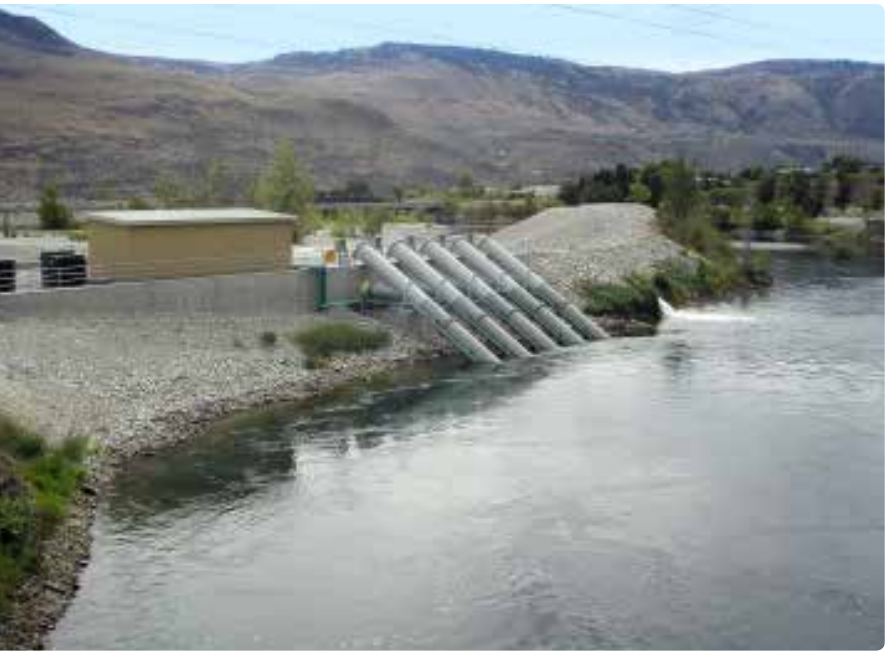
Flygt propeller pumps

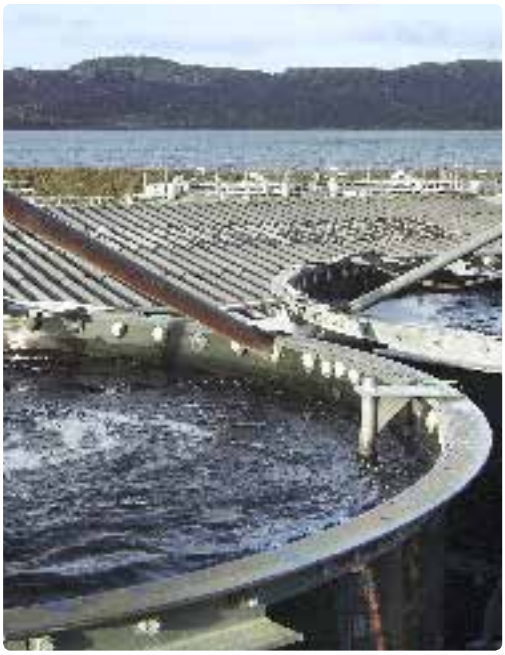
AN INVESTMENT IN RELIABLE OPERATION

FLYGT

POMPDIRECT

How clean is clean water?

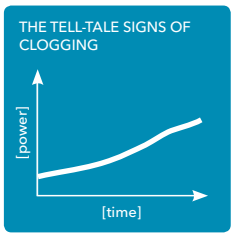




How clean is the liquid you need to pump? Is it completely free of vegetation or fibers, pieces of plastic or clothing, rags or wrappers? Have you ever wondered whether such material might be causing you problems?

How can you tell?

Turning off and inspecting a pump is an inadequate way to check propeller pumps because clogged material gets washed off when the pump is shut-down. There is however a simple way to find out: check the pump's power consumption. If you find that it has a tendency to rise, then you probably have a problem with clogging. In other words, an increase in power consumption often means that the liquid you are pumping is not as clean as you thought it was.



Examine your power curves: if they show a gradual increase in power consumption, the water you are pumping is probably not clean.

What is "clean" water costing you?

· High energy bills

Because propeller pumps move huge quantities of water, small decreases in efficiency can result in significant increases in energy consumption – especially if the pumps are running long duty-cycles.

· Clean-up costs and fines

There is one more risk associated with water that is not clean – pumps can overload. The reason is easy to understand: as pumps become clogged, the motors have to work harder, become too warm, and then shut down to prevent overheating. In critical applications such as storm-water pumping, unexpected stoppages can have serious and expensive consequences.

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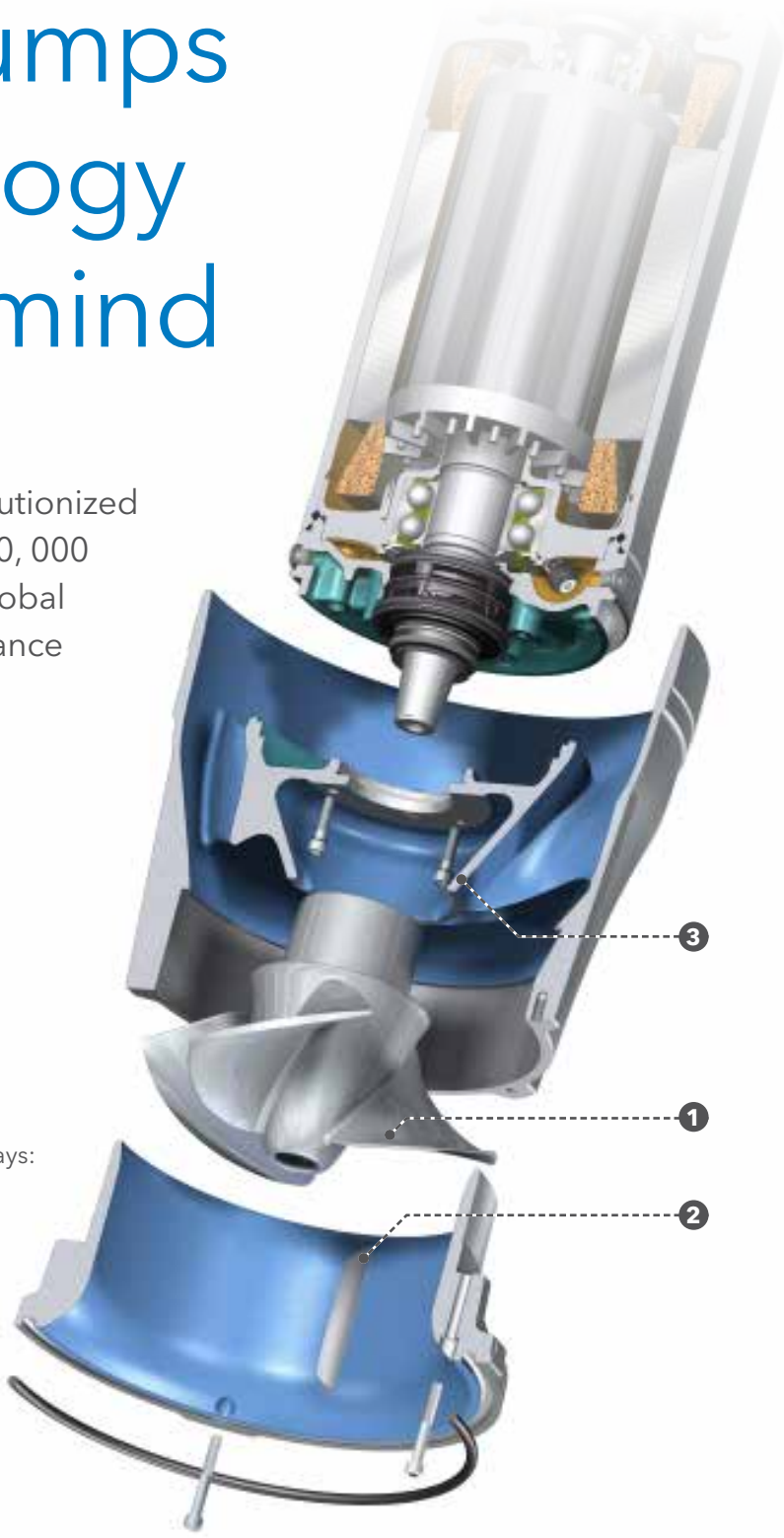
Propeller pumps + N-technology = peace of mind

Flygt self-cleaning N-technology revolutionized wastewater handling in 1997. Over 300, 000 installations later, it has become the global benchmark for non-clogging performance and sustained high efficiency.
Flygt propeller pumps offer N-technology for reliable pumping of high volumes at low heads.



How it works

N-technology reduces the risk of clogging in three ways:

1. The leading edge of the propeller blades has a radical swept-back design. This ensures that plastic bags, fibers, clothing and other material slide down the leading edge of the propeller blades out towards the pump housing.

2. Here, the material is fed into what we call the relief groove: a track cut into the inner-face of the pump housing. The relief groove forces the material through and out the pump.

3. In conventional propeller pumps stringy material can get caught on the guide-vanes. But with N-technology, the special design of the guide-vanes creates local turbulence around any accumulated material. This eases it off the vanes, after which it gets expelled from the pump housing.

Together, these features add up to high reliability and low operational costs.

Lower energy costs, fewer stoppages

With increased resistance to clogging, Flygt propeller pumps will give you high reliability, together with reduced risk of motor overload and unplanned stoppages. Reduced clogging also provides sustained factory-new pump efficiency, year after year.

The invented-here syndrome

The name Flygt has been synonymous with innovation from the early 1920s. In 1947, Sixten Englesson, the company's head engineer, developed the world's first submersible drainage pump. It was an invention that came to revolutionize the mining and construction industries. This has been followed by a long list of industry firsts – below, a small selection.

1947
World's first submersible drainage pump

1956
First submersible wastewater pump

1977
Launch of first submersible propeller pump

1988
Introduction of first PP propeller pump

1997
Unveiling of N-pump technology

2012
Launch of slimline PL propeller pumps

CASE STUDY;
ELIMINATING STORM-WATER FLOODING

THE CHALLENGE
Following heavy rainfall, overflowing of a storm-water canal, Gran Canal, in Mexico City was becoming a recurring problem. This was because the water was contaminated with plastic bags, rags and other waste, which was clogging up the existing pumps and preventing them from working at their intended capacity.

THE SOLUTION
Xylem was awarded the contract to design and construct a large storm-water pump station. An important part of the Flygt solution included a custom-made station with excellent flow conditions for the pumps, despite the compact dimensions dictated by site limitations.

THE RESULT
Seven PL propeller pumps were installed with a capacity of 21m³/s (333,000 gpm). To handle the large quantity of debris, the pumps were equipped with N-technology. Since commissioning in 2008, flooding has been eliminated and with no reported incidents of clogging.

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Why submersible?

There's a simple reason why submersible pumps are being used in increasing numbers around the world. Operating submerged, and out of the way, no superstructure or dedicated dry pit is required. And this means significantly lower construction costs.

Cost efficient
With the motor and hydraulics integrated in a compact unit, the only external support submersible propeller pumps require is a column pipe. That's it.

Easy to install and service
With no assembly or shaft-alignment problems, a Flygt submersible can be installed within minutes. It is also easy to hoist for servicing thanks to our smart installation concept.

Reliable and energy efficient
Because submersible propeller pumps do not need transmission shafts, couplings or intermediate bearings they offer greater reliability and higher operational efficiency.

Invisible and silent
Operating submerged, submersible pumps are invisible. Installed below ground-level and surrounded by fluid, Flygt pumps are virtually silent.

Flood and storm
High operational reliability is key, especially since storm-water often contains solids and long fibrous material.

Treatment plant effluent
Minimizing downtime is essential for treatment plants – Flygt Propeller pumps with N-technology provide reliable 24-hour-a-day operation in low-head applications containing sludge and effluent.

Raw water intakes
Even when operated 24 hours a day, Flygt pumps can provide factory-new efficiency over the long-term thanks to N-technology.

Theme and water parks
Flygt propeller pumps offer an attractive combination of low energy consumption, high reliability and global aftermarket support.

Anything from 100 to 7,000 liters per second

Flygt propeller pumps are designed for pumping large volumes at low heads. Because they are optimized to pump within this range, they provide a cost-effective alternative to centrifugal wastewater pumps.

Pumping anything from 100 to 7,000 liters per second, our portfolio of pumps gives you a wide range from which to select.

Robust and reliable
Every Flygt propeller pump is tested before leaving our factory to ensure high performance and quality. Like all Flygt products, Flygt propeller pumps deliver solid cost-effective performance that has been proven for more than 40 years in applications such as:

- Storm-water
- Wastewater treatment plant effluent
- Return activated sludge
- Water intakes
- Flood control
- Irrigation
- Amusement park attractions
- Surf riders
- Aquaculture

CASE STUDY;
COUNTERING LOW RIVER LEVELS

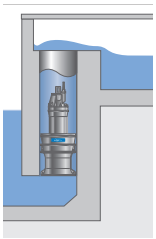
THE CHALLENGE
Following periods of extended drought, the water and power utilities along the Missouri River were concerned that cooling water intakes were being threatened by low river levels, rendering the cooling water pumps inoperable.

THE SOLUTION
Acting on an emergency basis, a USD 2 million low-river pump system was authorized. Four Flygt propeller pumps were installed in a new intake structure, each with a rated capacity of 1,100 l/s (17,000 gpm). The pumps were supplied with Flygt N-technology to prevent any stringy debris from causing clogging.

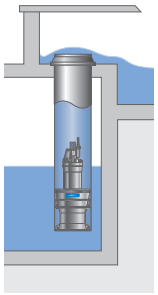
THE RESULT
To ensure adequate quantities of cooling water to the pumps during low river flows, the Flygt propeller pumps operate continuously during extreme, low-level river conditions. The system has proven itself on numerous occasions and similar projects to safeguard the raw water supply along the Missouri are under consideration.

Lean and fit – Flygt slimline propeller pumps
The slim profile of these Flygt propeller pumps means that they can be installed in smaller column pipes. Since the pump bay width is determined by the column pipe diameter, the pump station footprint can therefore be reduced. The smaller the station, the lower the cost for excavation, material and labor. Yet despite their slim dimensions, these pumps give you the heavy-duty reliability and superior performance.

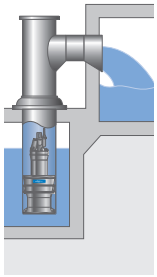
Six ways to install Flygt PL pumps
Flygt discharge components can be combined in many configurations to match different pump station layouts: free-hanging steel column or cast in concrete; open top or side outlet; optional water-tight cover and power cable entry for pressurized discharge; water tight cover, siphon system or horizontally in a pipe.



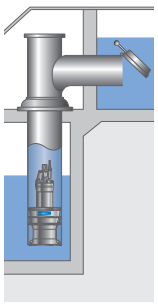
In concrete structures: For pumping to channel. No check valve is required.



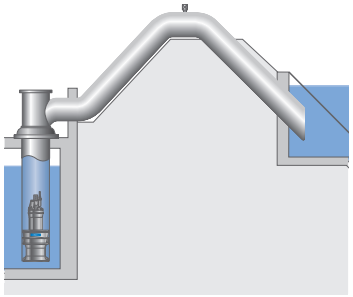
In manufactured columns: For pumping to channel. No check valve is required.



With a discharge pipe and free outlet.



With submerged outlet and flap valve.



With a siphon.

Horizontally in a pipe.

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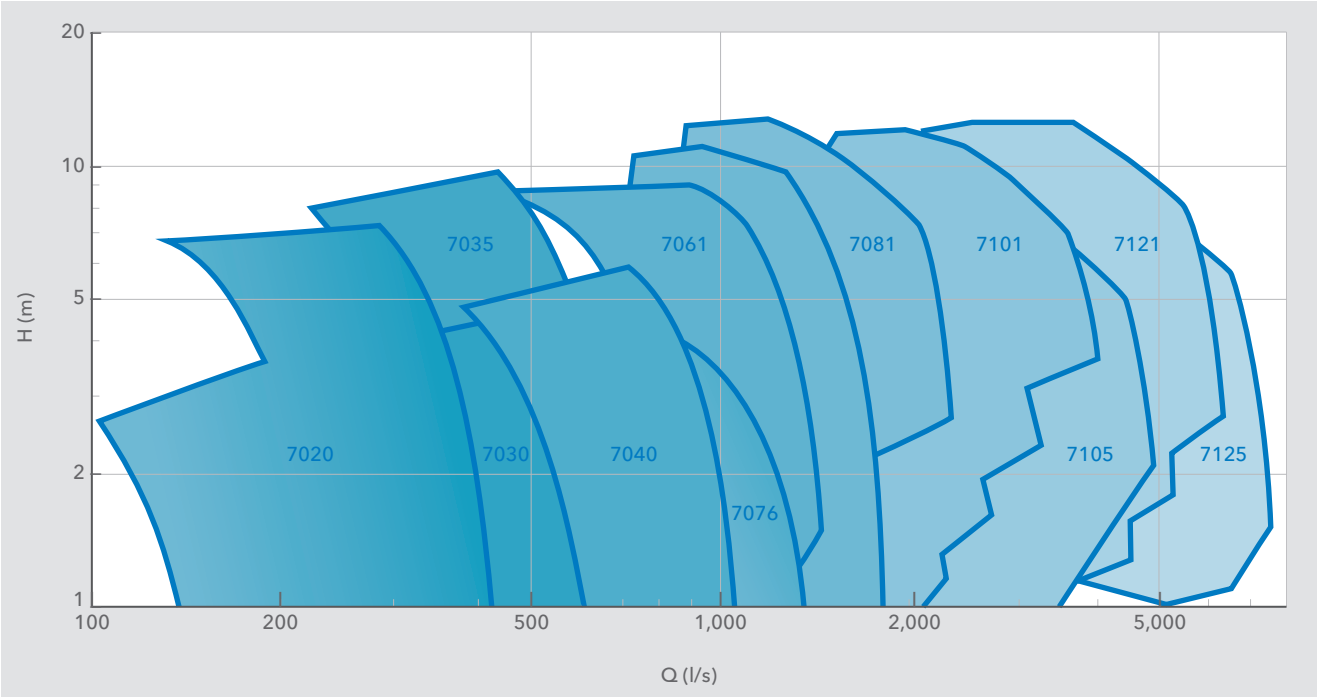
PL pumps – low head, very high flow

With their huge capacity and low power consumption Flygt PL pumps are ideal for moving large volumes at low heads. N-technology reduces the risk of fibrous material building up on the pumps, resulting in sustained efficiency over the long-term.

Performance 50 Hz



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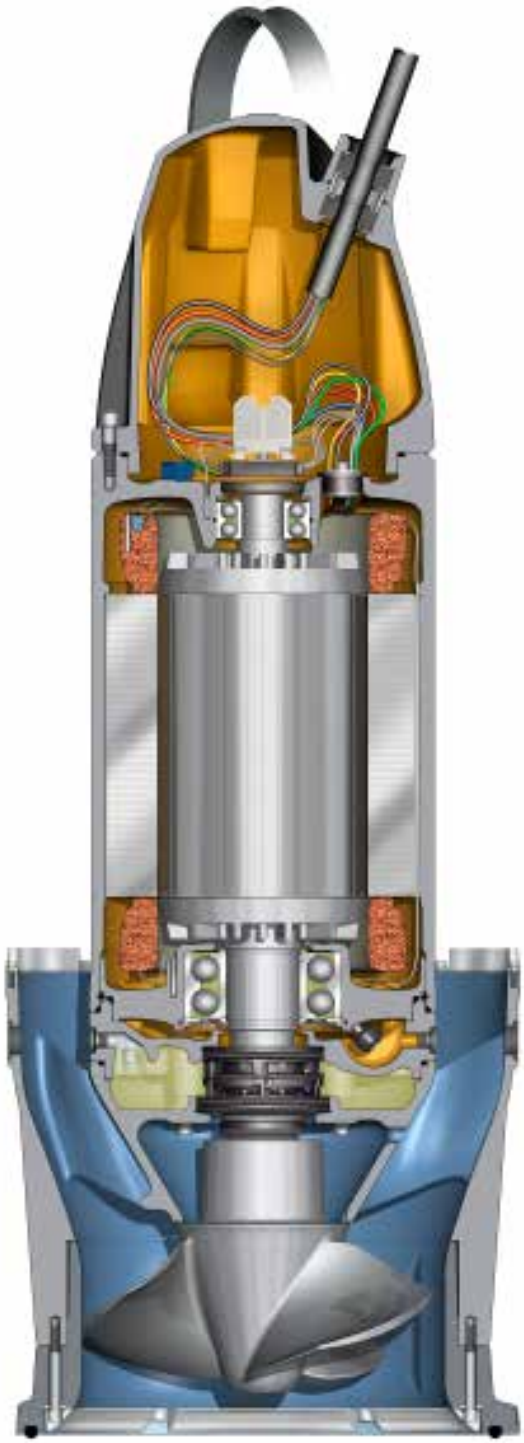


Class H (180°C/355°F) insulated motor – greater reliability

All motors are fully submersible (IP68) to a depth of at least 20 meters. Pumps are available in explosion-proof versions for use in hazardous environments. Long-life bearings provide extended operational lifetime.

Unique seals – extra safety

Flygt mechanical seal systems minimize shaft overhang, while maximizing cooling and lubrication. Two pairs of mechanical shaft seals work independently for double safety. The Flygt Active Seal™ system offers increased seal reliability and zero leakage into the motor, therefore reducing the risk of bearing and stator failure. An extra level of safety is provided by a double-grommet cable sealing.

Sensors – pump protection

Thermal sensors in the stator windings prevent overheating. Analogue Pt100 sensors monitor stator and bearing temperatures. Leakage sensor(s) alarms you to liquid intrusion through cable or seal. A vibration sensor warns against abnormal conditions.

Reliable and efficient hydraulics

N-technology ensures maximum reliability and sustained high efficiency. The suction of the pump is sealed with a replaceable rubber seal on the pump seat. Pump performance includes all losses (including pump column losses) up to at least 500 mm above the top of the motor.

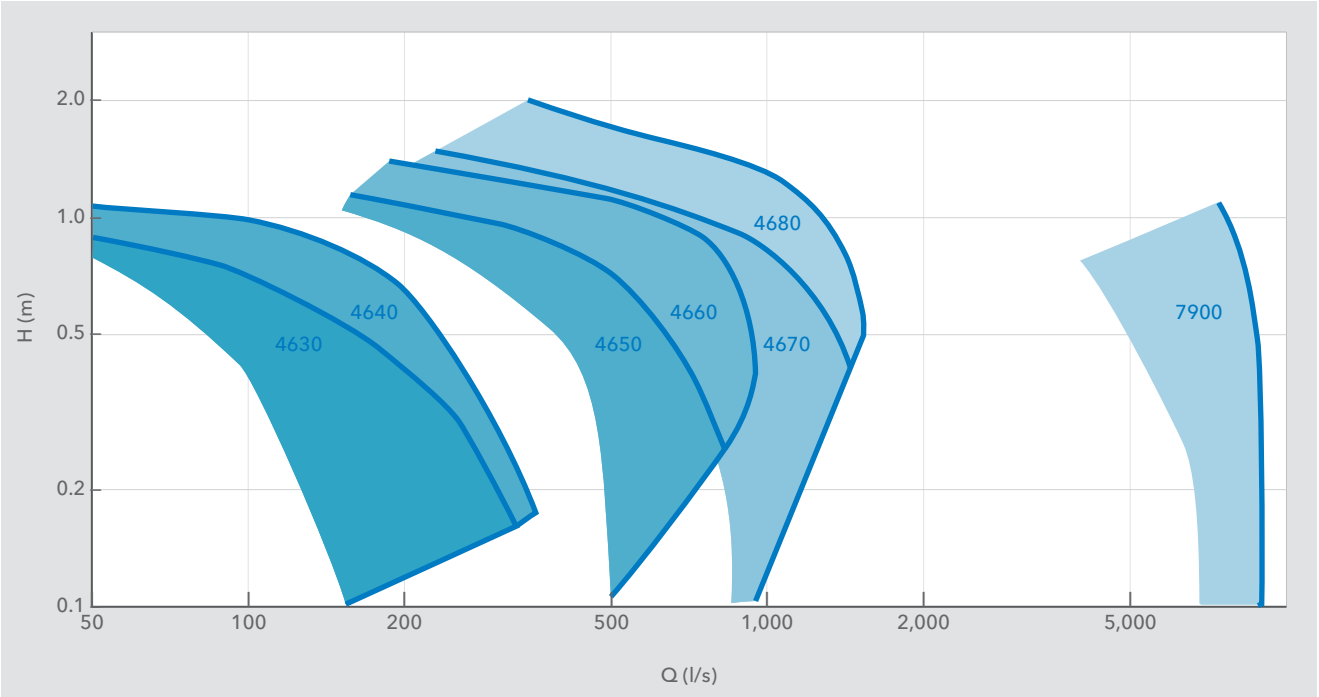
Data 50 Hz

Model	Motor power	Head range	Flow range	Propeller	Propeller	Column Ø
	kW	m	l/s	Material	Self-cleaning	(I.D.) mm
PL 7020	20–30	0.6–10	125–500	SS (Stainless Steel)	Standard	400
PL 7030	19–48	1 – 6	250–700	SS	Standard	500
PL 7035	67–112	2 – 16	300–800	SS	Standard	550 or 600
PL 7040	30–108	0.6–9	550–1,250	SS	Standard	600
PL 7061	52–179	1.5–13	500–1,700	Al-Bronze or SS	Optional	800
PL 7065	34–160	0.6–8.5	500–1,700	SS	Standard	800
PL 7076	30–48	0.9–4	500–1,350	Cast iron	N / A	1,000
PL 7081	48–160	1.5–10	600–2,050	Al-Bronze or SS	Optional	1,000
PL 7101	67–265	1.5–11	1,000–3,600	Al-Bronze or SS	Optional	1,200
PL 7105	101–298	1.5–9	1,600–4,700	SS	Standard	1,200
PL 7121	231–578	2–12.5	2,000–6,200	Al-Bronze or SS	Optional	1,400
PL 7125	287–447	2 – 10	3,200–7,000	SS	Standard	1,400

PP pumps – ultra-low head, high flow

With their high capacity and easy installation Flygt PP pumps are ideal for moving large volumes at very low heads. The swept-back propeller and shaft shield reduce the risk of fibrous material building up, resulting in sustained efficiency over the long-term.

Performance 50 Hz



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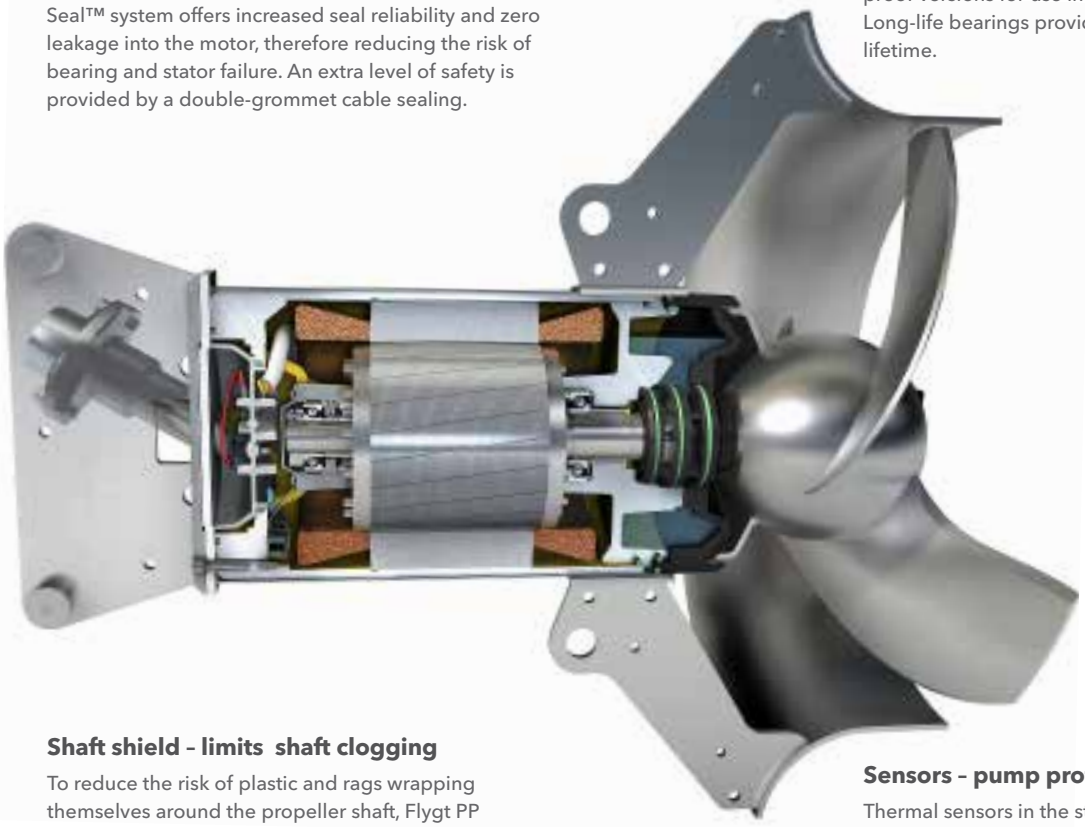
Flygt mechanical seal systems minimize shaft overhang, while maximizing cooling and lubrication. Two pairs of mechanical shaft seals work independently for double safety. The Flygt Active Seal™ system offers increased seal reliability and zero leakage into the motor, therefore reducing the risk of bearing and stator failure. An extra level of safety is provided by a double-grommet cable sealing.

Class H (180°C/355°F) insulated motor – greater reliability

All motors are fully submersible (IP68) to a depth of at least 20 meters. Pumps are available in explosion-proof versions for use in hazardous environments. Long-life bearings provide extended operational lifetime.



Swept-back propeller – reduces clogging

With the help of computational fluid dynamics, our engineers have developed a swept-back leading edge design that reduces the risk of plastic and fibrous materials from building up on the propeller.

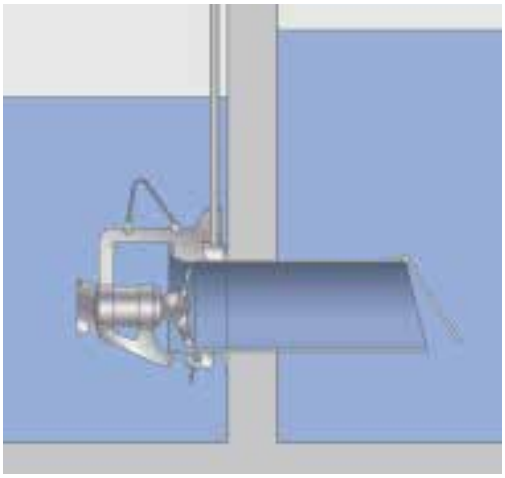
Shaft shield – limits shaft clogging

To reduce the risk of plastic and rags wrapping themselves around the propeller shaft, Flygt PP pumps feature a shaft shield. Consisting of a collar around the propeller and matching design around the oil housing, the shield creates local flow patterns which help keep fibers away from the shaft.

Sensors – pump protection

Thermal sensors in the stator windings prevent overheating. Analogue Pt100 sensors monitor stator and bearing temperatures. Leakage sensor(s) alarms you to liquid intrusion through cable or seal. A vibration sensor warns against abnormal conditions.

Easy installation

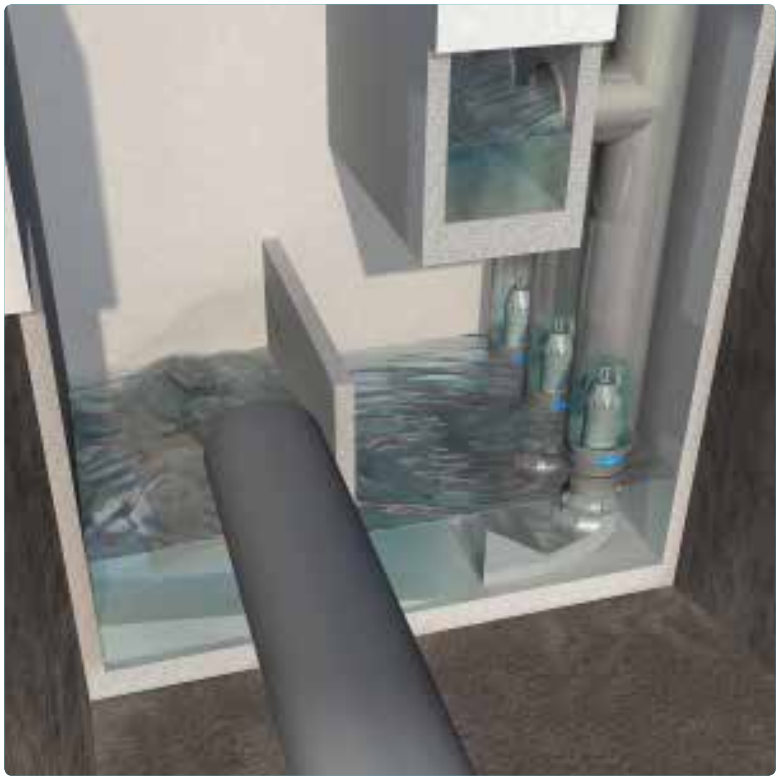


Flygt 4600 propeller pumps are designed for cost-effective installation. Just lower them down the guide-bars and the pumps automatically mate with the discharge connection.connection.

Data 50 Hz

Model	Motor power	Head rate	Flow range	Propeller	Column Ø
	kW	m	l/s	Material	(I.D.) mm
PP 4630	1.5	0.1–0.9	30–300	Stainless steel	400
PP 4640	2.5	0.1–1.1	30–350	Stainless steel	400
PP 4650	3.7–5.5	0.1–1.3	150–800	Stainless steel	600
PP 4660	7.5–10	0.1–1.4	150–900	Stainless steel	600
PP 4670	13	0.1–1.5	200–1300	Stainless steel	800
PP 4680	18.5–25	0.1–2.0	200–1400	Stainless steel	800
PK 7900	55–90	0.1–1.0	4000–9000	Cast iron	2250

Why station design is crucial



By specifying Flygt propeller pumps, you can cut the costs of construction and installation by 50%. However, because propeller pumps are sensitive to poor inflow conditions, it's vital to pay special attention to ensure correct station design. A badly designed pump station can lead to under-performing pumps, excessive noise and vibrations, as well as shorter equipment lifetime.

Pump system engineering know-how
With over 2 million Flygt pump stations in service worldwide, we have extensive knowledge of pump station design and operation, and a profound understanding of the importance of fluid dynamics.

Over the years, we have amassed considerable practical experience in designing, commissioning and maintaining propeller pumping systems. Flygt sump designs minimize the risk of adverse hydraulic conditions and help ensure reliable operation. By sharing your pump station planning with our experts, they can help optimize performance and lifetime of your station.

We are able to provide a broad range of engineering services, including:

- Pump selection
- Creative installation solutions
- System analysis and calculations
- Sump design
- Water hammer calculations
- Pump-start analysis
- Computational Fluid Dynamics (CFD)
- Physical pump sump scale-model testing

Whatever the undertaking, our ultimate goals are reliable, trouble-free pumping and energy-efficient operation.

CASE STUDY;

HOLDING BACK THE MISSISSIPPI

THE CHALLENGE

Established in 1750, the historic town of Ste. Genevieve, an hour south of St. Louis, was the first permanent European settlement in Missouri. For many years it had suffered from repeated floods from the Mississippi, the sixth largest river in the world in terms of discharge, with an annual average flow rate of 14,000 m³/s.

THE SOLUTION

Demanding tender specifications from the Army Corps of Engineers included net positive suction testing to avoid cavitation. The final specifications included three submersible propeller pumps that could obtain flow rates of xx l/s (75,000 gpm) at a total dynamic head of xx meters (25.6 feet). The pumps were integrated in the existing levee.

THE RESULT

A key purchasing factor for the Army Corps in selecting Flygt submersible pumps was the method of installation, which facilitates maintenance. For the first time in its 250-year history, Ste. Genevieve, which contains some of the most important French Colonial structures in North America, is now protected from flooding.

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Easier, faster and safer handling

Suction intake
For the most challenging inflow conditions, the Flygt Formed Suction Intake (FSI) ensures proper inflow to the pump suction. The FSI is placed directly underneath the pump and can be constructed in concrete or from prefabricated sheet metal. It is designed to function optimally together with all Flygt propeller pumps in the most demanding environments. The unique Flygt FSI is available through local sales companies.

Cable handling solutions
The power and signal cables that are needed to operate submersible propeller pumps are positioned inside the discharge column. Here they are exposed to high liquid velocity and strong turbulence – particularly close to the sides of the column – where they risk premature damage.

Xylem offers a number of different solutions that keep the cables secured to the lifting chain in the center of the column where the movement of liquid is least turbulent. Our experts can help you select the right solution for your installation.

Pump installation and retrieval
Propeller pumps are simple to install and to retrieve because they sit on the pump seat without having to be bolted into place.

Smart pump retrieval
Retrieving pumps that are completely submerged or that work in deep sumps can be a tricky business. Flygt Dock-Lock™ is a patented lifting device that makes pump retrieval fast and safe.