



Danfoss VFQ 2 Differential Pressure Controller User Guide

[Home](#) » [Danfoss](#) » Danfoss VFQ 2 Differential Pressure Controller User Guide 

Contents

- [1 Danfoss VFQ 2 Differential Pressure Controller](#)
- [2 Safety Notes](#)
- [3 Assembly](#)
 - [3.1 Connection of impulse tubes in the system](#)
- [Overview](#)
- [4 Insulation ☺](#)
- [5 Dismounting ⓘ](#)
- [6 Adjustment with Heat Meter](#)
- [7 Dimensions](#)
- [8 Documents / Resources](#)
- [9 Related Posts](#)



Danfoss VFQ 2 Differential Pressure Controller



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 flow rate controller is used for flow rate restriction of water and water-glycol mixtures in heating, district heating and cooling systems.

The technical data on the label plates determine the use.

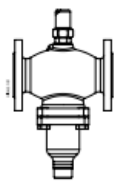
Scope of Delivery



	3 mm	SW13, 19, 36, 46

1

DN 15-125
 $T_{max} = 150\text{ }^{\circ}\text{C}$



Bellows
VFQ 2



adapter 003G1780¹⁾

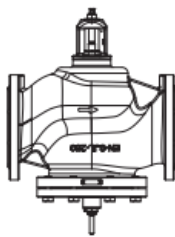


AFQ 2



AF (2x)²⁾

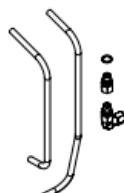
DN 65-250
 $T_{max} = 150\text{ }^{\circ}\text{C}$



Chamber
VFQ 22 (1)



AFQ 2



AF (1x)²⁾

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



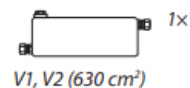
Bellows
VFQ 2



adapter 003G1780¹⁾



AFQ 2



V1, V2 (630 cm²)



AF (2x)²⁾

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

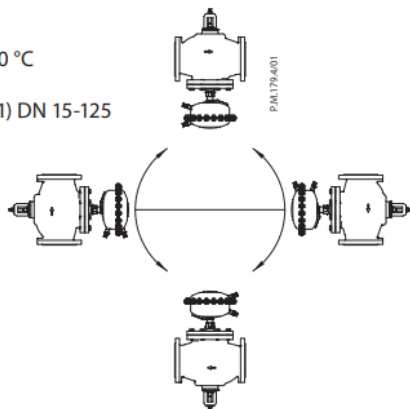
Assembly

Admissible Installation Positions

2

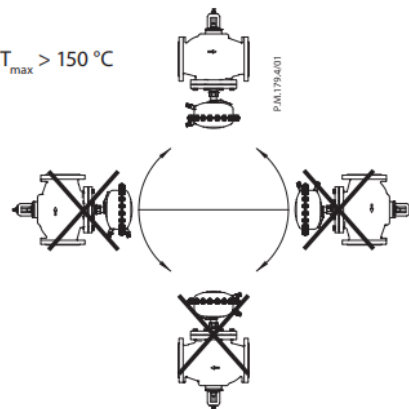
1

$T_{max} \leq 150\text{ }^{\circ}\text{C}$
VFQ 22
VFQ 2 (21) DN 15-125



2

$T_{max} > 150\text{ }^{\circ}\text{C}$

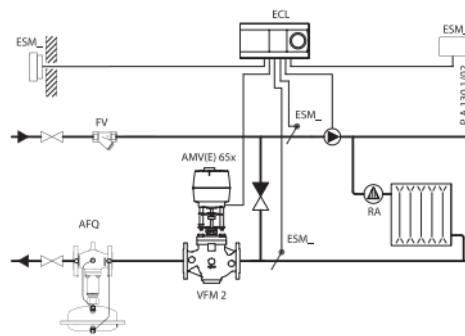


1. media temperatures up to 150 °C: Can be installed in any position.
2. media temperatures > 150 °C. Installation permitted only in horizontal pipelines with the actuator oriented

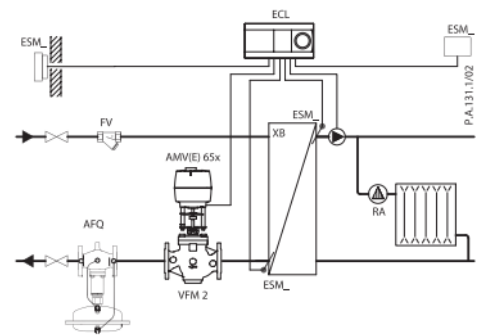
downwards.

Installation Location and Installation Scheme ③

③ Return mounting

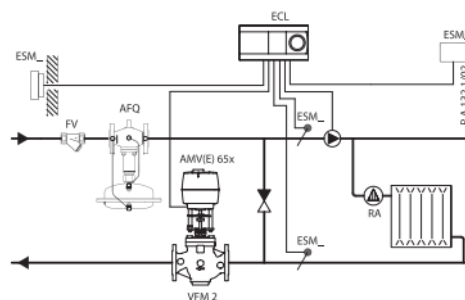


Direct-connected heating system

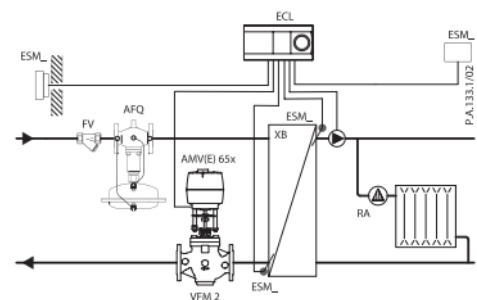


Indirectly connected heating system

Flow mounting



Direct-connected heating system

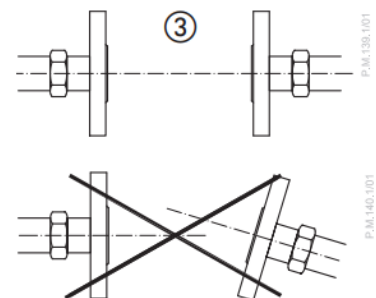
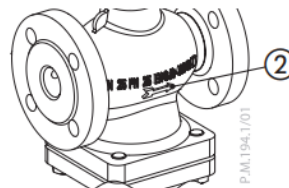
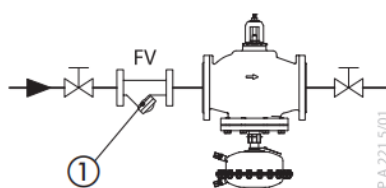


Indirectly connected heating system

- Return mounting
- Flow mounting

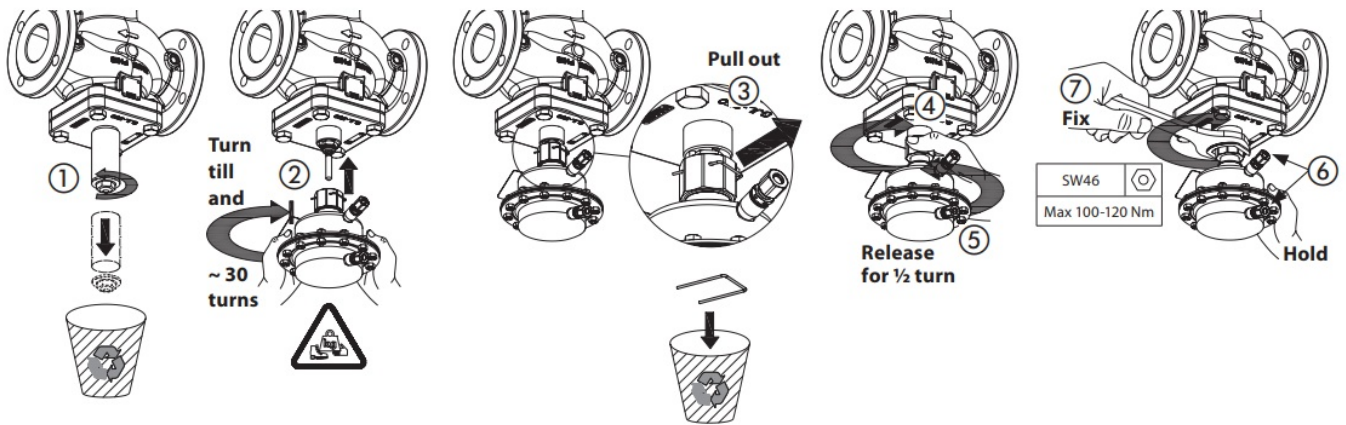
Valve Installation ④

④



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

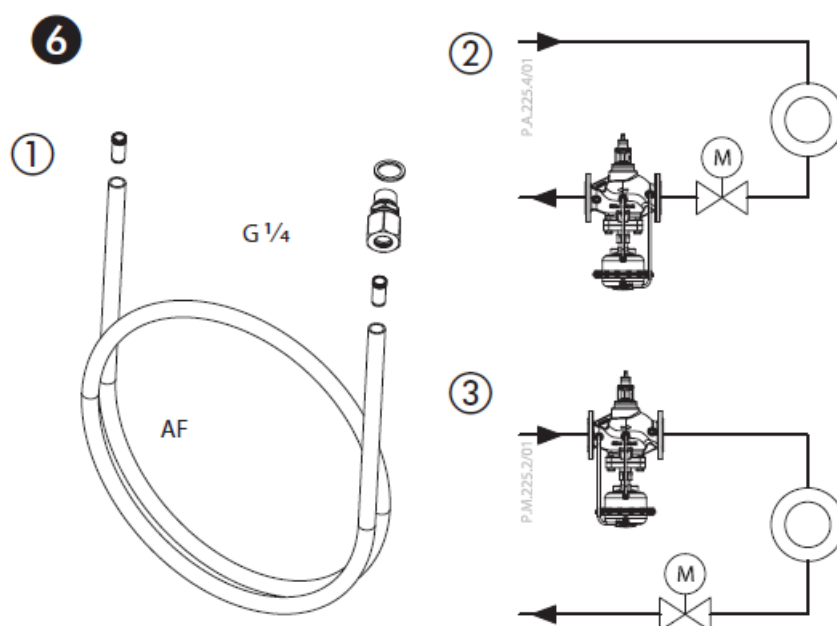
Actuator Installation ⑤



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 counter clockwise 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

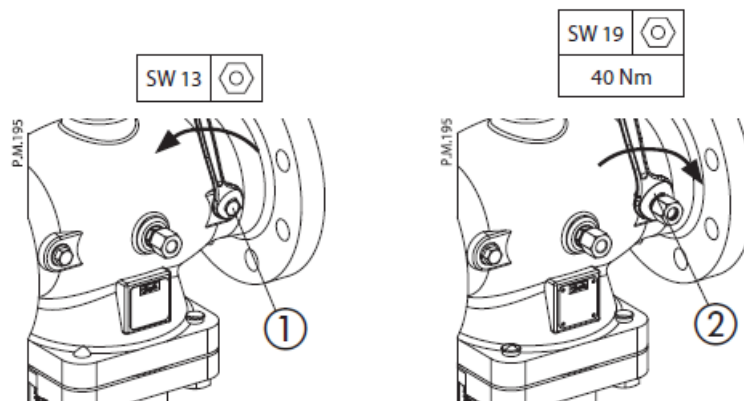


Connection of impulse tubes in the system Overview

1. Installation in return flow ②.
2. Installation in supply flow ③.

Connection of impulse tube set ⑦

7



Remove plug ① at the valve. Screw in threaded joint ② with copper seal. Torque: 40 Nm For installation of impulse tube sets, please observe the Installation Instructions for the Impulse tube sets.

Connection of impulse tube set AF

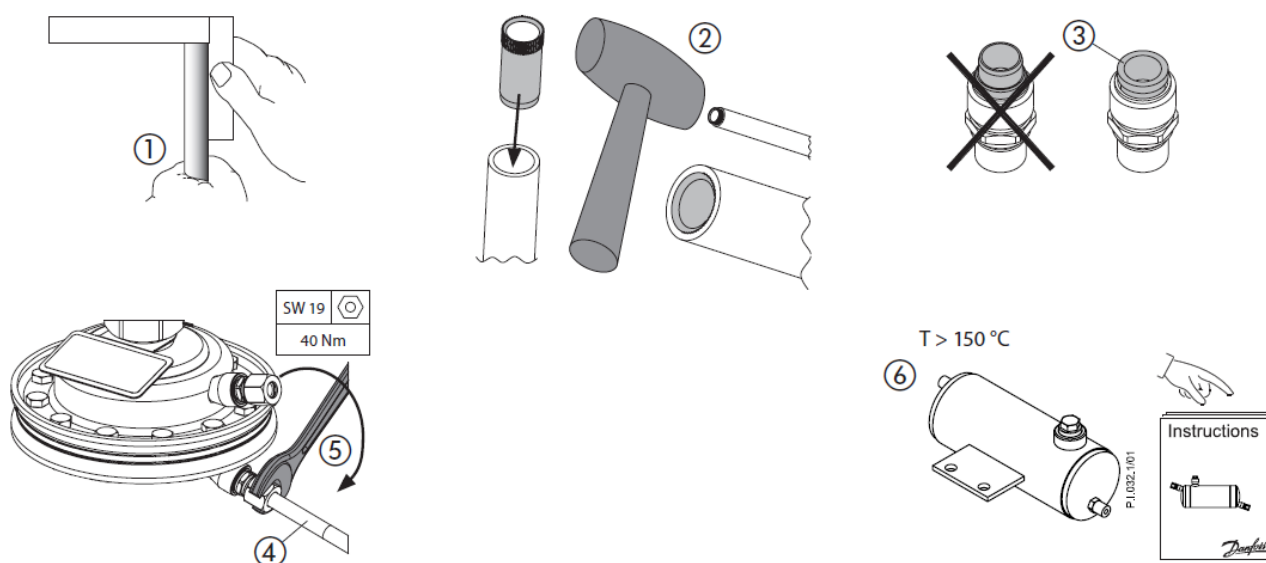
If control lines (copper) are not pre-bent or seal pots are to be installed, please observe the Assembly Instructions of these parts.

- Which impulse tubes to use? The impulse tube set AF (2×) ⑥ ① can be used:

Order No.: 003G1391 or use the following pipes:

Connection of impulse tube set ⑧①

8

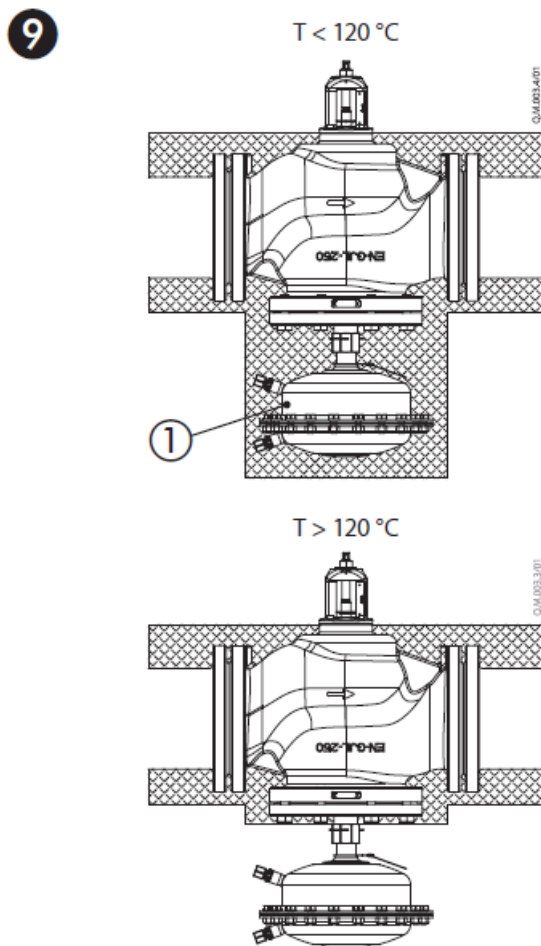


1. Cut pipe in rectangular sections ① and deburr.
2. For copper pipe: insert sockets ② on both sides.
3. Verify the correct position of the cutting ring ③.

4. Press impulse tube ④ into the threaded joint up to its stop.
5. Tighten union nut ⑤ Torque 40 Nm.

When installing seal pots ③⑥, please observe the Installation Instructions for the seal pots.

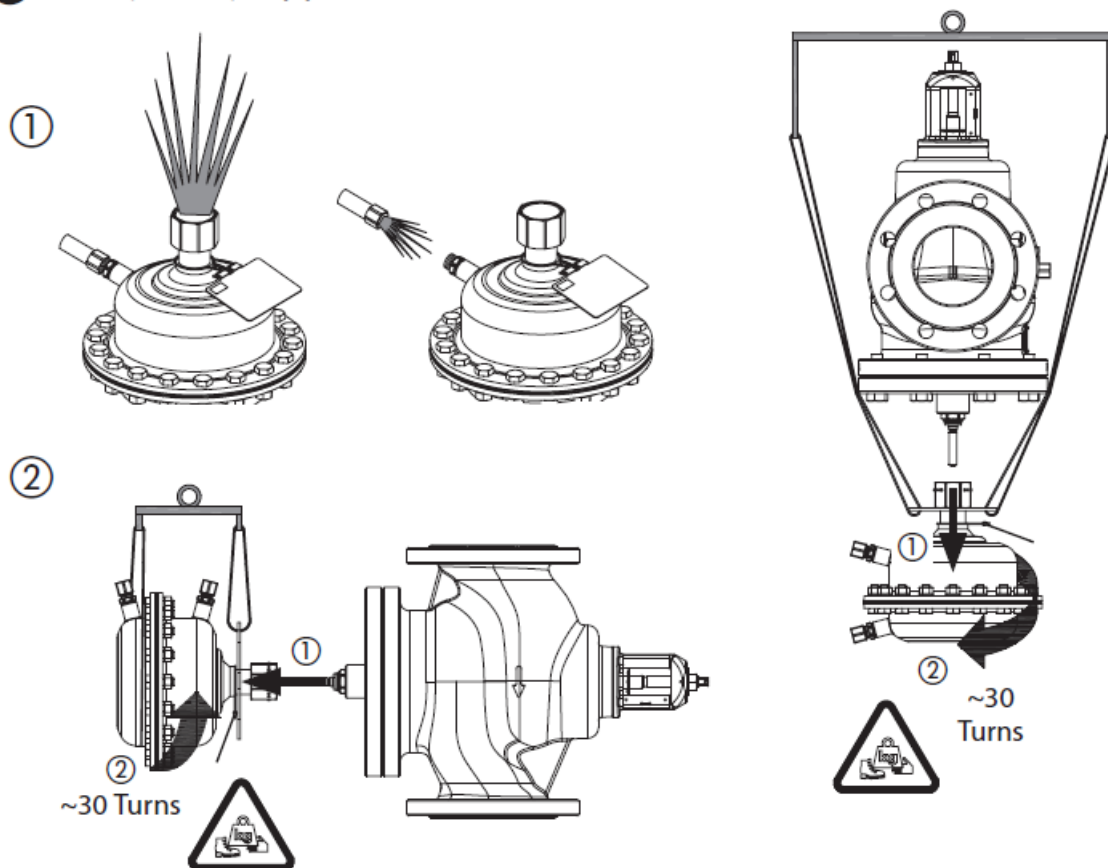
Insulation ⑨



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

Dismounting ⑩

10 AFQ 2/VFQ 22(1) DN 65-250



Danger

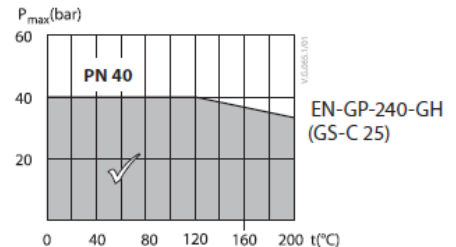
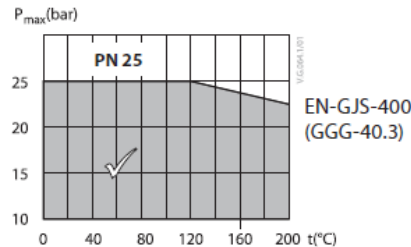
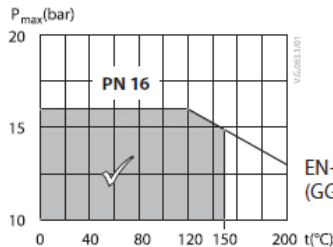
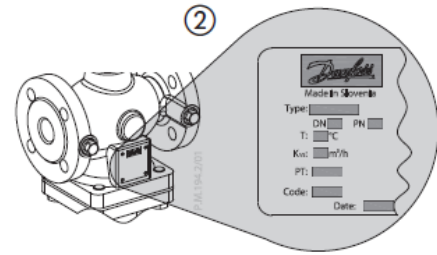
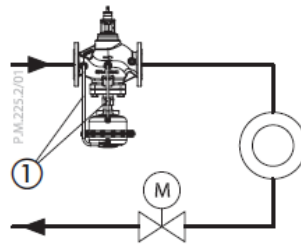
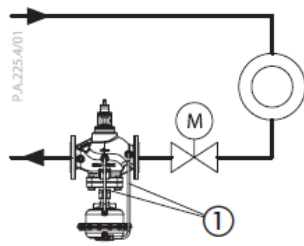
The danger of injury by hot water Prior to dismounting depressurized system or using shut-off valves on the impulse tubes! ①

Carry out dismounting in the following steps: ②

1. Fasten the 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 for ~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 the actuator back to the valve, the setting spring must be fully released again.

Leak and Pressure Test

11



“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 ① and close the valve with appropriate plugs. 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 damage at the actuator or valve.

Filling the System, Start-up

The return flow pressure ① must not exceed the supply flow pressure ②. Non-compliance may cause damages at the controller ③.

1. Slowly open valves in the system.
2. Slowly open shut-off devices ④ in the supply flow.
3. Slowly open shut-off devices ⑤ in the return flow.

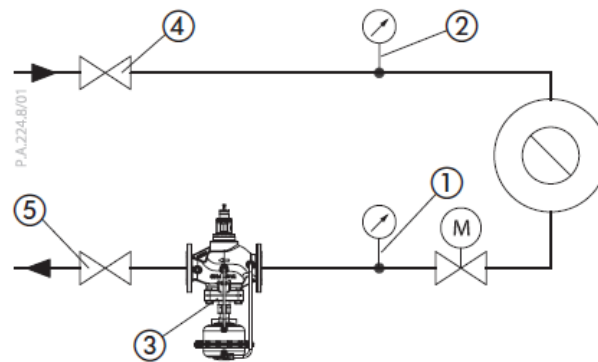
Putting out of Operation

1. Slowly close shut-off devices ④ in the supply flow.
2. Slowly close shut-off devices ⑤ in the return flow.

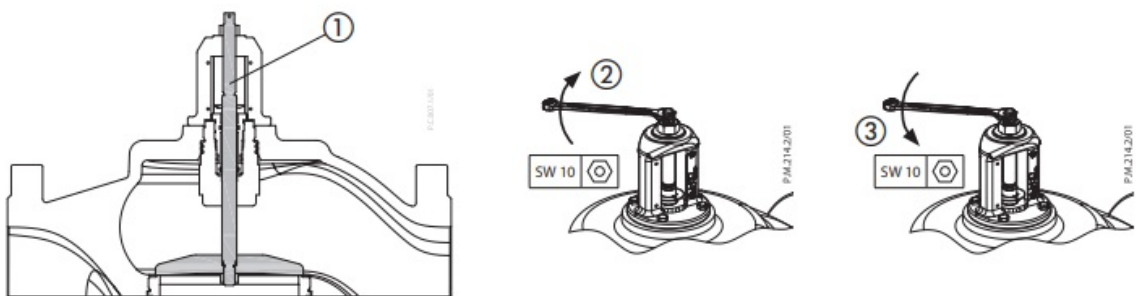
Adjustment of Flow Rate Limitation

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

12



13



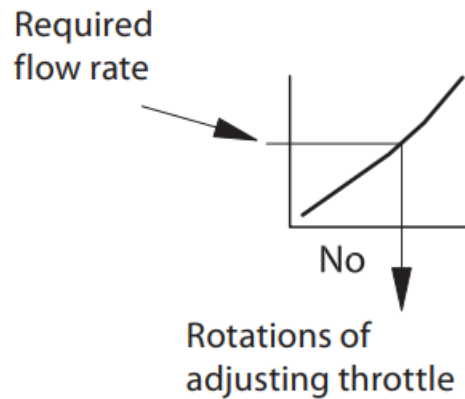
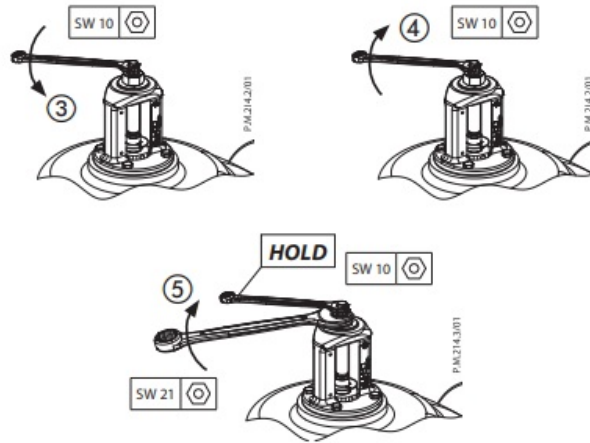
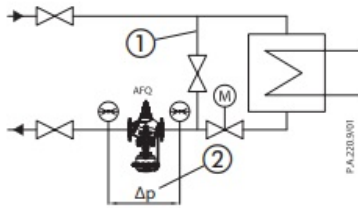
There are two options:

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.
2. Select flow adjusting curve (see).



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

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".

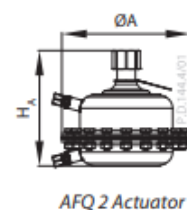
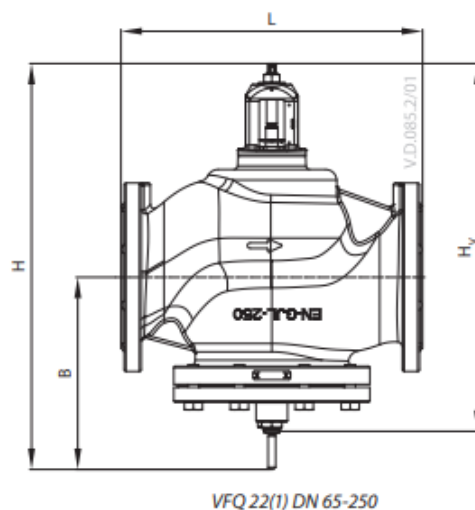
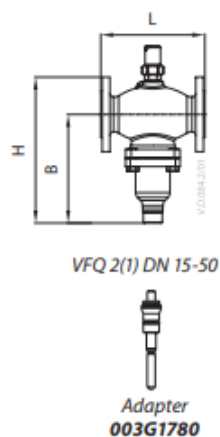
1. Observe heat meter indicator
2. Turn to the left ③ increase the flow rate
3. Turning to the right ④ reduces the flow rate.

When the adjustment is completed:

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

Dimensions

15

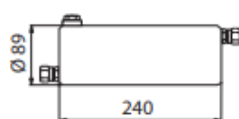


DN	15	20	25	32	40	50
L	130	150	160	180	200	230
B	213	213	239	239	241	241
H	267	267	304	304	323	323

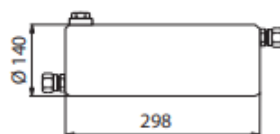
DN	L	B	H	H _v	Weight		
					PN 16	PN 25	PN 40
					mm		
65	290	220	480	400	24	25	26
80	310	220	480	400	29	30	32
100	350	260	560	480	47	48	50
125	400	260	590	520	60	62	60
150	480	325	690	630	105	108	130
200	600	360	780	720	204	210	260
250	730	420	850	790	343	353	375

Size (cm ²)	ØA	H _A	Weight (kg)
	mm		
160	230	200	13.5
320	300	200	20.5

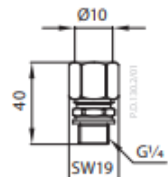
Total installation height of the controller (VFQ 22(1) valve + AFQ 2 pressure actuator) is sum of H_v and H_A



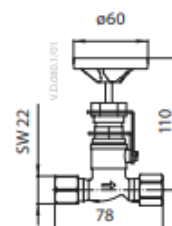
Seal pot V1



Seal pot V2



Compression fitting



Shut off valve

Flanges: connection dimensions acc. to 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 :

$\Delta p =$	Δp_b	+ $(V/k_{vs})^2$
	0,2	
	0,5	


3.
 - Δp_b restrictor Differential pressure [bar] (see rating plate)
 - V max. flow rate [m³/h] kvs [m³/h]

Danfoss A/S

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Documents / Resources

	<p>Danfoss VFQ 2 Differential Pressure Controller [pdf] User Guide AFQ 2, VFQ 2 1 DN 15-125, VFQ 22 1 DN 65-250, VFQ 2 Differential Pressure Controller, Differential Pressure Controller, Pressure Controller, Controller</p>
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