ENGINEERING
TOMORROW

Energy efficient Axial Piston Pumps & Energy Recover Devices for Seawater RO Desalination System

VIJAY

The Danfoss Group - Facts

Net sales	5.1 bn EUR
EBIT	549 m EUR
Employees	23,400
Worldwide sales	more than 100 countries
Factories	61 in 20 countries
Top three markets	USA, Germany and China
Ownership	Privately held
Headquarters	Nordborg, Denmark

Danfoss High Pressure Pumps
Focus Segments and Applications

Reverse Osmosis - RO

Applications

- Containerized
- Landbased
- Off-shore
- Marine

Ultra Pure Water

Applications

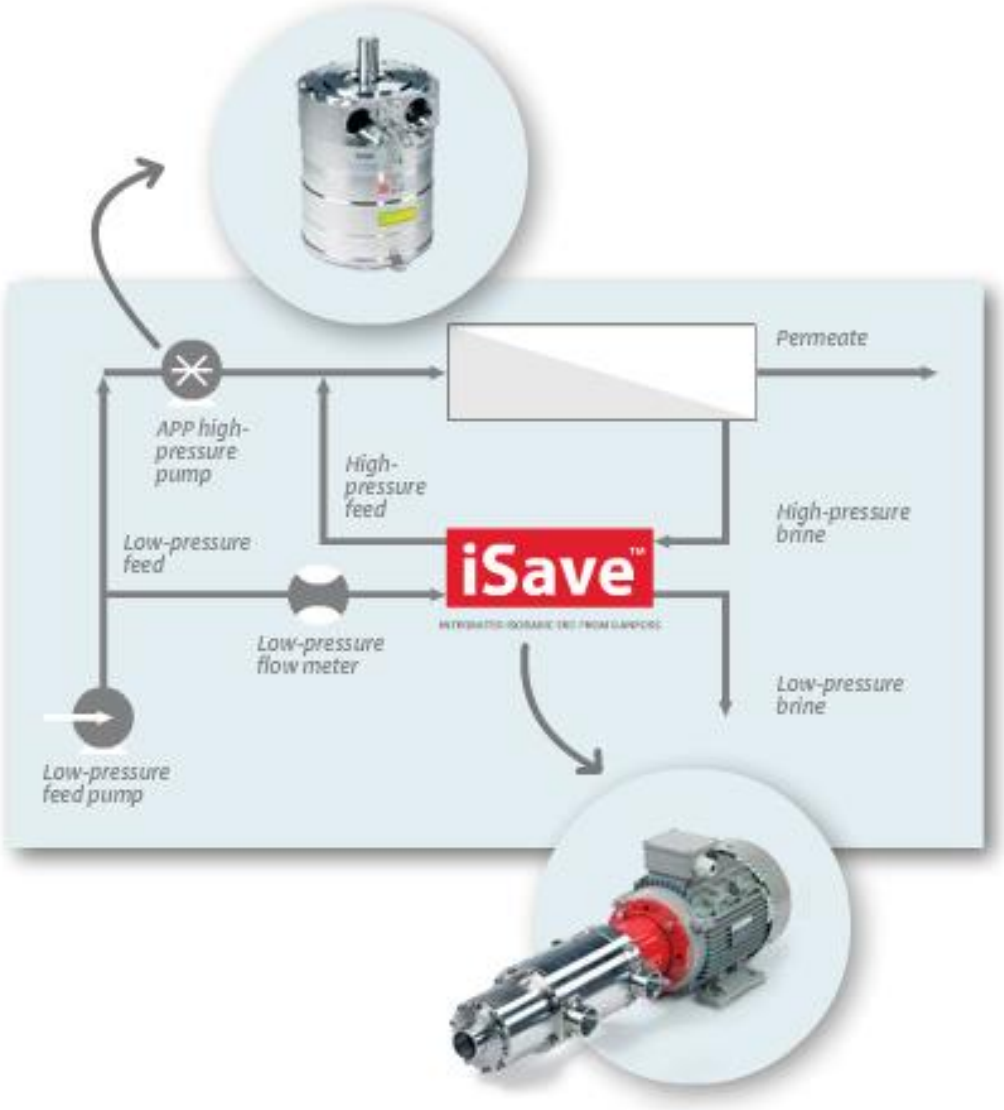
- Gas turbines
- Cleaning
- Humidification/ adiabatic cooling

Oil and Gas

Applications

- Onshore
- Offshore
- Subsea

HPP and ERD for SWRO system



Danfoss High Pressure Pumps - RO product range

High-pressure pumps

APP

High-pressure pumps

APP S 674

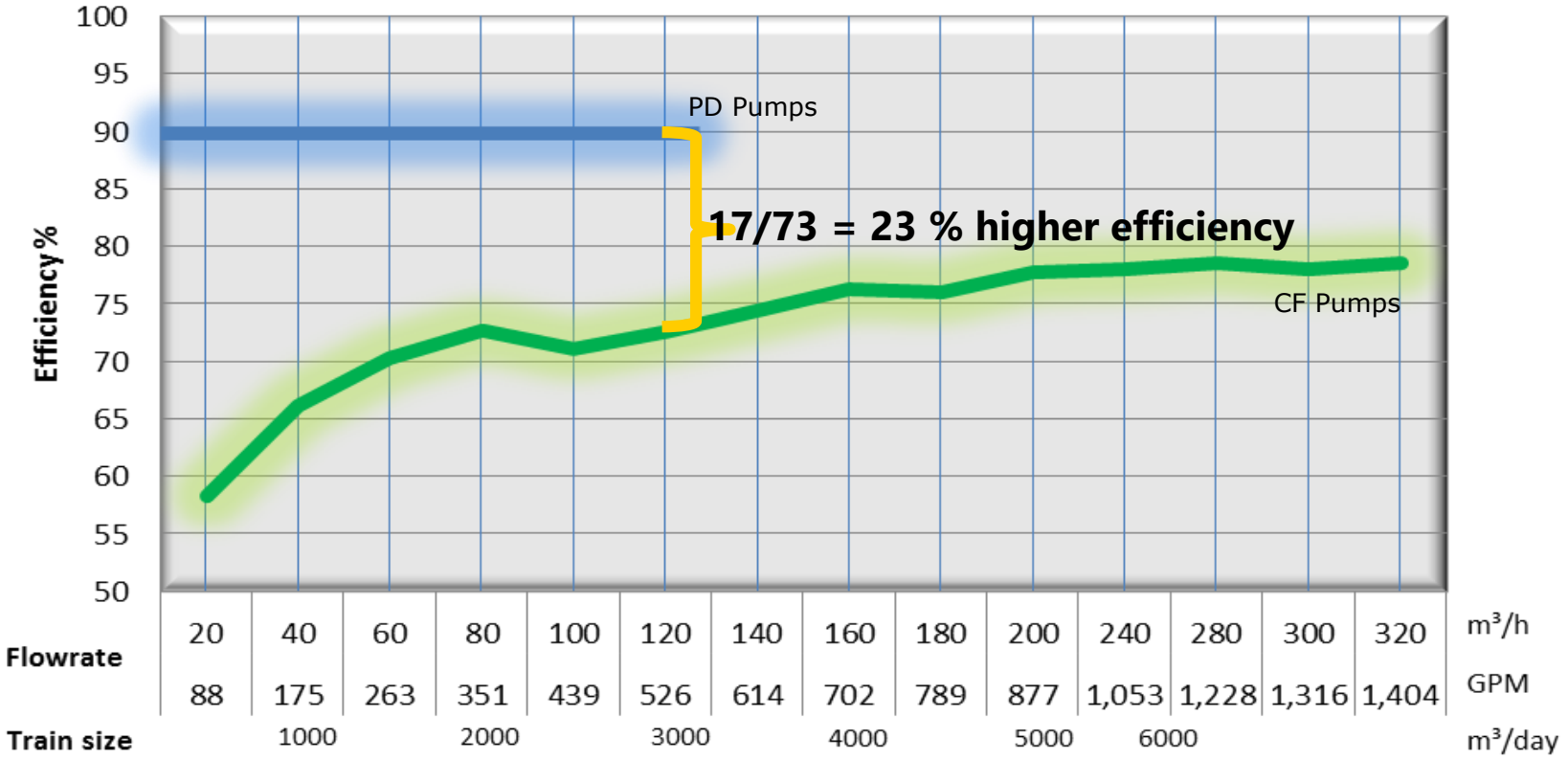
(*acc. to API and ATEX)*

Energy Recovery Devices

iSave

The energy efficiency of High Pressure Pumps

- The efficiency of centrifugal pumps is too low
- High efficient positive displacement pumps are limited in flow



The blue line is based on values from a PD pump with pressure at 60 bar/870 psi.
The green line is an average of values from well known centrifugal pump suppliers.

The Danfoss APP Pump Range

From 0.15 to 88 m^3/h (0.7 to 387 gpm).

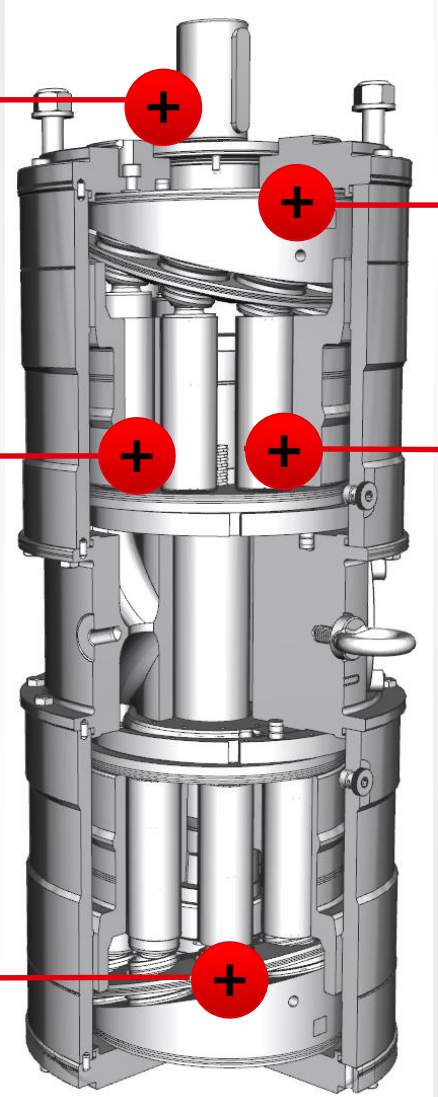
Pump size	Flow range		Pressure	
	m^3/h	gpm	barg	psig
APP 0.6 – 1.0	0.15 – 1.0	0.7 – 4.4	20 - 80	290 - 1160
APP 1.5 – 3.5	1.6 - 3.5	7.04 – 15.4	20 - 80	290 - 1160
APP 5.1.- 10.2	4.9 -10.3	21.6 – 45.3	20 - 80	290 - 1160
APP 11 – 13	11.0 – 13.5	48.4 – 59.4	10 - 80	145 - 1160
APP 16 - 22	15.8 – 21.8	69.9 – 96	10 - 80	145 - 1160
APP 21 - 43	21.1 – 44.6	92.9 – 196.4	10 - 80	145 – 1160
APP 53 – 86	25 - 88	110 -387	30 – 80	435 - 1160

Advantages of axial piston pump technology

Few moving parts
- Direct driven, no belts
- Long time between service
- Simple maintenance

Advanced design
- Unique efficiency
- Constantly high efficiency regardless of flow

Constant flow
- Constant flow regardless of pressure variations
- Wide flow ranges available with Danfoss VFDs



No oil lubrication
- Self-lubricating: pumped medium provides all necessary lubrication

Low pulsation
- Traditional crankshaft replaced by unique swash plate
- Rotating pistons
- High number of pistons reduce flow pulsations

Illustration of cut APP 78