

# DRIVE SOLUTIONS FOR INNOVATIVE SOLAR TECHNOLOGY

CASE STUDY: DHP TECHNOLOGY



**World's first solar folding  
roof over a sewage  
treatment plant**



**Automated retraction  
and extension of the  
folding roof groups**



**Intelligent NORD drives with  
integrated PLC**



**Reliable, secure and  
innovative**



**UNIVERSAL worm geared  
motors with mounted  
NORDAC *FLEX***



*In August 2018, dhp technology commissioned the world's first foldable solar roof at the Chur sewage treatment plant. Using robust cableway technology, the flexible folding roofs can be moved to a secure position where they are protected against extreme weather.*



**RENEWABLE ENERGIES**  
Solar power plant/  
sewage treatment plant



**GEARED MOTORS**  
UNIVERSAL worm geared  
motors with brake and  
magnetic encoder



**FREQUENCY INVERTER**  
NORDAC FLEX SK 205E



**APPLICATION VIDEO**

## PROJECT REQUIREMENTS

Sewage treatment plants consume large amounts of electrical energy and space. It is not possible to cover the area with conventional photovoltaic systems since the settling basins must be accessible from above at any given time for operational reasons.

**Solar technology redefined.** The HORIZON foldable solar roof by dhp technology is erected over already used areas and allows for an intelligent dual use of industrial sites. In August 2018, the world's first solar folding roof above a sewage treatment plant was commissioned at the Chur sewage treatment plant (Switzerland). It covers an area of 5,800 m<sup>2</sup> and completely covers the pretreatment, secondary (biological) treatment, and tertiary treatment basins. The 2,120 modules produce 550,000 kWh of electrical power per year – equalling about 20% of the auxiliary power required by the plant.

**Flexible and autonomous.** The foldable solar roof operates completely autonomously and automatically adjusts to the ambient conditions, using the weather data of a local weather station and external sources. The sun controls the intelligent drive units with integrated PLC automatically: Using robust cableway technology, the solar panels unfold automatically as soon as the first sun rays are visible. They return to their protective garage position when the sun goes down in the evening. The foldable solar roof also returns to this position automatically in case of snow, hail or wind, and extreme situations – such as power or communication failures.

## CUSTOMER PROFILE

dhp technology was founded in 2015 and develops solar power generation systems for a modern, renewable and decentralized power supply. Their center is focused on sustainable local value creation, the conservation of scarce resources and the reduction of CO<sub>2</sub> emissions. With the HORIZON foldable roof, the Swiss company developed a new technology that equally meets environmental, sociological, and economical needs.

[www.dhp-technology.ch](http://www.dhp-technology.ch)





*“Cooperation with NORD was very pleasant. Everything was a perfect fit - the product range as well as the personal contact.”*

**ANDREAS HÜGLI, CO-MANAGER OF DHP TECHNOLOGY**

## APPLICATION SOLUTION

The extension and retraction of the folding roof panels are handled by intelligent drive units from NORD DRIVESYSTEMS. The NORD drives – consisting of a UNIVERSAL worm geared motor with brake, magnetic encoder and motor-mounted NORDAC FLEX SK 205E frequency inverter – are mounted in a protected position on the supporting structure and can be individually controlled. This allows the maintenance personnel to retract individual folding roof groups into the garage and perform maintenance to specific basins.

**Controlled by weather station and algorithm.** Each of the 53 folding roof groups has a drive of its own and can be extended and retracted automatically, depending on the weather. For this purpose, the NORD frequency inverters read weather data and process this data using a custom meteorological algorithm that controls the plant

and gives the appropriate commands for retracting and extending. Rotary encoders ensure that the position of the panels is known at any given time. Each of the four drives are electrically linked via the internal CAN bus, with one of the drives controlling the movement sequences as master.

### **Intelligent drives with integrated PLC.**

The control unit is programmed to retract the solar panels into the secure garage position automatically in case of a power or communication failure. This means: Manual intervention via remote maintenance is possible but not necessary for secure operation. dhp technologies uses the ramp function to ensure it can retract the panels in an adequate period of time. The drive unit PLC controls this as well.



**“Above all, the PLC integrated in the drive unit convinced us. – Controlled via weather station and algorithm, it manages the sequences independently even in case of incidents. This maximizes the plant’s operational safety.”**

Philip Racine, technology system engineer at dhp technology

## THE PROJECT AT A GLANCE

The NORD drives consisting of a UNIVERSAL worm geared motor with brake, magnetic encoder and motor-mounted NORDAC FLEX SK 205E frequency inverter are used for automatically retracting and extending the folding roof panels. Controlled by a weather station and suitable algorithms, the integrated PLC manages the sequences independently:

- individually addressable for easier maintenance
- autonomous homerun function for increased operational safety
- speed control



## FURTHER REFERENCES AND APPLICATION CASES

[www.nord.com/references](http://www.nord.com/references)



**NORD Gear Corp.**  
800 NORD Drive  
PO Box 367  
Waunakee, WI 53597  
Phone: 608-849-7300  
Fax: 800-373-6673  
[info.us@nord.com](mailto:info.us@nord.com)

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