A Revolutionary Innovation in Chemical Pump Technology...

The Liquiflo POLY-GUARD™

Polymer-Lined Stainless Steel Gear Pump

...The Ultimate Solution for Pumping Corrosive Chemicals

Combines the chemical resistance of Fluoro-Polymers with the strength of Stainless Steel

Liquiflo® Chemical Processing Pumps

Poly-Guard™

Poly-Guard SERIES

POLYMER-LINED STAINLESS STEEL GEAR PUMP

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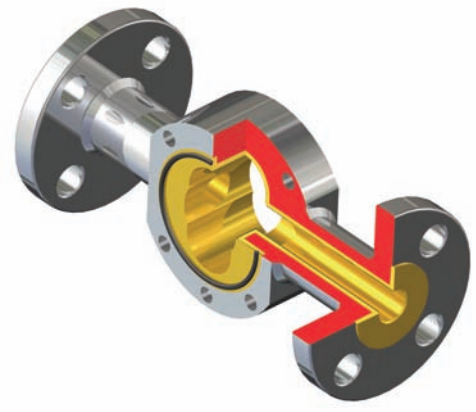
Description: THE TOUGHEST COMBINATION...

Liquiflo has long recognized the need for a Plastic Rotary Positive Displacement Pump for the chemical industry. While engineered plastics offered unsurpassed chemical resistance to virtually any fluid, they severely lacked the mechanical strength, integrity and safety of high-alloy metals. Therefore, the challenge was to use a combination of metal and plastic to produce a highly corrosion resistant pump that was safe to use in industrial applications. We chose a Fluoro-Polymer for its superior chemical resistance, and Stainless Steel for its strength and corrosion resistance (giving the pump one more layer of protection). Liquiflo perfected a specialized molding and machining technique for mechanically bonding, stabilizing and machining the plastic to exacting tolerances required to make a positive displacement pump.

The ultimate outcome was the Poly-Guard™, which combines the chemical resistance of a Fluoro-Polymer with the strength of Stainless Steel.



Typical Uses & Applications

The **Poly-Guard™** is an excellent choice for inorganic acids, bases and salts. The Poly-Guard™, with its tough Stainless Steel exterior and chemically resistant Fluoro-Polymer interior, offers the ultimate solution for your most difficult chemical applications. These pumps are durabie, safe and corrosion resistant, and unlike fiber-reinforced plastic pumps, they can also be used in high purity services where contamination from process system components must be avoided.

Typical Chemicals

Hydrochloric Acid
Ferric Chloride
Sulfuric Acid
Hydrofluoric Acid
Sodium Hypochlorite
Nitric Acid
Sodium Hydroxide
Chromic Acid
Fluorosilicic Acid
Hydrogen Bromide
Bromine

Markets

Chemical
Water Treatment
Pharmaceutical
Pulp & Paper
Electronics
Food & beverage
High Purity Service
...etc.

Metering

Gear pumps, due to their nearly **pulseless flow**, are preferred in many metering applications. When used with a VFD in a PID-controlled feedback loop, the pump can deliver exceptionally accurate flow. The input signal can be based on many different parameters – pH and flow being two of the most common.

Advantages

- The Poly-Guard™ offers both internal and external protection against corrosive fluids and harsh environments
- Strong Stainless Steel body handles pipe stresses and typical treatments found in industrial environments
- Fluoro-Polymer-lined for ultimate protection against any corrosive liquids, such as Acids, Caustics, Inorganic Salts and others
- A variety of non-metallic materials for internal components such as PEEK, Kynar (PVDF), Teflon, Silicon Carbide and TTZ, were chosen for exceptional wear resistance and chemical compatibility, allowing pump to be optimized for the intended service
- Ideal for high purity services (All wetted parts are non-metallic)
- Sealless Mag-Drive configuration prevents leakage
- Rotary Gear Pump design deliverer a smooth, pulseless flow which is desirable for both metering and transfer applications
- Close-Coupled configuration simplifies installation and maintains perfect alignment of pump and motor
- Product is extremely simple in design and easy to maintain and repair
- Available in 7 sizes to match your flow requirements up to 15 GPM (57 LPM)

Poly-Guard™ SERIES

POLYMER-LINED STAINLESS STEEL GEAR PUMP

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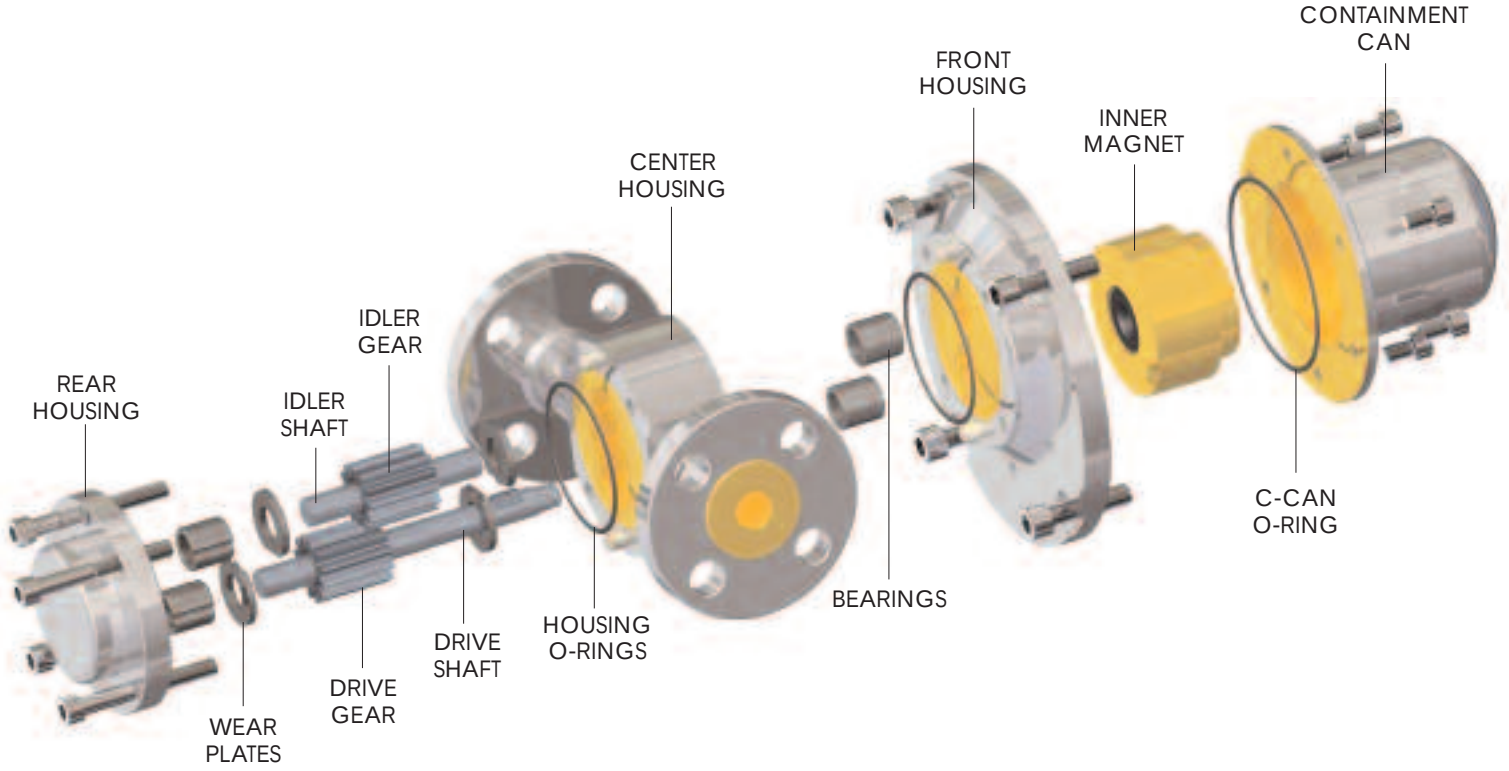

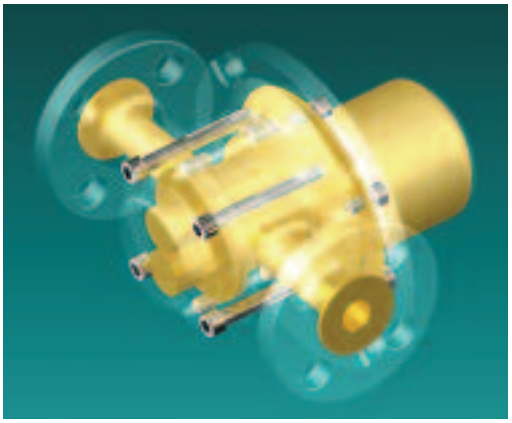

The **Poly-Guard™** Series pumps offer a durably constructed outer Stainless Steel body with a heavily layered Fluoro-Polymer (PFA) internal lining. This highly chemically resistant PFA lining is mechanically attached and bonded to the internal stainless steel surfaces using a specialized molding process, effectively isolating the fluid being pumped from any metal surfaces. Fluoro-Polymers exhibit the highest corrosion resistance of any plastics. This combination of stainless steel on the outside and Fluoro-Polymer on the inside gives the Poly-Guard™ the full strength and integrity of a metal pump with the ultimate corrosion resistance of a Fluoro-Polymer.

(Polymer lining is shown in gold)

Case History

A water supply authority was required to fluoridate the water system for a large metropolitan area. The method chosen was metered injection of concentrated Hydrofluorosilicic Acid into the water supply. Any process Interruption or fluid leakage would be unacceptable. Originally, diaphragm metering pumps were specified, however they were found to be unsatisfactory due to leakage as a result of diaphragm failure. They then chose a gear pump with an Alloy-C body; however, the Alloy-C was severely attacked by the acid resulting in fluid leakage within a month. Liquiflo was then approached to help them find a solution. Liquiflo recognized that an all metal pump was not acceptable from a corrosion standpoint. It was also known that glass and carbon were incompatible with this highly corrosive acid. This eliminated the option of using an all plastic pump that used carbon or glass fiber reinforcement. The solution was the Poly-Guard™ pump with PFA lining, Stainless Steel body, unfilled PVDF gears, and Silicon Carbide wear plates, bearings and shafts. These pumps have now been in service in excess of 18 months with zero down time due to fluid leakage or degraded performance.

Poly-Guard SERIES

POLYMER-LINED STAINLESS STEEL GEAR PUMP

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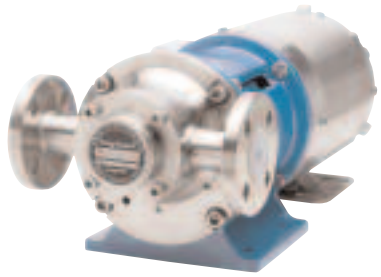
MODELS
P1-P4



MODELS
P5-P7

GENERAL SPECIFICATIONS

SPECIFICATION		Units	P1	P2	P3	P4	P5	P6	P7
Port Size & Type*	**ANSI 150#**	in	**3/4**	**3/4**	**3/4**	**3/4**	**1 1/2**	**1 1/2**	**1 1/2**
	DIN PN16	mm	**20**	**20**	**20**	**20**	**40**	**40**	**40**
Theoretical Displacement [1]		gal/rev L/rev	.000828 .00313	.00138 .00522	.00193 .00731	.00289 .01094	.00491 .01858	.00675 .02555	.00859 .03251
Max Speed		RPM	1750	1750	1750	1750	1750	1750	1750
Max Flow Rate[1]		GPM LPM	**1.4** 5.5	**2.4** 9.1	**3.4** 12.8	**5.0** 19.1	**8.6** 32.5	**11.8** 44.7	**15.0** 56.9
Max Differential Pressure		PSI bar	100 7	100 7	100 7	100 7	100 7	100 7	100 7
Max Allowable Pressure [2]		PSIG barg	275 19	275 19	275 19	275 19	275 19	275 19	275 19
Max Temperature		˚F ˚C	200 93	200 93	200 93	200 93	200 93	200 93	200 93
NPSHR @ Max Speed		ft m	2 0.6	2 0.6	2 0.6	3 0.9	5.2 1.6	5.2 1.6	4 1.2
Suction Lift (Dry)		ft m	1.5 0.45	2 0.6	4 1.2	6 1.8	6 1.8	7 2.1	7 2.1
Weight, less motor (approx.)		lbs kg	42 19	42 19	42 19	42 19	63 29	63 29	63 29

* Raised Face (RF) Flanges
1 Based on Maximum Speed and zero Differential Pressure.
2 Based on pressure rating of Flanges at ambient temperature.

MATERIALS AVAILABLE

BODY	GEARS	WEAR PLATES	BEARINGS	SHAFTS
SS-PFA Plastic-Lined	PEEK Kynar Ryton Teflon	Silicon Carbide [1] Carbon-60 Teflon	Silicon Carbide [1] Carbon-60	Silicon Carbide[1] Ceramic Zirconia [2]

1 Self-sintered SiC
2 Transformation Toughened Zirconia (TTZ)

Poly-Guard SERIES

POLYMER-LINED STAINLESS STEEL GEAR PUMP

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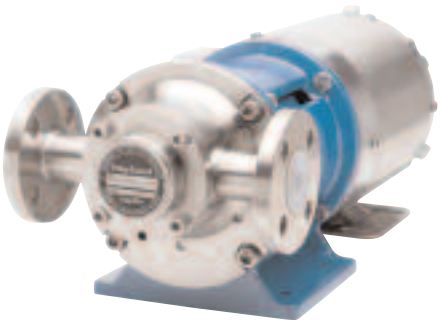
MODEL **P 1**



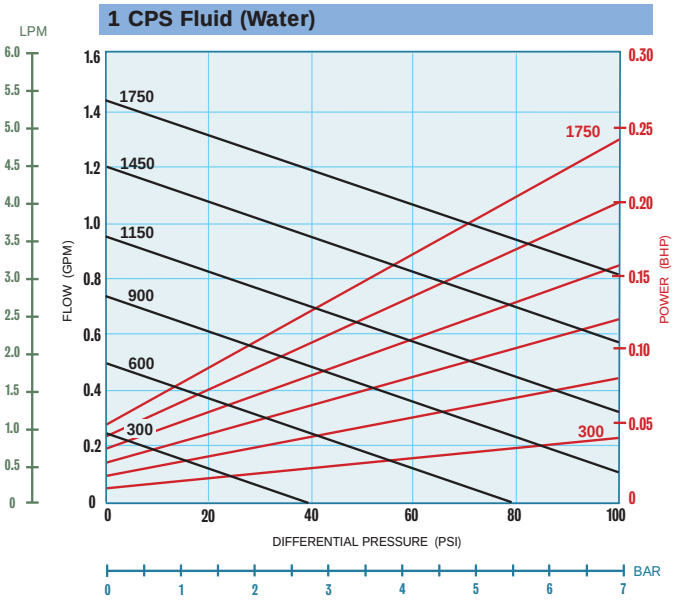
MAG-DRIVE, CLOSE-COUPLED

Port Size & Type	ANSI	3/4" 150# RF Flanges
	DIN	20 mm PN16 RF Flanges
Theoretical Displacement [1]		.000828 gal/rev (.00313 L/rev)
Max Speed		1750 RPM
Max Flow Rate[1]		**1.4 GPM (5.5 LPM)**
Max Differential Pressure		100 PSI (7 bar)
Max Allowable Pressure [2]		275 PSIG (19 barg)
Max Temperature		200°F (93°C)
NPSHR @ Max Speed		2 ft (0.6 m)
Suction Lift (Dry)		1.5 ft (0.45 m)
Gear Type		Spur, External
Bearing Type		Sleeve /Journal
Motor Frame Sizes	NEMA	56C, 143TC, 145TC
	IEC	71, 80, 90 – B5 Flange
Weight, less motor (approx.)		42 lbs (19 kg)

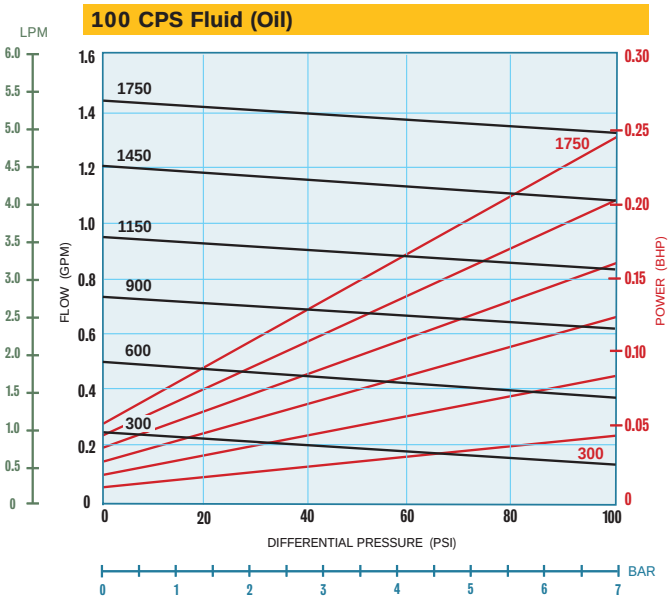
1 Based on Maximum Speed and zero Differential Pressure.
2 Based on pressure rating of Flanges at ambient temperature.

PERFORMANCE CURVES

1 CPS Fluid (Water)

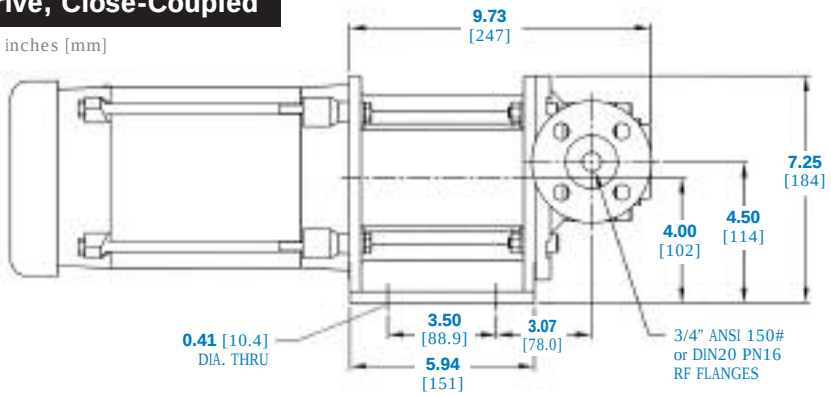


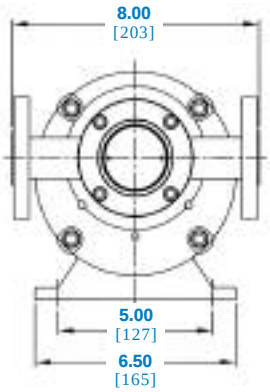
100 CPS Fluid (Oil)



P1: Mag-Drive, Close-Coupled

Dimensional Data: inches [mm]





Poly-Guard™ SERIES

POLYMER-LINED STAINLESS STEEL GEAR PUMP

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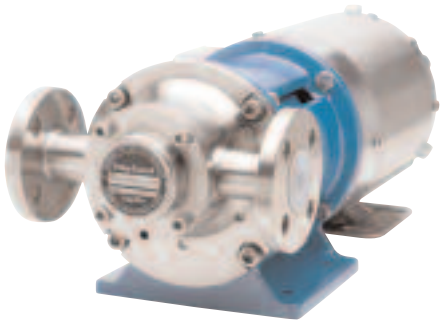
MODEL **P 2**



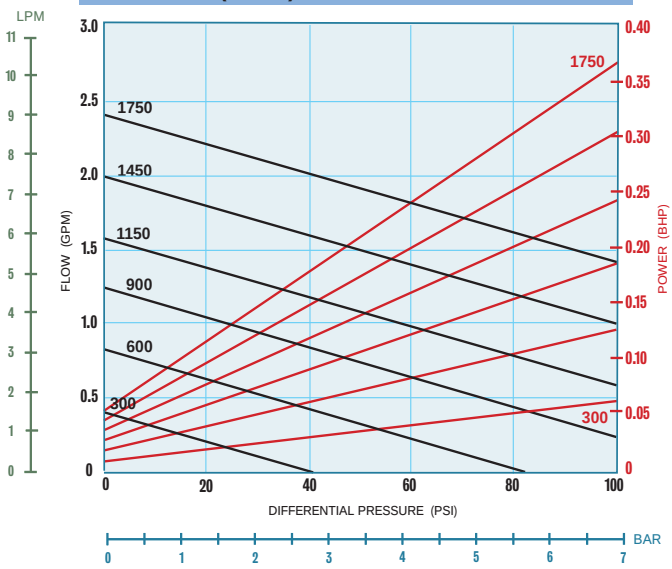
MAG-DRIVE, CLOSE-COUPLED

Port Size & Type	ANSI	3/4" 150# RF Flanges
	DIN	20 mm PN16 RF Flanges
Theoretical Displacement [1]		.00138 gal/rev (.00522 L/rev)
Max Speed		1750 RPM
Max Flow Rate[1]		**2.4 GPM (9.1 LPM)**
Max Differential Pressure		100 PSI (7 bar)
Max Allowable Pressure [2]		275 PSIG (19 barg)
Max Temperature		200°F (93°C)
NPSHR @ Max Speed		2 ft (0.6 m)
Suction Lift (Dry)		2 ft (0.6 m)
Gear Type		Spur, External
Bearing Type		Sleeve /Journal
Motor Frame Sizes	NEMA	56C, 143TC, 145TC
	IEC	71, 80, 90 – B5 Flange
Weight, less motor (approx.)		42 lbs (19 kg)

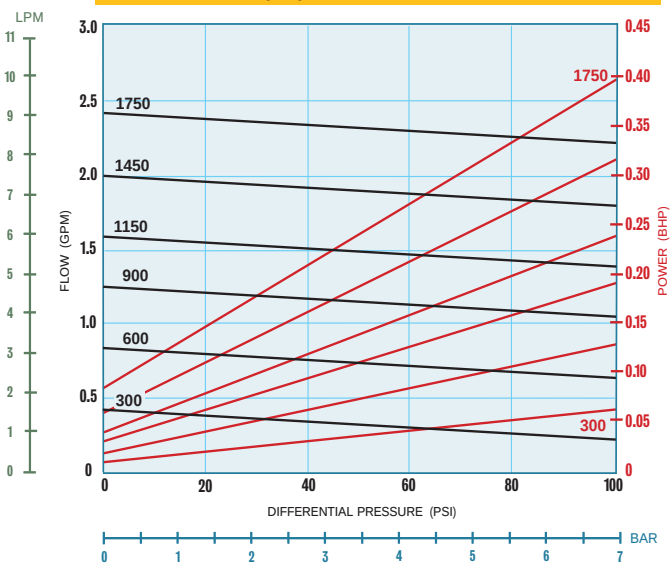
1 Based on Maximum Speed and zero Differential Pressure.
2 Based on pressure rating of Flanges at ambient temperature.

PERFORMANCE CURVES

1 CPS Fluid (Water)

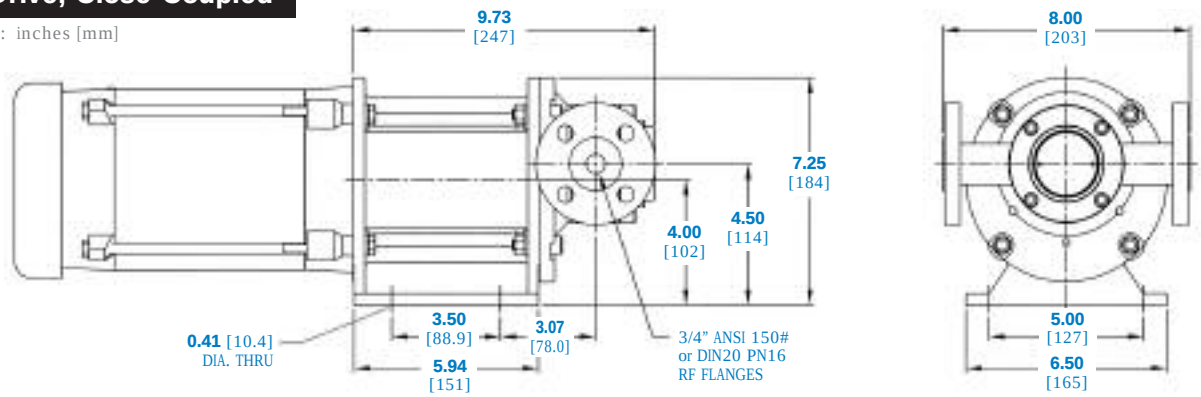


100 CPS Fluid (Oil)



P2: Mag-Drive, Close-Coupled

Dimensional Data: inches [mm]



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POLYMER-LINED STAINLESS STEEL GEAR PUMP

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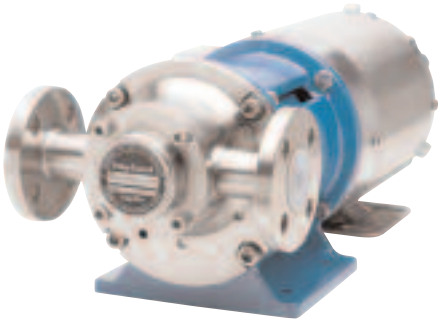
MODEL **P 3**



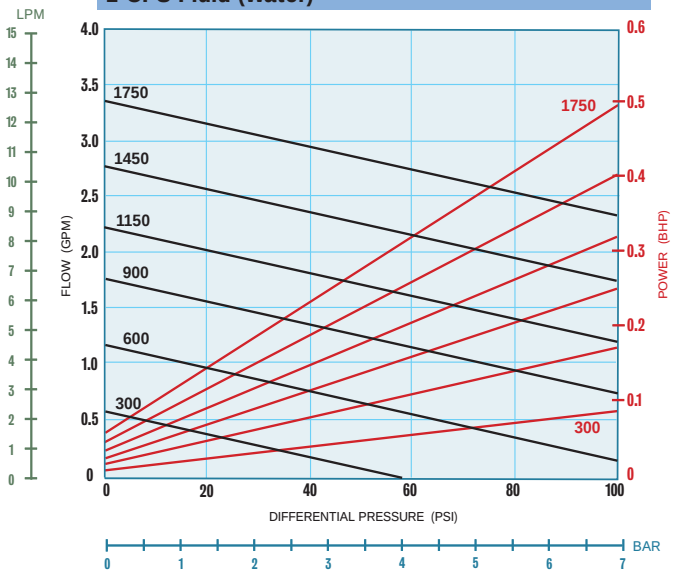
MAG-DRIVE, CLOSE-COUPLED

Port Size & Type	ANSI	3/4" 150# RF Flanges
	DIN	20 mm PN16 RF Flanges
Theoretical Displacement [1]		.00193 gal/rev (.00731 L/rev)
Max Speed		1750 RPM
Max Flow Rate[1]		**3.4 GPM (12.8 LPM)**
Max Differential Pressure		100 PSI (7 bar)
Max Allowable Pressure [2]		275 PSIG (19 barg)
Max Temperature		200°F (93°C)
NPSHR @ Max Speed		2 ft (0.6 m)
Suction Lift (Dry)		4 ft (1.2 m)
Gear Type		Spur, External
Bearing Type		Sleeve /Journal
Motor Frame Sizes	NEMA	56C, 143TC, 145TC
	IEC	71, 80, 90 – B5 Flange
Weight, less motor (approx.)		42 lbs (19 kg)

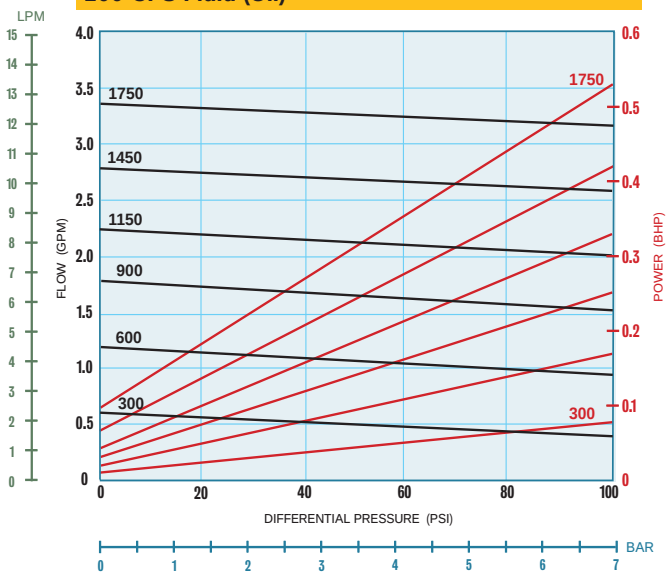
1 Based on Maximum Speed and zero Differential Pressure.
2 Based on pressure rating of Flanges at ambient temperature.

PERFORMANCE CURVES

1 CPS Fluid (Water)

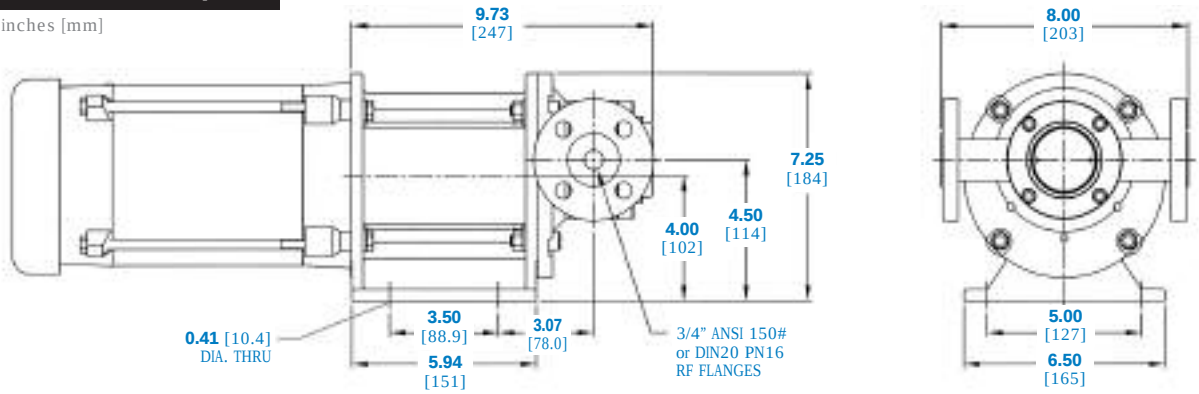


100 CPS Fluid (Oil)



P3: Mag-Drive, Close-Coupled

Dimensional Data: inches [mm]



Poly-Guard™ SERIES

POLYMER-LINED STAINLESS STEEL GEAR PUMP

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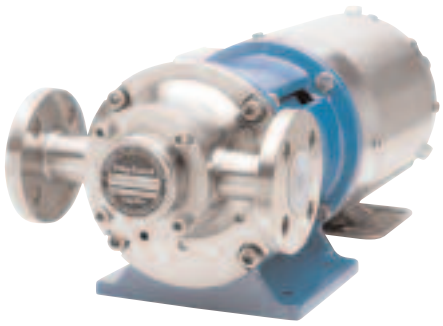
MODEL **P 4**



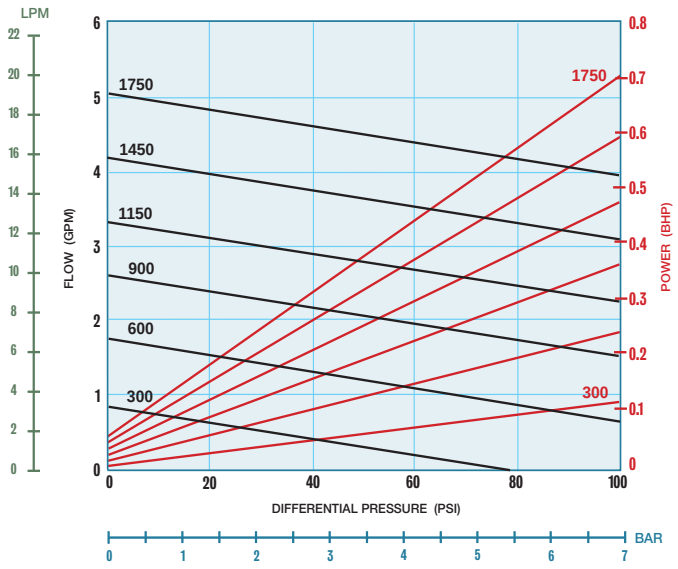
MAG-DRIVE, CLOSE-COUPLED

Port Size & Type	ANSI	3/4" 150# RF Flanges
	DIN	20 mm PN16 RF Flanges
Theoretical Displacement [1]		.00289 gal/rev (.01094 L/rev)
Max Speed		1750 RPM
Max Flow Rate[1]		**5.0 GPM (19.1 LPM)**
Max Differential Pressure		100 PSI (7 bar)
Max Allowable Pressure [2]		275 PSIG (19 barg)
Max Temperature		200°F (93°C)
NPSHR @ Max Speed		3 ft (0.9 m)
Suction Lift (Dry)		6 ft (1.8 m)
Gear Type		Spur, External
Bearing Type		Sleeve /Journal
Motor Frame Sizes	NEMA	56C, 143TC, 145TC
	IEC	71, 80, 90 – B5 Flange
Weight, less motor (approx.)		42 lbs (19 kg)

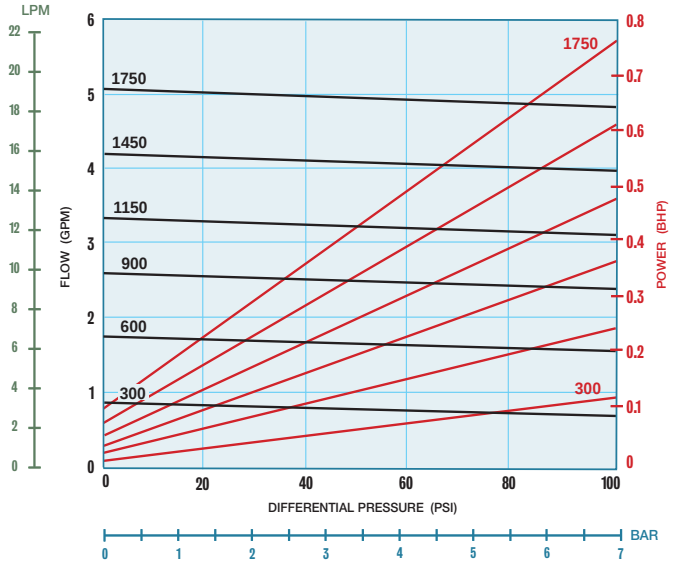
1 Based on Maximum Speed and zero Differential Pressure.
2 Based on pressure rating of Flanges at ambient temperature.

PERFORMANCE CURVES

1 CPS Fluid (Water)

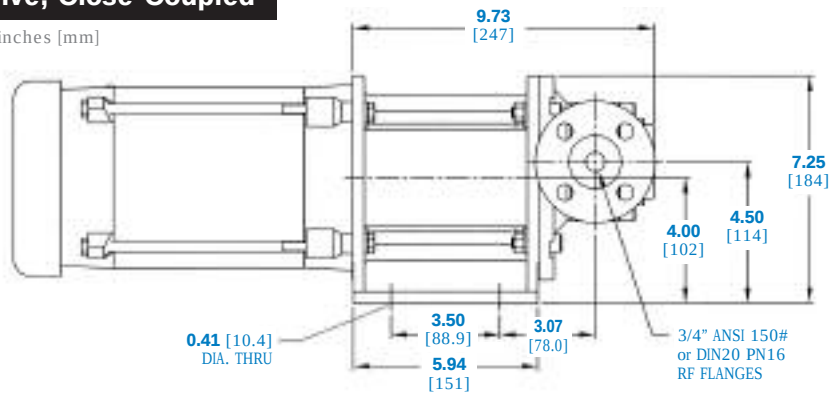


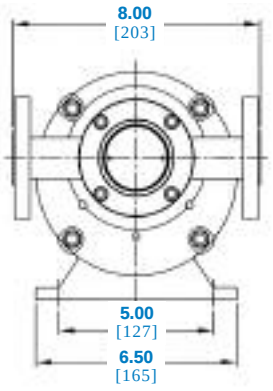
100 CPS Fluid (Oil)



P4: Mag-Drive, Close-Coupled

Dimensional Data: inches [mm]





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Poly-Guard SERIES

POLYMER-LINED STAINLESS STEEL GEAR PUMP

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MODEL **P5**

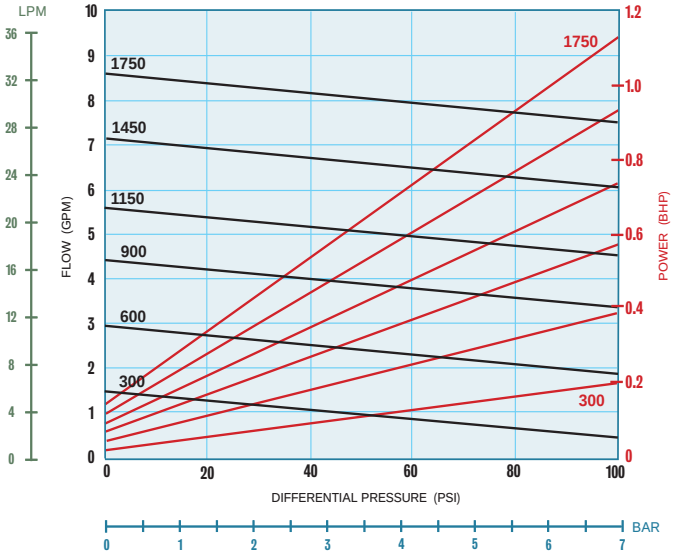
MAG-DRIVE, CLOSE-COUPLED

Port Size & Type	ANSI	1 1/2" 150# RF Flanges
	DIN	40 mm PN16 RF Flanges
Theoretical Displacement [1]		.00491 gal/rev (.01858 L/rev)
Max Speed		1750 RPM
Max Flow Rate [1]		**8.6 GPM (32.5 LPM)**
Max Differential Pressure		100 PSI (7 bar)
Max Allowable Pressure [2]		275 PSIG (19 barg)
Max Temperature		200°F (93°C)
NPSHR @ Max Speed		5.2 ft (1.6 m)
Suction Lift (Dry)		6 ft (1.8 m)
Gear Type		Spur, External
Bearing Type		Sleeve /Journal
Motor Frame Sizes	NEMA	56C, 143TC, 145TC, 182TC, 184TC
	IEC	71, 80, 90, 100, 112 – B5 Flange
Weight, less motor (approx.)		63 lbs (29 kg)

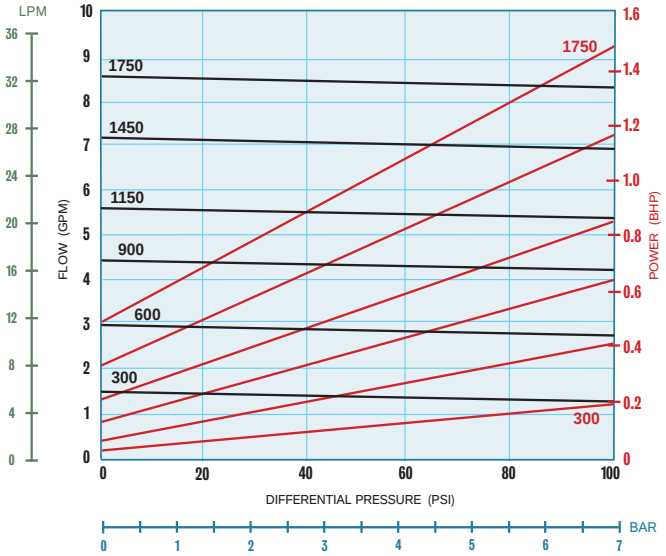
1 Based on Maximum Speed and zero Differential Pressure.
2 Based on pressure rating of Flanges at ambient temperature.

PERFORMANCE CURVES

1 CPS Fluid (Water)

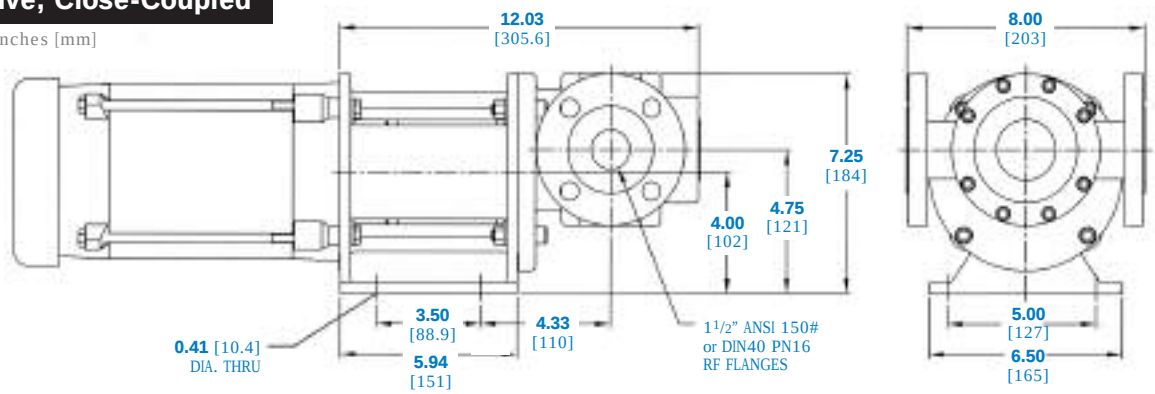


100 CPS Fluid (Oil)



P5: Mag-Drive, Close-Coupled

Dimensional Data: inches [mm]



Poly-Guard™ SERIES

POLYMER-LINED STAINLESS STEEL GEAR PUMP

Liquiflo™

MODEL **P 6**

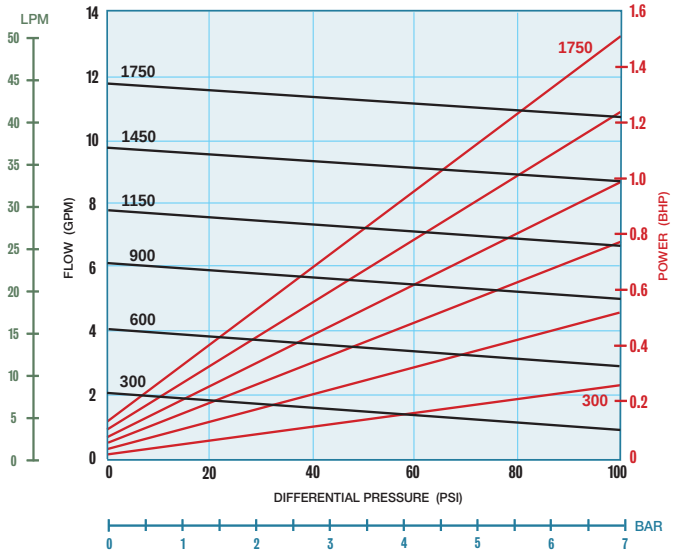
MAG-DRIVE, CLOSE-COUPLED

Port Size & Type	ANSI	1 1/2" 150# RF Flanges
	DIN	40 mm PN16 RF Flanges
Theoretical Displacement [1]		.00675 gal/rev (.02555 L/rev)
Max Speed		1750 RPM
Max Flow Rate[1]		**11.8 GPM (44.7 LPM)**
Max Differential Pressure		100 PSI (7 bar)
Max Allowable Pressure [2]		275 PSIG (19 barg)
Max Temperature		200°F (93°C)
NPSHR @ Max Speed		5.2 ft (1.6 m)
Suction Lift (Dry)		7 ft (2.1 m)
Gear Type		Spur, External
Bearing Type		Sleeve /Journal
Motor Frame Sizes	NEMA	56C, 143TC, 145TC, 182TC, 184TC
	IEC	71, 80, 90, 100, 112 – B5 Flange
Weight, less motor (approx.)		63 lbs (29 kg)

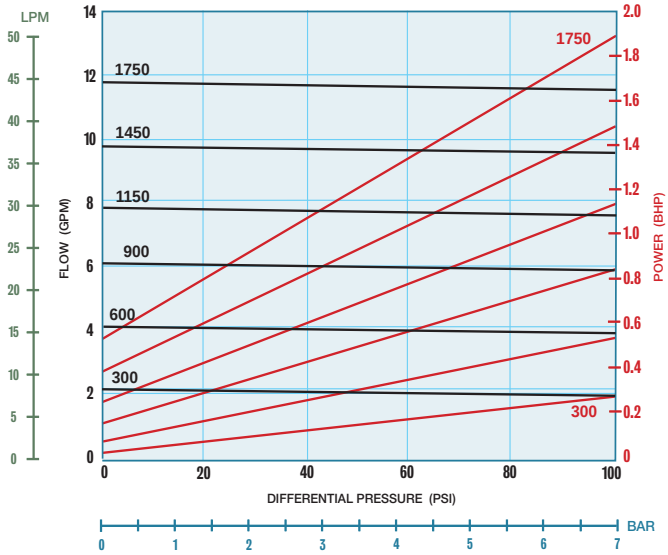
1 Based on Maximum Speed and zero Differential Pressure.
2 Based on pressure rating of Flanges at ambient temperature.

PERFORMANCE CURVES

1 CPS Fluid (Water)

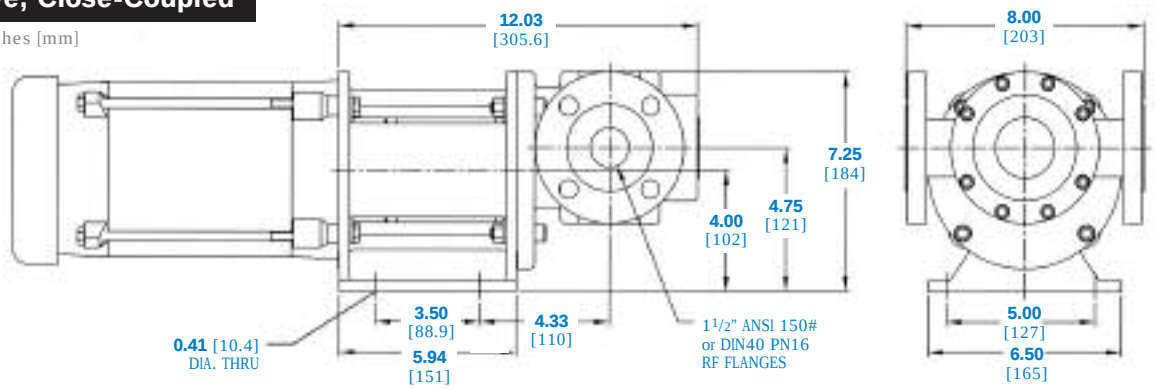


100 CPS Fluid (Oil)



P6: Mag-Drive, Close-Coupled

Dimensional Data: inches [mm]



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Poly-Guard SERIES

POLYMER-LINED STAINLESS STEEL GEAR PUMP

MODEL **P 7**

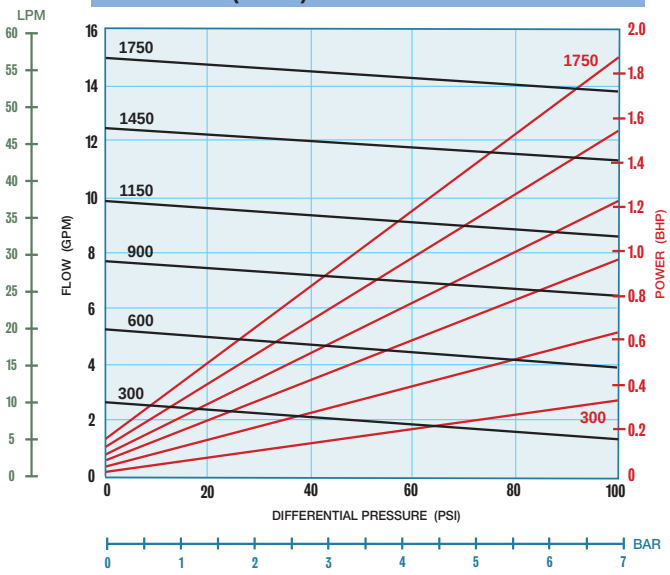
MAG-DRIVE, CLOSE-COUPLED

Port Size & Type	ANSI	1 1/2" 150# RF Flanges
	DIN	40 mm PN16 RF Flanges
Theoretical Displacement [1]		.00859 gal/rev (.03251 L/rev)
Max Speed		1750 RPM
Max Flow Rate[1]		**15.0 GPM (56.9 LPM)**
Max Differential Pressure		100 PSI (7 bar)
Max Allowable Pressure [2]		275 PSIG (19 barg)
Max Temperature		200°F (93°C)
NPSHR @ Max Speed		4 ft (1.2 m)
Suction Lift (Dry)		7 ft (2.1 m)
Gear Type		Spur, External
Bearing Type		Sleeve /Journal
Motor Frame Sizes	NEMA	56C, 143TC, 145TC, 182TC, 184TC
	IEC	71, 80, 90, 100, 112 – B5 Flange
Weight, less motor (approx.)		63 lbs (29 kg)

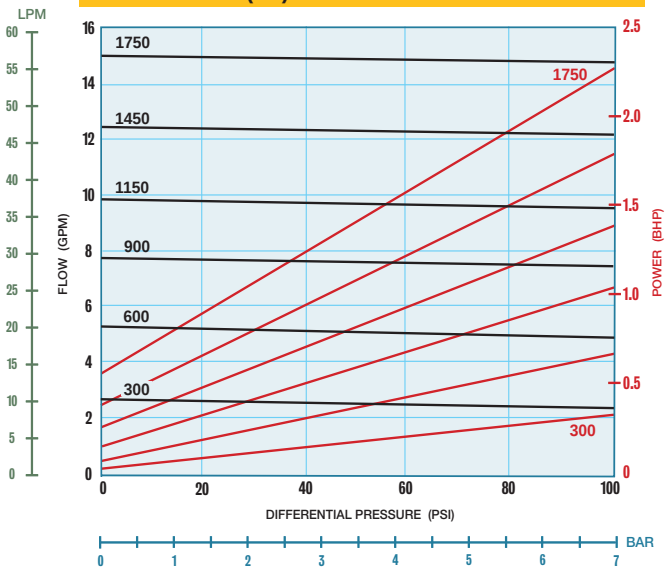
1 Based on Maximum Speed and zero Differential Pressure.
2 Based on pressure rating of ANSI 150# Flanges at ambient temperature.

PERFORMANCE CURVES

1 CPS Fluid (Water)

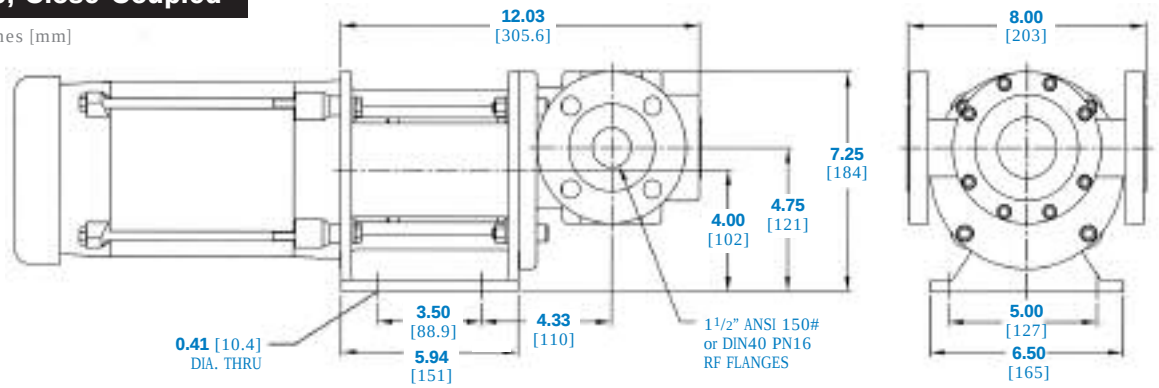


100 CPS Fluid (Oil)



P7: Mag-Drive, Close-Coupled

Dimensional Data: inches [mm]



PUMP MODEL CODING

EXAMPLE:

P3LPPBB100BVU, designates a Model P3 Pump with the following mat'l selection.

P3	L	P	P	B	B	1	0	0	B	V	U
1	2	3	4	5	6	7	8	9	10	11	12

Pos.	Description	Selection	
1	Pump Model	P3	**P3 Pump**
2	Body Mat'l/Ports	L	**SS/PFA & ANSI Flanges**
3	Drive Gear Mat'l	P	**PEEK**
4	Idler Gear Mat'l	P	**PEEK**
5	Wear Plate Mat'l	B	**Silicon Carbide**
6	Bearing Mat'l	B	**Silicon Carbide**
7	Motor Frame Size	1	**0.875" (143/145TC)**
8	Containment Can	0	**Alloy-C/PFA-Lined**
9	Bearing Flush	0	**None**
10	Shafts	B	**Silicon Carbide**
11	O-Rings	V	**Viton**
12	Mag Coupling	U	**MCU**

Liquiflo's Model Code describes both the pump's size and materials selected. This model code is required for the future identification of your pump when reordering either a pump or replacement parts.

■ **Available**

⊗ **Not Available**

CF Contact Factory

Flanges available: ANSI & DIN

CONNECTION SIZES

	P1 – P4	P5 – P7
ANSI 150#	3/4	1 1/2
DIN PN16	20	40

Poly-Guard SERIES

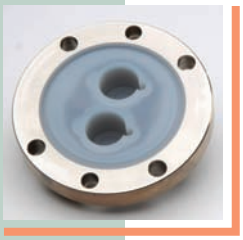
POLYMER-LINED STAINLESS STEEL GEAR PUMP

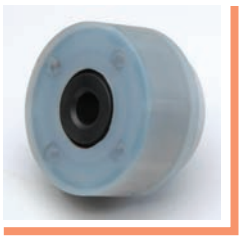
Selection & Availability

Sample Model No. P3 L P P B B 1 0 0 B V U

Position No. 1 2 3 4 5 6 7 8 9 10 11 12

Position			P1	P2	P3	P4	P5	P6	P7
Position 1 Model	1	**Pump Model**							
Position 2 Body Material & Port Type	2	L = SS/PFA Lined & ANSI Flanges E = SS/PFA Lined & DIN Flanges	■ ■	■ ■	■ ■	■ ■	■ ■	■ ■	■ ■
Position 3 Drive Gear	3	3 = Teflon 8 = Ryton P = PEEK K = Kynar	■ ■ ■ ■	■ ■ ■ ■	■ ■ ■ ■	■ ■ ■ ■	■ ■ ■ ■	■ ■ ■ ■	■ ■ ■ ■
Position 4 Idler Gear	4	3 = Teflon 8 = Ryton P = PEEK K = Kynar	■ ■ ■ ■	■ ■ ■ ■	■ ■ ■ ■	■ ■ ■ ■	■ ■ ■ ■	■ ■ ■ ■	■ ■ ■ ■
Position 5 Wear Plates	5	3 = Teflon B = Silicon Carbide E = Carbon 60	■ ■ ■	■ ■ ■	■ ■ ■	■ ■ ■	■ ■ ■	■ ■ ■	■ ■ ■
Position 6 Bearings	6	B = Silicon Carbide E = Carbon 60	■ ■	■ ■	■ ■	■ ■	■ ■	■ ■	■ ■
Position 7 Motor Frame Size	7	0 = 0.625" (NEMA 56C) 1 = 0.875" (NEMA 143/145TC) 2 = 14 mm (IEC 71 - B5) 3 = 19 mm (IEC 80 - B5) 4 = 24 mm (IEC 90 - B5) 5 = 1.125" (NEMA 182/184TC) 8 = 28 mm (IEC 100/112 - B5)	■ ■ ■ ■ ■ ⊗ ⊗	■ ■ ■ ■ ■ ⊗ ⊗	■ ■ ■ ■ ■ ⊗ ⊗	■ ■ ■ ■ ■ ⊗ ⊗	■ ■ ■ ■ ■ ■ ■	■ ■ ■ ■ ■ ■ ■	■ ■ ■ ■ ■ ■ ■
Position 8 Containment Can	8	0 = Alloy-C/PFA-Lined F = Carbon Fiber/PFA-Lined	■ CF	■ CF	■ CF	■ CF	■ CF	■ CF	■ CF
Position 9 Bearing Flush	9	0 = Standard Housings (without Bearing Flush)	■	■	■	■	■	■	■
Position 10 Shafts	10	B = Silicon Carbide Z = TTZ (Zirconia)	■ ■	■ ■	■ ■	■ ■	■ ■	■ ■	■ ■
Position 11 O-Rings	11	E = EPDM V = Viton K = Kalrez ■	■ ■ ■	■ ■ ■	■ ■ ■	■ ■ ■	■ ■ ■	■ ■ ■	■
Position 12 Magnetic Coupling	12	U = (MCU) 75 in-lbs B = (MCB) 120 in-lbs	■ ■	■ ■	■ ■	■ ■	⊗ ■	⊗ ■	⊗ ■
Suffix Trim Options		- 8 = Temperature Trim - 9D = Viscosity Trim (double clearance) - 9T = Viscosity Trim (triple clearance)	■ ■ ■	■ ■ ■	■ ■ ■	■ ■ ■	■ ■ ■	■ ■ ■	■ ■ ■





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For over 35 years, Liquiflo pumps have handled thousands of difficult chemicals