
# Danfoss AFPA 2 Differential Pressure Controller User Guide



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## Danfoss AFPA 2 Differential Pressure Controller

**Specifications**

- Model: AFPA 2 / VFG 2(1) DN 15-250, VFG 22(1) DN 65-250
- Maintenance: Maintenance-free
- Pressure Rating: PN 16, PN 25, PN 40
- Materials: EN-GJL-250 (GG-25), EN-GJS-400 (GGG-40.3), EN-GP-240-GH (GS-C 25)
- Actuator Type: AFPA 2 Actuator

## Product Usage Instructions

**Safety Notes**
Prior to assembly and commissioning, carefully read and observe the instructions to avoid injury or damage. Only qualified personnel should perform assembly, start-up, and maintenance work. Ensure the system is depressurized, cooled down, emptied, and cleaned before any maintenance work.

**Application**
The controller is designed for differential pressure control in bypass lines of water and water glycol mixtures used in heating, district heating, and cooling systems.

**Facility**

1. Ensure the system is depressurized, cooled down, emptied, and cleaned before installation.
2. Assemble the AFPA 2 Actuator and VFG valve according to the provided manual.
3. Follow the instructions provided by the system manufacturer or operator during installation.

**Operation**

1. Turn the AFPA 2/VFG 22(221) DN 65-250 valve until it stops (~30 turns).
2. Pull out the valve gently.
3. Fix the position securely.
4. For tightening, use SW46 with a maximum torque of 100-120 Nm.

**Maintenance**
The product is maintenance-free; however, periodic checks for any leaks or irregularities are recommended. If maintenance is required, it should be performed by qualified personnel following the provided guidelines.

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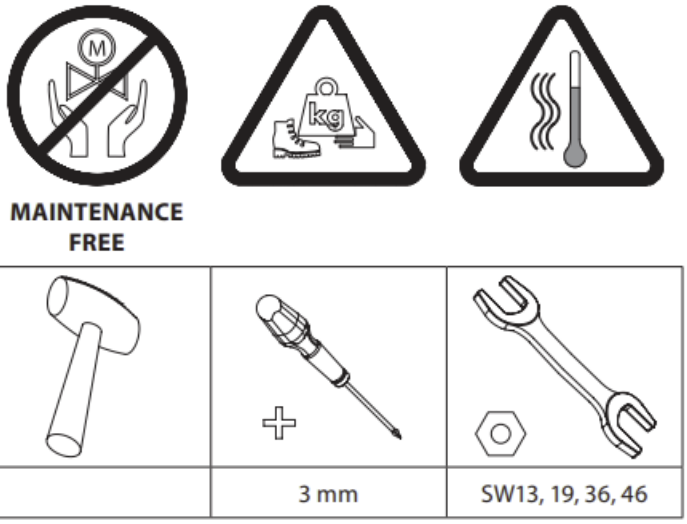
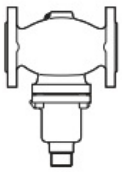
**AFPA 2 / VFG 2(1) DN 15-250, VFG 22(1) DN 65-250**




## Installation Instructions

**1**

*DN 15-250*
*$T_{max}$ = 150 °C*



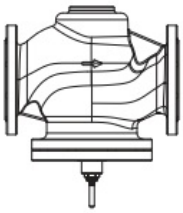
*Bellows*
*VFG2, VFG21*


*adapter **003G1780****

*AFPA 2*

*AF (2×)***

*DN 65-250*
*$T_{max}$ = 150 °C*

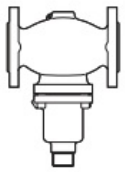


*Piston*
*VFG22, VFG221*

*AFPA 2*

*AF (2×)***

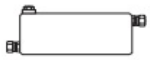
*DN 15-250*
*$T_{max}$ = 200 °C*



*Bellows*
*VFG2*

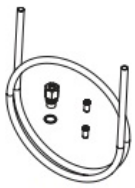

*adapter **003G1780****

*AFPA 2*



*1×*

*V1, V2 (630 cm²)*

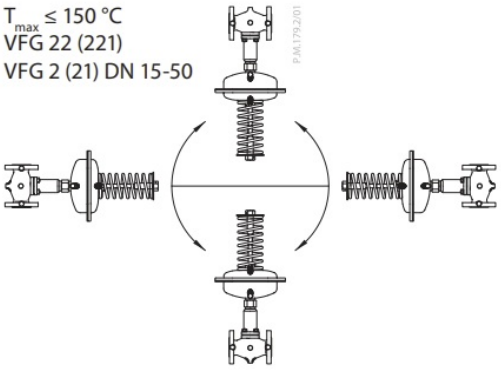


*AF (2×)***

**2**

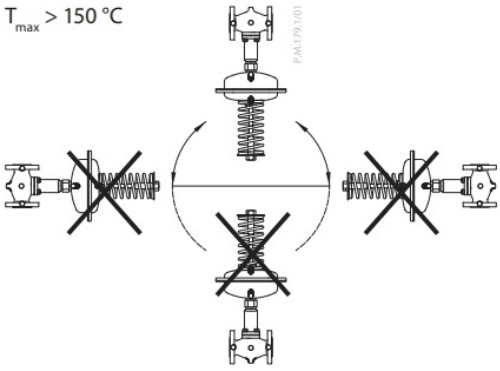
①

$T_{max}$ ≤ 150 °C
VFG 22 (221)
VFG 2 (21) DN 15-50



②

$T_{max}$ > 150 °C



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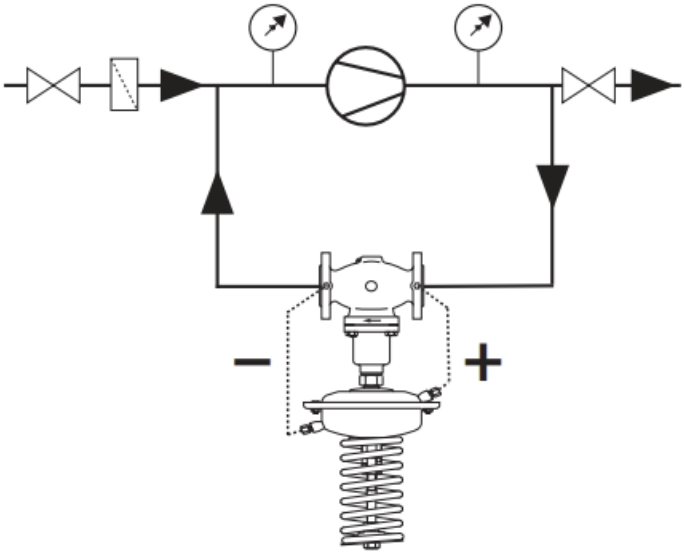


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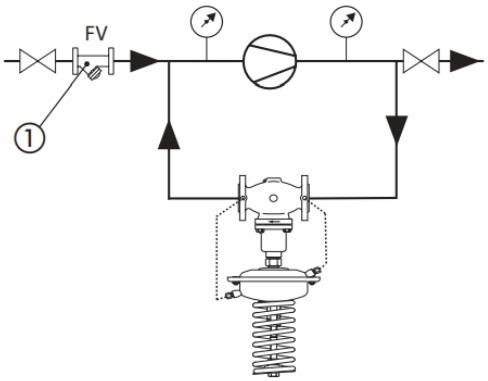
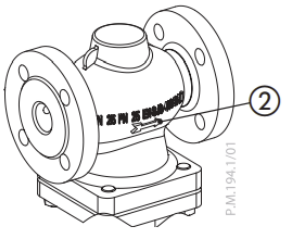
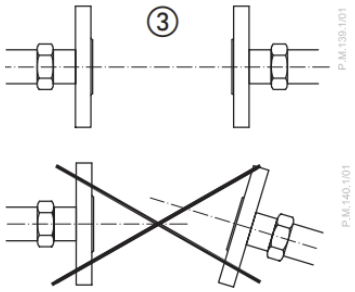
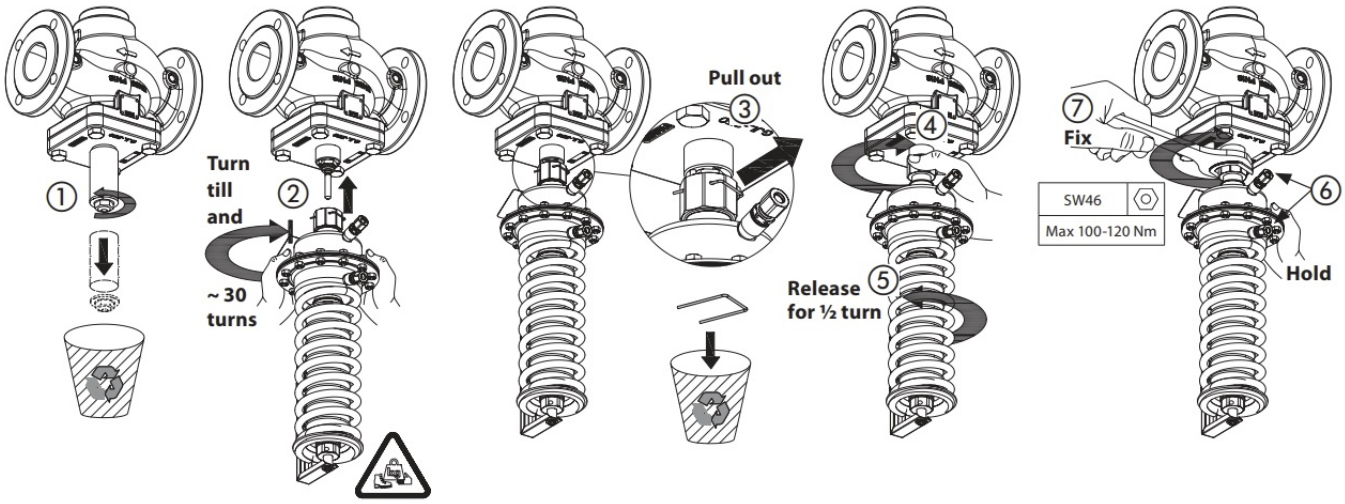
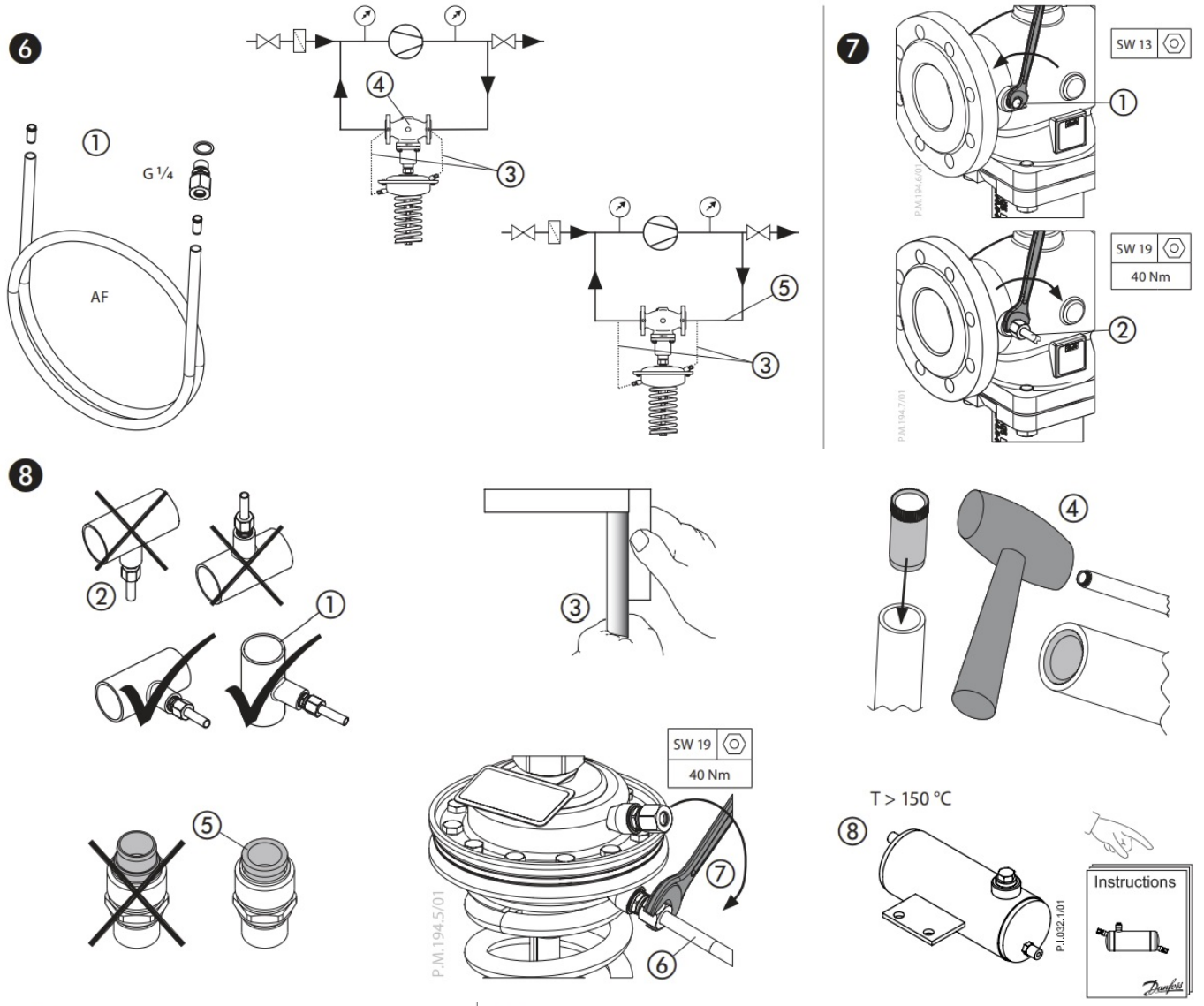


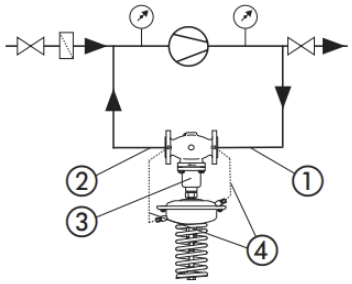



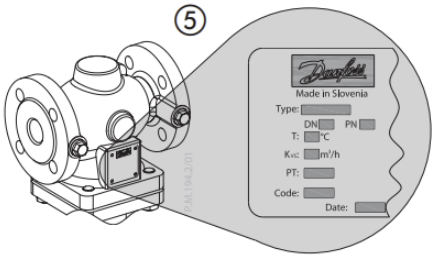

## 5 AFPA 2/VFG 22(221) DN 65-250

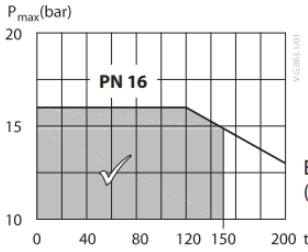



6
①
G ¼
AF
④
③
⑤
③
7
SW 13
①
P.M.194.6/01
SW 19
40 Nm
②
P.M.194.7/01
8
②
①
③
④
⑤
SW 19
40 Nm
⑦
⑥
P.M.194.5/01
T > 150 °C
8
P.J.032.1/01
Instructions
9
T < 120 °C
①
T > 120 °C
10
AFPA 2/VFG 22(221) DN 65-250
①
②
~30 Turns
②
①
~30
Turns
②
①

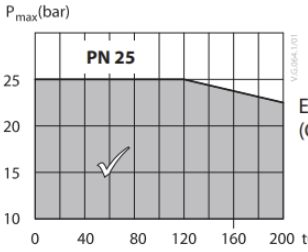
## 11



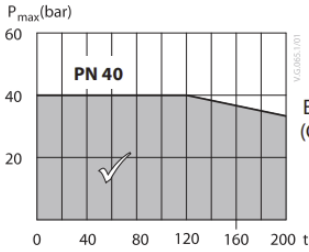




EN-GJL-250
(GG-25)

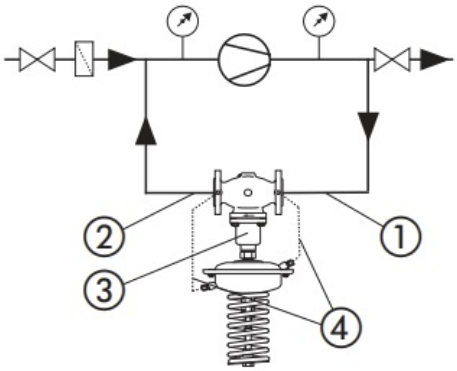


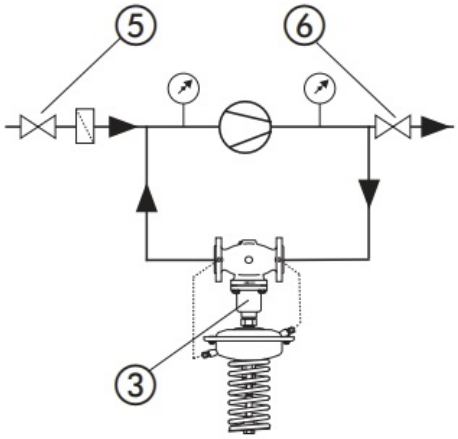

EN-GJS-400
(GGG-40.3)




EN-GP-240-GH
(GS-C 25)

## 12

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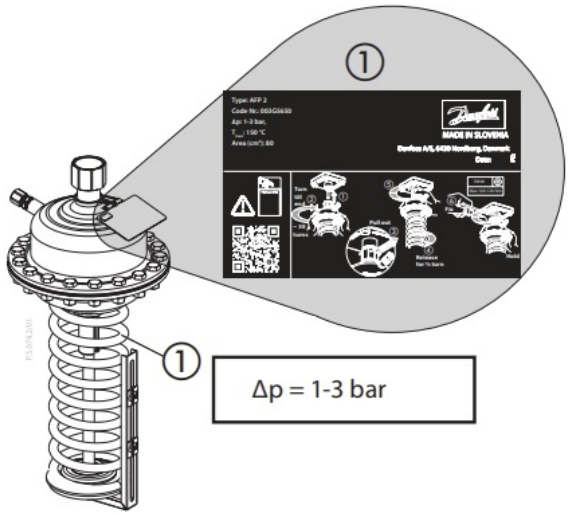
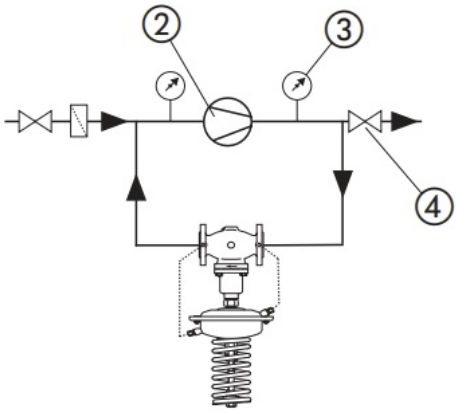



Δp = 1-3 bar



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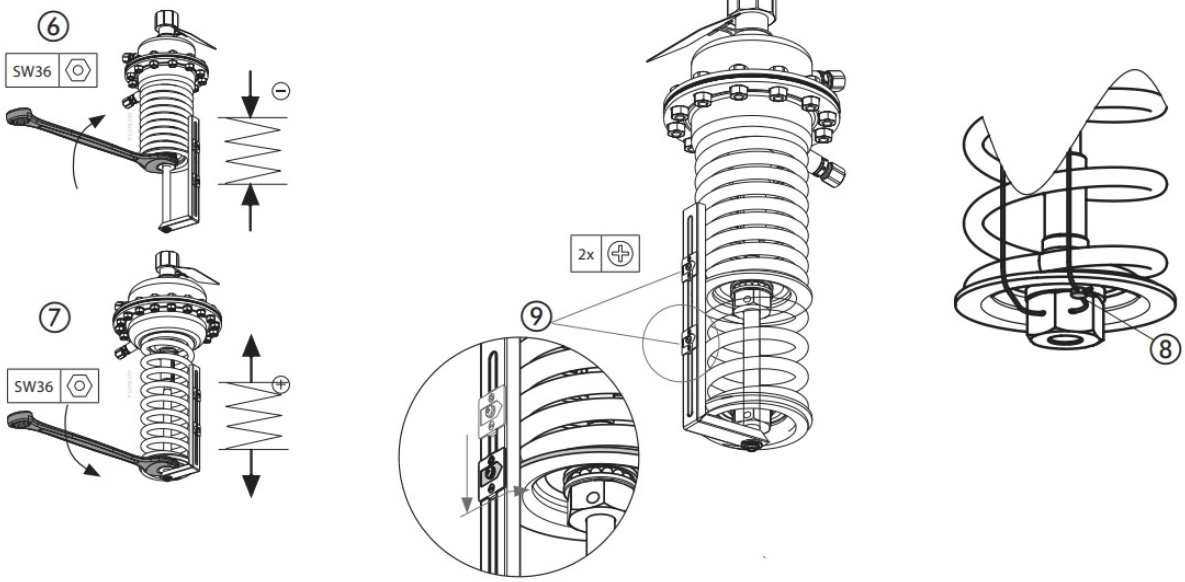


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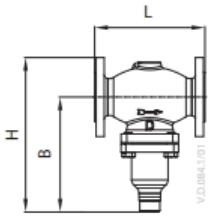
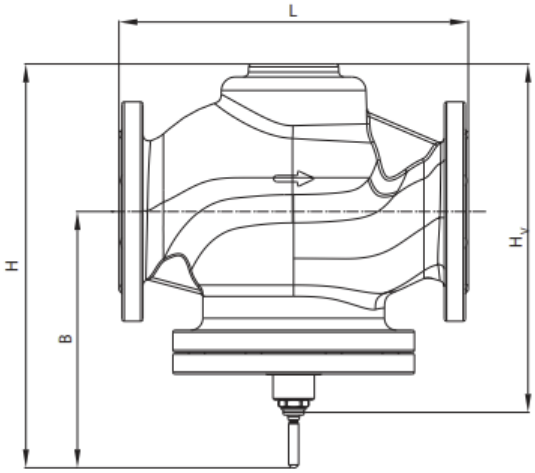
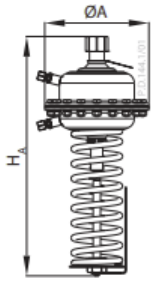



VFG 2 (21) DN 15-50

Adapter
**003G1780**




VFG 22(221) DN 65-250

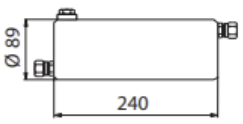



AFPA 2 Actuator

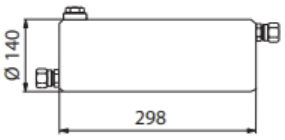
| DN | L | B | H |
|---|---|---|---|
| | mm | | |
| **15** | 130 | 213 | 267 |
| **20** | 150 | 213 | 267 |
| **25** | 160 | 239 | 304 |
| **32** | 180 | 239 | 304 |
| **40** | 200 | 241 | 323 |
| **50** | 230 | 241 | 323 |
| **65** | 290 | 245 | 370 |
| **80** | 310 | 240 | 365 |
| **100** | 350 | 275 | 425 |
| **125** | 400 | 270 | 435 |
| **150** | 480 | 330 | 520 |
| **200** | 600 | 365 | 610 |
| **250** | 730 | 420 | 680 |

| DN | L | B | H | $H_V$ | Weight | | |
|---|---|---|---|---|---|---|---|
| | mm | | | | PN 16 | PN 25 | PN 40 |
| | | | | | 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 |

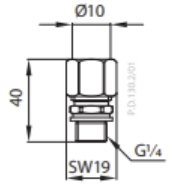
| Size ($cm^2$) | ØA | $H_A$ | Weight (kg) | |
|---|---|---|---|---|
| | mm | | AFPA 2 PN 16 | AFPA 2 PN 40 |
| 80 | 175 | 490 | 9 | 16 |
| 160 | 230 | 490 | 12.5 | 25 |
| 320 | 300 | 490 | 17 | 37 |
| 640 | 300 | 610 | 40 | 58 |



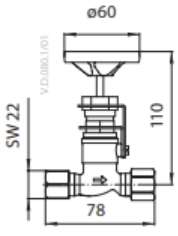

Seal pot V1




Seal pot V2




Compression fitting




Shut off valve

Total installation height of the controller (VFG 22(1) valve + AFPA 2 pressure actuator) is sum of HV and HA

**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 differential pressure control in bypass lines 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 ❶**
adapter 003G1780, accessory sold separately, Impulse tube AF, accessory sold separately

**Assembly**
Admissible Installation Positions ❷

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 ❸**

**Bypass installation**

- The valve is closed without pressure and is opening on rising differential pressure ①.

**Valve Installation ❹**

1. Install the 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 ❺**

**The actuator stem must be screwed into the valve stem. Spring on the pressure actuator is factory adjusted (stressed).**

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 spring (unstress) and release the uninon nut by pulling out the blocking spring.
4. Tight the union nut by hand or with wrench key using minimal force
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 ❻**

- Which impulse tubes to use?
- The impulse tube set AF (2×) ❻① can be used: Order No.: 003G1391 or use the following pipes:

| | | |
|---|---|---|
| Steel / Stainless steel | Ø 10×1 | ISO 1127 D3/T3 |
| Copper | Ø 10×1 | Cu-DHP R200 EN12449 |

- The impulse tube ③ can be connected directly to the valve ④ or to the pipeline ⑤.

**Connection to the valve ❼**

1. Remove plug ① at the valve.
2. Screw in threaded joint G 1/4 ② with copper seal, Torque 40 Nm.- or –

**Connection to the Pipeline ❽①**
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 the impulse tube ⑥ into the threaded joint up to its stop.
5. Tighten union nut ⑦ Torque 40 Nm.

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

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

**Dismounting ❿**

**Danger**
Danger of injury by hot water

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

**Carry out dismounting in the following steps: ②**

1. Fasten pressure actuator with the safety bands to the fixed points in the 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**

**Observe max.**
permitted pressure, see below.

- The pressure behind the valve ② must not exceed the pressure before the valve ①.
- Observe nominal pressure ⑤ of the valve.

**Caution**:

- The valve is closed without pressure and it opens on rising pressure before the valve.
- Prior to pressure tests, it is absolutely necessary to remove the impulse tube at the valve ④. Close connections with plugs G ¼ ISO 228.
- Max. pressure [bar] with connected impulse tube:

| AFPA 2<br>cm2 | 32 | 80 | 160 | 320 | 640 |
|---|---|---|---|---|---|
| bar | 16 | 5 | 2.5 | 1.3 | 0.35 |

Max. test pressure with disconnected impulse tube must not exceed the plant testing pressure and must always be lower than 1.5 × PN. Non-compliance may cause damage at the controller ③.

**Filling the System, Start-up**

- The pressure ② behind the valve must not exceed the pressure ① before the valve.

**Non-compliance may cause damages at the controller ③.**

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

**Putting out of Operation**

1. Slowly close shut-off device ⑤.
2. Slowly close shut-off device ⑥.

**Setpoint Adjustment**

1. Set-point range see rating plate ①
2. Start-up of system, see section .
3. Start pump ②
4. Observe pressure indicator ③
5. Slightly close fitting ④ behind the pump (in flow direction) so that the pressure ③ is rising.
6. Adjustment of the differential pressure over the valve:
    - Turning to the right ⑥ reduces the set-point (unstressing the spring-tension spring)
    - Turning to the left ⑦ increases the set-point (stressing the spring)
7. If the required pressure ③ cannot be set, further close the fitting ④.
8. The set-point adjuster ⑧ may be sealed.
9. Release the not yet used pointer ⑨, move it to the set position and fix it with the screw to mark setting position

**Dimensions**

- Flanges: connection dimensions acc. to DIN 2501, seal form C
- Any information, including, but not limited to information on selection of product, its application or use, product design, weight, dimensions, capacity or any other technical data in product manuals, catalogues descriptions, advertisements, etc. and whether made available in writing, orally, electronically, online or via download, shall be considered informative, and is only binding if and to the extent, explicit reference is made in a quotation or order confirmation. Danfoss cannot accept any responsibility for possible errors in catalogues, brochures, videos, and other material.
- Danfoss reserves the right to alter its products without notice. This also applies to products ordered but not delivered provided that such alterations can be made without changes to form, fit or function of the product.
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## FAQs

**Q: What is the application of the controller?**
A: The controller is used for differential pressure control in bypass lines of water and water glycol mixtures in heating, district heating, and cooling systems.

**Q: Is maintenance required for the product?**
A: The product is maintenance-free; however, periodic checks are recommended to ensure proper functionality.

## Documents / Resources


**Danfoss AFPA 2 Differential Pressure Controller** [pdf] User Guide
AFPA 2 1 DN 15-250, VFG 2 1 DN 15-250, VFG 22 1 DN 65-250, VFG 22 221 DN 65-250, AFPA 2 Differential Pressure Controller, AFPA 2, Differential Pressure Controller, Pressure Controller

## References

- Danfoss France - économie d'énergie et solutions innovantes | Danfoss
- Danfoss Italia | Soluzioni innovative e digitali per l'efficienza energetica industriale e residenziale | Danfoss
- Engineering Tomorrow | Danfoss
- User Manual