

Watering the Schwetzingen Palace Gardens

Retrofitting the irrigation pumping station



Schwetzingen Palace Gardens: approx. 14 ha of the grounds must be constantly irrigated Image credits: State Palaces and Gardens of Baden-Württemberg

In the 18th century, Palatine Prince Elector Carl Theodor had a palace garden created in Schwetzingen. Together, the palace and gardens are famous for their near-perfect harmony of geometric design and landscaping style: a masterclass in garden design! Who could resist a leisurely stroll through the French-style sharp, geometric planting of the seasonal beds in the central part of the gardens, known as the Zirkel? All this results in a palace and gardens that are of European cultural importance. Of the approximately 72 hectares of gardens, around 14 hectares require special care and attention, mainly the lawns, the circular parterre bed and the baroque garden. These areas of the garden must be watered regularly. Drawing surface water from ponds and canals is not permitted.

To provide a consistently sufficient supply of water for the irrigation systems that include around 800 sprinklers, the palace and garden management team decided decades ago to build a well system. Groundwater was extracted using a submersible borehole pump (approx. 30 m deep). A pressure equalisation tank was used to feed the sprinklers through a pre-existing piping system. The system did the job for many years, but was – from our current point of view – no longer up to date. The main reasons for this were that the old pump consumed a relatively large amount of energy and an increasing number of problems with the amount of sand contained in the groundwater. Ultimately, the well was in danger of silting up. The pump system needed to be retrofitted or upgraded.



Dry borehole DN 900 with a drilling depth of 31.5 m

System data:

Dry borehole DN 900
Drilling depth 31.5 m
Structure depth 31.0 m
ZSM riser DN 125
Wellhead can be removed separately
SP 95-6 pumps with Control MPC and CU 352 controller

SP 95-6 technical data

RPM: 2900
Nominal flow rate: 95 m³/h
Nominal head: 73 m
Pump and impeller material: Stainless steel with a wet-running motor with sand shield and liquid-lubricated bearings



SP borehole pump after installation

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Possibility in every drop



The CU 352 control system combined with two SP 95-6 pumps ensures optimum and efficient water supply



The shafts of the old system were also suitable for use for the new pumps. Michael Schöne, Deputy Head Gardener during system inspection

Facts and figures

Location: Schwetzingen Palace and Gardens
Customer: State Palaces and Gardens of Baden-Württemberg, Properties and Construction, Baden-Württemberg

Operator: Schwetzingen Palace Management
Borehole drilling: Lehr, Helmut & Lehr, Michael GbR, Lampertheim

Planning: Wasserwerke Paderborn GmbH in collaboration with Grundfos GmbH

Pump and control technology: Grundfos GmbH, Schlüterstr. 33, 40699 Erkrath, Germany

Customer benefits:

- Increased operational and supply reliability
- Low energy consumption
- Less maintenance and service work required
- Optimal pump management

New pumps save energy and ensure reliable supply

In the winter of 2020/2021, conversion work for the new pump system began. The commissioned borehole drilling company began by creating a DN 900 dry borehole for two SP 95-6 borehole pumps. This was done at the site of the old system. Once drilling was completed, the rod was lowered in along with the submersible borehole pumps. The old system's shafts and structures were also used as much as possible for the new pump system. Once the piping was installed in the shafts and the CU 352 control unit connected, the new pump system was ready for use. If water is needed for irrigation, the start pump switches on (alternating with pump 2). When consumption increases, the second pump switches on as well. This is done fully automatically via the control system to enable optimal energy use. The system can pump 150 m³ of water at a pressure of 6.0 bar each hour. This upper limit has been designated to avoid overloading the pre-existing pipe system. When the old system with the pressure compensation tank was in use, the irrigation systems did not receive a steady supply of water. The pressure shot up to 6.8 bar and then dropped to 4.2 bar, as the system had to be operated via the boiler. The uneven pressure affected the sprinklers, and as the pressure dropped, so did their spray. Due to the system's technical features, it constantly started up only to then lose pressure again. This constant up and down not only affected sprinkler performance, but also had a negative impact on the piping system. With the new system, pressure is maintained at 6.0 bar. This ensures an even and gentle load on the pipe system while providing an optimal supply to the sprinklers.

The technical side of the SP borehole pump

SP-series submersible pumps have been used around the world for many years. The sophisticated technology guarantees a reliable and efficient water supply with flow rates of up to 470 m³/h and heads of up to 810 m. Thanks to its modular design, a complete system can be installed for any application. The system's flexibility means that the pumps can be adapted to the particular requirements of any situation.

The SP series combines the best materials with excellent hydraulic design. For maximum reliability, optimum efficiency and low life-cycle costs, each pump is equipped with a perfectly adapted motor. Conventional submersible pumps can work well and for a long time in clean, cold water. In reality, however, groundwater often contains abrasive materials such as sand. This then adds to wear and tear in conventional systems. To minimise this wear and tear and optimise performance, SP pumps are designed to flush suspended particles out along with the medium. To achieve even greater efficiency, the SP pump can be used in combination with the CU 352 control system, developed by Grundfos for systems with two to six pumps. A highlight of the CU 352 is its easy-to-read colour display, which shows key system values including pressure and speed. An integrated data logger records all important values. Thanks to the speed control, managed by a frequency converter, a wide load profile can be covered, from small quantities to a full load. At constant pressure, the pump system only consumes as much energy as it needs for the specified duty point. Communication cards (CIM) can be used to connect to various fieldbus systems. Data can be read quickly from any location as required. In the event of an emergency, the system can be quickly accessed and corrections can be made. Combining SP pumps with the CU 352 makes the pump system safer and more efficient.

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