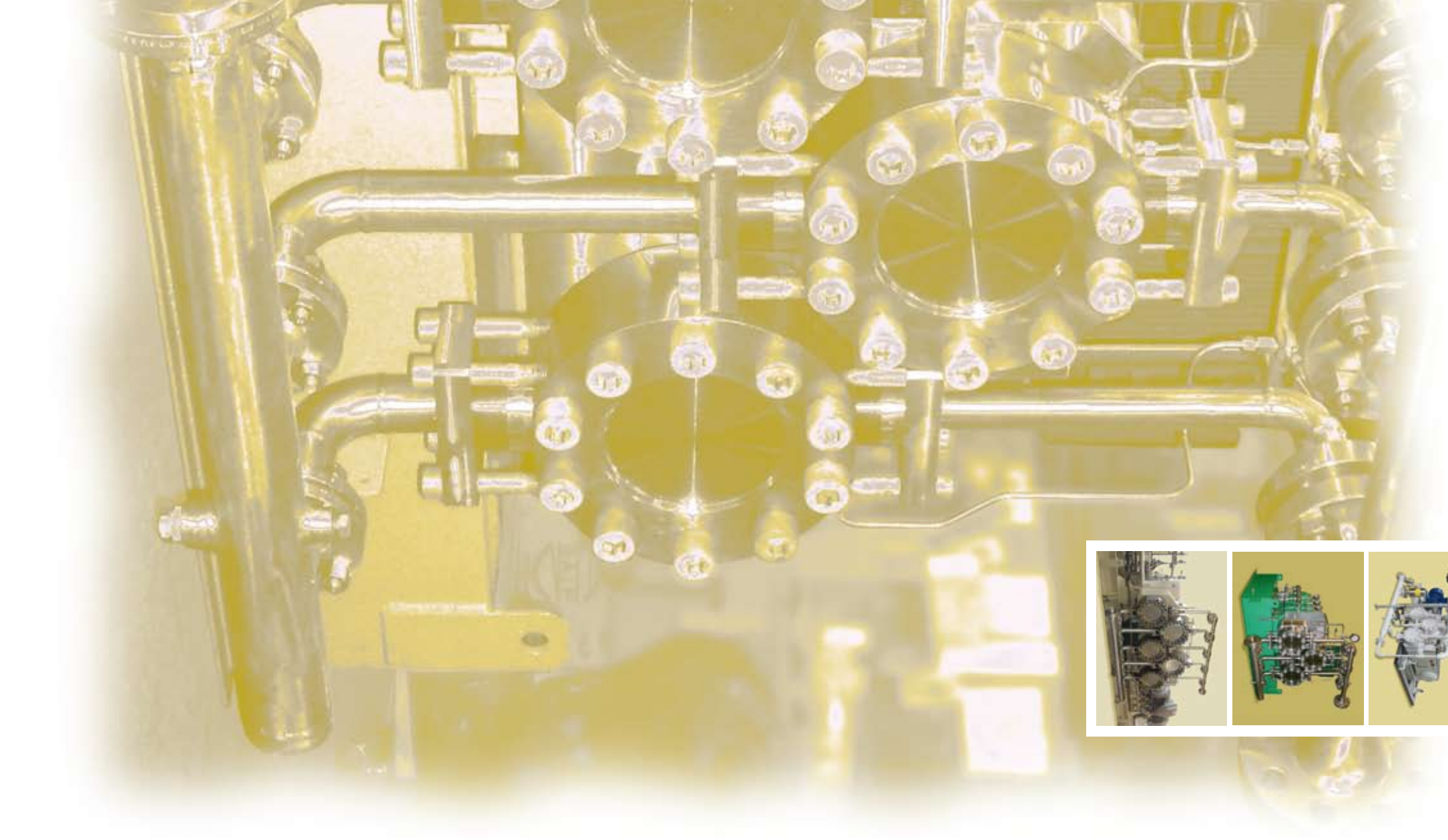


Diaphragm Pumps series

PERONIPOMPE

Process Diaphragm Pumps Series

A Process Diaphragm Pump is a fixed stroke reciprocating plunger pump, where the process fluid is set to motion via a double diaphragm actuated by hydraulic oil.

The reciprocating movement of the plunger displaces the oil contained in a pump chamber, and the oil, in turn, moves a diaphragm housed in the front end of the pump. The process fluid is moved in and out of the chamber by the alternate bending of the diaphragm. The diaphragm is a positive seal so the process fluid cannot contact other parts of the pump or the atmosphere. The Process Diaphragm Pumps are a version of TITANO and PTO/PQO/PSO Reciprocating Plunger Pumps Series API 674.

Titano 31.40 m Triplex Diaphragm Pump for Hydrocarbon Condensate in an offshore field

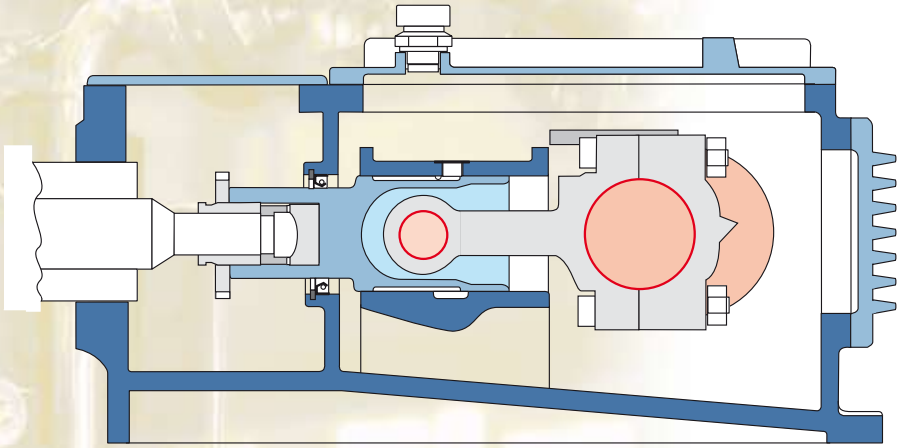
Titano 31.30 m Triplex Diaphragm Pump for Water Reinjection in an oil field

They use standard power ends, but with dedicated sandwich type double diaphragm pump heads. This leak-less solution can be used for handling any hazardous fluid, when stringent environmental regulations have to be met or when the "plunger leakage free solution" (the triple packing with seal oil barrier) is not accepted within the project.

Crank mechanism

The power end is the same widely used for API 674 Peroni Reciprocating Plunger Pumps and its characteristics are:

- *low stress levels in all components;*
- *crankshaft ends supported by axially self centred roller bearings (plus intermediate sleeve bearings for multiplex pumps);*
- *thin shell, bimetallic, antifriction type connecting rod bearings;*
- *spherical joint between crosshead and plunger to avoid bending loads and misalignments;*
- *a simple and safe hydrodynamic lubrication system with no need of external cooling, feed or reservoir for the Titano Series, and forced lubrication for the PTO/PQO/PSO Series.*



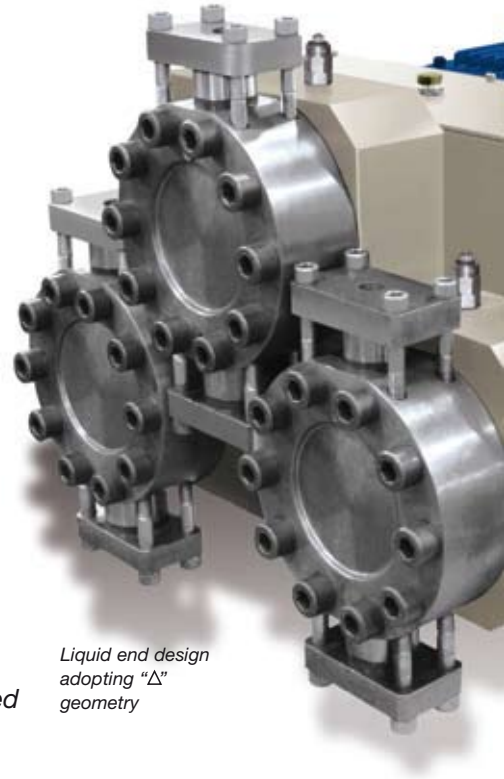
Diaphragm Pump Series: power end arrangement

PQO 160 m Quintuplex Diaphragm Pump for Sour Water Injection in an oil field

Liquid End

The liquid end of this series features a staggered configuration of the diaphragm heads where the heads are installed on the vertexes of a triangle.

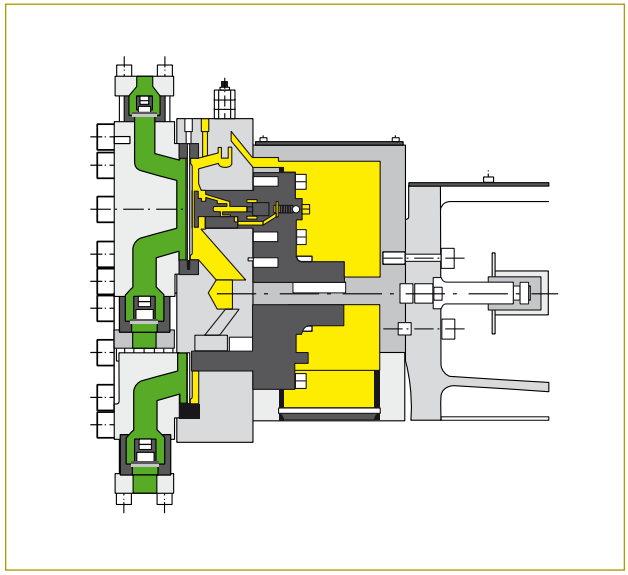
The "△" geometry of the Liquid End (patent pending) involves reduced dimensions of the pump and allows the utilization of Peroni API 674 power ends.



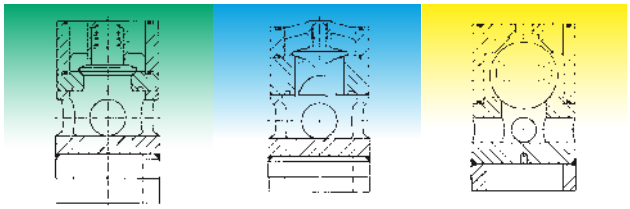
Liquid end design adopting "△" geometry

The Liquid End standard execution includes:

- *high strength modified PTFE double diaphragms, sandwich type;*
- *monitoring of diaphragm failure;*
- *incorporated relief valve, easily accessible for routine maintenance, to prevent any damage to the pump in case of accidental overpressure;*
- *internal recirculation valve, to restore the driving fluid if the relief valve opens, with an active push rod for diaphragm displacement control under high pressure suction conditions.*



Process Diaphragm Pumps: typical hydraulic end arrangement



Up-guided valve *Wing valve* *Ball valve*

Check valves and seats adopted for the Process Diaphragm Pumps are the same as for the Titano Plunger Pump Series.
Peroni has wide experience choosing the most suitable valve design (up-guided, wing or ball) in connection with the characteristics of the fluid.

Advantages of the series

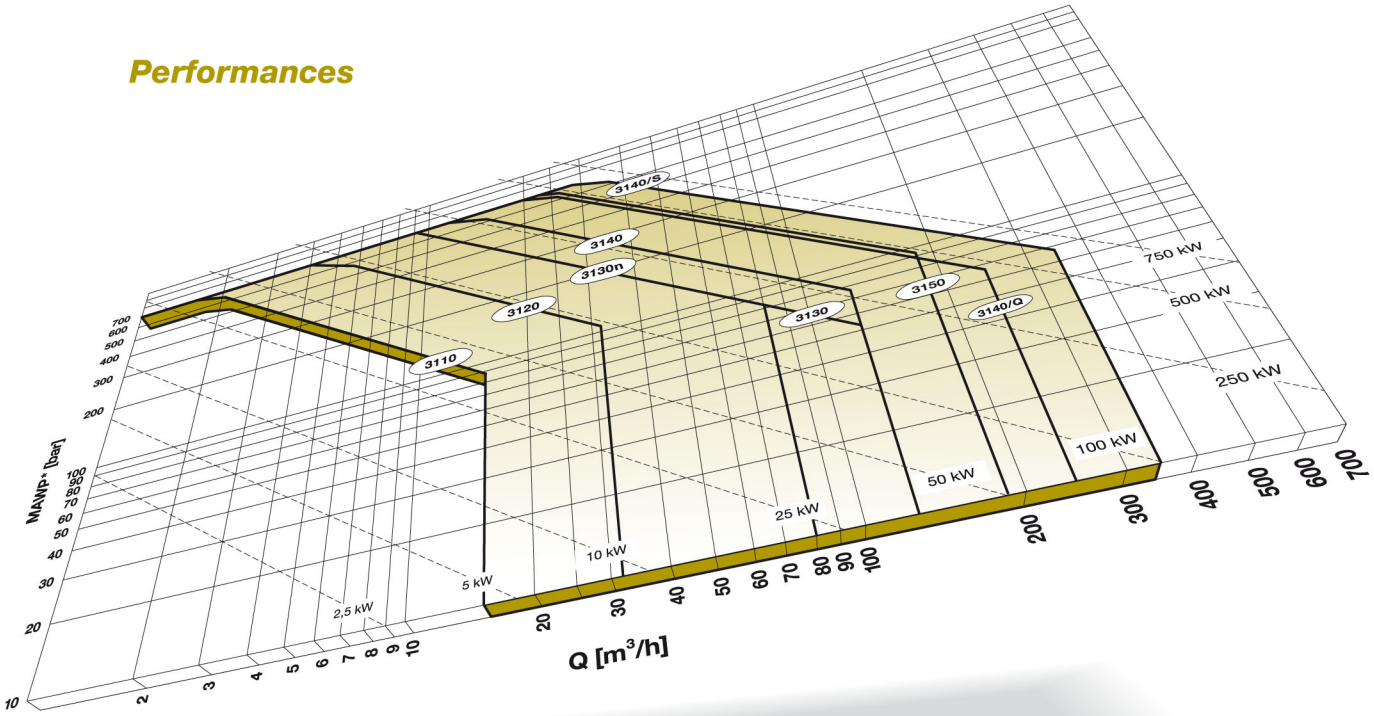
All the Process Diaphragm Pumps are designed and manufactured to the applicable API 674 and ASME standards. Every component of the pumps is designed with high safety factors that lead to a very stiff and safe construction and to limited life cycle costs.

Furthermore, the Peroni Process Diaphragm Pump solution offers important advantages like:

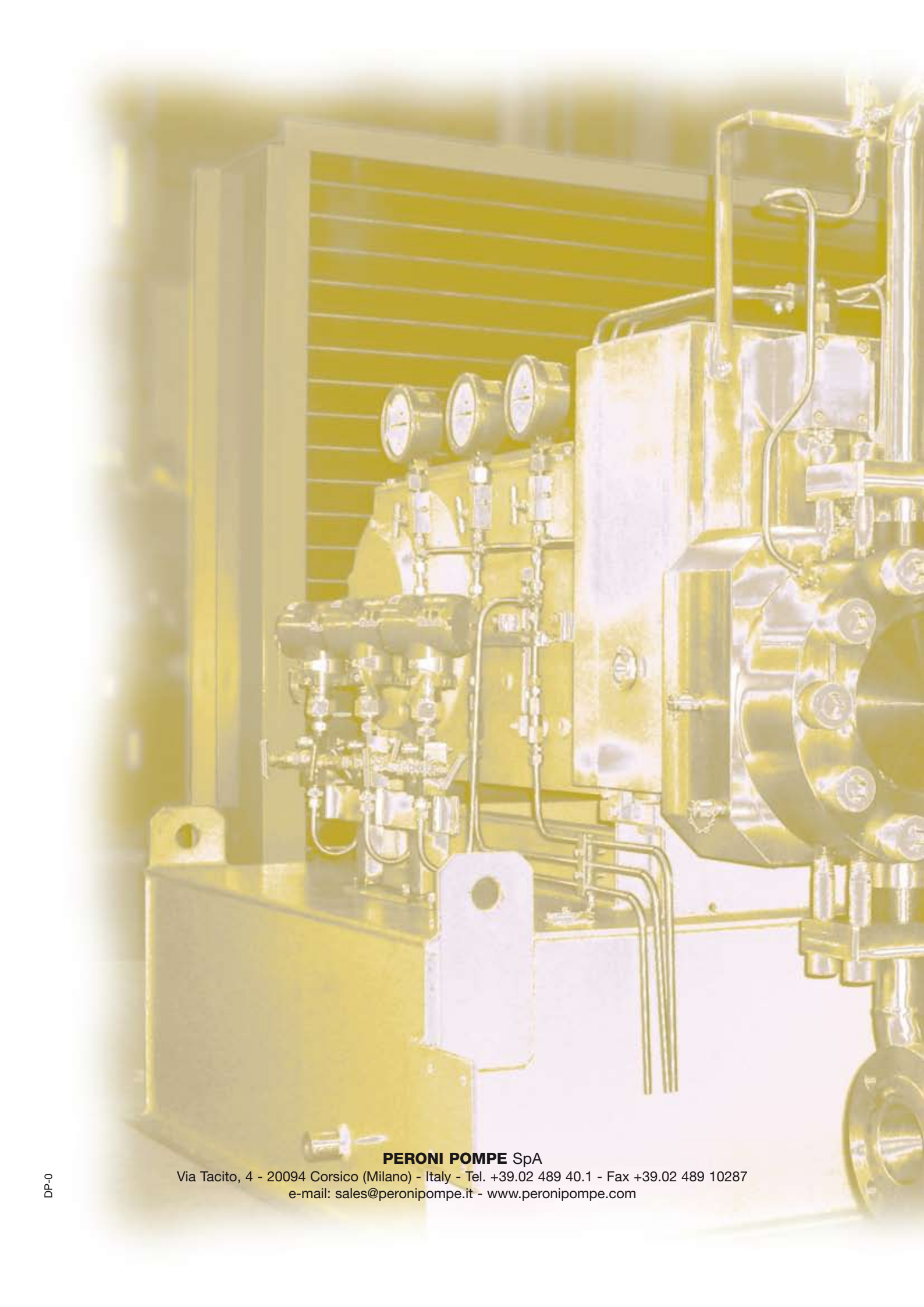
- *long life of the diaphragms due to our design that avoids stress concentrations, and that results in lower maintenance costs;*
- *high stiffness of the liquid end with very limited deformation under severe loads;*
- *reduced clearance volumes with consequent high value of the volumetric efficiency;*
- *low volume of oil necessary to actuate the diaphragms since the plunger sealing does not require to be oil flooded.*

Peroni Process Diaphragm Pumps are specifically designed for off-shore applications with footprints reduced up to 25% compared to the commonly used horizontal multihead design arrangement of this kind of pumps.

Performances



Maximum Allowable Working Pressure



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