

Danfoss



Danfoss Nessie®

*Water Hydraulics in Water Power Stations and
Water Level Control Systems*



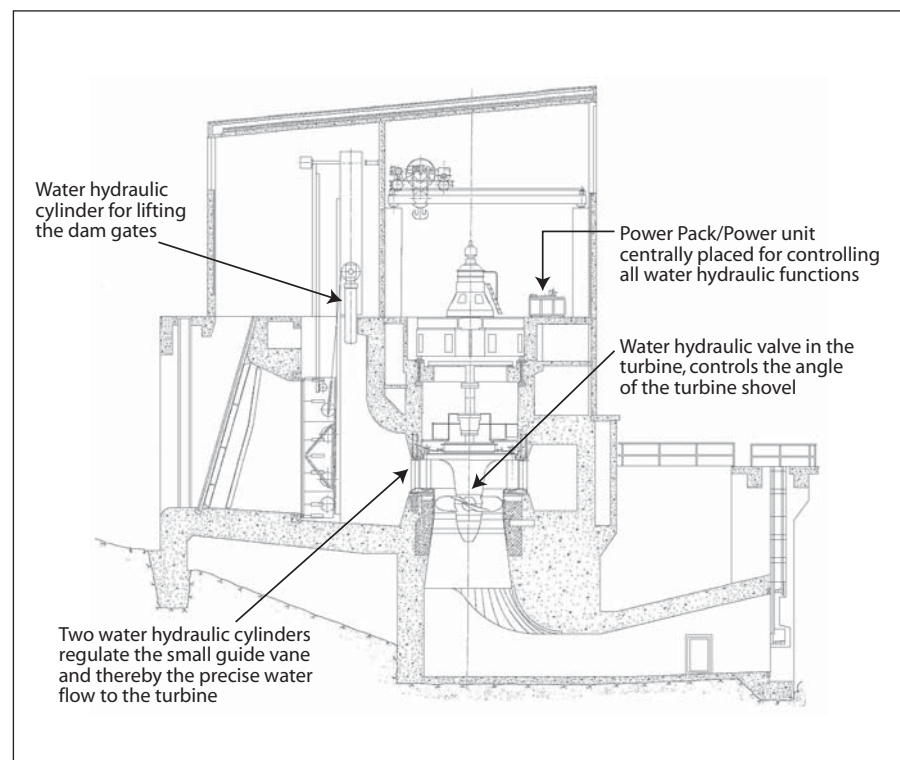
Why Choose Danfoss Nessie® High-Pressure Water Technology?

Facts

- Several cases of oil leakage into rivers and lakes at power stations from dam gate cylinders and turbine valves.
- Oil leakage from gate cylinders at water level control dams.
- Cleaning costs after an oil leakage are very high, and it may even not be possible to remove all oil at all.
- Water hydraulic products are safe for the environment.
- Possibility of obtaining environmentally friendly solution down to -40°C.

Benefits

- No risk of oil leakage into rivers or lakes when using water hydraulics.
- No cleaning costs in case of a leakage.
- No need for constant control at site as a leakage will be harmless.
- No oil disposal costs, no drip pan required for new and waste oil.
- Possibility of running several water hydraulic functions by one pump unit (gate cylinders and turbine valve).
- Same performance as that of conventional systems.



The drawing shows a typical water power station with dam gates and a turbine for generating electricity.

Typical Installations

A water hydraulic pump unit is centrally based in the power station or in a dedicated pump house with the water hydraulic cylinders and valves placed at the respective work zones.

To lift the big dam gates regulating the amount of water to the power station, a water hydraulic cylinder is installed at the gates.

Just before the turbine, the guide vane regulating the precise water flow into the turbine is placed. This guide vane is typically controlled by one or two water hydraulic cylinders.

In the turbine, a water hydraulic valve controls the angle of the turbine shovel securing constant speed of the turbine.

All these functions can be run from one water hydraulic power pack placed

centrally in the power station. The benefit is no risk of oil leakage. It is optional to have one function or all, but the more water hydraulic functions the less the risk of pollution.

At other installations, water hydraulics is used for regulating the water level in dams and lakes; this is also done with cylinders controlling the dam gates. Basically the system consists of a Nessie pump unit with water tank and valves. If the temperature comes below zero degrees Celsius at the site, environmentally friendly antifreezes can be applied, such as mono propylene glycol (Dowcal N/Dowcal 20) or a brine (Temper-S or Hydraulium). If necessary, the pump unit can also be placed in a heated pump house at the site.



Typical pump house for the water hydraulic power pack.



An example of guide vanes.



Central water hydraulic power pack.



Function

Cylinder function for gates controlling the lake water level.

Products

PAH 4 pump, Cetop 3 4/3-, VRH 30, VDH 60, VCH- and VOCH valves.

Function

Cylinder function for gates controlling the water level.

Products

PAH 6.3 pump, Cetop3 4/3-, VRH 30, VDH 60-, VCH- and VCOH valves.



Kläggen, Sweden • Installer: Olab AB.



Tidevad, Sweden • Installer: Olab AB.



Degerfors, Sweden • Installer: Olab AB.

Function

Cylinder function controlling the water inlet gate to turbine.

Products

2 PAH 12.5 pumps, Cetop3 4/3-, VRH 30, VDH 60-, VCH-, VCOH valves. All components are doubled for security reason.



Bångbro, Sweden • Installer: Olab AB.

Function

Cylinder function controlling the water inlet gate to turbine.

Products

2 PAH 10 pumps, Cetop3 4/3-, VRH 30, VDH 60-, VCH- and VCOH valves. All components are doubled for security.



Ottendorf, Germany • Installer: Lingk & Sturzebecher.

Function

Sluice, Sluice gate for filling and emptying.

Products

PAH 10 pump cylinder function and PAH 4 pump cooling and heating, Cetop05 4/3 way valve and VRH 30 valve.



Naussac, France • Installer: Fluid Hydr'Eau.

Function

Cylinder functions for controlling the water inlet gate to turbines and the guide vanes.

Products

PAH 10- and PAH 25 pumps, VRH-, 4/3 Cetop 3 3/4- and VDH 2/2 valves.



Hammar, Sweden • Installer: Olab AB.

Function

Cylinder function for gates controlling the lake water level.

Products

PAH 6.3 pump, Cetop3 4/3-, VRH 30-, VDH 60-, VCH- and VCOH valves.



Products typically used within Water Power Stations and Level Control Systems



Power Packs/Pump Units

- Standard and custom designed power packs/pump units
- Valves can be mounted on the standard power unit
- Modular valve system to suit individual installations
- Control box is optional
- Compact and easy to install
- Designed for tap water using non-corrosive materials
- Long operational life without maintenance

Flow rate for standard versions:
1.3-220 l/min / 0.3-58 GPM

Maximum pressure for standard versions:
160 bar



Cylinders

- Stainless steel for standard cylinders
 - Standard cylinders vary from diameter 25-80 mm and 100 -2000 strokes
 - Standard and custom designs
 - Designed for water, based on existing and proven technology
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Pumps

The pumps are designed to supply water flow under high pressure based on the axial piston principle enabling a very light and compact design. The pump design ensures that lubrication of the moving parts in the pumps is provided by the water itself. No oil lubrication is thus required.

All parts included in the pumps are designed for long service life performance, i.e. long service life with a constantly high efficiency and minimum of service required. The pumps are fixed displacement pumps where

the flow is proportional to the number of revolutions of the input shaft and the pump displacement.

Technical data:

Geometric displacement:	2-80 cm ³ /rev.
Flow range:	3-112 l/min 0.8-30 GPM
Power:	up to 33 kW
Pressure range:	up to 160 bar 2300 PSI



Valves

The stainless steel valves are designed for tap water operation, and the pressure range goes to 210 bar. The most used variants are the VRH 30, the VDH 60 and the Cetop3 4/3, but the variant depends on the size of the system. The VOCH and VCH flow valves are also used in the systems.

The relief valve is used for protecting the components in a system against overload as a result of a pressure peak. Further, the valve is designed for controlling/limiting the system pressure by draining off the surplus water from the pressure side. Two versions

of the directional valve are used. The 2/2 way valve is used for emergency shut downs while the Cetop valve version is used during normal operations.

Comprehensive valve range:

- Relief valves 30, 60 and 120 l/min
 - Solenoid valves ON/OFF – 2, 30, 60, 120 and 150 l/min
 - Proportional and servo valves – 30 l/min
 - Flow control, check valves etc. – 30, 60 and 120 l/min
 - HIC valve blocks
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Danfoss Nessie®
Your Source to Knowledge and New Solutions

Danfoss A/S is one of the largest industrial companies in Denmark, with net sales of around Euro 2.2 billion.

We employ more than 18,000 people, and 6,000 of them work in Denmark in 12 different locations.

www.nessie.danfoss.com

Danfoss is an international group and a leader in research, development and production for a wide spectrum of different industries. We produce about 250,000 components each day at our 54 factories in 20 countries.

The Group's primary aim is to create quality of life for our stakeholders and to be a leader in refrigeration, heating and motion controls.

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



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