

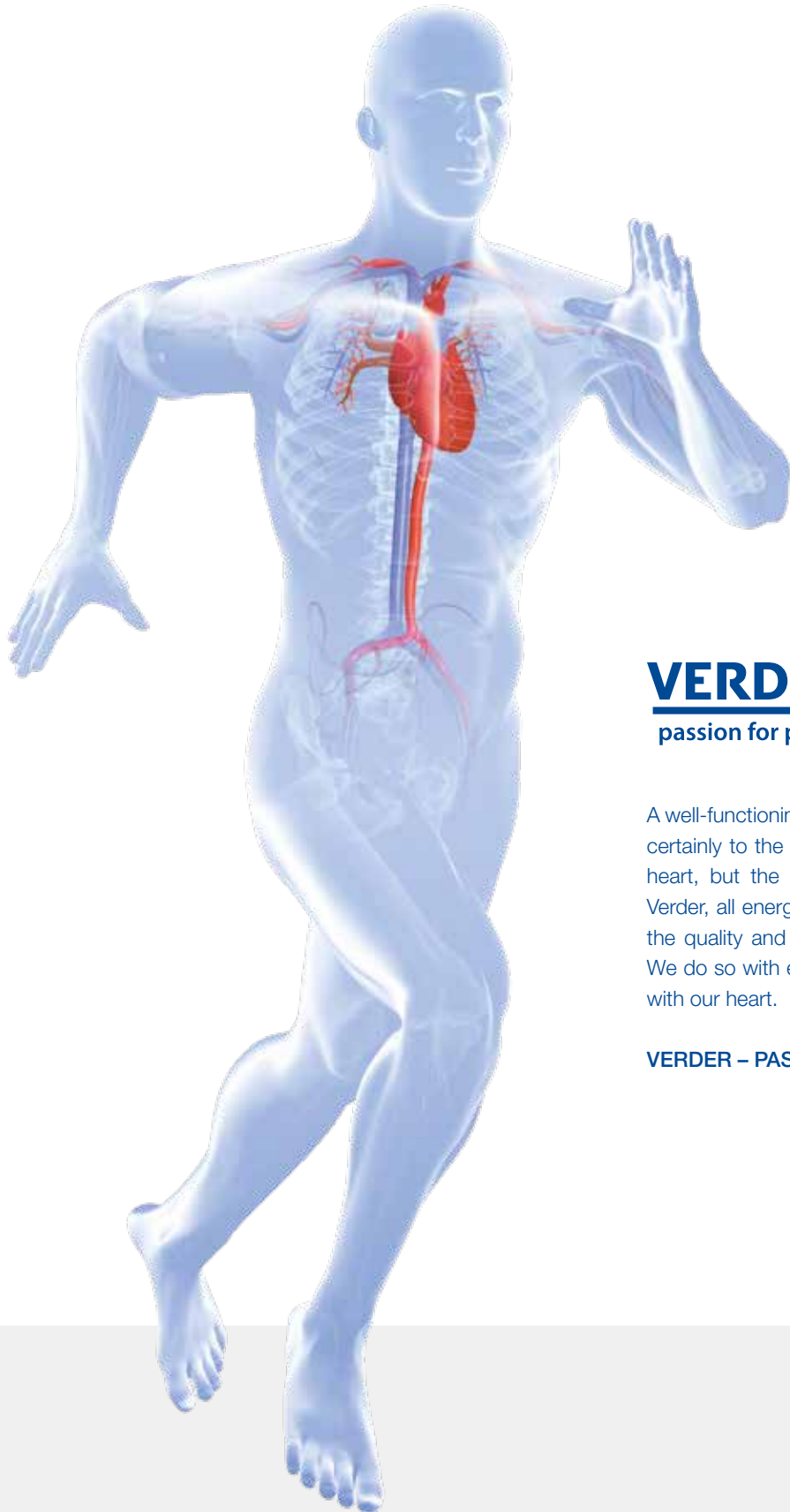


VERDERBAR **PRODUCT OVERVIEW**

Piston diaphragm pumps made by *Wanner*

Benefits

- No leaks due to seal-less design
- Reduce initial costs and operational expenses
- Exact metering with very low pulse flow



VERDER

passion for pumps

A well-functioning pump helps you succeed. That applies certainly to the most important pump in life, the human heart, but the same goes for pumps in business. At Verder, all energy and attention is focused on improving the quality and performance of our pump and service. We do so with energy, dedication and most importantly, with our heart.

VERDER – PASSION FOR PUMPS



THE VERDER GROUP

- 1 Company
- 28 Countries
- >60 Years of expertise
- Global network
- Local distributors
- In-house service & maintenance
- A solution for every application

The Verder group is a family owned business formed 60 years ago in the Netherlands; the group consists of a worldwide network of production and distribution companies. Group companies are involved in the development and distribution of industrial pumps, pumping systems, high-tech equipment for quality control, research and development into solid material (solids sample preparation and analytical technologies). The Verder Group employs over 1600 people and has an annual turnover in excess of 380 million Euros.

Our piston diaphragm pumps are part of the successful Verder pump program.

Verderbar piston diaphragm pumps

Verderbar Hydra-Cell pumps are highly efficient, heavy-duty pumps for liquid transfer, metering and dosing, injection and spraying of the widest range of liquids, including chemicals, solvents, acids, hydrocarbons, natural gas liquids, alkalis, polymers, aqueous ammonia, resins, slurries, recycled or dirty liquids etc.

Their outstanding low-pulsation characteristics and exceptional efficiency is very attractive compared to other high pressure pumps. From drinking water to highly viscous cutting liquids, Verderbar Hydra-Cell pumps handle the full spectrum of process liquids while maintaining high-efficiency operation. This includes non-lubricating liquids as well as difficult liquids with abrasives that can damage or destroy other types of pumps. This makes Hydra-Cell an ideal choice in a wide range of industries and when serving multiple applications in one facility.

VERDERBAR PISTON DIAPHRAGM PUMPS

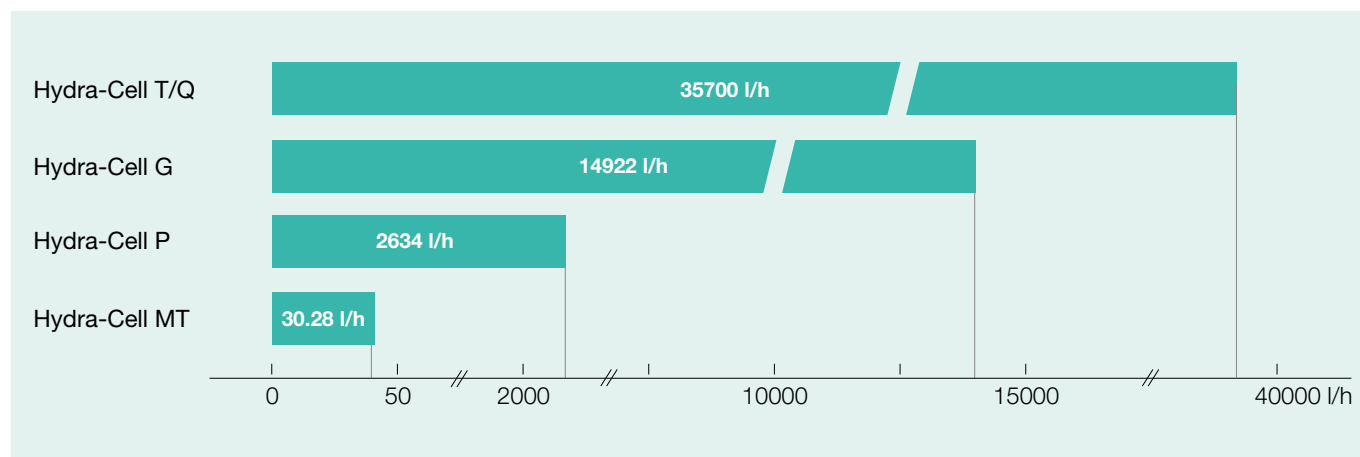


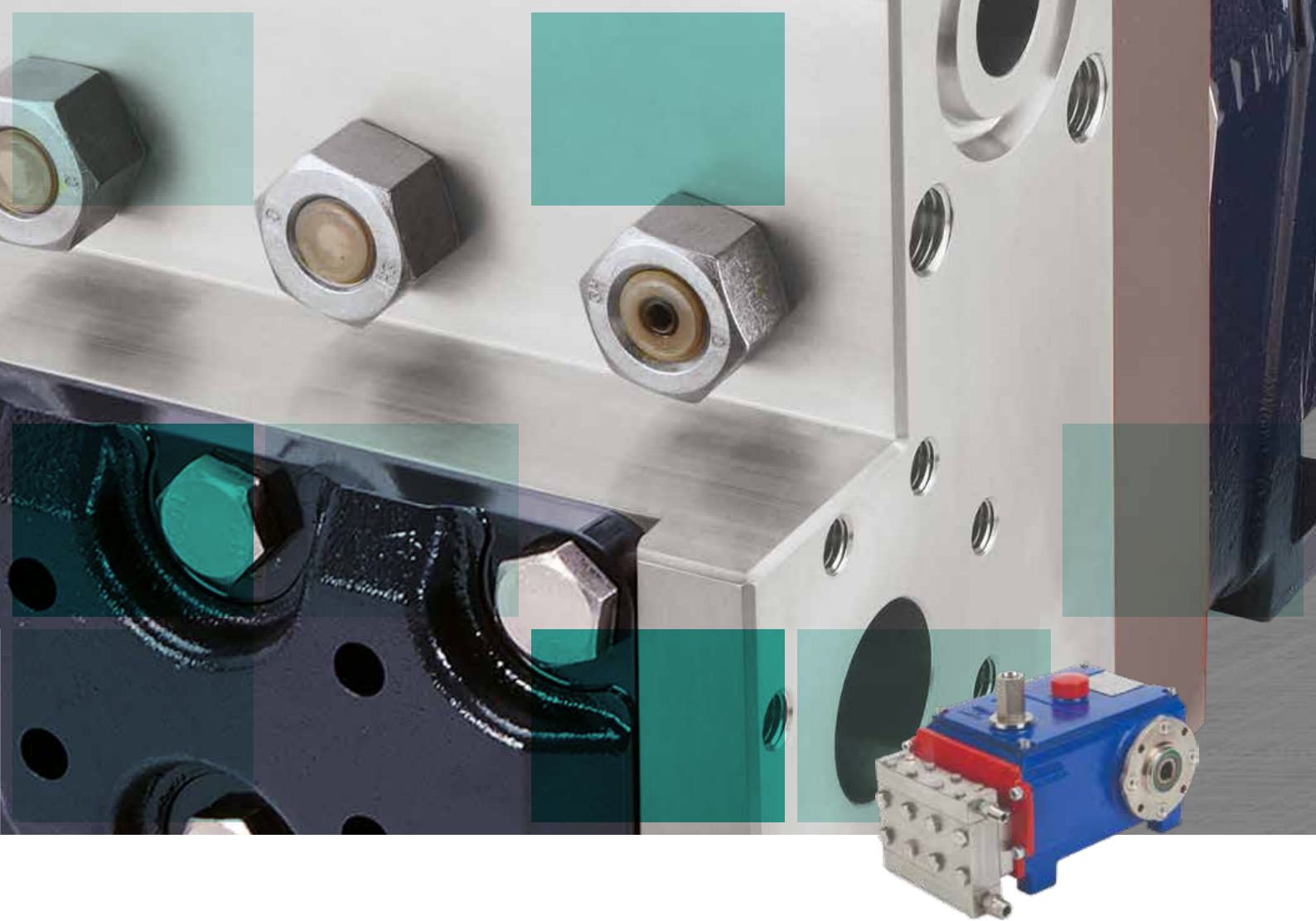
Piston diaphragm pumps are the solution for high-pressure and precise applications. They stand out through their high performance, compact design and their great energy efficiency. Thanks to the almost pulsation-free pumping characteristics and their robust construction, they have already proven themselves in many industries. The unique working principle of the Verderbar piston diaphragm pumps allows a pulsation-free delivery - even with solids laden media.

Features of the Verderbar Hydra-Cell

- Pulsation-free flow
- Seal-less and compact construction
- Supports solids containing media up to 0.8 mm
- High efficiency
- Low life cycle costs (LCC)
- Certified to ATEX, DNV, EAC
- Can also be fitted with ANSI, DIN, SAE
- Low maintenance and extremely long service life

Verderbar Performance Overview





What are **your benefits** using a Verderbar piston diaphragm pump?

Due to their long service life, their enormous efficiency and the simplest construction method, Verderbar piston diaphragm pumps made by Wanner are the optimal choice for most applications in fluid handling. They are very compact and easy to maintain.

No leaks due to seal-less design

- Tolerates abrasive solids and particulate matter up to 800 microns without the need for fine filtration
- No seals to leak any toxic vapors or harmful gasses
- Liquids are 100% sealed from the atmosphere. No danger of crystallization
- Can pump acids, slurries and liquids containing up to 40% of non-dissolved solids

Reduce initial costs and operational expenses

- Savings of initial costs due to lower kW motors for the same duty point
- Operates at 85-90% energy efficiency to reduce operating costs
- Seal-less design reduces maintenance and repair expenses
- Typically runs up to 6,000 hours between lubricating oil changes

Exact metering with very low pulse flow

- No need for pulsation dampeners
- Multiple diaphragms provide virtually pulse-less flow that exceeds API 675 (standards for accuracy, linearity, and repeatability)
- Flexible and money saving due to a wide flow range per pump
- Flow rate proportional to pump speed



VERDERBAR WORKING PRINCIPLES

Wanner Engineering's sophisticated working principle combines the benefits of different pumping systems while eliminating the drawbacks of known systems. All Hydra-Cell pumps have a virtually pulsation-free flow, very high efficiency and extremely long service life. They can run dry unlimited, handle solids-laden liquids and offer an enormous performance compared to their compact size. Find out more about the innovative, patented working principle [here](#).

Wobble plate operation

Wobble plate

The shaft drives a wobble plate, which converts the rotary motion of the shaft into an oscillating motion. This oscillation deflects the hydraulic pistons and the suction stroke fills the pistons with oil. The oil is pre-pumped towards the back of the diaphragm during the discharge stroke. This pressure is almost identical to the pressure on the medium side (= hydraulically balanced diaphragm).

During the suction stroke, springs in the hydraulic piston help to return the diaphragm to its original position. While the diaphragm is in the suction stroke, the medium flows through the open suction valve in the diaphragm chamber. The discharge pressure valve is closed in the suction stroke. During the discharge stroke the discharge pressure valve opens, the suction valve closes. This generates the pumping motion.



Crankshaft

The crankshaft is held in position by a respective ball bearing at the ends of the shaft. Between these bearings, pistons are attached to one or three cams. These pistons are attached at the other end to a spring-loaded check valve. The complete mechanism is immersed in a lubricating oil bath.

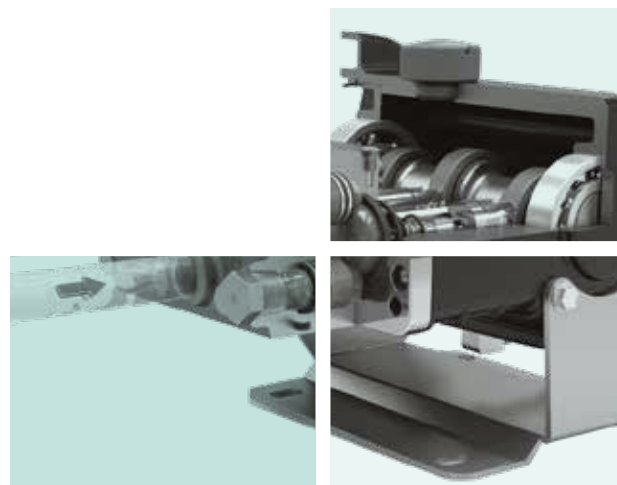
As the drive shaft rotates, each cam actuates the associated piston. Thus, the axial movement is converted into a linear pumping motion of the diaphragm attached to the piston. Each piston is located in a separate oil chamber that equalizes the pressure of the oil behind the diaphragm to the media-side pressure.

During the discharge stroke of the piston, the oil is compressed, causing the respective membrane to move outward and push the liquid out of the pump head. As the diaphragms move back, the liquid is admitted to the suction side of the pump head. The pistons are driven sequentially in uniform sequences by the drive shaft. This leads to a superposition of the strokes and thus to a uniform, nearly pulsation-free flow.

Asynchronous design

The principle of asynchronous design is the same principle as the crankshaft principle. But the diaphragms are not mechanically attached to the pistons. The diaphragms are hydraulically controlled. This allows much more performance with less mechanical stress. The underflow or overflow valve keeps the diaphragm in hydraulic equilibrium.

During the discharge stroke of the piston, the oil in the valve chamber is compressed at the diaphragm and leads to a deflection of the diaphragm. This controls the pumping action. This system eliminates the environmental concerns of packaged piston pumps and provides a virtually pulsation-free, linear flow - without the need for a pulsation damper.



VERDERBAR HIGHLIGHTS

Energy efficiency

Energy efficient

High efficiency for lower costs

Verderbar Hydra-Cell pumps operate with high efficiency. Switching to a high efficiency Hydra-Cell pump could offer far greater benefits than upgrading a motor from IE2 to IE3, which only achieved a few percentage points of efficiency increase. Larger energy savings can often be made by changing to another pumping principle. Hydra-Cell has a reciprocating positive displacement pumping action with multiple pumping elements to further enhance the overall efficiency. They are smaller and require smaller motors than competitive pumps.

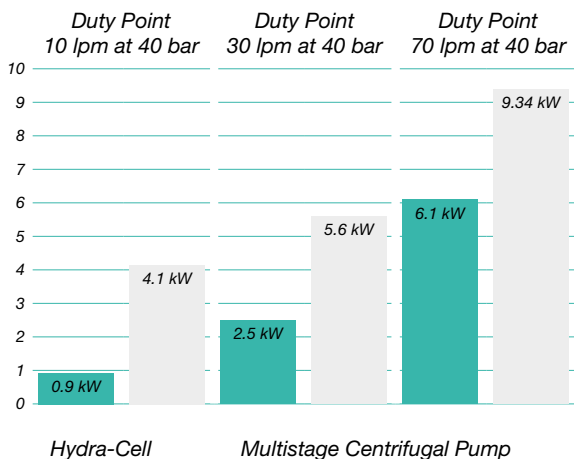
Constant high efficiency over time

The seal-less pumping chamber of the Hydra-Cell does not rely on the pumped liquid properties to maintain a pressure seal, this results in constant efficiency and reliability. From pump shaft to hydraulic power, Hydra-Cell's packing free design ensures constant high efficiencies through the life of the pump.

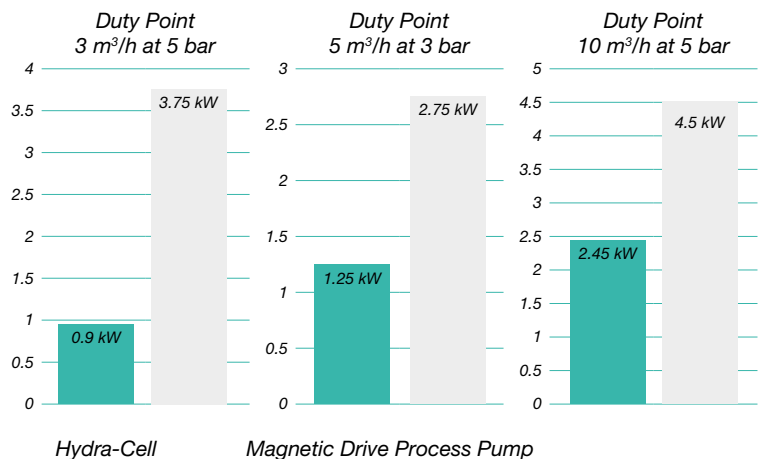
Energy saving functions

The flow rate of a Hydra-Cell pump is proportional to the speed of the drive shaft and can easily be controlled by a frequency converter, a concept advocated under the Climate Change Agreement program to improve energy efficiency. The flow rate from the Hydra-Cell pump can be controlled accurately delivering only what is required and not wasting energy.

Vertical Multistage Centrifugal Pumps



Magnetic Drive Process Centrifugal Pumps



VERDERBAR KEY BENEFITS

Eliminating wasted liquid

Voluptatem ea quodi

Reliable steady state accuracy

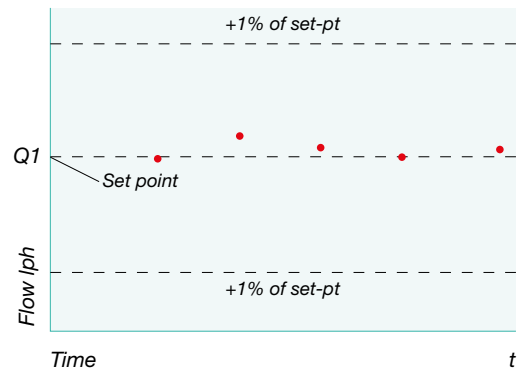
Thanks to the multi diaphragm pump head pulsation dampeners are not needed in most applications; saving on acquisition, maintenance and service costs and ensuring a more consistent and accurate process. The virtually pulse-less flow from Hydra-Cell's multiple diaphragm single pump head gives a more even distribution of injected chemicals assisting in a complete chemical reaction, reducing cost by the efficient use of chemicals.

Hydra-Cell patented hydraulic management system

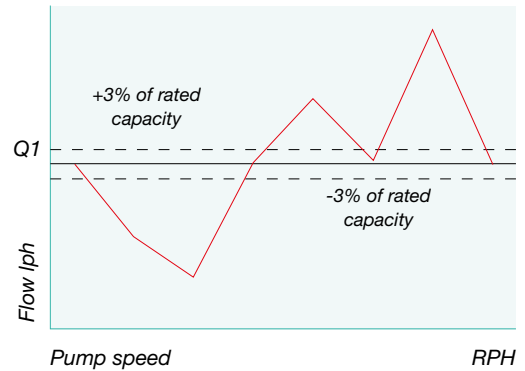
The accuracy of a metering pump with a hydraulically balanced diaphragm is significantly affected by controlling the volume of hydraulic oil behind the diaphragm and how the pump replenishes this actuating liquid. With the Hydra-Cell P and G series, on every suction stroke if the correct amount of hydraulic oil is not present the valves open and the hydraulic cell is replenished. Ensuring a consistent diaphragm displacement and consistent and accurate flow rate on every stroke.

For the MT8 and T & Q series pumps, these utilise a patented hydraulic system consisting of an under fill and over fill valve which compensates for any decrease in any actuating liquid on every stroke ensuring optimum accuracy.

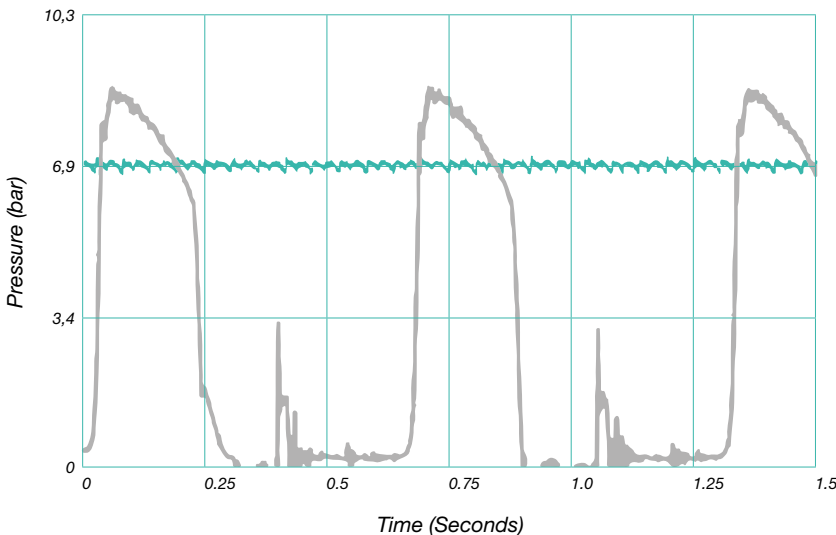
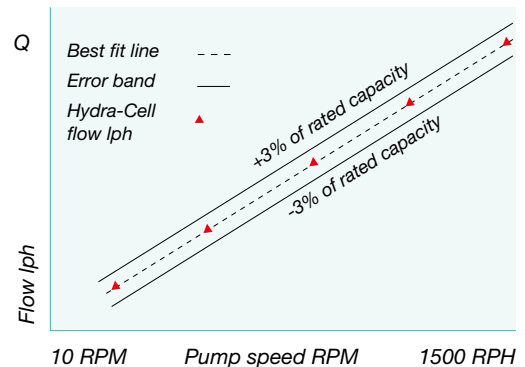
Steady state accuracy - better than +/- 1%



Repeatability - better than +/- 3%



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



VERDERBAR HIGHLIGHTS

Advantages and eliminated disadvantages

Verderbar piston diaphragm pumps combine the advantages of several pump principles! At the same time, the unique Hydra-Cell technology eliminates the disadvantages of other pumping systems.

Kel-Cell diaphragm technology

With Kel-Cell diaphragm technology developed by Wanner Engineering, the risk of diaphragm rupture can virtually be ruled out. The innovative diaphragm position helps the diaphragms of Hydra-Cell pumps to balance unfavorable conditions on the suction side.

Unfavorable system conditions include:





- Inadequate fluid supply due to blockage
- Clogged inlet filter or closed inlet shut-off valve
- High viscosity liquids or insufficient differential pressure

All conditions that lead to a vacuum on the suction side. An unplanned system failure, a bad system design or even a faulty installation can lead to a vacuum on the suction side. This can bring the diaphragm out of hydraulic equilibrium and deform or destroy the diaphragms.

Working principle

Adapted Advantage

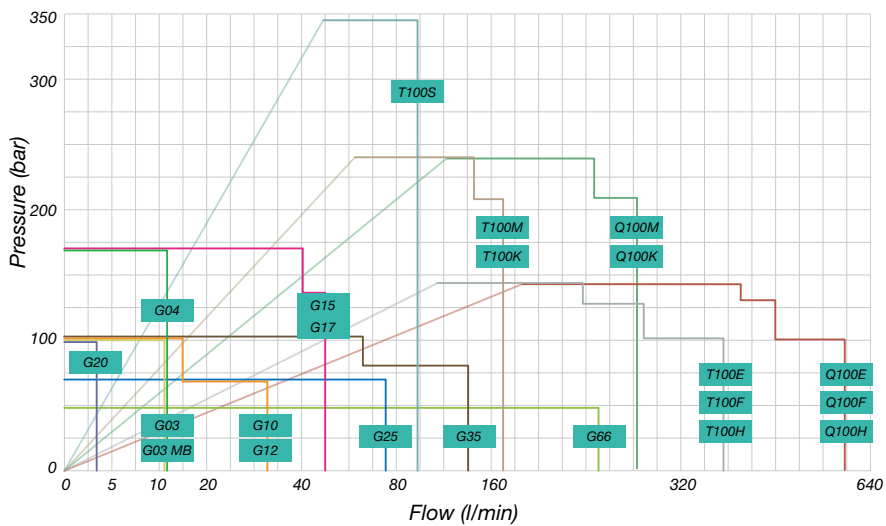
Eliminated disadvantage

Diaphragm pump	+ Constant flow rate	◀		▶	- Delivery is dependent from the pressure
Piston pump	+ Pumping at high pressure	◀		▶	- Big floor space - High acquisition cost
Progressing cavity pump	+ Can handle solids	◀		▶	- High maintenance costs - Mechanical seals
Centrifugal pump	+ Pulsation-free pumping	◀		▶	- High energy requirement - Low efficiency

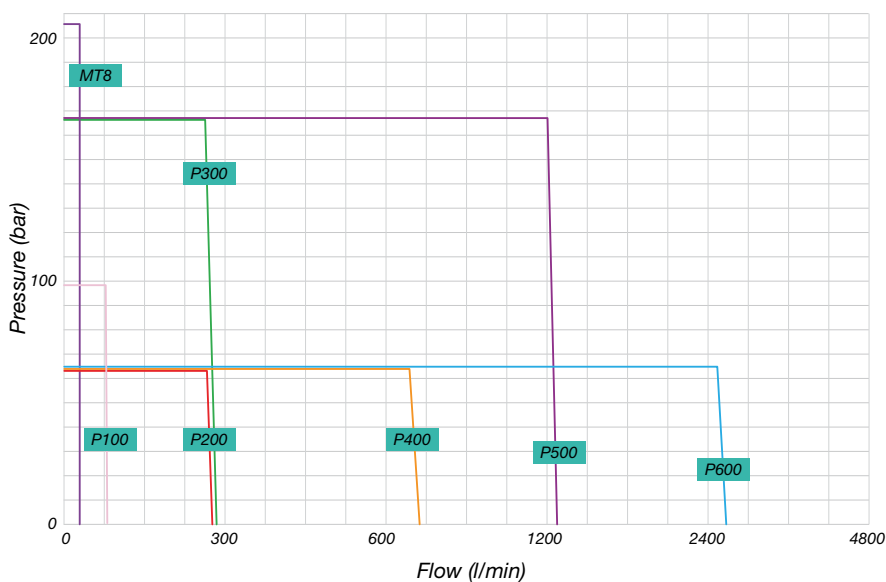
VERDERBAR FLOW CHARTS

The graph shows the maximum flow capacity at a given pressure. Please Note: Some models do not achieve maximum flow at maximum pressure. Refer to the individual model specifications in this section for precise flow and pressure capabilities by specific pump configuration.

Flow capacities and pressure ratings Hydra-Cell G, T, Q



Flow capacities, pressure ratings metering and dosing pumps Hydra-Cell P, MT



THE VERDERBAR PROGRAM

An overview

The Verderbar Hydra-Cell piston diaphragm pumps are very compact transfer and metering pumps. They can handle solids and very difficult fluids thanks to the innovative seal-less design.



Hydra-Cell MT

High pressure, low volume

The compact triplex dosing pump to dose very low flow rates at high pressure.

Max. flow	30.28 l/h	Max. pressure	241 bar
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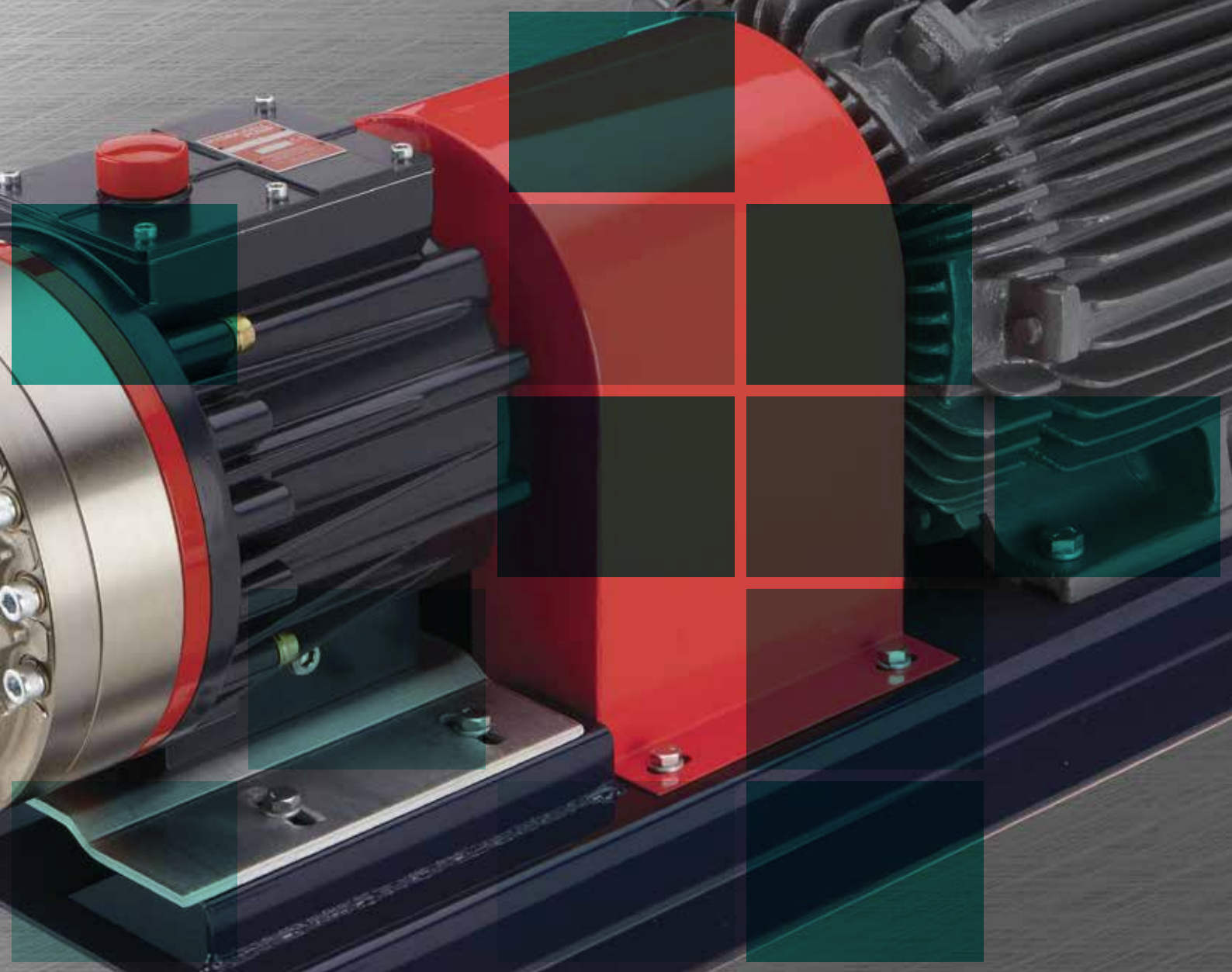


Hydra-Cell P

High pressure dosing

Incl. gearbox for optimal dosing results: Repeatability and linearity ($\pm 3\%$). Precise and constant dosage ($\pm 1\%$).

Max. flow	2634 l/h	Max. pressure	172 bar
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Hydra-Cell G

Seal-less design

The cost effective alternative to oscillating and rotating pump systems.

Max. flow	127 l/min	Max. pressure	172 bar
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Hydra-Cell T/Q

High pressure piston diaphragm pump

The compact alternative to conventional triplex process pumps.

Max. flow	595 l/min	Max. pressure	241 bar
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VERDERBAR HYDRA-CELL MT

High pressure, low volume



The triplex dosing pump Verderbar MT8 has been designed to dose very low flow rates at high pressure. The robust and compact pump can be regulated down to 0.227 l/h and at the same time reaches a maximum pressure of 241 bar! With the small footprint of approx. 36 x 30 cm a lot of space can be saved and an efficient dosing system can be built up.

The Verderbar dosing pumps work according to the proven Hydra-Cell functional principle and thus offer you an almost pulsation-free flow rate as well as unmatched accuracy, repeatability ($\pm 1\%$) and linearity ($\pm 1\%$), with precise, constant dosing ($\pm 0.5\%$) at the same time. It meets and exceeds the performance standards and requirements of API 675.

Features of MT Series

- Wide adjustable flow range turn down ration of 290:1
- Can handle particles up to 800 microns
- Working principle: crankshaft operation
- Certificates: ATEX

Max. flow

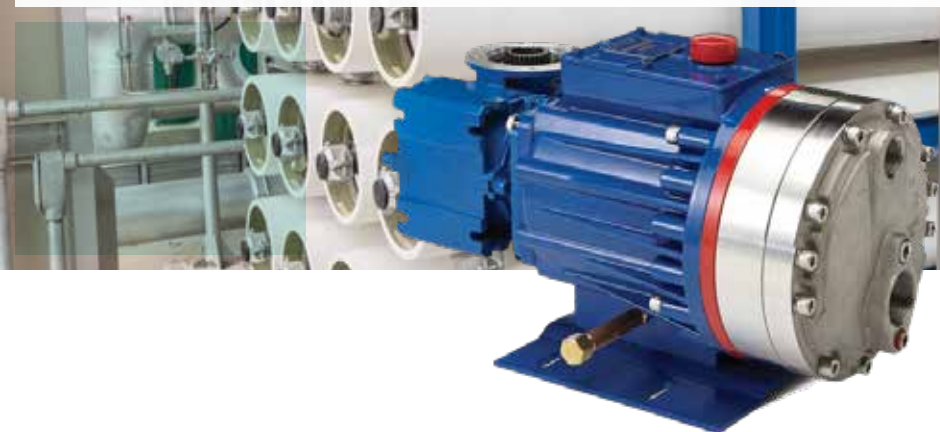
30.28 l/h

Max. pressure

241 bar

VERDERBAR HYDRA-CELL P

High pressure dosing

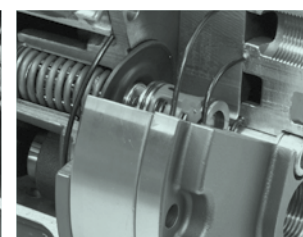
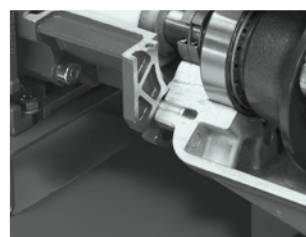
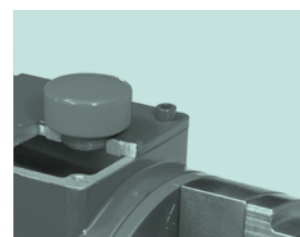


Verderbar Hydra-Cell P pumps can accommodate measured flow requirements from 1 to 2634 l/h at pressures of up to 172 bar with virtually no pulsation. The Verderbar dosing pumps work according to the proven Hydra-Cell functional principle and thus offer you an almost pulsation-free flow rate as well as unmatched accuracy, repeatability ($\pm 1\%$) and linearity ($\pm 1\%$), with precise, constant dosing ($\pm 0.5\%$) at the same time. It meets and exceeds the performance standards and requirements of API 675. They are able to pump abrasives and liquids that contain solid particles and being seal-less, can pump hazardous liquids safely and can even run dry indefinitely without suffering damage.

Features of P Series

- Available in 6 sizes
- Intelligent pump version available
- Working principles: wobble plate and crankshaft operation
- Kel-Cell technology
- Can handle particles up to 800 microns
- Certificates: ATEX

Max. flow	2634 l/h	Max. pressure	172 bar
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VERDERBAR HYDRA-CELL G

Sealless design



The piston diaphragm pumps Hydra-Cell G are particularly suitable for all non-lubricating, crystallizing or abrasive liquids. It is designed for the medium flow rate and pressure range. Having no dynamic seals also enables Hydra-Cells to pump dirty fluids that may contain abrasive particles, situations that would eventually cause problems for other pumping technologies.

The Verderbar dosing pumps work according to the proven Hydra-Cell functional principle and thus offer you an almost pulsation-free flow rate as well as unmatched accuracy, repeatability ($\pm 3\%$) and linearity ($\pm 3\%$), with precise, constant dosing ($\pm 1\%$) at the same time. It meets and exceeds the performance standards and requirements of API 675.

Features of G Series

- Available in 11 sizes
- Vertical versions available
- Intelligent pump version available
- Working principles: wobble plate and crankshaft operation
- Kel-Cell technology
- Can handle particles up to 800 microns
- Certificates: ATEX

Max. flow

127 l/min

Max. pressure

172 bar

VERDERBAR HYDRA-CELL T/Q

High pressure piston diaphragm pump



The Hydra-Cell T/Q process pumps achieving flow rates of up to 595 lpm and pressures up to 395 bar, the pumps have low NPSH requirements, allowing for operation with a vacuum condition on the suction - positive suction pressure is not necessary. Hydra-Cell T/Q-Series pumps can operate with a closed or blocked suction line and run dry indefinitely without damage, eliminating downtime and repair costs.

The unique diaphragm design can handle solids up to 800 microns and more abrasive particles with less wear than gear, screw or plunger pumps. The compact design and double-ended shaft provide a variety of installation options. The single pump head with having up to five diaphragms guarantees a virtually pulseless flow.

Features of T/Q Series

- Available in 11 sizes
- Working principle: asynchronous design
- Diaphragm Position System
- Can handle particles up to 800 microns
- Certificates: ATEX

Max. flow	595 l/min	Max. pressure	241 bar
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VERDERBAR ACCESSORIES AND OPTIONS

Pressure Regulating Valves

To protect the pump from damage in the case of fast-closing pressure-side valves or clogged nozzles, pressure relief valves must always be installed. As soon as the outlet pressure exceeds the set spring pressure, the piston opens the bypass, which reduces the system pressure.

Due to the simple principle of these valves, a conical piston is sealed by a valve seat, they are very robust and easy to maintain. These adjustable relief valves are available in stainless steel, Hastelloy C or brass with $\frac{3}{4}$ " to $1\frac{1}{4}$ " NPT or BSPT connections.

Accessories and options

Oil condition monitoring:

sensors monitor the the oil level in case of a diaphragm rupture (ATEX requirements).

Frequency converter:

the speed is directly proportional to the pumped volume. An external control (potentiometer, 4-20 mA signal, 0-10 V signal, PROFIBUS and others) optimizes the pumps for all dosing and pump applications.

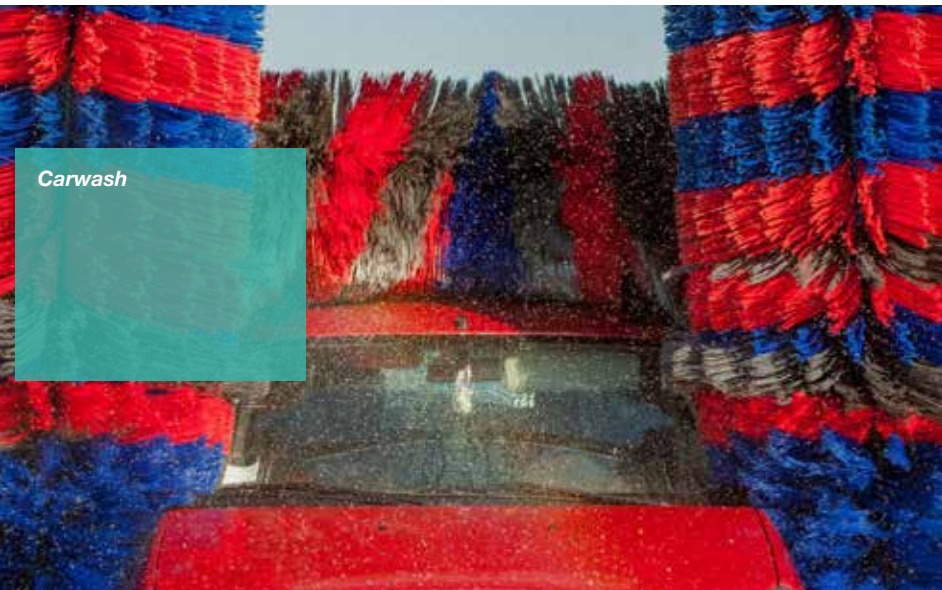
VERDERBAR: A **PUMP SOLUTION** FOR EVERY APPLICATION



Dosing and metering



Reverse Osmosis



Carwash



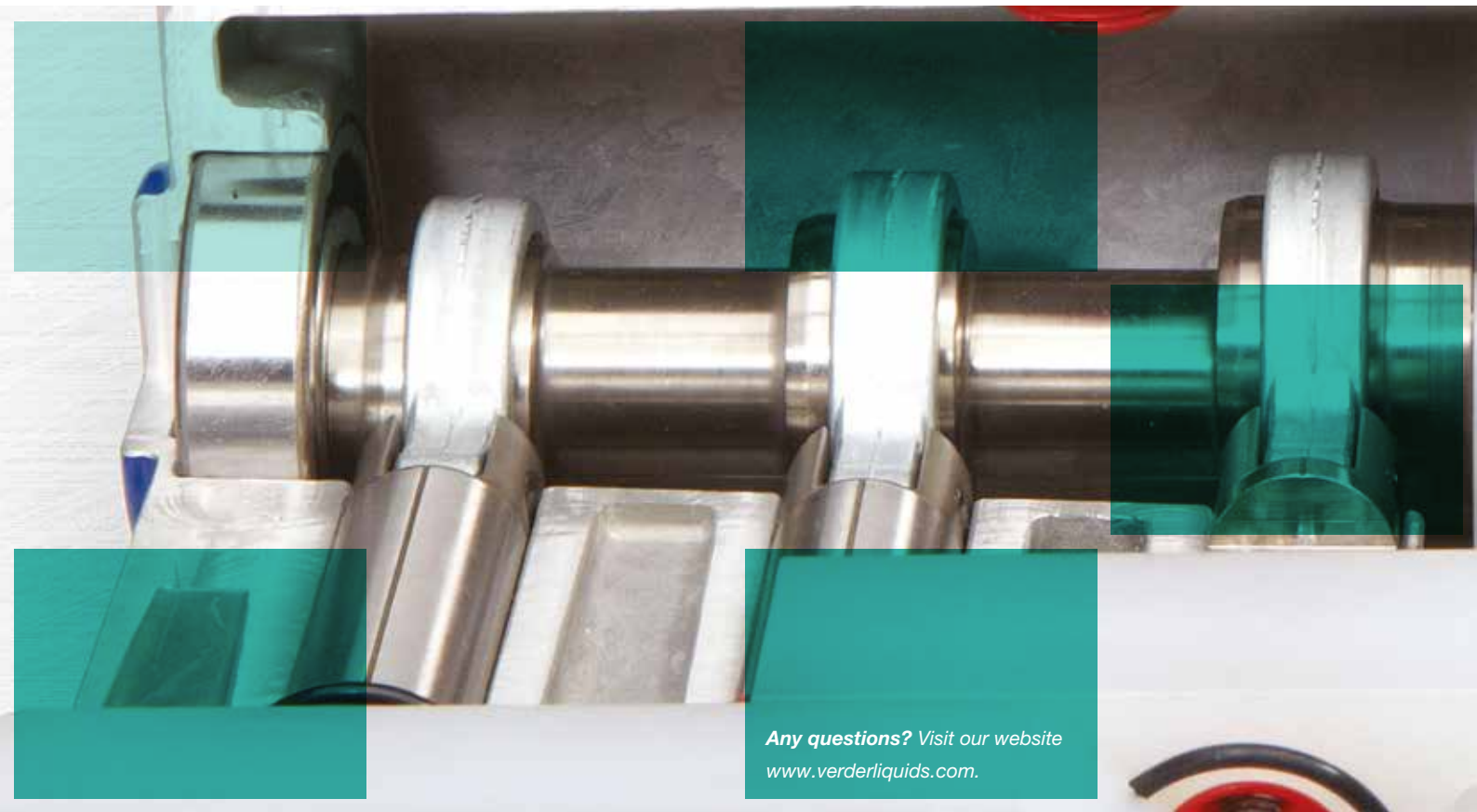
Oil, gas, methanol



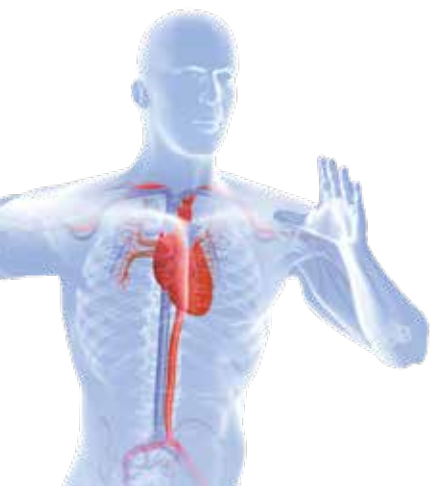
Blending, spraying, coating



Cleaning



*Any questions? Visit our website
www.verderliquids.com.*



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Verderbar® Hydra-Cell pumps – by Wanner.

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