



# Hydra-Cell®

Seal-less Pumping Technology

Oil and Gas

NO PACKING – to Leak or Replace



# Hydra-Cell® Oil and Gas Pumps

Compact seal-less pumps for long life and high reliability



Gas drying – pumping hot TEG

With over 35 years experience in oil and gas industry service, Hydra-Cell pumps have proven performance. In 2010, the new Hydra-Cell T80 Series packing-free triplex pump received a “Spotlight on New Technology” award from the Offshore Technology

- Production
- Transport
- Refining



Hydra-Cell pumps are used for many oil and gas applications.



**Hydra-Cell®**  
Seal-less Pumping Technology

Typical Chemicals and Liquids Pumped	Challenges in Pumping	The Hydra-Cell Advantage
<b>Produced Water &amp; Sour Water</b> <i>(Injection, Disposal, Transfer)</i>	Corrosive, can contain H <sub>2</sub> S, salt, CO <sub>2</sub> plus other impurities forming acidic solutions.	<ul style="list-style-type: none"> <li>Corrosion resistant liquid head materials available.</li> <li>Seal-less pumping chamber.</li> </ul>
	Abrasive; water contains sand and other contaminants: barium, cadmium, sulphur, chromium, copper, iron, lead, nickel, silver, zinc.	<ul style="list-style-type: none"> <li>Seal-less pump head means that liquids containing particles can be pumped reliably.</li> <li>No dynamic seals to wear.</li> </ul>
	Containment of H <sub>2</sub> S gas.	<ul style="list-style-type: none"> <li>No cups, packings or seals to leak gas.</li> <li>Seal-less pump chamber provides 100% containment.</li> </ul>
<b>Hot Triethylene Glycol (TEG) Diethylene Glycol (DEG)</b> <i>(Gas Drying)</i>	Non-lubricating.	<ul style="list-style-type: none"> <li>No need for lubrication from pumped liquid.</li> </ul>
	Liquid temperatures up to 212°F (100°C).	<ul style="list-style-type: none"> <li>No dynamic seals to be damaged.</li> </ul>
	Controllability of injected TEG /DEG.	<ul style="list-style-type: none"> <li>Flow rate directly proportional to pump rpm.</li> <li>Shaft speed adjustable range from 10 to 1500 rpm (1000 rpm for some models).</li> </ul>
<b>Methanol</b> <i>(Well Icing Prevention)</i>	Non-lubricating, especially pumping at pressure.	<ul style="list-style-type: none"> <li>No need for lubrication from pumped liquid.</li> </ul>
<b>Natural Gas Liquids</b> <i>(Mixtures of Methane, Propane, Ethane)</i>	Non-lubricating.	<ul style="list-style-type: none"> <li>No need for lubrication from pumped liquid.</li> </ul>
	Must be 100% contained to comply with VOC emissions legislation	<ul style="list-style-type: none"> <li>Seal-less pump chamber provides 100% containment.</li> </ul>
<b>Amines</b>	Containment of any H <sub>2</sub> S saturated in Amine.	<ul style="list-style-type: none"> <li>Seal-less pump chamber provides 100% containment.</li> </ul>
	Responsive accurate control of flow rate.	<ul style="list-style-type: none"> <li>Virtually pulse-free flow gives responsive control with accuracy exceeding API 675 performance criteria.</li> </ul>
<b>Caustics</b> <i>(Sodium Hydroxide, Potassium Hydroxide)</i>	Tend to crystallize when cold or in contact with air, forming solids which can damage mechanical seals.	<ul style="list-style-type: none"> <li>Seal-less pump head means that liquids containing particles can be pumped reliably.</li> </ul>
<b>Acids</b> <i>(Sulphuric, Hydrochloric, Nitric)</i>	Corrosive.	<ul style="list-style-type: none"> <li>No dynamic seals to be damaged.</li> </ul>
	Tend to crystallize when cold or in contact with air, forming solids which can damage mechanical seals	<ul style="list-style-type: none"> <li>Unique vertical check valve can handle liquids with particles reliably</li> </ul>
<b>Condensates</b>	Non-lubricating.	<ul style="list-style-type: none"> <li>No need for lubrication from pumped liquid.</li> </ul>
	Must be 100% contained to comply with VOC emissions legislation.	<ul style="list-style-type: none"> <li>Seal-less pump chamber provides 100% containment.</li> </ul>
<b>Polymers</b> <i>(Well Stimulation)</i>	Shear sensitive gel structures which can be broken down easily.	<ul style="list-style-type: none"> <li>Low-shear pumping action.</li> </ul>
	High viscosity.	<ul style="list-style-type: none"> <li>Unique vertical check valves for reliable pumping action.</li> </ul>
	Abrasive, contains soda ash.	<ul style="list-style-type: none"> <li>Seal-less pump chamber and vertical orientated check valves allows reliable pumping of liquids with suspended solids.</li> </ul>
	Responsive accurate control of flow rate	<ul style="list-style-type: none"> <li>Virtually pulse-free flow gives responsive control with accuracy exceeding API 675 performance criteria.</li> </ul>
<b>Crude Oil</b>	Range of viscosities make it difficult to pump.	<ul style="list-style-type: none"> <li>Hydra-Cell seal-less pumping action can handle liquids with viscosities from 0.01 to 5000 cPs, or liquids containing a mixture of viscosities.</li> </ul>

# Hydra-Cell® Advantages

Designed for continuous use, Hydra-Cell seal-less pumps are robust, reliable, efficient and can be used in a wide range of oil and gas applications, lowering the total cost of ownership.

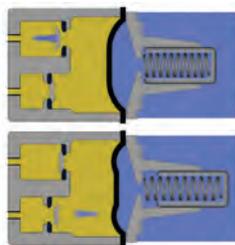


Enhanced oil recovery - pumping shear-sensitive polymers

## High reliability - low maintenance

Having **no packing** means high reliability.

- Run dry indefinitely.
- No packing or seals to wear or replace.
- No packing or seals to leak potentially harmful gases such as H<sub>2</sub>S.
- No packing or seals to leak any Volatile Organic Compounds (VOC).
- No tight tolerances that could be susceptible to corrosion or damaged by solid particles.
- Pumps liquids with viscosities from 0.01 to 5000 cPs.
- Pumps non-lubricating liquids reliably.
- Pumps liquids with up to 8000 microns particulate matter (depending on model).
- No drop off in performance due to seal wear.



## Compact design

For metering and dosing applications the compact design of Hydra-Cell offers significant advantages:

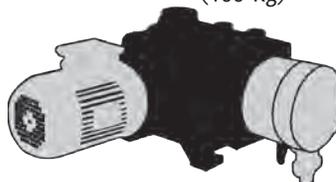
1. Space saving
2. Easy to service
3. Lower initial purchase cost

Both pumps rated at 2500 PSI (172 bar) and 29 GPH (110 LPH)



◀ Hydra-Cell weight: 51 lbs. (23 kg)

▼ Traditional metering pump weight 220 lbs. (100 kg)



## High efficiency

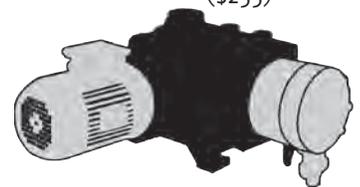
- A true positive-displacement pump, Hydra-Cell is one of the most efficient metering and dosing pumps available.

Both pumps rated at 2500 PSI (172 bar) and 29 GPH (110 LPH)



◀ Hydra-Cell metering pump motor 0.75 kw (\$78)

▼ Traditional metering pump motor 4 kw (\$233)



## Save up to 65% on motor costs

The Hydra-Cell multiple-diaphragm head means that smaller motors can be used, saving energy.

## Unique horizontal check valves

- Reliably pump acids and caustics which crystallize.
- Efficient pumping of liquids with solids such as lime slurries, soured water containing sand.

## Energy saving

- Very economical to run compared to centrifugal pumps.
- Smaller, more compact motors can be used.

Compared with multi-stage centrifugal pumps for fluid pumped at 290 PSI (20 bar)

Flow (ft <sup>3</sup> /hr)	Energy used (kw)		Energy Saving	Potential Annual Savings*
	Centrifugal	Hydra-Cell		
21	1.54	0.50	67%	\$250
53	2.0	1.44	28%	\$134

Compared with multi-stage centrifugal pumps pumping fluid at 580 PSI (40 bar)

Flow (ft <sup>3</sup> /hr)	Energy used (kw)		Energy Saving	Potential Annual Savings*
	Centrifugal	Hydra-Cell		
148	9.34	6.10	35%	\$778
268	15.40	11.00	28%	\$1,056

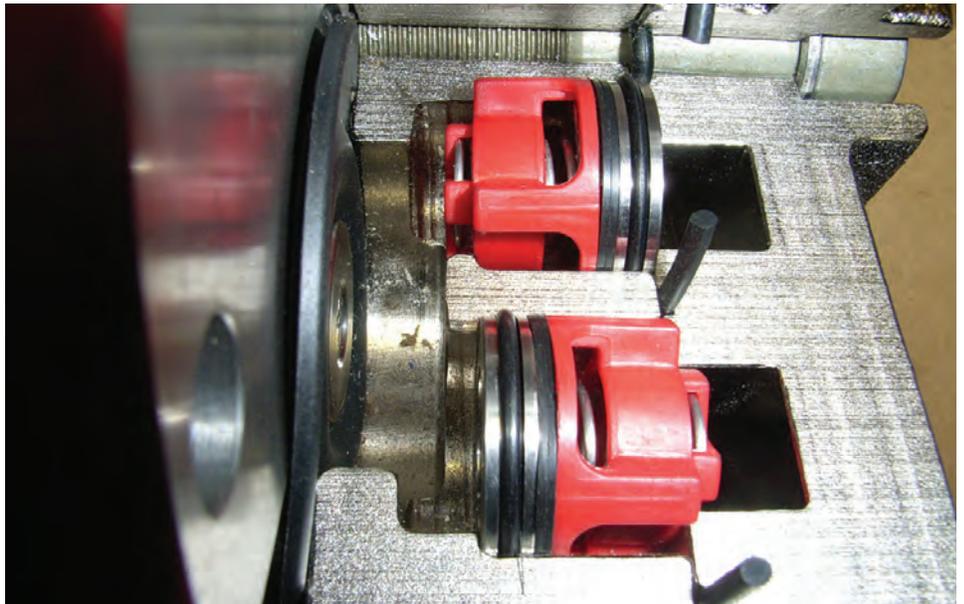
\* Based on pumps running 2,000 hr/yr @ USA average of 12¢/kwh

## Simple robust design

- Designed and built for long service life.
- Simple maintenance with no special tool requirements.
- No critical tolerances to be aware of during maintenance.
- On-site repair possible, no costly removal and transportation requirement to workshops.

## Low-shear pumping action

Due to the gentle pumping action, shear-sensitive liquids (especially polymers) can



be pumped without breaking down the long chain structures within the liquids.

## Minimal filtration

- No mechanical seals or tight tolerances that need protection by fine filtration.
- Can handle particles up to 8000 microns (depending on model).

- Can pump liquids with non-dissolved solids up to 40%, depending on particle distribution.
- Unaffected by lapses in filtration, reducing costly pump repairs.
- Reduced filtration maintenance and management.



Pumping ceramic slurry at 40% solid content.

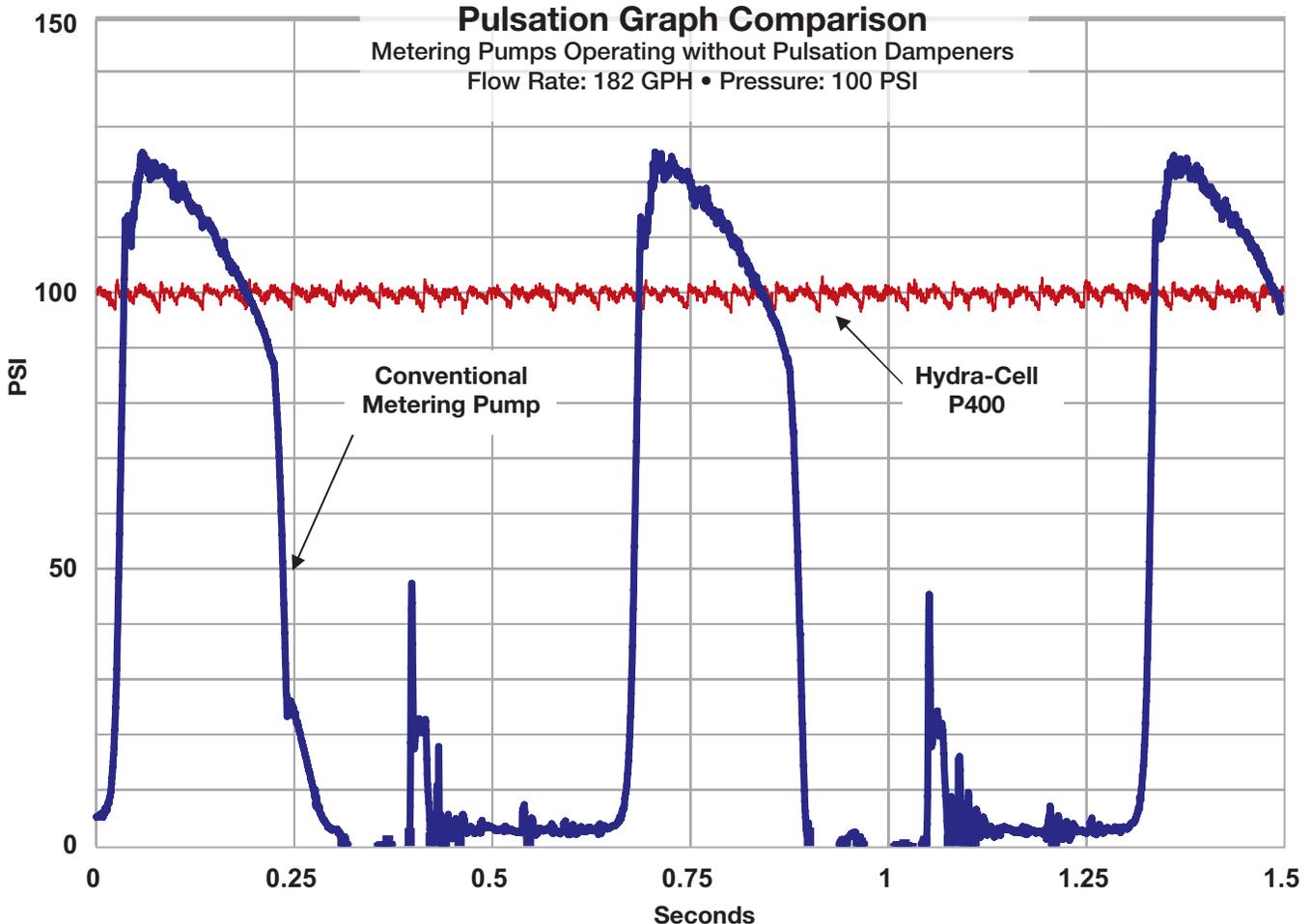
# Ultimate Control for Metering and Dosing

A high level of accuracy and control is required for the safe, precise injection of chemicals used in various phases of oil and gas processing. Hydra-Cell P Series metering pumps feature electronic flow control and virtually pulse free operation to provide such accuracy and reliable control during oil and gas production, refining, and transmission and distribution.



## Virtually pulse-free flow for accurate metering

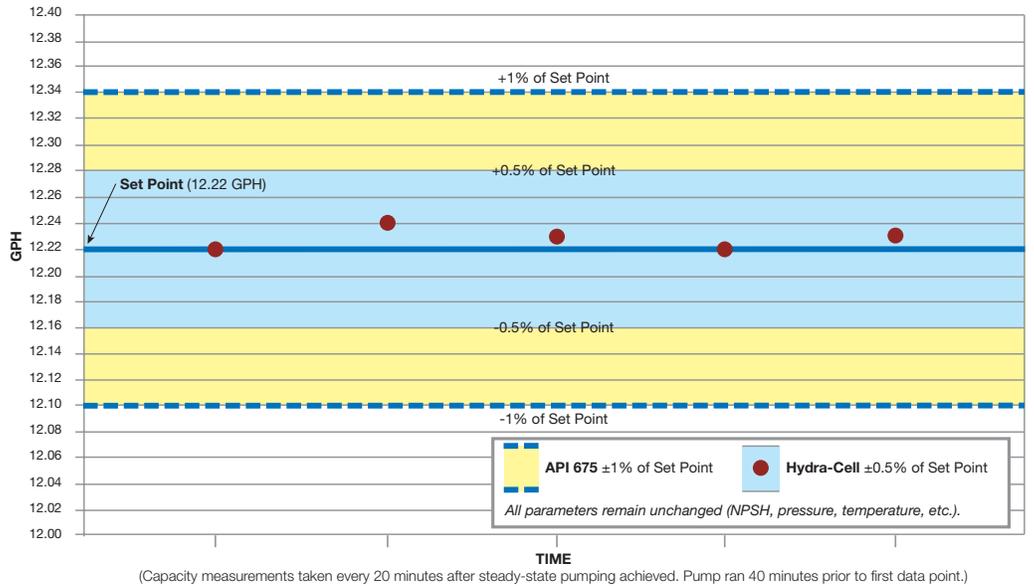
- Multiple-diaphragm design minimizes pulsations, eliminating the need for expensive pulsation dampeners for most Hydra-Cell models.
- More accurate control of flow rate and efficient use of chemicals.
- Significantly less inlet acceleration head issue than traditional single-diaphragm metering pumps, especially with viscous liquids.



# Metering pumps that meet or exceed API 675 performance standards

## Steady-state accuracy better than $\pm 1\%$

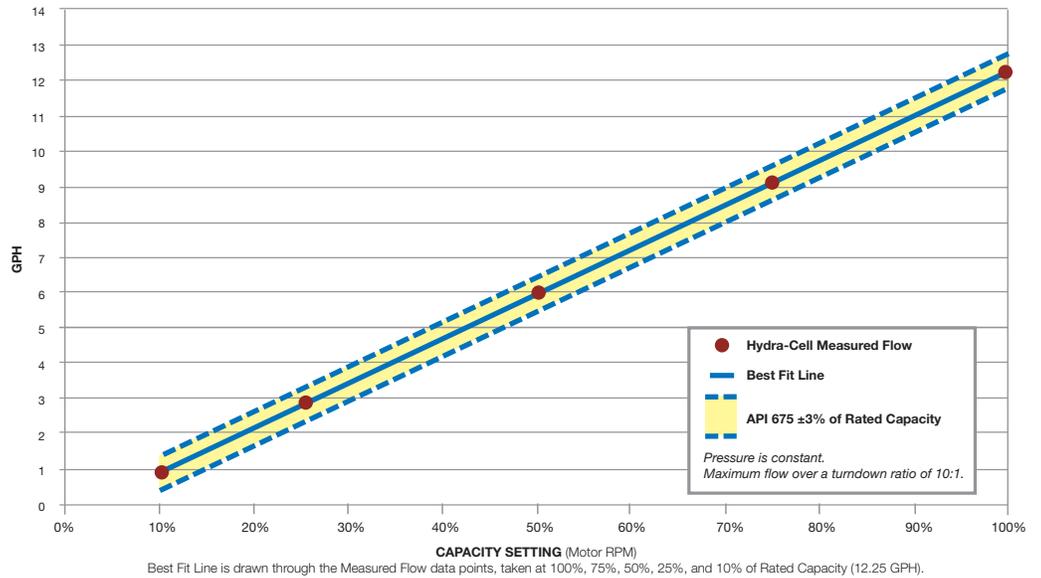
This is a measure of how well a set flow rate can be maintained.



## Linearity better than $\pm 3\%$

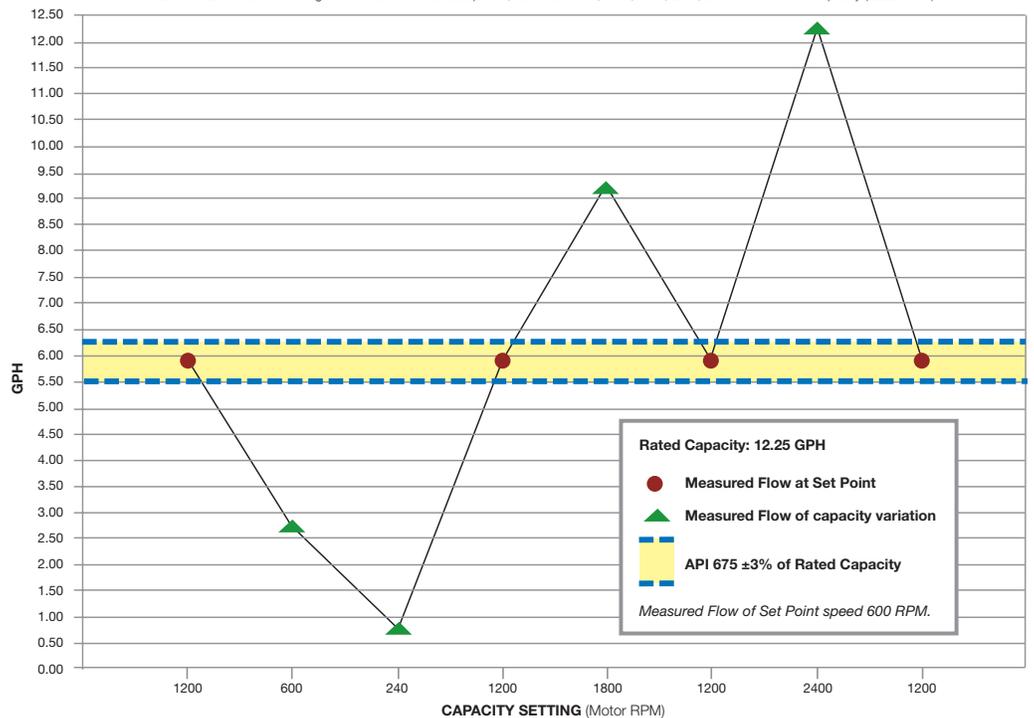
(Pump shaft speed/flow rate relationship)

This is a measure of how well a set flow rate can be maintained.



## Repeatability better than $\pm 3\%$

This is a measure of how accurately the flow rate can be controlled when varying the pump shaft rpm away from a set point and returning to that set point.



# Pump Selection



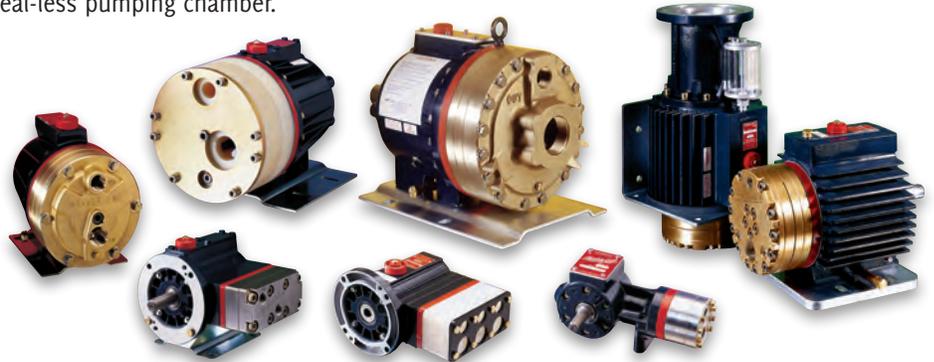
*Jet pump oil extraction process - surface pump supplying high-pressure water to down-hole jet pump*

## Hydra-Cell F/M/D & H Series - High Performance, Positive Displacement Diaphragm Pumps

Hydra-Cell F/M/D & H Series heavy duty pumps are designed for transfer, pressure injection, and dosing and have proven performance and reliability pumping aggressive, corrosive, abrasive, non-lubricating, hot liquids in many arduous applications.

Hydra-Cell's seal-less design enables produced water and sour water to be handled reliably and safely, 100% containing any H<sub>2</sub>S gas.

VOC emissions are also eliminated by the seal-less pumping chamber.



## Hydra-Cell P Series - Extraordinary Metering Pumps - Exceeding API 675 Performance Standards

Hydra-Cell P Series pumps are designed for dosing chemicals at up to 895 GPH when high accuracy and control are required. These pumps offer the reliability and simplicity of a hydraulically balanced, multi-diaphragm in a pump that exceeds API 675 performance standards.

Liquids that crystallize and can cause damage to other pumps usually can be dosed very successfully and accurately with Hydra-Cell P Series pumps thanks to its inherently simple yet elegant design.

Based on its modern features, the acquisition and operating costs of Hydra-Cell metering pumps provide significant

savings compared to conventional metering pumps of similar performance.





Gas field - transfer of hydrocarbons

### Liquid Head Materials

A range of liquid head materials is available to suit the pumped liquid.

### Diaphragm Materials

A variety of materials is available to suit different performance conditions.

Liquid Head Materials	Diaphragm Materials
Hastelloy®	EPDM
Duplex SS	Viton®
316 SS	PTFE
Brass	Neoprene
Cast Iron	Buna
Polypropylene	Aflas (above 100° F/38° C)
Kynar®	

### Pipe Connections

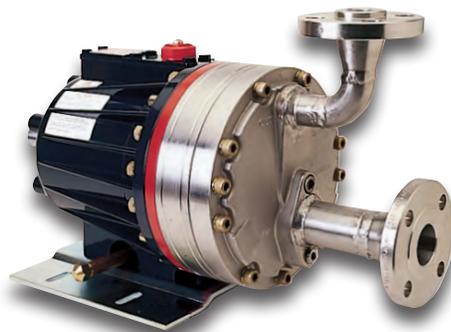
SAE flange connections.

Specialized flange connections (e.g. Tri-Clamp®).



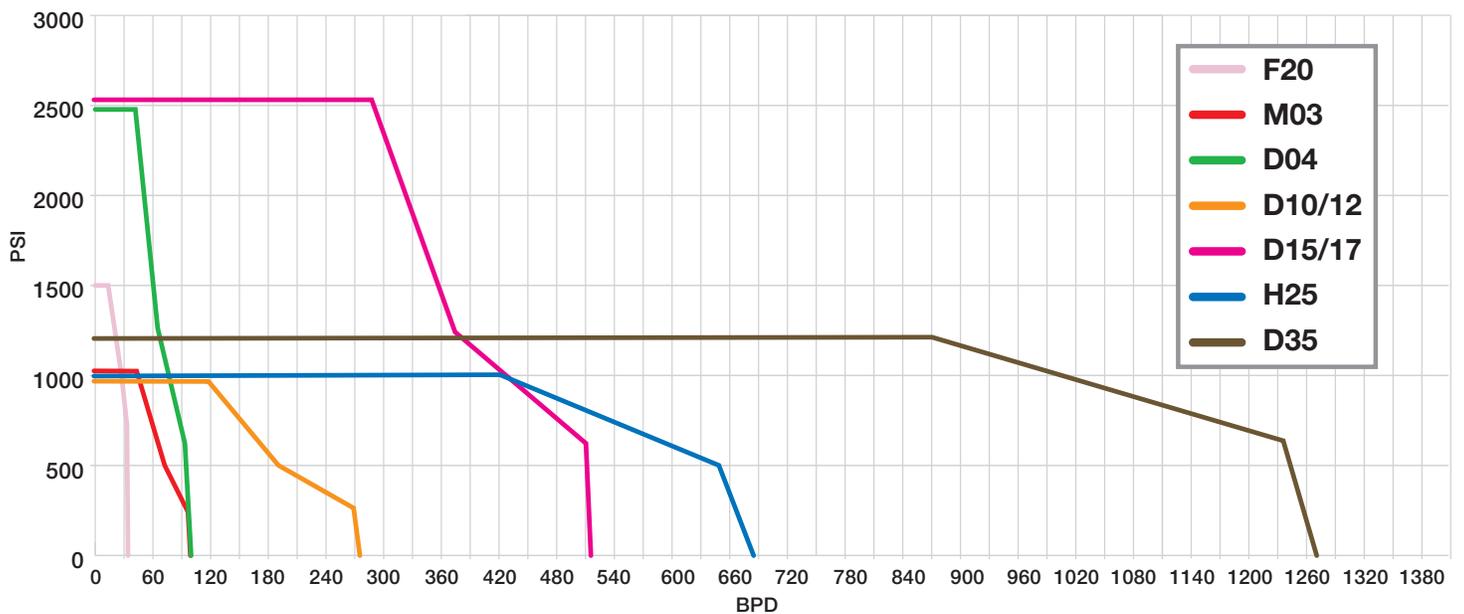
ANSI flange connections.

Threaded connections NPT or BSPT.



# Pump Flow and Pressure Rates

## F/M/D/H Series Pumps



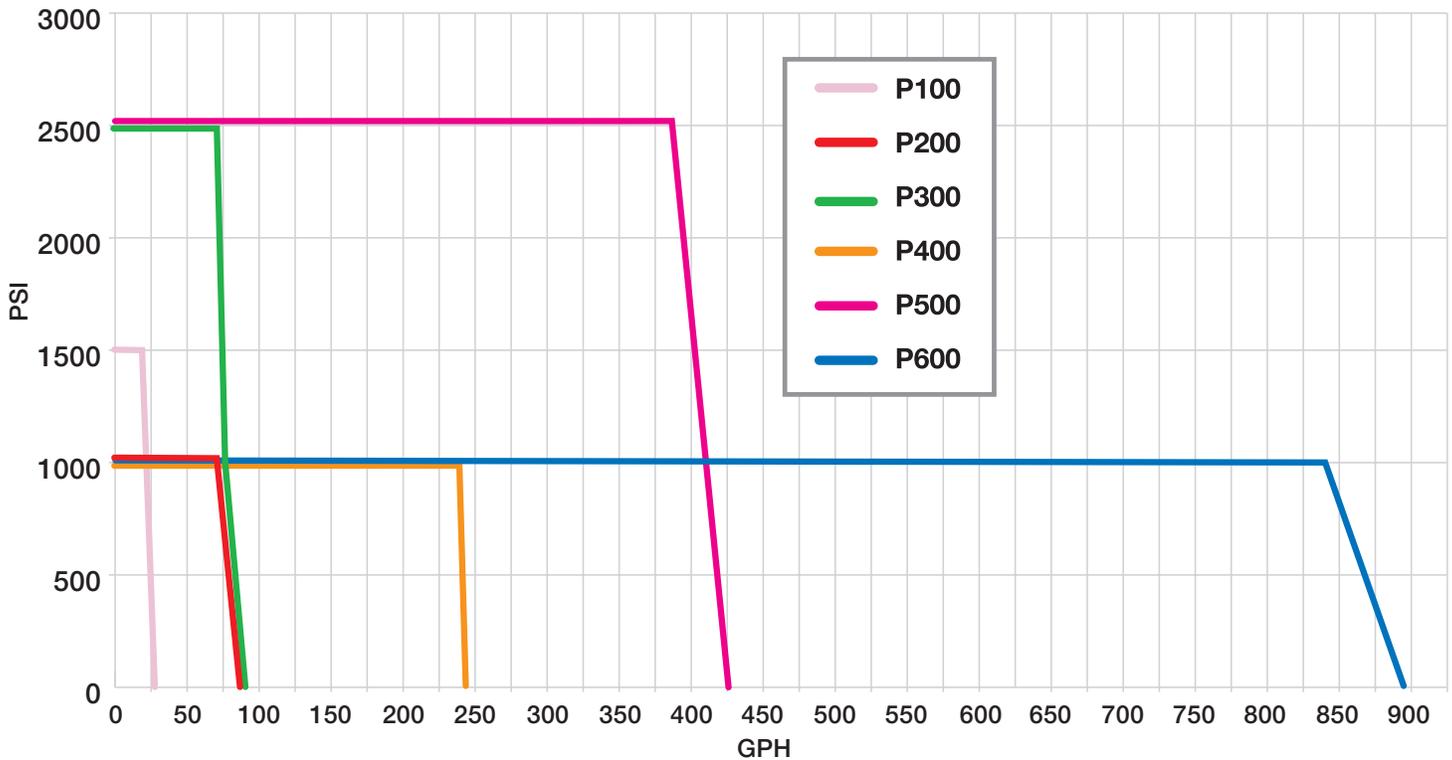
## Capacities and Ratings

Model*	Maximum Capacity	Maximum Discharge Pressure		Maximum Temperature		Maximum Suction Pressure
		Non-Metallic	Metallic	Non-Metallic	Metallic	
F20	34.3 BPD (3.8 l/min)	250 PSI (17 bar)	1500 PSI (103 bar)	140° F (60° C)	250° F (121° C)	250 PSI (17 bar)
M03	102.8 BPD (11.3 l/min)	250 PSI (17 bar)	1000 PSI (69 bar)	140° F (60° C)	250° F (121° C)	250 PSI (17 bar)
D04	102.8 BPD (11.3 l/min)	N/A	2500 PSI (172 bar)	N/A	250° F (121° C)	500 PSI (34 bar)
D10/12	274.3 BPD (30.3 l/min)	250 PSI (17 bar)	1000 PSI (69 bar)	140° F (60° C)	250° F (121° C)	250 PSI (17 bar)
D15/17	514.3 BPD (56.8 l/min)	N/A	2500 PSI (172 bar)	N/A	250° F (121° C)	500 PSI (34 bar)
H25	685.7 BPD (75.7 l/min)	250 PSI (17 bar)	1000 PSI (69 bar)	140° F (60° C)	250° F (121° C)	250 PSI (17 bar)
D35	1268.5 BPD (140 l/min)	250 PSI (17 bar)	1200 PSI (69 bar)	140° F (60° C)	250° F (121° C)	250 PSI (17 bar)

\* Ratings are for X-Cam design

# Pump Flow and Pressure Rates

## P Series Pumps



## Capacities and Ratings

Model	Maximum Capacity	Maximum Discharge Pressure		Maximum Temperature**		Maximum Suction Pressure	
		Non-Metallic*	Metallic	Non-Metallic*	Metallic		
P100	27 GPH (100.3 LPH)	250 PSI (17 bar)	1500 PSI (103 bar)	140° F (60° C)	250° F (121° C)	250 PSI (17 bar)	
P200	81 GPH (305.9 LPH)	250 PSI (17 bar)	1000 PSI (69 bar)	140° F (60° C)	250° F (121° C)	250 PSI (17 bar)	
P300	82 GPH (311.5 LPH)	N/A	2500 PSI (172 bar)	N/A	250° F (121° C)	500 PSI (34 bar)	
P400	243 GPH (919.9 LPH)	250 PSI (17 bar)	1000 PSI (69 bar)	140° F (60° C)	250° F (121° C)	250 PSI (17 bar)	
P500	426 GPH (1662.6 LPH)	N/A	2500 PSI (172 bar)	N/A	250° F (121° C)	500 PSI (34 bar)	
P600	895 GPH (3387.9 LPH)	250 PSI (17 bar)	1000 PSI (69 bar)	140° F (60° C)	250° F (121° C)	250 PSI (17 bar)	

\* 350 PSI (24 bar) maximum with Kynar® liquid end.

\*\* Consult factory for correct component selection for temperatures above 160° F (71° C).



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