

Spherical Membrane Pumps Innovative Design Minimizes Costs



ABEL[®]

**Excellence
in Products
and Service**

A newly developed design sets new standard

Development

At the end of the 1970's, ABEL was the first company to develop a spherical membrane pump – a new generation of slurry pumps.

Innovative features are the cylindrically shaped membrane and the modified hydraulic fluid control system.

The spherical design, membrane housing lends itself to high pressure applications and facilitates high volumetric efficiencies through reduced clearance volumes.

The Spherical Membrane Pump is an innovative blend of time proven and new design features, which makes it another ABEL leading product.



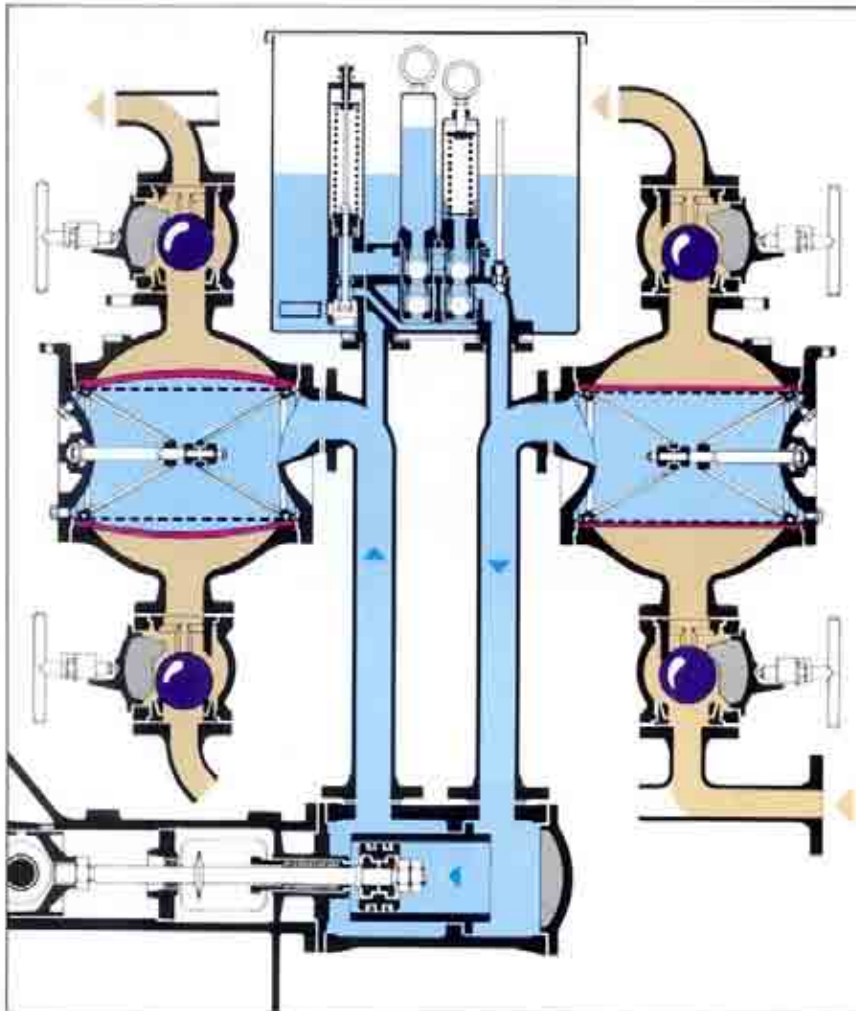
Advantages

The newly developed spherical membrane pump offers users highly reliable pumps with superior elastomer technology. This new generation pump already has a proven track record with many successfully operating plants. ABEL Piston Membrane Pumps offer economic and technical advantages, such as excellent wear part life and optimized volumetric efficiency.

These features are especially important for demanding, continuous, 24 hour/day operation in industrial and municipal applications.

This pump is being recognized among experts as the slurry pump innovation for the future.





Function and Design

ABEL positive displacement pumps are available from simplex to quintuplex configurations. ABEL has chosen for the spherical membrane pump the double acting (simplex, double-acting) configuration for small to medium capacities, and the quadruple acting (duplex, double-acting) configuration for large capacities.

The ABEL quadruple acting design particularly makes optimum use of all pump components especially with the double-acting pistons. ABEL supplies open air or membrane type pulsation dampeners which are sized to dampen the pressure fluctuations associated with a simplex or duplex design.

Features

- geometrically optimized design of fluid end
- high volumetric efficiencies through minimized clearance volumes
- sealless on pumpage side
- ball or cone valves available
- quick opening valve housing cover
- membrane leakage detection capability
- safety, pressure relief valves on hydraulic side
- central pressure regulating valve for filter feed applications
- automatic hydraulic fluid control system
- quiet, smooth operation

Hydraulic Fluid Control System

The hydraulic fluid control system is important for the successful operation of piston membrane pumps.

ABEL has developed a unique hydraulic fluid control system assuring safe and reliable performance on continuous duty.

Spherical Membrane Pump Application

Filter press Feeding

ABEL Spherical Membrane Pumps put ABEL on the leading edge of filter press feed pump technology worldwide.

The internal hydraulic fluid control system assures optimum filter press feed flow matching the requirements of the filter press. During the filtration cycle, the filter cake forms gradually with increasing back pressure causing a reduced flow demand from the filter press feed pump.

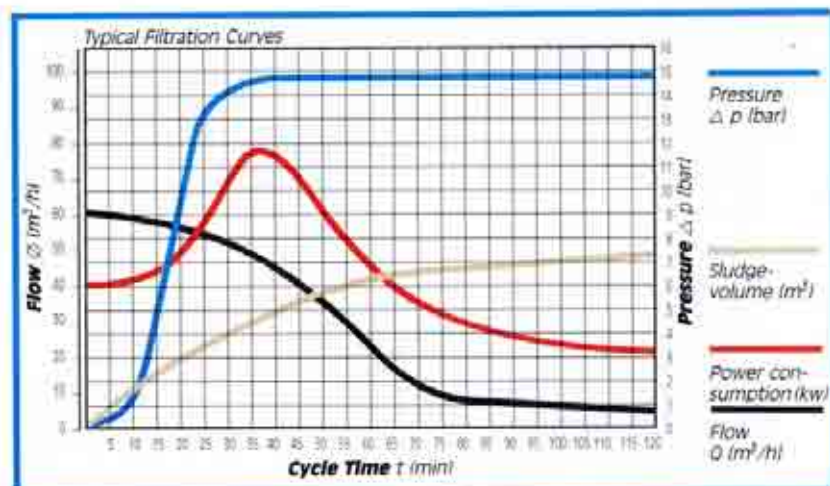
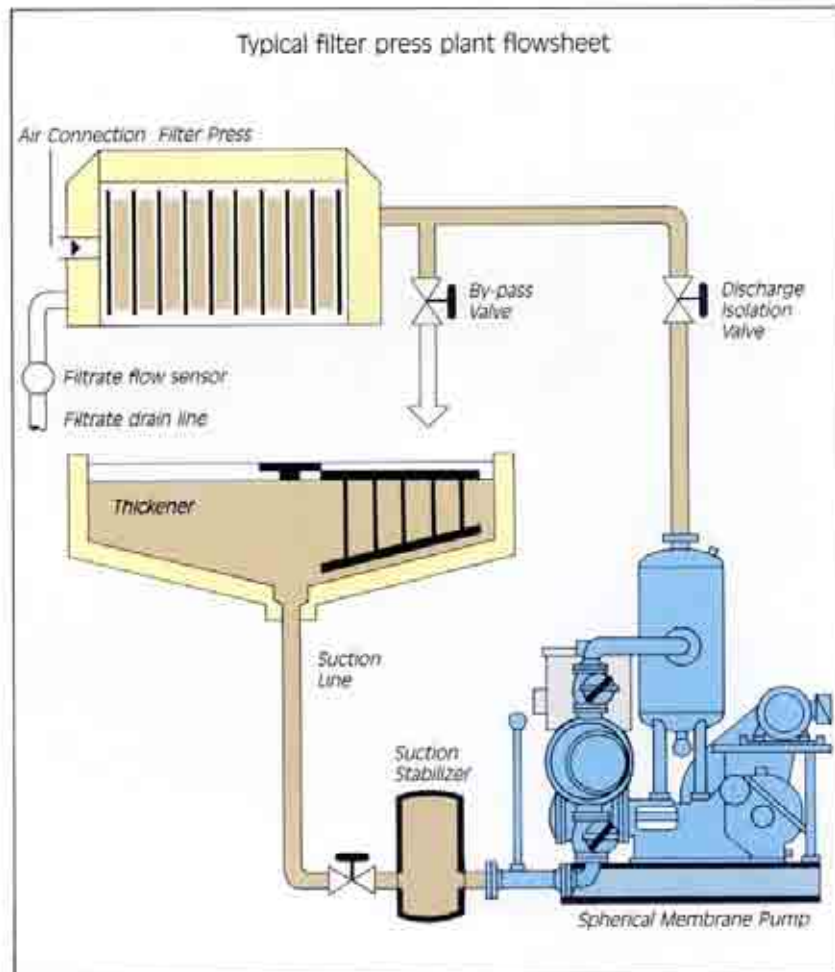
The ABEL Spherical Membrane Pump follows the filter's flow/pressure requirements automatically with its internal hydraulic control system. With increasing pressure, the hydraulic control system reduces the amount of fluid available to displace the membrane.

The reduced membrane stroke results in a gradual reduction of pumpage flow to the filter press. Finally, the flow is reduced to 0 at a predetermined final filtration pressure.

This internal control system saves energy and eliminates the need for expensive, external variable speed drive devices.

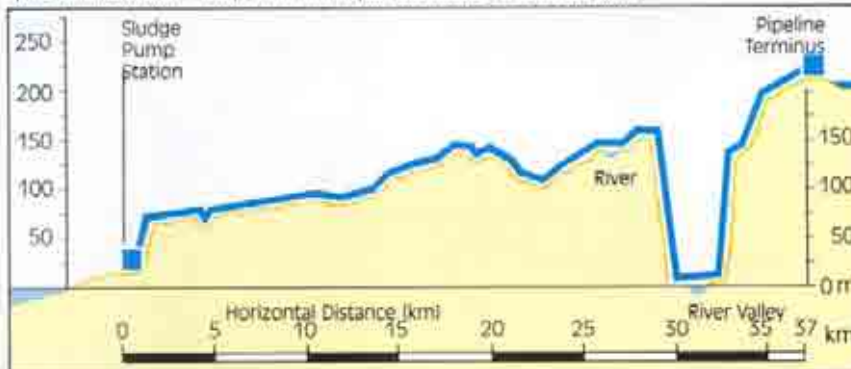
One of the first ABEL Spherical Membrane Pumps was installed at a sewage treatment plant in the state of Baden-Wuerttemberg, West Germany. The pump has a maximum flow capacity of 25 m³/h and 15 bar final filtration pressure. The pump has operated reliably since 1981, surpassing all of the customer's expectations.

ABEL Spherical Membrane Pumps are also frequently used for the filtration of industrial sludges/slurries; i.e. flue gas desulphurisation systems, water and wastewater treatment plants, metal hydroxide sludge dewatering, chemical process, etc.

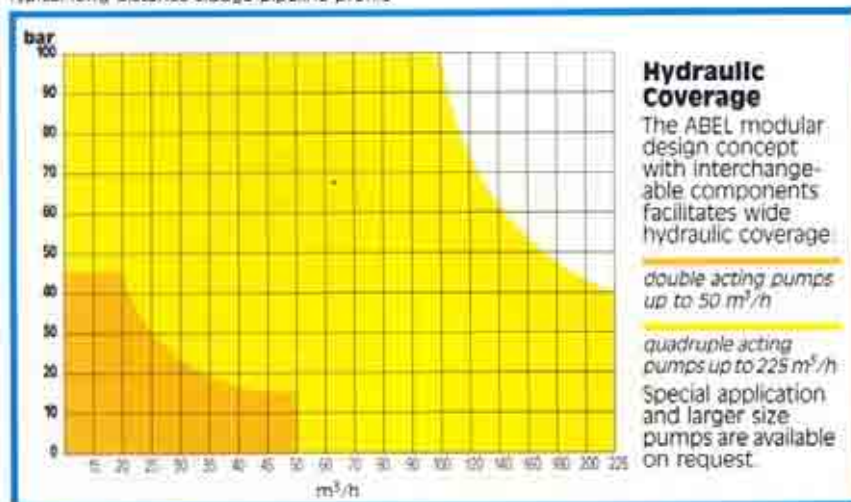




Spherical Membrane Pumps in a municipal wastewater treatment plant



Typical long distance sludge pipeline profile



Transfer and Process Applications

The ABEL Spherical Membrane Pump is ideally suited for the transfer of slurries over long distances, for mine dewatering, spray dryer feed, coal gasification, etc.

Some typical applications are:

- Quadruple acting ABEL Spherical Membrane Pump for the dewatering of a uranium mine in Southern France.

Technical data:
Rated Capacity: 20m³/h, 64 bar
Design Pressure
Specific Gravity: 2.2
Solids Concentration: 30%

- ABEL Spherical Membrane Pumps for the transfer of fine coal tailings have been operating on a continuous basis since 1981 at a coal mine in Belgium.

Technical data:
Slurry Specific Gravity: 1.3 to 1.4
Pump Capacity: 22 m³/h
Design Pressure: 40 bar

Other Spherical Membrane Pumps are used for the transfer of slurries in steel plants. Typical capacities are 40m³/h at 40 bar.

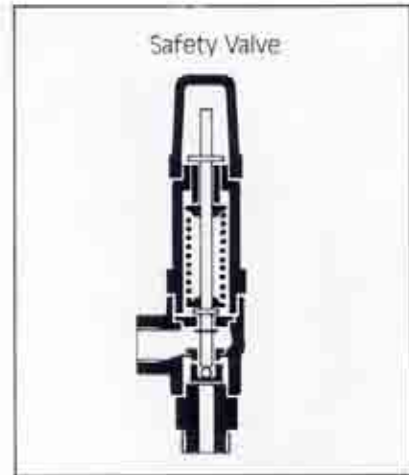
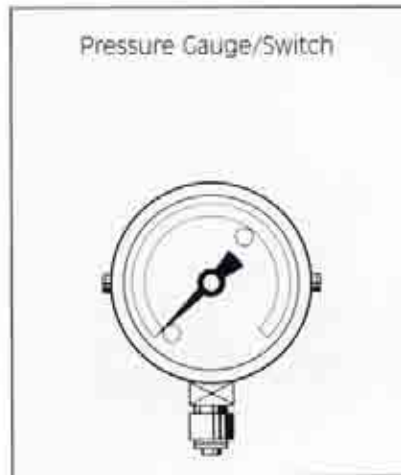
ABEL has in house capabilities to test various slurries for their abrasiveness (Miller number) and corrosion characteristics and thus offer the best suited pump for the application. Our slurry testing involves state of the art equipment and procedures.

Spherical Membrane Pumps Superior Technology insures Safety

Safety and Control

Safety Valves

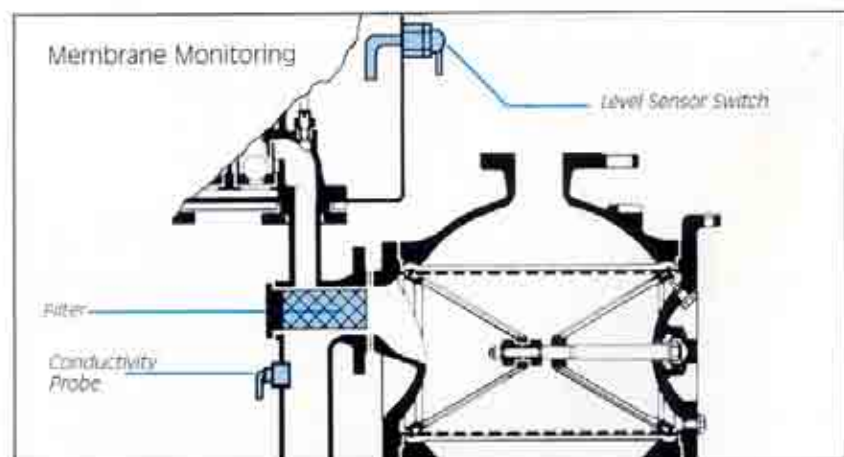
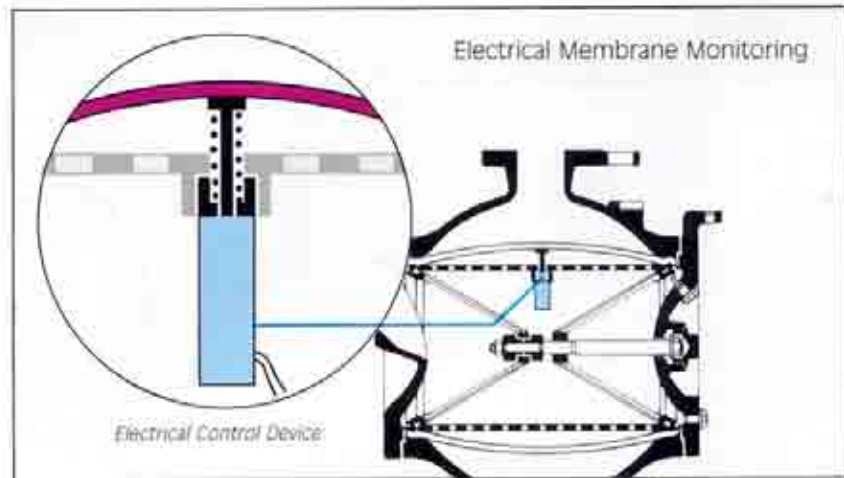
ABEL Spherical Membrane Pumps have a unique safety valve on the hydraulic fluid side of the pump. The safety valves open in the case of overpressure and the hydraulic fluid will be bypassed internally. In case of transient pressure peaks an optional pressure switch can turn the pump off immediately. Also available are pumpage side safety valves or rupture discs as additional operating safety.



Membrane Control

ABEL Spherical Membrane Pumps have several systems to monitor the condition of the membranes. Connected to each membrane is an electrical control device which indicates possible membrane overstretching. Warning from this device allows the operator to take corrective action prior to membrane breakage thus greatly increasing membrane life.

Nevertheless should membrane rupture occur, a level sensor switch on the hydraulic fluid reservoir can alert the operator that hydraulic fluid is escaping into the pumpage. A conductivity probe and a fine mesh filter on the internal hydraulic piping of the pump help to avoid the pumpage contaminating the pump hydraulic fluid. Therefore components on the hydraulic fluid side of the pump such as the piston, the cylinder liner, and the control valves are afforded maximum protection.

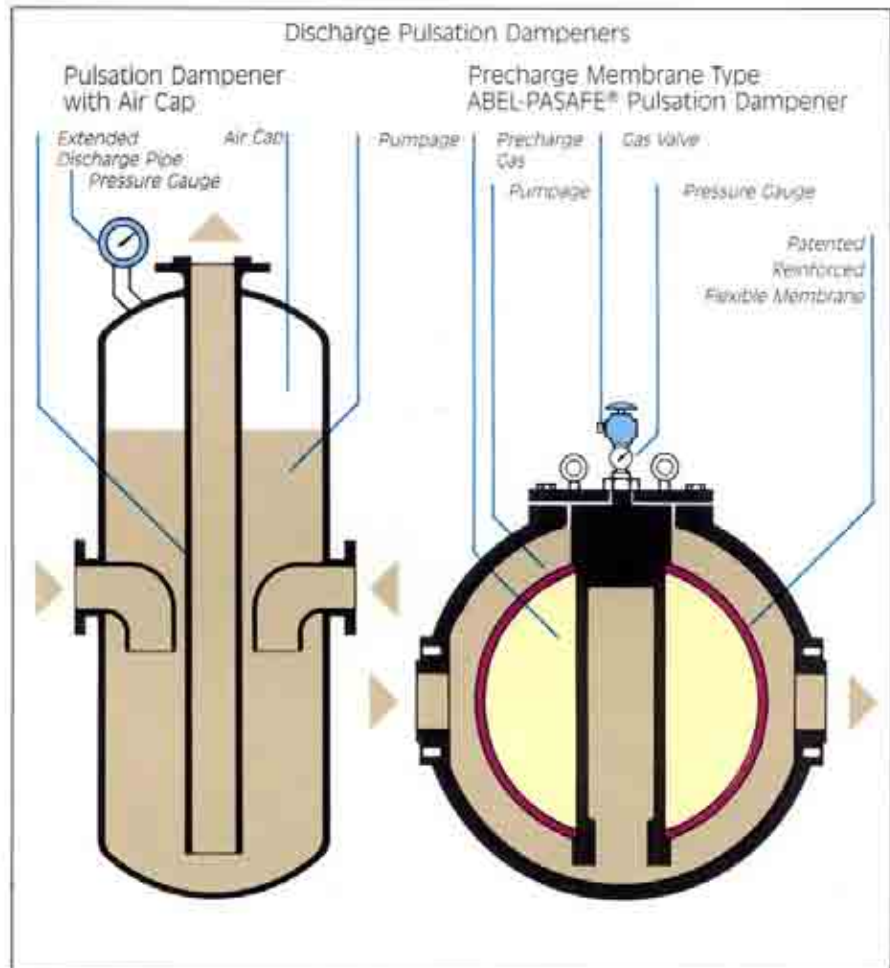


Pulsation Dampeners

ABEL has devoted special attention to the development of the most suitable pulsation dampeners for double and quadruple acting spherical membrane pumps.

In the range of 0-25 bar a simple, correctly sized open air pulsation dampener is the best solution. The air cap reacts immediately to flow and pressure variations, dampening them most efficiently in this pressure range. This air-cap pulsation dampener is especially effective for filter press feed pumps wherein the pump pressure gradually increases from zero to maximum filtration pressure.

For higher pressure above 25 bar, especially for pipeline transfer pumps, and for pumpage which can quickly absorb the air cap a precharged membrane type pulsation dampener is the optimum technical solution. Most of the commercially available pulsation dampeners have been unsatisfactory. When a pre-charged membrane type pulsation dampener is required, ABEL uses the ABEL PASAFE® pulsation dampener whose "flow through" design most efficiently dampens both flow and acceleration induced pressure variations.

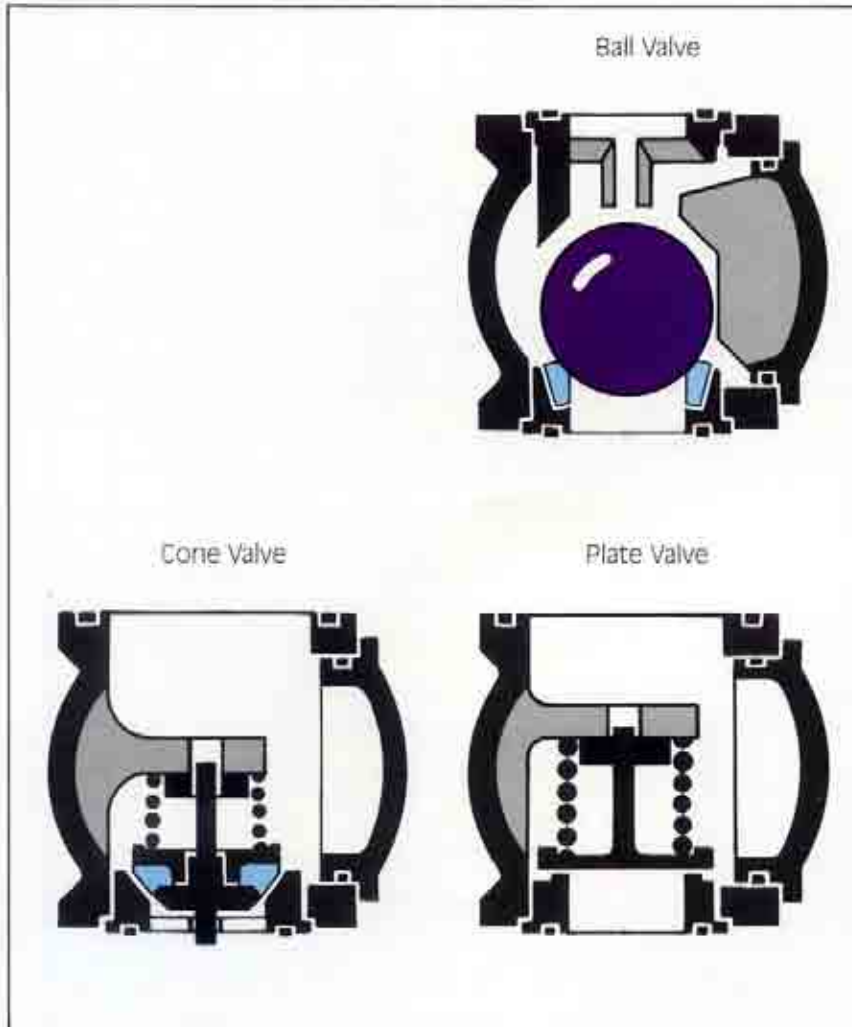


Spherical Membrane Pump – Power End

ABEL has decades of experience in the design and production of power ends for positive displacement pumps. ABEL gear boxes are manufactured in our own factory. Our time proven, robust design assures maximum operating life with a minimum of downtime.

All ABEL gears are self aligning single reduction helical double row equipped with an eccentric or crank shaft housed in a rugged cast iron gear box.

Simple splash oil lubrication is used for most constant speed pumps. A forced lubrication system can be supplied for high piston rod loads and some variable speed applications utilizing hydraulic couplings, frequency changers, or thyristor controlled DC motors.



Valve Design

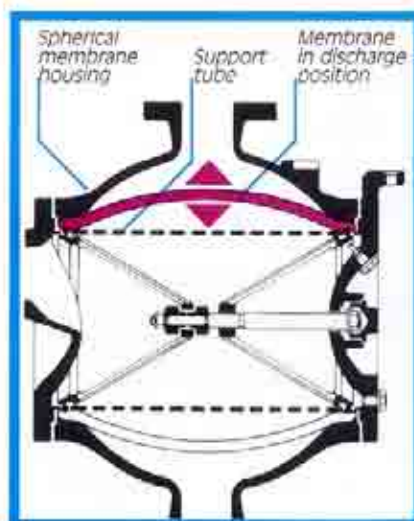
Depending on the particle size distribution of the pumped slurries, ABEL pumps can be constructed with plate, cone or ball type valves with or without spring assisted closure. Plate valves are used for slurries with only trace amounts of solid particles. Cone valves work best for slurries with various solids concentrations in the form of a homogeneous suspension of small particles. Ball valves are best for heterogeneous slurries with a relatively high concentration of fibrous materials or large particles.

To assure optimum valve wear and volumetric efficiencies, ABEL can offer valve seats in either hard metal or elastomer material. The valve closure piece (ball, cone or plate) is also available in hard metal or elastomer material.

All ABEL slurry valves are of the vertical flow through in line design which avoids unnecessary changes in the flow direction and minimizes horizontal piping in which solids can settle.

Membranes and Valves

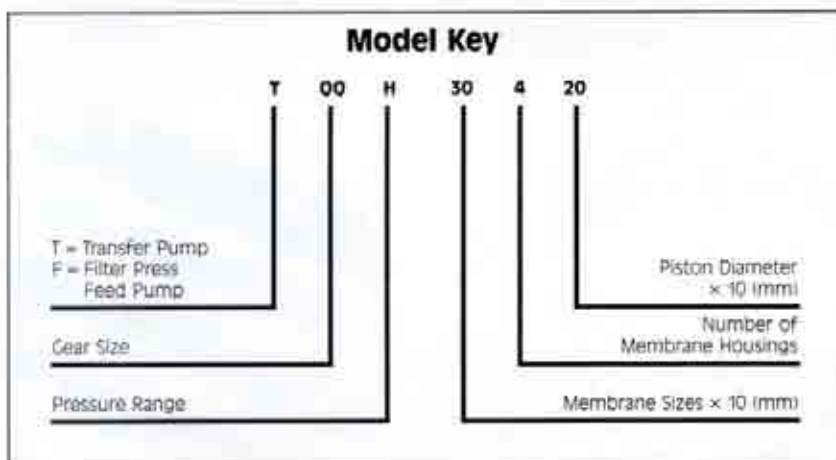
Membranes are offered in various elastomers to be compatible with the pumpage. Pumpage end wetted parts can be made of stainless steel or elastomer lined depending on the abrasion/corrosion characteristics of the pumpage.



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Hydraulic Coverage

100 bar	TQOK 184-10	TQOK 184-10	TRKX 224-14	TRKX 224-14	TRKX 224-14	TRKX 224-14	TRKX 224-14	TRKX 224-14	TRKX 224-14	TVVK 304-18	TVVK 304-18	TVVK 304-18	TVVK 304-18	TVVK 304-18	TVVK 304-18									
80 bar	TQOK 184-10	TQOK 184-10	TQOK 184-10	TRKX 224-14	TRKX 224-14	TRKX 224-14	TRKX 224-14	TRKX 224-14	TRKX 224-14	TVVK 304-18	TVVK 304-18	TVVK 304-18	TVVK 304-18	TVVK 304-20	TVVK 304-20	TVVK 304-20								
64 bar	TRHF 184-10	TQOF 184-11	TQOF 224-12	TQOF 224-12	TRRF 224-14	TRRF 224-14	TRRF 224-14	TRRF 224-14	TRRF 224-14	TRRF 304-18	TRRF 304-18	TRRF 304-18	TRRF 304-18	TRRF 304-20	TRRF 304-20	TRRF 304-20	TRRF 304-20	TRRF 304-22	TRRF 304-22					
50 bar	TRHF 184-10	TRHF 184-11	TQOF 224-12	TQOF 224-12	TQOF 224-14	TQOF 224-14	TQOF 224-14	TQOF 224-14	TRRF 304-18	TRRF 304-20	TRRF 304-20	TRRF 304-20	TRRF 304-20	TRRF 304-20	TRRF 304-20	TRRF 304-20	TRRF 304-22	TRRF 304-22	TRRF 304-22	TRRF 304-25	TRRF 304-25	TRRF 304-25		
40 bar	TQE 222-14	TQE 222-16	TQOE 224-14	TQOE 224-14	TQOE 224-14	TQOE 224-16	TQOE 224-16	TRRE 304-18	TRRE 304-20	TRRE 304-20	TRRE 304-20	TRRE 304-20	TRRE 304-20	TRRE 304-22	TRRE 304-22	TRRE 304-22	TRRE 304-22	TRRE 304-25	TRRE 304-25	TRRE 304-25	TRRE 304-28	TRRE 304-28	TRRE 304-28	
25 bar	TQH 222-14	TQH 222-16	TQH 302-14	TQH 302-20	TQH 302-20	TQH 302-20	TQH 302-20	TQH 304-18	TQH 304-20	TQH 304-20	TQH 304-20	TQH 304-20	TQH 304-20	TRRH 304-22	TRRH 304-22	TRRH 304-28	TRRH 304-28	TRRH 304-28	TRRH 304-28	TRRH 304-28	TRRH 304-28	TRRH 304-28	TRRH 304-28	TRRH 304-28
16 bar	TQC 222-14	TQC 222-16	TQC 302-20	TQC 302-14	TQC 302-20	TQC 302-20	TQC 302-25	TQC 302-25	TRHC 304-22	TQOC 304-20	TQOC 304-20	TQOC 304-22	TQOC 304-22	TQOC 304-25	TQOC 304-25	TRRC 304-28	TRRC 304-28	TRRC 304-28	TRRC 304-28	TRRC 304-32	TRRC 304-36	TRRC 304-36		
0 m³/h	15	20	25	30	35	40	45	50	60	70	80	90	100	120	140	160	180	200	225					



We reserve the right to technical changes without prior notice.