

ENGINEERING  
TOMORROW

*Danfoss*

# Introduction to Hydronic Underfloor Heating

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# Hydronic Underfloor Heating

## Agenda

- Brief Danfoss history
- Danfoss hydronic underfloor heating portfolio
- Where to find more information
- Contact details



# DANFOSS

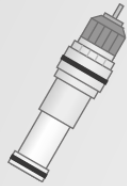
## Who we are

- Mads Clausen founded Danfoss 1933 in Elsmark (Denmark).
- Ten years later he invented the first thermostatic radiator valve.
- Like you - we are a (big) family business with 26 000 people in countries all over the world!

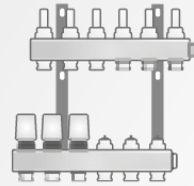


# Danfoss Hydronic Underfloor Heating

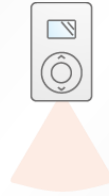
## Historical milestones



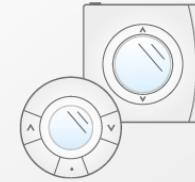
First sales of built-in valves (used in floor heating manifold)



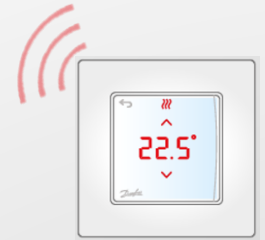
First manifold with Danfoss built-in valves



CF2 wireless room controls introduced with infrared sensor



Launch of Danfoss Link™ floor heating and living by Danfoss



Launch of Danfoss Icon™ 24V / wireless system

1943

1982

1996

1998

2002

2005

2007

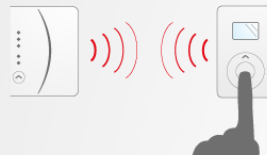
2011

2017

2018



Mads Clausen designs the first radiator thermostat in the world



World's first wireless room control for floor heating introduced



Danfoss acquires PentaCom floor heating and launches its own TWA

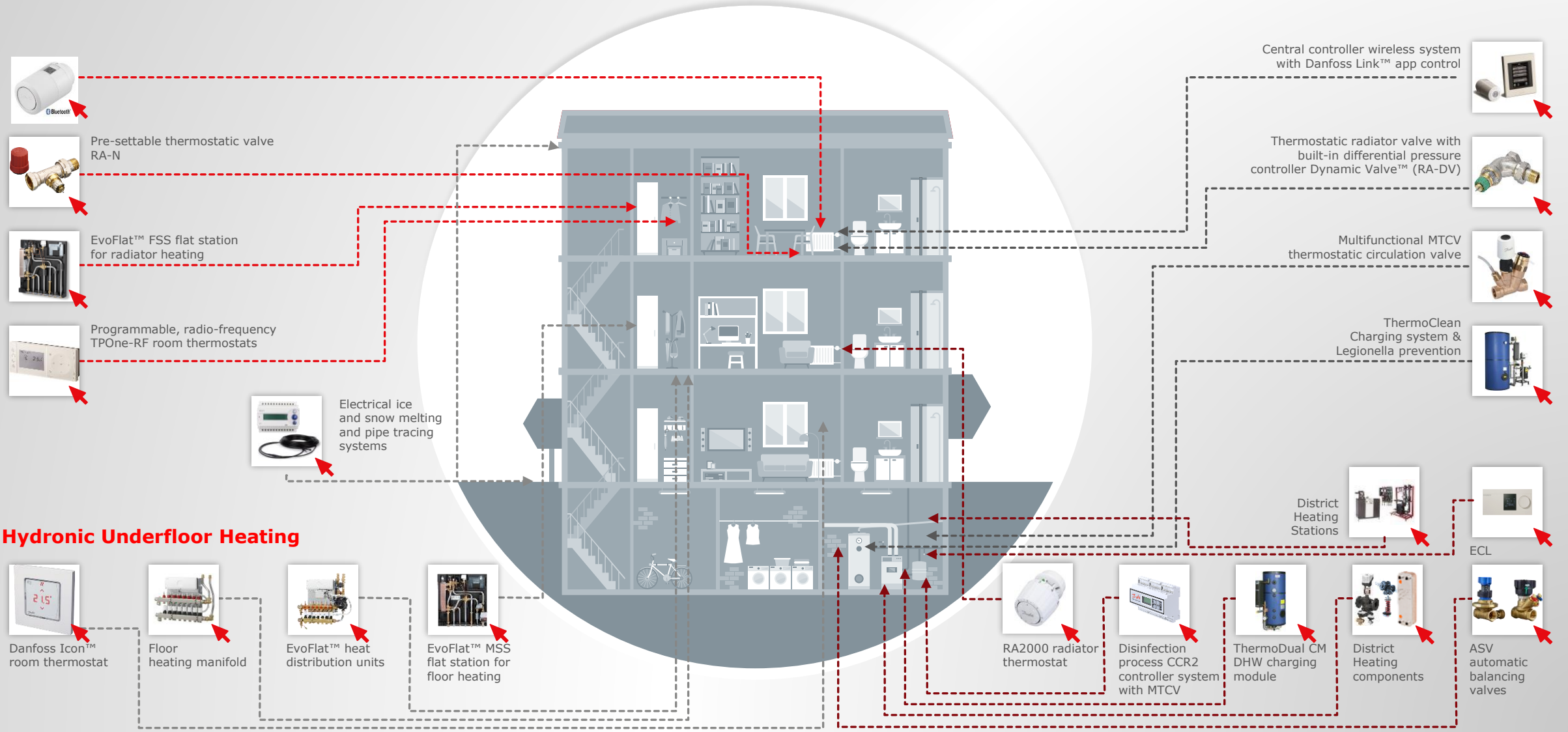


Danfoss acquires Jupiter floor heating



Launch of Danfoss Icon™ 230V room thermostats

# Danfoss offers a full solution for your multi family building



## Hydronic Underfloor Heating

## Danfoss Climate Solutions



**From 1<sup>st</sup> January 2021 Danfoss has changed its group structure to combine the Heating and Cooling segments into Danfoss Climate Solutions.**

For more than 80 years, Danfoss has been pushing the boundaries of climate and energy technologies. By combining our expertise and portfolio within heating and cooling into Danfoss Climate Solutions, we will be able to serve our customers even better.

With the increasing urbanisation and a global focus on the green transition, Danfoss Climate Solutions can provide the integrated energy-efficient heating and cooling solutions needed to meet the world's climate targets.

Building on our advanced components, systems and software using proven technology we engineer tomorrow's solutions for industry, the built environment and the entire food chain

# Products

- **Manifolds**
- **Thermal Actuators**
- **Pump Shunt**
- **Wired Controls**
- **Wireless Controls**
- **Electric Floor Heating / Plus snow melt**
- **Heat Exchangers**
- **AB-PM**



# Floor Heating Manifolds

Available in high quality stainless steel

Easy-to-use presetting on

- RA valve inserts
  - flow meters
- to control the design flow per loop

Hydronically balanced systems run with a higher energy efficiency and provide better comfort

Manifold variants up to 12 loops, with pre-installed air-vents and purge valves, both with and without flowmeters

Accessories available: mounting brackets, end-plugs, thermal actuators, connection pieces, air-vents etc.





# TWA Thermal Actuator

For easy control of your valves

- RA Connection for Danfoss valve
- M30x1,5 Fits most 3<sup>rd</sup> party valves

Travel time 3 mins  
Stroke length 3,8mm

NC version comes with red stopper to make the installation simple

230V NC/NO  
24V NC/NO,  
2 wire version  
4 wire version – with end switch

Fast easy installation,  
time proven quality



# Mixing shunt FHM-C1

## Temperature and advanced applications

Combined with Icon controls, advanced load compensation applications available

Max PN10  
Max 90°C flow T

Low-energy, variable speed pump

Built-in check valve, air-vent and a thermometer

Direct connection to manifold, orientation independent



# Controls for Underfloor Heating

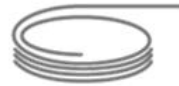
Find the fit based on your needs

## WIRELESS SOLUTIONS



### **Danfoss Icon Wireless / 24V »**

Designer room thermostats, App control, cooling and supply temperature control



## HARDWIRED SOLUTIONS



**230V  
Danfoss Icon™»**  
Designer room thermostats with multiple features.



**230V BasicPlus<sup>2</sup> »**  
Basic 230V room thermostats.



**24V FH-Wx»**  
No electrician needed (low voltage).

# 230V – FH-WC Wiring Centre

## Simple wiring

- 230v
- Output – 230v
- 8 zones
- Time channels for night set back – TS710
- Boiler interlock – Volt free
- Pump interlock – Volt free



Time switch (optional)

Thermostat

Thermal Actuator



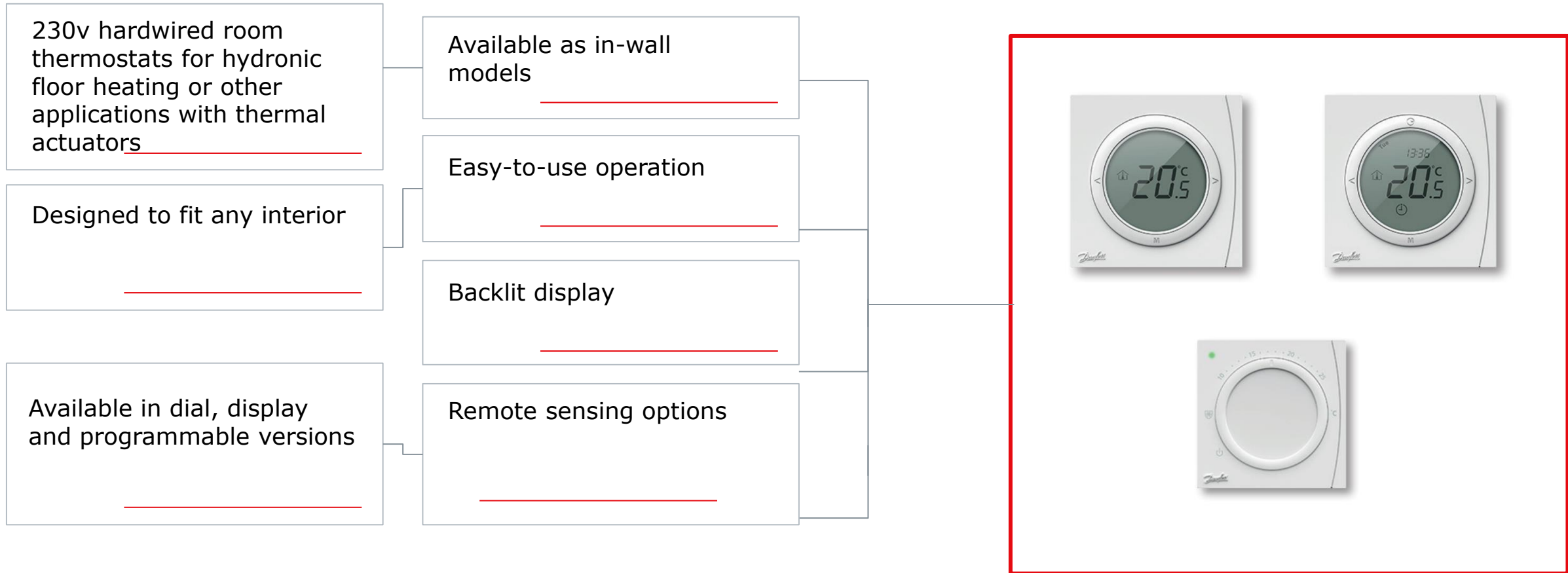
Pump

Boiler



# 230V - BasicPlus<sup>2</sup>

## Design wired controls for underfloor heating



# Design philosophy

We set out to create a product that is aesthetically pleasing but at the same time blends into the surroundings while offering a modern user interface.

The result is the **Danfoss Icon™** thermostats.

## Comfort control, made to blend in:

Designed to look like a light switch  
User interface that will fade out when not in use  
Touchscreen control with icon-based navigation  
Flush with the wall with a depth of only 11 mm (in-wall version)  
Available as both in-wall and on-wall  
Available in three versions: Dial, Display and Programmable

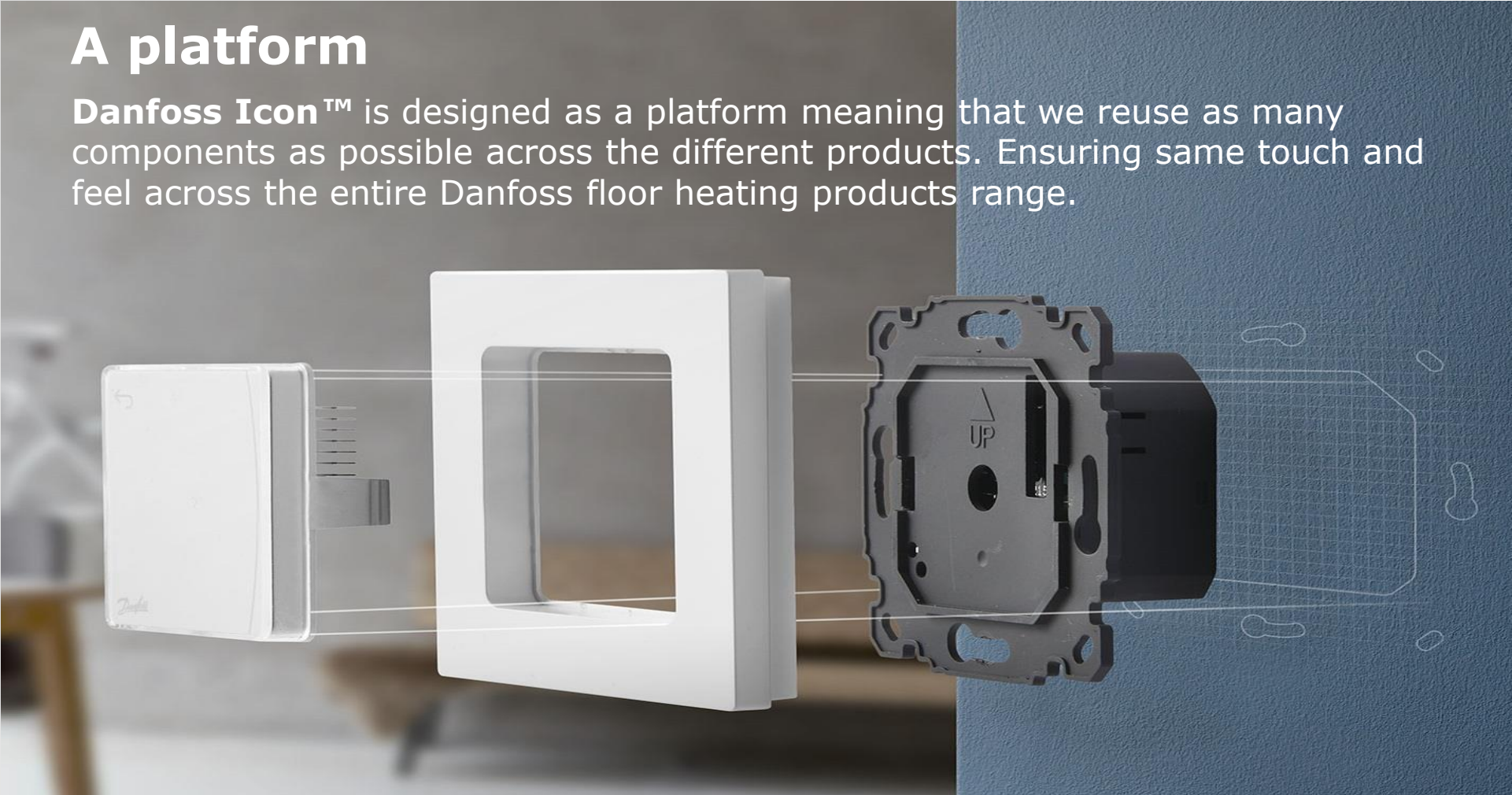
**>99%**

Screen is "off"  
>99% of time



## A platform

**Danfoss Icon™** is designed as a platform meaning that we reuse as many components as possible across the different products. Ensuring same touch and feel across the entire Danfoss floor heating products range.



# On-wall

**Front module**  
50x50mm.

Placed inside the frame  
once this is snapped  
onto the rear module.

**Wall frame**  
86x86mm.

Snap the frame  
onto the rear part.

**Rear module**

Mount the rear part on the wall  
or on top of a junction box and  
connect the wires to the  
terminal.





# 230V - Icon™ thermostats

Design wired controls for underfloor heating

230v hardwired room thermostats for hydronic floor heating or other applications with thermal actuators

Designed to look like a light switch and fit any interior

Available in dial, display and programmable versions

Available in on-wall and in-wall models

Easy-to-use touchscreen operation

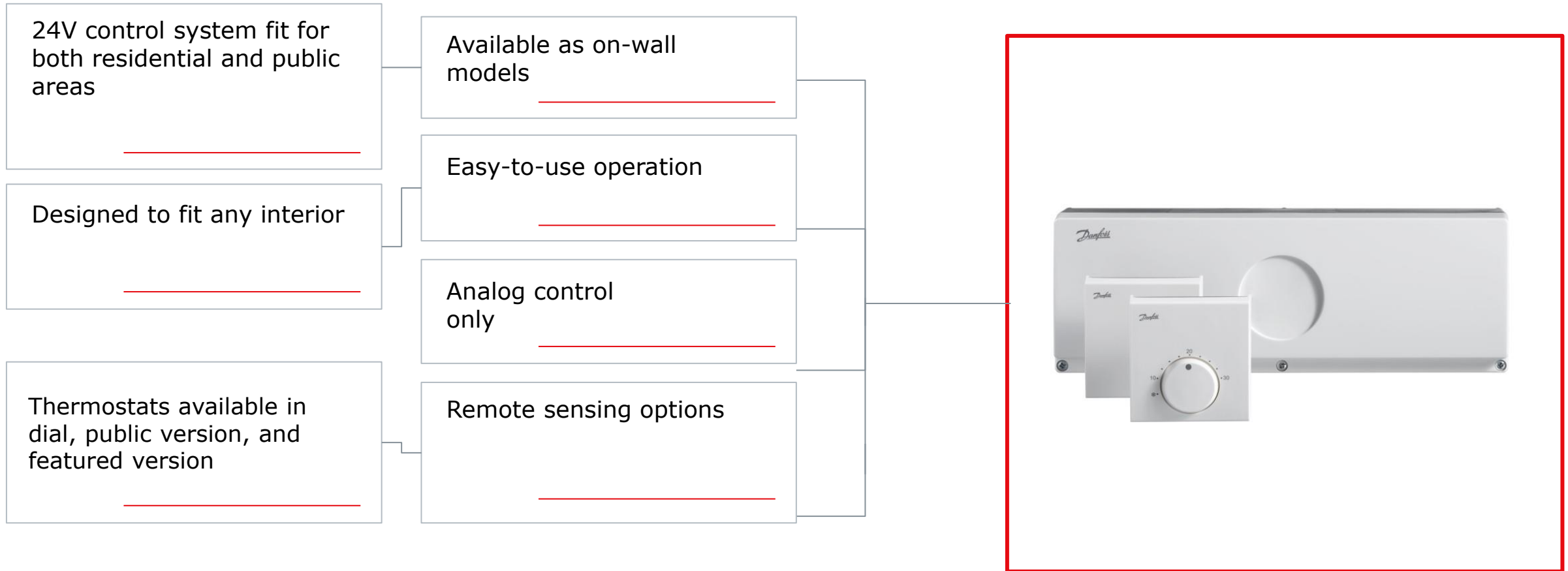
Display switches of when not used

Both for heating and simple cooling application



# 24V – FH-Wx thermostats and wiring center

Design wired controls for underfloor heating



# 24V - Icon™ Smart controls

Smart wired and wireless controls for underfloor heating

24V wired and wireless  
underfloor heating controls

Available in on-wall  
and in-wall models

Designed to look like a  
light switch and fit any  
interior

Easy-to-use  
touchscreen operation

Delivering user comfort with  
precise control and elegant  
design

Display switches  
off when not used

Dial and display version of  
room thermostat

App remote controllable with  
advanced system balancing  
feature



# Danfoss *Icon*™ 24V and wireless featured systems - overview

## Master Controller

With automatic balancing, active pump relay, boiler relay, commissioning test, PWM for accurate control, adaptive learning, and other advanced heating control options. Works with 24V and/or wireless room thermostats in the same system. Available with 10 and 15 outputs and can be extended with up to three masters in a system.

## Expansion Module

With ten pre-defined applications that can handle global away input, cooling input, dew point sensor, automatic cooling change-over and supply temperature control.

## 24V room thermostats

- In-wall or on-wall
- Noiseless switching
- Can be build into compatible switch frames (in-wall only)
- Temperature limitation
- Optional floor sensor (088U1110)

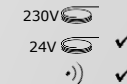
Wired bus communication either as star configuration or daisy chain.

## Radio Module

To establish wireless connection to wireless room thermostats.

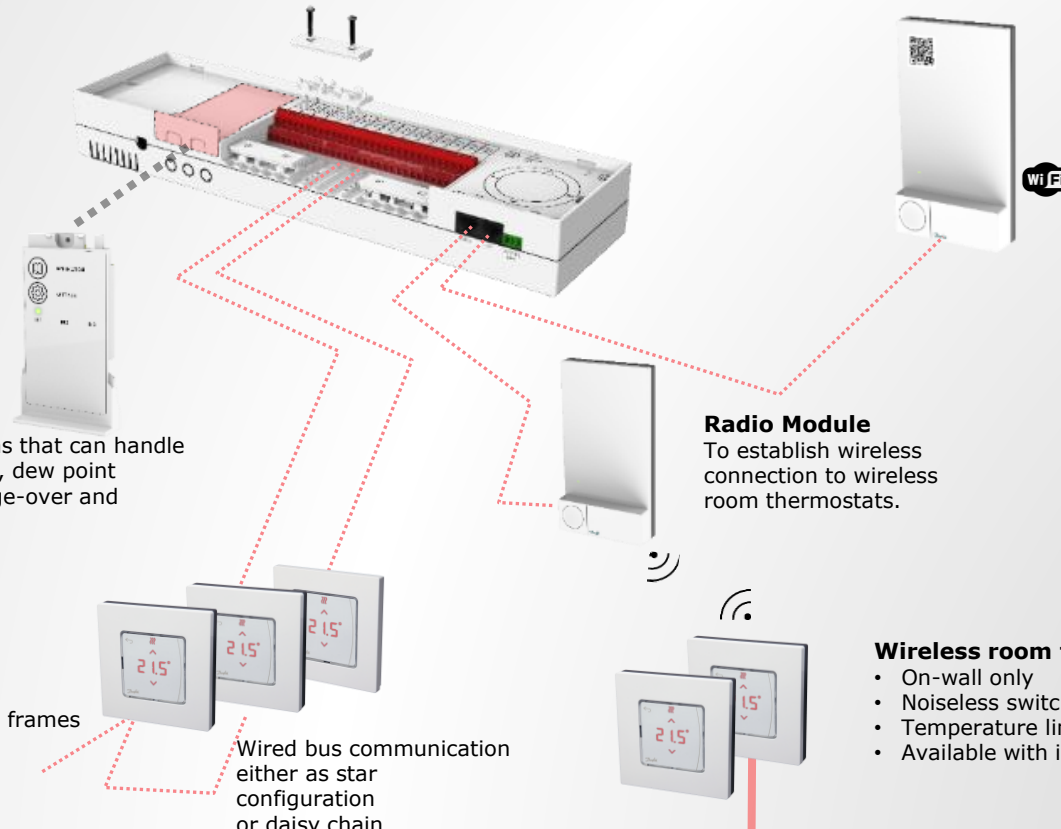
## Wireless room thermostats

- On-wall only
- Noiseless switching
- Temperature limitation
- Available with infrared floor sensor



## App Module

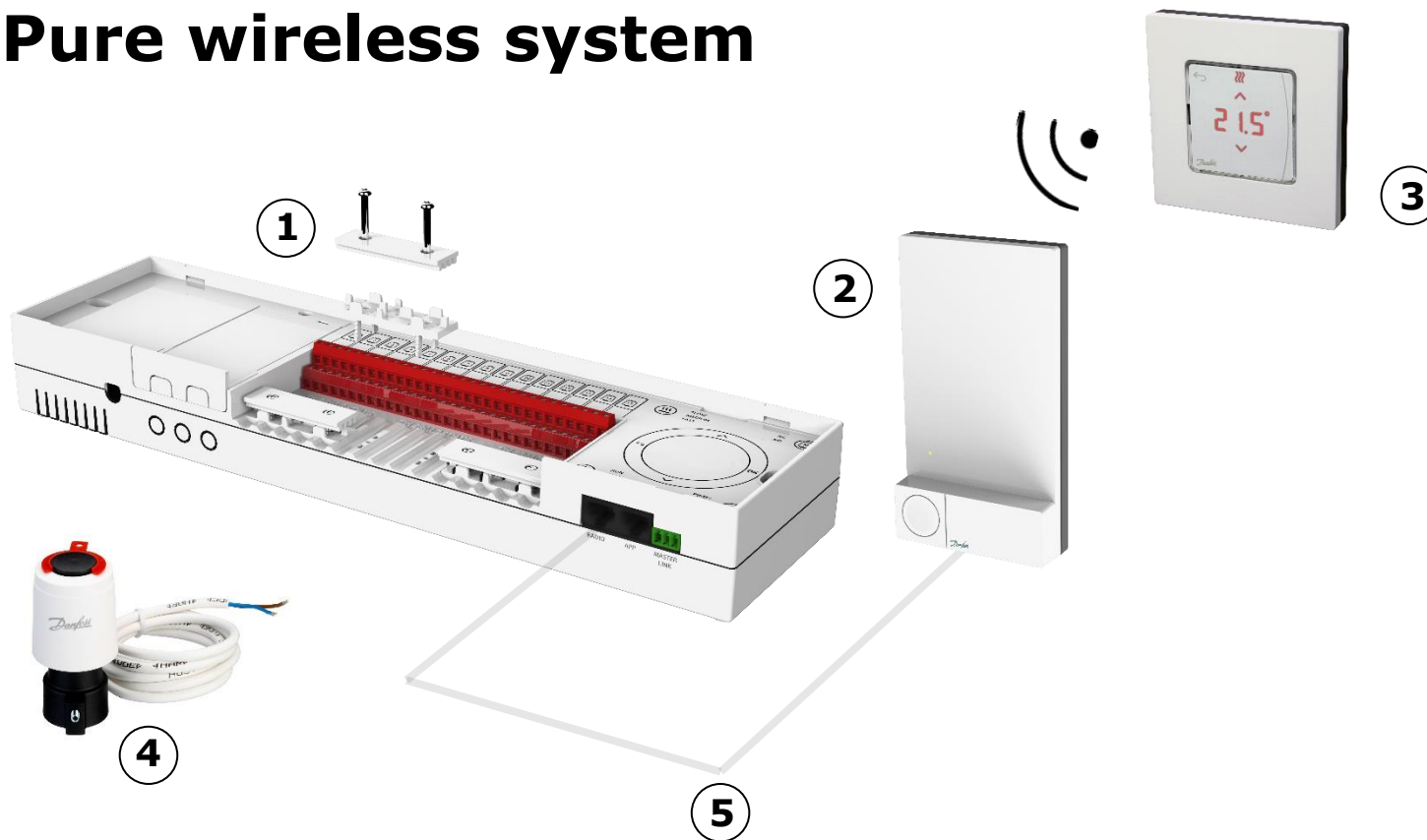
To establish Wi-Fi connection to the router which enables remote access via the Danfoss *Icon*™ App.





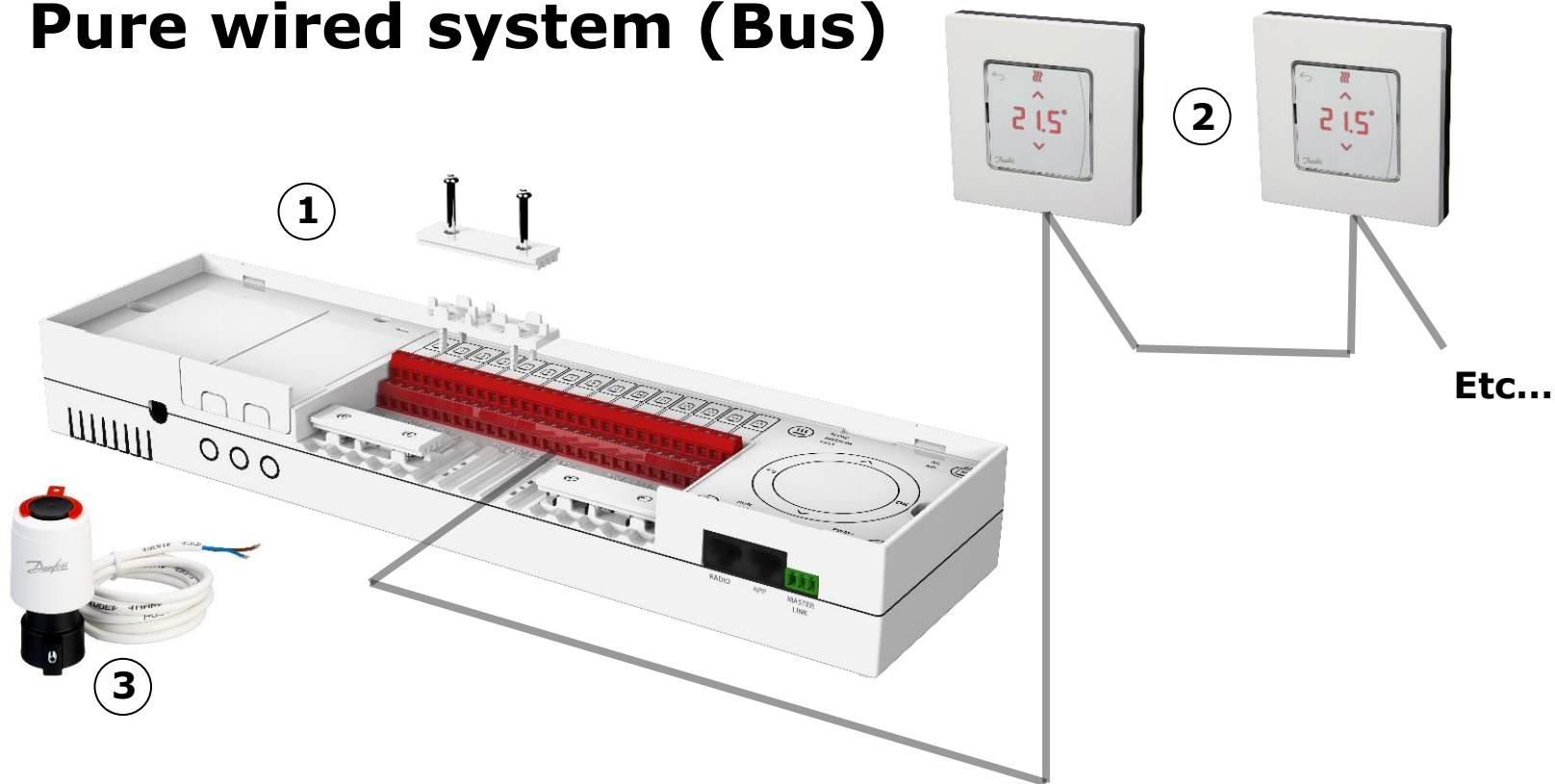
# Icon™ 24v

## Pure wireless system

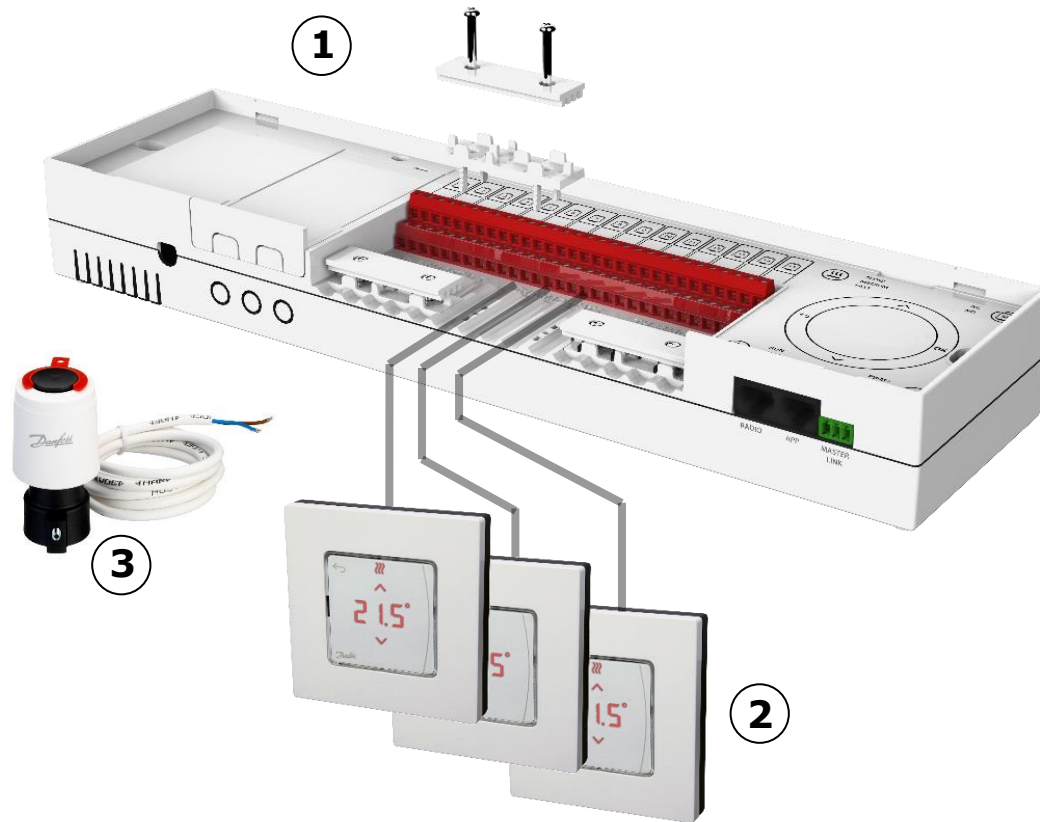


# Icon™ 24v

## Pure wired system (Bus)



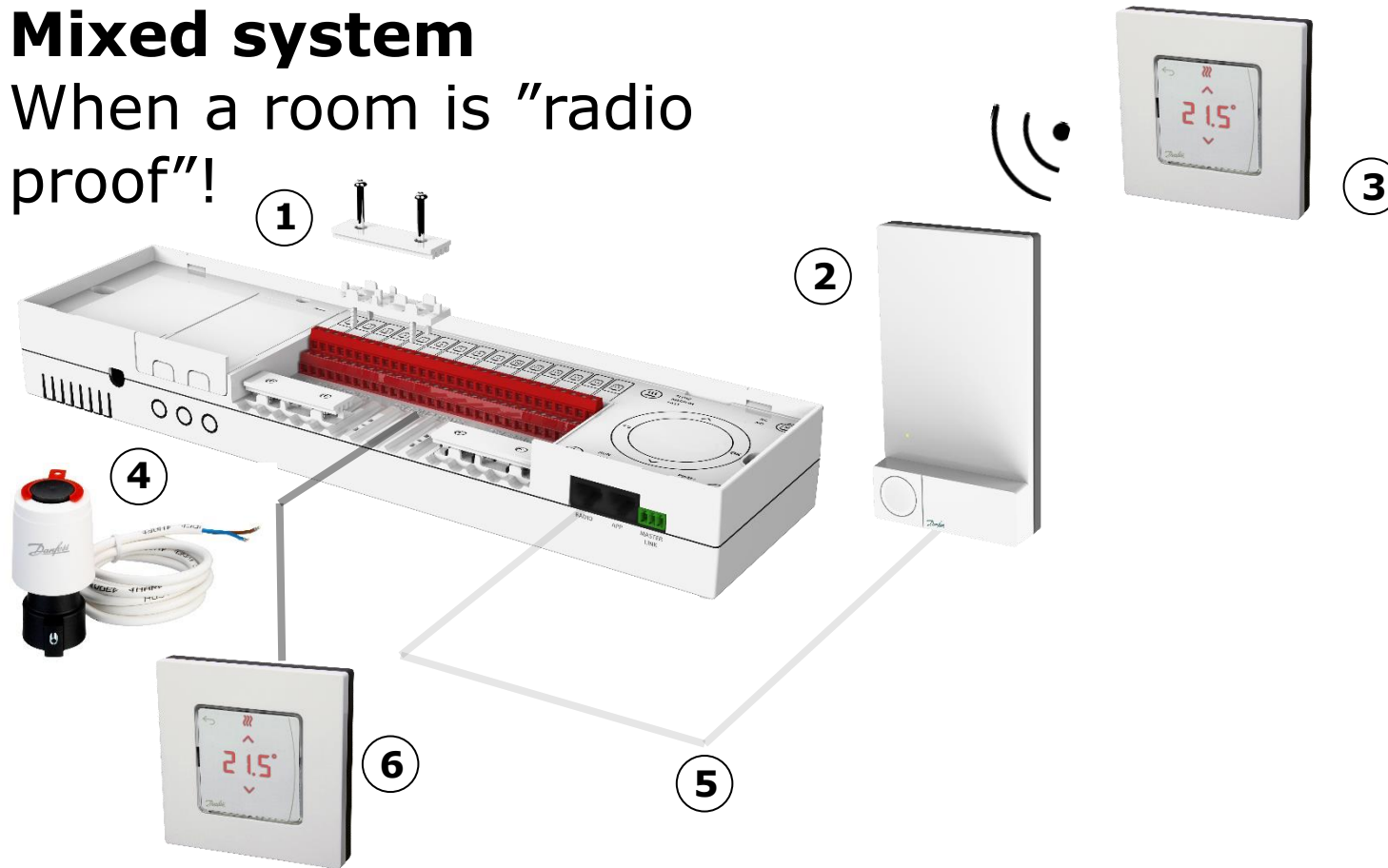
## Pure wired system (Star)



# Icon™ 24v

## Mixed system

When a room is "radio proof"!

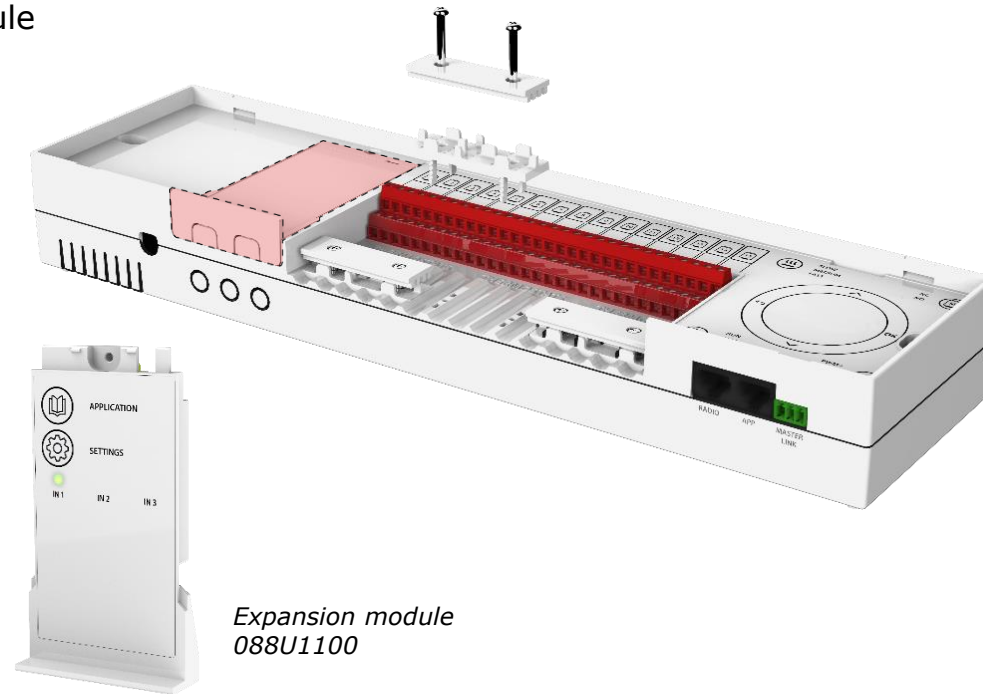
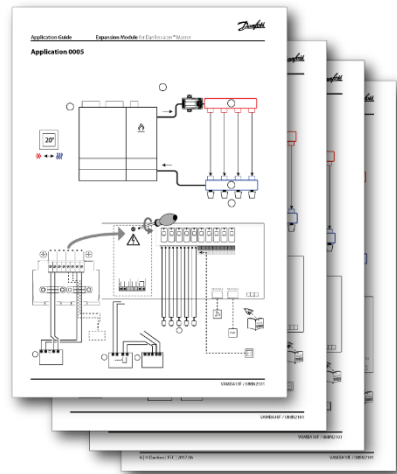




# Icon™ 24v

## Option (All): Expansion module

- Perform wiring on expansion module
- Slide into master controller
- Choose between 10 applications



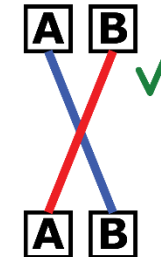
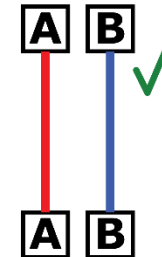
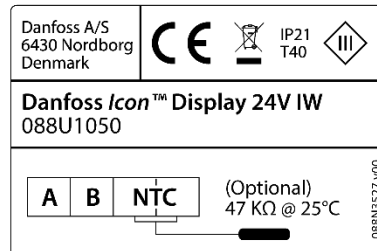
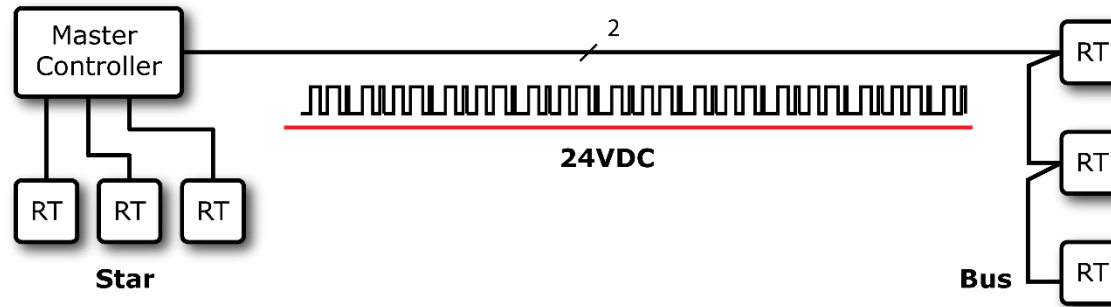
# Icon™ 24v

## Powerline communication (PLC)

- 24V thermostats connect to the master controller with just a 2-core cable. The cable supplies 24V DC and the communication is "overlaid" as a morse code.
- The PLC solution is polarity insensitive - it will work regardless how the installer connects the two ends of the wires – and can run on a wide range of wire types/cross sections.

### PLC

- **Flexible**
- **No Polarity issues**
- **Safe**
- **Foolproof**



# Icon™ 24v – Automatic Balancing

The procedure and the patent is based around a PWM controller, running in what we normally refer to as “spreading”. On top of this, the Auto balancing algorithm is implemented

It is possible via the master controller read out to see the actual average duty cycle per output. This feature can be used as a problem solver,

The automatic balancing feature is patented (patent granted in 2015)

The system requires approximatley 2 days to gather enough data, then the automatic balancing function is “up and running”.

## **Sales argumentation**

No need to balance the system, significant potential saving on commissioning

Self maintenance, always in play.









Updating older existing systems with full control upgrade will ensure the system is now fully optimised, this with app control will bring the oldest of UFH systems into the 21st century.

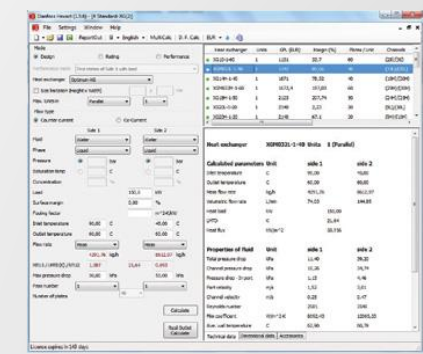
# Floor Heating Electric

World market leader in electric Heating systems. Also known under the brand DEVI, which was acquired in 2003, but has been producing electric heating since 1942 and ensured optimal indoor comfort and outdoor safety.



# Braised plate heat exchangers

Connection size: 3/4" - 2"							
							
<b>XB05</b>	<b>XB06</b>	<b>XBDW22</b>	<b>XB25</b>	<b>XB12</b>	<b>XB37</b>	<b>XB52</b>	<b>XB59</b>
312 x 76 [mm]	320 x 95 [mm]	376 x 119 [mm]	491 x 94,5 [mm]	288 x 118 [mm]	525 x 119 [mm]	466 x 256 [mm]	613 x 186 [mm]
3/4"	3/4"	3/4"	3/4"	1" & 5/4"	1"	2"	2"
M, X	H+, H, L	DW*	H	H, M, L	H, M, L	M	M
Cu	Cu; Cu+; StS	Cu	Cu	Cu	Cu; Cu+; StS	Cu	Cu
Cu 25 [bar] StS 10 [bar], X only	Cu, CoResist 25 [bar] StS 16 [bar]	Cu 16 [bar]	Cu 25 [bar]	Cu 25 [bar]	Cu, CoResist 25 [bar] StS 16 [bar]	Cu 25 [Bar]	Cu 25 [Bar]



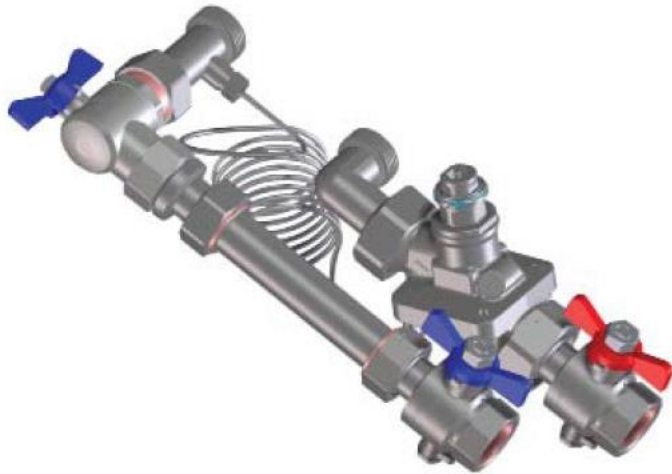
[www.hexact.danfoss.com](http://www.hexact.danfoss.com)



# Space heating

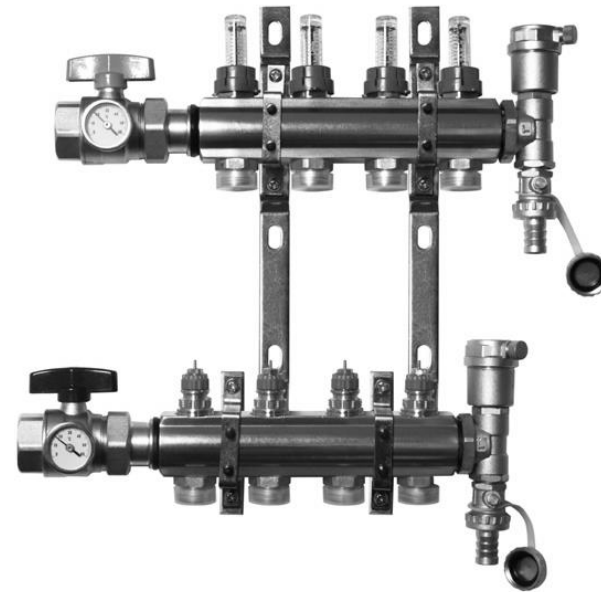
## AB-PM Connection set

- Optimized hydronic balance lowers costs
- Improved comfort
- Fast and easy installation
- Correct distribution@ partial loads
- Energy Saving
- Multi Functional Systems



## Floor Heating Manifold

- Control of flow in wet system
- Optional flow meter
- Electronic control by Temperature
- Remote sensor control
- Accessories options for shut off



# Information

## Web sources

- Product Store
- Icon site
- Danfoss.com

## E-learning

- Webinars
- Danfoss learning platform

## Tools

- Digital design center
- Danfoss quickplanner
- Installer app, for mobile devices

## Services

- Design support

# **Contacts & information**

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