# Hydra-Cell®
Seal-less Pumps

## Reliable Pumps for Oil and Gas Processing with No Dynamic Seals or Packing to Leak or Replace

Oil & Gas Processing


Wanner Engineering, Inc.

# Pressure Injecting and Mixing • Transfer • Spraying • Metering and Dosing

Hydra-Cell® Pumps for Oil & Gas Processing

## Compact, Seal-less Pumps for Reliable Operation and Long Service Life

With more than 40 years of experience serving the industry, including many of the major global companies, Hydra-Cell pumps are performance-proved for continuous use in a wide range of oil and gas applications.

- Can pump corrosive and abrasive fluids, even at high temperatures.
- Able to run dry without damage (or additional maintenance) to the pump in case of accident or operator error.
- Minimizes maintenance because there are no mechanical seals, packing, or cups to leak or replace.

### Field Production and Transport Applications

- Hot Glycol Injection
- Produced Water Injection, Disposal & Transfer
- Condensate Transfer & Injection
- Hot Amine Injection
- Chemical Injection
- Crude Oil Transfer

### Refinery Applications

- Catalytic Injection
- Crude Oil Sampling
- High Pressure Water
- Caustic Soda Wash Down
- Emission Control
- Pumping Slurry for $SO_2$ Removal/Acidic Neutralization
- Amine Injection for Sour Liquids & Gases

*"Before we installed our Hydra-Cell pump, we were using a plunger pump. And, anytime you run a plunger pump you're going to get some leakage in the packing or they end up burning out. At the speed we needed to run them at, they were burning up packing quite regularly. So we replaced our old plunger pumps with D04 Hydra-Cell pumps and since then we haven't had an issue. Their durability and seal-less design have helped us reduce costly maintenance."*

Denis Boucher
Production Foreman
Trident Exploration Group Inc.

### Hydra-Cell Pumps Selection and Applications

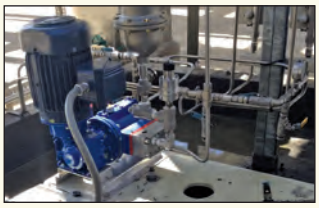
Hydra-Cell positive displacement pumps are available in several models to cover a wide range of flows and pressures in different applications.

Ten (10) Hydra-Cell Seal-less models are ideal for transfer, spraying, and pressure injecting and mixing.

Seven (7) Hydra-Cell T&Q Series pump models are designed for higher flow capacities and greater pressure ratings.

Seven (7) Hydra-Cell Metering Solutions models that are ideal for metering and dosing, spraying, and pressure injection and mixing.

In addition, four (4) Hydra-Cell solenoid diaphragm metering pump models provide low-flow, low-pressure chemical injection.



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

Offshore
*(Chemical Injection & Reverse Osmosis)*

Gas Extraction
*(Water Reinjection, Well Dewatering & NGL Transfer)*

Gas Processing & Distribution
*(Glycol Injection and Odorizing)*

Oil Refining
*(Steam, Stripping, Additive Injection, Stack Cooling & Chemical Metering)*

Jet Pumps
*(Artificial Lift)*

Pressure Testing
*(Pipes and Well Testing)*

Oil Extraction
*(Well Simulation, Water Reinjection, Chemical Injection)*

Crude Oil
*(Transfer & Sampling)*

| Typical Chemicals and Liquids Pumped | Challenges in Pumping | The Hydra-Cell Advantage |
|---|---|---|
| **Produced Water & Sour Water**<br>(Injection, Disposal, Transfer, Steam Generator Feed Water) | Corrosive – can contain $H_2S$, salt, $CO_2$ plus other impurities forming acidic solutions that can damage a pump. | • Seal-less design provides no leak path and handles corrosive fluids.<br>• Corrosion-resistant liquid end materials available. |
| | Abrasive – water contains sand and other contaminants (e.g.) barium, cadmium, sulfur, chromium, copper, iron, lead, nickel, silver, zinc. | • Seal-less design and spring-loaded, horizontal disk check valves enable liquids with particulates up to 800 microns (depending on pump model) to be pumped reliably without damage to the pump.<br>• No dynamic seals to wear. |
| | $H_2S$ gas may not be fully contained by packing or seals. | • No cups, packing or dynamic seals to leak gas.<br>• Seal-less pump chamber provides 100% containment. |
| **Hot Triethylene Glycol (TEG)**<br>**Diethylene Glycol (DEG)**<br>(Gas Drying) | Non-lubricating – requires internal gearing or reservoir with added maintenance issues. | • Pumping action does not require lubrication. |
| | Handling high temperature of liquid pumped. | • No dynamic seals to be damaged. |
| | Controllability of injected TEG/DEG. | • Flow rate directly proportional to pump speed.<br>• Shaft speed adjustable range from 10 to 1800 rpm (1200 rpm for some models). |
| **Methanol**<br>(Well Icing Prevention) | Non-lubricating, especially pumping at pressure. | • Pumping action does not require lubrication. |
| **Natural Gas Liquids**<br>(Mixtures of Methane, Propane, Ethane) | Non-lubricating – requires internal gearing or reservoir with added maintenance issues. | • Pumping action does not require lubrication. |
| **Amines**<br>(Liquid & Gas Sweetening, Monoethanolamine, Diethanolamine, Methyldiethanolamine, Diglycolamine) | Difficult to contain any $H_2S$ saturated in an amine. | • Seal-less pump chamber provides 100% containment. |
| | Control of flow rate must be responsive and accurate. | • Utilizes speed control for greater accuracy.<br>• Exceeds API 675 performance criteria for linearity (speed/flow rate relationship). |
| **Caustics**<br>(Sodium Hydroxide, Potassium Hydroxide) | Tend to crystallize when cold or in contact with air, forming solids that can damage mechanical seals, cups, packing, and other pump components that require a lubricating film. | • Seal-less design means no rotary shaft seals to wear or replace, preventing air and moisture contamination.<br>• Spring-loaded, horizontal disk check valves enable liquids with particulates up to 800 microns in size (depending on pump model) to be pumped reliably without damage to the pump. |
| **Acids**<br>(Sulfuric, Hydrochloric, Nitric) | Corrosive – can damage pump. | • Seal-less design provides no leak path and handles corrosive fluids.<br>• Corrosion-resistant liquid end materials available. |
| | Tend to crystallize when cold or in contact with air, forming solids that can damage mechanical seals and other pump components that require a lubricating film. | • Seal-less design and spring-loaded, horizontal disk check valves enable liquids with particulates up to 800 microns (depending on pump model) to be pumped reliably without damage to the pump. |
| **Condensates**<br>(Field, Lease) | Non-lubricating – requires internal gearing or reservoir with added maintenance concerns. | • Pumping action does not require lubrication. |
| | Must be 100% contained to comply with VOC emissions legislation. | • No cups, packing or dynamic seals to leak gas.<br>• Seal-less pump chamber provides 100% containment. |
| **Polymers**<br>(Enhanced Oil Recovery) | Shear-sensitive gel structures can be broken down easily. | • Provides low-shear pumping action and virtually pulse-less flow that protect polymers. |
| | Difficultly in pumping high-viscosity fluids. | • Low-shear pumping action also handles higher-viscosity fluids. |
| | Abrasive – contains soda ash. | • Seal-less design and spring-loaded, horizontal disk check valves enable liquids with particulates up to 800 microns (depending on pump model) to be pumped reliably without damage to the pump. |
| | Control of flow rate must be responsive and accurate. | • Utilizes speed control for greater accuracy.<br>• Exceeds API 675 performance criteria for linearity (speed/flow rate relationship). |
| **Crude Oil**<br>(Transfer, Sampling, LACT) | Range of viscosities makes it difficult to pump. | • Seal-less design and low-shear pumping action enable handling of liquids with viscosities from 0.01 to 5000 cPs or more as well as liquids containing a mixture of viscosities. |

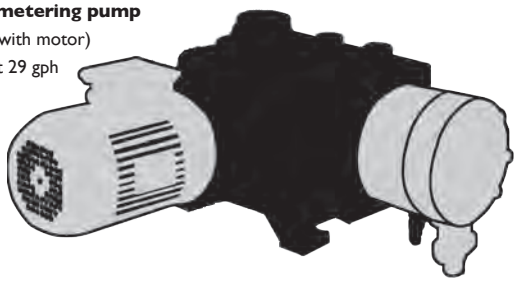
# Lower Initial Investment and Lower Energy Costs

## Uses lower hp motors

- Although both metering pumps have the same pressure rating, the lighter, more compact Hydra-Cell has a higher flow rating while requiring a less expensive, lower hp motor. This means Hydra-Cell saves approximately 30% to 55% on initial costs.

**Hydra-Cell metering pump**
Weight: 83.5 lbs. (with motor)
Rated: 2500 psi at 36 gph
Motor: 1-1/2 hp

**Conventional metering pump**
Weight: 220 lbs. (with motor)
Rated: 2500 psi at 29 gph
Motor: 5 hp



## Low power consumption - 85% to 90% energy efficiency

- The lower hp requirement of the Hydra-Cell pump achieves the same performance but with greater energy efficiency and less power consumption.
- Hydra-Cell positive displacement pumps show significant energy savings when compared to screw pumps and multi-stage centrifugal pumps.

*The multiple-diaphragm liquid head of Hydra-Cell also allows a less expensive, energy-saving motor to be used.*

Compared with multi-stage centrifugal pumps for fluid pumped at 290 psi.

| Flow ($ft^3$/hr) | Energy Used (kW) | | Energy Saving | Potential Annual Savings* |
|---|---|---|---|---|
| | Centrifugal | Hydra-Cell | | |
| 21 | 1.54 | 0.50 | 67% | $280 |
| 53 | 2.0 | 1.44 | 28% | $151 |

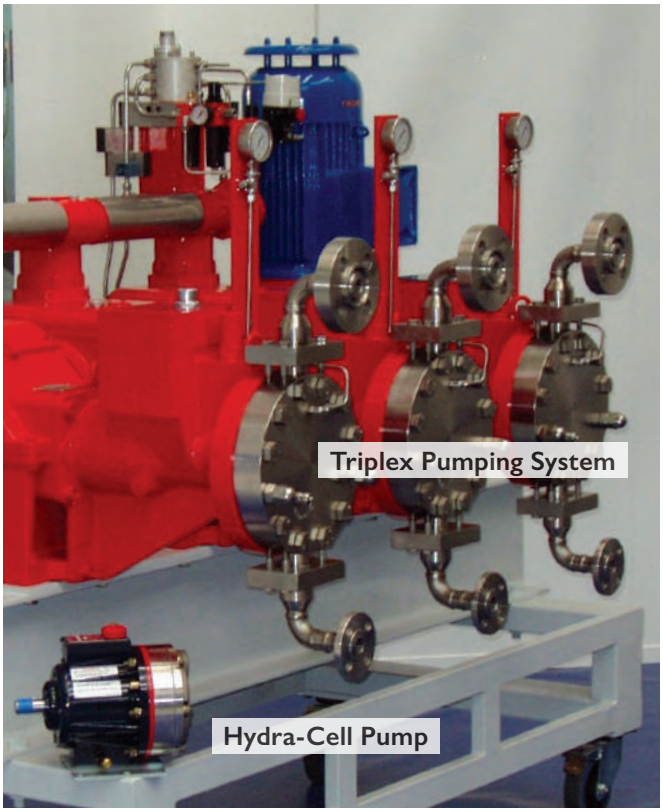
Compared with multi-stage centrifugal pumps for fluid pumped at 580 psi.

| Flow ($ft^3$/hr) | Energy Used (kW) | | Energy Saving | Potential Annual Savings* |
|---|---|---|---|---|
| | Centrifugal | Hydra-Cell | | |
| 148 | 9.34 | 6.10 | 35% | $875 |
| 268 | 15.40 | 11.00 | 28% | $1,188 |

** Based on pumps running 2,000 hr/yr @ USA average of 13.5¢/kWh.*

## Small footprint for savings

- Compact design can mean up to 30% lower initial cost compared to other pumps.
- Space-saving design creates a smaller footprint for more efficient use of plant space.
- Easier to access for routine maintenance or servicing.

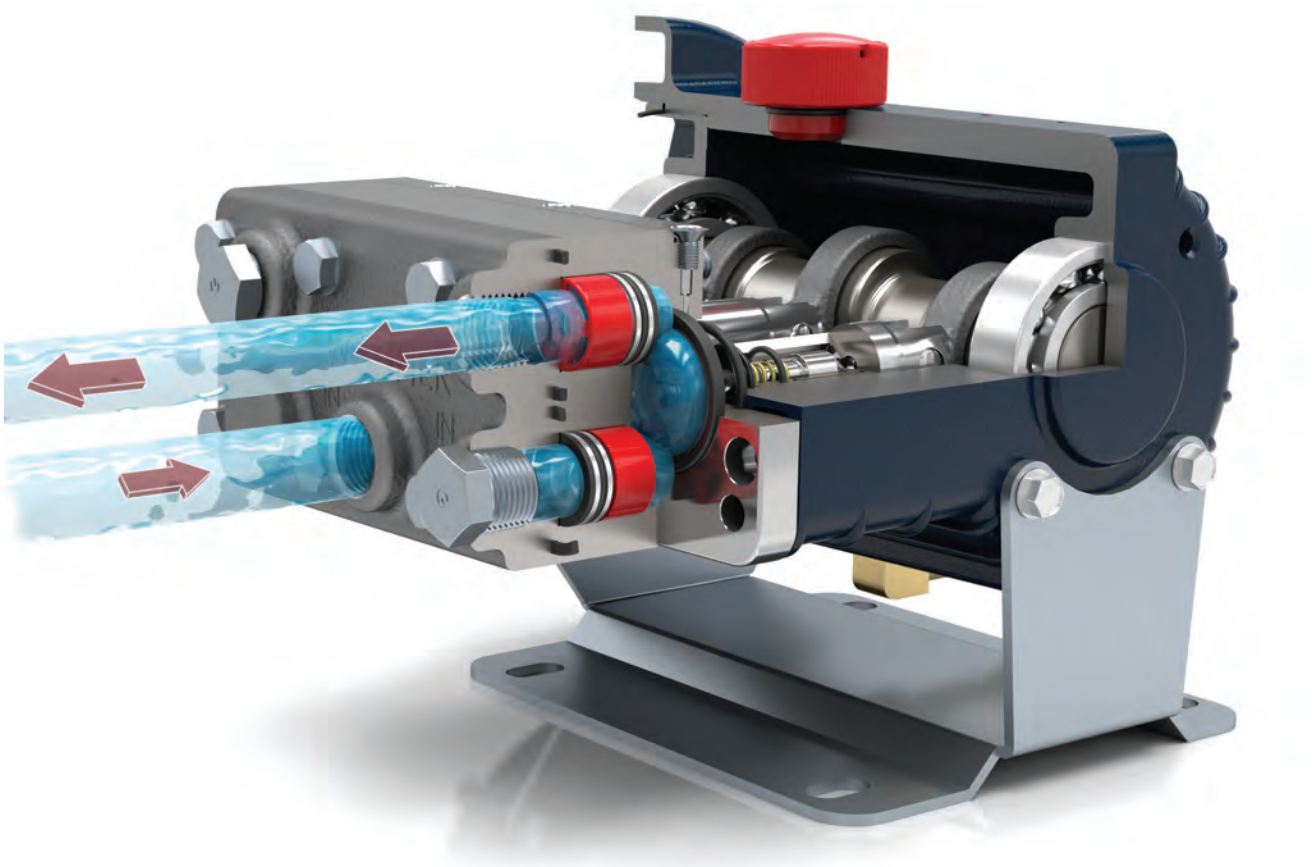



**Pumps Shown to Scale**

*This Hydra-Cell pump shown to scale has the same flow capacity and pressure rating as this conventional triplex metering pump system.*

# Pumps Abrasives and Low-to-High Viscosity Fluids





*Hydra-Cell's seal-less design and horizontal check valve orientation will handle abrasives and particulates without clogging or damaging the pump.*

## Handles abrasives and particulates

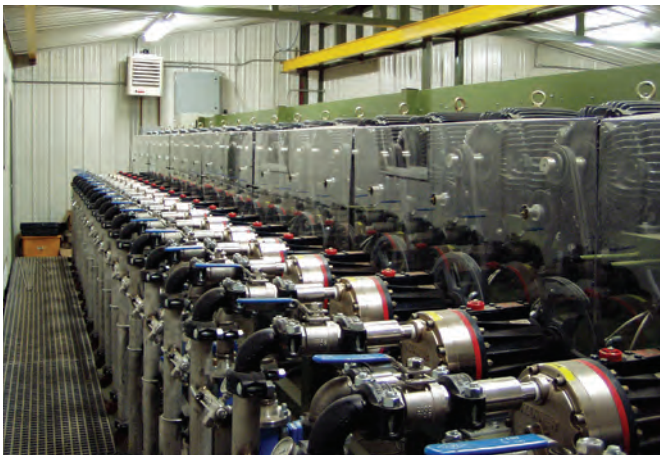
- Seal-less design and spring-loaded, horizontal disk check valves provide superior handling of abrasives and particulates.
- Efficiently pumps liquids with solids such as lime slurries and sour water containing sand. Can handle abrasive fillers and particulates up to 800 microns in size (depending on pump model) and up to 9 hardness (out of 10) on the Mohs scale.

## Runs dry without damage

- Hydraulically-balanced diaphragms with patented Diaphragm Position Control (DPC) technology enable Hydra-Cell pumps to run dry without damage to the pump in the event of a blocked suction line, valve closure, or other system interruptions.

## Handles low-to-high viscosity fluids

- Pumps thin to highly viscous liquids up to 5000 cPs or more (depending on pump model) throughout the entire pressure range.
- Low-shear pumping action makes Hydra-Cell ideal for pumping and protecting shear-sensitive polymers.
- Non-lubricating liquids can be pumped reliably.



*Hydra-Cell pumping shear-sensitive polymers for enhanced oil recovery.*

*"We've had our pump for three years – four years this fall and it's been great. There's very little maintenance and it's cost effective to run."*

Pat Hollman
Senior Operator
Macklin Facility • Husky Energy

# One Versatile, Low-Maintenance Pump Design

## No dynamic seals, cups, or packing to leak, wear or replace

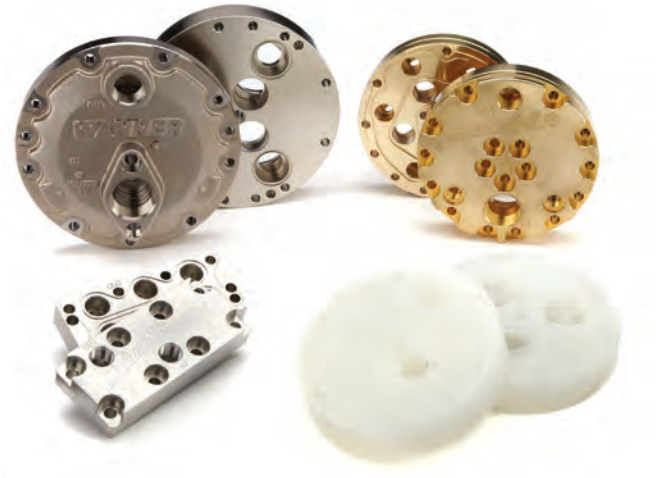
- Since there are no dynamic seals to wear or replace, Hydra-Cell pumps need little maintenance and will operate reliably under continuous duty at high pressure.
- No tight tolerances that could be susceptible to corrosion or damaged by solid particles.
- No drop-off in performance common to sealed pumps as the seals wear.

## Environmental protection - no harmful emissions

- Liquids are 100% sealed from the atmosphere.
- No leak path for toxic vapors or harmful gases such as $H_2S$.
- No dynamic seals so there is full containment of Volatile Organic Compounds (VOC).

## Built for continuous duty and long service life

- One design for all applications minimizes the need for standby pumps and spare parts, which optimizes training and service expertise and reduces inventory size and expense.
- Can operate up to 6,000 hours between lubricating oil changes (compared to 1,500 hours recommended by many piston pump manufacturers).



## Simple pump head design

- Liquid head materials can be changed readily, enabling Hydra-Cell to be used for many different chemicals and liquids pumped.
- Minimal maintenance required; no special tools are needed.
- Low cost of spare parts.

*"The longevity of the pump is what makes it such a great tool. With the Hydra-Cell, we just don't have any of the packing or leaking issues that most normal pumps do."*

Trevor Clay,
Field Operator
Talisman Energy

## Reduced filtration maintenance and management

- No dynamic seals or tight tolerances that need protection by fine filtration.
- Pumps particulates and abrasives up to 800 microns in size (depending on pump model) which can eliminate the need for fine filtration.
- Can pump liquids with non-dissolved solids up to 40%, depending on particle distribution.
- Unaffected by lapses in filtration, reducing costly pump repairs.

## Adaptable to many applications

- One Hydra-Cell design applied to a large selection of models covers a wide range of operating flows and pressures.
- Can be fitted with ANSI, SAE or DIN flanges, IEC or NEMA motor mounts, or provided with ATEX certification to adapt to specific applications or meet international standards.
- Proven record of replacing different pump technologies with improved abrasives handling, less maintenance, and other benefits (as detailed on pages 8-10).


*Hydra-Cell pumps shown processing volatile crude oil.*

# Accurate Metering and Dosing with Pulse-free, Linear Flow

## Accurate electronic flow control

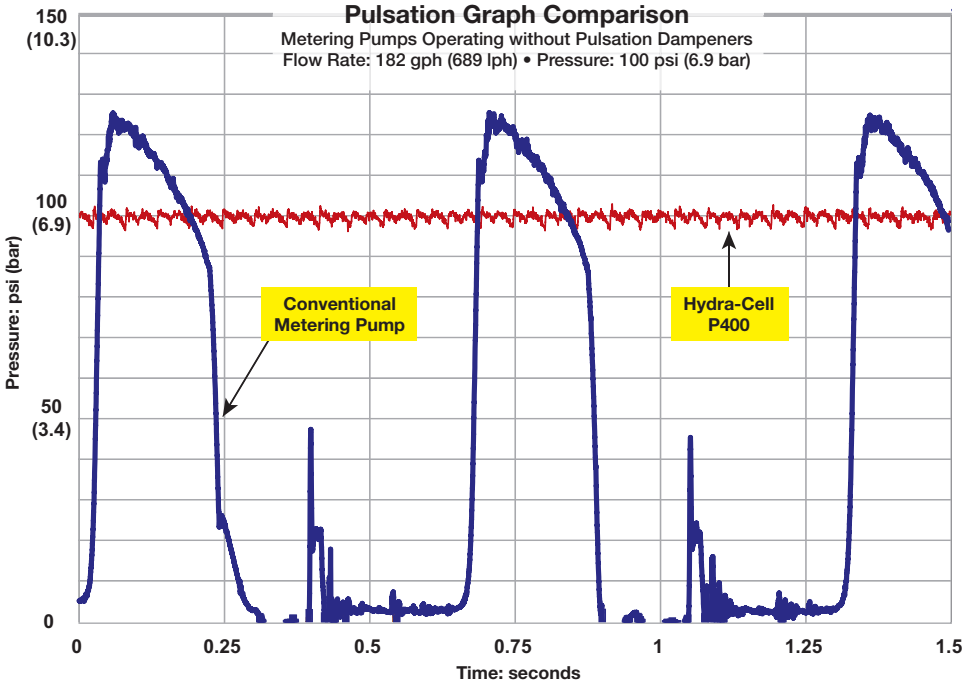
- Compared to pumps that rely on manual stroke adjustment or expensive actuators to change flow, Hydra-Cell metering pumps utilize speed control for greater accuracy throughout the turndown range.
- Can be equipped with solid-state electronic flow control where the volume per every stroke is constant and a known value.
- Electronic flow also provides easy calibration of the desired feed rate and a near instantaneous rate of change (0 to maximum rpm in 0.3 seconds).

| | Hydra-Cell Seal-less Pump Models | Hydra-Cell Metering Pump Models |
|---|---|---|
| Steady State Accuracy | ±1% | ±1% or better |
| Repeatability | ±3% | ±3% or better |
| Linearity | ±3% | ±3% or better |

*Typical results for recommended speed range.*

## Virtually pulse-free flow

- Multiple-diaphragm design minimizes pulsations, eliminating the need for expensive pulsation dampeners for most Hydra-Cell models.
- Reduces pipe strain.
- Enhances operating safety.
- Minimizes maintenance.
- Reduces acceleration/friction losses in the suction line.
- Provides accurate metering with linear, constant flow.
- Lowers system acquisition costs.




# Versatility for Field and Refinery Applications

## Variety of liquid end materials

A choice of liquid end materials is available to suit the fluid being pumped:

- Hastelloy C
- 316L SST
- 304 SST
- Cast Iron
- Ductile Iron
- Brass
- Duplex Alloy 2205 SST
- Manganese Bronze
- Nickel Aluminum Bronze (NAB)
- Polypropylene
- PVDF
- PVC

## Variety of diaphragm materials

Diaphragms are available in a choice of materials to operate over a wide range of processing and performance conditions:

- EPDM
- PTFE
- Buna-N
- FKM
- Neoprene
- Aflas

## Variety of pipe connections

*SAE flange connections*

*ANSI flange connections*

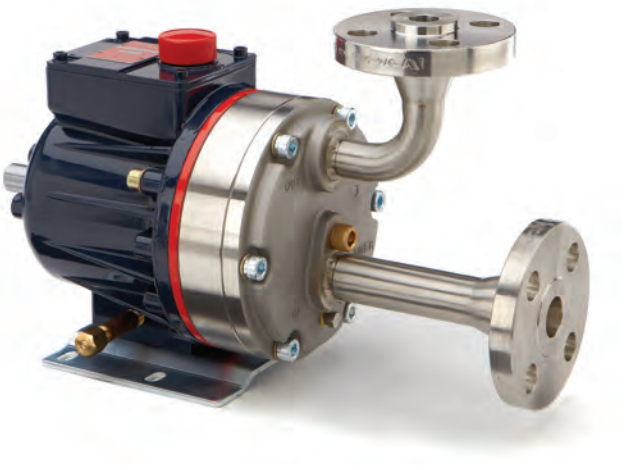
*NPT or BPST threaded connections*

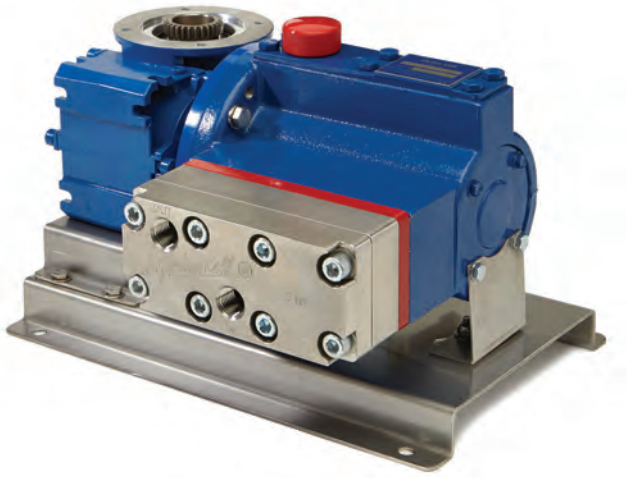
# Hydra-Cell® Performance Advantages Compared to Other Types of Pumps

*Plunger pumps (shown) have maintenance, wear, lubrication, and environmental issues that Hydra-Cell pumps avoid because of the seal-less, multiple-diaphragm design of Hydra-Cell.*

| Plunger/Piston Pump Disadvantages: | Hydra-Cell Advantages: |
|---|---|
| • Packing requires frequent adjustments and then replacement as it wears. | • Seal-less design uses no packing, reducing downtime and maintenance costs. |
| • Packing must leak to provide lubrication – creating maintenance, containment, disposal, safety, and housekeeping issues with their associated costs. | • No packing means no secondary containment requirements, no clean-up or disposal issues, improved safety, and reduced maintenance costs. |
| • Packing allows emissions that require expensive "vapor-less" alternatives or vapor recovery systems. | • Seal-less design eliminates emissions and costly associated fines. |
| • Packing causes plunger wear, which is made worse by abrasive media; the plunger, stuffing box, and packing must be compatible with the product being pumped. | • Diaphragm design allows pumping of abrasive and corrosive media without concern for wear, compatibility or replacement of packing or plunger/piston. |
| • May require external lubrication systems at an additional cost of up to $3,000 – another maintenance and repair factor. | • No lubrication necessary, resulting in less maintenance and lower cost of ownership expenses. |

| Conventional Metering Pump Disadvantages: | Hydra-Cell Advantages: |
|---|---|
| • Use manual stroke adjusters or expensive actuators to control flow, which can result in pumping inaccuracies, lost motion, operator error, and a greater chance of leakage. | • Hydra-Cell employs optional Variable Frequency Drive (VFD) electronic flow control for greater accuracy and repeatability, eliminating lost motion, reducing the chance of operator error, and removing a potential leak path. |
| • Require expensive pulsation dampeners to minimize pulsations. | • Multiple-diaphragm design provides smooth, linear, virtually pulse-free flow, so expensive pulsation dampeners may not be required. |
| • May only offer PTFE diaphragms, requiring frequent replacement due to stress and poor elastomeric memory. | • Available with a wide choice of cost-effective, elastomeric diaphragm materials. |
| • Large footprint to achieve required maximum flow and pressure. | • Can meet the same flow and pressure requirements with a much smaller footprint, saving space and costs. |
| • Different plunger and liquid end sizes needed to accommodate changes in operating pressures. | • Operates over a wide range of pressures without changes to the plunger or liquid end size. |
| • Integral gearing (necessary to prevent cross-contamination of actuating oil) is difficult and expensive to maintain. | • The simplicity of design means lower parts and maintenance costs.<br>• Separate gearbox prevents cross-contamination of the actuating oil. |





*Compared to other pumps, Hydra-Cell requires minimal maintenance for oil and gas processing. Hydra-Cell has no mechanical seals, cups, or packing that leak or need to be replaced and no internal gears to wear.*

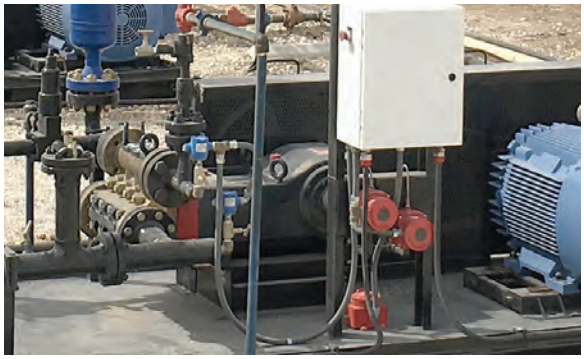
| Internal Gear Pump Disadvantages: | **Hydra-Cell Advantages:** |
|---|---|
| • Mechanical seals and packing require maintenance, and replacement or adjustment. | • The seal-less design of Hydra-Cell means that there are no mechanical seals or packing to leak or replace. |
| • Does not tolerate thin/non-lubricating liquids, and does not handle solids, abrasives or particulates well. | • Seal-less pumping chamber and spring-loaded, horizontal disk check valves can pump solids, abrasive fillers and particulates while handling liquids thick or thin. |
| • Designed for operating at low speeds and low pressure ratings.<br>• Low volumetric efficiency. | • Operates at low-to-high speeds and at higher pressures with higher volumetric efficiency. |
| • Component wear reduces accuracy and efficiency. | • No internal gears to wear so there is less maintenance and spare part replacement.<br>• Accuracy and efficiency are more stable. |
| • One bearing runs in the pumped fluid. | • No bearings in the pumped fluid. |
| • Unbalanced - overhung load on the shaft bearing. | • Hydraulically balanced design so there is no overhung load. |

| External Gear Pump Disadvantages: | **Hydra-Cell Advantages:** |
|---|---|
| • Mechanical seals and packing require maintenance, and replacement or adjustment. | • The seal-less design of Hydra-Cell means that there are no mechanical seals or packing to leak or replace. |
| • Does not tolerate solids, abrasives, or particulates. | • Seal-less pumping chamber and spring-loaded, horizontal disk check valves can pump solids, abrasive fillers, and particulates. |
| • Component wear reduces accuracy and efficiency. | • No internal gears to wear so efficiency is more stable and there is less maintenance and spare part replacement. |
| • Contains four bushings/bearings in the fluid area. | • No bushings/bearings in the pumped fluid. |
| • Fixed end clearances are typical. | • Design does not rely on clearances. |
| • Efficiency drops as outlet pressure increases. | • Efficiency remains relatively constant over its range of operating pressures. |
| • Depends on pumped liquid for lubrication. | • Seal-less design does not require pumped liquid for lubrication. |

# Hydra-Cell® Performance Advantages Compared to Other Types of Pumps

| Progressive Cavity Pump Disadvantages: | Hydra-Cell Advantages: |
|---|---|
| • Dynamic seals are worn by pumping abrasive fluids. | • No dynamic seals in the pumped fluid; can handle abrasive fluids reliably. |
| • Hydrodynamic film between the stator and rotor cam breaks down under pressure, reducing flow rate and negating true positive displacement pumping action. | • Seal-less pump chamber with hydraulically-balanced diaphragms mean that flow rate is maintained even as discharge pressure increases. |
| • Running dry can result in damage to the pump. | • Seal-less design enables Hydra-Cell to run dry without damage to the pump. |
| • Higher pressure requires additional stages with an increasing footprint for horizontal pumps. | • Can meet the same flow and pressure requirements with a much smaller footprint, saving space as well as investment and operation costs. |

| Centrifugal Pump (Multi-stage) Disadvantages: | Hydra-Cell Advantages: |
|---|---|
| • Mechanical seals and packing require maintenance and replacement or adjustment. | • The seal-less design of Hydra-Cell means that there are no mechanical seals or packing to leak or replace. |
| • Particulates and fines in the pumped fluid will cause wear in the case and the impellers. | • Seal-less pumping chamber with spring-loaded, horizontal disk check valves can pump particulates and fines up to 800 microns in size (depending on pump model). |
| • Difficult to maintain high efficiency while varying flow rate or outlet pressure. | • Designed for efficient, high-pressure delivery. |
| • Running dry and air entrapment can cause catastrophic mechanical seal failure. | • Can run dry without damage to the pump. Entrapped air does not cause immediate failure. |
| • Ineffective at low speeds and high outlet pressures. | • Runs at very low speeds (from 18 to 1800 rpm) while maintaining outlet pressures. |
| • Flow rate is difficult to control effectively. | • Positive displacement design allows for accurate speed control. |
| • Higher pressure requires additional stages with an increasing footprint for horizontal pumps. | • Can meet the same flow and pressure requirements with a much smaller footprint, saving space as well as investment and operation costs. |




*Hydra-Cell features a seal-less design that separates the liquid end from the hydraulic end. This enables the pump to tolerate solids, abrasives, and particulates, handle non-lubricating fluids, and run dry without damage to the pump.*

# Hydra-Cell Positive Displacement Diaphragm Pumps are Ideal for Handling Abrasives and Particulates

- Unmatched versatility for a wide range of pumping applications required in oil and gas processing.
- Features a seal-less design and horizontal disk check valves that enable the pump to handle abrasives and particulates that might damage or destroy other types of pumps.
- Simple, compact design reduces initial investment and lowers maintenance costs.
- Selection of models that can operate with very low to very high flow rates and discharge pressures up to 2500 psi.
- Available in a wide range of pump head materials of construction and diaphragm materials.
- Variety of options and accessories to optimize performance.

In his work throughout Southern and Central California, Steve Burks of Oil Field Solutions, has found it challenging at times to get customers to change the way they operate.

*"But once I get them using a Hydra-Cell and they see the difference it can make in reducing maintenance headaches and operating costs for their well operations, they are all for it."*

Steve Burks
Owner
Oil Field Solutions

## Flow Capacities (barrels per day) and Pressure Ratings

| Model[1] | Maximum Capacity BPD | gpm | l/min | Maximum Discharge Pressure psi (bar) Non-metallic[2] | Metallic | Maximum Operating Temperature F (C)[3] Non-metallic | Metallic | Maximum Inlet Pressure psi (bar) |
|---|---|---|---|---|---|---|---|---|
| **F20** | 34 | 1.0 | 3.8 | 350 (24) | 1000 (69) | 140˚ (60˚) | 250˚ (121˚) | 250 (17) |
| **M03** | 106 | 3.1 | 11.7 | 350 (24) | 1000 (69) | 140˚ (60˚) | 250˚ (121˚) | 250 (17) |
| **D04** | 99 | 2.9 | 11.2 | N/A | 2500 (172) | N/A | 250˚ (121˚) | 500 (34) |
| **D10[4]** | 147 | 4.3 | 15.1 | N/A | 1500 (103) | N/A | 250˚ (121˚) | 250 (17) |
| **D10** | 301 | 8.8 | 33.3 | 350 (24) | 1000 (69) | 140˚ (60˚) | 250˚ (121˚) | 250 (17) |
| **D12** | 278 | 8.1 | 30.6 | N/A | 1000 (69) | N/A | 250˚ (121˚) | 250 (17) |
| **D15 & D17** | 473 | 13.8 | 52.3 | N/A | 2500 (172) | N/A | 250˚ (121˚) | 500 (34) |
| **H25** | 686 | 20.0 | 75.7 | 350 (24) | 1000 (69) | 140˚ (60˚) | 250˚ (121˚) | 250 (17) |
| **D35[5]** | 792 | 23.1 | 87.5 | N/A | 1500 (103) | N/A | 250˚ (121˚) | 250 (17) |
| **D35** | 1251 | 36.5 | 138.0 | N/A | 1200 (83) | N/A | 250˚ (121˚) | 500 (34) |
| **D66** | 2253 | 65.7 | 248.7 | 250 (17) | 700 (48) | 120˚ (49˚) | 200˚ (93.3˚) | 250 (17)[6] |

*1 Ratings are for X-cam design.*
*2 350 psi (24 bar) maximum with PVDF liquid end; 250 psi (17 bar) maximum with Polypropylene liquid end.*
*3 Consult factory for correct component selection from 160˚F (71˚C) to 250˚F (121˚C).*
*4 D10 @790 rpm maximum.*
*5 D35/G35 @700 rpm maximum; consult factory for pressures above 1200 psi (83 bar).*
*6 D66 maximum inlet pressure 50 psi (3.4 bar) for non-metallic models.*

**For complete specifications and ordering information, consult the Hydra-Cell catalog.**

# Hydra-Cell Metering Solutions Pumps Exceed API 675 Standards and Provide "Pulse-free" Linear Flow

IChemE 2007 Honourable Mention

The IChemE Awards recognize innovation and excellence in making outstanding contributions to safety, the environment, and sustainable development in the chemical and bioprocess industries.

Hydra-Cell® METERING SOLUTIONS™

- Designed for use with Variable Frequency Drive (VFD) electronic flow control to maintain greater accuracy throughout the turndown range.
- Multiple-diaphragm design (except the P100) provides virtually pulse-free flow, eliminating the need to purchase expensive pulsation dampeners.
- Offers all the features and benefits of original Hydra-Cell pumps (F/M/D/H Series) including seal-less design, horizontal disk check valves (P Series) and space-saving, compact design.
- Selection of models that can operate with very low to very high flow rates and discharge pressures up to 3500 psi.
- Available in a wide range of pump head materials of construction and diaphragm materials.
- Every model is available with a variety of gear box ratios to meet your application needs.
- Variety of options and accessories to optimize performance.

*"We use our Hydra-Cell to pump ethanol glycol for dehydrating natural gas and it's been working well. We've had it for over two years and it's easy to use and there's minimal maintenance, which makes for a longer lasting pump."*

Bud Bessler
Worland Plant Manager
Hiland Partners

## Flow Capacities and Pressure Ratings

| Model[1] | Maximum Capacity gph[2] | Maximum Discharge Pressure psi (bar) | | Maximum Operating Temperature F (C)[3] | | Maximum Inlet Pressure psi (bar) |
|---|---|---|---|---|---|---|
| | | Non-metallic[3] | Metallic | Non-metallic[4] | Metallic | |
| **MT8** | 8.0 | 350 (24) | 3500 (241) | 140° (60°) | 250° (121°) | 500 (34)[5] |
| **P100** | 27.0 | 350 (24) | 1500 (103) | 140° (60°) | 250° (121°) | 250 (17) |
| **P200** | 81.0 | 350 (24) | 1000 (69) | 140° (60°) | 250° (121°) | 250 (17) |
| **P300** | 81.4 | N/A | 2500 (172) | N/A | 250° (121°) | 500 (34) |
| **P400** | 242.8 | 350 (24) | 1000 (69) | 140° (60°) | 250° (121°) | 250 (17) |
| **P500** | 425.9 | N/A | 2500 (172) | N/A | 250° (121°) | 500 (34) |
| **P600** | 890.3 | 350 (24) | 1000 (69) | 140° (60°) | 250° (121°) | 250 (17) |

*1 Ratings are for X-cam design.*
*2 Consult factory for ratings in liters per hour (lph).*
*3 350 psi (24 bar) maximum with PVDF or PVC (MT8 only) liquid ends; 250 psi (17 bar) maximum with Polypropylene liquid end (P Series only).*
*4 Consult factory for correct component selection for temperatures from 160°F (71°C) to 250°F (121°C).*
*5 300 psi (21 bar) for MT8 non-metallic heads.*

**For complete specifications and ordering information, consult the Hydra-Cell metering pumps catalog.**

# Hydra-Cell MT8 Triplex Metering Pumps and S Series Electronic Solenoid/Diaphragm Metering Pumps



*The groundbreaking MT8 triplex metering pump provides linear, virtually pulse-free flow without the need for expensive pulsation dampeners. It is available with PTFE diaphragms and a variety of metallic and non-metallic liquid ends.*

The MT8 meets or exceeds API 675 performance standards for Steady-State Accuracy (±1%), Linearity (±3%) and Repeatability (±3%).

Hydraulically-balanced and actuated, the pump features an integral relief valve for added safety and cartridge check valves for ease of maintenance.

| | |
|---|---|
| Minimum Flow Rate: | 0.06 gph (0.227 lph) |
| Maximum Flow Rate | 8.00 gph (30.28 lph) |
| Maximum Pressure: | 3500 psi (241 bar) for Metallic Pump Heads |

Hydra-Cell® METERING SOLUTIONS™

*SM030CAS manual control with stroke speed dial.*

*SP060HVS with pulse-in control and digital readout.*

*ST03RPES with pulse-in control, timer, and digital readout.*

*SA03RPES with pulse-in/analog-in control and digital readout.*

The S Series pumps provide an economical choice for chemical injection in metering applications. Solenoid driven, the S Series pumps feature a wide discharge-volume range, extensive choice of liquid end materials, various control functions, and a wide voltage range.

Double-ball check valve ensures accurate metering and reduces the chance of water hammer, and an anti-syphon check valve prevents clogging at the injection point and aids in priming.

"Eco-friendly" environmentally sound operation is standard with SP, ST, and SA models. This feature can lower power consumption up to 55%.

| Flow Rate | SM Series Models | SP/ST/SA Series Models |
|---|---|---|
| 30 ml/min* | SM030 | SP/ST/SA-030 |
| 60 ml/min | SM060 | SP/ST/SA-060 |
| 100 ml/min | SM100 | SP/ST/SA-100 |
| 220 ml/min | N/A | SP/ST/SA-200 |
| ***With Relief Valve*** | | |
| 30 ml/min* | SM03R | SP/ST/SA-03R |
| 60 ml/min | SM06R | SP/ST/SA-06R |
| 100 ml/min | SM10R | SP/ST/SA-10R |

** High-pressure models have maximum flow rates of either 25 or 28 ml/min. Consult S Series catalog for more information.*

# Hydra-Cell T and Q Series Pumps

Available to Meet API 674!

## T and Q Series Design Features

- Seal-less design separates the power end from the process fluid end, eliminating leaks, hazards and the expense associated with seals and packing.
- Low NPSH requirements allow for operation with a vacuum condition on the suction - positive inlet pressure is not necessary.
- Can operate with a closed or blocked suction line and run dry indefinitely without damage, eliminating downtime and repair costs.
- Unique diaphragm design handles more abrasives with less wear than gear, screw, or plunger pumps.
- Hydraulically balanced diaphragms handle high pressures with low stress.
- Provides low-pulse, linear flow due to its multiple-diaphragm design.
- Lower energy costs than centrifugal pumps and other pump technologies.
- Rugged construction for long life with minimal maintenance.
- Compact design and double-end shaft (T100 and Q155) provide a variety of installation options.

Hydra-Cell® Seal-less Pumps

Product Innovation of the YEAR PUMPS & SYSTEMS 2010 FINALIST

OFFSHORE TECHNOLOGY CONFERENCE®

*Hydra-Cell model T100 was a finalist in the Pumps & Systems "Product Innovation" awards, and the T100 Series earned a "Spotlight on New Technology" award from the Offshore Technology Conference.*

*T100 High Pressure Model.*


*Q155 Low Pressure Model.*

NEW


*T200 Medium Pressure Model.*

| Model | Maximum Capacity BPD | gpm | l/min | Max. Discharge Pressure psi (bar) |
|---|---|---|---|---|
| **T100E** | 3292 | 96.0 | 366.1 | 1500 (103) |
| **T100F** | 2623 | 76.5 | 289.6 | 1850 (128) |
| **T100H** | 2332 | 68.0 | 257.8 | 2100 (145) |
| **T100K** | 1543 | 45.0 | 170.4 | 3000 (207) |
| **T100M** | 1302 | 38.0 | 143.8 | 3500 (241) |
| **T100S** | 891 | 26.0 | 98.4 | 5000 (345) |

| Model | Maximum Capacity BPD | gpm | l/min | Max. Discharge Pressure psi (bar) |
|---|---|---|---|---|
| **Q155E** | 5383 | 157 | 595 | 1500 (103) |
| **Q155F** | 4354 | 127 | 490 | 1850 (128) |
| **Q155H** | 3806 | 111 | 421 | 2100 (145) |
| **Q155K** | 2674 | 78 | 295 | 3000 (207) |
| **Q155M** | 2228 | 65 | 246 | 3500 (241) |

| Model | Maximum Capacity BPD | gpm | l/min | Max. Discharge Pressure psi (bar) |
|---|---|---|---|---|
| **T200K** | 3258 | 95 | 359 | 3000 (207) |
| **T200M** | 2915 | 85 | 321 | 3500 (241) |
| **T200P** | 2538 | 74 | 280 | 4000 (276) |
| **T200Q** | 2230 | 65 | 246 | 4500 (310) |

*Maximum Inlet Pressure for all models: 500 psi (34 bar).*
*Maximum Operating Temperature for all models: 180°F (82°C). Consult factory for correct component specification for temperatures above 180°F (82°C) or below 40°F (4°C)*

**For complete specifications and ordering information, consult the Hydra-Cell T100, Q155, & T200 product bulletins.**

# Non-metallic ANSI Centrifugal Pumps

STAN-COR

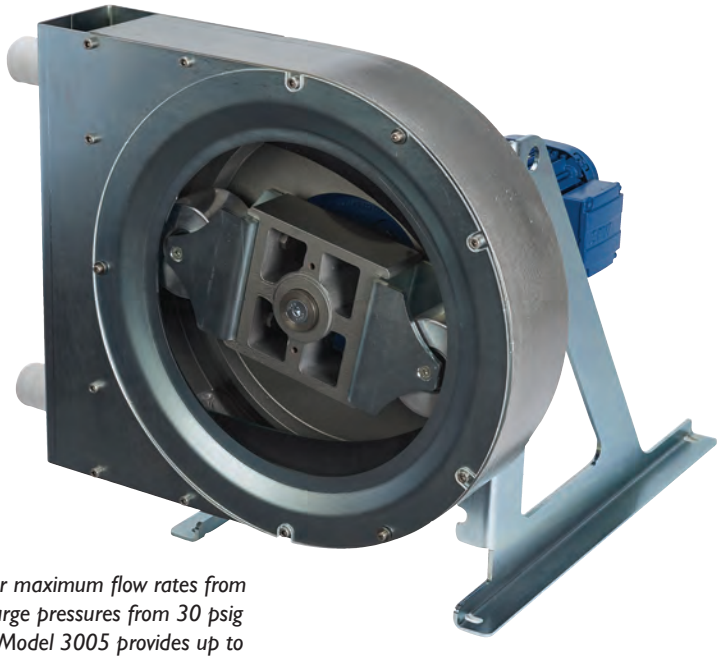
- Solid PVDF pump head for chemical compatibility and excellent abrasion resistance.
- Operate with a smooth, full-curve performance.
- Concentric casing design for better flow patterns than other centrifugal pumps - less turbulence, longer seal life, and reduced shaft deflection.
- Handles high operating temperatures.
- Compact design features including heavy-duty drive shaft, adjustable bearing supports, and large-capacity oil bath ensure low maintenance as well as durable performance for the toughest fluid applications.
- Back pull-out design for easy servicing.
- Handles solid sizes up to 9/16" maximum.

*Designed to handle difficult process fluids, Stan-Cor pumps offer total dynamic head to 350 feet and flow rate capacities to 700 gpm (2650 l/min).*

# Peristaltic Pumps that Isolate the Pumped Fluid

VECTOR

- Dry pump cavity.
- Self-priming operation.
- Runs dry without damage to the pump.
- Complete isolation of the fluid being pumped from contact with mechanical parts for the fluid transport system.
- Heavy-duty roller bearings.
- Wide range of pump configurations and flow rates.
- No cups, packing, or dynamic seals to leak or replace or come in direct contact with the pumped fluid.
- Low maintenance.
- Reversible flow.



*Nine 2000 Series Vector pump models (2006 shown) offer maximum flow rates from 0.3 gpm (1.1 l/min) to 211 gpm (798.7 l/min) and discharge pressures from 30 psig (2.1 bar) to 116 psig (8 bar) depending on pump model. Model 3005 provides up to 9.2 gpm (34.8 l/min) at 200 psig (13.8 bar).*

*Seven 4000 Series Vector pump models offer maximum flow rates from 0.79 gpm to 154.1 gpm and discharge pressures of 110 psig or 218 psig depending on pump model.*

# Hydra-Cell®

## Seal-less Pumps

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