ENGINEERING
TOMORROW

Product Guide

Hydronic floor heating
Easy, proven and **profitable**

Easy

selection saves time and increases your turnover.

heating.danfoss.com

+80 years

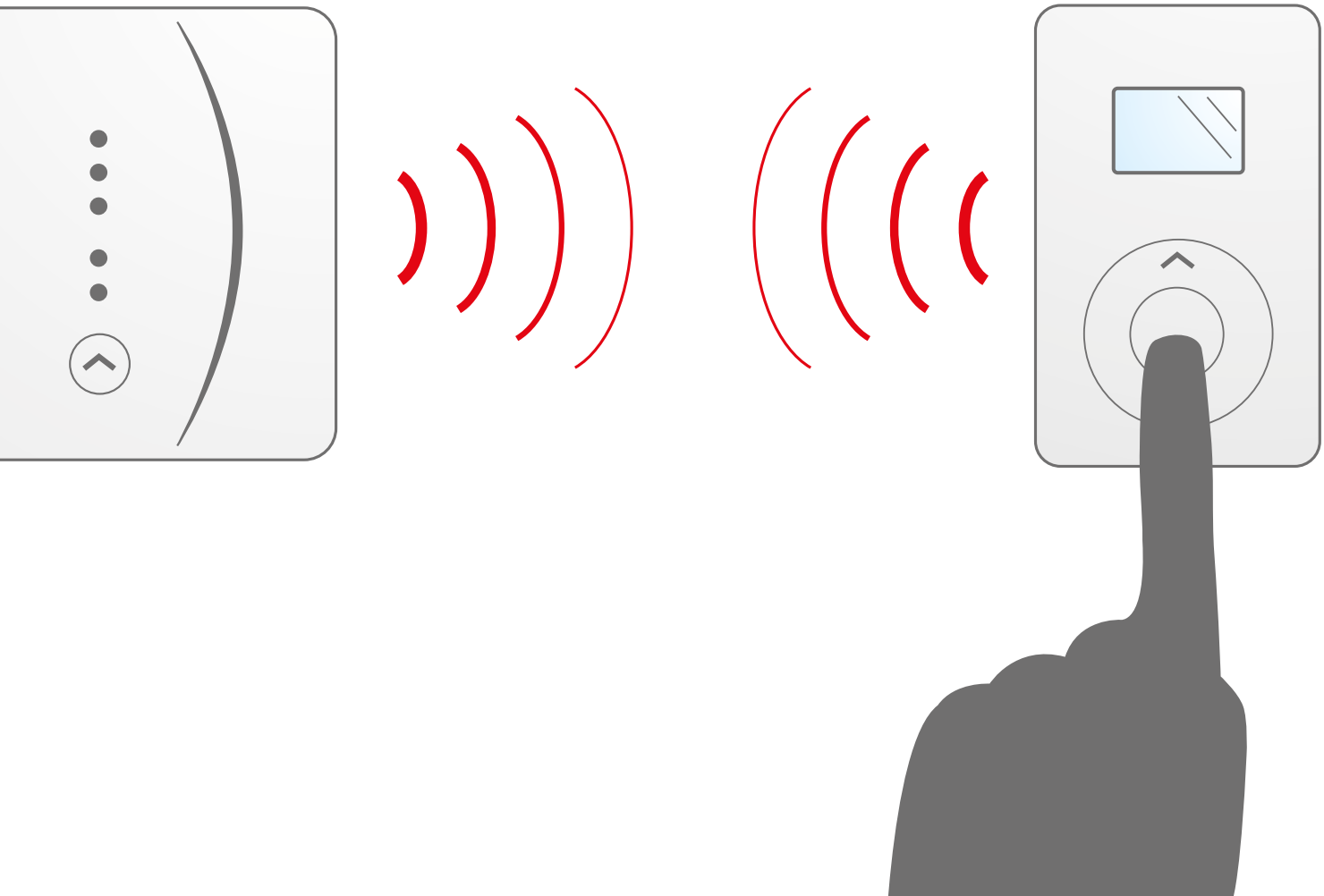
of experience with innovating heating control technology.

TEAM UP WITH THE INVENTOR

Being the first to introduce **wireless floor heating control** is only one part of our long life within comfort control.

Danfoss has been pioneering heating control systems for more than 80 years and we have 20 years of experience in advanced wireless solutions. Throughout the years, it has been our goal to simplify both installation and operation to ensure maximum end user value and energy savings.

Contents



The most advanced **test center**

In Vejle, Denmark we are testing floor heating in combination with other heat emitters and heat sources while simulating outdoor temperatures.

Thermal mass
(Cell 1, 2 and 4)
Houses around the world are constructed differently. Each room in the Test Center is therefore constructed with different materials and different thermal mass. The amount of thermal mass determines the heat absorbing ability of the room and thereby how fast the floor heating can heat up the room.

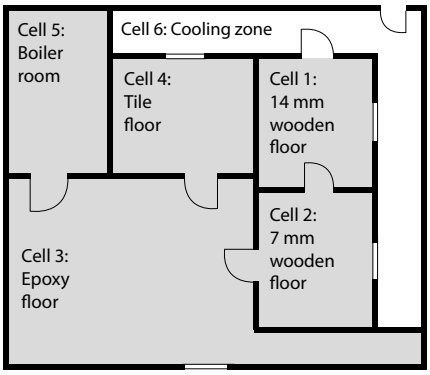
Outdoor temperature simulation
(Cell 6)
The test rooms are surrounded by a cooling zone. This enables the engineers to simulate different outdoor temperatures conditions and test how floor heating reacts under different conditions.

Floor heating reaction time
(Cell 1, 2 and 4)
Floor heating reacts slower than radiators. Temperature sensors are embedded in the concrete at multiple levels and vertically in the cell from floor surface to ceiling for every 0.5 m. This enables the engineers to register the reaction time of the floor heating system.

Impact on the entire system
(Cell 5)
The floor heating can be connected to different heat sources such as gas boilers and district energy stations. Also, multiple heat emitters (floor heating and radiator) in the same room can be tested. This enables the engineers to assess the impact of any change on the entire system and not just on the floor heating.

Thermal radiation
(Cell 1, 2 and 4)
A special sensor not only measures the air temperature but also the thermal radiation from e.g. windows when it is cold outside. Thermal radiation affects comfort, which means that an air temperature of 21 °C may not feel like 21 °C.

Multiple rooms for testing
(Cell 1, 2 and 4)
Most test facilities use only one room. The Danfoss test facility has three rooms. This enables the engineers to test in a multi-room-system approach that is similar to a normal house.



The Test Center enables the engineers to measure the performance of the heat control system in different building constructions without any uncontrolled disturbances.

From specification to after-sales service
We have you covered

Before...

- Danfoss can provide all necessary components for balancing the entire system and can advise you on the optimum solution
- Danfoss offers radiator, hydronic and electrical floor heating control and can advise you about the ideal heat emitter
- Danfoss can provide written system specifications to help you with the tendering process
- Danfoss offer specialist training to ensure optimum installation results

...during...

- If applications change during the project, we can advise on any necessary changes
- Danfoss can help you with your first installation, thereby minimizing the risk of mistakes
- Danfoss offer full technical support. Simply call us

...after installation

- With over 80 years of experience, you can rely on our ongoing support
- Danfoss offer cost-free help with balancing the floor heating system correctly
- During handover, we provide all relevant material, e.g. operating instructions. This minimizes call-backs

All products from one supplier ensures better systems and makes your life easier.

WE PROVIDE **CONTROL EXPERTISE**

Our advanced knowledge of **hydronic control** means that you get the best products on the market.

Our knowledge of hydronic control and balancing provides you with:

- Comfort in terms of accurate temperature control
- Comfort and energy savings due to easy and accurate balancing of the heating system

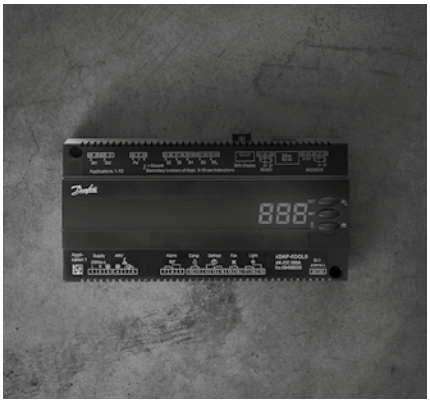
Hydronic Balancing Controls

District Heating Controls

Hydronic Floor Heating Controls

6 product areas

where hydronic control engineering results in comfort and energy saving products.



Heat Pump Controls

Radiator Controls

Cooling Controls

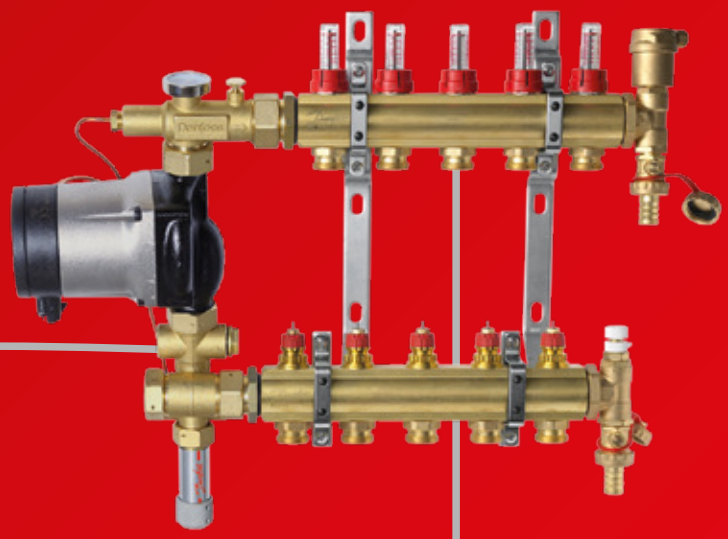
Flow control
for any application

Danfoss offers an extensive range of high-performance and versatile floor heating solutions for any type of application – from single rooms in private homes to office complexes or public buildings.

Whatever your project demands, we have the products and tools to make it happen and the service and logistics backup to ensure that you meet your deadlines and budget.

On the following pages, you will find an overview of some of our most popular systems and solutions. If you have any specific questions or queries, please feel free to get in touch.

District heating | **Solar heating** | **Heat pumps** | **Central heating** | **Biomass CHP**



Compact Mixing Shunt + FHF-F Manifold with flow indicators and unique presetting valves that ensure quick and easy hydronic balancing.

Room control
for any ambition

Danfoss Link wireless system

Danfoss Link can control floor heating, radiator thermostats, electric on/off relays and more. The controller has an intuitive touch screen and provides a single access point for all of your heating system. An agile and flexible solution that is also ideal for retrofit projects.

CF2+ wireless system

The Danfoss CF2+ is a unique floor heating control system for all heating and cooling applications – specially designed to reduce installation time. CF2+ offers advanced functionality for every need, e.g. four different thermostats, including the infrared floor sensor for optimal comfort, low energy optimizer function and more.

Hardwired systems

The FH-Wx is a standard hardwired system available as both 24V and 230V.

The BasicPlus (FH-CWx) and the uniquely designed BasicPlus² (WT-x) are available as 230V. They can be connected directly with an actuator or via a connection box.

Danfoss Link wireless system

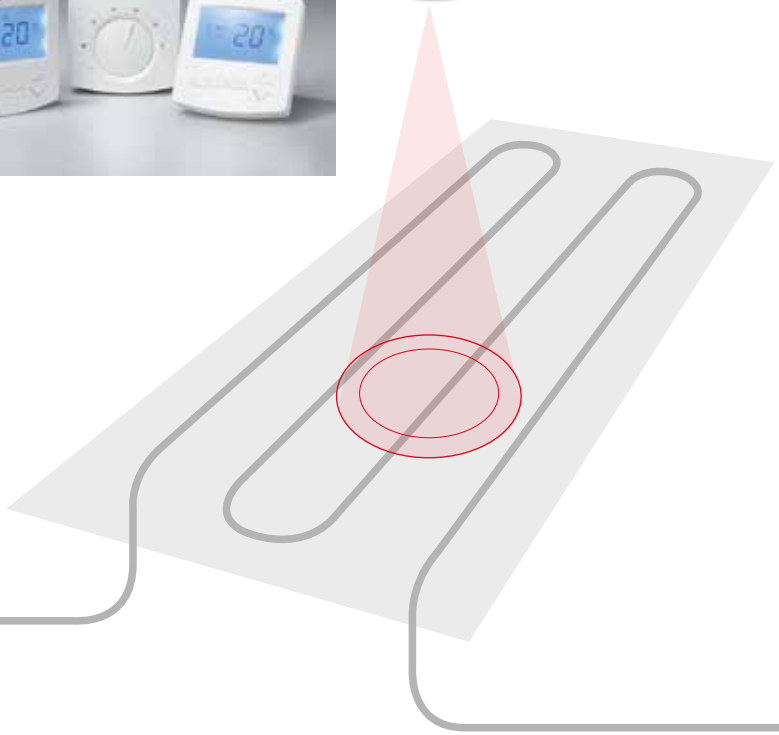
CF2+ wireless system

FH-Wx hardwired system

BasicPlus room thermostats

Enjoy the benefits of the CF2+ intelligent infrared floor sensor.

BasicPlus² room thermostats



The classic FHV

A well-proven solution for single room control with the original Danfoss thermostat.

ROOM
CONTROLS

Product highlight: *Danfoss Link*

Danfoss Link™ CC – intuitive touch screen and access point:

- Controls floor heating, radiators and electric on/off relays from a single central point
- Makes temperature scheduling easy. Save 5% energy for every degree the room temperature can be lowered
- Adaptive learning ensures the right temperature at the right time
- Put entire heating system in 'away', 'economy' or 'comfort' mode from a single central point
- Wireless for easy installation
- Very accurate control with e.g. PID-controlled *living connect®* for more comfort

TIP! Ask your customers if they are interested in a smart home solution.

Easy wireless temperature control from one access point – all around the house:

1. *Danfoss Link™* PR
   Plug-in relay for electric on/off control
2. *living connect®*
   Electronic radiator thermostat
3. *Danfoss Link™* RS
   Room sensor for radiator and floor heating control
4. *Danfoss Link™* HR
   Hidden relay for electric on/off control
5. *Danfoss Link™* HC
   Hydronic controller for floor heating
6. *Danfoss Link™* App
   Easy temperature control from your smartphone (cannot control *Danfoss Link™* PR /HR relays)

A simple
smart home solution

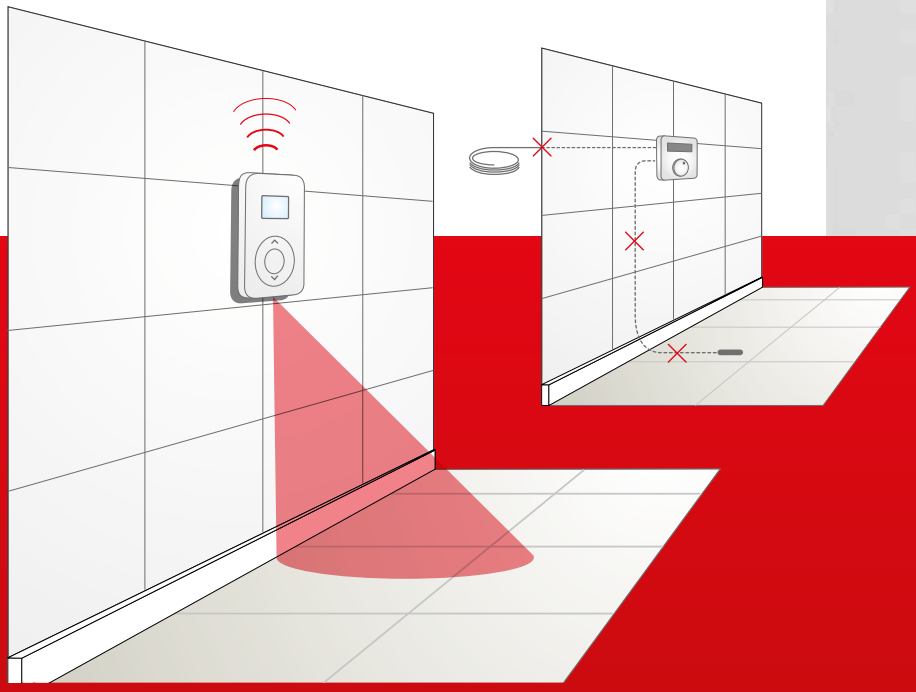
Product highlight: **CF2⁺ wireless floor heating system**

CF2⁺ offers easy installation and saves time:

- No need to plan embedding of wires in concrete and wall
- No need to involve an electrician
- Saves time as no wiring is necessary
- 2-way wireless communication link test ensures that you can confidently hand over a fully functioning system
- Can be used in cooling systems

TIP! Ask your customers if they would like to know more about increased comfort from using infrared temperature control.

Infrared floor sensor makes installation easy and provides accurate floor temperature.



Wireless infrared floor sensor CF-RF thermostat advantages:

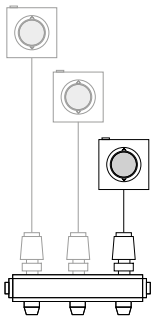
- Infrared can be installed any time – a floor sensor embedded in concrete cannot
- No wires from thermostat to floor
- Controlled on the basis of floor surface temperature for more accurate control (as opposed to sensor embedded in concrete)
- Perfect for tiles in e.g. bathrooms where comfortable floors are desired
- Max. temperature option for protection of valuable wooden or quarry-tiled floors
- Optional switch from floor surface temperature to room temperature control

Product highlight:
Hardwired WT-x BasicPlus² 230V

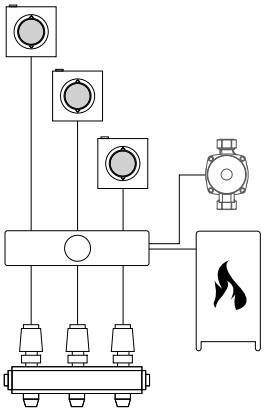
Scandinavian design with multiple features:

- Unique Scandinavian design
- Available with week scheduling
- Wired floor sensor with maximum temperature option for protection of valuable wooden or quarry-tiled floors
- Can be connected to the boiler or pump. This way the boiler or pump will switch off when there is no heat demand

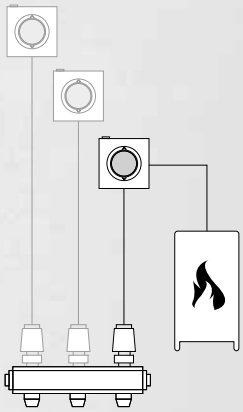
Room control
Direct



Room control
via connection box



Room control
incl. Auxiliary Switch



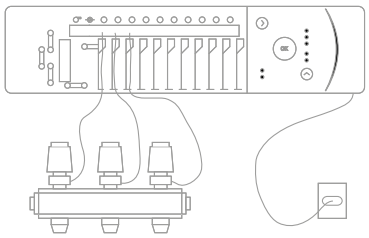
Push one button for energy savings:

- *Press "M" to activate away mode*
- *Save 5% energy for every degree you lower the room temperature*

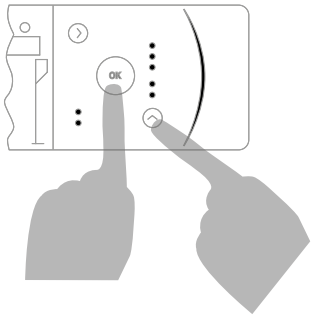
TIP! Ask your customers if they are interested in temperature setbacks that can save energy

WIRELESS INSTALLATION **REALLY IS SIMPLE**

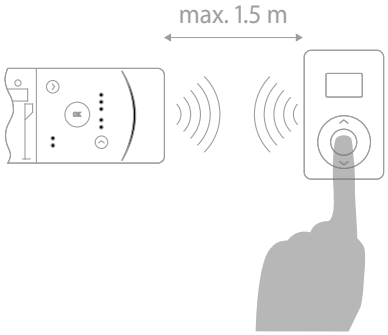
Installing **CF2+**



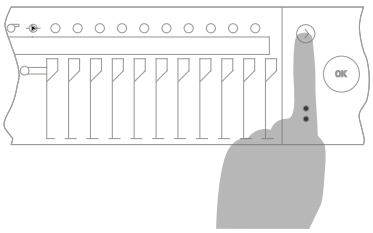
1.
When all actuators are connected, connect the CF-MC Master Controller to the main supply.



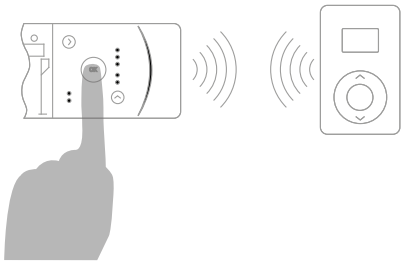
2.
1. Press ^ button and the Install LED flashes.
2. Press OK button and the Install LED lights up.



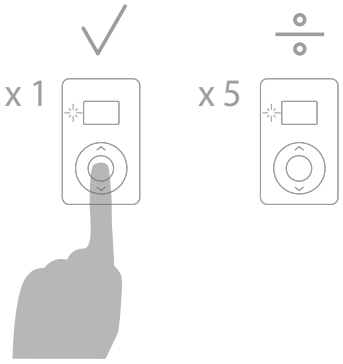
3.
Press center button of room thermostat once.



4.
First available output is flashing. Push > until you reach the desired output.

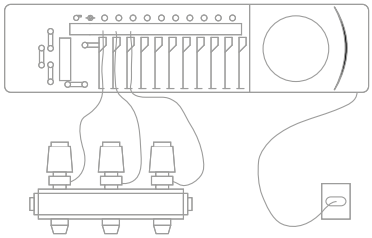


5.
Press OK button to add the room thermostat to CF-MC. Repeat the steps for each room thermostat you wish to add.

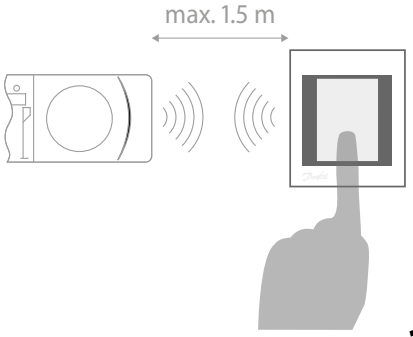


6.
Place the room thermostat in the room and press center button for link test.
LED flashes once: Link is established.
LED flashes 5 times: Link has failed.

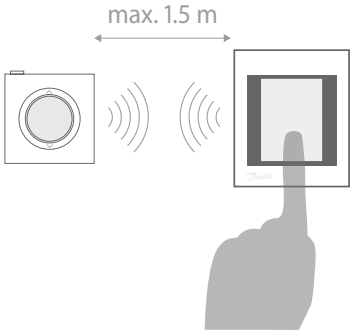
Installing ***Danfoss Link™ CC***



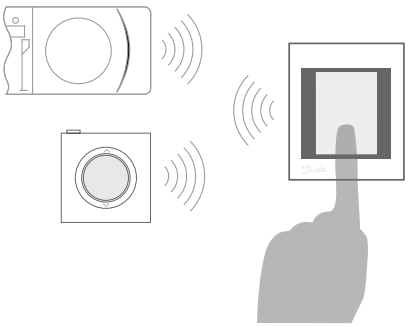
1.
When all actuators are connected, connect the *Danfoss Link™* HC *to* the main supply.



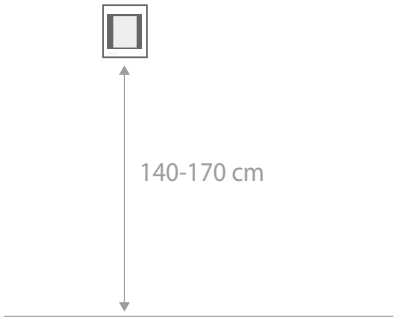
2.
Add the master controller to *Danfoss Link™ CC.*



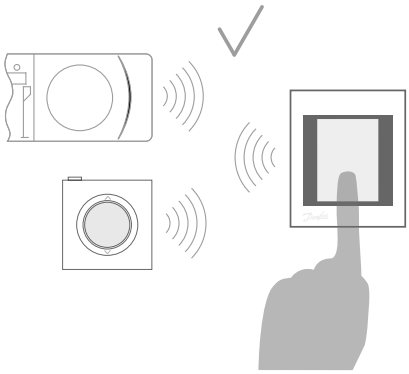
3.
Add the room thermostat to *Danfoss Link™ CC.*



4.
Pair the room thermostat with the output via *Danfoss Link™ CC.*



5.
Install the *Danfoss Link™ CC* in its final position.



6.
Perform a network test via *Danfoss Link™ CC.*

Selling system controls
is good for your business and provides comfort and savings for your customers

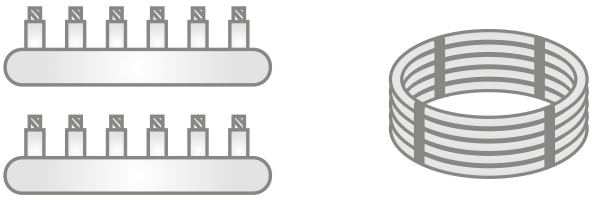
Danfoss control solutions makes it easier for you to boost your business.

The example below is for a home where six room controls are needed.

In both cases, the manifold is a FHF and pipes are PE-RT. Room controls are CF2+ wireless system with room thermostat CF-RS.

TIP! Inform your customers about the comfort and energy saving benefits from using room controls.

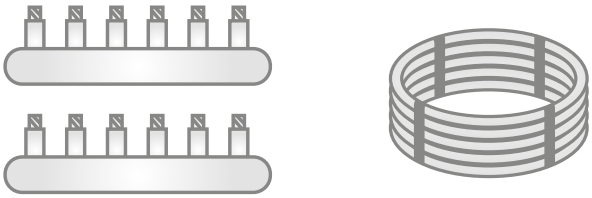
Typical installation **without** controls

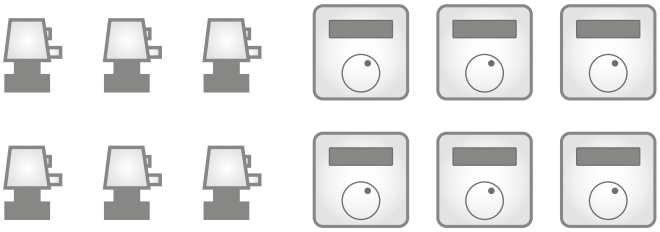


Turnover **INDEX ~40**

Typical installation **with** controls

Turnover **INDEX ~100**





Double your turnover and provide comfort and energy savings for your customers.


Danfoss
21.0°C

ROOM CONTROLS
WHAT TO CONSIDER

1.

BUILDING SIZE

Is the house or individual apartment larger than 300 m²? (Wireless range)

NO

YES

CHOOSE
HARDWIRED

2.

FLEXIBILITY

Are short installation time and flexibility of placing thermostat important?

NO

YES

CHOOSE
WIRELESS

3.

COOLING

Will floor heating system be used for floor cooling?

NO

YES

CHOOSE
WIRELESS
CF2+

WIRELESS SOLUTIONS

Danfoss Link »

The full "Smart house" solution. Use the intuitive touch screen to control both radiators and floor heating. NB: no floor sensor or cooling option is available.

CF2+ »

The simple, state-of-the-art floor heating system, with the option of choosing infrared floor sensor and cooling.

4.

BATTERIES

Is it ok that batteries need to be changed every 2 years?

NO

YES

CHOOSE
WIRELESS

5.

MILLING

Can wiring be established in a satisfactory way (milling and drilling in the wall)

YES

CHOOSE
HARDWIRED

NO

CHOOSE
WIRELESS

HARDWIRED SOLUTIONS

FH-CWx 230V (BasicPlus) »
The price-optimized choice for weekly scheduling.

WT-x 230V (BasicPlus²) »
Design thermostats with weekly scheduling and boiler switch.

FH-Wx 24V »
No electrician needed (low voltage). However also available as 230V.

ROOM CONTROLS
OVERVIEW

	Control solutions	Master controller	Pump relay	Input relay for external signal	Boiler relay
Wireless	CF2+	Required	✓ [7]	✓	✓ [7]
	Danfoss Link	Required	✓	✓	✓ [7]
Hardwired	FH-Wx 24V	Required	✓	n.a.	✓
	FH-Wx 230V	Optional	✓ [5]	n.a.	✓ [5]
	FH-CWx 230V	Optional	✓ [5]	n.a.	✓ [5]
	WT-x	Optional	✓ [8]	n.a.	✓ [8]
Self-acting thermostatic	FHV [9]	n.a.	n.a.	n.a.	n.a.

[1] Radiator thermostats and floor heating controlled via the same controller (*Danfoss Link™CC*)
[2] Requires remote controller 088U0221
[3] Requires separate scheduling on each room thermostat – i.e. no central controller for easy scheduling
[4] Combined with dew point sensor 088U0251 for moist prevention
[5] Requires connection box 088H0016
[6] Hardwired (as opposed to CF2+ which is infrared)
[7] Also available as wireless relay (014G0272 for *Danfoss Link* and 088U0252 for CF2+)
[8] 088U0624 and 088U0626 both have one output for either boiler or pump. Add connection box 088H0016 for more relays.
[9] FHV-A (003L1001) for RA thermostatic room sensor (sensor not included) and FHV-R (003L1000 and 003L1015) for FVJR return temperature sensor (FVJR sensor not included).

Danfoss Link wireless system

CF2+ system

The classic FHV

Central control interface	Radiator thermostat compatible [1]	Week schedule option	Adaptive learning	Floor sensor option	Output voltage	Optimized for cooling application
Optional [2]		(✓) [2]	✓	✓	24V	✓ [4]
Required	✓	✓	✓		24V	n.a.
n.a.		n.a.	n.a.	✓ [6]	24V	n.a.
n.a.		n.a.	n.a.	n.a.	230V	n.a.
n.a.		(✓) [3]	n.a.	✓ [6]	230V	n.a.
n.a.		(✓) [3]	n.a.	✓ [6]	230V	n.a.
n.a.		n.a.	n.a.		–	n.a.

BasicPlus
FH-CWx hardwired system

BasicPlus[2]
WT-x hardwired system

FH-Wx hardwired system

CF2+ WIRELESS

Master Controller
CF-MC 5 channels: 088U0245
CF-MC 10 channels: 088U0240

Master controllers	Code no.
Master Controller, CF-MC 5 channels	088U0245
Master Controller, CF-MC 10 channels	088U0240

CF-RD
With display
088U0214

CF-RS
With dial
088U0210

CF-RF
Display and infrared
088U0215

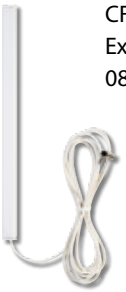
CF-RP
Tamper proof
088U0211

CF2+, Room thermostats	Code no.
Room thermostat, CF-RS	088U0210
Room thermostat, CF-RP	088U0211
Room thermostat, CF-RD	088U0214
Room thermostat, CF-RF	088U0215

CF-RC
Remote Controller
088U0221

CF-RU
Repeater Unit
088U0230

TWA-A, NC 24V
Thermal Actuator
088H3110



CF-EA
External Antenna
088U0250

Accessories	Code no.
Remote Controller, CF-RC	088U0221
Repeater Unit, CF-RU	088U0230
External Antenna, CF-EA	088U0250
Cable for CF-EA	088U0255
Dew Point Sensor, CF-DS	088U0251
Wireless Relay, CF-WR	088U0252
Thermal Actuator, TWA-A, NC 24V	088H3110
Thermal Actuator, TWA-A, NO 24V	088H3111
Thermal Actuator, TWA-K, NC 24V	088H3140
Thermal Actuator, TWA-K, NO 24V	088H3141

ROOM CONTROLS

Features					
Pump relay	Input relay for external signal	Boiler relay	Input relay for heating/cooling	Adaptive learning	Week schedule option (via CF-RC)
✓	✓	✓	✓	✓	✓
✓	✓	✓	✓	✓	✓

Features					
Temperature limitation	Display	Dial	Floor sensor, infrared	Flush mounted	Wall mounted
✓		✓			✓
✓*		✓			✓
✓	✓				✓
✓	✓		✓		✓

*Tamperproof

Description
For central control incl. scheduling
To extend wireless signal range
To extend wireless signal range. Incl. 2 meter cable
Extension cable, 5 meters
To prevent condensation in cooling application. Mounted on manifold
Connected to boiler, pump or chiller. Receives wireless signal from CF-MC when there is a cooling need. CF-RC required
RA manifold connection. Connect wire to master controller
RA manifold connection. Connect wire to master controller
M30×1.5 manifold connection. Connect wire to master controller
M30×1.5 manifold connection. Connect wire to hydronic controller

Danfoss Link™ CC wireless

Hydronic Controller
HC, 5 channels: 014G0103
HC, 10 channels: 014G0100

Room Thermostat, RS
014G0158

CF-RU
Repeater unit
088U0230

Danfoss Link™ CC

With NSU
014G0287 /
014G0289

With PSU
014G0286 /
014G0288

TWA-A, NC 24V
Thermal Actuator
088H3110

CF-EA
External
Antenna
088U0250

Wireless relay, PR
014G0270

Radiator thermostat
014G0001 /
014G0002

Hidden relay, HR
014G0271

Wireless relay, FT
014G0272

Master controllers	
Hydronic Controller, HC , 5 channels	014G0103
Hydronic Controller, HC, 10 channels	014G0100

Note: All products require *Danfoss Link™ CC* (Central Controller)

Room thermostats	Code no.
Room thermostat, RS	014G0158

Note: All products require *Danfoss Link™ CC* (Central Controller)

Accessories	Code no.
Central Controller, *Danfoss Link™ CC*	014G0287 / 014G0289
Central Controller, *Danfoss Link™ CC*	014G0286 / 014G0288
Repeater Unit, CF-RU	088U0230
External Antenna, CF-EA	088U0250
Cable for CF-EA	088U0255
Thermal Actuator, TWA-A, NC 24V	088H3110
Thermal Actuator, TWA-A, NO 24V	088H3111
Thermal Actuator, TWA-K, NC 24V	088H3140
Thermal Actuator, TWA-K, NO 24V	088H3141

Other products...	
Wireless relay, PR (Plug-in Relay)	014G0270
Wireless relay, HR (Hidden Relay)	014G0271
Wireless relay, FT (Floor Thermostat)	014G0272
Radiator thermostat, *living connect®*	014G0001
Radiator thermostat, *living connect®*	014G0002

ROOM CONTROLS

Features				
Pump relay	Input relay for external signal	Boiler relay	Adaptive learning	Week schedule (via *Danfoss Link™ CC*)
✓	✓	✓	✓	✓
✓	✓	✓	✓	✓

Features				Flush mounted	Wall mounted
Temperature limitation	Display	Radiator thermostat compatible	Floor sensor		
✓	✓	✓			✓

Description
Controller with user friendly screen. With NSU (wall mounted). Required
Controller with user friendly screen. With PSU (flush-mounted). Required
To extend wireless signal range
To extend wireless signal range . Incl. 2 meter cable
Extension cable, 5 meters
RA manifold connection. Connect wire to hydronic controller
RA manifold connection. Connect wire to hydronic controller
M30×1.5 manifold connection. Connect wire to hydronic controller
M30×1.5 manifold connection. Connect wire to hydronic controller

...that can be controlled by *Danfoss Link™ CC*
Plug-in on/off relay
Hidden on/off relay
For on/off temperature control of electric heating. Can be connected with floor sensor (included) or room thermostat RS
With RA adapter
With RA + K (M30x1.5) adapter

HARDWIRED

FH-WT
Room thermostat
088H0022

FH-WP
Room thermostat
088H0023

FH-WS
Room thermostat
088H0024

FH-Wx – 24V room controls	Code no.
Room thermostat, FH-WT	088H0022
Room thermostat, FH-WP	088H0023
Room thermostat, FH-WS	088H0024

All 24V room controls require FH-WC 24V 088H0017 connection box to operate

FH-CWT
Room thermostat
088U0601

FH-CWD
Room thermostat
088U0602

FH-CWP
Room thermostat
088U0603

FH-CWx BasicPlus – 230V room controls	Code no.
Room thermostat, FH-CWT	088U0601
Room thermostat, FH-CWD	088U0602
Room thermostat, FH-CWP	088U0603

WT-D/DR
Room thermostat
088U0622 /
088U0624

WT-T
Room thermostat
088U0620

WT-P/PR
Room thermostat
088U0625 /
088U0626

WT-x BasicPlus² – 230V room controls	Code no.
Room thermostat, WT-T	088U0620
Room thermostat, WT-D	088U0622
Room thermostat, WT-DR *	088U0624
Room thermostat, WT-P	088U0625
Room thermostat, WT-PR *	088U0626

* Requires an inner socket box size of minimum 46.2 x 62.3 mm (WxH)

Master Controller:
FH-WC 24V – 10 outputs
088H0017
FH-WC 230V – 8 outputs
088H0016

Connection Boxes	Code no.
Master Controller, FH-WC 24V – 10 outputs	088H0017
Master Controller, FH-WC 230V – 8 outputs *	088H0016

* Note! If a Normally Open (NO) actuator is connected, the pump or boiler relay cannot be used as the relay function is inverted.

Thermal Actuator
088H3110 - 088H3113
088H3140 - 088H3143

FH-WF
Floor sensor
088H0025

Accessories – for hardwired solutions	Code no.
Thermal actuators for 24V	088H3110 (NC) + 088H3111 (NO)
Thermal actuators for 230V	088H3112 (NC) + 088H3113 (NO)
Thermal actuators for 24V	088H3140 (NC) + 088H3141 (NO)
Thermal actuators for 230V	088H3142 (NC) + 088H3143 (NO)
Floor sensor, for FH-Wx – 24V	088H0025
Floor sensor, for FH-CWx and WT-x	088U0610

ROOM CONTROLS

	Temperature limitation	Display	Dial	*Floor sensor, hardwired option	Temperature set-back button	Soundless (no relay/bi-metal)	Flush mounted	Wall mounted
	✓		✓			✓		✓
	✓*		✓			✓		✓
	✓		✓	✓	✓	✓		✓

* Tamperproof

* See accessories

	Temperature limitation	Display	Dial	* Floor sensor, hardwired option	Week schedule option (per room)	Flush mounted	Wall mounted
			✓				✓
	✓	✓		✓		✓	
	✓	✓		✓	✓	✓	

* See accessories

	Temperature limitation	Display	Dial	Floor sensor, hardwired option	Week schedule option (per room)	Temperature set-back button	*Auxiliary switch	Flush mounted	Wall mounted
			✓						✓
	✓	✓		✓		✓		✓	
	✓	✓		✓		✓	✓	✓	
	✓	✓		✓	✓	✓		✓	
	✓	✓		✓	✓	✓	✓	✓	

* Boiler/pump on/off

Features				Description
Pump relay	Cooling	Standby relay	Boiler relay	
✓			✓	Required for all 24V room controls
✓			✓	230V controls can be connected directly to connection box

For system		Features
230V	24V	
	✓	RA manifold connection. Connected via connection box 088H0017
✓		RA manifold connection. Connected directly with 230V room thermostats or conn. box 088H0016
	✓	M30 manifold connection. Connected via connection box 088H0017
✓		M30 manifold connection. Connected directly with 230V room thermostats or conn. box 088H0016
	✓	For setting either minimum or maximum floor temperature
✓		FH-CWx: For setting max. floor temperature. WT-x: For setting min., max. or fixed floor temperature.

MANIFOLDS AND MIXING SHUNTS

MEET THE FAMILY

Combine a **mixing shunt** → … with the **ball valves**

Mixing shunt

Mounting the mixing shunt is extremely easy, as it is very compact from only 110 mm in installation dimension. The mixing shunt is mounted directly on the manifold on either the left or right-hand side, it can also be angle mounted with angle fittings as accessories.

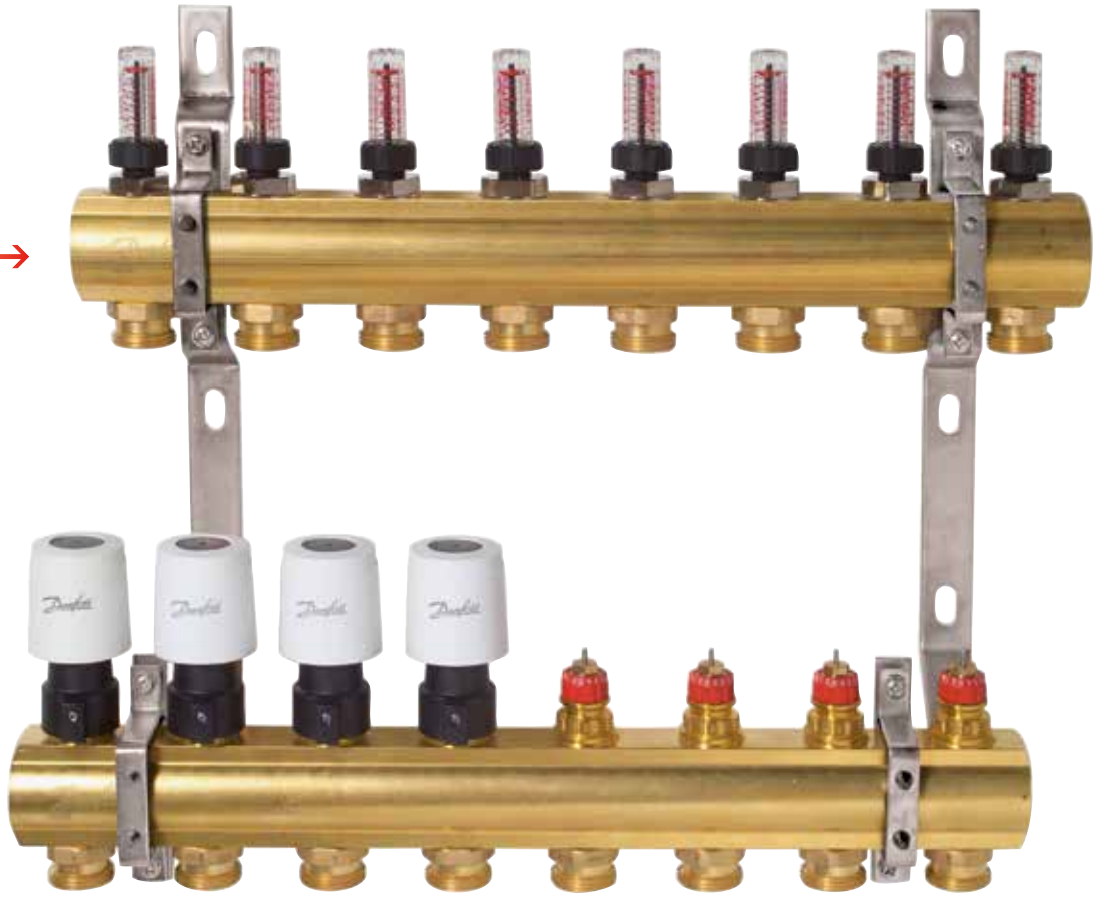
Product highlights:

- Prefabricated for quick and easy mounting
- Very compact - fits into cabinets
- Capillary tube which measures the temperature directly in the water instead of the temperature on the pipe

MANIFOLDS AND MIXING SHUNTS

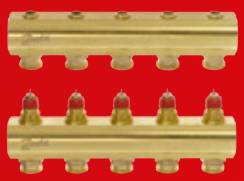
… then the **manifolds**

and then an **air vent type**



FHF

With pre-setting but without flow meter. FHF with flow meter (FHF-F) is shown on the above picture.



FH-ME (BasicPlus)

No flow meter and no pre-setting.

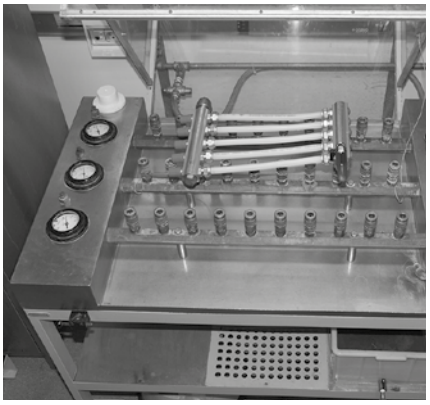
SSM-F

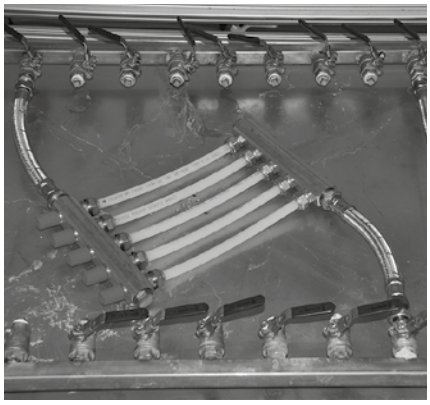
With pre-setting and flow meter.

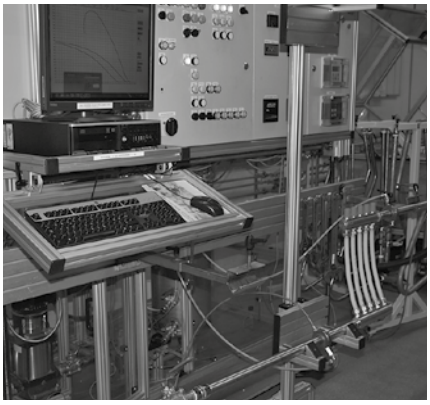
TESTED TO LAST FOR DECADES

We have minimized failure rates so you can maximize your business.

During production and development, all components are subjected to various tests to maximize their efficiency and working life.







Pressure test

In a pressure test, the manifolds, fittings and pipes are assembled and placed under pressure. In this way, the manifold, fittings and pipes can be tested to withstand even unrealistic pressures.

Temperature test

In a temperature test, the floor heating system is exposed to different heat levels. These variations make the components expand and contract, allowing us to test the sustainability of the different components.

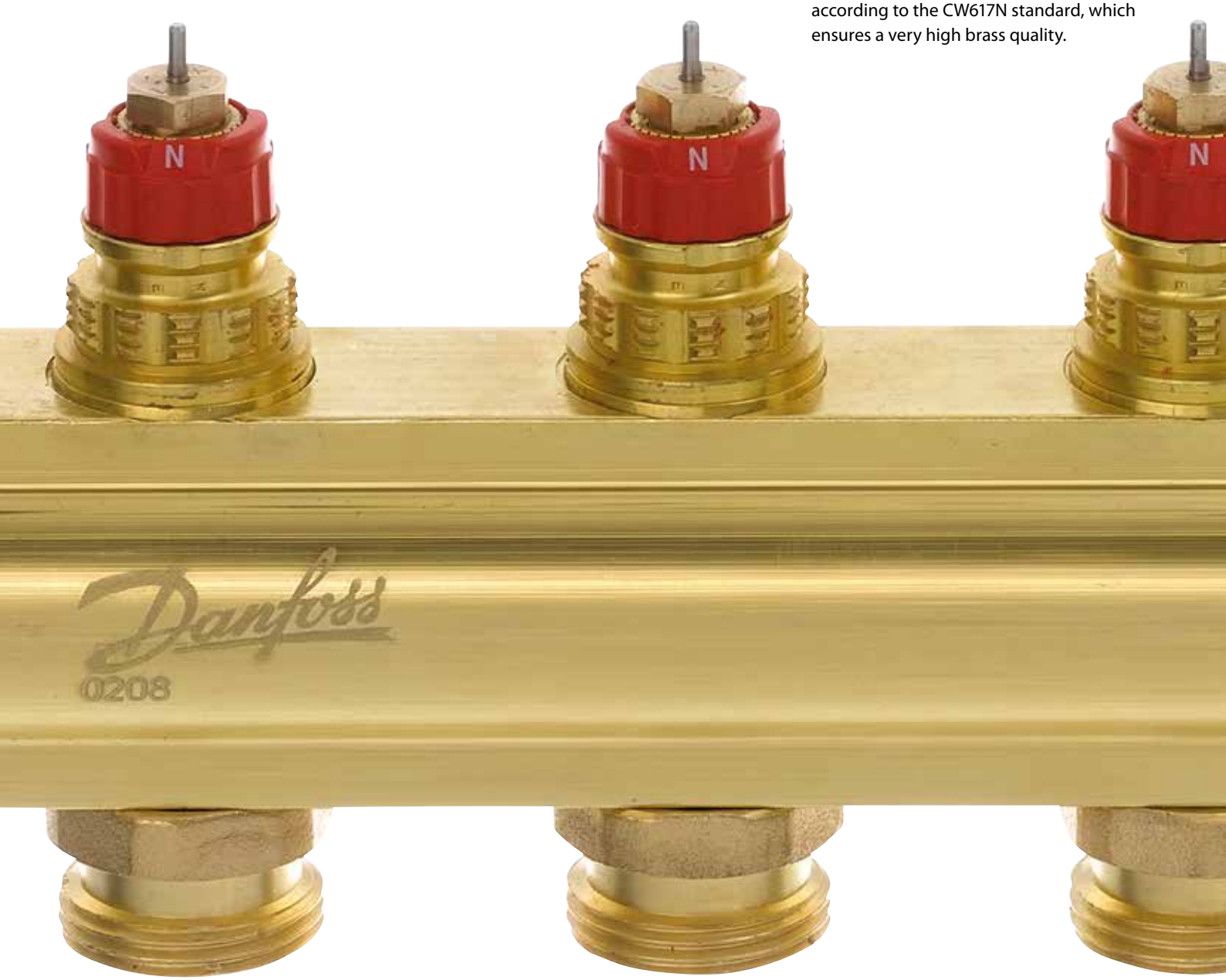
Capacity test

In a capacity test, the flow through the valves is tested, enabling us to find the kvs-value. This allows us to calculate how much energy each circuit can provide to the room.

High quality **brass**

The purity and quality of the brass used in Danfoss manifolds minimizes the risk of corrosion and leakages.

FHF and FHF-F manifolds are all produced according to the CW617N standard, which ensures a very high brass quality.



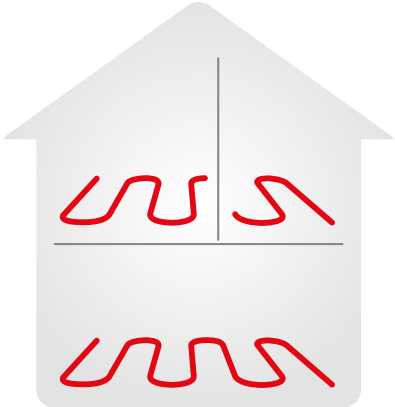
Manifolds with pre-setting
Reduce call-backs and provide comfort and savings for your customers

A study with 537 plumbers from seven countries shows that installers are called back to approx. 20% of installations. The saving potential for leaving behind a well-functioning system is enormous.

TIP! Make sure to explain the importance of perfect hydronic balancing to your customers.

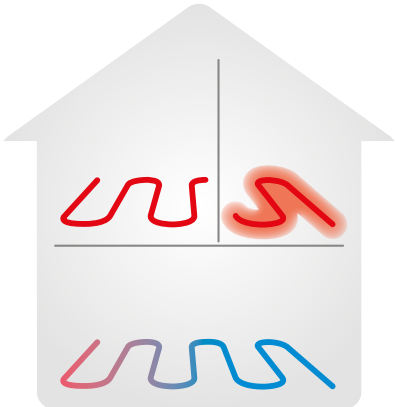
Typical installation **with** pre-setting

With pre-setting, the right amount of water can be distributed to the right rooms.



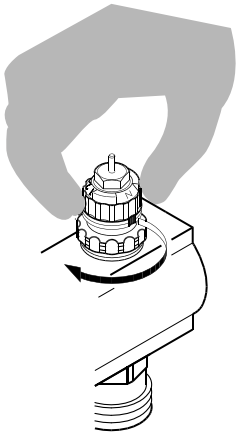
Typical installation **without** pre-setting

Without pre-setting valves, you risk the scenario of very uneven heat distribution which decreases comfort.

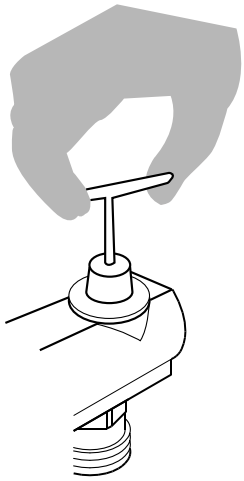


More than just pre-setting
We give you the best solutions on the market

A Danfoss manifold with pre-setting offers better distribution of water and energy, which ensures the right temperatures in different rooms.



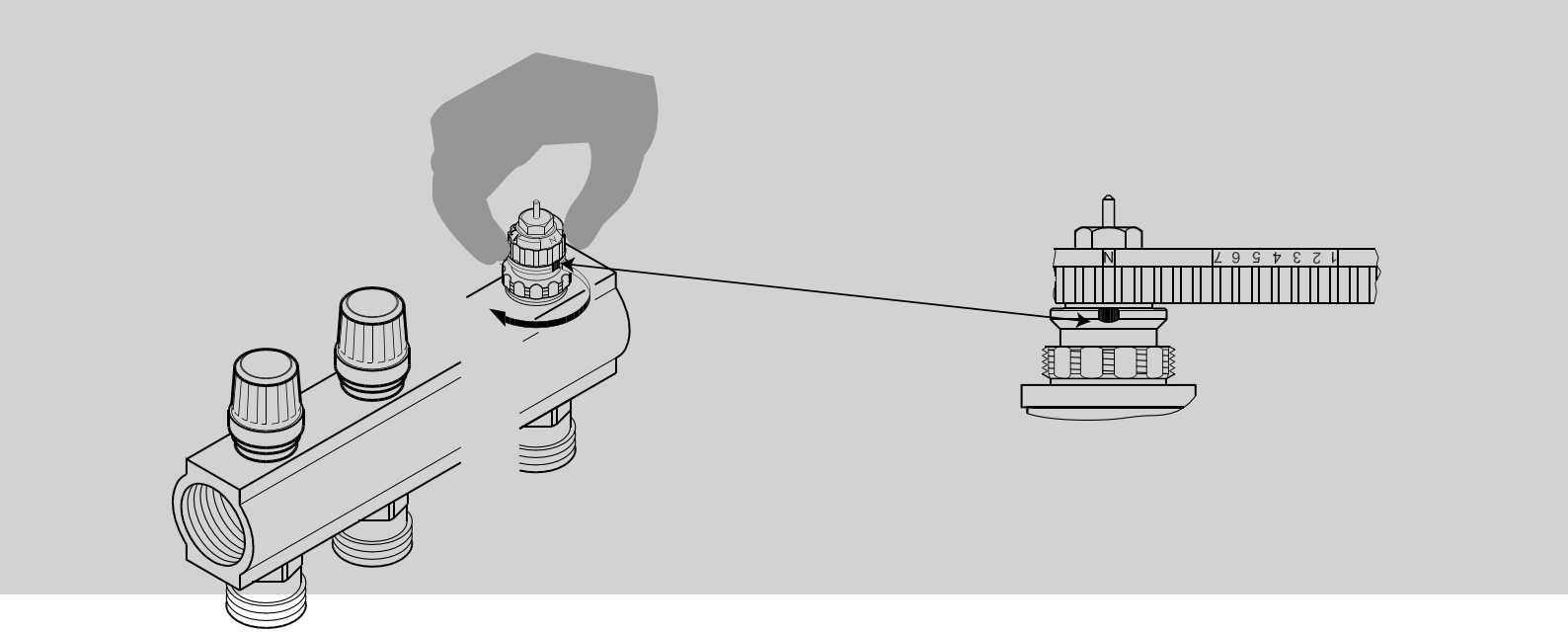
Danfoss **throttle** pre-setting



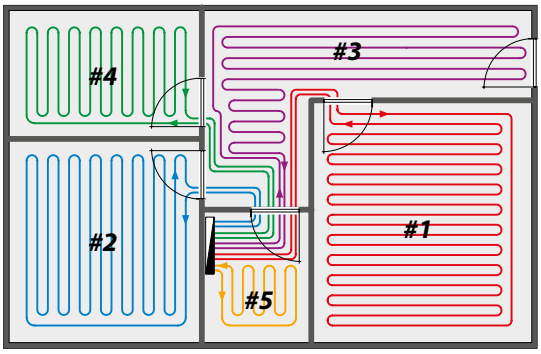
Typical non-Danfoss pre-setting

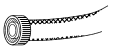
Comparison

Danfoss throttle pre-setting	Typical non-Danfoss pre-setting
No tools required. Can be done quickly and easily	Tools required. Time consuming
Precise pre-setting scale visible on valve	Normally not visible on valve
Easy to use pre-setting guide	More complex pre-setting
Pre-setting can be checked after installation (visible setting)	Pre-setting cannot be checked without a visible scale
Spindle and valve seat produced as 1 piece – provides extreme accuracy	Spindle uses manifold as seat. Difficult to set accurately



Accurate pre-setting **example**





20 x 2 mm

	120	115	110	105	100	95	90	85	80	75	70	65	60	55	50
120	n														
115	7	n													
110	6	6,5	n												
105	5,5	6	7	n											
100	5	5,5	6	7	n										
95	4,5	5	5,5	6,5	7	n									
90	4	4,5	5	5,5	6	7	n								
85	4	4	4,5	5	5,5	6	7	n							
80	3,5	4	4	4,5	5	5,5	6	7	n						
75	3,5	3,5	4	4	4,5	5	5,5	6	7	n					
70	3	3,5	3,5	4	4,5	4,5	5	5,5	6	7	n				
65	3	3	3,5	3,5	4	4	4,5	5	5	6	7	n			
60	3	3	3	3,5	3,5	4	4	4,5	4,5	5	6	7	n		
55	2,5	3	3	3	3,5	3,5	3,5	4	4	4,5	5	6	6,5	n	
50	2,5	2,5	2,5	3	3	3	3,5	3,5	4	4	4,5	5	5,5	6,5	n
45	2	2,5	2,5	2,5	3	3	3	3	3,5	3,5	4	4,5	4,5	5	6
40	2	2	2	2,5	2,5	2,5	3	3	3	3,5	3,5	4	4	4,5	5
35	1,5	1,5	1,5	2	2	2,5	2,5	2,5	2,5	3	3	3,5	3,5	4	4,5
30	1	1	1	1,5	1,5	2	2	2	2,5	2,5	2,5	3	3	3,5	4
25	1	1	1	1	1,5	1,5	1,5	1,5	2	2	2,5	2,5	2,5	3	3,5
20	1	1	1	1	1	1	1	1	1	1,5	1,5	2	2	2,5	2,5
15	1	1	1	1	1	1	1	1	1	1	1	1	1,5	1,5	2
10	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1

#1 100 m

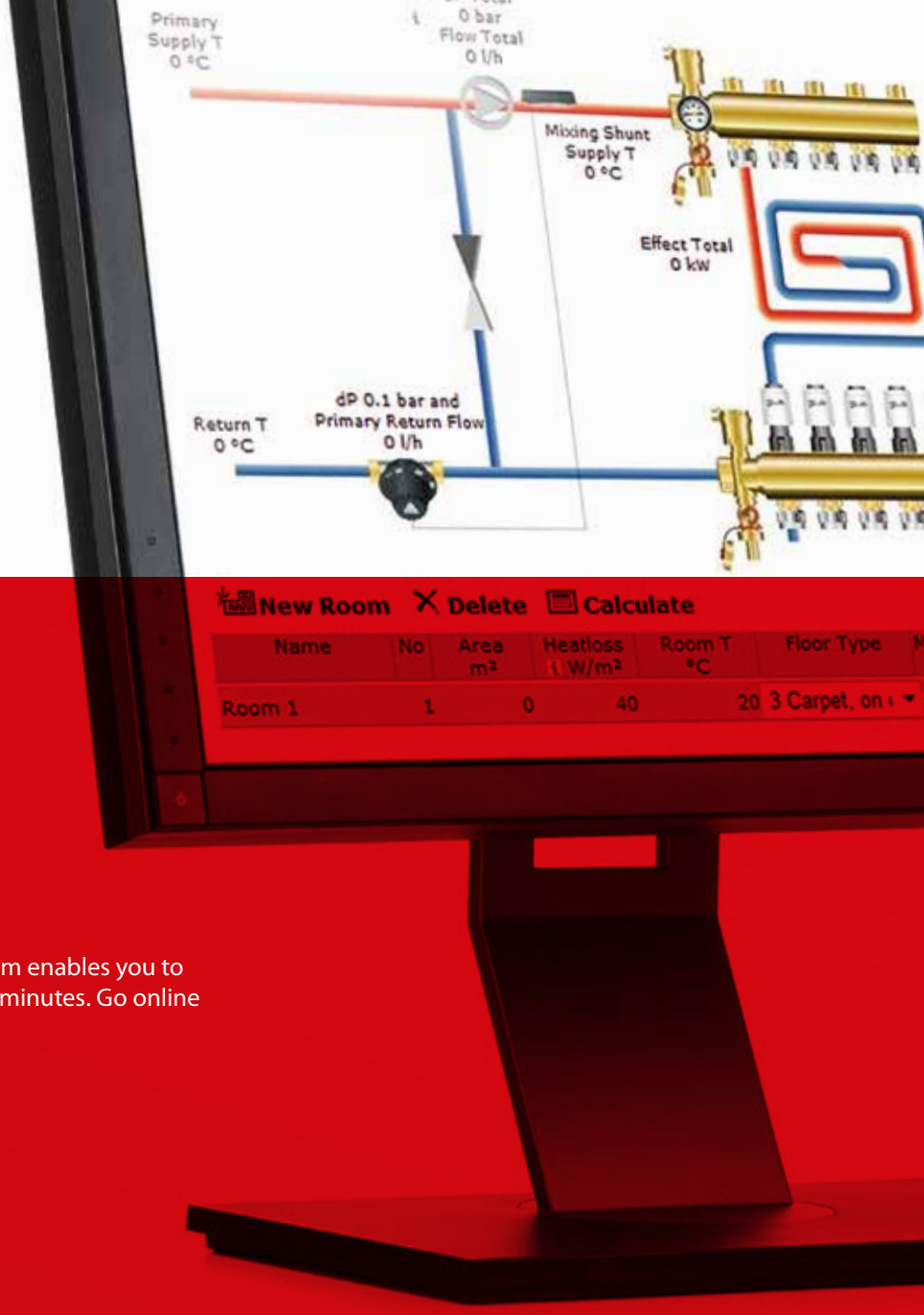
#1 100 m

#2 85 m

#3 70 m

#4 60 m

#5 40 m



...or with our **online tool**

Our online QuickPlanner dimensioning program enables you to calculate the correct pre-setting values in just minutes. Go online and have the following information ready:

- Room sizes
- Heat requirement (W/m²)
- Supply temperature
- Desired room temperature
- Floor type

→ quickplanner.danfoss.com

MIXING & MIDI SHUNTS
WHAT TO CONSIDER

1.

TEMPERATURE

IS THERE A HIGH TEMPERATURE HEAT SOURCE?
(e.g. boiler or district energy)

YES

NO

NO NEED FOR MIXING SHUNT

2.

VARIABLE SPEED

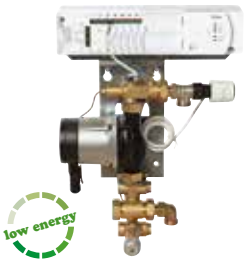
USE A MIXING SHUNT
Should it be with a variable speed pump for extra energy saving?

YES

CHOOSE VARIABLE SPEED

FHM-C8
» 15-60

FHM-C9
» 15-40



MIDI-SHUNTS
Solution with 1-3 circuits
CF2+ master and actuators.
Just add room controls

NO

CHOOSE FIXED SPEED

FHM-C5
» 15-40

FHM-C6
» 15-60

MANIFOLDS
WHAT TO CONSIDER

1.

BALANCED SYSTEM

Is balancing via pre-setting or flow meters required?

YES → **2.**

NO

CHOOSE FH-ME (BASICPLUS) OR FHF-B

2.

FLOW METER

Are flow meters required?

YES → **3.**

NO

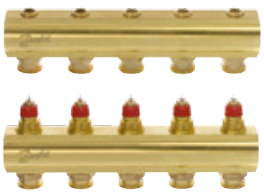
CHOOSE FHF WITH PRE-SETTING

3.

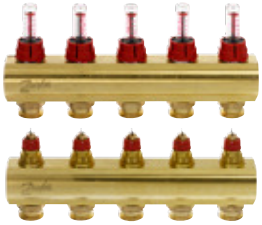
CHOOSE

FHF-F OR SSM-F WITH BOTH PRE-SETTING AND FLOW METER

FH-ME (BasicPlus)
No flow meter and no pre-setting



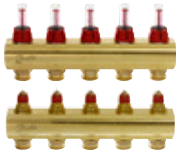
FHF
With pre-setting



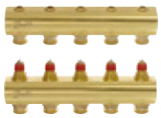
FHF-F
With pre-setting and flow meter

SSM-F
With presetting and flow meter
Premounted components

MANIFOLD
OVERVIEW



FHF-F
088U0522-32



FHF
088U0502-12

FH-ME (BasicPlus)
088U0612-18

SSM-F
088U0752-62

Manifolds	Code no.
FHF-F	088U0522-32
FHF	088U0502-12
FH-ME (BasicPlus)	088U0612-18
FHF-B with shut-off	088U0542-52
SSM-F	088U0752-62

Only manifold: You will need to order end-piece (1 pcs. 088U0582 or 2 pcs. end section 088U0581 or 088U0580), mounting brackets (088U0585) and ball valves (088U0586).
Assembled: You will only need to order mounting brackets (088U0585).

End caps
088U0582

Mounting brackets
088U0585

End section
088U0785

End section
088U0786

Ball valves
088U0586

Connection piece
088U0583

Accessories	Code no.
End caps (2 pieces)	088U0582
End section – automatic air vent	088U0785
End section – manual air vent	088U0786
Mounting brackets (2 pieces)	088U0585
Reduction bushes	088U0584
Connection piece	088U0583
Ball valves (2 pieces)	088U0586

Number of outputs	Flow meter	Pre-setting	Control valves for actuators	Solution	Material	Working Pressure
From 2+2 (088U0522) – To 12+12 (088U0532)	✓	✓	✓ (TWA-A)	Only manifold	Brass	6 bar
From 2+2 (088U0502) – To 12+12 (088U0512)		✓	✓ (TWA-A)	Only manifold	Brass	10 bar
From 2+2 (088U0612) – To 8+8 (088U0618)			✓ (TWA-A)	Only manifold	Brass	10 bar
From 2+2 (088U0542) – To 12+12 (088U0552)				Only manifold	Brass	10 bar
From 2+2 (088U0752) – To 12+12 (088U0762)	✓	✓	✓ (TWA-A)	Assembled	Stainless steel	6 bar

Description
Used where air vents are not used
Includes automatic air vent and drain valve
Includes manual air vent and drain valve
Used to mount manifold
Enables connection between ¾" pipe and 1" manifold"
For combining two or more manifolds
To shut off water to entire manifold

MIDI SHUNT
OVERVIEW

With 1 circuit,
up to 20 m²
088U0181

With 2 circuits,
up to 40 m²
088U0182

With 3 circuits,
up to 60 m²
088U0183

Midi shunt – for small floor heating systems	Code no.
Midishunt with 1 circuit	088U0181
Midishunt with 2 circuits	088U0182
Midishunt with 3 circuits	088U0183

CF-RD
With display
088U0214

CF-RS
With dial
088U0210

CF-RF
Display and infrared
088U0215

CF-RP
Tamper proof
088U0211

Just add... CF2+ room thermostats	Code no.
Room thermostat, CF-RS	088U0210
Room thermostat, CF-RP	088U0211
Room thermostat, CF-RD	088U0214
Room thermostat, CF-RF	088U0215

Measurement mm (H x W x D)	Pre-mounted components			
	Pump type	Controls	System size	Actuators
425 x 325 x 165	Alpha 2, 15-40	CF2+, MC 5	Up to 20 m²	✓
425 x 325 x 165	Alpha 2, 15-40	CF2+, MC 5	Up to 40 m²	✓
425 x 369 x 165	Alpha 2, 15-40	CF2+, MC 5	Up to 60 m²	✓

Features					
Temperature limitation	Display	Dial	Floor sensor, infrared	Adaptive learning	Week schedule option (via CF-RC)
		✓		✓	✓
✓				✓	✓
	✓			✓	✓
	✓		✓	✓	✓

MIXING SHUNT
OVERVIEW

FHM-C5 (088U0095)
» 3-speed UPS 15-40 pump
» Internal non-return valve
» FHD-T thermometer
» FH-TC self-acting thermostatic controller
» FH-ST55 safety thermostat prewired to pump

FHM-C6 (088U0096)
» 3-speed UPS-15-60 pump
» Internal non-return valve
» FHD-T thermometer
» FH-TC self-acting thermostatic controller

FHM-C8 (088U0098)
» Speed-controlled Alpha2 15-60 pump
» Internal non-return valve
» FHD-T thermometer
» FH-TC self-acting thermostatic controller

FHM-C9 (088U0099)
» Speed-controlled Alpha2 15-40 pump
» Internal non-return valve
» FHD-T thermometer
» FH-TC self-acting thermostatic controller

Mixing shunt	Code no.
FHM-C5	088U0095
FHM-C6	088U0096
FHM-C8	088U0098
FHM-C9	088U0099

Accessories for mixing shunt	Code no.
Safety thermostat	088U0301
Measurement set	088U0304
Manual flow limiter	088U0303
Angle fittings	088U0305
Upgrade Kit – ECL	088U0090

Features			
Pump type	Pump speed	Additional accessories included	Pump energy class
UPS 15-40	Fixed, non-adaptive	Safety thermostat	C
UPS 15-60	Fixed, non-adaptive	-	C
Alpha 2, 15-60	Variable	-	A
Alpha 2, 15-40	Variable	-	A

Description
Stops pump if supply temperature is above 55 °C
Output for measuring flow
Spindle valve for limiting mixing shunt flow
For mounting mixing shunt at a diffent angle
For controlling supply temperature based on outdoor temperature

Safety thermostat (088U0301)

Upgrade Kit – ECL (088U0090)

Includes: Weather Compensator ECL 110 (087B1261)
Electric actuator ABV-NC (082F0051)
Temperature sensor ESMT (084N1012)
Universal sensor ESMB-12 (087B1184)
Sensor pocket and valve insert

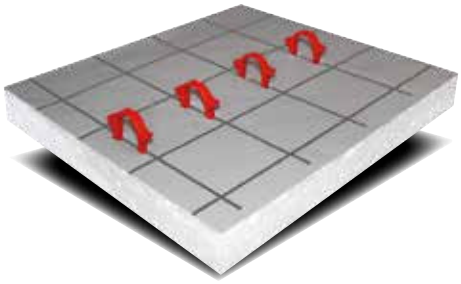
FLOOR HEATING **PANELS**

FLOOR HEATING PANELS
MEET THE FAMILY

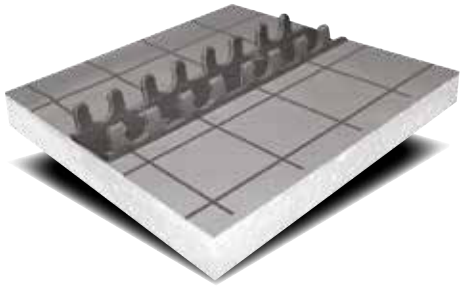
Basic™ screed systems

Using tools and laying pipes at the same time is difficult. No tools are required for BasicRail™ and BasicGrip™. This means that one person can lay the pipes alone when using BasicRail™ and BasicGrip™.

For BasicRail™ the rails need to be installed first. The BasicGrip™ panel, on the other hand, contains both insulation and knobs that hold the pipes in place. That means fewer work processes with BasicGrip™.



BasicClip™



BasicRail™

BasicGrip™

Panels
What to consider

1.

INSTALLATION

Is 1-person installation important?

YES

NO

CHOOSE
BasicClip™

2.

WORK PROCES

Is few work processes important?

YES

NO

CHOOSE
BasicRail™

CHOOSE
BasicGrip™

FLOOR HEATING PANEL
OVERVIEW


BasicGrip™


BasicClip™

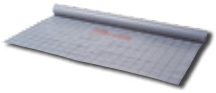

BasicRail™


Clips for BasicRail™
088X0043


Clips for foil
088X0060


Connection panel
088X0053


Manifold/multi-panel
088X0054


Foil
088X0130


Insulation roll
088x0072


BasicClip™ Tool
088X0061


Conduit elbow
088X0058


Perimeter insulation
088X0065


Basic movement gap strip
088X0066


Basic pipe sleeve
088X0067

System overview	Installation time (min./ m² at c/c 300 mm)
BasicGrip™	7.5
BasicClip™	8
BasicRail™	6.5

BasicRail™	Code no.
FH-BRA – Rails, 2 meters for 16x2 pipe	088X0040
FH-BRC – Rails, 3 meter, for 20x2,25 pipe	088X0042
FH-BRD – Clips for BasicRail™, 500 pcs	088X0043
FH-BCC – Clips for foil, 200 pcs.	088X0060

BasicClip™	Code no.
FH-BCB – Clips for BasicClip™, 300 pcs	088X0062
FH-BCC – Clips for foil, 200 pcs.	088X0060

BasicGrip™ panels and rolls	Code no.
FH-BGA – Standard panel	088X0050
FH-BGB – Standard panel	088X0051
FH-BGC – Standard panel	088X0052
FH-BGD – Connection panel	088X0053
Manifold/multi-panel	088X0054
Manifold/multi-panel	088X0055
Manifold/multi-panel	088X0056

BasicClip™ and BasicRail™ rolls	Code no.
FH-SL – Foil	088X0130
Basic insulation roll	088X0072
Basic insulation roll	088X0073

Other accessories	Code no.
FH-BCA – BasicClip™ Tool	088X0061
FH-BGI – Conduit elbow	088X0058
FH-BK – Perimeter insulation	088X0065
FH-ACA – Basic movement gap strip	088X0066
FH-ACB – Basic pipe sleeve	088X0067

Available insulation thickness (mm)	Installation tools needed
0, 11, 35	None
0, 20, 35 (panels) / 30 (10 m² rolls)	BasicClip Tool
0, 20, 35	None

Consumption (m/m²)
1.2
1.2

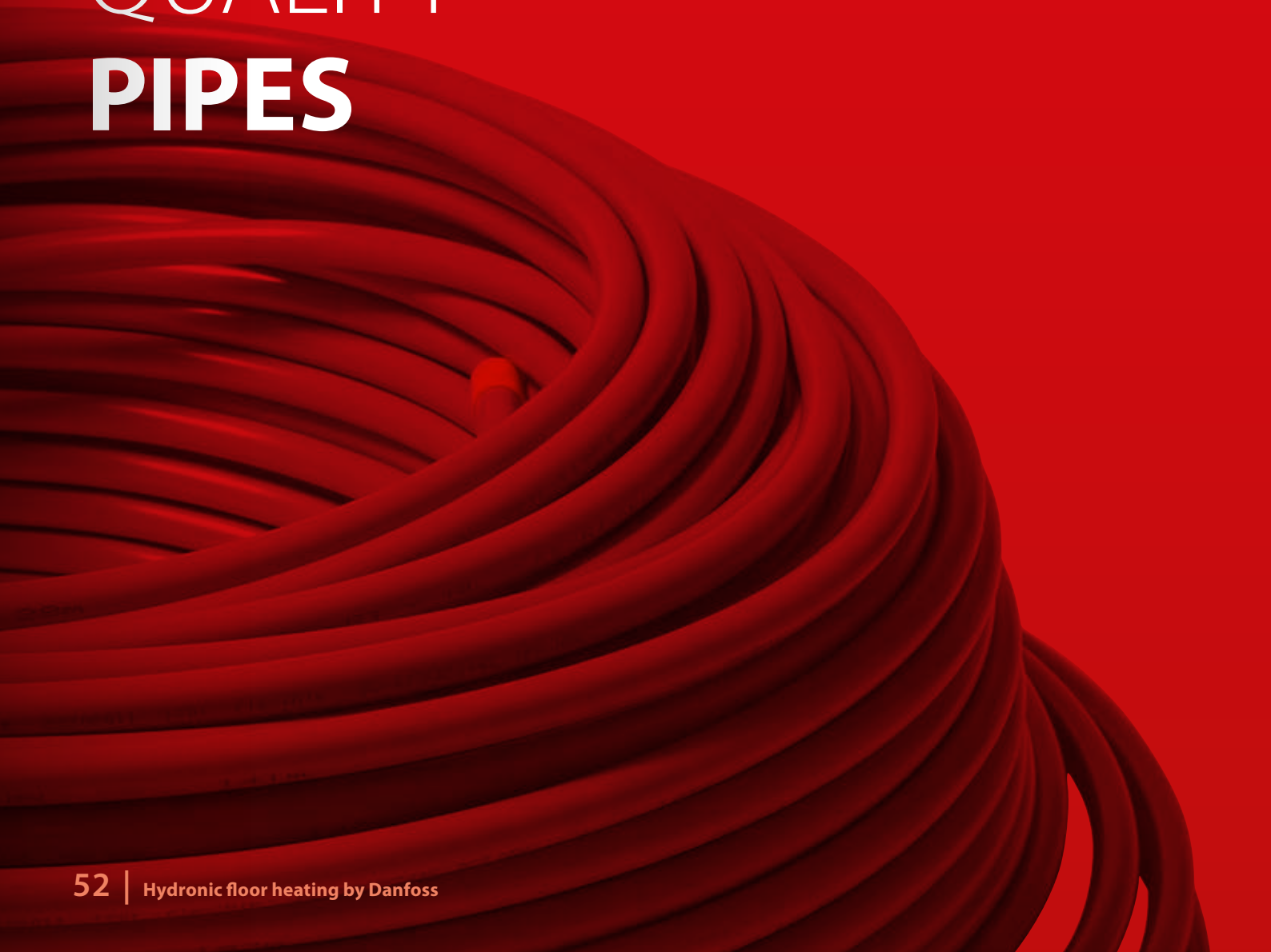
Consumption, pcs./m² with c/c 300 mm	Consumption, pcs./m² with c/c 250 mm	Consumption, pcs./m² with c/c 200 mm	Consumption, pcs./m² with c/c 150 mm	Consumption, pcs./m² with c/c 100 mm
7	8	10	13	20

Form	Insulation thickness (mm)	Size (m²)
Panel	35	1
Panel	11	1
Panel	0	1
Panel	0	0.1
Panel	35	0.5
Panel	11	0.5
Panel	0	0.5

Form	Insulation thickness (mm)	Size (m²)	System	
			BasicClip™	BasicRail™
Roll	0	50	✓	✓
Roll	30	10	✓	
Roll	20		✓	

For which system			Comments
BasicGrip™	BasicClip™	BasicRail™	
	✓		For mounting clips
✓			For 16-20 mm pipe
✓	✓	✓	
✓	✓	✓	2 meters
✓	✓	✓	For 16 mm pipe and pipe length 40 cm

QUALITY
PIPES



Pipes
What to consider

1.

LOW TEMPERATURE

Is the pipe installed in temperatures below -10 °C?

NO

YES

USE COMPOSITE PIPES WITH ALUMINIUM

2.

PIPE EXPANSION

Is it important that the pipe does not expand?

NO

YES

USE COMPOSITE PIPES WITH ALUMINIUM

3.

PRESSURE AND TEMPERATURE

Is pressure higher than 6 bars or does temperature exceed 60 °C?

NO

YES

USE COMPOSITE PIPES WITH ALUMINIUM

CHOOSE

PE-RT PIPES

COMPOSITE PIPES WITH ALUMINIUM

Composite pipes with aluminium are manufactured in such a way that the aluminum layer prevents the pipe from going back to its original form. This makes installation much easier.

Because of the firm bonding of the synthetic layers with the aluminum, linear expansion is determined by the expansion coefficient of the aluminum and is therefore similar to the expansion of a metal pipe, i.e. only 1/7 that of a purely synthetic pipe. This is important in e.g. dry systems where pipes are not cast into concrete.

COMPOSITE PIPE WITH ALUMINIUM

PE-RT inner pipe, stabilized for high temperatures

Adhesive layer

Homogeneous, longitudinally, butt-welded and totally circular aluminium pipe

Adhesive layer

Polymer outer pipe stabilized for high temperatures. Grey and UV stabilized

PE-RT PIPE

PE-RT pipe wall

Adhesive layer

Oxygen (O_2) diffusion barrier layer

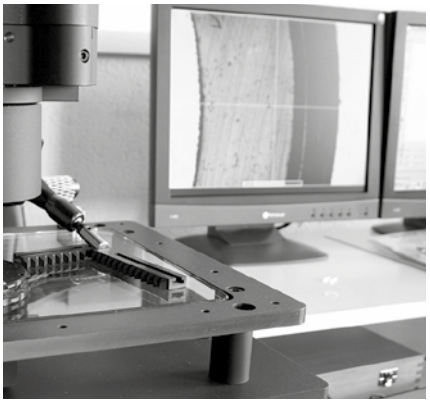
Adhesive layer

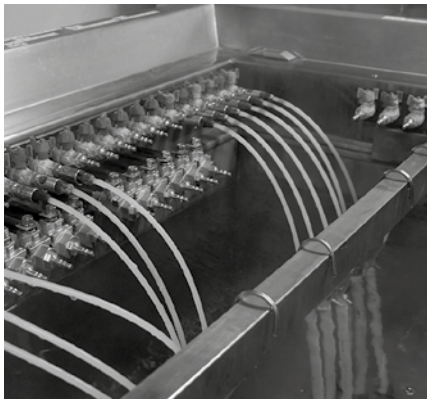
Protective PE-RT layer

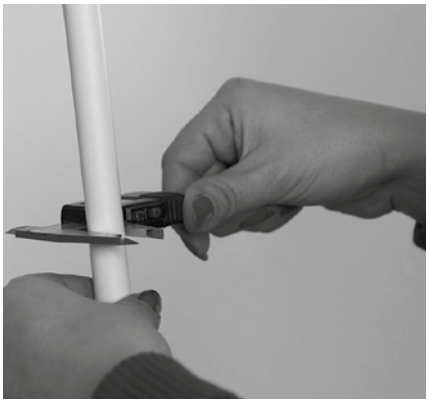
TESTING OUR PIPES TO THE MAX

All pipes are thoroughly tested to meet the highest quality standards.

Danfoss pipes are subjected to a range of different tests to ensure optimum product quality and working life. During production, the pipes undergo real life simulation tests and quality inspections to meet our precise tolerances.







Layer and wall thickness

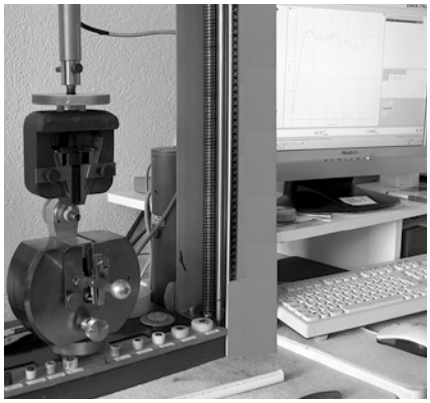
The thickness of each layer is measured. Thickness needs to be kept within narrow tolerances to ensure that the fittings precisely match the pipes, enabling them to withstand high pressures.

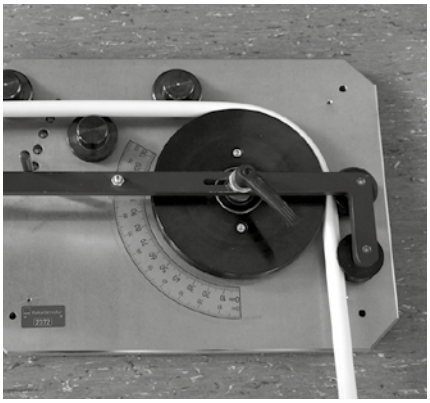
Long-term pressure test

The pipes undergo a thermal cycle test. The test simulates the conditions that pipes are exposed to during their lifetime. The test is based on the ISO 22391 standard.

Outer diameter test

During production, random tests are carried out on the outer diameter of our pipes to ensure that tolerances are met.





Adhesion test

The pipes consist of several layers that are “glued” together. In the lab, their durability is thoroughly tested to prevent the layers from dissolving over time.

Bending relaxation test

The extent to which the pipe changes shape when bent is important for the resistance in the pipe. An oval pipe will increase resistance, which may affect pump requirments.

PIPE
OVERVIEW

FH composite pipe
088X0001

FH PE-RT pipe
088X0004

Most popular pipes	Code no.
FH Composite pipe	088X0001
FH Composite pipe	088X0003
FH PE-RT pipe	088X0004
FH PE-RT pipe	088X0006
FH PE-RT pipe	088X0005

Press fitting 16 x 2 mm
088X0020

Press fitting 20 x 2.25 mm
088X0021

Screw coupling 16 x 2 mm
088X0025

Screw coupling 20 x 2.25 mm
088X0026

Accessories for pipes	Code no.
Fitting for composite 16 x 2 mm	013G4186
Fitting for composite 20 x 2.25/3 mm	013G4093
Press fitting 16 x 2 mm	088X0020
Press fitting 20 x 2.25 mm	088X0021
Screw coupling 16 x 2 mm	088X0025
Screw coupling 20 x 2.25 mm	088X0026

Dimension	Material type	Coil length	Oxygen barrier	Max. temperature	Max. pressure	Life expectancy
16 x 2.0 mm	PE-RT/Alu/PE-HD	200 m	Yes, alu	95 °C	10 bar	+50 years
16 x 2.0 mm	PE-RT/Alu/PE-HD	500 m	Yes, alu	95 °C	10 bar	+50 years
16 x 2.0 mm	PE-RT	200 m	Yes, EVOH	60 °C	6 bar	+50 years
16 x 2.0 mm	PE-RT	500 m	Yes, EVOH	60 °C	6 bar	+50 years
20 x 2.25 mm	PE-RT	150 m	Yes, EVOH	60 °C	6 bar	+50 years

Description
Fitting for connecting pipes to manifolds or valves with ¾" thread
Fitting for connecting pipes to manifolds or valves with ¾" thread
Connection fitting for joining two pipes e.g. for repairs (press tool required)
Connection fitting for joining two pipes e.g. for repairs (press tool required)
Connection fitting for joining two pipes e.g. for repairs (fittings incl. insulator ring for use with AluPex/Composite pipes)
Connection fitting for joining two pipes e.g. for repairs (fittings incl. insulator ring for use with AluPex/Composite pipes)

CASE STORIES

Energy makeover generates **efficient and controllable heating**

Renovating a private house
A stone's throw from Frankfurt-am-Main, Germany, the house was built in 1984 and boasted what was then state-of-the-art insulation. When the current owners took over the house, in addition to inadequate roof insulation by today's standards, the underfloor heating was not sufficiently controllable and drove up energy consumption.

Meeting the challenge
The existing underfloor heating system was slow to heat up, virtually unregulated and worked continuously at too high a flow rate. This meant excessive room temperatures and a high level of energy waste. In addition, the manifold's control valves were extremely calcified by old leaks and the actuators were completely disconnected and disabled.

Comprehensive renovation
Looking for suitable products, the contractor identified the Danfoss CF2+ system. This wireless solution offers individual room control and excellent regulation and management features. For the twin heating circuits, two CF-MC Master Controllers were installed along with an external CF-EA antenna to ensure good wireless contact. Once the old system had been fully overhauled, the valve flow settings were defined to ensure correct hydronic balance.

Room-by-room heating control
A CF-RF thermostat with infrared floor sensor was fitted in the reception room to ensure an adequate base temperature. This device also regulates floor temperature when secondary heat sources are in use, such as a fireplace. Other rooms were equipped with CF-RD thermostats. A CF-RC remote control was fitted to look after timing and the old manifold was replaced for a FHF-F equipped with new TWA-A actuators.

Increased comfort and energy savings
The biggest advantage over the old solution was the achievement of genuine heating comfort. Temperature can now be individually set and regulated in each room, which offers excellent cost savings in a household with children and working adults.

Country: Germany

Building type: 1-family house

Renovation year: 2013

Size: 220 m²

Heat emitter: Floor Heating

Control type:
CF2+, FHF-F and TWA-A

Heat source: Gas, with water-based floor heating

Company name:
Braun Haustechnik, Dreieich

Company industry:
Plumbing

Private consumer name:
Klaus Gerlach, Wehrheim

"The wireless CF2+ system removes the need for expensive cable laying and almost all the restoration work was carried out in the control cabinet. The work caused no mess and both installation and commissioning were very straightforward."

D. Braun,
Braun Haustechnik

> With the Danfoss CF2 system we are able to control the underfloor heating and cooling, and can also ensure future flexibility for repositioning of the thermostats at the same time.
>
> Bas Linsen
> Underfloor heating constructor

Underfloor heating and cooling
For year round comfort

A sustainable solution
In the Dutch city of Rotterdam, an office building from the 60's was completely stripped to its core and re-built. The project involved creating new offices and adding a further nine floors of luxury apartments on top. The developer wanted a highly sustainable climate system with both heating and comfort cooling. Heat is supplied to the building via the city's district heating system. To achieve the desired cooling effect, a customized solution was developed that involved drawing water from the river Maas, which flows right alongside the building. The water is then fed into heat exchangers to provide the cooling.

Floor heating and cooling
To ensure that residents in the apartments could enjoy the most comfortable possible living experience, the decision was taken to use floor heating. During the warm months of the year, this system is also able to contribute to cooling the apartments. A manual switch to change from heating to cooling operation ensures that heating and cooling cannot work simultaneously and avoids wasting energy.

Flexibility required
Throughout the apartments, non-structural stud walls were used to give future owners the flexibility to arrange the room layout to suit their personal preferences. This design choice meant that the temperature controls in each of the rooms needed to be easy to relocate.

Wireless controls
A Danfoss solution using the CF2 wireless control system was chosen to accommodate the demands of the innovative design concept. This allowed temperatures to be set individually in each room. In addition, the wireless CF-R thermostats provided the necessary flexibility for possible future changes to the room layout in the apartments. Thanks to 2-way communication between room thermostats and the central master controller on a frequency of 868.42 MHz, the wireless system is extremely reliable.

Country: The Netherlands

Building type: Apartments

Building year: 2012

Size: 36 x 210 m^2

Heat emitter: Underfloor heating

Cool emitter: Underfloor cooling

Control type: CF2
(CF-MC, CF-RD, CF-RS, CF-EA)

Heat source: District heating

Cooling source: River water

Company name:
Jupiter Vloerverwarming Benelux BV

Company industry:
Underfloor heating construction

Private consumer name:
Mr. and Mrs. Schoneveld

The apartment cabinet
Heating and cooling supplies enter the apartment and are connected to the manifold. A manual switch allows the apartment occupants to determine between heating or cooling control. CF2 contains several features to optimize control in floor-cooling applications and the CF-MC Master Controller automatically opens or closes the electric actuators. Each is controlled by one of the CF-R room thermostats.

Well-balanced floor heating comfort **in 17 high-rise apartment buildings**

Ensuring comfortable heating
The "Taiyang Gongyuan" project in Beijing, China, includes 17 residential buildings with a total of 2,154 apartments. All buildings are heated via district heating. Due to the large size of the buildings, each with up to 29 floors, establishing proper hydronic balancing was a priority. This would eliminate complaints from residents about uneven heating while providing the desired high level of indoor comfort. To meet both requirements, Danfoss proposed a thoughtfully configured system that included automatic balancing valves, floor heating and individual room temperature control.

Hydronic balancing
To establish the necessary hydronic balance, Danfoss ASV automatic balancing valves were installed for each apartment. These valves prevent pressure fluctuations and ensure even heat distribution throughout the entire building.

Different temperatures in each room
In the larger apartments, room temperature can be individually controlled via Danfoss CWD thermostats. The temperature can be separately set for each room, ensuring superb levels of indoor comfort while also saving energy by not heating rooms unnecessarily.

In the smaller apartments, temperature is controlled via one central CWD thermostat. A total of 6,090 thermostats were installed to provide the 2,154 apartments with optimum temperature and comfort control.

Country: China

Building type: 17 multi family house**s**

Building year: 2010

Size: 500,000 m^2

Heat emitter: Floor heating and hydronic balancing

Floor heating control type: Danfoss CWD and FHF-F manifolds

Heat source: District heating

Company name: Xinyuan

Company industry: Real estate company

Private consumer name: Ms. Chen

Danfoss manifold with RA-G valve and TWA-A actuator. This combination was installed in the smaller apartments to provide central temperature control via a CWD thermostat in the main living room. Individual room controls were installed in the larger apartments.

Danfoss ASV balancing valves and energy meters were installed in the technical room for each group of four apartments.

"We wanted to avoid typical complaints related to poor hydronic balancing while also offering residents optimal comfort. With the help of Danfoss, we fully achieved both these goals."

Mr. Shengguo Zhu
Xinyuan real estate

Buying all the products we needed from one supplier provided a sense of reassurance. We basically just added the floor heating pipes.

John Møller-Pedersen
Constructor

The advantage of working with **a single solution provider**

Optimal indoor climate
The task was to build 18 houses in Denmark with the best possible indoor climate and zero energy consumption. A tough challenge, but very achievable.

Designing a total solution
The contractor and the manager of the building project put their heads together to work out a solution. A photovoltaic system was chosen as the primary energy source, transforming the sun's rays into electric power. The electric power is then used to operate a heat pump and a heat recovery and ventilation unit. The heat pump provides warm water for the floor heating in the houses.

Floor heating helps to eliminate heating costs
Energy consumption for heating and ventilating the houses is estimated to be less than 4,000 kWh per year per house, while the photovoltaic system produces around 6,000 kWh. This means that more energy is produced than is required to operate the heat pump and ventilation unit. Using floor heating in combination with the heat pump is very energy efficient. This is because floor heating requires a lower supply temperature than radiators. For every 1 degree centigrade that the supply temperature can be lowered, heat pump efficiency (COP) improves by 2%.

Country: Denmark

Building type:
18 family houses

Building year: 2013-2014

Size: 104-125 m²

Heat emitter: Floor heating

Floor heating type: CF2⁺

Heat source:
Danfoss heat pump, DHP-AQ

Company name:
Salling Entreprise

Company industry:
Constructor

Private consumer name:
Dorthe Pedersen

Floor heating with low-energy optimizer
The CF2⁺ floor heating system uses a technique called "low energy optimizer" for heat pumps. The technique optimizes floor heating duty cycles so that the heat pump runs more efficiently .

Individual room controls **save energy**

Optimizing living space
What do you do when you want to offer apartment owners maximum living space, valuable energy savings and high heating comfort at the same time? The architects and engineers working on the 'Vadistanbul' project in Istanbul, Turkey, agreed that they could meet all these requirements by using Danfoss floor heating. Floor heating would save precious space in the development's many small apartments while increasing comfort and reducing energy consumption at the same time.

A prestigious project
The 'Vadistanbul' project is one of Turkey's most prestigious projects. An entire new district will be added to the Istanbul metropolis in three stages. In the first phase, called 'Vadistanbul Teras', 1,111 apartments are being constructed in eight buildings. Subsequent phases will see the construction of a shopping mall, restaurants, a 5-star hotel and a further 1,200 apartments.

Individual temperature control
The key to long-term energy savings is the provision of individual temperature control for each room. Heating is provided only when and where it is needed. In addition, floor heating provides such a high level of comfort that the desired temperature can be set 1 or 2 degrees centigrade lower than a comparable radiator heating system. 5% energy is saved for every degree the room temperature is lowered.

Hydronic balancing
To maximize both energy savings and living comfort, the floor heating system is hydronically balanced. Each group in the floor heating system is pre-set to allow only the required flow to pass through.

A complete floor heating portfolio
Danfoss provided all necessary floor heating products. In addition, the innovative Danfoss floor panels make the installation of FH PE-RT pipes a simple job.

Country: Turkey

Building type:
8 apartment buildings

Building year: 2014

Size: 1+1 rooms (70 m^2) up to 5+1 rooms (400 m^2)

Heat emitter: Floor heating

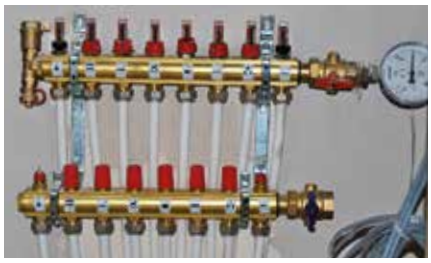
Floor heating type: BasicPlus for 600 km of PE-RT pipe

Floor heating controls:
6,342 FH-WT thermostats + 1,179 FH-WC connection boxes control 8.226 TWA-A actuators on FHF-F manifolds

Heat source:
Central heating with a sub-station per apartment

Company name:
Artas-Aydinli-Kelesoglu construction consortium

Company industry:
Construction



Manifolds with both flow meter and pre-setting
The high-quality FHF-F manifolds with flow meter and pre-setting valves create a well-balanced system. TWA-A actuators will be installed to enable the room thermostats to control the temperature in each room.

"Individual room temperature controls will provide future occupants energy savings and a high comfort level."

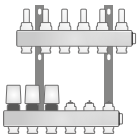
Mr.Kerim Akıncı
Mechanical engineer

ENGINEERING
TOMORROW

Pioneering heating controls **for decades**

Danfoss has been designing and developing heating control systems for more than 80 years. Throughout that time, it has been our goal to continuously innovate, perfect and refine cutting-edge heating and cooling solutions.

1982 First sales of built-in valves (used in floor heating manifolds)



1998 First manifold with Danfoss built-in valves

2005 CF2 wireless room controls introduced with infrared sensor

2007 Danfoss acquires Jupiter floor heating

1943

Mads Clausen designs the world's first radiator thermostat

1996

World's first wireless room control for floor heating introduced

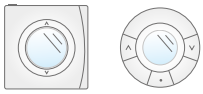
2002

Danfoss acquires PentaCom floor heating and launches its own TWA

2006

Devilink™ is introduced (platform for *Danfoss Link™ CC*)

2011



Launch of *Danfoss Link* floor heating and radiator thermostat

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