

# I N S T R U C T I O N S



## RITEFLOW® FLOWMETERS AND KITS

***BEL-ART - SP SCIENCEWARE***

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## BEL-ART RITEFLOW® FLOWMETERS AND KITS

### FLOWMETERS

#### 150mm

|             |                         |                   |       |        |
|-------------|-------------------------|-------------------|-------|--------|
| H40401-0035 | Riteflow® Flowmeter     | Plain Ends        | 150mm | Size 1 |
| H40403-0055 | Riteflow® Flowmeter     | Guarded, Complete | 150mm | Size 1 |
| H40401-0075 | Riteflow® Flowmeter     | Plain Ends        | 150mm | Size 2 |
| H40403-0095 | Riteflow® Flowmeter     | Guarded, Complete | 150mm | Size 2 |
| H40401-0125 | Riteflow® Flowmeter     | Plain Ends        | 150mm | Size 3 |
| H40403-0145 | Riteflow® Flowmeter     | Guarded, Complete | 150mm | Size 3 |
| H40401-0215 | Riteflow® Flowmeter     | Plain Ends        | 150mm | Size 4 |
| H40403-0235 | Riteflow® Flowmeter     | Guarded, Complete | 150mm | Size 4 |
| H40401-0305 | Riteflow® Flowmeter     | Plain Ends        | 150mm | Size 5 |
| H40403-0325 | Riteflow® Flowmeter     | Guarded, Complete | 150mm | Size 5 |
| H40409-0000 | Riteflow® Bench Mounted | Aluminum Kit      | 150mm |        |
| H40407-0035 | Riteflow® Bench Mounted | Aluminum          | 150mm | Size 1 |
| H40407-0075 | Riteflow® Bench Mounted | Aluminum          | 150mm | Size 2 |
| H40407-0125 | Riteflow® Bench Mounted | Aluminum          | 150mm | Size 3 |
| H40407-0215 | Riteflow® Bench Mounted | Aluminum          | 150mm | Size 4 |
| H40407-0305 | Riteflow® Bench Mounted | Aluminum          | 150mm | Size 5 |
| H40408-0000 | Riteflow® Bench Mounted | Teflon® Kit       | 150mm |        |
| H40405-0035 | Riteflow® Bench Mounted | Teflon®           | 150mm | Size 1 |
| H40405-0075 | Riteflow® Bench Mounted | Teflon®           | 150mm | Size 2 |
| H40405-0125 | Riteflow® Bench Mounted | Teflon®           | 150mm | Size 3 |
| H40405-0215 | Riteflow® Bench Mounted | Teflon®           | 150mm | Size 4 |
| H40405-0305 | Riteflow® Bench Mounted | Teflon®           | 150mm | Size 5 |

#### 65mm

|             |                                      |            |       |        |
|-------------|--------------------------------------|------------|-------|--------|
| H40400-0005 | Riteflow® Flowmeter                  | Plain Ends | 65mm  | Size 1 |
| H40400-0010 | Riteflow® Flowmeter                  | Plain Ends | 65mm  | Size 2 |
| H40400-0015 | Riteflow® Flowmeter                  | Plain Ends | 65mm  | Size 3 |
| H40400-0020 | Riteflow® Flowmeter                  | Plain Ends | 65mm  | Size 4 |
| H40400-0025 | Riteflow® Flowmeter                  | Plain Ends | 65mm  | Size 5 |
| H40400-0030 | Riteflow® Flowmeter                  | Plain Ends | 65mm  | Size 6 |
| H40406-0005 | Riteflow® Aluminum Frame             |            | 65mm  | Size 1 |
| H40406-0010 | Riteflow® Aluminum Frame             |            | 65mm  | Size 2 |
| H40406-0015 | Riteflow® Aluminum Frame             |            | 65mm  | Size 3 |
| H40406-0020 | Riteflow® Aluminum Frame             |            | 65mm  | Size 4 |
| H40406-0025 | Riteflow® Aluminum Frame             |            | 65mm  | Size 5 |
| H40406-0030 | Riteflow® Aluminum Frame             |            | 65mm  | Size 6 |
| H40404-0005 | Riteflow® Teflon® Frame              |            | 65mm  | Size 1 |
| H40404-0010 | Riteflow® Teflon® Frame              |            | 65mm, | Size 2 |
| H40404-0015 | Riteflow® Teflon® Frame              |            | 65mm  | Size 3 |
| H40404-0020 | Riteflow® Teflon® Frame              |            | 65mm  | Size 4 |
| H40404-0025 | Riteflow® Teflon® Frame              |            | 65mm  | Size 5 |
| H40404-0030 | Riteflow® Teflon® Frame              |            | 65mm  | Size 6 |
| H40402-0005 | Riteflow® Flowmeter Guarded Complete |            | 65mm  | Size 1 |
| H40402-0010 | Riteflow® Flowmeter Guarded Complete |            | 65mm  | Size 2 |
| H40402-0015 | Riteflow® Flowmeter Guarded Complete |            | 65mm  | Size 3 |
| H40402-0020 | Riteflow® Flowmeter Guarded Complete |            | 65mm  | Size 4 |
| H40402-0025 | Riteflow® Flowmeter Guarded Complete |            | 65mm  | Size 5 |
| H40402-0030 | Riteflow® Flowmeter Guarded Complete |            | 65mm  | Size 6 |

## BEL-ART RITEFLOW® FLOWMETERS

Bel-Art Flowmeters feature precision formed glass flowtubes and are available in three formats: Plain Ends which is a glass flowtube with floats and Teflon® end plugs; Guarded, which has a plastic safety guard over the flowtube; and Mounted, which has an anodized aluminum frame to hold the flowtube and facilitate mounting the unit on an instrument panel or use with a base, free-standing on a lab bench.

## PRINCIPLE OF OPERATION

Bel-Art Flowmeters are fabricated from heavy walled, shock resistant, borosilicate glass with permanently fused ceramic scales. Bores are uniformly tapered with internal rib guides. Floats are retained by Teflon® plugs. Useful metering ratios are 10:1 or better. Ratio can be increased to 20:1 by replacing the glass float with stainless steel float or Carboloy (heavy gauge steel) for size 5 (150mm), size 6 (65mm).

Flowmeters must be installed in a vertical position in the line carrying the gas or liquid to be measured. Gas or liquid enters through the opening at the bottom end, and exits through the opening at the top end. Upward pressure causes the float to rise. Flow takes place through the circular area between the float and the inside surface of the Flowmeter. As the float rises, the flow area increases, due to the tapered bore of the Flowmeter. Dynamic equilibrium results when the upward force, due to the air or liquid pressure, balances the weight of the float.

The vertical position of the float at equilibrium corresponds exclusively to one flow rate.

This flowrate is obtained by reading the scale etched on the flowtube calibration chart for the particular fluid.

Flow rates are determined by reading the scale graduation at the center of the spherical float. To increase the accuracy and reproduction of the metering a vertical locator line is incorporated into the geometry of the scale graduation.

## SPECIFICATIONS

### FLOWTUBES

Flowtubes are fabricated from heavy walled, shock resistant, borosilicate glass with permanently fused on ceramic scales. Bores are uniformly tapered with internal rib guides. Floats are retained by Teflon® plugs. Flow ranges are linear; low differential pressures are independent of flow rate changes.

### PLAIN ENDS

Maximum operating pressure: 200 PSIG

Maximum operating temperature: 250°F (121°C)

Materials that come in contact with fluids are:

Flowtubes: Borosilicate glass  
Floats: Glass (color: black) and Stainless Steel (color: metallic) with 150mm size 1,2,3,4, and 65mm size 1,2,3,4, & 5

Glass (color: black) and Carboly (color: metallic, magnetic) with 150mm size 5 and 65mm size 6

Float Stops: Teflon®

Dimensions:

Overall Length: 65mm scale = 80mm (3 3/16")  
150mm scale = 190mm (7 1/2")

| Size | 65mm Tube<br>Inlet/Outlet Inches | Inlet/Outlet<br>mm | 150mm Tube<br>Inlet/Outlet Inches | Inlet/Outlet<br>mm |
|------|----------------------------------|--------------------|-----------------------------------|--------------------|
| 1    | 3/8" / 3/8"                      | 8.5 / 8.5          | 3/8" / 3/8"                       | 8.5 / 8.5          |
| 2    | 3/8" / 3/8"                      | 8.5 / 8.5          | 3/8" / 3/8"                       | 8.5 / 8.5          |
| 3    | 3/8" / 3/8"                      | 8.5 / 8.5          | 3/8" / 3/8"                       | 8.5 / 8.5          |
| 4    | 3/8" / 3/8"                      | 8.5 / 8.5          | 1/2" / 1/2"                       | 12.7 / 12.7        |
| 5    | 31/64" / 15/32"                  | 12.3 / 11.9        | 1/2" / 9/16"                      | 12.7 / 14.3        |
| 6    | 9/16" / 1/2"                     | 14.3 / 12.7        | —                                 | —                  |

**GUARDED**

Maximum operating pressure: 200 PSIG

Maximum operating temperature: 150°F

Materials that come in contact with fluids are:

|               |                                                                                                                                                                                                               |
|---------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Flowtubes:    | Borosilicate glass                                                                                                                                                                                            |
| Floats:       | Glass (color: black) and Stainless Steel (color: metallic) with 150mm size 1,2,3,4, and 65mm size 1,2,3,4,5<br>Glass (color: black) and Carboly (color: metallic, magnetic) with 150mm size 5 and 65mm size 6 |
| NPT Fittings: | Viton-A, 316 Stainless Steel, Teflon®                                                                                                                                                                         |

Dimensions:

|                 |                                                          |
|-----------------|----------------------------------------------------------|
| Overall Length: | 65mm scale = 152mm (6")<br>150mm scale = 263mm (10 3/8") |
|-----------------|----------------------------------------------------------|

|               |          |          |
|---------------|----------|----------|
| End Bushings: | 65mm     | 150mm    |
| O.D.:         | 1/4" NPT | 1/4" NPT |
|               | 1"       | 1"       |

**MOUNTED FLOWMETER - TEFLON®**

Maximum operating pressure: 60 PSIG

Maximum operating temperature: 150°F

Materials that come in contact with fluids are:

|            |                                                                                                                                                                                                               |
|------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Flowtubes: | Borosilicate glass                                                                                                                                                                                            |
| Floats:    | Glass (color: black) and Stainless Steel (color: metallic) with 150mm size 1,2,3,4, and 65mm size 1,2,3,4,5<br>Glass (color: black) and Carboly (color: metallic, magnetic) with 150mm size 5 and 65mm size 6 |
| Valve:     | Teflon® and Kel F                                                                                                                                                                                             |
| Frame:     | Aluminum (black anodized)                                                                                                                                                                                     |

|                           |                                                    |         |
|---------------------------|----------------------------------------------------|---------|
| Dimensions:               | 65mm                                               | 150mm   |
| Height:                   | 6.156"                                             | 10.469" |
| Width:                    | 1.250"                                             | 1.250"  |
| Mounting Hole Dimensions  |                                                    |         |
| Center to Center:         | 5.031"                                             | 9.344"  |
| O.D.:                     | 0.575"                                             | 0.575"  |
| Inlet/Outlet Connections: | Compression glass fittings<br>for 3/8" I.D. tubing |         |

### **MOUNTED FLOWMETER - ALUMINUM**

Maximum operating pressure: 200 PSIG

Maximum operating temperature: 250°F

Materials that come in contact with fluids are:

Flowtubes: Borosilicate glass  
Floats: Glass (color: black) and Stainless Steel (color: metallic)  
with 150mm size 1,2,3,4, and 65mm size 1,2,3,4,5  
Glass (color: black) and Carboly (color: metallic, magnetic)  
with 150mm size 5 and 65mm size 6

Valve: Buna N, 316 Stainless Steel, and Delrin

Frame: Aluminum (black anodized)

|                                 |        |        |
|---------------------------------|--------|--------|
| Dimensions:                     | 65mm   | 150mm  |
| Height:                         | 5.5"   | 9.813" |
| Width:                          | 1.250" | 1.250" |
| <u>Mounting Hole Dimensions</u> |        |        |
| Center to Center:               | 4.5"   | 8.813" |
| O.D.:                           | 0.625" | 0.624" |

Inlet/Outlet Connections: 1/8" NPT polypropylene hose barbs fittings  
for 5/16" to 3/8" I.D. tubings. Can be removed  
for use of male 1/8" NPT fitting.

## OPERATION

Flow input should be connected to the bottom of the Flowmeter and output to the top. Insure that input and output tubings are securely connected; check specifications to determine maximum pressure ratings of each format (Plain End, Guarded or Mounted). For most accurate readings, flowtubes should be exactly vertical to prevent friction of floats on flowtube walls.

### BEFORE USE

#### 65 MM

Each 65mm Flowmeter is supplied with a glass float (color: black) inside the flowtube. An additional float is supplied in a vial on the side; stainless steel (color: metallic) for Sizes 1-5, Carbonyl (color: metallic, magnetic) for Size 6.

#### 150MM

Each 150mm Flowmeter is supplied with two floats in the tube. Flowmeters are more accurate when only one float is used, however two floats can be used with Size No.'s 2 to 5 if they are not too close to each other in the desired range of flow. Always place the heavier (metallic) float on the bottom and read the float that is closest to or above the middle of the scale. Size #1 can only be used with one float; one float must be removed before use.

See Cleaning and Changing Floats (Page 11) for proper float removal and handling.

### READING A FLOWRATE

To obtain accurate flow readings locate the center of the float and read the scale graduations as follows:

1. Position your head in front of the Flowmeter, with your eyes level with the float.
2. Move your head horizontally to the left until the contour of the float appears to just touch the locator line tangentially.
3. The intersection of the locator line with the horizontal graduation at the center of the float pinpoints the appropriate reading value.
4. The number on the scale corresponds to a flowrate for the given gas or liquid on the appropriate calibration chart.



Universal millimeter scales permit maximum utilization of a single Flowmeter for a variety of gases and liquids through the use of flow calibration curves and tables corrected for differences in specific gravity, pressure and temperature.

The contrasting background is designed to minimize eye fatigue associated with periods of repetitive readings.

Contact Bel-Art for flowcharts for fluids being metered.

### **PLAIN ENDS**

Flowtube should be mounted vertically on a ring stand or other appropriate support. Input tubing should be connected to the bottom, output tubing to the top.

### **GUARDED**

Guarded Flowmeters utilize a 1/8" wall C.A.B. plastic cylinder to shield the Flowmeter, offering protection against possible flowtube breakage when being operated under higher pressures (up to 200 max p.s.i.). The Guarded Flowmeter should be mounted vertically on a ring stand or other appropriate support and input tubing should be connected to the bottom 1/4" NPT stainless steel fitting, output tubing to the top one.

### **MOUNTED**

Mounted Flowmeters are designed to enable mounting on an instrument panel or use while standing on a bench (when mounted on the levelling base). They are available in Aluminum or Teflon® models in both 65mm and 150mm sizes for different chemical resistance needs. See "Specifications" (pages 5 and 6) for complete materials listing. The flowtubes are installed in an anodized aluminum frame which has a convenient precision needle valve for regulating the flow through the flowtube. In addition, the frame features an exclusive tubelock design, which facilitates simple installation and replacement of tubes in frame by preventing them from turning while being tightened during assembly.

For use on a bench, use the Levelling Base (cat. no. 94040-9000). This base contains a level which allows adjustment of the Flowmeter to an exactly vertical position, which enhances accuracy by eliminating friction between the float and the flowtube.

The Aluminum model has 1/8" polypropylene hose barb fittings which accept input/output tubing from 5/16" to 3/8" i.d. The Teflon® model has 3/8" o.d. straight glass connectors for input/output tubing. Input should be connected to the bottom; output tubing to the top.

Mounted Flowmeters are available in Teflon® or Aluminum models in both 65mm and 150mm sizes.

## FLOWMETER KITS

Kits are designed to allow the use of the entire Riteflow® line of 150mm Flowmeters on one stand for a wide range of flow measuring capability.

Mounted Aluminum 150mm Flowmeter Kits (H40409-0000) include an aluminum frame, an acrylic leveling base, large orifice for high flowrate measurements, 4 flowtubes (Size No. 1,2,3 and 5), 8 floats (2 in each of the flowtubes), top and bottom Viton gaskets for all Flowmeters, two support brackets, two mounting rods, two rod clamps, 5 vials for float storage and a Flowmeter cleaning kit (94040-9026).

Mounted Teflon® 150mm Flowmeter Kits (H40408-0000) include a Teflon frame, an acrylic leveling base, 4 flowtubes (Size No. 1,2,3 and 4), 9 floats (2 in each of the flowtubes and 1/4" dia. Carboloy in a vial), two support brackets, two mounting rods, two rod clamps, 5 vials for float storage and a Flowmeter cleaning kit (94040-9026).

## DISASSEMBLY AND ASSEMBLY

Each Guarded and Mounted Flowmeter contains a flowtube, which can be removed or replaced using the following procedure (See Figure 1).

### GUARDED FLOWMETER:

1. Unscrew two end bushings.
2. Remove flowtube from plastic guard.
3. Reassemble in the following order:
  - a. Insert top rubber gasket (P) in upper bushing (M).
  - b. Screw plastic tube (N) on upper bushing.
  - c. Insert flowtube (B) into plastic tube until top of Flowmeter seats against rubber gasket.
  - d. Insert rubber gasket (P) into lower bushing (M).
  - e. Screw lower bushing (M) into plastic tube until lower end of the Flowmeter seats against rubber gaskets.
  - f. Plastic tube will almost completely cover the thread on bushings and provide a tight seal against the inner rubber gasket.

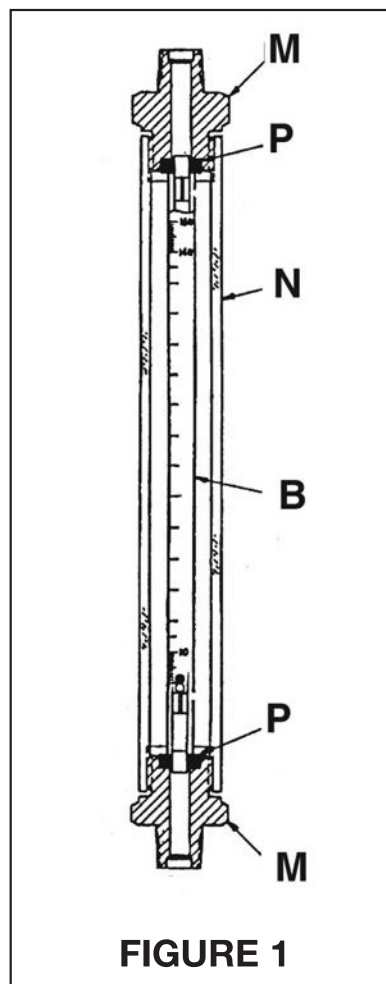
g. Meter may be directly piped into a system, or hose ends may be used for connection with rubber tubing. For quick disconnect, use Bel-Art's Stat-O-Lok™ system (19723-0802/0202, 19724-0804/0204)

#### **MOUNTED FLOWMETER:**

1. Remove front panel by unscrewing four socket head screws.
2. Remove back panel by unscrewing the two large nuts. These nuts also hold the support brackets against the back panel, and these brackets will also have to be removed. If Flowmeter is panel mounted, this step can be omitted.
3. Turn knurled nut on top counter-clockwise as far as it will go. If it sticks, a pin may be inserted in the hole in the nut to start it.
4. Push flowtube up and swing it out bottom first.
5. To reassemble, reverse the above order. Be sure the scale is facing out.

#### **MOUNTED FLOWMETER: (ALUMINUM MODELS)**

1. Remove front panel by unscrewing four socket head screws.
2. Remove back panel by unscrewing the two large nuts. These nuts also hold the support brackets against the back panel, and these brackets will also have to be removed. If Flowmeter is panel mounted, this step can be omitted.
3. Insert a 5/32" hex wrench into the pressure nut at the top of the flowmeter. While holding the flowtube between your thumb and forefinger, turn the wrench, counter clockwise to release the flowtube. Carefully remove the flowtube so as not to damage it.
4. To reassemble, reverse the above order. Be sure the scale is facing out.



**FIGURE 1**

#### **GASKETS**

Note that Viton gaskets are provided at the end of the Flowmeter in Guarded and Aluminum bench mounted Flowmeter assemblies.

Always use the gasket with the largest diameter tubing that will fit into the Flowmeter. The tubing will center the Flowmeter in the guard.

## CLEANING AND CHANGING FLOATS

See below for details on Bel-Art's Flowmeter Cleaning Kit (94040-9026).

For thorough cleaning, floats and float stops should be removed using the following procedures:

For Size Nos. 1, 2 and 3, push bottom float stop upward using the small diameter rod provided. Push until both stops and floats pop out at the top. Be careful not to scratch inside of flowtube.

For Size Nos. 4 and 5, pull float stops out from each end by using the wire hooks provided. Insert one prong through tube past float stop, hook end on far side of stop and pull.

Clean flowtubes using a thin stiff brush with mild laboratory detergent such as Bel-Art's Aquet® (Catalog No. F17094-0030). More stubborn stains can be removed from glass parts only by using Chromerge® (F17089-0000), Bel-Art's chromic-sulfuric acid concentrate. Rinse and dry flowtube by blowing clean dry air or Bel-Art's Blow Hard®, O.S. extra (F17080-0100) through it.

Do not handle floats as that may deposit a film that could cause sticking. Observe the following procedures:

1. Dump floats from flowtube into a plastic cup or on a lint-free surface.
2. Using tweezers, dip each float into a cleaning solution. Never touch floats with your hand.
3. Dip float into an anti-static agent.
4. Remove and dry using clean dry air. Do not breathe on floats, as moisture impairs the clean surface.
5. Replace floats in flowtubes or into their container.

## FLOWMETER CLEANING KIT

Bel-Art's Flowmeter cleaning kit (94040-9026) contains the following:

|             |                            |
|-------------|----------------------------|
| 94040-9013  | Cleaning solution, 1/2 oz. |
| 94040-9015  | Anti-Static agent, 1/2 oz. |
| F17080-0100 | Blow Hard® o.s. extra      |
| 94040-9017  | Stiff Brush                |
| 94040-9016  | Tweezers                   |
| 94040-9003  | Push Rod Long              |
| 94040-9001  | Rod, Push                  |

## FLOAT INFORMATION, 65MM MODELS

| SIZE | FLOATS SUPPLIED                 |
|------|---------------------------------|
| 1    | 1/8" Glass and Stainless Steel  |
| 2    | 1/8" Glass and Stainless Steel  |
| 3    | 1/8" Glass and Stainless Steel  |
| 4    | 3/16" Glass and Stainless Steel |
| 5    | 1/4" Glass and Stainless Steel  |
| 6    | 1/4" Glass and Carboloy         |

## FLOAT INFORMATION, 150MM MODELS

| SIZE | FLOATS SUPPLIED                |
|------|--------------------------------|
| 1    | 1/8" Glass and Stainless Steel |
| 2    | 1/8" Glass and Stainless Steel |
| 3    | 1/8" Glass and Stainless Steel |
| 4    | 1/4" Glass and Stainless Steel |
| 5    | 1/4" Glass and Carboloy        |

## TO ORDER ADDITIONAL FLOATS

| PART NO.   | DESCRIPTION                                     |
|------------|-------------------------------------------------|
| 94040-1037 | 1/8" Stainless Steel Float (color: metallic)    |
| 94040-1126 | 1/4" Glass Float (color: black)                 |
| 94040-1127 | 1/4" Stainless Steel Float                      |
| 94040-1039 | 1/8" Glass Float                                |
| 94040-8001 | 1/4" Carboloy Float (color: metallic, magnetic) |
| 94040-1036 | 1/8" Sapphire Float, (color: red)               |
| 94040-1040 | 1/8" Carboloy Float                             |
| 94040-8002 | 1/4" Sapphire Float                             |

Other sizes and type floats are available under special order.

| Reading<br>at<br>center<br>of the<br>ball | Size No. 1                                                                                                                                                                                                                   |                                                                                                                                                                                                           | Size No. 2                                                                                                                                                                             |                                                                                                                                                                     | Size No. 3                                                                                                                                       |                                                                                                                               | Size No. 4                                                                                                 |                                                                                         | Size No. 5                                                           |                                                   | Size No. 6                     |            |
|-------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------|----------------------------------------------------------------------|---------------------------------------------------|--------------------------------|------------|
|                                           | 40400-0005                                                                                                                                                                                                                   | 40406-0005                                                                                                                                                                                                | 40400-0010                                                                                                                                                                             | 40406-0010                                                                                                                                                          | 40400-0015                                                                                                                                       | 40406-0015                                                                                                                    | 40400-0020                                                                                                 | 40406-0020                                                                              | 40400-0025                                                           | 40406-0025                                        | 40400-0030                     | 40406-0030 |
|                                           | 40404-0005 <td>40404-0005<td>40404-0010<td>40404-0010<td>40404-0015<td>40404-0015<td>40404-0020<td>40404-0020<td>40404-0025<td>40404-0025<td>40404-0030<td>40404-0030</td></td></td></td></td></td></td></td></td></td></td> | 40404-0005 <td>40404-0010<td>40404-0010<td>40404-0015<td>40404-0015<td>40404-0020<td>40404-0020<td>40404-0025<td>40404-0025<td>40404-0030<td>40404-0030</td></td></td></td></td></td></td></td></td></td> | 40404-0010 <td>40404-0010<td>40404-0015<td>40404-0015<td>40404-0020<td>40404-0020<td>40404-0025<td>40404-0025<td>40404-0030<td>40404-0030</td></td></td></td></td></td></td></td></td> | 40404-0010 <td>40404-0015<td>40404-0015<td>40404-0020<td>40404-0020<td>40404-0025<td>40404-0025<td>40404-0030<td>40404-0030</td></td></td></td></td></td></td></td> | 40404-0015 <td>40404-0015<td>40404-0020<td>40404-0020<td>40404-0025<td>40404-0025<td>40404-0030<td>40404-0030</td></td></td></td></td></td></td> | 40404-0015 <td>40404-0020<td>40404-0020<td>40404-0025<td>40404-0025<td>40404-0030<td>40404-0030</td></td></td></td></td></td> | 40404-0020 <td>40404-0020<td>40404-0025<td>40404-0025<td>40404-0030<td>40404-0030</td></td></td></td></td> | 40404-0020 <td>40404-0025<td>40404-0025<td>40404-0030<td>40404-0030</td></td></td></td> | 40404-0025 <td>40404-0025<td>40404-0030<td>40404-0030</td></td></td> | 40404-0025 <td>40404-0030<td>40404-0030</td></td> | 40404-0030 <td>40404-0030</td> | 40404-0030 |
|                                           | 40402-0005                                                                                                                                                                                                                   |                                                                                                                                                                                                           | 40402-0010                                                                                                                                                                             |                                                                                                                                                                     | 40402-0015                                                                                                                                       |                                                                                                                               | 40402-0020                                                                                                 |                                                                                         | 40402-0025                                                           |                                                   | 40402-0030                     |            |
|                                           | Glass                                                                                                                                                                                                                        | Stainless                                                                                                                                                                                                 | Glass                                                                                                                                                                                  | Stainless                                                                                                                                                           | Glass                                                                                                                                            | Stainless                                                                                                                     | Glass                                                                                                      | Stainless                                                                               | Glass                                                                | Stainless                                         | Glass                          | Carbonyl   |
| 65                                        | 5.77                                                                                                                                                                                                                         | 16.77                                                                                                                                                                                                     | 48.70                                                                                                                                                                                  | 145.00                                                                                                                                                              | 202.10                                                                                                                                           | 522.00                                                                                                                        | 1,249.00                                                                                                   | 2,520.00                                                                                | 6,318.01                                                             | 12,058.16                                         | 22,574.92                      | 56,500.00  |
| 60                                        | 5.16                                                                                                                                                                                                                         | 14.82                                                                                                                                                                                                     | 43.60                                                                                                                                                                                  | 129.10                                                                                                                                                              | 181.20                                                                                                                                           | 474.00                                                                                                                        | 1,140.00                                                                                                   | 2,339.00                                                                                | 5,940.28                                                             | 11,429.93                                         | 21,085.50                      | 54,300.00  |
| 55                                        | 4.61                                                                                                                                                                                                                         | 13.15                                                                                                                                                                                                     | 37.10                                                                                                                                                                                  | 113.40                                                                                                                                                              | 159.80                                                                                                                                           | 423.00                                                                                                                        | 1,025.00                                                                                                   | 2,140.00                                                                                | 5,552.99                                                             | 10,627.67                                         | 19,116.10                      | 49,900.00  |
| 50                                        | 4.08                                                                                                                                                                                                                         | 11.70                                                                                                                                                                                                     | 31.60                                                                                                                                                                                  | 97.20                                                                                                                                                               | 139.80                                                                                                                                           | 383.00                                                                                                                        | 902.00                                                                                                     | 1,945.00                                                                                | 5,123.61                                                             | 9,854.41                                          | 17,175.60                      | 45,400.00  |
| 45                                        | 3.58                                                                                                                                                                                                                         | 10.20                                                                                                                                                                                                     | 26.30                                                                                                                                                                                  | 82.50                                                                                                                                                               | 117.90                                                                                                                                           | 334.00                                                                                                                        | 785.00                                                                                                     | 1,747.00                                                                                | 4,718.20                                                             | 9,083.36                                          | 15,657.97                      | 40,900.00  |
| 40                                        | 3.18                                                                                                                                                                                                                         | 9.00                                                                                                                                                                                                      | 21.40                                                                                                                                                                                  | 67.00                                                                                                                                                               | 97.50                                                                                                                                            | 287.00                                                                                                                        | 675.00                                                                                                     | 1,540.00                                                                                | 4,298.72                                                             | 8,323.04                                          | 13,927.77                      | 35,900.00  |
| 35                                        | 2.79                                                                                                                                                                                                                         | 7.75                                                                                                                                                                                                      | 18.00                                                                                                                                                                                  | 55.20                                                                                                                                                               | 79.00                                                                                                                                            | 241.60                                                                                                                        | 550.00                                                                                                     | 1,320.00                                                                                | 3,854.23                                                             | 7,487.53                                          | 12,000.46                      | 31,100.00  |
| 30                                        | 2.37                                                                                                                                                                                                                         | 6.53                                                                                                                                                                                                      | 14.70                                                                                                                                                                                  | 45.20                                                                                                                                                               | 63.20                                                                                                                                            | 198.00                                                                                                                        | 440.00                                                                                                     | 1,096.00                                                                                | 3,393.69                                                             | 6,603.74                                          | 10,052.57                      | 26,200.00  |
| 25                                        | 1.94                                                                                                                                                                                                                         | 5.37                                                                                                                                                                                                      | 11.70                                                                                                                                                                                  | 36.00                                                                                                                                                               | 49.80                                                                                                                                            | 158.00                                                                                                                        | 310.00                                                                                                     | 854.00                                                                                  | 2,922.54                                                             | 5,716.80                                          | 8,124.28                       | 22,237.00  |
| 20                                        | 1.64                                                                                                                                                                                                                         | 4.25                                                                                                                                                                                                      | 8.60                                                                                                                                                                                   | 27.20                                                                                                                                                               | 38.60                                                                                                                                            | 125.00                                                                                                                        | 215.00                                                                                                     | 610.00                                                                                  | 2,433.65                                                             | 4,856.00                                          | 6,790.97                       | 18,004.00  |
| 15                                        | 1.25                                                                                                                                                                                                                         | 3.20                                                                                                                                                                                                      | 6.10                                                                                                                                                                                   | 18.90                                                                                                                                                               | 28.30                                                                                                                                            | 94.00                                                                                                                         | 120.00                                                                                                     | 370.00                                                                                  | 1,938.11                                                             | 3,928.76                                          | 4,972.22                       | 14,031.00  |
| 10                                        | 0.95                                                                                                                                                                                                                         | 2.28                                                                                                                                                                                                      | 4.00                                                                                                                                                                                   | 12.30                                                                                                                                                               | 20.00                                                                                                                                            | 61.00                                                                                                                         | 70.00                                                                                                      | 165.00                                                                                  | 1,423.40                                                             | 2,977.83                                          | 3,443.03                       | 9,900.00   |
| 5                                         | 0.75                                                                                                                                                                                                                         | 1.40                                                                                                                                                                                                      | 2.80                                                                                                                                                                                   | 8.10                                                                                                                                                                | 13.10                                                                                                                                            | 45.00                                                                                                                         | 28.00                                                                                                      | 90.00                                                                                   | 853.82                                                               | 1,973.16                                          | 1,991.52                       | 6,082.00   |
| 65                                        | 0.07                                                                                                                                                                                                                         | 0.28                                                                                                                                                                                                      | 0.55                                                                                                                                                                                   | 2.38                                                                                                                                                                | 2.64                                                                                                                                             | 12.01                                                                                                                         | 26.97                                                                                                      | 70.67                                                                                   | 147.00                                                               | 364.00                                            | 521.74                         | 1,866.25   |
| 60                                        | 0.06                                                                                                                                                                                                                         | 0.26                                                                                                                                                                                                      | 0.49                                                                                                                                                                                   | 2.10                                                                                                                                                                | 2.33                                                                                                                                             | 10.88                                                                                                                         | 22.93                                                                                                      | 63.29                                                                                   | 137.00                                                               | 341.00                                            | 492.61                         | 1,728.00   |
| 55                                        | 0.05                                                                                                                                                                                                                         | 0.23                                                                                                                                                                                                      | 0.43                                                                                                                                                                                   | 1.82                                                                                                                                                                | 2.02                                                                                                                                             | 9.57                                                                                                                          | 19.18                                                                                                      | 57.58                                                                                   | 128.00                                                               | 315.00                                            | 451.13                         | 1,584.16   |
| 50                                        | 0.05                                                                                                                                                                                                                         | 0.20                                                                                                                                                                                                      | 0.37                                                                                                                                                                                   | 1.59                                                                                                                                                                | 1.74                                                                                                                                             | 8.28                                                                                                                          | 15.74                                                                                                      | 51.28                                                                                   | 116.00                                                               | 294.00                                            | 408.86                         | 1,428.57   |
| 45                                        | 0.04                                                                                                                                                                                                                         | 0.17                                                                                                                                                                                                      | 0.32                                                                                                                                                                                   | 1.34                                                                                                                                                                | 1.48                                                                                                                                             | 7.04                                                                                                                          | 11.02                                                                                                      | 44.71                                                                                   | 104.00                                                               | 267.00                                            | 367.53                         | 1,287.13   |
| 40                                        | 0.04                                                                                                                                                                                                                         | 0.14                                                                                                                                                                                                      | 0.27                                                                                                                                                                                   | 1.16                                                                                                                                                                | 1.22                                                                                                                                             | 5.84                                                                                                                          | 8.58                                                                                                       | 37.95                                                                                   | 94.00                                                                | 242.00                                            | 327.10                         | 1,107.69   |
| 35                                        | 0.03                                                                                                                                                                                                                         | 0.11                                                                                                                                                                                                      | 0.22                                                                                                                                                                                   | 0.91                                                                                                                                                                | 1.00                                                                                                                                             | 4.70                                                                                                                          | 6.81                                                                                                       | 31.60                                                                                   | 85.00                                                                | 222.00                                            | 283.91                         | 986.84     |
| 30                                        | 0.03                                                                                                                                                                                                                         | 0.08                                                                                                                                                                                                      | 0.17                                                                                                                                                                                   | 0.73                                                                                                                                                                | 0.80                                                                                                                                             | 3.74                                                                                                                          | 5.37                                                                                                       | 23.33                                                                                   | 70.00                                                                | 190.00                                            | 240.00                         | 829.49     |
| 25                                        | 0.02                                                                                                                                                                                                                         | 0.06                                                                                                                                                                                                      | 0.13                                                                                                                                                                                   | 0.56                                                                                                                                                                | 0.63                                                                                                                                             | 2.89                                                                                                                          | 4.27                                                                                                       | 13.54                                                                                   | 62.00                                                                | 162.00                                            | 197.69                         | 693.07     |
| 20                                        | 0.02                                                                                                                                                                                                                         | 0.05                                                                                                                                                                                                      | 0.10                                                                                                                                                                                   | 0.40                                                                                                                                                                | 0.50                                                                                                                                             | 2.21                                                                                                                          | 3.43                                                                                                       | 9.74                                                                                    | 45.00                                                                | 133.00                                            | 155.71                         | 582.52     |
| 15                                        | 0.02                                                                                                                                                                                                                         | 0.04                                                                                                                                                                                                      | 0.06                                                                                                                                                                                   | 0.30                                                                                                                                                                | 0.38                                                                                                                                             | 1.65                                                                                                                          | 2.78                                                                                                       | 7.50                                                                                    | 33.00                                                                | 104.00                                            | 115.61                         | 435.48     |
| 10                                        | 0.01                                                                                                                                                                                                                         | 0.03                                                                                                                                                                                                      | 0.04                                                                                                                                                                                   | 0.20                                                                                                                                                                | 0.27                                                                                                                                             | 1.14                                                                                                                          | 1.49                                                                                                       |                                                                                         |                                                                      |                                                   |                                |            |

# PREDICTABILITY FLOW TABLE FOR AIR & WATER FOR 150MM FLOWMETERS

| Reading at center of the ball | Size No. 1<br>40401-0035<br>40403-0055<br>40407-0035<br>40405-0035 |          |           | Size No. 2<br>40401-0075<br>40403-0095<br>40407-0075<br>40405-0075 |          |           | Size No. 3<br>40401-0125<br>40403-0145<br>40407-0125<br>40405-0125 |          |           | Size No. 4<br>40401-0215<br>40403-0235<br>40407-0215<br>40405-0215 |           |         | Size No. 5<br>40401-0305<br>40403-0325<br>40407-0305<br>40405-0305 |           |         |
|-------------------------------|--------------------------------------------------------------------|----------|-----------|--------------------------------------------------------------------|----------|-----------|--------------------------------------------------------------------|----------|-----------|--------------------------------------------------------------------|-----------|---------|--------------------------------------------------------------------|-----------|---------|
|                               | Glass                                                              | Sapphire | Stainless | Glass                                                              | Sapphire | Stainless | Glass                                                              | Sapphire | Stainless | Glass                                                              | Stainless | Carboly | Glass                                                              | Stainless | Carboly |
| 150                           | 25.66                                                              | 36.90    | 75.50     | 375.0                                                              | 522.45   | 827.0     | 2,313                                                              | 3,079    | 4,562     | 9,229                                                              | 17,430    | 24,442  | 23,121                                                             | 42,650    | 61,161  |
| 140                           | 23.00                                                              | 32.90    | 67.30     | 345.0                                                              | 483.80   | 773.0     | 2,170                                                              | 2,874    | 4,295     | 8,625                                                              | 16,287    | 22,871  | 21,556                                                             | 40,023    | 57,235  |
| 130                           | 20.35                                                              | 29.10    | 59.30     | 317.0                                                              | 446.93   | 719.0     | 2,050                                                              | 2,690    | 4,040     | 8,014                                                              | 15,194    | 21,354  | 19,908                                                             | 37,175    | 52,788  |
| 120                           | 17.95                                                              | 25.50    | 52.50     | 286.0                                                              | 410.12   | 666.0     | 1,932                                                              | 2,510    | 3,780     | 7,344                                                              | 14,057    | 19,769  | 18,403                                                             | 34,477    | 48,527  |
| 110                           | 15.30                                                              | 22.00    | 46.00     | 257.0                                                              | 370.53   | 612.0     | 1,807                                                              | 2,340    | 3,520     | 6,680                                                              | 12,944    | 18,242  | 16,752                                                             | 31,446    | 43,998  |
| 100                           | 13.05                                                              | 18.90    | 40.00     | 225.0                                                              | 330.62   | 556.0     | 1,674                                                              | 2,165    | 3,256     | 6,051                                                              | 11,814    | 16,704  | 15,149                                                             | 28,522    | 39,659  |
| 90                            | 11.30                                                              | 16.10    | 34.40     | 195.0                                                              | 289.91   | 503.0     | 1,535                                                              | 1,982    | 2,990     | 5,414                                                              | 10,607    | 15,040  | 13,499                                                             | 25,514    | 35,485  |
| 80                            | 9.40                                                               | 13.60    | 29.20     | 165.0                                                              | 249.33   | 443.0     | 1,392                                                              | 1,790    | 2,708     | 4,832                                                              | 9,462     | 13,409  | 11,881                                                             | 22,547    | 31,089  |
| 70                            | 8.00                                                               | 11.40    | 24.70     | 138.0                                                              | 207.38   | 380.0     | 1,240                                                              | 1,610    | 2,400     | 4,228                                                              | 8,307     | 11,766  | 10,278                                                             | 19,622    | 26,905  |
| 60                            | 6.75                                                               | 9.30     | 20.50     | 112.0                                                              | 167.51   | 320.0     | 1,085                                                              | 1,403    | 2,117     | 3,628                                                              | 7,156     | 10,159  | 8,699                                                              | 16,627    | 22,698  |
| 50                            | 5.60                                                               | 7.50     | 16.70     | 89.0                                                               | 133.12   | 257.0     | 928                                                                | 1,210    | 1,780     | 3,006                                                              | 5,977     | 8,527   | 7,152                                                              | 13,673    | 18,617  |
| 40                            | 4.40                                                               | 6.00     | 13.20     | 67.0                                                               | 100.77   | 200.0     | 763                                                                | 990      | 1,500     | 2,322                                                              | 4,732     | 6,808   | 5,587                                                              | 10,893    | 14,659  |
| 30                            | 3.45                                                               | 4.50     | 10.20     | 50.0                                                               | 74.28    | 146.0     | 590                                                                | 760      | 1,145     | 1,628                                                              | 3,454     | 5,052   | 4,095                                                              | 8,080     | 10,812  |
| 20                            | 2.65                                                               | 3.30     | 7.50      | 37.0                                                               | 52.25    | 103.0     | 395                                                                | 525      | 868       | 961                                                                | 2,225     | 3,334   | 2,621                                                              | 5,321     | 6,977   |
| 10                            | 1.70                                                               | 2.20     | 5.00      | 25.5                                                               | 35.26    | 69.0      | 185                                                                | 276      | 480       | 357                                                                | 959       | 1,523   | 1,115                                                              | 2,550     | 3,285   |
| 150                           | 0.31                                                               | 0.56     | 1.25      | 5.72                                                               | 10.64    | 20.47     | 53.5                                                               | 77.80    | 130.4     | 215.5                                                              | 521.6     | 769.86  | 558.9                                                              | 1,319.9   | 1,903   |
| 140                           | 0.27                                                               | 0.49     | 1.08      | 5.28                                                               | 9.65     | 18.91     | 50.7                                                               | 73.50    | 123.0     | 199.6                                                              | 486.1     | 716.59  | 518.0                                                              | 1,232.4   | 1,778   |
| 130                           | 0.24                                                               | 0.42     | 0.94      | 4.63                                                               | 8.70     | 17.36     | 47.7                                                               | 69.36    | 116.0     | 184.4                                                              | 450.8     | 665.85  | 474.0                                                              | 1,135.7   | 1,644   |
| 120                           | 0.22                                                               | 0.37     | 0.81      | 3.96                                                               | 7.77     | 15.82     | 44.7                                                               | 64.69    | 107.5     | 168.9                                                              | 412.9     | 612.78  | 434.1                                                              | 1,047.7   | 1,523   |
| 110                           | 0.20                                                               | 0.32     | 0.70      | 3.40                                                               | 6.79     | 14.31     | 41.5                                                               | 60.00    | 101.0     | 154.7                                                              | 376.1     | 559.53  | 391.5                                                              | 952.0     | 1,389   |
| 100                           | 0.15                                                               | 0.27     | 0.61      | 2.87                                                               | 5.82     | 12.77     | 38.1                                                               | 55.00    | 93.0      | 135.7                                                              | 341.0     | 508.18  | 351.8                                                              | 859.4     | 1,257   |
| 90                            | 0.13                                                               | 0.23     | 0.52      | 2.43                                                               | 4.95     | 11.26     | 34.6                                                               | 50.14    | 86.0      | 119.2                                                              | 305.0     | 455.30  | 313.0                                                              | 763.6     | 1,123   |
| 80                            | 0.12                                                               | 0.19     | 0.45      | 2.01                                                               | 4.15     | 9.53      | 30.9                                                               | 45.34    | 77.0      | 104.3                                                              | 271.0     | 406.28  | 275.4                                                              | 670.7     | 990     |
| 70                            | 0.10                                                               | 0.16     | 0.38      | 1.64                                                               | 3.33     | 7.82      | 26.9                                                               | 39.70    | 69.0      | 87.9                                                               | 236.6     | 355.64  | 235.2                                                              | 560.4     | 860     |
| 60                            | 0.08                                                               | 0.13     | 0.32      | 1.30                                                               | 2.55     | 6.24      | 22.6                                                               | 34.50    | 60.7      | 69.9                                                               | 202.5     | 306.09  | 197.2                                                              | 491.4     | 729     |
| 50                            | 0.07                                                               | 0.11     | 0.27      | 1.00                                                               | 1.90     | 4.73      | 18.2                                                               | 29.18    | 51.6      | 52.3                                                               | 167.2     | 254.37  | 159.2                                                              | 403.0     | 598     |
| 40                            | 0.05                                                               | 0.09     | 0.22      | 0.75                                                               | 1.40     | 3.51      | 13.5                                                               | 23.50    | 42.4      | 35.0                                                               | 128.7     | 198.78  | 122.0                                                              | 314.5     | 470     |
| 30                            | 0.04                                                               | 0.08     | 0.18      | 0.55                                                               | 1.00     | 2.46      | 9.2                                                                | 17.60    | 33.0      | 20.1                                                               | 88.9      | 140.66  | 83.7                                                               | 228.3     | 347     |
| 20                            | 0.03                                                               | 0.07     | 0.14      | 0.40                                                               | 0.69     | 1.70      | 5.2                                                                | 11.50    | 22.2      | 7.9                                                                | 51.4      | 85.34   | 48.6                                                               | 146.10    | 224     |
| 10                            | 0.02                                                               | 0.06     | 0.09      | 0.26                                                               | 0.49     | 1.11      | 1.6                                                                | 5.00     | 9.4       | 2.8                                                                | 18.6      | 32.46   | 17.7                                                               | 59.9      | 99      |
| WATER, ML./MIN. @70°F         |                                                                    |          |           |                                                                    |          |           |                                                                    |          |           |                                                                    |           |         |                                                                    |           |         |
| AIR, ML./MIN @ 1 ATM & 70°F   |                                                                    |          |           |                                                                    |          |           |                                                                    |          |           |                                                                    |           |         |                                                                    |           |         |

## REPLACEMENT PARTS-RITEFLOW® FLOWMETERS

| Item                                          | Size 1                        | Size 2     | Size 3     | Size 4     | Size 5     | Size 6     |
|-----------------------------------------------|-------------------------------|------------|------------|------------|------------|------------|
| Frame Only, Teflon® 150mm                     | 94040-8000                    | 94040-8000 | 94040-8000 | 94040-8000 | 94040-8000 |            |
| Frame Only, Teflon® 65mm                      | 94040-4000                    | 94040-4000 | 94040-4000 | 94040-4000 | 94040-4000 | 94040-4000 |
| Frame Only, Aluminum, 150mm                   | 94040-9033                    | 94040-9033 | 94040-9033 | 94040-9033 | 94040-9033 |            |
| Frame Only, Aluminum, 65mm                    | 94040-6015                    | 94040-6015 | 94040-6015 | 94040-6015 | 94040-6015 | 94040-6015 |
| Teflon® Stop Set/2                            | 94040-1038                    | 94040-1076 | 94040-1128 | 94040-1216 | 94040-1306 |            |
| Bench Mounting Kit, Complete (bracket & base) | 94040-1000 For All Sizes      |            |            |            |            |            |
| Long Push Rod                                 | 94040-9003 For Sizes 4 & 5    |            |            |            |            |            |
| Push Rod                                      | 94040-9001 For Sizes 1,2, & 3 |            |            |            |            |            |



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