

ENGINEERING  
TOMORROW



# Smart heating optimization **increases your building's lifetime value**

The Danfoss Renovation+ concept for two-pipe heating systems.

**61%**

**of residents**

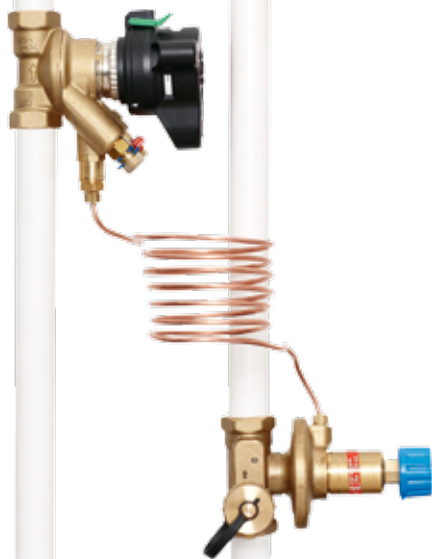
rate expected energy  
costs as a major factor  
when choosing their next  
home.

# Happy tenants are good tenants

Investing in more efficient heating  
is a sound commercial decision

There are few feelings as pleasant as a comfortable and warm apartment on a cold or rainy day. Even better if your tenants know that you've installed a heating system that's saving them money as well. Quite apart from reducing CO<sub>2</sub> emissions and helping to protect the environment.

Tenants today are more aware and more demanding than ever. Easily accessing information from a range of media, their expectations are high and getting higher. And they will not hesitate to let you know if they feel those expectations are not being met.



## Introducing Danfoss Renovation<sup>+</sup>

A smart solution that strengthens  
your letting business

Danfoss Renovation<sup>+</sup> is a simple and cost-effective approach to boosting the efficiency of heating systems by using the latest high-performance balancing valves and temperature controllers. This offers a number of direct benefits, not least in retaining and attracting good tenants.

Satisfied tenants complain less, saving you time and money on services and administration. They are more likely to stay, saving you re-letting costs and protecting your cash flow. Their good

opinion of the building they live in spreads among their neighbors, helping to build local demand for your properties as well as your image with regard to social responsibility.

With energy costs continuing to rise above the rate of inflation, there is no better way to keep your tenants happy than by offering them a comfortable living environment while minimizing what they have to pay to achieve it.



**68%**  
**of a building's**  
total annual energy use is  
absorbed by the heating  
system.

### **Seizing a major opportunity**

At present, around 80-90% of multi-family buildings in northern Europe – even those built in the last 30 years – have heating systems with little or no hydronic balancing and/or poor temperature control. This represents a major opportunity for improvement, for both commercial and environmental reasons.

Fortunately, with the Danfoss Renovation<sup>+</sup> concept, achieving significant gains in the efficiency of your heating system and the level of comfort is both easy and very affordable. Although exact results will vary from renovation to renovation, it is not unusual for a Danfoss Renovation<sup>+</sup> solution to pay for itself in as little as one year.



# Rethinking your heating concept

## The road to satisfied tenants

### Understanding the shortcomings of traditional systems

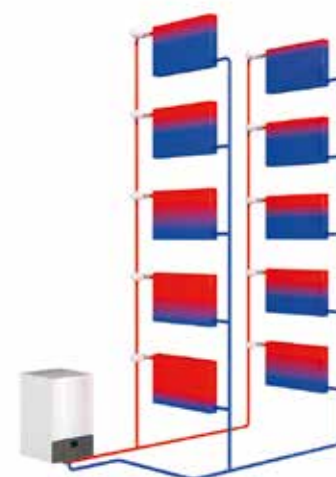
Generally, buildings constructed prior to 1990 have a single boiler or district heating connection providing heated water to all radiators in the building via a vertical or horizontal riser. Each riser provides heated water to a number of radiators, which are mostly manually controlled.

Based on a simple physical principle, the heated water always takes the easiest route to its destination. This means that the risers closest to the heat source transport more heated water than those further away. It also means that radiators closest to the heat source provide more heat more quickly than those at the end.

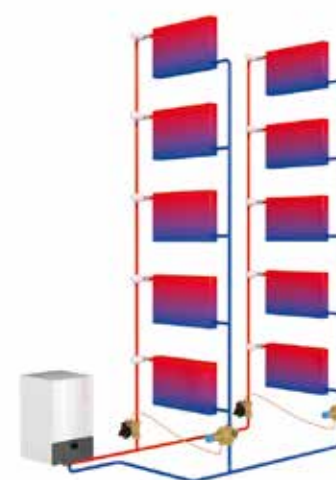
### System misbalances result in dissatisfied tenants

This traditional but inefficient design concept causes huge misbalances in the system, making it extremely difficult for tenants to achieve the comfort level they desire. All tenants will experience noisy radiators, excessive or inadequate heating and big differences in heating time between apartments. Those tenants living furthest from the boiler are too cold while those who are closest are too hot. They constantly need to adjust the manual radiator valves or sometimes even open windows to get the temperature down to a comfortable level, wasting large amounts of energy.

System misbalances and a lack of temperature control are major sources of tenant dissatisfaction. In the end, whether they have too much heat or too little, all tenants find it hard to achieve comfortable room temperatures while over-paying for their heating.



*Unbalanced system*



*Balanced system*

**20%**  
**energy savings**  
can easily be achieved,  
simply by correctly  
balancing the system and  
fitting radiator thermostats.



# Quick, simple and highly cost-effective

Danfoss Renovation<sup>+</sup> is the answer



**Three requirements should be met to fully optimize the heating system:**

## Ensure that the risers are properly balanced

Our recommendation is to install automatic balancing valves. These provide the basis for achieving proper hydronic balance throughout the system, under all system conditions (partial or full load) and outside temperatures.

The result is even heat distribution among all risers throughout the entire heating season and significant energy savings.

## Ensure that all radiators are properly balanced

Once the risers have been properly balanced, the next requirement is to ensure an even flow of water through the system by balancing the radiators. This can be achieved by simply fitting thermostatic radiator valves with a pre-set function. In this way, each radiator will get the right amount of heated water – nothing more, nothing less.

## Ensure easy and effective temperature control

Adding a sensor to the thermostatic radiator valves to achieve automatic temperature regulation is the perfect way to provide tenants with an optimal indoor climate and maximum energy savings. The desired room temperature can then be determined by the tenant for each single room of the apartment, ensuring constant comfort with no need for manual regulation.

## Achieving measurable results

There is no more noticeable or quickly appreciated improvement you can make for your tenants than providing increased comfort and reduced energy bills. Fortunately, with Danfoss Renovation<sup>+</sup>, this is neither complicated nor costly – no matter what sort of building you are renovating or how limited your budget is.

**Even minor investments, such as heating optimization, can achieve significant improvements.**

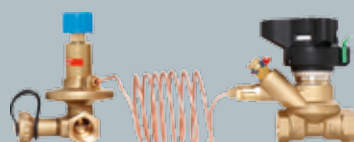
# Renovation concept for two-pipe systems

## An overview of the Renovation<sup>+</sup> products

Balance risers by installing Danfoss ASV automatic balancing valves

Balance radiators by installing and commissioning Danfoss RA-N or RA-UN thermostatic radiator valves

Provide temperature control by installing Danfoss RA 2000 or RAW thermostatic sensors



Danfoss ASV automatic balancing valves consist of two components: a differential pressure controller and its partner valve. The components are connected via an impulse tube that enables differential pressure over the riser to be controlled. In most cases, the installation of the valves takes place in the basement with hardly any inconvenience to your tenants.

### Benefits include:

- ⊕ eliminating the pressure fluctuations that cause noise problems
- ⊕ establishing a good hydronic balance to avoid the problems of uneven heating
- ⊕ minimum inconvenience for tenants during installation

Danfoss RA-N and RA-UN thermostatic valves offer easy installation and pre-setting features. There is a wide range of models to cover any situation and as many as 14 setting options for accurate pre-setting. The RA-N valves are our standard pre-setting valves for average water flows. The RA-UN valves are especially suitable for pre-setting of low water flows.

### Benefits include:

- ⊕ establishing correct water flow for each radiator, reducing energy wastage
- ⊕ providing the best possible working conditions for the thermostatic sensor

The Danfoss RA 2000 and RAW thermostatic radiator sensors provide fully automated temperature control for improved comfort and reduced costs. The RA 2000 is 'best in class' when it comes to control accuracy and energy savings. The RAW is especially suitable for projects where cost is an important factor, offering excellent performance at a moderate price.

### Benefits include:

- ⊕ automatic but adjustable room temperature control
- ⊕ easy operation
- ⊕ energy saving by automatically closing the radiator valve when the set temperature has been reached

Get the full package and maximize the benefits of Renovation<sup>+</sup>



The best results are achieved when both risers and radiators are hydronically balanced, as well as when radiators are equipped with thermostatic sensors for automatic temperature control. When done so Renovation<sup>+</sup> benefits include:

- ✓ no more noise complaints
- ✓ no more over and under heating complaints

- ✓ less maintenance and service costs
- ✓ an energy efficient heating system
- ✓ improved rentability of apartments



**1-4 years  
payback time**

Explore our case studies on [www.twopipesolutions.danfoss.com](http://www.twopipesolutions.danfoss.com) and see for yourself how quickly you can expect to benefit from your investment.

## Boosting the lifetime value of your buildings

The Danfoss Renovation<sup>+</sup> concept offers you a flexible and highly cost-effective solution for your renovation project, regardless of building type, current condition or available budget.

By involving Danfoss Renovation<sup>+</sup> in your renovation, you will benefit from the support of experienced professionals in ensuring you get maximum return from your renovation investment. At the same time, you will significantly increase tenant

satisfaction while reducing your annual heating service costs. This reduces your Total Cost of Ownership while leaving you free to concentrate all your energies on running your letting business.



## Talk to us about a no-obligation survey and assessment

We will be delighted to visit your planned renovation site and advise you on the most suitable strategy for upgrading your current heating system.

Feel free to contact us direct at any time, or simply ask your preferred installer about Danfoss solutions.

# Working with a market leader

Our experience is your guarantee of satisfaction



Danfoss was the original inventor of both the radiator thermostat and the automatic differential pressure controller: the two main components of the Danfoss Renovation<sup>+</sup> concept for two-pipe heating systems in multi-family houses. Today, we have been serving the needs of the heating industry for almost 80 years and are a market leader in automatic heating control technology.

In addition to the Danfoss Renovation<sup>+</sup> concept for two-pipe heating systems, Danfoss offers a range of other solutions and products for the renovation of multi-family houses, including:

- Danfoss Renovation<sup>+</sup> for one-pipe heating systems
- Domestic hot water system optimization using Danfoss MTCV circulation valves
- Decentralized heating system and instantaneous domestic hot water production with EvoFlat™ stations
- Substations and control components for buildings connected to district heating networks

**For more information, contact your personal Danfoss sales representative or nearest Danfoss office.**

Learn more about our products at our website:

**[www.twopipesolutions.danfoss.com](http://www.twopipesolutions.danfoss.com)**



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