



## » Dalian-Xinghai: Environment-friendly heating and cooling for a business district in China, with 3 Unitop® 33/28 units

### Client

Dalian Xinghai Bay Development and Construction Administration, Dalian Municipal Government

### System Consultant

Skandinavisk Termoekonomi AB

### Cooperation Partner

Dalian Bingshan Group

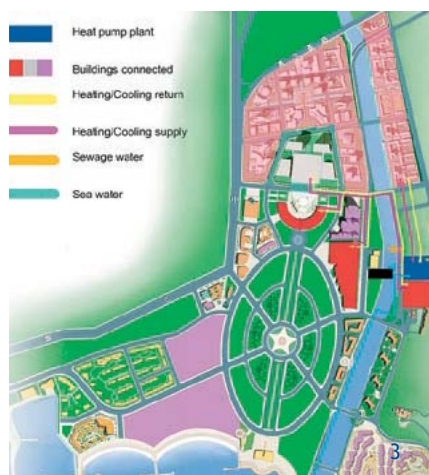
### Dalian City

Dalian is one of China's most vibrant and modern cities with a population of 5.7 million and a land area of 12,574 km<sup>2</sup>. It is located in the southernmost part of the Liaodong Peninsula in northeast China.

The municipal government of Dalian paid great attention to the city's environmental development for the last 20 years. As one of the most liveable cities in China, Dalian is recognized by the Chinese Central Government as "National Model City in Environmental Protection". The state government chose Dalian as a demonstration city for heat pump applications in China.

### Xinghai Bay Business District

Located at the coast, the Xinghai Bay Business District is a rapidly developing area around the 110,000 m<sup>2</sup> Xinghai Square, Dalian's scenic tourist attraction. The idea of the city government is to develop the Xinghai Business District into a conglomerate area that integrates exhibition centres, office buildings, recreational facilities, shopping malls and high



standard apartment buildings. Xinghai Bay Development & Construction Administration (XBA) is the management body designated by the city government to carry out the area's planning and development, infrastructure construction and real-estate management, as well as the environment protection and state-asset management.

### District Heating and Cooling

Centralized district heating schemes in China were initiated in the 1950's, while district cooling is yet a new concept to the country. The question how to generate and use energy more efficiently along with economic growth became a new, important issue that

is crucial to the country's sustainable development.

Following intensive studies of successful heat pump applications in Sweden and Norway, XBA decided in 2005 to use this technology in Dalian.

Friotherm's Unitop® type heat pump units providing high efficient dual function in heating and cooling generation met the city's special demand for a reliable and environmentally friendly solution.

Since early 2007, 3 Unitop® 33/28 heat pumps provide heating and cooling energy for an initial floor space of 300,000 m<sup>2</sup>. The heat pump plant is located in the basement of a commercial two-floor building. Within the first buildings connected are the Dalian World Exhibition Centre and the City Natatorium (indoor swimming pool).

### "Free of charge"-energy reclaimed

Heat is reclaimed from treated sewage water of the adjacent sewage treatment plant. During winter, the units work in heat pump mode and the compressors operate in series. In summer, the units are used as AC-chillers with the compressors operating in parallel. Excess heat is rejected to sewage water.

The installation of the heat pump/chiller units was completed in early





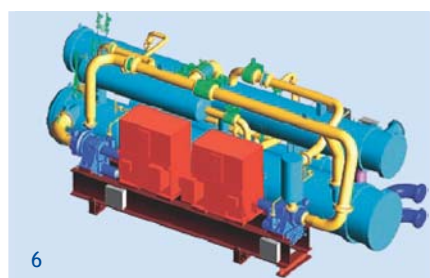
2007 and followed by an instantly successful trial operation period in heat pump mode. The Dalian Software Fair and the Davos World Economic Forum held in the Xinghai World Exhibition Centre were the first events taking advantage of the very reliable performance of the 3 Unitop® 33/28 units.

Sea water will be used as heat source in winter for further extensions of the heat pump plant. During summer, excess heat will be rejected to the sea.

#### Let our customer speak...

“This is one of the efforts made by the Dalian municipality to promote a ‘green Davos’ in Dalian,” says Mr. Xia Deren, mayor of Dalian. “We would like to take this opportunity to show our experience in environmental protection and energy saving as an effort to build a sustainable and environment-friendly society.”

The high expectations of the client regarding COP were met at all times: “The income has outranged the investment and we are making profit. Now we save more than 30% of energy compared with conventional solutions”, says Mr. Lin Hao, director of XBA.



#### Main features of a Unitop® 33/28

- Open-type single stage compressors
- Tough industrial design
- Planetary type gears
- Suited for all drive systems
- Series & parallel operation
- Refrigerants: halocarbon/hydrocarbon
- High efficiency (COP)
- Operating temperatures -40°C/+80°C
- Suitable for almost any heat source
- Large capacity, small floor space

#### Customized Plant Control System

A Siemens S95 PLC-Type control system is used for local control of the heat pumps. Its main advantages for the customer are the high grade of customisation and its exceptionally high reliability, combined with the industry-specific standard and world-wide availability.

#### Legend

- 1 The skyline of rapidly developing Dalian City seen across the labour park, the symbol of Dalian.
- 2 The City’s Natatorium (indoor swimming pool): one of the first buildings connected to the heat pump plant.
- 3 The Xinghai Bay development area with the impressive Xinghai Square in the center. Indicated are the locations of the heat pump plant and the areas served.
- 4 A Unitop® 28 type compressor in the works of Friotherm. The integrated oil system is partly visible at the bottom.
- 5 One of the Unitop® 33/28 heat pump units assembled in the workshop of Dalian Bingshan Group and operating at the Xinghai facility.
- 6 Unitop® heat pump/chiller units are engineered to best meet the very specific requirements of each client.

#### Technical data:

3 Unitop® 33/28 heat pump units, each

Operating mode	Summer	Winter
Chilled water in/out (°C)	+10/+3	+7.5/+2.5
Heating water in/out (°C)	+23/+33	+55/+65
Cooling capacity (kW)	10,000	—
Heating capacity (kW)	—	8,323
Power absorbed (kW)	1,882	2,485
COP	5.31	3.35

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