

ENGINEERING
TOMORROW

Danfoss

Danfoss control components for district heating

Full range. Right selection
Optimum system performance

5+ mill.

installations worldwide

To date, Danfoss control components are operating inside more than 5 million heating systems and contributing to optimizing energy efficiency.

www.districtenergy.danfoss.com

Make your applications perform better

by having the right components for:

**Weather compensation
and system monitoring**

**Temperature and
control performance**

**Hydronic balancing
of the system**



Application challenges ...

Every district heating system needs to perform with optimum efficiency while providing the best possible environment and comfort for the end-user.

To fulfill these essential requirements, every system operator faces a number of application challenges that need to be resolved in an optimal way.

These challenges relate directly to the essential functions that a district heating system needs to perform, monitor and control to meet its primary purpose: efficiently supplying heat and domestic hot water to the end-user.

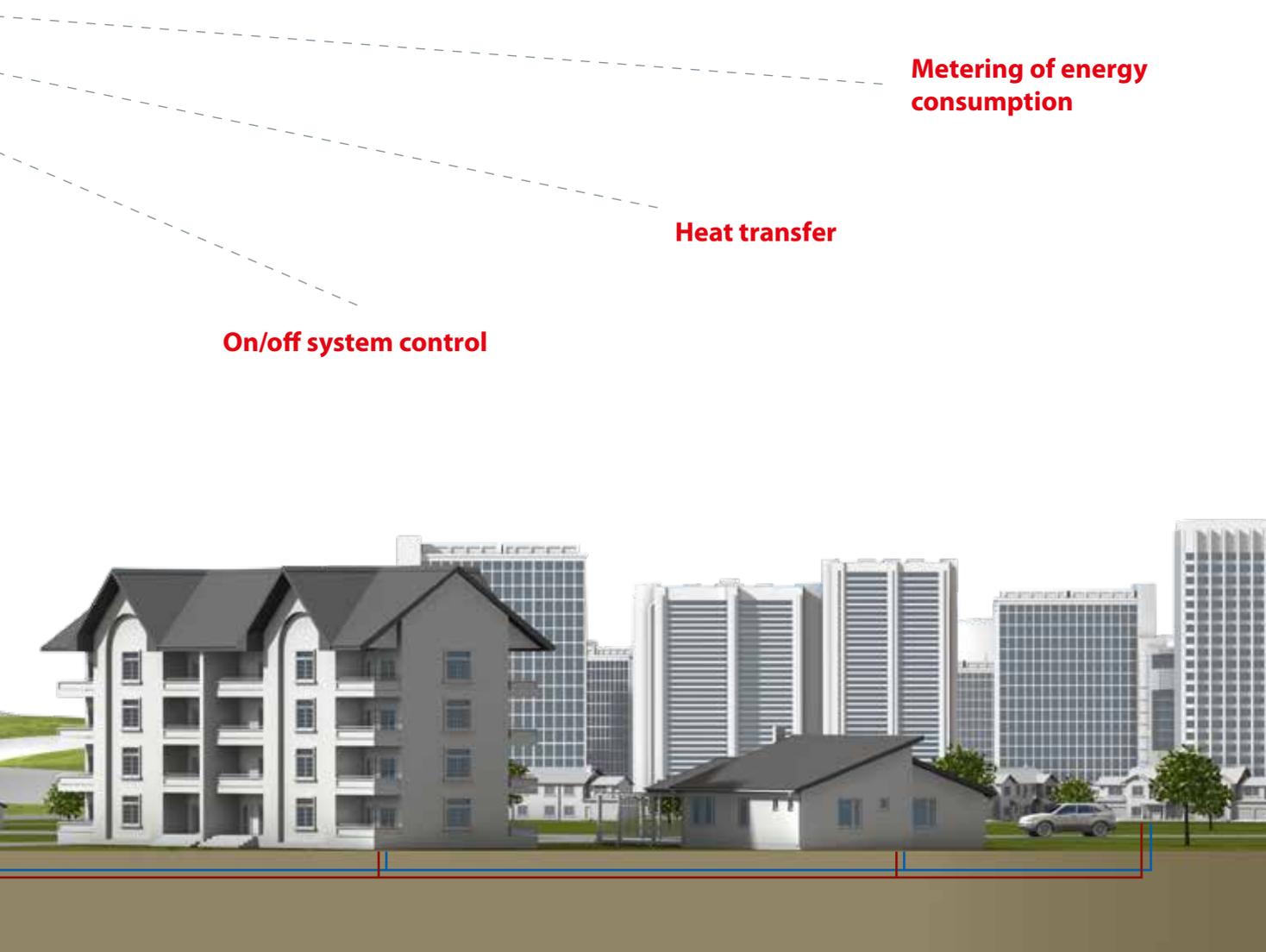
The control and heat transfer functions represent the heart of every district heating system. They enable the operation and delivery of heat from the primary energy source via heat transfer to the secondary side and finally to the end-user. It is this process that enables the thermal living comfort of the premises.

The main task for every provider of district heating is thus to ensure optimum control performance that enables efficient and reliable operation of the entire district heating network. Achieving this also makes environmental sense as it leads to reduced CO₂ emissions.

Everyday challenges

Typical control functions of a district heating system include:

- Weather compensation and system monitoring
- Temperature and control performance
- Hydronic balancing of the system
- On/off system control
- Heat transfer
- Metering of energy consumption



Metering of energy consumption

Heat transfer

On/off system control

... call for the right components

Every district heating system requires certain components to perform its basic function of transferring and distributing heat from the combined heat and power plant to the end-user.

Each component plays a vital role in making this happen in an optimum and energy-efficient way.

Having the right components with the correct specifications and advanced features makes the difference between average and high system performance, reliable operation, energy efficiency and the lifetime cost of the system.

With a track record of more than 75 years and our specialized technological competence, Danfoss is your leading provider of a complete range of control components for any district heating system.

Expand your perspective on district heating components

WEATHER COMPENSATION AND SYSTEM MONITORING



Intelligent weather compensation performed by a correctly commissioned electronic controller optimizes the energy efficiency of a district heating system by reducing the return temperature. This creates energy savings of around 10-15% and longer system life.

A variety of communication options in the electronic controller provide easy-access network communication and monitoring, a clear overview and remote control of all connected controllers in the system.

WEATHER COMPENSATORS

- Electronic temperature controllers
- ECL application keys
- Temperature sensors
- SCADA communication solutions

TEMPERATURE AND CONTROL PERFORMANCE



Precise control performance of the temperature level in the heating system provides proper end-user comfort in the building.

In energy efficiency terms, optimal performance of temperature control can lead to decreasing heat loss and therefore reduced CO₂ emissions.

Good control ratios and rapid response times to changes in domestic hot water requirements are just some of the features needed to ensure optimum control performance. This also applies to motorized control valves and self-acting temperature controllers.

MOTORIZED CONTROL VALVES AND TEMPERATURE CONTROLLERS

- Control valves seated
- Electrical and thermal actuators
- Temperature controllers
- Safety temperature controllers
- Flow-compensated temperature controllers

HYDRONIC BALANCING OF THE SYSTEM



To achieve optimum operational conditions for the heating system, it is very important to provide the system with hydronic balancing.

By controlling the differential pressure and flow within the system, the right hydronic balance is guaranteed. This reduces the flow and heat loss of the system, thus increasing pump performance and ensuring adequate hot water and heat supply to all users.

Differential pressure and flow controllers are the components that provide hydronic balance of system pressure and flow.

PRESSURE AND FLOW CONTROLLERS

- Differential pressure controllers
- Differential pressure controllers and flow/limiter controllers
- Flow controllers with int. control valves
- Pressure relief controllers
- Pressure reduction controllers
- Differential pressure relief controller

ON/OFF SYSTEM CONTROL



In every district heating utility, combined heat and power plant, distribution network and substation, there is a need for on/off control of the building system connection.

The on/off regulation enables the carrying out of service, maintenance and repairs to the system by allowing it to be shut down for a period of time.

Ball valves are the components that provide on/off regulation of the district heating application.

BALL VALVES

- JIP™ steel ball valves for building installation
- JIP™ Underground steel ball valves for pre-insulation

HEAT TRANSFER



The transfer of heat from the district heating utility to the end-user while minimizing temperature reduction is one of the main functions of a heating system.

Wherever heat is exchanged, MicroPlate™ Heat Exchangers can boost system efficiency by improving heat transfer and reducing the need for pump power.

Heat exchangers are the components that perform the function of heat transfer within the district heating system.

PLATE HEAT EXCHANGERS

- Brazed 1-pass MicroPlate™ heat exchanger
- Brazed 2-pass MicroPlate™ heat exchanger
- Gasketed heat exchangers (MicroPlate™ and Fishbone)

METERING OF ENERGY CONSUMPTION



With the increasing focus on energy savings and reducing CO₂ emissions, measuring energy consumption is now a key focus of any district heating provider and end-user.

Energy consumption data ensures a transparent billing system for both district heating supplier and end-user. By metering energy consumption, it is easy to keep track of the energy performance of any heating, district heating or cooling system.

Energy meters are the components that provide energy consumption measurement.

ENERGY METERS

- Energy meter
- Ultrasonic flow sensor
- Calculator



Intelligent weather compensation Ensures system control and high performance

Electronic Controllers ECL Comfort



Danfoss has a long tradition of producing electronic controllers for district heating. Based on the success and benefits of previous generations, the latest 7th generation of Danfoss controllers – ECL Comfort 210 and 310 – ensure comfort and convenience for heating, cooling and domestic hot water systems.

Our ECL controllers comply with market standards and demands and integrate seamlessly with key system components from Danfoss and other suppliers. Add to this the fact that installing, commissioning, servicing and upgrading ECL controllers can be done swiftly and efficiently, and you will see a sound return on investment.

Less is more – benefits for you

The Danfoss ECL Comfort controller looks simple but works smarter, adding more

performance than you would expect. For example, you can save on installation and commissioning time, reduce unplanned maintenance, benefit from a shorter learning curve and reduce energy consumption.

The key to avoiding potential headaches

The ECL Comfort controller is matched with a full range of ECL Application Keys. Each Application Key is programmed with specific parameters for a particular district heating or cooling application.

The ingenious ECL Application Key makes it easier than ever to install and set up your heating system application in the ECL controller – all without any need for advanced programming.



Engineered simplicity

Where most controllers for heating systems tend to become increasingly difficult to operate, Danfoss has taken a new turn. With the ECL Comfort controllers, setting up and operating the heating installation has never been easier or more straightforward. With the ECL controller or ECA remote control unit, all navigation and interaction takes place by turning and pushing the dial on the front panel.

ECL COMFORT 310

The ECL Comfort 310 is the advanced electronic controller for weather compensation in district heating, central heating and cooling systems. The ECL Comfort 310 offers state-of-the-art options for communication interfaces, like Modbus, M-Bus, Internet and USB for service purposes.





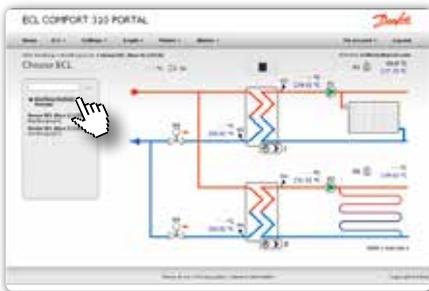
SCADA communication solutions for ECL Controllers

ECL Portal

Access your ECL controllers via PC or smartphone. The ECL Portal application for the electronic controller ECL Comfort 310 is an easy-to-use SCADA tool for controlling your district heating system. ECL Portal enables you to streamline service, commissioning and maintenance – directly from your PC or smartphone, wherever you are.



ECL Portal*

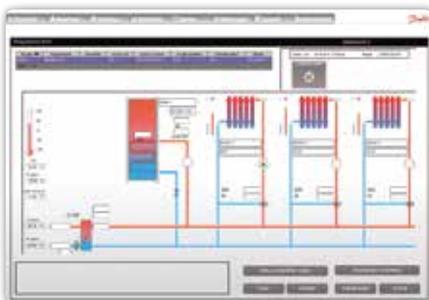


The Danfoss ECL Portal is an effective turnkey SCADA tool for service personnel of district energy stations to streamline service, commissioning, maintenance and control tasks.

This web-based SCADA solution requires no local server and will automatically configure its user interface and functionality to support the application in the controller.

With the ECL Portal, you can monitor and control one or more ECL Comfort 310 controllers remotely from a PC or smartphone app.

DECS 2.0*

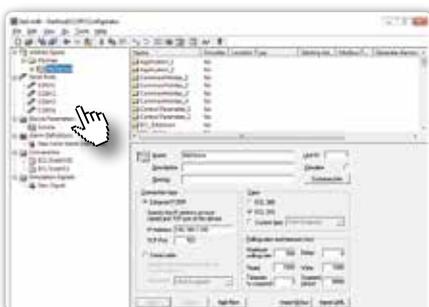


The Danfoss Energy Control System (DECS) is a web-based, easy-to-use SCADA solution ready for biomass heating systems.

This SCADA solution can be installed locally at the heating utility and will automatically configure its user interface and functionality to support the application in the controller.

Our ECL Comfort 310 and APEX 20 controllers can be monitored and controlled remotely using this solution.

OPC Server



The Danfoss OPC Server is compliant with most SCADA clients and lets you quickly connect and configure the ECL controller as a device in a SCADA system.

The OPC Server supports standard Modbus communication protocols via RS485 and/or Ethernet, as well as special read/write algorithms to increase throughput to/from the ECL Comfort 310 controller.

The OPC Server package also includes a Configurator utility that significantly eases the configuration of the OPC Server.

* Available in selected countries



Precise temperature control brings increased comfort and system energy savings

Motorized Control Valves



The range of Danfoss motorized control valves (MCV) for district heating is applicable for use in water- and glycol-based heating and cooling systems. The MCVs ensure stable and accurate control of water. This in turn improves temperature control, leading to enhanced comfort for the end-user. The MCV range comprises both regular and pressure-relieved valves operating with high differential pressures.

Excellent control performance

Control capabilities included in the range of motorized control valves are based on different control characteristics, including split characteristics appropriate for DHW applications using heat exchangers, as well as linear and logarithmic characteristics. This means that even the most difficult control requirements in district heating can be

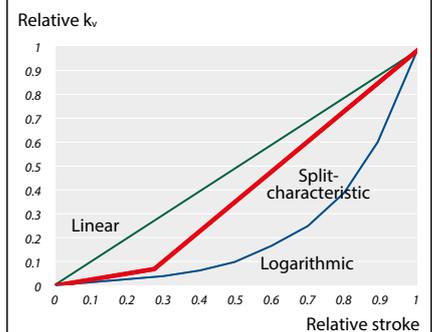
met, while still providing instantaneous hot water.

For DHW systems, the low slope of the split characteristic in this part of the stroke ensures stable control of the valve in the critical area near the closing position. The steeper part of the characteristic (large flow), on the other hand, enables fast and stable control.

Easy handling and installation

Easy to handle, easy to operate and easy to understand – these are distinctive properties of our product range. Quick and easy connection of actuator and valve is enabled by a threaded coupling, which also allows for rotations after mounting. External LED visualization and signaling save time and effort during installation and commissioning of MCVs.

Relative characteristic comparison



AME 655

The electrical actuator AMV(E) 655 can be controlled by electronic controllers with modulating or 3-point control output in heating, district heating and cooling systems.

- Power supply: 24/230 V AC (50/60 Hz)
- Force: 2000 N / Stroke: 50 mm
- Speed (selectable): 3 or 6 s/mm
- Max. medium temperature: 200°C





Precise temperature control ensures system stability and room comfort

Temperature Controllers

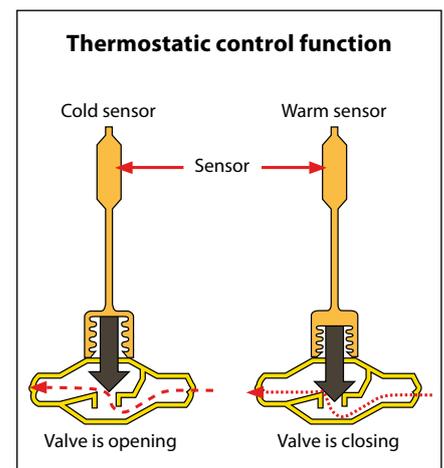


Danfoss offers a complete range of self-acting temperature controllers, which can be used as return temperature limiters and Domestic Hot Water controls. Temperature controllers provide precise temperature control that ensures correct temperatures in your system. Danfoss self-acting controllers are offered in modular formats, such as controller + safety thermostat, and also feature safety functions that meet DIN standards.

Function of the controller

Self-acting thermostats basically consist of a sensor and a bellows element, connected via a capillary tube. When the sensor registers a temperature change, the pressure changes in the charge. The spindle then moves the valve cone.

- Small and compact sensor design ensuring fast and stable temperature control
- Pressure-relieved valves improve temperature performance at varying differential pressure
- Easy to set and read the temperature setting
- Two temperature controllers (standard and safety thermostat) operating one control valve
- Flow-compensated temperature controller for instantaneous DHW control in combination with high-performance Danfoss plate heat exchanger
- Fast opening and closing performance minimizes the risk of calcium deposits forming in the plate heat exchanger
- Idle temperature control when there is no DHW consumption.



IHPT

IHPT is a state-of-the-art compensated temperature controller with built-in differential pressure controller. It was developed to control instantaneous heating of domestic hot water by means of a heat exchanger.

- k_{vs} : 2.4, 3.0 m³/h
- DN 15 mm; PN 16 bar
- Setting range: 45... 65°C
- Temperature range: 2... 120°C
- Connections: Union nut





Differential pressure and flow control provides hydronic balancing of the DH system

Differential Pressure and Flow Controllers



For use in heating, district heating and cooling systems, Danfoss offers a comprehensive range of self-acting controllers, suitable for all types of applications.

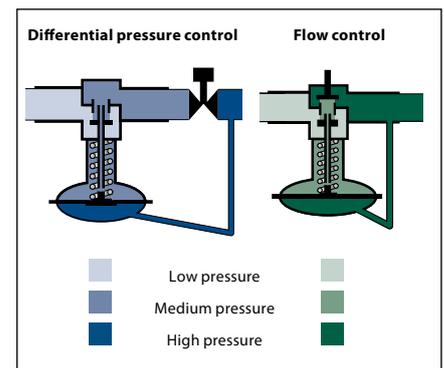
Main control functions:

- Differential pressure control
- Flow control and limitation
- Combination of differential pressure and flow control
- Combination of differential pressure, flow and temperature control

Hydronic balancing of the district heating network provided by the self-acting controllers through flow and differential pressure ensures adequate heat supply to all subscriber stations, reduces flow and heat loss in the network and increases pump performance.

Self-acting controls maintain constant differential pressure (Δp) across the control valve. This ensures the adequate pressure conditions assumed at control valve sizing and enables accurate temperature control and low return temperature, as well as prolonging the life of the control equipment.

Low differential pressure (Δp) across the control valve provided by Danfoss self-acting controllers prevents cavitation and reduces noise emission in the system.



AVQM

Self-acting flow controller with integrated control valve, primarily for use in district heating systems. The controller has a control valve with adjustable flow restrictor, a connection neck for electrical actuator and an actuator with one control diaphragm.

- DN 15-50 mm; PN 16, 25 bar
- k_{vs} : 0,4-25 m³/h
- Flow range: 0,015-15 m³/h
- Flow restrictor Δp : 0,2 bar
- Connections: Ext. thread (weld-on, thread and flange tailpieces), Flange





Effective transfer of heat provides system efficiency and energy saving

Plate Heat Exchangers



Danfoss produces the entire range of both brazed and gasketed plate heat exchangers for district heating and cooling applications. Danfoss has developed a totally new plate design for its brazed heat exchangers called MPHE™ – MicroPlate™ Heat Exchangers.

Thanks to a unique plate pattern design, our new MPHEs give you an excellent route to better performance and lower environmental impact. By improving the flow of fluids across the plate and utilization of the surface area, MPHEs enable much better heat transfer.

Up to 10% enhanced heat transfer

Thanks to the new plate design, the difference between the fastest and slowest flowing areas is only x3, leading to enhancement of the heat transfer rate by 10%.

Up to 35% lower pressure loss

Thanks to the unique plate design, the way that water is distributed inside the MPHE also reduces pressure loss. This means less energy is needed to drive the water round the system and consequently reduces running costs.

Longer life time

The improved design results in less wear and smoother operation, thus extending the lifetime of the product.

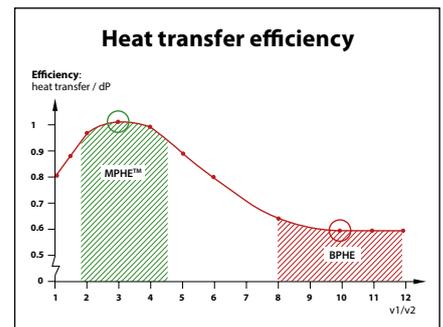
With MicroPlate™ Heat Exchangers, you simply get:

- Energy and cost savings
- Better heat transfer
- Lower pressure loss
- More flexible design
- Longer life time



MicroPlate™ Heat Exchangers

Traditional Fishbone Heat Exchangers



BRAZED MPHE™

The XB series is a range of copper-brazed plate heat exchangers for use in District Heating (DH) and District Cooling (DC) applications that offer a compact design and excellent heat transfer properties.

- Min. / max. temperature: -10°C / +180°C
- Max. working pressure: 25 bar
- Connection size DN (threaded or flanged): 20...100 mm





Perfect shut-off function ensures easy system maintenance and on/off regulation

JIP™ Ball Valves



Danfoss offer a complete range of steel ball valves for any type of heating or district heating application. The range is divided in steel ball valves for building or underground installation, available in different connection types.

Up to 30% energy saving and low operating costs

Danfoss' unique flow design of the ball valves ensures low pressure drop and low pump power consumption, resulting in less energy use and reduced operating costs.

No external leakage – extended lifetime

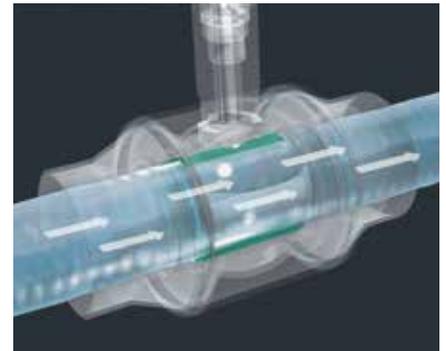
Danfoss ball valves feature life-long external tightness, even at high and changing temperatures, thanks to a unique PTFE/carbon stem packing box that prevents external leakage.

No internal leakage during lifetime

A sophisticated spring construction provides optimum internal tightness and ensures Class A leakage rates throughout the product's lifetime.

Always easy to operate

Danfoss JIP™ ball valves are always easy to open and close due to independence from axial forces and a unique break loose system.



JIP™ STANDARD BALL VALVES

JIP™ standard ball valves are used for on/off district heating system control. They are offered with flanged or flange/welded connections.

- ON/OFF valves
- Nominal diameter DN: 15-600 mm
- Temperature range: 0-180°C
- Nominal pressure PN: 16 / 25 / 40 bar
- Handle, worm gear or electric actuator





Monitoring of energy consumption provides better energy performance

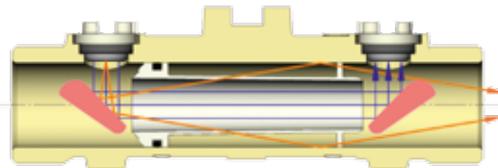
Energy Meters



Energy meters make it easy to keep track of the energy performance of any heating, district heating or cooling system. With the increased focus on energy saving and individual billing according to consumption, this system improves customer satisfaction and retention.

Danfoss SONOMETER™ energy meters use patented ultrasonic technology that guarantees highly accurate and reliable measurement and long-term stability. The robust and dirt-resistant design makes it very service friendly. The meters ensure low cost of ownership in all areas.

Unlimited system capability makes SONOMETER™ the perfect meter for smart metering. Data transmission by wire or radio provides simple energy data management. No hardware changes or



reconfiguration are necessary for adapting to different system engineering.

To achieve optimum control and full performance of your heating and cooling system, Danfoss recommends combining the use of the energy meter with an electronic ECL Comfort controller, temperature sensors and motorized control valves.

Core features of SONOMETER™:

- MID (EN 1434) class 2 approval
- Remote reading via M-Bus, L-Bus, RS 232, RS 485, Radio or optical interface

- Integrated Radio 868 MHz with Open Metering Standard (OMS)
- Individual remote reading (Automatic Meter Reading) with add-on modules Plug&Play
- 2 communication ports (e.g. M-Bus + M-Bus)
- Improved radio performance
- Dedicated district heating application telegram
- Suitable for Danfoss ECL Comfort controller and ECL Comfort internet portal connection

SONOMETER™ 1100

The SONOMETER™1100 is an ultrasonic static compact energy meter especially designed for heating, cooling or combined heating/cooling application in local and district energy systems.

Consists of the following components:

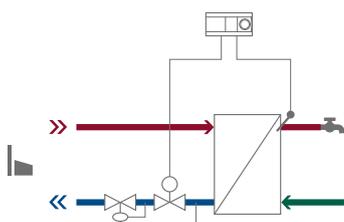
- Ultrasonic flow sensor
- Calculator with integral hardware and software for measuring flow rate, temperature and energy consumption
- Pair of temperature sensors



Find the matching
component combination
for your application solution

**We cover all application areas,
from a single family house to
residential, commercial build-
ings and distribution stations.**

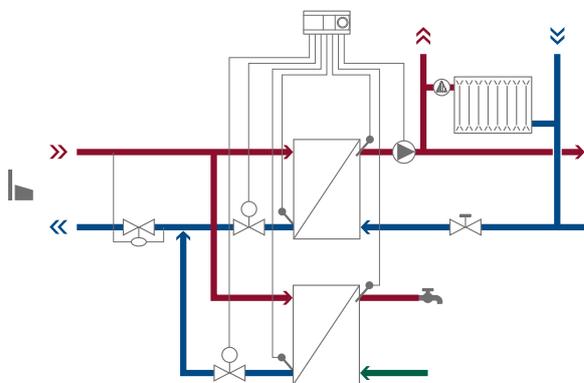
 **SINGLE FAMILY HOUSE SYSTEM**



COMPONENT LIST

- WEATHER COMPENSATION
- COMMUNICATION / MONITORING
- DHW
- HEATING
- COMMON
- HEAT EXCHANGER
- BALL VALVES

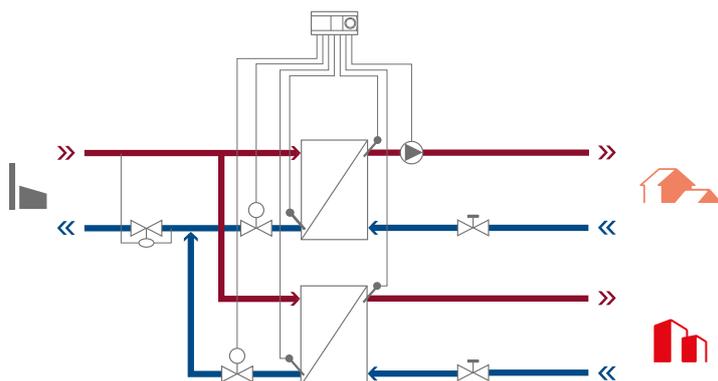
 **RESIDENTIAL/COMMERCIAL BUILDING SYSTEM**



COMPONENT LIST

- WEATHER COMPENSATION
- COMMUNICATION / MONITORING
- DHW
- HEATING
- COMMON
- HEAT EXCHANGER
- BALL VALVES

 **CENTRAL/DISTRIBUTION STATION SYSTEM**



COMPONENT LIST

- WEATHER COMPENSATION
- COMMUNICATION / MONITORING
- DHW
- HEATING
- COMMON
- HEAT EXCHANGER
- BALL VALVES

LIGHT

Small-to-medium sized systems,
Self-acting or Electronic DHW
T < 120°C, dp < 4 bar

MEDIUM

Medium sized systems,
Electronic DHW,
T > 120°C, dp > 4 bar

ADVANCED

Large systems,
Electronic DHW,
T > 120°C, dp > 4 bar

Control type		Control type		Control type		Control type	
	ECL110		ECL210 (or ECL310)		ECL210 (or ECL310)		ECL310
	-		(ECL Portal or DECS2.0)		(ECL Portal or DECS2.0)		ECL Portal or DECS2.0
T	IHPT	T,P	IHPT	T,P,Q	AVQM / AMV 33	T	VM 2 / AMV 33
T	VS2 / AMV 10	T,P,Q	AHQM / AMV 10	T,P,Q	AVQM / AMV 10	T	VS 2 / AMV 10
P	AVPL or AHP		-		-	P,Q	AVPQ
	XB		XB		XB		XB
	-		JIP WW		JIP WW		JIP WW

Control type		Control type		Control type		Control type	
	ECL210		ECL210 (or ECL310)		ECL310		ECL310
	-		(ECL Portal or DECS2.0)		ECL Portal or DECS2.0		ECL Portal or DECS2.0
T	AVT / VG 2	T	VM 2 / AMV 33	T,P,Q	AVQM / AMV 33	T	VB 2 / AMV 33
T	VM 2 / AMV 20	T	VM 2 / AMV 20	T,P,Q	AVQM / AMV 20	T	VFM 2 / AMV 655
P	AVPL or AHP	P	AVP		-	P,Q	VFQ 2 / AFPQ
	XB and/or XG		XB and/or XG		XB and/or XG		XB and/or XG
	VFY		JIP WW		JIP FF		JIP FF

Control type		Control type		Control type	
	ECL 310		ECL 310		ECL310/ECL APEX 20
	OPC, ECL Portal or DECS2.0		OPC, ECL Portal or DECS2.0		OPC, ECL Portal or DECS2.0
T	VF2 / AMV 56	T,P,Q	AFQM* / AME 658	T	VFM 2 / AME 658
T	VF2 / AMV 55	T,P,Q	AFQM* / AME 655	T	VFM 2 / AME 655
P	VFG2 / AFP		-	P,Q	VFQ 2 / AFPQ or PCVPQ
	XB and/or XG		XB and/or XG		XB and/or XG
	JIP WW		JIP FF		JIP FF

T: Temperature control

P: Differential pressure control

Q: Flow limitation

***:** For PN25 adapter needed



Technical tables

Electronic controllers

Electronic controllers, ECL Comfort

ECL Comfort		ECL Application Key designation	Application and system type	Circuit types			Domestic hot water (DHW)			Reference to previous ECL cards (ECL Comfort 200/300)
ECL 210	ECL 310			Heating	Cooling	DHW	Storage with internal heat exchanger	Storage with charging	DHW control with HEX	
■	■	A214	DH/DC (Vent)							C14
■	■	A217	DH							P16, P17, C17
■	■	A230	DH/DC	¹⁾	¹⁾					P30, C12, C30, L10 ²⁾
■	■	A231	DH							-
■	■	A232 ²⁾	DH/DC							L32
■	■	A237	DH							C35, C37
■	■	A247	DH							C47
■	■	A260	DH							C60, C62
■	■	A266	DH							C66, F11
■	■	A275	BOILER							P20, C25, C55, C75
	■	A333	DH							-
	■	A361	DH							-
	■	A367	DH							C67
	■	A368	DH							-
	■	A376	DH							L76
	■	A377	DH							-

Legend for ECL Application Key designation:

- A = Application Key
- 2 = Suitable for ECL Comfort 210 and 310
- 3 = Only suitable for ECL Comfort 310
- xx = Specific application type

Abbreviations:

DH (district heating); DC (district cooling)

Notes:

- ¹⁾ Either heating or cooling
- ²⁾ Coming later



Technical tables

Motorized control valves

Temperature controllers

Motorized control valves

Valves	VS2	VM2/VB2	VFG2	VFM2	VRG/B	VFS/VF2/VF3
System side	Primary			Secondary		
DN [mm]	15-25	15-50	15-250	65-250	15-50	15-100/15-150/15-150
PN [bar]	16	25	16/25/40	16	16	16/25
Max temp. [°C]	130	150	140-350	150	130	130-200
Connection	Thread	Thread / Flange	Flange	Flange	Thread	Flange
Actuators						
AMV 150	X ⁴⁾					
AMV(E) 10 / 20 / 30	X	X				
AMV(E) 13¹⁾ / 23¹⁾ / 33¹⁾	X	X				
AMV(E) 435					X	X ⁶⁾
AMV(E) 55 / 56						X ²⁾
AMV(E) 655 / 658 / 659¹⁾			X ⁵⁾	X ⁷⁾		X
AMV(E) 85 / 86				X		X

¹⁾ Safety function according to DIN 14597

²⁾ Applicable for valves DN 65-100/150

³⁾ Only together with AMV(E)10

⁴⁾ VS2, DN15 only

⁵⁾ With adapter

⁶⁾ Applicable for valves up to DN 80

⁷⁾ Applicable for up to DN 125

Temperature controllers

Actuators	RAVK, RAVI	AVTQ ⁽¹⁾	IHPT	AVTB ¹⁾ , AVT	AFT ²⁾	FJV ¹⁾	STM, STFW	AVT
Valves	RAV, VMT, VMA, VMV			VG	VFG 2 (1)		VG 2, VFG (1)	AVTQ, AVQMT, AVPQT
DN [mm]	15-25	15-20	15	15-25/15-50	15-125	15-25	15-50/15-125	15-50
PN [bar]	10-16	16	16	16/25	16/25/40	16	16/25/40	25
Max. hot water temp. [°C]	120/130	100	120	130/150	150/200	130	150/200	150
Connection	Thread	Thread	Thread	Thread / Flange	Flange	Thread	Thread / Flange	Thread / Flange
Fixed idle temp. [°C]	35-40							
Temp. control	x	x	x	x	x			x
Return temp. limitation						x		x
Safety temp. limitation							x	x
Flow compensation		x	x					
Diff. pressure and flow limiter								x
Flow controller								

¹⁾ Type designation covers a complete controller.

²⁾ The temperature controllers type AVT and AFT can also be supplied with safety temperature monitors and limiters as combined solutions operating the same valve. Safety temperature monitors and limiters are approved according to DIN standards.



Technical tables

Pressure and flow controllers

Self-acting pressure and flow controllers

Actuators	AVPL ¹⁾ AHP ¹⁾	AVP ¹⁾ AFP	AVQ ¹⁾ AFQ	AVPB ¹⁾ AFPB	AVPQ(4) ¹⁾ AFPQ(4)	AHQM ¹⁾	AVQM ¹⁾ AFQM ¹⁾	AVA ¹⁾ AFA	AVPA ¹⁾ AFPA	AVD ¹⁾ AFD	PCV ^{1) 2)}
Valves		VFG 2(1)	VFQ 2	VFQ 2	VFQ 2			VFG 2(1)	VFG 2(1)	VFG 2(1)	
PN [bar]	16	16/25/40	16/25/40	16/25/40	16/25/40	16	16/25/40	16/25/40	16/25/40	16/25/40	16/25/40
DN [mm]	15 15-100	15-50 15-250	15-50 15-250	15-50 15-125	15-50 15-250	15-100	15-50 40-250	15-50 15-250	15-50 15-250	15-50 15-250	100-250 ³⁾
Max diff. pressure [bar] ⁴⁾	4.5/2.5	12/16/20	12/16/20	12/16/20	12/16/20	4	12/16/20	12/16/20	12/16/20	12/16/20	10/12/15
Max. media temp. [°C]	120	150/200	150/200	150/200	150/200	120	150	150/200	150/200	150/200	150/ 200/300
Connection	Thread / Flange										Flange
Diff. pressure control [P]	X	X		X	X	(X) ⁵⁾	(X) ⁵⁾				X
Flow control [Q]			X		X	X	X				X
Flow limitation [B]				X							
Motorized control [M]						X	X				
Pressure relief [A]								X	X		X
Pressure reduction [D]										X	X

¹⁾ Type designation covers a complete controller

²⁾ The pilot-controlled valves (PCV) can be equipped with one or several pilot controllers for the requested functions

³⁾ Smaller dimensions (DN) available as well

⁴⁾ Max diff. pressure depends on DN

⁵⁾ Controller has differential pressure controller already built in , it controls constant differential pressure over control valve built in A_QM

Note: Controllers with fixed differential pressure setting are also available but are not mentioned in the matrix



Brazed heat exchangers

Type name	Connection size [DN]	Connection type	Width [mm]	Length [mm]	Max design pressure [bar]	Max working temperature [°C]
XB 04	3/4"	Thread	93	296	25	180
XB 05	3/4"	Thread	76	312		
XB 06	3/4"	Thread	95	320		
XB 10	1"	Thread	118	288		
XB 20	1"	Thread	118	338		
XB 24	3/4"	Thread	93	490		
XB 30	1"	Thread	118	438		
XB 37	1"	Thread	119	525		
XB 51	2"	Thread+flange	253	462		
XB 59	2"	Thread	188	613		
XB 61	2"	Thread+flange	243	525		
XB 66	2½"	Flange	296	706		
XB 70	65/100	Flange	365	991		

Gasketed heat exchangers

XG 10	1"	Thread	158	310	16	150
XG 14	1¼"	Thread	200	560		
XG 18	1¼"	Thread	200	760		
XG 20	2"	Thread	300	835		
XG 30	65	Flange	360	910		
XG 31	65	Flange	360	910		
XGM 032	32	Thread	160	600		
XGF 100-34	100	Flange	510	1185		
XGF 100-35	100	Flange	510	1185		
XGF 100-50	100	Flange	510	1603		
XGF 100-66	100	Flange	510	2021		
XGC 008	32	Thread	180	774	25	
XGC 009	40	Thread	250	725		
XGC 013	50	Thread	320	832		
XGC 016	50	Thread	320	832		
XGC 026	100	Flange	450	1265		
XGC 042	100	Flange	450	1520		
XGC 044	100	Flange	450	1675		
XGC 051	150	Flange	585	1730		
XGC 054	150	Flange	630	1730		
XGC 091	150	Flange	626	2390		
XGC 118	150	Flange	626	2870		
XGC 060	200	Flange	825	1700		
XGC 100	200	Flange	825	2280		
XGC 140	200	Flange	825	2860		
XGC 085	300	Flange	1060	1985		
XGC 145	300	Flange	1060	2565		
XGC 205	300	Flange	1060	3215		
XGC 265	300	Flange	1060	3795		
XGC 325	300	Flange	1060	4375		
XGC 230	500	Flange	1510	3172		
XGC 330	500	Flange	1510	3782		
XGC 430	500	Flange	1510	4392		



Technical tables JIP™ ball valves

JIP™ ball valves for building installation

Type	DN [mm]	PN [bar]	Max temp. [°C]	Connection type
JIP™ Standard	15-50	40	180°C	Welded/Welded
	65-600	25		
	15-50	40		Flange/Flange, Flange/Welded
	65-600	16 / 25		
	15-50	40		
JIP™ Full bore	15-50	40	180°C	Welded/Welded
	65-400	25		
	15-50	40		Flange/Flange, Flange/Welded
	65-400	16 / 25		
	20-50	40		
JIP™ House Insertions (Twins)	15-50	40	180°C	Welded/Welded, Internal thread/ Welded Internal thread/Internal thread,
JIP™ Copper	15-50	10 / 16	130°C	Copper, Copper/Welding, Internal thread/Welding
JIP™ Specials	15-50	40	180°C	Detachable ends, Welding/External thread

JIP™ underground ball valves for pre-insulation

Type	DN [mm]	PN [bar]	Max temp. [°C]	Connection type	Actuation
JIP™ Underground	20-600	25	180°C	Welded/Welded	Hexagon stem (T-Handle)
					Gear Flange
					Worm and Bevel Gear
JIP™ Service Valves	20-100	25	180°C	Welded	Hexagon
JIP™ Hot Tap	20-50	40	180°C	Welded/Welded	Allen key, L-handle
	65-100	25			
JIP™ Branching	20-50	40	180°C	Welded/Welded,	Allen key. Hexagon
	65-100	25		Internal thread/Welded	



Energy meters, Sonometer™

Nominal flow rate q_p [m ³ /h] ¹⁾	0.6	1.00	1.5	2.5	3.5	6	10	15	25	40	60
Maximum flow rate q_s [m ³ /h]	1.2	2	3	5	7	12	20	30	50	80	120
Standard minimum flow rate q_i [l/h]	6	10	15	25	35	60	100	150	250	400	600
Extended minimum flow rate q_i [l/h] ²⁾			6	10		24	40	60	100	160	240
Starting flow rate [l/h]	1	2.5	2.5	4	7	7	20	40	50	80	120
DN [mm]	15/20		20		25/32		40	50	65	80	100
PN [bar]	16/25				25						
Overall length [mm]	110/130/190			130/190	260	300	270	300	300	360	
Flow sensor temp. range [°C]	heating	5-130				5-150					
	cooling	5-50				5-50					
	heating/ cooling	5-105				5-105					

¹⁾ Bigger sizes up to 18,000 m³/h of SONOMETER™ 3100. Available on request.

²⁾ Extended minimum flow rate for dynamic range of 1:250. Available on request.



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... excellence?

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