



Hydra-Cell[®]

Seal-less Pump Technology

Oil and Gas
Robust design - Reliability



Hydra-Cell® Oil and Gas Industry Pumps

Compact seal-less pumps for long life and high reliability



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 Conference (OTC)

• Production • Transport • Refining



Hydra-Cell® Pumps are used in a wide variety of applications.



Offshore
Chemical injection, RO



Gas Extraction
Water re-injection, well dewatering, NGL transfer



Oil Extraction

Well stimulation, water re-injection, chemical injection, methanol injection, biocide injection, drilling muds, crude oil transfer and sampling



Gas Processing and Distribution

Glycol injection and odourising



Pressure Testing

Pipes and well testing



Jet Pumps

Power fluid pressurisation



Oil Refining

Steam stripping, additive injection, stack cooling and chemical metering

Typical Chemicals and Liquids Pumped	Challenges in Pumping	The Hydra-Cell® Advantage
Produced Water and Sour Water... injection, disposal & transfer	<ul style="list-style-type: none"> Corrosive. Can contain H₂S, salt, CO₂ plus other impurities forming acidic solutions 	<ul style="list-style-type: none"> Corrosion resistant liquid head materials available Seal-less pumping chamber
	<ul style="list-style-type: none"> Abrasive. Water contains sand and other contaminants... barium, cadmium, sulphur, chromium, copper, iron, lead, nickel, silver and zinc 	<ul style="list-style-type: none"> Seal-less pump head means that liquids containing particles can be pumped reliably No dynamic seals to wear
	<ul style="list-style-type: none"> Containment of H₂S gas 	<ul style="list-style-type: none"> No cups, packings or seals to leak gas Seal-less pump chamber provides 100% containment
Hot Tri-ethylene Glycol (TEG) & Diethylene Glycol (DEG)... for gas drying	<ul style="list-style-type: none"> Non-Lubricating 	<ul style="list-style-type: none"> No need for lubrication from pumped liquid
	<ul style="list-style-type: none"> Liquid temperatures up to 100 °C 	<ul style="list-style-type: none"> No dynamic seals to be damaged
	<ul style="list-style-type: none"> Controllability of injected TEG /DEG 	<ul style="list-style-type: none"> Flow rate directly proportional to pump rpm. RPM adjustable range from 10 rpm to 1500 rpm (1000 rpm for some models)
Methanol... for well icing prevention	<ul style="list-style-type: none"> Non-lubricating, especially pumping at pressure 	<ul style="list-style-type: none"> No need for lubrication from pumped liquid
Natural Gas Liquids... Mixtures of Methane, Propane, Ethane	<ul style="list-style-type: none"> Non-lubricating 	<ul style="list-style-type: none"> No need for lubrication from pumped liquid
	<ul style="list-style-type: none"> Must be 100% contained to comply with VOC emissions legislation 	<ul style="list-style-type: none"> Seal-less pump chamber provides 100% containment
Amines	<ul style="list-style-type: none"> Containment of any H₂S saturated in Amine 	<ul style="list-style-type: none"> Seal-less pump chamber provides 100% containment
	<ul style="list-style-type: none"> Responsive accurate control of flow rate 	<ul style="list-style-type: none"> Virtually pulse-less flow gives responsive control with accuracy exceeding API 675 performance criteria
Caustics... Sodium Hydroxide, Potassium Hydroxide	<ul style="list-style-type: none"> Tend to crystallise when cold or in contact with air, forming solids which can damage mechanical seals 	<ul style="list-style-type: none"> Seal-less pump head means that liquids containing particles can be pumped reliably
Acids... Sulphuric, Hydrochloric, Nitric	<ul style="list-style-type: none"> Corrosive 	<ul style="list-style-type: none"> No dynamic seals to be damaged
	<ul style="list-style-type: none"> Tend to crystallise when cold or in contact with air, forming solids which can damage mechanical seals 	<ul style="list-style-type: none"> Unique vertical check valve, which can handle liquids with particles reliably
Condensates	<ul style="list-style-type: none"> Non-lubricating 	<ul style="list-style-type: none"> No need for lubrication from pumped liquid
	<ul style="list-style-type: none"> Must be 100% contained to comply with VOC emissions legislation 	<ul style="list-style-type: none"> Seal-less pump chamber provides 100% containment
Polymers... for well stimulation	<ul style="list-style-type: none"> Shear sensitive gel structures which can be broken down easily 	<ul style="list-style-type: none"> Low shear pumping action
	<ul style="list-style-type: none"> High viscosity 	<ul style="list-style-type: none"> Unique vertical check valves for reliable pumping action
	<ul style="list-style-type: none"> Abrasive, contains soda ash 	<ul style="list-style-type: none"> Seal-less pump chamber and vertical orientated check valves allows reliable pumping of liquids with suspended solids
	<ul style="list-style-type: none"> Responsive accurate control of flow rate 	<ul style="list-style-type: none"> Virtually pulseless flow gives responsive control with accuracy exceeding API 675 performance criteria
Crude Oil	<ul style="list-style-type: none"> Range of viscosities makes it difficult to pump 	<ul style="list-style-type: none"> Hydra-Cell® seal-less pumping action can handle liquids with viscosities from 0.01 to 6000 cSt, or liquids containing a mixture of viscosities.
Biocide Injection	<ul style="list-style-type: none"> Very low flow rates, accurate metering of chemicals to optimise usage, minimise environmental damage. 	<ul style="list-style-type: none"> Unique multiple diaphragm pump head providing virtually pulseless flow for accurate metering.

Hydra-Cell® advantages

Designed for continuous use, Hydra-Cell® Seal-less Pumps are robust, reliable, efficient and can be used in a wide variety of Oil and Gas applications, lowering the total cost of ownership.

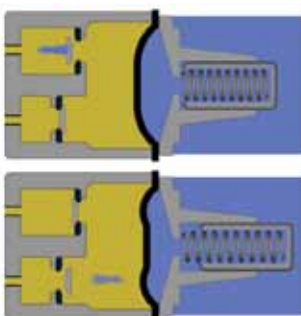


Enhanced oil recovery –
Pumping shear sensitive polymers

High reliability... low maintenance

Having **No Dynamic Seals** means high reliability.

- Run dry indefinitely
- No seals to wear
- No seals to leak any potentially harmful gases such as H₂S
- No seals to leak any Volatile Organic Compounds
- No tight tolerances that could be susceptible to corrosion or damaged by solid particles
- Pumps liquids with viscosities from 0.01 to 6000 cSt
- Pumps non-lubricating liquids reliably
- Pumps liquids with up to 500µm dia. particulate matter
- No 'drop-off' in performance due to seal wear



Hydra-Cell pumps have no packing's

Compact design

For metering and dosing applications Hydra-Cell's compact design gives real advantages.

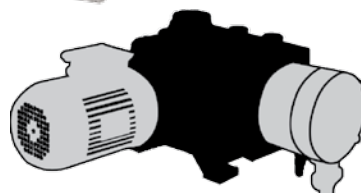
1. Space saving
2. Easier servicing
3. Lower initial purchase cost

Both pumps are rated at 172 Bar and 110 l/hr



◀ Hydra-Cell®
Weight 23 kg

▼ Traditional
metering pump
Weight 100 kg



High efficiencies

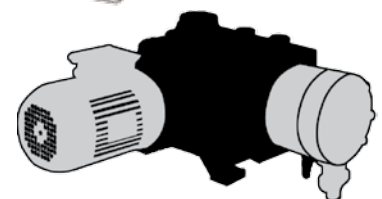
- A true positive-displacement pump, Hydra-Cell® is one of the most efficient metering and dosing pumps available.

Both pumps are rated at 172 Bar and 110 l/hr



◀ Hydra-Cell® metering pump
Motor 0.75 kW (€60)

▼ Traditional
Metering pump
Motor 4 kW (€180)



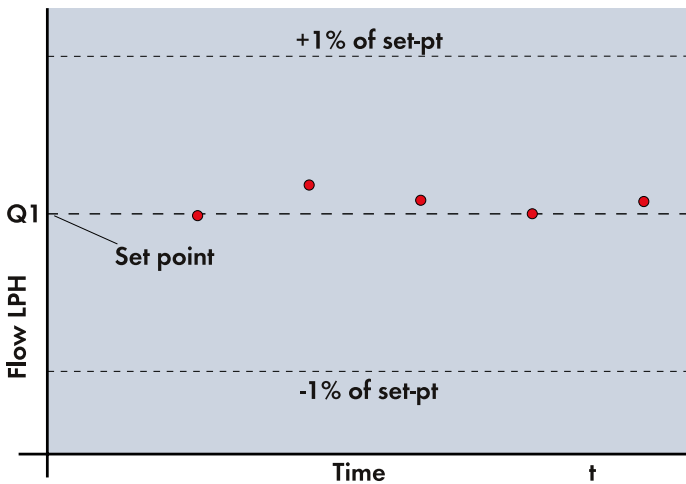
Save up to 65% on motor costs

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

Ultimate Controllability for Metering and Dosing

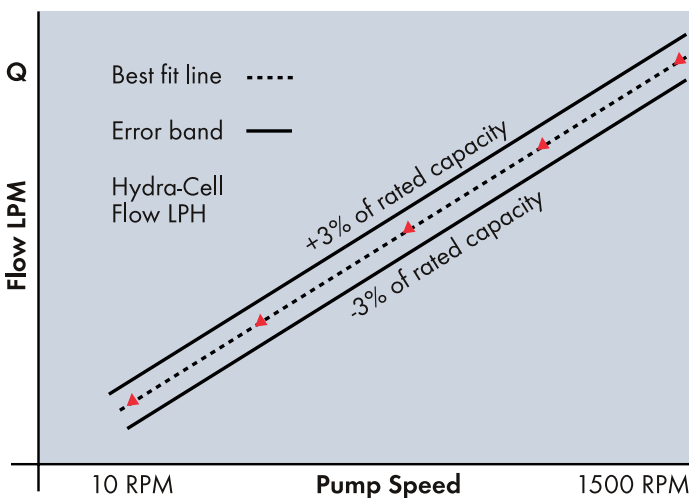
Metering & dosing performance better than API675.

- Steady state accuracy better than +/- 1%



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

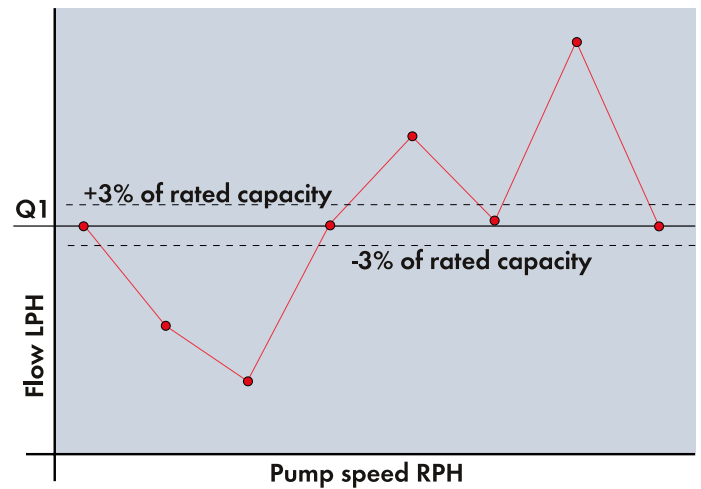
- Linearity (Pump shaft speed/flow rate relationship) better than +/- 3%



This is a measure of how accurate the flow rate can be set by changing and setting pump speed.



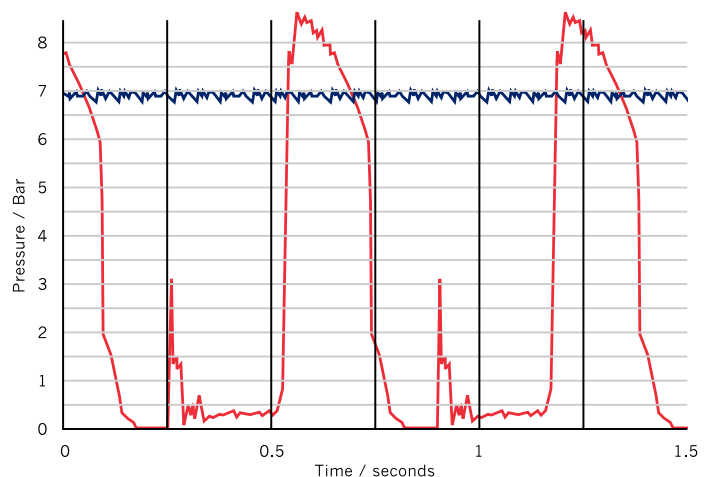
- Repeatability better than +/- 3%



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

Virtually pulse-less flow for accurate metering

- Pulsation dampeners may not be required for most Hydra-Cell® pumps.
- More accurate control of flow rate and efficient use of chemicals.
- Significantly less inlet acceleration head issues than traditional single diaphragm metering pumps, especially with viscous liquids.



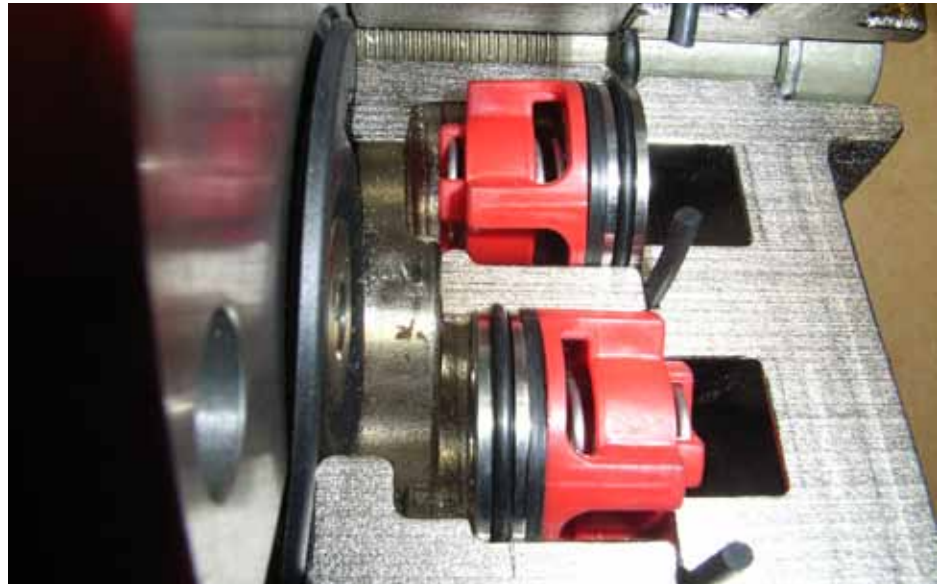
Hydra-Cell® pumps —————
 Leading brand metering pump ————

Unique vertical check valves ▶

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

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.



Pumping ceramic slurry at 40% solid content.

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 requirement for removal and transportation to workshops.

Minimal filtration

- No mechanical seals or tight tolerances that need protection by fine filtration. Hydra-Cell® pumps can handle particles up to 500 µm, depending on model. Also 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

Energy saving

- Very economical to run compared with centrifugal pumps
- Smaller, more compact motors required

Compared with multi-stage centrifugal pumping water at 20 bar:

Flow (m³/hr)	Energy used (kw)		Energy saving	Potential annual euro saving
	Centrifugal	Hydra-Cell		
0.6	1.54	0.5	67%	€945
1.5	2.0	1.44	28%	€470

Compared with multi-stage centrifugal pumping water at 40 bar:

Flow (m³/hr)	Energy used (kw)		Energy saving	Potential annual euro saving
	Centrifugal	Hydra-Cell		
4.2	9.34	6.1	35%	€2,830
7.6	15.4	11.0	28%	€3,840



NGL transfer Russia

Pump selection



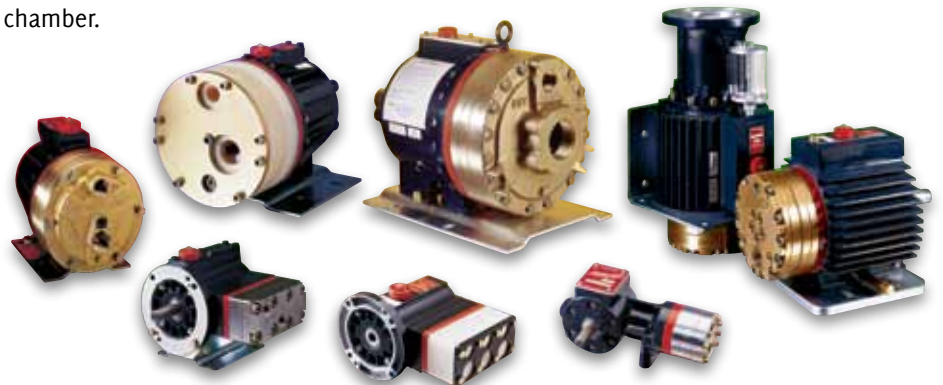
Jet pump oil extraction process –
Surface pump supplying high
pressure water to down-hole Jet pump.

Hydra-Cell® G-Series - High Performance, Positive Displacement Diaphragm Pumps

Hydra-Cell® G-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 H₂S gas.

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



Hydra-Cell® P-Series - Extraordinary Metering Pumps - exceeding API 675 performance standards

Designed for dosing chemicals from 2 l/hr to 2500 l/hr, when the high accuracy, control, simplicity and reliability of a hydraulically balanced diaphragm pump are needed.

Thanks to its modern design, acquisition cost of Hydra-Cell® high accuracy metering and dosing pumps compare favourably with the cost of conventional metering pumps of similar performance.

Liquids that crystallise and can cause damage to other pumps can usually be dosed very successfully and

accurately with Hydra-Cell® P-Series pumps thanks to their inherently simple yet elegant design.





Gas field – Transfer of Hydro-Carbons

Materials

A variety of liquid head materials and diaphragm materials are available to suit the pumped liquid and varying performance conditions.

Liquid Head Materials	Diaphragm Materials
Hastelloy	EPDM
Duplex SS	Viton®
316 SS	PTFE
Brass	Neoprene
Cast Iron	Buna
Polypropylene	Aflas
Kynar	

Pipe connections

SAE flange connections.



Specialised flange connections e.g. Tri-Clamp®



Flanged connections.



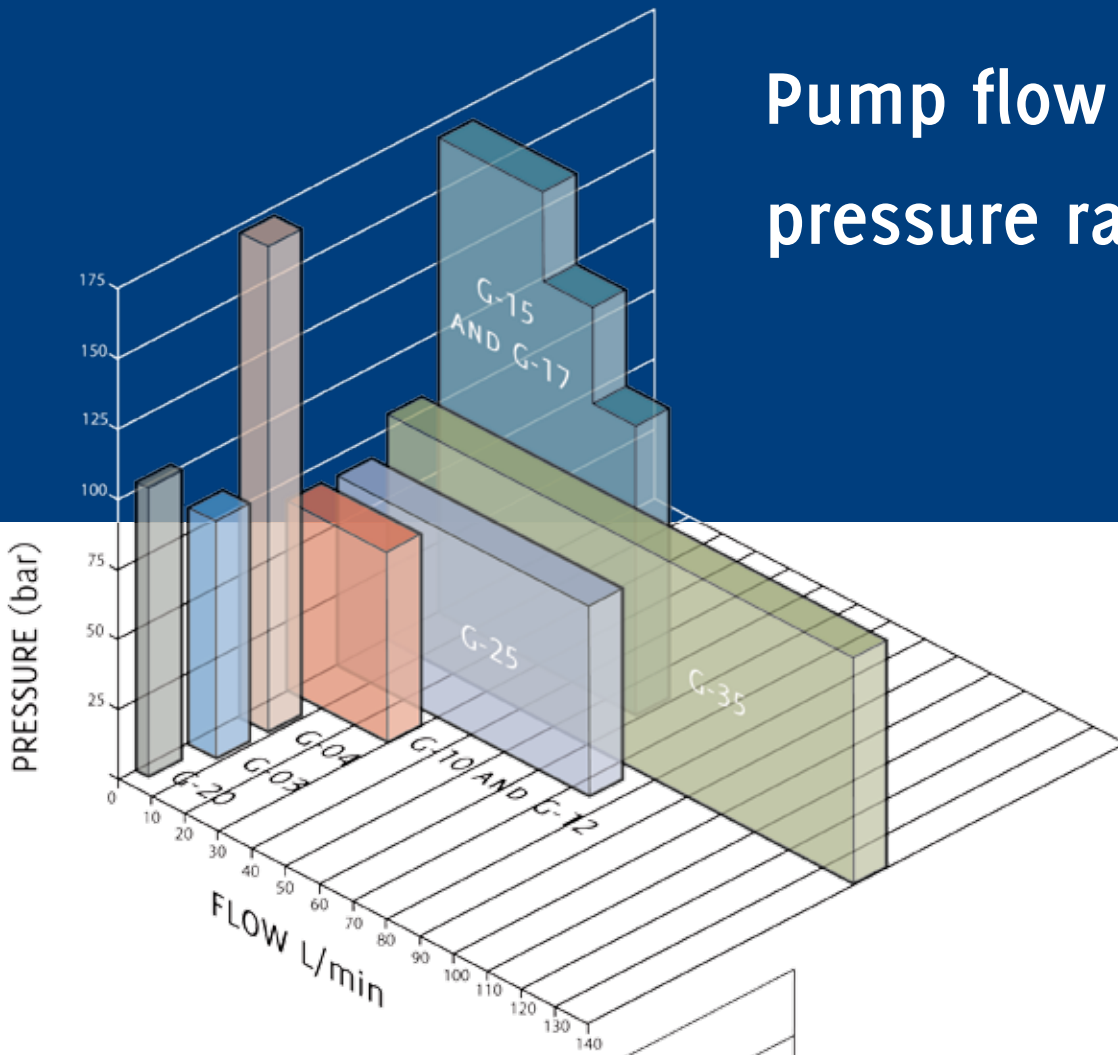
Simple threaded connections NPT or BSPT



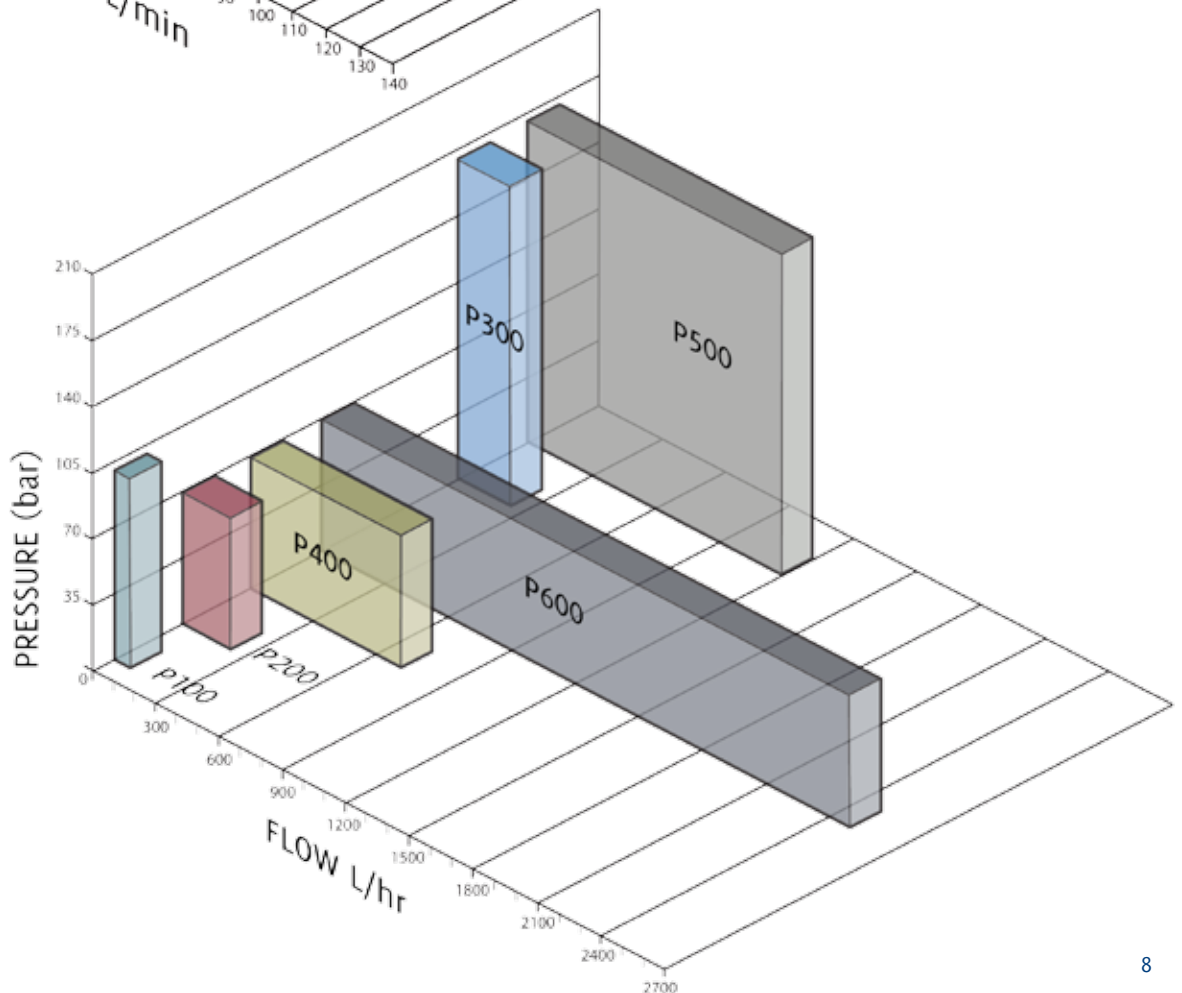
Kynar head and flange connections

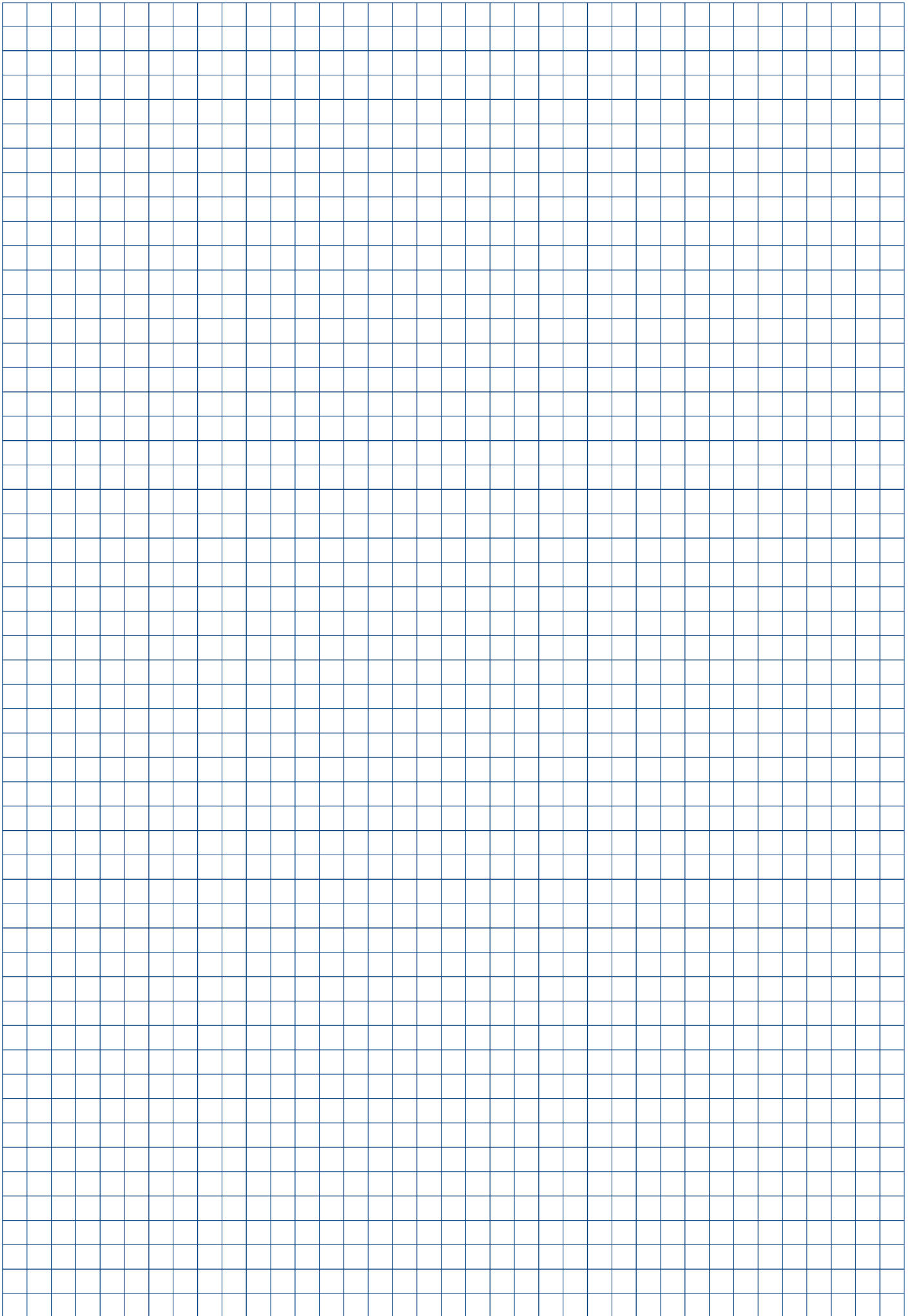


Pump flow and pressure rates



P-Series Pumps







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