

Sealless Pump Know-How from HMD Kontro

HMD Kontro



"We find HMD Kontro pumps last over 20 years but sealed pumps need to be replaced in 10 or 12 years."

Pharmaceutical manufacturer

Sealless Pump Know-How Contents

2	Pump know-how	4	What about solids?
2	Why do pumps fail?	5	No seal support systems
3	What are the advantages over a mechanically sealed pump?	6	How do I protect my HMD Kontro pump?
3	What makes HMD Kontro pumps so special?	6	What about total life cycle costing?
4	So what operating parameters can sealless pumps now handle?	7	Total life costing exercise
4	How long do HMD Kontro pumps last?		

At HMD Kontro we like to say yes, particularly as our sealless pumps are suited to many processes and applications. However, our customers seem to like it when we say no:-



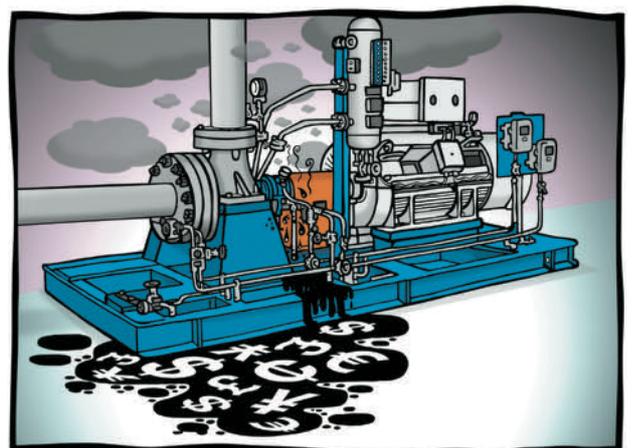
- No Seals
- No Seal Support Systems
- No Risk of Seal Failure
- No Leaks (At All!)
- No Emissions
- No Environmental Hazards
- No Health Issues
- No Safety Concerns
- No Maintenance (Almost!)
- No Buffer or Flush Fluid Costs
- No Need to Decontaminate
- No Loss of Product
- No Loss of Production Output
- No Unexpected Expenses
- No Problems!

By specifying an HMD Kontro sealless pump you can be absolutely positive that you have made the right decision. Combining cutting-edge technology with over sixty years of expertise and experience, since we developed the concept, our pumps provide complete peace of mind.

Why do pumps fail?

According to a report by the Health and Safety Executive in 2003, mechanical seals are widely regarded as the weakest point in any pumping system using them. They account for 80% of all pump failures, the remainder being leakage through static seals such as gaskets / O rings and bearing failure. It follows that if you eliminate the problem, you eliminate the failure.

HMD Sealless Pumps are magnetically driven, they have no mechanical seals, and only a single, fully trapped gasket that ensures system integrity, even at high temperatures and pressures.



A typical sealed pump!



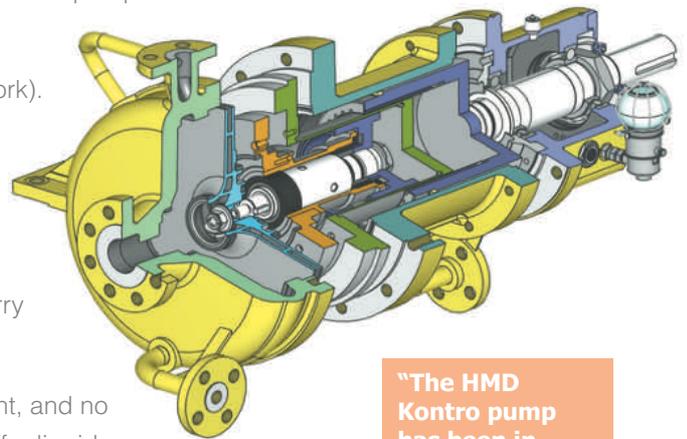
What are the advantages of magnetic drive over mechanically sealed pumps?

The mean time between failure (MTBF) for magnetic sealless drive pumps is typically three times that of mechanically sealed pumps.

Mechanical seals leak across their faces (that is how they work). Magnetic drive pumps are a true zero leakage design. This eliminates potentially harmful emissions and odours associated with sealed pumps.

Sealless pumps are easier to maintain, have fewer working parts, no potential leak paths and no support systems to worry about.

There is less cost involved in system design and procurement, and no concerns regarding material compatibility or appropriate buffer liquids.



"The HMD Kontro pump has been in continuous operation since its installation in 1979 and has not required any maintenance."

Report from major oil refining company densitometer pump.

What makes HMD Kontro pumps so special?

HMD Kontro have manufactured only sealless pumps in Eastbourne since 1947 and so the design is specific, and not a modified mechanically sealed pump. We make them differently and engineer them to last.

The containment shell is a welded construction to ASME VIII pressure vessel standards and typically of 1.2mm thickness. Our competitors usually have hydro formed shells, much thinner and weaker than the HMD Kontro design. Rotating parts are dynamically balanced ensuring smooth, quiet operation and longevity.

HMD Kontro pumps are a modular cartridge design. This can reduce maintenance time considerably. This method of construction means that there are many common components for each of the three frame sizes throughout the range, reducing the need for a large stock of spare parts in a multiple pump installation.

The outer magnet ring is fully encapsulated. This means that the magnets are protected from being chipped on assembly and against corrosion from the pumped liquid in the event of containment shell breach. It also means that the component can be easily cleaned in usual workshop conditions.

Each and every HMD Kontro pump is hydrostatically tested and performance tested before being delivered to guarantee optimum reliability.



HMD Magnetic Drive



Other Magnetic Drive



So how long do HMD Kontro pumps last?

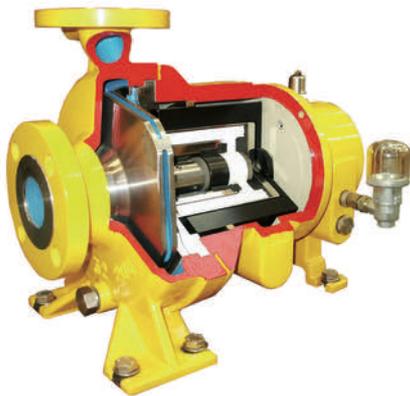
We have many examples of extended pump life in our sixty year history. Being the inventors of the magnet drive pump we have more experience than any other manufacturer. In many installations pumps have run without maintenance for ten years and more.

In most of our pumps we use silicon carbide bearings a material so hard that under normal process conditions it will not wear for many years. When you add permanent samarium cobalt magnets and the unique way we engineer our pumps, this results in a very long service life with minimal maintenance.

Although it is difficult to give a MTBF (mean time between failure) for our pumps because of the wide variety of applications they have, on clean liquid it can be in the region of 8 to 10 years or more.

So what operating parameters can Sealless Pumps now handle? (50 Hz)

"A large UK oil refinery has had 14 HMD Kontro pumps running for 12 years. There have been no failures whatsoever."



- Temperature Down to -80°C / -112°F
- Up to (Torque Ring Design) 450°C / 840°F
- Up to (Synchronous Design) 315°C / 600°F
- Flow Rates Up to 686m³/hour / 3022 USGPM
- Heads Up to 240m / 767ft
- Viscosity Maximum 200c
- Pressure Up to 185 bar / 2683 psi
- Solids Up to 5%, w/w a particle size of less than 150 microns
Up to 8% and less than 250 microns with filtration
- Power (Maximum Motor Size) 220kw / 268hp
- Speed Range 1450 – 3500 RPM
- Full compliance with ANSI / ISO / API685 (API610)
- Available Materials 316st st / Alloy 20 / Alloy C / ETFE

But what about solids?

All HMD Kontro pumps, as standard, can handle up to 5% hard solids and 150 microns diameter. We can increase this, by fitting a self-cleaning in line filter, to 8% solids and 250 microns.

For larger solids we can provide pumps with a clean flush system or filter built into the flush pipework. Please ask for details.



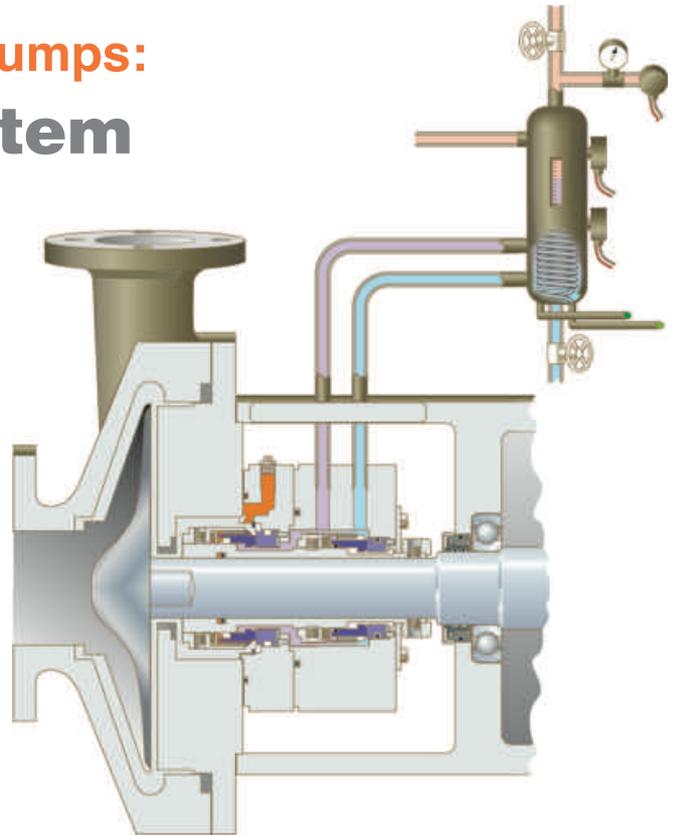
An in line filter can increase the solids handling capability of HMD pumps

The big advantage of sealless pumps: No seal support system

Whilst a sealless magnetic drive pump completely contains the liquid, a sealed pump, by its very nature, is designed to leak. This is how the friction between the seal and the shaft is lubricated.

In many instances a sealed pump needs to incorporate a complex and complicated seal support system, to prevent the liquid being pumped leaking to atmosphere. These are often complex and need as much, if not more, time and attention for installation and operation as the pump itself.

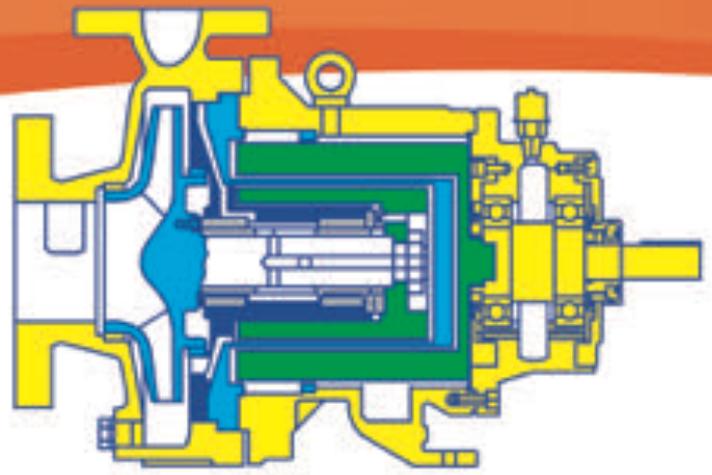
In addition to higher specification and installation costs, the support system then requires time and cost to monitor and maintain. Examples of the costs associated with a seal support system are as follows:



Additional Capital Costs	<ul style="list-style-type: none"> Seal support system Water or air cooling system Larger baseplate and foundation required
Additional Installation Costs	<ul style="list-style-type: none"> Cooling water piping or heat exchangers Barrier fluid (first fill) Instrument wiring and connection Instrument configuration (DCS)
Additional Project Costs	<ul style="list-style-type: none"> Additional documentation for system and instrumentation PED may be applicable for pressure vessel Extended SIL and HAZOP meetings Long lead times for seal support systems
Additional Operating Costs	<ul style="list-style-type: none"> Repair or replacement of mechanical seals and bearings Replenishment of barrier fluid Additional man-hours to operate and maintain seal systems Lost production during downtime Removal of barrier fluid from product Maintaining of seals on stand-by pumps

“Research has shown typical seal life for ANSI pumps to be in the region of only 1.7 to 2 years. Further independent studies have shown the total life cost of sealless pumps to be 60% of their equivalent sealed pump.”

As the name suggests, because a magnetic drive pump is sealless, there is no need for a seal support system and all the costs and complexities that involves. As a result, maintenance is significantly reduced and there is less risk to operatives during ongoing operations.



How do I protect my pump?

The main cause of pump failure is process related. This is true of both sealed and sealless pumps. Most process related failures are caused by:

- Dry running or low flow
- Closing valve on suction or discharge
- Cavitation or vapour in pump
- High flow overload

These can be eliminated in most cases by using a power control monitor. This simple, inexpensive device monitors the actual power absorbed and cuts out the pump if it falls below a predetermined value or goes above its upper set limit.

In addition to this we can provide temperature sensors. These measure the temperature at the containment shell and can therefore give an indication of process or mechanical problems.

Fit both and this will eliminate 90% or more of any magnetic drive pump failures.



Power control monitors only have to be activated once then they will have paid for themselves.

What about total life cycle costing?

HMD Kontro have considered this very carefully. Whereas in some cases a magnetic drive pump is a little more expensive to purchase than a mechanically sealed pump due to the extra costs of manufacture, in most cases the long service life and minimal maintenance costs provide a highly competitive life cycle cost.

Remember with sealless pumps you have no sealing support systems to design, procure, install and maintain. You have an extended mean time between failure and comparatively economical spares costs there is no shaft or impeller damage caused by shaft deflection and no shaft sleeve wear caused by the seal. Generally only a low cost service kit is required for HMD Kontro pumps.

There is no product leakage and no leakage of barrier fluid into the product as happens with double mechanical seals.

The costs of lost production is greatly reduced, there is less environmental impact and less disposal and decontamination costs.

Taking all of this into account you can build a good picture of the whole life costing of HMD pumps against sealed pumps and a very simple example is shown on the next page. This is based on a pump having a flow rate of 20 m³/hour and 25 metres head. The MTBF shown for sealed pumps is typical according to independent data and is a conservative estimate for an HMD Kontro pump.

Total Life Costing Exercise

Sealed vs Sealless Cost Comparison

Installation Costs	Double Sealed	Sealless
Initial pump cost	£2,400	£3,510
Seal Support System cost	£800	N/A
Installation cost including cost of design & procurement	£1,400	£1,000
Total Installation Cost	£4,600	£4,510
Running Cost		
Cost / kw hour (typical industrial tariff 2009)	£0.08	£0.08
Pump power consumed	2.0kw	2.4kw
Total cost/year based on 16 hours/day, 200 days/year	£512	£614
Cost each year of inspection & maintaining seal support 20 minutes/week @ £30/hour	£520	N/A
Total Running Cost - 15 Years	£15,480	£9,210
Cost of Failure		
Mean time between maintenance events (years)	2	5
Cost of bearings, gaskets (similar for both pumps)	£100	£100
Cost of seal or service kit	£750	£830
Cost of labour 7 hours @ £30/hour	£210	£210
Total cost of each failure / maintenance event	£1,060	£1,140
Total Failure Cost - 15 years	£7,420	£3,420
Total cost of 15 years operation	£27,500	£17,140
Total Lifetime Saving / Extra Cost of Sealed Over Sealless!	£10,360	60.4%

Other costs to consider:

Add to the above figures the cost of lost production, cost of disposal and decontamination of parts and barrier fluid / gas supply, plus the potential environmental costs (remember magnetic drive pumps do not leak to atmosphere) of a sealed pump and you have a very convincing case to specify sealless.

That's HMD Kontro Know-How

In summary, HMD Kontro sealless pumps can give a much-reduced lifetime cost for the majority of applications. They can also help to meet your H&S commitments. Please enquire today for further information on +44 (0) 1323 452000 or visit www.hmdkontro.com.

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