

Data sheet

Pressure reduction controller

AFD 2 / VFG 22(1)

Description



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The controller is a self-acting pressure reduction controller primarily for use in district heating systems. Direct operated, reliable and high precise controller closes on rising pressure.

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

Further on two valve versions are available:

- VFG 22 with metallic sealing cone
- VFG 221 with soft sealing cone

Remote network balancing optimization function.

Together with Danfoss intelligent electrical actuator AMEi 6 iNET, remote adjustment of the pressure is enabled.

Main data:

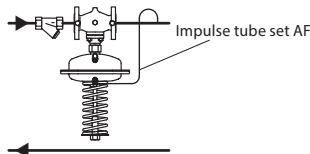
- DN 65-250
- k_{VS} 60-800 m³/h
- PN 16, 25, 40
- Setting range:
0.1-0.35 bar / 0.1-1 bar / 0.5-1.5 bar /
1-2.5 bar / 1.5-4 bar / 1-3 bar / 1.5-5 bar /
3-8.5 bar / 3-12 bar / 8-16 bar
- Temperature:
– Circulation water / glycolic water up to 30%:
2 ... 150°C
- Connections:
– Flange

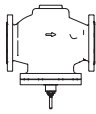
Ordering

Example 1:
Pressure reduction controller, for
water, DN 65, k_{VS} ,
PN 16, metallic sealing, setting
range 1,5-5 bar, T_{max} 150 °C, flange

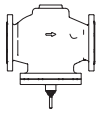
- 1x VFG 22 DN 65 valve
Code no: **065B5500**
- 1x AFD 2 actuator
Code no: **003G5626**
- 1x Impulse tube set AF
Code no: **003G1391**

Products will be delivered
separately.

**VFG 22 Valve (metallic sealing cone)**

Picture	DN (mm)	k_{VS} (m ³ /h)	Connections	T_{max} (°C)	Code No.		
					PN 16	PN 25	PN 40
	65	60	Flanges acc. to EN 1092-1	150	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

VFG 221 Valve (soft sealing cone)

Picture	DN (mm)	k_{VS} (m ³ /h)	Connections	T_{max} (°C)	Code No.		
					PN 16	PN 25	PN 40
	65	60	Flanges acc. to EN 1092-1	150	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

Ordering (continuous)

AFD 2 Actuator

Picture	Setting range (bar)	Possible combinations with DN							Actuator size (cm ²)	Spring colour	Code No.	
		65	80	100	125	150	200	250			PN 16	PN 40
	8-16	✓	✓	✓	✓	-	-	-	32	black ¹⁾	-	003G5634
	3-12	✓	✓	✓	✓	-	-	-	32	red	003G5625	003G5635
	3-8.5	✓	✓	✓	✓	-	-	-	80	black ¹⁾	-	003G5624
	1.5-5	✓	✓	✓	✓	-	-	-	80	red	003G5626	003G5636
	1-3	✓	✓	✓	✓	-	-	-	80	yellow	003G5627	003G5637
	1.5-4	✓	✓	✓	✓	✓	✓	✓	160	black ¹⁾	003G5628	003G5638
	1-2.5	✓	✓	✓	✓	✓	✓	✓	160	red	003G5629	003G5639
	0.5-1.5	✓	✓	✓	✓	-	-	-	160	yellow	003G5630	003G5640
	0.4-1.5	✓	✓	✓	✓	✓	✓	✓	320	red	003G5631	003G5641
	0.1-1	✓	✓	✓	✓	✓	✓	✓	320	orange	003G5632	003G5642
	0.1-0.35	✓	✓	✓	✓	✓	✓	✓	640	yellow	003G5633	003G5643

¹⁾ Combination with AMEi 6 not possible

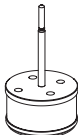
Accessories

Picture	Type designation	Description	Connections	Code No.
	Impulse tube set AF	– 1x Copper tube Ø10 x 1 x 1500 mm – 1x compression fitting for imp. tube connection to pipe (G ¼) – 2x socket	–	003G1391
	Compression fitting ²⁾	For impulse tube Ø10 connections to controller	G ¼	003G1468
	Shut off valve	For impulse tube Ø10	–	003G1401
	Static throttle valve			065B2909
	Adapter	For combination of new Virtus pressure actuators AFx 2, with old generation of valves VFx 2 (DN15-250)	–	003G1780
	AMEi 6 iNET el. actuator 230 V	Intelligent Δp actuator with iNET function	–	082G4302
	AMEi 6 iNET el. actuator 24 V			082G4303

²⁾ Consist of a nipple, compression ring and nut

Service kits

Service kits

Picture	Type	k _{vs} (m³/h)	PN	DN	Code No.		
	Pressure control insert VFG/Q 22	60	16/25/40	65	003G1800		
		80		80	003G1801		
		160		100	003G1802		
		250		125	003G1803		
		380		150	003G1804		
		650		200	003G1805		
		800		250	003G1806		
		Pressure control insert VFG/Q 221		60	65	003G1807	
	80			80	003G1808		
	160			100	003G1809		
	250			125	003G1810		
	380			150	003G1811		
	650			200	003G1812		
	800			250	003G1813		
				Pressure stuffing box VFG/Q 221			65-125
					150-250	003G1731	

Technical data

Valve

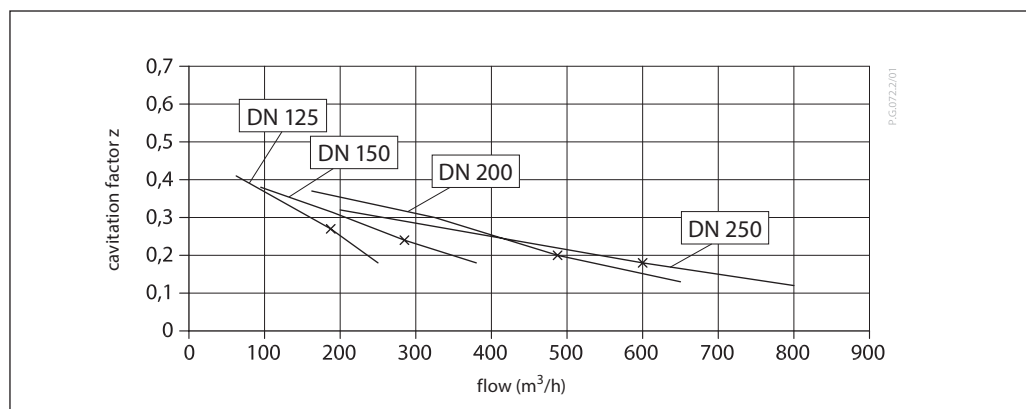
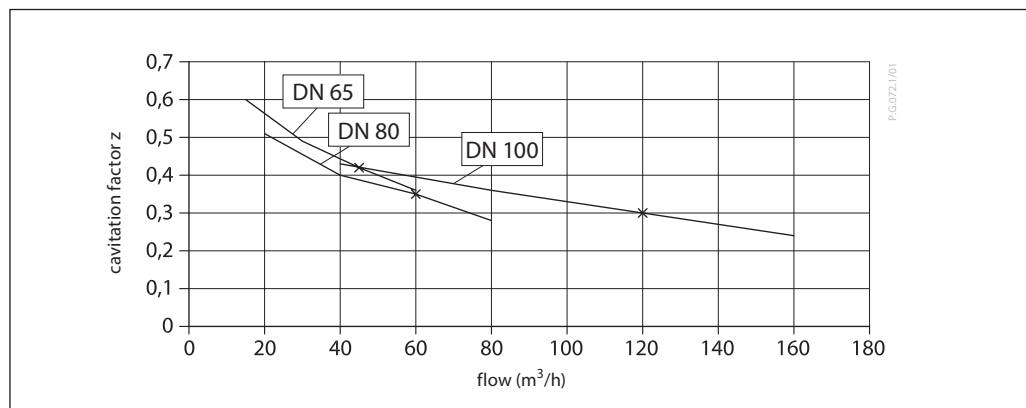
Nominal diameter		DN	65	80	100	125	150	200	250
k _{vs} value		m³/h	60	80	160	250	380	650	800
Leakage acc. to standard IEC 534 (% of k _{vs})	VFG 22	≤ 0.03					≤ 0.05		
	VFG 221	≤ 0.01							
Nominal pressure		PN	16, 25, 40						
Max. differential pressure	PN 16	bar	16	15			12	10	
	PN 25, 40		20						
Pressure relieve system		Chamber relieved							
Media		Circulation water / glycolic water up to 30%							
Media pH		Min. 7, max. 10							
Media temperature	VFG 22(1)	°C	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. 1.4021							
Valve cone		Stainless steel, mat. No. 1.4021							
Sealing	VFG 22	Metal							
	VFG 221	EPDM							

AFD 2 Actuator

Actuator size	cm²	32		80		160			320		640
Max. operating pressure	bar	40									
Diff. pressure setting ranges and spring colours	bar	black	red	red	yellow	black ¹⁾	red	yellow	red	orange	yellow
		8-16	3-12	1.5-5	1-3	1.5-4	1-2.5	0.5-1.5	0.4-1.5	0.1-1	0.1-0.35
For valve DN		65-125				65-250		65-100	65-250	65-250	
Materials											
Actuator housing		Steel, mat. No. 1.0345, zinc plated									
Control diaphragm		EPDM (fibre enforced)									

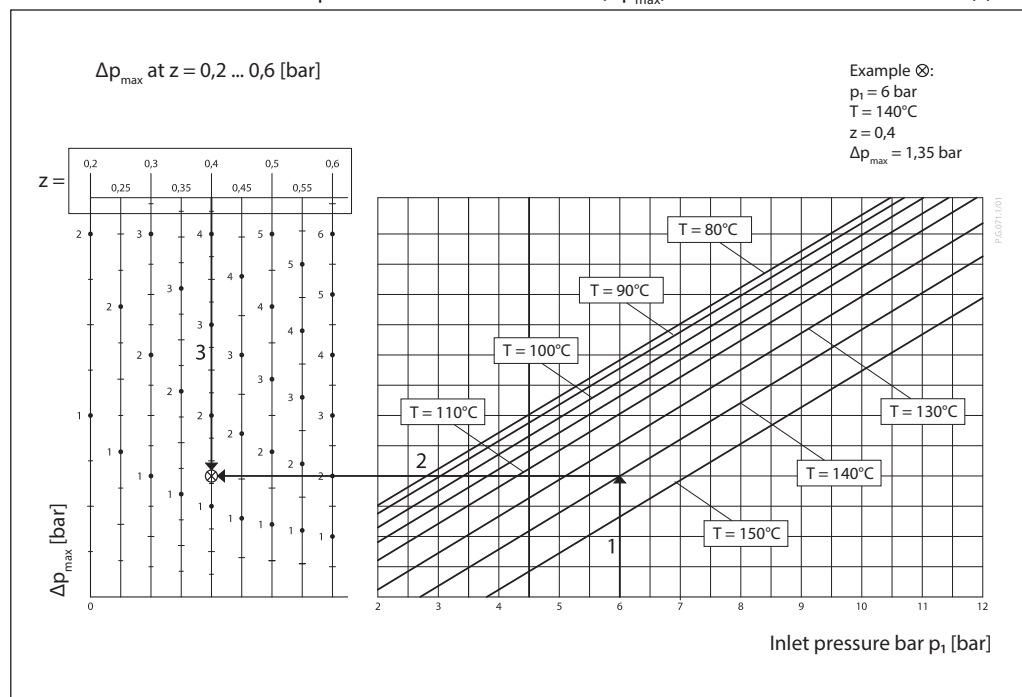
¹⁾ Combination with AMEi 6 not possible

Actuator and impulse tubes minimum temperature is 2 °C to prevent media from freezing

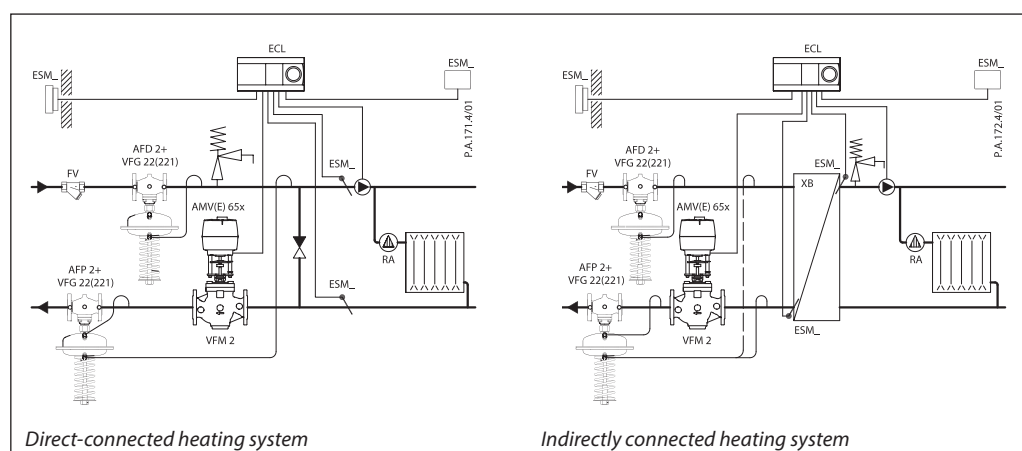


Operating area

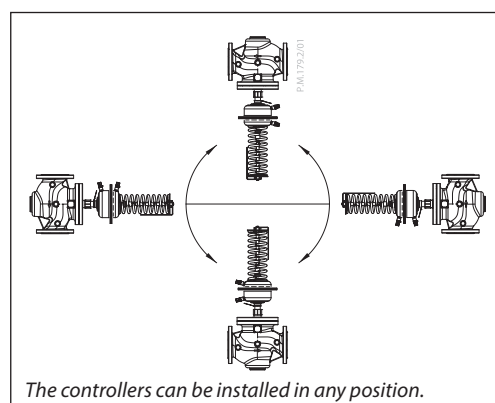
Maximum allowed differential pressure over the controller ($\Delta p_{\max}$) at different cavitation factors (z)



Application principles

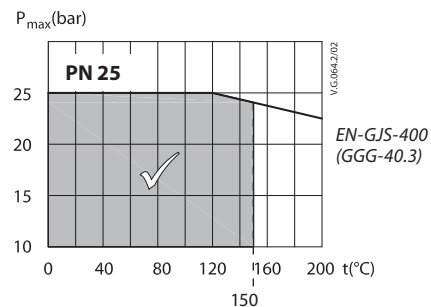
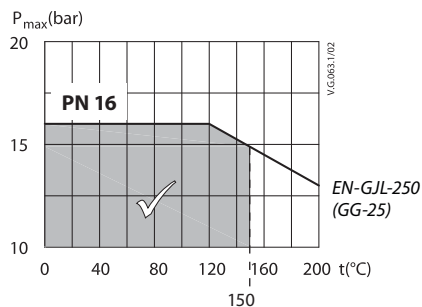


Installation position

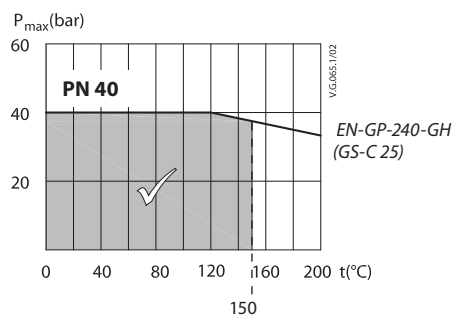


Pressure temperature diagram

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

Pressure reduction controller has to control 6.0 bar behind the controller. Max. flow through the system is less than 4.0 m³/h, min. flow pressure is 7.5 bar.

Given data:

$$Q_{\max} = 35 \text{ m}^3/\text{h}$$

$$p_{1 \min} = 7.5 \text{ bar}$$

$$p_{\text{reduced}} = 6.0 \text{ bar}$$

k_v value is calculated according to formula:

$$k_v = \frac{Q_{\max}}{\sqrt{\Delta p_{\text{AFD}}}} = \frac{35}{\sqrt{1.5}}$$

$$k_v = 28.6 \text{ m}^3/\text{h}$$

Solution:

AFD 2 3-12

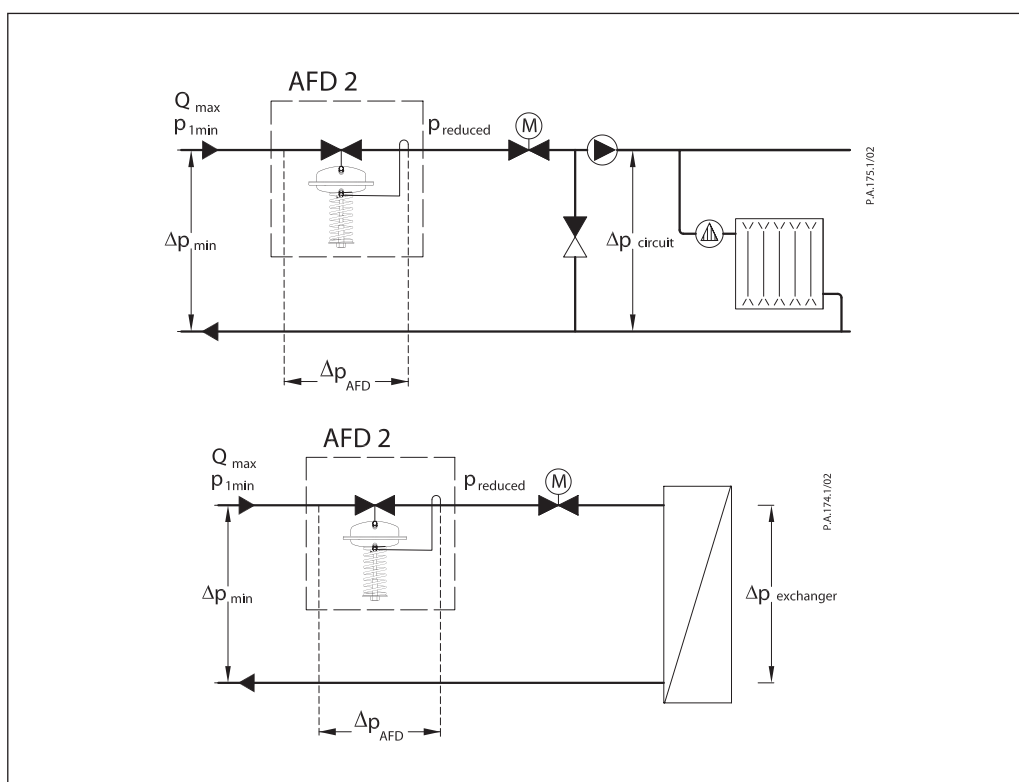
VFG 22(1) DN65 $k_{vS} 60$

Nominal pressure PN 25

The min. differential pressure across the controller is calculated from the formula:

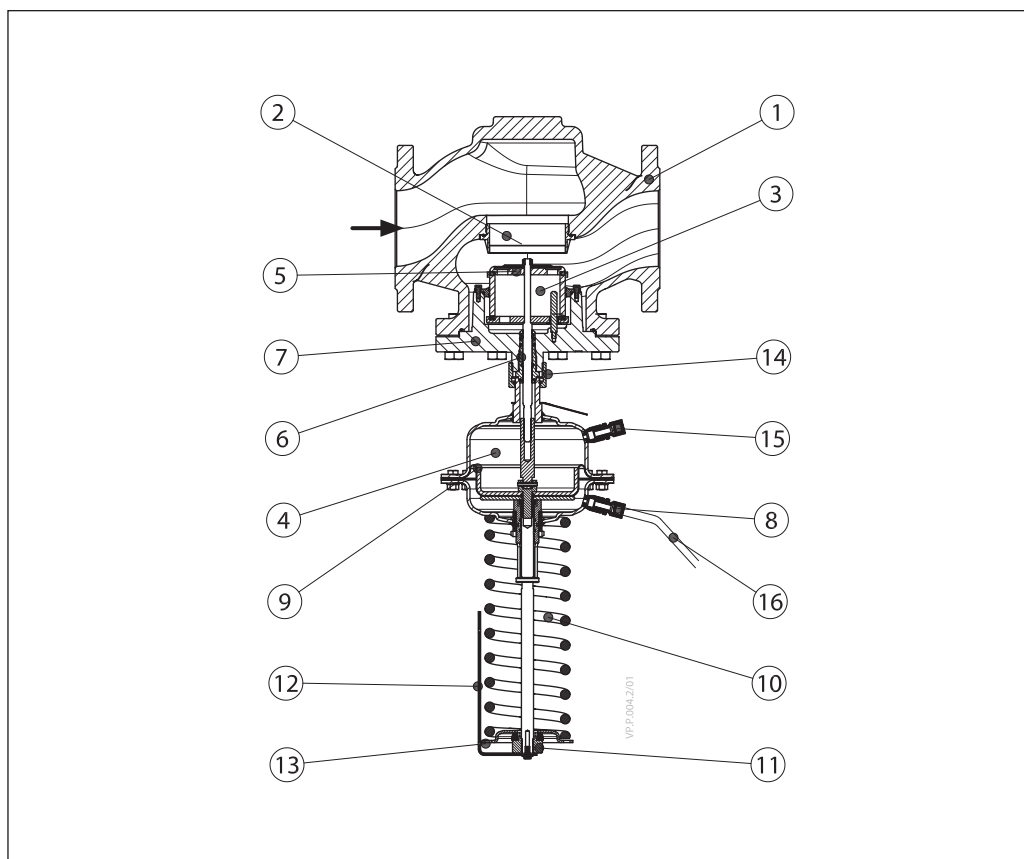
$$\Delta p_{\text{AFD}} = p_{1 \min} - p_{\text{reduced}} = 7.5 - 6.0$$

$$\Delta p_{\text{AFD}} = 1.5 \text{ bar}$$



Design

1. Valve body
2. Valve seat
3. Pressure control insert
4. Pressure actuator
5. Pressure control cone
6. Stuffing box
7. Cover
8. Impulse tube connection
9. Diaphragm
10. Setting spring for pressure control
11. Adjuster for pressure setting
12. Setting scale
13. Setting indicator
14. Union nut
15. Air space bore
16. Impulse tube



Function

The pressure behind 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 opened. It closes on rising pressure and opens on falling pressure to maintain constant pressure.

Settings

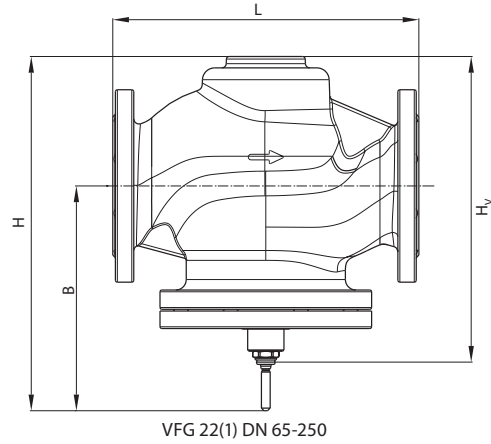
Pressure setting

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.

Data sheet

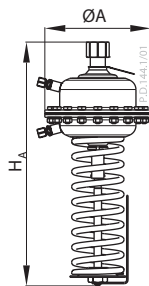
Pressure reduction controller AFD 2 / VFG 22(1)

Dimensions



VFG 22, VFG 221 Valves

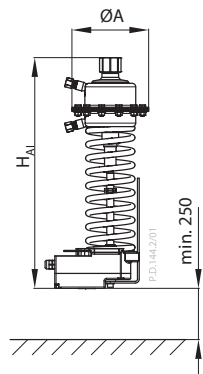
DN	L	B	H	H _v	Weight		
					PN 16	PN 25	PN 40
	mm				kg		
65	290	245	370	285	24	24	27
80	310	240	365	290	29	29	32
100	350	275	425	350	47	48	53
125	400	270	435	370	60	60	68
150	480	330	520	460	105	106	121
200	600	365	610	550	204	206	235
250	730	420	680	620	343	350	404



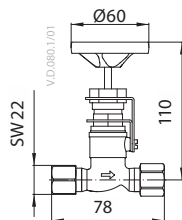
AFD 2 Actuator

Size (cm ²)	ØA	H _A	H _{Ai}	Weight (kg)			
				AFD 2 PN 16	AFD 2 PN 16 + AMEi 6	AFD 2 PN 40	AFD 2 PN 40 + AMEi 6
32	175	495	595	10	12.5	17	19.5
80				9	11.5	16	18.5
160	230	510	610	11.5	14	23.5	26
320	300	510	610	15	17.5	35.5	38
640	300	630	730	38	40.5	58	60.5

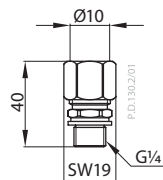
Total installation height of the controller (VFG 22(1) valve + AFD 2 pressure actuator) is sum of H_v and H_A (H_{Ai})



AMEi 6 intelligent actuator with iNET functionality should be ordered separately



Shut off valve



Compression fitting

Danfoss A/S

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