10 Commandments for the Development of the MULTISAFE Hose-Diaphragm Piston Pump

I. Reliability on highest Priority!
In excess of 50 years experience having left its mark on this product.

II. Develop to Customer Requirements!
For this reason we investigated, evaluated the results and influenced the design accordingly.

III. Progress!
By modification of the traditional flat diaphragm system into a hose-diaphragm and the development of a comprehensive, precise diagnosis system.

IV. Flexibility!
Invention of a unique modular system.

V. Cost of Ownership!
Reduction of life cycle cost (CAPEX / OPEX). In addition, easily removable new delivery valves have been designed with reversible valve seats.

VI. Environmental Acceptability!
Hermetically sealed design with redundant hose-diaphragm system.

VII. Efficiency!
Unique cost effectiveness. Exceptionally high efficiency.

VIII. Minimum Pulsation!
Pumps are available with 1, 2, 3, 4, 6 & 8 pump heads. Provision either with air vessels (with or without in-built piston compressor) or with FELUWA hose-diaphragm pulsation dampener.

IX. Universal Utilization!
Hygienic design options.

X. Control of the "Magic Triangle"!
Reduction of lead time!
Minimization of costs at higher technical and economical value!
Improvements & quality!

The result is called:

MULTISAFE

Perfect in quality, capacity, weight and ease of maintenance!
A new, hermetically sealed displacement pump without compromises!
A pump of which others maintain that it cannot be realistic!

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MULTISAFE Double Hose-Diaphragm Piston Pump
The Answer to Future Requirements!

Fig. 1
FELUWA MULTISAFE
Hose-Diaphragm Piston Pump

Technical trends within the pumping industry are at present coming down to cost reduction as a rule. However, strategies to achieve such cost reduction, are differing.

While the majority puts emphasis on cost reduction measures in fabrication and procurement sections only, FELUWA has developed a new, innovative double hose-diaphragm piston pump with higher economical and technical value, that is provided with a forward-looking diagnosis system for the hose-diaphragm and for the delivery valves. The FVPMS (FELUWA Valve Performance Monitoring System) is based on an active leakage detection system and includes manifold options for an onward transmission of sensor readings.

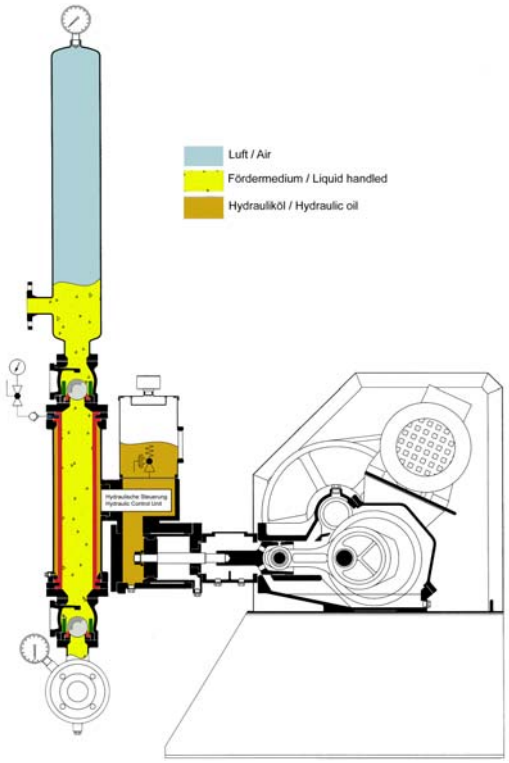

Fig. 2 Section FELUWA MULTISAFE

The reliability of diaphragm piston pumps is in the first instance determined by the service life of the diaphragm and the delivery valves. Dependent on the nature of the conveyed fluid, diaphragm failure may result in considerable damage and costs for repair, cleaning and down-time, since the conveyed fluid enters the hydraulic chamber, where it comes into contact with sliding seals and the cylinder face.

The development of the **MULTISAFE** process hose-diaphragm piston pump promises the safer, more maintenance-friendly and more economic transportation of most different fluids and slurries that arise in

- Process engineering
- Chemical industry
- Hard metal industry
- Pharmaceutical industry
- Food industry
- Aseptic process engineering
- Biotechnology etc.

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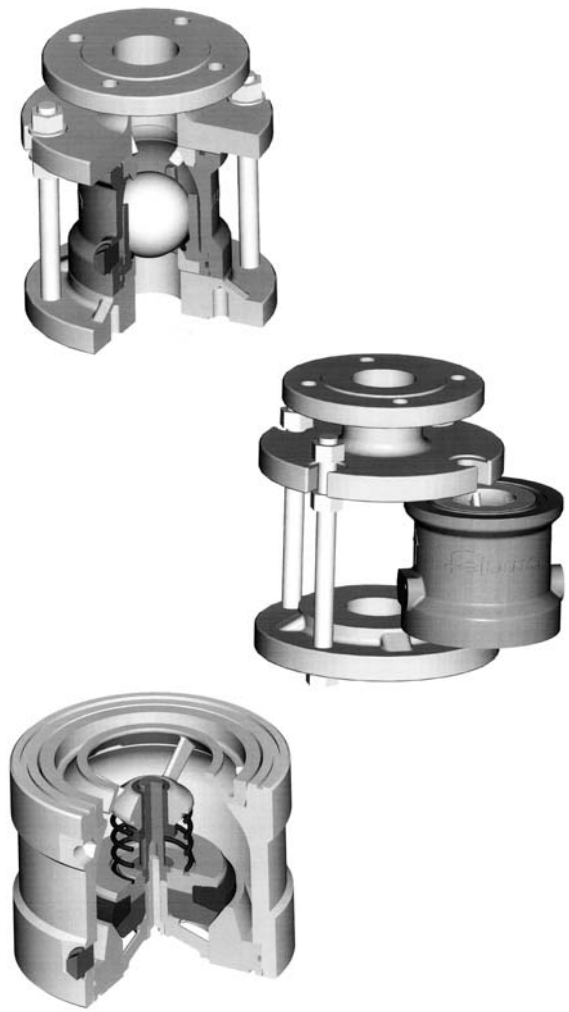
The unit meets all basic design requirements of the aseptic process engineering and is thus also suitable for applications within the food industry.

Unlike other pump designs (such as centrifugal pumps), the MULTISAFE process hose-diaphragm piston pump handles sensitive media with suspended solids particularly carefully, without solids destruction.
The unit is a hermetically sealed, leak-proof, reciprocating displacement pump with smooth operating chamber, easy to be cleaned.

The commonly utilised principle of a flat diaphragm has been modified into two flexible hose-diaphragms, which not only provide the displacement of the product, but also the hermetic partition between the slurry wetted area and the hydraulic actuation system (see sectional drawing as per Fig. 2).

With the MULTISAFE, the conveyed fluid is in contact with the inside of the hose-diaphragm and suction and discharge check valves only.

The operating chamber is thus hermetically sealed from the hydraulic chamber. The pump is leak-proof towards the outside and inside and is normally provided with a smooth faced operating chamber.



Working Principle

In conjunction with the cross head of the combined stroke and reduction gearbox, the piston causes the change of internal volume of the hose-diaphragm by transmission of hydraulic actuation fluid and thus provides for the linear displacement of the conveyed fluid without deviation. The linear flow path is particularly advantageous for the handling of media that either include solids, are of abrasive nature or may be shear sensitive.

Unlike mechanically driven hose pumps, the hose-diaphragm is not fully compressed. Instead with each stroke of the piston it makes an elastic movement comparable with a pulsating human vein.

The constant displacement-controlled movement and the individual adaptation of the elastomere material to the specific application ensure an extraordinarily long service life of the hose-diaphragms, which is considerably extended beyond that of traditional flat diaphragms.

Under excess-pressure or vacuum conditions, the coupling method of the two hose-diaphragms ensures that the synchronous movement of the pair of hose-diaphragms to the reciprocating piston is maintained. With the suction stroke of the piston, the hose-diaphragm inevitably moves towards the hose-diaphragm casing.

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Working Principle, cont'd.

If one of the two hose-diaphragms fails, the second one ensures that the conveyed fluid will neither come into contact with the pump casing nor with the hydraulic chamber or even leak outwardly. By this means, leak-proof operation is maintained until the process allows for a shut-down and repair of the unit.

For the handling of fluids with entrapped gases or slurries with propensity to fast sedimentation, the hose-diaphragm is provided with a so-called "dead space reducing cylinder".

The distinct technical advantages of the FELUWA MULTISAFE pump are its particularly smooth and linear flow and the unique clamping method of the hose-diaphragms. With this design, sediments that might damage the diaphragm, are reliably avoided.

With the MULTISAFE hose-diaphragm piston pump the conveyed fluid is not in contact with the pump head (pump casing) as in case of traditional diaphragm pumps. This shows unique technical and economic advantages since the heavy pump casing may be fabricated from less expensive material due to the non-contacting aspect of the pump design.

Pump chamber (inside of the hose-diaphragm) and/or delivery valves can be cleaned without prior removal of pipework or other pump items.

The most distinctive features of the FELUWA MULTISAFE Hose-Diaphragm Piston Pump

- Compact reciprocating displacement pump.
- Improved cost effectiveness.
- Long service life at low maintenance requirements.
- High operating safety due to double hose-diaphragm with smooth & linear flow path and integrated hose-diaphragm leak detection.
- Easy to clean.
- CIP and SIP capability.
- Direct replacement of wear parts without removal of adjacent elements.
- The conveyed fluid is not in contact with the pump casing.

- Design with ball or cone valves. Valve seats either with metal or soft sealing or with metal and additional soft sealing.
- Pump and drive end (gearbox with piston pump) able to be installed separately.
- Heating or cooling options for the handling of fluids with extreme pumping temperatures.
- Immune to excess-pressure.
- Environmentally-friendly. Leak-proof and quiet operation.
- State-of-the-art options for fault-diagnosis, speed regulation and control systems.
- Various drive options: electric motor, pneumatic or hydro-pneumatic drives.
- Modular principle with 1, 2, 3, 4, 6 or 8 pump heads for flow rates from 0,1 to 100 m³/h and working pressures up to 300 bar.

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