

The Torus™ - 3D Tank Cleaning Tool, up to 15 kpsi (TR-200)

Description:

The **Torus** 3D Tool is designed for cleaning tanks, vessels, autoclaves, ducts and reactor interiors. The tool is capable of working pressures up to 15,000 psi (1035 bar) and flow rates of 50 to 220 gpm. The wide range of flow rates is accommodated by the use of seven different manifolds; each is engraved with its corresponding offset (i.e. R30). A maintenance-free magnetic brake is used to control rotation speed. Note that rotation speed may increase as the tool warms up to operating temperature. The complete Torus cleaning cycle varies from about 10 to 88 minutes of operating time depending on rotation speed, which is determined by pressure, flow rate, nozzle diameter, manifold choice and brake setting. A uniform jet pattern is achieved after 440 revolutions of the manifold shaft (136 revolutions of the body) and is recommended for most applications. The tool can continue to run, thus generating a finer jet pattern. A complete cleaning cycle is 1426 revolutions of the manifold shaft (441 revolutions of the body). The HP manifold shaft revolves 3.23 times for each body revolution. When used in large vessels, extension arms up to 36 inches long can be used to reduce the jet standoff distance. The Torus can be hung from the high pressure water hose or by the optional pulling ring available for the tool. It is recommended to blow out all internal water passages (nozzles, weep holes, inlet) with compressed air after each use.

WARNING: The Torus contains several high-energy, rare-earth magnets that produce a magnetic field in excess of 10 Gauss. Persons with a pacemaker or other electronic medical device must use extreme caution when handling, or in close proximity to the Torus. It is recommended that a minimum distance of 6 inches (152mm) be maintained at all times between the Torus and any electronic medical devices.

CAUTION: The use of gloves when handling the tool after operation is recommended as the body at the pulling ring end may reach temperatures of up to 160°F depending on operating conditions.

Operation:

Before use, confirm that the installed manifold is the correct configuration to match the operating pressure and flow rate. Failure to use the correct manifold will result in an over-speed condition causing permanent component damage, or a condition in which the tool rotates very slowly or not at all. The chart below shows the correct manifold to use for various pressure and flow combinations. Make absolutely certain that the two nozzles being used are the same size and in good condition, otherwise the Torus may rotate erratically, too fast, or not at all. To use the chart, first select the operating pressure row from the left. Move to the right across the table until you read the flow closest to actual. Located directly under the flow rate is the appropriate manifold type, and located at the top of this column is the appropriate nozzle size. If you know the pressure and nozzle size, select the operating pressure row to the left, and read across the nozzle sizes in the top boxes until you get to the nearest nozzle size. The box where these two intersect will give the appropriate flow rate and manifold type.

		NOZZLE SIZE												
		Nozzle Diameter	0.075	0.085	0.095	0.105	0.125	0.145	0.165	0.175	0.190	0.200	0.215	0.250
PRESSURE, PSI	8,000	FLOW, GPM					76	100	130	146	172	190	218	
		MANIFOLD					R75	R60	R45	R35	R30	R25	R20	
	10,000	FLOW, GPM				60	84	112	146	164	192	212		
		MANIFOLD				R75	R60	R45	R35	R30	R25	R20		
	12,000	FLOW, GPM			52	66	92	124	160	178	210			
		MANIFOLD			R75	R60	R45	R35	R30	R25	R20			
	15,000	FLOW, GPM		48	60	72	102	138	178	200				
		MANIFOLD		R75	R60	R45	R35	R30	R25	R20				

Maintenance:

The Torus 3D Tool is simple to operate, but some care is necessary for safe and productive use. Please read and follow all of these recommendations.

HIGH PRESSURE SEAL

The Torus has two high pressure seals, one in the inlet shaft, and one in the cross shaft. These seals are identical; they may leak water at low pressure (under 1000 psi) and will leak water continuously at operating pressure during failure. If water is leaking out of the weep holes closest to the inlet, the inlet seal is damaged. If the water is leaking out of the weep holes furthest from the inlet, the cross-shaft seal is damaged.

LUBRICATION AND STORAGE

It is recommended to grease the tool every 100 hours of operation. Any multi-purpose NLGI 2 grease is acceptable. There are four grease fittings located on the elbow assembly, and one located on the inlet end. It is also recommended to blow out all internal water passages (nozzles, weep holes, inlet) with compressed air after each use to maximize the life of internal components.

MAGNETIC BRAKE

The magnetic brake requires no lubrication or maintenance. If a problem is suspected with the magnetic brake assembly, it should be sent to a certified StoneAge repair center for service or replacement.

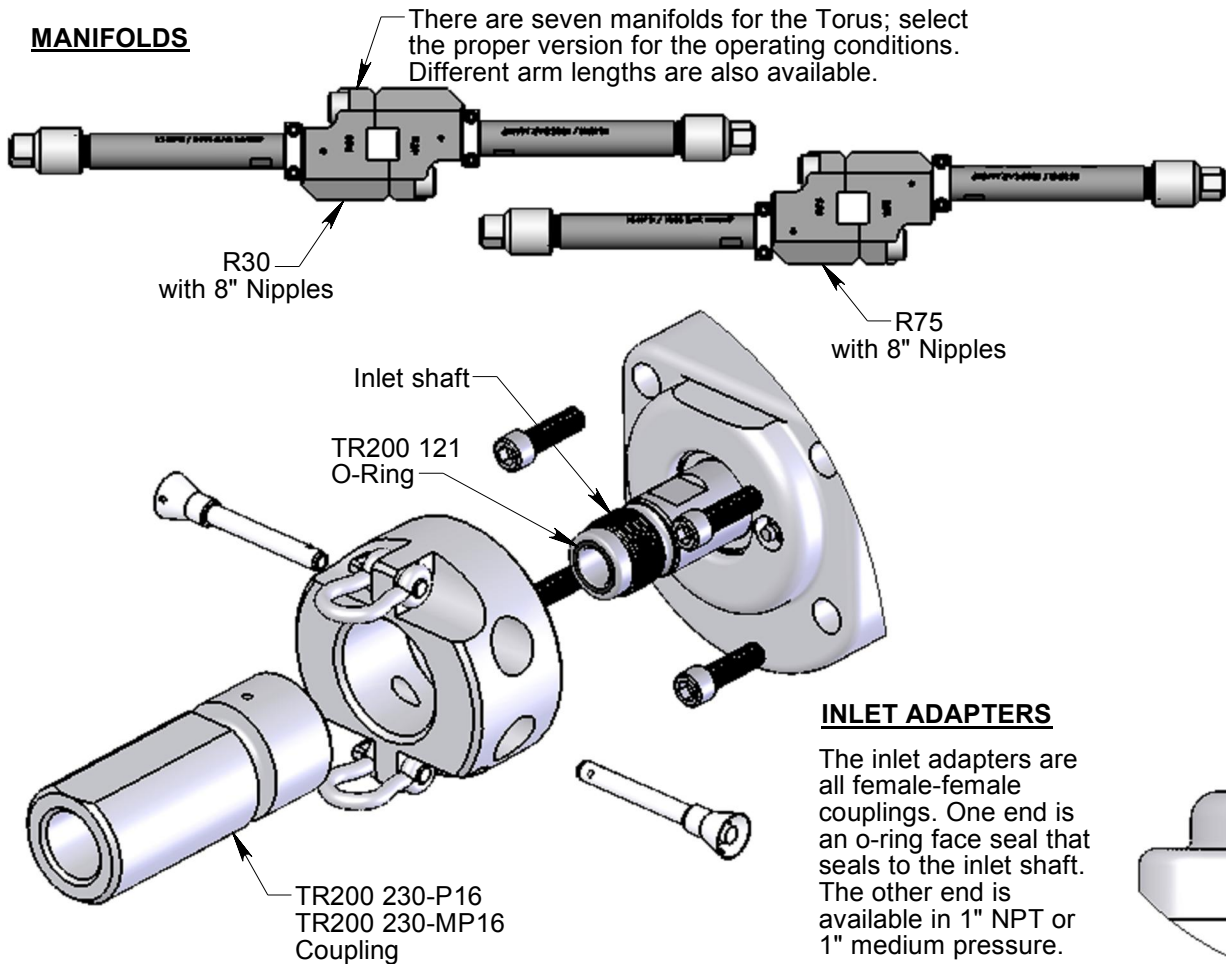
THREADED HIGH PRESSURE CONNECTIONS

To avoid galling, for pipe thread connections use Parker Thread Mate ® thread sealant (StoneAge part number GP047) and fluorocarbon tape. For all other threaded high pressure connections use anti-seize lubricant alone. StoneAge recommends Swagelok Blue Goop ® (StoneAge part number GP 043).

THREADED FASTENERS

It is HIGHLY IMPORTANT that all threaded fasteners be reassembled per the following procedure: A) Fasteners labeled with a specific Blue Loctite (GP180) note are to be reassembled and torque as noted. B) All other fasteners are to be reassembled using Blue Goop ® (GP 043) and torque if specified.

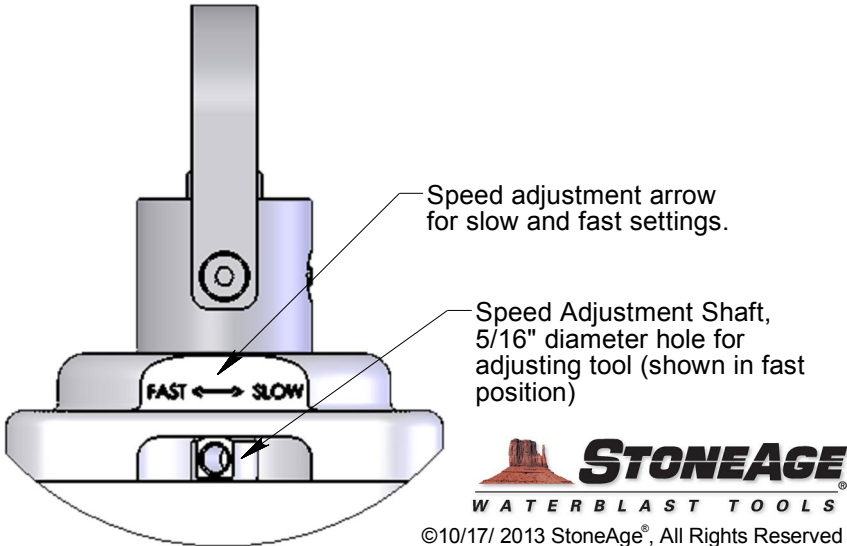
Description:



SPEED ADJUSTMENT

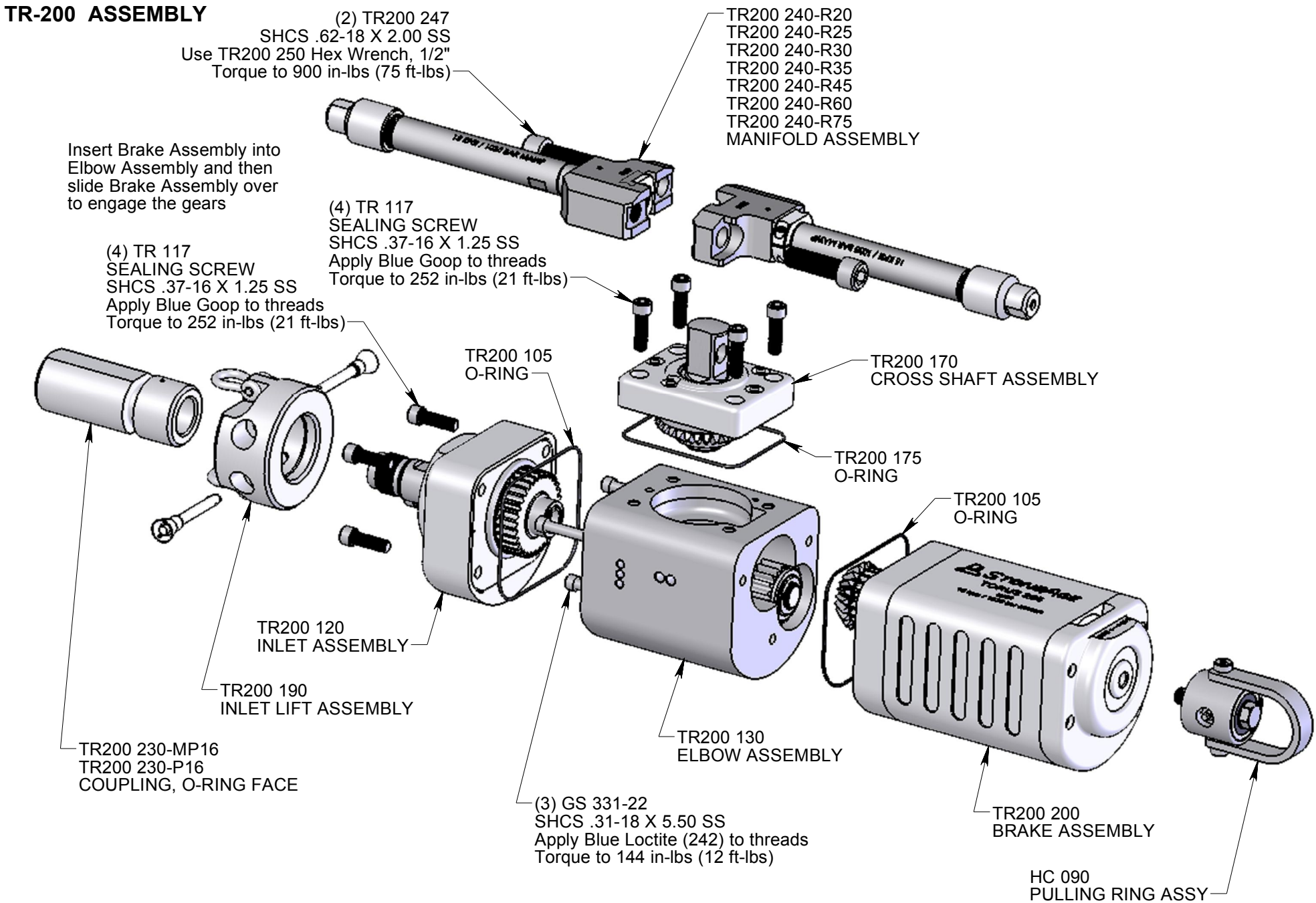
Note: It is not necessary to remove the Pulling Ring Assy to access the Speed Adjustment Knob.

The rotation speed of the Torus may be adjusted using the speed adjustment shaft located under the pulling ring assembly. The shaft may be set at any location between slow and fast. Any suitable tool such as a phillips head screwdriver may be used to adjust the speed by inserting the tool thru the access slot on the housing and into the hole in the shaft. To change from slow to fast, turn the speed adjustment shaft approximately 50° to the left. Marks are engraved on the outside of the body to indicate slow and fast settings. Changing the speed from slow to fast will increase speed by approximately six times (i.e. slow 5 rpm; fast 30 rpm). The rotational speed depends on the torque produced by the operating pressure, flow, manifold version and brake setting. The average operating speed range of the cross-shaft is approximately 5-8 rpm on slow and approximately 30-45 rpm on fast.

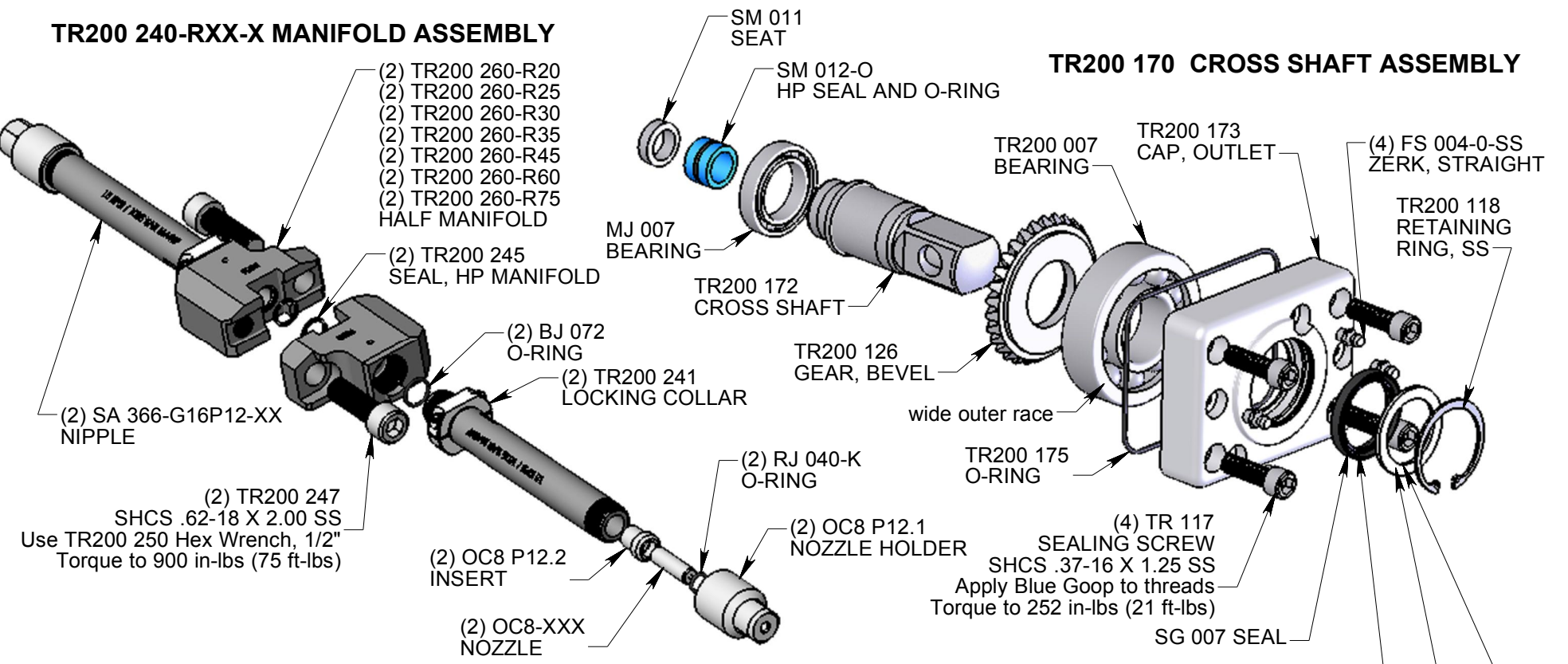


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TR-200 ASSEMBLY

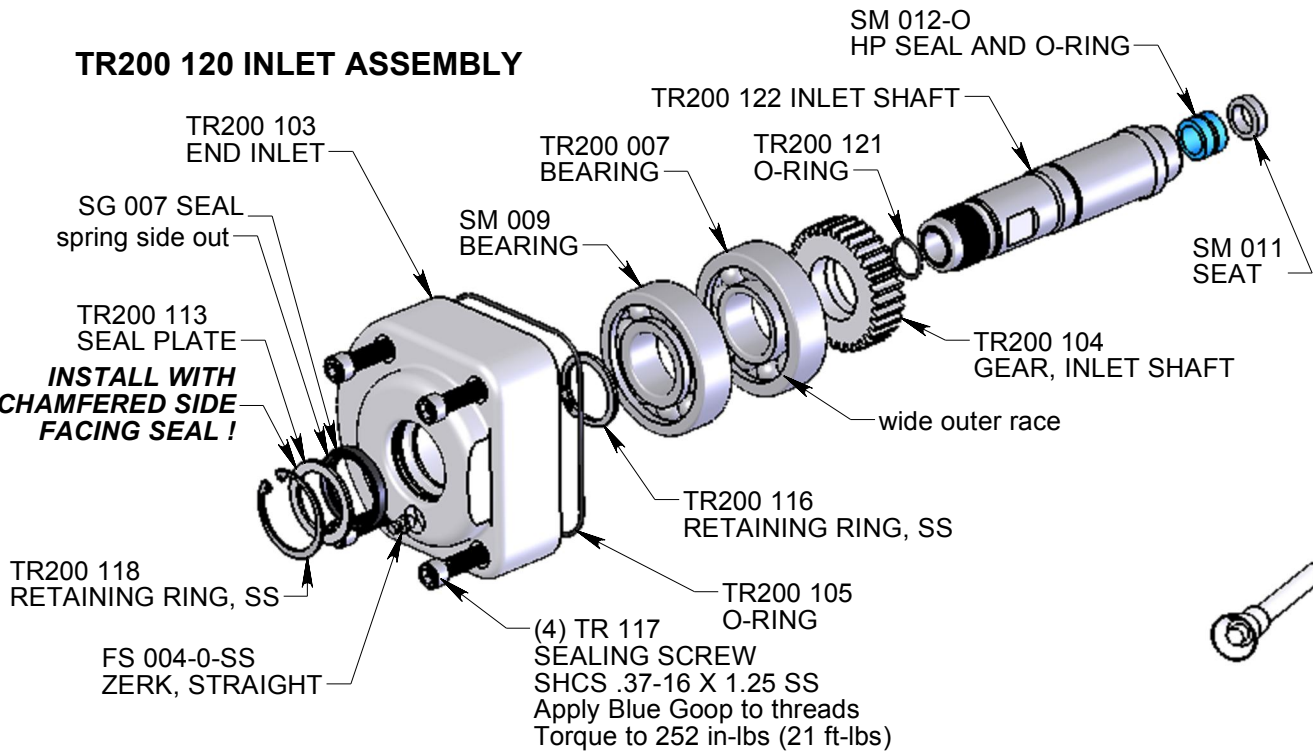


TR200 240-RXX-X MANIFOLD ASSEMBLY

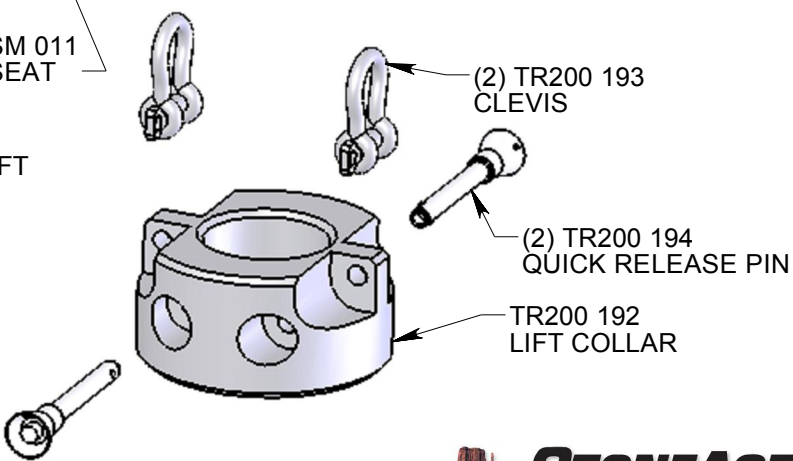


TR200 170 CROSS SHAFT ASSEMBLY

TR200 120 INLET ASSEMBLY

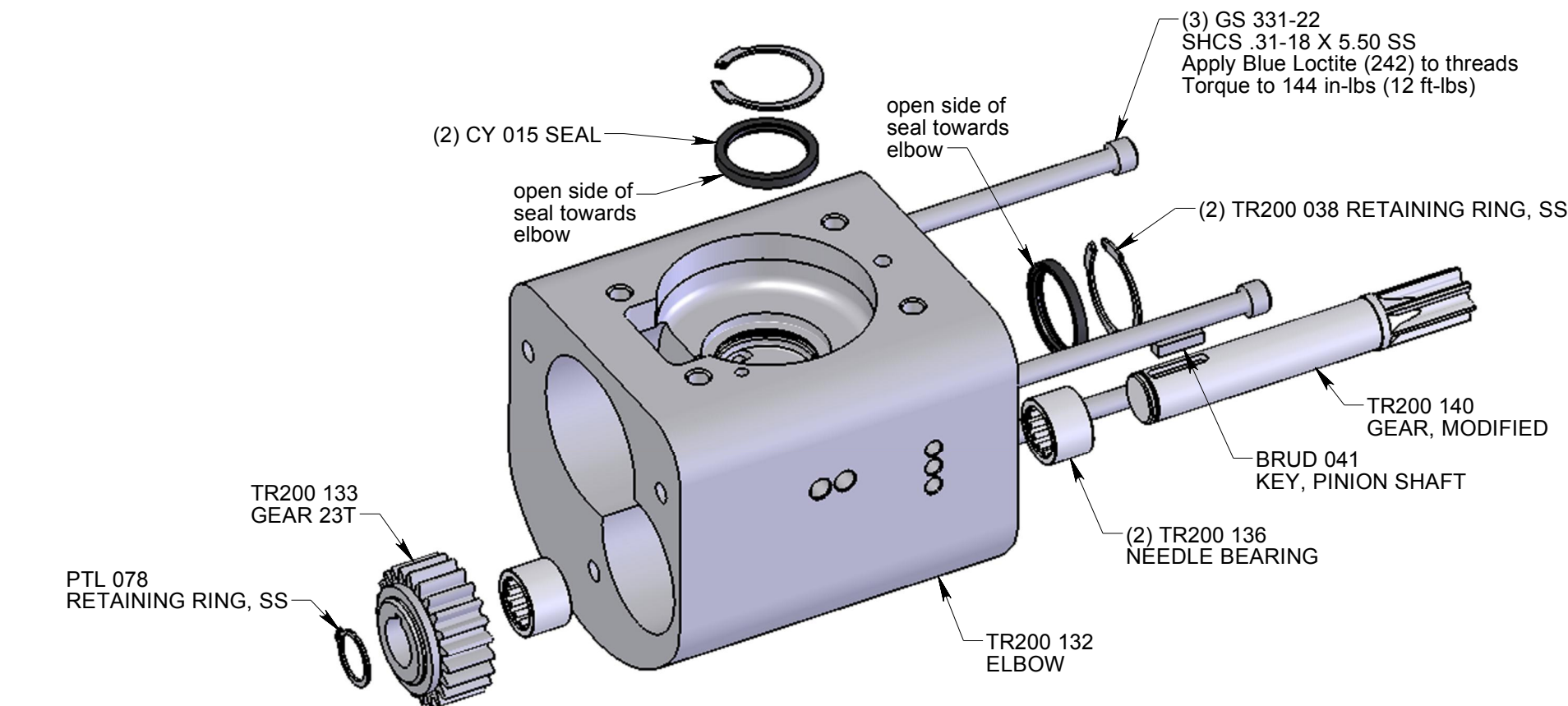


TR200 190 INLET LIFT ASSEMBLY

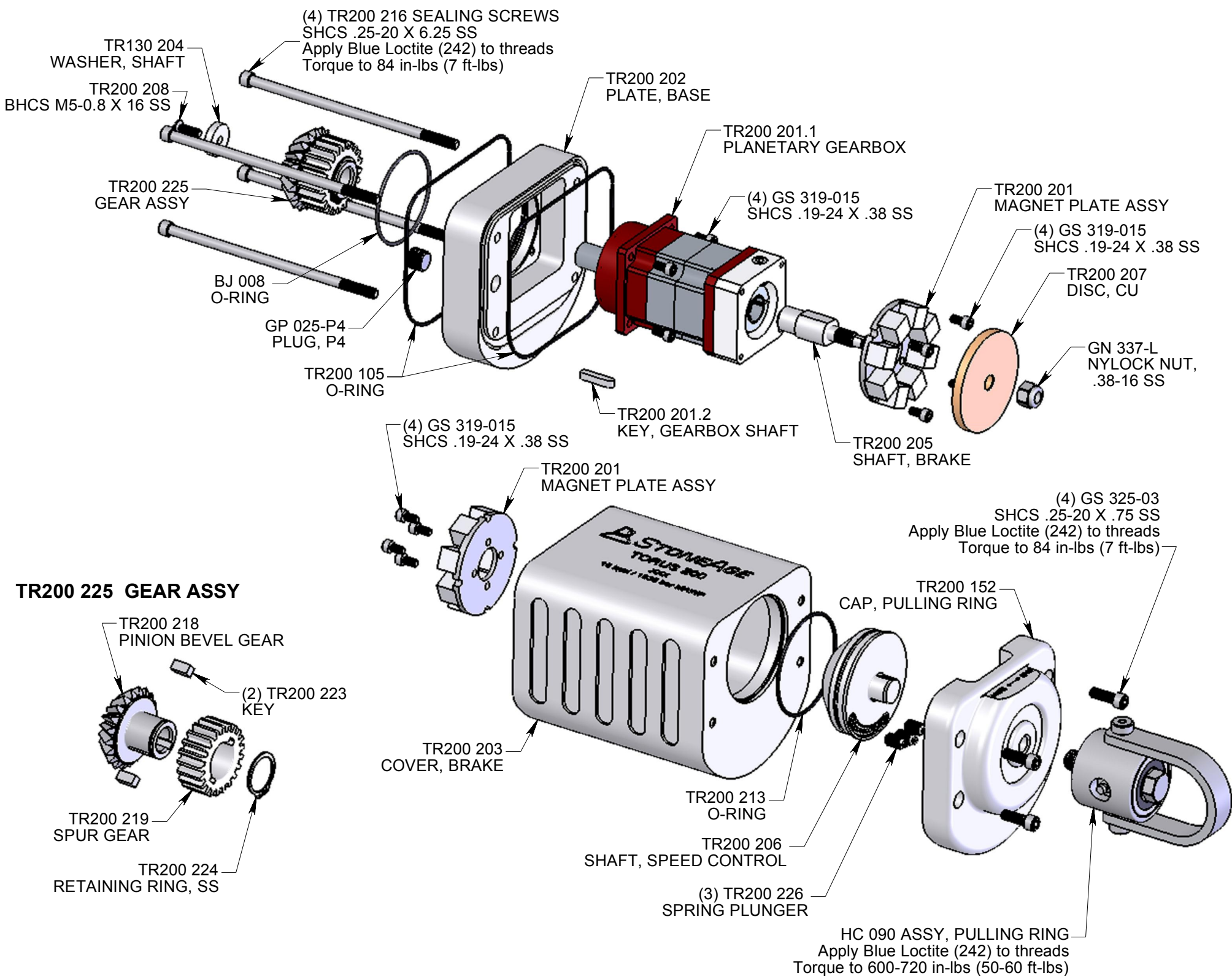


The Torus™ - 3D Tank Cleaning Tool

TR200 130 ELBOW ASSEMBLY



TR200 200 BRAKE ASSEMBLY



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TR-200 HIGH PRESSURE SEAL MAINTENANCE

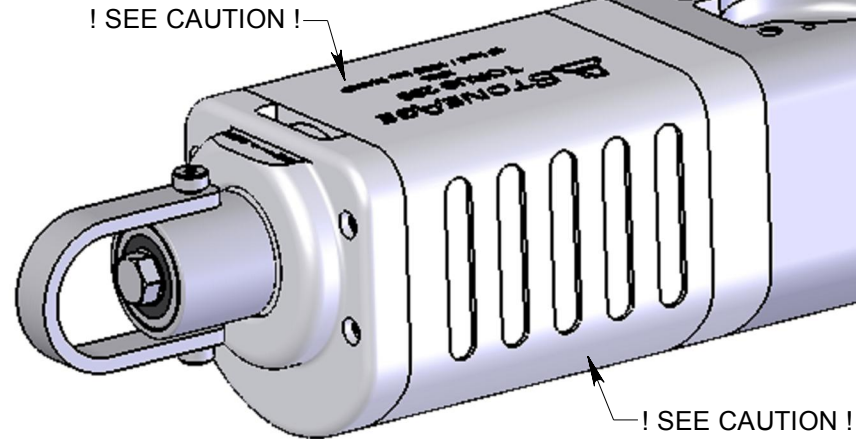
The Torus has 2 high pressure seals. These seals may leak at tap pressure, but should seal at pressures above 1000 psi.

To access the Cross Shaft Seal:

1. Rotate the Half Manifolds as necessary to gain access to the (4) Sealing Socket Head Cap Screws that hold the Cross Shaft Assy (TR200 170) to the Elbow Assy and remove them. Lift the Cross Shaft Assy out of the Main Elbow. The Seal is located in the end of the Cross Shaft. No more disassembly is required.

Note: Always use anti-sieze lubricant on all threaded connections to prevent galling.

Also grease the (5) Zerks on the Inlet Housing & Cross Shaft Housing if necessary.



! CAUTION !: The use of gloves when handling the tool after operation is recommended as the body and brake cover at the pulling ring end may reach temperatures of up to 160°F depending on operating conditions.

To access the Inlet Shaft Seal:

1. Remove the (4) Sealing Socket Head Cap Screws holding the Inlet Assy (TR200 120) to the Elbow Assy. The Inlet Assy may then be slid out of the Elbow Assy to gain access to the Seal. The Seal is located in the end of the Inlet Shaft. No more disassembly is required.

(4) TR 117
SEALING SCREW
SHCS .37-16 X 1.25 SS
Apply Blue Goop to threads
Torque to 252 in-lbs (21 ft-lbs)

SM 012-O
H.P. Seal & O-Ring
SM 011 Seat

chamfered face
SM 011
Carbide Seat
flat face
towards seal
SM 012-O
H.P. Seal & O-Ring

To maintain H.P. Seat & Seal:

1. Remove the Carbide Seat (SM 011) and the H.P. Seal (SM 012-O). Inspect the Seat for chips on edges. Replace if damaged. Inspect the related face of the Elbow Assy for dings or pits. If damaged, it must be faced or replaced, otherwise the Seal will leak.

2. Apply grease to new H.P. Seal and install into bore. Place the Seat on the Seal with the flat side against the Seal. The chamfered side should face towards the Elbow Assy.

TR200 600 Service Kit Contents		
PART NUMBER	DESCRIPTION	QUANTITY
BJ 072	O-Ring, G16	2
GP 043	Blue Goop ® 2oz	1
GP 180	Blue Loctite 242 ® .02oz	1
PL 557	TR-200 Manual Insert	1
SM 011	High Pressure Seat	2
SM 012-O	High Pressure Seal w/ O-Ring	2
TR200 121	O-Ring, Inlet	1
TR200 245	High Pressure Seal, Manifold	2

TR200 610 Overhaul Kit Contents		
PART NUMBER	DESCRIPTION	QUANTITY
BJ 008	O-Ring, Brake	1
BJ 072	O-Ring, G16	2
CY 015	Seal	2
GP 043	Blue Goop ® 2oz	1
GP 180	Blue Loctite 242 ® .02oz	1
MJ 007	Bearing, Ball	1
PL 557	TR-200 Manual Insert	1
PTL 078	Retaining Ring, SS	1
RJ 040-K	O-Ring	2
SG 007	Seal	2
SM 009	Bearing, Ball	1
SM 011	High Pressure Seat	2
SM 012-O	High Pressure Seal w/ O-Ring	2
TR200 007	Bearing, Angular Contact	2
TR200 038	Retaining Ring, SS	2
TR200 105	O-Ring, Body	3
TR200 116	Retaining Ring, SS	1
TR200 118	Retaining Ring, SS	2
TR200 121	O-Ring, Inlet	1
TR200 136	Needle Bearing	2
TR200 175	O-Ring, Cross Shaft	1
TR200 213	O-Ring, Brake	1
TR200 224	Retaining Ring, SS	1
TR200 245	High Pressure Seal, Manifold	2