

Grundfos TP
– the widest range of in-line choices

Grundfos TP – the most comprehensive range of in-line pumps in the world

Grundfos is one of the world's leading suppliers of pump technology, and therefore has a major influence on the levels of manufacturing standards and operating efficiency that can be achieved with pumps.

To meet the particular needs of the commercial building services sector, Grundfos has designed, manufactured and perfected the world's most comprehensive series of high-efficiency in-line pumps – the Grundfos TP range – with capacities that extend up to more than 4500 m³/h.

These provide customers with efficient, reliable solutions throughout the entire spectrum of heating and air-conditioning systems, as well as in the transfer of fluids used in industrial processes.

Comprehensive range

The Grundfos TP range provides customers with the widest possible range of choice when specifying in-line pumps. This makes it easy to configure in-line pump installations to meet an exceptionally wide spectrum of system requirements and user needs, and to benefit from Grundfos TP advantages in many different configurations and applications.

Reliability and efficiency

Grundfos solutions meet – and often surpass – virtually all customer requirements in this field, from pumps and pump configurations that extend over the entire size range, to the control systems and software. These are backed by the Grundfos service and support essential for peak reliability and efficiency.

The energy difference

Energy costs represent a major component of an in-line pump's Life Cycle Costs. The Grundfos TP design provides the best possible opportunities for implementing electronic

speed control, which keeps the energy consumption of TP pumps to an absolute minimum.

The kind of key technical improvements that are only available from a company like Grundfos, with a specialist staff of 450 people working solely on R&D and product development, means reliability and efficiency that set new standards for in-line pumps.



Important advantages of the Grundfos TP range

Optimised design and better flow

The smoothness of the liquid flow through any pump is crucial for overall efficiency because it reduces hydraulic friction. Any unnecessary flow disturbances simply mean wasted energy.

Perfect match between impeller and pump casing

Grundfos has now minimised the tolerances used in the manufacture of both the impeller and the pump casing. This reduces backflow and cuts back on energy consumption, which together have a major influence on the overall efficiency and performance of the pump.

Optimised flow geometry

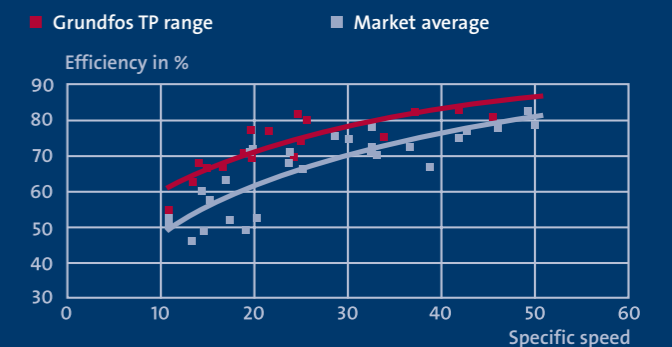
Using special 3D simulations and computer calculations, Grundfos has fine-tuned the flow geometries of both the impeller and the pump casing to ensure maximum compatibility between these two key components.

The Grundfos TP design means that the pumped liquid flows through the pump with only a minimum of aquadynamic disturbances to influence energy consumption, and only a minimum of backflow.



Shifting the curve on efficiency

Grundfos focuses intensely on the overall efficiency of all its pump designs. With the technology capacity and R&D facilities only available to one of the world's leading manufacturers in this field, Grundfos is able to optimise the design, manufacture and operation of both pump and motor, and every component element of both. The Grundfos TP range features a series of improvements that are individually significant and jointly decisive in boosting the efficiency and reliability of the installations that Grundfos customers are responsible for.



Motor design



The efficiency of the motor plays a crucial role in the efficiency of any pump. Grundfos TP pumps therefore feature EFF1 motors as standard.

EFF1 motors – standard equipment in TP pumps

All Grundfos TP pumps are now fitted with energy-efficient EFF1 motors as standard. EFF1 is the most efficient category of motors in the new European CEMEP norm, which means that these motors have the lowest energy consumption currently available. The efficiency and energy consumption of a pump motor are particularly crucial under the partial-load conditions at which most pumps actually operate most of the time. These motors therefore make an important contribution to Grundfos TP pumps being the most efficient and reliable in-line pump units currently available anywhere in the world.

Lower heat generation – smaller ventilators

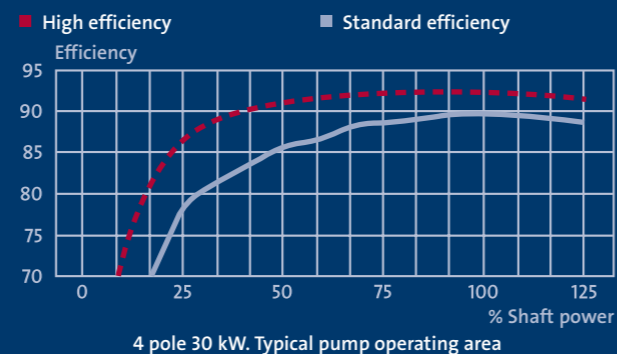
The high level of efficiency in EFF1-standard motors means that pump operation produces less heat. The cooling requirement of the motor is therefore reduced, which in turn means that a smaller ventilator is required.

Low noise level – long bearing life

Fitting a smaller ventilator means the noise level is reduced. At the same time, the motor bearings benefit from the low operating temperature, thereby prolonging their service life.

Long lubrication intervals

With the reduced amount of heat being produced, the pump motor requires less frequent lubrication. This saves both time and money in the maintenance budget.



Grundfos TP – exceptional reliability

Grundfos TP pumps are world-renowned for their exceptional durability and long-term reliability. The clear-cut Grundfos reliability advantage provides both installers and end-users with major benefits and cost savings.

Exceptional manufacturing standards

- Grundfos manufacturing facilities throughout the world are certified to ISO 9000 standard or higher. All Grundfos TP pumps are therefore exhaustively checked and tested prior to dispatch, and all manufacturing data is fully accessible.
- Components are machined using the most advanced CNC machinery currently available. This ensures complete uniformity.
- Sourcing components from rigorously evaluated specialist suppliers.

Exceptional design

- An exceptionally rigid construction in which the coupling and shaft of the pump are friction-welded together to provide an extremely stable, mechanical unit with reduced vibration and friction. This reduces wear on the bearings and on the mechanical shaft seal, increasing both efficiency and operational reliability.
- The very rigid shaft and coupling design means that the shaft seal works more efficiently, and vibration and wear are reduced to an absolute minimum. This also ensures longer service life for the motor bearings.
- Use of reduced tolerances for the distance between the impeller and the pump casing eliminates irregular movement and backflow is minimised. This means greater efficiency and lower energy consumption.



▣ The integration of coupling and shaft has traditionally been the weak point of in-line pumps, since this has an important effect on wear in both motor bearings and the mechanical shaft seal. The new, fully integrated coupling/shaft used in the Grundfos TP design addresses this problem by friction-welding them together into one completely stable mechanical unit.

The impeller of the Grundfos TP in-line is balanced in much the same way as the wheels of a car to ensure as stable and smooth an operation as possible >



Reduce your real costs

Not just a question of price

In a highly competitive market, it is only natural that interest centres on price issues. However, experience shows that on average the purchase price of a pump amounts to as little as 5–10% of the total cost. Maintenance and service account for 2–5%, while as much as 90% of the overall cost of a pump stems from the energy it uses when in operation.

To make sure of getting maximum value from Grundfos TP pumps, just as from any other pump system, it is crucial to go beyond the initial purchase price and to analyse the full Life Cycle Cost of each particular system configuration.

Life Cycle Cost (LCC) analysis

The Life Cycle Cost analysis is a method of calculating the overall costs of a pump system. LCC is a neutral benchmark reference that includes the initial investment, installation costs and maintenance costs as well as the costs of the energy used while in operation.

LCC calculations are exceedingly useful because they provide an independent standard of reference. This provides neutral benchmarking of the real costs of operating a particular pump installation. This reference standard makes it possible to compare both different pump solutions and different suppliers of pump technology – in an objective way.

Huge reductions in electricity consumption

Almost 20% of the world's electricity consumption is associated with pump systems. Users can save 30–50% of this energy by converting to electronic speed-controlled pump systems that automatically adjust their operation to match the prevailing conditions – and thus ensure that energy is always used with maximum efficiency.

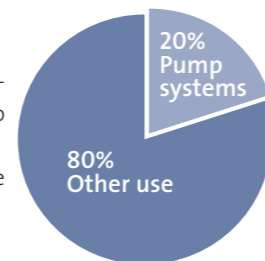
The benefits of LCC analysis are thus twofold:

- financial – a tool to decide which combination of pumps and total pump systems provides the best value for money
- environmental – minimised energy consumption.

Payback time of less than two years

Grundfos electronic speed control systems minimise energy consumption. Because energy costs exert a huge influence on the Life Cycle Costs of a pump, there is usually a payback time of as little as 1–2 years on the extra cost of a speed-controlled pump system. Such solutions can often provide energy savings of as much as 60–70%.

Further information about Life Cycle Cost and the benefits of Grundfos speed-controlled pumps is available at www.grundfos.com/cbs



Almost 20% of the world's electricity consumption relates to pump systems. 30–50% of this energy could be saved.

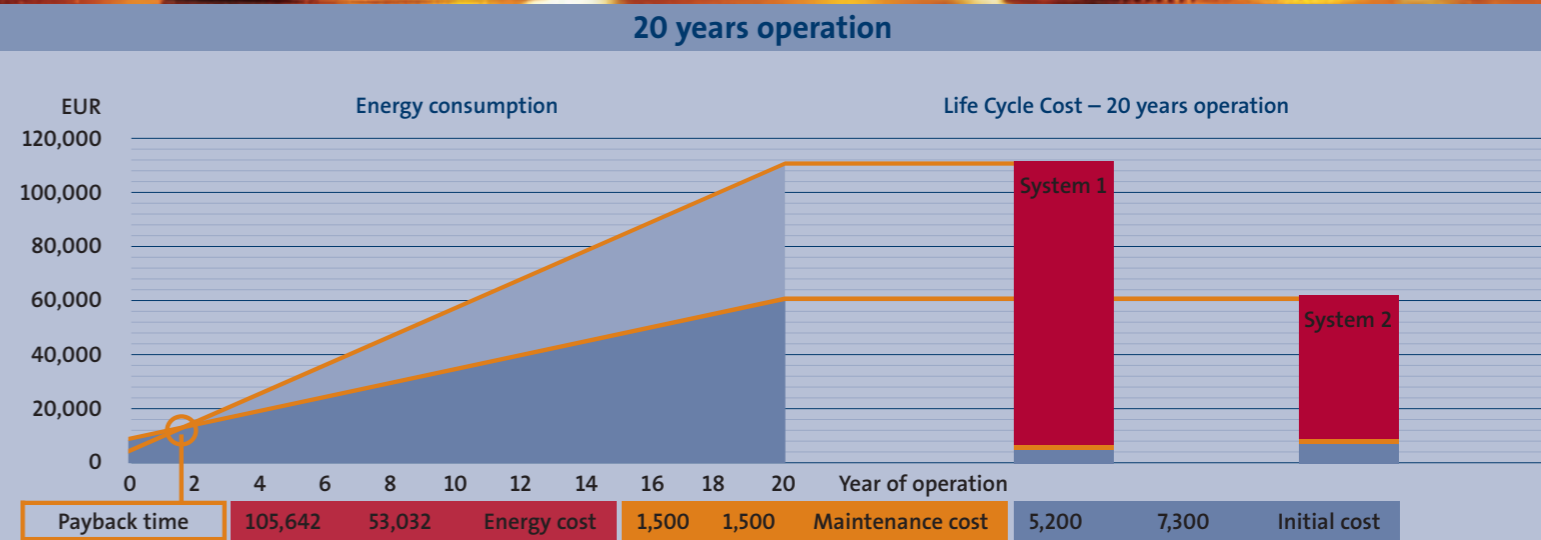


Grundfos electronic speed-controlled pumps provide significant, clear-cut advantages:

- significantly reduced energy consumption
- minimised system noise
- better operating conditions for other system components
- opportunities for monitoring and remote control.

Supported by recognised bodies

The method that Grundfos and other major manufacturers use to calculate LCC is the result of the joint efforts of the Hydraulic Institute (the largest association of pump producers and leading suppliers in North America), Europump (on behalf of 15 national manufacturing associations in Europe, representing more than 400 pump manufacturers) and the Office of Industrial Technologies (OIT) at the US Department of Energy (UDE).



Assumptions behind the calculation

System 1 features 2 constant-speed pumps (2 Grundfos 80-250/259 end-suction pumps). **System 2** features 3 speed-controlled pumps (3 Grundfos TP pumps).

Depending on energy costs, the payback time on the extra cost of electronic speed-controlled pumps is extremely short. Given a cost of EUR 0.1 per kWh, it normally amounts to approx. 1.7 years. The payback time on the extra cost of an electronic speed-controlled pump is extremely short – normally in the region of as little as 18 months.

	System 1-EUR	%LCC	System 2-EUR	%LCC	Saving - EUR	%Saving	Remarks:
Cic	5,200	4.6	7,300	11.5	-2,100	-40	End-user price
Cin	500	0.4	600	0.9	-10	-17	Commissioning
Ce	105,642	92.8	53,032	83.6	+52,610	+50	Energy price EUR 0.1/kWh
Co	-	-	-	-	-	-	
Cm	1,500	1.3	1,500	2.4	-	-	New shaft seals/motor bearings
Cs	-	-	-	-	-	-	
Cen	-	-	-	-	-	-	A standby pump is installed
Cd	1,000	0.9	1,000	1.6	-	-	
LCC	113,842	100	63,432	100	50,410	+44	