ENGINEERING
TOMORROW

Danfoss

Chemical liquid pumps
just got smaller, lighter and
tougher

The Danfoss pump range combines compact axial piston pump technology with precision production in high-grade material. Pump reliability for the oil and gas industry has never been this good.

90%
reduced space and weight compared to traditional pumps.

www.oilandgas.danfoss.com

Chemical liquid pumps
that punch way above their weight

Maximum reliability.
Minimum footprint and maintenance.
More than 20 patents.
All in one pump.

The Danfoss Group has more than 40 years of experience developing and producing axial piston pumps. Today Danfoss is among the three largest manufactures world-wide of this pump technology.

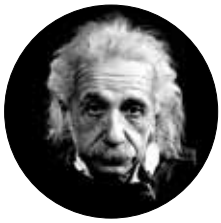
We listened to the needs of industries that require reliable but lightweight pumps in extreme environments. Then we adapted the axial piston technology used in heavy-duty hydraulic applications to ultra-compact pumps – all made in some of the most corrosion-resistant materials available.

With high-grade materials inside and out and our patented production technology, we produce chemical liquid pumps that keep process platforms in business.

Where are Danfoss CLP pumps used?

- **Methanol or MEG injection**
- **Dehydration/glycol pumping**
- **Chemical injection of biocides, oxygen scavengers, scale inhibitors**
- **Water/glycol hydraulic fluid**
- **Chemical/technical process**
- **Gas sweeting "Amine"**
- **Produced water injection**
- **Wash water system**
- **Transfer pump**
- **Subsea**

We took:
Practical knowledge



- Our heritage: more than 40 years of experience in axial piston technology for hydraulic applications
- Our field experience: everything we have learned about pumps in extreme environments
- Our dedication to reliability: Danfoss pumps play a mission-critical role across a spectrum of industries

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We added:
Metallurgy science

- Advanced materials technology: high-grade stainless steel and carbon-reinforced PEEK, from surface to core, for corrosion resistance
- World-class production technology: patented processes and global procurement expertise

=

You get:
Breakthrough technology

- Ultra-compact: smallest footprint and lowest weight of any comparable pump
- High reliability
- Corrosion resistance
- Unsurpassed energy efficiency
- Low maintenance, with dramatically increased service intervals
- Industry-leading total costs of ownership

Axial piston technology makes it possible.
High-grade materials make it last

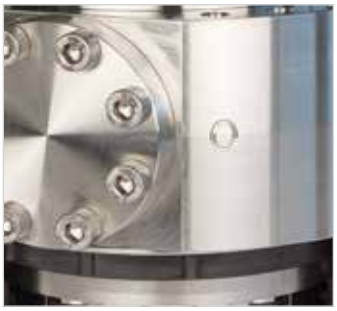
Traditional diaphragm or plunger pumps are built with few but relatively large chambers and pistons, and rely on crankshafts to transfer power and check valves to control the flow.

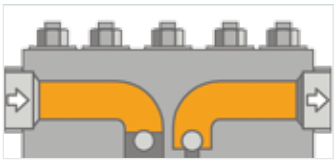
Danfoss CLP pumps use axial piston technology to deliver powerful performance. Crankshafts are not used, multiple pistons run against a swash plate and integrated port and valve plates control flow.

Because Danfoss CLP pumps pack so much power into a compact design, it is now cost-effective to build the entire pump – inside and out – from high-grade stainless steel and carbon-reinforced PEEK.

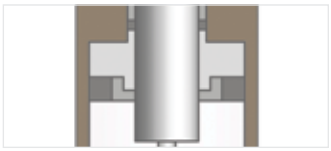
Danfoss Axial pumps	Traditional Plunger pumps	Size Comparsion

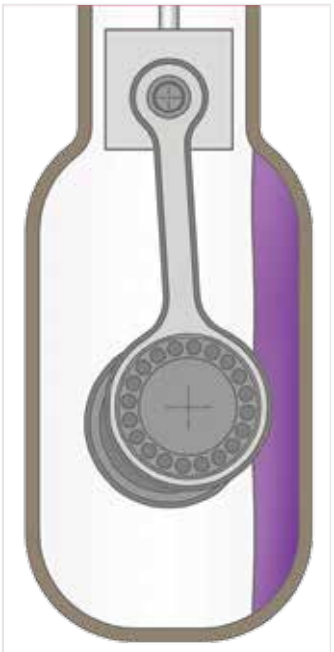
Traditional suction/ pressure check valves are replaced by a simple port and valve plate – further reducing complexity and maintenance worries.





5-9 pistons deliver extremely low pulsation rates eliminating the use of pulsation dampeners.





Traditional crankshafts are replaced by a simple fixed swash plate. No need for oil lubrication: the pumped medium provides all necessary lubrication.

Power has never been this compact.
Maintenance has never been this simple

Danfoss CLP pumps outperform traditional diaphragm and plunger pumps that are much heavier and larger.

Fewer service routines
Danfoss CLP pumps are not only easier to find room for. They also require much less service to keep them running. Breakthrough design and manufacturing technology mean that the pumped fluid provides all the lubrication that is necessary, and checking and changing oil, seals, belts and pulleys are all things of the past.

Longer meantime between services
While traditional pumps have service schedules that include monthly, weekly and even daily maintenance tasks, Danfoss CLP pumps need their first inspection/service after one year when working under normal conditions. That is 364 days of non-stop, worry-free performance between preventive maintenance service routines.

200%
increased service interval

Corrosion resistant
All wetted parts of Danfoss CLP pumps are produced in high-grade materials. We have also used the latest polymer and surface treatment technologies to provide the very best resistance to corrosive and low viscosity fluids.

PREVENTATIVE MAINTENANCE CHECKLIST

	Traditional Diaphragm Pumps						Danfoss CLP Pumps
Check	Daily	Weekly	50 hrs.	500 hrs.	1,500 hrs.	3,000 hrs.	1 year
Clean Filters	X						
Oil Level Quality	X						
Oil Leaks	X						
Water Leaks	X						
Belts, Pulley		X					
Plumbing		X					
Initial Oil Change			X				
Oil Change				X			
Seal Change					X		
Accessories					X		
Valve Change						X	
Inspection /service							X

API AND NORSOK

Both the metering pump, CLP 675, and multipurpose pump, CLP 674, are designed according to API standards.

Pumps can also be delivered according to NORSOK M-630 and M-650.

Maximum Reliability
Simple design with fewer parts.

Reliable by design
With fewer parts than traditional pumps, there are fewer things that can go wrong. And even though they do not need it very often, Danfoss CLP pumps are also designed for easy maintenance.

Lightweight, small footprint
Danfoss CLP pumps are based on the axial piston principle to make them as compact as possible. This means they are much easier to transport and handle than traditional pumps – and far more simple to configure in systems where space is at a premium.

90%
reduced space and weight
Ultra-compact axial piston pump design radically reduces footprint compared to traditional pumps.

SIMPLE DESIGN

	Traditional Diaphragm Pumps	Danfoss CLP Pumps
Dynamic Seals	From 6 to 18 or more	0
Bearings	At least 8	2
Suction Stabilizer	25-160%	<1.5%
Mass Acceleration Loss	Yes (25-160%)	No
Chrank shaft	Required	No need
Pulsation Damper	Required	No need
Oil Lubrication System	Required	No need
Gearbox	Required	No need
Pressure Rippels	Yes	No

Proven technology at work in some of **the world's toughest environments**

DONG energy

"We once thought we had a problem with one of the pumps, and Danfoss flew a replacement to the rig in less than 24 hours. It turned out that there was actually nothing wrong with the pump. Since we depend on 100% uptime, confidence in our suppliers is a must."

Henrik Nysted
Project Manager

The challenge: Upgrading the produced water system

Dong Energy took over the Siri oil field in 2002 and has since made it one of the most cost-effective production platforms in the North Sea. Upgrading the produced water system as part of an environmental improvement program required new pumps to inject biocides, scale inhibitors and oxygen scavengers. In addition to pump reliability, Dong Energy wanted to save space and weight – and electricity.

Vendor flexibility was also crucial in case spare parts or replacement pumps were needed.

The solution: Three sets of two pumps

Dong Energy selected a solution that consisted of three sets of two Danfoss pumps to provide complete redundancy. Despite the extra pumps, the new system was considerably smaller and lighter than the previous one.

Danfoss high-pressure pumps

Danfoss also supplies a wide range of positive displacement pumps to the oil and gas industry, including pumps that drive reverse osmosis systems.

We are proud of our customers

Our growing list of customers in the international oil and gas industry includes BP, Shell, Statoil, Talisman Energy, BR Petrobas, Dong Energy, ZG Wood Group, Petronas, Quatar Petroleum, Apache and Total.

A complete program
of high-performance chemical liquid pumps for the oil and gas industry

Danfoss CLP pumps are specially designed and produced for the oil and gas industry.

All pumps can be designed according to American Petroleum Institute standards, API 674 and API 675; on request, pumps can also be delivered according to Norwegian NORSOK standards, M-630 and M-650.

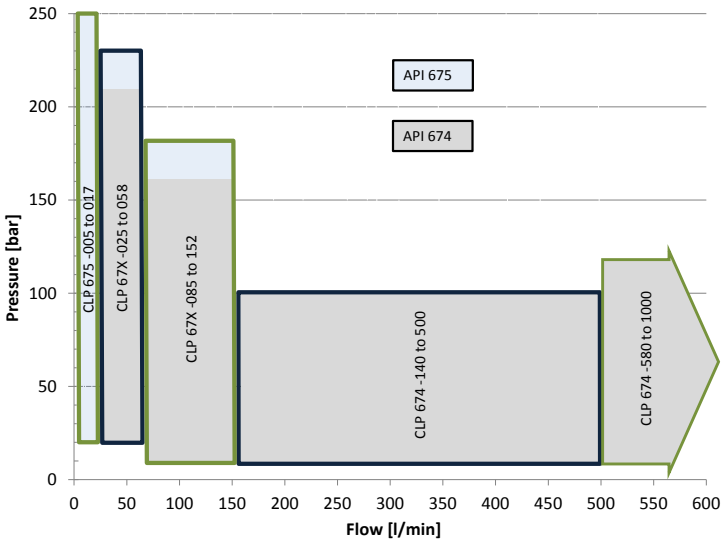
All wetted parts can be made of Duplex or Super Duplex to provide resistance to corrosive and low viscosity fluids.

Danfoss CLP pumps are fixed displacement pumps. Flow is proportionate to the number of input shaft revolutions and pump displacement, regardless of any counter pressure. Acceleration loss is minimal, and pulsations are low.

All Danfoss CLP pumps can run either continuously or in specified duty cycles.

Selectable materials:

- AISI 316
- Duplex
- Super Duplex / Duplex
- Super Duplex



Multipurpose pumps CLP 674

Designed according to API 674, latest edition

API 674		From	To
Flow*	l/min	6.2	506
	gpm	1.6	134.7
Pressure*	barg	10	210
	psig	145	3046
Weight	kg	15	110
	lb	33	242

Metering pumps CLP 675

Designed according to API 675, latest edition

API 675		From	To
Flow*	l/min	1.3	147
	gpm	0.34	38.8
Pressure*	barg	10	250
	psig	145	3626
Weight	kg	10.4	110
	lb	23	242

** Flow and pressure outside the mentioned range can also be provided*

For applications up to 210 barg (3,046 psig)

The CLP 674 pump is designed to support glycol, chemicals and other hard-to-handle fluids used in harsh environments.

The pump can be provided with magnetic coupling for truly leak-free operation.

For applications up to 250 barg (3,626 psig)

The CLP 675 pump has proven its value by solid performance in a wide range of applications and industries. Additives, methanol injection, water treatment, acids and a number of other applications are all handled by this metering pump.

High precision

The CLP 675 pump features very high precision of ± 0.3%. The pump can be provided with magnetic coupling for truly leak-free operation.

Compact pump power:
We put everything you need on one small skid

Size of a traditional pump skid

Size of a Danfoss Oil and Gas pump skid

The new, all-in-one skid solution dramatically reduces both weight and footprint for offshore installations.

With average costs on offshore platforms running up to $35,000 per m^2 and $75,000 per tonne, it's no wonder that space is at a premium. That's why our latest innovation packs more high-pressure power per cubic inch than ever before. And to save you installation costs as well as space and weight, we've also made it as close to plug and play as it can be.

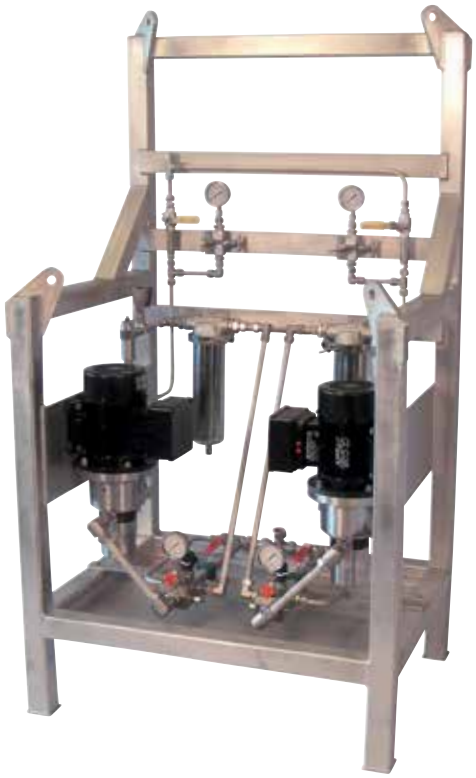
Our high-pressure pump skid includes everything you need to keep production moving at a fraction of the normal volume and weight: main and reserve pumps, all pipes and fittings, and its own light-weight frame. All you need to do is connect the suction and discharge ports and provide the electricity.

More power, less space.

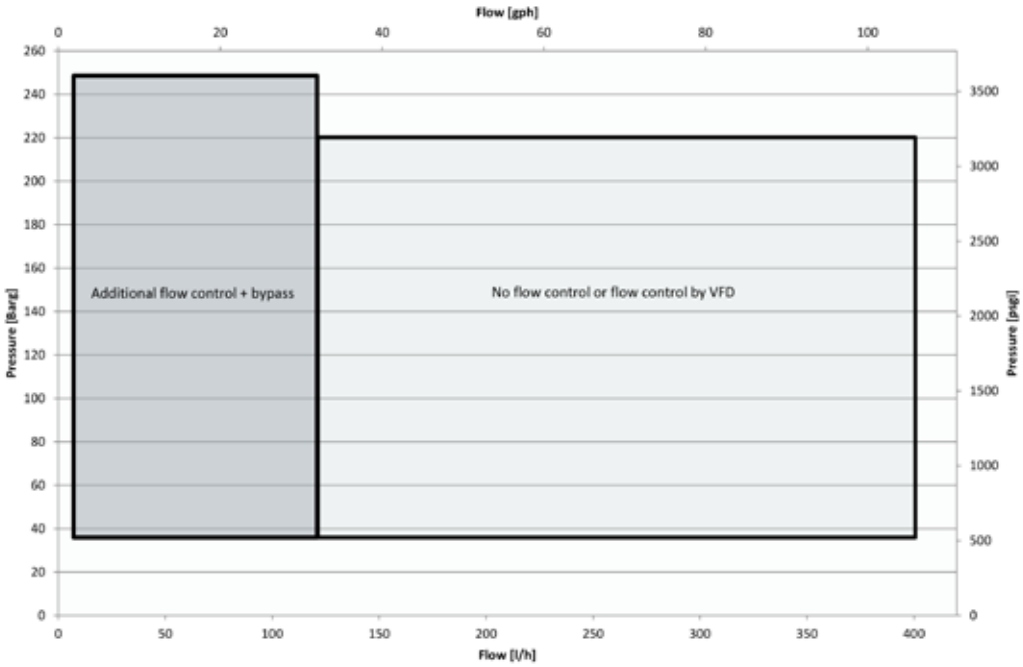
Reduce volume from 4 m^3 to 0.8 m^3

compared to traditional pump skids.

Weighing in below 400 kg, and with dimensions of just 95 x 85 x 175 cm (WxHxL), our pump skid easily outperforms cumbersome configurations of up to six times the cubic volume.



Operating range Danfoss injection skid: INJ 2x010



ENGINEERING
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A world leader in pump and energy technology

The Danfoss Group is one of the largest industrial companies in Denmark, with more than 23,000 employees worldwide, production on four continents and sales in almost every country on the planet. Danfoss plays a leading role in research, development and production in a wide spectrum of industries.

Danfoss is among the world's top three manufacturers in all of its key divisions. Similarly, we are among the top three producers in all pump business areas in which we are active.

Our work is based on our core values: Trust, Passion for Technology, Reliability, Global Perspective with Local Commitment, and Environmental and Social Responsibility.

Reducing our own CO_2 footprint – and helping our customers do the same

Before one of our CLP pumps even starts saving energy in a customer installation, Danfoss has already carefully considered the pump's entire CO_2 life cycle. From compact designs that use less material, to highly efficient manufacturing processes and simple maintenance routines, we take our environmental responsibility seriously, and think it into everything we do.

The Danfoss High Pressure Pump Division

The Danfoss High Pressure Pump Division brings decades of hydraulic experience to the design and manufacture of energy-saving pumps. The division designs and markets a broad range of high-performance pumps, including the groundbreaking APP pumps for the reverse osmosis market and specially developed APP pumps for the oil and gas industry.

Learn more at www.danfoss.com

Danfoss also produces a line of rugged pumps for the reverse osmosis market: APP pumps.

Danfoss High Pressure Pumps

Reverse osmosis

Danfoss APP pumps for reverse osmosis systems are also available in a special version designed for the oil and gas industry.

The Danfoss APP S 674 range of high-pressure RO pumps provides a strong alternative to traditional centrifugal pumps designed according to API 610. Danfoss APP S 674 pumps, designed according to API 674, use the axial piston principle to save on space, weight and maintenance.

Ultra Pure Water

Danfoss PAHT pumps for ultra pure water applications are today sold for gas turbines in the offshore industry.

These pumps can also be available according to API 674.

Learn more about the pumps by contacting Danfoss High Pressure Pumps.

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