

***TriScroll™ 600  
Series  
Dry Scroll  
Vacuum Pump***

*MAJOR MAINTENANCE  
MANUAL*

# TriScroll™ 600 Series Dry Scroll Vacuum Pump



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*Loctite and PST are registered trademarks of Loctite Corporation.*

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**Declaration of Conformity  
Konformitätserklärung  
Déclaration de Conformité  
Declaración de Conformidad  
Verklaring de Overeenstemming  
Dichiarazione di Conformità**



We	Varian, Inc.
Wir	Vacuum Technologies
Nous	121 Hartwell Avenue
Nosotros	Lexington, MA, 02421-3133 USA
Wij	
Noi	

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auf das sich diese Erklärung bezieht, mit der/den flogenden Norm(en) oder Richtlinie(n) übereinstimmt.  
auquel se réfère cette déclaration est conforme à la (auz) norme(s) ou au(x) document(s) normatif(s).  
al que se refiere esta declaración es conforme a la(s) norma(s) u otro(s) documento(s) normativo(s).  
waamaar deze verklaring verwijst, aan de volende norm(en) of richtlijn(en) beantwoordt.  
a cui se riferisce questa dichiarazione è conforme alla/e sequente/I norma/o documento/I normativo/i.

**98/37/EEC, Machinery Directive**

EN 1012-2:1996	Compressors and Vacuum pumps Safety Requirements; Part 2 Vacuum Pumps
EN 1050:1996	Safety of machinery - principles for risk assessment
EN 60204-1	Electrical equipment of industrial machines; general requirements

**73/023/EEC, Low Voltage Directive**

EN 60034 part 1	Rotating electrical machines - Part 1: Rating and performance
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**89/336/EEC, Electromagnetic Compatibility Directive**

EN 61000-4-2	Testing and Measurement Techniques - Electrostatic Discharge Immunity Test
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Operations Manager  
Vacuum Technologies  
Varian, Inc.  
Lexington, Massachusetts, USA

March 2003

# Preface

This manual provides the information you need to successfully perform scheduled maintenance on your Vacuum Technologies TriScroll™ Dry Vacuum Pump. The time to perform major rebuild is typically 18,000 hours. If you have questions that are not addressed in this manual, please contact the nearest Vacuum Technologies service facility listed on the rear cover of this manual.

## Safety Considerations

READ THE FOLLOWING INSTRUCTIONS. TAKE ALL NECESSARY PRECAUTIONS.

The following format is used in this manual to call attention to hazards:

### WARNING



*The warning messages are for attracting the attention of the operator to a particular procedure or practice which, if not followed correctly, could lead to serious injury.*

### CAUTION



*The caution messages are displayed before procedures, which if not followed, could cause damage to the equipment.*

### NOTE



*The notes contain important information taken from the text.*

Maintenance personnel must be aware of all hazards associated with this equipment. They must know how to recognize hazardous and potentially hazardous conditions, and know how to avoid them. The consequences of work performed by unskilled or improperly trained maintenance personnel, or careless operation of the equipment employed in the specified maintenance procedures can be serious.

Every maintenance person must read and thoroughly understand the materials discussed and the instructions provided in this manual, as well as any additional information provided by Vacuum Technologies.

## TriScroll 600 Dry Scroll Vacuum Pump

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All warnings and cautions must be read carefully, fully understood, and strictly observed. Consult local, state/province, and national agencies regarding specific requirements and regulations. Address any safety, operation, and/or maintenance questions to the nearest Vacuum Technologies location.

### WARNING



*Disconnect power from the TriScroll 600 before performing any maintenance procedure.*

*Allow the pump to cool before performing any maintenance procedure. Approximate cool-down time is one to two hours.*

### CAUTION



*Wipe all O-rings clean with a lint-free cloth before installation to ensure that no foreign matter is present to impair the seal.*

*Do not use alcohol, methanol or other solvents on O-rings. To do so causes deterioration and reduces their ability to hold a vacuum.*

*If applicable, apply a small amount of Krytox<sup>®</sup> GPL 224 grease and wipe the O-rings “shiny” dry.*

### NOTE



*Vacuum Technologies recommends replacing all O-rings during routine maintenance or during any maintenance procedure requiring that O-rings be removed.*

*Unless otherwise stated, apply Loctite<sup>®</sup> 242 or Loctite PST<sup>®</sup> to the first few threads only. Apply just enough to obtain a seal.*

### WARNING



*The TriScroll 600 weighs 32 kg (70 lbs). To avoid injury, use proper lifting techniques when moving the pump.*

### Related TriScroll Manuals

Manuals related to the installation and operation, tip seal and pump module replacement for TriScroll 600 series pumps are listed in the following table:

Title	Applicable TriScroll Model	Part Number
Pump Module Replacement	All TriScroll 600 Series Models	699904305
Tip Seal Replacement Manual	All TriScroll 600 Series Models	699904310
Installation and Operation Manual	All TriScroll 600 Series Models	699904290

### Maintenance and Tool Kits

Material and tooling required to perform maintenance on TriScroll pumps is provided in kit form. A description of each kit and ordering information is provided in the following table:

Description	Contents	Applicable TriScroll Model	Part Number
Major Maintenance Kit	All bearings, bearing seals, bearing lubricant, O-rings, and tip seals required to rebuild TriScroll 600 Series pumps.	All TriScroll 600 Series models	PTSS0600MK
Maintenance Tool Kit	All fixtures and tools required to perform any maintenance on TriScroll 600 Series pumps.	All TriScroll 600 Series models	PTSS0600TK
Tip Seal Tool Kit	All tools required to change the tip seals on any TriScroll Series pump.	All TriScroll Series models	PTSTSTKIT
Replacement Tip Seal Set	Replacement tip seals and static O-rings for TriScroll 600 Series pumps.	All TriScroll 600 Series models	PTSS0600TS
	<i>NOTE: The Maintenance Tool Kit or the Tip Seal Tool Kit is required for tip seal replacement.</i>		



### Factory Service Options

Vacuum Technologies offers factory-rebuild service or advance exchange of complete TriScroll Pumps or TriScroll Pump Modules. Contact your nearest Vacuum Technologies sales office for price and availability information. Select your preferred service option from the table below.

Factory Service Options	Part Number
Advance Exchange TriScroll 600 Single Phase	EXPPTS06001
Advance Exchange TriScroll 600 Three Phase	EXPPTS06003
Advance Exchange TriScroll 610 Single Phase	EXPPTS06101
Advance Exchange TriScroll 610 Three Phase	EXPPTS06103
Advance Exchange TriScroll 600 Pump Module Only	EXPTS0600SC
Advance Exchange TriScroll 610 Pump Module Only	EXPTS0610SC
Service/Rebuild TriScroll 600 Pump (Single or Three Phase)	PTS0600KMA
Service/Rebuild TriScroll 610 Pump (Single or Three Phase)	PTS0610KMA
Service/Rebuild TriScroll 600 Pump Module Only	PTS0600SCRP
Service/Rebuild TriScroll 610 Pump Module Only	PTS0610SCRP

### Contacting Vacuum Technologies

In the United States, you can contact Vacuum Technologies Customer Service at 1-800-8VARIAN. See the back cover of this manual for a listing of our sales and service offices.

Internet users:

- ❑ Send email to Customer Service & Technical Support at [vpl.customer.support@varianinc.com](mailto:vpl.customer.support@varianinc.com)
- ❑ Visit our web site at [www.varianinc.com/vacuum](http://www.varianinc.com/vacuum)
- ❑ Order on line at [www.evarian.com](http://www.evarian.com)

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# Major Maintenance

## General Information

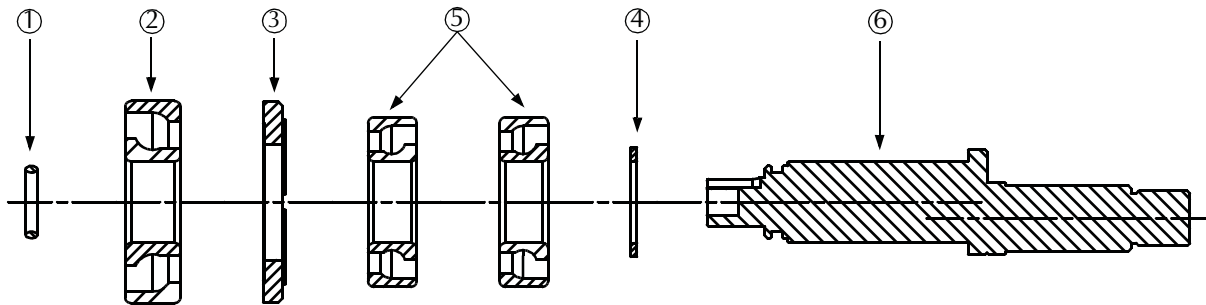
Vacuum Technologies TriScroll 600 series pumps are designed to provide years of trouble-free service if maintenance procedures and intervals are observed. Bearing grease replenishment and tip seal replacement are recommended when the pump base pressure has risen to an unacceptably high level for your application. Bearings, rotary seals and O-rings should also be replaced if the pump exhibits humming or grinding noises from the bearings. Main bearing life may be shortened if your application requires the pumping of high quantities of water vapor. Use of the bearing purge will keep this water from impacting bearing life.

## Required Equipment

- ❑ **Maintenance Tool Kit:** PTSS0600TK (page 2)
- ❑ **Major Maintenance Kit:** PTSS0600MK (page 4)
- ❑ **Arbor Press:** 1/2 ton or larger, 10" work diameter capacity, 8" capacity over table
- ❑ **Oven:** 400 °F temperature capability, 11" wide x 11" deep x 4" high minimum chamber, 500 watt or higher heating capacity
- ❑ **Heat Resistant Surface**
- ❑ **Vacuum Gauge:** Capable of measuring pressure of 5 mTorr to 20 mTorr with an accuracy of  $\pm 1$  mTorr. A capacitance manometer or Pirani gauge is recommended.

# Crankshaft Assembly

## Crankshaft Exploded View



Callout	Part Number	Description	Quantity 302	Quantity 301
①	MK*	2-115 Viton® O-ring	1	1
②	MK*	7305WN SU Bearing	1	1
③	S4770001	VDS4 - Bearing Spacer	1	1
④	S4769001	Wave Washer - Crank	1	1
⑤	MK*	7205W SU Bearing	2	2
⑥	S4811001	VDS20 - Crankshaft	-	1

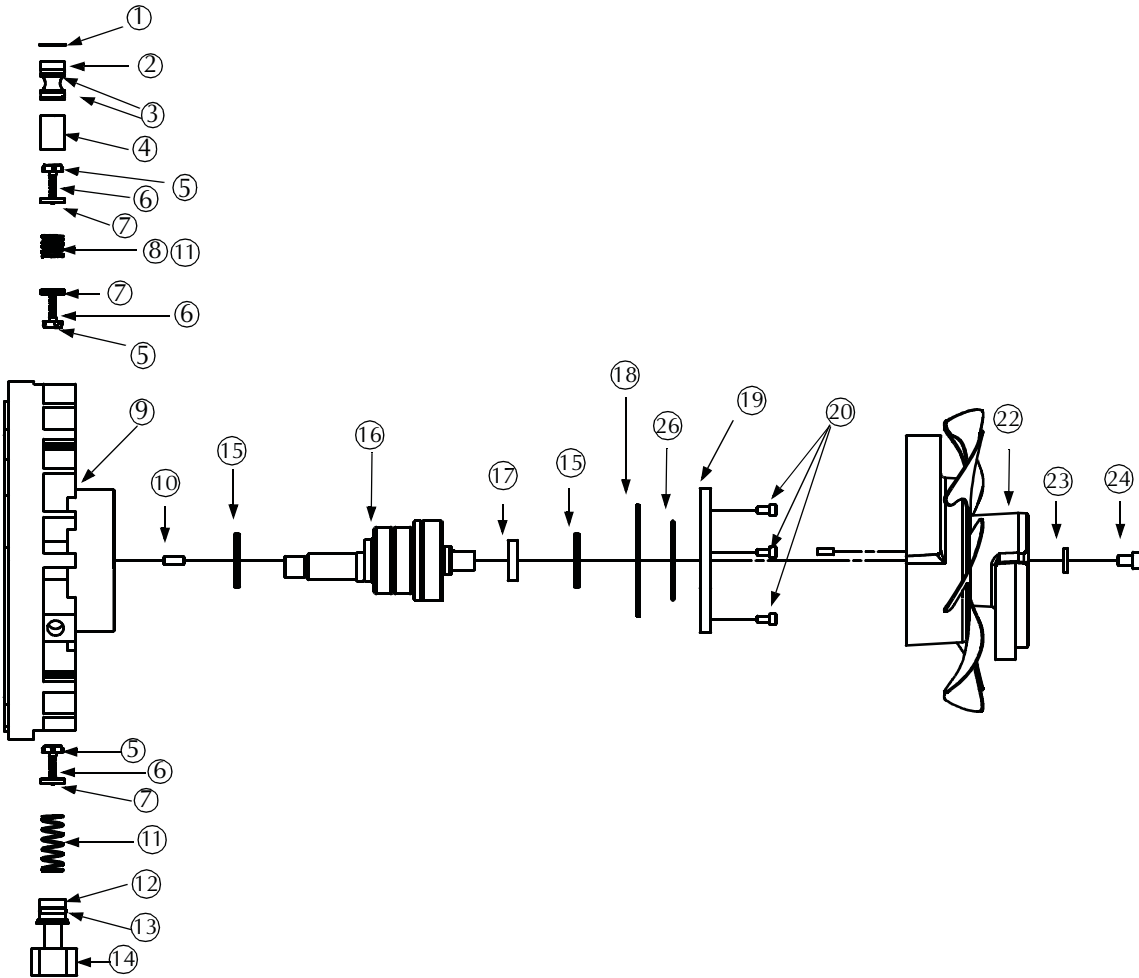
MK = Included in major maintenance kit

TSK = Included in tip seal kit

NSS = Not sold separately

# Inboard Housing Assembly

## Inboard Housing Exploded View



## TriScroll 600 Dry Scroll Vacuum Pump

Callout	Part Number	Description	Quantity	
			PTS06101-UNIV and PTS06103-UNIV	PTS06001UNIV and PTS06003UNIV
①	NSS*	Snap Ring N5000-75	1	1
②	S4835001	VDS20- Check Valve Plug	1	1
③	MK*	O-ring, Viton 2-113	2	2
④	S4837001	VDS20- Check Valve Spacer	1	1
⑤	S4723002	VDS20- Check Valve	2	3
⑥	660285574	Spring, S/S, .18 OD x .75 L x .014 Wire OD	2	3
⑦	S4820001	VDS20- Plunger Guide	2	3
⑧	660285540	Spring, S/S, .72 OD x .75 L x .055 Wire OD	1	1
⑨	NSS*	VDS20- Inboard Housing	1	1
⑩	NSS*	Dowel Pin, Steel, M6x16	2	2
⑪	660285545	Spring, S/S, .72 x 2.00 L x .055 Wire OD	-	1
⑫	S4806001	VDS20- Exhaust Fitting	1	1
⑬	MK*	O-ring, Viton 2-207	1	1
⑭	NSS*	Snap Ring, N5000-93	1	1
⑮	MK*	Shaft Seal, 32mm x 42mm x 4mm	2	2
⑯	NSS*	VDS20- Crankshaft Assembly	1	1
⑰	S4727001	VDS4- Seal Spacer	1	1
⑱	MK*	O-ring, Viton 2-152	1	1
⑲	S4712001	VDS4- Seal Housing	1	1
⑳	NSS*	Screw, Socket Head Cap, M5x10, Black Steel	3	3
㉒	NSS*	VDS20- Fan Assembly	1	1
㉓	NSS*	Washer, 11/32 x 3/4 x 1/8	1	1
㉔	NSS*	Screw, Socket Head Cap, M8x12, Black Steel	1	1
㉖	MK*	O-ring, Viton 2-140	1	1

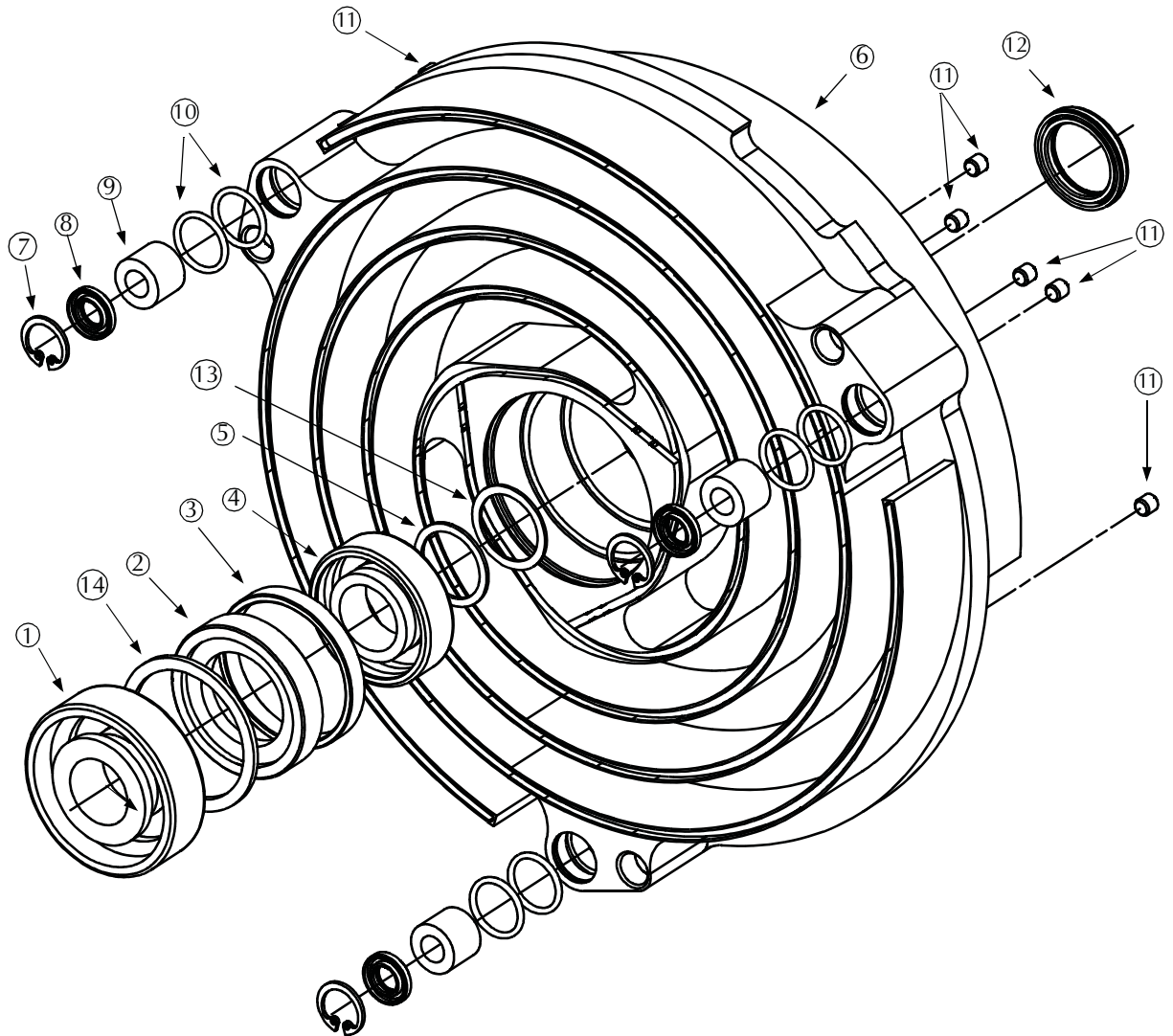
MK = Included in major maintenance kit

TSK = Included in tip seal kit

NSS = Not sold separately

# Orbiting Plate Assembly

## Orbiting Plate Exploded View



## TriScroll 600 Dry Scroll Vacuum Pump

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Callout	Part Number	Description	Quantity
①	MK*	7304WN SU Bearing	1
②	S4829001	VDS20- Orbiting Spacer	1
③	MK*	VDS4- Nylon Sleeve	1
④	MK*	J9104P x1527 Bearing	1
⑤	S4758001	Wave Washer - Nested	1
⑥	NSS*	VDS20- Center Orbiting Plate	1
⑦	NSS*	DIN472-0150 Snap Ring	3
⑧	MK*	Shaft Seal, 8x15x3	3
⑨	MK*	NK 8/12 Needle Bearing	3
⑩	MK*	2-016 Viton O-ring	6
⑪	NSS*	M5x5 Set Screw	6
⑫	MK*	Shaft Seal 22x30x4	1
⑬	S4816001	Steel Washer	1
⑭	S4857001	Wave Washer	1

MK = Included in major maintenance kit

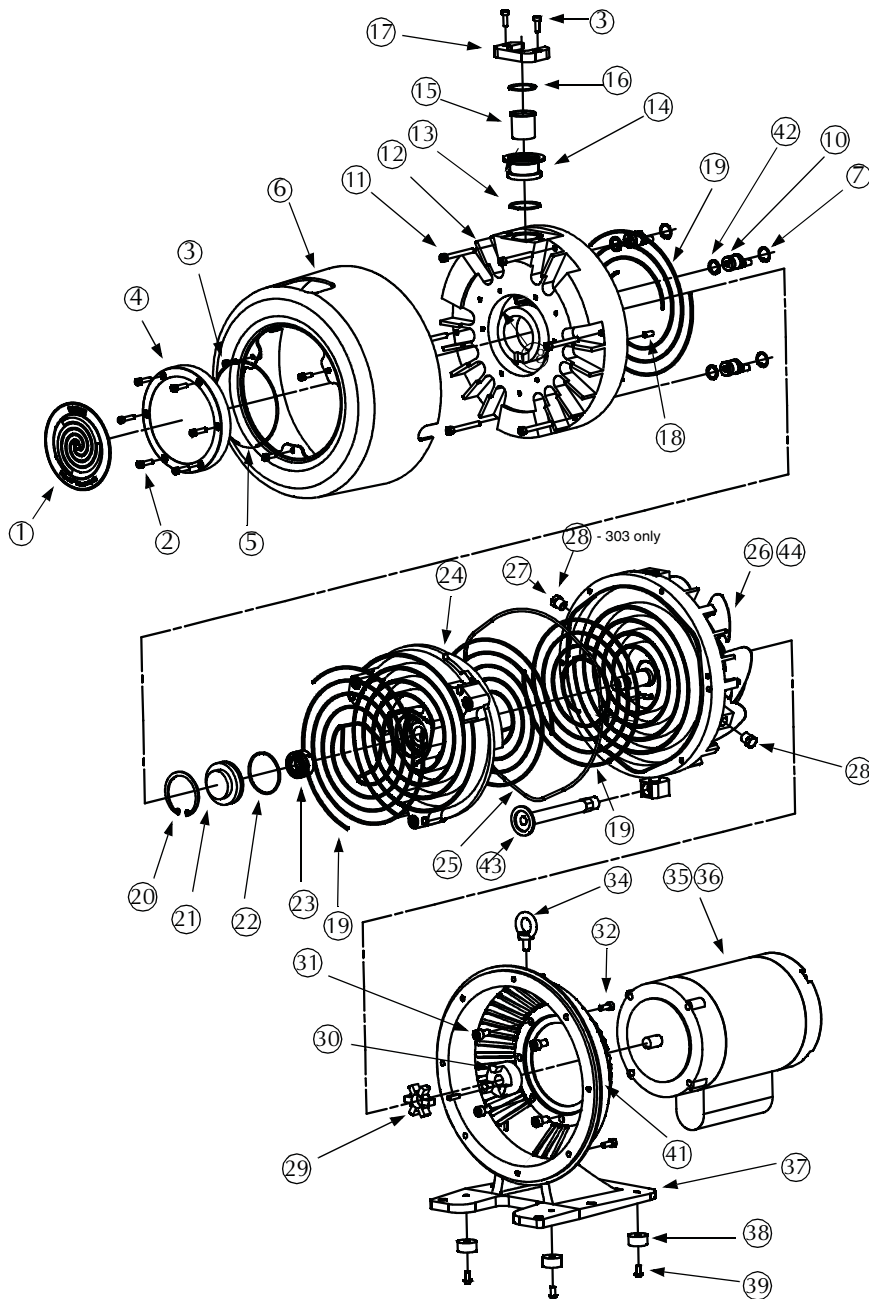
TSK = Included in tip seal kit

NSS = Not sold separately



# TriScroll 600 Assembly

## TriScroll 600 Exploded View



## TriScroll 600 Dry Scroll Vacuum Pump

Callout	Part Number	Description	Quantity			
			PTS06103UNIV	PTS06101UNIV	PTS06003UNIV	PTS06001UNIV
①	S4744001	TriScroll Pump Front Label	1	1	1	1
②	NSS*	M5x22 SHCS, Black Steel	6	6	6	6
③	NSS*	M5x16 SHCS, Black Steel	5	5	5	5
④	S4703001	VDS4 - Outboard Cover	1	1	1	1
⑤	MK*	2-157 Viton O-ring	1	1	1	1
⑥	S4805001	VDS20 - Cowling	1	1	1	1
⑦	NSS*	N5000-75 Snap Ring	3	3	3	3
⑩	MK*	VDS20- Sync Crank Assembly	3	3	3	3
⑪	NSS*	M6x55 SHCS, Black Steel	6	6	6	6
⑫	NSS*	VDS20 - Outboard Housing	1	1	1	1
⑬	MK*	2-127 Viton O-ring	1	1	1	1
⑭	S4809001	VDS20-NW40 Intake Fitting	1	1	1	1
⑮	S4824001	VDS20 - Intake Screen	1	1	1	1
⑯	NSS*	N5000-137 Snap Ring	1	1	1	1
⑰	S4808001	VDS20 - Intake Clamp	1	1	1	1
⑱	NSS*	M6x16 Steel Dowel Pin	2	2	2	2

MK = Included in major maintenance kit

TSK = Included in tip seal kit

NSS = Not sold separately

## TriScroll 600 Dry Scroll Vacuum Pump

Callout	Part Number	Description	Quantity			
			PTS06103UNIV	PTS06101UNIV	PTS06003UNIV	PTS06001UNIV
⑲	TSK* & MK*	VDS4 - Tip Seal	1	1	1	1
⑳	NSS*	N5000-225 Snap Ring	1	1	1	1
㉑	S4819001	VDS20 - Orbiting Cup	1	1	1	1
㉒	TSK* & MK*	2-137 Viton O-ring	1	1	1	1
㉓	617919032	Spieth Locknut	1	1	1	1
㉔	NSS*	VDS20 - Orbiting Plate Assembly	1	1	1	1
㉕	TSK* & MK*	2-273 Viton O-ring	1	1	1	1
㉖	NSS*	TS600 Inboard Assembly	-	-	1	1
㉗	642971040	Breather Vent	-	-	1	1
㉘	NSS*	1/4 Brass Plug	2	2	1	1
㉙	670086120	Spider, L075 Open	1	1	1	1
㉚	622471058	Coupling, L075 W/15 mm Key	1	1	1	1
㉛	NSS*	M8x16 SHCS	4	4	4	4
㉜	NSS*	M6x16 SHCS	4	4	4	4
㉝	611810025	M8x1.25 Eye Bolt	1	1	1	1
㉞	S4841001	VDS20 - Single Phase Motor	-	1	-	1
㉟	S4842001	VDS20-1 HP 3 Phase Motor	1	-	1	-
㊱	S4804001	VDS20 - Transition Frame	1	1	1	1
㊲	648099055	Rubber Foot	4	4	4	4

MK = Included in major maintenance kit

TSK = Included in tip seal kit

NSS = Not sold separately

## TriScroll 600 Dry Scroll Vacuum Pump

Callout	Part Number	Description	Quantity			
			PTS06103UNIV	PTS06101UNIV	PTS06003UNIV	PTS06001UNIV
③⑨	NSS*	M6x12 Socket Head Button Screw	4	4	4	4
④①	NSS*	Arrow Decal	1	1	1	1
④②	660288013	SSB-0075, Wave Spring	3	3	3	3
④③	S4807001	VDS20-NW25 Pipe Fitting	1	1	1	1
④④	NSS*	TS610 Inboard Assembly	1	1	-	-

MK = Included in major maintenance kit

TSK = Included in tip seal kit

NSS = Not sold separately