

ENGINEERING
TOMORROW

Danfoss

Virtus

Shaped for the future

Digital empowered heavy duty pressure and flow controllers for district heating and cooling networks.

20%

of energy saving
potential using
hydraulic balancing
controls

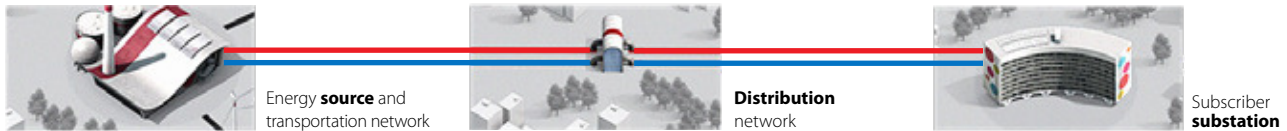


virtus.danfoss.com

Explore Virtus; innovative optimization of district energy networks

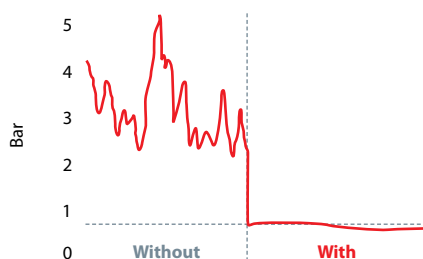
– from energy generation to building application.

Optimal hydronic balance and perfect temperature control is the key to maximizing efficiency of heating and cooling networks. With that it also means that you are saving energy, money and improving end-users' comfort. To help achieve your goals, Danfoss developed a range of heavy duty differential pressure and flow controllers for most demanding district heating and cooling applications, named **Virtus**. They are designed to be used in energy source, transportation network, distribution network and subscriber substation.



Benefits of Virtus

Differential pressure variation without and with Virtus dp control



Perfect control & stability

Efficient network hydronic balancing and ΔT optimization with advanced pressure- and flow controllers

Design without dynamic sealing between cone and valve body ensures low hysteresis and optimal inner pressure conditions and balancing. Split characteristic and high control ratio for improved control and accuracy.

Perfect hydronic balancing of your system improves ΔT and leads to economical balance between temperature and flow. Operational costs will be reduced, system efficiency improved.

Primary energy generation cost will be reduced for min. 1% for each 3° of ΔT increase.



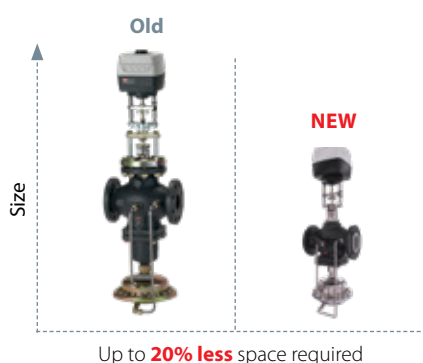
Big flow capacities

Big flow capacities and optimal network design reduces investment costs and improves network efficiency

Danfoss' Virtus pressure and flow controllers with big flow capacities are able to control the pressures and flows even in largest and most demanding district heating and cooling systems where big heat/cold is required.

By use of smaller valve DN with "XXL" flow capacity and by proper network planning and dimensioning, **investment could be reduced for up to 17%**, compared to traditional design. Therefore, Virtus has the best-in-class flow/investment ratio.

Compact size



Easy installation, commissioning & maintenance

Optimal network design & low investment costs with new compact pressure and flow controllers

Compact chamber balanced design and multiple installation positions can help to **save for up to 20% of the installation space** and help to design the network more optimally. No tool flow adjustment, easy flow/ Δp setting and visible indicator means trouble free commissioning and setting where operational parameters are always under control.

Trouble free installation, commissioning, adjustment and operation will result in **reduced installation, maintenance and operational costs.**

Network optimization with iSET and iNET

Maximize energy production and improve network efficiency

Optimize ΔT , minimize production and distribution cost and provide best quality of supply with state-of-the-art iSET and iNET intelligent actuators.

Intelligent substation efficiency optimization with iSET

ΔT optimization without oscillations

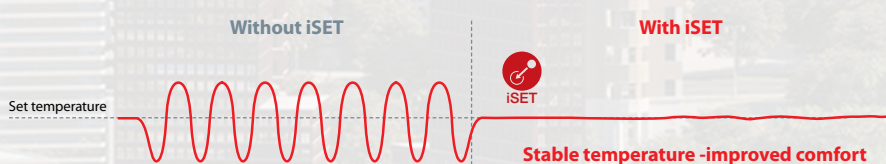


iSET eliminates the temperature fluctuations in the building connected to district energy network by automatic adjustment of differential pressure (Δp) over the motorized control valve (MCV) in substation. Control valve then operates in optimal mode which reflects in precise and stable temperature at consumer and longer lifetime of equipment.

How auto stabilization function works

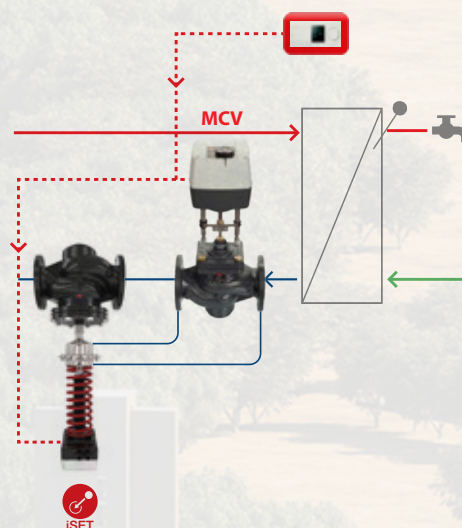
Monitors control signal level \rightarrow In case of oscillating signal and low MCV opening, iSET adjusts the Δp over the MCV \rightarrow MCV operates at bigger valve openings

Temperature at consumer



Benefits of iSET:

- Lower return temperature on primary network side
- Perfect balance of temperature and flow in a real-time mode
- Stable temperature-improved comfort for consumers
- Reduced operational cost for energy provider, especially in dynamic DHC systems
- Longer lifetime of installed equipment



Intelligent network balancing with iNET

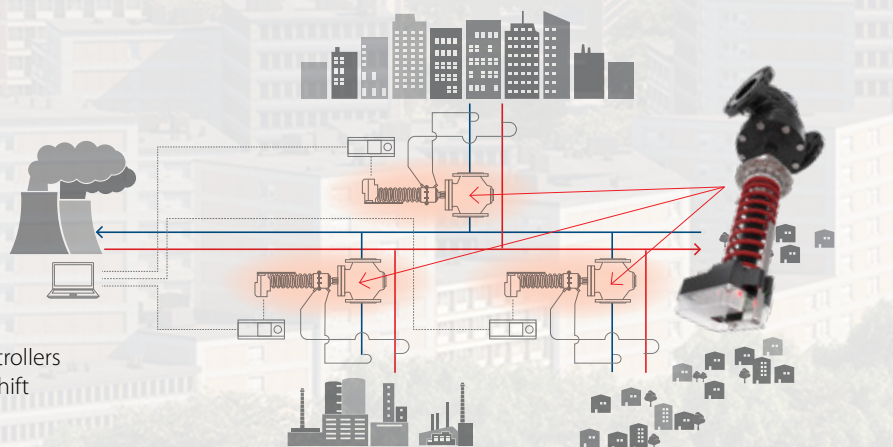
Pumping cost reduction and peak load management



iNET remote network balancing function enables remote Δp adjustment at the single branch level. This is the solution for continually changing heat consumption which requires changes in heat distribution. In order to provide optimal input for the pumps, Δp should be optimized at each branch. The remote control can, for example, be established with Danfoss *Leanheat® Monitor* and *ECL controller*.








Benefits of iNET:

- Lower pumping costs
- Easier operators work due to remotely controlled controllers
- Automatically resolved problems with critical points shift







Virtus product range overview and characteristics

Complete product range in dimensions from DN65 to DN250, PN 16, 25 & 40.

Type of control	Product type	PN [bar]	DN [mm]	Setting range Δp control / p reduction [bar]	Range of max. flow setting [m ³ / h]	Kvs [m ³ /h]	Max Δp_v [bar]	Max temperature [°C]	Mounting options
Differential pressure control (P)	 AFP 2+ VFG 22(221) ¹⁾	16/25/40	65-250	0,1-5	–	60-800	10-20	150	Flow and return
Differential pressure control with max flow limitation (PB)	 AFPB 2+ VFQ 22	16/25/40	65-250	0,1-1,5	28-500	60-800	10-20	150	Return
Flow control (Q)	 AFQ 2+ VFQ 22	16/25/40	65-250	–	28-500	–	10-20	150	Flow and return
Pressure relief control (A, PA)	 AFA 2+ VFG 22(221)	16/25/40	65-250	0,1-16	–	60-800	10-20	150	Bypass
	 AFPA 2+ VFG 22(221) ¹⁾	16/25/40	65-250	0,1-6	–	60-800	10-20	150	Bypass
Pressure reduction (D)	 AFD 2+ VFG 22(221) ¹⁾	16/25/40	65-250	0,1-16	–	60-800	10-20	150	Flow
Different pressure and flow control (PQ)	 AFPQ 2(4)+ VFQ 22	16/25/40	65-250	0,2-1,5	28-500	60-800	10-20	150	Flow and return
Pressure control valves with flow limiter (QM)	 AFQM 2	16/25/40	65-250	–	28-500	–	10-20	150	Flow and return
Pressure independent control valve with flow limiter – variable setting (QMP)	 AFQMP 2	16/25/40	65-250	0,1-1,0	27-630	–	10-20	150	Flow and return

iSET and iNET intelligent actuators for combination with AFP/D/A 2 and AFQMP 2

 	AMEI 6 iSET el. actuator 230 V	Intelligent actuator with iSET function
	AMEI 6 iSET el. actuator 24 V	
 	AMEI 6 iNET el. actuator 230 V	Intelligent actuator with iNET function
	AMEI 6 iNET el. actuator 24 V	

¹⁾VFG 22 metal sealing cone; VFQ 221 soft sealing cone

Danfoss A/S

Climate Solutions • danfoss.com • +45 7488 2222

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