R22	R22	R22
	9	34	R15	R15	R15	R15	R12
	12	45	R15	R12	R12	R12	R12

Warthog® PRO (WT-1/2) HEAD OFFSET CHART							
WT WITH 500' OF Ø1/2" HOSE			PRESSURE				
			2500 PSI	3000 PSI	3500 PSI	4000 PSI	4500 PSI
FLOW	GPM	L/MIN	170 BAR	210 BAR	240 BAR	280 BAR	310 BAR
	9	34	R15	R12	R12	R12	R12
	12	45	R12	R12	R12	R12	R12
	15	57	R12	R12	R12	R12	R09
	18	68		R12	R12	R09	R09
	21	79				R09	R09

## NOTICE

The two most important items in maintaining the PRO (WT) tools;

- Keep debris from entering the tool and preventing it from rotating by flushing hoses before use.
- Keep the PRO (WT) full of viscous fluid to maintain control and rotation speed. When the viscous fluid is lost or contaminated, the rotation speed of the tool will increase, which reduce the life of the high pressure seal and bearing. We recommend that this is done after every 40 to 50 hours of operation. If the tool is spinning much faster than when new, this is an indication that it needs fluid.

## OPERATION:

- Make sure the operator has a controlled dump in the system and it is operated by the person closest to the job. Test the dump prior to beginning the job.
- Flush out the high pressure hoses before connecting the PRO (WT) to eliminate debris.
- Attach the tool to the end of the hose; prepare the threads per the “TECH TIP” below. There is a large O-Ring (WT 030) around the inlet, covering up the wrench flats. This O-Ring helps prevent the tool from getting caught on the rear edge when pulling the tool back out of the line. When attaching the tool to the hose end, slide the O-Ring up the hose out of the way until the connection is tightened, and then roll the O-Ring back into its original place.



**TECH TIP:** NPT threads -StoneAge recommends the use of Teflon tape and yellow Threadmate™ on NPT thread connections.

Fine and high pressure threads- StoneAge recommends the use of Blue Goop® Anti-seize on Fine and high pressure thread connections.

- It is recommended that the hose be marked a few feet from the end with a piece of tape so the operator knows when to stop on the way back out.
- Position the tool within the pipe to be cleaned; bring the pump up to pressure, making certain that the Warthog begins to pull it's way in the proper direction into the pipe. If roots are present, feeding at a slower rate will improve the cleaning results. Depending on the amount of debris in the pipe, it may be necessary to occasionally pull the Warthog back toward the pipe entrance to prevent large buildups behind the tool.
- Close the dump and slowly bring the pump up to pressure the first time to make sure jets are not plugged and the jet thrust is correct. The PRO (WT) should begin to slowly rotate.
- Once the pump is up to pressure, feed the Warthog at a reasonable rate to allow the jets time to clean the pipe. Once operating pressure is reached, feed the tool into the pipe to begin the cleaning job.
- Depending on the amount of debris in the pipe, it may be necessary to occasionally pull the Warthog back toward the pipe entrance to prevent large buildups behind the tool. Allow the jets time to do their work by feeding the hose out at a controlled rate.
- When finished cleaning, shut down and secure pump before removing Warthog from line. If the Warthog will be removed from the line and stored for more than several days, blow out water with compressed air to prolong the life of the internal components.

Blue Goop® is a registered trademark of the Swagelock® Corporation.

Parker Threadmate™ is a registered trademark of the Parker Hannifin Corporation.

**SEAL LEAK:**

- The seal may leak initially at low pressure, but should pop closed as pressure is increased. If operating pressure is reached and the seal is leaking continuously, the high pressure seal may need to be replaced. See the “Disassembly and Assembly” sections of this manual for instructions. Maintenance Kits can be found in the “Service Kit” section of this manual.

**HEAD WILL NOT ROTATE:**

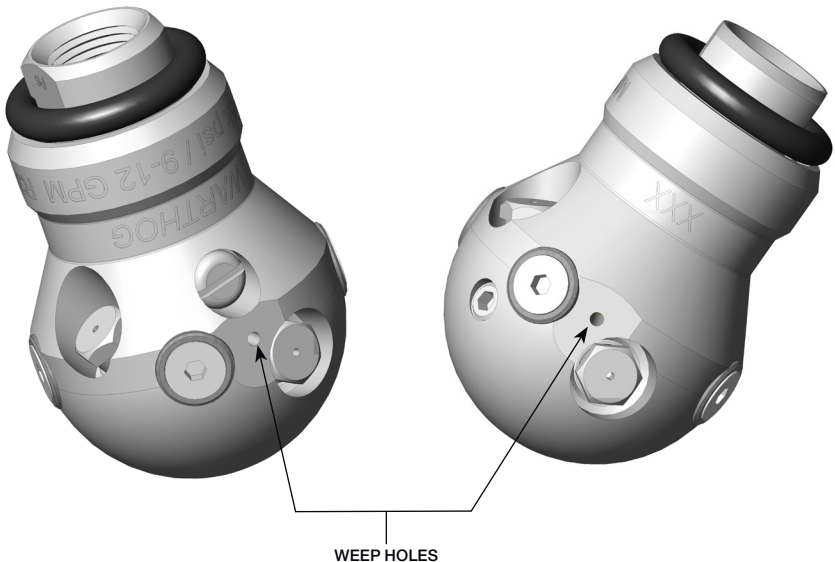
- First try rotating head by hand and see if it feels rough or gritty to turn. If it does, the tool must be disassembled and repaired; it likely has bad bearings, seals and fluid. If the tool feels okay, check to see if any jets are plugged; even if a jet is only partially blocked it can keep the head from rotating. Jets must be removed from the head to properly clean them; it does not do any good to poke the material plugging the jet back into the head, as it will just replug a jet.

**HEAD SPINS TOO FAST OR TOO SLOW:**

- If the head spins to fast, it is likely that the swivel is low on viscous fluid, or the viscous fluid has water in it. The best thing to do is drain all the fluid, wipe the parts clean and refill with the proper fluid. Check that the shaft seals are still good and will keep the fluid from leaking out.
- Check that the tool is jetted correctly for the length and diameter of the hose. If the hose is too long for the jetted configuration, it will cause a reduction in pressure and torque at the tool. The opposite would be true if the hose is too short for the jetted configuration.

**NOT GETTING THE DESIRED OPERATING PRESSURE:**

- The sizes of the jets may need to be changed. Verify jetting at [jetting.stoneagetools.com](http://jetting.stoneagetools.com)
- For more information contact your factory authorized StoneAge® Inc. distributor or go to [www.sewernozzles.com](http://www.sewernozzles.com) for help.



# TOOL SERVICE INFORMATION

## TOOL SERVICE

The Warthog® PRO (WT) also has a high pressure seal that will last between 150 and 300 hours. The seal may leak at low pressure, but will seal at high pressures unless it has worn out. Refer to this manual for assembly instructions.

Product training and proper tools are required to service this tool. If you are uncomfortable performing the service, bring the PRO (WT) to your authorized dealer.

The use of a bench vice and an arbor press is highly helpful. Take care throughout the entire procedure to keep the internals clean and free from grit, lint, and contamination. Failure to do so could result in premature failure after service.

### LIST OF TOOLS:

- Bench Vice (recommended)
- Arbor Press (recommended)
- Medium size flat-head screw driver
- Pick
- Small needle nose pliers
- WT 612 Tool Kit
  - BA 100 Retaining Ring Pliers
  - WT 105 Seal Press Tool

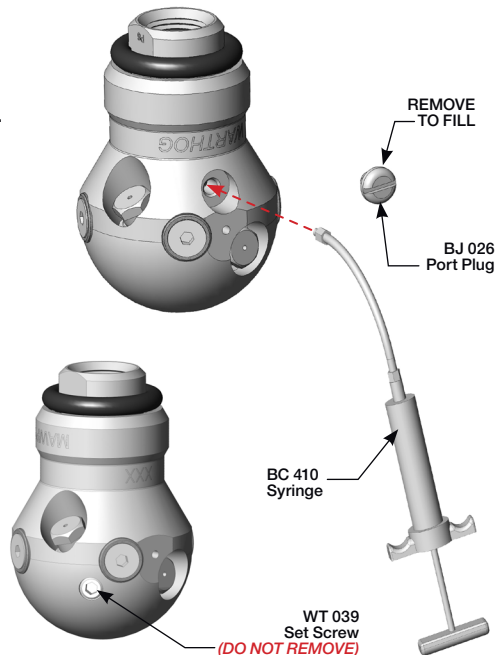
### LIST OF MATERIALS:

- Clean lint free rags or blue shop towels
- Lithium Soap Grease – StoneAge PN (GP 048 Grease)
- Isopropyl Alcohol or Denatured Alcohol
- VS 604-S Visc\Syringe Kit
  - 6oz Slow Visc
  - BC 410 Syringe

## VISCOUS FLUID FILL INSTRUCTIONS

### TO FILL WITH VISCOUS FLUID

1. Fill the syringe with viscous fluid. This is best done by unscrewing the handle from the tube and pulling out the plunger. Pour fluid into the tube; reassemble the syringe.
2. Hold the Warthog with the hose end up as shown. Remove the Port Screw (BJ 026) from the Warthog. Thread the syringe fitting into the port, and slowly squeeze fluid into swivel until excess fluid comes out around the inlet end. If the fluid coming out appears dirty or watery, keep squeezing in new fluid until it comes out clean.
3. Remove syringe from the Head and install Port Plug.



## DISASSEMBLY

1. Remove the O-Ring (WT 030) at the rear end of the Warthog.
2. Remove the Retaining Ring (WT 032) at the rear end of the Warthog.
3. Pull the Shaft Barrel & Inlet Assembly (WT 201/WT 202-XX) out of the Head (WT 140-RXX-DS). The bearings and other parts will come out with the Shaft.



**TECH TIPS:** Use a pick to gently remove the O-Ring. Use a medium sized flat screwdriver to pry off the Retaining Ring

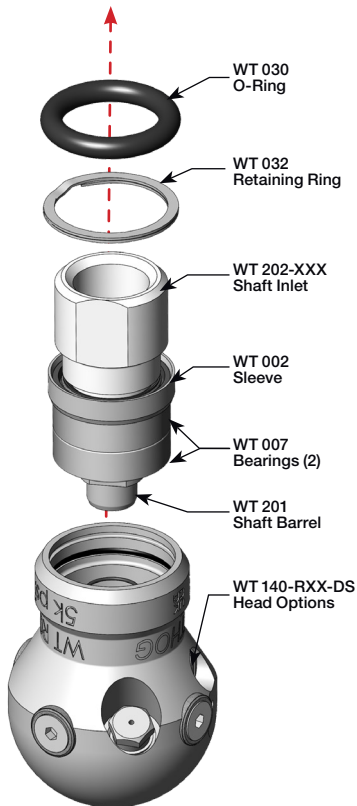


Figure 1: For Steps 1-3

4. Remove the Seat (RJ 011-K), H.P. Seal and the (RJ 012-KTO) from the Shaft.
5. Remove the Wave Spring (WT 014) from the bore of Shaft.



**TECH TIPS:** Use a pick to gently remove the Brass Seat and High Pressure Seal.

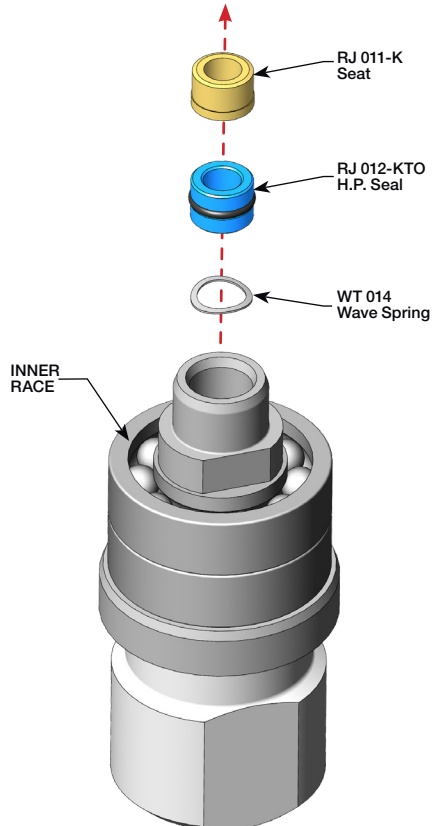



Figure 2: For Steps 4-5

# DISASSEMBLY

6. Pull the Shaft Barrel (WT 201) and Bearings (WT 007) out of the Shaft Inlet.
7. Remove the Shaft Seal Sleeve (WT 002) from the Shaft Inlet (WT 202-XX).
8. Remove the Bearings (WT 007) from the Shaft Barrel (WT 201).

 **TECH TIPS:** If using an Arbor Press to push the Shaft out of the Bearings, be sure to set the bearing down on the inner race and make sure everything is straight before pressing.

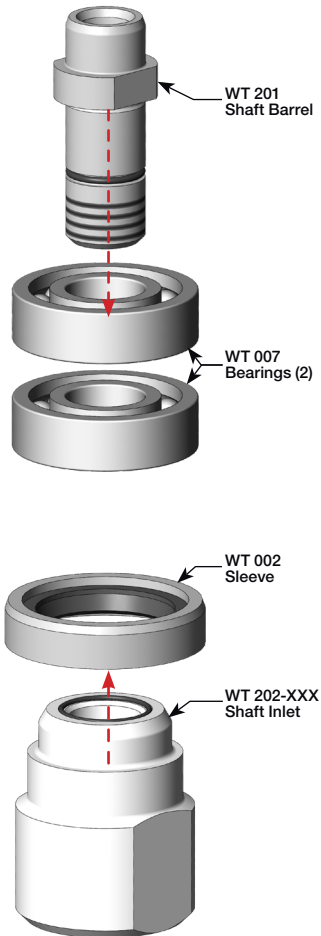



Figure 3: For Steps 6-8

9. Remove the Shaft Seal (WT 010) from the Sleeve (WT 002).
10. Remove the O-Rings from the Shaft Barrel (WT 201) and Shaft Inlet (WT 202-XX).

 **TECH TIPS:** Use a pick to gently remove the Seal and O-Rings.

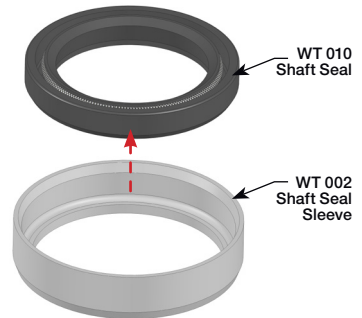


Figure 4: For Step 9

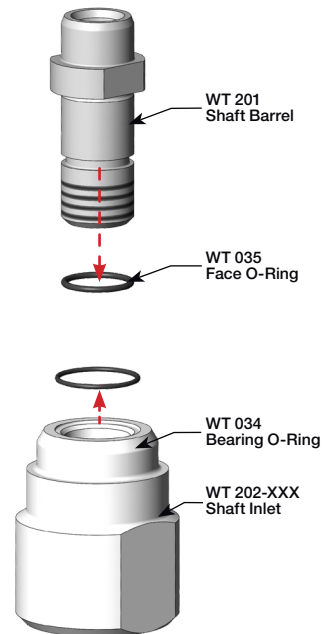

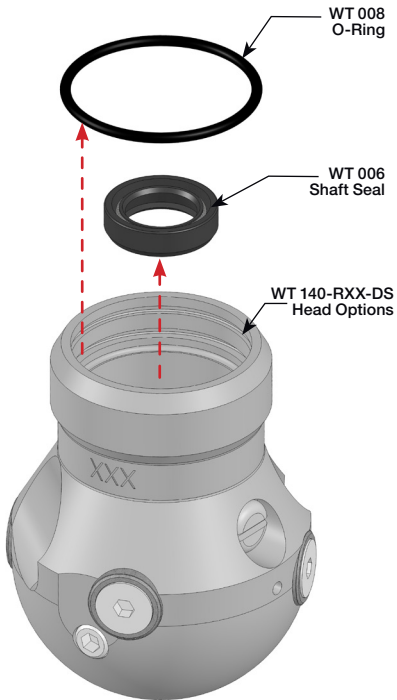


Figure 5: For Step 10

11. Remove the Shaft Seal (WT 006) from the Head (WT 140-RXX-DS); be careful not to scratch the face below this seal.
12. Remove the O-Ring (WT 008) from the Head.

 **TECH TIPS:** Use a pick to gently remove the Seals and O-Ring.



**Figure 6: For Steps 11-12**

## NOTICE

Before reassembly of the tool

Wash all parts in solvent and blow dry and

Inspect wear items, (High Pressure Seal

Assembly, Shaft Seals, O-Rings, and Port Plug.)

See the "Maintenance Kits" section of this manual for a complete list of Service, Overhaul, and, Tool kits.

## ASSEMBLY

1. Using the WT 105 Tool, install Shaft Seal (WT 006) in Head LIP SPRING UP.
2. Install O-Ring (WT 008) in Head. Note that the O-ring goes in the second groove.

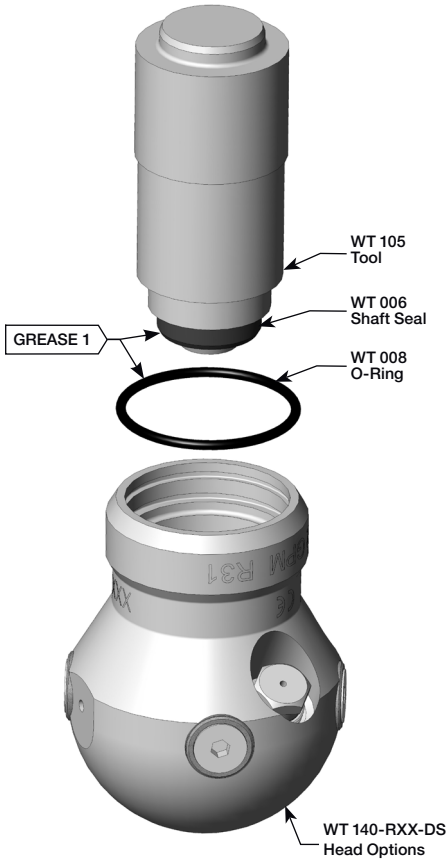


Figure 1: For Steps 1-2

3. Install Shaft Seal (WT 010) in Sleeve (WT 002) LIP SPRING UP. Apply grease to the inside of the seal.



Figure 2: For Step 3

4. Install the (WT 035 Face O-Ring) into the groove on the Shaft Barrel (WT 201). Grease O-Ring.
5. Install the (WT 034 Bearing O-Ring) into the groove in the Shaft Inlet (WT 202-XX). Grease O-Ring.

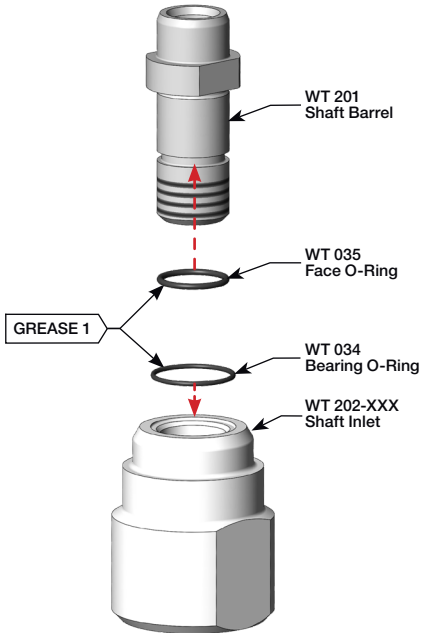


Figure 3: For Steps 4-5

6. Press both (WT 007) Bearings onto the Shaft Barrel (WT 201).

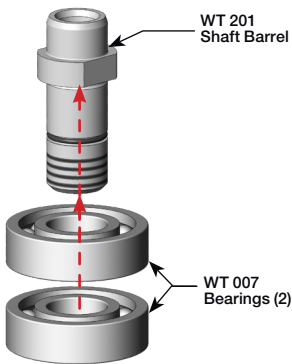


Figure 4: For Step 6

7. Install the Shaft Seal Sleeve / Shaft Seal Assembly onto the Shaft Inlet (WT 202-XXX)



**TECH TIPS:** Grease the shoulder edge of Shaft Inlet at seal interface before installing seal.

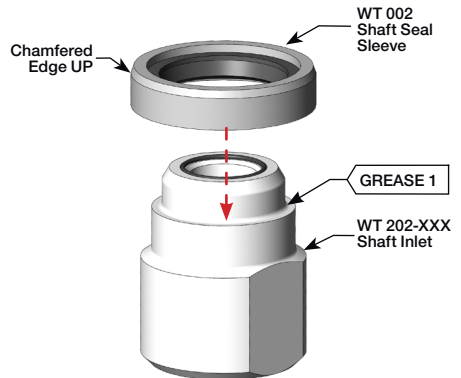


Figure 5 For Step 7

8. Apply Blue Loctite® (242) to the threads of the Shaft Barrel (WT 201) and install into the Shaft Insert (WT 202-XX).
9. Torque to 28 ft.-lbs.

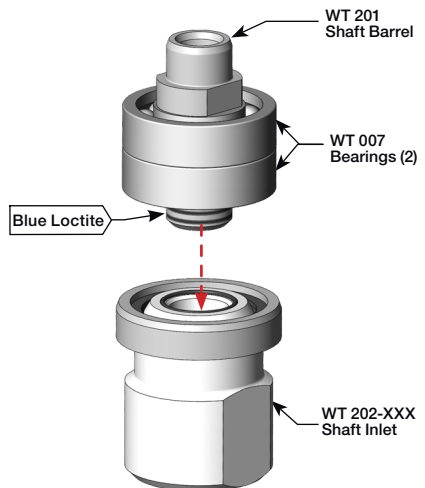


Figure 6 For Steps 8-9

# ASSEMBLY

10. Install Wave Spring (WT 014) in bore of Shaft. Apply grease to H.P. Seal O-Ring (RJ 012-KTO) before sliding it into the bore of the Shaft.
11. Grease the large bore of the shaft and the leading outside edge. Grease the top of the blue seal after installation. Insert the brass seat until the top of step aligns with the top of the shaft.



**TECH TIPS:** Greasing the O-Ring on the H.P. Seal prevents it from tearing in the tight bore of the Shaft.

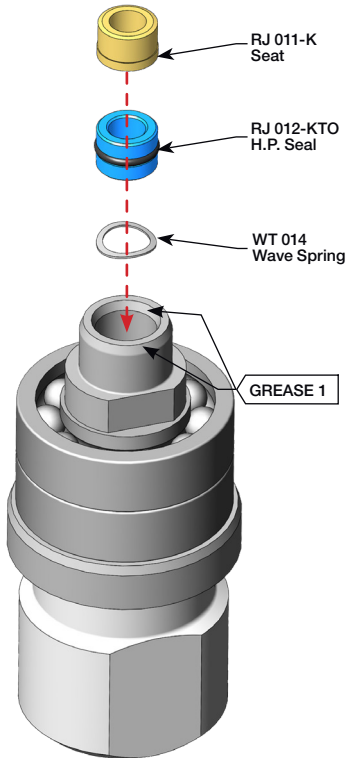


Figure 7: For Steps 10-11

12. Slide shaft assembly into head. Install Retaining Ring (WT 032) in groove of head. Make sure it is fully inserted in the groove.
13. Install the O-Ring (WT 030) into the shallow groove of the Shaft at the rear end of the tool.
14. Refer to the Maintenance Section for viscous fluid filling instructions before using the tool.

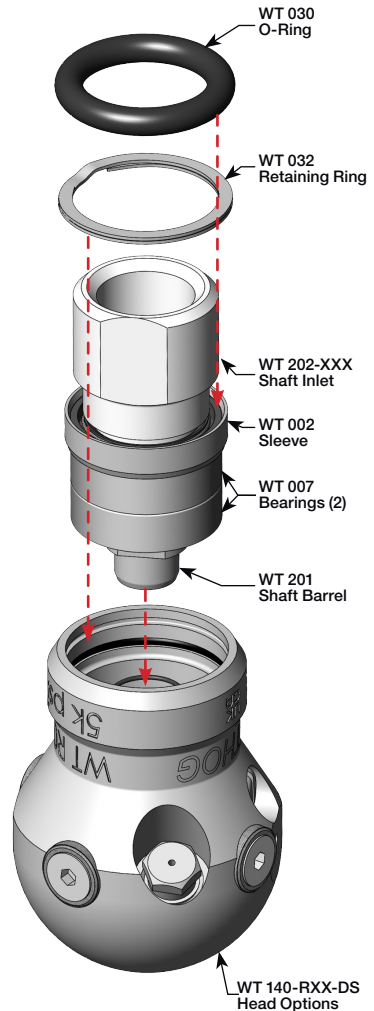
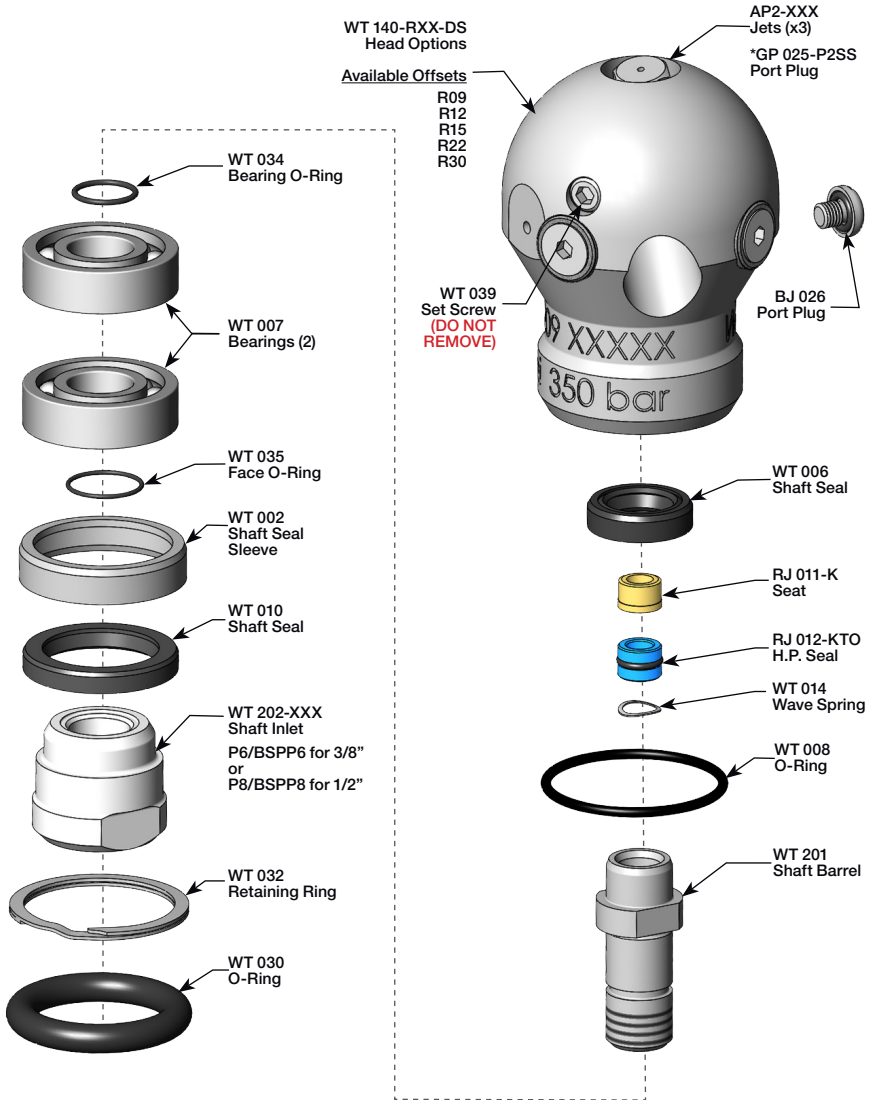


Figure 8: For Steps 12-14

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# PART NAMES/NUMBERS



**KITS AND KIT CONTENTS**

**WT 600-ST1 SERVICE KIT**

- 1 BJ 026 Port Plug
- 1 RJ 011-K Brass Seat
- 1 RJ 012-KTO H.P. Seal & O-Ring
- 1 WT 014 Wave Spring
- 1 WT 032 Retaining Ring, Spiral Int 1.188

**WT 600-VS SERVICE KIT WITH VISC**

- 1 BJ 048-S 6oz Slow Visc
- 1 BC 410.15 & BC 415 Syringe & Hose Assembly
- 1 BJ 026 Port Plug
- 1 RJ 011-K Brass Seat
- 1 RJ 012-KTO H.P. Seal & O-Ring
- 1 WT 014 Wave Spring
- 1 WT 032 Retaining Ring, Spiral Int 1.188

**WT 610-RT1 OVERHAUL KIT**

- 1 BJ 026 Port Plug
- 1 RJ 011-KBrass Seat
- 1 RJ 012-KTO H.P. Seal & O-Ring
- 1 WT 006 Seal
- 2 WT 007 Bearing, Ball
- 1 WT 008 O-Ring
- 1 WT 010 Seal
- 1 WT 014 Wave Spring
- 1 WT 030 O-Ring
- 1 WT 032 Retaining Ring, Spiral Internal
- 1 WT 033 Retain Ring, HD External
- 1 WT 034 Bearing O-Ring
- 1 WT 035 Face O-Ring

**WT 610-VS WITH VISC**

- 1 BJ 048-S 6oz Slow Visc
- 1 BC 410 Syringe
- 1 BJ 026 Port Plug
- 1 RJ 011-KBrass Seat
- 1 RJ 012-KTO H.P. Seal & O-Ring
- 1 WT 006 Seal
- 2 WT 007 Bearing, Ball
- 1 WT 008 O-Ring
- 1 WT 010 Seal
- 1 WT 014 Wave Spring
- 1 WT 030 O-Ring
- 1 WT 032 Retaining Ring, Spiral Internal
- 1 WT 033 Retain Ring, HD External
- 1 WT 034 Bearing O-Ring
- 1 WT 035 Face O-Ring

**WT 612 TOOL KIT**

- 1 BA 100 Retaining Ring Pliers
- 1 WT 105 Tool

**VS 604-S VISC/SYRINGE KIT**

- 1 BJ 048-S 6oz Slow Visc
- 1 BC 410 Syringe

**WT 610-RT2 OVERHAUL KIT**

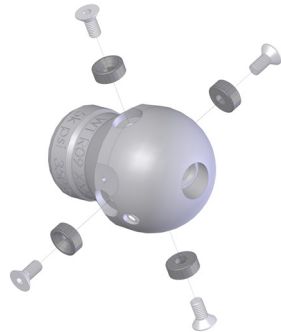
- 1 BJ 026 Port Plug
- 1 RJ 011-KBrass Seat
- 1 RJ 012-KTO H.P. Seal & O-Ring
- 1 WT 006 Seal
- 2 WT 007 Bearing, Ball
- 1 WT 008 O-Ring
- 1 WT 010 Seal
- 1 WT 014 Wave Spring
- 1 WT 030 O-Ring
- 1 WT 032 Retaining Ring, Spiral Internal
- 1 WT 033 Retain Ring, HD External
- 1 WT 034 Bearing O-Ring
- 1 WT 035 Face O-Ring
- 1 WT 150 Carbide Button
- 1 WT 152 Flat Head SCS, 10-32 x 7/16 SS

**WT 610-VS2 WITH VISC**

- 1 BJ 048-S 6oz Slow Visc
- 1 BC 410 Syringe
- 1 BJ 026 Port Plug
- 1 RJ 011-KBrass Seat
- 1 RJ 012-KTO H.P. Seal & O-Ring
- 1 WT 006 Seal
- 2 WT 007 Bearing, Ball
- 1 WT 008 O-Ring
- 1 WT 010 Seal
- 1 WT 014 Wave Spring
- 1 WT 030 O-Ring
- 1 WT 032 Retaining Ring, Spiral Internal
- 1 WT 033 Retain Ring, HD External
- 1 WT 034 Bearing O-Ring
- 1 WT 035 Face O-Ring
- 1 WT 150 Carbide Button
- 1 WT 152 Flat Head SCS, 10-32 x 7/16 SS

**WT 615 CARBIDE BUTTONS KIT**

- 1 BN18 482 Loctite 680 Retaining Compound .5ml
- 4 WT 150 Carbide Button
- 4 WT 152 Flat HD SCS, 10-32 x 7/16 SS



# TERMS AND CONDITIONS AND WARRANTY INFORMATION

**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.

# TERMS AND CONDITIONS AND WARRANTY INFORMATION

**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.

PAT <http://www.sapatents.com>

## STONEAGE TERMS AND WARRANTY

View StoneAge's Terms and Warranty Conditions online.

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

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

## 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](http://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.

## TERMS AND CONDITIONS AND WARRANTY INFORMATION

**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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