Data sheet

Pressure flow controllers

AFA 2 / VFG 2(1) / VFG 22(1)

Pressure relief controller

Description

The controller is a self-acting pressure relief controller primarily for use in district heating systems. The controller is normally closed and opens on rising pressure.

The controller has a control valve, an actuator with one control diaphragm and a spring(s) for pressure setting.

Further on two valve versions are available:
- VFG 2 / VFG 22 with metallic sealing cone
- VFG 21 / VFG 221 with soft sealing cone

Together with Danfoss intelligent electrical actuator AMEi 6 intelligent optimization functions are available:
- iNET-intelligent network balancing

Main data:
- DN 15-250
- k_{VS} 4.0-800 m^3/h
- PN 16, 25, 40
- Setting range:
  - 0.1-0.4 bar / 0.2-0.8 bar / 0.3-1.5 bar / 1-3 bar / 0.5-3 bar / 1.5-6 bar / 4-14 bar / 10-16 bar
- Temperature:
  - Circulation water / glycolic water up to 30 %: 2 … 150 °C (200 °C)
- Connections:
  - Flange

Features & benefits

- Essential System Safety:
  - Provides reliable overpressure protection as a self-acting controller that is normally closed and opens on rising pressure, automatically safeguarding the district heating system from pressure surges and potential damage.
- Enhanced Network Optimization:
  - Achieves advanced system control and efficiency by integrating with the Danfoss AMEi 6 intelligent electrical actuator, enabling the iNET function for intelligent and remote network balancing.
- Broad Application Flexibility:
  - Accommodates a wide array of system designs with its extensive range of sizes (DN 15-250), pressure ratings (PN 16-40), multiple pressure setting options, and flanged connections, ensuring a suitable model for diverse requirements.

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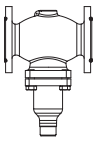
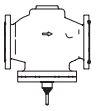
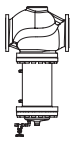
Ordering

Product code numbers

VFG 2 / VFG 22 Valve (metal sealing cone)

Picture	DN (mm)	k_{vs} (m^3/h)	Connections	$T_{max.}$ (°C)	Code No.		
					PN16	PN25	PN40
	15 [2]	4.0	Flanges acc. to EN 1092-1	150 °C (PN16)	**065B2388**	**065B2401**	**065B2411**
	20 [2]	6.3			**065B2389**	**065B2402**	**065B2412**
	25 [2]	8.0			**065B2390**	**065B2403**	**065B2413**
	32 [2]	16		200 °C [1] (PN25,40)	**065B2391**	**065B2404**	**065B2414**
	40 [2]	20			**065B2392**	**065B2405**	**065B2415**
	50 [2]	32			**065B2393**	**065B2406**	**065B2416**
	65	60		150 °C	**065B5500**	**065B5507**	**065B5514**
	80	80			**065B5501**	**065B5508**	**065B5515**
	100	160			**065B5502**	**065B5509**	**065B5516**
	125	250			**065B5503**	**065B5510**	**065B5517**
	150	380			**065B5504**	**065B5511**	**065B5518**
	200	650			**065B5505**	**065B5512**	**065B5519**
	250	800			**065B5506**	**065B5513**	**065B5520**
	150 [2]	280		200 °C [1]	**065B2424**	-	**On request**
	200 [2]	320			**065B2425**	-	**On request**
	250 [2]	400			**065B2426**	-	**On request**

[1] At temperatures above 150°C only with seal pots (see Accessories)

[2] VFG 2 valves require ordering of 003G1782 adapter for a combination with AFA 2 pressure actuators

Example 1:

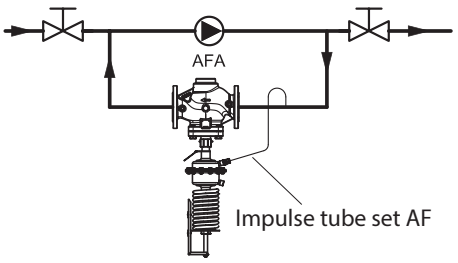
Pressure relief controller, DN 65, k_{vs} 60 m^3/h, PN 16, metallic sealing, setting range 1-3 bar, T_{max} 150 °C, flange;

– 1× VFG 22 DN 65 valve
Code no: **065B5500**

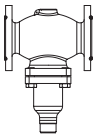
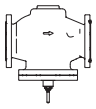
– 1× AFA 2 actuator
Code no: **003G5662**

– 1× Impulse tube set AF
Code no: **003G1391**

Products will be delivered separately.



VFG 21 / VFG 221 Valve (soft sealing cone)

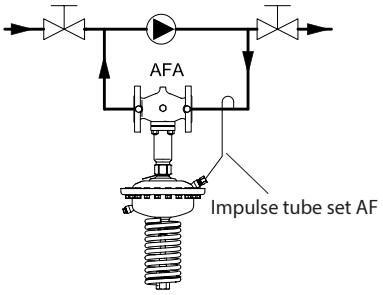
Picture	DN (mm)	k_{vs} (m^3/h)	Connections	$T_{max.}$ (°C)	Code No.		
					PN16	PN25	PN40
	15 [1]	4.0	Flanges acc. to EN 1092-1	150 °C	**065B2502**	-	-
	20 [1]	6.3			**065B2503**	-	-
	25 [1]	8.0			**065B2504**	-	-
	32 [1]	16			**065B2505**	-	-
	40 [1]	20			**065B2506**	-	-
	50 [1]	32			**065B2507**	-	-
	65	60			**065B5521**	**065B5528**	**065B5535**
	80	80			**065B5522**	**065B5529**	**065B5536**
	100	160			**065B5523**	**065B5530**	**065B5537**
	125	250			**065B5524**	**065B5531**	**065B5538**
	150	380			**065B5525**	**065B5532**	**065B5539**
	200	650			**065B5526**	**065B5533**	**065B5540**
	250	800			**065B5527**	**065B5534**	**065B5541**

[1] VFG 21 valves require ordering of 003G1782 adapter for a combination with AFA 2 pressure actuators

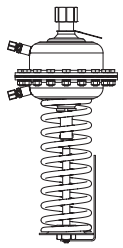
Example 2:
Pressure relief controller; DN 15; k_{VS} 4.0; metallic sealing; PN 16; setting range 0.5 - 3.0 bar; T_{max} 150 °C; flange;

– 1× VFG 2 DN 15 valve
Code no: **065B2388**
– 1× AFA 2 actuator
Code no: **003G5661**
– 1× Impulse tube set AF
Code no: **003G1391**
– 1× Adapter VFG 2 - AF(P)A 2
Code no: **003G1782**

Products will be delivered separately.



AFA 2 Actuator

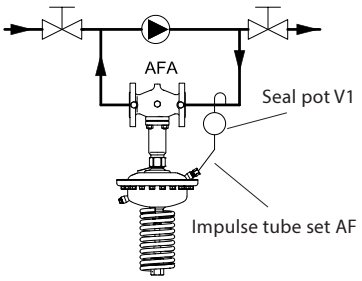
Picture	Setting range (bar)	Possible combinations with DN	Actuator size (cm^2)	Spring colour	Code No.	
					PN16	PN40
	10-16	15-125	32	black [1]	-	**003G5667**
	4-14	15-125	32	red	**003G5659**	**003G5668**
	1.5-6	15-125	80	red	**003G5660**	**003G5669**
	0.5-3	15-125	80	yellow	**003G5661**	**003G5670**
	1-3	15-250	160	red	**003G5662**	**003G5671**
	0.3-1.5	15-125	160	yellow	**003G5663**	**003G5672**
	0.4-1.5	15-250	320	red	**003G5664**	**003G5673**
	0.2-0.8	15-250	320	yellow	**003G5665**	**003G5674**
	0.1-0.4	15-250	640	yellow	**003G5666**	**003G5675**

[1] Combination with AMEi6 not possible

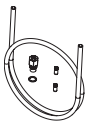
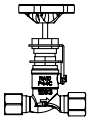
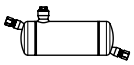
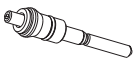
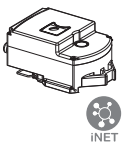
Example 3:
Pressure relief controller; DN 15; k_{VS} 4.0; metallic sealing; PN 25; setting range 0.5 - 3 bar; T_{max} 200 °C; flange;

– 1× VFG 2 DN 15 valve
Code no: **065B2401**
– 1× AFA 2 actuator
Code no: **003G5670**
– 1× Impulse tube set AF
Code no: **003G1391**
– 1× Seal pot V1
Code no: **003G1392**
– 1× Adapter VFG 2 - AF(P)A 2
Code no: **003G1782**

Products will be delivered separately.

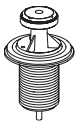
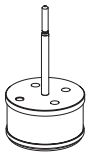
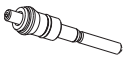
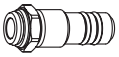


Accessories code numbers

Picture	Type designation	Description	Connections	Code No.
	Impulse tube set AF	– 1× Copper tube Ø10 × 1 × 1500 mm – 1× compression fitting for imp. tube connection to pipe (G ¼) – 2× socket	-	**003G1391**
	Compression fitting	For impulse tube Ø10 connections to controller	G ¼	**003G1468**
	Shut off valve	For impulse tube Ø10	-	**003G1401**
	Static throttle valve			**065B2909**
	Seal pot V1	Capacity 1 liter; with compression fittings for imp. tube Ø10	-	**003G1392**
	Seal pot V2	Capacity 3 liter; with compression fittings for imp. tube Ø10 , for actuator size 640 cm^2		**003G1403**
	Adapter VFG 2 - AFA 2	For combination of new Virtus pressure actuators AF(P)A 2, with old generation of valves VFx 2	-	**003G1782**
	AMEi 6 **iNET** el. actuator 230 V	Intelligent Δp actuator with **iNET** function	-	**082G4302**
	AMEi 6 **iNET** el. actuator 24 V			**082G4303**

Spare parts code numbers

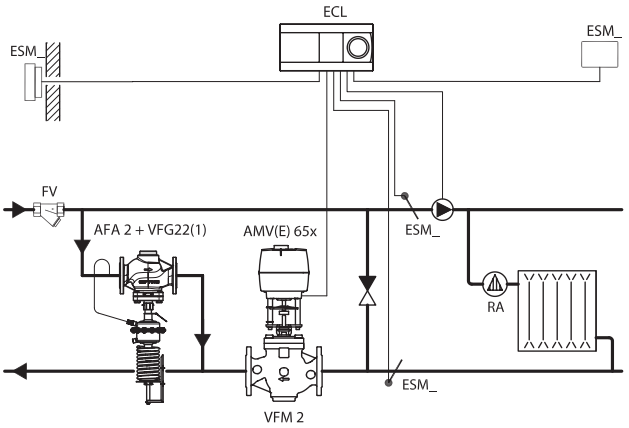
Service kits

Picture	Type designation	DN (mm)	k_{vs} (m^3/h)	PN	for VFG 2 / VFG 22	for VFG 21 / VFG 221
	Valve insert	15	4.0	16/25/40	**065B2796**	**065B2790**
		20	6.3		**065B2797**	**065B2791**
		25	8.0		**065B2798**	**065B2792**
		32	16			
		40	20		**065B2799**	**065B2793**
		50	32			
	Pressure control insert VFG 22(1)	65	60		**003G1800**	**003G1807**
		80	80		**003G1801**	**003G1808**
		100	160		**003G1802**	**003G1809**
		125	250		**003G1803**	**003G1810**
		150	380		**On demand**	**On demand**
		200	650		**On demand**	**On demand**
		250	800		**On demand**	**On demand**
	Adapter VFG 2 - AFA 2	15-250	-		**003G1782** [1]	
	Pressure stuffing box VFG 22(1)	65-125	-		**003G1730**	
		150-200	-		**003G1731**	
		250	-		**003G1732**	

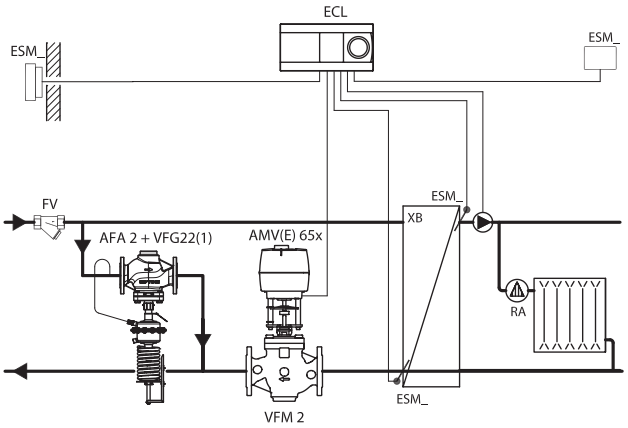
[1] To be available end of Q1 2026

Overview

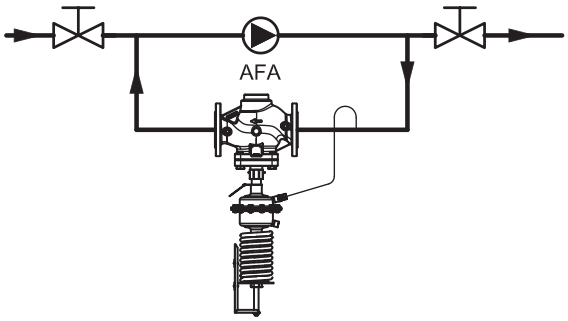
Application examples



Direct-connected heating system



Indirectly connected heating system



Pressure control for a pump in bypass

Product details

General data

VFG 2 / VFG 22(1) Valve

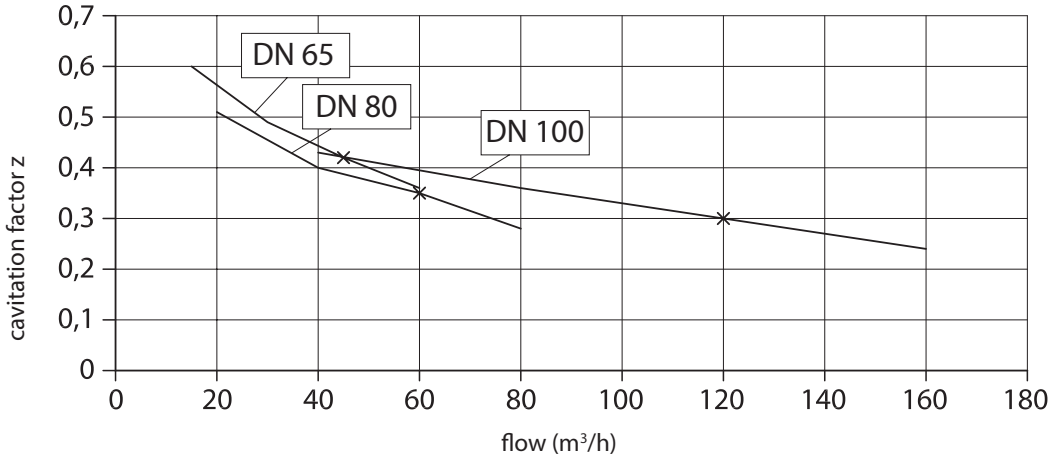
Nominal diameter		**DN**	**15**	**20**	**25**	**32**	**40**	**50**	**65**	**80**	**100**	**125**	**150**	**200**	**250**
k_{VS} value of Δp controller		m^3/h	4.0	6.3	8.0	16	20	32	60	80	160	250	380	650	800
Cavitation factor z			0.6	0.6	0.6	0.55	0.55	0.5	0.42	0.35	0.3	0.27	0.23	0.2	0.18
Leakage acc. to standard IEC 534 (% of k_{vs})	VFG 2 / VFG 22		≤ 0.03										≤ 0.05		
	VFG 21 / VFG 221		≤ 0.01												
Nominal pressure		PN	16, 25, 40												
Max. differential pressure	PN 16	bar	16								15		12	10	
	PN 25, 40		20												
Pressure relieve system			Bellows (Stainless steel 1.4571)						Chamber relieved						
Media			Circulation water / glycolic water up to 30 %												
Media pH			Min. 7, Max. 10												
Media temperature	VFG 2 / VFG 22	°C	2 ... 150 / 2 ... 200 [1]						2 … 150						
	VFG 21 / VFG 221		2 ... 150												
Connections			Flange												
Materials															
Valve body	PN 16		Grey cast iron EN-GJL-250 (GG-25)												
	PN 25		Ductile iron EN-GJS-400 (GGG-40.3)												
	PN 40		Cast steel GP240GH (GS-C 25)												
Valve seat			Stainless steel, mat. No. 14021												
Valve cone			Stainless steel, mat. No. 14404						Stainless steel, mat. No. 1.4021						
Sealing	VFG 2		Metal												
	VFG 22														
	VFG 21		EPDM												
	VFG 221														

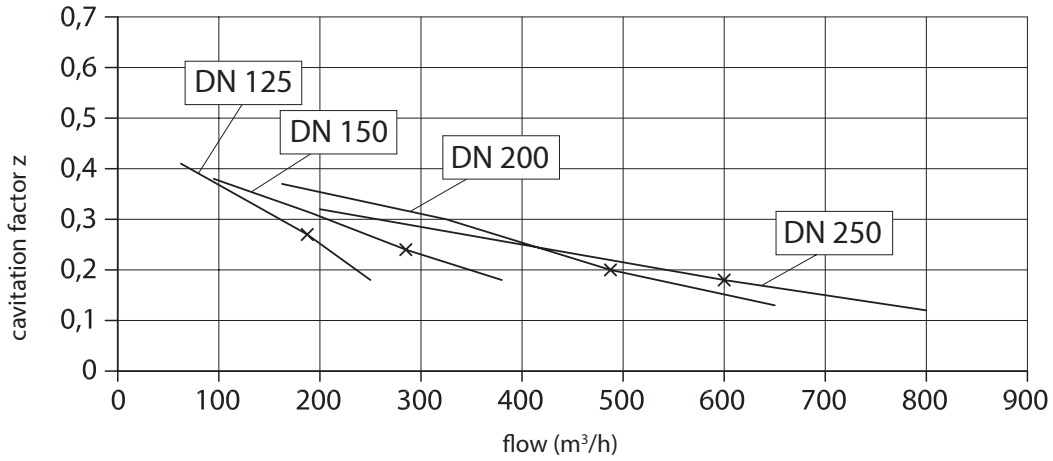
[1] At temperatures above 150 °C only with seal pots (see Accessories)

AFA 2 Actuator

Actuator size	**cm^2**	**32**		**80**		**160**		**320**		**640**
Max. operating pressure	bar	16, 40								
Diff. Pressure setting ranges and spring colours	bar	black [1]	red	red	yellow	red	yellow	red	yellow	yellow
		10-16	4-14	1.5-6	0.5-3	1-3	0.3-1.5	0.4-1.5	0.2-0.8	0.1-0.4
For valve DN		15-125				15-250	15-125	15-250		
Materials										
Actuator housing		Steel, mat. No. 10345 , zinc plated								
Control diaphragm		EPDM								

[1] Combination with AMEi 6 not possible

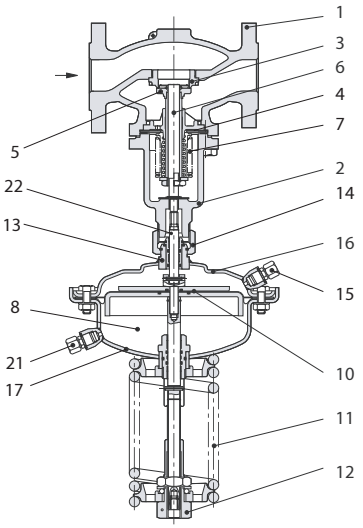

DN 65
DN 80
DN 100
cavitation factor z
0,7
0,6
0,5
0,4
0,3
0,2
0,1
0
0
20
40
60
80
100
120
140
160
180
flow (m³/h)


DN 125
DN 150
DN 200
DN 250
cavitation factor z
0,7
0,6
0,5
0,4
0,3
0,2
0,1
0
0
100
200
300
400
500
600
700
800
900
flow (m³/h)

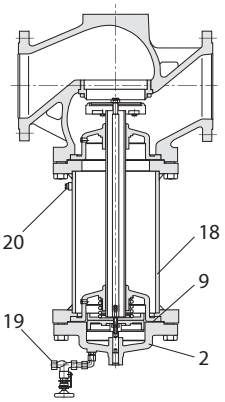
Design

DN15-50

1. Valve body
2. Cover
3. Valve seat
4. Valve insert
5. Pressure relieved valve cone
6. Valve stem
7. Bellows for pressure relief of valve cone
8. Actuator
9. Diaphragm for pressure relief of valve cone
10. Control diaphragm for pressure control
11. Setting spring for pressure control
12. Adjuster for pressure setting, prepared for sealing
13. Stuffing cone
14. Union nut
15. Compression fitting for impulse tube
16. Upper casing of diaphragm
17. Lower casing of diaphragm
18. Valve body extension
19. Shut off valve for water filling
20. Closing plug
21. Air space bore
22. Adapter VFG 2 - AFA 2



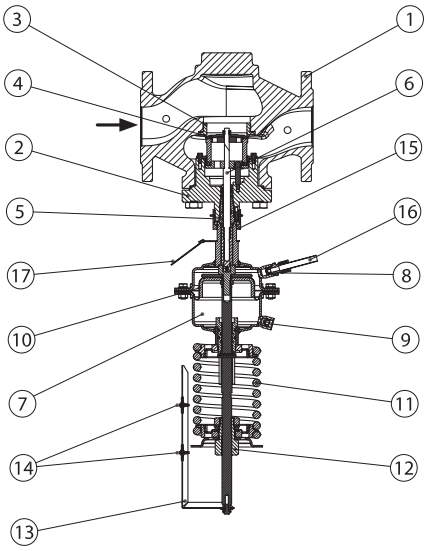
AFA 2 / VFG 2 DN15-50



VFG 2 DN150-250, T_{max} 200 °C

DN65-250

1. Valve body
2. Valve cover
3. Valve seat
4. Pressure control insert
5. Pressure stuffing box
6. Valve steam
7. Pressure actuator
8. Impulse tube connection
9. Air space bore
10. Diaphragm
11. Differential pressure setting spring
12. Differential pressure setting nut
13. Setting scale
14. Setting indicator
15. Union nut
16. Impulse tube
17. Identification plate



Function

The pressure in front of the control valve is being transferred through the impulse tube to the actuator chamber and act on control diaphragm for pressure control. On the other side of the diaphragm atmospheric pressure is acting (through air space bore). Control valve is normally closed. It opens on rising pressure and closes on falling pressure to maintain constant pressure.

Settings

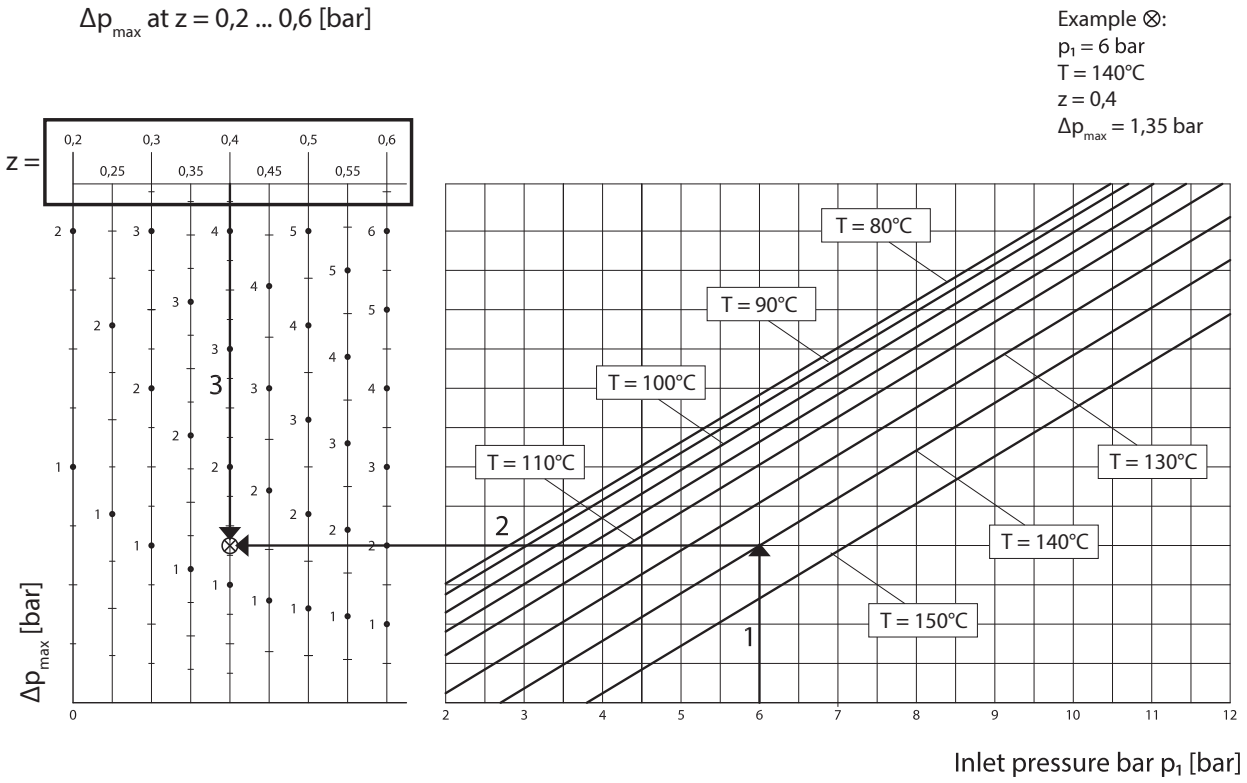
Pressure setting

Pressure setting is being done by the adjustment of the setting spring for pressure control. The adjustment can be done by means of spring for pressure setting and pressure indicators.

Pressure and temperature data

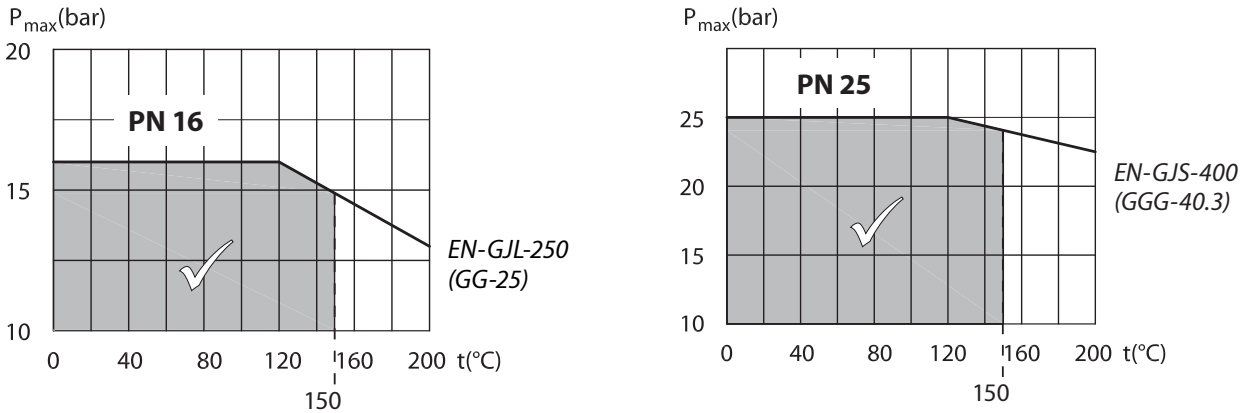
Operating area

Maximum allowed differential pressure over the controller (Δp_{max}) at different cavitation factors (z)

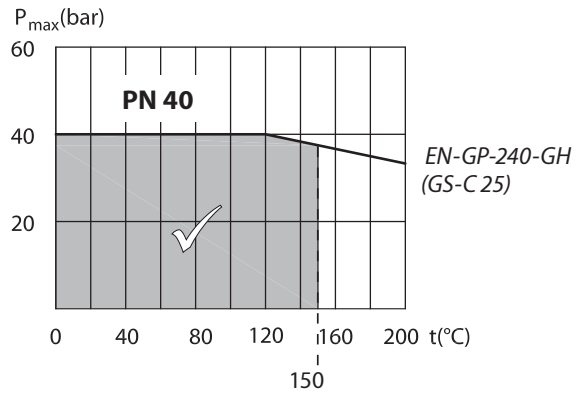


Pressure temperature diagram

Working area is below P-T line and it ends at T_{max} for each valve



Maximum allowed operating pressure as a function of media temperature (according to EN 1092-2)



Maximum allowed operating pressure as a function of media temperature (according to EN 1092-1)

Sizing

Example:

The application demands a maximal flow of 60 m³/h. The minimal differential pressure available over controller is 1.3 bar. Demanded opening setting pressure is 2 bar.

Given data:

Q_{max} = 60 m³/h
Δp_{min} = 1.3 bar

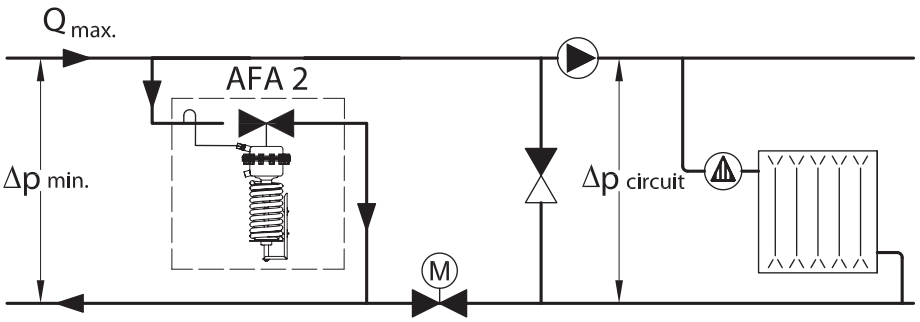
Calculate the k_v value:

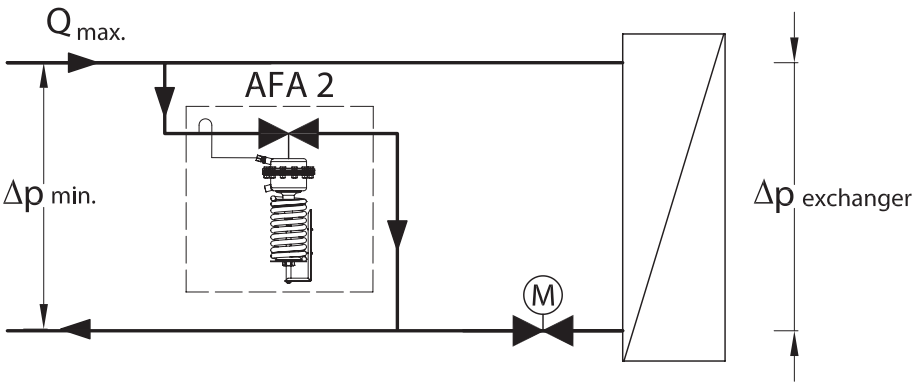
$$k_v = \frac{Q_{max}}{\sqrt{\Delta p_{min}}} = \frac{60}{\sqrt{1.3}} = 52.6 m^3/h$$

The first bigger k_{VS} to 52.6 m³/h is 60 m³/h and gives VFG 22 DN 65.

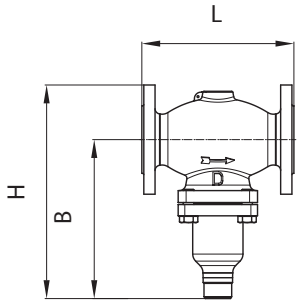
The available setting range to control 2 bar is 1-3 bar bar and is available for DN 65.

Solution:
AFA 2 1-3 bar
VFG 22 (221) DN 65 k_{VS} 60 m³/h

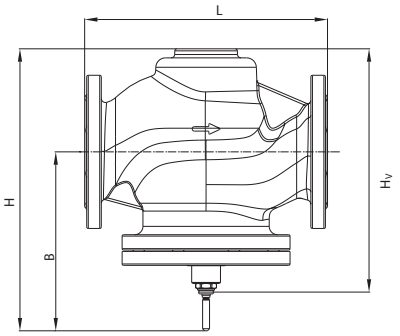




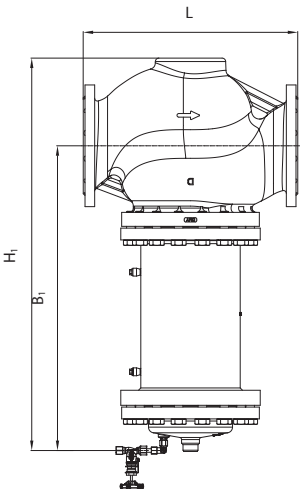
Dimensions



VFG 2 DN15-50



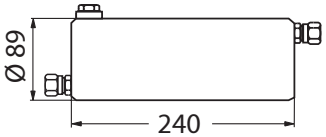
VFG 22(1) DN65-250



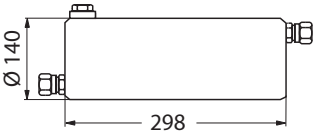
VFG DN150-250
with valve body extension up to 200 °C

VFG 2(1), VFG 22(1) Valves

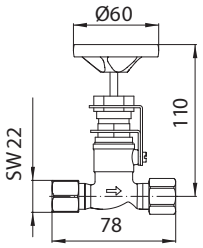
DN	L	B	H	H_V	B_1	H_1	Weight		
							PN 16	PN 25	PN 40
15	130	213	267	-			7.5	7.5	7.5
20	150	213	267	-			8.5	8.5	8.5
25	160	239	304	-			10	10	10
32	180	239	304	-			12	12	12
40	200	241	323	-			15	15	15
50	230	241	323	-			18	18	18
65	290	245	370	285	-		24	24	27
80	310	240	365	290	-		29	29	32
100	350	275	425	350	-		47	48	53
125	400	270	435	370	-		60	60	68
150	480	330	520	460	-		105	106	121
200	600	365	610	550	-		204	206	235
250	730	420	680	620	-		343	350	404
150 extension	480	-	-	-	620	799	154	-	179
200 extension	600	-	-	-	852	1089	301	-	336
250 extension	730	-	-	-	1199	1459	469	-	505



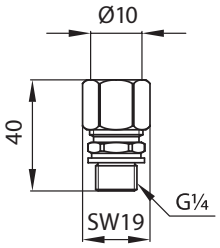
Seal pot V1



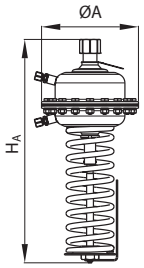
Seal pot V2



Shut off valve



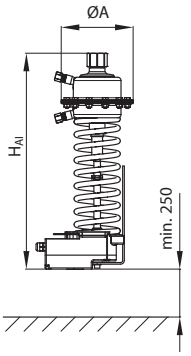
Compression fitting



AFA 2 Actuator

Size	ØA	H_A	H_{AI}	Weight (kg)			
cm^2	mm			AFA 2 PN 16	AFA 2 PN 16 + AMEi 6	AFA 2 PN 40	AFA 2 PN 40 + AMEi 6
32	175	490	590	10	12.5	17	19.5
80		490	590	9	11.5	16	18.5
160	230	490	590	12.5	15	25	27.5
320	300	490	590	17	19.5	37	39.5
640	300	610	710	40	42.5	58	60.5

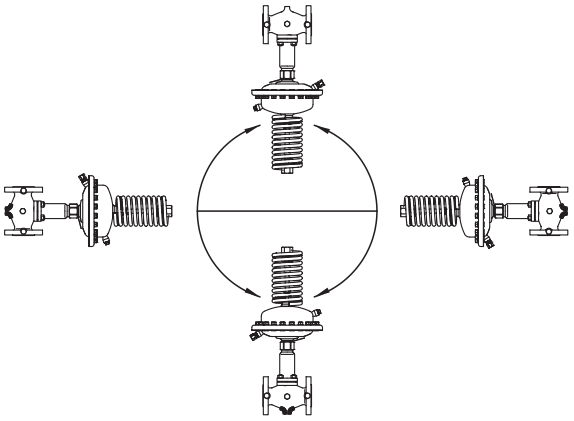
Total installation height of the controller (VFG 22(1) valve + AFA 2 pressure actuator) is sum of H_V and H_A (H_{AI})



AMEi 6 intelligent actuator with iNET functionality should be ordered separately

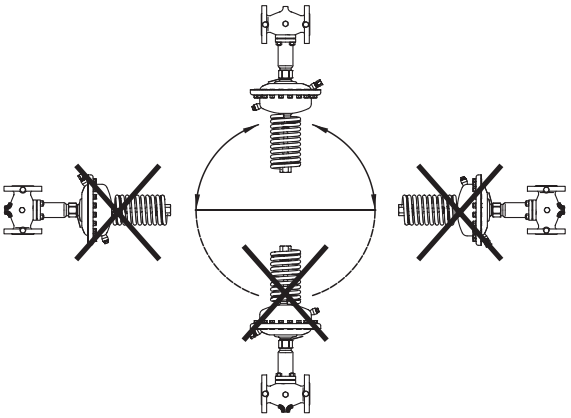
Installation

VFG 2(1) DN15-50
$T_{max} \leq 120$ °C



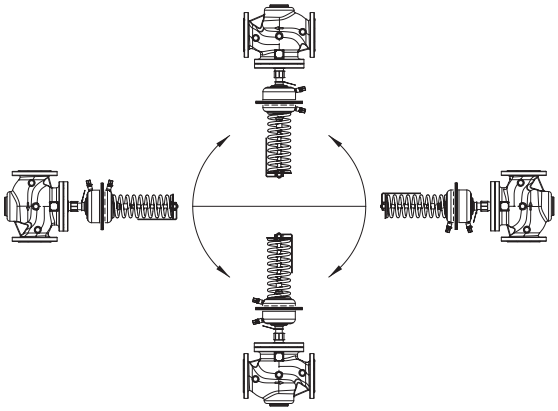
The controllers can be installed in any position.

VFG 2(1) DN15-50
$T_{max} > 120$ °C



The controllers can be installed in horizontal pipes only, with a pressure actuator oriented downwards.

VFG 22(1) DN65-250
2 ... 150 °C



The controllers can be installed in any position.

Certificates, declarations and approvals

The list contains all certificates, declarations, and approvals for this product type. Individual code number may have some or all of these approvals, and certain local approvals may not appear on the list.

When you click on the link you will be directed to the latest version of the 'Declaration of Conformity'. Products developed and sold before this date of issue conform to the directives/standards in force at the time of their sale.

Approval type	Title	Certification body	Approval topic
EAC Declaration	EAC KZ 7100841.13.12.02339	EAC - Eurasian Customs Union	MD
EU Declaration	Danfoss EU 230612EN0854103.05	Danfoss	PED, Pressure
Export Control Declaration	Actuators pressure flow and temperature	Danfoss	
EU Declaration	Danfoss EU 230530EN0858104.06	Danfoss	PED, Pressure
UA Declaration	Danfoss UA 10.01.23 Heat Control Valves	Danfoss	
Pressure Safety Certificate	CE-0062-PED-H-DAF 002-24-DNK-rev-A	BV - Bureau Veritas	PED, Pressure

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