

Smart District Heating Substation - saving energy and environment



INTRODUCTION

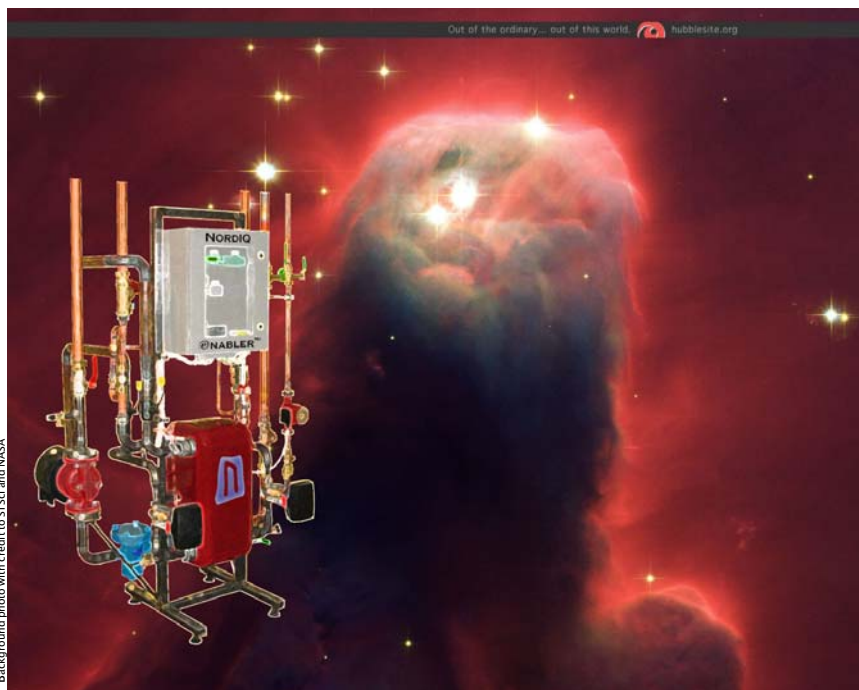
NordIQ have created a completely new concept for substations in district heating systems by the systematic embedment of 20 years of research and experience into electronics and software. The result is the Xpert S series with 3 standard substations covering demands for up to 140 apartments. Forget all the complicated design. Choose colour/size – plug-in-and-start.

The fact that the substation saves energy, has unbeatable return cooling effect and other unique qualities hardly makes the matter worse.

The enabler™ is at the heart of the NordIQ concept – the steering equipment with technology borrowed from the vehicle and telecommunications industries makes possible things you can otherwise just dream about.

Where conventional substations with PID-regulation work on an "error correction" principle, the Xpert S is "designed for correctness".

Come on board – something new in district heating is starting up.



Background photo with credit to STSf and NASA

- EMBLA** 10–40 apts; 600–2500 m²
- FREJA** 30–80 apts; 1800–5000 m²
- TOR** 70–140 apts; 4000–8400 m²

Xpert S can be linked to the internet and a web page.



PROPERTIES

Energy Saving. Energy loss is reduced by the unique soft steering system giving savings of 10–30%. Data from the substation can also be used to identify conventional energy saving measures.

Improved cooling – lower flow charges. Good cooling increases the efficiency of the district heating system and increases the potential to use environmentally friendly waste heat.

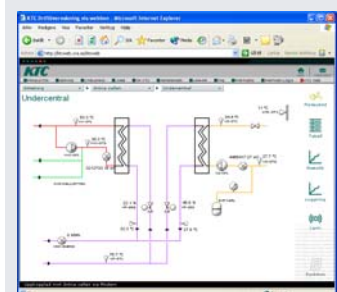
Reduced top power – lower power charges. Soft steering evens out power demand and Primitation™ reduces the top effect still further.

Plug-and-run. Xpert S adapts to current network conditions. Little engineering and no risk of problems.

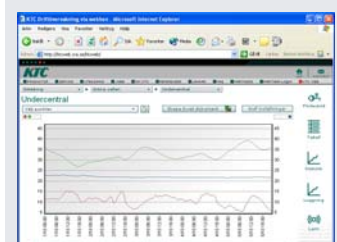
Problem free, longer life. No risk of oscillation and problems associated with unstable regulation (scale, cracked exchangers, worn actuators, low comfort levels etc)

Upgradeable. Xpert S can be programmed for maximal power/flow and/or kv. You can increase the capacity limit with a few clicks on the computer.

Built-in diagnostics and fault-tolerance. If the performance (of a heat exchanger for example) decreases then you can be informed via the web site or by a warning to your cell phone. In the unlikely event that a sensor should malfunction then there is alternative operating modes.



You can see detailed operational information in the flow chart. You can even set power, flow and/or kv-restrictions.



You can see history, indicators etc with the statistics function.

The environmentally friendly alternative

District heating is generally seen as an environmentally friendly alternative for space heating.

Xpert S makes it even more environmentally friendly.

Softcontrol™ significantly decreases energy use and thereby decreases CO₂ emissions and other environmental impact.

The high cooling rate facilitates the extraction of a larger proportion of the energy from cheap and environmentally friendly waste heat, flue gas condensing etc.



Secure, fast and easy

No fluctuation problems. High comfort levels – long lasting – minimal costs for adjustment and maintenance.

Fast and safe design.

Standardisation and capacity margins that are only used when needed increase the security of the design and allow up-grades.

Programmable primitation facilitates efficient capacity restriction without risking security as the limitation can be reprogrammed with a click of the mouse.

Type approval

The Xpert S was approved by Det Norske Veritas in October 2004. It is probably the first type approved district heating substation in the world. The enabler control allows standardisation as it makes the design independent of component sizes. This is why we are the first to present a standardised "type" that can be approved.

A complete system for hot water and radiator systems

Xpert S contains everything needed for domestic hot water production and radiator systems. Cut-off valves, filters, check and safety valves, variable-speed controlled radiator pump, hot water circulation pump, regulation components and sensors are included in the prefabricated substation.

You need to add an expansion vessel and a charging valve for the radiator system.

We offer remote monitoring and control in partnership with CRA with alarm, real time information, statistics and indicators

Stop heat for the crows

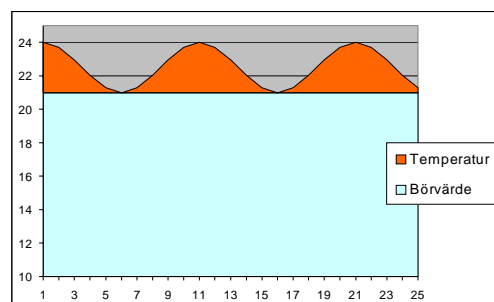
NordIQ Softcontrol™ is a new way to save energy by managing the radiator system!

A conventional system sends excess energy to the radiators with the intention that the radiator thermostats turn off the heat when it is warm enough. The problem is that this regulation is slow and inaccurate leading to relatively large variations in temperature in the room.

It is usual to adjust the system so that the lowest temperature is acceptable. Additional energy above this point is essentially lost, see diagram.

NordIQ Softcontrol™ maintains a stable temperature, thereby cutting out waste.

Experience from normal Swedish households gives a saving of between 10% and 30%



Safe and cost-efficient with an operational guarantee and incentive agreement

Suppliers that deliver and run or who blame each other for any problems arising can now be a thing of the past. You can't loose out with our business model - basic investment + incentive agreement.

Our income depends on your savings. Our primary interest is that the plant operates to its full potential. That's why we give an operational guarantee for the full contract period.

We can save more energy together

Xpert S gives us access to more information of relevance for heating and energy use such as power, flow rate, temperature and consumption separated into hot water and the radiator system.

This information provides new opportunities to find savings potential and reveal weaknesses.

There are often savings of 10-20% to be found here.

With our operational guarantee and incentive agreement there is no risk of you being left without support - we share your savings.

Automatic flow balancing

Adjustment of the radiator system is a costly procedure to save energy and ensure that everyone receives sufficient heat.

Xpert S has variable-speed controlled pump and a function for automatic flow rate balancing. This reduces the need for adjustments and improves distribution, comfort and cooling in the system.



ronmentally friendly waste heat by 35%, and we would not need to pump over 200 million m³ around the Swedish district heating systems.

Sven Werner, Professor in District Heating Systems Technology, has demonstrated that a 10°C increased cooling would save 60-70M€ in Swedish district heating systems. A flow cost of at least 0,2€ /m³ primary flow is usual.

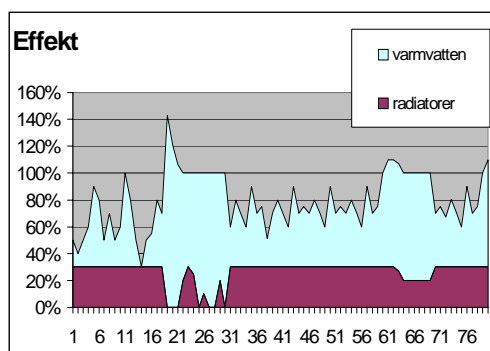
Then it could also be possible to avoid the need to increase capacity in the networks and heat production plants.

Primitation™ gives a lower power demand

Primiting™ stands for prioritising and limitation. You can limit power, flow and/or valve with this function which often gives you a lower fixed rate cost.

Priority is given to provide heat to the hot water (and ventilation). The radiator system is slow and can often wait until lower demand situations.

The power limit is "soft" so that short-term peaks can be accepted but the average power is limited, see diagram.



In practice, this provides a possible decrease in peak power of 40%.

In the event of a lack of power (i.e. malfunction in a boiler), the available power and flow will be more equally distributed amongst consumers. It is otherwise normal today, in the event of a lack of power, for the "first" consumer in the network to take all the capacity as their substation is over-dimensioned and without limit. In the worst case scenario, consumers at the end of the network may find themselves without a heat supply

It is possible to raise the limit if necessary, so the substation can be more tightly regulated than is the case with a fixed limit (i.e. with small valves) as there is no need for significant safety margins.

Dimensioning

Dimensioning and choice of the substation can hardly be easier. Xpert S is a "plug-and-run" system, i.e. it adapts to the local network and load conditions.



It is also insensitive to the size of property. You simply need to know which size class your building is, in order to choose the right substation.

The risk of getting the wrong dimensions is minimal. It is even possible that you can connect an additional property without problem. Possibly with slightly poorer cooling on the coldest days of the year. As cooling is better than with other substations, this is of less importance.



Fault-tolerance and Diagnosis

There are sensors for most process parameters to diagnose degraded performance of things like the heat exchanger (scaling etc), but also problems and changes in the building (such as short circuits).

The substation is also fault tolerant which means that it can continue to function even if one or several sensors should fail.

Good cooling gives increased efficiency

Operating a district heating system with low cooling is like running a freight train and only unload half of the cargo at the destination, and bring the rest back.

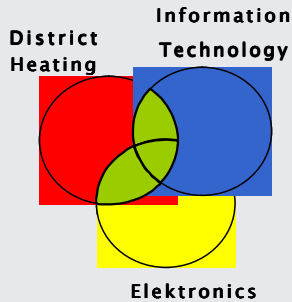
Efficient cooling decreases losses, facilitates increased use of environmentally friendly waste heat and increase network capacity.

Xpert S often cool the district heating system to an average of 30-35°C. Average return temperatures in Sweden are around 46°C. An improvement in cooling effect of 15°C increases the potential for envi-

Xpert S

NordIQ Göteborg AB

NordIQ supplies knowledge based heat exchanger applications with a focus on district heating and space heating.



Quality assurance policy:

Our aim is to provide the best possible value for our customers.

Our systems are based on holistic solutions and practical experience.

Standardisation is a motto to maintain simplicity, cost-efficiency and high quality.

Continual evaluation takes place and is used for further improvement of our products.

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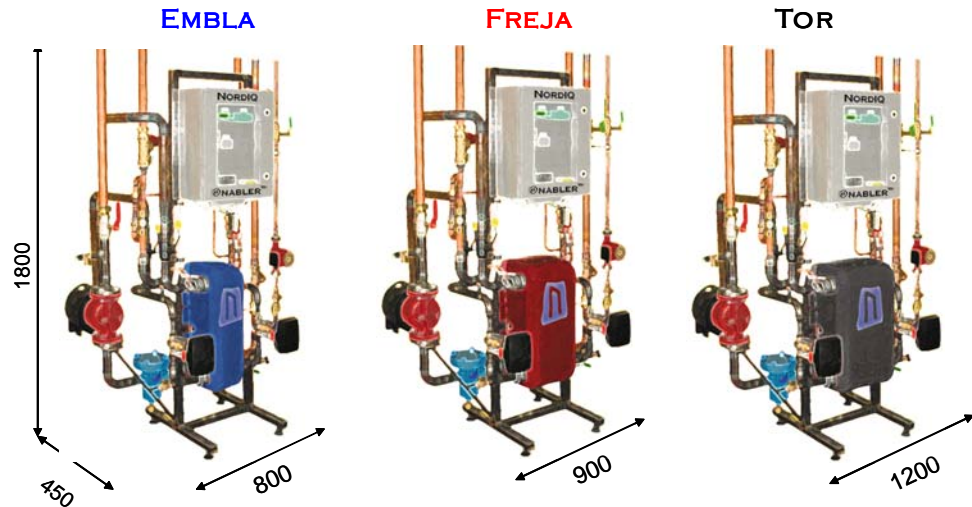
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TECHNICAL SPECIFICATION

Number of circuits: 2 hot water, radiator system



	EMBLA	FREJA	TOR
Capacity:	10–40 apartments	30–80 apartments	70–140 apartments
Living area:	600–2.500m ²	1.500–5.000m ²	4.000–8.400 m ²
Power rating			
Hot water:	140kW	180kW	250kW
Radiator circuit:	125kW	250kW	500kW

Primary circuit:

Pressure classification: PN16 (PN25 optional)
Max temperature: 120 °C
Connections: forward, return steel piping, welded, DN32
Filter, cut-off valves

Domestic hot water circuit:

Connections: hot water: copper piping, soldered, 42 mm
kallvatten: copper piping, soldered, 42 mm
hot water circulation: copper piping, soldered, 22 mm

Filter, cut-off valves, check valves
Hot water circulation pump

Radiator circuit:

PN6 (PN10 option)
Connections: forward, return: 1,5" internally threaded fitting to cut-off valve, DN40
Filter
Safety valve: 6 bar
Radiator pump: variable speed, Grundfos magna 32120 or 40120
Filling: not included
Expansion vessel: not included

Tillval:

Primitation™
Softcontrol™
Remote connection with IP-modem, telephone modem or GSM-modem
M-bus module
Web-page
Ventilation circuit