A1009-....- Dynamic Balancing Electric Control Valve Series



Dynamic Balancing Electric Control Valve
A1009 Series
Threaded/Flanged Connection
PN16

Performance & Features:

- Nominal diameter: DN15...DN200;
- Integrating three functions: dynamic differential pressure control, static flow presetting, and electric regulation, which greatly saves installation space.
- Setting of optimal flow rate according to the actual flow demand of terminal equipment, enabling more precise control and easier adjustment.
- No change to inherent stroke of the electric control valve core upon manual flow rate presetting, w thus not affecting the control accuracy.
- Flow control only related to the adjustment of the electric actuator, and not affected by fluctuations in system differential pressure.
- Combination with linear stroke electric actuators to realize control with various signals, such as 3-point floating, 0-10 V DC, 4-20 mA, etc.
- No need to re-commission the hydraulic balance of the pipe network regardless of increasing, decreasing or changing the system flow rate in case of use in the renovation of old systems.
- Enabling optimal selection of water pumps, allowing the system to operate at minimum flow and minimum differential pressure for the smoothest operation and optimal energy-saving effect.

Applications:

As an innovative control valve designed for heating and cooling systems, this valve integrates constant dynamic differential pressure, and electric control. Featuring characteristics of a pressure independent & control valve (PICV), it is widely used in heating and cooling systems, such as air handling units, computer room air conditioners, heat exchange units, and other equipment.

Flow control is only related to the regulating opening of the electric actuator, and comprehensive hydraulic balance can be achieved without additional dynamic balance valves for flow regulation. The flow control is not affected by fluctuations in system differential pressure, nor does it interfere with other terminal equipment. This enables comfortable control while achieving energy savings.

A 100% authority valve, together with an actual flow characteristic curve consistent with the ideal curve, allows rapid and precise control, and reduces actuator operating frequency, resulting in higher control accuracy, a more stable system and longer service life. It also enables optimal selection of water pumps, allowing the system to operate at minimum flow and minimum differential pressure, thus achieving the smoothest operation and optimal energy-saving effect.

Note: At a control flow rate below the specified minimum, the valve will lose its dynamic balancing function and only exhibit the flow characteristics of an ordinary electric control valve. Therefore, it is recommended that the valve be operated within its rated flow range (i.e., the flow rate is to be selected according to the equipment load).

Model Designation:

For example: A1009F-M65-16Q/ Actuator model

1. A1009 Dynamic Balance Electric Control Valve;
2. "F": Flanged connection; "T": Threaded connection;
3. "-": separator;
4. "M": Modulation type;
5. "-65": Nominal Diameter DN65;
6. "16": Nominal Pressure, PN25/PN16;
7. "Q": Ductile Iron , "T": Brass, "P": Stainless Steel;

Technical Specification:

PN (Nominal Pressure)	PN16, PN25 for option
Connection Standard	DN15-50: Threaded connection EN10226 (ISO228)
	DN65-200: Flanged connection EN1092-1/2 (GB/T12221-2005)
Working Temperature	DN15-50: -15℃~130℃
	DN65-200: -15℃~130℃
Body	DN15-32: Forged Brass HPb59-1,
	DN40-50: Stainless Steel SUS304
	DN65-200: Ductile Iron GGG450-10
Stem, Spring	DN15-50: Stainless Steel SS410
	DN65-200: Stainless Steel SS410
Balancing Valve Core	DN15-50: Stainless Steel SS410
	DN65-200: Stainless Steel SS304
	Valve closes as the valve core moves downward.
	Valve opens as the valve core moves upward.
Leakage rate	≤0.05% Kvs
Seal	PTFE/EPDM

Parameter Table:

Model/PN16	Pipe Diameter (in.)	Min Flow Rate (m^3/h)	Max Flow Rate (m^3/h)	Stroke (mm)	Differential Pressure Range (KPa)	Temp. (℃)
A1009T-M20-16T	3/4"	0.2	1.1	2.5	30-400	1℃~110℃
A1009T-M25-16T	1"	0.4	2.0	5	30-400	
A1009T-M-32-16T	1-1/4"	0.7	3.5	6	30-400	
A1009T-M-40-16P	1-1/2"	1.6	8.0	10	30-400	
A1009T-M-50-16P	2"	2.0	10.0	15	30-400	
A1009F-M65-16Q	2-1/2"	4.0	20.0	20	30-400	
A1009F-M80-16Q	3"	6.4	32.0	20	30-400	
A1009F-M100-16Q	4"	8.4	42.0	25	30-400	
A1009F-M125-16Q	5"	22.5	75.0	30	30-400	
A1009F-M150-16Q	6"	31.5	105.0	40	30-400	
A1009F-M200-16Q	8"	45.0	150.0	40	30-400	

Matching Actuator Parameters:

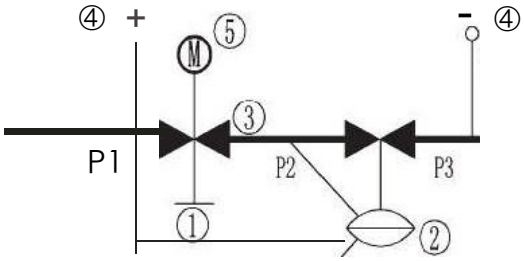
Model	Nominal Diameter	Maximum Allowable Differential Pressure of Body ΔP (KPa)	Recommended Matching Actuator and Shut-off Differential Pressure ΔP (KPa)						
			VAJ1T02. (switch) 90N	VAJ1... 200N	VAJ3... 1000N	VAJ3... 1500N	VAJ4... 1800N	VAJ4... 3000N	VAJ6... 6500N
A1009T-M20-16T	DN20	400	400	400	-	-	-	-	-
A1009T-M25-16T	DN25	400	400	400	-	-	-	-	-
A1009T-M-32-16T	DN32	400	400	310	400	-	-	-	-
A1009T-M-40-16P	DN40	400	-	-	400	-	-	-	-
A1009T-M-50-16P	DN50	400	-	-	400	-	-	-	-
A1009F-M65-16Q	DN65	400	-	-	-	400	400	-	-
A1009F-M80-16Q	DN80	400	-	-	-	310	370	400	-
A1009F-M100-16Q	DN100	400	-	-	-	-	-	400	-
A1009F-M125-16Q	DN125	400	-	-	-	-	-	400	400
A1009F-M150-16Q	DN150	400	-	-	-	-	-	400	400
A1009F-M200-16Q	DN200	400	-	-	-	-	-	240	400

* Parameters in this document are for reference only due to product upgrades or updates. For accurate specifications, please contact ZIGTOO representatives.

Working Principle:

The dynamic balancing electric control valve mainly has the following 3 functions:

- Manual adjustment mechanism ① with a dial, used for presetting the maximum allowable flow rate.
- Differential pressure control unit ②, which maintains a constant differential pressure across the control valve core through the automatic balancing characteristic of the internal dynamic valve core.
- Control valve ③, used to regulate the flow of medium passing through the valve body.



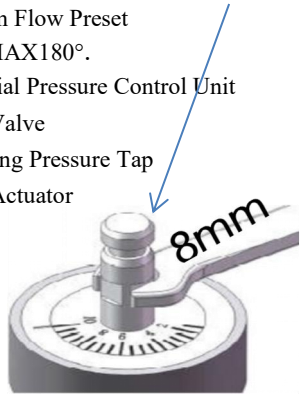
The control valve core and dynamic valve core are connected in series inside the valve. The differential pressure control unit ② keeps the differential pressure (P1–P2) across the control valve ③ constant, ensuring a fixed flow rate through the valve.

The required maximum flow rate is preset via the manual adjustment mechanism ① with a dial. The flow rate is controlled by adjusting the opening of control valve ③.

The flow rate increases with a larger valve opening; thus, the water flow delivered is fixed at any given opening position. The electric actuator mounted on the valve controls the flow rate in response to control signals from an external controller. In this configuration, the authority of the electric control valve equals 1, so the actual flow characteristic curve is consistent with the ideal flow characteristic curve of the control valve. For this reason, this kind of dynamic balancing electric control valve exhibits superior regulation performance compared with conventional electric control valves.

Main Components:

- ①Maximum Flow Preset Assembly,MAX180°.
- ②Differential Pressure Control Unit
- ③Control Valve
- ④Self-sealing Pressure Tap
- ⑤Electric Actuator



Manual adjustment mechanism with a dial, marked as ① in the diagram above, used to adjust the **Kvs value** of the valve.

Preset Scale Corresponding Flow Values (m³/h):

Model	Nominal Diameter	Flow Value Corresponding to the Number of Turns m³/h						
		1	1.5	2	4	6	8	10
A1009T-M15-16T	DN15	-	0.18	0.22	0.31	0.39	0.52	0.6
A1009T-M20-16T	DN20	-	0.3	0.34	0.50	0.66	0.83	1.0
A1009T-M25-16T	DN25	-	0.42	0.51	0.72	0.93	1.15	1.4
A1009T-M-32-16T	DN32	-	1.08	1.17	1.83	2.53	3.22	3.6
A1009T-M-40-16P	DN40	-	1.2	1.27	3.15	4.71	6.05	7.5
A1009T-M-50-16P	DN50	-	2.87	3.17	5.13	6.6	8.2	10
A1009F-M65-16Q	DN65	-	5.9	6.64	11.4	17.22	20.38	24
A1009F-M80-16Q	DN80	-	8.63	9.45	14.54	19.56	22.94	32
A1009F-M100-16Q	DN100	-	13	14.5	24	31.7	40.3	48
A1009F-M125-16Q	DN125	-	20.3	22.5	37.5	49.5	63	75
A1009F-M150-16Q	DN150	-	32.5	36	61	80	101	120
A1009F-M200-16Q	DN200	-						

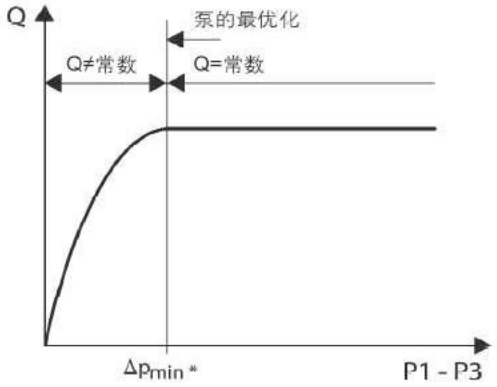
Note: Data is subject to update without prior notice. Please refer to the latest company documentation.

Dynamic Characteristics & Technical Features

Dynamic characteristics of the dynamic balancing electric control valve:

When the differential pressure between P1 and P3 exceeds the actuation value, the differential pressure section begins to operate to increase the flow to the maximum flow limit. By measuring the differential pressure between P1 and P3, it is able to verify whether the differential pressure is sufficient and check the flow rate. This measurement can also be used to optimize pump settings.

The pump head setting is gradually reduced until the differential pressure in the most unfavorable branch is no greater than ΔPmin. The optimal pump head is reached when the proportional relationship between the pump head and the measured differential pressure no longer exists.



Technical Features:

- Precise pressure-independent flow limiting function, ensuring no excessive flow under partial load conditions, and guaranteeing that the terminal temperature control accuracy meets the design requirements: dividing the entire system into independent control loops that do not interfere with each other.

  Stable temperature control across the full load range, with excellent control even at low loads: accurately limiting flow under all load conditions and preventing the increased energy consumption commonly encountered when static balancing valves are used in variable flow systems.
- Automatic correction of internal system interference by the built-in diaphragm-type differential pressure control unit, ensuring smaller indoor temperature fluctuations, reducing the operating frequency of the valve actuator and extending its service life.
- Integrating static balancing, differential pressure control and electric regulation functions, greatly reducing installation costs.
- Automatic flow limiting function available, with no need for professional commissioning, thus reducing costs.
- Easy to adjust: even if the design flow is modified after installation, the valve can still be put into normal operation by simply adjusting the flow rate..
- Normal commissioning and operation allowed even if the system is not completely installed or only partially in use, and no influence of completed system on the operation or balancing status of the original system.

Selection and Calculation Example:

Given:

Load: P=160KW,

Temperature Difference:ΔT=6℃,

The flow rate can be calculated using the following formula: $Q=P/\Delta T *0.86 =160/6 *0.86=22.9(m^3/h)$

Under ideal conditions, the valve is typically selected to operate at approximately 80% of its maximum flow rate to ensure optimal performance.

Therefore, based on the parameter table, the determined nominal diameter and model to be selected is: DN80 A1010-80-……

The maximum flow rate of this product is 32 m³/h. By adjusting the preset mechanism of the flow disc and referring to the flow vs. turns comparison table, set it to position 8, corresponding to a flow rate of 22.9 m³/h. The loop will operate at a design flow rate not exceeding 22.9 m³/h.

Installation Instructions

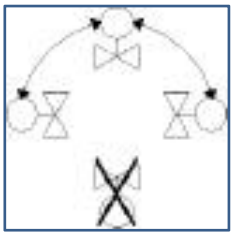
Installation on the return water pipe is recommended. In heating systems, the water flow in the return pipe is relatively stable, securing a higher control accuracy. In addition, the return water temperature is lower, which helps extend the service life of the valve stem sealing materials.

In open systems, there may be a risk of the valve core seizing due to scale deposits. In such cases, an actuator with a higher driving force should be selected. In addition, the valve should be operated regularly (two to three times per week). A filter must be installed at the valve inlet!

Before installing the valve, the pipeline shall be thoroughly cleaned to ensure it is free of debris, welding slag and other foreign matters. The pipeline shall be laid horizontally and vertically without excessive vibration. When installing the valve, the actuator shall be positioned upward, slightly upward or horizontal. It must not be installed facing downward or inclined downward (as shown in the diagram below).

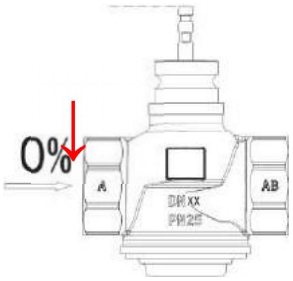
Sufficient space shall be reserved for on-site installation, future inspection and maintenance of the valve and actuator. The actuator body and bracket shall not be covered with insulation cotton or other thermal insulation materials, so as not to affect normal heat dissipation.

The valve shall not be installed in locations prone to collision, impact or vibration. The ambient temperature shall be maintained within 2 – 50 °C. In addition, it shall not be installed in environments exposed to steam, water spray or dripping water.

Installation Direction		The valve shall not be installed downward, to prevent condensate water from flowing into the actuator.
Medium Flow Direction	During installation, follow the medium flow arrow → marked on the valve body	
Notes for Pipeline Pressure Test	Commissioning of the valve may only be carried out after the actuator and valve have been correctly installed. During pressure test of the installation pipeline, the valve must be fully opened (stem pulled upward). Excessive differential pressure or high pressure may exceed the maximum bearing capacity of the internal diaphragm, resulting in damage to internal valve components. The maximum differential pressure across the valve shall not exceed the maximum allowable differential pressure ΔPmax (refer to the previous table for details). After matching with the actuator, the maximum differential pressure across the valve shall not exceed the close-off differential pressure ΔPs. The value of ΔPs shall be referred to the actuator matching table.	

The valve stem retracts downward. ↓: Valve closes Flow rate decreases

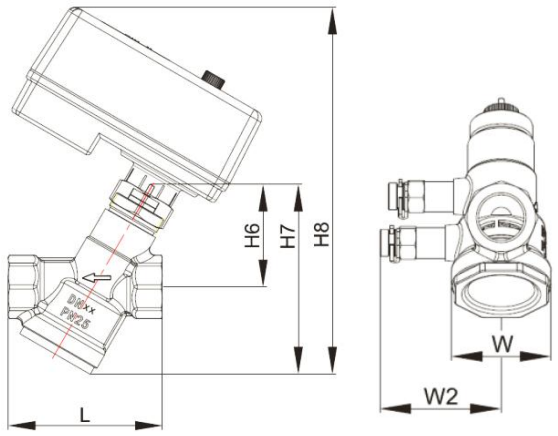
Valve stem extends upward ↑: Valve open Flow rate increases



Dimension Chart

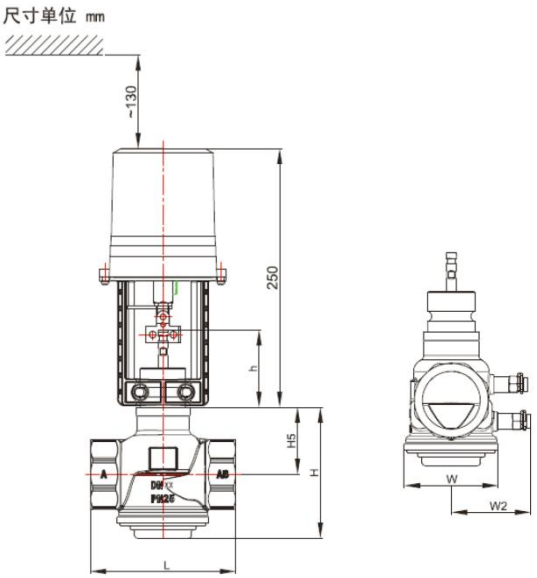
DN15-DN32 Threaded Connection

DN	PN25						重量 (Kg)
	L	W	W2	H6	H7	H8	
15	75	45	57	52	101	199	0.65
20	85	48	59	57	105	203	0.72
25	90	48	59	62	114	212	0.98
32	115	59	65	75	138	236	1.35

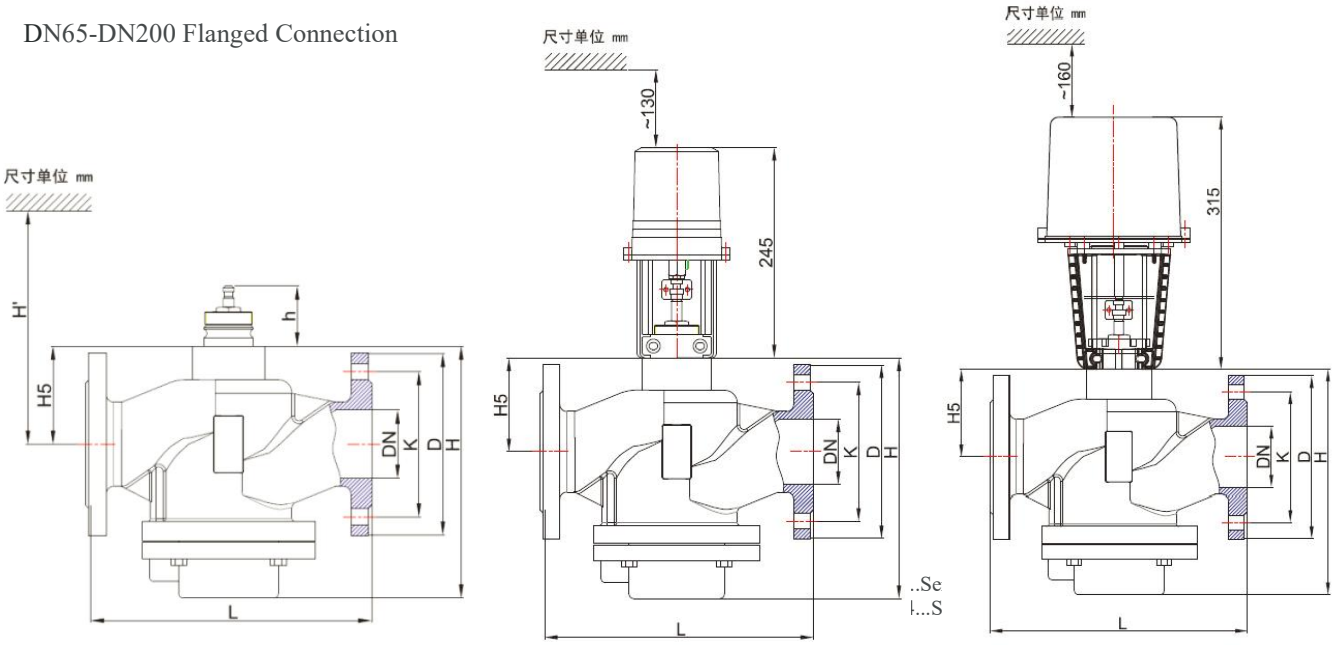


DN40-DN50 Threaded Connection

DN	PN25						重量 (Kg)
	L	W	W2	H5	H	h	
40	140	89	121	60	121	75	2.7
50	140	89	121	65	126	75	3.0



DN65-DN200 Flanged Connection



DN	L	PN16			PN25			H	H5	h	H'				重量 (Kg)
		D	K	孔数及螺栓规格	D	K	孔数及螺栓规格				VAJ3A..1000N	VAJ3D..1500N	VAJ4..1800N	VAJ4..3000N	
65	290	185	145	4-M16	185	145	8-M16	248	90	66	-	578	708	-	25
80	310	200	160	8-M16	200	160	8-M16	252	101	66	-	582	712	-	32
100	350	220	180	8-M16	235	190	8-M20	296	111	66	-	-	-	756	43
125	400	250	210	8-M16	270	220	8-M24	339	127	66	-	-	-	799	65
150	480	285	240	8-M20	300	250	8-M24	370	141	66	-	-	-	830	83
200	495	340	295	12- M20	360	310	12- M24	448	145	66	-	-	-	840	115

Wiring Diagram