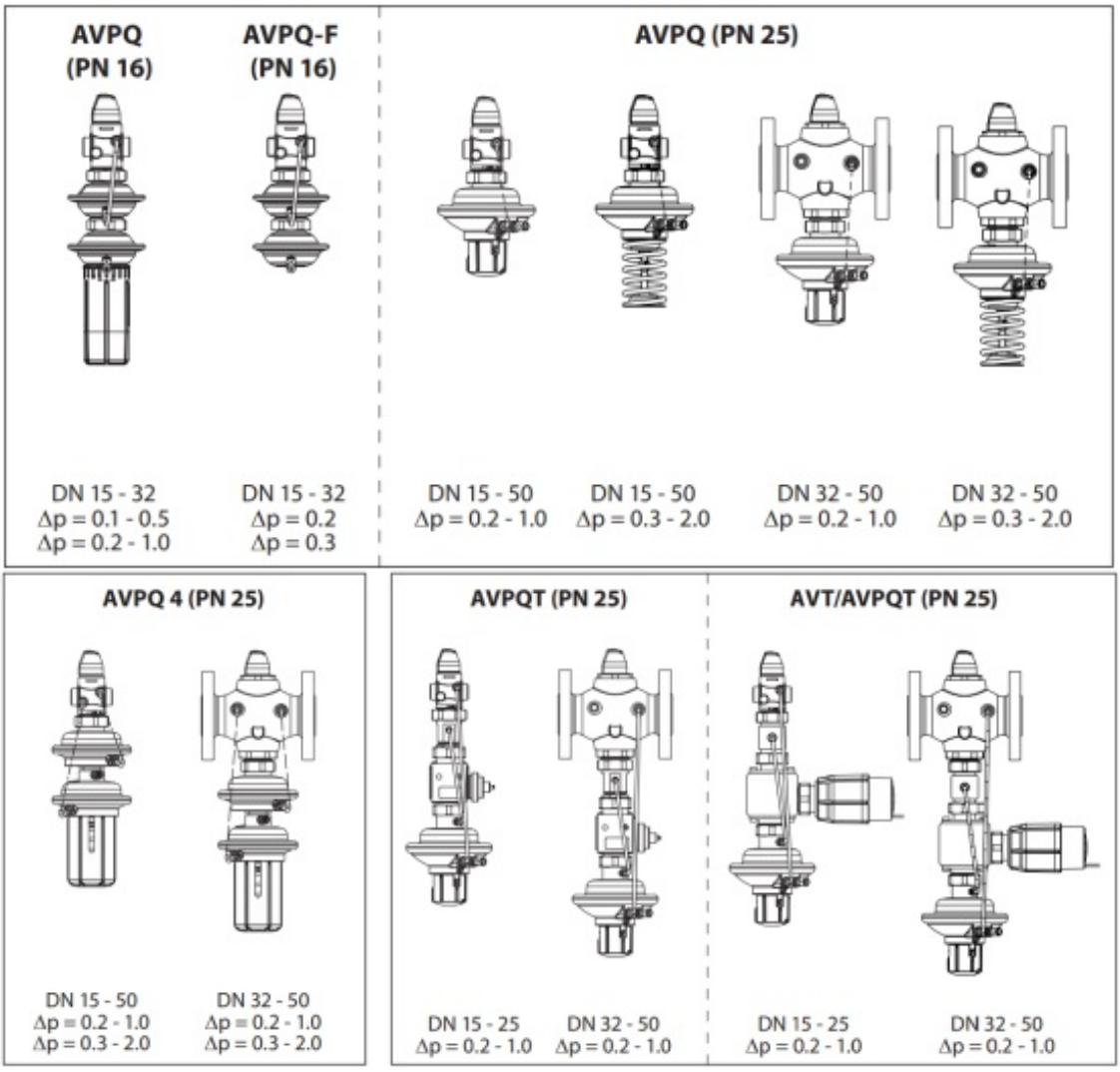
Danfoss AVPQ Differential Pressure and Flow Controller Instructions

Instructions
AVPQ, AVPQ-F, AVPQ 4, AVPQT
PN 16,25 / DN 15 – 50

Contents

AVPQ Differential Pressure and Flow Controller



Differential pressure and flow controller
AVPQ, AVPQ-F, AVPQ 4, AVPQT
www.danfoss.com

Safety Notes

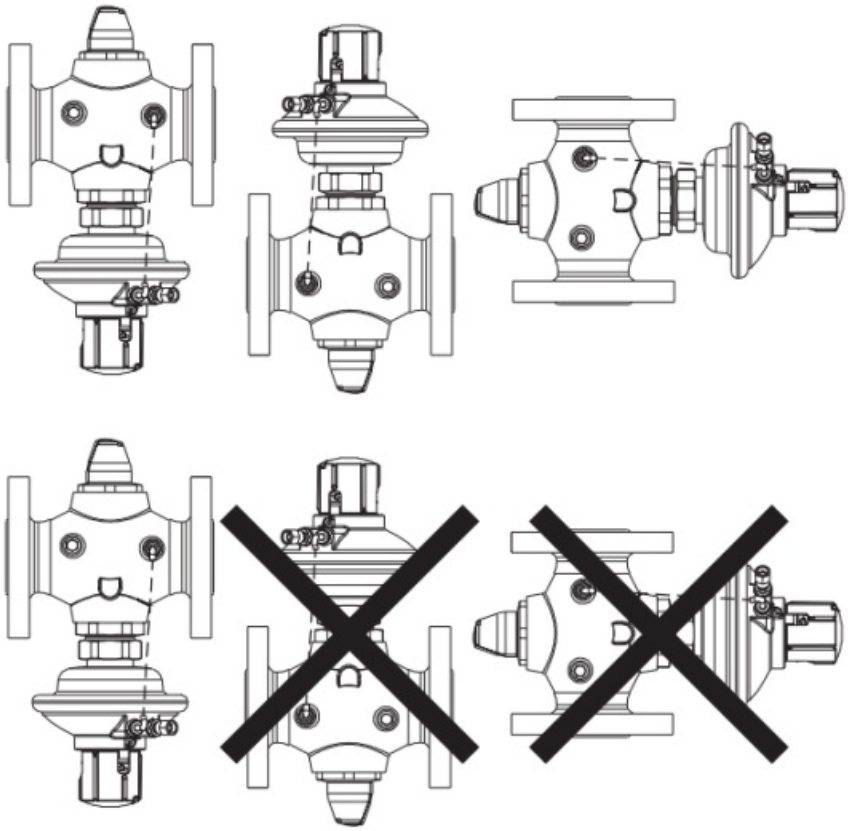
⚠ Prior to assembly and commisioning to avoid injury of persons and damages of the devices, it is absolutely necessary to carefully read and observe these instructions. Necessary assembly, startup, and maintenance work must be performed only by qualified, trained and authorized personnel.
Prior to assembly 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 and flow (and temperature at AVPQT) control of water and water glycol mixtures for heating, district heating and cooling systems.
The technical parameters on the product labels determine the use.

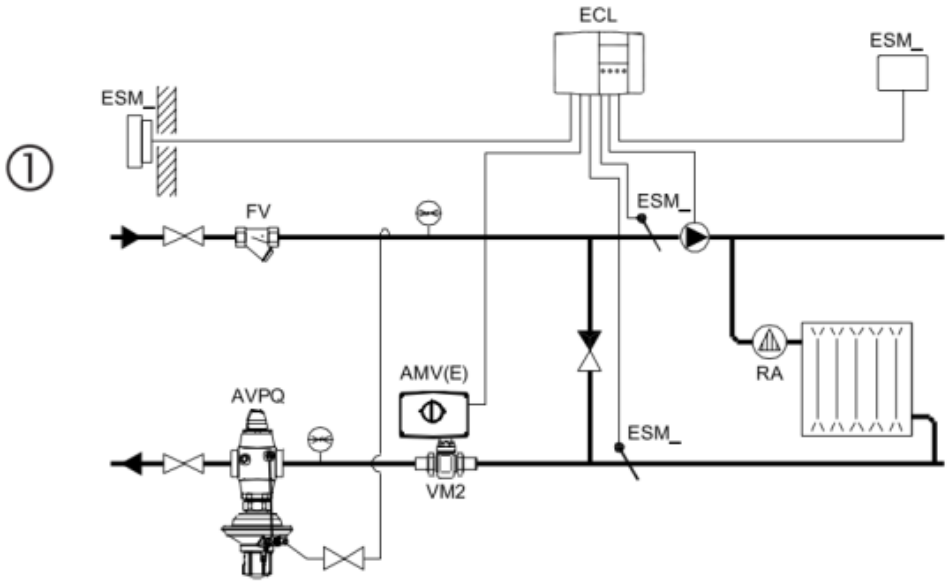
Assembly

Admissible Installation Positions
Medium temperatures up to 100 °C:
– Can be installed in any position.
Medium temperatures > 100 °C:
– Installation permitted only in horizontal pipelines with the actuator oriented downwards.



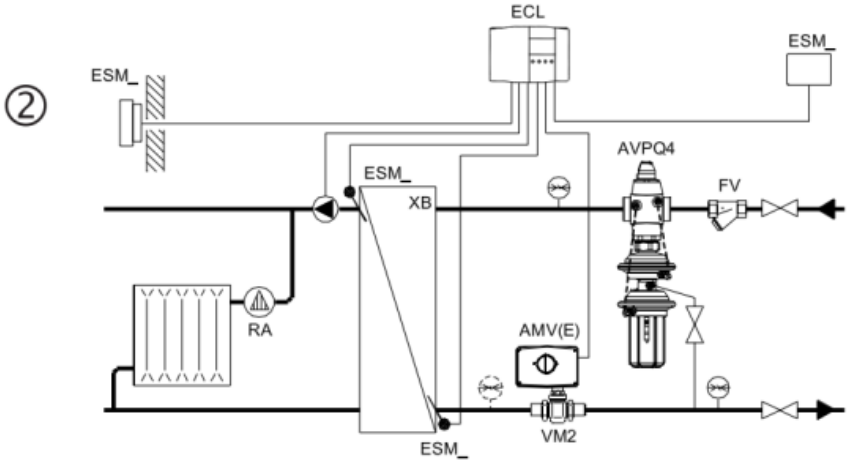
Installation Location and Installation Scheme

1. AVPQ(-F)
   return mounting



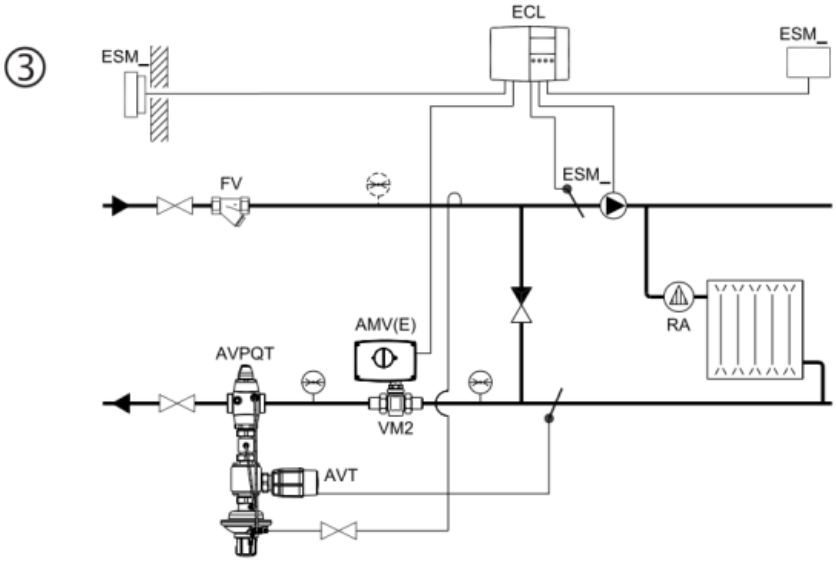
2. AVPQ 4

   flow mounting



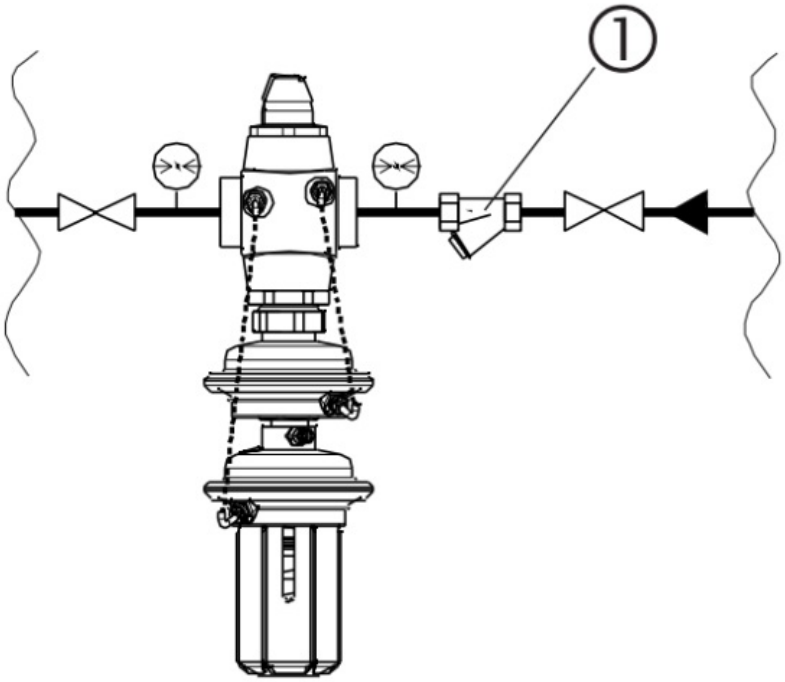
3. AVPQT

   return mounting

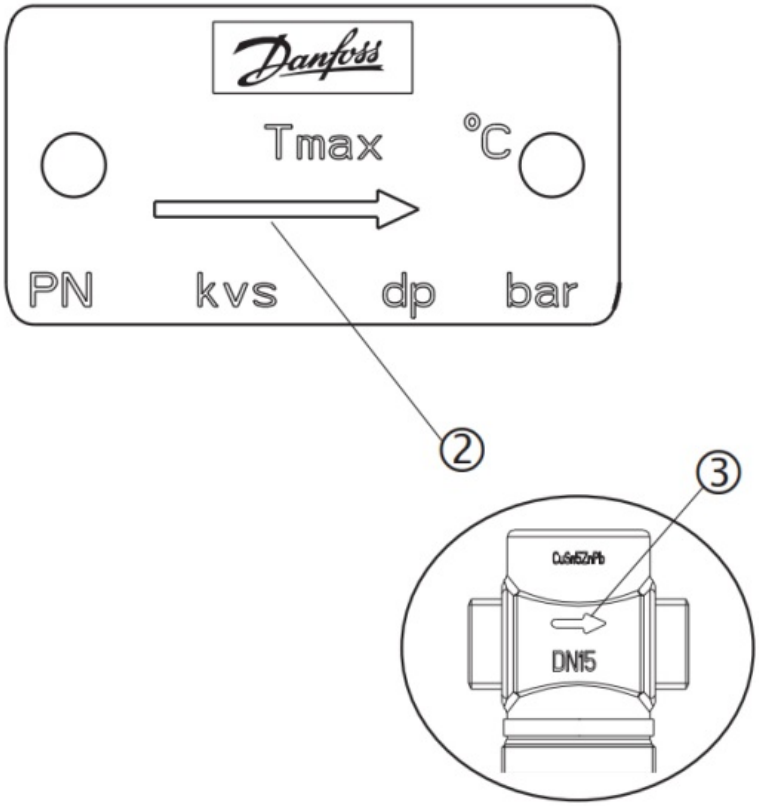


Valve Installation

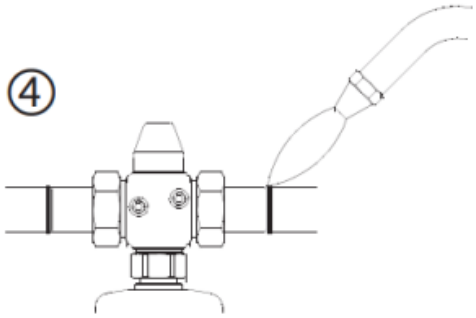
1. Clean pipeline system prior to assembly.

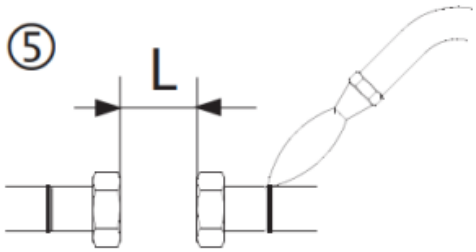


2. The installation of a strainer in front of the controller is strongly recommended 1.



3. Install pressure indicators in front of and behind the system part to be controlled.





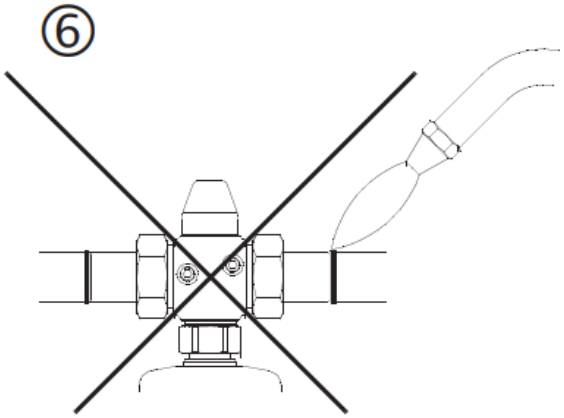
DN	L (mm)
15	69
20	74
25	79
32	104
40	114
50	134

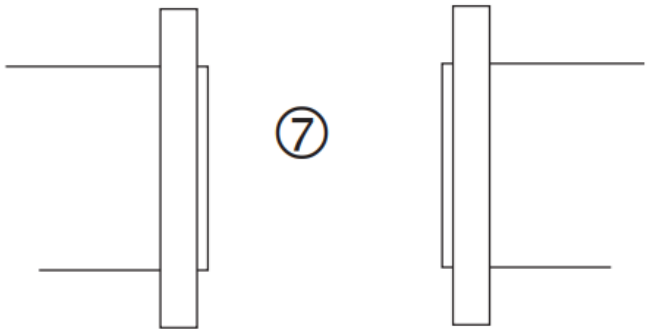
4. Install valve

   • The flow direction indicated on the product label 2 or on the valve must be observed 3.

   • The valve with mounted weld-on taipieces may only be spotwelded to the pipeline 5.

   The weld-on taipieces may be welded only without the valve and seals! 5 6





   If these instructions are not observed, high welding temperatures may destroy the seals.

   • Flanges 7 in the pipeline must be in parallel position and sealing surfaces must be clean and without any damage. Tighten screws in flanges crosswise in 3 steps up to the maximum torque (50 Nm).

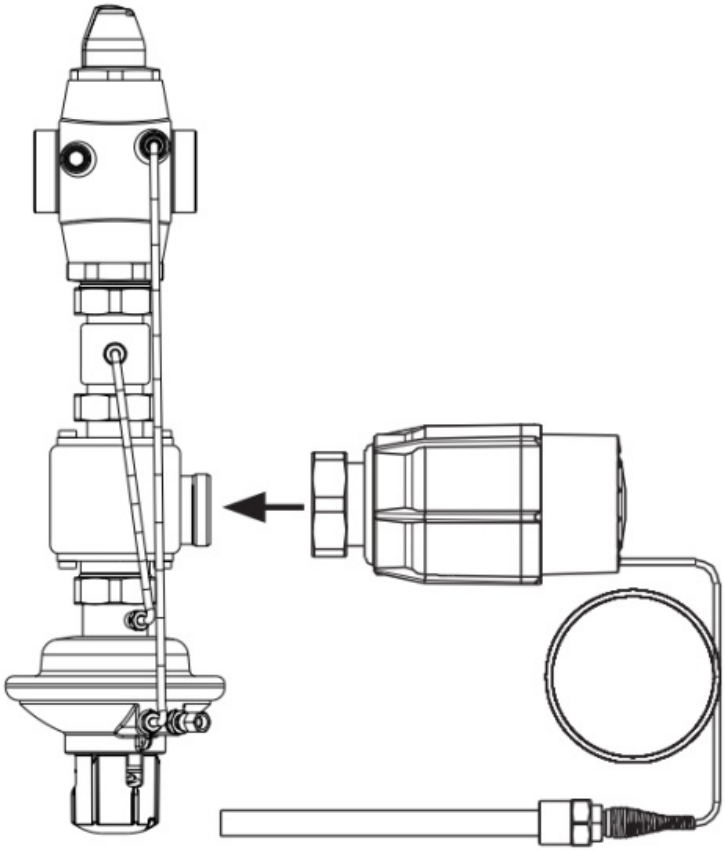
5. Caution:

   Mechanical loads of the valve body by the pipelines are not permitted.

Mounting of temperature actuator

(relevant only at AVPQT controllers)

Place temperature actuator AVT at the combination piece and tighten union nut with wrench SW 50.



Torque 35Nm.
Other details:
See instructions for temperature actuator AVT.

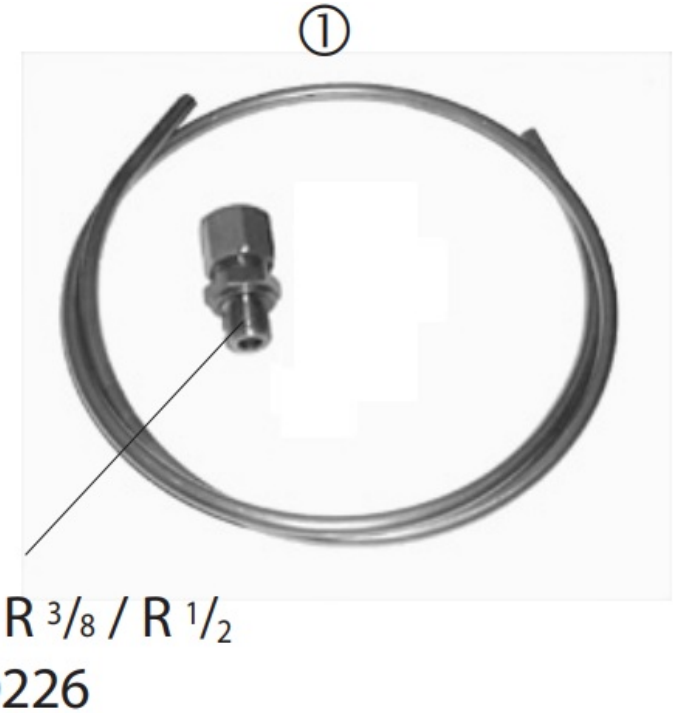
Impulse tube mounting

- Which impulse tubes to use?

  Use Impulse tube set AV 1 or use followinge pipe:

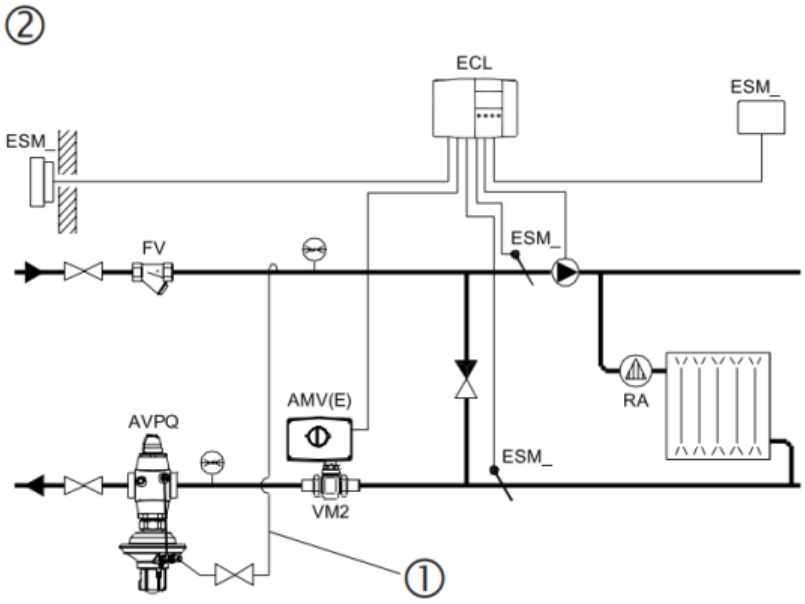
  Copper Ø 6×1 mm

  EN 12449

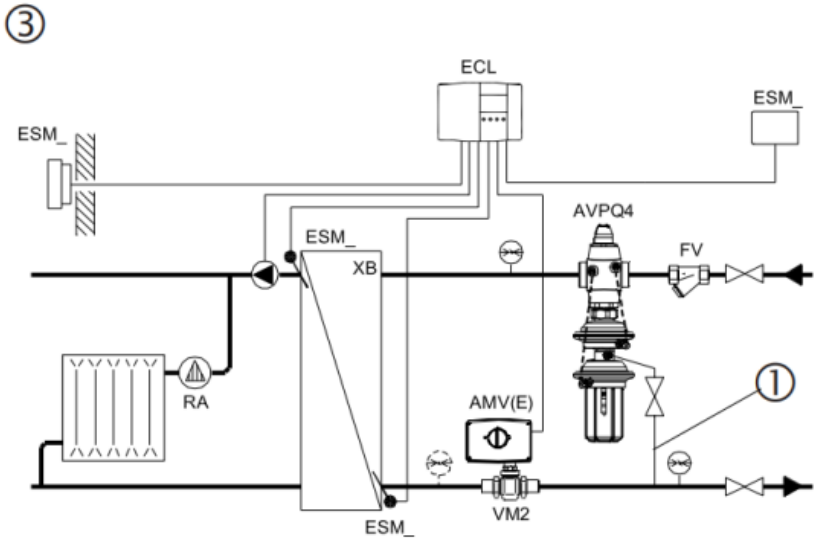


- Connection of impulse tube 1 in the system

Return mounting 2



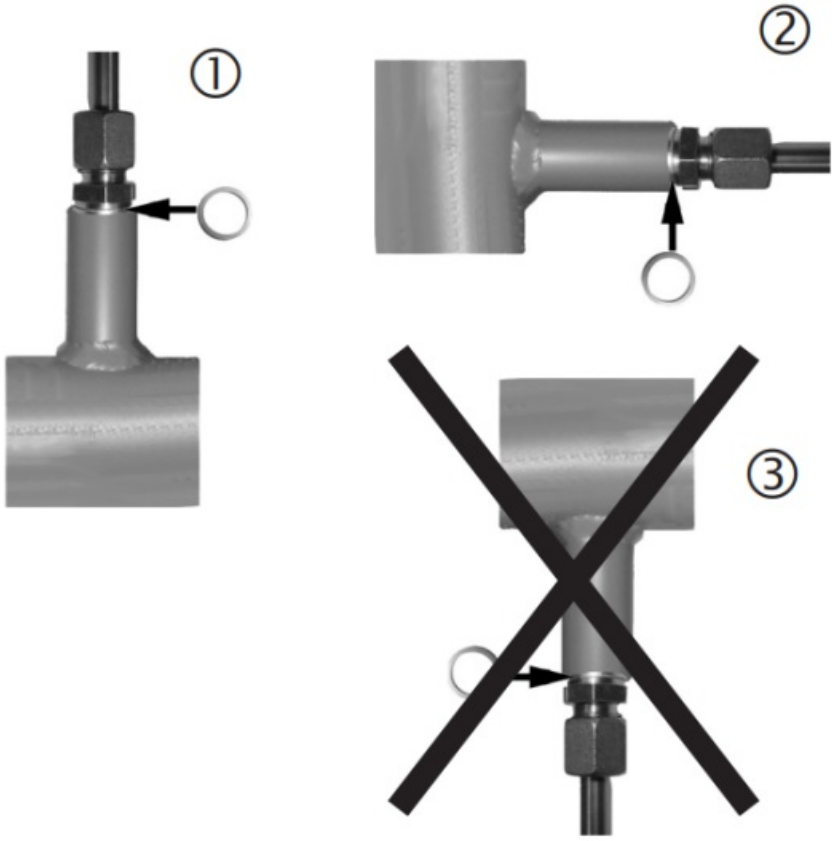
Flow mounting 3



- **Connection to the pipeline**

  It is strongly recommended to install the impulse tube to the pipeline horizontally 2 or upwards 1.

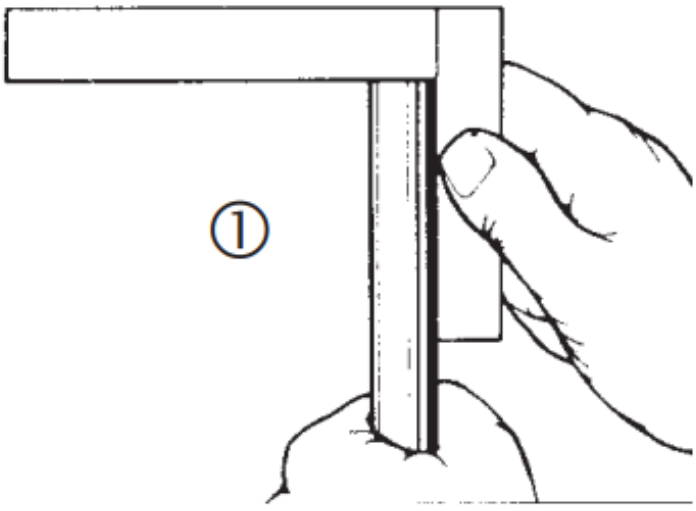
  This prevents dirt accumulation in the impulse tube and possible malfunction of thecontroller.



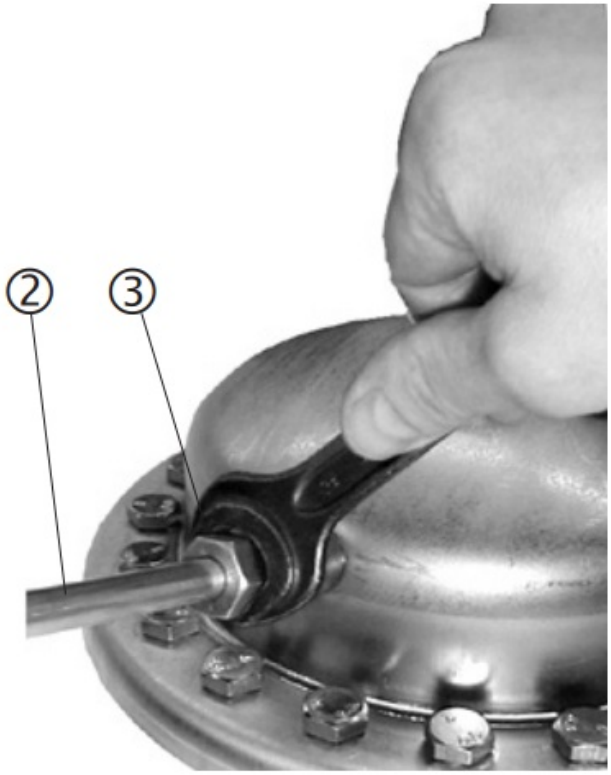
Connection downwards is not recommendable 3.

Impulse Tube Mounting

1. Cut pipe perpendicularly to the pipe axis and smooth edges out 1.



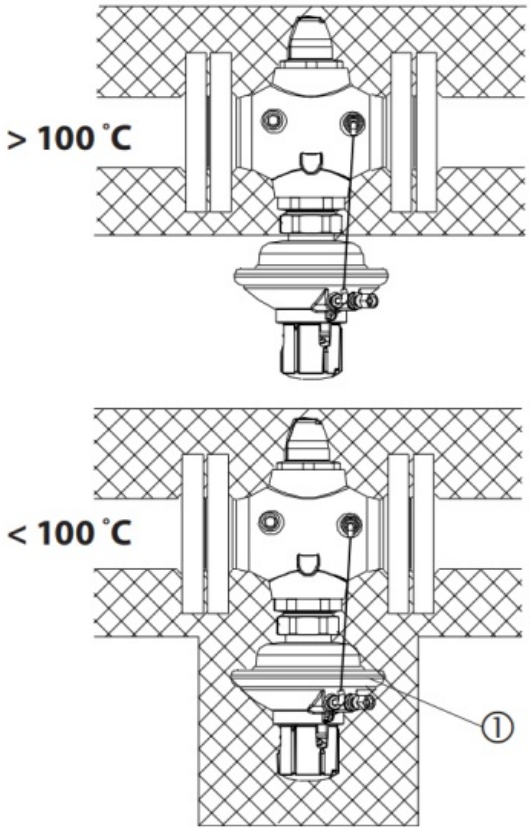
2. Press impulse tube 2 into the threaded joint up to its stop.



3. Tighten union nut 3 Torque 14 Nm

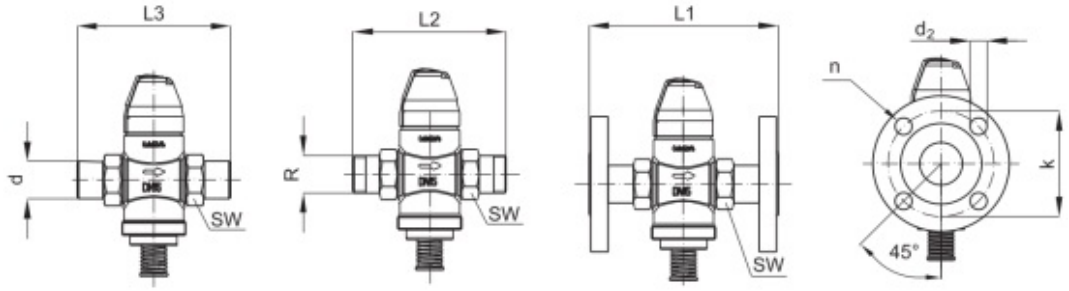
Insulation

For medium temperatures up to 100 °C the pressure actuator 1 may also be insulated.

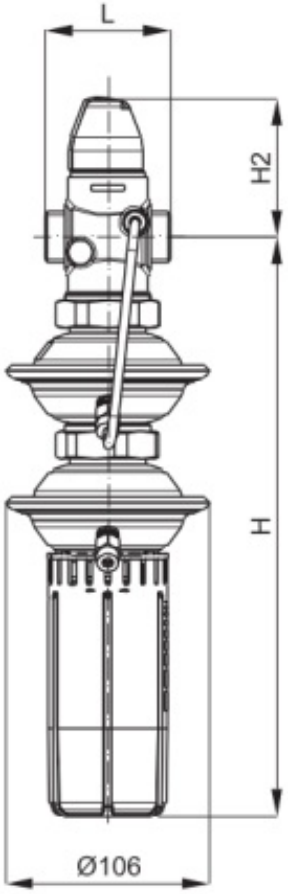


Dimensions, Weights

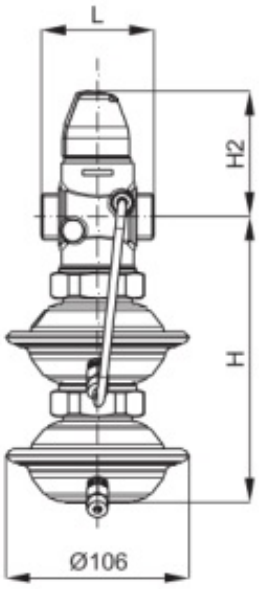
1) Conical ext. thread acc. to EN 10226-1
2) Flanges PN 25, acc. to EN 1092-2



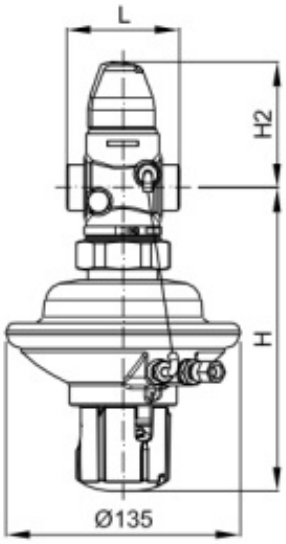
DN		15	20	25	32	40	50
SW	mm	32 (G 3/4A)	41 (G 1A)	50 (G 11/4A)	63 (G 13/4A)	70 (G 2A)	82 (G 21/2A)
d		21	26	33	42	47	60
R1)		1/2	3A	1	1 1/4		
L12)		130	150	160			
L2		131	144	160	177		
L3		139	154	159	184	204	234
k		65	75	85	100	110	125
d2		14	14	14	18	18	18
n		4	4	4	4	4	4



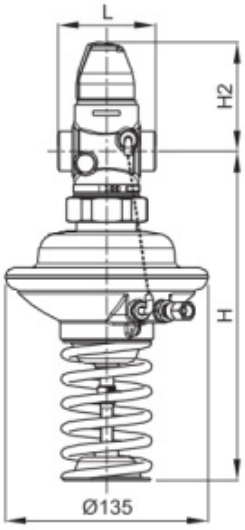
AVPQ (PN16)
DN 15 - 32
Δp = 0.1 - 0.5
Δp = 0.2 - 1.0



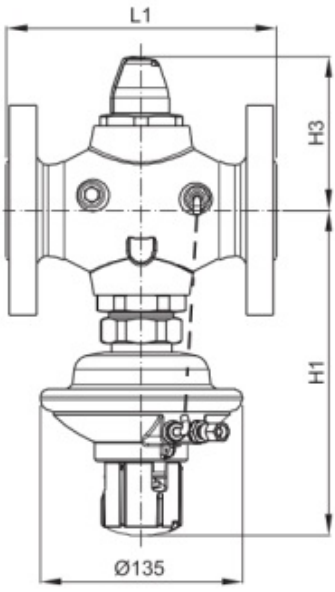
AVPQ-F (PN16)
DN 15 - 32
Δp = 0.2
Δp = 0.3



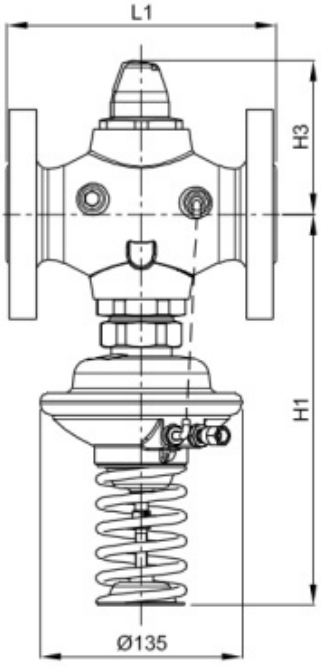
AVPQ (PN25)
DN 15 - 50
Δp = 0.2 - 1.0



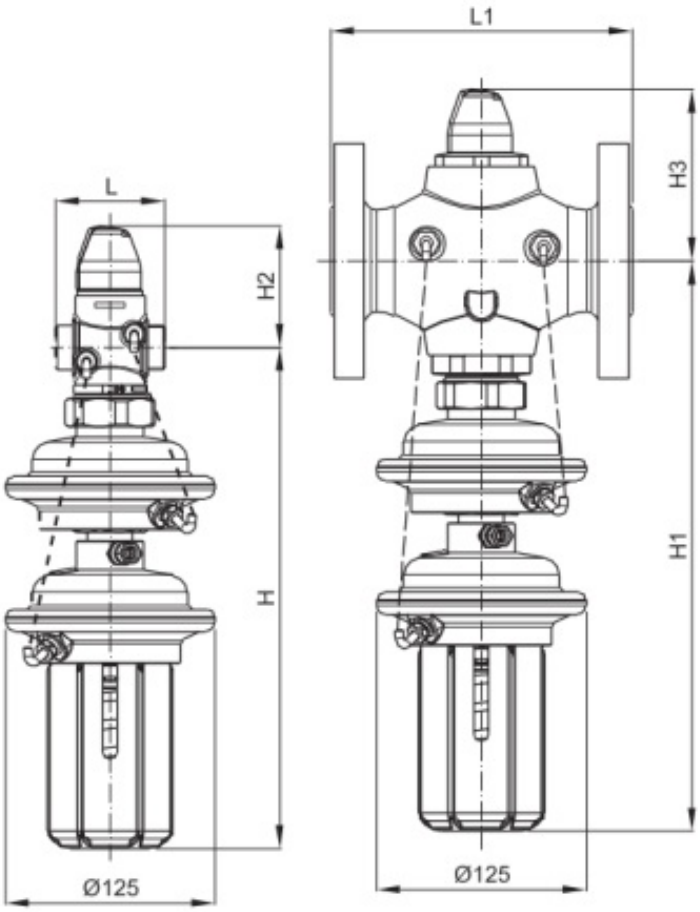
AVPQ (PN25)
DN 15 - 50
Δp = 0.3 - 2.0



AVPQ (PN25)
DN 32 - 50
Δp = 0.2 - 1.0



AVPQ (PN25)
DN 32 - 50
Δp = 0.3 - 2.0



AVPQ 4 (PN25)
DN 15 - 50
Δp = 0.2 - 1.0
Δp = 0.3 - 2.0

AVPQ 4 (PN25)
DN 32 - 50
Δp = 0.2 - 1.0
Δp = 0.3 - 2.0

AVPQ PN 25

DN		15	20	25	32	40	50
L	mm	65	70	75	100	110	130
LI					180	200	230
H (Ap = 0.2 – 1.0)		175	175	175	217	217	217
H (Ap = 0.3 – 2.0)		219	219	219	260	260	260
H1 (Ap = 0.2 – 1.0)					217	217	217
H1 (Ap = 0.3 – 2.0)					260	260	260
H2		73	73	76	103	103	103
H3					103	103	103

Note: other flange dimensions – see table for tailpieces
AVPQ 4 PN 25

DN		15	20	25	32	40	50
L	mm	65	70	75	100	110	130
L1					180	200	230
H		298	298	298	340	340	340
H1					340	340	340
H2		73	73	76	103	103	103
H3					103	103	103

Note: other flange dimensions – see table for tailpieces
AVPQ PN 16

DN		15	20	25	32
L		65	70	75	100
H	mm	301	301	301	301
H2		73	73	76	77

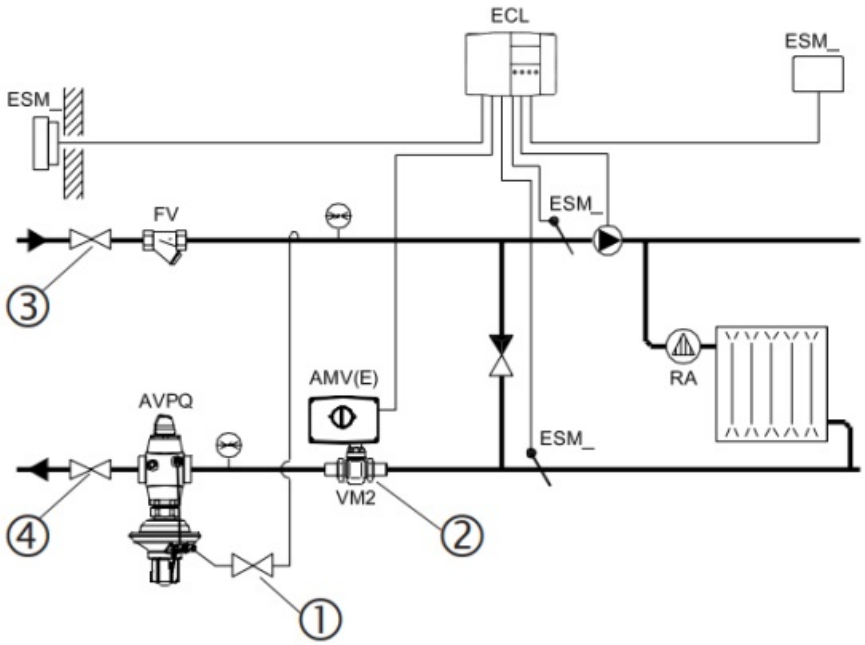
AVPQ-F PN 16

DN		15	20	25	32
L		65	70	75	100
H	mm	165	165	165	165
H2		73	73	76	77

Start-up

Filling the system, first start-up

1. Slowly open shut-off valves 1 that are possibly available in the impulse tubes.
2. Open valves 2 in the system.

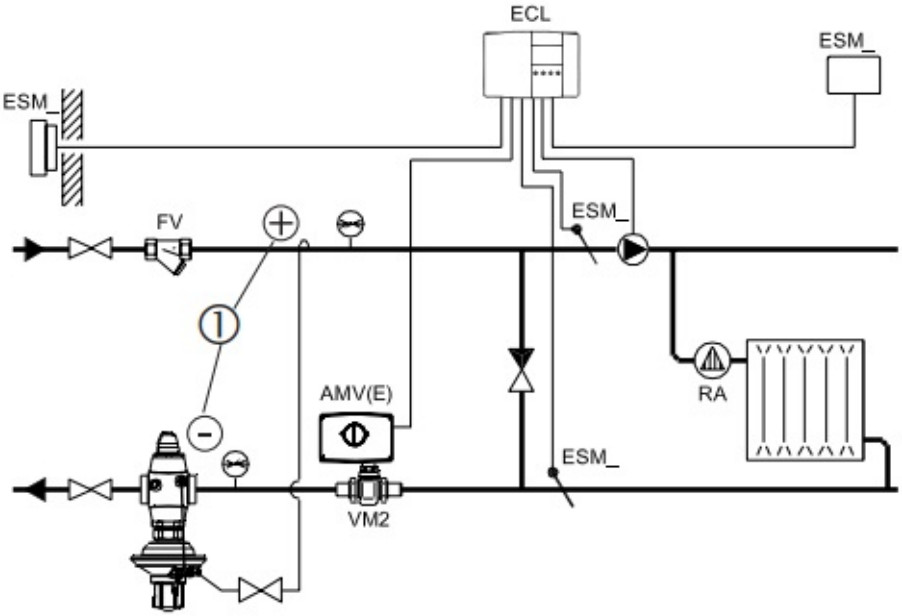


3. Slowly open shut-off devices 3 in the flow pipeline.
4. Slowly open shut-off devices 4 in the return pipeline.

Leak and Pressure Tests

Before pressure test, open the adjustable flow restrictor 2 by turning it to the left (counter clockwise).

⚠ Pressure must be gradually increased at the +/- connection 1.

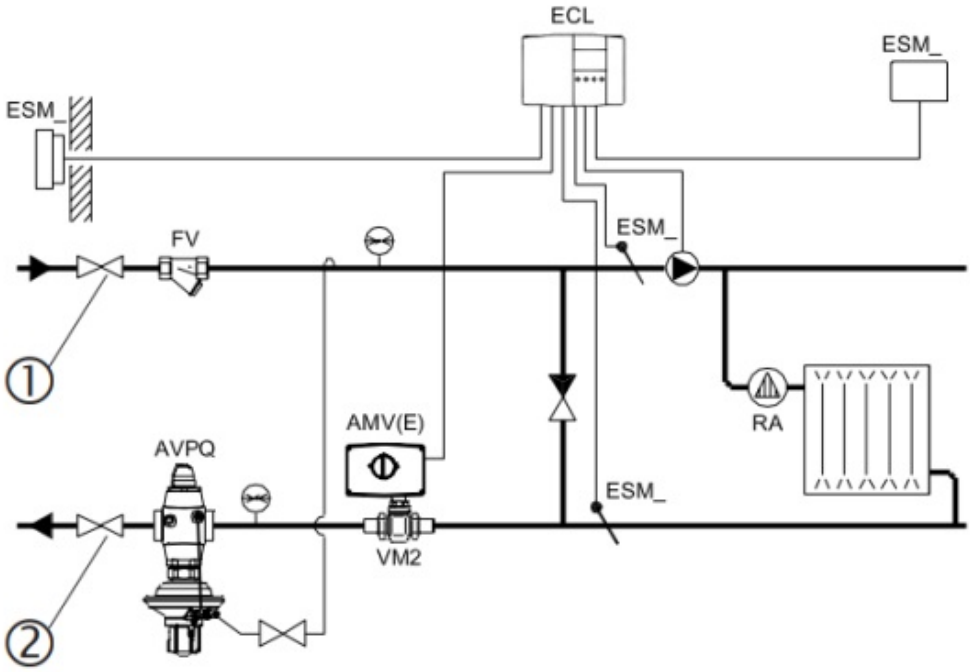


Non-compliance may cause damages at the actuator or the valve.
A pressure test of the entire system must be carried out in accordance with manufacturer's instructions.
The maximum test pressure is:
1.5 x PN

PN – see product label

Putting out of operation

1. Slowly close shut-off devices 1 in the flow pipeline.



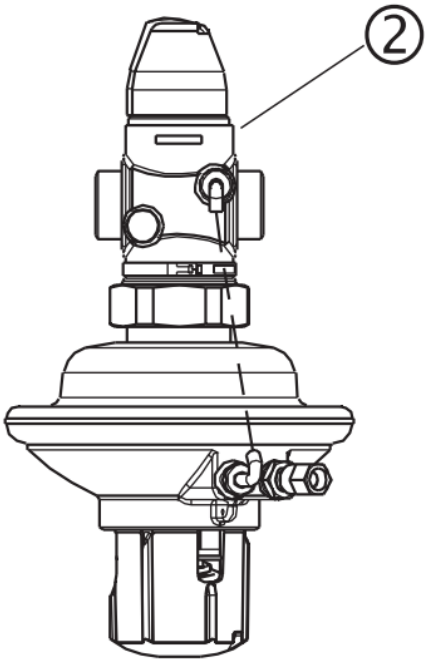
2. Slowly close shut-off devices 2 in the return pipeline.

Settings
First set the differential pressure.

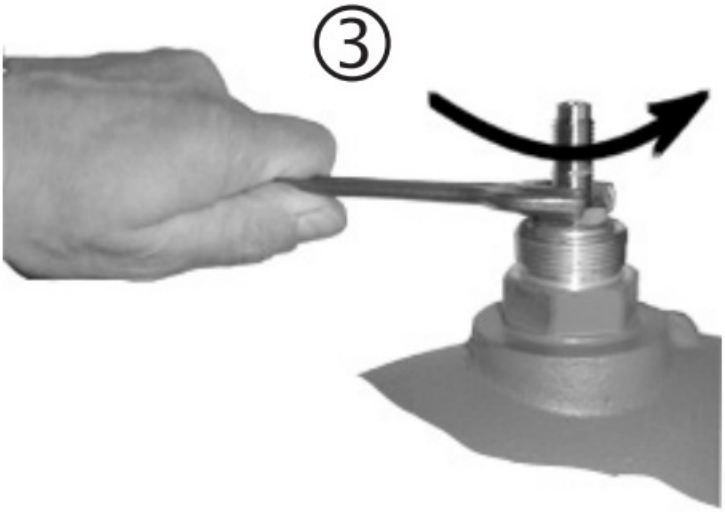
① $\Delta p = 0.2 - 1$ bar

Differential Pressure Setting
(not relevant at fixed setting version AVPQ-F)
The diff. pressure setting range is indicated on the product label 1.
Procedure:

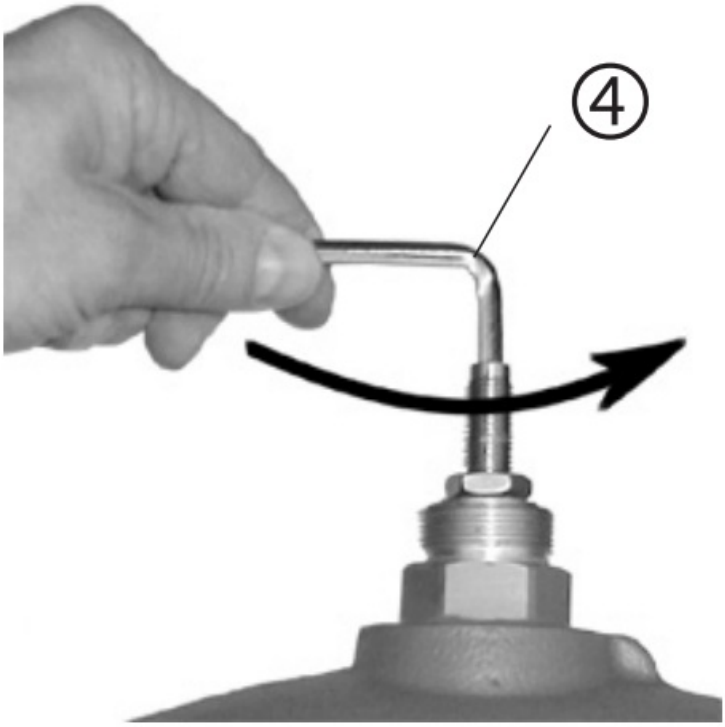
1. Unscrew cover 2.



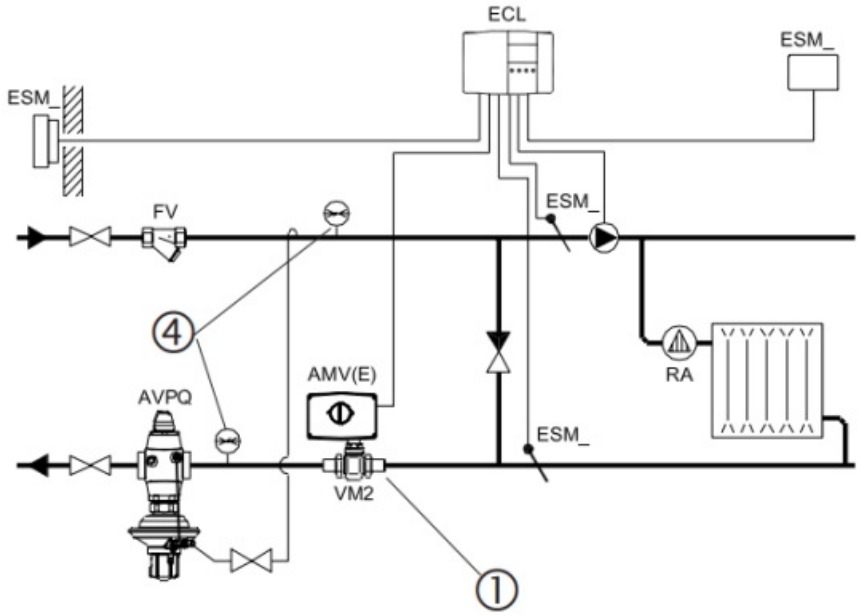
2. Loosen counter nut 3.



3. Unscrew (counter-clockwise) adjustable flow restrictor 4 up to its stop.

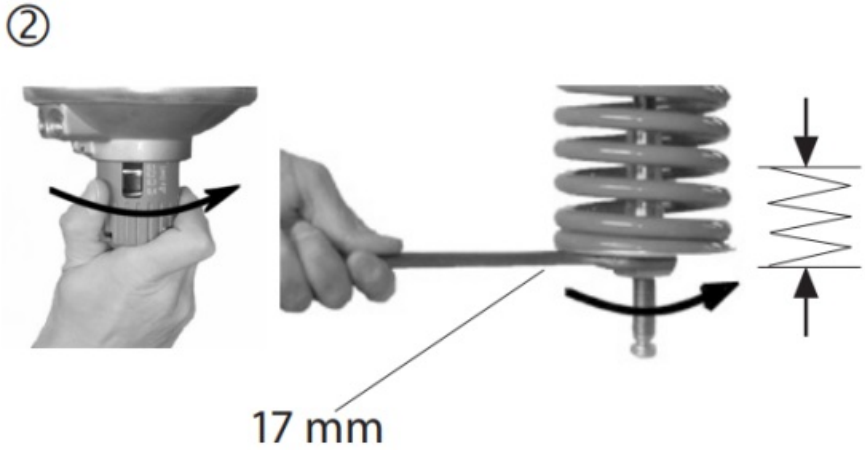


4. Start system, see section “Filling the system, first start-up“ Completely open all shutoff devicesin the system.

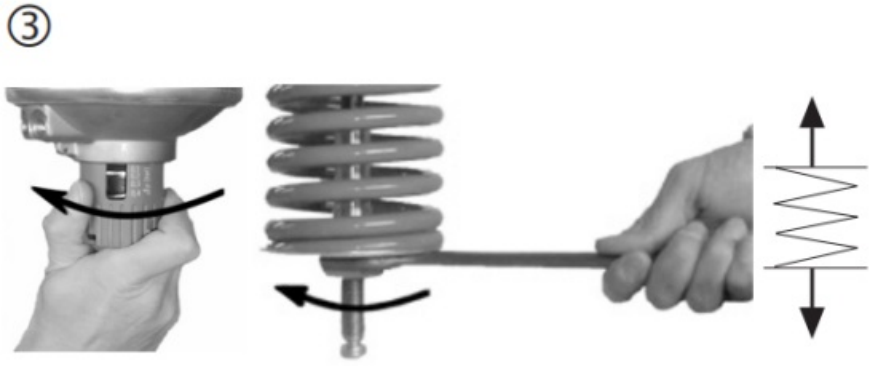


5. Set flow rate on a motorised valve 1, on which differential pressure is controlled, to about 50 % .
6. Adjustment

   Observe pressure indicators 4 or/and alternatively see handle scale indication.



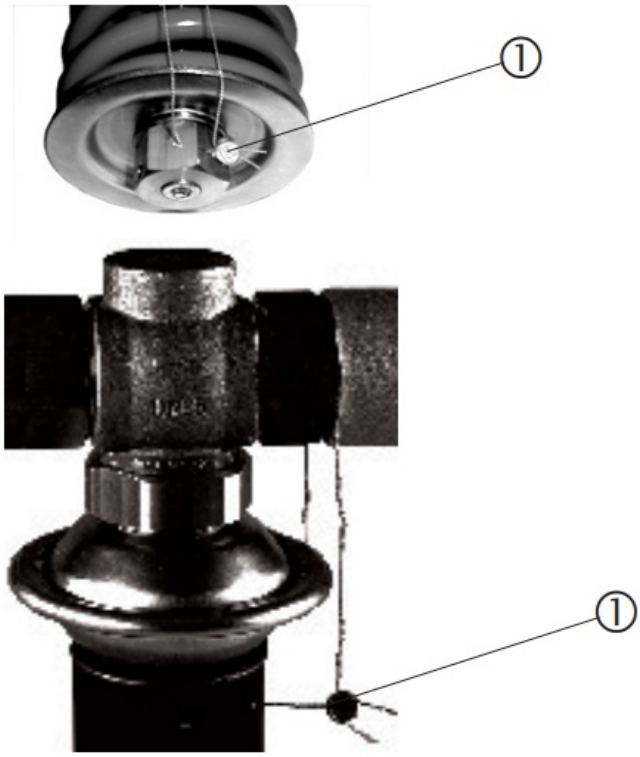
Turning to the right 2 (clockwise) increases the set-point (stressing the spring).



Turning to the left 3 (counter-clockwise) reduces the set-point (releasing the spring).

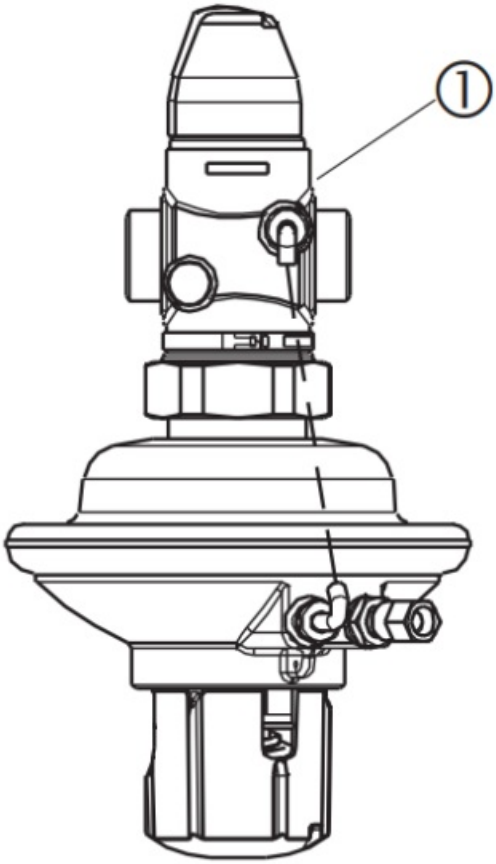
Note:
If the required differential pressure is not attained, a cause may be a too small pressure loss in the system

Seal
The set-point adjuster can be sealed by a seal wire 1, if neccessary.



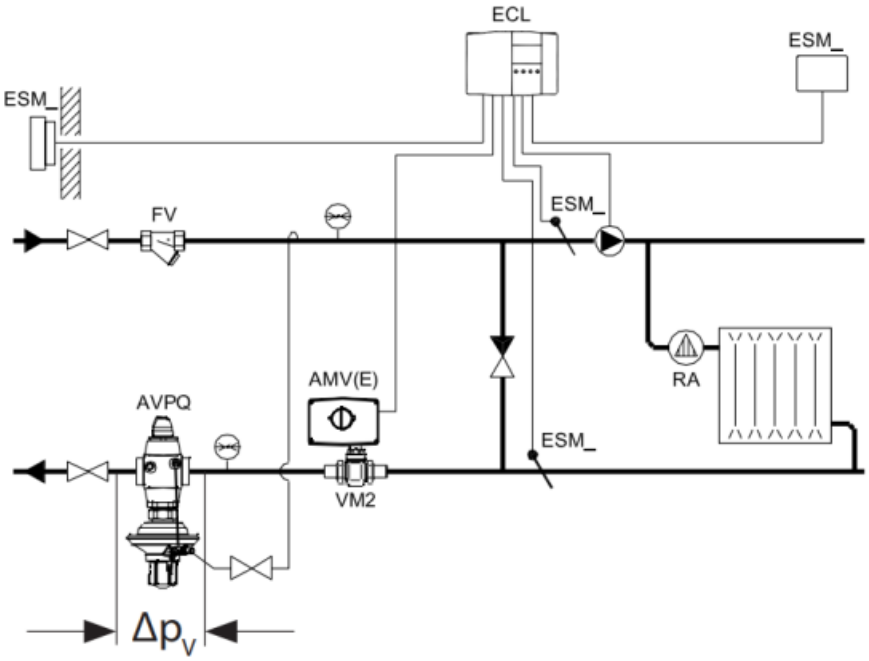
Flow Rate Setting
The flow rate is adjusted by means the setting of adjustable flow restrictor 1.
There are two possibilities:

1. Adjustment with the flow adjusting curves,



2. Adjustment with heat meter, see page 19.

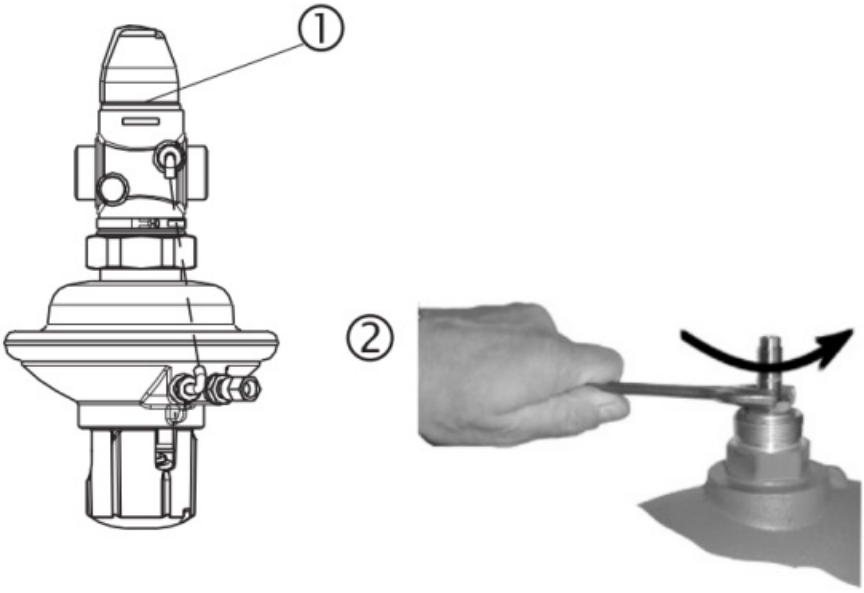
Pre-condition
(min. diff. pressure over the valve)
At the maximum flow rate, the pressure difference Δpv across the control valve musbe at least:
Δp min = 0.5 bar



Adjustment with flow adjusting curves

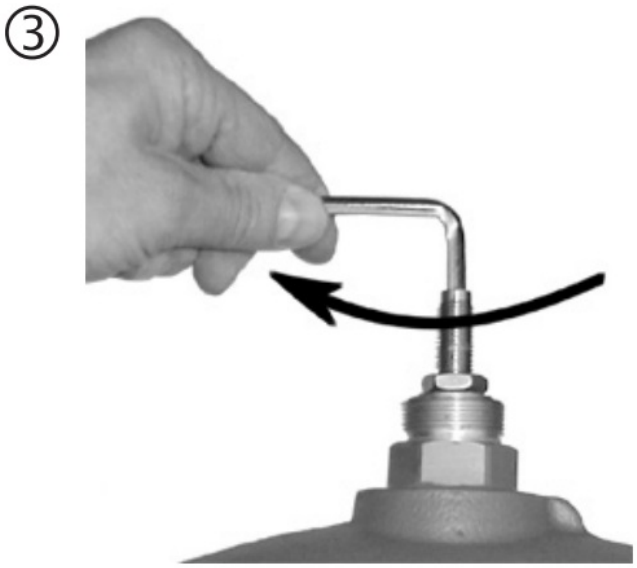
The system don’t need to be active for being adjusted.

1. Unscrew cover 1, loosen counter nut 2.

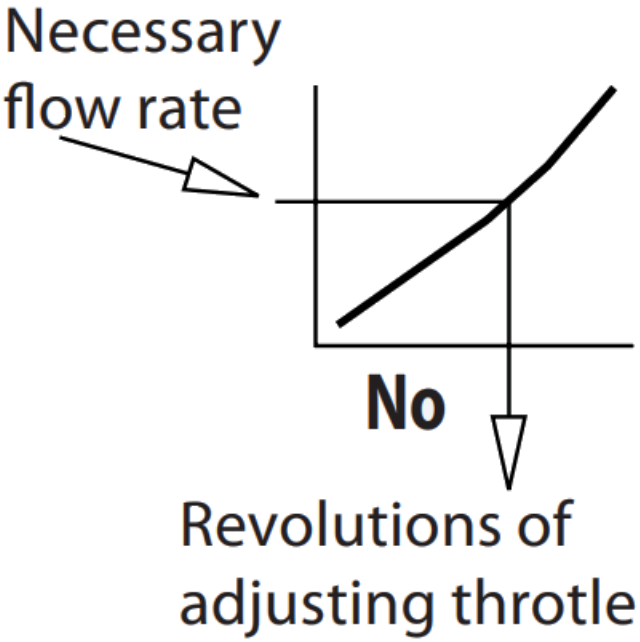


2. Screw (clockwise) adjustable flow restrictor 3 in up to its stop.

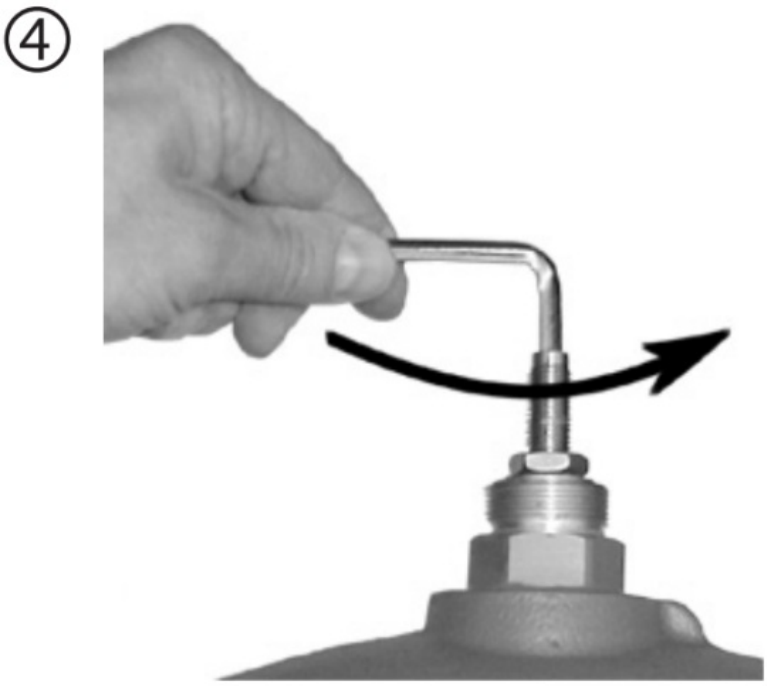
   Valve is closed, no flow.



3. Select flow adjusting curve in the diagram (see next page).



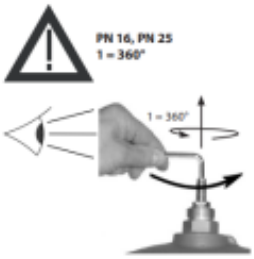
4. Unscrew (counterclockwise) the adjustable flow restrictor by determined number of revolutions 4.

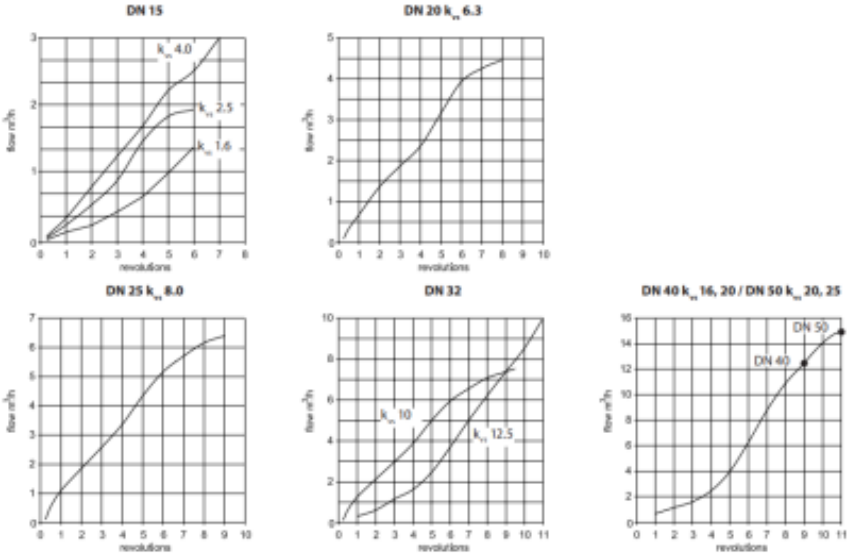


5. Adjustment is completed,continue with step 3,page 19.

Note:
The setting may be verified with help of a heat meter if the system is in operation, see next section.

Flow Adjusting Curves



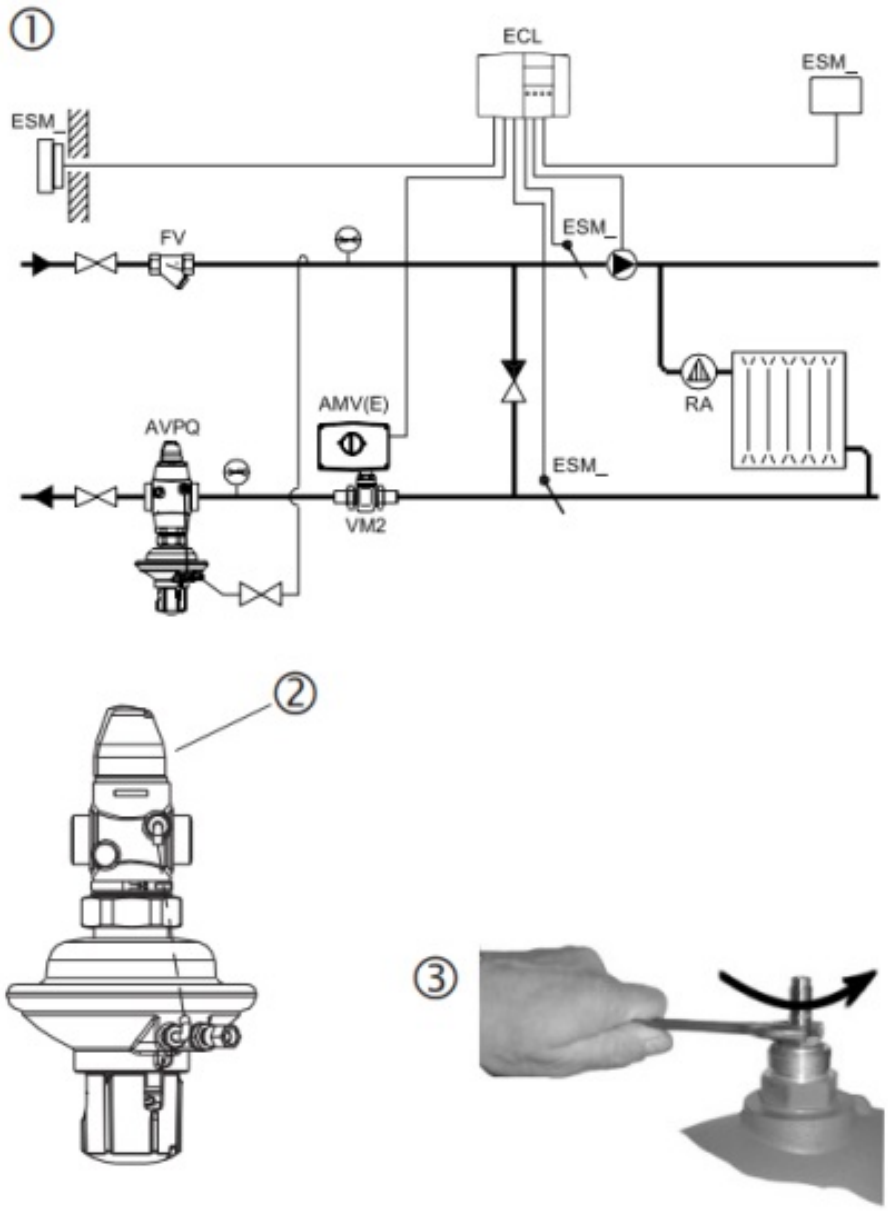


Adjustment with Heat Meter

Pre-condition:

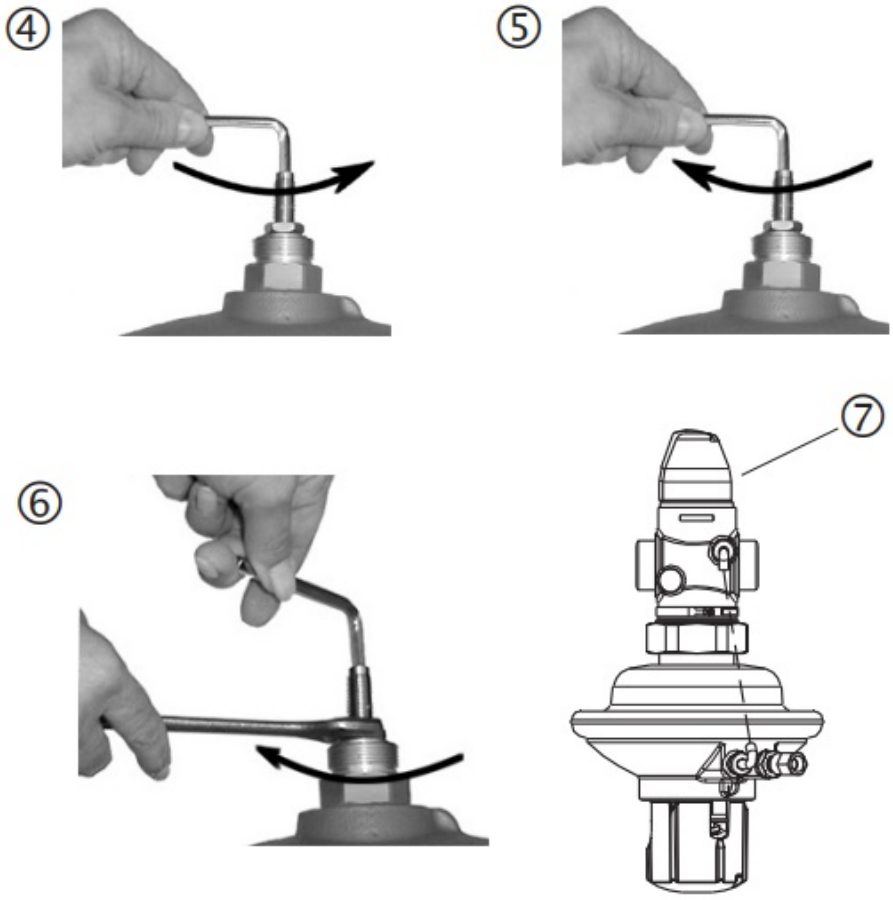
The system must be in operation. All units in the system 1 or a bypass must be completely open.

1. Unscrew cover 2, loosen counter nut 3.
2. Observe heat meter indicator.



Turning to the left (counter-clockwise) 4 increases the flow rate.

Turning to the right (clockwise) 5 reduces the flow rate.

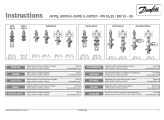


After the adjustment has been completed:

3. Tighten counter nut 6.
4. Screw the cover 7 in and tighten.
5. Cover may be sealed.

Temperature setting
(relevant only at AVPQT controllers)
See instructions for temperature actuator AVT.

Documents / Resources

	Danfoss AVPQ Differential Pressure and Flow Controller [pdf] Instructions AVPQ, AVPQ-F, AVPQ4, AVPQT, AVPQ Differential Pressure and Flow Controller, AVPQ, Differential Pressure and Flow Controller, Pressure and Flow Controller, Flow Controller

References

- Engineering Tomorrow | Danfoss
- Danfoss España: Soluciones innovadoras y ahorro de energía | Danfoss
- Danfoss - Engineering tomorrow | Danfoss

- **User Manual**

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