

Installation, Operation and Maintenance Manual

G-Power® District Heating Substation



DISTRICT HEATING IN GENERAL

Finland's most popular form of heating

District heating is the most popular form of heating in Finland. It is used in nearly all cities and urban areas. Some 2.4 million Finns live in houses with district heating.

District heating accounts for around 50% of the heating market. District heating is used in more than 90% of multi-storey residential buildings, around half of terraced houses and the majority of public and commercial buildings in Finland. District heating pipes are built for new developments if enough houses opt in for the district heating network.

To end users, district heating is a reliable and flexible form of heating.

District heating contributes to a cleaner and more comfortable living environment

District heating also conserves energy and the environment. Optimal savings are achieved through combined heat and electricity production, which has a fuel efficiency of 80% to 90%.

DISTRICT COOLING IN GENERAL

District cooling is an environmentally friendly method of cooling indoor areas.

In district cooling, chilled water is delivered through pipes to cool the temperature of a building. Its operating principle is the same as in district heating, but excess heat is transferred back from the customer to the energy company's cooling water reserve.

District cooling can also be used for cooling production and storage facilities at industrial plants.

Easy and cost-effective district cooling

District cooling conserves energy and saves money as it is more cost-effective than cooling individual buildings.

District cooling eliminates noise pollution caused by refrigeration machines and allows the space needed for them to be used for other purposes. Switching away from refrigeration machines also saves on service and maintenance costs.

ON DISTRICT HEATING SUBSTATIONS

General

This guide provides general instructions on the safety, installation and commissioning of district heating substations. Detailed technical specifications, circuit diagrams, electrical circuit diagrams, component manuals and warranty terms and conditions are found in the delivery materials provided to the customer either with the district heating substation delivery or separately by mail. The information and instructions in the delivery materials must be read before installing and commissioning the equipment.

Safety instructions

Gebwell Ltd. shall not accept liability for damages caused by improper installation or storage. It is very important that you read all instructions carefully before installing and using the district heating substation in order to avoid accidents and damage to the equipment.

Installation, start-up and maintenance of district heating substations may only be performed by a professional technician. Unused connections and shut-off valves must be sealed with stoppers.

High temperature and pressure warning

Check the maximum pressure and temperature values for the equipment from the machine plate. Compare these values to those given by the district heating supplier. The district heating substation may not be installed if any of the network values exceed the maximum values indicated on the machine plate.

District heating water may have a very high temperature and pressure. The district heating substation must be drained in the event that heat exchangers, control valves or other components on the district heating side must be removed for maintenance.

Overpressure protection equipment in the district heating network are located in connection with heat production and maintained by the heat supplier. The district heating substation has safety valves on its secondary side. Their operation should be inspected periodically.

Hot surfaces warning

The district heating substation has hot surfaces that may cause burns if touched. Special care must be taken when moving or working in the vicinity of the district heating substation.

Warning on shipping damage

Before commissioning the equipment, ensure that the district heating substation has not been damaged during shipping. Special care must be taken when lifting or moving the large and heavy district heating substation.

DELIVERY

Receiving the delivery

The following matters should be checked when receiving the district heating substation delivery:

- There are no signs of damage during shipping
- The delivery corresponds to the order in all aspects
 - After verifying that the product is in good condition and corresponds to the order, sign the waybill and keep your copy stored
 - If the delivery has been damaged during shipping, fill in the shipping damage form immediately. The form must be signed by both the recipient and the forwarder's representative (such as the driver). Each driver carries the form for reporting shipping damage.

Moving the substation

The district heating substation is mounted on a transport platform that allows the substation to be moved and lifted to the site of installation by means of a pallet jack and lifting slings. Plan the easiest route to the site and be careful not to break floor and wall surfaces, stairs, door frames or other structures on the property.

Do not damage the substation during lifting! The district heating substation contains fragile components. If the delivery includes separate lifting instructions or designated lifting points, these must be followed carefully. The heat distribution substation may not be lifted without the support of the transport platform. The transport platform under the district heating substation may not be removed until at the site of installation.

Storage

If the district heating substation is stored before installation, ensure that the site of storage is warm and dry.

INSTALLATION AND COMMISSIONING

Installation

The district heating substation may be installed and connected only by a professional technician. The connections must comply with local standards and regulations.

Move the district heating substation to the site of installation according to the instructions under section "Moving the substation". Sufficient space must be reserved around the substation for installation and maintenance. The substation is installed directly on the floor and does not need to be mounted on the platform.

Use the adjustable legs included in the delivery to adjust the substation at the desired height. The district heating substation should be level. Tighten the tension nuts on the adjustable legs carefully to ensure that the substation remains level and in the correct position.

Inspect and tighten all joints in the district heating substation as they may have loosened during shipping.

Check that the product corresponds to the plans and technical specifications included in the separate delivery materials.

All aids used during transport must be removed before commissioning the district heating substation. Before installation, all pipes and couplings must be cleaned and rinsed.

Pipe connections

Ensure that all pipe connections are in accordance with the plans and technical specifications included in the delivery materials. Threaded, flanged and welded couplings are used for connecting the substation to the district heating network and internal networks.

The district heating substation must not be exposed to excessive pulsating pressure or vibration. All connected pipe lines must be supported in a way that ensures that the district heating substation is not exposed to external strain. In particular, temperature fluctuations and torsional tension must be taken into account.

Electrical connections

Electrical connection work may only be performed by a qualified technician. The electrical circuit diagrams for the district heating substation are included in the delivery materials. Internal electrical connections have been made at the factory. Electrical wiring may not be attached to hot pipes.

Components

The delivery materials contain detailed operating manuals for all components of the district heating substation. (e.g. pumps, regulators, heat exchangers)

Commissioning the district heating substation

Check the following before filling:

- Pipe connections are according to plan
- Drainage valves are closed
- Surge tank is connected
- Threaded and flanged couplings are tightened
- Safety valves are inspected and operational

Fill the district heating substation with the flow medium and slowly raise the pressure to the operating pressure. The substation must be vented during start-up. The primary side stopper on the return side is opened and the input side stopper is closed. The substation is vented by opening the district heating venting valve. Switch on the automatics.

After the first start-up, check the following:

- Temperatures
- Pressures
- Thermal expansion
- Possible leaks
- Pump operation
- Flow directions

After this, continue to monitor the district heating substation's operation at a general level. After verifying that the substation operates as planned, continuous use can be started.

Ensure that the operating staff have received training!

Insulation

We recommend insulating the high-temperature pipes in the district heating substation.

Condensing tubes and components must be insulated and diffusion coated. Recommended insulation is self-adhesive cellular rubber with a thickness of 13 mm or another insulation with equivalent insulating capacity and diffusivity.

MEASURES DURING OPERATION

Servicing

Monitoring and regular maintenance are important for ensuring that the district heating substation is kept in good working order.

Use a professional maintenance provider when your equipment needs to be serviced.

Service inspections must be performed at least twice per year, before and after the heating season. Comprehensive preventive maintenance by a maintenance provider should be performed yearly.

Flow mediums that differ from the technical specification may not be used in the heat exchanger. By default, the medium is water without a corrosive agent.

In matters related to warranty, contact Gebwell Ltd. maintenance services. The warranty terms are included in the delivery materials.

Cleaning heat exchangers

Under normal conditions, the heat exchangers do not need to be cleaned. The powerful turbulent flow creates a continuous self-cleansing effect on the heat delivery surfaces. If the heat exchanger becomes dirty for any reason, it can be cleaned by backflushing and, if necessary, a suitable detergent solution.

Checklist, general points to monitor

Check at least the following before and after the heating season:

- Possible leaks
- Secondary side pressure should be in line with plans
- No extraordinary sounds during operation

Checklist, annual preventive maintenance by a maintenance provider

- Clean the sanitary trap if necessary
- Input and output temperatures must be in line with plans.
- Control device tuning
- Pressure losses in the heat exchangers
- Water heat loss must be in line with the requirements of the local district heating provider.
- Initial pressure of the expansion tank
- Inspecting the pump's operating point

Regulator tuning orders

Tuning for the Ouman regulator is ordered from Ouman Ltd., tel. +358 424 8401.

Tuning of other regulators can be requested from Gebwell Ltd., tel. +358 400 897 492 / Olli Koponen.

GENERAL WARRANTY TERMS

1) Scope and issuer of warranty

The warranty applies to district heating substations and heat exchangers supplied by Gebwell Ltd. for use in district heating.

2) Validity of the warranty

The warranty is valid from the date of delivery as follows:

- District heating substation components, 24 months
- Piping parts and connectors, 24 months
- Heat exchangers, 24 months

The warranty is not voided by changes in ownership whereby the equipment remains in use in Finland. Extended warranty or a new warranty period is not issued for repaired or replacement products.

3) Warranty content

Gebwell Ltd. is responsible for ensuring that the usability and quality of the goods remain normal for the duration of the warranty. If this is not the case, the goods contain a defect covered by the warranty.

However, Gebwell Ltd. is not liable for the defect if it can be demonstrated that the deterioration in the quality of goods or abnormal usability is likely due to:

- negligent or improper installation (e.g. insufficient support for piping, improper operating environment)
- exceeding the permitted maximum pressure (pressure shocks)
- external strain (temperature, mechanical strain, etc.)
- repairs by a maintenance company other than one approved by Gebwell Ltd.
- poor quality of circulating water, i.e. if the water does not meet the reference value recommendations given in report KK3/1988 by Finnish Energy or requirements issued in Resolutions 953/1994 and 74/1994 of the Ministry of Social Affairs and Health (on water hardness, aggressiveness, etc.)

The warranty becomes void, if

- the product is modified or repaired without Gebwell Ltd.'s consent
- the product is installed or the product is used or serviced contrary to the manufacturer's instructions (see the manual)
- the product is used for a purpose for which it is not intended
- the product is stored in humid or otherwise inappropriate conditions (see the manual)
- the control automation of the product is replaced or its properties are modified from the original (for example, by installing an accessory that affects the control)

Gebwell Ltd. is not liable for any indirect caused by possible damages.

4) Notification of defect

The customer must notify Gebwell Ltd. of the defect within 14 days of the time that it has detected or should have detected the defect.

5) Correcting the defect

Insofar as the defect falls within the scope of these warranty terms, Gebwell Ltd. is responsible for correcting the defect or providing a replacement product free of defects within a reasonable period of time after receiving the notification of defect.

6) Rights of the customer after expiry of the warranty. The warranty does not affect the customer's rights under Chapter 5 of the Consumer Protection Act in the event of a defect.

7) Settlement of disputes

The customer has the right to refer disputes arising from these warranty terms to the Consumer Disputes Board. If the dispute over warranty is brought before the court, it shall be heard in the competent district court of the customer's domicile.

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