

# DK 50

Flow and differential pressure controller with adjustable set-point



**TA**

Pressurisation & Water Quality › Balancing & Control › Thermostatic Control

ENGINEERING ADVANTAGE

High-performing flow and differential pressure controllers for variable flow heating and cooling systems, the DK/DKF 50 are especially effective in systems where high pressure drop is required. Also suitable for secondary side usage in district heating and comfort cooling systems. Capable of operating quietly and are rust resistant.

> **Special internal geometry**

Allows big pressure drop without noise.

> **Adjustable set-point**

Ensure the desired differential pressure.

> **Adjustable flow**

Ensures the design flow.



## > Technical description

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**Application:**

District heating and cooling systems with variable flow.

**Functions:**

Differential pressure control over the load and flow limitation.  
Closes at increasing  $\Delta p$ .

**Dimensions:**

DN 32-200

**Pressure class:**

PN 16 and PN 25

**Max. differential pressure ( $\Delta p_V$ ):**

1600 kPa = 16 bar

**Setting range:**

$\Delta p$  over the presetting throttle is kept on 15 kPa ( $F_c=15$ ) or 45 kPa ( $F_c=45$ ).

$\Delta p_L$  is adjustable within 10-60 kPa, 50-150 kPa and 130-250 kPa.

Delivery setting: 10 kPa, 50 kPa respectively 130 kPa.

**Temperature:**

Max. working temperature: 150°C

Min. working temperature: -10°C

**Media:**

Water and neutral fluids, water-glycol mixtures.

**Material:**

Valve body: Ductile iron EN-GJS-400-18LT

Diaphragms and gaskets: EPDM

Valve plug: Stainless steel with EPDM insert.

Valve seat: Stainless steel.

**Surface treatment:**

Duasolid painting.

**Marking:**

TA, DN, PN,  $F_c$  and flow direction arrow.

**Flanges:**

According to EN-1092-2:1997, type 21.

## Operating function

The controller consists of the valve (1) and the actuator (11). The valve body has the built-in throttle (4) with a flow adjustment scale (2). Inside the actuator there are two diaphragms, (13) for flow and (12) for differential pressure control. The differential pressure on the diaphragms acts against the forces of their springs. The spring attempts to open, and the differential pressure attempts to close the valve. Both diaphragms act parallel, totally independent one from another. The pressure before the throttle acts as plus pressure (V+) to the bottom side of the flow diaphragm and simultaneously as minus pressure ( $\Delta p$ -) to the top side of the differential pressure diaphragm.

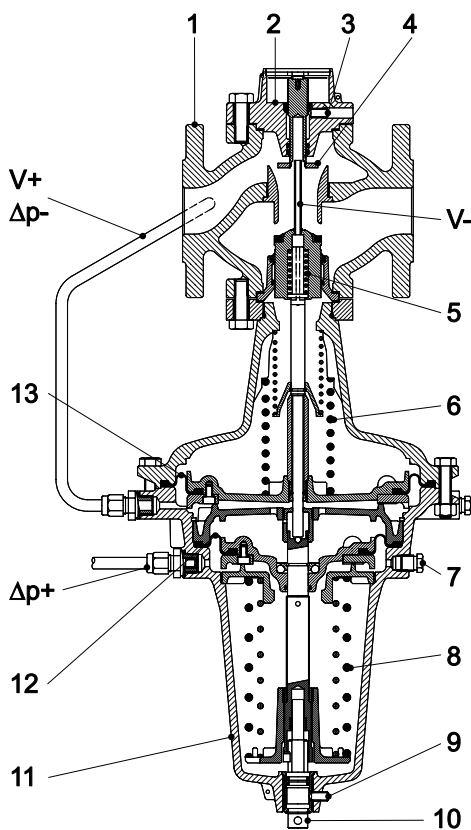
The pressure downstream of the throttle acts as minus pressure (V-) to the top side of the flow diaphragm.

The pressure upstream of the load acts as plus pressure ( $\Delta p$ +) to the bottom side of the differential pressure diaphragm.

Increased flow or more closed throttle will increase the pressure drop on the throttle. This also causes the increase of the differential pressure and the closing force on the flow diaphragm. The diaphragm moves the valve plug until it is stopped by the spring force.

There is only one value of the flow for one throttle position when the forces, that act on the diaphragm, are in balance.

Constant flow, maintained by the controller, depends only on the throttle position and not on the pressure upstream and downstream of the valve.



1. Valve
2. Adjustment scale
3. Fixing screw (flow adjustment)
4. Throttle
5. Safety spring
6. Flow control spring
7. Venting screws
8. Differential pressure control spring
9. Fixing screw (differential pressure adjustment)
10. Adjustment screw
11. Actuator
12. Differential pressure control diaphragm
13. Flow control diaphragm

## Sizing

1. Select the smallest size for the flow you need according to  $q_{max}$  in the product tables.
2. Check that the available  $\Delta p$  is larger than the sum of the pressure drops calculated according to the formula:

$$\Delta p_{min} = F_c + \left( 0.01 \frac{q}{K_{vd}} \right)^2 \quad [l/h, \text{ kPa}]$$

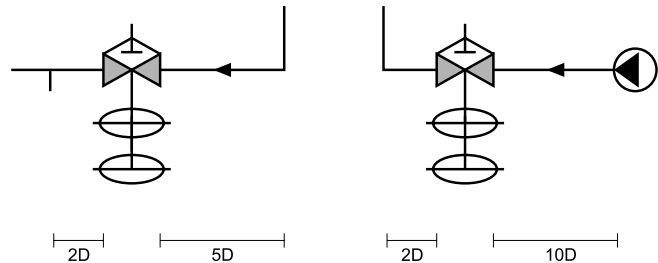
## Installation

The controller must be installed in the return pipe. It is recommended to install the controller in horizontal pipeline with actuator body below.

Installation of a strainer upstream of the valve is recommended. When filling, vent the actuator body by using the venting screws. The direction of the flow is shown by the arrow on the valve body. Connect capillary pipes (copper Ø6x1) always laterally to the pipe.

### Normal pipe fittings

Try to avoid mounting taps and pumps immediately before the valve.



## Setting

### Flow adjustment

Release the fixing screw (3). Turn the throttle clockwise down to the start position of 0,00 turns. Then adjust the corresponding number of scale turns according to flow chart and the pointer on the valve's body. At the end, tighten the fixing screw. The water flow is being measured on each individual controller in all positions of the adjustment scale. Flow chart with identity number of the controller is included in the scope of supply. The original flow chart is kept in supplier's archive.

If balancing valve STAF is used the flow can be measured by using the balancing instrument TA-SCOPE or measuring instrument TA-CMI.

### Differential pressure adjustment

Release fixing screw (9). Adjust differential pressure by turning the adjustment screw. To increase the differential pressure, turn the screw clockwise (bottom view of screw). At the end, tighten the fixing screw.

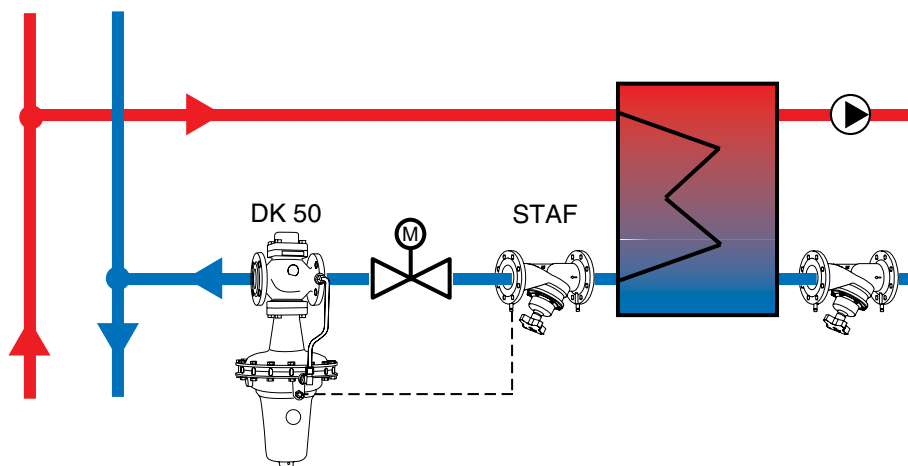
## Application example

### Keeping the differential pressure over a control valve constant

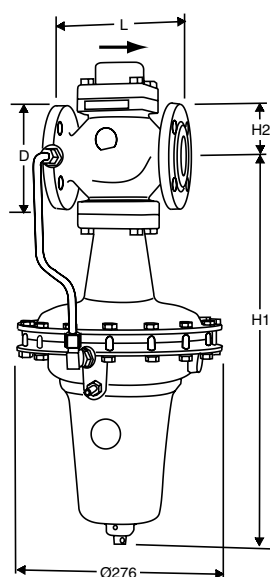
#### Heat exchanger

The controller should be mounted downstream the control valve and STAF upstream the control valve, but downstream the heat exchanger.

STAF can be mounted in the supply pipe, but with a decreased valve authority as a consequence.



## DK 50 – Fc 15 kPa



2 500 mm capillary pipe (Ø6) included

PN 25 (DN 32-50 and DN 80 also fit PN 16 flanges)

Article No	DN	D	L	H1	H2	Kvd	$q_{min}$ [m <sup>3</sup> /h]	$q_{max}$ [m <sup>3</sup> /h]	Kg
<b>10-60 kPa</b>									
52 781-132	32	140	180	535	124	21	0,8	8,5	38
52 781-140	40	150	200	535	124	25	0,8	9,5	39
52 781-150	50	165	230	560	135	32	1,0	13	46
52 781-165	65	185	290	580	155	55	1,5	21	55
52 781-180	80	200	310	592	172	70	2,5	24	66
52 781-190	100	235	350	680	225	120	4,0	45	88
52 781-191	125	270	400	690	235	145	5,0	60	105
52 781-192	150	300	480	775	274	230	15	200	235
52 781-193	200	360	600	822	310	360	20	230	297
<b>50-150 kPa</b>									
52 781-232	32	140	180	535	124	21	0,8	8,5	38
52 781-240	40	150	200	535	124	25	0,8	9,5	39
52 781-250	50	165	230	560	135	32	1,0	13	46
52 781-265	65	185	290	580	155	55	1,5	21	55
52 781-280	80	200	310	592	172	70	2,5	24	66
52 781-290	100	235	350	680	225	120	4,0	45	88
52 781-291	125	270	400	690	235	145	5,0	60	105
52 781-292	150	300	480	775	274	230	15	200	235
52 781-293	200	360	600	822	310	360	20	230	297
<b>130-250 kPa</b>									
52 781-332	32	140	180	535	124	21	0,8	8,5	38
52 781-340	40	150	200	535	124	25	0,8	9,5	39
52 781-350	50	165	230	560	135	32	1,0	13	46
52 781-365	65	185	290	580	155	55	1,5	21	55
52 781-380	80	200	310	592	172	70	2,5	24	66
52 781-390	100	235	350	680	225	120	4,0	45	88
52 781-391	125	270	400	690	235	145	5,0	60	105
52 781-392	150	300	480	775	274	230	15	200	235
52 781-393	200	360	600	822	310	360	20	230	297

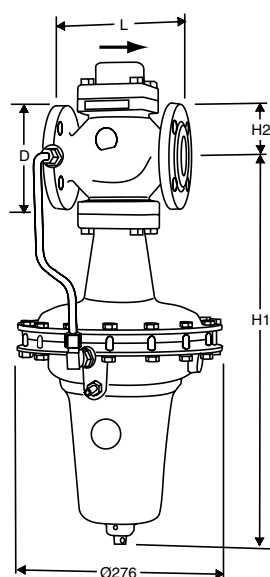
### PN 16

Article No	DN	D	L	H1	H2	Kvd	$q_{min}$ [m <sup>3</sup> /h]	$q_{max}$ [m <sup>3</sup> /h]	Kg
<b>10-60 kPa</b>									
52 781-565	65	185	290	580	155	55	1,5	21	55
52 781-590	100	235	350	680	225	120	4,0	45	88
52 781-591	125	270	400	690	235	145	5,0	60	105
52 781-592	150	300	480	775	274	230	15	200	235
52 781-593	200	360	600	822	310	360	20	230	297
<b>50-150 kPa</b>									
52 781-665	65	185	290	580	155	55	1,5	21	55
52 781-690	100	235	350	680	225	120	4,0	45	88
52 781-691	125	270	400	690	235	145	5,0	60	105
52 781-692	150	300	480	775	274	230	15	200	235
52 781-693	200	360	600	822	310	360	20	230	297
<b>130-250 kPa</b>									
52 781-765	65	185	290	580	155	55	1,5	21	55
52 781-790	100	235	350	680	225	120	4,0	45	88
52 781-791	125	270	400	690	235	145	5,0	60	105
52 781-792	150	300	480	775	274	230	15	200	235
52 781-793	200	360	600	822	310	360	20	230	297

→ = Flow direction

Kvd = Is the Kv value of the differential pressure control component when fully open, used to calculate the minimum pressure drop necessary for the valve to operate according to the formula found under "Sizing".

## DK 50 – Fc 45 kPa



2 500 mm capillary pipe (Ø6) included

PN 25 (DN 32-50 and DN 80 also fit PN 16 flanges)

Article No	DN	D	L	H1	H2	Kvd	q <sub>min</sub> [m <sup>3</sup> /h]	q <sub>max</sub> [m <sup>3</sup> /h]	Kg
<b>10-60 kPa</b>									
52 754-732	32	140	180	535	124	21	1,3	14	38
52 754-740	40	150	200	535	124	25	1,3	15	39
52 754-750	50	165	230	560	135	32	1,6	21	46
52 754-765	65	185	290	580	155	55	2,4	34	55
52 754-780	80	200	310	592	172	70	4,0	38	66
52 754-790	100	235	350	680	225	120	6,4	72	88
52 754-791	125	270	400	690	235	145	8,0	96	105
52 754-792	150	300	480	775	274	230	24	320	235
52 754-793	200	360	600	822	310	360	32	368	297
<b>50-150 kPa</b>									
52 754-832	32	140	180	535	124	21	1,3	14	38
52 754-840	40	150	200	535	124	25	1,3	15	39
52 754-850	50	165	230	560	135	32	1,6	21	46
52 754-865	65	185	290	580	155	55	2,4	34	55
52 754-880	80	200	310	592	172	70	4,0	38	66
52 754-890	100	235	350	680	225	120	6,4	72	88
52 754-891	125	270	400	690	235	145	8,0	96	105
52 754-892	150	300	480	775	274	230	24	320	235
52 754-893	200	360	600	822	310	360	32	368	297
<b>130-250 kPa</b>									
52 754-932	32	140	180	535	124	21	1,3	14	38
52 754-940	40	150	200	535	124	25	1,3	15	39
52 754-950	50	165	230	560	135	32	1,6	21	46
52 754-965	65	185	290	580	155	55	2,4	34	55
52 754-980	80	200	310	592	172	70	4,0	38	66
52 754-990	100	235	350	680	225	120	6,4	72	88
52 754-991	125	270	400	690	235	145	8,0	96	105
52 754-992	150	300	480	775	274	230	24	320	235
52 754-993	200	360	600	822	310	360	23	368	297

### PN 16

Article No	DN	D	L	H1	H2	Kvd	q <sub>min</sub> [m <sup>3</sup> /h]	q <sub>max</sub> [m <sup>3</sup> /h]	Kg
<b>10-60 kPa</b>									
52 751-565	65	185	290	580	155	55	2,4	34	55
52 751-590	100	235	350	680	225	120	6,4	72	88
52 751-591	125	270	400	690	235	145	8,0	96	105
52 751-592	150	300	480	775	274	230	24	320	235
52 751-593	200	360	600	822	310	360	32	368	297
<b>50-150 kPa</b>									
52 751-665	65	185	290	580	155	55	2,4	34	55
52 751-690	100	235	350	680	225	120	6,4	72	88
52 751-691	125	270	400	690	235	145	8,0	96	105
52 751-692	150	300	480	775	274	230	24	320	235
52 751-693	200	360	600	822	310	360	32	368	297
<b>130-250 kPa</b>									
52 751-765	65	185	290	580	155	55	2,4	34	55
52 751-790	100	235	350	680	225	120	6,4	72	88
52 751-791	125	270	400	690	235	145	8,0	96	105
52 751-792	150	300	480	775	274	230	24	320	235
52 751-793	200	360	600	822	310	360	32	368	297

→ = Flow direction

Kvd = Is the Kv value of the differential pressure control component when fully open, used to calculate the minimum pressure drop necessary for the valve to operate according to the formula found under "Sizing".

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