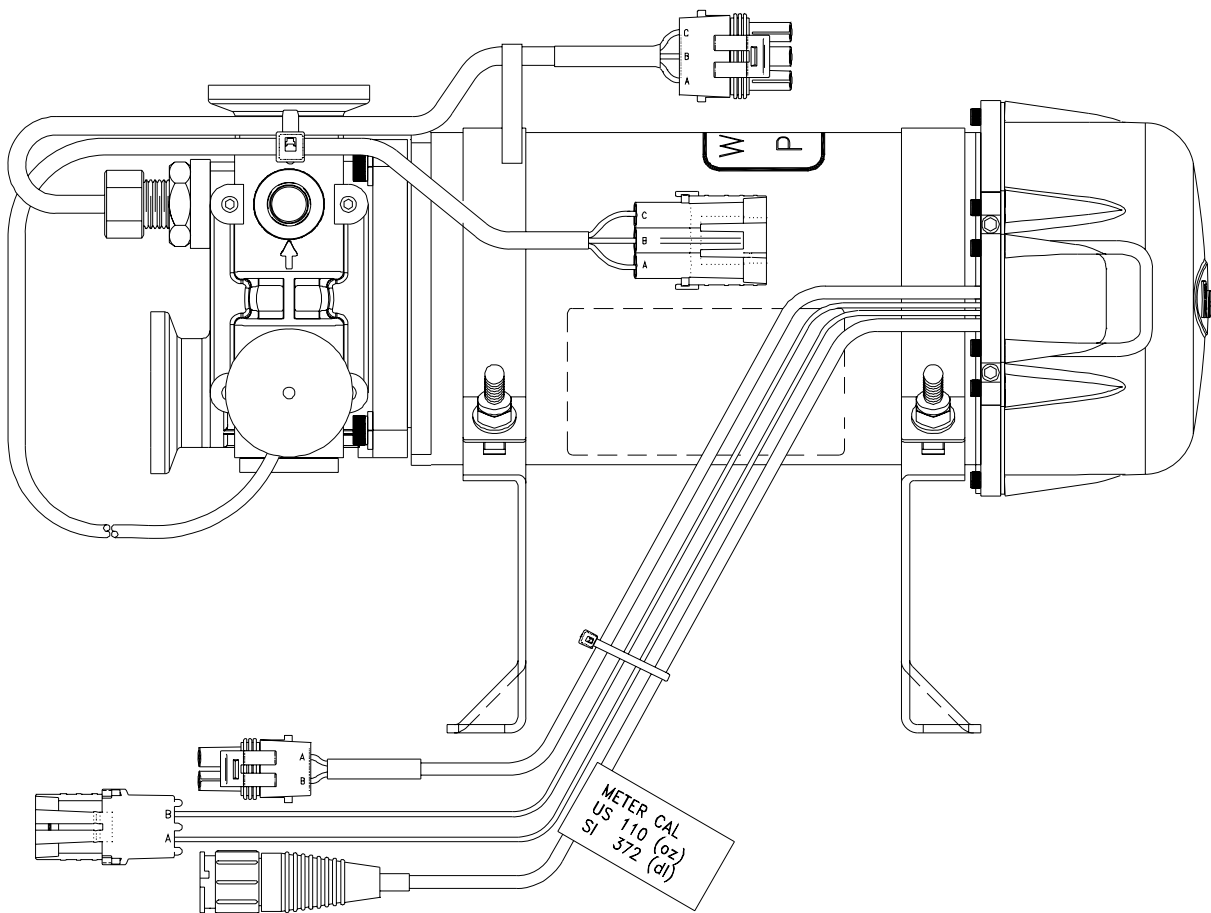




# INJECTION PUMP

1-40 oz/min AND 5-200 oz/min



## SERVICE MANUAL



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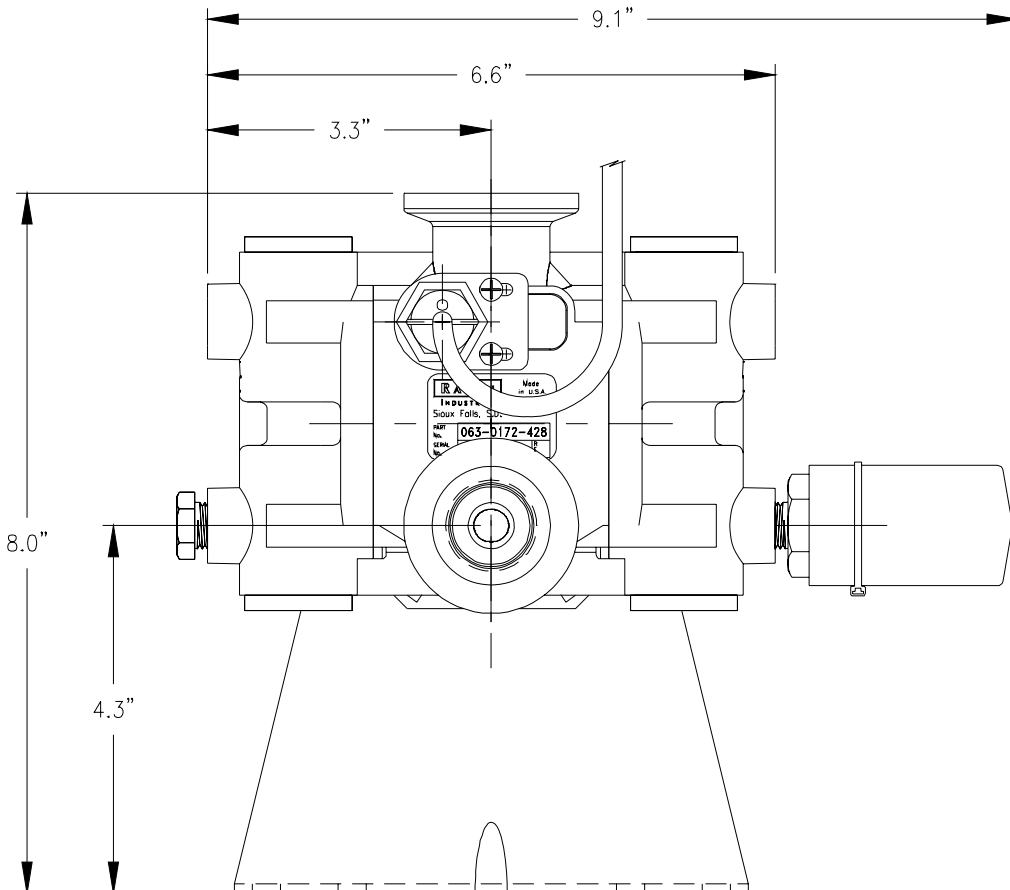
## REPLACEMENT PARTS SHEETS

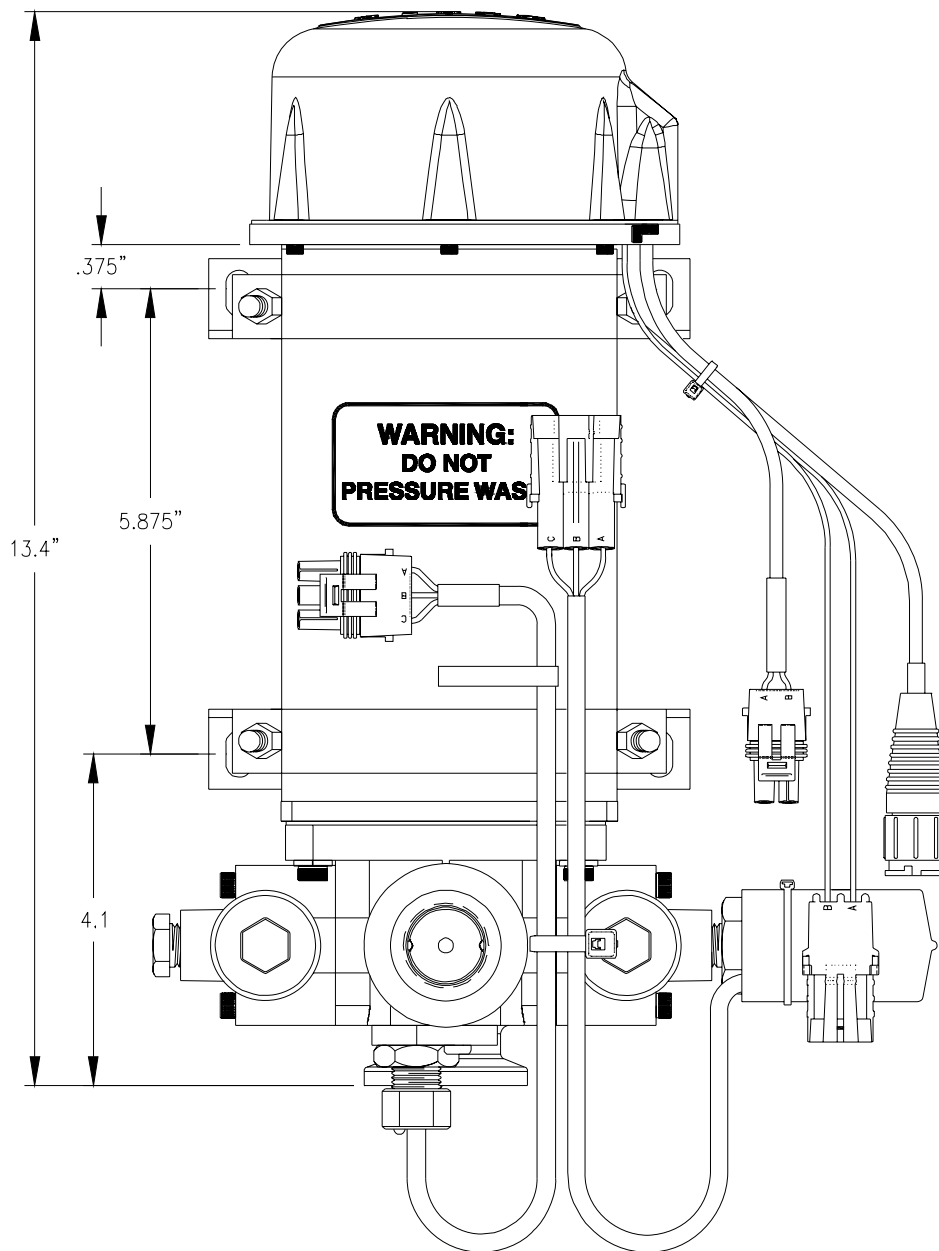
# GENERAL INFORMATION

The Raven Injection Pump is a positive displacement, piston pump. See Pump Maintenance section for details.

## SPECIFICATIONS

Dimensions .....	See drawing below and on next page	
Pistons .....	1 @ .750" Dia.	
Maximum Stroke Length .....	.390 in.	
Flow Output Range.....	P/N 063-0172-428	P/N 063-0172-510
	5-200 oz/min	1-40 oz/min
Maximum Operating Pressure .....	150 psi	
Maximum Power Required.....	1/4 Hp	
Maximum Recommended Suction Lift .....	2 ft.	
Inlet & Outlet Plumbing.....	Mates with Banjo M100 Flange & 3/4" Female NPT	
Wetted Parts .....	Polypropylene Stainless Steel	
Body Material.....	Polypropylene	
Wetted Seals/O-Rings .....	V965-80 Viton & Graphite Filled Teflon	





# INJECTION PUMP

## 1. PRIMING PROCEDURE

Injection Pump priming is required:

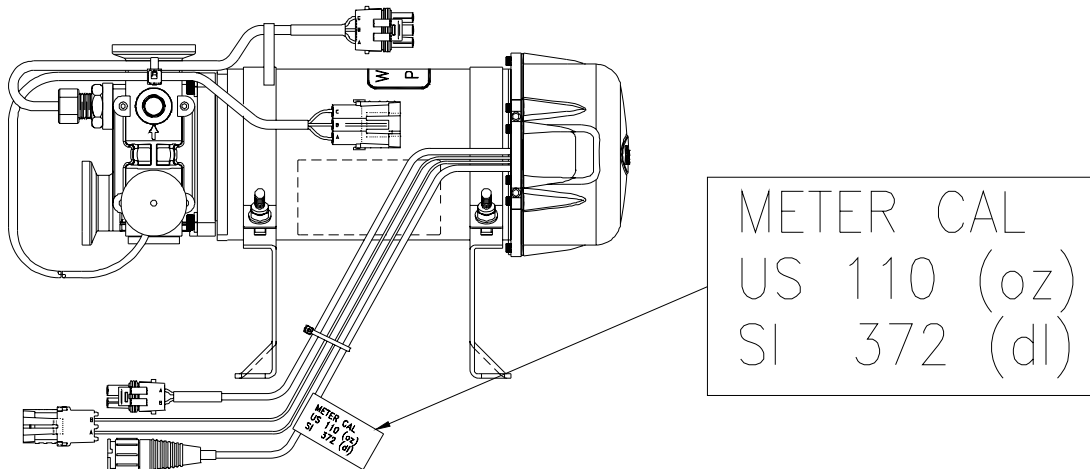
- 1) At initial start up.
- 2) If product tank has run empty.
- 3) When changing from one product to another.

To prime the Injection Pump, complete the following procedure.

- 1) Position the Injection Module hand valve for recirculation of product to Injection Module tank.
- 2) Run the Injection Pump at moderate speed for 3 minutes.
- 3) Return the Injection Module hand valve to operating position.

## 2. CALIBRATION VERIFICATION PROCEDURE

The Raven Injection Pump has been factory calibrated to constant listed on the calibration tag shown below in FIGURE 1. This should be verified periodically. Calibration verification is detailed for below. This tag is located on Metering Sensor cable of Injection Pump. NOTE: Illustration shows CAL Number for a high vol pump. The CAL Number for a low volume pump is different.



**FIGURE 1**

**NOTE:** The keys referenced in the steps below refer to using this pump with the Raven SIDEKICK system.

1. Enter 50 into the METER CAL key on the SCS SIDEKICK Console.
2. Place 3-way valve handle on Injection Pump to recirculate position.
3. Place BOOM and MASTER switches ON. Place the OFF/HOLD/RUN switch to RUN.
4. Run pump until liquid appears from tank return hose. Place OFF/HOLD/RUN switch to HOLD.
5. Enter "0" into TOTAL VOLUME key.
6. Place tank return hose into measuring container.
7. Place OFF/HOLD/RUN switch to RUN until 50 ounces of measured product is pumped. The number displayed in TOTAL VOLUME is the new METER CAL.
8. Enter this new METER CAL number in METER CAL key.
9. Enter "0" in TOTAL VOLUME key.
10. Place OFF/HOLD/RUN switch to RUN until 50 ounces of measured product is pumped.
11. The number in TOTAL VOLUME should be 49, 50, or 51. If not, repeat calibration procedures.

12. Empty tank return hose into measuring container.
13. Pour product caught in measuring container back into Injection Module Tank.

<b>NOTE:</b>	A.	Typical causes for Injection System to under apply are: <ol style="list-style-type: none"><li>1. Fouled Pump Check Valves.</li><li>2. Air leaks on Injection Pump inlet plumbing.</li><li>3. Air entrained in chemical.</li><li>4. Plugged inlet strainer.</li><li>5. Chemical is too thick to flow thru inlet plumbing.</li></ol>
	B.	Typical cause for over application: Incorrect calibration data entered into Console.

CALIBRATION FLASK  
106-0159-454

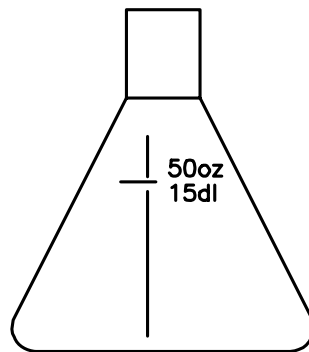


FIGURE 2

### 3. RECOMMENDED INJECTION PUMP FLUSH SYSTEM

The recommended flush system is shown in FIGURE 3. Strainers are recommended for the product and flush system water. Strainers suitable for concentrated product are typically 20 mesh stainless steel. It is recommended that a flush system be incorporated with the injection system. This will enhance the performance of the injection pump. The basic components are shown below and are available through your local spraying equipment supplier. This system shall be installed as shown and operated per the following instructions. The required frequency of flushing may vary per the product being injected.

- 1) Drain or empty Product Injection Tank. (Valve #2)
- 2) Place VALVE #3 in Recirculation position.
- 3) Place VALVE #1 in position to let clean water circulate thru Injection Pump from flush pump. **VENT CHEMICAL TANK.** Start flush System, pump approximately 1/2 gallon into Injection Tank.
- 4) Reposition VALVE #1 and VALVE #3 to allow rinse mixture to be injected. Spray rinse mixture at normal recommended rate.
- 5) Repeat this procedure until Pump and Tank are clean. (i.e. Triple rinse).

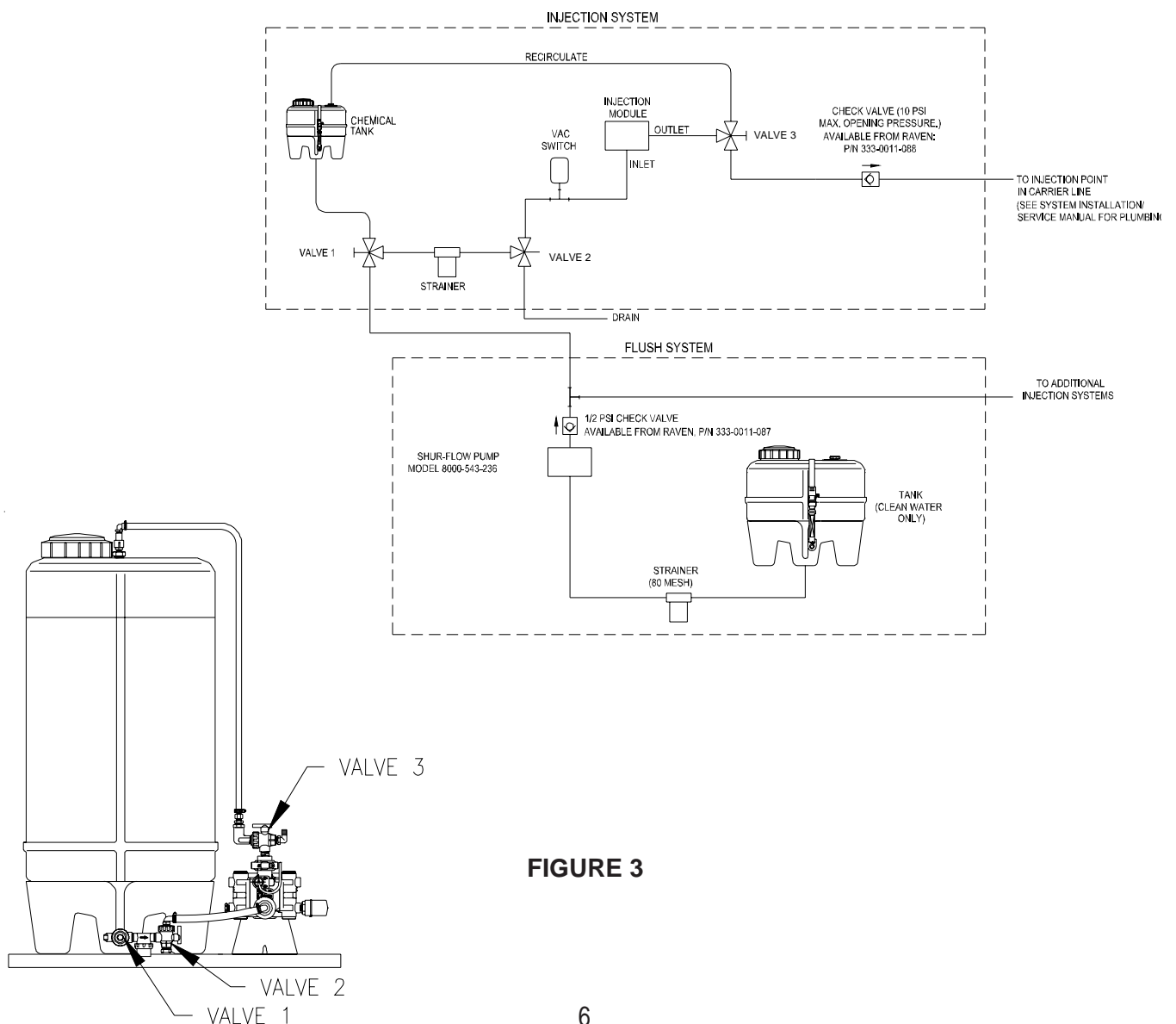


FIGURE 3

# MAINTENANCE

## 1. CLEANING OR REPLACING CHECK VALVE O-RINGS

Small particles of rust, sand, or grit may get trapped in the check valve seats. If this happens, the operator will notice a change in accuracy of application rate. It will be necessary to clean or replace the check valve o-rings. New o-rings are furnished in kit P/N 117-0159-987, which is available through your dealer. Complete the following procedure. Reference FIGURE 4 on page 8.

- 1) Empty any product from the Injection Module tank. Flush Pump with water.
- 2) Carefully remove the intake and discharge plugs from the Pump.
- 3) Examine o-ring around outside of valve assembly. Replace if cut or nicked. See note below.

<b>NOTE:</b> These o-rings are made of a chemical resistant compound and should only be replaced with o-rings supplied by your Dealer.
--

- 4) Disassemble check valve assemblies per instructions on page 8. To prevent loss of parts place valve assembly inside clear plastic bag prior to doing this procedure. Examine the guide, spring, and poppet. Examine the poppet o-ring. Check for wear, pits, swelling, or foreign matter. Clean or replace if necessary. See note above.
- 5) Reassemble check valve assemblies per instructions on page 8. Do not interchange springs from the discharge and intake valves. The heavy spring is for the discharge valve (top), and the light spring is for the intake valve (bottom).
- 6) Apply petroleum jelly to valve body o-rings. Press check valve assemblies into the Pump head. Tighten plug.

## 2. PUMP VALVE ORDER OF ASSEMBLY AND REPLACEMENT PARTS

**CAUTION:** WHERE SAFETY GLASSES DURING ALL ASSEMBLY AND DISASSEMBLY OF VALVES.

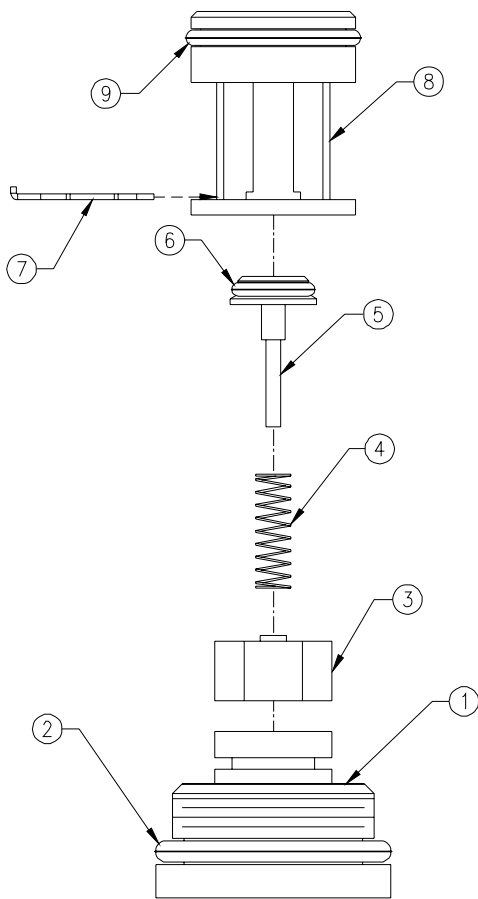
Reference FIGURE 4.

ITEM	DESCRIPTION	RAVEN PART #
1	Fitting, Plug	107-0171-519
2	O-Ring	219-0002-912
3	Guide, Poppet	107-0159-934
4	Spring	314-0000-006
5	Poppet	107-0159-935
6	O-Ring (Viton)	219-0007-011
7	Clip, Retainer	107-0171-576
8	Valve Body, Discharge	107-0171-528
9	O-Ring (Viton)	219-0002-018

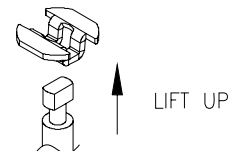
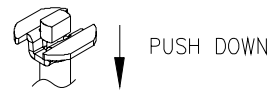
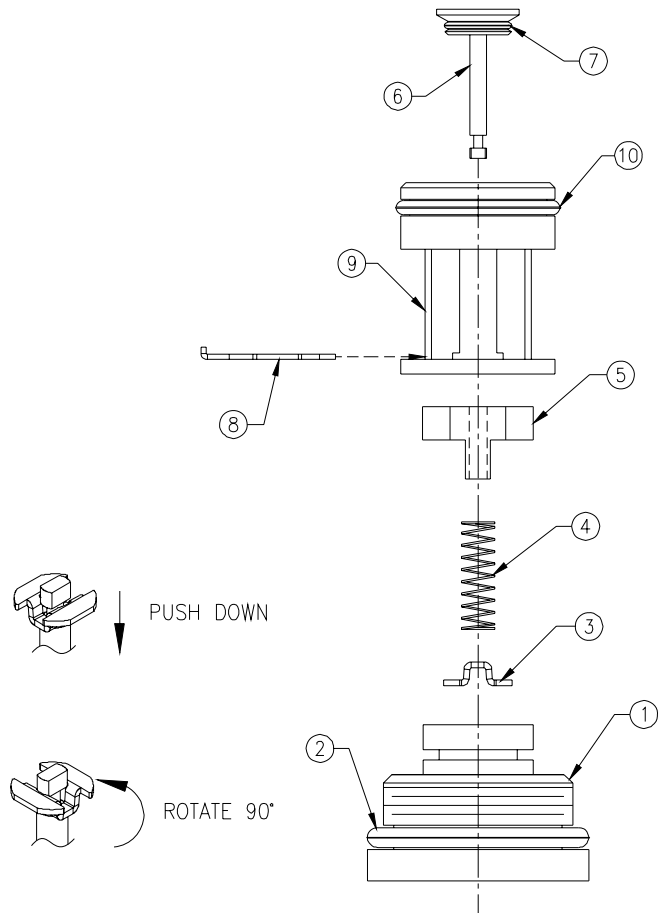
ITEM	DESCRIPTION	RAVEN PART #
1	Fitting, Plug	107-0171-519
2	O-Ring	219-0002-912
3	Retainer, Intake	107-0171-459
4	Spring	314-0000-005
5	Guide, Poppet	107-0171-092
6	Stem, Poppet	107-0171-447
7	O-Ring (Viton)	219-0007-011
8	Clip, Retainer	107-0171-576
9	Valve, Body Intake	107-0171-527
10	O-Ring (Viton)	219-0002-018

\*\* O-Rings included in kit P/N 117-0159-987

DISCHARGE VALVE ASSY (063-0172-504)



INTAKE VALVE ASSY (063-0172-503)



SPRING RETAINER  
DETAIL

FIGURE 4

### 3. REPLACEMENT OF PISTON SEALS

Install new seals when Pump leaks excessive product. Leakage will be through weep hole on the underside of the pump housing. New seals are furnished in kit 117-0159-987, which is available through your dealer. To install the seal kit, complete the following Steps.

For reference diagrams during this procedure see:  
Figures 4, 5, AND 6

- 1) Empty any product from the Injection Module tank. Flush the Pump with water.
- 2) Disconnect the plumbing and wiring from the pump. Take the pump to a work bench. Separate the pump from the motor by removing 4 socket head screws.
- 3) Loosen and remove the four socket head cap screws that secure each Pump head to the crankcase. Remove the heads. Take care not to damage the finish on the exposed piston. Watch for a stainless steel ball in case it would fall out during removal of the pump head (ref. Fig 6). Remove the 2 balls and magnet assembly from the pump.
- 4) Remove the slipper seals and o-rings from the pump. The slipper seal and o-rings may stay in the pump head or stay on the piston.

**NOTE:** These o-rings are made of a chemical resistant compound and should only be replaced with o-rings supplied by your Dealer.

- 5) Inspect the piston for scratches. Piston must be smooth. If not, replace the piston.
- 6) Inspect the piston bearing for wear. Replace if necessary.

#### SEAL INSTALLATION

Refer to Figure 6. Complete one side before starting the other.

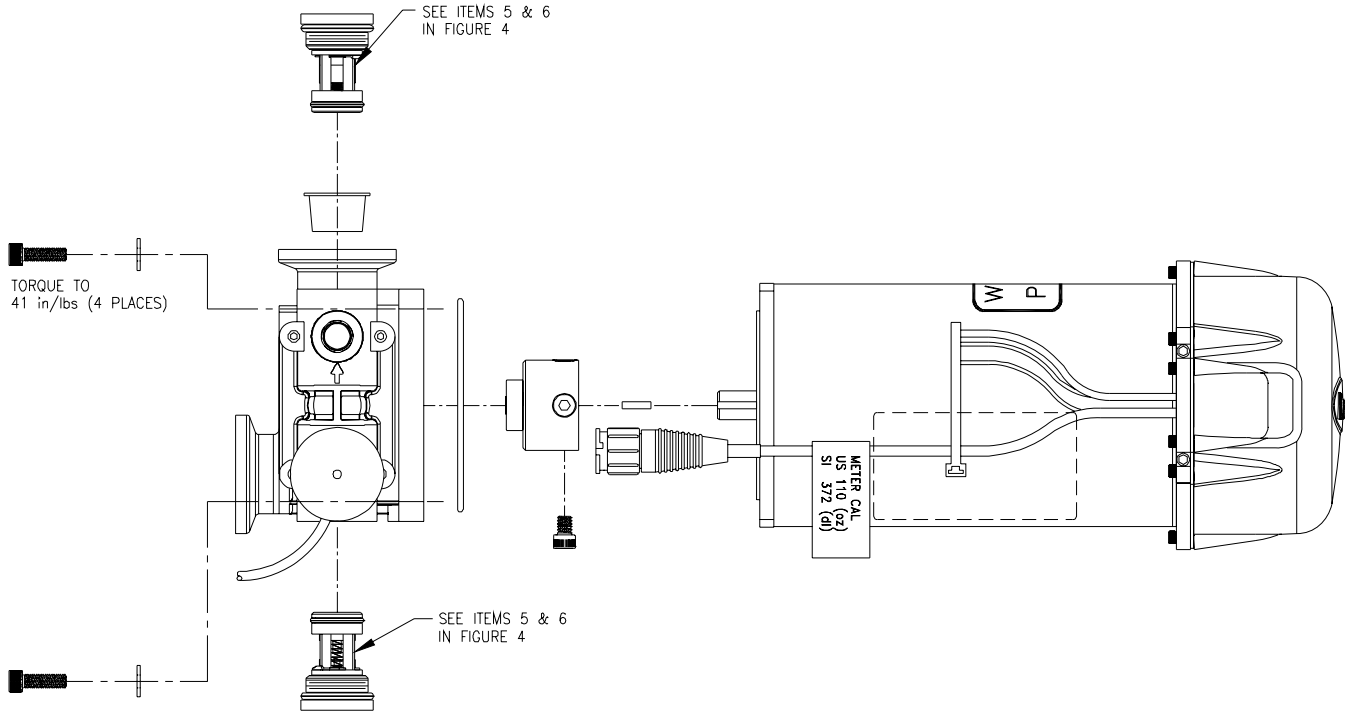
- 7)
  - a. Start by installing the slipper seal (item 3) onto the piston.
  - b. Use some general purpose grease to lubricate o-ring (item 2). Place this o-ring over the slipper seal.
  - c. Install o-rings (item 1) in head. If they tend to fall out before head is installed, use more lubricant on o-ring.
  - d. Install head on side just completed.
  - e. Install stainless steel balls, magnet assembly and spring in correct order. Ref. Figure 6.
  - f. Repeat process on remaining side of pump.
- 8) Tighten bolts to torque specified in Figures 5 and 6.

# 4. SEALS

Reference Figures 5 & 6.

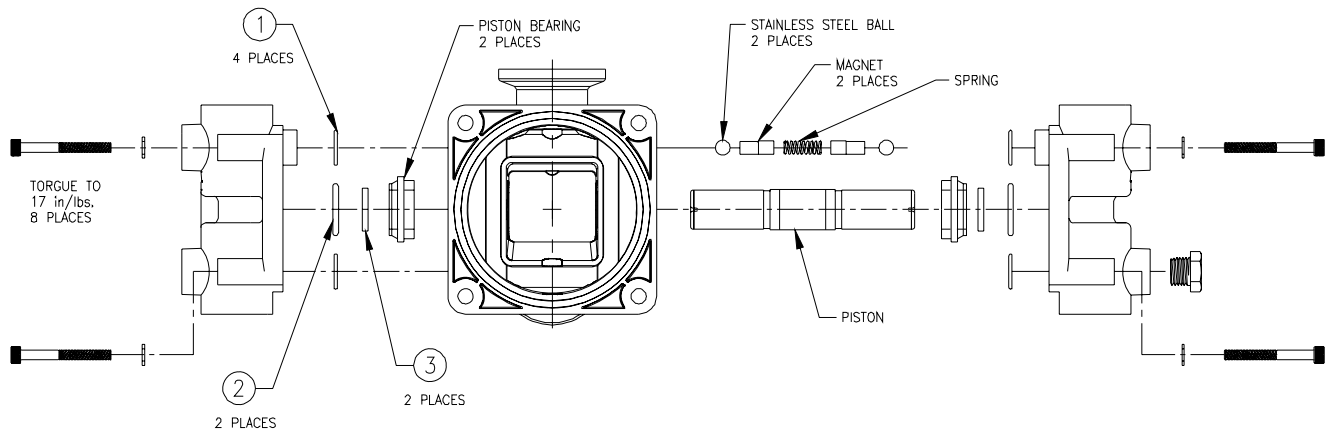
ITEM	DESCRIPTION	RAVEN PART #	QTY
1	O-ring, Viton	219-0002-015	4
2	O-ring, Compound 117965-80	219-0007-117	2
3	Seal, Slipper 3/4"	219-0000-125	2
*4	O-ring (check valve poppet)	219-0007-011	4
*5	O-ring (check valve plug)	219-0002-018	4

\*\* Seals available in kit P/N 117-0159-987



**FIGURE 5**

**PUMP SEPARATION FROM MOTOR**

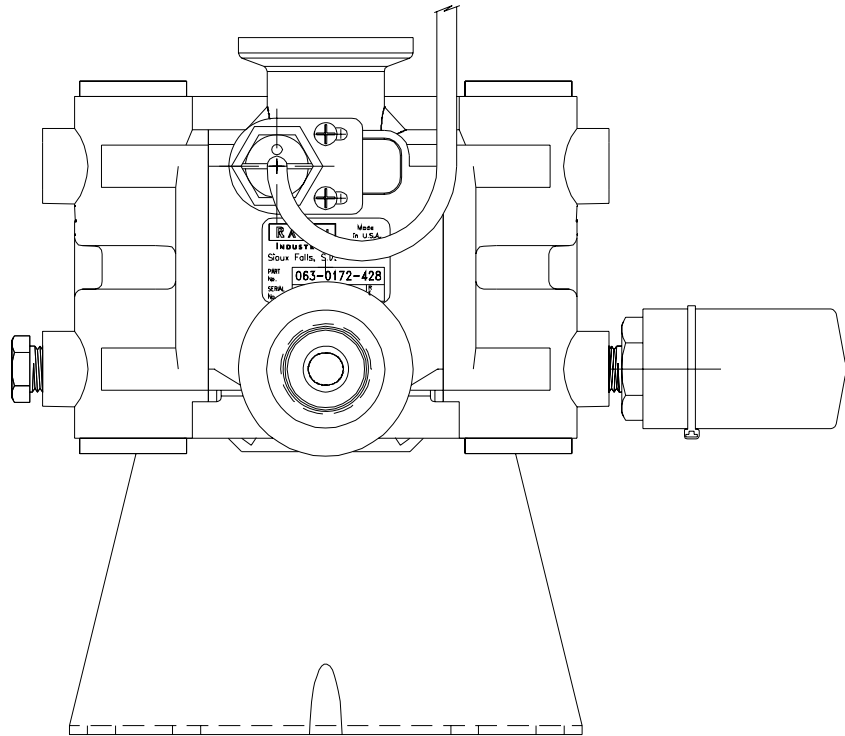


**FIGURE 6**

**SEAL INSTALLATION**

## 5. LUBRICATION

No lubrication maintenance is required. Pump is permanently lubricated.



**FIGURE 7**

## 6. STORAGE

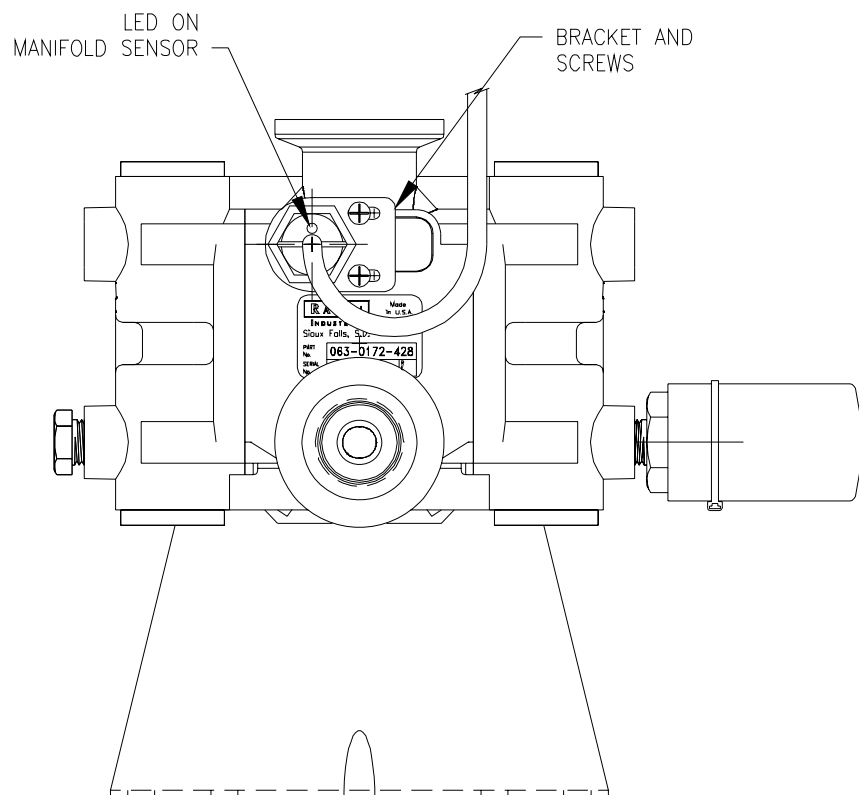
Prepare the Injection Pump for storage as follows:

- 1) Flush any product remaining in the pump by recirculating water through the Injection Module. Incrustations of product may be removed by flushing with kerosene or fuel oil.
- 2) Recirculate a 50% water and 50% antifreeze mixture through the Injection Module.

## 7. SENSITIVITY ADJUSTMENT PROCEDURE, MANIFOLD FLOW MONITOR

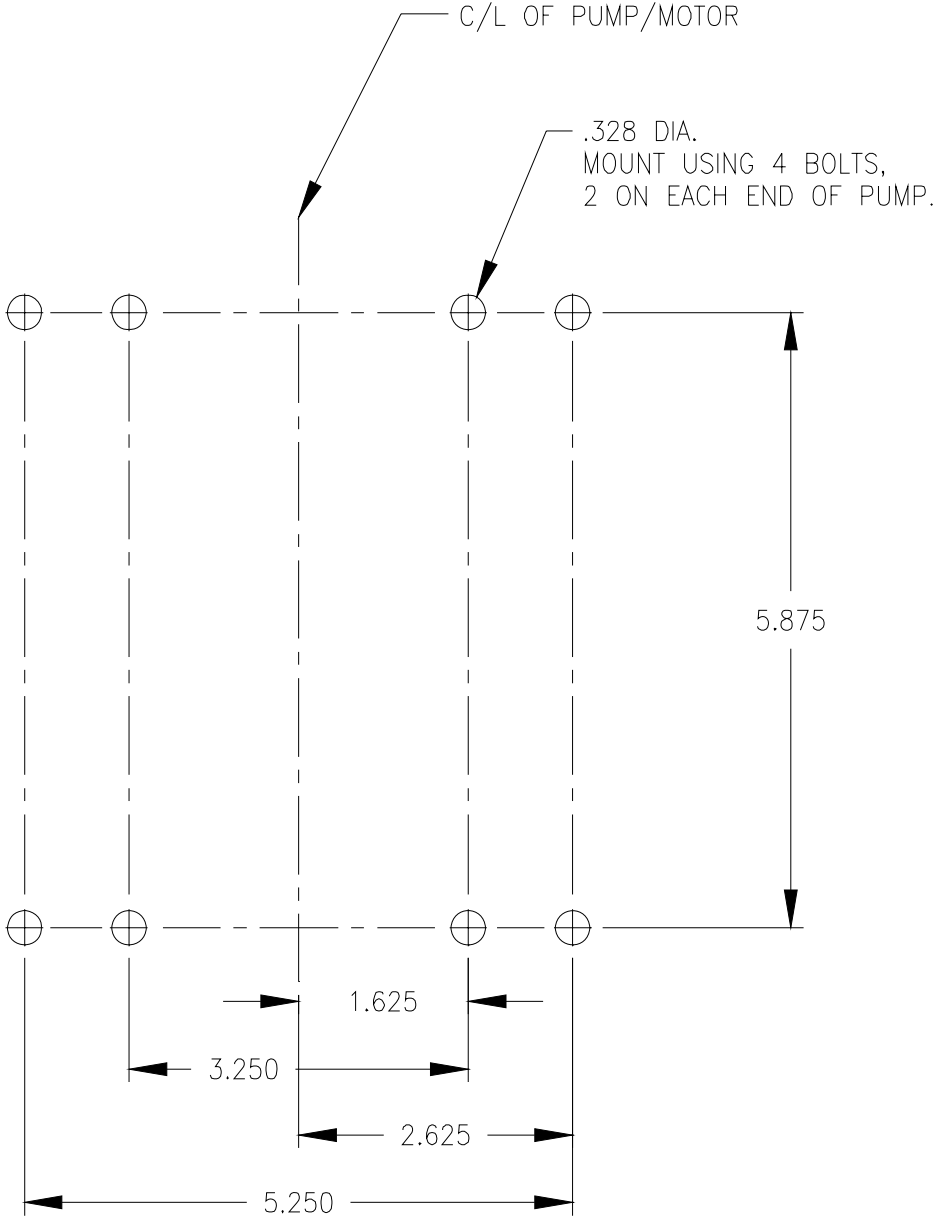
1. Position injection modules hand valve to recirculate. Run pump to prime system. Inspect for any leaks. Repair as necessary.
2. Monitor volume per minute. Manually adjust pump output, Hi Vol - 5 oz. per min / Lo Vol - 1 oz. per min.
3. Visually monitor LED on manifold sensor. Adjust manifold sensor left or right until LED flashes. Tighten screws on bracket. Ref. Figure 8.
4. Verify LED continues to flash.
5. Manually adjust pump output to 40 oz/min. Verify LED continues to flash.
6. During normal operation LED shall flash. If pump pumps on only one cylinder, LED will no longer flash. Flow error message will be displayed on console.
7. Return hand valve to injection position.

**NOTE:** To read vol/min, refer to SIDEKICK CONSOLE Manual.

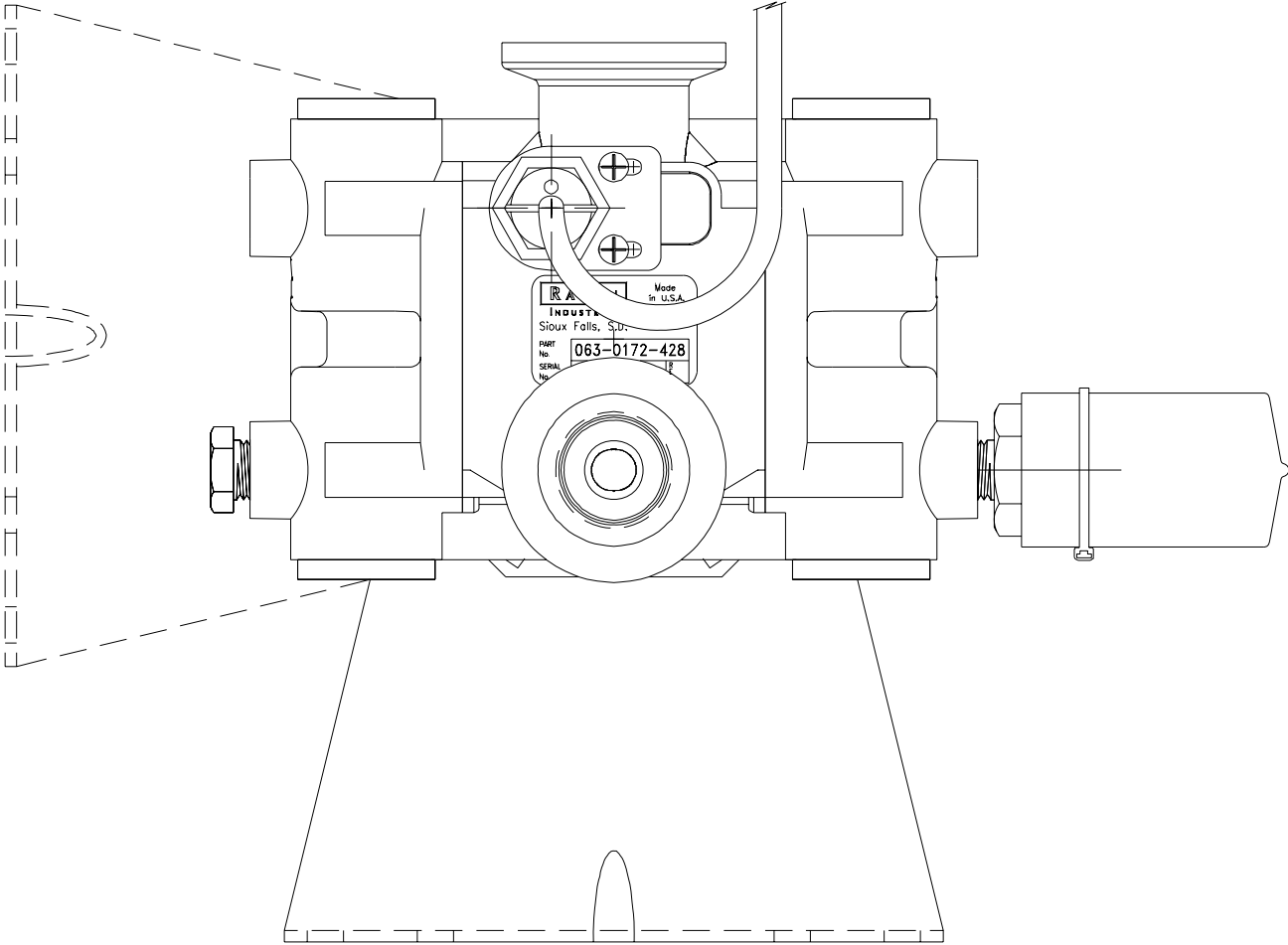


**FIGURE 8**

# PUMP MOUNTING PATTERN



# PUMP MOUNTING

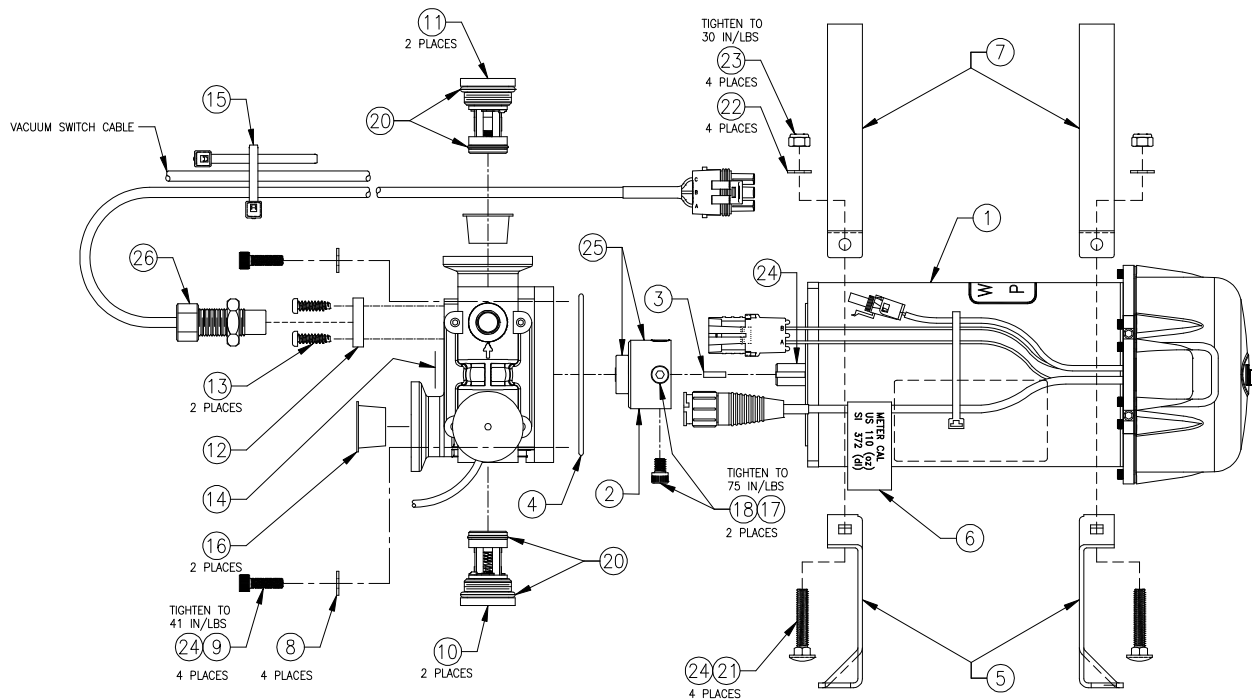


MOUNTING BRACKET MAY BE ROTATED TO ACCOMODATE SIDE MOUNTING, HOWEVER PUMP MUST REMAIN LEVEL AND PERPENDICULAR TO THE GROUND AS SHOWN.

# RAVEN INJECTION PUMP, 5-200 oz/min. REPLACEMENT PARTS

063-0172-428

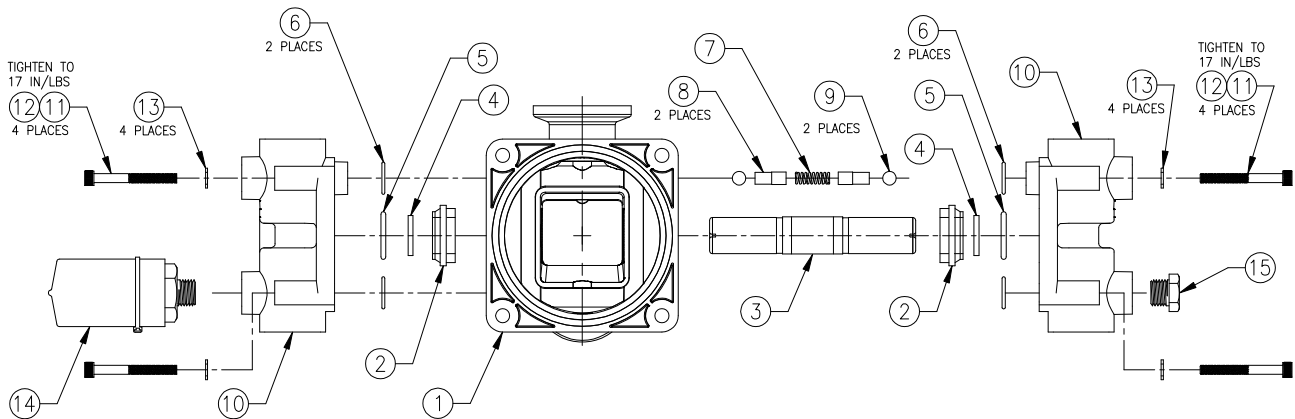
ITEM	DESCRIPTION	RAVEN PART #
1	Motor/Tach Assembly	063-0172-500
2	Bearing Assembly	063-0172-501
3	Key	107-0171-588
4	O-Ring	219-0001-153
5	Bracket, Mounting, Pump/Motor	107-0171-589
6	Label, Meter Cal	041-0159-718
7	Strap	107-0171-594
8	Washer, Internal Tooth, Lock 1/4" SS	313-3000-017
9	Screw, Socket Heat, Cap 1/4"-20 x 3/4"	311-0073-066
10	Cartridge, Intake	063-0172-503
11	Cartridge, Discharge	063-0172-504
12	Bracket, Sensor	106-0159-539
13	Screw	311-0004-040
14	Label, Serial	041-0159-710
15	Tie, Cable	435-1000-003
16	Cap, Tapered	118-0159-041
17	Thread Sealant Loctite #242	222-1001-029
18	Screw, Cap, Hex Socket Head 1/4"-20 x 1/4	311-0068-060
19	Manual (Not Shown)	016-0159-975
20	Grease, Lubricating, Versilube	222-0000-002
21	Bolt, 1/4"-20 x 1"	311-0069-004
22	Washer	313-2300-009
23	Nut	312-4000-057
24	Anti-Sieze Compound, Nickel	222-1001-079
25	Grease	222-1001-114
26	Sensor, Universal, Flowmonitor	063-0172-525



# RAVEN INJECTION PUMP, 5-200 oz/min. REPLACEMENT PARTS

063-0172-428

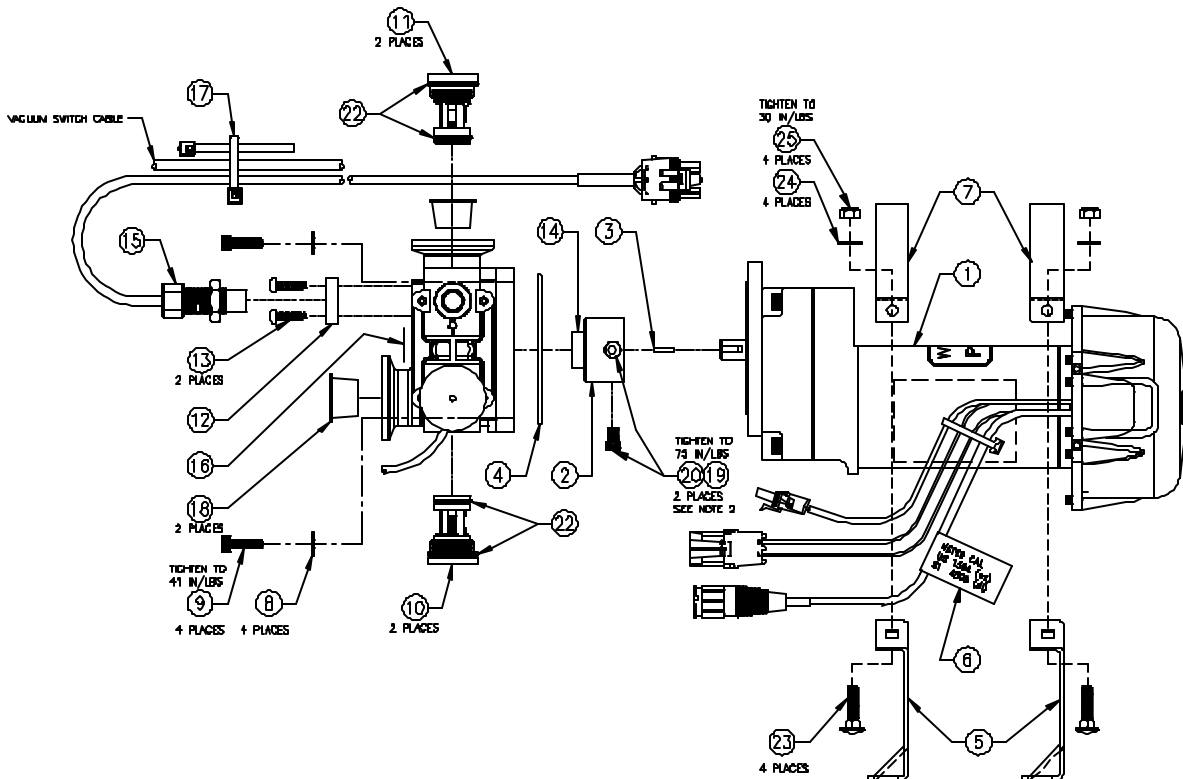
ITEM	DESCRIPTION	RAVEN PART #
1	Housing, 3/4" Injection Pump	107-0171-523
2	Bearing, Piston	325-0000-018
3	Piston, 3/4" Pump	107-0171-531
4	Seal, Slipper	219-0000-125
5	O-Ring	219-0007-117
6	O-Ring	219-0002-015
7	Spring	314-0000-012
8	Magnet Assembly	063-0172-518
9	Ball	321-0000-313
10	Head, 3/4" Pump	107-0171-526
11	Screw 10-24 x 1 1/2" SS	311-0068-191
12	Anti-Sieze Compound, Nickel	222-1001-079
13	Washer, Internal Tooth Lock	313-3000-014
14	Switch, Vacuum	063-0171-035
15	Plug, Hex, Pipe	333-0009-061
16	Seal Kit (Not Shown)	117-0159-987



# RAVEN INJECTION PUMP, 1-40 oz/min. REPLACEMENT PARTS

063-0172-510

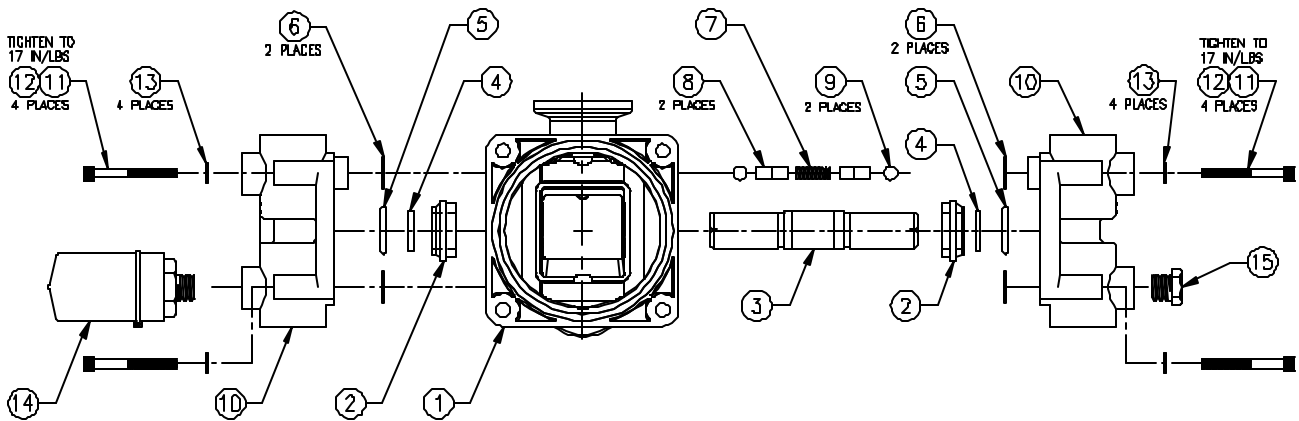
ITEM	DESCRIPTION	RAVEN PART #
1	Motor/Tach Assembly	063-0172-527
2	Bearing Assembly	063-0172-501
3	Key	107-0171-588
4	O-Ring	219-0001-153
5	Bracket, Mounting, Pump/Motor	107-0171-599
6	Label, Meter Cal	041-0159-720
7	Strap	107-0171-600
8	Washer, Internal Tooth, Lock 1/4" SS	313-3000-017
9	Screw, Socket Head, Cap 1/4"-20 x 3/4"	311-0073-066
10	Cartridge, Intake	063-0172-503
11	Cartridge, Exhaust	063-0172-504
12	Bracket, Sensor	106-0159-539
13	Screw	311-0004-040
14	Grease	222-1001-114
15	Sensor, Universal, Flowmonitor	063-0172-525
16	Label, Serial	041-0159-721
17	Tie, Cable	435-1000-003
18	Cap, Tapered	118-0159-041
19	Thread Sealant Loctite #242	222-1001-029
20	Screw, Cap, Hex Socket Head 1/4"-20 x 1/4"	311-0068-060
21	Manual (Not Shown)	016-0159-975
22	Grease, Lubricating, Versilube	222-0000-002
23	Bolt, 1/4"-20 x 1"	311-0069-004
24	Washer	313-2300-009
25	Nut	312-4000-057



# RAVEN INJECTION PUMP, 1-40 oz/min. REPLACEMENT PARTS

063-0172-510

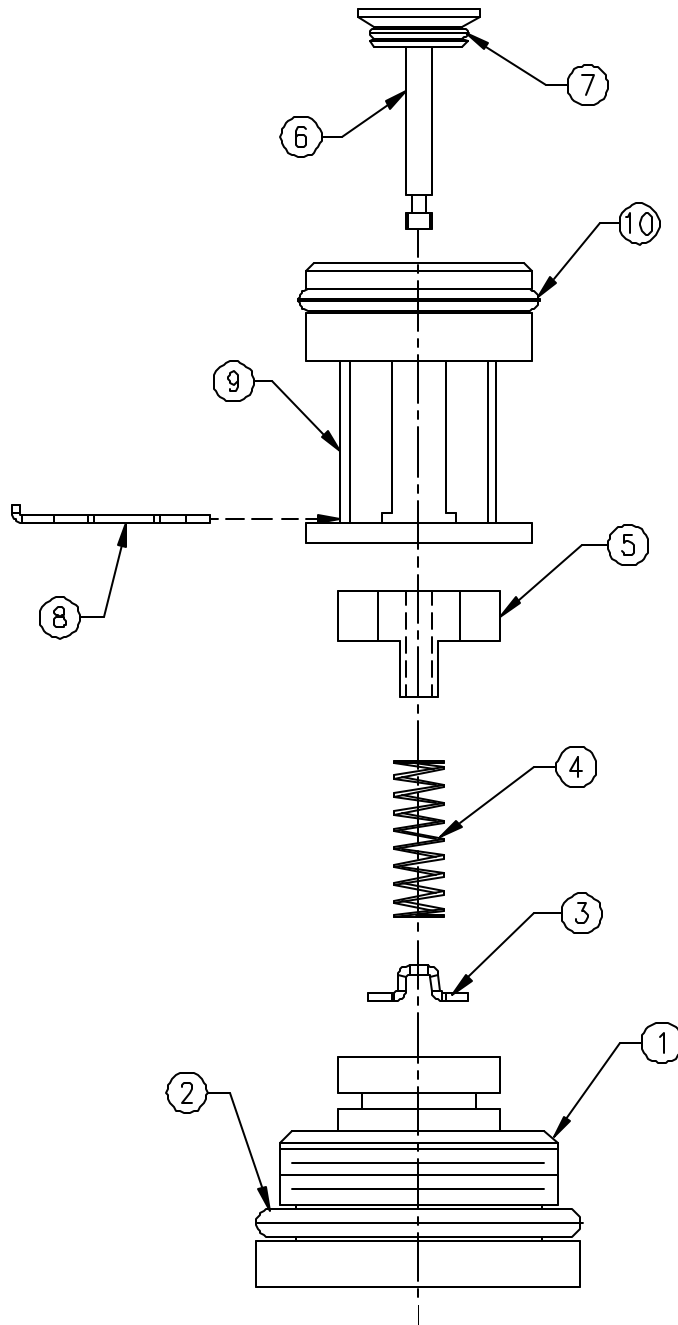
ITEM	DESCRIPTION	RAVEN PART #
1	Housing, 3/4" Injection Pump	107-0171-523
2	Bearing, Piston	325-0000-018
3	Piston, 3/4" Pump	107-0171-531
4	Seal, Slipper	219-0000-125
5	O-Ring	219-0007-117
6	O-Ring	219-0002-015
7	Spring	314-0000-012
8	Magnet Assembly	063-0172-518
9	Ball	321-0000-313
10	Head, 3/4" Pump	107-0171-526
11	Screw 10-24 x 1 1/2" SS	311-0068-191
12	Anti-Sieze Compound, Nickel	222-1001-079
13	Washer, Internal Tooth Lock	313-3000-014
14	Switch, Vacuum	063-0171-035
15	Plug, Hex, Pipe	333-0009-061



# INTAKE VALVE REPLACEMENT PARTS

063-0172-503

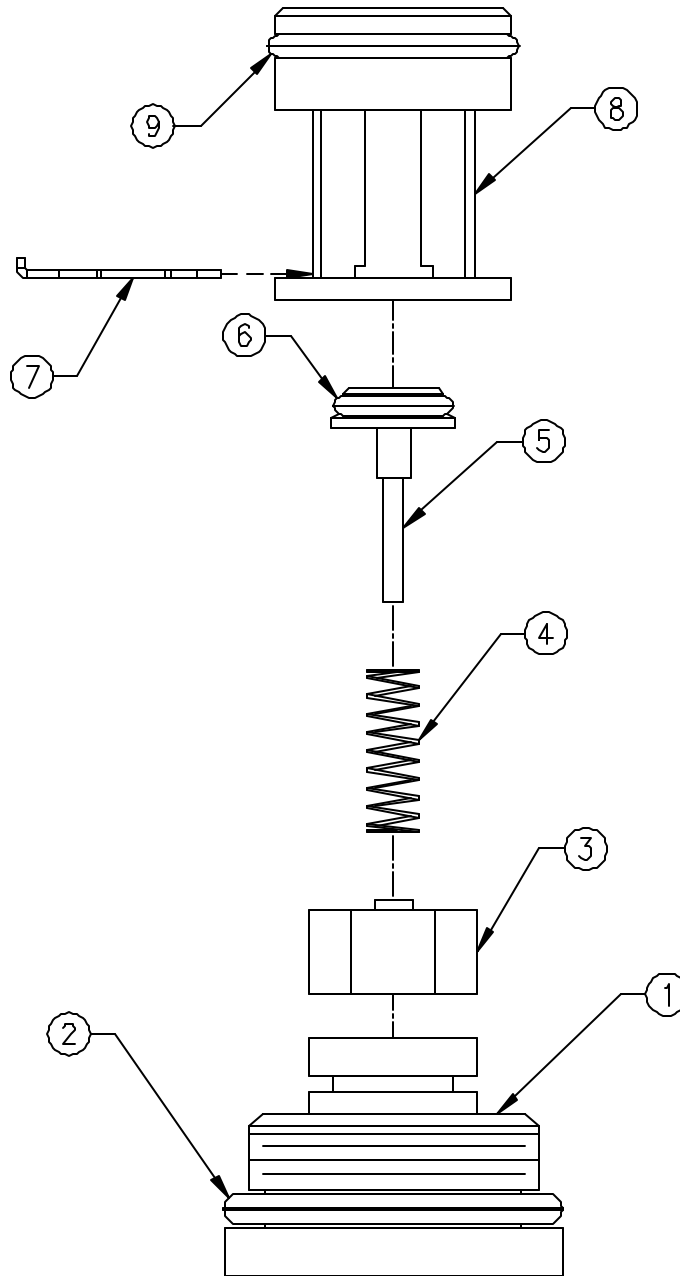
ITEM	DESCRIPTION	RAVEN PART #
1	Fitting, Plug	107-0171-519
2	O-Ring	219-0002-912
3	Retainer, Intake	107-0171-459
4	Spring	314-0000-005
5	Guide, Poppet	107-0171-092
6	Stem, Poppet	107-0171-447
7	O-Ring	219-0007-011
8	Clip, Retainer	107-0171-576
9	Valve, Body Intake	107-0171-527
10	O-Ring	219-0002-018



# DISCHARGE VALVE REPLACEMENT PARTS

063-0172-504

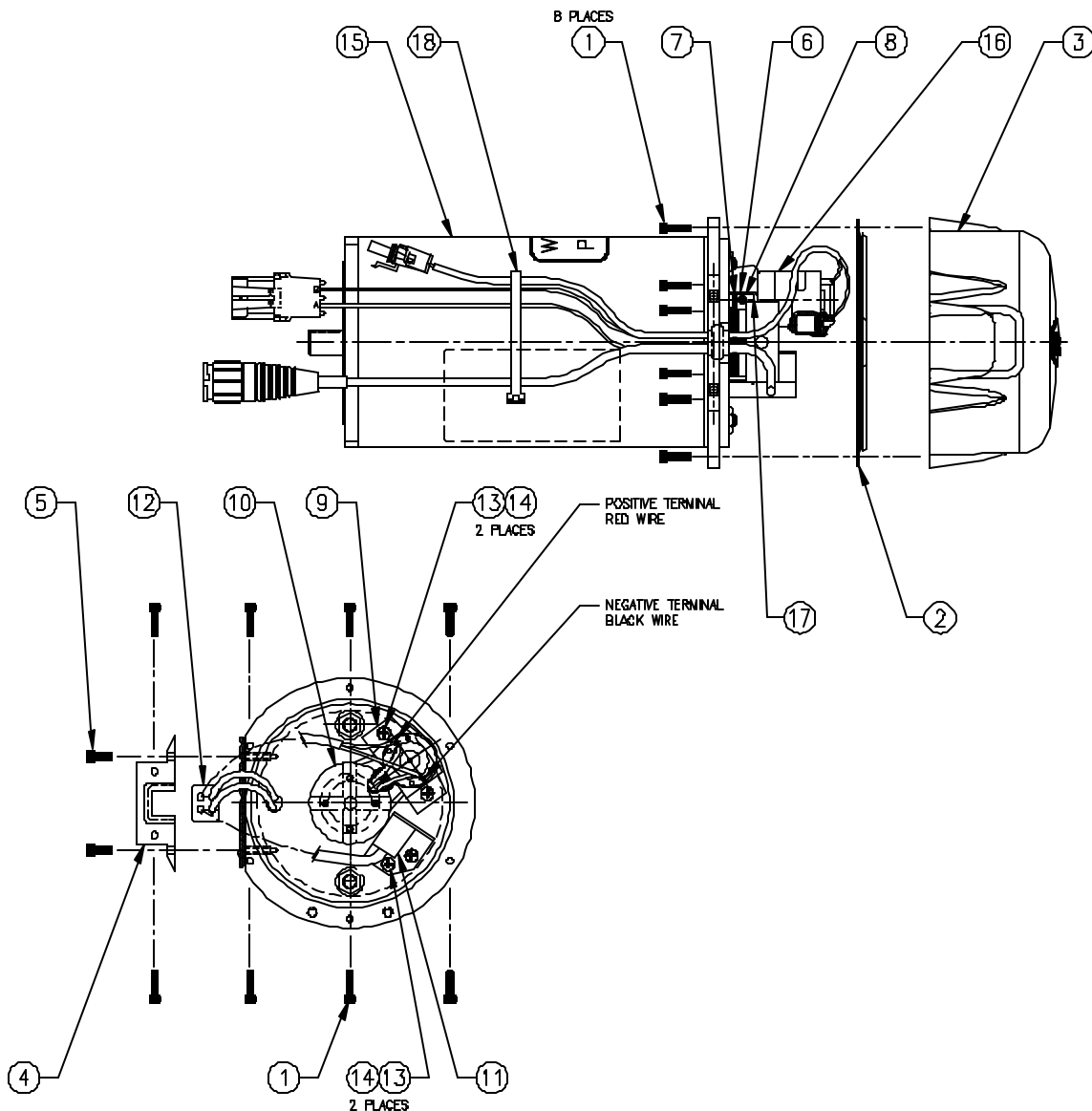
ITEM	DESCRIPTION	RAVEN PART #
1	Fitting, Plug	107-0171-519
2	O-Ring	219-0002-912
3	Guide, Poppet	107-0159-934
4	Spring	314-0000-006
5	Poppet	107-0159-935
6	O-Ring	219-0007-011
7	Clip, Retainer	107-0171-576
8	Valve, Body Discharge	107-0171-528
9	O-Ring	219-0002-018



# MOTOR/TACH ASSEMBLY 5-200 oz/min. REPLACEMENT PARTS

063-0172-500

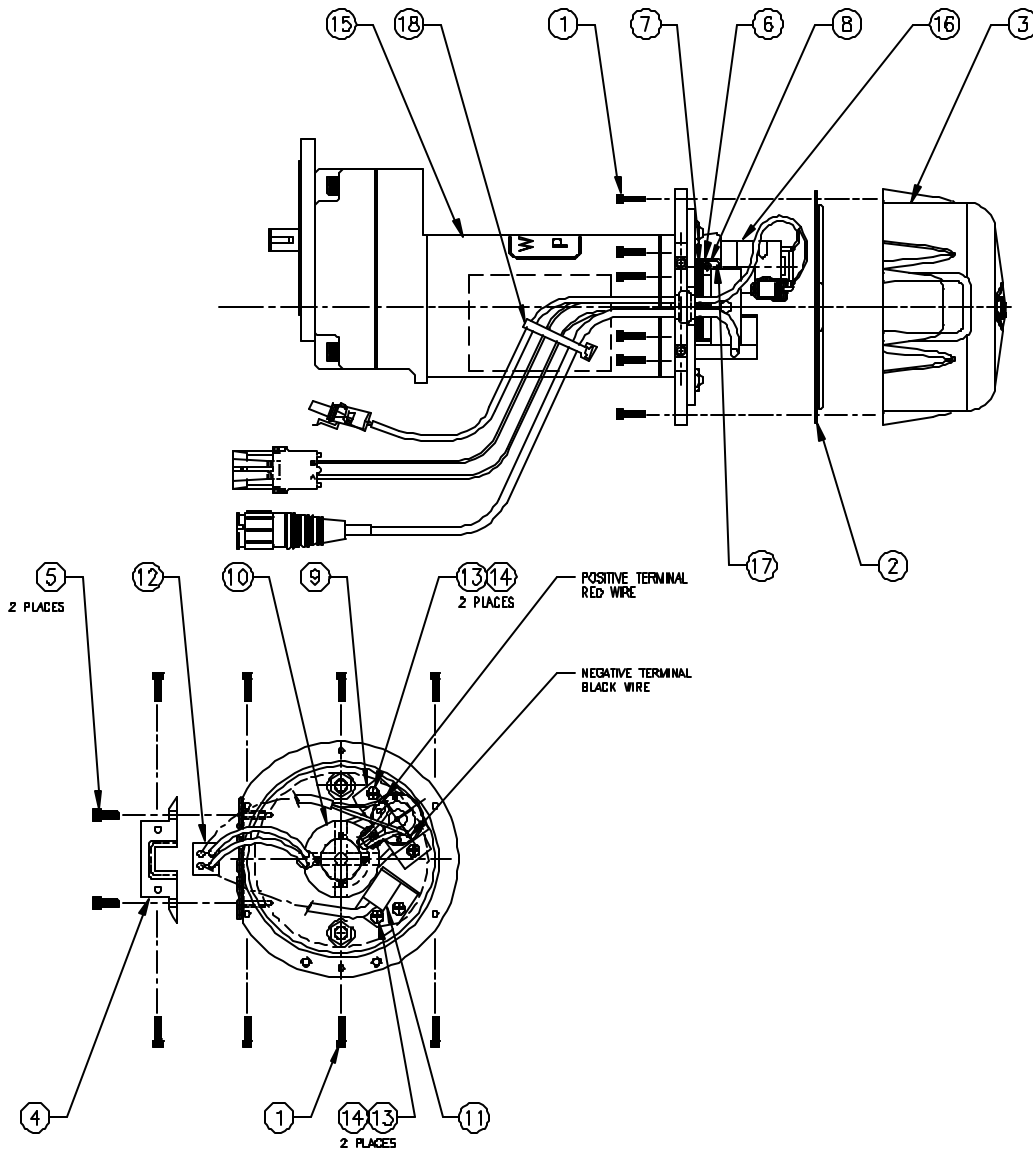
ITEM	DESCRIPTION	RAVEN PART #
1	Screw, Socket Head Cap #4-40 x 1/2"	311-0068-007
2	Gasket, Enclosure	106-0159-576
3	Enclosure	106-0159-577
4	Clamp, Strain Relief	107-0171-470
5	Screw, Socket Head Cap #6-32 x 1/2"	311-0068-025
6	Pulley, Small	107-0171-437
7	O-Ring	219-0003-126
8	Screw, Hex Cap #4-40 unc 2A x 1/4" LG	311-0068-003
9	Bracket, Mounting	107-0171-473
10	Assembly, Pulley	063-0172-306
11	Sensor, Speed	063-0172-351
12	Strain Relief/Grommet	107-0171-478
13	Screw, Phillips Pan Head #6-32 x 1/4"	311-0004-005
14	Washer, Lock, Internal #6	313-3000-007
15	Motor, Electric	416-0000-033
16	Tach Assembly	063-0172-312
17	Screw, Metric Machine M2.6 x 6.0 mm	311-0070-004
18	Tie, Cable	435-1000-002



# MOTOR/TACH ASSEMBLY 1-40 oz/min. REPLACEMENT PARTS

063-0172-527

ITEM	DESCRIPTION	RAVEN PART #
1	Screw, Socket Head Cap #4-40 x 1/2"	311-0068-007
2	Gasket, Enclosure	106-0159-576
3	Enclosure	106-0159-577
4	Clamp, Strain Relief	107-0171-470
5	Screw, Socket Head Cap #6-32 x 1/2"	311-0068-025
6	Pulley, Small	107-0171-437
7	O-Ring	219-0013-121
8	Screw, Hex Cap #4-40 unc 2A x 1/4" LG	311-0068-003
9	Bracket, Mounting	107-0171-473
10	Assembly, Pulley	063-0172-528
11	Sensor, Speed	063-0172-351
12	Strain Relief/Grommet	107-0171-478
13	Screw, Phillips Pan Head #6-32 x 1/4"	311-0004-005
14	Washer, Lock, Internal #6	313-3000-007
15	Motor, Electric	416-0000-034
16	Tach Assembly	063-0172-312
17	Screw, Metric Machine M2.6 x 6.0 mm	311-0070-004
18	Tie, Cable	435-1000-002









# **RAVEN INDUSTRIES**

## **LIMITED WARRANTY**

### **WHAT IS COVERED?**

This warranty covers all defects in workmanship or materials in your Raven Flow Control Product under normal use, maintenance, and service.

### **HOW LONG IS THE COVERAGE PERIOD?**

This warranty coverage runs for 12 months from the purchase date of your Raven Flow Control Product. This warranty coverage applies only to the original owner and is not transferrable.

### **HOW CAN YOU GET SERVICE?**

Bring the defective part, and proof of date of purchase, to your local dealer. If your dealer agrees with the warranty claim, he will send the part, and proof of purchase to his distributor or to Raven for final approval.

### **WHAT WILL RAVEN INDUSTRIES DO?**

When our inspection proves the warranty claim, we will, at our option, repair or replace the defective part and pay for return freight.

### **WHAT DOES THIS WARRANTY NOT COVER?**

Raven Industries will not assume any expense or liability for repairs made outside our plant without written consent. We are not responsible for damage to any associated equipment or product and will not be liable for loss of profit or other special damages. The obligation of this warranty is in lieu of all other warranties, expressed or implied, and no person is authorized to assume for us any liability. Damages caused by normal wear and tear, mis-use, abuse, neglect, accident, or improper installation and maintenance are not covered by this warranty.



**RAVEN INDUSTRIES FLOW CONTROL DIVISION**  
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Injection Pump Manual  
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