

# Instruction Manual

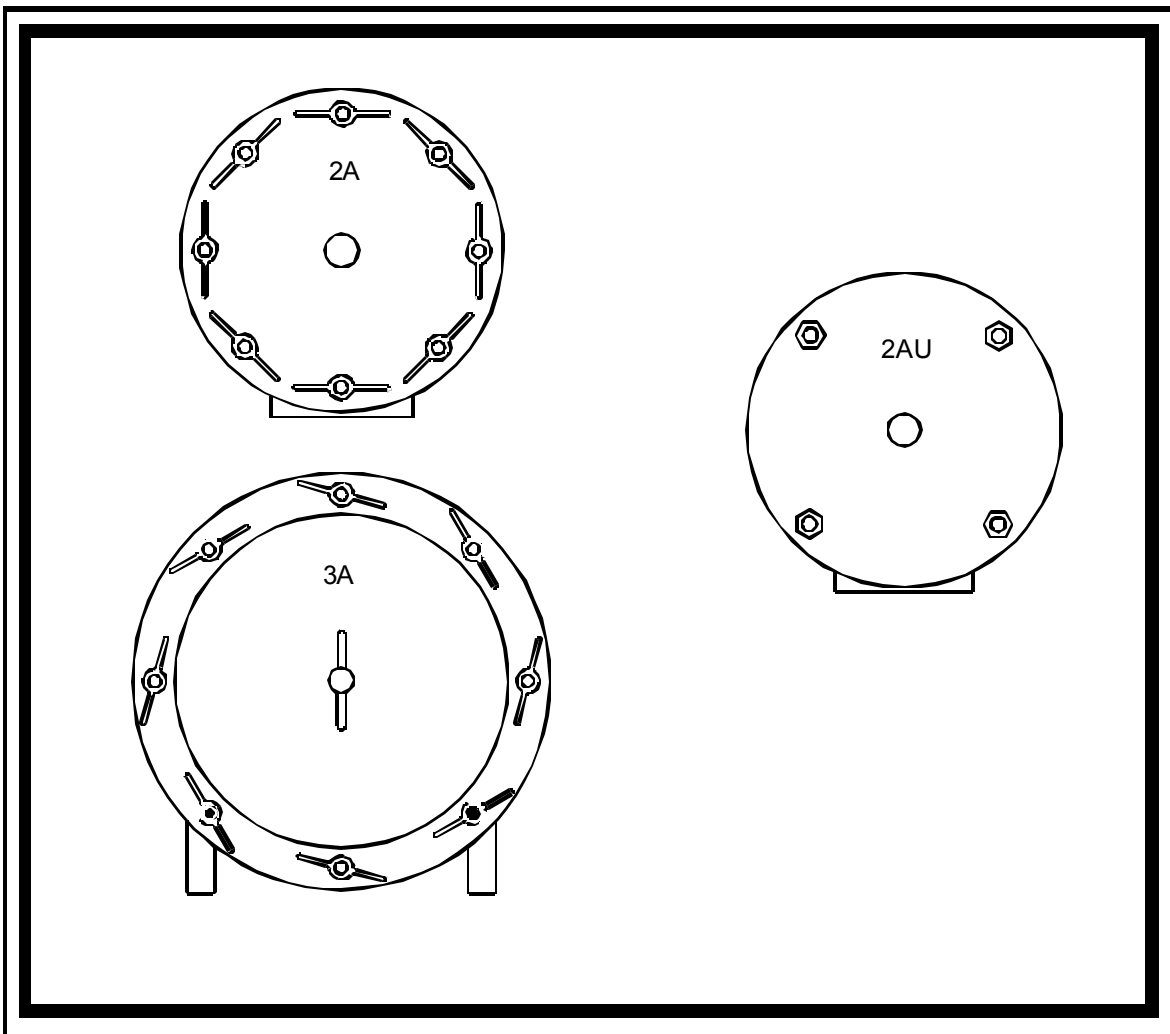


AndersonInstrumentCo.Inc..  
156AuriesvilleRoad  
Fultonville,NY12072  
1-800-833-0081  
Fax518-922-8997

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

InstrumentModelNumber \_\_\_\_\_

InstrumentSerialNumber \_\_\_\_\_



## RZ Positive Displacement Flowmeters



FormNumberAIC2038  
©June2004 Rev. 2/13

---

## Table of Contents

<b>1. Specifications .....</b>	<b>3</b>
<b>2. Introduction .....</b>	<b>5</b>
2.1 Description	
2.2 Theory of Operation	
2.3 Pressure Drop	
2.4 3 inch Pressure Drop Table	
2.5 2 inch Pressure Drop Table	
<b>3. Installation .....</b>	<b>8</b>
3.1 Installation Illustration	
<b>4. Electrical Wiring .....</b>	<b>9</b>
<b>5. Calibration .....</b>	<b>9</b>
<b>6. Maintenance .....</b>	<b>10</b>
6.1 Disassembly and Inspection	
6.2 RZ 2A Materials List	
6.3 RZ 2AU Materials List	
6.4 RZ 3A Materials List	
6.5 Piston Wear	
6.6 Example: Piston Wear	
6.7 Assembly	
<b>7. Troubleshooting .....</b>	<b>13</b>
7.1 Troubleshooting Guide	
7.2 Piston Damage	
<b>8. Warranty Statement .....</b>	<b>14</b>

# 1. SPECIFICATIONS

## Environmental Specifications

Power / Signal

Voltage: 12-24 VDC, 0.8 Watts

Signal Output: Unscaled, Pulsed Output

## Operational Specifications

Flow Range on Water: 20 - 120 GPM For RZ-2A / U

20 - 315 GPM For RZ-3A

Accuracy:  $\pm 0.15\%$  Over Entire Flow Range

Repeatability:  $\pm 0.05\%$

Maximum Product Temperature: 200°F / 93°C

Maximum Inlet Pressure: 85 psi/5.9 bar For RZ-2A / U

65 psi/4.5 bar For RZ-3A

Maximum Allowable Pressure Drop: 45 psi/ 3.1 bar

Material / Construction

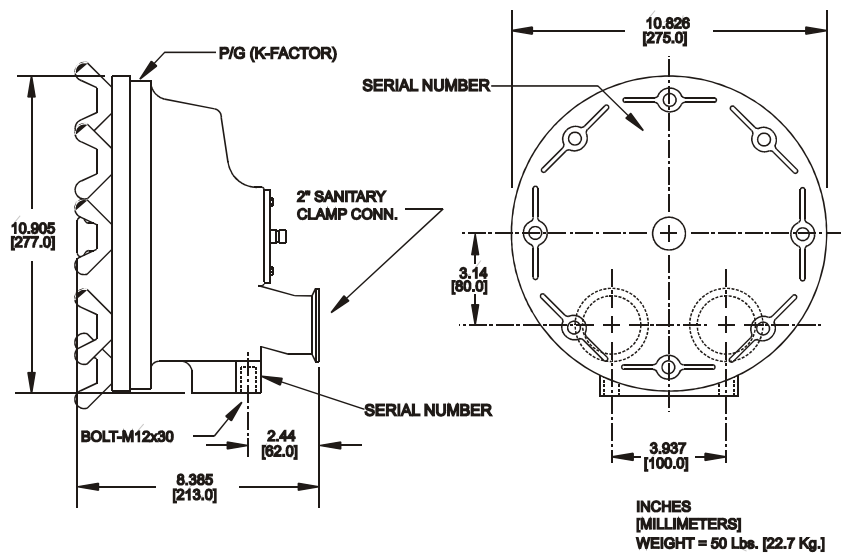
Housing: 316L Stainless Steel (Ra25  
or As Cast for the RZ-2AU)

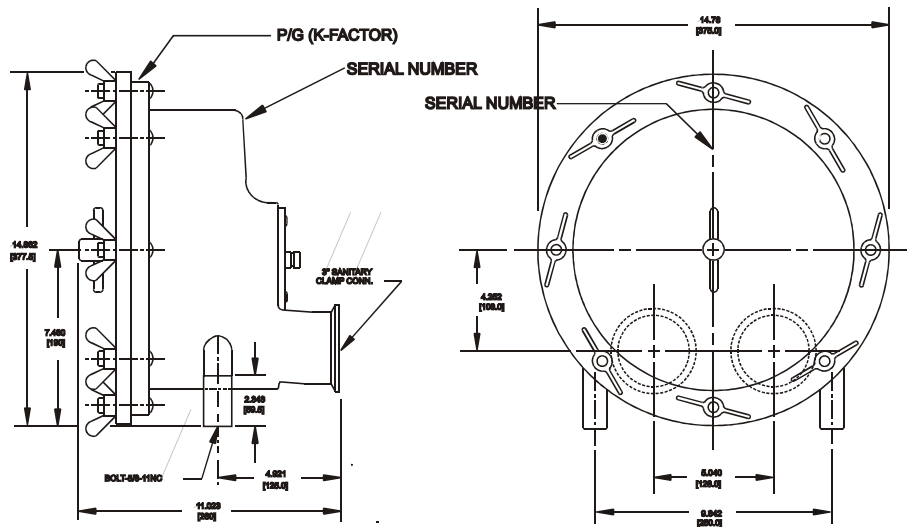
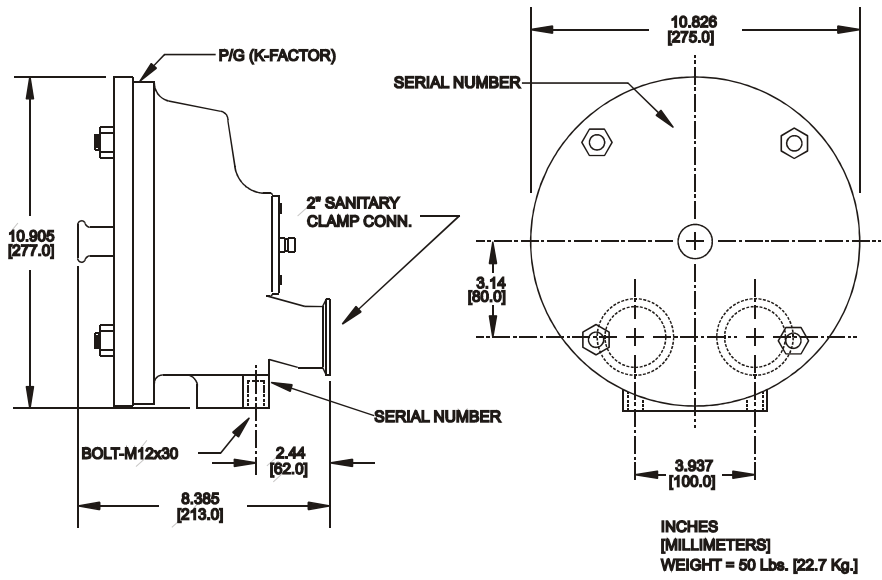
Piston: CIP-O-Plast (Food Grade Synthetic Polymer)

Wetted Parts: 316L Stainless Steel & CIP-O-Plast

Process Connection: 2" or 3" Tri-Clamp

Figure 1.1 Dimensions





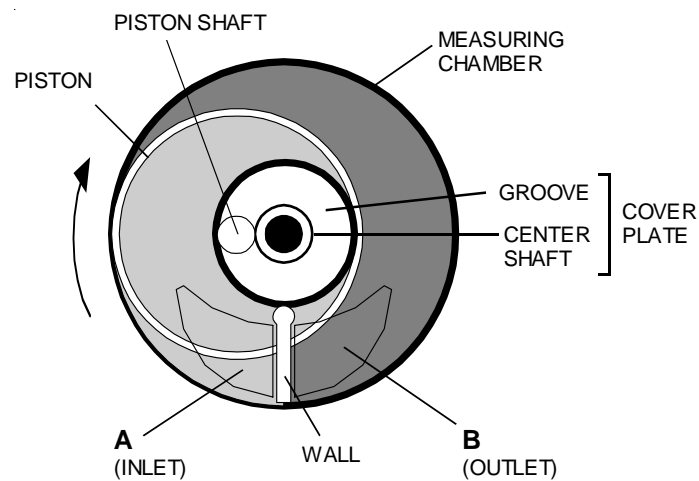
## 2. Introduction

### 2.1 Description

The RZ is a positive displacement flowmeter. When liquid flows through the measuring chamber, it causes the piston to rotate. Each rotation of the piston displaces a precise volume of liquid. An electronic transducer senses the piston rotation and outputs 12 digital pulses per rotation. This digital signal may feed instrumentation such as process controllers or totalizing indicators. The all stainless design meets the demands of damp or wet applications, and may be directly washed down during normal cleanup. Units are shipped factory calibrated with a pulse per gallon value labeled on the body.

Figure 2.2 Theory of Operation

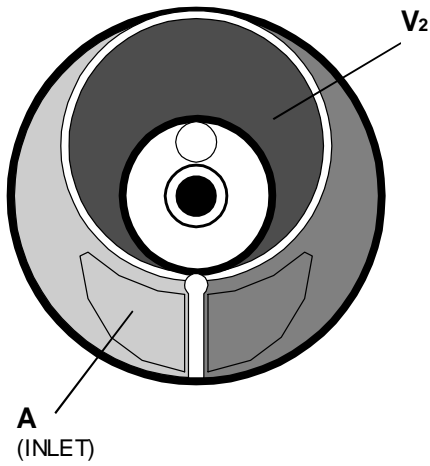
As fluid flows through the flowmeter, the rotary piston rotates in a groove around the center shaft of the Cover plate. The piston is also confined by a wall separating the inlet opening from outlet opening. The following diagrams show the rotation of the piston through one complete "cycle."



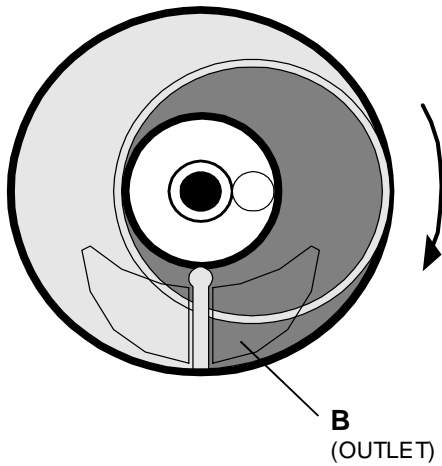
### Theory of Operation

#### Position 1

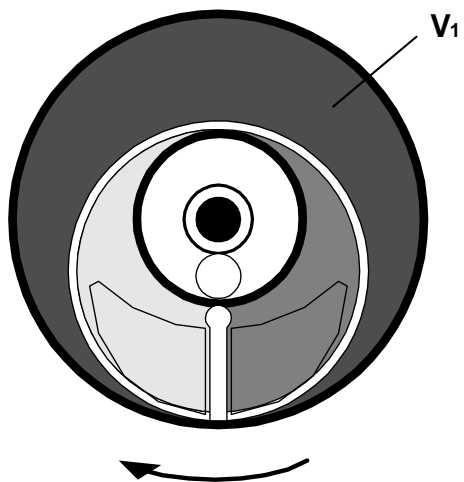
A higher-pressure condition (shaded light) occurs in the measuring chamber due to the incoming liquid, which drives the piston in the direction of the arrow.



Position 2  
*The inner "sickle" shaped space V2 is now completely sealed off. In the section above the inlet opening A, a higher-pressure condition remains and the piston continues rotating in the same direction.*



Position 3  
The piston continues rotating in the direction of the arrow, with the liquid now flowing through outlet opening B.



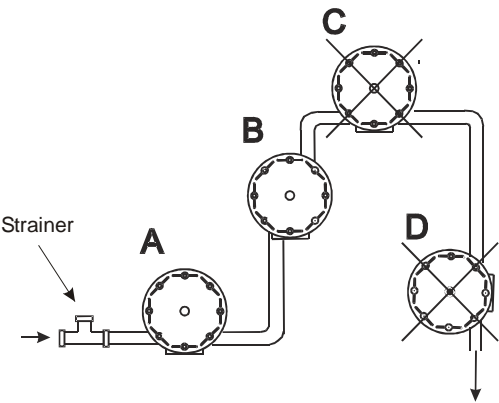
Position 4  
Now the outer "sickle" shaped space V1 is sealed off and the liquid flowing into the inner space turns the piston in the same direction



### 3. Installation

Mount the flow meter to a stationary bracket, using the mounting base (12mm bolts and lockwashers supplied). Locate the meter in the piping system such that it is always filled with fluid (see figure 3.2). Since the RZ flowmeter is bi-directional either port can function as the inlet and outlet with no effect on metering accuracy, also elbows, reducers, valves or other flow disturbing elements can be installed directly upstream or downstream of the flowmeter. It is not recommended that the flowmeter be installed before the pump or subject to a vacuum. Since the RZ is a precision positive displacement meter it needs protection from particles which may cause damage to the piston and internal chamber, an in-line strainer or filter is recommended to be installed upstream of the flowmeter. Prior to start-up, remove the piston from the meter, flush the entire piping system to remove all residue left from the installation and re-install the piston. During assembly be careful not to pinch the cover O-ring between the cover plate and the meter housing. Wetting the O-Ring will ease this assembly and lessen any chance of this occurring. Following assembly of the cover, hand tighten wingnuts uniformly at diametrically opposed points. In the case of the RZ2AU tighten the hex nuts to a torque of 25ft-lb

Figure 3.1 Installation Illustration

Guidelines	Installation Illustrations
<p><b>A</b> Install in a horizontal pipe section at a low point before a rising pipeline to ensure meter body remains full.</p>	
<p><b>B</b> Install in a vertical pipe section with an upward direction of flow to ensure meter body remains full</p>	
<p><b>C</b> Do not install in a horizontal pipe section located at the highest point of the pipeline. This location allows air to accumulate in the flow tube which causes measuring errors.</p>	
<p><b>D</b> Do not install in a vertical pipe section with a downward direction of flow. This location allows air to accumulate in the meter body which causes measuring errors</p>	



---

## 4. Electrical Wiring

Always route signal cables separate from AC power and AC control circuits, Signal cables must be shielded with the bare shield drain wire grounded on one end and floating on the other end. A 12VDC @ 50mA or 24VDC @ 70mA power source is required for operation of the RZ flowmeter. The RZ flowmeters are provided with a three conductor, foil shielded cable. Wiring codes are as follows:

RED = +12-24VDC  
WHITE = SIGNAL  
BLACK = COMMON  
SHIELD = GROUND

NOTE: If it becomes necessary to splice cable connections, be sure to properly solder or join wire connections. Loose connections have the ability to generate false counts.

---

## Section 5 Calibration

As indicated earlier, the probe in a RZ flowmeter outputs 12 pulses for every rotation of the piston, the amount of liquid which is displaced by the piston of a flowmeter is not exactly the same for every flowmeter due to very slight changes in meter dimensions. To account for these changes, each meter is flow tested at the factory and a very specific numeric value is determined which identifies the amount of pulses the meter will output per a fixed volume that passes through it. In the case of Anderson flow products, a gallon is the volume. This value is labeled on the meter body as a "P/G" pulses per gallon, which is also know as a "K-Factor". Pulsed output values are normally entered into digital converter as a divider value "K-Factor", or as a multiplier value known as a "Scale Factor". Either method converts the unscaled pulses of a flowmeter into the desired engineering unit of your choice, such as gallons, tenths of gallons, liters, etc.

### Calculations:

The pulse per gallon value is typically entered as labeled on the meter body when a K-Factor is required.

The Scale Factor for an RZ flowmeter is easily calculated by using this formula:

$$\text{Scale Factor} = \frac{1 \text{ (Unit of Measure)}}{\text{K Factor}}$$

## 6 Maintenance

The RZ flowmeter, if properly applied, should provide many years of trouble-free service.

### 6.1 Disassembly and Inspection

Verify that all line pressure is relieved and all valves are closed prior to removal of meter or components. Remove cover fasteners. CAREFULLY, remove cover plate; be sure the rotary piston does not fall out of the chamber. It may be necessary to lightly tap from the back side of the cover plate with a soft mallet for removal. Place all items on a clean flat area for inspection. The piston dividing wall should freely slide forward from the chamber( it may be necessary to rinse the chamber with hot water to aid in releasing the dividing wall). Remove fastening screws and remove signal probe. Visually inspect all components for indications of chamber and piston damage. Lodged foreign matter in the chamber and piston should be removed, and resulting burrs removed using fine abrasives. Verify the piston dividing wall is straight. Look for moisture on the signal probe and probe chamber.

Figure 6.2 RZ-2A Materials List

ITEM	PART NUMBER	QTY	DESCRIPTION
1	RZ32-3	1	COVER
2	SM388-02	8	12mm STUD
3	SM35-02	8	FLAT WASHER
4	RZ32-6	8	12mm WINGNUT
5	O-285	1	O-RING GASKET (BUNA)
6	RZ32-2	1	ROTARY PISTON
7	RZ32-4	1	DIVIDING WALL
8	RZ32-1	1	MEASURING CHAMBER
9	RZ32-08	1	PROBE GASKET
10	RZ32-02-24V	1	PICK-UP PROBE
11	N/A	3	M6 x 10 MTG. SCREW
12	CABLE-SW-25	1	* EXTENSION CABLE 25FT.
13	RZ32-13	2	12mm x 30 MOUNTING BOLT
14	RZ32-14	2	LOCK WASHER

\* CONSULT ANDERSON FOR OTHER LENGTHS

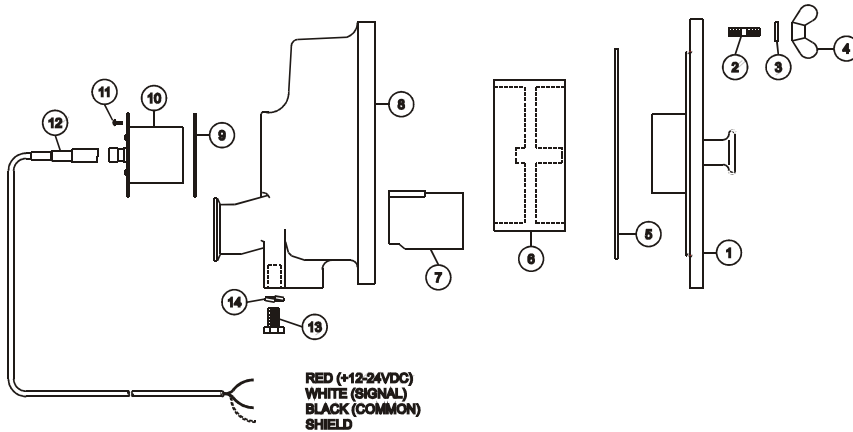


Figure 6.3 RZ-2AU Materials List

ITEM	PART NUMBER	QTY	DESCRIPTION
1	RZ32-3AU	1	COVER
2	SM365-02	4	12mm STUD
3	SM365-02	4	FLAT WASHER
4	RZ32-6U	4	12mm HEX NUT
5	O-285	1	O-RING GASKET (BUNA)
6	RZ32-2	1	ROTARY PISTON
7	RZ32-4	1	DIVIDING WALL

ITEM	PART NUMBER	QTY	DESCRIPTION
8	RZ32-1AU	1	MEASURING CHAMBER
9	RZ32-98	1	PROBE GASKET
10	RZ32-62-24V	1	PICK-UP PROBE
11	N/A	3	M6 x 10 MTG. SCREW
12	CABLE-3W-25	1	* EXTENSION CABLE 25FT.
13	RZ32-13	2	12mm MOUNTING BOLT
14	RZ32-14	2	LOCK WASHER

\* CONSULT ANDERSON FOR OTHER LENGTHS

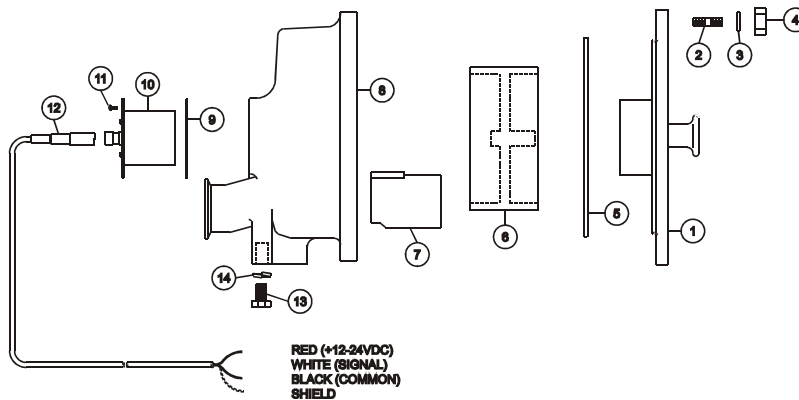
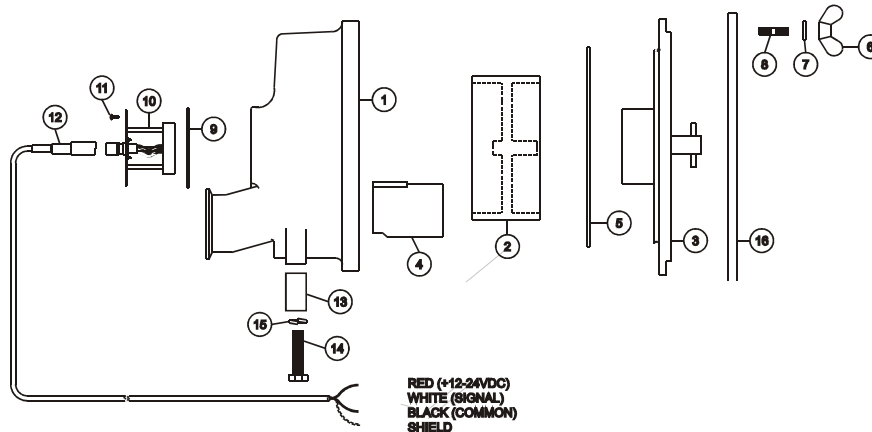


Figure 6.4 RZ-3A Materials List

ITEM	PART NUMBER	QTY	DESCRIPTION
1	RZ33-1	1	MEASURING CHAMBER
2	RZ33-2	1	ROTARY PISTON
3	RZ33-3	1	COVER
4	SM133-07	1	DIVIDING WALL
5	RZ33-5	1	O-RING GASKET (BUNA)
6	RZ32-6	6	12mm WINGNUT
7	SM365-02	6	FLAT WASHER
8	RZ33-8	6	12mm STUD

ITEM	PART NUMBER	QTY	DESCRIPTION
9	RZ33-98	1	PROBE GASKET
10	RZ33-62-24V	1	PICK-UP PROBE
11	N/A	3	M6 x 10 MOUNTING SCREW
12	CABLE-3W-25	1	* EXTENSION CABLE 25FT.
13	RZ33-13	2	LEG EXTENSION
14	RZ33-14	2	5/8-11 x 4" MTG. BOLT
15	RZ33-15	2	5/8" LOCK WASHER
16	RZ33-7	1	OUTER RING

\* CONSULT ANDERSON FOR OTHER LENGTHS



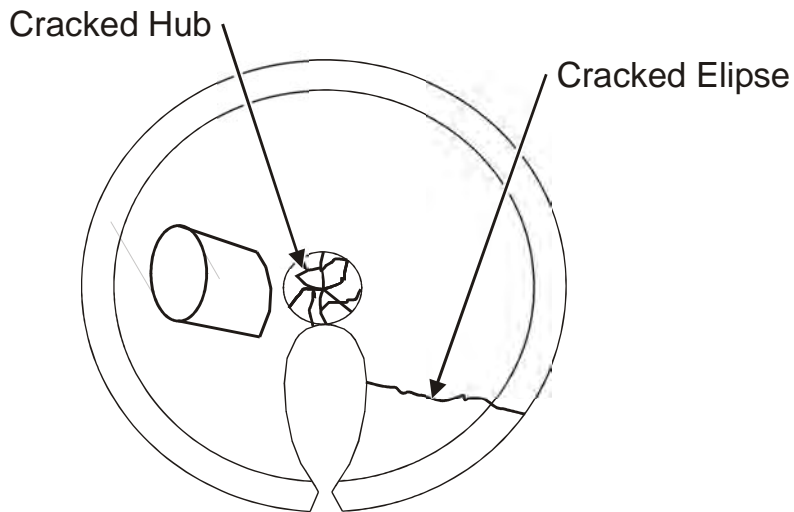
---

**6.5 Piston Wear**

Inspect piston center hub for flat spots (Figure 6.6). Center hub wear is often amplified from excessive flow rates. Inspect the entire piston for cracks or damage.

---

Figure 6.6 Piston Wear



---

**6.7 Assembly**

Insert dividing wall with cut-out end first. Align the piston and divider wall; place magnet side first into the chamber. Rotate the piston by hand and verify rotation free of binding. Be careful not to pinch the cover O-Ring Gasket when assembling meter cover plate. Wetting the O-Ring will lubricate it for assembly purposes. Tighten wing nuts uniformly at diametrically opposed points. Install signal probe with gasket.

## Section 7 Troubleshooting

Figure 7.1 Troubleshooting Guide

PROBLEM	CAUSE	ACTION
No output or erratic output	<ul style="list-style-type: none"> <li>Failed Probe (no output)</li> <li>Broken Piston Ellipse</li> <li>Broken Center Hub</li> <li>No power, bad connection</li> <li>Moisture and/or corrosion in probe-to extension cable connector</li> <li>Incorrect wiring</li> <li>Bad cable splice</li> <li>No scale factor entered</li> <li>Signal interface problem</li> </ul>	<ul style="list-style-type: none"> <li>Verify 12 PLS/REV, 6 for MPW</li> <li>Check for excessive pressure drop (Often the result of a bent divider wall) Figure 7.2</li> <li>Find source of foreign objects or solids (Can result from solidified product) Figure 7.2 Install Strainer</li> <li>Check fuses and power source to readout device</li> <li>Disconnect extension cable at probe for visual check, dry or clean if required</li> <li>Check manual for correct wiring configuration</li> <li>Check color code and continuity integrity</li> <li>Check readout device scale factor</li> <li>Check signal input specs of receiving device</li> </ul>
Poor accuracy/ repeatability	<ul style="list-style-type: none"> <li>Air in system</li> <li>Process flow rate out of meter flow range</li> <li>Poor meter installation</li> <li>Poor system hydraulics</li> <li>Incorrect scale factor</li> <li>Electrical noise</li> <li>Changing density, if reading in weight units</li> <li>Inaccurate proving standard</li> <li>Operating error – poor testing method</li> <li>Piston damaged</li> <li>Pinched cover gasket</li> </ul>	<ul style="list-style-type: none"> <li>Add air elimination device</li> <li>Check meter specs for flow range info (adjust flow rate or change-out meter)</li> <li>Locate meter in low spot (see install)</li> <li>Backflow? (Install check valve) Valve closing time?</li> <li>Check: scale factor, K factor and unit of measure</li> <li>Check: shielding, separate signal from AC wires</li> <li>Check: product weight, scale accuracy, control temp to stabilize density</li> <li>Verify accuracy of proving standard (vessel/scale)</li> <li>Observe test procedure</li> <li>Remove piston for visual check, install strainer</li> <li>Inspect gasket, look for leak at cover</li> </ul>

### 7.2 Piston Damage

#### Factory Assistance

Try to obtain the following information prior to contacting Anderson Instruments for technical assistance:

- Flowmeter model and serial number
- Model and serial number of peripheral electronics
- Product information (Product ID, viscosity, temperature and flow rate)
- Application (batching, blending totalizing, etc)

If problem concerns accuracy please confirm error amount, error plus or minus, repeatable or not, unit of measure, test standard and procedure being used

---

## **8. Warranty and Return Statement**

These products are sold by The Anderson Instrument Company (Anderson) under the warranties set forth in the following paragraphs. Such warranties are extended only with respect to a purchase of these products, as new merchandise, directly from Anderson or from an Anderson distributor, representative or reseller, and are extended only to the first buyer thereof who purchases them other than for the purpose of resale.

### ***Warranty***

These products are warranted to be free from functional defects in materials and workmanship at the time the products leave the Anderson factory and to conform at that time to the specifications set forth in the relevant Anderson instruction manual or manuals, sheet or sheets, for such products for a period of one year.

**THERE ARE NO EXPRESSED OR IMPLIED WARRANTIES WHICH EXTEND BEYOND THE WARRANTIES HEREIN AND ABOVE SET FORTH. ANDERSON MAKES NO WARRANTY OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE WITH RESPECT TO THE PRODUCTS.**

### ***Limitations***

Anderson shall not be liable for any incidental damages, consequential damages, special damages, or any other damages, costs or expenses excepting only the cost or expense of repair or replacement as described above.

Products must be installed and maintained in accordance with Anderson instructions. Users are responsible for the suitability of the products to their application. There is no warranty against damage resulting from corrosion, misapplication, improper specifications or other operating condition beyond our control. Claims against carriers for damage in transit must be filed by the buyer.

This warranty is void if the purchaser uses non-factory approved replacement parts and supplies or if the purchaser attempts to repair the product themselves or through a third party without Anderson authorization.

### ***Returns***

Anderson's sole and exclusive obligation and buyer's sole and exclusive remedy under the above warranty is limited to repairing or replacing (at Anderson's option), free of charge, the products which are reported in writing to Anderson at its main office indicated below.

Anderson is to be advised of return requests during normal business hours and such returns are to include a statement of the observed deficiency. The buyer shall pre-pay shipping charges for products returned and Anderson or its representative shall pay for the return of the products to the buyer.

Approved returns should be sent to:      ANDERSON INSTRUMENT COMPANY INC.  
156 AURIESVILLE ROAD  
FULTONVILLE, NY 12072 USA

ATT: REPAIR DEPARTMENT







