The Noventa-Huber ThermWin® System

Right below the ground, running through the sewers, is a hidden and seldom used source of energy: domestic or municipal wastewater with a temperature of 60°F-70°F or 15°C – 20°C all year round. Depending on the sewer characteristics, the constant supply of wastewater can be an ideal energy source for both heating and cooling buildings or industrial processes.

Using Noventa's patented Huber ThermWin® wastewater energy transfer system, energy is either extracted from the sewer to supply heating to buildings in the winter or heat is rejected to the sewer to provide cooling to buildings in the summer. High coefficients of performance or COP's are achieved using Trane heat pumps in combination with our patented Huber ThermWin® Technology. Gas and electricity consumption are significantly reduced providing meaningful environmental as well as financial benefits for the end users and the community as a whole.

The Huber RoWin® heat exchanger – the key component of the Huber ThermWin® System – has been specifically developed to extract the enormous energy potential hidden in wastewater and other difficult media. It is the product of over 100 years of Huber ingenuity and experience dealing with the corrosive elements of sewage – and it is exclusively licensed to Noventa.

Noventa's choice for Wastewater Energy Transfer

Huber & the Huber ThermWin ® System

Huber is an established, multinational corporation that specializes in the production of high-quality machines, plants and stainless-steel equipment for municipal and industrial water, wastewater and sludge treatment. With more than 40,000 installations worldwide, Huber contributes to the solutions of the global water problems.

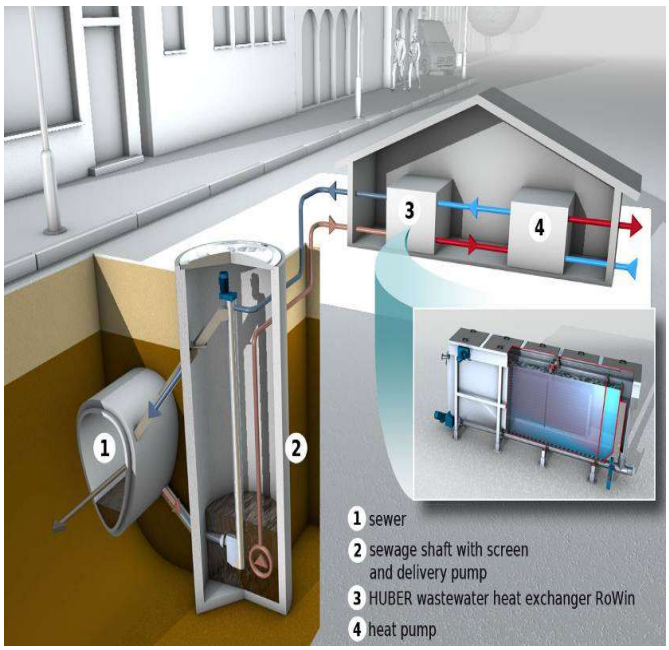
Drawing on almost 100 years of experience, Huber has developed and patented the Huber ThermWin® system that recovers thermal energy from sewage. The self-cleaning ThermWin® system diverts sewage from the sewer, screens it, pumps it through the above-ground heat exchangers, and then returns it to the sewer. Because the sewage is screened and pumped, the ThermWin® system can use compact and cost-effective heat exchangers, wherein it can generate a well-defined and turbulent flow for efficient heat transfer.

Noventa is proud to be working exclusively with Huber to promote the ThermWin® Technology across North America. Our respective engineering teams work together to design customized energy solutions for residential communities, commercial and institutional buildings and industrial facilities throughout Canada and the US. In partnership with Trane (our exclusive heat pump supplier), local engineering design firms and mechanical contractors, we design, build, finance, own and operate projects that significantly reduce CO_2 emissions and manage energy costs.

Huber ThermWin® System - How it works - Energy from Wastewater

Wastewater contains thermal energy. Using our exclusively licensed Huber ***ThermWin®*** system, in conjunction with Trane heat pumps, we can extract this energy from the sewer to supply heating to buildings in the winter or we can reject heat to the sewer to provide cooling to buildings in the summer.

- A portion of the raw sewage flows via gravity through an intake structure from the sewer into the wetwell and the Huber ***ROTAMAT® RoK4 Pumping Station Screen,*** that retains the coarse solids.
- The solids retained by the screen are transported vertically upwards and returned to the sewer system.
- The screened wastewater is lifted by a pump installed in the inlet structure and flows by gravity through the ***RoWin®*** heat exchanger installed above ground. This creates continuously stable hydraulic conditions and ensures a controlled heat transfer. In the Huber ***RoWin®*** heat exchanger the heat energy is transferred to a cooling medium (normally water) which transports the energy to a heat pump.
- The cooled wastewater flows back to the sewer taking along the screenings separated by the ***Huber ROTAMAT® RoK4 Pumping Stations Screen***.



Description of Huber ThermWin® System components

1. **Sewer** - The Huber ***ThermWin®*** System is independent of sewer shape and size. Even small flow rates are handled without problems due to the gravity system and intake near the sewer bottom

2. **Wetwell – Shaft with Screen** - The shaft is located directly at the sewer and has two functions. It serves as a sump for the pump feeding the heat exchanger and houses the ***Huber RoK 4® Pumping Stations Screen***. This type of Huber screen is well-proven worldwide and ensures pre-screening of the wastewater to protect the heat exchanger against coarse material. A vertical screw conveyor with brushes transports the separated solids upwards and at its top discharges them to the sewer.

3. **Heat Exchanger** - The Huber ***RoWin®*** Heat Exchanger has been developed especially for wastewater applications. The tank is completely made of stainless steel and odour-tight and therefore can be installed even in residential areas. The patented self- cleaning mechanism and sediments removal screw inside the ***RoWin®*** guarantee continuous system operation with low maintenance requirements. Due to its modular design, the Huber RoWin® Heat Exchanger can be tailored to suit project-specific requirements.

RoK 4® Pumping Screen

Pumping Screen Basket

RoWin® Heat Exchanger

4. **Heat Pump** Many buildings in North America are designed with heat pumps because they are able to provide both heating and cooling thereby reducing capital and operating costs. Additionally, by reducing natural gas consumption, they contribute to lower carbon emissions. Noventa has partnered with one of the world's leading suppliers of heat pumps – Trane. By combining Huber technology and Trane heat pumps, Noventa is able to significantly reduce carbon emissions, improve HVAC system reliability and lower operating costs.

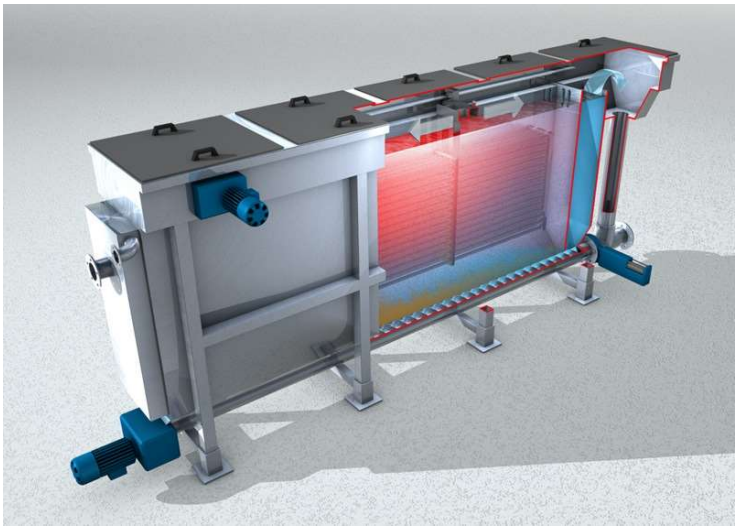
Trane Heat Pumps

For every 1KW of electric energy put into a heat pump, Noventa's proprietary Huber ThermWin® system can produce over 6 kW of eco-friendly energy to heat and cool buildings.

Huber RoWin® Heat Exchanger

The Huber RoWin® Heat Exchanger consists of a welded stainless-steel construction in which horizontal pipe modules are arranged in parallel. The pipe modules are made of stainless steel to achieve maximum heat transfer efficiency. The pre-screened wastewater flows through the heat exchanger and, via the compactly arranged pipes, gives off its thermal energy to the cooling water.

Due to the specific chemical/biological properties of wastewater a biofilm is developed over time on the heat transfer surfaces that significantly impairs heat transfer. Preventive cleaning of the heat transfer surfaces therefore is applied to ensure the maximum heat transfer capacity is permanently maintained. Sediments and solids settling on the tank floor are removed by a screw conveyor and returned to the sewer along with the cooled wastewater.


Interior view of RoWin®

The Huber RoWin® Heat Exchanger is available, as required, with an outer insulation for particularly exposed sites. Installed above ground, the system offers the benefits of easy maintenance and operation. Due to its modular design the Huber RoWin® Heat Exchanger can be tailored to suit specific site requirements. In combination with a heat pump up to several hundred kilowatts of thermal output can be generated, depending on the unit size. With the optimal combination of both systems municipalities or industrial enterprises can cover up to 80 % of the heat required from wastewater as energy source.

Benefits of the Huber RoWin® Heat Exchanger

- Compact, enclosed tank design
- Continuous maximum heat transfer capacity
- Stable hydraulic conditions
- Fully automatic operation, minimum maintenance requirements
- Unsusceptible to grease, floating and coarse material
- Automatic removal of sediments
- Modular design for tailored solutions that meet the customer's specific requirements
- Various possible applications in both the municipal and industrial field
- Developed especially to be used with wastewater and sludge
- Odour-tight
- Low maintenance requirements – Self-cleaning

RoWin® Heat Exchanger			
Component	Dimensions	Dimensions Including Clearance	Weight
RoWin® BG8	Length: 4,546 mm Width: 1,767 mm Height: 2,380 mm	Length: 8,578 mm (4000 mm Clearance required on tube-access side) Width: 2,767 mm Height: 2,530 mm	Empty: 2,400 kg Full: 10,000 kg
RoWin® BG6	Length: 4,492 mm Width: 1,519 mm Height: 2,250 mm	Length: 8,476 mm (3,953 mm Clearance required on tube-access side) Width: 2,380 mm Height: 2,392 mm	Empty: 2,000 kg Full: 7,800 kg
RoWin® BG4	Length: 4,418 mm Width: 1,173 mm Height: 2,130 mm	Length: 8,334 mm (3,887 mm Clearance required on tube-access side) Width: 1,837 mm Height: 2,264 mm	Empty: 1,500 kg Full: 5,500 kg
RoK4 Pumping Screen			
RoK4 BG700 & BG700 XL	Diameter: 730 mm Height: 3,700 mm – 12,000 mm	Screen Perforation Size: 6 mm	Pumping Capacity: 180 L/s
RoK4 BG500	Diameter: 530 mm Height: 3,300 mm – 12,000 mm	Screen Perforation Size: 6 mm	Pumping Capacity: 120 L/s
RoK4 BG300	Diameter: 330 mm Height: 2,700 mm – 12,000 mm	Screen Perforation Size: 6 mm	Pumping Capacity: 46 L/s
Wetwell size varies depending on number and size of RoK4 pumping screens required and depth of sewer below ground level.			