


Q 2(4) Differential
Pressure Regulator



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Danfoss AFPQ 2(4) Differential Pressure Regulator



Safety Notes

- Prior to assembly and commissioning to avoid injury of persons and damages of the devices, it is absolutely necessary to carefully read and observe these instructions.
- Necessary assembly, start-up, and maintenance work must be performed only by qualified, trained and authorized personnel.

Prior to assembly and maintenance work on the controller, the system must be:

- depressurized,
- cooled down,
- emptied and
- cleaned.

Please comply with the instructions of the system manufacturer or system operator.

Definition of Application

The controller is used for flow rate limitation and differential pressure control of water and water glycol mixtures for heating, district heating and cooling systems.

The technical data on the label plates determines the use.

Scope of Delivery 1



DN 15-50
 $T_{max} = 150^{\circ}\text{C}$



Bellows
VFQ2

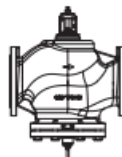


adapter 003G1780¹⁾



AFPQ 2, AFPQ24

DN 65-250
 $T_{max} = 150^{\circ}\text{C}$



Piston
VFQ22 (1)



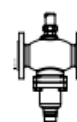
AFPQ 2, AFPQ24



VFQ22(1) + AFPQ 2²⁾ VFQ22(1) + AFPQ 24²⁾

	+	
	3 mm	SW13, 19, 36, 46

DN 15-125
 $T_{max} = 200^{\circ}\text{C}$



Bellows
VFQ2



adapter 003G1780¹⁾



AFPQ 2, AFPQ24

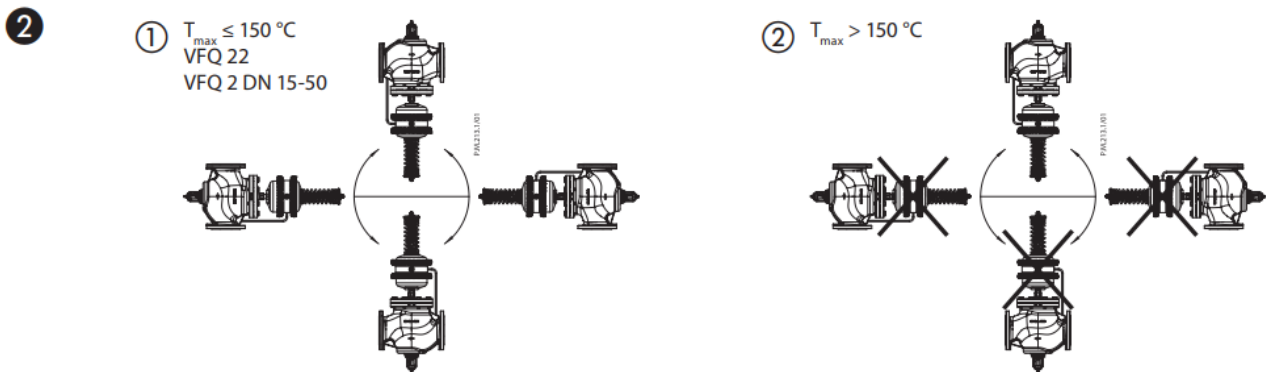
1x
V1, V2 (630 cm²)¹⁾

1. accessory sold separately,
2. Impulse tube set – accessory sold separately

Assembly

Admissible Installation Positions ②

1. media temperatures up to 150 °C: Can be installed in any position.
2. media temperatures > 150 °C. Installation permitted only in horizontal pipelines with the actuator oriented downwards.

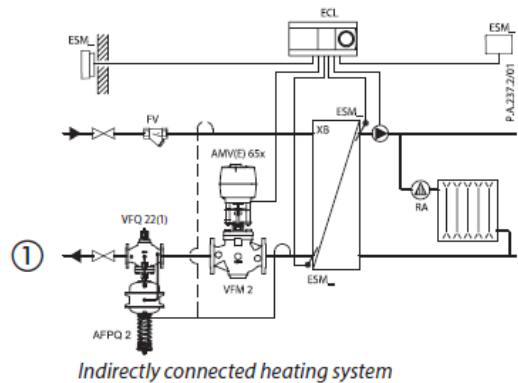
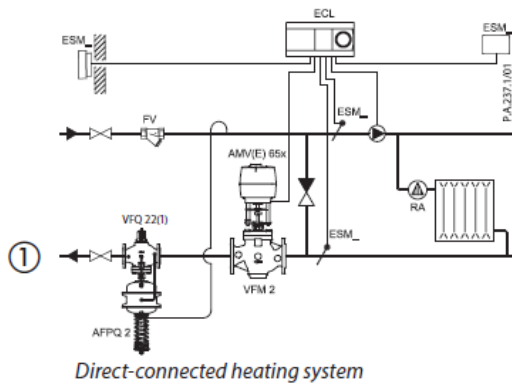


Installation Location and Installation Scheme ③

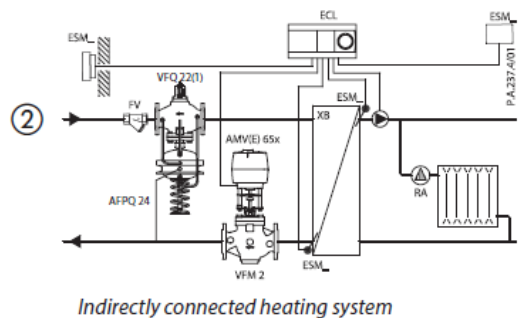
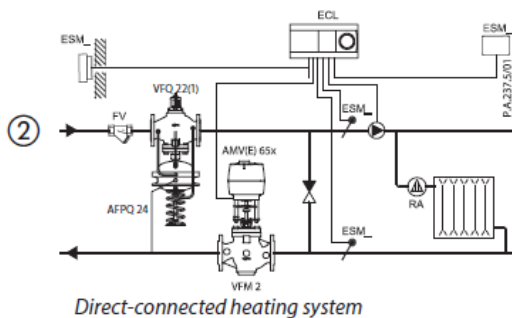
AFPQ 2 / VFQ 22(1) Return mounting ① AFPQ 24 / VFQ 22(1) Flow mounting ②

③

– Return mounting



– Flow mounting

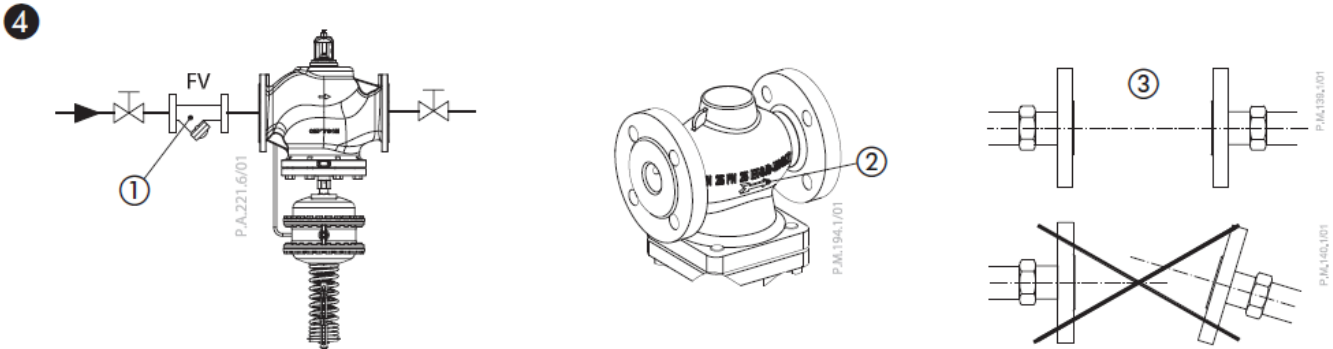


Valve Installation ④

1. Install strainer ① before the controller.
2. Rinse system prior to installing the valve.
3. Observe flow direction ② on the valve body.

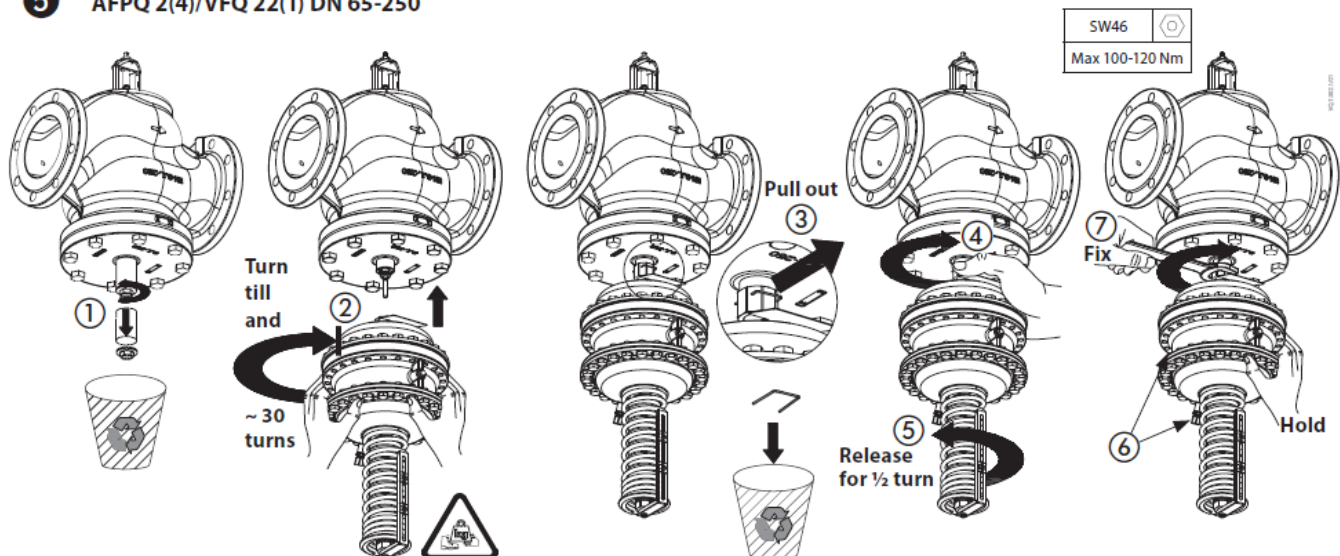
Flanges ③ in the pipeline must be in parallel position, and sealing surfaces must be clean and without any damage.

4. Install valve.
5. Tighten screws crosswise in 3 steps up to the max. torque.



Actuator Installation ⑤

5 AFPQ 2(4)/VFQ 22(1) DN 65-250



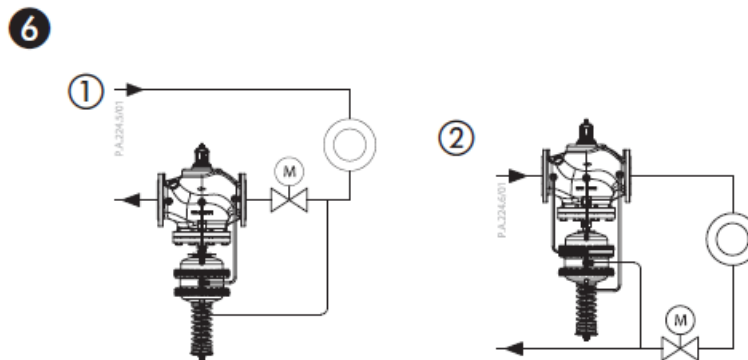
The actuator stem must be screwed into the valve stem. Spring on the pressure actuator is factory adjusted (released) for proper installation.

1. Remove the spindle protection cup and release the valve spindle by removing the nut, washer and cardboard tube.
2. Align the actuator stem with the valve stem, connect both stems and turn gently the whole pressure actuator clockwise with both hands, until the stems are fully connected (valve stem fully screwed into the actuator stem).
3. Release the union nut by pulling out the blocking spring.
4. Tight the union nut
5. Release the pressure actuator by turning it counterclockwise for approximately half a turn.

6. Observe the position of impulse tubes connection to the valve and align the actuator accordingly.
7. Hold the actuator in the position and tight the union nut to the valve with 100- 120 Nm torque.

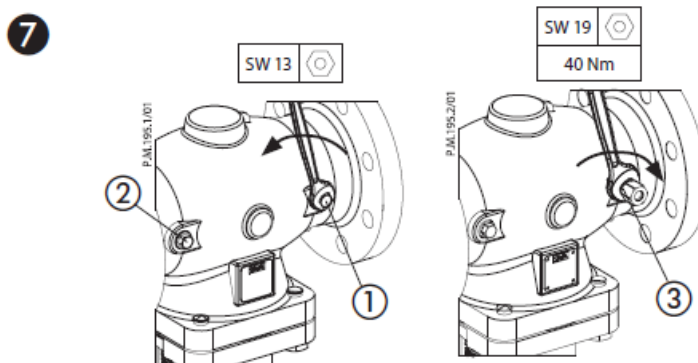
Impulse Tube mounting ⑥

Connection of impulse tubes in the system – Overview



1. Installation in return flow ①.
2. Installation in supply flow ②.

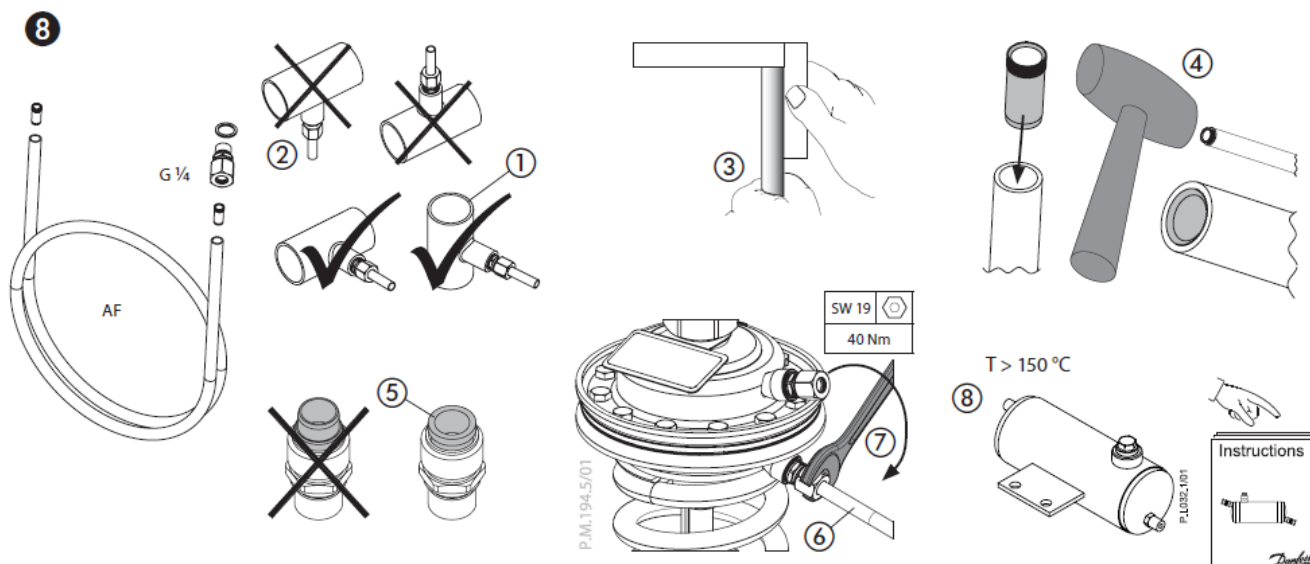
Connection of impulse tube set ⑦



- Remove plug ① at the valve. For AFPQ 4, remove plug ② in addition
- Screw in threaded joint ③ with copper seal. Torque: 40 Nm

For instalation of impulse tube sets ⑥ ⑤ ⑥, please observe the Installation Instructions for the Impulse tube sets.

Connection to the Pipeline ③



Which impulse tubes to use?

The impulse tube set AF (2x) ⑧ ① can be used: Order No.: 003G1391 or use the following pipes:

Stainless steel	Ø 10×0.8	DIN 17458, DIN 2391
Steel	Ø 10×1	DIN 2391
Copper	Ø 10×1	DIN 1754

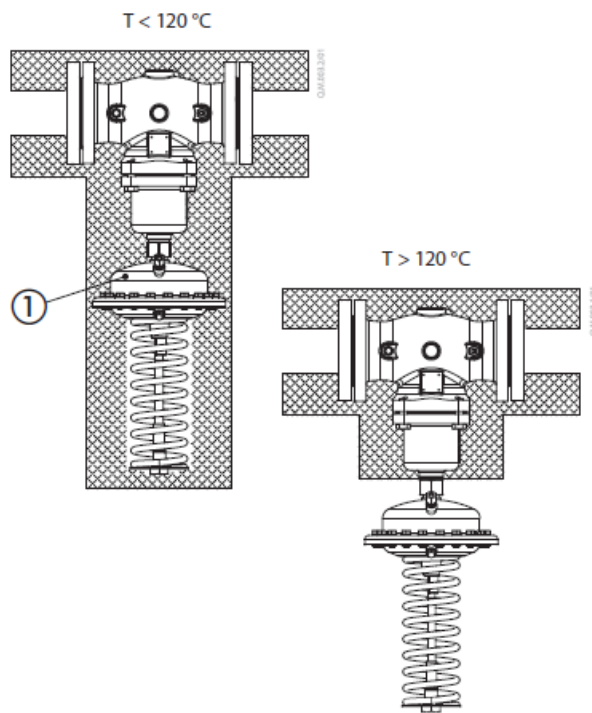
No connection downwards/upwards ②, could bring dirt/air into an impulse tube.

1. Cut pipe in rectangular sections ③ and deburr.
2. For copper pipe: insert sockets ④ on both sides.
3. Verify the correct position of the cutting ring ⑤.
4. Press impulse tube ⑥ into the threaded joint up to its stop.
5. Tighten union nut ⑦ Torque 40

Insulation ⑨

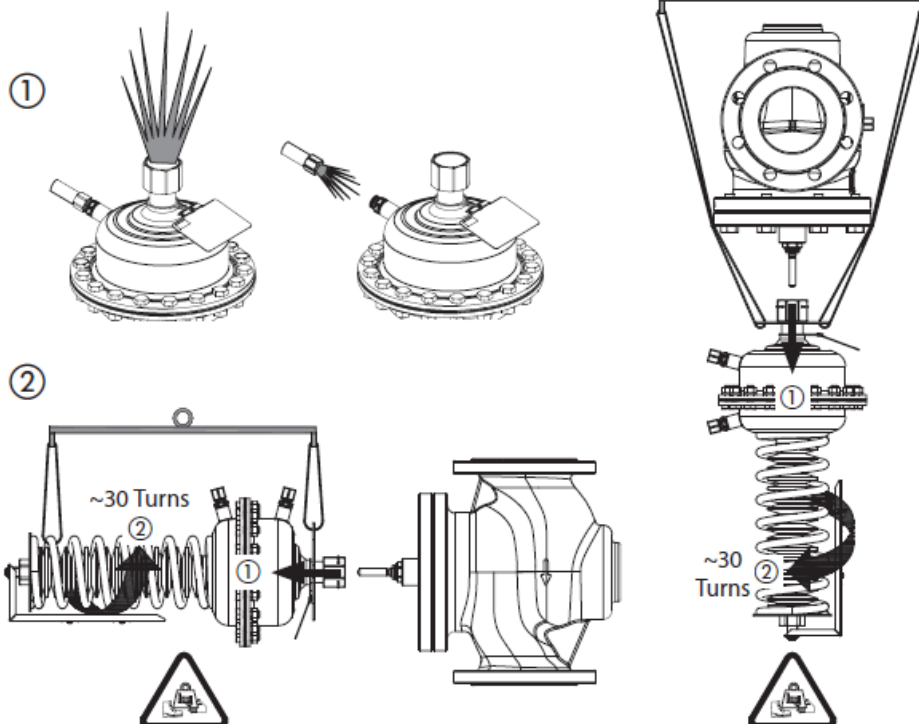
For media temperatures up to 120 °C the pressure actuator may be insulated ①.

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Dismounting ⑩

⑩ AFPQ 2(4)/VFQ 22(1) DN 65-250



Danger

Danger of injury by hot water

Prior to dismantling depressurize system or use shut-off valves on the impulse tubes! ①

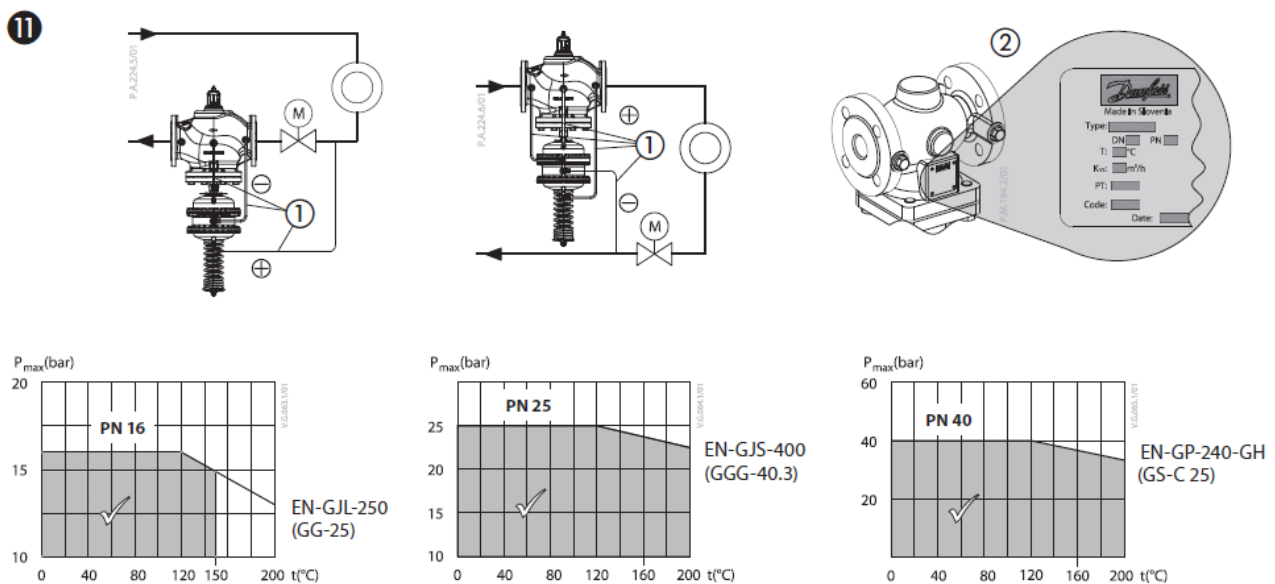
Carry out dismantling in following steps: ②

1. Fasten pressure actuator with the safety bands to the fixed points in surroundings
2. Before releasing the actuator, fully release the union nut
3. Hold the pressure actuator with both hands, and release it by turning it counterclockwise ~30 turns. During turning, control the actuator weight all the time to prevent unexpected fall of detached actuator.
4. Carefully remove the actuator from the valve.

Before installing actuator back to the valve, setting spring must be fully released again.

Leak and Pressure Test

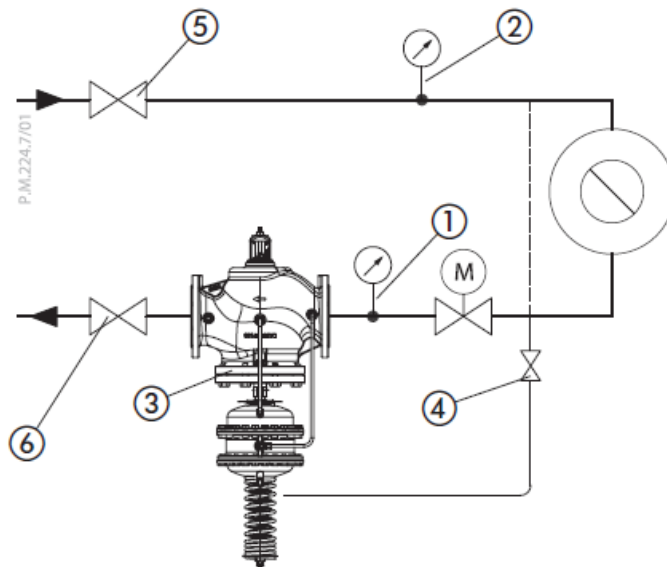
“Danger of injury by heavy weight of pressure actuator. When dismantling the pressure actuator from the valve, control the actuator weight all the time to prevent unexpected fall of detached actuator and potential injuries due to the heavy weight!” To prevent damages on the diaphragm pressure must be constantly and simultaneously increased at the + and – connection ① until the max testing pressure is reached.



- In case of higher test pressures, remove impulse tubes at the pipelines ①.
- Observe nominal pressure ② of the valve.
- Max. test pressure must not exceed the plant testing pressure and must always be lower than $1.5 \times \text{PN}$
- Non-compliance may cause damages at the actuator or valve.

Filling the System, Start-up

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The return flow pressure ① must not exceed the supply flow pressure ②.

Non-compliance may cause damages at the controller ③.

1. Open shut-off devices ④ that are possibly available at the impulse tubes.
2. Slowly open valves in the system.
3. Slowly open shut-off devices ⑤ in the supply flow.
4. Slowly open shut-off devices ⑥ in the return flow.

Putting out of Operation

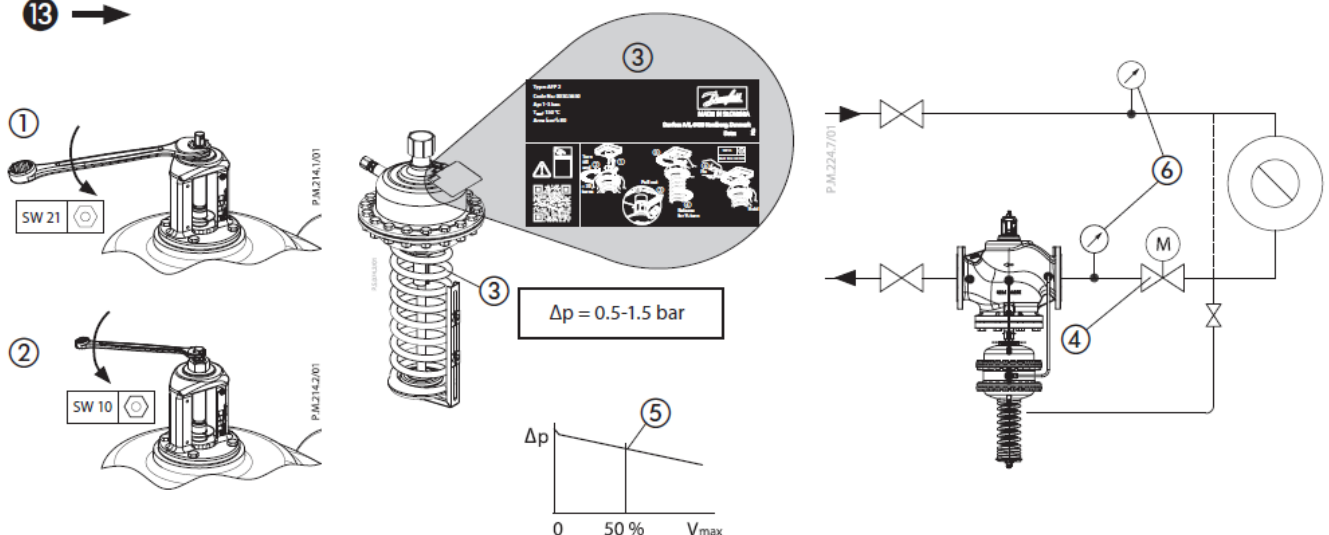
1. Slowly close shut-off devices ⑤ in the supply flow.
2. Slowly close shut-off devices ⑥ in the return flow.

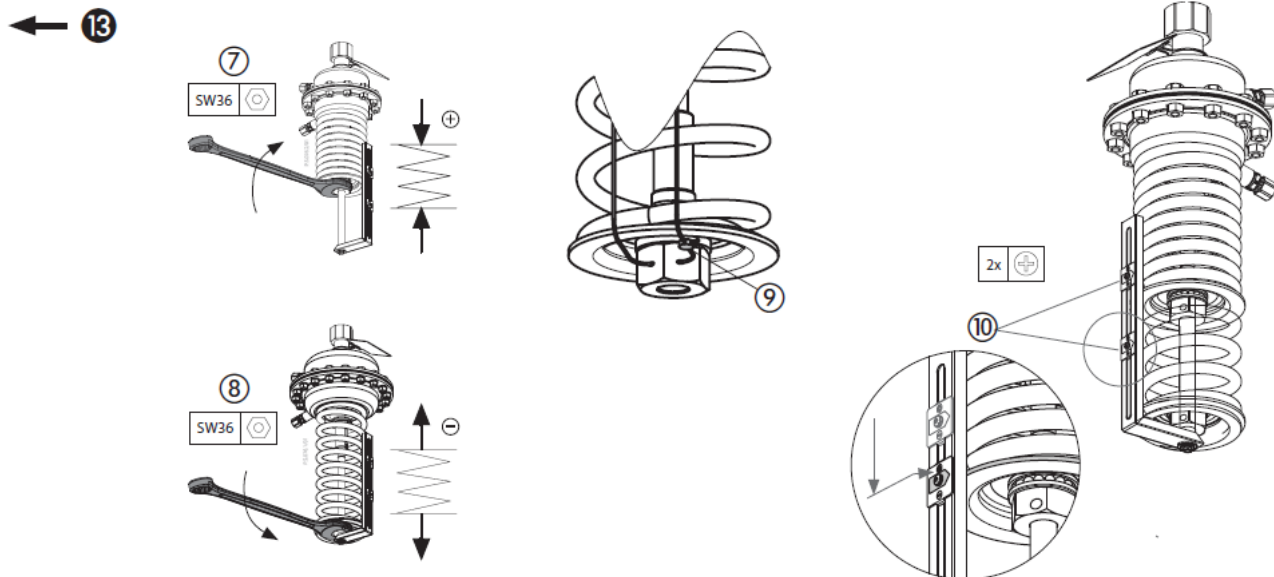
Set-point Setting

First set the differential pressure.

Differential Pressure Setting

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1. Loosen counter nut ①.
2. Unscrew adjusting throttle ② up to its stop.
3. Start system, see section "First Start-up"
4. Completely open all shut-off devices in the system.
5. Set-point range see rating plate ③
6. Set flow rate on a motorized valve ④ over which the differential pressure is controlled, to about 50 % ⑤
7. Adjustment
 - Observe pressure indicators ⑥
 - Turning to the right ⑦ increases the set-point (stressing the spring)
 - Turning to the left ⑧ reduces the set-point (un-stressing the spring)
 - The set-point adjuster ⑨ may be sealed.
 - Release the not yet used pointer ⑩, move it to the set position and fix it with the screw

Adjustment of Flow Rate Limitation

The flow rate is limited by adjusting the stroke of the adjusting throttle ①.

There are two options:

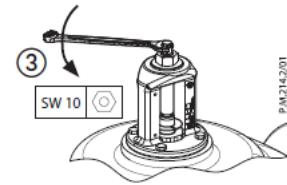
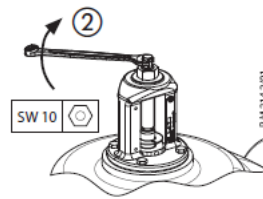
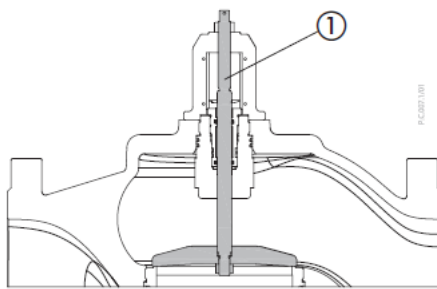
1. Adjustment with the flow adjusting curves
2. Adjustment with heat meter.

Adjustment with flow adjusting curves

The system must not be running! When closing the adjusting throttle (step 3), the actuator could be damaged in case of high pressure differences.

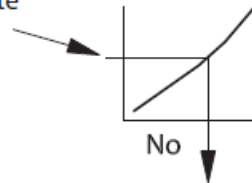
1. Screw in adjusting throttle ② up to its stop. Valve is closed, no flow.

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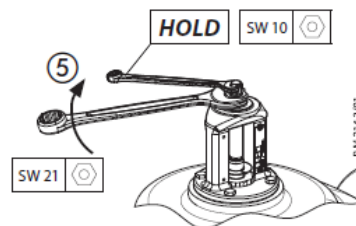
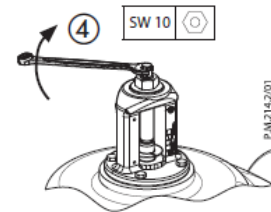
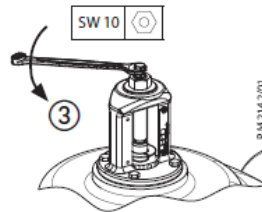
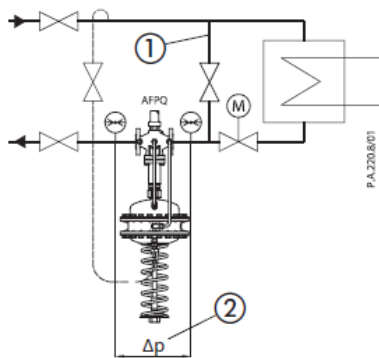
2. Select flow adjusting curve (see).

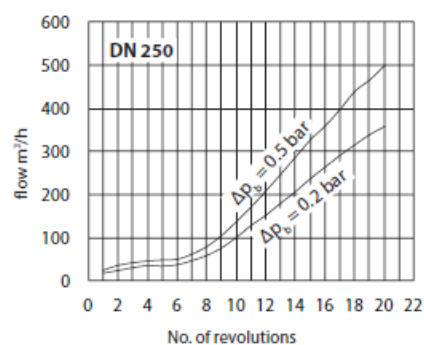
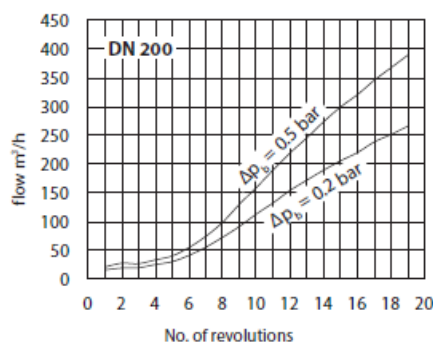
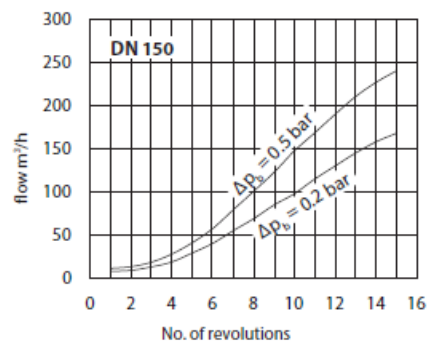
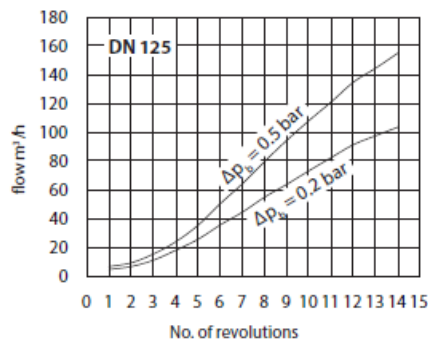
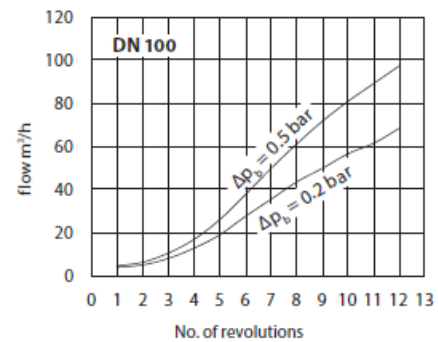
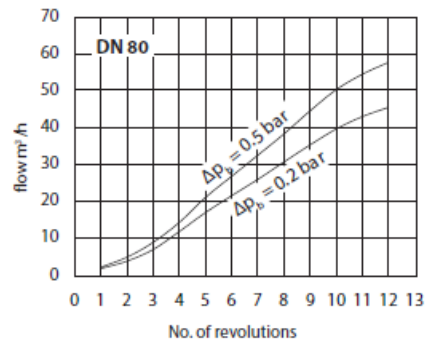
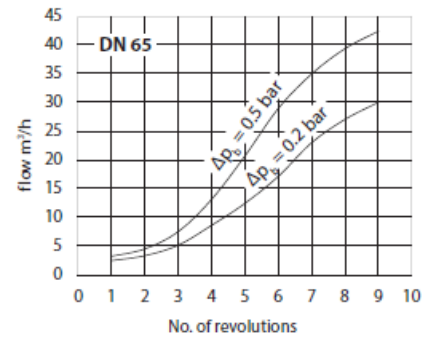
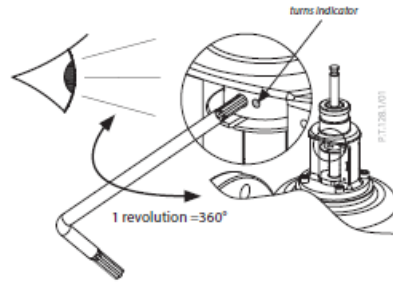
Required
flow rate



Rotations of
adjusting throttle

15 →



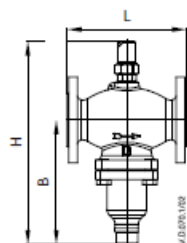


3. Turn adjusting screw ③ by the number of rotations from diagram to the right The adjustment of the valve stroke is completed
4. The adjusting screw may be sealed

Note

The adjustment may be checked when the system is running by means of a heat meter, see next section.

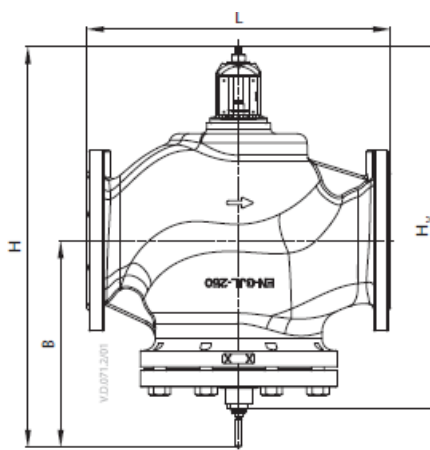
Adjustment with Heat Meter



VFQ 2 DN 15-50

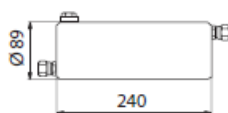
Adapter
003G1780

DN	15	20	25	32	40	50
L	130	150	160	180	200	230
B	213	213	239	239	241	241
H	267	267	304	304	323	323

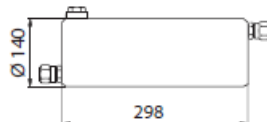


VFQ 22(1) DN 65-250

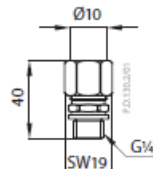
DN	L	B	H	H _v	Weight		
					PN 16	PN 25	PN 40
					mm		
					kg		
65	290	220	345	285	24	25	26
80	310	220	345	285	29	30	32
100	350	260	405	345	47	48	50
125	400	260	425	365	60	62	60
150	480	325	515	455	105	108	130
200	600	360	605	545	204	210	260
250	730	420	675	615	343	353	375



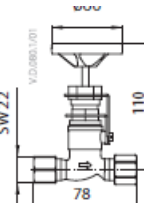
Seal pot V1



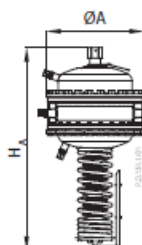
Seal pot V2



Compression fitting



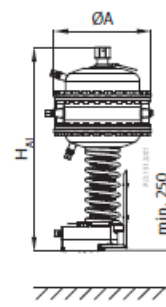
Shut off valve



AFPQ 2, AFPQ 24 Actuators

Type	Size	ØA	H _A	H _{Nl}	Weight (kg)	
					AFPQ 2(4)	AFPQ 2(4)+ AMEi 6
AFPQ 2	160	230	630	730	26	29
	320	300	630	730	38	41
AFPQ 24	160	230	650	750	33	36
	320	300	650	750	45	48

Total installation height of the controller (VFQ 22(1) valve + AFPQ 2 pressure actuator) is sum of H_v and H_A (H_{Nl})



AMEi 6 intelligent actuator with iSET/iNET functionality should be ordered separately

Pre-condition:

Ensure that the system or a bypass ① is completely open.

For the max. flow rate, the pressure difference Δp ② at the control valve must be at least:

$$\Delta p_{\min} = 2 \times \Delta p_b$$

See also section "Flow rate is too low".

1. Observe heat meter indicator
2. Turn to the left ③ increase the flow rate
3. Turning to the right ④ reduces the flow rate.

When the adjustment is completed:

- Tighten counter nut ⑤.
- 8. The adjusting screw may be sealed

Dimensions, Weights

Flanges: connection dimensions acc. too DIN 2501, seal form C

Flow rate is too low, what to do?

Remedy:

1. Verify adjustment, see section before.
2. Check differential pressure at the control valve.

min. differential pressure Δp :

	Δp_b	
$\Delta p =$	0,2	$+ (V/k)^2$ VS
	0,5	

Δp_b restrictor Differential pressure [bar] (see rating plate)

V max. flow rate [m³/h] kvs [m³/h]

Danfoss A/S

Climate Solutions

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FAQ

- **Q: How do I determine the correct torque for fixing the product?**

A: The torque values are specified for different components. Use a torque wrench to achieve the recommended torque settings for secure installation.


- **Q: What is the recommended pressure range for optimal performance?**

A: The product is designed to operate within a pressure range of 0.5-1.5 bar for best results.

- **Q: How do I adjust the flow rate of the product?**

A: Follow the provided flow rate indicators and adjust the number of revolutions accordingly to achieve the desired flow rate.

Documents / Resources

	<p>Danfoss AFPQ 2(4) Differential Pressure Regulator [pdf] User Guide DN 65-250, 73695710, AFPQ 2 4 Differential Pressure Regulator, AFPQ 2 4, Differential Pressure Regulator, Pressure Regulator</p>
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References

- [User Manual](#)

[Manuals+](#), [Privacy Policy](#) | [@manuals.plus](#) | [YouTube](#)

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