GRI PUMPS
A GORMAN-RUPP COMPANY
The Pump People

Pocket Bellows Pumps

Pocket Bellows models are ideal for low flow, low pressure metering applications. The pump is constructed entirely of plastic and utilizes GRI's time-proven bellows technology to provide an accurate chemically-resistant metering pump with a long life, at an economical price.

Features:

- Average repeatability from stroke-to-stroke, ± 0.75%
- Dry run capability
- Self-priming
- No dynamic seals
- Superior corrosion resistance

Contents **Pages**

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Pocket Bellows Metering Pumps Overview

Pocket Bellows Metering Pumps are the most economical metering pump on the market while maintaining the high quality standards of a Gorman-Rupp Industries product. Pocket Bellows Metering Pumps are ideal for low flow, low pressure metering applications where a fixed flow rate is required.

Like the Mini Bellows Metering Pump line, the Pocket Bellows are constructed entirely of plastic and use GRI's time-proven bellows technology to provide an accurate chemically-resistant metering pump with a long life, at an economical price. The only difference is the Pocket Bellows line utilizes a fixed crank mechanism.

Bellows Metering Pump Operation:

The Pocket Bellows Metering Pumps operate on a positive displacement principle. The rotation of the motor shaft is transmitted into an up and down linear motion through an concentric crank mechanism. This motion provides a continuous compressing and relaxing force on the bellows module, forcing fluid between two check valves located in the module's valve body.

Optimum Operating Conditions:

Optimum operating conditions consist of a 6" minimum suction lift and a discharge head of not less than 6". Pumps must be mounted vertically with the valve body at the top to obtain maximum metering accuracy. For conditions where a positive suction head condition exists, an anti-siphon spring or anti-siphon spring kit can be added to aid the poppet valve seal properly during operation. See page 7 for Accessories.

Flow Rates:

The flow rate of the bellows module is regulated by the following factors:

1. Diameter of the bellows
2. Speed of the gearmotor

The full stroke displacement and discharge pressure of the pump is dependent on the size of the bellows as shown below. If higher discharge pressure is required, please consult factory for an OEM solution.

POCKET BELLOWS MODULE FLOW RATE CHART				
Bellows Size	1/2"	3/4"	1"	1 1/2"
Full Stroke Displacement (ml)	0.4	1.5	4.5	10.0
Max Discharge Pressure (psi)	5	5	5	2.5

Motor RPM	Max Flow per Module (ml/min)							
	50 Hz	60 Hz	50 Hz	60 Hz	50 Hz	60 Hz	50 Hz	60 Hz
8	2.7	3.2	10.0	12.0	30.0	36.0	66.7	80.0
15	5.0	6.0	18.7	22.5	56.3	67.6	125.0	150.0
24	8.0	9.6	30.0	36.0	90.0	108.0	200.0	240.0

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Pocket Bellows Metering Pump Specifications:

Flow Rates - Range from 2.7 ml/min to 240 ml/min
Max Discharge Pressures - Range to 5 psi.
Max Fluid Temperature - To 140°F (60°C)

Note: Reduce pressure rating by 50% for fluid temperatures over 120°F (49°C).
Viscosity/Slurries - Maximum fluid viscosity is 5,000 centistokes. Poppet valves can handle fine slurries. Duckbill valves are recommended for heavy slurries or fibrous materials. Heavy slurries should be flushed from the pump before shutdown.

MAXIMUM DRY AND WET PRIMING SPECIFICATIONS • Feet (Meters)				
Bellows Sizes	Dry Prime 50% of Full Stroke	Dry Prime 100% of Full Stroke	Wet Prime 50% of Full Stroke	Wet Prime 100% of Full Stroke
½"	2.50 (.76)	8.67 (2.64)	5.83 (1.78)	17.17 (5.23)
¾"	1.08 (.33)	3.75 (1.14)	2.50 (.76)	6.25 (1.91)
1"	3.08 (.94)	8.33 (2.54)	6.25 (1.91)	14.25 (4.34)
1 ½"	4.33 (1.32)	11.00 (3.35)	9.58 (2.92)	20.58 (6.27)

Note: All testing is done with water at an ambient temperature of 80 degree F. If specific gravity or viscosity of fluid being pumped is significantly greater than water (1.0), please consult factory.

Materials in Contact with Solution:

Connectors - Polypropylene
O-Rings (Elastomers) - EPT/EPDM or Viton®/Fluoroelastomer
Poppet/Duckbill Valves - EPT/EPDM or Viton®/Fluoroelastomer
Bellows - Standard Polypropylene Materials
Additional materials available, refer to OEM Section for details.

Pump Selection:

Please refer to the Pump Selection guide on pages 4 and 5.

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Pump Selection Guide
Pocket Bellows

Order Notes: When ordering a Pocket Bellows model, refer to steps 1 through 3 (bottome of page) and follow the example provided.

Example: *The model number and codes for a pump with 1" bellows module, with EPT/EPDM elastomers and 3⁄8" barbed connector, driven by a 115V, 50/60 Hz, 8 RPM motor would be: 16503-050 X-112 T-003.*

CHART A

BELLOWS MODULE OUTPUT				
Bellows Size	**½"**	**¾"**	**1"**	**1½"**
Full Stroke Displacement (ml)	.4	1.5	4.5	10.0

CHART B

TYPICAL FLOW								
Typical Flow (ml/min)	**Bellows Size**							
	½"		**¾"**		**1"**		**1½"**	
Motor RPM	**50 Hz**	**60 Hz**	**50 Hz**	**60 Hz**	**50 Hz**	**60 Hz**	**50 Hz**	**60 Hz**
8	2.7	3.2	10.0	12.0	30.0	36.0	66.7	80.0
15	5.0	6.0	18.7	22.5	56.3	67.5	125.0	150.0
24	8.0	9.6	30.0	36.0	90.0	108.0	200.0	240.0

CHART C

O-RING AND POPPET/DUCKBILL VALVE OPTIONS						
Materials	**Bellows Size**					
	½"		**¾"**		**1" & 1½"**	
	Poppet	**Duckbill**	**Poppet**	**Duckbill**	**Poppet**	**Duckbill**
EPT/EPDM	X-002	X-092	X-112	X-032	X-112	X-032
Viton®/ Fluoroelastomer	X-006	X-096	X-116	X-036	X-116	X-036

CHART D

SELECTED POCKET BELLOWS PUMPS				
Model Number	**RPM @ 60 Hz**	**Bellows Size**	**Volts**	**Hz**
16501-050	8	½"	115	50/60
16501-053	8	½"	230	50/60
16502-050	8	¾"	115	50/60
16502-053	8	¾"	230	50/60
16503-050	8	1"	115	50/60
16503-053	8	1"	230	50/60
16504-050	8	1½"	115	50/60
16504-053	8	1½"	230	50/60
16501-051	15	½"	115	50/60
16501-054	15	½"	230	50/60
16502-051	15	¾"	115	50/60
16502-054	15	¾"	230	50/60
16503-051	15	1"	115	50/60
16503-054	15	1"	230	50/60
16504-051	15	1½"	115	50/60
16504-054	15	1½"	230	50/60
16501-052	24	½"	115	50/60
16501-055	24	½"	230	50/60
16502-052	24	¾"	115	50/60
16502-055	24	¾"	230	50/60
16503-052	24	1"	115	50/60
16503-055	24	1"	230	50/60
16504-052	24	1½"	115	50/60
16504-055	24	1½"	230	50/60

1. Using **Chart A** and **B**, select a bellows module and a motor RPM combination whose maximum output meets or exceeds your flow requirements. Then refer to **Chart D** to select an appropriate model number. If a T-head valve body is required, please consult factory.
2. Using **Chart C**, select the appropriate X-code for each module's O-ring, and poppet or duckbill valve elastomers.
3. Using the **Tubing Connector Chart** (following page), select one T-code for each X-code chosen from **Chart C**.

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Pump Selection Guide
Pocket Bellows

T-CODES			
T-Code	**For Elastomeric Tubing Size**	**Connector Type**	**Bellows Module Size**
T-001	1/8" I.D. x 1/4" O.D.	Barbed Compression	1/2"
T-002	1/4" I.D. x 3/8" O.D.	Barbed Compression	1/2"
T-003	3/8" I.D.	Barbed	3/4" & 1" & 1 1/2"
T-004	1/2" I.D.	Barbed	3/4" & 1" & 1 1/2"
T-006	1/8" I.D. x 1/4" O.D.	Barbed Compression	3/4"
T-007	1/4" I.D. x 3/8" O.D.	Barbed Compression	3/4"
T-008	3/8" I.D.	Elbow Swivel, Barbed	3/4" & 1" & 1 1/2"
T-009	1/2" I.D.	Elbow Swivel, Barbed	3/4" & 1" & 1 1/2"
T-011	1/4" I.D.	Elbow Swivel, Barbed	3/4" & 1"
T-012	4mm (5/32") I.D.	Elbow Swivel, Barbed	3/4"
T-013	4mm (5/32") I.D.	Elbow Swivel, Barbed	1/2"
T-014	1/4" I.D.	Barbed	3/4" & 1"

TUBING CONNECTORS


T-001


T-002


T-003


T-006


T-004


T-008


T-009


T-007


T-011


T-013


T-014


T-012

Options
Pocket Bellows

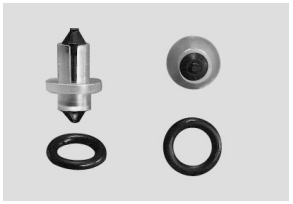
GRI specializes in the adaptation of standard models to meet the ever-changing needs of the Original Equipment Market. Contact us if one of our standard models does not meet your specific requirements.

Motors

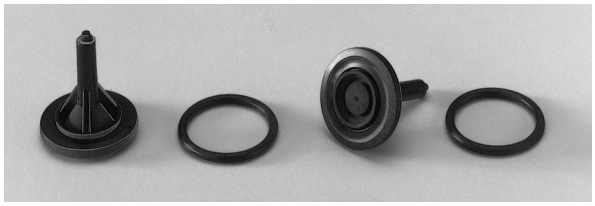
- **Speeds**
  Standard synchronous motor speeds are 8, 15 and 24 RPM at 60 Hz. Custom speeds available in shaded pole and DC motors, please consult factory.
- **Voltages**
  Standard voltages are 115V, 50/60 Hz or 230V, 50/60 Hz. However, the following special voltages are also available: 12 and 24VDC.
- **Designs**
  The standard motor is an AC voltage synchronous motor. Depending on the type of pocket bellows metering pump, the following motor types are available: shaded pole, and DC.

Poppet Valves & O-Rings

The standard elastomers for the poppet valves and O-rings are EPT/EPDM and Viton®/Fluoroelastomer. These elastomers have historically been able to handle the vast majority of the applications in which we've been involved. However, Butyl, Kel-F® and Silicone can be supplied for chemicals requiring such materials.



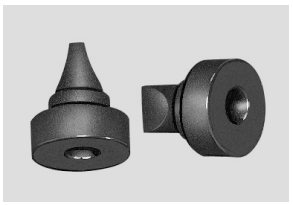
1/2" Poppet Kit



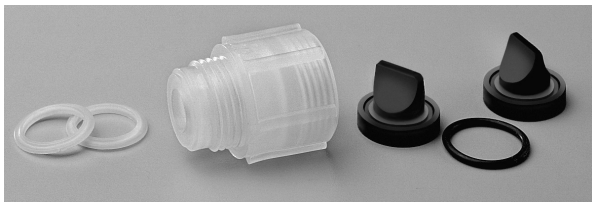
3/4", 1", 1 1/2" Poppet Kit

Duckbill Valves & O-Rings

Duckbill valves are required in those applications where heavy slurries and fibrous materials are being pumped. Heavy slurries should be flushed from the bellows before pump is shut down. Duckbill valves are available in the same elastomers as the poppet valves.



1/2" Duckbill Valve Kit



3/4", 1", 1 1/2", Duckbill Valve Kit

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Accessories
Pocket Bellows

Check and Foot Valves

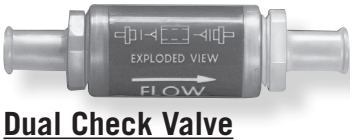
Check and foot valves are used to maintain a pump's prime or to prevent backflow through a pump in applications with long suction lengths. Check valves can be positioned in-line on the suction or discharge side of the pump; foot valves on the suction side only. To order, refer to the chart on this page.

Elastomer	Single Check Valves		Dual Check Valves	Foot Valves	
	⅜" I.D. Tubing	½" I.D. Tubing	⅜" I.D. Tubing	⅜" I.D. Tubing	½" I.D. Tubing
EPT/EPDM	15099-002	15099-018	12171-004	15101-002	15101-018
Viton®/ Fluoro-elastomer	15099-006	15099-022	—	15101-006	15101-022

Single Check Valve

Opening Pressure: 1 psi (spring loaded)
Materials in Contact with Solution:
- Body, valve seat, connectors, screen (149 Micron) - Polypropylene
- O-rings - EPT/EPDM, Viton®/Fluoro-elastomer
- Spring - Hastelloy® C

Options: ½" or ⅜" I.D. tubing connectors



Dual Check Valve

Opening Pressure: .2 psi (two poppets located in series)
Materials in Contact with Solution:
- Body, connectors - Polypropylene
- Poppet valves & O-rings — EPT/EPDM

Foot Valve

Opening Pressure: 1 psi (spring loaded)
Materials in Contact with Solution:
- Body, valve seat, connectors, screen (149 Micron) - Polypropylene
- O-rings - EPT/EPDM, Viton®/Fluoro-elastomer
- Spring - Hastelloy® C

Options: ½" or ⅜" I.D. tubing connectors

Anti-Siphon Spring Kits

Anti-siphon springs are available to springload poppet valves. Use of these springs produces more positive shutoff of poppet valves and permits use of the pump where there is a positive pressure on the suction side. Available for the 1", 1½" and 2½" models. To order, select the proper spring material and O-ring by referring to the Chemical Resistance Section. The appropriate kit can then be chosen based on the blow-off pressure (PSI) required.

(Valve extension required only on suction port.)

Spring	O-Ring (Elastomer) Material			
	EPT/EPDM		Viton®/Fluoroelastomer	
	.5 PSI	5 PSI	.5 PSI	5 PSI
Monel	02501-112	02501-113	02501-124	02501-525
316 S.S.	02501-114	02501-115	02501-126	02501-127
Hastelloy® C	02501-116	02501-117	02501-128	02501-129

Kits include valve extension for suction port. Kits do not include poppet valve.

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Replacement Kits
Pocket Bellows

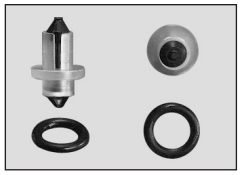
Bellows Module Kits

Proper selection of bellows module and poppet valve replacement kits depends on the X-code of the model number and not on the pump type.

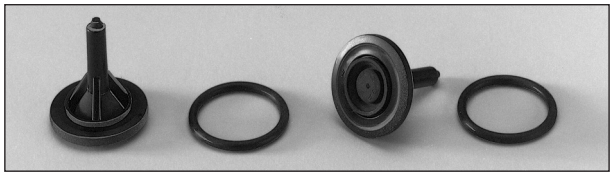
Materials	Bellows Size			
	½"	¾"	1"	1½"
EPT/EPDM	02501-702	02501-705	02501-708	02501-711
Viton®/ Fluoroelastomer	02501-703	02501-706	02501-709	02501-712

Poppet Valve and O-Ring Kits

The standard elastomers for the poppet valves and O-rings are EPT/EPDM and Viton®/Fluoroelastomer. These elastomers have historically been able to handle the vast majority of the applications in which we've been involved. However, Butyl, Kel-F® and Silicone can be supplied for chemicals requiring such materials.



½" Poppet Kit

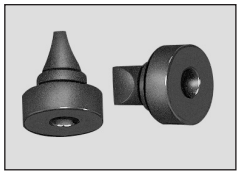


3/4" , 1" and 1½" Poppet Kit

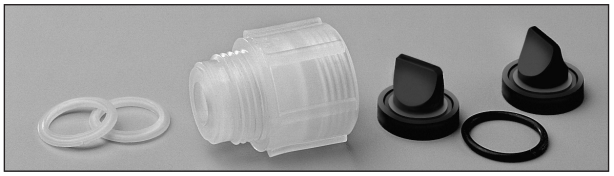
Materials	½" Bellows	¾" Bellows	1" Bellows	1½" Bellows
EPT/EPDM	02500-318 (X-002)	02500-605 (X-112)	02500-605 (X-112)	02500-605 (X-112)
Viton®/ Fluoroelastomer	02500-317 (X-006)	02500-609 (X-116)	02500-609 (X-116)	02500-609 (X-116)

Duckbill Valve and O-Ring Kits

Duckbill valves are required in those applications where heavy slurries or fibrous materials are being pumped. Heavy slurries should be flushed from the bellows before the pump is shut down. The standard elastomers are EPT/EPDM and Viton®/Fluoroelastomer. However, Butyl, Hydrin, Kel-F®, Silicone and Nitrile can be supplied.



½" Duckbill Valve Kit



3/4", 1" and 1½" Duckbill Valve Kit *(Valve extension required only on suction port.*

Materials	½" Bellows	¾" Bellows	1" Bellows	1½" Bellows
EPT/EPDM	02500-597 (X-092)	02500-322 (X-032)	02500-322 (X-032)	02500-322 (X-032)
Viton®/ Fluoroelastomer	02500-601 (X-096)	02500-319 (X-036)	02500-319 (X-036)	02500-319 (X-036)

Tubing Connector Kits

Connectors are made from polypropylene and are designed for use with soft vinyl and similar tubing.

T-Code	Kit Part Number
T-001	02500-312
T-002	02500-635
T-003	02500-352
T-004	02500-353
T-005	02500-258

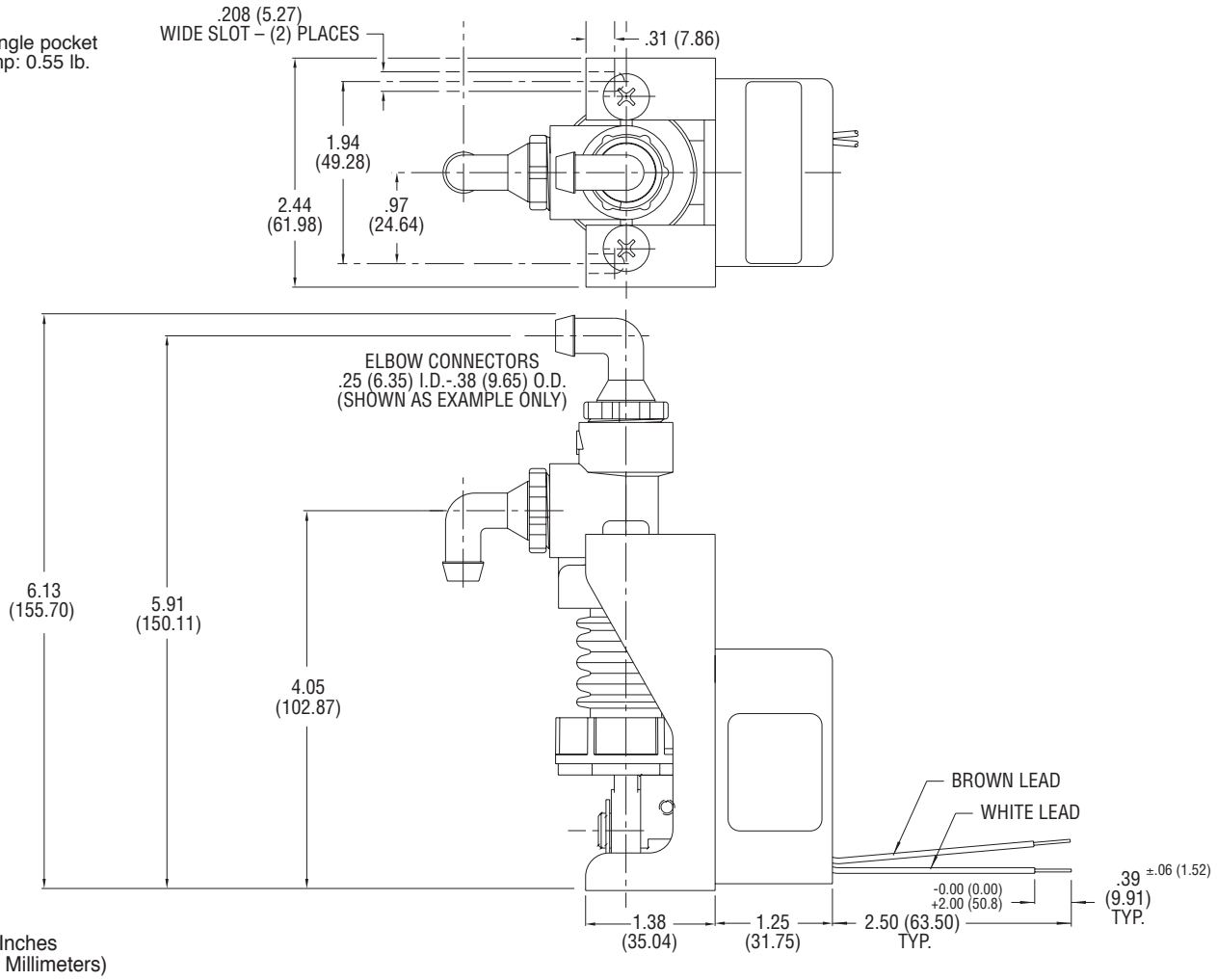
T-Code	Kit Part Number
T-006	02500-259
T-007	02500-260
T-008	02500-261
T-009	02500-354

T-Code	Kit Part Number
T-011	02501-337
T-012	02501-246
T-013	02501-541
T-014	02501-673

Note: Kit includes two connector nuts and connectors.

Typical Dimensions
Pocket Bellows

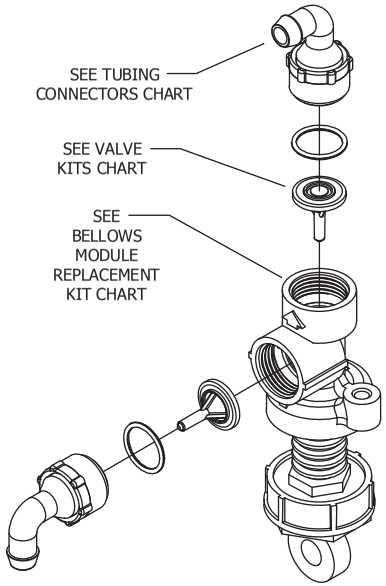
Weight of single pocket bellows pump: 0.55 lb.



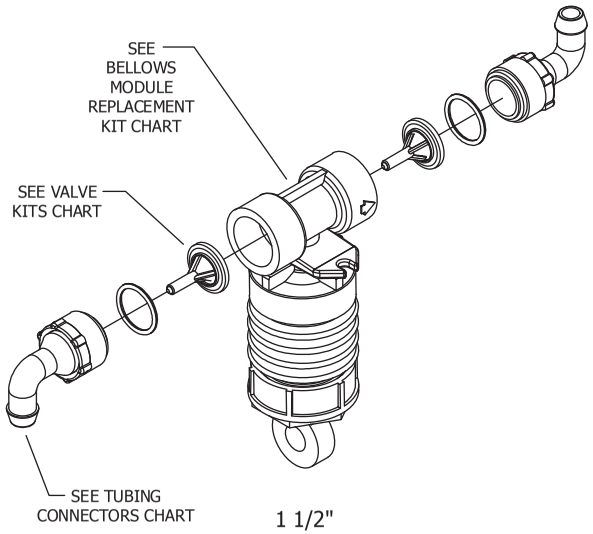
Dimensions in Inches
(Dimensions in Millimeters)

Exploded View

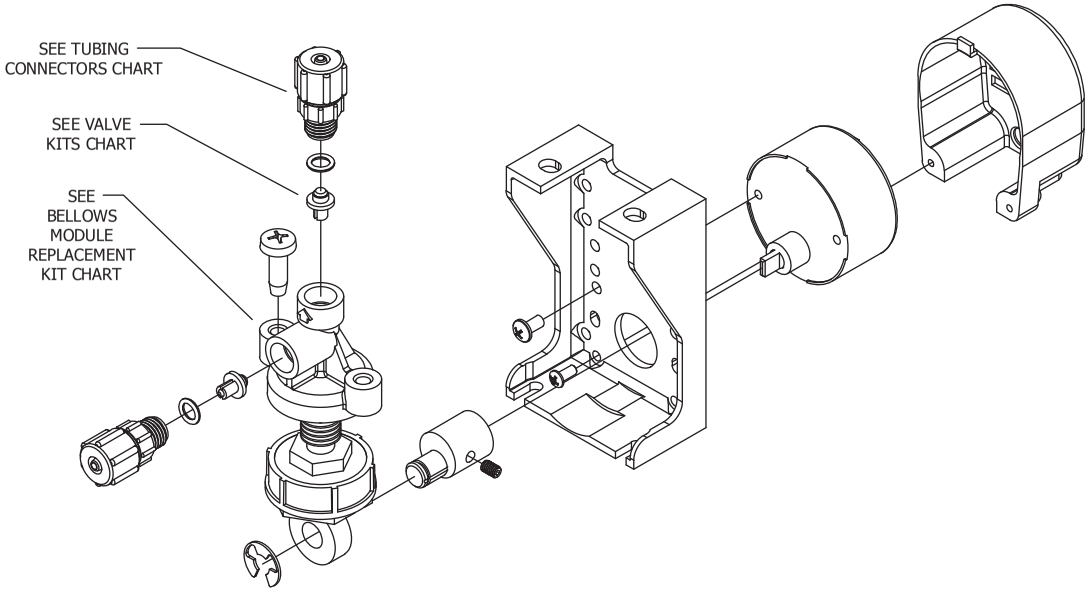
Pocket Bellows



3/4" & 1"



1 1/2"



1/2"

TO ORDER REPLACEMENT PUMPS OR KITS, CALL YOUR LOCAL GRI DISTRIBUTOR

FORM NO. 86298-0521

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